

#### Fedora on RISC-V

RISC-V in servers everywhere?

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# fedora



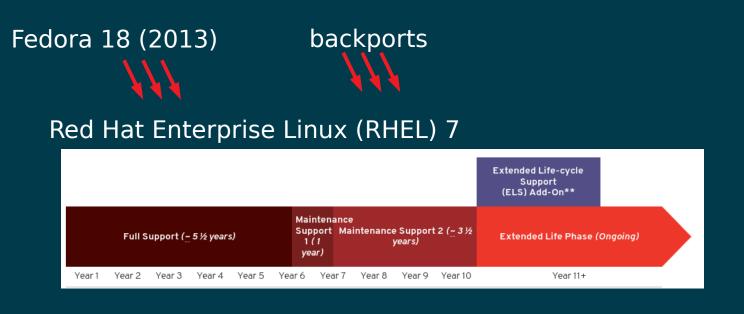




Upstream developers Fedora Rawhide Fedora 28 (May 2018)



#### Red Hat Enterprise Linux



#### CentOS 7



#### Upstream First





#### Closed to Open





QUMRANET

😥 Manage IQ

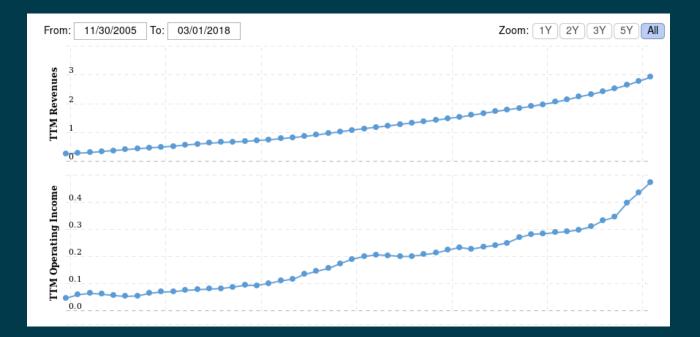
MAKARA







#### Step 3 - profit





#### Fedora on RISC-V

Final bootstrap took 2 months

- 16,725 builds
- 12,785 binary packages

Current build farm:

- 2 x HiFive Unleashed boards
- 11 qemu instances on 4 Intel servers
- Fedora Rawhide & Fedora 28, plus "shadow Koji"

Bootable disk images widely used by developers experiencing RISC-V for the first time.



### Fedora on RISC-V

- IRC: #fedora-riscv (FreeNode)
- https://fedoraproject.org/wiki/Architectures/RISC-V
- https://fedorapeople.org/groups/risc-v/disk-images/



#### RISC-V on the server





#### RISC-V on the server





#### Don't make these mistakes

- Require manual intervention to choose the right bootloader/kernel per vendor
- X Out of tree drivers or patches
- No standards / constantly changing standards
- **\*** No organization providing direction on server standards
- Incompatible variants of the ISA
  - => single kernel image cannot be made
- Breaking ABIs:
  - ISA | kernel | modules | glibc | libraries | ISV software
- Intimately tied to Linux, so other OS vendors are excluded
- \* Developer boards are too expensive for developers



+ gemu-system-riscv64 -nographic -machine virt -smp 4 -m 2G -kernel bbl -object rng-random,filename=/dev/urandom,id=rng end 'console=ttyS0 ro root=/dev/vda' -d systemd[1]: System time before build time, advancing clock. systemd[1]: systemd 237 running in system mode. (+PAM +AUDIT +SELINUX +IMA -APPA file=stage4-disk.img,format=raw,id=hd0 RMOR +SMACK +SYSVINIT +UTMP -LIBCRYPTSETUP +GCRYPT -GNUTLS +ACL +XZ +LZ4 -SECCOM -netdev user,id=usernet,hostfwd=tcp::10 P +BLKID +ELFUTILS +KMOD +IDN2 -IDN +PCRE2 default-hierarchy=hvbrid) systemd[1]: Detected architecture riscv64. rrrrrrrrrrr Welcome to Fedora 28 (Rawhide)! rrrrrrrrrrrrrr rrrrrrrrrrrrrrrrr systemd[1]: Set hostname to <stage4.fedoraproject.org>. rrrrrrrrrrrr systemd[1]: Reached target Swap. rrrrrrrrrrrr [ OK ] Reached target Swap. rrrrrrrrrrrrr systemd[1]: Started Forward Password ReWelcome to the Fedora/RISC-V stage4 disk image rrrrrrrrrrrr OK ] Started Forward Password Requentity://fedoraproject.org/wiki/Architectures/RISC-V l r r systemd[1]: Reached target Remote File l r r [ OK ] Reached target Remote File Sy Build date: 2018-03-31 21:16 rrrr systemd[1]: Created slice System Slice rrrrrr r [ OK ] Created slice System Slice. Kernel 4.16.0-rc5-01493-g7f82cffaad50 on an riscv64 (ttyS0) rrrrrrr systemd[1]: Created slice system-getty rrrrrrrr OK ] Created slice system-getty.sl The root password is 'riscv'. rrrrrrrrrr **VVVVVVVV** rrrr systemd[1]: Listening on udev Control **VVVVV** rrrrrrrrrrrr OK ] Listening on udev Control Soc∥To install new packages use 'dnf install ...' vv rrrrrrrrrrrrr rrrrrr systemd[1]: Listening on Journal Socket rrrrrrrrrrrrrrrr ] Listening on Journal Socket ( If DNS isn't working, try editing '/etc/yum.repos.d/local.repo'. 0K rrrrrrrrrrrrrrrrrr rrrrr ] Listening on udev Kernel Socke 0K rrrrrrrrrrrr ] Listening on /dev/initctl Com For updates and latest information read: 0K ] Listening on Process Core Dum https://fedorapeople.org/groups/risc-v/disk-images/readme.txt 0K INSTRUCTION SETS WANT TO BE FREE OK ] Listening on Journal Socket. OF: fdt: Ignoring memory range 0x800000 Mounting POSIX Message Queue stage4 login: root Linux version 4.16.0-rc5-01493-g7f82cff Starting Setup Virtual Consol Password: gcc version 7.3.1 20180303 (Red Hat 7.3 Starting Apply Kernel VariableLast login: Mon May 7 10:36:16 on ttvS0 TC 2018 Starting Remount Root and Ker [root@stage4 ~]# uname -a bootconsole [earlv0] enabled Mounting Temporary Directory |Linux stage4.fedoraproject.org 4.16.0-rc5-01493-g7f82cffaad50 #6 SMP Fri Mar 16 Initial ramdisk at: 0x (ptrval) Starting udev Coldplug all De 00:38:51 UTC 2018 riscv64 riscv64 riscv64 GNU/Linux Zone ranges: OK ] Listening on Network Service [[root@stage4 ~]# DMA32 emptv 0K ] Created slice User and Session [mem 0x000000080200000-0x00 Normal OK ] Reached target Slices. Movable zone start for each node 1 0K ] Created slice system-sshd\x2d Early memory node ranges Starting Journal Service... 0: [mem 0x000000080200000-0x0 node OK | Created slice system-serial\x Initmem setup node 0 [mem 0x0000000802 EXT4-fs (vda): re-mounted. Opts: (null elf hwcap is 0x112d [ OK ] Mounted POSIX Message Queue F. percpu: Embedded 15 pages/cpu @ systemd[1]: Started Setup Virtual Conso Built 1 zonelists, mobility grouping on OK 1 Started Setup Virtual Console systemd[1]: Started Apply Kernel Varia OK ] Started Apply Kernel Variable





## **THANK YOU**

Search for "Fedora RISC-V"

### Koji Fedora build system

ed uild	o <b>ra</b> . system					Pa	ckages	¥	Sat, 05 May 2018 12:42:35 C
Summ	ary Packages	Builds	Tasks	Tags	Build Targets	Users	Hosts	Reports	Search
	4-								
Hos	sts								
State	enabled 🗸								
					Hosts 1 thro	ugh 15 of 15			
ID	Name 🛦				Arches	-	bled?	Ready?	Last Update
2	builder1.tranquillity.se				riscv64			<b>_</b>	2018-05-05 12:42:21
3	builder2.tranquillity.se				riscv64			· ·	2018-05-05 12:42:31
14	fedora-riscv-kojibuilder	1.tranguillity.	se		riscv64			- <b>-</b>	2018-05-05 12:42:26
15	fedora-riscv-kojibuilder		riscv64				2018-05-05 12:42:25		
4	five.home.annexia.org				riscv64	-			2018-05-05 12:42:34
13	hifive.delorie.com				riscv64	-		<ul> <li>Image: A second s</li></ul>	2018-05-05 07:58:29
1	kojibuilder1.davidlt.org				riscv64	<ul> <li>Image: A start of the start of</li></ul>		-	2018-04-28 15:21:50
5	vm01.home.annexia.or	g			riscv64	<ul> <li>Image: A start of the start of</li></ul>		<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:22
6	vm02.home.annexia.or	g			riscv64	<ul> <li>Image: A start of the start of</li></ul>		<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:33
7	vm03.home.annexia.or	g			riscv64	<ul> <li>Image: A second s</li></ul>		<ul> <li>Image: A set of the set of the</li></ul>	2018-05-05 12:42:35
8	vm04.home.annexia.or	g			riscv64	<ul> <li>Image: A second s</li></ul>		<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:20
9	vm05.home.annexia.or	g			riscv64	<ul> <li>Image: A start of the start of</li></ul>		<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:20
10	vm06.home.annexia.or	g			riscv64	<ul> <li>Image: A set of the set of the</li></ul>		<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:20
10					riscv64			<ul> <li>Image: A second s</li></ul>	2018-05-05 12:42:23
10 11	vm07.home.annexia.or	g			1130704	•			

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#### Koji Fedora build system

Summa	ry Packages	Builds	Tasks	Tags	Build Targets	Users	Hosts	Reports	Searc	h	
Nelc	ome to Koji V	/eb									
	nt Builds	0.0									
ID ₹	NVR					Built by		Finished			State
24865		L.1.riscv64.fc				davidlt					- Ar
24864	0	L.O.riscv64.fc	29			davidlt		2018-05-05 02:	53:06		
24863	hivex-1.3.1	.5-3.fc29				rjones		2018-05-04 15:	54:05		×.
24862	file-5.33-3.	fc29				davidlt		2018-05-04 13:	27:28		<ul> <li>Image: A second s</li></ul>
24861	nano-2.9.6	-1.fc29				davidlt		2018-05-04 13:4	48:59		- <b>-</b>
24860	mutt-1.9.5	4.fc29				davidlt		2018-05-04 13:	38:15		<ul> <li>Image: A second s</li></ul>
24859	sed-4.5-1.1	c29				davidlt		2018-05-04 13:	21:46		<ul> <li>Image: A second s</li></ul>
24858	mailx-12.5	-28.fc29				davidlt		2018-05-04 12:	22:37		- <b>-</b>
24857	zlib-1.2.11	-8.fc29				davidlt		2018-05-04 13:0	01:42		
24856	coreutils-8.29-10.fc29					davidlt		2018-05-04 14:30:37			
	nt Tasks <sup>Type</sup>							Owner	Arch	Finished	State
727	build (f29-candidate,	/rpms/gcc.git	:273a6e3e21	Lb0edabf0c	0a2f4aae7d097e4ea	ub35c)		davidlt	noarch		0
725	distRepo (f29)							davidlt	noarch	2018-05-05 02:03:14	-
723	distRepo (f29)							davidlt	noarch	2018-05-04 21:49:31	×
721	distRepo (f29)							davidlt	noarch	2018-05-05 07:40:49	<b>×</b>
718	build (f29-candidate,	/rpms/gcc.git	:b840e5963d	i9b3f1d7fba	ad779baf3bfa1c62ca	acc2)		davidlt	noarch	2018-05-05 02:53:07	_
715	newRepo (rawhide)							kojira	noarch	2018-05-04 16:25:54	- <b>~</b>
714	newRepo (f29-build)							kojira	noarch	2018-05-04 16:23:06	- <b>/</b>
711	distRepo (f29)							davidlt	noarch	2018-05-04 19:20:52	
709	newRepo (rawhide)							kojira	noarch	2018-05-04 15:05:47	- <b>/</b>
	newRepo (f29-build)							kojira	noarch	2018-05-04 15:06:20	



#### DJ's glibc development system



