

Overview

HP Cluster Management Utility V4.1 (CMU) is a software suite of tools that are used to manage a large collection of nodes within a High Performance Computing (HPC) cluster environment. Each cluster configuration includes separate management networks using Ethernet switches. CMU makes the management of this cluster more user friendly, efficient, and error free than if it were being managed by scripts, or on a node-by-node basis. CMU also offers full support for ILO2, LO100i adaptors or Integrity ILO adaptors, where applicable on the HP servers in the cluster.

CMU software supports both AMD-based and Xeon-based HP ProLiant rack and blade servers running Linux.

Interface

CMU comes with a Command Line Interface (CLI) and a full JAVA® Graphical User Interface (GUI) that can be customized. It allows access to all compute node consoles from a single screen with a single mouse click. CMU software supports HP SIM level 1 integration. Very large cluster configurations (more than 4000 nodes) are supported.

Management

From the CMU graphical user interface, you can monitor, halt, boot, reboot or power off any selection of nodes using ILO2, LO100i adaptors or Integrity ILO management functionality where applicable. Your CMU session connects to several nodes in the cluster and broadcasts commands to the selected nodes. You can also use CMU for reporting and managing cluster events, such as nodes shutting down or powering up. Using the CMU CLI, you can halt, boot, reboot or power off any selection of nodes by using the HP server management card functionality where appropriate. Group and node administration tasks like create/modify or delete are also available through CMU CLI and shell commands. This capability allows, for example, the dynamic creation of groups of nodes matching Platform LSF®, Altair PBS® Professional™ and SLURM (and other resource manager) node allocations.

Provisioning

CMU has the capability to propagate an operating system image to all of the compute nodes in the cluster. CMU can clone, (over the network), disk partition contents from an image server to the local disks of the compute nodes. You use this process for first time installation of compute nodes and also to propagate updates to the kernel or the current system configuration. CMU automatically manages the target disk partitioning in cases where the target partition differs from the initial image. CMU partitions the target disk during the cloning phase, avoiding the partitioning of each compute node during the first installation. Cloning functionality is available from both the CMU CLI and GUI. The cloning algorithm is scalable and achieves high efficiency through hierarchical provisioning. In addition, CMU supports diskless cloning for Red Hat Enterprise Linux and for SUSE Linux Enterprise Server, on up to 192 servers. As part of the cloning procedure, CMU has a mechanism for running scripts just after the completion of cloning and also during the cloning phase, just after net boot. This latter feature permits, for example, the remote flashing of the bios.

Aside from the cloning feature, CMU also provides the ability to use kickstart (for Red Hat) remote installation.

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Monitoring

The CMU monitoring features makes it possible to see, at a glance, the state of the cluster. The cluster monitoring GUI provides a summary of each node's state and also provides a summary per group. In addition, the GUI can display, using a performance gauge, the cumulative value of any metric over the servers that are displayed. The GUI displays customizable information and also displays alerts for all nodes of the cluster. The default update timer is 5 seconds, but it should be noted that the monitoring module does not heavily burden the CPU's on the compute nodes. As an example, measurements on a 100-node cluster, showed that the monitoring feature uses about 0.01% of the CPU time on each compute node. In addition to the sensors (sometimes known as metrics) that are pre-configured with CMU, administrators can configure their own sensors. Also, a large number of lightweight sensors are provided with collectl, a popular monitoring package included with CMU. Collectl can be configured to store monitoring data for later analysis. The data can be viewed directly, and historical displays can also be viewed using the colplot software provided with CMU. Very large configurations (more than 4000 nodes) are supported through monitoring synchronization and a scalable petals display mechanism.

Availability

HP ServiceGuard can be used for the fail over of all CMU services other than cloning and backup. Support for HP ServiceGuard will be discontinued in subsequent releases of CMU.

Operating System Support The CMU software is generally supported on Red Hat Enterprise Linux (RHEL) Advanced Server 3, 4 and 5 and SUSE Linux Enterprise Server (SLES) 9, 10 and 11. CMU diskless support is, however, limited to SLES 10. Amongst the distributions supported for diskless cloning, are RHEL 4.7, RHEL 5.3 and SLES 10 sp2.

Under certain circumstances, open source Linux distribution like Debian, CentOS, Scientific Linux can be supported with HP CMU on the compute nodes. Please contact your HP sales representative for more information.

Installation

CMU software and documentation is delivered on a single DVD-ROM that includes the software itself and all the documentation. The system administrator need only mount the DVD-ROM, read the release notes and follow the CMU installation Guide instructions to install CMU and begin crafting a cluster.

Hardware Requirements

CMU Software is supported on each node of a valid configuration such as the HP Cluster Platform 3000/3000BL or HP cluster platform 4000/4000BL.

- The supported Cluster Platform 3000 systems are based on HP ProLiant DL140, DL160, DL 170h, DL320, DL360, and DL380 each of which uses Intel Xeon processors.
- The supported Cluster Platform 3000BL systems are based on HP ProLiant blade BL2x220c, BL260c, BL460c, BL480c, SL2x170z and xw460c servers each of which use Intel Xeon processors.
- The supported Cluster Platform 4000 systems are based on HP ProLiant DL145, DL165, DL585 and DL785 servers each of which use AMD Opteron processors.
- The supported Cluster Platform 4000BL systems are based on HP ProLiant blade BL465c, BL495c and and BL685c servers each of which use AMD Opteron processors.

As new HP servers are released, the above list of CMU-supported platforms will be augmented. Please contact your HP salesperson for more information.

Each node may be connected to the others with a valid system interconnect that could be Gigabit, 10 Gigabit Ethernet, Myricom Myrinet-2000, Quadrics QsNetII or InfiniBand.

All SATA or SAS hard disk drives configurations are supported, provided that those drives are supported

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by the servers.

Pre-requisite Software

The appropriate Red Hat or SUSE Linux kit must be installed on the master server before CMU Software installation. These kits can be purchased from HP.

Software Licensing Information

For the Software license to be valid on an HP Cluster, the HP Cluster must be licensed both by CMU License (one per cluster) and CMU Compute Node Licenses for a total quantity equal to or greater than the number of HP ProLiant in the HP Cluster.

Subject to the terms and conditions of this Agreement and the payment of any applicable license fee, HP grants You a non-exclusive, non-transferable license to Use (as defined below) in object code form one copy of the Software on one device at a time for Your internal business purposes, unless otherwise indicated above or in applicable Transaction Document(s). "Use" means to install, store, load, execute and display the Software in accordance with the Specifications. Your Use of the Software is subject to these license terms and to the other restrictions specified by HP in any other tangible or electronic documentation delivered or otherwise made available to You with or at the time of purchase of the Software, including license terms, warranty statements, Specifications, and "readme" or other informational files included in the Software itself. Such restrictions are hereby incorporated in this Agreement by reference. Some Software may require license keys or contain other technical protection measures. You acknowledge that HP may monitor your compliance with Use restrictions remotely or otherwise. If HP makes a license management program available which records and reports license usage information, You agree to appropriately install, configure and execute such license management program beginning no later than one hundred and eighty (180) days from the date it is made available to You and continuing for the period that the Software is Used.

Other terms of the HP Software License are provided on the license agreement that is delivered with the CMU software. For more information about the Hewlett-Packard Company licensing terms and policies, contact your local Hewlett-Packard office.

Electronic Software Delivery

Electronic software is now available in most countries. HP recommends purchasing electronic products over physical products when available for faster delivery and the convenience of not having to manage either file away or throw away-confidential paper licenses. For more information, please contact an HP representative.

License Management Facility Support

CMU supports the FlexLM license management facility. The FlexLM license key is provided upon presentation of a valid license key request form. This form is delivered with the software license (see the Ordering Information section of these QuickSpecs). For more information about installing the CMU license keys, refer to the CMU documentation.

Pre-requisite Software

Software and Services Warranty

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services.

- **WARRANTY:** HP Branded Software will materially conform to its Specifications. If a warranty period is not specified for HP Branded Software, the warranty period will be ninety (90) days from the delivery date.
- **WARRANTY LIMITATION:** HP does not warrant that the operation of Software will be uninterrupted or error free, or that Software will operate in Hardware and Software combinations other than as expressly required by HP in the Software Specifications or that Software will meet requirements specified by Customer.
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 2. Customer's non-compliance with Specifications
 3. Improper or inadequate maintenance or calibration
 4. Customer or third-party media, software, interfacing, supplies, or other products
 5. Modifications not performed or authorized by HP
 6. Virus, infection, worm or similar malicious code not introduced by HP
 7. Abuse, negligence, accident, loss or damage in transit, fire or water damage, electrical disturbances, transportation by Customer, or other causes beyond HP's control.

HP provides third-party products, software, and services that are not HP Branded "AS IS" without warranties of any kind, although the original manufacturers or third party suppliers of such products, software and services may provide their own warranties.

Ordering Information

CMU products are ordered by HP order administrators, using either of two ordering formats. With the latter format, fixed Care Pack services are available in addition to other contractual services (see the section on Software Product Services. Each server in an HP Cluster, except for the management node, must be licensed by a CMU Compute Node License (BA664A or 436284-B21 or TC297AAE). The management node must be licensed by the license which comes with the product CMU License and Media (BA666A or 433257-B21).). In addition, if the management node will also be managed by CMU as a compute node, an additional CMU Compute Node License will be required.

NOTE: Electronic software (TC297AAE) is available in all countries except China and Japan. For China and Japan should order the physical equivalent.

Product Name	Comments	Part Number
CMU License and Media	1 per cluster	BA666A or 433257-B21
CMU Compute Node E-License	1 per compute node	TC297AAE
CMU Compute Node License	1 per compute node	BA664A or 436284-B21

Distribution Media and Software Documentation

CMU Software and documentation is available on a single DVD that comes with the product CMU License and Media (BA666A or 433257-B21). Patch kits may be required, and can be downloaded from the website: <http://www.itrc.hp.com/>.

Documentation can also be downloaded from the following website: <http://www.hp.com/go/cmu>

Service and Support, Care Pack and Warranty Information

Software Product Services Standard software support includes customer access to technical resources during standard hours (see later), problem analysis, escalation management and resolution. HP also provides unlimited access to an electronic facility that includes a knowledge database with known symptoms and solutions, software product descriptions, specifications, and technical literature. In addition, HP will also make available certain software patches, including security patches, to the CMU Software. During the term of a standard software support contract, a customer is entitled to receive new versions of the software. With standard software support, customers can access technical resources via telephone, electronic communications or FAX where available, during standard business hours on standard business days, including the hours of 8:00 am and 5:00 pm, Monday through Friday excluding HP holidays. 24x7 software support extends the access-window to 24 hours a day, from Monday through Sunday, including holidays. According to your business requirements please contact HP sales representative to determine the appropriate level services contract.

Business terms and conditions governing software services can be found at the HP website http://legal.hp.com/legal/files/Standard_Agreements.asp.

When ordering CMU products using the 433***-B21 format, and as part of the CMU services offering services can be also purchased as fixed Care Packs.

	1 Year	3 Years
9x5 Standard Technical Support & Updates - unlimited	UE871E	UF087E
24x7 Standard Technical Support & Updates - unlimited	UF086E	UF088E



Ordering Information

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A variety of customer service options are available from Hewlett-Packard for CMU. For more information, contact your local Hewlett-Packard office.

Amongst the service options are software factory installation services, where CMU is installed and configured on Cluster Platforms at the factory. There are also on-site Consulting and Integration Services available for CMU. Contact your local Hewlett-Packard office or your Hewlett-Packard services representative for more information.