Power Systems
POWER9 Scale Out Servers

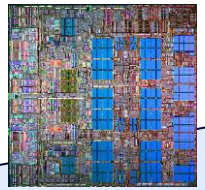
MTM 9009-42A	**(S924)**
MTM 9009-41A	**(S914)**
MTM 9009-22A	**(S922)**
MTM 9008-22L	**(L922)**
MTM 9223-42H	**(H924)**
MTM 9223-22H	**(H922)**

Mickey Sparks – mrspark@us.ibm.com
Power Client Technical Specialist

Credits to:
- Ron Arroyo
- Simon Porstendorfer
- Ruby Zgabay
- Michael Fisher
- Nigel Griffiths
- Alison Butterill

IBM **Power** Systems

POWER Processor Roadmap



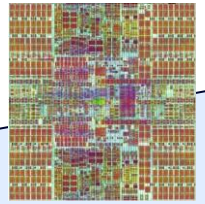
POWER5™
130 nm
1.5 – 2.3GHz

- Dual Core
- Enhanced Scaling
- SMT 2
- Distributed Switch +
- Core Parallelism +
- FP Performance +
- Memory bandwidth +
- Virtualization

- Transistors 276M

2004

POWER5+
90 nm

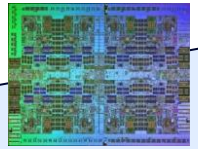


POWER6
65 nm
3-5GHz

- Dual Core
- High Frequencies
- Virtualization +
- Memory Subsystem +
- Altivec
- Instruction Retry
- Dynamic Energy Mgmt
- SMT 2+
- Protection Keys
- Transistors 790M

2007

POWER6+
65 nm



POWER7
45 nm
3-4+GHz

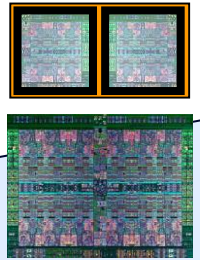
- Multi Core (up to 8)
- On-Chip eDRAM (L3)
- Power Optimized Cores
- Mem Subsystem ++
- SMT 4
- Reliability +
- VSM & VSX (AltiVec)
- Protection Keys+

- Transistors 1.2B
- POWER7+ 2.1B

2010

POWER7+
32 nm

2012



POWER8
22 nm
3-4+ GHz

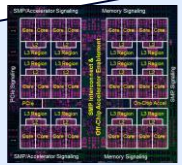
- Multi Core (up to 12)
- Double L1 data cache
- On Chip eDRAM (L3)
- L4 on Memory cCards
- Bandwidth +++
- SMT 8
- Reliability ++
- On Chip Power Mgmt
- PCIe Gen 3

- Transistors 4B+

2014

POWER8NV
22 nm

2016

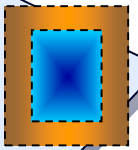


POWER9

- Enhanced Thread performance
- Analytics Optimization
- Extreme Big Data Optimization
- Next Gen Memory
- On-chip accelerators
  - Open CAPI
  - BW enhancements

- Transistors 8B

2017



POWER10

2020

POWER9 Processor

New Core Microarchitecture

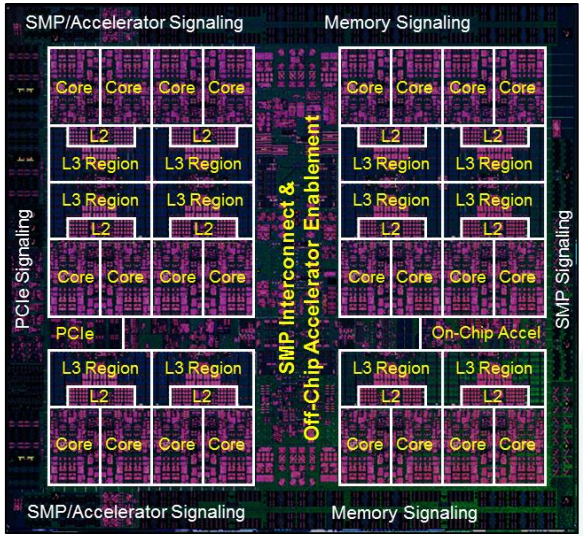
- Stronger thread performance
- Efficient agile pipeline
- POWER ISA v3.0

Enhanced Cache Hierarchy

- 120MB NUCA L3 architecture
- 12 x 20-way associative regions
- Advanced replacement policies
- Fed by 7 TB/s on-chip bandwidth

Cloud + Virtualization Innovation

- Quality of service assists
- New interrupt architecture
- Workload optimized frequency
- Hardware enforced trusted execution



14nm finFET Semiconductor Process

- Improved device performance and reduced energy
- 17 layer metal stack and eDRAM
- 8.0 billion transistors

Leadership Hardware Acceleration Platform

- Enhanced on-chip acceleration
- Nvidia NVLink 2.0: High bandwidth, advanced new features (25G Link)
- CAPI 2.0: Coherent accelerator and storage attach (PCIe G4)
- OpenCAPI: Improved latency and bandwidth, open interface (25G Link)

State of the Art I/O Subsystem

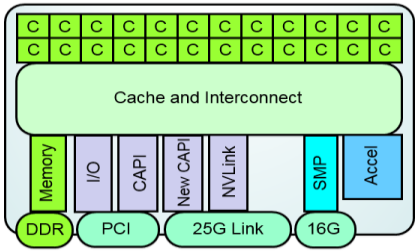
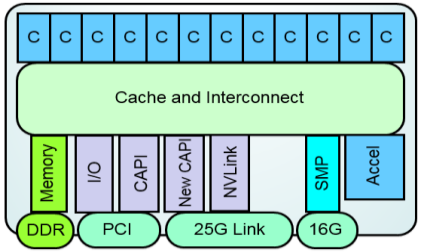
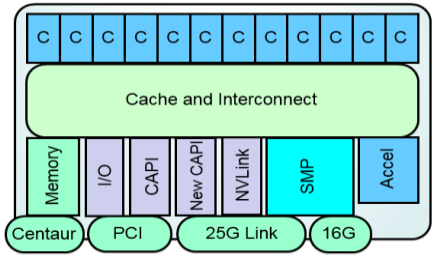
- PCIe Gen4 – 48 lanes

High Bandwidth Signaling Technology

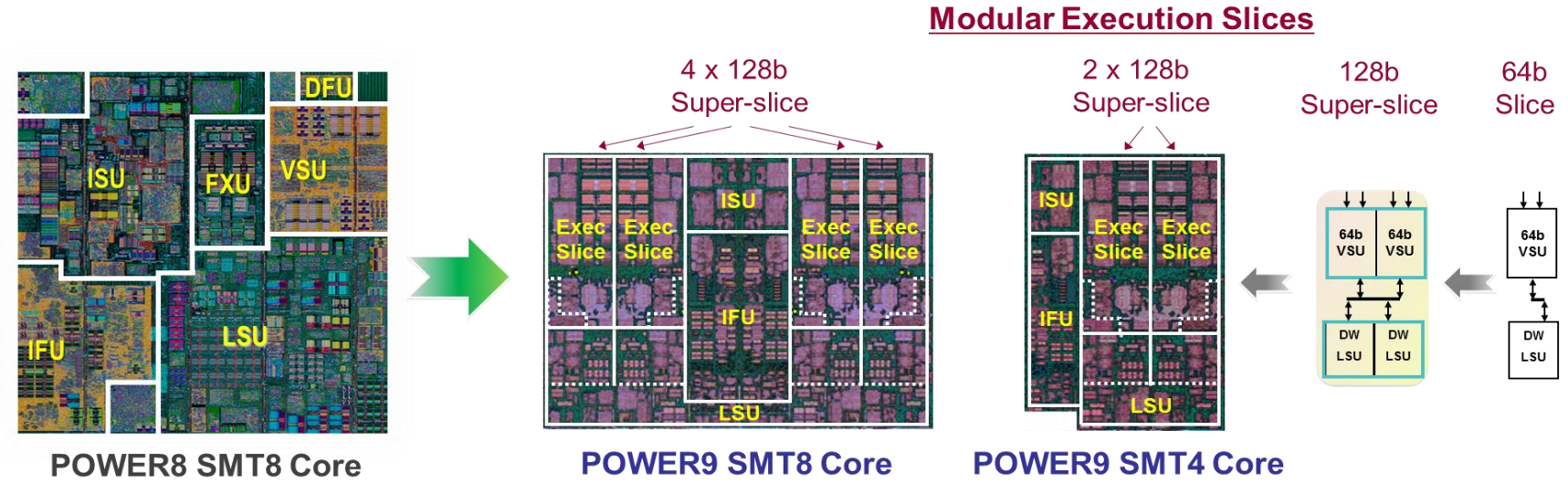
- 16 Gb/s interface – Local SMP
- 25 Gb/s interface
  - – Accelerator, remote SMP

POWER9 Processor Family

Core Count / Size

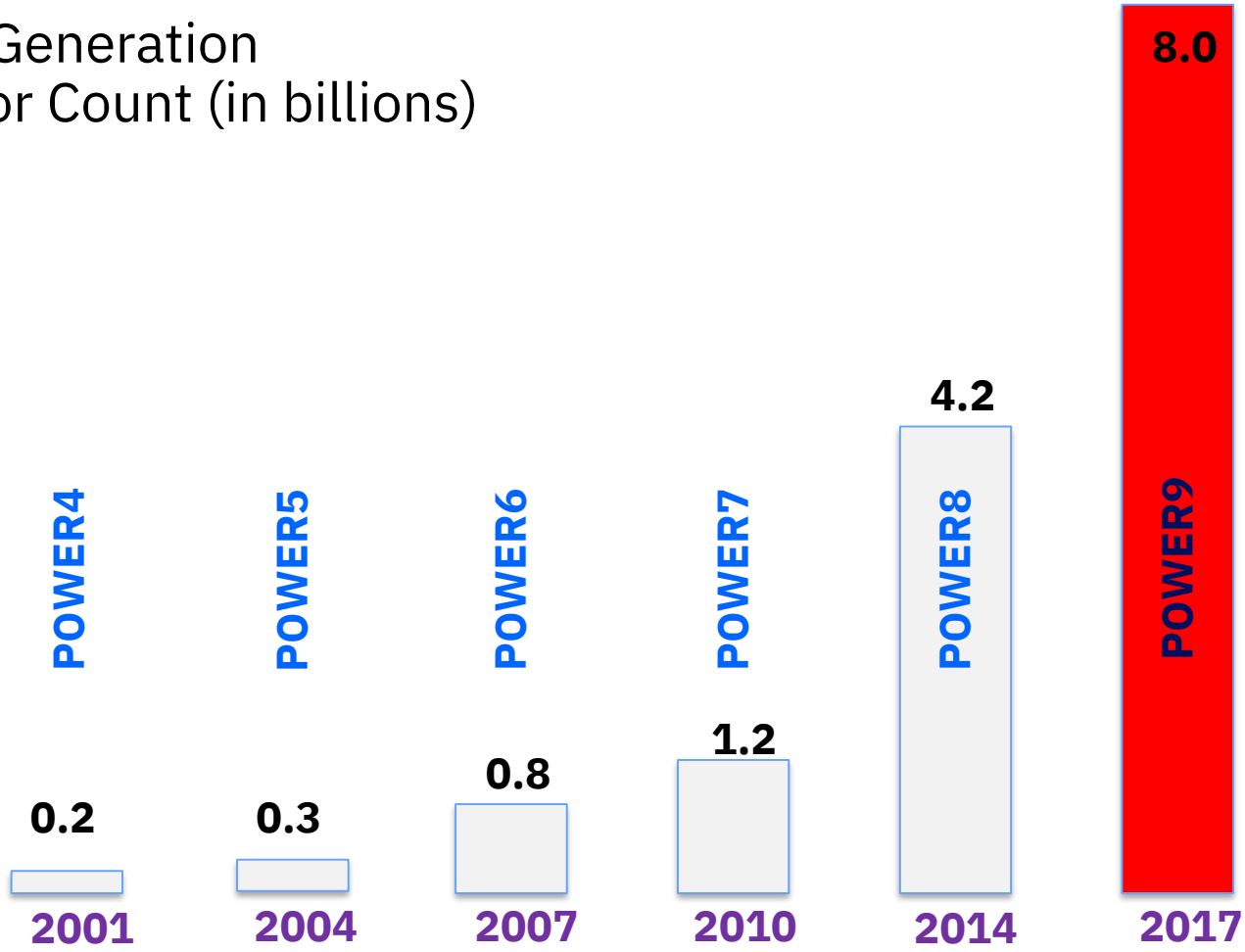
SMP scalability / Memory subsystem	SMT4 Core 24 SMT4 Cores / Chip Linux Ecosystem Optimized	SMT8 Core 12 SMT8 Cores / Chip PowerVM Ecosystem Continuity
Scale-Out – 2 Socket Optimized **Robust 2 socket SMP system** **Direct Memory Attach** • Up to 8 DDR4 ports • Commodity packaging form factor		
Scale-Up – Multi-Socket Optimized **Scalable System Topology / Capacity** • Large multi-socket **Buffered Memory Attach** • 8 Buffered channels		

POWER9 Processor

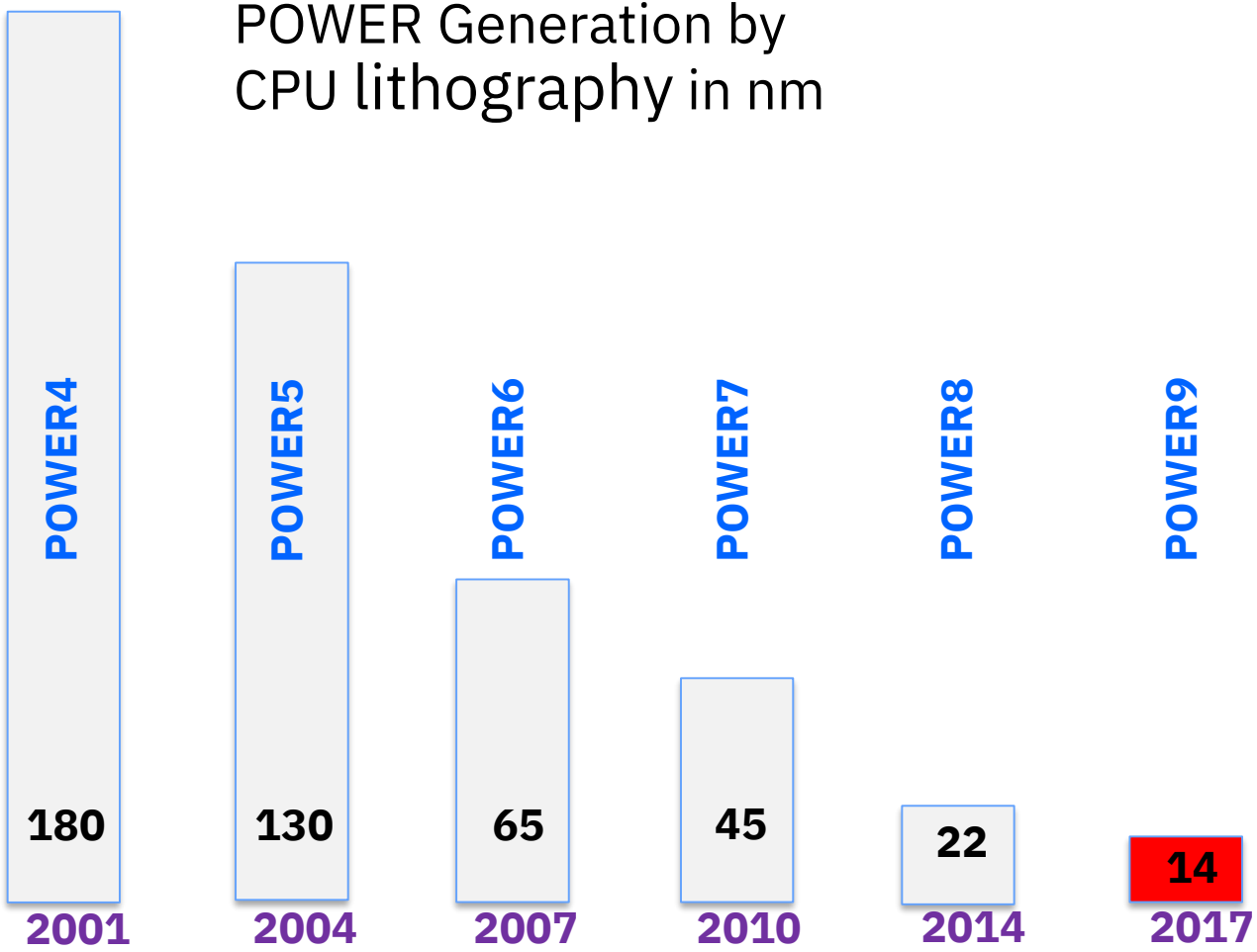


The core consists primarily of the following six units: instruction fetch unit (IFU), instruction sequencing unit (ISU), load-store unit (LSU), fixed-point unit (FXU), vector and scalar unit (VSU) and decimal floating point unit (DFU)

POWER Generation
Transistor Count (in billions)



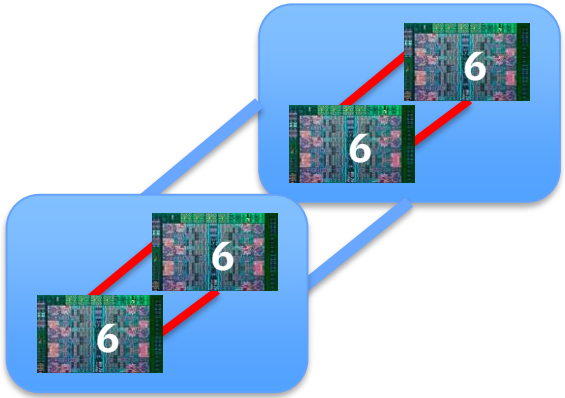
POWER Generation by CPU lithography in nm



POWER9 Scale-Out faster Architecture

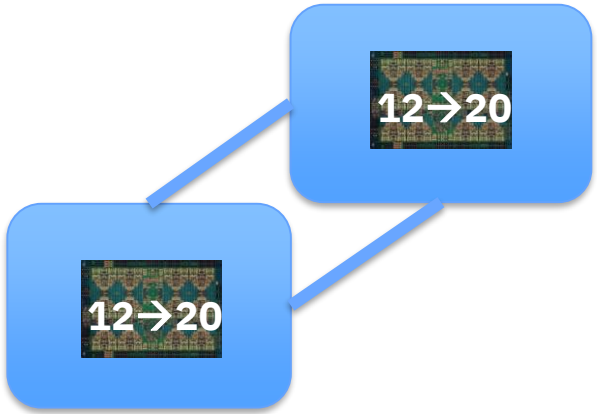
POWER8

- 2 Sockets each with 2 POWER8 chips
- Four islands of L3 cache



POWER9

- 2 Sockets each with 1 POWER9 chip
- Two islands of larger L3 cache
- No comms within the socket = FASTER



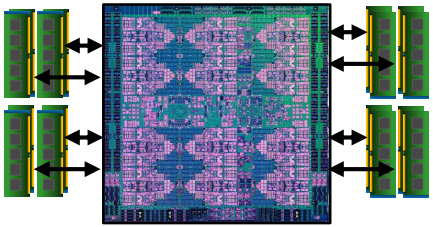
Numbers are max number of cores

POWER9 Memory Subsystems

Two Memory Architectures

Scale Out

Direct Attach Memory



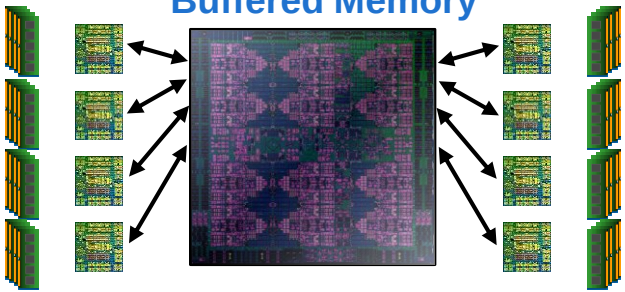
8 Direct DDR4 Ports

- Up to 170 GB/s of peak bandwidth
- Low latency access
- Commodity packaging form factor
- Adaptive 64B / 128B reads
- Simplified Design Point

Max 2-Socket Systems

Scale Up

Buffered Memory



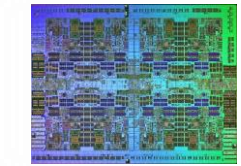
8 Buffered Channels

- Up to 230 GB/s of memory bandwidth
- Extreme capacity – up to 8TB / socket
- Superior RAS with chip kill and lane sparing
- Compatible with POWER8 system memory
- Agnostic interface for alternate memory innovations

4 to 16 Socket Systems

POWER9 PCIe GEN4

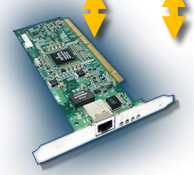
POWER7/7+



GX Bus

I/O Bridge

PCIe G2

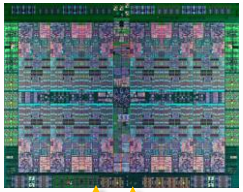


PCI Device

Proprietary GX Attach
Utilizes Bridge Chip

40 GB/s
Peak Bandwidth

POWER8



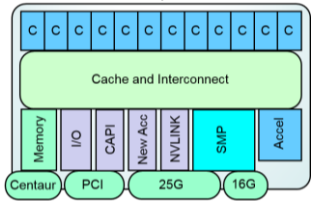
PCIe G3

PCI Device

Directly Integrates PCI
Improves latency/bandwidth
CAPI 1.0 Support

96 GB/s
Peak Bandwidth

POWER9



PCIe G4

PCI Device

Directly Integrates PCI
Leadership Lane Count
Full Cache Integration
Very Early Adoption
CAPI 2.0 Support

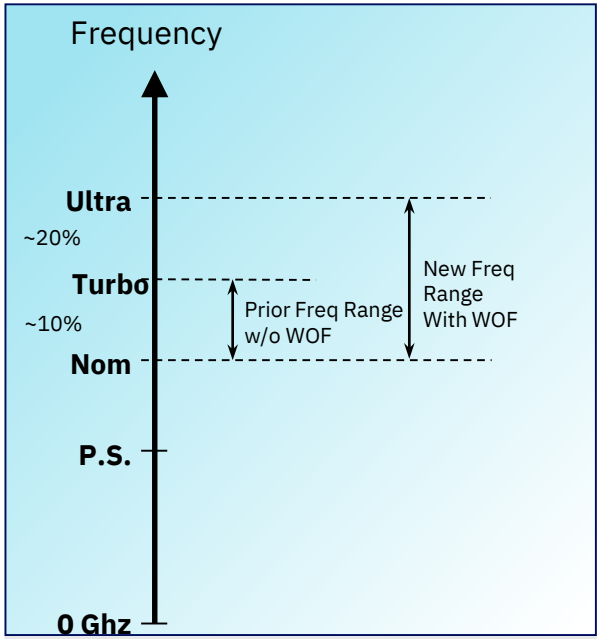
192 GB/s
Peak Bandwidth

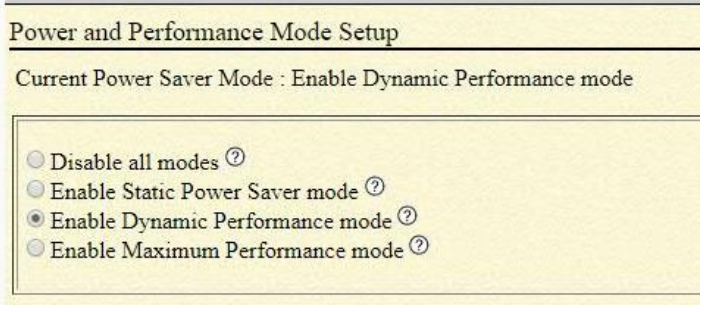
Workload Optimized Frequency Provides max performance

- Enables higher dynamic operational frequencies
  - For lighter workloads that do not fully utilize the core
  - For cases when all cores are not active
  - For systems in nominal operating conditions

- Modes of Operation
  - Power Save Mode – Static frequency operation
  - Nominal Mode – Static frequency operation
  - **New** Nominal Dynamic Performance Mode – (WOF on)
    - CPU managed to Nominal power draw
    - Max Workload/Max Cores will run at least Nom Freq
    - Lighter workloads/Less cores will run at higher Freq
  - **Changed** Maximum Dynamic Performance Mode – (WOF on)
    - Same as Favor Perf Mode but with WOF enabled
    - Higher acoustics – CPU managed to Higher power draw
    - Max Workload/Max Cores runs at least Turbo Freq
    - Lighter workloads/Less cores will run at higher Freq

It does not take a reboot to change modes





POWER9 M.2 NVMe support - S922 & S924

S922/S924 has two internal direct attached storage connectors
Connector support either:

- NVMe carrier card & attaches two 400 GB M.2 NVMe drives
- SAS controller requiring DASD backplane (like POWER8)
- You can mix an NVMe card and a SAS card
- Not socket dependent

M.2 NVMe on POWER9 on S922/S924

- A maximum of four x M.2 NVMe drives
- Will be higher performance than SAS DASD in backplane
- Will not support concurrent maintenance (unlike SAS drives)
- Will have a write endurance of 1 drive write per day
- Intended primarily to store and boot OS (AIX / VIOS / Linux) images
- Each NVMe device→separate PCIe endpoint assign to different LPARs
- NVMe drives may be assigned to the VIOS and virtualized to client OS

POWER9 No internal DVD support

This should not be surprising 22year old Tech!

1. DVD read 16x ~ **20MB/s** and only 9 GB in size
2. DVD is likely to be a very low RAS item
   a) Cheaply made
   b) Mechanical
   c) Hot laser inside
   d) Regular user interaction (sticky fingers)

Alternative is a USB Memory Key

1. Faster: USB 3.0 reads at **90 MB/s**
2. Larger + cheaper: 32 GB USB Memory Key is ~$20

Can add external USB DVD or DVD-RAM

- AIX and VIOS support the option of downloading a single volume install image from IBM entitled system support website and copying that image to USB flash memory stick to be used as installation media.
- Once copied to a USB flash memory stick, this media can be used on Power 8 and Power 9 systems in all the same ways as supported by DVD install media.

POWER9

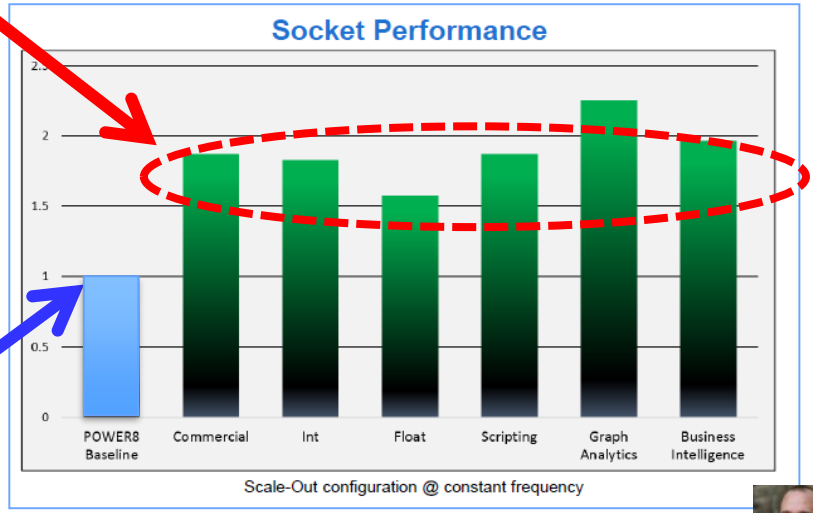
the Servers

POWER9 session from Jeff Stuecheli

40% - 60% Performance Boost

Same SMT
Same # of cores

POWER8 = 1 baseline



AC922 *- POWER9 with increased GPU and IO bandwidth for differentiation*

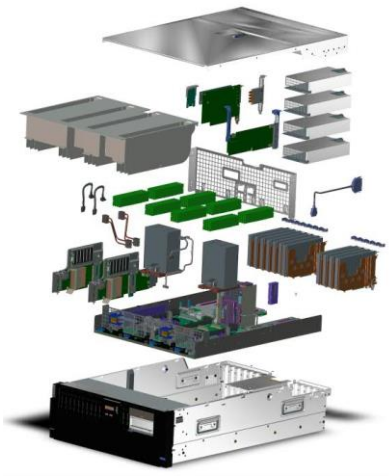
Realize unprecedented performance and application gains with POWER9 and NVLink 2.0

- 2 POWER9 CPUs and up to 4 “Volta” NVLink 2.0 GPUs in a versatile 2U Linux server
- PCIe Gen4 bus has double I/O Bandwidth vs. PCIe Gen3
- CPU (Turbo)/GPU (Boost) enabled for improved data center efficiency and performance to be maintained at high levels

High level System Overview

- 2-Socket, 2U Packaging
- 40 P9 Processor cores
- 4 NVIDIA Volta 2.0 GPUs
- 1 TB Memory (16x - 64GB DIMMs)
- 4 PCIe Gen4 Slots
- 2x SFF (HDD/SSD), SATA, Up to 7.7 TB storage
- Supports 1.6TB and 3.2TB NVMe Adapters
- Redundant Hot Swap Power Supplies and Fans
- Default 3 year 9x5 warranty, 100% CRU

POWER9 Server Highlights



- Full Portfolio refresh planned (2017 and 2018)
- CPU Single Chip Module packaging
  - Eliminates SW licensing issues associated with Dual Chip Module designs
  - Lowers latency for CPU to CPU transfers due to simpler CPU fabric topology
- Up to 4x increased CPU fabric bandwidth for max scalability
- Embedded Analytics and Algorithms on the chip help run POWER9 at an always optimized dynamic frequency
- Increased Memory capacities over POWER8
- Leveraging IS RDIMMs to provide more competitive offerings in 2-socket space
- Increased I/O bandwidth with PCIe GEN4 Slots and future PCIe GEN4 Expansion Drawer
- 25Gb ports for High Speed GPU/OpenCAPI acceleration
- Integrated NVMe Flash device support
- Basic form factors and power requirements remain the same

POWER9 Scale Out family



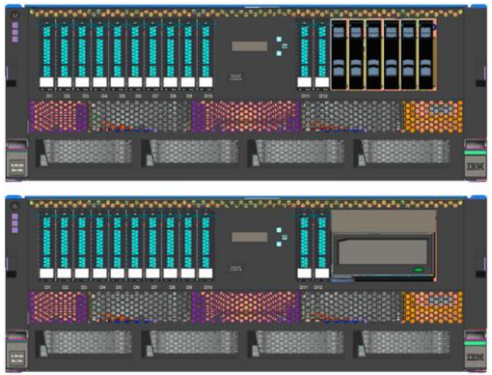



L922 9008-22L	S922 9009-22A	S914 9009-41A	S924 9009-42A	H922 9223-22H	H924 9223-42H
• 1,2-socket, 2U • 8,10,12 cores/ socket • 32 IS RDIMM slots • 4TB memory • 4 CAPI 2.0 Slots • Linux only • PowerVM • KVM (GA2)	• 1,2-socket, 2U • 4, 8,10 cores/ socket • 32 IS RDIMM slots • 4TB memory • 4 CAPI 2.0 Slots • AIX, IBM *i**, & Linux • PowerVM * no IBM i on 4-core, limited to 4 core/LPAR	• 1-socket, 4U & Tower • 4,6,8 cores/ socket • 16 IS RDIMM slots • 1TB memory • 2 CAPI 2.0 Slots • Internal RDX Media • AIX, IBM i, Linux • PowerVM	• 2-socket, 4U • 8,10,12 cores/ socket • 32 IS RDIMM slots • 4TB memory • 4 CAPI 2.0 slots • Internal RDX Media • AIX, IBM i, Linux • PowerVM	• 1,2-socket, 2U • 4, 8,10 cores/ socket • 32 IS RDIMM slots • 4TB memory • 4 CAPI 2.0 Slots • AIX, IBM i up to 25% • Linux • PowerVM	• 2-socket, 4U • 8,10,12 cores/ socket • 32 IS RDIMM slots • 4TB memory • 4 CAPI 2.0 slots • Internal RDX Media • AIX, IBM i up to 25% • Linux • PowerVM

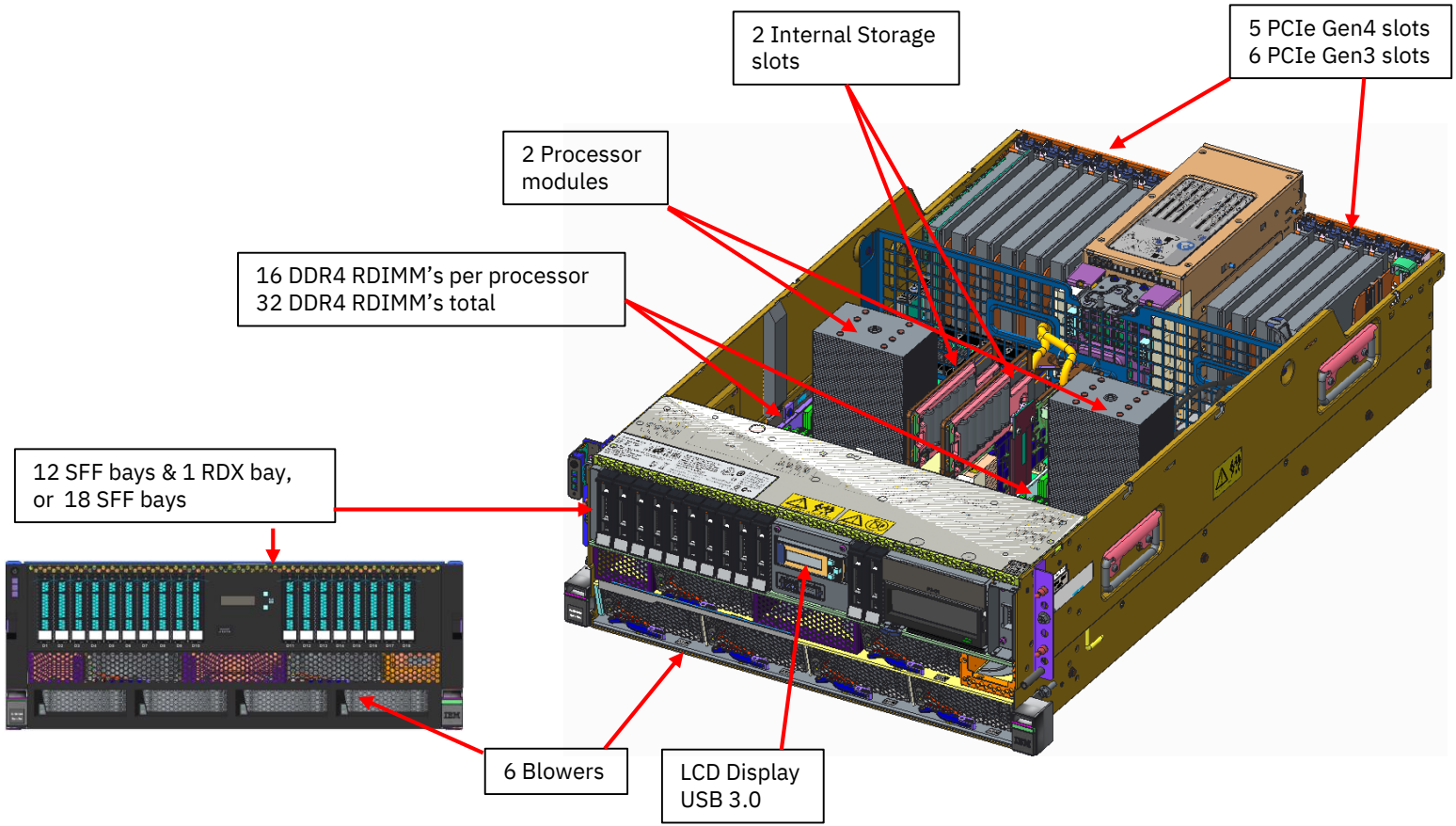
Technology Leadership	• **Cloud enabled - Embedded virtualization capabilities with PowerVM** • **Up to 4TB in 2 socket - DDR4 Industry Standard memory RDIMMs** • **High Speed 25Gb/s external ports – one per socket** • **2 Internal NVMe Flash boot adapters** • **Embedded Analytics and Algorithms on the chip help run POWER9 at an always optimized frequency**

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



Front View (without the name label)

We like the operator panel at the top left,

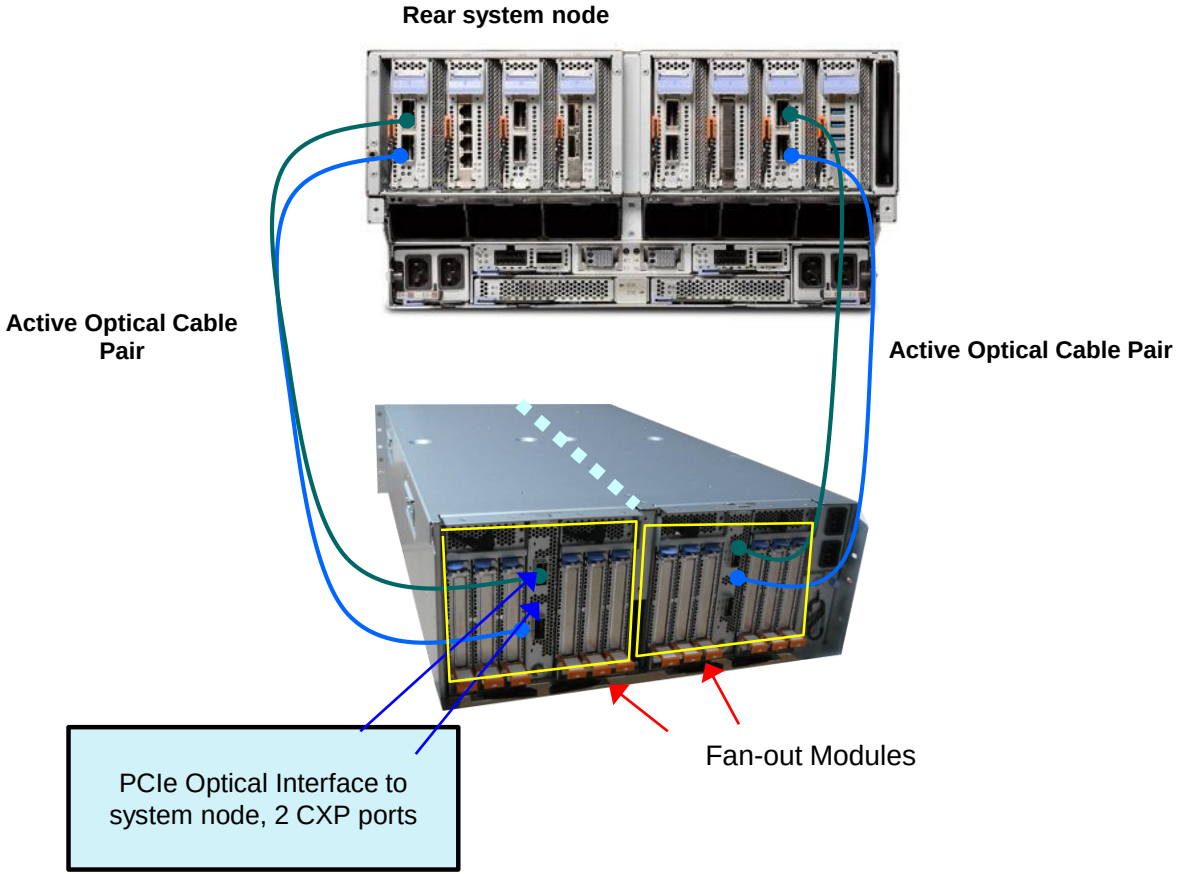
No optional LCD panel on this Server

Under the hood

Nicely thought out with a clear Perspex cover

Clear is good, as you can see the LEDs & DIMMs

PCIe Expansion Drawer



S924/ H924 PCIe Slots

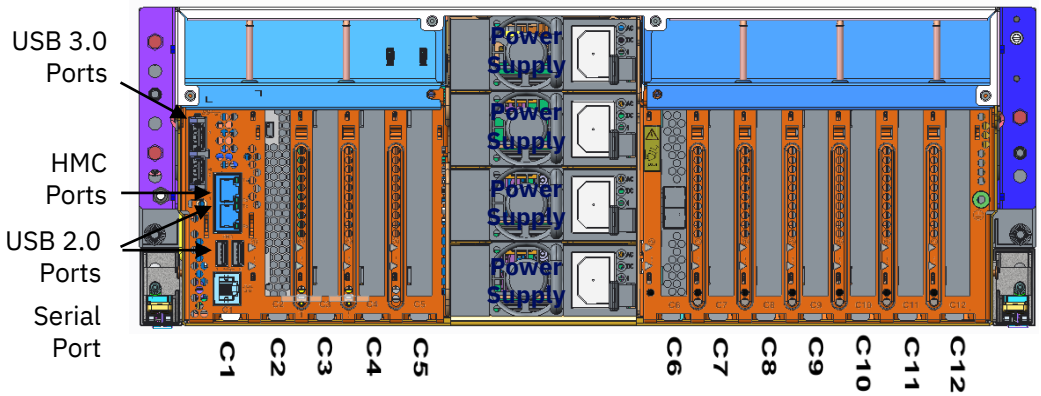
Internal PCIe Slot Summary

Slot	Attributes	Note
C1	Service Processor Card	
C2	PCIe Gen4 x8 (x16 Conn)	2nd POWER9 socket
C3	PCIe Gen4 x16 (EJ08 slot)	
C4	PCIe Gen4 x16 (EJ08 slot)	
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

PCIe Slots are Concurrently Maintainable

Full Height, Half Length PCIe form factor



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

S924 / H924 Processor Highlights

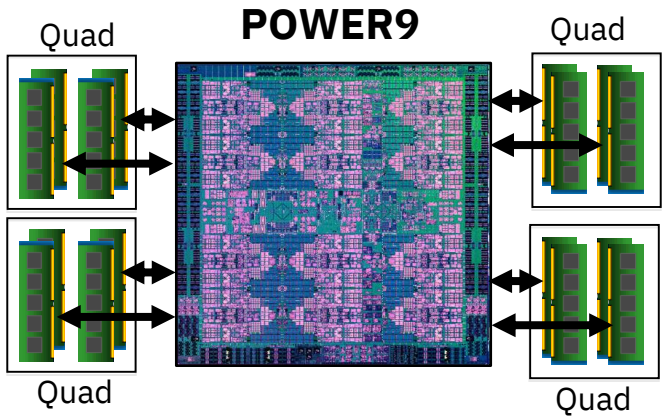
- ✓ SCM Design – Single Chip Module
- ✓ Three processor offerings available (SMT8 cores)
  - 12-core processor (maximum throughput)
  - 10-core processor
  - 8-core processor (maximum core performance)

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

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



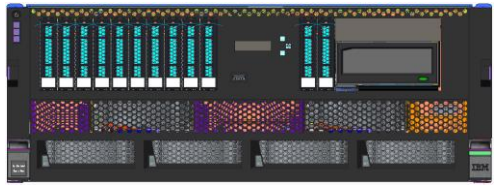
Feature Code	DIMM Size	2-8 DIMMs per socket	10-16 DIMMs per socket
EM62	16GB DIMM	2666 MHz	2133 MHz
EM63	32GB DIMM	2400 MHz	2133 MHz
EM64	64GB DIMM	2400 MHz	2133 MHz
EM65	128GB DIMM	2400 MHz	2133 MHz

S924/ H924 Storage Options

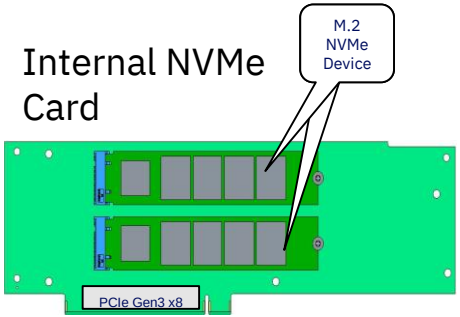
Internal Storage Options

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

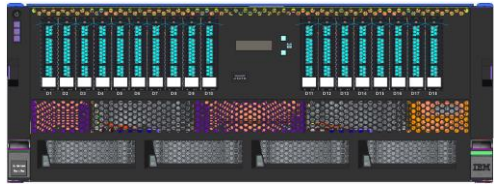
12 SFF bays,
1 RDX bay



Internal NVMe Card



18 SFF bays



External Storage Options

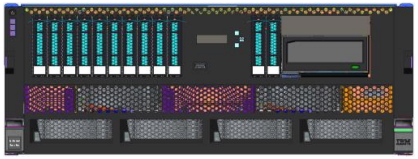
FC	Description
ESLL	19” Disk Expansion Drawer 12 LFF Gen2-Carrier Bays (Slider12)
ESLS	19” Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (Slider24)
5887	19” Disk Expansion Drawer 24 SFF Gen2-Carrier Bays (EXP24S) Migrate

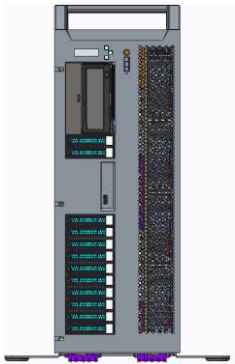
Supported Media Overview

- **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)

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 on the tower model**
- ✓ Supports AIX, IBM i and Linux





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

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)
  - ✓ No IBM i support for the 4-core S922
  - ✓ Maximum of 4 IBM i cores per partition
- ✓ L922 supports Linux only (First GA is PowerVM only, future support for bare metal and KVM)

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)	Not Supported

- ✓ 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

** P10 group limits IBM i partitions to a max of 4 cores per partition
No IBM i support for the 4 core processor option

Scale Out Portfolio Transition

S812

S812
1 socket, 2U
1 - 4 cores, up to 128GB

S822

S822
1 or 2 socket, 2U
4 - 20 cores, up to 1 TB

S814

S814
1 socket, 4U
4 - 8 cores, up to 1 TB

S824

S824
2 socket, 4U
6 - 24 cores, up to 2 TB

S922

S922
1 or 2 socket, 2U
4 - 20 cores, up to 4 TB

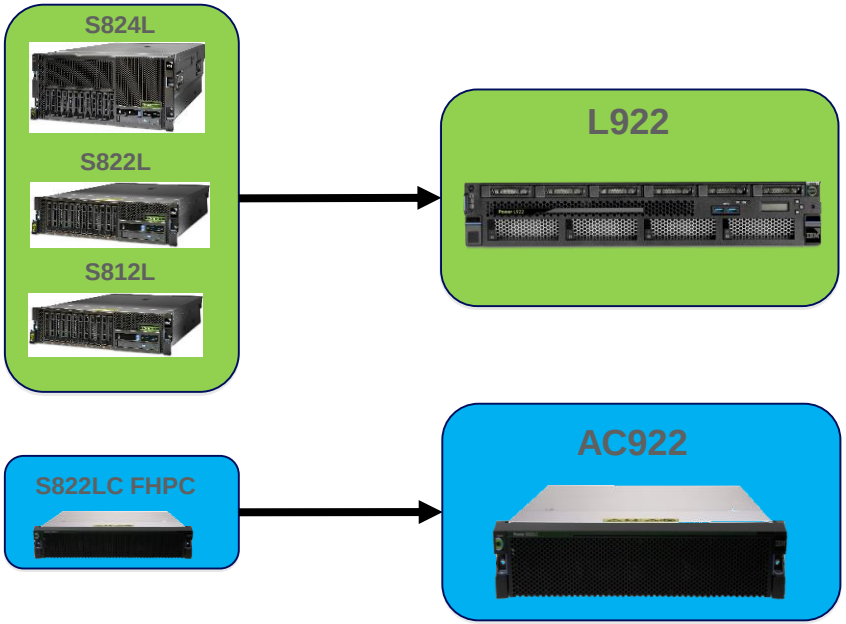
S914

S914
1 socket, 4U
4 - 8 cores, up to 1 TB

S924

S924
2 socket, 4U
8 - 24 cores, up to 4 TB

Linux Portfolio Transition



- Highest performance CPU server in the Linux portfolio
- Highest RAS server in the Linux market
- Industry leading utilization in with PowerVM

- Industry leading platform for acceleration
- Incorporates 2nd generation NVLink between CPU-GPU
- Up to 6 total Volta GPUs
- Primary workloads include AI, HPC

Comparison

	POWER9	POWER8
Form Factor	2U / 4U	2U / 4U
	Rack & Tower	Rack & Tower
CPU	2U - 190W / 225W 4U - 225W / 300W	2U - 190W / 225W 4U – 225W / 260W
	12 cores (SMT8) or 24 cores (SMT4)	12 cores (SMT8)
	74 GB/s - Fabric BW	38.4 GB/s - Fabric BW
Memory	4TB	2TB
	170 GB/s socket	192 GB/s socket
	IS RDIMMs	CDIMMs
I/O	PCIe – GEN3/4 80 GB/s peak BW	PCIe GEN3 (48 lanes) 48GB/s peak BW
	Max total 26 PCIe Slots (Server + Drawers)	Max total 31 PCIe Slots (Server + Drawers)
	4 CAPI Slots (one x8 and 3 x16)	4 CAPI Slots (x16)
	2U – 8 SFF Bays 4U – 12 / 18 SFF Bays	2U – 12 / 8 SFF Bays 4U – 12 / 18 SFF Bays
	4 internal NVMe M.2 boot devices	Not available
	6Gb SAS	6Gb SAS
RAS	2U – Single & Dual RAID Write Cache 4U – Dual Raid Write Cache	2U - Dual RAID Write Cache 4U - Dual RAID Write Cache

POWER9 I/O Items
Adapters and more

Note: there are two phases GA1 and GA2

Additional New storage and networking I/O on Power 9 Scale out systems

2 New PCIe3 Network Adapters:

2-Port 10Gb NIC & RoCE SR/Cu Adapter

2-Port 25/10Gb NIC & RoCE SR/Cu Adapter

- Both adapters use Mellanox ConnectX-4 Lx Network controller
- Both adapters support NIC SR-IOV
- Additionally NIC SR-IOV support is extended to existing PCIe3 2-port 100GB NIC & RoCE QSFP28 adapter (feature codes #EC3M & #EC3L)

2 New PCIe3 Fibre Channel Adapters:

16Gb 4-port Fibre Channel Adapter

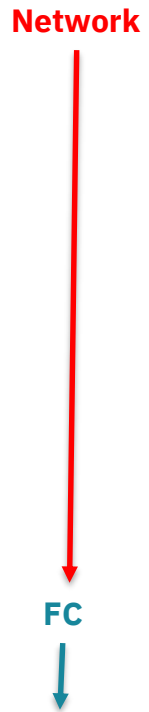
32Gb 2-port Fibre Channel Adapter

- Both adapters use Broadcom (Emulex) Fibre Channel controller

Scale-out GA1 supported I/O items 1-25

S922/S924

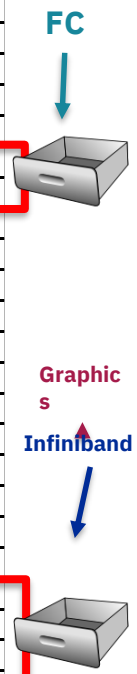
No.	Type	Description	CodeName	FC
1	ROCE	2-Port 10Gb NIC&ROCE SR/Cu PCIe 3.0 Adapter	Everglades EN LP	EC2R
2	ROCE	2-Port 10Gb NIC&ROCE SR/Cu PCIe 3.0 Adapter	Everglades EN	EC2S
3	ROCE	2-Port 25/10Gb NIC&ROCE SR/Cu PCIe 3.0 Adapter	Everglades EN LP	EC2T
4	ROCE	2-Port 25/10Gb NIC&ROCE SR/Cu PCIe 3.0 Adapter	Everglades EN	EC2U
5	ROCE	PCIe3 100GbE RoCE Dual Port x16 CX4	Glacier Park-EN LP	EC3L
6	ROCE	PCIe3 100GbE RoCE Dual Port x16 CX4	Glacier Park-EN HP	EC3M
7	LAN	PCIe2 LP 4-port 1GbE Adapter	Austin LP	5260
8	LAN	PCIe2 4-port 1GbE Adapter	Austin HP	5899
9	LAN	PCIe2 4-Port (10Gb+1GbE) SR+RJ45 Adapter	Shiner-S HP	EN0S
10	LAN	PCIe2 LP 4-Port (10Gb+1GbE) SR+RJ45 Adapter	Shiner-S LP	EN0T
11	LAN	PCIe2 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter	Shiner-S Twinax HP	EN0U
12	LAN	PCIe2 LP 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter	Shiner-S Twinax LP	EN0V
13	LAN	PCIe2 2-port 10/1GbE BaseT RJ45 Adapter	Shiner-T HP	EN0W
14	LAN	PCIe2 LP 2-port 10/1GbE BaseT RJ45 Adapter	Shiner-T LP	EN0X
15	LAN	PCIe G3 x8 4x10 4-Port Ethernet SR Optical HP	Slate SR HP	EN15
16	CNA	PCIe2 4-port (10Gb FCoE & 1GbE) SR&RJ45 SR	Houston SR HP	EN0H
17	CNA	PCIe2 LP 4-port (10Gb FCoE & 1GbE) SR&RJ45 SR	Houston SR LP	EN0J
18	CNA	PCIe2 4-port (10Gb FCoE & 1GbE) SFP+Copper&RJ4	Houston Cu HP	EN0K
19	CNA	PCIe2 LP 4-port (10Gb FCoE & 1GbE) SFP+Copper&RJ4	Houston Cu LP	EN0L
20	Stg_ctrl	8Gigabit PCIExpress Dual Port Fibre Channel Adapter	COHO-2port HP	5735
21	Stg_ctrl	PCIe LP 8Gb 2-Port Fibre Channel Adapter	COHO-2port LP	5273
22	Stg_ctrl	PCIe2 16Gb 2-port Fibre Channel Adapter	Bluefin HP	EN0A
23	Stg_ctrl	PCIe2 LP 16Gb 2-port Fibre Channel Adapter	Bluefin LP	EN0B
24	Stg_ctrl	PCIe3 16Gb 4-port Fibre Channel Adapter	Bluefish FH	EN1C
25	Stg_ctrl	PCIe3 16Gb 4-port Fibre Channel Adapter	Bluefish LP	EN1D



S922/S924

Scale-out GA1 supported I/O items 25 - 50

No.	Type	Description	CodeName	FC
26	Stg_ctrl	PCIe3 32Gb 2-port Fibre Channel Adapter	Redfish FH	EN1A
27	Stg_ctrl	PCIe3 32Gb 2-port Fibre Channel Adapter	Redfish LP	EN1B
28	Stg_ctrl	PCIe2 8Gb 4-port Fibre Channel Adapter	Spookfish HP	5729
29	Stg_ctrl	PCIe2 LP 8Gb 4-port Fibre Channel Adapter	Sailfish LP	EN0Y
30	Stg_ctrl	PCIe3 RAID SAS quad-port 6Gb LP Adapter	GTO LP	EJ0M
31	Stg_ctrl	PCIe3 RAID SAS Adapter Quad-port 6Gb	GTO HP	EJ0J
32	Stg_ctrl	PCIe3 LP 4x8 SAS Port Adapter (Tape/DVD)	GTO Media LP	EJ11
33	Stg_ctrl	PCIe3 4x8 SAS Port Adapter (Tape/DVD)	GTO Media HP	EJ10
34	Stg_ctrl	PCIe3 12GB CACHE RAID SAS 4A ADAPTER QUAD PORT 6Gb W/ ADV FEATURES	Z06 HP	EJ14
35	WAN	4 Port Async EIA-232 PCIe Adapter	BELL HP	5785
36	WAN	PCIe 1-port Bisync Adapter	QUARTZ Bisync	EN13
37	Graphics	PCIe LP POWER GXT145 Graphics Accelerator	Cortina LP	5269
38	Graphics	PCIe LP POWER GXT145 Graphics Accelerator	Cortina HP	5748
39	IB	1-PORT EDR 100Gb IB CONNECTX-5 GEN4 PCIe x16 CAPI CAPABLE LP ADAPTER	LASSEN IB LP	EC62
40	IB	1-PORT EDR 100Gb IB CONNECTX-5 GEN4 PCIe x16 CAPI CAPABLE LP ADAPTER	LASSEN IB HP	EC63
41	IB	2-PORT EDR 100Gb IB CONNECTX-5 GEN4 PCIe x16 CAPI CAPABLE LP ADAPTER	LASSEN IB LP	EC64
42	IB	2-PORT EDR 100Gb IB CONNECTX-5 GEN4 PCIe x16 CAPI CAPABLE LP ADAPTER	LASSEN IB HP	EC65
43	Encryption	PCIe3 Crpto Coprocessor BSC-Gen3 4767	Sentry BSC	EJ33
44	Bus Expansion	Bearpaw to attach MEX	Bearpaw LP	EJ05 EJ07
45	Bus Expansion	BearMountain to attach MEX	BearMountain HP	
46	Drawer	EXP24S SFF Gen2-bay Drawer (19" SAS 6Gbs 24 GEN2-SE DISK BAYS)	HomeRun	5887
47	Drawer	PCIe Gen3 I/O Expansion Drawer (19" PCIe G3 4U I/O Expansion Drawer)	MEX Drawer	EMX0
48	Drawer	PCIe3 6-Slot Fanout Module for PCIe3 Expansion Drawer (Fan Out Module (max	MEX (Fan Out)	EMXF
49	Drawer	EXP12SX SAS Storage Enclosure	SLIDER12	ESLL
50	Drawer	EXP24SX SAS Storage Enclosure	SLIDER24	ESLS



Remote I/O drawer Features

Scale-out GA2 supported I/O items 1 - 15 **S922/S924**

No.	Type	Description	Code Name	FC
1	ROCE	PCIe3 LP 2-port 10GbE NIC&RoCE SR Adapter	Baby Blue Tip w/Optics LP	EC2M
2	ROCE	PCIe3 2-port 10GbE NIC&RoCE SR Adapter	Baby Blue Tip w/Optics HP	EC2N
3	ROCE	PCIe3 LP 2-port 10GbE NIC&RoCE SFP+ Copper Adapter	Baby Blue Tip LP	EC37
4	ROCE	PCIe3 2-port 10GbE NIC&RoCE SFP+ Copper Adapter	Baby Blue Tip HP	EC38
5	ROCE	PCIe3 LP 2-Port 40GbE NIC RoCE QSFP+ Adapter	Travis-3EN LP	EC3A
6	ROCE	PCIe3 2-Port 40GbE NIC RoCE QSFP+ Adapter	Travis-3EN HP	EC3B
7	LAN	PCIe G3 x8 4x10 4-Port Ethernet SFP+ HP	Slate HP	EN17
8	LAN	PCIe LP 2-Port 1GbE SX Adapter	ELP PASO-E-FSX LP	5274
9	LAN	2-Port Gigabit Ethernet-SX PCI Express Adapter	ELP PASO-E-FSX HP	5768
10	CNA	PCIe2 4-port (10Gb FCoE & 1GbE) LR&RJ45 Adapter	Houston LR HP	EN0M
11	CNA	PCIe2 LP 4-port (10Gb FCoE & 1GbE) LR&RJ45 Adapter	Houston LR LP	EN0N
12	Stg_ctrl	PCIe2 8Gb 4-port Fibre Channel Adapter	Sailfish HP	EN12
13	Stg_ctrl	PCIe2 8Gb 2-port Fibre Channel Adapter	HalfSail FH	EN0G
14	Stg_ctrl	PCIe2 8Gb 2-port Fibre Channel Adapter	HalfSail LP	EN0F
15	Stg_ctrl	PCIe3 12GB Cache RAID SAS Adapter Quad-port 6Gb	ZR1 HPE (dual only)	EJ0L

Scale-out GA2 supported I/O items 15 - 30

No.	Type	Description	Code Name	FC
16	Stg_ctrl	PCI-E 8x SAS Storage Controller - Low Profile Capable Tape/DVD	Cadet - HP/ Tape & DVD only	EJ1P
17	Stg_ctrl	PCI-E 8x SAS Storage Controller - Low Profile Capable Tape/DVD	Cadet - LP/ Tape & DVD only	EJ1N
18	Stg_ctrl + SSD	NON-VOLATILE MEMORY PCIe 3x8 1.6TB SSD LOW PROFILE CAPABLE NVMe ADAPTER	Bolt	EC5A
19	Stg_ctrl + SSD	NON-VOLATILE MEMORY PCIe 3x8 3.2TB SSD LOW PROFILE CAPABLE NVMe ADAPTER	Bolt	EC5C
20	Stg_ctrl + SSD	NON-VOLATILE MEMORY PCIe 3x8 6.4TB SSD LOW PROFILE CAPABLE NVMe ADAPTER	Bolt	EC5E
21	WAN	PCIe LP 4-Port Async EIA-232 Adapter	BELL - LP	5277
22	WAN	PCIe 2-Line WAN w/Modem	QUARTZ	2893
23	Graphics	PCIe2 LP 3D Graphics Adapter x1	Edwards - LP	EC41
24	Graphics	PCIe2 3D Graphics Adapter x1	Edwards - HP	EC42
25	Graphics	PCIe3 LP 3D Graphics Adapter x16	Edwards 2 - LP	EC51
26	IB	2-port 100Gb EDR IB Adapter x16	Glacier Park PCIe - LP	EC3E
27	IB	1-port 100Gb EDR IB Adapter x16	Glacier Park PCIe - LP	EC3T
28	USB	PCIe2 4-Port USB 3.0 Adapter	LILAC - HP	EC46
29	USB	PCIe2 LP 4-Port USB 3.0 Adapter	LILAC - LP	EC45
30	Encryption	PCIe Crypto Coprocessor No BSC 4765-001	Y4-CRYPTO	EJ28

POWER9 Operating Systems

Compatible Mode Architecture

P7 MODE	P8 MODE	P9 BASE MODE	P9 MODE
4-Thread SMT	8-Thread SMT	8-Thread SMT, fused core optimization	8-Thread SMT, fused core optimization
VSX (Vector Scalar Extension)	VSX2, In-Core Encryption Acceleration	VSX3, In-Core Encryption Acceleration, string, video encode, quad floating point	VSX3, In-Core Encryption Acceleration, string, video encode, quad floating point
64-core / 256-thread Scaling 256-core / 1024-thread Scaling	192-core / 768-thread Scaling	192-core / 1536-thread Scaling Atomic Memory Operations	192-core / 1536-thread Scaling Atomic Memory Operations
P7+ : AME compression acceleration and Encryption acceleration	AME compression acceleration and Encryption acceleration	AME compression acceleration and Encryption acceleration	AME compression acceleration and Encryption acceleration, **direct user-mode Gzip acceleration**
MMU Support	Software Effective to Virtual address translation	Hardware Effective to Virtual address translation (in memory segment tables)	Hardware Effective to Virtual address translation (in memory segment tables)
Hypervisor Interrupt Virtualization	Hypervisor Interrupt Virtualization	Hypervisor Interrupt Virtualization	**External** Interrupt Virtualization **Engine (OS/Hypervisor bypass)**

IBM Operating System Plans for POWER9

Power Systems	redhat 7.4	ubuntu Supported by Canonical 16.04.4	SUSE 12SP3	AIX 5.3	AIX 6.1	AIX 7.1	AIX 7.2	IBM i 7.1	IBM i 7.2	IBM i 7.3
POWER9	✓	✓	✓		✓	✓	✓		✓	✓
POWER8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Linux on Power Systems

Linux is designed to function in multiple modes
Depending on the Power System, supported modes can be:

- **Bare-metal** (non-virtualized)
- **KVM** hosting and KVM guests
- **PowerVM** LPARs and VIOS

S922/S924 systems are all **PowerVM only**
S922/S924 systems **will not support** bare-metal or KVM
Different from POWER8

L922 PowerVM only (for now)

Linux support at GA

As usual: all latest updates are mandatory for support

Supported / should work:

Ubuntu 16.04.03 P8compat mode
Ubuntu 16.04.04 P8compat mode available ~mid-Feb 2018
Ubuntu 16.04.xx always be P8compat mode only
→Actually has POWER9 kernel features but NOT tested or supported

SLES 11 SP4 BE P8compat mode only
SLES 12 SP3 LE Limited basic POWER9 mode
→Boots to POWER9, sets the mode & allows P9 instructions in apps

RHEL 7.4 BE for P8 NOT supported on POWER9 at all
RHEL 7.4 LE for P8 P8compat mode only

CentOS 7.4 LE for P8 should work P8compat mode only
– but is not tested or supported by IBM

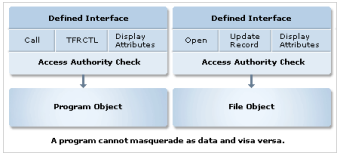
March 2018 Updates for IBM i

IBM i Architecture

DB2 for i & Single Level Store

Automate & optimize storage management

Object Based Architecture

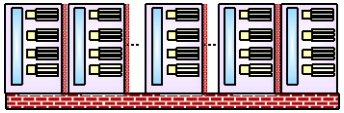


Enables integrity, security, virus-resistance

Integration

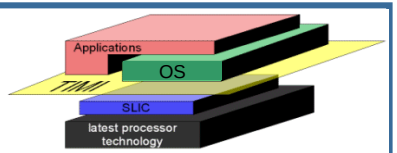
Integrates business components, e.g. DB2 database

Virtualized Work Management



Provides built-in application virtualization

Technology Independent Machine Interface



Ensures application compatibility across multiple technology generations

Operating system and middleware components are designed, developed, built, tested, delivered and supported as one

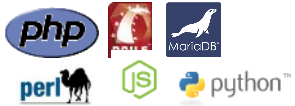
IBM i Strategic Directions

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

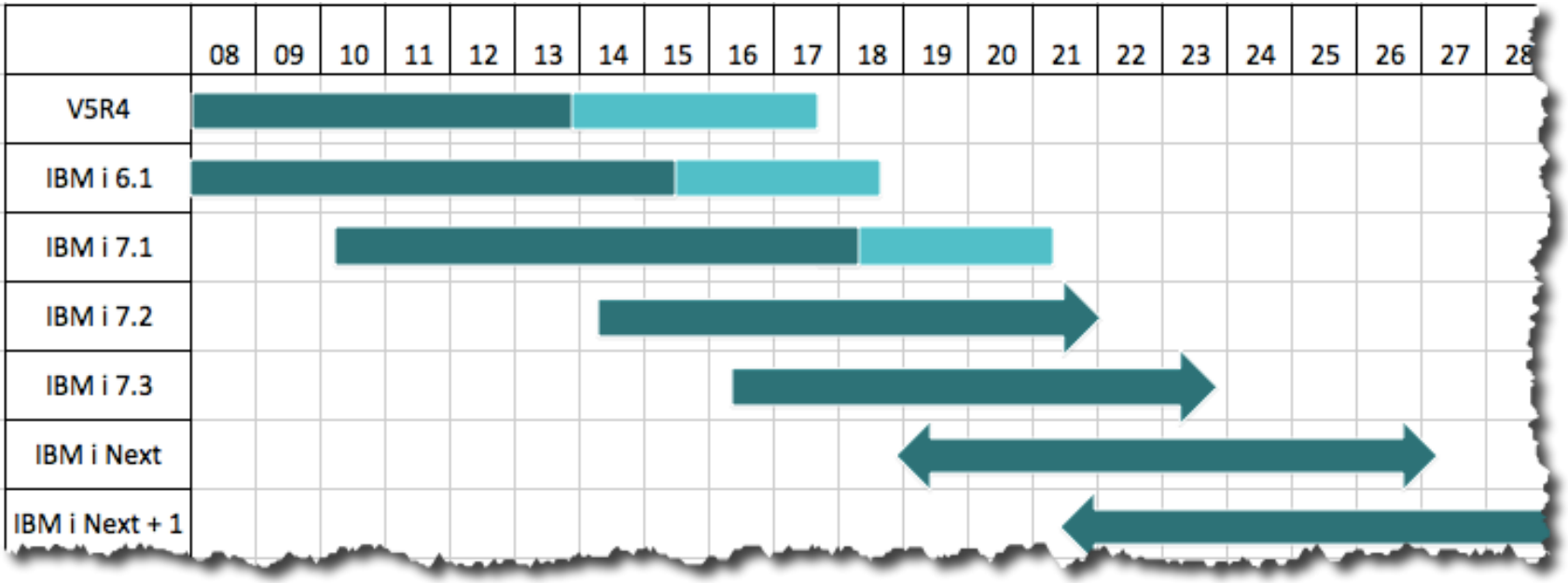
- Grow IBM i solutions options including open source languages and applications
- Extend IBM i solutions portfolio with Linux and AIX application choices



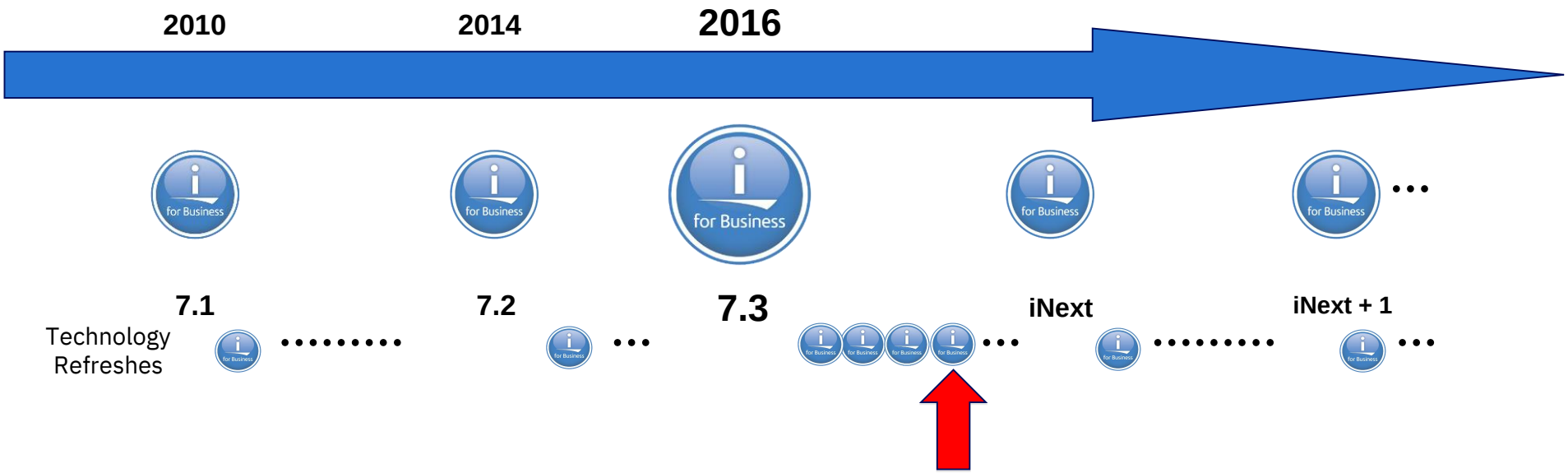
The *Integrated* Promise of IBM i

- 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 Support Roadmap



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.

S922/S924

Systems	IBM i 7.2	IBM i 7.3
POWER9 S914, S922 (VIOS only), S924 (TBC H922, H924)	✓	✓
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+ & POWER6 520, 550, 560, JS23/43 & 570, 595, JS12/22	✓ No IOP or HSL	

For S922/S914/S924

IBM i 7.3 TR4 + Technology Refreshes

IBM i 7.2 TR8 + Technology Refreshes

No NVMe support
Max of 4 cores on IBM i on the S922
No IBM i support for 4-core S922

IBM i D-mode IPL Simplification for POWER9

Install IPLs & Disaster Recovery

When not using HMC, DVD is no longer required to IPL to DST and continue with another device

Instead, load source uses integrated USB adapter in the POWER9 system unit

- Use any USB IPL hardware type (e.g., DVD, RDX, USB Flash drive) for entire install operation
- For genesis install from IBM distribution (ESS):
  - Use .IMG images for RDX & USB Flash drive
  - Use .UDF images for DVD drive (external USB)

IBM i 7.3 TR4 Highlights

Support for Power9 Scale-out Servers

- Support for native and VIOS configurations for new IBM S914 and IBM S924 servers with Power9 technology
- Support for native and VIOS configurations for the new IBM H924 server with Power9 technology
- Support for VIOS configurations for the new IBM S922 server with Power9 technology
- Support for VIOS configurations for the new IBM H922 server with Power9 technology

Install options expanded

- Extensions to the new installation process for LIC using USB 3.0

Expanding the Secure-ability of IBM i

- IBM i Integrated Web Services adds advanced features to help administrators and programmers leverage APIs in a more secure environment

Increasing Productivity of Developers and Administrators

- CL commands can be stored in the IFS with full edit and compile capability
- New RPG IV Operation (DATA-INTO) allow PGMRs to parse structured data from most formats into RPQ variable
- IBM i Access Client Solutions continues to be enhanced to meet the needs of the user community.

IBM Software currency

- IBM Notes/Domino 9.1 feature pack 10 (including IBM Traveler) with Security enhancements for IBM i

Additional Hardware Enhancments

- PowerVM 2.2.6
- HMC Virtual Appliance Version 9
- PCIe3 2-port 25/10 GbE IOA f/c EC2T/EC2U – native dedicated, native SRIOV and VIOS (7.2 TR8 VIO only)
- PCIe3 2-port 10 GbE IOA f/c EC2R/EC2S – native dedicated, native SRIOV and VIOS (7.2 TR8 VIO only)
- PCIe3 2-port 100 GbE IOA f/c EC3M/EC3L – adds native dedicated and native SRIOV support
- PCIe3 32GB 2-port Fiber Channel Adapter f/c EN1A/EN1B
- PCIe3 16GB 4-port Fiber Channel Adapter f/c EN1C/EN1D

Functional Enhancments

- Unmap function for Flash System Configurations

  Helps manage disk utilization and may help performance for both disk initialization and run time

Application Development

Rational Development Studio for i

- RPG ILE enhanced to support parsing of multiple states types like JSON with the new DATA INTO function

IBM i Integrated Web Services Server

- Usage of Authenticated User Profile across the connection
- Web Services re-deploy

IBM i Integrated Web Services Client

- Access SOAP faults from RPG stub PGMs

Compile CL from IFS source

Arcad Converter for i – 5733-ACL

Arcad Observer for i – 5733-AO1

Systems Management

IBM i Access Client Solutions – becoming tool of choice for admin, PGMRs and DB engineers

- **IFS tools enhanced** – view and permissions
- **Printer output** – Users can select to be prompted for download
- **Database tools Updated**
  - Journal objects – support for properties and changing receivers action
  - Visual Explain – new legend included to better understand what is viewed
  - Run SQL Scripts – Insert from examples updated to include new services

BRMS – cloud remote system restore

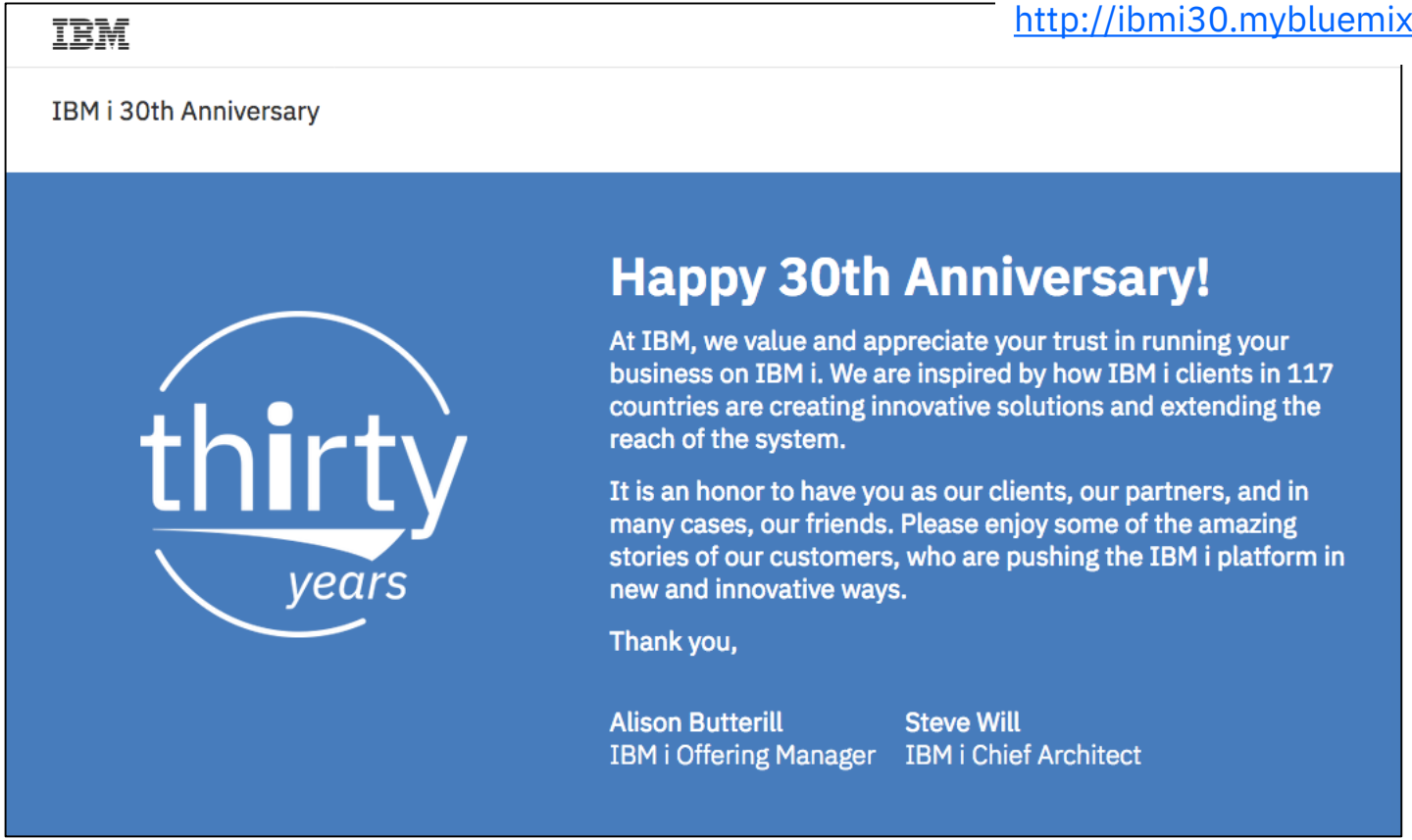
For More Information:

Some Links You Need	Twitter	#Hashtags
IBM i Home Page: www.ibm.com/systems/i IBM Systems Magazine IBM i Edition: http://ibmsystemsmag.com/ibmi/ Support Life Cycle: https://www-01.ibm.com/software/support/ibmi/lifecycle/ License Topics: https://www-01.ibm.com/support/docview.wss?uid=nas8N1022087 IBM i Technology Updates Wiki https://www.ibm.com/developerworks/community/wikis/home?lang=en_us#!/wiki/IBM%20i%20Technology%20Updates	 @IBMSystems @COMMONug @IBMChampions @IBMSystemsISVs @IBMiMag @ITJungleNews @SAPonIBMi @SiDforIBMi	#PowerSystems #IBMi #IBMAIX #POWER8 #POWER9 #LinuxonPower #OpenPOWER #HANAonPower #ITinfrastructure #OpenSource #HybridCloud #BigData

IBM i Thirtieth Anniversary - #IBMi30

IBM i 30th WebSite

http://ibmi30.mybluemix.net/



Thank You

Hardware Management Console

HMC Requirements

HMC code level V9R1.910

CR7	7042-CR7
CR8	7042-CR8
CR9	7042-CR9
CR1	7063-CR1

No longer sold

HMC Hardware update Q3 2017

POWER8 HW Appliance – like the Intel HMC HW Appliance

- But 6 POWER8 CPU cores, 32 GB RAM & two disks
- POWER8 faster than Intel + SMT=8 for massive concurrency
- Model: POWER8 7063-CR1 [Older Intel: 7042-CR9]

POWER8 virtual HMC – like the Intel vHMC

- Runs in a PowerVM LPAR on a POWER8 server
- Obviously, you can't manage the server its actually running on!
- Note: not KVM, XEN, Vmware as these are Intel only
- Use a vHMC to test new HMC versions on temporary basis
- **Bottom line: minimum of one/two real physical HMCs is still normal**

HMC Software Releases

HMC 860 "old"
Runs on
- Intel

Manages
- POWER6
- POWER7
- POWER8

Classic GUI &
- Enhanced+ GUI

Support till Q4 2018

HMC 870 Q4 2017
Runs on
- Intel
- POWER8

Manages
- POWER6
- POWER7
- POWER8

Enhanced+ GUI Only
Support at least 2019
Some "missing" features
- get added here like System Plans

CLI no change

HMC 9xx – Q1 2018
Runs on
- Intel
- POWER8

Manages
- \- ← gone
- POWER7
- POWER8
- POWER9 ← new

Enhanced+ GUI Only
Supported for years

Buying POWER9?
A good time to move up to a POWER8 HMC

= Most current releases

POWER9 Miscellaneous

PowerVM offer

- Migrate from previous IBM Power Systems servers with Live Partition Mobility capabilities.
- Every new Power S922/S924 server can be ordered with a temporary (60 day) IBM PowerVM license for your old server to support a seamless move to IBM POWER9 servers.
- Feature Code ELPM (one for each legacy server)
- POWER7 & POWER8 only

New 19” Rack 7965-S42

GA 4Q17

POWER8 & POWER9

	S42	T42	94Y
42U	Yes	Yes	Yes
600mm Wide (datacenter floor tile)	Yes	No	Yes
Ship Loaded from Factory	Yes	Yes	No
Flat surface for mounting H2O Manifolds and Strip PDUs	Yes	No	Yes
1200mm Depth (rack w/ covers)	1070+130cvrs	1016+cvrs	1040 + cvrs
Rear door heat exchanger	Yes	Yes	Yes
# Vertical, 1U Pockets	4	4	6
Height Reduction – fit standard doorways	Yes	Yes	No
Back cable depth (mm)	280	246	261
Earthquake certified	Yes – 45lbs / EIA	Yes – 35 lbs/ EIA	No

Power Supplies

Concurrent maintenance & redundant power

Rating

- 1400 W 200- 240 VAC → POWER8 was 900W
- S924 redundancy 2+2 → if cabled correctly
- S914 redundancy 1+1
- S922 redundancy 1+1
- S914 Tower 2+2 [900W 100-127 VAC or 200-240VAC]

Energy Efficiency

- 80+ Platinum Power Supply Compliant
- EPA Energy Star Compliant
- Built-in Advanced Thermal & Power Management

Video Links

AIX / Power Systems Virtual User Group
POWER9 Jeffrey Stuecheli – Power Hardware Architect 90 minutes
http://public.dhe.ibm.com/systems/power/community/aix/Central-VUG-Replays/2017-01-26_IBM_POWER9.wmv

POWER9 Servers: What to expect by Nigel Griffiths 2 minutes
https://www.youtube.com/watch?v=UI0A2ge_TeU

Bill Starke: IBM POWER Ecosystem and POWER9 Strategic Outlook
https://www.youtube.com/watch?v=Pu05iF_-mzo

Wikipedia on POWER9
https://en.wikipedia.org/wiki/POWER9