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# **Job Monitor**

The Cadence<sup>®</sup> Job Monitor lets you run and query the status of Cadence software jobs. You can also use Job Monitor to view the jobs in a queue; run jobs immediately or at a later time; display output and error log files; suspend, resume, and terminate jobs; customize the appearance of the *Jobs* table view; and search for jobs that match specific criteria.

Job Monitor uses Load Balancing System (LBS), a Cadence proprietary load-sharing system, to distribute jobs across a network of workstations. LBS refers to the API that applications use to launch jobs and the back-end load-sharing system. This API works with the Cadence proprietary LBS called cdsqmgr and third-party systems such as Load Sharing Facility (LSF), Sun Grid Engine (SGE), and OpenLava (OLV).

cdsqmgr is the default load balancing system. To specify a different system, set the LBS\_BASE\_SYSTEM shell environment variable to one of the following:

- LBS LSF (for LSF)
- LBS\_SGE (for SGE)
- LBS\_OLV (for OLV)

To use LSF, SGE, or OLV, you must have it installed at your site. For more information, contact the respective vendor.

Job Monitor

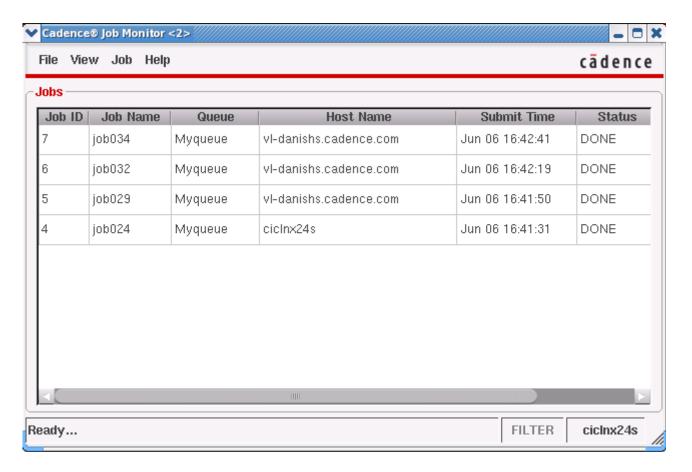
## **Starting Job Monitor**

To start Job Monitor:

→ In a terminal window, type

```
cdsJobMonitor \
  [{-32 | -64 | -32only | -64only | -3264 | -6432}] [-quiet3264] \
  [-debug3264] [-plat <platform>] [-v3264] [-help3264] \
  <application-specific-options>...
```

The Job Monitor window appears. The *Jobs* table view displays the jobs that have been submitted to the Job Monitor.



Job Monitor

### **Job Monitor Menu Bar**

### File Menu

- Save Defaults saves the current settings of Job Monitor as the default settings. See <u>Job Monitor Window Settings</u> for more information.
- Exit closes the Job Monitor.

### Job Monitor Window Settings

Before you start the Job Monitor, type the following to set the CDS\_JOB\_MONITOR\_DEFAULTS environment variable to use the predefined settings. setenv CDS\_JOB\_MONITOR\_DEFAULTS "parameter\_1=value\_1 parameter\_2=value\_2..."

**Note:** The parameter-value pairs in the CDS\_JOB\_MONITOR\_DEFAULTS environment variable must not contain any blank spaces or quotes.

The table below describes the parameters, data types, default values, and descriptions that are supported by the CDS\_JOB\_MONITOR\_DEFAULTS environment variable.

Parameter	Туре	Default	Description
frame_width	integer	600	Width of the Job Monitor window
frame_height	integer	400	Height of the Job Monitor window
frame_x	integer	0	Horizontal position of the top-left corner of the window
frame_y	integer	0	Vertical position of the top-left corner of the window
show_toolbar	Boolean	false	Shows the toolbar
columns_order	string	JobID, JobName, Queue, HostName, SubmitTime, Status	Order of columns in the Job Monitor window. The allowed column names are JobID, JobName, Queue, HostName, SubmitTime, Status, StartTime, EndTime, Command, and Owner
filter_by_status	Boolean	false	State of the <i>Status</i> check box on the <u>Filters</u> form

Job Monitor

filter_by_hostname	Boolean	false	State of the <i>Host Name</i> check box on the <u>Filters</u> form
filter_by_owner	Boolean	false	State of the <i>Owner</i> check box on the <u>Filters</u> form
filter_by_jobname	Boolean	false	State of the <i>Job Name</i> check box on the <u>Filters</u> form
status_filter	string	RUNNING	Status of the job on the <u>Filters</u> form. The allowed states are RUNNING, PENDING, SUSPENDED, and ENDED
hostname_filter	string		Text controlled by the <i>Host Name</i> check box on the <u>Filters</u> form
owner_filter	string		Text controlled by the <i>Owner</i> check box on the <u>Filters</u> form
jobname_filter	string		Text controlled by the <i>Job Name</i> check box on the <u>Filters</u> form
confirm_kill	Boolean	true	State of the <i>Show confirmations</i> before terminating jobs check box on the <u>Options</u> form
send_abort_mail	Boolean	true	State of the <i>Send default mail on job abort</i> check box on the <u>Options</u> form
refresh_rate	integer	2	Position of the <i>Rate</i> slider on the <u>Options</u> form
auto_refresh	Boolean	true	State of the <i>Auto</i> radio button on the <u>Options</u> form
show_jobname	Boolean	true	State of the <i>Job Name</i> check box on the <u>Options</u> form
show_owner	Boolean	false	State of the <i>Owner</i> check box on the <u>Options</u> form
show_hostname	Boolean	true	State of the <i>Host Name</i> check box on the <u>Options</u> form
show_status	Boolean	true	State of the <i>Status</i> check box on the <u>Options</u> form
show_submittime	Boolean	true	State of the <i>Submit Time</i> check box on the <u>Options</u> form

Job Monitor

show_starttime	Boolean	false	State of the <i>Start Time</i> check box on the <u>Options</u> form
show_endtime	Boolean	false	State of the <i>End Time</i> check box on the <u>Options</u> form
show_command	Boolean	false	State of the <i>Command</i> check box on the <u>Options</u> form
show_queue	Boolean	false	State of the <i>Queue</i> check box on the <u>Options</u> form

**Note:** The values for the parameters filter\_by\_status, filter\_by\_hostname, filter\_by\_owner, and filter\_by\_jobname are set automatically if the corresponding filter string has been assigned a value. For example, setting the status\_filter parameter to true will automatically set the filter\_by\_status parameter to true.

#### View Menu

- Refresh reloads the Jobs table view
- Toolbar displays or hides the toolbar
- Log Files displays output and error log files
- Options lets you select the job attributes—choose column headings, set the refresh rate, show or hide the Confirm Terminate Job dialog box, and choose to send e-mail notifications when a job aborts
- Filters lets you find jobs by their status, owner, host name, job name, or queue

### Job Menu

- Run lets you launch new jobs and schedule jobs to run later
- Suspend lets you defer a job to run later
- Resume lets you run a suspended job
- Terminate lets you stop a job that is running
- Properties displays information about a job

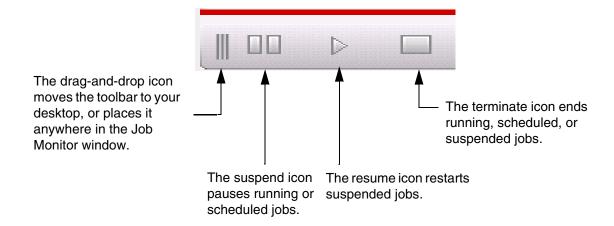
### Help Menu

Help Topics links to the online documentation library

Job Monitor

 About Job Monitor displays information about the version of Job Monitor you are running

### **Job Monitor Toolbar**



The toolbar is hidden by default.

To display the toolbar:

→ From the Job Monitor window, choose View – Toolbar.

You can use the same command to hide the toolbar.

You can place the toolbar anywhere on your desktop or inside the Job Monitor window.

To move the toolbar:

→ Drag the drag-and-drop icon to the location you want.

To return the toolbar to its original position:

→ Drag the drag-and-drop icon between the menu bar and the *Jobs* table view on the Job Monitor window.

If the close button is not visible, move the toolbar inside the Job Monitor window.

### **Job Monitor Context Menu**

The context menu gives you fast access to the common commands. The commands in the menu are enabled or disabled depending on the status of the selected jobs. For example, if more than one job is selected, the *Properties* command is disabled.

Job Monitor

To use the context menu:

- **1.** In the *Jobs* table view, select the jobs you want to suspend, resume, terminate, or for which you want to display the properties.
- 2. Right-click to display the context menu.
- **3.** Click the task you want to perform.

The *Jobs* table view displays the new status of the job.

## **Selecting Jobs**

To select a single job:

→ In the Jobs table view, click the job.

To select multiple adjacent jobs, do one of the following:

- Press and hold the Shift key, then click the start and end row of the set you want.
- Click and drag over the jobs you want to select.

To select multiple non-adjacent jobs:

→ Press and hold the Ctrl key, then click the jobs you want to select.

## **Deselecting Jobs**

To deselect a single job:

In the Jobs table view, press and hold the Ctrl key and click the job you want to deselect.

To deselect the selected jobs:

→ In the Jobs table view, select a new job.

# **Closing Job Monitor**

To close Job Monitor:

→ Choose File – Exit.

Job Monitor

# **Job Management using Job Monitor**

This chapter discusses the following topics:

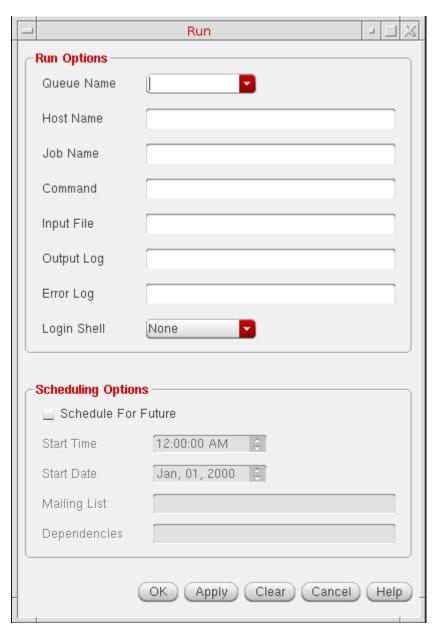
- Running Jobs
- Displaying Output and Error Log Files
- Managing the Status of a Job
- Customizing the Jobs Table View
- Updating Job Information
- Searching for Specific Jobs
- Displaying Information about a Job

# **Running Jobs**

To run a job or schedule it for later, do the following:

**1.** Choose *Job – Run*.

The Run form appears.



**2.** From the *Queue Name* drop-down list box, choose the queue in which you want to run the job or leave it blank for the job to run in the DEFAULT queue.

Job Management using Job Monitor

- **3.** (Optional) In the *Host Name* field, type the name of the host on which you want to run the job.
  - ☐ If you specify both *Queue Name* and *Host Name*, the job runs when the host becomes available on the queue.
  - ☐ If you specify only *Queue Name*, the job runs on the host that has the least load as identified by the underlying distributed resource management systems. The job is dispatched when a host becomes available.
  - □ If you specify only *Host Name*, or if you specify neither *Queue Name* nor *Host Name*, the job is run on the DEFAULT queue. The DEFAULT queue is served by all hosts in the network.
- 4. (Optional) In the *Job Name* field, type the name of the job.
- **5.** In the *Command* field, type the name of the command.
- **6.** In the *Input File* field, type the name of the input file.
- 7. (Optional) In the *Output Log* field, type the filename to store the errors that might prevent the job from running.
- **8.** (Optional) In the *Error Log* field, type the filename to store the error log.
- **9.** Run the job now or later as required.
  - $\Box$  To run the job immediately, click OK to launch the job and close the form.
    - Alternatively, click *Apply* to launch the job. The Run form remains open to let you launch additional jobs.
  - □ To run the job later:
    - **a.** In the *Scheduling Options* section, select the *Schedule For Future* check box. The *Start Time* and the *Start Date* fields are set to the current time and date.
    - **b.** In *Start Time*, specify a new time or use the spin box to select a new time.
    - **c.** In *Start Date*, specify a new date or use the spin box to select a new date.
    - **d.**(Optional) In the *Mailing List* field, enter the e-mail address of the users you want to notify about the job status.
    - **e.** In the *Dependencies* field, type the ID of the job that must end before this job starts.
    - f.Click OK.

## **Displaying Output and Error Log Files**

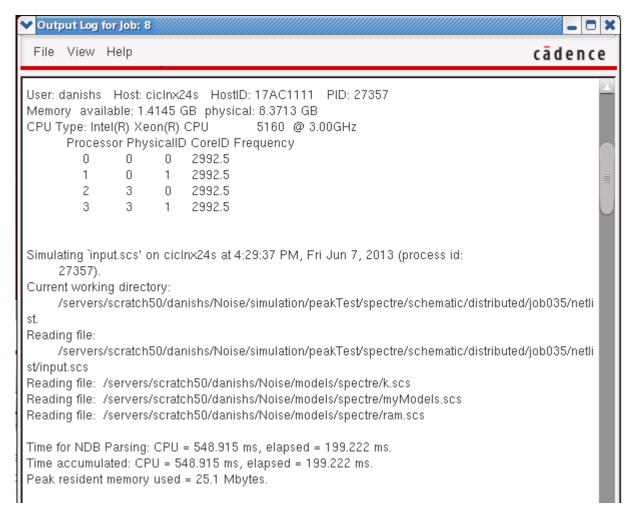
You can display the output and error status of jobs using the Output/Error Log form. This form is updated dynamically when the file changes.

To display the <u>output</u> or <u>error</u> log of a job:

- **1.** In the *Jobs* table view, select the job whose files you want to view.
- **2.** Choose *View Log Files Output* or *View Log Files Error*.

**Note:** The *Log Files* option is enabled only if a single job is selected and it has an associated output and error log file. The *Output* and *Error* options are enabled or disabled depending on whether the selected job has an output or an error log file.

The log form for the selected job appears.



The status bar displays the line count for the text you select in the window.

## Managing the Status of a Job

You can change the status of a job in one of the following ways:

- Suspend a running or scheduled job
- Terminate a running or scheduled job
- Resume a suspended job

### **Job States in Job Monitor**

A job can have the following states.

State	Description
UNKNOWN	Out of the recognized range
PENDING	Waiting for resource availability
PEND_SUSPENDED	Suspended while waiting for resource availability
ABORTED	Suspended in the queue due to resource unavailability
RUNNING	Submitted and under execution
USR_SUSPENDED	Suspended by the user during execution
SYS_SUSPENDED	Suspended by LBS
TERMINATED	Terminated sending a notification to the Unix terminal
EXITED	Exited before submission giving a non-zero value
DONE	Completed successfully with a zero value

## Suspending a Job

To suspend a job:

- **1.** In the *Jobs* table view, select the jobs you want to suspend.
- **2.** Choose *Job Suspend*.

The *Status* column in the *Jobs* table view shows the selected jobs as suspended.

If the job cannot be suspended, an error dialog box appears. You can skip the job, process the next selected job, or cancel the operation.

# Job Management using Job Monitor

### Terminating a Job

To terminate a job:

- **1.** In the *Jobs* table view, select the jobs you want to terminate.
- **2.** Choose *Job Terminate*.

A confirmation dialog box prompts you to confirm the termination process.

**Note:** If you deselect the Show confirmations before terminating jobs check box in the Options form, the confirmation dialog box does not appear.

The *Status* column in the *Jobs* table view shows the selected jobs as terminated.

If the job cannot be terminated, an error dialog box appears. You can skip the job, process the next job in the selected set, or cancel the operation.

### Resuming a Job

To resume a suspended job:

- 1. In the *Jobs* table view, click the suspended jobs you want to resume.
- **2.** Choose *Job Resume*.

The *Status* column in the *Jobs* table view shows the selected jobs as running.

If the job cannot be resumed, an error dialog box appears. You can skip the job, process the next job in the selected set, or cancel the operation.

## **Customizing the Jobs Table View**

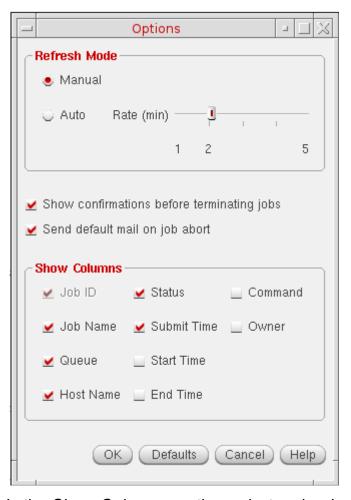
You can customize the *Jobs* table view by displaying or hiding column headings, changing the width of the columns, and changing the sort order of items in the columns.

## **Displaying or Hiding Column Headings**

To display or hide column headings in the *Jobs* table view:

**1.** Choose *View – Options*.

The Options form appears.



- **2.** In the *Show Columns* section, select or deselect the headings you want in the *Jobs* table view.
- 3. Click OK.

## **Resizing Column Headings**

To resize a column heading:

■ In the Jobs table view, drag the column delimiters as required.

# Job Management using Job Monitor

### **Sorting Jobs**

By default, the jobs are sorted in descending order of the job ID. You can also sort the jobs according to other attributes. The other attributes sort the jobs alphanumerically except the submit time, start time, and the end time attributes, which are sorted by date.

To sort the jobs according to a different job attribute:

In the Jobs table view, click the required column heading.

The jobs are re-sorted.

## **Updating Job Information**

You can see the latest information in the *Jobs* table view by refreshing the display. Job Monitor has two refresh modes, *Manual* and *Auto*. *Auto* refresh mode lets you set specific time intervals for the information to be reloaded. *Manual* refresh mode lets you reload the information on demand.

To set the refresh mode:

**1.** Choose *View – Options*.

The Options form appears.

- **2.** In the *Refresh Mode* section, do one of the following:
  - □ Click Manual.

Choose *View – Refresh* each time you want to refresh the display.

□ Click Auto.

Move the *Rate (min)* slider to the required refresh rate.

By default, the Job Monitor refreshes the display every 2 minutes.

3. Click OK.

## **Searching for Specific Jobs**

To search for specific jobs:

**1.** Choose *View – Filters*.

The Filters form appears.



- 2. Select the required filters.
- 3. Specify the values for each filter.
- 4. Click OK.

The *Jobs* table view displays the jobs matching the specified values.

# **Displaying Information about a Job**

To display information about a job:

- **1.** Select a job from the *Jobs* table view.
- 2. Choose Job Properties.

The Job Properties form appears.

Job Management using Job Monitor

A

# **Understanding Clusters and Queues**

A cluster is a set of hosts working together to balance the job load. Each cluster is controlled by a daemon process called cdsqmgr. Jobs from different applications are submitted to the cdsqmgr, which sends the jobs to the hosts in the cluster.

Following are the best practices for farm software:

- All involved machines must use a common path to access file systems. For example, the Cadence software should be available on all machines using the same file path.
- All involved machines must share common user-account information. For a given account name, userId, groupId, and home directory should not vary between machines.
- All machines must be able to access the user's home directory using the same file path.
- It is recommended that the farm machines use common file servers for data, rather than being dependent upon each other. In terms of reliability, this becomes more important as the number of farm machines increases.

**Note:** The information in this chapter is applicable only to Default-LBS. When you run jobs using LSF-LBS, cdsqmgr is not used. For more information about the daemon process involved in LSF, see LSF documentation available at <a href="https://www.platform.com">www.platform.com</a>.

### To start cdsqmgr:

In a terminal window, type

```
cdsqmqr configPath
```

where configPath is the path to a configuration file that lists the queues and the hosts (available for each queue) on which you want to run the jobs.

Typically, you can start cdsqmgr on a machine and all the applications can use this cdsqmgr.

**Note:** When using ssh to start cdsqmgr, access must be enabled using the fully qualified domain name for each host, otherwise ssh will not be able to resolve the name to the correct IP address.

## **How Applications Connect to cdsqmgr**

You can set the LBS\_CLUSTER\_MASTER environment variable to control the cdsqmgr to which your application connects. This variable should be set to the name of the host on which the cdsqmgr resides. This host is also known as the cluster master. The default cluster master is the local host.

The following logic determines how applications connect to the cdsqmgr.

**Note:** Applications do not have to code this logic; linking to the LBS client-side libraries or using the LBS JAVA class files is sufficient.

- 1. The application can connect to cdsqmgr residing on the cluster master using <code>login\_name</code>. <code>login\_name</code> is the login name of the person who attempts to launch the application.
- 2. If there is no instance of cdsqmgr running as login\_name, the application attempts to connect to cdsqmgr running as root on the cluster master.
- 3. If there is no instance of cdsqmgr running as root, an instance of cdsqmgr is automatically started up on the cluster master, and the application connects to it. Because cdsqmgr was started using the login name of the person who attempts to launch the application, it continues to run as login\_name.

Because cdsqmgr is started automatically, a configuration file cannot be specified. In this case, only the *DEFAULT* queue is considered to have been configured in the cluster.

To balance loads across all the users in a cluster, the person who is logged in as root must start up cdsqmgr on a known cluster master. The users should set the LBS\_CLUSTER\_MASTER environment variable to this cluster master. They will then connect to the same cdsqmgr, which will balance the load across all users' jobs.

If each user were to connect to a separate cdsqmgr, the load would be balanced only across each user's jobs.

В

# **Job Monitor Configuration File**

The configuration file is a setup file that defines the number of jobs that can be submitted to the specified queues and the hosts that are available for each queue. Each host has a job limit that identifies the maximum number of active jobs it can run at a time for a specific queue.

To create a configuration file:

- 1. Open a text editor.
- 2. Type a list of queues and hosts in the form

queueName numberOfHosts
hostname numberOfJobs

As an example, see the sample configuration file.

3. Save the file.

## **Specifying a Different Configuration File**

If cdsqmgr is running and you want to specify a different configuration file

In a terminal window, type

```
cdsreconfig filename
```

A prompt asking you to confirm the new configuration appears.



If cdsqmgr is running as root, your system needs to run as a root. You must notify all the LBS clients connected to this cdsqmgr to avoid disrupting their work.

If cdsqmgr is not running and you want to specify a configuration file other than the default,

In a terminal window, type

```
cdsqmgr configPath
```

where *configPath* is the absolute path to the configuration file.

Job Monitor Configuration File

**Note:** If you did not specify a configuration file, the *DEFAULT* queue is available only if you are using Default-LBS. If you are using a different load-balancing system, such as LSF, the default queue of that system is used. *ALL* lets you view all the jobs running in all the known queues.

The mechanism used by cdsqmgr to start programs on remote hosts is configurable. For more information, see <u>cdsRemote</u> in the *Cadence Interprocess Communication SKILL Reference* guide.

### Sample Configuration File

The sample configuration file below contains a list of the different queues in the cluster and the different hosts available for each queue.

queue1 3 hostA 2 hostB 1 hostD 5 queue2 2 hostA 3 hostC 4 queue3 4 hostA 1 hostB 4 hostC 6 hostD 5

This file contains the following information:

- Three hosts—hostA, hostB, and hostD are available for queue1. A maximum of two jobs (submitted to queue1) can run on hostA, one on hostB, and five on hostD. When all these hosts have reached their maximum job limit, the jobs that are submitted must wait in the queue until one of the hosts becomes available.
- Two hosts—hostA and hostC are available for queue2, with a maximum limit of three and four jobs, respectively.
- Four hosts—hostA, hostB, hostC, and hostD are available for queue3, with a maximum limit of one, four, six, and five jobs, respectively.

DEFAULT and ALL queue modes are reserved and cannot be used for queue names. Queue names and host names are case sensitive.

When using ssh to start cdsqmgr, you must specify each host using its fully qualified domain name, otherwise ssh will not be able to resolve the name to the correct IP address.

C

# **Form Descriptions**

### **Filters Form**

Use the Filters form to filter the list of jobs based on selected criteria. Regular expressions are not supported and values must be specified fully.

**Status** activates the cyclic field to let you select a status for filtering the jobs.

**Owner** lets you type the name of the owner.

**Host Name** lets you type the name of the host on which the job was launched.

Job Name lets you specify a name to the job.

Queue lets you type the name of the queue in which the job is running.

**OK** submits the selected filter attributes and closes the form.

**Apply** submits the selected filter attributes and leaves the form open so you can submit additional filter searches.

**Clear** removes all the information from the form.

**Cancel** closes the form without applying the selected filters.

**Help** describes the form.

### Related Topics

Searching for Specific Jobs

Form Descriptions

## **Options Form**

#### Refresh Mode

Manual sets the refresh mode to update the display only on request.

**Auto** lets you set the refresh mode to update the display automatically at the specified rate. Move the slider to adjust the rate. The default refresh rate is 2 minutes.

**Show confirmations before terminating jobs** lets you specify whether you want the Job Monitor to display a dialog box to alert you before terminating a job.

**Send default mail on job abort** lets you specify whether you want the Job Monitor to send you an e-mail notification when a job aborts.

**Show Columns** lets you select the following job attributes to display:

**Job Id** displays the identification number assigned to a job.

The job ID is always displayed and cannot be disabled.

Job Name displays the name of the job.

Owner displays the user ID of the owner of the job.

**Host Name** displays the name of the host on which the job was launched.

Status displays the state of a job.

**Submit Time** displays the time when a job was submitted.

**Start Time** displays the time when a job started running or is scheduled to run.

**End Time** displays the time when a job was terminated.

**Command** lets you specify a set of instructions to run a job.

**Queue** displays the name of the queue in which the job is launched.

**OK** sets the specified options and closes the form.

**Defaults** resets the form values to their default values.

**Cancel** closes the form without applying your selections.

**Help** describes the form.

Form Descriptions

## Related Topics

Customizing the Jobs Table View

Form Descriptions

# **Output Log Form**

File - Close closes the form.

*View – Refresh* reloads the data being displayed. Refresh is done automatically every 5 seconds if you do not perform a manual refresh.

*View – File Info* provides the filename, location, size, and permissions of the output or error log file being viewed.

Help describes the form.

### Related Topics

**Displaying Output and Error Log Files** 

Form Descriptions

## **Run Form**

### **Run Options**

Queue Name lets you specify the name of the queue in which you want to run a job.

**Host Name** lets you specify the name of the host on which you want to run a job. If you select the *DEFAULT* queue, you can specify any host name. If you do not specify a host name, the Job Monitor runs the jobs on your local host.

If you select a specific queue, you can type the name of a host that is available for the specified queue or click the arrow to select one of the hosts. If *Host Name* is left blank, the system assigns a host depending on the availability and the load of each machine assigned to the queue.

**Job Name** lets you specify a name to a job or a group of jobs. This field is optional and defaults to the command name.

**Command** lets you specify a set of instructions to run a job.

Input File lets you specify the path to the file that connects to the stdin of the job. If the job attempts to read its stdin, it reads the contents of this file. This path can be specified as absolute or relative to the working directory of the job. The default is /dev/null.

**Output Log** lets you specify the path to the file to which the output of the job will be sent. If the job attempts to write to its stdout, the contents are written to this file. This path can be specified as absolute or relative to the working directory of the job. The default is /dev/null.

**Error Log** lets you specify the path to the file to which the stderr output of the job is sent. If the job attempts to write to its stderr, the contents are written to this file. This path can be specified as absolute or relative to the working directory of the job. The default is /dev/null.

**Login Shell** lets you select a shell specific to your environment prior to running a job.

### **Scheduling Options**

**Schedule For Future** lets you specify a start date in the future.

**Start Time** lets you set the time at which you want to start the job. You can enter or use the spin box to specify the time.

The clock is reset when this form is closed.

**Start Date** lets you select the date on which you want to start the job. You can enter or use the spin box to specify the date.

Form Descriptions

**Mailing List** lets you type the list of users you want to notify when a job terminates or stops running. You can specify multiple entries using a comma or a space as a delimiter.

**Dependencies** lets you type the job ID of jobs that must end before this job can start. Separate multiple entries by a comma or a space.

**OK** launches the job and closes the form.

Apply launches the job and leaves the form open.

**Clear** removes all the information from the form.

**Cancel** closes the form without launching the job.

**Help** describes the form.

### Related Topics

Running Jobs