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LoadLeveler V2R2
Installation Memo

AIX

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Software

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Year 2000

The product documented in this manual is Year 2000 Ready.

Contents

Chapter 1. Introduction

This memo describes how to install LoadLeveler Version 2 Release 2.0, program number 5765-D61 for AIX 4.3.3.

Note that in this document, the IBM RISC System/6000 Scalable POWERparallel Systems hardware platform is referred to as the “SP.”

Chapter 2. Pre-Installation Planning

This section explains the things you should be aware of before you install LoadLeveler.

Installation Overview

The steps you need to take to install LoadLeveler are the following:

1. Install AIX 4.3.3 (a prerequisite for LoadLeveler Version 2 Release 2).
2. If you plan to run POE jobs in user space mode with LoadLeveler on a SP, you must install the Job Switch Resource Table Services fileset (**ssp.st. 3.1** or later compatible releases) of the PSSP install image.

   For more information on running interactive POE jobs under LoadLeveler, see the “Administration Tasks for Parallel Job” chapter of *LoadLeveler: Using and Administering*.
3. If you plan to configure LoadLeveler to exploit DCE security, you must install the **ssp.clients 3.2** SP Authenticated Clients Commands fileset of the PSSP install image.

   For more information on configuring LoadLeveler to exploit DCE security, see “Configuring LoadLeveler to use DCE Security Services” in *LoadLeveler: Using and Administering*.
4. Make configuration decisions, including:
   - Decide which machine will act as the central manager, and decide which machines will be backup central managers
   - Decide on the locations of the home and local directories for the LoadLeveler user ID
   - Decide which directories will be shared directories, and which will not be shared.
5. Set up the LoadLeveler user ID and group ID on the central manager machine.
6. Receive the install image.
7. Run the installation script.
8. Update configuration files.
9. Repeat the installation process for each workstation in the LoadLeveler cluster.

The above tasks are described in detail in this document.

About the LoadLeveler Filesets

Table 1 shows the filesets that comprise the LoadLeveler product. It also shows their associated AIX directories after installation.

Note that in this document *lang* refers to the abbreviated name for a language locale, such as en_US or Fr_FR.

Table 1. LoadLeveler Filesets and Their Associated Directories

Fileset	Description	Associated Directory
LoadL.full	LoadLeveler	/usr/lpp/LoadL/full
LoadL.so	Submit-Only LoadLeveler	/usr/lpp/LoadL/so
LoadL.msg.*lang*	Messages and man pages for the supported languages	Various subdirectories under /usr
LoadL.html	HTML pages	/usr/lpp/LoadL/html
LoadL.pdf	PDF documentation	/usr/lpp/LoadL/pdf
LoadL.tguides	Configuration tasks	/usr/lpp/LoadL/codebase/tguides

The LoadLeveler product is available through the LoadLeveler install image either on tape or on CD. At times, the LoadLeveler install image is also given as an AIX file. To view the filesets that are available to you, enter the following command:

```
installp -l -d device
```

where *device* is as explained following Table 2 on page 14.

Configuration Planning

An integral part of the installation of LoadLeveler is to configure your nodes. *LoadLeveler: Using and Administering* has full details regarding configuration. Configuration information includes the following:

Configuration Information	Default Value
LoadLeveler user ID and group ID	**loadl** is the LoadLeveler user ID and the LoadLeveler group ID
The configuration directory.	The home directory of **loadl** is the configuration directory
The global configuration file	**LoadL_config** is the name of the configuration file

The keywords **LOCAL_CONFIG** and **ADMIN_FILE** in the global configuration file define the full path names of the local configuration and the administration files. The global configuration file specifies system attributes common to all nodes. The administration file specifies attributes specific to individual nodes. The information given in the local configuration file is specific to an individual node. It overrides the corresponding information given in the global configuration file.

LoadLeveler assumes a common name space. This means that a user needs the same user ID and group ID on all machines in a LoadLeveler cluster. The term cluster refers to all machines mentioned in the LoadLeveler configuration file. See *LoadLeveler: Using and Administering* for information on when you might choose to *not* have a login ID for a user on a particular node.

You may define your own LoadLeveler user ID and/or group ID. Note however that if you use an ID other than **loadl**, you have to substitute this new ID into all appropriate installation instructions in this document. Also, you must create a file called **/etc/LoadL.cfg** and place it in the local directory **/etc** of each of the nodes in your LoadLeveler cluster. In the LoadL.cfg file, you specify the following three keywords:

LoadLUserid
: Specifies the LoadLeveler user ID

LoadLGroupid
: Specifies the LoadLeveler group ID

LoadLConfig
: Specifies the full path name of the configuration file.

See “Changing the LoadLeveler User ID” on page 13 for additional information.

General Considerations

- Many of the steps for installing LoadLeveler must be performed as root. Therefore, you need superuser authority on each machine in the cluster.
- AIX/UNIX commands are case sensitive. Therefore, you must enter commands, directory names, and so on exactly as they appear in this document.
- Many of the install steps for AIX contain examples of input for using the System Management Interface Tool (SMIT) fields or commands that assume you are using standard LoadLeveler directories and names. If you do not use the standard names, you must modify the examples accordingly. This is especially true for the LoadLeveler local and home directories.

- To use the **llctl** command to start remote machines in a cluster, all LoadLeveler administrator user IDs must have **rsh** privileges on all machines in the cluster. Check the appropriate AIX (or UNIX) Commands Reference for more information on the files used by **rsh** such as **$HOME/.rhosts** and **/etc/hosts.equiv**.
- The **LoadL_master** daemon is root-owned and setuid-executable. If the release directory will be shared among machines in the cluster using NFS, you must allow all files to be **world-readable** (by default), or you must export the file system with root permission to all hosts that will be running LoadLeveler. When mounting the file system, do not use the flag **-nosuid**.
- LoadLeveler log files should be stored locally at the nodes for best performance.
- The **LoadL.html** fileset contains HTML versions of the LoadLeveler documentation. If you install this fileset, the HTML files are located in **/usr/lpp/LoadL/html**. Since other programs access these files, the files should not be moved from this directory.
- LoadLeveler can be run with full DCE security services. If you wish to enable DCE services, see "Configuring LoadLeveler to use DCE Security Services" in the "Administering and Configuring LoadLeveler" chapter of *LoadLeveler: Using and Administering*.

Migration Considerations

This section discusses considerations for migrating your current version of LoadLeveler to LoadLeveler 2.2. There are two separate ways you can migrate LoadLeveler:

- Take down all the machines and migrate the entire cluster at once. This is the **required** path if you are migrating from LoadLeveler 1.3.
- Migrate your cluster node-by-node. This path is only available to users migrating from 2.1 to 2.2, and who have applied the appropriate LoadLeveler 2.1 PTF (for APAR IY06027) which allows a mixed-cluster environment. You should migrate the Central Manager machine first.

Whichever method you choose, you should make backup copies of the following files:

- **LoadL_admin**, the LoadLeveler administration file.
- **LoadL_config**, the LoadLeveler global configuration file.
- **LoadL_config.local**, the LoadLeveler local configuration file.

Note: If you're running Parallel Environment (PE), LoadLeveler, and Parallel System Support Programs (PSSP), see the chapter "Planning for Migration" in *RS/6000 SP Planning Volume 2, Control Workstation and Software Environment* for supported software levels.

Handling Running Jobs

It is recommended that you let your existing LoadLeveler jobs run to completion before you attempt to migrate from 1.3 or 2.1 to 2.2.

Migrating LoadLeveler

Follow these steps to migrate either the entire cluster or machine-by-machine.

1. Drain the machines you are migrating so that all running jobs complete. Idle jobs will remain in the Idle state. Use the **drain** option of the **llctl** to drain the machines. For information on **llctl**, see *IBM LoadLeveler: Using and Administering*.
2. After all running jobs have completed and only idle jobs remain in the job queue, issue **llctl stop** to stop LoadLeveler on the machines you are migrating. You can use **llctl -g stop** to stop LoadLeveler on all machines if you are migrating the entire cluster.
3. Run the **llacctmrg** command to collect accounting information on each machine you are migrating which is running the **schedd** daemon.
4. Perform a backup of all the files in the LoadLeveler **spool** directory on every machine you are migrating running the **schedd** daemon.
5. Install LoadLeveler 2.2. Follow the steps in "Chapter 3. Installing LoadLeveler" on page 11.

6. Restore the files saved in Step 4 to the appropriate **spool** directories.
7. If you are migrating from 1.3, run the **lldbconvert** command with the **-f** and **-c** options to convert jobs from 1.3 format to 2.*x* format. For more information, see “lldbconvert: Job Migration Utility”.
8. Issue **llctl start** (or **llctl -g start** for the entire cluster) to bring up 2.2. Any jobs carried over will run in the upgraded cluster.

Handling Checkpoint Jobs

To allow LoadLeveler 1.3 checkpoint jobs to run under 2.2, you must recompile and relink the application using the 2.2 compile scripts.

APIs

LoadLeveler provides application programming interfaces (APIs) that allow application programs written by customers to use specific data or functions that are part of LoadLeveler. These APIs are enabled such that user programs that use them do not need to be recompiled when an installation migrates from LoadLeveler to a newer version of LoadLeveler. The only stipulation is that at the time the user program was compiled and linked, it had to have been dynamically linked with the **libllapi.a** library. Programs that were statically linked with the 1.3 or 2.1 version of **libllapi.a** do need to be relinked (either statically with the current version of **libllapi.a** or, preferrably, dynamically with the path to the current version of **libllapi.a**, **/usr/lpp/LoadL/full/lib**). The sample Makefiles in **/usr/lpp/LoadL/full/samples/*** use dynamic linking.

Note that a user program compiled with a previous version of LoadLeveler is limited to the information specific to that release. Thus, if you have a user program compiled in 2.1, you do not absolutely have to recompile to use it in 2.2, but you would not see any of the new function specific to LoadLeveler 2.2. To see the new function specific to 2.2, you would have to recompile with the 2.2 version of **llapi.h**.

lldbconvert: Job Migration Utility

Administrators can use the **lldbconvert** utility to convert jobs from 1.3 format to 2.*x* format.

Syntax

```
lldbconvert [-H] [-v] [-f] [-c]
```

Where:

-H Displays help information.

-v Displays the version number.

-f Specifies a forward migration of the job queue. This flag converts the files **job_queue.dir** and **job_queue.pag** in the **spool** directory from 1.3 format to 2.2 format.

-c Converts any **OpSys=="***your_os***"** requirements statements to **OpSys=="AIX43"** where *your_os* can be any valid operating system. This flag also adds the **wall_clock_limit=unlimited** statement to jobs that do not already contain this keyword.

Usage Notes

On machines where jobs need to be migrated, login as **loadl** (or the primary LoadLeveler user ID defined in **/etc/LoadL.cfg**) and run **lldbconvert** from the local LoadLeveler **spool** directory.

The **-c** flag is needed since jobs with a requirement of **Opsys==AIX42** will not run in a 2.2 cluster. This flag converts requirements statements in the form **OpSys=="***your_os***"**. Statements in other formats (such as those with *your_os* not enclosed in double quotes) are not converted.

The **-c** flag is also needed since the Backfill scheduler requires that a **wall_clock_limit** is set.

When you create the **LoadL_admin** file for the version to which you are migrating, you should preserve all the job class definitions used in the version from which you are migrating. For example, if a converted job needs to run as a `large` class job, and class `large` is not defined in the 2.2 **LoadL_admin** file, the job will never be run.

lldbconvert only converts job steps that are in one of the following states: Idle, Hold, Deferred, or NotQueued. If the conversion is successful, you will receive further instructions from **lldbconvert** on what to do before starting LoadLeveler on the given machine.

Once you run **lldbconvert**, do not move the converted job queues to another **schedd** machine.

Hardware, Software, and Disk Requirements

Planning for installation requires two main tasks: ensuring you have the correct software and hardware installed, and allocating the correct amount of disk space for directories.

The software and hardware requirements listed below apply to all platforms unless specifically stated otherwise.

Note: The customer is responsible for licensing and installing these products and integrating them with LoadLeveler.

Hardware Requirements

LoadLeveler runs on the following platforms:
- IBM RISC System/6000 Scalable POWERparallel Systems SP
- IBM RISC System/6000 family

Note that the machine on which you run the LoadLeveler graphical user interface (GUI) should have an all-points-addressable 1284 x 1024 pixel color display.

Software Requirements

Both the RISC System/6000 platform and the SP platform require the following software (or later compatible releases):

- AIX Version 4 Release 3.3 or later compatible releases
- AIXWindows Environment Version 4 Release 3.3 (program number 5765-C34) (Only required if using the graphical user interface)
- The Job Switch Resource Table Services fileset (**ssp.st 3.1** or later compatible releases) of the PSSP install image (if you plan to run POE jobs in user space mode with LoadLeveler on a SP)
- SP Authenticated Clients Commands fileset **(ssp.clients 3.2)** of the PSSP installp image (if you plan to configure LoadLeveler to support DCE security services)

Disk Space Requirements

After installation, certain directories require specific amounts of disk space.

Directory	**Bytes**
release directory (/usr/lpp/LoadL/full)	27MB
local directory	15MB (minimum)
home directory	no limits unless same as release or local directory
release directory for Submit-only (/usr/lpp/LoadL/so)	11MB
PDF documentation directory (/usr/lpp/LoadL/pdf)	2MB
HTML pages directory (/usr/lpp/LoadL/html)	2MB
Configuration Tasks Directory (usr/lpp/LoadL/codebase/tguides)	1MB

Configuration Example

The following tables demonstrate one way you can install LoadLeveler. These examples show a LoadLeveler installation on a small pool of workstations connected by a network. Many other configurations are possible.

LoadLeveler Element	Example directory or Location on Central Manager Machine	Example directory or Location on First Node in Cluster
Machine Name	mycenman	mynode01
Central Manager	mycenman	mycenman
Home Directory	/u/loadl (exported)	/u/loadl (mounted)
Local Directory	/var/loadl/mycenman	/var/loadl/mynode01
Release Directory	/usr/lpp/LoadL/full (exported)	/usr/lpp/LoadL/full (mounted)
Global Configuration File	LoadL_config (in home directory) One copy for all machines.	LoadL_config (in home directory) One copy for all machines.
Local Configuration File	LoadL_config.local One copy for each machine.	LoadL_config.local One copy for each machine.
Administration File	LoadL_admin (in home directory) One copy for all machines.	LoadL_admin (in home directory) One copy for all machines.
Log Directory	/var/loadl/mycenman/log (in sub-directory of the local directory)	/var/loadl/mynode01/log (in sub-directory of the local directory)
Spool Directory	/var/loadl/mycenman/spool (in sub-directory of the local directory)	/var/loadl/mynode01/spool (in sub-directory of the local directory)
Execute Directory	/var/loadl/mycenman/execute (in sub-directory of the local directory)	/var/loadl/mynode01/execute (in sub-directory of the local directory)

Entries in the **LoadL_admin** file and the **LoadL_config** file appear in the following table:

LoadL_admin File

```
mycenman: type=machine
          central_manager=true
mynode01: type=machine
          central_manager=false
```

LoadL_config File

```
RELEASEDIR=/usr/lpp/LoadL/full
LOCAL_CONFIG=$(tilde)/$(host)/LoadL_config.local
LOG=/var/loadl/$(host)/log
SPOOL=/var/loadl/$(host)/spool
EXECUTE=/var/loadl/$(host)/execute
```

Chapter 3. Installing LoadLeveler

This section explains how to install LoadLeveler from the product media onto either of the following platforms:

- RISC System/6000 workstation cluster
- RISC System/6000 Scalable POWERparallel System SP

This section also tells you how to configure your LoadLeveler environment. The System Management Interface Tool (SMIT) is recommended for performing the installation, but you can also use the command line to install LoadLeveler.

These installation instructions assume that the LoadLeveler user ID is **loadl**. See “Changing the LoadLeveler User ID” on page 13 for information on using a user ID other than **loadl** as the LoadLeveler user ID.

Step 1: Decide on Directories for LoadLeveler

Use the information in “Installation Overview” on page 3 to decide on the location of the home and local directories. Once you decide, write the locations in the “Actual Directory” column.

LoadLeveler Element	Example Directory	Actual Directory
local directory	/var/loadl	
home directory	/u/loadl	
release directory	/usr/lpp/LoadL/full	/usr/lpp/LoadL/full
name of central manager machine	mycenman	

Important: The local directory must be unique to each machine in the cluster and must not be shared by any other machines in the cluster. Also, each machine must have its own LoadLeveler **spool**, **execute**, and **log** directories.

Step 2: Login as root

Unless otherwise indicated, all the steps performed during LoadLeveler installation should be done from the **root** user ID.

Step 3: Create the loadl Group Name

This procedure creates the group name only for the node that you are currently logged into. It must be repeated for every node in the LoadLeveler cluster.

REQTEXT

Using SMIT

Enter smit

Select Security and Users

Select Groups

Select Add a Group

Enter The appropriate information in each field. For example:

```
Group name: loadl
Administrative group: true
```

The group name and ID must be the same on each machine in the cluster.

Press Enter (Do)

After the command completes, press the **Done** button and then select **System Management** from the **Return to:** list. If using SMITTY, press F3 (cancel) until you return to the System Management window.

Using the Command Line

Enter the following:

```
mkgroup -a loadl
```

Step 4: Create the loadl User ID

This procedure creates the user ID only for the node that you are currently logged into. It must be repeated for every node in the LoadLeveler cluster.

REQTEXT

Using SMIT

Select Security and Users

Select Users

Select Add a User

Enter The appropriate information in the **Create User** window. For example:

```
User Name: loadl
Primary group: loadl
Group set: loadl
Home directory: /u/loadl
```

The user name and ID must be the same on each machine in the cluster.

Press Enter (Do)

On the RISC/System 6000 Platform: When the command completes, press the **Done** button and then select **System Management** from the **Return to** list. If using SMITTY, press F3 (cancel) until you return to the System Management window.

On the SP Platform: When the command completes, select the **Done** button and select **Exit Smit** from the **Exit** menu or press F12. If using SMITTY, press F10 to exit the program.

When the install is complete, exit SMIT.

Using the Command Line

On the RISC/System 6000 Platform: Enter the following:

```
mkuser pgrp=loadl groups=loadl home=/u/loadl loadl
```

On the SP Platform: Enter the following:

```
spmkuser pgrp=loadl login=true groups=loadl home=/home/loadl loadl
```

Changing the LoadLeveler User ID

If you want to use a different user ID, for example, “joe”, as the LoadLeveler user ID, you must create a file called **/etc/LoadL.cfg** and modify this file to point to the user ID. To create this file, follow these steps:

1. **su - root**
2. Copy the **LoadL.cfg** file from the samples directory to the **/etc** directory. For example, on AIX, issue:

   ```
   cp /usr/lpp/LoadL/full/samples/LoadL.cfg /etc/
   chmod 644 LoadL.cfg
   ```

3. Edit the file by typing:

   ```
   vi /etc/LoadL.cfg
   ```

4. Edit the LoadLUserid line to indicate a user ID other than **loadl**.
5. Edit the LoadLGroupid line to indicate a group associated with the new user ID.
6. Edit the LoadLConfig line to indicate the directory where the LoadL_config file will be located. For example, if the user ID is “joe” with a home directory of **/u/joe**, then:

   ```
   LoadLConfig=/u/joe/LoadL_config
   ```

7. Enter **exit**.

Step 5: Receive the Install Image

Before proceeding, make sure that no other licensed programs are in the process of being installed. For example, if the following command returns nothing, then no other **installp** programs are running.

```
ps -ef | grep installp | grep -v grep
```

1. Set Up Your Installation Device: If you are installing from a tape, insert the tape into the tape drive. If you have more than one tape drive configured, use SMIT to obtain the exact name of the device you are using and substitute this name for *device* in Table 2 on page 14.

   If you are installing from a CD, insert the CD into the CD drive and mount the CD using the following commands:

   ```
   mkdir /cdrom
   mount -v cdrfs -p -r /dev/cd0 /cdrom
   ```

   Then substitute **/cdrom** for *device* in Table 2 on page 14.

   Note that *device* can also refer to a directory containing the **installp** image.
2. Choose an Installation Method: You can use SMIT or the command line to install LoadLeveler. *If you want access to all* **LoadL.msg.***lang filesets you must install LoadLeveler from the command line.*

REQTEXT

Using SMIT

Do the following to install LoadLeveler using SMIT:
Select Software Installation and Maintenance
Select Install/Update Software
Select Install Software Products from Latest Available Software
Enter The device or directory containing the install images.
Enter The appropriate information to specify options (or select PF4)
Press Enter (Do)

When the command completes, press **Done**, and then select **Exit Smit** from the **Exit** menu or press F12. If using SMITTY, press F10 to exit the program.

If you install using SMIT and select the following default:

```
Include corresponding LANGUAGE filesets? Yes
```

and *lang* is one of the supported languages, then the **LoadL.msg.***lang* fileset that matches your LANG environment variable is automaticaly installed. If you set this option to No, no message filesets are installed.

Using the Command Line

Refer to the following table to determine which command or commands to enter to install the desired LoadLeveler features:

Table 2. Installation Commands for LoadLeveler Features

To Install This	Enter This Command
The entire LoadLeveler product	installp -X -d *device* all
The LoadLeveler component	installp -X -d *device* LoadL.full
The Submit-only component	installp -X -d *device* LoadL.so
Messages and man pages	installp -X -d *device* LoadL.msg.*lang*
PDF documentation	installp -X -d *device* LoadL.pdf
HTML pages	installp -X -d *device* LoadL.html
Configuration tasks	installp -X -d *device* LoadL.tguides

Where *device*:

- For a tape is either **/dev/rmt0** or, if more than one tape drive, the value returned by SMIT as explained previously in this step.
- For a CD is **/cdrom**
- For a file is the path name of the install image.

The **installp** command reports on the success or failure of this step. Ensure that the **result** column in the summary contains SUCCESS for each part of LoadLeveler that you are installing (APPLYing). Do not continue until all of the parts you wish to install are successfully applied.

Whether you are using SMIT or the command line, you can now unmount the tape or CD.

To unmount the tape, enter:

```
tctl -f /dev/rmt0 offline
```

To unmount the CD, enter:

```
unmount /cdrom
```

Step 6: Run the Installation Script llinit

This step must be run for each of the machines in the LoadLeveler cluster.

1. You must perform this step using the LoadLeveler user ID. These instructions use **loadl** as this ID. To switch to the **loadl** ID, enter the following:

   ```
   su - loadl
   ```

2. Ensure that your HOME environment variable is set to **loadl's** home directory.
3. Change the current directory to the **bin** subdirectory in the release directory by typing:

   ```
   cd /usr/lpp/LoadL/full/bin
   ```

4. To run **llinit**, ensure that you have write privileges in the LoadLeveler home, local, and **/tmp** directories.
5. Enter the **llinit** command. For example, to run the **llinit** command with a local directory of **/var/loadl**, a release directory of **/usr/lpp/LoadL/full**, and a central manager named **mycenman**, enter the following:

   ```
   ./llinit -local /var/loadl -release /usr/lpp/LoadL/full -cm mycenman
   ```

About llinit

llinit does the following:

- Creates the **LoadL_config** file and the **LoadL_admin** file, if they don't already exist.
- Copies the **LoadL_admin** and the **LoadL_config** files from the release directory (in the **samples** subdirectory) into the home directory of **loadl**.

  Note: These files are a common resource for all the machines in the LoadLeveler cluster, and therefore must be made accessible to all members of the LoadLeveler pool.
- Creates the LoadLeveler **log**, **spool**, and **execute** directories in the local directory with permissions set to 775, 700, and 1777, respectively.
- Copies the **LoadL_config.local** file from the release directory (in the **samples** subdirectory) into the **local** directory.
- Creates symbolic links from the **loadl** home directory to the **spool**, **execute**, and **log** subdirectories and the **LoadL_config.local** file in the local directory (if home and local directories are not identical).
- Creates symbolic links from the home directory to the **bin**, **lib**, **man**, **samples**, and **include** subdirectories in the **release** directory.

The above files are copied and directories / symbolic links are created only if they don't already exist.

Note: You can change the locations of the **log**, **spool**, and **execute** directories by changing the associated paths in the global configuration file. The global configuration file must reside in **loadl's** home directory or the location specified in **/etc/LoadL.cfg**.

For example, if you want to move the log, spool, and execute directory from **/var/loadl** into **/tmp/loadl**, with appropriate permissions set, you can do so but you must create **/tmp/loadl/spool**, **/tmp/loadl/execute**, and **/tmp/loadl/log** in **/tmp/loadl** or LoadLeveler will not start up.

See *LoadLeveler: Using and Administering* for more information on the **llinit** command.

Step 7: Make the Graphical User Interface Resource File Available

Note that this step is optional. You should perform this step if you want to use **xloadl**, the graphical user interface, on this machine.

Copy the LoadLeveler GUI resource files from the **lib** directory to the standard locations for resource files, and set the permission for the **Xloadl** files to 644 (read/write for owner, read for group and others) by typing the following:

```
cp /usr/lpp/LoadL/full/lib/Xloadl /usr/lib/X11/app-defaults/
chmod 644 /usr/lib/X11/app-defaults/Xloadl
```

If you installed a LoadL.msg.*lang* fileset in step 3, then copy the resource file for that *lang*.

```
cp /usr/lpp/LoadL/full/lib/$LANG/Xloadl /usr/lib/X11/$LANG/app-defaults/
chmod 644 /usr/lib/X11/$LANG/app-defaults/Xloadl
```

The resource file **/usr/lib/X11/$LANG/app-defaults/Xloadl** takes precedence over the file **/usr/lib/X11/app-defaults/Xloadl**.

Step 8: Update the PATH Environment Variable

Add one of the following path statements to your PATH environment variable:

```
/usr/lpp/LoadL/full/bin
/u/loadl/bin
```

You can specify **/u/loadl/bin** if you previously ran **llinit**.

Step 9: Make the Man Pages Available

Note that this step is optional. If you don't want to make the man pages available to users, you can skip this step.

Add the following path to your MANPATH environment variable:

```
/usr/lpp/LoadL/full/man
```

If you installed a LoadL.msg.*lang* fileset in step 3, then add the following, preceding **/usr/lpp/LoadL/full/man**:

```
/usr/lpp/LoadL/full/man/$LANG
```

Step 10: Repeat the Appropriate Steps for Each Machine

If the release directory can be mounted with AFS or NFS, you can mount the directory, skip Step 5 and continue with Step 6 (run the installation script) for other machines in your configuration.

When you do not run **installp**:

- You must create symbolic links for the shared libraries. Enter the following commands:

  ```
  ln -s /usr/lpp/LoadL/full/lib/libllapi.a /usr/lib/libllapi.a
  ln -s /usr/lpp/LoadL/full/lib/libllmulti.a /usr/lib/libllmulti.a
  ln -s /usr/lpp/LoadL/full/lib/llapi_shr.o /usr/lib/llapi_shr.o
  ```

- You should issue the **errupdate** command on each machine where you want to format error logging entries. As **root**, issue the following command:

  ```
  errupdate -f loadl_err.S
  ```

  The **loadl_err.S** file is located in the **/usr/lpp/LoadL/full/include** directory. Note that if the release directory is mounted as read-only, the **errupdate** will fail unless you copy the file **loadl_err.S** to another directory before you issue the command.

Step 11: Configure Your LoadLeveler System

Configuring your LoadLeveler system consists of editing the files, **LoadL_config** and **LoadL_admin**, and the local file, **LoadL_config.local** to meet the needs of your installation. For detailed instructions, refer to Chapter 5, “Administering and Configuring LoadLeveler”, in the *LoadLeveler: Using and Administering* manual.

Once you configure your system, you can verify your configuration by starting LoadLeveler. See “Starting LoadLeveler” on page 23 for more information.

Chapter 4. Installing Submit-Only LoadLeveler

This section explains how to install LoadLeveler from the product media onto either of the following platforms:
- RISC System/6000 workstation cluster
- RISC System/6000 Scalable POWERparallel System SP

Submit-Only Planning Considerations

Before installing Submit-Only LoadLeveler, make sure you have read the following sections:
- “Configuration Planning” on page 4
- “Migration Considerations” on page 5
- “Hardware, Software, and Disk Requirements” on page 8

Also, If the release directory will be shared among submit-only machines using NFS, you must either allow all files to be world readable (by default), or the file system must be exported to all hosts that will be running Submit-Only LoadLeveler.

If you have a license for LoadLeveler, then you do not need a separate license for the Submit-Only LoadLeveler. You can install the Submit-Only LoadLeveler on multiple machines.

Disk Space Requirements

The directory and the disk space used after installation are listed below.

Platform	Directory	Bytes
RISC System/6000 and SP	release directory (/usr/lpp/LoadL/so)	11MB

Step 1. Set up User ID, Group, and Filespace

This step must be done as **root.**

1. Create a userid named **loadl** and a group named **loadl** on the submit-only machine. You must use the same user ID number for all LoadLeveler machines. The same is true for the group ID. Include the loadl user ID in the loadl group.
2. Create a home directory for the loadl user ID.

Notes:
1. The owner and group of all directories created must be **loadl.**
2. The release directory may be shared among submit-only machines.
3. There are no requirements that each directory be in a different area. An example configuration is:

Directory	Description
/u/loadl	home directory
/usr/lpp/LoadL/so	release directory

Step 2. Receive the Install Image

See “Step 5: Receive the Install Image” on page 13 for more information.

Step 3. Update Your Configuration

This step must be performed as **loadl**. Ensure that your HOME environment variable is set to **loadl**'s home directory.

1. Copy and rename the three files from the **samples** directory to the **loadl** home directory and the local directory. This step assumes the local directory is $HOME/*hostname*.

   ```
   cp /usr/lpp/LoadL/so/samples/LoadL_admin  $HOME
   cp /usr/lpp/LoadL/so/samples/LoadL_config.so  $HOME/LoadL_config
   cp /usr/lpp/LoadL/so/samples/LoadL_config.local.so $HOME/hostname/LoadL_config.local
   ```

2. Copy the resource file **Xloadl_so** from the **lib** (or **lib**/*lang*) subdirectory of the release directory to **/usr/lib/X11/app-defaults**. You must have root authority to copy files into these directories. The **xloadl_so** binary is the submit-only version of **xloadl**, the LoadLeveler Motif-based graphical user interface.

   ```
   cp /usr/lpp/LoadL/so/lib/Xloadl_so /usr/lib/X11/app-defaults
   chmod 644 /usr/lib/X11/app-defaults/Xloadl_so
   ```

   If you installed a LoadL.msg.*lang* fileset, then copy the resource file for that *lang*.

   ```
   cp /usr/lpp/LoadL/so/lib/$LANG/Xloadl_so /usr/lib/X11/$LANG/app-defaults
   chmod 644 /usr/lib/X11/$LANG/app-defaults/Xloadl_so
   ```

   The resource file **/usr/lib/X11/$LANG/app-defaults/Xloadl_so** takes precedence over the file **/usr/lib/X11/app-defaults/Xloadl_so**.

3. Add **/usr/lpp/LoadL/so/bin** to the PATH environment variable.
4. Add **/usr/lpp/LoadL/so/man** to the MANPATH environment variable.

   If you installed a LoadL.msg.*lang* fileset in "Step 2. Receive the Install Image", then also add:

   ```
   /usr/lpp/LoadL/so/man/$LANG
   ```

Step 4. Update the Cluster Configuration

You must update various files for your cluster. It is recommended that the **LoadL_admin** and **LoadL_config** files be the same on all machines, with local differences made in the **LoadL_config.local** file. The files copied from the submit-only samples directory contain the few, necessary entries for Submit-Only LoadLeveler. However, you can make the **LoadL_admin** and **LoadL_config** files the same as that used by a regular LoadLeveler client.

Perform the following steps using the **loadl** userid:

1. Change to the **loadl** home directory and update the **LoadL_config** file. In most cases, you can just use the default settings in this file, as shown below.

   Note: If the home directory is accessible via NFS or another shared file system, you only need to make the changes once because the other machines in the pool will be viewing the same configuration file.

   ```
   #    Pathnames
   #
        LOCAL_CONFIG   = $(tilde)/$(host)/LoadL_config.local
        ADMIN_FILE     = $(tilde)/LoadL_admin
   ```

2. Change to the **loadl** home directory and update the **LoadL_admin** file. See *LoadLeveler: Using and Administering* for details. The minimum changes required are as follows:

   a. If the **LoadL_admin** file is not shared by the regular LoadLeveler pool machines, edit the machine stanza of this **LoadL_admin** file, and specify the name of the central manager machine in place of *machine_name*:

      ```
      machine_name:  type = machine
                     central_manager = true
      ```

b. If the **LoadL_admin** file is not shared by the regular LoadLeveler pool machines, edit the machine stanza of this **LoadL_admin** file and specify the names of any public schedulers, as defined in the **LoadL_admin** file used by the regular LoadLeveler pool. For example:

```
llhost1:      type = machine
              schedd_host = true
llhost2:      type = machine
              schedd_host = true
```

c. Edit the machine stanza of the **LoadL_admin** file used by the LoadLeveler pool machines, and add the name of each submit-only machine and specify the following keywords:

```
so_ll3:       type = machine
              schedd_host = false
              submit_only = true
so_ll4:       type = machine
              schedd_host = false
              submit_only = true
```

Notes:

a. For submit-only to work, your LoadLeveler administration file, **LoadL_admin**, must have one or more machines defined as public schedulers (**schedd_host = true**).

b. Adding a submit-only machine stanza to the **LoadL_admin** file of the LoadLeveler pool is required if you intend the submit-only machine to submit jobs to a cluster that sets **MACHINE_AUTHENTICATE = TRUE** in the **LoadL_config** or **LoadL_config.local** file. If **MACHINE_AUTHENTICATE = TRUE** is set, then the associated machines will accept jobs only from machines that are defined in their **LoadL_admin** file.

3. In the **LoadL_config.local** file on the submit-only machine, specify the following:

```
SCHEDD_RUNS_HERE = FALSE
START_DAEMONS = FALSE
```

If the configuration file specifies account validation (**ACCT=A_VALIDATE**), add the following keyword:

```
ACCT_VALIDATION=/usr/lpp/LoadL/so/bin/llacctval
```

See the **LoadL_config.so** file in **/usr/lpp/LoadL/so/samples** for additional keywords you can use.

From the submit-only machine you can now submit jobs, query job status, and cancel jobs with the following commands: **llsubmit**, **llq**, and **llcancel**. You can also perform these actions using the graphical user interface, **xloadl_so**.

Step 5. Install on Other Machines in the Pool

Repeat the previous steps for each machine in the pool. If the release directory can be mounted using NFS, you do not have to receive the install image; you can mount the release directory onto the machine. However, if you do this you must create symbolic links for the shared library as described in “Step 10: Repeat the Appropriate Steps for Each Machine” on page 16.

Chapter 5. Post-Installation Considerations

This section tells you how to start (or restart) and stop LoadLeveler. It also tells you where files are located after you install LoadLeveler, and it gives you some hints for troubleshooting LoadLeveler.

Starting LoadLeveler

You can start LoadLeveler using any LoadLeveler administrator user ID as defined in the configuration file. To start all the machines that are defined in machine stanzas in the administration file, enter:

```
llctl -g start
```

To start machines individually, enter:

```
llctl -h hostname start
```

where *hostname* is the name of the machine to start. If you have problems, verify that you have **rsh** permission to each machine.

You can also start all the machines automatically by making the appropriate entry in **/etc/inittab** to start the desired executables.

You should verify that the machine has been properly configured by running the sample jobs in the appropriate **samples** directory (job1.cmd, job2.cmd, and job3.cmd). You must read the job2.cmd and job3.cmd files before submitting them because job2 must be edited and a C program must be compiled to use job3. It is a good idea to copy the sample jobs to another directory before modifying them; you must have read/write permission to the directory in which they are located. You can use the **llsubmit** command to submit the sample jobs from several different machines and verify that they complete.

If you are running AFS and some jobs do not complete, you may need to use the AFS **fs** command (**fs listacl**) to ensure that the you have write permission to the **execute**, **log**, and **spool** directories.

If you are running DCE and some jobs do not complete, ensure that you have write permission to the **execute**, **log**, and **spool** directories.

If you are running Submit-Only LoadLeveler: once the LoadLeveler pool is up and running, you can use the **llsubmit, llq,** and **llcancel** commands from the submit-only machines. You can also invoke the LoadLeveler graphical user interface from the submit-only machines.

Location of Directories Following Installation

After installation, the following product directories reside on disk. The installation process creates only those directories required to service the LoadLeveler options specified with the **installp** command.

Directory	Description
/usr/lpp/LoadL/full/bin	Part of the release directory containing daemons, commands, and other binaries
/usr/lpp/LoadL/full/lib	Part of the release directory containing product libraries and resource files
/usr/lpp/LoadL/full/man	Part of the release directory containing man pages

Directory	Description
/usr/lpp/LoadL/full/samples	Part of the release directory containing sample administration and configuration files and sample jobs
/usr/lpp/LoadL/full/include	Part of the release directory containing header files for the application programming interfaces.
local directory	log, spool, and execute directories for each machine in the cluster
home directory	Administration and configuration files, and symbolic links to the release directory
/usr/lpp/LoadL/pdf	LoadLeveler documentation in PDF format
/usr/lpp/LoadL/html	LoadLeveler documentation in HTML format
/usr/lpp/LoadL/codebase/tguides	Configuration tasks

Location of Directories for Submit-Only LoadLeveler

Directory	Description
/usr/lpp/LoadL/so/bin	Part of the release directory containing commands.
/usr/lpp/LoadL/so/man	Part of the release directory containing man pages
/usr/lpp/LoadL/so/samples	Part of the release directory containing sample administration and configuration files.
/usr/lpp/LoadL/so/lib	Contains libraries and graphical user interface resource files
home directory	Contains administration and configuration files.

Troubleshooting – Why Won't LoadLeveler Start?

If the **master** daemon will not run, go to the node where **LoadL_master** will not start and enter from the command line:

```
LoadL_master -t
```

This generates messages that may help to diagnose the problem. In addition, ensure the following are true:

1. **Release** and **bin** directories are properly specified in the configuration files.
2. Administration file exists and is properly defined in the configuration file.
3. Central manager is correctly defined in the administration file.
4. **log** directories are correctly defined in the configuration file.
5. **log**, **spool**, and **execute** directories exist and permissions are set as follows:

- the **spool** subdirectory is set to 700
- the **execute** subdirectory is set to 1777
- the **log** subdirectory is set to 775.

6. **/usr/lpp/LoadL/full/bin/LoadL_master** binary is owned by root and has the setuid bit set.
7. Daemons are not already running. If they are already running, use **ps** command to identify the processes, and then use the **kill** command to kill the daemons.

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