

# Power Systems : Scale Right your Infrastructure

common  
Romandie

**Alain Cyr**

*Global Power Systems Competitive Sales*

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 @trollnyrd



POWER9

 OpenPOWER™

# Cloud has reset IT expectations

Self-service user experience, from anywhere

Pay as you go for what you use

Rapid access to resources – compute, storage, GPUs, network bandwidth

Deploy and scale apps rapidly – on demand

Simplified management and operations

Continuous software, infrastructure innovation

**Cloud as a capability and not a place**



**81%** of organizations have embraced a multicloud strategy and are using multiple public, private and hybrid clouds

[Source: Rightscale 2018 State of the Cloud Report](#)

**71%** of organizations already use services from three or more clouds in enterprise solutions

[Source: Rightscale 2018 State of the Cloud Report](#)

# IBM Power Systems Virtual Server on IBM Cloud

## Offering Highlights

### Offering Summary:

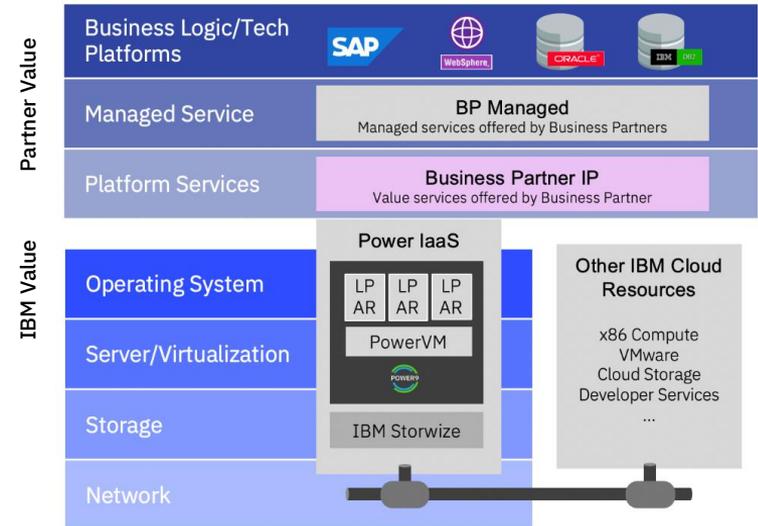
- AIX and IBM i Virtual Servers available on-demand, priced monthly
- Flexible sizing with sliding scale configuration for number of cores, type of cores (dedicated / shared), memory, storage, etc.
- Purchase through the IBM Marketplace, API enabled for programmatic fulfillment of established contracts
- Systems exist in IBM Cloud colocation site; DirectLink services available for integration with on-prem and other IBM cloud resources

### Best fit for:

- Clients looking for hybrid cloud flexibility for Power hardware
- Clients looking to lower costs and continue to leverage existing skills
- Clients wanting to off-load some OS and infrastructure management
- VARs, ISVs and MSPs looking to resell, hosting or managed services

### Typical Use Cases:

- Dev/Test environment
  - Temporary compute for cyclical spikes in demand
- Move business critical apps to the cloud for hybrid cloud flexibility
  - HA/DR on cloud as alternative to second datacenter
- Backup to the cloud for archive of less frequently accessed data
  - Host AIX and IBM i apps as a Service (ISVs, VARs, MSPs)



*Multi-tenant, self managed, Power compute as-a-service  
in IBM Cloud with consumption-based OPEX pricing*

Introducing IBM Power Systems for Google Cloud (Cloud Next '19)

[https://www.youtube.com/watch?v=\\_0ml4AwewXo](https://www.youtube.com/watch?v=_0ml4AwewXo)

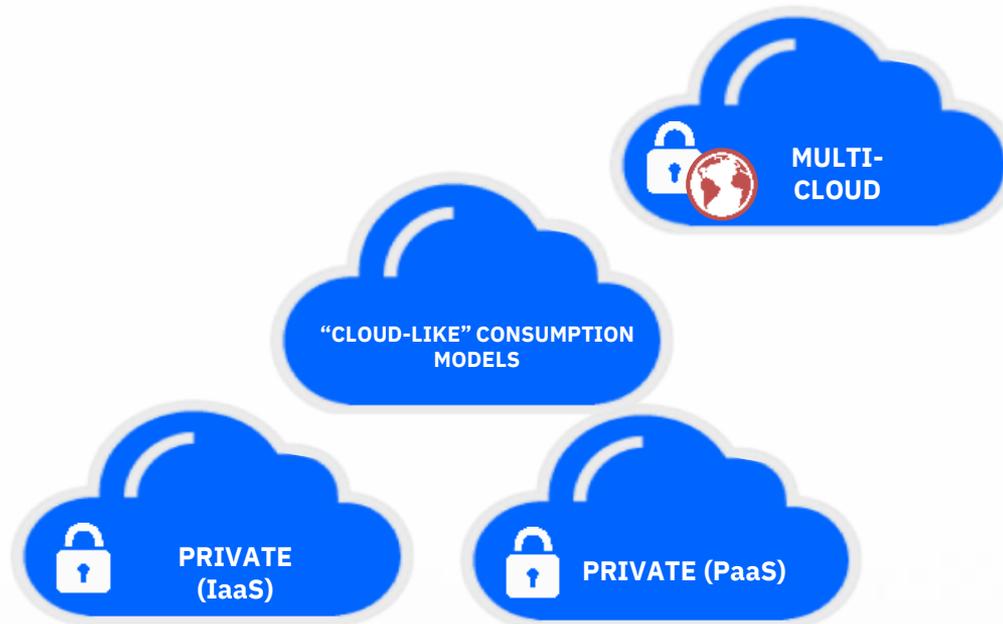


# HYB221: Introducing IBM Power Systems for Google Cloud

Carl Burnett, Distinguished Engineer  
Andy Waddell, Technical Program Manager  
Kyle Johnson, Senior Engineer, IBM

Google Cloud





# IT teams worldwide are exploring where their Power solutions fit in today's Multicloud world



...IBM provides **flexible ready-for-the-enterprise cloud solutions** to realize your organization's goals

# Industry leaders trust Power Systems



10 / 10

Top Banking  
Companies<sup>1</sup>



8 / 10

Top Healthcare  
Companies<sup>1</sup>



9 / 10

Top Insurance  
Companies<sup>1</sup>



8 / 10

Top  
Retailers<sup>1</sup>

# POWER9 starts with technology,



Transistor Count (in billions)



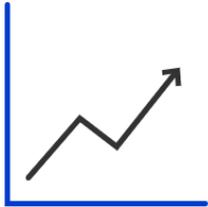
## Fuel your business with POWER9 technology

Business is faster, with **more data** to manage, **more complexity**, instant delivery, improved availability

IT transformation and new solutions require a proven and **innovative infrastructure**

### POWER9 is not only a processor

POWER Systems family is a built-in and innovative new server design, continuously improving to meet your business challenges



#### Industry-leading value and performance

gain up to 2x better price-performance than x86 options



#### No. 1 in reliability by ITIC

Power Systems deliver the most reliable infrastructure to meet customer demands



#### Enterprise cloud-ready

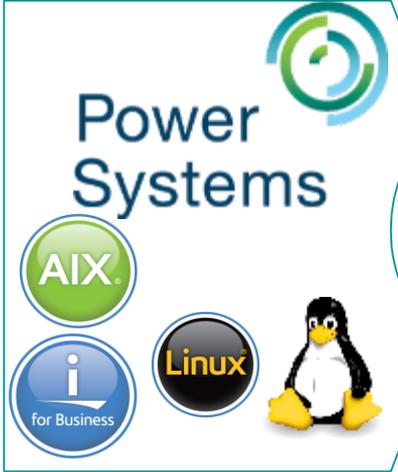
easily integrate into private or hybrid cloud strategy to handle flexible consumption models and changing customer needs.

# Power Opens to all Ecosystems for Innovation



IBM Power Systems

Industry



PowerAI Enterprise  
PowerAI Vision

Mission critical needs

Open Source Agility for new workloads and additional solutions

POWER9 Processor with CAPI Technology

# IBM Power8/9 Systems Family

PowerVM  
PowerHA  
PowerVC  
PowerSC  
PowerVP



OpenPOWER



# POWER9 Systems Portfolio



POWER9 solutions are built to crush today's most advanced data applications – from mission critical applications to the next generation of AI workloads.

Mission Critical Workloads

Big Data Workloads

Enterprise AI Workloads

## Power Enterprise Systems

S922/S914/S924  
H922/H924/L922  
SCALE OUT



Power E950  
MID RANGE



Power E980  
ENTERPRISE



LC921/LC922  
LINUX  
OPTIMIZED



AC922  
HPC & AI



Core Infrastructure

Next Gen AI Workloads

# Power Systems Software Highlights

## PowerVM

Every POWER9 based server workload is virtualized, mobile and fully cloud-enabled with PowerVM

Live migration from POWER7, POWER8 to POWER9 based systems with Live Partition Mobility

Mobile workloads are compressed and encrypted for improved security and acceleration

## PowerVC

Export / Import capability to share images across data centers /clouds

Integration with Spectrum Scale to support SAN-less Clouds

OpenPower Support: Seamlessly manage AIX, IBM i and cloud native appl. with a single pane of glass

Support for IBM Cloud Private

## PowerSC

Simplify Management of Security & Compliance across AIX and LoP

Improved real-time Malware detection

Enhanced compliance automation with support for GDPR

Scalability enhancements incl. REST APIs

Improved Audit support (end-to-end) incl. a new interactive time-line

## PowerSC MFA

Enhanced support covering AIX, Linux on Power, and the HMC

Additional factors in addition to RSA SecurID and certificate based smart cards were added - such as TOTP on your phone, Yubikey, Radius protocol, and more

## PowerHA

New Back-up to the Cloud Option

New Metrics that allow to track failover times and calculate recovery time

Automated offline backup (SVC only)

Policy-based incremental and full backups

Support for one-site and multisite deployments

## VMR HA / VMR DR

VMR provides a simplified VM replication and restart solution

Server, VM, and workload-level HA OS agnostic

Co-location and anti-colo policy support

Non-disruptive DR rehearsal

Application monitoring agents for DB2, Oracle, and SAP HANA



# PowerVM: Industrial-strength virtualization

Accelerated secure LPM (unique on E950/E980)

- Exploits on-chip NX encryption/compression
- Protects VM image data in motion

PowerVM enables sharing of:

- POWER processors (Micro-Partitioning™)
- POWER memory (Active Memory Sharing™)
- POWER I/O (Virtual I/O Sharing)

Adjust resources by 1/100<sup>th</sup> of a core

Allocate up to 192 cores to a VM (E980)

# PowerVM

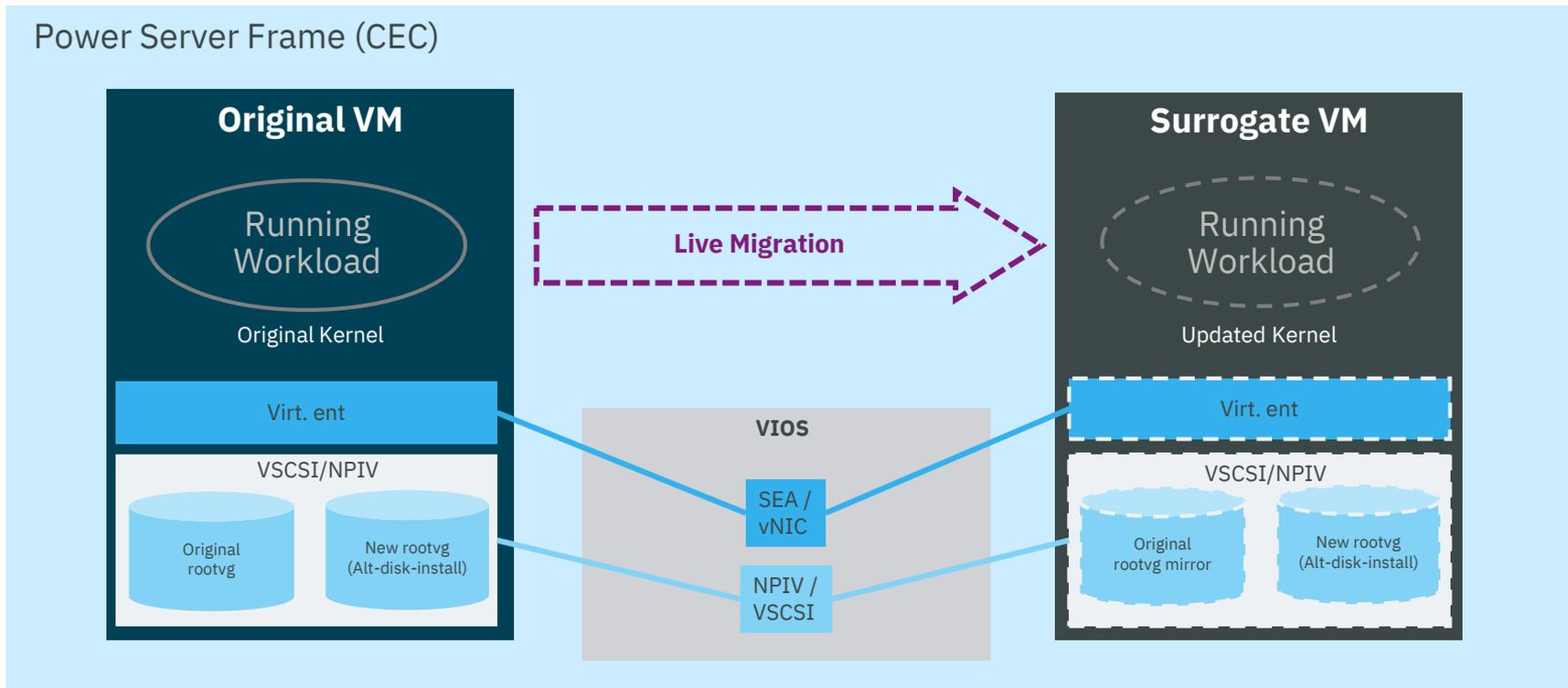
## POWER9 Cloud Benefits

- Faster mobility allows for seamless cloud provisioning and workload optimization
- Mobile workloads encrypted for improved cloud security and compliance

Aix partition 50Gb of memory, no workload running (idle partition)  
Dual VIOS with 4 dedicated processor, 8Gb memory, and 1Gb network

1GB Network	Initial Memory Pass Time	Resume Time	Total Bytes Sent
Existing support	3:48	5 seconds	51 GB
Existing with IPSEC	5:59	8 seconds	51 GB
Compress/Encrypt	15 seconds	0.6 seconds	1 GB

# AIX 7.2 Live Update – Overview



# POWER9 Servers: A Cloud-Everywhere Solution

Optimized for private, public, hybrid and multi-clouds



Built-in **PowerVM**, so every (E950/E980) workload is virtualized with accelerated secure mobility

**Cloud PowerVC Manager** included in orders, for resource optimization and private cloud portal

**Cloud Management Console (CMC)** entitlement for consolidated monitoring over multiple locations

Consistent enterprise-wide multi-cloud management with **VMware vRealize Suite** integration

Create new Power cloud-native solutions with **IBM Cloud Private** suite of DevOps tools and app store

Dynamic resource management across multiple Power cloud servers with **Enterprise Pools**

## Additional POWER9 Cloud benefits

- Simplified transfer of VMs between private and public clouds enables hybrid use cases
- Cloud-ready Power software images facilitate rapid workload provisioning
- Broader availability of term licenses and SaaS pricing for Power software and tools

**PowerVM**



**PowerVC**



# IBM Power Systems Flexible Consumption Offerings

*Capacity on Demand offerings are now simpler and easier to use, purchase, provision and enable in minutes via IBM Entitled Systems Support (ESS)\**

## Capacity Upgrade on Demand

Permanently activate inactive processor cores and memory units by purchasing an activation feature and entering the provided activation code. You can do this without restarting your server or interrupting business.

## Trial Capacity on Demand

Evaluate the use of inactive processor cores, memory or both at no charge using Trial CoD. After you enroll, the trial period is available for 30 power-on days.

## Elastic Capacity on Demand

Activate processor cores or memory units daily for as long as need by using your HMC to enable the resources temporarily. \*

## Utility Capacity on Demand

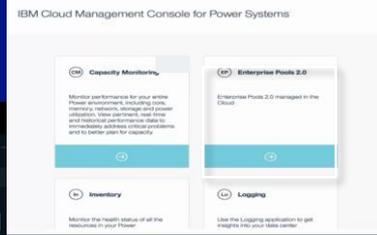
Utility CoD is used when you have unpredictable, short workload spikes. Automatically provide additional processor capacity on a temporary basis within the shared processor pool. Use is measured in processor minute increments and is reported at the Utility CoD website.

## Power Enterprise Pool

A Power Enterprise Pool is a group of Power Enterprise Systems that can share Mobile CoD processor resources and memory resources.

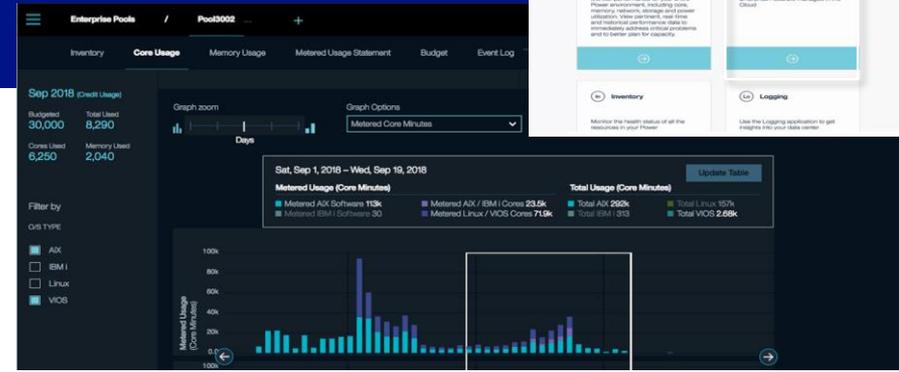
\* ESS not available in all countries/regions

# Power Enterprise Pools 2.0



## Shared Utility Capacity across a pool of Power E980 systems

- Purchase one or more systems with Base Capacity
- Variable demand addressed by purchasing Capacity Credits for Metered Capacity
- Cloud Management Console with HMC automatically tracks resource consumption within a pool and debits any charges for Metered Capacity use against Capacity Credits

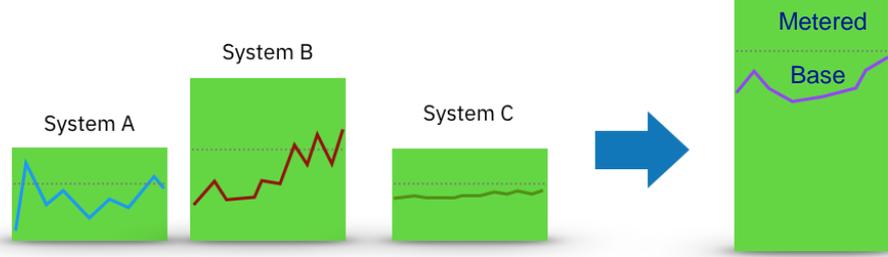


Utility Capacity consists of *Base & Metered* Capacity

- Processor activations
- Memory activations
- AIX and IBM i licenses

Usage of each resource is tracked by the minute via Cloud Management Console (CMC)

*All processor & memory resources are fully activated*



Announced : April 23<sup>rd</sup>  
Initial GA : May 17<sup>th</sup>  
Initial availability : NA, EMEA, AP

# Total Cost of Ownership (TCO) is much more than Total Cost of Acquisition (TCA)!

	Components	Environments					Time
		Prod	Dev	Test	QA	DR	
TCO	Hardware	\$	\$	\$	\$	\$	Planning
	Software	\$	\$	\$	\$	\$	Upgrades
	People	\$	\$	\$	\$	\$	Migration
	Network	\$	\$	\$	\$	\$	Growth
	Storage	\$	\$	\$	\$	\$	Parallel Costs
	Facilities	\$	\$	\$	\$	\$	Net Present Value
	QoS – Availability, Reliability, Security and Scalability						





# We can help estimate the cost savings

Compute Performance Metrics (CPM) from **Precision IT** determines the optimal infrastructure solution for your applications

- **Actionable TCO in Minutes!**
- **Evaluate Application Licensing implications**
  - Across any on-premise, hybrid, or cloud environments
  - Reduces software TCO by 70%
- **Analyze Infrastructure Cost Effectiveness**
  - Provides relative performance values for every x86, IA-64 and RISC processor
- **Minimally Invasive**
  - Does not require collectors or agents to analyze existing infrastructure environment.
- **Comprehensive Compute Relative Performance Metrics**
  - For every compute processor and/or server model enabling you to perform automated consolidation, technology refresh, and capacity planning analytics.



No Charge for IBM sellers. BPs- reach out to your Distributor or SPR.  
 Contact for analysis: [Info@PrecisionIT.com](mailto:Info@PrecisionIT.com)  
 Learn more: <https://ibm.box.com/s/5guser2pdl1rwy0kblmj2q9ehb5ifli>

## Executive Summary

This TCO analysis was performed by analyzing Sample Customer's Weblogic Suite - HPE x86 - HDD Storage infrastructure outlined below:

<u>Existing Infrastructure</u>	vs.	<u>Target Infrastructure(s)</u>
(31) Weblogic Suite - HPE x86 - HDD Storage Servers	vs.	(5) Hyperconverged Servers (31) AWS VMs (31) Azure VMs

It is projected that Sample Customer can reduce its Existing 3-year Weblogic Suite - HPE x86 - HDD Storage TCO up to **\$3,409,580** and reduce its Existing 3-year average operating expense up to **49%** by migrating to a(n) Hyperconverged solution.



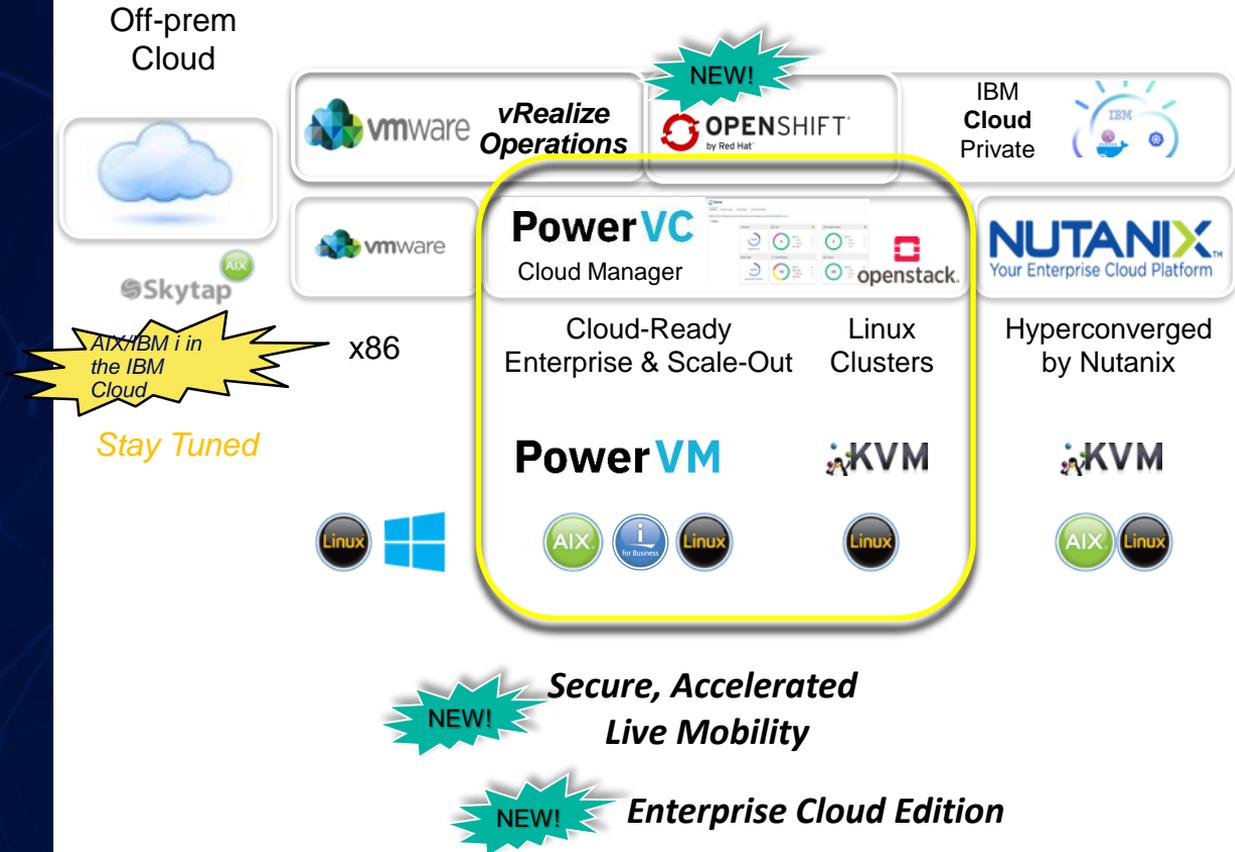
## 3-year TCO Details

	Existing Weblogic Suite - HPE x86 - HDD Storage Environment	Hyperconverged Environment	AWS Environment	Azure Environment
Servers/Nodes/Instances	31	5	31	31
Cores/vCPUs	372	180	248	248
Processors	62	10	N/A	N/A
Compute Performance Metric (CPM) - Existing Env. @ 50% CPU Utilization	50,383	62,165	N/A	N/A
Total Memory (GB)	1,984	5,120	1,891	1,984
CPU Architecture	Various	Xeon Gold 6140	Intel Xeon E5-2686 v4 (Broadwell)	Intel Xeon E5-2673 v4 (Broadwell)

# Power Everywhere Cloud Anywhere

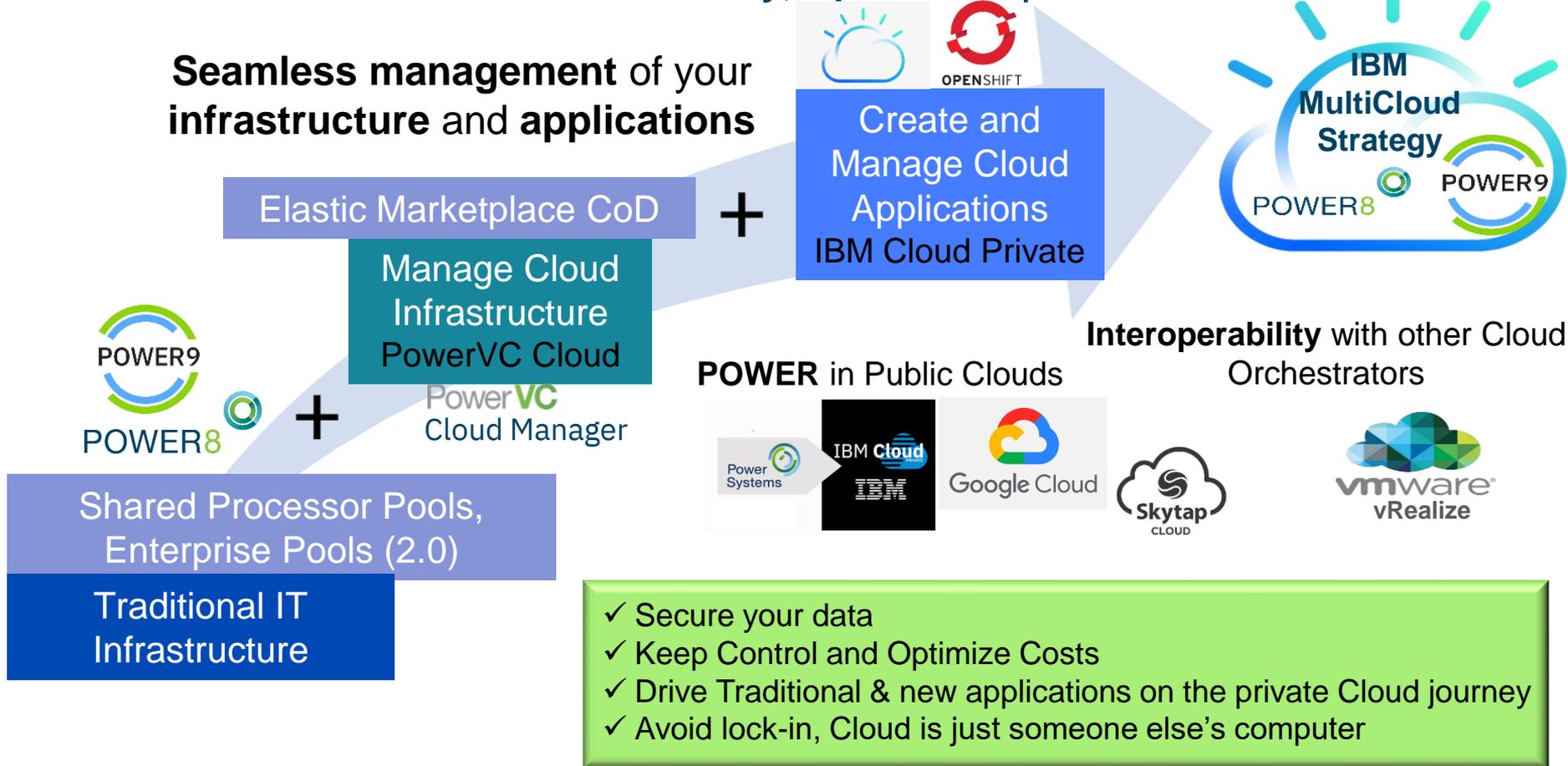
- Transform IT Infrastructure to an on premises private cloud
- Extreme simplicity with IBM / Nutanix HCI
- Heterogeneous cloud management
- IBM Cloud Private
- Off-prem cloud options
- Enabled for Multi-cloud

## On Premises, Hybrid or Multi-Cloud



# Cloud on Power: Modernization Journey, Open and Optimized

**Seamless management of your infrastructure and applications**



Elastic Marketplace CoD

+

Manage Cloud Infrastructure  
PowerVC Cloud

Create and Manage Cloud Applications  
IBM Cloud Private



**Interoperability with other Cloud Orchestrators**

**POWER in Public Clouds**



Shared Processor Pools,  
Enterprise Pools (2.0)

Traditional IT  
Infrastructure

- ✓ Secure your data
- ✓ Keep Control and Optimize Costs
- ✓ Drive Traditional & new applications on the private Cloud journey
- ✓ Avoid lock-in, Cloud is just someone else's computer

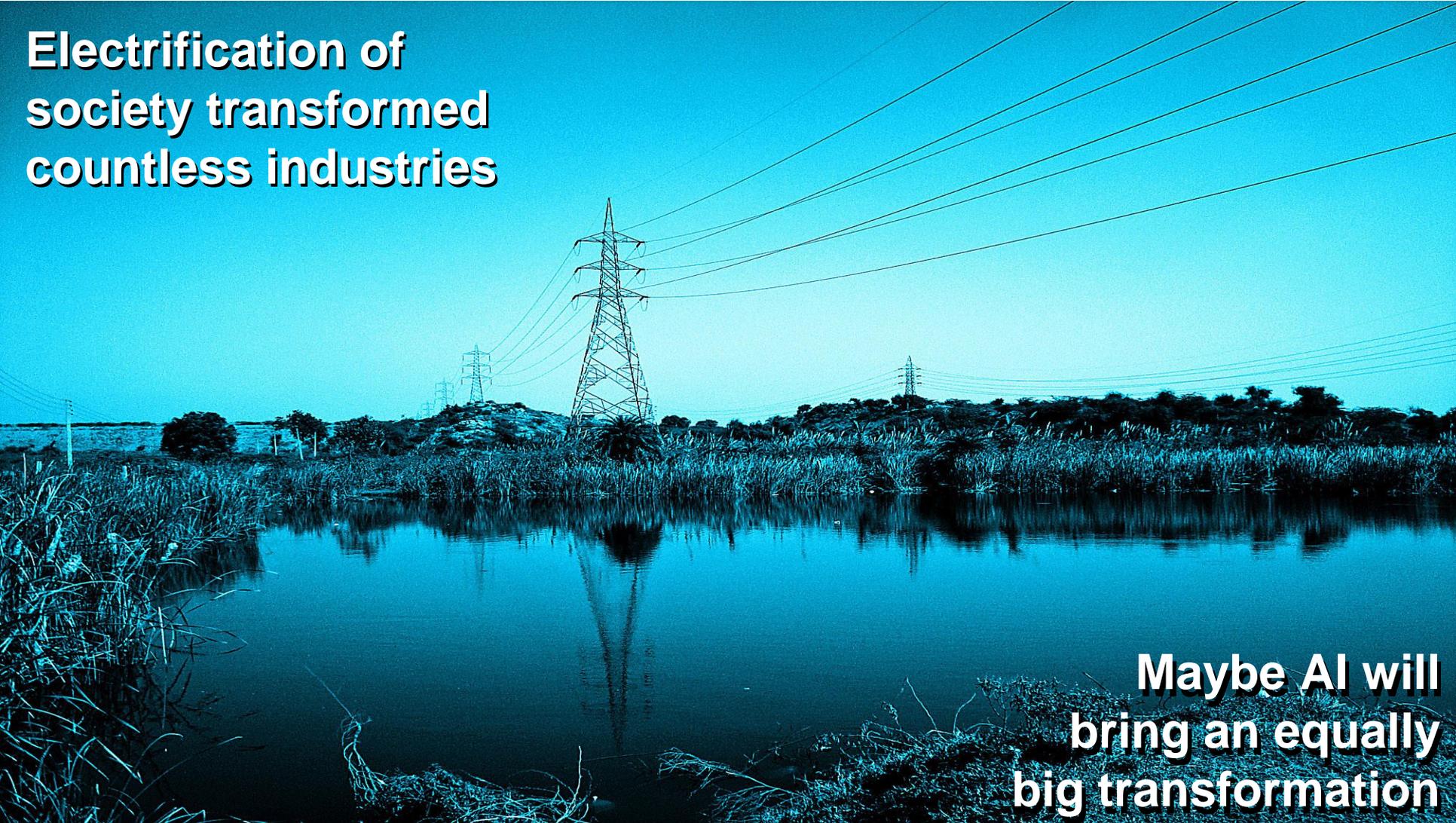
# Introducing AIX Cloud Instances

- **Migrate Unchanged**
  - Migrate AIX and AIX-dependent workloads into the cloud without refactoring
- **Accelerate Application Delivery**
  - Reduce development and test times & eliminate environment contention by providing immediate, self-service access to cloneable, cloud env.
- **Modernize Architecture and Process**
  - Incorporate cloud-native capabilities and implement modern practices like DevOps and agile development

The screenshot shows the Skytap dashboard for an environment named 'Storefront v2.0.2'. The dashboard includes a navigation bar with 'Dashboard', 'Environments', 'Assets', 'Projects', 'Schedules', 'Admin', and 'Help'. Below the navigation, there are controls for the environment, including 'Settings', 'Tags', 'Region/Owner', 'VMs (9)', 'Networking: Settings', 'Automation', and 'Collaboration'. The main area displays a grid of VMs with their respective compute types (x86 and Power) and configurations.

\*AIX running on Power Systems and Linux/Solaris/Windows running on x86 architecture  
[https://www.youtube.com/watch?v=c6\\_tDsyu\\_10](https://www.youtube.com/watch?v=c6_tDsyu_10)

First in the public Cloud to support blended solutions including x86, AIX workloads and containers

A landscape photograph with a blue color cast. In the foreground, there is a body of water reflecting the sky and the structures. The water is surrounded by tall reeds and grasses. In the middle ground, several high-voltage power line towers (pylons) are visible, with power lines stretching across the sky. The background shows a line of trees and a clear blue sky. The overall scene suggests a natural environment intersected by modern infrastructure.

**Electrification of  
society transformed  
countless industries**

**Maybe AI will  
bring an equally  
big transformation**

25

# The future is now

facial recognition  
unlocks your phone

fraud detection  
protects your credit

speech recognition  
lets you go hands-free

Machine/Deep Learning  
and AI  
are everywhere

recommendations  
help you shop faster

autonomous vehicles  
detect pedestrians

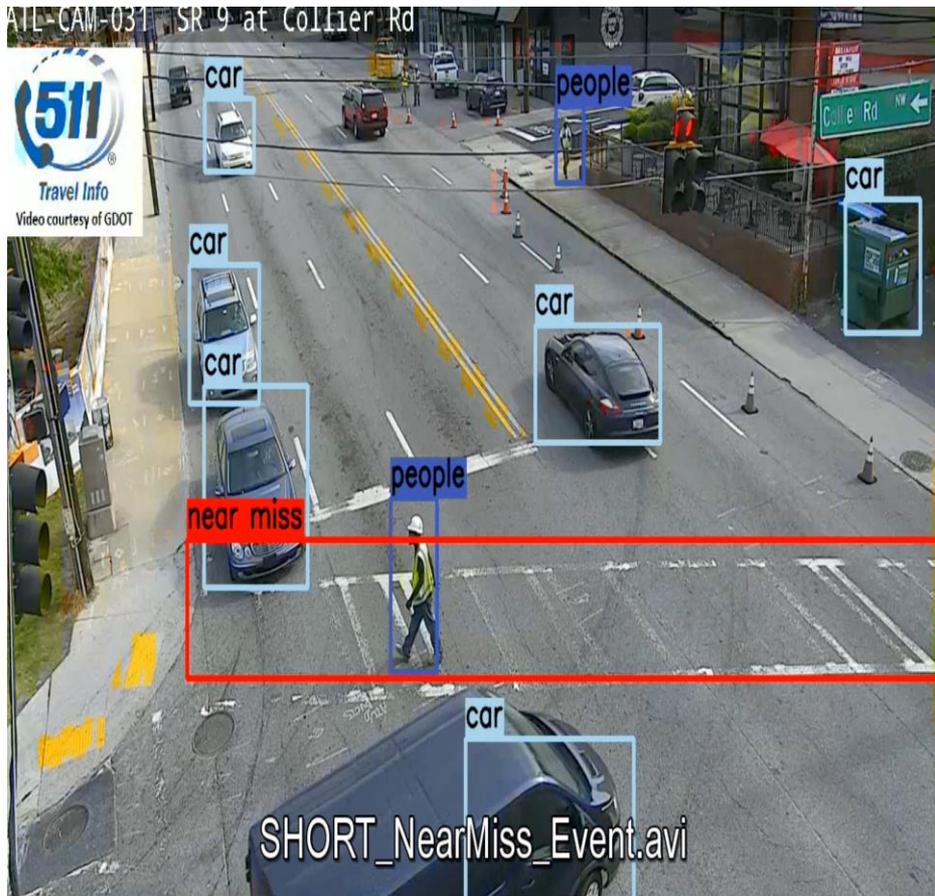
chat bots  
route calls quicker

machine vision  
detects cancer early

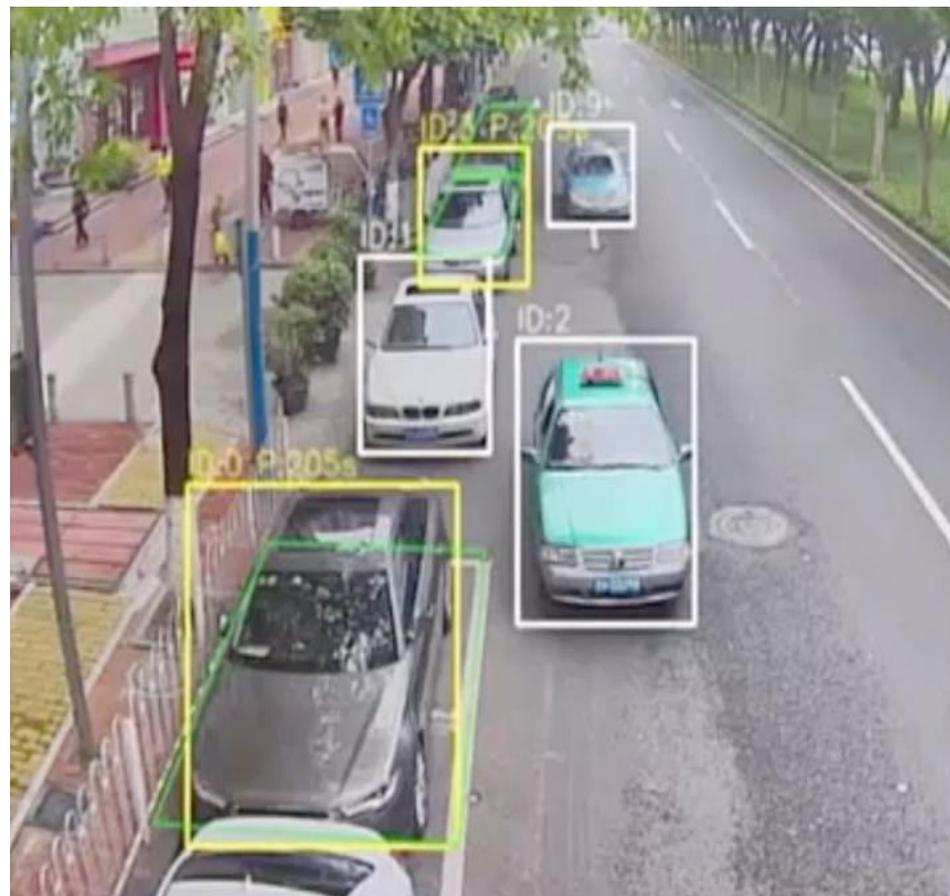
spam detection  
unclogs your Inbox

# Smarter & Safer Cities

Near miss at intersections



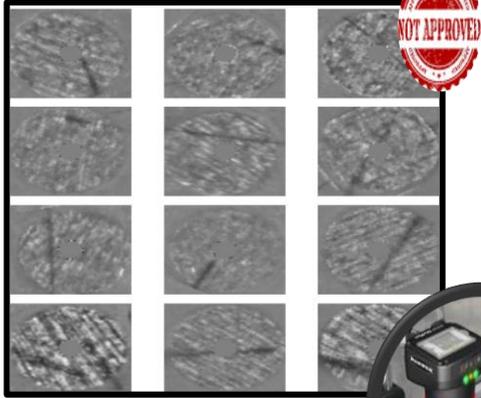
Monitor and Impose regulations



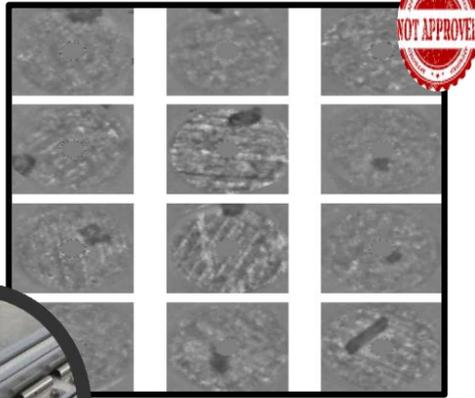
# Visual Inspection for Quality

## QA for photo resistive wafers

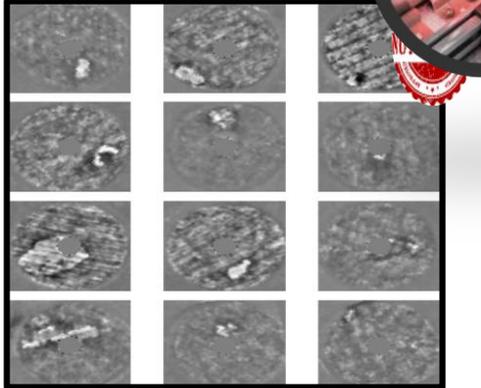
SCRATCH



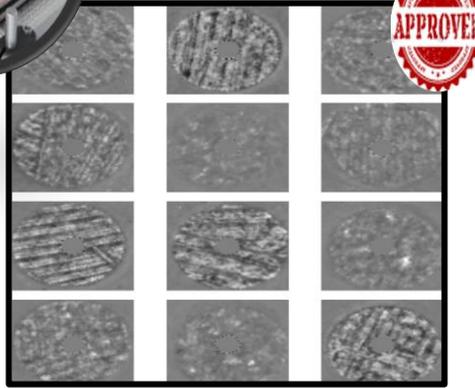
DARK SPOTS



BRIGHT SPOTS



APPROVED



## Survey Solar panels for defects





# Pain Points – Deep Learning Pipeline

## DATA PREPARATION

Complexity /  
Technology  
Rapidly  
Changing

Volume,  
Multi-source  
Labeling &  
Tagging,  
Ingestion

Hyper-parameter  
Complexity,  
Compute Intensive  
Iterations,  
Long Training Times,  
Limited Resources

## DEPLOY & INFER

Model Tuning/  
Pruning,  
Scale &  
Performance,  
Resiliency,  
Application  
Access

Data Changes,  
Constant  
iteration  
Required

**UP & RUNNING**

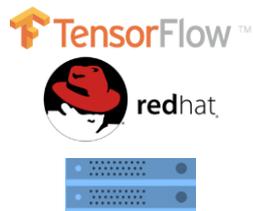
**BUILD, TRAIN,  
OPTIMIZE**

**MAINTAIN  
ACCURACY**

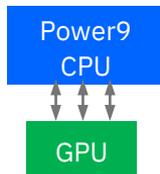
Sharing Valuable Resources Across Multiple Users, Multiple Lines of Business, Multiple Applications  
With Security, Resiliency, and at Scale

# PowerAI: Enterprise AI Platform

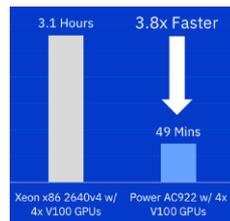
Simplicity: Integrated Platform that Just Works



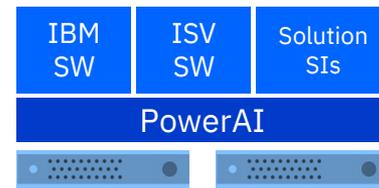
Ease of Use, Unique Capabilities



Faster Model Training Time



Open AI Platform w/ Ecosystem Partners



Curate, Test, and Support Fast Moving Open Source

Provide Enterprise Distribution on RedHat

Easy to deploy Enterprise AI Platform

Large data & model support due to NVLink

Acceleration of Analytics & ML

AutoML: PowerAI Vision

Elastic Training: Scale GPUs as Required

Faster Training Times in Single Server

Scalability to 100s of Servers (Cluster level Integration)

Leads to Faster Insights and Better Economics

Platform that Partners can build on

Software Partners: H2O, IBM, Anaconda

SIs, Solution Vendors & Accelerator Partners

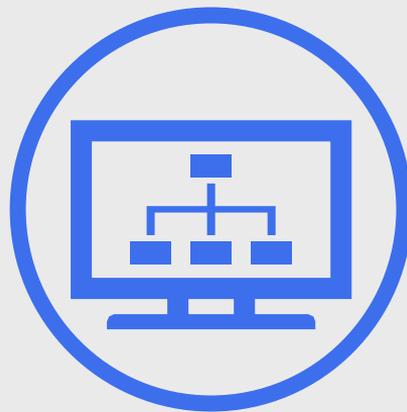
# IBM PowerAI Enterprise



**Faster Time  
to Results**



**Increased  
Resource  
Utilization**



**Simplified  
Management**



**Enterprise  
Solution**

“SUMMIT” on POWER  
vs. “TITAN” on x86



**5-10x**

FASTER  
vs. previous  
x86 system

**75%**

LESS NODES  
for superior  
density

**~29x**

PER NODE  
PERFORMANCE  
(>40TF)

**~8x**

MORE  
STORAGE  
(250PB@2.5TB/s)

**16x**

MORE  
MEMORY  
per node

**summit**

Scale new heights. Discover new solutions.

Oak Ridge National Laboratory's next High Performance Supercomputer.

"Summit, like Titan, will open a door to new ways to simulate and explore complex systems in the natural world. Our scientific community will see decreased time to solution, along with the ability to increase the complexity of their computational models, improving the simulation fidelity of a wide variety of important phenomena that are beyond the range of conventional experimental investigations."

— James J. Hack, Oak Ridge Leadership Computing Facility

# POWER9 fuels most Powerful & Smartest Supercomputers

## System Performance

- Peak performance of 200 petaflops for modeling & simulation
- Peak of 3.3 ExaOps for data analytics and artificial intelligence

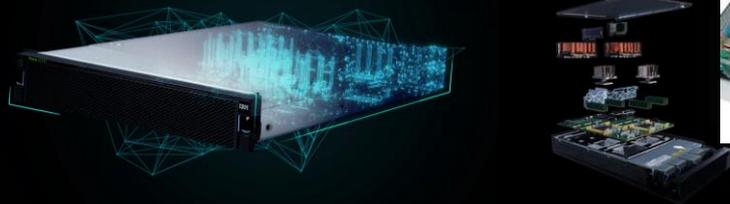
## Each node has

- 2 IBM POWER9 processors
- 6 NVIDIA Tesla V100 GPUs
- 608 GB of fast memory
- 1.6 TB of NVMe memory

## The system includes

- 4608 nodes
- Dual-rail Mellanox EDR InfiniBand network
- 250 PB IBM Spectrum Scale file system transferring data at 2.5 TB/s

## IBM Power Systems AC922



Summit in a box: Best Server for Enterprise AI

## Sierra is no2 world fastest supercomputer



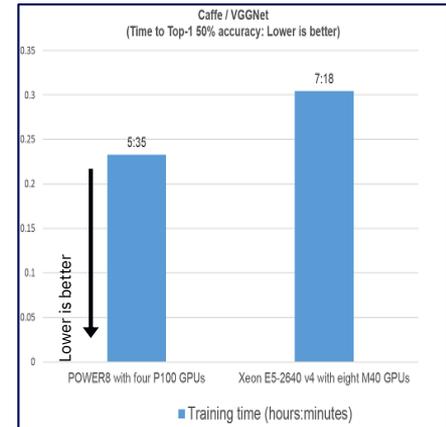
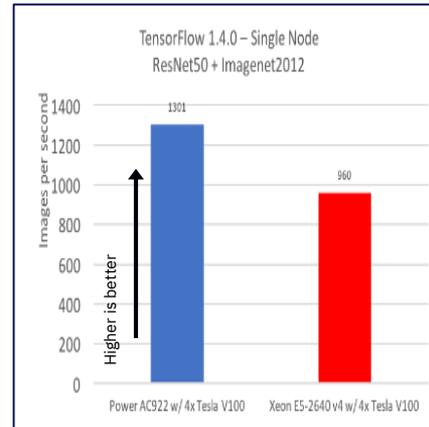
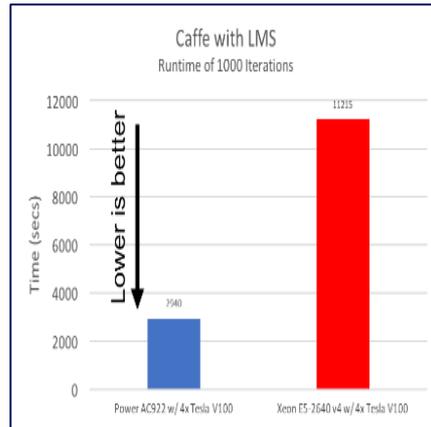
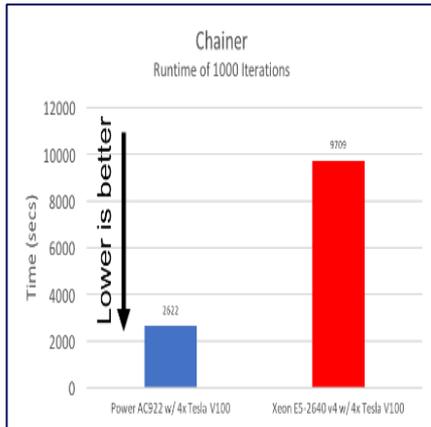
Lawrence Livermore  
National Laboratory

# IBM Power AI Systems Performance

# IBM Power AI Enterprise

## Faster training times than x86<sup>1</sup>

- **3.7x** faster running Chainer<sup>2</sup>
- **3.8x** faster running Caffe<sup>3</sup>
- **2.3x** faster running TensorFlow<sup>4</sup> and **35%** more images per second<sup>5</sup>
- Four (4) GPUs on Power is faster than eight (8) GPUs on Intel<sup>6</sup>
- Large AI Models Train **~4x** faster than x86 equivalent solution



# Driverless AI Delivers “Expert Data Scientist in a Box”

- Created and supported by world renowned AI experts
- Empowers companies to accomplish AI and ML with a single platform
- Performs the function of an expert data scientist and adds more power to both novice and expert teams
- Details and highlights insights and interpretability with easy to understand results and visualizations



21 day free trial for [Driverless AI](#)

# The Driverless AI Experience

# Start Experiment

## < H2O.ai Experiment **desusupe**

DRIVERLESS AI 1.3.0 - AI TO DO AI

Licensed to IBM (SN26193 - For evaluation only, not for production use)

DATASETS EXPERIMENTS MLI HELP PY\_CLIENT MOJ02-RUNTIME MESSAGES[0] LOGOUT KSCHLAMB

### TRAINING DATA

DATASET

creditcard.csv

ROWS

24K

COLUMNS

25

DROPPED COLS

--

VALIDATION DATASET

--

TEST DATASET

--

TARGET COLUMN

default payment next

FOLD COLUMN

--

WEIGHT COLUMN

--

TIME COLUMN

[OFF]

TYPE

bool

COUNT

23999

UNIQUE

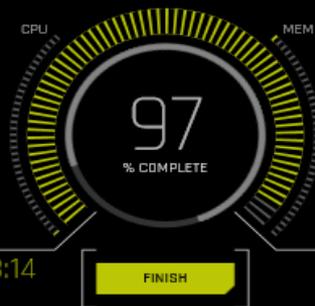
2

TARGET FREQ

5369

### ASSISTANT

TRAINED 4/4 ENSEMBLE BASE LEARNERS  
[XGBOOST]



### EXPERIMENT SETTINGS



CLASSIFICATION



REPRODUCIBLE



ENABLE GPU

### SCORER

GINI

MCC

F05

F1

F2

ACCURACY

LOGLOSS

AUC

AUCPR

### ITERATION DATA - VALIDATION



### VARIABLE IMPORTANCE

43_NumToCatTE:MARRIAGE:PAY_0:PAY_2.0	1.00
42_TruncSVD:MARRIAGE:PAY_0:PAY_2:PAY_3.0	0.71
47_TruncSVD:PAY_0:PAY_3:PAY_AMT5.1	0.57
48_NumToCatWoE:PAY_0:PAY_5:PAY_AMT2.0	0.35
10_PAY_0	0.30
27_ClusterDist6:PAY_0.5	0.16
27_C	0.15
32_I	0.13
50_NumToCatTE:PAY_2:PAY_5.0	0.11
59_NumToCatTE:LIMIT_BAL:PAY_4.0	0.10
57_ClusterTE:ClusterID76:BILL_AMT3:PAY_0.0	0.09
31_ClusterDist6:BILL_AMT1.4	0.08
63_NumToCatTE:BILL_AMT2:PAY_0:PAY_2:PAY_3:PAY_5:PA...	0.07
26_NumToCatWoE:LIMIT_BAL:PAY_4.0	0.07

Feature Engineering

## Quickly Start Experiment

Options Log Trace



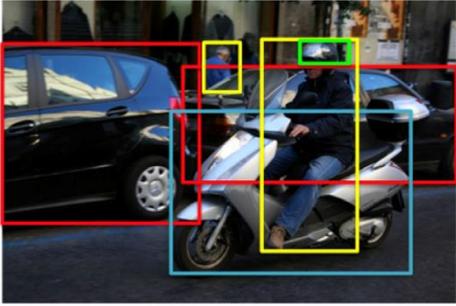
### ROC PREC-RECALL LIFT GAINS GPU USAGE



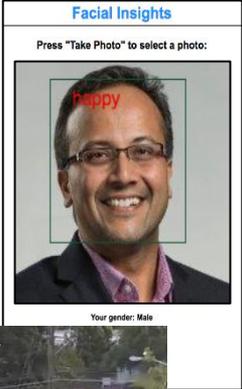
# H2O Driverless AI Complements IBM PowerAI Vision



IBM PowerAI delivers Deep Learning for Images



Person  
Car  
Motorcycle  
Helmet



DRIVERLESSAI

H2O Driverless AI is Automatic Machine Learning

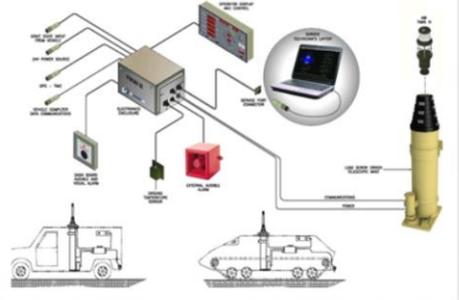
Transactional Data: Store Level

Transactional

Transaction ID	Date	Time	AMOUNT	Card number
p1913045367	11/24/2010	3:20:32 AM	14.47525	*****2323
66781991970	12/4/2010	10:30:10 AM	39.46618	*****6451
19176276262	11/2/2010	1:29:21 AM	24.99964	*****2179
17328082178	10/8/2010	12:29:40 AM	19.21824	*****5826
16835491892	10/17/2010	10:36:12 PM	30.56086	*****9408
w833871154	12/5/2010	8:20:58 PM	33.35420	*****9379
v1240348539	10/27/2010	6:12:35 AM	49.64483	*****5466
w5440173613	11/26/2010	10:36:36 PM	24.23247	*****1816
w8906115216	11/3/2010	1:57:33 PM	32.45101	*****2662
11400944560	11/25/2010	7:26:45 PM	22.12299	*****4380
z3667608889	10/9/2010	11:09:58 AM	21.93351	*****6533
p6738256686	11/23/2010	10:14:36 AM	21.71996	*****4615
g8964299443	11/24/2010	1:19:24 AM	15.46741	*****7694
r9012945206	11/22/2010	2:02:18 PM	31.14203	*****7140
52116305133	11/23/2010	7:15:13 PM	43.16047	*****9208
17478724264	11/2/2010	12:08:46 PM	40.14018	*****2695
w208440203				
v2388-2986				
w5672364				

Example: Flat File

Sensors



Log

```
tail -f -
localhost:9001
tail -f -
225.134.169.96 -- [16/Sep/2017:09:54:03 +0200] "GET /explore HTTP/1.0" 200 0
sp Mozilla/5.0 (Windows; U; ; en-US; rv:1.9.1.20) Gecko/2010-0
113.138.63.126 -- [16/Sep/2017:08:55:00 +0200] "GET /app/main/posts HTTP/1.0
/lay/5 (X11; Linux x86_64; rv:1.9.6.20) Gecko/2010-10-06; 20:56
171.32.25.164 -- [16/Sep/2017:09:57:15 +0200] "GET /app-admin HTTP/1.0" 200 4
a/5.0 (Windows; CE; AppleWebKit/537.10; HTML; Like Gecko) Chrome
142.221.145.288 -- [16/Sep/2017:18:01:23 +0200] "GET /list HTTP/1.0" 200 498
a/5.0 (Windows; NT 5.1; AppleWebKit/532.0; HTML; Like Gecko) C
100.241.58.38 -- [16/Sep/2017:18:06:23 +0200] "DELETE /app-content HTTP/1.0"
sp Mozilla/5.0 (Macintosh; PPC Mac OS X 10_6_9; rv:1.9.2.20)
235.99.289.148 -- [16/Sep/2017:18:09:51 +0200] "POST /app-content HTTP/1.0" 2
a/5.0 (Macintosh; U; PPC Mac OS X 10_5_7; rv:1.0; it-IT; AppleWebKit/531.92.7.6
fac/531.61.6"
231.252.210.231 -- [16/Sep/2017:18:12:24 +0200] "PUT /app/main/posts HTTP/1.0" 200 5832 "http://www.clineros.biz/" Mozilla/
3.0 (Windows NT 5.2; AppleWebKit/534.107ML; like Gecko) Chrome/15.0.824.0 Safari/534.107ML
134.55.85.239 -- [16/Sep/2017:18:15:58 +0200] "GET /app/main/posts HTTP/1.0" 200 4945 "http://elliott.com/faq/" Mozilla/5.0
(X11; Linux x86_64; rv:1.9.5.20) Gecko/2010-12-18; 15:51:32 Firefox/4.0"
38.226.28.255 -- [16/Sep/2017:18:19:53 +0200] "DELETE /app/cart.jsp?appId=1368 HTTP/1.0" 301 5058 "http://www.perkins-mendo
za.org/categories/explore/index.html" Opera/8.27 (Windows NT 6.0; 11-TT; Presto/2.9.171 Version/12.00)
4.169.232.86 -- [16/Sep/2017:18:21:48 +0200] "GET /app-content HTTP/1.0" 200 5898 "http://www.burress.com/explore/explore/
client/register.html" Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_8; AppleWebKit/5331.0; HTML; Like Gecko) C
128.242.65.27 -- [16/Sep/2017:18:21:48 +0200] "GET /app-content HTTP/1.0" 200 5898 "http://www.burress.com/explore/explore/
client/register.html" Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_8; AppleWebKit/5331.0; HTML; Like Gecko) C
168.203.133.24 -- [16/Sep/2017:18:28:38 +0200] "GET /app/cart.jsp?appId=1368 HTTP/1.0" 200 4972 "http://www.terry.org/" Mo
zilla/5.0 (Macintosh; PPC Mac OS X 10_7_8; rv:6.0; it-IT; AppleWebKit/534.26.3 (KHTML, like Gecko) Version/5.0
Safari/534.26.3"
```

NLP

## Is proven reliable

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IBM Power Systems ranked the most reliable for 10th straight year delivering 99.9996% uptime.\*



## Delivers with security

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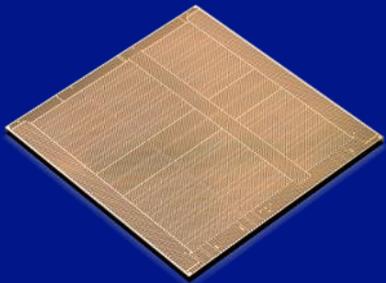
IBM Power Systems have security built in at all layers, from processor to the OS, designed to deliver end-to-end security.



## Scales performance affordably

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IBM POWER9 processor drives the world's fastest supercomputers and is ready to accelerate your enterprise.



## Simplifies multicloud

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IBM Power Systems enable the most data intensive and mission critical workloads in private and hybrid cloud environments.



\* ITIC 2018 Global Server Hardware, Server OS Reliability Survey Mid-Year Update. The highest uptime of 99.9996% is calculated based on 2.0 minutes/server/annum unplanned downtime of any non-mainframe Linux platforms

# Thanks

## Questions ?



Industry leading 2-socket vs x86. Designed to meet highest performance and security needs, within a dense form factor, and a memory footprint up to 4TB.



## S914

- 1-socket, 4U / Tower
- 4, 6 and 8 cores/ socket
- 1TB memory
  
- AIX, IBM i, & Linux
- PowerVM



## L922

- 1,2-socket, 2U
- 8,10, and 12 cores per socket
- 4TB memory
  
- Linux only
- PowerVM



## S922

- 1,2-socket, 2U
- 4, 6 8, and 10 cores per socket
- 4TB memory
  
- AIX, IBM i, & Linux
- PowerVM

## S924

- 2-socket, 4U
- 8, 10, and 12 cores per socket
- 4TB memory
  
- AIX, IBM i, & Linux
- PowerVM



## Optimized for SAP HANA in-memory database workloads

Up to 2-socket, 12 cores per socket with 4TB memory for SAP HANA workloads

## Highly flexible systems with best in class virtualization

Consolidate workloads to reduce data center footprint

### H922

- 1,2-socket, 2U
- 4, 8, and 10 cores per socket
- 4TB memory
- Linux
- Max. 25% of cores for AIX or IBM i

### H924

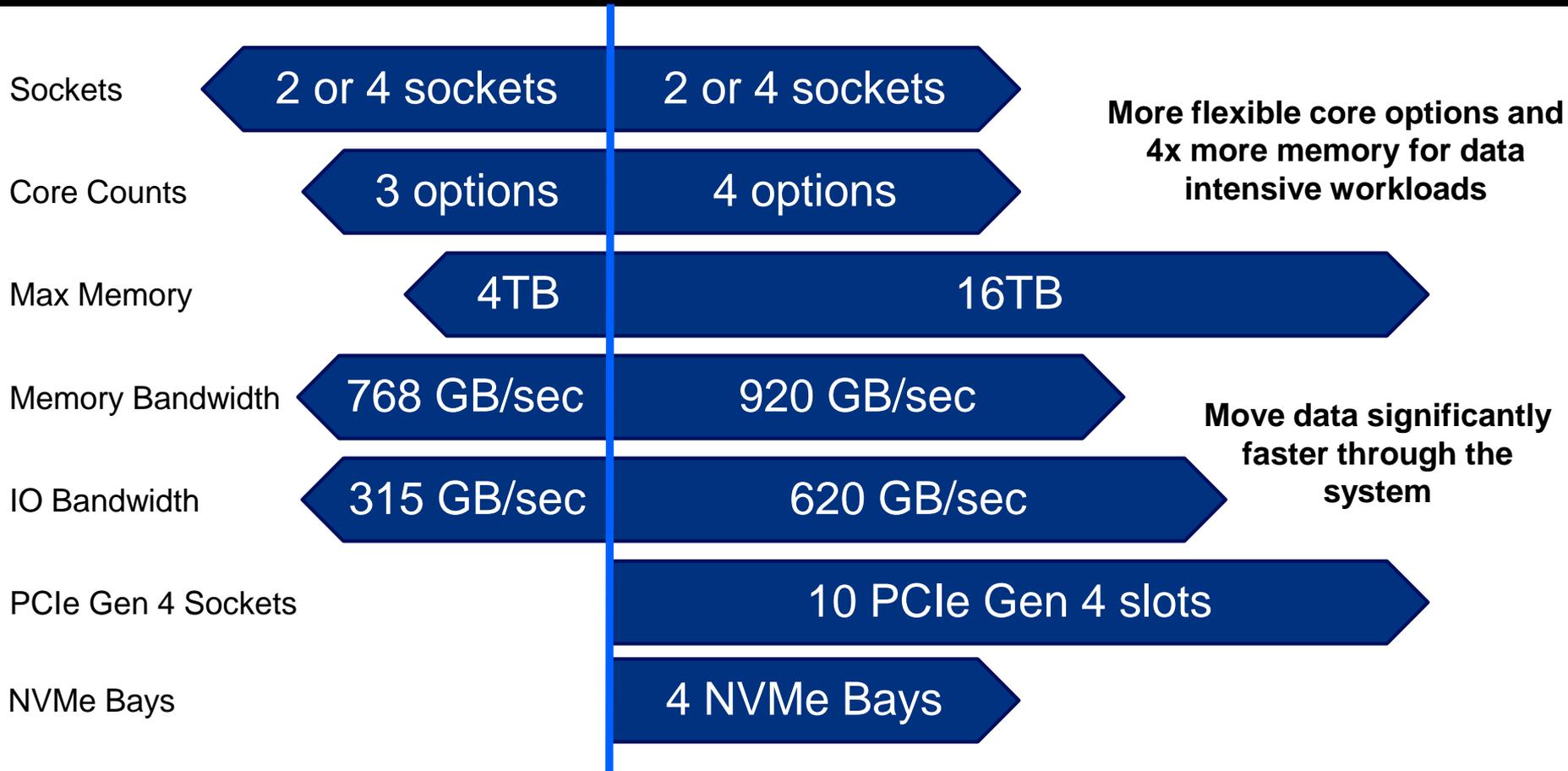
- 2-socket, 4U
- 8, 10, and 12 cores per socket
- 4TB memory
- Linux
- Max. 25% of cores for AIX or IBM i



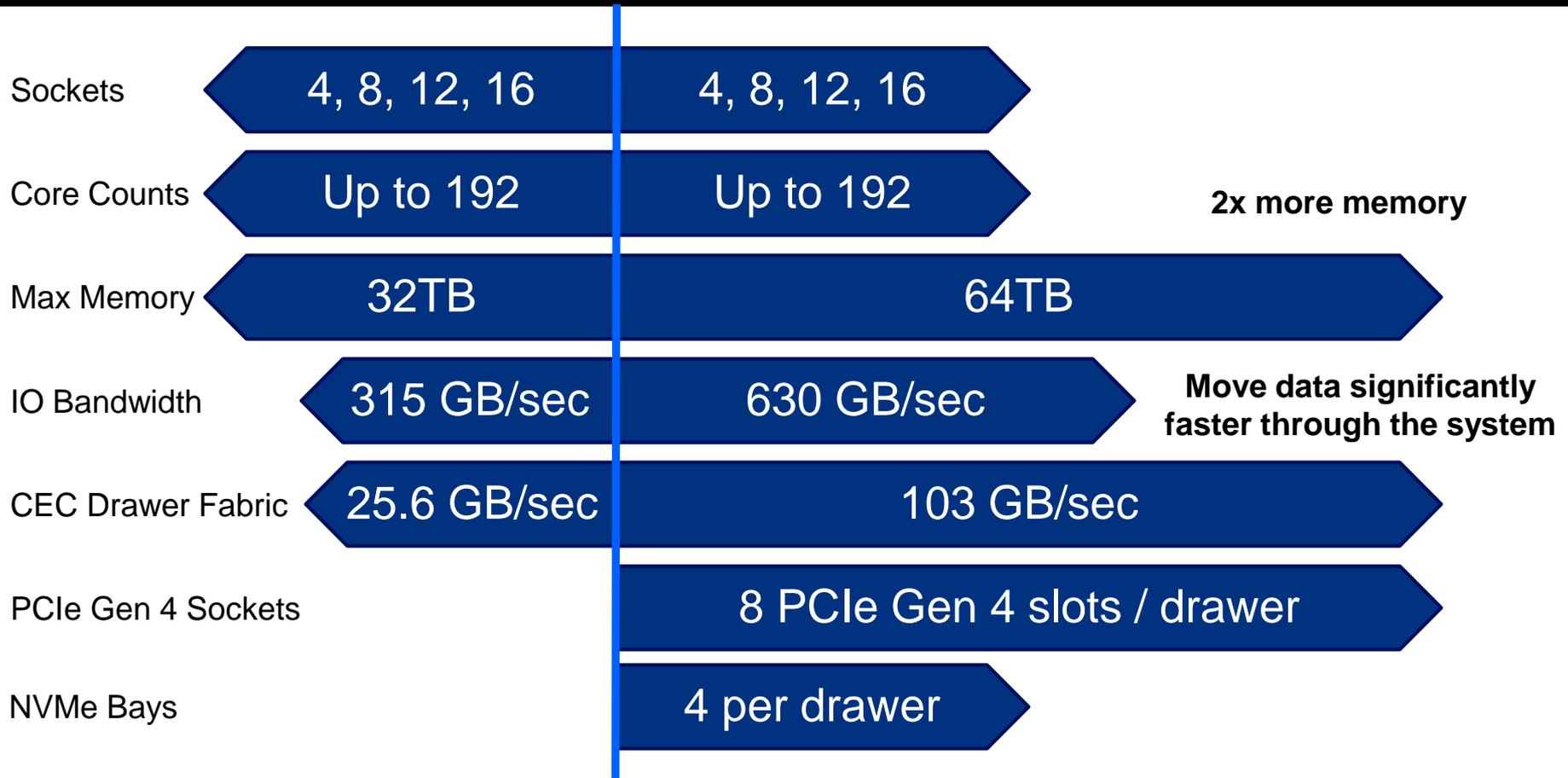
**1.3x** more memory capacity than x86 Xeon SP (Skylake) 2-socket platform

Only 2-socket Scale-out SAP HANA system (TDI5 or Appliance) with 4TB of memory

# Performance – E850 vs. E950



# Performance – E880C vs. E980



# POWER9 E950



## Software Stack

- HMC 920+
- PowerVM 2.2.6.23+
- AIX 6 TL9 sp12, 7.1 TL5 sp4 & 7.2 TL3 (full P9 support)
- Linux
  - SLES 11 sp4, 12 sp3, 15
  - RHEL 7.5
  - Ubuntu 16.04
- IBM i not supported

3 Year 24x7 Warranty

	System (9040-MR9) – 4U
POWER9 Fast/Fused Core Processors	Two or four processors → 16,20,22,24,32,40,44,48 CPU cores 8, 10, 11 or 12 CPU Cores per socket Maximum 3.8 GHz
Sockets	2 or 4 Field Upgradable
Memory	8 Riser Cards each with 16 x DDR4 ISDIMMs = 128 total DIMM sizes 8, 16, 32, 64,128 GB 16 TB max Memory (four times the E850)
Media Bays	DVD via external USB DVD or USB flash key
Integrated PCIe - 11 slots Full Height	PCIe Gen 4: eight x16 + two x8 (2 processors = 4 x16) PCIe Gen 3: one x8 (default Ethernet @ 2x10GB + 2x1Gb) PCIe slots are Full High, Half Length and Blind swap
Internal storage SAS / NVMe	- Up to 8 SAS 2.5 inch, 15mm via 1 or 2 SAS adapters (x8) Split disk capable JBOD, RAID 1,5,6 or 10 - U.2 format 1 to 4 NVMe slots for 1 to 4 NVMe devices 2.5 inch 7 mm 800GB, 1.6TB 3.2TB - USB 3.0 (2 front and 2 rear)
Max I/O Drawers	4 EMX I/O Drawer (PCIe Adapter drawer)
External Storage Drawers	EXP12SX, ESP24SX & EXP24S Each requires: PCIe SAS adapter or SAS port

# POWER9 E980

2U System Control Unit  
5U 4x System Nodes

	System (9080-M9S)	E980
POWER9 Fast/Fused Core Processors	Four Sockets each node 32,40,44,48 CPU cores Sept 21 <sup>st</sup> 1 or 2 Node drawers Nov 16 <sup>th</sup> 1 to 4 Node drawers 8, 10, 11 or 12 CPU Cores per socket 3.9 to 4.0 GHz	
Sockets	4 per node (all populated)	
Memory	CDIMM sizes 32, 64,128, 256, 512 GB populated in quads 16 TB max Memory per node => 64TB in 4 node 230GB/s per module / 920GB/s total (each node!)	
Media Bays	DVD via external USB DVD or USB flash key in SCU	
Integrated PCIe/node	Eight PCIe Gen 4 x16 HH HL All are CAPI capable and use Blind Swap Cassettes	
Internal I/O	- U.2 format 1 to 4 NVMe slots for 1 to 4 NVMe devices 2.5 inch 7 mm 800GB, no other size supported on E980 - USB 3.0	
Max I/O Drawers	GA1 0-2 MEX PCIe Adapter drawers per node GA2 0-4 MEX PCIe Adapter drawers per node	
External Storage Drawers	EXP12SX, ESP24SX & EXP24S Each requires: PCIe SAS adapter or SAS port	

## Software Stack

- HMC 920+
- PowerVM 2.2.6.30+
- AIX 6 TL9 sp12, 7.1 TL5 sp4 & 7.2 TL3 (full POWER9 support)
- Linux
  - SLES 11 sp4, 12 sp3, 15
  - RHEL 7.4, 7.5
- IBM i
  - 7.2 TR9, 7.3 TR5