Actualités PowerEdge

Serveurs AMD EPYC Gen2 / Processeurs Cascade-Lake / SSD Optane

Comité X/STRA, le17 Septembre 2019

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A collective force of innovative capabilities

DELLTechnologies

DELL	**DELL**EMC	Pivotal.	RSA	SecureWorks	virtustream	vmware

Innovative devices, services and solutions designed for the way people work (and play)

Transforming the data center with industry-leading servers, storage and converged infrastructure

Leading intersection of Big data, PaaS and agile development leveraging data on one cloud-independent platform

Premier provider of security, risk and compliance solutions solving your most complex challenges

Elite and trusted intelligence that strengthens security and reduces risk in a dynamic landscape

Leading enterprise-class cloud software and solution provider

Most trusted virtualization solution for desktop, data center and applications

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New Dell EMC PowerEdge Servers / AMD
Lancement Sept-Oct 2019 / 2nd Generation AMD EPYC^{TM}

| R6515	R7515	R6525	R7525	C6525
Single-socket 1U rack server brings peak performance and excellent TCO	Highly scalable 2U rack server delivers performance and outstanding TCO	Highly configurable 1U rack server delivers outstanding balanced performance for dense compute	Highly adaptable 2U rack server brings powerful performance and flexible configuration	Compute-dense server sled accelerates data center performance to tackle diverse HPC applications
1S RACKS		**2S RACKS**		**C-SERIES**

EMERGING WORKLOADS

MULTI - CLOUD

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2nd Generation AMD EPYC™
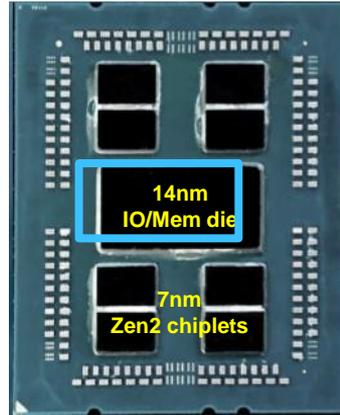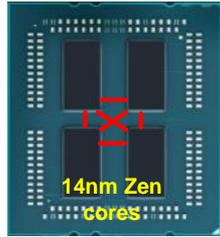
Up to 64 cores / 128 threads

2 x L3 cache per core
(16MB per 4 cores)

2 x PCIe performance with Gen4 at 16GT/s

14nm IO/Mem die

7nm Zen2 chiplets

2x performance*

14nm Zen cores

20% memory speed increase: 2666MHz to 3200MHz

Double the speed per socket with xGMI-2 (~16GT/s)

Secure Encrypted Virtualization SEV provides 509 unique hypervisor keys

Naples: I/O and memory spread across each Zen core creates lots of internal traffic

Rome: Single IO/Mem die removes internal bottleneck for lower latency

*Perf projections based on AMD internal 20Jan2019. Subject to change.

MULTI-CHIP DESIGN BENEFITS

Separate I/O die from Zen2 chiplets allows:

- Flexible core configurations
- Higher chip yields

Dedicated I/O+mem die defaults to 1 NUMA domain

- Flexibility to also configure 2 or 4 NUMA domains
- 30ns improvement in latency for non NUMA aware apps (analytics, HPC – NamD, Linpack)

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Portfolio PowerEdge

Shared Infrastructure

PowerEdge VRTX
Dense 2S/4S
Storage & Networking
for SMB & ROBO

PowerEdge FX
2U Rack-based Flexible
Compute & Storage
for the Data Center

PowerEdge MX7000 7U
Dense 2S/4S
Compute & Networking for
the Data Center

NEW!

PowerEdge C6525
2U - 4 sleds AMD 2S
Compute & Storage

PowerEdge C6420
2U Rack-based
Compute & Storage

M-Series Blades (M1000e/VRTX) and FX Nodes (FX2)

FD332 (FX)
Direct Attach Storage

MX5016S (MX)
Direct Attach Storage

FC640
Dense 2S

FC830
Dense 4S

MX740C
Dense 2S

MX840c
Dense 4S

Rack-optimized

NEW!

R240
Entry 1S (1U)

R340
Mainstream 1S (1U)

R440
Mainstream 2S (1U)

R540
Mainstream 2S (2U)

R640
Performance 2S (1U)

R740, R740xd
Performance 2S (2U)

NEW!

R740xd2
High Storage 2S (2U)

NEW!

R6515, R6525
AMD 1S et 2S (1U)

R7515, R7525
AMD 1S et 2S (2U)

R840
Highly Scalable 4S (2U)

R940
Highly Scalable 4S (3U)

R940XA
Scalable 4S with GPU (4U)

C4140
2S & Dense GPU (1U)

Towers

T30
SOHO 1S

NEW!

T140
Entry SMB 1S

T340
Mainstream 1S

T440
Mainstream 2S

T640
Scalable 2S

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Evolution à venir > 14G

PowerEdge Dernières Innovations
Performance, Sécurité et Manageabilité

Brand new Board Design	Improved signal integrity for PCIe Gen4 and enables balanced airflow for better thermal design
Higher Performance	2nd Gen AMD EPYC delivers higher performance with up to 64 Cores / 128 Threads , 2x L3 cache/ core
Greater Bandwidth	PCIe Gen4 enables 2x PCIe performance at 16GT/s. Additionally, 20% higher memory speed increase to 3200MHz
Workload – Optimized Configurations	Risers optimized for each specific workload including GPUs for ML/DL, maximizing slots for VDI or max PCIe B/W

iDRAC9	4x faster user experience vs. previous generation including support for PCIe Gen4
Automated Cooling	Multi-vector cooling that is automatically guided on to the hottest parts of the server
Intelligent Power Management	Streamline power management with the latest OpenManage Enterprise plug-in architecture

|	
Integrated security	Protect each VM by isolating the guests and the hypervisor with AMD Secure Encrypted Virtualization (SEV) Protect data by using a single key to encrypt the system memory with AMD Secure Memory Encryption (SME)
Drift detection & System lockdown	Detect and remediate unauthorized or malicious change with drift detection and system lockdown with OpenManage Enterprise and iDRAC9
Protect data at rest	Reduce the risks of securing data across their data center with OpenManage Secure Enterprise Key Manager[1]

1. OpenManage Secure Enterprise Key Manager will be available on R6515 and R7515 in December 2019

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Nouveau design carte mère
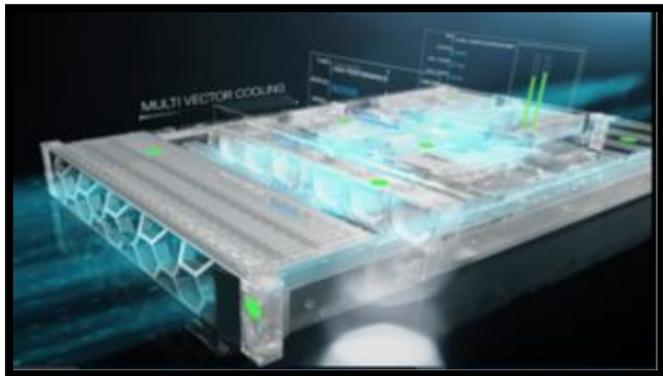
Balanced airflow provides better thermals for workloads requiring rich configurations

- CPU TDPs up to **240W**

- Multiple GPUs up to **300W**

- High mem capacities – up to **32** LRDIMMs
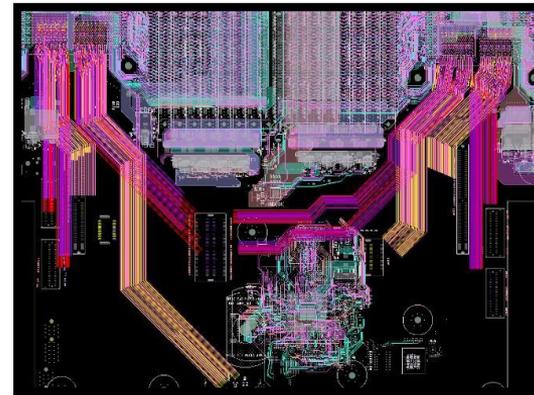
Improved signal integrity for PCIe Gen4 at 2X the speed of Gen3 – 16GT/s

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Dell EMC Defines Networking Industry Standards

PowerEdge networking moves to new Open Compute Project (OCP) 3.0

Dell rNDC

- Proprietary
- x8 Gen3
- Non-standard riser connector
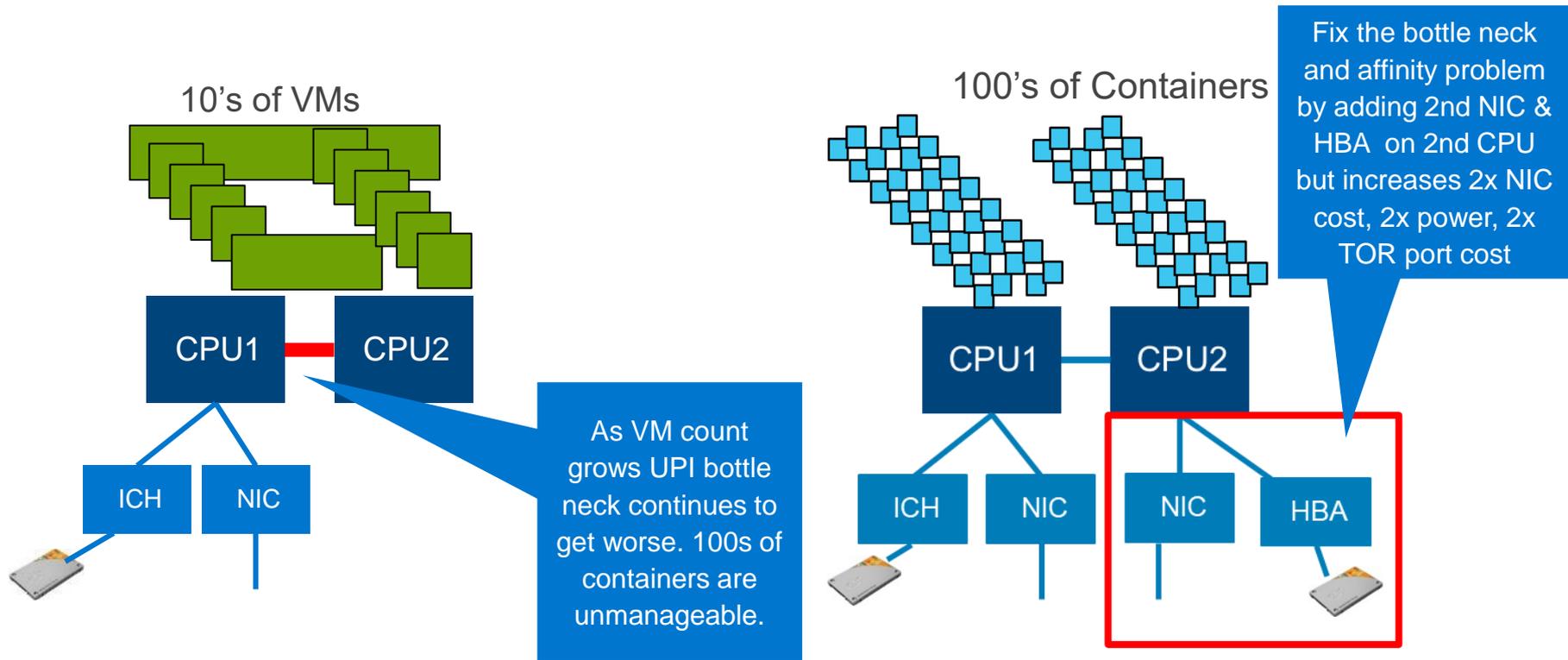- Shared LOM with iDRAC

OCP 3.0

- Industry Standard – wider variety of cards available
- x16 Gen4 – twice the speed, twice the bandwidth
- Standard Edge connector
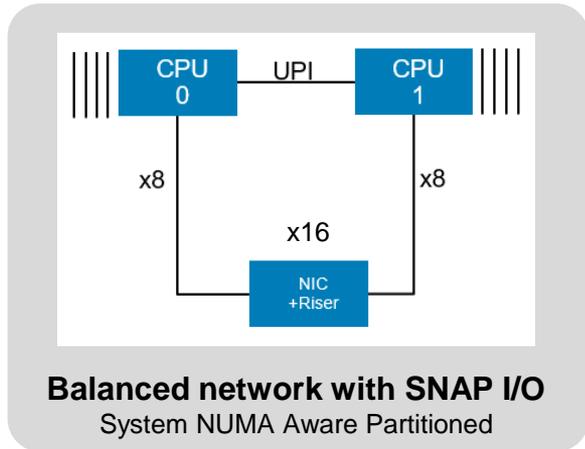- Shared LOM with iDRAC (standard PCIe cards do not support this function)

Upcoming Changes

- New speeds: 4x25G, 2x50G, 2x100G (PAM4)
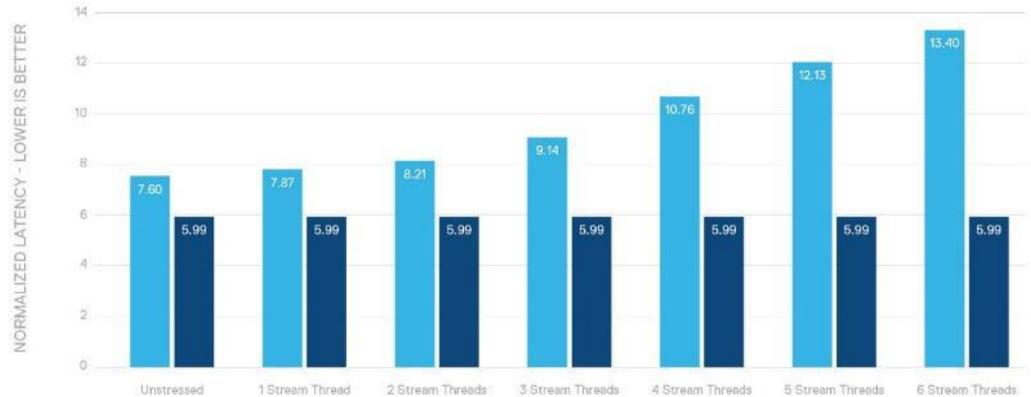- 10GbE adapters no longer come with 2x 1GbE ports (moved to LOM)

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Problématiques des DSI: latences réseau

10's of VMs

100's of Containers

CPU1 — CPU2

ICH NIC

As VM count grows UPI bottle neck continues to get worse. 100s of containers are unmanageable.

CPU1 — CPU2

ICH NIC NIC HBA

Fix the bottle neck and affinity problem by adding 2nd NIC & HBA on 2nd CPU but increases 2x NIC cost, 2x power, 2x TOR port cost

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Solution: SNAP I/O avec PowerEdge

Balanced network with SNAP I/O
System NUMA Aware Partitioned

2S Server: CPU0 vs CPU1 Network Latency to IO on CPU0 during stress

Standard slot   SNAP I/O *

- Bandwidth steering from 1 port to both CPUs
- Multi Host NIC trains as 2 x8's - Standard Mellanox NIC with new FW and Others heading this way
- No affinity mapping required
- NO NUMA link hops – greater bandwidth and lower latency leads to deterministic performance
- Reduced port IO to TOR switch – less cables
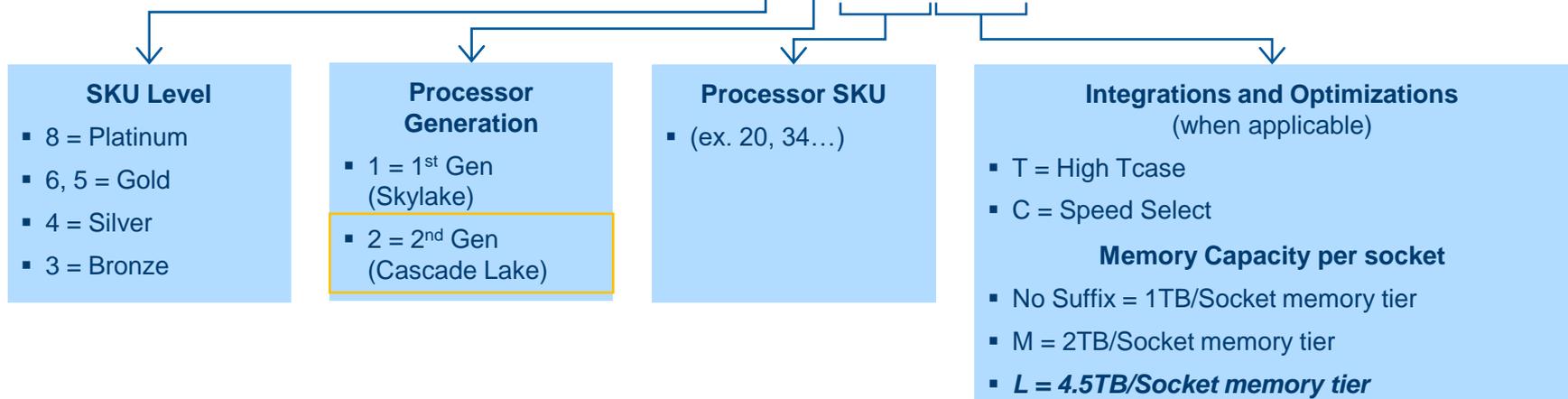- **PowerEdge is helping you feed your cores!**

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Cascade-Lake

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Cascade Lake product numbering convention for Intel® Xeon® Processor scalable family

Intel® Xeon® Platinum	8	#	#	#	a	a	Processor
Intel® Xeon® Gold	6	#	#	#	a	a	Processor
Intel® Xeon® Gold	5	#	#	#	a	a	Processor
Intel® Xeon® Silver	4	#	#	#	a	a	Processor
Intel® Xeon® Bronze	3	#	#	#	a	a	Processor

SKU Level
- 8 = Platinum
- 6, 5 = Gold
- 4 = Silver
- 3 = Bronze

Processor Generation
- 1 = 1st Gen (Skylake)
- 2 = 2nd Gen (Cascade Lake)

Processor SKU
- (ex. 20, 34…)

Integrations and Optimizations (when applicable)
- T = High Tcase
- C = Speed Select

Memory Capacity per socket
- No Suffix = 1TB/Socket memory tier
- M = 2TB/Socket memory tier
- *L = 4.5TB/Socket memory tier*

Note: **All information provided here is subject to change without notice**. Intel may make changes to specifications and product descriptions at any time, without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps

intel Technologies

Intel® Xeon® processor scalable family – Cascade Lake processor levels and features

82xx (Platinum)	62xx (Gold)	52xx (Gold)	42xx (Silver) [1]	32xx (Bronze)
▪ 2S-2UPI, 2S-3UPI, 4S-2UPI, 4S-3UPI capability	▪ 2S-2UPI, 2S-3UPI, 4S-2UPI, and 4S-3UPI capability	▪ 2S-2UPI & 4S-2UPI capability	▪ 2S-2UPI	
▪ *6-ch DDR4 @ 2933 1DPC*	▪ 6-ch DDR4 @ 2933 1DPCDIMM	▪ *6-ch DDR4 @ 2666*	▪ 6-ch DDR4 @ 2400	▪ 6-ch DDR4 @ 2133
▪ *Intel® Optane™ DC Persistent Memory DIMM*	▪ 16Gb based DDR4 DIMM	▪ Intel® Optane™ DC Persistent Memory DIMM	▪ *16Gb based DDR4 DIMM*	▪ *16Gb based DDR4 DIMM*
▪ *16Gb based DDR4 DIMM*	▪ Intel® Optane™ DC Persistent Memory DDR4 DIMM	▪ 16Gb based DDR4 DIMM	▪ 2 UPI links @ 9.6GT/s	▪ 2 UPI links @ 9.6GT/s
▪ 3 UPI links @ 10.4GT/s	▪ 3 UPI links @ 10.4GT/s	▪ 2 UPI links @ 10.4GT/s	▪ Intel® Turbo Boost	▪ Intel® AVX-512 (1 512-bit FMA)
▪ Intel® Turbo Boost	▪ Intel® Turbo Boost	▪ Intel® Turbo Boost	▪ Intel® Hyper-Threading	▪ Intel® Deep Learning Boost (VNNI)
▪ Intel® Hyper-Threading	▪ Intel® Hyper-Threading	▪ Intel® Hyper-Threading	▪ Intel® AVX-512 (1 512-bit FMA)	
▪ Intel® AVX-512 (2 512-bit FMAs)	▪ Intel® AVX-512 (2 512-bit FMAs)	▪ Intel® AVX-512 (1 512-bit FMA)	▪ Intel® Deep Learning Boost (VNNI)	▪ 48 lanes PCIe Gen3
▪ *Intel® Deep Learning Boost (VNNI)*	▪ Intel® Deep Learning Boost (VNNI)	▪ Intel® Deep Learning Boost (VNNI)	▪ 48 lanes PCIe Gen3	▪ Standard RAS
▪ 48 lanes PCIe Gen3	▪ 48 lanes PCIe Gen3	▪ 48 lanes PCIe Gen3	▪ Standard RAS	
▪ Node Controller Support	▪ Node Controller Support	▪ Advanced RAS		

[1] *Note: One Silver 42xx Processor planned to support DDR-T/Intel® Optane™ DC Persistent Memory*
Changes in feature set from shelf to shelf highlighted in green
Changes in feature set from Skylake are *underlined and italicized*
Supported only on R940, R940xa and R840
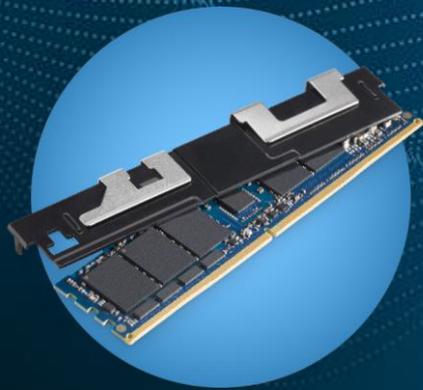
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Cascade Lake - OS Minimum Requirements

- RedHat Enterprise Linux 7.6

- RedHat Enterprise Linux 8.0 (June block)

- SUSE Linux Enterprise Server (SLES) 15   (SLES12 SP4 will work but unsupported)

- Microsoft Windows Server 2016   (with Hyper-V)

- Microsoft Windows Server 2019   (with Hyper-V)

- Ubuntu 18.04.2   (16.04.5 w. latest HWE kernel will work but unsupported)

- VMware vSphere ESXi 6.5 U2

- VMWare vSphere ESXi 6.7 U1

- VMWare vSphere ESXi 6.7 U2 (June block)

- Citrix Xen Server 7.1 CU1

- Oracle Linux 6.10 (UEK4u7)/7.6 (UEK5u2); Oracle VM 3.4.6 (UEK4u7)

- – Not supported on Cascade Lake

  - Microsoft Windows Server 2012 R2

  - RHEL6.x (virtualized or containerized only)

(intel) D∕LLTechnologies

Intel® Optane™ DC Persistent Memory Features and Roadmap
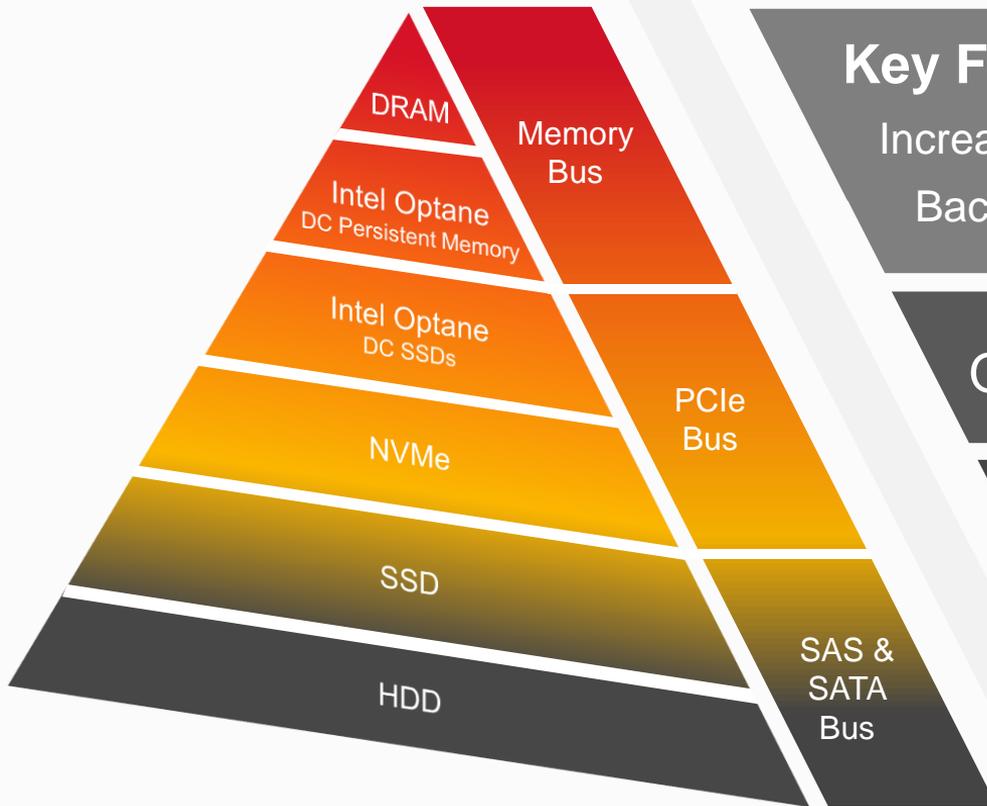
Key Features:

Increased capacity | Affordability | Performance

Backwards compatibility | Memory persistence

Pyramid levels (top to bottom): DRAM, Intel Optane DC Persistent Memory, Intel Optane DC SSDs, NVMe, SSD, HDD

Bus labels: Memory Bus, PCIe Bus, SAS & SATA Bus

Q2
R740/740XD | R940

Q3
MX840c | MX740c | R940xa
R640 | R840

Memory Mode vs App Direct Mode

Memory Mode

App Direct Mode
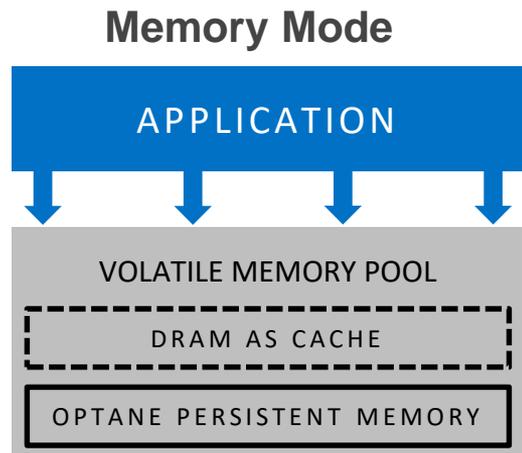
Getting to a large memory footprint, affordably and easily

Persistence and performance, for applications that natively utilize DCPMM

Any application as long as a supported OS is being used	Applications must support App Direct Mode • Opportunity for layers of storage protocols to be removed so data can be accessed directly from memory using load/store
Only Intel® Optane™ DC persistent memory (DCPMM) appears as the available system memory • DRAM acts as a cache	All memory is available as system memory
Not persistent	Persistent • Storage class memory • Improved software startup times

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Memory Mode TCO Example

Capacity	Approximate Relative Pricing	
	RDIMM & LRDIMM	Intel Optane
32GB	1X	-
64GB	2X	-
128GB	8X	2X
256GB	-	6X
512GB	-	22X

Using 32GB as the baseline for relative pricing
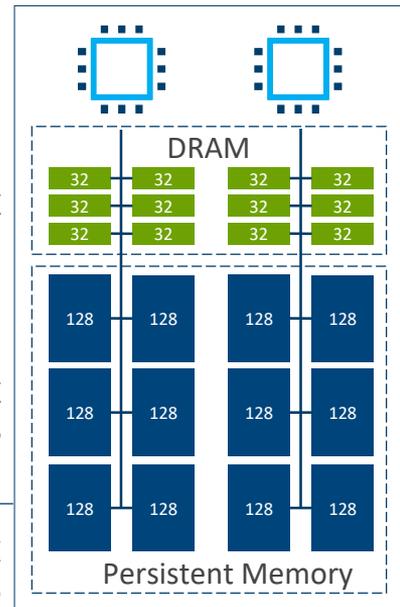The above rough pricing may change over time

Regular Memory

24 x 64GB LRDIMMs

Total Capacity: 1,536

48X
1,536 GB
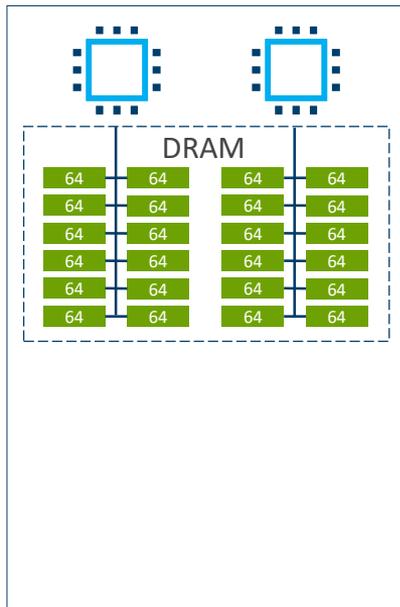
Price: 48X
1,536 GB

Optane Memory

12 x 32GB RDIMMs
12 x 128GB Optane DIMMs

Total Capacity: 1,536

12X
1,536 GB

24X
1,536 GB

Price: 36X
1,536 GB

Persistent Memory

Storage

25% Memory Savings

Storage

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Intel® Optane™ DC Persistent Memory Requirements

- Requires Gold or Platinum Cascade Lake CPUs
  - PowerEdge does not support the single Silver SKU that Intel enabled for Intel Optane DC persistent memory

- Runs at 2666 MT/s (which is the max speed when there are 2 DIMMs on a channel)

- Note that large memory configs require and M or L CPU SKU
  - No CPU SKU requirements: less than 1TB
  - M SKU required: between 1TB and 2TB
  - L SKU required: greater than 2TB

- For R940, the 2400W PSU is required

CPU SKU	1 DIMM Per Channel	2 DIMMs Per Channel	Intel Optane DC Persistent Memory Support
(82xx) Platinum	2933 MT/s	2666 MT/s	Yes
(62xx) Gold	2933 MT/s	2666 MT/s	Yes
(52xx) Gold	2666 MT/s (one SKU 2933)	2666 MT/s	Yes
(42xx) Silver	2400 MT/s	2400 MT/s	No
(32xx) Bronze	2133 MT/s	2133 MT/s	No

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Storage Over App Direct Mode

- Intel Optane DC persistent memory operates as a block storage device
    - Traditional read/write instructions
    - Works with existing file systems
    - Block sizes 4K or 512B
    - NVDIMM OS driver required

- Data is persistent

- Application does not have to be DCPMM aware

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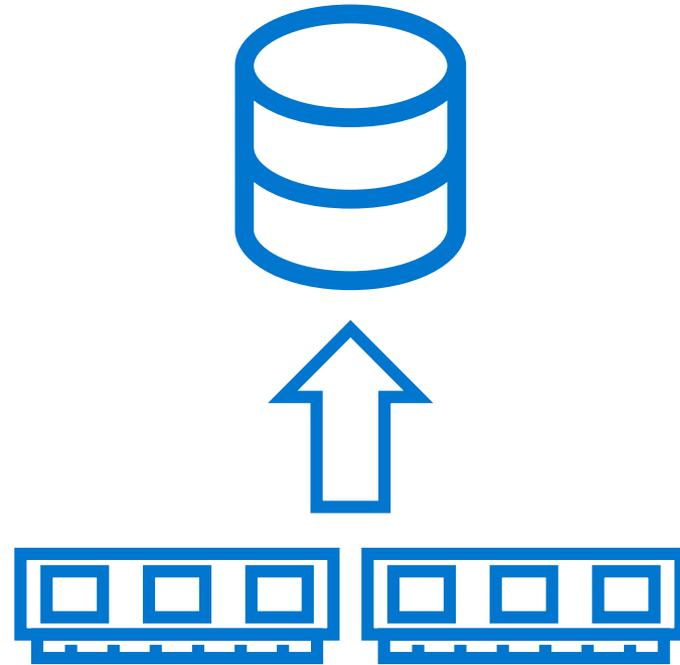
Microsoft SQL 2019 Data Path using App Direct Mode

Microsoft® SQL Server®

- 270% increase in the number of transactions with SQL 2019 using App Direct Mode
  – Linux version
  – DCPMM vs NVMe drives

- App Direct mode removes layers of protocols and software stacks

- DCPMM capacity allows the entire database to be kept in memory

Traditional Microsoft SQL Data Path

Data Operation

Copy to Memory

Kernel

File System

Storage Stack

NVMe Drive
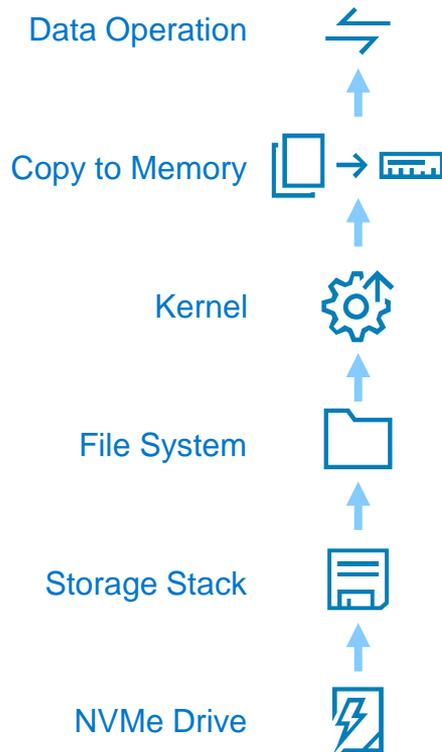
Microsoft SQL 2019 App Direct Data Path

Data Operation

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Real results today: Improve SQL database performance

Up to **2.7x**

Improvement

PowerEdge R740xd

Intel® Optane DC™ persistent memory

Based on testing performed by internal Dell EMC with PowerEdge on
Microsoft SQL Server 2019 preview on Linux and VMware ESXi 6.7

SQL Database Performance
(Transactions per Second)

Mixed Use NVMe	Intel Optane DC persistent memory
1	2.7

Top Use Cases

	Virtualization	SAP & Other In-Memory Databases	MS SQL 2019 and other Databases
Value Proposition	• Affordable large memory capacity	• Affordable large memory capacity • Improved software startup times because of persistency	• Improved performance with App Direct Mode • DCPMM is much faster than NVMe and SSD drives
Mode	Memory Mode	App Direct Mode	App Direct Mode
Customer Profile	• Customers looking to use 64GB DIMMs or higher. • Customers who have memory constrained servers	• Anyone using SAP and other in-memory databases • More affordable than 64GB DIMMs and much more affordable than 128GB DIMMs • Customers concerned about updating systems because of software startup times.	• SQL 2019 customers where the database can fully reside in the DCPMM DIMMs
Considerations	• Customers must evaluate the performance of memory mode with their workloads in their environment. Read heavy workloads will perform better	• DCPMM provides a large affordable capacity but will operate slightly slower than regular memory	• MS SQL2019 comes out in Q4 CY2019 • SQL 2019 Linux version offers best performance. Windows version offers good performance. • No performance information yet on of other databases

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Applications that Will Support App Direct Mode

Type of Software	Operating Mode	Application	Description	Min Version
ISV	App Direct	Aerospike Enterprise Edition	In memory noSQL database	4.5
ISV	App Direct	SAP HANA	In memory database	2.0 SPS 03
ISV	App Direct	Gigaspaces	Distributed in-memory data-grid	V14.0
ISV	App Direct	Microsoft SQL Server 2019	Database	2019
Open Source	App Direct	Apache Cassandra	NoSQL database management system	4.X - Open source avail on github – not upstreamed Contact DataStax to help Intel accelerate code adoption
Open Source	App Direct	Apache Spark SQL with Optimized Analytics Package (OAP)	SQL database with a cluster-computing framework	Apache Spark version 2.3.2 with OAP 0.5.0 - Open source avail on github
Open Source	App Direct	Apache HBase Bucket Cache	Distributed non-relational database	Open source avail on github
Open Source	App Direct	Apache Hadoop HDFS Cache	Software framework for distributed storage	Hadoop 3.1 – Patch available, not upstreamed yet

Last updated 3/26/2019

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Applications that Intel has Evaluated using Storage over App Direct Mode

Type of Software	Operating Mode	Application	Version
ISV	Storage over App Direct	Asia-info	3.1.1
Open Source	Storage over App Direct	Apache Kafka	
Open Source	Storage over App Direct	MongoDB/WiredTiger	4.0
Open Source	Storage over App Direct	PerconaDB(MySQL)/InnoDB	
Open Source	Storage over App Direct	PerconaDB(MySQL)/MyRocks	
Open Source	Storage over App Direct	RocksDB	

Last updated 3/26/2019

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INTEL® OPTANE™ DC PERSISTENT MEMORY LATENCY

- Orders of magnitude lower latency than SSD

- 2X read/write bandwidth vs disk, with one module, more with multiple modules

Read idle latency

Ranges from 180ns to 340ns

(vs. DRAM ~70ns)

Latency vs. Load - P4800X vs. P4610 vs. Intel Optane DC Persistent Memory
(70Read/30Write Random , 4kB) for SSD's, 256B for Intel Optane DC PMM

Intel DC P4610 NVMe SSD

Intel Optane DC SSD P4800X
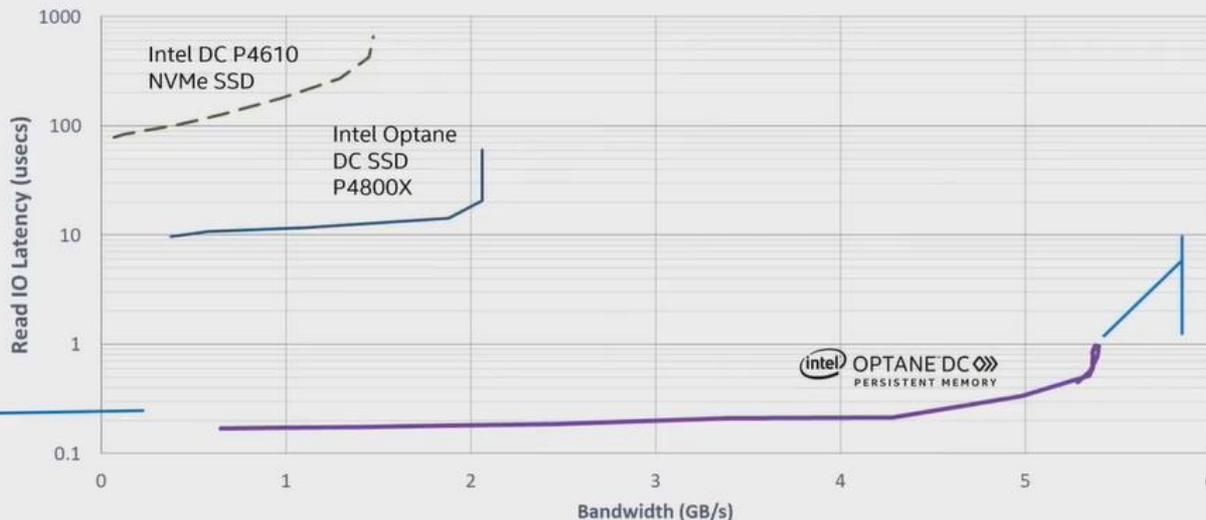
Smaller granularity (vs. 4K)

Read IO Latency (usecs) vs *Bandwidth (GB/s)*

1. 256B granularity (64B accesses). Note 4K granularity gives about same performance as 256B

OpenManage Enterprise

V3.X

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OpenManage Enterprise : nouveau look!

1

- **OBSESSIVE SIMPLICITY**

- Modern HTML5 UI
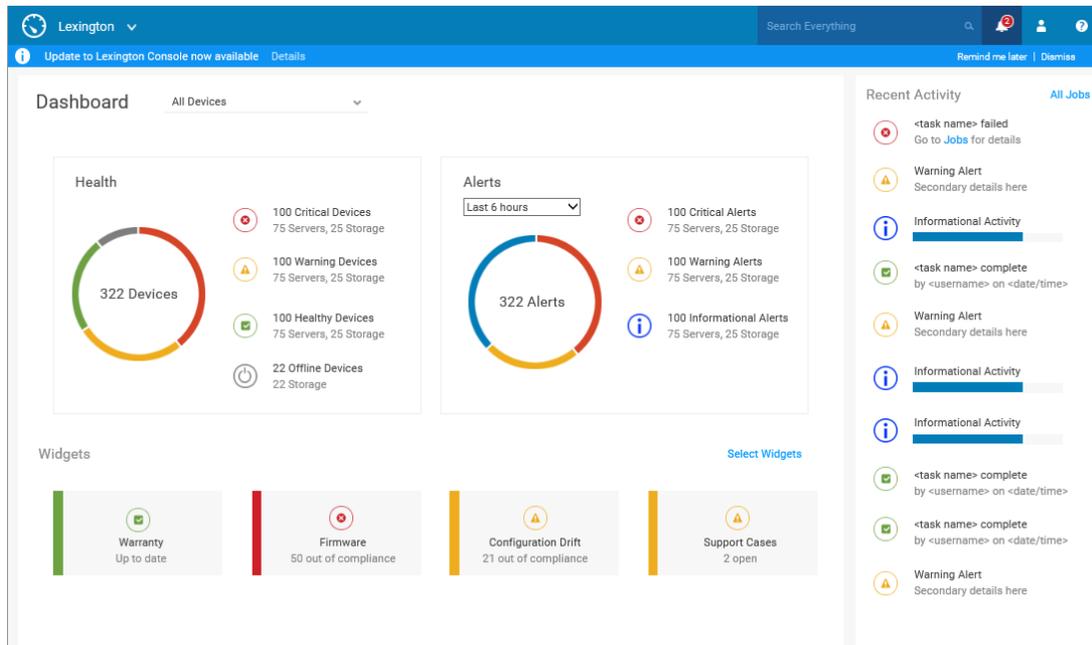- Turn key deployment as a virtual appliance
- Grounds up usability design

2

- **END TO END AUTOMATION**

- Comprehensive Redfish inspired API
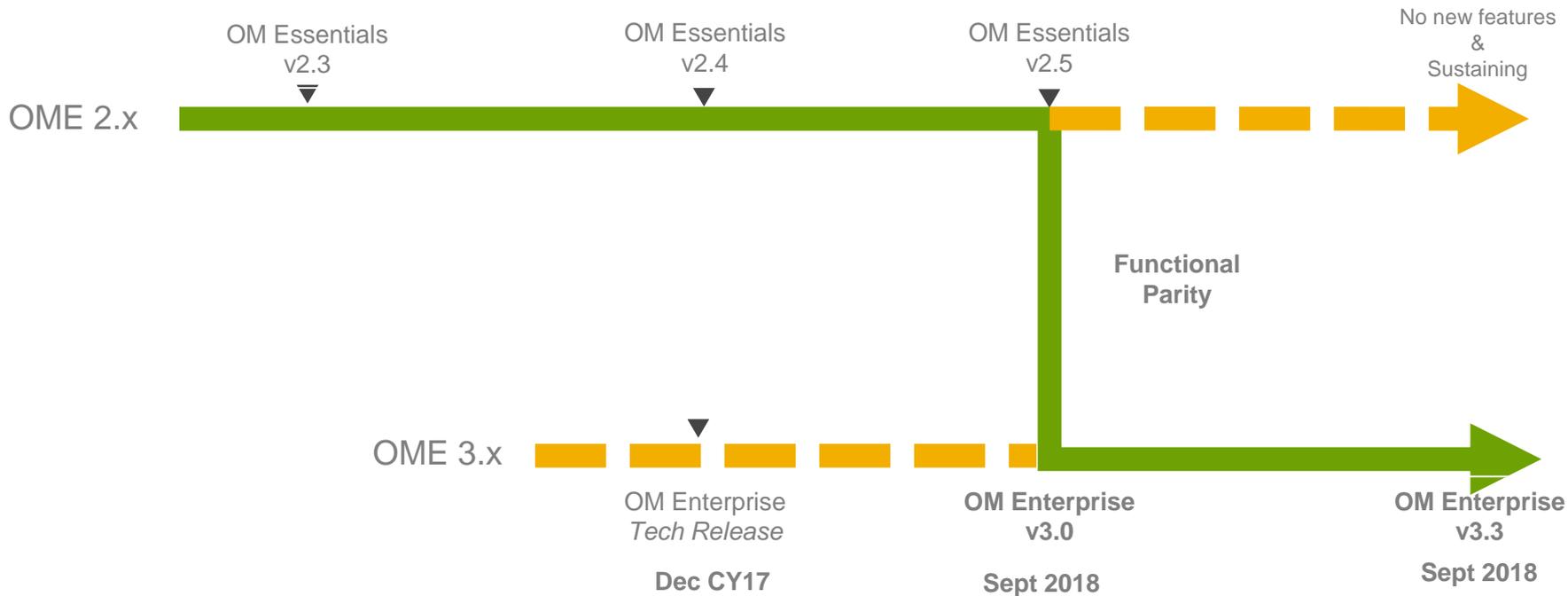- Policy driven everything!

3

- **UNIFICATION**

- Centralized authentication
- Similar management model regardless of server form factor
- Solution aware management

Built for IT professionals who refuse to be limited by management complexity

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Evolution OME vers OME!

OM Essentials v2.3

OM Essentials v2.4

OM Essentials v2.5

No new features & Sustaining

OME 2.x

Functional Parity

OME 3.x

OM Enterprise *Tech Release*

Dec CY17

OM Enterprise v3.0

Sept 2018

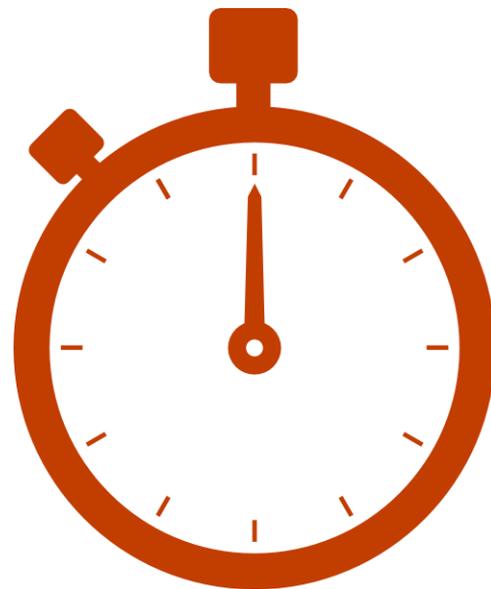**OM Enterprise v3.3**

Sept 2018

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OpenMange Enterprise

OpenManage Enterprise has functional equivalent features to OpenManage Essentials

There is **NO** in-place upgrade from OM Essentials to Enterprise
There is **in-Place** upgrade from OM Enterprise Tech Release to 3.0

- Following customers can start using OM Enterprise:
  - **Linux Centric** customers
  - **New** Dell EMC customers
  - Essentials customers with **>=12G** systems and **no OMSA**
- Customers who will need to take a more measured approach:
  - **<= 11G** platforms and **OMSA** dependencies
  - **Complex** alert policies, CLI/API integrations, IO identity and vLAN management
  - Customer with No Virtualization Environment of any kind
  - Essentials Customers may run both OM consoles in parallel until everything migrated from Essentials and **<=11G** servers retired

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