

POWER9 Scale Out Servers

MTM 9009-42A	(S924)
MTM 9009-41A	(S914)
MTM 9009-22A	(S922)
MTM 9008-22L	(L922)
MTM 9223-42H	(H924)
MTM 9223-22H	(H922)

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IBM Power Systems



IBM i Strategic Directions

Power Solutions

- Enable clients to exploit latest hardware technology (POWER9 and peripherals)
- Enable clients to transform their customer experience using mobile, cognitive/ML/AI
- Enable ISV Solutions to implement the latest technologies
- Provide flexible solutions options for MSPs



Open Platform

- Grow IBM i solutions options including open source languages and applications
- Extend IBM i solutions portfolio with Linux and AIX application choices



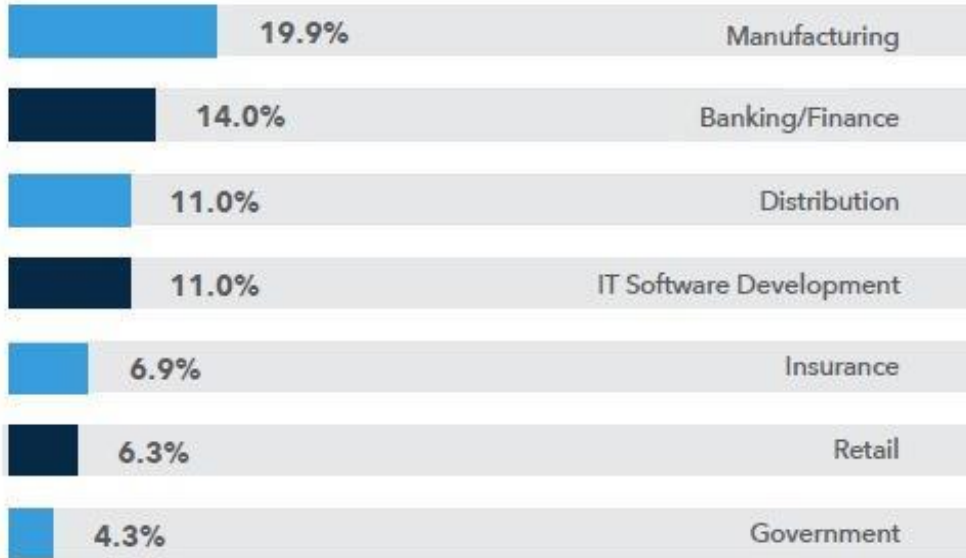
The *Integrated* Promise of IBM i

- Deliver a simple, high value platform for business applications
- Provide exceptional security and resiliency for critical business data
- Leverage IBM systems, storage and software technologies



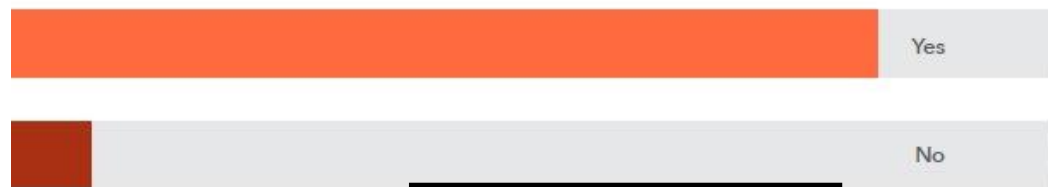
IBM i Industries

What is your primary industry?

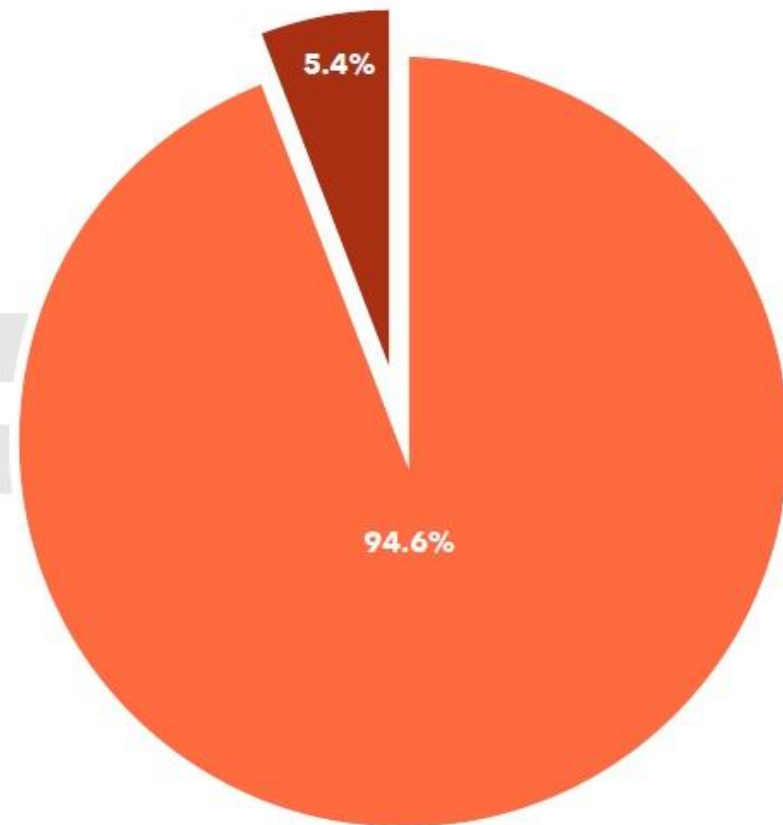


<https://www.helpsystems.com/resources/guides/2017-ibm-i-marketplace-survey-results>

Do you believe your IBM i server gives you a better ROI than other servers?

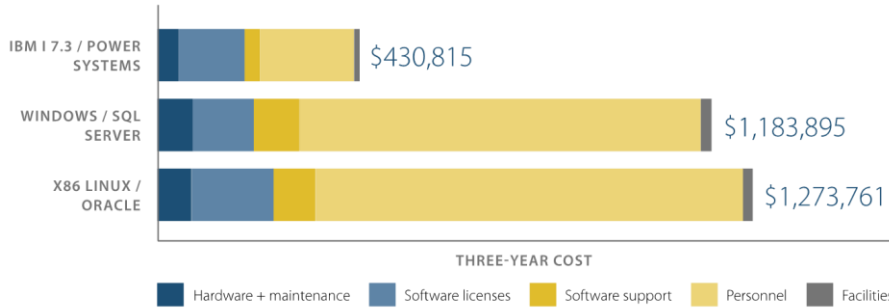


**IBM i customers
Better ROI?
Yes: 94.6 %**

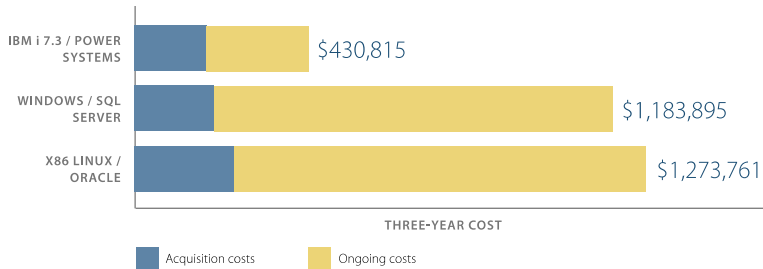


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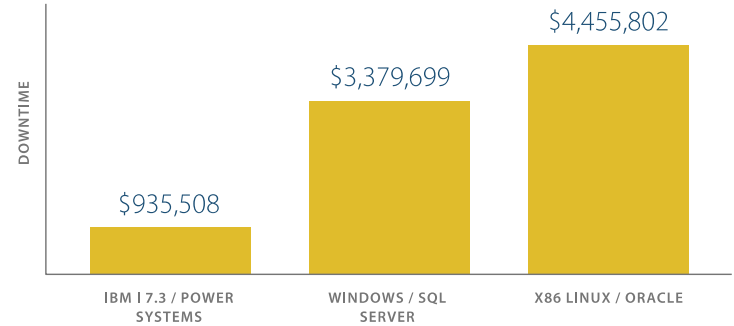
IBM i on Power Systems Meets the Diverse Needs of Midsize Businesses



60+% Lower Total Cost of Ownership



Competitive Cost of Acquisition, 75% Less Cost of Ongoing Operations



3 - 4X more reliable

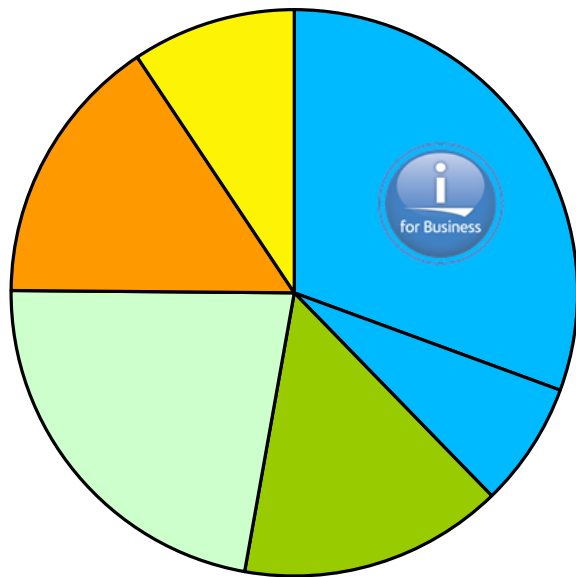
SOURCE: Quark + Lepton, IBM i on Power Systems for Midsize Businesses, 2017

https://www-01.ibm.com/marketing/iwm/dre/signup?source=urx-19319&S_PKG=ov60945&cm_mmc=OSocial_Blog--Systems_Systems+-Advanced+Analytic+Servers--WW_WW--SystemsMagIBMi&cm_mmca1=000001AF&cm_mmca2=10003273&



IBM i is Strategic to IBM Power Systems Business

- IBM is investing in IBM i and planning on revenue growth



- **2017 Highlights**
 - IBM i 7.3 TR2/IBM i 7.2 TR6 announced
 - IBM i Service Provider Monthly Offering
 - IBM i ARCAD Observer & Converter
 - IBM i 7.1 EoM / EoS Announcement
 - Geographically Dispersed Resiliency (GDR) for IBM i
 - IBM i 7.3 TR3/IBM i 7.2 TR7 announced
 - Cloud Storage Solutions
- **2018 Highlights**
 - IBM i 7.3 TR4/IBM i 7.2 TR8
 - IBM i 30th Anniversary; theme “Looking Forward”

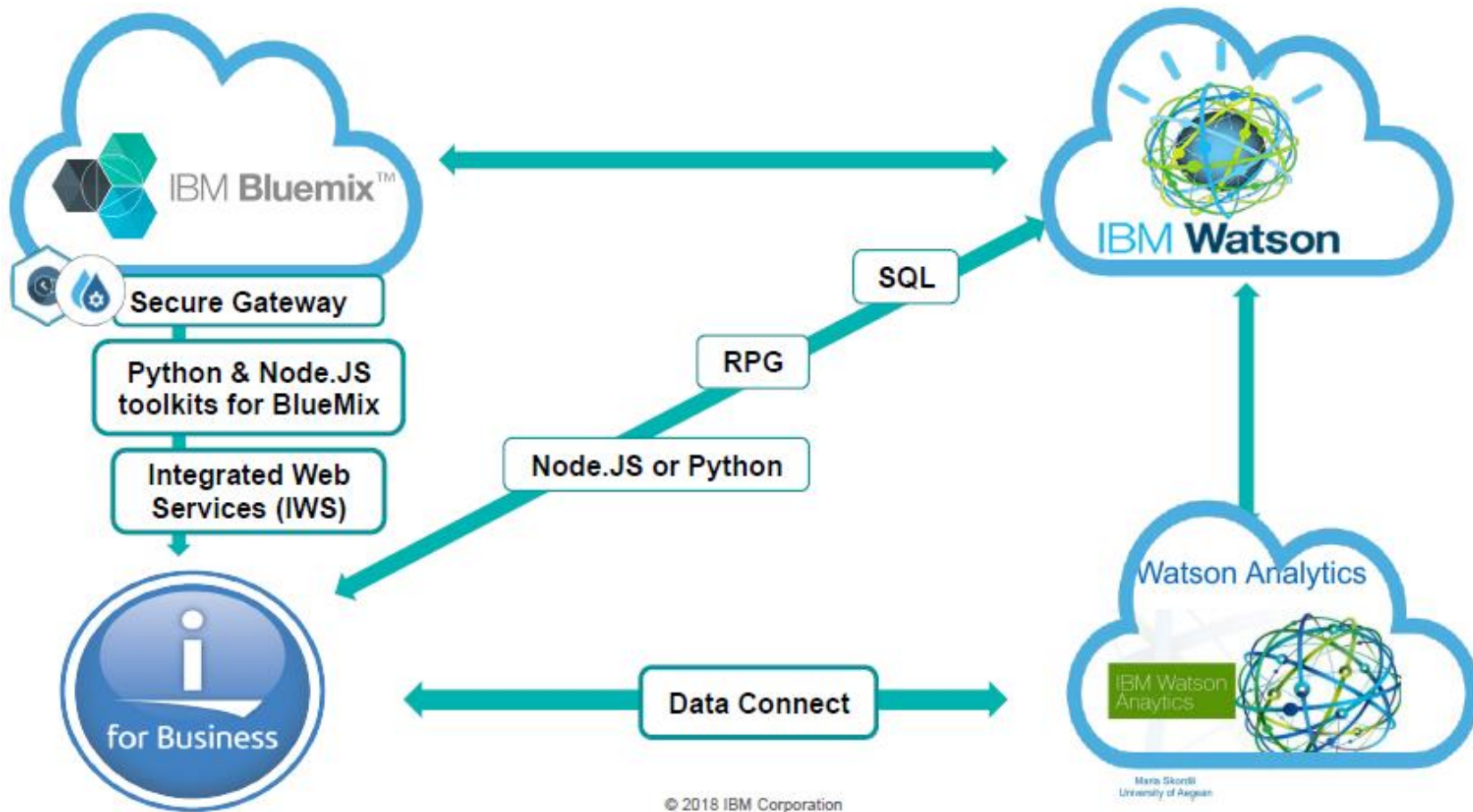
IBM i 30th Anniversary Celebration Begins

- **IBM i 30th Anniversary Celebration kicked off Tues 4/3/18**
- **Various events and other activities planned leading up to COMMON Europe (June)**
- **This anniversary celebration will be focused on the future, emphasizing the themes:**
 - The influx of young talent to the IBM i community through Fresh Faces
 - The transformation of the platform into an equal player in mobile, cloud, analytics and cognitive

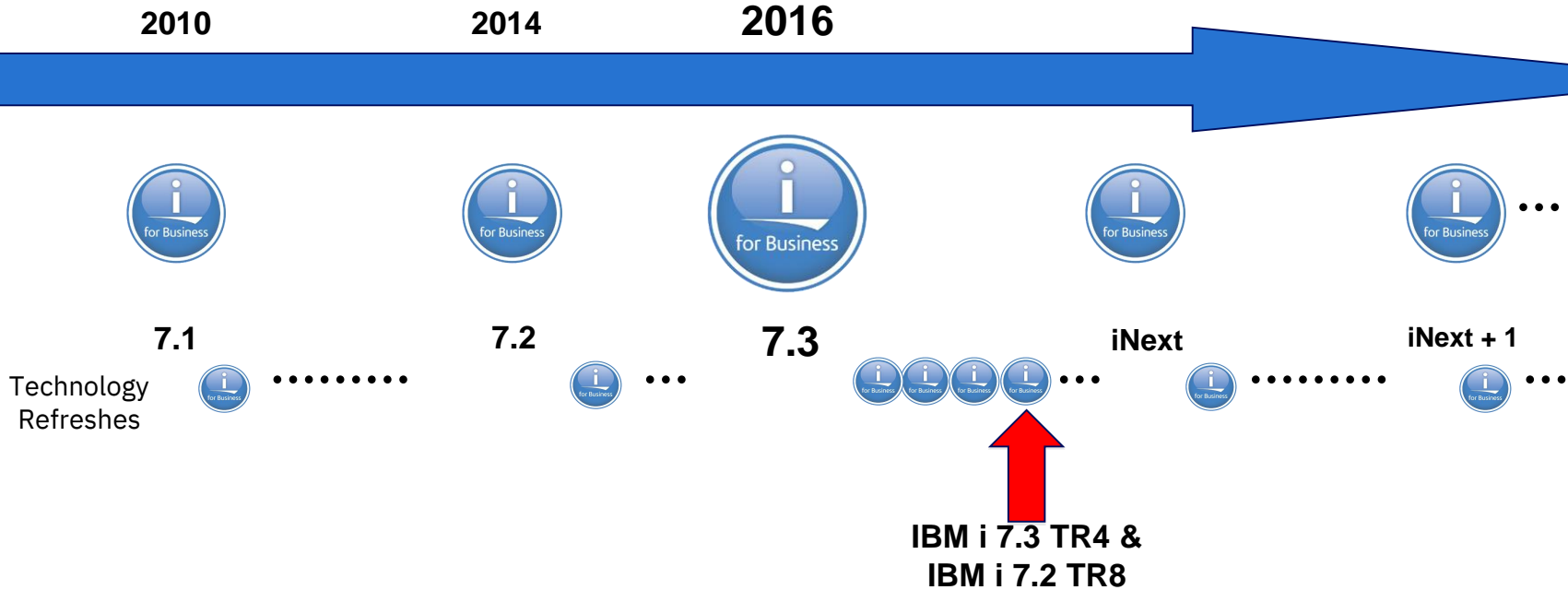


<http://ibmi30.mybluemix.net>

Connecting IBM i to Watson

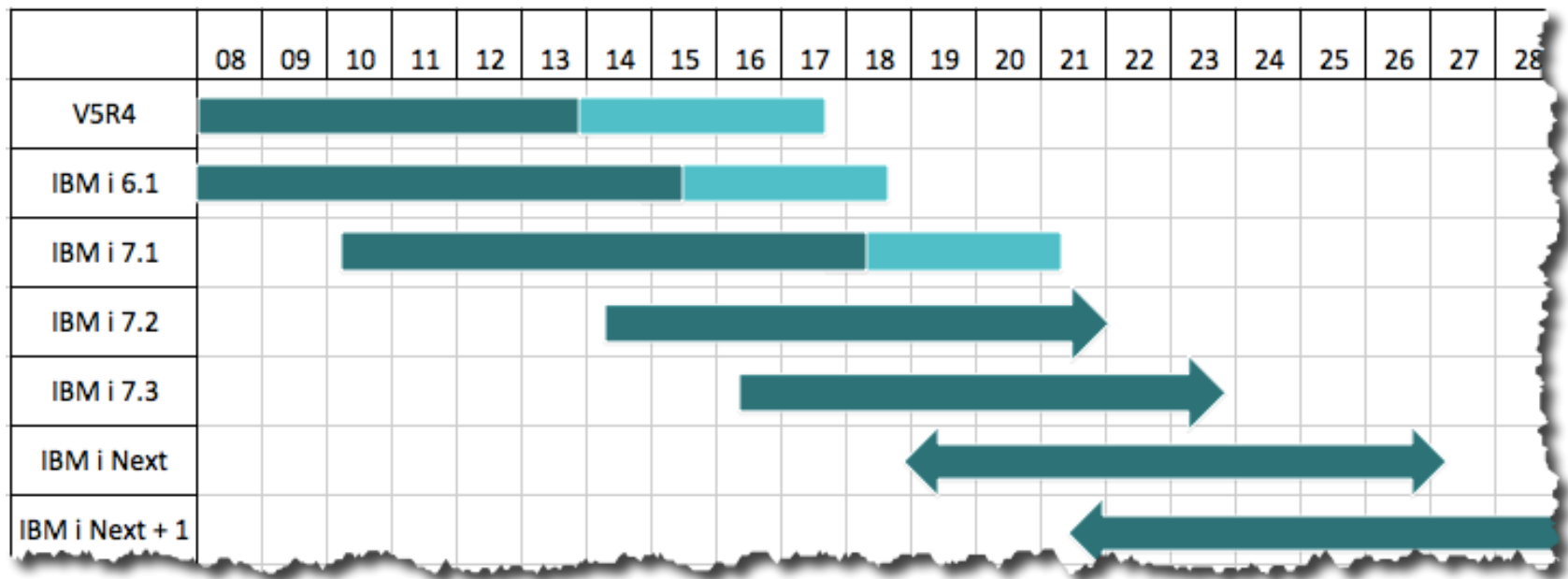


IBM i Roadmap



** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

IBM i Support Roadmap



IBM i Support Roadmap

IBM i 5.4

- End of Extended Extended Support – September 30, 2017

IBM i 6.1

- End of Extended Support – September 30, 2018


IBM i 7.1

- End of Marketing – September 30, 2017
- End of Support – April 30, 2018

 Extended Support – announced November 14, 2017

- [US 617-024](#)
- [Europe ZS17-0033](#)
- [Japan JS17-0045](#)
- [Asia Pacific AS17-0024](#)
- [Canada A17-0690](#)
- [Latin America LS17-0020](#)

IBM i System Support

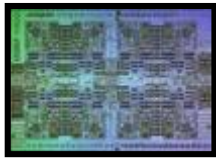
Systems	IBM i 7.2	IBM i 7.3
POWER9 	✓	✓
POWER8 S812, S814, S822 (VIOS only), S824, E870, E870C, E880, E880C	✓	✓
POWER7/7+ Servers Power 710, 720, 730, 740, 750, 760, 770, 780, 795	✓	✓
POWER7/7+ Blades and Compute Nodes PS700/701/702/730/704, PureFlex p260/460	✓	
POWER6+ 520, 550, 560, JS23/43 POWER6 520, 550, 570, 595, JS12/22	✓ 1	

IBM i 7.3 TR4
 IBM i 7.2 TR8

Reminder – EoS Dates for Older Hardware Models

Type	Model		EOS date	SW tier
9408	M25	POWER6 - 520	12/31/16	P10
9407	515	POWER5 - 515	12/31/17	P05
8203	E4A	POWER6 - 520	3/31/19	P10
9409	M50	POWER6 - 550	3/31/19	P20
8231	E1C/D	POWER7 - 710	9/30/19	P05
8202	E4B/C	POWER7-720	9/30/19	P10
8205	E6B/C	POWER7 - 740	9/30/19	P20
9406	525	POWER5 - 520	12/31/21	P10
9405	520	POWER5 - 520	12/31/21	P10
9406	520	POWER5 - 520	12/31/21	P10
9406	550	POWER5 - 550	12/31/21	P20

IBM's Latest Processor: POWER9

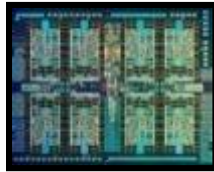


POWER7
45 nm

Enterprise

- 8 Cores
- SMT4
- eDRAM L3 Cache

1H10

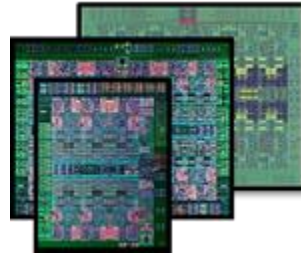


POWER7+
32 nm

Enterprise

- 2.5x Larger L3 cache
- On-die acceleration
- Zero-power core idle state

2H12

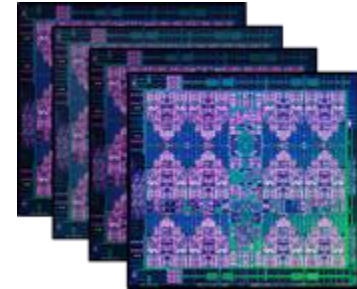


POWER8 Family
22nm

Enterprise & Big Data Optimized

- Up to 12 Cores
- SMT8
- CAPI Acceleration
- High Bandwidth GPU Attach

1H14 – 2H16



POWER9 Family
14nm

Built for the Cognitive Era

- Only processor with NVLink, PCIe Gen 4 advanced IO interfaces and coherence
- Premier Platform for Accelerated Computing
- Processor Family with Scale-Up and Scale-Out Optimized Silicon

2H17 – 2H18+

POWER9

The only processor specifically designed for the AI era.

4x

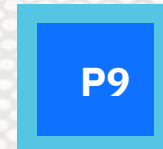
More threads for high performance cores vs x86

5x+

more I/O bandwidth than x86

> 2x

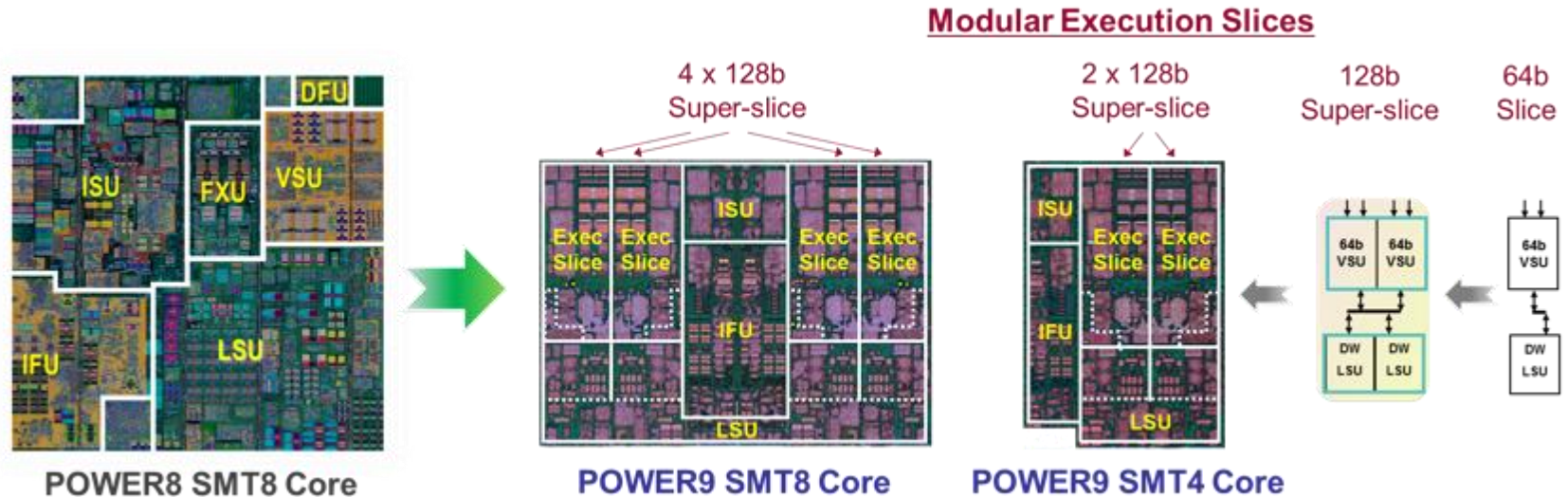
more memory bandwidth



OpenCAPI
NVLink 2.0
PCIe Gen4

POWER9 Processor

Redesigned Core Provides Improved Efficiency and Workload Alignment



- The redesigned P9 core enables it to be optimized aligning with market needs
- Both SMT8 and SMT4 options available, which the SMT4 is $\frac{1}{2}$ of a full SMT8 core

POWER9 Processor Family implementations

Core Count / Size

SMP scalability / Memory subsystem

Scale-Out – 2 Socket Optimized

Robust 2 socket SMP system

Direct Memory Attach

- Up to 8 DDR4 ports
- Up to 170 GB/s memory BW
- Commodity packaging form factor

Scale-Up – 4+-Socket Optimized

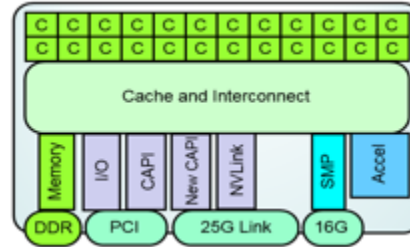
Scalable System Topology / Capacity

- Large multi-socket
- Buffered Memory Attach
- 8 Buffered channels
- Up to 230 GB/s memory BW

SMT4 Core

24 SMT4 Cores / Chip

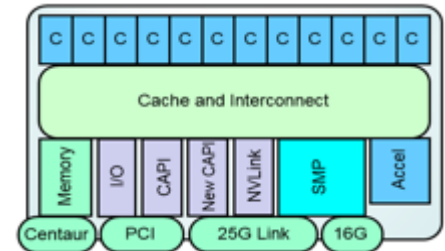
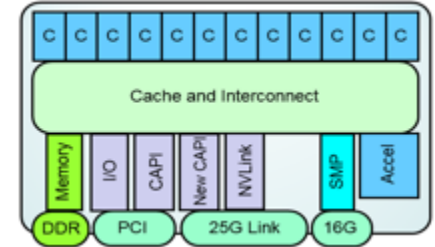
Linux Ecosystem Optimized



SMT8 Core

12 SMT8 Cores / Chip

PowerVM Ecosystem Continuity



POWER9 – Premier Acceleration Platform

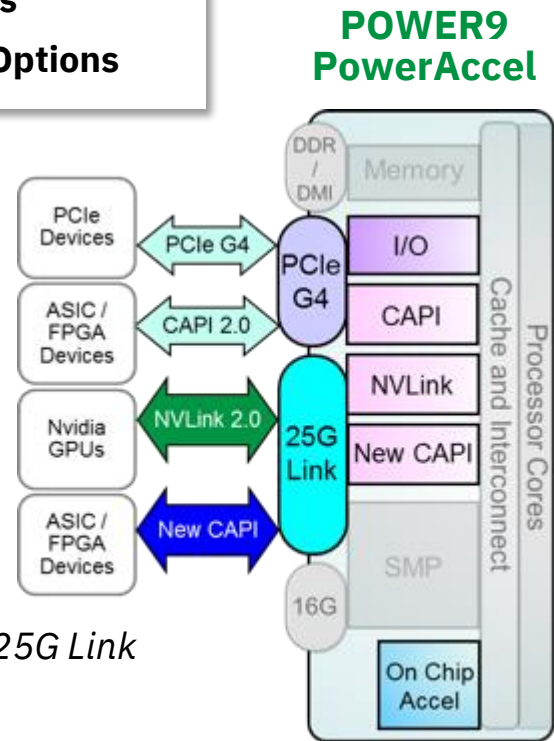
- **Extreme Processor / Accelerator Bandwidth and Reduced Latency**
- **Coherent Memory and Virtual Addressing Capability for all Accelerators**
- **OpenPOWER Community Enablement – Robust Accelerated Compute Options**

State of the Art I/O and Acceleration Attachment Signaling

- **PCIe Gen 4** x 48 lanes – 192 GB/s duplex bandwidth
- **25G Link** x 48 lanes – 300 GB/s duplex bandwidth

Robust Accelerated Compute Options with OPEN standards

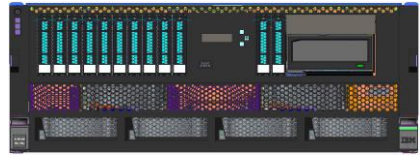
- **On-Chip Acceleration** – Gzip x1, 842 Compression x2, AES/SHA x2
- **CAPI 2.0** – 4x bandwidth of POWER8 using *PCIe Gen 4*
- **OpenCAPI 3.0** – High bandwidth, low latency and open interface using *25G Link*
- **NVLink 2.0** – Next generation of GPU/CPU bandwidth and integration



POWER9 Scale-out Servers - the most reliable and resilient **entry level** cloud-enabled servers



S924/H924 2-socket 4U server, is designed to meet highest performance and security with a memory footprint of up to 4TB, an industry leader in the 2 socket market



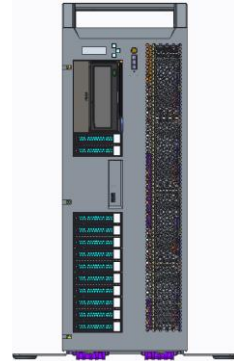
S914 1-socket 4U server is the price attractive entry offering into the POWER9 family of servers. Industry leading integrated security and reliability as well cloud enabled out of the box with integrated PowerVM technology



S922/H922 2-socket 2U server is designed to meet highest performance and security in a dense form factor with a memory footprint of up to 4TB, an industry leader in the 2 socket market



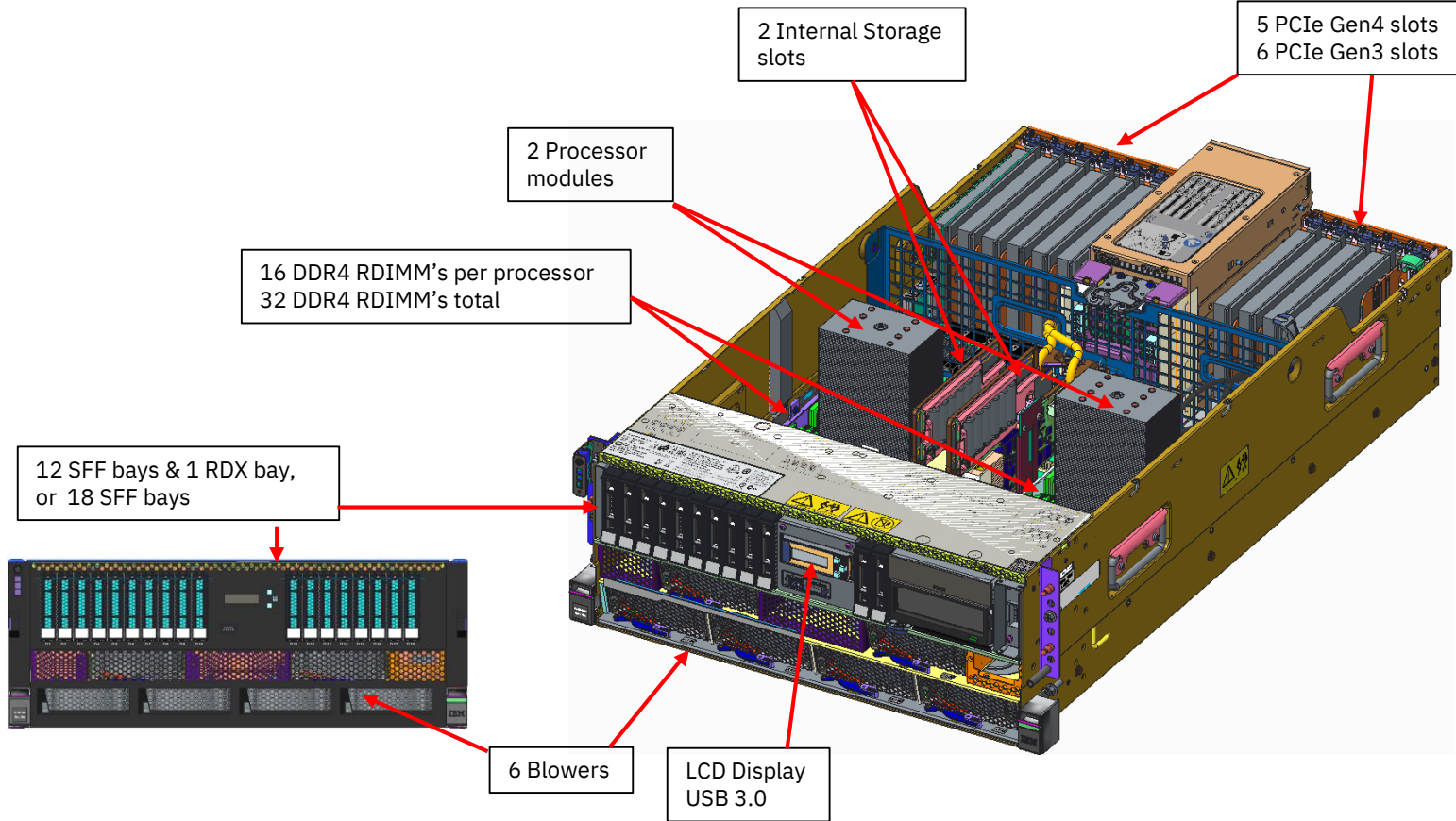
L922 2-socket 2U server is designed to meet highest performance and security for Linux workloads in a dense form factor with a memory footprint of up to 4TB, an industry leader in the 2 socket market



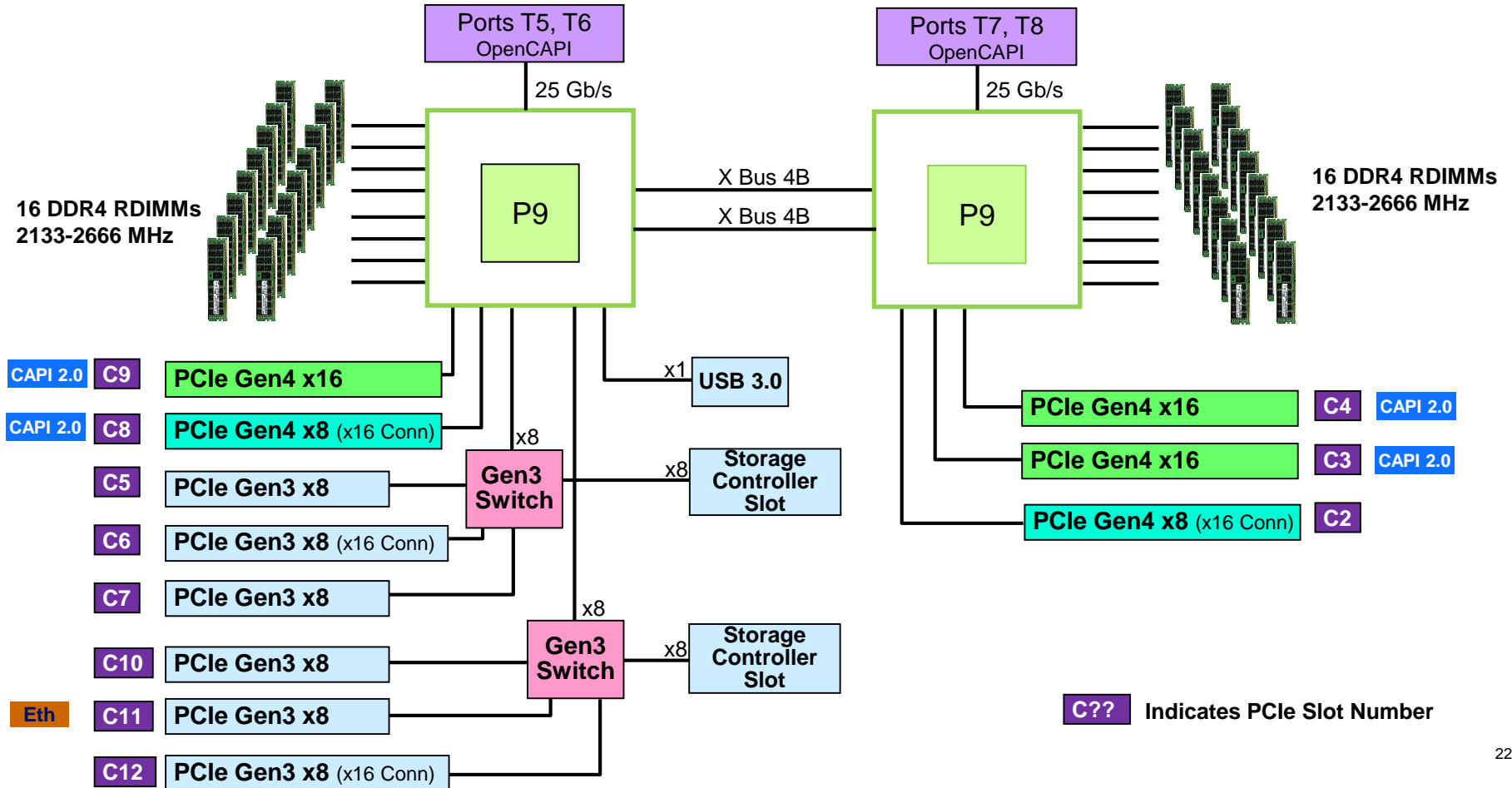
S924 / H924 Scale Out Server

- ✓ 4U server - 19" Rack enclosure
- ✓ POWER9 Scale-Out SMT8 processor (12-core, 10-core, 8-core)
- ✓ Up to 4TB Memory Capacity
 - Industry Standard DDR4 RDIMMs @ up to 2666 Mhz operation
- ✓ 11 PCIe Gen3/Gen4 slots
 - Five PCIe Gen4 slots (4 CAPI enabled)
 - Six PCIe Gen3 slots (1 reserved for Ethernet adapter)
- ✓ 4 High Speed 25Gb/s ports for future OpenCAPI Acceleration
- ✓ 12 or 18 SFF (2.5") SAS bay options
- ✓ Two internal storage controller slots
 - Single or Split backplane or Dual RAID Write Cache support
 - 2 Internal NVMe Flash boot adapters (two M.2 devices per card)
- ✓ Internal RDX Media bay (DVD external)
- ✓ I/O Expansion Drawer support
- ✓ Supports AIX, IBM i and Linux (H924 limits AIX and IBM i to 25% core activations)

S924 / H924 Scale Out Server



S924 / H924 System Topology



S924 / H924 Processor Highlights

- ✓ SCM Design – Single Chip Module
- ✓ Three processor offerings available (SMT8 cores)
 - 12-core processor (maximum throughput)
 - 10-core processor
 - 8-core processor (maximum core performance)

Feature Code	Processor SMT8 Cores	Typical Frequency Range	IBM i P Group
EP1G	12 cores	3.4 to 3.9 Ghz (max)	P20
EP1F	10 cores	3.5 to 3.9 GHz (max)	P20
EP1E	8 cores	3.8 to 4.0 GHz (max)	P20

- ✓ Single processor config supported for 8 and 10-core processor offerings
- ✓ Processor frequencies dynamic by default: Set to Max Performance Mode
- ✓ Increased processor to processor fabric interconnect
 - Two 16Gb/s X-Bus fabric connect between CPUs

POWER9 Power Management Modes

➤ Static Power Save Mode

➤ Static Nominal Mode

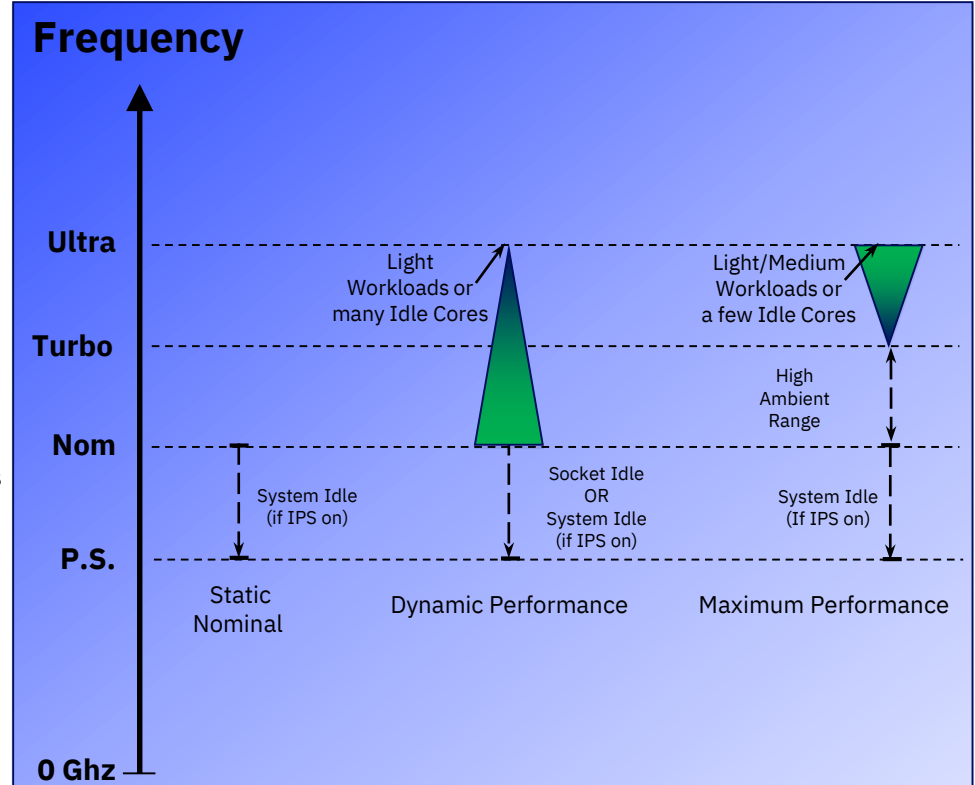
- Idle Power Saver (IPS) can be on or off

➤ Dynamic Performance Mode

- Workloads run at highest frequency possible
- Max Workload/Max Cores runs \geq nominal in all environments
- CPU managed to Nominal power draw
- Idle Power Saver (IPS) can be on or off

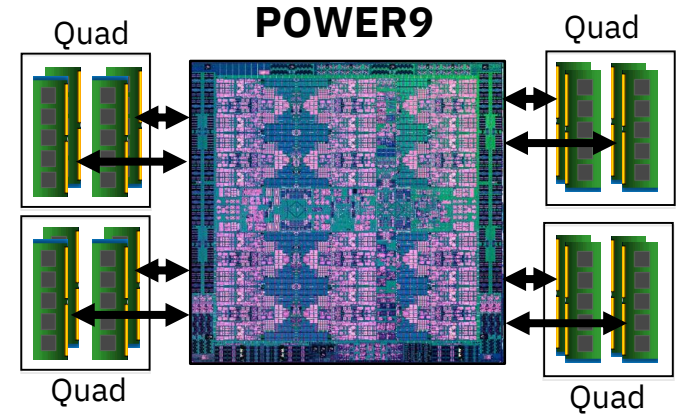
➤ Maximum Performance Mode

- Workloads run at highest frequency possible
- Max Workload/Max Cores runs \geq turbo in favorable environments
- CPU managed to Turbo power draw level – Higher acoustics
- Idle Power Saver (IPS) can be on or off



S924 / H924 Memory

- ✓ Low latency direct attach memory architecture
- ✓ Up to 170 GB/s peak memory bandwidth per socket
- ✓ Industry standard DDR4 memory RDIMMs
- ✓ 16 DIMM slots per socket, 32 DIMM slots total
- ✓ Maximum memory capacity 4TB
- ✓ Minimum config is 2x 16GB DIMM's per processor socket
- ✓ Supported DIMM sizes and frequencies shown in table below
- ✓ DIMM plug rules per socket
 - ✓ DIMM's installed: 2, 4, 6, 8, 12, 16
 - ✓ DIMM's in the same Quad as shown must be the same size

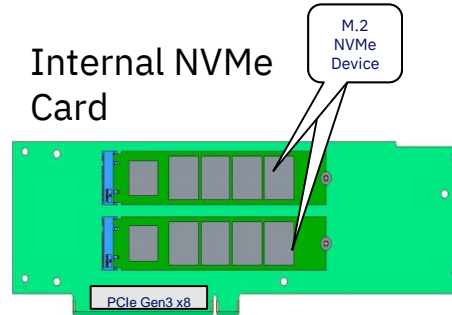


Feature Code	DIMM Size	2-8 DIMMs per socket	10-16 DIMMs per socket
EM62	16GB DIMM	2666 MHz	2133 MHz
EM63	32GB DIMM	2400 MHz	2133 MHz
EM64	64GB DIMM	2400 MHz	2133 MHz
EM65	128GB DIMM	2400 MHz	2133 MHz

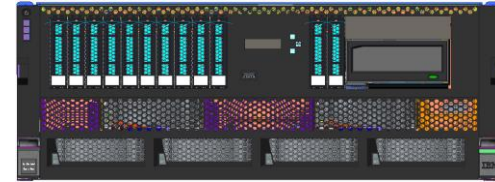
S924/ H924 Storage Options

Internal Storage Options

FC	Description
EC59	NVMe Card with two M.2 connectors
EJ1C	Single RAID 0,10,5,6 12 SFF bays (Gen3-Carrier), 1 RDX bay
EJ1E	Split Backplane RAID 0,10,5,6 6+6 SFF bays (Gen3-Carrier), 1 RDX bay
EJ1M	Dual Write Cache RAID 0,10,5,6,5T2,6T2 12 SFF bays (Gen3-Carrier), 1 RDX bay
EJ1D	Dual Write Cache RAID 0,10,5,6,5T2,6T2 18 SFF bays (Gen3-Carrier)
EU00	RDX Docking Station



12 SFF bays,
1 RDX bay



18 SFF bays



External Storage Options

FC	Description
ESLL	19" Disk Expansion Drawer 12 LFF Gen2-Carrier Bays (Slider12)
ESLS	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (Slider24)
5887	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (EXP24S) Migrate

Supported Media Overview

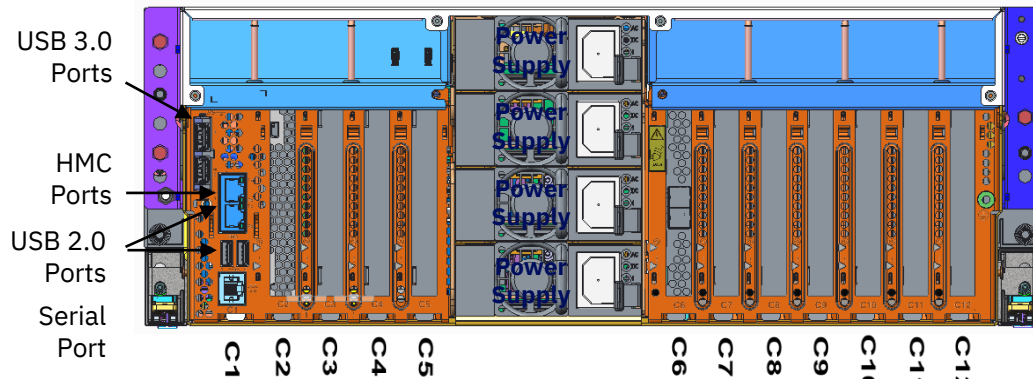
- **NVMe M.2 Flash devices**
400GB (ES14)
- **SFF HDDs**
600GB, 1200GB, 1800GB - 10K RPM
300GB, 600GB – 15K RPM
- **SFF SSDs**
387GB, 775GB, 1551GB – 10 DWPD
931GB, 1860GB, 3720GB – 1 DWPD
- **RDX Disk Cartridge**
1TB Disk Cartridge (EU01)
2TB Disk Cartridge (EU2T)

S924/ H924 PCIe Slots

Internal PCIe Slot Summary

Slot	Attributes	Note
C1	Service Processor Card	
C2	PCIe Gen4 x8 (x16 Conn)	2 nd POWER9 socket
C3	PCIe Gen4 x16 (EJ08 slot)	
C4	PCIe Gen4 x16 (EJ08 slot)	
C5	PCIe Gen3 x8	1 st POWER9 socket
C6	PCIe Gen3 x8 (x16 Conn)	
C7	PCIe Gen3 x8	
C8	PCIe Gen4 x8 (x16 Conn)	
C9	PCIe Gen4 x16 (EJ08 slot)	
C10	PCIe Gen3 x8	
C11	PCIe Gen3 x8	
C12	PCIe Gen3 x8 (x16 Conn)	

EJ08 – I/O Expansion Adapter



External PCIe Expansion Summary

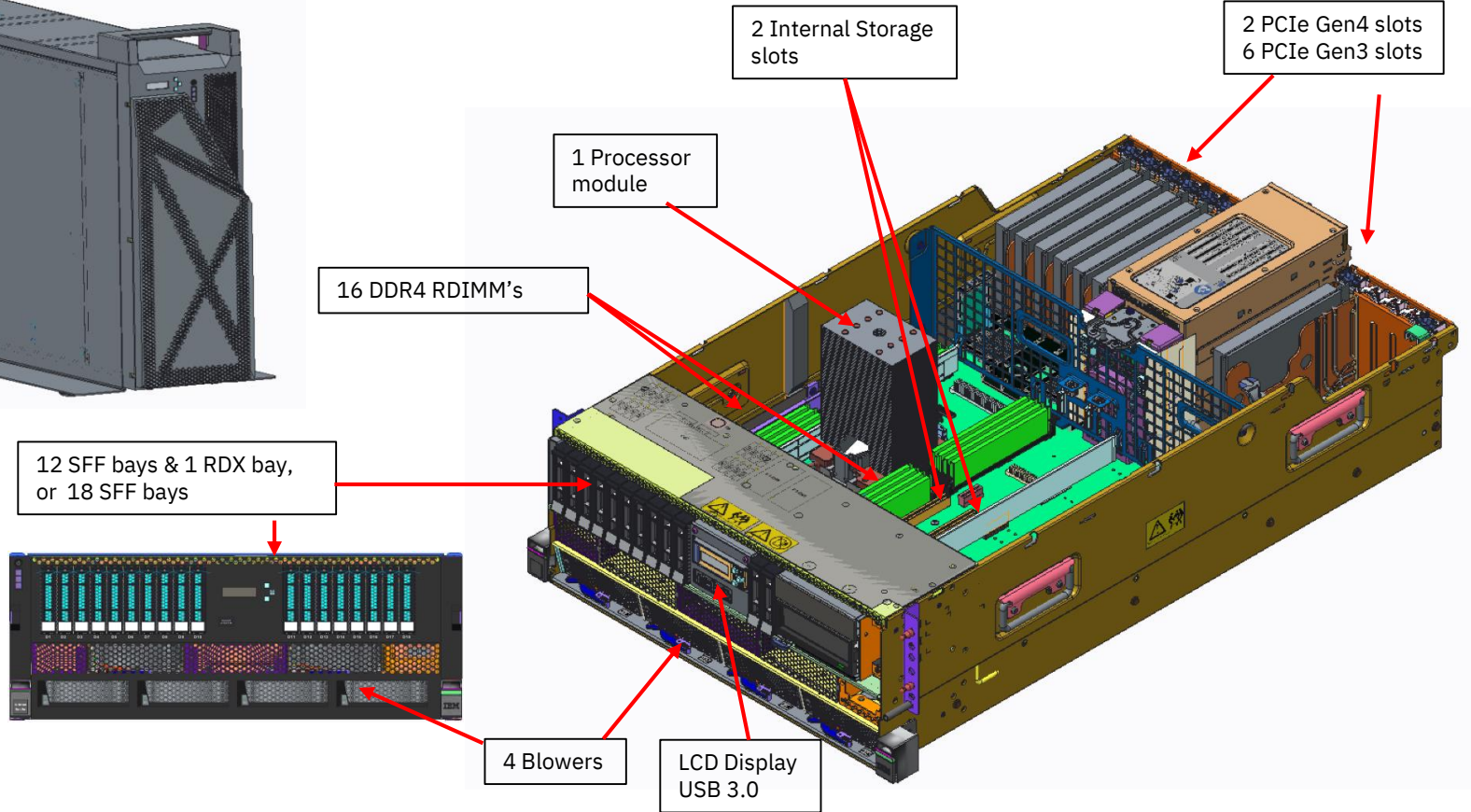
Num of CPUs	Max num of I/O Exp Drawers (EMX0)	Max num of I/O Fanout Modules (EMXF)	Total PCIe Slots
1	1	1	13
2	2	3	26

PCIe Slots are Concurrently Maintainable
Full Height, Half Length PCIe form factor

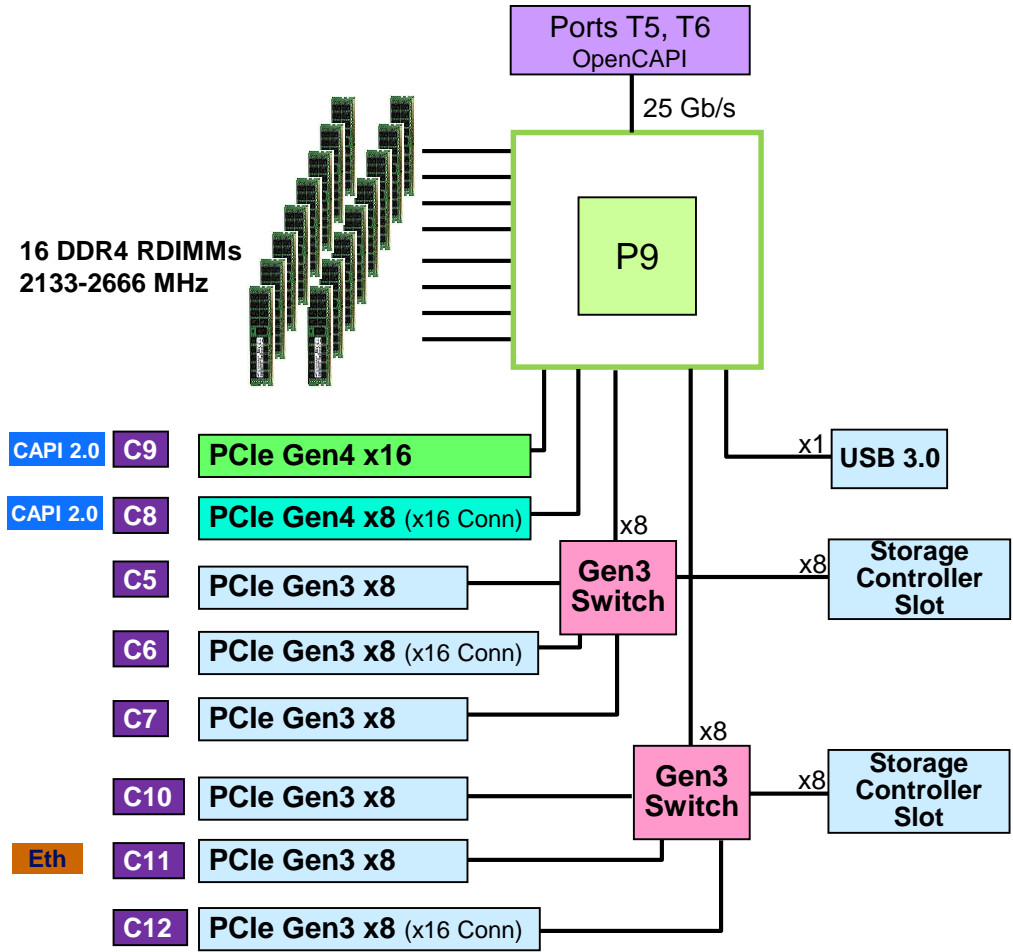
S914 Scale Out Server

- ✓ 4U server - 19" Rack enclosure or Tower
- ✓ POWER9 Scale-Out SMT8 processor (8-core, 6-core, 4-core)
- ✓ Up to 1TB Memory Capacity
 - Industry Standard DDR4 RDIMMs @ up to 2666 Mhz operation
- ✓ 8 PCIe Gen3/Gen4 slots
 - Two PCIe Gen4 slots (2 CAPI enabled)
 - Six PCIe Gen3 slots (1 reserved for Ethernet adapter)
- ✓ 2 High Speed 25Gb/s ports for future OpenCAPI Acceleration
- ✓ 12 or 18 SFF (2.5") SAS bay options
- ✓ Two internal storage controller slots
 - Single or Split backplane or Dual RAID Write Cache support
 - 2 Internal NVMe Flash boot adapters (two M.2 devices per card)
- ✓ Internal RDX Media Bay (DVD External)
- ✓ I/O Expansion Drawer support for 8-core and 6-core feature only
- ✓ 110 VAC support
- ✓ Supports AIX, IBM i and Linux

S914 Scale Out Server



S914 System Topology



C?? Indicates PCIe Slot Number

S914 Processor Highlights

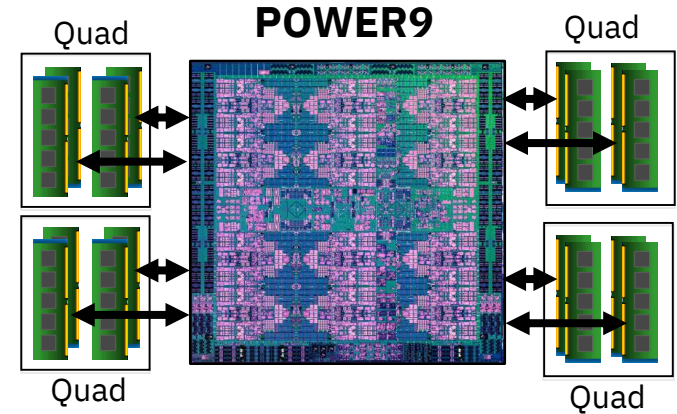
- ✓ SCM Design – Single Chip Module
- ✓ Three processor offerings available (SMT8 cores)
 - 8-core processor (maximum throughput)
 - 6-core processor
 - 4-core processor (minimum entry price)

Feature Code	Processor SMT8 Cores	Typical Frequency Range	IBM i P Group
EP12	8 cores	2.8 to 3.8 GHz (max)	P10
EP11	6 cores	2.3 to 3.8 GHz (max)	P10
EP10	4 cores	2.3 to 3.8 GHz (max)	P05

- ✓ Processor frequencies dynamic by default: Set to Dynamic Performance Mode

S914 Memory Subsystem

- ✓ Low latency direct attach memory architecture
- ✓ Up to 170 GB/s peak memory bandwidth per socket
- ✓ Industry Standard DDR4 RDIMMs
- ✓ 16 DIMM slots total
- ✓ Maximum memory capacity 1TB (4-Core feature limited to 64GB)
- ✓ Minimum config is 2x 16GB DIMM's
- ✓ Supported DIMM sizes and frequencies shown in table below
- ✓ DIMM plug rules per socket
 - ✓ DIMM's installed: 2, 4, 6, 8, 12, 16
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S914 Storage Options

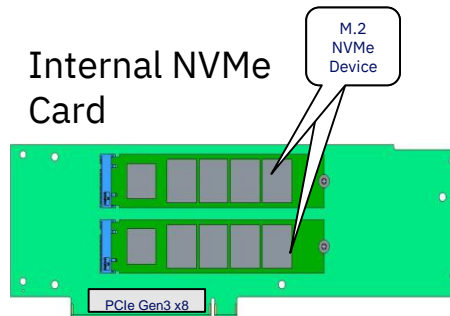
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EJ1M	Dual Write Cache RAID 0,10,5,6,5T2,6T2 12 SFF bays (Gen3-Carrier), 1 RDX bay
EJ1D	Dual Write Cache RAID 0,10,5,6,5T2,6T2 18 SFF bays (Gen3-Carrier)
EU00	RDX Docking Station

12 SFF bays,
1 RDX bay



Internal NVMe
Card



18 SFF bays



External Storage Options

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ESLL	19" Disk Expansion Drawer 12 LFF Gen2-Carrier Bays (Slider12)
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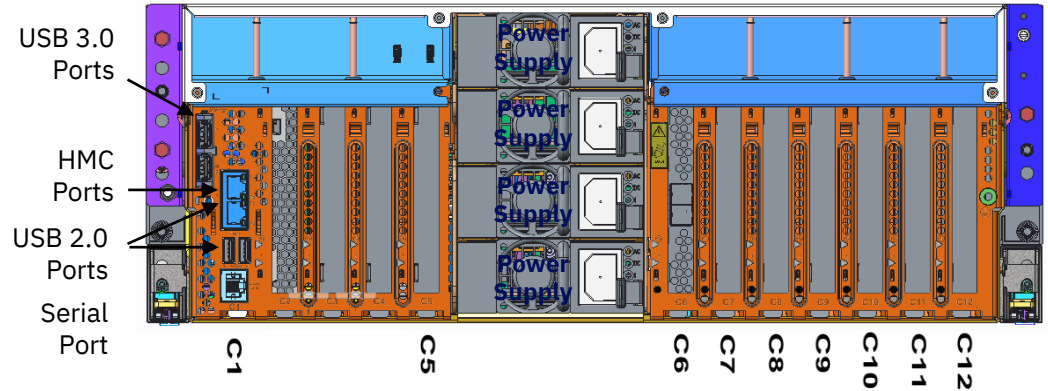
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1TB Disk Cartridge (EU01)
2TB Disk Cartridge (EU2T)

S914 PCIe Slots

Internal PCIe Slot Summary

Slot	Attributes	Note
C1	Service Processor Card	
C5	PCIe Gen3 x8	1st POWER9 socket
C6	PCIe Gen3 x8 (x16 Conn)	
C7	PCIe Gen3 x8	
C8	PCIe Gen4 x8 (x16 Conn)	
C9	PCIe Gen4 x16 (EJ08 slot)	
C10	PCIe Gen3 x8	
C11	PCIe Gen3 x8	
C12	PCIe Gen3 x8 (x16 Conn)	

EJ08 – I/O Expansion Adapter



External PCIe Expansion Summary

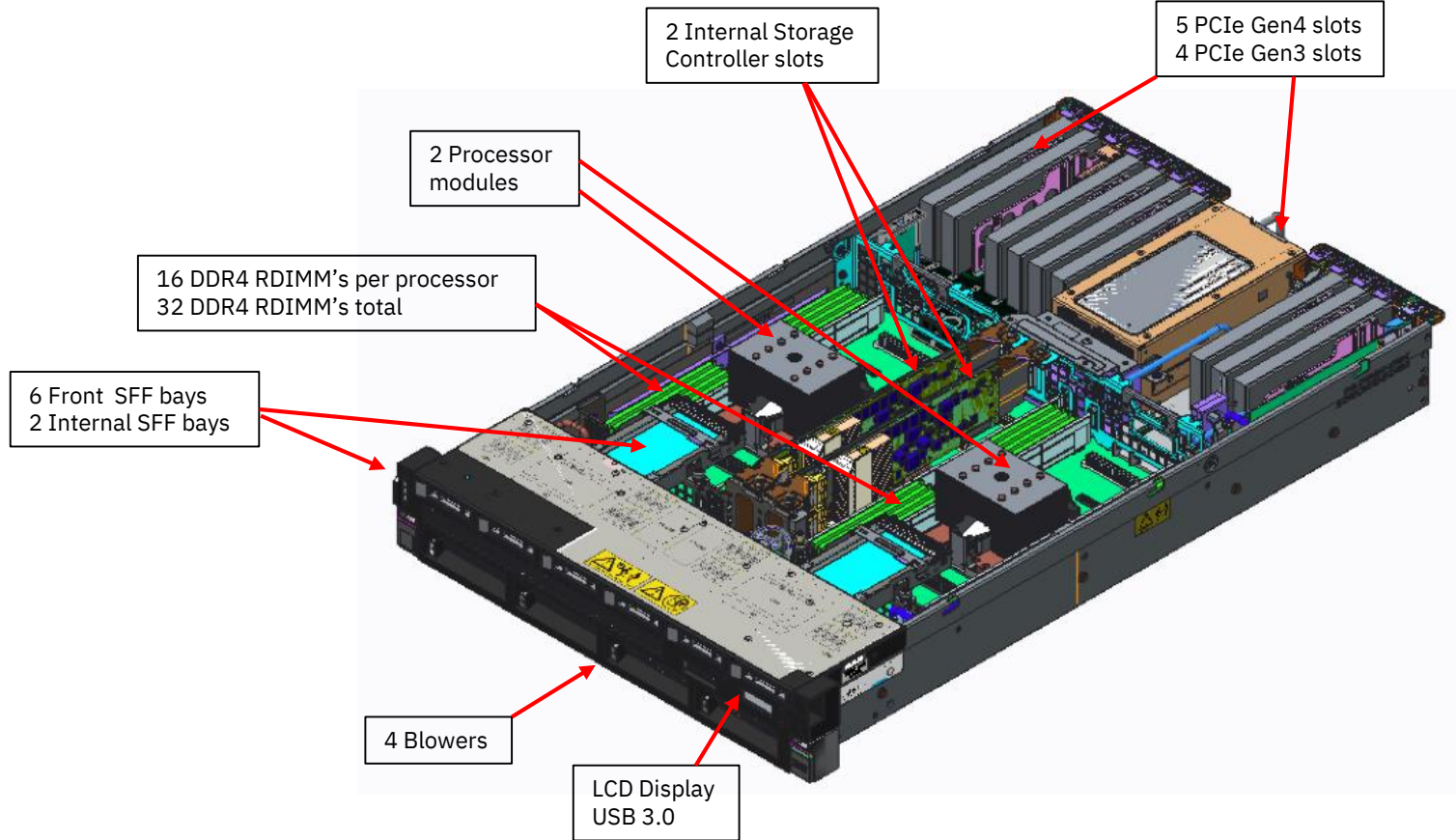
Num of CPUs	Max num of I/O Exp Drawers (EMX0)	Max num of I/O Fanout Modules (EMXF)	Total PCIe Slots
1	1	1	13

PCIe Slots are Concurrently Maintainable
Full Height, Half Length PCIe form factor

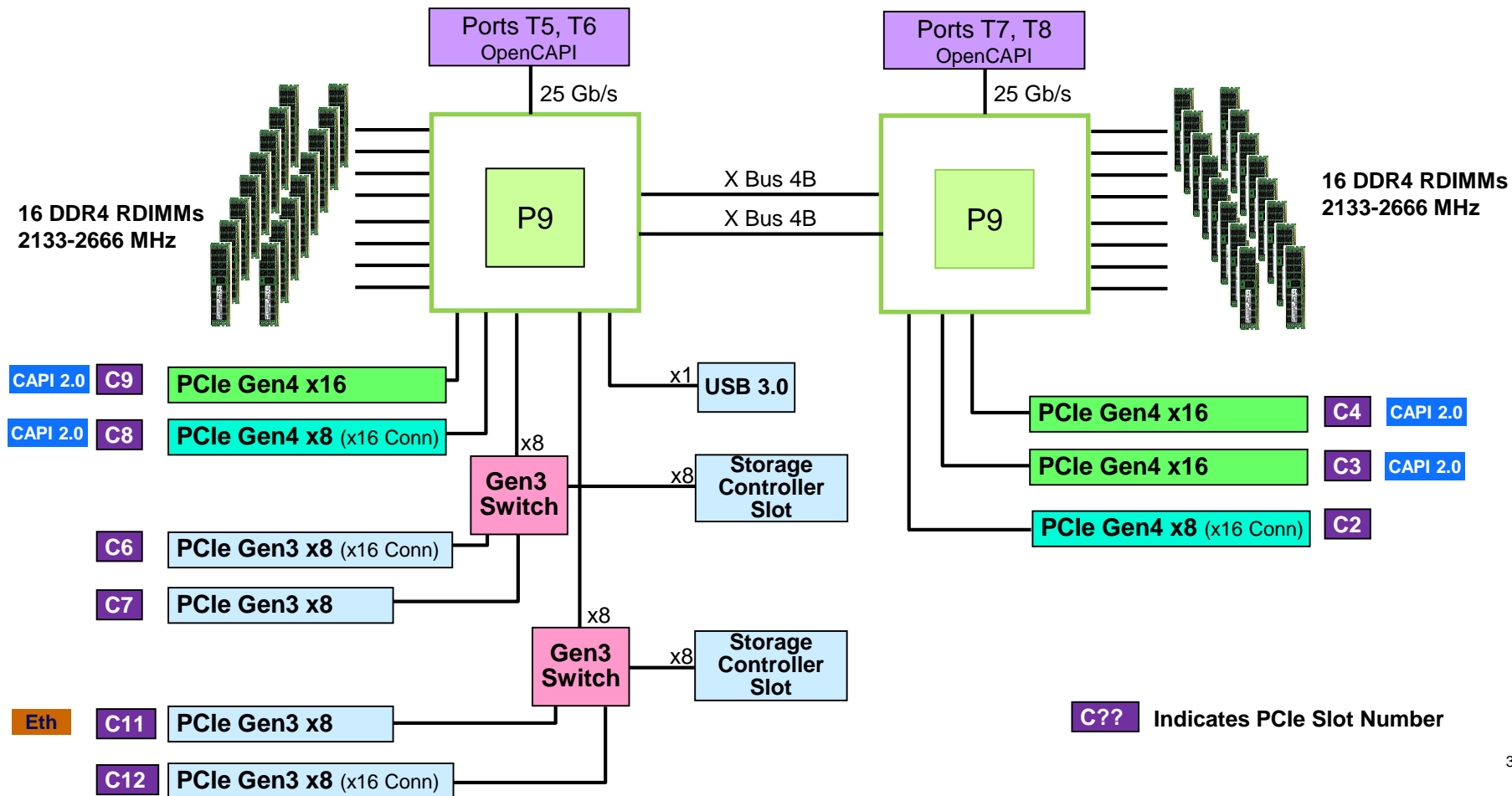
S922 / H922 / L922 Scale Out Server

- ✓ 2U server - 19" Rack enclosure
- ✓ POWER9 Scale-Out SMT8 processor (12-core, 10-core, 8-core, 4-core offerings)
- ✓ Up to 4TB Memory Capacity
 - Industry Standard DDR4 RDIMMs @ up to 2666 Mhz operation
- ✓ 9 PCIe Gen3/Gen4 slots
 - Five PCIe Gen4 slots (4 CAPI enabled)
 - Four PCIe Gen3 slots (1 reserved for Ethernet adapter)
- ✓ 4 High Speed 25Gb/s ports for future OpenCAPI Acceleration
- ✓ 8 SFF (2.5") SAS bay option
- ✓ 2 internal storage controller slots
 - Single or Split backplane support
 - 2 Internal NVMe Flash boot adapters (two M.2 devices per card)
- ✓ I/O Expansion Drawer support
- ✓ S922 / H922 supports AIX. IBM i and Linux (H922 limits AIX and IBM i to 25% core activations)
- ✓ L922 supports Linux only (First GA is PowerVM only, future support for bare metal and KVM)

S922 /H922 / L922 Scale Out Server



S922 / H922 / L922 System Topology



S922 / H922 Processor Offering

- ✓ SCM Design – Single Chip Module
- ✓ Three processor offerings available (SMT8 cores)
 - 10-core processor (maximum throughput)
 - 8-core processor (maximum core performance)
 - 4-core processor (minimum entry price)

Feature Code	Processor SMT8 Cores	Typical Frequency Range	IBM i P Group
EP19	10 cores	2.9 to 3.8 GHz (max)	P10
EP18	8 cores	3.4 to 3.9 GHz (max)	P10
EP16	4 cores	2.8 to 3.8 GHz (max)	P10

- ✓ Single processor configs supported
- ✓ EP16 4-Core feature limited to single socket config only
- ✓ EP16 4-Core feature does not support External I/O Expansion or External Disk Expansion
- ✓ Processor frequencies dynamic by default, set to Maximum Performance Mode

L922 Processor Offering

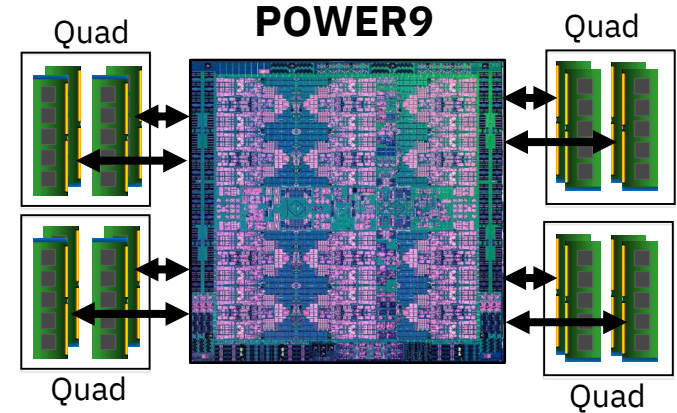
- ✓ SCM Design – Single Chip Module
- ✓ Three processor offerings available (SMT8 cores)
 - 12-core processor (maximum throughput)
 - 10-core processor
 - 8-core processor (maximum core performance)

Feature Code	Processor SMT8 Cores	Typical Frequency Range
ELPX	12 cores	2.7 to 3.8 GHz (max)
EPPW	10 cores	2.9 to 3.8 GHz (max)
ELPV	8 cores	3.4 to 3.9 GHz (max)

- ✓ Single processor config supported for 8 and 10-core processor offerings
- ✓ Processor frequencies dynamic by default, set to Maximum Performance Mode

S922 / H922 / L922 Memory

- ✓ Low latency direct attach memory architecture
- ✓ Up to 170 GB/s peak memory bandwidth per socket
- ✓ Industry standard DDR4 memory RDIMMs
- ✓ 16 DIMM slots per socket, 32 DIMM slots total
- ✓ Maximum memory capacity 4TB
- ✓ Minimum config is 2x 16GB DIMM's per processor socket
- ✓ Supported DIMM sizes and frequencies shown in table below
- ✓ DIMM plug rules per socket
 - ✓ DIMM's installed: 2, 4, 6, 8, 12, 16
 - ✓ DIMM's in the same Quad as shown must be the same size

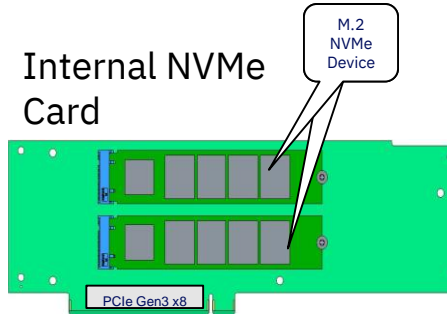


Feature Code	DIMM Size	2-8 DIMMs per socket	10-16 DIMMs per socket
EM62	16GB DIMM	2666 MHz	2133 MHz
EM63	32GB DIMM	2400 MHz	2133 MHz
EM64	64GB DIMM	2400 MHz	2133 MHz
EM65	128GB DIMM	2400 MHz	2133 MHz

S922 / H922 / L922 Storage Options

Internal Storage Options

FC	Description
EC59	NVMe Card with two M.2 Connectors
EJ1G	Single RAID 0,10,5,6 8 SFF Bays (Gen3 Carrier)
EJ1H	Split Backplane RAID 0,10,5,6 4+4 SFF Bays (Gen3 Carrier)



Supported Media Overview

- **NVMe M.2 Flash devices**
400GB (ES14)
- **SFF HDDs**
600GB, 1200GB, 1800GB - 10K RPM
300GB, 600GB - 15K RPM
- **SFF SSDs**
387GB, 775GB, 1551GB - 10 DWPD
931GB, 1860GB, 3720GB - 1 DWPD

External Storage Options

System	FC	Description
S922 H922	ESLL	19" Disk Expansion Drawer 12 LFF Gen2-Carrier Bays (Slider12)
	ESLS	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (Slider24)
	5887	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (EXP24S) migrate
L922	ELLL	19" Disk Expansion Drawer 12 LFF Gen2-Carrier Bays (Slider12)
	ELLS	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (Slider24)
	EL1S	19" Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (EXP24S) migrate

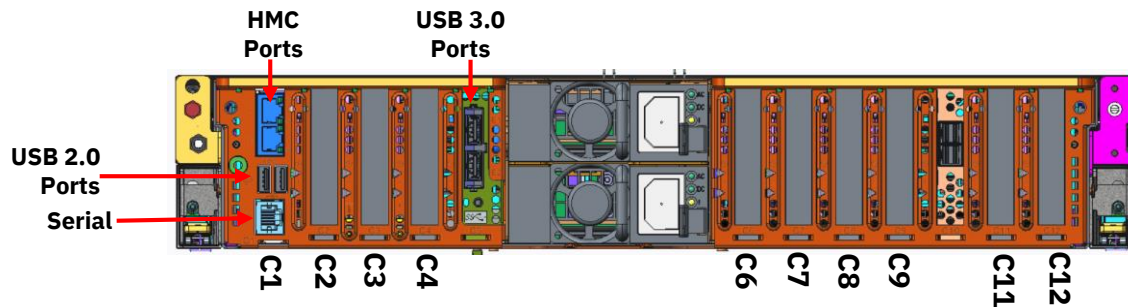
S922 / H922 / L922 PCIe Slots

Internal PCIe Slot Summary

Slot	Attributes	Note
C1	FSP Service Processor Card	
C2	PCIe Gen4 x8 (x16 Conn)	with 2 nd POWER9 module populated
C3	PCIe Gen4 x16 (EJ05 slot)	
C4	PCIe Gen4 x16 (EJ05 slot)	
C6	PCIe Gen3 x8 (x16 Conn)	with 1 st POWER9 module populated
C7	PCIe Gen3 x8	
C8	PCIe Gen4 x8 (x16 Conn)	
C9	PCIe Gen4 x16 (EJ05 slot)	
C11	PCIe Gen3 x8	
C12	PCIe Gen3 x8 (x16 Conn)	

EJ05 – I/O Expansion Adapter

PCIe Slots are Concurrently Maintainable
Low Profile PCIe form factor



External PCIe Expansion Features S922/H922

Num of CPUs	Max num of I/O Exp Drawers (EMX0)	Max num of I/O Fanout Modules (EMXF)	Max PCIe Slots
1	1	1	11
2	2	3	24





External PCIe Expansion Features L922

Num of CPUs	Max num of I/O Exp Drawers (ELMX)	Max num of I/O Fanout Modules (ELMF)	Total PCIe Slots
1	1	1	11
2	2	3	24

Software Stack Support

- Firmware level FW910
- HMC code level V9R1.910
- VIOS 2.2.4, 2.2.5, 2.2.6
- AIX 7.2 TL2
- AIX 7.2 TL0, TL1 (P8 Compatibility Mode)
- AIX 7.1 TL4, TL5 (P8 Compatibility Mode)
- AIX 6.1 TL9 (P7 Compatibility Mode)
- IBM i 7.3 TR4
- IBM i 7.2 TR8
- Ubuntu 16.04.4 LTS (P8 Compatibility Mode)
- RedHat RHEL 7.4 LE (P8 Compatibility Mode)
- SuSE SLES 11 SP4 (P8 Compatibility Mode)
- SuSE SLES 12 SP3

IBM Power Systems POWER9 Family – CPW/Software Tier

Model	MTM	Cores	Description	CPW	% Improvement	Software Tier
S914	9009-41A	4	2.3 – 3.8 GHz #EP10	52,500	40.22%	P05
		6	2.3 – 3.8 GHz #EP11	78,500	39.18%	P10
		8	2.8 – 3.8 GHz #EP12	122,500	51.14%	P10
		S922	9009-22A	4	8-core 3.4 – 3.9 GHz #EP18	68,000
		4	10-core 2.9 – 3.8 GHz #EP19	60,000	41.28%	P10 (note 1)
		S924	9009-42A	8	3.8 – 4.0 #EP1E	145,500
		10	3.5 – 3.9 #EP1F	174,500		P20
		16	3.8 – 4.0 #EP1E	268,500	63.25%	P20
		20	3.5 – 3.9 #EP1F	318,000		P20
		24	3.4 – 3.9 #EP1G	370,700	69.65%	P20

IBM i is NOT supported on the POWER9 S922/H922 #EP16
4-core processor feature

IBM i is limited to 25% on the H922/H924

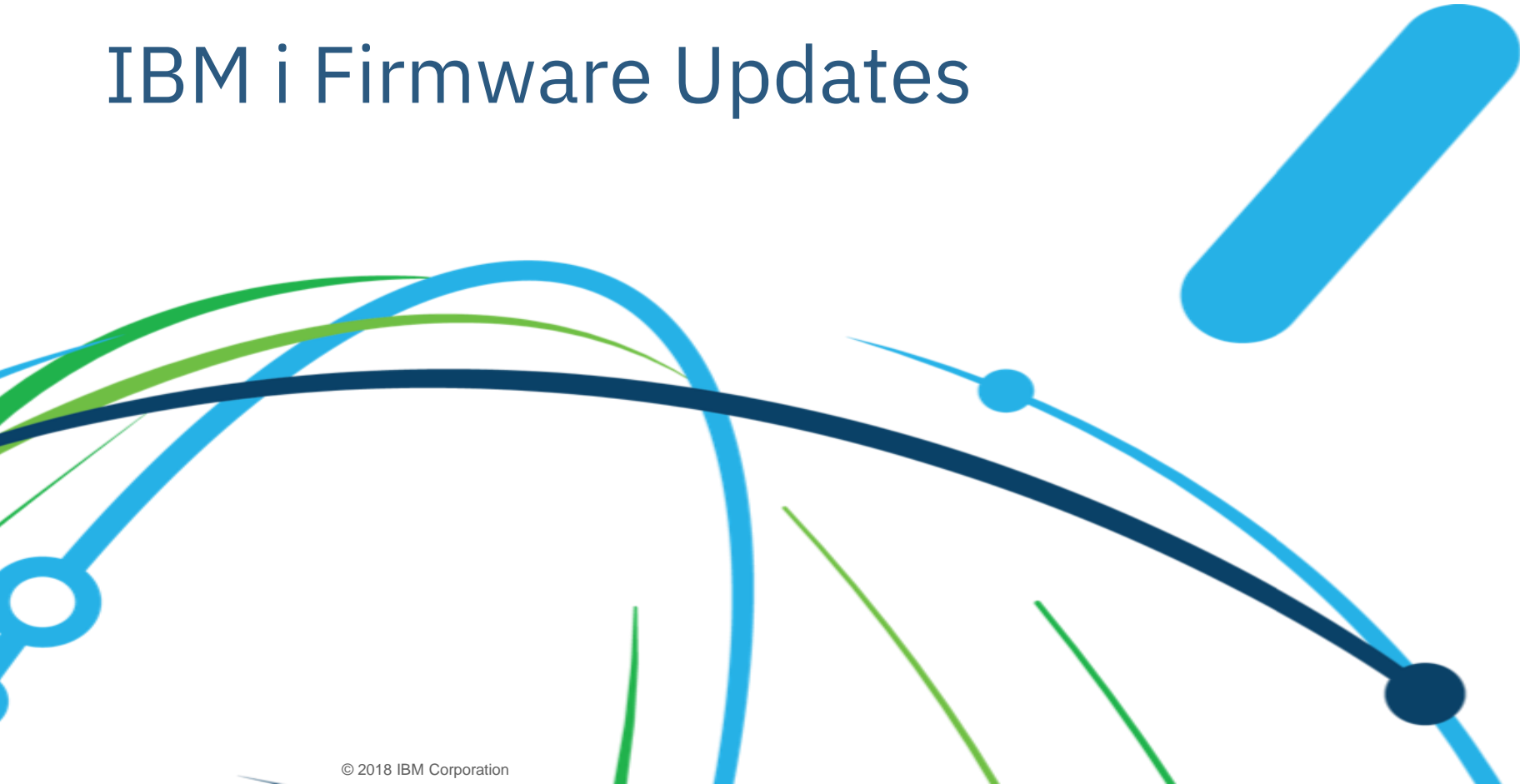
The model S914 is available as an IBM i Solution Edition



Note 1: These instances of P10 limit an IBM i partition to a maximum of 4 cores (multiple partitions are allowed), and VIOS is required for IBM i.

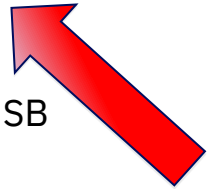


IBM i Firmware Updates



New Installation Process for IBM i

IBM i 7.3 TR3 & IBM i 7.2 TR7



Current installation process using USB (introduced Oct 2017):

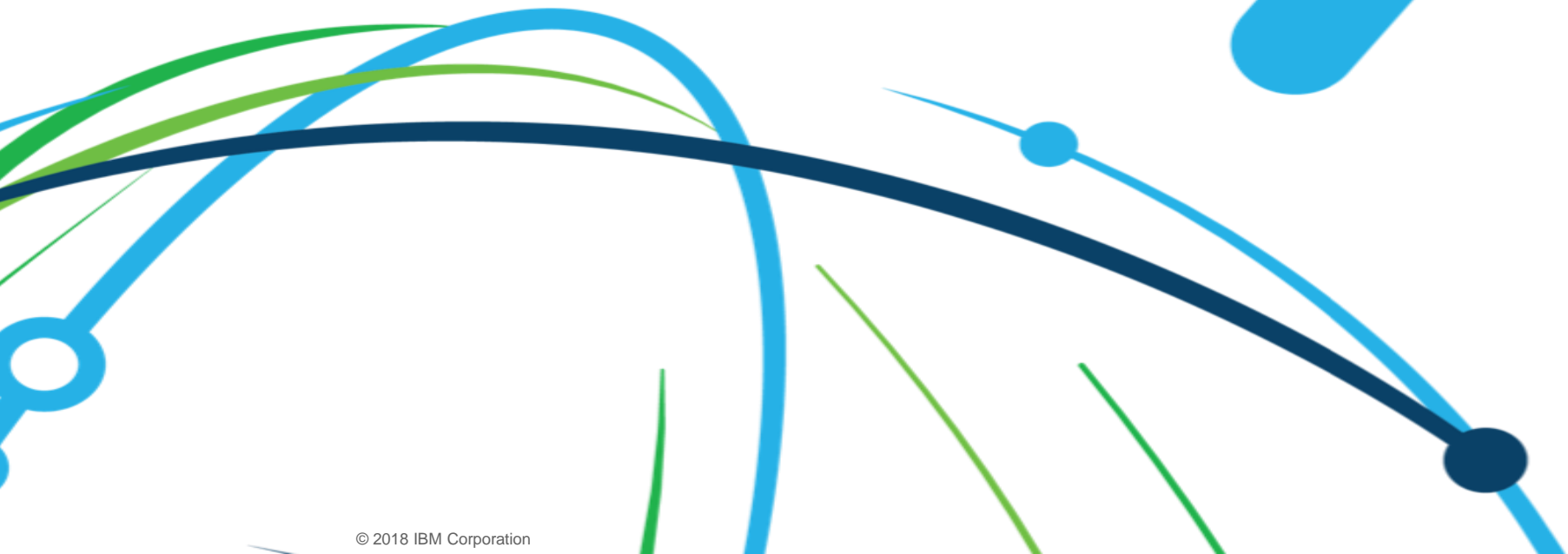
- ESS has LIC media image (I_BASE_01.IMG) for use with POWER8 USB 3.0 adapter and USB Removable Mass Storage
- Also has IBM-supplied program which can be downloaded to a PC
 - Use it to copy bootable LIC media image to USB Flash Drive
 - On a managed system, point to USB adapter and do D-mode IPL to use USB Flash drive to install LIC
 - On an unmanaged system, use DVD image to D-mode IPL to DST, then use “Define alternate installation device” option to select the USB device to install LIC
 - Note: The D-mode device and alternate install device must have the same LIC version/modification level when installing Licensed Internal Code.
 - Can also stack OS and any desired LPPs that fit on the USB Flash Drive

Future enhancements:

- Can copy image to RDX media, stack OS and desired LPPs, and use it for D-mode IPL
- IBM-supplied program for copying image will have a GUI
- Requires new copy of IBM-supplied program, but can use previous Tech Refresh levels



Application Development Updates



IBM i Application Languages Strategy

- RPG is the most commonly used language on IBM i so
 - Enable RPG as a powerful, modern procedural language
 - Partner for tools which transform older RPG to modern RPG
 - Work with partners & schools to teach RPG to non-RPG developers quickly
- Extensive skills and catalogs of solutions exist for business in other languages
 - Support key industry languages and programming models on IBM i
 - Ensure those new approaches can integrate with existing IBM i solutions
 - Enable tools for development, debug, lifecycle – from IBM and from partners

RPG



RPG IV - A Modern Business Language

- Interoperability
 - XML
 - SQL
 - **JSON**
- Readability
 - Free form
 - No 8-80 restriction
- Functionality
 - New Built In Functions
 - Integrates with GIT
 - Source in IFS
- Modern Tools
 - RDi, RTC, ARCAD Power Pack

```
ctl-opt bnmdir('ACCRCV');
dcl-f custfile usage(*update);
dcl-ds custDs likerec(custRec);
dcl-f report printer;

read custfile custDs;
dow not %eof;
    if dueDate > %date(); // overdue?
        sendOverdueNotice();
        write reportFmt;
        exec sql insert :name, :duedate into
            mylib/myfile;
    endif;
    read custfile custDs;
enddo;
*inlr = '1';

dcl-proc sendOverdueNotice;
    sendInvoice (custDs : %date());
end-proc;
```

Parsing Data – Today

RPG

- XML-INTO
 - Take an XML document and parse it into an RPG Variable
- Data-INTO
 - Parse a 'Data document' into an RPG Variable
 - JSON
 - Property file
 - CSV, Others ??

Database

- XML_Table
 - Take a XML document and parse it into a relational DB table
- JSON_Table
 - Take a JSON document and parse it into a relational DB Table

Compile CL from IFS Source

IBM i 7.3 TR4 only

- ILE CL source stored in an IFS stream file can now be compiled
- Following Commands have been updated:
 - **CRTCLMOD**
 - **CRTBNDCL**
- Both the SRCSTMF and INCDIR parameters have been added to allow IFS source
- SRCSTMF parameter has been added to the **INCLUDE** command so users can embed another source file stored in IFS stream files
- Both RPG and CL Source can now be managed by



How Do I Convert to Modern RPG ??



ARCAD Converter

ARCAD Converter for i - 5733-AC1

- Plugs into RDi
- Identification of truncation issues – Warnings or Auto

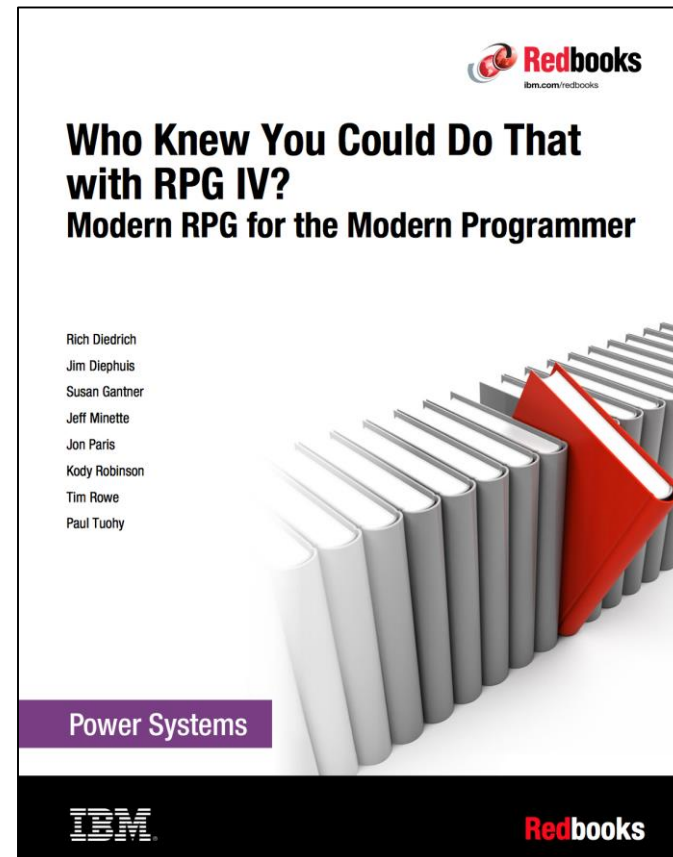
<https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=AN&subtype=CA&htmlfid=897/ENUS217-151&appname=lenovous&language=en>

New RPG Redbook

- Modern RPG
- New in Dec 2016
- Updated from the original book from 2000
- Many of the same expert Authors, plus a few New ones!

10300+ Downloads!!!!

<https://www.redbooks.ibm.com/redbooks/pdfs/sg245402.pdf>



Why a Tool for Analysis?

- Rapid analysis for hot fixes
- Application Change Studies (cost estimation)
- Redesign/re-architecting/SOA
- Extraction of business rules
- Application modernization
- Skill transfer
 - Help new people learn the application
- Generation of documentation required by regulatory constraints

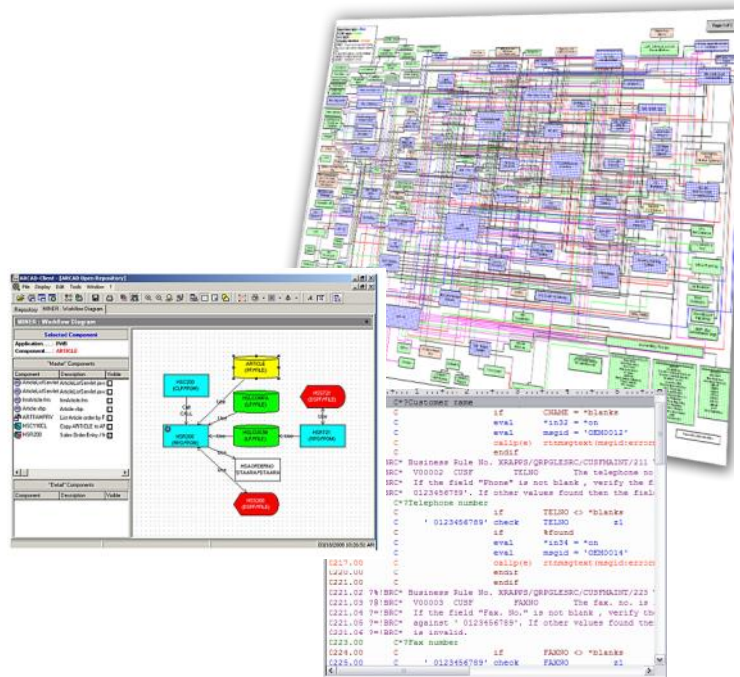


Provides the
Blueprint

Time to Start Understanding Your Code

ARCAD Observer ARCAD Observer for i - 5733-AO1

- Plugs into RDi
 - Requires RDi 9.6
- Multi-job compile
- Many updates, fixes and enhancements



<https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=AN&subtype=CA&htmlfid=897/ENUS217-151&appname=lenovous&language=en>

What IBM i Development Tools Are You Using?



=



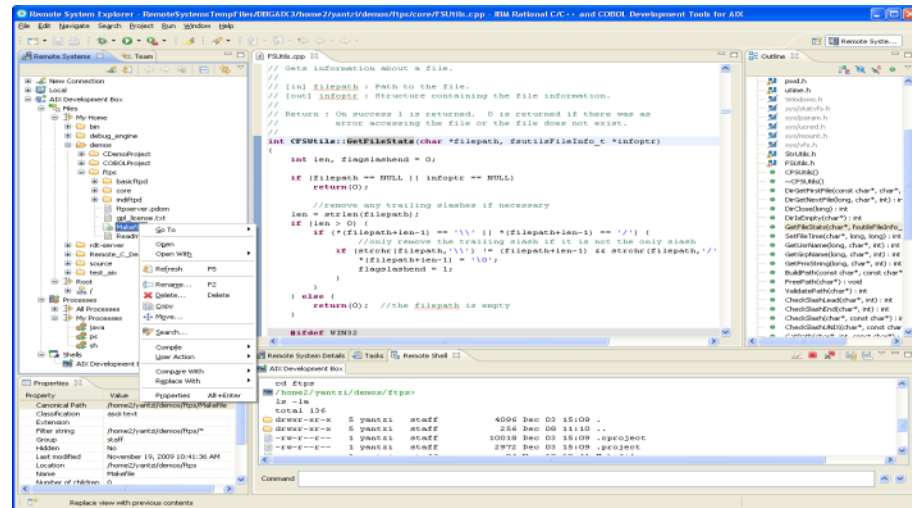
```
Session A - [24 x 80]
Columns . . . : 6 76          Edit          YANTZI/QRPGLESRC
SEU=>
FMT *
***** Beginning of data *****
-----
*
* Program: ORDENTR
*
* This program allows a user to enter and confirm an order. It sends
* a print request to a batch job via a data queue. The program only
* handles District 1 and Warehouse '0001'.
*
* Don was here
*
* INDICATOR USAGE:
* 03 - F3=Exit
* 04 - F4=Prompt
* 06 - F6=Accept order
* 12 - F12=Cancel

F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F10=Cursor  F11=Toggle
F16=Repeat find  F17=Repeat change  F24=More keys
(C) COPYRIGHT IBM CORP. 1981, 2005.
02/009
```

Tried and True, Yes but also SLOW, OLD, No new features

Rational Developer for i V9.6

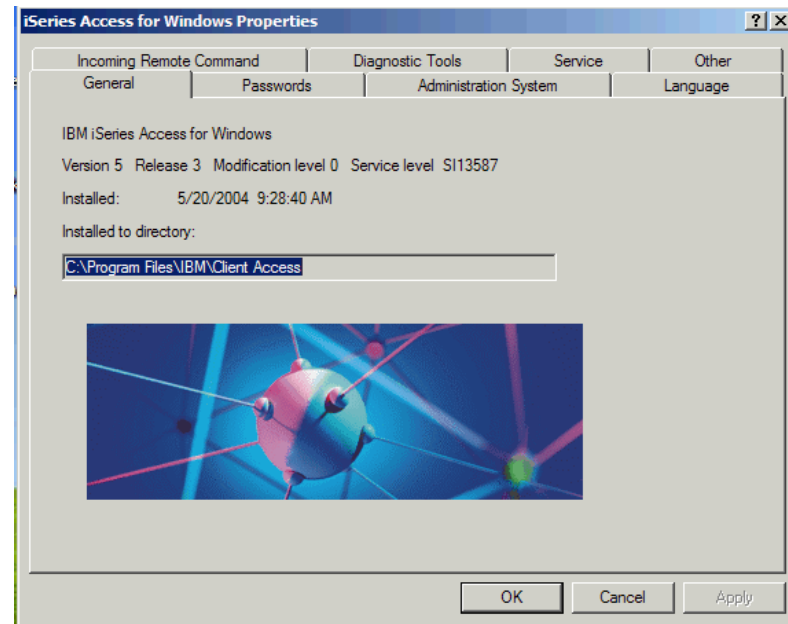
- Addition of a built-in 5250 emulator
- Removal of the 80 column restriction in RPG code editor
- Addition of Snippet Support in the Push-to-Client feature
- Enhanced ability to rearrange Remote System Explorer (RSE) Filters
- Improvements to free-form RPG formatting (indentation support) in the RPG code editor
- Improved RPG Content Assist
- General improvements to code coverage analysis capabilities, significant performance improvements



<https://www.ibm.com/us-en/marketplace/rational-developer-for-i>

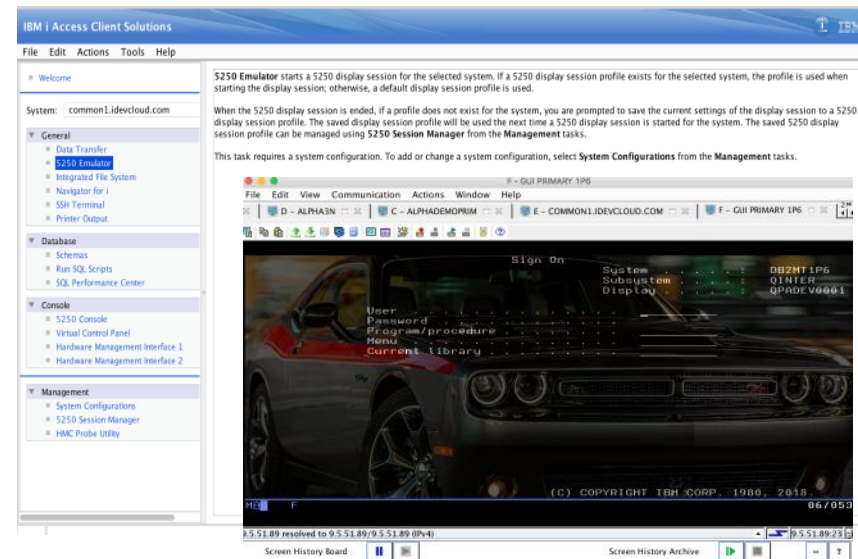
Client Access for Windows

- Old technology
- Based on Windows 8 (or older)
- Skip-shipped the last few IBM i releases
- Imbeds old technology
 - PCOMM for emulator
- Strategic Direction
 - Access Client Solutions (ACS)
 - Runs on multiple environments
- Plans to withdraw this year (so IBM i 7.3 the last supported release)
 - Encourage clients to move to ACS



Access Client Solutions (ACS)

- IBM Access Client Solutions
 - Strategic solution for Accessing and Managing your IBM i
 - Supports
 - Windows, including Windows 10
 - Mac
 - Linux – All distributions
 - Database tools
 - Run SQL Scripts
 - Index Advisor
 - Schemas
 - Visual Explain
 - Plan Cache
 - Lots more...



http://ibm.biz/IBMi_ACS (direct download link)

Access Client Solutions Product Page

<http://www-03.ibm.com/systems/power/software/i/access/solutions.html>

IBM Systems > Power Systems > Software > IBM i >

IBM i Access

Overview

Client Solutions

Windows

Linux

Web

Mobile

Overview

Support

Resources

IBM i Access Client Solutions is the newest member of the IBM i Access family. It provides a Java based, platform-independent interface that runs on most operating systems that support Java, including Linux, Mac, and Windows™.

IBM i Access Client Solutions consolidates the most commonly used tasks for managing your IBM i into one simplified location. The latest version of IBM i Access Client Solutions is available to customers with an IBM i software maintenance contract.

- [Download IBM i Access Client Solutions base package](#)
- [QuickStartGuide](#)
- [GettingStarted](#)
- ↓ [Updates](#)

Access videos



- [Introduction to IBM i Access Client Solutions \(00:01:17\)](#)
- [All IBM i Access videos](#)

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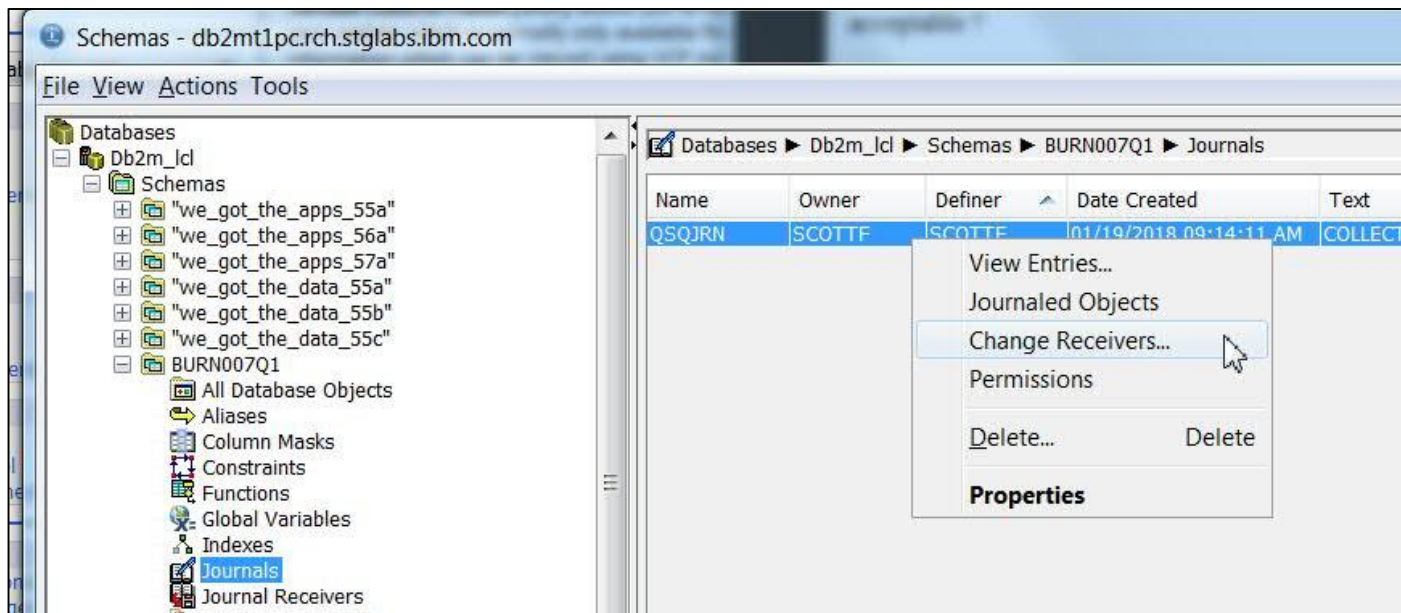
Browse Power Systems

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Download direct from the Web site!!!

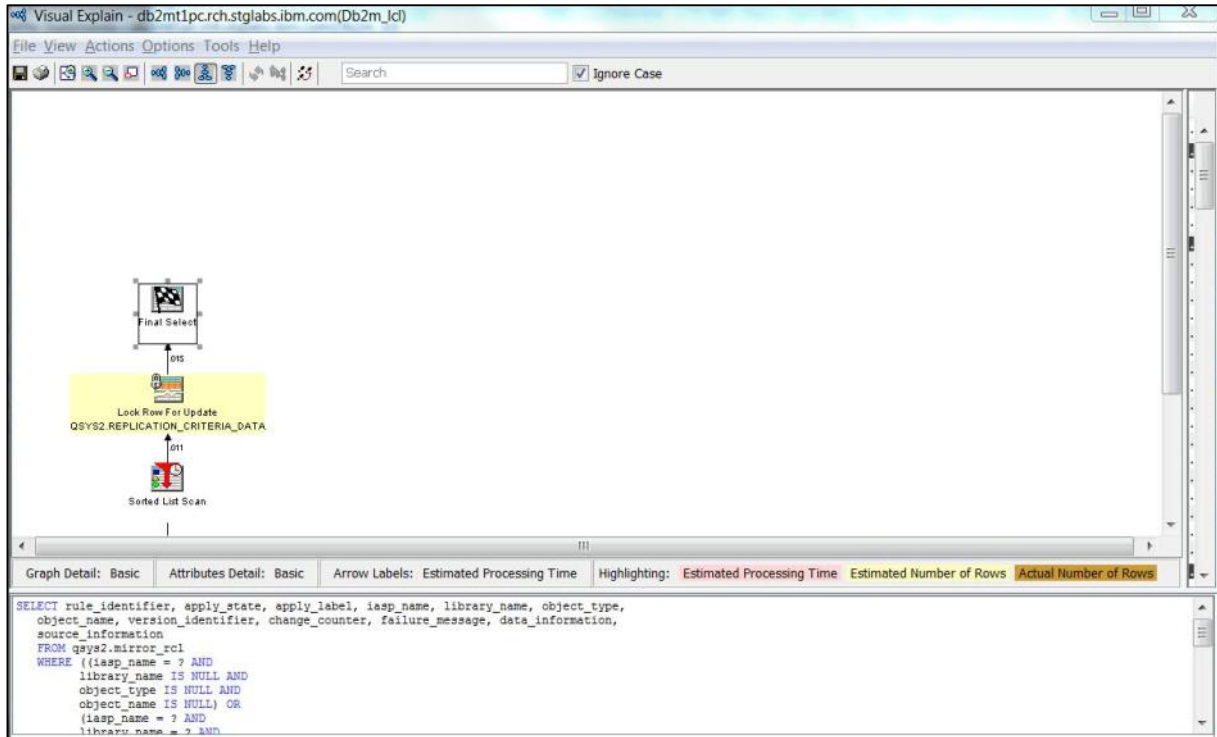
ACS – Database Tools update

- Support for Properties and Change Receivers actions are added to Journal objects



ACS – Database Tools update

- Within Visual Explain a new legend has been included to help the user better understand what is being viewed



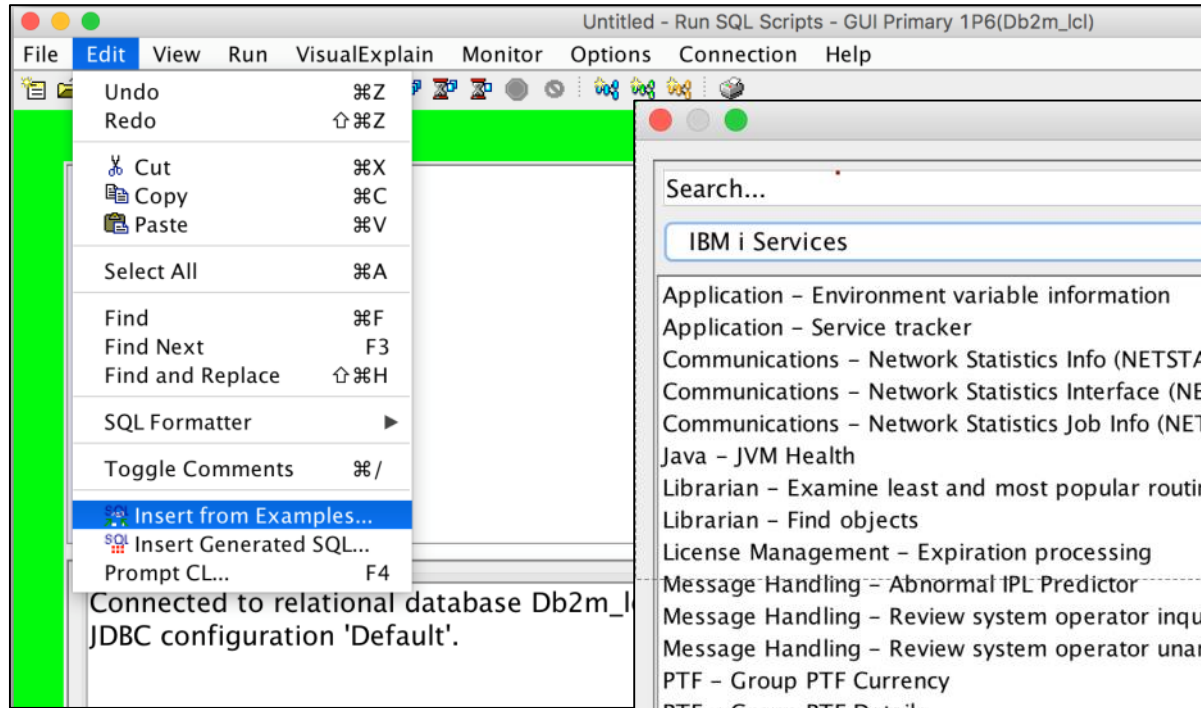
The screenshot displays the Visual Explain interface for a query. The main window shows a query execution plan with three nodes: 'Sorted List Scan' at the bottom, 'Lock Row For Update QSYS2.REPLICATION_CRITERIA_DATA' in the middle (highlighted in yellow), and 'Final Select' at the top. Arrows labeled '015' and '011' indicate the flow of data between the nodes. Below the plan, a legend is visible with the following items:

Graph Detail:	Attributes Detail:	Arrow Labels:	Highlighting:
Basic	Basic	Estimated Processing Time	Estimated Processing Time, Estimated Number of Rows, Actual Number of Rows

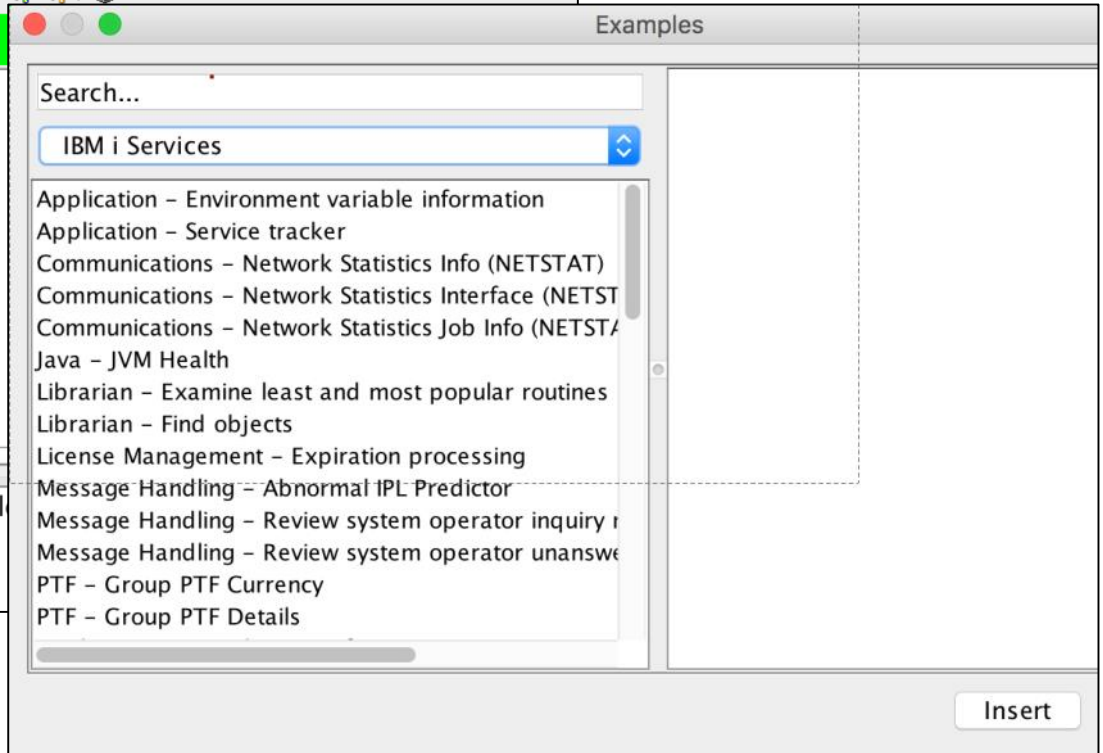
The SQL query text is shown at the bottom of the window:

```
SELECT rule_identifier, apply_state, apply_label, iasp_name, library_name, object_type,
       object_name, version_identifier, change_counter, failure_message, date_information,
       source_information
FROM qsys2.mirror_rcl
WHERE ((iasp_name = ? AND
       library_name IS NULL AND
       object_type IS NULL AND
       object_name IS NULL) OR
       (iasp_name = ? AND
       library_name = ? AND
```

ACS – Database Tools update – SQL Services

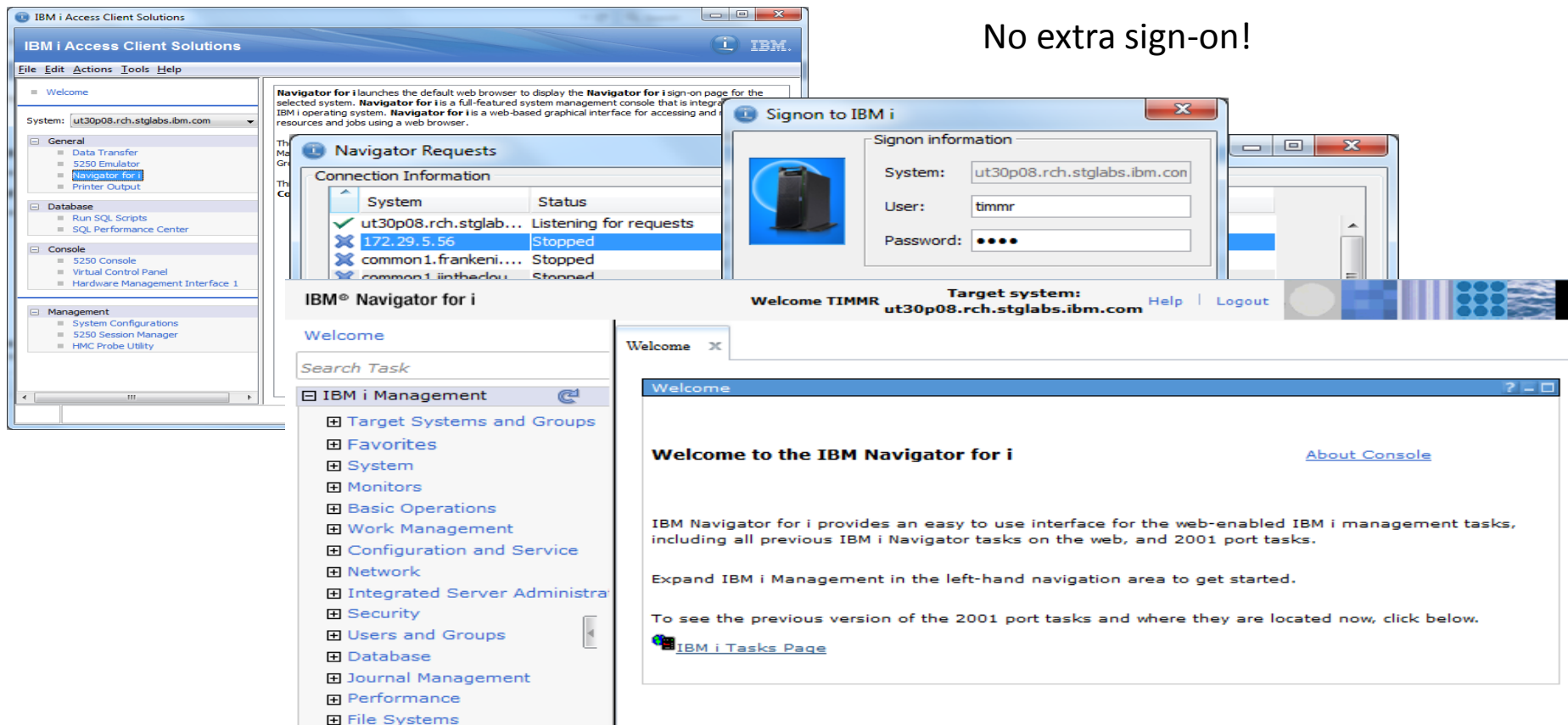


Examples included
in ACS



<http://ibm.biz/DB2foriServices>

ACS and IBM Navigator for i



The image displays the IBM i Access Client Solutions (ACS) interface. On the left, the 'IBM i Access Client Solutions' window shows a navigation tree with categories like General, Database, Console, and Management. The 'Navigator for i' window is open, displaying a 'Navigator Requests' table with columns for System and Status. A 'Signon to IBM i' dialog box is overlaid, showing signon information for the system 'ut30p08.rch.stglabs.ibm.com' with user 'timmr' and a masked password. Below the dialog, the main console area shows a 'Welcome' message for user 'TIMMR' and a list of navigation options under 'IBM i Management'.

No extra sign-on!

System	Status
ut30p08.rch.stglab...	Listening for requests
172.29.5.56	Stopped
common1.frankenl...	Stopped
common1.iintheclou...	Stopped

Signon information

System: ut30p08.rch.stglabs.ibm.com

User: timmr

Password: ●●●●

IBM® Navigator for i

Welcome TIMMR Target system: ut30p08.rch.stglabs.ibm.com Help | Logout

Welcome

Search Task

IBM i Management

- Target Systems and Groups
- Favorites
- System
- Monitors
- Basic Operations
- Work Management
- Configuration and Service
- Network
- Integrated Server Administra
- Security
- Users and Groups
- Database
- Journal Management
- Performance
- File Systems

Welcome

Welcome to the IBM Navigator for i [About Console](#)

IBM Navigator for i provides an easy to use interface for the web-enabled IBM i management tasks, including all previous IBM i Navigator tasks on the web, and 2001 port tasks.

Expand IBM i Management in the left-hand navigation area to get started.

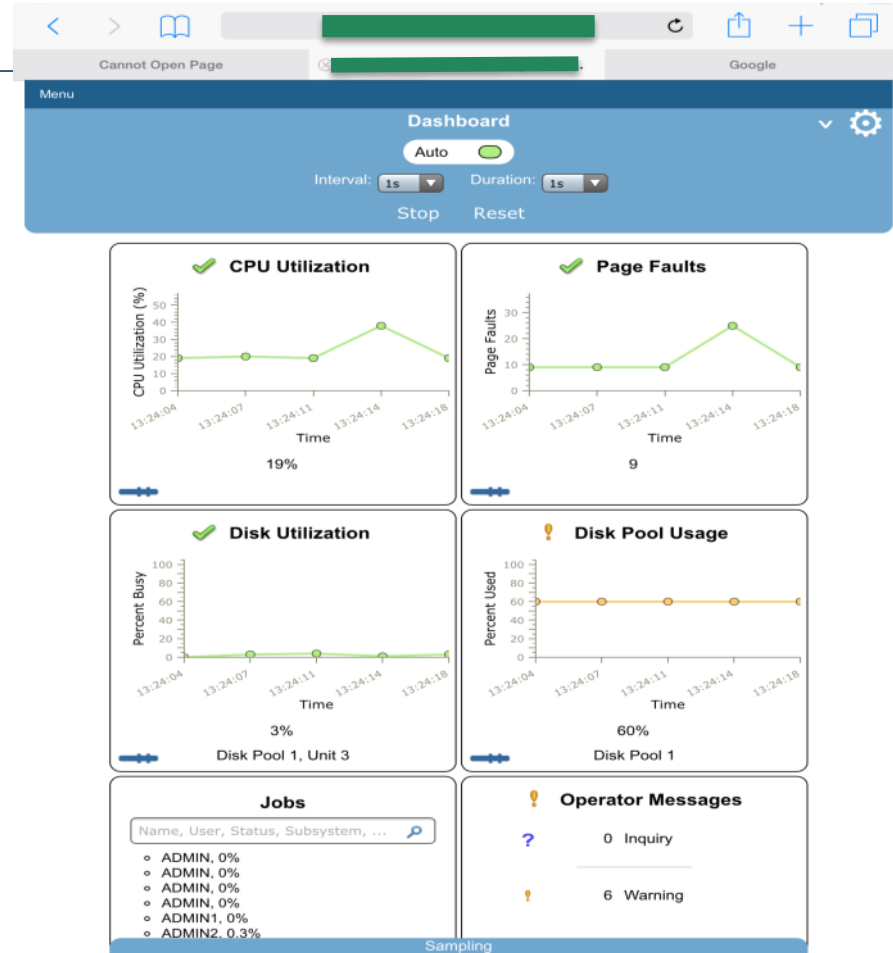
To see the previous version of the 2001 port tasks and where they are located now, click below.

[IBM i Tasks Page](#)

Mobile Dashboard

iAccess Mobile

- Watch several Key Metrics with 'Live' data
- Set thresholds to quickly visualize issues on your system
- Watch from your favorite Mobile Device
 - Phone
 - Tablet
- Visual notification when a threshold is exceeded



IBM Cloud Storage Solutions for i (5733-ICC).

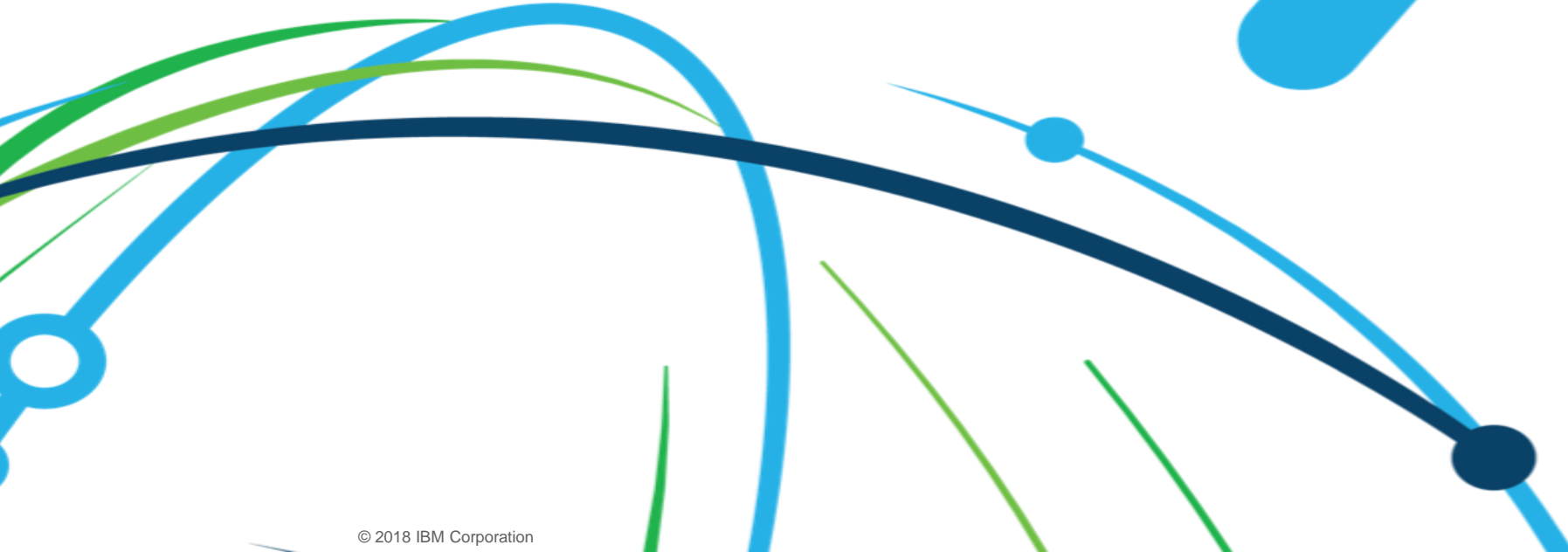
- BRMS can be used to transfer virtual save media, from tape or optical image catalogs, to/from the cloud using IBM Cloud Storage Solutions for i
- Allows cloud connector resources to be defined for cloud storage providers such as IBM SoftLayer, AWS S3, IBM Cloud Object Storage cloud server and for private interfaces such as file transfer protocol (FTP)



- https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/icc/topics/iccuoverview.htm
- [https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20Backup,%20Recovery%20and%20Media%20Services%20\(BRMS\)%20for%20i/page/Using%20Cloud%20Storage%20Solutions%20for%20i%20with%20BRMS](https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20Backup,%20Recovery%20and%20Media%20Services%20(BRMS)%20for%20i/page/Using%20Cloud%20Storage%20Solutions%20for%20i%20with%20BRMS)

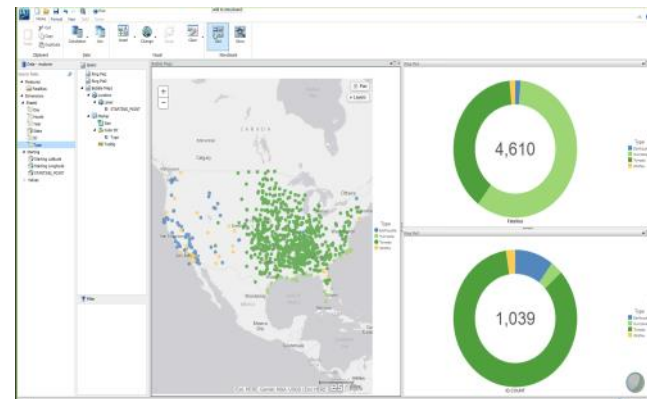


Db2 Web Query 2.2.1



Db2 Web Query Version 2.2.1

- Steps beyond traditional Business Intelligence into Data Discovery
 - New data driven Visualization empowers:
 - Users, Analysts, and Data scientists
 - Data layers (e.g., demographics) for geographic maps
 - What is the average income in this zip code?
- Consolidate, Prepare, and Transform Data with DataMigrator ETL
 - Even augment existing data with data from Watson
- Install or upgrade in 15 minutes with the “EZ-Install” Package
 - Includes 100’s of sample reports, for the business and I/T

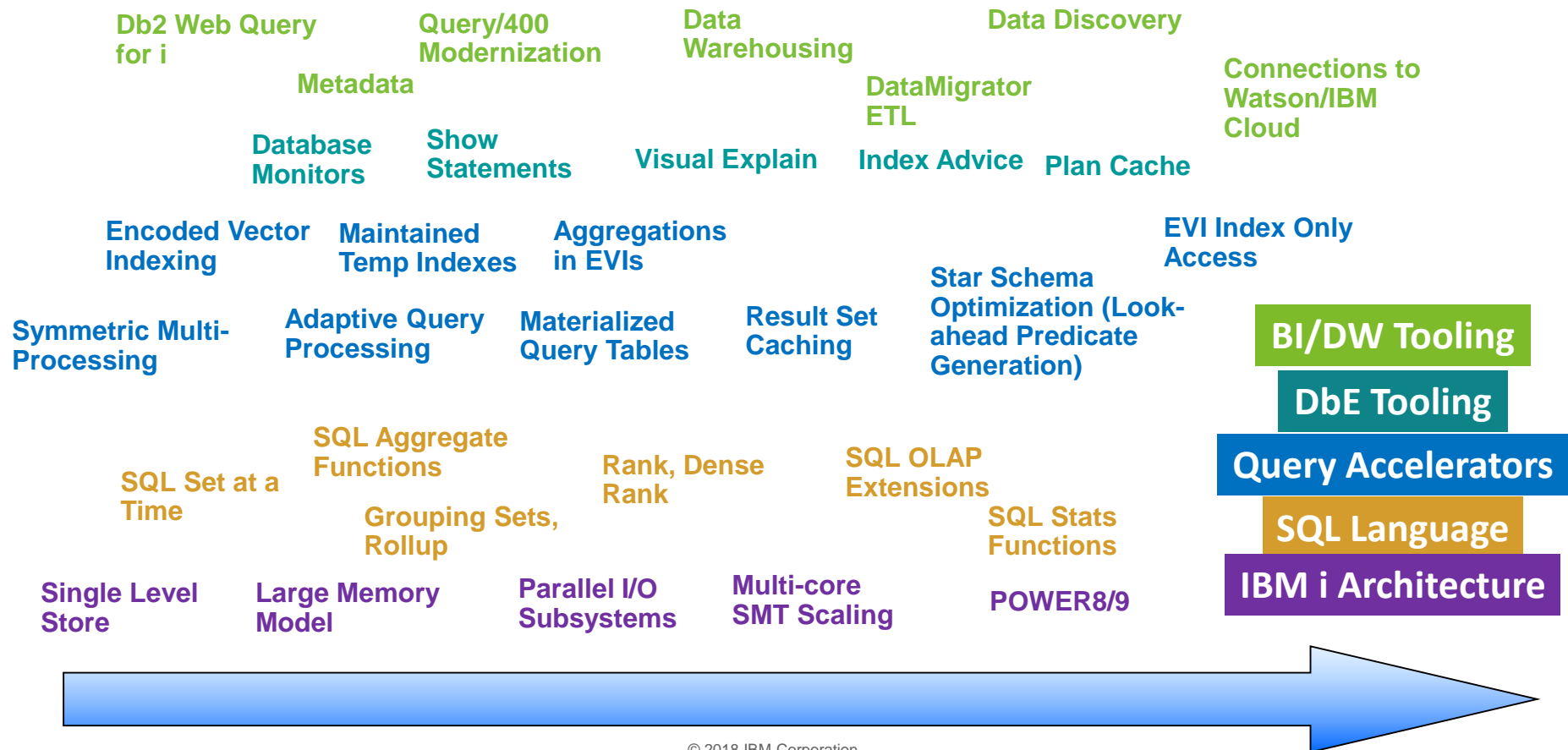


Video Demonstrations at ibm.biz/db2wq-221-videos
db2webqueryi.blogspot.com

GA 12/08/2017

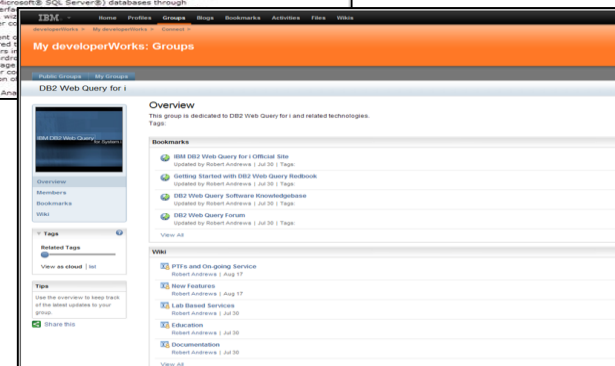
No Charge Upgrade from previous versions**

IBM i, Db2 for i and Db2 Web Query



To Learn More

- Db2 Web Query for i Website
 - ibm.biz/db2webqueryi
- Db2 Web Query for i Wiki
 - ibm.co/db2wqwiki
- Db2 Web Query Getting Started Enablement:
 - <https://ibm.biz/db2wqconsulting>
- Db2 Web Query Version 2.2.1
 - <http://ibm.biz/db2wqv221blog>
- EZ-Install
 - <http://ibm.biz/db2wqezinstall-info>
- Follow Db2 Web Query guy Doug Mack on twitter at @mckdrmoly or check out his blog at <http://db2webqueryi.blogspot.com/> for the latest info

Geographically Dispersed Resiliency (GDR)



GDR V1.2 for Power Systems

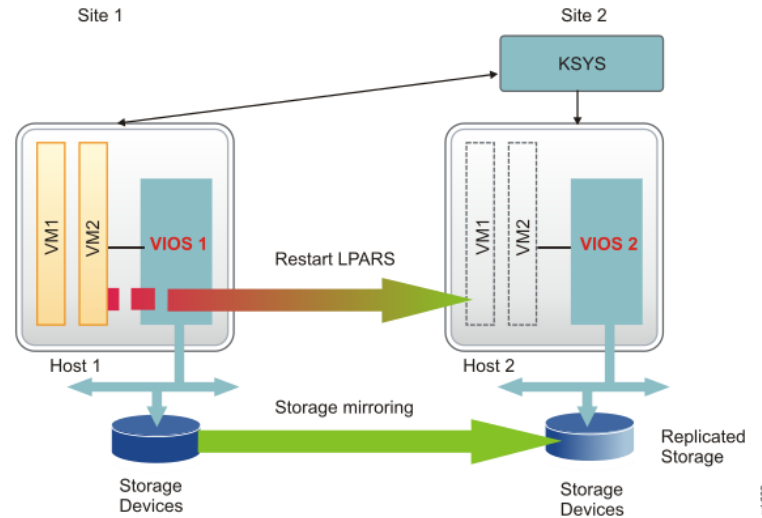
GDR provides high availability and disaster recovery solutions based on virtual machine restart technology

KSYS is the orchestration controller

- manages the real-time replication of the VMs between storage servers
- manages the VM restart operations between source and target systems
- installed on an AIX partition

GDR is deployed via VIOS and PowerVM

- Supports AIX, i and Linux
- DS8000, Storwize, EMC and Hitachi



- VMs are replicated real-time via SAN storage
 - synchronous mode replication: RPO of 0
 - asynchronous mode: RPO seconds/minutes
- GDR licenses reside in Ksys partition

GDR V1.2 for Power Systems

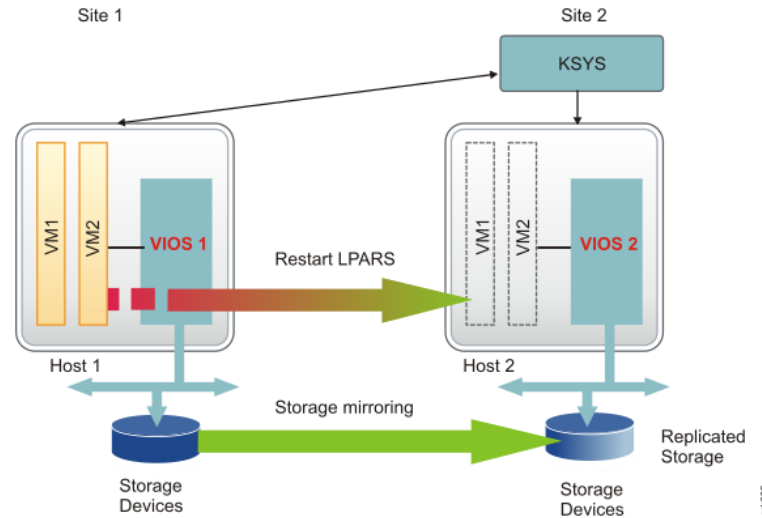
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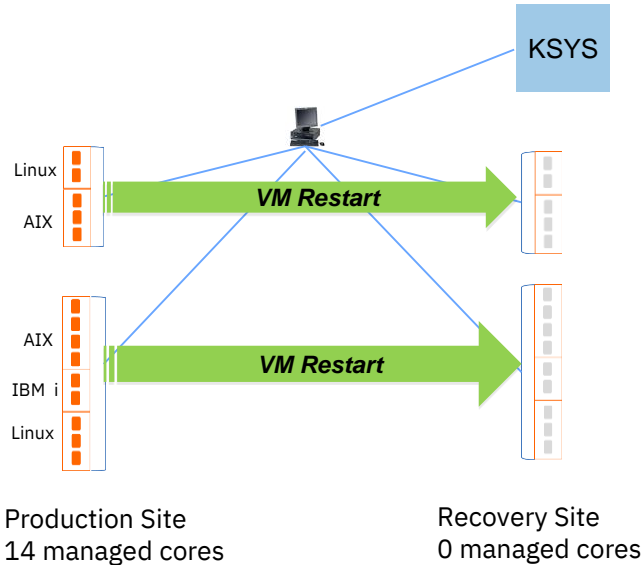


- VMs are replicated real-time via SAN storage
 - synchronous mode replication: RPO of 0
 - asynchronous mode: RPO seconds/minutes
- GDR licenses reside in Ksys partition

GDR V1.2 for Power Systems

Virtual Machine replication & restart solution for disaster recovery

- AIX, i and Linux Power System customers



Offering construct

- Storage based VM replication
- Ksys (orchestrator partition) manages replication and VM restart
- GDR licenses reside in Ksys partition

GDR for Power Systems – 5765-DRG (orderable via AAS on Aug 11)		
Software tier	small processor group/core	medium processor group price/core
List price for managed cores (US pricing example)	\$1020	\$1575

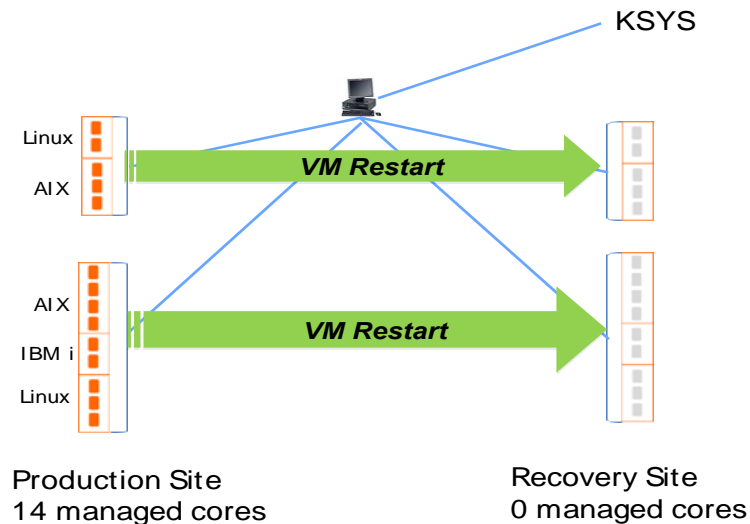
U.S. prices

- Priced per managed production core
- No license required on recovery system
- First year SWMA included

GDR Pricing Example

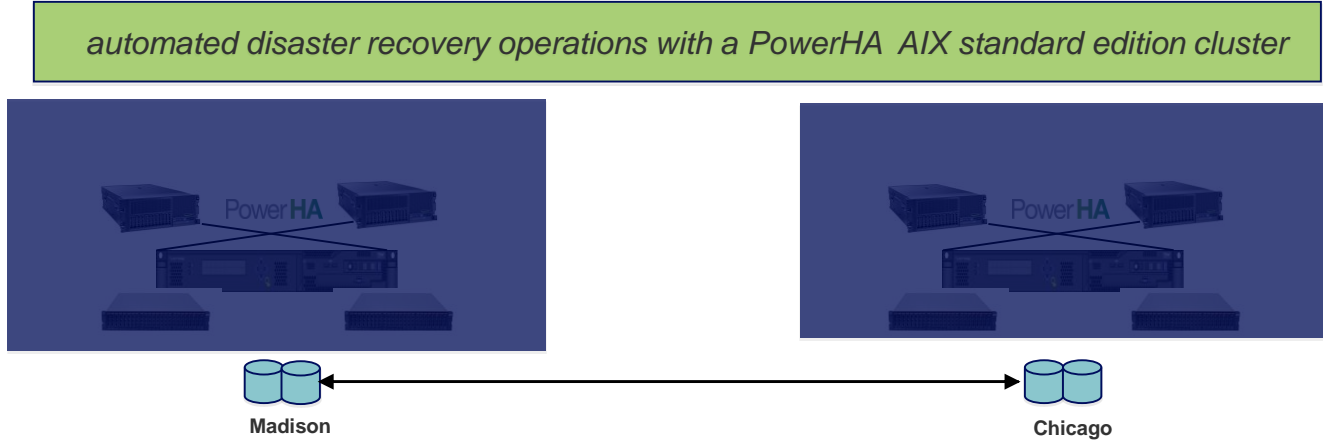
Using our example of 14 managed cores on the production servers

- Production servers in this example are in the small processor group therefore \$1020/core
- 14 managed cores = 14 GDR entitlements to be installed on the KSYS partition
- Total price; \$15,300 (U.S. prices)
- DRaaS hosted customers can conduct disaster recovery testing 4 times a year for 72 hours per test



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PowerHA for AIX + GDR




Host level VM restart of production PowerHA cluster in Madison to the Chicago disaster recovery center

IBM and Vulnerabilities Known as Spectre and Meltdown

- The web site below is updated with status on any fixes and plans for IBM Power System firmware updates as well as any operating system software patches
- **IBM PSIRT Blog for Power Family Processors**
- <https://www.ibm.com/blogs/psirt/potential-impact-processors-power-family>
- **Power Systems Firmware Security Bulletin**
- Firmware patches for POWER7, POWER7+, POWER8 and POWER9 platforms are available
<http://www.ibm.com/support/docview.wss?uid=isg3T1026811>
- IBM i Security Bulletin
- PTFs are available for releases 7.1, 7.2 and 7.3 of the IBM i operating system
<http://www.ibm.com/support/docview.wss?uid=nas8N1022433>

For More Information:


Some Links You Need	Twitter	#Hashtags
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IBM i operating system (OS) levels and related software products are frequently enhanced via PTFs. Prior to the existence of this wiki, IBM did not provide a single point for clients to learn about all IBM i enhancements.

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IBM i 7.2	TR8 - TR7 - TR6 - TR5 - TR4 - TR3 - TR2 - TR1 - Base Enhancements
IBM i 7.1	TR11 - TR10 - TR9 - TR8

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