



**Hewlett Packard
Enterprise**

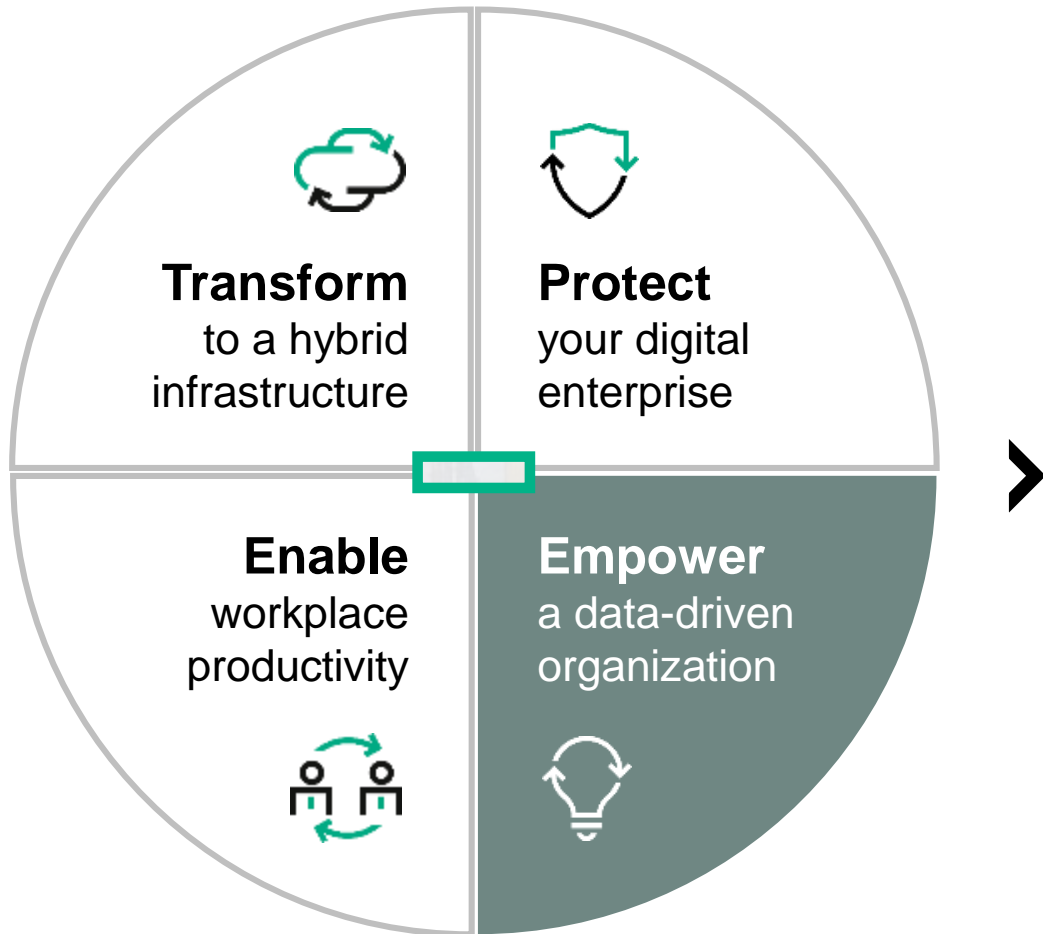
HPC & Big Data Strategy & Portfolio Overview

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April 13th, 2016

Businesses are transforming – need to be more agile to compete today

Empowering a data driven enterprise with HPC, Big Data & IOT



Use Cases

- Generating real time insights with simulation, modeling & analysis
- Analyzing high volume machine data from connected devices
- Sorting unstructured data including images, audio and video
- Dealing with your data – back up, archive and recovery – to manage risk and compliance

The ability to collect, store, process and analyze all of this data presents a **huge opportunity to those who are equipped to understand and use it.**

A Data-Driven Organization is unstoppable



New business models



Improved customer experiences



Differentiated products and services



Improve operational efficiency



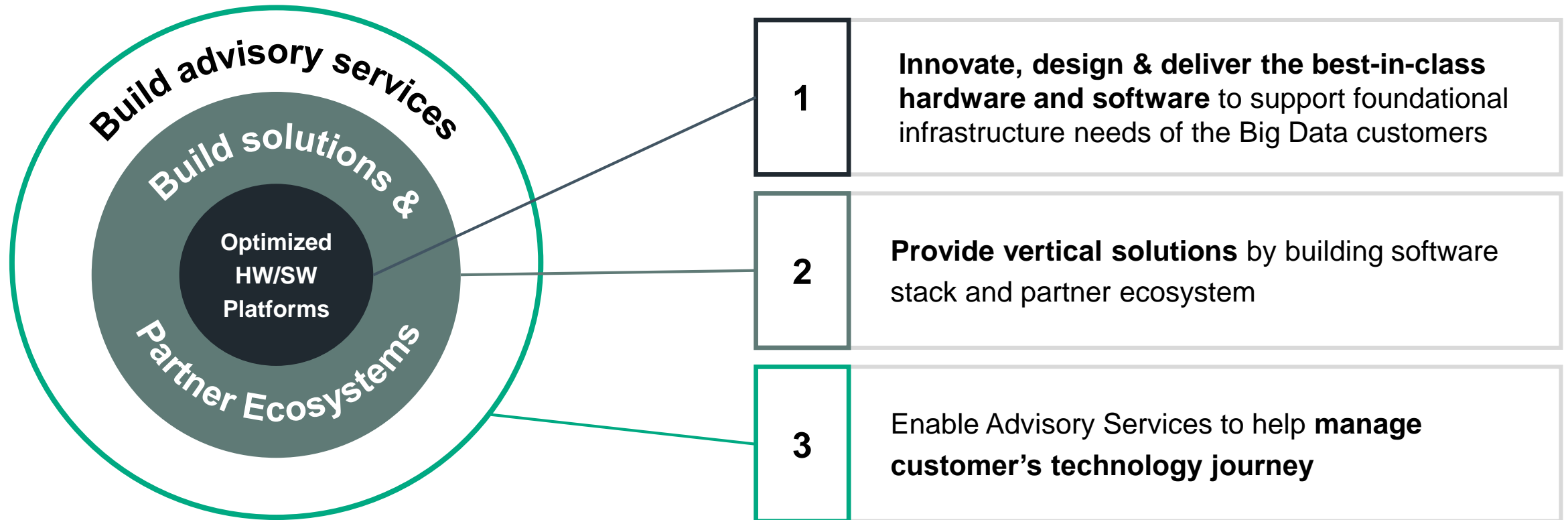
Increased workforce productivity



New sources of data and insight --- “things”

Big Data and HPC Portfolio Strategy

Design and Deliver Comprehensive Solutions with purpose-built platforms



Drive HPC and Big Data across all Enterprises

Design Principles for HPC and Big Data Innovation

Application Driven, Cloud-ready, Code Modernization



Innovative application platforms



Admin, user & application control options



Unified physical & virtual infrastructure



Modernize code to take advantage of new technologies

Workload-optimized Systems

Deep Learning



Performance



Scalability



Simplicity

HPC



Performance



Scalability



Efficiency

Big Data



Scalability



Flexibility



Lower Cost

Mobility



Lower Cost



Experience



Productivity

Converged, Composable, Open, Software Defined, Secure

Common modular architecture and management



Modern **common** architectures



Modular technologies








Common management



Protect Digital Enterprise with **Encryption**

HPE Apollo and Moonshot Servers

HPE Apollo platforms & solutions optimized for HPC and Big Data

Platforms	HPE Apollo 8000 Supercomputing		HPE Apollo 6000 Rack Scale HPC		HPE Apollo 2000 Enterprise Bridge to Scale-Out Compute	HPE Moonshot Optimized for Workspace Mobility & Media	HPE Apollo 4000 Server Solutions Purpose Built for Big Data		
									
Solutions / ISVs	HPC Workloads					Workloads	Big Data Workloads		
	Energy / Oil and gas	Health / Life Sciences	Financial Services	Manufacturing CAD/CAE	Academia / Research	Media / Mobility	Object Storage	Data Analytics	
	Halliburton	BIOVIA	Redline	ANSYS	Custom Apps	Media	Ceph	Cloudera	
	Paradigm	Gaussian		Synopsys		Mobile workplace	Cleversafe	Hadoop	
	Schlumberger					Mobility	Scality	Hortonworks	
	Intel		Mellanox			NVIDIA		Seagate	
	HPE Software (i.e. Vertica, HPE Haven), HPE Enterprise Services								

HPE Apollo 2000 System

The Enterprise Bridge to Scale-Out Architecture

Density optimized for traditional datacenters

- Up to **4 powerful servers in 2U chassis** – 2X the density of 1U servers
- **Traditional racks and cabling** for existing datacenters
- **Cost effective** in any configuration

Configuration flexibility for a variety of workloads

- **Mix and Match servers** for workload optimization
- **HPC performance** with accelerators, top bin CPUs, fast HPC clustering
- **Storage flexibility** and a **broad range of I/O options** for workload optimization

Simple at scale

- **ProLiant** enterprise-class management and operational tools
- **HPE iLO Management** saves administration time and cost
- **HPE Advanced Power Manager (APM)** enables more efficient capacity per rack
- **HPE Insight CMU** to monitor, manage and optimize compute clusters of any size

Now supporting Intel E5-2600 v4 processors!

Chassis

Gen9 12 LFF disk or SSD chassis

**Apollo
r2200**



Gen9 24 SFF disk or SSD chassis

**Apollo
r2600**



Gen9 24 SFF disk or SSD chassis
with drive mapping capability

**Apollo
r2800**

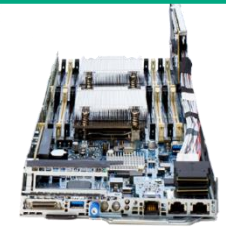


Server Trays



ProLiant XL170r

1U half width



ProLiant XL190r

2U half width

HPE Apollo 6000 System

Rack Scale HPC



Leading performance per \$ per watt

- Up to **4X more performance** per \$ per watt using **60% less rack space** with up to 20 front accessible servers in 5U

Rack scale efficiency

- Scale by chassis or rack with a singular modular infrastructure, external power shelf dynamically allocating power to help **maximize rack-level energy efficiency and easy management**

Flexibility to tailor the workload for lower TCO

- Selection of compute, accelerator, storage, and networking to fit workload needs while **increasing cost savings**

Now supporting Intel E5-2600 v4 processors!

Chassis

Supports 10 single slot trays max
Front serviceable with traditional
rear cabling

**Apollo
a6000**



Power

Pooled power efficiency
Supports N, N+1, N+N
redundancy

**Apollo
6000
Power
Shelf**



Server Trays



ProLiant XL230a
1U half width



ProLiant XL250a
2U half width
Supports 2 accelerators

HPE Apollo 8000 System

Advancing the Science of Supercomputing

Leading teraflops per rack for accelerated results

- **4X** teraflops per square foot than air-cooled systems
- **> 250 teraflops per rack**

Efficient liquid cooling without the risk

- **40% more FLOPS per watt** and **28% less** energy than air-cooled systems
- **Dry-disconnect** servers, intelligent Cooling Distribution Unit (iCDU) monitoring and isolation

Redefining data center energy recycling

- Save up to **3,800 tons** of CO2 per year (790 cars)
- **Recycle water** to heat facility

Now supporting Intel E5-2600 v4 processors!

Infrastructure



HPE Apollo f8000 Rack

- Standard rack footprint
- Up to 144 servers per rack
- Integrated liquid cooling with multi-level sensors for monitoring and intelligent rack isolation

HPE Apollo 8000 iCDU Rack

- Half-rack solution with 26U available in the top half
- Avoids/limits the use of power-hungry chiller units
- Available in N AND N+N redundancy mode



Server Trays

ProLiant XL730f

1U, 2 x 2P



ProLiant XL750f

2U, 1 x 2P
Supports 2 accelerators



HPE Moonshot Systems



Solution Focused

- Targeted high resource utilization
- Tight integration with software stack
- Unique value for specific workloads

System-on-a-chip

- Performance at low power
- SOC technology with accelerators
- M.2 SSD flash memory

Highly flexible fabrics

- Multiple low latency fabrics
- Supporting current and future capabilities
- Integrated networking

Dense form factor

- High compute density
- Capability for mixed cartridges
- Hot-plug components
- Significantly less cabling

Chassis

- Up to 45 hot-pluggable server cartridges
- Can support up to 45 10Gb ports of network bandwidth per switch (2 switchers per chassis)
- Simple cable management

HPE Moonshot 1500 System



Cartridges



m300

Atom™ C2750
8 cores, 2.4GHz



m700

(4) AMD Opteron™ X2150
4 CORES, 1.5ghZ



m350

(4) Atom™ C2730
8 cores/SoC, 1.7GHz



m710p

Xeon E3-1284L v4
“Broadwell-H”
4 cores, 2.9-3.8GHz



m400

ARM 64bit
8 cores, 2.4GHz



m800

(4) TI Keystone II based
66AK2H, A15
4 cores, 1GHz

HPE Apollo 4000 Systems

Server Solutions Purpose Built for Big Data

Apollo 4200: Bringing Big Data storage density to enterprise

- **Leadership storage density** with 224 TB in a 2U server
- **Fits traditional enterprise/SME rack server datacenters** – deploy today, no cost of change
- **Balanced capacity, performance, and throughput** with flexible options – disks, CPUs, I/O, and interconnects

Apollo 4500: Optimized for storage density and performance for Big Data

- **More capacity in smaller form factor** with up to 68 HDDs in a single node server, adding 26% more storage capacity per rack
- **Enhanced option flexibility**
- **Improved serviceability** through simplified cabling to reduce deployment and management time

Now supporting Intel E5-2600 v4 processors!

Infrastructure

Purpose built as the Enterprise bridge to scale-out storage
2U/ Supports 28 LFF or 50 SFF

**Apollo
4200**



Purpose built for Object Storage
4U/ Supports 1 node x 68 LFF

**Apollo
4510**



NEW
Purpose built for Lustre* storage solutions
4U/ Supports 2 nodes x 23 LFF

**Apollo
4520**



Purpose built for Hadoop and Big Data
4U/ Supports 3 nodes x 15 LFF

**Apollo
4530**



What's New at HPE

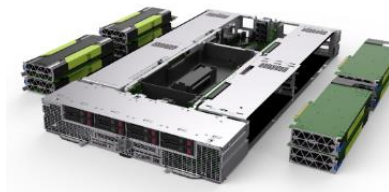
Recent Additions to the HPE Apollo Family

Deliver Automated Intelligence in Real-time for Deep Learning

Unprecedented Performance and Scale with HPE Apollo 6500 High density GPU solution



Use Cases



Automated Intelligence
delivered by HPE Apollo 6500 and
Deep Learning software solutions

Video, Image, Text,
Audio, time series
pattern recognition

Large, highly complex,
unstructured simulation
& modeling

Real-time, near real-
time analytics

Faster Model Training Time, Better Fusion of Data*

Customer Benefits

HPE Apollo 6500 is an ideal HPC and Deep Learning platform providing **unprecedented performance with 8 GPUs, high bandwidth fabric and a configurable GPU topology to match deep learning workloads**

- Up to 8 high powered GPUs per tray (node), 2P Intel E5-2600 v4 support
- Choice of high-speed, low latency fabrics with 2x IO expansion
- Workload optimized using flexible configuration capabilities

HPE Apollo 6500 Solution Innovation

System Design Innovation to maximize GPU capacity and performance with lower TCO

New Technologies, Products



Deep Learning, HPC Software platform Enablement
(CogX, Café, CUDA, Google TensileFlow, HPE IDOL)



Cluster Management Enhancements
(Massive Scaling, Open APIs, tight Integration, multiple user interfaces)



HPE Apollo 6500
- Dense GPU server optimized for Deep Learning & HPC Workloads
- Density Optimization
- High Performance Fabrics



Unique Solution Differentiators



- GPU Density
- Bus Architecture
- Power & Cooling Optimization
- Manageability
- TCO

Enable Open Storage Innovation for Massive Parallel Workloads

Lustre based flexible, resilient HPE Apollo 4520 with open software & management



Use Cases

Real-time Insights
delivered by HPE Apollo 4520 with IEEL

For seismic processing, media content distribution, scientific research	To retain large quantities of processed data (10-15TB/week)	For thousands of clients to access data simultaneously
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Lower TCO with Cluster in a Box*

Customer Benefits




Storage Cluster optimized for parallel processing with extreme density and flexible scalability and resiliency (**Cluster in a Box**)

- HPE Apollo 4520 is designed for **PB-Scale data sets**
- Deployment services for installation of Intel Enterprise Edition of Lustre
- Highly flexible big data storage server **optimized for parallel processing**, leverages Intel Xeon E5-2600v4 Series processors
- **Maximum parallel storage capacity** with up to 23 LFF drives per node (2 x 23 / 4U chassis)
- **Open Infrastructure Innovation** with storage tiering, data compression and RESTful APIs

HPE Apollo 4520 innovation with Lustre for HPC

Architecture Innovation for open infrastructure innovation with system scalability & resiliency

New Technologies, Products

	<p>Lustre Parallel File System</p>
<p>HPE Solution with Intel® Enterprise Edition for Lustre*</p>	<p>HPC Scalable Storage Solution High Performance Parallel File System optimized for flexibility & simplicity, tuned with OpenZFS</p>
	<p>Cluster Management Enhancements (Massive Scaling, Open APIs, tight Integration, multiple user interfaces)</p>
	<p>HPE Apollo 4520 Highly flexible storage server optimized for parallel processing</p>



Unique Differentiators

- Enable Open infrastructure innovation
- Flexible Configurations
- Scalable architecture
- Resiliency via failover capability

Optimized Performance targeting Financial Services Industry

The Confidence to Achieve HPC Innovation in Financial Services Industry



Optimized Performance by HPE Apollo / Moonshot Systems



Risk Compliant Archive Solution
using HPE Apollo 4510 System



HPC for Trader Workstation powered
by HPE Moonshot System using HPE
ProLiant Server Cartridges



HPE Trade and Match Server Solution
using HPE Apollo 2000 System

HPE Innovation Delivering Optimized Performance

- **Optimize HFT workload performance with HPE Trade and Match Server** using Apollo 2000 running at maximized frequency
- **Regulatory compliance of enterprise-wide data archive made easy** with HPE Risk Compliant Archive; iTernity iCAS for compliance, Scalify RING for efficient data archive, density optimized HPE Apollo 4000 server family
- **Maximize trader productivity** and enhance customer experience with superior compute and graphics performance of HPE Trader Workstation



**Performance optimized solutions that address today's
Financial Services Industry challenges and fuel innovation**

Maximize Performance and Agility for High Frequency Trading

HPE Trade and Match Server Solution to accelerate financial trading speed



Use Cases



Optimized Performance

Trade and Match Server for FSI with HPE Apollo 2000

To reduce latency by collocating servers on the same network	To minimize system latency for trading operations	To perform better at maximized frequency
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Up to 28% performance increase *

Customer Benefits

Gain competitive differentiation for high frequency trading workloads with Extreme Performance Compute solutions



- Optimized for HFT applications that perform better at higher frequency (up to 45%) and with lower core count – save costs
- Avoid overprovisioning with ability to tune and optimize for improved frequency – save time
- Designed to minimize system latency for trading operations – save time
- Safer and cost-effective air-cooled approach, not a risky liquid-cooled solution – save costs

Maximize Performance and Agility for High Frequency Trading

HPE Trade and Match Server Solution to accelerate financial trading speed



Use Cases

Optimized Performance
Trade and Match Server for FSI with HPE Apollo 2000

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Thank you