FUJITSU Software PRIMECLUSTER GLS 4.4A00

Installation Guide

Linux

J2UL-2099-03ENZ0(02)
December 2017

Preface

Purpose

This manual explains how to install PRIMECLUSTER GLS.

Target Readers

This manual is written for people who will install this product.
It is strongly recommended that you read the Software Release Guide from the product media before using this manual.
When setting up systems, it is assumed that readers have the basic knowledge required to configure the servers, storage and network devices to be installed.

Organization

This manual consists of four chapters, and appendices. The contents of these chapters, the appendices are listed below.

Title	Description
Chapter 1 Program components	Explains the packages of which this product is composed.
Chapter 2 Operation Environment	Explains the operational environment of this product.
Chapter 3 Installation	Explains how to install this product.
Chapter 4 Uninstallation	Explains how to uninstall this product.
Appendix A Troubleshooting	Explains how to address problems that occur.
Appendix B Necessary OS packages to be installed.	Explains about the necessary OS packages to be installed.

Notational Conventions

The notation in this manual conforms to the following conventions.

- References and character strings or values requiring emphasis are indicated using double quotes (").
- Text to be entered by the user is indicated using bold text.
- Variables are indicated using italic text.

The following abbreviations are used in this manual:

- Global Link Services is abbreviated as GLS.
- Reliant Monitor Services is abbreviated as RMS.
- PRIMEQUEST 2000/1000 Series is abbreviated as PRIMEQUEST.

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Changes	Section	Manual code
Added the descriptions of FUJITSU Cloud Service K5 environment.	Chapter 3, Chapter 4	J2UL-2099-03ENZ0(01) J2UL-2099-03ENZ2(01)
"Appendix B Necessary OS packages to be installed" has been modified.	B.3	J2UL-2099-03ENZ0(02) J2UL-2099-03ENZ2(02)

Contents

Chapter 1 Program components

The unit of the program that composes the system is called a package.
This chapter explains about the packages of which this software is composed.

PRIMERGY

- Red Hat Enterprise Linux 6 (for x86)
- Red Hat Enterprise Linux 6 (for Intel64)
- Red Hat Enterprise Linux 7 (for Intel64)

PRIMEQUEST

- Red Hat Enterprise Linux 6 (for x86)
- Red Hat Enterprise Linux 6 (for Intel64)
- Red Hat Enterprise Linux 7 (for Intel64)

1.1 Red Hat Enterprise Linux 6 (for x86) for PRIMERGY/ PRIMEQUEST

No.	Component	Package	Version	Function
1	Global Link Services(GLS)	kmod-FJSVhanet-drv	2.16-x	High Available Network Support
		FJSVhanet	2.16-1	

1.2 Red Hat Enterprise Linux 6 (for Intel64) for PRIMERGY/ PRIMEQUEST

No.	Component	Package	Version	Function
1	Global Link Services(GLS)	kmod-FJSVhanet-drv	2.16-x	High Available Network Support
		FJSVhanet	2.16-1	

1.3 Red Hat Enterprise Linux 7 (for Intel64) for PRIMERGY/ PRIMEQUEST

No.	Component	Package	Version	Function
1	Global Link Services(GLS)	kmod-FJSVhanet-drv	2.16-x	High Available Network Support
		FJSVhanet	2.16-1	

Chapter 2 Operation Environment

This chapter explains the operation environment of this software.

2.1 Software environment

1. Basic software prerequisites

   Install the following software product:

   - PRIMERGY

No.	Basic Software	Kernel	Errata
1	Red Hat Enterprise Linux 6.2 (for x86)	Supports kernel-2.6.32-220.4.2.el6 or later	RHBA-2012:0124-1 or later (*1)(*2)
2	Red Hat Enterprise Linux 6.3 (for x86)	Supports kernel-2.6.32-279.22.1.el6 or later	RHSA-2013:0223-1 or later (*1)
3	Red Hat Enterprise Linux 6.4 (for x86)	Supports kernel-2.6.32-358.6.1.el6 or later	RHSA-2013:0744-1 or later (*1)
4	Red Hat Enterprise Linux 6.5 (for x86)	Supports kernel-2.6.32-431.el6 or later	
5	Red Hat Enterprise Linux 6.6 (for x86)	Supports kernel-2.6.32-504.el6 or later	
6	Red Hat Enterprise Linux 6.7 (for x86)	Supports kernel-2.6.32-573.el6 or later	RHBA-2015:1827-1 or later (*3)
7	Red Hat Enterprise Linux 6.8 (for x86)	Supports kernel-2.6.32-642.el6 or later	
8	Red Hat Enterprise Linux 6.2 (for Intel64)	Supports kernel-2.6.32-220.4.2.el6 or later	RHBA-2012:0124-1 or later (*1)(*2)
9	Red Hat Enterprise Linux 6.3 (for Intel64)	Supports kernel-2.6.32-279.22.1.el6 or later	RHSA-2013:0223-1 or later (*1)
10	Red Hat Enterprise Linux 6.4 (for Intel64)	Supports kernel-2.6.32-358.6.1.el6 or later	RHSA-2013:0744-1 or later (*1)
11	Red Hat Enterprise Linux 6.5 (for Intel64)	Supports kernel-2.6.32-431.el6 or later	
12	Red Hat Enterprise Linux 6.6 (for Intel64)	Supports kernel-2.6.32-504.el6 or later	
13	Red Hat Enterprise Linux 6.7 (for Intel64)	Supports kernel-2.6.32-573.el6 or later	RHBA-2015:1827-1 or later (*3)

No.	Basic Software	Kernel	Errata
14	Red Hat Enterprise Linux 6.8 (for Intel64)	Supports kernel-2.6.32-642.el6 or later	
15	Red Hat Enterprise Linux 7 (for Intel64)	Supports kernel-3.10.0-123.el7 or later	
16	Red Hat Enterprise Linux 7.1 (for Intel64)	Supports kernel-3.10.0-229.el7 or later	
17	Red Hat Enterprise Linux 7.2 (for Intel64)	Supports kernel-3.10.0-327.el7 or later	
18	Red Hat Enterprise Linux 7.3 (for Intel64)	Supports kernel-3.10.0-514.el7 or later	

(*1) Please apply to all the OS's where this software is installed.

(*2) In the KVM environment, whether this software is installed or not on the host OS, be sure to apply this patch to the host OS.

(*3) When bundling the bonding interface with Virtual NIC mode of GLS, please apply to the OS.

- PRIMEQUEST

No.	Basic Software	Kernel	Errata
1	Red Hat Enterprise Linux 6.2 (for x86)	Supports kernel-2.6.32-220.4.2.el6 or later	RHBA-2012:0124-1 or later (*1)(*2)
2	Red Hat Enterprise Linux 6.3 (for x86)	Supports kernel-2.6.32-279.22.1.el6 or later	RHSA-2013:0223-1 or later (*1)
3	Red Hat Enterprise Linux 6.4 (for x86)	Supports kernel-2.6.32-358.6.1.el6 or later	RHSA-2013:0744-1 or later (*1)
4	Red Hat Enterprise Linux 6.5 (for x86)	Supports kernel-2.6.32-431.el6 or later	
5	Red Hat Enterprise Linux 6.6 (for x86)	Supports kernel-2.6.32-504.el6 or later	
6	Red Hat Enterprise Linux 6.7 (for x86)	Supports kernel-2.6.32-573.el6 or later	RHBA-2015:1827-1 or later (*3)
7	Red Hat Enterprise Linux 6.8 (for x86)	Supports kernel-2.6.32-642.el6 or later	
8	Red Hat Enterprise Linux 6.2 (for Intel64)	Supports kernel-2.6.32-220.4.2.el6 or later	RHBA-2012:0124-1 or later (*1)(*2)

No.	Basic Software	Kernel	Errata
9	Red Hat Enterprise Linux 6.3 (for Intel64)	Supports kernel-2.6.32-279.22.1.el6 or later	RHSA-2013:0223-1 or later (*1)
10	Red Hat Enterprise Linux 6.4 (for Intel64)	Supports kernel-2.6.32-358.6.1.el6 or later	RHSA-2013:0744-1 or later (*1)
11	Red Hat Enterprise Linux 6.5 (for Intel64)	Supports kernel-2.6.32-431.el6 or later	
12	Red Hat Enterprise Linux 6.6 (for Intel64)	Supports kernel-2.6.32-504.el6 or later	
13	Red Hat Enterprise Linux 6.7 (for Intel64)	Supports kernel-2.6.32-573.el6 or later	RHBA-2015:1827-1 or later (*3)
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18	Red Hat Enterprise Linux 7.3 (for Intel64)	Supports kernel-3.10.0-514.el7 or later	

(*1) Please apply to all the OS's where this software is installed.

(*2) In the KVM environment, whether this software is installed or not on the host OS, be sure to apply this patch to the host OS.

(*3) When bundling the bonding interface with Virtual NIC mode of GLS, please apply to the OS.

For the supported versions of the kernel, please contact your local Fujitsu sales representative.

This software, when operating on the above software, requires additional packages to be added besides the packages which are installed with a minimum OS option installation. Please refer to "Appendix B. Necessary OS packages to be installed" for the necessary additional packages.

2. Required software

   None.

3. Exclusive software

   None.

2.2 Hardware environment

The following hardware requirements must be satisfied to operate this software.

1. Memory

   512MB or more of memory is required.

2. Required hardware

   None.

3. Related hardware

   None.

2.3 Static disk resources

This section explains static disk space requirements for this software.

2.3.1 Required disk space

The following table lists the disk space requirements for installing this software. If necessary, expand the size of the relevant file systems.

No.	Directory	Disk space (in MB)	Remarks
1	/	3.2	
2	/usr	0.0	
3	/var	1.1	
4	/var/opt	0.1	
5	/etc/opt	0.4	
6	/opt	17.2	

2.3.2 Required work area

None.

2.4 Dynamic disk resources

This section explains dynamic disk space requirements for this software.

2.4.1 Required disk space

When this software is operated in the following environment, the additional disk space shown below is required for each directory as well as the disk space required for installing this software as described in "2.3 Static disk resources". If free space is insufficient, expand the size of the relevant file system.

No.	Directory	Disk space (in MB)	Operation
1	/var	13.0	When you are running PRIMECLUSTER GLS. (The execution log is preserved.)
2	/var/tmp	5.0	When FJQSS (Information Collection Tool) of PRIMECLUSTER GLS is executed for collecting information.

GLS: Global Link Services

2.5 Required memory

The following table shows the memory required when this software is operated in the following environment:

No.	Memory (in MB)	Operation
1	8.6	When it is a dual network using the Redundant Line Control Function (NIC switching mode).
2	9.4	When it is a dual network using the Redundant Line Control Function (Fast switching mode).
3	9.8	When it is a dual network using the Redundant Line Control Function (Virtual NIC mode).
4	30.6	When it is a dual network using the Redundant Line Control Function (GS linkage mode).

Chapter 3 Installation

This chapter explains the installation of this software.

Note

To use PRIMECLUSTER GLS in combination with PRIMECLUSTER Clustering Base in FUJITSU Cloud Service K5 environment, refer to the installation guide of PRIMECLUSTER Clustering Base and install both products at the same time.

You can install this software on each node where basic and required software is installed. For details about error messages during installation, see "Appendix A Troubleshooting".

3.1 Preparations

1. Prerequisites

   1. Time required

      It takes approximately 10 minutes to install this software.

   2. OS version check

      Execute the following command, and confirm whether it is the one corresponding to the version of software from which the version of OS has been described to "2.1 Software environment".

      ```
      # uname -r <Return>
      ```

   3. Check the auto startup of the NetworkManager service.

      PRIMECLUSTER does not support the NetworkManager service.
      Check the auto startup of the NetworkManager service setting.

      ```
      Red Hat Enterprise Linux 6

      Check that the setting of auto startup of the NetworkManager service  is "off" using the
      following command.
      ```

      ```
      # /sbin/chkconfig --list NetworkManager
      NetworkManager  0:off   1:off   2:off   3:off   4:off   5:off   6:off
      ```

      ```
      If there is runlevel that is in "on", disable the NetworkManager service using the following
      command.
      ```

      ```
      # /sbin/service NetworkManager stop
      # /sbin/chkconfig NetworkManager off
      ```

      ```
      Red Hat Enterprise Linux 7

      Check that the setting of auto startup of the NetworkManager service  is "disabled" using the
      following command.
      ```

      ```
      # /usr/bin/systemctl is-enabled NetworkManager.service
      disabled
      ```

      ```
      If the setting is "enabled", disable the NetworkManager service using the following command.
      ```

      ```
      # /usr/bin/systemctl stop NetworkManager.service
      # /usr/bin/systemctl disable NetworkManager.service
      ```

2. Package check

   1. Check if a previous version of this software is installed.

      ```
      # rpm -qi FJSVhanet <Return>
      ```

   2. If the name of the installed package is displayed by the above operation, the package is already installed. After saving the configuration files, remove the displayed package from the system. See "3. Saving the Configuration files" for how to save a configuration files, and see "Chapter 4 Uninstallation" for how to remove a package.

   3. Before installing this software, check that enough disk space is available, For the disk size used by this software, see "2.3 Static disk resources" If there is insufficient space available, reconfigure the disk partition.

3. Saving the configuration files

   1. This software contains several configuration files. Before upgrading this software, save the configuration files by executing the command listed below. For detailed information about the command, refer to "4.6.1 Backing up Configuration Files" in PRIMECLUSTER Global Link Services Configuration and Administration Guide: Redundant Line Control Function.

      ```
      # /opt/FJSVhanet/usr/sbin/hanetbackup -d save_destination_directory <Return>
      ```

3.2 Installation

1. Login to the system and become the root user.

   ```
   # su <Return>
   Password:password <Return>
   ```

2. The system is changed to the single user mode.

   [Red Hat Enterprise Linux 6]

   Edit the contents of the id entry of the /etc/inittab file using vi(1) etc. as shown below to start the system in single-user mode.

   Note

   - The default runlevel varies depending on the environment when the patch is applied (3 in the example below)
   - Put down the default target before upgrading as you can restore the system to the state prior to upgrading later.

   [Before Modification]

   ```
   # Default runlevel, The runlevels used by RHS are:
   #   0 - halt (Do NOT set initdefault to this)
   #   1 - Single user mode
   #   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
   #   3 - Full multiuser mode
   #   4 - unused
   #   5 - X11
   #   6 - reboot (Do NOT set initdefault to this)
   #
   id:3:initdefault:
   ```

   [After Modification]

   ```
   # Default runlevel, The runlevels used by RHS are:
   #   0 - halt (Do NOT set initdefault to this)
   #   1 - Single user mode
   #   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
   #   3 - Full multiuser mode
   #   4 - unused
   #   5 - X11
   ```

```
#   6 - reboot (Do NOT set initdefault to this)
#
id:1:initdefault:
```

Start the system again in single-user mode.

```
# shutdown -r now <Return>
```

[Red Hat Enterprise Linux 7]

Check the default target.

Note

- The default target before upgrading ([multi-user.target] in the following example) varies depending on the system.
- Put down the default target before upgrading as you can restore the system to the state prior to upgrading later.

```
# systemctl get-default <Return>
multi-user.target
```

The default target changes in single-user mode.

```
# systemctl set-default rescue.target <Return>
rm '/etc/systemd/system/default.target'
ln -s '/usr/lib/systemd/system/rescue.target' '/etc/systemd/system/default.target'
```

Start the system again in single-user mode.

```
# shutdown -r now <Return>
```

3. Insert DVD in the DVD-ROM drive.

```
# mount -t iso9660 -r /dev/<device file name> <DVD-ROM mount point> <Return>
```

<DVDROM_DIR> will be used as the mount point.

4. Execute the CLI installer.

```
# cd <DVDROM_DIR>/Tool <Return>
# ./cluster_install -e PCL-GLS <Return>

Installation of PRIMECLUSTER started.

PRODUCT : GLS

        .
        .

The installation finished successfully.
```

5. Eject DVD.

```
# cd / <Return>
# umount <DVDROM_DIR> <Return>
# eject <Return>
```

6. Patch download

Download the latest PRIMECLUSTER patch by UpdateSite format and update information file from Updatesite.

7. Please apply the patch for PRIMECLUSTER.

   Please refer to the update information file of each patch for installation instructions and points of concern, etc.

3.3 Environment configuration

1. If the configuration files have been saved, execute the following command to restore them:
   Refer to "4.6.2 Restoring Configuration Files" and "7.19 hanetrestore Command" in PRIMECLUSTER Global Link Services Configuration and Administration Guide: Redundant Line Control Function.

```
# cd /save_destination_directory <Return>
# /opt/FJSVhanet/usr/sbin/hanetrestore -f name_of_saved_file <Return>
```

2. Reboot the system.

   [Red Hat Enterprise Linux 6]

   Edit the contents of the id entry of the /etc/inittab file, which has been changed in Step 2, to the original contents to start the system in multi-user mode.

   [Before Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:1:initdefault:
```

   [After Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:3:initdefault:
```

   Start the system again.

```
# shutdown -r now <Return>
```

   [Red Hat Enterprise Linux 7]

   The default target changes in multi-user mode.

```
# systemctl set-default multi-user.target <Return>
rm '/etc/systemd/system/default.target'
ln -s '/usr/lib/systemd/system/multi-user.target' '/etc/systemd/system/default.target'
```

   Start the system again.

```
# shutdown -r now <Return>
```

Chapter 4 Uninstallation

This chapter explains the uninstallation of this software.

Note

- To use PRIMECLUSTER GLS in combination with PRIMECLUSTER Clustering Base, refer to the installation guide of PRIMECLUSTER Clustering Base and uninstall both products at the same time.

4.1 Preparation

Before uninstalling, if you are applying patch for PRIMECLUSTER by UpdateSite format, remove them by UpdateAdvisor (middleware). For details, see help information on UpdateAdvisor(middleware) and the update information file of the patch.

4.2 Uninstallation

1. Login to the system as the root user.

```
# su <Return>
Password:password <Return>
```

2. Boot the system in single user mode.

   [Red Hat Enterprise Linux 6]

   Edit the contents of the id entry of the /etc/inittab file using vi(1) etc. as shown below to start the system in single-user mode.

   Note

   - The default runlevel varies depending on the environment when the patch is applied (3 in the example below).
   - Put down the default target before upgrading as you can restore the system to the state prior to upgrading later.

   [Before Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:3:initdefault:
```

   [After Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
```

```
#
id:1:initdefault:
```

Start the system again in single-user mode.

```
# shutdown -r now <Return>
```

[Red Hat Enterprise Linux 7]

Check the default target.

Note

- The default target before upgrading ([multi-user.target] in the following example) varies depending on the system.
- Put down the default target before upgrading as you can restore the system to the state prior to upgrading later.

```
# systemctl get-default <Return>
multi-user.target
```

The default target changes in single-user mode.

```
# systemctl set-default rescue.target <Return>
rm '/etc/systemd/system/default.target'
ln -s '/usr/lib/systemd/system/rescue.target' '/etc/systemd/system/default.target'
```

Start the system again in single-user mode.

```
# shutdown -r now <Return>
```

3. Insert DVD and mount the DVD-ROM device.

```
# mount -t iso9660 -r /dev/<device file name> <DVD-ROM mount point> <Return>
```

<DVDROM_DIR> will be used as the mount point.

4. Execute the CLI uninstaller.

```
# cd <DVDROM_DIR>/Tool <Return>
# ./cluster_uninstall -e PCL-GLS <Return>
Are you sure to remove PRIMECLUSTER from your system (y or n) ? y <Return>

  .
  .

The uninstallation finished successfully.
```

5. In PRIMECLUSTER Global Link Services: Redundant Line Control Function, when using the user command execution function and script files remains, the directory under /etc/opt/FJSVhanet/script is not deleted.
   Delete this directory after saving or deleting script files.

```
# cd /etc/opt <Return>
# rm -rf FJSVhanet <Return>
```

6. Eject DVD, then reboot the system by executing the "shutdown(8)" command.

```
# cd / <Return>
# umount <DVDROM_DIR> <Return>
# eject <Return>
```

[Red Hat Enterprise Linux 6]

Edit the contents of the id entry of the /etc/inittab file, which has been changed in Step 2, to the original contents to start the system in multi-user mode.

[Before Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:1:initdefault:
```

[After Modification]

```
# Default runlevel, The runlevels used by RHS are:
#   0 - halt (Do NOT set initdefault to this)
#   1 - Single user mode
#   2 - Multiuser, without NFS (The same as 3, if you do not have networking)
#   3 - Full multiuser mode
#   4 - unused
#   5 - X11
#   6 - reboot (Do NOT set initdefault to this)
#
id:3:initdefault:
```

Start the system again.

```
# shutdown -r now <Return>
```

[Red Hat Enterprise Linux 7]

The default target changes in multi-user mode.

```
# systemctl set-default multi-user.target <Return>
rm '/etc/systemd/system/default.target'
ln -s '/usr/lib/systemd/system/multi-user.target' '/etc/systemd/system/default.target'
```

Start the system again.

```
# shutdown -r now <Return>
```

Appendix A Troubleshooting

This chapter explains how to address problems that occur.

A.1 Error messages

The following section describes the messages display during the installation of this software and the recommended procedure of handling these messages.

RMS is running.

Description

You can not uninstall or upgrade a package while RMS is running.

Workaround

You must switch to a single user mode before running any package operations.

ERROR: Failed to install FJQSS<Information Collection Tool>

Description

Installation of FJQSS failed.

Workaround

Collect the following information then contact your Fujitsu system engineers.
- /tmp/fjqssinstaller.log

ERROR: The installation of following package(s) failed. <PackageName>

Description

The installation of <PackageName> failed. You may have tried to install in the kernel version of OS not supported.

Workaround

Please confirm whether there is required patch of PRIMECLUSTER corresponding to the kernel version of OS. If the patch is existing, please apply the patch and execute "rpm -V --nodigest --nofiles --noscripts --nosignature <PackageName >" afterwards. When nothing is output, it means the execution of the CLI installer succeeded. Please perform the subsequent procedure.
If the above action fails to solve the problem, put down the message then contact your Fujitsu system engineers.

A.2 When segmentation violation causes an installation failure

If segmentation violation is due to the rpm(8) command, take the following corrective steps. If the problem still remains unresolved, contact Fujitsu customer support engineers.

1. Reboot the system by executing the shutdown(8) command.

```
# shutdown -r now <Return>
```

2. Delete PRIMECLUSTER from the system according to "4.2 Uninstallation".

3. Execute the following command.

```
# rpm --rebuilddb <Return>
```

4. Install PRIMECLUSTER again.

Appendix B Necessary OS packages to be installed

When operating this software on Red Hat Enterprise Linux, in addition to the packages that are installed with a minimum OS option installation, the following packages are used.

B.1 For Red Hat Enterprise Linux 6 (for x86)

Package	Architecture
OpenIPMI	i686
OpenIPMI-libs	i686
alsa-lib	i686
at	i686
autoconf	noarch
bc	i686
bind	i686
bind-utils	i686
compat-libstdc++-33	i686
cpp	i686
crash	i686
cvs	i686
dhcp	i686
docbook-utils	noarch
dump	i686
ebtables	i686
ed	i686
eject	i686
fontconfig	i686
freetype	i686
ftp	i686
gcc	i686
gdb	i686
ghostscript	i686
graphviz	i686
hdparm	i686
httpd	i686
httpd-tools	i686
indent	i686
ipmitool	i686
iw	i686
kernel-devel	i686
kernel-headers	i686

Package	Architecture
kexec-tools	i686
libICE	i686
libSM	i686
libX11	i686
libXau	i686
libXext	i686
libXft	i686
libXi	i686
libXmu	i686
libXp	i686
libXrender	i686
libXt	i686
libXtst	i686
libjpeg/libjpeg-turbo(*1)	i686
libpng	i686
libproxy-bin	i686
libreport	i686
libvirt-client	i686
libxcb	i686
lsof	i686
lvm2	i686
make	i686
man	i686
mlocate	i686
mod_wsgi	i686
mt-st	i686
mtools	i686
mtr	i686
mysql-server	i686
nc	i686
net-snmp	i686
net-snmp-utils	i686
nfs-utils	i686
ntp	i686
openmotif	i686
openmotif22	i686
opensp	i686
openssh-clients	i686
openssl098e	i686

Package	Architecture
parted	i686
patch	i686
pciutils	i686
perl	i686
perl-libwww-perl	noarch
pinfo	i686
prelink	i686
procmail	i686
psacct	i686
quota	i686
rpcbind	i686
rsh	i686
samba-common	i686
setuptool	i686
strace	i686
subversion	i686
sysstat	i686
tcpdump	i686
telnet	i686
time	i686
tree	i686
vconfig	i686
vim-common	i686
xinetd	i686
xorg-x11-apps	i686
xorg-x11-server-Xorg	i686
xorg-x11-server-utils	i686
xterm	i686
xz	i686
zip	i686

(*1) For Red Hat Enterprise Linux 6.3 or earlier, use the libjpeg package.
For Red Hat Enterprise Linux 6.4 or later, use the libjpeg-turbo package.

B.2 For Red Hat Enterprise Linux 6 (for Intel64)

Package	Architecture
OpenIPMI	x86_64
OpenIPMI-libs	x86_64
PyQt4	x86_64
PyQt4-devel	i686

Package	Architecture
PyQt4-devel	x86_64
alsa-lib	i686
alsa-lib	x86_64
at	x86_64
audit-libs	i686
autoconf	noarch
bc	x86_64
bind	x86_64
bind-utils	x86_64
compat-libstdc++-33	i686
compat-libstdc++-33	x86_64
cpp	x86_64
crash	x86_64
cvs	x86_64
device-mapper	x86_64
dhcp	x86_64
docbook-utils	noarch
dump	x86_64
ebtables	x86_64
ed	x86_64
eject	x86_64
fontconfig	i686
fontconfig	x86_64
freetype	x86_64
gcc	x86_64
gdb	x86_64
ghostscript	x86_64
glibc	i686
hdparm	x86_64
httpd	x86_64
indent	x86_64
ipmitool	x86_64
iscsi-initiator-utils	x86_64
kernel-devel	x86_64
kernel-headers	x86_64
kexec-tools	x86_64
libICE	x86_64
libSM	x86_64
libX11	i686

Package	Architecture
libX11	x86_64
libXau	i686
libXau	x86_64
libXext	i686
libXext	x86_64
libXft	x86_64
libXi	i686
libXi	x86_64
libXmu	x86_64
libXp	x86_64
libXrender	x86_64
libXt	x86_64
libXtst	i686
libXtst	x86_64
libgcc	i686
libjpeg/libjpeg-turbo(*1)	x86_64
libpng	x86_64
libstdc++	i686
libvirt-client	x86_64
libxcb	x86_64
lsof	x86_64
lvm2	x86_64
make	x86_64
man	x86_64
mlocate	x86_64
mt-st	x86_64
mtools	x86_64
mtr	x86_64
nc	x86_64
net-snmp	x86_64
net-snmp-utils	x86_64
nfs-utils	x86_64
ntp	x86_64
openmotif	x86_64
openmotif22	x86_64
opensp	i686
openssh-clients	x86_64
openssl098e	x86_64
parted	x86_64

Package	Architecture
patch	x86_64
pciutils	x86_64
perl	x86_64
perl-libwww-perl	noarch
pinfo	x86_64
prelink	x86_64
psacct	x86_64
quota	x86_64
rpcbind	x86_64
rsh	x86_64
ruby	x86_64
samba-common	x86_64
scsi-target-utils	x86_64
setuptool	x86_64
strace	x86_64
subversion	x86_64
sysstat	x86_64
tcpdump	x86_64
time	x86_64
tree	x86_64
vconfig	x86_64
xinetd	x86_64
xorg-x11-apps	x86_64
xorg-x11-server-utils	x86_64
xterm	x86_64
zip	x86_64

(*1) For Red Hat Enterprise Linux 6.3 or earlier, use the libjpeg package.
For Red Hat Enterprise Linux 6.4 or later, use the libjpeg-turbo package.

B.3 For Red Hat Enterprise Linux 7 (for Intel64)

Package	Architecture
ImageMagick	x86_64
OpenIPMI	x86_64
OpenIPMI-libs	x86_64
PyQt4-devel	x86_64
alsa-lib	i686
at	x86_64
audit-libs	i686
autoconf	noarch

Package	Architecture
bc	x86_64
bind	x86_64
bind-utils	x86_64
cpp	x86_64
crash	x86_64
device-mapper-multipath	x86_64
dialog	x86_64
docbook-utils	noarch
ed	x86_64
efibootmgr	x86_64
fontconfig	i686
fontconfig	x86_64
gcc	x86_64
gdb	x86_64
ghostscript	x86_64
glibc	i686
graphviz	x86_64
httpd	x86_64
httpd-tools	x86_64
indent	x86_64
ipmitool	x86_64
iscsi-initiator-utils	x86_64
iw	x86_64
kernel-devel	x86_64
kernel-headers	x86_64
libICE	x86_64
libSM	x86_64
libX11	i686
libX11	x86_64
libXau	i686
libXau	x86_64
libXext	i686
libXext	x86_64
libXft	x86_64
libXi	i686
libXi	x86_64
libXmu	x86_64
libXp	x86_64
libXrender	x86_64

Package	Architecture
libXt	x86_64
libXtst	i686
libXtst	x86_64
libgcc	i686
libjpeg-turbo	x86_64
libpng	x86_64
libreport	x86_64
libstdc++	i686
libvirt-client	x86_64
libxcb	x86_64
lsof	x86_64
m4	x86_64
mlocate	x86_64
motif	x86_64
motif-devel	x86_64
mt-st	x86_64
mtools	x86_64
mtr	x86_64
net-snmp	x86_64
net-snmp-utils	x86_64
nfs-utils	x86_64
ntp	x86_64
opensp	i686
pam-devel	x86_64
patch	x86_64
pciutils	x86_64
perl	x86_64
perl-libwww-perl	noarch
pinfo	x86_64
prelink	x86_64
psacct	x86_64
psmisc	x86_64
quota	x86_64
rpcbind	x86_64
ruby	x86_64
samba-common	x86_64/noarch(*1)
setuptool	x86_64
strace	x86_64
subversion	x86_64

Package	Architecture
sysstat	x86_64
targetcli	noarch
tcpdump	x86_64
time	x86_64
xorg-x11-server-utils	x86_64
xterm	x86_64

(*1) For Red Hat Enterprise Linux 7.1 or earlier, use x86_64.
For Red Hat Enterprise Linux 7.2 or later, use noarch.