

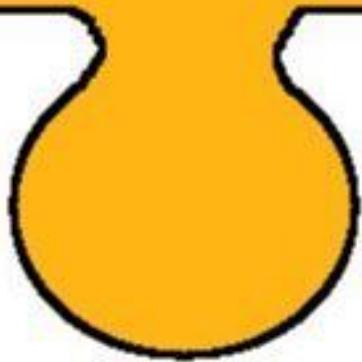
HPE Apollo 2000 system & Cluster Management Utility 8.1



Jetsada Malaisirirat

jetsada@clusterkit.co.th

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Apollo Hardware

Hardware Safety considerations

- To prevent electrostatic damage
 - Discharge electrostatic before touch device or server
 - Always be properly grounded when touching a static-sensitive component or assembly
 - Avoid touching pins, leads, or circuitry
 - Place parts on a grounded surface before removing them from their containers

HPE Apollo 2000 – Enterprise Bridge to Hyperscale Infrastructure

Flexible scale-out architecture in a traditional 2U form factor

Workgroup / Departmental



 **Flexible**

Customize

Mix and match different servers for workload optimization

 **Efficient**

Density optimized

2x density of 1U servers – four (4) Servers in 2U

 **Fast**

Performance

From general purpose apps to HPC with top bin CPU's and accelerators

Bringing webscale density, scale, and efficiency to enterprise data workloads and HPC

HPE Apollo 2000



- Apollo 2800
- Flexible disk
- Apollo 2600
- 2.5 SFF hotswap disk
- Apollo 2200
- 3.5 LFF hotswap disk

Hardware Focus

- Apollo 2000 System
- Chassis
 - Apollo 2600 chassis
- Node
 - HPE XL170r
 - HPE XL190r



Cloudera Hadoop Cluster & Vertica

- Cloudera Hadoop
 - 16 x HPE XL170r
 - 1 x manager + cmu
 - 2 x Name nodes
 - 13 x Data Nodes
 - 1 x HPE XL190r
 - 1 x service node
- Vertica Hadoop
 - 3 x HPE XL 190r



HPE Apollo 2600 Chassis - Specifications

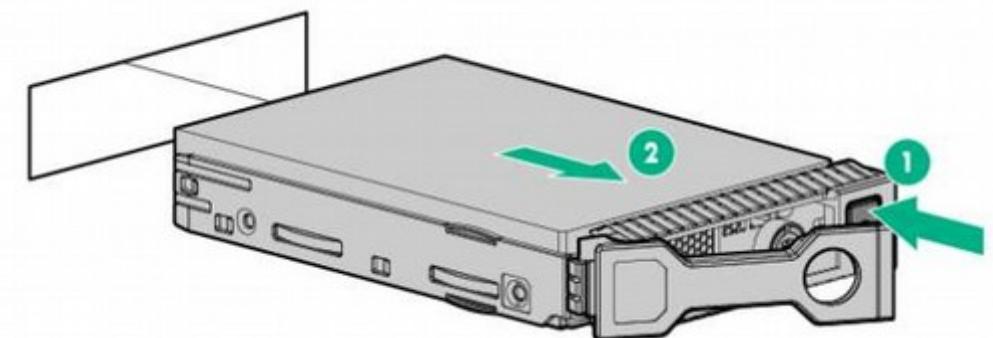
- Chassis
 - 24 SFF hot-plug SAS or SATA HDDs or SSDs - allocated equally across server nodes
 - 2U Rack Units
 - Chassis Depth : 32.4 in (82.27 cm)
- Weight Empty: 21.74 lb (9.86 kg)
- Max Enclosure Weight: 51.69 lb (23.45 kg)

Apollo Chassis Front & Rear

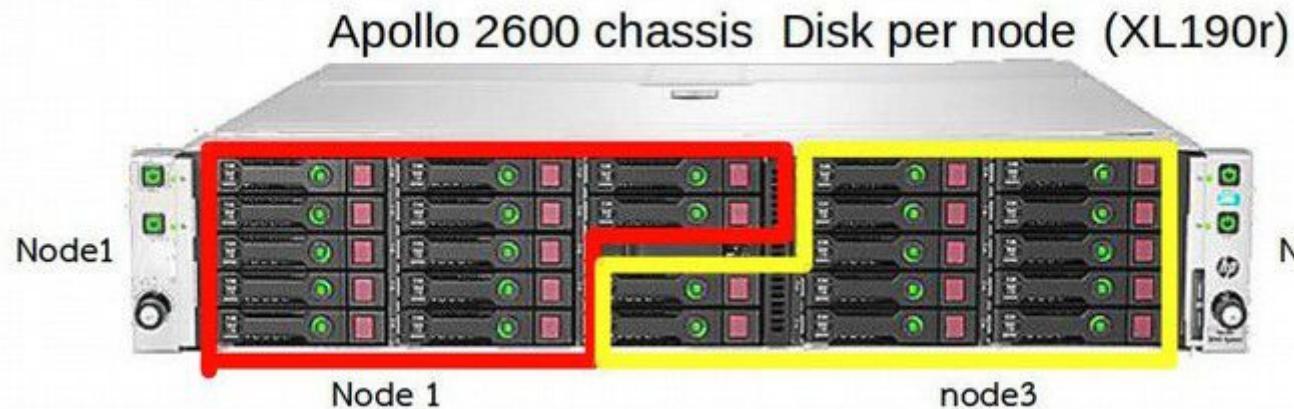
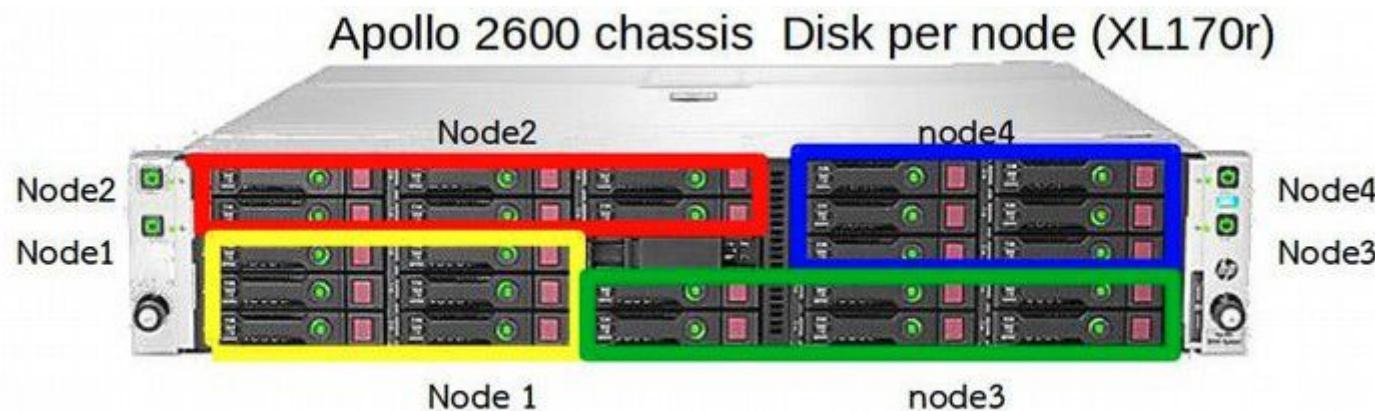


Disk storage

- The Apollo R2600 Chassis supports 24 hot-plug SAS or SATA HDDs or SSDs up front that are allocated equally between the installed server nodes.



Drive mapping for nodes



Chassis and node Serial number



Plug and play

HP SmartArray P440
(with 4GB cache)

2x 1400W
Power Supplies

2x 10GbE for
primary network connectivity
(SFP+ ports)

4



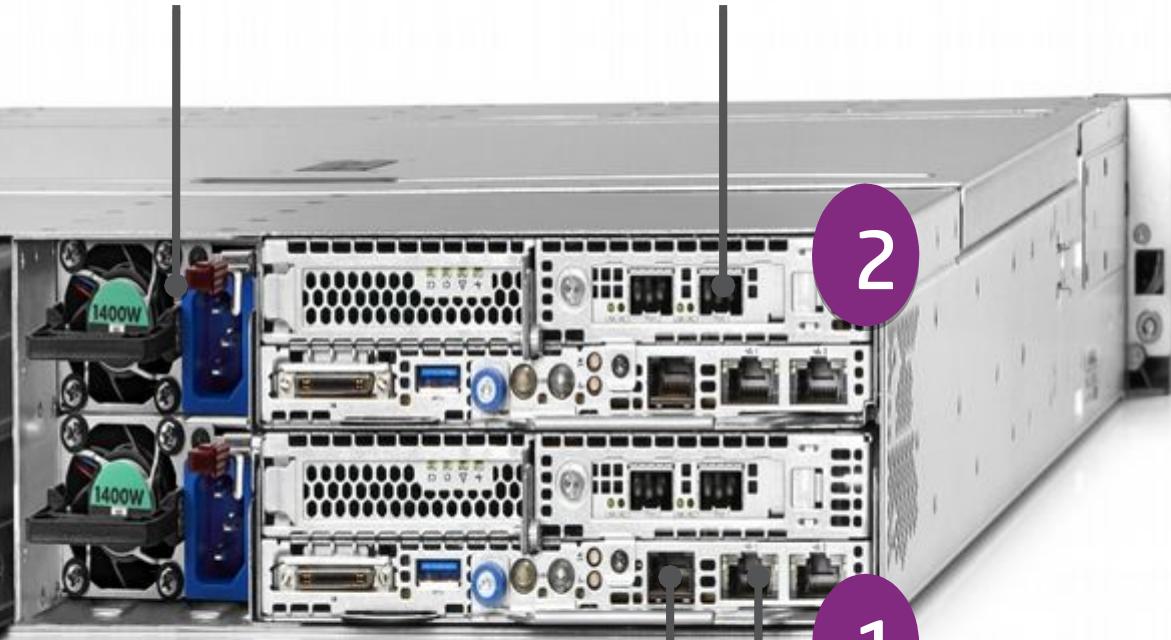
3

Serial/USB/Video
(fits HP 36-pin Dongle)

USB 3.0 connector
(for USB-based Factory Reset)

2x 1GbE
RJ 45 ports

2



1

Dedicated
iLO4 port

1GbE for initial installation
of first appliance
(RJ 45 port)

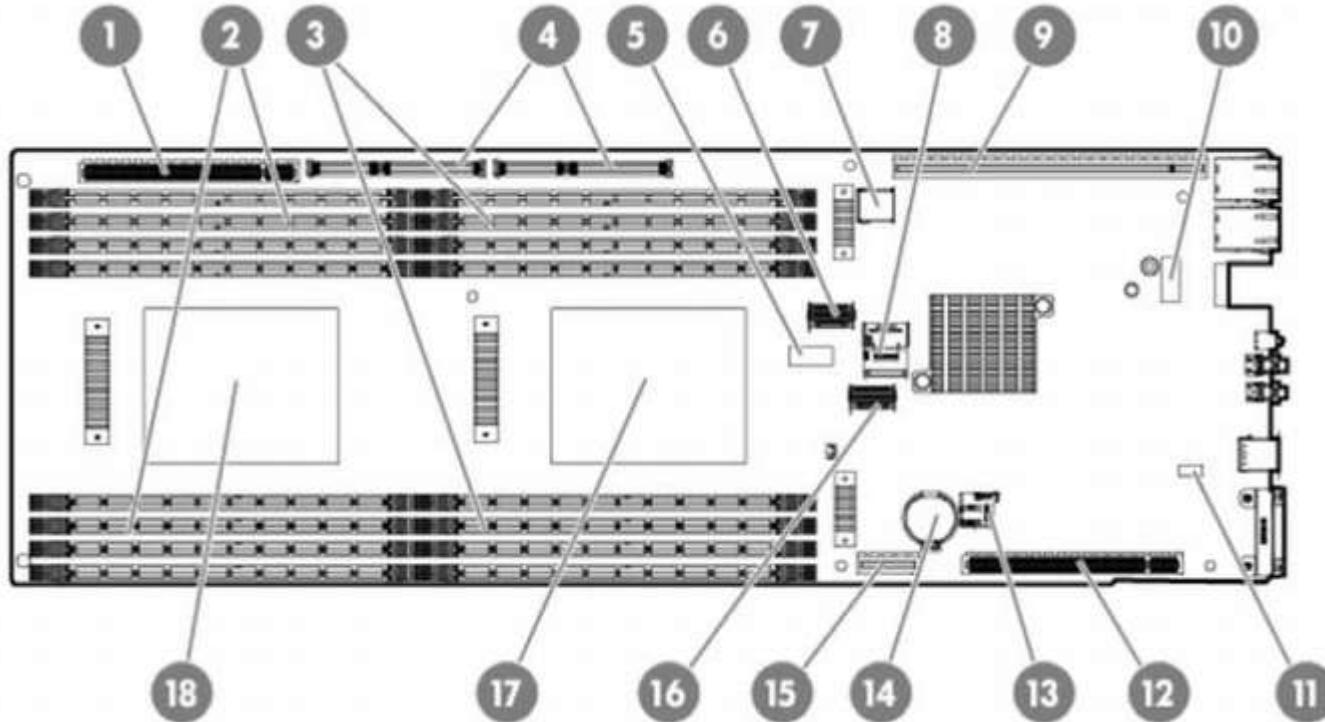
HPE ProLiant XL170r Gen9 Server

- The ProLiant XL170r Gen9 Server is a 1U half-width, 2-processor server with configuration options for:
 - Performance and efficient CPUs -- Intel Xeon E5-2600v3 and E5-2600v4 series processor options with choices from 4-18 Cores, 1.6GHz – 3.5GHz CPU speed, and power ratings between 85-145 Watts
 - 16 memory DIMM slots with up to 512GB DDR4 memory at up to 2400 MHz
 - 2 I/O slots for a choice of networking and clustering options and options for either 1 PCIe slot plus a FlexibleLOM or 2 PCIe slots

HPE ProLiant XL190r Gen9 Server

- The ProLiant XL190r Gen9 Server is a **2U half-width**, 2-processor server with configuration options for:
 - Almost Same specification with HPE XL170r but the difference between the two is primarily
 - XL190r : 3 External slots and 1 internal slot
 - XL170r : 2 External slots PCIe
 - HPE ProLiant XL190r can support an Nvidia Tesla GPU or Intel Xeon Phi coprocessor

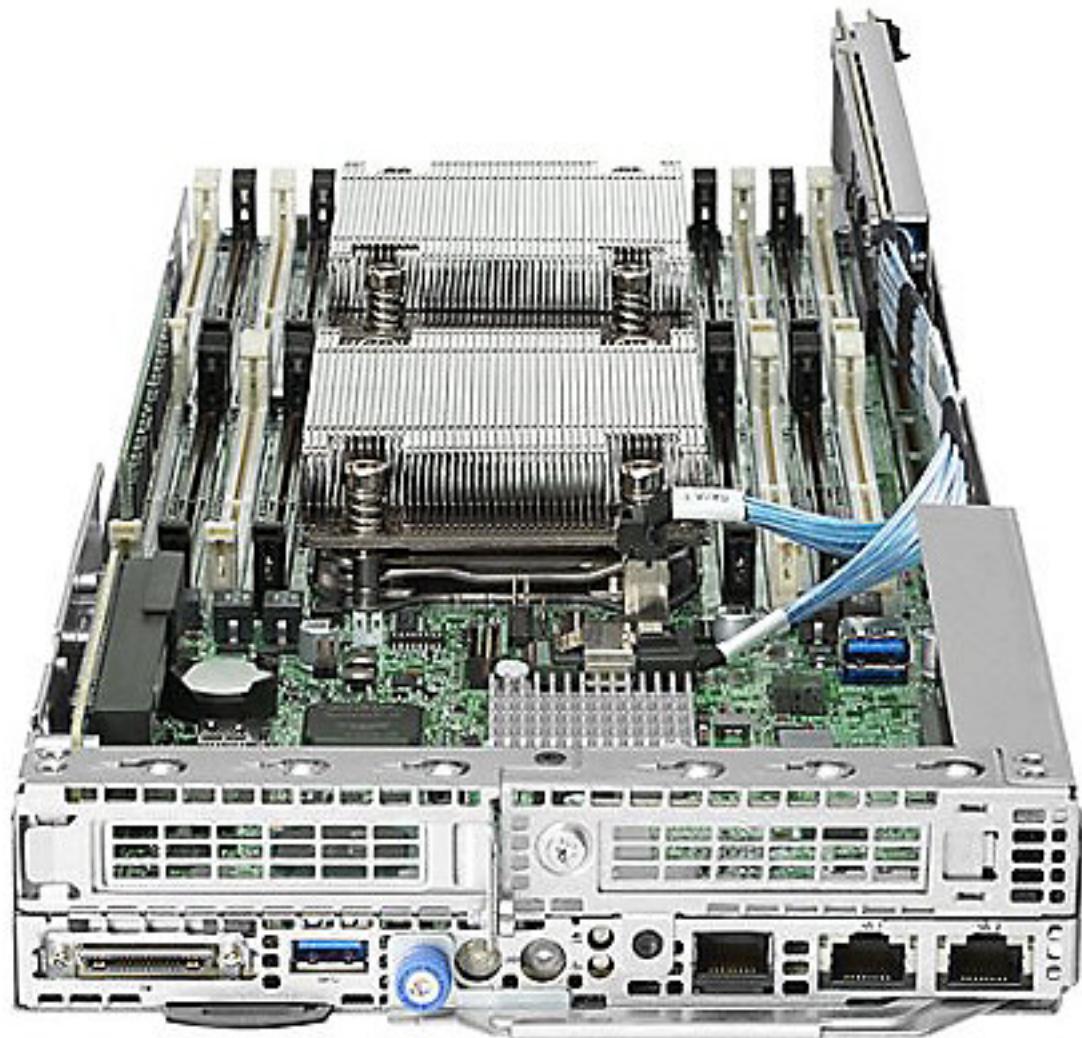
HPE XL170r/XL190r Logical view



Item	Description	Item	Description
1	Bayonet board slot	10	Dedicated iLO port connector
2	DIMMs for processor 2	11	NMI header
3	DIMMs for processor 1	12	PCIe x16 riser board connector*
4	PCIe x40 riser board connector*	13	microSD slot
5	System maintenance switch	14	System battery
6	Mini-SAS connector 1 (SATA x4)	15	M.2 SSD riser connector
7	Internal USB 3.0 connector	16	TPM connector
8	Mini-SAS connector 2 (SATA x4)	17	Processor 1
9	PCIe x24 riser board connector*	18	Processor 2

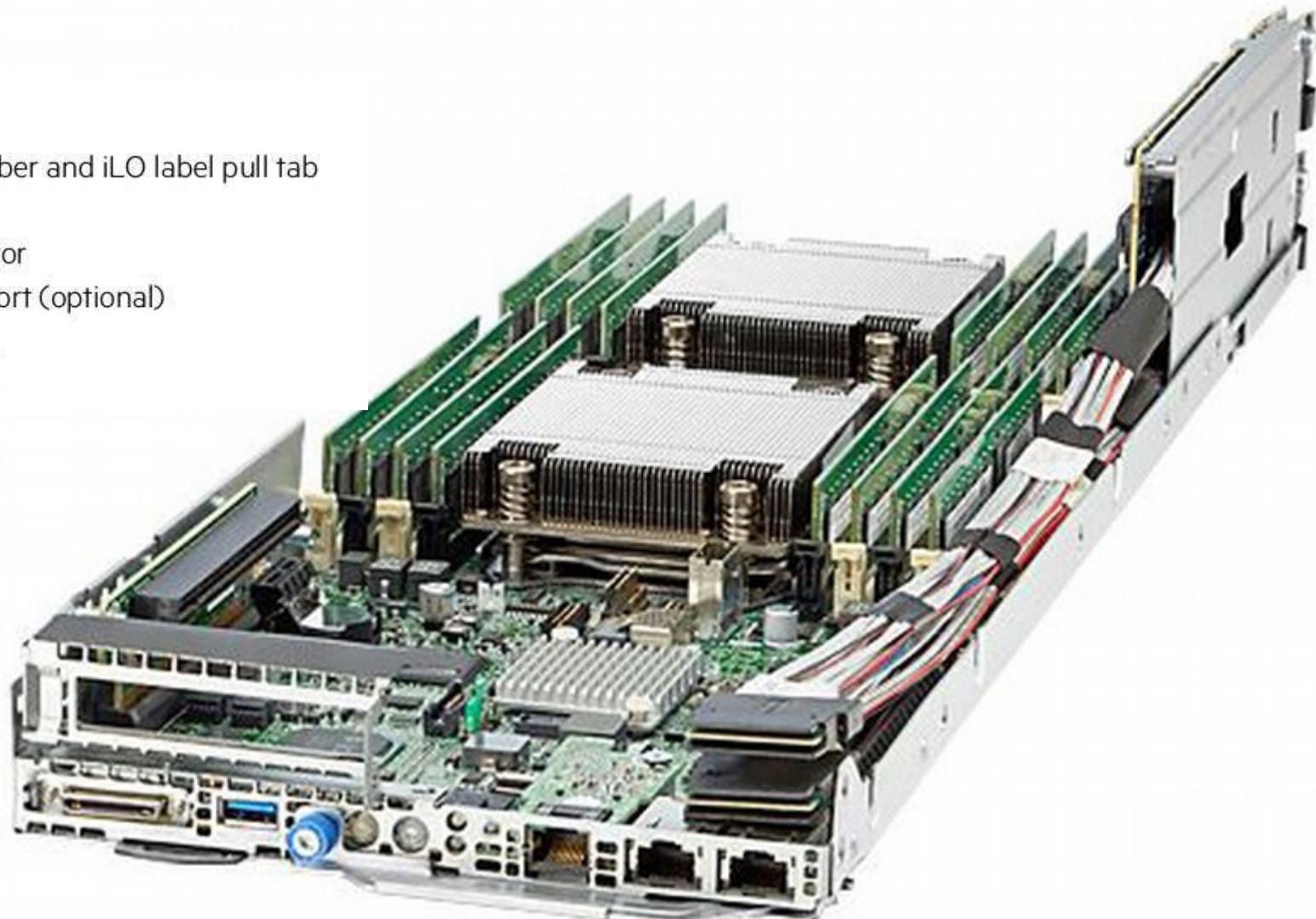
HPE XL170r Rear view

Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2

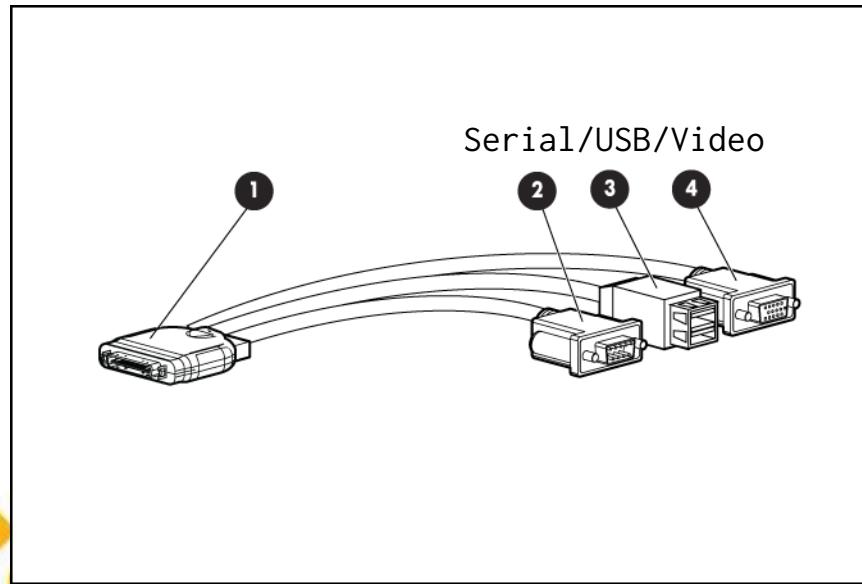


HPE XL190r Rear view

Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2



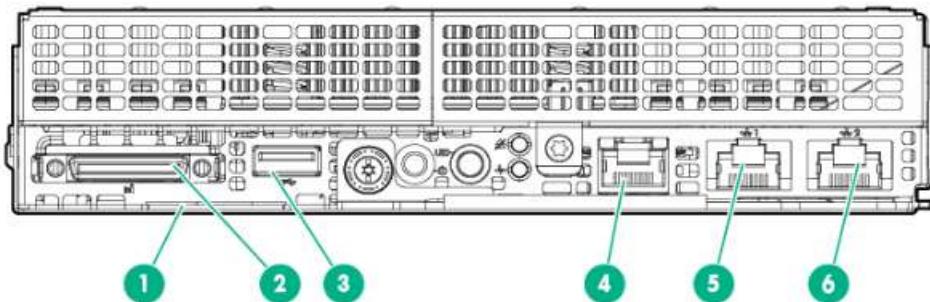
SUV Cable



Rear connector

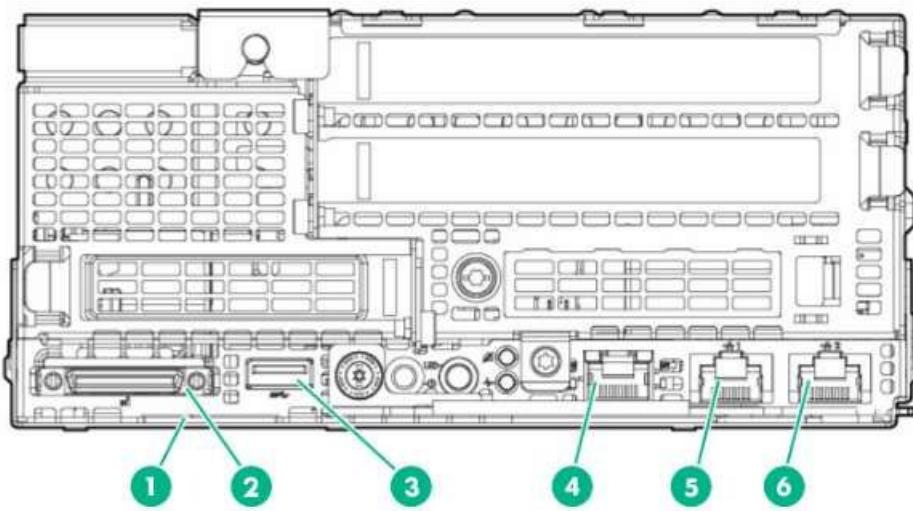
XL170r

To view rear panel components



Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2

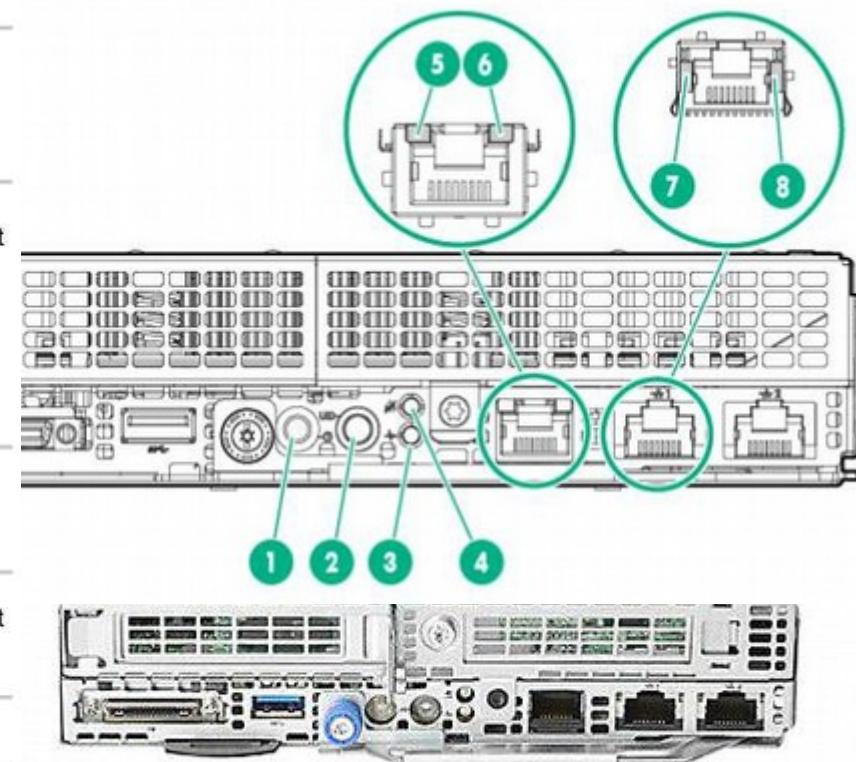
XL190r



Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2

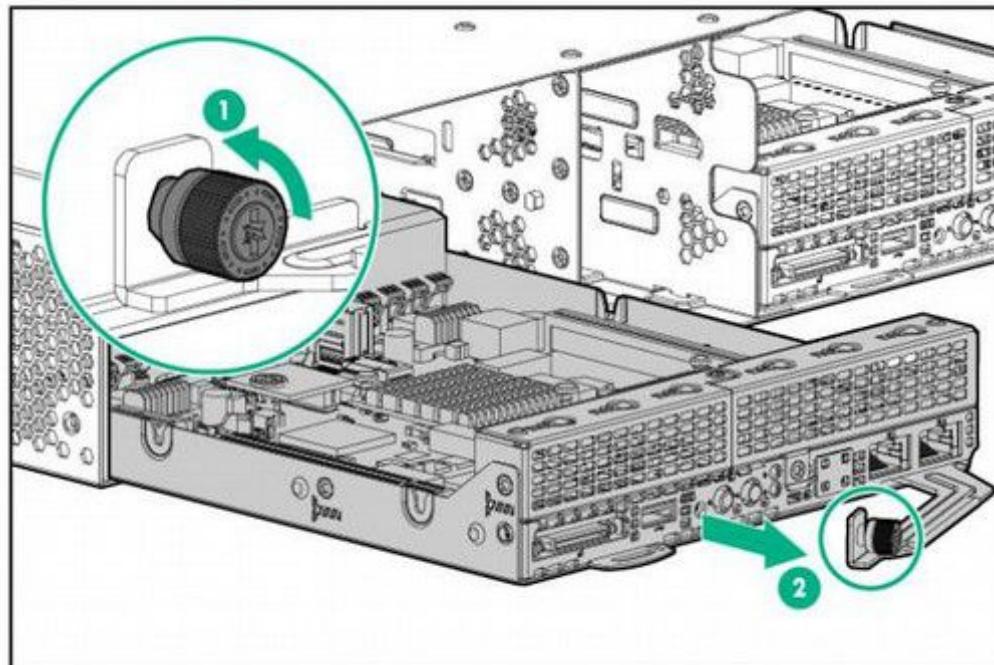
Rear Panel LEDs and Buttons

Item	Description	Status
1	Power button/LED ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²
2	UID button/LED ¹	Solid blue = Activated <ul style="list-style-type: none"> • 1 flash per second = Remote management or firmware upgrade in progress • 4 flashes per second = iLO manual soft reboot sequence initiated • 8 flashes per second = iLO manual hard reboot sequence in progress Off = Deactivated
3	Health LED ¹	Solid green = Normal Flashing green = iLO rebooting Flashing amber = System degraded Flashing red = System critical ³
4	Do not remove LED	Flashing white = Do not remove the node. Removing the node may terminate the current operation and cause data loss. Off = The node can be removed.
5	iLO activity LED	Green or flashing green = Network activity Off = No network activity
6	iLO link LED	Green = Linked to network Off = No network connection
7	NIC link LED ¹	Green = Linked to network Off = No network connection
8	NIC activity LED ¹	Green or flashing green = Network activity Off = No network activity

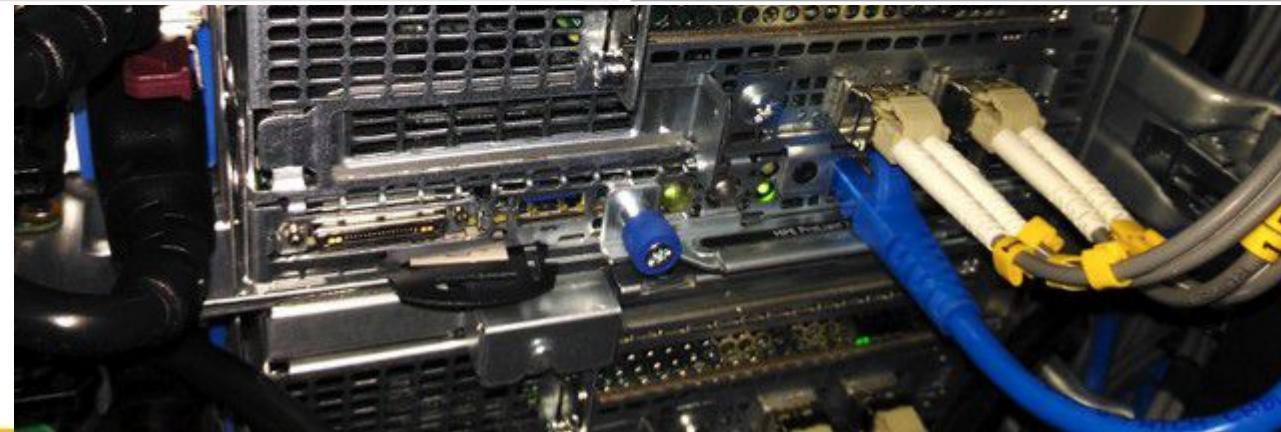
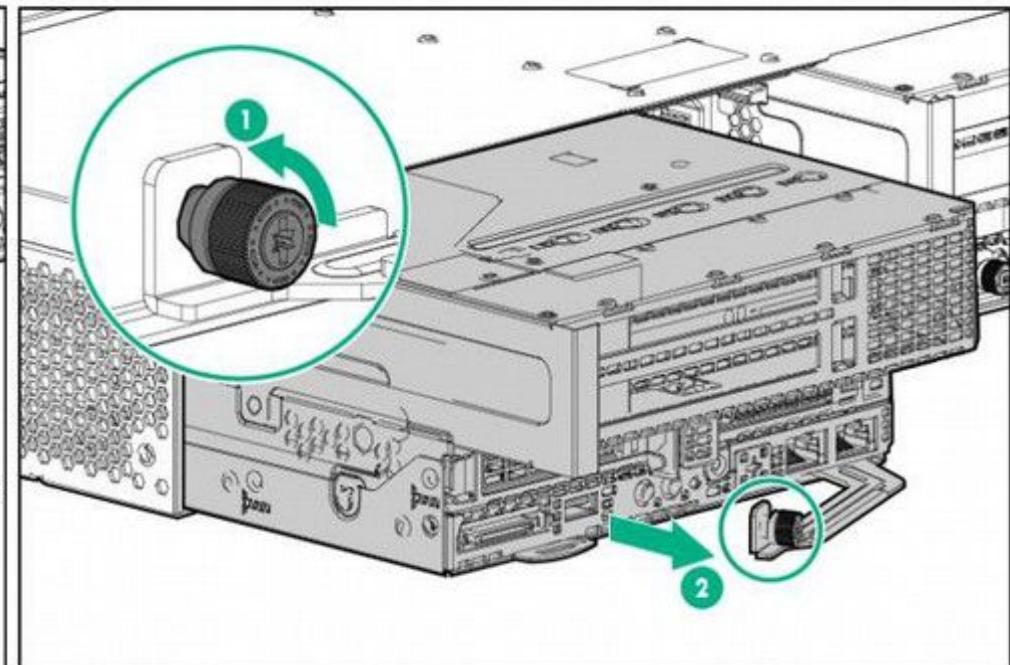


Remove Node

— 1U node

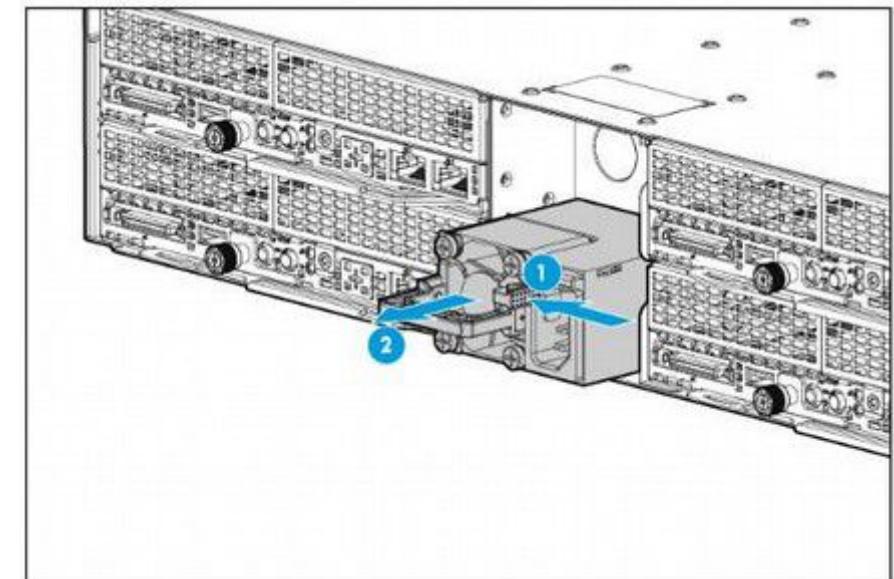


— 2U node



Remove Power Suply Unit

- Power down the system
- Release the power cord
 - Release the power cord from power source
 - Release the power cord from power supply
- Remove the power supply



CPU Support on XL170r/XL190r

- Intel Xeon E5-2600v3 and E5-2600v4 series processor
 - Support DDR4 RDIMMs/LRDIMMs
 - Max memory installed 2TB on 2 CPU (16 dimms)

Intel® Xeon® Processor E5-2650 v4
30M Cache, 2.20 GHz

Add to Compare

Specifications	Compatible Products	Benchmarks	Ordering and Compliance
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Essentials						Export specifications
Product Collection	Intel® Xeon® Processor E5 v4 Family	Code Name	Products formerly Broadwell	Vertical Segment	Server	
Processor Number	E5-2650V4	Status	Launched	Launch Date ?	Q1'16	
Lithography ?	14 nm	Recommended Customer Price ?	\$1166.00 - \$1171.00			

Performance			
# of Cores ?	12	# of Threads ?	24
Max Turbo Frequency ?	2.90 GHz	Cache ?	30 MB SmartCache
# of QPI Links ?	2	TDP ?	105 W
Processor Base Frequency ?	2.20 GHz	Bus Speed ?	9.6 GT/s QPI
VID Voltage Range ?	0		

CPU Architecture

New features:

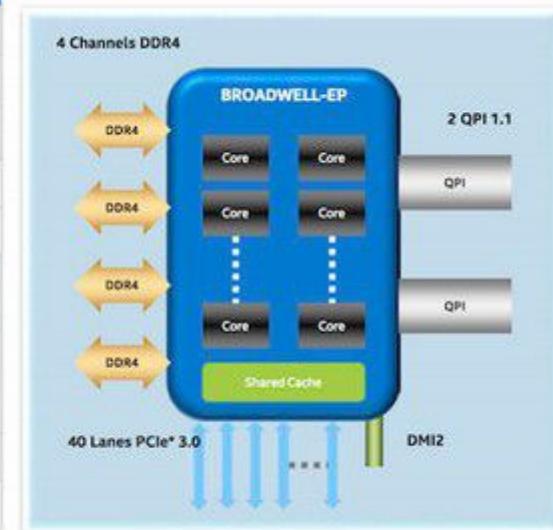
- Broadwell microarchitecture
- Built on 14nm process technology
- Socket compatible[®] replacement for Intel[®] Xeon[®] processor E5-2600 v3 on Grantley

New processor technologies:

- Posted Interrupts
- Page Modification Logging
- Cache Allocation Technology
- Memory BW Monitoring

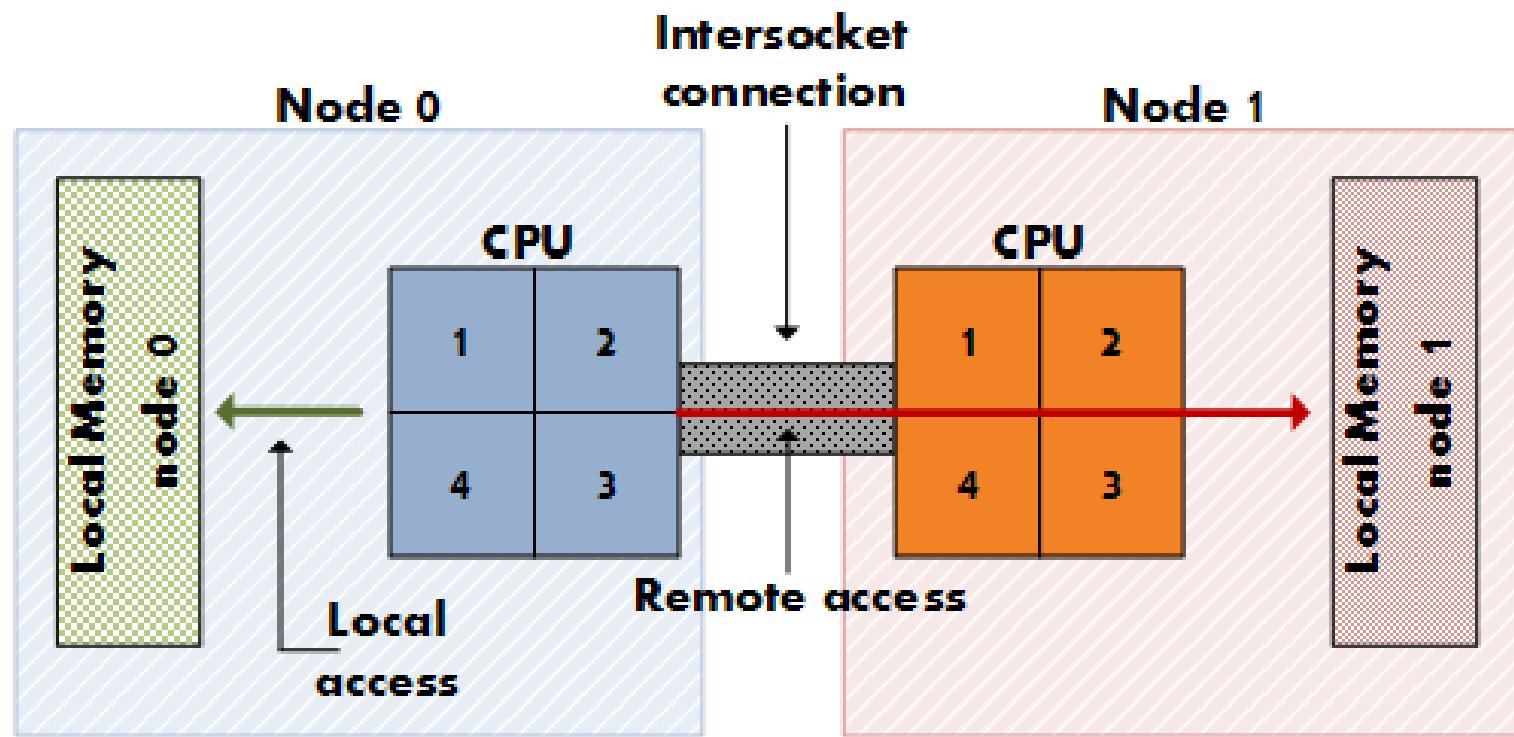
- Crypto Speedup
- Supervisor Mode Access Prevention
- New RDSEED instruction
- Intel[®] Processor Trace
- Hardware Controlled Power Management

Features	Xeon E5-2600 v3 (Haswell-EP)	Xeon E5-2600 v4 (Broadwell-EP)
Cores Per Socket	Up to 18	Up to 22
Threads Per Socket	Up to 36 threads	Up to 44 threads
Last-level Cache (LLC)	Up to 45 MB	Up to 55 MB
QPI Speed (GT/s)	2x QPI 1.1 channels 6.4, 8.0, 9.6 GT/s	
PCIe [®] Lanes / Speed(GT/s)	40 / 10 / PCIe [®] 3.0 (2.5, 5, 8 GT/s)	
Memory Population	4 channels of up to 3 RDIMMs or 3 LRDIMMs	+ 3DS LRDIMM [†]
Memory RAS	ECC, Patrol Scrubbing, Demand Scrubbing, Sparing, Mirroring, Lockstep Mode, x4/x8 SDDC	+ DDR4 Write CRC
Max Memory Speed	Up to 2133	Up to 2400
TDP (W)	160 (Workstation only), 145, 135, 120, 105, 90, 85, 65, 55	

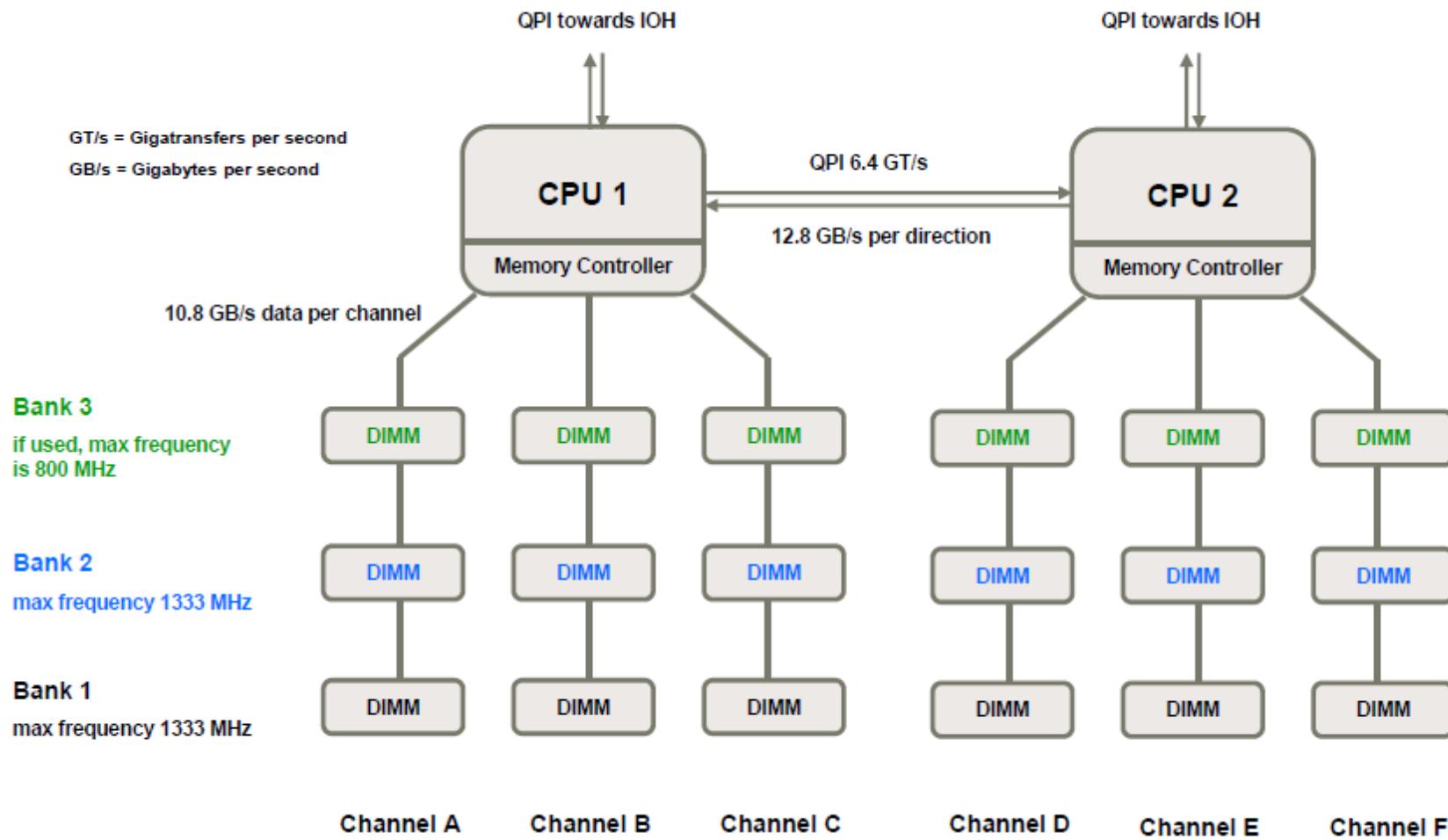


NUMA

- Non-Uniform Memory Architecture

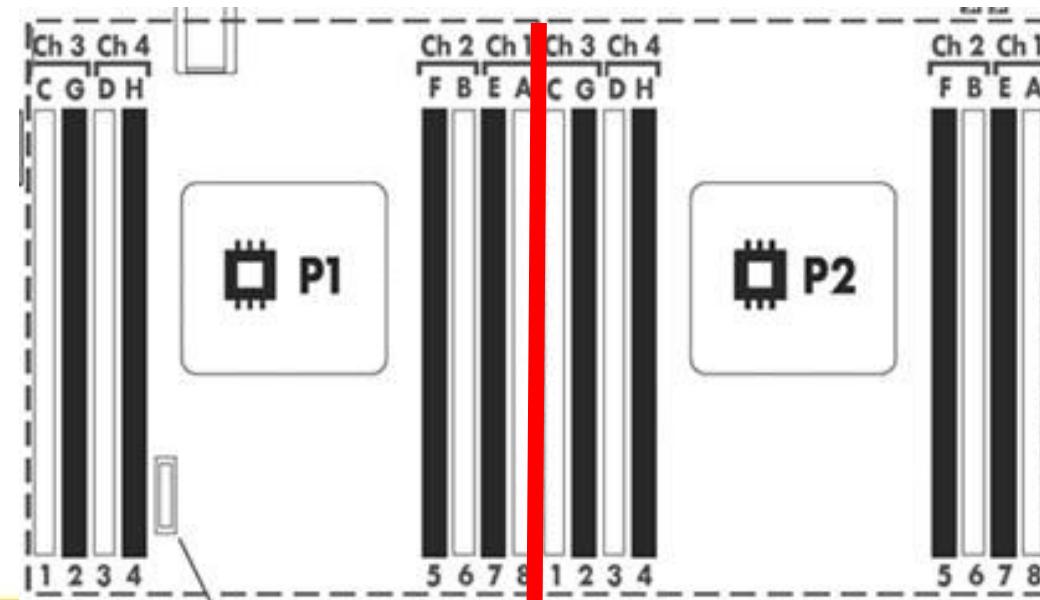


Memory Controller



Processor Memory channel

- Intel® Xeon® E5-2600v3 or E5-2600v4 family
contains 4 memory channels / 2 dimms per channel
total 16 DIMMs (2 Socket install) for the server.
- Use slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D).



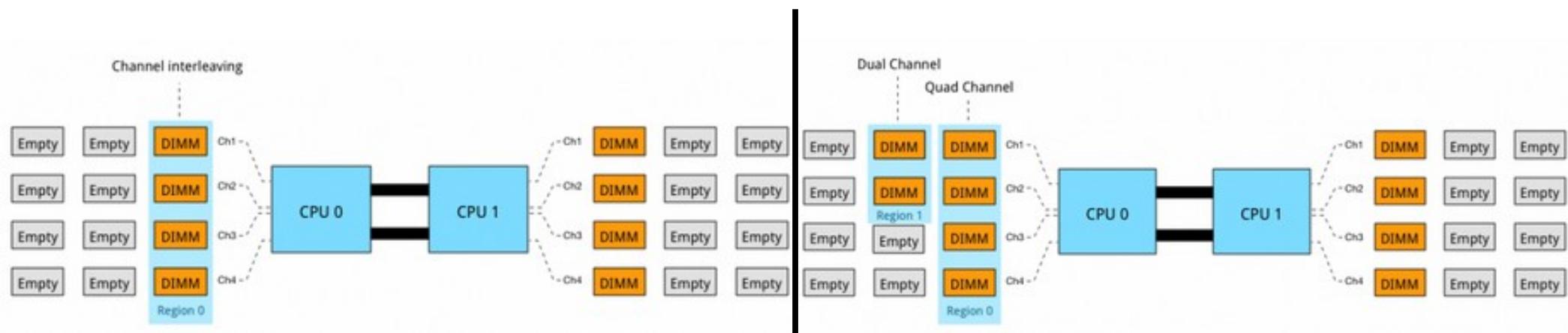
Memory configuration

Channel Balance

- To leverage all the available bandwidth each channel should be populated with at least one DIMM

Channel Unbalance

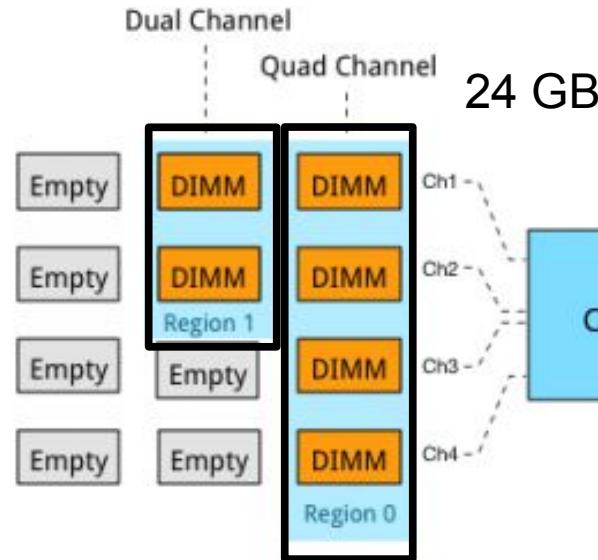
- inconsistent performance
- Unbalance across channels
- Unbalance across Processor



Channel Unbalance

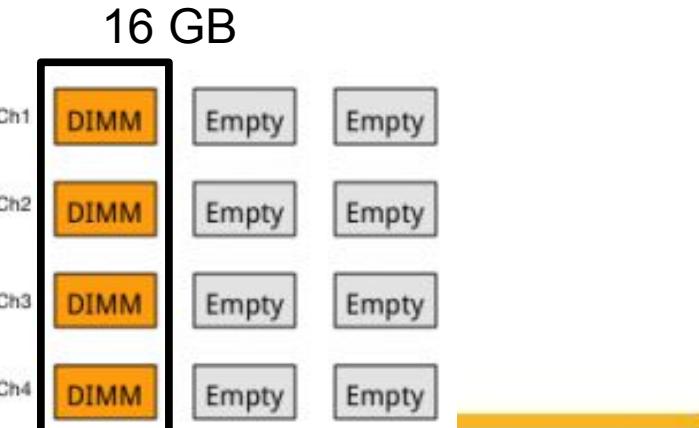
- Unbalance across channels

- throughput in Region 1 may be as little as 50% of the throughput in Region 0



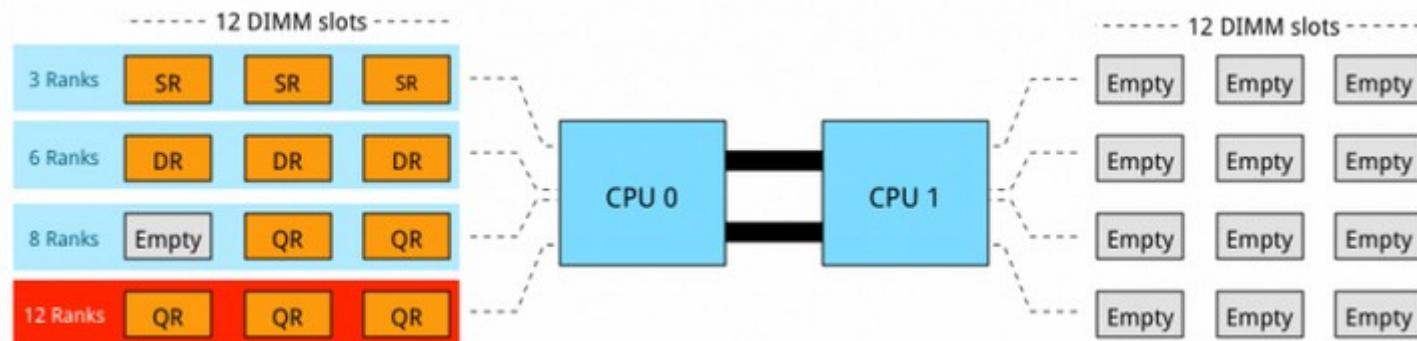
- Unbalance across Processor

- CPU1 and request remote memory from CPU0 The longer latencies associated with the remote memory will result in reduced performance of those threads



Memory ranking

- A DIMM groups the chips together in ranks
- DDR4 specification supports a maximum of 8 ranks per memory channel
- Higher rank dimm must be install on first dimm on memory channel
- For more capacities, you need to look for another type of DIMM, the load-reduced DIMM (LRDIMM)



Memory choice

Table 1-1 Choices in Memory Technology

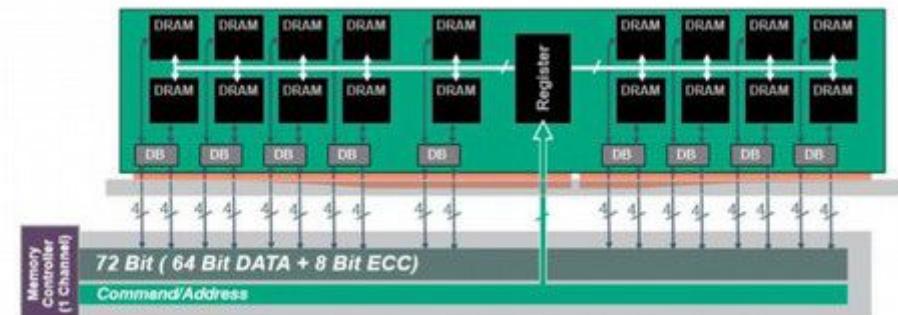
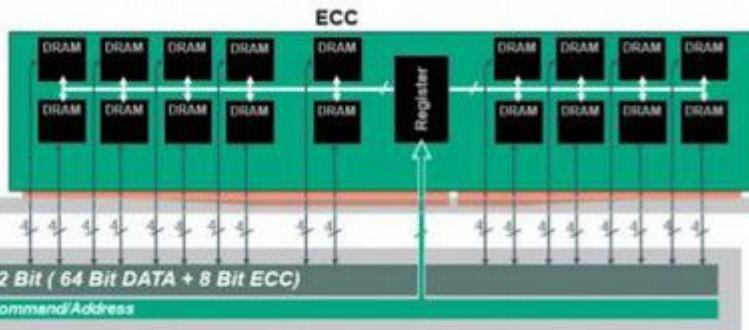
	<i>UDIMMs</i>	<i>RDIMMs</i>	<i>LRDIMMs</i>
PC4-2133P capacities	4GB 8GB 16GB 32GB	4GB 8GB 16GB 32GB	32GB 64GB
PC4-2400T capacities	8GB 16GB 32GB	8GB 16GB 32GB	32GB 64GB 128GB
Maximum DIMMs per channel	1 dual rank	3 dual rank	3 "any" rank
Address error detection	Yes	Yes	Yes
Lower cost	Yes	Yes	No (due to additional components and stacking technology)
Ranks/DIMM support	1, 2	1, 2	2, 4, 8
DRAM support	x8	x4, x8	x4
Maximum server capacity (GB)	64 (4 slots)	768 (24 slots) 3072 (96 slots)	3072 (24 slots) 12288 (96 slots)

What is LRDIMM?

- LRDIMM or Load Reduced DIMM is an industry standard memory technology that has been adopted by Intel for their next generation Intel® Xeon® E5-2600 family processor that addresses the need for greater memory bandwidth and capacity.
- LRDIMM memory buffer reduces the electrical load to the memory controller and allows higher capacity memory to run at 3 DIMMs per channel. LRDIMM is for customers who require the maximum memory capacity.

RDIMM and LRDIMM

- RDIMM puts less electrical loading on the command/address signals due to the register, which acts as a buffer on the DIMM between the memory controller and the DRAMs
- LRDIMM has additional data buffers (DB) on the DIMM between the memory controller and DRAM in order to reduce electrical loading on the data signals of the memory bus



LRDIMM 3DS TSV

- 3D Stacking (3DS) and Through Silicon Vias (TSV)
- Use With the 128GB LRDIMM
- Don't mix with regular LRDIMM

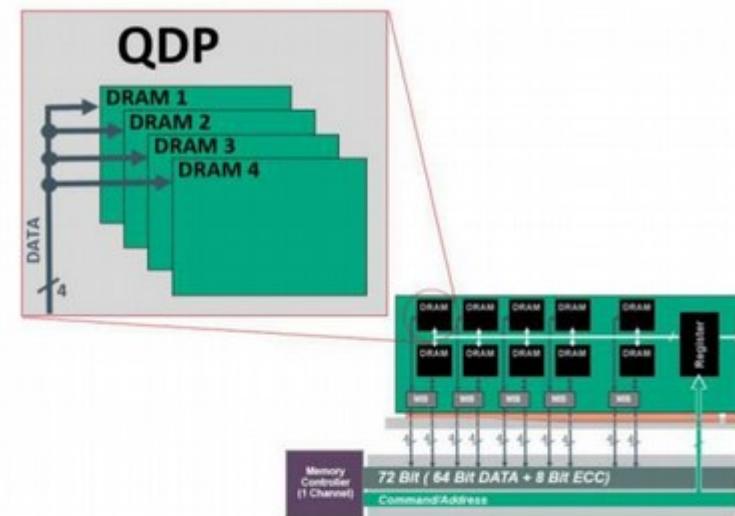


Figure 1-12: A QDP.

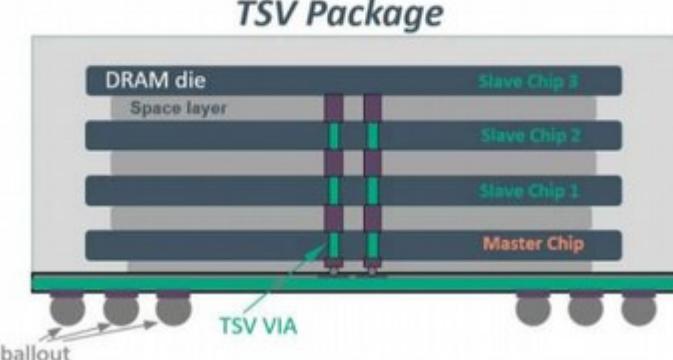


Figure 1-13: A stack solution that uses TSV.

Warning for memory configuration

- Mixing of processor speeds and types is not supported
- Minimum 2 DIMMs are required if two processors are installed
- **LRDIMM and RDIMM** are distinct memory technologies and **cannot be mixed** within a server
- Don't mix 3DS TSV LRDIMMs with regular LRDIMMs,
 - if you mix? The server won't boot
- When two processors are installed, balance the total capacity of the DIMM's across the two processors.
- Populate the white DIMM slots first (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D)

Max memory speed on Xeon E-5 V4

Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)	Speed (MT/s); Voltage (V);					
			Slot Per Channel (SPC) and DIMM Per Channel (DPC)					
			2 Slots Per Channel		3 Slots Per Channel			
			1DPC	2DPC	1DPC	2DPC	3DPC	
RDIMM	SRx8	4 GB	1.2 V	2400	2133	2400	2400	1866
RDIMM	SRx4	8 GB	1.2 V	2400	2133	2400	2400	1866
RDIMM	DRx4	16 GB	1.2 V	2400	2133	2400	2400	1866
LRDIMM	DRx4	32 GB	1.2 V	2400	2400	2400	2400	2400
LRDIMM	QRx4	64 GB	1.2 V	2400	2400	2400	2400	2400
LRDIMM	8Rx4	128 GB	1.2 V	2400	2400	2400	2400	2400

Figure 3-2: Max speeds on Xeon v4 by configuration.

HPE Server Memory Configurator Tool

- Google keyword “HPE Server Memory Configurator Tool”

[The screenshot shows the HPE DDR4 Server Memory Configurator tool. At the top, there's a navigation bar with links for Hewlett Packard Enterprise, Solutions, Services, Products, About Us, and Support. Below the navigation bar, it says "Servers / HPE ProLiant servers". The main title is "HPE DDR4 Server Memory Configurator". Below the title, there's a step-by-step guide: 1 Select server > 2 ID existing memory > 3 Select memory capacity > 4 Select memory option > 5 Create parts list. Step 1a asks if you have a pre-configured BTO server model part number, with "No" checked. Step 1b asks to select HPE ProLiant Server Series, showing five options with radio buttons: HPE ProLiant DL Servers, HPE ProLiant ML Servers, HPE Synergy, HPE Apollo System, and HPE ProLiant BladeSystem. A dropdown menu at the bottom says "Select your ProLiant server above".](https://h22195.www2.hpe.com/DDR4memoryconfig/Home>SelectServer</p></div><div data-bbox=)

HPE Check warranty status

- Google search keyword
“Check your warranty
status - HPE Support
Center”
- <http://h20564.www2.hp.com/hpsc/wc/public/home>

The screenshot shows the 'Hewlett Packard Enterprise Support Center' website. The top navigation bar includes links for Solutions, Services, Products, About Us, and Support. Below the navigation, there are links for Product Support, Insight Online, and My IT Environment. A 'Check your warranty status' section is prominently displayed. It contains two main forms: 'Warranty Check' and 'Serial number lookup'. The 'Warranty Check' form has fields for serial numbers and countries of purchase. The 'Serial number lookup' form is a table with columns for Item, Product serial number, and Country of purchase. The table lists 10 items, with the first one having a serial number entered ('SGH703VE0X') and Thailand selected as the country of purchase. Other items are empty. At the bottom of the page are 'Add more warranties', 'Clear', and 'Submit' buttons.

Item	Product serial number	Country of purchase
1	SGH703VE0X	Thailand
2		United States
3		United States
4		United States
5		United States
6		United States
7		United States
8		United States
9		United States
10		United States

Warranty status

The screenshot shows the Hewlett Packard Enterprise Support Center homepage. The top navigation bar includes links for Solutions, Services, Products, About Us, and Support. Below the navigation is the title "Hewlett Packard Enterprise Support Center". Underneath the title are two dropdown menus: "Product Support" and "My IT Environment". A gear icon for settings is also present. The main content area is titled "Warranty check results". On the left, there's a sidebar with "Warranty Check" and "Help" sections, followed by a "Related Links" section containing links to contracts, support cases, self-repair, purchase support agreements, and support services central. The main content area displays a summary for an "HP Apollo r2600 24SFF CTO Chassis" with serial number "SN: SGH703VEOX". It includes a note about hash characters concealing sensitive information. A table lists the warranty details:

Type	Identifier	Service type	Start date	End date	Status
Support agreement	#####	HPE Foundation Care 24x7 SVC			
		HPE Hardware Maintenance Onsite Support	Jan 9, 2017	Jan 8, 2020	Active
		HPE Collaborative Remote Support	Jan 9, 2017	Jan 8, 2020	Active
Base Warranty	SGH703VEOX	Wty: HPE HW Maintenance Onsite Support	Jan 26, 2017	Feb 24, 2020	Active
		Wty: HPE Support for Initial Setup	Jan 26, 2017	May 25, 2017	Active

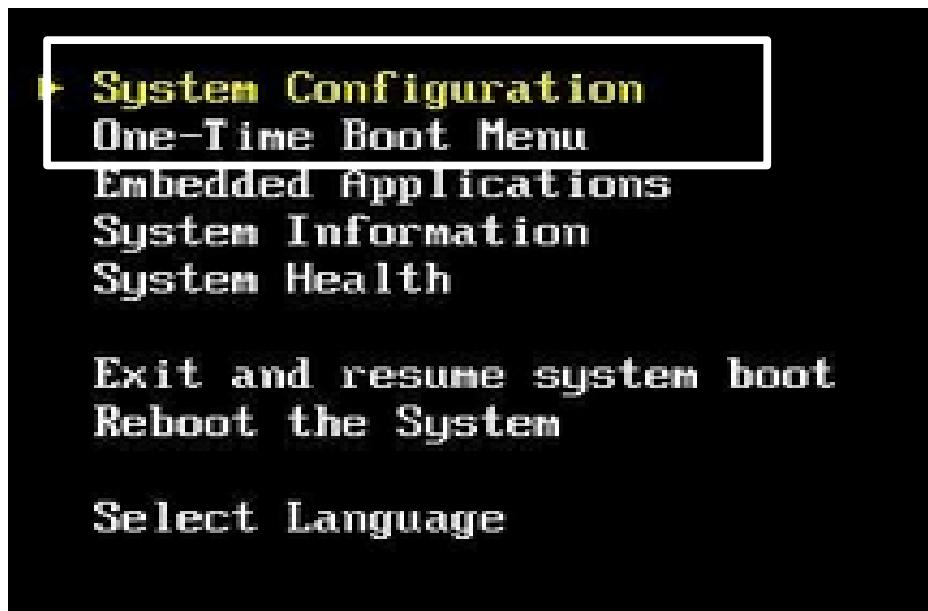
Sign-in above to add warranties to your profile
Use your warranty products to find support or submit and manage support cases.

Bios configuration

- Power on, During the initial boot:
- Press F9 key in the ProLiant POST screen to enter the UEFI System Utilities screen.
- Press F11 for Boot menu
- Press F12 for Network PXE



Bios menu



- System Configuration
 - Config system bios
- One-Time Boot menu
 - Boot device next time

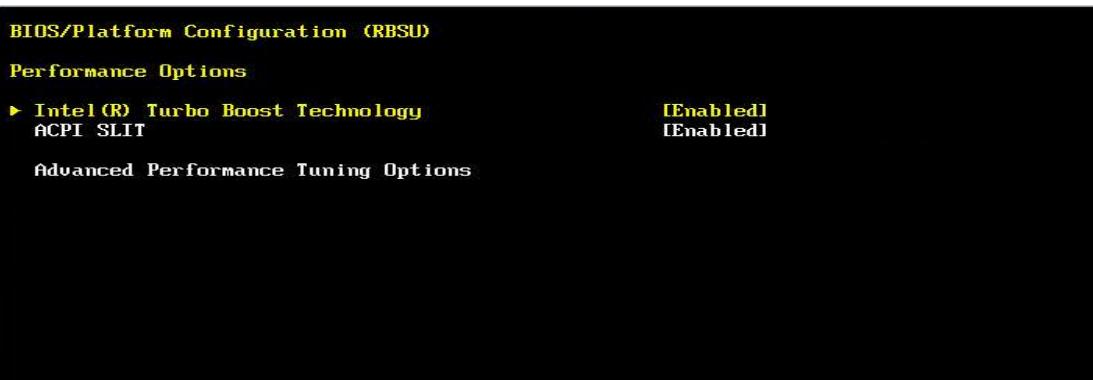
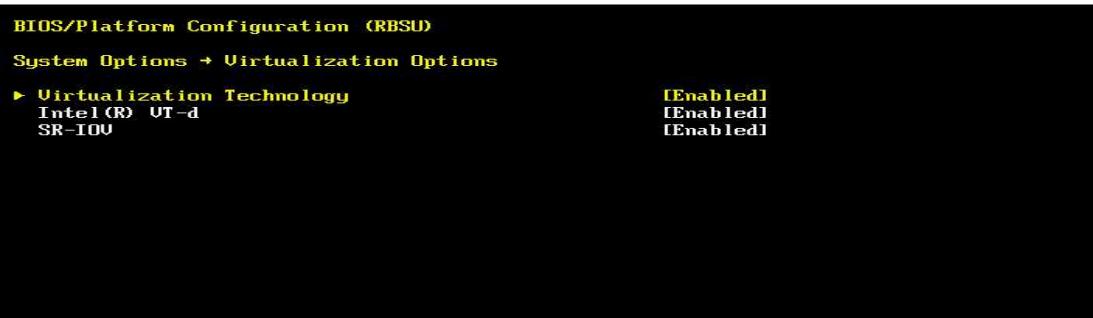
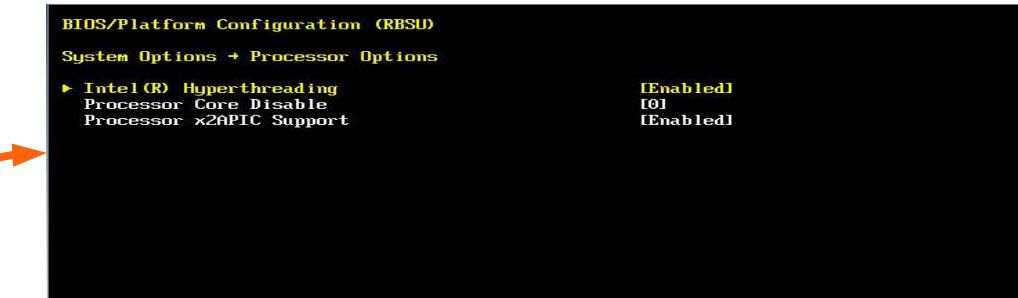
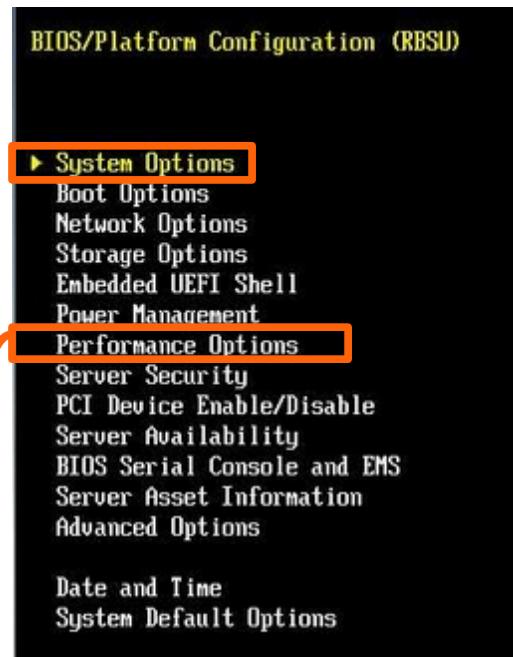
BIOS/iLO 4 setup

- Choose BIOS/Platform Configuration (RBSU)
- iLO 4 Configuration Utility for iLO setup

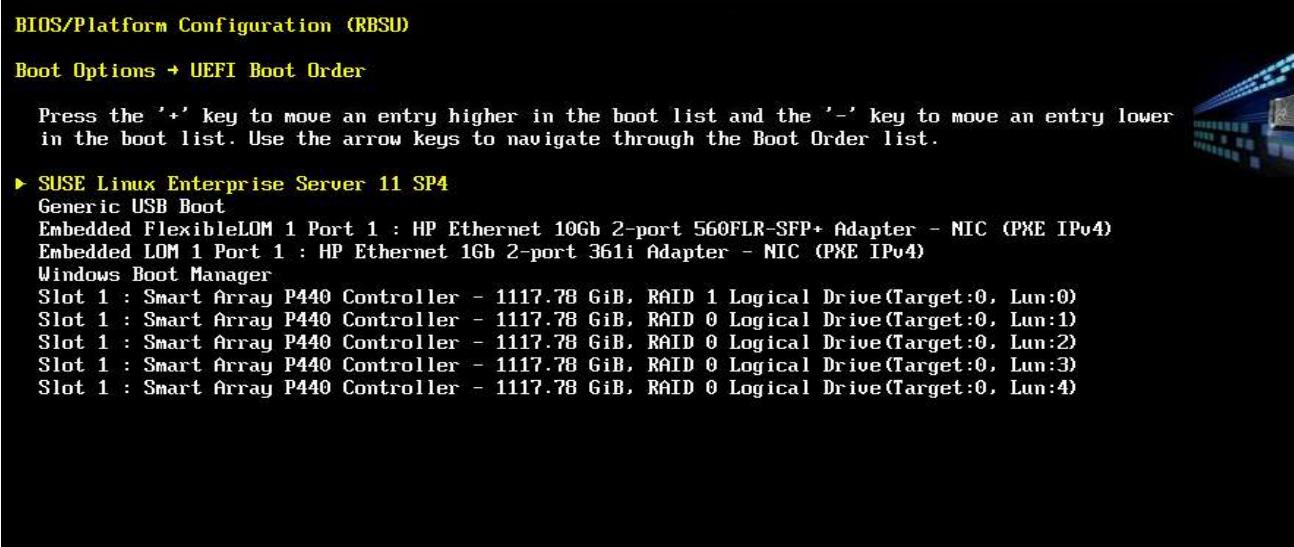
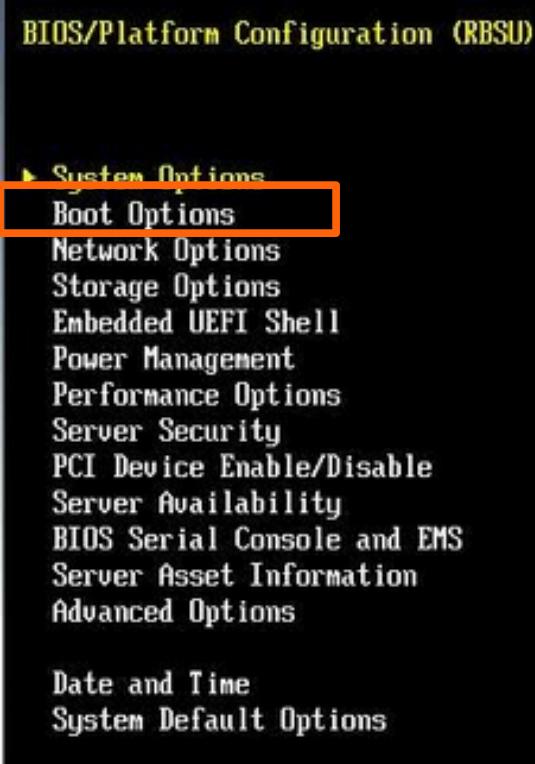
The screenshot shows a dark-themed user interface for the iLO 4 Configuration Utility. At the top, there is a navigation bar with a back arrow and the text "BIOS/Platform Configuration (RBSU)". Below this, the main content area displays the following system configuration details:

- iLO 4 Configuration Utility
- Embedded Storage : Dynamic Smart Array B140i
- Embedded LOM 1 Port 1 : HP Ethernet 1Gb 2-port 361i Adapter - NIC
- Embedded LOM 1 Port 2 : HP Ethernet 1Gb 2-port 361i Adapter - NIC
- Embedded FlexibleLOM 1 Port 1 : HP Ethernet 10Gb 2-port 560FLR-SFP+ Adapter - NIC
- Embedded FlexibleLOM 1 Port 2 : HP Ethernet 10Gb 2-port 560FLR-SFP+ Adapter - NIC
- Slot 1 : Smart Array P440 Controller

CPU/USB Options



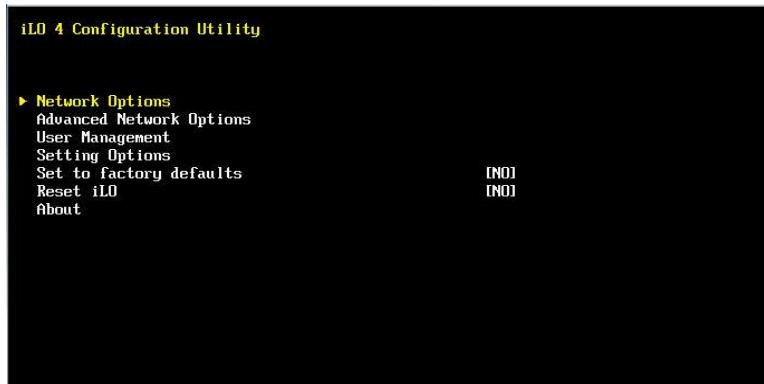
Boot Options



Network Option/Power Management



ILO4 Configuration



The screenshot shows the "Network Options" configuration screen. At the top left, it says "iLO 4 Configuration Utility" and "Network Options". The screen lists several network settings with their current values in brackets:

Setting	Value
MAC Address	[70:10:6F:B9:82:96]
Network Interface Adapter	[ON]
Transceiver Speed Autoselect	[ON]
DHCP Enable	[OFF]
DNS Name	[iLOSGH703UE2?]
IP Address	[10.0.51.41]
Subnet Mask	[255.255.255.0]
Gateway IP Address	[10.0.51.254]

iLO4 User Management/Setting Option



Integrated Lights-Out 4



iLO 4

ProLiant

Firmware Version 2.50
ILOSGH703VE27

Local user name:

Password:

Log In



Overview

Hewlett Packard Enterprise

iLO 4
ProLiant XL170r Gen9

Local User: hheadmin
iLO Hostname: ILOSGH703VE27..

HOME | SIGN OUT

?

Expand All

- Information
 - Overview
 - System Information
 - ILO Event Log
 - Integrated Management Log
 - Active Health System Log
 - Diagnostics
 - Location Discovery Services
 - Insight Agent
- + iLO Federation
- + Remote Console
- + Virtual Media
- + Power Management
- + Network
- + Remote Support
- + Administration
- + Chassis

Information

	Information	Status
Server Name	HD-Compute-Node-13	System Health OK
Product Name	ProLiant XL170r Gen9	Server Power ON
UUID	31383937-3535-4753-4837-303356453237	UID Indicator UID OFF
Server Serial Number	SGH703VE27	TPM Status Not Present
Product ID	798155-B21	SD-Card Status Not Present
Chassis Serial Number	SGH703VE10	iLO Date/Time Tue Mar 7 14:29:00 2017
System ROM	U14 v2.30 (09/12/2016)	
System ROM Date	09/12/2016	Connection to HPE
Backup System ROM	09/12/2016	
Integrated Remote Console	.NET Java Web Start Java Applet	Not registered
License Type	iLO Advanced	
iLO Firmware Version	2.50 Sep 23 2016	
IP Address	10.0.51.41	
Link-Local IPv6 Address	FE80::7210:6FFF:FEB9:8296	
iLO Hostname	ILOSGH703VE27..	

Active Sessions

User	IP Address	Source
Local User: hheadmin	10.0.51.100	HTTPS
Local User: hheadmin	10.0.51.100	HTTPS

POWER: ON ON UID: OFF OFF 0

Computer xterm ILO: HD-Compute-No... Tue Mar 7, 2:29 PM

System Information

Hewlett Packard Enterprise iLO 4 ProLiant XL170r Gen9 Local User: hpeadmin HOME | SIGN OUT

Expand All

Information

Overview

System Information

iLO Event Log

Integrated Management Log

Active Health System Log

Diagnostics

Location Discovery Services

Insight Agent

> ILO Federation

> Remote Console

> Virtual Media

> Power Management

> Network

> Remote Support

> Administration

> Chassis

Subsystems and Devices

Subsystems and Devices

	Status
Agentless Management Service	OK
Smart Storage Battery Status	OK
BIOS/Hardware Health	OK
Fan Redundancy	Redundant
Fans	OK
Memory	OK
Network	OK
Power Supplies	OK
Processors	OK
Storage	OK
Temperatures	OK

10.0.51.41/

SUSE Getting Started Latest Headlines Mozilla Firefox

iLO 4 ProLiant XL170r Gen9 Local User: hpeadmin ILO Hostname: IL0SGH703VE27

System Information - Fan Information

Fans

	Status	Speed
Fan 1	OK	23%
Fan 2	OK	23%
Fan 3	OK	25%
Fan 4	OK	25%
Fan 5	OK	23%
Fan 6	OK	23%
Fan 7	OK	25%
Fan 8	OK	25%

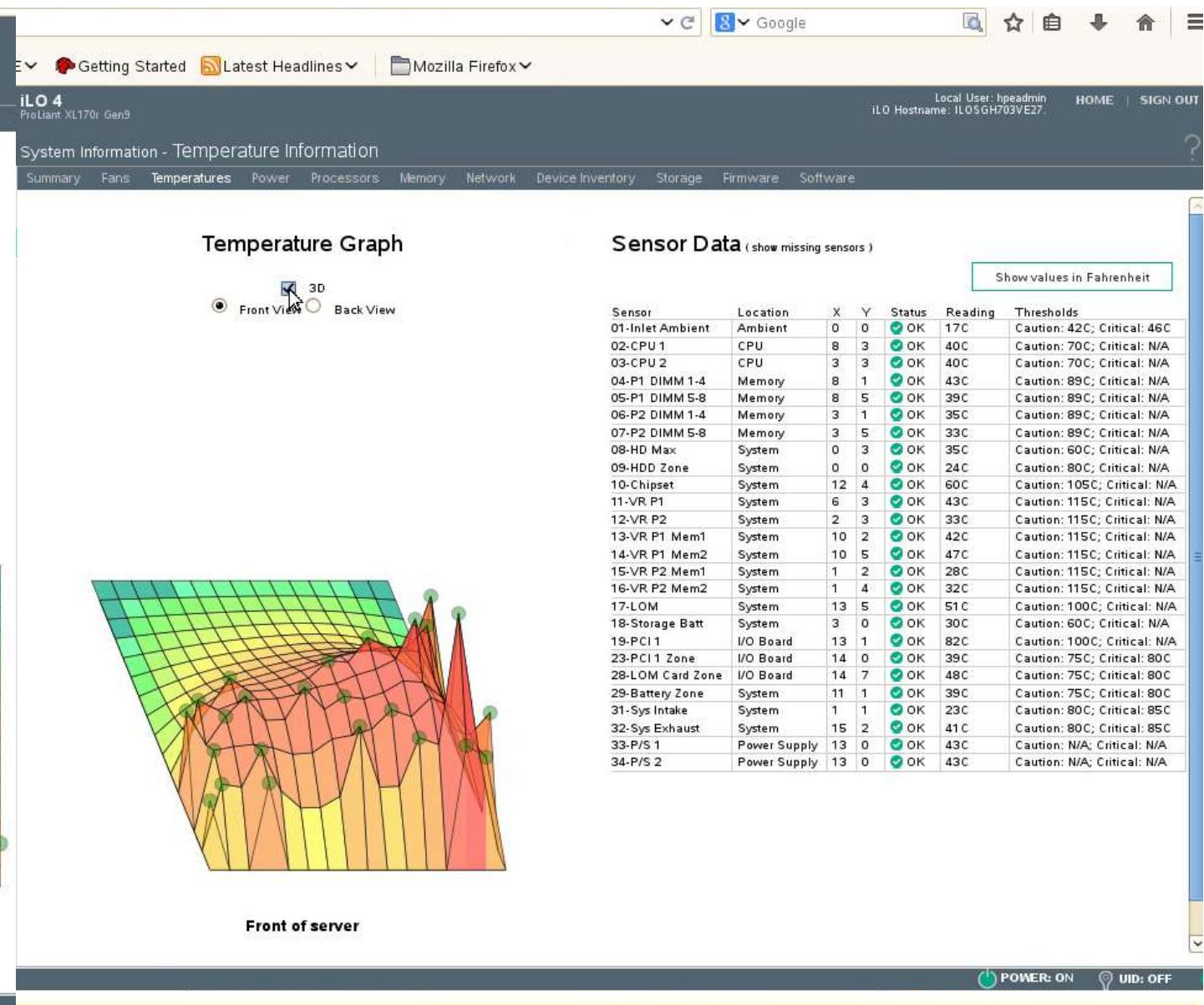
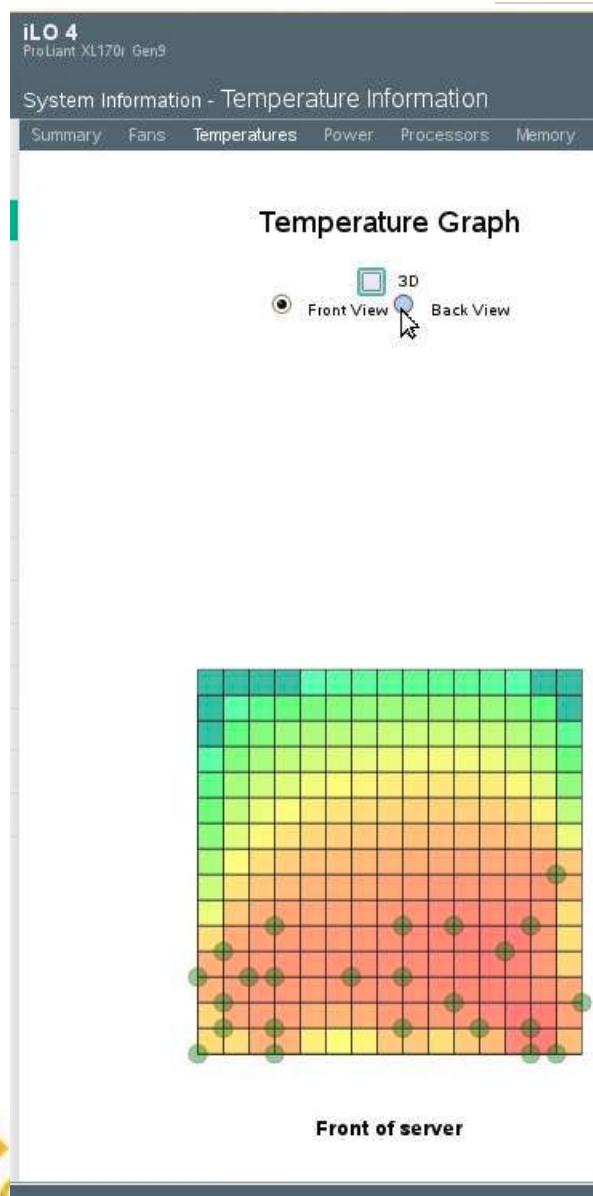
https://10.0.51.41/html/content.html#mainContent

POWER: ON UID: OFF

Computer xterm iLO: HD-Compute-No... Tue Mar 7, 2:30 PM

51

Server temperature



Processor & Memory

0.0.51.41/ v C | g v Google

SUSE Getting Started Latest Headlines Mozilla Firefox

iLO 4 ProLiant XL170r Gen9 iLO Host

System information - Processor Information

Processor 1

Processor Name	Intel(R) Xeon(R) CPU E5-2650 v4 @ 2.20GHz
Processor Status	OK
Processor Speed	2200 MHz
Execution Technology	12/12 cores; 24 threads
Memory Technology	64-bit Capable
Internal L1 cache	768 KB
Internal L2 cache	3072 KB
Internal L3 cache	30720 KB

Processor 2

Processor Name	Intel(R) Xeon(R) CPU E5-2650 v4 @ 2.20GHz
Processor Status	OK
Processor Speed	2200 MHz
Execution Technology	12/12 cores; 24 threads
Memory Technology	64-bit Capable
Internal L1 cache	768 KB
Internal L2 cache	3072 KB
Internal L3 cache	30720 KB

System information - Memory Information

Fans Temperatures Power Processors Memory Network Device Inventory Storage Firmware Software

Memory Protection (AMP)

Supported AMP Modes

- Advanced ECC
- Online Spare (Rank Sparing)
- Intr socket Mirroring

Memory Summary

Location	Number of Sockets	Total Memory	Operating Frequency	Operating Voltage
Processor 1	8	128 GB	2400 MHz	1.2 V
Processor 2	8	128 GB	2400 MHz	1.2 V

Memory Details (show empty sockets)

Memory Location	Socket	Status	HPE Memory	Part Number	Type	Size	Maximum Frequency	Minimum Voltage	Ranks	Technology
Processor 1	1	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 1	3	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 1	6	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 1	8	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 2	1	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 2	3	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 2	6	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM
Processor 2	8	Good, In Use	HPE SmartMemory	809083-091	DIMM DDR4	32768 MB	2400 MHz	1.2 V	2	RDIMM

Local User: hpeadmin ILO Hostname: IL05CH703VE27. HOME SIGN OUT

ClusterKit

Remote Console

Hewlett Packard Enterprise

iLO 4
ProLiant XL170i Gen9

Local User: hpeadmin
iLO Hostname: iLOSGH703VE27

HOME | SIGN OUT

?

Expand All

Information

iLO Federation

Remote Console

Remote Console

Virtual Media

Power Management

Network

Remote Support

Administration

Chassis

Launch Hot Keys Security

.NET Integrated Remote Console (.NET IRC)

The .NET IRC provides remote access to the system KVM and control of Virtual Power and Media from a single console built on the Microsoft .NET Framework.

If you are using Windows 7, 8, 8.1 or 10, a supported version of the .NET Framework is already included in your operating system. The .NET Framework is also available at the Microsoft Download Center. The .NET IRC supports the following versions of the .NET Framework: 3.5 (Full), 4.0 (Full), 4.5 and 4.6.

Note for Firefox users: Firefox requires an Add-on to launch .NET applications. Visit the [Firefox Add-on website](#) to download the latest version of the Microsoft .NET Framework Assistant.

Note for Chrome users: Chrome requires an extension to launch .NET applications.

As a workaround select one of the following instead:

- Integrated .NET IRC application with another browser
- Standalone .NET IRC application available from www.hpe.com
- iLO Mobile Application  access the iLO Remote Console

Launch

Java Integrated Remote Console (Java IRC)

The Java IRC provides remote access to the system KVM and control of Virtual Power and Media from a Java Web Start console or applet-based console. Hewlett Packard Enterprise recommends using the latest version of the Java™ Runtime Environment. This version of iLO was tested with JRE version 8 update 65.

Note: On systems with OpenJDK, **you must** use the Java Applet option with a browser (such as FireFox) that supports a Java plug-in.

Web Start Applet

HPE iLO Mobile App

The HPE iLO Mobile application provides access to the remote console of your HPE server from your mobile device. The mobile app interacts directly with the iLO processor on HPE servers, providing total control of the server at all times as long as the server is plugged in. You can troubleshoot problems and perform software deployments from almost anywhere.

Download, Connect, Manage! Get started today.
www.hpe.com/info/ilo/mobileapp

Learn More

POWER: ON  UID: OFF 

Computer xterm iLO: HD-Compute-No...   Tue Mar 7, 2:42 PM  54

Boot Order

Hewlett Packard Enterprise iLO 4 ProLiant XL170 Gen9 Local User: hpeadmin iLO Hostname: iLOSGH703VE27. HOME SIGN OUT ?

Boot Order

Virtual Floppy/USB key: None
Virtual CD/DVD-ROM: None

Boot Mode:

Unified Extensible Firmware Interface (UEFI)
 Legacy BIOS

Apply

Server Boot Order:

SUSE Linux Enterprise Server 11 SP4.
Generic USB Boot.
Embedded FlexibleLOM 1 Port 1 : HP Ethernet 1Gb 2-port 560FLR-SFP+ Adapter - NIC (PXE IPv4)
Embedded LOM 1 Port 1 : HP Ethernet 1Gb 2-port 361i Adapter - NIC (PXE IPv4)
Windows Boot Manager
Slot 1: Smart Array P440 Controller - 1117.78 GiB, RAID 1 Logical Drive (Target0, Lun:0)
Slot 1: Smart Array P440 Controller - 1117.78 GiB, RAID 0 Logical Drive (Target0, Lun:1)
Slot 1: Smart Array P440 Controller - 1117.78 GiB, RAID 0 Logical Drive (Target0, Lun:2)
Slot 1: Smart Array P440 Controller - 1117.78 GiB, RAID 0 Logical Drive (Target0, Lun:3)
Slot 1: Smart Array P440 Controller - 1117.78 GiB, RAID 0 Logical Drive (Target0, Lun:4)

Apply Up Down

One-Time Boot Status

Current One-Time Boot Option:
No One-Time Boot

Select One-Time Boot Option:
No One-Time Boot

Select UEFI Target Option:
SUSE Linux Enterprise Server 11 SP4.

Apply

Additional Options

Boot to System Setup Utilities Server Reset



Virtual Power button

The screenshot shows the iLO 4 web interface for a ProLiant XL170i Gen9 server. The left sidebar is a navigation menu with the following items:

- Hewlett Packard Enterprise
- Find All
- Information
- iLO Federation
- Remote Console
- Virtual Media
- Boot Order
- Power Management
- Server Power (selected)
- Power Meter
- Power Settings
- Network
- Remote Support
- Administration
- Chassis

The main content area is titled "Virtual Power Button". It displays the current "System Power" status as "ON". Below this are four buttons for power actions:

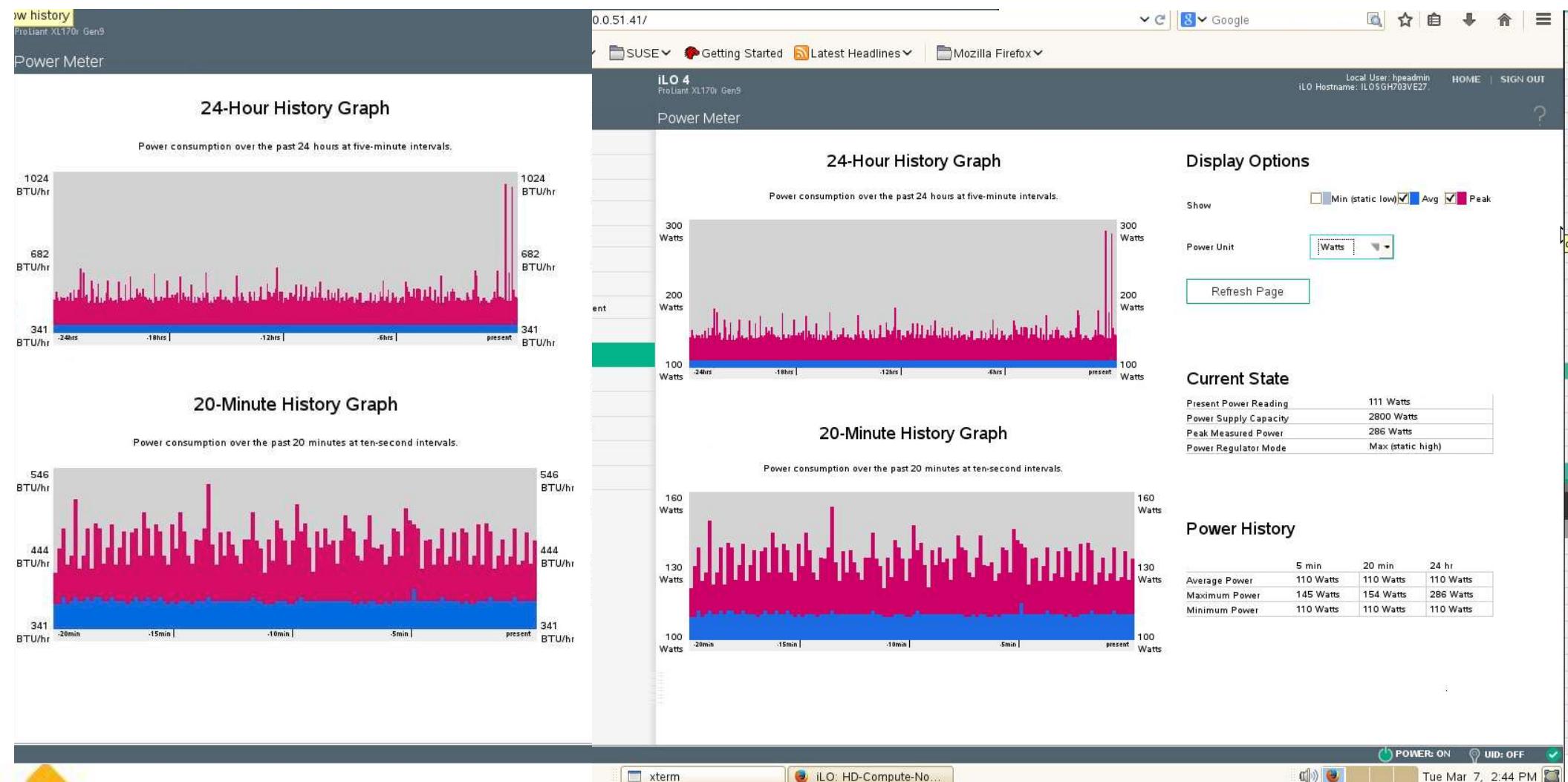
- Graceful Power Off: Momentary Press
- Force Power Off: Press and Hold
- Force System Reset: Reset
- Force Power Cycle: Cold Boot

Below these buttons is a section titled "System Power Restore Settings". It includes two sets of radio buttons:

- Auto Power-On:
 - Always Power On
 - Always Remain Off
 - Restore Last Power State (selected)
- Power-On Delay:
 - Minimum Delay (selected)
 - 15 Second Delay
 - 30 Second Delay
 - 45 Second Delay
 - 60 Second Delay
 - Random up to 120 Seconds

A green "Submit" button is located at the bottom of the form.

Power meter



Power Setting

TightVNC: root's X desktop (HD-Service-Node:1) (on HD-Service-Node)

iLO: HD-Compute-Node-13 - iLOSGH703VE27 - Mozilla Firefox

https://10.0.51.41/

Most Visited SUSE Getting Started Latest Headlines Mozilla Firefox

Hewlett Packard Enterprise iLO 4 ProLiant XL170r Gen9 Local User: hpeadmin iLO Hostname: iLOSGH703VE27 HOME SIGN OUT

Expand All

Information iLO Federation

Remote Console Remote Console

Virtual Media Virtual Media

Boot Order

Power Management Static High Performance Mode

Server Power

Power Meter

Power Settings

Power Cap is not supported.

Power Regulator Settings

Power Regulator

- Dynamic Power Savings Mode
- Static Low Power Mode
- Static High Performance Mode
- OS Control Mode

Apply

SNMP Alert on Breach of Power Threshold

Warning Trigger	Warnings Disabled
Warning Threshold	0 Watts
Duration	0 Minutes

Show values in BTU/hr Apply

Other Settings

Enable persistent mouse and keyboard

Apply

The screenshot shows the iLO web interface for a ProLiant XL170r Gen9 server. The left sidebar is collapsed, showing a list of management options. The main content area is titled 'Power Settings'. It displays a message stating 'Power Cap is not supported.' Below this is a section for 'Power Regulator Settings' where 'Static High Performance Mode' is selected. There is also a section for 'SNMP Alert on Breach of Power Threshold' with fields for warning trigger, threshold, and duration. At the bottom, there is an 'Other Settings' section with a checkbox for 'Enable persistent mouse and keyboard' and an 'Apply' button.

ILO 4 Config

The screenshot shows the iLO 4 configuration interface for a ProLiant XL170r Gen9 server. The browser title bar reads "iLO: HD-Compute-Node-13 - ILOSGH703VE27 - Mozilla Firefox". The URL in the address bar is "https://10.0.51.41/". The left sidebar menu includes options like Information, iLO Federation, Remote Console, Virtual Media, Boot Order, Power Management, Network (selected), and Chassis. Under Network, "iLO Dedicated Network Port" is selected. The main content area displays several tabs: "Information", "Summary", "General", "IPv4", "IPv6", and "SNTP". The "IPv4" tab is active, showing the "iLO Hostname Settings" (Hostname: ILOSGH703VE27) and "NIC Settings" (Link State: Auto-Negotiate). The "IPv4" tab also lists the IP configuration: IPv4 Address (10.0.51.41), Subnet Mask (255.255.255.0), and Default Gateway (10.0.51.254). The "IPv6" tab shows the "DHCPv6 Status" as "Disabled". The right side of the interface shows the "iLO Dedicated Network Port - IPv4 Settings" panel, which includes sections for enabling DHCPv4 options, setting static routes, and defining DNS servers.

iLO 4
ProLiant XL170r Gen9

iLO Dedicated Network Port - Network General

iLO Hostname Settings

iLO Subsystem Name (Hostname): ILOSGH703VE27

NIC Settings

Link State: Automatic

IPv4 Summary

DHCPv4 Status: Disabled

IPv4

Address	10.0.51.41
Subnet Mask	255.255.255.0
Default Gateway	10.0.51.254

IPv6 Summary

DHCPv6 Status: Disabled

DHCPv6 Stateless Address Auto-Configuration (SLAAC)

IPv6

SLAAC Address	FE80::7210:6FFF:FE89:829
Default Gateway	

iLO Dedicated Network Port - Network General

iLO Dedicated Network Port - IPv4 Settings

Enable DHCPv4:

- Use DHCPv4 Supplied Gateway
- Use DHCPv4 Supplied Static Routes
- Use DHCPv4 Supplied Domain Name
- Use DHCPv4 Supplied DNS Servers
- Use DHCPv4 Supplied Time Settings
- Use DHCPv4 Supplied WINS Servers

IPv4 Address: 10.0.51.41

Subnet Mask: 255.255.255.0

Gateway IPv4 Address: 10.0.51.254

Static Route #	Destination	Mask	Gateway
Static Route #1	0.0.0.0	0.0.0.0	0.0.0.0
Static Route #2	0.0.0.0	0.0.0.0	0.0.0.0
Static Route #3	0.0.0.0	0.0.0.0	0.0.0.0

Primary DNS Server: 0.0.0.0

Secondary DNS Server: 0.0.0.0

Tertiary DNS Server: 0.0.0.0

Enable DDNS Server Registration

ILO 4 Administration

The screenshot shows the ILO 4 User Administration interface. On the left, a navigation menu lists various administrative sections. The 'User Administration' section is currently selected, indicated by a green highlight.

Local Users: This table displays two users: 'Administrator' and 'hheadmin'. The columns represent 'User Name' and several privilege levels (e.g., Modify, Delete, Power Cycle). Both users have full privileges assigned.

User Name	Modify	Delete	Power Cycle	Reboot	Lock	Unlock	Log Off
Administrator	✓	✓	✓	✓	✓	✓	✓
hheadmin	✓	✓	✓	✓	✓	✓	✓

Directory Groups: This table displays two groups: 'Administrators' and 'Authenticated Users'. The 'SID' column shows 'S-1-5-11' for both groups. The same set of privilege icons is present as in the Local Users table.

Group	SID
Administrators	S-1-5-11
Authenticated Users	S-1-5-11

Navigation and Status: The top right corner shows the local user 'hheadmin' and the ILO hostname 'ILO-SGH703VE27'. Navigation links include 'HOME' and 'SIGN OUT'. A question mark icon provides help. The bottom status bar indicates 'POWER: ON', 'UID: OFF', and a checked checkbox.

Add/Edit Local User

https://10.0.51.41/

Hewlett Packard Enterprise iLO 4 ProLiant XL170r Gen9 Local User: hpeadmin ILO Hostname: ILOSGH703VE27. HOME | SIGN OUT

Add/Edit Local User

User Information

User Name: user

Login Name: user

Password: ****

Password Confirm: ****

User Permissions

Account Privileges: These privilege settings can be used to deny or allow access to iLO features.

select all

Administer User Accounts

Remote Console Access

Virtual Power and Reset

Virtual Media

Configure iLO Settings

IPMI/DCMI Privilege based on above settings: user

Add User Cancel

POWER: ON UID: OFF

Computer xterm iLO: HD-Compute-No... Tue Mar 7, 2:47 PM

Access Setting

Hewlett Packard Enterprise

iLO 4
ProLiant XL170r Gen9

Local User: hpeadmin
iLO Hostname: iLOSGH703VE27. HOME | SIGN OUT

Expand All

Information

iLO Federation

Remote Console

Remote Console

Virtual Media

Virtual Media

Boot Order

Power Management

Server Power

Power Meter

Power Settings

Network

iLO Dedicated Network Port

Shared Network Port

Remote Support

Registration

Service Events

Data Collections

Administration

Firmware

Licensing

User Administration

Access Settings

Security

Management

Access Settings Language

Notes

- Applying new Port or iLO Functionality settings will require a restart of iLO and terminate this browser connection. It may take several minutes before you can reestablish a connection.
- Changes to the Idle Connection Timeout may not take place immediately in current user sessions but will be immediately enforced in all new sessions.

Service	Access Options
Secure Shell (SSH) Access	Enabled
Secure Shell (SSH) Port	22
Remote Console Port	17990
Web Server Non-SSL Port	80
Web Server SSL Port	443
Virtual Media Port	17988
SNMP Access	Enabled
SNMP Port	161
SNMP Trap Port	162
IPMI/DCMI over LAN Access	Enabled
IPMI/DCMI over LAN Port	623
Apply	
Idle Connection Timeout (minutes)	30
iLO Functionality	Enabled
iLO ROM-Based Setup Utility	Enabled
Require Login for iLO RBSU	Disabled
Show iLO IP during POST	Enabled
Serial Command Line Interface Status	Enabled - Authentication Required
Serial Command Line Interface Speed	9600
Virtual Serial Port Log	Disabled
Minimum Password Length	8
Server Name	HD-Compute-Node-13
Server FQDN / IP Address	
Authentication Failure Logging	Enabled - Every 3rd Failure
Authentication Failure Delay Time	10 seconds
Authentication Failures Before Delay	1 Failure causes no delay
Apply	

POWER: ON

UID: OFF

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Secure shell to iLO

- Secure shell to iLO ip address with administrative privilege User

The screenshot shows a terminal window titled "Terminal" with the following content:

```
File Edit View Terminal Help
HD-Service-Node:~/Desktop # ssh hpeadmin@10.0.51.41
The authenticity of host '10.0.51.41 (10.0.51.41)' can't be established.
RSA key fingerprint is 09:91:0d:14:53:ca:2b:9b:53:f0:24:fc:3a:f9:4f:b2 [MD5].
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.0.51.41' (RSA) to the list of known hosts.
hpeadmin@10.0.51.41's password:
User:hpeadmin logged-in to ILOSGH703VE27.(10.0.51.41 / FE80::7210:6FFF:FEB9:8296
)

iLO Advanced 2.50 at Sep 23 2016
Server Name: HD-Compute-Node-13
Server Power: On

</>hpiLO-> help

HPE CLI Commands:

POWER   : Control server power.
UID     : Control Unit-ID light.
ONETIMEBOOT: Access One-Time Boot setting.
NMI     : Generate an NMI.
VM      : Virtual media commands.
LANGUAGE : Command to set or get default language
VSP     : Invoke virtual serial port.
TEXTCONS : Invoke Remote Text Console.
TESTTRAP : Sends a test SNMP trap to the configured alert destinations.

</>hpiLO-> </>hpiLO-> power help

status=0
status_tag=COMMAND COMPLETED
Tue Mar 14 16:25:10 2017

POWER : The power command is used to change the power state of the server
and is limited to users with the Power and Reset privilege
Usage:
power      -- Displays the current server power state
power on    -- Turns the server on
power off   -- Turns the server off
power off hard -- Force the server off using press and hold
power reset -- Reset the server

</>hpiLO-> UID on

status=0
status_tag=COMMAND COMPLETED
Tue Mar 14 16:27:01 2017

</>hpiLO-> uid off

status=0
status_tag=COMMAND COMPLETED
Tue Mar 14 16:27:10 2017

</>hpiLO->
```

Basic ipmitool

- Use ipmitool command to communicate with the iLO firmware

- ipmitool sdr # print sensor information
- ipmitool fru print # print server information

- Ipmi tool chassis

Chassis Commands : status, power, identify

- Ipmi tool chassis power

chassis power Commands: status, on, off, cycle, reset, diag, soft

- Ipmi tool chassis identify 0/255/force

ipmitool over network

- The Linux IPMI tool has the capability to securely communicate with the iLO firmware by using IPMI 2.0
- Example : retrieve sensor data from remote iLO
 - ipmitool -I lanplus -H <iLO ip address> -U <username> -P <password> sdr
 - ipmitool -I lanplus -H 10.0.51.25 -U hpeadmin -P hpeinvent sdr

Remote Console

- Remote Console
 - From windows with .net framework
 - Linux with javaws or javaapplet

The screenshot shows the iLO 4 Management interface for a ProLiant XL170i Gen9 server. The main title bar reads "iLO 4 ProLiant XL170i Gen9". The left sidebar has a "Information" section expanded, containing links like Overview, System Information, iLO Event Log, Integrated Management Log, Active Health System Log, Diagnostics, Location Discovery Services, Insight Agent, ILO Federation, Remote Console, Virtual Media, Power Management, Network, Remote Support, Administration, and Chassis.

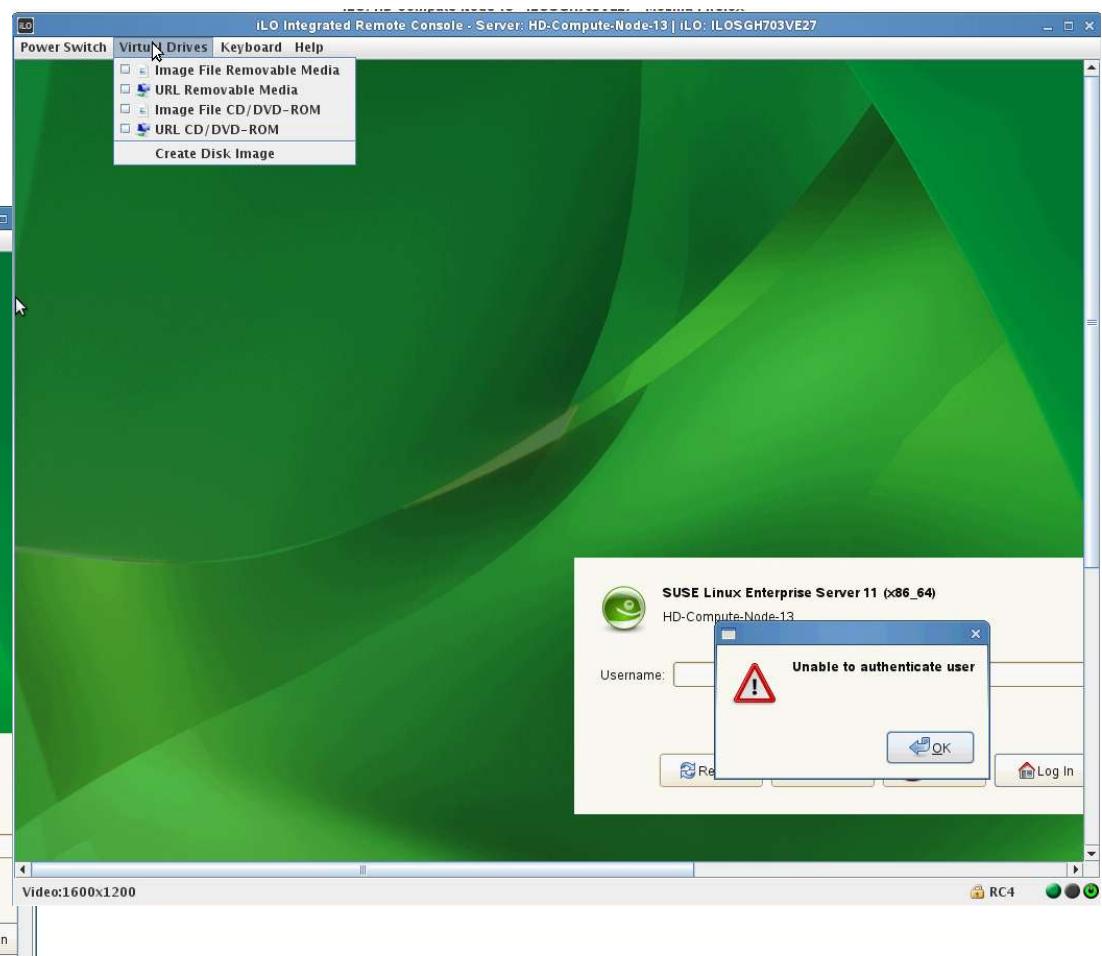
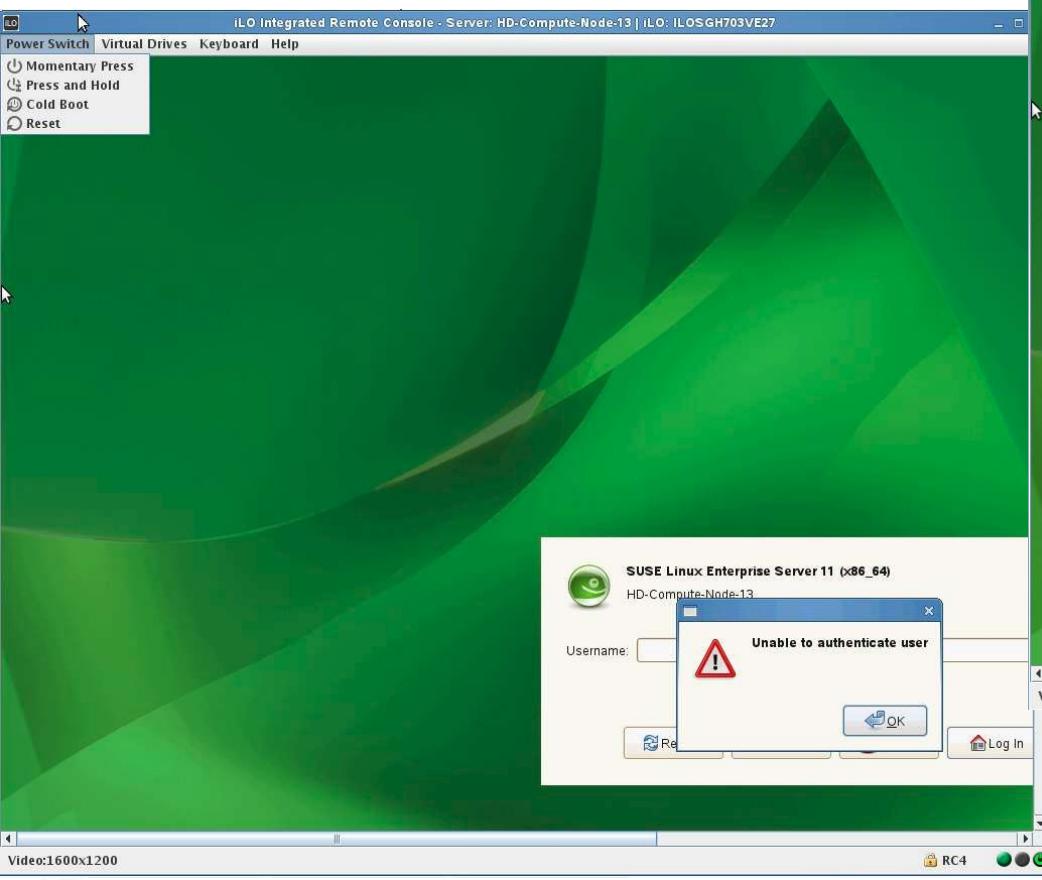
The central panel displays the "Information" tab under the "iLO Overview" heading. It shows detailed system information such as Server Name (HD-Compute-Node-13), Product Name (ProLiant XL170i Gen9), UUID (31383937-3535-4753-4837-303356453237), Server Serial Number (SGH703VE27), Product ID (798155-B21), Chassis Serial Number (SGH703VE10), System ROM (U14 v2.30 (09/12/2016)), and System ROM Date (09/12/2016). A circled menu bar at the top of this section includes "Integrated Remote Console", ".NET", "Java Web Start", and "Java Applet".

The right side of the interface shows the "Status" and "Connection to HPE" sections. The "Status" section lists System Health (OK), Server Power (ON), UID Indicator (ON), TPM Status (Not Present), SD-Card Status (Not Present), and ILO Date/Time (Tue Mar 7 14:51:46 2017). The "Connection to HPE" section shows a yellow warning icon and the message "Not registered".

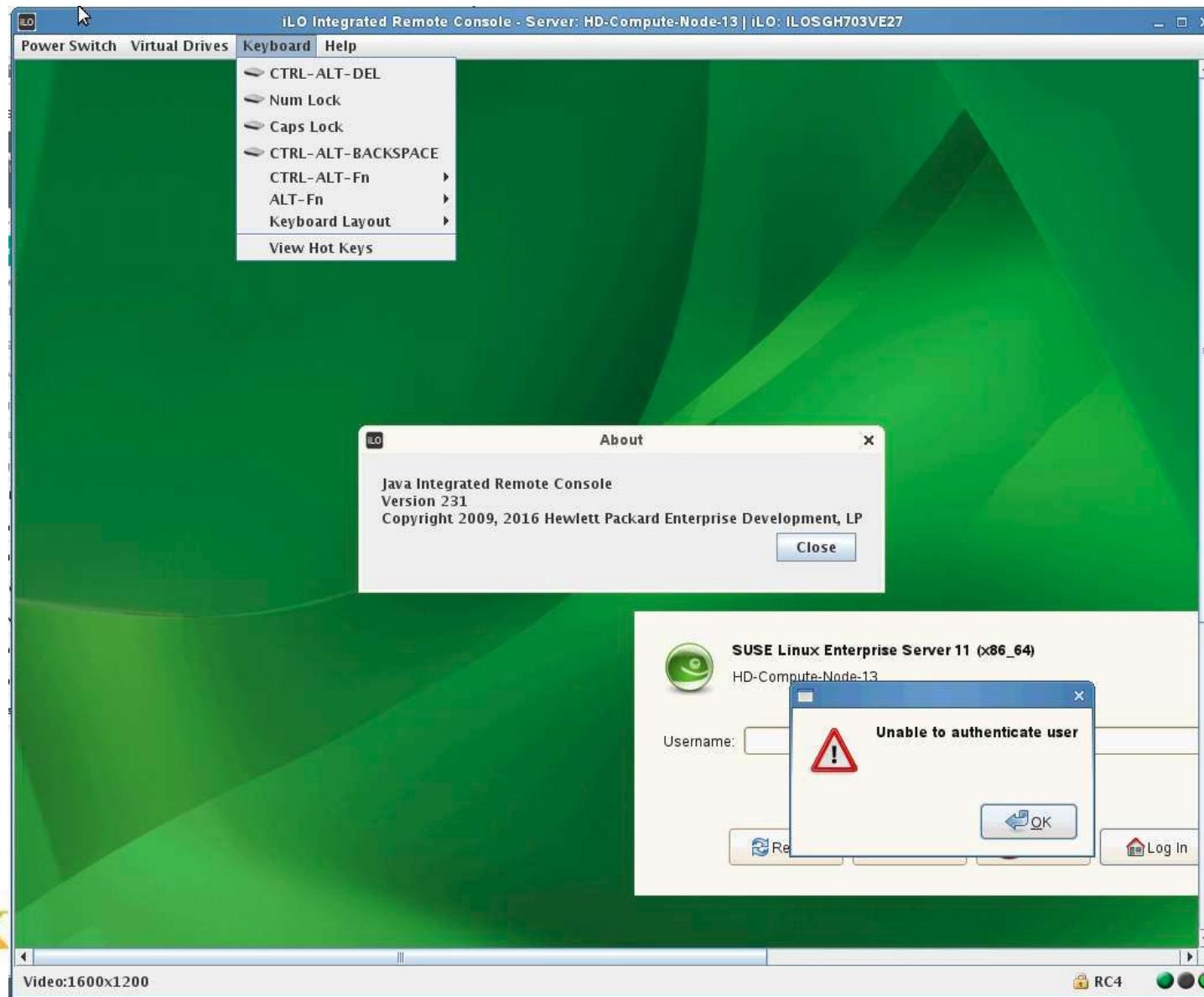
At the bottom, there's a "Health" summary with green checkmarks for Fans, Fan Redundancy, Temperatures, Power Supplies, Smart Storage Battery Status, Storage, Network, Processors, Memory, BIOS/Hardware Health, and AMS. The footer includes navigation links for Computer, xterm, and ILO: HD-Compute-No..., and status icons for POWER: ON, UID: ON, and a date/time stamp (Tue Mar 7, 2:52 PM).

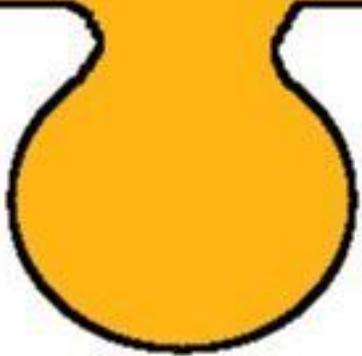
Remote Console

- Power management
- Mount virtual media



Remote Console





HPE Insight Cluster Management Utility (HPE CMU)

HPE Insight CMU 8.1

- Introducing the latest version of the industry's leading cluster management tool

Accelerate

- Free licensing for standalone clusters up to 32 nodes
- Expanded REST API
 - New backup and cloning capabilities
 - Provides easier integration with partner components
- Automate processes with Ansible playbooks

Monitor

- New monitoring options for Hadoop clusters
- New Bar Graph View provides alternate view for monitoring a group of nodes
- Improvements to the GUI to ease the monitoring setup for hardware and GPUs

Manage

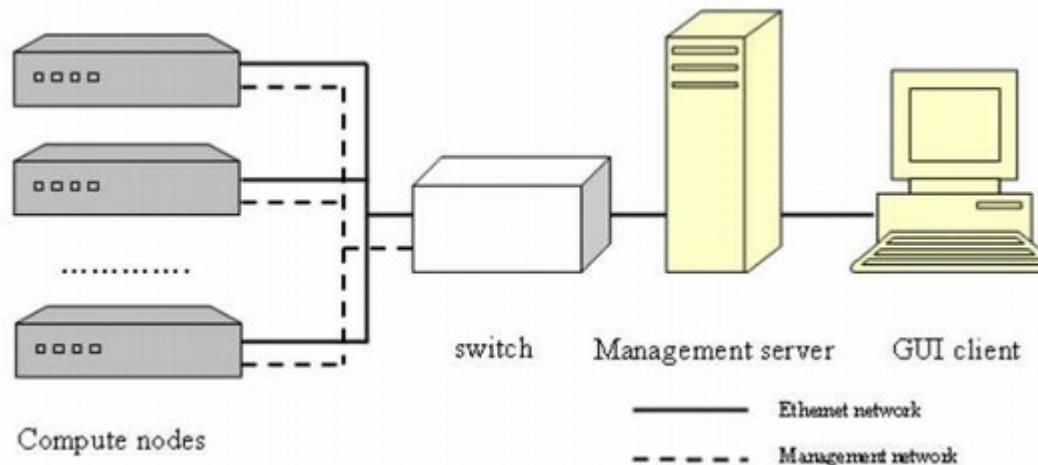
- Automatically update inventory using outside resources via Ansible dynamic inventory
- Build processes for containers and deploy applications in the cloud with Ansible playbooks
- Install multiple firmware components at one time

Support for non-HPE server

- All core features work. For example:
 - single|multi broadcast
 - pdsh with cmudiff
 - pdcp
- Power control and console access depend on non-Hewlett Packard Enterprise hardware.
- Insight CMU supports IPMI. Otherwise, a new power interface can be configured. Insight
- CMU has an API for power control.
- BIOS and firmware management are Hewlett Packard Enterprise-specific.

HP SIM Architecture

- Connect one NIC to a network established for compute node administration.
- Connect a second NIC used to provide access to the network connecting all the compute node management cards (iLOs).
- (Option) A third NIC is typically to the network connecting the Insight CMU management node to the Insight CMU GUI clients.



Hostname and IP Address information

Manage Cluster from manager node

Hostname	Hostname	IP Address/VLAN (Private) Port1	IP Address/VLAN (Public) Port2	IP Address/VLAN (MGMT)
Cloudera Manager + CMU	HD-Cloudera-Node	172.16.120.30	203.157.102.93	10.0.51.26
Name Node	HD-Name-Node	172.16.120.31		10.0.51.27
Secondary Name Node	HD-Sec-Name-Node	172.16.120.32		10.0.51.28
Compute Node	HD-Cumpute-Node-01	172.16.120.33		10.0.51.29
Compute Node	HD-Cumpute-Node-02	172.16.120.34		10.0.51.30
Compute Node	HD-Cumpute-Node-03	172.16.120.35		10.0.51.31
Compute Node	HD-Cumpute-Node-04	172.16.120.36		10.0.51.32
Compute Node	HD-Cumpute-Node-05	172.16.120.37		10.0.51.33
Compute Node	HD-Cumpute-Node-06	172.16.120.38		10.0.51.34
Compute Node	HD-Cumpute-Node-07	172.16.120.39		10.0.51.35
Compute Node	HD-Cumpute-Node-08	172.16.120.40		10.0.51.36
Compute Node	HD-Cumpute-Node-09	172.16.120.41		10.0.51.37
Compute Node	HD-Cumpute-Node-10	172.16.120.42		10.0.51.38
Compute Node	HD-Cumpute-Node-11	172.16.120.43		10.0.51.39
Compute Node	HD-Cumpute-Node-12	172.16.120.44		10.0.51.40
Compute Node	HD-Cumpute-Node-13	172.16.120.45		10.0.51.41
Service Node	HD-Service-Node	172.16.120.46	203.157.102.41	10.0.51.42

Installing Support

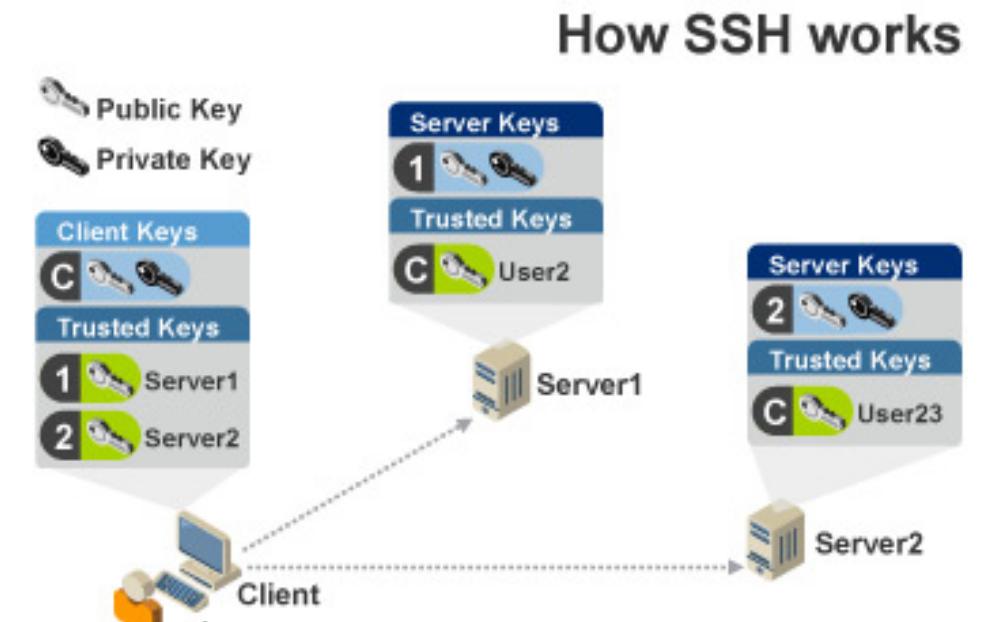
- HPE Insight Cluster Management Utility is installing on x86 64-bit kit only and can no longer run on x86 32-bit hardware
- Install on 64 bit OS
 - RedHat Enterprise 5/6/7
 - SuSe Enterprise 11/12
- Support client
 - RedHat/CentOS/Scientific Linux
 - SuSe Enterprise/OpenSuSe
 - Ubuntu 12.x/13.x/16.x

Configuring the management cards

- To configure the management cards such as iLO on all node in cluster
 - 1. Power on the server.
 - 2. Access the management card (iLO).
 - 3. Assign the same username and password to all management cards.

Ssh without password

- Use Public Key Infrastructure(PKI) for authenticate
- Instruction to set up
 1. Generate your public/private key pair
 2. Send public keys to target server
 3. Try to log in



https://www.venafi.com/assets/img/how_ssh_works.jp
g

Generat public/private ket

- In Shell type ssh-keygen to create keys

```
# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
01:5b:68:6d:50:3c:6b:0a:69:6b:7e:fb:47:e4:a4:cf root@ctc.clusterkit.co.th
#
```

Install key on client machine

- Share public key to destination host by command “ssh-copy-id”

```
# ssh-copy-id -i ~/.ssh/id_rsa.pub root@192.168.123.52  
21  
root@192.168.123.52's password:  
Now try logging into the machine, with "ssh 'root@web1i'",  
and check in:
```

`.ssh/authorized_keys`

to make sure we haven't added extra keys that you weren't expecting.

sshd configuration

- For disable root login from network, we config /etc/ssh/sshd_config
- Config for PermitRootLogin on Linux is
PermitRootLogin <Option>
- Option
 - Yes – Accept root login with password/publickey
 - No – Denied root login with password/publickey
 - Without-password – Denied root login with password / Accept root login with publickey

JAVA for run CMU

- IBM java is not supported
- Insight CMU v8.0 does not support IBM java on both the Insight CMU server and GUI clients.
- HPE recommends using OpenJDK 7+ or Oracle Java Runtime Environment 1.7u45 or later on the Insight CMU server and GUI clients.

CMU Firewall Configuration

- On the Insight CMU management node
 - External network interface
 - RMI registry traffic (tcp ports 1099, 49150)
 - Webserver port (tcp 80)
 - ssh server (tcp 22)
 - Internal network
 - Allow all traffic be a trusted interface

SELinux config (redhat)

- Hewlett Packard Enterprise recommends disabling SELinux on the management node and the compute node creating the image. To disable SELinux in RHEL versions, set SELINUX=disabled in the /etc/sysconfig/selinux file and restart the node.

CMU Dependency packages

- acl
- attr
- bc
- dhcp
- ed
- expect
- Ipmiutil
- libcurl
- net-tools
- NFS
- OpenSSL
- OpenJDK 7+ or Oracle JRE 1.7u45 or later
- perl-IO-Socket-SSL.
- perl-Net-SSLeay
- psmisc
- rsync
- tcl-8
- telnet
- tftp client
- tftp server
- xinetd
- net-snmp-utils (RHEL distros)
or net-snmp(SLES distros)

CMU Installation

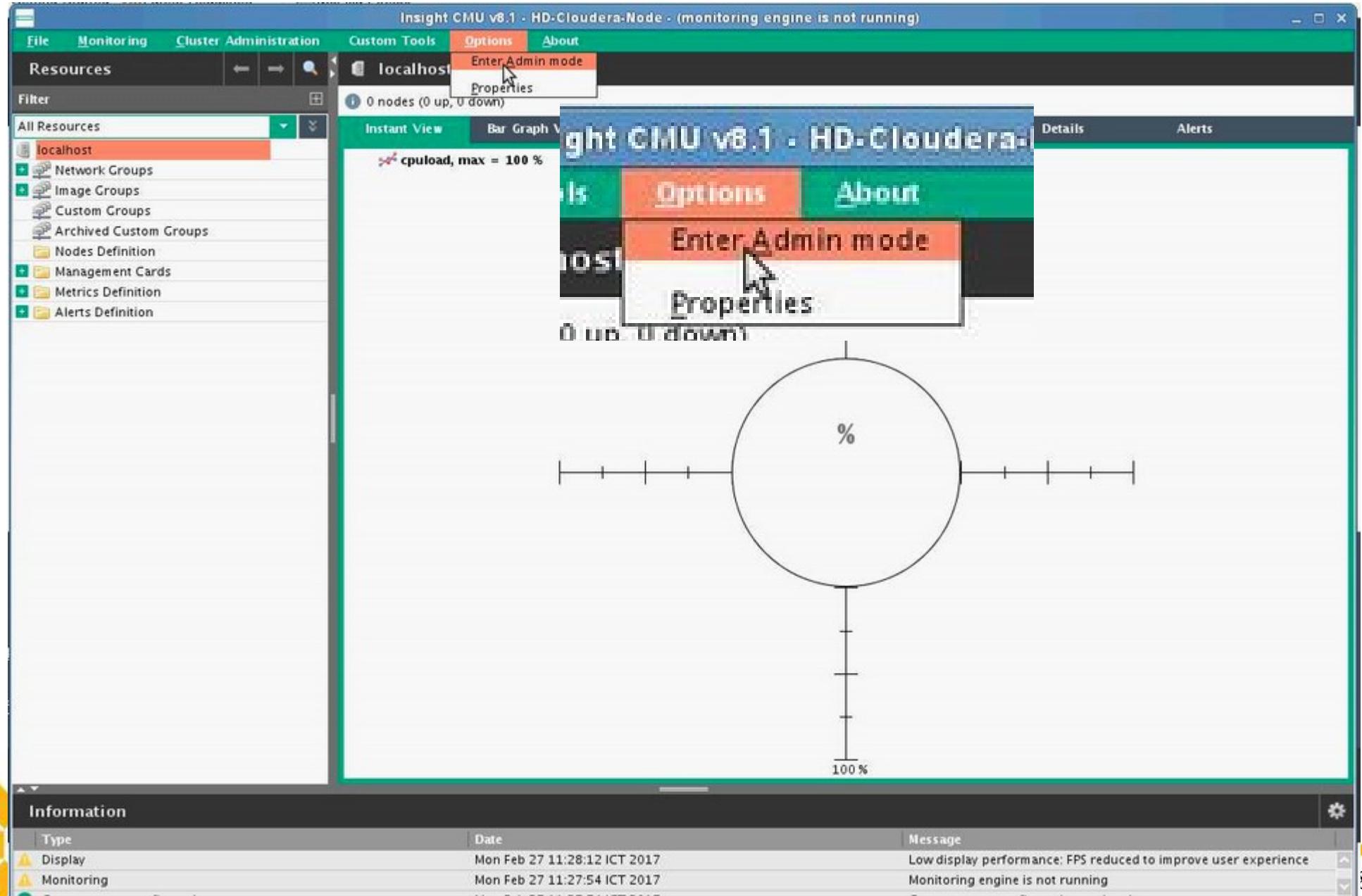
- Mount iso to access
- Install rpm key of cmu
- Install cmu rpm
- Config cmu configuration
- Install license key
- Check configuration
- Start CMU

How to Access CMU GUI

- Client require OpenJDK 7+ or Oracle Java Runtime Environment 1.7u45 or later
- Access to CMU webpage by CMU_IP_Address:port and click Lunch Insight Cluster Management Utility GUI
- If browser can open with javaws , CMU Window can open otherwise, Download cmu.jnlp file and use javaws to open cmu.jnlp file, CMU windows can open



CMU GUI client



Management card setting

Insight CMU v8.1 - HD-Cloudera-Node - root@HD-Cloudera-Node

File Monitoring Cluster Administration Custom Tools Options About

Resources

Filter

All Resources

- manager
- Network Groups
- Image Groups
- Custom Groups
- Archived Custom Groups
- Nodes Definition
- Management Cards
 - iLO
 - lo100i
 - ILOCM
 - IPMI
- Metrics Definition
- Alerts Definition

iLO

iLO

Details and Settings

Feature	Value
- Resource Features	
Name	iLO
Custom Features	
- Internal Features	
ID	-1
UUID	2c45ad5b-c374-3047-9c97-bb8d9eb61389
Creation time	
Modification time	
Deletion time	

Change management card settings :

Login :

Password :

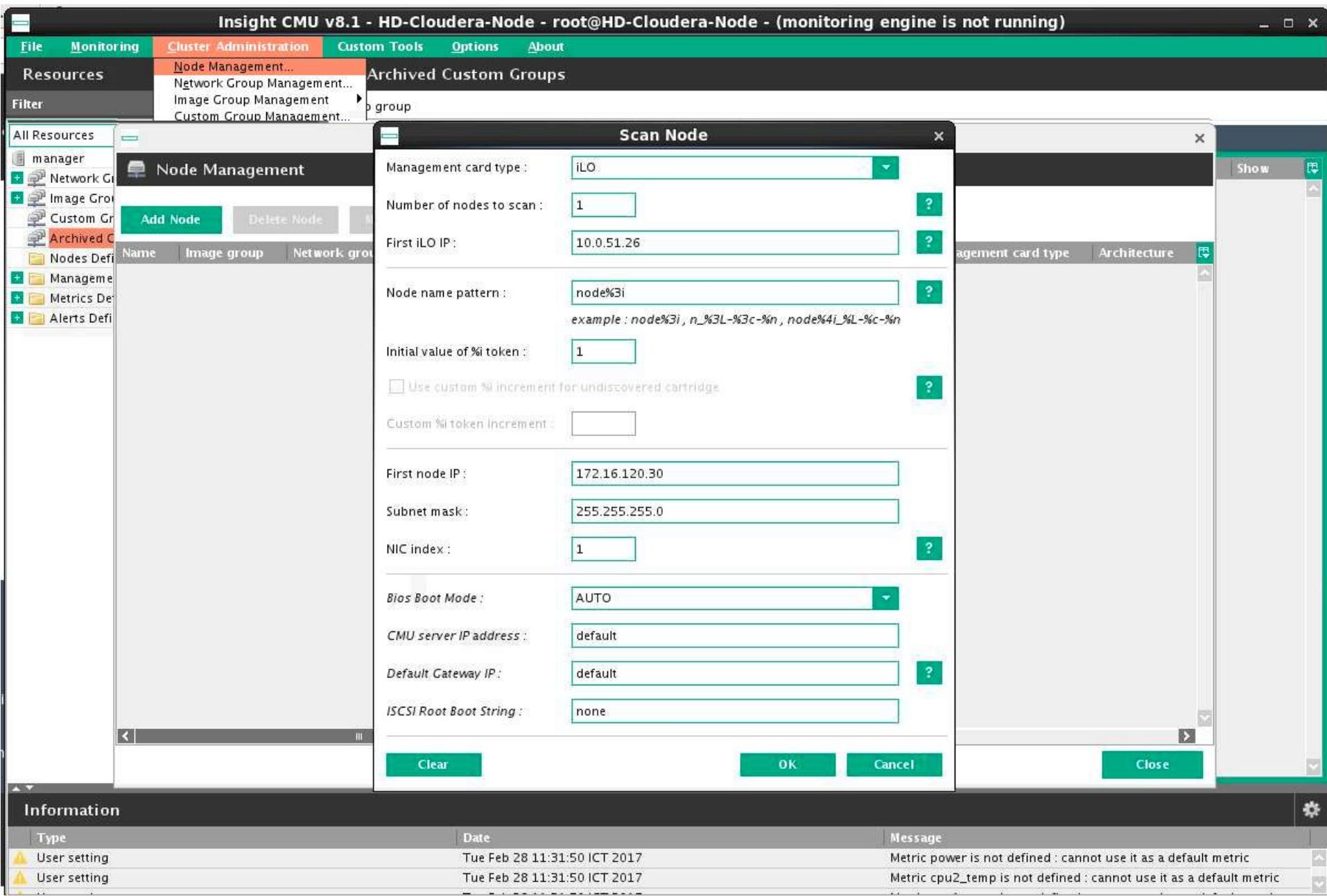
OK Cancel

Information

Type	Date	Message
Scan Nodes	Tue Feb 28 11:39:16 ICT 2017	Scanned nodes successfully added.
Scanning nodes	Tue Feb 28 11:39:03 ICT 2017	1 node(s) found during scan.

7

CMU Node management



CMU Node Management(*con't*)

Insight CMU v8.1 - HD-Cloudera-Node - root@HD-Cloudera-Node

File Monitoring Cluster Administration Custom Tools Options About

Resources **HD-01**

Filter **HD-01**

All Resources

Icon	Name	Image group	Network group	IP address	Subnet mask	MAC address	Management card IP address	Management card MAC address	Management card Port
	HD-Cloudera-Node	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8F...	10.0.51.26		iLO
	HD-Name-Node	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:73...	10.0.51.27		iLO
	HD-Sec-Name-Node	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:89...	10.0.51.28		iLO
	HD-Data-Node-01	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8F...	10.0.51.29		iLO
	HD-Data-Node-02	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:85...	10.0.51.30		iLO
	HD-Data-Node-03	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8E...	10.0.51.31		iLO
	HD-Data-Node-04	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8E...	10.0.51.32		iLO
	HD-Data-Node-05	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:75...	10.0.51.33		iLO
	HD-Data-Node-06	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:82...	10.0.51.34		iLO
	HD-Data-Node-07	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:74...	10.0.51.35		iLO
	HD-Data-Node-08	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8E...	10.0.51.36		iLO
	HD-Data-Node-09	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:75...	10.0.51.37		iLO
	HD-Data-Node-10	N/A	N/A	172.16.120....	255.255.255.0	58:20:81:08:53...	10.0.51.38		iLO
	HD-Data-Node-11	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:75...	10.0.51.39		iLO
	HD-Data-Node-12	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8E...	10.0.51.40		iLO
	HD-Data-Node-13	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:82...	10.0.51.41		iLO
	HD-01	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:71...	10.0.51.43		iLO
	HD-02	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8...	10.0.51.44		iLO
	HD-03	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:71...	10.0.51.45		iLO
	HD-Service-Node	N/A	N/A	172.16.120....	255.255.255.0	70:10:6F:B9:8F...	10.0.51.42		iLO

Information

Type

- Scan Nodes
- Scanning nodes
- Scanning nodes
- Scanning nodes
- Scanning nodes
- Scan Nodes
- Scanning nodes
- Scanning nodes
- Scan Nodes
- Scanning nodes

Node Management

Add Node Delete Node Modify Node Scan Nodes Import Nodes Export Nodes

HD-[01-03] (3 elements)

- Modify Node
- Change Image Group
- Delete Node(s)
- Add Node

Tue Feb 28 11:52:37 ICT 2017 Scanned nodes successfully added.

Tue Feb 28 11:52:33 ICT 2017 3 node(s) found during scan.

Tue Feb 28 11:52:30 ICT 2017 Operation started...

Tue Feb 28 11:51:01 ICT 2017 Scanned nodes successfully added.

Tue Feb 28 11:50:51 ICT 2017 13 node(s) found during scan.

Close

Cluster group management

Insight CMU v8.1 - Hadoop Cluster (HD-Cloudera-Node) - root@HD-Cloudera-Node

File Monitoring Cluster Administration Custom Tools Options About

Resources Filter All Resources Hadoop Cluster Network Groups Unassigned nodes Cloudera HD-Cloudera-Node HD-Compute-Node-01 HD-Compute-Node-02 HD-Compute-Node-03 HD-Compute-Node-04 HD-Compute-Node-05 HD-Compute-Node-06 HD-Compute-Node-07 HD-Compute-Node-08 HD-Compute-Node-09 HD-Compute-Node-10 HD-Compute-Node-11 HD-Compute-Node-12 HD-Compute-Node-13 HD-Namenode1 HD-Namenode2 HD-Service-Node Image Groups Custom Groups Archived Custom Groups Nodes Definition Management Cards Metrics Definition Alerts Definition

Node Management... Network Group Management... Image Group Management Custom Group Management... Upload file(s) to /tmp ... cpupload, max = 100 %

Network Group Management

Select a Network Group : Cloudera Delete Create

Nodes not in any Network Group :

Nodes in Network Group :

=> <= Close

New Network Group

Network Group Name : Cloudera OK Cancel

Information

Type	Date	Message
Custom menu configuration	Tue Mar 14 16:54:15 ICT 2017	Custom menu configuration updated
Remote connection	Tue Mar 14 16:54:14 ICT 2017	CMU server connection initialized

19 day(s)
day(s)
292.7
323
19 day(s)

Install CMU monitoring client

The screenshot shows the Insight CMU v8.1 interface for managing a Hadoop Cluster. The main window title is "Insight CMU v8.1 - Hadoop Cluster (HD-Cloudera-Node) - root@HD-Cloudera-Node". The left sidebar displays a tree view of resources under "All Resources", including Network Groups, Image Groups, and various nodes like HD-Cloudera-Node, HD-Data-Node-01 through 13, HD-Name-Node, HD-Sec-Name-Node, HD-Service-Node, HD-Vertica-01, HD-Vertica-02, and HD-Vertica-03. The "Monitoring" tab is selected for the node "HD-Data-Node-04". The "Metrics" table shows the following data:

Metric	HD-Data-Node-04	Unit
kernel_version	Undefined	release
cpupload	Undefined	%
memory_used	Undefined	%
process_memory	Undefined	%
page_cache	Undefined	%
buffer_cache	Undefined	%
uptime	Undefined	day(s)
disk_write	Undefined	MB/s

A context menu is open over the node details for "HD-Data-Node-04". The menu items include:

- SSH Connection
- Management Card Connection
- Virtual Serial Port Connection
- Shutdown (using SSH)
- Power Off (using BMC)
- Boot (using BMC)
- Reboot (using SSH)
- Change UID LED Status
- Multiple Windows Broadcast
- PDSH (using cmudiff)
- PDCP (Distributed Copy)
- Capture Image (Backup)
- Deploy Image (Clone)
- AutoInstall (Kickstart | AutoYaST | Preseed | Unattended)
- Update:
 - Firmware and BIOS
 - Set Display Color
 - Copy to Clipboard
- Update Node Details
- Install Monitoring Client
- Rescan MAC address
- Update Firmware Inventory (HPE Gen8+ hardware only)

The "Install Monitoring Client" option is highlighted in orange. The bottom status bar shows two log entries:

Type	Date	Message
Monitoring	Tue Feb 28 13:38:50 ICT 2017	Restarting monitoring engine
User setting	Tue Feb 28 13:36:08 ICT 2017	Metric power is not defined : cannot use it as a default metric

Agentless Management Service

The screenshot shows the Insight CMU v8.1 interface for monitoring a Hadoop Cluster (HD-Cloudera-Node). The main window displays various metrics for the cluster, including kernel_version, uptime, disk_write, disk_read, net_in, and net_out. A modal window titled "Configure Platform-specific Metrics" is open, showing metrics for the HPE iLO4+ Agentless Management Service, specifically cpu1_temp, cpu2_temp, and power.

Configure Platform-specific Metrics

Metric category :	Enable	Disable
cpu1_temp	40	
cpu2_temp	40	
power	110	

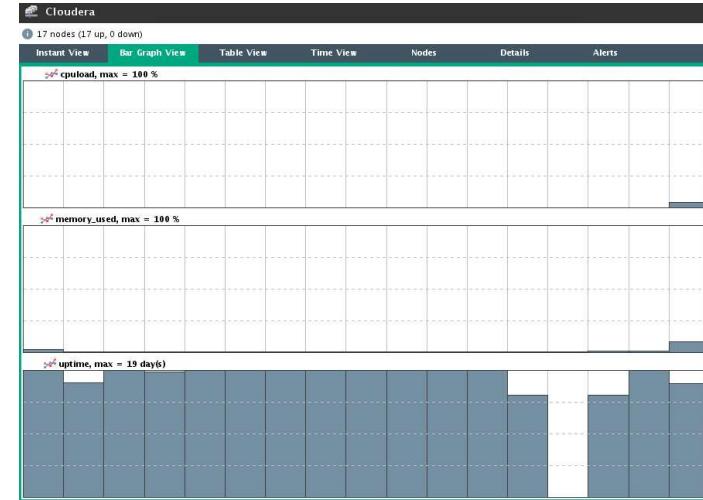
Metrics Table

Metric	HD-Cloudera-Node	Unit
kernel_version	3.0.101-63-default	release
uptime	0.2	%
disk_write	2	%
disk_read	3	%
net_in	2	%
net_out	0	%
logins	0	%
swap_avail	0	%
swap_used	0	%
cpu_frequency	1.9	day(s)
cpu_usage	0.14	MB/s
disk_usage	0	MB/s
net_usage	0.01	MB/s
login_rate	0	MB/s
swap_usage	0	login(s)
swap_free	0	MB
swap_percent	0	%
swap_size	0	MHz
swap_total	0	mount(s)
swap_type	0	Celsius
swap_usage	0	Celsius
swap_usage	0	Celsius
swap_usage	0	watts

Information Log

Type	Date	Message
Monitoring	Tue Feb 28 14:25:33 ICT 2017	Monitoring engine is back
Monitoring	Tue Feb 28 14:25:23 ICT 2017	Monitoring engine is not running
Monitoring	Tue Feb 28 14:25:00 ICT 2017	Restarting monitoring engine
Custom menu configuration	Tue Feb 28 14:24:47 ICT 2017	Custom menu configuration updated
Monitoring	Tue Feb 28 14:24:45 ICT 2017	Add HPE iLO4+ Agentless Management Service metrics
Monitoring	Tue Feb 28 14:03:53 ICT 2017	Monitoring engine is back
Monitoring	Tue Feb 28 14:03:43 ICT 2017	Monitoring engine is not running

View of Cluster Monitor



Cloudera Cluster Monitor Table View

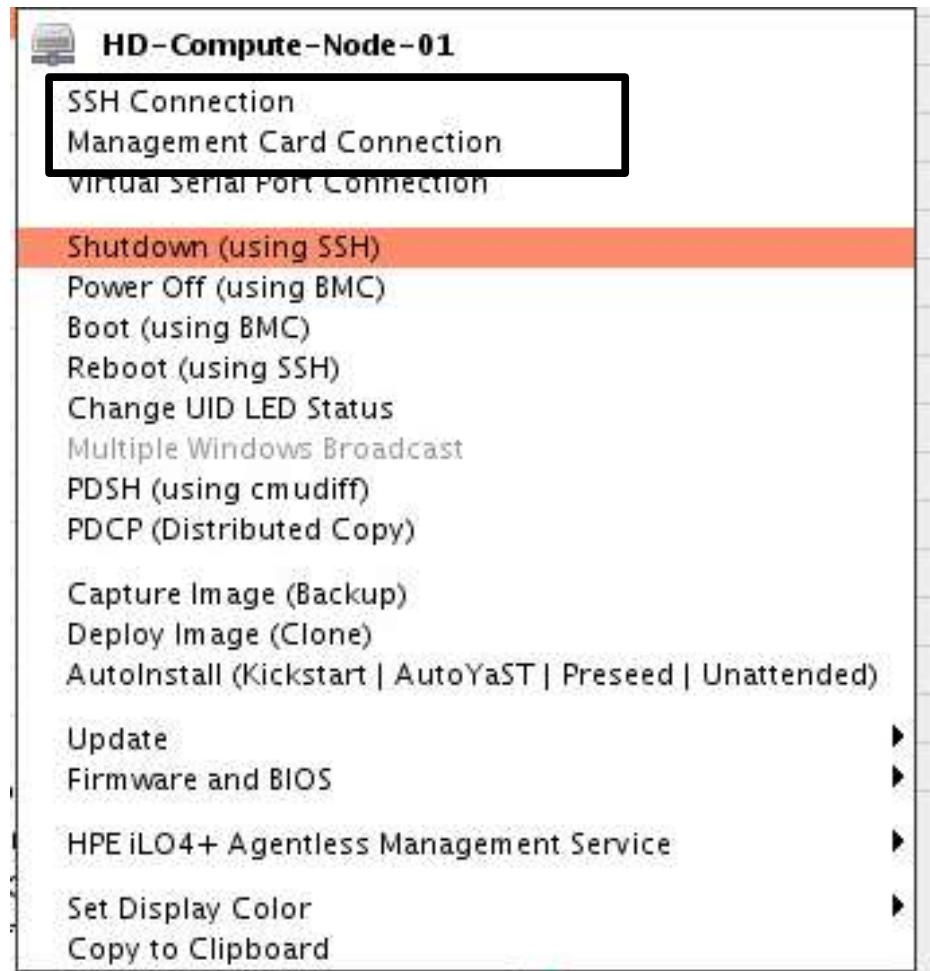
17 nodes (17 up, 0 down)

Node	Monitoring state	kernel_version	cpuload	memory_used	process_memory	page_cache	buffer_cache
HD-Cloudera-Node	✓	3.0.10.1-63-default	0.2	3	3	2	0
HD-Compute-Node-01	✓	3.0.10.1-63-default	0.2	1	4	82	0
HD-Compute-Node-02	✓	3.0.10.1-63-default	0.2	1	4	79	0
HD-Compute-Node-03	✓	3.0.10.1-63-default	0	1	4	82	0
HD-Compute-Node-04	✓	3.0.10.1-63-default	0	1	4	80	0
HD-Compute-Node-05	✓	3.0.10.1-63-default	0	1	4	84	0
HD-Compute-Node-06	✓	3.0.10.1-63-default	0	1	4	77	0
HD-Compute-Node-07	✓	3.0.10.1-63-default	0.2	1	4	83	0
HD-Compute-Node-08	✓	3.0.10.1-63-default	0	1	4	82	0
HD-Compute-Node-09	✓	3.0.10.1-63-default	0.2	1	4	77	0
HD-Compute-Node-10	✓	3.0.10.1-63-default	0	1	4	81	0
HD-Compute-Node-11	✓	3.0.10.1-63-default	0	1	4	83	0
HD-Compute-Node-12	✓	3.0.10.1-63-default	0.2	1	3	72	0
HD-Compute-Node-13	✓	3.0.10.1-63-default	0.2	1	1	0	0
HD-Namenode1	✓	3.0.10.1-63-default	0.2	2	2	1	0
HD-Namenode2	✓	3.0.10.1-63-default	0.2	2	2	1	0
HD-Service-Node	✓	3.0.10.1-63-default	4	9	9	58	0

CMU Management

- Secure shell to server/iLO
- Multiple windows broadcast
- pdsh
- pdcp
- On/Off Machine via system/iLO

Remote to machine/ iLO



iLO Connection

```
HD-Compute-Node-01
contacting 10.0.51.29...
Warning: Permanently added '10.0.51.29' (RSA) to the list of known hosts.
hpeadmin@10.0.51.29's password:
User:hpeadmin logged-in to IL0SGH703VE2F.(10.0.51.29 / FE80::7210:6FFF:FEB9:8F3A)
)
iLO Advanced 2.50 at Sep 23 2016
Server Name: HD-Compute-Node-01
Server Power: On
</>hpiLO->
```

SSH Connection

```
HD-Compute-Node-01
Last login: Tue Mar 14 10:42:03 2017 from hd-cloudera-node
HD-Compute-Node-01:~ #
```

Multiple windows broadcast

Insight CMU v8.1 - Hadoop Cluster (HD-Cloudera-Node) - root@HD-Cloudera-Node

File Monitoring Cluster Administration Custom Tools Options About

Resources Filter All Resources Hadoop Cluster Network Groups Unassigned nodes Cloudera HD-Compute-Node-01 HD-Compute-Node-02 HD-Compute-Node-03 HD-Compute-Node-04 HD-Compute-Node-05 HD-Compute-Node-06 HD-Compute-Node-07 HD-Compute-Node-08 HD-Compute-Node-09 HD-Compute-Node-10 HD-Compute-Node-11 HD-Compute-Node-12 HD-Compute-Node-13 HD-Namenode1 HD-Namenode2 HD-Service-Node Image Groups Custom Groups Archived Custom Groups Nodes Definition Management Cards Metrics Definition Alerts Definition

HD-Compute-Node-01

Monitoring Details Alerts

Metric	HD-Compute-Node-01	Unit
kernel_version	3.0.101-63-default	release
cpuload	0	%
memory_used	1	%
process_memory	4	%

HD-Compute-Node-[01-06] (6 elements)

- SSH Connection
- Management Card Connection
- Virtual Serial Port Connection
- Shutdown (using SSH)
- Power Off (using BMC)
- Boot (using BMC)
- Reboot (using SSH)
- Change UID LED Status
- Multiple Windows Broadcast
- PDSH (using cmudif)
- PDCP (Distributed Copy)
- Capture Image (Backup)
- Deploy Image (Clone)
- AutoInstall (Kickstart | AutoYaST | Preseed | Unattended)
- Update
- Firmware and BIOS
- HPE iLO4+ Agentless Management Service
- Set Display Color
- Copy to Clipboard

Broadcast

Connection type : SSH Management Card Virtual Serial Port

Terminal size : 80 x 24

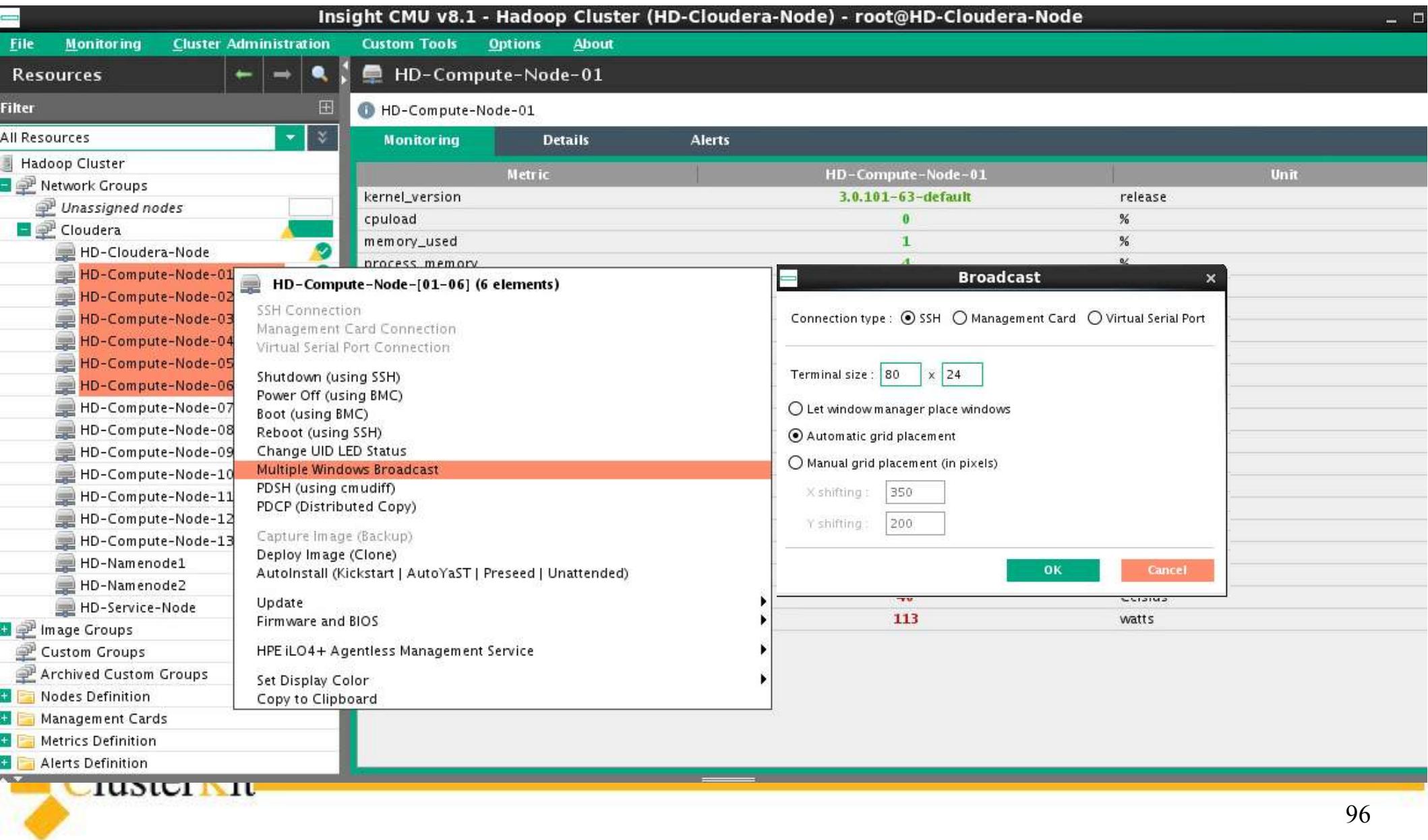
Let window manager place windows
 Automatic grid placement
 Manual grid placement (in pixels)

X shifting : 350

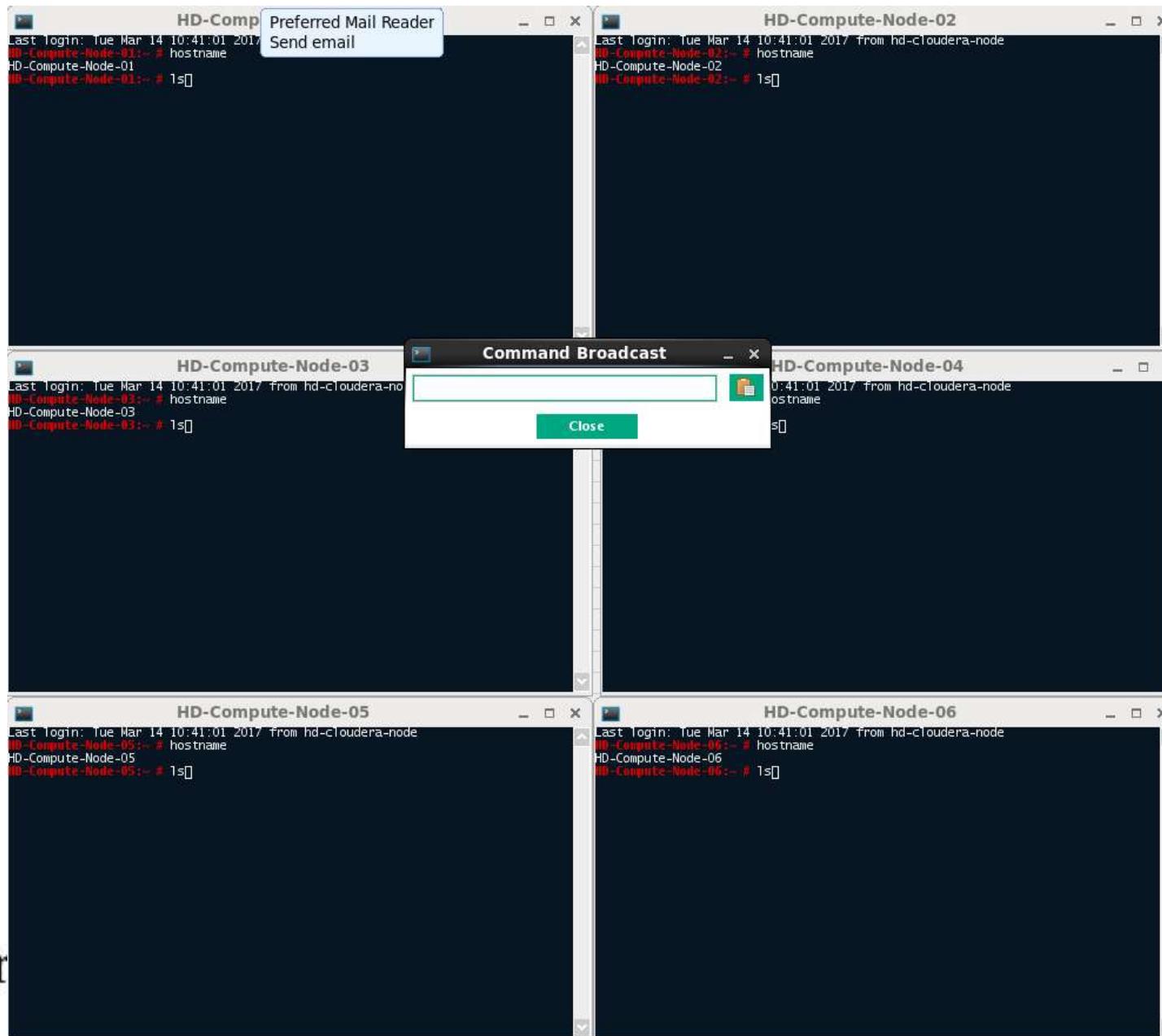
Y shifting : 200

OK Cancel

113 watts



Multiple windows broadcast(cont'd)



pdsh (using cmudiff)

Insight CMU v8.1 - Hadoop Cluster (HD-C)

File Monitoring Cluster Administration Custom Tools Options About

Resources Filter

All Resources

- Hadoop Cluster
- Network Groups
 - Unassigned nodes
 - Cloudera
 - HD-Cloudera-Node
 - HD-Compute-Node-01
 - HD-Compute-Node-02
 - HD-Compute-Node-03
 - HD-Compute-Node-04
 - HD-Compute-Node-05
 - HD-Compute-Node-06
 - HD-Compute-Node-07
 - HD-Compute-Node-08
 - HD-Compute-Node-09
 - HD-Compute-Node-10
 - HD-Compute-Node-11
 - HD-Compute-Node-12
 - HD-Compute-Node-13
 - HD-Compute-Node-14
 - HD-Compute-Node-15
 - HD-Compute-Node-16
 - HD-Compute-Node-17
 - HD-Compute-Node-18
 - HD-Compute-Node-19
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 - HD-Compute-Node-27
 - HD-Compute-Node-28
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 - HD-Compute-Node-39
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 - HD-Compute-Node-41
 - HD-Compute-Node-42
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 - HD-Compute-Node-44
 - HD-Compute-Node-45
 - HD-Compute-Node-46
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 - HD-Compute-Node-60
 - HD-Compute-Node-61
 - HD-Compute-Node-62
 - HD-Compute-Node-63
 - HD-Compute-Node-64
 - HD-Compute-Node-65
 - HD-Compute-Node-66
 - HD-Compute-Node-67
 - HD-Compute-Node-68
 - HD-Compute-Node-69
 - HD-Compute-Node-70
 - HD-Compute-Node-71
 - HD-Compute-Node-72
 - HD-Compute-Node-73
 - HD-Compute-Node-74
 - HD-Compute-Node-75
 - HD-Compute-Node-76
 - HD-Compute-Node-77
 - HD-Compute-Node-78
 - HD-Compute-Node-79
 - HD-Compute-Node-80
 - HD-Compute-Node-81
 - HD-Compute-Node-82
 - HD-Compute-Node-83
 - HD-Compute-Node-84
 - HD-Compute-Node-85
 - HD-Compute-Node-86
 - HD-Compute-Node-87
 - HD-Compute-Node-88
 - HD-Compute-Node-89
 - HD-Compute-Node-90
 - HD-Compute-Node-91
 - HD-Compute-Node-92
 - HD-Compute-Node-93
 - HD-Compute-Node-94
 - HD-Compute-Node-95
 - HD-Compute-Node-96
 - HD-Compute-Node-97
 - HD-Compute-Node-98
 - HD-Compute-Node-99
 - HD-Compute-Node-100
 - HD-Compute-Node-101
 - HD-Compute-Node-102
 - HD-Compute-Node-103
 - HD-Compute-Node-104
 - HD-Compute-Node-105
 - Image Groups
 - Custom Groups
 - Archived Custom Groups
 - Nodes Definition
 - Management Cards
 - Metrics Definition
 - Alerts Definition

PDSH

```
-----  
HD-Compute-Node-[01-05] { 5 nodes }  
-----  
cmudiff display is <ON>, interactive  
cmudiff comprehensive guide: type 'cmudiff [option]' to change cmudiff behaviour  
--help          -h      : display complete cmudiff help  
--reference    -r <name> : specify the reference node  
--ignore        -i <name> : ignore specified nodes  
--reorder       -R      : reorder lines in files to reduce differences  
--replay        -P      : reprocess data from last command  
  
type 'cmudiff' or 'dshbak' to toggle those display on and off  
anything else is a command passed to pdsh  
cmu_pdsh>
```

PDSH

```
Responses: 5 { HD-Compute-Node-[01-05] }  
Reference: HD-Compute-Node-01 - 9 lines  
2 groups of similar nodes found:  
[x] 4 { HD-Compute-Node-[01-02,04-05] }  
[x] 1 { HD-Compute-Node-03 }  
Ignored:  
[ ] <none>  
  
autoinst.xml  
bin  
collectl-4.1.0  
collectl-4.1.0.src.tar.gz  
Desktop  
Documents  
inst-sys  
libpq5-9.4.4-0.6.2.x86_64.rpm  
python-psycopg2-2.6.2-3.3.x86_64.rpm  
more lines after>  
exit code 0 : 5 { HD-Compute-Node-[01-05] }  
(END)
```

h Help q Quit

Information

- Type
- Custom menu configuration
- Remote connection

Date

Tue Mar 14 16:54:15 ICT 2017

Tue Mar 14 16:54:14 ICT 2017

Message

Custom menu configuration updated

CMU server connection initialized

PDCP (Distributed Copy)

1

2

3

4

1. In the 'Parallel distributed copy' menu, select 'PDCP (Distributed Copy)'.

2. Set the Source path to `/root/test.txt` and the Destination path to `/root/testdest.txt`.
 recursive preserve permissions

3. Terminal output:

```
Mbps
PDCP
copying </root/test.txt> to </root/testdest.txt> ... done
[[ Exit code: 0. Press <Enter> to close terminal ]]
```

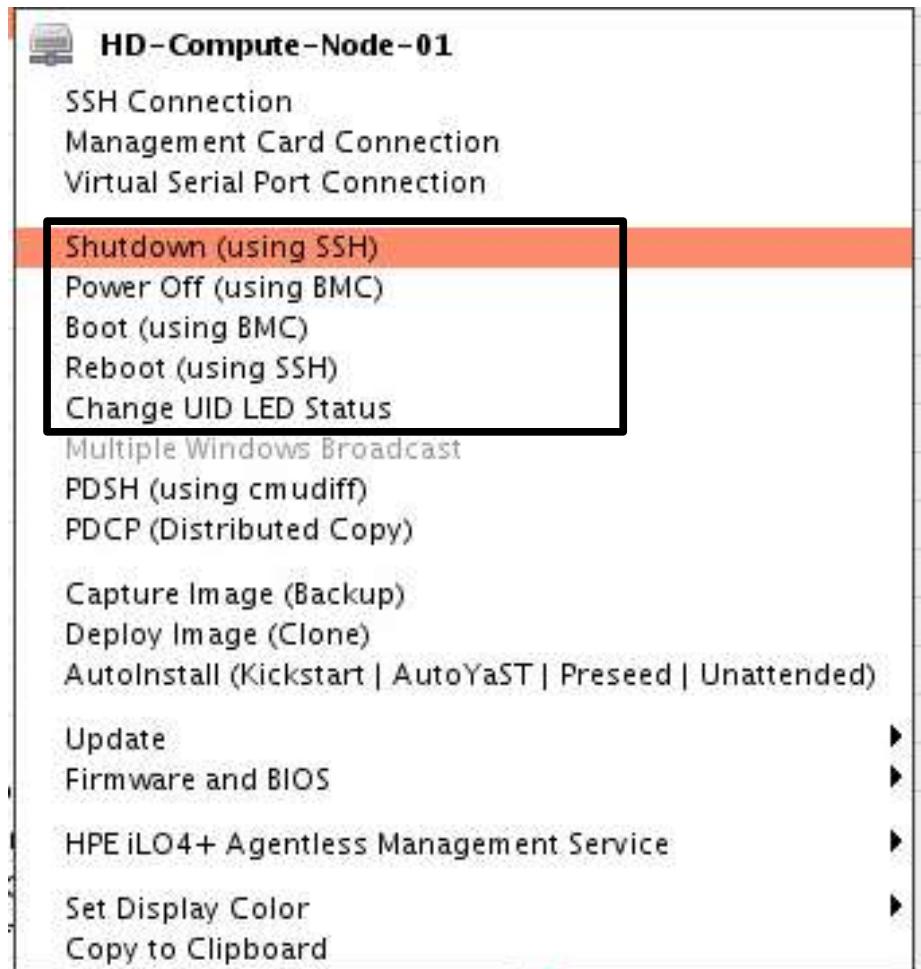
4. Terminal output after completion:

```
HD-Namenode1
Last Login: Tue Mar 14 10:30:30 2017 from hd-cloudera-node
HD-Namenode1:~ # ls *.txt
2.txt testdest.txt
HD-Namenode1:~ # pwd
/root
HD-Namenode1:~ #
```

Message

- Unable to authenticate user:Unable to authenticate user
- Unable to authenticate user:Unable to authenticate user
- Unable to authenticate user:Unable to authenticate user
- Low display performance: FPS reduced to improve user experience
- Custom menu configuration updated
- CMU server connection initialized

ON/OFF machine via CMU



- Shutdown (using SSH)
 - Remote shutdown
- Power Off (using BMC)
 - Force off machine by iLO
- Boot (using BMC)
 - Power On machine
- Reboot (using SSH)
 - Remote reboot

- If can't boot PXE

PXE-booting fails over Cisco switches when Spanning Tree Protocol is enabled

Insight CMU deploys an OS to the compute nodes via PXE-booting, and PXE-booting fails to work over the network when Spanning Tree Protocol (STP) is enabled. This scenario often occurs when Cisco switches are used because STP is enabled by default on Cisco switches and STP is recommended by Cisco. To work around this issue, you must either disable STP or enable STP Edge Port support on the appropriate ports in the switch.

The End.



เจษฎา มาลัยศิริรัตน์
(Jetsada Malaisirirat)
kittirak@clusterkit.co.th

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