




Apple Qmaster 2 and Compressor 2

Distributed Processing Setup



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Contents

Preface	5 Introduction to Distributed Processing
	6 Using Distributed Processing to Increase Speed and Efficiency
	7 Basic Components of the Apple Qmaster Distributed Processing System
	8 Clients
	8 Clusters
	9 QuickClusters
	9 How the Apple Qmaster System Distributes Batches
	11 About the Distributed Processing Setup Guide
	12 Apple Websites
	12 Compressor and Shake Websites
	12 AppleCare Service and Support Website
	12 Other Apple Websites
Chapter 1	15 Getting Started Quickly
	15 Quick and Easy Distributed Processing
Chapter 2	21 Preparing a Network for Distributed Processing
	21 The Minimum You Need to Know
	22 Example of a Minimal Distributed Processing Network
	22 Using One Computer to Serve Two Distributed Processing Roles
	23 Other Possible Components of a Distributed Processing Network
	24 Example of an Expanded Distributed Processing Network
	25 Sample Setup for Part-Time Processing on Desktop Computers
	26 Configuring Access for Part-Time Distributed Processing
	27 Additional Steps For Part-Time Distributed Processing With Shake
Chapter 3	29 The Interfaces
	30 The Interfaces in the Apple Qmaster Distributed Processing System
	31 Apple Qmaster Pane in System Preferences
	33 Apple Qadministrator
	35 Client Interfaces: Compressor and Apple Qmaster
	36 Using Compressor
	36 Using Apple Qmaster
	37 Batch Monitor

Chapter 4

39	Creating and Administering Clusters
40	An Overview of Configuring a Cluster
40	Configuring Service Nodes and Cluster Controllers
41	Configuring Service Node Processing
42	Options in the Apple Qmaster Pane in System Preferences
43	Managed Vs. Unmanaged Services
45	Turning Cluster Controller Services On or Off
46	Making the Most of Multi-processor Computers
48	Creating Clusters With Apple Qadministrator
50	About QuickClusters
50	Creating QuickClusters
51	Advanced Settings in the Apple Qmaster Preferences Pane
54	Modifying and Deleting Clusters With Apple Qadministrator
55	Monitoring Cluster Activity
56	Setting Cluster Preferences
57	Setting Passwords and Scratch Storage
57	Setting Cluster Administrator and User Passwords
58	Setting a Service Password for Including a Computer in a Cluster
59	Cluster Storage: Setting a Scratch Storage Location
60	Recovery and Failure Notification Features
60	Recovery Features
61	Failure Notification

Appendix

63	Command-Line Usage
63	Installing Apple Qmaster from the Command Line
64	Shell Commands for Configuring Service Nodes and Cluster Controllers
64	Shell Commands for Submitting Compressor Jobs
66	Shell Commands for Submitting Apple Qmaster Jobs
68	Shell Commands for Monitoring Batches

Index

71

Introduction to Distributed Processing

Rendering a series of large files on one desktop computer is processing intensive and time consuming. You can increase speed and productivity by distributing processing across multiple computers.

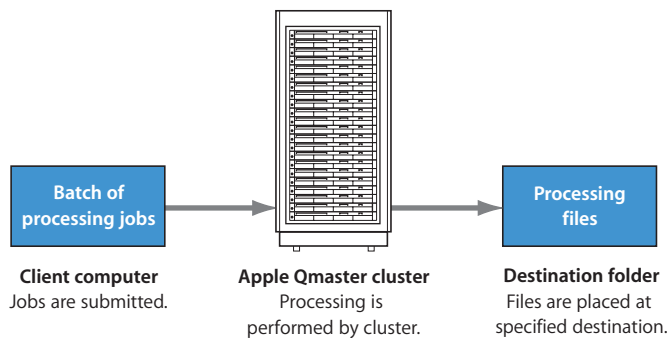
High-volume processing is sometimes addressed by carefully managing multiple computers; technicians set up batches of processing tasks for each computer, and then monitor their progress, collect and route the processed files, and start over again with new batches. While this is an improvement over the single-computer method, the resource and process management can be laborious and slow.

The Apple Qmaster distributed processing engine provides a more efficient solution, handling all the work distribution and processing for you, behind the scenes. Apple Qmaster and the Apple Qmaster features of Compressor 2 manage the processing across designated computers. They subdivide the work for speed, route the work to the computers with the most available computing power, and direct the processing.

Using Distributed Processing to Increase Speed and Efficiency

Distributed processing accelerates processing by distributing the work to multiple computers that have been chosen to provide more processing power. You can submit batches of processing jobs to Apple Qmaster, which allocates those jobs to other computers in the most efficient way (described in more detail in “How the Apple Qmaster System Distributes Batches” on page 9).

Computers that submit batches to the Apple Qmaster distributed processing system are called *clients*. A *job* is a processing task such as a Compressor preset-source pair, or a Shake file, or other file or commands, that use UNIX commands to specify settings such as rendering instructions and file locations and destinations.

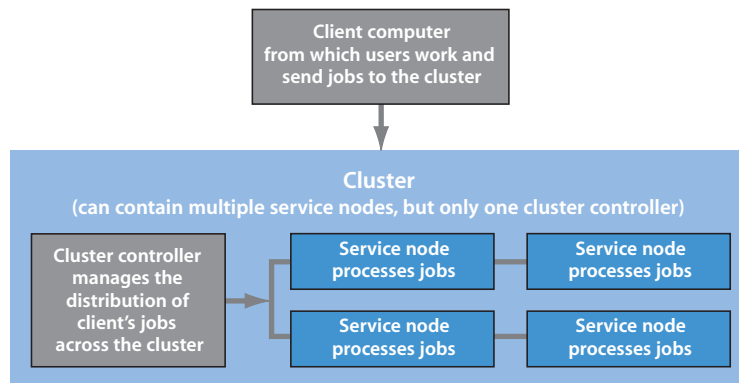


A *batch* is one or more jobs submitted for processing at one time. The procedure is analogous to printing multi-page documents from a word processing program; the files are spooled and processed in the background. Although a batch can include just one job, you will typically want to submit several jobs at once for processing. Similarly, several people can use the same Apple Qmaster system at the same time, with several client computers sending batches in the same time frame. Batches are managed and distributed by the computer that is designated as the Apple Qmaster *cluster controller*, which is described in the next section.

Basic Components of the Apple Qmaster Distributed Processing System

While the Apple Qmaster software includes a few different applications (see Chapter 3, “The Interfaces,” on page 29), as a whole it is part of a networked system that includes the following basic components:

- *Client(s)*: The computer or computers that use Compressor or Apple Qmaster to submit jobs for distributed processing. Applications that can use Apple Qmaster services for processing include Compressor 2, Shake, Alias Maya, and many UNIX command-line programs.
- *Apple Qmaster cluster*, which contains:
 - *Service nodes*: The computers that perform the processing of batches submitted via Compressor or Apple Qmaster. A batch can include one or more jobs.
 - *Cluster controller*: The software, enabled on a computer by means of the Apple Qmaster pane in System Preferences, that divides up batches, determines which service nodes to send work to, and generally tracks and directs the processes.



The client computer, the service nodes, and the cluster controller are often on separate (but network-connected) computers, for the most rapid processing potential. However, the cluster controller could be on a client computer or a service node. See “Using One Computer to Serve Two Distributed Processing Roles” on page 22 for more information on this scenario.

Following is a closer look at the part each component plays in the Apple Qmaster system.

Clients

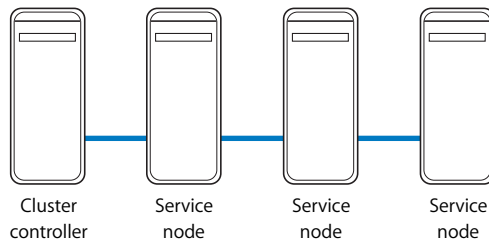
Batches are submitted for distributed processing from the *client computers*. A client computer can be any computer that has Compressor 2 or Apple Qmaster installed and is on the same network (subnet) as the cluster controller. Multiple client computers can be on the same subnet, using the same cluster to do the processing for various applications.

You use Compressor 2 or the Apple Qmaster application to submit batches to be processed for a client. See the *Compressor 2 User Manual* and the *Apple Qmaster 2 User Manual* for details on using these applications.

Clusters

When a client sends batches to the Apple Qmaster distributed processing system, all the processing and subsequent moving of any output files is performed by a group of Apple Qmaster-configured computers called a *cluster*. You can create one or more clusters of service nodes, with one cluster controller included in each cluster. Each computer in the cluster is connected to the other computers in the cluster through a network connection.

Example of a cluster



Note: This illustration provides only one simple example of a cluster. Other possibilities are described in Chapter 2, “Preparing a Network for Distributed Processing.”

Service Nodes

The service nodes are where the processing work is done. When you assign a group of service nodes to a cluster, they function as one very powerful computer because all their resources are shared. If one service node is overloaded or otherwise inaccessible, another service node is used.

You make a computer available as a service node by configuring it in the Apple Qmaster pane in System Preferences. The simple steps involved in using System Preferences to configure a service node are described in Chapter 4, “Creating and Administering Clusters,” on page 39.

Note: The terms *processing* and *rendering* will come up frequently as you read this document. The term *processing* is used here generically to cover both rendering (for Shake, and other frame-based rendering applications) and encoding (or transcoding or compression) for Compressor. For more information see the *Shake 4 User Manual* and the *Compressor 2 User Manual*.

Cluster Controllers

The cluster controller software acts as the manager of a cluster. The cluster controller directs the distribution of batches within the cluster. It has the ability to determine the best use of the cluster resources based on work and availability variables. (See “How the Apple Qmaster System Distributes Batches,” next, for more details.) The cluster controller is responsible for accepting batch submissions, maintaining and managing the batch queue, and doling out the work to the appropriate service node. It also tracks the status of all outstanding batches.

You make a computer available as a cluster controller by turning on the cluster-controlling service in the Apple Qmaster pane in System Preferences.

QuickClusters

The QuickCluster feature of the Apple Qmaster distributed processing system is a simple and automated alternative to creating and configuring clusters manually. For more information about QuickClusters, see “Creating QuickClusters” on page 50.

How the Apple Qmaster System Distributes Batches

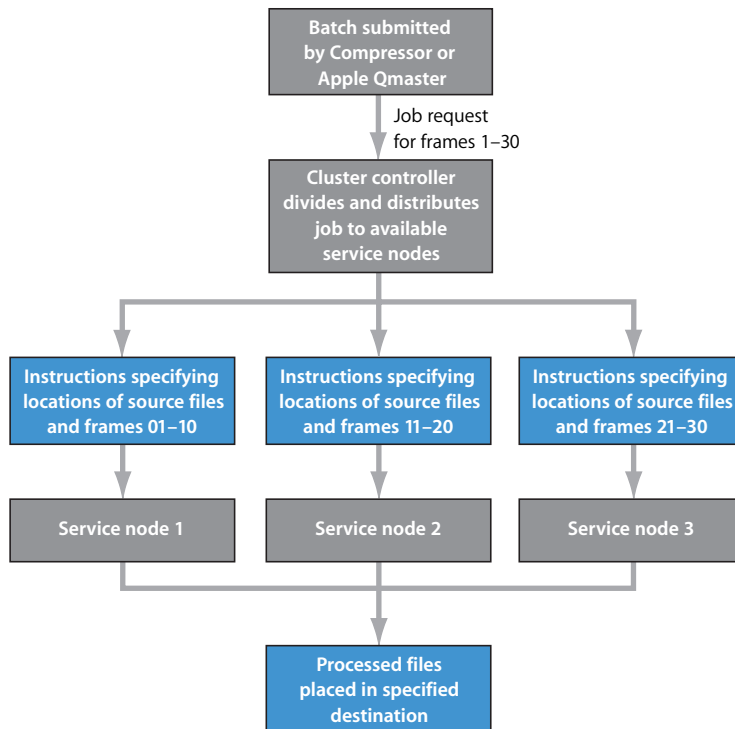
The Apple Qmaster cluster controller determines the most efficient use of the cluster resources. It makes this determination based on the availability of each service node and the number of separable parts (described next) of the batch.

Because Apple Qmaster subdivides individual batches across different service nodes, the work is shared and completed more quickly. And, because this method uses all the service nodes as much as possible, you avoid under-utilizing your resources.

Batches can be distributed to a cluster by the cluster controller in one or both of the following ways. (Apple Qmaster determines which way is the most efficient for specific batches, depending on the circumstances.)

- *The batch is subdivided into data segments:* For example, for a render batch, the cluster controller could divide the frames into groups (*segments*). Each segment would be processed in parallel on the service nodes in the cluster.
- *The batch is subdivided into tasks:* For example, for a render batch, the cluster controller could subdivide the rendering work into different processing tasks. Different tasks would be run on different service nodes.

Rather than actually moving segments, Apple Qmaster tells the service nodes which segments to read via the network, where to find them, and what to do with them. Below is an example of how one batch could be processed in an Apple Qmaster system.



In distributing batches, Apple Qmaster uses the technology built in to Mac OS X to locate services in a cluster on the same IP subnet and to dynamically share and receive information. Because the computers can continually transmit their current processing availability status, Apple Qmaster can distribute (load-balance) the workload evenly across the cluster.

About the Distributed Processing Setup Guide

The background information that introduces most of the basic concepts and terms related to using the Apple Qmaster distributed processing system is contained in this preface: “Introduction to Distributed Processing.”

- Chapter 1, “Getting Started Quickly,” on page 15, gets you going with a few very simple steps.
- Chapter 2, “Preparing a Network for Distributed Processing,” on page 21, will help you make sure that the network part of your Apple Qmaster system is ready.
- Chapter 3, “The Interfaces,” on page 29, introduces each of the applications and utilities included with the Apple Qmaster distributed processing software, and describes when you need to use each of them.
- Chapter 4, “Creating and Administering Clusters,” on page 39, tells you how to configure and administer the clusters, and how to submit and monitor the batches that you want to have processed by the clusters.
- The Appendix, “Command-Line Usage,” on page 63, explains how you can use the distributed processing system entirely from the command line.

While all of the chapters should be useful to administrators, client users may only need to refer to the *Compressor 2 User Manual* or the *Apple Qmaster 2 User Manual*, and possibly to the introductory information in this preface, to understand how to use the Apple Qmaster distributed processing system for their purposes.

To access the Distributed Processing Setup guide:

- Choose Help > Distributed Processing Setup.

You can also choose either Help > Apple Qmaster User Manual or Help > Compressor User Manual.

Each user manual contains a homepage that provides quick access to various features, including Late-Breaking News.

Additionally, a comprehensive bookmark list allows you to quickly choose what you want to see and takes you there as soon as you click the link.

In addition to these navigational tools, the Help documentation gives you other means to locate information quickly:

- All cross-references in the text are linked. You can click any cross-reference and jump immediately to that location. Then, you can use the navigation Back button to return to where you were before you clicked the cross-reference.
- The table of contents and index are also linked. If you click an entry in either of these sections, you jump directly to that section of Help.
- You can also use the Find dialog to search the index or text for specific words or phrases.

Apple Websites

There are a variety of Apple websites that you can visit to find additional information.

Apple Qmaster, Compressor, and Shake Websites

To access the Apple Qmaster support page, go to:

- <http://www.apple.com/support/appleqmaster>

To access the Compressor website, go to:

- <http://www.apple.com/finalcutpro/compressor.html>

To access the Compressor support page, go to:

- <http://www.apple.com/support/compressor>

To access the Compressor discussion page, go to:

- <http://discussions.info.apple.com/compressor>

To access the Shake website, go to:

- <http://www.apple.com/shake>

To access the Shake support page, go to:

- <http://www.apple.com/support/shake>

AppleCare Service and Support Website

For software updates and answers to the most frequently asked questions for all Apple products, go to:

- <http://www.apple.com/support>

You'll also have access to product specifications, reference documentation, and Apple and third-party product technical articles.

Other Apple Websites

Start at the Apple homepage to find the latest information about Apple products:

- <http://www.apple.com>

QuickTime is industry-standard technology for handling video, sound, animation, graphics, text, music, and 360-degree virtual reality (VR) scenes. QuickTime provides a high level of performance, compatibility, and quality for delivering digital video. Go to the QuickTime website for information on the types of media supported, a tour of the QuickTime interface, and specifications:

- <http://www.apple.com/quicktime>

For information about seminars, events, and third-party tools used in web publishing, design and print, music and audio, desktop movies, digital imaging, and the media arts go to:

- <http://www.apple.com/pro>

For resources, stories, and information about projects developed by users in education using Apple software, including Compressor, go to:

- <http://www.apple.com/education>

Go to the Apple Store to buy software, hardware, and accessories direct from Apple. You can also find special promotions and deals that include third-party hardware and software products:

- <http://www.apple.com/store>

The Apple Qmaster distributed processing system has default settings that allow you to use distributed processing immediately.

Whether you are using the distributed processing system for Compressor or Apple Qmaster, you can get up and running quickly with the following steps.

Note: The Compressor 2 distributed processing feature is limited to computers that have either Final Cut Studio or DVD Studio Pro 4 installed.

Quick and Easy Distributed Processing

The steps below describe the simplest and quickest way to start using distributed processing.

Step 1: [Install the software](#)

Install the appropriate software on the computers you want to include in your distributed processing network. Each computer in the network will require Apple Qmaster 2 and/or Compressor 2 software.

To install the software:

- 1 Make sure the client software is on at least one computer in your network.

In order to submit jobs and batches to the distributed processing system, you will need to run *client* (submission) software (either Compressor or Apple Qmaster). If you are reading this, you have probably already installed one or both of these. For further information, see the installation booklet that came with either of these applications.

- 2 Install Apple Qmaster software on each computer you want to use for distributed processing. (All computers must be on the same subnet.)

In most standard distributed processing networks, you will need to install Apple Qmaster software on every computer in the network.

a Locate the folder containing the Apple Qmaster software:

- If you are using Compressor, insert the DVD Studio Pro 4 or the Final Cut Studio installation disc and locate the “AppleQmasterNode.mpkg” installer package.
- If you are using Shake, insert the Shake 4 installation disc and locate the “AppleQmasterNode.mpkg” installer package.

b Do one of the following:

- Double-click the “AppleQmasterNode.mpkg” installer package, and follow the onscreen instructions. By default, this installer will install all the necessary Apple Qmaster software. You may choose to customize the process by removing either of the following from the installation: *Apple Qmaster Applications* (which installs the Apple Qmaster application, Apple Qadministrator, and Batch Monitor) or *Apple Qmaster Services* (which installs the Apple Qmaster pane in System Preferences, necessary to create QuickClusters and/or service nodes).
- Install Apple Qmaster software from the command line. See “Installing Apple Qmaster from the Command Line” on page 63 for more information.

Note: In order to use the Apple Qmaster distributed processing system to process Dolby Digital Professional audio, each node (computer) in your distributed processing network must have either Final Cut Studio or DVD Studio Pro 4 installed.

If you are unsure which role each computer will play in your network, just install the Apple Qmaster software on each computer in your network. You can sort out the details later. See “Basic Components of the Apple Qmaster Distributed Processing System” on page 7 for additional information on what roles individual computers can play in the distributed processing system.

Note: Shake users can create distributed processing clusters containing computers that do not have any Apple Qmaster software installed. See the *Apple Qmaster 2 User Manual* for more information.

Step 2: Configure a QuickCluster

Use the Apple Qmaster pane in System Preferences to configure the cluster controller and service node computers.

- 1 Open System Preferences.
- 2 Click the Apple Qmaster button, located in the Other section.

The Apple Qmaster pane appears.



- 3 If the pane is locked, unlock it by clicking the padlock in the lower-left corner to enter the administrator name and password.
- 4 Click Start Sharing.

This creates a QuickCluster with this computer as its controller, and an instance of processing services for each processor on the computer.

Step 3: Add service nodes to the cluster

On each computer that you would like to make a service node on your cluster, do the following:

- 1 Open System Preferences.
- 2 Click the Apple Qmaster button, located in the Other section.
The Apple Qmaster pane appears.
- 3 If the pane is locked, unlock it by clicking the padlock in the lower-left corner to enter the administrator name and password.
- 4 Click the Services Only radio button.



- 5 Click Start Sharing.

This creates a service node that will automatically process jobs submitted to the QuickCluster you set up in “Configure a QuickCluster” on page 17.

Step 4: Create a batch

In the Compressor Batch window, or in the Apple Qmaster window, create a batch with one or more jobs. See the *Compressor 2 User Manual* or the *Apple Qmaster 2 User Manual* for details.

Step 5: Submit the batch

- 1 Depending on whether you are using Compressor or Apple Qmaster, do one of the following:
 - In the Compressor Batch window, click the Cluster pop-up menu and choose the cluster you created in Step 2.



- In the Apple Qmaster window, click the Submit To pop-up menu and choose the cluster you created in Step 2.



- 2 Click Submit.

The distributed processing system will now process the batch using the cluster you created.

For more advanced information on creating and controlling clusters and services see any of the following:

- “Basic Components of the Apple Qmaster Distributed Processing System” on page 7
- “Sample Setup for Part-Time Processing on Desktop Computers” on page 25
- “The Interfaces in the Apple Qmaster Distributed Processing System” on page 30
- “Apple Qmaster Pane in System Preferences” on page 31
- “Apple Qadministrator” on page 33
- “An Overview of Configuring a Cluster” on page 40
- “Configuring Service Nodes and Cluster Controllers” on page 40
- “Creating Clusters With Apple Qadministrator” on page 48
- “About QuickClusters” on page 50
- “Modifying and Deleting Clusters With Apple Qadministrator” on page 54

Preparing a Network for Distributed Processing

2

A distributed processing network can consist of as few as one or two computers, while a high-volume network may include many computers, an Xserve and Xserve cluster nodes in a rack, and high-speed networking infrastructures.

You can scale up a distributed processing system as your workload demands by adding features and devices to the network that supports it. This chapter helps you prepare your network by describing the following:

- The Minimum You Need to Know (p. 21)
- Other Possible Components of a Distributed Processing Network (p. 23)
- Sample Setup for Part-Time Processing on Desktop Computers (p. 25)

The Minimum You Need to Know

The following are the basic rules for setting up a distributed processing network:

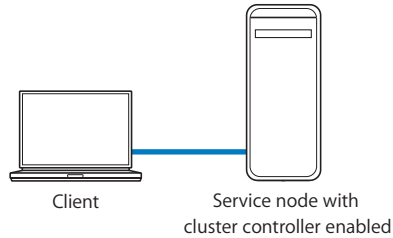
- A cluster must contain one (and only one) computer acting as the cluster controller, and at least one computer acting as the service node. (These two can be the same computer, as shown next in “Example of a Minimal Distributed Processing Network.”)
- The client computers and the computers in any cluster that supports them must be on the same network.
- The network must support the Apple networking technology built in to Mac OS X.
- All the computers in a cluster need Read and Write access to any computers (or storage devices) that will be specified as output destinations for files.

Example of a Minimal Distributed Processing Network

A very small distributed processing setup could include as few as two computers:

- One computer connected to the client and configured to act as both the service node and the cluster controller
- One client computer

Minimum setup for distributed processing



Though simple, this setup is useful in a small-scale environment because it allows the client computer to off-load a lot of processing work.

See “Example of an Expanded Distributed Processing Network” on page 24 for an illustration of a more powerful setup.

Using One Computer to Serve Two Distributed Processing Roles

To maximize your resources, you may want to consider using some computers for more than one distributed processing function.

- *Service node and cluster controller:* In a small setup, one of the service nodes in a cluster can also act as the cluster controller so that it performs both functions. However, in a cluster of many service nodes, the processing load required for the cluster controller could be so high that it would not be efficient to use one computer as both a service node and a cluster controller.
- *Client computer and cluster controller or service node:* You could also set up a client computer to act as a cluster controller or service node in a cluster, but again, keep in mind that the more available processing power a computer has, the faster it can manage or process jobs.

Other Possible Components of a Distributed Processing Network

There are many ways to expand the capacity of a distributed processing network. You could include any of the following:

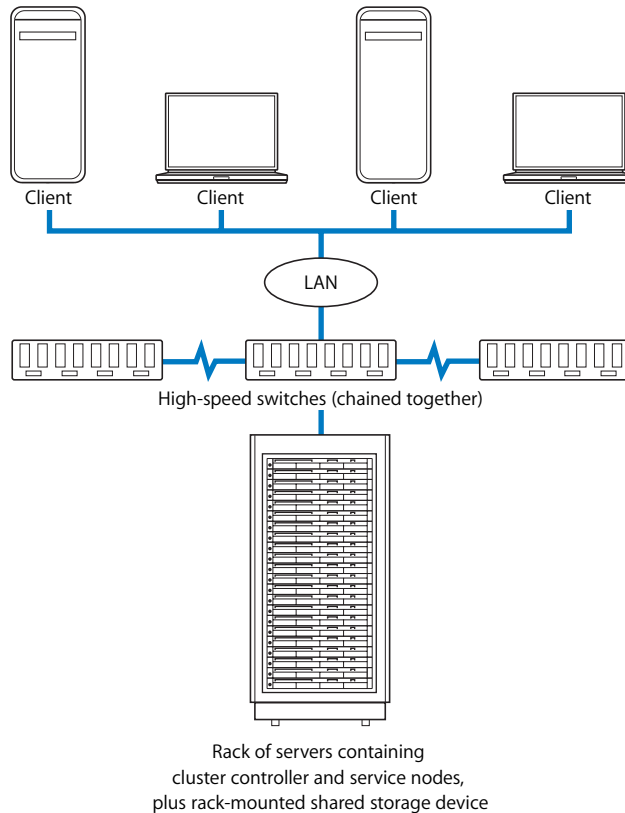
- *High-speed switch and cables:* A 100BaseT or Gigabit Ethernet switch and compatible cables to allow your data to move over the LAN at maximum speed.
- *Multiple clients:* Multiple client computers can use the services of the same cluster. And, you can have multiple client applications on the same client computer, using the same cluster.
- *Multiple clusters:* Depending on how extensive your network is and how many clients it needs to serve, you may want to divide up available computers and create more than one cluster to serve various clients. (Users select the cluster they want to send a batch to when they submit the batch.)
- *Multiple service nodes:* In general, more service nodes means more processing power. In deciding how many service nodes to have in a cluster, consider the ratio of data movement time to computing time. If the processing demand is greater than the network demand required to move job segments throughout the cluster, as is the case with rendering, more service nodes are a good idea. If the computing load, per job, is closer to the network load, having a smaller number of service nodes per cluster may be more efficient. If you are using the Apple Qmaster distributed processing system with applications other than Shake or Compressor, consult the application's user manual on how to optimize the number of service nodes.
- *Storage device:* A storage device, such as a remote disk or group of disk arrays, can be used as *cluster scratch storage*, which is a place for short-term storage of temporary data generated by the cluster controller, clients, and service nodes. (You set the scratch storage location in the Apple Qmaster pane in System Preferences. See "Cluster Storage: Setting a Scratch Storage Location" on page 59.) Alternatively, a storage device can be used as a final destination for the files after they are processed.

Many of these items are incorporated in the example that follows.

Example of an Expanded Distributed Processing Network

For rendering, a network might include a number of client computers on a LAN, connected to a cluster using a high-speed switch. A rack of servers plus a shared storage device, acting as the cluster, would be an extremely strong rendering engine. The service nodes would each have a local copy of the relevant client application software so that they could process the rendering jobs.

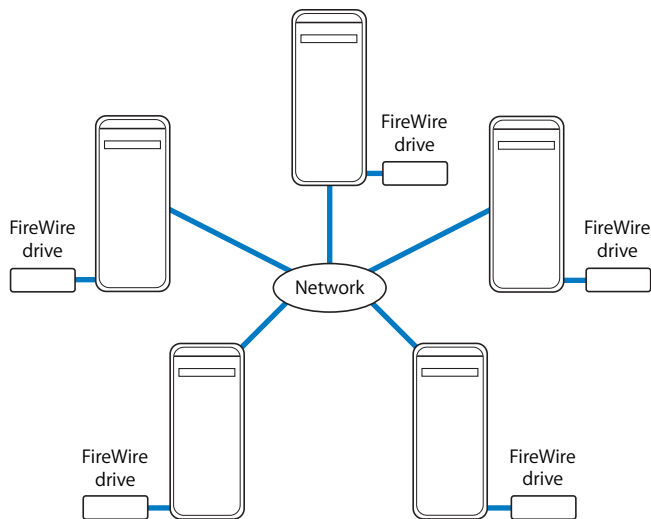
Example of a network setup for distributed rendering



Sample Setup for Part-Time Processing on Desktop Computers

This section takes you through the basic steps involved in a sample setup for “part-time” distributed processing. You can use it to get an idea of the kind of distributed processing environment you want to create, and as a guide in setting up that environment.

This setup is for an environment that uses desktop computers. It is called “part-time” processing because each computer acts as someone’s workstation, but at the same time is also part of the distributed processing cluster. The bulk of the processing jobs can be submitted with Compressor or Apple Qmaster at the end of the day, so that the computers are busy processing a large queue of distributed processing batches after everyone has gone home. (See “Advanced Settings in the Apple Qmaster Preferences Pane” on page 51 for information on scheduling service node availability.)



Each computer acts as:

- A client that submits jobs for processing
- A service node that performs the processing

All source and output files are stored on the FireWire drives.

In this sample setup, as shown above, five computers act as both the clients (user workstations from which users submit jobs for distributed processing) and cluster computers (which do the processing). Each computer has an additional volume, such as a FireWire drive, that is used for media before and after it is rendered, and for the associated files.

The steps that follow describe how to configure this desktop distributed processing environment. Before you get started, keep these essentials in mind:

- The cluster computers (cluster controller and service nodes) and the client computers (user workstations) need to be on the same local network (subnet).
- All the computers in the setup need Read and Write access to any volumes that will be specified as the source location or output destination for files, including Shake scripts. (An appropriate way to configure this access is included in the sample steps below.)

Configuring Access for Part-Time Distributed Processing

Step 1: Install Compressor 2 and/or Apple Qmaster

The necessary components of Compressor 2 or Apple Qmaster need to be installed on each computer. See “Install the software” on page 15 for more information.

Important: The Compressor 2 distributed processing feature is limited to computers that have either Final Cut Studio or DVD Studio Pro 4 installed. Previous versions of Compressor are not enabled for distributed processing.

Step 2: Make sure each computer has a volume dedicated to media

Make sure each computer has the necessary available storage, preferably a dedicated media volume. For example, give each computer a second volume, such as a FireWire drive, that is used for media. Each computer can use this volume for all source and destination files associated with distributed processing.

If you are a Compressor user, you can skip to one of the following chapters to complete the setup of your part time distributed processing system:

- Chapter 1, “Getting Started Quickly,” on page 15
- Chapter 4, “Creating and Administering Clusters,” on page 39

If you are a Shake user and you cannot consolidate all of the necessary source files (Shake scripts, media files, etc.) on a single-cluster storage volume, skip to “Additional Steps For Part-Time Distributed Processing With Shake” on page 27 before going on to Step 3.

Step 3: Create a cluster

First, use the Apple Qmaster pane in System Preferences to enable cluster controlling on one of the computers and enable the processing services on all the computers (making them service nodes). Then, you can assemble these computers as a cluster. Apple Qadministrator may not be necessary. See Chapter 4, “Creating and Administering Clusters,” on page 39, for detailed instructions.

Additional Steps For Part-Time Distributed Processing With Shake

The following additional steps may be necessary for Shake users who cannot consolidate all of the necessary source files (Shake scripts, media files, etc.) on a single cluster storage volume.

Step 1: Turn off the UNC (Universal Naming Convention) setting for Shake

To make sharing and volume mounting work smoothly in this setup, you need to turn off the Shake UNC setting on each computer. The UNC setting uses the entire file pathname, with the network address, in a convention that starts with `//ComputerName/DriveName/path`. You don't want Shake to use this filenames convention because it conflicts with the file sharing and volume mounting used in this setup.

Note: All the media volumes created in Step 2 of “Configuring Access for Part-Time Distributed Processing,” above, should have the *same* name.

The Shake *startup* .h file

In the three steps below, you make this change in a Shake *startup* .h file. As described in the Shake documentation, the *startup* .h files, located in the *startup* directory, are used to customize Shake settings (similar to setting preferences).

To turn off the UNC setting, do the following on *each* of the computers:

- 1 Log in as the user who will use Shake on the computer.
- 2 Double-click the Terminal icon in /Applications/Utilities to open a Terminal window.
- 3 Enter these two command lines in the Terminal window, pressing Return after each command line:

```
mkdir -p ~/nreal/include/startup/  
echo 'script.uncFileNames = 0;' > ~/nreal/include/startup/UNC_off.h
```

Step 2: Turn Personal File Sharing on

On each computer, open System Preferences, click Sharing, and turn on Personal File Sharing. This allows the computers to share the media volumes.

Step 3: Mount all the media storage volumes

On each computer, log in as the administrator. (The first user account you create when you set up Mac OS X is an administrator account.) Then, on each computer in the group, use the Connect to Server command in the Finder's Go menu to mount each media volume.

On each computer, you need to:

- Enter another computer's name in the Connect to Server dialog.
- Choose the associated media volume (FireWire drive) as the volume you want to mount.

Do this until all the computers are mounting all the media volumes in the cluster.

Submitting Processing Jobs in the Sample Part-Time Distributed Processing Setup

After you finish the final step above, each one of these computers can be used to submit jobs for distributed processing.

Important: Because of the way access has been configured in this setup, all file pathnames are conveniently consistent and simple for the purposes of specifying them in Compressor, in Shake scripts, and in Apple Qmaster, assuming that:

- Users place the source media on a mounted media volume (one of the FireWire drives).
- Users place the Shake scripts on a mounted media volume.
- All folders and files on the shared media volumes have Read and Write access enabled for everyone (for Owner, Group, and Others). You can make this access setting by selecting the folder or file and choosing File > Get Info.

The above three assumptions are important because they ensure that all the computers have Read and Write access to all the source files and output destinations.

Specifying Media File and Script Locations

The following additional configuration guidelines apply to anyone using Shake (or any other UNIX-based rendering applications).

Specifying the Media File Locations in Shake Scripts

In the above setup, all the Shake render scripts should specify their source media (File In) locations and output (File Out) destinations as: */Volumes/MediaDiskName*. For example: */Volumes/Media3*.

Specifying Shake Script Locations in Apple Qmaster

In the above setup, all the Shake script locations should be specified in Apple Qmaster as: */Volumes/MediaDiskName/ScriptFilename*. For example: */Volumes/Media3/Script.shk*.

Instead of one individual interface, the Apple Qmaster distributed processing system includes up to four different applications and utilities for configuring, monitoring, and managing services.

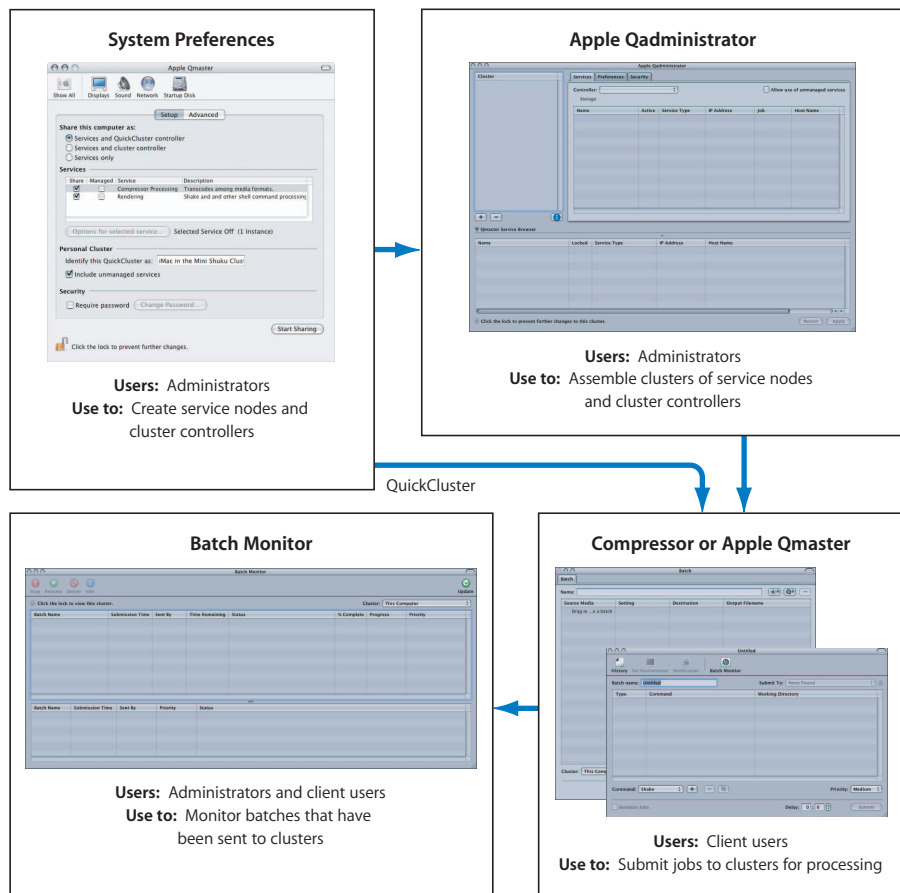
This chapter introduces the following elements of the Apple Qmaster distributed processing system:

- The Interfaces in the Apple Qmaster Distributed Processing System (p. 30)
- Apple Qmaster Pane in System Preferences (p. 31)
- Apple Qadministrator (p. 33)
- Client Interfaces: Compressor and Apple Qmaster (p. 35)
- Batch Monitor (p. 37)

The Interfaces in the Apple Qmaster Distributed Processing System

The Apple Qmaster system is a suite of applications that work together to provide maximum power and flexibility for distributed processing. The elements of the system can be combined in a variety of different ways to suit your needs.

In general, you use the Apple Qmaster pane in System Preferences to configure service nodes and cluster controllers, and to create simple clusters. System administrators use Apple Qadministrator for advanced cluster creation and control. Next, client users use Compressor or Apple Qmaster to submit batches of jobs for processing. Then, the Batch Monitor can be used by both administrators and client users to monitor batches.

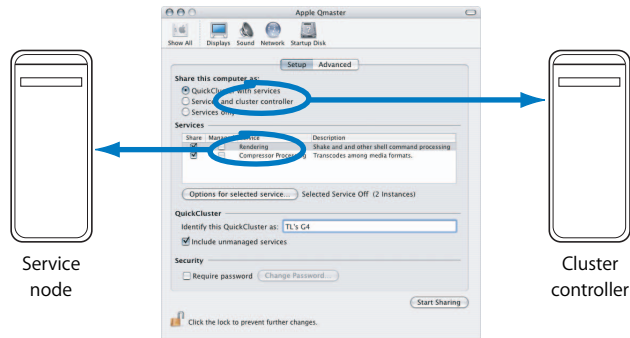


Note: It is possible to create a simple (personal) distributed processing system and skip Apple Qadministrator altogether. See “Apple Qmaster Pane in System Preferences” (next) and “About QuickClusters” on page 50 for more information.

Apple Qmaster Pane in System Preferences

Use the Apple Qmaster pane in System Preferences to activate, create, or make changes to Apple Qmaster cluster-controlling and processing services (including passwords and scratch storage locations).

Use Apple Qmaster System Preferences to configure service nodes and cluster controllers:



For details about using the Apple Qmaster pane in System Preferences, see:

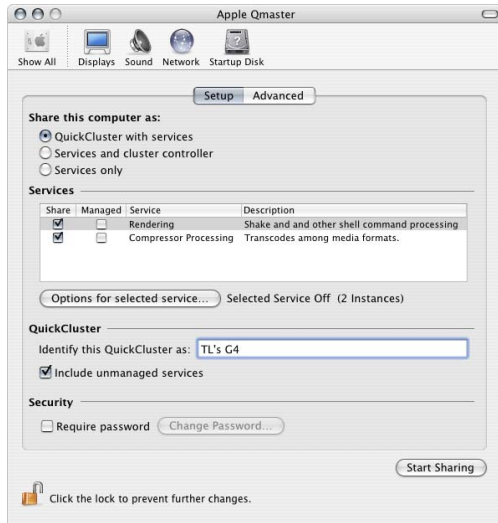
- “Configuring Service Nodes and Cluster Controllers” on page 40
- “Making the Most of Multi-processor Computers” on page 46
- “Setting a Service Password for Including a Computer in a Cluster” on page 58
- “Cluster Storage: Setting a Scratch Storage Location” on page 59

Also see the *Apple Qmaster 2 User Manual* for more information, including creating an extended node cluster which uses nodes without Apple Qmaster installed.

To open the Apple Qmaster pane in System Preferences:

- 1 Open System Preferences.
- 2 Click the Apple Qmaster button, located in the Other section.

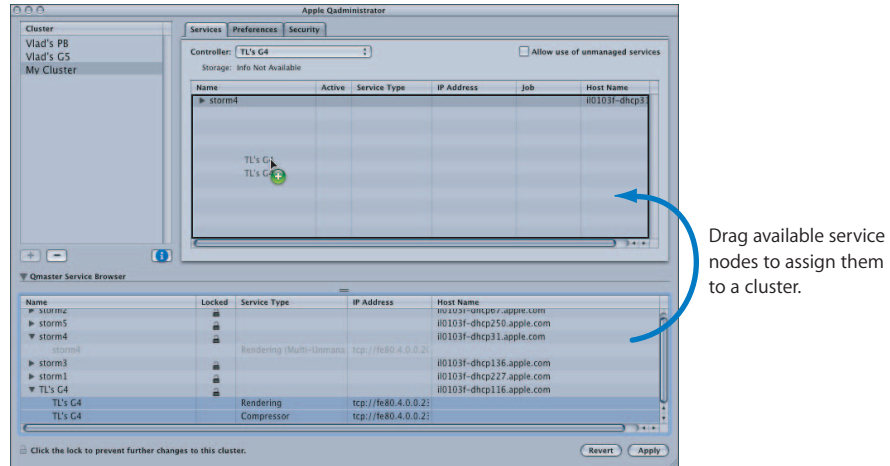
The Apple Qmaster pane appears.



Apple Qadministrator

Use the Apple Qadministrator application to create and modify Apple Qmaster clusters. Apple Qadministrator can be used on any computer that is on the same network as the cluster you want to administer. With the administrative password (if one was created), you can also use Apple Qadministrator to see and modify existing clusters on the network.

Use Apple Qadministrator to assemble clusters:



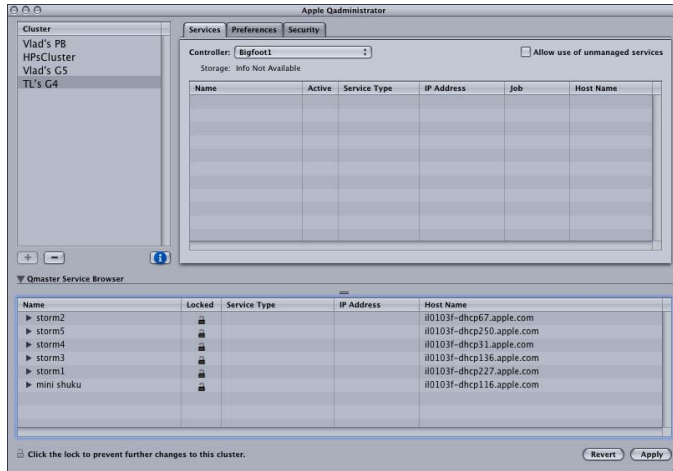
For details about using Apple Qadministrator, see:

- “Creating Clusters With Apple Qadministrator” on page 48
- “Modifying and Deleting Clusters With Apple Qadministrator” on page 54
- “Monitoring Cluster Activity” on page 55
- “Setting Cluster Preferences” on page 56
- “Setting Cluster Administrator and User Passwords” on page 57

To open Apple Qadministrator:

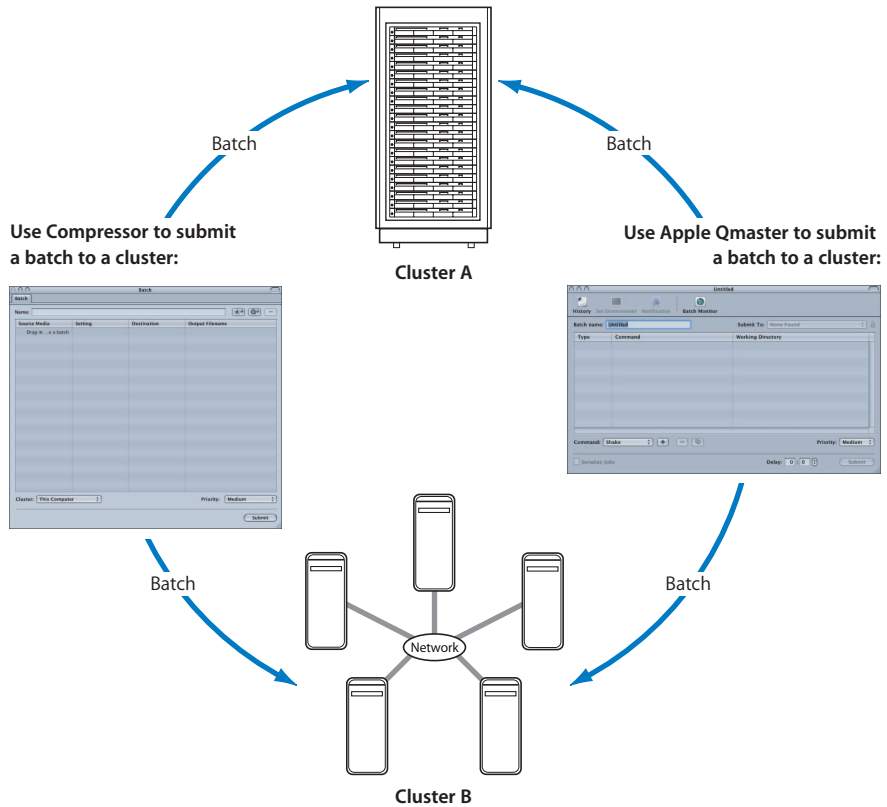
- Double-click the Apple Qadministrator icon in the Applications folder.

The Apple Qadministrator window appears. If a password was created for the currently selected cluster, you will not be able to see or modify the cluster until you click the Lock button and then enter the password in the dialog that appears.



Client Interfaces: Compressor and Apple Qmaster

Client computer users use either Compressor, or the interface called Apple Qmaster, to submit batches for processing.



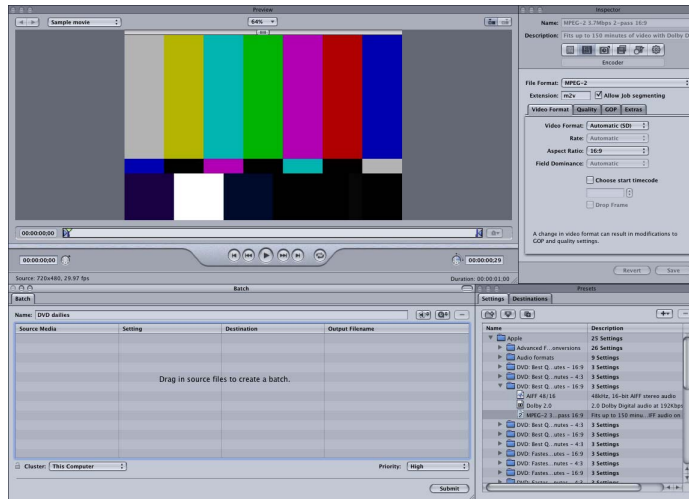
Using Compressor

Use the Cluster pop-up menu in the Compressor Batch window to choose a cluster for any given batch. For more information on submitting batches with Compressor, see the *Compressor 2 User Manual*.

To open Compressor:

- Double-click the Compressor icon in the Applications folder.

The Compressor default window layout appears.



Using Apple Qmaster

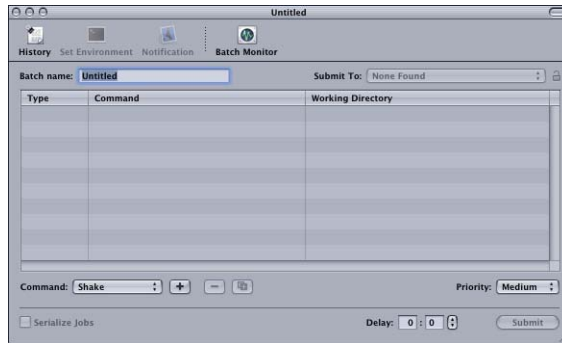
- For Shake processing batches, you can drag Shake files into the Apple Qmaster window. A default script for submitting the jobs is automatically created. In Apple Qmaster, you can then specify certain details, such as which cluster to use, and make adjustments to certain settings.
- For Maya batches, there is also a special interface within Apple Qmaster for submitting and customizing Maya jobs.
- You can use the Generic Render command in Apple Qmaster for the distributed processing of projects from other frame-based rendering applications (such as After Effects and LightWave).

For details about using Apple Qmaster, see the *Apple Qmaster 2 User Manual*.

To open Apple Qmaster:

- Double-click the Apple Qmaster icon in the Applications folder.

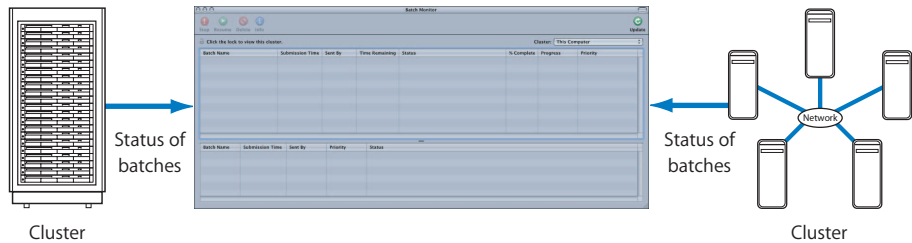
The Apple Qmaster window appears.



Batch Monitor

As an administrator, you can use the Batch Monitor to track the progress of all the batch activity for all the clusters on your network. You can see how close to completion each job is, along with other details, and you can stop, resume, or delete batches as well. If you are a client user, you can use the Batch Monitor to view and manage your own batches.

Use the Batch Monitor to see information about batches that have been sent to specified clusters:

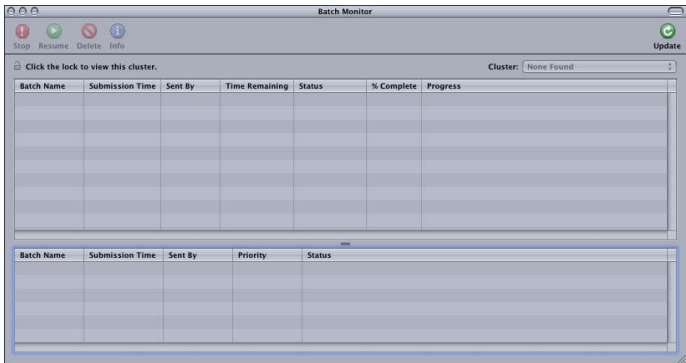


For details about using the Batch Monitor, see the *Batch Monitor User Manual*.

To open the Batch Monitor, do one of the following:

- Use the Batch Monitor that automatically opens after you submit a batch with Compressor or Apple Qmaster.
- Double-click the Batch Monitor icon in the Utilities folder in the Applications folder.
- Click the Batch Monitor button in the Apple Qmaster window or in the Compressor batch window.
- In Apple Qadministrator, choose Cluster > Show Batch Monitor.

The Batch Monitor appears. If you don't see any batches in the cluster, and the lock icon in the Lock button is closed, you need to click the Lock button and then enter the cluster user password in the dialog that appears.



Once your network is set up and you have installed the necessary components, you are ready to create distributed processing clusters.

As the administrator of your distributed processing network, you can set a number of cluster options and security controls. You may also want to know about failure notification and recovery features.

This chapter covers the following:

- An Overview of Configuring a Cluster (p. 40)
- Configuring Service Nodes and Cluster Controllers (p. 40)
- Creating Clusters With Apple Qadministrator (p. 48)
- About QuickClusters (p. 50)
- Advanced Settings in the Apple Qmaster Preferences Pane (p. 51)
- Modifying and Deleting Clusters With Apple Qadministrator (p. 54)
- Monitoring Cluster Activity (p. 55)
- Setting Cluster Preferences (p. 56)
- Setting Passwords and Scratch Storage (p. 57)
- Recovery and Failure Notification Features (p. 60)

If you have questions about any concepts and terms used here, refer to the preface, “Introduction to Distributed Processing” on page 5.

An Overview of Configuring a Cluster

Assuming Apple Qmaster software is installed on all the computers that you plan to use as part of the cluster, there are three basic steps involved in configuring a cluster.

Note: If you are an Apple Qmaster user and you want to create a cluster that includes computers that do not have Apple Qmaster installed, see the *Apple Qmaster 2 User Manual* for instructions.

Step 1: Configure service nodes

Configuring a service node to perform distributed processing is a matter of turning on processing services in the Apple Qmaster pane in System Preferences. Optionally, you can also set passwords at this time. See “Configuring Service Nodes and Cluster Controllers,” below, for details.

Step 2: Configure a cluster controller

To configure a computer to control the cluster, turn on the cluster control services in the Apple Qmaster pane in System Preferences. See “Turning Cluster Controller Services On or Off” on page 45 for more information.

Step 3: Create a cluster

You can create a simple “QuickCluster” in the Apple Qmaster pane in System Preferences, or you can create a “managed cluster” from the service nodes and cluster controller using Apple Qadministrator. After a cluster is created, client applications on the same network can start sending batches to the cluster. You can use Apple Qadministrator from any computer (with Apple Qadministrator installed) that is on the same network as an Apple Qmaster cluster. See any of the following for more details:

- “Getting Started Quickly” on page 15
- “Creating QuickClusters” on page 50
- “Creating Clusters With Apple Qadministrator” on page 48

Configuring Service Nodes and Cluster Controllers

Once service processing or cluster controlling is enabled on a computer, the computer is advertised on the network as available to be used in a cluster.

There can only be one cluster controller in a cluster. However, a computer can be designated as both a cluster controller and a service node (see “Using One Computer to Serve Two Distributed Processing Roles” on page 22).

Configuring Service Node Processing

Use the Apple Qmaster pane in System Preferences or Apple Qadminimator to set processing services on a computer.

To turn on processing services:

- 1 Open the Apple Qmaster pane in System Preferences.
- 2 Optionally, you can configure a number of settings before you turn on the processing services. (See “Options in the Apple Qmaster Pane in System Preferences” on page 42.)
Note: It’s easiest to do this now because you can’t make these settings when processing services are enabled. To make these settings after services have been enabled, you need to turn off the services, make the settings, and then turn the services on again.
- 3 In the “Share this computer as” section, select one of the following buttons:
 - “QuickCluster with services”
 - “Services and cluster controller”
 - “Services only”
- 4 In the Services section, do one of the following:
 - In the Share column, select the checkbox for Compressor Processing (for Compressor services).
 - In the Share column, select the checkbox for Rendering (for Apple Qmaster services).
- 5 Click Start Sharing.

The processing service is enabled, making this computer a service node that can process batches.



Options in the Apple Qmaster Pane in System Preferences

You can configure any of the following settings before you turn on processing services. (In order for you to change any of the following settings, processing services must be turned off.)

Setting the Name

By default, a computer is identified on the network by its computer name (as it is entered in the Sharing pane in System Preferences). You can change this name to something more meaningful if you like, since it is the name used to identify this computer in the Apple Qmaster distributed processing system. If you are setting up a QuickCluster, this is the name that will appear in the Compressor Cluster pop-up menu or the Apple Qmaster Submit To pop-up menu. If you are setting up a managed cluster controller, this is the name that will appear in the Apple Qadministrator Controller pop-up menu.

- If you are setting up a QuickCluster, enter the new name for the cluster in the “Identify this QuickCluster as” field.
- If you are setting up a controller to use with Apple Qadministrator, do the following:
 - a Click Advanced to open the Advanced pane.
 - b Enter the new name in the “Identify this computer to Apple Qadministrator as” field.

Unmanaged Services

You can enable unmanaged services for a QuickCluster. For more information, see “Managed Vs. Unmanaged Services” on page 43.

Setting the Password

To add a password requirement, click the “Require password” checkbox.

- If you are setting up a QuickCluster, other users will be required to enter this password before being allowed to submit requests to this computer.
- If you are setting up a cluster to use with Apple Qadministrator, an administrator will be required to enter this password before being allowed to add this computer to a cluster.

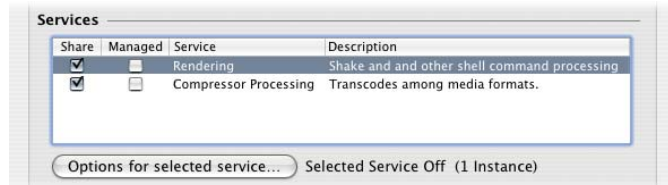
For more information, see “Setting Passwords and Scratch Storage” on page 57. (If you configure the computer as both a cluster controller and a service node, this password is used for both.)

Setting Cluster Storage

You can change the default scratch storage for processing that occurs on this computer in the Advanced pane. For more information, see “Cluster Storage: Setting a Scratch Storage Location” on page 59.

Managed Vs. Unmanaged Services

You have flexibility in how you build clusters for distributed processing with Compressor or Apple Qmaster. When you turn on processing services (See “Turning Cluster Controller Services On or Off” on page 45), you can choose to make them either managed services or unmanaged services (the default).



Managed Services

Managed services can be assigned to serve one particular cluster controller. Once assigned, managed services remain exclusively dedicated to that cluster until they are removed with the Apple Qadministrator application. QuickClusters cannot use managed services, except in the case of extended node clusters. For more information, see “Modifying and Deleting Clusters With Apple Qadministrator” on page 54. See the *Apple Qmaster 2 User Manual* for more information on extended node clusters.

Unmanaged Services

Unmanaged services will automatically assign themselves to the first available QuickCluster with enabled unmanaged services support. QuickClusters listen for unmanaged service advertisements and may mark or remember any of them for later use. A QuickCluster can use any available unmanaged service on the same local network (subnet). An unmanaged service will remain dedicated to its QuickCluster only long enough to finish the current job. Once the current job is complete, an unmanaged service is once again a “free agent,” and will advertise its availability to all QuickClusters.

Note: Managed clusters (those created with Apple Qadministrator) can also use unmanaged services. When unmanaged services support is enabled on a “managed” cluster, the cluster will automatically add any available unmanaged services in addition to its managed services (that were explicitly added using Apple Qadministrator).

Enabling Unmanaged Services on QuickClusters

Follow these steps to enable unmanaged services on QuickClusters.

- 1 Open the Apple Qmaster pane of System Preferences.
- 2 Select the “QuickCluster with services” button to create a QuickCluster.
- 3 Click “Include unmanaged services.”



- 4 Click Start Sharing.

For more information on creating QuickClusters, see “Getting Started Quickly” on page 15 and “About QuickClusters” on page 50.

Enabling Unmanaged Services on Managed Clusters

Follow these steps to enable unmanaged services on Managed Clusters.

- 1 Select a cluster in the Cluster list, or click the Add (+) button to add a new cluster.
- 2 Click “Allow use of unmanaged services.”
 - For more information on creating managed clusters, see “Creating Clusters With Apple Qadministrator” on page 48.

To set the type of processing service:

In the Apple Qmaster pane in System Preferences, do one of the following with the checkbox in the Managed column:

- For managed services, select the checkbox.
- For unmanaged services, deselect the checkbox.

Note: If processing services are enabled, you must turn them off before you can adjust the processing service type.

To turn off processing services

- 1 In the Apple Qmaster pane in System Preferences, click Stop Sharing.
- 2 In the dialog that appears, enter the number of minutes you want processing services to continue before shutting down, then click OK.



The default is 10 minutes, but you can turn off the service immediately by entering 0 in the field. If you enter any number greater than 0, a countdown appears next to the Cancel button. The shutdown delay is provided because some computers may be in the middle of processing batches, and these could be damaged by a premature shutdown.

- 3 In the Services section, do one of the following:
 - Deselect the On checkbox for Compressor Processing (to turn off Compressor services).
 - Deselect the On checkbox for Rendering (to turn off Apple Qmaster services).

Turning Cluster Controller Services On or Off

Use the Services pane in the Apple Qmaster pane in System Preferences to turn the cluster controller on or off on a specific computer.

To turn on cluster controller services:

- 1 Open the Apple Qmaster pane in System Preferences.
- 2 Optionally, you can configure a number of settings before you turn on the processing services. (See “Options in the Apple Qmaster Pane in System Preferences” on page 42.)

Note: It’s easiest to do this now because you can’t make these settings when processing services are enabled. To make these settings after services have been enabled, you need to turn off the services, make the settings, and then turn the services on again.

- 3 In the “Share this computer as” section, select one of the following buttons:
 - “QuickCluster with services”
Choose this option to create an “instant” cluster with unmanaged services.
 - “Services and cluster controller”
Choose this option to build a cluster in Apple Qadministrator. (See “Creating Clusters With Apple Qadministrator” on page 48 for more information.)

Also see “Managed Vs. Unmanaged Services” on page 43 for more information.

- 4 In the Share column, select the checkbox.
- 5 Click Start Sharing.

The cluster is enabled, making this computer a cluster controller.

To turn off cluster controller services:

- 1 Open the Apple Qmaster pane in System Preferences.
- 2 Click Stop Sharing.
- 3 In the dialog that appears, enter the number of minutes you want controller services to continue before shutting down, then click OK.



The default is 10 minutes, but you can turn off the service immediately by entering 0 in the field. If you enter any number greater than 0, a countdown appears next to the Cancel button. The shutdown delay is provided because some computers may be in the middle of processing batches, and these could be damaged by a premature shutdown. No new cluster connections are allowed to occur as the cluster controller is shutting down.

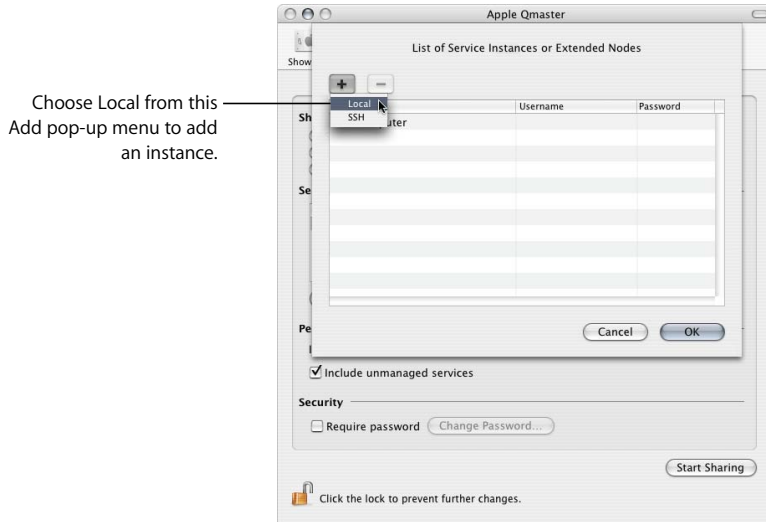
Making the Most of Multi-processor Computers

If any of the service nodes you are administering have multiple processors, you may want to adjust the number of instances of processing services. By default, the Apple Qmaster system will create one instance for each processor. For process-intensive work, having many instances may increase speed and efficiency, depending on the processing application. (Consult the documentation that came with the application to see if using each processor individually is ideal.)

Note: This feature is available only for Shake (with Apple Qmaster), Alias Maya, and other UNIX command-line programs. It is not available for Compressor processing.

To change the number of instances of processing services on a computer:

- 1 Open the Apple Qmaster pane in System Preferences.
- 2 Select the Rendering service in the Services section.
- 3 Click the “Options for selected service...” button.
- 4 In the dialog that appears, do one of the following:
 - Choose Local from the Add (+) pop-up menu to add an instance.
 - Select an instance in the list and click the Remove (–) button to remove an instance.



- 5 Click OK.
- 6 In the Services section, select the Share checkbox for Rendering.

Note: The Service Options dialog is also used to add extended nodes to a cluster, as described in the *Apple Qmaster 2 User Manual*.

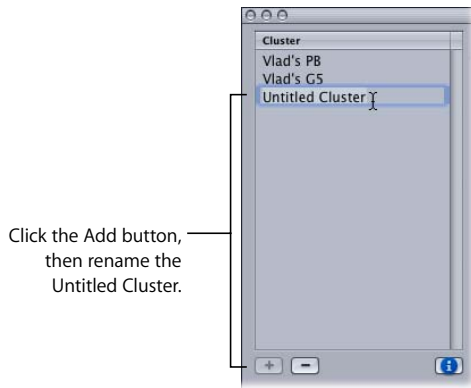
Creating Clusters With Apple Qadministrator

Once you configure managed service nodes and/or cluster controllers, they are visible in Apple Qadministrator, which you use to create and modify Apple Qmaster clusters.

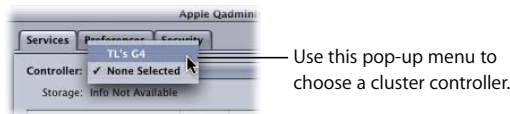
There are two basic steps to creating a managed cluster with Apple Qadministrator. First, you create a new cluster and choose the cluster controller. Then, you add service nodes to the cluster.

Step 1: Create a new cluster

- 1 Open Apple Qadministrator, and then do the following:
 - a Click the Add (+) button.
 - b Select Untitled Cluster and rename it. (The cluster name you create will also appear in the cluster pop-up menus in the Batch Monitor and Apple Qmaster.)



- 2 From the Controller pop-up menu, choose a cluster controller from those available on the network.



Note: If a password was created for the cluster controller in System Preferences, a password authentication dialog appears.

- 3 Optionally, create cluster passwords by clicking the Security tab and selecting and entering the passwords you want.
 - *Administrator Password:* If you create this password, administrators will need to know it in order to modify this cluster and to view this cluster's batches in the Batch Monitor.
 - *User Password:* If you create this password, users will need to know it in order to submit batches to this cluster and to view those batches in the Batch Monitor.

Step 2: Assign service nodes to the cluster

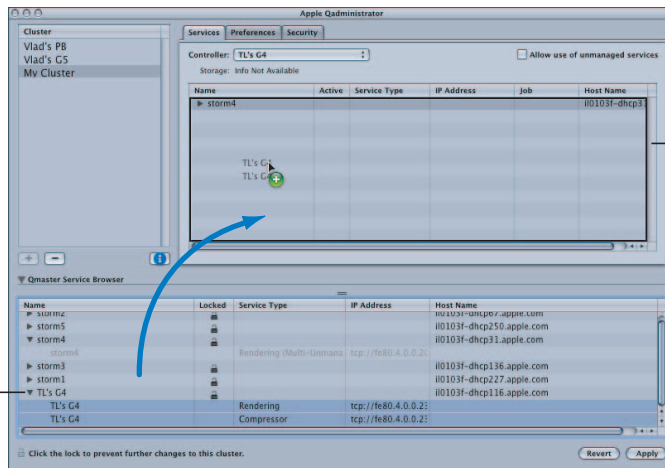
- 1 If the Qmaster Services Browser is not already displayed, click the disclosure triangle to see it.

Click this disclosure triangle to see available nodes.



- 2 Add service nodes to the new cluster by dragging them from the Qmaster Service Browser list at the bottom of the window, up to the cluster's service nodes list.
 - If there is a closed lock icon next to a computer name, click the lock and enter the password that was assigned to it in the Apple Qmaster pane in System Preferences. Otherwise, you won't be able to drag that service node into the cluster.
 - Service nodes that are already assigned to another cluster are not shown.

Clicking this disclosure triangle displays each instance of the services set in System Preferences for this node.



Drag nodes to this list from the Service Browser list.

Note: The computer names you see at the top level of the Name columns may appear in one of three formats, depending on your configuration: the computer name (for example, Lemur node), the Apple networking name (for example, Lemur-node.local), or the network address for the computer (for example, 02030b-dhcp45.company.com).

- 3 When you have finished adding service nodes, click Apply.
Your cluster is now ready to process batches.

About QuickClusters

QuickClusters offer a simple and automated way to create and configure clusters, and an alternative to creating and configuring clusters manually with Apple Qadminstrator. QuickClusters with enabled unmanaged support will auto-configure themselves and use any available unmanaged services on the same local network (subnet). QuickClusters listen for unmanaged service advertisements and may mark or remember any of them for later use.

Creating QuickClusters

You can create and modify QuickClusters in the Apple Qmaster pane in System Preferences.

- 1 Open the Apple Qmaster pane in System Preferences.



- 2 Under "Share this computer as," click "QuickCluster with services."
- 3 Optionally, you can configure a number of settings before you turn on the processing services. (See "Options in the Apple Qmaster Pane in System Preferences" on page 42.)

Note: It's easiest to do this now because you can't make these settings when processing services are enabled. To make these settings after services have been enabled, you need to turn off the services, make the settings, and then turn the services on again.

- 4 Click Start Sharing.

This creates a QuickCluster with this computer as its controller.

Note: With an active QuickCluster, Apple Qmaster users can create extended node clusters, which contain one or more computers that do not have Apple Qmaster installed. See the *Apple Qmaster 2 User Manual* for more information.

Advanced Settings in the Apple Qmaster Preferences Pane

You can use the Advanced section in the Apple Qmaster Preferences Pane to further configure your distributed processing system.



Advanced Service Settings

Use these features to schedule service restarts and service availability.

Restart all services every 24 hours

The “Restart all services every 24 hours” checkbox ensures a robust distributed processing system. Refreshing the services periodically prevents increased virtual memory sizes and memory leaks in third-party software.

Set schedule for unmanaged services

If you enabled unmanaged services, you can open a calendar interface and schedule the availability of these services to the distributed processing system.

To schedule service availability:

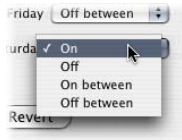
- 1 Click Set.

The work schedule interface appears.



By default, the services are available 24 hours a day, 7 days a week.

- 2 To constrain the availability of the services, click the pop-up menu next to a particular day of the week, and choose one of the following:
 - *Off* makes the service unavailable on that day of the week.
 - *On between* allows you to enter the period of time the service will be available.
 - *Off between* allows you to enter the period of time the service will not be available.



- 3 Enter any constraining time periods in the appropriate time fields.
- 4 Click OK to save the settings.

Shared Cluster Storage

Use these features to configure scratch storage for this computer's cluster controller. For more information on cluster storage, see "Cluster Storage: Setting a Scratch Storage Location" on page 59.

Delete Files Older Than ___ Days

Enter the number of days temporary process files may remain on the cluster's scratch location before they are automatically deleted.

Cluster Storage

Enter a local folder directory to change the scratch location for the cluster's temporary process files. See "Cluster Storage: Setting a Scratch Storage Location" on page 59 for more information.

Network

Use these features to configure network settings.

Allow wide area Bonjour in domain

Select this checkbox to have Apple Qmaster use computers beyond the local subnet, and enter the DNS Domain in the text field. This feature requires Mac OS X v10.4 or later.

Use Network Interface

Restrict distributed processing activity to a particular network interface card by choosing it from this pop-up menu.

Extras

Use these features to configure additional settings.

Log service activity to file

If selected, an activity log is created and updated regularly with information about the Apple Qmaster actions on this computer. This log is located in the /Library/Logs/Apple Qmaster folder.

Show Qmaster service status in menu bar

If selected, an Apple Qmaster icon appears in the computer's menu bar. The menu bar item provides Apple Qmaster status and activity information.

Identify this computer to Apple Qadministrator as

By default, a computer is identified on the network by its computer name (as it is entered in the Sharing pane in System Preferences). You can change this name to something more meaningful if you like, since it is the name used to identify this computer in the Apple Qadministrator application. If you are setting up a managed cluster controller, this is the name that will appear in the Apple Qadministrator Controller pop-up menu.

Modifying and Deleting Clusters With Apple Qadministrator

Using Apple Qadministrator, you can change and delete clusters. Once a cluster is configured, you can use Apple Qadministrator to deactivate and reactivate the processing services on a computer in the cluster, to add a service node to the cluster, or to remove a service node from the cluster.

Note: QuickClusters are not visible in Apple Qadministrator. Only “managed” clusters can be modified and deleted in Apple Qadministrator. Managed clusters are clusters that were created in Apple Qadministrator. QuickClusters must be modified in the Apple Qmaster pane in System Preferences.

Note: If you want to change the cluster controller in a cluster, you need to delete the cluster and then re-create it with a new cluster controller.

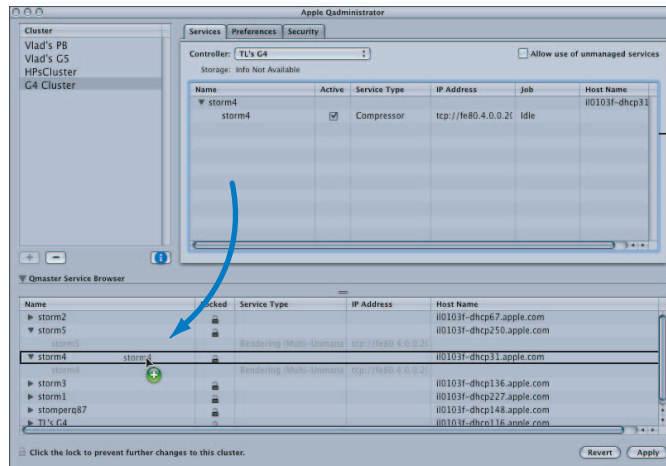
To modify a cluster:

- 1 Open Apple Qadministrator.
- 2 In the Cluster list (on the left side of the window), select the cluster you want to change.

If the cluster’s Service Nodes list isn’t already showing individual services, click the disclosure triangle in the Name column to reveal them.

Make any of the following changes:

- To temporarily turn off the processing services on a computer in the cluster, deselect the Active checkbox for that service node.
- To remove a computer from the cluster, select the computer and drag it back to the Qmaster Service Browser at the bottom of the Apple Qadministrator window.



- To add a service node to the cluster, drag it from the service browser list at the bottom of the window to the service nodes list.

- 3 Click Apply Now.

Note: To turn off the service node or cluster controlling services on any computer within a cluster, see “Configuring Service Node Processing” on page 41 and “Turning Cluster Controller Services On or Off” on page 45.

To change a cluster’s name in Apple Qadminimator:

- 1 In the Cluster list, double-click the cluster name.
- 2 Type a new name, then press Return.
- 3 Click Apply Changes.

To delete a cluster in Apple Qadminimator:

- 1 In the Cluster list, select the cluster you want to delete.
- 2 Click the Remove (–) button.

Monitoring Cluster Activity

You can use Apple Qadminimator to find out what is happening within a cluster by examining details (such as CPU usage, which batch is being processed, disk space usage, and data activity) about each node in the cluster.

To monitor cluster activity in Apple Qadminimator:

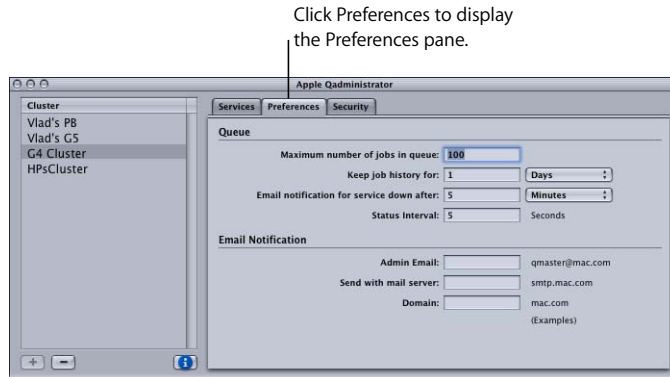
- 1 In the Cluster list, select the cluster you want to examine.
- 2 Select a node in the cluster service nodes list.
- 3 Click the Info (I) button near the bottom of the Cluster list.
- 4 In the resulting window, click the CPU, Memory, Volume Info, or I/O Activity tabs to see a variety of details about the selected node.

Setting Cluster Preferences

You can use Apple Qadminimator Preferences to configure several aspects of Apple Qadminimator.

To set cluster preferences:

- 1 Open Apple Qadminimator.
- 2 In the Cluster list, select the cluster for which you want to set preferences.
- 3 Click Preferences.



- 4 Set any of the following preferences:

Queue

- *Maximum number of jobs in the queue:* Enter the maximum number of batches that can be queued up at one time for this cluster. If the maximum number is reached, the cluster does not accept new batches until there is an opening in the queue.
- *Keep job history for:* Set how long batches are listed in the History table of the Batch Monitor.
- *Email notification for service down after:* Set how much time should pass, after a service becomes inaccessible, before the cluster controller sends an alert message to the administrator. (See “Email Notification,” below.)
- *Status Interval:* Set how often status information about this cluster should be generated and sent to the Batch Monitor.

Email Notification

To have the cluster controller send service failure alerts to an administrator, enter the relevant information in the fields provided. See “Recovery and Failure Notification Features” on page 60 for more information.

- *Admin Email:* Enter the administrator’s email address.
- *Send with mail server:* Enter the administrator’s mail server.
- *Domain:* Enter the cluster controller’s domain.

Setting Passwords and Scratch Storage

You can create several different types of passwords for the Apple Qmaster distributed processing system. All these passwords are optional; you can use the system without creating them.

- *Cluster administrator password:* A password required for modifying a cluster in Apple Qadministrator, and for modifying the status of the cluster's batches in the Batch Monitor. See "Setting Cluster Administrator and User Passwords," next.
- *Cluster user password:* A password that client users will need in order to submit batches to a cluster and to modify the status of those batches in the Batch Monitor. See "Setting Cluster Administrator and User Passwords," next.
- *Service password:* A password required for an administrator to add a specific service node or cluster controller to a cluster. See "Setting a Service Password for Including a Computer in a Cluster" on page 58.

You can also change the default scratch storage location for a cluster, or for each computer in a cluster. See "Cluster Storage: Setting a Scratch Storage Location" on page 59.

Setting Cluster Administrator and User Passwords

You can create cluster passwords while creating a new cluster, as described in "Creating Clusters With Apple Qadministrator" on page 48. However, once the cluster is created, you can still add or change passwords, using the same settings in Apple Qadministrator.

To create or change cluster passwords:

- 1 In Apple Qadministrator, select the cluster from the Cluster list.
- 2 Click Security.
- 3 Select and enter or change the passwords you want.



- 4 Click Apply Changes.

Note: Cluster administrator and cluster user passwords can be stored in a user's keychain.

Setting a Service Password for Including a Computer in a Cluster

If you want to control who is able to include a specific service node or cluster controller in a cluster, you can create a password called a *service password* for the computer.

Note: A service password can be stored in a user's keychain.

To set a service password:

- 1 On the computer designated as the service node or cluster controller, open the Apple Qmaster pane in System Preferences.
- 2 If any Apple Qmaster services are enabled on this computer, temporarily turn them off by clicking Stop Sharing.
- 3 Click Require Password.

The password sheet opens.



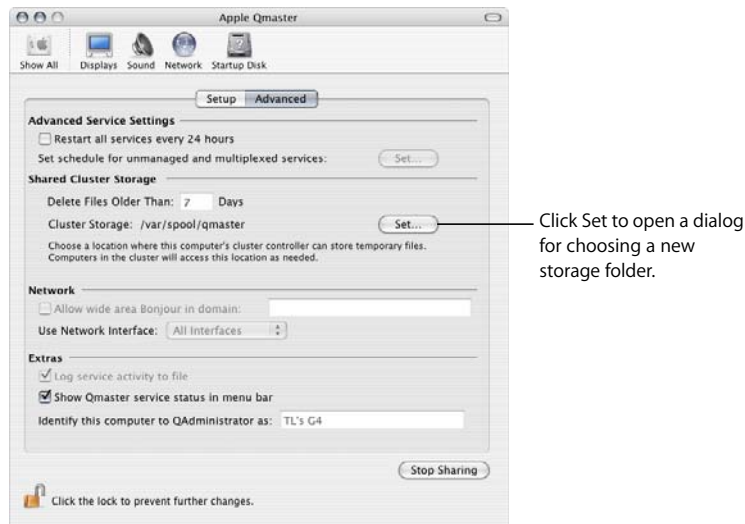
- 4 Enter and verify a password, and click OK.
- 5 Click the relevant checkbox or the Start Sharing button to restart the services you need on this computer.

Cluster Storage: Setting a Scratch Storage Location

By default, the Apple Qmaster distributed processing system saves temporary process files in the `/var/spool/qmaster` directory on the cluster controller. You can also choose any other location on a local disk. Computers in the cluster will access this location as needed.

To select a new storage location for a cluster:

- 1 On the cluster controller, open the Apple Qmaster pane in System Preferences.
- 2 If any Apple Qmaster services are enabled on this computer, click Stop Sharing to temporarily turn them off.
- 3 Click Advanced to open the Advanced pane.



- 4 Click the Set button next to the Cluster Storage field.
- 5 Navigate to the folder in the dialog, select it, and then click Choose.

Note: If you are using the default *This Computer* setting in the Cluster pop-up menu in the Compressor Batch window, and you choose Cluster Storage as the destination, the output file will be copied to the Source location.

Recovery and Failure Notification Features

The Apple Qmaster distributed processing system has a number of built-in features designed to attempt recovery if there is a problem, and to notify you when it attempts a recovery.

Recovery Features

The recovery actions described next occur automatically if failures occur in the Apple Qmaster distributed processing system. There is no need for you, as the administrator, to enable or configure these features.

If a service stops unexpectedly

If either the cluster controller service or the processing enabled on a service node stops unexpectedly, the Apple Qmaster distributed processing system restarts the service. To avoid the risk of endless stopping and restarting, the system restarts the failed service a maximum of four times. The first two times, it restarts the service right away. If the service stops abruptly a third or fourth time, the system restarts it only if it had been running for at least 10 seconds before the service stopped.

If a batch is interrupted

When a service stops suddenly while in the middle of processing an Apple Qmaster batch, the cluster controller resubmits the interrupted batch in a way that prevents the reprocessing of any batch segments that were complete before the service stopped. The cluster controller delays resuming the batch for about a minute from the time it loses contact with the service.

If a batch fails

When the service is running, but one batch fails to process, a *service exception* occurs. When this happens, the cluster controller resubmits the batch immediately. It resubmits the batch a maximum of two times. If the job fails on the third submission, the distributed processing system stops resubmitting the job. In the Batch Monitor, the job is moved to the History table, where the status column indicates that a failure occurred.

Failure Notification

There are two different ways that the Apple Qmaster distributed processing system can provide information about a problem.

Email Notification

When a processing service stops unexpectedly, Apple Qmaster sends a notification email to the address that was entered in the Apple Qadministrator Cluster Preferences dialog for that cluster. If no address was entered there, the email is sent to the address in the Internet settings of the computer on which the cluster controller is enabled.

Log files for individual jobs or batches

If a particular job or batch fails, a log file is generated that describes this failure. You can find the name and location of this log file through the Batch Monitor. Select the batch or job in the History table of the Batch Monitor window, and click the Info icon. If any log files were generated because of failures in the processing of the item, the names and locations of those logs are shown.

Command-Line Usage

If you are accustomed to doing your work from Terminal shells, and need or prefer to run the distributed processing system from the command line with minimal use of application interfaces, this appendix is for you.

The appendix includes the following topics:

- “Installing Apple Qmaster from the Command Line” (next)
- “Shell Commands for Configuring Service Nodes and Cluster Controllers” on page 64
- “Shell Commands for Submitting Compressor Jobs” on page 64
- “Shell Commands for Submitting Apple Qmaster Jobs” on page 66
- “Shell Commands for Monitoring Batches” on page 68

Installing Apple Qmaster from the Command Line

Follow these steps to install Apple Qmaster software on each computer you want to use for distributed processing. (All computers must be on the same subnet.)

- 1 Copy the standalone installer package (AppleQmasterNode.mpkg) to the remote system.

You can either use the Finder, or copy the files using Secure Copy:

```
scp <source file> <user>@<remote host>:<path>
```

Note: Do not alter the file hierarchy of the packages.

- 2 Log into the remote system.

- 3 Enter the following command:

```
sudo installer -pkg AppleQmasterNode.mpkg -target /
```

- 4 Do one of the following to start the Apple Qmaster processes:

- Enter this command:

```
sudo systemstarter start Qmaster\ services
```

- Restart the remote computer

- 5 Repeat these steps for each computer in your distributed processing network.

Shell Commands for Configuring Service Nodes and Cluster Controllers

As an alternative to using the Apple Qmaster pane in System Preferences, you can use the command *qmasterprefs*, with command-line options for enabling and disabling service node and cluster controlling services.

In the command-line descriptions below, angle brackets < > indicate a mandatory argument in a command and brackets [] indicate an optional argument.

Synopsis

Below is a synopsis of the command for enabling and disabling cluster controlling services on a computer. The *qmasterprefs* command is located in */usr/sbin*.

```
qmasterprefs -cluster <on | off> [-timeout <minutes>] [-servername <name>] [-list] [-help]
```

Below is a synopsis of the command for enabling and disabling service node processing on a computer.

```
qmasterprefs -service "Unix Processing" <on | off> [-instances <n>] [-timeout <minutes>] [-servername <name>] [-list] [-help]
```

Command options

This table provides information about each of the enabling and disabling service-node and cluster-controlling services on a computer.

Preference command option	Description
[- <i>cluster</i>] <on off>	Turns cluster-controlling services on or off. [<i>timeout</i> min] [<i>servername</i> name] [<i>quickcluster</i> on off] [<i>unmanagedservices</i> on off] [<i>unmanagedmulticapturethreshold</i> sec] [<i>networkinterface</i> allinterfaces <bsd name>]
[- <i>service Rendering</i>] <on off>	Turns UNIX Rendering services on or off. [<i>timeout</i> min] [<i>instances</i> n] [<i>autorestart</i> on off] [<i>unmanaged</i> on off]
[- <i>list</i>]	Lists the current <i>qmasterprefs</i> settings.
[- <i>help</i>]	Displays information about supported options for <i>qmasterprefs</i> .
[- <i>restart</i>]	Restarts Apple Qmaster service.
[- <i>service name options</i>]	Sets service options.

Shell Commands for Submitting Compressor Jobs

You can run the Compressor application from the command line using the *Compressor* command, with a number of command-line options for submitting jobs.

In the command-line descriptions below, angle brackets < > indicate a mandatory argument in a command and brackets [] indicate an optional argument.

Synopsis

Below is a synopsis of the command for submitting a job to a cluster. The *Compressor* command is located in /Applications/Compressor.app/Contents/MacOS.

Compressor [-clustername <name>] [-clusterid <user name:password@IP address:port number>][-command <command type> -options <XML command> [-wd <working directory>] [-timeout <seconds>] [-show] [-batchname <name>] [-help]

Once the job is submitted successfully, this command displays the batch ID (identifier) and job ID (identifier) in the shell, and you can monitor the progress of a batch in the Batch Monitor.

Command options

This table provides information about each of the command options for submitting jobs.

Submission command option	Description
[-clustername <name>]	Use to specify the name of the cluster to which you want to send the job. Using the cluster name, Compressor looks for the cluster on the network in order to use it.
[-batchname <name>]	Use to specify a name for the batch so that you can easily recognize it in the Batch Monitor.
[-clusterid <user name:password@IP address:port number>]	<p>Optionally, you can use <i>-clusterid</i> to enter the cluster ID and port number instead of using <i>-clustername</i>. (When you enter the cluster ID and port, less time is required to find the cluster on the network.)</p> <p>Or, if you used <i>-clustername</i> and the cluster requires a password, use <i>-clusterid</i> to specify the user name and password. (You need to include the IP address: port number as well whenever you use <i>-clusterid</i>.)</p> <p>Tip: Use <i>Compressor -show</i> to see a cluster's IP address and port number.</p>
[-priority <value>]	Specifies the priority level for a job.
[-jobpath <url>]	Specifies the location of the source file.
[-settingpath <url>]	Specifies the location of the settings for the job.
[-destinationpath <url>]	Specifies the destination file URL for the job.
[-info <xml>]	Gives detailed information for a batch or a job.
[-timeout <seconds>]	Use to specify the number of seconds before Compressor can quit when looking for a cluster. The default value is 0, which puts no limit on the timeout and allows Compressor to browse the network for as long as it needs to find the cluster.
[-show]	Shows the ID information for the cluster specified with <i>-clustername</i> or <i>-clusterid</i> , or for all clusters if no cluster is specified.
[-help]	Displays information regarding the required parameters for the <i>Compressor</i> command.

Example of Compressor Command XML

The code below is an example of XML code for submitting a Compressor command. Notice that because it needs to be entered as one command line, every character after -options that isn't alphanumeric must be preceded with a backslash (\).

```
./Compressor -clusterid tcp://127.0.0.1:51737 -batchname myBatch -jobpath /Volumes/  
Source/ShortClips/NTSC24p.mov -settingpath /Users/stomper10/Library/Application\  
Support/Compressor/PhotoJPEG.setting -destinationpath /Users/machinename/  
myDestinationFilename.mov.
```

This command has the following elements:

- Cluster address is tcp://127.0.0.1:51737.
- Batchname is myBatch.
- Job path is /Volumes/Source/ShortClips/NTSC24p.mov.
- Setting path is /Users/stomper10/Library/Application\ Support/Compressor/
PhotoJPEG.setting.
- Destination path is /Users/machinename/Movies.

Shell Commands for Submitting Apple Qmaster Jobs

You can use the Apple Qmaster command, *Apple\ Qmaster*, with a number of command-line options for submitting jobs.

In the command-line descriptions below, angle brackets < > indicate a mandatory argument in a command and brackets [] indicate an optional argument.

Synopsis

Below is a synopsis of the command for submitting a job to a cluster. The *Apple\ Qmaster* command is located in /Applications/Apple Qmaster.app/Contents/MacOS.

```
Apple\ Qmaster [-clustername <name>] [-clusterid <user name:password@IP  
address:port number>][-command <command type> -options <XML command> [-wd  
<working directory>] [-timeout <seconds>] [-show] [-batchname <name>] [-help]
```

Once the job is submitted successfully, this command displays the batch ID (identifier) and job ID (identifier) in the shell.

Command options

This table provides information about each of the command options for submitting jobs.

Submission command option	Description
<code>[-clustername <name>]</code>	Use to specify the name of the cluster to which you want to send the job. Using the cluster name, Apple Qmaster looks for the cluster on the network in order to use it.
<code>[-batchname <name>]</code>	Use to specify a name for the batch so that you can easily recognize it in the Batch Monitor.
<code>[-clusterid <user name:password@IP address:port number>]</code>	<p>Optionally, you can use <code>-clusterid</code> to enter the cluster ID and port number instead of using <code>-clustername</code>. (When you enter the cluster ID and port, less time is required to find the cluster on the network.)</p> <p>Or, if you used <code>-clustername</code> and the cluster requires a password, use <code>-clusterid</code> to specify the user name and password. (You need to include the IP address: port number as well whenever you use <code>-clusterid</code>.)</p> <p>Tip: Use <code>Apple\ Qmaster -show</code> to see a cluster's IP address and port number.</p>
<code>[-command <command type>]</code>	Specifies the kind of command you are entering: <i>Shell</i> , <i>Shake</i> , <i>Maya</i> , or other command, depending on the application you want to use for distributed processing.
<code>[-options <XML command>]</code>	<p>Specifies the command with XML code. Enter the XML code after <code>-options</code>, with the necessary qualifiers for entering it in a shell. See "Example of Shake Command XML," next, for an example.</p> <p>If no <code>-option</code> is entered, the values from the application's preferences file, in <code>~/Library/Preferences</code>, are used (which are the values of the most recent job submitted).</p>
<code>[-wd <working directory>]</code>	Use to specify the working directory path (from which the command should be executed). The default working directory is <code>/Applications/Shake</code> .
<code>[-timeout <seconds>]</code>	Use to specify the number of seconds before Apple Qmaster can quit when looking for a cluster. The default value is 0, which puts no limit on the timeout and allows Apple Qmaster to browse the network for as long as it needs to find the cluster.
<code>[-show]</code>	Shows the ID information for the cluster specified with <code>-clustername</code> or <code>-clusterid</code> , or for all clusters if no cluster is specified.
<code>[-help]</code>	Displays information about supported options for <code>Apple \ Qmaster</code> .

Example of Shake Command XML

The code below is an example of XML code for submitting a Shake command. Notice that because it needs to be entered as one command line, every character after -options that isn't alphanumeric must be preceded with a backslash (\).

```
/Applications/Apple\ Qmaster.app/Contents/MacOS/Apple\ Qmaster -clustername elvis  
-command "Shake" -options \<command\ executable=\\"/Applications/Shake/  
shake.app/Contents/MacOS/shake\\" script=\\"/Volumes/Jaguar/scripts/  
applestyle.shk\\" start=\\"1\\" end=\\"1000\\" stepsOf=\\"1\\" minCount=\\"10\\"  
otherOptions=\\"\\ previewNode=\\"\\ previewWidth=\\"0\\" shutterOn=\\"yes\\"  
motion=\\"yes\\" proxyFlags=\\"0\\" proxyScale=\\"1.000000\\"  
proxyRatio=\\"1000.000000\\" shutter=\\"1.000000\\">\</command\>
```

Note: Apple Qmaster stores the XML code for the last command you entered in ~Library/Preferences/com.apple.AppleQmaster.plist. You can copy the command in XML form there, and customize it to use for a new job submission.

Shell Commands for Monitoring Batches

You can use the Batch Monitor command, *Batch Monitor*, with a number of command-line options for monitoring jobs.

In the command-line descriptions below, angle brackets < > indicate a mandatory argument in a command and brackets [] indicate an optional argument.

Synopsis

Below is a synopsis of the command for monitoring batches. The *Batch Monitor* command is located in /Applications/Utilities/Batch Monitor.app/Contents/MacOS.

```
Batch Monitor [-clustername <name>] [-clusterid <user name:password@IP address:port  
number>] [-jobid <identifier> -batchid <identifier>] [-timeout <seconds>] [-query  
<seconds>] [-help]
```

To cancel a job or batch:

- *Batch Monitor* [-clustername <name>] [-clusterid <IP address> <port number>
<user name> <password>] -kill -jobid <identifier> -batchid <identifier>

Command options

This table provides information about each of the command options for monitoring batches.

Monitoring command option	Description
<code>[-clustername <name>]</code>	Use to specify the name of the cluster to which the job was sent.
<code>[-clusterid <user name:password@IP address:port number>]</code>	<p>Optionally, you can use <code>-clusterid</code> to enter the cluster ID and port number instead of using <code>-clustername</code>.</p> <p>Or, if you used <code>-clustername</code> and the cluster requires a password, use <code>-clusterid</code> to specify the user name and password. (You need to include the IP address: port number as well whenever you use <code>-clusterid</code>.)</p> <p>Tip: Use <code>Apple Qmaster -show</code> or <code>Compressor -show</code> to see a cluster's IP address and port number.</p>
<code>[-jobid <identifier> -batchid <identifier>]</code>	<p>Use to specify the job you want to monitor.</p> <p>When you use the <code>-jobid</code> option, you must also specify the <code>-batchid</code>, in the form of the name that was given to the batch when it was submitted. (The batchid and jobid are displayed after a batch is submitted.)</p> <p>If you do not use the <code>-jobid</code> option, all the jobs submitted to the specified cluster are listed.</p>
<code>[-timeout <seconds>]</code>	Use to specify the number of seconds before Batch Monitor can quit when looking for a cluster. The default value is 0, which puts no limit on the timeout and allows Batch Monitor to browse the network for as long as it needs to find the cluster.
<code>[-query <seconds>]</code>	Use to specify how frequently, in seconds, the job status should be updated.
<code>[-kill -jobid <identifier> -batchid <identifier>]</code>	Cancels the specified job or batch.
<code>[-help]</code>	Displays information about supported options for <i>Batch \ Monitor</i> .

Index

A

- activity logs 61
- administrator email address 56
- administrator mode, Batch Monitor 38
- administrator password
 - Apple Qadministrator 33
 - cluster administrator 48, 57
- Apple Qadministrator
 - creating clusters 48–49
 - deleting clusters 54, 55
 - failure notification 61
 - modifying clusters 54–55
 - monitoring cluster activity 55
 - notification emails to 61
 - opening 34
 - overview 33–34
 - passwords 33
 - QuickClusters 54
 - setting cluster preferences 56
 - setting passwords 57–58
- Apple Qmaster
 - dual processors and 46
 - failure notification 61
 - installing 26
 - installing from command line 63
 - interfaces 29–38
 - introduction to 5–11
 - opening 36–37
 - preferences. *See* Apple Qmaster pane in System Preferences
 - recovery features 60–61
 - setting scratch location 59
 - specifying Shake script locations 28
 - submitting batches for processing 8
 - turning cluster controller on/off 45
 - turning off temporarily 54
 - turning processing services on/off 41–45
 - using shell commands 66–68
- Apple Qmaster networks 21–28
 - basic rules for 21
 - described 21
 - desktop processing environment 25–28
 - examples of 22, 24

- expanded 24
- expanding capacity of 23–24
- simple 22
- subnet 8

- Apple Qmaster pane in System Preferences 17, 31–32
 - advanced settings 51–53
 - opening 17, 32
 - Services pane 45
 - settings overview 42
- Apple websites 12

B

- batches
 - See also* batch jobs
 - canceling 68
 - creating 18, 36
 - described 6
 - distribution of 9–10
 - dividing into segments 10
 - dividing into tasks 10
 - failure of 60
 - history 56
 - interruption of 60
 - listing in History table 56
 - log files 61
 - passwords 48
 - submitting for processing 8, 19, 35–37
 - tracking activity of 37–38
- batch jobs
 - See also* batches
 - canceling 68
 - described 6
 - for distributed rendering 28
 - log files 61
 - Maya 36
 - monitoring with shell commands 68–69
 - number of 56
 - submitting with Apple Qmaster 36
 - submitting with shell commands 64–68
- Batch Monitor
 - administrator mode 38
 - batches listed in 56

- cluster status information 56
- log files 61
- opening 38
- overview 37–38
- tracking batch activity 37–38
- user mode 38
- Batch Monitor command 68–69

C

- cables, high-speed 23
- clients
 - batches and 8
 - as cluster controllers 22
 - described 6, 7
 - multiple 8, 23
 - overview 8
 - passwords 57
 - as service nodes 22
 - subnet 8
- cluster administrator password 48, 57
- cluster controllers
 - changing 54
 - choosing 48
 - clients as 22
 - configuring 40–47
 - configuring with shell commands 64
 - described 7
 - distributing batches via 9–10
 - domains 56
 - enabling/disabling 64
 - failure alerts 56
 - illustrated 7
 - number of 40
 - overview 9
 - passwords 48
 - service exceptions 60
 - service nodes as 22
 - service stops unexpectedly 60
 - turning services on/off 45–46
- clusters 39–61
 - adding service nodes to 18, 54
 - assigning service nodes to 49
 - changing cluster controllers in 54
 - components 7
 - configuring 40
 - creating 40, 48–49
 - deleting 55
 - distributing batches to 9–10
 - extended nodes 59
 - modifying 54–55
 - monitoring activity 55
 - multiple 23
 - names 48, 55
 - overview 8
 - passwords 34, 48

- preferences 56
- removing computers from 54
- renaming 55
- status information 56
- cluster user password 48, 57
- command-line usage 63–69
- commands
 - shell 63–69
- Compressor
 - getting started with 15–19
 - opening 36
 - workflows. *See* workflows
- computers
 - client. *See* clients
 - cluster. *See* clusters
 - desktop rendering environment 25–28
 - media storage volumes 27
 - names 42, 49
 - passwords. *See* passwords
 - removing from clusters 54
 - shutdown delay 45, 46
 - storage locations for 23, 59
 - turning off Apple Qmaster 54
- configuration
 - Apple Qmaster clusters 40
 - cluster controllers 40–47, 64
 - service nodes 40–47, 64

D

- data segments 10
- deleting items
 - clusters 55
- desktop rendering environment 25–28
- disk arrays 23
- distributed processing 6
 - expanded example 24
 - installing software 15–16, 26
 - introduction 6
 - managed services 43
 - network configuration 21–28
 - part-time 25–28
 - quick and easy steps 15–19
 - simple example 22
 - unmanaged services 43
- distribution, batches 9–10
- domains 56
- dual processors 46–47

E

- email notification 56, 61

F

- failure notification 56, 61
- files
 - log 61

- Maya 36
- sharing 27
- temporary 59

H

- history, batch 56
- History table 56

I

- installing Compressor/Apple Qmaster 26

J

- jobs. *See* batch jobs

L

- lock icon 49
- log files 61

M

- mail server 56
- managed services 43
- manual, about 11
- Maya batches 36
- media storage volumes 27

N

- networks. *See* Apple Qmaster networks

P

- passwords 57–58
 - administrator. *See* administrator password
 - cluster administrator 48, 57
 - cluster controllers 48
 - clusters 34, 48
 - cluster users 48, 57
 - computers 49
 - service 57, 58
 - users 48
- Personal File Sharing 27
- preferences
 - Apple Qmaster. *See* Apple Qmaster pane in System Preferences
 - clusters 56
- processes
 - directing 7
 - storage locations for 23, 59
 - tracking 7
- processing
 - defined 9
 - desktop processing environment 25–28
 - distributed part-time 25–28
 - expanded network for 24
 - installing software 15–16, 26
 - quick and easy steps 15–19
 - submitting batches for 28

- processing services
 - distributed processing 6
 - failure alerts 56, 60
 - running dual instances 46–47
 - service failure 60
 - time allotted for 45, 46
 - turning off 45
 - turning on 41

Q

- Qadministrator. *See* Apple Qadministrator
- Qmaster. *See* Apple Qmaster
- qmasterprefs command 64
- QuickCluster
 - configuring 17
- QuickClusters
 - about 9, 50
 - Apple Qadministrator 54
 - creating 50
 - enabling unmanaged services 44
 - extended node clusters 50
 - managed vs. unmanaged services 43

R

- recovery features 60–61
- rendering defined 9
- Rendering services 41
 - turning off 45

S

- scratch storage 23, 42, 59
- security passwords. *See* passwords
- servers
 - See also* computers
 - distributed processing and 24
 - mail 56
 - rack of 24
- service exceptions 60
- service nodes
 - adding to clusters 18, 54
 - assigning to clusters 49
 - clients as 22
 - as cluster controllers 22
 - configuring with Apple Qmaster 40–47
 - configuring with shell commands 64
 - creating 41
 - described 7
 - dual processors 46–47
 - enabling/disabling 64
 - illustrated 7
 - inaccessible 9
 - multiple 23
 - overloaded 9
 - overview 9
 - passwords 58

- processing services 44–45
- processing stops unexpectedly 60
- turning off processing services 45
- turning on processing services 41, 45
- Service Options dialog 47
- service passwords 57, 58
- Services pane 45
- Shake
 - dual processors 46
 - installing distributed processing 27
 - media file locations 28
 - script locations 28
 - source files 26
 - startup .h file 27
 - UNC setting 27
- shell commands 64–69
- shutdown delay 45, 46
- storage devices 23
- subnet 8, 10
- switches, high-speed 23, 24
- System Preferences 17, 31–32

T

- tasks 5, 6, 10

- See also* batches
- Terminal shell commands 63–69

U

- unmanaged services 43
 - enabling on managed clusters 44
 - enabling on QuickCluster 44
- user mode, Batch Monitor 38
- users
 - cluster 48, 57
 - passwords 48, 57

V

- video codecs
 - See also* codecs

W

- websites
 - Apple 12
 - Apple Store 13

X

- XML code 66, 68