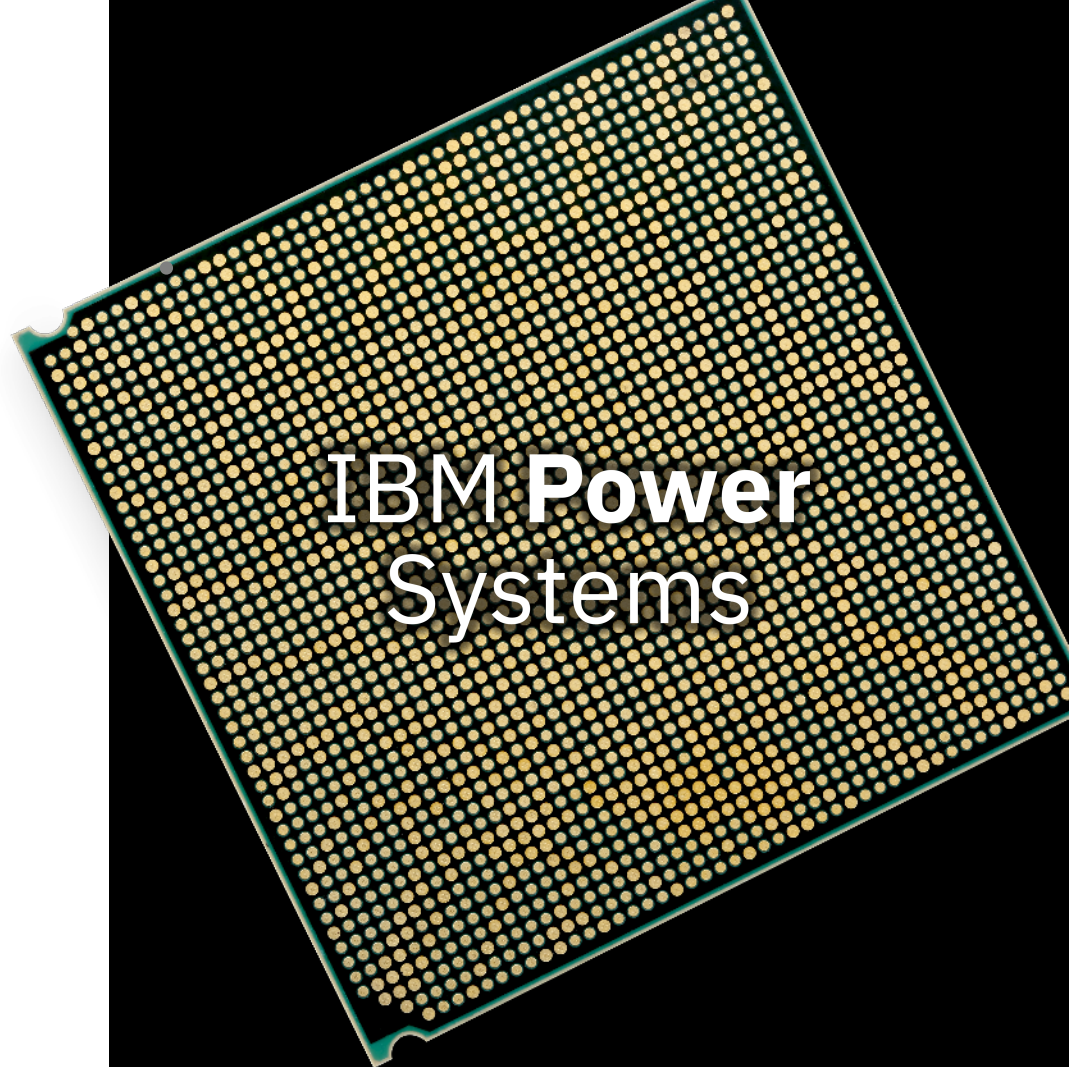# IBM POWER9: Power update

Novinky z oblasti IBM Systems Server portfólia s dôrazom na Linuxové riešenia, AI a "in-memory" databázove riešenia ako napr. SAP HANA a SAS Viya
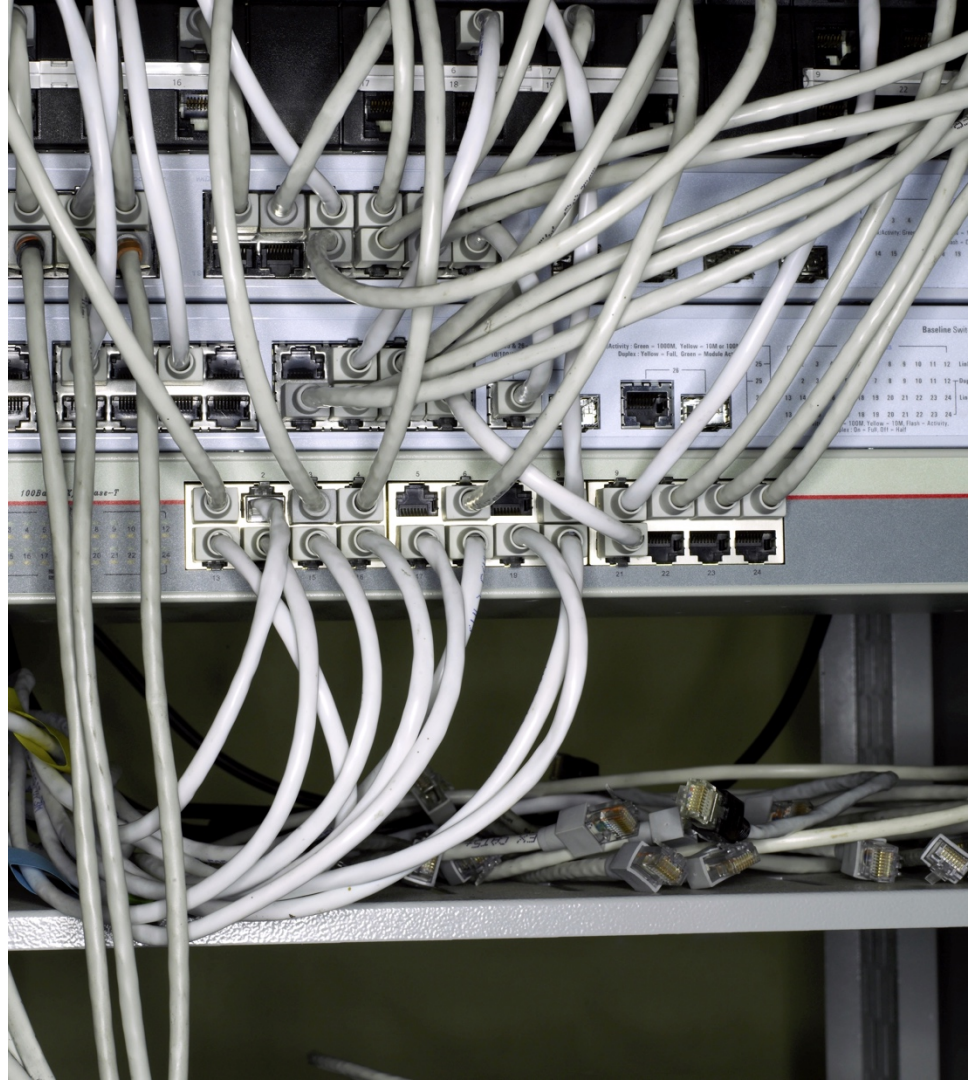
27. Máj, 2020
—

Martin Nemeček
Client Technical Specialist for Power Cognitive Systems

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IBM **Power** Systems

# Agenda

- Na čo sa dnes používa IBM POWER ?

- AIX a System i Roadmap

- POWER a Cloud

- POWER a SAP HANA

- POWER a SAS

- Nový POWER9 Server (IC922) – Nový server pre AI Inferencing a Linuxove nasadenia

Na čo sa dnes používa IBM POWER ?
 - je to stále relevantná technológia ?

**HPC** – Summit (najvýkonnejší počítač na svete) P9+Nvidia
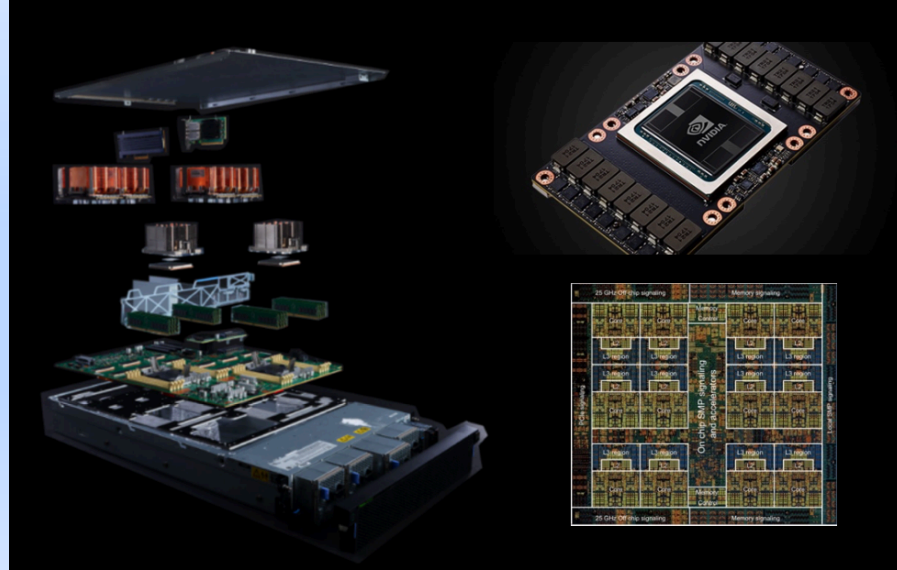**Microservices** – Docker Container, Kubernetes
**IT Automation** – OpenStack/vmware + PowerVC
**Hybrid Cloud** – IBM Power in IBM Cloud, OpenShift
**AI a ML -** GPU/FPGA Accelerated Computing (AC922, IC922)
**In-Memory DB a Analytics** – SAP HANA, SAS Viya na Power
**Security** – POWER9, Data at rest Encryption, Tape

# Naďalej s nimi počítame: 10+ rokov roadmapa pre IBM i a AIX

## AIX Highlights

- AIX Security: PowerSC and PowerSC MFA updates for malware intrusion prevention and for strong authentication
- New workload acceleration with Shared Memory Communications over RDMA (SMC-R)
- Availability: AIX Live Update Enhancements; GDR 1.2; PowerHA 7.2
- Cloud Managementt: IBM Cloud PowerVC Manager for SDI; Import/Export;
- AIX 7.2 native support for POWER9 – e.g. enabling NVMe
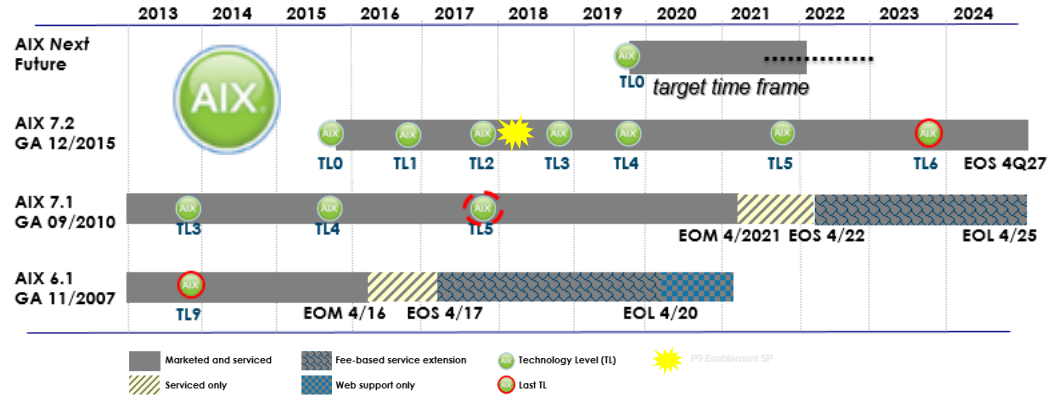
## IBM i Highlights

- POWER9 exploitation
- Expanding the secure-ability of IBM i with TLS, secure APIs, logs for SIEM solutions
- Expanded Install Options – installation process using USB 3.0 media
- Encryption and compression for cloud storage
- Increasing Productivity of Developers & Administrators
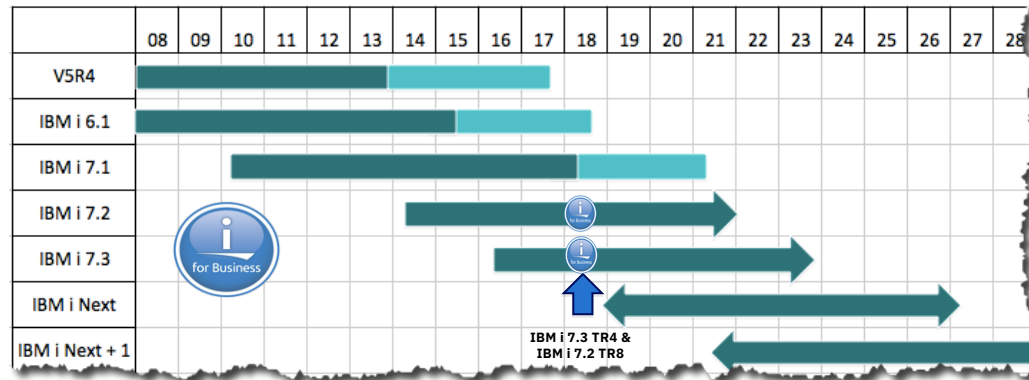
# 0% financing for POWER9 servers and other IBM HW products

## Acquire now – 0%, 15 months - start paying August 2020

### You get

- **Easy way how to conserve cash during COVID-19 crisis**

- **An affordable way to acquire your Power solution**

- **Help stretching your budget**

- **Less cash constraint**

- **Cost matched to benefits**

# 0%

IBM Global Financing offers credit qualified customers 15 months financing at 0% interest, including a 3 months payment deferral

- 15-month total term – 0% interest
- 3 months with no payments followed by 12 monthly in advance payments - simply divide the price by 12 to calculate the monthly payment, valid for various deal sizes

**Credit qualified customers such as Slovenská Sporiteľňa are eligible for 0% financing up to 24 months.**

Promoted 0% financing is available on a 15-month Loan, Installment Payment Plan and Full Payout Lease. Offering is valid for eligible products, from as low as 20,000 EUR for credit qualified clients in Slovakia, sold directly through IBM or through an authorized IBM Business Partner.

**Accelerated servers**

**Enterprise servers**

**Scale-out servers**

**Hyperconverged infrastructure**

For more information feel free to contact your IBM Global Financing representative
**Matúš Vitko, +421 911 105 415, matus.vitko@sk.ibm.com**

# POWER a Cloud

# IBM POWER v cloude

**Compute nodes hosting**

- IBM POWER9 **in IBM Cloud** for AI, AIX, Linux, IBM i
- IBM POWER9 **LPARs in Google Cloud** AIX, Linux
- Public providers PowerCloud (CZ), LPARBox, SiteOx

**Hybrid Cloud** with Kubernetes/OpenShift, OpenStack, vmware

**Hyperconverged** infrastructure with IBM POWER nodes for **Nutanix or vmware over vRealize + PowerVC**

## OpenShift 4.3 on Power – teraz k dispozícii ! *

Red Hat Blog: https://www.openshift.com/blog/openshift-4.3-now-available-on-ibm-power-systems-1

IBM Blog: https://developer.ibm.com/linuxonpower/2020/04/30/red-hat-openshift-4-now-available-on-ibm-power-systems/

Try it Now for free for 60 days: https://cloud.redhat.com/openshift/install

* GA pre OpenShift 4.3 on Power – 27.4.2020

# Get started with OpenShift

Try Red Hat OpenShift 4 now, or set up your own clusters in the environment of your choice.

**Instant access to a cluster**        **Create your own cluster**

# Try Red Hat OpenShift 4 now

Get instant access to OpenShift 4 clusters and see the features for yourself. With our simple tutorials and playgrounds, you can learn as you go.

| LEARN | LEARN | INSTANT CLUSTER |
|---|---|---|
| 10 MINUTES \| BEGINNER | 15 MINUTES \| BEGINNER | OPEN-ENDED \| BEGINNER |
| **Getting started with OpenShift** | **Deploying applications from images** | **OpenShift 4 playgroun** |
| Use the OpenShift Container Platform to build and deploy | Deploy an application from an | Explore OpenShift 4 us' playgroun, which give |

# Create your own OpenShift 4 cluster – https://cloud.redhat.com/openshift/install

# Install OpenShift 4.3 on Power with 60-day evaluation subscription !

# Cloud Solutions on Power – Užitočné odkazy

## Clients @ IBM Developer

http://ibm.biz/power-hybrid-cloud



**OpenShift 4.3**
*Try it now*

**Check out the OpenShift 4 on Power Systems blog:**

## BPs & IBM Sellers @ Seismic



https://ibm.seismic.com/Link/Content/DChm--E3Y6uEmGlhq5wlrGcw

# POWER a SAP HANA

# Novinky SAP HANA na POWER

## Virtual Persistent Memory on Power

- Až **17x** rýchlejší HANA štart *

- Až **30%** rýchlejší HANA shutdown *

- Nová funkcionalita integrovaná v PowerVM a firmware (DRAM rozdelenie na dva regióny)

- Stávajúci zákazníci P9 nemusia nič dokupovať (nutný iba update FW)

## Shared Procesor Pool



Shared Master Processor Pool

| VM1: Linux | VM2: Linux | VM3: Linux | VM4: AIX | VM5: Linux |
|---|---|---|---|---|
| SAP HANA DB1 | SAP HANA DB2 | SAP App Server 1 | SAP App Server 2 | SAP App Server 3 |

| PowerVM |
|---|
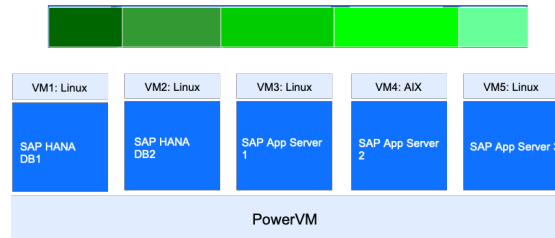
*The >17x improvement in SAP HANA startup time and 30% faster SAP HANA shutdown time with Virtual Persistent Memory are based on our internal tests with POWER9 system 9040-MR9 that has 48 cores and 8 TB memory. Configuration details for comparison test with POWER9 firmware level equal or greater VM940_FW940.00 (27) – 4TB main memory compared with 512MB main memory and 3584MB virtual persistent memory. Both configurations included following SAP HANA db VMs - 1 x SAP HANA database server with 28 dedicated cores and 512 to 4196 GB main memory, 1 x SAP Netweaver Application Server with 16 ded. cores and 512 GB main memory
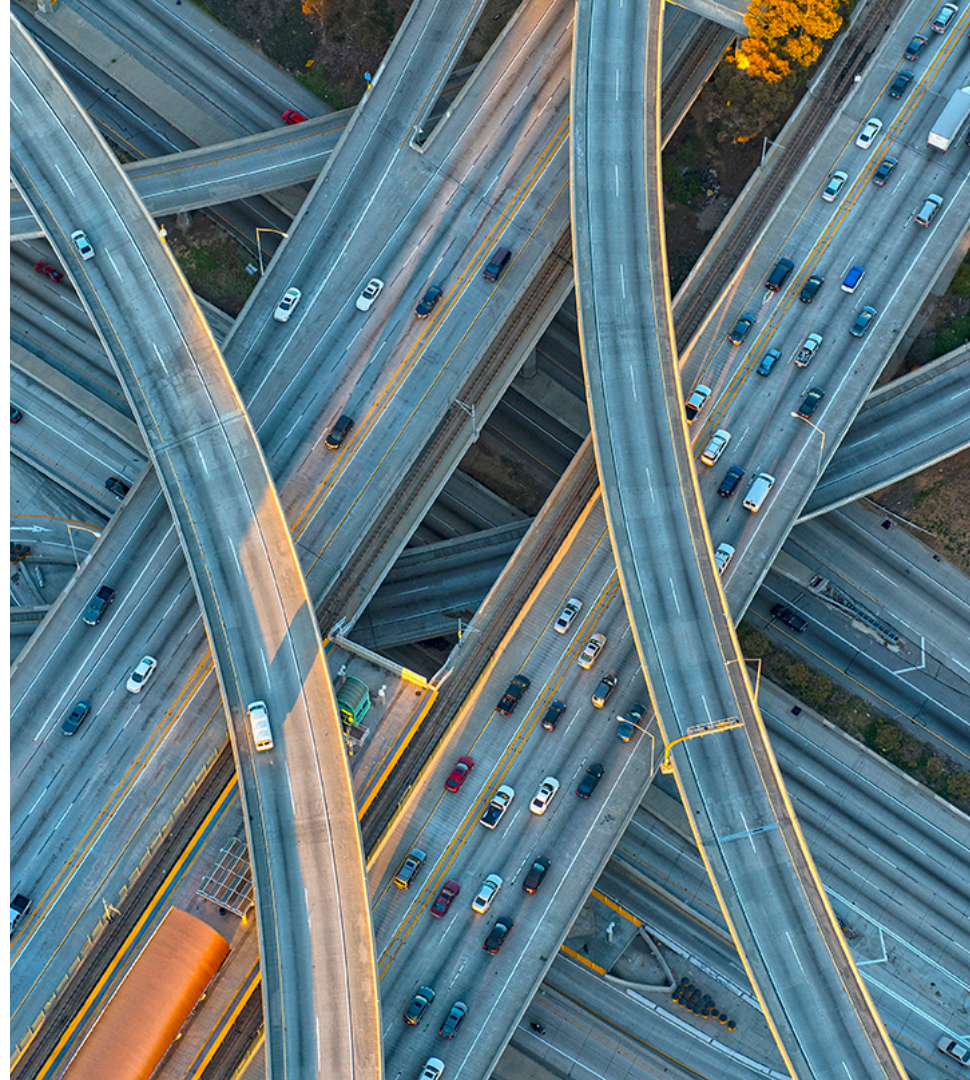
# POWER a SAS

# Výhody IBM POWER + IBM Storage pre SAS

IBM **Power Systems**
+
IBM **Storage**

Flexibilita

Spoľahlivosť

Vysoký výkon

# Výhody IBM POWER + IBM Storage pre SAS

## Flexibilita

**Výhody IBM Power**

Virtualizácia založená na firmvéri, ktorá má izoláciu výkonu a zvýšené zabezpečenie

Iba PowerVM virtualizácia, voči ostatným konkurentom, s nulovým počtom reportovaných bezpečnostných chýb[1]

## Spoľahlivosť

**Výhody IBM Power**

Hodnotený ako #1 v oblasti spoľahlivosti posledných 11 rokov[1]

**Výhody IBM Storage**

IBM Storage garantuje 100% dostupnosť s technológiou HyperSwap

## Vysoký výkon

**Výhody IBM Power**

**2x**
I/O priepustnosť[1]

**1.8x**
Pamäťová priepustnosť [2]

**5.6x**
CPU GPU interconnect[3]

Svetový superpočítač #1 a #2 v top500.org je IBM Power Systems

# 40+ rokov partnerstva medzi SAS a IBM

IBM hardware je optimalizovaný pre SAS aplikácie:

- SAS 9.4 pre AIX na IBM Power Systems

- SAS Viya on Linux na IBM Power Systems

- IBM Spectrum LSF tvorí základ pre SAS Grid

**Ken Gahagan**
Director, R&D
SAS

"POWER9 has this high-throughput capability that other processors do not have."

"[POWER9 is] a perfect fit for our machine learning and deep learning capability in SAS Viya"

Ken Gahagan
Director, R&D
SAS

Video: Driving innovation with SAS® Software and IBM Power Systems

# POWER9 Server (IC922)
## – Nový server pre AI Inferencing a Linuxove nasadenia

# IBM IC922 – Cenovo dostupné riešenie "End-to-end"

This OpenPOWER 3rd party developed server addresses four needs:

1. **GPU based Inferencing AI & other HPC workloads**
   1. 6 GPU PCIe adapters [8 statement of direction]
   2. 2 TB memory
   3. 40 POWER9 CPU cores with SMT=4
   4. Lower cost Inferencing partner for AI on the AC922
2. **High density Storage server**
   - 24 internal disk bays for HD, SSD plus NVMe drives

3. **Cloud Server (like RHEL OpenShift)**
   - Low cost & flexible set of resource options
4. **Generic Linux / KVM VMs on POWER Server**
   - Low cost & flexible set of resource options
   - KVM supported at a later date

**Specialised use or a mixed workloads like: Cloud (OpenShift) with some GPU Inferencing + Data nodes**

# IBM Power Systems portfólio
 *- od cenovo dostupných Linux systémov až po Enterprise riešenia*

# Zhrnutie

# POWER9 vs x86 – Benefity pre cloud, AI workloads aj tradičné AIX a System i riešenia

**POWER9**

**More Container Apps Less Cost**

## 3.2X
Greater containers/core[2]

## 2.6X
Better price-performance[3]
(based on number of containers)

**mongoDB.**

### AI Models Train ~4X Faster
Caffe with LMS (Large Model Support)
Runtime of 1000 Iterations



3.1 Hours

49 Mins **POWER9**

Time (secs) — 12000, 10000, 8000, 6000, 4000, 2000, 0

Xeon x86 2640v4 w/ 4x V100 GPUs

Power AC922 w/ 4x V100 GPUs
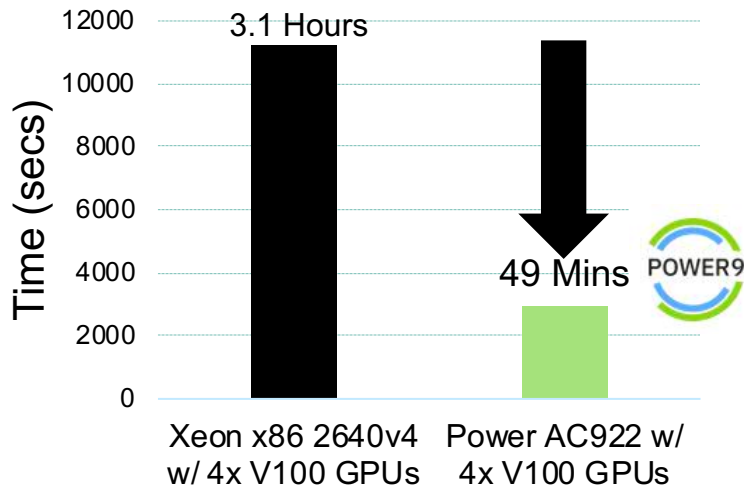
### Power is Open Source Hardware (Chips & Systems)

**OpenPOWER**
- Mellanox TECHNOLOGIES
- XILINX
- SUPERMICRO
- NVIDIA.

**OpenCAPI**
- AMD
- Hewlett Packard Enterprise
- Google
- DELL

## POWER9 Architecture vs. Intel x86

| 4x | 5.6x | 2.6x | 2X | 7-10X |
|---|---|---|---|---|
| Threads per core vs x86 | Up to 5.6x more I/O bandwidth than x86 | More RAM possible vs. x86 | I/O Bandwidth - 1st PCIe Gen 4 Busses | CPU to GPU Bandwitdh |

GoogleNet model on Enlarged ImageNet Dataset (2240x2240)     For Performance Details see following pages

# Užitočné odkazy - IC922, AI ...

IBM Power System IC922 Marketplace page:
https://www.ibm.com/us-en/marketplace/power-system-ic922

Data Sheet:
https://www.ibm.com/downloads/cas/LVYP6RM2

IBM Power System IC922 Technical Overview and Introduction (draft):
http://www.redbooks.ibm.com/redpieces/abstracts/redp5584.html

IBM Power System IC922 Knowledge Center:
https://www.ibm.com/support/knowledgecenter/POWER9/p9hdx/9183_22x_landing.htm

Enterprise AI Brochure
https://ibm.box.com/v/IBM-EAI-brochure

Data, Train, Inference (DTI) Solution Guide https://www.ibm.com/downloads/cas/YE6N4XRV

Why Your AI Infrastructure needs Both Training and Inference
https://www.ibm.com/account/reg/us-en/signup?formid=urx-41232

# Ďakujem !

## Cloud Solutions for Power Systems

**Red Hat OpenShift + Private Cloud**
Solutions for Power

**Hybrid Multicloud**
**Integration** across Public & Private Cloud

**IBM Cloud Paks**
for Data, Management, Applications, Integration, and Automation

**Public Cloud Expansion**
Solutions for Power

**Hyperconverged Systems**
Powered by Nutanix

Kontakt

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Client Technical Specialist for Power
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Power Systems

IBM

# Backup slides

# Red Hat OpenShift (OCP) and Power

- Red Hat's private cloud offering

- Ideal for Red Hat stack clients

- Initial release of OCP on Power in October 2018

- PowerVM support now available (April 2019)

- Primarily targeted at developers

- Containerize and manage existing Red Hat or open source applications via OCP catalog

- Runs across Power Systems portfolio

- Independent Power and x86 Cluster Support

**Available today**

POWER9

## POWER Cloud Benefits

- Build, run open source cloud native apps with full control of Kubernetes on Power (Bare-metal, KVM, PowerVM)

- POWER9 exploitation to modernize AIX and IBM i apps and accelerate AI/Deep Learning algorithms



Open Hybrid Cloud Fabric / Kubernetes Platform Mgmt.

# Provide a high value Platform for Mission Critical Workloads while Modernizing for Open Source, Cloud & AI – AIX and other Power Systems SW Highlights

## Workload Optimization

### New Levels of Workload Scalability

➢ *Improved (de)compression performance leveraging Power9 on-chip GZIP accelerator*

➢ *Improved interrupt performance via XIVE enablement*

➢ *VMM lock scaling for improved SAP workload performance*

➢ *High speed network adapter (100Gb) performance improvements*

### AI for data residing on AIX

➢ *Availability of Python based Machine Learning packages on the AIX toolbox*

➢ *Tech Preview: Enable scoring / inferencing capabilities on PowerVM-based Systems (via WML CE / H2O DAI)*

## Cloud

### AIX in the public Cloud

➢ *AIX in the IBM Cloud*
➢ *AIX in the Google Cloud*
➢ *AIX in the Skytap Cloud (e.g. Azure)*
➢ *AIX in various other CSPs' Clouds*

### AIX & Cloud native Apps

➢ *Integration with Cloud native apps / IBM Cloud Paks on OpenShift*

➢ *API access to workloads / data running on AIX*

### AIX & Open Source

➢ *A huge set of added / updated packages on the AIX Toolbox*

➢ *Building blocks for AIX patching and VIOS update use cases (Ansible!, Chef, Puppet)*

**PowerVC 1.4.4**

## Continuous Availability

**Oracle Certified!**

### Enhanced Scope & Usability for AIX Live Update

➢ *Kerberos Support*
➢ *AutoFS Support*
➢ *Improved preview behavior*
➢ *Improved error handling*

### PowerVM 3.1.1

➢ *Enhanced SSP network resiliency / built-in network failover*

### PowerHA for AIX 7.2.4

➢ *Cross Cluster Verification*
➢ *MQ Listener Support*

### VM Recovery Manager 1.4

➢ *VM workgroups spanning multiple hosts*

➢ *HA/DR unified management*

## Security & Compliance

### Enhanced Security and Compliance Capabilities

➢ *AIX Secure Boot*
➢ *AIX Trusted Installs*
➢ *IPSEC Resiliency Improvements*
➢ *SMB 2.1 support*

### PowerSC 1.3

➢ *Set of new AIX compliance profiles*
  ➢ *DoD STIG 7*
  ➢ *SAP*
  ➢ *CIS*
➢ *PowerSC MFA Integration*

### PowerSC MFA 1.2.0.2

➢ *Web Services APIs*
➢ *Failover scenario support*

### PowerHA for AIX 7.2.4

➢ *Encrypted password management*

# IBM i 7.4 TR 2 and IBM i 7.3 TR8 Highlights

**High Availability & Disaster Recovery**
- IBM Db2 Mirror for i – supports internal storage storage including NVMe
- PowerHA - Automation, use of SQL services, simplified updates
- BRMS - Highly requested enhancements and extensions

**Db2 for i**
- New SQL functions e.g. INTERPRET & COMPARE_FILE;
- SQL Services for Work Management functions

**Security (for 7.3 TR8)**
- TLS 1.3, TLS 1.2
- New Digital Certificate Manager Interface

**Increasing Productivity of Developers & Administrators**
- IBM i Access Client Solutions improved content assist support plus more ease-of-use functions
- Updated RPG Built-ins - %TIMESTAMP, %KDS & LIKEDS
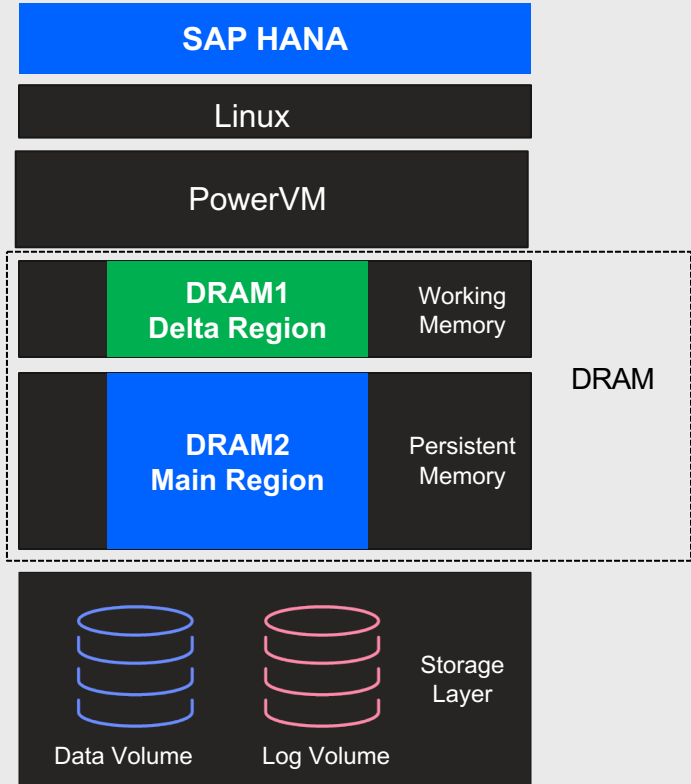- RDi – enhancements from requested RFEs

**Open Source enhancements**
- Improved content assist plus more ease-of-use functions
- Jq
- Python and Security environment updates

**Other**
- Clustering – more automation
- Virtual Tape Libraries
- Hybrid Networking – Making full use of high-speed fabric with Live Partition Mobility

# Virtual PMEM for SAP HANA on IBM Power Systems



- DRAM is split into two regions DRAM1 (delta region) & DRAM2 (Main region)

- DRAM2 is presented as PMEM device

- DRAM2 region is initialized with Main region when it is added for the first time

- Data written from DRAM2 to data volume after delta merge (creates new main)

- Changes to database continuously logged to Log volume

- Restart of HANA or Linux do not require main region to be loaded from Storage layer into DRAM2