



Cray Linux Environment™ (CLE) 3.1 Software Release Overview Supplement

S-2497-3102

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RECORD OF REVISION

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Software Enhancements [1]

CLE 3.1 software update releases provide bug fixes and a limited set of software enhancements or features. This chapter provides an overview of software enhancements that are introduced in each update release.

Software enhancements and features that were introduced with the initial or base CLE 3.1 release are described in *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31), which is also provided with the release package.

1.1 Software Enhancements in CLE 3.1.UP02

1.1.1 DVS POSIX Atomicity

Who will use DVS atomic stripe parallel mode?

System administrators.

How can atomic stripe parallel mode help me?

These enhancements can prevent interleaving of data, which could occur when an application performs I/O on a shared file without using file locking on a DVS stripe parallel mount point.

What does atomic stripe parallel mode do?

Atomic stripe parallel, a Cray DVS mode, adheres to POSIX read/write atomicity rules while still allowing for possible parallelism within a file. It is similar to stripe parallel mode in that the server used to perform the read, write, or metadata operation is selected using an internal hash involving the underlying file or directory inode number and the offset of data into the file relative to the DVS block size.

Where can I find more information?

For information on Cray DVS, see *Introduction to Cray Data Virtualization Service*. For information on how to set up Cray DVS, see *Installing and Configuring Cray Linux Environment (CLE) Software* and *Managing System Software for Cray XE and Cray XT Systems*.

1.1.2 Changes to GPCD (Gemini Performance Counters Device) to Improve Performance when Accessing Memory Mapped Registers Using CrayPat

Who will use this enhancement?

End-users.

How can this enhancement help me?

CLE has been modified to decrease MMR (Memory Mapped Register) access time, thus giving a significant performance improvement when using CrayPat. Users should be able to make traces that involve MMR data throughout their program with less overhead than previous releases.

Another direct end-user benefit of this improvement is that Gemini network counter event collection can be done more frequently during application execution. The user can now monitor a half-dozen counters without drastically degrading performance. As a reference, when tracing function enter/return, the overhead to count one Gemini event is approximately equivalent to four processor counter events.

What is modified to increase performance?

The Gemini application specific integrated circuit contains MMRs, also known as network performance counters, that are used within CrayPat to capture network performance data during trace experiments. The performance improvement introduced in this update release decreases the access time experienced when using CrayPat to view Gemini MMR data. This is done via a modification to a kernel-level interface, `gpcd` (Gemini Performance Counters Device); thus, end-users do not need to take any further action to take advantage of this benefit.

Where can I find more information?

For more information on Gemini MMRs used as performance counters, see *Using the Cray Gemini Hardware Counters*. For more information on CrayPat, see *Cray Performance Analysis Tools Release Overview and Installation Guide* and *Using Cray Performance Analysis Tools*.

1.1.3 Repurposed Compute Node Support for PBS Professional

Who will use repurposed compute node support for PBS Professional?

System administrators.

How can this help me?

You can potentially improve performance or maintainability of PBS Professional batch system services by moving the MOM node to a dedicated node instead of sharing resources with other services on an existing service node.

What is repurposed compute node support for PBS?

Beginning with CLE 3.1.UP02, Cray tests and supports repurposing a compute node as a PBS Professional MOM node. CLE 3.1.UP01 introduced new functionality to repurpose compute nodes as service nodes. For the initial release of this feature, support for repurposing compute nodes as a PBS Professional MOM nodes was not available. For more information on repurposed compute nodes, see [Repurposed Compute Nodes on page 11](#).

Where can I find more information?

For information on how to setup and configure compute nodes as PBS Professional MOM nodes, see *Repurposing Compute Nodes as Service Nodes on Cray XE and Cray XT Systems* and PBS Professional documentation available from Altair Engineering, Inc. at <http://www.altair.com>.

1.1.4 New `xtverifydefaults` Command

Who will use this command?

System administrators, automatically via the `xtopview` utility.

How can this command help me?

The `xtopview` utility automatically invokes a new command, `xtverifydefaults`, to verify that the default software version for Cray packages is the same on all service nodes. In rare cases, the shared root links to Cray packages can become inconsistent so that not all service nodes point to the same default software version. This situation can be difficult to detect. By default, the `xtopview` utility invokes the `xtverifydefaults` command during exit processing to correct any inconsistent links that may have been generated during the `xtopview` session. System administrators can also run the command manually from within `xtopview`.

What does this command do?

The `xtverifydefaults` command verifies and optionally fixes the default links in the shared root for Cray system software packages. If the version of software a link points to is different from the version that the default view link of the same name points to, the link is considered inconsistent. The `xtverifydefaults` command flags and optionally fixes inconsistent links. All of the `node` and `class` view default links for Cray packages (e.g. those that start with "cray-") are forced to match the default view default links.

Where can I find more information?

See the `xtverifydefaults(8)` man page.

1.1.5 Core Specialization is NUMA-aware

Who will use NUMA-aware core specialization?

End-users.

How can NUMA-aware core specialization help me?

This enhancement may help to "even out" the distribution of the application-generated service processes when the `aprun -r` core specialization option is greater than 1.

What is NUMA-aware core specialization?

Core specialization may improve application performance by binding system processes and daemons to a set of cores in each processor. Initially, only one specialized core per node was allowed. In CLE 3.1.UP01, this limitation was removed. This feature provides more support for core specialization for specialized cores greater than 1. ALPS allocates specialized cores round-robin across the NUMA nodes on a node (starting with the highest-numbered core on the highest-numbered NUMA node), unless the user specifies the `aprun -cc cpu_list` option. In that case, specialized cores are allocated from the highest-numbered cores, avoiding the cores in *cpu_list*.

Where can I find more information?

For more information on how to use core specialization, see the `aprun(1)` man page and *Workload Management and Application Placement for the Cray Linux Environment*.

1.1.6 Cray XT5 and Cray XT4 Systems Supported

Who will use this functionality?

All users and administrators on Cray XT5 and Cray XT4 systems.

What is required to install CLE 3.1 on these systems?

Moving from CLE 2.2 to CLE 3.1 requires a migration from SLES 10 SP2 to SLES 11. The migration process involves preserving some of your local configuration data from the CLE 2.2 system set, performing an initial install of CLE 3.1 on a different system set, and finally restoring the preserved configuration data. Lustre file system data is preserved.

What prerequisites do I need to know about?

The System Management Workstation (SMW) must be running the SMW 5.1 release. To install the SMW 5.1 release on your SMW, you must run release version CLE 2.2.UP03 or later on your Cray XT system.

Note: To run SMW 5.1 with CLE 2.2.UP02, you must contact your Cray service representative and request a special CLE 2.2.UP02 release package that includes modifications to the CLE installation software.

Where can I find more information?

To move from CLE 2.2 to CLE 3.1 on a Cray XT5 or Cray XT4 system, follow *Migrating to Cray Linux Environment (CLE) 3.1 Software for Cray XT Systems* (S-2489).

If you have a Cray XT5 that is being hardware upgraded to a Cray XE system, select either a single phase or a dual phase migration path as follows:

For a single phase migration, start with a Cray XT5 system running CLE 2.2 and directly migrate to a Cray XE6 or Cray XE5 system running CLE 3.1 (follow *Migrating a Cray XT System with Cray Linux Environment (CLE) 2.2 to a Cray XE System with CLE 3.1* (S-0035) and specific sections in *Installing and Configuring Cray Linux Environment (CLE) Software* (S-2444) as directed.)

For a dual phase migration, first move from CLE 2.2 to CLE 3.1 (follow *Migrating to Cray Linux Environment (CLE) 3.1 Software for Cray XT Systems*.) Following a successful software migration, upgrade CLE 3.1 for SeaStar systems to CLE 3.1 for Gemini systems along with the hardware replacement (follow *Upgrading a Cray XT System with Cray Linux Environment (CLE) 3.1 to a Cray XE System with CLE 3.1*) (Deferred).

For more information, see Field Notice Number 5673c.

1.2 Software Enhancements in CLE 3.1.UP01

1.2.1 Gemini Network Resiliency and Congestion Management

Who will use these enhancements?

End-users, system administrators, and site analysts.

How can these enhancements help me?

Network congestion is inherent in any High Performance Computing (HPC) high speed interconnect. Cray's software and hardware are designed to minimize the effects of network congestion. This release includes system software enhancements, administrative recommendations, and user documentation, which together help to prevent network congestion or to protect user jobs and data if congestion occurs.

What are the network resiliency and congestion management enhancements?

The CLE 3.1.UP01 and SMW 5.1.UP01 releases provide the following software enhancements and documentation to improve network resiliency and manage network congestion on Cray XE systems with a Gemini based system interconnection network.

- New user documentation describes some cases where congestion can occur and how to modify PGAS and SHMEM applications to minimize the potential for inducing network congestion.
- The Hardware Supervisory System (HSS) includes new software that monitors the Gemini network and, if necessary, throttles traffic to alleviate the complications due to congestion.

For more information, see Field Notice Number 5673c.

- System administrators can use new information about Gemini High Speed Network (HSN) routing to identify and potentially modify unrouteable network configurations.

- To improve network resiliency on the HSN, system software on the L0 automatically brings up lanes that have been downed.
- System software changes include selective link speed increases and improvements to the HSN routing algorithm (*zone routing*). These adjustments can improve global HSN communication performance by as much as 15 to 25 percent. For more information, contact your Cray service representative.

1.2.2 Repurposed Compute Nodes

Who will use this feature?

System administrators and site analysts.

How can repurposed compute nodes help me?

You can improve performance or maintainability of some Cray system services by moving the service to a dedicated node instead of sharing resources with other services on an existing service node.

You do not need to make hardware configuration changes (swapping modules) to configure additional nodes with a service node role; you can implement a flexible approach to service node configuration on an as-needed basis.

The addition of service nodes can increase throughput for some functions. For example, multiple DVS servers working in parallel can increase I/O throughput; multiple MOM nodes can allow additional jobs to run in parallel.

For some services, configuring additional service nodes can increase redundancy and minimize the negative impact of a failed service node.

What does this feature do?

The CLE 3.1.UP01 release includes new functionality that supports booting compute node hardware with service node images. By using this functionality to change the role of a compute node, you can add additional service nodes for services that do not require external connectivity.

Some services on Cray systems have resource requirements or limitations (for example, memory, processing power or response time) that you can address by configuring a dedicated service node, such as a Cray Data Virtualization Service (Cray DVS) node or a batch system management (MOM) node. On Cray XE and Cray XT systems, service I/O node hardware (on a service blade) is equipped with Peripheral Component Interconnect (PCI) protocol card slots to support external devices. Compute node hardware (on a compute blade) does not have PCI slots. For services that do not require external connectivity, you can configure the service to run on a single, dedicated compute node and avoid using traditional service I/O node hardware.

When you configure a node on a compute blade to boot a service node image and perform a service node *role*, that node is referred to as a *repurposed compute node*.

Cray tests and supports the following services on repurposed compute nodes: DVS servers, Moab TORQUE MOM nodes, and PBS Professional MOM nodes.

Note: Support for repurposing a compute node as a PBS Professional MOM node was originally deferred but is now supported.

Where can I find more information?

A new Cray publication, *Repurposing Compute Nodes as Service Nodes on Cray XE and Cray XT Systems* (S–0029–3101) describes the feature and provides implementation procedures.

Note: The information in this new document supersedes procedures to manually configure compute nodes as compute node root servers for DSL (using DVS) in the following documentation:

- *Installing and Configuring Cray Linux Environment (CLE) Software* (S–2444–31)
- *Managing System Software for Cray XE and Cray XT Systems* (S–2393–31)

1.2.3 Lustre Upgraded to Version 1.8.2

Who will use this feature?

All users and administrators on Cray systems that use the Lustre file system.

How can this new version of Lustre help me?

A large number of existing problems are fixed with this new version of Lustre.

What does upgrading to Lustre 1.8.2 do?

When you update a CLE 3.0 or CLE 3.1 system to CLE 3.1.UP01, your Lustre file system software is automatically upgraded from version 1.8.1 to version 1.8.2. This change is transparent to both users and administrators.

Where can I find more information?

Refer to <http://wiki.lustre.org>. For information about upgrades to Lustre 1.8 from Lustre 1.6, see *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31).

1.2.4 Application Completion Reporting

Who will use this feature?

System administrators and site analysts.

How can ACR help me?

Application Completion Reporting (ACR) provides a way to track, manage, and report application data, which gives system administrators an effortless way to see how system resources are being allocated.

Data provided by ACR reports can make it easier to see where system resources are being used so that recommendations can be made for application improvement, different allocation schemes, or use of different time slices.

What does ACR do?

ACR extends the data persistence schema from Cray Management Services (CMS) and provides three commands to examine and report application data.

- Use the `mz job` command to examine reservation data; you can specify the format of the search output so that you can use it in other programs or scripts.
- Use the `mz report` command to examine application completion status information; the command supports claims (applications), jobs (reservations), or user completion status.
- Use `mz2attr` to read and display node attributes.

ACR requires CLE 3.1.UP01 or later and SMW 5.1.UP01 or later; support for this feature was deferred in earlier SMW and CLE releases.

Where can I find more information?

Using Cray Management Services (CMS) (S-2484-5101) and the `mz job(8)`, `mz report(8)` and `mz2attr(8)` man pages.

1.2.5 Topology and NID Ordering on Cray XE Systems

Who will use this feature?

End-users, site-analysts, and system administrators.

How can this feature help me?

The Application Level Placement Scheduler (ALPS) "xyz-by2" node ordering feature provides performance improvements for larger applications that run on Cray XE systems with no user interaction. System administrators can implement the new ordering with only a single configuration option change to the `/etc/sysconfig/alps` file on the boot node.

What does this feature do?

The node ordering functionality directs ALPS to use a node ordering option that results in better application performance for larger applications run on Cray XE systems.

Cray's first method for application placement on nodes along the interconnect torus was to use the node ID (NID) number list and place applications on nodes in this numerical order. Later, the simple "xyz" placement method was added, which reordered the sequence of NID numbers, used in assigning placements, in a natural 3D communications sequence (that is, following the torus, not the chassis and cabinet layout). The original numerical ordering method provides good "packing" for small numbers of nodes, but for large applications, there are "clumps" of nodes that spread across the machine, which causes inter-application traffic contention on the interconnect. With the "xyz" placement, available with previous releases of CLE, the applications are better isolated, but smaller applications are spread more thinly, losing some of the advantage.

New with this release, the "xyz-by2" NID reordering method combines the incidental small node packing of the simple NID number method with the inter-application interaction reduction of the "xyz" method.

To implement this node ordering, system administrators must set the `ALPS_NIDORDER="-O2"` parameter in the `/etc/sysconfig/alps` configuration file and make identical changes to the file of the same name on the shared root. If configured, a custom ordering is created when ALPS is started on the boot node, triggered in the `/etc/init.d/alps` script file, and used by the `apbridge` component of ALPS.

You should change the `ALPS_NIDORDER` parameter **only** at system reboot time.

Previously, this feature was supplied to selected customers via a software patch. While the internal mechanism used to implement this feature remains the same, the configuration method has changed. The preferred method is to set the `ALPS_NIDORDER` parameter in the `/etc/sysconfig/alps` file. The configuration instructions provided with the patch are obsolete and should no longer be used.

Where can I find more information?

The `apbridge(8)` man page was updated for the CLE 3.1.UP01 release.

1.3 Software Enhancements in CLE 3.1.UP00

For information about feature content in the initial or base CLE 3.1 release (CLE 3.1.UP00), see *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31).

1.4 Bugs Addressed Since the Last Release

The primary purpose of each CLE 3.1 update package is to provide fixes for the release. The list of customer-filed bug reports that were closed with CLE 3.1 releases is included in the *CLE 3.1 Errata*; this document is provided with the release package.

1.4.1 Resolved Limitations

The following features or capabilities were identified as limitations with an earlier CLE 3.1 release and were described in the *CLE 3.1 Limitations* document. These issues are now resolved in the update release indicated.

1.4.1.1 CLE 3.1.UP02

1.4.1.1.1 Checkpoint/Restart Supported with Cray XT Systems Running CLE 3.1

The CLE 3.1.UP01 Limitations document states that with CLE 3.1, Checkpoint/Restart is not functional on Cray XT systems. The CLE 3.1.UP02 update release removes this limitation. For additional information, see *Managing System Software for Cray XE and Cray XT Systems* for more information on Checkpoint/Restart.

1.4.1.2 CLE 3.1.UP01

1.4.1.2.1 LSI RDAC Support

Beginning with the CLE 3.1.UP01 update release, the integrated LSI Redundant Disk Array Controller (RDAC) code is updated to version V09.03.0C00.0214 to support all models and firmware releases of LSI hardware. For additional information about support for multipathing I/O in the CLE 3.1 release, see *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31), Section 2.15.1 "Support for Multipathing I/O"; This document is also provided with the release package.

Note: Replace the last paragraph in the referenced section with the following, corrected, statement regarding performance impact: Multipathing functionality does not negatively impact I/O performance during normal system operations. In the event of a failure, Multipathing functionality may impact performance depending on the multipath configuration, failure scenario and I/O workload on your system.

1.4.1.2.2 Number of Cores Support for Core Specialization

The *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31) states that with CLE 3.1, only `r=1` is supported for the Core Specialization feature. The CLE 3.1.UP01 update release removes this limitation. You can specify a value for cores greater than or equal to one for the `aprun -r cores` option to enable core specialization. For additional information, see the *Workload Management and Application Placement for the Cray Linux Environment* and the `aprun(1)` man page.

1.4.1.2.3 Huge Page Support for Both Dynamically and Statically Linked SHMEM, UPC and CAF Applications on Cray XE Systems

Beginning with CLE 3.1.UP01 release, SHMEM, Unified Parallel C (UPC), and Co-Array Fortran (CAF) applications on Cray XE systems may be either statically or dynamically linked with `libhugetlbfs`. For additional information, see the `intro_hugepages(1)` man page that is released in the `xt-asyncpe 4.2` package.

1.5 Compatibilities and Differences

The *README* document that is included with the release package describes compatibility issues and functionality changes that you should be aware of after you install a CLE 3.1 update release on a Cray system that was running an earlier version of the CLE 3.1 release; for example, a CLE 3.1.UP01 to CLE 3.1.UP02 update installation.

For information about compatibility issues and functionality changes after you migrate or upgrade from the CLE 2.2 or CLE 3.0 releases, see the *Compatibilities and Differences* chapter in *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31).

The *README* document also includes additional documentation or changes to the documentation identified after the documentation for this release was packaged.

Support Requirements [2]

2.1 Supported Cray System Hardware Platforms

The CLE 3.1.UP02 update release supports Cray XE6, Cray XE5, Cray XE5m, Cray XT6, Cray XT6m, Cray XT5, Cray XT5m, Cray XT4 systems.

2.2 Supported Software Upgrade Path

2.2.1 System Management Workstation (SMW) Requirements

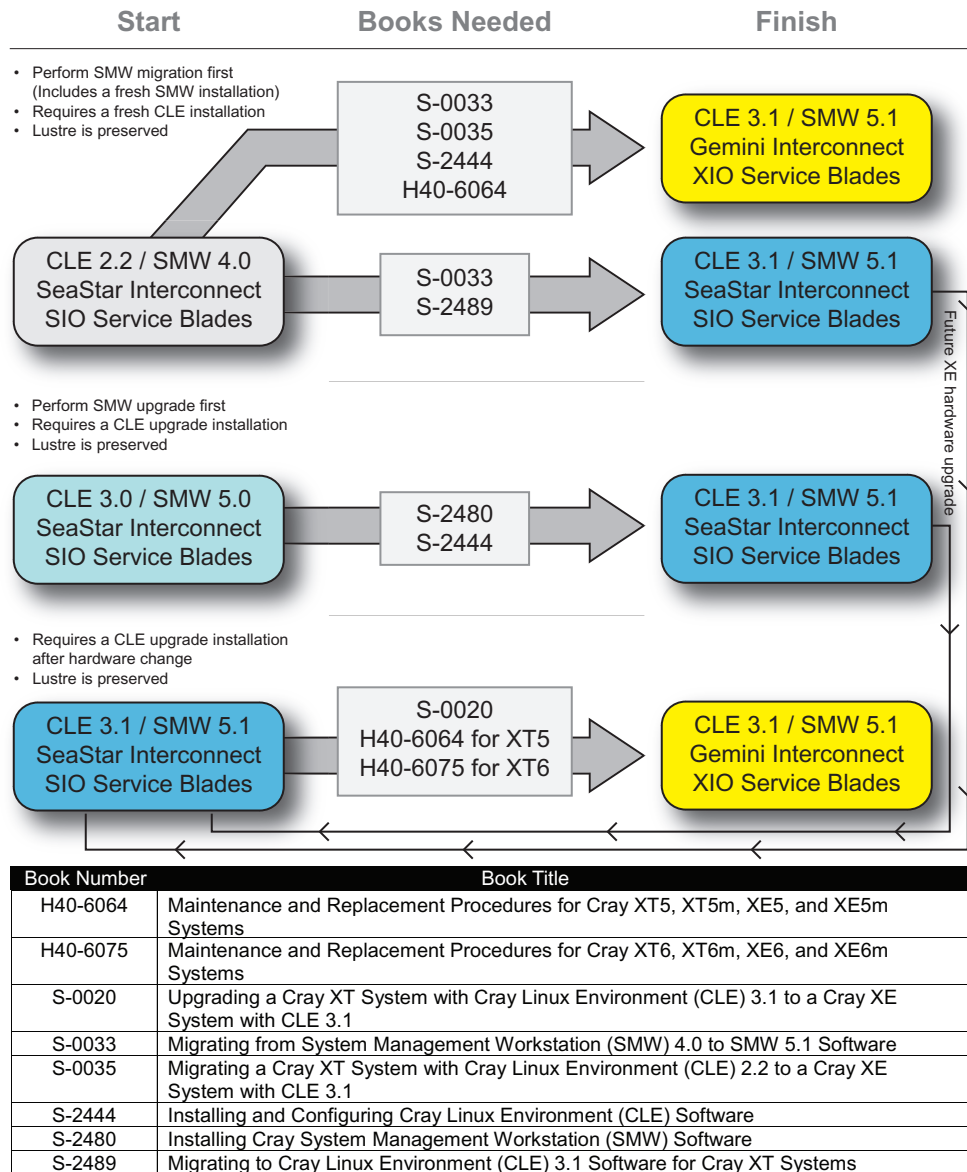
The System Management Workstation (SMW) must be Restriction of Hazardous Substances (RoHS) compliant and must be running the SMW 5.1.UP02 release before you install the CLE 3.1.UP02 update release package. For additional information, see the SMW *README* document included with the SMW release package.

Note: If you have a Cray XT system, you must run release version CLE 2.2.UP03 or later to install the SMW 5.1 release on your SMW. To run SMW 5.1 with CLE 2.2.UP02, contact your Cray service representative and request a special CLE 2.2.UP02 release package that includes modifications to the CLE installation software.

2.2.2 Supported CLE Software Installations

The CLE 3.1 release supports four types of software installations. CLE software installation types are described in *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31).

[Figure 1](#) visualizes the upgrade, update, migration, and installation processes for various Cray hardware paths. The CLE 3.1.UP02 update release supports the following software installations:

Figure 1. CLE Migration Roadmap

- **Initial** or new software installations on the following platforms: Cray XE6, Cray XE6m, Cray XT6, Cray XT6m, Cray XE5, Cray XE5m, Cray XT5, and Cray XT4 systems.
- **Update** installations from CLE 3.1.UP00 and CLE 3.1.UP01.
- **Upgrade** installations from CLE 3.0 on Cray XT6 systems.
- **Upgrade** software installations on Cray XT5 or Cray XT6 systems running CLE 3.1 that have been hardware upgraded to Cray XE systems.

Note: This type of installation requires that you install 3.1.UP02 or later on your Cray XE system after upgrading the hardware.

- (Deferred Implementation) **Migration** installations from CLE 2.2 on Cray XT4 and Cray XT5 systems.

Note: This type of installation requires an initial installation with modifications to preserve Lustre file systems.

- **Migration** installations from CLE 2.2 on Cray XT5 systems that have been hardware upgraded to Cray XE6 or Cray XE5 systems.

Note: This type of installation requires an initial installation with modifications to preserve Lustre file systems and reconfigure CLE for Gemini.

System administrators may want to advise users on compatibility of binaries between the various migration, update, and upgrade paths. Please refer to *Cray Linux Environment (CLE) Software Release Overview* for more information on binary compatibility when installing CLE 3.1.

2.3 Binary Compatibility

A previous version of the *Cray Linux Environment (CLE) Software Release Overview* stated that application binaries built using dynamic libraries did not require recompiling. The language in that statement remains accurate. However, applications written in C++ or Partitioned Global Address Space (PGAS) programming models must be recompiled when migrating applications.

2.4 Additional Software Requirements

2.4.1 Release Level Requirements for Other Cray Software Products

Cray Linux Environment (CLE) 3.1 Software Release Overview (S-2425-31) includes a table of other Cray software products supported with CLE 3.1 and the minimum release level required for verified compatibility. The information in this table applies to CLE 3.1 update releases with the following exceptions:

- The System Management Workstation (SMW) must be upgraded to the SMW 5.1.UP02 release before you install the CLE 3.1.UP02 update release package. For more information, see the *README* document included with the SMW release package.
- The System Management Workstation (SMW) must be upgraded to the SMW 5.1.UP01 release before you install the CLE 3.1.UP01 update release package. For more information, see the *README* document included with the SMW release package.

- Cray Application Developer's Environment (CADE) must be upgraded to the most current version (at time of release this is 5.06) to ensure compatibility with the CLE 3.1.UP02 release package. For CADE release information, see *Cray Application Developer's Environment Installation Guide* (S–2465).

Support for other Cray software products is provided in the form of updates to the latest released version only. Unless otherwise noted in the associated release documentation, Cray recommends that you continue to upgrade these releases as updates become available.

2.4.1.1 Programming Environments Requirements for Migrations

Perform the following programming environments changes after migrations involving upgrade installations of Cray XT systems from CLE 3.0 to 3.1 or Cray XT to Cray XE systems hardware running CLE 3.1:

Uninstall and Reinstall:

- PGI
- Intel
- Cray Performance Tools
- Cray MPT (Message Passing Toolkit) — Cray MPT 5.0 or later is required for Gemini-based systems
- Chapel

For upgrades to the Gemini-based interconnect, Cray recommends you remove the following:

- SeaStar RPMs for Cray MPT
- Portals RPMs

Cray also recommends that you use the most recent version level of the Cray Compiling Environment as the default.

2.4.2 Third-party Software Requirements

Cray Linux Environment (CLE) 3.1 Software Release Overview (S–2425–31) includes a section that lists third-party software requirements for the CLE 3.1 release; this information applies to CLE 3.1 update releases.

Information regarding supported and certified batch system software release levels is available on the CrayPort website at <http://crayport.cray.com>. Click on **3rd Party Batch SW** in the menu bar.

Cray recommends that you continue to upgrade these products as updates become available.

3.1 Cray-developed Books Provided with This Release

[Table 1](#) list the books provided with the CLE 3.1 release and indicates which books are new or revised with this update release. The most recent version of each book is provided with the release package.

For information about additional documentation resources and accessing documentation, see *Cray Linux Environment (CLE) 3.1 Software Release Overview* (S-2425-31), which is also provided with the release package.

Table 1. Books Provided with This Release

Book Title	Number	Updated
<i>Cray Linux Environment (CLE) Software Release Overview Supplement</i> (this document)	S-2497-3102	Yes
<i>Cray Linux Environment (CLE) Software Release Overview</i>	S-2425-31	No
<i>Installing and Configuring Cray Linux Environment (CLE) Software</i>	S-2444-3102	Yes
<i>Managing System Software for Cray XE and Cray XT Systems</i>	S-2393-3102	Yes
<i>Managing Lustre for the Cray Linux Environment (CLE)</i>	S-0010-31	No
<i>Introduction to Cray Data Virtualization Service</i>	S-0005-3102	Yes
<i>Writing a Node Health Checker (NHC) Plugin Test</i>	S-0023-3101	No
<i>Workload Management and Application Placement for the Cray Linux Environment</i>	S-2496-3102	Yes
<i>Using the GNI and DMAPP APIs</i>	S-2446-3102	Yes
<i>Repurposing Compute Nodes as Service Nodes on Cray XE and Cray XT Systems</i>	S-0029-3101	No
<i>Lustre Operations Manual</i>	S-6540-1813	No
<i>CrayDoc Installation and Administration Guide</i>	S-2340-411	No

Book Title	Number	Updated
<i>Upgrading a Cray XT System with Cray Linux Environment (CLE) 3.1 to a Cray XE System with CLE 3.1</i>	S–0020–3102	New
<i>Migrating a Cray XT System with Cray Linux Environment (CLE) 2.2 to a Cray XE System with CLE 3.1</i>	S–0035–3102	New
<i>Migrating to Cray Linux Environment (CLE) 3.1 Software for Cray XT Systems</i>	S–2489–3102	New

3.1.1 CLE Migration Publications

The following publications provide procedures for CLE 3.1 upgrade or migration scenarios.

- If you have a new system, follow *Installing and Configuring Cray Linux Environment (CLE) Software* (S–2444) to perform an initial installation of the CLE software.
- If you have a system that is already running CLE 3.1, follow *Installing and Configuring Cray Linux Environment (CLE) Software* (S–2444) to install a new CLE 3.1 update release.
- If you have a Cray XT6 system running CLE 3.0, follow *Installing and Configuring Cray Linux Environment (CLE) Software* (S–2444) to upgrade to CLE 3.1.
- If you have a Cray XT5 or Cray XT6 system running CLE 3.1 and your system is being hardware upgraded to a Cray XE system, follow *Upgrading a Cray XT System with Cray Linux Environment (CLE) 3.1 to a Cray XE System with CLE 3.1* (S–0020).
- (Deferred Implementation) If you have a Cray XT4 or Cray XT5 system running CLE 2.2, follow *Migrating to Cray Linux Environment (CLE) 3.1 Software for Cray XT Systems* (S–2489) to install CLE 3.1 for SeaStar systems.
- If you have a Cray XT5 system running CLE 2.2 and your system is being hardware upgraded to a Cray XE6 or Cray XE5 system, follow *Migrating a Cray XT System with Cray Linux Environment (CLE) 2.2 to a Cray XE System with CLE 3.1* (S–0035) and specific sections in *Installing and Configuring Cray Linux Environment (CLE) Software* (S–2444) as directed.

3.2 Changes to Man Pages

3.2.1 New Cray Man Pages CLE 3.1.UP02

- `xtverifydefaults(8)`: Verifies and fixes inconsistent system default links within the shared root.

3.2.2 New Cray Man Pages CLE 3.1.UP01

- `xtorder2db(8)`: Converts a text file to values in the `od_allocator_id` field of the processor table in the Service Database (SDB).
- `xtodb2order(8)`: Converts the processor table `od_allocator_id` field in the SDB to a text file.

3.2.3 Changed Cray Man Pages

3.2.3.1 CLE3.1.UP02

- `apbridge(8)`: Updated to add `-Oy` and other NID ordering clarifications from CLE3.1.UP01
- `aprun(1)`: Updated hugepage information; updated `-r` option; added text for `-T`; revised `-t` option text
- `apstat(1)`: Updated with text to describe unbound and `pendCancel States`.
- `xtopview(8)`: Invokes `xtverifydefaults` during exit processing.
- `xtcheckhealth(8)`: Updated new and changed exit codes in the RETURN VALUES section
- `xtcleanup_after(8)`: Updated new and changed exit codes in the RETURN VALUES section
- `rsipd.conf(5)`: Changed `initial_lease_time` option default setting to 60; system administrators may wish to change the value of `initial_lease_time` in `/etc/opt/cray/rsipd/rsipd.conf` from its default of 60 seconds to a larger value (600 seconds is suggested) to strike a balance between clients renewing their leases too often and clients taking a long time to recover after an RSIP server outage.

3.2.3.2 CLE 3.1.UP01

- `aprun(1)`: Includes descriptions of the following environment variables: `APRUN_DEFAULT_MEMORY`, `APRUN_XFER_LIMITS` and `APRUN_SYNC_TTY`.
- `apbridge(8)`: Includes a new `-O2` option for the `ALPS_NIDORDER` parameter to provide the "xyz-by2" NID reordering method.
- `basil(7)`: Corrected `ENGINE` query output; marked `-s1`, `-sn`, and `-S` option not for exclusive use; changed `reservation_mode` default to `unset`, use `apsched` default; changed `gemini` in 1.1 to `router_id`.
- `CLEinstall.conf(5)`: Includes new default network mask for Cray XE systems; clarifies that `sdbnode_failover_interface` must be set even if SDB node failover is not configured.
- `xtcleanup_after(8)`: Includes a new `-i` option to allow callers to specify a string in place of the APID when printing to the console.
- `xtnodestat(8)`: Includes a detailed description of the legend; explains how repurposed compute nodes are displayed.