



Modernize with SQL Server 2019 and Intel® Technologies



Presenting Sponsors:





SQL Server 2008 EOS Is
Coming - Modernizing with
Intel® Technologies



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Experience

Microsoft Certified Professional 2012/2014,
2016-2017

Over 10 years of experience

Multi-platform DBA

Community

Guatemala SQL Server User Group – board
member

Fields of Experience

MS SQL Server

Linux Distros

Oracle 10-11g

Data-Centric Infrastructure Focus

MOVE **Faster**



SILICON PHOTONICS

OMNI-PATH FABRIC

MOVE **More**



PROCESS **Everything**



Software & System-Level **OPTIMIZED**



Data-Centric Portfolio

MOVE **Faster**

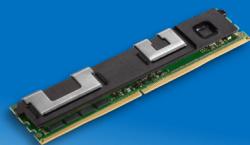
STORE **More**

PROCESS **Everything**

INTEL®
ETHERNET
800 SERIES



INTEL®
OPTANE™ DC
Persistent Memory



DUAL Port
INTEL®
OPTANE™ DC SSD



INTEL®
QLC 3D NAND SSD



2nd Generation
INTEL®
Xeon® Scalable



INTEL®
Xeon® D-1600



INTEL®
AGILEX™ FPGA



A Modern OS for the Digital Age

Investment areas for WS 2016

- Hyper-converged infrastructure management
- Support for Windows containers with optimized images
- Advanced multi-layer security
- Cloud-ready application platform
- Networking enhancements for greater density and quicker endpoint creation
- Nano Server is a lightweight OS for running “cloud-native” applications
- Windows Admin Center simplifies HCI infrastructure management

Investment areas WS 2019

- HCI enhancements for better management scale and performance and storage class memory support
- Linux container support, optimized server images, service fabric & Kubernetes orchestration
- Shielded VMs for Linux, integrated Windows Defender ATP/Exploit Guard, encrypted subnets
- Unique hybrid platform with easier connection to Azure services
- In-place OS Upgrade from Windows Server 2012 R2, Windows Server 2016

Legacy Windows Server vs. Modern

	Windows Server 2008 R2	Windows Server 2012 R2	Windows Server 2016	Windows Server 2019
Hardware Scale	1 TB RAM/64 LPs	4 TB RAM/320 LPs	24 TB RAM/512 LPs	24 TB RAM/512 LPs
Virtualization Scale	Up to 4 VPs per VM Up to 1 TB RAM per VM	Up to 64 VPs per VM Up to 1 TB RAM per VM	Up to 240 VPs per VM Up to 12 TB RAM per VM	Up to 240 VPs per VM Up to 12 TB RAM per VM
Hyper-Converged Infrastructure	-	-	Yes	Yes
Software Defined Storage	-	Shared SAS	Storage Spaces Direct (HCl)	Storage Spaces Direct (HCl)
Software Defined Networking	-	SDN v1	SDN v2	SDN + Container Networking
Containers	-	-	Windows Server Containers	Windows & Linux Containers
Shielded VMs	-	-	Windows Only	Windows & Linux
iWARP*/RDMA	-	Storage Only	Yes Storage & Hyper-V	Yes Storage and Hyper-V
Virtualization Based Security	-	-	Yes	Yes
Advanced Flash Support	-	-	NVMe	NVMe, NVDIMM, Intel® Optane™ SSD
Memory	DDR3-800 to 1333MHz	DDR3-800 to 1600MHz	Up to DDR4-2666	Up to DDR4-2933 + Intel® Optane™ DC Persistent Memory (est. 2019)
Server Core	3.0GB	5.2GB	3.8GB	1.6GB
Nano Server	-	-	410MB	< 100MB
System Insights	-	-	-	Yes

Upgrade for Best Performance and Security

8 year Old Server + Windows Server 2008 R2 vs.
Intel® Xeon® Scalable Platform + Windows Server 2019



Compute

7X number of cores

2 sockets/28 cores (56 cores total)
Accelerate Compute-Intensive Workloads with Intel® AVX-512, AES-NI



Memory

4-16X more Memory

256 GB – 3.0 TB
Intel® Optane™ DC Persistent Memory Capable



Storage

Hyper-Converged Infrastructure

Microsoft Storage Spaces Direct with iWARP RDMA acceleration
High performance, advanced flash support NVMe, NVDIMM, Intel® Optane™ SSD



Networking

Integrated Intel® Ethernet with iWARP RDMA

Numerous network offloads
10/25/40/50/100 Gb NICs



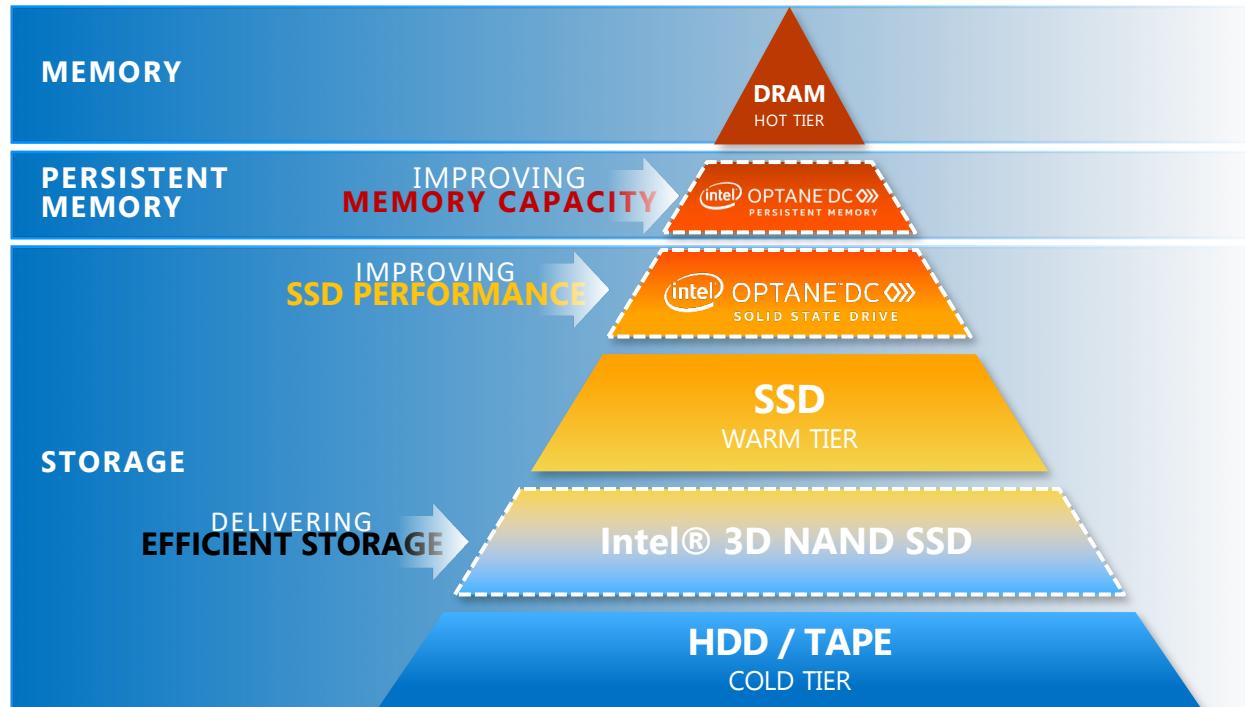
PLATFORM SECURITY
UEFI, TPM 2.0, Secure Boot

ACCELERATED DATA ENCRYPTION
Bitlocker, AES-NI

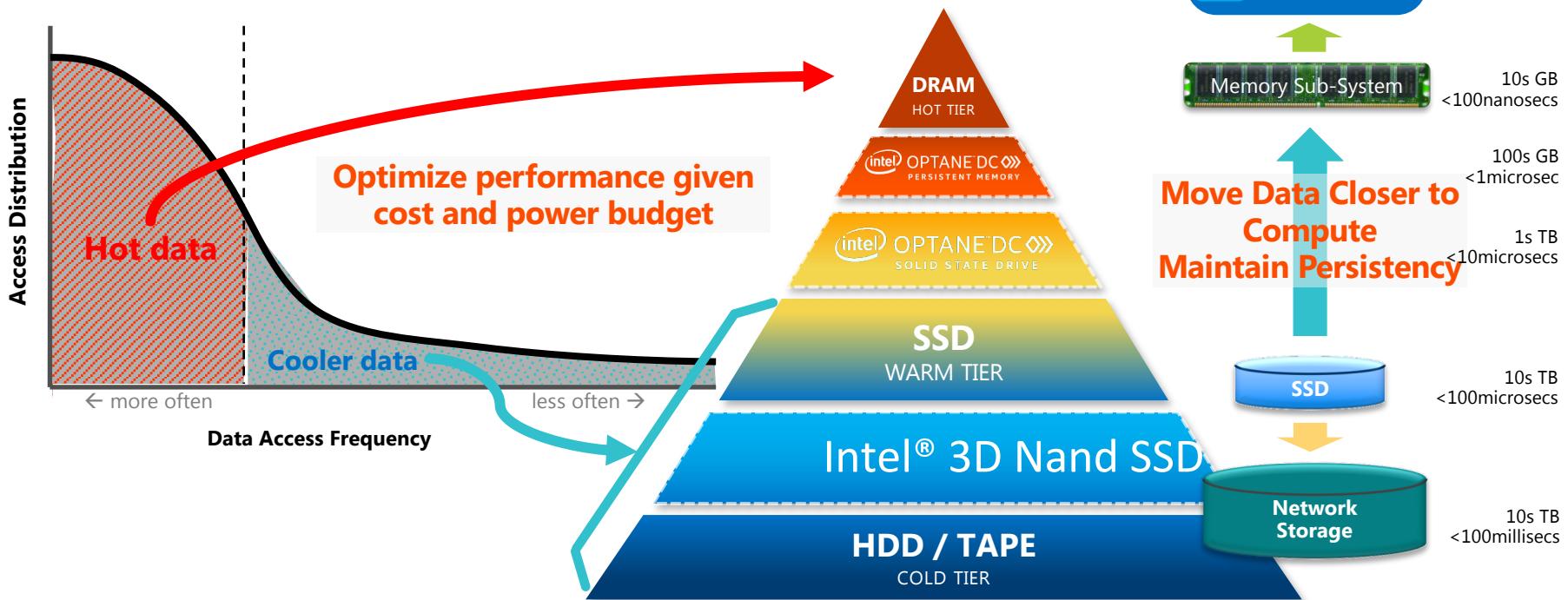
SHIELDED VMs
Windows & Linux



Transforming the Memory Storage Hierarchy



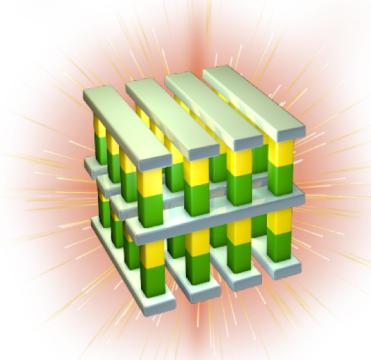
Goal: Efficient Data Centric Architecture



Technology Driven: Intel® Optane™ Technology

Unleashing breakthrough performance for a new generation of

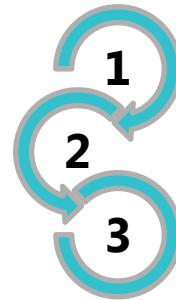
Intel® 3D XPoint™ Memory Media



Breakthrough material
advances for scalability
& high performance

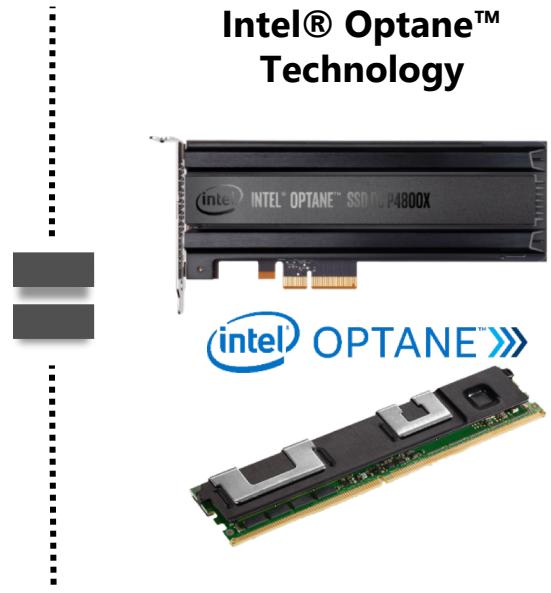


computing Intel® building blocks



Intel System
Memory Controller,
Interface HW, and SW IP

Intel® Optane™ Technology





Faster Query Performance with 2nd Gen Intel® Xeon® Processor + SQL Server

PAST
CUSTOMER
EXPERIENCE

FASTER DATA WAREHOUSE QUERY PERFORMANCE WITH LATEST SW & HW

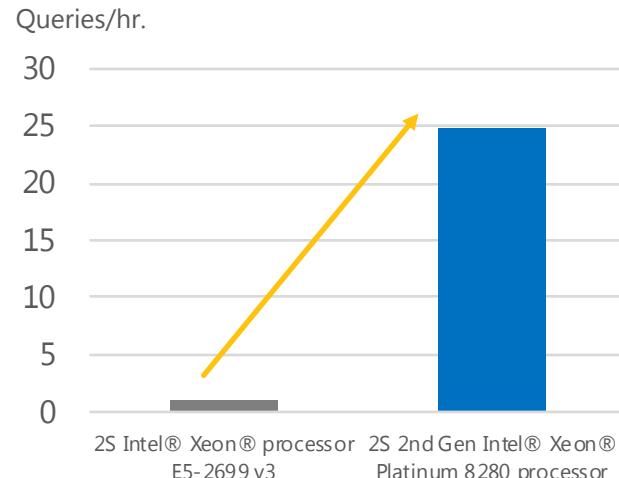
33,681 queries per hour
at 1TB scale factor with a 4 year old system

CUSTOMER
EXPERIENCE
TODAY

With 2nd Gen Intel® Xeon® Scalable processors:

836,261 queries per hour
at 1TB scale factor

24.8X better

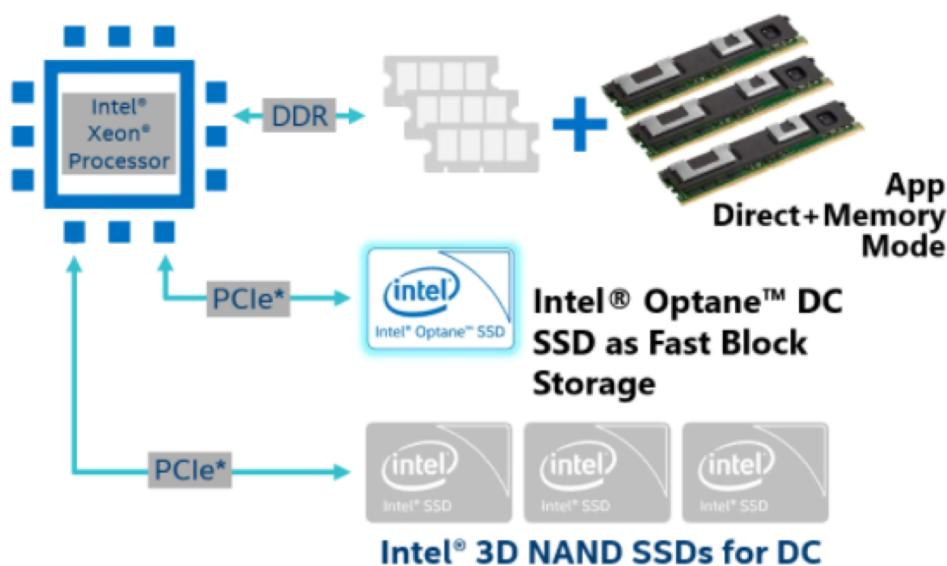


Performance results are based on testing by Intel as of 2/8/2019 and may not reflect all publicly available security updates. See configuration disclosures for details. No product or component can be absolutely secure. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit www.intel.com/benchmarks. 1. Configuration: See slide 13

*Other names and brands may be claimed as the property of others

REDUCED PERSISTENT MEMORY SUPPORT - TAIL OF THE LOG

FAST STORAGE AND MEMORY MODE

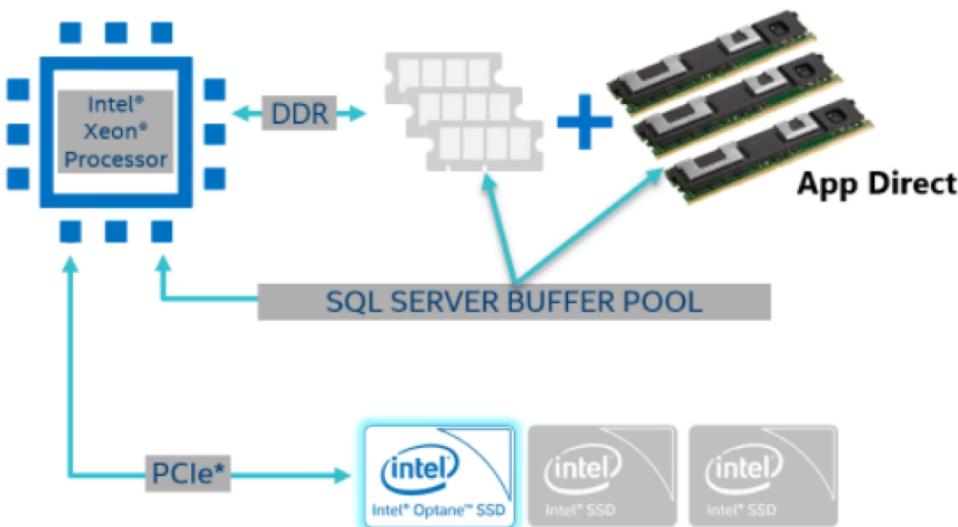


SQL SERVER - PMEM SUPPORT

SQL Server 2016 – Support for Tail of the log – Use part of PMEM capacity for tail of the log and remainder as Memory Mode. Use Optane DC SSD for TempDB and Transaction Log support

EXPAND BUFFER POOL WITH PERSISTENT MEMORY

FAST STORAGE AND MEMORY MODE



Intel® Optane™ DC SSD and
Intel® 3D NAND SSDs for DC
as Fast Block Storage Mode

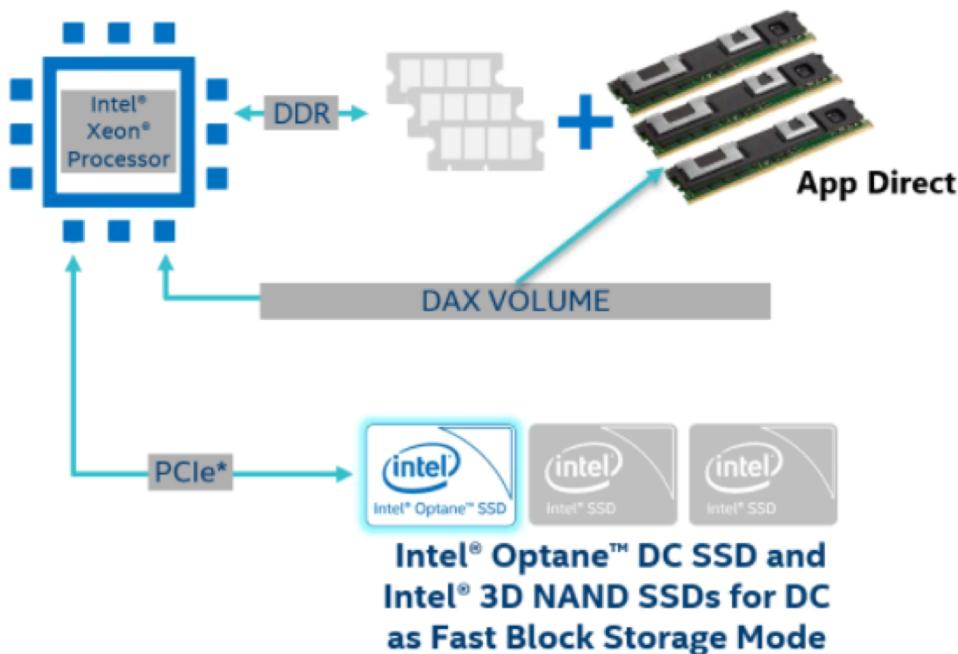
SQL SERVER - PMEM SUPPORT-HBPE

Uses Optane DC Persistent Memory as extension of SQL Server Buffer Pool (HBPE)
Uses Memory Mapped IO to access clean pages stored in PMEM space.

Use Large allocation space and format volume in DAX mode

ENLIGHTENED VERSION - ALL DAX 4 ALL

FAST STORAGE AND MEMORY MODE



SQL SERVER-PM SUPPORT - ENLIGHTENED

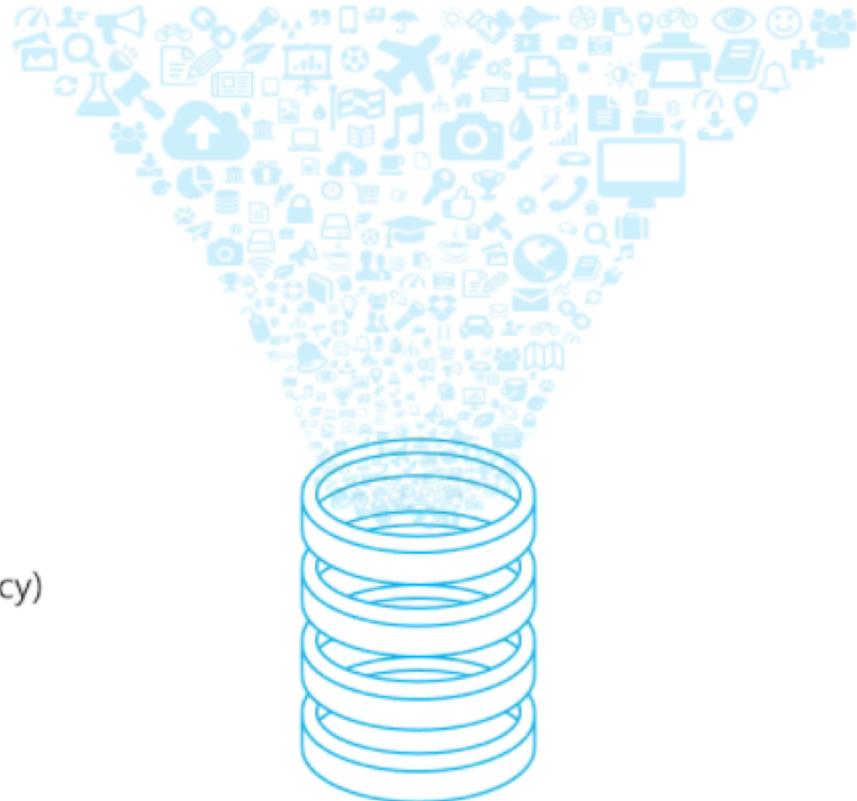
For Enlightened versions of SQL, database files can be placed in DAX Volumes

Enable trace flag 3979 to disable the forced flush mechanism

As of May 2019, SQL Server 2019 CTP on Linux support.

New Features in SQL Server 2017

- Support for graph data and queries
- Advanced Machine Learning with R* & Python*
- Native T-SQL scoring
- Adaptive Query Processing and Automatic Plan Correction
- Cross Platform HA (OS-level redundancy)
- Agile Dev/Ops with support for containers



Memory Mode Example- Virtualized SQL Server

INCREASE VMS PER NODE FOR MULTI-TENANT
VIRTUALIZED DATABASES

ALL DRAM CONFIGURATION (768 GB)

 22 Microsoft SQL VM instances with DRAM memory at ~\$1,588 USD per VM

DRAM (192 GB) + INTEL® OPTANE™ DC PERSISTENT MEMORY (1024 GB)

 +  30 Microsoft SQL VM instances at ~\$1,108 USD per VM

36% more VMs per node¹
30% lower estimated HW cost per VM²

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Intel® Select Solutions

BOOST
IT Velocity

WITH PRE-DEFINED AND VERIFIED
INFRASTRUCTURE SOLUTION STACKS
AVAILABLE FROM A
RANGE OF PARTNERS

> 50

VERIFIED
PARTNER
SOLUTIONS

INCREASE
System Level
Performance

WITH HIGHLY OPTIMIZED
CONFIGURATIONS
OF INDUSTRY-LEADING
INTEL DATA CENTER TECHNOLOGIES

UNPARALLELED
HW / SW
Ecosystem

TO ACCELERATE YOUR
PACE OF INNOVATION ACROSS
CRITICAL BUSINESS WORKLOADS



<http://www.intel.com/selectsolutions>



Making workload acceleration Easy With Intel® Select Solutions



A blue rectangular card titled "Analytics". At the top is a small icon of a computer monitor displaying binary code (011010110110...). Below the title are two sections, each with a "UPDATED" badge in the top right corner. The first section contains "MICROSOFT SQL SERVER" and "WINDOWS SERVER". The second section contains "MICROSOFT SQL SERVER" and "LINUX*". At the bottom left is the text "* Coming Soon".

Analytics

UPDATED

MICROSOFT SQL SERVER
WINDOWS SERVER

UPDATED

MICROSOFT SQL SERVER
LINUX*

* Coming Soon



A blue rectangular card titled "Hybrid Cloud". At the top is a white cloud icon. Below the title are two sections, each with a "UPDATED" badge in the top right corner. The first section contains "MICROSOFT AZURE STACK". The second section contains "MICROSOFT AZURE STACK HCI".

Hybrid Cloud

UPDATED

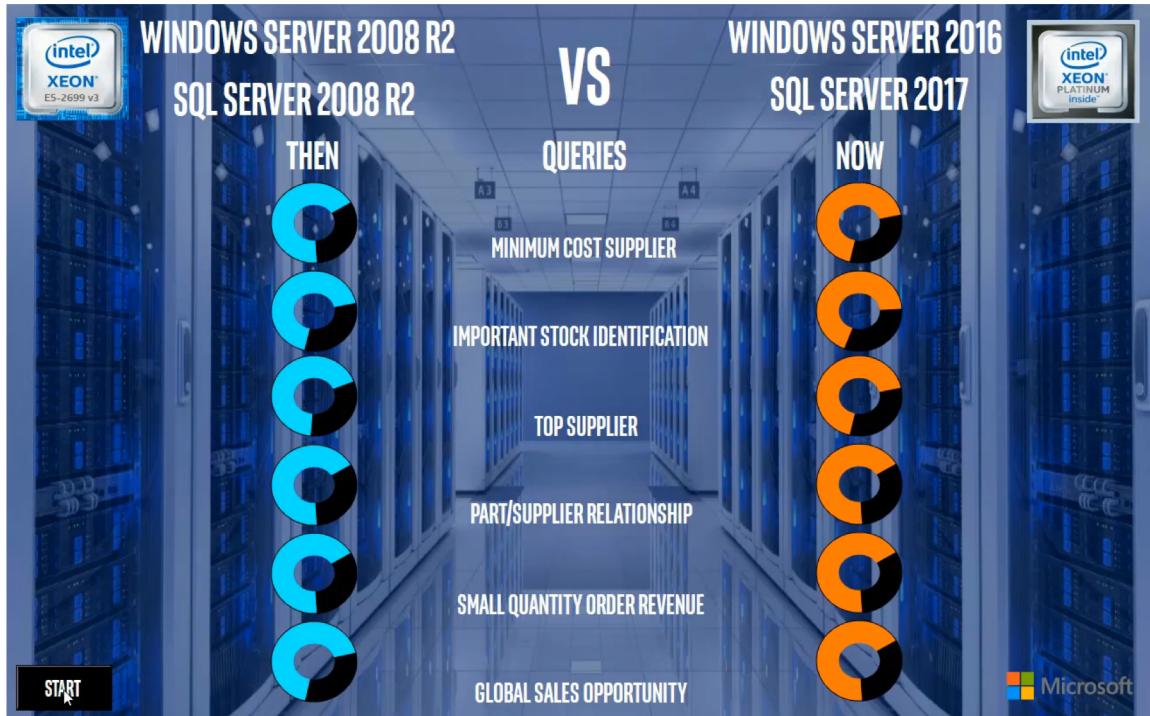
MICROSOFT AZURE STACK

UPDATED

MICROSOFT AZURE STACK HCI

Reduced Query Runtimes⁴

With 2nd Gen Intel® Xeon® Scalable Processor + SQL Server 2017



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Thank You