Installation Instructions for Platform Suite for SAS®
Version 4.1 for Windows®
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30 March 2009
Chapter 1 - Introduction

This document describes how to install the Platform Suite for SAS, version 4.1, on Windows hosts for use with SAS products and solutions. The Platform Suite for SAS can be an individual addition to several SAS products and solutions to provide enterprise-level scheduling capabilities on a single server environment. The Platform Suite for SAS is also included as part of the SAS Grid Manager product to enable:

- Distributed enterprise scheduling
- Workload balancing
- Parallelized workload balancing

The Platform Suite for SAS includes the following components:

- **Process Manager** – this is the interface used by the SAS scheduling framework to control the submission of scheduled jobs to LSF and manage any dependencies between the jobs. The Flow Manager and Calendar Editor clients are included with Process Manager and may be optionally installed. These clients are not required by SAS however, they do provide additional functionality.
  - **Flow Manager** - provides a visual representation of flows that have been created for a Process Manager Server. These include flows that were created and scheduled in SAS Management Console’s Schedule Manager, as well as reports that have been scheduled through SAS Web Report Studio. Platform Flow Manager provides information about each flow’s status and associated dependencies. You can view or update the status of jobs within a flow, and you can run or rerun a single job regardless of whether the job failed or completed successfully.
  - **Calendar Editor** - is a scheduling client for a Process Manager Server. This client enables you to create new calendar entries for time dependencies for jobs that are scheduled to run on the server. You can use it to create custom versions of the calendars that are used to create time dependencies for jobs.

- **LSF** – dispatches all jobs submitted to it, either by Process Manager or directly by SAS, and returns the status of each job. LSF also manages any resource requirements and performs load balancing across machines in a grid environment.

- **Grid Management Services** – provides the run-time information about jobs, hosts and queues for display in the SAS Grid Manager Plug-in for SAS Management Console.
Job scheduling on a single machine requires that you install Platform Process Manager 7.0. During the Process Manager install, you will also install Platform LSF 7.02. See the section “Installing Process Manager and LSF” for the instructions on installing on a single server.
Several types of machines make up a SAS grid environment. These machines have been defined to clarify the software components that must be installed on each one as well as the SAS metadata that must be configured. The SAS metadata server is shown on a separate machine in this sample architecture. It is common to dedicate a machine to running the SAS metadata server, but you may choose to run the metadata server on the grid control server. The three machines types specific to a grid installation are defined as follows:

- **grid client** - a grid client submits work to the grid but is not part of the grid resources available to execute work. Examples of a grid client are:
  - a SAS Data Integration Studio client (Platform LSF not installed on this client machine)
  - a SAS Enterprise Miner client (Platform LSF not installed on this client machine)
  - a SASMC client using the Schedule Manager plug-in or any other applications scheduling SAS workflows. (Platform LSF not installed on this client machine)
  - a SAS foundation install (minimum Base SAS, SAS/CONNECT and Platform LSF) used to run a program that submits work, both whole programs or programs broken into parallel chunks, to the grid. Installation of the Platform LSF component is required in this case in order for SAS/CONNECT to submit the work to the grid.

- **grid control server** - any machine in the grid can be designated as the grid control server. More software is installed on the grid control server and more SAS metadata configuration takes place on this machine. You should start the installation of the Platform Suite for SAS on this machine. In a SAS Data Integration Studio and SAS Enterprise Miner scenario the grid control server runs a workspace server that executes programs that utilize SAS/CONNECT to
distribute work to the grid nodes. The grid control server can be configured as a grid resource capable of receiving work to execute or not, depending on the needs of your environment.

- **grid node** - a grid node is a grid computing resource capable of receiving the work that is being distributed. Each grid node must be running a minimum of Base SAS, SAS/CONNECT and Platform LSF.

Installation of Platform Suite for SAS is performed first on the Grid control server and is followed by installation on all of the Grid Node machines. Installation of Platform LSF on the Grid control server can be installed as a part of the Process Manager installation or it can be installed by itself. This document will only show LSF being installed as part of the Process Manager installation.

Not only do machines that do processing for the grid need Platform LSF installed, but machines that submit jobs to run on the grid must also have Platform LSF installed on them. Grid clients such as DI Studio or Enterprise Miner do not submit jobs directly but rather work with a SAS Workspace Server or a Stored-Process Server that does the job submission. Since those grid clients do not submit jobs, they do not need Platform LSF installed, but the machine where the Workspace Server or Stored-Process server would need it installed. If you are writing your own grid-enabled SAS program in Foundation SAS and want to run the program, that grid client workstation must have Platform LSF installed since it will be doing the actual submission of jobs to the grid.


SAS Grid Manager Control Server requires Platform Process Manager 7.0 and Platform Grid Management Service 7.0. Platform LSF 7.02 will be installed during the Platform Process Manager 7.0 installation. See the section title “Installing Process Manager and LSF” for the instructions on installing Process Manager and LSF. See the section “Installing Grid Management Services (GMS)” for instructions on installing Grid Management Services. SAS Grid Manager Node and SAS Grid Manager Client require only Platform LSF 7.02. See the section title “Installing LSF on Grid Nodes or Foundation SAS Grid Clients” for the instructions on installing LSF.

### Installation Directories

**Caution:** Do not install Process Manager and LSF to the same directory.

The Platform Suite for SAS installation produces the following directory structure:

- Process Manager Server and Client files are by default installed in `C:\Program Files\Platform Computing\Platform Process Manager\7`.
- LSF uses a shared directory for configuration and management of jobs. All machines in the grid need to be able to access this shared directory. While the directory can be a share on any machine in the grid, it is recommended that the share not be on a machine in the grid for increased high availability (HA).
- The Grid Management Service (GMS) files are installed in the LSF directory structure under their own directory: `gms`
**Pre-Installation Requirements**

1. Create a domain LSF administrator account. While the example screenshots in this document show a `<domain>\userid`, it is recommended that you refer to the relevant section on User Accounts in the *SAS Intelligence Platform: Application Server Administration Guide* for guidance on the userid to specify for your installation. This document assumes it will be `<domain>\lsfadmin`. The LSF administrator must have the following privileges on EACH LSF host:
   - Act as part of the operating system
   - Debug programs
   - Replace a process
   - Log on as a service
   - Increase quotas

   *Note:* The account should belong to the Local Administrators group on each host.

2. Locate `LSF92_*.txt` file located in the `sid_files` directory in your SAS Software Depot. This file will license all components of Platform Suite for SAS. (For 9.1.3, the license is the `PlatformJSxxxxxx.txt` file sent by SAS.)

3. Create a shared directory. Ensure the shared directory is accessible with the same path name from all machines in the grid. The LSF administrator needs to be able to write to this directory from all the machines in the grid. For example, if the host machine is named `fileserver` and the shared directory is named `lsf7` then you would enter `\fileserving\lsf7` when the install process asks for the shared directory name.

**Post-Installation Tasks**

Chapter 2 - Installing Process Manager and LSF

Caution: Do not install Process Manager and LSF to the same directory.

1. Run the executable located in the SAS Software Depot. For 9.2, the location is in the `third_party/Platform_Process_Manager/7_00` directory under the sub-directory named for the operating system you are installing on.

For 9.1.3, the location in the CD directory is based on the operating system.

- EM38S6 – Platform Computing manuals and documents
- EM39S4 – Microsoft Windows
- EM40S4 – Microsoft Windows for x64
- EM48S4 – Microsoft Windows for ia64
2. You should be presented with a window showing the extraction progress.
3. When extraction is complete, the Platform Process Manager splash screen is displayed and a progress indicator for set-up.
4. When the installation program has completed loading, it will display the Platform Process Manager welcome screen.

Click Next to continue.
5. Next, the Platform End User License Agreement is displayed.

Click **Agree** after reading the agreement (the default is **Disagree**).
6. Next the install asks you for the location to install the Platform Process Manager files.

Click **Next** to continue.
Next, the install will ask you what components you want to install.

Since you are installing both Process Manager and LSF, make sure everything is selected. If LSF is already installed, remove the check next to the Platform LSF option. Click Next to continue (the default is Back).
8. Next, the install will ask you the name of the cluster's administrator and the path of the license file.

You should enter the domain LSF administrator you created in the pre-installation requirements. Find the license file provided by SAS, including its path, mentioned in the pre-installation requirements. Leave the port number at 1966. Click Next to continue.
9. Next, the install will ask you for the user ID that will be used to run the Process Manager and LSF service programs.

You should enter the domain LSF administrator you created in the SAS pre-installation checklist (usually `<domain>\lsfadmin` where `<domain>` is your Windows domain name).
10. Next, LSF will give you the option of receiving email whenever a job completes.

The mail configuration is optional. If you don’t want LSF to send e-mail then leave the box unchecked and click Next to continue.
11. The install has gathered all the information it needs and will present you with a summary before starting the install.

Click *Next* to continue.
12. The install will display the progress as it installs Progress Manager.
13. Next, LSF wants to know where it should install the configuration files for the cluster.

![Shared Directory](image)

**Note:** Make sure the LSF administrator account (i.e., `<domain>`\lsfadmin) has write permission to the share. Otherwise you will receive Error 30035 about the failure to run the egoconfig mghost command.

Enter a new path or take the default and click **Next**.
14. Next, LSF wants to know where it should install its files.
15. Next, LSF needs to know the name of the cluster. This name will be used to identify LSF services and configuration files.

Enter the name of the grid (cluster), without spaces, and click **Next** to continue.
16. Next, LSF needs to know the base port for the grid (cluster) connection.

Unless you know there is a conflict, leave the port number at 7869. In this example, LSF will use ports 7869, 7870, 7871, and 7872. Click Next to continue.
17. Next, LSF needs to know the base port for grid (cluster) services.

Unless you know there is a conflict, leave the default values. Click **Next** to continue.
18. When the install is complete, LSF will display an installation results summary.

Make sure everything succeeded and click Install to continue. You will see a progress indicator screen for the installing of LSF.
19. LSF has completed the install and displays its final screen.

Click **Finish** to continue.
20. Process Manager has completed the install and displays its final screen.

![Platform Process Manager Setup](image)

Click **Finish** to continue.

21. Reboot your system.

**Testing the Installation**

Once the system has rebooted, you can follow these steps to make sure LSF on the grid control server (LSF master machine) is operating properly.

1. Log onto the machine as one of the users you added to LSF using the `lspasswd` command. These are usually `<domain>\lsfadmin`, `<domain>\sasadm`, `<domain>\sastrust`, or `<domain>\sasdemo`.
2. Open a DOS window by selecting **Start** → **Programs** → **Accessories** → **Command Prompt**.
3. Run the command `lsid`. This will display the cluster name and the grid control server (LSF master machine) name.
4. Run the command `lshosts`. This will display static information about the grid control server (LSF master machine).
5. Run the command `lsload`. This will display dynamic information about the grid control server (LSF master machine).
6. Run the command `bsub sleep 100`. This will submit a job to the cluster.
7. Run the command `bjobs`. This will display the job information. As you repeat this command, you should see the job go from **PEND**, to **RUN**, to being removed from the queue.

The following is sample output assuming the grid control server (LSF master machine) is **d15003.testgrid.com**.
8. Run the command `jid`. When prompted for username and password provide the administrator (lsfadmin) credentials. This will display static information about the Process Manager Server.

9. Start Flow Manager by selecting **Start→Programs→Platform Process Manager→Flow Manager** to run a client application to verify client communication to the Process Manager Server.

**Note:** If you are installing Platform Suite for SAS for single machine scheduling, you are done and should stop here. If you are installing Platform Suite for SAS for use with SAS Grid Manager, continue with the next chapter.
Chapter 3 - Installing Grid Management Service (GMS)

Grid Management Service is a daemon that is used by the Grid Manager Plug-in for the SAS Management Console to display grid information. After installing this service, you should be able to use the SAS Management console to view grid information.

1. Log onto the grid control server as the LSF administrator (<domain>\lsadmin).
2. Run the installation program. Double-click lsf7.0_gms_w2k.exe. The self-extracting executable is provided by SAS.

For 9.1.3, the location in the CD directory is based on the operating system.

- EM38S6 – Platform Computing manuals and documents
- EM39S4 – Microsoft Windows
- EM40S4 – Microsoft Windows for x64
- EM48S4 – Microsoft Windows for ia64
3. The **Welcome** dialog opens.

   ![Welcome dialog](image)

   **This wizard will install Platform Grid Management Service. To continue, click Next.**

   - It is strongly recommended that you exit all Windows programs before running this Setup program.
   - Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
   - **WARNING:** This program is protected by copyright law and international treaties.
   - Unauthorized reproduction or distribution of the program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.

   Click **Next** to continue.

4. Choose the destination location.

   ![Destination dialog](image)

   **Specify the full path to the top-level directory in which LSF has been installed (LSF_TOP).**

   Grid Management Service will be installed under LSF_TOP\gms.

   To select this folder, click **Next**. To select a different folder, click **Browse**.

   Unless you need to change the installation location, click **Next** to continue.
5. The Grid Management Service Configuration dialog opens.

Unless there is a conflict, leave the port number in the **Port** field at the default, 1976. Make sure your port is not already in use. Click **Next** to continue.
6. Specify the domain and user ID under which the Grid Management Service server will run.

![Platform Grid Management Service Setup](image)

Specify the domain and user ID under which the Grid Management Service server will run. It is recommended that Grid Management Service use the same installation account as LSF. The account will need to be a LSF administrator. Specify the password for that user ID. Confirm the password. Click Next to continue.
7. The **Start Copying Files** dialog opens.

![Start Copying Files](image1)

Click **Next** to continue to start the installation. The following progress indicator will display.

![Platform Grid Management Service Setup](image2)
8. The **Setup Complete** dialog opens.

![Setup Complete dialog]

Click **Finish**. You are done.

**Testing the Installation**

Once SAS has been installed and configured, the SAS Grid Manager Plug-in in the SAS Management Console can be used to test to make sure Grid Management Service is working.
Chapter 4 - Installing LSF on Grid Nodes or SAS Foundation Grid Clients

1. Run the Windows installer (lsf7Update2*.msi file) located in the SAS Software Depot. For 9.2, the location is in the third_party/Platform_LSF/7_02 directory under the sub-directory named for the operating system you are installing on.

For 9.1.3, the location in the CD directory is based on the operating system.

- EM38S6 – Platform Computing manuals and documents
- EM39S4 – Microsoft Windows
- EM40S4 – Microsoft Windows for x64
- EM48S4 – Microsoft Windows for ia64
2. You should see the LSF InstallShield Welcome screen:

Click Next to continue.
3. You will be asked if this is a new cluster or if you are adding a host to an existing cluster.

Since you are installing on the grid node machine, we will be adding to an already existing cluster. Select **Add a Host – join an existing cluster** and click **Next** to continue.
4. You will be asked for the shared location for configuration.

Enter the share path created when the grid control server was installed (see step #13 of “Installing Process Manager and LSF”). This will allow LSF to read information out of the configuration files for the cluster.
5. You will be asked the installation location.

Enter a new path or take the default and click **Next** to continue. This is the same path that was specified in step #14 in the section “Installing PM and LSF”.
6. You will be asked which type of host. If you installed Platform LSF on a machine that you want to be a grid node then select “LSF Server”. If however, you installed LSF on a machine you plan on just being a SAS Foundation grid client then select “LSF Client”. The LSF Client is only for the case where you are going to run Foundation SAS for the purposes of submitting jobs to the grid without allowing that machine to participate as a grid node.

Click Next to continue.
7. If you selected “LSF Server” then you will be asked for the LSF Administrator. If you selected “LSF Client” then you will go to the screen in the next step.

If the domain LSF administrator(s) is not already filled in, enter the domain LSF administrator you created in the SAS pre-installation checklist (usually `<domain>\lsfadmin` where `<domain>` is your Windows domain name). Click **Next** to continue.
8. LSF has completed getting all the information it needs and displays it in a summary before starting the install.

Click Next to start the install.
9. LSF has completed the install and displays its final screen.

Click Finish.

10. Reboot the new grid node machine and run the `lsfrestart` command on the grid control server so that the cluster learns about the new grid node machine. To run the command, start a DOS command prompt using `Start→Programs→Accessories→Command Prompt` and execute the command.

**Testing the Installation**

Once the system has rebooted, you can follow these steps to make sure LSF on the cluster is operating properly.

1. Log onto the grid control server as `lsfadmin`.
2. Open a command prompt to execute the command in the following steps.
3. Run the command `lshosts`. This should display static information about the grid control server and all grid nodes.
4. Run the command `lsload`. This should display dynamic information about the grid control server and all grid nodes.
5. Run the command `bsub sleep 1000`. This will submit a job to the cluster. Repeat this command once for each node in the cluster.
6. Run the command `bjobs`. This will display the job information. As you repeat this command, you should see the job go from `PEND`, to `RUN`, to being removed from the queue.
The following is sample output of a heterogeneous cluster where the grid control server (i.e., LSF master machine) is D15003.testgrid.com running the Windows operating system and the grid nodes are grid1.testgrid.com, grid2.testgrid.com, and grid3.testgrid.com, all running Linux. For a homogeneous cluster, all machines will be running the same operating system.

```
[lsfadmin@grid3 ~]$ . /grid/conf/profile.lsf
[lsfadmin@grid3 ~]$ lshosts
HOST_NAME  type    node1  cpuf  ncpus  raxmem  maxswap  server  RESOURCES
D15003.test LINUX86  PC150  13.2   1   2038M  3926M  Yes (SASMain nt)
grid1.test LINUX86  Opteron8  60.0   1   250M   511M   Yes (SASMain linux)
grid2.test LINUX86  Opteron8  60.0   1   250M   511M   Yes (SASMain linux)
grid3.test LINUX86  Opteron8  60.0   1   250M   511M   Yes (SASMain linux)

[lsfadmin@grid3 ~]$ lsload
HOST_NAME  status  r15s  r1m  r15m  ut  pg   ls   it  tmp  swp   mem
grid2.testgrid.  ox  0.1   0.0   0.5  2%  9.3  0  8988M  512M  211M
grid1.testgrid.  ox  0.5   0.0   0.4  2%  8.2  0  7936M  512M  210M
grid3.testgrid.  ox  0.6   0.7   0.8 17% 464.5 1  0988M  510M  168M
D15003.testgrid  ox  1.0   1.3   0.7 55% 16.4 1  0890M  274M  877M

[lsfadmin@grid3 ~]$ bhosts
HOST_NAME  STATUS  J/U  MAX  NJOBS  RUN  SSUSP  USUSP  RSV
D15003.testgrid.co  ok  -  1  0  0  0  0  0
grid1.testgrid.com  ok  -  1  0  0  0  0  0
grid2.testgrid.com  ok  -  1  0  0  0  0  0
grid3.testgrid.com  ok  -  1  0  0  0  0  0

[lsfadmin@grid3 ~]$ 
```
## Chapter 5 - LSF Quick Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>lsid</strong></td>
<td>Displays version number, cluster name, and the grid control server (master host) name. Useful to see if the grid daemons are running and if running in SAS mode.</td>
</tr>
<tr>
<td><strong>lshosts</strong></td>
<td>Displays information about the hosts recognized by LSF along with their static resource information.</td>
</tr>
<tr>
<td><strong>lsload</strong></td>
<td>Displays the dynamic resource information for the hosts in the grid (cluster).</td>
</tr>
<tr>
<td><strong>bhosts</strong></td>
<td>Displays batch information about all hosts in the grid (cluster).</td>
</tr>
<tr>
<td><strong>bjobs</strong></td>
<td>Displays information about current user’s LSF jobs</td>
</tr>
<tr>
<td><strong>lsfstartup</strong></td>
<td>Starts the LIM, RES, sbatchd, and mbatchd daemons on all hosts in the cluster. Must be run as root and all hosts must be running rsh or ssh daemons.</td>
</tr>
<tr>
<td><strong>lsfrestart</strong></td>
<td>Restarts the LIM, RES, sbatchd, and mbatchd daemons on all hosts in the cluster. Must be run as root and all hosts must be running rsh or ssh daemons.</td>
</tr>
<tr>
<td><strong>lsfshutdown</strong></td>
<td>Shuts down the LIM, RES, sbatchd, and mbatchd daemons on all hosts in the cluster. Must be run as root and all hosts must be running rsh or ssh daemons.</td>
</tr>
<tr>
<td><strong>lsadmin</strong></td>
<td>Administrative tool for LSF available to LSF administrators. Useful subcommands are</td>
</tr>
<tr>
<td><strong>reconfig</strong></td>
<td>Restarts all LIMs in the cluster to read any changes in the configuration files.</td>
</tr>
<tr>
<td><strong>limstartup</strong></td>
<td>Starts LIM on the local host</td>
</tr>
<tr>
<td><strong>limrestart</strong></td>
<td>Restarts LIM on the local host</td>
</tr>
<tr>
<td><strong>resstartup</strong></td>
<td>Starts RES on local host</td>
</tr>
<tr>
<td><strong>resrestart</strong></td>
<td>Restarts RES on local host</td>
</tr>
<tr>
<td><strong>bhist</strong></td>
<td>Displays historical information about jobs. Useful parameters are</td>
</tr>
</tbody>
</table>

- **-p** | Displays information about specific jobs (**p**ending, **r**unning, **d**one, or **a**ll). |
- **-l** | Display in long format. |
- **-u <user> | all** | Displays job for specified or all users. |
- **<job ID>** | Displays only specified job information. |
### Installation Instructions for Platform Suite for SAS for Windows

**badmin**

Administrative tool for LSF’s batch processing facility available to LSF administrators. Useful subcommands are

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reconfig</td>
<td>Reconfigures the batch facility without restarting sbatchd or mbatchd to read any changes in the configuration files.</td>
</tr>
<tr>
<td>hstartup</td>
<td>Starts sbatchd on the local host</td>
</tr>
<tr>
<td>hrestart</td>
<td>Restarts sbatchd on the local host</td>
</tr>
<tr>
<td>mbdrestart</td>
<td>Restarts mbatchd. Needs to be done when new hosts are added to the grid (cluster).</td>
</tr>
<tr>
<td>hclose &lt;host&gt;</td>
<td>Closes a host preventing it from running jobs.</td>
</tr>
<tr>
<td>hopen &lt;host&gt;</td>
<td>Opens a host to allow it to run jobs.</td>
</tr>
</tbody>
</table>

**bsub**

Submit a job to the grid. Useful parameters are

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-I</td>
<td>Interactive. Remote output displayed locally.</td>
</tr>
<tr>
<td>-m</td>
<td>Submit to a specific host.</td>
</tr>
<tr>
<td>-R “res_req”</td>
<td>Submit with specified resource</td>
</tr>
</tbody>
</table>

The LSF commands shown in this section show examples of typical output. The output you see will differ according to your local configuration.

The commands are described briefly so that you can easily use them as a “sanity check” for your LSF installation. See the *LSF Reference* for complete usage and command options. You can use these commands on any LSF host. If you get proper output from these commands, your cluster is ready to use. If your output from the commands discussed in this section has errors, see the *LSF Reference* for help.

### Check Cluster Configuration (*lsadmin*)

`lsadmin ckconfig -v`

The *lsadmin* command controls the operation of an LSF cluster and LSF configuration files. The -v flag displays detailed information about the LSF configuration:

```
lsadmin ckconfig -v
```

Checking configuration files ...

Platform EGO 1.2.3.115075, Sep 09 2008  
Copyright (C) 1992-2008 Platform Computing Corporation

binary type: nt-x86  
fixed:
Reading configuration from \hostB\LSF_7.02\conf\ego\sas_cluster\kernel/ego.conf  
Jan 07 08:17:05 2009 2492:4052 6.7.03 Lim starting...  
Jan 07 08:17:05 2009 2492:4052 6.7.03 LIM is running in advanced workload execution mode.
Jan 07 08:17:05 2009 2492:4052 6 7.03 Master LIM is not running in EGO_DISABLE_UNRESOLVABLE_HOST mode.
Jan 07 08:17:05 2009 2492:4052 5 7.03 C:\Program Files\Platform Computing\Platform LSF\7.0\etc/lim.exe -C
Jan 07 08:17:05 2009 2492:4052 7 7.03 setMyClusterName: searching cluster files...
Jan 07 08:17:05 2009 2492:4052 7 7.03 setMyClusterName: local host hostA belongs to cluster sas_cluster
Jan 07 08:17:05 2009 2492:4052 3 7.03 domanager(): \\hostB\LSF_7.02\conf/lsf.cluster.sas_cluster(13): The cluster manager is the invoker
   \lsfadmin> in debug mode
Jan 07 08:17:05 2009 2492:4052 6 7.03 reCheckClass: numhosts 1 so reset exchIntvl to 15.00
Jan 07 08:17:05 2009 2492:4052 7 7.03 getDesktopWindow: no Desktop time window configured
Jan 07 08:17:05 2009 2492:4052 6 7.03 Checking Done.
---------------------------------------------
No errors found.

The messages shown are typical of normal output from `lsadmin ckconfig -v`. Other messages may indicate problems with your LSF configuration. See the LSF Reference for help with some common configuration errors.

**Find Out Cluster Status (lsid and lsload)**

**lsid**

Tells you if your LSF environment is set up properly. lsid displays the current LSF version number, cluster name, and host name of the current grid control server (LSF master host) for your cluster. The grid control server (LSF master host) name displayed by lsid may vary, but it is usually the first host configured in the Hosts section of `LSF_CONFDIR/lsf.cluster.cluster_name`.

```
lsid
Platform LSF HPC 7 Update 2, Sep 09 2008
Copyright 1992-2007 Platform Computing Corporation

My cluster name is sas_cluster
My master name is hostB
Cluster in ISV mode : SAS
```

**lsload**

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. For example:

```
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 0.0 0.0 0.0 9% 0.0 4 1 130M 319M 12M
```
A busy status is shown for hosts with any load index beyond its configured thresholds. An asterisk (*) marks load indices that are beyond their thresholds, causing the host status to be busy. A minus sign (-) in front of the value ok means that RES is not running on that host.

If you see the message

LIM is down

or

LIM is not responding

after starting or reconfiguring LSF, wait a few seconds and try lsload again to give the LIMs time to initialize. lsload also shows if LSF is licensed for the host. If you see the message

Host does not have a software license

you must install a valid LSF license or make sure that the license server is running properly.

There are also a couple of other useful commands:

- The lshosts command displays configuration information for LSF hosts and their static resource information.
- The lsinfo command displays cluster configuration information about resources, host types, and host models.

### Check LSF Batch Configuration (badmin)

```bash
badmin ckconfig -v
```

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 flag displays detailed information about the configuration:

```bash
badmin ckconfig -v
Checking configuration files ...
----------------------------------------------------------
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. See the LSF Reference for help with some common configuration errors.
Find Out LSF Batch System Status (bhosts and bqueues)

**bhosts**

The `bhosts` command tells you if LSF Batch is running properly. `bhosts` displays the status and other details about the grid nodes (LSF Batch server hosts) in the cluster:

- Maximum number of job slots allowed by a single user
- Total number of jobs in the system, jobs running, jobs suspended by users, and jobs suspended by the system
- Total number of reserved job slots

The status should be `ok` for all grid nodes (hosts) in your cluster. For example:

```
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
```

If you see the message

```
lsbatch daemons not responding
```

after starting or reconfiguring LSF, wait a few seconds and try `bhosts` again to give the SBDs time to initialize.

**bqueues**

LSF Batch queues organize jobs with different priorities and different scheduling policies. The `bqueues` command displays available queues and their configuration parameters. For a queue to accept and dispatch jobs, the status should be `Open:Active`.

```
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
```
The queue information displayed by `bqueues` is configured in `lsb.queues`. Eight queues are defined by default in `lsb.queues`. Modify this file to add, delete, or change queues.

```
bqueues -l
```

To see more detailed queue information, use `bqueues -l normal`:

```
bqueues -l normal
```

**QUEUE: normal**

```
-- For normal low priority jobs, running only if hosts are lightly loaded. This is the default queue.
```

**PARAMETERS/STATISTICS**

```
PRIO NICE STATUS MAX JL/U JL/P JL/H NJOBS PEND RUN SSUSP USUSP RSV
30 20 Open:Active -- -- 8 8 0 0 0 0
```

**STACKLIMIT MEMLIMIT**

```
2048 K 5000 K
```

**SCHEDULING PARAMETERS**

```
rl5s rl1m rl5m ut pg io ls it tmp swp mem
loadSched -- -- -- -- -- -- -- --
loadStop -- -- -- -- -- -- -- --
```

**USERS: all users**

**HOSTS: all hosts used by the LSF Batch system**

`bqueues -l` shows the following kinds of information about the queue:

- What kinds of jobs are meant to run on the queue
- Resource usage limits
- Hosts and users are able to use the queue
- Scheduling threshold values:
  - `loadSched` is the threshold for LSF to dispatch a job automatically
  - `loadStop` is the threshold for LSF to suspend a job automatically

There are a couple of other useful commands:

- The `bparams` command displays information about the LSF Batch configuration parameters.
- The `bhist` command displays historical information about jobs.

**For More Information**

See the *LSF Administrator’s Guide* for more information about seeing the status of your cluster.

See the *LSF Reference* for detailed information about the commands described in this section.

See *Administering Process Manager* for detailed information about Process Manager configuration and maintenance.

These documents are also available at [http://support.sas.com/rnd/scalability/platform/index.html](http://support.sas.com/rnd/scalability/platform/index.html).
Appendix A – Multiple Host Installation

Pre-Installation Requirements

1. MSI version 2.0 or later is required.
2. Choose LSF hosts. These include grid control server (master host) and grid nodes (master candidate hosts and compute hosts). SAS recommends the interactive configuration of the grid control server, interactive configuration of one grid node, and silent configuration of the rest of the grid nodes.
3. Choose an installation directory that is available on every host (for example, C:\LSF_7.0).
4. Create and share a shared directory (for example, \<myhost>\LSF_7.0). SAS recommends that the file server host not be in the grid. Ensure the shared directory is accessible with the same path name from all nodes.
5. Make sure the base connection ports (BASEPORT through BASEPORT+3) and the LSF sbatchd (SBDPORT), res (RESPORT), and mbatchd (MBDPORT) ports are available on all hosts.
6. Choose a primary LSF administrator (owns all the configuration and log files; e.g., <domain>\lsfadmin). Create the primary LSF administrator with the following privileges on EACH LSF host:
   - Act as part of the operating system
   - Debug programs
   - Replace a process
   - Log on as a service
   - Increase quotas

Important: The account should belong to the Local Administrators group on each host.

7. Get the LSF distribution file.
8. Get the LSF license file.

You can download the psexec onto the master host, and then simply copy PsExec.exe onto the execution path (for example, C:\WINDOWS\System32) of the host. You will be installing all compute hosts from this host.
10. Make sure the Remote Registry Service is started on every compute host. This service should have been started automatically by default.

Installation Procedure

The recommended procedure to install LSF is

1. Install the grid control server first, interactively
2. Install a grid node, interactively.
3. Install all the remaining grid nodes with psexec silently.
Follow these steps to install LSF7.0/SAS on multiple hosts:

1. Install the grid control server. Log on as <domain>\lsfadmin on the grid control server and run the installer (for example, lsf7Update2_win32.msi). Keep a note of the base port, sbatchd res, and mbatchd port for the following steps.
2. Install on one of the grid nodes. Log on as <domain>\lsfadmin on the grid node machine and run the installer.
3. Log on to the grid control server as <domain>\lsfadmin and run lsfstartup to start the LSF cluster. At this point, the basic grid (LSF cluster) is up and running. We will then install and start up all the remaining grid nodes, and let those hosts join the cluster.
4. Copy the LSF distribution file onto a shared location, to which all hosts have access. (for example, \<myhost>\LSF_7.02\install)
5. On the grid control server where psexec is installed, execute the psexec command to silently install and start LSF on all compute hosts. For example:

```
psexec \gridnode1,gridnode2,gridnode3[, ...] -u <domain>\lsfadmin -p mypasswd msiexec -i \<myhost>\LSF_7.02\lsf7Update2_win32.msi
MASTERHOST=gridcontrolmachine LICENSEFILE=\HOSTF\LSFInstallShare\license.dat HOSTTYPE=Compute INSTALLDIR=C:\LSF_7.0 CLUSTERADMIN=<DOMAIN>\lsfadmin BASEPORT=baseport RESPORT=resport SBDPORT=sbdport MBDPORT=mbdport SERVERHOSTS=masterhost LSFPORCHOSTTYPE=Server STARTUP=Yes /qn
```

In this example, gridnodeX is the name of the remaining grid node machines, -u specifies the log on user, and -p specifies the log on password. Make sure all the port numbers match the recorded values in step 1.

Wait until the installation is completed and the psexec exit normally (that is, exit code 0).
6. Wait a few minutes until all the grid nodes join the grid (LSF cluster).
7. To enable fail-over, define your master candidates. List the desired order of fail-over, starting with the grid control server. For example:

```
eoconfig masterlist HOSTGCN, HOSTX
```

**Testing the Installation**

Once the system has rebooted, follow these steps to ensure LSF on the grid control server is operating properly.

1. Log onto the machine as one of the users you added to LSF using the lspasswd command. These are usually <domain>\lsfadmin, < domain >\sasadm, < domain >\sastrust, or < domain >\sasdemo.
2. Open a DOS window by selecting Start—Programs—Accessories—Command Prompt.
3. Run the command lsid. This will display the cluster name and the grid control server (LSF master machine) name.
4. Run the command lshosts. This will display static information about the grid control server (LSF master machine).
5. Run the command lsload. This will display dynamic information about the grid control server (LSF master machine).
6. Run the commandbsub sleep 100. This will submit a job to the cluster.
7. Run the command bjobs. This will display the job information. As you repeat this command, you should see the job go from PEND, to RUN, to being removed from the queue.
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