TIME FOR A CHANGE: ACCELERATING DATA, ACCELERATING BUSINESS, WITH SQL SERVER 2019

Wendy Harms, Product Manager
HARNESS DATA IN REAL-TIME TO TRANSFORM YOUR BUSINESS

Converging transactions and analytics at the core

Accurate and instantaneous service personalization

Real-time portfolio risk estimation

Hyper-individualized patient treatment

Real-time demand/supply matching

Immediate response to security threats
VISIONARY INNOVATION TO ADDRESS THE DATA DILEMMA

Embrace the possibilities of a world transformed by exponential data growth

- Turn data into actionable insights in real time
- Keep pace with evolving business demands
- Safeguard your mission-critical workloads

Speed to insight  →  Flexibility and agility  →  Continuous business
**REQUIREMENTS OF MISSION-CRITICAL APPLICATIONS**

- **Control and Governance**
  - Data, user-access and application control
  - Audit, Regulatory compliance and operational governance

- **Customization and Interoperability**
  - Home-grown, custom-built applications
  - Internal and external data/application interop

- **Performance and Scalability**
  - Huge, ever-growing data demands, real-time processing
  - Peaks and lows in demand

- **Availability and Security**
  - Non-negotiable availability, strict RTOs and RPOs
  - Disaster Recovery
  - Unbreakable Security, Data Protection
SOLVE YOUR MOST DEMANDING SQL SERVER CHALLENGES

HPE Superdome Flex for mission-critical Linux/Windows workloads

Capitalize on flexible scale-up capacity
- Scale from 4 up to 32 Intel® Xeon® processors
- Up to 48TB RAM memory in a single server! (24TB Windows)
- Consolidate multiple SQL Server instances onto a single system
- Eliminate network latency and deliver greater OLTP performance

Right size every mission-critical workload
- 4-socket/8-socket size (at 45% lower cost!), and scale-up as needed
- Run your core business applications on SQL Server
- Modernize and migrate Oracle and IBM databases to SQL Server
- Equip for tomorrow's growth without overprovisioning

Safeguard SQL Server with end-to-end reliability
- Extreme Superdome RAS to achieve highest service levels
- Error analysis engine, advanced memory resiliency, self-healing
- HPE Serviceguard fortifies Linux workloads for HA and disaster recovery

HPE and Microsoft engineering teams work together to optimize SQL Server performance on HPE Superdome
HPE SUPERDOME FLEX SERVER: 32-SOCKET ARCHITECTURE

Unique point-to-point design maximizes performance

- Extreme processing speed at scale

Scales from 4 to 32 sockets
- Supports up to 8 chassis, with 4 sockets per chassis
- Includes 16 Superdome Flex ASICs
- Point-to-point, ‘all-to-all’ Flex Grid link between system ASICs – unique in the industry
- Lower latency and increased bandwidth over previous solutions, and competitive systems - delivering extreme performance

Compute resources provided
- 32 sockets, up to 896 cores
- 384 DIMM slots: up to 48 TB with 128 GB DIMMs
- 128 PCIe Gen3 card slots (56 x16, 72 x8) maximum
END-TO-END INFRASTRUCTURE RELIABILITY FOR THE HIGHEST AVAILABILITY LEVELS

Superdome RAS features begin where most commodity x86 servers leave off

Reduce human error
- Error Analysis Engine predicts hardware faults and initiates self-repair without operator assistance

Prevent data corruption
- “Firmware First” ensures error containment at the firmware level, before any data corruption can occur

Minimize time to repair
- Quick and efficient service repairs—often without tools, many redundant and hot swappable components

60% downtime reduction
95% reduction in memory outages
PROTECTING YOUR DATA IN MOTION AND AT REST

Layers of protection built-in

- Advanced Threat Analytics
- SQL Server auditing

Control access

- Windows Authentication
- Row-level security
- Dynamic data masking

Protect data

- Always Encrypted (SQL Server 2016)
- Transparent data encryption

Electrically isolate workloads for maximum security

Hard partitions: OLTP, Dev, Test, DW

Software + hardware tuned from the start
FORTIFYING LINUX WITH SERVICEGUARD
High Availability (HA) & Disaster Recovery (DR) for mission critical applications

Unattended Recovery

- **Fully Automatic:** Enable quick recovery and avoids human errors
- **Quick Failure Detection:** Recover in as fast as **four seconds**
- **Application Aware:** Application context aware smart recovery and automation
- **Disaster Recovery:** Seamlessly recover workloads across any distance

Preserve Data Integrity

- **Data Integrity:** SCSI 3 PR, Dynamically Linked Storage, Deadman, smart quorum
- **Robust Algorithm:** Comprehensive failure detection (hardware, software, OS, application)

Easy to Deploy and Maintain

- **Out-of-box integration:** 93% set up time reduction for DB’s like Microsoft SQL
- **Powerful GUI:** Setup a cluster in 10 clicks, multi cluster management
- **Non Disruptive maintenance:** Rolling upgrades, Live Application Detach for live upgrades
- **Seamless Virtualization Integration:** Clustering that complements virtualization strengths

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1. Failover recovery observed in HPE internal lab testing. System was based on an HPE ProLiant DL380 Gen9 Server (two Intel® Xeon® processors, eighteen computing cores each) with Red Hat® Enterprise Linux 7.1 running HPE Serviceguard 12.00.30. Configuration-dependent excluding cluster reformation time.

2. Based on HPE internal lab analysis that shows typical manual effort for integrating Oracle Database into a cluster to require 30 engineering days. With Oracle toolkit from HPE, this integration is achieved in two engineering days or less.
MODERNIZE WITH SQL SERVER 2019

Now with big data clusters

Intelligence over any data

Choice of platform and language

Industry-leading performance

Most secure over the last 8 years

Insights in minutes and rich reports

Analytics over structured and unstructured data with the power of SQL and Apache Spark

T-SQL
Java
C/C++
SQL
SCALA
Node.js
C#/VB.NET
Python
Ruby
.NET core

#1 OLTP performance

#1 DW performance on 1TB, 10TB, and 30TB

The best of Power BI and SQL Server Reporting Services in Power BI Report Server

In-memory across all workloads

Most consistent data platform

1/10th the cost of Oracle

Private cloud

Public cloud

All TPC Claims as of 1/19/2018.

HPE PERSISTENT MEMORY
Growing need for a new class of memory

Extreme Memory Capacity
“Make large memory servers less expensive”

Memory Resilience
“Minimal latency for huge memory capacity”

Innovation is required

Hyper-Speed Storage
“Allow in-memory data to survive soft reset or hard reboot”

“Give me a faster storage interface”
HPE PERSISTENT MEMORY
Redefining the memory/storage hierarchy

- Processor
  - CPU
    - CPU cache
  - SD-RAM/DDR-SDRAM
    - Physical memory
      - HPE Smart Memory
  - Solid-State Drives
    - Solid-state memory
      - HPE Optane™ SSD
        - HPE SSD
  - Mechanical Drives
    - Hard
      - Virtual memory
        - HPE Hard Drives
HPE PERSISTENT MEMORY

Portfolio

HPE 16GB NVDIMM Single Rank x4 DDR4 2666 Module Kit

Database storage bottlenecks
Software licensing reduction Caching

HPE 128GB 2666 Persistent Memory Kit

Large in-memory compute
Checkpoints and restores
HTAP real-time analytics
Large databases
Software-defined storage
Service providers, performance tier, and virtualization

HPE 256GB 2666 Persistent Memory Kit

HPE 512GB 2666 Persistent Memory Kit
**HPE PERSISTENT MEMORY**

Operational modes

<table>
<thead>
<tr>
<th>Memory Mode</th>
<th>Offering the best of DRAM storage in one product</th>
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<tbody>
<tr>
<td>DRAM Attributes</td>
<td>and</td>
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<tr>
<td><strong>Performance comparable to DRAM at low latencies</strong>¹</td>
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<tr>
<th>App Direct Mode</th>
<th>Storage Attributes</th>
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<tr>
<td><strong>Data persistence with higher capacity than DRAM</strong>²</td>
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<th>Memory Mode Attributes</th>
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<tr>
<td>Higher capacity than achievable with DRAM alone</td>
<td>Persistent: Retaining data even during power cycles without requiring external power sources</td>
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<tr>
<td>More affordable than equivalent DRAM (cost per GB)</td>
<td>High availability / less downtime: Fast restart times; reduced wait times when fetching data</td>
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<tr>
<td>Ease of adoption: Works with today's applications</td>
<td>Significantly faster storage: Move, store, and process larger data sets closer to the processor</td>
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1. "Fast performance comparable to DRAM" - Intel persistent memory is expected to perform at latencies near DDR4 DRAM. Benchmarks and proof points forthcoming. "Low latencies" - Data transferred across the memory bus causes latencies to be orders of magnitude lower when compared to transferring data across PCI Express I/O bus to NAND/Hard Disk. Benchmarks and proof points forthcoming.
2. HPE persistent memory offers 3 different capacities – 128GB, 256GB, 512GB. Individual DIMMs of DDR4 DRAM max out at 128GB.
3. A BIOS update will be required before using HPE DC Persistent Memory.
ACCELERATING THE REAL-TIME ENTERPRISE WITH HPE SUPERDOME FLEX

Unlock insights for real-time action
Faster queries with today’s massive amounts of data with in-memory design

Start small and grow really big
Ultimate flexibility with modular design and unparalleled scale

Ensure continuous digital operations
Safeguard your most critical apps and data

The world’s most innovative platform for the next decade
THANK YOU