

User's Manual



R-Studio for Linux



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I Introduction to R-Studio for Linux

R-Studio is a family of powerful and cost-effective undelete and data recovery software. Empowered by new unique data recovery technologies, it is the most comprehensive data recovery solution for recovering files from [Ext2/3/4FS](#) and [XFS](#) (Linux), [FAT12/16/32](#), [exFAT](#), NTFS, NTFS5 (created or updated by Windows 2000/XP/2003/? Vista/2008/7/8/8.1/?), HFS/HFS+ and APFS (Macintosh), Little and Big Endian variants of [UFS1/UFS2](#) (FreeBSD/? OpenBSD/NetBSD/Solaris) [partitions](#). It functions on local and network disks, even if such partitions are [formatted](#), damaged or deleted. Flexible parameter settings give you absolute control over the data recovery.?

[R-Studio for Linux Features](#)

[System Requirements](#)

[Contact Information and Technical Support](#)

[Data Recovery Using R-Studio for Linux](#)

[Basic File Recovery](#)

[Advanced Data Recovery](#)

[Mass File Recovery](#)

[Volume Sets and RAIDs](#)

[Data Recovery over Network](#)

[R-Studio Technician/T80+](#)

[Text/Hexadecimal editor](#)

[Technical Information and Troubleshooting](#)

[Working with the Third-Party Hardware](#)

[R-Studio Emergency](#)

[R-Studio Agent Emergency](#)

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1.1 R-Studio for Linux Features

R-Studio is a family of file restoring utilities. It recovers files both on local disks and on disks on remote computers over network, even if their [partition](#) structures are damaged. A unique **IntelligentScan** technology and flexible parameter settings give you real control over the fastest data recovery ever seen.

R-Studio for Linux features:

- Host OS: Linux, kernel 2.6 and above.
- Automatic check for updates.
- Remotely recovers data over network. Data can be recovered on network computers running Windows, Mac, and Linux and some other UNIX OS.

- Supported [file systems](#):

Windows: FAT12/16/32, [exFAT](#), NTFS, NTFS5, ReFS/ReFS2+ file (Resilient File System); ReFS for Windows Server 2019 (including deduplication).

macOS: HFS, HFS+, HFSX, APFS, [FAT](#)/exFAT;

Linux and UNIX: [Ext2/3/4FS](#) and [XFS](#) (created by Linux or other OS), and [UFS1](#), [UFS2](#), [UFS BigEndian](#) (used by the FreeBSD, OpenBSD, and NetBSD operating systems);

CD/DVD/Images: ISO9660;

Magnetic tape devices: UStar/Tar/CPIO/Pax (**R-Studio Technician/T80+**).

Please note, that when a file is being deleted on the HFS, HFS+, HFSX file systems, the computer completely removes all system information on it, and there is no way to recover the deleted file except by using the [Extra Search for Known File Types](#) option. Nevertheless, **R-Studio for Linux** is able to read existing files from HFS, HFS+, and HFSX disks.

- Support for [known file types](#). **R-Studio for Linux** searches for files with known typical features of their structures allowing the user to search for files on devices with unknown files systems, including an HD, CD, DVD, floppy disk, Compact Flash Card, USB drive, ZIP drive, Memory Sticks, and other removable media.
- [Scan process](#) visualization. While scanning an object, **R-Studio for Linux** graphically shows items that have been found, including files of known types, FAT and NTFS MFT records, boot records, etc.
- Mass file recovery support.
- Support for estimation of chances for successful recovery.
- Support for file recovery lists - lists of files that can be exported from **R-Studio for Linux**, manually edited, and then loaded back. Files from such lists will be automatically marked for recovery.
- APM, Basic and GPT support. **R-Studio for Linux** supports all three partition schemes used to define the low-level organization of data on disks [formatted](#) for use with Macintosh computers.
- Support for [Linux mdadm Volumes](#)
- Support for [Linux LVM/LVM2](#)
- [Dynamic disk](#) support.
- Software RAID, volume set, and stripe set support. Support for RAID 6, RAID 5, and RAID 4 layouts. Support for custom RAID layouts. Parameters like block size and order, offsets, and even the number of stripe blocks can be explicitly specified. Custom RAID configurations can be saved.
- Support for [Windows Storage Spaces](#), created by Windows 8/8.1 and Windows 10/Threshold 2/Anniversary/Fall Creators updates.
- Support for [Apple software RAIDs](#)
- Support for [Apple CoreStorage/FileVault/Fusion Drive Volumes](#)
- Support for Intel Software RAID.
- Hardware RAID, volume set, and stripe set support.
- RAID consistency check (check for valid data parity values).
- Automatic RAID parameter recognition.
- Creates [image](#) files for an entire drive, [logical](#) disk, or its part. Such image files can be processed like regular drives. In addition to simple exact object copies (Plain images) and **R-Drive Image** compatible images. It can create other disk image and virtual disk formats, together with opening several file formats "read-only". You may read more about those formats and their properties on the [Supported Virtual Disk and Disk Image Formats](#) page. Images may be saved either on the local or remote computer. Image creation can be stopped and then resumed. **R-Studio for Linux** can scan objects while creating their images. **R-Studio Technician/T80+** supports [multi-pass](#) and [runtime](#) imaging. Images can be mounted in the operating system as devices which makes their content accessible to any program including any other data recovery software.
- Creates image files for an entire hard drive, logical disk, or its part. Such image files can be processed like regular disks. Images can be either simple exact object copies (Plain images) compatible with the previous versions of **R-Studio for Linux**, or compressed images that can be compressed, split into several parts, and password-protected. Such images are fully compatible with the images created by **R-Drive Image**, but

incompatible with the previous versions of **R-Studio for Linux**. Images may be saved either on the local or remote computer. **R-Studio for Linux** can scan objects while creating their images.

- Recovers files on damaged or deleted partitions.
- Recovers compressed files (NTFS, NTFS5).
- Recovers encrypted files (NTFS5).
- Recovers [alternative data streams](#) (NTFS, NTFS5).
- Support for NTFS deduplication, including Windows Server 2022.
- Support for [symbolic links](#). Symbolic link recovery options in the Technician version.
- Support for file system journal on the HFS+ and Ext3/4fs file systems.
- Support for soft updates journal on the UFS file system.
- Support for extended attributes on the HFS+, Ext3/4fs, and UFS file systems.
- Support for compressed files on the HFS+ file system.
- Recognizes localized names.
- Recovered files can be saved on any (including network) disks visible to the host operating system.
- A hexadecimal disk and file viewer/editor supporting NTFS file non-resident attribute editing. Data alteration is available on the **Technician/T80+** version only.
- Patterns (or templates) in the hexadecimal editor allowing for parsing the data according to specific data structure. Such patterns may be custom-created.
- File preview. Most of the file types can be previewed to estimate recovery chances.
- Enhanced remote host scanning procedure. In the new **R-Studio for Linux** network versions, data are analyzed on the remote host rather than on the home host, thereby the speed of recovery procedure greatly increases.
- Recovered files may be saved on a disk on a connected remote computer rather than be transferred over network to the local one. Saving recovered files on a remote computer may be useful when the remote computer has a healthy disk because you do not have to transfer files over network. It may be an external USB hard drive, for example.
- Support for [S.M.A.R.T.](#) (Self-Monitoring, Analysis and Reporting Technology) attribute monitoring.
- **R-Studio Emergency***. The **R-Studio for Linux Emergency** version starts from a floppy or compact disk when it is necessary to recover data on a computer, on which OS cannot start up because its system files are corrupted or deleted.

*The **R-Studio Emergency** is a part of the **R-Studio for Linux** software package. When you buy an **R-Studio for Linux** single license you may run the **R-Studio Emergency** or/and install the **R-Studio for Linux** Windows version on one PC only and you may not transfer the licensed software to another PC.

R-Studio features available in the Technician/T80+ versions:

- Magnetic tape devices file system: **UStar/Tar/CPIO/Pax**.
- [Extended file information](#)
- [Symbolic link recovery options](#)
- [Drive Copy Wizard](#) to copy any object in the Drives panel to any other object. In addition to byte to byte copy of any object visible in the Drives panel, smart copy of partitions and drives is available.
- [I/O Monitor and Sector Map files](#).
- [Multi-pass](#) and [Runtime](#) imaging

- [Reverse RAIDs](#): A technique that decomposes real drive objects into virtual RAIDs. Then those components of reverse RAID scan be processed like real objects. They can be viewed, edited, imaged, copied to physical
- Support for [third-party hardware](#).
- [Forensic mode](#).
- [File recovery over Internet](#).

R-Studio for Linux recovers files:

- That have been removed without the **Recycle Bin**, or when the **Recycle Bin** has been emptied;
- Removed by virus attack or power failure;
- After the partition with the files was reformatted, even for a different file system;
- When the partition structure on a hard drive was changed or damaged. In this case, **R-Studio for Linux** can scan the drive trying to find previously existed partitions and recover files from found partitions.
- From disks with [bad sectors](#). In this case, **R-Studio for Linux** can first copy the entire disk or its part into an image file and then process such image file.

R-Studio for Linux can create image files for an entire hard drive, logical disk, or its part. Such image files can be processed like regular disks. Images are very useful if there is a risk of total data loss due to hardware malfunction. If bad blocks are constantly appearing on a hard drive, the only way to save the data is to immediately create an image of that drive. All data search, scan and recovery can be done from this image.

To learn more about the *IntelligentScan* technology, go to the [IntelligentScan](#) topic .

1.2 System Requirements

- An Intel-compatible x86 or 64-bit platform with 256 MB RAM, a mouse, and enough disk space for recovered files, image files, etc.
- Linux: Fedora 12+, Ubuntu/Kubuntu 10.4+ , Debian 4.0+ or any kernel 2.6+ Linux distribution capable of installing .rpm or .deb packages.
- Any Window manager.
- X.Org X server 1.7.6+ installed.
- Root privileges to install and run the program.
- A network connection for data recovering over network.

1.3 Contact Information and Technical Support

To obtain the latest version of **R-Studio for Linux**, go to:

Product Site: <http://www.r-tt.com>

Sales Department: sales@r-tt.com

Many specific data recovery cases are discussed in the R-TT's [Data Recovery Guide](#).

R-Studio for Linux Technical Support Team is available 24 hours a day, seven days a week, and has an average response time less than 4 hours.

Tech. Support: support@r-tt.com

Send your support request to: <http://www.r-tt.com/SupportRequest.shtml>

File Recovery FAQ: http://www.r-tt.com/File_Recovery_FAQ.shtml

R-tt Forum: <http://forum.r-tt.com>

1.4 R-Studio for Linux Main Panel

When R-Studio for Linux starts, its main panel appears on the desktop.

R-Studio for Linux Main panel

The screenshot displays the R-Studio for Linux main panel. The top menu bar includes Drive, Create, Tools, View, and Help. The toolbar contains icons for Refresh, Show Files, Scan, Partition Search, Create Image, Open Image, Create Region, Start Runtime Image, RAIDs, Connect To Remote, Remove, and Stop. The main area is divided into two panes: the left pane shows a tree view of the local computer's drives and partitions, and the right pane shows the properties of the selected drive.

Device/Disk	Label	/Interfa	Start	Size	Name	Value
Local Computer					Drive Type	Physical Drive, Disk
JMicon Tech 3202		SCSI (8:0)		232.89 GB	Name	WDC WD3200BEVT-08A23T1 02.01A02
Partition1	System Reserv...	NTFS	1 MB	50 MB	OS Object	/dev/sdd
/media/andrew/C872...		NTFS	51 MB	97.11 GB	R-Studio Driver	ahci
Partition3		NTFS	97.16 GB	508 MB	Size	298.09 GB (625142448 Sectors)
Empty Space15			97.66 GB	135.23 GB	Logical Sector Size	512 Bytes
KINGSTON SA400S37120...	50026B77843...	SATA2, SSD		111.79 GB	Physical Sector Size	512 Bytes
/	Ext4fs	Ext4	1 MB	111.79 GB	I/O Retries	Default
SAMSUNG HD642Jj 1AA01...	S1AFJ1MQ400...	SATA2, HDD		596.17 GB	Drive Control	
/home	Ext4	Ext4	1 MB	596.17 GB	Maximum Transfer	128 KB
WDC WD3200BEVT-08A23...	WD-WXC1A80...	SATA2, HDD		298.09 GB	I/O Block Size	512 Bytes
Volume1	ext4fs	Ext4	992.50 KB	37.25 GB	Buffer Alignment	4 KB
Volume2	xfs	XFS	37.25 GB	37.25 GB	Physical Drive Geometry	
Volume3	exFAT	exFAT	74.51 GB	37.25 GB	Cylinders	38913
Volume4	NTFS	NTFS	111.76 GB	44.70 GB	Tracks Per Cylinder	255
Volume5	FAT32	FAT32	156.46 GB	11.72 GB	Sectors Per Track	63
Volume6	NTFS	NTFS	168.18 GB	129.91 GB	Sector Size	512 Bytes
Flash Disk	2CCA54405A8...	USB		1000 MB	Partition Layout Sector Size	512 Bytes
/media/andrew/NTFS ...	NTFS Test	NTFS	0 Bytes	1000 MB	Device Identification	

The Properties tab shows the following information:

- Maximum Transfer: 128 KB
- I/O Block Size: 512 Bytes
- Buffer Alignment: 4 KB
- Cylinders: 38913
- Tracks Per Cylinder: 255
- Sectors Per Track: 63
- Sector Size: 512 Bytes
- Partition Layout Sector Size: 512 Bytes

The Log panel shows the following entries:

Type	Date	Time	Text
System	11/10/23	2:36 PM	File enumeration was completed in 5s.
System	11/10/23	2:36 PM	All file regions are collected.

Drives panel:

You can select an object by clicking on it.

Device/Disk	Label	FS/Interface	Start	Size
Local Computer				
JMicon Tech 3202		SCSI (9:0)		232.89 GB
Partition1	System Reserved	NTFS	1 MB	50 MB
/media/andrew/C872A01272A006F2		NTFS	51 MB	97.11 GB
Partition3		NTFS	97.16 GB	508 MB
Empty Space22			97.66 GB	135.23 GB
KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2, SSD		111.79 GB
/	Ext4fs	Ext4	1 MB	111.79 GB
SAMSUNG HD642Jj 1AA01110	S1AFJ1MQ400283	SATA2, HDD		596.17 GB
/home	Ext4	Ext4	1 MB	596.17 GB
WDC WD3200BEVT-08A23T1 02.01A02	WD-WXC1A8019298	SATA2, HDD		298.09 GB
Volume1	ext4fs	Ext4	992.50 KB	37.25 GB
Volume2	xfs	XFS	37.25 GB	37.25 GB
Volume3	exFAT	exFAT	74.51 GB	37.25 GB
Volume4	NTFS	NTFS	111.76 GB	44.70 GB
Volume5	FAT32	FAT32	156.46 GB	11.72 GB
Volume6	NTFS	NTFS	168.18 GB	129.91 GB
Flash Disk	2CCA54405A8D3A89	USB		1000 MB
/media/andrew/NTFS Test	NTFS Test	NTFS	0 Bytes	1000 MB

Properties tab:

This tab shows the properties of an object selected on the Drives panel.

Depending on the selected object, information on this Properties tab may vary.

Name	Value
Drive Type	Physical Drive.Disk
Name	WDC WD3200BEVT-08A23T1 02.01A02
OS Object	/dev/sdc
R-Studio Driver	ahci
Size	298.09 GB (625142448 Sectors)
Logical Sector Size	512 Bytes
Physical Sector Size	512 Bytes
I/O Retries	Default
Drive Control	
Maximum Transfer	128 KB
I/O Block Size	512 Bytes
Buffer Alignment	4 KB
Physical Drive Geometry	
Cylinders	38913
Tracks Per Cylinder	255
Sectors Per Track	63
Sector Size	512 Bytes
Partition Layout Sector Size	512 Bytes
Device Identification	
Vendor	WDC
Product	WD3200BEVT-08A23T1
Firmware	02.01A02
Serial Number	WD-WXC1A8019298
IDE Properties	
Size	298GB (625142448 LBA)
Sector Size	512
Interface	SATA 2.6, 3.0 Gb/s
Interface Speed	3.0 Gb/s
Standard	ATA8-ACS
Features	S.M.A.R.T., APM, AAM, LBA48, NCQ
Bus Type	SerialATA-II
LDM DiskGroup GUID	78fedd5d-1da9-11ed-83ea-448a5bb8b822
LDM Host GUID	1b77da20-c717-11d0-a5be-00a0c91db73c
LDM Disk GUID	78fedd5e-1da9-11ed-83ea-448a5bb8b822

The Properties tab names and values are described in detail on the [Properties tab](#) topic.

Log panel

Type	Date	Time	Text
System	11/10/23	2:36 PM	File enumeration was completed in 5s.
System	11/10/23	2:36 PM	All file regions are collected.

S.M.A.R.T. Info for a Hard Drive

R-Studio for Linux shows hard drive [S.M.A.R.T.](#) states using their icons. You may copy all S.M.A.R.T. attributes and paste them into a text editor.

Hard drive S.M.A.R.T. states and icons

Normal: This state indicates that the hard drive is in good conditions.

Health Status:	GOOD	Temperature:	33 °C		
Power on Hours:	6762 hour	Power on Count:	4718 count		
Rotation Rate:	5400 RPM				
Standard:	ATA8-ACS ----				
Features:	S.M.A.R.T., APM, AAM, 48bit LBA, NCQ				
-S.M.A.R.T.					
ID	Attribute Name	Current	Worst	Threshold	Raw Values
01	Read Error Rate	200	200	51	000000000001
03	Spin-Up Time	154	133	21	000000000503
04	Start/Stop Count	81	81	0	000000004DF0
05	Reallocated Sectors Count	200	200	140	000000000000
07	Seek Error Rate	100	253	51	000000000000
09	Power-On Hours	91	91	0	000000001A6A
0A	Spin Retry Count	100	100	0	000000000000
0B	Recalibration Retries	100	100	0	000000000000
0C	Power Cycle Count	96	96	0	00000000126E
0C	Power-off Retract Count	200	200	0	000000000122
C1	Load/Unload Cycle Count	1	1	0	0000000A902B
C2	Temperature	110	68	0	000000000021
C4	Reallocation Event Count	200	200	0	000000000000
C5	Current Pending Sector Count	200	200	0	000000000000
C6	Uncorrectable Sector Count	100	253	0	000000000000
C7	UltraDMA CRC Error Count	200	200	0	000000000000
C8	Write Error Rate	200	200	0	000000000000
F0	Head Flying Hours	92	92	0	0000000018FE

Refresh Copy All

Warning: This state indicates that some small problems with the disk are possible in the future, you may work with it but with cautions and regular check of these parameters. [Disk imaging](#) is strongly recommended.



Health Status: **CAUTION** Temperature: 29 °C
 Power on Hours: 2135 hour Power on Count: 2384 count
 Rotation Rate: UNKNOWN
 Standard: ATA/ATAPI-7 | ATAB-ACS version 3b
 Features: S.M.A.R.T., APM, AAM, 48bit LBA, NCO

S.M.A.R.T.

ID	Attribute Name	Current	Worst	Threshold	Raw Values
01	Read Error Rate	100	100	51	000000000000
03	Spin-Up Time	86	86	11	000000013D8
04	Start/Stop Count	98	98	0	0000000098A
05	Reallocated Sectors Count	99	99	10	00000000011
07	Seek Error Rate	100	100	51	000000000000
08	Seek Time Performance	100	100	15	000000000000
09	Power-On Hours	100	100	0	000000000857
0A	Spin Retry Count	100	100	51	000000000000
0B	Recalibration Retries	100	100	0	000000000000
0C	Power Cycle Count	98	98	0	000000000950
0D	Soft Read Error Rate stab	100	100	0	000000000000
B7	Unknown	100	100	0	000000000000
B8	End-to-End Error	100	100	99	000000000000
BB	Reported Uncorrectable Errors	100	100	0	000000000000
BC	Command Timeout	100	100	0	000000000000
BE	Airflow Temperature	73	59	0	00001B1B001B
C2	Temperature	71	57	0	00001E1B001D
C3	Hardware ECC recovered	100	100	0	000000000577
C4	Reallocation Event Count	100	100	0	000000000000
C5	Current Pending Sector Count	100	100	0	000000000000
C6	Uncorrectable Sector Count	100	100	0	000000000000
C7	UltraDMA CRC Error Count	100	100	0	000000000000
C8	Write Error Rate	100	99	0	00000000000F
C9	Soft Read Error Rate	253	253	0	000000000000

Refresh Copy All

Critical: This state indicates that the hard drive conditions are critical and chances of hardware failure are great. The best recommendation for this case is to stop working with the disk and bring it to professional data recovery specialists. You may though continue to work with the disk at your own risk, but [disk imaging](#) is very strongly recommended.



Health Status: **BAD** Temperature: 32 °C
 Power on Hours: 2 hour Power on Count: 107 count
 Rotation Rate: 5400 RPM
 Standard: ATAB-ACS | ATAB-ACS version 4
 Features: S.M.A.R.T., APM, 48bit LBA, NCO

S.M.A.R.T.

ID	Attribute Name	Current	Worst	Threshold	Raw Values
01	Read Error Rate	83	68	6	00000997EB10
03	Spin-Up Time	99	99	0	000000000000
04	Start/Stop Count	100	100	20	0000000002D3
05	Reallocated Sectors Count	35	35	36	000000000547
07	Seek Error Rate	75	60	30	0000020EE607
09	Power-On Hours	100	97	0	000000000002
0A	Spin Retry Count	100	100	97	000000000000
0C	Power Cycle Count	100	37	20	00000000006B
B8	End-to-End Error	100	100	99	000000000000
BB	Reported Uncorrectable Errors	1	1	0	000000003F10
BC	Command Timeout	1	1	0	0006000060BF
BD	High Fly Writes	100	100	0	000000000000
BE	Airflow Temperature	68	59	45	0000201E0020
BF	G-Sense Error Rate	100	100	0	00000000001D
C0	Power-off Retract Count	100	100	0	000000000097
C1	Load/Unload Cycle Count	66	66	0	000000010A94
C2	Temperature	32	41	0	000700000020
C3	Hardware ECC recovered	39	27	0	00000997EB10
C5	Current Pending Sector Count	100	100	0	000000000233
C6	Uncorrectable Sector Count	100	100	0	000000000233
C7	UltraDMA CRC Error Count	200	200	0	000000000000
FE	Free Fall Protection	100	100	0	000000000000

Refresh Copy All

When a hard drive is selected on the **R-Studio for Linux** main panel, an additional S.M.A.R.T. tab will appear. You may view the detailed **S.M.A.R.T.** data of the drive.

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a technology widely-used in hard drives and solid-state devices that monitors their reliability conditions to predict possible hardware failures.

Changing the program language

You may select the language of **R-Studio for Linux** main panel. To do so, select an available language on **Change Language** on the **Help** menu.

Panel view options

You may set which panels and bars to enable/disable.

To enable/disable:

Toolbar	Select/clear Toolbar on the View menu
Status bar	Select/clear Status bar on the View menu
Drive pane	Select/clear Device View on the View menu
Properties pane	Select/clear Properties View on the View menu
Log panel	Select/clear Event Log on the View menu
If you have several tabs in the right pane, you may easily switch to any of the tab by selecting on the View menu	
Properties Tab	to view the Properties tab
Scan Information Tab	to view the Scan Information Tab tab
Parents Tab	to view the Parents tab
Properties	Select data types in which the data will be represented



Connect

Click this button to connect to a remote computer on a network.



Refresh

Click this button to refresh the panels.



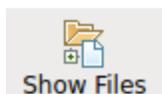
Scan

Click this button to start scanning a selected object.



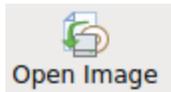
Partition Search

Click this button to start [fast searching for lost and deleted partitions](#).



Show Files

Click this button to start searching for files on a selected object.

**Open Image**

Click this button to open a previously created image.

**Create Image**

Click this button to create an image of a selected area.

**Create Region**

Click this button to create a region on a selected disk.

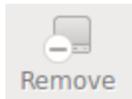
**Create Virtual RAID**

Click this button to create a virtual volume set or RAID.
Select an appropriate type from the menu.



Click this button to start [runtime imaging](#) of the selected object.

(**Technician/T80+** versions only)

**Remove**

Click this button to remove a selected object on the main panel.

The button may change its appearance and title depending on the context.

**Stop**

Click this button to stop the current operation.

Sometimes, there may be a lot of similar objects on the Drives panel. Those may be components of a RAID, for example. You may turn numerical indexes for such objects to distinguish them better. Those indexes will appear before the object names on the Drives panel.

To turn the numerical indexes on/off, go to the **Device** item on the **View** menu, and select/clear:

Show Physical Drives Indexes to display the indexes only for hard drives

Show All Objects Indexes to display the indexes for all objects on the Drives panel

Device/Disk	Label	FS/Interface	Start	Size
[0] Local Computer				
[17] Micron Tech 3202		SCSI (9-0)		232.89 GB
[19] Partition1	System Reserved	NTFS	1 MB	50 MB
[20] media/andrew/C872A01272A00...		NTFS	51 MB	97.11 GB
[21] Partition3		NTFS	97.16 GB	508 MB
[22] Empty Space22			97.66 GB	135.23 GB
[1] KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2, SSD		111.79 GB
[8] /	Ext4fs	Ext4	1 MB	111.79 GB
[2] SAMSUNG HD642J 1AA01110	S1AF1MQ400283	SATA2, HDD		596.17 GB
[9] /home	Ext4	Ext4	1 MB	596.17 GB
[4] WDC WD3200BEVT-0RA23T1.02-01A02	WD-WXCLA8019298	SATA2, HDD		298.09 GB
[11] Volume1	ext4fs	Ext4	992.50 KB	37.25 GB
[12] Volume2	xfs	XFS	37.25 GB	37.25 GB
[13] Volume3	exFAT	exFAT	74.51 GB	37.25 GB
[15] Volume4	NTFS	NTFS	111.76 GB	44.70 GB
[16] Volume5	FAT32	FAT32	156.46 GB	11.72 GB
[14] Volume6	NTFS	NTFS	168.18 GB	129.91 GB
[3] Flash Disk	2CCA54405A8D3A89	USB		1000 MB
[10] media/andrew/NTFS Test	NTFS Test	NTFS	0 Bytes	1000 MB

You may select the units in which object's start and size are displayed.

To select the units

- 1 Select Devices on the View menu
- 2 Select the units in which you want to see object sizes.

You may select

Show as Bytes

Show as Sectors

Show as Bytes and Sectors

Depending on the task **R-Studio for Linux** performs, its panel may vary. Those panels are described in appropriate topics. The Properties tab names and values are described in detail on the [Properties tab](#) topic.

The general settings can be set on the [Settings](#) dialog box.

You may also copy the object's information displayed on the Drives panel. Right-click the object on the necessary column and select **Copy Device/Disk**, **Copy Label**, and so on.

R-Studio for Linux has two operation modes:

File search on a [partition](#) (including recently found during [disk scan](#)).

In this mode, **R-Studio for Linux** analyzes MFTs on NTFS partitions, FATs on [FAT](#) partitions, and SuperBlocks on Ext2/3/4FS partitions. Then it displays all files which records have been found in the analyzed tables. Then recently deleted files, which records still remain, can be recovered. If files have not been found, that means that their records have been deleted. In this case, the disk must be scanned.

File search supports [file masks](#) and [regular expressions](#). Multiple files in different folders can be found and recovered in one recover session.

R-Studio for Linux supports [mass file recovery](#). There is no limit in the number of files that may be recovered during one session.

File content may be [previewed](#) before recovery.

File or disk binary data can be viewed and edited in the [text/hexadecimal editor](#). Also can be viewed and changed all attributes for NTFS files.

Disk scan, searching for partitions.

In this mode, **R-Studio for Linux** scans the entire disk or its part. Using a number of statistic and deterministic criteria known as *IntelligentScan* technology, it determines existing or existed partitions on the disk, and their [file systems](#). It is also possible to add new partitions, by setting manually all required parameters.

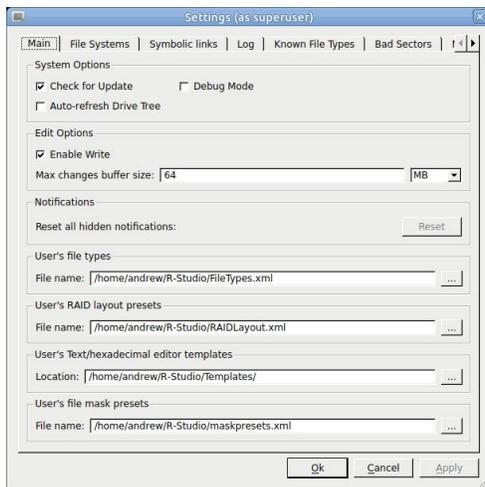
A disk can be scanned through several successive scans, each with its own parameters. **R-Studio for Linux** accumulates the information from successive scans and keeps track of changes in the information obtained from different scans. The information obtained from the disc scan can be stored in a file. It may be loaded and processed later at any convenient time.

1.5 R-Studio for Linux Settings

You may specify some global setting for **R-Studio for Linux** on the Settings dialog box. You may reach it by selecting **Settings** on the **Tools** menu.

Main

Main dialog box



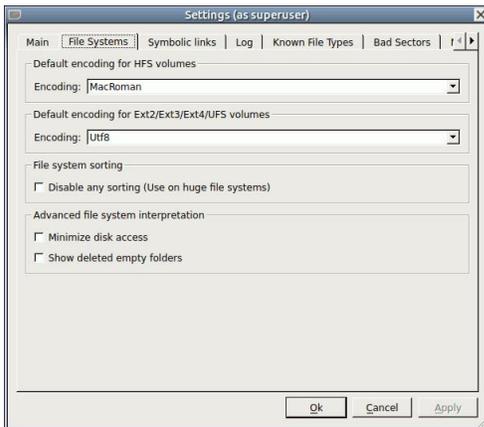
Main settings

System Options	
Check for update	If this box is selected, R-Studio for Linux will automatically check for updates.
Debug Mode	If this check box is selected, R-Studio for Linux displays an additional command Create FS Snapshot on the context menu for an object with a file system . An FS Snapshot contains system data for the file system only (file descriptions without file contents). If a problem appears, this snapshot can be sent to R-Studio for Linux technical support to identify the problem. This option greatly slows R-Studio for Linux .
Auto-refresh Drive Tree	If this box is selected, R-Studio for Linux automatically refreshes the list of connected disks. You may disable it if R-Studio for Linux experiences problems with connected devices.
Edit Options	
Enable Write	If this check box is selected, R-Studio for Linux enables you to write any changes made in the Text/Hexadecimal editor .
Max changes buffer size	Maximum amount of data stored for the Undo command in the Text/hexadecimal editor .
Notifications	
Reset all hidden notifications	This button enables all previously disabled notification and warning messages.
User's file types	
File name	Specifies a file name and path to the file where the descriptions of user's known file types are stored. You need to re-start R-Studio for Linux or click the Reload User's File Types button on the Known File Types tab for the new file to take effect.
User's RAID layout	

File name	Specifies a file name and path to the file where the descriptions of user's RAID layouts are stored
HexView templates path	
Location	Specifies the path for pattern description files for Text/Hexadecimal editor .
User's file mask presets	
File name:	Specifies a file name and path to the file with file mask presets.

File Systems

File Systems dialog box



File Systems

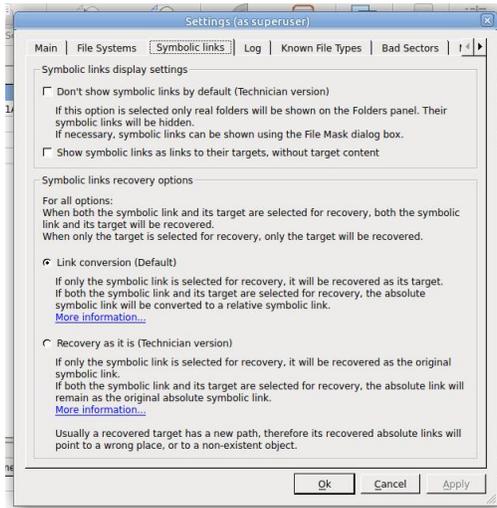
Default encoding for HFS volumes	Select the national encoding for the HFS partitions .
Default encoding for Ext2/Ext3/Ext4/UFS volumes	Select the national encoding for the Ext2, Ext3, Ext4, and UFS partitions.
Disable any sorting	Select this option if the number of files on the disk is so large that R-Studio for Linux sorts files in selected folders for too long time.

Symbolic Links

Settings are available in the Technician version only!

[Symbolic links](#) (of symlinks for short) are object that contains references to other files or folders directory in the form of absolute or relative paths and that affect pathname resolution. For example, if a symlink `c:\ProgramData\Documents` points to `D:\Recovered Files\Root\Users\Public\Documents`, entering it will result in entering `D:\Recovered Files\Root\Users\Public\Documents`.

Symbolic Links dialog box



Symbolic Links

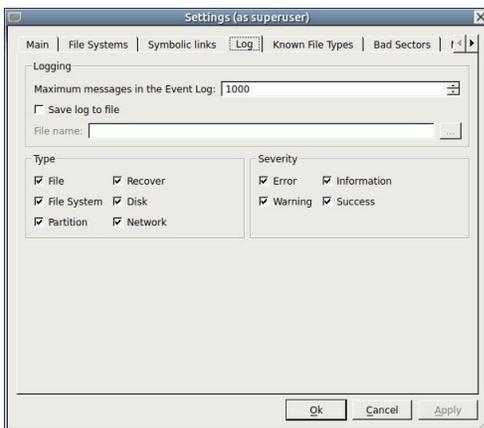
Don't show symbolic links by default (Technician version)	If this option is selected, R-Studio for Linux hides all symbolic links by default. Only real objects will be visible. You may make them visible by clearing the Hide symbolic links option on the Mask dialog box.
Show symbolic links as links to their targets, without target content	Only links to their target will be shown on the right pane (Contents). They target content can be reached by clicking those links.
Link conversion (Default)	
Both an object and its symbolic link are selected for recovery:	If both an object and its symbolic link are selected for recovery, both the object and its symbolic link will be recovered. The file path in that symbolic link will be converted from absolute to relative. Example: If the object <code>C:\ProgramData\Documents</code> is a symbolic link to <code>C:\Users\Public\Documents</code> , it will be converted to a symbolic link to <code>..\Users\Public\Documents</code> . Therefore, the symbolic link will point to its object regardless of the place to which the object has been recovered.
Only an object is selected for recovery:	Only the selected object will be recovered.
Only a symbolic link is selected for recovery:	The selected symbolic link will be recovered as a real object.
Recovery as it is (Only in the Technician version)	
Both an object and its symbolic link are selected for recovery:	If both an object and its symbolic link are selected for recovery, both the object and its symbolic link will be recovered. The file path in that symbolic link will remain the same. Example: The place to store recovered data: <code>D:\Recovered Files</code> . The object to recover: <code>C:\Users\Public\Documents</code> The symbolic link: <code>C:\ProgramData\Documents</code>

	<p>After recovery:</p> <p>The recovered object: D:\Recovered Files\Root\Users\Public\Documents</p> <p>The recovered symbolic link: D:\Recovered Files\Root\ProgramData\Documents pointing to C:\Users\Public\Documents.</p> <p>Therefore, if someone tries to enter to the symbolic link, the system will open the object C:\Users\Public\Documents, rather than recovered D:\Recovered Files\Root\Users\Public\Documents.</p>
Only an object is selected for recovery:	Only the selected object will be recovered.
Only a symbolic link is selected for recovery:	The symbolic link will be recovered as a symbolic link which may contain a path to a nonexistent object.

The [Data Recovery Topics](#) topic explains processing of symbolic links recovery in more detail.

Log

Log dialog box



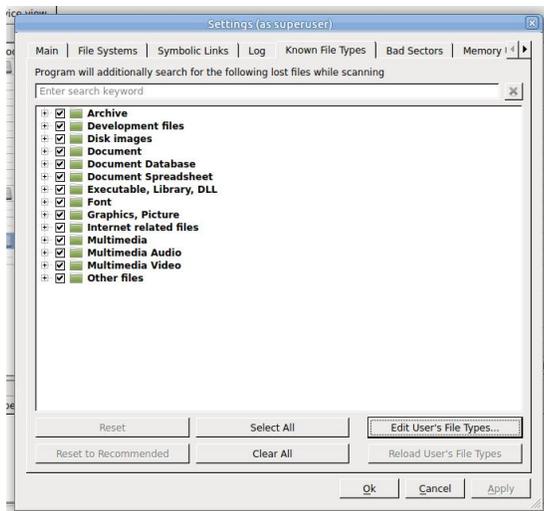
Log options

Logging	
Maximum messages in the Event Log	Specifies the maximum number of messages R-Studio for Linux will keep in the event log
Save log to file	If this check box is selected, R-Studio for Linux writes its log into a log file specified in the File name field.
File name	Specifies the file name in which the log will be saved.
Type	
File	If this check box is selected, R-Studio for Linux logs all events with recovered files.
File System	If this check box is selected, R-Studio for Linux logs all events with the file system.
Partition	If this check box selected, R-Studio for Linux logs all events with partitions.
Recover	If this check box is selected, R-Studio for Linux logs all events with the recovering processes.

Disk	If this check box is selected, R-Studio for Linux logs all events with disks.
Network	If this check box is selected, R-Studio for Linux logs all events with network operation.
Severity	
Error	If this check box is selected, R-Studio for Linux adds error messages into its log.
Warning	If this check box is selected, R-Studio for Linux adds warning messages into its log.
Information	If this check box is selected, R-Studio for Linux adds information messages into its log.
Success	If this check box is selected, R-Studio for Linux adds success messages into its log.
NEVER WRITE A LOG FILE ON THE DISK FROM WHICH YOU RECOVER DATA!!! Or you may obtain unpredictable results and lose all your data.	
Note: If in the Recover dialog box the Condense successful restoration events check box is selected, the Log will display only Error, Warning, and Information event messages.	

Known File Types

Known File Types dialog box



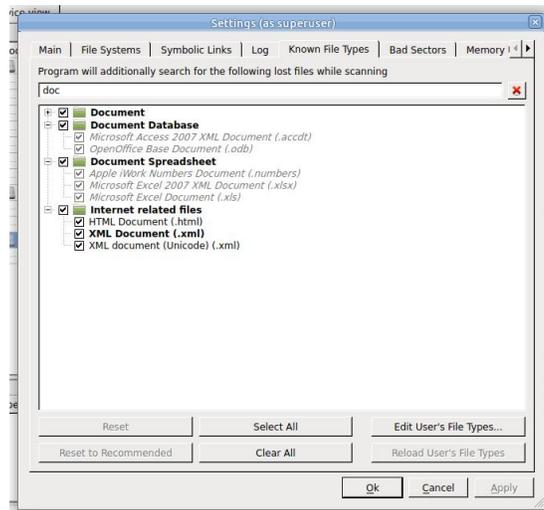
You may specify which [Known File Types](#) will be enabled/disabled by default. You may also specify know file types to search for during a [specific scan](#) session on the [Scan](#) dialog box.

Known File Types

Reset	Click this button to reset the settings to the previous state. Active until the Apply button is clicked.
Select All	Click this button to select all file types in the list.
Clear All	Click this button to clear all file types in the list except some predefined ones.
Reload User's File Types	Click this button to apply new file types after the user's file types file has been changes from the Main tab.
Edit User's File Types	Click this button to add a new customer's Known File Type, or to edit already existing ones. See the Customizing File Types help page for more details.

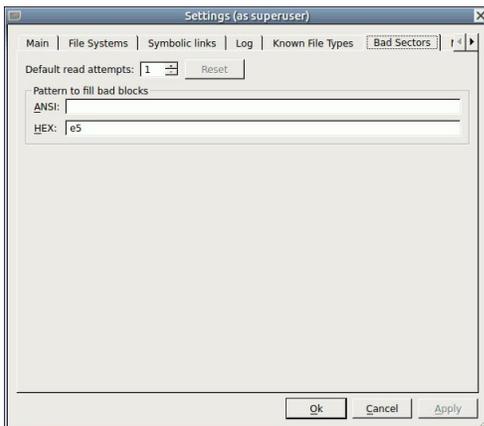
You may search for required file types if necessary

Search for the doc pattern



Bad Sectors

Bad Sectors dialog box



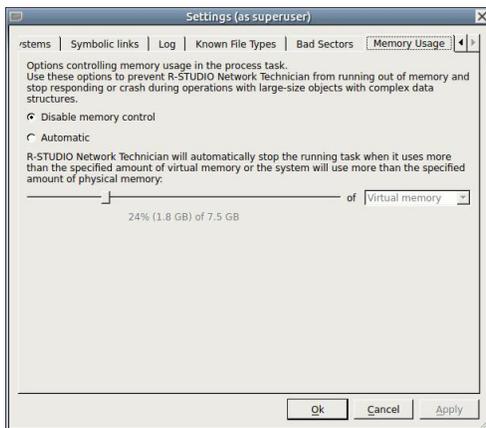
Bad Sectors settings

<p>Default read attempts</p>	<p>Specifies a default value for I/O Tries, or how many times R-Studio for Linux will try to read a bad sector. You may specify this parameter for each drive separately on the Properties tab.</p> <p>R-Studio for Linux treats bad sectors in the following way: It reads a certain part of disk (predefined by Windows) and</p> <ul style="list-style-type: none"> • If Default read attempts is set to 0, the entire part with bad sectors will be filled with the specified pattern. • If Default read attempts is set to a non-zero value, R-Studio for Linux reads again that part sector by sector, repeating the attempts the specified number of times. If R-Studio for Linux still cannot read a bad sector, it fills the sectors with the specified pattern. In this case only the bad sectors will be filled with the pattern, but that extremely slows the disk read process.
------------------------------	---

	For example, if you set Default read attempts to 1, a bad sector will be read 2 times.
Set for all drives	Click this button to reset I/O Tries for all drives to the default value.
Pattern to fill bad blocks	Specifies a default pattern R-Studio for Linux will use to fill bad sectors in files to recover, in images , or when showing data in the Text/Hexadecimal editor . You may specify the pattern either in the ANSI or Hex data format. Note: R-Studio for Linux will never ever try to write anything on the disk from which data is to recover or an image is to create.

Memory Usage

Memory Usage dialog box



These settings control how much memory **R-Studio for Linux** uses for its work. They help preventing **R-Studio for Linux** from locking when trying to perform very memory-consuming tasks like scanning large disks or processing file systems with a lot of files.

☐ Memory Usage settings

Disable memory control	If this option is selected, the memory control is disabled.
Automatic	If this option is selected, R-Studio for Linux will automatically stop performing the task when the amount of used memory reaches the specified value. You may specify the limit for either the virtual or physical memory.

You may see how much memory **R-Studio for Linux** actually uses on the [Memory Usage](#) dialog box.

II Data Recovery Using R-Studio for Linux

Many specific data recovery cases are discussed in the R-TT's [Data Recovery Guide](#).

Depending on the situation, data recovery may vary:

1. Recovery of deleted files that have resided on an existing logical disk

This can be done using [Basic File Recovery](#).

2. Recovery of files that have resided on a data disk with a damaged file system, or on a previously deleted or formatted partition

If the file system on such [logical disk](#) is damaged, the operating system sees that logical disk as a [partition](#) without a valid [file system](#). Such partition should be previously [scanned](#). Also, it should be scanned if you want to recover data on a previously deleted or re-[formatted](#) partition.

When the partition is scanned, a number of recognized partitions will appear. **R-Studio for Linux** shows them in different colors depending on which elements of the partition have been found.

 Partition5	An existing logical disk or partition
 Recognized5	An existing logical disk or partition after disk scan
 Recognized7	A recognized partition. Both boot records and file entries are found for this partition
 Recognized6	A recognized partition. Only file entries are found for this partition
 Recognized16	A recognized partition. Only boot records are found for this partition
 Recognized5	A fast found partition
 DeletedPart1	A deleted partition
 Empty Space17	Empty space on the object
Raw Files	Files that have been found using scan for known file types .

Although such recognized partitions are virtual objects, files can be searched for and recovered from recognized partitions as from real logical disks using [Basic File Recovery](#).

To successfully recover files from a recognized partition, it is necessary to find a right one which corresponds to the real logical disk on which the files resided. No strict rules can be applied to that, but the following considerations should be taken into account:

- If you are going to recover files from a **disk with a damaged file system**, most likely the right recognized partition will be a green one.
- If you are going to recover files from a **previously deleted** or **re-formatted partition**, most likely the right recognized partition will be a yellow one.

Also always check the recognized partition's file system, start point, and size. They should be the same for the recognized partition and real logical disk/partition. When in doubt, try to [preview](#) a couple of files from the recognized partition. If the files are seen correctly, this is the right partition.

3. Data recovery from a damaged [system disk](#). The computer does not start up.

- If this computer is on a network, create an [R-Studio Agent Emergency](#) startup disk for the computer, install **R-Studio for Linux** on another computer on the network, and recover data [over network](#).
- If this computer is stand-alone, create an [R-Studio Emergency](#) startup disk and use it to start up the computer and recover data. You may use external USB hard disks to store recovered files.

[R-Studio for Linux Features](#)

[Contact Information and Technical Support](#)

[Basic File Recovery](#)

[Advanced Data Recovery](#)

[Mass File Recovery](#)

[Volume Sets and RAIDs](#)

[Data Recovery over Network](#)

[Text/Hexadecimal editor](#)

[Technical Information and Troubleshooting](#)

[R-Studio Emergency](#)

[R-Studio Agent Emergency](#)

2.1 Basic File Recovery

NEVER TRY TO SAVE RECOVERED FILES/FOLDERS TO THE SAME LOGICAL DISK WHERE THEY RESIDE!!!

Or you may obtain unpredictable results and lose all of your data.

See the [Data Recovery Issues](#) topic for details.

Basic file recovery can be made for deleted files that has resided on an existing [partition](#) visible to the operating system. In all other cases, [Advanced Data Recovery](#) is required.

To recover deleted files from a logical disk (recognized partition),

1 Double-click a logical disk on the R-Studio for Linux's Drives panel to enumerate files on the disk

Other ways to enumerate files

- Select the disk and click the **Open Drive Files** button,
or
- Right-click the selected disk and select **Open Drive Files** on the context menu,
or
- Select **Open Drive Files** on the **Drive** menu

If you try to enumerate files on a hard drive or another object without a valid file system on it, a Double-click a logical disk... message will appear. Select a [logical disk](#) on the object or [scan](#) the object.

> R-Studio for Linux will change its panel showing the disk's folders/files structure

R-Studio for Linux analyzes data on the object and displays all files for which records have been found in the analyzed tables. If files have not been found, that means that their records have been deleted. To find such files, [Advanced Data Recovery](#) is required.

Please note that **R-Studio for Linux** shows only those files/folders that match a specified [file mask](#).

R-Studio for Linux Main panel

The screenshot displays the R-Studio File view interface. The left pane shows a file system tree for 'Volume2 -> WDC WD3200BEVT-08A23T1 02.01A02 : WD-WXC1A8019298'. The right pane shows a list of files with columns: Name, Recovery chances, Bad sectors, Size, Bytes, and Created. The Log panel at the bottom shows system messages.

Name	Recovery chances	Bad sectors	Size, Bytes	Created
DSC00398.png	Good (Existing file)	OK	3,398,913	8/16/2022 10:45 AM
DSC00400.png	Undetermined (Unfragi)	OK	2,461,696	8/16/2022 10:45 AM
DSC00401.png	Undetermined (Unfragi)	OK	2,842,624	8/16/2022 10:45 AM
DSC00402.png	Good (Existing file)	OK	2,720,737	8/16/2022 10:45 AM
DSC00403.png	Undetermined (Unfragi)	OK	5,660,672	8/16/2022 10:45 AM
DSC00409.png	Good (Existing file)	OK	3,075,200	8/16/2022 10:45 AM
DSC00410.png	Undetermined (Unfragi)	OK	3,215,360	8/16/2022 10:45 AM
DSC00411.png	Good (Existing file)	OK	3,449,788	8/16/2022 10:45 AM
DSC00412.png	Good (Existing file)	OK	3,569,690	8/16/2022 10:45 AM
DSC00413.png	Good (Existing file)	OK	3,859,720	8/16/2022 10:45 AM
DSCN0108.png	Good (Existing file)	OK	7,097,038	8/16/2022 10:45 AM
DSCN0109.png	Good (Existing file)	OK	5,438,556	8/16/2022 10:45 AM
DSCN0113.png	Good (Existing file)	OK	5,659,776	8/16/2022 10:45 AM
DSCN0116.png	Good (Existing file)	OK	6,134,205	8/16/2022 10:45 AM
DSCN0117.png	Good (Existing file)	OK	5,959,411	8/16/2022 10:45 AM
DSCN0121.png	Undetermined (Unfragi)	OK	10,162,176	8/16/2022 10:45 AM
DSCN0124.png	Good (Existing file)	OK	1,985,537	8/16/2022 10:45 AM
DSCN0125.png	Good (Existing file)	OK	5,411,986	8/16/2022 10:45 AM
DSCN0129.png	Good (Existing file)	OK	5,071,967	8/16/2022 10:45 AM
DSCN0131.png	Good (Existing file)	OK	6,001,689	8/16/2022 10:45 AM
DSCN0132.png	Good (Existing file)	OK	2,431,530	8/16/2022 10:45 AM
DSCN0133.png	Good (Existing file)	OK	9,220,571	8/16/2022 10:45 AM
DSCN0135.png	Good (Existing file)	OK	5,531,787	8/16/2022 10:45 AM
DSCN0136.png	Undetermined (Unfragi)	OK	6,508,544	8/16/2022 10:45 AM
DSCN0138.png	Good (Existing file)	OK	3,206,761	8/16/2022 10:45 AM

Sorted by: Real Extensions Creation Time Modification Time Access Time

Log

Type	Date	Time	Text
System	8/17/22	11:15 AM	File enumeration was completed in 0 sec
System	8/17/22	11:16 AM	File enumeration was completed in 0 sec
System	8/17/22	11:19 AM	No specified files found.
System	8/17/22	11:19 AM	Found file: Documents/Microsoft-files/Word-files/Doc-files/DOCFile_500kb.doc
System	8/17/22	11:19 AM	Search has been finished.

Ready Marked: 58 files and 19 folders. Total size: 139.80 MB Total 17.13 GB in 391 files in 45 folders

Panel view options

You may set which panels and bars to enable/disable. To enable/disable

The Toolbar	Select/clear Toolbar on the View menu
The Status bar	Select/clear Status bar on the View menu
The Folders panel	Select/clear Folders View on the View menu
The Files panel	Select/clear Contents View on the View menu
The Log panel	Select/clear Event Log on the View menu
The Find Results panel	Select/clear Find Results on the View menu

You may also arrange the data as required. On the **View** menu, select **Arrange** and then a required arrangement.

You may specify which columns will be visible on the Files panel. On the **View** menu, select **Contents Columns**, and select the columns you want to see.

Files can be shown as a list or as icons/tiles of different sizes.

Files shown as icons/tiles



Recovery chances

R-Studio for Linux shows its estimates of chances for successful file recovery in the **Rec** column.

Recovery chances

	Undefined
	Good
	Above average
	Average
	Below average
	Bad

When **R-Studio** has enumerated files, those estimates may not be accurate and aren't available for most files. You may improved them by right-clicking any folder on the Content pane and selecting **Recheck Recovery Chances** on the context menu.

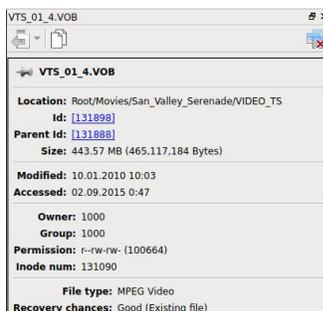


The best estimations are though after scanning the disk/partition.

File Information

You may view some information about a file. Right-click the file and select **Get Info** on the context menu.

File Information



R-Studio Technician shows much more information about a file. See the [Information about a File](#) topic for more details.

Folders panel

 Accordion

 Large

 Helsinki

 Users

 Documents and Settings

 .Trashes

 Accordion

Deleted folder

Marked folder (all child objects in this folder are marked)

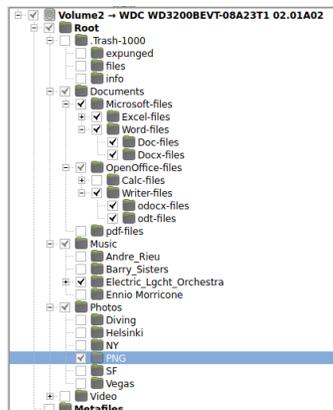
Partially marked folder (some child objects in this folder are marked)

[Target of a symlinked folder](#)

[Symlink](#) to a folder

[Cross-linked](#) folder (A FAT folder containing data which also belongs to other FAT folders.)

[Questionable](#) deleted folder (A FAT folder found by **R-Studio for Linux**, but with apparently invalid content.)



Files panel:

-  Ennio Morricono-C'Era
-  DSC00401.png
-  DSC00400.png
-  IMG_3579.JPG
-  IMG_3579.JPG

Deleted file:

Marked deleted file

Selected deleted file

[Target of a hard link](#)

[Hard link to a file](#)

Name	Recovery chances	Bad sectors	Size, Bytes	Created	Modified	Accessed	Fileid	ParentId
<input type="checkbox"/> DSC00398.png	 Good (Existing file)	OK	3,398.913	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033ae6	2c400000000010e
<input checked="" type="checkbox"/> DSC00400.png	 Undetermined (Unfragmented)	OK	2,461.696	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:50 AM	2c0000000033ae7	2c400000000010e
<input checked="" type="checkbox"/> DSC00401.png	 Undetermined (Unfragmented)	OK	2,842.624	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:50 AM	2c0000000033ae7	2c400000000010e
<input type="checkbox"/> DSC00402.png	 Good (Existing file)	OK	2,720.737	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033ae1	2c400000000010e
<input checked="" type="checkbox"/> DSC00403.png	 Undetermined (Unfragmented)	OK	5,660.672	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:50 AM	2c0000000033ae5	2c400000000010e
<input type="checkbox"/> DSC00409.png	 Good (Existing file)	OK	3,075.200	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033af0	2c400000000010e
<input checked="" type="checkbox"/> DSC00410.png	 Undetermined (Unfragmented)	OK	3,215.360	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:50 AM	2c0000000033ad7	2c400000000010e
<input type="checkbox"/> DSC00411.png	 Good (Existing file)	OK	3,449.788	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033ada	2c400000000010e
<input type="checkbox"/> DSC00412.png	 Good (Existing file)	OK	3,569.690	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033ae0	2c400000000010e
<input type="checkbox"/> DSC00413.png	 Good (Existing file)	OK	3,859.720	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033adb	2c400000000010e
<input type="checkbox"/> DSCN0108.png	 Good (Existing file)	OK	7,097.038	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033adf	2c400000000010e
<input type="checkbox"/> DSCN0109.png	 Good (Existing file)	OK	5,438.556	8/16/2022 10:45 AM	8/9/2016 09:29 AM	8/17/2022 10:48 AM	2c0000000033adc	2c400000000010e
<input type="checkbox"/> DSCN0113.png	 Good (Existing file)	OK	5,659.776	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:48 AM	2c0000000033aef	2c400000000010e
<input type="checkbox"/> DSCN0116.png	 Good (Existing file)	OK	6,134.205	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:48 AM	2c0000000033aec	2c400000000010e
<input type="checkbox"/> DSCN0117.png	 Good (Existing file)	OK	5,959.411	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033aeb	2c400000000010e
<input checked="" type="checkbox"/> DSCN0121.png	 Undetermined (Unfragmented)	OK	10,162.176	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:50 AM	2c0000000033ade	2c400000000010e
<input type="checkbox"/> DSCN0124.png	 Good (Existing file)	OK	1,985.537	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ae2	2c400000000010e
<input type="checkbox"/> DSCN0125.png	 Good (Existing file)	OK	5,411.986	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ae3	2c400000000010e
<input type="checkbox"/> DSCN0129.png	 Good (Existing file)	OK	5,071.967	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033aed	2c400000000010e
<input type="checkbox"/> DSCN0131.png	 Good (Existing file)	OK	6,001.689	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ae4	2c400000000010e
<input type="checkbox"/> DSCN0132.png	 Good (Existing file)	OK	2,431.530	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ae9	2c400000000010e
<input type="checkbox"/> DSCN0133.png	 Good (Existing file)	OK	9,220.571	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ae8	2c400000000010e
<input type="checkbox"/> DSCN0135.png	 Good (Existing file)	OK	5,531.787	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033add	2c400000000010e
<input checked="" type="checkbox"/> DSCN0136.png	 Undetermined (Unfragmented)	OK	6,508.544	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:50 AM	2c0000000033ad9	2c400000000010e
<input type="checkbox"/> DSCN0138.png	 Good (Existing file)	OK	3,206.761	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033aee	2c400000000010e
<input type="checkbox"/> IMG_0301.png	 Good (Existing file)	OK	14,404.532	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000033ad8	2c400000000010e
<input type="checkbox"/> P1000075.png	 Good (Existing file)	OK	11,610.015	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000000113	2c400000000010e
<input type="checkbox"/> P1000076.png	 Good (Existing file)	OK	9,207.688	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ad6	2c400000000010e
<input checked="" type="checkbox"/> P1000077.png	 Undetermined (Unfragmented)	OK	11,190.272	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ad5	2c400000000010e
<input checked="" type="checkbox"/> P1000078.png	 Undetermined (Unfragmented)	OK	11,091.968	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000033af2	2c400000000010e
<input checked="" type="checkbox"/> P1000079.png	 Undetermined (Unfragmented)	OK	11,141.120	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000033af3	2c400000000010e
<input type="checkbox"/> P1000080.png	 Good (Existing file)	OK	10,956.258	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000033af6	2c400000000010e
<input type="checkbox"/> P1000081.png	 Good (Existing file)	OK	11,098.334	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000033af4	2c400000000010e
<input type="checkbox"/> P1010289.png	 Good (Existing file)	OK	11,554.652	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000000111	2c400000000010e
<input type="checkbox"/> P1010292.png	 Good (Existing file)	OK	6,832.528	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033af5	2c400000000010e
<input checked="" type="checkbox"/> P1010296.png	 Undetermined (Unfragmented)	OK	9,359.360	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:50 AM	2c0000000033af1	2c400000000010e
<input type="checkbox"/> P1010299.png	 Good (Existing file)	OK	8,687.022	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000000112	2c400000000010e
<input type="checkbox"/> P1010302.png	Good (Existing file)	OK	6,321.585	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c000000000010f	2c400000000010e
<input type="checkbox"/> P1010304.png	Good (Existing file)	OK	6,190.904	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/17/2022 10:49 AM	2c0000000033ad4	2c400000000010e
<input type="checkbox"/> P1010316.png	Good (Existing file)	OK	11,243.418	8/16/2022 10:45 AM	8/9/2016 09:30 AM	8/16/2022 10:40 AM	2c0000000000110	2c400000000010e

You may also arrange the data as required: by their extensions, creation/modification time, or as a real file structure

Sorted by: [Real](#) | [Extensions](#) | [Creation Time](#) | [Modification Time](#) | [Access Time](#)

See [Find and Mark Multiple Files](#) for more details

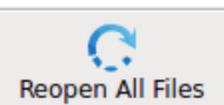
Find Results panel

Find Results
 Find All "File Extensions: doc", "Volume2"
 Root/Documents/Microsoft-files/Word-files/Doc-files/DOCFile_500kb.doc
 Root/Documents/Microsoft-files/Word-files/Doc-files/file-sample-doc_100kb.doc
 Root/Documents/Microsoft-files/Word-files/Doc-files/file-sample-doc_1MB.doc
 Root/Documents/Microsoft-files/Word-files/Doc-files/file-sample-doc_500kb.doc
 === Matching files: 4 Total files searched: 391 ===



Select Drive

Click this button to return to the **R-Studio for Linux** main panel to select another drive.



Reopen All Files

Click this button to list files again.

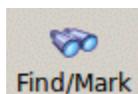


Recover

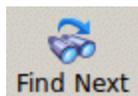
Click this button to recover selected folders/files.

**Recover Marked**

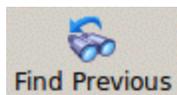
Click this button to recover marked folders/files.

**Find**

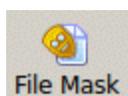
Click this button to find or/and mark a particular file/folder.

**Find Next**

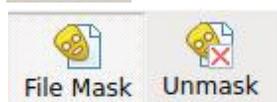
Click this button to find the next object specified in the **Find/Mark** dialog box

**Find Previous**

Click this button to find the previous object specified in the **Find/Mark** dialog box.

**File Mask**

Click this button to specify a file mask.

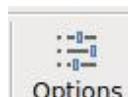


The **Unmask** button appears when a mask is applied.

Click this button to remove the applied mask.

**Up**

Click this button to move highlighting one folder up.

**Options**

Click this button to change Recovery Options.

**Stop**

Click this button to stop the current operation.

The Log panel will show how many files and folders are on the object, and their size. You may specify which events will be shown in the log pane by setting a [log filter](#).

Note: Metafiles are the file system's internal files invisible to any user, or file system data, which **R-Studio for Linux** represents as files. These files do not contain user data directly. Unless you want to scrutinize a disk file system, do not restore them.

If the Too many files... message appears, you may temporarily stop file listing and browse through found files. Then you can resume file listing. You also may skip this file topic and continue. **R-Studio for Linux** will keep information about the entire file structure.

You may also copy the information about folders and files.

☐ **For the folder (the Folders pane):**

Click Copy Folder :	To copy the folder's name
Click Copy Path :	To copy the path to the folder

☐ **For the file (the Contents pane):**

Click Copy (Column Name) :	To copy the file's Name, Size, Created , etc., depending on which column is selected
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Click Copy Path :	To copy the file path.
Click Copy Selected Text :	To copy all the columns of the selected file.

2 Select a file/folder to recover

You may select several files/folders in the same parent folder by pressing the **Shift** button and clicking the objects simultaneously.

☐ **Marking multiple files/folders from different parent folders manually:**

Mark a file/folder to recover by clicking the box left to the object, or select **Mark** on the context menu. You may mark several files/folders in different parent folders. You may mark all objects in the folder by selecting **Mark All** on the **Tools** or context menu. To unmark an object, click the box left to the object once more or select **Unmark** on the context menu. You may unmark all objects in the folder by selecting **Unmark All** on the **Tools** or context menu.

The Log panel will show how many files and folders you have marked, and their total size.

R-Studio for Linux can search for a particular file. Go to the [Searching for a File](#) topic for details. If you need to find and mark many files, go to the [Find and Mark Multiple Files](#) topic for details.

File content may be previewed before recovery. Go to the [Previewing Files](#) topic for details.

If you do not find files that you want to recover:

Sometimes **R-Studio for Linux** can find the files but not the entire file paths to them. It puts such files into the **Extra Found Files** folder. Try to search for the files there. If that does not help, try to find them by using file search globally on the entire disk. Go to the [Searching for a File](#) topic for details

If you still cannot find files that you want to recover but are sure they have existed on the logical disk, you need to use [Advanced Data Recovery](#) to find them.

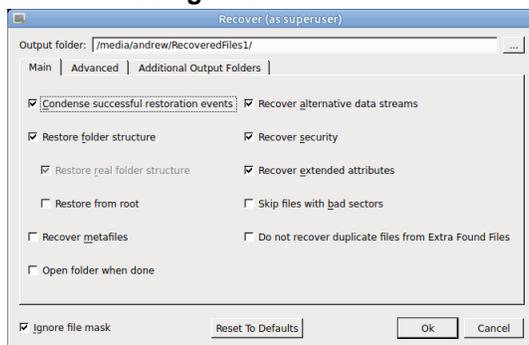
3 Click the Recover or Recover Marked button

☐ **Other ways to recover selected files**

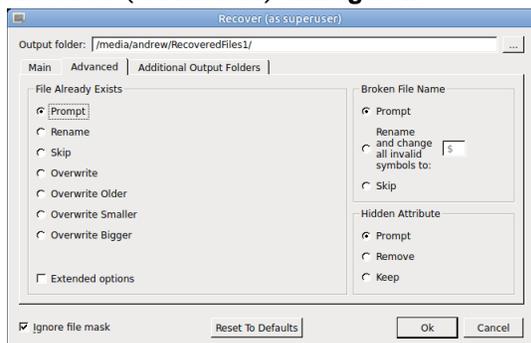
- Right-click the selected file/folder and select **Recover** or **Recover Marked** on the context menu, or
- Select **Recover** or **Recover Marked** on the **File** menu.

4 Specify recover options and output folder on the Recover dialog box and click the OK button

Recover dialog box



Recover (Advanced) dialog box



If you have another computer connected to **R-Studio for Linux** over network, the Recover dialog box will be slightly different. See [Data recovery over network](#) for details.

Recover options

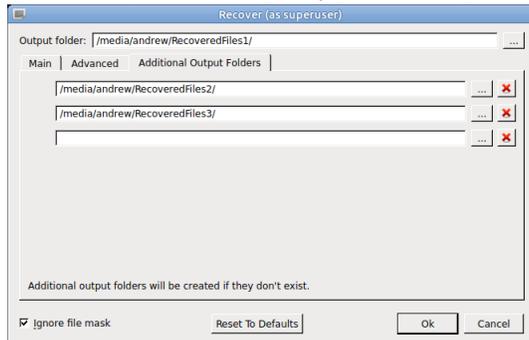
Condense successful restoration events	If this check box is selected, R-Studio for Linux will display only error and warning messages in its Log
Restore folder structure	If this check box is selected, R-Studio for Linux recovers the entire path to the selected object.
Restore from root	If this check box is selected, R-Studio for Linux recovers the entire path to the selected object starting from the root folder of the disk.
Recover metafiles	If this check box is selected, R-Studio for Linux recovers disk metafiles. Metafiles are the file system's internal files invisible to any user, or file system data, which R-Studio for Linux represents as files. These files do not contain user data directly. Unless you want to scrutinize a disk file system, do not restore them.
Recover alternative data streams	If this check box is selected, R-Studio for Linux recovers alternative data streams for file systems that support them. Has no effect on FAT files. See Extended Information Recovery for the NTFS file system, and Data Recovery on HFS/HFS+ File System for the Mac computers.
Recover security	If this check box is selected, R-Studio for Linux recovers security attributes for NTFS files. Has no effect on FAT files. See Extended Information Recovery for details.
Recover extended attributes	If this check box is selected, R-Studio for Linux recovers extended (HPFS) file attributes.
Remove hidden attributes	If this check box is selected, R-Studio for Linux removes the Hidden and System attributes from recovered files enabling the user to see them in the Windows Explorer.
Recover real folders structure	Enabled when the files are sorted by their extensions or date. See Find and Mark Multiple Files for details. If this check box is

	selected, R-Studio for Linux recovers the real folders/files structure on the disk rather than that of sorted files.
Skip files with bad sectors	If this check box is selected, R-Studio for Linux skips files with bad sectors and displays their list on the Files with bad sectors dialog box when the recovery has been completed. You may separately decide later what to do with those files. See Bad sectors for details. If this check box is cleared, R-Studio for Linux tries to read those sectors several times (specified on the Settings/Bad Sectors dialog box), and, if fails, fills bad sectors in the recovered file with the pattern specified on the same box. Information about such files will appear in the Log .
Do not recover duplicate files from Extra Found Files	If this check box is selected, R-Studio for Linux does not recover files from Extra Found Files (raw files) that coincide with files recovered from the file system.
Ignore file mask	If this check box is selected, R-Studio for Linux recovers all content of a selected folder, ignoring a specified File Mask .
Open folder when done	If this check box is selected, the folder with recovered files will be opened upon recovery completion.
Advanced	Specifies options for mass file recovery

If you want to recover multiple files at once, go to the [Recover Multiple Files](#) for more information

R-Studio Technician/T80+

Recover (Additional Output Folders) dialog box



Additional Output Folders

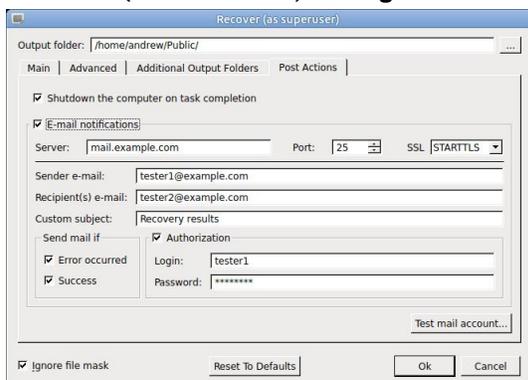
Additional Output Folders

Additional output folders where recovered files will be stored when **R-Studio for Linux** runs out of space.

NEVER TRY TO SAVE RECOVERED FILES/FOLDERS TO THE SAME LOGICAL DISK WHERE THEY RESIDE!!!

Or you may obtain unpredictable results and lose all of your data.

Recover (Post Actions) dialog box

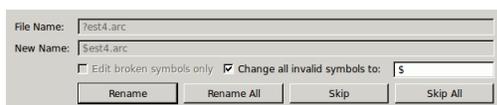


Post Actions Options

Shutdown the computer on task completion	If this check box is selected, R-Studio for Linux will shut down your computer when file recovery has been completed. The program will warn you if any option on the Advanced tab is set to Prompt.
E-Mail notifications	If this check box is selected, R-Studio for Linux will inform you about the outcome of the operation via email.

If a file to be recovered appears to have an invalid name, a Broken File Name dialog box will appear. You may correct the name and resume file recovery.

Broken File Name dialog box

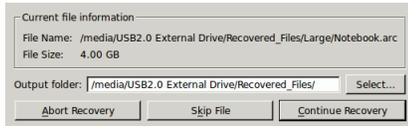


Broken File Name properties

File name	Shows the current incorrect file name.
New name	Field for a new file name.
Edit broken symbols only	If this check box is selected, only invalid symbols may be corrected
Change all invalid symbols to	If this check box is selected, all invalid symbols will be changed to the specified symbol
Buttons	
Rename	Click to resume file recovery
Rename All	Click to resume file recovery. All other files will be renamed according to the specified rule.
Skip	Click to skip this file
Skip All	Click to skip all files and stop file recovery

If there is no space available for the recovered files, the There is not enough space on the disk dialog box will appear. You may either select other place to store the files, skip that particular file or abort the recovery process.

There is not enough space on the disk **dialog box**



- > **R-Studio for Linux will recover the selected/marked files/folders to the specified folder and show the results in the Log pane**

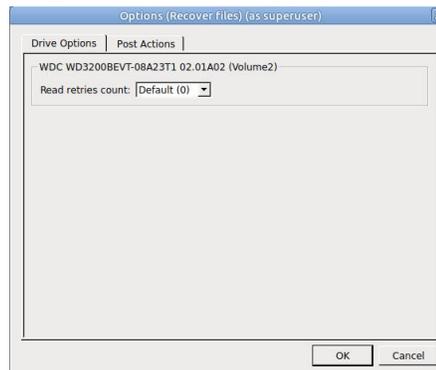
The Recovery progress indicator will show the log and progress of recovery process.

Recovery progress indicator

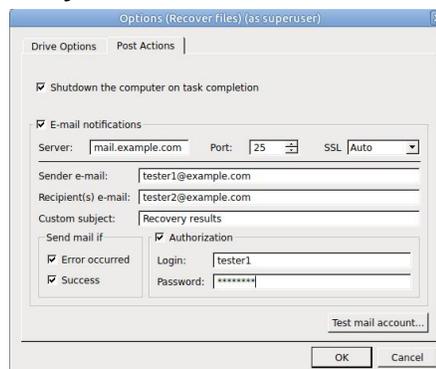


You may change some options during the process of file recovery and see [I/O Monitor](#) to inspect the process of drive input/output operations in real time

You may change some options during the process of file recovery



Only in the Technician version



Note: R-Studio for Linux recovers files from Ext2/3/4FS partitions, but can write them to any local or network disks. . R-Studio for Linux successfully recovers files from Ext2FS partitions except its security attributes. R-Studio for Linux recovers [symlinks](#) as files containing the path to files which *symlinks* point to.

See [Data Recovery on HFS/HFS+ file system](#) for details on recovering data from disks with the HFS/HFS+ file system

[Opening several disk/partitions in one tab](#)

[Searching for a File](#)

[Finding Previous File Versions](#)

[Previewing Files](#)

[File Masks](#)

[Regular Expressions](#)

[Event Log](#)

2.1.1 Opening several partitions in one tab

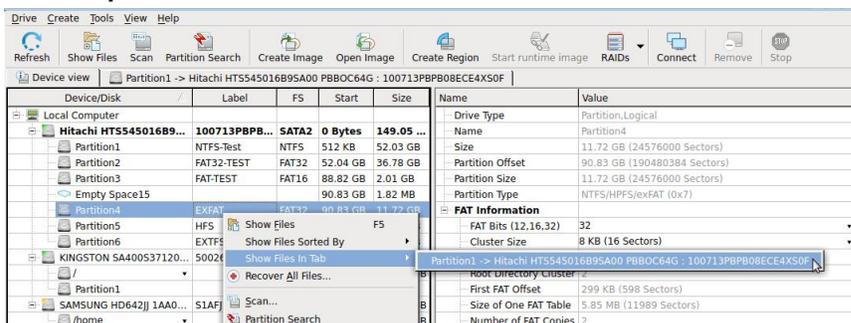
You may open several [partitions](#) in one tab. Then you may search for files and recover them from several disks/[partitions](#) at once. This is especially useful if files are to be recovered from several recognized partitions found on one real partition or a drive.

To open several partitions in one tab,

- 1 Open one partition in a usual way (double-click a logical disk, for example).
- 2 Right-click the next partition, select **Show Files In Tab**, and select the tab you want the partition appear in, or

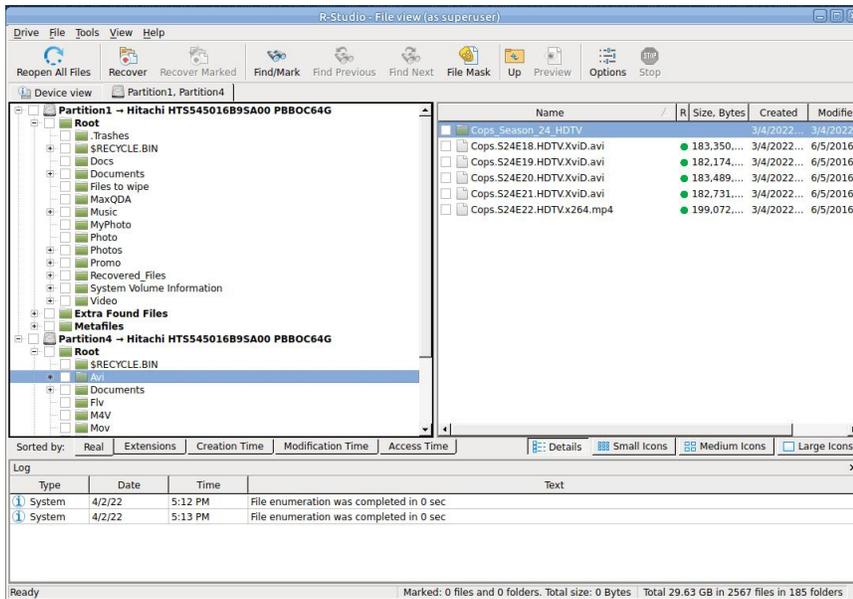
drag the disk/partition from the Device view to the required tab.

Several partitions in one tab



> R-Studio for Linux will show files from several partitions in one tab

Several partitions in one tab

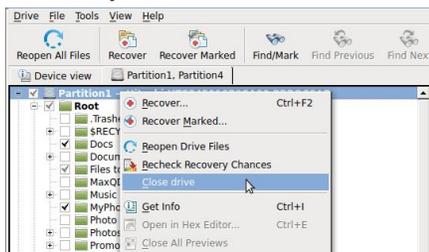


Now files may be searched for, marked for recovery, and recovered.

To remove a partition from the tab,

- 1 Right-click the required partition in the tab and select **Close drive** in the context menu.

Several partitions in one tab



2.1.2 Searching for a File

R-Studio for Linux can find a particular file, if it is difficult to find it manually on the Folders or Files panel. You can also automatically mark/unmark all found files.

To search for a file,

- 1 Click the **Find** button

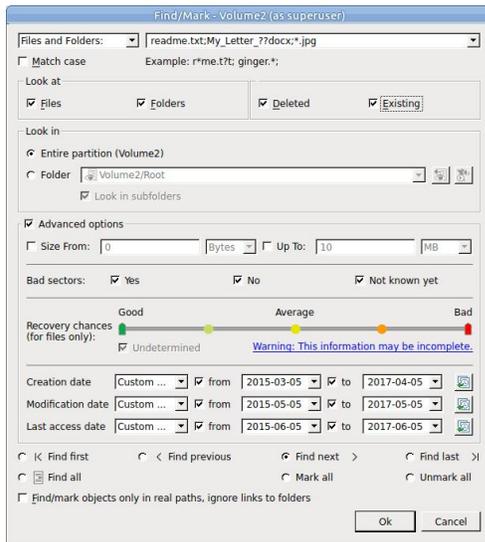
Other ways to search for the file

- Right-click a folder and select **Find** on the context menu,
- or
- Select a folder and select **Find** on the **Tools** menu

- 2 Specify a file to be found and its options on the **Find** dialog box, and click the **OK** button

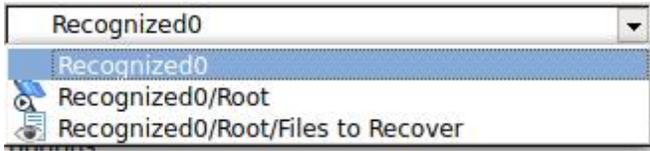
Note that a **File Mask** may be applied.

Find/Mark dialog box



Find/Mark options

You may specify how to treat specified strings. Please note that R-Studio for Linux stores previously entered search strings.	
All Files and Folders	If this option is selected, R-Studio for Linux applies Advanced Options to all files.
File Extensions	If this option is selected, R-Studio for Linux treats specified strings as file extensions
Files and Folders	If this option is selected, R-Studio for Linux treats specified strings as file names. Use ? for one unspecified character and * for an unlimited number of them to specify file masks.
Regular Expressions	If this option is selected, R-Studio for Linux treats specified strings as regular expressions
File Id	Specifies File Id that R-Studio for Linux assigns to a file.
Match case	If this check box is selected, R-Studio for Linux makes a case-sensitive search
Look at	
Files	If this check box is selected, R-Studio for Linux includes files into a search.
Folders	If this check box is selected, R-Studio for Linux includes folders into a search. Disables when the Mark/Unmark All option is selected.
Deleted files	If this check box is selected, R-Studio for Linux makes a search among deleted files/? folders.
Existing files	If this check box is selected, R-Studio for Linux makes a search among existing files/? folders.
Look in	Specifies where R-Studio searches for, and marks, files. It can look for them on the Entire partition, or in/from a certain folder. If several partitions are opened in one tab, the places will be: All opened partitions, Selected partition, or in/from a certain folder. You may specify the starting folder for the search.

	 <ul style="list-style-type: none">  identifies current opened folder.  identifies current starting folder for the search.  sets starting folder to the current opened folder.  sets back current starting folder.
Advanced options	If this check box is selected, R-Studio for Linux will use the advanced options.
Size from/up to	Specifies file size limits. See the Data Formats and Multipliers topic for more details on data formats.
Bad sectors	Specifies whether there are bad sectors in the files. Not known: it's unclear if there are bad sectors in the files.
Runtime image	Specifies whether the files have already been included into the runtime image .
Recovery Chances	Specifies files with certain recovery chances.
Date	Specifies file date boundaries. Dates for Modified, Created, and Last Accessed timestamps may be set separately.
	The Set for all button sets the specified data for all fields.
Find/Mark options	<p>Specify what R-Studio for Linux does with the found files.</p> <p>The Find first/previous/next/last options. R-Studio for Linux stops at the first/previous/next/last file that matches the specified search criteria.</p> <p>Find all files. R-Studio for Linux searches for all files that matches the specified search criteria.. The search results appear in the Find Results panel.</p> <p>Mark/Unmark All. R-Studio for Linux marks/unmarks all files that match the search criteria. When these options are selected, R-Studio marks/unmarks files only, not folders, regardless of what Look at: Folders specifies.</p> <p>Please note, that when performing a new find and mark/unmark task, R-Studio for Linux does not takes into consideration the previous marked/unmarked state of files. For example, if you first mark all <code>doc</code> files, and then all <code>txt</code> files, all <code>doc</code> files remain marked, too. To unmark them, you should specify <code>doc</code> once again and select Unmark files.</p>
Find/mark objects only in real paths, ignore links to folders	If this check box is selected, links to folders will be treated as real folders: they will appear among search results or marked objects.

> **R-Studio for Linux will show/mark the found file(s)**

If you need to find and mark many files, go to the [Find and Mark Multiple Files](#) topic for details.

To repeat the search,

- * **Click the Find Next or Find Previous buttons**

- ▣ **Other ways to repeat the search**

- Right-click a folder and select **Find Next** or **Find Previous** on the context menu
 - or
 - Select a folder and select **Find Next** or **Find Previous** on the **Tools** menu

To find all files and show them on the Find Results panel,

- * **Select Find all on the on the Find dialog box,**

or

select **Find all** on the **Tools** menu

- > **R-Studio for Linux will show the found files on the Find Results panel**

You may do the following actions on the found files:

Recover, Mark, Preview

by right-clicking the found file and selecting the appropriate item in the context menu.

2.1.3 Finding Previous File Versions

R-Studio for Linux can find previous versions of files. It searches for them in the file's current folder and in **Extra Found Files**.

File versions are searched for using file size. If the size of a files is within 10% of the original filesize, the following conditions are checked:

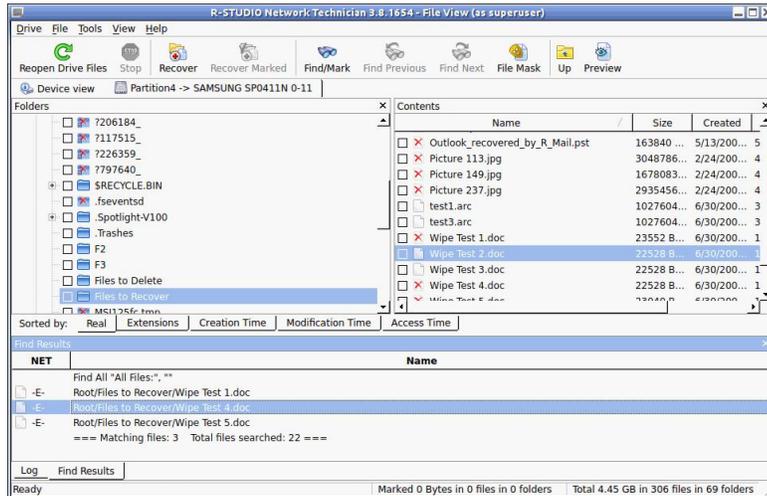
Conditions	Legend
File name	N
File extension	E
Recognized file type	T

To search for previous file versions,

1 Right-click the file and select **Find Previous Versions of the File** on the context menu

* **R-Studio for Linux** will show the files in the list:

File versions



This technique can be used to find deleted original files after attacks of file encrypting viruses.

2.1.4 Previewing Files

R-Studio for Linux has a built-in file previewer that allows you to preview both existing and deleted files. You may use this feature to estimate chances for successful file recovery or to find a file to recover.

While previewing a file in the external viewer, you may recover it or mark the file for recovery using Previewer buttons.

Previewer buttons



Mark for recovery, Previous file, Next file, Recover

To preview a file

1 Right-click a file to preview on the **Files** panel and select **Preview** on the context menu

Other ways to preview the file

- Select the file on the **Files** panel and click the **Preview** button,
- or
- Select the file on the **Files** panel and select **Preview** on the **File** menu

> **R-Studio for Linux** will show the content of the file

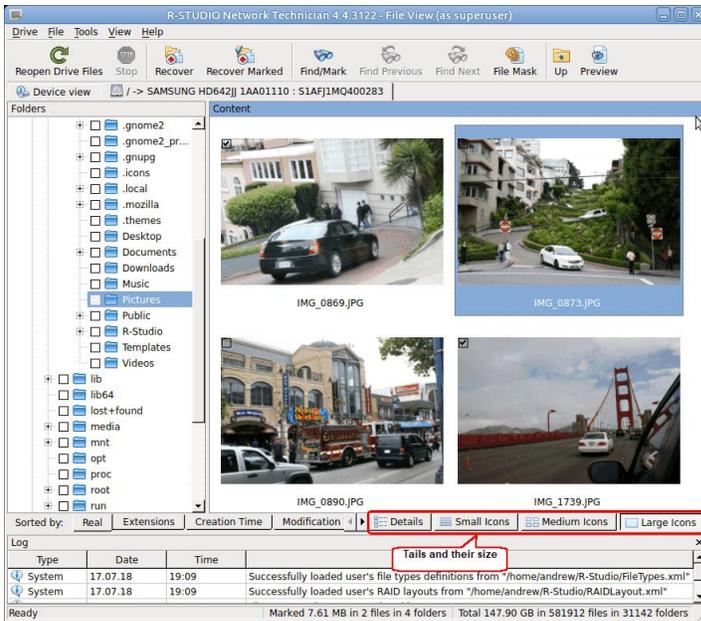
If you have several files open in the previewer, you may instantly close all of them by selecting **Close All Previews** on the **File** menu.

File Previewer for Pictures:

Pictures can be previewed either as tiles within the main window of **R-Studio for Linux** or in an external previewer.

Within the main window as tiles:

Tile size can be changed..

Pictures as tiles**In the external viewer:**

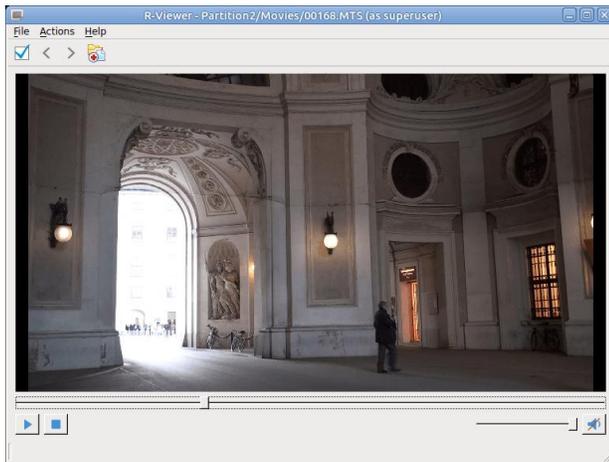
Picture files can be zoomed in/out and rotated.

Picture file previewer

**File Previewer for Video and Audio files:**

Video and audio files can be played even without their respective application installed.

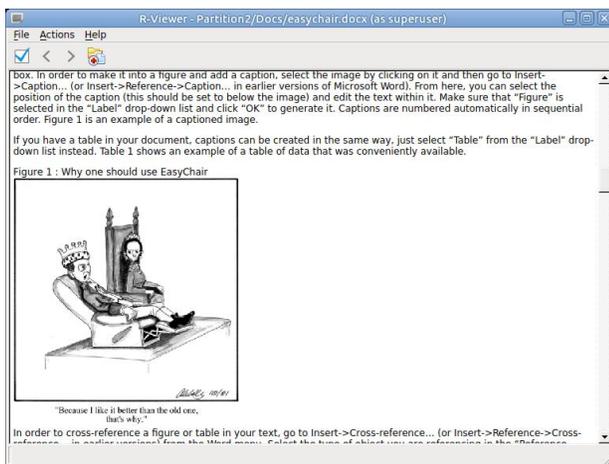
Video file previewer



File Previewer for Microsoft/Open/Libre Office Documents:

Documents can be shown (including embedded pictures) even without their respective applications installed. They can be zoomed in/out for better viewing.

Microsoft/Open/Libre Office document previewer

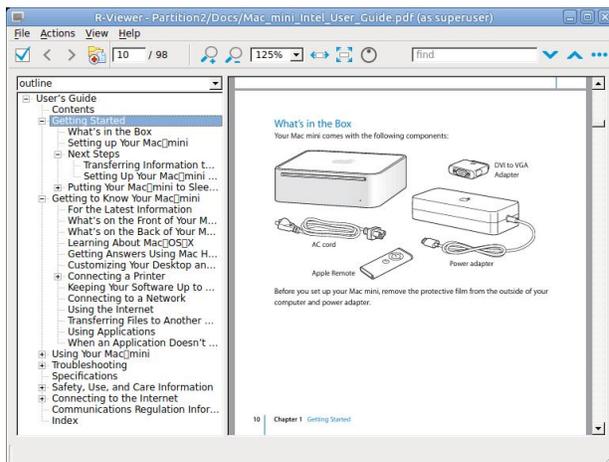


File Previewer for Adobe Acrobat PDF Files:

Files can be shown even without Adobe Acrobat installed.

The previewer allows the users to jump to a required page, zoom the document, and search for a required text.

Adobe Acrobat pdf document previewer



The files can be shown in different layouts and rotated. Click the **View** menu and select the required options.

Supported File Types:
 Documents:

MS Office and Open/Libre Office files, even without the programs installed:

- Word/Writer documents: docx;
- Excel/Calc spreadsheets:.xlsx;
- PowerPoint presentation: pptx.

Office 97-2003, without the program installed:

- Word documents: doc;
- Excel spreadsheets xls;
- PowerPoint presentation ppt.

Adobe Acrobat document: pdf.

 Multimedia Files
Video formats:

AIFF, ASF, AVI, BFI, CAF, FLV, GIF, GXF, HLS, QuickTime, 3GP, MP4, Matroska, Maxis XA, MPEG-DASH, MPEG program stream, MPEG transport stream (including AVCHD), MXF, Material eXchange Format, SMPTE, MSN Webcam stream, NUT, Ogg, OMA, RL2, TXD, WTV.

Audio formats:

8SVX, AAC, AAC+, AC-3, ADPCM, AMR-NB, AMR-WB, Amazing Studio PAF Audio, Apple lossless audio, QuickTime, ATRAC, CELT, DCA (DTS Coherent Acoustics), DPCM, DSD (Direct Stream Digital), DSP Group TrueSpeech, DST (Direct Stream Transfer), DV audio, FLAC (Free Lossless Audio Codec), G.723.1, G.729, GSM, IAC (Indeo Audio Coder), iLBC (Internet Low Bitrate Codec), IMC (Intel Music Coder), Interplay ACM, MACE (Macintosh Audio Compression/Expansion), MACE (Macintosh Audio Compression/Expansion), MLP (Meridian Lossless Packing), Monkey's Audio, MP1 (MPEG audio layer 1), MP2 (MPEG audio layer 2), MP3 (MPEG audio layer 3), MPEG-4 Audio

Lossless Coding (ALS), Musepack SV7/SV8, Nellymoser Asao, AVC (Audio for Video Codec), PCM A-law/mu-law, QCELP/PureVoice, QDesign Music Codec, RealAudio, Vorbis, Voxware MetaSound, WavPack, Westwood Audio, Windows Media Audio, Xbox Media Audio

▣ **Graphic files (with file extensions)**

3DS Max thumbnail (max), AAA logo (bpr), ACE texture (ace), ADEX (img, rle), AIM Grey Scale (ima, im), AIPD image (aipd), ARF (arf), AT&T Group 4 (att), AT&T multigen (icn), AVHRR Image (sst), AVT RAW (raw), AWD (awd), Ability Photopaint Image (apx), Access (g4, acc), Aces200 (ace), Acorn Sprite (acorn), AdTech perfectfax (adt), Adobe Illustrator (ai), Adobe PhotoParade(images) (php), Adobe Photoshop (psd), Advanced Art Studio (ocp, art, pic), AirNav (anv), Album bébé (frm), Alias Image File (pix, als, alias), Alpha Microsystems BMP (bmp), Amapi (2d), Amica Paint (ami, [b]), Amiga IFF (iff, blk), Amiga icon (info), Amstrad Cpc Screen (cpc), Analyze (avw), Analyze-7 (img), Andrew Toolkit raster object (atk), Apollo HDRU (hdru, hdr, gn), ArcInfo Binary (hdr), Art Director (art), Artisan (art), Artist 64 (a64), Artrage (ptg), Artweaver Document (awd), Astronomical Research Network (arn), Atari grafik (pcp), Aurora (sim), Auto F/X (afx), AutoCAD DWG (dwg, dwt), AutoCAD DXF (dxf), Autocad CAD-Camera (img), Autodesk Animator (fli, flc), Autodesk QuickCAD thumbnail (cad), Autodesk SKETCH thumbnail (skf), Autodesk SketchUp component (skp, skb), Autologic (gm, gm2, gm4), Award Bios Logo (epa), Axialis Screensaver(images) (ssp), B3D(images) (b3d), BFLI (bfl, bfli, fli, flp, afl), BIAS FringeProcessor (msk, img, raw, flt), BLP textures (blp), BMF (bmf), BSB/KAP (kap), BYU SIR (sir), Bert's Coloring (bmg, ibg), Bfx Bitware (bfx), Bio-Rad confocal (pic), Blazing Paddles (pi), Bob Raytracer (bob), Brender (pix), Brooktrout 301 (brk, 301, brt), Brother Fax (uni), Buttonz & Tilez texture (til), CALS Raster (cal, cals, gp4, mil), CDU Paint (cdu), CGM (cgm), CImage (dsi), CMU Window Manager (cmu), CP8 256 Gray Scale (cp8), CSV (csv), Calamus (cpi, crg), Camera RAW (raw), Canon EOS-1D Mark II RAW (cr2), Canon Navigator Fax (can), Canon PowerShot (crw), Cartes Michelin (big), Casio QV-10/100 Camera (cam), Casio RAW (bay, raw), Chinon ES-1000 digital camera (cmt), Cisco IP Phone (cip), Cloe Ray-Tracer (clo, cloe), ColoRIX (rix, sci, scx, sc?), CompW (wlm), CompuServe GIF (gif, giff), Computer Eyes, Digital Vision (ce), ComputerEyes Raw (ce1, ce2), Contax RAW (bay, raw), Core IDC (idc), Corel Draw Bitmap(preview) (cdr), Corel Draw Pattern(preview) (pat), Corel Flow(preview) (bmf), Corel Metafile Exchange(preview) (cmx), Corel PhotoPaint 6.0 (cpt), CoverDesigner(images) (ncd), CoverDesigner Template(images) (nct), Crayola (art), Creative PC-CAM RAW (bay, raw), DBW Render (), DIV Game Studio Map (map), DIV Game Studio Multi Map (fpg), DKB Ray-Tracer (dis), DNG (dng), DPX (dpx), Dali Raw (sd0, sd1, sd2), Datacopy (img), Degas & Degas Elite (pi1, pc1, pi2, pc2, pi3, pc3, pi4, pi5, pi6), Deluxe Paint, Electronic Arts (lbm, ilbm), Dicom (dcm, acr, dic, dicom, dc3), Digital F/X (tdim), Digital Research(GEM Paint) (img, gem), Direct Draw Surface (dds), Discorp CMP Image (cmp), DjVu (djvu, djv, iw4), DolphinEd (dol), Doodle Atari (doo), Doodle C64 (dd), Doodle C64(Compressed) (jj), Dr Halo (cut), Draz Paint (drz), EA Sports FSH (fsh), EPS Interchange Format (epi, ept), ERI-chan(Entis Rasterized Image) (eri), ESM Software Pix (pix), Ecchi (ecc), Eclipse (tile), Edmics (c4), Egg Paint (trp), Electric Image (ei, eidi), Embroidery (bmc), Encapsulated Postscript (ps, eps), Encapsulated Postscript (Preview) (eps), Enhance Simplex (esm), Enhanced Compressed Wavelet (ecw), Epson RAW (erf), Eroïca (eif), Everex Everfax (efx, ef3), Explore(TDI) & Maya (iff, tdi), FIF(Iterated System) (fif), FIT (fit), Face Painter (fpt), Fast Piecewise-constant (pwc), Fax Group 3 (g3, fax), Fax man (fmf), Faxable PCX (fcx), Faxable TIFF (ftf), Fenix Map (map), Fenix Multi Map (fpg), FileMagic (mag), Flash Image (fi), FlashCam Frame (ncy), FlashPix Format (fpx), Flexible Image Transport System (fts, fits, fit), Foculus RAW (bay, raw), Fantasy Grafik (bsg), Fremont Fax96

(f96), Fugawi Map (fx3), Fuji S2 RAW (raf), Fun Painter II (fp2, fun), Fun Photor (fpr), Fuzzy bitmap (fbm, cbm), GRS16 (g16), Gamma Fax (gmf), GeoPaint (geo), Gfa Raytrace (sul), GigaPaint Hi-res (gih), GigaPaint Multi (gig), Gimp Bitmap (xcf), Gimp Brush (gbr), Gimp Icon (ico), Gimp Pattern (pat), GoDot (4bt, 4bit, clp), GunPaint (gun, ifl), HD Photo (wdp, hdp), HDRI (hdr, hdri), HF (hf), HP-48/49 GROB (gro, grb), HP-49 OpenFire (gro2, gro4), HPGL-2 (hp, hpg, hgl, plt, hpgl, hpgl2, gl2, prn, prt, spl), HRU (hru), HSI Raw (raw), Half-Life Model (mdl), Hasselblad RAW (3fr), Hayes JTFax (jtf), Hemera Photo Image (hpi), Hemera Thumbs (hta), Heretic II MipMap (m8), Hi-Eddi (hed), Hires C64 (hir, hbm), Homeworld Texture (lif), IBM Kips (kps), IBM Printer Page Segment (pse), IM5(Visilog) (im5), IMNET Image (imt), IOCA (ica, ioca, mod), IPLab (ipl), iPod thumb (ithmb), ISS (iss), IcoFX (ifx), Icon Library (icl), Imacon/Hasselblad RAW (fff), Image Capture Board (icb), Image Magick file (mif, miff), Image Speeder (ish), Image System(Hires) (ish), Image System(Multicolor) (ism), Image Systems RLC2 Graphic (rlc), ImageLab (b&w, b_w), ImagePro Sequence (seq), Imaging Fax (g3n), Imaging Technology (img), Img Software Set (img), Inshape (iim), InterPaint(Hires) (iph), InterPaint(Multicolor) (ipt), Intergraph Format (itg, cit, rle), Interleaf (iimg), Iris CT (ct), Iris Graphics (iris), J Wavelet Image Codec (wic), JBIG (jbg, bie, jbig), JBIG-2 (jb2), JFIF based file (jb2), JPEG/JFIF (jpg, jpeg, jif, jfif, J, jpe), JPEG 8BIM header(Mac) (jpg, jpeg, jif, jfif, J, jpe), JPEG XR (jxr), JPEG-2000 Code Stream (jpc), JPEG-2000 JP2 File Format (jp2, j2k, jpx, jpf), JPEG-LS (jls), Jeff's Image Format (jif), Jigsaw (jig), Jovian VI (vi), Jpeg Network Graphics (jng), JustButtons animated bitmap (btn), KONTRON (img), Khoros Visualization Image file (vif, viff, xv), KinuPix Skin (thb), Kiss Cel (cel), Koala Paint (koa, kla), Koala Paint(Compressed) (gg), Kodak Cineon (cin), Kodak DC120 Digital Camera (kdc), Kodak DC25 Camera (k25), Kodak Photo CD (pcd), Kodak Pro Digital RAW (dcr), Kofax Group 4 (kfx), Kolor Raw Format (kro), Konica Camera File (kqp), LSS16 (lss, 16), LView Pro (lvp), LaserData (lda), Leaf RAW (mos), Leica RAW (bay, raw), Light Work Image (lwi), LucasFilm Format (lff), Lumena CEL (cel), LuraDocument Format (ldf), LuraDocument.jpm Format (jpm), LuraWave Format (lwf), LuraWave JPEG-2000 Code Stream (jpc), LuraWave JPEG-2000 Format (jp2, j2k, jpx, jpf), MAKIchan Graphics (mag), MGI Photosuite Project(images) (pzp), MGR bitmap (mgr), MRC(Medical Research Council) (mrc), MTV Ray-Tracer (mtv), Mac Paint (mac, mpnt, macp, pntg, pnt, paint), Mac icon (icns), Macintosh Quickdraw/Pict (pic, pict, pict2, pct), Mac OSX Resource (rsc, rsrc), Maggi Hairstyles & Cosmetics (fff), Male MRI (pd, t1, t2), Male Normal CT (fre), Mamiya RAW (mef), Marks Russel File (mrf), Mavica (411), Maw-Ware Textures (mtx), Mayura Draw (pdx), MegaPaint (bld), Megalux Frame (firm), Micro Dynamics MARS (pbt), Micro Illustrator Uncompressed (mil), Micrografx Picture Publisher 4.0 (pp4), Micrografx Picture Publisher 5.0 (pp5), Micron RAW (bay, raw), Microsoft Image Composer (mic), Microsoft Paint (msp), Microtek Eyestar (img), Mindjonnig Format (ipg), Minolta DiIMAGE RAW (mrw), Mobile FAX (rfa), MonkeyCard (pdb), MonkeyLogo (pdb), MonkeyPhoto (mph), MrSid (sid), Msx 2 Screen (sc2), Multiple Network Graphics (mng), NCR Image (ncr), NIST ihdr (pct), National Imagery Transmission F. (ntf, nift), NeoBook Cartoon (car), Neochrome(ST & TT) (neo), Neopaint Mask (npm), Neopaint Stamp (stw), NewsRoom (nsr, ph, bn), Nifti (img), Nikon RAW (nef), Nokia Group Graphics (ngg), Nokia Logo File (nlm), Nokia OTA bitmap (otb), Nokia Operator Logo (nol), OAZ Fax (oaz, xfx), OS/2 Bitmap (bmp, bga), Olicom Fax (ofx), Olympus RAW (orf), Open Image Library Format (oil), OpenEXR (exr), Optigraphics (ctf), Optigraphics Tiled (ttf), Optocat (abs), Oric Hires (hir), Oric TAP (tap), Os/2 Warp (bga), PABX background (pix), PAX (pax), PC Paint/Pictor Page (pic, clp), PCO (b16), PM (pm), Page Control Language (pcl), Paint Magic (pmg), PaintShopPro Browser Cache File (jbf), PaintShopPro Brush (pspbrush), PaintShopPro Brush (jbr), PaintShopPro Frame (pfr, pspframe), PaintShopPro Image (psp, pspimage), PaintShopPro Mask (pspmask), PaintShopPro Mask (msk), PaintShopPro Pattern (pat), PaintShopPro Picture Tube (tub, psptube), PaintShopPro Texture (tex), Palm

Pilot (pdb), Panasonic DMC-LC1 RAW (srf), Panasonic LX3 RAW (rw2), Panasonic RAW (bay, raw), Pegs (pxs, pxa), Pentax *ist D (pef), Pfs Art Publisher (art), Photo Deluxe (pdd, pdb), Photo Filtre Studio (pfi), PhotoFantasy Image (fsy), PhotoFrame (frm), PhotoStudio File (psf), PhotoStudio Stamp (stm), Photomatrix (cat), Pic2 (p2), Picasso 64 (p64), Picture Gear Pocket (prc), Picture It! (mix), Pixar picture file (pic, pxr, picio, pixar), Pixel Power Collage (ib7, il7, il8, if9), Pixia (pxa), Pixibox (pxb), Planetary Data System (pds, img), Playback Bitmap Sequence (bms), Pocket PC Bitmap (2bp), Pocket PC Themes(images) (tsk), Polychrome Recursive Format (prf), Portable Bitmap (pbm, rpbm, ppm), Portable Document Format (pdf), Portable Greyscale (pgm, rpgm), Portable Image (pnm, rpnm, pbm, rpbm, pgm, rpgm, ppm, rppm), Portable Network Graphics (png, apng), Portable Pixmap (ppm, rppm), Portfolio Graphics (pgf), Portfolio Graphics Compressed (pgc), Portrait (cvp), Poser Bump (bum), Postscript (ps, ps1, ps2, ps3, eps, prn), PowerCard maker (crd), PowerPoint(images) (pps), PowerPoint Presentation(images) (ppt), Print Master (pm), Print Shop (psa, psb), Printfox/Pagefox (bs, pg, gb), Prism (cpa), Prisms (pri), Psion Series 3 Bitmap (pic), Psion Series 5 Bitmap (mbm), Punk Productions Picture (ppp), Puzzle (pzl), Q0 (q0, rgb), Qdv(Random Dot Software) (qdv), Qrt Ray-Tracer (qrt), Quake Texture (wal), Quantel VPB (vpb), QuickTime Image Format (qtif, qti), RAW DVR (raw), RIPTerm Image (icn), Radiance (rad, img, pic), Rainbow Painter (rp), Raw (raw, gry, grey), Rawzor (rwz), Rayshade (pic), Red Storm File Format (rsb), Ricoh Digital Camera (j6i), Ricoh Fax (001, ric), Ricoh IS30 (pig), Rm2K XYZ (xyz), Rollei RAW (rdc, ia), RoverShot RAW (bay, raw), RunPaint(Multicolor) (rpm), Saracen Paint (sar), SBIG CCD camera ST-4 (st4), SBIG CCD camera ST-X (stx, st4, st5, st6, st7, st8), SciFax (sci), SciTex Continuous Tone (sct, ct, ch), Seattle Film Works (sfw), Seattle Film Works multi-image (pwp, sfw), SecretPhotos puzzle (xp0), Sega SJ-1 DIGIO (sj1), Sharp GPB (img), Siemens Mobile (bmx), SIF MICHEL-Soft (sif), Sigma RAW (x3f), Silicon Graphics RGB (rgb, rgba, bw, iris, sgi, int, inta), Sinar RAW (cs1, sti), Skantek (skn), Slow Scan Television (hrz), SmartDraw 6 template (sdt), SmartFax (1), SmoothMove Pan Viewer (pan), Softimage (pic, si), Solitaire Image Recorder (sir), Sony DSC-F1 Cyber-shot (pmp), Sony DSC-F828 RAW (srf), Sony PS2 TIM (tm2), Sony Playstation TIM (tim), Sony RAW (sr2, arw), Spectrum 512 (spu), Spectrum 512(Compressed) (spc), Spectrum 512(Smooshed) (sps), SPOT (dat), SriSun (ssi), Stad (pic, pac, seq), Star Office Gallery (sdg), Starbase (img), Stardent AVS X (x, avs, mbfs, mbfavs), Starlight Xpress SX (RAW), Stereo Image (jps), ST Micro RAW (bay, raw), Structured Fax Format (sff), Sun Icon/Cursor (icon, cursor, ico, pr), Sun Rasterfile (ras, rast, sun, sr, scr, rs), Sun TAAC file (iff, vff, suniff, taac), Syberia texture (syj), Synthetic Universe (syn, synu), SVG (svg), TG4 (tg4), TI Bitmap (92i, 73i, 82i, 83i, 85i, 86i, 89i), TIFF Revision 6 (tif, tim, tiff), TMSat image (imi), TRS 80 (hr), TealPaint (pdb), Teli Fax (mh), Thumbnail (tnl), TilePic (tjp), Tiny (tmy, tn1, tn2, tn3), TopDesign Thumbnail (b3d, b2d), Total Annihilation (gaf), Truevision Targa (tga, targa, pix, bpx, ivb), Ulead Pattern (pst), Ulead PhotoImpact (upi), Ulead Texture(images) (pe4), Usenix FaceServer (fac, face), Utah raster image (rle, urt), VIPS Image (v), VITec (vit), VRML2 (wrl), Venta Fax (vfx), Verity (vif), Vicar (vic, vicar, img), Vidcom 64 (vid), Video Display Adapter (vda), Vista (vst), Vivid Ray-Tracer (img), Vort (pix), Vue d'esprit (vob), WAD(Half life) (wad), WSQ (wsq), WaveL (iwc), Wavefront Raster file (rle, rlb, rpf), WebShots(images) (wb1, wbc, wbp, wbz), Weekly Puzzle (jig), WebP (webp, wep), Whypic (ypc), WinFAX (fxs, fxo, wfx, fxr, fxd, fxm), WinMIPS (pic), Windows & Aldus Metafile (wmf), Windows Animated Cursor (ani), Windows Bitmap (bmp, rle, vga, r14, r18, sys), Windows Clipboard (clp), Windows Comp. Enhanced Metafile (emz), Windows Compressed Metafile (wmz), Windows Cursor (cur), Windows DIB (dib), Windows Enhanced Metafile (emf), Windows Icon (ico), Winzle Puzzle (wzl), Wireless Bitmap(level 0) (wbmp, wbm, wap), Word Perfect Graphics(images) (wpg), Worldport Fax (wfx), X Windows System dump (xwd, x11), X11 Bitmap (xbm, bm), X11 Pixmap (xpm, pm), XV Visual Schnauzer (p7), Xara(images) (xar), Xerox DIFF (xif), Ximage (xim), Xionics SMP (smp), YUV 16Bits

(yuv, qtl, uyvy), YUV 16Bits Interleaved (yuv, qtl, uyvy), YUV 4:1:1 (yuv, qtl), YUV 4:2:2 (yuv, qtl), YUV 4:4:4 (yuv, qtl), ZX Spectrum Hobetta (\$s, \$c, !s), ZX Spectrum Snapshot(sna), ZX Spectrum standard (screen scr), ZZ Rough (rgh), Zeiss BIVAS (dta), Zeiss LSM (lsm), Zoner Callisto Metafile(zmf), Zoner Zebra Metafile (zbr), Zsoft Multi-page Paintbrush (dcx), Zsoft Publisher's Paintbrush (pcx, pcc, dcx), byLight (bif)

2.1.5 File Masks

R-Studio for Linux shows only those files/folders that match the specified file mask. File mask affects files/? folders that are processed by the **Recover** and **Find** commands.

To specify a file mask,

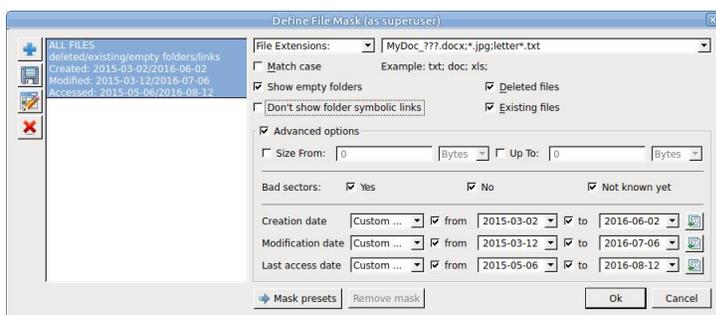
1 Click the File Mask button

Other ways to specify the file mask

- Right-click a folder and select **File Mask** on the context menu
- or
- Select the folder and select **File Mask** on the **Tools** menu

2 Specify the file mask on the File mask dialog box and click the OK button

Mask (Main) dialog box



File mask options

You may specify options for All Files, File Extensions, Files, and Regular Expressions	
Match case	If this check box is selected, R-Studio for Linux makes a case-sensitive search.
Show empty folders	If this check box is selected, R-Studio for Linux will show folders with no files in them.
Deleted files	If this check box is selected, R-Studio for Linux makes a search among deleted files/folders.
Existing files	If this check box is selected, R-Studio for Linux makes a search among existing files/folders.
Hide symbolic links	If this check box is selected, R-Studio for Linux hides all symbolic links . It may be selected by default if the Don't show symbolic links by default option is selected on the Settings dialog box.
Use advanced options	If this check box is selected, R-Studio for Linux will use the advanced options, even when they are hidden.
Advanced Options	

Size from/up to	Specifies file size limits. See the Data Formats and Multipliers topic for more details on data formats.
Bad sectors	Specifies whether there are bad sectors in the files. Not known: it's unclear if there are bad sectors in the files.
Runtime image	Specifies whether the files have already been included into the runtime image .
Date	Specifies file date boundaries. Dates for Modified, Created, and Last Accessed timestamps may be set separately.
	The Set for all button sets the specified data for all fields.

> **R-Studio for Linux will show only those files that match the specified file masks**

Mask presets

You may set various presets with different file masks. Just click on the Plus button to add the data from the dialog box to the presets. You may also give presets names, delete them, and store them permanently.

2.1.6 Regular Expressions

Regular expression is a notation for patterns of text, as opposed to exact strings of characters. The notation uses literal characters and metacharacters. Every character which does not have special meaning in the regular-expression syntax is a literal character and matches an occurrence of that character. For example, letters and numbers are literal characters. A metacharacter is a symbol with special meaning (an operator or delimiter) in the regular-expression syntax.

.	Wildcard: any character
*	Repeat: zero or more occurrences of previous character or class
^	Line position: beginning of line
\$	Line position: end of line
[class]	Character class: any character in the set
[^class]	Inverse class: any character not in the set
[x-y]	Range: any characters within the specified range
\x	Escape: literal use of metacharacter x
\<xyz	Word position: beginning of the word
xyz\>	Word position: end of the word

For example, the following regular expression `.*` matches any string of characters, `^a` matches any string beginning with character a.

2.1.7 Event Log

R-Studio for Linux logs and displays events in the Log panel. You may set a **Log filter** to display only needed information and to write it to a log file. You may specify the log settings on the [Settings](#) dialog box.

You may clear or save the log

To clear the log,

* **Right-click the Log panel and select Clear Log on the context menu.**

To save the log to a file,

* **Right-click the Log panel and select Save Log to File on the context menu.**

2.2 Advanced Data Recovery

This chapter explains how to perform advanced data recovery operations.

- [Disk Scan](#)
- [Customizing File Types](#)
- [Customizing File Types-I](#)
- [Customizing File Types-II](#)
- [Regions](#)
- [Exclusive Regions](#)
- [Images](#)
- [Object Copy](#)

2.2.1 Disk Scan

In order to completely analyze data structure on an object, it must be scanned. Any object on the Drives panel can be [scanned](#). In addition, you may create a **region** to scan only a part of an object. The [Regions](#) topic explains how to create and work with **regions**. Scan is also greatly improves estimations for chances of successful file recovery.

You may select scan area and some other scan parameters. Scan information may be saved to a file and later this file may be opened.

Attention: Scanning large areas may be a very lengthy process!

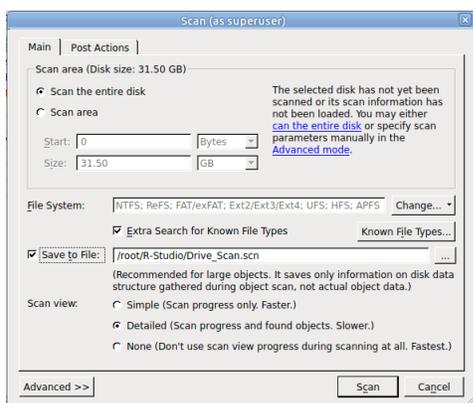
NEVER TRY TO SAVE SCAN INFORMATION TO THE OBJECT BEING SCANNED!!!

Or you may obtain unpredictable results and lose all of your data.

To scan an object

- 1 Select an object on the **R-Studio for Linux's** Drives panel
- 2 Click the Scan button
 - ▣ **Other ways to start scan**
 - Right-click the selected disk and select **Scan** on the context menu,
 - or
 - Select **Scan** on the Drive menu
- 3 Specify the required parameters on the Scan dialog box and click the Scan button

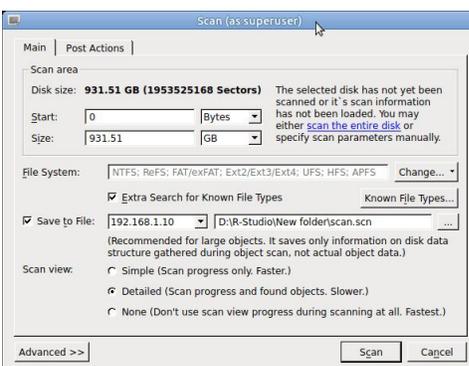
Scan dialog box



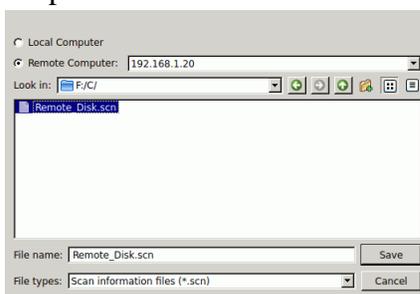
☐ Scan options

Disk Size:	Shows the size of the object to be scanned
Start:	Sets the start point of the area to be scanned.
Size:	Sets the size of the area to be scanned.
Numbers in these fields can be in bytes or sectors. See the Data Formats and Multipliers topic for more details on data formats.	
File Systems:	Specifies the file systems which objects are to be searched for. Current version supports: FAT , NTFS, exFAT , ReFS, Ext2/3/4FS , XFS , HFS, APFS, and UFS file systems. The Technician version supports also the ISO9660 file system. Please note that if you need to scan an HFS, HFS+, or HFSX disk, always enable the Extra search for Known File Types option. This is very important because when files are being deleted on the HFS, HFS+, HFSX file systems, the computer completely removes all system information on them, and there is no way to recover the deleted files except by using the Extra Search for Known File Types option. See Data Recovery on HFS/HFS+ file system for details.
Extra search for Known File Types	Enables search for Known File Types.
Save scan Info to File:	If this checkbox is selected, R-Studio for Linux will save scan information to a specified file. Later this file may be opened. Please note, that this option does not save actual disk data, only information on disk data structure gathered during disk scan.
Simple view	If this option is selected, R-Studio for Linux will show only scan progress.
Detailed view	If this option is selected, R-Studio for Linux will show graphic representation on objects found during scan.
None	If this option is selected, R-Studio for Linux will not show the Scan Information tab during scan.
Buttons	
Scan	Starts scanning
Advanced	Activates advanced scan options
Known File Types...	Selects file types that R-Studio for Linux will recognize during the disk scan.
Cancel	Closes the dialog box
NEVER TRY TO SAVE SCAN INFORMATION TO THE OBJECT BEING SCANNED!!! Or you may obtain unpredictable results and lose all of your data.	

If a remote computer is connected for [Data Recovery over Network](#), the the Scan dialog box will have a different look.

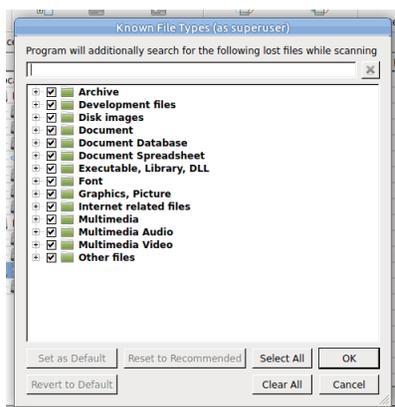


and the Save Scan Information File dialog box will appear when you select a place to store scan info. You may save it to the local or remote computer.



Known File Types: While scanning, **R-Studio for Linux** can recognize the data's particular file type. Using such information, **R-Studio for Linux** can obtain more information about data/file structure on the object being scanned. By default, **R-Studio for Linux** tries to recognize the default list of supported file types specified on the Known File Types tab of the [Settings](#) panel, greatly increasing time required for the scan. You may reduce it by selecting only those file types that you need. Click the **Known File Types...** button and select the required file types on the File Types dialog box. These selections will be applied to that scan session only.

File Types dialog box



Known File Types

Set as Default	Click this button to set the current list of selected file types as default values.
Revert to Default	Click this button to revert the default settings specified on the Known File Types tab of the Settings panel.

Reset to Recommended	Click this button to revert to factory-preset default settings.
Select All	Click this button to select all file types in the list.
Clear All	Click this button to clear all file types in the list except some predefined ones.

▣ List of known file types

Document			
AbiWord Document: .abw	Adobe InDesign File: .indd	Adobe PDF document: .pdf	Apple iWork Keynote document: .key
Apple iWork Pages document: .pages	Apple iWork document	Capella document: .cap	Final Draft Document: .fdr
FrameMaker Document: .fm	GNU Info Document: .info	Garmin MapSource data: .mps	Lotus AMI Pro Document: .sam
Lotus Organizer: .or5	Lotus Word Pro Document: .lwp	Microsoft Office Open XML Document	Microsoft OneNote section file: .one
Microsoft Pocket Streets Map File: .mps	Microsoft PowerPoint 2007 XML Document: .pptx	Microsoft PowerPoint Document: .ppt	Microsoft Visio document: .vsd
Microsoft Word 2007 XML Document: .docx	Microsoft Word Document: .doc	Word for Macintosh Document: .mcw	Microsoft Word2 Document: .doc
Microsoft Works document: .wps	OLE Storage	OpenOffice Writer document: .odt	OpenOffice document: .ods
PageMaker Document: .p65	PostScript document: .ps	QuarkXPress file: .qxd	QuarkXpress project: .qxp
Rich Text Document: .rtf	TEX document: .tex	Text document: .txt	Unicode document: .txt
WordPerfect Document: .doc			
Document: E-book			
Chaoxing SSReader eBook: .pdg	EPUB eBook: .epub	FB2 eBook: .fb2	MOBI eBook: .mobi Microsoft Money Data: .mny
Microsoft Reader eBook: .lit	Microsoft Reader eBook annotations: .ebo		
Document: Spreadsheet			
Apple iWork Numbers document: .numbers	Lotus 1-2-3 v1 worksheet: .wk3	Lotus 1-2-3 v2 workshee: .wk1, .fmt	Lotus 1-2-3 v3 worksheet: .wk3, .fm 3
Lotus 1-2-3 v4 worksheet: .wk4	Lotus 1-2-3 workbook: .123	Microsoft Excel 2/3/4 worksheet: .xls	Microsoft Excel 2007 XML Document: .xlsx

Microsoft Excel 4 Spreadsheet: .xls	Microsoft Excel Spreadsheet: .xls	Quattro Pro Spreadsheet: .wq1	
Document: Database			
Cathy database: .caf	Data Interchange Format file: .dif	GDSII database: .gds	Microsoft Access 2007 XML Document: .accdt
Microsoft Access 2007 Database: .accdb	Microsoft Access Database: .mdb	Microsoft SQL Log: .ldf	Microsoft SQL Database: .mdf
MySQL Database Dictionary: .frm	MySQL database: .myi	Omnis Studio Library: .lbs	Omnis Studio Database: .df1
OpenOffice Base document: .odb	dBase III Database: .dbf		
Document: Financial			
Microsoft Money Data: .mny	QuickBooks Backup File: .qbb	QuickBooks Primary Data File: .qbw	Quicken Data: .qdf
TurboTax return file: .tax			
Internet-related files			
Compiled HTML file: .chm	Internet shortcut: .url	Microsoft Outlook Personal Folder: .pst	Microsoft Outlook/Inbox offline folder: .ost
Mozilla Firefox browser extension: .xpi	Mozilla Mail Summary file: .msf	Outlook Express Messages: .dbx	The Bat! Address book: .abd
The Bat! Message Base: .tbb	The Bat! Message Index: .tbi	Windows Address Book: .wab	XML document (Unicode): .xml
Email			
E-Mail Message: .eml	Microsoft Outlook Personal Folder: .pst	Microsoft Outlook Inbox offline folder: .ost	Mozilla Mail Summary file: .msf
Outlook Express Messages: .dbx	The Bat! Address book: .abd	The Bat! Message Base: .tbb	The Bat! Message Index: .tbi
Windows Address Book: .wab			
Font			
Adobe PostScript Font: .pfb	Adobe Printer Font: .pfm	BDF Unix font: .bdf	BGI font: .chr
CPI DOS font: .cpi	OpenType font: .otf	TrueType Font: .ttf	Windows System Font: .fon
Graphics/Picture			
AVHRR Satellite image: .sst	Adobe Lightroom preview: .lrprev	Adobe Photoshop image: .psd	Agfa/Matrix Scodl Image: .scd

Alias Wavefront Raster Image: .rla	Amiga icon: .info	ArcView Shape: .shp	AutoCAD Binary Image: .dxf
AutoCAD Drawing: .dwg	AutoCAD Image: .dxf	Autodesk Animator Pro color palette: .col	Autodesk Animator Pro Image: .pic
Autodesk Animator Image: .pic	Autologic Image: .gm	BMF image: .bmf	Bentley MicroStation CAD Drawing: .dgn
Canon (CR2) RAW graphics file: .cr2	Canon (CRW) RAW graphics file: .crw	ColorIX Image: .rix	Computer Graphics Metafile image: .cg
ComputerEyes Raw Image: .cel, .cel	Continous Edge Graphic Image: .ceg	Corel Texture Image: .tex	CorelDraw CMX Image: .cmx
CorelDraw Image: .cdr	Cubcomp Picture Maker Image .r8, .g8, .b8	DICOM medical image: .dcm	Digital Negative image: .dbg
Dr. Halo palette: .pal	Enhanced MetaFile Image: .emf	Epson RAW image: .erf	Epson Stylus Image: .prn
Erdas LAN/GIS Image: .lan, .gis	Fractal Image Format: .fif	Freehand (MX) Database: .fh10	Fuji RAW image: .raf
GEM Raster Image: .img	GEM VDI Image: .gdi	CompuServe GIF Image: .gif	Garmin Mapsource image: .img
Graphics Workshop for Windows Thumbnail: .thn	Gridded Binary Image: .grb	HP Command Language Image: .pcl	HP Raster Image: .rtl
HSI JPEG Image: .hsi	Hemera Photo-Object Image: .hpi	Hitachi Raster Image: .hrf	Hotspot Image: .shg
IBM Picture Maker Image: .pic	JPEG 2000: .jp2	JPEG Digital Camera: .jpg	JPEG Image: .jpg
Jovian Logic Image: .vi	Kodak PhotoCD Image: .pcd	Kodak RAW image: .dng	LBM/IFF Image: .lbm
Leica RAW image: .dng	Lightwave Object: .lwo	Lotus PIC Image: .pic	Macintosh PICT Image: .pct, .pic
Macintosh Paint Image: .mac	Mamiya RAW image: .mef	McIDAS Satellite Image: .goe	Microsoft Paint Image: .msp
Minolta RAW image: .mrw	Nikon RAW image: .nef	OS/2 Icon: .ico	Olympus RAW image: .orf
PBM Image: .pbm	PGM Image: .pgm	PIX Image: .pix	PM Image: .pm
PNG Image: .png	PPM Image: .ppm	PaintShop Pro Image: .psp	Panasonic RAW image: .rw2
PaperPort Image: .max	Pentax RAW image: .pef	Pictor PC Paint Image: .pic	Print Shop Image: .pds
Quick Link II fax Image: .qfx	QuickDraw 3D Metafile: .3dmf	RAW Digital Camera image: .dng	RenderMan Image: .rib

Ricoh RAW image: .dng	SGI Image: .sgi	STAD Image: .pac	Samsung RAW image: .dng
Seattle FilmWorks/? PhotoWorks image: .pwm	Sigma RAW image: .x3f	Sketch Image: .sk	SmartDraw file: .sdr
Sony RAW image: .arw	Sun Raster Image: .sun	SymbianOS Image: .mbm	TI Image: .92i
Tagged Image Format File: .tif	TargetExpress image: .mte	Utah Raster Toolkit Image: .rle	VITec Image: .vit
Webshots Image: .wb1	Weresc CADE drawing: .drc	Windows Animated cursor: .ani	Windows Bitmap Image: .bmp
Windows Color Palette: .pal	Windows Fax Cover Image: .cpe	Windows MetaFile Image: .wmf	Windows cursor: .cur
Windows icon: .ico	WordPerfect Graphics Image: .wpg	X PixMap Image: .xpm	X Window Dump Image: .xwd
Xara Drawing: .xar	ZSoft PCX Image: .pcx	iPhoto Image: .attr	
Multimedia: Audio Files			
AIFF Sound: .aif	AVR Sound: .avr	AY Chip music: .ay	AdLib Tracker 2 module: .a2m
Advanced Streaming Format file: .asf	Audacity audio: .au	AudioCD file: .cda	Battery 3 sample: .nov
CMF music: .cmf	Common Loudspeaker Binary: .cfl	Creative voice file: .voc	DiamondWare sound: .dwd
Digital Speech File: .dss	Digital voice file: .dvf	EA ASF/MUS audio file: .asf	Extended M3U playlist: .m3u
FLAC audio file: .fla, .flac	KaraBox sound: .mkf	La Lossless audio file: .la	Liquid Audio File: .la1
MIDI Instrument definition: .idf	MIDI music: .mid	MIDI stream: .mids	MPEG Layer I audio file: .mpg
MPEG Layer II audio file: .mp2	MPEG Layer III audio file: .mp3	MUS music: .mus	Monkeys audio file: .ape
Musepack audio file: .mpc	Next/Sun uLaw sound: .au	Nitro Composer sound: .minincs	Nord Modular G2 Patch: .pch2
Ogg Vorbis audio file: .ogg	OptimFROG audio file: .ofr	Portable Sound Format: .psf	RIFF MIDI music: .rmi
RK Audio sound: .rka	Sierra AUD sound: .aud	Sony OpenMG audio file: .oma	Super NES audio file: .spc
TTA audio file: .tta	VQF sound: .vqf	WavPack audio file: .wv	Westwood AUD sound: .aud
Windows Media Audio File: .wma	Windows WAVE sound: .wav	X-MIDI music: .xmi	ZyXEL sound: .zyx

aPac audio file: .apc			
Multimedia: Video Files			
3GPP multimedia audio/video: .3gp	3GPP2 multimedia audio/video: .3g2	4X Movie Video: .4xm	Adobe Filmstrip Animation: .fsf
AMV Video: .amv	ARMovie video: .rpl	Adobe Filmstrip animation: .fsf	Autodesk Animator: .fli
BINK Video: .bik	BluffTitler video: .bt	DVM video: .dvm	DeluxePaint animation: .anm
Director video: .dcr	DriveCam video: .dce	Eyemail video: .eye	Flash Video: .flv
Intel DVI Video: .dvi	Intel Indeo Video File: .ivf	Interplay MVE Video: .mve	LZA animation: .lza
LZA Animation: .lza	Lotus ScreenCam video: .scm	MPEG Transport Stream video: .mts	MPEG video: .mpg
MPEG-2 Transport Stream video: .m2ts	Matroska video: .mkv	MythTV video: .nuv	NEOchrome animation: .ani
Nancy Codec video: .noa	Nullsoft Video: .nsv	QV-10 video: .cam	QuickTime video: .mov
SGI movie format: .mv	SMJPEG Video: .mjpg	Sega FILM/CPK video: .cpk	Shockwave video: .swf
Smacker video: .smk	Sony Movie Player video: .mqv	VOB video files: .vob	VP6 encoded Video: .vp6
VideoCD video: .vcd	Vivo streaming video: .viv	Windows AVI Video: .avi	Windows Media Video: .wmv
Multimedia Files			
MP4 file: .mp4	Material Exchange File: .mxf	RIFF Multimedia File	Real Networks audio/video: .rm
Archive Files			
7-Zip archive: .7z	ACE archive: .ace	AIN archive: .ain	ARJ archive: .arj
ARX archive: .arx	Android Package: .apk	BAG archive: .bag	BIX archive: .bix
BOA archive: .b58, .boa	BZip2 archive: .bz2	BlackHole archive: .bh	Blink archive: .bli
CPIO archive: .cpio	ChArc archive: .chz	Compress archive: .z	Crush archive: .cru
DEB archive: .deb	FOXSQZ archive: .sqz	GZip archive: .gz	HA archive: .ha
HAP archive: .hap	HPack archive: .hpk	Hyper archive: .hyp	InstallShield CAB archive: .cab
InstallShield Z archive: .z	InstallShield compressed file	JAR archive: .jar	JRC archive: .jrc
LHA/LZARK archive: .lzh	LZA archive: .lza, .lzz	LZOParchive: .lzo, .lzip	LZX archive: .lzx

LIMIT archive: .lim	Microsoft Cabinet archive: .cab	Microsoft Compress compressed file	PAKLEO archive: .pll
QFC archive: .qfc	Quantum archive: .q, .pak	Quark archive: .ark	RAR archive: .rar
RPM archive: .rpm	ReSOF archive: .sof	SAR archive: .sar	SBC archive: .sbc
SQZ archive: .sqz	SZip archive	StuffIt archive: .sit	TAR archive: .tar
UFA archive: .ufa	UHArc archive: .uha	UltraCompressor 2 archive: .uc2	WRaptor archive: .wra
WinImp archive: .imp	Windows Installer Merge Module: .msm	Windows Installer Package: .msi	indows Installer Patch: .msp
Windows Installer Patch Creation File: .pcp	Windows Installer Validation Module: .cub	YAC archive: .yc	YBS archive: .ybs
ZIP archive: .zip	ZOO archive: .zoo	ZZip archive: .zz	iOS Package: .ipa
xz archive: .xz			
Executable/Library/DLL			
DOS Style Executable: .exe	ELF Executable (UNIX)	ELF Library (UNIX)	ELF Module (UNIX)
Java Bytecode: .class	KolibriOS Executable	NetWare Loadable Module: .nlm	Shell Script
UEFI Executable .efi	Windows DLL: .dll	Windows Executable: .exe	Windows 9x Device Driver: .vxd
Windows Device Driver: .sys	Windows OCX File: .ocx		
Development files			
ACUCOBOL object	Borland Delphi Compiled Unit: .dcu	Borland Turbo Pascal compiled Unit: .tpu	C/C++ Source Code: .c
COM Type Library: .tlb	GUI Design Studio project: .gui	LUA Script: .lua	Library: .lib
Microsoft .NET XML Resource template: .resx	Microsoft ClassWizard file: .clw	Microsoft Linker database .ilk	Microsoft Precompiled header: .pch
Microsoft Program database: .pdb	Microsoft Visual C++ project: .mdp	Microsoft Visual Studio Solution: .sln	Microsoft Visual Studio project: .dsp
Microsoft Visual Studio workspace: .dsw	OMF Object library: .lib	PolySpace results: .chk	RDOFF Object File: .rdf
Resource Compiler Script File: .rc	Visual Studio Solution User Options: .suo	Visual Studio Widget File: .wid	Visual Studio Workspace Options file: .opt
VisualBasic Project: .vbproj	WinDev Window: .wdw	Windows Compiled resource (32bit) : .res	XPCOM Type Library: .xpt

Xcode Project: .pbxproj			
Disk images			
Hyper-V virtual disk: .vhdx	JAM compressed disk: .jam	Norton Ghost disk image: .ghs	QEMU virtual disk: .qcow2
R-Drive Image disk image: .rdr	VMware virtual disk: .vmdk	Virtual PC virtual disk: .vhd	VirtualBox virtual disk: .vdi
Other file types			
ABBYY Lingvo dictionary: .lsd	AIX Backup File: .bff	ArtMoney Table file: .amt	CrystalMaker Data File: .cmdf, .cmmf
Dwarf Fortress save data: .dat	EasyCrypto file: .encrypted	Fallout 3 save game: .fos	Java Applet cache index: .idx
Kaspersky Anti-Virus data base: .avc	Kaspersky Anti-Virus report: .rpt	Kaspersky Anti-Virus signature bas: .kdc	Magic 3D Easy View object: .x
Microsoft Security Catalog: .cat	NHTSA UDS-1992 crash test result: .uds	NOD32 Antivirus Update file: .nup	ORTIMZeit project: .ozv
OziExplorer Map data: .map	PRO100 project: .sto	PlayStation 3 Theme: .p3t	RegEdit file: .reg
RegEdit file (UNICODE): .reg	Source Game Engine Compiled AI Nodegraph: .ain	Unreal Package	Valve Texture File: .vtf
WinHelp: .hlp	WinHelp Contents: .cnt	WinXP Prefetch file: .pfp	Windows Backup File: .bkf
Windows Clipboard file: .clp	Windows Color Profile: .icm	Windows Minidump: .dmp, .mdm P	Windows National locale: .nls
Windows Password file: .pwl	Windows Registry hive: .dat, .hiv	Windows Thumbnail cache: .db	Windows User Interface Module: .wim
Windows shortcut: .lnk	X-Plane Scenery: .dsf	XNA Game Data: .xnb	

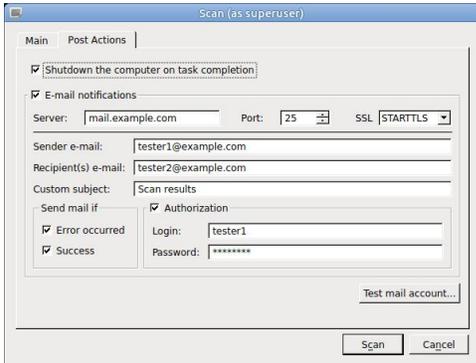
Note: Using scan for Known File Types, **R-Studio for Linux** can successfully recover only un-fragmented files.

You may also specify your own file types for scanning. See [Customizing File Types](#) for details. User-defined file types precede over built-in ones, if their definitions overlap.

You may set the defaults for known file types on the [R-Studio for Linux Settings](#).

R-Studio Technician/T80+

Scan (Post Actions) dialog box

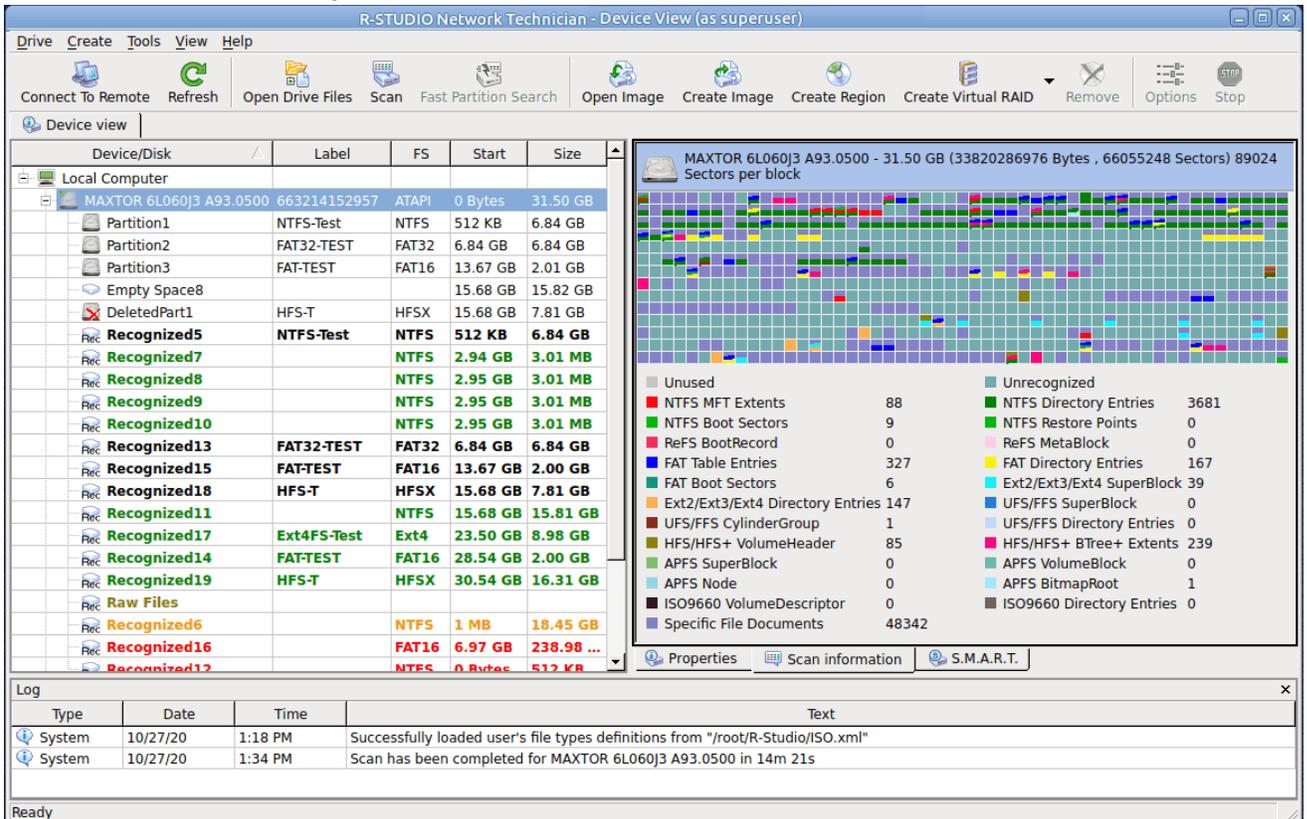


Post Actions Options

Shutdown the computer on task completion	If this check box is selected, R-Studio for Linux will shut down your computer when scan has been completed. You should select the Save to file checkbox and specify a place to save scan info to activate this option.
E-Mail notifications	If this check box is selected, R-Studio for Linux will inform you about the outcome of the operation via email.

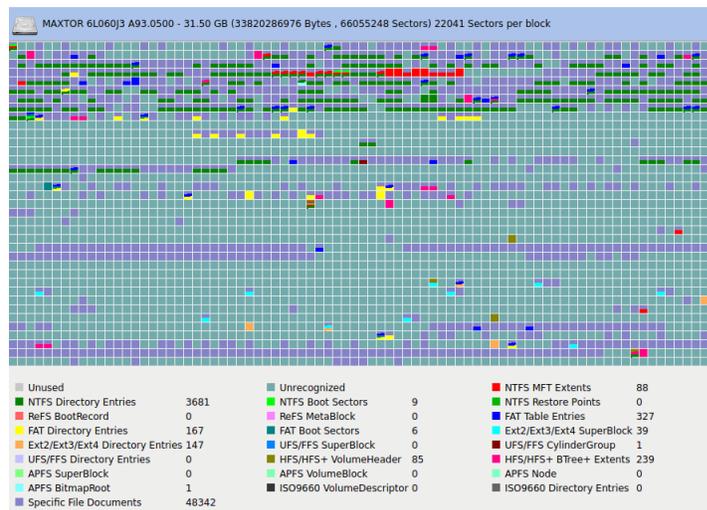
> **R-Studio for Linux** starts scanning the object, and its panel will show information about new found objects:

R-Studio for Linux Main panel



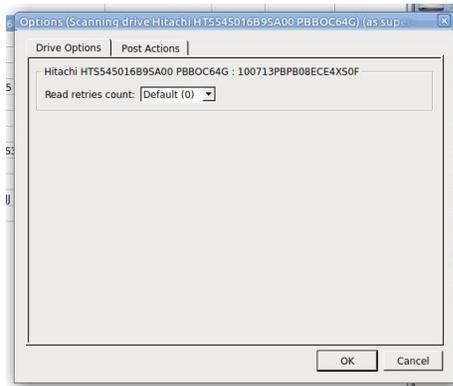
Drives panel after scanning:
You can select an object by clicking on it

Device/Disk	Label	FS	Start	Size
Local Computer				
MAXTOR 6L060J3 A93.0500	663214152957	ATAPI	0 Bytes	31.50 GB
Partition1	NTFS-Test	NTFS	512 KB	6.84 GB
Partition2	FAT32-TEST	FAT32	6.84 GB	6.84 GB
Partition3	FAT-TEST	FAT16	13.67 GB	2.01 GB
Empty Space8			15.68 GB	15.82 GB
DeletedPart1	HFS-T	HFSX	15.68 GB	7.81 GB
Recognized5	NTFS-Test	NTFS	512 KB	6.84 GB
Recognized7		NTFS	2.94 GB	3.01 MB
Recognized8		NTFS	2.95 GB	3.01 MB
Recognized9		NTFS	2.95 GB	3.01 MB
Recognized10		NTFS	2.95 GB	3.01 MB
Recognized13	FAT32-TEST	FAT32	6.84 GB	6.84 GB
Recognized15	FAT-TEST	FAT16	13.67 GB	2.00 GB
Recognized18	HFS-T	HFSX	15.68 GB	7.81 GB
Recognized11		NTFS	15.68 GB	15.81 GB
Recognized17	Ext4FS-Test	Ext4	23.50 GB	8.98 GB
Recognized14	FAT-TEST	FAT16	28.54 GB	2.00 GB
Recognized19	HFS-T	HFSX	30.54 GB	16.31 GB
Raw Files				
Recognized6		NTFS	1 MB	18.45 GB
Recognized16		FAT16	6.97 GB	238.98 MB
Recognized12		NTFS	0 Bytes	512 KB
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	93.13 GB
Partition2			93.13 GB	9.31 GB
/home		Ext4	102.45 GB	493.73 GB

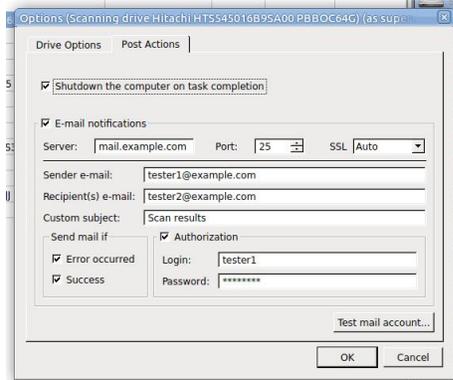


Type	Date	Time	Text
System	10/27/20	1:18 PM	Successfully loaded user's file types definitions from "/root/R-Studio/ISO.xml"
System	10/27/20	1:34 PM	Scan has been completed for MAXTOR 6L060J3 A93.0500 in 14m 21s

The Log pane will show scan progress. Scan may be stopped by clicking the **Stop** button on the toolbar. Later the scan process may be resumed with different scan parameters. Some scan parameters may also be changed during the scan process. Click the Options button and change them on the Scanning dialog box. You may change some options during the scan process

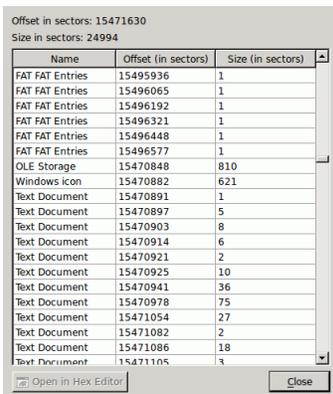


Only in the Technician version



You may see which file object(s) is/are on a particular disk part. Click the corresponding rectangle on the Scan Information pane and view the information on the Scan Information dialog box.

Scan Information dialog box



Double-click an object to view/edit the file object in the [Text/Hexadecimal editor](#).

When an object is scanned, a number of Recognized partitions will appear. **R-Studio for Linux** shows them in different colors depending on which elements of the [partition](#) have been found.

Partition5	An existing logical disk or partition
Recognized5	An existing logical disk or partition after disk scan
Recognized7	A recognized partition. Both boot records and file entries are found for this partition
Recognized6	A recognized partition. Only file entries are found for this partition

 Recognized16	A recognized partition. Only boot records are found for this partition
 Recognized5	A fast found partition
 DeletedPart1	A deleted partition
 Empty Space17	Empty space on the object
Raw Files	Files that have been found using scan for known file types .

Although such recognized partitions are virtual objects, files can be searched for and recovered from recognized partitions as from real [logical disks](#) using [Basic File Recovery](#).

To see the information about a newly found object, simply click it on the Drives panel. Click this link to see the information about the object Recognized1 on the Partition5:

Name	Value
Drive Type	Partition
Name	Recognized1
Size	27.85 GB (58412277 Sectors)
Partition Offset	0 Bytes
Partition Size	27.85 GB (58412277 Sectors)
Recognized FS	
Parsed Boot Records	2
Parsed File Entries	501
Estimated Size	27.85 GB (58412277 Sectors)
FAT Information	
FAT Bits (12,16,32)	32
Cluster Size	16 KB (32 Sectors)
First Cluster Offset	13.91 MB (28480 Sectors)
Root Directory Cluster	2
First FAT Offset	18 KB (36 Sectors)
Size of One FAT Table	6.96 MB (14254 Sectors)
Number of FAT Copies	2
Active FAT copy	Auto

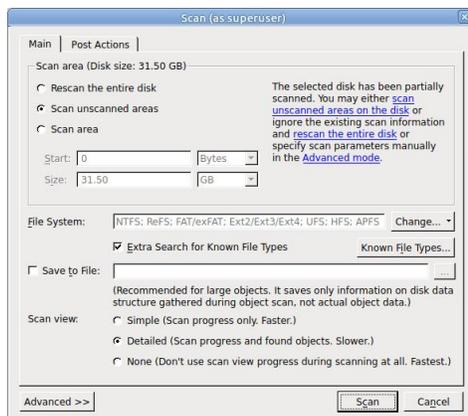
All scanned information may be deleted on the context menu for a scanned object.

Scan information may be saved in a file. Previously saved scan information may be loaded. This can be done on the **Drive** or context menu for a selected object.

Resuming incomplete scans or scanning the object with different parameters

You may resume the scan of an incompletely scanned object or rescan the already scanned object with different parameters. The Scan dialog will be a little bit different in this case.

Scan dialog box for incomplete scans



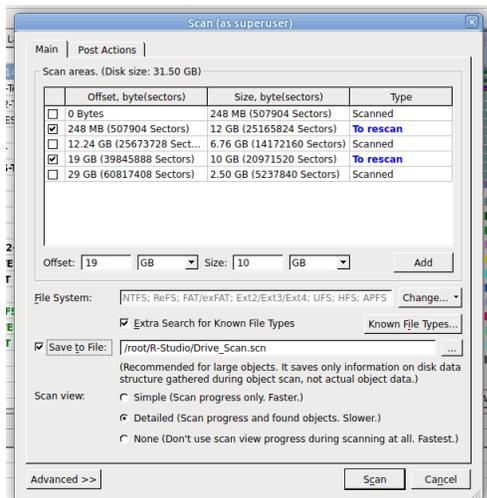
You may rescan the entire disk, scan unscanned areas, or scan an explicitly specified area.

Scan of multiple areas

You may simultaneously scan several successive or overlapping areas. Click the **Advanced** button, specify an offset and size for a new area to scan on the Advanced Scan dialog box and click the **Add** button. You may specify and add several scan areas. You may select which areas should be scanned. Selected scan areas can be

merged. Right-click a necessary area and select either **Merge Down**, **Merge Down All**, and **Merge Selected**. You may also select/unselect unscanned areas.

Advanced Scan dialog box



R-Studio for Linux accumulates the information from successive scans and keeps track of changes in this information obtained from different scans.

You may manage the areas

Managing scan information

Scan information may be saved to a file. Previously saved scan information may be loaded.

To save scan information

- 1 Select an object on the **R-Studio for Linux Drives panel**
- 2 Select **Save Scan Information** on the **Drive** or **context menu** and save the scan information in a file
The default file extension is *.scn.

To load scan information

- 1 Select an object on the **R-Studio for Linux Drives panel**
 - 2 Select **Open Scan Information** on the **Drive** or **context menu** and select the required file with the scan information
The default file extension is *.scn.
- > The scan information will appear in the **Drives panel**

To remove scan information

- 1 Select an object on the **R-Studio for Linux Drives panel**
 - 2 Select **Remove Scan Information** on the **Drive** or **context menu**
- > The scan information will disappear from the **Drives panel**

NEVER TRY TO SAVE SCAN INFORMATION ON THE OBJECT BEING SCANNED!!!
Or you may obtain unpredictable results and lose all your data.

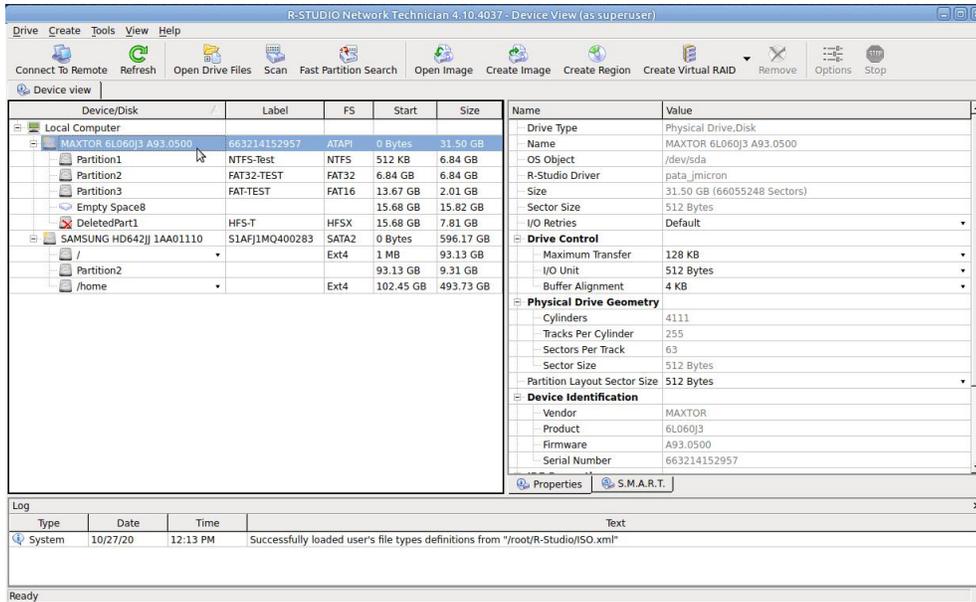
2.2.2 Fast Search for Lost Partitions

[Drive scan](#) gives very detailed and accurate results but takes long time. If you want to find only [partitions](#) previously existed on the disk you may use fast search for lost partitions which is much faster.

To perform fast search for lost partitions,

- 1 Select an object on the R-Studio for Linux's Drives panel

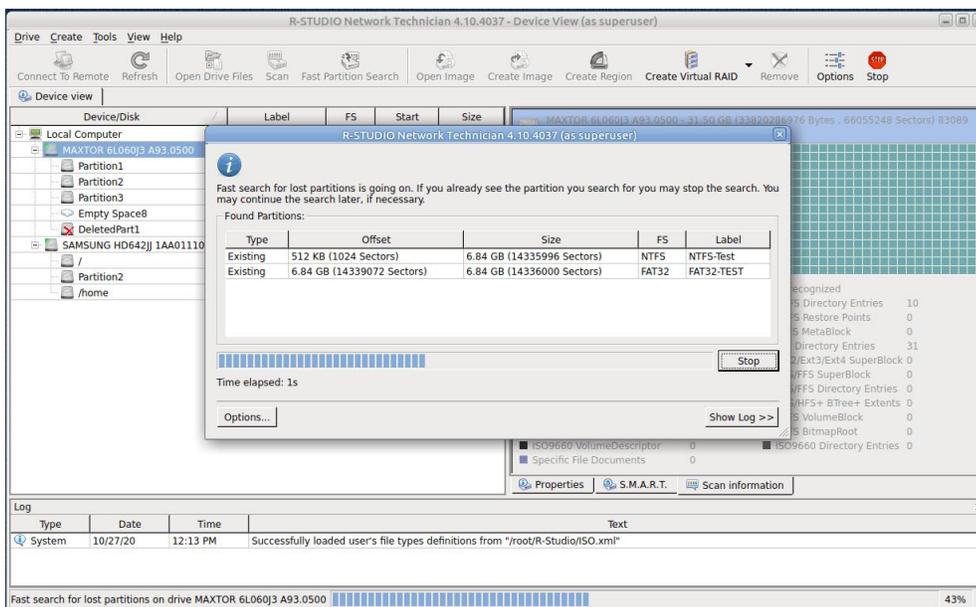
Fast search for lost partitions



- 2 Click the Fast Partition Search button

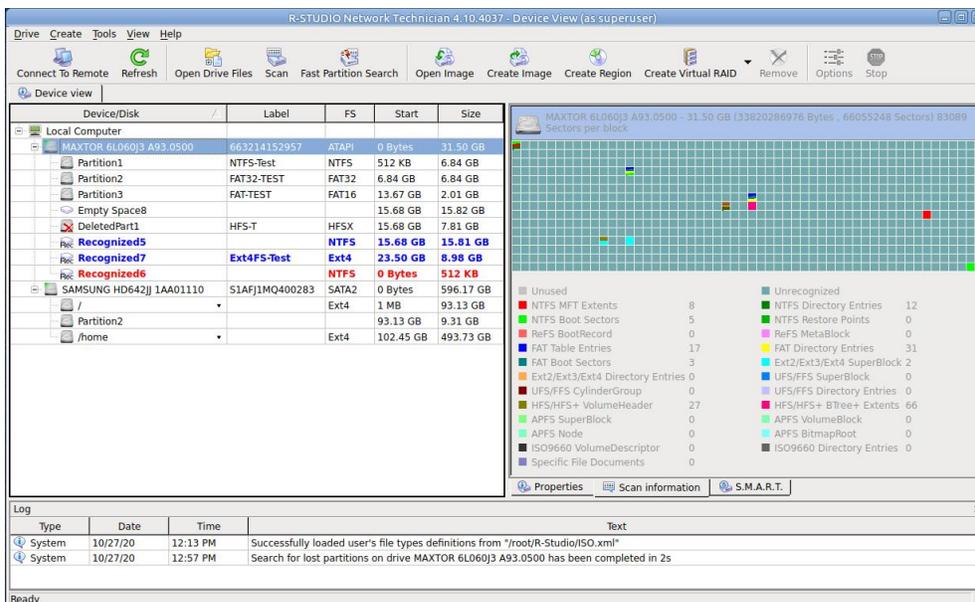
R-Studio for Linux will start searching for lost partitions showing its progress.

Fast search for lost partitions



- > **R-Studio for Linux** will show fast found partitions in blue.

Fast search for lost partitions



You may right-click the partition and select Complete scan to scan the entire disk.

2.2.3 Customizing File Types

You may create your own [known file types](#) and add their file signatures for scanning in Known File Types. They will appear in their respective folders on the [File Types](#) dialog box.

You can do that either by using the **R-Studio for Linux's** graphic interface or by direct editing the known file description file specified on the **R-Studio for Linux** [Main](#) settings dialog box.

Creating a Known File Types using a Graphic User's Interface

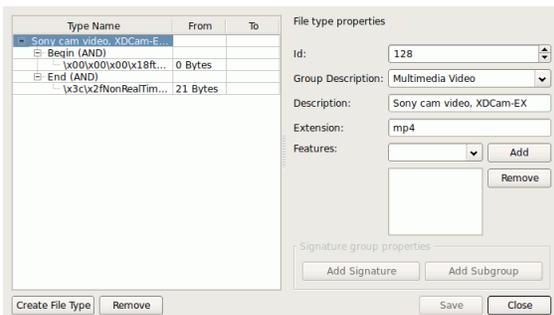
The easiest way to add your own is to use the **R-Studio for Linux's** graphic interface.

To create a Known File Type,

- 1 On the [Known File Types](#) settings dialog box, click the Edit User's File Types... button

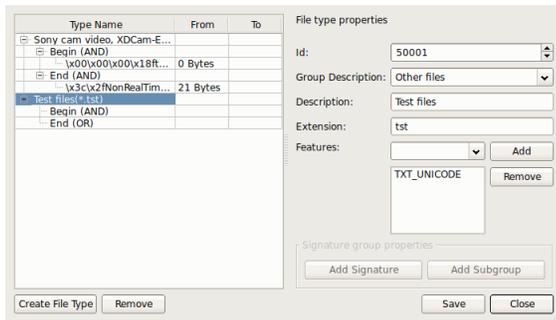
- > The Edit User's File Types dialog box will appear

Edit User's File Types dialog box



2 Click the Create File Types button and specify File type properties

Edit User's File Types dialog box

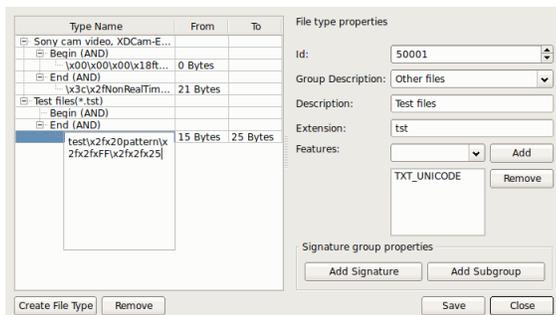


File Types properties

id	digit	Required	Digital file type identifier. Should be unique for each custom file type.
group	string	Optional	Specifies a file type group in which found files will appear. You may specify either your own groups or select those predefined on the File Types dialog box.
description	string	Optional	Brief file description
features	NO_SCAN TXT_ANSI TXT_UNICODE	Optional	Additional properties of the file type. If you want to specify several properties, they should be separated by a space. NO_SCAN: Not to be scanned for. If this flag is used, R-Studio for Linux will not search for such file type. Such files will be shown when sorting files by their extensions. TXT_ANSI: The file can be viewed as ANSI text. If this flag is specified, the file can be correctly represented as an ANSI text. When previewing, this file will be immediately sent to Text? hexadecimal editor . TXT_UNICODE: The file can be viewed as UNICODE text. If this flag is specified, the file can be correctly represented as a UNICODE text. When previewing, this file will be immediately sent to Text? hexadecimal editor .
extension	<string>	Optional	File extension.

3 Click the Add Signature button, specify the signature parameters, and click the Save button

Edit User's File Types dialog box



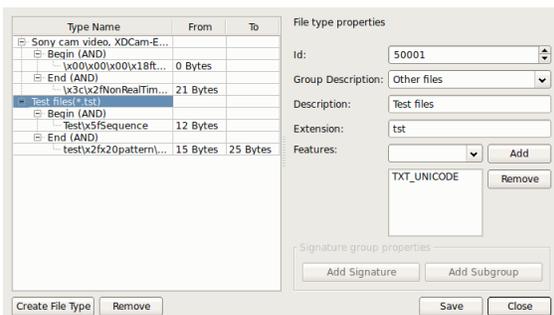
File signature properties

Begin	Specifies from where the signature begins.
End	If End, the offset is from the end of file to the first byte of the signature. That is, if the signature is two bytes long, the offset value should be 2.
AND OR	Shows the order of the logical operation (union or intersection)
From	A decimal number specifying the leftmost possible offset for the file signature.
To	A decimal number specifying the rightmost possible offset for the file signature.

You may specify as many signatures as you need. Moreover, you may specify subgroups within a signature using the **Add Subgroup** button. The structure of such possible subgroups is described on the [Customizing File Types-II](#) help page.

- > **The newly specified file type will appear on the** Edit User's File Types **dialog box and the** [File Types dialog box](#)

Edit User's File Types **dialog box**



2.2.4 Customizing File Types-I

The syntax of signature description is similar to that of the XML language. They are stored in the file specified on the **R-Studio for Linux** [Main](#) settings dialog box.

More advanced features are described in [Customizing File Types-II](#).

Signature file example

```
<?xml version="1.0" encoding="utf-8"?>
<FileTypeList>
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Signature offset="3" count="1">Abc\x5c\x00\x04</Signature>
    <Signature offset="9" count="2">\x23\x01\xf4</Signature>
  </FileType>
</FileTypeList>
```

File structure

File header

The file starts with a standard XML header

```
<?xml version="1.0" encoding="utf-8"?>
```

Section FileTypeList

```
<FileTypeList>
```

It requires a closing element `</FileTypeList>`.

Section FileType

This is a description of each file signature.

Attributes:

id	<u32>	Required	Digital file type identifier. Should be unique for each file type.	
group	<string>	Optional	Specifies a file type group in which found files will appear. You may specify either your own groups or those predefined on the File Types dialog box.	Default: unknown
description	<string>	Optional	Brief file description	Default: null (no description)
features	NO_SCAN TXT_ANSI TXT_UNICODE	Optional	Additional properties of the file type. If you want to specify several properties, they should be separated by a space.	Default: 0
extension	<string>	Optional	File extension.	Default: null (no extension)

File type properties flags

NO_SCAN	Not to be scanned for. If this flag is used, R-Studio for Linux will not search for such file type. Such files will be shown when sorting files by their extensions.
TXT_ANSI	The file can viewed as ANSI text. If this flag is specified, the file can be correctly represented as an ANSI text. When previewing, this file will be immediately sent to Text/?hexadecimal editor .
TXT_UNICODE	File can viewed as UNICODE text. If this flag is specified, the file can be correctly represented as a UNICODE text. When previewing, this file will be immediately sent to Text/hexadecimal editor .

This section can contain an unlimited number of the `Signature` elements. If there are several `Signature` elements, that means that all those signatures are simultaneously present in the file. Such signatures should have different `offset` attributes and they should not overlap.

Element Signature

The element contains a string value of the file signature consisting of ASCII characters and hex bytes in the `\xhh` format, where `hh` is a hexadecimal byte code. If there is not a hexadecimal number after `\x`, `\x` are treated as a part of the string section of the signature

Attributes:

offset	<u16>	Optional	Decimal offset for the signature	Default: 0
count	<u16>	Optional	Decimal number specifying the number of signatures of the same length. Used when several signatures of the same length starting with the same offset can be present in a file.	Default: 1

			In this case they should be sequentially written in the element, and the <code>size</code> attribute specifies the length of signature. <code>count*size</code> should be equal to the number of bytes in the element. If only one signature can be on this offset, <code>count</code> should be equal "1", and <code>size</code> should be equal to the length (the number of bytes) of the signature.	
<code>size</code>	<code><u16></code>	Optional	Decimal number specifying the number of bytes in the signature.	Default: the number of bytes written in the element.
<code>from</code>	<code>begin</code> <code>end</code>	Optional	Specifies from where the <code>offset</code> is calculated. If <code>end</code> , the <code>offset</code> is from the end of file to the first byte of the signature. That is, if the signature is two bytes long, the <code>offset</code> value should be 2.	Default: <code>begin</code>

Comments

```
<!-- Comment string -->
```

An XML standard string for a comment.

2.2.5 Customizing File Types-II

Currently **R-Studio for Linux** supports two versions of file type descriptions. Version 2 extends legacy Version 1 by adding variable signature offsets and AND/OR combination of several signatures in one file type. The version of file type description is specified by the version attribute of the `FileTypeList` section. Version 1 is the default option.

File structure

Elements common to Versions 1 and 2 of file type description

File header

The file starts with a standard XML header

```
<?xml version="1.0" encoding="utf-8"?>
```

Section `FileTypeList`

```
<FileTypeList>
```

Attributes:

<code>version</code>	1.0 2.0	Optional	Version of file type description	Default: 1.0
----------------------	------------	----------	----------------------------------	--------------

It requires a closing element `</FileTypeList>`.

Comments

```
<!-- Comment string -->
```

An XML-standard string for a comment.

Version 1 of file type description

Signature file example

```
<FileTypeList>
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Signature offset="3" count="1">Abc\x5c\x00\x04</Signature>
    <Signature offset="9" count="2">\x23\x01\xf4</Signature>
  </FileType>
</FileTypeList>
```

Section FileType

This is a description of each file signature.

Attributes:

id	<u32>	Required	Digital file type identifier. Should be unique for each file type.	
group	<string>	Optional	Specifies a file type group in which found files will appear. You may specify either your own groups or those predefined on the File Types dialog box. See the table below.	Default: unknown
description	<string>	Optional	Brief file description	Default: null (no description)
features	NO_SCAN TXT_ANSI TXT_UNICODE	Optional	Additional properties of the file type. If you want to specify several properties, they should be separated by a space.	Default: 0
extension	<string>	Optional	File extension.	Default: null (no extension)

File type properties flags

NO_SCAN	Not to be scanned for. If this flag is used, R-Studio for Linux will not search for such file type. Such files will be shown when sorting files by their extensions.
TXT_ANSI	The file can be viewed as ANSI text. If this flag is specified, the file can be correctly represented as an ANSI text. When previewing, this file will be immediately sent to Text/Hexadecimal editor .
TXT_UNICODE	The file can be viewed as UNICODE text. If this flag is specified, the file can be correctly represented as a UNICODE text. When previewing, this file will be immediately sent to Text/Hexadecimal editor .

List of predefined file type groups

Group	Name on the File Types dialog box.
archive	Archive Files
graphics	Graphics/Picture
internet	Internet-related files

multimedia	Multimedia Files
audio	Multimedia: Audio Files
video	Multimedia: Video Files
font	Font
document	Document
doc_database	Document: Database
doc_sheet	Document: Spreadsheet
exe	Executable/Library/DLL
unknown	Other file types

This section can contain an unlimited number of the `Signature` elements. If there are several `Signature` elements, that means that all those signatures are simultaneously present in the file. Such signatures should have different offset attributes and they should not overlap.

Element `Signature`

The element contains a string value of the file signature consisting of ASCII characters and hex bytes in the `\xhh` format, where `hh` is a hexadecimal byte code. If that is not a hexadecimal number after `\x`, `\x` are treated as a part of the string section of the signature

Attributes:

<code>offset</code>	<u16>	Optional	Decimal offset for the signature	Default: 0
<code>count</code>	<u16>	Optional	Decimal number specifying the number of signatures of the same length. Used when several signatures of the same length starting with the same offset can be present in a file. In this case they should be sequentially written in the element, and the <code>size</code> attribute specifies the length of signature. <code>count*size</code> should be equal to the number of bytes in the element. If only one signature can be on this offset, <code>count</code> should be equal to "1", and <code>size</code> should be equal to the length (the number of bytes) of the signature.	Default: 1
<code>size</code>	<u16>	Optional	Decimal number specifying the number of bytes in the signature.	Default: the number of bytes written in the element.
<code>from</code>	<code>begin</code> <code>end</code>	Optional	Specifies from where the offset is calculated. If <code>end</code> , the offset is from the end of file to the first byte of the signature. That is, if the signature is two bytes long, the offset value should be 2.	Default: <code>begin</code>

Version 2 of file type description

Signature file example

```
<?xml version="1.0" encoding="utf-8"?>
<FileTypeList version="2.0">
  <FileType id="5626" group="_Test" description="Test file" extension="tst">
    <Begin combine="and">
      <Signature from="0" to="20">ABC</Signature>
      <Signature offset="1">CDEFG</Signature>
      <AND>
        <Signature offset="0">DE</Signature>
        <Signature offset="0">RTD</Signature>
      <OR>
        <Signature offset="12">CP</Signature>
        <Signature offset="16">RTD</Signature>
      </OR>
    </AND>
  </Begin>
  <End combine="or">
    <Signature from="3" to="20">ABC</Signature>
    <Signature offset="5">CDEFG</Signature>
    <AND>
      <Signature offset="2">DE</Signature>
      <Signature offset="3">RTD</Signature>
    <OR>
      <Signature offset="12">CP</Signature>
      <Signature offset="16">RTD</Signature>
    </OR>
    </AND>
  </End>
</FileType>
</FileTypeList>
```

Section `FileType`

This is a description of each file signature.

Attributes:

Similar to those in Version 1.

The section can contain one element `Begin` and one `End`. It should contain at least one of them.

Example

```
<FileTypeList version="2.0">
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Begin [attributes]>
      ...
    </Begin>
    <End [attributes]>
      ...
    </End>
  </FileType>
</FileTypeList>
```

Sections `Begin` and `End`

Specify the positions of file type signatures in the file.

Attributes

combine	and or	Optional	Shows the order of the logical operation (union or intersection)	Default: and
---------	-----------	----------	--	--------------

These sections can contain one of several elements *Signature*. And one or several elements OR or AND. If there are several elements inside the section they are combined according to the attribute *combine*.

Example:

```
<FileTypeList version="2.0">
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Begin combine="or">
      <Signature [attributes]> ... </Signature>
      ...
      <Signature [attributes]> ... </Signature>
      <AND>
        ...
      </AND>
      <OR>
        ...
      </OR>
    </Begin>
  <End>
  <OR>
    ...
  </OR>
  <Signature [attributes]> ... </Signature>
  ...
  <Signature [attributes]> ... </Signature>
</End>
</FileType>
</FileTypeList>
```

Sections AND and OR

These sections can contain one of several elements *Signature*. And one or several elements OR or AND. If there are several elements inside the section they are combined according to the section type (logical AND or OR).

Example:

```
<FileTypeList version="2.0">
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Begin>
      <Signature [attributes]> ... </Signature>
      ...
      <Signature [attributes]> ... </Signature>
      <AND>
        <Signature [attributes]> ... </Signature>
      <OR>
        <Signature [attributes]> ... </Signature>
      <AND>
        <Signature [attributes]> ... </Signature>
        <Signature [attributes]> ... </Signature>
      </AND>
      <OR>
        <Signature [attributes]> ... </Signature>
        <Signature [attributes]> ... </Signature>
      </OR>
    </Begin>
  <End>
  <OR>
    ...
  </OR>
  <Signature [attributes]> ... </Signature>
  ...
  <Signature [attributes]> ... </Signature>
</End>
</FileType>
</FileTypeList>
```

```

        </OR>
    </OR>
    <Signature [attributes]> ... </Signature>
</AND>
</Begin>
</FileType>
</FileTypeList>

```

Element Signature

The element contains a string value of the file signature consisting of ASCII characters and hex bytes in the `\xhh` format, where `hh` is a hexadecimal byte code. If that is not a hexadecimal number after `\x`, `\x` are treated as a part of the string section of the signature

Attributes:

offset	<u16>	Optional	Decimal offset for the signature	Default: 0
from	<u16>	Optional	Decimal number specifying the leftmost possible offset for the file signature. Ignored if the <code>offset</code> attribute is specified.	Default: undefined
to	<u16>	Optional	Decimal number specifying the rightmost possible offset for the file signature. Ignored if the <code>offset</code> attribute is specified.	Default: undefined
size	<u16>	Optional	Decimal number specifying the number of bytes in the signature.	Default: the number of bytes written in the element.

Example:

```

<FileTypeList version="2.0">
  <FileType id="2" group="archive" description="ARJ Archive" extension="arj">
    <Begin>
      <Signature offset="3">Abc\x5c\x00\x04</Signature>
      <Signature from="9" to="15">\x23\x01\xf4</Signature>
    </Begin>
  </FileType>
</FileTypeList>

```

2.2.6 Regions

Scanning large objects may take a long time. Sometimes, only a smaller area of a disk needs to be scanned or searched for files. Such area is called a *region*. A [region](#) can be created on any object in the **R-Studio for Linux**'s Drives panel.

Created regions can be scanned, and files on them can be recovered in the same way as from hard drives or [logical disks](#).

Created regions can be deleted.

Note: **R-Studio for Linux** does not create anything real on the disk. Regions are virtual objects that do not affect actual data on the disk.

To create a region

- 1 Select an object on the **R-Studio for Linux's** Drives panel and click the **Create Region** button

Other ways to create the region

- Right-click the selected object and select **Create Region** on the context menu
- or
- Select the object and select **Create Region** on the **Create** menu

- 2 Specify required parameters on the **Create region dialog box** and click the **Create** button

Create region dialog box

Region options

Disk size:	Shows size of the object where the region is to be created. The region cannot be larger than this size.
Start:	Start point of the region
Size:	Size of the region. Cannot be larger than Disk size.
Numbers in these fields can be in bytes or sectors. See the Data Formats and Multipliers topic for more details on data formats.	

- > A Region object will appear on the **Drives** panel.

Device/Disk	Label	FS	Start	Size
SAMSUNG HD642...	S1AF1MQ...	SATA2		596.1...
Partition1	Backup	NTFS	31.50...	402.5...
/		Ext4	402.5...	190.7...
Empty Space15			593.3...	992.5...
Partition3			593.3...	2.84 GB
ST3120811AS3.AAE	6PT0J1FH	SATA		111.7...
Partition1	Windows ...	NTFS	31.50...	29.29...
Region 0 on...	Windows XP	NTFS	0 Bytes	16 GB
Direct V...		NTFS	0 Bytes	16 GB
Partition2	Mac OS	HFS+	29 0 Bytes	29...
Partition3		Ext3	58.59...	23.44...
Partition4			82.03...	1.91 GB
Partition5	COMMON	FAT32	83.93...	27.85...
TSS%corp CDW/DV...		ATAPI		1024...
USB 2.0Storage D...		USB...		37.31...
Empty Space17			512 B...	7.84 MB
/media/USB2.0.x	USB2.0 Ext...	NTFS		7.88 MB 37.30...

To remove a region

- * Select a **Region** on the **R-Studio for Linux** **Drives** panel and click the **Remove** button, or Right-click the selected region and select **Remove Region** on the context menu.

To change the size of a region

- * Right-click a **Region** on the **R-Studio for Linux** **Drives** panel, select **Edit** on the context menu, and enter a new size on the **Edit Region dialog box**.

To convert a region into an exclusive one

- * Right-click the **Region** on the **R-Studio for Linux** **Drives** panel and select **Exclude area** on the context menu

To remove a region

- * Select a **Region** on the **R-Studio for Linux** **Drives** panel and click the **Remove** button, or Right-click the selected region and select **Remove Region** on the context menu.

2.2.7 Exclusive Regions

Exclusive regions are areas on any object visible on the **R-Studio for Linux's** Drives panel that are excluded from disk operations. **R-Studio for Linux** never tries to read/write data from/to such area. Exclusive regions are necessary when, for example, there are areas with [bad sectors](#) on a hard drive, and it is necessary to avoid any disk operations with such areas to not inflict further damage to such drive and to speed work with it.

Note: **R-Studio for Linux** does not create anything real on the disk. Exclusive regions are virtual objects that do not affect actual data on the disk.

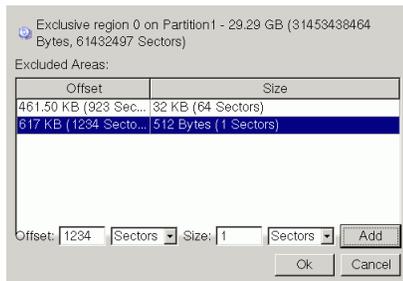
To create an exclusive region

- 1 **Right-click** an object on the **R-Studio for Linux's** Drives panel and select **Create Exclusive Region** on the context menu, or

Select the object and select **Create Exclusive Region** on the **Create** menu

- 2 **Specify required parameters** on the **Create Exclusive Region dialog box** and click the **Add** button

Create exclusive region dialog box



Exclusive Region options

Offset:	Start point of the exclusive region
Size:	Size of the exclusive region. Cannot be larger than Disk size.
Numbers in these fields can be in bytes or sectors. See the Data Formats and Multipliers topic for more details on data formats.	

- > **An Exclusive Region object will appear on the Drives panel.**

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ1...	S1AFJ1MQ...	SAT...	0 Bytes	596.17 ...
Partition1	Backup	NTFS	31.50 ...	402.59 ...
/		Ext4	402.59 ...	190.74 ...
Partition3			593.33 ...	2.84 GB
ST3120811AAS3.AAE	6PT0J1FH	SATA	0 Bytes	111.79 ...
Partition1	Windows XP	NTFS	31.50 ...	29.29 GB
Exclusive region ...	Windows XP	NTFS	0 Bytes	29.29 GB
Direct Volume		NTFS	0 Bytes	29.29 GB
Partition2	Mac OS	HFS+	29.29 ...	29.29 GB
Partition3		Ext3	58.59 ...	23.44 GB
Partition4			82.03 ...	1.91 GB
Partition5	COMMON	FAT32	83.93 ...	27.85 GB
TSSSTcorp CDW/DVD ...		ATAPI	0 Bytes	1024.0...

Its properties can be seen on the Excluded Areas tab.

Excluded Areas	Start	Size
Excluded area 0	461.50 KB	32 KB
Excluded area 1	617 KB	512 Bytes

To remove an exclusive region

- * **Select an Exclusive Region on the R-Studio for Linux Drives panel and click the Remove button, or** Right-click the selected region and select **Remove Region** on the context menu.

To change the size of an exclusive region

- * **Right-click an Exclusive Region on the R-Studio for Linux Drives panel, select Edit on the context menu, and add/remove excluded areas on the Edit Exclusive Region dialog box.**

You may remove an excluded area by right-clicking it and selecting **Remove** on the context menu.

2.2.8 Images

An *image* is an exact, byte by byte, copy of any object on the Drives panel. When created, images can be processed like their original objects.

Images are very useful if there is a risk of total data loss due to hardware malfunction. If bad blocks are constantly appearing on a hard drive, you must immediately create an image of this drive. All data search, scan and restoring can be done from this image.

While creating images, **R-Studio for Linux** can simultaneously perform disk scan and save scan information to lessen time necessary to process the disk.

The image can be saved on the remote computer if it is created [via network](#). **R-Studio for Linux** can also load and process images created with the **DeepSpar Disk Imager™**.

To create an *image*,

- 1 **Select an object on the R-Studio for Linux's Drives panel and click the Create Image button**

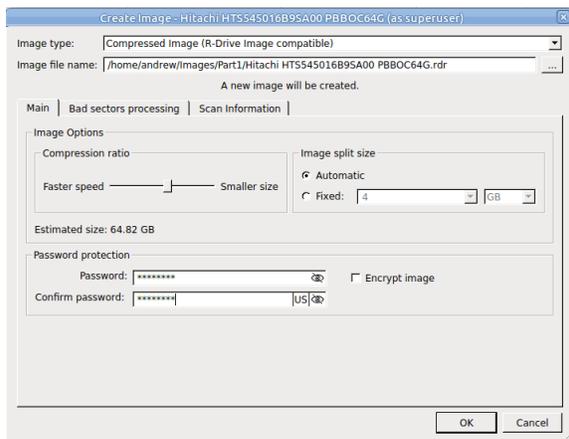
▣ **Other ways to create the image**

- Select the object and select **Create Image** on the **Drive** menu
- OR
- Right-click the selected object and select **Create Image File** on the context menu

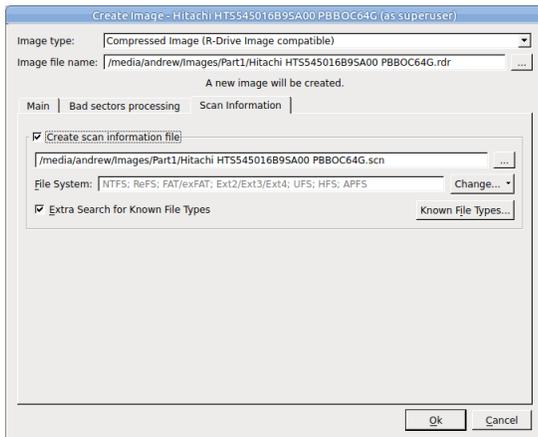
- 2 **Specify image options, a file name, and destination for the *image* on the Create Image dialog box**

Note: To store an image file, you need a [free space](#) equal to at least the object size.

Create Image (Main) dialog box



Create Image (Scan Information) dialog box



Create Image (Advanced) dialog box

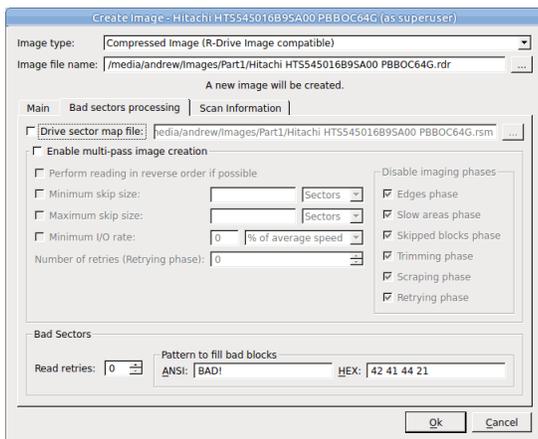
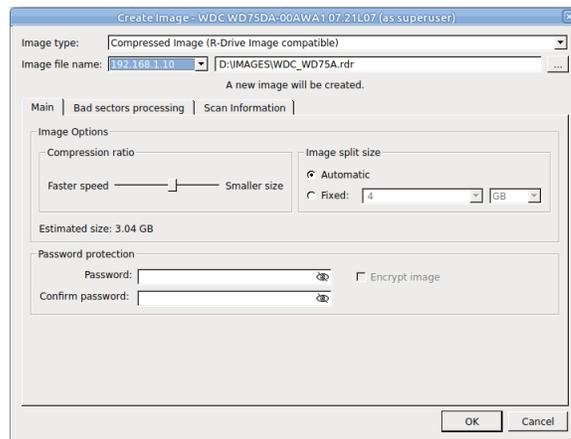


Image Options

Image name	Specifies the name and path for the image file
Image type:	<p>Compressed image (R-Drive Image compatible): If this option is selected, R-Studio will create an image file which can be compressed, split into several parts, and password-protected. This image file is fully compatible with the images created by R-Drive Image, but incompatible with very old versions of R-Studio.</p> <p>Byte by byte image to a file: If this option is selected, R-Studio will create a simple exact copy of the object.</p> <p>VMDK (VMware Virtual Machine Disk) image: If this option is selected, R-Studio will create an image of the VMware virtual disk type. Available in the Corporate, Technician, and T80+ license.</p> <p>Byte to byte image to a physical disk: R-Studio will create an exact copy of the disk on another hard drive. Data on the target drive will be overwritten. Available in the Corporate, Technician, and T80+ license.</p> <p>Some other image formats are also available in the Technician, and T80+ licenses. You may read more about these formats in the Supported Virtual Disk and Disk Image Formats page.</p>

Image compression ratio	You may compress the data in the image to save space. Active only if the Compressed image (R-Drive Image compatible) is selected.
Estimated size	Shows the estimated size of the image file. An actual image size depends on how much empty space is on the selected partition and what file types are there. Active only if the Compressed image (R-Drive Image compatible) is selected.
Image split size	You may set this option to Automatic and let the OS decide how to split the image file. This mostly depends on the file system on the destination disk. You may also either explicitly specify the split size, or choose a preset for various devices with removable storage. Select Fixed size for that. Active only if the Compressed image (R-Drive Image compatible) is selected.
Password Encrypt image	You may protect your image file with a password. Note: If you leave the Encrypt image option clear this feature will provide a relatively moderate protection against conventional unauthorized access. If this option is selected, R-Studio will encrypt the image using the AES-XTS algorithm. Note: Only files in the RDR format can be password protected and encrypted.
Create scan information file	If this option is selected, R-Studio for Linux will perform disk scan simultaneously with image creation. See the Disk Scan help page to learn scan options.
Read retries	Specifies a value for I/O Tries, or how many times R-Studio for Linux will try to read a bad sector . R-Studio for Linux treats bad sectors in the following way: It reads a certain part of disk (predefined by Windows) and <ul style="list-style-type: none"> • If Default read attempts is set to 0, the entire part with bad sectors will be filled with the specified pattern. • If Default read attempts is set to a non-zero value, R-Studio for Linux reads again that part sector by sector, repeating the attempts the specified number of times. If R-Studio for Linux still cannot read a bad sector, it fills the sectors with the specified pattern. In this case only the bad sectors will be filled with the pattern, but that extremely slows the disk read process. For example, if you set Default read attempts to 1, a bad sector will be read 2 times.
Pattern to fill bad blocks	Specifies a pattern R-Studio for Linux will use to fill bad sectors in this image. You may specify the pattern either in the ANSI or Hex data format. Note: R-Studio for Linux will never ever try to write anything on the disk from which data is to recover or an image is to create. This pattern fills bad sectors only in the image.
Drive sector map file Enable multi-pass image creation	These options are available only in the Technician/T80+ versions. Read more about these options in the I/O Monitor and Sector Map files and Multi-pass imaging help page.

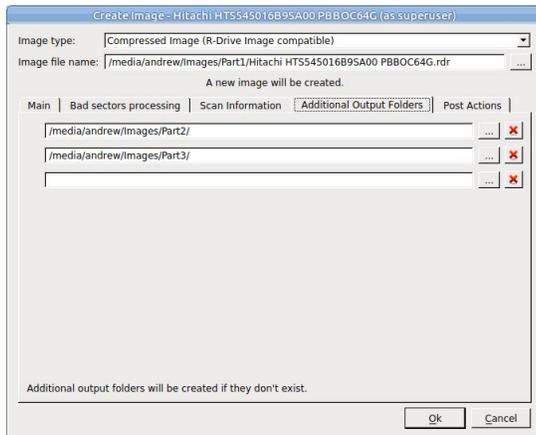
If a remote computer is connected for [Data Recovery over Network](#), the Save Image File dialog box will appear when you select a place to store the image. You may save it to the local or remote computer.



R-Studio Technician/T80+

These options are available only in the **Technician/T80+** versions.

Create Image (Additional output folders) dialog box

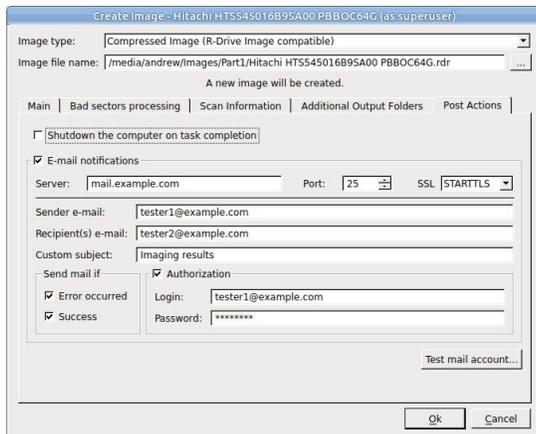


Additional output folders

Additional output folders

Additional output folders where image files will be stored when **R-Studio for Linux** runs out of space.

Create Image (Post Actions) dialog box



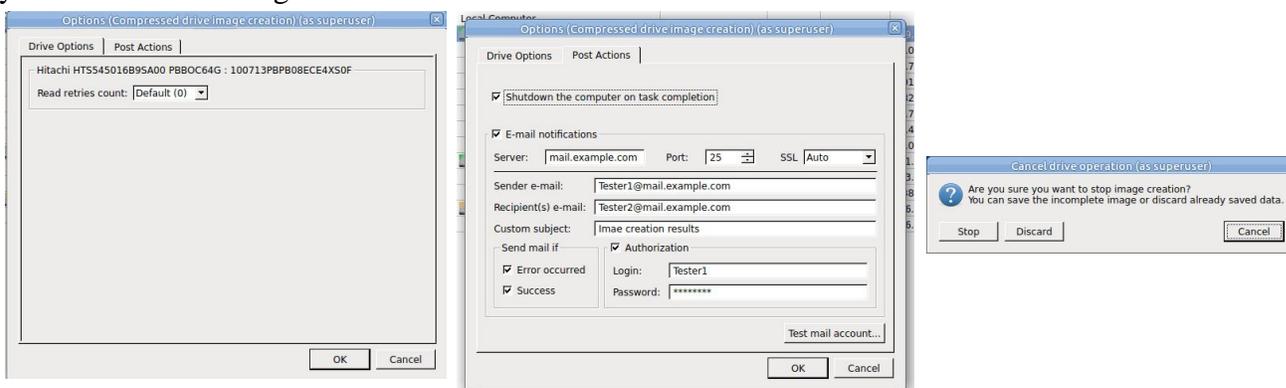
Post Actions Options

Shutdown the computer on task completion	If this check box is selected, R-Studio for Linux will shut down your computer when image creation has been completed.
E-Mail notifications	If this check box is selected, R-Studio for Linux will inform you about the outcome of the operation via email.

> **R-Studio for Linux** will start creating the image, the Progress message showing the progress.

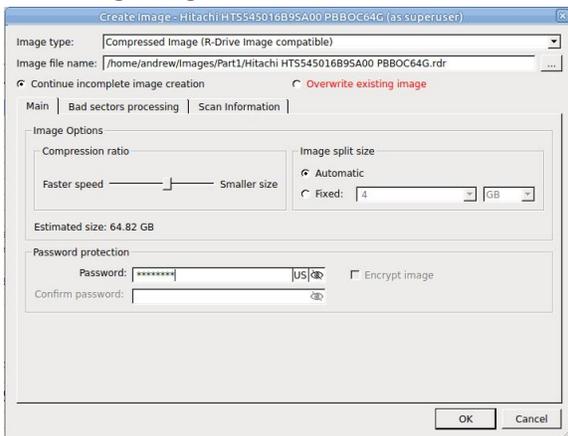
You may change some options during the imaging process. Click the **Options** button and change them as necessary/

You may stop the imaging process and then resume it later on. Click the **Stop** button and the Cancel drive operation dialog box will appear. Select **Stop** if you want to keep the partially created image or **Discard** if you don't need this image file.



To resume the creation of the image for the same object, select the same file name for the image. You'll be able to create a new image file or continue to create the image for the object.

Resuming image creation



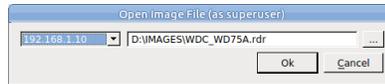
R-Studio for Linux will create a new file for every new start of imaging for the `.rdr` and `.vmdk` file types.

To process an already created *Image*, the image file should be opened.

To open an image

- 1 Click the **Open Image** button, or
Select **Open Image File** on the **Drive** menu

If a remote computer is connected for [Data Recovery over Network](#), the Open Image File dialog box will appear when you select a place to load the image file from. You may load it from the local or remote computer.



2 Select the required image file

If the image is a multi-volume one, and not all parts are at the same place, the dialog box will appear

Multi-volume image dialog box



Specify paths to other image parts and click the OK button.

> An *Image* object will appear on the Drives panel

Depending whether this is a [byte-by-byte](#), compressed (**R-Drive Image** compatible), multi-volume, or VMDK image, its appearance in the Drives panels is different.

You may perform all data search, scan, and recovery from this image as it were a regular drive/disk object.

Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2	0 Bytes	111.79 GB
/		Ext4	1 MB	103.41 GB
Partition1			103.41 GB	8.38 GB
SAMSUNG HD642Jj 1AA01110	S1AF1MQ400283	SATA2	0 Bytes	596.17 GB
/home		Ext4	1 MB	596.17 GB
Image				
WDC WD75AA-00BAA0 10.09K11	WD-WMA2L2883101	ATAPI	0 Bytes	7.02 GB
Partition1	NTFS-Test	NTFS	32 KB	2.93 GB
Partition2	FAT32-TEST	FAT32	2.93 GB	2.03 GB
Partition3	FAT-TEST	FAT16	4.96 GB	2.01 GB
Empty Space13			6.96 GB	60.45 MB

A compressed (R-Drive Image compatible) image

Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2	0 Bytes	111.79 GB
/		Ext4	1 MB	103.41 GB
Partition1			103.41 GB	8.38 GB
SAMSUNG HD642Jj 1AA01110	S1AF1MQ400283	SATA2	0 Bytes	596.17 GB
/home		Ext4	1 MB	596.17 GB
Image Files				
/home/andrew/Images/WDC WD75AA-00BAA0 10.dsk				7.02 GB
Partition1	NTFS-Test	NTFS	32 KB	2.93 GB
Partition2	FAT32-TEST	FAT32	2.93 GB	2.03 GB
Partition3	FAT-TEST	FAT16	4.96 GB	2.01 GB
Empty Space12			6.96 GB	60.45 MB

A byte by byte image

Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2	0 Bytes	111.79 GB
SAMSUNG HD642Jj 1AA01110	S1AF1MQ400283	SATA2	0 Bytes	596.17 GB
WDC WD20SP2X-08UA7 02.01A02	WD-WXV2EC05PPLj	SATA2	0 Bytes	1.82 TB
/media/andrew/Images		exFAT	1 MB	1.82 TB
Image				
04/04/2022 15:30:24 - Incomplete				
Hitachi HTS545016B9SA00 PBBOC64G	100713PBPB08ECE4X50F	SATA2	0 Bytes	149.05 GB
Partition1	NTFS-Test	NTFS	512 KB	52.03 GB
Partition2	FAT32-TEST	FAT32	52.04 GB	36.78 GB
Partition3	FAT-TEST	FAT16	88.82 GB	2.01 GB
Empty Space19			90.83 GB	58.22 GB
04/04/2022 16:23:53				
Hitachi HTS545016B9SA00 PBBOC64G	100713PBPB08ECE4X50F	SATA2	0 Bytes	149.05 GB
Partition1	NTFS-Test	NTFS	512 KB	52.03 GB
Partition2	FAT32-TEST	FAT32	52.04 GB	36.78 GB
Partition3	FAT-TEST	FAT16	88.82 GB	2.01 GB
Empty Space26			90.83 GB	1.82 MB
Partition4	EXFAT	FAT32	90.83 GB	11.72 GB
Partition5	HFS	HFSX	102.55 GB	21.48 GB
Partition6	EXTFS	Ext4	124.03 GB	25.02 GB

A multi-volume image

Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G 03090005	50026B77843A5628	SATA2	0 Bytes	111.79 GB
/		Ext4	1 MB	103.41 GB
Partition1			103.41 GB	8.38 GB
SAMSUNG HD642JJ 1AA01110	S1AFJ1M0400283	SATA2	0 Bytes	596.17 GB
/home		Ext4	1 MB	596.17 GB
Image				
WDC WD75AA-00BAA0 10.09K11	WD-WMA2L2883101	Local	0 Bytes	7.02 GB
Partition1	NTFS-Test	NTFS	32 KB	2.93 GB
Partition2	FAT32-TEST	FAT32	2.93 GB	2.03 GB
Partition3	FAT-TEST	FAT16	4.96 GB	2.01 GB
Empty Space13			6.96 GB	60.46 MB

A VMDK image

To close an image

- * **Select the image and click the Close Image button,**
 - or right-click the image and select **Close Image** on the shortcut menu
 - or select the image and press the **F8** key.



To close all image

- * **Select Close All Images on the Tools menu**

A [logical disk](#) (or disks) containing in an image can be mounted in the operating system as a device which makes its content accessible to any program including any other data recovery software.

2.2.9 Wiping Objects

Disk objects can be [wiped](#) in order to completely destroy its data.

Supported Wipe Algorithms

File wiping is necessary only for files stored on conventional hard drives. Files stored on new [SSD storage devices](#) cannot be effectively wiped out due to the principles of operation of these devices.

Currently **R-Studio** supports 6 wiping algorithms:

Zeroes	The disk object or file is filled with zeroes through 1 pass. The fastest but the least secure algorithm. Also it does not conceal the fact that the disk or file has been wiped.
Pseudo-random numbers	The disk object or file is filled with pseudo-random numbers through 1 pass. A slower but little bit more secure algorithm than the Zeroes algorithm and it also conceals to some degree the fact that the disk or file has been wiped.
DoD 5220.22-M(3)	The disk object or file is wiped using Department of Defense standard 5220.22-M(3). Provides high-grade data wiping filling the unused space or file with a special digital pattern through 3 passes This algorithm is very secure, but slow.
DoD 5200.28-STD(7)	The disk object or file is wiped using Department of Defense standard 5200.28-STD(7). Provides high-grade data wiping filling the unused space or file with a special digital pattern through 7 passes. This algorithm is very secure, but very slow.

Bruce Schneier(7)	The disk object or file is wiped using the Bruce Schneier(7) algorithm. The first pass overwrites the drive with the bit pattern "00", the second with "11", and the next five with a randomly generated bit pattern. This algorithm is very secure, but very slow.
Peter Gutmann (35)	The disk object or file is wiped using the Peter Gutmann's algorithm. Provides high-grade data wiping filling the unused space or file with a special digital pattern through 35 passes. This algorithm is military-level secure, but horribly slow.

What algorithm is to choose, depends on your specific needs. All of these wiping algorithms make recovery of wiped data with any software-based data recover utility impossible. So if you want to protect your information from a casual snooper, you may safely choose either the **Zeroes** or **Pseudo-random numbers** algorithm. The latter also conceals the fact that you wiped the data.

If you want more security, you need to know the following:

There are some techniques for recovery of wiped data. These techniques are based on the fact that magnetic medium on the hard drive's platters "store" some information about previously written data. Such information cannot be completely removed. Wiped data may be recovered even from mechanically damaged platters. So the only safe way to completely remove data from a hard drive is to mechanically grind the magnetic medium off the drive platters or dissolve them in special chemical solvents.

But in order to recover the wiped data using one of these techniques, a hard drive must be disassembled, its platters placed in a precise magnetic field measurement system, and the results of such measurement statistically processed. All that is very expensive and requires a very qualified and experienced personnel and a specially developed equipment. Only a very advanced organization such as a law enforcement or intelligence agency of a developed nation, or a special high-tech firm can afford this. Moreover, each successive wiping pass makes such data recovery much and much harder. So, the **DoD 5220.22-M(3)** clearing and sanitizing standard overwriting the data with a special pattern through 3 passes is a rather reliable and safe choice for this case.

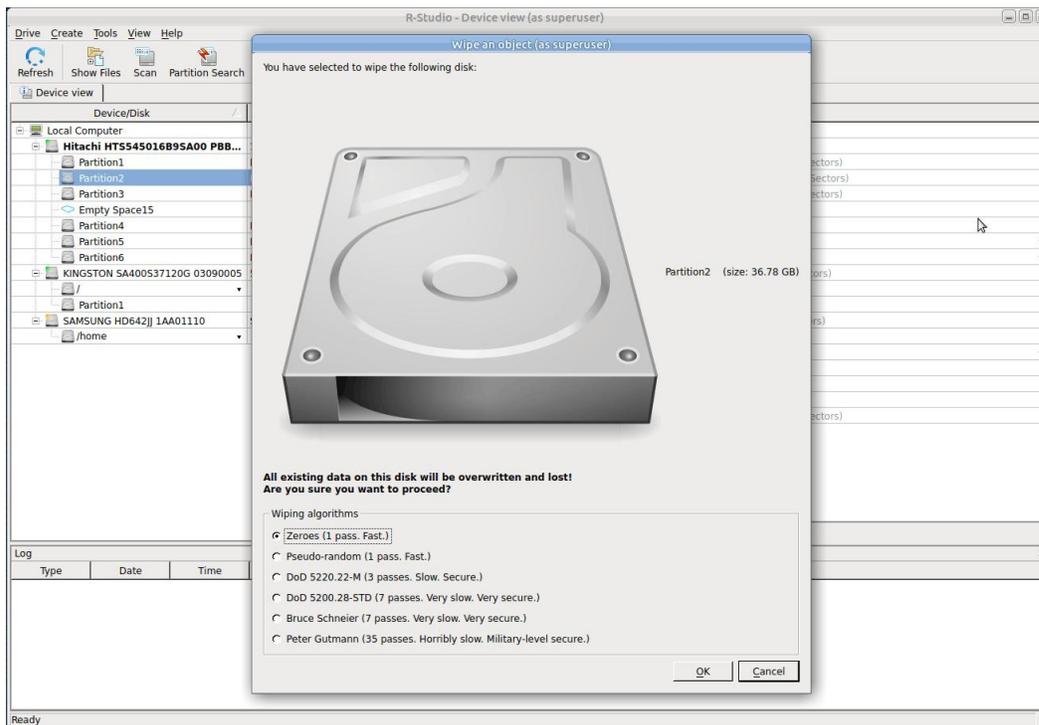
If you need the ultimate security, use the **DoD 5220.22-M(7)** clearing and sanitizing standard, the **Bruce Schneier(7)**, or even the **Peter Gutmann (35)** wiping algorithms. They render data almost unrecoverable, but they are extremely slow.

Wiping Disk Objects:

To wipe a disk object,

- 1 Right-click the disk object in the Device view pane and select Wipe...**
- > The Wipe an object dialog box will appear.**

Wiping Disk Objects



- 2 Select the desired wiping algorithms and click the OK button.
- > R-Studio for Linux will start wiping the object.

2.3 Mass File Recovery

Recovery of multiple files

If you need to recover multiple files you may do it through the following steps:

- 1 Find and mark all the necessary files
Go to the [Find and Mark Multiple Files](#) topic for more information
- 2 Recover all marked files in a single file recovery step
Go to the [Recover Multiple Files](#) for more information

Memory considerations

R-Studio for Linux stores information about found files in computer memory. If there are too many files, **R-Studio for Linux** may run out of it. To avoid this, you have two options:

Recover all files

If you want to recover data from an entire file system object (a [logical disk](#), [partition](#), partition image, etc.), you may use the **Recover All Files** command from the **Drive** or context menu. Right click the object in the Drives panel to access the context menu. A [Recover](#) dialog box will appear. Select required restore settings, including file mask. This command restores unlimited number of files without memory restrictions.

View file information in steps

As soon as **R-Studio for Linux** nearly runs out of memory, a Too many files... message appears. You may temporarily stop file listing and browse through found files. Then you can resume file listing. You also may skip this file section and continue file listing.

In all cases, **R-Studio for Linux** keeps information about the entire file structure.

- [Find and Mark Multiple Files](#)
- [Recover Multiple Files](#)

2.3.1 Find and Mark Multiple Files

If you need to find and mark many files at once, you may do that in the following ways:

By sorting them by their extensions or creation/modification/accessed time

To sort files by their extensions or creation/modification/accessed time,

* On the Folders/Piles panel select the tab

Extensions to sort the files by their extensions

Creation Time to sort the files by their creation time

Time

Modification Time to sort the files by their modification time

Time

Accessed Time to sort the files by their accessed time

Time

Other ways to sort files by their extensions or creation/modification/accessed time

- Select the disk on Drives panel, select **Open Drive Files Sorted By** on the **Drive** menu, and select the respective option,

or

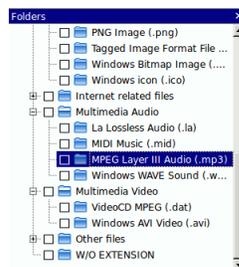
- On the Drives panel, right-click the disk and select **Open Drive Files Sorted By** on the context menu and select the respective option,

or

- On the Folders panel, right-click the disk letter and select **Show Files Sorted By** on the context menu and select the respective option,

> **R-Studio for Linux will show the sorted files in the Folders and Content panels, showing the path to each file:**

Folders panel for files sorted by their extensions



Content panel with files/folders sorted by their extensions

Name	Path	Size	Created	Modified
<input type="checkbox"/> ?UTTIN-1.MP3	Root/MUSIC/	4451512...	5/26/08 ...	12/13/06...
<input type="checkbox"/> 75_39.mp3	Root/Sp3/...	5056050...	5/24/07 ...	1/1/02 5...
<input type="checkbox"/> 75_39.mp3	Root/Sp3/...	5056050...	5/24/07 ...	1/1/02 5...
<input type="checkbox"/> 001 Bill Haley - Rock Around The Clock...	Root/Sp3/...	4124672...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 002 Brenda Lee - Dynamite.mp3	Root/Sp3/...	3842048...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 002 Brenda Lee - Dynamite.mp3	Root/Sp3/...	3842048...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 004 Connie Francis - He's Just A Scienti...	Root/Sp3/...	2932736...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 004 Connie Francis - He's Just A Scienti...	Root/Sp3/...	2932736...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 007 Connie Francis - Someone Else's Bo...	Root/Sp3/...	3334144...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 007 Connie Francis - Someone Else's Bo...	Root/Sp3/...	3334144...	5/24/07 ...	5/10/06 ...
<input type="checkbox"/> 01 - Band on the Run.mp3	Root/Sp3/1/	6201104...	5/24/07 ...	4/11/00 ...
<input type="checkbox"/> 01 - Band on the Run.mp3	Root/Sp3/1/	6201104...	5/24/07 ...	4/11/00 ...
<input type="checkbox"/> 01 - La donna e mobile-rigoletto.mp3	Root/Recy...	6129015...	12/25/09...	3/1/06 9...
<input type="checkbox"/> 01 - La Donna e mobile.mp3	Root/Recy...	6473732...	12/25/09...	9/24/07 ...

To return to the conventional view,

- * On the Drives panel, right-click the logical disk, select Open Drive Files Sorted By on the context menu, and select Real File System Structure,
 - or
 - On the Folders panel, select Show Files Sorted By on the Drive menu and select Real File System Structure
 - or
 - Click the Real tab

By finding and marking multiple files using the Find/Mark dialog box

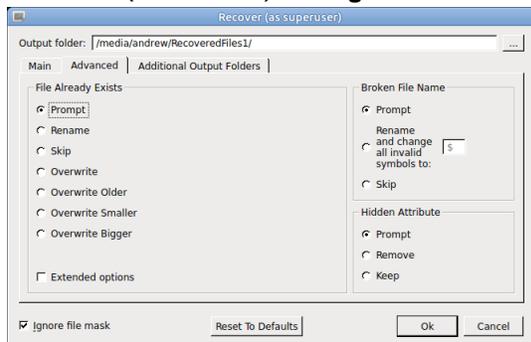
You may find and mark all the files on the entire disk by using Mark matched files in the Find/Mark mode option. You may specify all the necessary search options and mark all the found files. Please note that each find and mark/unmark operation is independent from previous ones. That is, if a file matches the search criteria, it will be marked/unmarked regardless of its previous marked/unmarked state.

For example, if you first mark all doc files, and then all txt files, all doc files remain marked, too. If you then decide to unmark all files smaller than 2 kB, all doc and txt files will stay marked except those that less than 2 kB.

2.3.2 Recover Multiple Files

If **R-Studio for Linux** while recovering files encounters either an already existing file or file with a broken name, normally it will stop working and ask you what to do with the file. If you recover multiple files, that may require you answer a lot of the same questions. You may use Mass File Recovery Options on the [Recover](#) dialog box to instruct **R-Studio for Linux** what to do in those cases for all files.

Recover (Advanced) dialog box



Advanced file recovery options

File Already Exists	These options instruct R-Studio for Linux what to do if there already exists a file with the same name.
---------------------	--

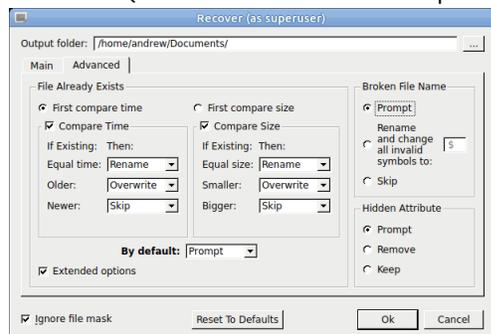
Extended options	If this option is selected, more advanced options become accessible to process multiple duplicates of the file.
Prompt	If this option is selected, R-Studio for Linux asks the user what to do for each such file. It stops file recovery until it receives the answer.
Rename	If this option is selected, R-Studio for Linux adds a File ID to the file name. If a file already exists with the same name and that file ID, a number will be added to the file name and file ID.
Skip	If this option is selected, R-Studio for Linux skips all new files with the same name.
Overwrite	If this option is selected, R-Studio for Linux overwrites the existing file with the new one.
Overwrite Older	If this option is selected, R-Studio for Linux overwrites the existing file with the new one if the existing file is older than the new file. The time stamp used is Modified.
Overwrite Smaller	If this option is selected, R-Studio for Linux overwrites the existing file with the new one if the existing file is smaller than the new file. The time stamp used is Modified.
Overwrite Bigger	If this option is selected, R-Studio for Linux overwrites the existing file with the new one if the existing file is bigger than the new file. The time stamp used is Modified.
Broken File Name	These options instruct R-Studio for Linux what to do if a file to be recovered appears to have an invalid name.
Prompt	If this option is selected, R-Studio for Linux shows the standard Broken File Name dialog box for each file with a broken file name. It stops file recovery until it receives the answer.
Rename and change all invalid symbols to:	If this option is selected, R-Studio for Linux changes all invalid characters to the character specified.
Skip	If this option is selected, R-Studio for Linux skips all files with broken file names.
Hidden Attribute	These options instruct R-Studio for Linux what to do if a file to be recovered appears to have the Hidden attribute.
Prompt	If this option is selected, R-Studio for Linux asks the user what to do with the attribute. It stops file recovery until it receives the answer.
Remove	If this option is selected, R-Studio for Linux removes the Hidden attribute from all files.
Keep	If this option is selected, R-Studio for Linux keeps the Hidden attribute for all files.

Extended options

These options give you more flexible ways to process multiple files with the same name. You may compare files by time (Modified) and size, and decide what **R-Studio for Linux** should do with those duplicates. If

any of the files has an invalid time, the comparison by time is skipped. In this case, if comparison by size is not active, **R-Studio for Linux** goes to the default action..

Recover (Advanced - Extended options) dialog box



Extended advanced file recovery options

First compare time First compare size	These options instruct R-Studio for Linux which condition to use first, file time or size.
Compare time Compare size	These options instruct R-Studio for Linux to enable comparison by time and size..
Actions	These selectable actions instruct R-Studio for Linux what to do if the condition is met.
Empty field	If this option is selected, R-Studio for Linux skips the condition.
Prompt	If this option is selected, R-Studio for Linux asks the user what to do for each such file. It stops file recovery until it receives the answer.
Rename	If this option is selected, R-Studio for Linux adds a File ID to the file name. If a file already exists with the same name and that file ID, a number will be added to the file name and file ID.
Skip	If this option is selected, R-Studio for Linux skips all new files with the same name.
Overwrite	If this option is selected, R-Studio for Linux overwrites the existing file with the new one.
Time conditions	If the Modified time stamp is invalid, R-Studio for Linux will skip the comparison.
Equal time	Two time stamps are the same.
Older	The existing file is older than the new one.i
Newer	The existing file is newer than the new one.i
Size conditions	
Equal size	Two files have the same size.
Smaller	The existing file is smaller than the new one.i
Bigger	The existing file is bigger than the new one.i
By default	The action R-Studio for Linux takes when none of the comparison conditions have been met. That may happen when the comparison by size is not enabled.

2.3.3 File Recovery Lists

You may create a file containing a list of files and folder found on a disk/partition. Then such file may be manually edited to specify files to recover and then loaded back into **R-Studio for Linux**. **R-Studio for Linux** will automatically mark the files in this list for recovery. Such file lists recovery are very useful, for example, when it is necessary to have such file lists approved for recovery by someone else who is far away from the computer where **R-Studio for Linux** is running.

You may create file recovery lists for the entire disk or for specific folders. Moreover, you may create a file recovery list for all files within the disk/folder, or for marked files/folders only.

All versions of **R-Studio for Linux** can create recovery lists in the plain text format with basic functionality. **R-Studio Technician/T80+** can create [custom recovery lists](#) in other formats with more advanced options

Creating a simple recovery list

To create a recovery list

1 For an entire disk, select Export Recovery List on the File menu, or

Right-click the uppermost folder (higher than **Root**, usually the letter or the name of the disk) and select **Export Recovery List** on the shortcut menu.

For a specific folder, right-click the folder and select Export Recovery List on the shortcut menu.

2 Specify the place to save the recovery list and other necessary options on the Export Recovery List dialog box

Export Recovery List dialog box



Options dialog box



Export Recovery List options

Export the entire folder/file tree Export marked file/folder names Export file/folder names	Specifies which file and folder names will be exported.
File format:	A file format for the recovery list. Only text format is available for the standalone and corporate versions. R-Studio Technician/T80+ can create custom recovery lists in other formats with more advanced options The following formats are available for R-Studio Technician/T80+ version: Plain Text HTML XML JSON CSV

File name:	Specifies a file name of the recovery list.
------------	---

Editing the file recovery list

All files without any marks in the recovery list will be marked when the list is loaded into **R-Studio for Linux**. So, if you have some files in the recovery list that don't need to be recovered, just delete them from the list. In addition, you may use the following marks to specify some options

- :+ Mark the file, or the folder, all its files, and subfolders within the folder.
- :* Mark the file, or the folder and its files, don't mark subfolders in the folder.
- :- Unmark the file, or the folder, its files, and subfolders in the folder.
- = Unmark the file or the folder and its files, dont unmark subfolders in the folder.
- ! Provide the information on the file. (**R-Studio Technician/T80+** only)

R-Studio for Linux processes records in the list consequently. That is, if there are the following lines in the file,

```
:+Files_to_Recover\  
:-Files_to_Delete\File_2.jpg
```

the file `File_2.jpg` won't be marked for recovery, while for the lines

```
:-Files_to_Recover\File_2.jpg  
:+Files_to_Recover\  
file File_2.jpg will be.
```

Loading the edited recovery list

To load a recovery list into R-Studio for Linux,

- * **Select Import Recovery List from the File menu and select the file, or**
Right-click the uppermost folder (higher than **Root**, usually the letter or the name of the disk) and select **Import Recovery List** on the shortcut menu.
- > **R-Studio for Linux will load the file and mark the files accordingly.**

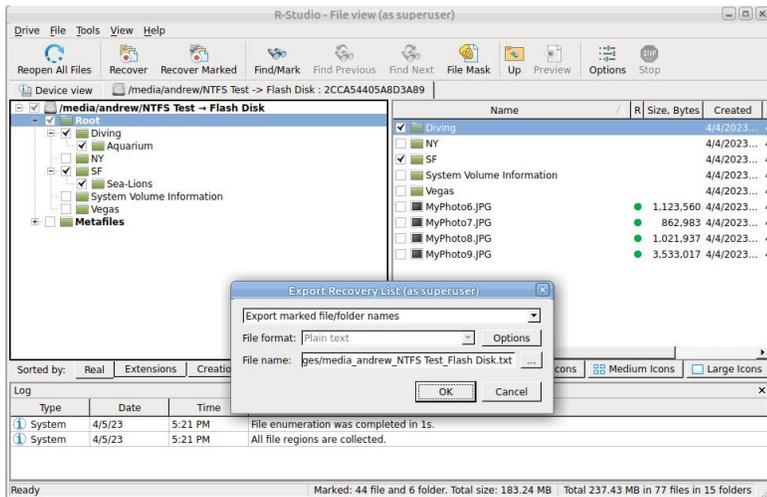
An example of a simple recovery list

As an example, we'll create a simple recovery list, edit it to mark only those files that are to be recovered, and load it back to mark those files.

To create such recovery list

- * **Mark the necessary folders, right-click the Root folder, and select Export Recovery List on the shortcut menu.**
Right-click the uppermost folder (higher than **Root**, usually the letter or the name of the disk) and select **Export Recovery List** on the shortcut menu.

Export Recovery List



Specify the necessary options and click the **OK** button.

> **R-Studio will save the file.**

Structure of a simple recovery list file created by R-Studio for Linux

```

:# Version = 1
:# Sort = by real
:# PathDelim = /
:# CaseSensitive
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";
label:"ntfs test"; fs:"NTFS";
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";
product:"disk"; vendor:"flash";
Diving/
Diving/Aquarium/
Diving/Aquarium/20190822_100644.jpg
Diving/Aquarium/20190822_101620.jpg
Diving/Aquarium/20190822_102526.jpg
Diving/Aquarium/20190822_103830.jpg
Diving/Aquarium/20190822_104333.jpg
SF/
SF/Sea-Lions/
SF/Sea-Lions/IMG_3493.JPG
SF/Sea-Lions/IMG_3535.JPG
SF/Sea-Lions/IMG_3542.JPG
SF/Sea-Lions/IMG_3579.JPG
SF/Sea-Lions/IMG_3580.JPG
SF/Sea-Lions/IMG_3581.JPG
SF/Sea-Lions/IMG_3589.JPG
SF/IMG_0869.JPG
SF/IMG_0873.JPG
SF/IMG_0890.JPG
SF/IMG_1739.JPG
SF/IMG_3460.JPG
SF/IMG_3461.JPG
SF/IMG_3476.JPG
SF/IMG_3478.JPG

```

```
SF/IMG_3479.JPG
SF/IMG_3480.JPG
SF/IMG_3481.JPG
SF/IMG_3493.JPG
SF/IMG_3535.JPG
SF/IMG_3542.JPG
SF/IMG_3579.JPG
SF/IMG_3580.JPG
SF/IMG_3581.JPG
SF/IMG_3589.JPG
SF/IMG_3590.JPG
SF/IMG_3591.JPG
SF/IMG_3592.JPG
SF/IMG_3593.JPG
SF/IMG_3594.JPG
SF/IMG_3595.JPG
SF/IMG_3596.JPG
SF/IMG_3608.JPG
SF/IMG_3627.JPG
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG
```

If such recovery list is created from an entire logical disk/partition, it will contain several virtual folders. For example, they'll have the following structure for an NTFS partition.

```
System Volume Information/
System Volume Information/IndexerVolumeGuid
System Volume Information/WPSettings.dat
Vegas/
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG
//m/$Extend/
//m/$Extend/$Deleted/
//m/$Extend/$RmMetadata/
//m/$Extend/$RmMetadata/$Txf/
//m/$Extend/$RmMetadata/$TxfLog/
//m/$Extend/$RmMetadata/$TxfLog/$Tops
//m/$Extend/$RmMetadata/$TxfLog/$TxfLog.blf
//m/$Extend/$RmMetadata/$TxfLog/$TxfLogContainer0000000000000000000001
//m/$Extend/$RmMetadata/$TxfLog/$TxfLogContainer0000000000000000000002
//m/$Extend/$RmMetadata/$Repair
//m/$Extend/$ObjId
//m/$Extend/$Quota
//m/$Extend/$Reparse
//m/$AttrDef
//m/$BadClus
//m/$Bitmap
//m/$Boot
//m/$LogFile
//m/$MFT
```

```

///m/$MFTMirr
///m/$Secure
///m/$UpCase
///m/$Volume

```

Now we need to edit this file to mark for recovery the following folders/files:

1. All files in the root folder;
2. Two files `MyPhoto1.jpg` and `MyPhoto3.jpg` in the `Diving` subfolder;
3. All files in the `Diving/Aquarium/` folder;
4. All files in the `SF/` folder except the `SF/Sea-Lions/` subfolder.

The edited simple recovery list

The final simple recovery list will be the following:

```

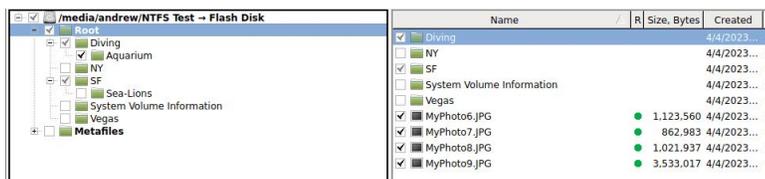
:# Version = 1
:# Sort = by real
:# PathDelim = /
:# CaseSensitive
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";
label:"ntfs test"; fs:"NTFS";
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";
product:"disk"; vendor:"flash";
:= Diving/
:+ Diving/Aquarium/
:+ Diving/MyPhoto1.jpg
:+ Diving/MyPhoto3.jpg
:+ SF/
:- SF/Sea-Lions/
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG

```

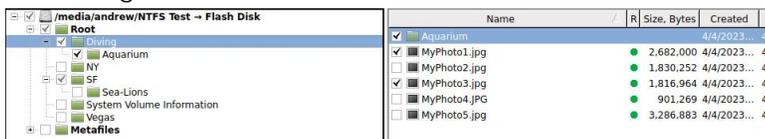
Loading the edited recovery list

When we load this recovery list into **R-Studio for Linux**, will see the following results;

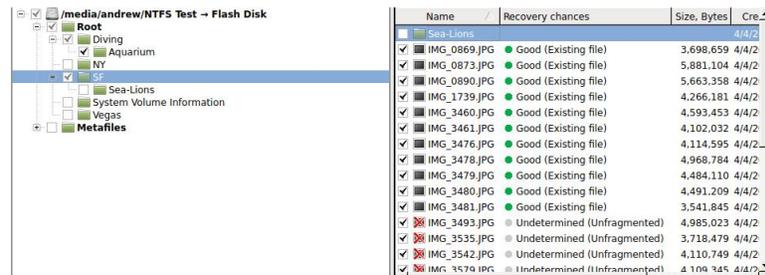
The root folder



The Diving folder



The SF folder



2.4 Volume Sets and RAIDs

R-Studio for Linux detects and processes valid hardware volume sets and RAIDs like regular drives/volumes.

R-Studio for Linux can analyze and recover data from software volume sets and RAIDs. If a software volume set or RAID is present in your system, **R-Studio for Linux** detects it, and a *Volume sets and RAIDs* object appears on the Drives panel. This object can be searched for files, scanned, and files found on it can be recovered the same way as from normal drives/volumes.

If, due to hardware failure, a hardware volume set or RAID cannot be accessed, or due to data loss your system does not recognize a software volume set or RAID, and you know what hard drives were in it, you may create a *Virtual volume set* or *RAID* and process it like a real software volume set or RAID or hardware volume set or RAID.

You may find more information on RAID types in our article [What is Hardware RAID](#).

You may turn [numerical indexes](#) for objects to distinguish them better while creating virtual RAIDs.

- [Volume Sets, Stripe Sets, and Mirrors](#)
- [Basic RAID 4 and RAID 5 Operations](#)
- [Working with RAID 6 Presets](#)
- [Working with RAID6 \(Double Xor\)](#)
- [Working with RAIDs with Parity Delays](#)
- [Working with Advanced RAID Layouts](#)
- [Nested and Non-Standard RAID Levels](#)
- [Finding RAID Parameters](#)
- [Checking RAID Consistency](#)
- [Syntax of a Description File for RAID Configurations](#)
- [Description Files for RAID Configurations](#)
- [Reverse RAIDs](#)
- [Various Disk and Volume Managers](#)

Managing your own RAID layouts

To save your own RAID layout in the presets

- 1 Click the **More...** button on **Parents** tab and **select Save** on the context menu.
- 2 **Specify the name for the configuration on the Preset name dialog box.**

Preset name **dialog box**



> **The new RAID configuration will be saved in the presets**

The configurations are stored in the [user's RAID layout file](#). The path and name for this file is specified on the [R-Studio for Linux Settings](#) dialog box. If no file is specified, **R-Studio for Linux** will ask you to enter the name.

Loading your RAID configuration

If there're objects in the Parents tab, the preset will be applied to them. If the Parents tab is empty, **R-Studio for Linux** will search the disks listed in the Drives tab for the parents in the [user's RAID layout file](#). If the search fails, **R-Studio for Linux** will show the Reference Parents not found message.

To load your RAID configuration

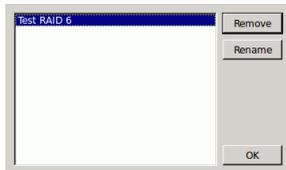
- 1 Click the **More...** button on Parents tab and select the preset you want to load

> **The new RAID configuration will be loaded**

To edit your own RAID configuration

- 1 Click the **More...** button on Parents tab and select **Edit...** on the context menu
- 2 Select the required configuration on the Edit Block RAID Layout Presets dialog box.

Edit Block RAID Layout Presets dialog box



- 3 Edit the parameters of the configuration and save it

> **The new configuration parameters will be saved.**

Turning Disks On-Line and Off-Line on-the-fly

You may turn the objects in the virtual RAID or volume set on-line and off-line by selecting/clearing the checkbox on the Parents tab. It may be useful, for example, if you need to see which disk is non-actual in a RAID 5.

Actually, when you turn an object off-line, **R-Studio for Linux** substitutes it with a *Missing Disk* or *Empty Space* object.

Missing Disks and Empty Space

If one [partition](#) from a hardware volume set or RAID or software volume set or RAID is absent, due to hardware failure, for example, you need to add a virtual missing disk or empty space in order to correctly reconstruct the hardware volume set or RAID or software volume set or RAID structure. The missing disk/empty space should be placed in the same place as the missing partition.

Note: **R-Studio for Linux** does not write anything real on the disk. Missing disks/empty space are virtual objects that do not affect actual data on the drive.

To add a *Missing disk/Empty space* object

- 1 Select a *Volume sets and RAID*s object on the R-Studio for Linux's Drives panel
- 2 Right-click in the **Parents** tab in the right pane and select **Add Missing Disk** or **Add Empty Space** on the context menu or select **Add Missing Disk** or **Add Empty Space** on the **Create** menu. Which object type is necessary, **R-Studio for Linux** decides automatically.

For the **Empty space** object, Specify its size on the Add Empty Space dialog box.

Add Empty Space dialog box



- > A *Missing Disk* or *Empty Space* object will appear in the **Parents** tab

2.4.1 Volume Sets, Stripe Sets, and Mirrors

To create a Volume set object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Volume set** or select the **Create Virtual Volume set** on the **Create** menu
- > A *Virtual Volume set* object will appear on the **Drives** panel

Device/Disk	Label	FS	Start	Size
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext3	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSS/Corp CDW/DVD SH-M522CTS07		ATAPI		1024.00 MB
ST3500320AS		USB (S:0)		465.76 GB
Empty Space17			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID				
Virtual volume set 1				
Image Files				
/media/Backup II/VolumeSet/VolumeSetDisk1.bin		NTFS		897.75 MB
/media/Backup II/VolumeSet/VolumeSetDisk2.bin				897.75 MB

- 2 Drag the required partitions from the **Drives** panel to the **Parents** tab
- 3 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu,
- OR
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

Or right-click the **Parents** tab and select the required partition from the context menu.

Note: Objects should be placed in the same order as they were in the original volume set. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

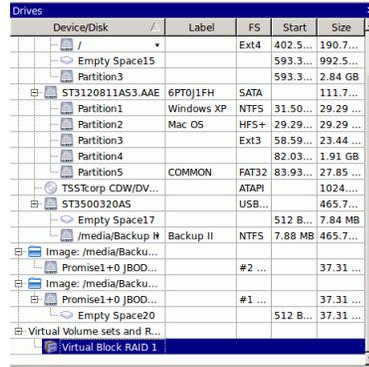
Device/Disk	Info	Start	Size
/media/Backup II/Volum...	NTFS		
/media/Backup II/Volum...			

- > The *Virtual volume set* or *RAID*s object can now be processed like regular drives/volumes

If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a partition object will appear on the **Drives** panel.

To create a Stripe set object (RAID 0)

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > A **Virtual Block RAID** object will appear on the **Drives** panel



- 2 Select **RAID 0 (Stripe set)** on the **RAID type**
- 3 Drag the required partitions from the **Drives** panel to the **Parents** tab

Or right-click the **Parents** tab and select the required partition from the context menu.

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original volume set. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

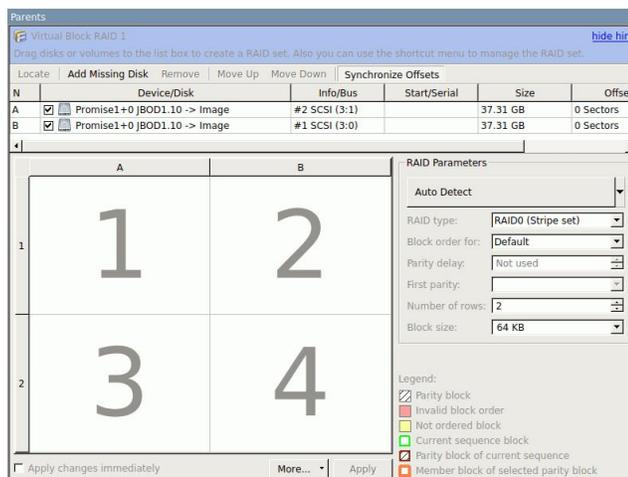
Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The **Block size** and **Offset** (in sectors) parameters must be set the same as for the original volume set.

You also need to specify **Block order**. You may select it on the **Blocks order** drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but they cannot be recovered.



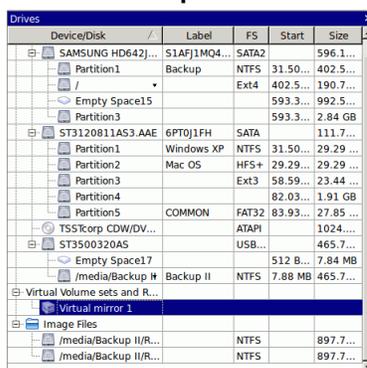
- > **The Virtual Block RAID object can now be processed like regular drives/volumes**

If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a partition object will appear on the Drives panel.

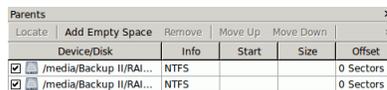
The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

To create a Mirror set object (RAID 1)

- 1 **Click the Create Virtual RAID button and select Create Virtual Mirror**
or select the **Create Virtual Mirror** on the **Create** menu
- > **A Virtual Mirror object will appear on the Drives panel**



- 2 **Drag the required partitions from the Drives panel to the Parents tab**
Or right-click the Parents tab and select the required partition from the context menu.



- > **The Virtual Mirror object can now be processed like regular drives/volumes**

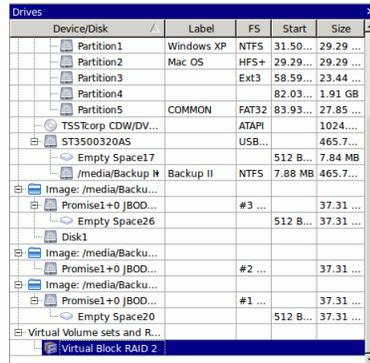
If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a partition object will appear on the Drives panel.

2.4.2 Basic RAID 4 and RAID 5 Operations

RAID 4 and RAID 5 are much similar. You may create and edit a RAID 4 object the same way as a RAID 5 one.

To create a RAID 5 object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > A **Virtual Block RAID** object will appear on the **Drives** panel



- 2 Select **RAID 5** on the **RAID** type
- 3 Drag the required partitions from the **Drives** panel to the **Parents** tab
- 3 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu, or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 5. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state

(after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 5.

You also need to specify Block order for virtual RAID 5. You may select it on the Block order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but files from the RAID 5 cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 5. Find a file and preview it. If the file appears correct, you have created a correct RAID 5 layout.

If your RAID 5 has an unusual configuration, you may create them manually. See [Working with Advanced RAID 5 Layouts](#) for details.

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642J1AA01110	S1AFJ1M0400283	SATA2		596.17 GB
ST3120811AS3.AAE	6PT0J1FH	SATA		111.79 GB
TSS Corp CDW/DVD SH-M522C...		ATAPI		1024.00 MB
ST3500320AS		USB (5...		465.76 GB
Image: /media/Backup II/RAID5/RA...				
Promise1+0 JBOD1.10		#3 SC...		37.31 GB
Empty Space26			512 Bytes	37.31 GB
Disk1				
Image: /media/Backup II/RAID5/RA...				
Promise1+0 JBOD1.10		#2 SC...		37.31 GB
Image: /media/Backup II/RAID5/RA...				
Promise1+0 JBOD1.10		#1 SC...		37.31 GB
Empty Space20			512 Bytes	37.31 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 2				74.62 GB
Empty Space33			512 Bytes	7.84 MB
Partition1	RAID5	NTFS	7.88 MB	74.49 GB
Empty Space34			74.50 GB	123.78 MB

Parents tab

Virtual Block RAID 1 hide hint

Drag disks or volumes to the list box to create a RAID set. Also you can use the shortcut menu to manage the RAID set.

N	Device/Disk	Info/Bus	Start/Serial	Size	Offset
A	<input checked="" type="checkbox"/> Promise1+0 JBOD1.10 -> Image	#1 SCSI (3:0)		37.31 GB	0 Sectors
B	<input checked="" type="checkbox"/> Promise1+0 JBOD1.10 -> Image	#2 SCSI (3:1)		37.31 GB	0 Sectors
C	<input checked="" type="checkbox"/> Promise1+0 JBOD1.10 -> Image	#3 SCSI (3:2)		37.31 GB	0 Sectors

	A	B	C
1	1	2	PD
2	3	PD	4
3	PD	5	6

RAID Parameters

Auto Detect

RAID type: RAID5

Block order for: Left Asynchronous (Conti)

Parity delay: Not used

First parity: []

Number of rows: 3

Block size: 64 KB

Legend:

- Parity block
- Invalid block order
- Not ordered block
- Current sequence block
- Parity block of current sequence
- Member block of selected parity block

RAID structure has been changed. Click Apply to commit changes.

Apply changes immediately More... Reset changes Apply

> The RAID 5 object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Creating and saving your own RAID 5 configuration

You may create and save your own RAID configurations for non-standard RAID5. You may specify Offset, Block order/size and Row count. See [Working with Advanced RAID 5 Layouts](#) for details.

2.4.3 Working with RAID 6 Presets

R-Studio for Linux allows you to create and process RAID 6 layouts. You may use either presets for several RAID 6 layouts, or use your own custom ones.

R-Studio for Linux provides presets for the following RAID 6 layouts:

Reed-Solomon

Left Synchronous (standard),	Left Asynchronous (continuous),	Right Synchronous	Right Asynchronous
---------------------------------	------------------------------------	-------------------	--------------------

In addition you may create your own RAID 6 configurations.

Creating a RAID 6 object from a preset:

We will use the Reed-Solomon (Left Synchronous (standard)) preset as an example.

To create a RAID 6 object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > **A Virtual Block RAID object will appear on the Drives panel**

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642J1AA01110	S1AFJ1M0400283	SATA2		596.17 GB
Partition1	Backup	NTFS	31.50 KB	402.59 GB
/		Ext4	402.59 GB	190.74 GB
Empty Space14			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811AS3.AAE	6PT0J1FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext3	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
T55Tcorp CDW/DVD SH-M522CT...		ATAPI		1024.00 MB
ST3500320AS		USB (S...		465.76 GB
Empty Space18			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1				
Image Files				
/media/Backup II/RAID6RS/img1....				897.75 MB
/media/Backup II/RAID6RS/img2....		NTFS		897.75 MB
/media/Backup II/RAID6RS/img3....				897.75 MB
/media/Backup II/RAID6RS/img4....				897.75 MB
/media/Backup II/RAID6RS/img5....				897.75 MB

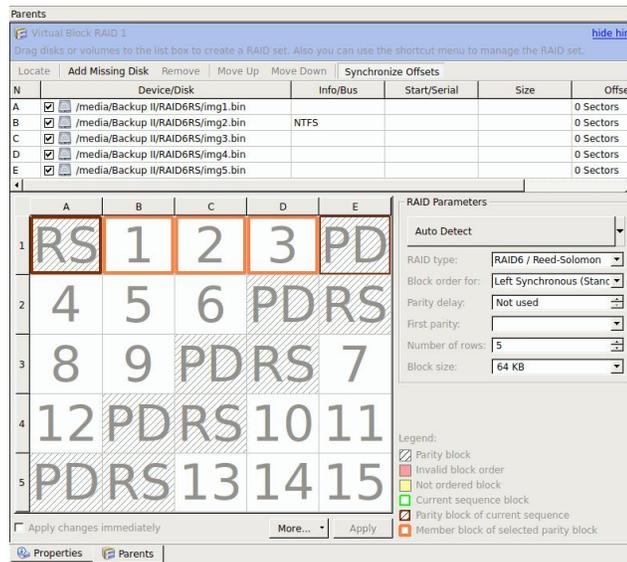
- 2 Select **RAID 6/Reed-Solomon** on the **RAID type**
- 3 Drag the required partitions from the **Drives panel** to the **Parents tab**
- 3 Drag the required partitions from the **Drives panel** to the **Parents tab**

Other ways to add objects

- Right-click the **Parents tab** and select the required partition from the context menu, or
- Right-click the partition on the **Drives panel**, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents tab**. Click the **Apply** button to apply the changes when are you through.

Parents tab



Note: Objects should be placed in the same order as they were in the original volume set. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original volume set.

You also need to specify Blocks order (Left Synchronous (standard) for our case) for virtual RAID 6. You may select it on the Blocks order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but they cannot be recovered.

Note: You may check how correctly you have reconstructed the original volume set or RAID. Find a file and preview it. If the file appears correct, you have created a correct RAID layout.

> The Virtual Block RAID object can now be processed like regular drives/volumes

If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel. The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Device/Disk	/	Label	FS	Start	Size
Local Computer					
SAMSUNG HD642J1AA01110		S1AF1MQ400283	SATA2		596.17 GB
Partition1		Backup	NTFS	31.50 KB	402.59 GB
/			Ext4	402.59 GB	190.74 GB
Empty Space14				593.33 GB	992.50 KB
Partition3				593.33 GB	2.84 GB
ST3120811AS3.AAE		6PT0J1FH	SATA		111.79 GB
Partition1		Windows XP	NTFS	31.50 KB	29.29 GB
Partition2		Mac OS	HFS+	29.29 GB	29.29 GB
Partition3			Ext3	58.59 GB	23.44 GB
Partition4				82.03 GB	1.91 GB
Partition5		COMMON	FAT32	83.93 GB	27.85 GB
T55Tcorp CDW/DVD SH-M522CT...			ATAPI		1024.00 MB
ST3500320AS			USB (5...		465.76 GB
Empty Space18				512 Bytes	7.84 MB
/media/Backup II		Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs					
Virtual Block RAID 1			NTFS		2.63 GB
Direct Volume			NTFS	0 Bytes	2.63 GB
Image Files					
/media/Backup II/RAID6R5/img1...					897.75 MB
/media/Backup II/RAID6R5/img2...			NTFS		897.75 MB
/media/Backup II/RAID6R5/img3...					897.75 MB
/media/Backup II/RAID6R5/img4...					897.75 MB
/media/Backup II/RAID6R5/img5...					897.75 MB

2.4.4 Working with RAID6 (Double Xor) Presets

R-Studio for Linux allows you to create and process RAID 6 Double Xor layouts with the following presets:

EVENODD

RAID DP

X-Code(2)

Adaptec 3805

In addition you may create your own RAID 6 configurations.

Creating a RAID 6 (Double Xor) object from a preset:

We will use the EVENODD preset as an example.

To create a RAID 6 (Double Xor) object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > **A Virtual Block RAID object will appear on the Drives panel**

Device/Disk	/	Label	FS	Start	Size
Local Computer					
Hitachi HD5721010CLA332JP4...		JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive		Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE		6PT0J1FH	SATA	0 Bytes	111.79 GB
/			Ext4	1 MB	37.25 GB
Partition2				37.25 GB	2.79 GB
/home			Ext4	40.05 GB	71.74 GB
ST3500320AS			USB (7...	0 Bytes	465.76 GB
Empty Space13				512 Bytes	7.84 MB
/media/Backup II		Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs					
Virtual Block RAID 1				0 Bytes	
Image Files					
/media/Backup II/RAID62X/RAI...			NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID62X/RAI...				0 Bytes	897.75 MB
/media/Backup II/RAID62X/RAI...				0 Bytes	897.75 MB
/media/Backup II/RAID62X/RAI...				0 Bytes	897.75 MB
/media/Backup II/RAID62X/RAI...				0 Bytes	897.75 MB
/media/Backup II/RAID62X/RAI...				0 Bytes	897.75 MB

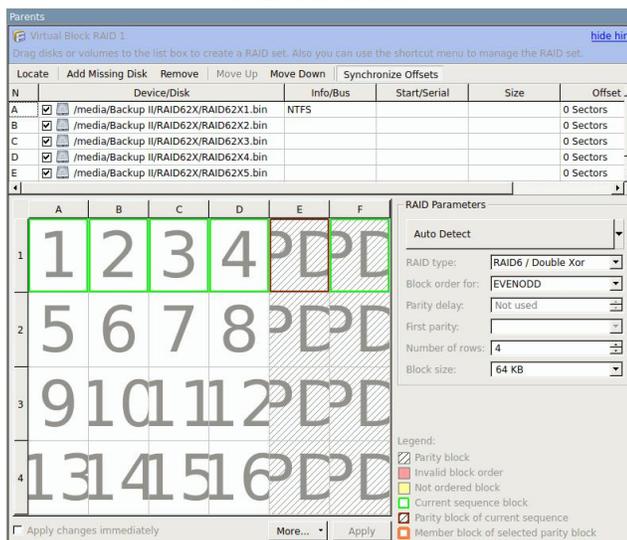
- 2 Select **RAID 6/Double Xor** on the **RAID type**
- 3 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu, or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Parents tab



Note: Objects should be placed in the same order as they were in the original volume set. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original volume set.

You also need to specify Blocks order (EVENODD for our case) for virtual RAID 6 (Double Xor). You may select it on the Blocks order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but they cannot be recovered.

Note: You may check how correctly you have reconstructed the original volume set or RAID. Find a file and preview it. If the file appears correct, you have created a correct RAID layout.

> **The Virtual Block RAID object can now be processed like regular drives/volumes**

If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel. The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD572101CLA332P...	JP9921HD3NYK...	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (...)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1		NTFS	0 Bytes	3.51 GB
Direct Volume		NTFS	0 Bytes	3.51 GB
Image Files				
/media/Backup II/RAID62X/RA...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID62X/RA...			0 Bytes	897.75 MB
/media/Backup II/RAID62X/RA...			0 Bytes	897.75 MB
/media/Backup II/RAID62X/RA...			0 Bytes	897.75 MB
/media/Backup II/RAID62X/RA...			0 Bytes	897.75 MB
/media/Backup II/RAID62X/RA...			0 Bytes	897.75 MB

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.5 Working with RAID5 with Parity Delays

R-Studio for Linux allows you to create RAID5 with parity delays (any level that allows that). For example, let us create a RAID 5 with parity delays with the following layout:

- Three disks,
- Delay=16
- Block size: 16 KB
- Offset: 1088 sectors (544 KB)
- Block order: Left Asynchronous (Continuous)

Block order table:

	A	B	C	
1	1	2	PD	Delay=16
2	3	4	PD	
3	5	6	PD	
4	7	8	PD	
5	9	10	PD	
6	11	12	PD	
7	13	14	PD	
8	15	16	PD	
9	17	18	PD	
10	19	20	PD	
11	21	22	PD	
12	23	24	PD	
13	25	26	PD	
14	27	28	PD	
15	29	30	PD	
16	31	32	PD	
17	33	PD	34	Delay=16
18	35	PD	36	
19	37	PD	38	

20	39	PD	40
21	41	PD	42
22	43	PD	44
23	45	PD	46
24	47	PD	48
25	49	PD	50
26	51	PD	52
27	53	PD	54
28	55	PD	56
29	57	PD	58
30	59	PD	60
31	61	PD	62
32	63	PD	64
33	PD	65	66
34	PD	67	68
35	PD	69	70
36	PD	71	72
37	PD	73	74
38	PD	75	76
39	PD	77	78
40	PD	79	80
41	PD	81	82
42	PD	83	84
43	PD	85	86
44	PD	87	88
45	PD	89	90
46	PD	91	92
47	PD	93	94
48	PD	95	96

Delay=16

To create such RAID 5,

- 1 **Click the Create virtual volume sets or RAID's button and select Create Virtual Block RAID & Autodetect** or select **Create Virtual Block RAID & Autodetect** on the **Create** menu
Check that the Apply changes immediately check box is clear on the Parents tab. This will prevent **R-Studio for Linux** from trying to start processing the RAID configuration until you specify it completely.
- 2 **Drag the required objects from the Drives pane to the Parents tab and select RAID 5 on the RAID type**
 - Other ways to add objects**
 - Right-click the Parents tab and select the required partition from the context menu,
or
 - Right-click the partition on the Drives panel, select **Add to RAID** on the context menu, and select the

RAID object you want to add the partition to.

These objects may be hard drives, [logical disks](#), or [images](#). Check that the objects are correctly placed.

Note: Objects should be placed in the same order as they were in the original RAID 5. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PTOJ1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
JMicronUSB to ATA/ATAPI Bridge	222291759477	USB (7-0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup II/RAID5HP/RAID5HPDisk1.bin			0 Bytes	897.75 MB
/media/Backup II/RAID5HP/RAID5HPDisk2.bin			0 Bytes	897.75 MB
/media/Backup II/RAID5HP/RAID5HPDisk3.bin			0 Bytes	897.75 MB

3 Specify the Block size and Offset parameters on the Parents tab

Disregard the Block order field.

4 Specify the parity delay number in the Parity delay control on the Parents tab.

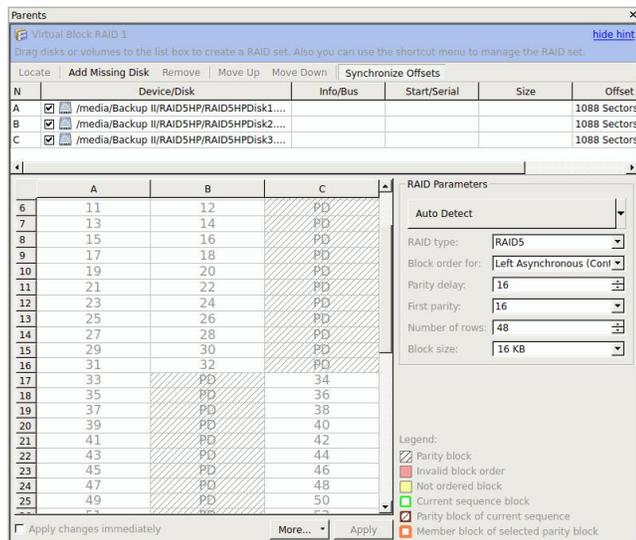
The number of rows will change to 48.

- ☐ If necessary, adjust the First parity parameter

By default, this parameter is set equal to Parity delay. By changing it, you may "shift" the block order table. For example, when the First parity parameter is set as 1 for the RAID 5 of 3 disks with Parity delay of 3., the block order table will be the following:

	A	B	C
1	1	2	PD
2	3	PD	4
3	5	PD	6
4	7	PD	8
5	PD	9	10
6	PD	11	12
7	PD	13	14
8	15	16	PD
9	17	18	PD

5 Select Left Asynchronous (Continuous) on the Block Order Field and click the Apply button on the Parents tab



- > The created Virtual Block RAID 1 object can now be processed like regular drives/volumes. If R-Studio for Linux detects a valid file system on this RAID object, a [partition](#) object will appear on the Drives panel.

The screenshot shows the 'Drives' panel in R-Studio. It lists various drives and partitions. Under 'Virtual Volume sets and RAID5', there is a 'Virtual Block RAID 1' entry with 'NTFS' file system and '1.75 GB' size. Below it, a 'Direct Volume' is also listed with 'NTFS' file system and '1.75 GB' size. The 'Image Files' section shows three files: '/media/Backup II/RAID5HP/RAID5HPDisk1.bin', '/media/Backup II/RAID5HP/RAID5HPDisk2.bin', and '/media/Backup II/RAID5HP/RAID5HPDisk3.bin', each with a size of 897.75 MB.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.6 Working with Advanced RAID Layouts

R-Studio for Linux allows you to create and process very complex custom RAID layouts.

For example, let us create a RAID 5 with the following layout:

- Three disks,
- Block size: 4 KB
- Offset: 32768 sectors (64 KB)
- Block order:

	A	B	C
1	PD	1	2
2	PD	3	4

3	PD	5	6
4	7	PD	8
5	9	PD	10
6	11	PD	12
7	13	14	PD
8	15	16	PD
9	17	18	PD

To create such RAID 5,

1 Click the **Create virtual volume sets or RAIDs** button and select **Create Virtual Block RAID**

3 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu, or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

Check that the **Apply changes immediately** check box is clear on the **Parents** tab. This will prevent **R-Studio for Linux** from trying to start processing the RAID configuration until you specify it completely.

2 Drag the required objects from the **Drives** pane to the **Parents** tab and select **Custom** on the RAID type

These objects may be hard drives, [logical disks](#), or [images](#). Check that the objects are correctly placed.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

Device/Disk	Label	FS	Start	Size
SAMSUNG HD642J1AA01110	S1AF1MQ400283	SATA2		596.17 GB
Partition1	Backup	NTFS	31.50 KB	402.59 GB
/		Ext4	402.59 GB	190.74 GB
Empty Space15			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811A53.AAE	6PT0J1FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext3	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSSiCorp CDW/DVD SH-M522C...		ATAPI		1024.00 MB
ST3500320AS		USB (5...		465.76 GB
Empty Space17			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 3				
Image Files				
/media/Backup II/RAIDSComple...				897.75 MB
/media/Backup II/RAIDSComple...				897.75 MB
/media/Backup II/RAIDSComple...				897.75 MB

3 Specify the Block size and Offset parameters on the Parents tab

Disregard the Block order field.

4 Manually enter 9 to Number of rows on the Parents tab

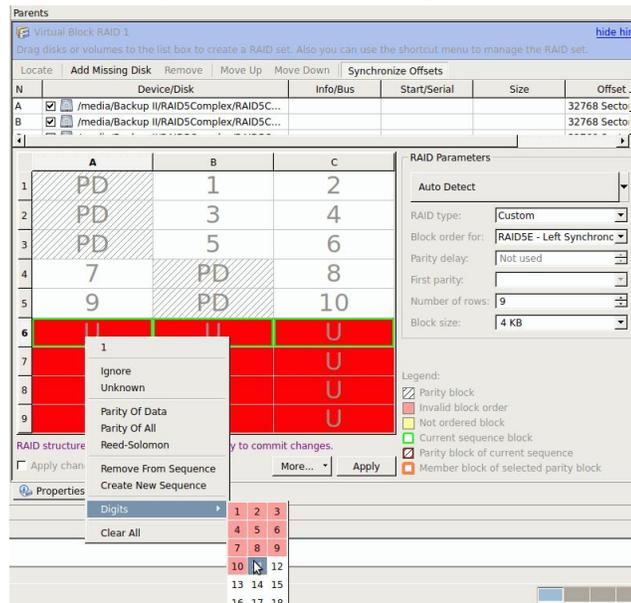
Block order will change to Custom.

5 Enter the block order in the table on the Parents tab

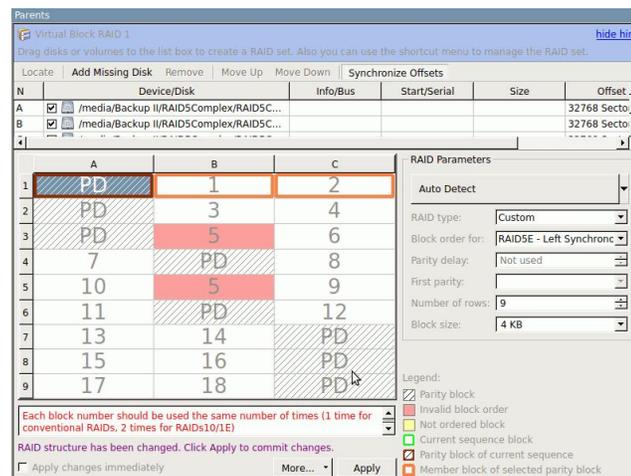
Use the RAID sequence window to move from one row to another.

Using the keyboard: arrow keys to navigate, digit and pd keys to enter the block order.

Using the mouse: right-click the cell and select the number or parity from the context menu. If the block table is too large, you better use the keyboard to enter the digits.

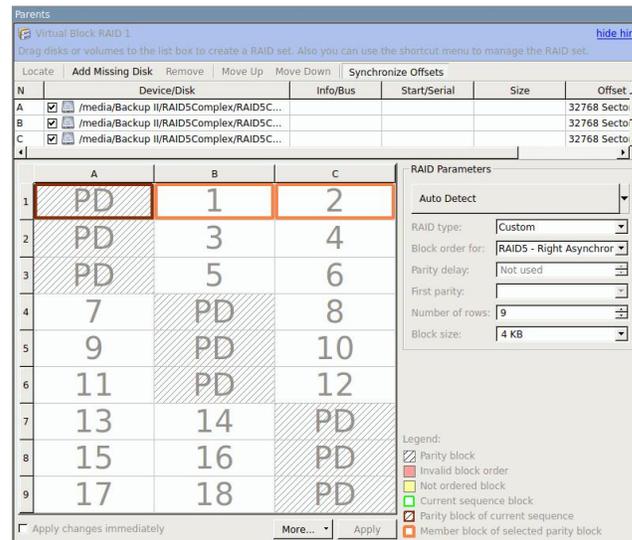


Corrections: R-Studio for Linux will tell you if some digits are not correct. Navigate to the required cell and enter the correct value. Use the **Delete** key to clear a cell.



Clear the table: Right-click the table and select **Clear all** on the context menu.

6 When you finishes entering the information, click the Apply button on the Parents tab



- > The created Virtual Block RAID 1 object can now be processed like regular drives/volumes
- If R-Studio for Linux detects a valid file system on this RAID object, a [partition](#) object will appear on the Drives panel.
- The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642J1...	S1AF1MQ4...	SATA2		596.1...
Partition1	Backup	NTFS	31.50 ...	402.5...
/		Ext4	402.5...	190.7...
Empty Space15			593.3...	992.5...
Partition3			593.3...	2.84 GB
ST3120811AS3 AAE	6PT01FH	SATA		111.7...
Partition1	Windows XP	NTFS	31.50 ...	29.29 ...
Partition2	Mac OS	HFS+	29.29 ...	29.29 ...
Partition3		Ext3	58.59 ...	23.44 ...
Partition4			82.03 ...	1.91 GB
Partition5	COMMON	FAT32	83.93 ...	27.85 ...
TSScorp CDW/DVD ...		ATAPI		1024...
ST3500320AS		USB...		465.7...
Empty Space17			512 B...	7.84 MB
/media/Backup II ...	Backup II	NTFS	7.88 MB	465.7...
Virtual Volume sets and RA...				
Virtual Block RAID 3		NTFS		1.72 GB
Direct Volume		NTFS	0 Bytes	1.72 GB
Image Files				
/media/Backup II/RA...				897.7...
/media/Backup II/RA...				897.7...
/media/Backup II/RA...				897.7...

Advanced RAID 5

Another example is a RAID with the following layout, similar to that used in Mac Pro internal RAID cards with 4 hard drives.

- Four disks,
- Block size: 512 KB (1024 sectors)
- Offset: 32768 sectors (64 KB)
- Block order:

A	B	C	D	A	B	C	D	A	B	C	D
PD	1	2	PD	3	4	PD	5	6	PD	7	8

As you see, this layout cannot be fit directly into a standard 2D block order table. Still, it's possible to create such RAID layout using the RAID Sequence window.

To create such RAID,

- 1 Click the **Create virtual volume sets or RAID**s button and select **Create Virtual Block RAID & Autodetect** or select **Create Virtual Block RAID & Autodetect** on the **Create** menu
Check that the **Apply changes immediately** check box is clear on the **Parents** tab. This will prevent **R-Studio for Linux** from trying to start processing the RAID configuration until you specify it completely.
- 2 **Drag the required objects from the Drives pane to the Parents tab and select RAID 5 on the RAID type**

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu,
or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

These objects may be hard drives, logical disks, or [images](#). Check that the objects are correctly placed.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT0JLFH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2		Ext4	37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
/MicronUSB to ATA/ATAPI Bridge	222291759477	USB (7:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID			0 Bytes	
Virtual Block RAID 1				
Image Files				
/media/Backup II/RAID_MAC_Pro/RAID_MAC...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC...			0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC...			0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC...			0 Bytes	897.75 MB

- 3 **Specify the Block size and Offset parameters on the Parents tab**
Disregard the **Block order** field.
- 4 **Manually enter 3 to Number of rows on the Parents tab and change Block order to Custom**
- 5 **Right-click the RAID Sequence window and select Remove All. Manually enter 3 to Number of rows on the Parents tab and change Block order to Custom**
- 6 **Right-click Cell 1 in the block order table and select Create New Sequence.**

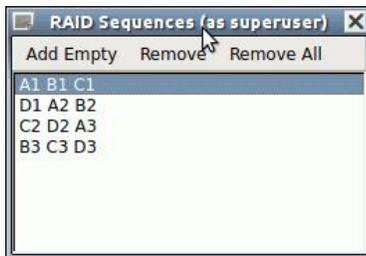
7 Right-click Cell 2 in the block order table and select Add to Sequence, do that for Cell 3, too.

8 Right-click Cell 4 in the block order table and select Create New Sequence.

9 Right-click Cell 5 in the block order table and select Add to Sequence, do that for Cell 6, too.

Continue those steps for the rest of the table until the RAID Sequence window will have 4 sequences of 3 disks:

Sequences window



10 Select the first line in the RAID Sequence window, right-click Cell 1 in the block order table, and select Parity of Data.

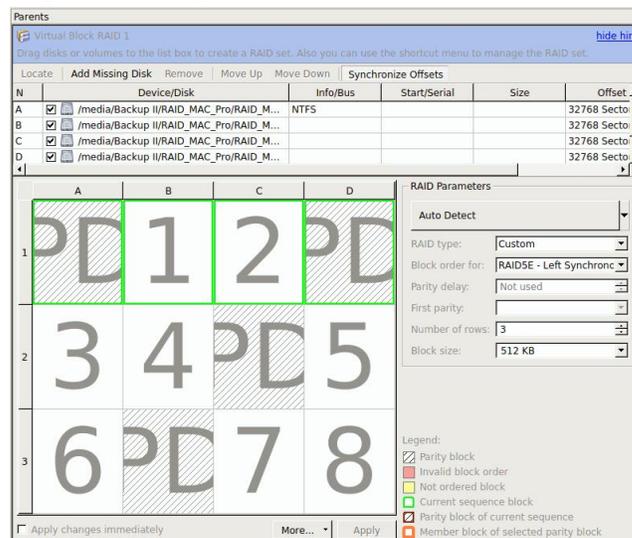
If any unnecessary sequences appear, right-click them in the RAID Sequence window, and select Remove.

11 Right-click Cell 2 in the block order table and select 1, do that for Cell 3 selecting 2.

If any unnecessary sequences appear, right-click them in the RAID Sequence window, and select Remove.

12 Move to the next sequence in the RAID Sequence window and repeat the procedure for cells 4, 5, and 6.

Do that for the rest of the sequences until you fill all cells in the block order table in the Parents tab.



> The created Virtual Block RAID 1 object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on this RAID object, a partition object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
MicronUSB to ATA/ATAPI Bridge	222291759477	USB (7:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1			0 Bytes	2.29 GB
EFI System Partition		FAT32	20 KB	200 MB
HFS-Test	HFS-Test	HFS+	200.02 MB	2.10 GB
Image Files				
/media/Backup II/RAID_MAC_Pro/RAID_MAC_...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC_...			0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC_...			0 Bytes	897.75 MB
/media/Backup II/RAID_MAC_Pro/RAID_MAC_...			0 Bytes	897.75 MB

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

Advanced RAID 6 Layout

For example, let us create a RAID 6 with the following layout:

- Five disks,
- Block size: 64 KB
- Offset: 0
- Block order:

	A	B	C	D	E
1	RS	1	2	3	PD
2	4	5	6	PD	RS
3	8	9	PD	RS	7
4	12	PD	RS	10	11
5	PD	RS	13	14	15
6	PA	PA	PA	PA	PA

where

- PD is parity of data;
- PA is parity of all;
- RS is Reed-Solomon;

Rows from 1 to 5 use two types of error correction: parity of data (xor) and Reed-Solomon. That is, row 1 uses blocks A1 and E1, row 2 uses blocks D2 and E2, and so on.

Row 6 is used for error correction for columns. That is, column A uses block A6, column B uses B6, and so on. Parity of all is used for error correction.

1 Click the Create virtual volume sets or RAID5 button and select Create Virtual Block RAID

3 Drag the required partitions from the Drives panel to the Parents tab

Other ways to add objects

- Right-click the Parents tab and select the required partition from the context menu,
- or
- Right-click the partition on the Drives panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

Check that the Apply changes immediately check box is clear on the Parents tab. This will prevent **R-Studio for Linux** from trying to start processing the RAID configuration until you specify it completely.

- 2 Drug the required objects from the Drives pane to the Parents tab and select Custom on the RAID type**
These objects may be hard drives, logical disks, or [images](#). Check that the objects are correctly placed.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ1AA01110	S1AF1MQ400283	SATA2		596.17 GB
Partition1	Backup	NTFS	31.50 KB	402.59 GB
/		Ext14	402.59 GB	190.74 GB
Empty Space14			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811AS3.AAE	6PT0J1FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext13	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSScorp CDW/DVD SH-M522CT...		ATAPI		1024.00 MB
ST3500320AS		USB (5...		465.76 GB
Empty Space18			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1				
Image Files				
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...		NTFS		897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB

- 3 Specify the Block size and Offset parameters on the Parents tab**

Disregard the Block order parameter.

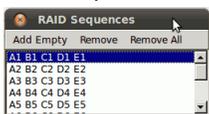
- 4 Manually enter 6 to Number of rows on the Parents tab**

- 5 Enter the block order in the table on the Parents tab**

You may enter either a block number, or an error correction block of the following types:

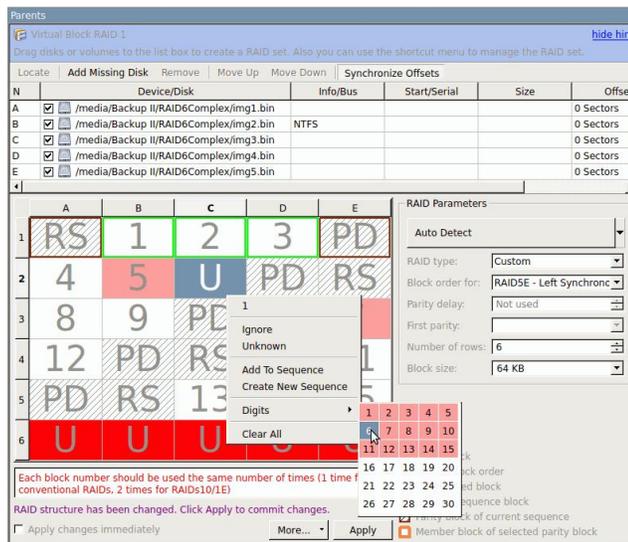
PD	Parity of data
PA	Parity of all
RS	Reed-Solomon
U	Unknown
I	Ignore

Note: You should specify an error correction block only when the correct sequence is selected on the RAID Sequences window.



Using the keyboard: arrow keys to navigate, digit, and rs, pd, pa, u, i keys to enter the block order.

Using the mouse: right-click the cell and select the number or parity from the context menu. If the block table is too large, you better use the keyboard to enter the digits.



For the rows:

Select the required row sequence on the RAID Sequences window, select the cell on the RAID table, and enter the required value. **R-Studio for Linux** automatically generates those sequences when you add RAID parents.

For the columns and arbitrary sequences:

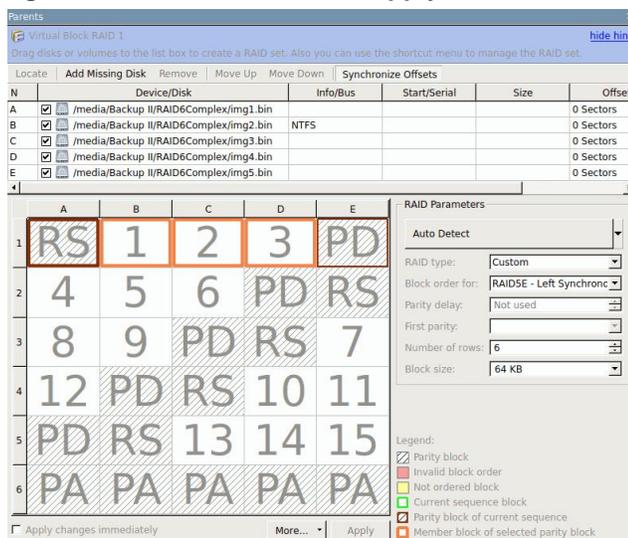
You need to create those sequences and add the respective blocks to it manually.

To create a sequence: Click **Add empty** on the RAID Sequences window or select **Create New Sequence** on the context menu on the Parents tab.

To add a block to a sequence: Right-click the respective cell and select **Add To Sequence** on the context menu on the Parents tab.

To remove a block to a sequence: Right-click the respective cell and select **Remove From Sequence** on the context menu on the Parents tab.

6 When you finishes entering the information, click the Apply button on the Parents tab



> **The created Virtual Block RAID 1 object can now be processed like regular drives/volumes**

If **R-Studio for Linux** detects a valid file system on this RAID object, a partition object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642J1AA01110	S1AFJ1MQ400283	SATA2		596.17 GB
Partition1	Backup	NTFS	31.50 KB	402.59 GB
/		Ext4	402.59 GB	190.74 GB
Empty Space14			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811AS3.AAE	6PT0J1FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext3	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSS1corp CDW/DVD SH-M522CT...		ATAPI		1024.00 MB
ST3500320AS		USB (S...		465.76 GB
Empty Space18			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1		NTFS		
Direct Volume		NTFS	0 Bytes	2.19 GB
Image Files				
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...		NTFS		897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB
/media/Backup II/RAID6Complex...				897.75 MB

2.4.7 Nested and Non-Standard RAID Levels

R-Studio for Linux can work with various [nested and non-standard RAID levels](#). Currently, the following RAID levels are supported:

- [RAID10 \(1+0\)](#)
- [RAID1E](#)
- [RAID5E](#)
- [RAID5EE](#)
- [RAID6E](#)

2.4.7.1 RAID10 (1+0)

A RAID 10 (or 1+0) is a stripe of mirrors. Its block order can be represented as:

	A	B	C	D
1	1	1	2	2

To create a RAID 10 object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu

> **A Virtual Block RAID object will appear on the Drives panel**

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PTQ1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup II/RAID10/RAID10...			0 Bytes	897.75 MB
Empty Space15			512 Bytes	897.75 MB
/media/Backup II/RAID10/RAID10...			0 Bytes	897.75 MB
Empty Space17			512 Bytes	897.75 MB
/media/Backup II/RAID10/RAID10...			0 Bytes	897.75 MB
/media/Backup II/RAID10/RAID10...			0 Bytes	897.75 MB

2 Drag the required partitions from the Drives panel to the Parents tab

Other ways to add objects

- Right-click the Parents tab and select the required partition from the context menu, or
- Right-click the partition on the Drives panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

3 Select RAID 10 on the RAID type

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the Apply changes immediately checkbox on the Parents tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 10. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

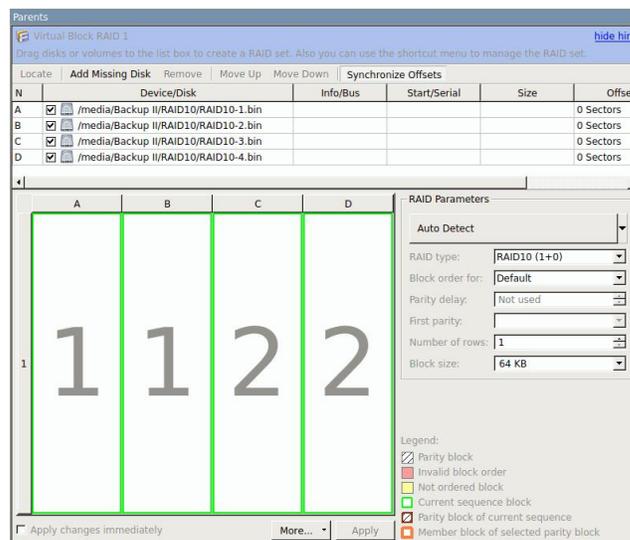
Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 10.

You also need to specify Block order for virtual RAID 10. You may select it on the Block order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but files from the RAID 10 cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 10. Find a file and preview it. If the file appears correct, you have created a correct RAID 10 layout.



Parents tab

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332j...	JP9921HD3NYK...	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53-AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2		Ext4	37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (...)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1			0 Bytes	1.75 GB
Empty Space25			512 Bytes	7.84 MB
Partition1		NTFS	7.88 MB	1.75 GB
Image Files				
/media/Backup II/RAID10/R...			0 Bytes	897.75 MB
Empty Space15			512 Bytes	897.75 MB
/media/Backup II/RAID10/R...			0 Bytes	897.75 MB
Empty Space17			512 Bytes	897.75 MB
/media/Backup II/RAID10/R...			0 Bytes	897.75 MB
/media/Backup II/RAID10/R...			0 Bytes	897.75 MB

> The RAID 10 object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.7.2 RAID1E

RAID 1E utilizes both the mirroring and striping: data is striped across all drives, as in RAID 0. Additionally, a copy of each stripe is stored on a different drive, as in RAID 1. Its block order can be represented as:

	A	B	C
1	1	1	2
2	2	3	3

To create a RAID 1E object

- 1 Click the Create Virtual RAID button and select Create Virtual Block RAID or select the Create Virtual Block RAID on the Create menu

> **A Virtual Block RAID object will appear on the Drives panel**

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup II/RAID1E/RAID1E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID1E/RAID1E...			0 Bytes	897.75 MB
/media/Backup II/RAID1E/RAID1E...			0 Bytes	897.75 MB

2 Drag the required partitions from the Drives panel to the Parents tab

Other ways to add objects

- Right-click the Parents tab and select the required partition from the context menu, or
- Right-click the partition on the Drives panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

3 Select RAID 1E on the RAID type

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the Apply changes immediately checkbox on the Parents tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 1E. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

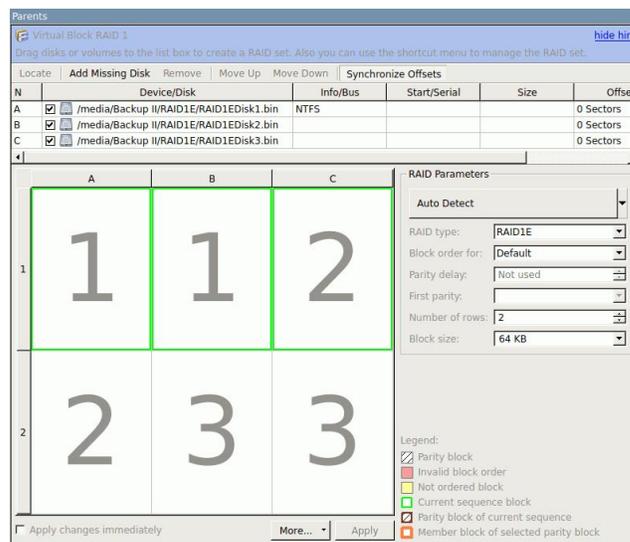
Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 1E.

You also need to specify Block order for virtual RAID 1E You may select it on the Block order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but files from the RAID 1E cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 1E. Find a file and preview it. If the file appears correct, you have created a correct RAID 1E layout.



Parents tab

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1		NTFS	0 Bytes	1.32 GB
Direct Volume		NTFS	0 Bytes	1.32 GB
Image Files				
/media/Backup II/RAID1E/RAID1E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID1E/RAID1E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID1E/RAID1E...		NTFS	0 Bytes	897.75 MB

> The RAID 1E object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.7.3 RAID5E

RAID 5E (where E stands for Enhanced) is a RAID 5 layout with an integrated hot-spare drive, where the spare drive is an active part of the block rotation scheme. An example of such RAID layout is in the table below:

	A	B	C	D
1	1	2	3	PD
2	5	6	PD	4
3	9	PD	7	8
4	PD	10	11	12
5	SP	SP	SP	SP

where PD and SP stand for Parity of Data and Spare Part.

To create a RAID 5E object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > A **Virtual Block RAID** object will appear on the **Drives** panel

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD572101CLA332P40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT01FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320A5		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup II/RAID5E/RAID5E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB

- 2 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu,
- OR
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

- 3 Select **RAID 5E** on the **RAID** type

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 5E. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 5E.

You also need to specify Block order for virtual RAID 5E You may select it on the Block order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but files from the RAID 5E cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 5E. Find a file and preview it. If the file appears correct, you have created a correct RAID 5E layout.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD572101CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT01FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAIDs				
Virtual Block RAID 1		NTFS	0 Bytes	2.10 GB
Direct Volume		NTFS	0 Bytes	2.10 GB
Image Files				
/media/Backup II/RAID5E/RAID5E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB
/media/Backup II/RAID5E/RAID5E...			0 Bytes	897.75 MB

Parents tab

N	Device/Disk	Info/Bus	Start/Serial	Size	Offset
A	/media/Backup II/RAID5E/RAID5EDisk1.bin	NTFS			0 Sectors
B	/media/Backup II/RAID5E/RAID5EDisk2.bin				0 Sectors
C	/media/Backup II/RAID5E/RAID5EDisk3.bin				0 Sectors
D	/media/Backup II/RAID5E/RAID5EDisk4.bin				0 Sectors

	A	B	C	D
1	1	2	3	PD
2	5	6	PD	4
3	9	PD	7	8
4	PD	10	11	12
5	SP	SP	SP	SP

> The RAID 5E object can now be processed like regular drives/volumes

If **R-Studio for Linux** detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.7.4 RAID5EE

RAID 5EE (where E stands for Enhanced) is a RAID 5 layout with an integrated hot-spare drive, where the spare drive is an active part of the block rotation scheme. An example of such RAID layout is in the table below:

	A	B	C	D
1	1	2	SP	PD
2	4	SP	PD	3
3	SP	PD	5	6
4	PD	7	8	SP

where PD and SP stand for Parity of Data and Spare Part.

To create a RAID 5EE object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > A **Virtual Block RAID** object will appear on the **Drives** panel

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.88 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup II/RAID5EE/RAID5...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAID5...			0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAID5...			0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAID5...		NTFS	0 Bytes	897.75 MB

- 2 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu, or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

- 3 Select **RAID 5EE** on the **RAID** type

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 5EE. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 5EE. You also need to specify Block order for virtual RAID 5EE You may select it on the Block order drop-down or context menu.

If the those parameters are not correct, data on the parents will not be damaged, but files from the RAID 5EE cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 5EE. Find a file and preview it. If the file appears correct, you have created a correct RAID 5EE layout.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332JP4...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT01FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1		NTFS	0 Bytes	1.75 GB
Direct Volume		NTFS	0 Bytes	1.75 GB
Image files				
/media/Backup II/RAID5EE/RAI...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAI...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAI...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID5EE/RAI...		NTFS	0 Bytes	897.75 MB

Parents tab

Parents

Virtual Block RAID 1

Drag disks or volumes to the list box to create a RAID set. Also you can use the shortcut menu to manage the RAID set.

Locate Add Missing Disk Remove Move Up Move Down Synchronize Offsets

N	Device/Disk	Info/Bus	Start/Serial	Size	Offset
A	/media/Backup II/RAID5EE/RAID5EEDisk1....	NTFS			0 Sectors
B	/media/Backup II/RAID5EE/RAID5EEDisk2....				0 Sectors
C	/media/Backup II/RAID5EE/RAID5EEDisk3....				0 Sectors
D	/media/Backup II/RAID5EE/RAID5EEDisk4....	NTFS			0 Sectors

RAID Parameters

Auto Detect

RAID type: RAID5EE

Block order for: Left Synchronous (Stanc...)

Parity delay: Not used

First parity: []

Number of rows: 4

Block size: 64 KB

Legend:

- Parity block
- Invalid block order
- Not ordered block
- Current sequence block
- Parity block of current sequence
- Member block of selected parity block

Apply changes immediately More... Apply

> The RAID 5EE object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.7.5 RAID6E

RAID 6E (where E stands for Enhanced) is a RAID 6 layout with an integrated hot-spare drive, where the spare drive is an active part of the block rotation scheme. An example of such RAID layout is in the table below:

	A	B	C	D	E	F
1	RS	1	2	3	4	PD
2	5	6	7	8	PD	RS
3	10	11	12	PD	RS	9
4	15	16	PD	RS	13	14

5	20	PD	RS	17	18	19
6	PD	RS	21	22	23	24
7	SP	SP	SP	SP	SP	SP

where RS, PD and SP stand for Reed-Solomon, Parity of Data, and Spare Part, respectively.

To create a RAID 6E object

- 1 Click the **Create Virtual RAID** button and select **Create Virtual Block RAID** or select the **Create Virtual Block RAID** on the **Create** menu
- > A **Virtual Block RAID** object will appear on the **Drives** panel

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PTQ1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID				
Virtual Block RAID 1			0 Bytes	
Image Files				
/media/Backup I/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup I/RAID6E/RAID6E...		NTFS	0 Bytes	897.75 MB
/media/Backup I/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup I/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup I/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup I/RAID6E/RAID6E...			0 Bytes	897.75 MB

- 2 Drag the required partitions from the **Drives** panel to the **Parents** tab

Other ways to add objects

- Right-click the **Parents** tab and select the required partition from the context menu, or
- Right-click the partition on the **Drives** panel, select **Add to RAID** on the context menu, and select the RAID object you want to add the partition to.

- 3 Select **RAID 6E** on the **RAID** type

You may either make **R-Studio for Linux** to process your changes immediately or wait until you finish editing the RAID layout. Select or clear the **Apply changes immediately** checkbox on the **Parents** tab. Click the **Apply** button to apply the changes when are you through.

Note: Objects should be placed in the same order as they were in the original RAID 6E. If this order is incorrect, you must change it by dragging the parents to place them in the correct order.

Object control buttons

Locate	Click this button to locate the selected object in the Drives panel.
Add Empty Space/Add Missing Disk	Click this button to add an empty space or missing disk object to the RAID
Remove	Click this button to remove the selected object from the RAID
Move Up	Click this button to move up the selected object in the RAID
Move Down	Click this button to move down the selected object in the RAID
Synchronize Offsets	Click this button to make the offsets the same for all objects in the RAID
Reset changes	Click this button to return the configuration to the initial state (after clicking the Apply button or immediately after loading)

The RAID block size and Offset (in sectors) parameters must be set the same as for the original RAID 6E.

You also need to specify Block order for virtual RAID 6E. You may select it on the Block order drop-down or context menu.

If those parameters are not correct, data on the parents will not be damaged, but files from the RAID 6E cannot be recovered.

Note: You may check how correctly you have reconstructed the original RAID 6E. Find a file and preview it. If the file appears correct, you have created a correct RAID 6E layout.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332J40...	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
ST3500320AS		USB (7:...	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID5				
Virtual Block RAID 1		NTFS	0 Bytes	3.01 GB
Direct Volume		NTFS	0 Bytes	3.01 GB
Image Files				
/media/Backup II/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup II/RAID6E/RAID6E...		NTFS	0 Bytes	897.75 MB
/media/Backup II/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup II/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup II/RAID6E/RAID6E...			0 Bytes	897.75 MB
/media/Backup II/RAID6E/RAID6E...			0 Bytes	897.75 MB

Parents tab

The screenshot shows the 'Parents' tab for 'Virtual Block RAID 1'. It displays a list of disks (A-F) with their device paths and file systems. Below the list is a RAID layout grid with 7 rows and 6 columns (A-F). The grid shows the distribution of data blocks and parity blocks (RS, PD, SP) across the disks. To the right of the grid are the RAID Parameters, including RAID type (RAID6E / Reed-Solomon), Block order for (Left Synchronous (Stanc)), Parity delay (Not used), First parity, Number of rows (7), and Block size (64 KB). A legend at the bottom explains the symbols used in the grid: RS for Parity block, SP for Invalid block order, PD for Not ordered block, RS for Current sequence block, RS for Parity block of current sequence, and SP for Member block of selected parity block.

> The RAID 6E object can now be processed like regular drives/volumes

If R-Studio for Linux detects a valid file system on the newly created RAID object, a [partition](#) object will appear on the Drives panel.

The [Description Files for RAID Configurations](#) topic shows the RAID description file for this RAID configuration.

You also may check the RAID consistency, if necessary. See the [Checking RAID Consistency](#) help page for details.

2.4.8 Finding RAID Parameters

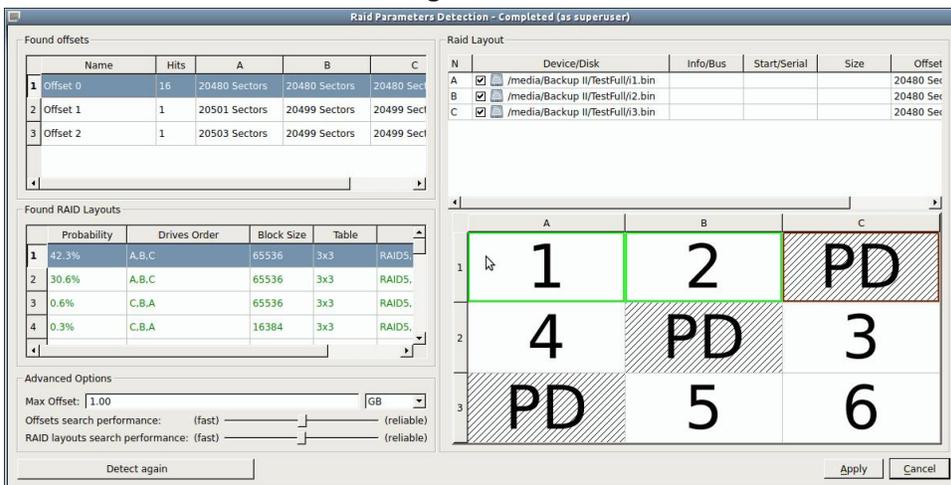
R-Studio for Linux can find parameters for RAID 5 and 6. RAID parameters can be found automatically or manually.

The number of disks in the RAID should be between 3 and 32. RAID parameters can be found only when all original disks (or their [images](#)) are present. Even one substitute object in a RAID (like a missing disk) makes finding RAID parameters impossible.

To find RAID parameters automatically,

- 1 Click the **Auto Detect** button on the **Parents** tab
- > **R-Studio for Linux** will start searching for the RAID parameters and show the most probable one on the RAID Parameter Detection dialog box

RAID Parameter Detection dialog box



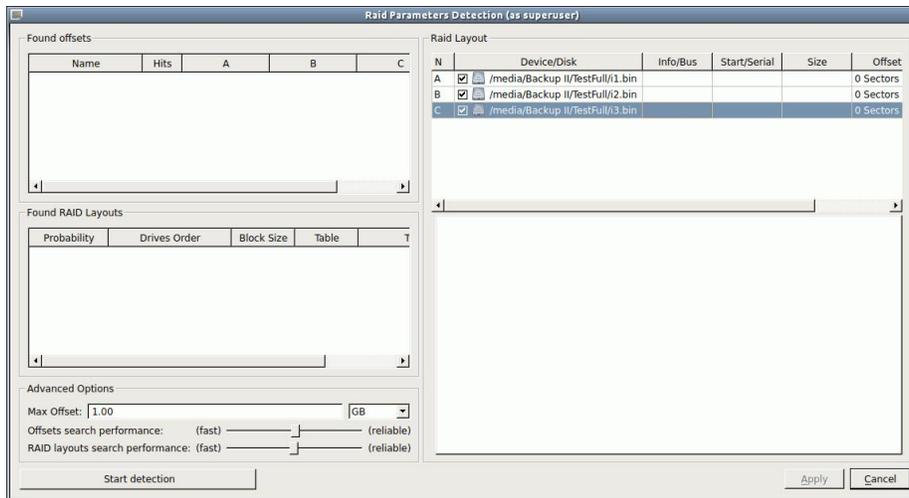
- 2 Click the **Apply** button and **R-Studio for Linux** will change the RAID layout to the selected one on the **Parents** tab.
- 3 Click the **Apply** button on the **Parents** tab
- > **R-Studio for Linux** will use the found parameters for the RAID.
If necessary, you may return to the RAID Parameter Detection dialog box by clicking the **Choose Variants** button, and select another RAID layout.

To find RAID parameters manually,

- 1 Click the drop-down **Auto Detect** list on the **Parents** tab and select **Advanced Detection**.

- Specify the necessary detection parameters on the RAID Parameter Detection dialog box and click the Start detection button

Raid Parameters Detection dialog box



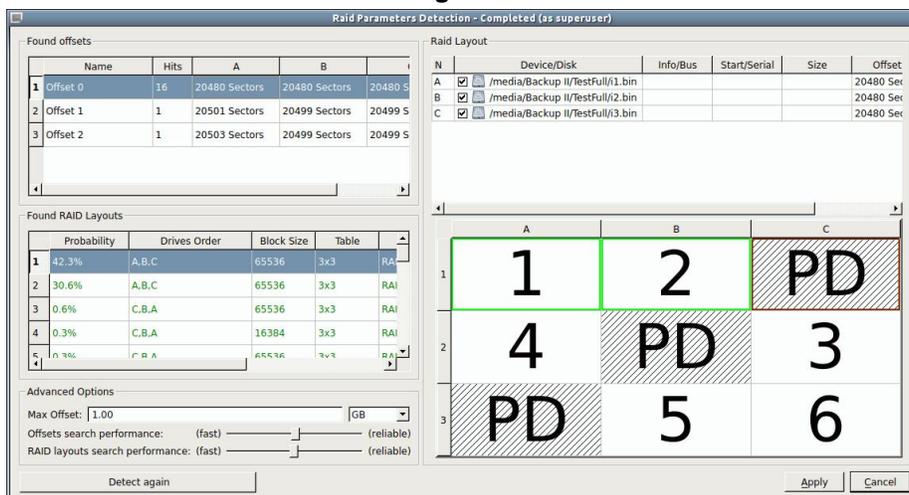
You may change the disk order, offset for disk(s), and enable/disable disks.

Advanced Parameters

Max offset:	The area on the disk to find RAID parameters in.
Offset search performance	Cumulative parameters that estimates the probability of certain found RAID parameters. Moving it to the right increases accuracy but slows the process. Moving it to the left reduces the accuracy but makes the process faster.
RAID layouts search performance	

- Select an offset and click the Click here to find RAID Layouts button on the RAID Parameters Detection dialog box

RAID Parameters Detection dialog box



You may add your own RAID offsets. Right-click empty space on the **Found offsets** pane and select **Add Custom offset** on the context menu and specify the offset individually for every disk.

- Select a RAID variant on the Found RAID layouts pane and click the Apply button
- Click the Apply button on the Parents tab

- > **R-Studio for Linux will use the found parameters for the RAID.**

If necessary, you may return to the RAID Parameter Detection dialog box by clicking the **Choose Variants** button, and select another RAID layout.

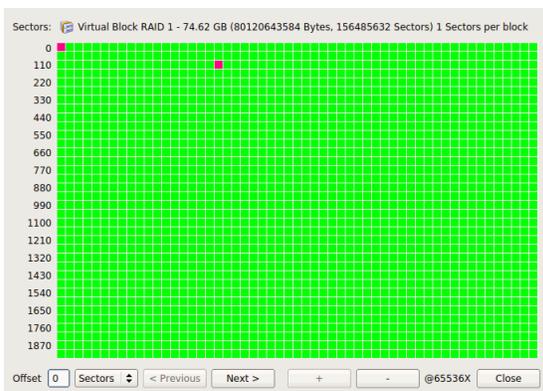
2.4.9 Checking RAID Consistency

You may check RAID consistency (whether the data parity values are valid) for RAID layouts with parity blocks.

To check RAID consistency,

- * **Right-click the RAID and select Check RAID consistency... on the context menu**
- > **The RAID consistency check window will appear showing the progress.**

RAID consistency check **window**



When the check is finished, you may inspect the results.

Block color	
Green	Data parity values are valid.
Red	Data parity values are not valid.
White	0's

When a mouse pointer hovers over a block, a tooltip will show the sector range within the block and number of consistent and inconsistent sectors. Double-clicking the block moves it to the upper-leftmost corner and zooms in the data by 2.

RAID consistency check controls

Sectors	The number of the first sector in the row.
Offset	Offset in the data. Enter the address you want to jump to and press the Enter key.
Sectors/Bytes/KB...	Specifies the dimension of the data in the Offset field.
Previous/Next	Moves to the previous/next part of the data.
+/-	Zooms into/out of, the data.

2.4.10 Syntax of a Description File for RAID Configurations

You may create and store your own RAID configurations. The syntax of those files is similar to that of the XML language. They are stored in an `.xml` file specified on the [R-Studio for Linux Settings](#).

A number of file examples are shown on the [Description Files for RAID Configurations](#) topic.

There are two types of such description files: for RAID presets and custom-created RAID layouts.

RAID preset configuration file

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID5" rows="3" type="5" order="2"
parityDelay="1">
  <Parents>
    <Parent comp="RAID5Disk1.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="1"/>
    <Parent comp="RAID5Disk2.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="2"/>
    <Parent comp="RAID5Disk3.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="3"/>
  </Parents>
</RAID>
</RAIDList>
```

Custom-created RAID configuration file example

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID6Complex" rows="6" type="256">
  <Parents>
    <Parent name="img1.bin" size="941359104" order="1"/>
    <Parent name="img2.bin" fs="NTFS" size="941359104" order="2"/>
    <Parent name="img3.bin" size="941359104" order="3"/>
    <Parent name="img4.bin" size="941359104" order="4"/>
    <Parent name="img5.bin" size="941359104" order="5"/>
  </Parents>
  <Table>
    <Block id="A1">ReedSolomon</Block>
    <Block id="B1">1</Block>
    <Block id="C1">2</Block>
    <Block id="D1">3</Block>
    <Block id="E1">XorOfData</Block>
    <Block id="A2">4</Block>
    <Block id="B2">5</Block>
    <Block id="C2">6</Block>
    <Block id="D2">XorOfData</Block>
    <Block id="E2">ReedSolomon</Block>
    <Block id="A3">8</Block>
    <Block id="B3">9</Block>
    <Block id="C3">XorOfData</Block>
    <Block id="D3">ReedSolomon</Block>
    <Block id="E3">7</Block>
    <Block id="A4">12</Block>
    <Block id="B4">XorOfData</Block>
    <Block id="C4">ReedSolomon</Block>
    <Block id="D4">10</Block>
    <Block id="E4">11</Block>
    <Block id="A5">XorOfData</Block>
    <Block id="B5">ReedSolomon</Block>
    <Block id="C5">13</Block>
```

```

    <Block id="D5">14</Block>
    <Block id="E5">15</Block>
    <Block id="A6" sequence="1">XorOfAll</Block>
    <Block id="B6" sequence="2">XorOfAll</Block>
    <Block id="C6" sequence="3">XorOfAll</Block>
    <Block id="D6" sequence="4">XorOfAll</Block>
    <Block id="E6" sequence="5">XorOfAll</Block>
  </Table>
  <Sequences>
    <Sequence id="1">A1 A2 A3 A4 A5 A6</Sequence>
    <Sequence id="2">B1 B2 B3 B4 B5 B6</Sequence>
    <Sequence id="3">C1 C2 C3 C4 C5 C6</Sequence>
    <Sequence id="4">D1 D2 D3 D4 D5 D6</Sequence>
    <Sequence id="5">E1 E2 E3 E4 E5 E6</Sequence>
  </Sequences>
</RAID>
</RAIDList>

```

File structure

File header

The file starts with a standard XML header:

```
<?xml version="1.0" encoding="utf-8"?>
```

Section RAIDList

```
<RAIDList>
```

It can contain any number of the <RAID> sections and requires a closing element </FileTypeList>.

Section structure example:

```

<RAIDList>
  <RAID [attributes]>
    ...
  </RAID>
  ...
  <RAID [attributes]>
    ...
  </RAID>

```

Section RAID

This section describes each RAID layout.

It must contain at least one <Table> and <Parents> sections and can contain one block <Sequences>..

```

<RAIDList version="1">
  <RAID blockSize="65536" name="RAID5" rows="3" type="5" order="2"
parityDelay="1">
  <Parents>

  </Parents>
  <Table>

  </Table>
  <Sequences>

  </Sequences>
</RAID>

```

```
</RAIDList>
```

Attributes:

blocksize	<u32>	Required	The block size of the RAID in bytes
name	<string>	Optional	The name of the RAID layout
rows	<u16>	Required	The number of rows in the RAID layout table.
type	<u16>	Required	The type of the RAID preset. The following types are supported: 1: RAID0 (Stripe set) 2: RAID10 3: RAID1E 4: RAID4 5: RAID5 6: RAID5E 7: RAID5EE 8: RAID6/Reed-Solomon Encoding 9: RAID6E/Reed-Solomon Encoding 10: RAID6/Vertical Xor Encoding 256: Custom Raid Table If the RAID type parameter contradicts to the RAID table, the RAID table always prevails.
order	<u16>	Required/Optional	The RAID sub-type. For example, order="2" means Left Asynchronous for RAID5 layouts. Any value for the custom RAID layouts will be ignored.
parityDelay	<u16>	Required	The Parity delay parameter.

Section structure example:

```
<RAID blockSize="65536" rows="6" type="256">
  <Parents>

  </Parents>

  <Table>

  </Table>
  <Sequences>

  </Sequences>
</RAID>
```

Section Parents

This section describes the RAID parents. It contains the <Parent> elements of the RAID.

Section structure example:

```
<Parents>
  <Parent comp="RAID5Disk1.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="1"/>
  <Parent comp="RAID5Disk2.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="2"/>
```

```

    <Parent comp="RAID5Disk3.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="3"/>
  </Parents>

```

Element Parent

The element specifies the parent of the RAID.

Attributes:

comp	<string>	Required/Optional	The file-container with the parent object.
name	<string>	Required	The object name of the RAID parent.
offset	<u16>	Required is not 0	The offset value in bytes
size=	<u16>	Required	The object size in bytes
order	<u16>	Required	The order of the RAID object

Section Table

This section describes the RAID layout table. It contains the <Block> elements which number is a product of two attributes in the <RAID> section: <parents> x <rows>.

Section structure example:

```

<RAIDList>
  <RAID name="example" parents="2" rows="2" blocksize="16777216">
    <Table>
      <Block [attributes]> ... </Block>
      <Block [attributes]> ... </Block>
      <Block [attributes]> ... </Block>
      <Block [attributes]> ... </Block>
    </Table>
  </RAID>
</RAIDList>

```

Element Block

The element specifies the block number in the RAID layout table (a positive integer number) or an error correction block of the following types:

- PD OR ParityOfData
- PA OR ParityOfAll
- RS OR ReedSolomon
- U OR Unknown
- I OR Ignore

Any other value is treated as Unknown.

Attributes:

id	<string>	Required	The alpha-numerical identifier of the block in the RAID layout table. The element in the 3-rd column of the 2-nd line is designated as C2. AA is used after letter z, and so on.
sequence	<string>	Optional	The numerical identifier for non-default sequences.

Section Sequences

This section describes the non-default data checksum sequences used to preserve data integrity. It is not necessary to explicitly list default sequences (the table rows). Sequences can contain any number of the `<Sequence>` elements.

Section structure example:

```
<RAIDList>
  <RAID name="example" parents="4" rows="4" blocksize="16777216">
    <Parents>

    </Parents>
    <Table>
      ...
    </Table>
    <Sequences>
      <Sequence [attributes]> ... </Sequence>
      ...
      <Sequence [attributes]> ... </Sequence>
    </Sequences>
  </RAID>
</RAIDList>
```

Element Sequence

The element contains the list of the RAID blocks belonging to that sequence. The elements are separated by a space .

Attributes:

id	<u16>	Required	The sequence identifier.
----	-------	----------	--------------------------

Element example:

See the [RAID configuration file example](#).

Comments

```
<!-- Comment string -->
```

An XML standard string for a comment.

2.4.11 Description Files for RAID Configurations

Below are description files for RAID examples described in the [Volume Sets and RAIDs](#) chapter. The syntax of them is described in the [Syntax of a Description File for RAID Configurations](#) topic.

StripeSet

The stripe set layout is described in the [Volume Sets, Stripe Sets, and Mirrors](#) topic.

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="StripeSet" rows="2" type="1" order="7"
  parityDelay="1">
    <Parents>
      <Parent comp="RAID0Disk1.dsk" name="Promise1+0 JBOD1.10"
  size="40060321792" order="1"/>
      <Parent comp="RAID0Disk2.dsk" name="Promise1+0 JBOD1.10"
  size="40060321792" order="2"/>
    </Parents>
  </RAID>
</RAIDList>
```

```

    </Parents>
  </RAID>
</RAIDList>

```

Basic RAID 5

The RAID layout is described in the [Working with Basic RAID 4 and RAID 5 Operations](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID5" rows="3" type="5" order="2"
parityDelay="1">
    <Parents>
      <Parent comp="RAID5Disk1.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="1"/>
      <Parent comp="RAID5Disk2.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="2"/>
      <Parent comp="RAID5Disk3.dsk" name="Promise1+0 JBOD1.10"
size="40060321792" order="3"/>
    </Parents>
  </RAID>
</RAIDList>

```

RAID 5 with parity delays

The RAID layout is described in the [RAID5 with Parity Delays Operations](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="16384" name="RAID5HP" rows="48" type="5" order="2"
parityDelay="16" firstParity="16">
    <Parents>
      <Parent name="RAID5HPDisk1.bin" offset="557056" size="941359104"
order="1"/>
      <Parent name="RAID5HPDisk2.bin" offset="557056" size="941359104"
order="2"/>
      <Parent name="RAID5HPDisk3.bin" offset="557056" size="941359104"
order="3"/>
    </Parents>
  </RAID>
</RAIDList>

```

Advanced RAID 5

The RAID layout is described in the [Working with Advanced RAID Layouts](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="4096" name="RAID5Complex" rows="9" type="256">
    <Parents>
      <Parent name="RAID5CDisk1.bin" offset="16777216" size="941359104"
order="1"/>
      <Parent name="RAID5CDisk2.bin" offset="16777216" size="941359104"
order="2"/>
      <Parent name="RAID5CDisk3.bin" offset="16777216" size="941359104"
order="3"/>
    </Parents>
    <Table>
      <Block id="A1">XorOfData</Block>
      <Block id="B1">1</Block>
    </Table>
  </RAID>
</RAIDList>

```

```

    <Block id="C1">2</Block>
    <Block id="A2">XorOfData</Block>
    <Block id="B2">3</Block>
    <Block id="C2">4</Block>
    <Block id="A3">XorOfData</Block>
    <Block id="B3">5</Block>
    <Block id="C3">6</Block>
    <Block id="A4">7</Block>
    <Block id="B4">XorOfData</Block>
    <Block id="C4">8</Block>
    <Block id="A5">9</Block>
    <Block id="B5">XorOfData</Block>
    <Block id="C5">10</Block>
    <Block id="A6">11</Block>
    <Block id="B6">XorOfData</Block>
    <Block id="C6">12</Block>
    <Block id="A7">13</Block>
    <Block id="B7">14</Block>
    <Block id="C7">XorOfData</Block>
    <Block id="A8">15</Block>
    <Block id="B8">16</Block>
    <Block id="C8">XorOfData</Block>
    <Block id="A9">17</Block>
    <Block id="B9">18</Block>
    <Block id="C9">XorOfData</Block>
  </Table>
</RAID>
</RAIDList>

```

Advanced RAID 5

The RAID layout is described in the [Working with Advanced RAID Layouts](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="524288" name="RAID_MacPro" rows="3" type="256">
    <Parents>
      <Parent name="RAID_MAC_ProDisk1.bin" fs="NTFS" offset="16777216"
size="941359104" order="1"/>
      <Parent name="RAID_MAC_ProDisk2.bin" offset="16777216" size="941359104"
order="2"/>
      <Parent name="RAID_MAC_ProDisk3.bin" offset="16777216" size="941359104"
order="3"/>
      <Parent name="RAID_MAC_ProDisk4.bin" offset="16777216" size="941359104"
order="4"/>
    </Parents>
    <Table>
      <Block id="A1" sequence="1">XorOfData</Block>
      <Block id="B1">1</Block>
      <Block id="C1">2</Block>
      <Block id="D1" sequence="2">XorOfData</Block>
      <Block id="A2">3</Block>
      <Block id="B2">4</Block>
      <Block id="C2" sequence="3">XorOfData</Block>
      <Block id="D2">5</Block>
    </Table>
  </RAID>
</RAIDList>

```

```

        <Block id="A3">6</Block>
        <Block id="B3" sequence="4">XorOfData</Block>
        <Block id="C3">7</Block>
        <Block id="D3">8</Block>
    </Table>
    <Sequences>
        <Sequence id="1">A1 B1 C1</Sequence>
        <Sequence id="2">D1 A2 B2</Sequence>
        <Sequence id="3">C2 D2 A3</Sequence>
        <Sequence id="4">B3 C3 D3</Sequence>
    </Sequences>
</RAID>
</RAIDList>

```

RAID 6 Reed-Solomon (Left Synchronous (Standard)) Preset

The RAID layout is described in the [Working with RAID 6 Presets](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
    <RAID blockSize="65536" name="RAID6RS" rows="5" type="8" order="1"
parityDelay="1">
        <Parents>
            <Parent name="img1.bin" size="941359104" order="1"/>
            <Parent name="img2.bin" fs="NTFS" size="941359104" order="2"/>
            <Parent name="img3.bin" size="941359104" order="3"/>
            <Parent name="img4.bin" size="941359104" order="4"/>
            <Parent name="img5.bin" size="941359104" order="5"/>
        </Parents>
    </RAID>
</RAIDList>

```

RAID6 (Double Xor) Preset

The RAID layout is described in the [Working with RAID 6 Presets](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
    <RAID blockSize="65536" name="RAID62X" rows="4" type="10" order="1"
parityDelay="1">
        <Parents>
            <Parent name="RAID62X1.bin" fs="NTFS" size="941359104" order="1"/>
            <Parent name="RAID62X2.bin" size="941359104" order="2"/>
            <Parent name="RAID62X3.bin" size="941359104" order="3"/>
            <Parent name="RAID62X4.bin" size="941359104" order="4"/>
            <Parent name="RAID62X5.bin" size="941359104" order="5"/>
            <Parent name="RAID62X6.bin" size="941359104" order="6"/>
        </Parents>
    </RAID>
</RAIDList>

```

Advanced RAID 6

The RAID layout is described in the [Working with Advanced RAID Layouts](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
    <RAID blockSize="65536" name="RAID6Complex" rows="6" type="256">
        <Parents>
            <Parent name="img1.bin" size="941359104" order="1"/>

```

```

    <Parent name="img2.bin" fs="NTFS" size="941359104" order="2"/>
    <Parent name="img3.bin" size="941359104" order="3"/>
    <Parent name="img4.bin" size="941359104" order="4"/>
    <Parent name="img5.bin" size="941359104" order="5"/>
</Parents>
<Table>
  <Block id="A1">ReedSolomon</Block>
  <Block id="B1">1</Block>
  <Block id="C1">2</Block>
  <Block id="D1">3</Block>
  <Block id="E1">XorOfData</Block>
  <Block id="A2">4</Block>
  <Block id="B2">5</Block>
  <Block id="C2">6</Block>
  <Block id="D2">XorOfData</Block>
  <Block id="E2">ReedSolomon</Block>
  <Block id="A3">8</Block>
  <Block id="B3">9</Block>
  <Block id="C3">XorOfData</Block>
  <Block id="D3">ReedSolomon</Block>
  <Block id="E3">7</Block>
  <Block id="A4">12</Block>
  <Block id="B4">XorOfData</Block>
  <Block id="C4">ReedSolomon</Block>
  <Block id="D4">10</Block>
  <Block id="E4">11</Block>
  <Block id="A5">XorOfData</Block>
  <Block id="B5">ReedSolomon</Block>
  <Block id="C5">13</Block>
  <Block id="D5">14</Block>
  <Block id="E5">15</Block>
  <Block id="A6" sequence="1">XorOfAll</Block>
  <Block id="B6" sequence="2">XorOfAll</Block>
  <Block id="C6" sequence="3">XorOfAll</Block>
  <Block id="D6" sequence="4">XorOfAll</Block>
  <Block id="E6" sequence="5">XorOfAll</Block>
</Table>
<Sequences>
  <Sequence id="1">A1 A2 A3 A4 A5 A6</Sequence>
  <Sequence id="2">B1 B2 B3 B4 B5 B6</Sequence>
  <Sequence id="3">C1 C2 C3 C4 C5 C6</Sequence>
  <Sequence id="4">D1 D2 D3 D4 D5 D6</Sequence>
  <Sequence id="5">E1 E2 E3 E4 E5 E6</Sequence>
</Sequences>
</RAID>
</RAIDList>

```

RAID10 (1+0)

The RAID layout is described in the [RAID10 \(1+0\)](#) topic.

```

<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID10" rows="1" type="2" order="7"
parityDelay="1">

```

```
<Parents>
  <Parent name="RAID10-1.bin" size="941359104" order="1"/>
  <Parent name="RAID10-2.bin" size="941359104" order="2"/>
  <Parent name="RAID10-3.bin" size="941359104" order="3"/>
  <Parent name="RAID10-4.bin" size="941359104" order="4"/>
</Parents>
</RAID>
</RAIDList>
```

RAID1E

The RAID layout is described in the [RAID1E](#) topic.

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID1E" rows="2" type="3" order="1"
parityDelay="1">
  <Parents>
    <Parent name="RAID1EDisk1.bin" fs="NTFS" size="941359104" order="1"/>
    <Parent name="RAID1EDisk2.bin" size="941359104" order="2"/>
    <Parent name="RAID1EDisk3.bin" size="941359104" order="3"/>
  </Parents>
</RAID>
</RAIDList>
```

RAID5E

The RAID layout is described in the [RAID5E](#) topic.

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID5E" rows="5" type="6" order="1"
parityDelay="1">
  <Parents>
    <Parent name="RAID5EDisk1.bin" fs="NTFS" size="941359104" order="1"/>
    <Parent name="RAID5EDisk2.bin" size="941359104" order="2"/>
    <Parent name="RAID5EDisk3.bin" size="941359104" order="3"/>
    <Parent name="RAID5EDisk4.bin" size="941359104" order="4"/>
  </Parents>
</RAID>
</RAIDList>
```

RAID5EE

The RAID layout is described in the [RAID5EE](#) topic.

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID5EE" rows="4" type="7" order="1"
parityDelay="1">
  <Parents>
    <Parent name="RAID5EEDisk1.bin" fs="NTFS" size="941359104" order="1"/>
    <Parent name="RAID5EEDisk2.bin" size="941359104" order="2"/>
    <Parent name="RAID5EEDisk3.bin" size="941359104" order="3"/>
    <Parent name="RAID5EEDisk4.bin" fs="NTFS" size="941359104" order="4"/>
  </Parents>
</RAID>
</RAIDList>
```

RAID6E

The RAID layout is described in the [RAID6E](#) topic.

```
<?xml version="1.0" encoding="UTF-8"?>
<RAIDList version="1">
  <RAID blockSize="65536" name="RAID6E" rows="7" type="9" order="1"
parityDelay="1">
  <Parents>
    <Parent name="RAID6E1.bin" size="941359104" order="1"/>
    <Parent name="RAID6E2.bin" fs="NTFS" size="941359104" order="2"/>
    <Parent name="RAID6E3.bin" size="941359104" order="3"/>
    <Parent name="RAID6E4.bin" size="941359104" order="4"/>
    <Parent name="RAID6E5.bin" size="941359104" order="5"/>
    <Parent name="RAID6E6.bin" size="941359104" order="6"/>
  </Parents>
</RAID>
</RAIDList>
```

2.4.12 Various Disk and Volume Managers

R-Studio for Linux can work with objects created by various disk and volume managers. Currently, the following managers are supported:

- [BitLocker Drive Encryption](#)
- [Windows Dynamic Disks](#)
- [Windows Storage Spaces](#)
- [Apple RAIDs](#)
- [Apple CoreStorage/File Vault/Fusion Drive Volumes](#)
- [Linux mdadm RAIDs](#)
- [Logical Volume Manager \(LVM and LVM2\)](#)

R-Studio for Linux can automatically recognize and add their physical components, component [images](#), or the user can manually add the components when their data is damaged so severely that **R-Studio for Linux** cannot recognize them.

In addition, **R-Studio** can work with various [virtual disk and disk image formats](#).

2.4.12.1 BitLocker Drive Encryption

BitLocker Drive Encryption, or **BitLocker**, is a data protection feature introduced by Microsoft since Windows Vista. It implements some hard/software measures to encrypt either USB external flash drives or internal system SSD/HDD devices. You may read more about **BitLocker Drive Encryption** on the [Microsoft site](#) or [Wikipedia](#).

There are following encryption methods (protectors in the Microsoft terms) that can be utilized in the **BitLocker** protection:

- A [TPM/TPM+PIN](#) chip
- A USB key (a flash drive containing a .bek file)
- A user's password (not to confuse with a user's logon password) / recovery key

These methods can be used either individually or as a combination thereof. If they are used as a combination, knowing the decryption information for only one method is enough to unlock the device.

R-Studio can unlock devices encrypted with **BitLocker** provided that all the necessary information is known.

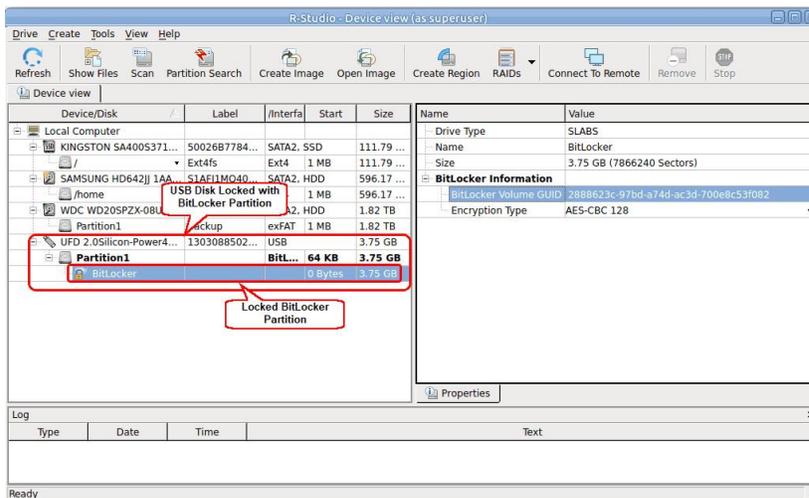
BitLocker ToGo

This is the method used to lock external removable devices. The password or a recovery key is necessary to know to unlock the device. A recovery key may be in the printed form or contained in a file. A name of such a file has the following pattern: BitLocker Recovery Key 600397A9-48AA-4DE4-B775-C71EB130EA1B.txt, where the last characters is the **BitLocker** volume identifier. That file contains the **BitLocker** volume identifier and a recovery key.

To unlock a BitLocker ToGo device,

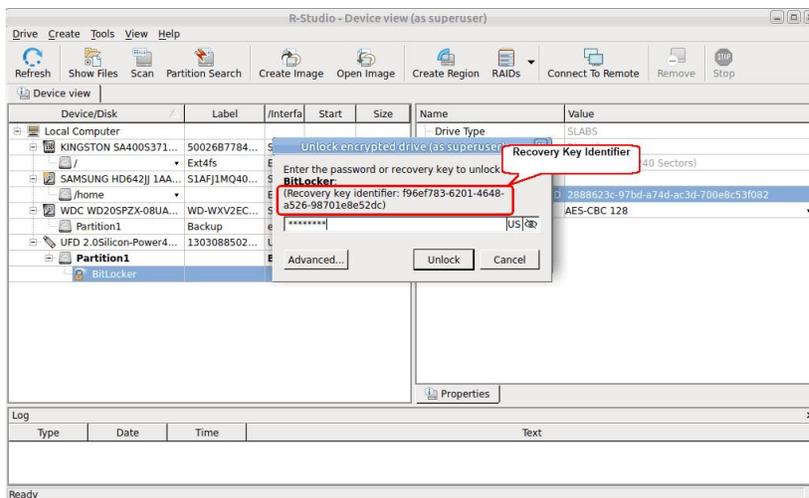
- 1 Locate the device and double-click the BitLocker partition.

BitLocker ToGo



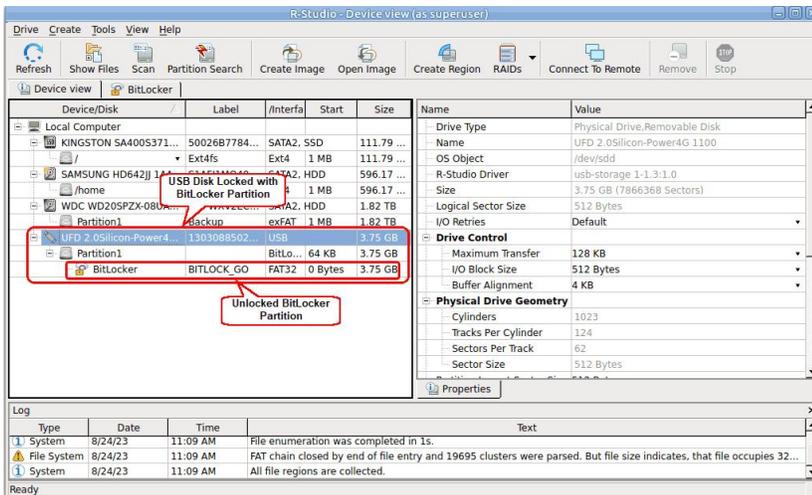
- 2 Enter the password or recovery key and click the Unlock button.

BitLocker ToGo



> R-Studio will unlock the volume

BitLocker ToGo



BitLocker System Drive Encryption

This is the method used to lock internal system drives.

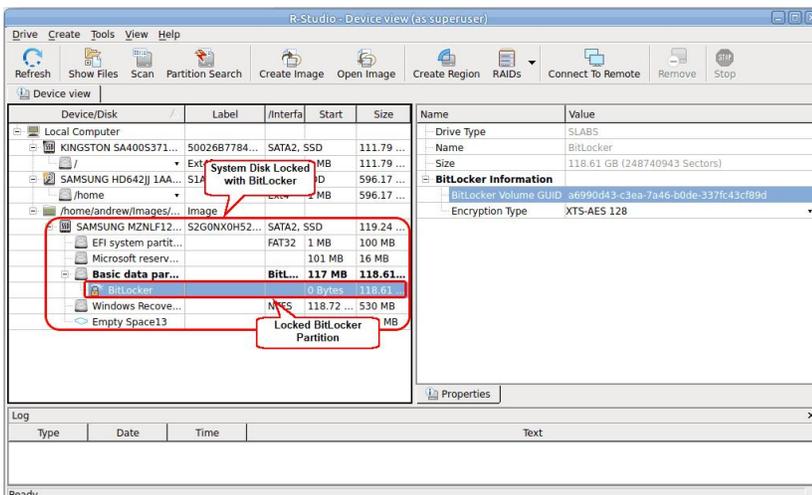
Depending on what methods are used, the following information is necessary to know to unlock the drive.

- A recovery key in the printed form or in a file. A name of such a file has the following pattern: BitLocker Recovery Key FDA7B96C-635E-45AA-BE63-00C3DB3771EE.txt , where the last characters is the **BitLocker** volume identifier. That file contains the **BitLocker** volume identifier and a recovery key.
- A password used to start the preboot process. It shouldn't be confused with the password for the user's logon.
- An external USB flash drive containing its .bek file. Note that Windows sets System and Hidden attributes for such files and Windows doesn't show such files by default.

To unlock a system drive with a BitLocker partition,

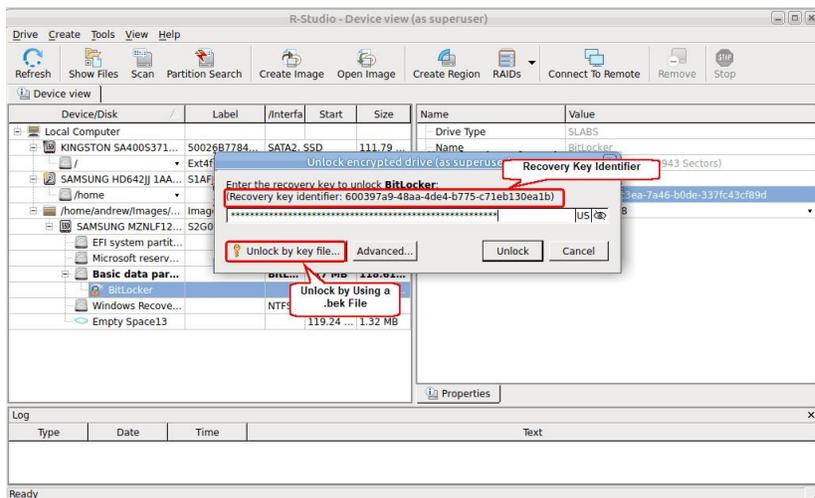
- 1 Locate the device and double-click the BitLocker partition.

BitLocker System Drive Encryption



2 Enter the password or recovery key and click the Unlock button.

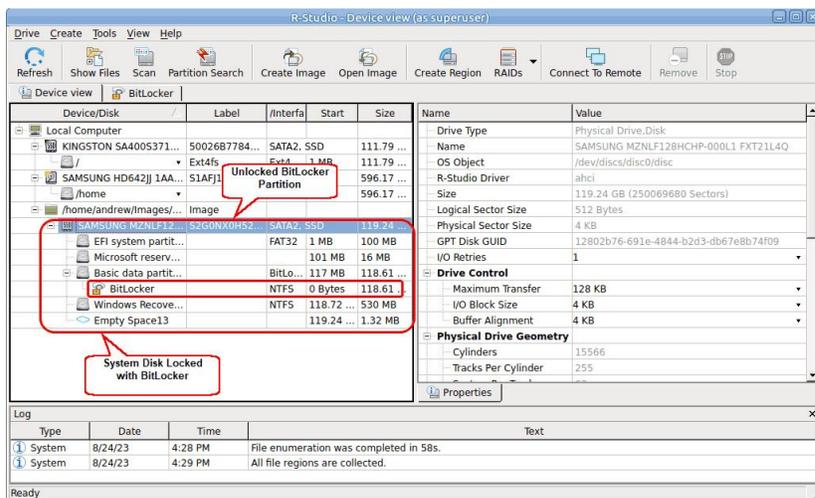
BitLocker System Drive Encryption



If you have the .bec file, click the **Unlock by key file** button and load the file.

> R-Studio will unlock the volume

BitLocker System Drive Encryption



TPM/TPM+PIN modes

Only in registered **R-Studio Technician/T80+** versions.

If only the TPM/TPM+PIN hardware was used to encrypt the partition, you must have either the FVEK (Full Volume Encryption Key) or VMK (Volume Master Key) data. Obtaining these keys is a very hard task, only quite advanced forensic professionals can do that using specialized hardware. Sometimes it may be possible to extract a FVEK from memory dumps and/or hibernation files, but this is still not a trivial process.

If you have FVEK or VMK data, click the **Advanced** button, select the key type of the data, enter the key or load a file with the key.

BitLocker TPM/TPM+PIN modes



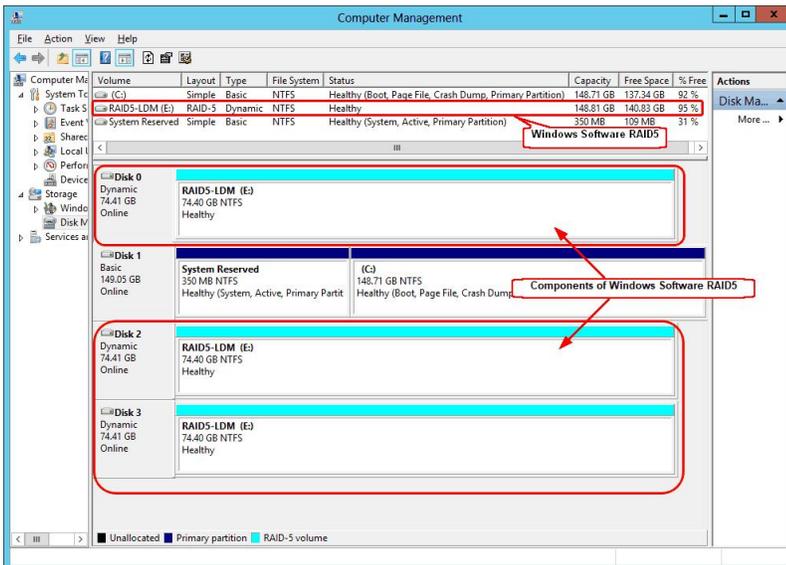
R-Studio for Linux will unlock the volume.

You may also save and load encryption information from a BitLocker Encryption volume.

2.4.12.2 Windows Dynamic Disks

R-Studio for Linux supports [dynamic disks](#), including [Windows software RAID5](#), mirrors, and spanned volumes. When **R-Studio for Linux** detects components from such dynamic disks, it assembles them accordingly.

Windows dynamic disks (RAID5)



R-Studio for Linux automatically detects components from dynamic disks and creates those dynamic disks automatically. At the same time, **R-Studio for Linux** gives access to the parents of the dynamic disks (hard drives and [images](#)).

Windows dynamic disks (RAID5) in R-Studio for Linux for Mac

Device/Disk	Label	FS	Start	Size
SAMSUNG HD642J1 1AA01110	TA2		0 Bytes	596.17 GB
Partition2	I4		1 MB	592.34 GB
Image ST380815AS 4.AAB	5QZ5GPEJ	#3 SATA2 (...)	0 Bytes	74.53 GB
Disk2-01			992.50 KB	74.53 GB
Image ST380215A 3.AAD	9RX2E6NG	#0 ATA (Pri...)	0 Bytes	74.53 GB
Disk3-01			992.50 KB	74.53 GB
Image ST380013AS 3.05	3JV4MHM8	#2 SATA (3...)	0 Bytes	74.53 GB
Disk1-01			992.50 KB	74.53 GB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8.0)	0 Bytes	931.51 GB
media\andrew\Backup II		NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID5				
Volume1	RAID5-LDM	NTFS		149.66 GB

Also, **R-Studio for Linux** automatically detects inconsistent components of dynamic disks and marks them accordingly.

Windows dynamic disks (RAID5) with unsynced parent

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
ST380815AS 4.AAB		#3 SATA2 (...)	0 Bytes	74.53 GB
Disk2-01			992.50 KB	74.53 GB
Image				
ST380215A 3.AAD	9RX2E6NG	#0 ATA (Pri...)	0 Bytes	74.53 GB
Disk3-01 - LDM UNSYNC			992.50 KB	74.53 GB
Image				
ST380013AS 3.05	3jv4MHM8	#2 SATA (3...)	0 Bytes	74.53 GB
Disk1-01			992.50 KB	74.53 GB
JMicron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID5				
Volume1	RAID5-LDM	NTFS		149.06 GB

R-Studio for Linux shows the components of the selected dynamic disk on its LDM Components tab.

LDM Components tab

Disk	Label	Size	Drive Name	Located On	Image file name	LDM Object Name	Serial	LDM Host Disk GUID
Disk 0:	[Disk1-01 (ST380013AS 3.05 - 3jv4MHM8) - 74.53 GB : /media/andrew]	74.53 GB	Disk1-01	ST380013AS 3.05	/media/andrew/Backup II/RAID5-WinLDM/ST380013AS-3jv4MHM8.rdr	Disk1-01	3jv4MHM8	8276047e-b42e-11e5-93f3-20cf30be3944
Disk 1:	[Disk2-01 (ST380815AS 4.AAB - 5QZ5GPEJ) - 74.53 GB : /media/andrew]	74.53 GB	Disk2-01	ST380815AS 4.AAB	/media/andrew/Backup II/RAID5-WinLDM/ST380815AS-5QZ5GPEJ.rdr	Disk2-01	5QZ5GPEJ	82760481-b42e-11e5-93f3-20cf30be3944
Disk 2:	[Disk3-01 (ST380215A 3.AAD - 9RX2E6NG) - 74.53 GB : /media/andrew]	74.53 GB	Disk3-01	ST380215A 3.AAD	/media/andrew/Backup II/RAID5-WinLDM/ST380215A-9RX2E6NG.rdr	Disk3-01	9RX2E6NG	82760484-b42e-11e5-93f3-20cf30be3944

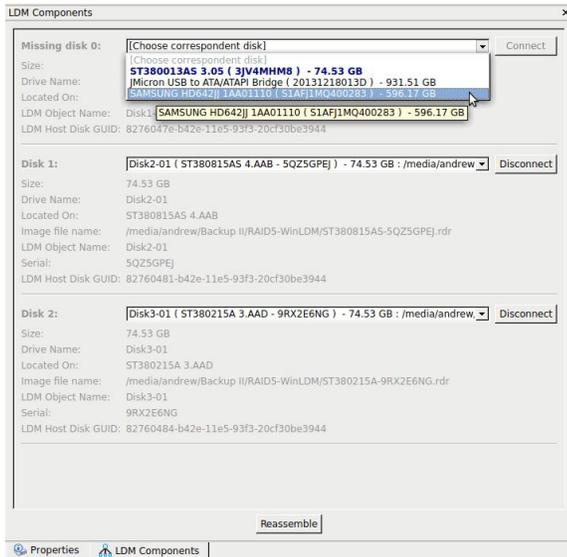
R-Studio for Linux shows broken dynamic disks in pink.

Broken dynamic disks in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
ST380215A 3.AAD	9RX2E6NG	#0 ATA (Pri...)	0 Bytes	74.53 GB
Disk3-01			992.50 KB	74.53 GB
Image				
ST380013AS 3.05	3jv4MHM8	#2 SATA (3...)	0 Bytes	74.53 GB
Disk1-01			992.50 KB	74.53 GB
JMicron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID5				
Volume1	RAID5-LDM	NTFS		149.06 GB

The LDM Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken dynamic disk. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the dynamic disk in blue.

Adding a component manually



You may immediately switch to the dynamic disk configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows dynamic disks with manually added components in blue:

Dynamic disks with added components in R-Studio for Linux

Drives	Device/Disk	Label	FS	Start	Size
Local Computer	SAMSUNG HD642J1 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
	Partition2		Ext4	1 MB	592.34 GB
					592.35 GB
Image	ST380815AS 4.AAB	5QZ5GPEJ	#3 SATA2 (...)	0 Bytes	74.53 GB
	Disk2-01				74.53 GB
Image	ST380215A 3.AAD	9RX2E6NG	#2 SATA (3...)	0 Bytes	74.53 GB
	Disk3-01			992.50 KB	74.53 GB
Image	ST380013AS 3.05	3JV4MHM8	#2 SATA (3...)	0 Bytes	74.53 GB
	Partition1				74.53 GB
	Micron USB to ATA/ATAPI Bridge	201312			931.51 GB
	/media/andrew/Backup II	Backup			931.51 GB
Virtual Volume sets and RAID5	RAID5-011		NTFS		149.66 GB

2.4.12.3 Windows Storage Spaces

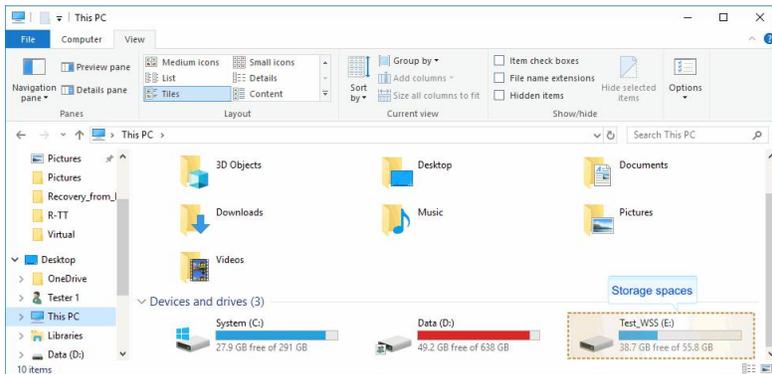
[Windows storage spaces](#) is a new storage technology, introduced in Windows 8 and Windows Server 2012, that allows the user to combine various (not always similar) hard drives into a kind of a RAID or compound volume. First, the hard drives are combined into a storage pool, then several storage spaces with striping (similar to RAID0), mirroring (similar to RAID1), and parity (similar to RAID5) can be created in that storage pool. You may read more about storage pools and spaces in the Microsoft's [Storage Spaces: FAQ](#)

When drives from a storage pool are connected to a Windows computer, it automatically detects them and assembles storage spaces accordingly.

R-Studio for Linux supports Windows Storage Spaces created by Windows 8/8.1 and Windows 10/Threshold 2/Anniversary/Fall Creators updates.

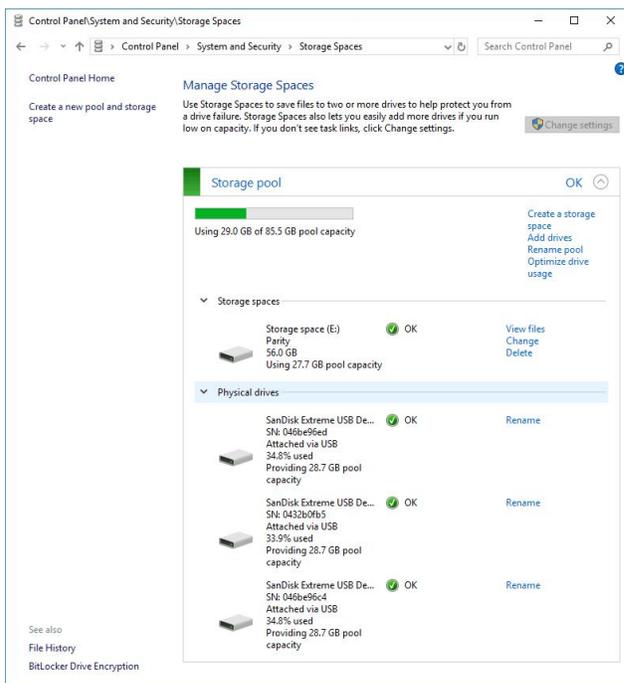
When Windows storage spaces use caching, **R-Studio for Linux** can process both the cache and the storage space itself simultaneously greatly increasing chances for successful recovery of deleted files. For [SSD \(Solid State Device\)](#) media, bypassing the cache may be the only available option to recover lost files.

Storage spaces in Windows



Storage pools and spaces can be managed using the **Storage Spaces** item in the **Windows Control Panel**.

Storage spaces in Windows



R-Studio for Linux detects disks (or their [images](#)) from storage pools and creates storage pools and spaces automatically. At the same time, **R-Studio for Linux** gives access to the parents of the storage spaces (hard drives and images)

Storage spaces in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AF1M0400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
SanDisk Extreme 0001	046be96ed	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition			17 KB	128 MB
Storage pool			129 MB	29.10 GB
SanDisk Extreme 0001	0432b0fb5	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition			17 KB	128 MB
Storage pool			129 MB	29.10 GB
SanDisk Extreme 0001	046be96c4	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition			17 KB	128 MB
Storage pool			129 MB	29.10 GB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB
Virtual Volume sets and RAIDs				
Storage space				56 GB
System Reserved Partition			1 MB	128 MB
GPTPart1	Test_WSS	NTFS	129 MB	55.87 GB

If recognized parents of a storage space, including disk [images](#), are added to **R-Studio for Linux** later, it automatically adds them to their respective storage space.

When an automatically created storage space is selected, **R-Studio for Linux** highlights its components.

R-Studio for Linux shows the components of the selected storage space on its WSS Components tab.

WSS Components tab

WSS Object Name	Serial	WSS Host Disk GUID
Storage pool (SanDisk Extreme 0001 - 046be96ed) - 29.10 GB : /media	046be96ed	b1a113be-2821-aaac-b234-626b5636a13b
Storage pool (SanDisk Extreme 0001 - 0432b0fb5) - 29.10 GB : /media	0432b0fb5	c7ae5cea-7bb8-9785-31bc-362c378cc015
Storage pool (SanDisk Extreme 0001 - 046be96c4) - 29.10 GB : /media	046be96c4	85e4c51c-d462-d661-178b-fbc72f85c187

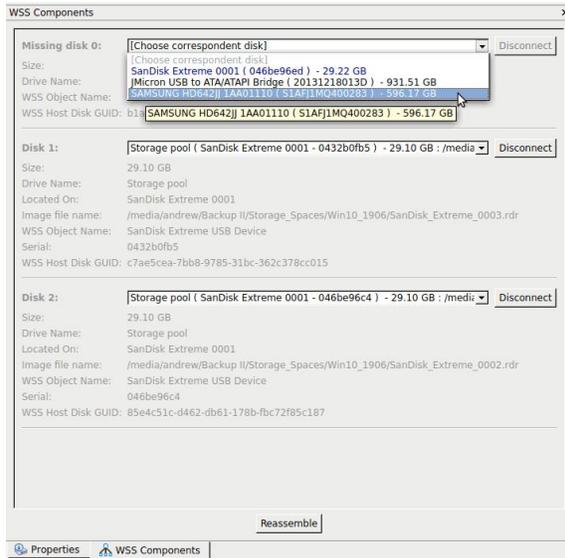
R-Studio for Linux shows broken storage spaces in pink.

Broken storage spaces in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AF1M0400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
SanDisk Extreme 0001	0432b0fb5	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition			17 KB	128 MB
Storage pool			129 MB	29.10 GB
SanDisk Extreme 0001	046be96c4	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition			17 KB	128 MB
Storage pool			129 MB	29.10 GB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB
Virtual Volume sets and RAIDs				
Storage space				56 GB
System Reserved Partition			1 MB	128 MB
GPTPart1	Test_WSS	NTFS	129 MB	55.87 GB

The WSS Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken storage space. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the storage space in blue.

Adding a component manually



You may immediately switch to the storage space configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows such storage spaces in blue:

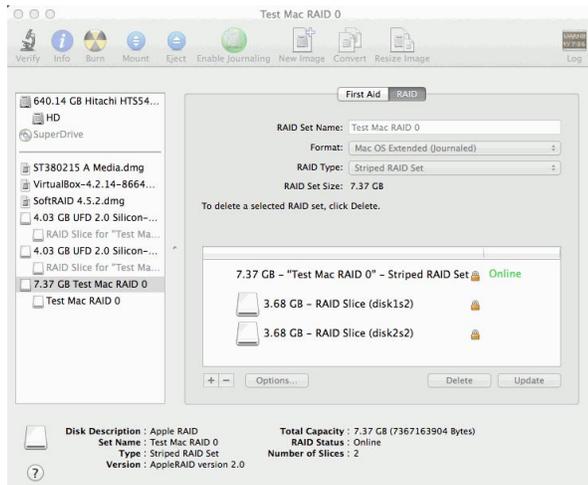
Storage spaces with added parents in R-Studio for Linux

Drives	Device/Disk	Label	FS	Start	Size
Local Computer					
SAMSUNG HD642JJ 1AA01110	/	0283	SATA2	0 Bytes	596.17 GB
Partition2	/		Ext4	1 MB	592.34 GB
Partition2				592.35 GB	3.83 GB
Image					
SanDisk Extreme 0001		046be96ed	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition				17 KB	128 MB
Storage pool				129 MB	29.10 GB
Image					
SanDisk Extreme 0001		0432b0fb5	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition				17 KB	128 MB
Storage pool				129 MB	29.10 GB
Image					
SanDisk Extreme 0001		046be96c4	#1 USB (0:0)	0 Bytes	29.22 GB
Microsoft reserved partition				17 KB	128 MB
Storage pool				129 MB	29.10 GB
Micron USB to ATA/ATAPI Bridge			USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II			NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID5					
Storage space					56 GB
System Reserved Partition				1 MB	128 MB
C:\PTP\nt1		Test_WSS	NTFS	129 MB	55.87 GB

2.4.12.4 Apple RAID5

macOS can create several software RAID5s from disks connected to a Mac computer: RAID1 (Mirror set), RAID0 (Stripe set), and Concatenated disk set.

Apple RAID0 example



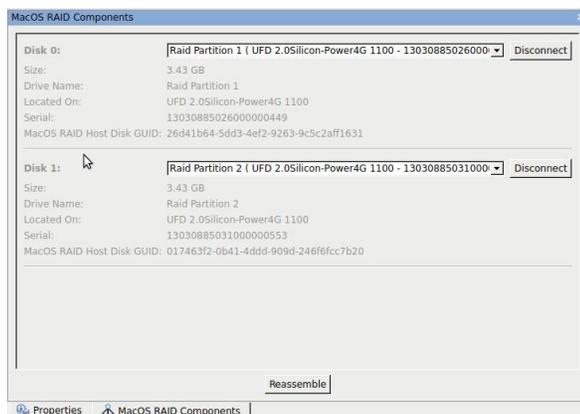
R-Studio for Linux detects components of Apple RAID sets and creates their virtual RAID0s automatically. At the same time, **R-Studio for Linux** gives access to the individual components of the Apple RAID sets (hard drives and [images](#)).

Apple RAID0s in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HTS547564A9E384 JEDOA80A	J2180053CAX6XC	SATA2	0 Bytes	596.17 GB
EFI		FAT32	20 KB	200 MB
HD	Apple RAID0 created by macOS	HFS+	02 MB	595.37 GB
Recovery HD	Recovery HD	HFS+		619.89 MB
Test Mac RAID 0	Test Mac RAID 0	RAID		6.86 GB
Test Mac RAID 0	Test Mac RAID 0	HFS+	0 Bytes	6.86 GB
UFD 2.0Silicon-Power4G 1100	1303088502600000449	USB	0 Bytes	3.75 GB
EFI		FAT32	20 KB	200 MB
Raid Partition 1		HFS+	200.02 MB	3.43 GB
Boot OS X	Boot OS X	HFS+	3.63 GB	128 MB
UFD 2.0Silicon-Power4G 1100	1303088503100000553	USB	0 Bytes	3.75 GB
EFI		FAT32	20 KB	200 MB
Raid Partition 2		HFS+	200.02 MB	3.43 GB
Boot OS X	Boot OS X	HFS+	3.63 GB	128 MB
WDC WD10EACS-00ZJB0	20131219	SD	0 Bytes	931.51 GB
Backup II	Apple RAID0 components	NTFS		931.51 GB
Virtual Volume sets and RAID0s				
Test Mac RAID 0	Test Mac RAID 0	HFS+		6.86 GB

When an automatically created Apple RAID is selected, **R-Studio for Linux** highlights its components. **R-Studio for Linux** shows the components of the Apple RAID on its MacOS Components tab.

MacOS Components tab



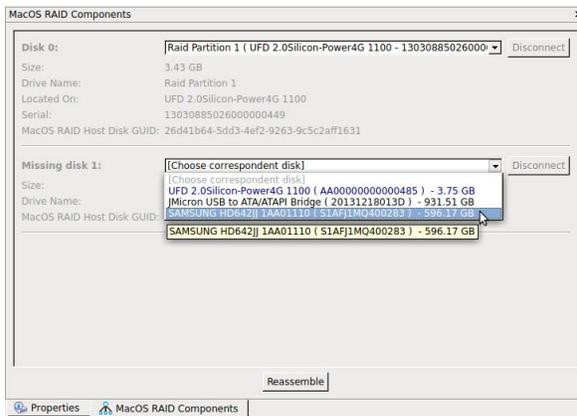
R-Studio for Linux shows broken Apple RAID0s in pink.

Broken Apple RAID in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
UFD 2.0Silicon-Power4G 1100	AA00000000000485	#2 USB (0:0)	0 Bytes	3.75 GB
EFI System Partition		FAT32	20 KB	200 MB
Raid Partition 2			200.02 MB	3.43 GB
Booter	Boot OS X	HFS+	3.63 GB	128 MB
Virtual Volume sets and RAID				
Test Mac RAID 0		HFS+		6.86 GB

The MacOS Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken Apple RAID. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the Apple RAID in blue.

Adding a component manually



You may immediately switch to the Apple RAID configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows Apple RAID with manually added components in blue:

Apple RAID with added members in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
UFD 2.0Silicon-Power4G 1100	AA00000000000485	#2 USB (0:0)	0 Bytes	3.75 GB
EFI System Partition		FAT32	20 KB	200 MB
Raid Partition 2			200.02 MB	3.43 GB
Booter	Boot OS X	HFS+	3.63 GB	128 MB
Virtual Volume sets and RAID				
Test Mac RAID 0		HFS+		6.86 GB

2.4.12.5 Apple CoreStorage/FileVault/Fusion Drive Volumes

The macOS operating system has the following disk management systems:

[FileVault](#), is a disk encrypted utility;

[Fusion Drive](#) is an Apple's hybrid drive technology;

[CoreStorage](#) is a logical volume management system.

R-Studio for Linux supports all these technologies and can unlock their encrypted volumes (hard drives and [images](#)) using either their passwords or recovery keys.

CoreStorage/FileVault

Locked CoreStorage Volume in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image: /media/andrew/Backup II/App...				
SanDisk Extreme 0001				59.63 GB
EFI System Partition				200 MB
CoreStorage Protective Partition			200.02 MB	59.31 GB
Data				5.90 GB
Booter	Boot OS X	HFS+	59.50 GB	128 MB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB

To unlock the volume

1. Right-click the encrypted volume and select **Unlock encrypted drive** on the context menu.
2. Enter the password/recovery key on the **Unlock encrypted drive** dialog box



> **R-Studio for Linux** will unlock the volume

Unlocked CoreStorage Volume in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image: /media/andrew/Backup II/App...				
SanDisk Extreme 0001				59.63 GB
EFI System Partition				200 MB
CoreStorage Protective Partition			200.02 MB	59.31 GB
Data	Data	HFS+		5.90 GB
Booter	Boot OS X	HFS+	59.50 GB	128 MB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II	Backup II	NTFS	1 MB	931.51 GB

If the volume is partially encrypted, **R-Studio for Linux** can recognize which part is encrypted and which isn't. It will provide a correct access to the unencrypted and encrypted parts of the volume, provided that the correct password is entered.

Partially encrypted volume



R-Studio Technician/T80+

In addition to the password, it's possible to enter other decryption data. Click the **Advanced...** button and enter available data.

Unlock encrypted drive: Advanced



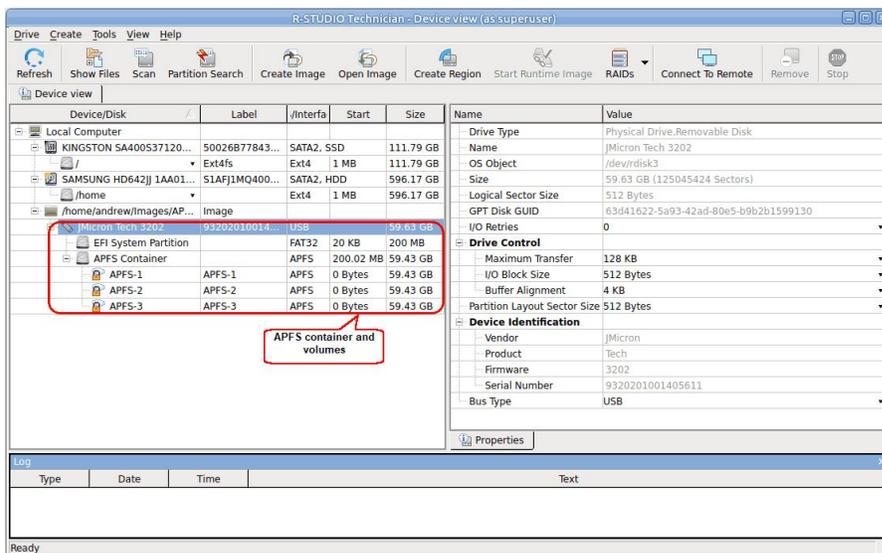
This data is usually very hard to obtain and only very advanced institutions can recover it from actual hardware.

Data recovery from deleted or damaged APFS volumes

When macos deletes an APFS volumes, it also wipes out all decryption information from its APFS container. In this case even knowing the password won't help. Still, there's a trick that may help to open a deleted or damaged encrypted volume.

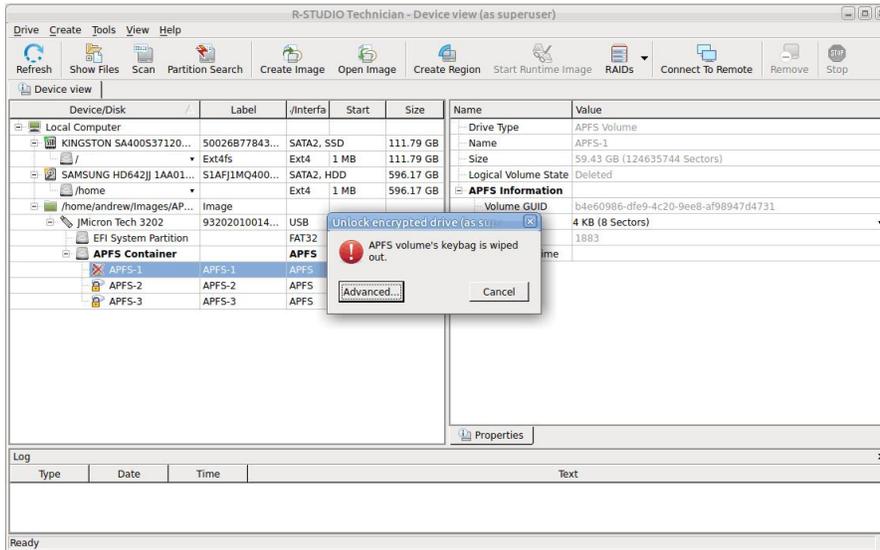
Let's us have a hard drive with an APFS container with 3 APFS volumes:

APFS container and its volumes



One of them has been deleted and **R-Studio for Linux** cannot unlock (decrypt) it:

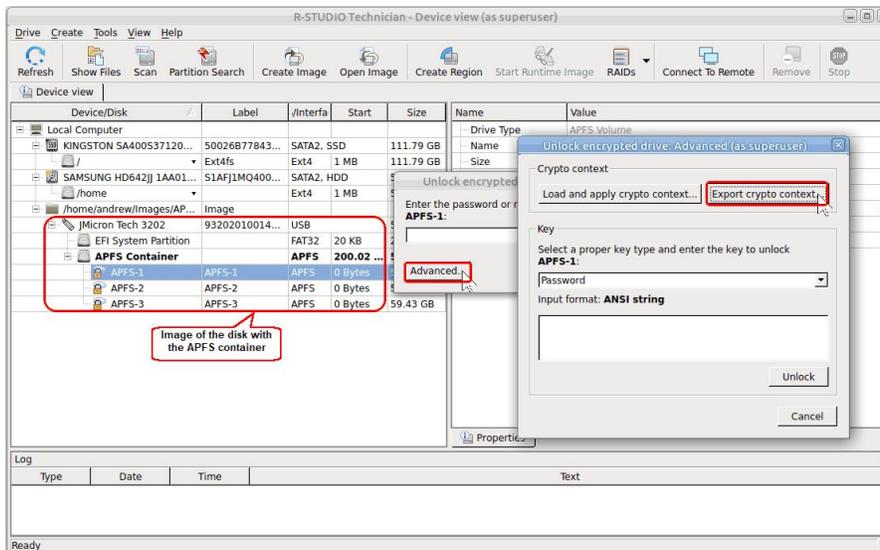
APFS container with a deleted APFS volume



But if we have an image of the disk's previous state, we can extract the necessary encryption information from that image.

Load the image and double-click the existing volume. Click the **Advanced...** button instead of entering its password.

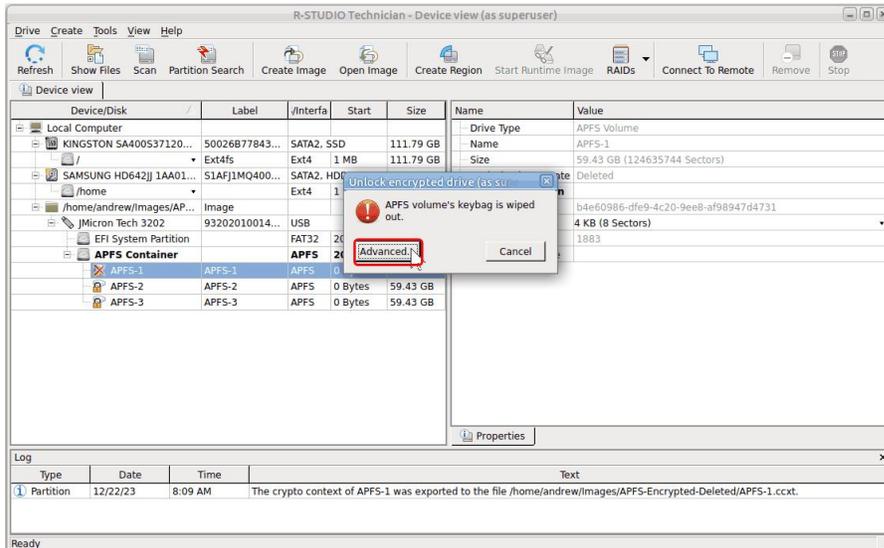
Export of encryption information



Click the **Export crypto context...** button and save a file with this information. Then click the **Close Image** button to unload the image.

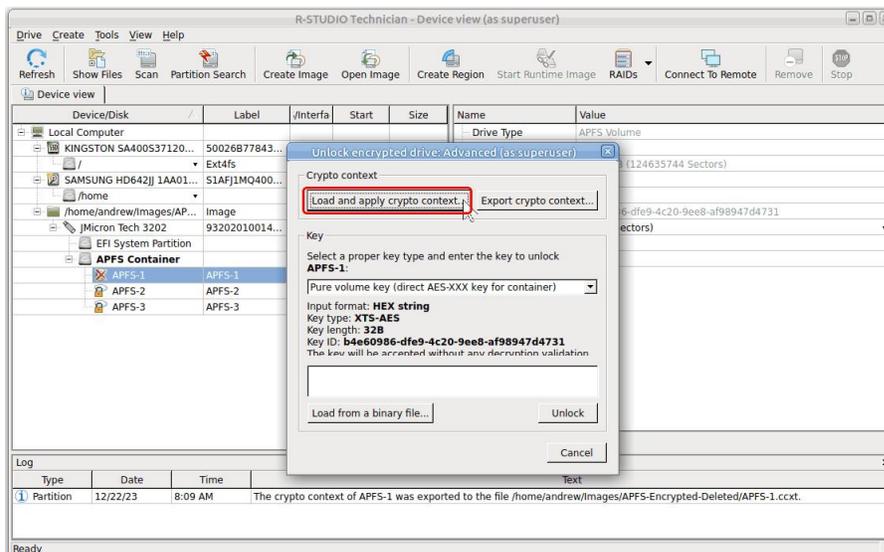
Then double-click the APFS-1 volume and click the **Advanced** button.

APFS container with a deleted APFS volume



Click the **Load and apply crypto context...** button

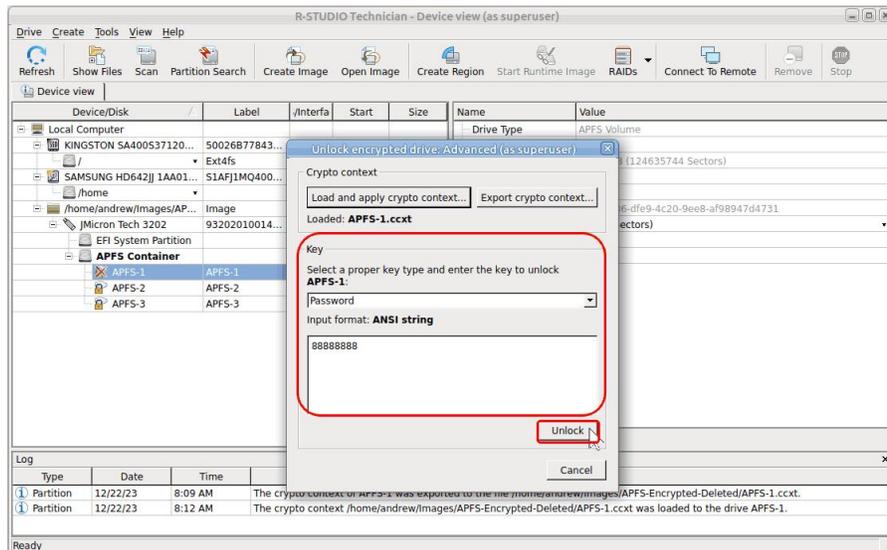
Loading the encryption information



and load the file generated from the image.

Select the required information type (a password for our case), enter the data, and click the **Unlock** button.

Unlocking the APFS volume



Note that the password will be explicitly shown.

R-Studio for Linux will open files on the volume.

Apple Fusion Drive

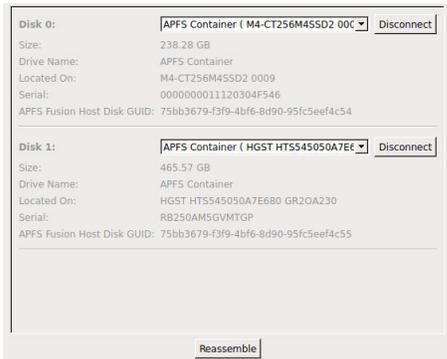
R-Studio for Linux detects components of Apple Fusion Drive and creates virtual Fusion Drives automatically. At the same time, **R-Studio for Linux** gives access to the individual components of the Fusion Drives (hard drives and [images](#)).

Fusion Drive in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
HGST HT545050A7E680 GR20A230	Fusion Drive components		0 Bytes	465.76 GB
EFI System Partition	FAT32	FAT32	20 KB	200 MB
APFS Container			200.02 MB	465.57 GB
M4-CT256M45SD2 0009	000000001112030...	SATA2	0 Bytes	238.47 GB
EFI System Partition	FAT32	FAT32	20 KB	200 MB
APFS Container	201 MB		238.28 GB	
SAMSUNG HD642JJ 1AA01110	S1AFJ1M0400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	596.17 GB
/snap/core/7713			0 Bytes	89.00 MB
/snap/core/7917			0 Bytes	89.12 MB
/snap/pulsemixer/23			0 Bytes	7.91 MB
/snap/pulsemixer/250			0 Bytes	7.93 MB
/snap/software-boutique/31			0 Bytes	71.64 MB
/snap/software-boutique/39			0 Bytes	16 KB
/snap/ubuntu-mate-welcome/411			0 Bytes	15.18 MB
/snap/ubuntu-mate-welcome/420			0 Bytes	15.18 MB
Virtual Volume sets and RAID5				
APFS Fusion Container				703.85 GB
APFS_Fusion_Test	APFS_Fusion_Test	APFS	0 Bytes	703.85 GB

When an automatically created Fusion Drive is selected, **R-Studio for Linux** highlights its components. **R-Studio for Linux** shows the components of the Fusion Drive on its APFS Fusion Components tab.

Fusion Drive Components tab



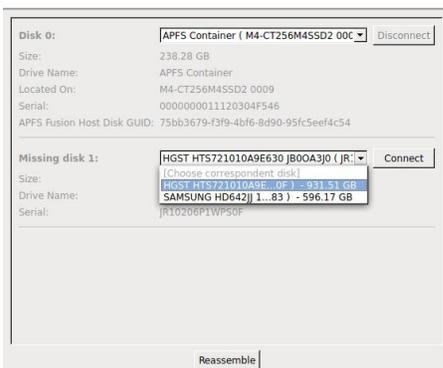
R-Studio for Linux shows broken Fusion Drive s in pink.

Broken Fusion Drive in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
HGST HTS721010A9E630 JB00A3J0	JR10206P1WPS0F	SATA2	0 Bytes	931.51 GB
EFI System Partition		FAT32	20 KB	200 MB
Data		HFSX	200.02 MB	931.19 GB
Empty Space18			931.39 GB	128.00 MB
M4-CT256M4SSD2 0009	000000001112030...	SATA2	0 Bytes	238.47 GB
EFI System Partition		FAT32	20 KB	200 MB
APFS Container			201 MB	238.28 GB
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
/		Ext4	1 MB	596.17 GB
/snap/core/7713			0 Bytes	89.00 MB
/snap/core/7917			0 Bytes	89.12 MB
/snap/pulsemixer/23			0 Bytes	7.91 MB
/snap/pulsemixer/250			0 Bytes	7.93 MB
/snap/software-boutique/31			0 Bytes	71.64 MB
/snap/software-boutique/39			0 Bytes	16 KB
/snap/ubuntu-mate-welcome/41			0 Bytes	15.18 MB
/snap/ubuntu-mate-welcome/4			0 Bytes	15.18 MB
Virtual Volume sets and RAIDs				
APFS Fusion Container				238.28 GB
APFS Fusion_Test	APFS Fusion_Test	APFS	0 Bytes	703.85 GB

The Fusion Drive Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken Fusion Drive. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the Fusion Drive in blue.

Adding a component manually



You may immediately switch to the Fusion Drive configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows Fusion Drive with manually added components in blue:

Fusion Drive with added members in R-Studio for Linux

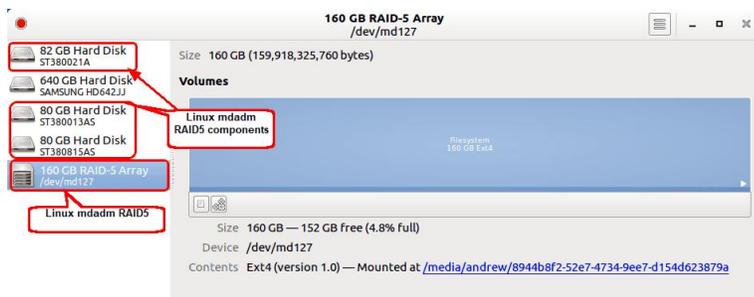
Device/Disk	Label	FS	Start	Size
HGST HTS721010A9E630 JB00A3J0	JR10206P1WP50F	SATA2	0 Bytes	931.51 GB
EFI System Partition		FAT32	20 KB	200 MB
Data	Data	HFSX	200.02 MB	931.19 GB
APFS Fusion-VirtualPv-75bb3679-...			201 MB	931.32 GB
Empty Space18			931.39 GB	128.00 MB
M4-CT256M45SD2 0009	00000000111203A	SATA2	0 Bytes	238.47 GB
EFI System Partition			0 MB	
APFS Container				8.28 GB
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
		Ext4	1 MB	596.17 GB
/snap/core/7713			0 Bytes	89.00 MB
/snap/core/7917			0 Bytes	89.12 MB
/snap/pulsemixer/23			0 Bytes	7.91 MB
/snap/pulsemixer/250			0 Bytes	7.93 MB
/snap/software-boutique/31			0 Bytes	71.64 MB
/snap/software-boutique/39			0 Bytes	16 KB
/snap/ubuntu-mate-welcome/411			0 Bytes	15.18 MB
/snap/ubuntu-m...			0 Bytes	15.18 MB
Virtual Volume sets and RAID5				1.14 TB
APFS Fusion Container	APFS_Fusion_Test	APFS	0 Bytes	703.85 GB

2.4.12.6 Linux mdadm RAID5

[mdadm](#) is a Linux utility used to manage and monitor software RAID devices.

R-Studio for Linux supports such devices and when drives from a mdadm RAID are connected to a Mac computer, it automatically detects them and assembles mdadm RAID5 accordingly.

Linux mdadm RAID5



R-Studio for Linux detects components from mdadm RAID5 and creates those RAID5 automatically. At the same time, **R-Studio for Linux** gives access to the components of those RAID5 (hard drives and [images](#)).

mdadm RAID5 in R-Studio for Linux

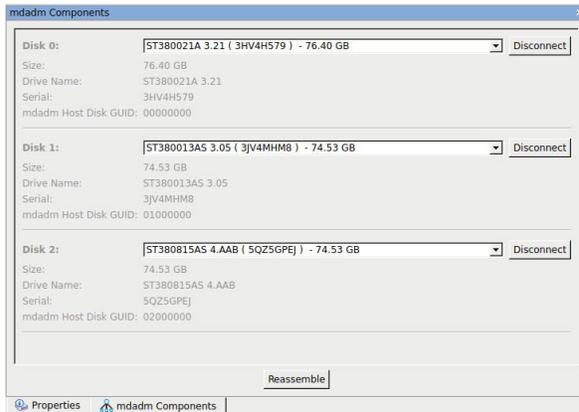
Device/Disk	Label	FS	Start	Size
SAMSUNG HD642JJ 1AA01110	0283	SATA2	0 Bytes	596.17 GB
Partition2		Ext4	1 MB	592.34 GB
Image			592.35 GB	3.83 GB
Image	ST380815AS 4.AA8	#1 SATA2...	0 Bytes	74.53 GB
Image	ST380021A 3.21	ATAPI	0 Bytes	76.40 GB
Image	ST380013AS 3.05	#1 SATA (...)	0 Bytes	74.53 GB
Image			512 Bytes	2.00 TB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II		NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID5				1.14 TB
virt-mdadm-andrew-System-Product-Name:0		Ext4		223.40 GB

If recognized components of a mdadm RAID, including disk images, are added to **R-Studio for Linux** later, it automatically adds them to their respective mdadm RAID.

When an automatically created mdadm RAID is selected, **R-Studio for Linux** highlights its components. It also highlights the mdadm RAID that Linux may itself create from the same components.

R-Studio for Linux shows the components of the mdadm RAID5 on its mdadm Components tab.

mdadm Components tab



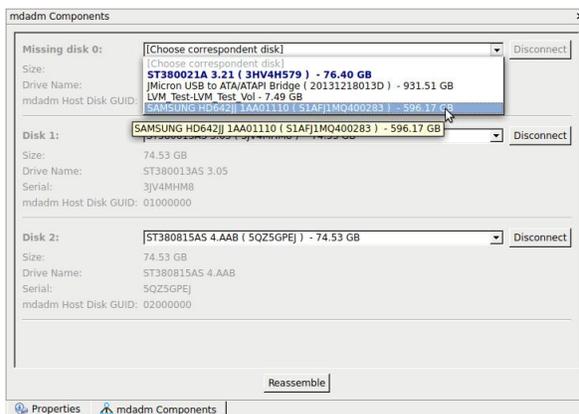
R-Studio for Linux shows broken mdadm RAID's in pink.

Broken mdadm RAID's in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642J 1AA01110	S1AF1MQ400283	SATA2	0 Bytes	596.17 GB
Partition1		Ext4	1 MB	592.34 GB
Partition2			592.35 GB	3.83 GB
Image				
ST380021A 3.21	3HV4H579	ATAPI	0 Bytes	76.40 GB
Image				
ST380013AS 3.05	3JV4MHM8	#1 SATA (3...	0 Bytes	74.53 GB
Partition1			512 Bytes	2.00 TB
JMicron USB to ATA/ATAPI Bridge	20131218013D	USB (8:0)	0 Bytes	931.51 GB
/media/andrew/Backup II		NTFS	1 MB	931.51 GB
Virtual Volume sets and RAID's				
vrt-mdadm-andrew-System-Product-Name:0		Ext4		148.94 GB

The mdadm Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken mdadm RAID. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the mdadm RAID in blue.

Adding a component manually



You may immediately switch to the mdadm RAID configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows such mdadm RAID's in blue:

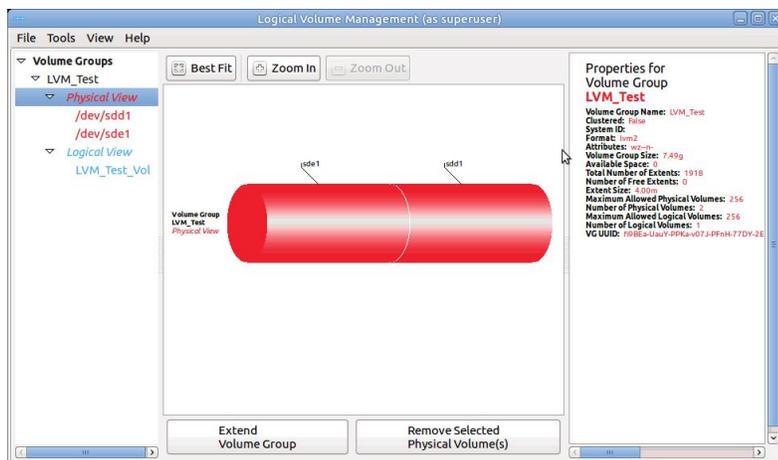
mdadm RAID's with added components in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
Partition2		Ext4	1 MB	592.34 GB
Image				
ST380815AS 4.AAB		#1 SATA2...	0 Bytes	74.53 GB
Partition1			512 Bytes	2.00 TB
Image				
ST380021A 3.21	3HV4H579	ATAPI	0 Bytes	76.40 GB
Image				
ST380013AS 3.05	3JV4MHM8	#1 SATA (...)	0 Bytes	74.53 GB
Partition1			512 Bytes	2.00 TB
Micron USB to ATA/ATAPI Bridge	20131218013D	USB (8.0)	0 Bytes	931.51 GB
/media/andrew/Backup II			1 MB	931.51 GB
Virtual Volume sets and RAID's				
c:\virt-mdadm-andrew-system-product-name-0		Ext4		148.94 GB

2.4.12.7 Linux LVM/LVM2

Linux LVM is a logical volume manager for the Linux OS that manages disk drives and other data storage devices. Using it, It is possible to create single logical volumes on several physical disks, add and replace them in a running system, resize logical volumes, create various RAID configuration, and so on. You may read more about Linux LVM in our article: [What is Logical Volume Manager \(LVM\)](#).

LVM volume example



R-Studio for Linux automatically detects disks from LVMs and creates their virtual volumes automatically. At the same time, **R-Studio for Linux** gives access to the components of the virtual LVM volumes (hard drives and images).

LVM Volumes in R-Studio for Linux

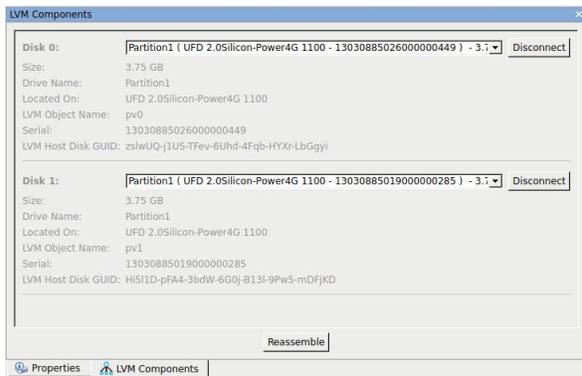
Device/Disk	Label	FS	Start	Size
Local Computer				
LVM_Test-LVM_Test_Vol		RAID	0 Bytes	7.49 GB
/media/andrew/87434fcd-f1e6-4b65-9163-15...		Ext4	0 Bytes	7.49 GB
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
Partition2		Ext4	1 MB	592.34 GB
UFD 2.0Silicon-Power4G 1100	1303088501900000285	USB (10.0)	0 Bytes	3.75 GB
Partition1			1 MB	3.75 GB
UFD 2.0Silicon-Power4G 1100	13030885026000000		0 Bytes	3.75 GB
Partition1			1 MB	3.75 GB
Virtual Volume sets and RAID's				
c:\virt-lvm-test-andrew-system-product-name-0		Ext4		7.49 GB

If recognized components of an LVM volume, including disk images, are added to **R-Studio for Linux** later, it automatically adds them to their respective LVM volume.

When an automatically created LVM volume is selected, **R-Studio for Linux** highlights its components. It also highlights the LVM volume that Linux may itself create from the same components.

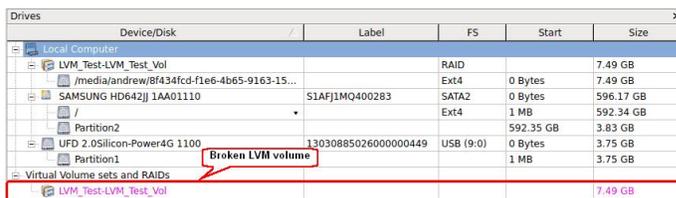
R-Studio for Linux shows the components of the LVM volume on its LVM Components tab.

LVM Components **tab**



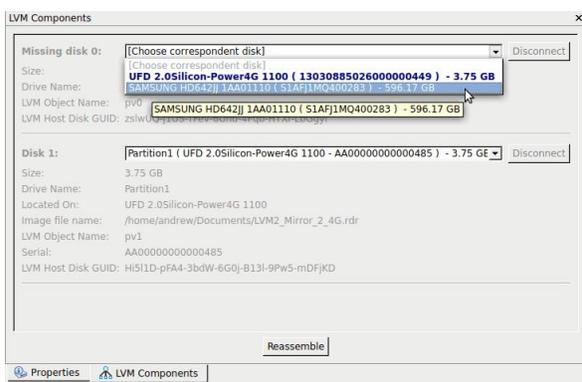
R-Studio for Linux shows broken virtual LVM volumes in pink.

Broken LVM volumes in R-Studio for Linux



The LVM Components tab also allows you to manually disconnect or connect the components, for example, if they are such damaged that **R-Studio for Linux** cannot recognize them as parts of a broken LVM volume. Select the object from the drop-down box and click the **Connect** button. **R-Studio for Linux** displays the objects it recognizes as the components of the LVM volume in blue.

Adding a component manually



You may immediately switch to the LVM volume configuration that **R-Studio for Linux** believes most probable by clicking the **Reassemble** button.

R-Studio for Linux shows such virtual LVM volumes in blue:

LVM volumes with added components in R-Studio for Linux

Device/Disk	Label	FS	Start	Size
Local Computer				
LVM_Test-LVM_Test_Vol		RAID		7.49 GB
media/andrew/8f434fcd-f1e6-4b65-9163-15...		Ext4	0 Bytes	7.49 GB
SAMSUNG HD642JJ 1AA01110	S1AFJ1MQ400283	SATA2	0 Bytes	596.17 GB
Partition2		Ext4	1 MB	592.34 GB
Image				
UFD 2.0Silicon-Power4G 1100			Bytes	3.75 GB
Partition1			1 MB	3.75 GB
UFD 2.0Silicon-Power4G 1100				3.75 GB
Partition1				3.75 GB
Virtual Volume sets and RAID5				
LVM_Test-LVM_Test_Vol		Ext4		7.49 GB

2.5 Data Recovery over Network

This chapter explains how to perform data recovery operations over network.

R-Studio for Linux has network capabilities that allow the system administrator, using its computer, to recover files on any computers accessible over network.

R-Studio for Linux supports the TCP/IP protocol and any protocol supported in Microsoft Network.

R-Studio Agent must be installed on computers where files are to be recovered. This program gives **R-Studio for Linux** access to local disks on remote computers over network.

If, due to file system crash, the network computer where you are going to recover your data cannot start, you may use [R-Studio Agent Emergency](#) to start the computer.

Files can be recovered without **R-Studio Agent** if the computer where the files are to be recovered runs Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 is accessible from a computer also running Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10. In this case, the administrator must have administrator privileges on the remote computer.

You should always disable a firewall and/or antivirus software on the both computers. As an alternative, advanced users may tune them to allow **R-Studio for Linux** and **R-Studio Agent** to communicate via network.

All data transmitted over network are encrypted with a strong algorithm for data security. Restoring data over network is very much the same as that on a local computer.

In addition, **R-Studio for Linux** can load/save any files like [disk images](#), [scan info](#) files, [RAID configuration](#) files, from/to the computers to which it has access using **R-Studio Agent**.

- [R-Studio Agent](#)
- [Data Recovery over Network](#)
- [Connecting over the Internet](#)

2.5.1 R-Studio Agent

R-Studio Agent is a program that provides **R-Studio for Linux** with an access to the drives of a network computer. It should be installed and properly registered on the computer which drives are to be accessed. **R-Studio Agent** has versions for the following PC operating systems:

- [Linux](#)
- [Windows](#)
- [Mac OS](#)

and there is [R-Studio Agent Emergency](#) that can be used to start a computer from which you are going to recover data that cannot start other way due to a file system crash, for example. Please, note that you need to use [R-Studio Emergency](#) as an emergency agent if you want to start a Mac computer.

R-Studio for Linux can work equally with all versions of *R-Studio Agent* and access computers run under Windows, Mac OS, and Linux.

You must have enough rights on the remote computer to install and run *R-Studio Agent*.

2.5.1.1 R-Studio for Linux Agent for Linux

You need to have the root privileges to run **R-Studio Agent for Linux**.

Unlike [R-Studio Agent for Windows](#) and [R-Studio Agent for Mac](#), **R-Studio Agent for Linux** is a console application and should be run in the Terminal. You also need to mark it as an executable before start.

When it is started for the first time, **R-Studio Agent for Linux** asks for its configuration.

R-Studio Agent for Linux Configuration dialog box

```

File Edit View Terminal Help
root@BCK-Ubuntu:~# cd RSA
root@BCK-Ubuntu:~/RSA# ./rsagent
Configuring R-Studio Agent 6.0.1020
# Specify password for incoming connections >
# Confirm password for incoming connections >
# Specify IP Address (and optional NETMASK delimited by space) to limit incoming
connections or 0 to allow any [] >192.168.1.1 255.255.255.0
# Specify TCP/IP port for listening [3174] >
* Running R-Studio Agent
* This product is licensed to: UNREGISTERED DEMO VERSION
* System: 2 x Intel(R) Core(TM)2 CPU 6300 @ 1.86GHz, 1862 MHz, 993 MB RAM
* OS: Linux 2.6.32-41-generic-pae #91-Ubuntu SMP Wed Jun 13 12:00:09 UTC 2012
? R-Studio Agent is not yet registered, 64KB file size recovery limit is implied
until remotely registered
* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start connection to remote R-Studio ...[]

```

R-Studio Agent for Linux Options

Specify password for incoming connection	Enter a password to obtain access to this computer from a network.
Confirm password for incoming connection	Re-enter the password for confirmation.
Specify IP address...	Specifies addresses and a subnet mask from which this computer can be accessed. Enter 0 to allow connections from any address.
Specify TCP/IP Port for listening	A TCP/IP port for incoming connections. Press Enter for the default one [3174].

Don't pay much attention to the warning about "unregistered demo version". If necessary, you'll be able to register **R-Studio Agent for Linux** through **R-Studio for Linux**.

You may see the current configuration by starting **R-Studio Agent for Linux** with the command `rsagent --show_config`.

R-Studio Agent for Linux Configuration dialog box

```

File Edit View Terminal Help
root@BCK-Ubuntu:~# cd RSA
root@BCK-Ubuntu:~/RSA# ./rsagent --show_config
R-Studio Agent 6.0.1020
Password for incoming connection: present
Accept incoming connection from IP addresses / NetMask: 192.168.1.1 / 255.255.255.0
Listening on port: 3174
root@BCK-Ubuntu:~/RSA# []

```

You may change the current configuration by starting **R-Studio Agent for Linux** with the command `rsagent --configure`.

Connecting from R-Studio Agent for Linux to R-Studio for Linux.

To establish a connection from R-Studio Agent for Linux to R-Studio for Linux,

- 1 Run the R-Studio Agent for Linux and press Enter
- 2 Enter the necessary information

Connect to R-Studio for Linux dialog box

```
File Edit View Terminal Help
root@BCK-Ubuntu:~# cd RSA
root@BCK-Ubuntu:~/RSA# ./rsagent
* Running R-Studio Agent
* This product is licensed to: UNREGISTERED DEMO VERSION
# System: 2 x Intel(R) Core(TM)2 CPU 6300 @ 1.86GHz, 1862 MHz, 993 MB RAM
# OS: Linux 2.6.32-41-generic-pae #91-Ubuntu SMP Wed Jun 13 12:00:09 UTC 2012
? R-Studio Agent is not yet registered, 64KB file size recovery limit is implied
until remotely registered
* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start connection to remote R-Studio ...
# Enter R-Studio IP address or just press ENTER to cancel>192.168.1.10
# Enter password or just press ENTER to connect without one>
Connection with 192.168.1.10:8080 is established successfully.
* You may press ENTER to start connection to remote R-Studio ...
```

- > **R-Studio Agent for Linux will connect to the computer where R-Studio for Linux is running and it will show the hard drive and logical disk structure of the remote computer.**

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
/MiconUSB to ATA/ATAPI Bridge	222291759477	USB (10:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Remote Computer				
VBOX HARDDISK1.0	VB4fa6095b-41527b...	SATA2	0 Bytes	64 GB
/		Ext4	1 MB	63.00 GB
Partition2			63.00 GB	1022 MB

It can be processed the same way as that on a local computer.

2.5.1.2 R-Studio Agent for Windows

Attention Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 users: R-Studio Agent should be installed under an administrator account.

When installed, *R-Studio Agent* starts automatically and runs as a service. To configure it, *R-Studio Agent* should be started again manually.

☐ **The following switches are available:**

-?	evokes a help screen;
-install	installs <i>R-Studio Agent</i> as a service
-remove	removes <i>R-Studio Agent</i> services
-console	starts <i>R-Studio Agent</i> as a console application

Started without a switch, *R-Studio Agent* runs as a GUI application and its icon appears on the taskbar tray. In this mode, it can be configured and its log may be viewed.

Simply connect to the remote computer providing a desired password for *R-Studio Agent* in the Connect to Remote Computer dialog box. **R-Studio for Linux** checks if there is *R-Studio Agent* running on this computer. If not, a Can't connect... message will appear.

Click the **Yes** button, and **R-Studio for Linux** will remotely install *R-Studio Agent*.

Attention Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 users: R-Studio Agent may be remotely installed over a network from a computer running Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 to another computer running Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10. To do so, you must have administrator accounts on both computers.

To access the R-Studio Agent main panel,

- 1 Click its tray icon



- > The main panel will appear. You may view its log

R-Studio Agent main panel



To configure *R-Studio Agent*,

- 1 Right-click its tray icon and select Configure
- 2 Specify required parameters on the Please configure R-Studio Agent dialog box and click the OK button

Please configure R-Studio Agent dialog box



R-Studio Agent Options

Password:	Enter a password to obtain access to this computer from a network.
Re-Enter:	Re-enter the password.
Accepted Protocols	
Pipes	supported by Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 only. To improve security, this option should be disabled.
TCP/IP	supported by any network OS.
Port	port for incoming connections
Accepted IP Addresses	
IP Address	specifies addresses from which this computer can be accessed.
Subnet Mask	specifies a subnet mask of the network from which this computer can be accessed.

- > *R-Studio Agent* will now run with the specified parameters

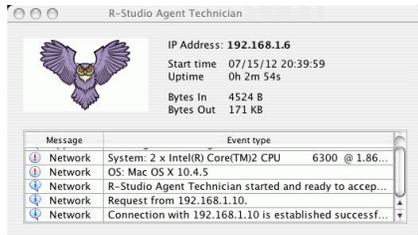
2.5.1.3 R-Studio Agent for Mac

You need to have an administrative account on the Mac computer to start **R-Studio Agent for Mac**.

To start the R-Studio Agent for Mac and access its main panel,

- 1 Go to the **Application folder**, double-click **R-Studio Agent for Mac**, and enter the account password
- > The main panel will appear. You may view its log

R-Studio Agent for Mac main panel



To configure *R-Studio Agent for Mac*,

- 1 Go to the **R-Studio Agent for Mac** menu and select **Preferences**
- 2 Specify required parameters on the **Please configure R-Studio Agent** dialog box and click the **OK** button

Please configure **R-Studio Agent Mac dialog box**



R-Studio Agent for Mac Options

Password:	Enter a password to obtain access to this computer from a network.
Re-Enter:	Re-enter the password.
Incoming connection preferences	
Enable incoming connections	Select this checkbox if you want to allow incoming connections.
TCP/IP Port	A TCP/IP port for incoming connections
Accepted IP Addresses	
IP Address	specifies addresses from which this computer can be accessed.
Subnet Mask	specifies a subnet mask of the network from which this computer can be accessed.

- > ***R-Studio Agent for Mac*** will now run with the specified parameters

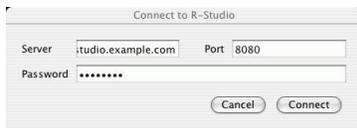
Connecting from R-Studio Agent for Mac to R-Studio for Linux.

To establish a connection from R-Studio Agent for Mac to R-Studio for Linux,

- 1 Run the **R-Studio Agent for Mac** and select **Connect** from the **Tools** menu

- 2 Enter the necessary information on the Connect to R-Studio for Linux dialog box and click the Connect button.

Connect to R-Studio for Linux dialog box



Connect to R-Studio settings

Server	Specify the DNS name or IP address of the host where R-Studio for Linux is running.
Port	Specify the port set on the R-Studio for Linux Connect to Remote Computer dialog box.
Password	Specify the password set on the R-Studio for Linux Connect to Remote Computer dialog box.

- > **R-Studio Agent for Mac will connect to the computer where R-Studio for Linux is running and it will show the hard drive and logical disk structure of the remote computer.**

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332P40A3MA		SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2		Ext4	37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
/MiconUSB to ATA/ATAPI Bridge		USB (10...	0 Bytes	465.76 GB
222291759477		USB (10...	512 Bytes	7.84 MB
Empty Space13				
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Remote Computer	192.168.1.6			
NVidiaHitachi HTS547564A9E384JE...	J2180053CAX6XC	SATA2	0 Bytes	596.17 GB
Mac OS	HD	HFS+	0 Bytes	595.37 GB
EFI System Partition		FAT32	20 KB	200 MB
Recovery HD	Recovery HD	HFS+	595.57 GB	619.89 MB

It can be processed the same way as that on a local computer.

2.5.2 Data Recovery over Network

Generally, data restoring over network is very much the same as that on a local computer.

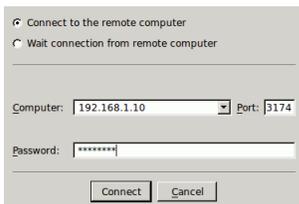
R-Studio Agent should be running on the network computer where data are to be recovered.

Read the [Connecting over the Internet](#) topic to learn how to establish connection between **R-Studio for Linux** and **R-Studio Agent** over the Internet.

To connect to a remote computer

- 1 Click the Connect to Remote button, or Select **Connect To Remote** on the Drive menu
- 2 Specify the name or IP address of the remote computer where data are to be recovered in the Computer: field

Connect to Remote Computer dialog box



The Port should coincide with the port specified for the [R-Studio Agent](#).

The Password: field is for the password of *R-Studio Agent* running on the remote computer. If you want to see the entered password, right-click the field and select **Show password** on the context menu.

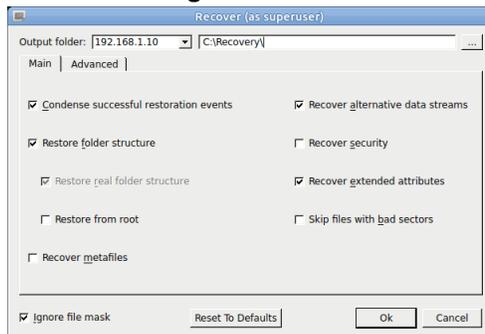
Note: If the remote computer is started with [R-Studio Agent Emergency](#), leave this field blank.

- > **R-Studio for Linux** will connect to the remote computer and show its hard drive and logical disk structure of the remote computer below the device/disk structure of your local computer

Device/Disk	Label	FS	Start	Size
Empty Space15			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811AS3.AAE	6PT01FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext13	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSScorp CDW/DVD SH-M522...		ATAPI		1024.00 ...
ST3500320AS		USB (...)		465.76 GB
Empty Space17			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Remote Computer	192.168.1.10			
ST380215A3.AA	#0 AT...			74.53 GB
C:	System	NTFS	31.50 KB	21.13 GB
D:	Backup	NTFS	21.13 GB	53.40 GB
QUANTUMFIREBALL ELSA08.	#1 AT...			4.78 GB
F:	NTFS-test	NTFS	63 KB	1.74 GB
G:	FAT32-TEST	FAT32	1.74 GB	1.24 GB
H:	FAT-TEST	FAT16	2.98 GB	1.75 GB
Empty Space37			4.73 GB	44.30 MB
A:				
ASUSDRW-0402P/D1.05				
E:				
PromiseRAID Console1.00				

It can be processed the same way as that on a local computer.

Recover dialog box



When the Recover dialog box appears, you may select whether you want to save recovered files on the local or remote computer. Saving recovered files on a remote computer may be useful when the remote computer has a healthy disk because you do not have to transfer files over network. It may be an external USB hard drive, for example.

When **R-Studio for Linux** connects to the remote computer, it check if *R-Studio Agent* is present and its password. If there is no *R-Studio Agent* installed, **R-Studio for Linux** may try to remotely install it. See the [R-Studio Agent](#) topic for details.

2.5.3 Connecting over the Internet

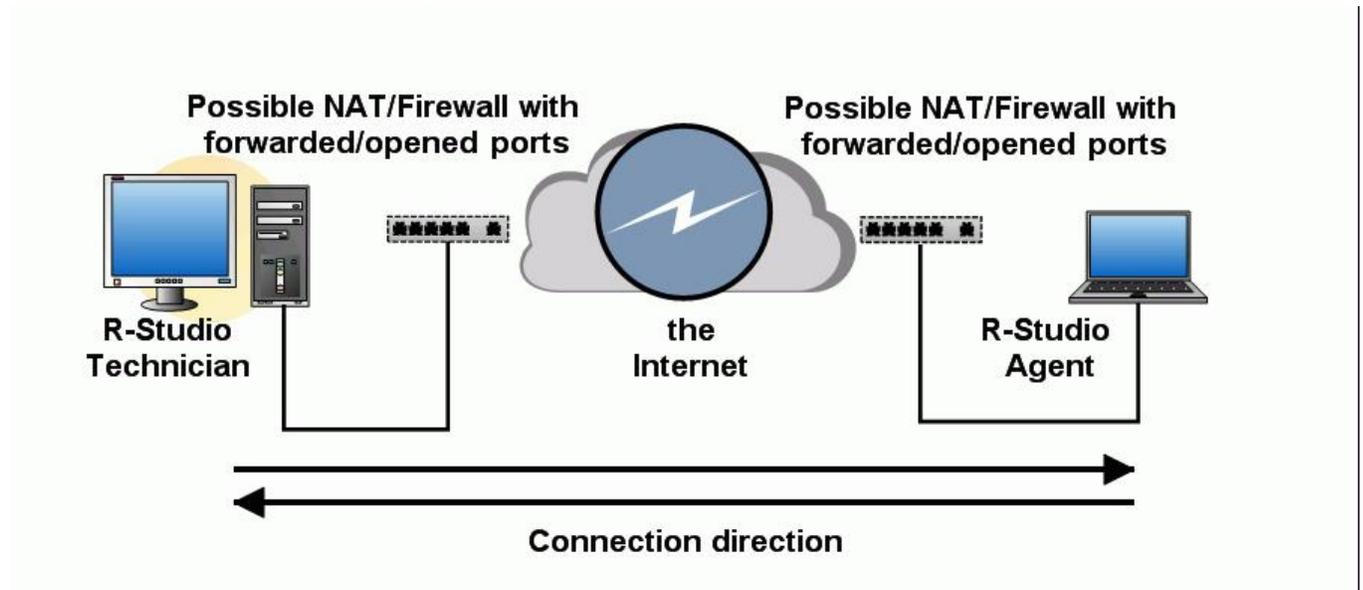
R-Studio for Linux and **R-Studio Agent** can be connected over the Internet. The connection can be made either using IP addresses or DNS names.

If hosts where **R-Studio for Linux** and **R-Studio Agent** are running have public IP addresses the connection can be made [the same way as for the local network](#), except that the IP address or DNS name should be explicitly specified in the Computer filed the Connect to Remote Computer dialog box

If either (or both) of the hosts are on private networks behind NATs and firewalls and do not have public IP addresses, the corresponding ports should be opened or forwarded. In addition, connection should be made either only from **R-Studio for Linux** or from **R-Studio Agent**.

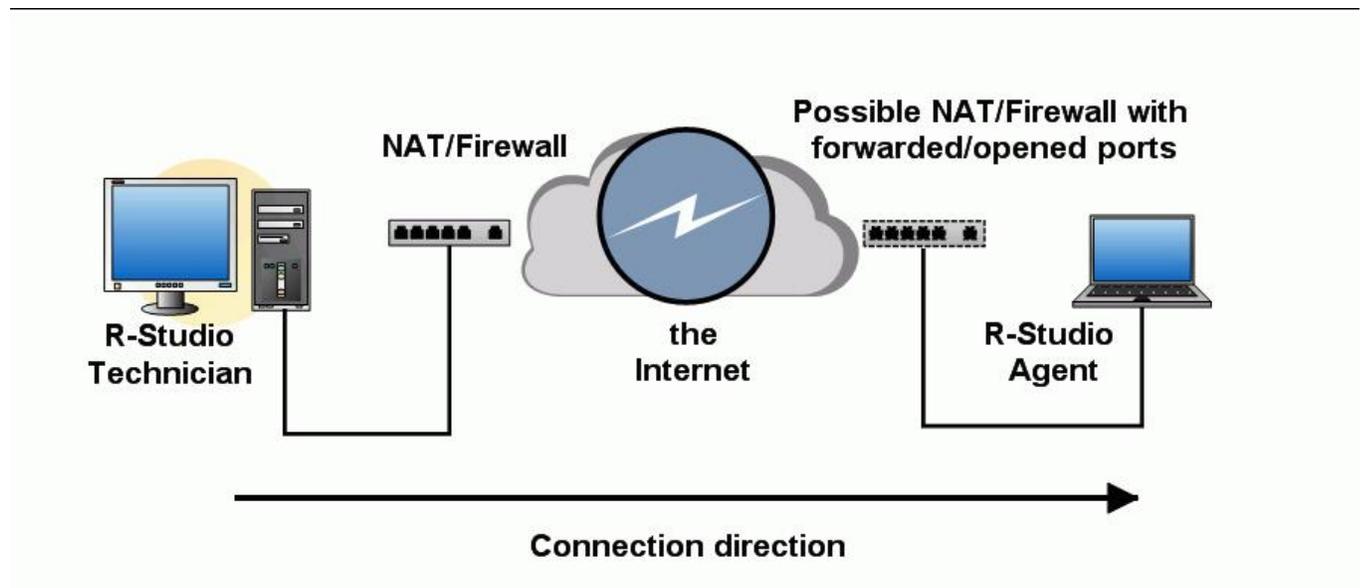
Connection directions

* Both **R-Studio for Linux** and **R-Studio Agent** have public IP addresses (no NAT/firewall) or the ports on the [NAT/firewall](#) are forwarded/opened.



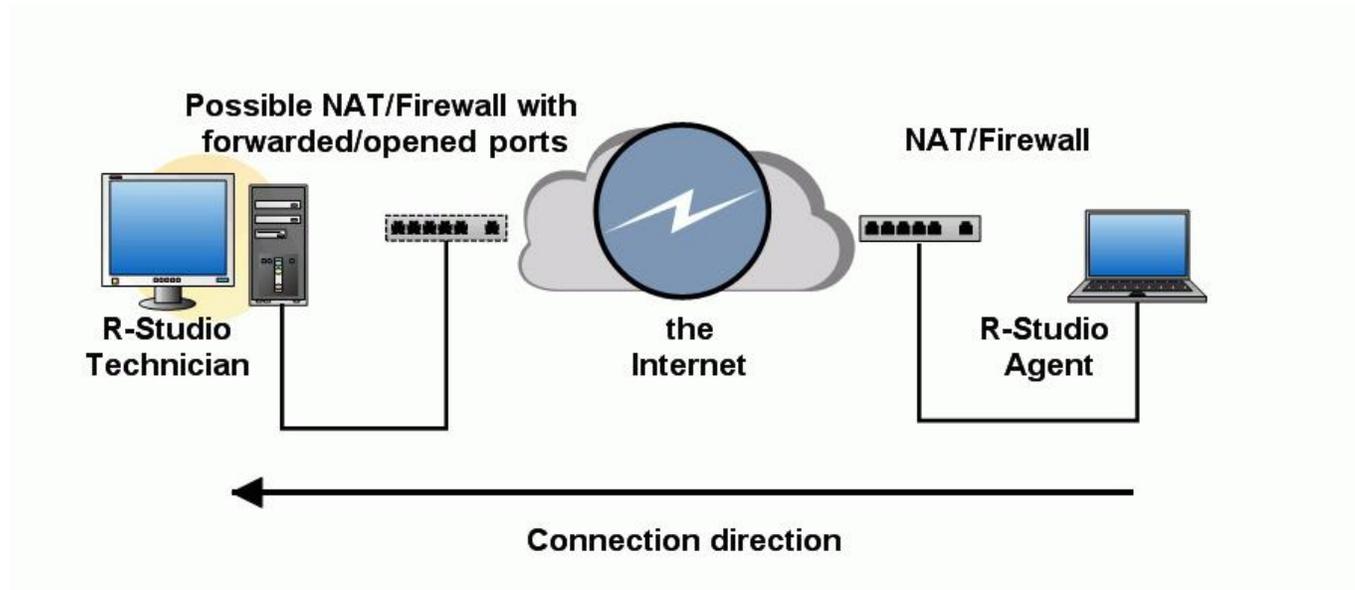
A connection can be made either from **R-Studio for Linux** or from **R-Studio Agent**.

* **R-Studio for Linux** is behind a NAT and **R-Studio Agent** has a public IP address or the ports on its **NAT/firewall** are forwarded/opened.



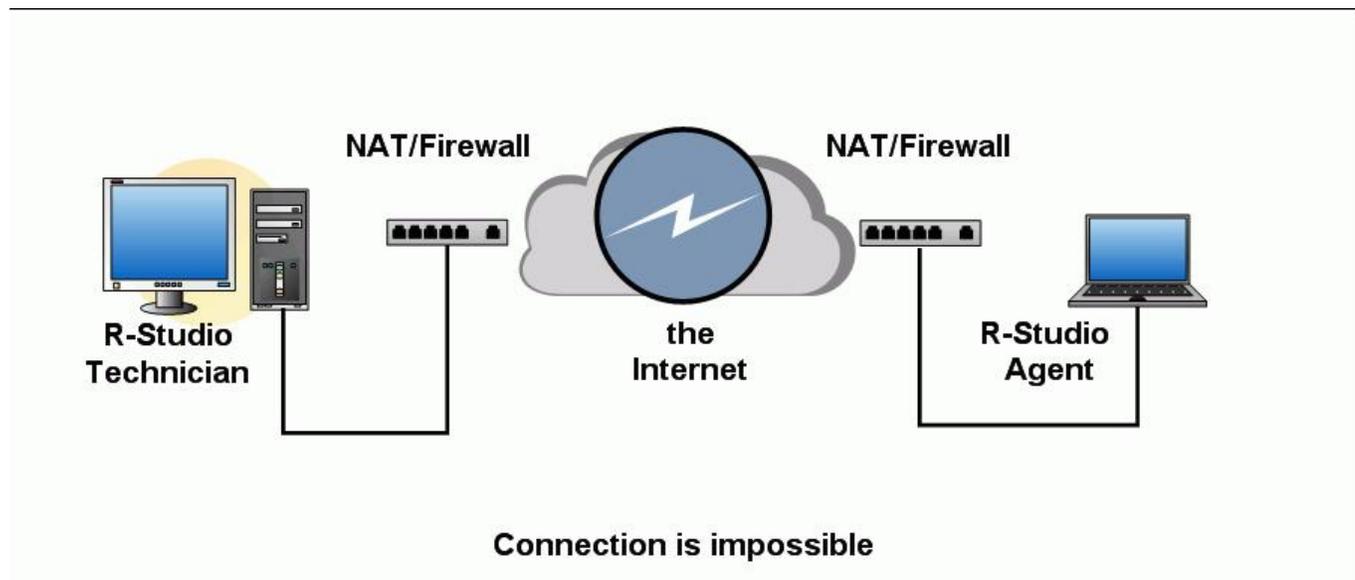
A connection should be made from **R-Studio for Linux**.

- * **R-Studio for Linux** has a public IP address or the ports on its NAT/firewall are forwarded/opened and **R-Studio Agent** is behind a NAT.



A connection should be made from **R-Studio Agent**.

- * **Both R-Studio for Linux and R-Studio Agent** are behind NATs/firewalls.



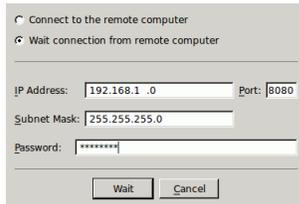
No connections are possible.

Connection from R-Studio Agent to R-Studio for Linux

R-Studio for Linux settings

If a connection is to be made from **R-Studio Agent** to **R-Studio for Linux**, **R-Studio for Linux** should be set to accept connection on the Connect to Remote Computer dialog box.

Connect to Remote Computer dialog box



Select **Wait connection from remote computer**, and specify options for incoming connections.

▣ R-Studio Incoming Connection Options

Password:	Enter a password to obtain access to this computer from a network.
IP Address	specifies addresses from which this computer can be accessed.
Subnet Mask	specifies subnet mask of the network from which this computer can be accessed.
Port	port for incoming connections.

R-Studio for Linux will wait for an incoming connection.

Waiting for remote connection dialog box



Connecting from R-Studio Agent to R-Studio for Linux.

To establish a connection from R-Studio Agent to R-Studio for Linux,

- 1 Right-click the **R-Studio Agent** tray icon and select **Connect**
- 2 Enter the necessary information on the **Connect to R-Studio for Linux** dialog box and click the **Connect** button.

Connect to R-Studio for Linux dialog box



▣ Connect to R-Studio settings

Server	Specify the DNS name or IP address of the host where R-Studio for Linux is running.
Port	Specify the port set on the R-Studio for Linux Settings (Server) dialog box.
Password	Specify the password set on the R-Studio for Linux Settings (Server) dialog box.

- > **R-Studio Agent** will connect to the computer where **R-Studio for Linux** is running and it will show the hard drive and logical disk structure of the remote computer.

Device/Disk	Label	FS	Start	Size
Empty Space15			593.33 GB	992.50 KB
Partition3			593.33 GB	2.84 GB
ST3120811AS3.AAE	6PT01FH	SATA		111.79 GB
Partition1	Windows XP	NTFS	31.50 KB	29.29 GB
Partition2	Mac OS	HFS+	29.29 GB	29.29 GB
Partition3		Ext3	58.59 GB	23.44 GB
Partition4			82.03 GB	1.91 GB
Partition5	COMMON	FAT32	83.93 GB	27.85 GB
TSScorp CDW/DVD SH-M522...		ATAPI		1024.00 ...
ST3500320AS		USB (...)		465.76 GB
Empty Space17			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Remote Computer	192.168.1.10			
ST380215A3.AA	#0 AT...			74.53 GB
C:	System	NTFS	31.50 KB	21.13 GB
D:	Backup	NTFS	21.13 GB	53.40 GB
QUANTUMFIREBALL ELSA08.	#1 AT...			4.78 GB
F:	NTFS-Test	NTFS	63 KB	1.74 GB
G:	FAT32-TEST	FAT32	1.74 GB	1.24 GB
H:	FATTEST	FAT16	2.98 GB	1.75 GB
Empty Space37			4.73 GB	44.30 MB
A:				
ASUSDRW-0402P/D1.05				
E:				
PromiseRAID Console1.00				

It can be processed the same way as that on a local computer.

III R-Studio Technician/T80+

R-Studio Technician/T80+ Demo can perform all data recovery actions except saving recovered files greater than 256 KB and multi-pass imaging.

The **R-Studio T80+** version requires an active internet connection to run and register. You may read more about **R-Studio T80+** in our article [R-Studio T80+ - A Professional Data Recovery and Forensic Solution for Small Business and Individuals Just for US\\$1/day.](#)

This chapter covers features that available only in the **R-Studio Technician/T80+** versions.

- [File Information](#)
- [Custom Recovery Lists](#)
- [Drive Copy Wizard](#)
- [File Maps](#)
- [I/O Monitor and Sector Map files](#)
- [Runtime Imaging](#)
- [Multi-pass Imaging](#)
- [Reverse RAIDs](#)
- [Working with the Third-Party Hardware](#)
- [Forensic Mode](#)

3.1 File Information

R-Studio Technician/T80+ shows much more information about files than R-Studio for Linux does.

Info about a file with good chances for recovery



Info for a file with below average recovery chances



More information

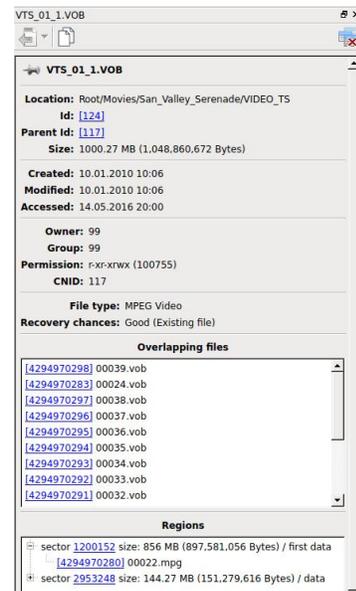
	<p>Click this button to pin the file information. This panel will show the information about the "pinned" file regardless of the current selected file.</p>
	<p>Click this button to copy all this information</p>
<ul style="list-style-type: none"> [394037] ABBA-11.MP3 [394040] ABBA-14.MP3 [131888] VIDEO_TS [131894] VTS_01_0.VOB [131895] VTS_01_1.VOB [131896] VTS_01_2.VOB [131897] VTS_01_3.VOB ✓ [131898] VTS_01_4.VOB 	<p>Click this button to select the file you want to go to.</p>
	<p>Click this button to close all the information.</p>
<p>Overlapping files</p>	<p>Shows the list or files that may occupy the same disk sectors. You may click the file id to see information about this file.</p>
<p>Regions</p>	<p>Shows the list of sectors occupied by the file and corresponding overlapping files. You may click a sector number open the sector in the built-in Hexadecimal editor.</p>

Examples of file information on other file systems

File info on an NTFS file system



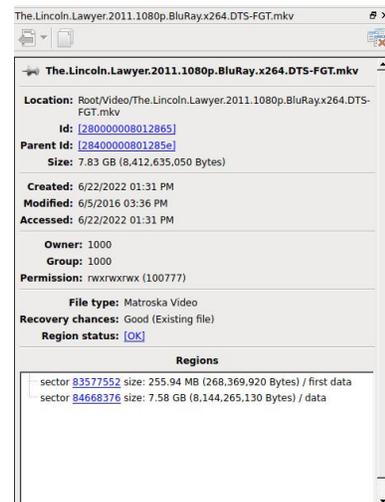
Info for a file on an HFS+ file system



File info on an APFS file system



Info for a file on an XFS file system



3.2 Custom Recovery Lists

The **R-Studio Technician/T80+** versions can create more advanced [recovery lists](#).

Export Recovery List options

Export the entire folder/file tree Export marked file/folder names Export file/folder names	Specifies which file and folder names will be exported.
File format:	A file format for the recovery list. Only text format is available for the standalone and corporate versions. R-Studio Technician/T80+ can create custom recovery lists in other

	formats with more advanced options The following formats are available for R-Studio Technician/T80+ version: Plain Text HTML XML JSON CSV
File name:	Specifies a file name of the recovery list.

Editing the file recovery list

All files without any marks in the recovery list will be marked when the list is loaded into **R-Studio for Linux**. So, if you have some files in the recovery list that don't need to be recovered, just delete them from the list. In addition, you may use the following marks to specify some options

- :+ Mark the file, or the folder, all its files, and subfolders within the folder.
- :* Mark the file, or the folder and its files, don't mark subfolders in the folder.
- :- Unmark the file, or the folder, its files, and subfolders in the folder.
- := Unmark the file or the folder and its files, don't unmark subfolders in the folder.
- !: Provide the information on the file. (**R-Studio Technician/T80+** only)

R-Studio for Linux processes records in the list consequently. That is, if there are the following lines in the file,

```
:+Files_to_Recover\  
:-Files_to_Delete\File_2.jpg
```

the file `File_2.jpg` won't be marked for recovery, while for the lines

```
:-Files_to_Recover\File_2.jpg  
:+Files_to_Recover\  
file File_2.jpg will be.
```

A simple recovery list for reference

Structure of a simple recovery list file created by R-Studio for Linux

```
:# Version = 1  
:# Sort = by real  
:# PathDelim = /  
:# CaseSensitive  
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";  
label:"ntfs test"; fs:"NTFS";  
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";  
product:"disk"; vendor:"flash";  
Diving/  
Diving/Aquarium/  
Diving/Aquarium/20190822_100644.jpg  
Diving/Aquarium/20190822_101620.jpg  
Diving/Aquarium/20190822_102526.jpg  
Diving/Aquarium/20190822_103830.jpg  
Diving/Aquarium/20190822_104333.jpg  
SF/  
SF/Sea-Lions/  
SF/Sea-Lions/IMG_3493.JPG  
SF/Sea-Lions/IMG_3535.JPG
```

```
SF/Sea-Lions/IMG_3542.JPG
SF/Sea-Lions/IMG_3579.JPG
SF/Sea-Lions/IMG_3580.JPG
SF/Sea-Lions/IMG_3581.JPG
SF/Sea-Lions/IMG_3589.JPG
SF/IMG_0869.JPG
SF/IMG_0873.JPG
SF/IMG_0890.JPG
SF/IMG_1739.JPG
SF/IMG_3460.JPG
SF/IMG_3461.JPG
SF/IMG_3476.JPG
SF/IMG_3478.JPG
SF/IMG_3479.JPG
SF/IMG_3480.JPG
SF/IMG_3481.JPG
SF/IMG_3493.JPG
SF/IMG_3535.JPG
SF/IMG_3542.JPG
SF/IMG_3579.JPG
SF/IMG_3580.JPG
SF/IMG_3581.JPG
SF/IMG_3589.JPG
SF/IMG_3590.JPG
SF/IMG_3591.JPG
SF/IMG_3592.JPG
SF/IMG_3593.JPG
SF/IMG_3594.JPG
SF/IMG_3595.JPG
SF/IMG_3596.JPG
SF/IMG_3608.JPG
SF/IMG_3627.JPG
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG
```

If such recovery list is created from an entire logical disk/partition, it will contain several virtual folders. For example, they'll have the following structure for an NTFS partition.

```
System Volume Information/
System Volume Information/IndexerVolumeGuid
System Volume Information/WPSettings.dat
Vegas/
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG
//m/$Extend/
//m/$Extend/$Deleted/
//m/$Extend/$RmMetadata/
//m/$Extend/$RmMetadata/$Txf/
//m/$Extend/$RmMetadata/$TxfLog/
```

```

///m/$Extend/$RmMetadata/$TxfLog/$Tops
///m/$Extend/$RmMetadata/$TxfLog/$TxfLog.blf
///m/$Extend/$RmMetadata/$TxfLog/$TxfLogContainer00000000000000000001
///m/$Extend/$RmMetadata/$TxfLog/$TxfLogContainer00000000000000000002
///m/$Extend/$RmMetadata/$Repair
///m/$Extend/$ObjId
///m/$Extend/$Quota
///m/$Extend/$Reparse
///m/$AttrDef
///m/$BadClus
///m/$Bitmap
///m/$Boot
///m/$LogFile
///m/$MFT
///m/$MFTMirr
///m/$Secure
///m/$UpCase
///m/$Volume

```

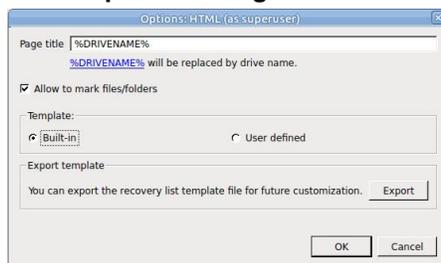
HTML format

This is a default format of recovery lists for the **R-Studio Technician/T80+** version. It allows its users to supply their customers with the recovery lists with the easiest way to edit.

Export Recovery List dialog box for the HTML format



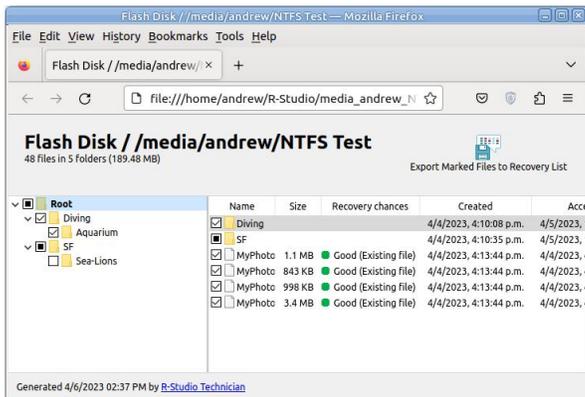
HTML Options dialog box



You may export the default HTML template and edit it to adapt it for your own purposes.

When the customer loads an HTML recovery list in their browser, they can mark files they want to recover, and export their names into the final recovery list in the plain text format.

HTML Recovery list in a browser



You may compare this list with the edited simple recovery list.

An exported recovery list

```

:# Version = 1
:# Sort = by real
:# PathDelim = /
:# CaseSensitive
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";
label:"ntfs test"; fs:"NTFS";
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";
product:"disk"; vendor:"flash";
Diving/Aquarium/20190822_100644.jpg
:! Id=3866625
Diving/Aquarium/20190822_101620.jpg
:! Id=3932161
Diving/Aquarium/20190822_102526.jpg
:! Id=3997697
Diving/Aquarium/20190822_103830.jpg
:! Id=4063233
Diving/Aquarium/20190822_104333.jpg
:! Id=4128769
Diving/MyPhoto1.jpg
:! Id=2883585
Diving/MyPhoto2.jpg
:! Id=2949121
Diving/MyPhoto3.jpg
:! Id=3014657
Diving/MyPhoto4.JPG
:! Id=3080193
Diving/MyPhoto5.jpg
:! Id=3145729
SF/IMG_0869.JPG
:! Id=4915201
SF/IMG_0873.JPG
:! Id=4980737
SF/IMG_0890.JPG
:! Id=5046273
SF/IMG_1739.JPG
:! Id=5111809

```

```
SF/IMG_3460.JPG
:! Id=5177345
SF/IMG_3461.JPG
:! Id=5242881
SF/IMG_3476.JPG
:! Id=5308417
SF/IMG_3478.JPG
:! Id=5373953
SF/IMG_3479.JPG
:! Id=5439489
SF/IMG_3480.JPG
:! Id=5505025
SF/IMG_3481.JPG
:! Id=5570561
SF/IMG_3493.JPG
:! Id=5636097
SF/IMG_3535.JPG
:! Id=5701633
SF/IMG_3542.JPG
:! Id=5767169
SF/IMG_3579.JPG
:! Id=5832705
SF/IMG_3580.JPG
:! Id=5898241
SF/IMG_3581.JPG
:! Id=5963777
SF/IMG_3589.JPG
:! Id=6029313
SF/IMG_3590.JPG
:! Id=6094849
SF/IMG_3591.JPG
:! Id=6160385
SF/IMG_3592.JPG
:! Id=6225921
SF/IMG_3593.JPG
:! Id=6291457
SF/IMG_3594.JPG
:! Id=6356993
SF/IMG_3595.JPG
:! Id=6422529
SF/IMG_3596.JPG
:! Id=6488065
SF/IMG_3608.JPG
:! Id=6553601
SF/IMG_3627.JPG
:! Id=6619137
MyPhoto6.JPG
:! Id=4194305
MyPhoto7.JPG
:! Id=4259841
MyPhoto8.JPG
:! Id=4325377
MyPhoto9.JPG
```

```
:! Id=4390913
```

A manually edited plain text recovery list

The edited simple recovery list

The final simple recovery list will be the following:

```
:# Version = 1
:# Sort = by real
:# PathDelim = /
:# CaseSensitive
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";
label:"ntfs test"; fs:"NTFS";
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";
product:"disk"; vendor:"flash";
:= Diving/
:+ Diving/Aquarium/
:+ Diving/MyPhoto1.jpg
:+ Diving/MyPhoto3.jpg
:+ SF/
:- SF/Sea-Lions/
MyPhoto6.JPG
MyPhoto7.JPG
MyPhoto8.JPG
MyPhoto9.JPG
```

Plain text format

Custom recovery lists in the text format contains more information about files than simple recovery lists.

Export Recovery List dialog box for the plain text format



You may compare two versions of the same plain text recovery list:

An advanced text recovery list

This is an advanced version of the recovery list described on the [Recovery List](#) page.

```
:# Version = 1
:# Sort = by real
:# PathDelim = /
:# CaseSensitive
:# Drive = type:"Volume"; size:"1048576000"; mountpoint:"/media/andrew/ntfs test";
label:"ntfs test"; fs:"NTFS";
:# Parent = type:"Drive"; size:"1048576000"; serial:"2cca54405a8d3a89";
product:"disk"; vendor:"flash";
Diving/
:! Id=4000000260001
```

```
!! Flags=directory
!! Created=4/4/2023 04:10 PM
!! Modified=4/4/2023 06:16 PM
!! Accessed=4/5/2023 01:31 PM
!! MFT number=38
!! Parent MFT number=5

Diving/Aquarium/
!! Id=4000000270001
!! Flags=directory
!! Created=4/4/2023 04:10 PM
!! Modified=4/5/2023 01:31 PM
!! Accessed=4/5/2023 01:31 PM
!! MFT number=39
!! Parent MFT number=38

Diving/Aquarium/20190822_100644.jpg
!! Id=3b0001
!! Size=5.49 MB (5,760,305 Bytes)
!! Created=4/5/2023 01:27 PM
!! Modified=8/5/2020 01:34 PM
!! Accessed=4/5/2023 01:27 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682782 (offset: 80 ) size: 72 Bytes / resident
!!   !! other files: [240000000410001] MyPhoto7.JPG
!! sector 682782 (offset: 176 ) size: 104 Bytes / resident
!!   !! other files: [240000000420001] MyPhoto8.JPG
!! sector 1282304 size: 5.49 MB (5,760,305 Bytes) / first data
!!   !! other files: [240000000410001] MyPhoto7.JPG
!! Bad sectors=No
!! MFT number=59
!! Parent MFT number=39

Diving/Aquarium/20190822_101620.jpg
!! Id=3c0001
!! Size=5.75 MB (6,030,395 Bytes)
!! Created=4/5/2023 01:27 PM
!! Modified=8/5/2020 01:47 PM
!! Accessed=4/5/2023 01:27 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682784 (offset: 80 ) size: 72 Bytes / resident
!!   !! other files: [240000000420001] MyPhoto8.JPG
!! sector 682784 (offset: 176 ) size: 104 Bytes / resident
!!   !! other files: [240000000430001] MyPhoto9.JPG
!! sector 1293560 size: 5.75 MB (6,030,395 Bytes) / first data
!!   !! other files: [240000000420001] MyPhoto8.JPG
!! Bad sectors=No
!! MFT number=60
!! Parent MFT number=39
```

```
Diving/Aquarium/20190822_102526.jpg
:! Id=3d0001
:! Size=4.92 MB (5,163,217 Bytes)
:! Created=4/5/2023 01:27 PM
:! Modified=8/5/2020 09:10 PM
:! Accessed=4/5/2023 01:27 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682786 (offset: 80 ) size: 72 Bytes / resident
   :! other files: [240000000430001] MyPhoto9.JPG
:! sector 682786 (offset: 176 ) size: 104 Bytes / resident
   :! other files: [240000000440001] IMG_3493.JPG
:! sector 1478800 size: 4.92 MB (5,163,217 Bytes) / first data
   :! other files: [240000000430001] MyPhoto9.JPG
:! Bad sectors=No
:! MFT number=61
:! Parent MFT number=39

Diving/Aquarium/20190822_103830.jpg
:! Id=3e0001
:! Size=5.41 MB (5,674,169 Bytes)
:! Created=4/5/2023 01:27 PM
:! Modified=8/5/2020 09:10 PM
:! Accessed=4/5/2023 01:27 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682788 (offset: 80 ) size: 72 Bytes / resident
   :! other files: [240000000440001] IMG_3493.JPG
:! sector 682788 (offset: 176 ) size: 104 Bytes / resident
   :! other files: [240000000450001] IMG_3535.JPG
:! sector 1488888 size: 5.41 MB (5,674,169 Bytes) / first data
   :! other files: [240000000440001] IMG_3493.JPG
:! Bad sectors=No
:! MFT number=62
:! Parent MFT number=39

Diving/Aquarium/20190822_104333.jpg
:! Id=3f0001
:! Size=6.36 MB (6,673,935 Bytes)
:! Created=4/5/2023 01:27 PM
:! Modified=8/5/2020 09:13 PM
:! Accessed=4/5/2023 01:27 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682790 (offset: 80 ) size: 72 Bytes / resident
   :! other files: [240000000450001] IMG_3535.JPG
:! sector 682790 (offset: 176 ) size: 104 Bytes / resident
   :! other files: [240000000460001] IMG_3542.JPG
:! sector 1642440 size: 6.36 MB (6,673,935 Bytes) / first data
```

```
    :! other files: [240000000450001] IMG_3535.JPG
:! Bad sectors=No
:! MFT number=63
:! Parent MFT number=39

Diving/MyPhoto1.jpg
:! Id=2c0001
:! Size=2.56 MB (2,682,000 Bytes)
:! Created=4/4/2023 06:16 PM
:! Modified=4/29/2009 05:52 AM
:! Accessed=4/4/2023 06:16 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682752 (offset: 80 ) size: 72 Bytes / resident
:! sector 682752 (offset: 176 ) size: 90 Bytes / resident
    :! other files: [2400000002d0001] MyPhoto2.jpg
:! sector 2036600 size: 2.56 MB (2,682,000 Bytes) / first data
:! Bad sectors=No
:! MFT number=44
:! Parent MFT number=38

Diving/MyPhoto2.jpg
:! Id=2d0001
:! Size=1.75 MB (1,830,252 Bytes)
:! Created=4/4/2023 06:16 PM
:! Modified=4/29/2009 05:53 AM
:! Accessed=4/4/2023 06:16 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682754 (offset: 80 ) size: 72 Bytes / resident
    :! other files: [2400000002e0001] MyPhoto3.jpg
:! sector 682754 (offset: 176 ) size: 90 Bytes / resident
    :! other files: [2400000002e0001] MyPhoto3.jpg
:! sector 2041840 size: 1.75 MB (1,830,252 Bytes) / first data
:! Bad sectors=No
:! MFT number=45
:! Parent MFT number=38

Diving/MyPhoto3.jpg
:! Id=2e0001
:! Size=1.73 MB (1,816,964 Bytes)
:! Created=4/4/2023 06:16 PM
:! Modified=4/29/2009 05:53 AM
:! Accessed=4/4/2023 06:16 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682756 (offset: 80 ) size: 72 Bytes / resident
    :! other files: [2400000002f0001] MyPhoto4.JPG
:! sector 682756 (offset: 176 ) size: 90 Bytes / resident
    :! other files: [240000000300001] MyPhoto5.jpg
```

```
!! sector 1683624 size: 1.73 MB (1,816,964 Bytes) / first data
  !! other files: [2400000002f0001] MyPhoto4.JPG
!! Bad sectors=No
!! MFT number=46
!! Parent MFT number=38

Diving/MyPhoto4.JPG
!! Id=2f0001
!! Size=880.15 KB (901,269 Bytes)
!! Created=4/4/2023 06:16 PM
!! Modified=4/29/2009 05:54 AM
!! Accessed=4/4/2023 06:16 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682758 (offset: 80 ) size: 72 Bytes / resident
  !! other files: [240000000310001] IndexerVolumeGuid
!! sector 682758 (offset: 176 ) size: 90 Bytes / resident
  !! other files: [240000000310001] IndexerVolumeGuid
!! sector 2045416 size: 880.15 KB (901,269 Bytes) / first data
  !! other files: [240000000300001] MyPhoto5.jpg
!! Bad sectors=No
!! MFT number=47
!! Parent MFT number=38

Diving/MyPhoto5.jpg
!! Id=300001
!! Size=3.13 MB (3,286,883 Bytes)
!! Created=4/4/2023 06:16 PM
!! Modified=4/29/2009 06:13 AM
!! Accessed=4/4/2023 06:16 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682760 (offset: 80 ) size: 72 Bytes / resident
  !! other files: [240000000320001] IMG_0201.JPG
!! sector 682760 (offset: 176 ) size: 90 Bytes / resident
  !! other files: [240000000320001] IMG_0201.JPG
!! sector 1687176 size: 3.13 MB (3,286,883 Bytes) / first data
  !! other files: [240000000310001] IndexerVolumeGuid
!! Bad sectors=No
!! MFT number=48
!! Parent MFT number=38

SF/
!! Id=4000000290001
!! Flags=directory
!! Created=4/4/2023 04:10 PM
!! Modified=4/5/2023 12:36 PM
!! Accessed=4/5/2023 01:27 PM
!! MFT number=41
!! Parent MFT number=5
```

```
SF/Sea-Lions/
:! Id=40000002a0001
:! Flags=directory
:! Created=4/4/2023 04:10 PM
:! Modified=4/4/2023 05:03 PM
:! Accessed=4/5/2023 12:36 PM
:! MFT number=42
:! Parent MFT number=41

SF/Sea-Lions/IMG_3493.JPG
:! Id=440001
:! Size=4.75 MB (4,985,023 Bytes)
:! Created=4/4/2023 05:02 PM
:! Modified=6/5/2009 09:50 PM
:! Accessed=4/4/2023 05:02 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682800 (offset: 80 ) size: 48 Bytes / resident
   :! other files: [2400000004c0001] IMG_0873.JPG
:! sector 682800 (offset: 152 ) size: 90 Bytes / resident
   :! other files: [2400000004c0001] IMG_0873.JPG
:! sector 682800 (offset: 272 ) size: 80 Bytes / resident
   :! other files: [2400000004c0001] IMG_0873.JPG
:! sector 1043832 size: 4.75 MB (4,985,023 Bytes) / first data
   :! other files: [2400000004b0001] IMG_0869.JPG
:! Bad sectors=No
:! MFT number=68
:! Parent MFT number=42

SF/Sea-Lions/IMG_3535.JPG
:! Id=450001
:! Size=3.55 MB (3,718,479 Bytes)
:! Created=4/4/2023 05:02 PM
:! Modified=6/5/2009 09:55 PM
:! Accessed=4/4/2023 05:02 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682802 (offset: 80 ) size: 48 Bytes / resident
   :! other files: [2400000004d0001] IMG_0890.JPG
:! sector 682802 (offset: 152 ) size: 90 Bytes / resident
   :! other files: [2400000004d0001] IMG_0890.JPG
:! sector 682802 (offset: 272 ) size: 80 Bytes / resident
   :! other files: [2400000004d0001] IMG_0890.JPG
:! sector 1076608 size: 3.55 MB (3,718,479 Bytes) / first data
   :! other files: [2400000004c0001] IMG_0873.JPG
:! Bad sectors=No
:! MFT number=69
:! Parent MFT number=42

SF/Sea-Lions/IMG_3542.JPG
:! Id=460001
```

```
!! Size=3.92 MB (4,110,749 Bytes)
!! Created=4/4/2023 05:02 PM
!! Modified=6/5/2009 09:57 PM
!! Accessed=4/4/2023 05:02 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682804 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [2400000004e0001] IMG_1739.JPG
!! sector 682804 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [2400000004e0001] IMG_1739.JPG
!! sector 682804 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [2400000004f0001] IMG_3460.JPG
!! sector 1109376 size: 3.92 MB (4,110,749 Bytes) / first data
!!   other files: [2400000004e0001] IMG_1739.JPG
!! Bad sectors=No
!! MFT number=70
!! Parent MFT number=42

SF/Sea-Lions/IMG_3579.JPG
!! Id=470001
!! Size=3.92 MB (4,109,345 Bytes)
!! Created=4/4/2023 05:02 PM
!! Modified=6/5/2009 09:59 PM
!! Accessed=4/4/2023 05:02 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682806 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [2400000004f0001] IMG_3460.JPG
!! sector 682806 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000500001] IMG_3461.JPG
!! sector 682806 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [240000000500001] IMG_3461.JPG
!! sector 1142144 size: 3.92 MB (4,109,345 Bytes) / first data
!!   other files: [2400000004f0001] IMG_3460.JPG
!! Bad sectors=No
!! MFT number=71
!! Parent MFT number=42

SF/Sea-Lions/IMG_3580.JPG
!! Id=480001
!! Size=3.35 MB (3,510,477 Bytes)
!! Created=4/4/2023 05:03 PM
!! Modified=6/5/2009 09:59 PM
!! Accessed=4/4/2023 05:03 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682808 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000510001] IMG_3476.JPG
!! sector 682808 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000510001] IMG_3476.JPG
```

```
!! sector 682808 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [240000000510001] IMG_3476.JPG
!! sector 1207680 size: 3.35 MB (3,510,477 Bytes) / first data
  !! other files: [240000000500001] IMG_3461.JPG
!! Bad sectors=No
!! MFT number=72
!! Parent MFT number=42

SF/Sea-Lions/IMG_3581.JPG
!! Id=490001
!! Size=4.09 MB (4,285,353 Bytes)
!! Created=4/4/2023 05:03 PM
!! Modified=6/5/2009 09:59 PM
!! Accessed=4/4/2023 05:03 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682810 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [240000000520001] IMG_3478.JPG
!! sector 682810 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [240000000520001] IMG_3478.JPG
!! sector 682810 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [240000000530001] IMG_3479.JPG
!! sector 1240448 size: 4.09 MB (4,285,353 Bytes) / first data
  !! other files: [240000000520001] IMG_3478.JPG
!! Bad sectors=No
!! MFT number=73
!! Parent MFT number=42

SF/Sea-Lions/IMG_3589.JPG
!! Id=4a0001
!! Size=4.44 MB (4,651,043 Bytes)
!! Created=4/4/2023 05:03 PM
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/4/2023 05:03 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682812 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [240000000530001] IMG_3479.JPG
!! sector 682812 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [240000000540001] IMG_3480.JPG
!! sector 682812 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [240000000540001] IMG_3480.JPG
!! sector 1273216 size: 4.44 MB (4,651,043 Bytes) / first data
  !! other files: [240000000530001] IMG_3479.JPG
!! Bad sectors=No
!! MFT number=74
!! Parent MFT number=42

SF/IMG_0869.JPG
!! Id=4b0001
!! Size=3.53 MB (3,698,659 Bytes)
```

```
!! Created=4/4/2023 05:05 PM
!! Modified=5/30/2009 01:13 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682814 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000550001] IMG_3481.JPG
!! sector 682814 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000550001] IMG_3481.JPG
!! sector 682814 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [240000000550001] IMG_3481.JPG
!! sector 1305984 size: 3.53 MB (3,698,659 Bytes) / first data
!!   other files: [240000000540001] IMG_3480.JPG
!! Bad sectors=No
!! MFT number=75
!! Parent MFT number=41

SF/IMG_0873.JPG
!! Id=4c0001
!! Size=5.61 MB (5,881,104 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=5/30/2009 01:15 PM
!! Accessed=4/5/2023 12:35 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682816 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000560001] IMG_3493.JPG
!! sector 682816 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000560001] IMG_3493.JPG
!! sector 682816 (offset: 272 ) size: 16 Bytes / resident
!!   other files: [240000000570001] IMG_3535.JPG
!! sector 682816 (offset: 312 ) size: 80 Bytes / resident
!!   other files: [240000000570001] IMG_3535.JPG
!! sector 1338752 size: 5.61 MB (5,881,104 Bytes) / first data
!!   other files: [240000000560001] IMG_3493.JPG
!! Bad sectors=No
!! MFT number=76
!! Parent MFT number=41

SF/IMG_0890.JPG
!! Id=4d0001
!! Size=5.40 MB (5,663,358 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=5/30/2009 01:47 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682818 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000580001] IMG_3542.JPG
!! sector 682818 (offset: 152 ) size: 90 Bytes / resident
```

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    :! other files: [240000000580001] IMG_3542.JPG
:! sector 682818 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [240000000580001] IMG_3542.JPG
:! sector 1371520 size: 5.40 MB (5,663,358 Bytes) / first data
    :! other files: [240000000570001] IMG_3535.JPG
:! Bad sectors=No
:! MFT number=77
:! Parent MFT number=41

SF/IMG_1739.JPG
:! Id=4e0001
:! Size=4.07 MB (4,266,181 Bytes)
:! Created=4/4/2023 05:05 PM
:! Modified=6/3/2009 12:59 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682820 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [240000000590001] IMG_3579.JPG
:! sector 682820 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [240000000590001] IMG_3579.JPG
:! sector 682820 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [2400000005a0001] IMG_3580.JPG
:! sector 1404288 size: 4.07 MB (4,266,181 Bytes) / first data
    :! other files: [240000000590001] IMG_3579.JPG
:! Bad sectors=No
:! MFT number=78
:! Parent MFT number=41

SF/IMG_3460.JPG
:! Id=4f0001
:! Size=4.38 MB (4,593,453 Bytes)
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 07:58 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682822 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [2400000005a0001] IMG_3580.JPG
:! sector 682822 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [2400000005b0001] IMG_3581.JPG
:! sector 682822 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [2400000005b0001] IMG_3581.JPG
:! sector 1469824 size: 4.38 MB (4,593,453 Bytes) / first data
    :! other files: [2400000005a0001] IMG_3580.JPG
:! Bad sectors=No
:! MFT number=79
:! Parent MFT number=41

SF/IMG_3461.JPG
:! Id=500001
```

```
!! Size=3.91 MB (4,102,032 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 07:58 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682824 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [2400000005c0001] IMG_3589.JPG
!! sector 682824 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [2400000005c0001] IMG_3589.JPG
!! sector 682824 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [2400000005c0001] IMG_3589.JPG
!! sector 1502592 size: 3.91 MB (4,102,032 Bytes) / first data
!!   other files: [2400000005b0001] IMG_3581.JPG
!! Bad sectors=No
!! MFT number=80
!! Parent MFT number=41

SF/IMG_3476.JPG
!! Id=510001
!! Size=3.92 MB (4,114,595 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 08:02 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682826 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [2400000005d0001] IMG_3590.JPG
!! sector 682826 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [2400000005d0001] IMG_3590.JPG
!! sector 682826 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [2400000005e0001] IMG_3591.JPG
!! sector 1535360 size: 3.92 MB (4,114,595 Bytes) / first data
!!   other files: [2400000005d0001] IMG_3590.JPG
!! Bad sectors=No
!! MFT number=81
!! Parent MFT number=41

SF/IMG_3478.JPG
!! Id=520001
!! Size=4.74 MB (4,968,784 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 08:03 PM
!! Accessed=4/5/2023 12:35 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682828 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [2400000005e0001] IMG_3591.JPG
!! sector 682828 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [2400000005f0001] IMG_3592.JPG
```

```
!! sector 682828 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [2400000005f0001] IMG_3592.JPG
!! sector 1568128 size: 4.74 MB (4,968,784 Bytes) / first data
  !! other files: [2400000005e0001] IMG_3591.JPG
!! Bad sectors=No
!! MFT number=82
!! Parent MFT number=41

SF/IMG_3479.JPG
!! Id=530001
!! Size=4.28 MB (4,484,110 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 08:03 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682830 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [240000000600001] IMG_3593.JPG
!! sector 682830 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [240000000600001] IMG_3593.JPG
!! sector 682830 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [240000000600001] IMG_3593.JPG
!! sector 1600896 size: 4.28 MB (4,484,110 Bytes) / first data
  !! other files: [2400000005f0001] IMG_3592.JPG
!! Bad sectors=No
!! MFT number=83
!! Parent MFT number=41

SF/IMG_3480.JPG
!! Id=540001
!! Size=4.28 MB (4,491,209 Bytes)
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 08:03 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682832 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [240000000610001] IMG_3594.JPG
!! sector 682832 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [240000000610001] IMG_3594.JPG
!! sector 682832 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [240000000620001] IMG_3595.JPG
!! sector 1633664 size: 4.28 MB (4,491,209 Bytes) / first data
  !! other files: [240000000610001] IMG_3594.JPG
!! Bad sectors=No
!! MFT number=84
!! Parent MFT number=41

SF/IMG_3481.JPG
!! Id=550001
!! Size=3.38 MB (3,541,845 Bytes)
```

```
!! Created=4/4/2023 05:05 PM
!! Modified=6/20/2009 02:00 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682834 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000620001] IMG_3595.JPG
!! sector 682834 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000630001] IMG_3596.JPG
!! sector 682834 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [240000000630001] IMG_3596.JPG
!! sector 1666432 size: 3.38 MB (3,541,845 Bytes) / first data
!!   other files: [240000000620001] IMG_3595.JPG
!! Bad sectors=No
!! MFT number=85
!! Parent MFT number=41

SF/IMG_3493.JPG
!! Id=560001
!! Size=4.75 MB (4,985,023 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 09:50 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682836 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000640001] IMG_3608.JPG
!! sector 682836 (offset: 152 ) size: 90 Bytes / resident
!!   other files: [240000000640001] IMG_3608.JPG
!! sector 682836 (offset: 272 ) size: 80 Bytes / resident
!!   other files: [240000000640001] IMG_3608.JPG
!! sector 1699200 size: 4.75 MB (4,985,023 Bytes) / first data
!!   other files: [240000000630001] IMG_3596.JPG
!! Bad sectors=No
!! MFT number=86
!! Parent MFT number=41

SF/IMG_3535.JPG
!! Id=570001
!! Size=3.55 MB (3,718,479 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 09:55 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682838 (offset: 80 ) size: 48 Bytes / resident
!!   other files: [240000000650001] IMG_3627.JPG
!! sector 682838 (offset: 152 ) size: 90 Bytes / resident
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    :! other files: [240000000650001] IMG_3627.JPG
:! sector 682838 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [240000000400001] MyPhoto6.JPG
:! sector 1731968 size: 3.55 MB (3,718,479 Bytes) / first data
    :! other files: [240000000650001] IMG_3627.JPG
:! Bad sectors=No
:! MFT number=87
:! Parent MFT number=41

SF/IMG_3542.JPG
:! Id=580001
:! Size=3.92 MB (4,110,749 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 09:57 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682840 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [240000000610001] IMG_3594.JPG
:! sector 682840 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [240000000420001] MyPhoto8.JPG
:! sector 682840 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [240000000430001] MyPhoto9.JPG
:! sector 1764736 size: 3.92 MB (4,110,749 Bytes) / first data
    :! other files: [240000000410001] MyPhoto7.JPG
:! Bad sectors=No
:! MFT number=88
:! Parent MFT number=41

SF/IMG_3579.JPG
:! Id=590001
:! Size=3.92 MB (4,109,345 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 09:59 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682842 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [240000000370001] IMG_0390.JPG
:! sector 682842 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [240000000380001] IMG_0391.JPG
:! sector 682842 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [240000000450001] IMG_3535.JPG
:! sector 1797504 size: 3.92 MB (4,109,345 Bytes) / first data
    :! other files: [240000000440001] IMG_3493.JPG
:! Bad sectors=No
:! MFT number=89
:! Parent MFT number=41
```

```
SF/IMG_3580.JPG
:! Id=5a0001
:! Size=3.35 MB (3,510,477 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 09:59 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682844 (offset: 80 ) size: 48 Bytes / resident
  :! other files: [240000000470001] IMG_3579.JPG
:! sector 682844 (offset: 152 ) size: 90 Bytes / resident
  :! other files: [240000000620001] IMG_3595.JPG
:! sector 682844 (offset: 272 ) size: 80 Bytes / resident
  :! other files: [240000000480001] IMG_3580.JPG
:! sector 1830272 size: 3.35 MB (3,510,477 Bytes) / first data
  :! other files: [240000000460001] IMG_3542.JPG
:! Bad sectors=No
:! MFT number=90
:! Parent MFT number=41

SF/IMG_3581.JPG
:! Id=5b0001
:! Size=4.09 MB (4,285,353 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 09:59 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682846 (offset: 80 ) size: 48 Bytes / resident
  :! other files: [2400000004a0001] IMG_3589.JPG
:! sector 682846 (offset: 152 ) size: 90 Bytes / resident
  :! other files: [2400000003b0001] 20190822_100644.jpg
:! sector 682846 (offset: 272 ) size: 80 Bytes / resident
  :! other files: [2400000003c0001] 20190822_101620.jpg
:! sector 1863040 size: 4.09 MB (4,285,353 Bytes) / first data
  :! other files: [240000000490001] IMG_3581.JPG
:! Bad sectors=No
:! MFT number=91
:! Parent MFT number=41

SF/IMG_3589.JPG
:! Id=5c0001
:! Size=4.44 MB (4,651,043 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 10:00 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
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```
!! Regions (sector size=512B):
!! sector 682848 (offset: 80 ) size: 48 Bytes / resident
!! other files: [2400000004c0001] IMG_0873.JPG
!! sector 682848 (offset: 152 ) size: 90 Bytes / resident
!! other files: [240000000330001] IMG_0211.JPG
!! sector 682848 (offset: 272 ) size: 80 Bytes / resident
!! other files: [240000000340001] IMG_0250.JPG
!! sector 1895808 size: 4.44 MB (4,651,043 Bytes) / first data
!! other files: [2400000004b0001] IMG_0869.JPG
!! Bad sectors=No
!! MFT number=92
!! Parent MFT number=41

SF/IMG_3590.JPG
!! Id=5d0001
!! Size=4.67 MB (4,899,941 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/5/2023 12:35 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682850 (offset: 80 ) size: 48 Bytes / resident
!! other files: [240000000350001] IMG_0283.JPG
!! sector 682850 (offset: 152 ) size: 90 Bytes / resident
!! other files: [240000000360001] IMG_0389.JPG
!! sector 682850 (offset: 272 ) size: 80 Bytes / resident
!! other files: [2400000004e0001] IMG_1739.JPG
!! sector 1928576 size: 4.67 MB (4,899,941 Bytes) / first data
!! other files: [2400000004d0001] IMG_0890.JPG
!! Bad sectors=No
!! MFT number=93
!! Parent MFT number=41

SF/IMG_3591.JPG
!! Id=5e0001
!! Size=4.08 MB (4,280,042 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682852 (offset: 80 ) size: 48 Bytes / resident
!! other files: [2400000004f0001] IMG_3460.JPG
!! sector 682852 (offset: 152 ) size: 90 Bytes / resident
!! other files: [2400000003d0001] 20190822_102526.jpg
!! sector 682852 (offset: 272 ) size: 80 Bytes / resident
!! other files: [2400000003e0001] 20190822_103830.jpg
!! sector 1961344 size: 4.08 MB (4,280,042 Bytes) / first data
!! other files: [240000000630001] IMG_3596.JPG
```

```

:! Bad sectors=No
:! MFT number=94
:! Parent MFT number=41

SF/IMG_3592.JPG
:! Id=5f0001
:! Size=5.04 MB (5,285,211 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 10:00 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682854 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [240000000510001] IMG_3476.JPG
:! sector 682854 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [240000000520001] IMG_3478.JPG
:! sector 682854 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [240000000390001] IMG_3694.JPG
:! sector 1994112 size: 5.04 MB (5,285,211 Bytes) / first data
    :! other files: [240000000500001] IMG_3461.JPG
:! Bad sectors=No
:! MFT number=95
:! Parent MFT number=41

SF/IMG_3593.JPG
:! Id=600001
:! Size=4.74 MB (4,969,442 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
:! Modified=6/5/2009 10:00 PM
:! Accessed=4/4/2023 05:05 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Integrity OK, Unfragmented)
:! Regions (sector size=512B):
:! sector 682856 (offset: 80 ) size: 48 Bytes / resident
    :! other files: [240000000530001] IMG_3479.JPG
:! sector 682856 (offset: 152 ) size: 90 Bytes / resident
    :! other files: [240000000540001] IMG_3480.JPG
:! sector 682856 (offset: 272 ) size: 80 Bytes / resident
    :! other files: [2400000003f0001] 20190822_104333.jpg
:! sector 2026880 size: 4.74 MB (4,969,442 Bytes) / first data
    :! other files: [2400000003a0001] IMG_3699.JPG
:! Bad sectors=No
:! MFT number=96
:! Parent MFT number=41

SF/IMG_3594.JPG
:! Id=610001
:! Size=4.69 MB (4,917,237 Bytes)
:! Flags=deleted
:! Created=4/4/2023 05:05 PM
```

```
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682858 (offset: 80 ) size: 48 Bytes / resident
!! other files: [240000000640001] IMG_3608.JPG, [240000000320001]
IMG_0201.JPG
!! sector 682858 (offset: 152 ) size: 90 Bytes / resident
!! other files: [240000000640001] IMG_3608.JPG, [240000000320001]
IMG_0201.JPG
!! sector 682858 (offset: 272 ) size: 80 Bytes / resident
!! other files: [2400000002e0001] MyPhoto3.jpg
!! sector 973080 size: 4.69 MB (4,917,237 Bytes) / first data
!! other files: [240000000550001] IMG_3481.JPG
!! Bad sectors=No
!! MFT number=97
!! Parent MFT number=41

SF/IMG_3595.JPG
!! Id=620001
!! Size=5.09 MB (5,338,697 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682860 (offset: 80 ) size: 48 Bytes / resident
!! other files: [240000000560001] IMG_3493.JPG
!! sector 682860 (offset: 152 ) size: 90 Bytes / resident
!! other files: [240000000570001] IMG_3535.JPG
!! sector 682860 (offset: 272 ) size: 80 Bytes / resident
!! other files: [240000000580001] IMG_3542.JPG
!! sector 1174920 size: 5.09 MB (5,338,697 Bytes) / first data
!! other files: [240000000300001] MyPhoto5.jpg
!! Bad sectors=No
!! MFT number=98
!! Parent MFT number=41

SF/IMG_3596.JPG
!! Id=630001
!! Size=4.93 MB (5,174,072 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:00 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682862 (offset: 80 ) size: 48 Bytes / resident
!! other files: [2400000005a0001] IMG_3580.JPG
```

```
!! sector 682862 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [240000000650001] IMG_3627.JPG
!! sector 682862 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [2400000005b0001] IMG_3581.JPG
!! sector 1437064 size: 4.93 MB (5,174,072 Bytes) / first data
  !! other files: [240000000590001] IMG_3579.JPG
!! Bad sectors=No
!! MFT number=99
!! Parent MFT number=41

SF/IMG_3608.JPG
!! Id=640001
!! Size=5.01 MB (5,257,021 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:01 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Below Average (Integrity OK, Beginning overwritten by existing
file)
!! Regions (sector size=512B):
!! sector 682864 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [2400000005d0001] IMG_3590.JPG
!! sector 682864 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [2400000005e0001] IMG_3591.JPG
!! sector 682864 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [2400000005f0001] IMG_3592.JPG
!! sector 1673352 size: 5.01 MB (5,257,021 Bytes) / first data
  !! other files: [2400000005c0001] IMG_3589.JPG
!! Overlapping files=[240000000320001] IMG_0201.JPG
!! MFT number=100
!! Parent MFT number=41

SF/IMG_3627.JPG
!! Id=650001
!! Size=3.48 MB (3,651,691 Bytes)
!! Flags=deleted
!! Created=4/4/2023 05:05 PM
!! Modified=6/5/2009 10:02 PM
!! Accessed=4/4/2023 05:05 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Integrity OK, Unfragmented)
!! Regions (sector size=512B):
!! sector 682866 (offset: 80 ) size: 48 Bytes / resident
  !! other files: [2400000002c0001] MyPhoto1.jpg
!! sector 682866 (offset: 152 ) size: 90 Bytes / resident
  !! other files: [2400000002d0001] MyPhoto2.jpg
!! sector 682866 (offset: 272 ) size: 80 Bytes / resident
  !! other files: [2400000002f0001] MyPhoto4.JPG
!! sector 1837136 size: 3.48 MB (3,651,691 Bytes) / first data
  !! other files: [240000000600001] IMG_3593.JPG
!! Bad sectors=No
!! MFT number=101
```

```
!! Parent MFT number=41

MyPhoto6.JPG
!! Id=400001
!! Size=1.07 MB (1,123,560 Bytes)
!! Created=4/4/2023 04:13 PM
!! Modified=4/29/2009 05:54 AM
!! Accessed=4/4/2023 04:13 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682792 (offset: 80 ) size: 48 Bytes / resident
!!   !! other files: [240000000460001] IMG_3542.JPG
!! sector 682792 (offset: 152 ) size: 90 Bytes / resident
!!   !! other files: [240000000470001] IMG_3579.JPG
!! sector 682792 (offset: 272 ) size: 80 Bytes / resident
!!   !! other files: [240000000470001] IMG_3579.JPG
!! sector 938624 size: 1.07 MB (1,123,560 Bytes) / first data
!!   !! other files: [240000000460001] IMG_3542.JPG
!! Bad sectors=No
!! MFT number=64
!! Parent MFT number=5

MyPhoto7.JPG
!! Id=410001
!! Size=842.76 KB (862,983 Bytes)
!! Created=4/4/2023 04:13 PM
!! Modified=4/29/2009 05:55 AM
!! Accessed=4/4/2023 04:13 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
!! sector 682794 (offset: 80 ) size: 48 Bytes / resident
!!   !! other files: [240000000480001] IMG_3580.JPG
!! sector 682794 (offset: 152 ) size: 90 Bytes / resident
!!   !! other files: [240000000480001] IMG_3580.JPG
!! sector 682794 (offset: 272 ) size: 80 Bytes / resident
!!   !! other files: [240000000480001] IMG_3580.JPG
!! sector 971392 size: 842.76 KB (862,983 Bytes) / first data
!!   !! other files: [240000000470001] IMG_3579.JPG
!! Bad sectors=No
!! MFT number=65
!! Parent MFT number=5

MyPhoto8.JPG
!! Id=420001
!! Size=997.99 KB (1,021,937 Bytes)
!! Created=4/4/2023 04:13 PM
!! Modified=4/29/2009 05:55 AM
!! Accessed=4/4/2023 04:13 PM
!! File type=JPEG Digital Camera
!! Recovery chances=Good (Existing file)
!! Regions (sector size=512B):
```

```

:! sector 682796 (offset: 80 ) size: 48 Bytes / resident
  :! other files: [240000000490001] IMG_3581.JPG
:! sector 682796 (offset: 152 ) size: 90 Bytes / resident
  :! other files: [240000000490001] IMG_3581.JPG
:! sector 682796 (offset: 272 ) size: 80 Bytes / resident
  :! other files: [2400000004a0001] IMG_3589.JPG
:! sector 1004160 size: 997.99 KB (1,021,937 Bytes) / first data
  :! other files: [240000000490001] IMG_3581.JPG
:! Bad sectors=No
:! MFT number=66
:! Parent MFT number=5

MyPhoto9.JPG
:! Id=430001
:! Size=3.37 MB (3,533,017 Bytes)
:! Created=4/4/2023 04:13 PM
:! Modified=4/29/2009 05:56 AM
:! Accessed=4/4/2023 04:13 PM
:! File type=JPEG Digital Camera
:! Recovery chances=Good (Existing file)
:! Regions (sector size=512B):
:! sector 682798 (offset: 80 ) size: 48 Bytes / resident
  :! other files: [2400000004a0001] IMG_3589.JPG
:! sector 682798 (offset: 152 ) size: 90 Bytes / resident
  :! other files: [2400000004b0001] IMG_0869.JPG
:! sector 682798 (offset: 272 ) size: 80 Bytes / resident
  :! other files: [2400000004b0001] IMG_0869.JPG
:! sector 1036928 size: 3.37 MB (3,533,017 Bytes) / first data
  :! other files: [2400000004a0001] IMG_3589.JPG
:! Bad sectors=No
:! MFT number=67
:! Parent MFT number=5

```

Other recovery list formats

You may export recovery lists in the following formats:

XML format

Export Recovery List dialog box for the XML format



JSON format

Custom recovery lists in the text format contains more information about files than simple recovery lists.

Export Recovery List dialog box for the JSON format



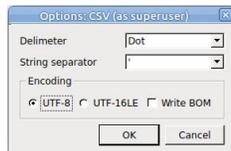
CSV format

Custom recovery lists in the text format contains more information about files than simple recovery lists.

Export Recovery List dialog box for the CSV format



CSV Options dialog box



3.3 Drive Copy Wizard

You may copy any object in the Drives panel to any other object, if there is enough space on the target one. Before **Copy object to...** becomes enabled on the **Create** menu, you need to enable writing.

To enable writing,

- 1 On the **R-Studio for Linux** main panel, select the **Tools** menu, then **Settings**, and select **Enable Write** on the [Settings](#) dialog box.

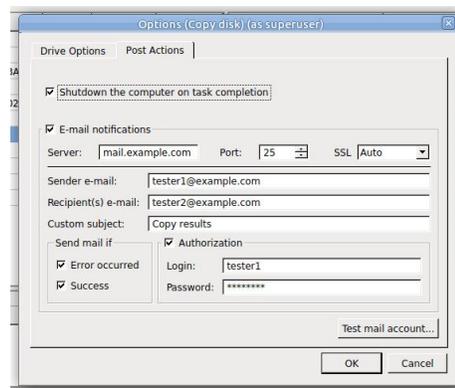
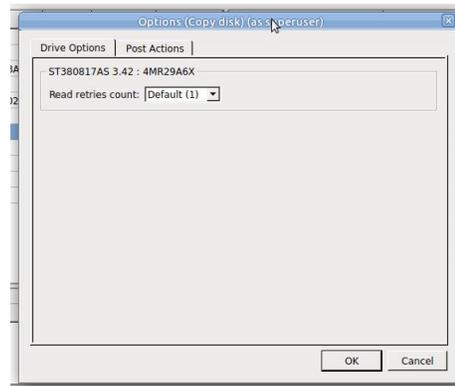
> The **Copy object to...** will be enabled on the **Create** menu.

Now objects can be copied.

While the objects are being copied, you may change some parameters and view the [I/O monitor](#) on the Object Copy Progress dialog box.



You may change some options during the copy process



Depending on the objects to copy and your tasks, you may do:

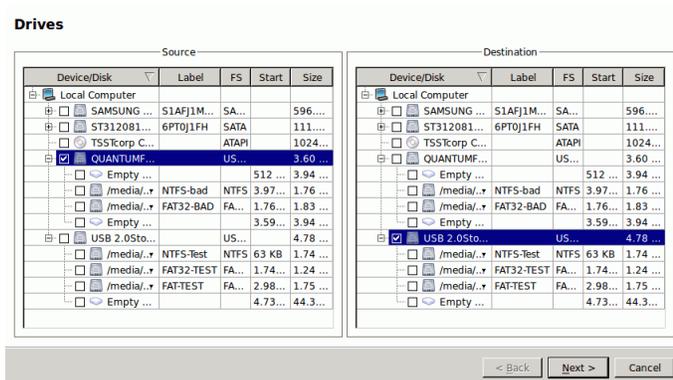
Binary (byte to byte copy)

An exact copy of the source object (or a part thereof) to the destination device (from its beginning or a specified offset). Any object may be copied to any object this way.

To perform a binary copy of an object,

- 1 **Select Copy object to... on the Create menu**
- 2 **Select a source and destination objects on the Drives Copy Wizard panel and click the Next button**

Drives Copy Wizard



- 3 **Select Binary (byte to byte) copy on the Copy Options dialog box, specify copy options, and click the Next button**

Copy options dialog box

Copy options

Source:

Destination:

Binary (byte to byte) copy
You may copy any object to any object.

Smart drive copy
Only whole drives can be copied with this option to other drives. You may change some parameters of the copied drives.

Source

Copy whole object

Copy range

Offset: Sectors

Size: Sectors

Destination

Offset: Sectors

< Back Next > Cancel

Copy options

Source	
Copy whole object	Select this option if you want to copy the entire source object to the destination one
Copy range	Select this option if you want to copy a part of the source object
Offset	Specify the offset from which the source object data will be copied to the destination object
Size	Specify the size of the source object data which will be copied to the destination object
Destination	
Offset	Specify the offset on the destination object to which the source object data will be copied

- 3 **View the copy task settings on the Drives Copy Wizard and click the Finish button**

Drives Copy Wizard

Binary disk copy

Source: QUANTUMFIREBALL_TM3840A1T00
BUS: USB (4294967295)
Sector size: 512 Bytes
Size: 3.60 GB (7539840 Sectors)

Destination: USB 2.0Storage Device0100
BUS: USB (4294967295)
Sector size: 512 Bytes
Size: 4.78 GB (10018890 Sectors)

Operation 1 of 1
Operation: Raw disk copy/restore
Model: QUANTUMFIREBALL_TM3840A1T00
Size: 3.60 GB (7539840 Sectors)
Connected: USB@40
Target HDD: USB 2.0Storage Device0100 (4.78 GB (10018890 Sectors))
Duration: 77 seconds

< Back Finish Cancel

or click the <Back button to edit the copy parameters

- > **R-Studio for Linux will start copying data from the source object to the destination one.**

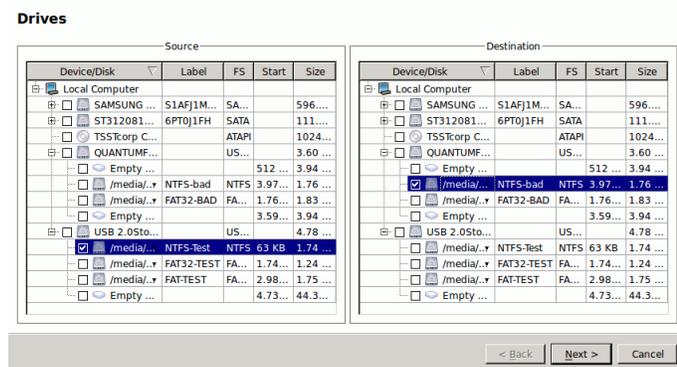
Smart partition copy

Only [partitions](#) can be copied with this option to other partitions or empty spaces. You may change some parameters of the the copied partition(s) on the destination drive.

To perform a smart partition copy of a partition,

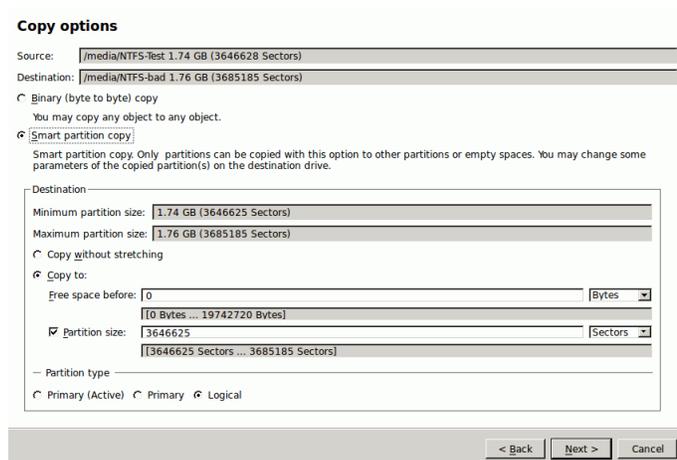
- 1 Select **Copy object to...** on the **Create** menu
- 2 Select **source and destination partitions on the Drives Copy Wizard** panel and click the **Next** button

Drives Copy Wizard



- 3 Select **Smart partition copy** on the **Copy Options** panel, specify copy options, and click the **Next** button

Copy options dialog box

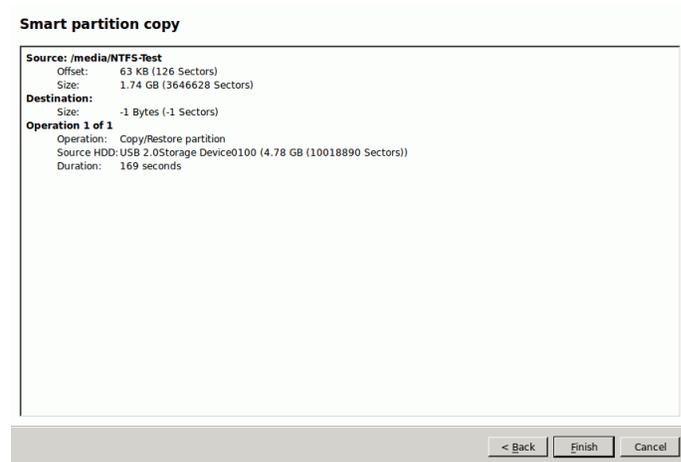


Copy options

Destination	
Copy without stretching	Select this option if you want to copy the partition exactly to the destination place
Copy to:	Select this option if you want to change some parameters of the copied partition on the destination place
Free space before	Specify how much space will be left empty before the start of the copied partition
Partition size	Select this option and specify the new size of the copied partition
Partition type Primary (Active)/ Primary/Logical	Specify the type of the partition to be copied. Do not change this setting unless you have serious reasons to do so.

3 View the copy task settings on the Drives Copy Wizard and click the Finish button

Drives Copy Wizard



or click the <Back button to edit the copy parameters

- > R-Studio for Linux will start copying data from the source partition to the destination place.

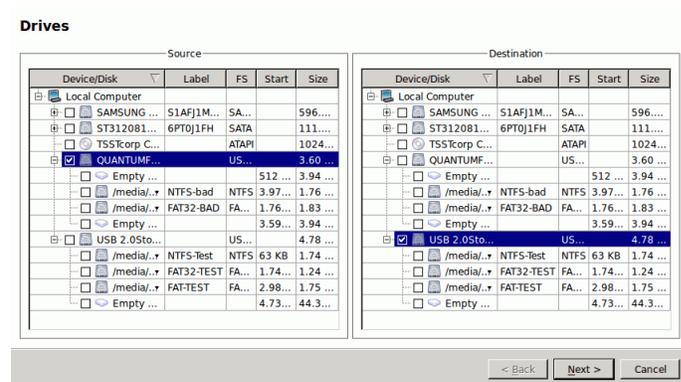
Smart drive copy

Only whole drives can be copied with this option to other drives. You may change some parameters of the copied drives.

To perform a smart drive copy of a hard drive,

- 1 Select Copy object to... on the Create menu
- 2 Select a source and destination hard drives on the Drives Copy Wizard panel and click the Next button

Drives Copy Wizard



3 Select Smart drive copy on the Copy Options panel, specify copy options, and click the Next button

Copy options dialog box

Copy options

Source: QUANTUMFIREBALL_TM3840A1T00 (1) 3.60 GB (7539840 Sectors)

Destination: USB 2.0Storage Device0100 (1) 4.78 GB (10018890 Sectors)

Binary (byte to byte) copy

You may copy any object to any object.

Smart drive copy

Only whole drives can be copied with this option to other drives. You may change some parameters of the copied drives.

Copying mode

Copy all partitions onto original places

One partition after another

Fixed active partition

Expand/Shrink partition to whole disk

Fixed active partition

Description

All partitions will be copied to their original places. If the drive's geometry is detected correctly, and there is no non-standard loader, it makes the exact sector-by-sector copy of the original object.

< Back Next > Cancel

Copy options

Copying mode	
Copy all partitions onto original places	Select this option if you want to copy all partitions to their original places.
One partition after another	Select this option if you want to copy the partitions one after another preserving their space. If there is empty space between the partitions, it will be omitted. Otherwise it is similar to Copy all partitions onto original places. If Fixed active partition is selected, the original offset/size of the active partition will be preserved (in case the loader has links to it).
Expand/Shrink partition to whole disk	Specify this option if you want to proportionally expand/shrink the selected partitions to occupy the entire target drive. If Fixed active partition is selected, the original offset/size of the active partition will be preserved (in case the loader has links to it).

3 View the copy task settings on the Drives Copy Wizard and click the Finish button

Drives Copy Wizard

Smart drive copy

Source: QUANTUMFIREBALL_TM3840A1T00

BUS: USB (4294967295)

Sector size: 512 Bytes

Size: 3.60 GB (7539840 Sectors)

Destination: USB 2.0Storage Device0100

BUS: USB (4294967295)

Sector size: 512 Bytes

Size: 4.78 GB (10018890 Sectors)

Operation 1 of 4

Operation: Clear disk

Model: USB 2.0Storage Device0100

Size: 4.78 GB (10018890 Sectors)

Connected: USB@50

Duration: 1 seconds

Operation 2 of 4

Operation: Copy/Restore partition

Source HDD: QUANTUMFIREBALL_TM3840A1T00 (3.60 GB (7539840 Sectors))

Target HDD: USB 2.0Storage Device0100 (4.78 GB (10018890 Sectors))

Target Offset: 3.97 MB (8127 Sectors)

Duration: 171 seconds

Operation 3 of 4

Operation: Copy/Restore partition

< Back Finish Cancel

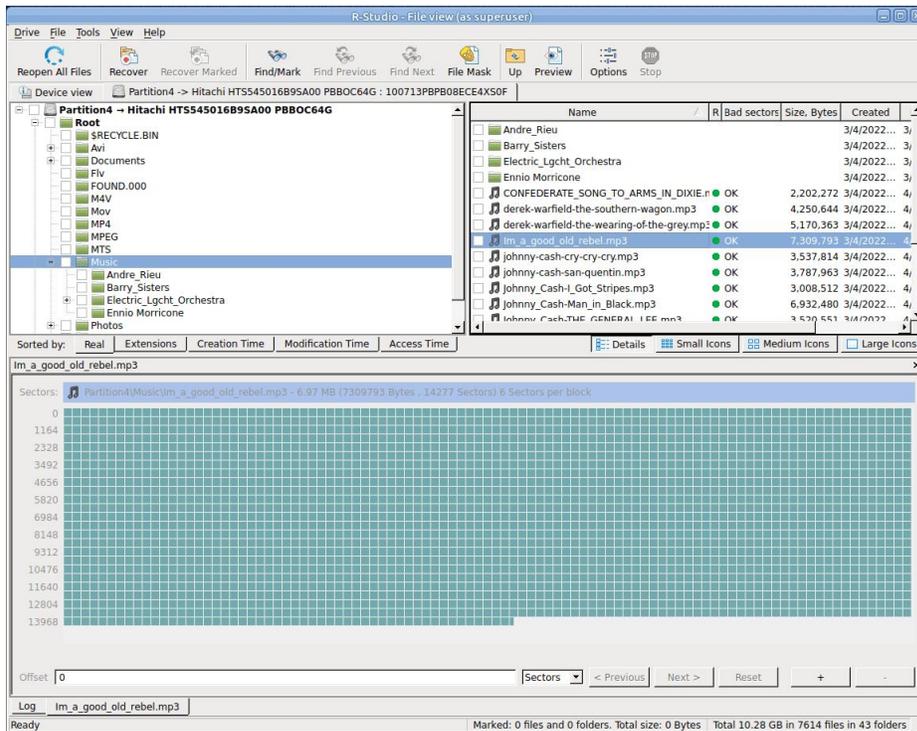
or click the <Back button to edit the copy parameters

> **R-Studio for Linux will start copying data from the source hard drive to the destination one.**

3.4 File Maps

R-Studio for Linux can show file maps. Right-click the file and select **Map of file** in their shortcut menu.

File Map



3.5 I/O Monitor and Sector Map Files

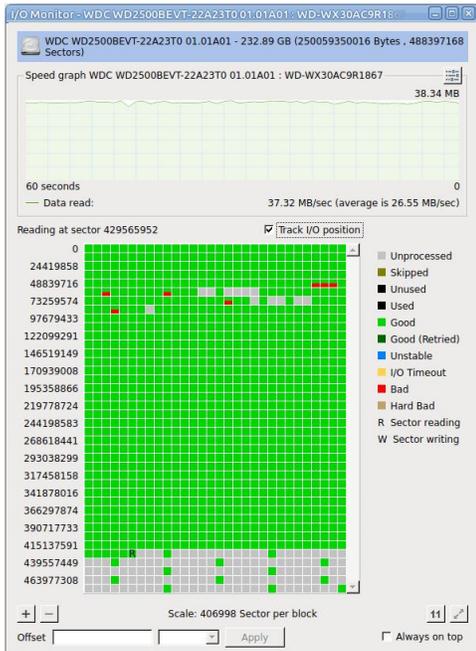
These features greatly improves working with failing drives for **R-Studio for Linux**.

I/O Monitor

I/O Monitor allows you to inspect the process of drive input/output operations in real time. When **R-Studio for Linux** performs a disk operation the **I/O Monitor button** becomes active.

Click this button, and the **I/O Monitor** will appear.

I/O Monitor



You may also start **I/O Monitor** from the context menu and progress dialog boxes during various drive operations.

Sector Map Files

[Sector map files](#) are files that contain information about conditions of drive sectors, which may be good, bad, slow, and unstable. **R-Studio for Linux** estimates chances for successful file recovery basing on these files and avoiding unnecessary attempts to read [bad sectors](#). Sector map files are crucial for [multi-pass imaging](#).

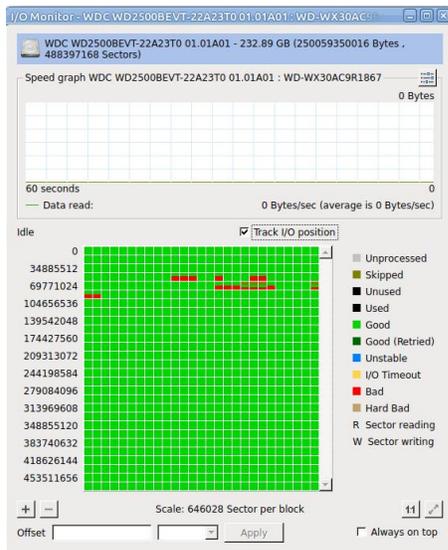
R-Studio for Linux creates its own sector map files or can import such files created from other disk imaging programs. Currently **R-Studio for Linux** supports sector map files from [HDDSuperClone](#) and [DDR Rescue](#).

To open, save or clean a sector map file for an object,

- * **Right-click the object and select Open Sector Map, Save Sector Map, or Clean Sector Map, respectively, on the context menu.**

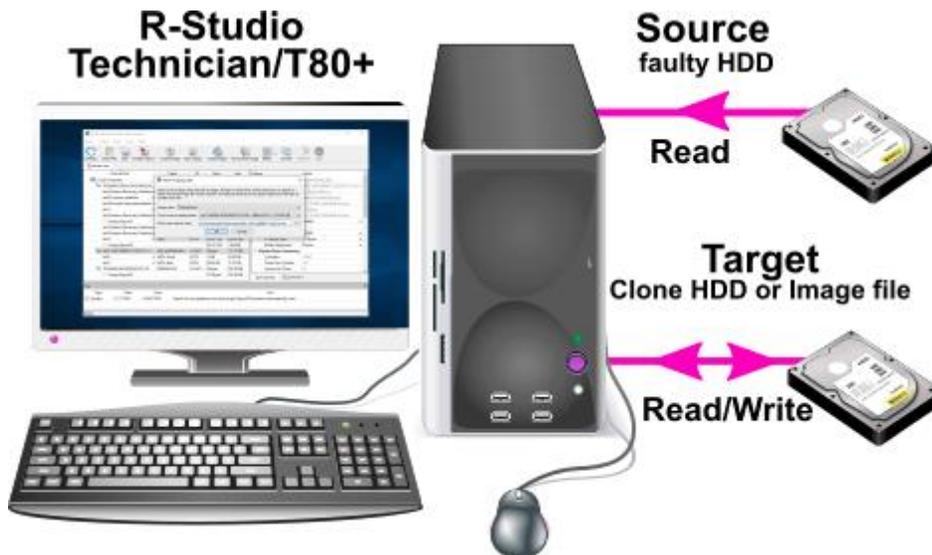
You may look at the graphical representation of the loaded sector map by starting **I/O Monitor**.

Sector Map



3.6 Runtime Imaging

Runtime imaging is [image](#) creation for a drive object performed simultaneously with other data read operations from this drive. When **R-Studio for Linux** reads data from a certain area of the source (a drive, [partition](#), or region), it writes the data to the target which can be either a dedicated drive or an image file. When the data from this area is needed again, **R-Studio for Linux** reads it from the target rather than the source thus reducing access to the source. This is very important for faulty or unstable drives which health may be constantly deteriorating during data recovery operations.

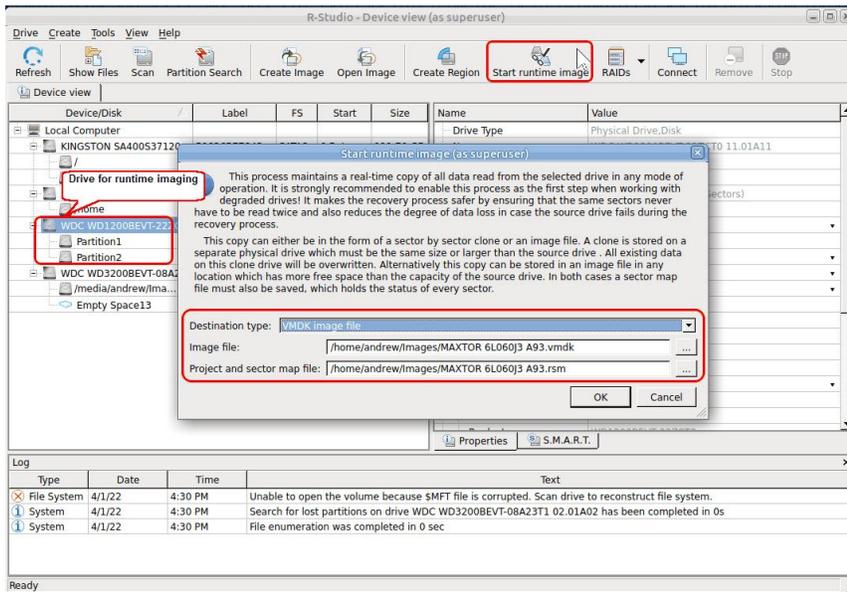


R-Studio for Linux also creates a [sector map file](#) during runtime imaging.

To start runtime imaging of an object,
using a plain image file

- 1 Select a drive object on the **R-Studio for Linux's** Drives panel and click the **Set Runtime Image** button, or right-click the object and select **Set Runtime Image** on the context menu.

Runtime imaging

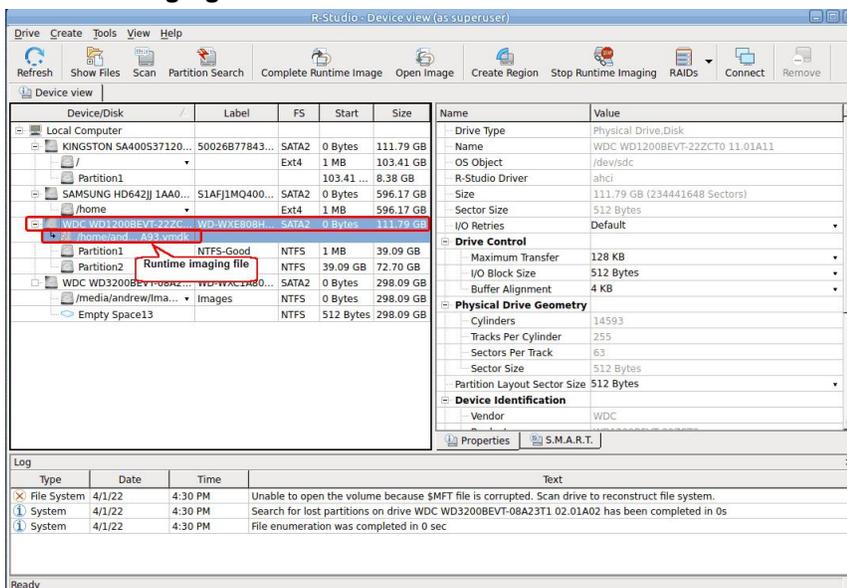


Select **Plain** or **another image type** in the **Image type** field, specify the file name and path for the image and sector map files, and click the **OK** button. Don't select the **VMDK image file** unless you can disable writing to the drive later. Cloning to a physical drive is not recommended because Windows can write some data to the drive corrupting the imaged data when the image has been completed and runtime imaging is over.

Plain image file requires immediate allocation of disk space equal to the object size, whereas **VMDK image file** is growing gradually upon imaging progress.

> R-Studio for Linux will turn on runtime imaging.

Runtime imaging

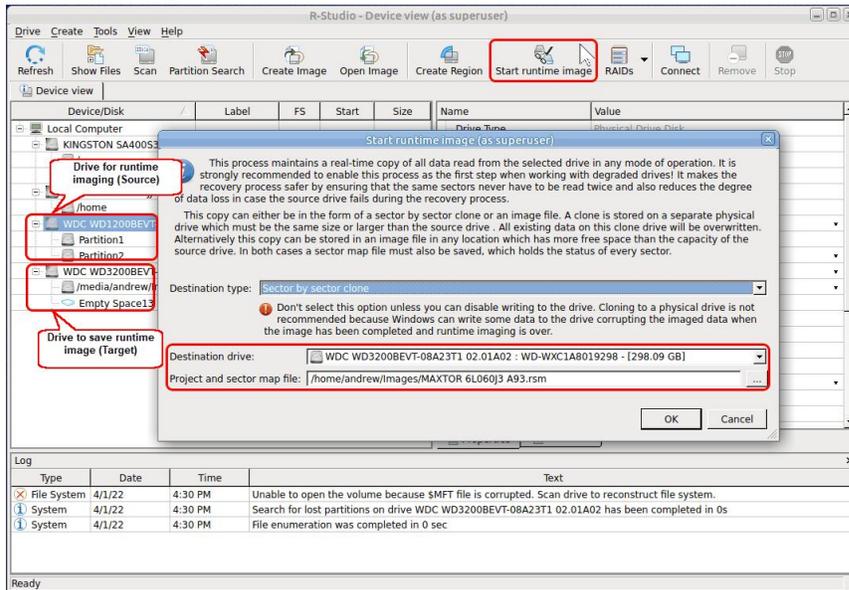


Select the object and click the **Stop Runtime Imaging** button or item in the context menu to turn runtime imaging off.

using a physical drive

- 1 Select a drive object on the R-Studio for Linux's Drives panel and click the **Set Runtime Image** button, or right-click the object and select **Set Runtime Image** on the context menu.

Runtime imaging

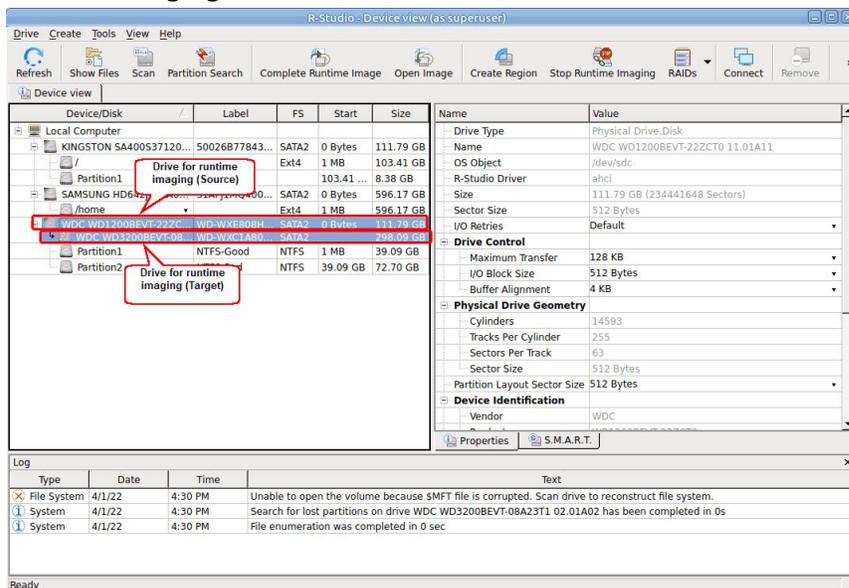


Select **Physical drive** in the **Image type** field, specify the name and path for the sector map file, and click the **OK** button.

Note: all data on the drive will be destroyed.

- > R-Studio for Linux will turn on runtime imaging.

Runtime imaging



Select the object and click the **Stop Runtime Imaging** button or item in the context menu to turn runtime imaging off.

R-Studio for Linux stores the information about runtime configurations and asks the users whether they want to keep runtime imaging or discard it during its startup.

Runtime imaging



and this configuration will appear in **R-Studio for Linux**.

Runtime imaging

Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G...	50026877843...	SATA2	0 Bytes	111.79 GB
/		Ext4	1 MB	103.41 GB
Partition1			103.41 ...	8.38 GB
SAMSUNG HD642JJ 1AA01...	S1AF1MQ400...	SATA2	0 Bytes	596.17 GB
/home		Ext4	1 MB	596.17 GB
WDC WD1200BEVT-22ZCT0...	WD-WXE808H...	SATA2	0 Bytes	111.79 GB
WDC WD3200BEVT-08...	WD-WXC1A80...	SATA2	0 Bytes	298.09 GB
Partition1	NTFS-Good	NTFS	1 MB	39.09 GB
Partition2	NTFS-Bad	NTFS	39.09 GB	72.70 GB

Completing Runtime Image

You may complete the runtime image without browsing through the entire file system on the disk.

- 1 Select the object being imaged and click the **Complete Runtime Image** button, or right-click the object and select **Complete Runtime Image** on the shortcut menu.

Runtime imaging

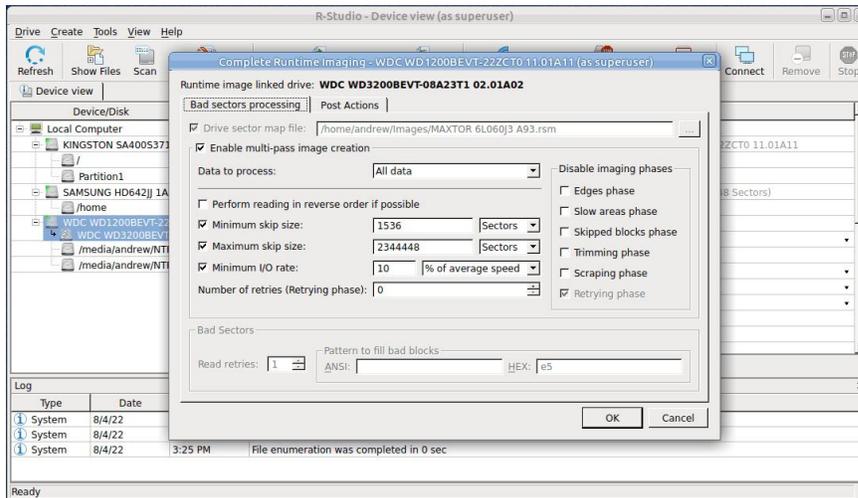
Device/Disk	Label	FS	Start	Size
Local Computer				
KINGSTON SA400S37120G...	50026877843...	SATA2	0 Bytes	111.79 GB
/		Ext4	1 MB	103.41 GB
Partition1			103.41 GB	8.38 GB
SAMSUNG HD642JJ 1AA01...	S1AF1MQ400...	SATA2	0 Bytes	596.17 GB
/home		Ext4	1 MB	596.17 GB
WDC WD1200BEVT-22ZCT0...	WD-WXE808H...	SATA2	0 Bytes	111.79 GB
WDC WD3200BEVT-08A23T1	WD-WXC1A801...	SATA2	0 Bytes	298.09 GB
/media/andrew/NTFS-G...	NTFS-Good	NTFS	1 MB	39.09 GB
/media/andrew/NTFS-Bad	NTFS-Bad	NTFS	39.09 GB	72.70 GB

Name	Value
Drive Type	Physical Drive.Disk
Name	WDC WD1200BEVT-22ZCT0 11.01A11
OS Object	/dev/sdc
R-Studio Driver	ahci
Size	111.79 GB (234441648 Sectors)
Logical Sector Size	512 Bytes
Physical Sector Size	512 Bytes
I/O Retries	Default
Drive Control	
Maximum Transfer	128 KB
I/O Block Size	512 Bytes
Buffer Alignment	4 KB
Physical Drive Geometry	
Cylinders	14593
Tracks Per Cylinder	255

Type	Date	Time	Text
System	8/4/22	3:24 PM	Search for lost partitions on drive WDC WD1200BEVT-22ZCT0 11.01A11 has been completed in 0s
System	8/4/22	3:25 PM	File enumeration was completed in 0 sec
System	8/4/22	3:25 PM	File enumeration was completed in 0 sec

- > **The Complete Runtime Imaging dialog box will appear.**

Runtime imaging

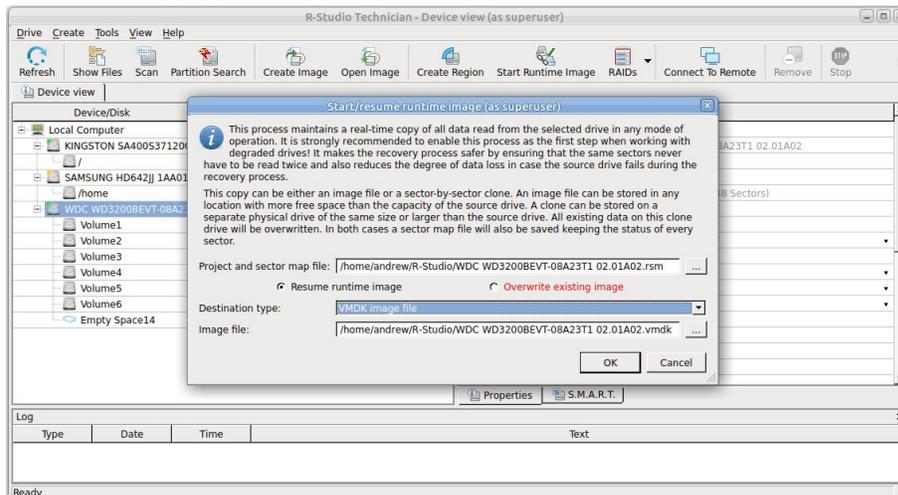


Select the necessary [parameters of multi-pass](#) imaging and select the **OK** button.

- > **R-Studio for Linux will complete the creation of the runtime image.**

If the runtime image has not been completed, you may resume it next time you start runtime imaging.

Runtime imaging

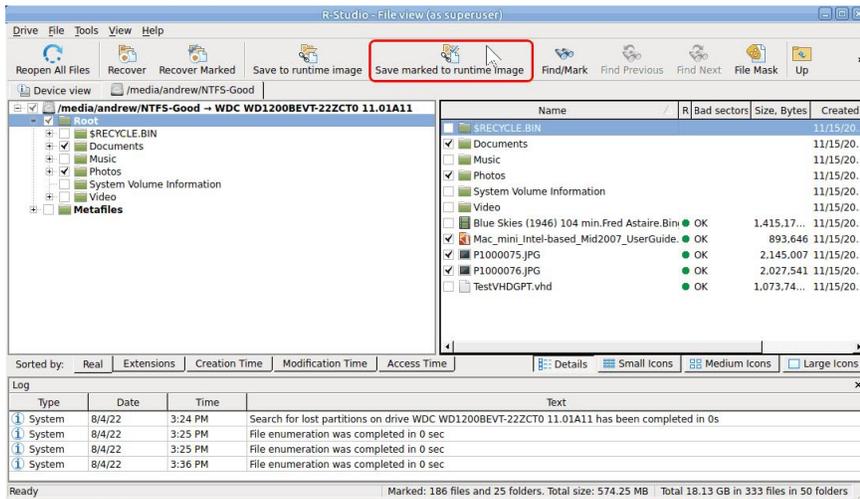


Creating runtime image for individual files

You may create a runtime image containing only individual files rather than all data on the disk.

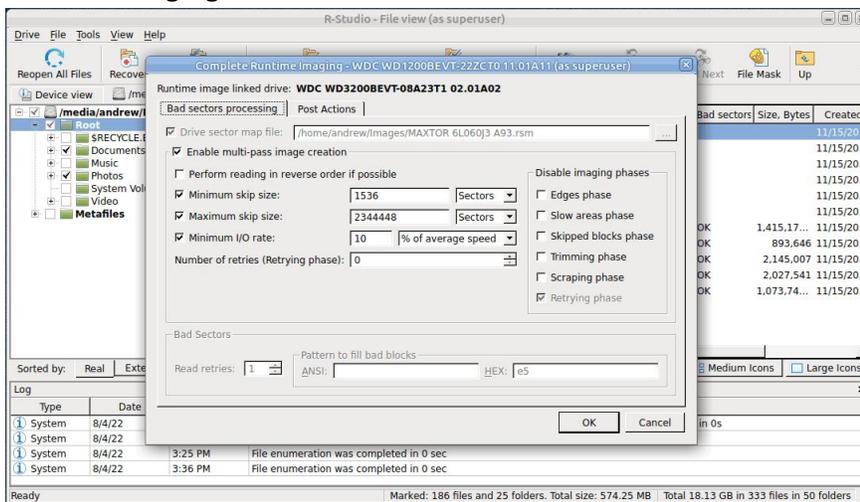
- 1 **Open the disk with the files, mark the files, and click the Save marked to runtime image button.**
or right-click on the right pane, and select **Complete Runtime Image** on the shortcut menu.

Runtime imaging



- > The Complete Runtime Imaging dialog box will appear.

Runtime imaging

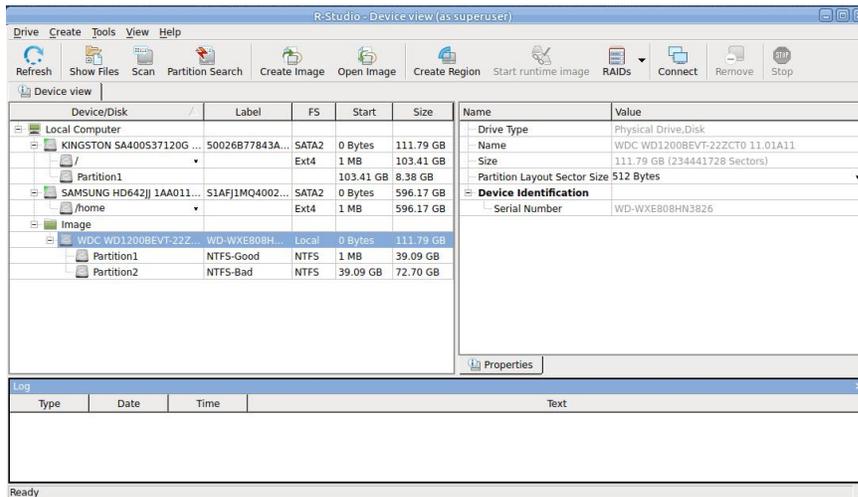


Select the necessary [parameters of multi-pass](#) imaging and select the **OK** button.

- > R-Studio for Linux will complete the creation of the runtime image. You may Skip files with [bad sectors](#) if necessary.

You may open such images as regular ones.

Runtime imaging



Such image contains information about the entire file system, but if a non-imaged file is opened, it'll contain only zeros.

3.7 Multi-pass Imaging

Multi-pass imaging is a process of [image](#) creation through several passes (phases). Each phase reads data from different areas of a hard drive, starting from areas with good sectors then going to slow sector areas and finishes with [bad sector](#) areas. This approach maximizes the amount of data that can be recovered from a failing drive and reduces its chances to fail during this process.

Phase 1. Copying most good data from the drive

In this phase, **R-Studio** reads data from drive by sector blocks, or groups of consecutive drive sectors read in one go. The phase is performed in several steps.

Step 1. R-Studio reads data from the drive until it runs into a block with bad or slow sector(s). Then it drops that block and jumps to another area until it finds a block with no bad or slow sectors. Then it continues reading data until it runs into another bad or slow block, and the process repeats. When this step is finished, most good data from the hard drive has been read, and **R-Studio** has detected the front blocks (edges) of bad and slow sector areas.

Step 2. R-Studio finds the rear edges of bad sector areas. It reads the skipped area from its rear end backwards until it runs into a block with a bad sector. Then **R-Studio** jumps to another bad sector area and the process is going on until all bad sector areas have been processed. When this step is finished, some good data from the hard drive has been read, and **R-Studio** has detected the rear edges of bad sector areas.

Step 3. R-Studio reads data from slow sector areas. It does that much the same way as for bad sector areas. When this step is finished, good data from slow sectors on the hard drive has been read, and **R-Studio** has detected the rear edges of slow sector areas.

Step 4. R-Studio finds the rear edges of bad sector areas in slow sector areas. When this step is finished, some new good data from slow sectors on the hard drive has been read, and **R-Studio** has detected the rear edges of all bad sectors within slow sector areas.

Step 5. R-Studio tries to read all skipped sector blocks. This is done without skipping bad sector blocks and checking read speed against minimum I/O rate.

When *Phase 1* is completed, **R-Studio** has read most of readable data and detected front and rear edges of all bad sector areas.

R-Studio tries to read the rest of data in the next phases, and does that sector by sector (rather than blocks).

Phase 2. Trimming

R-Studio detects the front and rear sectors of bad sector areas. When this step is finished, some new good data from bad sector areas has been read, and **R-Studio** has detected the front and rear sectors of all bad sector areas.

Phase 3. Scraping

R-Studio tries to read data from bad sector areas sector by sector.

Phase 4. Retrying (mostly optional)

R-Studio tries to read data from bad sectors through several attempts.

You may read more about this process in our article [Multi-pass imaging in R-Studio](#)

To create an image through multi-pass imaging,

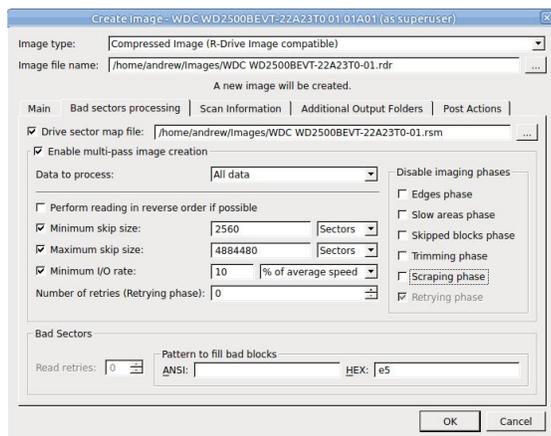
1 Select an object on the **R-Studio's** Drives panel and click the **Create Image** button

Other ways to create the image

- Select the object and select **Create Image** on the **Drive** menu
- or
- Right-click the selected object and select **Create Image File** on the context menu

2 Specify image options, a file name, and destination for the *image* on the **Create Image** dialog box and click the **OK** button

Create Image (Bad sector processing) dialog box



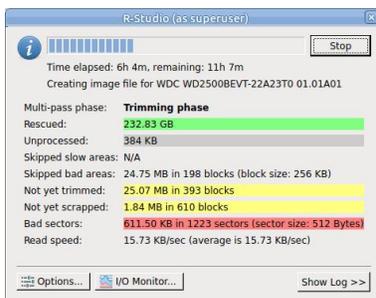
Bad sectors processing options

Image filename	Specifies the name and path for the image file
Image type:	Compressed image (R-Drive Image compatible): If this option is selected, R-Studio will create an image file which can be compressed, split into several parts, and

	<p>password-protected. This image file is fully compatible with the images created by R-Drive Image, but incompatible with the previous versions of R-Studio.</p> <p>Byte by byte image: If this option is selected, R-Studio will create a simple exact copy of the object.</p> <p>VMDK (ViMware Virtual Machine Disk) image: If this option is selected, R-Studio will create an image of the VMware virtual disk type. Available in the Corporate, Technician, and T80+ license.</p> <p>Some other image formats are also available in the Technician, and T80+ licenses. You may read more about these formats in the Supported Virtual Disk and Disk Image Formats page.</p>
Drive sector map file	A file with the sector map of the object to image. Optional for the RDI image type, mandatory for the byte-by-byte and VMDK image types.
Enable multi-pass image creation	Turns multi-pass imaging on and off.
Data to process	<p>All data: All data on the disk will be imaged.</p> <p>Existing files only (FS bitmap): Only the disk's area where existing files reside will be imaged.</p> <p>Unused clusters only: Only the disk's free space will be imaged.</p> <p>You may image the existing files first and then unused clusters.</p>
Perform reading in reverse order if possible	Switches the direction of all phases/steps to reverse.
Minimum skip size	Minimum size of drive area to skip when a bad sector is encountered.
Maximum skip size	Maximum size of drive area to skip when a bad sector is encountered.
Number of retries (Retrying phase)	The number of read attempts in the Retrying phase.
Disable imaging phases	Multi-imaging phases that can be skipped.

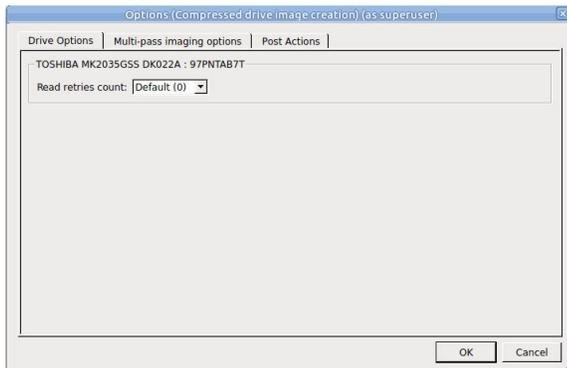
- > **R-Studio will start creating the image, the Progress message showing the progress.**

Multi-pass imaging progress dialog box

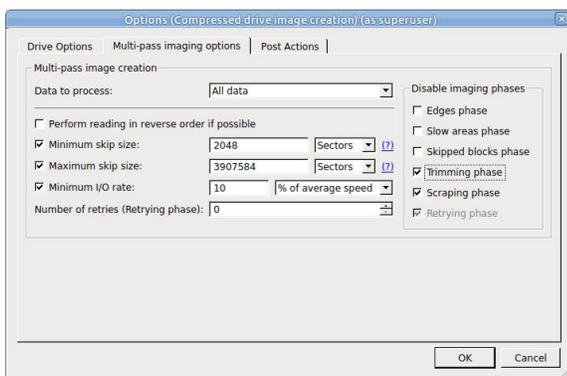


You may change operation parameters during image creation. Click the **Options** button and change them accordingly.

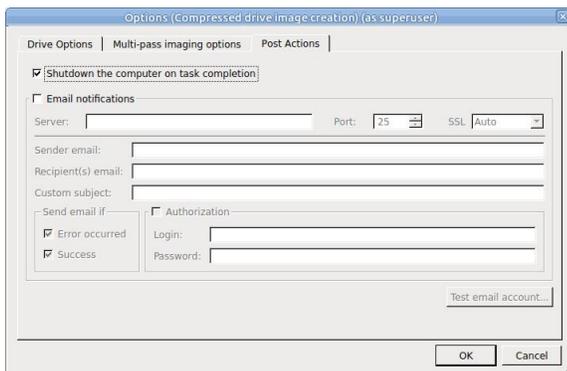
Drive Options tab



Multi-pass imaging options tab



Post Actions tab



3.8 Reverse RAIDs

Reverse RAID is a technique that is reverse to creating virtual RAID. When creating a reverse RAID, the data from a real object is decomposed into virtual parents. Then data on those virtual parents can be processed like on real objects. They can be viewed, edited, imaged, copied to physical drives, etc.

- [Reverse RAID of an Object](#)

This technique can be used to decompose data on a single volume into virtual parents. Then such virtual parents can be processed like on real objects. They can be viewed, edited, imaged, copied to physical drives, etc.

- [Reverse RAID of a RAID](#)

This technique can be used to re-construct data on individual RAID disks when data on physical disks is corrupted, but can be recovered using RAID redundancy. A missing disk is an example of this case. Or if there

are [bad sectors](#) scattered over the physical disks but the overall RAID integrity remains. Then the data can be copied to physical hard drives to create a healthy RAID.

Note: Many controllers write their own metadata to disks to recognize that the disks belong to certain RAID. Without that metadata they won't see those RAID. You have to write that metadata manually.

3.8.1 Reverse RAID of an Object

This technique can be used to decompose data on a single object into virtual parents. Then such virtual parents can be processed like on real objects. They can be viewed, edited, imaged, copied to physical drives, etc.

Suppose you have an [image](#) of a former RAID 6 (Reed-Solomon) and you want to re-create data on individual disks from that RAID 6. You can do that by creating a reverse RAID of an image.

Note: Many controllers write their own metadata to disks to recognize that the disks belong to certain RAID. Without that metadata they won't see those RAID. You have to write that metadata manually.

To create a reverse RAID of a disk image (or other disk object),

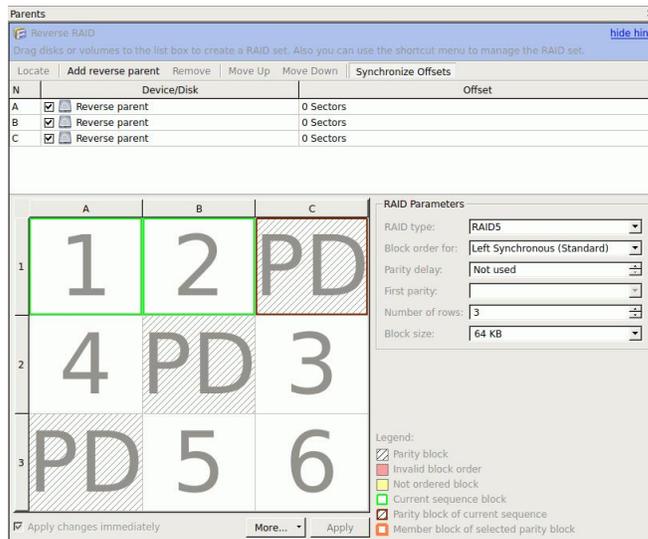
- 1 Right-click the disk object on the Drives panel and select Create Reverse RAID on the context menu.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
Image: /media/Backup II/Images/HDD ST38...				
ST380215A3.AAD	9RX2E6NG	#1 ATA (P...	0 Bytes	74.53 GB
Partition1	NTFS-Test	NTFS	32 KB	43.44 GB
Partition2	FAT32-TEST	FAT32	43.44 GB	29.03 GB
Partition3	FAT-TEST	FAT16	72.48 GB	2.01 GB
Empty Space19			74.49 GB	45.59 MB
IMicronUSB to ATA/ATAPI Bridge	222291759477	USB (5:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB

- > **The Reverse parents will appear on the Drives panel**

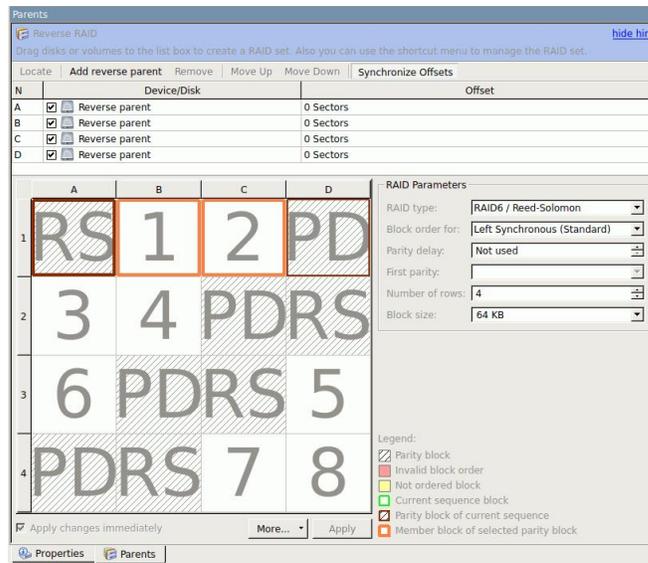
Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD5721010CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PT0J1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
Image: /media/Backup II/Images/HDD ST38...				
ST380215A3.AAD	9RX2E6NG	#1 ATA (P...	0 Bytes	74.53 GB
Reverse RAID				
Reverse parent #A				37.27 GB
Reverse parent #B				37.27 GB
Reverse parent #C				37.27 GB
Partition1	NTFS-Test	NTFS	32 KB	43.44 GB
Partition2	FAT32-TEST	FAT32	43.44 GB	29.03 GB
Partition3	FAT-TEST	FAT16	72.48 GB	2.01 GB
Empty Space19			74.49 GB	45.59 MB
IMicronUSB to ATA/ATAPI Bridge	222291759477	USB (5:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB

Initially, the reverse RAID is set to its default values as RAID 5 on the Parents tab.



2 Adjust RAID parameters on the Parents tab, as necessary.

You need to add one reverse parent, change RAID type, and adjust RAID offset .



> Process the appeared reverse parents on the Drives panel as real objects.

These parents can be imaged, viewed/edited, etc.

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HD572101CLA332JP40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
/media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811AS3.AAE	6PTQ1FH	SATA	0 Bytes	111.79 GB
/		Ext4	1 MB	37.25 GB
Partition2			37.25 GB	2.79 GB
/home		Ext4	40.05 GB	71.74 GB
Image: /media/Backup II/Images/HDD ST38...				
ST380215A3.AAD	9RX2E6NG	#1 ATA (...)	0 Bytes	74.53 GB
Reverse RAID				
Reverse parent #A				37.27 GB
Reverse parent #B				37.27 GB
Reverse parent #C				37.27 GB
Reverse parent #D				37.27 GB
Partition1	NTFS-Test	NTFS	32 KB	43.44 GB
Partition2	FAT32-TEST	FAT32	43.44 GB	29.03 GB
Partition3	FAT-TEST	FAT16	72.48 GB	2.01 GB
Empty Space19			74.49 GB	45.59 MB
/MicronUSB to ATA/ATAPI Bridge	222291759477	USB (5:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
/media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB

3.8.2 Reverse RAID of a RAID

This technique can be used to re-construct data on individual RAID disks when data on physical disks is corrupted, but can be recovered using RAID redundancy.

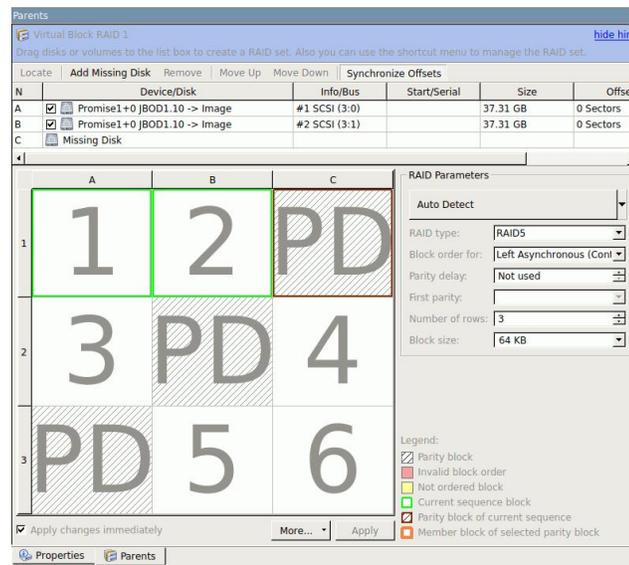
Suppose you have a RAID 5 with one missing hard drive and you need to reconstruct data on that disk. You can do that by creating a reverse RAID for it and then copy data from that missing disk to a real one, or to an [image](#).

Note: Many controllers write their own metadata to disks to recognize that the disks belong to certain RAID. Without that metadata they won't see those RAID. You have to write that metadata manually.

To create a reverse RAID of a RAID with a missing disk,

1 Create a virtual RAID 5 of the existing hard drives or their images

Add a missing disk to the Parents tab.



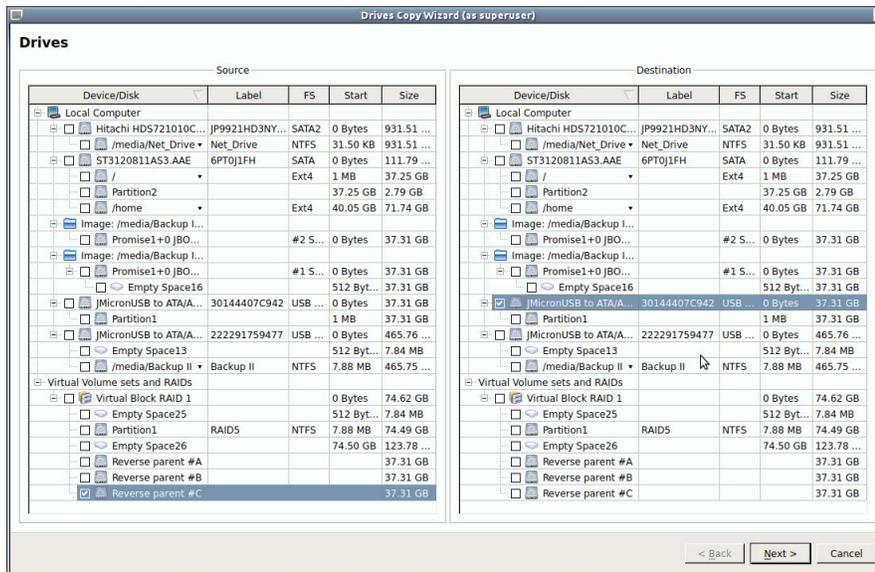
If necessary, read the [Basic RAID 4 and RAID 5 Operations](#) and [Volumes Sets and RAID](#)s help pages for details.

2 Right-click the Virtual Block Raid on the Drives panel and select Create Reverse RAID on the context menu.

> The Reverse parents will appear on the Drives panel

Device/Disk	Label	FS	Start	Size
Local Computer				
Hitachi HDS721010CLA332P40A3MA	JP9921HD3NYKWH	SATA2	0 Bytes	931.51 GB
media/Net_Drive	Net_Drive	NTFS	31.50 KB	931.51 GB
ST3120811A53.AAE	6PT0JLFH	SATA	0 Bytes	111.79 GB
Partition2		Ext4	1 MB	37.25 GB
home		Ext4	37.25 GB	2.79 GB
Image: /media/Backup II/RAID5/RAID5Disk2....		Ext4	40.05 GB	71.74 GB
Image: /media/Backup II/RAID5/RAID5Disk1....				
Promise1+0 JBOD1.10	#2 SCSI (...)		0 Bytes	37.31 GB
Promise1+0 JBOD1.10	#1 SCSI (...)		0 Bytes	37.31 GB
Empty Space16			512 Bytes	37.31 GB
IMicronUSB to ATA/ATAPI Bridge	222291759477	USB (5:0)	0 Bytes	465.76 GB
Empty Space13			512 Bytes	7.84 MB
media/Backup II	Backup II	NTFS	7.88 MB	465.75 GB
Virtual Volume sets and RAID				
Virtual Block RAID 1			0 Bytes	74.62 GB
Empty Space25			512 Bytes	7.84 MB
Partition1	RAID5	NTFS	7.88 MB	74.49 GB
Empty Space26			74.50 GB	123.78 MB
Reverse parent #A				37.31 GB
Reverse parent #B				37.31 GB
Reverse parent #C				37.31 GB

These parents may be processed as real objects, they can be imaged, viewed/edited. For your case the missing disk can be copied to a hard drive in the Drive Copy Wizard.



Note: The reverse parents contain the data that should be on the RAID parents, according to its layout, while RAID parents contain actual data, that may be corrupted.

3.9 Working with the Third-Party Hardware

The Technician version of **R-Studio for Linux** can work together with third-party hardware developed for in-depth data recovery. Currently, the following devices are supported:

- [HDDSuperClone](#)
- [DeepSpar Disk Imager™](#)

3.9.1 DeepSpar Disk Imager™

Currently only the Windows version of **R-Studio** can work with **DeepSpar Disk Imager™** directly. **R-Studio for Linux** versions for Mac and Linux can load and process its images.

DeepSpar Disk Imager™ (DDI) is an HDD imaging device specifically built for data recovery from hard drives with hardware issues. It greatly increases imaging speed, accuracy, and integrity of data retrieved from such drives.

The main features that **DDI** provides when working with hard drives are the following:

- Direct low-level access to a hard drive bypassing the computers BIOS.
- Disabling specific drive read/write heads.
- Disable SMART subsystem, Bad Sector Reallocation, and Read Look-Ahead
- Read sector timeout controlled by Software/Hardware/PHY drive reset commands
- Bit level analysis of corrupted data to filter out the read-write channel noise
- Fully customizable multi-pass imaging

And many more others an advanced disk imager must have. You may learn more about **DDI** on its vendor site: [DeepSpar Disk Imager™](#).

Viewing the drive map

A drive map shows the conditions for individual disk sectors. You may see which sectors are OK, bad, or unstable.

To view the drive map,

- * **Right-click the required hard drive/partition and select Show drive map... on the context menu,**
- > **The drive map will appear in the right tab.**

▣ Drive map controls

Sectors	The number of the first sector in the row.
Offset	Offset in the data. Enter the address you want to jump to and press the Enter key.
Sectors/Bytes/KB...	Specifies the dimension of the data in the Offset field.
Previous/Next	Moves to the previous/next part of the data.
+/-	Zooms into/out of, the data.

To see more detailed information about a particular sector range, right click the corresponding rectangle and select **Information** on the context menu.

Click the **Open in Hex Editor** button to open the selected block in the [Text/Hexadecimal editor](#).

Viewing the file map

A file map shows the conditions for individual file sectors. You may see which sectors are OK, bad, or unstable.

To view the file map,

- * **Right-click the required file and select Map of file... on the context menu,**
- > **The file map will appear in the lower pane.**

▣ File map controls

Sectors	The number of the first sector in the row.
Offset	Offset in the data. Enter the address you want to jump to and press the Enter key.
Sectors/Bytes/KB...	Specifies the dimension of the data in the Offset field.
Previous/Next	Moves to the previous/next part of the data.
+/-	Zooms into/out of, the data.

To see more detailed information about a particular sector range, right click the corresponding rectangle and select **Information** on the context menu.

Click the **Open in Hex Editor** button to open the selected block in the [Text/Hexadecimal editor](#).

3.9.2 HDDSuperClone

[HDDSuperClone](#) from SD Computing Service is a software solution for disk imaging, cloning, and data extraction tasks. It's specifically designed to work with unstable, faulty, or dying hard drives. It uses several advanced techniques to extract data from hard drives with [bad sectors](#) and other hardware issues while doing everything possible to avoid inflicting even more damage on the drive being processed.

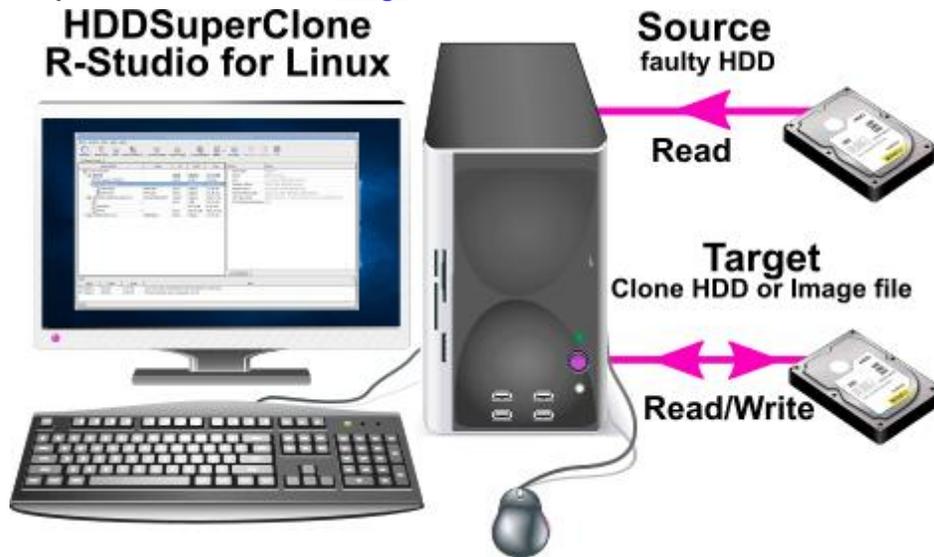
It has two modes of operations:

1. The disk cloning/imaging mode: It simply copies data from one disk (the source) to another disk or a file (the target). It also creates a disk map file (the log) that specifies the sectors that cannot be read (the bad sectors). Such data may be processed by a third-party data recovery program. This mode is available in both free and commercial versions, with some small limitations for the former.

2. A virtual drive mode (the commercial version only): In this mode, **HDDSuperClone** installs a special driver that creates a virtual drive from the disk. This virtual drive becomes accessible to the host OS and other programs.

To work with the HDDSuperClone in the virtual drive mode,

- 1 Connect the source drive and the target drive if such drive is necessary. If the source drive is small, it's possible to use a disk [image](#) file rather than another hard drive.



- 2 Run HDDSuperClone and create a new project. Next, install the virtual driver before connecting the source and target.

As the source drive is small, the target may be an image file in our case. Select the necessary **Virtual Mode** and click the **Start** button.

HDDSuperClone connected to the source drive

HDDSuperClone 2.2.22_20210207 (as superuser)			
File Mode Drives Settings Tools Help			
Connect	Project: /home/andrew/Public/HDDSuperClone/ST38081		
Disconnect	Domain: /home/andrew/Public/HDDSuperClone/ST38081.domain		
Start	Destination (All data will be overwritten!): /home/andrew/Public/HDDSuperClone/ST38081 (.)		
Stop	Source: /dev/sdb (ST380817AS, 4MR29A6X)		
SMART	Total LBA: 156301488 (80.03GB) LBA to read: 156301488 (80.03GB) Domain size: 7147344 (3.66GB)		
Analyze	Current position: 7147224 (3.66GB) Current status: Reading: Phase 4 Clone/Driver Mode: Mode 3		
Extended Analyze	Run time: 0:00:02:46 Remaining time: 0:00:24:32 Current / Recent / Longest: 7 ms / 7 ms / 22 ms		
Clone Mode	Current rate: 51 MB/s Recent rate: 51 MB/s Total rate: 51 MB/s		
Slow Driver	Last read size: 8, 200, 128 Retried: Remaining retry passes		
Virtual Mode 1	Finished: 7147344 (3.66GB) (3 / 4.572793%) Non-tried: 149154144 (76.37GB) (2 / 95.427208%)		
Virtual Mode 2	Non-trimmed: 0 (0.00GB) (0 / 0.000000%) Non-divided: 0 (0.00GB) (0 / 0.000000%)		
Virtual Mode 3	Non-scraped: 0 (0.00GB) (0 / 0.000000%) Bad: 0 (0.00GB) (0 / 0.000000%)		
Virtual Mode 4	Skips: 0 Skip runs: 0 Skip resets: 0		
Virtual Mode 5	Base skip size: 4096 (2.10MB) Last run size: 0 (0.00MB) Slow skips: 0		
Soft Reset	Data preview: 87 7e fb 32 99 06 12 c7 f9 0b 82 07 fc c5 c4 0f ...2.....		
Hard Reset	06 00 df 17 d5 40 c1 08 18 49 f2 b9 cb 02 0e 66@!.....f		
Activate	2c 73 c2 25 44 f8 d7 e2 5a e0 29 8d 8d 91 09 0f, s.%D...Z.).....		
Deactivate	BSY DRDY DF DSC DRQ CORR IDX ERR BBR UNC MC IDNF MCR ABRT TKONF AMNF		

You may read more about installing the driver and configuring **HDDSuperClone** in its documentation: [HDDSuperClone User Manual](#).

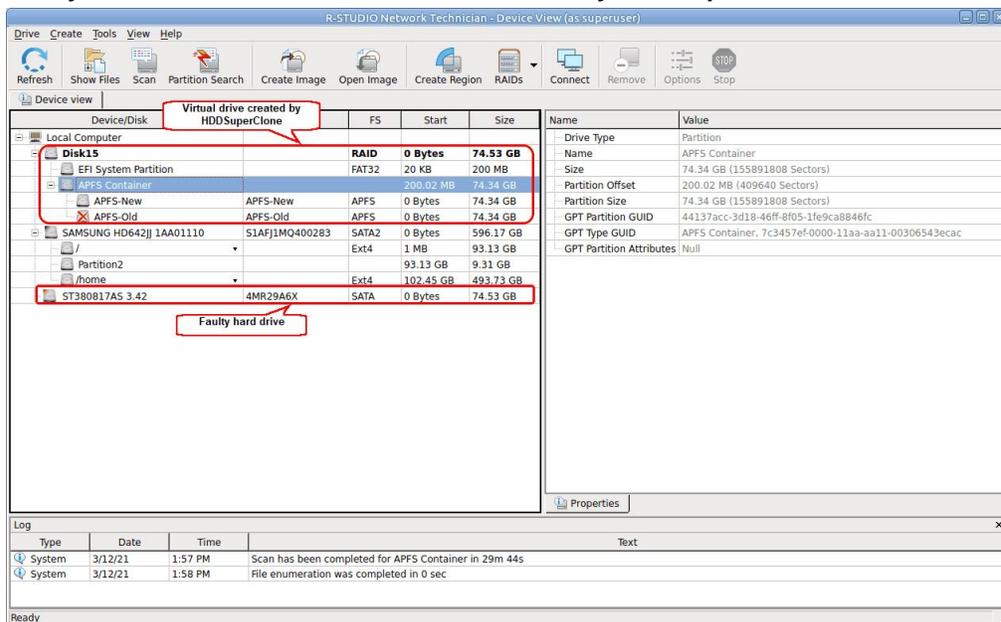
> A virtual drive will appear in the system

Virtual drive created by HDDSuperClone



And in the Main Panel of R-Studio for Linux

Faulty hard drive and its virtual drive created by HDDSuperClone



You may work with this virtual drive as it is a real physical drive.

You may read more about working with **HDDSuperClone** in our article [Joint work of R-Studio and HDDSuperClone](#).

3.10 Forensic Mode

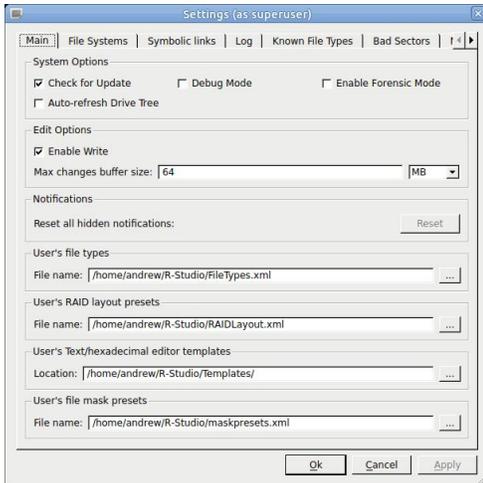
Note: This feature is available for the Technician version of **R-Studio for Linux** only!

When this mode is enabled, **R-Studio for Linux** will generate a [forensic](#) data collection audit log that can be presented at court hearings. This log includes information about a hardware configuration on which the forensic data collection takes place and MD5 for recovered files.

Note: A new log will be generated each time the hardware configuration is changed (a hard drive is connected/disconnected, an external USB device is connected/disconnected, etc)

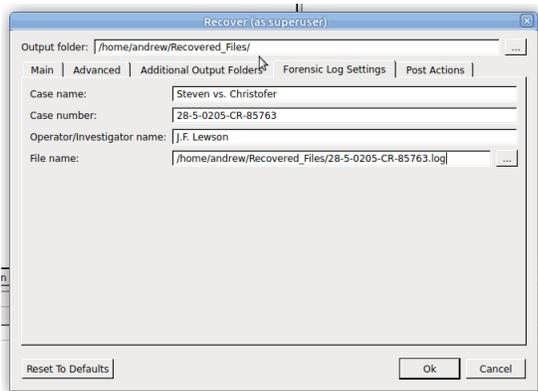
To enable this feature,

- * Select **Enable Forensic Mode** on the **Main** tab of the [Settings](#) dialog box.



The Forensic Log tab will appear on the Recover dialog box.

Forensic Log tab



Enter the required information on this tab and then go to the other tabs of the [Recovery](#) dialog box.

While file recovery, **R-Studio** will create forensic data collection audit log in the specified folder. Below is an example of such log.

```
***** Forensic Data Collection Audit Log
*****
```

R-Studio

```
***** Drives Information
*****
```

```
- Drive Number 0 -----
* Drive Type [256 bytes]: Computer,Local Computer
* Name [30 bytes]: Local Computer
* OS [152 bytes]: Linux 5.15.0-43-generic #46~20.04.1-Ubuntu SMP Thu Jul 14 15:20:17
UTC 2022
* System [132 bytes]: 4 x Intel(R) Core(TM) i3 CPU 530 @ 2.93GHz, 1200 MHz, 3747 MB
RAM
```

```
- Drive Number 1 -----
* Drive Type [256 bytes]: Physical Drive,Disk
* Name [62 bytes]: KINGSTON SA400S37120G 03090005
* OS Object [18 bytes]: /dev/sda
* R-Studio Driver [10 bytes]: ahci
* Size [8 bytes]: 111.7GB (234441648 sec)
* Logical Sector Size [4 bytes]: 512B
* Physical Sector Size [4 bytes]: 4KB
# I/O Retries [4 bytes]: Default
+ Drive Control [8 bytes]:
  # Maximum Transfer [4 bytes]: 131072
  # I/O Block Size [4 bytes]: 4096
  # Buffer Alignment [4 bytes]: 4096
+ Physical Drive Geometry [8 bytes]:
  * Cylinders [8 bytes]: 14593
  * Tracks Per Cylinder [4 bytes]: 255
  * Sectors Per Track [4 bytes]: 63
  * Sector Size [4 bytes]: 512B
# Partition Layout Sector Size [4 bytes]: 512B
+ Device Identification [8 bytes]:
  * Vendor [32 bytes]: KINGSTON
  * Product [64 bytes]: SA400S37120G
  * Firmware [16 bytes]: 03090005
  * Serial Number [32 bytes]: 50026B77843A5628
+ IDE Properties [8 bytes]:
  * Size [48 bytes]: 111.7GB (234441648 LBA)
  * Sector Size [8 bytes]: 512
  * Device Type [8 bytes]: SSD
  * Interface [38 bytes]: SATA 3.2, 6.0 Gb/s
  * Interface Speed [18 bytes]: 3.0 Gb/s
  * Standard [12 bytes]: ACS-3
  * Features [70 bytes]: S.M.A.R.T., APM-, LBA48, NCQ, TRIM
* Bus Type [4 bytes]: SerialATA-II

- Drive Number 2 -----
* Drive Type [256 bytes]: Physical Drive,Disk
* Name [50 bytes]: SAMSUNG HD642JJ 1AA01110
* OS Object [18 bytes]: /dev/sdb
* R-Studio Driver [10 bytes]: ahci
* Size [8 bytes]: 596.1GB (1250263728 sec)
* Logical Sector Size [4 bytes]: 512B
* Physical Sector Size [4 bytes]: 512B
# I/O Retries [4 bytes]: Default
+ Drive Control [8 bytes]:
  # Maximum Transfer [4 bytes]: 131072
  # I/O Block Size [4 bytes]: 512
  # Buffer Alignment [4 bytes]: 4096
+ Physical Drive Geometry [8 bytes]:
  * Cylinders [8 bytes]: 77825
  * Tracks Per Cylinder [4 bytes]: 255
  * Sectors Per Track [4 bytes]: 63
  * Sector Size [4 bytes]: 512B
```

```
# Partition Layout Sector Size [4 bytes]: 512B
+ Device Identification [8 bytes]:
  * Vendor [32 bytes]: SAMSUNG
  * Product [64 bytes]: HD642JJ
  * Firmware [16 bytes]: 1AA01110
  * Serial Number [32 bytes]: S1AFJ1MQ400283
+ IDE Properties [8 bytes]:
  * Size [50 bytes]: 596.1GB (1250263728 LBA)
  * Sector Size [8 bytes]: 512
  * Standard [24 bytes]: ATA/ATAPI-7
  * Features [70 bytes]: S.M.A.R.T., APM-, AAM-, LBA48, NCQ
* Bus Type [4 bytes]: SerialATA-II

- Drive Number 3 -----
* Drive Type [256 bytes]: Physical Drive,Disk
* Name [66 bytes]: Hitachi HTS545016B9SA00 PBBOC64G
* OS Object [18 bytes]: /dev/sdc
* R-Studio Driver [10 bytes]: ahci
* Size [8 bytes]: 149GB (312581808 sec)
* Logical Sector Size [4 bytes]: 512B
* Physical Sector Size [4 bytes]: 512B
# I/O Retries [4 bytes]: Default
+ Drive Control [8 bytes]:
  # Maximum Transfer [4 bytes]: 131072
  # I/O Block Size [4 bytes]: 512
  # Buffer Alignment [4 bytes]: 4096
+ Physical Drive Geometry [8 bytes]:
  * Cylinders [8 bytes]: 19457
  * Tracks Per Cylinder [4 bytes]: 255
  * Sectors Per Track [4 bytes]: 63
  * Sector Size [4 bytes]: 512B
# Partition Layout Sector Size [4 bytes]: 512B
+ Device Identification [8 bytes]:
  * Vendor [32 bytes]: Hitachi
  * Product [64 bytes]: HTS545016B9SA00
  * Firmware [16 bytes]: PBBOC64G
  * Serial Number [32 bytes]: 100713PBPB08ECE4XSOF
+ IDE Properties [8 bytes]:
  * Size [44 bytes]: 149GB (312581808 LBA)
  * Sector Size [8 bytes]: 512
  * Device Type [36 bytes]: HDD 2.5" 5400 RPM
  * Interface [38 bytes]: SATA 2.6, 1.5 Gb/s
  * Standard [18 bytes]: ATA8-ACS
  * Features [66 bytes]: S.M.A.R.T., APM, AAM, LBA48, NCQ
* Bus Type [4 bytes]: SerialATA-II

- Drive Number 4 -----
* Drive Type [256 bytes]: Volume,Disk
* Name [4 bytes]: /
* Mount Points [4 bytes]: /
* OS Object [20 bytes]: /dev/sda2
* Size [8 bytes]: 103.4GB (216860672 sec)
* Logical Sector Size [4 bytes]: 512B
```

```

* Partition Offset [8 bytes]: 1MB (2048 sec)
* Partition Size [8 bytes]: 103.4GB (216860672 sec)
+ Ext2/Ext3/Ext4 Information [8 bytes]:
# FS Character Set [4 bytes]: Utf8
* Block Size [4 bytes]: 4KB (8 sec)
* First SuperBlock Offset [4 bytes]: 1KB (2 sec)
* Blocks Per Volume [8 bytes]: 27107584
* INodes Per Volume [4 bytes]: 6782976
* Creator OS [4 bytes]: Linux
* Major Version [4 bytes]: 1
* Minor Version [2 bytes]: 0
* Last Mount Time [8 bytes]: 5.8.2022 18:54:4
* Last Write Time [8 bytes]: 5.8.2022 18:54:3
* Last Check Time [8 bytes]: 12.7.2022 15:43:7
* Volume Size [8 bytes]: 103.4GB (216860672 sec)
# I/O Retries [4 bytes]: Default
+ Drive Control [8 bytes]:
# Maximum Transfer [4 bytes]: 131072
# I/O Block Size [4 bytes]: 512
# Buffer Alignment [4 bytes]: 4096
+ Physical Drive Geometry [8 bytes]:
* Cylinders [8 bytes]: 13498
* Tracks Per Cylinder [4 bytes]: 255
* Sectors Per Track [4 bytes]: 63
* Sector Size [4 bytes]: 512B

- Drive Number 5 -----
* Drive Type [256 bytes]: Volume,Disk
* Name [12 bytes]: /home
* Mount Points [12 bytes]: /home
* OS Object [20 bytes]: /dev/sdb1
* Size [8 bytes]: 596.1GB (1250260992 sec)
* Logical Sector Size [4 bytes]: 512B
* Partition Offset [8 bytes]: 1MB (2048 sec)
* Partition Size [8 bytes]: 596.1GB (1250260992 sec)
+ Ext2/Ext3/Ext4 Information [8 bytes]:
# FS Character Set [4 bytes]: Utf8
* Block Size [4 bytes]: 4KB (8 sec)
* First SuperBlock Offset [4 bytes]: 1KB (2 sec)
* Blocks Per Volume [8 bytes]: 156282624
* INodes Per Volume [4 bytes]: 39075840
* Creator OS [4 bytes]: Linux
* Major Version [4 bytes]: 1
* Minor Version [2 bytes]: 0
* Last Mount Time [8 bytes]: 5.8.2022 18:54:14
* Last Write Time [8 bytes]: 5.8.2022 18:54:14
* Last Check Time [8 bytes]: 6.2.2022 12:42:58
* Volume Size [8 bytes]: 596.1GB (1250260992 sec)
# I/O Retries [4 bytes]: Default
+ Drive Control [8 bytes]:
# Maximum Transfer [4 bytes]: 131072
# I/O Block Size [4 bytes]: 512
# Buffer Alignment [4 bytes]: 4096

```

```
+ Physical Drive Geometry [8 bytes]:
* Cylinders [8 bytes]: 77825
* Tracks Per Cylinder [4 bytes]: 255
* Sectors Per Track [4 bytes]: 63
* Sector Size [4 bytes]: 512B

- Drive Number 6 -----
* Drive Type [256 bytes]: Partition,Primary
* Name [22 bytes]: Partition1
* Size [8 bytes]: 8.38GB (17577984 sec)
* Partition Offset [8 bytes]: 103.4GB (216862720 sec)
* Partition Size [8 bytes]: 8.38GB (17577984 sec)
* Partition Type [256 bytes]: Linux (swap) (0x82)

- Drive Number 7 -----
* Drive Type [256 bytes]: Partition,Active
* Name [22 bytes]: Partition2
* Mount Points [4 bytes]: /
* Size [8 bytes]: 103.4GB (216860672 sec)
* Partition Offset [8 bytes]: 1MB (2048 sec)
* Partition Size [8 bytes]: 103.4GB (216860672 sec)
* Partition Type [256 bytes]: Ext2FS/XIAFS (0x83)
+ Ext2/Ext3/Ext4 Information [8 bytes]:
# FS Character Set [4 bytes]: Utf8
* Block Size [4 bytes]: 4KB (8 sec)
* First SuperBlock Offset [4 bytes]: 1KB (2 sec)
* Blocks Per Volume [8 bytes]: 27107584
* INodes Per Volume [4 bytes]: 6782976
* Creator OS [4 bytes]: Linux
* Major Version [4 bytes]: 1
* Minor Version [2 bytes]: 0
* Last Mount Time [8 bytes]: 5.8.2022 18:49:39
* Last Write Time [8 bytes]: 5.8.2022 18:54:3
* Last Check Time [8 bytes]: 12.7.2022 15:43:7
* Volume Size [8 bytes]: 103.4GB (216860672 sec)

- Drive Number 8 -----
* Drive Type [256 bytes]: Partition,Primary
* Name [22 bytes]: Partition1
* Mount Points [12 bytes]: /home
* Size [8 bytes]: 596.1GB (1250260992 sec)
* Partition Offset [8 bytes]: 1MB (2048 sec)
* Partition Size [8 bytes]: 596.1GB (1250260992 sec)
* Partition Type [256 bytes]: Ext2FS/XIAFS (0x83)
+ Ext2/Ext3/Ext4 Information [8 bytes]:
# FS Character Set [4 bytes]: Utf8
* Block Size [4 bytes]: 4KB (8 sec)
* First SuperBlock Offset [4 bytes]: 1KB (2 sec)
* Blocks Per Volume [8 bytes]: 156282624
* INodes Per Volume [4 bytes]: 39075840
* Creator OS [4 bytes]: Linux
* Major Version [4 bytes]: 1
* Minor Version [2 bytes]: 0
```

```
* Last Mount Time [8 bytes]: 5.8.2022 18:54:14
* Last Write Time [8 bytes]: 5.8.2022 18:54:14
* Last Check Time [8 bytes]: 6.2.2022 12:42:58
* Volume Size [8 bytes]: 596.1GB (1250260992 sec)

- Drive Number 9 -----
* Drive Type [256 bytes]: Partition,Primary
* Name [22 bytes]: Partition1
* Size [8 bytes]: 52GB (109121536 sec)
* Partition Offset [8 bytes]: 512KB (1024 sec)
* Partition Size [8 bytes]: 52GB (109121536 sec)
* Partition Type [256 bytes]: NTFS/HPFS/exFAT (0x7)
+ NTFS Information [8 bytes]:
  * Cluster Size [4 bytes]: 2KB (4 sec)
  * MFT Record Size [4 bytes]: 1KB
  * MFT Position [8 bytes]: 12KB (24 sec)
  * MFT Mirror Position [8 bytes]: 302KB (604 sec)
  * Index Block Size [4 bytes]: 4KB
  * Sector Size [4 bytes]: 512B
  * Volume Size [8 bytes]: 52GB (109121535 sec)

- Drive Number 10 -----
* Drive Type [256 bytes]: Partition,Primary
* Name [22 bytes]: Partition2
* Size [8 bytes]: 36.7GB (77139794 sec)
* Partition Offset [8 bytes]: 52GB (109126110 sec)
* Partition Size [8 bytes]: 36.7GB (77139794 sec)
* Partition Type [256 bytes]: FAT32 (0xb)
+ FAT Information [8 bytes]:
  * FAT Bits (12,16,32) [4 bytes]: 32
  * Cluster Size [4 bytes]: 4KB (8 sec)
  * First Cluster Offset [8 bytes]: 73.4MB (150392 sec)
  * Root Directory Cluster [4 bytes]: 2
  * First FAT Offset [8 bytes]: 19KB (38 sec)
  * Size of One FAT Table [8 bytes]: 36.7MB (75185 sec)
  * Number of FAT Copies [4 bytes]: 2
  # Active FAT copy [4 bytes]: Auto
  * Sector Size [4 bytes]: 512B
  * Major Version [1 bytes]: 0
  * Minor Version [1 bytes]: 0
  * Volume Size [8 bytes]: 36.7GB (77139794 sec)

- Drive Number 11 -----
* Drive Type [256 bytes]: Partition,Primary
* Name [22 bytes]: Partition3
* Size [8 bytes]: 2GB (4210688 sec)
* Partition Offset [8 bytes]: 88.8GB (186265904 sec)
* Partition Size [8 bytes]: 2GB (4210688 sec)
* Partition Type [256 bytes]: FAT16 (big) (0x6)
+ FAT Information [8 bytes]:
  * FAT Bits (12,16,32) [4 bytes]: 16
  * Cluster Size [4 bytes]: 32KB (64 sec)
  * First Cluster Offset [8 bytes]: 209KB (418 sec)
```

```
* Root Directory Offset [8 bytes]: 263168
* Root Directory Length [4 bytes]: 16KB
* First FAT Offset [8 bytes]: 1KB (2 sec)
* Size of One FAT Table [8 bytes]: 128KB (256 sec)
* Number of FAT Copies [4 bytes]: 2
# Active FAT copy [4 bytes]: Auto
* Sector Size [4 bytes]: 512B
* Major Version [1 bytes]: 0
* Minor Version [1 bytes]: 0
* Volume Size [8 bytes]: 1.99GB (4193698 sec)

- Drive Number 12 -----
* Drive Type [256 bytes]: Partition,Logical
* Name [22 bytes]: Partition4
* Size [8 bytes]: 11.7GB (24576000 sec)
* Partition Offset [8 bytes]: 90.8GB (190480384 sec)
* Partition Size [8 bytes]: 11.7GB (24576000 sec)
* Partition Type [256 bytes]: NTFS/HPFS/exFAT (0x7)
+ FAT Information [8 bytes]:
  * FAT Bits (12,16,32) [4 bytes]: 32
  * Cluster Size [4 bytes]: 8KB (16 sec)
  * First Cluster Offset [8 bytes]: 11.9MB (24544 sec)
  * Root Directory Cluster [4 bytes]: 2
  * First FAT Offset [8 bytes]: 299KB (598 sec)
  * Size of One FAT Table [8 bytes]: 5.85MB (11989 sec)
  * Number of FAT Copies [4 bytes]: 2
  # Active FAT copy [4 bytes]: Auto
  * Sector Size [4 bytes]: 512B
  * Major Version [1 bytes]: 0
  * Minor Version [1 bytes]: 0
  * Volume Size [8 bytes]: 11.7GB (24576000 sec)

- Drive Number 13 -----
* Drive Type [256 bytes]: Partition,Logical
* Name [22 bytes]: Partition5
* Size [8 bytes]: 21.4GB (45056000 sec)
* Partition Offset [8 bytes]: 102.5GB (215058432 sec)
* Partition Size [8 bytes]: 21.4GB (45056000 sec)
* Partition Type [256 bytes]: Mac OS X HFS+ (0xaf)
+ HFS/HFS+ Information [8 bytes]:
  * HFS Type [64 bytes]: HFS+, Case-sensitive, Journaled
  * Block Size [4 bytes]: 4KB (8 sec)
  * HFS Version [4 bytes]: 5
  * Create Time [8 bytes]: 4.3.2022 21:7:1
  * Last Write Time [8 bytes]: 2.5.2022 12:58:2
  * Last Check Time [8 bytes]: 4.3.2022 18:7:1
  * Volume Size [8 bytes]: 21.4GB (45056000 sec)

- Drive Number 14 -----
* Drive Type [256 bytes]: Partition,Logical
* Name [22 bytes]: Partition6
* Size [8 bytes]: 25GB (52461568 sec)
* Partition Offset [8 bytes]: 124GB (260116480 sec)
```

```
* Partition Size [8 bytes]: 25GB (52461568 sec)
* Partition Type [256 bytes]: Ext2FS/XIAFS (0x83)
+ Ext2/Ext3/Ext4 Information [8 bytes]:
# FS Character Set [4 bytes]: Utf8
* Block Size [4 bytes]: 4KB (8 sec)
* First SuperBlock Offset [4 bytes]: 1KB (2 sec)
* Blocks Per Volume [8 bytes]: 6557696
* INodes Per Volume [4 bytes]: 1640160
* Creator OS [4 bytes]: Linux
* Major Version [4 bytes]: 1
* Minor Version [2 bytes]: 0
* Last Mount Time [8 bytes]: 3.5.2022 16:40:24
* Last Write Time [8 bytes]: 3.5.2022 16:41:17
* Last Check Time [8 bytes]: 4.3.2022 18:10:17
* Volume Name [16 bytes]: EXTFS
* Volume Size [8 bytes]: 25GB (52461568 sec)
```

```
- Drive Number 15 -----
* Drive Type [256 bytes]: Empty Space
* Name [28 bytes]: Empty Space15
* Size [8 bytes]: 1.82MB (3729 sec)
* Partition Offset [8 bytes]: 90.8GB (190476592 sec)
* Partition Size [8 bytes]: 1.82MB (3729 sec)
```

```
*****
*****
```

```
----- Session 1
-----
```

```
START Date / Time of Collection: 2022-08-05 15:04:59
```

```
Case Name: Steven vs. Christofer
Case Number: 28-5-0205-CR-85763
Operator / Investigator Name: J.F. Lewson
```

Source drive:	Sector	Modification Date	MD5
	SHA-1		SHA-256
		File Name	
9		2011-04-05 15:42:13	Root/Docs
9		2011-03-01 09:41:14	1b81a7a90fd69e59098737fef990733c 1c9c6f7f4ba9818a06fb84f19e331c1f20af9f02 710ae48e42cabf8379b55823db8a55737bbd64922c9bfa084bdafb74dd9d83c5
		Root/Docs/MyDoc1.odt	
		DATA: DATA (Non-Resident)	
		2268-2315	
9		2011-02-28 15:31:02	1b81a7a90fd69e59098737fef990733c 1c9c6f7f4ba9818a06fb84f19e331c1f20af9f02 710ae48e42cabf8379b55823db8a55737bbd64922c9bfa084bdafb74dd9d83c5
		Root/Docs/MyDoc2.odt	
		DATA: DATA (Non-Resident)	
		2316-2363	

```

9          2011-02-28 15:31:10      10bb34bb18ca4d30d577bbd7833f6f28
    621b7baacb7ed059e7aec486ba0bcc18e0b2a894
d5f57625ea06ebad876318b42d5a6a9f35dd2974c0639076210a3b377a9d69bc
Root/Docs/MyDoc3.odt
  DATA: DATA (Non-Resident)
    2020080-2383343
9          2022-03-04 13:25:38      Root/Documents
$I30: INDEX_ALLOC (Non-Resident)
    2992312-2992319
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-files
$I30: INDEX_ALLOC (Non-Resident)
    2972848-2972855
9          2022-03-04 13:25:37      Root/Documents/OpenOffice-
files/Calc-files
  $I30: INDEX_ALLOC (Non-Resident)
    2438980-2438987
9          2022-03-04 13:25:37      Root/Documents/OpenOffice-
files/Calc-files/ods-files
  $I30: INDEX_ALLOC (Non-Resident)
    2955404-2955411
9          2020-04-06 19:21:52      b1eb4cc9101bcb86c0042231f898f0ae
    8e5da7978ebe26604b5f556ec2d20a4cell176ff1
4d226d7f3c0e1c874f0aaf772f9a5cf9bed2c7d982906a4a0314c206cbc4bb35
Root/Documents/OpenOffice-files/Calc-files/ods-files/.DS_Store
  DATA: DATA (Non-Resident)
    2955388-2955403
9          2020-04-06 19:18:30      eab006354c7cf4e1fd3772afd0643672
    bfc7b3368a46a640c3145646b0dfad10bb89f096
4709af13b6dbaf11feab0750bc2a3734eab9a94e184bd7f736805adcb02ac368
Root/Documents/OpenOffice-files/Calc-files/ods-files/file_example_ods_10.ods
  DATA: DATA (Non-Resident)
    2972768-2972795
9          2020-04-06 19:20:50      94790aeb545e806ea9cf161f6ae2697f
    152a13f940c2dfa4530b1b022897cb3dbd0cb45b
edb79e7965f6b61722f1c6427200e4ba44692e573b2f2f8cd210f356aed7f3c9
Root/Documents/OpenOffice-files/Calc-files/ods-files/file_example_ods_1000.ods
  DATA: DATA (Non-Resident)
    2945868-2945967
9          2020-04-06 19:19:47      000389561d71032e79411613d73f01f5
    3e9fdd1b26eed17f40e98a0f8d13af11decdf951
b668e04c130d51d023531482c8067b5232284decdf54760c6ae431e3718388c3
Root/Documents/OpenOffice-files/Calc-files/ods-files/file_example_ods_50.ods
  DATA: DATA (Non-Resident)
    2972796-2972823
9          2020-04-06 19:21:44      28aa35b07f4a28f4f001e28f277dd1be
    f9dfcafc3e9b6c1c15a949ab9150b8e7d599f1d6
069ad480df6dba6de101188dc126f688127206932d98f02149eb390b6e8f2928
Root/Documents/OpenOffice-files/Calc-files/ods-files/file_example_ods_5000.ods
  DATA: DATA (Non-Resident)
    3047196-3047567
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Calc-files/oxlsx-files
  $I30: INDEX_ALLOC (Non-Resident)

```

2972840-2972847
9 2020-04-06 19:31:06 c763a032a1999d42934abebc25fc6a83
07c1d02aa03ae7768dfb88445bff68e9c32c2264
208fef9240237b668cbb927255a8f204e6ab808a68701ffe72bf3ca85e4d13e1
Root/Documents/OpenOffice-files/Calc-files/oxlsx-files/.DS_Store
DATA: DATA (Non-Resident)
2972824-2972839

9 2020-04-06 19:25:50 f893b7290b96905f0776e0e1cb4b91c4
d80a4175a6a2767b61fe8e2b33774bd211b6a934
ab82e943104f1edfa17b58595b4221c02ddf93aa4056fa630473de192f85d1fe
Root/Documents/OpenOffice-files/Calc-files/oxlsx-files/file_example_OXLSX_10.xlsx
DATA: DATA (Non-Resident)
2947864-2947875

9 2020-04-06 19:30:27 be99eeaa2e2aa77ecb4d7b9eeff44cb4
1aad45945f99a02383e168e339a20d38999491b6
cd6583c0aal6dde7342c4dc5483987edf173d7378ce946ded7383bbf4b5990ba
Root/Documents/OpenOffice-files/Calc-files/oxlsx-files/file_example_OXLSX_100.xlsx
DATA: DATA (Non-Resident)
2945968-2945987

9 2020-04-06 19:30:10 2280cba8bea0ded6bf9c428939f9cb32
4aee4fe0add47392f508fef28af3f5c02a9eb4a2
59da4d0e97a54c462fcf34268b14a4214ef324da368712a0a32678c976e89484
Root/Documents/OpenOffice-files/Calc-files/oxlsx-files/file_example_OXLSX_50.xlsx
DATA: DATA (Non-Resident)
2945988-2946003

9 2020-04-06 19:30:42 980e7a175ea67333379753a788d331e5
c90c1841006b8da26e69636596c7a8e5fcc26ec6
0d66f10f1b76f620d69e4054eeab6669f2e64b0b2fa5e3365101027aa5b657e7
Root/Documents/OpenOffice-files/Calc-files/oxlsx-files/file_example_OXLSX_5000.xlsx
DATA: DATA (Non-Resident)
3047568-3047939

9 2020-04-06 19:23:13 db42bc048678d194bda93124fcc1e359
9f7137c6703b51cd78a797b56b5f2a2e7c8b83ea
433476459c23ba979ab467ce4c310e29a40e3b9a8d68dd63467b503ddc4cdf23
Root/Documents/OpenOffice-files/Calc-files/.DS_Store
DATA: DATA (Non-Resident)
2955948-2955963

9 2022-03-04 13:25:38 Root/Documents/OpenOffice-
files/Microsoft-files
\$I30: INDEX_ALLOC (Non-Resident)
3050316-3050323

9 2022-03-04 13:25:38 Root/Documents/OpenOffice-
files/Microsoft-files/Excel-files
\$I30: INDEX_ALLOC (Non-Resident)
2946172-2946179

9 2022-03-04 13:25:38 Root/Documents/OpenOffice-
files/Microsoft-files/Excel-files/xls-files
\$I30: INDEX_ALLOC (Non-Resident)
2946164-2946171

9 2020-04-06 19:13:48 7901a6038143aa293bff65c1dcc564a9
13c30d142999708f8b0f3b71bce35c1c91304032
ad75eff3191cbb4e3215b25ce1733f062f474ff6aa242db82de391eada0f114e
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-files/.DS_Store

```
DATA: DATA (Non-Resident)
    2946040-2946055
9      2018-10-19 14:12:18      01a42d82b4e2e143876cc0afea4883ed
    3cc9264c3a5569c08abfb9ee343dbalbf96f1b3d
be198ae04df0476e6a8153e4b396da05c9badef729f87f1abbb626f8bfae8491
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-
files/file_example_XLS_10.xls
DATA: DATA (Non-Resident)
    2946056-2946095
9      2018-10-19 14:14:00      efc6e746de385a6ba15f9e697503f4c
    96451e09d24aacaab7c00292316020ecd8090dbf
8562df19f14cb945b769a0812fblafd5acd9e349f0cdd71150282202d71319ee
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-
files/file_example_XLS_100.xls
DATA: DATA (Non-Resident)
    2946096-2946163
9      2018-10-19 14:14:56      f9773bf0bd611c8a9107140956b3881f
    7a538e2ca18bb7cb0c2fb0130767012f7acd9019
d3107cae4af0231540887be840135ec03763d83926c2900fb76aead0226787ca
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-
files/file_example_XLS_1000.xls
DATA: DATA (Non-Resident)
    3047940-3048243
9      2018-10-19 14:13:23      b3df6dd6764416491f51415c4ccflaaf
    eealbebb11f6beab8f38bc2b1705dbf598bcbfa6
a7beba6217ffa60c9e79f0310d024a74cbaf363d7b884d214178e413e758b68e
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-
files/file_example_XLS_50.xls
DATA: DATA (Non-Resident)
    3048244-3048295
9      2018-10-19 14:15:24      ecb548b885ec5cf6f6e38ece80fa5f2e
    5ddffe520563c9b9c26a7c297c99b2e896e891d0
bc8d33d7033eb858dd63ae4882d4381fb9fe85c0740fd41efb9a309fca9e366f
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xls-
files/file_example_XLS_5000.xls
DATA: DATA (Non-Resident)
    3048296-3049659
9      2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Microsoft-files/Excel-files/xlsx-files
    $I30: INDEX_ALLOC (Non-Resident)
    3049708-3049715
9      2020-04-06 19:16:33      8f9765363a3610383bbafb7ed7e8928c
    075e8f3a721f3d733c20e897c3e9db0c907322b7
9320252c62acfa865ebd315c1597d767f9ebc16ea410bff7e3d2e479bdcde088
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-files/.DS_Store
DATA: DATA (Non-Resident)
    2946180-2946195
9      2018-10-19 14:16:15      bd5ec17de931c601b3231fdb4eac6db6
    2a647da6430913fa47cfd7874721f0832bb91f52
584bd2879378c518796f4422f8ed41c971798e76c5ee58c307fc3d40adb03eaa
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-
files/file_example_XLSX_10.xlsx
DATA: DATA (Non-Resident)
```

```

3049660-3049679
9          2018-10-19 14:17:58      43cb8b1c3ede97eae779d0bc7d03710
41360a2a5d2f8a2aaacd2ae503ea754fc33d93f4
97e004974d26f04bf7bf960d5b4e33f2f59a81d79e95526804f5b570f819eacb
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-
files/file_example_XLSX_100.xlsx
DATA: DATA (Non-Resident)
3049680-3049707
9          2018-10-19 14:18:45      513e4fac7ff88720001864d1a350ed1c
87e9c39ea24c1949cca6f68ff42cdb8208c32a13
14fed5fcf63206d7f5bd275058b7d79184cel87b062fcdab5d9ff77b4ea19502
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-
files/file_example_XLSX_1000.xlsx
DATA: DATA (Non-Resident)
3049716-3049823
9          2018-10-19 14:16:44      775654d96ef34c95cela60e9606977e9
1954ba25e67edc407955203d21aeb8c3a99d272f
e40aeadfebe57e3be87ac46260ad09e1c4c030b95eef2af767382d0fe79198a
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-
files/file_example_XLSX_50.xlsx
DATA: DATA (Non-Resident)
3049824-3049847
9          2018-10-19 14:19:09      ea38c0c454aa508b5909161bd8260918
e566e8c34a723ad44431cc3f0fdbf3bcel8410e5
acbd5c728f2738a70f59c245c961eb8122d59aa07b7debd7d348efe472b650b
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/xlsx-
files/file_example_XLSX_5000.xlsx
DATA: DATA (Non-Resident)
3049848-3050315
9          2020-04-06 19:31:14      52d71be9d0971685678823c546b72eff
1930f5ed939a35965802a508afb3865810e7e0af
8ffc5293b616b558264fdb2277fb6a8d032ebecaf6b678b491ddcfdef1a3f9f2
Root/Documents/OpenOffice-files/Microsoft-files/Excel-files/.DS_Store
DATA: DATA (Non-Resident)
2946020-2946039
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Microsoft-files/Word-files
$I30: INDEX_ALLOC (Non-Resident)
3054572-3054579
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Microsoft-files/Word-files/Doc-files
$I30: INDEX_ALLOC (Non-Resident)
3051564-3051571
9          2020-04-06 19:12:41      34b20ad44b5d33cc3401b0calc9c55ad
236a6271d535ea5149eca9fe73e939900968c019
9cc166b17367418d3af128bd74ae79c7b0a20c0alfd19c4d458c1834897905db
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Doc-files/.DS_Store
DATA: DATA (Non-Resident)
3050340-3050355

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9          2018-10-19 14:10:23      759cbcd3d7c574ec4de97222bc407665
    1308c158c06c9050ffa3f0f5898a5ccf4a94c8c7
3fbfda0b36c4edc4b4d48ec5c0425ced04ed15c6e3891495201a7289533a2ce2
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Doc-
files/DOCFile_500kb.doc
    DATA: DATA (Non-Resident)
          3050356-3051359
9          2018-10-19 14:20:26      35176f9b7f521954445100e5df74dee9
    5aee31c3f490b421e75548ea713a6755818980db
f907aad6b6b9b38c8e19eaf44aa11796051eeac35d0d2115246449da98f1137f7
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Doc-files/file-sample-
doc_100kB.doc
    DATA: DATA (Non-Resident)
          3051360-3051563
9          2018-10-19 14:19:59      bb8c0ad499fc64837a45154a27e07734
    1e09acf84e23e9eddb152f812354785e2f7cd159
2bcd9c011678a8aa7045a6485bef7872c4295fbb6c2467cc29135ffcc769457b
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Doc-files/file-sample-
doc_1MB.doc
    DATA: DATA (Non-Resident)
          3051572-3053587
9          2018-10-19 14:21:18      e16fb51cef336edf2c19d065ef49a662
    15bfff84aea3602cd0ec81bd7ac9789a969c3528
41f65cf10d9b0b42d12307a46b66ae632e6d883e067db5959969822780823d7a
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Doc-files/file-sample-
doc_500kB.doc
    DATA: DATA (Non-Resident)
          3053588-3054571
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Microsoft-files/Word-files/Docx-files
    $I30: INDEX_ALLOC (Non-Resident)
          3055528-3055535
9          2020-04-06 19:12:41      0717f9af8c983c9af7d5fb9d311ab163
    0celf83b661658d58cae54b75ede278a30e0927
359246310af6c9ff8c7192b637ae949a8c388f1c9b684d46c1ea013d4fcafffbb
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Docx-files/.DS_Store
    DATA: DATA (Non-Resident)
          3054580-3054595
9          2018-10-19 14:11:20      96d043aabc6bdad1046db4c47aa7a3a8
    7705c94a188ecebd1be2f68f70687b1ef7360d21
9383ce8098236174683cefab77cbddfe8cc17d8656b4e87281e783ce55b76d52
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Docx-
files/DOCXFile_500kb.docx
    DATA: DATA (Non-Resident)
          3054596-3055279
9          2018-10-19 14:22:33      0815c2eb26ab3ad59fab1ccba9d18fd0
    20898f28011ae05f5062e09690b292ed13fbbf20
acd7fe4a7ee20c77b48489be5b9dbad8a850a2b29af721c912f6993e238b5471
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Docx-files/file-sample-
docx_100kB.docx
    DATA: DATA (Non-Resident)
          3055280-3055527

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9 2018-10-19 14:21:55 9a1485d3bca8dd88cb67f248c0144d0b
0dcff5af4a39b3d57e964ead8a004636c3a276f4
98983b17e3562d015ac1c1a6f9d9971090303c04d0d70d6729416d376385eb2b
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Docx-files/file-sample-
docx_1MB.docx
DATA: DATA (Non-Resident)
3055536-3057619

9 2018-10-19 14:23:09 183a5dc1a099e3c8c0b54c6aa52d64b7
1266501c54bdea72f239925138a61a62a9f8b2ba
ff010e8d024e80c14901ea9ac618f253862667e7a69f69b070002cbc74df9f58
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/Docx-files/file-sample-
docx_500kB.docx
DATA: DATA (Non-Resident)
3057620-3058751

9 2020-04-06 19:44:01 8b1836fc208a9ab78cb95bc0d00b6256
c6f205d3920442756681d4bc1c3091dae0b69466
5dba5fad9c2bf25ea40190fb34594641a66e44d4fd40a7cabf9ea11862e6246a
Root/Documents/OpenOffice-files/Microsoft-files/Word-files/.DS_Store
DATA: DATA (Non-Resident)
3050324-3050339

9 2020-04-06 19:44:31 b6e071bf10615607b95d544a2022d187
199662a8e3916924b81b13ac8ae705f3c581cec9
c988d303b52f36214ce9464a07df2dbf114b6820971eddd987668e89bb0167a6
Root/Documents/OpenOffice-files/Microsoft-files/.DS_Store
DATA: DATA (Non-Resident)
2946004-2946019

9 2022-03-04 13:25:38 Root/Documents/OpenOffice-
files/Writer-files
\$I30: INDEX_ALLOC (Non-Resident)
3062596-3062603

9 2022-03-04 13:25:38 Root/Documents/OpenOffice-
files/Writer-files/odocx-files
\$I30: INDEX_ALLOC (Non-Resident)
3061716-3061723

9 2020-04-06 19:33:22 70b4b7f69342042902032114b234fa03
79bfe4ccde5838e150a0f236b9c7478104b9cd09
2dd6ea9aef467ef368f7024e22ae3ea03d3e4f73949c0elee7cb055779c596a7
Root/Documents/OpenOffice-files/Writer-files/odocx-files/file-sample-
odocx_100kB.docx
DATA: DATA (Non-Resident)
3058768-3058911

9 2020-04-06 19:36:02 e579cd58blac23749e4251835bc0f610
e8d59c3b4ea9f4c08c4e59031736a578d728dff6
1c0f9edf45a390e0d279ald10da038e374b515cef3e5c077c8bae99e3dd4a5cc
Root/Documents/OpenOffice-files/Writer-files/odocx-files/file-sample-odocx_1MB.docx
DATA: DATA (Non-Resident)
3058912-3060811

9 2020-04-06 19:36:58 0a64c077c83153e159aa45906220ff3e
ca27738f86b01900b3b94e19bd99003fb47a5c80
05100d4633bff3a8809b8b075ecbb7e9dd22f94148307faabad972ee8c8307d7
Root/Documents/OpenOffice-files/Writer-files/odocx-files/file-sample-
odocx_500kB.docx
DATA: DATA (Non-Resident)

```
3060812-3061715
9          2020-04-06 19:34:45      fldbf4f7ad95d39ccc0f877d9b887afa
c6b1149ecbd1303d75868e19643e61c60a822808
fb723512f7f3f166cb0013f3160d98b648719f08bc6dcde7db5043277cb1ca85
Root/Documents/OpenOffice-files/Writer-files/odocx-files/ODOCXFile_500kb.docx
DATA: DATA (Non-Resident)
3061724-3062595
9          2022-03-04 13:25:38      Root/Documents/OpenOffice-
files/Writer-files/odt-files
$I30: INDEX_ALLOC (Non-Resident)
3064956-3064963
9          2020-04-06 19:43:34      d4c494a030d81983196866482a5597fe
46aa85342a8d01ae27ea91965ce088813a4410ed
8fcb878c093e2f4652b632bb347b3f69db28ece431801b9651b3809b47ff16e4
Root/Documents/OpenOffice-files/Writer-files/odt-files/.DS_Store
DATA: DATA (Non-Resident)
3062604-3062619
9          2020-04-06 19:40:21      c3e2b9d976977ec25d6347ed02673120
c913470ca428305f83c37c34a17cdf79903a3248
455b56ea7a3bd759f917b8e3a3d16b567f10ada93c8202ddee8945db150bf810
Root/Documents/OpenOffice-files/Writer-files/odt-files/file-sample-odt_100kB.odt
DATA: DATA (Non-Resident)
3062620-3062863
9          2020-04-06 19:42:33      5f1e8dfdac3fc3133511a75f26001854
7a26c32e318fa96d08c4515122c197e7bf7397ba
23a5d871d288d0b5bd3a65747e2dc6bba4689a9c67ccf8e609e8d8ce9af74336
Root/Documents/OpenOffice-files/Writer-files/odt-files/file-sample-odt_1MB.odt
DATA: DATA (Non-Resident)
3062864-3064955
9          2020-04-06 19:41:23      324dd4fe1e621090a5dfe7e0c7680050
c070a68cce81d1058838a5438a91c3a6bff11fa5
de09f89e254cc5ecc388ba278cf2f224067e9fbc9c64ae3009adf565fcc798c6
Root/Documents/OpenOffice-files/Writer-files/odt-files/file-sample-odt_500kB.odt
DATA: DATA (Non-Resident)
3064964-3066095
9          2020-04-06 19:43:29      b45be240cb18dda2cd78caee72891837
06bb21bd6fffd5eae59034e4cf9533076ccb68bb5
ed39112cdf37ddc805e39b9edb033fd97dcce179831c1392a2a59e46f85a0796
Root/Documents/OpenOffice-files/Writer-files/odt-files/ODTFile_500kb.odt
DATA: DATA (Non-Resident)
3066096-3066611
9          2020-04-06 19:37:14      14a0ca21163393f57c739e278f95dfde
cc80e712df7b497601fb5ab86c23f4d6ebd8db0c
b4c09d792b41a04e369df0ccdd202eba89a11c9f1530a62be60183379cd85335
Root/Documents/OpenOffice-files/Writer-files/.DS_Store
DATA: DATA (Non-Resident)
3058752-3058767
9          2020-04-06 19:34:59      229601a0b29ad34773e4891161a14e2b
e0a791be31e35348bacl1d6840e27e8e47c730f98
2c6a0a942b9466457708117adfecb2408b24b214cd595fd00a850a8cca2a8d26
Root/Documents/OpenOffice-files/.DS_Store
DATA: DATA (Non-Resident)
2953248-2953263
```

9 2022-03-04 13:25:38 Root/Documents/pdf
\$I30: INDEX_ALLOC (Non-Resident)
3070908-3070915

9 2018-10-19 14:31:09 cafaa4fe6206c58f5dec13c3ea9d0371
7ed087345df3071191fbb455470a4ae8e4b423e7
2a42cd96488ebc2e8fd807008726dee7ab1709c007fa9abe8affbc5843591bb0
Root/Documents/pdf/file-sample-pdf_100kB.pdf
DATA: DATA (Non-Resident)
3066612-3067131

9 2018-10-19 14:28:32 f75c9215162661abdd9cd1aa11d792e6
06dcbad6d7184b39925fb0a19f55b4a9ce3f297b
0da983da280865ec4ef11497f7ae9a3322d36b88a12b419e90109774ae50d40f
Root/Documents/pdf/file-sample-pdf_1MB.pdf
DATA: DATA (Non-Resident)
3067132-3069495

9 2018-10-19 14:30:08 23d2d7627d3edbc66586726cbd4225b1
34d580da967fbc3balbc54e59da11b7183afffb6
0dce6c42b677f621d5f8ac8abbfad0ed7d69e7e18elf328c9276453e2b57680b
Root/Documents/pdf/file-sample-pdf_500kB.pdf
DATA: DATA (Non-Resident)
3069496-3070907

9 2018-10-19 15:05:41 2cea8c95dc5f5db6065f704068292867
6628857689d03f6e0b52cdaef20c9be4f17d0f79
5e147079d557fe26de3dbdf0c5c7aab4ac18ec13d4e31bea320d1167475dae0c
Root/Documents/pdf/large_pdf.pdf
DATA: DATA (Non-Resident)
2439500-2469391

9 2018-10-19 14:49:27 4bfa34445fe5e92cee0d4belc4b6afbd
4c166dd5ad455053664bb095fbed5238f5a17a68
1284a8bd83fa65802aa0ee0d7ca77a008c6db18cbd288f1b1f1319aae703fa4a
Root/Documents/pdf/PDFFile_500kb.pdf
DATA: DATA (Non-Resident)
3070916-3073503

9 2018-06-22 14:08:57 b05a97e064cc54b99daba53bde958d58
31249aec7b1e9dd55828b296f3626c5654071860
b0e8e10fc34b366dfa1709719cd737745581fb277a82509a60518cb5e6c8ddf
Root/Documents/easychair.docx
DATA: DATA (Non-Resident)
3002580-3007051

9 2013-06-26 11:00:33 0a4ffa384ae31d33a801acc0e1746e65
f09aedad237560fe3fc2d255d39520923cab91f2
6387b9576f369e587e7c810df976b29ededf8c4f7e3f1d6662b7ccd78dc4a521
Root/Documents/Mac_mini_Early2009_UG.pdf
DATA: DATA (Non-Resident)
3007052-3013299

9 2013-06-26 10:58:08 12ab314eb73a4a938bed3d6550da0ff2
22b0141246f4f5c7cf20171645c0f8de596cb35a
eada5fecc16cb98c28c54b080319ff79eb20b62a313ed4b6ba5c254a4a3ede7e
Root/Documents/Mac_mini_Intel-based_Mid2007_UserGuide.pdf
DATA: DATA (Non-Resident)
3013300-3015047

```
9          2013-06-26 10:56:33      bcb1278d0441dd482bc9aafb57abe8a6
    790de86e64018a72d48b97ed9281d9bbe036d728
b9aa929d68b88288d49fa4850143e18120c67d55c81c8733e605a639637cdb7c
Root/Documents/Mac_mini_Intel_User_Guide.pdf
    DATA: DATA (Non-Resident)
    3015048-3019475
9          2018-10-19 15:04:44      9bc47b9f8c3ddc76f98b888d29d58dc8
    ca2d122f689a98ca752fdb0414e6296dcff8c68
18ca6866a60efd06455338739bed02ed3a60bbe8e9cd5e8688b7877aa2a11ef6
Root/Documents/MyDoc1.docx
    DATA: DATA (Non-Resident)
    3019476-3047195
9          2016-08-09 09:43:29      cbe35c8518717402622e37fe748e08b3
    028f8ea45432e9b87e45693847d0b6c068b3096d
4868c01d946e0ab00fb2af3bb186ead65ff41d82817f8cc210e254cb115f494a
Root/Documents/Test_Arch.zip
    DATA: DATA (Non-Resident)
    3073504-3080463
9          2011-04-05 15:43:41      Root/MyPhoto
    $I30: INDEX_ALLOC (Non-Resident)
    1908-1915
9          2009-04-29 05:52:42      1be9257a5f5816119a1ee7932f277709
    b164610273e1684806c4cfdfb087dd6bb9c45ae4
de7eee26d1a8ef8b8f7098ca323d635bc2f2e2ec3260a8e7cdb9afee41d679aa
Root/MyPhoto/MyPhoto1.jpg
    DATA: DATA (Non-Resident)
    952892-958131
9          2009-04-29 05:53:22      96d4bd523d897cb9b71d81b9703e7361
    d4688bb699075afc0892b2a044eb42367c934c3e
7c0cb8fc34246a7711cf0e0ea56589fafdc204a911d20fe60ec23f516ca6a859
Root/MyPhoto/MyPhoto2.jpg
    DATA: DATA (Non-Resident)
    958132-961707
9          2009-04-29 05:53:58      bb6bbeaad2b8ef9c9abe4648de3a5999
    cdfcfb3779a3a208af1f7643914dce53632588c4
6030e056aa02221686bf6e6a32cfa7abff8a1401c28b43d57eab23a2aalfc5f2
Root/MyPhoto/MyPhoto3.jpg
    DATA: DATA (Non-Resident)
    961708-965259
9          2009-04-29 05:54:20      beb944c66d0c83a708felc69011a5d42
    4a9ebcece6a0c3a780f6e9852e065f2ce7d625a0
2b6598767763c096alec8161fd98ad00c878a514e91224e74598774e1285d00e
Root/MyPhoto/MyPhoto4.JPG
    DATA: DATA (Non-Resident)
    1997828-1999591
9          2009-04-29 06:13:38      55bef019410f8bcd10731a46fa250909
    35fa0050b34ec540b6f9facd24d01d31094f8bc4
c343fee6083774eeabe36c0e4496de4af942ec99ac3f454c675cef28cf6f9552
Root/MyPhoto/MyPhoto5.jpg
    DATA: DATA (Non-Resident)
    2006504-2012923
```

9 2009-04-29 05:54:46 3feacbf5dd9afc05143f12a55f0536f0
acf18fc7824c46e2107113e28438ala7f3d5364c
501d7f5876228466260bcf200bed3e71fbf362f9f7f5601cf45ff8b7e3dd792e
Root/MyPhoto/MyPhoto6.JPG
DATA: DATA (Non-Resident)
2898344-2900539

9 2009-04-29 05:55:06 22bf64446fcd3a630ab17bf839de6e7d
6e023a946c407fb59b2b96216f46b6d0e7f4081d
d317be69a99418cd6c1aa628837db02537b04cd2c0549099e2f5edc7f4361c40
Root/MyPhoto/MyPhoto7.JPG
DATA: DATA (Non-Resident)
2924760-2926447

9 2009-04-29 05:55:30 cb4bed7e6405a90b65cd80ccbec04928
6581e5cc10659704ea5d98b81a7a326ab9640a26
94f3d3b0877947b05a4e4a6be15f9caa590ff9a9dbc3984b65bf5ea9760758d8
Root/MyPhoto/MyPhoto8.JPG
DATA: DATA (Non-Resident)
2922764-2924759

9 2009-04-29 05:56:50 2abc60a295d7e3eaa91cb7ad92efc788
52de9551e8710d6978e525194b8e9cd3a44ea992
20141717c1bfbf42901603843fdd360a56ed64af6865fdc61197ec48fc89807b
Root/MyPhoto/MyPhoto9.JPG
DATA: DATA (Non-Resident)
1999600-2006503

9 2007-04-23 06:08:09 c1bffb09ff0b3a418fe76df995cf58fa
f90b22dcd65f848762bacfa7e9aa985415d090a7
4877436d651e00b30728c081286cbf81025197b886dfd1e1f622e13794cabcf6
Root/MyPhoto/Picture 001.jpg
DATA: DATA (Non-Resident)
1962376-1965587

9 2007-04-23 06:08:12 ca23ee170541b5dbcf099bb9e8e94ce0
56f5ee823718caee4c9a7090beed100b06d57c87
864daf84caff14e8a078a59c9f185817d2d76bb396f927be0b301be5839c5354
Root/MyPhoto/Picture 002.jpg
DATA: DATA (Non-Resident)
2425972-2429715

9 2007-04-23 06:08:14 2a9a0d53c84bc3358a5ee68abffcccdf
9baa28e00327f5fe17a54c9bd61c9ac94046f76e
00e0ef480705863eae0e3f0c65fd5c7f153cb68f55318ce81157adf49ald312
Root/MyPhoto/Picture 003.jpg
DATA: DATA (Non-Resident)
2429716-2432999

9 2007-04-23 06:08:17 163a4f725b82318c333ed4a3c6877954
88ff7a7c8e016723bb8eae2e9475e1dc0099cab4
6f38401f742229af5c53403bf96735426e0e95633dd77233a8b71fble179afba
Root/MyPhoto/Picture 004.jpg
DATA: DATA (Non-Resident)
943680-946863

9 2007-04-23 06:08:19 e982a269710dbdd81cd793fcf6fc79a5
e073695ccfabebef4af273f127bd027412fb7fd2
332bfe915c37aalc817782da6fele7a77ebf56058515bd22207694c884f73be9
Root/MyPhoto/Picture 005.jpg
DATA: DATA (Non-Resident)

```
946864-949963
9      2007-04-23 06:08:22      849b6c0dbd1dfd9e216f4c4670420d3d
      bb6780d41f01d253f85c9247a09e4f26c403e51b
64563295d55b1a67b36076b9c8c7f6d532d8276f135c96779be32fa4c3eeff73
Root/MyPhoto/Picture 006.jpg
DATA: DATA (Non-Resident)
      949964-952891
9      2022-03-04 13:28:41      Root/Video
$I30: INDEX_ALLOC (Non-Resident)
      2843104-2843111
9      2022-03-04 13:25:57      Root/Video/Avi
$I30: INDEX_ALLOC (Non-Resident)
      2843080-2843087
9      2022-03-04 13:26:59      Root/Video/Avi/Cops_Season_24_HDTV
$I30: INDEX_ALLOC (Non-Resident)
      2843088-2843103
9      2016-06-06 01:18:26      7f0357f25d88e1369c8dclacd0aed663
      317dd884a8bc77e96e7fd1656e4aed35d077b0da
a48313a5f5756abd792ba5falda6e92f9caf0a7511435e2f5dcfce5250bea41a
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E01.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      7024208-7382223
9      2016-06-06 01:19:24      8dd47bbfb3420f7ff4b0b101e8cad36b
      1fd74b806f952314abfecea3fbd56b0560ebb315
72a952dc62b83d078327a25c5e0d81e6027e684238c7b1bcf02c1c29e8f097ef
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E02.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      7382224-7739611
9      2016-06-06 01:19:41      e389377f24ca35cc802aa90d821a246d
      3f4c33408ad18287d5f1dca0b474c208748c7002
8622c265f0c0533bd756b0b45fdbf661c23370c093c8a708b14a503238a2ad9f
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E03.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      7739612-8097635
9      2016-06-06 01:12:38      5e828eea4a7d198d5d029eb6a5fd8a97
      5f696a6568215a658415bbf736098166253c7bd2
ce10df567443f9c8211655bf9c62071d636dd5106f334efbbf22d57b62e0a256
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E04.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      8097636-8455771
9      2016-06-06 01:17:43      409e0f6332db4c12da861cd3cab5ae14
      6d21926f26bd26e3730274b37ad69731219c29f5
e8b357b3f488e04276a2f1dfd9147e8f1b73e4a5a4ad7854abebble6a83fc379
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E05.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      8455772-8813603
9      2016-06-06 01:18:57      b55ee3db70b62f883db5573a5746e4d1
      08c309ee65b69c1a937f447b9b45e95055ad422e
e39d39283cd4fbee2a5e4e59dba6751c4b2be36eedfaf0ad4d2b3e904867dd9d
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E06.HDTV.XviD.avi
DATA: DATA (Non-Resident)
      8813604-9171227
```

9 2016-06-06 01:17:05 1febb45222f9f114e88c533c36f8f29b
b1656a3eb4766af43e31b46defb3827be551bfde
42513d7f9738dd06077f8e2636cdb6852aa852bc67316cbbc45b6bec5cff69c9
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E07.HDTV.XviD.avi
DATA: DATA (Non-Resident)
9171228-9528443

9 2016-06-06 01:16:17 0ecf424d46e619cd1d09bce2dae5b570
a15b481e4083022254c0ff9aa85f369782a7c87b
7240d9aed4d0129139f9d817bd1beb140f2c46b226e77570f083387e54a04ebd
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E08.HDTV.XviD.avi
DATA: DATA (Non-Resident)
9528444-9886203

9 2016-06-06 01:17:14 88b3f03a9e20f9b2310dde6cd0296fca
b839c39d53c22c5e8a46cda745f0c90ac86ac38d
2b61dad5b94d79f8b0e202db5dc30f5a581f1093b588a16354701419aaeb6ebb
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E09.HDTV.XviD.avi
DATA: DATA (Non-Resident)
9886204-10244171

9 2016-06-06 01:19:17 delcf8808dff26c1b4398220a8913dd1
139ad01952126d3294c49e4f2258168462f4b61d
3a70dfd2993d0ae572855aa7a20847d58a0e8823fba77e0e136a9a2a92b0bb6e
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E10.HDTV.XviD.avi
DATA: DATA (Non-Resident)
10244172-10602083

9 2016-06-06 01:16:49 216bdd9f74a00a7a9b4383e2e655ef58
47bdb9493dc69f0aff6c38536f3100cca3c6c3f3
ed4d42a3c4162a16da28f21d85a2dfb53b0f07fe005b9012e573717fef70af59
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E11.HDTV.XviD.avi
DATA: DATA (Non-Resident)
10602084-10959887

9 2016-06-06 01:17:34 51bf22c8ed46f23cd1efde24952d305e
a090ee7373d093cf91ee3afa42decbbdf5f43d6a
72d917ebda33cc238falbcada877f7949ff460105e7467d2c314a63fd1224740
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E12.HDTV.XviD.avi
DATA: DATA (Non-Resident)
10959888-11317795

9 2016-06-06 01:19:31 ac81e8b5472ca54054c8e57b6e69b1b0
bdb5963313cflcdcb9d7ae2e66daf8b669000d6
eae261da6d61b544dc42c8843ab4752496fb4869fcbff869baa9f62ea47b9ee7
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E13.HDTV.XviD.avi
DATA: DATA (Non-Resident)
11317796-11676463

9 2016-06-06 01:16:28 8d99cfc73a09a48825a276375bfad763
735aa03db094173277fb702ef0c7d96bdc8e11c2
052e121628b631a3154d04a2b30774340fdaf0e4593b9b751187f867b2c433e3
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E14.HDTV.XviD.avi
DATA: DATA (Non-Resident)
11676464-12035723

9 2016-06-06 01:18:51 6c498108cd539cblb05c813b8e91893d
843e634c0def9751870c8bbe5087be478211d62b
42d916b97a81a2147ef5e03a9e07dab0e6db4d6b148693492644f539ebbf1cdc
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E15.HDTV.XviD.avi
DATA: DATA (Non-Resident)

```
12035724-12393419
9          2016-06-06 01:18:10      0e418b50264b2bb748f031e1250de762
    b6a7edd6909b1fff6e5d6e85b6cd3734a8ddff4ef
9286b40a34a4fae19a24117c179cca4f4493f54341dc66fa2255e49eb209c1ab
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E16.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    12393420-12751411
9          2016-06-06 01:19:07      65fe333f28d8c5f27d21a2445d95fa91
    f6ed23e660b1f8559e5f7151eel6cd583e3fc353
344d36ce2ecefeld3676197f247dca485e37be2282a469aa2fb2a219907d737e
Root/Video/Avi/Cops_Season_24_HDTV/Cops.S24E17.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    12751412-13109855
9          2016-06-06 01:18:17      514b0659f98a3c45202f1cc8a125fe61
    1ba85643445ac825a4d4a5281020d6f82b5bc69a
b99c92603b97699ed7aa10a4e7f21fbd92a4cd8688a4083e33e8a4c54049aaba
Root/Video/Avi/Cops.S24E18.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    5206192-5564299
9          2016-06-06 01:18:12      0e6f2a5dea0e8ale4dd33ad2c99395cb
    9a0b653b3820ba4dd0d78ae94d0da524ff62567a
133cccd202e162aa8f52cbf289351dcb3414d78cfb82945ae49233b4d245d907
Root/Video/Avi/Cops.S24E19.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    5564300-5920111
9          2016-06-06 01:18:38      f3704970997f2eb8af3fb9dd2691f7d0
    580ca470463e58d4b29eba6471081910b7b4ebfc
3544a68251c3b273675eae72431be23a3971057c6c18292bf69f71cd5b42590f
Root/Video/Avi/Cops.S24E20.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    5920112-6278491
9          2016-06-06 01:18:47      ba81e0c6597f2e3898535fb78ffa0ccb
    7f537260ad18099950dcc69964de66ceb45fe176
3797d035d4b503falc8b05153790ed1371394b7d549589219955d75c77abedbd
Root/Video/Avi/Cops.S24E21.HDTV.XviD.avi
DATA: DATA (Non-Resident)
    6278492-6635391
9          2016-06-06 01:19:37      f61d04146b1f1e8404b1a16e9adfab5e
    306ebaddaa2d57688f4e5888cf5363da207e3f28
ad0d94c09fb496f2f2177c0d6de71ac3d8f2188c1631676ed713acd251b3f406
Root/Video/Avi/Cops.S24E22.HDTV.x264.mp4
DATA: DATA (Non-Resident)
    6635392-7024207
9          2012-09-04 09:35:36      Root/Video/DVR
    $I30: INDEX_ALLOC (Non-Resident)
    2945688-2945695
9          2012-09-03 13:21:55      86113b44e50500b1105dd580b0f9e42a
    4b194310f3d4dd7dfadd9c01dcaccc32876fba2d
ee5cf3e5c3a7b5695e5d5ac41155f91bdb810d71ffa006a59d235b4810b6f503
Root/Video/DVR/ch00000000000003-120819-023024-023024-12p103000000.264
DATA: DATA (Non-Resident)
    2972856-2987703
Zone.Identifier: DATA (Non-Resident)
```

2945728-2945731
 9 2012-09-03 08:32:37 c34452e92b49bff9e9d038c2a690c90e
 110d094fcf713c7680ccd6f79c89f08fa7babel4
 aa6098fbca1118b0d94565551f4f4a65fef46183ece8f6f3a66e9e91177fe782
 Root/Video/DVR/ch00000000000003-120819-023155-023155-12p003000000.264
 DATA: DATA (Non-Resident)
 2946196-2947219
 Zone.Identifier: DATA (Non-Resident)
 2945724-2945727
 9 2012-09-03 09:38:59 3f61e75a3aedc81e6a1493aa7848a31b
 29cdab282c34fb9109c8f4d5b243ce8c4613c678
 829cfe1938ca3d5e3fecb861d7306334a8724f2035d855952e4cb341321d6981
 Root/Video/DVR/ch00000000000003-120820-003908-003908-12p003000000.264
 DATA: DATA (Non-Resident)
 2947224-2947863
 Zone.Identifier: DATA (Non-Resident)
 2945720-2945723
 9 2012-09-04 10:00:10 56fdcb8908bb728fafd4ae33ab7c71a4
 9ad6b6798f57abab40975a1e432f0d3c44f624f6
 4ae468b2093995ab9568f297c0dbca4b984a67ff7368a89bb1625f4f72071e47
 Root/Video/DVR/dvr.xml
 9 2012-09-03 11:36:31 5ef432e651457058ab4954831c7f9d0f
 093b7dd72f3bef9a8107943ed4903f8a0a6alfcf
 03e048830d4aa193033c51feldbde73c8c107907b5e5b1fc8c236c0a23d11997
 Root/Video/DVR/es_ES.oxf
 DATA: DATA (Non-Resident)
 2947876-2948851
 Zone.Identifier: DATA (Non-Resident)
 2945716-2945719
 9 2010-01-29 10:51:29 53d73828dfd5cbb53408a1940fb25ef7
 261c7164b24035377d144f401dda5adf5e1alf58
 49a0743c2ad0b4b09db3a826cd7275960ed813af9e9f4982399a98b92e065f82
 Root/Video/DVR/FileTypes.xml
 DATA: DATA (Non-Resident)
 2945672-2945679
 9 2012-09-03 11:34:37 148c66b1f3f23e0725db4645bfd1eeab
 6bcfea38f0193fab83a570d4c52d95901ca177c8
 3899b56b880cea89031d3e2f230d73945ecf6379d2f82e26e9a6b3faf7f5b9c6
 Root/Video/DVR/ooo-dictionnaire-fr-moderne-v4.5.oxf
 DATA: DATA (Non-Resident)
 2948856-2953247
 Zone.Identifier: DATA (Non-Resident)
 2945712-2945715
 9 2022-03-04 13:27:02 Root/Video/Flv
 9 2010-01-05 17:11:42 d2ef7350396693de9389e8b39774b4d7
 31920aa00dc386e8d2e1889f80c7b170560d349c
 38a0753248b06cfca4ceeb4bc67198214216bdd2313e0d8cc3ee641471054766
 Root/Video/Flv/Better_than_me_flv.flv
 DATA: DATA (Non-Resident)
 13109856-13125951
 9 2022-03-04 13:27:02 Root/Video/M4V

```

9          2012-08-22 10:36:44      968139c8f965b32be629b5eddac23382
    3d4ab462a46e985f61e55d3d293598ae658179e9
d84d38f3792764ab30e3d735da22c5977920c92a0339d46055d5710b40e008bc
Root/Video/M4V/general_hospital_fall_2008_promo_(hq)_m4v.m4v
  DATA: DATA (Non-Resident)
    13125952-13127943
9          2022-03-04 13:27:40      Root/Video/Mov
9          2015-10-11 10:33:14      53bd8bd63f73df2e647b20ac336b5184
    3847624df92163b5857177e06fccfc01f09655c6
4b5af7cae10bd584f7ffcf7c6a690a8df6f12bf4a5d54e83fdcec6d44d6ae8d
Root/Video/Mov/FILE0031.MOV
  DATA: DATA (Non-Resident)
    13127944-15791631
9          2015-10-11 10:48:14      4d0737f26d565e7ade41c1eeff0e7cae
    9a11b89381fc546c638eb8cbdfb1a1f4b892348e
0afc907c0ae3aa8f6ee9a35ec2f863650872a30f9dcc3cb72391f856b7124370
Root/Video/Mov/FILE0032.MOV
  DATA: DATA (Non-Resident)
    15791632-18455539
9          2022-03-04 13:28:17      Root/Video/MP4
$I30: INDEX_ALLOC (Non-Resident)
    2843112-2843119
9          2010-11-30 13:58:19      3e3661d0dc6f16a5d416791614623e9e
    3d41e5063b1c5b1a4f659c669a2016873578c3c2
553fcee0ff4df6eefc45024c334ff2ddda887031c2d2ce75d64f8a0cc28365f1 Root/Video/MP4/mp4
Haiti_can_succeed,_but_not_without_your_help_(Former_US_president_Bill_Clinton).mp4
  DATA: DATA (Non-Resident)
    18455540-18631839
9          2015-09-18 20:52:23      f9d18db99b4d4f3d5d8f7ecda07a283a
    3f30923a876e075e0c5735d095fafc71798a5a8f
d055ab546e6c24517aeaadc8217b3a56443baf902230c7a41235f6402770e4c0
Root/Video/MP4/VID_20150918_215223.mp4
  DATA: DATA (Non-Resident)
    18631840-18836859
9          2015-09-18 21:00:20      b970ad6b6fc339a639a747d43279fc24
    226dd51746a2765ebfeb7e58a61d5f43ee8cfcf3
0e2d63dc86db96e93cb84e61724699bce08aal1f68ca17216e98355800ead5038
Root/Video/MP4/VID_20150918_220020.mp4
  DATA: DATA (Non-Resident)
    18836860-19173295
9          2015-09-20 11:31:20      050863ea63873886856c1850f89b2872
    15e1a4f4ed00ae657cc4892959e2d161d011b84f
64e86ce37f11c639c102721be53d58f6f42302056fc183a701c7cbd6696a0f38
Root/Video/MP4/VID_20150920_123120.mp4
  DATA: DATA (Non-Resident)
    19173296-19426331
9          2022-03-04 13:28:20      Root/Video/MPEG
9          2016-08-06 14:50:22      8661e7edc04aa49acced6da2520decc
    0b7c023cd7f19445e78f11a5d3d4c2058196e307
63a8045b7ee6345adec7079e0e18fe89656e0cb188eb34712614e9b539f89740
Root/Video/MPEG/Mpeg_Video.mpeg
  DATA: DATA (Non-Resident)
    19426332-19510263

```

9 2022-03-04 13:28:24 Root/Video/MTS
9 2015-08-05 06:44:42 28264a21f4babe4c26fd9422ecce8066
ddd8c7b7717e0c0374d50af851a499b9ec11e428
fdaf9826c0bb27005d60b611857f6ac4d81191cfcdd63519343f7d4192208491
Root/Video/MTS/00026.MTS
DATA: DATA (Non-Resident)
19510264-19700727
9 2013-03-20 10:16:48 c8813d64f8e33e4e41c773d188ce6f62
cd6dae3c9a31db7f02d18bfa8fa493d85b64e64b
1cfbb5d3d93c7725f06a388d93490e112427c640db705dfe90036c98c6db4820
Root/Video/MTS/00140.MTS
DATA: DATA (Non-Resident)
19700728-19714359
9 2013-03-20 10:16:20 40566a6585ba0440175eed119a32a32a
95776ef4d52ea51062c472ce744de1ef075bdf2f
34cf55b950cbce275ddc1ecad2e9fc0821e4b664d23eeb3270059b3e6e8d0c4e
Root/Video/MTS/00168.MTS
DATA: DATA (Non-Resident)
19714360-19730487
9 2013-03-20 10:15:22 90b17b9d8b04d14b2a72aala7ea2c6c8
19ddc6147e3f8d9c628c83cf33525cc859423c00
fbf55ea6c3b86c666c79caaf5c1386eebede4f02b8b70c7c91610effaf874ddc
Root/Video/MTS/00346.MTS
DATA: DATA (Non-Resident)
19730488-19746999
9 2011-02-25 05:07:46 6299534199985cc1c9071f8adcd06685
33a21bbb8c7ec7d6956dc8eddb0e3944633654af
0e6cc6acb1230bccde6269b6b26ebc47d98226cb34f5bbd331c3352cc1116ae5
Root/Video/MyMovie1.mp4
DATA: DATA (Non-Resident)
2383344-2425971
9 2011-02-25 05:07:47 7185b8d6a921ac1d1cdf6c0d7881868f
8a34c5478b7b8bb58d4fd16999f99bf1ba3d8c63
63342879fc8df632732efca8084f8eed3bbd37fb7fa44068b4175f897b9a0c3d
Root/Video/MyMovie2.mp4
DATA: DATA (Non-Resident)
902396-943679
9 2011-02-25 05:07:48 19542a1073bad1b58a0f94ee9fde0772
2a1383ea3c41d1388deba4e10473c75eb62162bb
c53641c7fc100233bdf929963766abae7807822ce63eb57a925649955e5aa18c
Root/Video/MyMovie3.mp4
DATA: DATA (Non-Resident)
2843520-2885903
9 2011-02-25 05:07:49 8d336514bb974726b20d8d358db1dba1
1fbc1cf51ala6f4b7b8162267d69bd9be77077e0
48a660f1359f763a77502688c59691fed8aee2b08d59c3bed5af9d45fdea4720
Root/Video/MyMovie4.mp4
DATA: DATA (Non-Resident)
1870024-1913723
9 2016-06-05 12:36:07 d6b0ce497e569371b94e19fea48355cd
37fbacb48c80859f47024f2382d9880be633477b
b08522bb8e9d63c86c290a8c7032f3097fc78db704ea1d54eaaa75934c29de46
Root/Video/The.Lincoln.Lawyer.2011.1080p.BluRay.x264.DTS-FGT.mkv

DATA: DATA (Non-Resident)
19747000-36177927

END Date / Time of Collection: 2022-08-05 15:12:07

IV Text/hexadecimal Editor

Any object visible to **R-Studio for Linux** can be viewed and edited in the **Text/hexadecimal editor**. It is also able to parse the data and represent data according to various data patterns. You may also create your own patterns to parse data.

Note: Data alteration is available on the **Technician/T80+** and **Corporate** versions only.

You may turn [numerical indexes](#) for objects to distinguish them better.

- [Viewing and Editing Objects](#)
- [Navigating through an Object](#)
- [Data Copy](#)
- [Files and Sectors](#)
- [Creating Custom Patterns](#)
- [Pattern Example I](#)
- [Pattern Example II](#)

[R-Studio for Linux Features](#)

[Contact Information and Technical Support](#)

[Data Recovery Using R-Studio for Linux](#)

[Basic File Recovery](#)

[Advanced Data Recovery](#)

[Mass File Recovery](#)

[Volume Sets and RAIDs](#)

[Data Recovery over Network](#)

[Technical Information and Troubleshooting](#)

[R-Studio Emergency](#)

[R-Studio Agent Emergency](#)

4.1 Viewing and Editing Objects

YOU MUST BE ABSOLUTELY SURE OF WHAT AND WHERE YOU ARE WRITING!

Or you may completely lose all your data.

Before you can physically write anything on a disk, you need to enable writing.

To enable writing,

- 1 On the **R-Studio for Linux** main panel, select the **Tools** menu, then **Settings**, and select **Enable Write** on the [Settings](#) dialog box.

> The Editable: **status will change to Yes** from Read Only.
Now the object can be edited.

To view/edit an object,

- 1 Right-click the object and select **View/Edit** on the context menu, or
Select the object and select **View/Edit** on the **File** menu

▣ R-Studio Text/hexadecimal editor

The screenshot displays the R-Studio Text/hexadecimal editor interface. The main window shows a hex dump of data with corresponding ASCII characters. On the left, there are two panels: 'Templates' and 'Properties'.

Templates Panel:

- Boot sector NTFS: b76fbab2 HI
- Name: Value
- JMP instruction: C7 9C 21
- OEM ID: ÇÇ"Ö%4i
- BIOS Parameter Block (expanded):
 - Bytes per sector: 40503
 - Sectors per cluster: 20
 - Reserved sectors (always zero): 3B F6 1C
 - (unused): 4D C2
 - Media descriptor: 17
 - (unused): 1D 11

Properties Panel:

- Name: Partition1 -> SAMS...
- Size: 7340032000
- Sector size: 512
- Offset: 0x0b76fb800
- Sector: 6010844
- Position in se...: 0
- Parent: SAMSUNG SP0411N...
- Size: 40060403712
- Offset: 0x0b77fb800
- Sector: 6012892

Main Editor:

Offset | Binary data | ANSI

```

B76FB780: 8E D6 6E 6A FC 2B 36 31 - BD 3C 96 37 7B 02 93 A4 ..nj.+61.<.7{... ..r
B76FB790: 91 95 2D 18 53 DC B9 9F - 06 AE 94 46 D6 D0 F1 76 ...S.....F...v ..
B76FB7A0: 0B 77 F6 31 14 20 43 FF - F1 06 BE B0 40 C3 7A 57 .w.1. C.....@.zW .w.
B76FB7B0: AB 65 52 76 B4 A1 D1 AE - F6 BD 37 4F 94 BE 87 49 .eRv.....70...I .eF
B76FB7C0: 2B F7 68 21 BF 22 A6 C2 - 47 EF D2 C3 72 A9 D3 E7 +.h!".G.....+.f
B76FB7D0: EE 69 44 C7 AD F3 E7 D0 - 6C 39 7C FD 2C 28 33 0D .iD.....19|.,(3. .iD
B76FB7E0: E7 C2 97 15 4F A0 11 55 - 07 54 89 CA 9D 2A 56 95 ...0..U.T...*V. ...
B76FB7F0: F3 F1 C4 2B C3 22 F9 F3 - B4 B5 D3 3A 73 4D ED 75 ...+.".....:sM.u ...
  
```

Sector 6010844 (Parent: SAMSUNG SP0411N TW100-11 Record: 6012892)

```

B76FB800: 30 32 77 62 80 02 00 00 - AF 8C 68 F2 C2 30 E0 50 02wb.....h..0.P 02w
B76FB810: 00 B0 F9 CB 1D 61 FD EB - 2E 71 68 C8 D9 5B 2B 37 .....a...qh...[+7 ...
B76FB820: A2 51 EE 34 39 B7 35 42 - 71 B4 82 92 49 B8 DB 6D .Q.49.5Bq...I..m .Q.
B76FB830: B6 15 E8 4A 11 11 54 84 - 09 E8 2F 1A D5 A4 E5 11 ...J.T.../..... ...
B76FB840: 10 A4 51 50 77 16 21 0C - 22 71 F3 84 46 11 D0 1B ...QPw.!."q..F.... .Ç
B76FB850: 88 63 C5 83 80 09 33 09 - CB D3 BB 4E F6 EC FD 26 .c...3...N...& .c.
B76FB860: 8A 36 6E 66 77 30 CE A3 - 07 5A FE 61 67 3C ED 6E .6nfw0...Z.ag<.n .6r
B76FB870: DD 2F F5 AA 3F 9B FD - CF FF 9B 3A 1F F8 B5 39 ./..P.....:..9 ./..
B76FB880: FE EF F7 6F 30 88 A6 E3 - 72 C7 1B 44 90 A6 48 1D ...o0...r..D..H. ...
B76FB890: B2 1F 2E C9 E0 79 40 34 - 10 95 0D 01 28 8A 59 AE .....y@4....(.Y. ...
B76FB8A0: 9C 3E 89 01 6B DE E9 86 - AC 43 0B 48 5A 31 5A 97 >..k....C.HZ1Z. >..
B76FB8B0: 7C EF A8 2F B5 CE 15 7E - E7 E4 FF AF E1 76 05 36 |.../.....v.6 |...
  
```

Find Results Panel:

Find: "FILE" from the position 0x0 to 0x1b57ffff

0x000003000 Tvae: Undefined FILE0... *"...8... ..3.....H.....a kèJi Ä. aJ

Bookmarks Find Results

Ready | Size 7340032000 | Offset 0x0b76fb800 = 307752128 | Sector 6010844 | Editable Binary data Unaltered

Data Parsed According to the Selected Pattern

Name	Value
[JMP instruction]	EB 52 90
OEM ID	NTFS
BIOS Parameter Block	
Bytes per sector	512
Sectors per cluster	4
Reserved sectors (always zero)	0
(unused)	00 00 00
Media descriptor (unused)	00 00
Sectors per track	63
Number of Heads	255
Hidden sectors (unused)	00 00 00 00
(always 80 00 80 00)	80 00 80 00
Total sectors	1433596
Logical Cluster Number for the file \$MFT	6
Logical Cluster Number for the file \$MFTMirr	151
Clusters Per File Record Segment	246
Clusters Per Index Block	2
Volume serial number (hex, reversed)	0x5c4e47d
Volume serial number (hex)	7D E4 EC 5C
64-bit serial number (hex)	7D E4 EC 5C 30 ED 5C FE
Checksum	0
Bootstrap Code	FA 33 C0 8E D0 BC 00 7C FB B8 C...
Signature (55 AA)	55 AA

Object Properties

Property	Value
Name	Partition1 -> SAMSUNG SP0411N TW100-11 : S01J20XC75851
Size	7340032000
Sector size	512
Offset	0x00000000
Sector	0
Position in sector	0
Parent	SAMSUNG SP0411N TW100-11
Size	40060403712
Offset	0x000100000
Sector	2048

Object Sector Mapping

Sector	Parent Sector
4615691	4617739
4615692	4617740
4615693	4617741
4615694	4617742
4615695	4617743
4615696	4617744
4615697	4617745
4615698	4617746
4615699	4617747
4615700	4617748
4615701	4617749
4615702	4617750
4615703	4617751
4615704	4617752
4615705	4617753
4615706	4617754

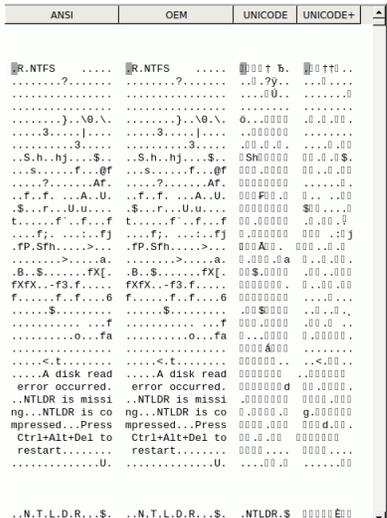
Data Shown as Various Digits

Name	Value
8 bit binary	00110000
ANSI character	0
OEM character	0
Little Endian	
UTF8 character	0
UTF16 character	0
8 bit hexadecimal n...	0x30
8 bit octal number	060
8 bit unsigned deci...	48
8 bit signed decimal...	48
16 bit hexadecimal ...	0x3230
16 bit octal number	031060
16 bit unsigned decli...	12848
16 bit signed declim...	12848
32 bit hexadecimal ...	0x6273230
32 bit octal number	0142356310...
32 bit unsigned decli...	1651978800
32 bit signed declim...	1651978800
64 bit hexadecimal ...	0x28062773...
64 bit octal number	0500142356...
64 bit unsigned decli...	2750431048...
64 bit signed declim...	2750431048...
Windows time	1601-01-04 ...
DOS time	2029-03-23 ...
Unix time	2022-05-08 ...
Big Endian	
UTF8 character	0
UTF16 character	0
8 bit hexadecimal n...	0x30
8 bit octal number	060
8 bit unsigned deci...	48
8 bit signed decimal...	48
16 bit hexadecimal ...	0x3032
16 bit octal number	030062
16 bit unsigned decli...	12338
16 bit signed declim...	12338
32 bit hexadecimal ...	0x30327762
32 bit octal number	06014473542
32 bit unsigned decli...	808613730
32 bit signed declim...	808613730
64 bit hexadecimal ...	0x30327762...
64 bit octal number	0300623566...
64 bit unsigned decli...	3472969527...

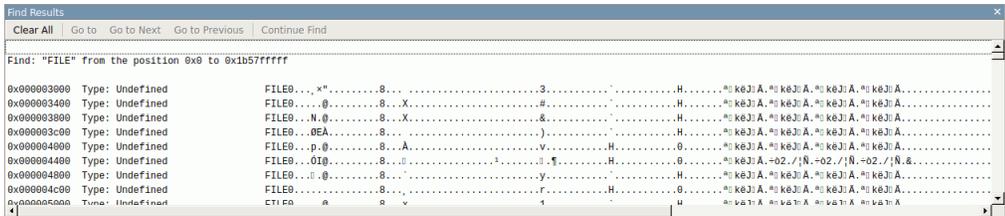
Binary view

Offset	Binary data
B76FB7E0:	E7 C2 97 15 4F A0 11 55 - 07 54 89 CA 0D 2A 56 95
B76FB7F0:	F3 F1 C4 2B C3 22 F9 F3 - B4 B5 D3 3A 73 4D ED 75
Sector 6010844 (Parent: SAMSUNG SP0411N TW100-11 Record: 6012892)	
B76FB800:	00 B0 F9 CB 1D 61 FD EB - 2E 71 68 C8 09 5B 2B 37
B76FB810:	A2 51 EE 34 39 B7 35 42 - 71 B4 82 92 49 8B DB 6D
B76FB820:	B6 15 E8 4A 11 11 54 84 - 09 E8 2F 1A 05 A4 E5 11
B76FB830:	10 A4 51 50 77 16 21 0C - 22 71 F3 84 46 11 D0 1B
B76FB840:	88 63 C5 83 80 09 33 09 - CB D3 8B 4E F6 EC FD 26
B76FB850:	8A 36 6E 66 77 30 CE A3 - 07 5A FE 61 67 3C ED 6E
B76FB860:	DD 2F F5 AA 3F 9B FD - CF F8 9B 3A 1F F8 B5 39
B76FB870:	FE EF F7 6F 30 88 A6 E3 - 72 C7 18 44 90 A6 48 1D
B76FB880:	B2 1F 2E C9 E9 79 49 34 - 10 95 00 01 28 8A 59 AE
B76FB890:	9C 3E 89 01 6B DE E9 86 - AC 43 08 48 5A 31 5A 97
B76FB8A0:	7C EF A8 2F B5 CE 15 7E - E7 E4 FF AF E1 76 05 36
B76FB8B0:	1F 3E 92 47 2B 0B 81 8B - FF F8 94 00 C0 80 02 8D
B76FB8C0:	26 4C C9 E9 32 50 58 44 - D9 BD 3D 28 4B 0A 50 78
B76FB8D0:	31 87 A5 09 01 6C 8F 66 - 74 F4 A3 21 07 02 76 49
B76FB8E0:	D1 06 00 24 EA 74 94 45 - CA 5A ED 57 8B D6 C8 29
B76FB8F0:	34 DC FF A4 06 24 82 46 - 43 E5 D9 74 11 14 03 82
B76FB900:	49 98 68 1C 44 53 5A C2 - 48 70 01 42 07 D0 D5 92
B76FB910:	B1 B3 F5 C9 EB 48 18 AF - 56 AE 29 75 6A A5 07 21
B76FB920:	68 A9 4C EF 07 5D C1 - B3 97 2F FD 64 3A 6C 58
B76FB930:	A2 09 93 4A 43 0F 02 - 43 86 DA C7 F4 E7 77 A4
B76FB940:	56 D2 89 EA 1E C9 28 A6 - E4 FF A0 05 C1 EE 82 90
B76FB950:	9E 3E 3C C5 A7 0B 00 C4 - E4 23 06 44 81 90 B3 04
B76FB960:	3C 38 D0 A0 94 56 83 92 - 90 15 B2 28 90 93 65 A7
B76FB970:	83 35 15 95 9F 4F 98 59 - 7C B1 E8 80 3A 8D 8F 41
B76FB980:	D4 9F 82 AD 10 A0 2A 39 - 76 A4 A2 D3 15 71 69 3D
B76FB990:	AF 09 A9 87 B9 AF 5D CC - CB B5 70 2A D7 C9 24 6D
B76FB9A0:	A0 B8 3D D2 D2 1B 8F 8B - D8 64 F5 81 63 76 2B 8F
B76FB9B0:	A5 82 69 93 87 32 44 78 - C0 F5 6F 2D 81 C0 0F AA
B76FB9C0:	32 71 34 29 A2 8C E9 8C - 72 1E EB F3 4B FC B9
B76FB9D0:	E9 76 92 B8 B5 3B 76 D4 - D3 DE AB 18 82 D0 79
B76FB9E0:	8B 5C A2 8C 1E 89 9C 91 - 29 E9 4E B6 11 27 1C 4E
Sector 6010845 (Parent: SAMSUNG SP0411N TW100-11 Record: 6012893)	

Text view



Find Results



List of Bookmarks

Bookmark	Location	Offset	Sector
Bookmark 1	Std	0x0b76fb800	6010844
Bookmark 2	Std	0x0b76fb874	6010844
Bookmark 3	Std	0x0b76fb935	6010844
Bookmark 4	Std	0x0b76fb9dd	6010844

Text/hexadecimal Editor status



Previous Pattern
 Click this button to go to the previous pattern.

Next Pattern
 Click this button to go to the next pattern.

Save Changes
 Click this button to save changes.

Code pages
 Turns supported code pages on/off.

Autoflow
 Click this button to turn autoflow on.

Panel view options

You may set which panels and bars to enable/disable.

▣ To enable/disable:

ANSI data	Select/clear ANSI on the View menu
OEM data	Select/clear OEMr on the View menu
UNICODE data	Select/clear UNICODE on the View menu
UNICODE+ data	Select/clear UNICODE+ on the View menu
Toolbar	Select/clear Toolbar on the View menu
Properties View	Select/clear Properties View on the View menu
Sectors View	Select/clear Sectors View on the View menu
Data Interpreter View	Select/clear Data Interpreter View on the View menu
Template View	Select/clear Template View on the View menu
Bookmarks View	Select/clear Bookmarks View on the View menu
Find Results View	Select/clear Find Results View on the View menu

2 View the information and make necessary changes

Select **Save Changes** on the **Tools** menu if you want to save changes.

▣ Other ways to save changes

- Select **Save Changes** on the **File** menu
- or
- Press the **Ctrl+S** keys

Viewing

There are up to four tabs showing the data in different representations. Actual number of tabs depends on the object and property being viewed/edited.

Std	Exact attribute data. If the attribute is compressed, R-Studio for Linux decompresses it prior to showing.
Unlimited	Exact attribute data + free space of last cluster. If the attribute is compressed, R-Studio for Linux decompresses it prior to showing.
Direct	Actual data written on the disk. If the attribute is not compressed, it coincides with the Std representation.
Allocation	Resident part of the attribute.

You may view data in 4 various code pages: ANSI/OEM/UNICODE/UNICODE+ by switching on/off the respective code pages in the **Code pages** buttons or select the appropriate code pages on the **View** menu.

Patterns or Templates

You may select a pattern according to which the data will be parsed and shown in the parsed data pane. The Data Interpreter shows the data selected on the Template pane in various representations.

You may find the next or previous data that matches the pattern signature on the disk. Right-click the right pane of the editor and select either **Find Template Signature Next** or **Find Template Signature Previous** on the context menu. You may also select these items on the **Edit** menu.

You may also [create](#) your own patterns to parse data from various objects.

Navigating.

Text/Hexadecimal Editor gives you various ways to navigate into an object. See the [Navigating through an Object](#) for more details

Data Copy

Text/Hexadecimal Editor gives you various ways to copy selected data navigate in an object. See the [Data Copy](#) for more details.

Filling an area with a pattern

To fill an area with a pattern, select **Fill** on the **Edit** menu, and specify the pattern and area on the Fill dialog box.

Fill dialog box
Fill options

Fill pattern	
HEX	Field for the pattern to fill the area in the hexadecimal representation
ANSI	Field for the pattern to fill the area in the ANSI encoding
OEM	Field for the pattern to fill the area in the OEM encoding
UNICODE	Field for the pattern to fill the area in the UNICODE encoding
Fill range	
From (hex)	Field for the start position of the area to fill with the pattern
To (hex)	Field for the end position of the area to fill with the pattern

3 Click the Save Changes button to save the changes**Other ways to save the changes made**

- Select **Save Changes** on the **Edit** menu

OR

- Press the **F2** key

> Viewer/Editor will save the changes on the object

YOU MUST BE ABSOLUTELY SURE OF WHAT AND WHERE YOU ARE WRITING!

Or you may completely lose all your data.

Selecting and saving an area in the Viewer/Editor

You may select an area in the Viewer/Editor panel and save it as a file.

To select and save an area in the Viewer/Editor panel,

1 Right-click the beginning of the selection and select Select From on the context menu**2 Right-click the end of the selection and select Select To on the context menu****Other ways to select an area**

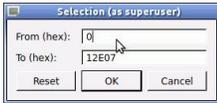
- Select **Select...** on the **Tools** menu and specify an area to select on the Select dialog box,

or

- Click the start point of the area and drag the mouse cursor to its end.

If you need to select an entire object, select **Select All** on the **Tools** menu or click the **Ctrl+A** key

Select **dialog box**



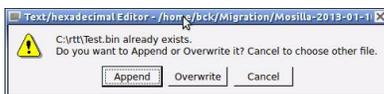
- 3 Select an appropriate item in the **Tools** menu to save the data in a required format and specify its file name

Select:

Save to Binary File...	to save the data in the binary format (default extension is <code>.bin</code>)
Save to Hexadecimal File	to save the data in the binary format (default extension is <code>.hex</code>)

on the **Tools** menu.

If you select an existing file, **R-Studio for Linux** will ask you if you want to append or overwrite the file.



If a remote computer is connected for [Data Recovery over Network](#), the Save as... dialog box will appear when you select a place to save the data. You may save it to the local or remote computer.



> **Viewer/Editor will save the data in the file**

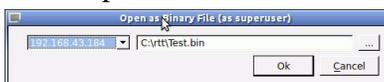
Loading data from an external file

You may load a data from a file and overwrite an area of the object opened in the Viewer/Editor panel.

To load binary data from a file and overwrite an area of the object opened in the Viewer/Editor panel,

- 1 Select an area to overwrite and select **Load from File...** on the **Tools** menu

If a remote computer is connected for [Data Recovery over Network](#), the Open as Binary File dialog box will appear when you select a place to open the data file from. You may open it from the local or remote computer.



- 2 Select the necessary file and load the data.

> **The area in the Viewer/Editor will be overwritten with the new data.**

4.2 Navigating through an Object

Navigating

You may quickly move to a particular part of the object. To move to a particular part of the object being viewed/edited, enter the required offset in the **Go to Offset** field between the buttons.

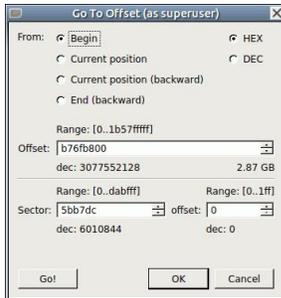
Offset to go to: Bytes Type an offset to which you want to go. You may select between bytes and sectors. See the [Data Formats and Multipliers](#) topic for more details on data formats.

If a file is opened in **Text/Hexadecimal Editor**, you may select data representation for that file.

Offset to go to: Bytes DATA: DATA (NR)

You may also use the Go To Offset dialog box to go to a specified place in the object. Click the Offset field on the **Status** bar. You may also use this dialog box to copy the offset.

Go To Offset dialog box



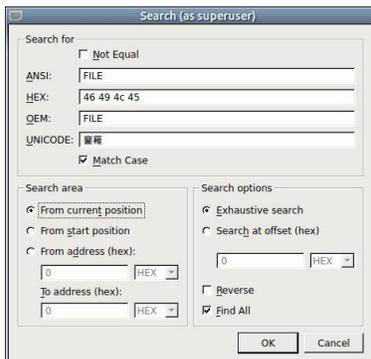
Go To Offset options

From:	Jump/offset direction. For example, if you need to find the offset from the object end for a selected byte, switch to the End (backward) option.
HEX/DEC	Switch between the hexadecimal and decimal data representation.
Range	Range of values that can be entered.
dec/hex:	Alternative data representation.
Offset:	Flat data offset (without separation between the sector and offset in the sector).
Sector/offset	Data offset represented as a sector and offset in the sector.
Go!/OK buttons	The Go! button moves the cursor to the specified positions, but the Go To Offset dialog box remains open. The OK button closes the dialog box after moving the cursor.

Searching

To search for a particular string, click the **Find**, **Find Next**, or **Find Previous** buttons or the same items on the **Edit** menu, and specify the string on the Search dialog box.

Search dialog box



▣ Search options

Not Equal	Search for the place which content is not equal to the string. For example, the first byte not equal to 00 or FF.
Search for	
HEX	Field for the string to search for in the hexadecimal representation
ANSI	Field for the string to search for in the ANSI encoding
OEM	Field for the string to search for in the OEM encoding
UNICODE	Field for the string to search for in the UNICODE encoding
Match case	Select this check box to make the search case-sensitive
Search area	
From current position	Select this check box to start search from the current position
From start position	Select this check box to start search from the beginning of the object
From Address	Select this check box and specify the range in which the search is to be carried out
Search position	
Exhaustive search	Select this check box to search the entire object
Search at offset	Select this check box and specify the sector offset from which the search will start
Reverse	Select this check box to start the search in the reverse direction
Find all	Select this check box to search for all instances of the string to search. Search results will be shown in the Find Results pane.

Text/Hexadecimal Editor will show the search progress.

Search results are shown on the Find Results pane. You may easily move to the required found item by clicking the item.

▣ Features of the Not Equal option

Suppose we have an object which first 3 consecutive sectors start with:

```
Sector1  FILEAAAAA.....
Sector2  FILEBBBBB.....
Sector3  NOTAFILE.....
```

And the search string is Not Equal FILE.

If the Exhaustive search option is selected, the **Text/Hexadecimal Editor** will stop at the first A character in Sector1.

If the Search at offset=0 option is selected, the **Text/Hexadecimal Editor** will stop at the N character in Sector3.

Bookmarking

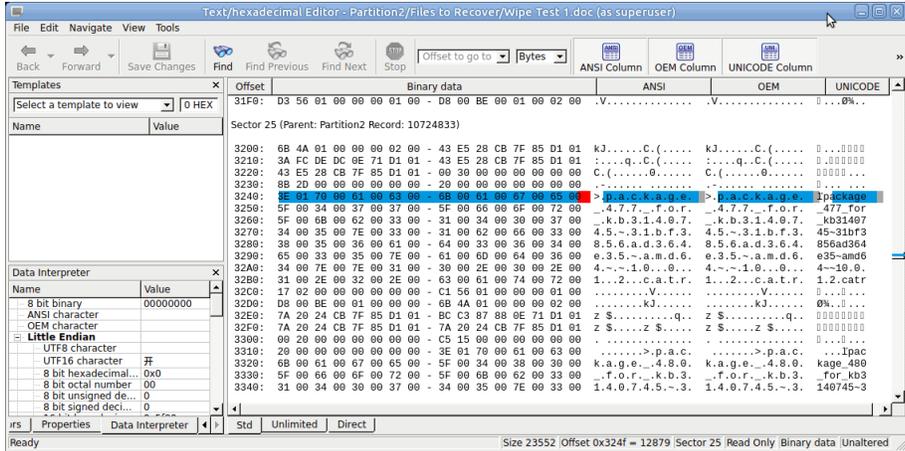
You may create bookmarks to easily move to those places. Right-click the cursor on the place you want to bookmark and select **Toggle Bookmark** on the context menu. The list of bookmarks appears in the Bookmark pane. You may easily move to the required bookmark by clicking it in the list.

You may control bookmarks on the **Edit** menu.

4.3 Data Copy

Text/hexadecimal Editor gives you various ways to copy selected data in an object.

Data selected in Text/hexadecimal editor



Depending on what column you have control-clicked, the following commands are available in the context menu:

<p>When right-clicking any column Copy Editor Display</p>	<p>Data pasted into a text editor</p>
<p>When right-clicking any column Copy as File Signature</p>	<p>Data pasted into a text editor</p>
<p>When right-clicking the Binary data column Copy as "Binary data"</p>	<p>Data pasted into a text editor</p>
<p>When right-clicking the ANSI column Copy as "ANSI"</p>	<p>Data pasted into a text editor</p>

Pattern structure**Pattern header**

Each pattern starts with a standard header

```
<?xml version="1.0" encoding="utf-8"?>
```

Section `template`

Each pattern starts with a section giving to the pattern a name that will be shown in the parsed data pane.

Attributes:

name	Specifies the pattern name shown in the parsed data pane
------	--

Example:

```
<template name="AVI File LIST">
  .....
</template>
```

Section `signature`**Attributes:**

align <code><positive integer></code>	Specifies if the data structure address is aligned (i.g., by a sector: 512)
---	---

This section contains elements `field` with hex-codes of the signature. The attribute `offset` specifies their offset from the start of the record. Field length is equal to the number of hex-codes.

Example:

```
<signature align="1">
  <field offset="0">46 49</field>
  <field offset="2">4c 45</field>
</signature>
```

Section `section`

Such sections contain all expressions and operations needed for the pattern to parse the data. A section name is shown in the parsed data pane. In fact, sections are virtual objects used to group logically connected `fields`. Sections can be nested.

The main section is not shown in the parsed data pane.

Section contain elements `field` which are actual data objects. `field` names are shown in the parsed data pane with their values.

Attributes:

name	Specifies the pattern name shown in the parsed data pane
------	--

Example:

```
<section name="JUNK">
  ....
</section>
```

List of All Objects in Patterns**Data types (in `field`)**

- integer
 - Sub-types:
 - int8
 - int16

```
int32
int64
uint8
uint16
uint32
uint64
uintX
```

Attributes:

endian: (be le system)	Optional. Default: <i>system</i> .
base: (decimal hex octal)	Optional. Specifies data representation. Default: <i>decimal</i> .
as-offset: <expression>	Optional. Specifies that this field is an offset and its value should be evaluated using the expression. A special variable <i>this</i> returns the value of this field.
purpose: (offset rsector sector cluster rcluster)	Optional. Specifies the type of the <i>as-offset</i> expression result . If this attribute is present, the attribute is necessary if the offset value should differ from the value of this field (variable <i>this</i>). <i>rsector</i> and <i>rcluster</i> are offsets relative to the absolute position of the pattern beginning.
assigned- template: <TemplateName>	Specifies the pattern name linked with this field. Ignored if the <i>as-offset</i> or <i>purpose</i> attributes are not specified.
var: <Name>	Optional. Specifies the name under which the value of this field can be accessed in expressions.

• **binary****Attributes:**

display-encoding: (hex binary)	Optional. Default: <i>hex</i> .
size: <bytes>	Mandatory.

• **char****Attributes:**

size: <bytes>	Mandatory.
codepage: (ansi oem utf8 utf16)	Optional. Specifies which codepage is used. Default: <i>ansi</i> .

• **filetime**

Shows time in the Win32 format (64 bits)

• **unixtime**

Shows time in the Unix format (seconds from 01/01/1970)

- `filetime`
Shows time in the DOS format (date: hiword, time: loword)

- `bits`

Attributes:

<code>size: <bytes></code>	Mandatory.
<code>pos: <comma separated list of bit positions></code>	Mandatory. Specifies bit positions in a data block.

Commands

- `goto`
Specifies a jump to a specified offset (either absolute or relative one)

Attributes:

<code>address: <expression></code>	Specifies an absolute address to jump to.
<code>offset: <expression></code>	Specifies a relative offset to jump by.

One and only one of the attributes should always be specified.

- `if`
Evaluates a condition specified in the `test` attribute and, if the condition is true, reads fields specified in this tag.

Attribute:

<code>test: <expression></code>	Sets a condition to test against.
---------------------------------------	-----------------------------------

- `repeat`
Reads the fields specified in the tag until the exit condition is equal to 0 or specified times

Attributes:

<code>count: <expression></code>	<code><expression></code> is evaluated one time upon entering the block. Internal elements are read the specified number of times.
<code>test: <expression></code>	<code><expression></code> is evaluated upon entering the block. Similar to the C++ construction <code>while(...) {}</code> .
<code>test: <expression></code>	<code><expression></code> is evaluated upon exiting the block. Similar to the C++ construction <code>do {} while(...)</code> .

- `setvar`
Sets the value of an internal variable. As an example, this command is convenient to store the current offset. The value of the current offset is stored in a predefined variable `offset`.

Attributes:

<code>var: <string></code>	Specifies the name of the variable.
<code>expr: <expression></code>	Specifies an expression which result will be assigned to the variable.

Expressions

Expressions in the patterns are arithmetic expressions which syntax is similar to that of the C language, including operation preceding.

The following operations are supported:

```
+ - */ & | > < <= >= != == || &&
```

Predefined variables

- `offset`

An offset in bytes from the pattern beginning data is currently read at.

- `start_position`

An absolute position of the pattern beginning. `offset + start_position = absolute offset`.

- `this`

This variable exists only within the context of the `ass-offset` expression evaluation and is the current value of the data field for which that expression is specified

4.6 Pattern Example I

Below is an example of a commented pattern parsing an AVI file.

```
<?xml version="1.0" encoding="utf-8"?>
<!-- A pattern section. The pattern name is AVI File. -->
<template name="AVI File">
  <!-- A template signature section. Alignment is 1. -->
  <signature align="1">
    <!-- A 4-byte signature at offset 0x00. -->
    <field offset="0x00">52 49 46 46</field> <!-- ANSI: RIFF -->
    <!-- A 4-byte signature at offset 0x08. -->
    <field offset="0x08">41 56 49 20</field> <!-- ANSI: LIST -->
  </signature>

  <!-- A data section. Its name is AVI File. This is the main data section. It is not shown in the parsing tree as
  a section (its name is ignored). -->
  <section name="AVI File">
    <!-- The first 4 bytes are read and shown as an ANSI string. -->
    <field type="char" size="4" name="Signature: RIFF" var="signature"/>
    <!-- The current position is moved to the beginning of the file. -->
    <goto offset="-4"/>
    <!-- The first 4 bytes in the file are read and shown as an unsigned integer. The internal variable signature
    gets the value of the field. -->
    <field type="uint32" base="hex" name="Signature RIFF as unsigned integer in hex
    format" var="signature"/>

    <!-- A test against the condition (signature == RIFF) -->
```

```

<if test="signature == 0x46464952"><!-- ANSI: RIFF -->
  <!-- The next 4 bytes are read and shown as an unsigned integer. The internal variable dataSize gets
the value of the field. -->
  <field type="uint32" name="Size of the data in file" var="dataSize"/>
  <!-- A new internal variable endOfFile is created and the expr field evaluates its value.-->
  <setvar var="endOfFile" expr="offset + dataSize - 8"/>
  <!-- The next 4 bytes is read and shown as an ANSI string. -->
  <field type="char" size="4" name="File type"/>

  <!-- A new section named DATA is created -->
  <section name="DATA">
    <!-- A new internal variable chunksOffset is created, the expr filed evaluating its value. This variable
gets the absolute value of template offset. -->
    <setvar var="chunksOffset" expr="start_position"/>

    <!-- A loop is created. Its condition is set in the test field (while the endOfFile variable is greater
then the current position.) -->
    <repeat test="endOfFile > offset">
      <!-- 4 bytes are read and shown as an ANSI string. -->
      <field type="char" size="4" name="Signature"/>
      <!-- The current position is moved backwards by 4 bytes. -->
      <goto offset="-4"/>
      <!-- The same 4 bytes are read and shown as an unsigned integer. The internal variable signature
gets this value. -->
      <field type="uint32" name="Signature as unsigned integer"
var="signature"/>

      <!-- A test against the condition (signature == LIST) -->
      <if test="signature == 1414744396"><!-- ANSI: LIST -->
        <!-- The section is shown. Its name is LIST -->
        <section name="LIST">
          <!-- The current position is moved backward by 4 bytes. -->
          <goto offset="-4"/>
          <!-- The 4 bytes are read and shown as an unsigned hexadecimal integer. This field has the
attributes offset and assigned-template. If the user double-clicks this field, the AVI File LIST pattern
will be invoked and the current pattern position will be moved to the address specified in as-offset.-->
          <field type="uint32" base="hex" name="Signature LIST as unsigned
integer in hex format" as-offset="start_position + offset - 4" assigned-
template="AVI File LIST"/>
          <!-- The next 4 bytes are read and shown as an unsigned integer. The listSize variable gets
its value. -->

```

```

                <field type="uint32" name="Size of the data in the list"
var="listSize"/>
        <!-- The 4 bytes are read and shown as an ANSI string. -->
        <field type="char" size="4" name="List type"/>
        <!-- The current position is moved backward by 4 bytes. -->
        <goto offset="-4"/>
        <!-- The same 4 bytes are shown as an unsigned hexadecimal integer. The listType variable
gets its value.-->
        <field type="uint32" base="hex" name="List type as unsigned integer in
hex format" var="listType"/>

        <!-- A test against condition (type == movi) -->
        <if test="listType == 0x69766f6d"> <!-- ANSI: movi -->
            <!-- The chunksOffset variable gets the value evaluated in the expr attribute. -->
            <setvar var="chunksOffset" expr="start_position + offset - 4"/>
        </if>

        <!-- The current position is moved to the address evaluated in the address attribute. -->
        <goto address="offset + listSize - 4"/>
    </section>
</if>

<!-- A test against condition (signature == JUNK) -->
<if test="signature == 1263424842"> <!-- ANSI: JUNK -->
    <!-- The section is shown with the JUNK name. -->
    <section name="JUNK">
        <!-- The next 4 bytes are read and shown as an unsigned integer. The internal variable
junkSize gets its value. -->
        <field type="uint32" name="Size of the data of the junk"
var="junkSize"/>
        <!-- The current position is moved by junkSize bytes forward. -->
        <goto offset="junkSize"/>
    </section>
</if>

<!-- A test against condition (signature == idx1) -->
<if test="signature == 829973609"> <!-- ANSI: idx1 -->
    <!-- The section is shown with the idx1 name. -->
    <section name="idx1">
        <!-- The next 4 bytes are read and shown as an unsigned integer. The internal variable
idxSize gets its value. -->

```

```

        <field type="uint32" name="Size of the data of the idx1"
var="idxSize"/>
    <!-- The section is shown with the First AVIINDEXENTRY name. -->
    <section name="First AVIINDEXENTRY">
        <!-- The 4 bytes are read and shown as an ANSI string. -->
        <field type="char" size="4" name="Chunck id"/>
        <!-- The next 4 bytes are read and shown as an unsigned hexadecimal integer. -->
        <field type="uint32" base="hex" name="Flags"/>
        <!-- The next 4 bytes are read ans shown as an unsigned hexadecimal integer. The offset
attribute is evaluated for this field as a sum of the chunksOffset variable and valued of this field. -->
        <field type="uint32" base="hex" name="Chunk offset" as-
offset="chunksOffset + this"/>
        <!-- The next 4 bytes are read and shown as an unsigned integer. -->
        <field type="uint32" name="Chunk size"/>
    </section>
    <!-- The current position is moved by idxSiz bytes forward. -->
    <goto offset="idxSize"/>
</section>
</if>

<!-- A test against the condition. &amp;&amp; is a logical AND (&&) -->
    <if test="signature != 1414744396 &amp;&amp; signature != 1263424842
&amp;&amp; signature != 829973609">
        <!-- An empty section is shown. Its name is Unknown signature found -->
        <section name="Unknown signature found">
        </section>
        <!-- The current position is moved to the address set in the endOfFile variable. -->
        <goto address="endOfFile"/>
    </if>
</repeat>
</section>
</if>
</section>
</template>

```

4.7 Pattern Example II

```

<?xml version="1.0" encoding="utf-8"?>
<!-- A pattern section. The pattern name is AVI File LIST -->
<template name="AVI File LIST">
    <!-- A template signature section. Alignment is 1. -->
    <signature align="1">
        <!-- A 4-byte signature at offset 0x00. -->

```

```
<field offset="0x00">4C 49 53 54</field> <!-- ANSI: LIST -->
</signature>
```

<!-- A data section. Its name is AVI File LIST. This is the main data section. It is not shown in the parsing tree as a section (its name is ignored).-->

```
<section name="AVI File LIST">
```

```
<!-- The first 4 bytes are read and shown as an ANSI string. -->
```

```
<field type="char" size="4" name="Signature: LIST"/>
```

```
<!-- The current position is moved to the beginning of the file (4 bytes backward). -->
```

```
<goto offset="-4"/>
```

<!-- The first 4 bytes in the file are read and shown as an unsigned integer. The internal variable signature gets the value of the field. -->

```
<field type="uint32" name="Signature LIST as unsigned integer" var="signature"/>
```

```
<!-- A test against the condition (signature == LIST) -->
```

```
<if test="signature == 1414744396"> <!-- ANSI: LIST -->
```

<!-- The next 4 bytes are read and shown as an unsigned integer. The internal variable listSize gets its value. -->

```
<field type="uint32" name="Size of the data in the list" var="listSize"/>
```

```
<setvar var="endOfList" expr="offset + listSize"/>
```

```
<field type="char" size="4" name="List type"/>
```

```
<goto offset="-4"/>
```

<field type="uint32" base="hex" name="List type as unsigned integer in hex format" var="listType"/>

```
<!-- A test against condition (listType == movi) -->
```

```
<if test="listType == 0x69766f6d"> <!-- ANSI: movi -->
```

```
<!-- This chunk is not to be parsed. The current position is moved to the end of the chunk. -->
```

```
<goto address="endOfList"/>
```

```
</if>
```

```
<setvar var="mediaType" expr="0"/>
```

```
<repeat test="endOfList > offset - 8">
```

```
<section name="CHUNK">
```

```
<field type="char" size="4" name="Chunk ID"/>
```

```
<goto offset="-4"/>
```

```
<field type="uint32" name="Chunk ID as unsigned integer" var="chunkId"/>
```

```
<if test="chunkId == 1414744396"> <!-- ANSI: LIST -->
```

```
<goto offset="-4"/>
```

```
<field type="uint32" base="hex" name="LIST chunk ID as unsigned integer in hex
format" as-offset="start_position + offset - 4" assigned-template="AVI File LIST"/>
</if>

<field type="uint32" name="Size of the data in the chunk"
var="chunkSize"/>
<setvar var="endOfChunk" expr="offset + chunkSize"/>

<!-- Rounding the value of the variable endOfChunk to a number divisible by 2. -->
<if test="endOfChunk & 1">
  <setvar var="endOfChunk" expr="endOfChunk & 0xFFFFFFFFE"/>
  <setvar var="endOfChunk" expr="endOfChunk + 2"/>
</if>

<if test="chunkId == 1751742049"> <!-- ANSI: avih -->
  <field type="uint32" name="Number of microseconds between frames"/>
  <field type="uint32" name="Approximate maximum data rate of the file"/>
  <field type="uint32" name="Alignment for data, in bytes"/>
  <field type="uint32" name="Bitwise combination of zero or more of the
flags"/>
  <field type="uint32" name="Total number of frames of data in the file"/>
  <field type="uint32" name="Initial frame for interleaved files"/>
  <field type="uint32" name="Number of streams in the file"/>
  <field type="uint32" name="Suggested buffer size for reading the file"/>
  <field type="uint32" name="Width of the AVI file in pixels"/>
  <field type="uint32" name="Height of the AVI file in pixels"/>
  <field type="binary" size="16" name="Reserved"/>
</if>

<if test="chunkId == 1852994675"> <!-- ANSI: strn -->
  <field type="char" size="chunkSize" name="Stream name"/>
</if>

<if test="chunkId == 1752331379"> <!-- ANSI: strh -->
  <field type="char" size="4" name="Type"/>
  <goto offset="-4"/>
  <field type="uint32" base="hex" name="Type as unsigned integer in hex
format" var="type"/>
  <setvar var="mediaType" expr="type"/>
  <field type="char" size="4" name="Handler (codec)"/>
  <field type="uint32" base="hex" name="Flags"/>
```

```

        <field type="uint32" name="Number of the first block of the stream that
is present in the file"/>
        <field type="uint32" name="Scale"/>
        <field type="uint32" name="Rate"/>
        <field type="uint32" name="Start time of stream"/>
        <field type="uint32" name="Size of stream in units as defined in Rate
and Scale"/>
        <field type="uint32" name="Size of buffer necessary to store blocks of
that stream"/>
        <field type="uint32" name="Quality"/>
        <field type="uint32" name="Sample size (number of bytes of one stream
atom)"/>
    </if>

<if test="chunkId == 1718776947"> <!-- ANSI: strf-->
    <if test="mediaType == 0x73646976"> <!-- ANSI: vids -->
        <section name="BITMAPINFOHEADER">
            <field type="uint32" name="Number of bytes required by the
structure"/>
            <field type="int32" name="Width of the bitmap, in pixels"/>
            <field type="int32" name="Height of the bitmap, in pixels"/>
            <field type="uint16" name="Number of planes for the target device"/>
            <field type="uint16" name="Number of bits-per-pixel"/>
            <field type="uint32" name="Type of compression for a compressed
bottom-up bitmap"/>
            <field type="uint32" name="Size, in bytes, of the image"/>
            <field type="int32" name="Horizontal resolution, in pixels-per-
meter, of the target device for the bitmap"/>
            <field type="int32" name="Vertical resolution, in pixels-per-meter,
of the target device for the bitmap"/>
            <field type="uint32" name="Number of color indexes in the color
table that are actually used by the bitmap"/>
            <field type="uint32" name="Number of color indexes that are required
for displaying the bitmap"/>
        </section>
    </if>

<if test="mediaType == 0x73647561"> <!-- ANSI: auds -->
    <section name="WAVEFORMATEX">
        <field type="uint16" name="Waveform-audio format type"/>
        <field type="uint16" name="Number of channels in the waveform-audio
data"/>

```

```
        <field type="uint32" name="Sample rate, in samples per second
(hertz)"/>
        <field type="uint32" name="Required average data-transfer rate, in
bytes per second, for the format tag"/>
        <field type="uint16" name="Block alignment, in bytes"/>
        <field type="uint16" name="Bits per sample for the Waveform-audio
format type"/>
        <field type="uint16" name="Size, in bytes, of extra format
information appended to the end of the WAVEFORMATEX structure"/>
    </section>
</if>
</if>

    <goto address="endOfChunk"/>
</section>
</repeat>

</if>

<if test="signature != 1414744396">
    <section name="Invalid LIST signature found">
        </section>
</if>

</section>
</template>
```

V Technical Information and Troubleshooting

This chapter covers various technical issues and troubleshooting.

- [IntelligentScan technology](#)
- [Data Recovery Issues](#)
- [Extended Information Recovery](#)
- [Data Formats and Multipliers](#)
- [Data Recovery on HFS/HFS+ file system](#)
- [Supported Virtual Disk and Disk Image Formats](#)
- [Bad Sectors](#)
- [File Information \(R-Studio Technician/T80+\)](#)
- [Memory Usage](#)
- [Forensic Mode](#)
- [R-Studio for Linux Switches](#)
- [Properties Tab](#)

[R-Studio for Linux Features](#)

[Contact Information and Technical Support](#)

[Data Recovery Using R-Studio for Linux](#)

[Basic File Recovery](#)

[Advanced Data Recovery](#)

[Mass File Recovery](#)

[Volume Sets and RAIDs](#)

[Data Recovery over Network](#)

[Text/Hexadecimal editor](#)

[R-Studio Emergency](#)

[R-Studio Agent Emergency](#)

5.1 IntelligentScan Technology

R-Studio for Linux uses a unique *IntelligentScan* technology when it tries to recover data on the area being scanned.

While scanning the selected area, **R-Studio for Linux** reads data directly from the disk, analyzes them, and tries to determine a record to which the data belong. The following record types are possible:

- MBR/GPT records
- NTFS Boot Sector, Folder, and MFT records
- FAT/[exFAT](#) Boot Sector, folder, and file records
- ReFS Boot sector records and ReFS Meta blocks
- HFS/HFS+ Volume headers and BTree+ nodes
- APFS Super blocks, APFS Volume blocks, and APFS nodes
- Ext2/3/4FS SuperBlocks records
- [UFS/FFS](#) SuperBlock records

- Specific file signatures of [Known File types](#) for raw file carving

All these record types have different, but known, structure. Knowing valid values of record fields and relations between them for each record type, **R-Studio for Linux** determines a record type for the data. If such record type cannot be unambiguously determined, the data are assigned to the most probable record type. The same data can be assigned to several record types, with a certain probability for each assignment. A list of possible files is generated from these records.

R-Studio for Linux generates a record list for each record type. This list contains references to records assigned to a record type from the list with their assignment probability. The same data can be included into different record lists. Then **R-Studio for Linux** analyzes relations between elements in each list and between different lists, and generates a list of found [partitions](#) with their parameters, such as partition start point and probable size, file system type, cluster size, and existence probability.

Using the file list and partition list, **R-Studio for Linux** reconstructs file systems and files on the found partitions. One file can be attributed to several different partitions.

When the entire disk or its part has been scanned, **R-Studio for Linux** shows all found partitions. Then the parameters of the found partitions may be manually corrected, if additional information on them is available.

Using the *IntelligentScan* technology, **R-Studio for Linux** can recover files not only on new and existing partitions. It also can find and recover data on partitions that have been deleted or [reformatted](#). If, for example, there was an NTFS partition, which later was reformatted as a [FAT](#) partition, **R-Studio for Linux** will show two partitions on the same place on the disk, one having the FAT file system, the other the NTFS. Then, found files can be recovered.

The *IntelligentScan* technology makes **R-Studio for Linux** a very powerful data recovery tool, but it is not omnipotent. As it uses probabilistic approach to data reconstruction, it cannot guarantee 100% correct results. Moreover, even if **R-Studio for Linux** has reconstructed data structure correctly, it is impossible to guarantee that all found files will be completely and correctly recovered, as new data may be already written over the old files. See the [Data Recovery Issues](#) topic for details.

5.2 Data Recovery Issues

NEVER TRY TO SAVE RECOVERED FILES/FOLDERS TO THE SAME LOGICAL DISK WHERE THEY RESIDE!!!

Or you may obtain unpredictable results and lose all of your data.

R-Studio for Linux writes directly to a hard drive only when writing recovered data and from its hex editor, if writing is enabled. In all other actions, **R-Studio for Linux** only reads data and analyzes them, and never modifies data on the hard drives being analyzed.

Most operating systems use lazy-write. So, there is a time lag between file actions and actual changes on data on a hard drive. **R-Studio for Linux** analyzes data on hard drives only. That is why it does not always detect recent changes in data structure.

Most operating systems constantly write their service information on hard drives. Such writing is especially intensive during startup and shutdown procedures. When an operating system deletes a file/folder, it treats the space where it has resided as empty and may write something in this place. If this happened, the file/folder and its parameters may be detected correctly, but its data may be lost.

Folder names like **\$\$\$Folder58448** on NTFS [partitions](#) mean that the folder has not been found on the drive but some references to it have been. For example, folders My documents, Work, Photos have been found and all they have one parent folder, whose description has not actually been found on the disk, so its name is unknown and

therefore represented as **\$\$\$Folder58448**. It may happen that the description of such folders was outside of the scan area, so try to enlarge the region or scan the entire hard drive. If that does not help, most likely that the description of the folder has been overwritten.

Folder names like **\$ROOT58448** on [FAT](#) partitions mean that some folders have been found, but they cannot be included into the folder structure for this FAT partition. Sometimes, such folders may contain other folder structures.

If you recover a file, and it appears that the file contains wrong data, try to do the following:

- **Scan:**
 - the [logical disk](#), if the file has been just deleted.
 - the hard drive, if the data structure is damaged more seriously.
- **Search for the file** to be restored on all found partitions and try to recover it from all found partitions. Check each recovered file to ensure that it contains correct data. As soon as you found the partition from which the file is recovered correctly, use this partitions to recover all other deleted files.

If there are several deleted files to be restored, you should use a file larger than 2KB to select the required partition.

FAT file system:

Cross-Linked Folders

Often **R-Studio for Linux** finds several FAT folder records that contain the same data. Such folders are called *cross-linked*. **R-Studio for Linux** marks such folders with an arrow mark:   **.Trashes**

R-Studio for Linux attributes the content of cross-linked folders to one folder called a *target folder*. When recovering, **R-Studio for Linux** places the content to the target folder.

To view the list of cross-linked folders,

- 1 **Right-click a cross-linked folder and select Cross Linked Folders on the context menu**
- > **A list of cross-linked folders will appear**
You may go to any folder in this list by clicking it.

To find a target folder,

- * **Right-click a cross-linked folder and select Go Target on the context menu, or**
Select the cross-linked folder and select **Goto Target** on the **File** menu
If **Go Target** is gray, this folder is already the target folder.

To set the target folder manually,

- * **Right-click a cross-linked folder and select Set As Default Target on the context menu, or**
Select the cross-linked folder and select **Set As Default Target** on the **File** menu.
If **Set As Default Target** is gray, this folder is already the target folder.

Questionable Folders

Sometimes, **R-Studio for Linux** may find FAT records, which look like folders, but their content is invalid. For example, file names have invalid characters, date, time, and size, or other file attributes may look strange. Please note that **R-Studio for Linux** correctly recognizes localized names. **R-Studio for Linux** treats such records as folders, but does not analyze their content and structure. You can manually scan such folders, but results may be unpredictable. Usually, such scan reveals garbage.

R-Studio for Linux marks such folders with a question mark.   Accordion

To re-scan an object,

- * Right-click a questionable folder on the R-Studio for Linux's Folders panel and select Rescan on the context menu, OR

Select the questionable folder and select Rescan on the File menu.

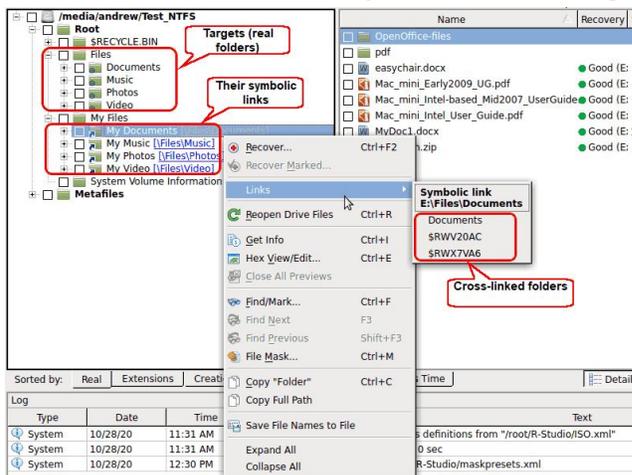
NTFS, APFS, HFS, XFS, and ext fs file systems:

Symbolic links (symlinks)

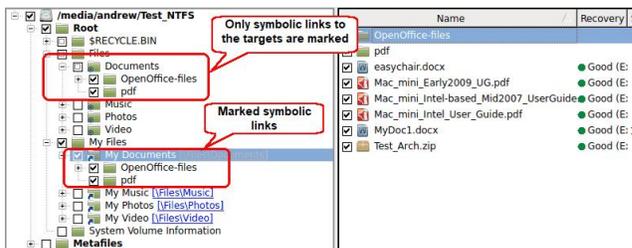
[Symbolic links](#) (of symlinks for short) are object that contains references to other files or folders directory in the form of absolute or relative paths and that affect pathname resolution. For example, if a symlink c:\ProgramData\Documents points to D:\Recovered Files\Root\Users\Public\Documents, entering it will result in entering D:\Recovered Files\Root\Users\Public\Documents.

They are present in almost all modern file systems. NTFS, HFS+, APFS, and EXT FS are probably the most popular examples.

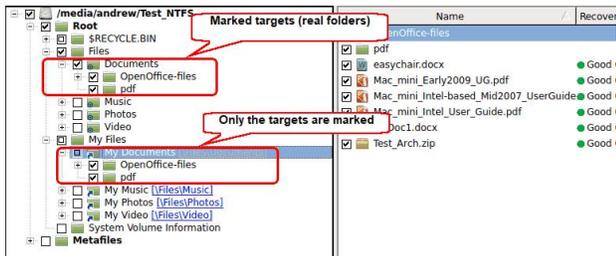
R-Studio for Linux shows such symlinks and their targets in the following way:



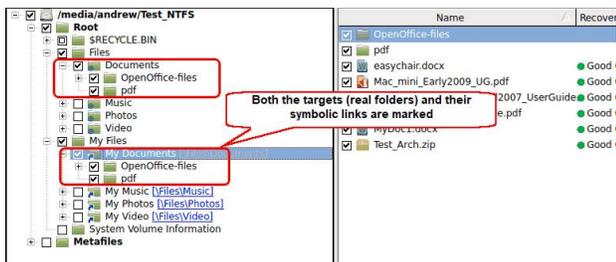
Symlinks can be marked for recovery



Only symlinks on the picture above are marked for recovery. They will be recovered as real files and folders.



Only targets (real folders) on the picture above are marked for recovery. They will be recovered as real files and folders.



Both targets (real folders) and symlinks on the picture above are marked for recovery. They will be recovered as real files and folders and symlinks.

The [R-Studio for Linux Settings](#) topic gives more details about symlink recovery.

Files:

Hard links

[Hard links](#) are file system entries that give file names to files. This term is usually used when files may have several names. **R-Studio for Linux** shows hard links using the following icons:

A hard link:  IMG_3579.JPG

The target file:  IMG_3579.JPG

You may find a target or hard link for a file. Right-click the file and select **Links** on the context menu.

5.3 Extended Information Recovery

R-Studio for Linux supports recovery of compressed files, [alternative data streams](#), encrypted files, file security and extended file attributes. If the **R-Studio for Linux** host OS and the file system of the disk you are going to save file to support any particular extended information, it will be saved with the file, too. Otherwise, the extended information will be saved as separate files with the same name as the restored file and extension showing the type of the extended information. Below is a quick reference for the host OS and file system of the target drive.

Extended Information	Required host OS	Required target disk FS
Encrypted files	Windows 2000/XP/2003/Vista/? 2008/7/8/8.1/10	NTFS
Alternative data streams	Windows NT/2000/XP/2003/? Vista/2008/7/8/8.1/10	NTFS
File security	Windows NT/2000/XP/2003/? Vista/2008/7/8/8.1/10	NTFS

Extended file attributes	Windows NT/2000/XP/2003/? Vista/2008/7/8/8.1/10	NTFS or FAT/exFAT
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5.4 Data Formats and Multipliers

You may enter data in all numerical fields either in sectors or in bytes. If there is no letters are after the number, **R-Studio for Linux** assumes the numbers are in bytes.

Decimal numbers are entered as they are: 2372354

Hexadecimal numbers are entered as 0x23Fa67 or 23Fa67 hex.

The following case-insensitive notation is possible:

b	1 byte
kb	1 kb = 2 ¹⁰ =1024 bytes
mb	1 mb = 2 ²⁰ =104857 bytes
gb	1 gb = 2 ³⁰ =1073741824 bytes
tb	1 tb = 2 ⁴⁰ =109951162776 bytes
eb	1 eb = 2 ⁵⁰ =1125899906842624 bytes
hex	A hexadecimal number
sec (sector)	A number is in sectors

You may also select the multipliers in the drop-down boxes.

Type an offset to which you want to go. You may select between bytes and sectors. See the [Data Formats and Multipliers](#) topic for more details on data formats.

If a file is opened in **Text/Hexadecimal Editor**, you may select data representation for that file.

When the multiplier has been changed, the data value will be changed according to the specific context commands for that field:

Suppose, the initial value is 1 GB, and the sector size of the object is 512 byte. The results will be the following:

Command: No recalculate

Change from GB to MB: 1

Change from GB to Sectors: 1

Command: Always recalculate

Change from GB to MB: 1024

Change from GB to Sectors: 2097152

Command: Units type recalculate

Change from GB to MB: 1

Change from GB to Sectors: 2097152

5.5 Data Recovery on HFS/HFS+ File System

When deleting a file, Mac OS X deletes system BTree+ records describing the file. Therefore, it is hard to recover such file directly. Those records may remain in:

1. The swap file (if the deleted file has been deleted recently).
2. In the journal (if the HFS+ journaling is on, and the deleted file has been CREATED recently)

Actually, if a file has been deleted, chances that the records would be found are small. To greatly increase the chances to recover deleted files successfully, you may actively use scanning with enabled [Known Files Types](#).

Note: All above is correct for intentionally deleted files. In case of a corrupted file system, HFS/HFS+ can be recovered quite successfully.

When recovering files with HFS+-specific attributes (resource fork, finder info, etc.), **R-Studio for Linux** saves them in the so-called [AppleDouble](#) format. When they are copied to an HFS+ disk under Mac OS X, those attributes will be automatically restored.

5.6 Supported Virtual Disk and Disk Image Formats

Along with file formats used for purely disk backup and [imaging](#) purposes, there are file formats for virtual disks. Virtual disks are software components that emulates data storage devices in virtual machines. At the same time, virtual disks can be used for disk backup and imaging, too. That is why it's expedient for disk backup and imaging software to support various file formats for virtual disks. This is especially important for system interoperability, when it's necessary to use disk backup/image files on other machines where the disk backup and imaging software isn't installed.

Currently **R-Studio for Linux** supports the following virtual disk and disk image formats:

RDR: A proprietary disk image format developed by **R-Tools Technology, Inc (R-TT)**. It is the main format in **R-Drive Image**, **R-Studio**, **R-Linux**, and **R-Undelete**. RDR files are interchangeable, that is, any **R-TT** program may load and process, within its capabilities, any rdr file created in another **R-TT** program.

The following image formats can be created only in the **R-Studio Corporate** and **Technician/T80+** versions:

VHD/VHDX: A virtual disk file format built into Windows. It's a native virtual hard drive for Hyper-V, the Windows virtual machine. You may read more about these file formats in Wikipedia: [VHD \(file format\)](#). **R-Studio** creates a special file with some metadata for the VHD file format, its extension is vhr. The VHDX file format contains this metadata within its main file.

VMDK: A virtual disk file format for the most virtual machines like VMware Workstation, VirtualBox, Parallels Desktop for Mac, etc. You may read more about these file format in our Glossary: [What is a VMDK Virtual Disk](#).

VDI: A virtual disk file format for the VirtualBox virtual machine. **R-Studio** creates a special file with some metadata for the VDI file format, its extension is vdr. You may read more about these file format in Wikipedia: [VDI](#).

R-Studio Standalone can load these image formats.

The main features of these file formats are presented in the table below:

Features	RDR	VHD/VHDX	VMDK	VDI
Compression	Yes	No	Yes	No
Encryption	Yes	No	No	No
Image Split	Yes	No	Yes	No
Native mounting on Windows	No	Yes	No	No

Mounting on Windows using R-Studio	Yes	Yes	Yes	Yes
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Additional file formats that can be opened "read-only"

Extensions	Description	Licenses
dmg	Apple Disk Image	All
e01/(ewf)	Expert Witness File Format	Technician/T80+
aff	Advanced Forensic Format	Technician/T80+

5.7 Bad Sectors

Quite often, drives from which the data are to be recovered have [bad sectors](#), or those sectors that are very hard, even impossible, to read, mostly due to hardware problems. **R-Studio for Linux** tries to read such sectors several times. The number of tries is specified either on the [Settings/Bad Sectors](#) dialog box, or on the [Properties](#) tab, the Drive Control section, for each drive separately.

When **R-Studio for Linux** encounters such bad sectors while performing various tasks and they appear unreadable, it treats them as follows:

Object images:

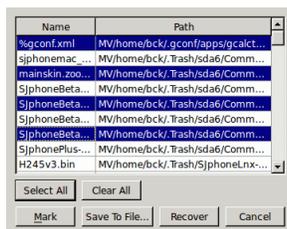
R-Studio for Linux fills the space in the [image](#) file where the bad sectors should be with the pattern specified in the Pattern to fill bad blocks field on the [Settings/Bad Sectors](#) dialog box. Please note that **R-Studio for Linux** writes the pattern on the image, not on the source drive.

Files

If Skip files with bad sectors on the [Recovery](#) dialog box is cleared, **R-Studio for Linux** fills bad sectors in the recovered file with the pattern specified on the the [Settings/Bad Sectors](#) dialog box. Information about such files will appear in the [Log](#).

If Skip files with bad sectors on the [Recovery](#) dialog box is selected, **R-Studio for Linux** skips files with bad sectors and displays their list on the Files with bad sectors dialog box when the recovery has been completed. You may select files to immediately recover them or to mark for later recovery. You may also save this list to a text file.

Files with bad sectors **dialog box**



Files with bad sectors Buttons

Select All	Click this button to select all files in the list.
Clear All	Click this button to unselect all selected files.
Mark	Click this button to mark all selected files in the list.

Save to File	Click this button to save the list of files with bad sectors to a text file.
Recover	Click this button to immediately recover selected files. The bad sectors in the recovered files will be filled with the pattern specified in the Pattern to fill bad blocks field on the Settings/Bad Sectors dialog box.

Objects edited in the Text/Hexadecimal editor/viewer

Bad sectors in the objects viewed/edited in the [Text/Hexadecimal editor](#) are shown as filled with the pattern specified in the Pattern to fill bad blocks field on the [Settings/Bad Sectors](#) dialog box.

5.8 Memory Usage

You may see how much memory **R-Studio for Linux** uses while performing a data recovery task. This is especially useful when scanning large disks on a computer with limited resources. You may specify memory control options on the Memory usage tab in the **R-Studio for Linux** [Settings](#)

To view memory usage,

1 Select Memory usage on the Tools menu

> **R-Studio for Linux** will show the total memory in your computer and how much memory it uses

Memory usage dialog box

Process Memory	System Memory Physical	System Memory Swap
Used: 45.21 MB	Used: 445.29 MB	Used: 0 Bytes
Free: 3.96 GB	Free: 548.47 MB	Free: 2.84 GB
Limit: 4.00 GB	Limit: 993.76 MB	Limit: 2.84 GB
OK		

Memory usage

Process Memory	Shows how much memory R-Studio for Linux uses. Limit shows how much memory your system can virtually allocate to R-Studio for Linux . Actual memory allocation depends also on the RAM and swap file sizes.
System Memory Physical	Shows how much RAM is in your system
System Memory Swap	Shows how much virtual memory is in your system

5.9 R-Studio for Linux Command Line Commands and Switches

You may start **R-Studio for Linux** from the terminal using the following command:

For **R-Studio for Linux**: `rstudio`.

For **R-Studio for Linux Technician**: `rstudio-tech`.

Note: You need to elevate your privileges if you're not the root to start **R-Studio for Linux**.

If there are problems in starting **R-Studio for Linux** and while working with it, you may use switches to avoid them.

The following switches are available:

<code>-all_drives</code>	Forces R-Studio for Linux to show all logical disks in the system. Normally R-Studio for Linux shows only local disks in the system. Some storage devices may pretend that they are not local disks.
<code>-debug</code>	Includes additional debug information. When this switch is used, an additional command Create FS Snapshot on the context menu appears for an object with a file

	system. An FS Snapshot contains system data for the file system only (file descriptions without file contents). If a problem appears, this snapshot can be sent to R-Studio for Linux technical support to identify the problem. This switch greatly slows R-Studio for Linux . You may also turn this mode on by selecting Debug Mode on the Settings dialog box.
-flush	Flushes the log file after each write to log operations. This switch is helpful when R-Studio for Linux locks and its log file remains in memory cache unwritten to a disk. This switch greatly slows R-Studio for Linux .
-log <filename>	Started with this switch, R-Studio for Linux writes its log into the specified file. If R-Studio for Linux locks and its log file remains in memory cache unwritten to a disk, use the -flush switch.
-mem <size in MB>	Sets memory usage limit in MB for R-Studio for Linux to reconstruct the file tree. When it exceeds the limit, a Too many files... message appears. You may temporarily stop file listing and browse through found files. Then you can resume file listing. You also may skip this file section and continue file listing. Example: -mem 400 - sets the limit to 400 MB.
-no_ide_ext	Turns off the inquiry about extended information on HDDs in Wind9x/ME. This switch may be helpful if R-Studio for Linux returns information about HDDs incorrectly (detects HDD geometry incorrectly).
-no_int13	Turns off the disc access through Int13 in Wind9x/ME. This switch may be helpful if the system operates incorrectly (detects HDD geometry incorrectly or lock the system).
-no_ios	Turns off the Wind9x/ME protected-mode I/O system. This switch may be helpful if this system operates incorrectly (detects HDD geometry incorrectly or lock the system).
-reset	R-Studio for Linux resets an HDD controller each time it reads a bad sector . This switch may be helpful if the controller locks after it attempts to read a bad sector, or returns incorrect data.
-safe	Disables automatic partition search on a hard drive, file system recognition on partitions, and other potentially problematic operations. In this mode, it is necessary to use Find partition command from the hard drive context menu to manually find a partition.

If an unrecognized problem appears, start **R-Studio for Linux** with the -debug and -log <filename> switches, and send the log and screenshot of the **R-Studio for Linux** main panel to the **R-Studio for Linux** technical support:

[R-Studio for Linux Technical Support Team](#) is available 24 hours a day, seven days a week, and has an average response time less than 4 hours.

5.10 Properties Tab

Object size units

You may select the units in which the information on object sizes will be displayed. Some parameters can be edited when the Debug mode is turned on on the [Main](#) dialog box of the **R-Studio for Linux** settings.

To select the units

- 1 Select Properties on the View menu
- 2 Select the units in which you want to see object sizes.

You may select

Show as Bytes

Show as Sectors

Show as Bytes and Sectors

1. Basic information

This section shows basic information for a disk object.

More information...

Drive Type	Device/disk type and subtype. Current R-Studio for Linux version supports the following types: Disk, WORM, CDROM, Optical, Changer, Floppy, RAM Disk, LDM Partition, LDM Component, LDM Volume and subtypes: Device, OS File, Physical Drive, Mount Point, Partition, Volume Set, Mirror, Stripe Set, RAID 4, RAID 5, RAID 6
Name	Device/disk name
Size	Device/disk size
Bus Type	Device/disk bus type. Can be: IDE/ATA, IDE/ATAPI, SCSI, Floppy, USB, 1394, SSA, FibreChannel, RAID, SMART, ABIOS

2. Information on hard drives and logical disks

This section shows available information on hard drives and [logical disks](#). These properties depend on the drive/disk type and appear only when applicable. Under Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10, an IDE drive/disk may be represented as a SCSI device, that is why the SCSI Address section appears under these OSes for those drives/disks.

More information...

OS object	Appears for image files under Windows 9x/ME and NT/2000/XP/2003/Vista/2008/7/8/8.1/10, for drives/disks under Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 only. An object name used by OS to access the device/disk.
R-Studio for Linux driver	Driver names (both internal and OS) used to access this drive/disk.
Sector Size	Drive/disk sector size
Physical Drive Geometry	This section shows physical geometry for a hard drive. For a logical disk it shows the physical geometry for a hard drive where the logical disk resides
Cylinders	
Tracks Per Cylinder	
Sectors Per Track	
Sector Size	
Device Identification	This section shows vendor information for the drive/disk
Vendor	

Product	
Firmware	
Bus	
SCSI Address	This section shows SCSI information for the drive/disk
Port Number	
Path ID	
Target ID	
Lun	
Windows 9x/ME adds the following properties:	
Int13 Drive Number	128 for the first hard drive accessible through Int13, 129 for the second one, etc. 0...128 for drives and other devices accessible through a Windows 9x/ME protected mode driver, if their Int13 device option is disabled. R-Studio for Linux can use Int13 disk access, and for some drive types, like SCSI devices, Int13 access is preferable. You may consider enabling the Int13 device option in the Windows Device Manager for such devices.
Int13 Extension Version	Int13 Extension Version Support for hard drives. Extended Int13 support is necessary for large drives. If this property is zero, Extended Int13 is not supported, otherwise, it shows Extended Int13 standard version, the large, the better.

3.Properties controlling access to hard drives and logical disks

This section shows properties that control access (read and write) to hard drives and logical disks. They are set to their optimal values and should be altered only if access problems appear.

 **More information...**

Drive Control	
Maximum transfer	Maximum data size that can be read or written during a single access to the drive. If there are problems with drive access, decrease the value of this property
I/O Unit	Data size read or written during a single access to the drive is a multiple value of this property. If there are problems with drive access, decrease the value of this property
Buffer Alignment	Drive data transfer buffer is positioned at an address multiple value of this property. If there are problems with drive access, increase the value of this property.
These three properties are set by OS drivers. If the drivers set incorrect values, problems may appear during data transfer operations. You can alter them until data transfer becomes stable.	
I/O Tries	Number of read/write tries during access to the drive. If there are bad sectors on the drive, increase the value of this property. This may help to successfully read those sectors. Sometimes, if the I/O Tries parameter is set too large and there are some unreadable sectors on the hard drive, the hard drive-controller pair may refuse to perform any successive read/write operations with the entire hard drive when it fails to read/write such sectors. In this case, set this parameter to zero. The default value is specified on the Settings (Bad Sectors) panel. R-Studio for Linux treats bad sectors in the following way: It reads a certain part of disk (predefined by Windows) and

- If Default read attempts is set to 0, the entire part with bad sectors will be filled with the specified pattern.
 - If Default read attempts is set to a non-zero value, **R-Studio for Linux** reads again that part sector by sector, repeating the attempts the specified number of times. If **R-Studio for Linux** still cannot read a bad sector, it fills the sectors with the specified pattern. In this case only the bad sectors will be filled with the pattern, but that extremely slows the disk read process.
- For example, if you set Default read attempts to 1, a bad sector will be read 2 times.

4.Partition properties

A [partition](#) is a continuous area on a hard drive, characterized by its offset and size. There are partitions on basic disks, dynamic disks, and recognized volumes and partitions. **R-Studio for Linux** treats regions like partitions.

More information...

Partition Offset	Initial offset for the partition.
Partition Size	Size of the partition.
Partition Type	File system type for the partition. If the record in the drive partition table is incorrect, this property may differ from the actual file system type for this partition. Still, R-Studio for Linux will process this partition correctly, as it does not use this property.
Partition number	Appears under Windows NT/2000/XP/2003/Vista/2008/7/8/8.1/10 only. Shows the number of the partition on the physical drive.
For regions and recognized partitions, Partition Offset and Partition Type properties can be manually corrected.	

5.Compound volume properties

A *compound volume* is a union of several partitions or other disk objects. Each union type has its own rules, unique for each compound volume type. Among compound volumes are: *Volume Sets* (RAIDs Level 0), *Mirrors* (RAIDs Level 1), *RAIDs4/5/6* (RAIDs Level 4/5/6), both physical and created by the user (*Virtual Volume Sets*, *Virtual Stripe Sets*, *Virtual Mirrors*, *Virtual RAID5*).

More information...

Main properties of compound volumes are <i>parents</i> (disk objects from which a compound volume is created) and their order. These properties may be viewed in the Parents tab. For user-created compound volumes these properties may be altered.	
Raid Block Size	Data block size for compound volumes of RAID (Level 0-5) types

6.LDM disks and volumes (Dynamic Disks)

LDM disks and volumes are volumes controlled by Logical Disk Manager (LDM). They are represented on a hard drive as a LDM database rather than partition tables. Under Windows 2000/XP/2003/Vista/2008/7/?/8/8.1/10, LDM disks are also called *Dynamic Disks*.

More information...

Offset of Logical Disk	Initial offset of a logical disk on a hard drive. For disks, initially formatted by LDM, this value is often 31.5KB , for converted disks, it may be larger.
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Supposed Parents Count	Supposed number of parent partitions for compound LDM volumes. If the LDM database is not damaged, the value of this property must be equal to the number of parent objects in the Parents tab for the disk object.
LDM Host GUID	Global Unique Identifier of a computer system where this LDM disk group has been created.
LDM DiskGroup GUID	Global Unique Identifier of the LDM disk group.
LDM Disk GUID	Global Unique Identifier of the hard drive.
LDM Volume GUID	Global Unique Identifier of the volume.
LDM Disk ID	Local hard drive Identifier, unique within this LDM disk group.
LDM Partition ID	Local partition Identifier, unique within this LDM disk group.
LDM Component ID	Local component Identifier, unique within this LDM disk group.
LDM Volume ID	Local volume Identifier, unique within this LDM disk group.
LDM Disk AltName	Additional Alternative Name given by LDM to the hard drive.
LDM Disk DriveHint	Last name of the volume, under which is has been mounted in the system. May be either a letter (C:, D:, etc.), or a mount point under Windows 2000/XP/2003/Vista/? 2008/7/8/8.1/10.

7.File System Volume properties

A *File System (FS) volume* is a disk object where a certain, supported by **R-Studio for Linux**, file system is present. There are two FS volume types: FS volume on a regular disk object and a recognized volume, found by a scan process. FS volume properties depend on volume's file system and type.

7.1.NTFS Volume properties

These properties are present for all NTFS volumes and represent their main properties. For *recognized volumes*, these values can be altered.

More information...

NTFS Information	Regular volumes
Recognized NTFS	Recognized volumes
Cluster Size	Cluster size for the NTFS volume.
MFT record size	Size of one MFT record describing one file on the NTFS volume. This is an important property of any NTFS volume. Its common value is 1KB. If this property has incorrect value, many files may be incorrectly recovered.
Sector Size	Sector size for the physical drive. This property is read from the boot sector of the NTFS volume and does not affect R-Studio for Linux operation.
Index Block Size	Index block size for the NTFS volume. This property determines binary trees used to store NTFS folder structure. It does not affect R-Studio for Linux operation.
MFT position	MFT offset from the start of the NTFS volume.
MFT Mirror Position	Second MFT copy offset from the start of the NTFS volume.
Volume size	Size of the NTFS volume. This property does not affect R-Studio for Linux operation.

7.2.FAT Volume properties

These properties are present for all [FAT](#) volumes and represent their main properties. For *recognized volumes*, these values can be altered.

▣ **More information...**

FAT Information	Regular volumes
Recognized FAT	Recognized volumes
FAT Bits (12,16,32)	FAT type. 12 for the FAT12, 16 for the FAT16, 32 for the FAT32.
Cluster Size	Cluster size for the FAT volume.
First Cluster Offset	Offset of the first cluster from the start of the FAT volume.
Boot Directory Cluster	<i>(For FAT32 only.)</i> Cluster number where the root directory starts on the FAT volume where the logical disk resides.
Root Directory Offset	<i>(For FAT12 and 16 only.)</i> Root directory offset from the start of the FAT volume.
Root Directory Length	<i>(For FAT12 and 16 only.)</i> Root directory length for the FAT volume.
First FAT Offset	Offset for the first FAT table on the volume. Together with the Size of One Fat Table property, is a most important property for a FAT volume. If this property is incorrect, many files (especially fragmented ones) may be incorrectly recovered.
Size of One FAT Table	Size of one FAT table on the volume.
Sector Size	Sector size of the hard drive. This property is read from the boot sector of the FAT volume and does not affect R-Studio for Linux operation.
Number of FAT Copies	Number of FAT copies on the FAT volume.
Active FAT copy	Active FAT table number for the FAT volume. Can be set to Disabled, Auto, 1, or 2. If it is Disabled, R-Studio for Linux processes the volume as there is no FAT table present. This may be useful if the volume has been reformatted and thus a new FAT table is created and the old one is deleted. In this case, it is reasonable to recover files from the previous volume without processing the new and irrelevant FAT table. All files will be recovered as continuous byte chains beginning from their start cluster. Unfragmented files will be recovered successfully. If it is 1 or 2, R-Studio for Linux uses the first or second FAT table copy, respectively. If it is Auto, R-Studio for Linux uses both FAT table copies and decides, which FAT table copy should be used for a particular FAT table sector. This may be useful when both FAT tables are partially damaged.
Major version	FAT version.
Minor version	FAT minor version.
Volume size	Size of the volume.

7.3.Ext2/3/4FS Volume properties

These properties are present for all [Ext2/3/4FS](#) volumes and represent their main properties. For *recognized volumes*, these values can be altered.

▣ **More information...**

Ext2/3/4FS Information	Regular volumes
Recognized Ext2FS	Recognized volumes

Block Size	Block size of Ext2FS file system. A block in the Ext2FS file system is similar to a cluster in the FAT file system.
First SuperBlock Offset	Offset of the first SuperBlock from the start of the Ext2FS volume.
Blocks Per Volume	Number of blocks in the Ext2FS volume.
INodes Per Volume	Number of inodes on the Ext2FS volume. An inode is a record describing file's size, attributes, position on an Ext2FS volume - all information about a file, except its name, which is stored separately. Therefore, the INodes Per Volume parameter is equal to the maximum number of files on an Ext2FS volume.
Creator OS	The OS that created this Ext2FS volume. May be Linux, Hurd, Masix, FreeBSD, Lites.
Major version	Ext2FS version. Usually 1.
Minor version	Ext2FS minor version. Usually 0.
Last Mount Time	Last mount time for this Ext2FS volume.
Last Write Time	Last write time for this Ext2FS volume.
Last Check Time	Last check time for this Ext2FS volume.
Volume size	Size of the volume.

7.4. Recognized Volume properties

These properties are present for all *recognized volumes*, regardless of their file system type. They estimate how reliable those volumes are recognized. This is useful for fast search for, and selection of, optimally recognized volume to recover.

More information...

Parsed File Entries	Number of files proving that this recognized volume existed. May have any non-negative values. The main property characterizing the reliability of volume recognition. The larger it, the higher probability that this recognized volume has file system properties that have been correctly found.
Parsed Boot Records	Number of boot records proving that this recognized volume existed. May be 0 or 1. This is the second important property characterizing the reliability of volume recognition.
Estimated Size	Estimated size of the recognized FS partition/volume. This property shows the most probable size of the recognized FS partition/volume. Alternatively, Size and Partition Size are set to the highest possible values in order to recover the maximum number of files.

VI R-Studio Emergency

R-Studio Emergency is a tool that allows you to startup a computer with a damaged startup disk and recover data stored on its hard drives. Then restored data can either be saved on its disk or transferred to a working computer via a network.

The R-Studio Emergency version is a part of the R-Studio software package.

You may run this R-Studio Emergency version on a computer for which you have bought an R-Studio license, and you may not transfer the licensed software to another computer.

[R-Studio Emergency](#)

[Contact Information and Technical Support](#)

[Installing R-Studio Emergency Startup Media Creator](#)

[Creating Startup Disks](#)

[R-Studio Emergency Operation](#)

[Starting a Computer with the R-Studio Emergency Startup Disks](#)

[File Recovery](#)

[Searching for a File](#)

[Disk Scan](#)

[Disk Images](#)

[Using R-Studio Emergency as Emergency Agent](#)

[Technical Information](#)

[Network Drives](#)

[Properties and Text/Hexadecimal Viewer](#)

[Log](#)

[Devices to Store Recovered Files](#)

[Hardware Compatibility List](#)

6.1 Contact Informaiton and Technical Support

To obtain the latest version of **R-Studio Emergency**, go to:

Product Site: <http://www.r-tt.com>

Sales Department: sales@r-tt.com

R-Studio Technical Support Team is available 24 hours a day, seven days a week, and has an average response time less than 4 hours.

Tech. Support: support@r-tt.com

Send your support request to: http://www.r-tt.com/Support_request.html

6.2 Creating Startup Disks

- [Installing R-Studio Emergency Startup Media Creator](#)
- [Creating Startup Disks Using R-Studio Emergency Startup Media Creator](#)

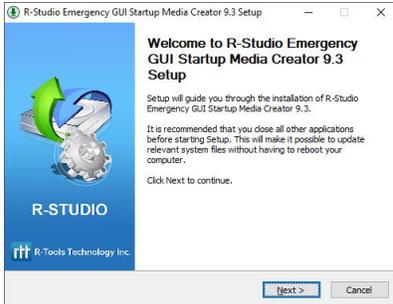
- [Creating Startup Disks for Mac and Linux Computers](#)

6.2.1 Installing R-Studio Emergency Startup Media Creator

You must have administrative privileges to install R-Studio Emergency Startup Media Creator.

If you are not sure whether you have such privileges, you almost certainly do not have them. Contact your system administrator for assistance.

1 Run the setup wizard



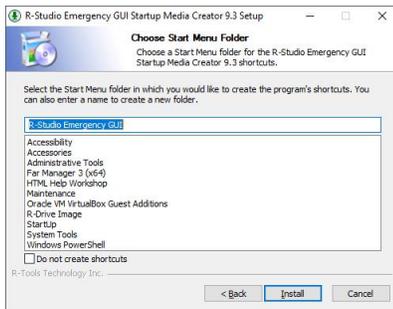
2 Read the License Agreement and accept its conditions.



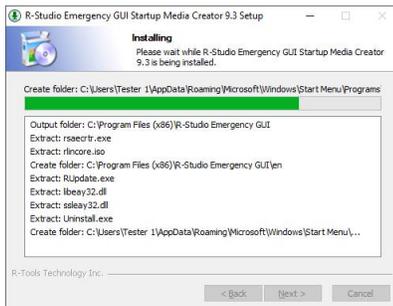
3 Select the installation location



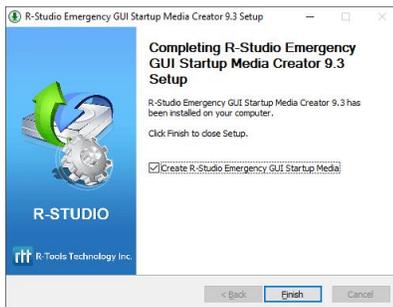
4 Select the Start Menu Folder



5 Wait for the program to install



6 You may start creating R-Studio Emergency immediately upon install completion.



6.2.2 Creating Startup Disks Using R-Studio Emergency Startup Media Creator

You need to create either

- A startup FAT/FAT32 removable device recognized by your system as a bootable one. The total available size of the device should be more than 50 MB. You may use this device to start both UEFI computers (modern Windows/Mac/Linux systems) and old Windows/Mac/Linux machines.

or

- A startup CD/DVD disc. You may create an ISO image, or write the disc directly from **R-Studio** Emergency Startup Media Creator, if there is a CD/DVD recorder in your system. You may use this disc to start both UEFI computers (modern Windows/Mac/Linux systems) and old Windows/Mac/Linux machines.

You may create a [Linux-based](#) or [WinPE](#) based startup disk.

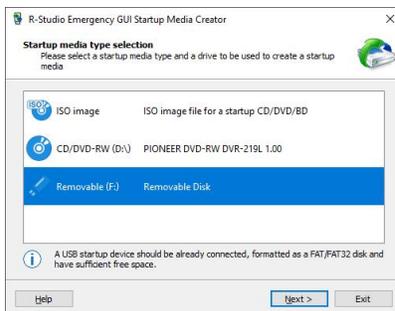
1 Run R-Studio Emergency

Welcome dialog box



click the **Next** button to see the list of all devices on which startup disks may be created.

Startup media type selection dialog box



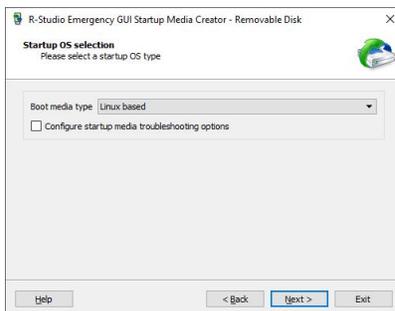
A Linux-based disk

Check the [Hardware Compatibility List](#).

If you have problems with starting your computer up from the **R-Studio** Emergency startup disks, select **Configure startup media troubleshooting options** on the Startup media type selection dialog box. Then the [Startup Media Troubleshooting Options](#) dialog box will appear. You may configure these options to eliminate those problems.

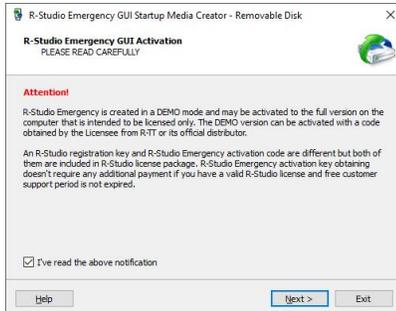
3 Select Linux based on the Startup OS selection and click the Next button.

Startup OS selection dialog box



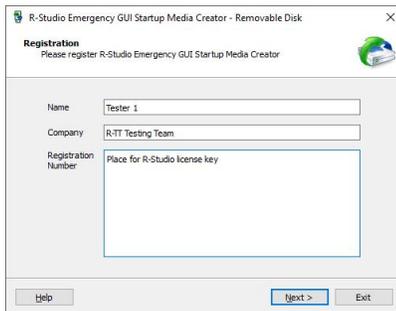
- 4 Read and accept the Activation terms on the R-Studio Emergency GUI Activation dialog box and click the Next button.

R-Studio Emergency GUI Activation dialog box



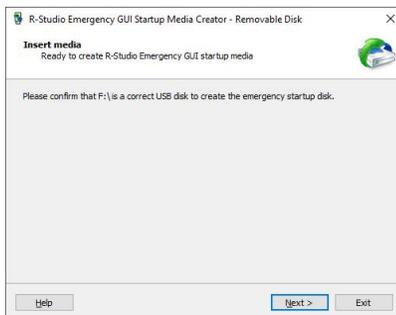
If you create startup disk for **R-Studio Emergency Technician**, you'll need to enter your license key on the Registration dialog box.

Registration dialog box



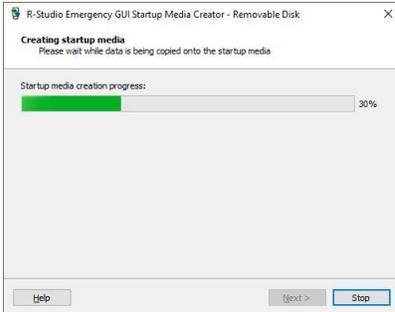
- 5 Specify the path and name for the ISO file or verify that you've select the correct USB device and click the Next button.

Insert media dialog box



> **R-Studio Emergency Startup Media Creator will start creating the startup USB disk showing the progress on the Creating startup media dialog box**

Creating startup media **dialog box**



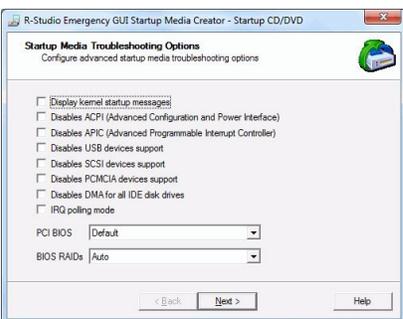
R-Studio Emergency Startup Media Creation is Finished message



Startup Media Troubleshooting Options

Those options will help you if you have problems with starting you computer up from the **R-Studio** startup disks. Please, contact the [R-Studio Technical Support Team](#) for more information.

R-Studio Startup Media Troubleshooting Options **dialog box**



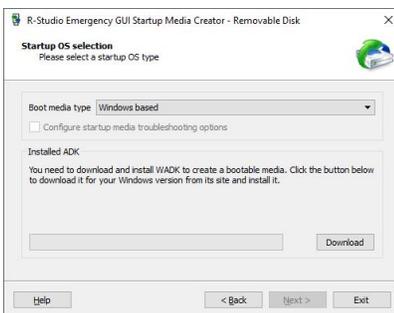
Display kernel startup messages	if this checkbox is enabled, R-Studio Emergency displays all startup messages. That may be useful to locate the source of the problem when your system hangs during R-Studio Emergency startup.
Disables ACPI Disables APIC	Select these checkboxes when your system detects some hardware incorrectly during R-Studio Emergency startup and displays messages like: hda: lost interrupt
Disables USB device support	Select this checkbox if your system experiences problems with USB devices during R-Studio Emergency startup.

Disables SCSI device support	Select this checkbox if your system experiences problems with SCSI devices during R-Studio Emergency startup.
Disables PCMCIA device support	Select this checkbox if your system experiences problems with PCMCIA devices during R-Studio Emergency startup.
Disables DMA for all IDE disk drives	Select this checkbox if your system experiences problems with IDE disks during R-Studio Emergency startup.
IRQ polling mode	Select this checkbox to enable the IRQ polling mode to prevent locking the system because a device generates too much interrupts for the system to handle.
PCI BIOS	Select an appropriate option if your system experiences problems with PCI cards.
BIOS RAIDS	Select an appropriate option if your system experiences problems with RAIDs built in the system board.

A WindowsPE-based disk

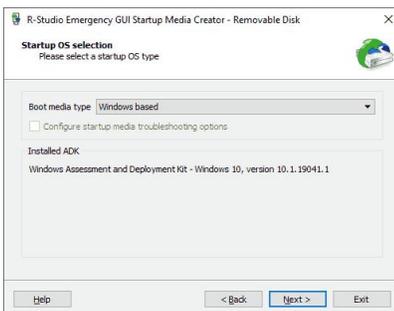
3 Select Windows based on the Startup OS selection and click the Next button.

Startup OS selection **dialog box**



If you select this option for the first time, you'll need to download and install some extra Windows components. Click the Download button and follow the on-screen instructions. When the process is finished, you'll be able to continue creating the startup disk.

Startup OS selection **dialog box**

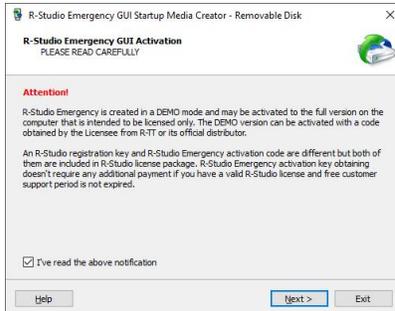


If you select this option for the first time, you'll need to download and install some extra Windows components. Click the Download button and follow the on-screen instructions.

You don't have to perform these steps next times.

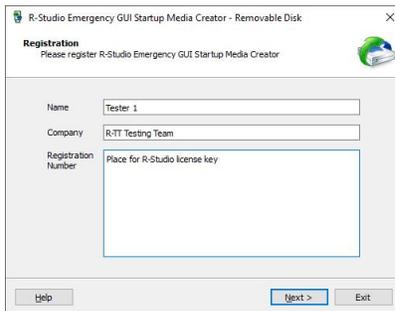
- 4 **Read and accept the Activation terms on the R-Studio Emergency GUI Activation dialog box and click the Next button.**

R-Studio Emergency GUI Activation dialog box



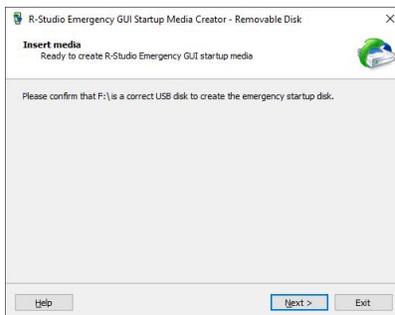
If you create startup disk for **R-Studio Emergency Technician**, you'll need to enter your license key on the Registration dialog box.

Registration dialog box



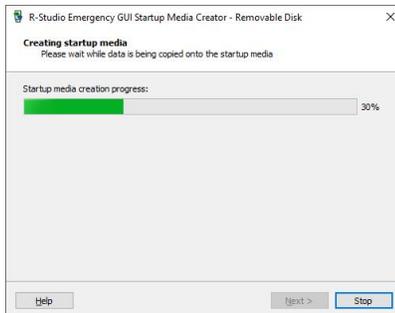
- 5 **Specify the path and name for the ISO file or verify that you've select the correct USB device and click the Next button.**

Insert media dialog box

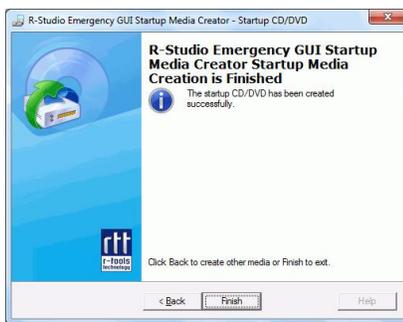


- > **R-Studio Emergency Startup Media Creator will start creating the startup USB disk showing the progress on the Creating startup media dialog box**

Creating startup media **dialog box**



R-Studio Emergency Startup Media Creation is Finished message



6.2.3 Creating Startup Disks on Mac and Linux Computers

To start a Mac or a Linux computer, you may use the following devices:

1. A USB device created using the R-Studio Emergency Startup Media Creator for Windows. See the [Creating Startup Disks Using R-Studio Emergency Startup Media Creator](#) page for more details.
2. A USB device created using a Mac or Linux computer. To create such device, download the ZIP archive of R-Studio Emergency, unzip it, and write files to a FAT32-formatted USB device.

Please note that you cannot use this disk to start non-UEFI computers (old Macs, for example), nor can you just copy those files to a CD/DVD disc to create an R-Studio Emergency startup disc. If you need a CD/DVD disc, burn it using the ISO image.

3. A startup CD/DVD disc. Download the ISO image of that disk and burn it or use the R-Studio Emergency Startup Media Creator for Windows to burn it on a Windows computer.

6.3 R-Studio Emergency Operation

[Starting a Computer with the R-Studio Emergency Startup Disks](#)

[File Recovery](#)

[Searching for a File](#)

[Disk Scan](#)

[Disk Images](#)

[Using R-Studio Emergency as Emergency Agent](#)

[Technical Information](#)

[Properties and Text/Hexadecimal Viewer](#)

[Network Drives](#)

[Log](#)

[Devices to Store Recovered Files](#)

[Hardware Compatibility List](#)

[R-Studio Emergency](#)

[Contact Information and Technical Support](#)

[Installing R-Studio Emergency Startup Media Creator](#)

[Creating Startup Disks](#)

6.3.1 Starting a Computer with the R-Studio Emergency Startup Disks

We recommended that you print out this help page and have the hardcopy on hand while you are performing this action.

If there is a non-IDE disk controller in your system, or you plan to use network disks or external hardware devices, first check the [Hardware Compatibility List](#).

If you plan to use any external device, turn it on before starting the system.

If the motherboard in your computer supports the Serial ATA (SATA) devices, but IDE disks are also present, only the SATA devices should be set to the Enhanced Mode in BIOS.

To start the computer with the R-Studio Emergency startup CD/DVD disc or any removable device,

- 1 Make sure that the first startup device in the system BIOS is the CD/DVD drive or the removable device**
Disable "Secure boot" in the system BIOS if your computer is certified to run Windows 8. Refer to your system documentation for details.
- 2 Insert the R-Studio Emergency startup CD/DVD disc and start your computer**

☒ If you have a Mac computer

To start a Mac computer with the **R-Studio Emergency** startup disk,

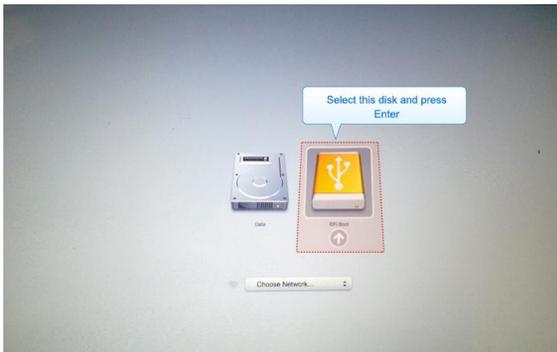
1. Insert a CD/DVD disc or connect a USB disk
2. Switch the Mac on.
3. While loading, press the **Option** key on the Mac keyboard (the **Alt** key if you use a non-Apple keyboard).

The Options key



4. Select the **EFI boot disk** and press **Enter**.

The R-Studio Emergency startup disk



R-Studio Emergency will start loading.

Then a startup screen will appear:



Select the **R-Studio Emergency GUI (Graphic Mode)** to run **R-Studio Emergency** in the graphic mode in which its user interface is similar to the Windows version. If **R-Studio Emergency** cannot run in this mode, restart the system in the Safe VGA mode (only VESA-compliant) which is compatible with most video cards and monitors. If it fails too, select the Text mode in which the **R-Studio Emergency** user interface is shown in the pseudo-graphic mode compatible with all video cards. The help describes this pseudo-graphic mode.

> **R-Studio Emergency** will start and its Device/Disk panel will appear

To start the computer with the **R-Studio Emergency** startup floppy disks,

1 Make sure that the first startup device in the system BIOS is A (Floppy)

Refer to your system documentation for details.

2 Insert the first startup floppy disk and start your computer

> The following text will appear on the screen:

```
Loading
Uncompressing ... OK, starting the kernel
VFS: Insert the second boot disk and press ENTER
```

3 Insert the second disk and press ENTER.

> R-Studio Emergency will start and its Device/Disk panel will appear

Secure boot:

It may be impossible to start a Windows 8 certified computer with the R-Studio Emergency startup disk without some additional actions. This happens because any computer should use a so-called "Secure boot" procedure to comply with Windows 8 hardware certification from Microsoft. In brief, this procedure prevents computer from booting into any operating system that isn't digitally signed with an appropriate digital signature. "Secure boot" is claimed to prevent unauthorized modification of the boot sector by bootkits, viruses, trojans, and other malicious software. To the date, only Windows 8, Windows Server 2012, and selected Linux distributions support this feature. As a side effect, it also prevents most LiveCDs, rescue disks (R-Studio and R-Drive Image included), and other OS from running.

Likely enough, the other requirement of Windows 8 hardware certification is to make it possible for the user to disable the Secure boot procedure. Those settings can be done through the system BIOS under the Boot options. Generally, it's enough to enable Legacy support in those options, but sometimes it may require additional actions. Please, refer to your system documentation to learn more about disabling/enabling Secure boot.

When Secure boot is disabled, it should be possible to start the computer with the R-Studio Emergency startup disk.

Please note that you should enable this feature back after using the startup disks because Windows 8 or Server 2012 may not start properly without the Secure boot feature enabled.

6.3.2 File Recovery

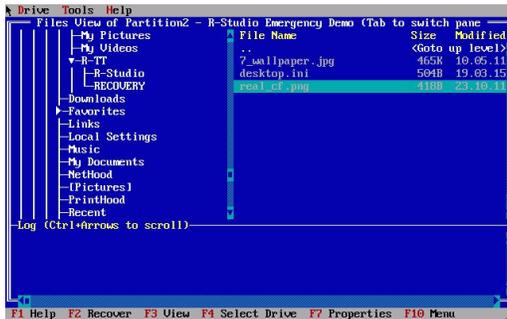
To recover files,

1 Select a partition on the Device/Disk panel on which the files to recover reside and press the Enter key

> R-Studio will change its panel showing the disk's folders/files structure

2 Select the file to recover on the Files View panel. Use the Tab key to switch between panes

Files View panel



- 3 Press the F2 key and specify the output folder on the Recover dialog box

Recover dialog box



External USB drives with the NTFS file system: R-Studio Emergency can save recovered files on such disks if they are properly disconnected in a Windows system using the **Safely Remove Hardware** icon in the system tray or while shutting Windows down.

[Searching for a File](#)

[Mapping Network Drives](#)

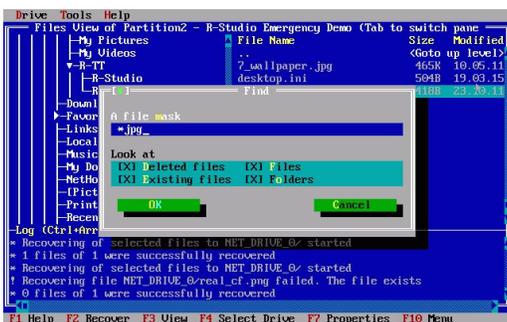
[Viewing object properties](#)

6.3.3 Searching for a File

To search for a file,

- 1 Select Find on the Tools menu (or press the Alt+F key)
- 2 Specify a file name or mask

Find dialog box



Look at dialog box

Deleted files: If it is selected, **R-Studio** makes a search among deleted files/folders.

Existing files:	If it is selected, R-Studio makes a search among existing files/folders.
Files:	If it is selected, R-Studio includes files into a search.
Folders:	If it is selected, R-Studio includes folders into a search.

To find the next file corresponding to the specified file mask,

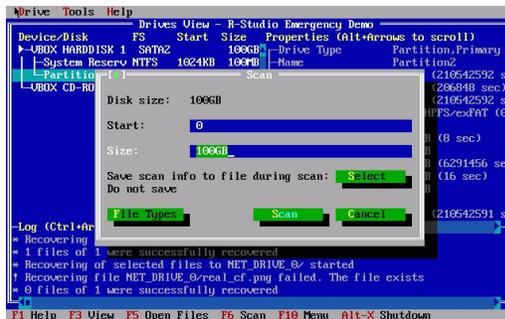
- * Press the Alt+N key

6.3.4 Disk Scan

To scan an object

- 1 Select an object on the Device/Disk panel and press the F6 key
- 2 Specify the required parameters on the Scan dialog box and press the Enter key

Scan dialog box



Scan dialog box

Start:	Sets the start point of the area to be scanned.
Size:	Sets the size of the area to be scanned.
Numbers in these fields can be in bytes or sectors. If no letters are after the numbers, R-Studio assumes the numbers in bytes. The following case-ignoring notation is possible:	
b	Bytes
kb	Kilobytes
mb	Megabytes
gb	Gigabytes
tb	Terabytes

- > When an object is scanned, it may be searched for files, and found files may be recovered the same way as for a regular object

Scan results



Found objects:

Extra Found Files	Entries of known file types have been found
Recognized1	Records and file entries are found for this partition
Recognized2	Only file entries are found for this partition
Recognized3	Only boot records are found for this partition

To save scan information

- 1 Select an object with scan information
- 2 Press the Alt+D key and select Save Scan Information on the Drive menu
- 3 Specify the output folder and file name on the Save Scan Information dialog box

[Mapping Network Drives](#)

To open scan information

- 1 Select an object to which scan information is to be opened
- 2 Press the Alt+D key and select Open Scan Information on the Drive menu
- 3 Specify the folder and file name with the scan information on the Open Scan Information dialog box

[Mapping Network Drives](#)

To delete scan information

- 1 Select an object to which scan information is to be deleted
- 2 Press the Alt+D key and select Delete Scan Information on the Drive menu

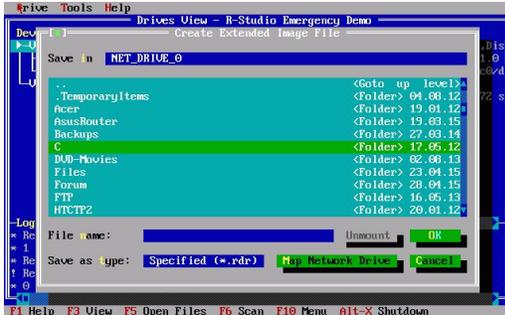
6.3.5 Disk Images

To create an image file

- 1 Select an object on the Device/Disk panel

- 2 Press the **Alt+D** key and select **Create Plain Image File** or **Create Compressed Image File** on the **Drive** menu

Create Image **dialog box**



Plain Image

If this option is selected, **R-Studio** will create a simple exact copy of the object. This image format is compatible with the previous versions of **R-Studio**.

Compressed Image

If this option is selected, **R-Studio** will create an image file compatible with the images created by **R-Drive Image**, but incompatible with the previous versions of **R-Studio**.

- 3 Specify the output folder and file name on the **Create Image File dialog box**

[Mapping Network Drives](#)

To load an image file

- 1 Press the **Alt+D** key and select **Open Image File** on the **Drive** menu
- 2 Specify the folder and file name with the image on the **Open Image File dialog box**

[Mapping Network Drives](#)

6.4 Using R-Studio Emergency as an Emergency Agent

R-Studio Emergency Linux version can be used as an emergency agent for **R-Studio**. Moreover, if you have a Mac computer, this is the only way to start it with **R-Studio Agent Emergency**.

To start the computer with the **R-Studio Emergency/Agent startup CD/DVD disc** or any removable device ,

- 1 **Make sure that the first startup device in the system BIOS is the CD/DVD drive or the removable device**
Disable "Secure boot" in the system BIOS if your computer is certified to run Windows 8. Refer to your system documentation for details.
- 2 **Insert the R-Studio Emergency startup CD/DVD disc or the removable device and start your computer**

If you have a Mac computer

To start a Mac computer with the **R-Studio Emergency** startup disk,

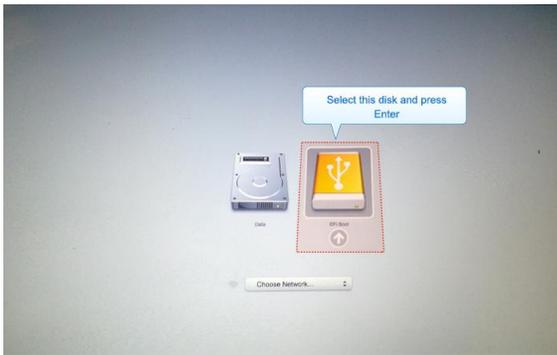
1. Insert a CD/DVD disc or connect a USB disk
2. Switch the Mac on.
3. While loading, press the **Option** key on the Mac keyboard (the **Alt** key if you use a non-Apple keyboard).

The Options key



4. Select the **EFI boot disk** and press **Enter**.

The R-Studio Emergency startup disk



R-Studio Emergency will start loading.

Then a startup screen will appear:

Startup Options



- 2 Select the **R-Studio Agent Emergency** to run **R-Studio Emergency** as an emergency agent.
- > **R-Studio Agent Emergency** will start and its prompt will appear

R-Studio Emergency as an Emergency Agent

```

Loading rootagt...ok
Loading rmconfig.bin...ok
Decompressing Linux... Parsing ELF... No relocation needed... done.
Booting the kernel.
-----
Booting R-Studio Agent Emergency. Please wait...
Waiting 8 seconds for PCMCIA devices to settle...
Booting R-Studio Agent Emergency. Now you may remove boot media.
-----
Querying DHCP to configure network interfaces...
Press ENTER within 10 seconds to configure them manually.
IP Address 192.168.1.14 was assigned for interface eth0 using DHCP protocol
Default gateway is 192.168.1.1 now
* Running R-Studio Agent Emergency 7.6.1116
* This product is licensed to: UNREGISTERED DEMO VERSION
# System: 2 x Intel(R) Core(TM)2 Duo CPU P7350 @ 2.00GHz, 1938 MHz
# OS: Linux 3.18.2 #1 SMP Fri Jan 16 12:46:09 EST 2015
? R-Studio Agent Emergency is not yet registered, 256KB file size recovery limit
  is implied until remotely registered
* R-Studio Agent Emergency started and ready to accept connections...
* R-Studio Agent Emergency is listening on IP(s): 192.168.1.14
* You may press 'E' to view EULA, press 'L' to view Third-Party Copyright Notice
  s and Disclaimers, press ENTER to start connection to remote R-Studio ...

```

If your network has a DHCP server

The computer running R-Studio Agent Emergency will be assigned an IP address automatically

A prompt with a computer address will appear. You need to remember it to access the computer via network.

If your network does not have a DHCP server

You need to configure the interfaces and IP addresses manually.

1. Press Enter to start configuring the settings. A prompt to select an interface will appear. Enter the selected interface name and press **Enter**.
2. A prompt to enter its IP address and optional subnet mask will appear. Enter the IP address and optional subnet mask and press **Enter**.

Network Setting Configuration

```

Loading rm_pcard.b32...ok
Loading rm_other.b32...ok
Loading rootagt...ok
Loading rmconfig.bin...ok
Decompressing Linux... Parsing ELF... No relocation needed... done.
Booting the kernel.
-----
Booting R-Studio Agent Emergency. Please wait...
Waiting 8 seconds for PCMCIA devices to settle...
Booting R-Studio Agent Emergency. Now you may remove boot media.
-----
Querying DHCP to configure network interfaces...
Press ENTER within 10 seconds to configure them manually.
-----
[ List of Interfaces ]-----
Name      IP Address  NETMASK    Vendor
-----
eth0      Unconfigured      Intel(R) PRO/100+
-----
# Enter interface name, 'gw' for default gateway or just press ENTER to finish
eth0
#># Enter IP address and optional NETMASK delimited by space
192.168.1.14 255.255.255.0
#>

```

3. A prompt to configure another interface, gateway, or to finish configuring the interfaces will appear. Enter **gw**, enter the IP address of the gateway, and press **Enter**.

Network Setting Configuration

```

# Enter interface name, 'gw' for default gateway or just press ENTER to finish
eth0
#># Enter IP address and optional NETMASK delimited by space
192.168.1.14 255.255.255.0
#>
-----
[ List of Interfaces ]-----
Name      IP Address  NETMASK    Vendor
-----
eth0      192.168.1.14 255.255.255.0 Intel(R) PRO/100+
gw        Unconfigured      Default gateway
-----
# Enter interface name, 'gw' for default gateway or just press ENTER to finish
gw
#># Enter default gateway IP address
192.168.1.1
#>
-----
[ List of Interfaces ]-----
Name      IP Address  NETMASK    Vendor
-----
eth0      192.168.1.14 255.255.255.0 Intel(R) PRO/100+
gw        192.168.1.1      Default gateway
-----
# Enter interface name, 'gw' for default gateway or just press ENTER to finish

```

4. Press **Enter** to finish configuring the interfaces, or enter the name of the next interface to configure.

> R-Studio Agent Emergency will show a prompt that is ready to accept connections

R-Studio Emergency as an Emergency Agent

```
# Enter interface name, 'gw' for default gateway or just press ENTER to finish
gw
# Enter default gateway IP Address
192.168.1.1
#
-----[ List of Interfaces ]-----
Name      IP Address      NETMASK      Vendor
-----
eth0      192.168.1.14    255.255.255.0 Intel(R) PRO/100+
gw        192.168.1.1     Default gateway
-----
# Enter interface name, 'gw' for default gateway or just press ENTER to finish
#>* Running R-Studio Agent Emergency 7.6.1116
# This product is licensed to: UNREGISTERED DEMO USER
# System: 2 x Intel(R) Core(TM)2 Duo CPU P7350 @ 2.00GHz, 1364 MHz
# OS: Linux 3.18.2 #1 SMP Fri Jan 16 12:46:09 EST 2015
# R-Studio Agent Emergency is not yet registered, 256KB file size recovery limit
# is implied until remotely registered
# R-Studio Agent Emergency started and ready to accept connections...
# R-Studio Agent Emergency is listening on IP(s): 192.168.1.14
# You may press 'E' to view EULA, press 'L' to view Third-Party Copyright Notice
# and Disclaimers, press ENTER to start connection to remote R-Studio ...
```

Now the computer may be accessed by **R-Studio** via network.

Secure boot:

It may be impossible to start a Windows 8 certified computer with the R-Studio Emergency startup disk without some additional actions. This happens because any computer should use a so-called "Secure boot" procedure to comply with Windows 8 hardware certification from Microsoft. In brief, this procedure prevents computer from booting into any operating system that isn't digitally signed with an appropriate digital signature. "Secure boot" is claimed to prevent unauthorized modification of the boot sector by bootkits, viruses, trojans, and other malicious software. To the date, only Windows 8, Windows Server 2012, and selected Linux distributions support this feature. As a side effect, it also prevents most LiveCDs, rescue disks (R-Studio and R-Drive Image included), and other OS from running.

Likely enough, the other requirement of Windows 8 hardware certification is to make it possible for the user to disable the Secure boot procedure. Those settings can be done through the system BIOS under the Boot options. Generally, it's enough to enable Legacy support in those options, but sometimes it may require additional actions. Please, refer to your system documentation to learn more about disabling/enabling Secure boot.

When Secure boot is disabled, it should be possible to start the computer with the R-Studio Emergency startup disk.

Please note that you should enable this feature back after using the startup disks because Windows 8 or Server 2012 may not start properly without the Secure boot feature enabled.

To connect to R-Studio's computer,

- 1 Press the Enter key and enter the IP address of the computer where R-Studio is running as IPaddress:port.

The default port is 8080, and you don't have to specify it.

- 2 Enter the password if required, and press the Enter key.
- > When the connection is established successfully, R-Studio Agent Emergency will notify you about this.

R-Studio Emergency as an Emergency Agent

```
Waiting 8 seconds for PCMCIA devices to settle...
Booting R-Studio Agent Emergency. Now you may remove boot media.
-----
Quering DHCP to configure network interfaces...
Press ENTER within 10 seconds to configure them manually.
IP Address 192.168.1.14 was assigned for interface eth0 using DHCP protocol
Default gateway is 192.168.1.1 now
* Running R-Studio Agent Emergency 7.6.1116
* This product is licensed to: UNREGISTERED DEMO VERSION
# System: 2 x Intel(R) Core(TM)2 Duo CPU P7350 @ 2.00GHz, 1930 MHz
# OS: Linux 3.18.2 #1 SMP Fri Jan 16 12:46:09 EST 2015
? R-Studio Agent Emergency is not yet registered, 256KB file size recovery limit
  is implied until remotely registered
* R-Studio Agent Emergency started and ready to accept connections...
* R-Studio Agent Emergency is listening on IP(s): 192.168.1.14
* You may press 'E' to view EULA, press 'L' to view Third-Party Copyright Notice
  s and Disclaimers, press ENTER to start connection to remote R-Studio ...

# Enter R-Studio IP address or just press ENTER to cancel>192.168.1.10:8080
# Enter password or just press ENTER to connect without one>
Connection with 192.168.1.10:8080 is established successfully.
* R-Studio Agent Emergency is listening on IP(s): 192.168.1.14
* You may press 'E' to view EULA, press 'L' to view Third-Party Copyright Notice
  s and Disclaimers, press ENTER to start connection to remote R-Studio ...
```

6.5 R-Studio Emergency Technical Information

[Properties and Text/Hexadecimal Viewer](#)

[Network Drives](#)

[Log](#)

[Devices to Store Recovered Files](#)

[R-Studio Emergency](#)

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[Installing R-Studio Emergency Startup Media Creator](#)

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[Starting a Computer with the R-Studio Emergency Startup Disks](#)

[File Recovery](#)

[Searching for a File](#)

[Disk Scan](#)

[Disk Images](#)

[Using R-Studio Emergency as Emergency Agent](#)

[Hardware Compatibility List](#)

6.5.1 Properties and Text/Hexadecimal Viewer

To view object properties,

- 1 Select an object
- 2 Press the F7 key

To view an object

- 1 Select an object
- 2 Press the **F3** key
- 3 Press the **F6** key to view and select file attributes
Press the **Esc** key to close the viewer.

6.5.2 Network Drives

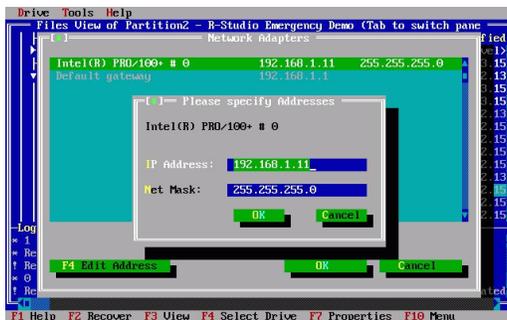
To map a network drive,

- 1 On a dialog box with Map Network Drive, press the **Alt+M** key
> The Querying DHCP message will appear

If the network has a DHCP server, the computer will obtain an IP address automatically. A list of adapters and their IP addresses will appear on the Network Adapters dialog box.

If the network does not have a DHCP server, select a network adapter on the Network Adapters dialog box and press the **F4** key. Enter the IP address and network mask and press the **Enter** button.

Network Addresses dialog box



- 2 Select a configured network adapter and press the **Enter** key
- 3 Enter the required information on the Map Network Drive message message

Map Network dialog box



Server IP Address:	IP address of the computer where the network drive is to reside.
Server Share Name:	Name of the shared folder where the network drive is to reside.
Login:	Username of a user on the computer where the network drive is to reside.
Password:	User's password on the computer where the network drive is to reside.

For the network drive's path //SERVER/Net_Drive,

Server IP address: The IP address of the `SERVER` computer (192.168.1.20)

Server share name: `Net_Drive`.

> The mounted network disk will appear

To disconnect a mounted network drive

1 Select a mounted network drive

2 Switch to the Disconnect button and press the Enter key

6.5.3 Log

To clear log information

* Select Clear Log on the Tools menu

To save log information to a file

* Select Save Log To File on the Tools menu

6.5.4 Devices to Store Recovered Files

R-Studio Emergency can write recovered files to the following devices:

- FAT devices such as USB sticks, memory cards, and other similar devices. Such devices are inexpensive and easily available, they can be fully accessed by all operating systems, but they have one important drawback: they cannot store files larger than 2GB. So, if you plan to recover large video files, this is not your option.

- exFAT devices such as large USB sticks and memory cards, external hard disks, and other similar devices. They are fully accessed by all operating systems. Unlike FAT devices, they don't have the 2GB file size limit.

- NTFS disks (primarily used in Windows computers).

Access without any third-party software:

Windows computers: full.

Mac computers: read.

Linux computers: full.

- HFS/HFS+ disks (used in Mac computers).

Access without any third-party software:

Windows computers: no.

Mac computers: full. Some access problems may appear for files written by **R-Studio Emergency**.

Linux computers: full. Some access problems may appear for files written by **R-Studio Emergency**.

- Ext2/3/4 disks (used in Linux computers).

Access without any third-party software:

Windows computers: no.

Mac computers: no

Linux computers: full.

- XFS disks (used in Linux computers).

Access without any third-party software:

Windows computers: no.

Mac computers: no

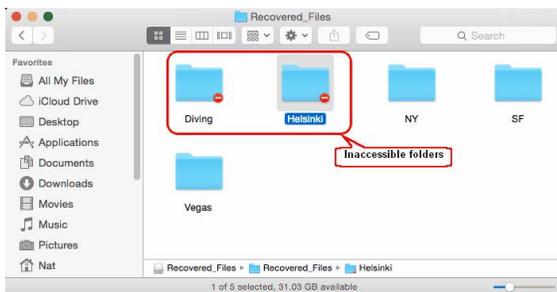
Linux computers: full.

- Network disks. Such disks may be on other network computers or NAS devices. See the [Network Drives](#) page for more details

How to solve file access problems on Macs

Finder in the OSX system shows such inaccessible folders and files in the following way:

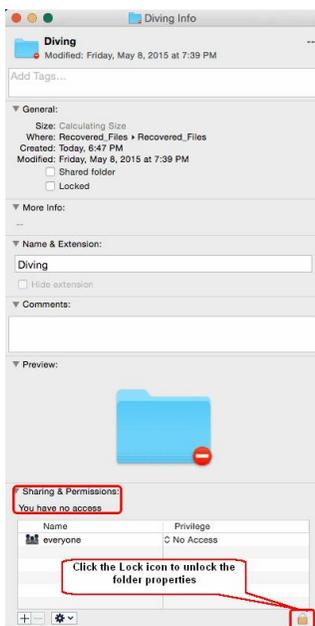
Inaccessible folders in Finder



To get access to such data, do the following:

1. Under an administrator account, right-click the folder and select **Get Info** on the contextual menu.

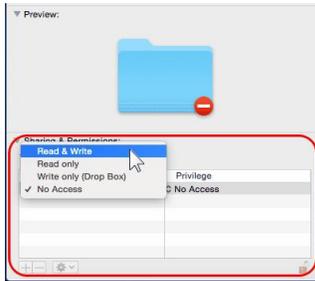
Info of an inaccessible folder



Click the **Lock** icon in the **Sharing & Permissions** section to unlock the folder properties. The system will ask you for the account password.

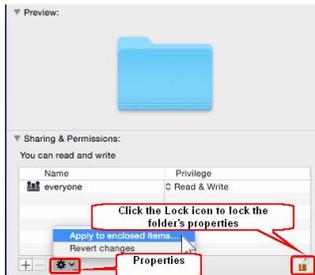
2. Click the **Privilege** column and select **Read & Write** on the contextual menu.

Setting the access rights for the folder



3. If this is a folder with other folders and files, click the **Properties** icon and select **Apply to enclosed items**.

Setting access rights for enclosed items in the folder



Then click the **Lock** icon to lock the properties back.

6.6 R-Studio Emergency Hardware Compatibility List

R-Studio Emergency supports the following hardware devices:

Data Storage Devices

Serial ATA and Parallel ATA drivers

ACPI firmware driver for PATA
 AHCI SATA
 ALi PATA
 AMD/NVidia PATA
 ARTOP 6210/6260 PATA
 ARTOP/Acard ATP867X PATA
 ATI PATA
 CMD / Silicon Image 680 PATA
 CMD640 PCI PATA
 CMD64x PATA
 CS5510/5520 PATA
 CS5530 PATA
 CS5535 PATA

Networking Devices

Ethernet (10 or 100Mbit)

3c501 `EtherLink`
 3c503 `EtherLink II`
 3c505 `EtherLink Plus`
 3c507 `EtherLink 16`
 3c509/3c529 (MCA)/3c579 `EtherLink III`
 3c515 ISA `Fast EtherLink`
 3c590/3c900 series (592/595/597)
 `Vortex/Boomerang`
 3cr990 series `Typhoon`
 AMD 8111 (new PCI lance)
 AMD LANCE and PCnet (AT1500 and NE2100)
 AMD PCnet32 PCI
 AT1700/1720

CS5536 PATA
Compaq Triflex PATA
Cypress CY82C693 PATA
EFAR SLC90E66
Generic ATA
HPT 343/363 PATA
HPT 366/368 PATA
HPT 370/370A/371/372/374/302 PATA
HPT 372N/302N PATA
IT8211/2 PATA
IT8213 PATA
Initio 162x SATA
Intel ESB, ICH, PIIX3, PIIX4 PATA/SATA
Intel PATA MPIIX
Intel PATA old PIIX
Intel SCH PATA
JMicron PATA
Legacy ISA PATA
Marvell PATA support via legacy mode
Marvell SATA
NETCELL Revolution RAID
NVIDIA SATA
Nat Semi NS87410 PATA
Nat Semi NS87415 PATA
Ninja32/Delkin Cardbus ATA
OPTI FireStar PATA
OPTI621/6215 PATA
Older Promise PATA controller
PCMCIA PATA
Pacific Digital ADMA
Pacific Digital SATA QStor
Platform AHCI SATA
Promise PATA 2027x
Promise SATA SX4
Promise SATA TX2/TX4
QDI VLB PATA
RADISYS 82600 PATA
RDC PATA
SC1200 PATA
SERVERWORKS OSB4/CSB5/CSB6/HT1000 PATA
Adaptec Starfire/DuraLAN
Ansel Communications EISA 3200
Apricot Xen-II on board Ethernet
Atheros L2 Fast Ethernet
Broadcom 440x/47xx ethernet
CS89x0
Cabletron E21xx
DECchip Tulip (dc2114x) PCI
Dave ethernet support (DNET)
Davicom DM910x/DM980x
Early DECchip Tulip (dc2104x) PCI
EtherExpress 16
EtherExpressPro support/EtherExpress 10 (i82595)
Generic DECchip & DIGITAL EtherWORKS PCI/EISA
HP 10/100VG PCLAN (ISA, EISA, PCI)
HP PCLAN (27245 and other 27xxx series)
HP PCLAN+ (27247B and 27252A)
ICL EtherTeam 16i/32
Intel(R) PRO/100+
LP486E on board Ethernet
Myson MTD-8xx PCI Ethernet
NE2000/NE1000
NI5010
NI5210
NI6510
National Semiconductor DP8381x series PCI Ethernet
OpenCores 10/100 Mbps Ethernet MAC
PCI NE2000 and clones support (see help)
RDC R6040 Fast Ethernet Adapter
RealTek RTL-8129/8130/8139 PCI Fast Ethernet Adapter
RealTek RTL-8139 C+ PCI Fast Ethernet Adapter
SEEQ8005
SMC 9194
SMC EtherPower II
SMC Ultra
SMSC LAN9420 PCI ethernet adapter
SiS 900/7016 PCI Fast Ethernet Adapter
Silan SC92031 PCI Fast Ethernet Adapter driver

ServerWorks Frodo / Apple K2 SATA
 SiS 964/965/966/180 SATA
 SiS PATA
 Silicon Image 3124/3132 SATA
 Silicon Image SATA
 ULi Electronics SATA
 VIA PATA
 VIA SATA
 VITESSE VSC-7174 / INTEL 31244 SATA
 Winbond SL82C105 PATA
 Winbond W83759A VLB PATA

SCSI low-level drivers

3ware 5/6/7/8xxx ATA-RAID
 3ware 97xx SAS/SATA-RAID
 3ware 9xxx SATA-RAID
 7000FASST SCSI
 ACARD SCSI
 ARECA (ARC11xx/12xx/13xx/16xx)
 SATA/SAS RAID Host Adapter
 Adaptec AACRAID
 Adaptec AHA152X/2825
 Adaptec AHA1542
 Adaptec AIC79xx U320
 Adaptec AIC7xxx
 Adaptec AIC7xxx Fast -> U160
 Adaptec AIC94xx SAS/SATA
 Adaptec I2O RAID
 AdvanSys SCSI
 Always IN2000 SCSI
 BusLogic SCSI
 DMX3191D SCSI
 DTC3180/3280 SCSI
 EATA ISA/EISA/PCI (DPT and generic
 EATA/DMA-compliant boards)
 Emulex LightPulse Fibre Channel Support
 Future Domain 16xx SCSI/AHA-2920A
 Generic NCR5380/53c400 SCSI MMIO
 Generic NCR5380/53c400 SCSI PIO
 HP Smart Array SCSI driver
 HighPoint RocketRAID 3xxx/4xxx Controller

Sun Cassini
 Sun GEM
 Sun Happy Meal 10/100baseT
 Sundance Alta
 TI ThunderLAN
 ULi M526x controller
 VIA Rhine
 WD80*3
 Winbond W89c840 Ethernet
 Zenith Z-Note
 nForce Ethernet

Ethernet (1000 Mbit)

Alteon AceNIC/3Com 3C985/NetGear GA620
 Gigabit
 Atheros L1C Gigabit Ethernet
 Atheros L1E Gigabit Ethernet
 Atheros/Attansic L1 Gigabit Ethernet
 Broadcom CNIC
 Broadcom NetXtremeII
 Broadcom Tigon3
 DL2000/TC902x-based Gigabit Ethernet
 IP1000 Gigabit Ethernet
 Intel(R) 82575/82576 PCI-Express Gigabit Ethernet
 Intel(R) 82576 Virtual Function Ethernet
 Intel(R) PRO/1000 Gigabit Ethernet
 Intel(R) PRO/1000 PCI-Express Gigabit Ethernet
 JMicron(R) PCI-Express Gigabit Ethernet
 National Semiconductor DP83820
 New SysKonnnect GigaEthernet
 Packet Engines Hamachi GNIC-II
 Packet Engines Yellowfin Gigabit-NIC
 QLogic QLA3XXX Network Driver Support
 Realtek 8169 gigabit ethernet
 SiS190/SiS191 gigabit ethernet
 SysKonnnect Yukon2
 VIA Velocity

Ethernet (10000 Mbit)

Broadcom NetXtremeII 10Gb
 Chelsio 10Gb Ethernet
 Chelsio Communications T3 10Gb Ethernet

IBM Power Linux RAID adapter
 IBM ServeRAID
 Initio 9100U(W)
 Initio INI-A100U2W
 Intel/ICP (former GDT SCSI Disk Array) RAID Controller
 LSI Logic Legacy MegaRAID Driver
 LSI Logic Management Module
 LSI Logic MegaRAID Driver
 LSI Logic MegaRAID SAS RAID Module
 LSI MPT Fusion SAS 2.0 Device Driver
 Marvell 88SE64XX/88SE94XX SAS/SATA
 NCR53c406a SCSI
 PAS16 SCSI
 PMC SIERRA Linux MaxRAID adapter
 PMC-Sierra SPC 8001 SAS/SATA Based Host Adapter driver
 Promise SuperTrak EX Series
 QLogic ISP4XXX host adapter family
 QLogic QLA2XXX Fibre Channel Support
 Qlogic FAS SCSI
 Qlogic QLA 1240/1x80/1x160 SCSI
 SYM53C8XX Version 2 SCSI
 Symbios 53c416 SCSI
 Tekram DC390(T) and Am53/79C974 SCSI
 Tekram DC395(U/UW/F) and DC315(U) SCSI
 Trantor T128/T128F/T228 SCSI
 UltraStor 14F/34F
 UltraStor SCSI
 VMware PVSCSI driver
 Workbit NinjaSCSI-32Bi/UDE

USB support

Cypress C67x00 HCD
 Datafab Compact Flash Reader
 Freecom USB/ATAPI Bridge
 ISD-200 USB/ATA Bridge
 ISP 1760 HCD
 ISP116X HCD
 ISP1362 HCD
 Lexar Jumpshot Compact Flash Reader

Chelsio Communications T4 Ethernet
 Cisco VIC Ethernet NIC Support
 Intel(R) 10GbE PCI Express adapters
 Intel(R) PRO/10GbE
 Mellanox Technologies 10Gbit Ethernet
 Myricom Myri-10G Ethernet
 NetXen Multi port (1/10) Gigabit Ethernet NIC
 Neterion X3100 Series 10GbE PCIe Server Adapter
 QLOGIC QLCNIC 1/10Gb Converged Ethernet NIC Support
 QLogic QLGE 10Gb Ethernet Driver Support
 S2IO 10Gbe XFrame NIC
 ServerEngines' 10Gbps NIC - BladeEngine
 Solarflare Solarstorm SFC4000/SFC9000-family
 Sun Neptune 10Gbit Ethernet
 Tehuti Networks 10G Ethernet

Token Ring driver support

3Com 3C359 Token Link Velocity XL adapter
 Generic TMS380 PCI
 Generic TMS380 Token Ring ISA/PCI adapter
 IBM Lanstreamer chipset PCI adapter
 IBM Olympic chipset PCI adapter
 IBM Tropic chipset based adapter
 Madge Smart 16/4 PCI Mk2
 Proteon ISA
 SMC ISA/MCA adapter
 SysKconnect TR4/16 ISA

USB Network Adapters

ASIX AX88xxx Based USB 2.0 Ethernet Adapters
 CDC EEM
 CDC Ethernet support (smart devices such as cable modems)
 Davicom DM9601 based USB 1.1 10/100 ethernet devices
 GeneSys GL620USB-A based cables
 Host for RNDIS and ActiveSync devices
 MosChip MCS7830 based Ethernet adapters
 NetChip 1080 based cables (Laplink, ...)
 Prolific PL-2301/2302 based cables

OXU210HP HCD
Olympus MAUSB-10/Fuji DPC-R1
R8A66597 HCD
SL811HS HCD
SanDisk SDDR-09 (and other SmartMedia,
including DPCM)
SanDisk SDDR-55 SmartMedia
USB 2.0
USB Mass Storage
USB Monitor
USBAT/USBAT02-based storage
xHCI HCD (USB 3.0)

Block devices

Compaq SMART2
Compaq Smart Array 5xxx
Mylex DAC960/DAC1100 PCI RAID Controller
Normal floppy disk
Promise SATA SX8

IEEE 1394 (FireWire) support

Legacy alternative FireWire driver stack
Storage devices (SBP-2 protocol)

PCMCIA network device support

3Com 3c574 PCMCIA
3Com 3c589 PCMCIA
Asix AX88190 PCMCIA
COM20020 ARCnet PCMCIA
Fujitsu FMV-J18x PCMCIA
NE2000 compatible PCMCIA
New Media PCMCIA
SMC 91Cxx PCMCIA
Xircom 16-bit PCMCIA

Other devices

Microsoft Hyper-V Utilities driver
Microsoft Hyper-V client drivers
Microsoft Hyper-V virtual block driver
Microsoft Hyper-V virtual network driver
Microsoft Hyper-V virtual storage driver

SMSC LAN95XX based USB 2.0 10/100 ethernet
devices
Sharp Zaurus (stock ROMs) and compatible
Simple USB Network Links (CDC Ethernet subset)
USB CATC NetMate-based Ethernet device
USB KLSI KL5USB101-based ethernet device
USB Pegasus/Pegasus-II based ethernet device
USB RTL8150 based ethernet device

VII R-Studio Agent Emergency

R-Studio Agent Emergency is a tool that allows you to start a network computer with a damaged startup disk and recover data stored on its hard drives. Then restored data can be transferred to a working computer via the network.

It works very simple: Just start the computer with the **R-Studio Agent Emergency** startup disk(s) and, if necessary, manually configure a network interface for **R-Studio Agent Emergency**. When started, the computer and its hard drives can be accessed by **R-Studio** installed on another computer on the network.

[Contact Information and Technical Support](#)

[Installing R-Studio Agent Emergency Startup Media Creator](#)

[Creating Startup Disks](#)

[Starting a Computer with the R-Studio Agent Emergency Startup Disk](#)

[Hardware Compatibility List](#)

[Disk Controllers](#)

[Network Cards](#)

7.1 Contact Information and Technical Support

To obtain the latest version of **R-Studio Agent Emergency**, go to:

Product Site: <http://www.r-tt.com>

Sales Department: sales@r-tt.com

R-Studio Technical Support Team is available 24 hours a day, seven days a week, and has an average response time less than 4 hours.

Tech. Support: support@r-tt.com

Send your support request to: http://www.r-tt.com/Support_request.html

7.2 Installing R-Studio Agent Emergency Startup Media Creator

You must have administrative privileges to install R-Studio Agent Emergency Startup Media Creator.

If you are not sure whether you have such privileges, you almost certainly do not have them. Contact your system administrator for assistance.

1. Run the setup file.
2. Follow the on-screen instructions.

You may create startup disks even before the installation ends.

7.3 Creating Startup Disks

You need to create either

- A startup CD/DVD disc. You may create an ISO image, or write the disc directly from **R-Studio** Emergency Startup Media Creator, if there is a CD/DVD recorder in your system.

or

- A startup FAT/FAT32 removable device recognized by your system as a bootable one. The total available size of the device should be more than 10 MB.

or

- 4 formatted floppy disks

Check the [Hardware Compatibility List](#).

When **R-Studio Agent Emergency Startup Media Creator** starts, its Welcome dialog box appears:

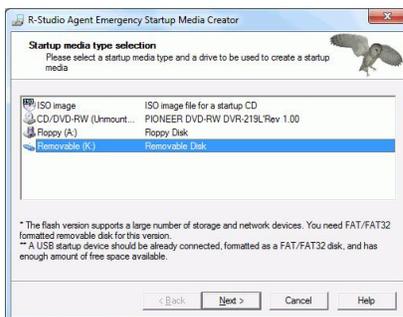
Welcome to **R-Studio Agent Emergency Startup Media Creator dialog box**

Welcome **dialog box**



click the **Next** button to see the list of all devices on which startup disks may be created.

Startup media type selection **dialog box**

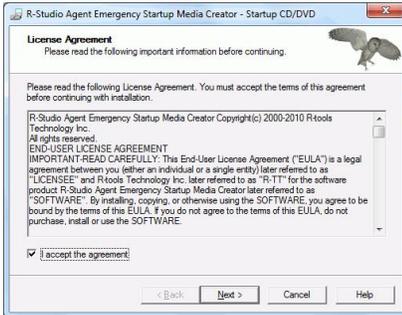


To create a startup CD/DVD disc directly on your CD/DVD writer (if present):

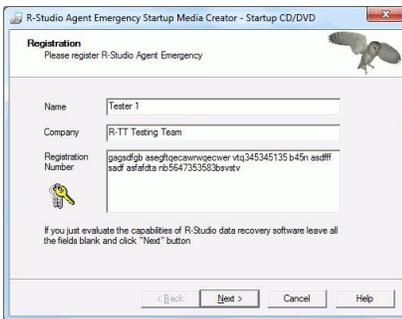
- 1 Run **R-Studio Agent Emergency**
- 2 Select the **CD/DVD writer** on the Startup media type selection **dialog box** and click the **Next** button
- 3 Read and accept the **License Agreement** and enter the **R-Studio Agent** registration key on the **R-Studio Agent Emergency Activation dialog box** and click the **Next** button

Note: You should enter the registration key of **R-Studio Agent**, not **R-Studio** itself.

R-Studio Agent Emergency License Agreement dialog box



R-Studio Agent Emergency Activation dialog box



if you do not enter the registration key, **R-Studio Agent** Emergency will work in the Demo mode. You may enter the key later when **R-Studio Agent** Emergency and **R-Studio** establish a connection

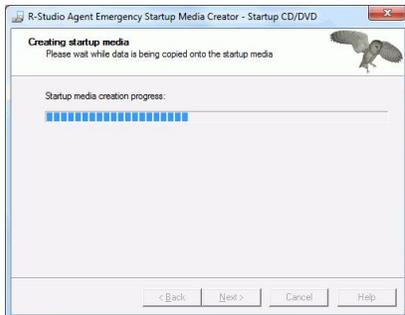
4 Insert a blank CD/DVD disk into the CD/DVD recorder and click the Next button

Insert media disc dialog box



- > **R-Studio Agent Emergency Startup Media Creator will start creating the startup CD/DVD disc showing the progress on the Creating startup media dialog box**

Creating startup media **dialog box**



When R-Studio Agent Emergency Startup Media Creator finishes creating the startup CD/DVD disc, the R-Studio Agent Emergency Startup Media Creation is Finished message will appear

You may either exit **R-Studio Emergency Startup Media Creator** by clicking the **Finish** button or create another startup media by clicking the **Back** button.

R-Studio Agent Emergency Startup Media Creation is Finished message



To create an ISO image of a startup CD/DVD disc

- 1 Run R-Studio Agent Emergency**
 - 2 Select ISO Image for a startup CD/DVD on the R-Studio Agent Emergency Startup Media Creator dialog box and click the Next button**
 - 3 Read and accept the License Agreement and enter the R-Studio Agent registration key on the R-Studio Agent Emergency Activation dialog box and click the Next button**
- Note:** You should enter the registration key of **R-Studio Agent**, not **R-Studio** itself.
if you do not enter the registration key, **R-Studio Agent** Emergency will work in the Demo mode. You may enter the key later when **R-Studio Agent** Emergency and **R-Studio** establish a connection.
- 4 Select a place and file name for the ISO image of the startup CD/DVD and click the Save button**
- > **When R-Studio Bootable Startup Media Creator finishes writing the file with the ISO image, the R-Studio Agent Emergency Startup Media Creation is Finished message will appear**

You may either exit **R-Studio Bootable Startup Media Creator** by clicking the **Finish** button or create another startup media by clicking the **Back** button.

R-Studio Agent Emergency Startup Media Creation is Finished dialog box



5 Create the startup CD/DVD using your favorite CD/DVD creation software

Load the created ISO image into the CD/DVD creation software. Consult documentation for the software for details.

To create a startup FAT/FAT32 removable device

1 Run R-Studio Agent Emergency

2 Select the removable device on the Startup media type selection dialog box and click the Next button

3 Read and accept the License Agreement and enter the registration key on the R-Studio Agent Emergency Activation dialog box and click the Next button

4 Check that the correct FAT/FAT32-formatted device is selected and click the Next button

Confirm device selection dialog box

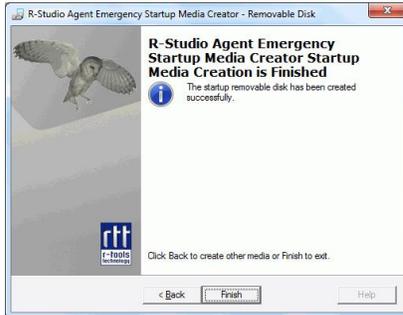


> R-Studio Agent Emergency Startup Media Creator will start creating the startup USB disk showing the progress on the Creating startup media dialog box

When R-Studio Agent Emergency Startup Media Creator finishes creating the startup device, the R-Studio Agent Emergency Startup Media Creation is Finished message will appear

You may either exit R-Studio Emergency Startup Media Creator by clicking the Finish button or create another startup media by clicking the Back button.

R-Studio Agent Emergency Startup Media Creation is Finished dialog box

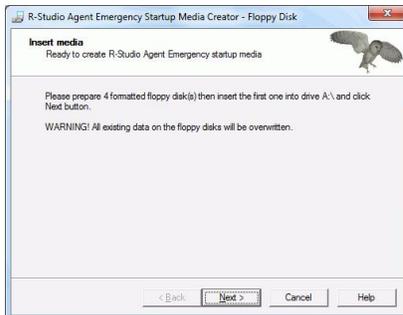


To create floppy disks:

You will need 4 formatted floppy disks.

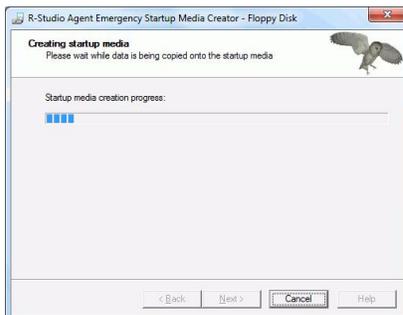
- 1 **Run R-Studio Agent Emergency**
- 2 **Select Floppy Disk for the startup floppy disk on the R-Studio Agent Emergency Startup Media Creator dialog box and click the Next button**
- 3 **Enter the registration information and number on the Registration dialog box and click the Next button**
If you leave all the field blank, **R-Studio Agent Emergency** will work with the **Demo-version limitations**
- 4 **Insert the floppy disk and click the Next button on the Insert floppy dialog box**

Insert floppy dialog box

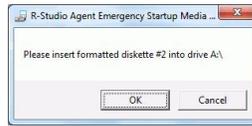


- > **R-Studio Agent Emergency Startup Media Creator will start creating the startup floppy disk showing the progress on the Creating startup media dialog box**

Creating startup media dialog box



- 5 Insert the **second floppy disk** and click the **OK** button when the **Please insert formatted diskette #2** into drive A: **message will appear**



Do it with the next 2 floppy disks.

- > **When R-Studio Startup Media Creator finishes creating the startup floppy disk, the R-Studio Agent Emergency Startup Media Creation is Finished message will appear. You may either exit R-Studio Startup Media Creator by clicking the Finish button or create another startup media by clicking the Back button.**

R-Studio Agent Emergency Startup Media Creation is Finished dialog box



7.4 Starting a Computer with the R-Studio Agent Emergency Startup Disk

We recommended that you print out this help page and have the hardcopy on hand while you are performing this action.

Before you start the computer you should be aware that your network has a DHCP server or you know the computer's IP address and network mask.

If there is a non-IDE disk controller in your system, or you plan to use network disks or external hardware devices, first check the [Hardware Compatibility List](#).

If you plan to use any external device, turn it on before starting the system.

If the motherboard in your computer supports the Serial ATA (SATA) devices, but IDE disks are also present, only the SATA devices should be set to the Enhanced Mode in BIOS.

To start the computer with the R-Studio Agent Emergency startup disks

- 1 **Make sure that the first startup device in the system BIOS is the device from which you plan to start your computer (a CD/DVD drive or A (Floppy))**

Disable "Secure boot" in the system BIOS if your computer is certified to run Windows 8. Refer to your system documentation for details. Refer to your system documentation for details.

- 2 **Insert the R-Studio Agent Emergency startup CD/DVD disc, a removable device, or the first floppy disk and start your computer**

- > **R-Studio Agent Emergency will start and its prompt will appear**

If you start your computer with floppy disks, you'll see prompts to insert a next floppy disk.

```
-----
Booting R-Studio Emergency. Please wait...
```

```

Waiting 8 seconds for PCMCIA devices to settle
Booting R-Studio Agent Emergency. Now you may remove floppy.
-----
Querying DHCP to configure network interfaces...
Press ENTER within 10 seconds to configure them manually.

```

If your network has a DHCP server

The computer running R-Studio Agent Emergency will be assigned an IP address automatically

A prompt with a computer address will appear. You need to remember it to access the computer via network.

If your network does not have a DHCP server

You need to configure the interfaces and IP addresses manually.

1. A prompt to select an interface will appear. Enter the selected interface name and press **Enter**.
2. A prompt to enter its IP address and optional subnet mask will appear. Enter the IP address and optional subnet mask and press **Enter**.

```

-----[ List of
Interfaces ]-----
Name          IP Address          NETMASK          Vendor
-----
re0           Unconfigured        RealTek
8139C+
-----
# Enter interface name, 'gw' for default gateway or just press
ENTER to finish
#>re0
# Enter IP address and optional NETMASK delimited by space
#>192.168.0.10 255.255.255.0

```

3. A prompt to configure another interface, gateway, or to finish configuring the interfaces will appear. Enter gw, enter the IP address of the gateway, and press **Enter**.

```

-----[ List of
Interfaces ]-----
Name          IP Address          NETMASK          Vendor
-----
re0           Unconfigured        RealTek
8139C+
-----
# Enter interface name, 'gw' for default gateway or just press
ENTER to finish
#>re0
# Enter IP address and optional NETMASK delimited by space
#>192.168.0.10 255.255.255.0

```

```

-----[ List of
Interfaces ]-----
Name          IP Address          NETMASK          Vendor
-----

```

```

re0          192.168.0.10          255.255.255.0          RealTek
8139C+
gw          Unconfigured          Default
gateway
-----
-----
# Enter interface name, 'gw' for default gateway or just press
ENTER to finish
#>gw
# Enter default gateway IP Address
#>192.168.0.1

-----[ List of
Interfaces ]-----
Name          IP Address          NETMASK          Vendor
-----
re0          192.168.0.10          255.255.255.0          RealTek
8139C+
gw          192.168.0.1          Default
gateway
-----
-----
# Enter interface name, 'gw' for default gateway or just press
ENTER to finish
#>

```

4. Press **Enter** to finish configuring the interfaces, or enter the name of the next interface to configure.

> **R-Studio Agent Emergency will show a prompt that is ready to accept connections**

```

* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start to remote R-Studio...

```

Now the computer may be accessed by **R-Studio** via network.

Secure boot:

It may be impossible to start a Windows 8 certified computer with the R-Studio Agent Emergency startup disk without some additional actions. This happens because any computer should use a so-called "Secure boot" procedure to comply with Windows 8 hardware certification from Microsoft. In brief, this procedure prevents computer from booting into any operating system that isn't digitally signed with an appropriate digital signature. "Secure boot" is claimed to prevent unauthorized modification of the boot sector by bootkits, viruses, trojans, and other malicious software. To the date, only Windows 8, Windows Server 2012, and selected Linux distributions support this feature. As a side effect, it also prevents most LiveCDs, rescue disks (R-Studio and R-Drive Image included), and other OS from running.

Likely enough, the other requirement of Windows 8 hardware certification is to make it possible for the user to disable the Secure boot procedure. Those settings can be done through the system BIOS under the Boot options. Generally, it's enough to enable Legacy support in those options, but sometimes it may require additional actions. Please, refer to your system documentation to learn more about disabling/enabling Secure boot.

When Secure boot is disabled, it should be possible to start the computer with the R-Studio Agent Emergency startup disk.

Please note that you should enable this feature back after using the startup disks because Windows 8 or Server 2012 may not start properly without the Secure boot feature enabled.

Starting a Connection from R-Studio Agent Emergency

When you need to connect **R-Studio** and **R-Studio Agent Emergency** over the Internet, it may be necessary to start the connection from the computer where **R-Studio Agent Emergency** is running.

To connect to **R-Studio's** computer,

- 1 Press the Enter key and enter the IP address of the computer where R-Studio is running as IPaddress:port.

```
* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start connection to remote R-Studio...
# Enter R-Studio IP address or just press ENTER to cancel>
192.168.0.25:80
```

The default port is 8080, and you don't have to specify it.

- 2 Enter the password if required, and press the Enter key.

```
* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start connection to remote R-Studio...
# Enter R-Studio IP address or just press ENTER to cancel>
192.168.0.25:80
# Enter password or just press ENTER to connect without
one>PaSsWoRd1234
```

- > When the connection is established successfully, R-Studio Agent Emergency will notify you about this.

```
* R-Studio Agent started and ready to accept connections...
* You may press ENTER to start connection to remote R-Studio...
# Enter R-Studio IP address or just press ENTER to cancel>
192.168.0.25:80
# Enter password or just press ENTER to connect without
one>PaSsWoRd1234
Connection with 192.168.0.25:80 is established successfully.
```

7.5 R-Studio Agent Emergency Hardware Compatibility List

[Disk Controllers](#)

[Network Cards](#)

[R-Studio Agent Emergency](#)

[Contact Information and Technical Support](#)

[Installing R-Studio Agent Emergency Startup Media Creator](#)

[Creating Startup Disks](#)

[Starting a Computer with the R-Studio Agent Emergency Startup Disk](#)

7.5.1 Disk Controllers

R-Studio Agent Emergency is based on the **FreeBSD 5.3** kernel and supports devices from the list published at <http://www.freebsd.org/releases/5.3R/hardware-i386.html>.

*: Supported in the floppy version

Disk controllers

IDE/ATA controllers (ata driver) *

The adapters supported by the [aic](#) driver include:

- Adaptec AHA-1505 (ISA)
- Adaptec AHA-1510A, AHA-1510B (ISA)
- Adaptec AHA-1520A, AHA-1520B (ISA)
- Adaptec AHA-1522A, AHA-1522B (ISA)
- Adaptec AHA-1535 (ISA)
- Creative Labs SoundBlaster SCSI host adapter (ISA)
- Adaptec AHA-1460, AHA-1460B, AHA-1460C, AHA-1460D (PC Card)
- Adaptec AHA-1030B, AHA-1030P (PC98)
- NEC PC-9801-100 (PC98)

The [aha](#) driver supports the following SCSI host adapters:

- Adaptec AHA-154xB
- Adaptec AHA-154xC
- Adaptec AHA-154xCF
- Adaptec AHA-154xCP
- Adaptec AHA-1640
- Adaptec AHA-174x in 154x emulation mode
- DTC 3290 SCSI controller in 1542 emulation mode
- Tekram SCSI controllers in 154x emulation mode

The [ahb](#) driver supports the following SCSI host adapters:

- Adaptec AHA-1740
- Adaptec AHA-1742
- Adaptec AHA-1740A
- Adaptec AHA-1742A

The [ahc](#) driver supports the following SCSI host adapter chips and SCSI controller cards:

- Adaptec AIC7770 host adapter chip
- Adaptec AIC7850 host adapter chip
- Adaptec AIC7860 host adapter chip
- Adaptec AIC7870 host adapter chip
- Adaptec AIC7880 host adapter chip
- Adaptec AIC7890 host adapter chip
- Adaptec AIC7891 host adapter chip
- Adaptec AIC7892 host adapter chip
- Adaptec AIC7895 host adapter chip
- Adaptec AIC7896 host adapter chip
- Adaptec AIC7897 host adapter chip
- Adaptec AIC7899 host adapter chip
- Adaptec 274X(W)
- Adaptec 274X(T)
- Adaptec 284X
- Adaptec 2910

Adaptec 2915
Adaptec 2920
Adaptec 2930C
Adaptec 2930U2
Adaptec 2940
Adaptec 2940J
Adaptec 2940N
Adaptec 2940U
Adaptec 2940AU
Adaptec 2940UW
Adaptec 2940UW Dual
Adaptec 2940UW Pro
Adaptec 2940U2W
Adaptec 2940U2B
Adaptec 2950U2W
Adaptec 2950U2B
Adaptec 19160B
Adaptec 29160B
Adaptec 29160N
Adaptec 3940
Adaptec 3940U
Adaptec 3940AU
Adaptec 3940UW
Adaptec 3940AUW
Adaptec 3940U2W
Adaptec 3950U2
Adaptec 3960
Adaptec 39160
Adaptec 3985
Adaptec 4944UW
NEC PC-9821Xt13 (PC-98)
NEC RvII26 (PC-98)
NEC PC-9821X-B02L/B09 (PC-98)
NEC SV-98/2-B03 (PC-98)
Many motherboards with on-board SCSI support

The [ahd](#) driver supports the following:

Adaptec AIC7901 host adapter chip
Adaptec AIC7901A host adapter chip
Adaptec AIC7902 host adapter chip
Adaptec 29320 host adapter
Adaptec 39320 host adapter
Many motherboards with on-board SCSI support

Controllers supported by the [aac](#) driver include:

Adaptec AAC-364
Adaptec SCSI RAID 2120S

Adaptec SCSI RAID 2130S
Adaptec SCSI RAID 2200S
Adaptec SCSI RAID 2410SA
Adaptec SCSI RAID 2810SA
Adaptec SCSI RAID 5400S
Dell CERC SATA RAID 2
Dell PERC 2/Si
Dell PERC 2/QC
Dell PERC 3/Si
Dell PERC 3/Di
Dell PERC 320/DC
HP NetRAID 4M

The **adv** driver supports the following SCSI controllers:

AdvanSys ABP510/5150
AdvanSys ABP5140
AdvanSys ABP5142
AdvanSys ABP902/3902
AdvanSys ABP3905
AdvanSys ABP915
AdvanSys ABP920
AdvanSys ABP3922
AdvanSys ABP3925
AdvanSys ABP930, ABP930U, ABP930UA
AdvanSys ABP960, ABP960U
AdvanSys ABP542
AdvanSys ABP742
AdvanSys ABP842
AdvanSys ABP940
AdvanSys ABP940UA/3940UA
AdvanSys ABP940U
AdvanSys ABP3960UA
AdvanSys ABP970, ABP970U
AdvanSys ABP752
AdvanSys ABP852
AdvanSys ABP950
AdvanSys ABP980, ABP980U
AdvanSys ABP980UA/3980UA
MELCO IFC-USP (PC-98)
RATOC REX-PCI30 (PC-98)
@Nifty FNECHARD IFC-USUP-TX (PC-98)

The **adw** driver supports SCSI controllers including:

AdvanSys ABP940UW/ABP3940UW
AdvanSys ABP950UW
AdvanSys ABP970UW
AdvanSys ABP3940U2W

AdvanSys ABP3950U2W

The **bt** driver supports the following BusLogic MultiMaster ``W'', ``C'', ``S'', and ``A'' series and compatible SCSI host adapters:

- BusLogic BT-445C
- BusLogic BT-445S
- BusLogic BT-540CF
- BusLogic BT-542B
- BusLogic BT-542B
- BusLogic BT-542D
- BusLogic BT-545C
- BusLogic BT-545S
- BusLogic/BusTek BT-640
- BusLogic BT-742A
- BusLogic BT-742A
- BusLogic BT-747C
- BusLogic BT-747D
- BusLogic BT-747S
- BusLogic BT-757C
- BusLogic BT-757CD
- BusLogic BT-757D
- BusLogic BT-757S
- BusLogic BT-946C
- BusLogic BT-948
- BusLogic BT-956C
- BusLogic BT-956CD
- BusLogic BT-958
- BusLogic BT-958D
- Storage Dimensions SDC3211B / SDC3211F

AMI FastDisk Host Adapters that are true BusLogic MultiMaster clones are also supported by the **bt** driver.

The **dpt** driver provides support for the following RAID adapters:

- DPT Smart Cache Plus
- Smart Cache II (PM2???, PM2022 [EISA], PM2024/PM2124 [PCI]) (Gen2)
- Smart RAID II (PM3???, PM3021, PM3222)
- Smart Cache III (PM2?3?)
- Smart RAID III (PM3?3?, PM3332 [EISA], PM3334UW [PCI]) (Gen3)
- Smart Cache IV (PM2?4?, PM2042 [EISA], PM2044/PM2144 [PCI]) (Gen4)
- Smart RAID IV

The adapters currently supported by the **asr** driver include the following:

- Adaptec Zero-Channel SCSI RAID 2000S, 2005S, 2010S, 2015S
- Adaptec SCSI RAID 2100S, 2110S
- Adaptec ATA-100 RAID 2400A
- Adaptec SCSI RAID 3200S, 3210S
- Adaptec SCSI RAID 3400S, 3410S
- Adaptec SmartRAID PM1554
- Adaptec SmartRAID PM1564

Adaptec SmartRAID PM2554
Adaptec SmartRAID PM2564
Adaptec SmartRAID PM2664
Adaptec SmartRAID PM2754
Adaptec SmartRAID PM2865
Adaptec SmartRAID PM3754
Adaptec SmartRAID PM3755U2B / SmartRAID V Millennium
Adaptec SmartRAID PM3757
DEC KZPCC-AC (LVD 1-ch, 4MB or 16MB cache), DEC KZPCC-CE (LVD 3-ch, 64MB cache), DEC KZPCC-XC (LVD 1-ch, 16MB cache), DEC KZPCC-XE (LVD 3-ch, 64MB cache) -- rebadged SmartRAID V Millennium

The `amr` driver supports the following:

AMI MegaRAID 320-1
AMI MegaRAID 320-2
AMI MegaRAID 320-4X
AMI MegaRAID Series 418
AMI MegaRAID Enterprise 1200 (Series 428)
AMI MegaRAID Enterprise 1300 (Series 434)
AMI MegaRAID Enterprise 1400 (Series 438)
AMI MegaRAID Enterprise 1500 (Series 467)
AMI MegaRAID Enterprise 1600 (Series 471)
AMI MegaRAID Elite 1500 (Series 467)
AMI MegaRAID Elite 1600 (Series 493)
AMI MegaRAID Elite 1650 (Series 4xx)
AMI MegaRAID Express 100 (Series 466WS)
AMI MegaRAID Express 200 (Series 466)
AMI MegaRAID Express 300 (Series 490)
AMI MegaRAID Express 500 (Series 475)
Dell PERC
Dell PERC 2/SC
Dell PERC 2/DC
Dell PERC 3/DCL
Dell PERC 3/QC
Dell PERC 4/Di
HP NetRAID-1/Si
HP NetRAID-3/Si (D4943A)
HP Embedded NetRAID
Note: Booting from these controllers is supported. EISA adapters are not supported.

Controllers supported by the `mlx` driver include:

Mylex DAC960P
Mylex DAC960PD / DEC KZPSC (Fast Wide)
Mylex DAC960PDU
Mylex DAC960PL
Mylex DAC960PJ
Mylex DAC960PG

Mylex DAC960PU / DEC PZPAC (Ultra Wide)

Mylex AcceleRAID 150 (DAC960PRL)

Mylex AcceleRAID 250 (DAC960PTL1)

Mylex eXtremeRAID 1100 (DAC1164P)

RAIDarray 230 controllers, aka the Ultra-SCSI DEC KZPAC-AA (1-ch, 4MB cache), KZPAC-CA (3-ch, 4MB), KZPAC-CB (3-ch, 8MB cache)

All major firmware revisions (2.x, 3.x, 4.x and 5.x) are supported, however it is always advisable to upgrade to the most recent firmware available for the controller. Compatible Mylex controllers not listed should work, but have not been verified.

Note: Booting from these controllers is supported. EISA adapters are not supported.

Controllers supported by the `mly` driver include:

Mylex AcceleRAID 160

Mylex AcceleRAID 170

Mylex AcceleRAID 352

Mylex eXtremeRAID 2000

Mylex eXtremeRAID 3000

Compatible Mylex controllers not listed should work, but have not been verified.

The `twe` driver supports the following ATA RAID controllers:

AMCC's 3ware 5000 series

AMCC's 3ware 6000 series

AMCC's 3ware 7000-2

AMCC's 3ware 7006-2

AMCC's 3ware 7500-4LP

AMCC's 3ware 7500-8

AMCC's 3ware 7500-12

AMCC's 3ware 7506-4LP

AMCC's 3ware 7506-8

AMCC's 3ware 7506-12

AMCC's 3ware 8006-2LP

AMCC's 3ware 8500-4LP

AMCC's 3ware 8500-8

AMCC's 3ware 8500-12

AMCC's 3ware 8506-4LP

AMCC's 3ware 8506-8

AMCC's 3ware 8506-8MI

AMCC's 3ware 8506-12

AMCC's 3ware 8506-12MI

The `twa` driver supports the following PATA/SATA RAID controllers:

AMCC's 3ware 9500S-4LP

AMCC's 3ware 9500S-8

AMCC's 3ware 9500S-8MI

AMCC's 3ware 9500S-12

AMCC's 3ware 9500S-12MI

The **ncr** driver provides support for the following NCR/Symbios SCSI controller chips:

53C810
53C810A
53C815
53C820
53C825A
53C860
53C875
53C875J
53C885
53C895
53C895A
53C896
53C1510D

The following add-on boards are known to be supported:

I-O DATA SC-98/PCI (PC-98)
I-O DATA SC-PCI (PC-98)

The **sym** driver provides support for the following Symbios/LSI Logic PCI SCSI controllers:

53C810
53C810A
53C815
53C825
53C825A
53C860
53C875
53C876
53C895
53C895A
53C896
53C897
53C1000
53C1000R
53C1010-33
53C1010-66
53C1510D

The SCSI controllers supported by **sym** can be either embedded on a motherboard, or on one of the following add-on boards:

ASUS SC-200, SC-896
Data Technology DTC3130 (all variants)
DawiControl DC2976UW
Diamond FirePort (all)
I-O DATA SC-UPCI (PC-98)
Logitec LHA-521UA (PC-98)
NCR cards (all)

Symbios cards (all)

Tekram DC390W, 390U, 390F, 390U2B, 390U2W, 390U3D, and 390U3W

Tyan S1365

The following devices are currently supported by the `ncv` driver:

I-O DATA PCSC-DV

KME KXLC002 (TAXAN ICD-400PN, etc.), KXLC004, and UJDCD450

Macnica Miracle SCSI-II mPS110

Media Intelligent MSC-110, MSC-200

NEC PC-9801N-J03R

New Media Corporation BASICS SCSI

Qlogic Fast SCSI

RATOC REX-9530, REX-5572 (SCSI only)

Controllers supported by the `stg` driver include:

Adaptec 2920/A

Future Domain SCSI2GO

Future Domain TMC-18XX/3260

IBM SCSI PCMCIA Card

ICM PSC-2401 SCSI

MELCO IFC-SC

RATOC REX-5536, REX-5536AM, REX-5536M, REX-9836A

Note that the Adaptec 2920C is supported by the `ahc` driver.

Cards supported by the `isp` driver include:

ISP1000

PTI SBS440

ISP1020

ISP1040

PTI SBS450

Qlogic 1240

Qlogic 1020

Qlogic 1040

Qlogic 1080

Qlogic 1280

Qlogic 12160

Qlogic 2100

Qlogic 2102

Qlogic 2200

Qlogic 2202

Qlogic 2204

Qlogic 2300

Qlogic 2312

PTI SBS470

Antares P-0033

Controllers supported by the `amd` driver include:

MELCO IFC-DP (PC-98)

Tekram DC390
Tekram DC390T

Controllers supported by the `nsp` driver include:

Alpha-Data AD-PCS201
I-O DATA CBSC16
Adaptec AIC-7110 Parallel to SCSI interfaces (`vpo` driver)

The following controllers are supported by the `ida` driver:

Compaq SMART Array 221
Compaq Integrated SMART Array Controller
Compaq SMART Array 4200
Compaq SMART Array 4250ES
Compaq SMART 3200 Controller
Compaq SMART 3100ES Controller
Compaq SMART-2/DH Controller
Compaq SMART-2/SL Controller
Compaq SMART-2/P Controller
Compaq SMART-2/E Controller
Compaq SMART Controller

Controllers supported by the `ciSS` driver include:

Compaq Smart Array 5300
Compaq Smart Array 532
Compaq Smart Array 5i
HP Smart Array 5312
HP Smart Array 6i
HP Smart Array 641
HP Smart Array 642
HP Smart Array 6400
HP Smart Array 6400 EM
HP Smart Array 6422
HP Smart Array V100
HP Modular Smart Array 20 (MSA20)
HP Modular Smart Array 500 (MSA500)

Controllers supported by the `iir` driver include:

Intel RAID Controller SRCMR
Intel Server RAID Controller U3-1 (SRCU31a)
Intel Server RAID Controller U3-1L (SRCU31La)
Intel Server RAID Controller U3-2 (SRCU32)
All past and future releases of Intel and ICP RAID Controllers.
Intel RAID Controller SRCU21 (discontinued)
Intel RAID Controller SRCU31 (older revision, not compatible)
Intel RAID Controller SRCU31L (older revision, not compatible)
The SRCU31 and SRCU31L can be updated via a firmware update available from Intel.
Promise SuperTrak ATA RAID controllers (`pst` driver)

The **hptmv** driver supports the HighPoint RocketRAID 182x SATA controllers.

Controllers supported by the **ips** driver include:

- IBM ServeRAID 3H
- ServeRAID 4L/4M/4H
- ServeRAID Series 5
- ServeRAID 6i/6M

The following controllers are supported by the **mpt** driver:

- LSI Logic 53c1030 (Dual Ultra320 SCSI)
- LSI Logic FC909 (1Gb/s Fibre Channel)
- LSI Logic FC909A (Dual 1Gb/s Fibre Channel)
- LSI Logic FC919 (2Gb/s Fibre Channel)
- LSI Logic FC929 (Dual 2Gb/s Fibre Channel)

The SCSI controller chips supported by the **mpt** driver can be found onboard on many systems including:

- Dell PowerEdge 1750
- IBM eServer xSeries 335

SCSI controllers supported by the **trm** driver include:

- Tekram DC-315 PCI Ultra SCSI adapter without BIOS and internal SCSI connector
- Tekram DC-315U PCI Ultra SCSI adapter without BIOS
- Tekram DC-395F PCI Ultra-Wide SCSI adapter with flash BIOS and 68-pin external SCSI connector
- Tekram DC-395U PCI Ultra SCSI adapter with flash BIOS
- Tekram DC-395UW PCI Ultra-Wide SCSI adapter with flash BIOS
- Tekram DC-395U2W PCI Ultra2-Wide SCSI adapter with flash BIOS

For the Tekram DC-310/U and DC-390F/U/UW/U2B/U2W/U3W PCI SCSI host adapters, use the **sym** driver.

The **wds** driver supports the WD7000 SCSI controller.

7.5.2 Network Cards

R-Studio Agent Emergency is based on the **FreeBSD 5.3** kernel and supports devices from the list published at <http://www.freebsd.org/releases/5.3R/hardware-i386.html>.

*: Supported in the floppy version

Ethernet NICs

Adapters supported by the **sf** driver include:

- ANA-62011 64-bit single port 10/100baseTX adapter
- ANA-62022 64-bit dual port 10/100baseTX adapter
- ANA-62044 64-bit quad port 10/100baseTX adapter
- ANA-69011 32-bit single port 10/100baseTX adapter
- ANA-62020 64-bit single port 100baseFX adapter

The **ti** driver supports Gigabit Ethernet adapters based on the Alteon Tigon I and II chips. The **ti** driver has been tested with the following adapters:

- 3Com 3c985-SX Gigabit Ethernet adapter (Tigon 1)
- 3Com 3c985B-SX Gigabit Ethernet adapter (Tigon 2)
- Alteon AceNIC V Gigabit Ethernet adapter (1000baseSX)
- Alteon AceNIC V Gigabit Ethernet adapter (1000baseT)
- Digital EtherWORKS 1000SX PCI Gigabit adapter

Netgear GA620 Gigabit Ethernet adapter (1000baseSX)

Netgear GA620T Gigabit Ethernet adapter (1000baseT)

The following adapters should also be supported but have not yet been tested:

Asante GigaNIX1000T Gigabit Ethernet adapter

Asante PCI 1000BASE-SX Gigabit Ethernet adapter

Farallon PN9000SX Gigabit Ethernet adapter

NEC Gigabit Ethernet

Silicon Graphics PCI Gigabit Ethernet adapter

The `pcn` driver supports adapters and embedded controllers based on the AMD PCnet/FAST, PCnet/FAST+, PCnet/FAST III, PCnet/PRO and PCnet/Home Fast Ethernet chips:

AMD Am53C974/Am79C970/Am79C974 PCnet-PCI *

AMD Am79C970A PCnet-PCI II *

AMD Am79C971 PCnet-FAST *

AMD Am79C972 PCnet-FAST+ *

AMD Am79C973/Am79C975 PCnet-FAST III *

AMD Am79C976 PCnet-PRO *

AMD PCnet/Home HomePNA

Allied-Telesis LA-PCI

Contec C-NET(98)S (PC-98)

NEC SV-98/2-B05, B06

The `lnc` driver supports the following adapters:

Novell NE2100 *

Novell NE32-VL *

Isolan AT 4141-0 (16 bit)

Isolan BICC

Isolink 4110 (8 bit)

Diamond HomeFree

Digital DEPCA

Hewlett Packard Vectra 486/66XM

Hewlett Packard Vectra XU

Also supported are adapters working with the `pcn` driver. The `lnc` driver runs these in compatibility mode, thus the `pcn` driver should be preferred.

SMC 83c17x (EPIC)-based Ethernet NICs (`tx` driver)

The `ed` driver supports the following Ethernet NICs:

3Com 3c503 Etherlink II

AR-P500 Ethernet

Accton EN1644 (old model), EN1646 (old model), EN2203 (old model) (110pin) (flags 0xd00000)

Accton EN2212/EN2216/UE2216

Allied Telesis CentreCOM LA100-PCM_V2

Allied Telesis LA-98 (flags 0x000000) (PC-98)

Allied Telesis SIC-98, SIC-98NOTE (110pin), SIU-98 (flags 0x600000) (PC-98)

Allied Telesis SIU-98-D (flags 0x610000) (PC-98)

AmbiCom 10BaseT card

Bay Networks NETGEAR FA410TXC Fast Ethernet

CNet BC40 adapter
Compex Net-A adapter
Contec C-NET(98), RT-1007(98), C-NET(9N) (110pin) (flags 0xa00000) (PC-98)
Contec C-NET(98)E-A, C-NET(98)L-A, C-NET(98)P (flags 0x300000) (PC-98)
Corega Ether98-T (flags 0x000000) (PC-98)
Corega Ether PCC-T/EtherII PCC-T/FEther PCC-TXF/PCC-TXD
CyQ've ELA-010
DEC EtherWorks DE305
Danpex EN-6200P2
D-Link DE-298, DE-298P (flags 0x500000) (PC-98)
D-Link DE-650/660
D-Link IC-CARD/IC-CARD+ Ethernet
ELECOM LD-98P (flags 0x500000) (PC-98)
ELECOM LD-BDN, LD-NW801G (flags 0x200000) (PC-98)
ELECOM Lanced LD-CDL/TX, LD-CDF, LD-CDS, LD-10/100CD, LD-CDWA (DP83902A)
HP PC Lan+ 27247B and 27252A
IBM Creditcard Ethernet I/II
ICM AD-ET2-T, DT-ET-25, DT-ET-T5, IF-2766ET, IF-2771ET, NB-ET-T (110pin) (flags 0x500000) (PC-98)
I-O DATA LA/T-98, LA/T-98SB, LA2/T-98, ET/T-98 (flags 0x900000) (PC-98)
I-O DATA ET2/T-PCI
I-O DATA PCLATE
Kansai KLA-98C/T (flags 0x900000) (PC-98)
Kingston KNE-PC2, KNE-PCM/x Ethernet
Linksys EC2T/PCMP100/PCM100, PCMLM56
Linksys EtherFast 10/100 PC Card, Combo PCMCIA Ethernet Card (PCMP100 V2)
Logitech LAN-98T (flags 0xb00000) (PC-98)
MACNICA Ethernet ME1 for JEIDA
MACNICA ME98 (flags 0x900000) (PC-98)
MACNICA NE2098 (flags 0x400000) (PC-98)
MELCO EGY-98 (flags 0x300000) (PC-98)
MELCO LGH-98, LGY-98, LGY-98-N (110pin), IND-SP, IND-SS (flags 0x400000) (PC-98)
MELCO LGY-PCI-TR
MELCO LPC-T/LPC2-T/LPC2-CLT/LPC2-TX/LPC3-TX/LPC3-CLX
NDC Ethernet Instant-Link
NEC PC-9801-77, PC-9801-78 (flags 0x910000) (PC-98)
NEC PC-9801-107, PC-9801-108 (flags 0x800000) (PC-98)
National Semiconductor InfoMover NE4100
NetGear FA-410TX
NetVin 5000
Network Everywhere Ethernet 10BaseT PC Card
Networkd 98X3 (flags 0xd00000) (PC-98)
Networkd EC-98X, EP-98X (flags 0xd10000) (PC-98)
Novell NE1000/NE2000/NE2100
PLANEX ENW-8300-T

PLANEX EN-2298-C (flags 0x200000) (PC-98)
PLANEX EN-2298P-T, EN-2298-T (flags 0x500000) (PC-98)
PLANEX FNW-3600-T
RealTek 8029
SMC Elite 16 WD8013
SMC Elite Ultra
SMC EtherEZ98 (flags 0x000000) (PC-98)
SMC WD8003E/WD8003EBT/WD8003S/WD8003SBT/WD8003W/WD8013EBT/WD8013W and clones
Socket LP-E
Surecom EtherPerfect EP-427
Surecom NE-34
TDK LAK-CD031, Grey Cell GCS2000 Ethernet Card
Telecom Device SuperSocket RE450T
VIA VT86C926
Winbond W89C940
C-Bus, ISA, PCI and PC Card devices are supported.

Adapters supported by the rl driver include:

Accton "Cheetah" EN1207D (MPX 5030/5038; RealTek 8139 clone)
Allied Telesyn AT2550
Allied Telesyn AT2500TX
Belkin F5D5000
BUFFALO(Melco INC.) LPC-CB-CLX(CardBus)
Compaq HNE-300
CompUSA no-name 10/100 PCI Ethernet NIC
Corega FEther CB-TXD
Corega FEtherII CB-TXD
D-Link DFE-530TX+
D-Link DFE-538TX (same as 530+?)
D-Link DFE-690TXD
Edimax EP-4103DL CardBus
Encore ENL832-TX 10/100 M PCI
Farallon NetLINE 10/100 PCI
Genius GF100TXR,
GigaFast Ethernet EE100-AXP
KTX-9130TX 10/100 Fast Ethernet
LevelOne FPC-0106TX
Longshine LCS-8038TX-R
NDC Communications NE100TX-E
Netronix Inc. EA-1210 NetEther 10/100
Nortel Networks 10/100BaseTX
OvisLink LEF-8129TX
OvisLink LEF-8139TX
Peppercon AG ROL-F
Planex FNW-3800-TX

SMC EZ Card 10/100 PCI 1211-TX
SOHO(PRAGMATIC) UE-1211C

The **wb** driver supports Winbond W89C840F based Fast Ethernet adapters and embedded controllers including:

Trendware TE100-PCIE *

The **vr** driver supports VIA Technologies Rhine I, Rhine II, and Rhine III based Fast Ethernet adapters including:

D-Link DFE530-TX
Hawking Technologies PN102TX
AOpen/Acer ALN-320

The **sis** driver supports Silicon Integrated Systems SiS 900 * and SiS 7016 * based Fast Ethernet adapters and embedded controllers, as well as Fast Ethernet adapters based on the National Semiconductor DP83815 (MacPhyter) chip. Supported adapters include:

@Nifty FNECHARD IFC USUP-TX
MELCO LGY-PCI-TXC
Netgear FA311-TX (DP83815)
Netgear FA312-TX (DP83815)
SiS 630, 635, and 735 motherboard chipsets

The **nge** driver supports National Semiconductor DP83820 * and DP83821 based Gigabit Ethernet adapters including:

SMC EZ Card 1000 (SMC9462TX)
D-Link DGE-500T
Asante FriendlyNet GigaNIX 1000TA and 1000TPC
Addtron AEG320T
LinkSys EG1032 (32-bit PCI) and EG1064 (64-bit PCI)
Surecom Technology EP-320G-TX
Netgear GA622T
Netgear GA621
Ark PC SOHO-GA2500T (32-bit PCI) and SOHO-GA2000T (64-bit PCI)
Trendware TEG-PCITX (32-bit PCI) and TEG-PCITX2 (64-bit PCI)

The **ste** driver supports Sundance Technologies ST201 based Fast Ethernet adapters and embedded controllers including:

D-Link DFE-530TXS
D-Link DFE-550TX

Adapters supported by the **sk** driver include:

3COM 3C940 single port, 1000baseT adapter
Belkin F5D5005 single port, 1000baseT adapter
Linksys EG1032 single port, 1000baseT adapter
SK-9521 SK-NET GE-T single port, 1000baseT adapter
SK-9821 SK-NET GE-T single port, 1000baseT adapter *
SK-9822 SK-NET GE-T dual port, 1000baseT adapter *
SK-9841 SK-NET GE-LX single port, single mode fiber adapter *
SK-9842 SK-NET GE-LX dual port, single mode fiber adapter *
SK-9843 SK-NET GE-SX single port, multimode fiber adapter *
SK-9844 SK-NET GE-SX dual port, multimode fiber adapter *

SMC 9452TX single port, 1000baseT adapter

The `tl` driver supports Texas Instruments ThunderLAN based Ethernet and Fast Ethernet adapters including a large number of Compaq PCI Ethernet adapters. Also supported are:

Olicom OC-2135/2138 10/100 TX UTP adapter

Olicom OC-2325/OC-2326 10/100 TX UTP adapter

Racore 8148 10baseT/100baseTX/100baseFX adapter

Racore 8165 10/100baseTX adapter

The `tl` driver also supports the built-in Ethernet adapters of various Compaq Prosignia servers and Compaq Deskpro desktop machines including:

Compaq Netelligent 10

Compaq Netelligent 10 T PCI UTP/Coax

Compaq Netelligent 10/100

Compaq Netelligent 10/100 Dual-Port

Compaq Netelligent 10/100 Proliant

Compaq Netelligent 10/100 TX Embedded UTP

Compaq Netelligent 10/100 TX UTP

Compaq NetFlex 3P

Compaq NetFlex 3P Integrated

Compaq NetFlex 3P w/BNC

The `dc` driver provides support for the following chipsets: *

DEC/Intel 21143

ADMtek AL981 Comet, AN985 Centaur, ADM9511 Centaur II and ADM9513 Centaur II

ASIX Electronics AX88140A and AX88141

Conexant LANfinity RS7112 (miniPCI)

Davicom DM9009, DM9100, DM9102 and DM9102A

Lite-On 82c168 and 82c169 PNIC

Lite-On/Macronix 82c115 PNIC II

Macronix 98713, 98713A, 98715, 98715A, 98715AEC-C, 98725, 98727 and 98732

Xircom X3201 (cardbus only)

The following NICs are known to work with the `dc` driver at this time:

3Com OfficeConnect 10/100B (ADMtek AN985 Centaur-P)

Abocom FE2500

Accton EN1217 (98715A)

Accton EN2242 MiniPCI

Adico AE310TX (98715A)

Alfa Inc GFC2204 (ASIX AX88140A)

Built in 10Mbps only Ethernet on Compaq Presario 7900 series desktops (21143, non-MII)

Built in DE500-BA on DEC Alpha workstations (21143, non-MII)

Built in Sun DMFE 10/100 Mbps Ethernet on Sun Netra X1 and Sun Fire V100 (DM9102A, MII)

Built in Ethernet on LinkSys EtherFast 10/100 Instant GigaDrive (DM9102, MII)

CNet Pro110B (ASIX AX88140A)

CNet Pro120A (98715A or 98713A) and CNet Pro120B (98715)

Compex RL100-TX (98713 or 98713A)

D-Link DFE-570TX (21143, MII, quad port)

Digital DE500-BA 10/100 (21143, non-MII)

ELECOM Lanced LD-CBL/TXA (ADMtek AN985)
Hawking CB102 CardBus
IBM EtherJet Cardbus Adapter
Intel PRO/100 Mobile Cardbus (versions that use the X3201 chipset)
Jaton XpressNet (Davicom DM9102)
Kingston KNE100TX (21143, MII)
Kingston KNE110TX (PNIC 82c169)
LinkSys LNE100TX (PNIC 82c168, 82c169)
LinkSys LNE100TX v2.0 (PNIC II 82c115)
LinkSys LNE100TX v4.0/4.1 (ADMtek AN985 Centaur-P)
Matrox FastNIC 10/100 (PNIC 82c168, 82c169)
Melco LGY-PCI-TXL
Microsoft MN-120 10/100 CardBus (ADMtek Centaur-C)
Microsoft MN-130 10/100 PCI (ADMtek Centaur-P)
NDC SOHOware SFA110A (98713A)
NDC SOHOware SFA110A Rev B4 (98715AEC-C)
NetGear FA310-TX Rev. D1, D2 or D3 (PNIC 82c169)
Netgear FA511
PlaneX FNW-3602-T (ADMtek AN985)
SMC EZ Card 10/100 1233A-TX (ADMtek AN985)
SVEC PN102-TX (98713)
Xircom Cardbus Realport
Xircom Cardbus Ethernet 10/100
Xircom Cardbus Ethernet II 10/100

Adapters supported by the [aue](#) driver include:

Abocom UFE1000, DSB650TX_NA
Accton USB320-EC, SpeedStream
ADMtek AN986, AN8511
Billionton USB100, USB100LP, USB100EL, USBE100
Corega Ether FEther USB-T, FEther USB-TX, FEther USB-TXS
D-Link DSB-650, DSB-650TX, DSB-650TX-PNA
Elecom LD-USBL/TX
Elsa Microlink USB2Ethernet
HP hn210e
I-O Data USB ETTX
Kingston KNU101TX
LinkSys USB10T adapters that contain the AN986 Pegasus chipset, USB10TA, USB10TX, USB100TX, USB100H1
MELCO LUA-TX, LUA2-TX
Planex UE-200TX
Sandberg USB to Network Link (model number 133-06)
Siemens Speedstream
SmartBridges smartNIC
SMC 2202USB
SOHOware NUB100

The **cue** driver supports CATC USB-EL1210A based USB Ethernet adapters including:

- Belkin F5U011/F5U111
- CATC Netmate
- CATC Netmate II
- SmartBridges SmartLink

The **kue** driver supports Kawasaki LSI KL5KLUSB101B based USB Ethernet adapters including:

- 3Com 3c19250
- 3Com 3c460 HomeConnect Ethernet USB Adapter
- ADS Technologies USB-10BT
- AOX USB101
- ATen UC10T
- Abocom URE 450
- Corega USB-T
- D-Link DSB-650C
- Entrega NET-USB-E45, NET-HUB-3U1E
- I/O Data USB ETT
- Kawasaki DU-H3E
- LinkSys USB10T
- Netgear EA101
- Peracom USB Ethernet Adapter
- SMC 2102USB, 2104USB

The **axe** driver supports ASIX Electronics AX88172 based USB Ethernet adapters including:

- Buffalo (Melco Inc.) LUA-U2-KTX
- D-Link DUBE100
- LinkSys USB200M
- Netgear FA120
- System TALKS Inc. SGC-X2UL

The **rue** driver supports RealTek RTL8150 based USB Ethernet adapters including:

- Buffalo (Melco Inc.) LUA-KTX
- Green House GH-USB100B
- LinkSys USB100M
- Billionton 10/100 FastEthernet USBKR2

The **udav** driver supports the following adapters:

- Corega FEther USB-TXC

Adapters supported by the **de** driver include:

- Adaptec ANA-6944/TX
- Cogent EM100FX and EM440TX
- Corega FastEther PCI-TX
- D-Link DFE-500TX
- DEC DE435, DE425, DEC DE450, and DEC DE500
- ELECOM LD-PCI2T, LD-PCITS
- I-O DATA LA2/T-PCI
- SMC Etherpower 8432, 9332 and 9334
- ZNYX ZX3xx

Controllers and cards supported by the [fe](#) driver include:

Allied Telesis RE1000, RE1000Plus, ME1500 (110-pin)
CONTEC C-NET(98)P2, C-NET (9N)E (110-pin), C-NET(9N)C (ExtCard)
CONTEC C-NET(PC)C PCMCIA Ethernet
Eiger Labs EPX-10BT
Fujitsu FMV-J182, FMV-J182A
Fujitsu MB86960A, MB86965A
Fujitsu MBH10303, MBH10302 Ethernet PCMCIA
Fujitsu Towa LA501 Ethernet
HITACHI HT-4840-11
NextCom J Link NC5310
RATOC REX-5588, REX-9822, REX-4886, and REX-R280
RATOC REX-9880/9881/9882/9883
TDK LAC-98012, LAC-98013, LAC-98025, LAC-9N011 (110-pin)
TDK LAK-CD021, LAK-CD021A, LAK-CD021BX
Ungermann-Bass Access/PC N98C+(PC85152, PC85142), Access/NOTE N98(PC86132) (110-pin)

Adapters supported by the [fxp](#) driver include:

Intel EtherExpress PRO/10
Intel InBusiness 10/100
Intel PRO/100B / EtherExpressPRO/100 B PCI Adapter *
Intel PRO/100+ Management Adapter
Intel PRO/100 VE Desktop Adapter
Intel PRO/100 M Desktop Adapter
Intel PRO/100 S Desktop, Server and Dual-Port Server Adapters
Contec C-NET(PI)-100TX (PC-98)
NEC PC-9821Ra20, Rv20, Xv13, Xv20 internal 100Base-TX (PC-98)
NEC PC-9821X-B06 (PC-98)
Many on-board network interfaces on Intel motherboards

The [ex](#) driver supports the following Ethernet adapters:

Intel EtherExpress Pro/10
Intel EtherExpress Pro/10+
The Olicom OC2220

The [ie](#) driver provides supports the following 8 and 16bit ISA Ethernet cards that are based on the Intel i82586 chip:

3COM 3C507
AT&T EN100
AT&T Starlan 10
AT&T Starlan Fiber
Intel EtherExpress 16
RACAL Interlan NI5210

The [ep](#) driver supports Ethernet adapters based on the 3Com 3C5x9 Etherlink III Parallel Tasking chipset, including:

3Com 3C1 CF
3Com 3C509-TP, 3C509-BNC, 3C509-Combo, 3C509-TPO, 3C509-TPC ISA

3Com 3C509B-TP, 3C509B-BNC, 3C509B-Combo, 3C509B-TPO, 3C509B-TPC ISA
3Com 3C529, 3C529-TP MCA
3Com 3C562/3C563 PCMCIA
3Com 3C569B-J-TPO, 3C569B-J-COMBO CBUS
3Com 3C574-TX, 3CCFE574BT, 3CXFE574BT, 3C3FE574BT PCMCIA
3Com 3C579-TP, 3C579-BNC EISA
3Com 3C589, 3C589B, 3C589C, 3C589D, 3CXE589DT PCMCIA
3Com 3CCFEM556B, 3CCFEM556BI PCMCIA
3Com 3CXE589EC, 3CCE589EC, 3CXE589ET, 3CCE589ET PCMCIA
3Com Megahertz 3CCEM556, 3CXEM556, 3CCEM556B, 3CXEM556B PCMCIA
3Com OfficeConnect 3CXSH572BT, 3CCSH572BT PCMCIA
Farallon EtherMac PCMCIA

The **el** driver supports the 3Com 3c501 8bit ISA Ethernet card.

The **xl** driver supports the following hardware:

3Com 3c900-TPO *
3Com 3c900-COMBO *
3Com 3c905-TX *
3Com 3c905-T4 *
3Com 3c900B-TPO *
3Com 3c900B-TPC *
3Com 3c900B-FL *
3Com 3c900B-COMBO *
3Com 3c905B-T4 *
3Com 3c905B-TX *
3Com 3c905B-FX *
3Com 3c905B-COMBO *
3Com 3c905C-TX *
3Com 3c980, 3c980B, and 3c980C server adapters
3Com 3cSOHO100-TX OfficeConnect adapters
3Com 3c450 HomeConnect adapters
3Com 3c555, 3c556 and 3c556B mini-PCI adapters
3Com 3C3SH573BT, 3C575TX, 3CCFE575BT, 3CXFE575BT, 3CCFE575CT, 3CXFE575CT,
3CCFEM656, 3CCFEM656B, and 3CCFEM656C, 3CXFEM656, 3CXFEM656B, and 3CXFEM656C
CardBus adapters
3Com 3c905-TX, 3c905B-TX 3c905C-TX, and 3c920B-EMB embedded adapters

Both the 3C656 family of CardBus cards and the 3C556 family of MiniPCI cards have a built-in proprietary modem. Neither the xl driver nor any other driver supports this modem.

The **vx** driver supports the following cards:

3Com 3c590 EtherLink III PCI *
3Com 3c592 EtherLink III EISA
3Com 3c595 Fast EtherLink III PCI in 10 Mbps mode *
3Com 3c597 Fast EtherLink III EISA in 10 Mbps mode
Crystal Semiconductor CS89x0-based NICs (**cs** driver)

The [sn](#) driver supports SMC9xxx based ISA and PCMCIA cards including:

3Com Megahertz X-Jack Ethernet PC-Card CC-10BT

The [xe](#) driver supports the following cards:

Xircom CreditCard Ethernet (PS-CE2-10)

Xircom CreditCard Ethernet + Modem 28 (PS-CEM-28)

Xircom CreditCard Ethernet + Modem 33 (CEM33)

Xircom CreditCard 10/100 (CE3, CE3B)

Xircom CreditCard Ethernet 10/100 + Modem 56 (CEM56)

Xircom RealPort Ethernet 10 (RE10)

Xircom RealPort Ethernet 10/100 (RE100)

Xircom RealPort Ethernet 10/100 + Modem 56 (REM56, REM56G)

Accton Fast EtherCard-16 (EN2226)

Compaq Netelligent 10/100 PC Card (CPQ-10/100)

Intel EtherExpress Pro/100 PC Card Mobile Adapter 16 (Pro/100 M16A)

Other similar devices using the same hardware may also be supported.

Adapters supported by the [lge](#) driver include:

SMC TigerCard 1000 (SMC9462SX) *

D-Link DGE-500SX *

The [txp](#) driver supports the following cards:

3Com 3CR990-TX-95 *

3Com 3CR990-TX-97 *

3Com 3cR990B-TXM *

3Com 3CR990SVR95 *

3Com 3CR990SVR97 *

3Com 3cR990B-SRV *

The [bge](#) driver provides support for various NICs based on the Broadcom BCM570x family of Gigabit Ethernet controller chips, including the following:

3Com 3c996-T (10/100/1000baseTX) *

Dell PowerEdge 1750 integrated BCM5704C NIC (10/100/1000baseTX) *

Dell PowerEdge 2550 integrated BCM5700 NIC (10/100/1000baseTX) *

Dell PowerEdge 2650 integrated BCM5703 NIC (10/100/1000baseTX) *

IBM x235 server integrated BCM5703x NIC (10/100/1000baseTX) *

HP ProLiant NC7760 embedded Gigabit NIC (10/100/1000baseTX) *

HP ProLiant NC7770 PCI-X Gigabit NIC (10/100/1000baseTX) *

HP ProLiant NC7781 embedded PCI-X Gigabit NIC (10/100/1000baseTX) *

Netgear GA302T (10/100/1000baseTX) *

SysKonnnect SK-9D21 (10/100/1000baseTX) *

SysKonnnect SK-9D41 (1000baseSX) *

The [em](#) driver supports Gigabit Ethernet adapters based on the Intel 82540, 82541PI, 82542, 82543, 82544, 82546, 82546EB and 82547 controller chips:

Intel PRO/1000 CT Network Connection (82547)

Intel PRO/1000 F Server Adapter (82543)

Intel PRO/1000 Gigabit Server Adapter (82542)*

Intel PRO/1000 GT Desktop Adapter (82541PI)

Intel PRO/1000 MF Dual Port Server Adapter (82546)
Intel PRO/1000 MF Server Adapter (82545)
Intel PRO/1000 MF Server Adapter (LX) (82545)
Intel PRO/1000 MT Desktop Adapter (82540)
Intel PRO/1000 MT Desktop Adapter (82541)
Intel PRO/1000 MT Dual Port Server Adapter (82546)
Intel PRO/1000 MT Quad Port Server Adapter (82546EB)
Intel PRO/1000 MT Server Adapter (82545)
Intel PRO/1000 T Desktop Adapter (82544)
Intel PRO/1000 T Server Adapter (82543)
Intel PRO/1000 XF Server Adapter (82544)
Intel PRO/1000 XT Server Adapter (82544)

The **gx** driver supports Gigabit Ethernet adapters based on the Intel 82542 and 82543 controller chips:

Intel PRO/1000 Gigabit Server Adapter (82542)
Intel PRO/1000 F Server Adapter (82543)
Intel PRO/1000 T Server Adapter (82543)

The **hme** driver supports the on-board Ethernet interfaces of many Sun UltraSPARC workstation and server models. Cards supported by the **hme** driver include:

Sun PCI SunSwift Adapter
Sun SBus SunSwift Adapter `` (hme" and ``SUNW,hme")
Sun PCI Sun100BaseT Adapter 2.0
Sun SBus Sun100BaseT 2.0
Sun PCI Quad FastEthernet Controller
Sun SBus Quad FastEthernet Controller

The **my** driver provides support for various NICs based on the Myson chipset. Supported models include:

Myson MTD800 PCI Fast Ethernet chip
Myson MTD803 PCI Fast Ethernet chip
Myson MTD89X PCI Gigabit Ethernet chip

Broadcom BCM4401 based Fast Ethernet adapters (bfe driver) *

The **re** driver supports RealTek RTL8139C+, RTL8169, RTL8169S and RTL8110S based Fast Ethernet and Gigabit Ethernet adapters including:

Alloy Computer Products EtherGOLD 1439E 10/100 (8139C+) *
Compaq Evo N1015v Integrated Ethernet (8139C+) *
Corega CG-LAPCIGT Gigabit Ethernet (8169S) *
Gigabyte 7N400 Pro2 Integrated Gigabit Ethernet (8110S) *
PLANEX COMMUNICATIONS Inc. GN-1200TC (8169S) *
Xterasys XN-152 10/100/1000 NIC (8169) *

The **ixgb** driver supports the following cards:

Intel PRO/10GbE LR Server Adapter *
Intel PRO/10GbE SR Server Adapter *

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