sgi

SGI ProPack™ 7 for Linux® Start Here

Record of Revision

Version	Description
001	April 2010 Original publication.

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About This Guide

> **Note:** SGI ProPack 7 for Linux requires the SGI Foundation Software 2 release. For more information, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

This guide provides information about the SGI ProPack 7 for Linux release. It is divided into the following chapters:

- Chapter 1, "Release Features," describes the major features of this release, the CD contents, SGI Open Source software, SGI system controller software, and documentation information.

- Chapter 2, "Software Planning and Installation," describes the flowcharts of disk partitions and file configurations and layouts that you need to get started and provides instructions for installing SGI ProPack for Linux.

- Chapter 3, "Product Support," documents the product components that are supported on SGI Altix systems.

Online versions of this document, the SGI ProPack 7 release notes, which contain the latest information about software and documentation in this release, the list of RPMs distributed with SGI ProPack 7, can be found in the /docs directory on the on the SGI ProPack 7 for Linux CD.

This Preface covers the following topics:

- "Helpful Online Resources" on page xiv
- "Novell Documentation" on page xvi
- "Intel Compiler Documentation" on page xvii
- "Other Intel Documentation" on page xvii
- "SGI Documentation" on page xvii
- "Obtaining SGI Publications" on page xxiv

Helpful Online Resources

This section describes the electronic support services available for your SGI system running SGI ProPack 7, as follows:

- Supportfolio

  Supportfolio, the SGI support web site, including the SGI Knowledgebase, SGI YaST Online Update (YOU) server, SUSE YaST Online Server, links for software supports and updates, as described in this listing.

  https://support.sgi.com/login

- Supportfolio SGI Knowledgebase

  The SGI Knowledgebase available from Supportfolio has answers to common questions, problem resolutions, how-to documents, and many other useful articles for system administrators.

  https://support.sgi.com/kb/publisher.asp

- SGI YaST Online Update Server

  The SGI YaST Online Update (YOU) server is available for your convenience. Get updates to SGI ProPack 7 for Linux release using the YaST install tool right from your system. The *YaST Online Update - Patch Media Instructions* describes how to update your system using patch media. Use your Supportfolio account name and password, and point YaST to this location:

  https://update.sgi.com/

- Supportfolio Software Updates

  Check for new updates to your purchased SGI software, and download or order CDs all in one convenient place. Supportfolio Software Updates provides one-stop shopping to check for and get new updates for your SGI software.

  https://support.sgi.com/software?cmd=order

- SGI Customer Support Center

  You can open calls to the SGI Customer Support Center online, keep track of all your cases, and receive automatic update information when your case is updated via the Supportfolio Problem Resolution Tools at:

  https://support.sgi.com/caselist

- SGI Software Licensing

  If you need to get your license for SGI software, you can order your software licenses conveniently via e-mail or online.

  You can send a blank e-mail to license@sgi.com, and you will receive a simple template to fill out. You will quickly receive your new license back with complete instructions for installing it back via e-mail.

  Or, you can go online to the SGI Key-O-Matic at:

  http://www.sgi.com/support/licensing/

Related Publications

Documents listed in this section contain additional information that might be helpful, as follows:

- "Novell Documentation" on page xvi
- "Intel Compiler Documentation" on page xvii
- "Other Intel Documentation" on page xvii
- "SGI Documentation" on page xvii

Novell Documentation

This section describes documentation for SUSE Linux Enterprise Server 11 available from Novell.

Documentation for SUSE Linux Enterprise Server 11 is located on your system in the `/docu/en` directory.

Note: Novell makes SUSE Linux Enterprise Server 11 documentation available online at: http://www.novell.com/documentation/

The following SLES11 documentation is available:

- *SUSE Linux Enterprise Server 11 Installation Quick Start* (`installquick.pdf`)
- *SUSE Linux Enterprise Server 11 Deployment Guide* (`deployment.pdf`)
- *SUSE Linux Enterprise Server 11 Administration Guide (*`admin.pdf`*)*
- *SUSE Linux Enterprise Server SLES11: Storage Administration Guide* (`storage.pdf`)
- *SUSE Linux Enterprise Server 11 Package Descriptions* available online at: http://www.novell.com/products/linuxenterpriseserver/packages.html

Intel Compiler Documentation

Documentation for the Intel compilers is located on your system in the `/docs` directory of the directory tree where your compilers are installed. If you have installed the Intel compilers, the following documentation is available:

* *Intel C++ Compiler User's Guide* (`c_ug_lnx.pdf`).

* *Intel Fortran Compiler User's Guide* (`for_ug_lnx.pdf`).

* *Intel Fortran Programmer's Reference* (`for_prg.pdf`).

* *Intel Fortran Libraries Reference* (`for_lib.pdf`).

Other Intel Documentation

The following references describe the Itanium (previously called "IA-64") architecture and other topics of interest:

* *Intel Itanium 2 Processor Reference Manual for Software Development and Optimization*, available online at
  http://developer.intel.com/design/itanium2/manuals/251110.htm.

* *Intel Itanium Architecture Software Developer's Manual,* available online at
  http://developer.intel.com/design/itanium/manuals/iiasdmanual.htm.

* *Introduction to Itanium Architecture,* available online at
  http://shale.intel.com/softwarecollege/CourseDetails.asp?courseID=13
  (secure channel required).

* Intel Xeon processor documentation is available at
  http://www.intel.com/support/processors/sb/CS-029807.htm

SGI Documentation

This section describes SGI documentation and covers these topics:

* "SGI ProPack Manuals" on page xviii

* "Additional SGI Software Manuals" on page xix

* "SGI Hardware Manuals" on page xx

> **Note:** Online and postscript versions of SGI documentation is available at SGI Technical Publications Library at http://docs.sgi.com.

SGI ProPack Manuals

- *SGI ProPack 7 for Linux Release Notes*
  Provides the latest information about software and documentation in this release. The release notes are on the SGI ProPack for Linux CD in the `root` directory, in a file named `README.TXT`.

- *Porting IRIX Applications to SGI Altix Platforms: SGI ProPack for Linux*
  Provides information about porting an application to the SGI Altix platform.

- *Message Passing Toolkit (MPT) User's Guide*
  Describes industry-standard message passing protocol optimized for SGI computers.

- *REACT Real-Time for Linux Programmer's Guide*
  Describes the facilities of REACT real-time for Linux that supports real-time programs.

- *Performance Co-Pilot Linux User's and Administrator's Guide*
  Describes the Performance Co-Pilot (PCP) software package of advanced performance tools for SGI systems running the Linux operating system.

- *Unified Parallel C (UPC) User's Guide*
  Documents the SGI implementation of the Unified Parallel C (UPC) parallel extension to the C programming language standard.

- *Linux Resource Administration Guide*
  Provides a reference for people who manage the operation of SGI Altix servers and contains information needed in the administration of various system resource management features such as Comprehensive System Accounting (CSA), Array Services, CPU memory sets and scheduling, and the Cpuset System.

- *Linux Application Tuning Guide*
  Provides information about tuning application programs on SGI Altix systems. Application programs include Fortran and C programs written on SGI Linux systems with the compilers provided by Intel.

Additional SGI Software Manuals

- *SGI Foundation Software 2 Start Here*
  Provides information about the SGI Foundation Software 2 release that supports SGI differentiated server solutions.

- *SGI Tempo System Administrator's Guide*
  Describes how to perform general system installation, configuration, and operations on the SGI Altix ICE series systems.

- *Embedded Support Partner User Guide*
  Provides information about using the Embedded Support Partner (ESP) software suite to monitor events, set up proactive notification, and generate reports. This revision of the document describes ESP version 3.0, which is the first version of ESP that supports the Linux operating system.

- *Event Manager User Guide*
  Provides information about the Event Manger application that collects event information from other applications. This document describes the Event Manager application, the application programming interface that you can use to access it, the procedures that you can use to communicate with it from another application, and the commands that you can use to control it.

- *XFS for Linux Administration*
  Describes XFS, an open-source, fast recovery, journaling filesystem that provides direct I/O support, space preallocation, access control lists, quotas, and other commercial file system features.

- *XVM Volume Manager Administrator's Guide*
  Describes the configuration and administration of XVM logical volumes using the XVM Volume Manager.

- *CXFS 5 Administration Guide for SGI InfiniteStorage*
  Documents CXFS running on a storage area network (SAN). CXFS is clustered XFS, a parallel-access shared clustered filesystem for high-performance computing environments.

- *CXFS 5 Client-Only Guide for SGI InfiniteStorage*
  Provides an overview of the installation and configuration procedures for CXFS client-only nodes running SGI CXFS clustered filesystems.

- *Guaranteed-Rate I/O Version 2 Guide*
  Provides information about GRIO version 2, the second-generation guaranteed-rate I/O product from SGI.

- *SGI InfiniteStorage High Availability Using Linux-HA Heartbeat*

Provides information about the high-availability (HA) resource agents provided for the Linux-HA Heartbeat product in order to support SGI products

* *DMF 4 Administrator's Guide for SGI InfiniteStorage*
  Describes how to perform administration of the Data Migration Facility (DMF). DMF is a hierarchical storage management system for SGI environments. Its primary purpose is to preserve the economic value of storage media and stored data. This manual describes DMF components, features, and architecture; it focuses on the tasks of configuration and ongoing administrative duties.

* *SGI InfiniteStorage Appliance Manager User's Guide*
  Describes the operation of SGI InfiniteStorage Appliance Manager, which is a web-based interface that lets you configure, manage, and monitor a storage server.

* *SGIconsole 2.1 Start Here*
  Provides an introduction to SGIconsole and information about setting up and configuring SGIconsole hardware and software.

* *Console Manager for SGIconsole Administrator's Guide*
  Provides information about the Console Manager software graphical interface allows you to control multiple SGI servers, SGI partitioned systems, and large single-system image servers.

* *SGI L1 and L2 Controller Software User's Guide*
  Describes how to use the L1 and L2 controller commands at your system console to monitor and manage SGI Altix 350 systems, the SGI Altix 3000 and SGI Altix 4000 family of servers and superclusters.

* *Platform Manager On SGI Altix ICE Systems Quick Reference Guide*
  Describes how to use Platform Manager management software to perform general system discovery, installation, configuration, and operations on SGI Altix ICE 8200 series systems.

SGI Hardware Manuals

* *SGI Altix ICE 8200 Series System Hardware User's Guide*
  Describes the features of the SGI Altix ICE 8200 series systems and provides operating instructions and general troubleshooting information.

* *SGI Altix ICE 8400 Series System Hardware User's Guide*
  Describes the features of the SGI Altix ICE 8400 series systems and provides operating instructions and general troubleshooting information.

* *SGI Altix XE210 System User's Guide*

Describes the features of the Altix XE210 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE240 System User's Guide*
  Describes the features of the Altix XE240 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE250 System User's Guide*
  Describes the features of the Altix XE250 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE270 System User's Guide*
  Describes the features of the Altix XE270 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE310 System User's Guide*
  Describes the features of the Altix XE310 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE320 System User's Guide*
  Describes the features of the Altix XE320 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE340 System User's Guide*
  Describes the features of the Altix XE340 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE500 System User's Guide*
  Describes the features of the Altix XE500 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE Clusters Quick Reference Guide*
  Provides an overview of some of the common operations that system administrators may have to perform to set-up, boot, re-configure (upgrade) or troubleshoot an SGI Altix XE cluster.

- *SGI Altix 330 System User's Guide*
  Provides an overview of the Altix 330 system components, and it describes how to set up and operate this system

- *SGI Altix 350 System User's Guide*
  Provides an overview of the Altix 350 system components, and it describes how to set up and operate this system.

- *SGI Altix 350 Quick Start Guide*
  Guides a knowledgeable user through the installation, setup, and simple configuration of most SGI Altix 350 systems.

- *SGI Altix 3000 User's Guide*
  Provides an overview of the architecture and describes the major components of the SGI Altix 3000 family of servers and superclusters. It also describes the standard procedures for powering up and powering down the system, provides basic troubleshooting information, and includes important safety and regulatory specifications.

- *SGI Altix 3700Bx2 User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Altix 3700Bx2 family of servers. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI Altix 450 System User's Guide*
  Provides an overview of the Altix 450 system components, and it describes how to set up and operate this system.

- *SGI Altix 4700 User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Altix 4700 family of servers. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI C1103-TY12 System User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI C1103-TY12 system. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI Octane III Workstation System User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Octane III workstation. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI Octane III Deskside Cluster Server User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Octane III Deskside Cluster server. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI CloudRack X2 System User's Guide*
  This guide provides an overview of the SGI CloudRack X2 workgroup cluster server's architecture and descriptions of the major components. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI Altix UV 10 System User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Altix UV 10 system. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

Obtaining SGI Publications

You can obtain SGI documentation in the following ways:

- See the SGI Technical Publications Library at http://docs.sgi.com. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.

- You can view man pages by typing `man` <*title*> on a command line.

Conventions

The following conventions are used throughout this publication:

Convention	Meaning
`command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	Italic typeface denotes variable entries and words or concepts being defined.
`user input`	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. (Output is shown in nonbold, fixed-space font.)
`manpage(`*x*`)`	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address:

  techpubs@sgi.com

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.

- Send mail to the following address:

  Technical Publications
  SGI
  46600 Landing Parkway
  Fremont, CA 94538

SGI values your comments and will respond to them promptly.

Release Features

This chapter provides an introduction to SGI ProPack 7 for Linux and describes the CD contents, provides documentation information, and provides a brief overview of the installation process. It covers the following topics:

- "Software Introduction" on page 1

- "CD Contents" on page 2

- "System Controller Software 1.24 CD" on page 4

- "Getting Updates" on page 4

- "SGI Open Source Information" on page 5

- "Installation Overview" on page 6

- "Documentation Updated for This Release" on page 6

Note: SGI ProPack 7 for Linux requires the SGI Foundation Software 2 release. For more information, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

Software Introduction

The SGI ProPack 7 for Linux product includes capabilities and performance improvements ideal for enabling technical and creative users to solve their big compute and data problems by using the Linux operating system and Intel processors. This product adds to or enhances features in the base SUSE Linux Enterprise Server 11 distribution. SGI ProPack 7 designed to run on any SGI Altix, SGI Altix XE, or SGI Alitx ICE system.

SGI hardware platforms and OS configuration settings supported by SGI in this release are documented at the following URL:

http://www.sgi.com/servers/altix/

CD Contents

This section describes the main contents of the SGI ProPack 7 for Linux CD, as follows:

- Array Session Module

- Linux Comprehensive System Accounting (CSA)

- Linux jobs (Commands, init scripts, libraries and PAM module)

- LSI Fusion-MPT host adapter management utility

- NUMA tools to manage CPU placement of processes (`bcfree`, `dplace`, `dlook` utilities)

- Performance Co-Pilot, system-level performance monitoring and performance management tool

- SGI ProPack configuration recommendations

- Flexible File I/O (FFIO) system

- Cpuset Facility workload manager tool

- Performance Co-Pilot visualization tools (`pcp-sgi` package, the SGI proprietary part of Performance Co-Pilot)

- Intel Compiler runtime libraries

- Array Services

- Message-Passing Toolkit (MPT)

- XVM Command line tools and graphical user interface (GUI) SLES only

- SGI ProPack documentation

- REACT Real-time for Linux libraries and documentation

- libarena: Custom memory allocator interface

Note: Not all SGI ProPack 7 features are available on x86_64 systems. For the list of supported products on the x86_64 architecture, see "SGI ProPack 7 for Linux Products" on page 31.

The Scientific Computing Software Library (SCSL) software is no longer delivered with the SGI ProPack release. SCSL continues to be available via web release in courtesy

mode. Login to Supportfolio Online at http://support.sgi.com. Click on the Downloads link under Supportfolio areas on the left. Enter `scsl` in the **Enter a Product type or keywords** search box and then select `Linux OS` in the **Select the download type** list.

Software Package License Information

SGI ProPack contains software packages released under a variety of licenses. The licensing terms for all proprietary software packages allow users to install the software only on SGI systems. See the `PACKAGE_LICENSES.txt` file that is available in the `/docs` directory of the SGI ProPack 7for Linux CD for more details.

SGI ProPack 7 for Linux CDs

The following CDs ship with each SGI ProPack 7 for Linux release:

- SGI ProPack 7 for Linux for Intel Itanium CD
- SGI ProPack 7 for Linux for AMD64/EM64T CD

Release Information, Documentation, and Release Notes

For a complete list of RPMs included in the SGI ProPack 7 release, see the file called `RPMS.txt` that is available in the `/docs` directory on the SGI ProPack 7 for Linux CD.

For the latest information about software and documentation in this release, see the release notes that are in a file named `README.TXT` that is available in `/docs` directory on the SGI ProPack 7 CD.

The SGI ProPack 7 for Linux release notes get installed to the following location on a system running SGI ProPack 7:

`/usr/share/doc/packages/sgi-propack-7/README.txt`

System Controller Software 1.24 CD

The System Controller software provides a system control platform for field service and system maintenance applications. For information on the system controller software, see the *SGI Foundation Software 2 Start Here.*

Getting Updates

This section describes how to get software updates for SGI ProPack 7 for Linux system and covers these topics:

- "SLES 11 Updates" on page 4
- "SGI Foundaton 2 Updates" on page 5

Detailed instructions for downloading and installing SGI ProPack 7 for Linux updates are available from the SGI ProPack 7 product pages on Supportfolio: https://support.sgi.com/.

Note: You must have a Supportfolio account to access this page and the SGI update server.

SLES 11 Updates

SLES11 customers are encouraged to use the YaST Online Update tool to keep the software on their systems updated with the latest maintenance fixes.

Software updates for SLES11 are provided by Novell. In order to configure your system to enable online updates, you must register with Novell. For more help with this, you can use the **Novell Customer Center Configuration** tool available in the Software section of the YaST Control Center.

Customers that received SGI ProPack 7 pre-installed on their new SGI Altix system may run the following command as **root user** to add the proper update source for SGI ProPack 7:

```
$ /usr/sbin/sgi-propack-update-source
```

This script will prompt you for your Supportfolio login and then add the proper SGI update source for the given architecture.

For additional information on how to configure YaST Online Update to download updates for SGI ProPack 7, login to Supportfolio at http://support.sgi.com. Click on the **Browse Collections** link on the left. Click on **SGI ProPack** "SGI ProPack patch downloads and descriptions" on the right. Click on **Supported Major Releases / Service Packs**. Find **SGI ProPack™ 7 for Linux®** under the **Description** column. Click on the button under the **File** column. The **SGI ProPack™ 7 for Linux®** page appears.

SGI Foundaton 2 Updates

Customers that received SGI Foundation Software 2 pre-installed on their new SGI Altix system may run the following command as **root user** to add the proper update source for SGI Foundation Software 2:

```
$ /usr/sbin/sgi-foundation-update-source
```

This script will prompt you for your Supportfolio login and then add the proper SGI update source for the given architecture.

For additional information on how to configure YaST Online Update to download updates for SGI ProPack 7, login to Supportfolio at http://support.sgi.com. Click on the **Browse Collections** link on the left. Click on **SGI ProPack** "SGI ProPack patch downloads and descriptions" on the right. Click on **Supported Major Releases / Service Packs**. Click on **SGI® Foundation Software 2** on the right. The **SGI® Foundation Software 2** page appears.

SGI Open Source Information

SGI maintains the following website for open source information that describes projects related to its open source efforts:

> http://oss.sgi.com

You can also access open source information (such as LKCD) from the following website:

> http://sourceforge.net

Installation Overview

SGI ProPack 7 for Linux will most likely come pre-installed on your SGI platform. Installation is described in Chapter 2, "Software Planning and Installation".

This release also supports installing your Linux software over the network as described in "SLES and SGI ProPack Network Installation for Experts" on page 24.

Documentation Updated for This Release

The following manuals are new or have been updated for this release:

- *Message Passing Toolkit (MPT) User's Guide*

    - Updated MPI 2.0 standard compliance information in Chapter 1, "Introduction".

    - Updated release information in Chapter 2, "Administrating MPT".

    - Corrected --relocate option example in "Installing MPT Software in an Alternate Location" in Chapter 2.

    - Revised information in "Using MPI Collective Communication Routines" in Chapter 4.

    - Added information about the SGI Perfboost wrapper library in Chapter 6, "PerfBoost".

    - Combined the contents of the prior Chapter 6, "Profiling MPI Applications" into Chapter 8, "MPI Performance Profiling".

- *REACT Real-Time for Linux Programmer's Guide, 007-4746-012*

    - Added support for SGI ProPack 7 and SLES 11

    - Clarified "Physical Interfaces" section in Chapter 3

    - Added support for the `react`(8) command and the `react-utils` package. See Chapter 9, "REACT System Configuration".

        This includes the removal of `libsgirt` and the addition of `libreact`. The `sgi-shield` functionality has moved from `libsgirt` to `libreact`, so you must now link with `libreact` instead.

As a transition, the `reactconf.pl` command and the `react-configuration` package still exist; if you use `reactconf.pl`, it sends the appropriate information to the `react` command. Information about `reactconf.pl` is provided in Appendix E, "`reactconf.pl` Reference (Deprecated)".

- *SGI Tempo System Administrator's Guide, 007-4993-011*

  Updated for the SGI Tempo v2.0 release.

  – Added information for the SGI Altix ICE 8400 series systems in "InfiniBand Fabric" in Chapter 1.

  – Added information for the SGI Altix ICE 8400 series systems in "InfiniBand Fabric Overview" in Chapter 4.

  – Updated migration information in "Migrating to a Cold Spare: Booting for the First Time on the Migrated Node" in Chapter 5.

  – Added a new section called "Migrating to a Cold Spare: Advanced Details on the Auto Recovery Mode" in Chapter 5.

  – Updated information on how to turn off the `temperature.pmie` value in "Turning Off the `temperature.pmie` Value" in Chapter 5.

  – Added a new section called "Adjusting `temperature.pmie` Values" in Chapter 5.

- *Unified Parallel C (UPC) User's Guide, 007-5604-001*

  New for this release, documents the SGI implementation of the Unified Parallel C (UPC) parallel extension to the C programming language standard.

- *SGI Foundation Software 2 Start Here*, 007-5641-001

  Not part of the SGI ProPack release but required for all systems running SGI ProPack 7 for Linux release.

Software Planning and Installation

Note: SGI ProPack 7 for Linux **requires** the SGI Foundation Software 2 release. For more information, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

This chapter describes the planning that you need to do to get started and provides instructions for installing SGI ProPack 7.

Your SGI Altix system comes with a base Linux distribution of SUSE Linux Enterprise Server 11 (SLES11) and the SGI ProPack 7 for Linux software preinstalled. This chapter describes how to install the software from the CD if it should ever become necessary to reinstall it.

Note: For information on how to install, configure, and operate or update software on an SGI Altix ICE series system, see the *SGI Tempo System Administrator's Guide* available at http://docs.sgi.com.

For security reasons, Linux requires a root password for login. The default password for your preinstalled software is sgisgi. After you have logged in, change this root password to a string of your own choice.

The SGI ProPack7 for Linux software works only with the SLES 11 environment. Earlier versions of these distributions, or any other distributions, are not compatible with SGI ProPack 7 for Linux software.

Before you install or configure your system, please read Chapter 1, "Release Features" so that you understand the features of SGI ProPack 7 software. You might also want to familiarize yourself with some or all of the documentation listed in "Related Publications" on page xvi.

This chapter covers the following topics:

- "Software Planning" on page 10
- "License Manager Updates" on page 14
- "Read Me First - Installing the Base Operating System" on page 15
- "Installing SLES11 and SGI ProPack 7" on page 17
- "SLES and SGI ProPack Network Installation for Experts" on page 24
- "Upgrading to SGI ProPack 7 with SLES11" on page 26

Software Planning

This section provides disk and file information you need to have about the software that has been shipped to you and covers the following topics:

- "Table of Disk Partitions" on page 10
- "Systems with Multiple Ethernet Configurations" on page 11
- "XVM Volumes Access in Rescue Mode" on page 11
- "Adding the xfs_quota Variable to the initrd Boot Image" on page 12
- "SLES11 Kernels" on page 12
- "Linux Kernel Crash Dump" on page 12
- "Latest PROM Firmware" on page 13
- "Getting the Latest Firmware/Software for Your SGI Altix XE System" on page 14

Table of Disk Partitions

SGI ships Altix systems with Itanium processors from the factory running SGI ProPack 7 with SLES11 with the partition layout as shown in Table 2-1

Table 2-1   Disk Partitions for Itanium Systems with SGI ProPack 7 and SLES11

Partition	Type	Mount Point	Size
part1	VFAT	/boot/efi	500 MB
part2	XFS	/	100 GB

Table 2-1   Disk Partitions for Itanium Systems with SGI ProPack 7 and SLES11

Partition	Type	Mount Point	Size
part3	/swap	/swap	10 GB
part4	XFS	/data1	remainder of disk

SGI ships Altix XE systems with Xeon processors from the factory running SGI ProPack 7 with SLES11 with the partition layout shown in Table 2-2.

Table 2-2   Disk Partitions for x86_x64 Systems with SGI ProPack 7 and SLES11

Partition	Type	Mount Point	Size
part1	ext3	/boot	100 GB
part2	XFS	/	100 GB
part3	SWAP	/swap	10 GB
part4			remainder of disk with filesystem mounted as /data1

Systems with Multiple Ethernet Configurations

When doing a network installation on a system with multiple Ethernet interfaces, there is no guarantee about initial interface names. The first interface discovered will be named "eth0", and so on. This can make network installations confusing. If this is a problem, a workaround is to remove the Ethernet cards that are **not** being used to install software over the network. Once the installation is complete, the Ethernet cards can be reinstalled. A persistent naming mechanism ensures that an interface, once named, retains its name across system reboots.

XVM Volumes Access in Rescue Mode

You cannot access XVM Volumes in Rescue Mode on SGI ProPack 7 systems. It is possible to boot into rescue mode from the SLES 11 DVD, but that DVD does not contain the xvm kernel module. This makes it is impossible to perform maintenance on XVM volumes

from rescue mode at this time. SGI recommends that you do not migrate any system directories to XVM since there is no way to access them from rescue mode.

Adding the `xfs_quota` **Variable to the** `initrd` **Boot Image**

You need to add `xfs_quota` to the `INITRD_MODULES` variable in the `/etc/sysconfig/kernel` file when `rootflags=quota` is set or the `initrd` boot loader will panic your system at boot time.

SLES11 Kernels

For ia64 systems, SLES11 contains two kernel variants, `kernel-default` and `kernel-debug`. During installation, if you do not explicitly select to install `kernel-debug`, your SGI Altix system will boot with the `kernel-default` variant after installation. Both the `kdb/lkcd` and `kexec/kdump` crash dump facilities are compatible with this default kernel.

For x86_64 systems, SLES11 contains `kernel-default` and `kernel-xen`. The `kernel-default` variant provides multi-processor support.

Linux Kernel Crash Dump

The two methods for getting crash dumps are, as follows:

- `kdb/lkcd` for SLES11 on Altix 4000 series systems
- `kexec/kdump` for SLES11 on Altix XE and Altix ICE systems

This section describes these two methods.

LKCD Crash Dump Facility

In the event of a system crash on SGI Altix 3000 and 4000 series systems running SGI ProPack 7, the Linux Kernel Crash Dump (LKCD) facility will save a crash dump that will appear in the `/var/log/dump` directory after your system reboots. SGI support personnel can analyze this file to determine the cause of the system crash.

If you wish to save crash dumps to a different location, edit the DUMPDIR variable in
/etc/sysconfig/dump and then run the following command: lkcd config.

Note: Depending on which kernel you have installed, the system may enter the KDB
kernel debugger after a crash. If a **kdb**> prompt appears on the console, type **sr d** to
initiate a crash dump.

---

kexec/kdump **Crash Dump Utility**

In the event of a system crash onAltix XE and Altix ICE systems running SGI ProPack 7
running SLES11, the system uses the kexec/kdump crash dump utility. The
kexec/kdump utility creates a Linux kernel crash dump at
/var/crash/*timestamp*/vmcore if kexec/kdump is installed, enabled, and
configured. After SGI ProPack 7 is installed, your system is set up to take dumps when
needed. In order to analyze a crash dump, you need the debuginfo packages installed.
For more information, see the SGI ProPack 7 release notes.

Latest PROM Firmware

Note: This section only applies to ia64 systems. For x86_64 systems, see "Getting the
Latest Firmware/Software for Your SGI Altix XE System" on page 14.

Unless you have the most current PROM, the kernel may fail to boot during the
installation procedure. The PROM version is printed when the system resets in the
PROM banner.

The PROM RPM is now part of the SGI Foundation Software 2 release. For more
information, see the *SGI Foundation Software 2 Start Here*.

Note: SGI Altix 450 or SGI Altix 4700 systems running SGI ProPack 7 for Linux should
use the PROM located in shub2snprom.bin. The System Controller 1.22 release
provides a sys_ctrl-ProPackICE_1.22.tar file that installs onto an SGI Altix ICE
8200 system to service an Altix 450 that provides NAS support. All other SGI systems
should use the PROM located in shub1snprom.bin. This note does **not** apply to SGI

Altix XE systems (instead see "Getting the Latest Firmware/Software for Your SGI Altix XE System" on page 14). Software support contract customers can download the most recent PROM versions from SGI Supportfolio: https://support.sgi.com/

You can determine the PROM level installed on your machine, as follows:

```
% cat /proc/sgi_prominfo/node*/version
5.00
SGI SAL Version 5.00 rel080415 IP41 built 06:31:53 AM Apr 15, 2008
```

On an SGI Altix 4700 system, the output from the version file looks similar to the following:

```
% cat /proc/sgi_prominfo/node*/version
1.40
SGI SAL Version 1.40 rel071217 IP65 built 06:08:32 AM Dec 17, 2007
```

The PROM RPM on the SGI Foundation Software 2 CD contains all of the appropriate flash images for SGI systems running SGI ProPack 7. The flash utility chooses the appropriate image for your machine from this RPM.

Getting the Latest Firmware/Software for Your SGI Altix XE System

For information on the latest firmware for you Altix XE system, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

License Manager Updates

Important: Please backup your license key files prior to installing SLES11 and/or SGI ProPack 7. A license key file is **not** included in these RPMs.

Your original license key files will need to be restored after you complete your installation.

In terms of software licensing support, the USE distributors do not ship any code. ISVs are responsible for obtaining and including software licensing components into their products.

For information on the SGI software licensing mechanism called LK and, new for this release, LK floating licenses facilities, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

Read Me First - Installing the Base Operating System

This section provides an overview of installing SLES 11 on your SGI system.

Note: For information on how to install, configure, and operate software on an SGI Altix ICE 8200 system, see the *SGI Tempo System Administrator's Guide* available at http://docs.sgi.com.

This section provides some information about installing SLES11 on SGI Altix systems. You need to have SLES11 installed before you can install SGI ProPack 7 for Linux.

For installation instructions, see "Installing SLES11 and SGI ProPack 7" on page 17.

In general, the documentation that comes with SUSE applies to installing software on an SGI Altix system. This section provides some notes to get you started, as follows:

Note: Please read all the notes below before attempting installation.

- **Find installation documentation.**

  You can find installation documentation on the SLES11 DVD in the `docu/en` directory. It contains these `.pdf` documentation files:

  `installquick.pdf deployment.pdf admin.pdf storage.pdf`

- **Find and read the SLES11 release notes.**

  It is important to read the SLES11 release notes as well. You will find them in a text file named `RELEASE-NOTES.en.txt` in the `root` directory of the SLES 11 DVD. The YaST installation tool can also get the latest version of the release notes directly from Novell. On the installed system, the latest version of the release notes are at the following location:

`/usr/share/doc/release-notes/SUSE_Linux_Enterprise_Server_11/RELEASE-NOTES.en.html`

- **How to erase everything and start with a clean root drive.**

By default, the YaST installer does **not** allow you to remove older partitions and create a clean root. To do so, you must run the YaST Partitioner in "Expert Mode" The default filesystem type for partitions is `reiserfs`. To create partitions with the XFS filesystem type, manually "Edit" the partition and then select XFS. Boot partitions on SGI Altix 450 or 4000 series systems should always use the FAT filesystem.

- **Find the best installation method for SLES11 for your site.**

There are several different methods to install SLES11. To use the graphical YaST installation, SGI recommends using the `vnc` or `ssh` methods, assuming the SGI system is connected to a network.

Insert the media in the DVD drive and reset the machine. The BIOS on x86_64 systems should already be configured to attempt booting from CD first. The SLES11 media should boot when the system comes back up.

To use this mode on ia64 systems, SGI suggests the **EFI Shell [Built-in]** from the **Boot Maintenance** menu. A list of fs# devices will be presented before you get to the `Shell>` prompt. One from the list, will have the word CDROM in the display. If the fs# associated with the CDROM is 1, enter the following commands:

```
Shell> fs1:
fs1:\> cd efi\boot
```

You are now ready to launch the installer. Issue the following command:

```
fs1:\efi\boot> bootia64
```

You now will see a list of choices including **Installation**, **Installation - Safe Settings**, and so on. Keep the default **Installation** choice highlighted. In the **boot:** prompt, your selection depends on the type of system you are booting.

If you prefer to install using `vnc` or `ssh`, enter **vnc=1** or **usessh=1** in the **Boot:** line.

If you are installing software on an Altix system you need to specify information about the serial console on the boot line. If you wish to use `vnc` or `ssh`, you can supply those options as well. An example boot line specifying the serial console for installation and the use of `vnc` is similar to the following:

For ia64:

```
boot: console=ttySG0,38400n8 vnc=1
```

For x86_64:

If you are using a VGA monitor/keyboard to install, you do not need to supply any options.

If you are using a serial console, the setting depends on how the system is configured. An example is, as follows:

```
boot: console=ttyS1,38400n8 vnc=1
```

Note: If ttyS1 does not work, try ttyS0. The serial cable might be attached to the other serial port

For ia64 systems, if you choose to install over the serial console or an L2 controller with xterm, note that the serial console may not be 100% clean and that you may run into "screen corruption". Often this can be cleared up by entering `Ctrl-L` from the command line, which re-draws the screen. When using xterm, remember to set the encoding to UTF-8. The following command line options have yielded fairly good results:

```
xterm -sb -en UTF-8 -geometry 130x40 -e "cu -s 38400 -l /dev/ttySG0"
```

- **Find out how to perform a network installation.**

  If you plan to set up a system to do network installations, you may find the "Network Install Server Setup" in this document helpful. This section describes how to integrate SGI ProPack 7 with SUSE operating system repositories.

- F**ind information on AutoYaST.**

  For information on AutoYaST, see "Using AutoYaST" on page 25.

Installing SLES11 and SGI ProPack 7

Note: SGI ProPack 7 for Linux **requires** the SGI Foundation Software 2 release. For more information, see the *SGI Foundation Software 2 Start Here* available at http://docs.sgi.com.

To install SUSE Linux Enterprise Server 11 (SLES11) from the DVD media, perform the procedures described in this section.

Note: Before starting a fresh install of SLES11 and SGI ProPack 7 over the existing operating system, it is a good idea to remove the production root drive from your system. Perform the fresh install over the operating system on your backup root drive. This provides a fall back route to your previous operating system, in case of application compatibility issues.

Installation Overview

For SLES11, see the see the *USE Linux Enterprise Server 11 Installation Quick Start* (`installquick.pdf`) in the the `/docu/en` directory and proceed to "Installation Procedure for SLES11" on page 18.

How to Determine if a YaST Session is Hung During Installation

If you suspect that a YaST session is hung during installation of SGI software products, run the following command and check the time stamps of the latest log entries against the system time:

```
$ tail -n3 /var/log/YaST2/y2log
   2009-03-25 09:04:00 <0> ia64sys2(3655) [solver]
Resolver.cc(show_pool):1069
2367: U_Ts_[S1:1][package]mysql-shared-5.0.26-12.18.ia64
   2009-03-25 09:04:00 <0> ia64sys2(3655) [solver]
Resolver.cc(show_pool):1069
2949: U_Ts_[S1:1][package]sysstat-8.0.4-1.4.ia64
   2009-03-25 09:04:00 <1> ia64sys2(3655) [qt-ui]
YQUI_builtins.cc(runPkgSelection):92 Running package selection...
```

As YaST works, it logs time stamped messages into the `y2log` file. Comparing the time stamp of the last logged action against current system time can help provide additional data upon which you may base a decision concerning whether a YaST session is still actively running or not.

Installation Procedure for SLES11

Documentation for SUSE Linux Enterprise Server 11 is located on your system in the `/docu/en` directory.

> **Note:** For an overview of SLES11 installation, see the *SUSE Linux Enterprise Server 11 Installation Quick Start* (`installquick.pdf`). This document provides a quick overview of how to run through the default installation of SLES walking you through a number of installation screens. For detailed installation instructions, see the *SUSE Linux Enterprise Server 11 Deployment Guide* (`deployment.pdf`).

There are a number of ways to install SGI ProPack 7 on top of the SUSE Linux Enterprise Server 11 (SLES11) operating system. One method is to install it at the same time as you install SLES11. Another method is to install SGI ProPack 7 after SLES11 has been completely installed. The two procedures are quite similar and are described in this section, as follows:

- "Install SLES11 and SGI ProPack 7 Together" on page 19
- "Install SGI ProPack 7 on a Previously Installed SLES11 System" on page 23

Install SLES11 and SGI ProPack 7 Together

To install SUSE Linux Enterprise Server 11 (SLES11) and SGI ProPack 7 from the DVD media, perform the following steps:

1. Insert the SLES 11 Installation DVD in the DVD drive and reboot your system.

2. Follow the steps in the *USE Linux Enterprise Server 11 Installation Quick Start.*

3. When you get to the **Installation Mode** screen as shown in Figure 2-1, click the button next to **Include Add-On Products from Separate Media** and then click **Next** to continue.
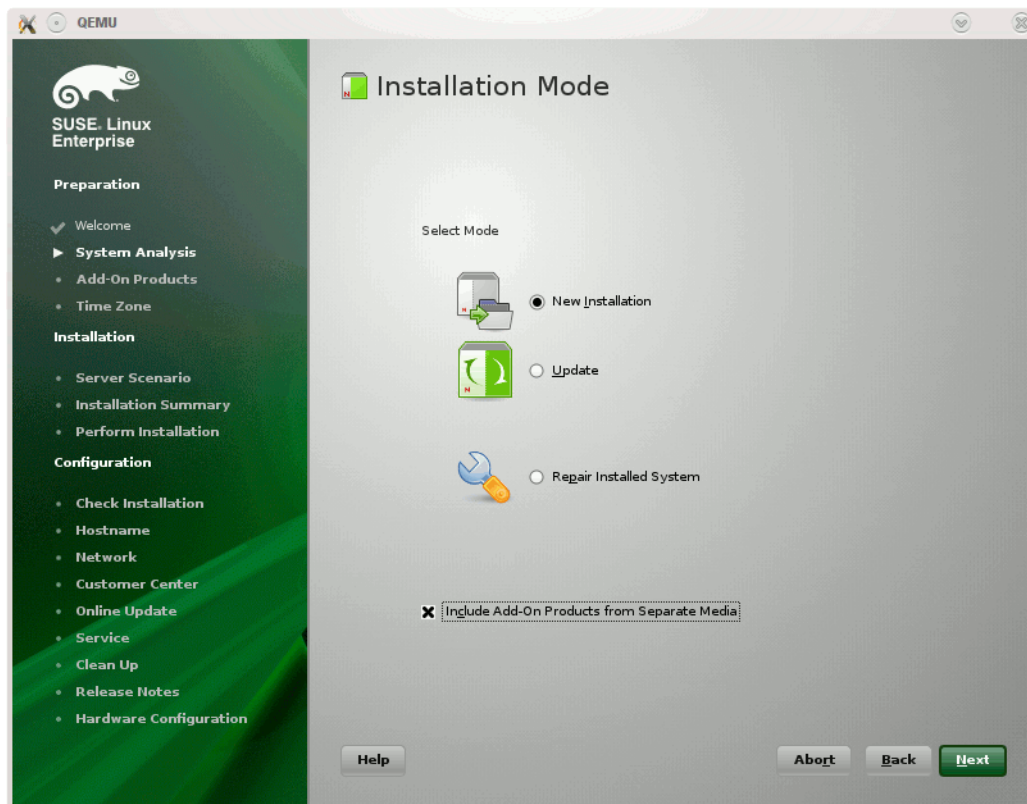
Figure 2-1   SLES11 **Installation Mode** screen

Because SGI ProPack 7 is dependent on SGI Foundation Software 2, you should add it first and then SGI ProPack 7. For information on add-on products, see chapter 10, "Installing Add-On Products" ins the *SUSE Linux Enterprise Server 11 Deployment Guide.* You can also see the *SGI Foundation Software 2 Start Here* for installation instructions.

4. From the **Media Type** screen shown in Figure 2-2, click the button to the left of **CD**.

Figure 2-2   SLES11 **Media Type** Screen

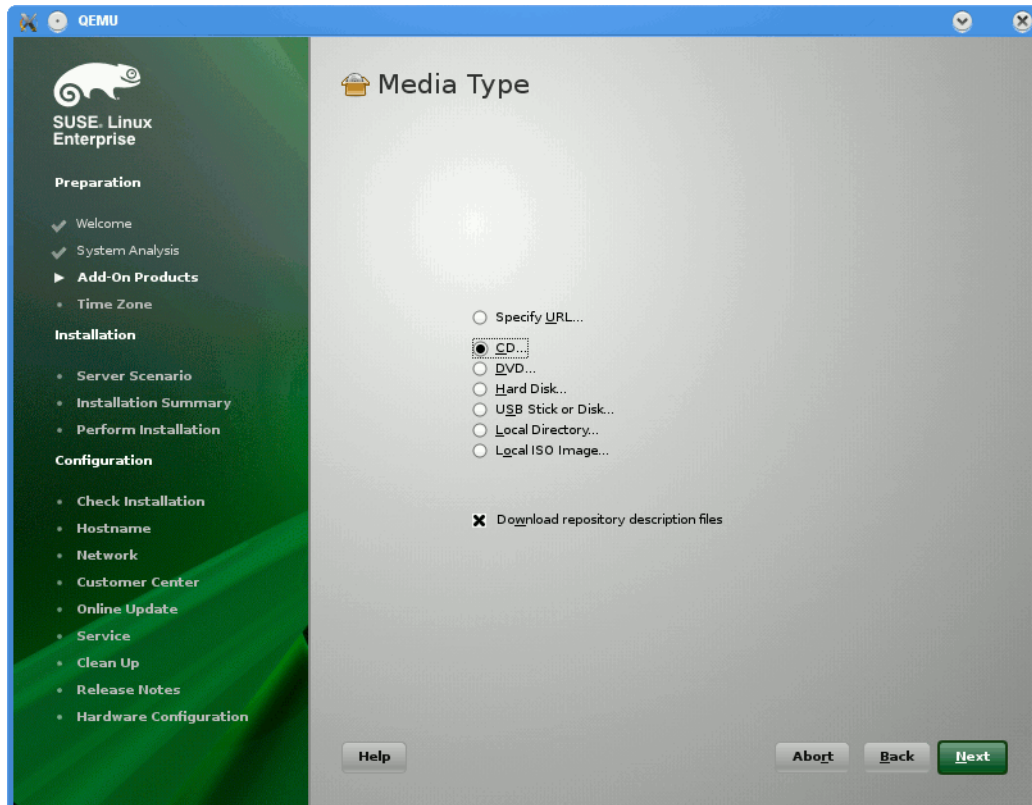5.   The **Insert the add-on product CD** dialog box appears. Insert the SGI
     -Foundation-x86_64 CD into the drive and click the **Continue** button and then **Next**
     to proceed.

6.   From the **Add-On Product Installation** screen as shown in Figure 2-3, click on
     SGI-Foundation-x86_64 1-3 cd:///.Directory and click the **Add** button and then
     Next to proceed.

Figure 2-3   SLES11 **Add-On Product Installation** Screen for SGI Foundation

7. Repeat steps 3 through 6 to add SGI ProPack 7 for Linux as an add-on product. Eject the SGI Foundation 2 CD and replace it with the SGI ProPack 6 for Linux Service Pack 7 CD. From the **Add-On Product Installation** screen as shown in Figure 2-4, click on **SGI-ProPack-x86_64 6-4 cd:///Directory** click the **Add** button and then **Next** to proceed.
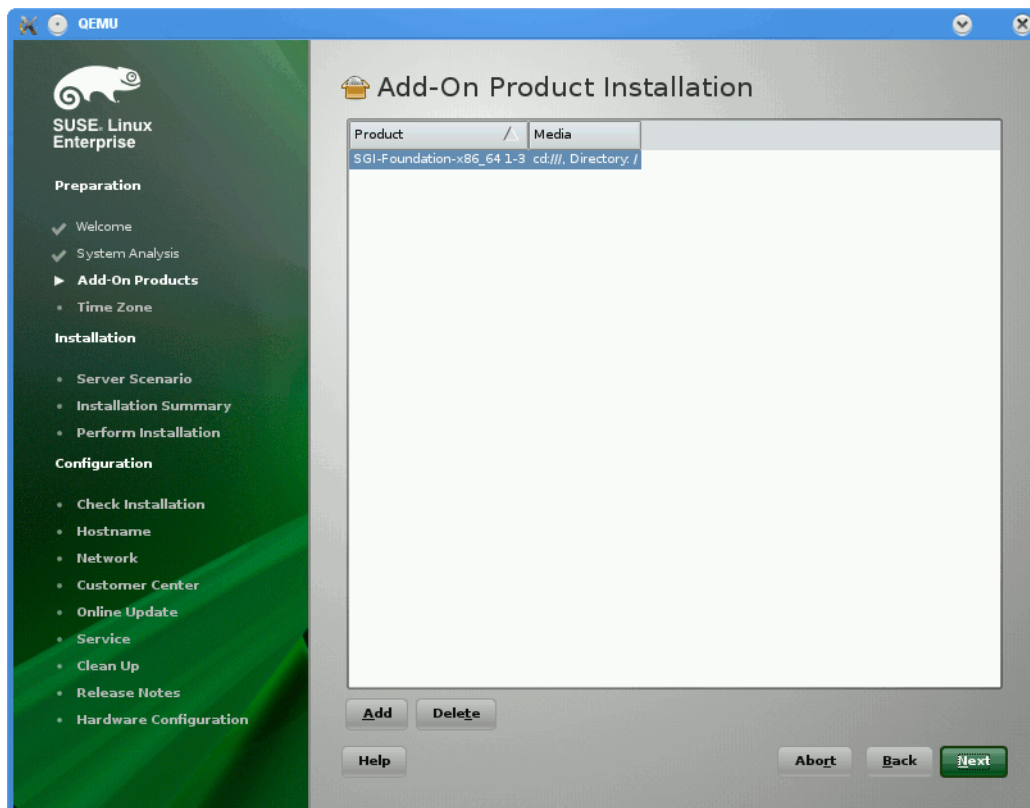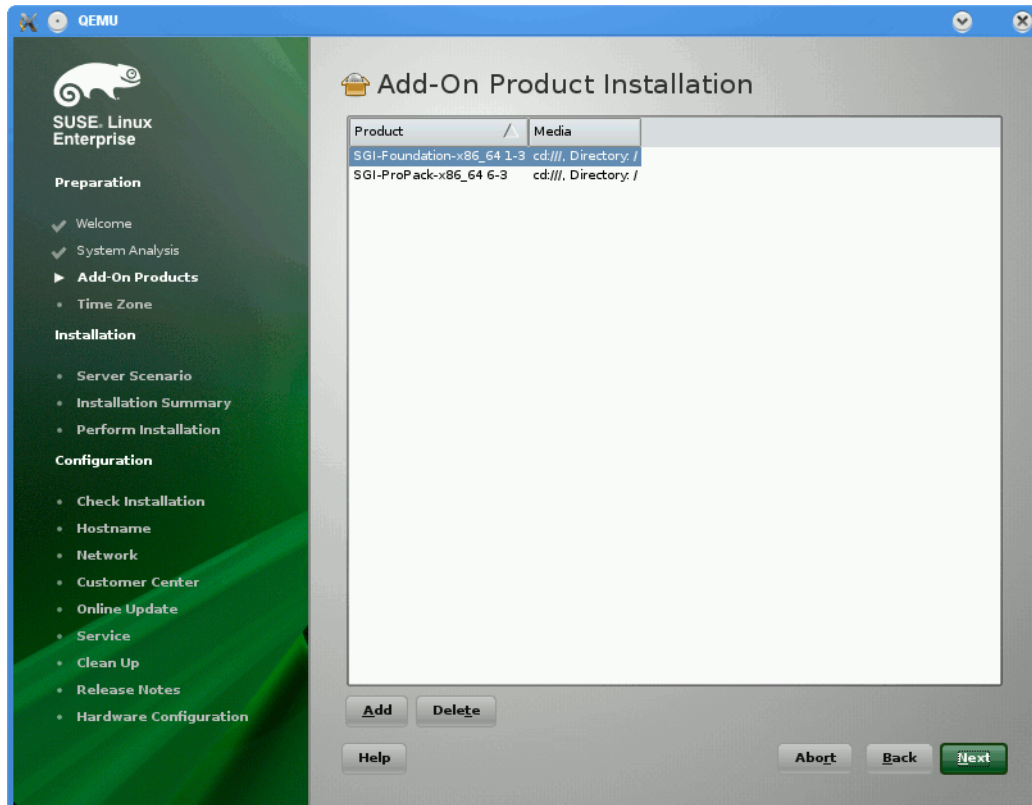
Figure 2-4   SLES11 **Add-On Product Installation** for SGI ProPack 7

8.   Follow the SLES11 instructions to complete the installation.

Install SGI ProPack 7 on a Previously Installed SLES11 System

Because SGI ProPack 7 is dependent on SGI Foundation Software 2 , you should add it
first and then SGI ProPack 7. For information on add-on products, see chapter 10,
"Installing Add-On Products" ins the *SUSE Linux Enterprise Server 11 Deployment Guide*.
You can also see the *SGI Foundation Software 2 Start Here* for installation instructions for
SGI Foundation 2 software on a previously installed SLES11 system.

To install SGI ProPack 7 on a previously installed SLES11 system, perform the following steps:

1. Start the graphical (yast2) version of the YaST install tool.

2. Under the **Software** section, choose **Add-On Products**.

3. From the **Add-On Product Installation** screen, press the **Add** button on the bottom left side.

4. The Media Type screen appears, as shown in Figure 2-2 on page 21. Insert the SGI ProPack 7 CD into the drive and press the **Continue** button and then the **Next** button to proceed.

5. Enter you SGI SupportFolio login and password. This will enable you to set up an install source for software updates from SGI ProPack 7.

6. If you wish to simply install suggested defaults, simply press **Accept** in the screen that lists available patterns. The software will then be installed.

SLES and SGI ProPack Network Installation for Experts

This section describes how to set up a network install server and provides some information on using AutoYaST. It covers these topics:

• "Setting up the Network Install Server" on page 24

• "Using AutoYaST" on page 25

Setting up the Network Install Server

This section provides you with some information on installing SLES11 and SGI ProPack 7 all in one session over the network. This is helpful for systems administrators who have several machines to install and keep up to date.

Note: For information on setting up a network install server, see the "Installing Add-On Products" section in Chapter 7, "System Configuration with Yast" in the *SUSE Linux Enterprise Server Installation and Administration* manual that resides in the

sles-admin.pdf file in the docu directory of the SLES11 DVD and see "Chapter 4. Configuration and Installation Options" in *AutoYaST* available at http://www.suse.de/~ug/autoyast_doc/index.html.

In SLES11, you can create a special add_on_products file that directs YaST to look at additional install sources. You may list a URL to the SGI ProPack 7 install source in this file.

To create an SGI ProPack 7 install source, you simply mount the SGI ProPack 7 for Linux CD and copy all of the contents in to a repository. An example of how to do this is, as follows:

```
mkdir /path/to/new-propack-repository
mount /dev/cdrom /mnt
cp -a /mnt/* /path/to/new-propack-repository/
umount /mnt
```

In the add_on_products file that exists in your SLES11 network repository, you just add a URL pointer to your new target. The URL can be nfs, http, ftp, and so. An example entry for the add_on_products file is similar to the following:

```
nfs://server/path/to/new-propack-repository
```

Using AutoYaST

AutoYaST is a tool that allows you to install and configure a system based on control file settings. With AutoYaST, you could install and configure a system over the network automatically.

You can find information on how to use AutoYaST in *AutoYaST* available at http://www.suse.de/~ug/autoyast_doc/index.html.

You can find information about AutoYaST in Chapter 5, "Automated Installation", of the *SUSE Linux Enterprise Server Installation and Administration* manual. This resides in the sles-admin.pdf file in the /docu/en directory of the SLES 11 DVD. Documentation is also available in /usr/share/doc/packages/autoyast2/html/index.html on systems running SLES11.

Upgrading to SGI ProPack 7 with SLES11

This section describes how to upgrade from a prior release. It covers the following topics:

- "Upgrading from an Earlier SLES Base and SGI ProPack Release" on page 26
- "Upgrading From SGI ProPack 5 SPx or SGI ProPack 6 SPx to SGI Propack 7" on page 26

Upgrading from an Earlier SLES Base and SGI ProPack Release

Note: The best way to upgrade a system that is running a previous SLES and ProPack release is to install both SLES11 and SGI ProPack 7 at the same time (see "Installing SLES11 and SGI ProPack 7" on page 17). If SLES11 is already installed on your system, see "Install SGI ProPack 7 on a Previously Installed SLES11 System" on page 23.

Updates are supported starting from one of the following bases:

- SLES 9 GA (no Service Pack)
- SLES 9 SP3
- SLES 9 SP4
- SLES 10 GA (no Service Pack)
- SLES 10 SP1
- SLES 10 SP2
- SLES 10 SP3

Note: Update a system by starting the SLES11 installation system and choosing **Update** instead of **New Installation**.

Upgrading From SGI ProPack 5 SPx or SGI ProPack 6 SPx to SGI Propack 7

This section describes how to upgrade your SLES 10 SPx system running the SGI ProPack 6 SP6 release (or earlier) to SGI ProPack 7 on SLES11.

During this upgrade, your kernel and several other packages may be upgraded to a SLES 11 Online Update version. If you have been keeping up-to-date with SLES11 online updates, you may already have the newer updated packages installed. The upgrade will work fine in either case.

Caution: Do not use **System Update** to update SGI ProPack. The SLES 11 version of **System Update** is not currently supported by SUSE and will not work correctly.

You need to pay careful attention to the upgrade instructions. If you simply were to mark a pattern for upgrade, you will find only a few packages would be installed. You need to work around a problem in YaST to get the install to proceed properly.

SGI suggests that existing customers upgrade their system from SGI ProPack 5 SPx or SGI ProPack 6 SPx to SGI ProPack 7 using media because this ensures you get new packages for SGI ProPack 7. A simple online-update will not automatically offer new packages.

To upgrade from SGI ProPack 5 SPx or SGI ProPack 6 SPx to SGI ProPack 7, perform the following steps:

1. Remove any old SGI ProPack 5 SPx or SGI ProPack 6 SPx install source that may be present. There are several ways to do this. The following example uses the `yast` command.

   a. Start the graphical or text version of `yast`.

   b. Select **Software** -> **Installation Source**.

   c. Check for an install source named **SGI ProPack 7 for Linux**

   d. If the SGI ProPack 7 install source exists, select it and delete it.

   e. Select `Finish` to exit out of the tool.

2. Add ProPack 7 add-on product, as follows:

   a. Start the graphical or text version of `yast`.

   b. Select **Software** -> **Add-on Product**.

   Note: At this point, you need to select and define your media. This example shows the use of a physical CD.

   ---

     c.   Select **CD.**...

         You will be prompted to insert the media.

     d.   YaST will now add the install source for you.

Note: You will see an error message that states: "An error occurred while connecting to the server. Details: Cannot create the installation source Try again?"

This does **NOT** mean the add-on product failed to add. Instead, this is giving you a chance to enter your authentication information for getting updates/patches from SGI.

     e.   Answer `Yes` to the re-try question.

         You are now given a chance to set up authentication details

     f.   Unselect the **Anonymous** box.

     g.   Enter your SupportFolio login name for **User name**.

     h.   Enter your SupportFolio password for **Password**.

         YaST will now add the update source in addition to the ProPack 7 install source itself.

3.   You are now software manager. Perform the following steps:

     a.   Select **Filter** and then **Patterns**.

Caution: At this point, do not mark the patterns themselves for upgrade. That will cause the upgrade to not complete properly. See the introductory comments to this section ("Upgrading From SGI ProPack 5 SPx or SGI ProPack 6 SPx to SGI Propack 7" on page 26).

---

     b.   In Text mode, perform the following:

         Highlight the **SGI ProPack** pattern and select `OK`.

         Highlight one of the packages that are part of this pattern (any one will do).

         Tab to **Actions** and hit `Enter`.

         Select **All Listed Packages**...

         Select **Update All Unconditionally**

Now all the packages in this pattern should have '>' next to them.

c. In Graphical mode, perform the following:

Highlight the **SGI ProPack** pattern and right-click on any package in the list.

Select **All In List** and then **Update if newer version available**

4. If you have additional SGI ProPack or REACT patterns to update, go to the Caution in step 3a. and repeat the steps for each additional pattern.

5. Select **Accept** to install.

Your system will now be updated.

Product Support

This chapter documents the product components that are supported on the SGI Altix 3000 series, SGI Altix 4000 series, SGI Altix ICE series, and SGI Altix XE systems. (For a list of the products, see Table 3-1 on page 32.)

Descriptions of the product components are grouped in this chapter as follows:

- "SGI ProPack 7 for Linux Products" on page 31
- "Operating System Enhancements" on page 35
- "I/O Subsystems" on page 37
- "HPC Application Tools and Support" on page 38
- "NUMA Data Placement Tools" on page 43

SGI ProPack 7 for Linux Products

Software provided by SGI for the SGI ProPack 7 for Linux release consists of kernel modules for SGI software built against the kernels in SUSE Linux Enterprise Server 11 and value-add software developed by SGI specifically to run on SGI Altix or SGI Altix

XE systems and some additional third-party software (see VTune, in the first row of the table, below).

Table 3-1   SGI ProPack 7 for Linux Products

Product	Architecture Supported	Description
Application performance measuring tools	ia64	VTune - This tool, developed and supported by Intel, uses the performance measurement facilities of the Itanium processor to take profiles based on elapsed time or other architected events within the processor. These profiles can be used to measure, tune, and improve an application's performance. For more information on VTune, go to the following web location: http://developer.intel.com/software/products/vtune/
Array Services	ia64 and x86_64	Array Services includes administrator commands, libraries, daemons, and kernel extensions that support the execution of parallel applications across a number of hosts in a cluster, or array. The Message Passing Interface (MPI) of SGI ProPack uses Array Services to launch parallel applications. For information on MPI, see the Message Passing Toolkit (MPT) User's Guide The secure version of Array Services is built to make use of secure sockets layer (SSL) and secure shell (SSH). For more information on standard Array Services or Secure Array Services (SAS), see the Array Services chapter in the *Linux Resource Administration Guide.*
Cpuset System	ia64 and x86_64	The Cpuset System is primarily a workload manager tool permitting a system administrator to restrict the number of processors and memory resources that a process or set of processes may use. A system administrator can use cpusets to create a division of CPUs and memory resources within a larger system. For more information, see the "Cpusets on SGI ProPack 6 for Linux" chapter in the *Linux Resource Administration Guide.*
CSA	ia64 and x86_64	Provides jobs-based accounting of per-task resources and disk usage for specific login accounts on Linux systems. Linux CSA application interface library allows software applications to manipulate and obtain status about Linux CSA accounting methods. For more information, see the CSA chapter in the *Linux Resource Administration Guide.*

Table 3-1   SGI ProPack 7 for Linux Products **(continued)**

Product	Architecture Supported	Description
IOC4 serial driver	ia64	Driver that supports the Internal IDE CD-ROM, NVRAM, and Real-Time Clock.
		Serial ports are supported on the IOC4 base I/O chipset and the following device nodes are created:

		`/dev/ttyIOC4/0`
		`/dev/ttyIOC4/1`
		`/dev/ttyIOC4/2`
		`/dev/ttyIOC4/3`

Kernel partitioning support	ia64	Provides the software infrastructure necessary to support a partitioned system, including cross-partition communication support. For more information on system partitioning, see the *Linux Configuration and Operations Guide*.
libarena	x86_64	`libarena` is a custom memory allocator interface and implementation. Four allocators are provided: flat LIFO arena allocator, object pool allocator and two `malloc`(3) wrappers: one which returns the pointers unadulterated and one which obeys the requested, arbitrary alignment. These can be used directly, or through their exported prototype interfaces.
MPT	ia64 and x86_64	Provides industry-standard message passing libraries optimized for SGI computers. For more information on MPT, see the *Message Passing Toolkit (MPT) User's Guide*.
NUMA tools	ia64 and x86_64	Provides a collection of NUMA related tools (`dlook`(1), `dplace`(1), and so on). For more information on NUMA tools, see the *Linux Application Tuning Guide*.
Performance Co-Pilot collector infrastructure	ia64 and x86_64	Provides performance monitoring and performance management services targeted at large, complex systems. For more information on Performance Co-Pilot, see *Performance Co-Pilot for IA-64 Linux User's and Administrator's Guide*.
REACT real-time for Linux	ia64 and x86_64	Support for real-time programs. For more information, see the *REACT Real-Time for Linux Programmer's Guide*.

Table 3-1   SGI ProPack 7 for Linux Products **(continued)**

Product	Architecture Supported	Description
SGI Histx	ia64	SGI Histx is a performance analysis tool designed to complement `pfmon`, which is included with the SGI ProPack software for the Altix family of servers. The software is designed to run on Altix machines only and is only supported on systems running SGI ProPack 6 SP6 (or later) with SLES10. Used internally by SGI developers and benchmarkers, as well as SGI customers, this product is offered as a service to customers with a no-fee end user proprietary license via the Supportfolio website. For more information on SGI Histx, see http://www.sgi.com/products/software/histx.html
Utilities	ia64 and x86_64	`udev_xsci`, is a `udev` helper for doing XSCSI device names. `sgtools`, a set of tools for SCSI disks using the Linux SG driver and lsiutil, the LSI Fusion-MPT host adapter management utility.
XVM	ia64 and x86_64	Provides software volume manager functionality such as disk striping and mirroring. For more information on XVM, see the *XVM Volume Manager Administrator's Guide*.

SGI does not support the following:

- Base Linux software not released by Novell for SLES11 or other software not released by SGI.

- Other releases, updates, or patches not released by Novell for SLES11 or by SGI for SGI ProPack software.

- Software patches, drivers, or other changes obtained from the Linux community or vendors other than Novell and SGI.

- Kernels recompiled or reconfigured to run with parameter settings or other modules as not specified by Novell and SGI.

- Unsupported hardware configurations and devices.

Operating System Enhancements

Building on the Linux operating system's rapid expansion and improvements for general commercial and enterprise environments, SGI has focused on improving Linux capabilities and performance specifically for high performance computing's (HPC's) big compute and big data environments. Thus, SGI has leveraged its experience with NUMAflex and HPC from its IRIX operating systems and MIPS processor-based systems and concentrated on the Linux kernel improvements specifically important to HPC environments.

Cpuset Support

The cpuset facility is primarily a workload manager tool permitting a system administrator to restrict the number of processors and memory resources that a process or set of processes may use. A cpuset defines a list of CPUs and memory nodes. A process contained in a cpuset may only execute on the CPUs in that cpuset and may only allocate memory on the memory nodes in that cpuset. Essentially, cpusets provide you with a CPU and memory containers or "soft partitions" within which you can run sets of related tasks. Using cpusets on an SGI Altix system improves cache locality and memory access times and can substantially improve an applications performance and runtime repeatability. Restraining all other jobs from using any of the CPUs or memory resources assigned to a critical job minimizes interference from other jobs on the system. For example, Message Passing Interface (MPI) jobs frequently consist of a number of threads that communicate using message passing interfaces. All threads need to be executing at the same time. If a single thread loses a CPU, all threads stop making forward progress and spin at a barrier. Cpusets can eliminate the need for a gang scheduler.

Cpusets are represented in a hierarchical virtual file system. Cpusets can be nested and they have file-like permissions.

In addition to their traditional use to control the placement of jobs on the CPUs and memory nodes of a system, cpusets also provide a convenient mechanism to control the use of Hyper-Threading Technology.

For detailed information on cpusets, see Chapter 6, "Cpusets on SGI ProPack 6 for Linux" in the *Linux Resource Administration Guide*.

Comprehensive System Accounting (CSA)

The port of Comprehensive System Accounting (CSA) software packages from IRIX to Linux is the result of an open source collaboration between SGI and Los Alamos National Laboratory (LANL) to provide jobs-based accounting of per-task resources and disk usage for specific login accounts on Linux systems.

Providing extensive system accounting capabilities is often important for very large systems, especially when the system will be shared or made available for other organizations to use. CSA uses a Job Containers feature, which provides on Linux the notion of a job. A job is an inescapable container and a collection of processes that enables CSA to track resources for any point of entry to a machine (for example, interactive login, cron job, remote login, batched workload, and so on).

The Linux CSA application interface library allows software applications to manipulate and obtain status about Linux CSA accounting methods.

CSA on Linux is an SGI open source project, also available from the following location:

http://oss.sgi.com/projects/csa

For further documentation and details on CSA support, see the chapter titled "Comprehensive System Accounting" in the *Linux Resource Administration Guide*.

Partitioning

SGI provides the ability to divide a single SGI Altix system into a collection of smaller system partitions. Each partition runs its own copy of the operating system kernel and has its own system console, root filesystem, IP network address, and physical memory. All partitions in the system are connected via the SGI high-performance NUMAlink interconnect, just as they are when the system is not partitioned. Thus, a partitioned system can also be viewed as a cluster of nodes connected via NUMAlink.

Benefits of partitioning include fault containment and the ability to use the NUMAlink interconnect and global shared memory features of the SGI Altix to provide high-performance clusters.

For further documentation and details on partitioning, see the *Linux Configuration and Operations Guide.*

I/O Subsystems

Although some HPC workloads might be mostly CPU bound, others involve processing large amounts of data and require an I/O subsystem capable of moving data between memory and storage quickly, as well as having the ability to manage large storage farms effectively. The XFS filesystem, XVM volume manager, and data migration facilities were leveraged from IRIX and ported to provide a robust, high-performance, and stable storage I/O subsystem on Linux. This section covers the following topics:

- "Persistent IP Addressing of Ethernet Interfaces" on page 37
- "PCI Domain Support for SGI Altix 450 and 4700 Systems" on page 37
- "XSCSI Naming Systems on SGI ProPack Systems" on page 37
- "XFS Filesystem" on page 38
- "XVM Volume Manager" on page 38

Persistent IP Addressing of Ethernet Interfaces

An Ethernet interface can be given a persistent internet addresses by associating its permanent MAC address, such as 08:00:69:13:f1:aa, with an internet protocol (IP) address, for example 192.168.20.1. An interface with a persistent IP address will be given the same IP address each time the system is booted. For more information, see "Persistent Network Interface Names" in the *Linux Configuration and Operations Guide.*

PCI Domain Support for SGI Altix 450 and 4700 Systems

On an SGI Altix 450 and 4700 system, a *PCI domain* is a functional entity that includes a root bridge, subordinate buses under the root bridge, and the peripheral devices it controls. Separation, management, and protection of PCI domains is implemented and controlled by system software. For more information, see "PCI Domain Support for SGI Altix 450 and 4700 Systems" in the *Linux Configuration and Operations Guide.*

XSCSI Naming Systems on SGI ProPack Systems

The XSCSI subsystem on SGI ProPack 4 systems was an I/O infrastructure that leveraged technology from the IRIX operating system to provide more robust error handling, failover, and storage area network (SAN) infrastructure support, as well as long-term,

large system performance tuning. This subsystem is not necessary for SGI ProPack 7 systems. However, XSCSI naming is available on SGI ProPack7 systems. For more information, see "XSCSI Naming Systems on SGI ProPack Systems" in the *Linux Configuration and Operations Guide.*

XFS Filesystem

The SGI XFS filesystem provides a high-performance filesystem for Linux. XFS is an open-source, fast recovery, journaling filesystem that provides direct I/O support, space preallocation, access control lists, quotas, and other commercial file system features. Although other filesystems are available on Linux, performance tuning and improvements leveraged from IRIX make XFS particularly well suited for large data and I/O workloads commonly found in HPC environments.

For more information on the XFS filesystem, see *XFS for Linux Administration.*

XVM Volume Manager

The SGI XVM Volume Manager provides a logical organization to disk storage that enables an administrator to combine underlying physical disk storage into a single logical unit, known as a logical volume. Logical volumes behave like standard disk partitions and can be used as arguments anywhere a partition can be specified.

A logical volume allows a filesystem or raw device to be larger than the size of a physical disk. Using logical volumes can also increase disk I/O performance because a volume can be striped across more than one disk. Logical volumes can also be used to mirror data on different disks.

This release adds a new XVM multi-host failover feature. For more information on this new feature and XVM Volume Manager in general, see the *XVM Volume Manager Administrator's Guide.*

HPC Application Tools and Support

SGI has ported HPC libraries, tools, and software packages from IRIX to Linux to provide a powerful, standards-based system using Linux and Itanium 2-based solutions for HPC

environments. The following sections describe some of these tools, libraries, and software.

Message Passing Toolkit

The SGI Message Passing Toolkit (MPT) provides industry-standard message passing libraries optimized for SGI computers. On Linux, MPT contains MPI and SHMEM APIs, which transparently utilize and exploit the low-level capabilities within SGI hardware, such as memory mapping within and between partitions for fast memory-to-memory transfers and the hardware memory controller's fetch operation (fetchop) support. Fetchops and other shared memory techniques enable ultra fast communication and synchronization between MPI processes in a parallel application.

MPI jobs can be launched, monitored, and controlled across a cluster or partitioned system using the SGI Array Services software. Array Services provides the notion of an array session, which is a set of processes that can be running on different cluster nodes or system partitions. Array Services is implemented using Process Aggregates (PAGGs), which is a kernel module that provides process containers. PAGGs has been open-sourced by SGI for Linux.

For more information on the Message Passing Toolkit, see the *Message Passing Toolkit (MPT) User's Guide*.

MVAPICH2 and OpenMPI

SGI no longer ships any open source MPI packages via the SGI Propack for Linux release. MVAPICH2 and OpenMPI RPMs are available as a courtesy, via the cool downloads section on Supportfolio at https://support.sgi.com/browse_request/dcs.

These RPMs are IB interconnect, Intel compiler compiled versions of the open source products.

SGI MPT is provided with the SGI Propack 7 release and supports all SGI platforms.

Performance Co-Pilot

The SGI Performance Co-Pilot software was ported from IRIX to Linux to provide a collection of performance monitoring and performance management services targeted at

large, complex systems. Integrated with the low-level performance hardware counters and with MPT, Performance Co-Pilot provides such services as CPU, I/O, and networking statistics; visualization tools; and monitoring tools.

For more information on Performance Co-Pilot, see the *Performance Co-Pilot for IA-64 Linux User's and Administrator's Guide.*

Extensible Firmware Interface (EFI)

The Extensible Firmware Interface (EFI), a supporting platform to provide input to the CPU and to handle its output, is provided by SLES11, the base Linux operating system for SGI Altix systems running SGI ProPack 7. EFI also controls the server's boot configuration, maintaining the boot menu in durable, non-volatile memory.

SLES11 uses the `elilo` package which places the bootloader (`elilo.efi`) and configuration file (`elilo.conf`) in the `/boot/efi/efi/SuSE/` directory on SGI Altix systems.

Note: When booting from SLES11, use the `bootia64` command instead of `elilo`. Once the system is running SLES11 use `elilo` to boot from EFI.

Note: If you have installed multiple kernel images and want to boot with one that is not currently the system default (`vmlinuz` in `/boot/efi/efi/SuSE`), simply copy the `vmlinuz` and `initrd` files for the kernel you wish to use from `/boot` to `/boot/efi/efi/SuSE`.

For a summary of EFI commands, see Table 3-2.

Table 3-2   EFI Commands

EFI Command	Description
`alias` [-bdv] [*sname*] [*value*]	Sets or gets alias settings
`attrib` [-b] [+/- *rhs*] [*file*]	Views or sets file attributes
`bcfg`	Configures boot driver and load options

Table 3-2   EFI Commands **(continued)**

EFI Command	Description
cd [*path*]	Updates the current directory
cls [*background color*]	Clears screen
comp *file1 file2*	Compares two files
cp *file* [*file*] ... [*dest*]	Copies files or directories
date [*mm/dd/yyyy*]	Gets or sets date
dblk *device* [*Lba*] [*blocks*]	Performs hex dump of block I/O devices
dh [-b] [-p *prot_id*]	[*handle*]	Dumps handle information
dmpstore	Dumps variable store
echo [-on	-off]	[*text*]	Echoes text to stdout or toggles script echo
edit [*file name*]	Edits a file
endfor	Script only: Delimits loop construct
endif	Script-only: Delimits IF THEN construct
err [*level*]	Sets or displays error level
exit	Exits
flash *filename*	Flashes PROM on C-brick
for var in *set*	Script-only: Indicates loop construct
getmtc	Gets next monotonic count
goto *label*	Script-only: Jumps to label location in script
guid [-b] [*sname*]	Dumps known guid IDs
help [-b] [*internal command*]	Displays this help
if [not] *condition* then	Script-only: Indicates IF THEN construct
load *driver_name*	Loads a driver
ls [-b] [*dir*] [*dir*] ...	Obtains directory listing

Table 3-2   EFI Commands **(continued)**

EFI Command	Description
map [-bdvr] [*sname*[:]] [*handle*]	Maps shortname to device path
mem [*address*] [*size*] [;*MMIO*]	Dumps memory or memory mapped I/O
memmap [-b]	Dumps memory map
mkdir *dir* [*dir*] ...	Makes directory
mm *address* [*width*] [;*type*]	Modifies memory: Mem, MMIO, IO, PCI
mode [*col row*]	Sets or gets current text mode
mount *BlkDevice* [*sname*[:]]	Mounts a filesytem on a block device
mv *sfile dfile*	Moves files
pause	Script-only: Prompts to quit or continue
pci [*bus dev*] [*func*]	Displays PCI device(s) info
reset [cold/warm] [*reset string*]	Indicates cold or warm reset
rm *file/dir* [*file/dir*]	Removes file or directories
set [-bdv] [*sname*] [*value*]	Sets or gets environment variable
setsize *newsize fname*	Sets the files size
stall *microseconds*	Delays for *x* microseconds
time [*hh:mm:ss*]	Gets or sets time
touch [*filename*]	Views or sets file attributes
type [-a] [-u] [-b] *file*	Types file
ver	Displays version information
vol *fs* [*volume label*]	Sets or displays volume label

SGIconsole

SGIconsole is a combination of hardware and software that provides console management and allows monitoring of multiple SGI servers running the IRIX operating system and SGI ProPack for Linux. These servers include SGI partitioned systems and large, single-system-image servers, including SGI Altix 350 and 450 systems and the SGI Altix 3000 and 4000 family of servers and superclusters.

SGIconsole consists of an 1U rackmountable SGI server based on the Intel Pentium processor, a serial multiplexer or Ethernet hub, and a software suite that includes the Console Manager package and Performance Co-Pilot, which provides access to common remote management tools for hardware and software.

Console Manager is a graphical user interface for the SGIconsole management and monitoring tool used to control multiple SGI servers. SGIconsole also has a command line interface. For more information on SGIconsole, see the *SGIconsole Start Here*.

NUMA Data Placement Tools

This section describes the commands that are currently provided with the collection of NUMA related data placement tools that can help you with tuning applications on your system.

Note: Performance tuning information for single processor and multiprocessor programs resides in *Linux Application Tuning Guide*.

`dlook` Command

The `dlook`(1) command displays the memory map and CPU use for a specified process. The following information is printed for each page in the virtual address space of the process:

- The object that owns the page (file, `SYSV` shared memory, device driver, and so on)

- Type of page (`RAM`, `FETCHOP`, `IOSPACE`, and so on)

- If RAM memory, the following information is supplied:

- – Memory attributes (SHARED, DIRTY, and so on)
- – Node on which that the page is located
- – Physical address of page (optional)

Optionally, the amount of elapsed CPU time that the process has executed on each physical CPU in the system is also printed.

`dplace` Command

The dplace(1) command binds a related set of processes to specific CPUs or nodes to prevent process migrations. In some cases, this tool improves performance because of the occurrence of a higher percentage of memory accesses to the local node.

`taskset` Command

The taskset(1) command is used to set or retrieve the CPU affinity of a running process given its PID or to launch a new command with a given CPU affinity. CPU affinity is a scheduler property that "bonds" a process to a given set of CPUs on the system. The Linux scheduler will honor the given CPU affinity and the process will not run on any other CPUs. Note that the Linux scheduler also supports natural CPU affinity; the scheduler attempts to keep processes on the same CPU as long as practical for performance reasons. Therefore, forcing a specific CPU affinity is useful only in certain applications.

For more information on NUMA tools, see Chapter 5, "Data Placement Tools" in the *Linux Application Tuning Guide*.

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