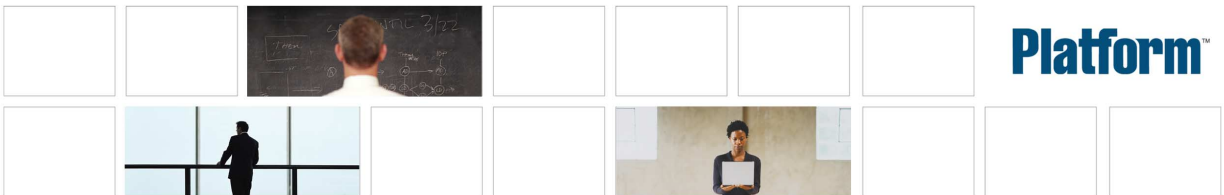


Using Platform **LSF**[®] on Windows

Version 6.0

February 2004

Comments to: doc@platform.com



Platform[™]

Copyright © 1994-2004 Platform Computing Corporation

All rights reserved.

We'd like to hear from you You can help us make this document better by telling us what you think of the content, organization, and usefulness of the information. If you find an error, or just want to make a suggestion for improving this document, please address your comments to doc@platform.com.

Your comments should pertain only to Platform documentation. For product support, contact support@platform.com.

Although the information in this document has been carefully reviewed, Platform Computing Corporation ("Platform") does not warrant it to be free of errors or omissions. Platform reserves the right to make corrections, updates, revisions or changes to the information in this document.

UNLESS OTHERWISE EXPRESSLY STATED BY PLATFORM, THE PROGRAM DESCRIBED IN THIS DOCUMENT IS PROVIDED "AS IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL PLATFORM COMPUTING BE LIABLE TO ANYONE FOR SPECIAL, COLLATERAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LOST PROFITS, DATA, OR SAVINGS, ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PROGRAM.

Document redistribution policy This document is protected by copyright and you may not redistribute or translate it into another language, in part or in whole.

Internal redistribution You may only redistribute this document internally within your organization (for example, on an intranet) provided that you continue to check the Platform Web site for updates and update your version of the documentation. You may not make it available to your organization over the Internet.

Trademarks ® LSF is a registered trademark of Platform Computing Corporation in the United States and in other jurisdictions.

™ ACCELERATING INTELLIGENCE, THE BOTTOM LINE IN DISTRIBUTED COMPUTING, PLATFORM COMPUTING, CLUSTERWARE, PLATFORM ACTIVECLUSTER, IT INTELLIGENCE, SITEASSURE, PLATFORM SYMPHONY, PLATFORM JOBSCHEDULER, PLATFORM INTELLIGENCE, PLATFORM INFRASTRUCTURE INSIGHT, PLATFORM WORKLOAD INSIGHT, and the PLATFORM and LSF logos are trademarks of Platform Computing Corporation in the United States and in other jurisdictions.

UNIX is a registered trademark of The Open Group in the United States and in other jurisdictions.

Other products or services mentioned in this document are identified by the trademarks or service marks of their respective owners.

Last update February 5 2004

Latest version www.platform.com/services/support/docs_home.asp

Contents

Welcome	7
About This Guide	8
About Platform LSF	10
Learning About Platform LSF	12
Technical Support	13
I Concepts	15
Windows-only or Mixed Cluster	16
LSF Installation Directory and LSF File Server	17
LSF and Microsoft Client Access Licenses	19
LSF Setup Host and Unpacking Directory	20
LSF Hosts	21
Host Types—Server and Client Hosts	22
Location of LSF Binary Files	23
LSF Users	24
LSF Installation Account	25
LSF Service Account	26
Cluster Administrators	28
Evaluation or Permanent License	29
FLEXlm License Server	30
License Installation	31
Cluster Name	32
Mail Server Configuration	33
Error Logging	34
Event Logging	35
Cluster Identification	36
LSF Cluster Information	37
Shared or Non-shared File Systems	38
LSF Administrator Group	40
LSF User Domain	41
Limitations	42

2	Installation	43
	Installation Overview	44
	Installation Checklist	45
	Getting a License File	46
	Getting the LSF Setup Program	47
	Extracting the LSF Installation Files	48
	Installing LSF	49
	Setting File Permissions in a Domain	50
	Setting Ports	51
	Setting Environment	52
	Registering User Passwords in LSF	53
3	Testing Your LSF Installation	55
	Checking the License Server (Permanent LSF License)	56
	Checking the Cluster	58
	Checking LSF Batch	62
4	Adding and Removing Hosts	65
	Adding a Windows Host to a Cluster	66
	Removing Windows Hosts from a Cluster	68
5	Permanent LSF Licenses and FLEXlm	69
	LSF License File (license.dat)	70
	FLEXlm License Management Tools	71
	Obtaining an LSF License	72
	Updating Licenses	73
	Updating a FLEXlm License	75
	Starting the License Server on Windows	76
	Checking the License Server Status	77
	Installing a New Permanent License with LSF Setup	78
	Updating an LSF License	79
6	Upgrading LSF on Windows	81
	About Upgrading LSF on Windows	82
	Prerequisites	83
	Pre-upgrade Steps	84
	Upgrade Steps	85
	Post-upgrade Steps	86
	Compatibility Notes	87

7	LSF Default User Mapping	89
	About LSF Default User Mapping	90
	Specifying User Names	92
	Configuring LSF Default User Mapping	93
	Syntax Substitution for Windows Users	94
8	Environment	97
	Job Execution Environment	98
	Controlling Execution Environment Using Job Starters	100
9	Configure Cluster Administrators on Windows	101
	LSF Administrators on Windows	102
	About the LSF Administrator Group	103
	About LSF Administrator Manager	104
	When to Use LSF Administrator Manager	105
	Adding and Configuring Cluster Administrators	106
	Removing Cluster Administrators	108
10	Charting Resources with Windows Performance Monitor	109
	LSF Monitor Statistics	110
	Installing LSF Monitor	112
	Configuring LSF Monitor	113
	Using LSF Monitor	114
	Uninstalling LSF Monitor	115
11	DHCP and LSF	117
	Dynamic IP Addressing for LSF Hosts	118
12	Local Windows User Accounts in LSF	121
	LSF Default User Mapping for Local Accounts	122
	Creating New Local User Accounts	123
	Setting Local User Passwords	124
	Setting SYSTEM_MAPPING_ACCOUNT for a Local Account	125

13 Mixed UNIX-Windows Clusters	127
Planning a Mixed Cluster	128
Building a Mixed Cluster on a Shared File System	129
Building a Mixed Cluster without a Shared File System	132
LSF Configuration Settings	136
LSF Default User Mapping for Mixed Clusters	137
Duplicating LSF User Accounts in a Mixed Cluster	138
Reconfiguring the Mixed Cluster	140
Upgrading a Mixed Cluster	141
14 Samba	143
Configuring the Samba Shared File System for LSF Installation	144
15 Displaying GUIs in LSF with Microsoft Terminal Services	149
How LSF Works with Terminal Services	150
Supported Platforms	151
Requirements	152
Configuring Terminal Services for LSF	153
Configuring LSF to Run Terminal Services Jobs	154
Submitting LSF Jobs to Terminal Services Hosts	155
Limiting the Number of Terminal Services Jobs on a Host	156
Submitting LSF Jobs to Terminal Services Hosts from UNIX	157
Index	159

Welcome

- Contents
- ◆ “About This Guide” on page 8
 - ◆ “About Platform LSF” on page 10
 - ◆ “Learning About Platform LSF” on page 12
 - ◆ “Technical Support” on page 13

About Platform Computing

Platform Computing is the largest independent grid software developer, delivering intelligent, practical enterprise grid software and services that allow organizations to plan, build, run and manage grids by optimizing IT resources. Through our proven process and methodology, we link IT to core business objectives, and help our customers improve service levels, reduce costs and improve business performance.

With industry-leading partnerships and a strong commitment to standards, we are at the forefront of grid software development, propelling over 1,600 clients toward powerful insights that create real, tangible business value. Recognized worldwide for our grid computing expertise, Platform has the industry's most comprehensive desktop-to-supercomputer grid software solutions. For more than a decade, the world's largest and most innovative companies have trusted Platform Computing's unique blend of technology and people to plan, build, run and manage grids.

Learn more at www.platform.com.

About This Guide

Purpose of this guide

This guide serves as the installation guide for LSF products on Windows, and as a supplement to *Administering Platform LSF*. In it, you will find all the information you need to do the following:

- ◆ Install LSF on Windows
- ◆ Plan and install a mixed UNIX-Windows cluster
- ◆ Use and administer a cluster that includes Windows hosts and user accounts
- ◆ Use LSF features that are only available on Windows

Who should use this guide

This guide is written for Platform LSF system administrators and LSF users whose cluster includes Windows hosts.

What you should already know

This guide assumes you are familiar with:

- ◆ Common Windows system administration tasks, such as managing user accounts and backing up the system
 - ◆ Basic LSF concepts such as clusters, jobs, resources, servers, and hosts
- See *Administering Platform LSF* for information about fundamental LSF concepts.

How to find out more

To learn more about LSF:

- ◆ See *Administering Platform LSF* for detailed information about LSF concepts and tasks.
- ◆ See the *Platform LSF Reference* for detailed information about LSF commands, files, and configuration parameters.
- ◆ See “[Learning About Platform LSF](#)” for additional resources.

Typographical Conventions

Typeface	Meaning	Example
Courier	The names of on-screen computer output, commands, files, and directories	The <code>lsid</code> command
Bold Courier	What you type, exactly as shown	Type cd /bin
<i>Italics</i>	<ul style="list-style-type: none"> ◆ Book titles, new words or terms, or words to be emphasized ◆ Command-line place holders—replace with a real name or value 	The queue specified by <i>queue_name</i>
Bold Sans Serif	◆ Names of GUI elements that you manipulate	Click OK

Command Notation

Notation	Meaning	Example
Quotes " or '	Must be entered exactly as shown	<i>job_ID[index_list]</i>
Commas ,	Must be entered exactly as shown	<i>-C time0,time1</i>
Ellipsis ...	The argument before the ellipsis can be repeated. Do not enter the ellipsis.	<i>job_ID ...</i>
lower case italics	The argument must be replaced with a real value you provide.	<i>job_ID</i>
OR bar	You must enter one of the items separated by the bar. You cannot enter more than one item, Do not enter the bar.	<i>[-h -V]</i>
Parenthesis ()	Must be entered exactly as shown	<i>-X "exception_cond([params])::action] ...</i>
Option or variable in square brackets []	The argument within the brackets is optional. Do not enter the brackets.	<i>lsid [-h]</i>
Shell prompts	<ul style="list-style-type: none"> ◆ C shell: % ◆ Bourne shell and Korn shell: \$ ◆ root account: # Unless otherwise noted, the C shell prompt is used in all command examples	% cd /bin

About Platform LSF

What LSF can do for you

Platform LSF provides workload management services across a cluster of networked computers. LSF allows you to control and manage all of your networked computing resources to run jobs and maximize system resources.

Manage networked resources

By using a network of computers as a single system, you are no longer limited to the resources on your own workstation. Platform LSF automatically selects the best hosts for the job based on the current load conditions and the resource requirements of the applications.

Run jobs

Run batch jobs automatically when required resources become available, or when systems are lightly loaded. LSF maintains full control over the jobs, including the ability to suspend and resume the jobs based on load conditions.

Platform LSF can run both sequential and parallel applications as interactive and batch jobs.

Manage applications

Transparently run software that is not available on your local host. For example, you could run a CAD tool that is only available on an HP host from your Sun workstation. The job would run on the HP host and be displayed transparently on your Sun system.

You do not need to rewrite or change your programs to take advantage of Platform LSF. Nearly any UNIX or Windows command or third-party application can be run using LSF commands.

Control access to system resources

System administrators can easily control access to resources such as:

- ◆ Who can submit jobs and which hosts they can use
- ◆ How many job specific users or user groups can run simultaneously
- ◆ Time windows during which each host can run load shared jobs
- ◆ Load conditions under which specific hosts can accept jobs or have to suspend some jobs
- ◆ Resource limits for jobs submitted to specific queues

Implement scheduling policies

LSF provides built-in scheduling policies to manage the efficient operation of the LSF Batch system. Configure your own fairshare policies at the queue or host partition level to manage conflicting demands for computing resources. Configure queues such as preemptive, preemptable, exclusive, to implement business policies other than standard first-come, first-served scheduling.

Reserve resources

Resources can be reserved by a job or configured in a queue. Reserving resources guarantees that while the job is running enough resources will be available. As jobs run, their resource requirements change, and using resource reservation helps alleviate this problem.

Share resources among hosts

Shared resources are available among a set of machines. A typical application of shared resources is to manage networked floating licenses for software applications. Any machine that has the software tool installed can request a

license to run the application as a shared resource. LSF maximizes the use of network floating licenses by ensuring that a license is available when a batch job is dispatched to a host.

LSF architecture

Platform LSF extends operating system services to create a single system image for a network of computers. LSF is built in layers, with the base system services providing dynamic load balancing and transparent access to the resources available on all machines participating in the cluster. The LSF Batch system is built on the base cluster system services and provides a central, scalable, fault tolerant batch queuing and job scheduling system.

LIM, RES and LSLIB form the LSF base system The LSF base system provides basic load-sharing services for the cluster. All other Platform LSF products are built on this base. It provides services such as resource information, host selection, placement advice, transparent remote execution, and remote file operation.

The LSF base system comprises the Load Information Manager (LIM), Remote Execution Server (RES), and the LSF Base API (LSLIB).

Structure of LSF Batch LSF Batch is a distributed batch system for clusters of UNIX and Windows computers. All batch jobs go through a consistent interface, independent of the resources they need or the hosts they run on.

LSF Batch is built on top of the LSF base system, extending its services to provide batch queuing and job scheduling.

How LSF Batch runs jobs LSF Batch accepts user jobs and holds them in queues until suitable hosts are available. Host selection is based on up-to-date load information from the master LIM, so LSF can take full advantage of all your hosts without overloading any one host.

Master Batch Daemon (mbatchd) One master batch daemon (`mbatchd`) runs on the same host as the master LIM. A slave batch daemon (`sbatchd`) runs on each LSF server host. User jobs are held in queues by `mbatchd`, which checks the load information on all candidate hosts periodically. When a host with the necessary resources becomes available, `mbatchd` sends the job to `sbatchd` on that host for execution. When more than one host is available, the best host is chosen. The slave batch daemon controls the execution of the jobs and reports job status to the master batch daemon.

Master Batch Scheduler Daemon (mbschd) The master batch scheduler daemon runs on the master server host. It performs the scheduling functions of LSF and dispatches jobs to `sbatchd` on the execution host.

LSF Batch API library (LSBLIB) The LSF Batch Library (LSBLIB) is the Application Programming Interface (API) for LSF Batch, providing easy access to the services of `mbatchd`, `sbatchd`, and `mbschd`. LSBLIB provides a powerful interface for advanced users to develop new batch processing applications in C.

Learning About Platform LSF

World Wide Web and FTP

The latest information about all supported releases of Platform LSF is available on the Platform Web site at www.platform.com. Look in the Online Support area for current README files, Release Notes, Upgrade Notices, Frequently Asked Questions (FAQs), Troubleshooting, and other helpful information.

The Platform FTP site ([ftp.platform.com](ftp://platform.com)) also provides current README files, Release Notes, and Upgrade information for all supported releases of Platform LSF.

Visit the Platform User Forum at www.platformusers.net to discuss workload management and strategies pertaining to distributed and Grid Computing.

If you have problems accessing the Platform web site or the Platform FTP site, contact support@platform.com.

Platform training

Platform's Professional Services training courses can help you gain the skills necessary to effectively install, configure and manage your Platform products. Courses are available for both new and experienced users and administrators at our corporate headquarters and Platform locations worldwide.

Customized on-site course delivery is also available.

Find out more about [Platform Training](http://www.platform.com/training) at www.platform.com/training, or contact Training@platform.com for details.

README files and release notes and UPGRADE

Before installing LSF, be sure to read the files named `readme.html` and `release_notes.html`. To upgrade to Version 6.0, follow the steps in `upgrade.html`.

You can also view these files from the Download area of the Platform Online Support Web page.

Platform documentation

Documentation for Platform products is available in HTML and PDF format on the Platform Web site at www.platform.com/services/support/docs_home.asp.

Technical Support

Contact Platform Computing or your LSF vendor for technical support.

Email support@platform.com

World Wide Web www.platform.com

Phone

- ◆ North America: +1 905 948 4297
- ◆ Europe: +44 1256 370 530
- ◆ Asia: +86 10 6238 1125

Toll-free phone 1-877-444-4LSF (+1 877 444 4573)

Mail Platform Support
Platform Computing Corporation
3760 14th Avenue
Markham, Ontario
Canada L3R 3T7

When contacting Platform, please include the full name of your company.

We'd like to hear from you

If you find an error in any Platform documentation, or you have a suggestion for improving it, please let us know:

Email doc@platform.com

Mail Information Development
Platform Computing Corporation
3760 14th Avenue
Markham, Ontario
Canada L3R 3T7

Be sure to tell us:

- ◆ The title of the manual you are commenting on
- ◆ The version of the product you are using
- ◆ The format of the manual (HTML or PDF)

Concepts

Overview This chapter helps you plan the characteristics of your LSF cluster and introduces the concepts that you will need to understand when you run LSF Setup.

- Contents**
- ◆ “[Windows-only or Mixed Cluster](#)” on page 16
 - ◆ “[LSF Installation Directory and LSF File Server](#)” on page 17
 - ◆ “[LSF and Microsoft Client Access Licenses](#)” on page 19
 - ◆ “[LSF Setup Host and Unpacking Directory](#)” on page 20
 - ◆ “[LSF Hosts](#)” on page 21
 - ◆ “[Host Types—Server and Client Hosts](#)” on page 22
 - ◆ “[Location of LSF Binary Files](#)” on page 23
 - ◆ “[LSF Users](#)” on page 24
 - ◆ “[LSF Installation Account](#)” on page 25
 - ◆ “[LSF Service Account](#)” on page 26
 - ◆ “[Cluster Administrators](#)” on page 28
 - ◆ “[Evaluation or Permanent License](#)” on page 29
 - ◆ “[FLEXlm License Server](#)” on page 30
 - ◆ “[License Installation](#)” on page 31
 - ◆ “[Cluster Name](#)” on page 32
 - ◆ “[Mail Server Configuration](#)” on page 33
 - ◆ “[Error Logging](#)” on page 34
 - ◆ “[Cluster Identification](#)” on page 36
 - ◆ “[LSF Cluster Information](#)” on page 37
 - ◆ “[Shared or Non-shared File Systems](#)” on page 38
 - ◆ “[LSF Administrator Group](#)” on page 40
 - ◆ “[LSF User Domain](#)” on page 41
 - ◆ “[Limitations](#)” on page 42

Windows-only or Mixed Cluster

When you install LSF and create a new cluster, you must decide whether the cluster will contain only UNIX hosts, only Windows hosts, or a mix of both UNIX and Windows hosts.

UNIX cluster

See the installation documentation for LSF on UNIX.

Windows cluster

A Windows-only cluster is easier to install than a mixed cluster because there are less difficulties in sharing files and authenticating user accounts.

Mixed cluster

To run jobs across both operating systems, you need a mixed cluster.

If you have a shared file system between UNIX and Windows hosts, install separate UNIX and Windows clusters, then transfer the Windows hosts to the UNIX cluster using LSF Cluster Merge Manager.

If you do not have a shared file system between UNIX and Windows hosts, install a UNIX cluster, then add Windows hosts to the UNIX cluster with LSF Setup. For more details about shared and non-shared file systems, see [“Planning a Mixed Cluster”](#) on page 128.

For best performance, potential LSF master hosts should also be UNIX server hosts.

LSF Installation Directory and LSF File Server

LSF binaries are installed on every LSF server and client host. The shared LSF configuration and program files are typically installed on one machine, which is then called the LSF file server. The dedicated file server can be a host in an LSF cluster, but for best performance, this is not recommended on large clusters.

You should choose a powerful computer to be your LSF file server, such as a host running:

- ❖ Windows 2000 Server
- ❖ Windows 2000 Advanced Server
- ❖ Windows NT 4.0 Server (Service Pack 4 or later)
- ❖ Windows XP 64-bit Edition

LSF server hosts will need to access files on this host. If you use per server licensing, make sure you have enough connections. See “[LSF and Microsoft Client Access Licenses](#)” on page 19. Windows NT Workstation and Windows 2000 Professional are not recommended because they only support a limited number of shared connections.

On the LSF file server and all LSF hosts, the system root directory (for example, `C:\WINNT`) must be shared.

On the LSF file server, you should have a separate directory for LSF, to hold all the common files, including the shared LSF configuration files. This directory is called the LSF installation directory or LSF top directory. It must be a shared network directory accessible to all LSF users.

By default, LSF Setup automatically creates and shares a new directory under the local directory of the file server.

Mixed cluster

You can build a mixed cluster from a shared file system or a system that does not share files.

With a shared file system When you build a mixed cluster, the file server is always a UNIX host, and the LSF top directory must be accessible to all LSF hosts. To build a mixed cluster, you can have a shared system that allows Windows and UNIX hosts to share files across the network.

Without a shared file system When you build a mixed cluster without a shared file system, Windows and UNIX hosts do not share files across the network. Files are only shared among Windows hosts, and among UNIX hosts.

Multiple domains

The LSF file server must be accessible by all user and resource domains that will contain LSF users or LSF hosts. Configure your trusts accordingly.

Customizing the installation

To install LSF in a different location, type a UNC path (in the format `\\host_name\directory_name`) that specifies the host name and the installation directory that you want to use. When you modify the default, the file server host must already have a shared directory on it.

You can specify a subdirectory one level below the existing shared directory, and LSF Setup will automatically create and share that directory for you. For example, if you type `\\hostA\share\lsf_60`, then you must already have a shared directory on HostA called `share`, but LSF Setup will create and share a new subdirectory called `lsf_60`.

LSF and Microsoft Client Access Licenses

All LSF services, commands, and jobs use Microsoft Windows Client Access Licenses (CALs). To avoid any potential problems related to the number of CALs, we recommend that you use per seat licensing.

If your network is licensed per server instead of per seat, you might run out of these licenses, and LSF will fail. The error you see might be 255 or cannot find `lsf.conf`, and you can find more information in the Windows event log or LSF logs. You are more likely to have problems if your LSF file server is a workstation host instead of a server running Windows NT Server or Windows 2000 Server.

Check the LSF file server:

- ◆ To check the licensing mode, choose **Start | Settings | Control Panel | License**.
- ◆ To see the number of connections, use the Windows Performance Monitor.
 - a Choose **Start | Programs | Administrative Tools (Common) | Performance Monitor**.
 - b Choose **Edit | Add to Chart**.
 - c Select the object **Server**.
 - d Select the counter **Server Sessions**.
 - e Click **Add**.
 - f Click **Done**.

Number of licenses required

The number of CALs used by LSF depends on the number of LSF hosts. The three LSF services (`LSF cluster_name LIM`, `LSF cluster_name RES`, `LSF cluster_name SBD`) use one license each. The number of CALs used by LSF also depends on the version of Windows. Each LSF job requires one license to start, but Windows 2000 releases it after a short time, while Windows NT does not release the license until the job is complete. Whenever you run LSF commands such as `bsub` and `lsid`, they also use one license each.

To get an approximate idea of how many CALs LSF needs, try the following formulas:

- ◆ number of CALs on Windows 2000:
 $number_LSF_hosts * 3$
- ◆ number of CALs on Windows NT:
 $(number_LSF_hosts * 3) + number_running_LSF_jobs$

More information

For more information about CALs in your version of Windows, including choosing between the two licensing modes and situations that use up licenses, see the Resource Kit section of the MSDN Library CD. Try searching for "licensing modes", "per seat", and "per server".

LSF Setup Host and Unpacking Directory

The LSF setup host does not have to be an LSF host; you can use it just for installing LSF on other computers. It must run Windows NT 4.0 Workstation or Server (Service Pack 4 or later), or Windows 2000 Professional, Server, or Advanced Server.

You must have local administrative privileges to unpack the LSF distribution.

The online help system for LSF Setup is based on Microsoft HTML Help, which requires certain components of Internet Explorer version 4.0 or later; these are included with the Windows operating system. However, some installations of Windows NT 4.0 might not display HTML Help properly. You can solve the problem by installing IE 5.0, or by applying a patch that is available from Microsoft.

Unpacking directory

When you download LSF, the file is delivered as a self-extracting executable that extracts the LSF Setup program (`setup.exe`) and runs it automatically.

The self-extracting executable copies the actual LSF Setup program in a temporary directory that you specify at installation time. The directory contents remain after the installation is complete, so that you can use LSF Setup to modify the cluster at any time. However, you can delete the directory if you choose.

By default, the unpacking directory is `%TEMP%\LSF` on the local host.

LSF Hosts

All LSF server hosts must connect to the LSF file server through a shared file system (the Windows OS normally shares files through a Windows server machine). In a multiple-domain environment, the execution host has to validate the LSF user account, therefore we recommend that the resource domains trust the user domains.

On all LSF hosts, the system root directory (for example, `C:\WINNT`) must be shared. The binary directory must also be shared; for a default installation, this is the `C:\` directory.

You could create the cluster with only a few hosts, then add the remaining hosts after you configure and test the cluster.

During installation, on the Host Selection dialog, LSF Setup creates a list of host names for you to select from. In a domain environment, the list of available hosts includes all of the hosts in your current domain, some of which might already belong to one or more LSF clusters. You have the option to type the names of selected hosts manually, which can be faster if you are only installing on a few hosts when there are many hosts available.

Multiple domains In a multiple-domain environment, we suggest that you install LSF in one domain at a time. Once you create a cluster in one domain, run LSF Setup in another domain and choose **Install - Add Hosts** to add hosts to the existing cluster.

System requirements for LSF hosts

- ◆ Operating Systems:
 - ❖ Windows NT 4.0 Workstation (Service Pack 4 or later)
 - ❖ Windows NT 4.0 Server (Service Pack 4 or later)
 - ❖ Windows 2000 Professional
 - ❖ Windows 2000 Server
 - ❖ Windows 2000 Advanced Server
 - ❖ Windows XP
 - ❖ Windows XP 64-bit Edition
- ◆ The LSF server hosts must all have fixed IP addresses. You can only use DHCP with LSF client hosts. See “[Host Types—Server and Client Hosts](#)” on page 22.

Limitations Note the following two limitations when installing LSF on an IA64-bit host running Windows XP:

- ◆ To *add* an IA64-bit host running Windows XP to a cluster, run the installer on a host with Windows XP or Windows 2000. Do not run the installer on a host with Windows NT.
- ◆ To *remove* an IA64-bit host running Windows XP from a cluster, run the installer on an IA64-bit host with Windows XP 64-bit. Do not run the installer on a host with Windows NT, Windows 2000, or a 32-bit version of Windows XP.

Host Types—Server and Client Hosts

A server host is available to run LSF jobs, so you expect the best performance from a cluster when all the machines are server hosts.

By default, each host is a server host.

Customizing the installation

A client host only forwards jobs to run on server hosts. Machines that use DHCP can be client hosts. If a machine is very slow or does not have enough resources to run jobs, you should make it a client host.

To make a host an LSF client host, click the **Advanced Configuration** button on the Location of LSF Binary Files dialog. In the Advanced Configuration dialog, select the host and choose **LSF Client Host**, or double-click the host name to switch the host type.

Location of LSF Binary Files

By default, LSF Setup copies LSF binary files to each LSF server and client host, and stores them in `C:\LSF_60`. The `C:\` directory must already be shared.

Customizing the installation

You can install the binary files in a different directory on each LSF host.

To do so, select a host, then specify a new directory path using either UNC format or drive letter convention. If you use drive letter convention, `C:\` refers to the C drive on the individual host you selected (not the C drive on the file server or the C drive on the machine running LSF Setup). Any drive you specify this way must be a local hard drive, not a network-mapped drive.

To set the same binary file location on multiple hosts, select multiple hosts using the Shift or Control key, then type a new binary file location. The new path will be assigned to the group of hosts that you selected.

LSF Users

- ◆ By default, there is no restriction on which users can submit jobs to LSF. However, the users must be able to read the LSF configuration files that are shared (in the LSF installation directory) on the LSF file server.
- ◆ User account names must not include any spaces.
- ◆ Users must register their user account passwords with LSF (using `lspasswd`). This means you must update LSF every time the Windows user account password expires or changes.

Mixed cluster

UNIX accounts and Windows accounts in the Windows domain that is the LSF user domain must have identical names for default user mapping to work (default user mapping lets you run jobs across platforms).

Local accounts

The use of local accounts is intended for situations where you cannot use domain accounts. Local accounts are more difficult to administer.

In a domain environment, a domain user account can be authenticated on all hosts in the domain, but a local user normally uses only one host. To make LSF useful, you have to set up local accounts so that users can run jobs on all hosts. There are two ways to do this:

Separate user accounts Set up separate user accounts and user groups to use with LSF. LSF users need an account on each server host, with the same user ID and password on each account.

The advantage of this method is that different users can have different permission levels based on the specific user or user group.

One system account Set up only one account to be used by LSF. This system account will be used to run jobs submitted by any user who submits jobs to LSF. This account is copied to every LSF host.

The advantage of this method is that you eliminate the overhead of creating separate users and passwords—users can submit jobs with their existing login name and passwords and LSF will use the system account to run the job. The disadvantage of this method is that all users will have the same permission level since they are all mapped to the same account.

LSF Installation Account

The user account used to install LSF is called the installation account. It does not have to be an LSF user. It must be a local administrator on all the hosts you are installing on (a Windows domain administrator account is normally a local administrator on every host in the domain).

The installation account must be able to read and write to the installation directory (also called the LSF top directory) where the shared LSF configuration files are located.

By default, LSF makes the installation account a cluster administrator when you create a new LSF cluster.

Existing cluster When you add hosts to an existing cluster, the installation account must be able to read and write to `lsf.conf`. Also, the installation account must be able to write to `lsf.cluster.cluster_name`.

Domain account The installation account must be a member of the local administrators group on every host.

Local account The installation account must have administrative privileges and the same user ID and password on every host.

Mixed cluster The installation account must be able to read and write to the LSF_CONFDIR directory.

LSF Service Account

The LSF services, `LSF cluster_name LIM`, `LSF cluster_name RES`, and `LSF cluster_name SBD` (slave batch daemon), run under an LSF service account. This is similar to the LSF primary administrator account on UNIX, except that you might have different service accounts on different hosts.

This account must be valid on all the hosts selected. The account name cannot include spaces. This account must have read and write permission on the installation directory.

LSF automatically assigns the following privileges to this account. In Windows 2000, make sure domain-level policy settings do not remove these privileges:

- ◆ Act as part of the operating system
- ◆ Debug programs
- ◆ Increase quotas
- ◆ Log on as a service
- ◆ Replace a process level token

By default, LSF Setup makes the service account a cluster administrator.

By default, the LSF service account is either `lsfadmin` or the installation account:

- ◆ If your installation account is a domain user without domain administrator privileges, LSF Setup defaults to your own account.
- ◆ If your installation account is a domain administrator, LSF Setup defaults to the `lsfadmin` account under the same domain as your installation account. LSF Setup will create this account if it does not already exist.
- ◆ If your installation account is a local account, LSF Setup defaults to `.\lsfadmin`. LSF Setup will create this account on every host if it does not already exist.

Customizing the installation

New user account To create a new account to be the LSF service account, specify any local account or a domain account. To create a new domain account, you must be an administrator of that domain.

Existing user account You can specify an existing user account as the LSF service account. Specify the existing password.

LSF user account names, including the LSF service account, must not include any spaces.

Multiple domains If you don't have one single account that is valid on all the hosts in the cluster, you need different service accounts on different hosts. If you have two domains that do not trust each other, you must run LSF Setup once in each domain, using different installation accounts, and specifying different service accounts.

You might also choose to use different service accounts to control different hosts. Each time you run LSF Setup, specify only hosts that will use the same service account.

Cluster Administrators

Cluster administrators are able to start, stop, and configure the LSF services, LSF *cluster_name* LIM, LSF *cluster_name* RES, and LSF *cluster_name* SBD

You should give the cluster administrators permission to modify LSF configuration files.

By default, the LSF service accounts and the installation accounts all become cluster administrators.

Customizing the installation

To specify additional cluster administrators, type the user names separated by spaces. These accounts must exist; LSF Setup will not create or check them for you.

If you do not want to grant cluster administrator privileges to one of the default users, delete the name.

After installation

To set up cluster administrators after installation, use LSF Administrator Manager. See [“Configure Cluster Administrators on Windows”](#) on page 101.

Evaluation or Permanent License

Evaluation licenses

If you have not yet purchased LSF, get an evaluation (DEMO) license key. Typically, an evaluation license licenses all LSF products and expires after 30 days. If you purchase LSF during this time, you can switch to a permanent license with no interruption in service.

Permanent licenses

A permanent license restricts the total number of hosts in the cluster and defines which LSF products will be used. It defines which hosts in your network will run LSF, and how they are arranged into clusters. This type of license does not expire, but has to be updated if you add more hosts or add another LSF product.

Platform LSF uses the FLEXlm license management software from GLOBEtrouter Software. Permanent LSF licenses are managed by the FLEXlm license server daemon (lmgrd) running on one or three hosts in your network. When you get a permanent license, you will need to provide information about the license server host.

FLEXlm License Server

Permanent licenses only.

If you install a permanent license using LSF Setup and do not already use FLEXlm software, LSF Setup installs FLEXlm automatically. In this case, you must choose a host as an LSF license server.

Choose a reliable host as license server to ensure that the LSF licenses are always available. In many installations, the license server runs on the host that is the dedicated file server for the Platform LSF software. This permits the licenses to be available whenever LSF is available.

Platform Computing requires the hardware host name and host identifier for each license server host at your site.

You can specify 3 hosts to be license servers instead of just one. For more information about using multiple license servers, see *Licensing Platform LSF*.

Existing FLEXlm server

If you already have a FLEXlm license server installed, LSF Setup prompts you to merge the contents of your LSF license file into your existing FLEXlm license file. You must do this before you can use LSF. You can do this after LSF Setup finishes. See “[Updating a FLEXlm License](#)” on page 75.

LSF Setup also prompts you to check the version of FLEXlm. LSF is compatible with FLEXlm version 7.0 or later. If you run an older version, you must upgrade FLEXlm before you can use LSF.

At the end of LSF installation, LSF Setup prompts you to start LSF services automatically. Do not start the LSF services until you have updated FLEXlm and the `license.dat` file used by FLEXlm.

License Installation

Specify the full path to your LSF license. You must have a valid LSF license to install LSF.

Cluster Name

Each LSF cluster requires a name. Every production cluster should have a unique cluster name.

The default cluster name is `cluster1`.

Mixed clusters

You can create a mixed cluster from a shared file system or from a system that does not share files.

Shared file system In a mixed UNIX-Windows cluster with a shared file system, it is required that your temporary Windows-only cluster have the same name as the UNIX cluster (instead of a unique name). The names of LSF services on Windows hosts incorporate the name of the original cluster.

Without a shared file system Without a shared file system, you do not need a temporary Windows-only cluster. You add Windows hosts to an existing UNIX cluster.

Customizing the installation

The LSF cluster name can be any alphanumeric string containing no spaces and not more than 39 characters.

- ◆ You should never use a valid host name as the cluster name.
- ◆ You cannot change the cluster name after installation.

Mail Server Configuration

On Windows, LSF supports SMTP and Microsoft Exchange mail protocols through LSF's `lsmail` application.

By default, LSF Setup does not configure mail.

Customizing the installation

If you choose to configure mail during installation, LSF Setup prompts you to specify the name of the mail server, and to choose SMTP or Microsoft Exchange mail protocol.

Requirements for lsmail

- ◆ You must have a Microsoft Exchange mail server that allows the logon user ID to be used for the mail address.
- ◆ The mail server must run Windows NT 4.0 or later.
- ◆ Each host must have a Microsoft Exchange Client (for example, Outlook) installed.
- ◆ The Microsoft Exchange Client should be installed using the default settings. Otherwise, copy `newprof.exe` to both of the following subfolders of the Program Files folder:
 - ❖ `C:\Program Files\Windows NT\Windows Messaging\newprof.exe`
 - ❖ `C:\Program Files\Windows Messaging\newprof.exe`

Configuring lsmail after installation

If you build a new cluster, you are prompted to configure the mail program during installation. After installation, complete the following steps to configure `lsmail` as your mail program:

- 1 Edit `lsf.conf`:
 - a Set `LSB_MAILSERVER`. Specify the protocol (SMTP or EXCHANGE) and the name of the mail server, separated by a colon:

```
LSB_MAILSERVER = SMTP:Host2
```
 - b Set `LSB_MAILPROG` to `lsmail.exe`:

```
LSB_MAILPROG = lsmail.exe
```
- 2 Run `lsadmin reconfig`.
- 3 Run `lsadmin resrestart all`.
- 4 Run `badadmin hrestart all`.
- 5 Run `badadmin reconfig`.

For more information

See the *Platform LSF Reference* for information about the `LSB_MAILPROG` and `LSB_MAILSERVER` parameters in the `lsf.conf` file.

Error Logging

The `LSF_LOGDIR` parameter must be defined in `lsf.conf` in order for logging to take place. Otherwise, no logging is done.

If the `LSF_LOGDIR` parameter is defined in `lsf.conf`, error messages from LSF servers are logged to files in this directory.

If `LSF_LOGDIR` is defined, but the daemons cannot write to files there, LSF attempts to write log files to the following locations, in order:

- ◆ `LSF_TMPDIR`, if defined in `lsf.conf`
- ◆ `%TMP%`, if defined
- ◆ `%TEMP%`, if defined
- ◆ System directory, such as `c:\winnt` for example

Event Logging

In addition to `lsb.events`, a summary of critical events is logged in the Windows Event Viewer as an application event.

When you install LSF, a new registry key is created by the installation program to enable event logging in the Windows Event Viewer:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\EventLog\Application\LSF
```

Not all LSF events are recorded in Event Viewer. For a comprehensive list of events, use the `lsb.events` file.

Events recorded in the Event Viewer

The following events are recorded in Event Viewer:

Event	Event Type
The LIM on a host goes down.	Error
The RES on a host goes down.	Error
The <code>sbatchd</code> on a host goes down.	Error
A host becomes unlicensed.	Error
A new master host is selected.	Information
An existing master host is no longer the master.	Information
<code>mbatchd</code> has started and is ready to schedule jobs.	Information
<code>mbatchd</code> goes down.	Error
<code>mbatchd</code> received a restart request.	Information
The <code>LSB_SHARE_DIR</code> is full.	Error

To view events in the Windows Event Viewer:

- 1 Select **Start | Programs | Administrative Tools(Common) | Event Viewer**.
Event Viewer is displayed.
- 2 Select **Log | Application**.
LSF events are identified as source LSF.

Cluster Identification

When you modify an existing cluster using LSF Setup, you are prompted to specify the name of a host that already belongs to the cluster. This helps LSF Setup to automatically determine the installation directory, which contains LSF configuration files for the cluster. LSF services must be up and running on the Windows host you specify.

If LSF Setup cannot find the cluster configuration files, you are prompted to specify the location of the installation directory.

If you prefer to identify the cluster by specifying the installation directory, leave the host name blank on the first dialog.

Mixed clusters If you do not yet have any Windows hosts in your cluster, leave the host name field blank and click **Next**. You are prompted to indicate whether your file system is shared or not shared.

LSF Cluster Information

LSF requires the following information to retrieve configuration information in a system in which a shared file system does not exist between UNIX and Windows hosts, or among hosts in different Windows domains in a multiple domain installation:

- LSF server hosts** ♦ Specify two or more LSF server hosts in your UNIX cluster, separated by spaces. This is required so that Windows LIMs can contact UNIX LIMs for configuration information.
For example: `server1 server2 server 3`
LSF must be working properly on your server hosts.
- LIM port** ♦ Specify the LIM port number in your cluster. The LIM port number is indicated in `lsf.conf` (`LSF_LIM_PORT`), or in `/etc/services/` or the NIS on UNIX.
The LIM port number is required for communication with the LIMs on the server hosts.

Shared or Non-shared File Systems

You can install LSF on shared file systems or on systems that do not use a shared file system.

You are prompted for **Shared** or **Not Shared** if you do not indicate a Windows host name when you begin the installation.

Shared

Select **Shared** when:

- ◆ A shared file system such as Samba or NFS exists between UNIX and Windows hosts when installing a mixed cluster.
- ◆ A shared file system such as Samba or NFS exists between hosts in different Windows domains when installing in multiple Windows domains.

Not Shared

Select **Not Shared** when you want to have:

- ◆ A cluster that includes hosts from multiple Windows domains but for which a shared file system does not exist between domains.
- ◆ A mixed Windows/UNIX cluster in which a shared file system does not exist between UNIX and Windows hosts.

- Limitations**
- ◆ If in your environment you use the `lsf.task` file or the `hosts` file, you will need to manually update these files in the Windows shared directory every time you change them on UNIX.
 - ◆ The commands `bhist`, `bacct`, and `badmin ckconfig` can only be used from UNIX.
 - ◆ You cannot administer your mixed cluster from Windows. You must administer your cluster and use administrative tools such as `xlsadmin` from UNIX.
 - ◆ License Management cannot be done from Windows.
 - ◆ A mixed cluster that is operating with a shared file system across UNIX and Windows cannot be converted to one that does not operate with a shared file system across UNIX and Windows; the opposite is also true.

How it works If you select **Not Shared**:

- ◆ LSF Setup creates an `lsf.conf` file in the Windows shared directory. You must define `LSF_MASTER_LIST` in the UNIX `lsf.conf`.
- ◆ LSF Setup creates an encrypted password file `passwd.lsfuser` in the Windows shared directory.
- ◆ An additional `lsf.conf` file is created in the Windows shared directory similar to the following:

```
LSB_MAILPROG=
LSB_MAILSERVER=
```

```
# Miscellaneous
LSF_CLUSTER_ID=mycluster
LSF_USER_DOMAIN=NOAM
LSF_SERVER_HOSTS="serverA serverB serverC"

# Other variables
LSF_LIM_PORT=42379
LSF_GET_CONF=lim
```

- ◆ An encrypted password file `passwd.lsfuser` is created in the Windows shared directory.

LSF Administrator Group

Incomplete installations only.

Normally, you do not need to understand this concept or do anything to configure the group. However, if you have errors when you run LSF Setup, you might need to create or modify this group manually on some hosts.

During installation, LSF creates a group on each host called “LSF Admins”. Members of this group are allowed to start LSF services. LSF Setup and LSF Administrator Manager automatically add the cluster administrators you specify to this group on each host.

If you upgrade from a version earlier than LSF 4.1, LSF keeps the name of the existing local LSF administrators group (“LSF Local Admins” by default).

LSF User Domain

Mixed clusters only.

The LSF user domain is used to enable default user mapping. This is intended to allow cross-platform job submission in a mixed UNIX-Windows cluster, by mapping a Windows account in the specified environment to a UNIX account of the same name. See “[LSF Default User Mapping](#)” on page 89.

The default is the current host domain.

New Windows-only clusters do not allow you to configure an LSF user domain during installation. However, when you upgrade LSF from a version older than LSF 4.1, the LSF user domain that already exists is maintained for backwards compatibility.

Customizing the installation

To change the default LSF user domain, specify the name of the domain you want to be the LSF user domain, or specify a period (.) to specify local accounts instead of domain accounts.

To disable LSF’s default user mapping, make the field blank.

Limitations

Job dependencies

The following syntax for submitting a job with a dependency expression has a limitation when used in Windows:

```
bsub -w 'dependency_expression'
```

This dependency expression is a logical expression composed of one or more dependency conditions.

In Windows, enclose the dependency expression in double quotes (") when the expression contains a space. For example:

- ◆ `bsub -w 'exit(678,0)'` can use single quotes when used in Windows because the expression does not include a space.
- ◆ `bsub -w "exit(678, 0)"` requires double quotes when used in Windows because the expression includes a space.

IA64-bit hosts

When installing LSF on an IA64-bit host running Windows XP, note the following two limitations:

- ◆ To *add* an IA64-bit host running Windows XP to a cluster, run the installer on a host with Windows XP or Windows 2000. Do not run the installer on a host with Windows NT.
- ◆ To *remove* an IA64-bit host running Windows XP from a cluster, run the installer on an IA64-bit host with Windows XP 64-bit. Do not run the installer on a host with Windows NT, Windows 2000, or a 32-bit version of Windows XP.

Installation

Overview This chapter describes the steps to install LSF for the first time.

- Contents**
- ◆ [“Installation Overview”](#) on page 44
 - ◆ [“Installation Checklist”](#) on page 45
 - ◆ [“Getting a License File”](#) on page 46
 - ◆ [“Getting the LSF Setup Program”](#) on page 47
 - ◆ [“Extracting the LSF Installation Files”](#) on page 48
 - ◆ [“Installing LSF”](#) on page 49
 - ◆ [“Setting File Permissions in a Domain”](#) on page 50
 - ◆ [“Setting Ports”](#) on page 51
 - ◆ [“Setting Environment”](#) on page 52
 - ◆ [“Registering User Passwords in LSF”](#) on page 53

Installation Overview

- Local accounts** LSF users can use local or domain accounts to interact with the LSF cluster. If the LSF users will use local accounts, see [“Local Windows User Accounts in LSF”](#) on page 121.
- Mixed cluster** If you are building a mixed UNIX-Windows cluster, see [“Mixed UNIX-Windows Clusters”](#) on page 127.
- Basic installation** This is the procedure to install LSF on Windows in a simple Windows domain environment.
- 1 The following steps must be performed before you install LSF.
 - ❖ [“Getting a License File”](#) on page 46
 - ❖ [“Getting the LSF Setup Program”](#) on page 47
 - 2 The following steps install LSF software on selected Windows machines. Extracting the installation files automatically starts the Setup program.
 - a [“Extracting the LSF Installation Files”](#) on page 48
 - b [“Installing LSF”](#) on page 49
 - 3 The following step is recommended after installation.
 - ❖ [“Setting File Permissions in a Domain”](#) on page 50
 - 4 The following steps must be performed after you install LSF.
 - a [“Setting Environment”](#) on page 52
 - b [“Registering User Passwords in LSF”](#) on page 53

Installation Checklist

Before you run LSF Setup, fill in this table. Prepare extra copies of the table if you have to run LSF Setup more than once (for example, to install on multiple domains with different service accounts).

- ◆ Installation account name:

- ◆ Cluster name:

- ◆ Cluster administrator names:

- ◆ File server host:

- ◆ Installation directory (on the file server):

- ◆ LSF service account name:

- ◆ Mail server (optional):

- ◆ Name and location of license file:

- ◆ Default binary file location (on each LSF host):

- ◆ LSF user domain name (for mixed clusters):

- ◆ LSF hosts (server hosts and client hosts):

Getting a License File

You must get a license before you can install LSF.

- 1 LSF licenses are stored in a text file called `license.dat`.

Where to get it:

- ❖ Contact your LSF vendor
- ❖ Complete the evaluation form on the Platform Web site (www.platform.com)

For a permanent license to be created, you must supply a hardware host name and host identifier for each license server host at your site. See “[Obtaining an LSF License](#)” on page 72.

If you have any questions about your license, contact license@platform.com.

- 2 Download or copy the license key to any location on the network that can be accessed by the machine that will install LSF.

Getting the LSF Setup Program

- 1 To install LSF on Windows, you must obtain the self-extracting executable file `lsf6.0_w2k_nt.exe`. This is available from:
 - ❖ LSF CD
 - ❖ your LSF vendor
 - ❖ website (www.platform.com)
 - ❖ FTP site ([ftp.platform.com](ftp://ftp.platform.com))Access to the download area of the Platform web site and the Platform FTP site is controlled by login name and password. If you are unable to access the distribution files, send email to support@platform.com.
- 2 Copy the file to the LSF installation host.

Download LSF files via FTP

These instructions describe how to get the LSF Setup program via FTP.

Download or copy the executable file to any location on the network that can be accessed by the machine that will install LSF.

- 1 Log on to the LSF file server.
- 2 Change to the distribution directory where you want to download the LSF distribution files.
For example:

```
> cd c:\temp
```
- 3 FTP to the Platform FTP site:

```
> ftp ftp.platform.com
```

Provide the login user ID and password provided by Platform or your LSF vendor.
- 4 Change to the directory for the LSF 6.0 release:

```
ftp> cd /lsf/distrib/6.0
```
- 5 Set file transfer mode to binary:

```
ftp> binary
```
- 6 Get the LSF distribution files and other notes:

```
ftp> get lsf6.0_w2k_nt.exe
ftp> get RELEASE.NOTES
```

Confirm the transfer of each file.
- 7 Exit FTP.

```
ftp> quit
```

Extracting the LSF Installation Files

Steps

- 1 Log on to the setup host. You must have local administrative privileges on this host.
- 2 Run `lsf6.0_w2k_nt.exe` to extract the LSF installation files.
- 3 On the **LSF - Welcome** dialog click **Next**.
- 4 On **LSF - Location to Unpack Files** dialog, specify an empty folder to use as the unpacking directory, for example:
`C:\TEMP\LSF6.0_SETUP`
and click **Finish**.
- 5 After the installation files are extracted, LSF Setup (`setup.exe`) will run automatically.

Installing LSF

Overview

This procedure describes how to install LSF and create a new cluster that can include Windows hosts but will not include UNIX hosts.

Steps

- 1 Log on to the setup host.
- 2 Start the LSF Setup program:
 - ❖ If you have already extracted the LSF Setup program (`setup.exe`), run it.
 - ❖ If you run the self-extracting executable file (`lsf6.0_w2k_nt.exe`), the LSF Setup program runs automatically.
- 3 Follow the prompts.
 - a For Setup Options, choose **Install**.
 - b For Installation Options, choose **Set up a new LSF cluster**.
 - c Follow the prompts. For help with LSF concepts, see “[Concepts](#)” on page 15.
 - d At the last step, LSF Setup summarizes your input. To install with the configuration described, click **Next**.

Sometimes LSF Setup is not able to modify certain files or groups, and prompts you to do some additional configuration manually. For example, you might need to update `license.dat` manually. In such cases, do not start the LSF services automatically when LSF Setup prompts you. Make the changes necessary to complete the installation, then start the LSF services manually.

After you run LSF Setup, a new cluster exists, the LSF software has been installed on some hosts. From now on, use other LSF Setup options to modify this cluster. For example, use **Install - Add Hosts** to install LSF on any Windows hosts that you want to add to this cluster.

Setting File Permissions in a Domain

After you install LSF, the directories `work`, `logs`, `bin`, `lib`, `etc`, and `conf`, are all subdirectories of your LSF directory. You should set the permissions as shown:

- work, logs**
 - ◆ LSF service accounts: full control (All) (All)
 - ◆ LSF administrators: full control (All) (All)
 - ◆ Everyone: special access (R) (R)
- bin, lib, etc**
 - ◆ LSF service accounts: full control (All) (All)
 - ◆ LSF administrators: full control (All) (All)
 - ◆ Everyone: special access (RX) (RX)
- conf**
 - ◆ LSF service accounts: full control (All) (All)
 - ◆ LSF administrators: full control (All) (All)
 - ◆ Everyone: special access (R) (R)
- passwd.lsfuser** If you have multiple service accounts, the `passwd.lsfuser` file is owned by the first one, and you must give any additional service accounts permission to modify the file.
 - ◆ LSF service accounts: full control (All) (All)

Setting Ports

If you have conflicts with the default ports used by LSF services and daemons, you will have to edit the settings manually. Different clusters should use different ports. In a mixed UNIX-Windows cluster, ports must be the same in both `lsf.conf` files.

To make a change, edit the following parameters in `lsf.conf`:

- ◆ `LSB_MBD_PORT`
- ◆ `LSB_SBD_PORT`
- ◆ `LSF_RES_PORT`
- ◆ `LSF_LIM_PORT`

The UNIX `lsf.conf` file is located in `LSF_ENVDIR`. The Windows `lsf.conf` file is created on the same UNIX host in `LSF_CONFDIR/cluster_name`.

Setting Environment

After you install the LSF software on a Windows machine, restart each LSF host. This will set system environment variables `LSF_BINDIR`, `LSF_ENVDIR` and `PATH`, and start LSF services `LSF cluster_name LIM`, `LSF cluster_name RES`, and `LSF cluster_name SBD`.

Registering User Passwords in LSF

A prerequisite procedure is “[Setting Environment](#)” on page 52.

Windows users cannot submit jobs to LSF unless they have provided their user account password to LSF, using `lspasswd.exe`. The LSF service account password is automatically registered during installation.

You only have to perform this procedure once, unless you modify your Windows user account password at a later date.

If you forget to register your password with LSF, you will still be able to view information about the cluster, but all the jobs that you submit will remain in the pending state forever.

Administrator steps

To register another user’s password with LSF:

- 1 Log on to an LSF server host as an LSF cluster administrator.
- 2 Choose **Start | Programs | Command Prompt**.
- 3 At the prompt type `lspasswd -u` and the name of the user whose password you wish to change. For example, to change the password of `DOMAINA\user1`, type:

```
lspasswd -u DOMAINA\user1
```
- 4 Input and verify the password.

User steps

To register your password with LSF:

- 1 Log on to an LSF server host as an LSF user.
- 2 Choose **Start | Programs | Command Prompt**.
- 3 At the prompt type `lspasswd`, input your password, and verify your password.

For example,

```
c:\ lspasswd
Your cluster id is "cluster_name"
Please enter user DOMAINA\user1's LSF password ...
Password: *****
Confirm Password: *****
You are connected...
```


Testing Your LSF Installation

Overview Before you make LSF available to users, you should make sure LSF is installed and operating correctly. This chapter describes how to use some basic LSF commands to do the following:

- ◆ Check the cluster configuration
- ◆ Start the LSF daemons (services)
- ◆ Verify that your new cluster is operating correctly

If you have a mixed UNIX and Windows cluster, make sure you can perform operations from both UNIX and Windows hosts.

Contents

- ◆ [“Checking the License Server \(Permanent LSF License\)”](#) on page 56
- ◆ [“Checking the Cluster”](#) on page 58
- ◆ [“Checking LSF Batch”](#) on page 62

Checking the License Server (Permanent LSF License)

Overview

If you are using a DEMO license, proceed to “[Checking the Cluster](#)” on page 58.

If you are using a permanent LSF license, perform the steps indicated to check the license server.

Check the License Server is started

The FLEXlm License Server service is installed as a Windows service to start automatically.

To check the License Server is started:

- ◆ Select **Start | Settings | Control Panel | Services** and make sure the FLEXlm License Server service is started.

Display License Server status

The lmstat command Use the `lmstat` command to check the License Server status and display the number of licenses available. You must use the `-c` option to specify the path to the LSF license file.

For example, depending on the LSF features installed, the output of the command should look something like the following:

```
C:\lsf\etc> lmutil lmstat -a -c %LSF_ENVDIR%/license.dat
lmutil - Copyright (C) 1989-2000 Globetrotter Software, Inc.
Flexible License Manager status on Fri 05/24/2002 13:23
License server status: 1711@hostA
  License file(s) on hostA: f:\winnt\system32\\hostA\c$\flexlm\license.dat:

  hostA: license server UP (MASTER) v7.0

Vendor daemon status (on hostA):

  lsf_ld: UP v7.0

Feature usage info:

Users of lsf_base: (Total of 2 licenses available)

Users of lsf_manager: (Total of 2 licenses available)

Users of lsf_sched_fairshare: (Total of 2 licenses available)
...
...
...
```

Display licensed products

Use the `lshosts -l` command to show what products are licensed for any host in the cluster:

```
C:\lsf\bin>lshosts -l hostA
```

```
HOST_NAME: hostA
type model cpuf ncpus ndisks maxmem maxswp maxtmp rexpri server
NTX86 PC450 13.2 1 2 127M 514M 749M 0 Yes
```

```
RESOURCES: (nt)
```

```
RUN_WINDOWS: (always open)
```

```
LICENSES_ENABLED: (LSF_Base LSF_Manager LSF_Analyzer)
```

```
LOAD_THRESHOLDS:
```

```
r15s rlm r15m ut pg io ls it tmp swp mem
- - - - - - - - - -
```

For more information

- ◆ Refer to the FLEXlm documentation for more information about the `lmstat` and `lmgrd` commands.
- ◆ Refer to *Administering Platform LSF* for more information about configuring and running the FLEXlm license server.

Checking the Cluster

Overview

Before using any LSF commands, wait a few minutes for LSF services to start.

To check the cluster, log on to any host in the cluster, and run the LSF commands described in this section.

Every command in LSF will display a list of possible options by using the `-h` command line argument and all LSF commands display a version string when run with the `-V` option.

Verify cluster configuration

The `lsadmin` command Verify the cluster configuration using the `lsadmin` command. This can be done without LSF daemons running.

The `lsadmin` command controls the operation of an LSF cluster and administers the LSF services, LSF `cluster_name` LIM and LSF `cluster_name` RES. Use the `lsadmin ckconfig` command to check the LSF configuration files.

The `-v` option displays detailed information about the LSF configuration:

```
C:\lsf\bin>lsadmin ckconfig -v
```

```
LSF 6.0, Oct 31 2003
Copyright 1992-2004 Platform Computing Corporation
Reading configuration from \\hostA\lsf\etc\lsf.conf
Feb 05 09:38:32 2004 24854 5 4.0 C:\lsf\etc\lim.exe -C
Feb 05 09:38:32 2004 24854 7 4.0 setMyClusterName: searching cluster files ...
Feb 05 09:38:32 2004 24854 7 4.0 setMyClusterName: local host hostA belongs to
cluster cluster1
Feb 05 09:38:32 2004 24854 3 4.0 domanager():
\\hostA\lsf\conf\lsf.cluster.cluster1(13): The cluster manager is the invoker
<lsfadmin> in debug mode
Feb 05 09:38:32 2004 24854 6 4.0 Checking Done.
-----
No errors found.
```

The messages shown are typical of normal output from `lsadmin ckconfig -v`.

Other messages may indicate problems with the Platform LSF configuration. Refer to the *Platform LSF Reference* for help with some common configuration errors.

Start the cluster

When you first start the cluster, it takes LSF some time to select an LSF master host. During this time (approximately 20 seconds) the cluster may not be able to locate the master host.

Use the following command to start the LSF cluster:

```
C:\lsf\bin>lsfstartup
```

This command starts the LSF services `LSF cluster_name LIM`, `LSF cluster_name RES`, and `LSF cluster_name SBD` on all LSF Windows hosts.

Mixed cluster If you have a mixed UNIX-Windows cluster, you will need to log on to a UNIX host and start the UNIX daemons with `lsfstartup`, and then log on to a Windows host and use `lsfstartup` from a Windows host to start LSF services on all Windows hosts.

Check the Load Information Manager (LIM)

If all the following commands display correct output, the LIMs are running correctly.

The `lsid` command The `lsid` command displays the cluster name and master host name. The master name displayed by `lsid` may vary, but it is usually the first host configured in the `Hosts` section of the `LSF_CONFDIR\lsf.cluster.cluster_name` file.

```
C:\lsf\bin>lsid
Platform LSF 6.0, Oct 31 2003
Copyright 1992-2004 Platform Computing Corporation
My cluster name is cluster1
My master name is hostA.platform.com
```

The `lsinfo` command The `lsinfo` command displays cluster configuration information about resources, host types, and host models. The information displayed by `lsinfo` is configured in `LSF_CONFDIR\lsf.shared`.

Depending on the LSF products installed, and the host types configured in your cluster, the output of the command should look something like the following. The ellipsis (...) indicates where the full output has been shortened for appearance.

In this example, only built-in resources are shown. Refer to *Administering Platform LSF* for information about configuring custom resources.

```
lsinfo
RESOURCE_NAME  TYPE  ORDER  DESCRIPTION
r15s           Numeric  Inc    15-second CPU run queue length
rlm            Numeric  Inc    1-minute CPU run queue length (alias: cpu)
r15m           Numeric  Inc    15-minute CPU run queue length
ut             Numeric  Inc    1-minute CPU utilization (0.0 to 1.0)
pg             Numeric  Inc    Paging rate (pages/second)
io             Numeric  Inc    Disk IO rate (Kbytes/second)
ls             Numeric  Inc    Number of login sessions (alias: login)
it             Numeric  Dec    Idle time (minutes) (alias: idle)
tmp            Numeric  Dec    Disk space in /tmp (Mbytes)
swp            Numeric  Dec    Available swap space (Mbytes) (alias: swap)
mem            Numeric  Dec    Available memory (Mbytes)
```

...

```
TYPE_NAME
UNKNOWN_AUTO_DETECT
```

```

DEFAULT
DigitalUNIX
HPPA
IBMAIX3
NTX86
NTALPHA
SGI6
SUNSOL
WIN95
...

```

```

MODEL_NAME      CPU_FACTOR      ARCHITECTURE
Ultra5S          10.30           SUNWUltra510_270_sparcv9
HP300            1.00
PENT_100        7.00
PC450            13.20           i686_448
NEWS5000        7.00
INDIGOXS24      7.00
SunSparc        12.00

```

...

The lshosts command The `lshosts` command displays configuration information and status of LSF hosts.

The output contains one line for each host in the cluster. Type, model, and resource information is configured in the `LSF_CONFDIR\lsf.cluster.cluster_name` file. The `cpuf` matches the CPU factor given for the host model in `LSF_CONFDIR\lsf.shared`.

```

C:\lsf\bin>lshosts
HOST_NAME  type  model  cpuf  ncpus  maxmem  maxswp  server  RESOURCES
HostA      NTX86  PC450  13.2  1      127M    514M    Yes    (nt)
HostB      SUNSOL5  DEFAULT  1.0  4      1024M    1934M    Yes    ()
HostC      SGI6    DEFAULT  1.0  -      -        -        Yes    ()
HostD      HPPA    DEFAULT  1.0  1      108M     256M    Yes    ()

```

The lsload command The `lsload` command displays the current load levels of the cluster. The output contains one line for each host in the cluster. The status should be ok for all hosts in your cluster.

```

C:\lsf\bin>lsload
HOST_NAME  status  r15s  r1m  r15m  ut  pg  ls  it  tmp  swp  mem
HostA      ok      0.0  0.0  0.0  6%  0.2  2  1365  97M  65M  29M
HostB      ok      0.1  0.1  0.2  9%  0.0  4  1  130M  319M  12M
HostC      ok      2.5  2.2  1.9  64%  56.7  50  0  929M  931M  4000M
HostD      ok      0.2  0.2  0.2  1%  0.0  0  367  93M  86M  50M

```

Check the Remote Execution Server (RES)

Make sure you have input your user password using `lspasswd`. See “[Registering User Passwords in LSF](#)” on page 53.

If all the following commands display correct output, RES on all hosts is running correctly.

The lsrunc command The `lsrun` command runs a command on one LSF host through RES. For example, the following command runs the `hostname` command on the remote host `hostA`:

```
C:\lsf\bin>lsrun -v -m hostA hostname
<<Execute hostname on remote host hostA>>
hostA
```

The lsgrunc command The `lsgrun` command runs a command on a group of hosts through RES. For example, the following command runs the `hostname` command on three remote hosts:

```
C:\lsf\bin>lsgrun -v -m "hostA hostB hostC" hostname
<<Executing hostname on hostA>>
hostA
<<Executing hostname on hostB>>
hostB
<<Executing hostname on hostC>>
hostC
<<Executing hostname on hostD>>
hostD
```

The lsclusters command The `lsclusters` command displays cross-cluster configuration information. The status should be `ok` for your cluster.

```
C:\lsf\bin>lsclusters -l
CLUSTER_NAME  STATUS  MASTER_HOST  ADMIN  HOSTS  SERVERS
cluster1      ok      HostA        lsfadmin  4      4
LSF administrators: lsfadmin
Available resources: nt
Available host types: NTX86
Available host models: UNKNOWN_AUTO_DETECT PC450
Accept jobs from this cluster: yes
Send jobs to this cluster: yes
```

For more information

- ◆ For more information about LSF commands, refer to *Administering Platform LSF* and the *Platform LSF Reference*.

Checking LSF Batch

Overview

To check LSF Batch, complete the following steps:

- 1 Verify the LSF Batch daemon configuration using the `badmin` command.
- 2 Check the LSF Batch system by running a few basic commands: `bhosts`, `bqueues`, `bsub`, `bjobs`.

To perform these checks, LIM must be running on the master host and on the submission host, which is the host from which you are running the command. See “[Start the cluster](#)” on page 58 for information about starting LSF services.

Refer to the LSF HTML command pages for an explanation of the output for the LSF commands discussed in this section.

Verify the LSF Batch daemon configuration

The `badmin` command The `badmin` command controls and monitors the operation of the LSF Batch system. Use the `badmin ckconfig` command to check the LSF Batch configuration files. The `-v` option displays detailed information about the configuration:

```
C:\lsf\bin>badmin ckconfig -v

Checking configuration files ...

Feb 05 09:38:32 2004 20246 6 4.0 minit: Trying to call LIM to get cluster name
...
Feb 05 09:38:32 2004 20246 6 4.0 Batch is enabled
Feb 05 09:38:32 2004 20246 6 4.0 autoAdjustInit: Auto-adjustment is disabled
Feb 05 09:38:32 2004 4433 6 4.0 Checking Done
-----
No errors found.
```

The messages shown above are the normal output from `badmin ckconfig -v`. Other messages may indicate problems with the Platform LSF Batch configuration. Refer to the *Platform LSF Reference* for help with some common configuration errors.

Display batch hosts

The `bhosts` command The `bhosts` command displays the status of batch server hosts in the cluster. The status should be `ok` for all hosts in your cluster.

```
C:\lsf\bin>bhosts

HOST_NAME      STATUS      JL/U      MAX  NJOBS      RUN  SSUSP  USUSP      RSV
hostA          ok          -         -     0         0     0     0         0
hostB          ok          -         -     0         0     0     0         0
hostC          ok          -         -     0         0     0     0         0
hostD          ok          -         -     0         0     0     0         0
```

Display batch queues

The bqueues command The `bqueues` command checks available queues and their configuration parameters. For a queue to accept and dispatch jobs, the status should be `Open:Active`. Queue information displayed by `bqueues` is configured in `LSB_CONFDIR\cluster_name\configdir\lsb.queues`.

```
C:\lsf\bin>bqueues
QUEUE_NAME      PRIO STATUS          MAX JL/U JL/P JL/H NJOBS  PEND  RUN  SUSP
owners          43  Open:Active      -   6   -   -     0     0    0    0
priority        43  Open:Active      -   -   -   -     0     0    0    0
night           40  Open:Active      -   -   -   -     0     0    0    0
chkpnt_rerun_qu 40  Open:Active      -   -   -   -     0     0    0    0
short           35  Open:Active      -   -   -   -     0     0    0    0
license         33  Open:Active      -   -   -   -     0     0    0    0
normal          30  Open:Active      -   -   -   -     0     0    0    0
idle            20  Open:Active      -   -   -   -     0     0    0    0
```

Display the default batch queue

The bparams command The `bparams` command displays information about the LSF Batch configuration parameters. Use `bparams` to display the name of the default queue:

```
C:\lsf\bin>bparams
Default Queues:  normal
Job Dispatch Interval:  20 seconds
Job Checking Interval:  15 seconds
Job Accepting Interval: 20 seconds

The DEFAULT_QUEUE parameter in
LSB_CONFDIR\cluster_name\configdir\lsb.params defines which queue
is the default queue.
```

Submit a test job

The bsub command The `bsub` command submits jobs to LSF queues. For example, the following command submits a sleep job to the default queue named `normal`:

```
C:\lsf\bin>bsub sleep 60
Job <1> is submitted to default queue <normal>.
```

Display batch jobs

The bjobs command The `bjobs` command displays the job status. The `bjobs -l` option displays a long format of jobs running in the batch system. Use `bjobs -w` to display the full user name, including domain name.

```
C:\lsf\bin>bjobs
JOBID USER      STAT  QUEUE    FROM_HOST  EXEC_HOST  JOB_NAME  SUBMIT_TIME
1   lsfadmin  RUN   normal   hostA      hostB      sleep 60  Jan
5 17:39:58
```

If all hosts are busy, the job is not started immediately and the `STAT` column says `PEND`. The job `sleep 60` should take one minute to run. When the job completes, LSF sends mail reporting the job completion.

For more information

- ◆ For more information about LSF commands, refer to *Administering Platform LSF* and *Platform LSF Reference*.

Adding and Removing Hosts

Administering Platform LSF describes how to add and remove hosts, but you will need this additional information if your cluster includes Windows hosts.

- ◆ [“Adding a Windows Host to a Cluster”](#) on page 66
- ◆ [“Removing Windows Hosts from a Cluster”](#) on page 68

Adding a Windows Host to a Cluster

If you have an LSF cluster that contains Windows hosts, you can add more Windows hosts at any time.

If your LSF cluster contains only UNIX hosts, and you want to add Windows hosts, you must create a mixed UNIX-Windows cluster. See “[Planning a Mixed Cluster](#)” on page 128.

Requirements

To add a host to the cluster, use the LSF Setup program. The same host and user account requirements apply whether you are creating a new cluster or adding to an existing one.

Steps

- 1 Make sure your LSF license will support the additional hosts. Update your license if necessary.
- 2 Log onto the domain containing the hosts that you want to add to the cluster. Make sure your installation account has the appropriate privileges on all the hosts you will select.
- 3 Run LSF Setup and follow the prompts:
 - a For Setup Options, choose **Install**.
 - b For Installation Options, choose **Add hosts to an existing LSF cluster**.
 - c For Cluster Identification:
 - ❖ If you selected **Shared** during installation:
Specify the name of any host in the cluster. This helps LSF Setup to automatically determine the location of the shared LSF configuration files for the cluster.
 - ❖ If you selected **Not Shared** during installation: leave the name field blank.
You will be prompted to indicate whether the file system is shared or not shared.
 - ❖ If you cannot remember what selection you made at installation, check your `lsf.conf` file on Windows. If the parameter `LSF_GET_CONF=lim`, you selected "Not Shared".
 - d For Host Selection, select only the hosts that you want to add to the cluster. LSF will be installed on the selected hosts. Hosts that already belong to the cluster may appear in the list of available hosts. Do not select those hosts.
- 4 You might need to take additional steps to set up the new hosts. See *Administering Platform LSF*.
 - ❖ Configure **lsb.hosts**.
 - ❖ Configure **lsb.queues**.
 - ❖ Configure DHCP.
- 5 After you make changes to the cluster, reconfigure the cluster to make your changes take effect. Run `lsadmin reconfig`.

- 6 Restart each of the new hosts.

Removing Windows Hosts from a Cluster

You may remove some or all Windows hosts from a cluster using LSF Setup.

Prerequisite steps

- 1 Remove running LSF jobs from the hosts that you want to remove. See *Administering Platform LSF*.
- 2 Shut down the LSF services on the hosts that you want to remove from the cluster.

Requirements

To remove a host from the cluster, use the LSF Setup program. The same user account requirements apply whether you are adding a host or removing one.

Steps

- 1 Log onto the domain containing the hosts that you want to remove from the cluster.
- 2 Run LSF Setup and follow the prompts:
 - a For Setup Options, choose **Uninstall**.
 - ◇ If you selected **Shared** during installation: specify the name of any host in the cluster. This helps LSF Setup to automatically determine the location of the shared LSF configuration files for the cluster.
 - ◇ If you selected **Not Shared** during installation: leave the name field blank.

You will be prompted to indicate whether the file system is shared or not shared.
 - ◇ If you cannot remember what selection you made at installation, check your `lsf.conf` file on Windows. If the parameter `LSF_GET_CONF=lim`, you selected "Not Shared".
 - b For Host Selection, select only the hosts that you want to remove from the cluster.

After you make changes to the cluster, reconfigure the cluster to make your changes take effect. See *Administering Platform LSF*.

Permanent LSF Licenses and FLEXlm

Managing LSF licenses is described in *Administering Platform LSF*. This chapter includes additional information that is necessary to license a cluster that includes Windows hosts.

- Contents**
- ◆ “[LSF License File \(license.dat\)](#)” on page 70
 - ◆ “[FLEXlm License Management Tools](#)” on page 71
 - ◆ “[Obtaining an LSF License](#)” on page 72
 - ◆ “[Updating Licenses](#)” on page 73
 - ◆ “[Updating a FLEXlm License](#)” on page 75
 - ◆ “[Starting the License Server on Windows](#)” on page 76
 - ◆ “[Checking the License Server Status](#)” on page 77
 - ◆ “[Installing a New Permanent License with LSF Setup](#)” on page 78
 - ◆ “[Updating an LSF License](#)” on page 79

LSF License File (license.dat)

The LSF license is stored in a text file. By default, the file name is **license.dat**. Your permanent license file must contain all the products that are defined in **lsf.cluster.cluster_name**.

For a description of the license file format, see *Administering Platform LSF*.

Locations of the license file

By default, there are two copies of your permanent license file. If LSF Setup installs FLEXlm for you, it copies your LSF license to both directories. If FLEXlm is installed before LSF, LSF Setup copies your LSF license to the LSF directory, but you must update the FLEXlm directory manually. After the permanent LSF license is installed, you have to update both copies when you make changes to your LSF licensing.

- ◆ LSF uses the file specified by LSF_LICENSE_FILE in **lsf.conf**. By default, the file is **license.dat** in LSF_CONFDIR (the **conf** directory). For example, if your LSF installation directory is **lsfshare\lsf** on HostA, your **lsf.conf** file might include the following line:

```
LSF_LICENSE_FILE=\\HostA\lsfshare\lsf\conf\license.dat
```

- ◆ The FLEXlm license manager uses the file in the FLEXlm installation directory on the host that is the FLEXlm license server. By default, the file is **license.dat** in **C:\flexlm**. For example, your license server might include the following file:

```
C:\flexlm\license.dat
```

Using FLEXlm to manage other software

If you use FLEXlm to manage other software, the **license.dat** file used by FLEXlm contains information that is not related to LSF, but the **license.dat** file used by LSF only contains LSF information. Even if the files in both locations are not identical, the lines relating to LSF must be exactly the same.

Modifying the LSF license

- ◆ On Windows, you must always modify the file used by FLEXlm manually. LSF Setup does not overwrite the file **C:\flexlm\license.dat** if it already exists.
- ◆ If you move the license file used by LSF, you must update the LSF_LICENSE_FILE parameter in **lsf.conf**.

FLEXlm License Management Tools

Administering Platform LSF describes FLEXlm commands and utilities that can help you manage your FLEXlm licenses. On Windows, these FLEXlm commands are subcommands of **lmutil**.

For example, to retrieve the FLEXlm host ID on UNIX, run **lmhostid**. On Windows, run **lmutil lmhostid**. To check the license server on UNIX, run **lmstat**; on Windows, run **lmutil lmstat**.

Obtaining an LSF License

See “[Getting a License File](#)” on page 46.

To allow Platform or your LSF vendor to create or update a permanent license, you must provide the following information:

- ◆ Host name of the license server
- ◆ FLEXlm host ID of the license server
- ◆ Number of LSF license units

Get the host name

To retrieve the host name of the license server:

- 1 Log on to the host that is going to be your license server.
- 2 Open a command prompt (**Start | Programs | Command Prompt**).
- 3 Type the **hostname** command:

```
c:\>hostname
```

Windows displays the hardware host name.

Get the FLEXlm host ID

To retrieve the FLEXlm host ID of the license server, run the **lmutil lmhostid** command at an MS-DOS prompt:

```
C:\temp>%LSF_SERVERDIR%\lmutil lmhostid
lmutil - Copyright (C) 1989-1997 Globetrotter Software, Inc.
The FLEXlm host ID of this machine is "0090273eeb99"
```

Updating Licenses

Once you have created an LSF cluster, you can update the licensing at any time. The procedure varies:

- ◆ “[Updating an evaluation cluster](#)” on page 73
- ◆ “[Expanding an existing cluster](#)” on page 73
- ◆ “[Upgrading to a new version of LSF](#)” on page 74

Updating an evaluation cluster

If you have an evaluation license, you must update it to a permanent license when you finish the evaluation and purchase LSF.

- Steps**
- 1 LSF permanent licenses use FLEXlm license management software.
 - ❖ If you already use FLEXlm, check the version. LSF is compatible with FLEXlm version 7.0 or later. If you have an older version, upgrade FLEXlm before installing the permanent LSF license.
 - ❖ If you do not have FLEXlm installed, see “[FLEXlm License Server](#)” on page 30 to learn about FLEXlm and permanent licensing.
 - 2 Obtain a new permanent license. See “[Obtaining an LSF License](#)” on page 72.
 - 3 If you already have FLEXlm installed, you must update your FLEXlm license file manually. Append the entire contents of the new LSF license to your existing file. See “[Updating a FLEXlm License](#)” on page 75.
 - 4 Whether you already use FLEXlm or not, run LSF Setup. This will update LSF and set up the license file used by LSF. If you have not yet installed FLEXlm, this step will also install FLEXlm and set up the license file used by FLEXlm. See “[Installing a New Permanent License with LSF Setup](#)” on page 78.

Expanding an existing cluster

When you have a permanent LSF license, the number of hosts and selection of LSF products and features is controlled by licensing.

- ◆ To expand the size of the cluster by adding hosts, you probably need to purchase additional licenses for the additional hosts.
- ◆ To enable new LSF products or features such as LSF MultiCluster, you need to purchase additional licenses. Sometimes you also need to install additional software. Update your license before you update the PRODUCTS line in the Parameters section of `lsf.cluster.cluster_name`.

To make a change that involves additional licensing, the first step is to manually update your existing license files. In the license file used by FLEXlm, the lines related to LSF must be identical to the contents of the license file used by LSF.

- Steps**
- 1 Obtain a new permanent license. See “[Obtaining an LSF License](#)” on page 72.

Instead of getting an entire new license, you will probably get an LSF **INCREMENT** license key or a new **FEATURE** line. Append the new lines to the existing LSF content without overwriting or deleting any information. If you have **INCREMENT** lines, you must add them immediately after the **FEATURE** line for the product.

- 2 Update FLEXlm. See [“Updating a FLEXlm License”](#) on page 75.
- 3 Update LSF. See [“Updating an LSF License”](#) on page 79.

Upgrading to a new version of LSF

Sometimes a minor upgrade or patch does not require any changes to the licensing. If the upgrade requires a new license, update the FLEXlm license manually and use LSF Setup to update LSF binaries and licensing. See [“Upgrading LSF on Windows”](#) on page 81.

Updating a FLEXlm License

- 1 Open the license file using a text editor such as Notepad.
The license file used by FLEXlm is normally `c:\flexlm\license.dat` on the license server host.
- 2 Make the required changes. This normally involves adding the new lines to your FLEXlm license. The only time you replace existing lines is when you upgrade from one version of LSF to another.
Do not overwrite or delete any content that is not related to LSF.
- 3 Save and close the file.
- 4 Update FLEXlm. Log on to the license server host and re-read the updated license file:

```
c:\flexlm\bin> lmutil lmreread -c c:\flexlm\license.dat
```

If the command is successful, you should see a message similar to the following:

```
lmreread - Copyright (C) 1989-1997 Globetrotter Software,  
Inc.  
lmreread successful
```

Starting the License Server on Windows

Start FLEXlm automatically

- ◆ Restart the machine.

Start FLEXlm manually

- 1 Log on to the license server host.
- 2 Choose **Services** in the Windows Control Panel.
- 3 Select the service **FLEXlm License Server** and click **Start**.

Checking the License Server Status

Overview

If you are using a permanent LSF license, check the license server by starting the license manager and displaying the status with the `lmutil lmstat` command on Windows.

If you are using a demo license, you do not have to perform this check because a demo license does not run a license server daemon.

The `lmutil lmstat` command

After starting the license server, use the `c:\flexlm\bin\lmutil lmstat` command on Windows to check its status and display the number of licenses available. You must use the `-c` option of `lmstat` to specify the path to the LSF license file.

The output of `lmstat` gives the status of the license server together with the name of the LSF vendor daemon (`lsf_ld`). The usage information for each product in the license file is provided.

For example, depending on the LSF features installed, the output of the command should look something like the following:

```
C:\flexlm\bin>lmutil lmstat -a -c c:\flexlm\license.dat
lmutil - Copyright (C) 1989-2000 Globetrotter Software, Inc.
Flexible License Manager status on Fri 05/24/2002 13:23

License server status: 1711@hostA
  License file(s) on hostA: f:\winnt\system32\hostA\c$\flexlm\license.dat:

  hostA: license server UP (MASTER) v7.0

Vendor daemon status (on hostA):

  lsf_ld: UP v7.0

Feature usage info:

Users of lsf_base: (Total of 2 licenses available)

Users of lsf_manager: (Total of 2 licenses available)

Users of lsf_sched_fairshare: (Total of 2 licenses available)
...
...
...
```

Installing a New Permanent License with LSF Setup

This procedure replaces temporary demo license used by LSF with a permanent license. If you do not already use FLEXlm, LSF Setup will install FLEXlm for you, and install the license file used by FLEXlm.

Take these steps:

- 1 Run LSF Setup and follow the prompts:
 - a For Setup Options, choose **License Management**.
 - b Specify the file containing your new LSF license.
 - c For Cluster Identification, specify the name of any Windows host in the cluster. This helps LSF Setup to automatically determine the cluster's installation directory.
- 2 Reconfigure the LSF cluster:
`lsadmin reconfig`

Updating an LSF License

- 1 Open the license file using a text editor such as Notepad.
The license file used by LSF is specified by `LSF_LICENSE_FILE` in `lsf.conf`.
- 2 Make the required changes. This normally involves appending the new lines without overwriting or deleting existing content.
- 3 Save and close the file.
- 4 Reconfigure LSF:

```
% lsadmin reconfig
```


Upgrading LSF on Windows

Overview This describes how to upgrade a cluster containing Windows hosts.

- Contents**
- ◆ [“About Upgrading LSF on Windows”](#) on page 82
 - ◆ [“Prerequisites”](#) on page 83
 - ◆ [“Pre-upgrade Steps”](#) on page 84
 - ◆ [“Upgrade Steps”](#) on page 85
 - ◆ [“Post-upgrade Steps”](#) on page 86
 - ◆ [“Compatibility Notes”](#) on page 87

About Upgrading LSF on Windows

If you have an LSF cluster running LSF version 3.2.4 or later, you can upgrade it using the “Upgrade” option of LSF Setup.

If you have an earlier version of LSF, you cannot use LSF Setup to upgrade. You must uninstall the old version completely, and then install the new version.

The procedure for upgrading your cluster replaces the installed binaries and the LSF services, and automatically updates your configuration files to support the new version of Platform LSF, if necessary.

You should upgrade your entire cluster to LSF version 6.0. Some files and commands are not compatible with older versions of LSF. Complete your upgrade before adding new hosts.

LSF 6.0 is compatible with FLEXlm version 7.0 or later. If you are running an older version of FLEXlm (such as the version of FLEXlm installed by any previous version of LSF), you must upgrade your license server and start the updated version of **lmgrd** before you start the LSF 6.0 cluster. For more information, refer to your FLEXlm documentation.

- Overview of steps**
- 1 Plan. See “[Prerequisites](#)” on page 83.
 - 2 Shut down the cluster and upgrade your license. See “[Pre-upgrade Steps](#)” on page 84.
 - 3 Upgrade the hosts. See “[Upgrade Steps](#)” on page 85.
 - 4 Start the cluster again. See “[Post-upgrade Steps](#)” on page 86.

Prerequisites

Before upgrading your cluster, you should complete the following steps:

- 1 Read the compatibility issues (“[Compatibility Notes](#)” on page 87) to find out the latest information about upgrading.
- 2 Obtain the new version of the LSF Setup program, the same as you would use to install a new cluster. The same host and user account requirements apply whether you are building a new cluster or upgrading an existing one.
- 3 Obtain a new license key. To get a new LSF license key, contact your LSF reseller, or contact Platform Computing directly (license@platform.com).
- 4 Do a complete backup of your Platform LSF binaries and configuration files, according to the procedures at your site.

Pre-upgrade Steps

To begin upgrading your cluster, complete the following steps:

- 1 Make sure there are no currently running jobs.
- 2 Drain all the queues by inactivating them.
To inactivate all LSF queues, use the following command:

```
% badmin qinact all
```
- 3 Shut down all LSF services.
Use the following command:

```
% lsfshutdown
```
- 4 Update your FLEXlm license.
Replace the lines relating to LSF with the lines from your new LSF license.
See [“Updating a FLEXlm License”](#) on page 75.

Upgrade Steps

- 1 Run LSF Setup and follow the prompts.
For Setup Options, choose **Upgrade**.
You will be prompted to either specify a Windows host or to leave the host field blank.
- 2 Select one of the following, depending on whether you specified a Windows host or not:
 - ❖ If you specified a Windows host, select the hosts that you want to upgrade in the Host Selection dialog. You should upgrade one domain at a time. By default, LSF Setup automatically selects all the Windows hosts listed in the cluster configuration file.
 - ❖ If you did not specify a Windows host, you will be prompted to indicate whether your file system is shared or not shared.

Note: If you are upgrading from LSF 3.x or LSF 4.x, you can only select **Shared**.

You should upgrade all the hosts in the cluster before you add new hosts to the cluster.

Limitation When upgrading from LSF 3.2.4 to LSF 6.0, do not specify a Windows host when prompted. Skip the host field, proceed to the next screen, and enter the LSF installation directory. LSF Setup needs the installation directory name to determine the cluster configuration. It cannot do this using a host name.

Post-upgrade Steps

After upgrading your cluster:

- 1 If you did not do this as part of the upgrade, restart the Platform LSF services on all hosts.
`% lsfstartup`
- 2 Activate the queues again so pending jobs can be dispatched.
To reactivate all LSF queues after upgrading, use the following command:
`% badmin qact all`

Note: When you upgrade, the Windows installer does not change `lsf.shared`. If you want to add a new host type to your cluster, edit the `lsf.shared` file and add the new host type to it.

Compatibility Notes

LSF daemons run as services on Windows NT

Prior to LSF 4.0, LSF had only one Windows service. Now, `LSF cluster_name LIM`, `LSF cluster_name RES`, and `LSF cluster_name SBD` run as Windows services. Other daemons and sub-processes, such as `mbatchd` and `eauth`, are not run as Windows services.

Default user mapping

Prior to LSF 4.1, LSF users belonged to a single domain, and users could be identified by user name only. Now LSF identifies Windows users by domain name and user name together. This change affects all LSF configuration files. To keep compatibility when you upgrade, LSF default user mapping is automatically enabled when you upgrade a cluster, keeping the old LSF user domain.

LSF Default User Mapping

The default user mapping in LSF has no effect on a UNIX-only cluster. You do not need to understand this feature unless your cluster includes Windows hosts.

- Contents**
- ◆ [“About LSF Default User Mapping”](#) on page 90
 - ◆ [“Specifying User Names”](#) on page 92
 - ◆ [“Configuring LSF Default User Mapping”](#) on page 93
 - ◆ [“Syntax Substitution for Windows Users”](#) on page 94

About LSF Default User Mapping

About LSF default user mapping

The default user mapping determines whether you can specify a Windows user in LSF by the user name alone. In a mixed cluster, it also specifies whether a Windows user account maps to a UNIX account of the same name, to allow cross-platform operation.

How LSF default user mapping works

LSF's default user mapping should be set during installation of LSF. If you specify an LSF user domain, the default user mapping is enabled.

When the default user mapping is enabled,

- ◆ a user name specified without a domain is interpreted (on a Windows host) as belonging to the LSF user domain
- ◆ a user name specified with the domain name of the LSF user domain is invalid

Mixed cluster In a mixed UNIX-Windows environment, if your Windows account in the LSF user domain has the same user name as your UNIX account, LSF's default user mapping lets LSF schedule and track jobs from both accounts as if they belong to a single user. On the execution host, LSF automatically runs the job using whichever of the two accounts is appropriate for that host.

To submit cross-platform jobs when your accounts have different user names in different environments, you should configure user account mapping for individual users. For more information, see *Administering Platform LSF*.

Multiple domain accounts To run jobs, the existing domain trust relationships apply in LSF, so if the execution domain trusts the submission domain, your job can run in the execution domain under your submission account. Accounts with the same user name in different domains are still treated as separate users by LSF.

Local accounts If your local account has the same user name and password on every Windows host, LSF's default user mapping lets LSF schedule and track jobs from all hosts as if they belong to a single user. On the execution host, LSF automatically runs the job using the local user account.

If your accounts have different user names in different environments, you should configure user account mapping. For more information, see *Administering Platform LSF*.

Installation examples

In the following examples, assume you are User1, and you have a valid user account in 3 Windows domains as well as a valid UNIX account. Not all the accounts can be used with LSF. Depending on the type of cluster, and the way you install the cluster, here are the different ways that LSF is configured:

Install or upgrade a UNIX-only cluster No mapping. You have one UNIX account, and LSF recognizes 1 user:

- ◆ user1 (UNIX account)

Install a new Windows-only cluster No mapping. You have 3 Windows accounts. For purposes of fairshare, per-user job slot limits, displaying statistical data, and so on, LSF recognizes 3 separate users:

- ◆ DOMAIN A\user1
- ◆ DOMAIN B\user1
- ◆ DOMAIN C\user1

Create a new UNIX-Windows cluster When you create the mixed cluster, you are prompted to enable default user mapping for one of your Windows accounts (such as Domain A) so that you can run cross-platform jobs between UNIX and Windows. LSF recognizes 3 separate users:

- ◆ user1 (your UNIX and Domain A accounts are treated as a single LSF user)
- ◆ DOMAIN B\user1
- ◆ DOMAIN C\user1

If you never run cross-platform jobs, you might choose to disable default user mapping by not specifying an LSF user domain. LSF then recognizes 4 separate users:

- ◆ user1 (UNIX account)
- ◆ DOMAIN A\user1
- ◆ DOMAIN B\user1
- ◆ DOMAIN C\user1

Upgrade a Windows-only cluster When older versions allowed only one LSF user domain, you used only one of your Windows accounts (Domain A). When you upgrade, default user mapping is enabled just to maintain backwards compatibility. LSF recognizes users from additional domains as separate users:

- ◆ user1 (your Domain A account)
- ◆ DOMAIN B\user1
- ◆ DOMAIN C\user1

Upgrade a UNIX-Windows cluster When older versions allowed only one LSF user domain, you used only one of your Windows accounts (Domain A). When you upgrade, default user mapping is enabled to maintain backwards compatibility, and to let you run cross-platform jobs. LSF recognizes users from additional domains as separate users:

- ◆ user1 (your UNIX and Domain A accounts are treated as a single LSF user)
- ◆ DOMAIN B\user1
- ◆ DOMAIN C\user1

Specifying User Names

In a Windows cluster or mixed UNIX-Windows cluster, in a domain environment, LSF users in different Windows domains might have the same user name. Because of this, LSF uses the Windows domain name with the user name, to differentiate the users.

User name only

When the default mapping is enabled, the user name alone specifies a user in the LSF user domain. The combination of a user name plus the domain name of the LSF user domain is not valid in LSF.

Domain name with user name

- | | |
|---------------------------------|---|
| Default mapping disabled | All Windows user accounts are specified using the domain name with the user name. There is no LSF user domain. |
| Default mapping enabled | User accounts in all domains except for the LSF user domain are specified using the domain name with the user name. |

How to specify a user name with a domain name

Unless a Windows user account belongs to the LSF user domain (LSF_USER_DOMAIN in **lsf.conf**), the combination of domain name and user name specifies a Windows domain user in LSF. The syntax is:

[DOMAIN_NAME | .]\user_name

Type the domain name in capital letters. Use a period (.) instead of a domain name to specify a local account instead of a domain account.

UNIX systems interpret the single backslash as a special character, so on UNIX you have to use a double backslash to specify the domain name in the command line:

```
Windows C:\> bjobs -u MYDOMAIN\user1
UNIX   % bjobs -u MYDOMAIN\\user1
```

Viewing user names

Use **bjobs -w** to view information about jobs and see the full name of a Windows user, including domain name.

When you run **bjobs**, the default is to truncate user names, and display the names of Windows users without the domain name.

Configuring LSF Default User Mapping

LSF Setup configures default user mapping automatically if you choose "upgrade" (upgrading from version 4.0 or earlier). You are prompted to configure it when you build a mixed cluster.

If you must enable default user mapping in a new cluster, or modify the configuration after installation, some manual steps are required.

- 1 To enable or modify default user mapping after you install LSF, set `LSF_USER_DOMAIN` in `lsf.conf` and specify the LSF user domain:
`LSF_USER_DOMAIN=DomainA`
- 2 Depending on the cluster configuration, you might have to redefine the service accounts, cluster administrators, queue administrators, user group memberships, and so on, so that your cluster remains operational after you restart the cluster.
- 3 Whenever you make any change to default user mapping, you affect users in the old LSF user domain and in the new LSF user domain. If you specify a new LSF user domain, users in both domains will have to use `lspasswd` to register their new names and passwords.

If users in the old and new LSF user domain have the same user name (such as `olddomain\user1` and `newdomain\user1`), then the `user1` account is already registered with LSF, and the user from the new LSF user domain has to change the password. To change the password, he must input the current password, which was set by the old user.

Syntax Substitution for Windows Users

In *Administering Platform LSF* and other LSF documentation, a user name is represented by the syntax:

user_name

If your cluster includes Windows hosts, you must understand that the full syntax for a user account on Windows is:

[*DOMAIN_NAME*\ | .\]*user_name*

Always type the domain name in capital letters.

LSF commands In the following LSF commands, use the full syntax to specify a user name.

- ◆ bchkpnt
- ◆ bdel
- ◆ bhist
- ◆ bjobs
- ◆ bkill
- ◆ bmig
- ◆ bmod
- ◆ brequeue
- ◆ bresume
- ◆ bstop
- ◆ bsub
- ◆ bswitch
- ◆ busers
- ◆ lsacct
- ◆ lspasswd
- ◆ wgpasswd
- ◆ wguser

LSF files In the following LSF files and parameters, use the full syntax to specify a user name.

- ◆ lsb.hosts
 - ❖ USER_SHARES
- ◆ lsb.params
 - ❖ SYSTEM_MAPPING_ACCOUNT
- ◆ lsb.queues
 - ❖ ADMINISTRATORS
 - ❖ FAIRSHARE
 - ❖ USERS
- ◆ lsb.users
 - ❖ GROUP_MEMBER
 - ❖ USER_SHARES
 - ❖ USER_NAME

- ❖ LOCAL
- ❖ REMOTE
- ◆ lsf.cluster.cluster_name
 - ❖ ADMINISTRATORS
- ◆ lsf.conf
 - ❖ LSF_SHELL_AT_USERS
- ◆ lsf.sudoers
 - ❖ LSF_EAUTH_USER
 - ❖ LSF_EEXEC_USER
 - ❖ LSF_STARTUP_USERS
 - ❖ LSB_PRE_POST_EXEC_USER

Environment

Overview This chapter describes how LSF sets the Windows environment variables.

- Contents**
- ◆ “[Job Execution Environment](#)” on page 98 (describing the default option)
 - ◆ “[Controlling Execution Environment Using Job Starters](#)” on page 100 (describing 2 alternative options)

Job Execution Environment

How LSF sets the job execution environment

By default, Platform LSF transfers environment variables from the submission to the execution host. However, some environment variables do not make sense when transferred. When submitting a job from a Windows to a UNIX machine, the `-L` option of `bsub` can be used to reinitialize the environment variables. If submitting a job from a UNIX machine to a Windows machine, you can set the environment variables explicitly in your job script.

PATH environment variable on UNIX and Windows

Platform LSF automatically resets the `PATH` on the execution host if the submission host is of a different type. If the submission host is Windows and the execution host is UNIX, the `PATH` variable is set to `/bin:/usr/bin:/sbin:/usr/sbin` and `LSF_BINDIR` (if defined in `lsf.conf`) is appended to it. If the submission host is UNIX and the execution host is Windows, the `PATH` variable is set to the system `PATH` variable with `LSF_BINDIR` appended to it. Platform LSF looks for the presence of the `WINDIR` variable in the job's environment to determine whether the job was submitted from a Windows or UNIX host. If `WINDIR` is present, it is assumed that the submission host was Windows; otherwise, the submission host is assumed to be a UNIX machine.

Environment variable handling on Windows

The following Windows environment variables are overridden based on the values on the execution host:

- ◆ `COMPSPEC`
- ◆ `COMPUTERNAME`
- ◆ `NTRESKIT`
- ◆ `OS2LIBPATH`
- ◆ `PROCESSOR_ARCHITECTURE`
- ◆ `PROCESSOR_LEVEL`
- ◆ `SYSTEMDRIVE`
- ◆ `SYSTEMROOT`
- ◆ `WINDIR`

If the `WINDIR` on the submission and execution host are different, then the system `PATH` variable on the execution host is used instead of that from the submission host.

Avoid using drive names in environment variables (especially the `PATH` variable) for drives that are connected over the network. It is preferable to use the UNC form of the path. This is because drive maps are shared between all users logged on to a particular machine. For example, if an interactive user has drive `F:` mapped to `\\serverX\share`, then any batch job will also see drive `F:` mapped to `\\serverX\share`. However, drive `F:` might have been mapped to a different share on the submission host of the job.

Job starters can be used to perform more site-specific handling of environment variables.

Controlling Execution Environment Using Job Starters

The command `bsub -L` cannot be used for a Windows execution host. LSF provides the following two job starters:

- ◆ `preservestarter`—preserves the default user environment of the execution host; does not include any submission host settings
- ◆ `augmentstarter`—augments the default user environment of the execution host by adding settings from the submission host that are not already defined on the execution host

Where the job starter executables are located

By default, the job starter executables are installed in `LSF_BINDIR`. If you prefer to store them elsewhere, make sure they are in a directory that is included in the default `PATH` on the execution host.

For example:

On Windows, put the job starter under `%WINDIR%`.

Source code for the job starters The source code for the job starters is installed in `LSF_MISC/examples`.

Configure Cluster Administrators on Windows

This chapter describes LSF cluster administrators in a Windows environment, how to configure them, and what they can do in an LSF cluster that includes Windows hosts.

This chapter also describes the LSF Administrator Manager tool for Windows.

- Concepts**
- ◆ “[LSF Administrators on Windows](#)” on page 102
 - ◆ “[About the LSF Administrator Group](#)” on page 103
 - ◆ “[About LSF Administrator Manager](#)” on page 104
 - ◆ “[When to Use LSF Administrator Manager](#)” on page 105
- Procedures**
- ◆ “[Adding and Configuring Cluster Administrators](#)” on page 106
 - ◆ “[Removing Cluster Administrators](#)” on page 108

LSF Administrators on Windows

In general, you must be an LSF administrator to perform operations that will affect other LSF users. On Windows, LSF can have multiple cluster and queue administrators.

Cluster administrators on Windows

To fully administer an LSF cluster that includes Windows hosts, a user must satisfy all these requirements:

- ◆ The LSF cluster configuration files list the user as an administrator of the cluster.
- ◆ The user is able to start the LSF services on each Windows host.
- ◆ The user is able to modify the LSF configuration files.

Users listed as cluster administrators in `lsf.cluster.cluster_name` can perform administrative operations on all jobs and queues in the cluster, and can stop LSF services on any host, but do not necessarily have permission to change LSF configuration files or start LSF services.

Users listed in the local LSF administrators group can start LSF services on a host. Use LSF Administrator Manager to administer this group on all the hosts in your cluster.

To modify LSF configuration files, users need write permission on the files.

Mixed clusters There is no need for a UNIX equivalent of LSF Administrator Manager. All the UNIX accounts listed as cluster administrators have permission to start LSF daemons on all UNIX hosts.

On UNIX, the primary LSF administrator owns the LSF configuration files, and can modify them. There is no Windows equivalent of the primary LSF administrator; it is up to you to make sure at least one LSF administrator has permission to modify the configuration files.

Multiple domains In some environments, it is not possible for one user account to be valid on all the LSF hosts. This means it is not possible for one user account to start or restart the LSF services on all the hosts. In this case, you must configure LSF with multiple cluster administrators, so each LSF host has at least one cluster administrator able to start the LSF services. Then, to start LSF services on every Windows host in the cluster, multiple cluster administrators have to run the command.

About the LSF Administrator Group

During installation on Windows, LSF gives cluster administrators the right to start the LSF services. To do so, LSF Setup creates a local group on each host called "LSF Admins". When you add or remove cluster administrators after installation, you can modify this group on each host using LSF Administrator Manager. LSF Administrator Manager also modifies `lsf.cluster.cluster_name` for you.

If you upgrade LSF from a version earlier than 4.1, the old local LSF administrators group is used for the same purpose, so the group name depends on your existing configuration. By default, the existing group is called "LSF Local Admins".

On UNIX, you can configure cluster administrators after installation by editing `lsf.cluster.cluster_name`. On Windows, use LSF Administrator Manager to edit `lsf.cluster.cluster_name` and also manage the "LSF Admins" group on each host.

About LSF Administrator Manager

On Windows, when you configure cluster administrators, you also configure which hosts they will be able to start LSF services on. LSF is easier to administer if all the cluster administrators can start LSF services on all hosts, but this may not be possible or appropriate in all cases.

Cluster administrators who are not associated with specific hosts can still perform all other administrative operations on all hosts.

Use LSF Administrator Manager (`lsadmgr.exe`) to configure cluster administrators. The LSF Administrator Manager will manage the LSF cluster configuration files, and manage permissions to start the LSF services, but it will not grant permission to modify the LSF configuration files.

When to Use LSF Administrator Manager

You might use LSF Administrator Manager to configure cluster administrators if you make any of the following changes to your cluster.

- ◆ Add or remove users
- ◆ Add or remove a user's right to be an LSF cluster administrator
- ◆ Add or remove hosts

Add cluster administrators

If you add a new user account to the system, you can make that user an LSF cluster administrator using LSF Administrator Manager.

If a user exists, but is not already a cluster administrator, you can use LSF Administrator Manager to grant new cluster administrative privileges to the user.

If a cluster administrator exists, but has not got permission to start the LSF services on all the hosts, you can use LSF Administrator Manager to add the cluster administrator to those hosts.

See [“Adding and Configuring Cluster Administrators”](#) on page 106.

Remove cluster administrators

If you want to remove a cluster administrator's user account from the system, use LSF Administrator Manager to remove the cluster administrator from LSF first.

If you want to change a cluster administrator into a regular LSF user, use LSF Administrator Manager to remove all the user's cluster administration privileges. If you only want to remove an administrator's right to start services on specific hosts, edit the LSF administrators group on each host manually.

See [“Removing Cluster Administrators”](#) on page 108.

Add hosts to the cluster

When you add hosts to the cluster, the LSF service account automatically becomes a cluster administrator able to start services.

If you don't specify additional cluster administrators during installation, all the existing cluster administrators are able to administer the host except for starting services.

You can use LSF Administrator Manager at any time to configure existing cluster administrators and allow them to start the LSF services on more hosts.

See [“Adding and Configuring Cluster Administrators”](#) on page 106.

Remove hosts from the cluster

Normally, when you remove a host from the cluster, you do not need to update anything else. However, if you are removing certain hosts because you are changing the organization of your system, it might be appropriate to remove cluster administration privileges from certain users also.

See [“Removing Cluster Administrators”](#) on page 108.

Adding and Configuring Cluster Administrators

To make an existing user an LSF cluster administrator, give the user permission to modify LSF configuration files, then take these steps.

To make an existing cluster administrator able to administer additional hosts in the cluster, take these steps.

- 1 Start LSF Administrator Manager.
 - a Log on to an LSF host using an account that is a member of the "Administrators" group on all the hosts that you want to modify.
To add a new administrator to the LSF cluster, your account must be able to modify `lsf.cluster.cluster_name`.
 - b Type `lsadmgr` at the command prompt to start LSF Administrator Manager.
- 2 Specify the cluster administrators.
 - a To add users who are not already cluster administrators, take these steps.
 - i Choose **Administrator | Add**.
If you see the Hosts list instead of the Users list, click **Back**.
 - ii Specify the user that will become an LSF cluster administrator. To add to the user list, type a user name in the space provided, then click **Add**.
You may specify Windows user groups, but LSF could have problems resolving the names of Windows users groups in a cluster with multiple Windows user domains.
If you want to add multiple cluster administrators and associate them with the same set of hosts, you can specify multiple users.
To remove users from the list, select them, then click **Remove**.
 - iii When the user list is complete, click **Next**.
 - b To configure users who are already cluster administrators, take these steps.
 - i Select an existing cluster administrator from the list.
If you want to associate multiple cluster administrators with the same set of hosts, you can select multiple users.
 - ii Choose **Administrator | Add**.
- 3 Specify hosts.

By default, cluster administrators will be able to start LSF services on all hosts in the cluster. In some environments, this is not possible or desirable. If you just added new hosts to the cluster, it is redundant to modify all the old hosts.

 - a Click to deselect the hosts where you cannot or do not want to modify the LSF administrators group.
 - b Click **Finish**.
- 4 Click **OK** to confirm.

- 5 Check for errors. The log window shows whether users are successfully added to the LSF administrators group on each host. If there are any problems, you will have to take additional steps.
LSF Administrator Manager also adds new cluster administrators to `lsf.cluster.cluster_name`.
- 6 Optional. Use LSF Administrator Manager to configure additional cluster administrators.
- 7 Before you close LSF Administrator Manager, select the log window and choose **File | Print** to print a permanent record of the changes you have made. LSF does not save this information, you must keep track of it yourself to know which cluster administrators are able start the LSF services on a host.

If your account is not a local Windows administrator on all the hosts that you want to modify, run LSF Administrator Manager again, using a different account to operate on different hosts.

Removing Cluster Administrators

To remove an LSF cluster administrator, remove the user's permission to modify LSF configuration files, then take these steps.

- 1 Start LSF Administrator Manager.
 - a Log on to an LSF host using an account that is able to modify `lsf.cluster.cluster_name`, and is a member of the "Administrators" group on all the hosts that you want to modify.
 - b Type `lsadmgr` at the command prompt to start LSF Administrator Manager.
- 2 Specify users.
 - a If the user still has cluster administrator privileges, take these steps.
 - i Select an existing cluster administrator from the list.
To remove multiple cluster administrators, select multiple users.
 - ii Choose **Administrator | Remove**.
 - b If the user is not in the list of cluster administrators, but still has to be removed from the LSF administrators group on some hosts, take these steps.
 - i Choose **Administrator | Remove**.
 - ii Specify the name of the cluster administrator that you are removing.
To add to the user list, type a user name in the space provided, then click **Add**.
To remove multiple cluster administrators, specify multiple users.
To remove users from the list, select them, then click **Remove**.
 - iii When the user list is complete, click **Next**.
- 3 Click **OK** to confirm.
- 4 Check for errors. The log window shows whether users are successfully removed from the LSF administrators group on each host. If there are any problems, you will have to take additional steps.
LSF Administrator Manager also removes cluster administrators from `lsf.cluster.cluster_name` if necessary.
- 5 Before you close LSF Administrator Manager, select the log window and choose **File | Print** to print a permanent record of the changes you have made. LSF does not save this information, you must keep track of it yourself to know which cluster administrators are able start the LSF services on a host.

If your account is not a local Windows administrator on all the hosts that you want to modify, run LSF Administrator Manager again, using a different account to operate on different hosts.

Charting Resources with Windows Performance Monitor

Overview LSF integrates with Windows Performance Monitor, so you can chart LSF cluster, host, queue, and job performance information. Windows Performance Monitor can also be used to trigger external commands when specified thresholds are exceeded.

A service called LSF Monitor passes information from LSF to the Windows Performance Monitor. LSF Monitor must be installed separately. On UNIX, you can use `xlsmom` to chart load information or you can use Platform SiteAssure to manage LSF resources on UNIX. To chart historical data, you can use Platform Analyzer.

This chapter provides instructions for installing, configuring, and using LSF Monitor.

- Contents**
- ◆ “[LSF Monitor Statistics](#)” on page 110
 - ◆ “[Installing LSF Monitor](#)” on page 112
 - ◆ “[Configuring LSF Monitor](#)” on page 113
 - ◆ “[Using LSF Monitor](#)” on page 114
 - ◆ “[Uninstalling LSF Monitor](#)” on page 115

LSF Monitor Statistics

Overview

Once installed, LSF Monitor automatically sends information to the Windows Performance Monitor. Use the Windows Performance Monitor to chart LSF performance information.

The Host, Queue, and Job objects support multiple instances.

The following LSF information is available:

- ◆ “Cluster information” on page 110
- ◆ “Host information” on page 110
- ◆ “Queue information” on page 110
- ◆ “Job information” on page 110
- ◆ “External information” on page 111

Cluster information

- ◆ Number of available servers
- ◆ Number of unavailable servers
- ◆ Number of servers where an LSF daemon (sbatchd or RES service) is down
- ◆ Number of unlicensed servers
- ◆ Number of pending jobs in the cluster
- ◆ Number of running jobs in the cluster
- ◆ Number of suspended jobs in the cluster
- ◆ Number of sick jobs (jobs submitted with no password, jobs with job dependency never satisfied, and jobs pending more than 3 days)
- ◆ Response time of LIM (as measured by the time to make an `ls_load` call)
- ◆ Response time of mbatchd (as measured by the time to make an `lsb_queueinfo` call)

Host information

- ◆ Load indices: `r15s`, `r15m`, `mem`, `swap`, `pg`, `ut`
- ◆ Number of running jobs
- ◆ Number of suspended jobs
- ◆ Number of reserved job slots
- ◆ External load Indices

Queue information

- ◆ Number of pending jobs
- ◆ Number of running jobs
- ◆ Number of suspended jobs
- ◆ Number of reserved job slots

Job information

- ◆ CPU time used by the job
- ◆ Memory used by the job (for jobs running on UNIX only)

- ◆ Swap space used by the job (for jobs running on UNIX only)

External information

- ◆ Values of one or two external load indices (configured by the LSF administrator)

Installing LSF Monitor

Requirements

- LSF version** You must have a cluster running LSF version 4.0 or higher.
- Host** Install LSF Monitor on any LSF server or client host running Windows.
- Cluster** The cluster may include UNIX hosts.
- Account** The LSF Monitor service runs under the account of an LSF cluster administrator. You will need to provide an LSF cluster administrator account and password.

Install LSF Monitor

The LSF Monitor setup program is installed with LSF. Use `lsfmon -install` to actually install the LSF Monitor service:

- 1 Log on to a Windows host as an LSF user in an existing LSF cluster.
- 2 In a command prompt, type:

```
lsfmon -install
```

LSF Monitor is installed.
- 3 On the Windows Control Panel, click **Services**.
The Services window opens.
- 4 Select **LSF Monitor** and click **Startup**.
- 5 In the **Log On As** section, deselect **System Account**, select **This Account**, and specify an LSF cluster administrator account (such as `lsfadmin`).
- 6 Type in the password twice and click **OK**.
- 7 In the Services window, select **LSF Monitor** and click **Start** to start the service.

Configuring LSF Monitor

Overview

You can configure sample intervals for host, queue and job information along with external load indices.

- In this section
- ◆ “Configure sample intervals” on page 113
 - ◆ “Configure external load indices” on page 113

Configure sample intervals

Overview LSF Monitor periodically samples information from LSF and updates the Windows Performance Monitor.

Default sample intervals By default, information is sampled at the following intervals:

- ◆ Host information = 30 seconds
- ◆ Queue information = 45 seconds
- ◆ Job information = 60 seconds

Change sample intervals To change the sample intervals for LSF host, job, or queue information, modify the Windows Registry settings.

Back up your registry before you make any changes.

To modify the registry:

- 1 Select the Registry subkey:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LSFMonitor
- 2 Edit the appropriate value, and specify the new sample interval in seconds:
 - ❖ SampleIntervalHost
 - ❖ SampleIntervalJob
 - ❖ SampleIntervalQueue

Configure external load indices

Overview You can use the Windows Performance Monitor to chart up to 2 external load indices, which you specify.

Steps To configure LSF Monitor to monitor external load indices, modify the Windows Registry settings. Update your backups before you modify the Registry.

To configure monitoring of external load indices:

- 1 Go to the Registry subkey:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LSFMonitor
- 2 Specify the appropriate value, and type the name of an external load index that is configured in your cluster:
 - ❖ ExternalLoadIndex1
 - ❖ ExternalLoadIndex2

Using LSF Monitor

Start and stop LSF Monitor

Use the Windows Control Panel to start or stop the LSF Monitor service.

View information about LSF Monitor

Errors related to LSF API calls and the operation of LSF services will be logged to the Windows event log. You can use the Windows Event Viewer to view this information.

Uninstalling LSF Monitor

Overview

Use `lsfmon -remove` to uninstall LSF Monitor. This command will first stop the LSF Monitor service if it is running, then remove it and remove related information from the Windows Registry.

Uninstall LSF Monitor

To uninstall LSF Monitor:

- ◆ In a DOS window, type:
`lsfmon -remove`

DHCP and LSF

This chapter describes how to use dynamic IP addressing with an LSF cluster.

Contents [“Dynamic IP Addressing for LSF Hosts”](#) on page 118.

Dynamic IP Addressing for LSF Hosts

About Dynamic Host Configuration Protocol (DHCP)

The purpose of DHCP (Dynamic Host Configuration Protocol) is to enable individual computers on an IP network to extract their configurations from particular machines (DHCP servers) that have no exact information about the individual computers until they request the information. This reduces the work necessary to administer a large IP network. The most significant piece of information distributed in this manner is the IP address.

How LSF works with dynamic IP addressing

LSF hosts running Windows can be configured as DHCP clients, which means their IP address is dynamic. Users who dial in or connect from a remote location might be assigned a different IP address with each connection.

The DHCP server issues an IP address to the LSF host, but LSF gets the IP address from DNS (Domain Name System). A WINS (Windows Internet Naming Service) server synchronizes information between the DHCP and DNS servers.

The IP address should not be changed while there are active TCP/IP connections with the host, for example, while installing LSF or running LSF commands. Normally, the IP address is maintained until the host is restarted or until the network connection is broken.

If an LSF client host is assigned a new IP address, you should wait for WINS to update DNS before you use that host to run LSF.

LSF client hosts LSF client hosts can be DHCP clients and can change their IP addresses anytime in a running cluster.

LSF server hosts Installing dynamic hosts on Windows allows support for dynamic IP addressing for LSF server hosts using DHCP.

LSF server hosts can be DHCP clients and can change their IP addresses anytime in a running cluster. The master host also saves the slave host IP address.

Setup

To run LSF on hosts that are DHCP clients, take these steps.

- 1 Make sure your system uses DHCP, DNS, and WINS. See [“Requirements”](#) on page 118.
- 2 Configure a short cache timeout value on the WINS server. See [“Configuring WINS”](#) on page 119.
- 3 Enable dynamic IP addressing for the LSF cluster. See [“Configuring dynamic IP addressing”](#) on page 119.

Requirements

To use DHCP with LSF, your system must include all of the following:

- ◆ DHCP server

- ◆ WINS server
- ◆ DNS server
- ◆ LSF hosts acting as DHCP clients

Install Microsoft DNS server and WINS server on the same machine.

Configuring WINS

The Cache Timeout Value for the WINS Lookup of the DNS should be as short as possible (the 10-minute default may be acceptable, but this should not be increased).

When an LSF client host is assigned a new IP address, you should wait this long before you use the client host to run LSF. This prevents possible conflicts by allowing time for the DNS to be updated.

Configuring dynamic IP addressing

By default, dynamic IP addressing is not enabled. To enable dynamic IP addressing for the cluster:

- 1 Configure the following parameters:
 - ◆ `lsf.conf`:
 - ◆ `LSF_DHCP_ENV=y`
 - ◆ `LSF_MASTER_LIST="host_name [host_name ...]"`
List the hosts that are candidates to become the master host for the cluster.
 - ◆ `LSF_DYNAMIC_HOST_TIMEOUT=hours` (optional)
Set an optional timeout value in hours. If the dynamic host is unavailable for longer than the number of hours specified, it is removed from the cluster.
 - ◆ `lsf.cluster.cluster_name` (optional)
 - ◆ `LSF_HOST_ADDR_RANGE=IP_address ...`
- 2 Reconfigure the cluster:

```
% lsadmin reconfig
% badmin reconfig
```

LSF checks for any configuration errors. If no fatal errors are found, you are asked to confirm reconfiguration. If fatal errors are found, reconfiguration is aborted.

Local Windows User Accounts in LSF

Overview This chapter describes using local (non-domain) Windows user accounts in LSF.

- Contents**
- ◆ [“LSF Default User Mapping for Local Accounts”](#) on page 122
 - ◆ [“Creating New Local User Accounts”](#) on page 123
 - ◆ [“Setting Local User Passwords”](#) on page 124
 - ◆ [“Setting SYSTEM_MAPPING_ACCOUNT for a Local Account”](#) on page 125

LSF Default User Mapping for Local Accounts

If your local account on every Windows host has the same user name, LSF's default user mapping lets LSF schedule and track jobs from all hosts as if they belong to a single user. On the execution host, LSF automatically runs the job using the local user account.

For more information, see “[LSF Default User Mapping](#)” on page 89.

If your accounts have different user names in different environments, you should configure user mapping. For more information, see *Administering Platform LSF*.

How to specify a local user name

Unless a Windows user account belongs to the LSF user domain (LSF_USER_DOMAIN in `lsf.conf`), the combination of domain name and user name specifies a Windows domain user in LSF. Use a period (.) to specify a local account instead of a domain account. The syntax is:

`.\user_name`

UNIX systems interpret the single backslash as a special character, so on UNIX you have to use a double backslash to specify the domain name in the command line:

Windows C:\> `bjobs -u .\user1`

UNIX % `bjobs -u .\\user1`

Creating New Local User Accounts

For local user accounts to run jobs on all hosts, LSF users should have an identical account on every host in the cluster. If these accounts do not already exist, create them using `wguser`. If you are using one system account and it does not already exist, create it using `wguser`. The system account can be `lsfadmin` or another account.

For example, to create local user accounts for users `user1`, `user2`, and `user3` on every host, type:

```
wguser .\user1 .\user2 .\user3
```

You can also use `wguser -r` to remove user accounts.

For example, to remove local user accounts `user2` and `user3` from every host, type:

```
wguser -r .\user2 .\user3
```

You will be prompted to specify a default password that applies to all the accounts you create. Afterwards, for security, all users should use `wgpasswd` to change their password from the default.

Setting Local User Passwords

If LSF users use local accounts, they should have an identical account on every host, with an identical password.

The `wguser` command assigns a default password to the accounts it creates on each host. To change the password of an account, use `wpasswd` and follow the prompts.

The LSF administrator can set the password of all users in LSF with `wpasswd`, whereas users can only set their own password.

Change your own password

To change your password on every host, type:

```
wpasswd
```

Change the password of other users

To change the password of other users, you must have administrative privileges.

Use `wpasswd` and specify the account to modify.

For example, to change the password of `user3` on every host, type:

```
wpasswd .\user3
```

Setting SYSTEM_MAPPING_ACCOUNT for a Local Account

Local accounts can operate under one account in LSF. This system account will be used to run jobs submitted by any user who submits jobs to LSF. This account is copied to every LSF host.

The advantage of this method is that you eliminate the overhead of creating separate users and passwords—users can submit jobs with their existing login name and passwords and LSF will use the system account to run the job. The disadvantage of this method is that all users will have the same permission level since they are all mapped to the same account.

If you have chosen to use one system account, set `SYSTEM_MAPPING_ACCOUNT` in `lsb.params` to that account.

For example, if you want the account `admin` to be the LSF account to which local user accounts are mapped, set:

```
SYSTEM_MAPPING_ACCOUNT=admin
```


Mixed UNIX-Windows Clusters

Overview This chapter describes how to join clusters.

- Contents**
- ◆ [“Planning a Mixed Cluster”](#) on page 128
 - ◆ [“Building a Mixed Cluster on a Shared File System”](#) on page 129
 - ◆ [“Building a Mixed Cluster without a Shared File System”](#) on page 132
 - ◆ [“LSF Default User Mapping for Mixed Clusters”](#) on page 137
 - ◆ [“Duplicating LSF User Accounts in a Mixed Cluster”](#) on page 138
 - ◆ [“Reconfiguring the Mixed Cluster”](#) on page 140
 - ◆ [“Upgrading a Mixed Cluster”](#) on page 141

Planning a Mixed Cluster

You can build a mixed UNIX-Windows cluster in a shared file system or in a system that does not share files.

To build a mixed cluster:

- 1 Identify whether there is a shared file system between UNIX and Windows hosts.

You have a shared file system if you can:

View and access LSF directories:

- ❖ On UNIX from Windows hosts
 - ❖ On Windows from UNIX hosts
 - ❖ From hosts in different Windows domains.
- 2 Follow the steps below for building a mixed cluster, depending on whether you have a shared file system or not.
 - ❖ If you have a shared file system, see [“Building a Mixed Cluster on a Shared File System”](#) on page 129.
 - ❖ If you don’t have a shared file system, see [“Building a Mixed Cluster without a Shared File System”](#) on page 132.

Building a Mixed Cluster on a Shared File System

To build a mixed Unix and Windows cluster on a shared file system, you should work in stages:

- 1 Set up a shared file system for the mixed cluster. Test the shared file system. For example, see “[Samba](#)” on page 143.
- 2 Create the cluster using only UNIX hosts. Test the cluster and user accounts. For instructions, see *Installing Platform LSF on UNIX*.
- 3 Create a small Windows cluster. Test the cluster and user accounts. See “[Create a temporary Windows cluster](#)” on page 129 for more information.
- 4 Join the two clusters using LSF Cluster Merge Manager.
This utility transfers the Windows hosts to the UNIX cluster, creating a mixed UNIX-Windows cluster. This utility also removes the Windows-only cluster. If the utility fails to join two clusters that are working independently, it usually means that LSF is properly installed but the shared file system is not working right.

Create a temporary Windows cluster

When you create a mixed UNIX-Windows cluster on a shared file system, the Windows-only cluster is a temporary step, used to verify that the LSF software is installed and functional. In the final stage of building a mixed cluster, the Windows hosts join a production cluster that includes UNIX hosts, and the temporary Windows cluster is deleted.

When you build the Windows cluster knowing that it will not become a production cluster, make sure that you do the following:

- ◆ Give your temporary Windows cluster the same name as the Unix cluster you intend to merge with.
Normally, every LSF cluster should have a unique cluster name. However, the LSF Cluster Merge Manager does not update the cluster name on the Windows hosts. The Windows Registry retains the names of LSF services and LSF settings, even after the temporary Windows cluster is joined to the UNIX cluster. You should give the temporary Windows cluster the same name as the UNIX cluster.
- ◆ Build the temporary Windows cluster using hosts from only one domain.
Normally, you would add all the hosts to the cluster when you build it, but the LSF Cluster Merge Manager only operates on hosts from one domain. You can use LSF Setup to add more hosts to the mixed cluster later on.
- ◆ Don't spend time configuring the temporary Windows cluster.
Configuration settings in the Windows cluster are not saved when the temporary Windows cluster is merged. After the clusters are joined, the Windows hosts will be controlled by the configuration settings of the original UNIX cluster.
- ◆ Purchase enough licenses for all the UNIX and Windows hosts.

You can use an evaluation license to test the temporary Windows cluster, but if the UNIX cluster uses a permanent license, you will need enough licences for all the hosts in the merged cluster.

LSF Cluster Merge Manager

In order to join a Windows cluster to a UNIX cluster, the following must be true:

- ◆ Both clusters run LSF version 4.2 or later.
- ◆ Each cluster operates properly on its own.
- ◆ A common shared file system operates properly.

How it works When you merge a temporary Windows cluster into an existing UNIX cluster, the following happens:

- ◆ The Windows cluster is disabled—the Windows hosts are added to the UNIX cluster
- ◆ Almost all Windows configuration settings are lost—the UNIX cluster's configuration settings affect both Windows and UNIX hosts in the mixed cluster.

Platform LSF Cluster Manager automatically takes care of the following:

- ◆ Ensures that all LSF hosts are using the same ports.
In a mixed UNIX-Windows cluster, Windows hosts read configuration information from a separate file that is a modified copy of the `lsf.conf` file used by the UNIX hosts. LSF Cluster Merge Manager automatically creates the file used by Windows hosts and sets the same ports as the original UNIX cluster.

What you must do When you join clusters:

- ◆ Specify an LSF user domain:
 - ❖ If your temporary Windows cluster already has an LSF user domain configuration, that configuration is automatically used in the mixed cluster.
 - ❖ If your temporary Windows cluster does not have an LSF user domain configuration, LSF Cluster Merge Manager prompts you specify an LSF user domain.
 - ❖ If you do not specify an LSF user domain, you must configure user mapping manually to run cross-platform jobs.
A new Windows-only cluster does not prompt you to enable LSF's default user mapping. When you create a mixed cluster, the LSF Cluster Merge Manager allows you to specify an LSF user domain, to enable cross-platform operations in a mixed cluster.
- ◆ Specify the same `lsf.conf` file as the UNIX cluster when you run LSF Setup on the mixed cluster.
The `lsf.conf` file that was part of the temporary Windows cluster is no longer used with the mixed cluster.
- ◆ Make sure that you are able to read the file `passwd.lsfuser`.

The LSF service account usually has this privilege. The installation account requirements that apply when you are creating a new cluster also apply when you are joining two existing ones.

If the installation account is not a local administrator of all the Windows hosts, these hosts will not be included in the new mixed cluster. This can occur if the Windows cluster has hosts from multiple domains. You can add these hosts to the mixed cluster later using LSF Setup.

Note: The Cluster Merge Manager checks file and directory access for all LSF cluster administrators. Therefore, you might see error messages if some cluster administrators are not valid on some hosts.

Merge the Unix and Windows clusters

- 1 Optional. Run `badadmin qclose all` to prevent users from submitting any new jobs, then wait for existing jobs to finish. Unfinished jobs in the Windows cluster will be lost when the Windows hosts join the UNIX cluster.
- 2 Run `lsfshutdown` to shut down all LSF services.
- 3 Run `lscmmgr` to start LSF Cluster Merge Manager. Follow the prompts.
 - a Specify the location of the shared LSF configuration files for the temporary Windows cluster. See [“LSF Installation Directory and LSF File Server”](#) on page 17.
 - b Specify the location of the shared LSF configuration files for the UNIX cluster. To identify the UNIX cluster, you might also be prompted to specify its cluster name, or the exact location of its `lsf.conf` file.
 - c Optional. Specify an LSF user domain. See [“LSF Default User Mapping for Mixed Clusters”](#) on page 137.

If your Windows cluster already has an LSF user domain configured, LSF Cluster Merge Manager skips this dialog and updates the UNIX cluster automatically.
- 4 Manually start or restart all LSF daemons on the master host.
- 5 Manually start or restart LSF daemons or services on the rest of the LSF hosts.

You must log on to UNIX to start daemons on UNIX hosts. On Windows, restart all Windows hosts to start services automatically.

Building a Mixed Cluster without a Shared File System

To build a mixed Unix and Windows cluster without a shared file system, you should work in stages:

- 1 Create the cluster using only UNIX hosts. Test the cluster and user accounts. For instructions, see *Installing Platform LSF on UNIX*.
- 2 Edit `lsf.conf` and add the parameter `LSF_MASTER_LIST`.
- 3 Add Windows hosts to the UNIX cluster and select the **Not Shared** option. For detailed instructions, see “[Install a mixed cluster without a shared file system](#)” on page 133.

Note: Refer to “[Limitations](#)” on page 38 to check the limitations of a mixed cluster that does not use a shared file system.

How it works

It is possible to install a mixed cluster without having a shared file system across UNIX and Windows hosts. You install a UNIX cluster, define the parameter `LSF_MASTER_LIST` in the `lsf.conf` on UNIX, then add Windows hosts to the cluster.

When you add Windows hosts, LSF setup creates a directory on one of your Windows hosts that is shared among all Windows hosts. This directory contains configuration information specific to your Windows hosts.

This directory contains the subdirectories `etc` and `conf`. An `lsf.conf` is created in `etc` with Windows-specific parameters.

The encrypted file `passwd.lsf` is created in the `conf` directory

lsf.conf on UNIX You define the parameter `LSF_MASTER_LIST` in the `lsf.conf` file on the UNIX file server to list potential master candidate hosts that have access to the `lsf.shared` and `lsf.cluster.cluster_name` files.

lsf.conf on Windows LSF Setup creates an additional `lsf.conf` file in the Windows shared directory (`LSF_ENVDIR`) similar to the following:

```
LSB_MAILPROG=
LSB_MAILSERVER=
# Miscellaneous
LSF_CLUSTER_ID=mycluster
LSF_USER_DOMAIN=NOAM
LSF_SERVER_HOSTS="serverA serverB serverC"
# Other variables
LSF_LIM_PORT=42379
LSF_GET_CONF=lim
```

Parameter	Description
LSF_SERVER_HOSTS	Defines two or more LSF server hosts that the Windows hosts should contact to find a Load Information Manager (LIM) on UNIX.
LSF_LIM_PORT	Must be the same port number as in the UNIX <code>lsf.conf</code> file, in <code>/etc/services</code> , or the NIS. LIMs on Windows hosts communicate with LIMs on UNIX server hosts and retrieve configuration information through <code>LSF_LIM_PORT</code> in <code>lsf.conf</code> .
LSF_USER_DOMAIN	Must be the same domain name as in the UNIX <code>lsf.conf</code> file.
LSF_GET_CONF	Must be <code>LSF_GET_CONF=LIM</code> . Indicates a shared file system between UNIX and Windows hosts does not exist. Do not change after installation
LSB_MAILPROG and LSB_MAILSERVER	These parameters are only filled in if the email option was selected during installation
LSF_CLUSTER_ID	Do not change after installation

`passwd.lsfuser` An encrypted password file `passwd.lsfuser` is created in the Windows shared directory (`LSF_CONFDIR`).

Install a mixed cluster without a shared file system

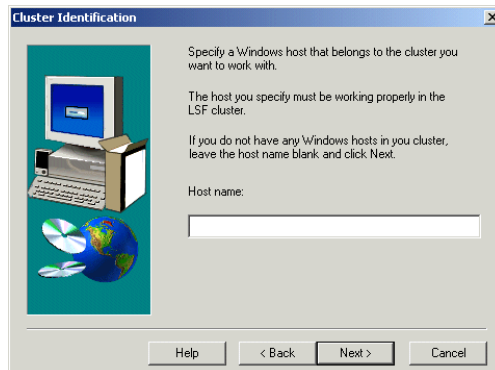
To install a mixed cluster without a shared file system:

- 1 Install the Unix cluster.
 - 2 Add the Windows hosts to the cluster.
- Install a UNIX cluster**
- 1 Create an LSF cluster using only UNIX hosts.
 - 2 Test the cluster and user accounts. For instructions, see *Installing Platform LSF on UNIX*.
 - 3 Prepare your UNIX cluster:
 - a Edit `LSF.conf` and add the parameter `LSF_MASTER_LIST`. List potential master candidate hosts. For example:

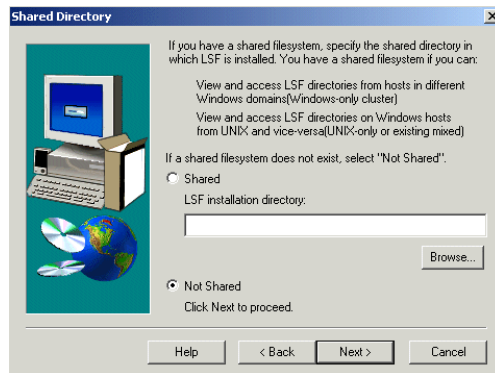
```
LSF_MASTER_LIST="hostA hostB hostC"
```

 Listed hosts must be defined in `lsf.cluster.cluster_name`.
 - b Restart all hosts in your cluster.
- Add Windows hosts to the UNIX cluster**
- 1 Log on to the Windows domain containing the hosts that you want to add to the cluster.
 Make sure your installation account has the local administrator privileges on all the hosts you will select.
 - 2 Run LSF Setup and follow the prompts:
 - a Choose **Install** from **LSF Setup Options**.
 - b Choose **Add hosts to an existing LSF cluster** from **Installation Options**.

- c Leave **Cluster Identification** blank since you do not have any Windows hosts in your cluster.

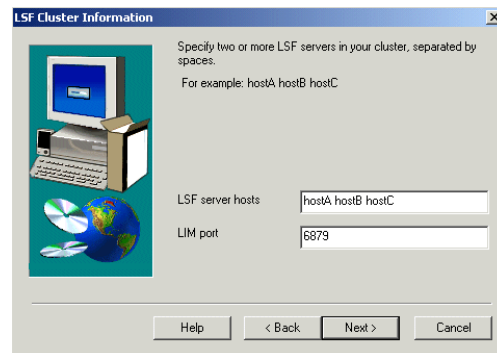


- d Select **Not Shared** for **Shared Directory**.



- e For LSF Cluster Information:

- ❖ **LSF server hosts**—specify two or more LSF server hosts in your UNIX cluster separated by spaces. This is required so that Windows LIMs can contact UNIX LIMs for configuration information. For example: server1 server2 server 3
- ❖ **LIM port**—specify the LIM port number in your cluster. The LIM port number is indicated in `lsf.conf` (`LSF_LIM_PORT`), or in `/etc/services` or the NIS on UNIX.



- 3 Follow the prompts.

Post-installation steps

- 1 If you use the `lsf.task` file or the `hosts` file in your environment, copy the content of the files in the UNIX shared directory to the Windows shared directory.
- 2 On any host specified in `LSF_MASTER_LIST` on UNIX, run the commands `lsadmin reconfig` and `badmin reconfig`.
- 3 Restart each of the new Windows hosts. LSF services should be started.

LSF Configuration Settings

- ◆ The following LSF settings in the Windows Registry use a local directory path, not UNC path. This is why LSF 4.2 or later is required:
 - ❖ LSF_BINDIR
 - ❖ LSF_LIBDIR
 - ❖ LSF_MACHDEP
 - ❖ LSF_SERVERDIR
 - ❖ LSF_TMPDIRLSF_ENVDIR is the exception to this rule.
- ◆ %LSF_BINDIR% defined as system environment variable uses a local directory path, not UNC Path.
- ◆ The ImagePath for all LSF Services (LSF *cluster_name* LIM, LSF *cluster_name* RES, and LSF *cluster_name* SBD) uses a local directory path, not UNC Path.

LSF Default User Mapping for Mixed Clusters

In a mixed UNIX-Windows environment, if your Windows account in the LSF user domain has the same user name as your UNIX account (see “[Duplicating LSF User Accounts in a Mixed Cluster](#)” on page 138), LSF’s default user mapping lets LSF schedule and track jobs from both accounts as if they belong to a single user. On the execution host, LSF automatically runs the job using whichever of the two accounts is appropriate for that host.

For more information, see “[LSF Default User Mapping](#)” on page 89.

To submit cross-platform jobs when your accounts have different user names in different environments, you should configure user mapping for individual users. For more information, see *Administering Platform LSF*.

How to specify a user name with a domain name

Unless a Windows user account belongs to the LSF user domain (LSF_USER_DOMAIN in `lsf.conf`), the combination of domain name and user name specifies a Windows domain user in LSF. The syntax is:

`[DOMAIN_NAME | .]\user_name`

Type the domain name in capital letters. Use a period (.) instead of a domain name to specify a local account instead of a domain account.

UNIX systems interpret the single backslash as a special character, so on UNIX you have to use a double backslash to specify the domain name in the command line:

```
Windows C:\> bjobs -u MYDOMAIN\user1
UNIX    % bjobs -u MYDOMAIN\\user1
```

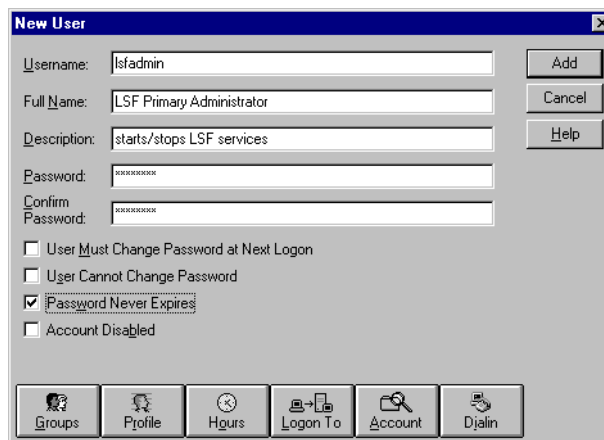
Duplicating LSF User Accounts in a Mixed Cluster

To work with LSF's default user mapping in a mixed cluster, LSF users should have user accounts on Windows and UNIX that have identical names.

On UNIX, the user names are case-sensitive. For example, LSF's default user account mapping will not allow Windows users to run jobs on UNIX hosts if the UNIX user account names are lowercase but the Windows names are uppercase. Furthermore, the `lspasswd` command for registering LSF users on Windows is not case-sensitive. For example, if you already registered "USER" then you cannot change it or register another Windows account named "user" or "User". To solve such problems, please contact Platform and ask about a customized solution.

If users do not already have duplicate user accounts, you can create them. Where the LSF user domain is a Windows domain, take these steps to create new accounts in Windows.

- Windows NT steps**
- 1 Log on to a machine running Windows NT Server as the domain administrator.
 - 2 Close any running applications.
 - 3 Choose **Start | Programs | Administrative Tools (Common) | User Manager for Domains**.
 - 4 Choose **User | New User**.



- 5 In the **Username** field, enter the user name of the UNIX account.
- 6 In the **Full Name** field, enter a full name for your own use (you may use spaces).
- 7 In the **Description** field, enter a suitable description for your own use.
- 8 In the **Password** field, enter a password that you will never need to change.
- 9 In the **Confirm Password** field, enter the same password again.
- 10 Clear the **User Must Change Password at Next Logon** check box.
- 11 Clear the **User Cannot Change Password** check box.
- 12 Select the **Password Never Expires** check box.
- 13 Clear the **Account Disabled** check box.

- 14 Click **Add** to add the new user.
- 15 Close the **User Manager for Domains**.
- 16 Choose **Server Manager | Computer | Synchronize Entire Domain** and reconfigure all backup domain controllers to make the new account take effect.

Reconfiguring the Mixed Cluster

In a mixed cluster, reconfigure the UNIX master host to make the changes take effect.

- Steps**
- 1 Log on to the UNIX LSF master host as the LSF primary administrator (by default, **lsfadmin**).
 - 2 Use the following commands to reconfigure the UNIX master host:
 - a `lsadmin reconfig`
 - b `badmin mbdrestart`

Upgrading a Mixed Cluster

When upgrading a mixed cluster, you must shut down the entire cluster to upgrade the Windows hosts. While the cluster is shut down, upgrade Windows hosts using LSF Setup, and upgrade the UNIX hosts using **lsfinstall**.

Samba

This section includes information on configuring Samba (www.samba.org) file servers to allow a mixed UNIX-Windows cluster. We assume Samba has already been installed.

- Contents** ♦ “[Configuring the Samba Shared File System for LSF Installation](#)” on page 144

Configuring the Samba Shared File System for LSF Installation

You can use Samba version 2.0.7 or later to share files between Windows (Windows domain environment) and UNIX (UNIX cluster installed using LSF defaults). For complete instructions on configuring Samba, use the **man** command to view the **smb.conf** man page:

```
man smb.conf
```

Take the following steps to configure Samba.

- Steps**
- 1 Log on as root to the UNIX host that is the LSF file server.
 - 2 Open **smb.conf** to edit (by default, in **opt/samba/lib**, or **/etc** on Linux). Older versions of Samba place **smb.conf** in **usr/local/samba/lib**.
 - 3 Configure parameters in the **[global]** section:

Parameter	Description
workgroup	Specify the LSF domain. For example, workgroup = DOMAIN
password server	Specify the Windows NT password server. For example, password server = hosta
security = server	Specify server security.
hosts allow	Specify the prefix of the subnet.
remote announce	Specify the subnet mask, a slash (/), and the LSF domain. For example, remote announce = 177.14.255.255/DOMAIN
browsable = yes	Make UNIX hosts show up when you view the network from a Windows host. This is the default.
encrypt passwords = yes	Encrypt passwords. This is the default. Windows NT 4.0 with Service Pack 3 or later does not work with plaintext passwords.
domain master = no	We assume your Samba server is not the PDC.
preferred master = no	Reduce network traffic by excluding this host from Samba's master election. This is the default.
nt acl support = yes	Enable this in Samba version 2.0.4 or later. This is the default. If you specify no, then the only ACE in the ACL will be "Everyone(Full Control)".
case sensitive = yes	Preserve case when resolving filenames.
preserve case = yes	This is the default.
short preserve case = yes	This is the default.
default case = lower	Specify upper or lower case.
wins server	If the Samba server is not the WINS server, specify the WINS server's IP address
wins proxy	If the WINS server resides on another subnet, specify yes

Parameter	Description
wins support	If the Samba server is the WINS server, specify yes
name resolve order	If the Samba server is the WINS server, specify wins lmhosts hosts bcact

- 4 Create a shared file system section for the **LSF_TOP/mnt** directory. The name of the share is displayed in Windows when you browse the shared file system through Samba. Use a name that is easily recognizable. For example: **[lsf_share]**

Configure the following parameters in the **[lsf_share]** section:

Parameter	Description
comment	Optional. Leave a comment to remind yourself and other administrators that this share is necessary for operation of your LSF cluster.
path	Path to LSF_TOP/mnt on the UNIX machine that is the LSF file server. The default LSF_TOP/mnt is /usr/share/lsf/mnt .
admin users	Make the LSF primary administrator an administrator of the shared directory, so that you can administer LSF from a Windows host. All specified users act as root when they operate on the share.
writeable = yes	Make the shared file system writable by Windows users, so that you can administer LSF from a Windows host.
follow symlinks = yes	Enable symbolic links. This is the default.
wide links = yes	Enable symbolic links to files outside the share. This is the default.
create mask = 644	Set the file mode permission mask for creating new files.
directory mask = 755	Set the file mode permission mask for creating new directories.
guest account =	Leave blank so that there is no guest account access to the share.
guest ok =	Leave blank so that there is no guest account access to the share.
guest only = no	Specify no so that LSF accounts can use the share. If you specify yes, only the guest account can access the share.
write list =	Leave blank so that read-only permissions on the files are not overwritten by Samba. This is the default.
read list =	Leave blank so that write permissions on the files are not overwritten by Samba. This is the default.
valid users =	Leave blank so that all LSF users have access to the share. This is the default. If you set this parameter, specify all LSF users, including the LSF primary administrator.
invalid users =	The specified users do not have access to the share. Make sure that all LSF users, including the LSF primary administrator, are not specified here.

The following is an example of a shared file system section for LSF:

```
[lsf_share]
comment = Shared disk for LSF
path = /usr/share/lsf/mnt
admin users = lsfadmin
writeable = yes
create mask = 644
directory mask = 755
```

- 5 Save and close **smb.conf**.
- 6 Configure the **smbpasswd** file and make sure all LSF users have input their passwords. The **smbpasswd** command is similar to the LSF **lspasswd** command and the UNIX **passwd** command.

If you cannot use the **smbpasswd** file, a less secure way to configure Samba is to set **encrypt passwords = no** in the **[global]** section of **smb.conf**. You might also have to set **security = server**.

- 7 Optional. Use the Samba command **testparm** to check **smb.conf** for configuration errors.
- 8 Restart the Samba daemons to make the changes take effect.

For example, on a Solaris system with Samba services named **samba** defined in **/etc/init.d**, add this command to the file **inittab**:

```
/etc/init.d/samba start
```

Also use the following command:

```
kill -HUP \init.d
```

Testing the Samba configuration

To verify that Samba is working correctly, test the configuration:

- 1 In the Windows Explorer, browse the shared LSF file system:
 - ❖ Use **Tools | Map Network Drive...** to map the LSF share to a drive.
OR
 - ❖ Use **Network Neighborhood** to display the UNIX host that is the LSF file server.

You should see the share name you defined for the LSF file system.

- 2 In the shared directory, create a test directory named **test**.
- 3 In the **test** directory, create a test file named **test.txt**.
- 4 On UNIX, Use the **ls -la** command to check the permissions of the **test** directory and the **test.txt** file.

For example:

```
% ls -la /usr/share/lsf/mnt/test
total 5638
drwxr-xr-x  2 root  lsf          512 May  3 10:19 ./
drwxr-xr-x  4 root  lsf          512 Apr 23 02:13 ../
-rw-r--r--  1 root  lsf          174 May  3 10:24 test
```

- 5 On Windows, delete the **test.txt** file and the **test** directory from the shared directory.

If you cannot complete any of these steps, check the Samba configuration, and correct any errors.

Displaying GUIs in LSF with Microsoft Terminal Services

Overview This chapter describes how to configure Microsoft Terminal Services and LSF to work together and how to submit and monitor jobs that display GUIs.

- Contents**
- ◆ “[How LSF Works with Terminal Services](#)” on page 150
 - ◆ “[Supported Platforms](#)” on page 151
 - ◆ “[Requirements](#)” on page 152
 - ◆ “[Configuring Terminal Services for LSF](#)” on page 153
 - ◆ “[Configuring LSF to Run Terminal Services Jobs](#)” on page 154
 - ◆ “[Submitting LSF Jobs to Terminal Services Hosts](#)” on page 155
 - ◆ “[Limiting the Number of Terminal Services Jobs on a Host](#)” on page 156
 - ◆ “[Submitting LSF Jobs to Terminal Services Hosts from UNIX](#)” on page 157

How LSF Works with Terminal Services

It is possible to run jobs to display graphical GUIs on remote hosts in LSF by using Microsoft Terminal Services.

Environment variables

The following environment variables are set for Terminal Services jobs:

- ◆ `LSF_LOGON_DESKTOP`
When `LSF_LOGON_DESKTOP=1`, jobs run in interactive foreground sessions. This allows GUIs to be displayed on the execution host. If this parameter is not defined, jobs run in the background.
- ◆ `LSB_TSJOB`
When the `LSB_TSJOB` variable is defined to any value, it indicates to LSF that the job is a Terminal Services job.

Job submission

- 1 Submit the job with `tssub` instead of `bsub`.
`tssub` is a wrapper around the `bsub` command which only submits jobs to hosts that have the `msts` resource.
- 2 `tssub` sets the `LSB_TSJOB` and `LSF_LOGON_DESKTOP` environment variables. These variables are then transferred to the execution host.
 - ❖ If the job is dispatched to a host in which Terminal Services is not installed or properly configured, the job is set to the PENDING state and a pending reason is written in `sbatchd.log.host_name`.
 - ❖ If `tssub -I` is specified, a terminal display is visible on the submission host after the job has been started.
 - ❖ If the job is not a GUI job, LSF runs a command window and output is displayed in the command window when something is written to `stdout`.
 - ❖ Pre- and post-execution commands are executed within the terminal session. The job does not complete until post-execution commands complete.
- 3 View job output with the command `tspeek`. If the terminal window is closed, the job remains running. You can reconnect to view the job with `tspeek`.

Limitations

- ◆ A job submitted as a Terminal Services job cannot be modified to become a non-Terminal Services job with `bmod`
- ◆ The `bsub` option `-o out_file` is not supported for `tssub`
- ◆ Only Windows `bsub` options are supported for `tssub`. For example, you cannot use the options `-Ip`, `-Is`, `-L login_shell` of `bsub` with `tssub`.
- ◆ If user mapping is defined, the user who invokes `tspeek` must have the required privileges to access the session
- ◆ MultiCluster is not supported

Supported Platforms

Submission hosts

Platforms supported by LSF on Windows:

- ◆ Windows NT 4.0 Workstation (Service Pack 4 or later)
- ◆ Windows NT 4.0 Server (Service Pack 4 or later)
- ◆ Windows 2000 Professional
- ◆ Windows 2000 Server
- ◆ Windows XP

Execution hosts

- ◆ Windows 2000 Server
- ◆ Windows 2000 Advanced Server

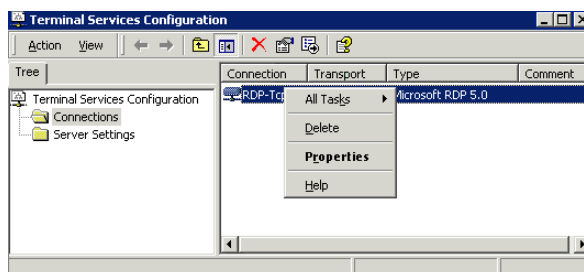
Requirements

- ❑ All submission hosts must have the Terminal Services Full Client Windows Installer (MSI) package installed. This package contains the required Microsoft Terminal Services Advanced Client ActiveX Control. Download it from the Microsoft web site.
- ❑ All execution server hosts must have the Terminal Services and Terminal Services Full Client Windows Installer (MSI) packages installed.
- ❑ Terminal Services server hosts can be in a different domain from submission hosts as long as the user can be authenticated by both domains.
- ❑ The service account on Terminal Services server hosts must be a member of the local administrators group.
- ❑ Your LSF cluster must be working properly.

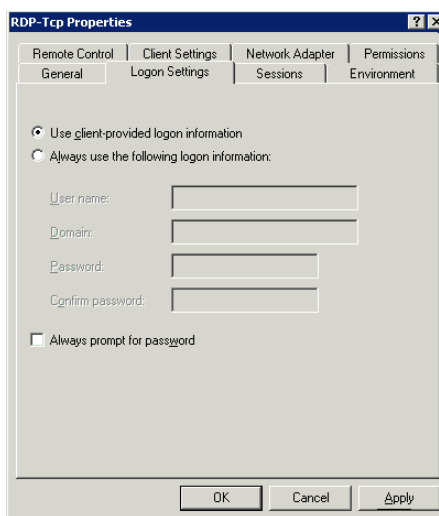
Configuring Terminal Services for LSF

By default, a Terminal Services connection always prompts for a password. You need to disable this option.

- 1 Start the Microsoft Management Console (MMC) Terminal Services Configuration snap-in (**Start | Programs | Administrative Tools | Terminal Services Configuration**).



- 2 Right-click the configuration for which you want to disable the default password setting, and select **Properties**.
- 3 Select the **Logon Settings** tab.
 - a Select **Use client provided logon information**.
This makes sure you are not using a predefined user to log on to Terminal Services.
 - b Clear the **Always prompt for password** check box.
Future connections will no longer force a password entry.



- 4 Click **Apply**, then click **OK**.
- 5 Close the dialog box.

Where to go next [“Configuring LSF to Run Terminal Services Jobs”](#) on page 154

Configuring LSF to Run Terminal Services Jobs

Define the msts static resource

Edit `lsf.shared` and define the `msts` static resource. Note that the resource name must be `msts` and values for the resource must be exactly as shown.

```
Begin Resource
RESOURCENAME TYPE   INTERVAL INCREASING DESCRIPTION
...
msts          Boolean  ()      ()          (Windows Terminal
Server)
...
End Resource
```

Add the msts resource to hosts

Edit `lsf.cluster.cluster_name` and add the `msts` resource to each host on which Terminal Server is installed. For example:

```
Begin Host
HOSTNAME  model  type  server rlm pg tmp RESOURCES
...
hostA     !      NTX86  1      -  -  -  (msts)
...
End Host
```

Create job starters to preserve a user's environment settings

Optional.

You may need to create a job starter script to preserve a user's environment settings on the execution host. For details, refer to *Administering Platform LSF*.

Submitting LSF Jobs to Terminal Services Hosts

Terminal Services Full Client Windows Installer (MSI) package must be installed on submission hosts.

Submit a job with `tssub`

Syntax `tssub [bsub_options]`

The `bsub` option `-o out_file` is not supported for `tssub`.

Only Windows `bsub` options are supported for `tssub`. For example, you cannot use the options `-Ip`, `-Is`, `-L login_shell` of `bsub` with `tssub`.

Submit a job to a host with Terminal Services installed by using the `tssub` command. For example:

```
% tssub myjob
```

View job output with `tspeek`

Syntax `tspeek job_ID`

You can use `tspeek` from any LSF Windows host to view the output of a Terminal Services job. For example, if your job ID is 23245:

```
% tspeek 23245
```

Monitor the job with `bjobs`

If you use `bjobs -l` to monitor the job, you will see a message such as:

```
External Message 2 was posted from LSF\lsfadmin to message box  
2
```

The body of the message contains the ID of the terminal session that was created.

Limiting the Number of Terminal Services Jobs on a Host

The `msts` resource indicates to LSF whether an execution host has Terminal Server installed or not.

To limit the number of Terminal Services jobs that run on a host and keep track of how many jobs are running, define a numeric resource in addition to the `msts` boolean resource. You can alternatively use an `elim` to report how many terminal servers are available for each host.

Configure a numeric Terminal Server resource

Define the resource in `lsf.shared`. For example:

```
Begin Resource
RESOURCENAME TYPE  INTERVAL INCREASING DESCRIPTION
...
term_server   Numeric 60      N          (Terminal Server)
...
End Resource
```

Submit a job with rusage

When submitting a job, use the `rusage` resource requirement string:

```
% tssub -R"rusage[term_server=1]" myjob
```

Submitting LSF Jobs to Terminal Services Hosts from UNIX

In mixed cluster environments, it is possible to submit a Terminal Services job with `bsub` from a UNIX host. Note however, that you will not be able to use `tspeek` to monitor job output from UNIX.

Requirements

The UNIX submission host must have an updated `bsub` binary dated on or after March 2002

Submit a Terminal Services job from UNIX

- 1 On the UNIX submission host, define the environment variables `LSF_LOGON_DESKTOP=1` and `LSB_TSJOB=1`.
 - ❖ When `LSF_LOGON_DESKTOP=1`, it allows GUIs to be displayed on the execution host.
 - ❖ When the `LSB_TSJOB` variable is defined to any value, it indicates the job is a Terminal Services job.
- 2 Submit the job with `bsub` and indicate the `msts` resource requirement. For example:

```
% bsub -R"msts" myjob
```


Index

Numerics

255 error 19

A

Add 105

add cluster administrators 105

add host 66

add hosts to cluster 105

add products 73

administrators

cluster 102

configure 104

group 40, 103

LSF 102

LSF service account 26

managing 104

API (Application Programming Interface), LSBLIB (LSF Batch LIBrary) 11

augmentstarter job starter 100

B

badadmin command 62

Batch 11

bhosts command 62

binary file location 23

bjobs command 63, 92

bparams command 63

bqueues command 63

bsub command 63

bsub -L 98

C

CALs (Client Access Licenses) 19

cannot find lsfc.conf error 19

checking

cluster configuration 58

license server 56

license server status (lmstat) 77

LIM 59

RES 60

checklist for installation 45

choosing, LSF hosts 28

Client Access Licenses (CALs) 19

client hosts 22

cluster

add hosts 66

checking 58

configuration, displaying 61

remove hosts 68, 105

starting 58

cluster administrators 102

concept 28

cluster administrators, add 105

cluster administrators, remove 105

cluster identification 36

Cluster Merge Manager 140

cluster name 32

cluster, add hosts 105

command syntax 8

commands

badadmin 62

bhosts 62

bjobs 63, 92

bparams 63

bqueues 63

bsub 63

lmstat 56

lmstat (FLEXlm)

displaying license server status 77

using 77

lsadmin 58

lsclusters 61

lsgrun 61

lshosts 60

lsid 59

lsinfo 59

lslload 60

lsrun 61

COMPSPEC 98

COMPUTERNAME 98

concepts of LSF Setup 15

configuration file directory 17

configure cluster administrators 104

configuring, LSF Monitor 113

configuring mail server 33

cross-platform user mapping 90

D

default user mapping 90

DHCP and LSF 118

directories, LSF top directory 17

directory of shared LSF configuration files 17

displaying

Batch hosts 62

Batch jobs 63

Batch queues 63

cross-cluster configuration information 61

license server status 56

license server status (lmstat) 77

LSF hosts 60

- DNS (Domain Name System) 118
- domain accounts 90
- domain installation, setting file permissions 50
- Domain Name System 118
- domain user accounts 24
- downloading LSF via FTP 47
- drive letter format 98
- duplicate LSF user accounts in a mixed cluster 138
- Dynamic Host Configuration Protocol 118
- E**
- email
 - configuring mail server 33
 - configuring on Windows NT 33
 - protocols 33
- environment variables 98
- environment, job execution 98
- error 255 19
- error, cannot find lsfc.conf 19
- event logging 35
- Event Viewer 35
- external, load indices, configuring in LSF Monitor 113
- F**
- file permissions, setting in a domain installation 50
- file systems, Samba 144
- files
 - downloading via FTP 47
 - getting LSF DEMO license 46
 - license.dat
 - description 70
 - location 70
- FLEXlm license server 30
- FTP, downloading LSF files 47
- G**
- getting
 - DEMO license file 46
 - LSF setup program 47
- H**
- hardware requirements 21
- Help in LSF Setup 20
- host names, displaying master 59
- host types (client/server) 22
- hosts
 - add to cluster 66, 105
 - choosing 28
 - displaying (bhosts) 62
 - displaying (lshosts command) 60
 - displaying configuration 60
 - dynamic IP addressing 118
 - remove from cluster 105
- HTML Help 20
- I**
- identification of the cluster 36
- installation 44
 - testing 55
- installation account 25
- installation directory 17
- installation host 20
- installation, checklist 45
- installing, LSF Monitor 112
- intervals, configuring in LSF Monitor 113
- J**
- job execution environment 98
- job starters
 - augmentstarter 100
 - preservestarter 100
- jobs
 - displaying 63
 - displaying GUIs with Terminal Services 149
 - submitting a test job 63
- joining two clusters 140
- L**
- L bsub option 98
- license file, getting 46
- license server 30
 - checking 56
 - checking status (lmstat) 77
 - displaying, status (lmstat) 77
 - displaying status 56
- license.dat file
 - description 70
 - location 70
- licenses
 - installation options 31
 - license.dat file 70
- licensing, CALs 19
- LIM (Load Information Manager)
 - checking 59
 - overview 11
- lmstat command 56
 - using 77
- load information, charting with Windows NT Performance Monitor 109
- Load Information Manager (LIM), checking 59
- local accounts
 - LSF's default user mapping 122
 - setting up LSF user passwords and privileges 124
- local administrators group 103
- local user accounts 24, 123
- local user accounts, specifying user names 122
- location of LSF binary files 23
- lsadmgr 104
- lsadmgr.exe 104
- lsadmin command 58
- lsb.params, SYSTEM_MAPPING_ACCOUNT 125
- LSB_MAILPROG parameter in lsfc.conf, lsmail.exe 33
- LSB_MAILSERVER parameter in lsfc.conf 33
- LSBLIB (LSF Batch LIBrary) 11
- lsclusters command 61
- lscmmgr 131
- LSF administrator group 40, 103
- LSF Administrator groups, Local Admins 26
- LSF Administrator Manager 104

- LSF administrators 102
 - concept 28
 - LSF Admins 40
 - LSF Admins group 103
 - LSF architecture 11
 - LSF Base API 11
 - LSF Batch, structure 11
 - LSF Batch hosts, displaying 62
 - LSF Batch jobs, displaying 63
 - LSF Batch queues, displaying 63
 - LSF binary files 23
 - LSF client hosts 22
 - LSF Cluster Merge Manager 140
 - LSF configuration file directory 17
 - LSF configuration, checking 58
 - LSF default user mapping 90
 - LSF files, downloading via FTP 47
 - LSF hosts
 - choosing 28
 - displaying 60
 - LSF installation 44
 - LSF installation account 25
 - LSF installation directory 17
 - LSF license file, getting 46
 - LSF license file (license.dat), description 70
 - LSF licenses, license file location 70
 - LSF Local Admins 26
 - LSF Monitor
 - configuring external load indices 113
 - configuring sample intervals 113
 - installing 112, 115
 - starting 114
 - statistics 114
 - stopping 114
 - LSF products, adding 73
 - LSF server hosts 22
 - LSF service account 26
 - LSF services, starting 58
 - LSF Setup concepts 15
 - LSF Setup online Help 20
 - LSF setup program, getting 47
 - LSF top directory 17
 - LSF user domain concept 41
 - LSF users 24
 - lsf.conf, LSF_BINDIR 98
 - lsf.conf file
 - configuring lsmail 33
 - email protocol 33
 - lsf.conf, cannot find error 19
 - lsf.conf, LSF_DHCP_ENV 119
 - LSF_BINDIR 98
 - LSF_DHCP_ENV in lsf.conf 119
 - LSF's default user mapping for mixed clusters 137
 - lsf5.1_w2k_nt.exe 47
 - lsfadmin account 26
 - lsfmon 115
 - lsgrun command 61
 - lshosts command 60
 - lsid command 59
 - lsinfo command 59
 - lsload command 60
 - lsmail program
 - configuring on Windows NT 33
 - configuring SMTP protocol 33
 - lsmail.exe, configuring 33
 - lspasswd, workgroup installation 53
 - lsrun command 61
- M**
- mail
 - configuring on Windows NT 33
 - protocols 33
 - mail server 33
 - managing administrators 104
 - mapping 90
 - master host, displaying 59
 - merging two clusters 140
 - Microsoft Exchange Mail protocol, configuring for Windows NT 33
 - Microsoft Exchange mail protocol 33
 - Microsoft HTML Help 20
 - mixed cluster
 - definition 16
 - Samba file sharing 144
 - user mapping 90
 - mixed cluster, duplicating user accounts 138
 - mixed cluster, planning 128
 - mixed cluster, upgrading 141
 - mixed clusters 127
 - mixed clusters, LSF's default user mapping 137
 - multiple domains 90
 - multiple operating systems 127
- N**
- newprof.exe 33
 - NTRESKIT 98
- O**
- online Help in LSF Setup 20
 - OS2LIBPATH 98
- P**
- passwords, setting up for local accounts 124
 - PATH environment variable 98
 - per seat licensing 19
 - per server licensing 19
 - permanent license
 - checking 56
 - displaying server status 56
 - permanent LSF license, displaying server status (lmstat) 77
 - permissions, setting for files in a domain installation 50
 - planning a mixed cluster 128
 - planning installation 45
 - planning LSF systems 15
 - preservestarter job starter 100
 - PROCESSOR_ARCHITECTURE 98

- PROCESSOR_LEVEL 98
- protocols
 - Microsoft Exchange Mail, configuring for Windows NT 33
 - SMTP
 - configuring for Windows NT 33
 - using Ismail 33
- Q**
- queues, displaying 63
- R**
- reconfiguring the mixed cluster, mixed cluster, reconfiguring 140
- Remote Execution Server (RES), checking 60
- remove cluster administrators 105
- remove hosts from cluster 105
 - hosts, remove from cluster 68
- requirements, hardware 21
- RES (Remote Execution Server)
 - checking 60
 - overview 11
- running, LSF services 58
- S**
- Samba 144
- sample intervals, configuring in LSF Monitor 113
- server hosts 22
- servers, DHCP 118
- servers, DNS 118
- servers, WINS 118
- service account 26
- Service Pack 4 for Windows NT 21
- services, starting LSF 58
- setup host 20
- setup program 47
- shared configuration file directory 17
- shared file systems, Samba 144
- SMTP 33
- SMTP protocol
 - configuring for Windows NT 33
 - using Ismail 33
- specifying local user names 122
- specifying user names 92
- starting
 - cluster 58
 - LSF Monitor 114
 - LSF services 58
- statistics in LSF Monitor 114
- stopping, LSF Monitor 114
- structure, of LSF Batch 11
- submitting a test job 63
- syntax of user names 92
- system account, workgroup installation 125
- SYSTEM_MAPPING_ACCOUNT 125
- SYSTEMDRIVE 98
- SYSTEMROOT 98
- T**
- temporary clusters 129
- Terminal Services, displaying GUIs with 149
- testing your installation 55
- typographic conventions 10
- U**
- UNC format 98
- uninstalling, LSF Monitor 115
- UNIX compatibility 98
- UNIX-Windows clusters 127
- unpacking directory 20
- upgrading a mixed cluster 141
- upgrading LSF 82
- user accounts, creating local accounts 123
- user domain concept 41
- user groups, LSF Administrator groups 26
- user mapping 90
- user passwords, setting up for local accounts 124
- users 24
 - adding a system account in workgroup installation 125
 - registering user passwords in workgroup installation 53
 - service account 26
 - specifying 92
 - viewing 92
- V**
- verifying cluster configuration 58
- view users 92
- W**
- WINDIR 98
- Windows 2000 Advanced Server 21
- Windows 2000 Professional 21
- Windows 2000 Server 21
- Windows cluster, definition 16
- Windows Internet Naming Service 118
- Windows NT, configuring email for LSF 33
- Windows NT 4.0 Server 21
- Windows NT 4.0 Workstation 21
- Windows NT Performance Monitor
 - charting LSF load information 109
 - configuring LSF Monitor 113
 - installing LSF Monitor 112
 - lsfmon 115
 - uninstalling LSF Monitor 115
- Windows NT Service Pack 4 21
- Windows XP 21
- Windows-only cluster 16
- Windows-UNIX clusters 127
- WINS (Windows Internet Naming Service) 118
- workgroup installation
 - adding a system mapping account 125
 - registering user passwords in LSF 53