Transform your mission-critical environment

HP Integrity Superdome X
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Recent IT market trends and challenges

Datacenters under pressure to keep up with demands
- Align with the business
- Manage risk
- Reduce cost

IT enters the irreversible x86 standardization journey
- Control CAPEX
- Add capacity incrementally
- Deploy Linux commercially

Scaling out becomes standard, but at a cost
- Dramatically increased OPEX
- Hardware “sprawl”
- Virtualization proliferation

“Reducing costs has become increasingly critical... resulting in significantly less IT budget for delivering what’s most important: innovation that can drive business growth in the 3rd Platform world.”

Source: IDC White Paper, sponsored by HP and Intel, Could HP’s Superdome X be the mission-critical x86 platform we’ve been waiting for?, December 2014

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The irreversible x86 standardization journey comes at a cost

“But the shift to low-capex scale-out x86 systems also had undesirable effects. The increased opex of managing the expanding x86 installed base has been taxing IT budgets, making it difficult to fund new initiatives that might have delivered revenue-generating innovations.”

Source: IDC White Paper, sponsored by HP and Intel, Could HP’s Superdome X be the mission-critical x86 platform we’ve been waiting for?, December 2014
HP Optimized Compute Portfolio

Drive Hybrid Infrastructure, Data Driven Organization and Workplace Productivity Transformations

**Software Defined & Cloud ready**

- HP OneView
- HP Helion
- RESTful APIs

**Workload Optimized**

**Core Business & Infrastructure applications**
- HP ProLiant Racks, Towers and BladeSystem
  - Optimized for Virtualization; decreased TCO, productivity

**Mission Critical**
- HP Integrity Superdome X
  - Availability for continuous business
- HP Integrity NonStop X
  - Availability for continuous business

**Web scalability & SP optimized**
- HP Cloudline
  - Lowest cost built to scale
- HP Helion
  - Web scalability & SP optimized

**Nex-gen Apps**
- HP Moonshot
  - Optimized for lowest TCO

**HPC, Big Data**
- HP Apollo Portfolio
  - Density & efficiency to scale rapidly

**Converged**

- Converged network
  - HP Networking
- Converged management
  - HP OneView
- Cluster Management
  - HP Insight CMU
- Converged storage
  - HP StoreVirtual VSA
- Common modular architecture

**Global support and services** | **Best-in-class partnerships** | **Converged System**
Customer challenges on mission-critical computing
Business Processing and Decision Support workloads

“We’re deploying new applications on x86 and need more reliability than we have today.”

“We need to reduce our operational costs for mission-critical applications.”

“I need more scalability and availability for our existing x86 applications.”

“I’m not happy with the downtime required for system maintenance.”

“I’m not getting the x86 performance we require for our core database.”
HP Integrity Superdome X

Drive business growth with groundbreaking mission-critical performance and availability at industry-standard efficiencies

Breakthrough performance for business transactions
9x performance than current HP 8-socket server

Increase competitive differentiation and reduce business risk
20x more reliability with 60% less downtime than other x86 platforms

Redefine economics for mission-critical compute
32% lower TCO compared to competitive UNIX environments
Achieve breakthrough performance for business transactions
Increase agility and grow seamlessly with Superdome X
Achieve breakthrough performance, even when you scale to the largest configurations

9x performance than current HP 8-socket server
Consolidate on a single server for lower cost

44x faster transaction process than legacy high-end SPARC®/Solaris server
Migrate from legacy infrastructure to speed IT delivery

1.9x scalability factor
Scale confidently without compromising performance
Exceptional scalability and performance for OLTP database workload

Superdome X comparison to a DL980 G7

Superior performance with Superdome X

- ~ 2.4X performance vs. DL980 G7 (8s to 8s)
- 1.6 scaling from 2 - 4 - 8 sockets
- Achieved ~ 90% CPU utilization

Configuration

- RHEL 6.6
- OLTP database workload
- External storage for database
- SSD drives for log and data
- Separated storage partitions for log and data
- Balanced performance across NUMA nodes
- Up to 8 socket 120 cores with hyper thread enabled

*Estimated workload based on known results of DL980 G7 with similar (OLTP) workloads
Consolidate in a large scale-up server without compromising performance

Superdome X demonstrates a 1.7x scalability factor using Oracle Multitenant feature

- Superdome X shows **1.7x scaling** from 8S to 16S
- **Balanced performance** across NUMA nodes
- **Lower TCO** by consolidating workloads

**Configuration**
- RHEL 6.6
- OLTP database workload
- Share external storage for databases
- SSD drives for log and data
- Oracle Multitenant, use 4 PDBs in 1 CDB
Statens Innkrevingssentral modernizes collections infrastructure
National Collection Agency selects Superdome X, 3PAR Storage and RHEL to lower costs and add performance

Profile
- Agency collecting fines, compensation, court case costs and confiscations, among others.
- 188 types of claims for 35 clients from 15 departments

Approach
- Migrate to x86 reliability and availability on the Superdome X Server, 3PAR and RHEL, including RHEV to drive down operational costs
- Focus on increased performance and improved availability

Results
- Streamlined online debt and fee collection for 35 government agencies
- Enabled 90% of collections to be processed online
- Delivers highly reliable infrastructure to support collection activities totaling up to ~2.5 M USD per day

10x performance boost
1/3 TCO vs. previous infrastructure
>30% deduplication of stored data
Mobile TeleSystems chooses Superdome X to power core database

- Powering core database for billing application
- Standardizing on x86
- Deploying in regional billing centers
- Requiring high performance solution due to company size and growth
- Migration project achieving
  - High ROI
  - More efficiencies
  - High performance and reliability

“The migration of core business critical applications to HP x86-based solutions helps us to reduce both CAPEX and OPEX for hardware platforms purchase and support. We got an opportunity to invest the freed up funds in development of new in-demand services”
— Dmitry Khomchenko, CIO, MTS
Increase competitive differentiation and reduce business risk
Experience superior x86 availability with Superdome X

- 60% decrease in downtime with end-to-end mission critical design
- Zero downtime for planned maintenance
- 95% reduction in memory outages
- 20x greater reliability with HP nPars
- Perform maintenance and updates online without application outage
- Ensure continuity with HP Firmware First
Availability from components to complete solutions
Superdome X with Power-on-Once technology

- Proactive services
- Insight Remote Support
- Failover Clustering
- Operating System
- Error Analysis Engine
- Online optimization and repair
- Hard partitioning (HP nPars)
- ‘Firmware First’ architecture
- Fault-tolerant fabric
- Common components

Up to 100% application availability
Error identification, reporting, recovery
Infrastructure reliability
End-to-end infrastructure reliability for the highest availability levels

Superdome X 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
The unique value of HP nPars

**Hard partitions** add flexibility and cost efficiencies

- **Lower your TCO**
  Optimize software costs by using HP nPars
- **Maximize resource utilization**
  Create different development, test, and production environments within a single enclosure
- **Minimize downtime**
  Take one partition offline, perform hardware or software maintenance and/or reconfiguration, while the other nPars continue to run undisturbed
- **20x greater reliability than soft partitions**
- **Protect your data**
  Electronic isolation provides a *high degree of security* between partitions

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HP BladeSystem Superdome Enclosure
Intelligent management simplifies your environment

Redundant, Hot Swap, Fault Tolerant, Memory RAS

Superdome Onboard Administrator
Minimize time to repair

Firmware First
Prevent data corruption

Error Analysis Engine
Minimize unplanned downtime

HP Support
Save time and increase Efficiency

Immediate Containment, Firmware Management (SUM)

Fault Management, Self-Healing, Central Reporting, Single User Interface

Insight Online, Insight Remote Support, Troubleshoot, Alerts, WBEM Providers
Linking directly into operating system software R&D

Unmatched partnership model maximizes mission critical capabilities

Driving innovations with partners and suppliers

Decades of mission-critical experience

Contributing what matters for mission-critical

- Processor advancements
- Hardware innovation
- Data center ecosystem

RESEARCH & DEVELOPMENT

Upstream communities
HP & Red Hat - partnership
Linux kernel development to support Superdome X

Done in community partnership by Hewlett-Packard and Red Hat developers

• Identify areas to improve and problems to fix
• Determine if an upstream patch already fixes the problem.
• If no upstream patches exist:
  – Develop and validate fix
  – Submit the patches upstream and work the upstream process (an iterative process) until accepted
• Back-port patches to and validate on RHEL kernels
• Submit back-ported patches along with performance justification to Red Hat for inclusion in RHEL
• Changes put into the next RHEL release for all RHEL customers to use.
Superdome X performance improvements in RHEL

Made in community partnership by Hewlett-Packard and Red Hat developers

- Don't do an idle balance when it makes no sense
- Mutex optimizations in the construction and use of mutexes
- Mutex MCS optimizations
- Futex hash size, wait queue, and NUMA awareness optimizations
- Lockless atomic updates used by VFS directory entry reference counting
- SELinux bit-map optimization
- Parallel page fault processing for hugetlb page
- Better scaling of epoll_ctl() (heavily used by Java applications)
- Finer grained kernel locking in System V semaphores
Superdome X RAS innovations in RHEL

Made in community partnership by Hewlett-Packard and Red Hat developers

- Crashdump performance improvements
  - Vmcore access improvements
  - Compression in makedumpfile
  - Parallelism
  - Improving cyclic dump processing
  - Moving from a 6TB/240 core dump in 12 hours to a 12TB/240 core dump in 16 minutes

- Advanced error handling improvements
  - Kernel cooperation for Firmware First behavior
  - Enable advanced error analysis
  - Xeon EX advanced MCA recovery
  - PCI express LER support

- Virtualization enhancements
  - KVM scaling to 240VCPU/6TB guests
  - Migrate large-scale VMs while running with minimal application hesitation:
    - Enabling hot-plug for memory and CPU
    - Extend Advanced Error Reporting (AER) for VMs – isolate crashes only to affected VM
    - Improvements for NUMA Awareness to improve performance to near-bare-metal speed
    - SRIOV enhancements for device sharing and direct device assignments
HP Serviceguard
What causes the most business disruptions?

Single-system RAS is key but not sufficient for your most mission-critical workloads

- **Human error**
  - Lack of knowledge or training
  - Distractions / Carelessness

- **Application failures**
  - System patching (~2 months)
  - Performance / Capacity Planning
  - Application Architecture / Design

- **Hardware, OS & Power failures**
  - Fan / Memory / Disk failures
  - OS crashing
  - Natural disasters

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Source: Building an IT Disaster Recovery Modernization Business Case, Gartner Symposium 2011
Recovery times from business disruptions are increasing

- It took organizations 18.5 hours to recover from an event
  - Lost an average of 4.8 hours worth of data
- Almost 25% of companies are likely to declare a disaster within 5 years
  - 40% have had a major disruption to their business operations
- The average cost of a disaster is $1.4M
  - Average cost of downtime per hour is ~$145K

Source: Wake-Up Call: You Aren’t Ready For A Disaster, Forrester 2011
Minimize application downtime with HP Serviceguard for Linux

4 sec failover time

Heal transparently and recover gracefully

Online operations over any distance

Protect geographically dispersed data centers

4x faster deployment

Simplify set up and management
What is HP Serviceguard

Application high availability clustering technology

**Servers**
- HP Integrity
  - rx, BL, Superdome series
  - HP Integrity virtual machine
- HP ProLiant
  - BL, DL, ML Gen7,8,9
  - Superdome X
  - VMware, KVM

**Storage**
- HP Storage (Fibre Channel, iSCSI, FCoE)
  - 3PAR, P9000, P6000, P4000, P2000
- 3rd Party Storage (only select models)
  - EMC, NetApp, IBM, HDS

**Appliances**
- ConvergedSystems for SAP HANA
  - CS500 Scale-up and Scale-out
  - CS900 Scale-up and Scale-out
HP Serviceguard Cluster

Quorum Server

LAN

SAN

Heartbeat

Application Package

Application Data in Shared Storage
HP Serviceguard Solutions in Action

- Across Availability Spectrum

**Local Serviceguard Cluster**

- Redundant networks carrying cluster heartbeats (1 cluster)

**Metrocluster**

- Redundant networks carrying cluster heartbeats (2 clusters)

**Continental Clusters**

- Synchronous or Asynchronous Replication

Animated slide
Leading global investment company selects Superdome X to run investment management front office solution

- Selected a whole new integrated software suite to rationalize their investment management front office processes
  - Up to 1000 connected users
- Application database layer is mission-critical and cost of downtime is extremely high
- Superdome X selected to support the database layer as it provides:
  - Highest levels of reliability than on standard x86 platforms, addressing the key requirement of solution availability
  - Better Total Cost of Ownership than competition
  - Lower operating costs by eliminating the need for proprietary skilled resources
  - Flexibility and ability to grow with the business by adding blades
  - Scalability for the clustered database based on isolated HP nPars
Total Cost of Ownership (TCO)
Industry-standard efficiency and breakthrough scalability

- 32% lower TCO than competitive UNIX
- Redefine the economics of your mission-critical environment
- 12TB memory
- Address all your traditional and in-memory database needs
- 2-16 sockets
- Scale-up your large workloads to new heights

1-8 scalable blades
12-240 core count
32% lower TCO than IBM Power 8

HP Integrity Superdome X versus IBM E870 (3-year TCO model)

Superdome X savings

- 70% hardware
- 26% software
- 22% support

Compares an 8-socket Superdome X with 2x 4-socket partitions running SLES and an active/active Oracle RAC cluster with an IBM E870 with 2x 4-socket partitions running AIX and an active/active Oracle RAC cluster.

Source: Based on HP results using publicly available competitive data, November 2014.
40% lower TCO than Oracle Exadata

HP Integrity Superdome X versus Oracle Exadata X5-2 Half Rack (3-year TCO model)

Comparative TCO Analyis

Source: Based on HP internal analysis results using publicly available competitive data, April 2015
Deploy with confidence with proven services and a sustainable roadmap
The business case for scale-up versus scale-out
More efficiencies and lower costs for SAP®, Oracle®, Microsoft® SQL Server and custom applications

Scale-out to scale-up workload consolidation
for more efficient management and IT simplification

21% lower networking costs
37% reduction in licensing fees
2x better server utilization

European Service Provider selects Superdome X to manage business critical platforms

Focus on mission-critical reliability and cost efficiencies

Objectives

• Support customer growth
• Improve application performance
• Decrease Time To Market
• Reduce Capex and Opex

Approach

• Migrate legacy Unix servers to Superdome X
• Add Superdome 2 for stability during the migration process

Expected outcomes

• More performance to support business growth
• Stable environment
• Lower TCO

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Cerner chooses Superdome X to deliver hosted services

- Powering core database for healthcare applications
- Replacing both x86 and older UNIX environments with Superdome X, as they standardize on x86 and RHEL
- Growing client base requires higher levels of infrastructure scalability, over and above what current x86 solution could offer
- With Superdome X, they now have an x86 server powerful enough for their largest environments

“As a global supplier of health information technologies, Cerner continues to innovate to meet our clients’ needs. We look to HP as a partner to provide compute power in support of our innovation. The HP Integrity Superdome X provides the scalability to support our largest clients, the performance to deliver the results our clients have come to expect, and the availability that health care demands.”

Kent Scheuler, SVP, Managed Service, Cerner
Deploy with confidence with proven services and a sustainable roadmap
Optimize your results with HP Technology Services for Superdome X

Services for the most demanding enterprise x86 solutions

Ensure the right compute for the right workload
- Platform Migration Strategy
- Advisory Services
- Workload Advisory Services

Accelerate time of IT service to the business
- HP Migration Services
- HP Implementation Services
- HP Education Services

Optimize system utilization - increase agility and flexibility
- System partitioning
- Virtualization services

Prevent problems - Improve stability, boost performance
- Proactive Care Services
- Datacenter Care

Advise
Transform & Integrate
Flex
Support
Superdome X Roadmap

This is a rolling (up to 3 year) roadmap and is subject to change without notice.

Current

- Intel Xeon processor E7 v2 with 12-240 cores per system
- Operating Environment support with
  - RHEL 6.5, 6.6, 7.0
  - SLES 11 SP3
- Memory: DDR3 16 GB and 32 GB DIMMs
- 10GigE and 16 Gb FC
- Windows, SQL Server, VMware support

Future

- Next Gen Xeon processor support
- Low core count processor options
- Memory: DDR4 16 GB and 32 GB DIMMs
- Infiniband and FCoE support
- Continued support for latest versions of RHEL, SLES, Microsoft Windows Server and VMware vSphere
Think what compute can do for your business

**20x**
greater reliability

**60%**
less downtime

**32%**
lower TCO

**44x**
faster transaction process

**9x**
performance

Software-defined and cloud-ready

Workload-optimized

Converged

Basic processing to Integrated systems

Micro to **mission-critical computing**

Client to cloud

Storage to networking

The right compute for the right workload at the right economics ... every time
Transform your mission-critical environment
Superdome X—for faster, better business results

**Drive** business growth with **breakthrough** performance

**Increase** competitive differentiation and **reduce** your **business risk**

**Redefine** mission-critical compute economics with **industry-standard** efficiencies
Thank you