Welcome to the Webinar!



### **Built on Power**

Peptalk Oracle on IBM Power







Torbjörn Appehl founded Built on Power and is an IBM Champion for IBM Power since 2016 Advising IBM ISV's François Martin from IBM is a Global Competitive Sales Specialist focusing on Oracle Tommi Sihvo is an IBM Champion from Tietoevry has helped customers moving from limited x86 servers to IBM Power

# What we promised as agenda

- An introduction to IBM (RISC Based) Power Servers
- IBM and Oracle, relations and resources
- Why Oracle runs so good on IBM Power Servers
- What did Tietoevry do to convince so many customers to move from x86 PC-servers
  - The arguments that works
  - The pain customers had before the move
  - The quick wins etc.
- ...

# Three different operating systems

# AIX IBMI LINUX









And many more..

### The CPU/Processor architecture

### x86 Architecture

(CISC – Complex Instruction Set Computers)



Introduced in the 1970s



(RISC – Reduced Instruction Set Computers)



Introduced in the 1980s

The performance of **RISC** processors is often two to four times **than** that of **CISC** processors because of simplified instruction set.

VS

### Who runs IBM Power?



Clients from various industries have moved from x86 to Power Systems			
	6 P		Constant of the second
Coop Group	United Breweries	Freudenberg IT	Aryzta
		- - -	
Würth Group	Vishal Mega Mart	Química Amparo	D.FI
Learn more about SAR	P HANA on Power		



#### Mar 19, 2018, 12:05pm EDT

Google Confirms POWER9 Processor Data Center Deployment At OpenPOWER Summit 2018



Patrick Moorhead Contributor ① Enterprise & Cloud I write about disruptive companies, technologies and usage models.

#### IBM i Explained - Torbjörn Appehl

### IBM Power Servers- Not like the rest: Built for business applications

### Below: x86/Windows/Linux



# You can be a bit more efficient for sure..





# IBM Power – Built for data load



# Scale up vs Scale out



#### Scale Out – One OS per box to manage. At a minimum



# Why Power is different infrastructure ?

A complete design, all components are integrated single solution and unique architecture for data processing

- Processor, Memory Xbar, Microcode, Virtualization, OS, ...
- ✓ Infrastructure Management
- System Software, Cloud capabilities
- RAS and Security
- I/O connectivity (Storage, Network)
- Unique Flexibility features (PEP, LUK,
- Simple operations
- For Long term investment

IBM Power Systems demonstrate benefits based on fact and proof points, no fiction, no secrets



Infrastructure is critical and it's only 25% of IT spending

### How Power drives Oracle TCO Savings ?

### SW cost is 80% of the TCO,



### licensing and SWMA cost reduction is the key to success

### SW costs lay beneath the surface

- Reduce #Cores to reduce SWMA cost
- Reduce #Cores to remain compliant
- Reduce #Cores to grow the workload with no additional licenses purchase



Core Factor



P9 vs x86  $\rightarrow$  x2.2\* Power10 vs x86  $\rightarrow$  2.8

Real Simultaneous Multi threading SMT8 throughput auto-optimized



# Architecture Design for Data processing

Unique integration: CPU, memory, I/O and all components usage





**Platform Efficiency** 

#### **Unique Capabilities**

Flexibility , Agility, highest RAS, Optimized infrastructure Better scalability

# **Core performance improvement vs x86**



IDC Qualified Performance Indicator

44 Cores E1080 64 Cores P780+ 48 Cores 48 Cores E880 E980 Xeon E5-2699 Xeon 8160 Xeon 8260 Xeon 8358 8-Core/chip 12-Core/chip 12-Core/chip 15 core/chip 22-Core/chip 24-Core/chip 24-Core/chip 32-Core/chip 7 nanometers 10 nanometers

← Continuous improvement →

Xeon E5-2690 Xeon E5-2697

24 Cores

12-Core/chip

36 Cores

Xeon E5-2699

18-Core/chip

16 Cores

8-Core/chip

### Workload growth without additional licenses purchase

Source: IDC QPI, http://www.idc.com/qpi



TCO Exadata (Xn) = exp(n)

### SAP S&D workload, Official & Public benchmarks (including the database tier)



Source: https://www.sap.com/dmc/exp/2018-benchmark-directory/#/sd

- World record 8-socket performance ullet
- More performance per core ullet
  - 4X vs 16-socket Intel<sup>1</sup>
  - 2.7X vs 8-socket Intel<sup>2</sup>

- 1. Google Cloud Platform: two-tier SAP SD standard application benchmark running SAP ERP 6.0 EHP5 (cloud); Intel Xeon Platinum 8280L 2.7 GHz, 16p/448c/896t, 157,000 SD benchmark users (892,270 SAPS), running Windows Server 2019 and Microsoft SQL Server 2017, Certification # 2021008.
- 2. HPE Superdome Flex; two-tier SAP SD standard application benchmark running SAP ERP 6.0 EHP5; Intel Xeon Platinum 8380H 2.9 GHz, 8p/224c/448t, 122,300 SD benchmark users (670,830 SAPS), Windows Server 2016 and Microsoft SQL Server 2012, Certification # 2021006.

### Power10 cores, Software and licenses

Fewer cores, fewer licenses, even more Oracle savings with Power10



E1080 12-cores recommended for Oracle Workloads for best performance and SW savings

Power8 to Power10, 50% reduction in nodes, less space, energy and cooling costs

Private Cloud Dynamic capacity Share resources across Power9 & Power10 in an automated way

Based on published SMT8 rPerf data for Power E980 and Power E880C and E1080 12 cores - <u>https://www.ibm.com/downloads/cas/K90RQOW8</u> rPerf is a computer benchmark that evaluates the relative OLTP performance. Oracle database performance may also vary according other kind of metrics. (\*) Per core performance improvement ranges are given with E1080 12 cores per socket

# Virtualization, higher Utilization !!

→ 2x CPU utilization, less cores/licenses

→ Flexible, on the fly resource management

 $\rightarrow$  Higher consolidation, less servers

→ Mixed environments, Prod, dev,...

→ Workloads physical isolation

→ No overhead, VMs scalability

→ Run DBs and Applications

→ Easier maintenance

→ Simple operations

fewer cores, fewer licenses

### **Sharing CPU** VM's idle CPU is **used**

# Mapping CPU VM's idle CPU is wasted



#### 1 to 1 Mapping 1 Virtual CPU = 1 Physical thread,Idle CPU in VMs is wasted

" CPU over-provisioning is possible, But workload performance conflicts can arise if all guests become fully active " https://www.oracle.com/a/tech/docs/exadata-kvm-overview.pdf#page=12



PowerVM Virtualization is integrated by design

- > Optimize CPU utilization
- Higher sustained Utilization
- Oracle "Hard Partitioning" pay what you use

# Oracle DB licensing on Power Systems

Enterprise Edition, per core

Oracle Global Pricing and Licensing https://www.oracle.com/corporate/pricing/specialty-topics.html

- Oracle Processor Core Factor Table Intel Xeon core= 0.5 / Power 6-7-8-9= 1 / All Other Multicore chips= 1
- <u>Oracle Partitioning Policy</u> IBM's LPAR, Oracle-approved hard partitioning technology, limit the number of software licenses, capped or a maximum number of cores



Disable LPM on OracleDB LPARs or negotiate usage with Oracle. (see footpage https://www.oracle.com/assets/partitioning-070609.pdf

Oracle **Live Partition Mobility** Oracle **DB** Server **DB** Server 2007, IBM invented Live Partition Mobility, customers appreciate for planned **10 cores Oracle DB** maintenance. 5 cores 5 cores = 10 licenses ? 2013, Oracle used technology to capture revenue and changed the licensing **Non-Oracle** Non-Oracle rule: "not an approved hard partitioning technology. All cores on both the LPM 

30 licenses !! SW Server **SW Server** source and destination servers .... Must be licensed " 10 cores 10 cores

### Power Systems has Unique Flexibility and Efficiency:

#### **Architecture and Consolidation and Deployment**

- Build Oracle Database Patterns according to <u>each</u> database SLA
  - Database architecture is not driven by infrastructure
- Efficient & robust virtualization as a solid and secure foundation for Oracle database consolation and non-Oracle workloads
- Keep control & dynamically adapt resources allocation

combine infrastructure (Power & Storage) HA/DR and Backup/restore solutions with Oracle Database HA/DR features and an optimal database consolidation strategy



• Pay only for what you use via metering by the minute (capacity credits) to handle unexpected peaks beyond base and to enable OpEx models



# <u>Share a Pool of resources</u> across servers in an automated way to optimize your infrastructure

Activate in a pool maximum usage resources instead of paying all cores activations

### RAS & Resilience, IBM Power servers Ranked Number #1 by ITIC, 12 years in a row



huawei-mission-critical-servers-deliver-highest-uptime-availiability/

Enterprise Server OS System Availability & Unplanned Downtime in 2020 (Hours per Year)



#### Is RAC cluster DB option required to meet Business Continuity, Uptime SLA?

NO → Save \$23,000 per license (list price) + 22% SWMA per year YES → Use RAC on Power Systems as a stretched active/active, it's HA, not just DR

### Security, by design

#### 

information Technology Laboratory

NATIONAL VULNERABILITY DATABASE



#### ➔ Outstanding and unrivaled security track record of AIX and PowerVM compared to Linux and x86 Virtualization when it comes to vulnerabilities

Power servers were the first in the IT industry with risk mitigation against Spectre and Meltdown security concerns

# On x86, you need to disable HMT and loose performance to mitigate the issue



https://access.redhat.com/security/vulnerabilities/L1TF

#### Q Search Results (Refine Search)

#### Search Parameters:

- Results Type: Overview
- Keyword (text search): PowerVM
- Search Type: Search All
- CPE Name Search: false

#### Q Search Results (Refine Search)

#### **Search Parameters:**

- Results Type: Overview
- Keyword (text search): KVM
- Search Type: Search All
- CPE Name Search: false

There are **5** matching records. Displaying matches **1** through **5**.

There are **172** matching records. Displaying matches **1** through **20**.

- The PowerVM hypervisor has very few reported security vulnerabilities since inception and provides the bullet-proof security that customers demand for mission-critical workloads
- Dare to compare search any security tracking DB and compare Power against x86

### Power10 Improves Security without cost and complexity

Protect data in memory with transparent memory encryption

#### Host based HW Encryption at all levels of the stack



- Fast hardware-accelerated and simplified encryption
- Security and data protection is not only about the DB
- Preventing programs from branching in and reading memory itself
- Encrypt Oracle single instance DB from top to bottom, Transparent Memory Encryption and AIX Logical Volume encryption at no additional cost
- All data encrypted in Oracle single instance DB, no need to define specific records, tables, columns.
- Simple and easy key management. (PKS and KMIP capable Key Management servers)
- OracleDB security option could be used (Transparent Data Encryption, \$15k list price per license)
- Overall security combination with storage immutable copies on Spectrum Virtualize, called Safeguarded Copy
- Protection against physical attacks

### Hybrid Cloud Strategy with IBM Power Systems



IBM Power Systems runs Oracle Software, also open to consolidation of any non-Oracle workload, AIX, IBMi / Linux Workloads, Apps and DB Tiers

No red Lock-in No Complexity

### **IBM Power Systems technology drives Innovation**

Build new cloud-native solutions on top of a robust infrastructure for back-end database

**Distributed Front-end Application** Micro-Service with OpenShift

#### Robust Back-end DB 🚍 All on a unique infrastructure



**OpenShift : Enterprise Kubernetes for Cloud Native** OCP on Power: 2.5 X more container density vs. x86 IBM Cloud Pak for Apps for easy Re-platforming & DevOps

ORACLE Mission critical Back-end Oracle Database on Power Systems for Resiliency / TCO



Deploy anywhere, private, public, hybrid



#### www.builtonpower.com



### ORACLE

IBM and Oracle have 30 years history of collaboration in certifying IB Systems technology, virtualization, and operating systems with the Oracle Database. Both companies continue their investments to develop, test and deliver Oracle Database on IBM servers including current and future releases of those products.

IBM has more than 10.000 Oracle specialist. If you need to get in contact with the IBM Oracle International Competency Center, pleas use the follow email address: https://www.com.com/







edbooks

Power Systems

IBM

#### https://www.ibm.com/case-studies/copel-oracle-power

#### Some useful links

Oracle Processor Core Factor Table https://www.oracle.com/us/corporate/contracts/processor-corefactor-table-070634.pdf

Modernizing Oracle Database on IBM Power (September 2021) https://www.ibm.com/downloads/cas/X0PJMD42

#### Power related links on www.oracle.com

Announcement: Support Statement for Oracle Database running on IBM Systems (Doc ID 2766930.1)

The why and how of migrating Oracle Sparc Solaris to IBM Power

Supported AIX 7.2 Versions https://docs.oracle.com/en/database/oracle/oracledatabase/12.2/axdbi/supported-ibm-aix-7-2-versions.html#GUID-7BDD5193-1943-4103-9795-CF9CCEC283B1

#### Why IBM Power Systems are a superior investment to Oracle SPARC Solaris and Exadata Systems

https://community.ibm.com/community/user/power/blogs/skipgarvin1/2021/03/08/why-ibm-power-systems-are-a-superiorinvestment-to

#### Links on Seismic (IBM/Business partners only)

Oracle on IBM Power: Opportunity Identification & Progression REFRESHED JULY 2021

Battlecard - IBM power vs Oracle Exadata (May 2021)

Oracle SW Support on PowerVS

Oracle on IBM Power - Sales Kit

#### stomer Success Stories

#### ttps://www.ibm.com/case-studies/oracle

acing double-digit growth, energy company Copel needed to ensure ore systems were up to the challenge. By upgrading to two IBM® ower Systems™ E880C servers, the company gained 49 percent dditional capacity for its Oracle Database workload without extra osts, and cut backup times by 43 percent, enabling higher uptime for ey apps.

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# Thank you!







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