Service description
Implementation of HPCC Solution Using Red Hat Linux Operating System

Introduction to your service agreement

This service provides for the design and implementation of a Dell High Performance Computing Cluster ("HPCC") consisting of a pre-racked Dell PowerEdge™ Server and up to two hundred and fifty-six (as defined by the SKU Description) of Dell PowerEdge compute nodes using Platform Cluster Manager ("PCM") or ClusterCorp Rocks+ as the hybrid software stack and packaged job scheduler, as set forth more specifically in this Service Description (the “Service” or “Services”). This Service includes:

- Design the configuration of servers, networking equipment and internal storage, as applicable;
- Installation of pre-configured racks, if pre-configured rack option is purchased with this Service;
- Configuration and installation of PCM or ClusterCorp Rocks+ in the compute nodes and the head node to bring the cluster online and operational;
- Integration of the HPCC solution into existing Ethernet network and the installation of Dell OpenManage™ software;
- Brief product orientation session and configuration guide documenting the implementation.

A Dell representative will contact the Customer to schedule this Service, allowing for at least a ten business day lead time prior to the start of the Service, based upon a mutually agreed to resource availability. This Service will be provided during normal Dell business hours Monday through Friday (8:00am to 6:00pm Customer local time) unless specified otherwise in Appendix B. Any services beyond normal Dell business hours will be reflected on the Customer’s invoice. No service activities shall take place during local, state and/or country holidays unless other arrangements have been made through the sales team and the Dell project manager.

This Service Description ("Service Description") is entered among you the customer ("you" or "Customer") and the Dell entity identified on your invoice for the purchase of this Service. This Service is provided in connection with Customer’s separate signed master services agreement with Dell that explicitly authorizes the sale of this Service (as defined herein) or, in the absence of such agreement, Dell’s terms of sale applicable to commercial customers, which is available at www.Dell.com/terms (you can access this at www.Dell.com/terms in the United States) or your local Dell.com website and incorporated by reference in its entirety herein.

By placing your order for the Services, utilizing the Services or associated software, or by clicking/checking the “I Agree” button or box on the Dell.com website in connection with your
purchase or within a Dell software interface you agree to be bound by this Service Description and the agreements incorporated by reference herein. If you are entering this Service Description on behalf of a company or other legal entity you represent that you have authority to bind such entity to this Service Description, which case ‘you’ or “Customer” shall refer to such entity.

**Service expires 1 year after purchase.** EXCEPT TO THE EXTENT APPLICABLE LAW REQUIRES OTHERWISE, YOU MAY USE THIS SERVICE ONE TIME DURING THE 1 YEAR PERIOD FOLLOWING THE DATE OF ORIGINAL PURCHASE (‘EXPIRATION DATE’). THE ORIGINAL PURCHASE DATE IS DEFINED AS THE EARLIER OF THE DATE OF THE INVOICE FOR THE SERVICE OR ORDER CONFIRMATION FROM DELL. DELL’S DELIVERY OF THE SERVICE WILL BE DEEMED SATISFIED AFTER THE EXPIRATION DATE EVEN IF YOU DO NOT USE THE SERVICE.

**The scope of your Service agreement**

**Service SKUs**

See Appendix A

**The key Service steps include**

- **Planning:**
  1. Review the site environmental and technical readiness requirements.
  2. Confirm readiness review and installation dates and highlight dependencies on complete Customer site readiness and product ship dates to meet the planned installation schedule.
  3. Confirm Customer reviews, accepts, and abides by the terms and conditions of this Service Description.

- **Design:**
  1. Obtain and review the site technical requirements with the Customer.
  2. Verify that the proposed configuration meets the minimum hardware and software requirements.
  3. Create an HPCC design:
     a. Define the component placement, including:
        i. Compute nodes.
        ii. Master/head/front end nodes.
        iii. I/O nodes.
        iv. Management/admin/cluster network switches.
        v. Infiniband switches.
        vi. Storage devices.
     b. Define the environmental requirements:
        i. Heat output (BTUs).
        ii. Electrical draw (amps).
        iii. Electrical circuits required.
        iv. Power, Uninterruptible Power Supply (‘UPS’) and PDU requirements.
     c. Define cable routing and lengths.
     d. Define floor plan requirements.
     e. Validate software mix.
     f. Define/confirm the configuration meets the minimum hardware and software requirements for the environment.
     g. 
• Implementation and testing:
  1. Install the HPCC components:
     a. Unpack and inspect racks prior to installation, if applicable.
     b. Verify that any add on cards required for Infiniband, QLogic®, and PERC are installed in the recommended PCI slot.
     c. Install and route the interconnect cables to the HPCC components.
     d. Attach any management ports to the Customer provided network drops.
     e. Label all the interconnect cables.
     f. Power on and ensure that all the hardware comes up and there are no fault indicators.
     g. Ensure that all hardware is at the supported firmware and BIOS levels; update as necessary.
  2. Configure the Ethernet switches:
     a. Initialize and set up management tool.
  3. Configure the Infiniband switches, if they are a part of the solution.
     a. Initialize and setup management tool.
  4. Configure the head node, as per the design:
     a. Install and configure PCM or ClusterCorp Rocks+:
        i. Basic customization such as adding cluster management package kits or rolls, drivers, libraries, and example of modifying the extend-compute xml file in order for the cluster to be configured for a local environment.
     b. If used as a file server setup of NFS.
     c. Set BMC IP address and complete any IPMI/BMC configuration for remote cluster management.
     d. Install any patches necessary for PCM or ClusterCorp Rocks+.
     e. Configure the internal storage, as per the design:
        i. Create Redundant Array of Independent Disks ("RAID") groups.
        f. Create partitions.
        g. Install file system (such as NFS).
        h. Install OpenManage, if applicable.
  5. Configure the compute nodes:
     a. Network installation of operating system using PCM or ClusterCorp Rocks+.
     b. Install and configure OpenManage Server Administrator, if applicable.
  6. Validation Testing
     a. Perform hardware function testing and fix issues found. Verify network connectivity to ensure there are no faulty cables.
     b. Run high performance Linpack benchmark ("HPL") for cluster stress test and validation of functionality.
  7. Remove all packaging material to a Customer-designated area within the immediate (within 10 meters of the) installation location, or arrange with the Customer for Customer removal.

• Product awareness:
  1. Conduct a brief product orientation session and review the associated documentation. This overview does not replace any available Dell Customer education courses for this product.
     a. Basic demonstration on how to run Linpack.
     b. How to operate management functions
     c. How to rebuild nodes.
     d. How to take nodes in or out of the cluster.
     e. Identify and configuration changes made during installation.
     f. Familiarize the Customer with cluster setup, tools and scripts for either PCM or ClusterCorp Rocks+. 
g. Familiarize the Customer with PCM or ClusterCorp Rocks+ documentation that contains valuable operational and troubleshooting information.

- **Project closeout:**
  1. Provide documentation to reflect the Services performed.
  2. Obtain Customer acknowledgment of the Services performed.

**Excluded Services**
- Un-boxing of any hardware other than the pre-configured rack.
- Racking of any hardware.
- Installation of cabling within the rack except for interconnect cabling.
- Installation of cables external to the rack not related to the HPCC.
- Installation or re-configuration of non-Dell equipment not related to the HPCC.
- Performance tuning including HPL for Top 500 or other benchmarks, scheduler customization, system optimization, teaming/load balancing of network interface cards ("NIC’s") or other similar Services.
- Intel Cluster Ready Certification
- Installation and configuration of external storage.
- Installation of non-Dell provided software stack such as CentOS and including open source cluster management tools such as Rocks.
- Installation or configuration of any compilers, application software, or any other commercial or non-commercial software not otherwise mentioned above.
- Installation or configuration of servers other than compute nodes and a single frontend/install node.
- Installation of any product into an unsupported rack.
- Any activities other than those specifically noted in this Service Description.

**Service specific Customer responsibilities**
- Ensure all hardware is mounted and cabled within each rack prior to technician’s arrival.
- Place the racks in the immediate area of which it will be installed.
- Ensure that the required power outlets are installed and functional.
- Provide Dell Power Distribution Units ("PDU’s"), as needed to provide proper power to the product.
- Make at least one technical contact, with system administration responsibilities, available and provide appropriate facility/site/system/information access privileges as a resource to Dell during the performance of this Service.
- Provide safe and sufficient access to required systems and networks as necessary to perform the Services during normal business hours, or other mutually-agreed times.
- Dispose of the packing material and other debris.
Terms and conditions about your Service

1 Supported products

This Service is available on select Dell Supported Products such as, OptiPlex™, Latitude™, Precision™, Vostro™, PowerEdge™, PowerEdge SC™, PowerVault™, PowerConnect™, Dell EqualLogic™, Dell | EMC Storage Systems™, Dell Compellent, and select Dell printers, which are purchased in a standard configuration. Supported Products are added regularly so please contact your Dell sales representative for the most up-to-date list of which Services are available on your Dell products.

Each Supported Product is tagged with a serial number (the "Service Tag"). A separate service agreement must be purchased by the Customer for each Supported Product. For example, a printer purchased with a laptop system is not covered by the laptop system’s service contract; the printer and the laptop will each need their own service contract. Please refer to the Service Tag on your Supported Product when contacting Dell for this Service.

2 Term of service

A This Agreement commences on the date you place your order and continues through the Term of Service. The “Term of Service” begins on the purchase date and extends for the term indicated on the Order Form. The number of systems, licenses, installations, deployments, managed end points or end-users for which Customer has purchased any one or more Services (defined below), the rate or price, and the applicable Term of Service for each is indicated on Customer’s order form or other mutually-agreed upon form of invoice, order acknowledgment or purchase order (collectively, “Order Form”). Purchases of Services under this Agreement shall be solely for Customer’s own internal use and not for resale or service bureau purposes.

3 Customer responsibilities

A Authority to grant access. Customer represents and warrants that it has obtained permission for both Customer and Dell to access and use the Supported Product, the data on it, and all hardware and software components included in it, for the purpose of providing these Services. If Customer does not already have that permission, it is Customer’s responsibility to obtain it, at Customer’s expense, before Customer asks Dell to perform these Services.

B Cooperate with phone analyst and on-site technician. Customer agrees to cooperate with and follow the instructions given by Dell phone analyst and its on-site technicians. Experience shows that most system problems and errors can be corrected over the phone as a result of close cooperation between the user and the analyst or technician.

C On-site obligations. Where Services require on-site performance, Customer must provide free, safe and sufficient access to Customer’s facilities and the Supported Product(s). Sufficient access includes ample working space, electricity, and a local telephone line. A monitor or display, a mouse (or pointing device), and keyboard must also be provided (at no cost to Dell), if the system does not already include these items.

D Maintain software and serviced releases. Customer must maintain software and Supported Product(s) at Dell-specified minimum release levels or configurations as specified on PowerLink for Dell | EMC Storage or EqualLogic™, or as specified on www.support.dell.com for additional Supported Products. Customer must also ensure installation of remedial replacement parts, patches, software updates or subsequent releases as directed by Dell in
order to keep the Supported Product(s) eligible for this Service.

E  **Data backup.** Complete a backup of all existing data and programs on all affected systems prior to the delivery of this Service by Dell. DELL WILL HAVE NO LIABILITY FOR LOSS OR RECOVERY OF DATA OR PROGRAMS or loss of use of system(s) arising out of this Service or related support activities or any act or omission, including negligence, by Dell or a third-party service provider.

F  **Third party warranties.** These Services may require Dell to access hardware or software that is not manufactured by Dell. Some manufacturers’ warranties may become void if Dell or anyone else other than the manufacturer works on the hardware or software. It is Customer’s responsibility to ensure that Dell’s performance of Services will not affect such warranties or, if it does, that the effect will be acceptable to Customer. DELL DOES NOT TAKE RESPONSIBILITY FOR THIRD PARTY WARRANTIES OR FOR ANY EFFECT THAT THE DELL SERVICES MAY HAVE ON THOSE WARRANTIES.

4 Important additional information

A  **RESCHEDULING.** ONCE THIS SERVICE HAS BEEN SCHEDULED, ANY CHANGES TO THE SCHEDULE MUST OCCUR AT LEAST 8 CALENDAR DAYS PRIOR TO THE SCHEDULE DATE. IF CUSTOMER RESCHEDULES THIS SERVICE WITHIN 7 DAYS OR LESS PRIOR TO THE SCHEDULE DATE, THERE WILL BE A RESCHEDULING FEE NOT TO EXCEED 25% OF THE CUSTOMER PRICE FOR THE SERVICES. CUSTOMER AGREES THAT ANY RESCHEDULING OF THE SERVICE WILL BE CONFIRMED AT LEAST 8 DAYS PRIOR TO COMMENCEMENT OF THE SERVICE.

B  **Payment for hardware purchased with installation & deployment services.** Unless otherwise agreed to in writing, payment for hardware shall in no case be contingent upon performance or delivery of installation or deployment services purchased with such hardware.

C  **Commercially reasonable limits to scope of service.** Dell may refuse to provide Services if, in its opinion, providing the Services creates an unreasonable risk to Dell or Dell’s Service providers or is beyond the scope of Services. Dell is not liable for any failure or delay in performance due to any cause beyond its control. Service extends only to uses for which the Supported Product was designed.

D  **Optional services.** Optional services (including point-of-need support, installation, consulting, managed, and professional, support or training services) may be available for purchase from Dell and will vary by Customer location. Optional services may require a separate agreement with Dell. In the absence of such agreement, optional services are provided pursuant to this Agreement.

E  **Assignment.** Dell may assign this Service and/or Service Description to qualified third party service providers.

F  **Cancellation.** Dell may cancel this Service at any time during the Service term for any of the following reasons:

- Customer fails to pay the total price for this Service in accordance with the invoice terms;
- Customer refuses to cooperate with the assisting analyst or on-site technician; or
- Customer fails to abide by all of the terms and conditions set forth in this Service Description.

If Dell cancels this Service, Dell will send Customer written notice of cancellation at the address indicated on Customer’s invoice. The notice will include the reason for cancellation and the effective date of cancellation, which will be not less than ten (10) days from the date Dell sends notice of cancellation to Customer, unless state law
requires other cancellation provisions that may not by varied by agreement. IF DELL CANCELS THIS SERVICE PURSUANT TO THIS PARAGRAPH, CUSTOMER SHALL NOT BE ENTITLED TO ANY REFUND OF FEES PAID OR DUE TO DELL.

G Geographic limitations & relocation. This Service will be delivered to the site(s) indicated on the Customer’s invoice. This Service is not available at all locations. Service options, including service levels, technical support hours and onsite response times will vary by geography and certain options may not be available for purchase in Customer’s location. Dell’s obligation to supply the Services to relocated Supported Products is subject to local service availability and may be subject to additional fees, and to inspection and recertification of the relocated Supported Products at Dell’s then current time and materials consulting rates. Customer will provide Dell with sufficient and safe access to Customer’s facilities at no cost to Dell for Dell to fulfill Dell’s obligations.

H Transfer of service. Subject to the limitations set forth in this Service Description, Customer may transfer this Service to a third party who purchases Customer’s entire Supported Product before the expiration of the then-current service term, provided Customer is the original purchaser of the Supported Product and this Service, or Customer purchased the Supported Product and this Service from its original owner (or a previous transferee) and complied with all the transfer procedures available at www.support.dell.com. A transfer fee may apply. Please note that if Customer or Customer’s transferee moves the Supported Product to a geographic location in which this Service is not available (or is not available at the same price) as Customer paid for this Service, Customer may not have coverage or may incur an additional charge to maintain the same categories of support coverage at the new location. If Customer chooses not to pay such additional charges, Customer’s Service may be automatically changed to categories of support which are available at such price or a lesser price in such new location with no refund available.

For more information about any of our service offerings, please contact your Dell representative or visit www.dell.com/services

Availability varies by country. To learn more, customers and Dell Channel Partners should contact your sales representative for more information.

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## Appendix A

### Service SKUs

<table>
<thead>
<tr>
<th>SKU</th>
<th>Description</th>
<th>Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>986-1379</td>
<td>HPCC Enterprise Implementation / Installation 1-16 Nodes - Cluster O/S Configuration Only</td>
<td>EDT</td>
</tr>
<tr>
<td>986-1389</td>
<td>HPCC Enterprise Implementation / Installation 17-32 Nodes - Cluster O/S Configuration Only</td>
<td>EDT</td>
</tr>
<tr>
<td>986-1399</td>
<td>HPCC Enterprise Implementation / Installation 33-64 Nodes - Cluster O/S Configuration Only</td>
<td>EDT</td>
</tr>
<tr>
<td>986-1409</td>
<td>HPCC Enterprise Implementation / Installation 65-128 Nodes - Cluster O/S Configuration Only</td>
<td>EDT</td>
</tr>
<tr>
<td>986-1419</td>
<td>HPCC Enterprise Implementation / Installation 129-256 Nodes - Cluster O/S Configuration Only</td>
<td>EDT</td>
</tr>
</tbody>
</table>
## Appendix B

### Exceptions to Dell business hours

<table>
<thead>
<tr>
<th>Country</th>
<th>Dell business hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Kitts, St. Lucia, St. Vincent, Trinidad, Virgin Islands, Rest of English speaking Caribbean</td>
<td>7:00 AM to 4:00 PM</td>
</tr>
<tr>
<td>Barbados, Bahamas, Belize, Costa Rica, El Salvador, Grand Cayman, Guatemala, Honduras, Jamaica, Panama, Puerto Rico, Rep. Dominicana, Suriname, Turks and Caicos</td>
<td>8:00 AM to 5:00 PM</td>
</tr>
<tr>
<td>Australia, Bermuda, China, Haiti, Hong Kong, Japan, Korea, Malaysia, Netherland Antilles, New Zealand, Singapore, Taiwan, Thailand</td>
<td>9:00 AM to 5:00 PM</td>
</tr>
<tr>
<td>Argentina, India, Paraguay, Uruguay</td>
<td>9:00 AM to 6:00 PM</td>
</tr>
<tr>
<td>Bolivia, Chile</td>
<td>9:00 AM to 7:00 PM</td>
</tr>
</tbody>
</table>