NQE Installation

SG–5236 3.0

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The UNICOS operating system is derived from UNIX® System V. The UNICOS operating system is also based in part on the Fourth Berkeley Software Distribution (BSD) under license from The Regents of the University of California.

New Features

NQE Installation SG–5236 3.0

The NQE 3.0 release has the following new features that affect installation:

- The NQE 3.0 release includes the new NQE database feature. When installing NQE 3.0, the `Configuration Editor` screen for the `NQE Master Server Software` selection includes an entry for the mSQL server host. You must specify the name of the mSQL server host.
- The online documentation provided through the CrayDoc documentation reader has been revised to support the NQE 3.0 release.

Record of Revision

The date of printing or software version number is indicated in the footer.

Version	*Description*
1.0	December 1993. Original printing. This publication describes how to install the Cray Network Queuing Environment (NQE) 1.0 release.
1.1	June 1994. Incorporates information for the NQE 1.1 release.
2.0	May 1995. Incorporates information for the NQE 2.0 release. Information in this document also supports Network Queuing EXtensions (NQX) synchronous with the UNICOS operating system 9.0 release; however, NQE on UNICOS systems does not use the installation tool discussed in this document.
3.0	April 1996. Incorporates information for the NQE 3.0 release. NQE on UNICOS systems does not use the installation tool discussed in this document.

Preface

This publication describes how to install the Cray Network Queuing Environment (NQE) on workstation platforms. NQE is a Cray Research software product that lets you submit, monitor, and control batch jobs for execution on an NQS server in a batch complex. NQE includes the NQE database and NQE scheduler clients to provide networkwide scheduling. You can create a customized scheduler by using NQE application programming interfaces (APIs). NQE also provides a Network Load Balancer (NLB), which supports destination selection and displays the status of batch requests across a batch complex. The File Transfer Agent (FTA) provides synchronous or asynchronous outbound and inbound file transfers. Transfers may also be queued so that they are retried if a network link fails.

This guide is intended to help system administrators install the NQE software. It describes the installation procedure, licensing concepts, and initial configuration.

Related publications

The following documents contain additional information that may be helpful:

- *Introducing NQE*, publication IN–2153, provides an overview of NQE functionality.
- *NQE User's Guide*, publication SG–2148, describes how to use the NQE software.
- *NQE Administration*, publication SG–2150, provides information on configuring, monitoring, and controlling NQE.

Introducing NQE, the *NQE User's Guide*, and *NQE Administration* also are available as part of the NQE software through the CrayDoc online documentation browser.

For information about installation and configuration of NQE on UNICOS systems, see the *UNICOS NQS and NQE Administrator's Guide*, publication SG–2305.

Ordering publications

The *User Publications Catalog*, publication CP–0099, describes the availability and content of all Cray Research hardware and software documents that are available to customers. Cray Research customers who subscribe to the Cray Inform (CRInform) program can access this information on the CRInform system.

To order a document, either call the Distribution Center in Mendota Heights, Minnesota, at +1–612–683–5907 or send a facsimile of your request to fax number +1–612–452–0141. Cray Research employees may send electronic mail to `orderdsk` (UNIX system users).

Customers who subscribe to the CRInform program can order software release packages electronically by using the `Order Cray Software` option.

Customers outside of the United States and Canada should contact their local service organization for ordering and documentation information.

Licensing and ordering NQE product

To order additional copies of this product, or to increase the number of licensed users, contact Cray Research, Inc. in one of the following ways:

1–800–289–2729

+1–612–683–3897

- Send mail to the following address:

  CrayDirect
  Cray Research, Inc.
  655A Lone Oak Drive
  Eagan, Minnesota 55121
  USA

- Send electronic mail from any system connected to Internet to the following address:

  `craysoft@cray.com`

- Send a facsimile (fax) to the following telephone number:

  +1–612–683–3559

- Contact Cray Research through the World Wide Web (WWW) at the following URL:

  `http://www.cray.com/craysoft`

Conventions

The following conventions are used throughout this manual:

Convention	Meaning
`command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
`manpage`(*x*)	Man page section identifiers appear in parentheses after man page names. The following list describes the identifiers:

1	User commands
2	System calls
3	Library routines, macros, and opdefs
4	Devices (special files)

Convention	Meaning
	4P Protocols 5 File formats 7 Miscellaneous topics 8 Administrator commands Some internal routines (for example, the `ddcnt()` routine) do not have man pages associated with them.
variable	Italic typeface denotes variable entries and words or concepts being defined.
`user input`	This bold fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
`ABBreviation` or `abbreviation`	Capital letters of a `qmgr` command or underlining indicates the shortest possible abbreviation for a command; underlining also highlights a summary phrase or sentence.
[ ]	Brackets enclose optional portions of a command line.
...	Ellipses indicate that a preceding command-line element can be repeated.

The following machine naming conventions may be used throughout this manual:

Term	Definition
Cray PVP systems	All configurations of Cray parallel vector processing (PVP) systems, including the following: CRAY C90 series (CRAY C916, CRAY C92A, CRAY C94, CRAY C94A, and CRAY C98 systems) CRAY C90D series (CRAY C92AD, CRAY C94D, CRAY C98D systems)

Term	Definition
	CRAY EL series (CRAY Y-MP EL, CRAY EL92, CRAY EL94, and CRAY EL98 systems) CRAY J90 series (CRAY J916 and CRAY J932 systems) CRAY T90 series (CRAY T94, CRAY T916, and CRAY T932 systems) CRAY Y-MP E series (CRAY Y-MP 2E, CRAY Y-MP 4E, CRAY Y-MP 8E, and CRAY Y-MP 8I systems) CRAY Y-MP M90 series (CRAY Y-MP M92, CRAY Y-MP M94, and CRAY Y-MP M98 systems)
Cray MPP systems	All configurations of Cray massively parallel processing systems, including the CRAY T3D series (CRAY T3D MC, CRAY T3D MCA, and CRAY T3D SC systems), and CRAY T3E series
All Cray Research systems	All configurations of Cray PVP and Cray MPP systems that support this release
SPARC systems	All SPARC platforms that run the Solaris operating system version 2.3 or later

The default shell in the UNICOS operating system, referred to in Cray Research documentation as the standard shell, is a version of the Korn shell that conforms to the following standards:

- Institute of Electrical and Electronics Engineers (IEEE) Portable Operating System Interface (POSIX) Standard 1003.2–1992
- X/Open Portability Guide, Issue 4 (XPG4)

The UNICOS operating system also supports the optional use of the C shell.

Cray UNICOS Version 9.0 is an X/Open Base 95 branded product.

The POSIX standard uses *utilities* to refer to executable programs that Cray Research documentation usually refers to as *commands*. Both terms may appear in this document.

Reader comments

If you have comments about the technical accuracy, content, or organization of this manual, please tell us. You can contact us in any of the following ways:

- Send us electronic mail from a UNIX system, using the following UUCP address:

  `uunet!cray!publications`

- Send us electronic mail from any system connected to the Internet, using the following Internet address:

  `publications@timbuk.cray.com`

- Customers in the United States and Canada can call the Cray Research Customer Support Center at either of the following telephone numbers. These telephone numbers are also listed on the `cs_support`(7) man page and on the Service and Support card included in the product package.

  1–800–272–9349 (toll free from the United States and Canada)

  +1–404–631–2244

- Customers in other countries can call their local Cray Research support office. These telephone numbers are listed on the `cs_support`(7) man page and on the Service and Support card contained in the product package.

- Contact your Cray Research representative and ask that a Software Problem Report (SPR) be filed. Use `PUBLICATIONS` for the group name, `PUBS` for the command, and `NO-LICENSE` for the release name.

- Call our Software Publications Group in Eagan, Minnesota, through the Customer Service Call Center, using either of the following numbers:

  1–800–950–2729 (toll free from the United States and Canada)

  +1–612–683–5600

- Send a facsimile of your comments to the attention of “Software Publications” in Eagan, Minnesota, at the following fax number:

  +1–612–683–5599

- Use the postage-paid Reader’s Comment Form at the back of the printed manual.

We value your comments and will respond to them promptly.

Contents

Overview [1]

The Network Queuing Environment (NQE) is a set of servers and clients that allow batch requests to be executed across a load-balanced network of hosts. This network is know as an *execution server complex* (also known as a *batch complex* or *cluster*). *Batch requests* are shell scripts that are executed independently of an interactive terminal session. Specifically, the requests are submitted from NQE clients and executed at NQE master and execution servers. Users can also log on to servers and submit requests.

To install and configure the NQE software, you will complete the following steps:

- If this is the first time NQE will be installed at your site **or** if you plan to change your configuration when you upgrade from the previous NQE release, plan your configuration and determine NQE servers, clients, and port numbers as described in section 2, page 2.
- Configure the license manager as described in section 3, page 9.
- If you are upgrading, follow the upgrade procedures described in section 4, page 17.
- Install NQE as described in section 5, page 21.

  If you do not have access to a CD-ROM, install NQE by exporting and mounting the NQE file system over the Network File System (NFS) and using the `addnode` command as described in section 8, page 39.
- Initialize and start NQE by using the `nqeinit`(8) command as described in section 6, page 31.
- Configure installation options, including the NQE World Wide Web (WWW) example and the CrayDoc online documentation reader, as described in section 7, page 37.
- Configure NQE components as described in section 9, page 45.

For problem-solving information, see section 10, page 51.

For information on mounting and unmounting CD-ROMs locally and across NFS, see appendix A, page 63.

For information on the default NQE configuration, see appendix B, page 75.

For information on the NQE licensing process, see appendix C, page 85.

For information about the default NQE file structure, see appendix D, page 89.

For a list of the man pages provided with the NQE product, see appendix E, page 93. Man pages are provided in online form only.

Planning Your Configuration [2]

Read this section if this is the first installation of NQE at your site or if you plan to change your configuration when you upgrade from the previous NQE release.

This section describes configuration decisions you must make before you start the installation process, including the following:

- Selecting NQE components
- Planning server configuration
- Setting port numbers

Selecting NQE components

2.1

The Network Queuing Environment (NQE) installation procedure lets you select among the following installation options. You can choose to install only one type of NQE software (master server, execution server, or client software) at one time. You must install a license manager for the NQE software.

The installation options are as follows:

- NQE Master Server Software. An NQE *master server* contains all NQE components. To distribute work among all NQE execution servers, a master server runs an NLB server; it also runs the NQE database and the NQE scheduler. A master server also contains all of the software that clients and execution servers contain, and they can function as execution servers in your batch complex. Only one NQE master server is required in a batch complex, although there may be more.

  Optionally , you can use the NQE scheduler and NQE database rather than the NLB to schedule work. This option lets users submit requests to a central storage database to be analyzed by the scheduler and submitted to NQS. Only one master server in the complex will run the NQE database server.

- NQE Execution Server Software. NQE *execution servers* contain NQE client software. In addition, they also contain the NQS, File Transfer Agent (FTA), NLB collectors, and the NQE database LWS. These additional components have the following functions:
  - NQS schedules and initiates batch requests.
  - FTA transfers files.
  - NLB collectors collect and communicate system load information to the NLB server so that the NLB can provide NQS with a list of servers, in order of preference, to run a request and provide status information upon request.
  - The LWS obtains request information from the NQE database, verifies validation, submits the copy of a request to NQS, and obtains exit status of completed requests from NQS.
- NQE Client Software. NQE *clients* contain software so users may submit, monitor , and control requests by using either the NQE graphical user interface (GUI) or the command-line interface. From clients, users also may monitor request status, delete or signal requests, monitor machine load, and receive request output using the FTA.
- NQE Web Example. The *NQE web example* provides an example World Wide Web (WWW) interface to selected NQE functions. After it is installed, you can access the WWW interface through web clients such as Mosaic or Netscape. This means that IBM PCs, Macintosh systems, workstations, and superservers can use NQE services. Through this interface, you can submit a batch request (from a file or entered interactively), obtain status on your requests, delete your requests, and signal your requests. You also can view and save output files produced. Hypertext-based online help is provided.

- FLEXlm License Manager Software. The FLEXlm *license manager* licenses the NQE product.

  Note: Before you start NQE, at least one license manager must be installed and running.

  For information about configuring your NQE licensing, see section 3, page 9.

- Online Document Reader Service. The CrayDoc *online documentation reader* provides access to the NQE documentation. This documentation set includes a user guide, an administrator's guide, and an introduction to the product. Optionally, you can install the reader and documentation on any host in your network. The `cdoc`(1) man page lists supported platforms.

If you are not sure where you want to run servers and clients, you should read appendix B, page 75. The appendix introduces the concepts of simple networks, load-balanced networks, and the default NQE configuration.

Planning server configuration

2.2

After you have determined where in your batch complex you will run master servers, execution servers, clients, license servers, and other installation options, you must gather information about the hosts on which they will run. This information is used when you contact Cray Research Customer Support to obtain your license and during installation of NQE.

You must know information about host names, directories, and port numbers for the servers and clients you install. Table 1 describes the directories and host names and the defaults that the installation procedure uses.

Section 2

Table 1. NQE installation information

Item	Description	Default value
target_root file system	The installation creates a directory tree under this directory. The FLEXlm and NQE directories are installed in a subdirectory of the target root file system called `/craysoft`. Do **not** use a `tmpfs` (memory-based) file system. You need the following approximate amount of disk space, depending upon the system: Master server: Approximately 22.7 Mbytes to 33.1 Mbytes of disk space Execution server: Approximately 22.3 Mbytes to 32.5 Mbytes of disk space Client: Approximately 9.25 Mbytes to 14.2 Mbytes of disk space WWW example: Approximately .2 Mbytes of disk space	`/usr` (`/opt` on Solaris systems)
NQE spool directory	All servers must specify the directory in which NQE working files (such as request files, output files, and the NLB database) are placed. When initially installed, you need approximately .5 Mbytes of disk space, although the amount of required disk space will vary depending upon the type of logging you do and the number of jobs running.	`/usr/spool/nqe` (`/opt/spool/nqe` on Solaris systems)
NLB server host name	All servers and clients must specify the host name of the NQE master server machine(s) on which the NLB server runs. To ensure greater availability of the NLB server in the network, you can run redundant servers.	No default

Table 1. NQE installation information (continued)

Item	Description	Default value
NQE database server host name (mSQL server host)	If you will use the NQE scheduler and NQE database, all servers and clients must specify the host name of the NQE master server machine on which the database server runs. Only one master server in the network can run the database server, even if you install multiple master servers.	No default
License server host name	When you obtain your NQE license, you must provide the name of the host(s) on which you will run license servers. License server software will require approximately .5 Mbytes to 1.3 Mbytes of disk space, depending upon the system.	No default
`NQS_SERVER`	All clients must have a default NQS server host to process their requests. This value must be the host name of an NQE master or NQE execution server.	Installation host for master and execution server installations; no default if installing on client

Setting port numbers

2.3

The TCP/IP port numbers for NLB, FTA, the NQE database (mSQL) and NQS have default values, as shown in Table 2, on page 8. These numbers must be the same for all nodes in the batch complex.

You must ensure that no other applications are listening on these ports. To display the ports that are in use, use the `netstat -a` command.

To determine the port numbers that are configured for the local system, examine the `/etc/services` file. If you are running NIS or NIS+, use the `ypcat` command to search the `services` file for port numbers. For example, to determine if the TCP/IP port number configured for NQS is port 607, use the following command:

```
% ypcat services | grep 607
nqs          607/tcp                # Network Queuing System
```

Table 2 also shows the default port number for the license manager. On the license server machine, you must ensure that no other applications are listening on the license manager port number. This number can be in use in other places in the network, but not on the license server.

Table 2. NQE default port numbers

Item	Description	Default value
FTA port	TCP/IP port number for file transfer	605
NLB port	TCP/IP port number for NLB	604
NQS port	TCP/IP port number for batch request transfers	607
mSQL port	TCP/IP port number for the NQE database (mini-SQL) server	603
FLEXlm port	TCP/IP port number for license manager daemon	7169

Configuring Licensing [3]

You must license NQE before you start it. The software licensing used by CraySoft products is based on the FLEXlm product from Globetrotter Software, Inc.

This section discusses the following:

- Licensing concepts
- How to configure and start NQE licensing

For more information on FLEXlm, you can order the *Flexible License Manager End User Manual* from Globetrotter Software, Inc. or from the Cray Research Distribution Center.

Section 3

Licensing concepts

3.1

This subsection provides information you should know about how FLEXlm and NQE work together.

FLEXlm components

3.1.1

The FLEXlm license software includes three components:

- License daemons called `lmgrd` and `craysoftd`
- A license file called `license.dat`
- FLEXlm commands that let you administer the software; FLEXlm commands are documented on man pages that are provided with the NQE product. (For the NQE file structure, see Figure 13, page 90.) To view FLEXlm man pages, ensure that /*target_root* `/craysoft/flexlm/man` is included in your `MANPATH`.

How you configure and run FLEXlm is based on your type of NQE license.

NQE licensing types

3.1.2

There are two types of NQE licenses: a user license and a server license.

- A *user license* (sometimes referred to as a *floating license*) regulates the number of users who can run requests simultaneously. The user license can be either a fixed number of users or `0`; a `0` indicates an unlimited user license.
- A *server license* regulates the number of master servers and execution servers allowed to run requests. The server license specifies `0` users, but it is issued to a specific TCP/IP host name or hardware serial number.

Where to run FLEXlm components

3.1.3

When you contact Cray Research Customer Service for a license, they will send you a `license.dat` file. You should place this `license.dat` file on all NQE master and execution servers. The file tells NQE where to look for the FLEXlm daemons. Systems that have only NQE clients do not need the file.

You will need to know the TCP/IP host name and the host ID of your FLEXlm server. You can use any host (or hosts) in your network to run the FLEXlm daemons. You do not have to use the same hosts on which you run NQE, although you may find it more convenient to use the same hosts.

You can run multiple FLEXlm daemons from different vendors on the same system. The port number is specified on the `SERVER` line(s) in each license file for each product.

Note: You can combine your NQE `license.dat` file with FLEXlm license files from other vendors if the `SERVER` lines match (excluding the port number). If it will help you to combine your NQE `license.dat` file with your other vendors' license files, you can get an NQE license file based on your host ID. If you have questions about your NQE `license.dat` file, contact Cray Research Customer Service.

Licensing example
3.1.4

The license.dat file in the following example lets 50 concurrent NQE users run requests on three NQE servers. The NQE servers are host1, host2, and host3. The NQE master server is on host1; the execution servers are host2 and host3. You cannot determine which servers are master and execution servers from the license.dat file because FLEXlm does not distinguish between NQE master and NQE execution servers for licensing purposes.

Suppose you decided to place the FLEXlm lmgrd daemon on another host in your network (host5), which is not part of the NQE complex. The name host5 appears in your license file on the SERVER line, along with the port number on which FLEXlm is listening (7169, which is the default port).

Your license file would look like the following example. Some of the lines in the example file are longer than 80 characters and may wrap on your screen; lines that start with a # are comments.


```
# add_checksum: using license file "/tmp/license.dat"
# ++++ Start of the license file >>>>
#>
SERVER host5 HOSTNAME=host5 7169
DAEMON craysoftd /usr/bin
FEATURE nqs_fl craysoftd 3.000 1-Jan-00 50 DB5850A675BC94CECA3A "nqs_connections" ANY
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host1
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host1
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host2
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host2
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host3
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host3
#<
# ---- <<<< end of the license file
# Checksum info
#
# 147: SERVER host5 HOSTNAME=host5 7169
# 210: DAEMON craysoftd /usr/bin
# 149: FEATURE nqs_fl craysoftd 3.000 1-Jan-00 50 DB5850A675BC94CECA3A "nqs_connections" ANY
# 155: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host1
# 117: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host1
# 156: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host2
# 118: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host2
# 157: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 "nqs_server" HOSTNAME=host3
# 119: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 "fta_client" HOSTNAME=host3
#  52: (overall file checksum)
```

Your license.dat file can be run through the lmcksum program provided in the /usr/craysoft/flexlm/bin directory (your target root directory may be different than /usr). The checksums generated should match the checksums in the comments at the bottom of the license.dat file. If they do not, your copy of the license.dat file has been corrupted, and you should contact Cray Research Customer Service for assistance.

The lmgrd daemon starts craysoftd on the same host (host5). lmgrd passes incoming license requests for NQE to craysoftd, which checks licenses in and out of the NQE license pool.

Configuring your licenses

3.2

You must decide which hosts you want to use as license servers before you contact Cray Research Customer Service.

To install and start the license server, perform the following steps:

1. Complete the registration card included as part of the NQE package.
2. Contact Cray Research Customer Service. Telephone numbers and electronic mail addresses are listed on the Service and Support card you received with your package and on the cs_support(7) man page. Give your customer representative the information from the registration card. You must provide the name of your license server host. The customer service representative will provide a license.dat file.

   Note: The *target_root* /craysoft/flexlm/doc/LICENSE.README file also includes the following instructions.
3. Install the FLEXlm software on the host you want to use as your license server (for information about how to install software products, see section 5).
4. Ensure that no other applications are listening on the TCP/IP port number 7169. To display the ports that are in use, use the netstat -a command or examine the /etc/services file.
5. Add the license manager binary directory to your search path. This lets you issue commands without specifying their full path names.

For `ksh`, use the following command:

```
export PATH=/usr/craysoft/flexlm/bin:$PATH
```

For `csh`, use the following command:

```
setenv PATH /usr/craysoft/flexlm/bin:$PATH
```

6. Copy the license file to the *target_root* `/craysoft` directory and name it `license.dat`.

7. Verify the license file you received from Cray Research by using the following command:

```
lmcksum -c /usr/craysoft/license.dat
```

You will receive output about your `license.dat` file. The last line should give you a checksum number, as in the following example:

```
lmcksum - Copyright (C) 1990 by Globetrotter Software, Inc.
lmcksum: using license file "/usr/craysoft/license.dat"
.
.
.
52: (overall file checksum)
```

This checksum (`52: (overall file checksum)`) should match the checksum line in your `license.dat` file. To see whether the checksums match, view the file.

8. Set the file access permissions on `license.dat` as follows:

```
chown root license.dat
chgrp other license.dat
chmod 644 license.dat
```

Note: If you have an unlimited user license, the license manager is configured and you can start NQE. You do not have to start any license daemons, but you still must place the `license.dat` file in the correct location as described in step 5.

Section 3

9. If you have a limited user license, you must start the license manager daemons on your license server host by using the following command. You can specify any name for *license .log*, and the directory for the log file must be writable by the FLEXlm process. The command starts the `lmgrd` and `craysoftd` daemons. Other license daemons may exist for other products.

   Note: In a three-license server configuration, you should install and configure the correct license files on all three machines before starting the license daemons. This action avoids repeated error messages being generated by the running daemons trying to establish a quorum.

   For `ksh`, use the following syntax:

```
# lmgrd -c /usr/craysoft/license.dat > license.log   2>&1 &
```

   For `csh`, use the following syntax:

```
# lmgrd -c /usr/craysoft/license.dat >& license.log   &
```

   To ensure the daemons have started, view the *license.log* file. You will see lines such as the following:

```
03/17 11:31:56 (lmgrd) FLEXlm - Copyright 1990 Globetrotter Software, Inc.
03/17 11:31:56 (lmgrd) FLEXlm (v3.0) started on balsam (Sun) (03/17/96)
03/17 11:31:56 (lmgrd) License file: "/usr/craysoft/license.dat"nqs_fl
03/17 11:31:56 (lmgrd) Started craysoftd
03/17 11:31:56 (craysoftd) Server started on balsam for:        nqs_fl
```

10. Optionally , you can install the licensing start-up commands from step 8 in system start-up files to activate the licensing daemons each time the server is booted.

11. If you are performing an upgrade installation, proceed to section 4, page 17. If this is the first installation of NQE at your site, proceed to section 5, page 21.

Upgrading NQE [4]

If you have previously installed the Network Queuing Environment (NQE), use the following steps to upgrade your software. If this is the first installation of NQE at your site, proceed to section 5, page 21.

Note: To run these upgrade steps, you must be `root`.

Warning: You can preserve NQS queued requests. You cannot preserve running or suspended requests across an upgrade. They are restarted from the beginning. Therefore, before upgrading, you should allow running or suspended requests to finish.

1. Before installing NQE, you should read the release errata. The release package contains a printed version of the errata. It is also available online. You can view the ASCII file in *mount_point* `/doc/errata.nqe` before you start the installation tool. After you have started the installation tools, you can view the errata by selecting `Errata...` under the `Help` menu.

   Note: NQE support of DCE/DFS does not support an installation running DFS-only file space. The spool and binary trees, among other components, must reside in UNIX file space.

2. Ensure you have your FLEXlm license file for this release. For information about ordering your FLEXlm license file, see subsection 3.2, page 12, of this installation guide.

   If you plan to change your configuration to run this NQE release, see section 2, page 3, before ordering your FLEXlm license file for this release.

   Note: You must install your NQE 3.0 `license.dat` file **before** you start NQE 3.0.

Section 4

3. If you want to preserve any NQS and Network Load Balancer (NLB) configuration changes you have made, perform the following steps:

   a. Issue the `qmgr snap` command to create a backup version of your NQS configuration.

   b. If you have made changes to your NQE 2.0 name map, objects, or access control lists, you must reapply those changes to the NQE 3.0 name map, objects, and access control lists. While you are running NQE 2.0, create an ASCII backup of these changes by issuing the following commands:

   `mkdir` ***backup_directory***
   `cd` ***backup_directory***
   `nlbconfig -mdump -f name_map`
   `nlbconfig -odump -f obj_def`
   `nlbconfig -adump -f acl`

4. Stop all NQE daemons by using the `nqestop`(8) command. Running jobs will be rerun, unless they explicitly specified the no rerun option.

5. Stop the license manager daemons by using the `lmdown -c` command.

   Note: To ensure that the correct `license.dat` file is used as input to the command, always use the `-c` option when using the `lmdown` command.

6. Install NQE. You must install 3.0 in the same target root directory as NQE 2.0 if you want to carry queued jobs forward from NQE 2.0.

   You can safely install NQE 3.0 in the same target root directory without losing the NQE 2.0 installation because the NQE 3.0 software is installed in a directory branch that separates different versions of the same product. For example, if the target root for NQE 2.0 release software is `/usr`, the NQE 3.0 software is installed in the `/usr/craysoft/nqe/3.0` directory, while the NQE 2.0 software is installed in the `/usr/craysoft/nqe/2.0` directory.

   Installing CrayDoc is optional; however, the online documentation has changed for the NQE 3.0 release.

On NQE master or execution servers, the directory tree /*target_root* /craysoft/nqe/2.0/*host_name* /database is relinked from your NQE 2.0 environment to the newly installed NQE 3.0 software. This database directory tree contains information on NQE configuration settings and holds NQS queued jobs and FTA transfer requests.

Caution: Significant changes to the name map have been made in NQE 3.0. After you have started NQE 3.0, you must reload the name map as described in step 5 of subsection 6.1 on page 31.

To install the NQE release software, see section 5, page 21.

7. After you have installed the NQE release software, start NQE as described in section 6, page 31.

Installing NQE [5]

This section describes how to use the NQE installation tool to install the NQE software from the CD-ROM media.

For information about how to install NQE by exporting and mounting an existing NQE file system over NFS, see section 8, page 39.

For examples of mounting the CD-ROM on supported NQE platforms, see subsection A.1, page 63. For system-specific reference material, see the `mount` and `showmount` man pages on your system.

> **Note:** If you are upgrading from a previous NQE release, proceed to subsection 5.2, page 22.

5.1 Preparing for an initial installation

> **Note:** The installation procedure must be run as `root` so that files will be installed properly for general use.

Before beginning Step 1, ensure the following have been done:

- Before installing NQE, you should read the release errata. The release package contains a printed version of the errata. It is also available online. You can view the ASCII file in *mount_point* `/doc/errata.nqe` before you start the installation tool. After you have started the installation tools, you can view the errata by selecting `Errata...` under the `Help` menu.

  > **Note:** NQE support of DCE/DFS does not support an installation running DFS-only file space. The spool and binary trees, among other components, must reside in UNIX file space.

- Ensure that you have installed and configured your FLEXlm license file for this release; it must be installed and configured **before** you start NQE. For information about ordering your FLEXlm license file, see the Preface of this installation guide.

- You must ensure that the X Window System display environment variable DISPLAY points to your local X Window System server (that is, the workstation you are using to run the installation procedure). The installation tool uses an X Window System display as determined by the DISPLAY environment variable.

For example, your local X Window System server is named ice and you are running the installation on a server named snow. If you use ksh, the following command sets the environment variable:

```
export DISPLAY=ice:0
```

If you use csh, the following command sets the environment variable:

```
setenv DISPLAY ice:0
```

You must add the host on which you are running the installation (which is snow in this example) to the client list on your X Window System server by using the xhost command. For example:

```
xhost snow
```

Step 1: Mount the CD-ROM

5.2

Place the CD-ROM into the caddy and insert it into the drive. To mount the CD-ROM, use the mount(1M or 8) command.

For examples of mounting the CD-ROM on supported NQE platforms, see subsection A.1, page 63. For system-specific reference material, see the mount and showmount man pages on your system.

Note for SGI systems: When mounting a CD-ROM on an SGI system, you must specify the notranslate option on the mount(1M) command. If you omit this option, directory names will be translated into lowercase, and the NQE software will not load properly. For an example, see subsection A.1.3, page 65.

On Solaris and SunOS systems, the Volume Management daemon automatically mounts the CD-ROM when you insert it at the mount point /cdrom/craysoft_nqe_30. It also creates a symbolic link,

Section 5

`/cdrom/cdrom0`, which points to the `/cdrom/craysoft_nqe_30` directory. Mount commands are not necessary.

Step 2: Start the installation tool

5.3

To begin the installation procedure, change directories to `/cdrom` and execute the `install/INSTALL` command, as follows:

```
cd /cdrom/cdrom0
install/INSTALL
```

The `INSTALL` script invokes the proper installation tool for your system's architecture and version of the operating system.

> **Note:** The installation procedure logs status and error messages in `/tmp/craysoft_install_log.`*process_id* . If the file exists, information is appended. If you want to log information to a different location, use the `install/INSTALL -log` *filename* command.

To receive a list of all possible options, invoke `INSTALL` by using the `-help` option. The options are printed and the command terminates. You then can reissue the command with the options you want to use.

If you want, you can log in to other systems and run more than one installation simultaneously.

If you are not `root` or if your `DISPLAY` environment variable is not set as described in subsection 5.1, page 21, the installation fails immediately. The installation logs messages to the log file when it fails.

Figure 1 shows what the initial installation tool screen looks like.

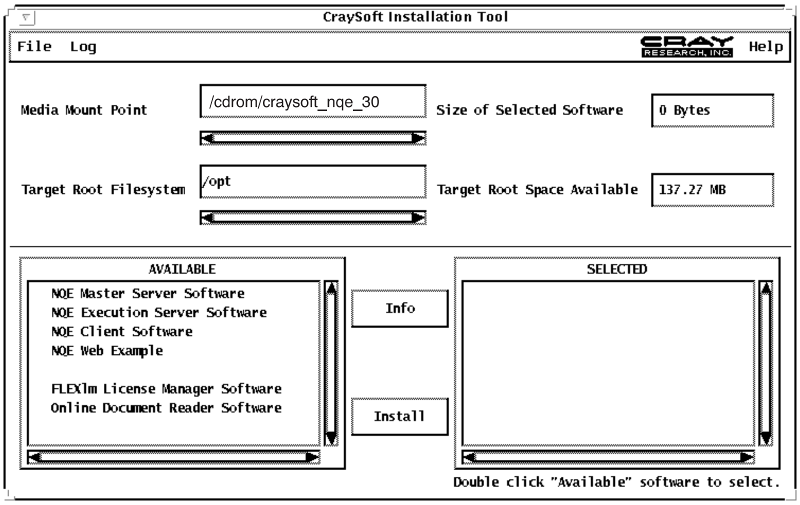

Figure 1. Initial installation tool screen

For a description of each of the components of the screen, see subsection 5.4, page 24.

Using the display

5.4

After you invoke the installation tool, you will see the screen in Figure 1. This subsection describes all of the installation tool's components for your reference.

On the initial display, you will see three menus on the menu bar, described as follows:

- The `File` menu lets you select between the following options:
  - The `Select Target Media` selection lets you specify a location from which the NQE software is loaded.

- The `Select Target Root` selection lets you specify a location for the NQE software after it is installed.

• The `Log` menu lets you choose between the following options:

- The `View Log` selection displays the contents of the installation log, as shown in Figure 2:

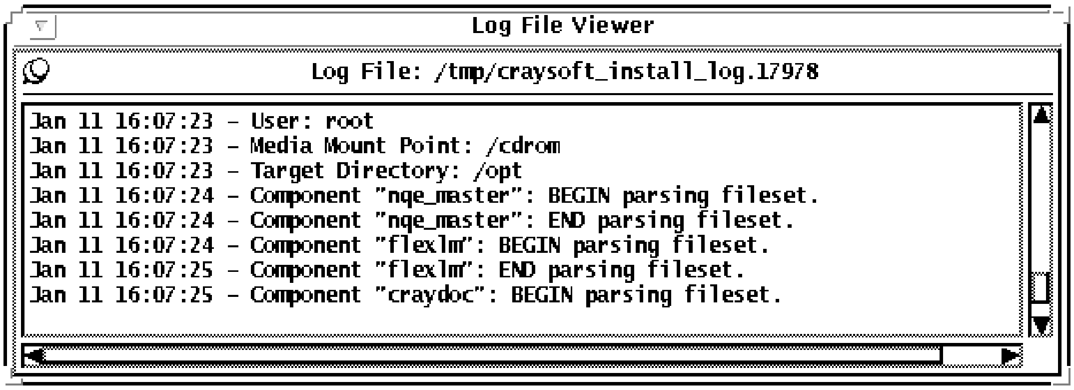

Figure 2. Log file viewer

- The `Enable Verbose Logging` selection increases the amount of information that is included in the installation log.

• The `Help` menu in the upper right corner of the display lets you choose among the following options:

- `About...` provides the version number and release date of the software.

- `Errata...` displays a copy of the release errata. If you have not already done so, you should read the errata.

– `Enable Context Help` displays informational messages in the lower right corner of the screen about the area of the screen to which your cursor arrow is pointing.

– `Help...` displays the man page for the installation tool program (`inst`(8)).

The display area below the menu bar provides information on the selections you have made, as follows:

- The `Media Mount Point` is the directory you are in when you invoke the installation tool. To change the default, choose `Select Target Media` from the `File` menu.
- The `Target Root Filesystem` is the directory into which you will install the NQE software. The default is `/usr` (`/opt` on Solaris systems). To change the default, choose `Select Target Root` from the `File` menu.
- The `Size of Selected Software` displays the size (in Mbytes) of the software you select to install.
- The `Target Root Space Available` displays the amount of unused space (in Mbytes) in the directory you choose for the target root file system.

The `AVAILABLE` and `SELECTED` panels display the software that is available for installation and the selections you have made, respectively. Using the left mouse button, double-click on an item in the `AVAILABLE` panel and it will move to the `SELECTED` panel. Double-click on an item in the `SELECTED` panel and it will move back to the `AVAILABLE` panel.

The `Info` button displays a brief description of a selection. To see the description, click once on a selection and click `Info`.

The `Install` button installs the software. After you have selected the software you want to install, click this button.

Step 3: Verify software locations

5.5 Selections under the `File` menu let you change the default locations in which the installation procedure finds the NQE software before it is installed (the media mount point) and the directory in which the procedure will install the NQE directory structure (the target root file system).

To change the default locations, use these selections, as follows:

- If you are not installing from the `/cdrom` directory, choose `Select Product Media` from the `File` menu. The screen in Figure 3 appears.

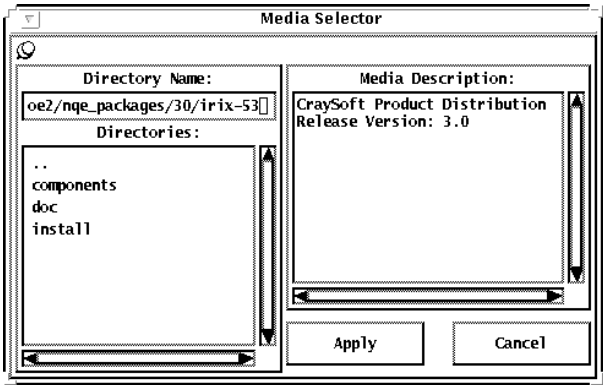

Figure 3. `Media Selector` screen

  Enter the directory from which you will install the software. To make the change and to dismiss the screen, using the left mouse button, click the `Apply` button.

  If you press `RETURN` after entering a directory (before you click the `Apply` button), the display shows the contents of the directory you entered.

- The installation places the software under the target root file system `/usr` (`/opt` on Solaris systems). If you want to change this to a different value, choose `Select Target Root` under the `File` menu.

Section 5

The screen in Figure 4 appears:

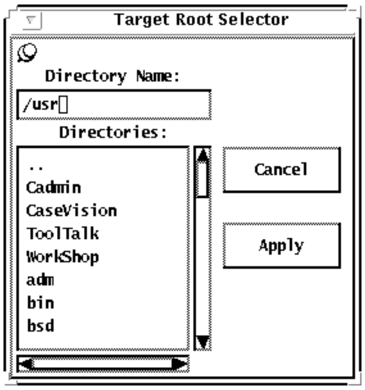

Figure 4. `Target Root Selector` screen

Enter the name of the directory in which the NQE software will reside. To make the change and to dismiss the screen, use the left mouse button to click on the `Apply` button.

Step 4: Select your software

5.6

If you click on an item from the `AVAILABLE` panel, the item is highlighted. To display a brief description of the product, use the left mouse button to click on the `Info` button.

Using the left mouse button, double-click on the options you want to install. They will move from the `AVAILABLE` panel to the `SELECTED` panel. (To move any options back from `SELECTED` to `AVAILABLE`, double-click on the option.)

The NQE master server, NQE execution server, and NQE client are exclusive choices. You can select only one of these items at a time. The other options are nonexclusive choices.

For example, if you select `NQE Master Server Software` and you then select `NQE Execution Server Software`, `NQE Master Server Software` is deselected and moves back into the `AVAILABLE` panel.

Step 5: Install the software

5.7 After you have selected your software, click `Install`. If your selections require that you provide configuration information, the configuration editor screen appears. If you select `NQE Master Server Software`, the screen in Figure 5 appears.

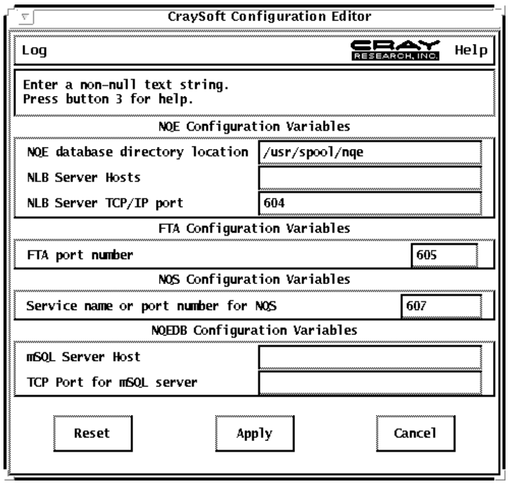

Figure 5. `Configuration editor` screen

The `Reset` button restores all fields to their default setting.

The `Apply` button applies your changes and begins the installation.

The `Cancel` button dismisses the screen and returns the pointer to the main window.

If you point to an entry field and click and hold the right mouse button, a pop-up menu lets you choose among the following options:

- `Undo` lets you undo your typing
- `Load Default` returns the field to its default setting
- `Help` provides a brief description of the field

Change or fill in the fields with the information described in Table 1, page 6, and Table 2, page 8.

You must specify the name of the NLB server host. You cannot proceed with the installation until you do.

You must specify the name of the mSQL server host. The mSQL server host runs on an NQE master server. When performing the installation configuration, you may have redundant NLB server hosts; however, you can have only one mSQL server host (see Figure 5). The default TCP/IP port number for the mSQL server is 603.

After you have filled in the fields, click `Apply`. The configuration editor screen disappears, and the software installs.

Status messages in the lower right corner of the screen tell you how the installation is progressing. After the installation has completed, you can either proceed to install more options or choose `Exit` under the `File` menu to terminate the installation procedure.

For information on configuring licensing, see section 3, page 9.

For information on configuring the WWW example interface and the online documentation, see section 7, page 37.

Step 6: Eject the CD-ROM

5.8

After you have finished installing the software, you can eject the CD-ROM. For examples of unmounting the CD-ROM on supported NQE platforms, see subsection A.2, page 68.

To start NQE, proceed to section 6, page 31. Remember that your FLEXlm license file for this release must be installed and configured **before** you start NQE.

Section 5

Starting NQE [6]

Section 6

This section describes how to initialize, configure, and start NQE. These instructions also are included in the *target_root* `/craysoft/nqe/README` file after you have installed the NQE software.

Steps you perform to start NQE

6.1

Note: Before you start NQE, you must perform the steps necessary to configure licensing, as described in section 3, page 9.

To initialize, configure, and start NQE, complete the following steps:

Note: You must complete steps 1, 2, and 3 on each NQE client.

1. If this is the first time NQE is being installed at your site, place the following entries in the `/etc/services` file:

```
fta      605/tcp          #NQE fta services
msql     603/tcp          #NQE msql service
nlb      604/tcp          #NQE nlb service
nqs      607/tcp          #NQE nqs service
```

2. Ensure that the `/etc/inetd.conf` file has the following entry:

```
fta stream tcp nowait root /usr/craysoft/nqe/bin/ftad  ftad
```

   The link to the `/usr/craysoft/nqe/bin/ftad` path name is created after you start NQE.

3. If you edit `/etc/inetd.conf`, send a hang-up signal (`SIGHUP` or `kill –1`) to the `inetd` process. This signals `inetd` to read

/etc/inetd.conf. For example, if inetd has the process ID (pid) 634, use the following command:

```
kill -1 634
```

Note: On AIX systems, if you manually edit the inetd.conf file, you must synchronize the inetd.conf file and the object data manager (ODM) database by using the inetimp command.

4. Ensure the appropriate machine identifier (mid) is defined in your nqs_config file.

5. Start NQE in one of the following ways, depending on if this is the first installation of NQE at your site or if you are upgrading:

   – **If this is the first installation of NQE at your site**, run the nqeinit script by using the following command (your target root directory may be different than /usr):

   ```
   /usr/craysoft/nqe/3.0/etc/nqeinit
   ```

   The nqeinit script creates a symbolic link to the /etc/nqeinfo file, which is used for the run-time configuration. It also creates links to the NQE directory structure so that the new distribution is in the standard location (that is, /usr/craysoft/nqe/bin is a link to /usr/craysoft/3.0/nqe/bin). For more information on the NQE file structure, see appendix D, page 89.

   – **If you are upgrading from the previous NQE release**, start NQE by using the following command (your target root directory may be different than /usr):

   ```
   /usr/craysoft/nqe/3.0/etc/nqeinit -u
   ```

   – This command creates symbolic links that point into the proper NQE version tree (in this case, the NQE 3.0 tree) and links the NQE 2.0 database into the NQE 3.0 database.

   Because the database directory tree is relinked from your NQE 2.0 tree, the NLB server will be using the 2.0 version of the name map after you execute the nqeinit command.

Significant changes to the name map have been made in NQE 3.0. You must read in the NQE 3.0 name map by using the following command:

nlbconfig -mput /*target_root* /craysoft/nqe/3.0/etc/name_map

If you had made changes to the name map, object definitions, or access control lists, use the ASCII backup files of the name map, object definitions, and access control lists that you created in step 3b of section 4, page 17, to recreate your changes to the name map, object definitions, and access control lists.

For additional information about how to configure the NLB, see *NQE Administration*, publication SG–2150.

6.2 Functions `nqeinit` performs to start NQE

On all NQE servers (master and execution servers), the `nqeinit` script performs the following functions:

- Ensures that the `nqeinfo` file can be found and is valid either in the location specified by the `NQEINFOFILE` environment variable or in the `/etc` directory
- Ensures that a valid NQE license file exists
- Creates the NQE spool directories if they do not exist
- Starts the NLB collector (`ccollect`) or restarts it if it is already running (for further information about the NLB collector, see *NQE Administration*, SG–2150, or see the `ccollect`(8) man page)
- Creates the File Transfer Agent (FTA) `$NQE_FTA_QUEUE` directory in the `nqeinfo` file if it does not exist
- Loads the `$NQE_ETC/fta_conf.template` into the NLB using the `nlbconfig` script
- Invokes the Tcl script `nqedb_config.tcl` to start up relevant components of the NQE database
- Starts the NQE database lightweight server (`lws`) system task

- If NQS is not running, the NQS start-up script (`qstart`) is executed to do the following:
  1. Create the NQS spool directory tree, if necessary
  2. Start the NQS daemon
  3. Initialize the system's NQS environment with commands defined in the `qmgr` input file
  4. Start the NQS queues

On NQE master servers, `nqeinit` performs the following additional functions:

- Starts the NLB server
- Loads NLB configuration data into the NLB server

On an NQE master server where the `nqeinfo` variable `MSQL_SERVER` (defined during installation) is the same as the local host name, the `nqeinit` script performs the following additional functions:

- Starts the `mSQL` database server (`msqld` daemon)
- Starts the NQE database monitor system task
- Starts the NQE database scheduler system task

No action is performed on NQE clients.

Checking the installation

6.3

The following steps allow you to check that the NQE installation correctly started essential processes.

To ensure that the NLB server is running, use the following command:

```
# /usr/craysoft/nqe/bin/nlbconfig -ping
latte: server alive and communicating
```

The response tells you that the NLB server is running and tells you the name of the server that was contacted when you issued the command.

To ensure that the NQS daemon is running, use the following command:

```
# /usr/craysoft/nqe/bin/qping -v
nqs-2550 qping: INFO
  The NQS daemon is running.
```

You also might want to invoke the NQE graphical user interface or try other user commands, as described in *Introducing NQE*, publication IN–2153.

If you have problems, see section 10, page 51.

Stopping NQE

6.4

If you need to stop NQE, execute the `nqestop(8)` command; you will receive output similar to the following:

```
# /usr/craysoft/nqe/bin/nqestop
NQE collector (ccol604) process killed
Reading NQE information file /etc/nqeinfo
Qstop shutting down NQS subsystem.
NQE NQS system stopped
pit: server shutdown
NQE NLB server stopped
```

On all NQE servers (master and execution servers), the `nqestop` script performs the following functions:

- Ensures that the `nqeinfo` file can be found and is valid either in the location specified by using the `NQEINFOFILE` environment variable or in the `/etc` directory
- Stops the Network Load Balancer (NLB) collector if it is running

- If NQS is running, the NQS shutdown script (qstop) is executed to do the following:
  1. Stop the NQS environment. By default, qstop shuts down the system's NQS environment by using commands contained in the qmgr input file.
  2. Stop the NQS daemon.
- Invokes the Tcl script nqedb_stop.tcl to shut down the NQE database components gracefully

On NQE master servers, the nqestop script also stops the NLB server if it is running.

On an NQE master server where the nqeinfo variable MSQL_SERVER (defined during installation) is the same as the local host name, the nqestop script performs the following additional functions:

- Stops the mSQL database server (msqld daemon)
- Stops the NQE database monitor system task
- Stops the NQE database scheduler system task

No action is performed on NQE clients.

Configuring Installation Options [7]

This section describes how to configure the optional software that is included on the Network Queuing Environment (NQE) media. To install any of these options, select them from the installation menu and click on `Install`. Files are copied to a subdirectory of the *target_root* `/craysoft` directory . The subdirectory names are unique for each product you install. After you have installed the software, follow the steps in this section to ensure that the software is configured correctly.

This section discusses configuration for the following installation options:

- NQE Web Example
- Online Document Reader Software

NQE Web Example

7.1

When you select `NQE Web Example` from the installation menu and click the `Install` button, the files are copied from the CD-ROM to the *target_root* `/craysoft/www` directory directory as show in Figure 14, page 91. The space requirements are approximately 5 Mbytes.

This interface is provided to NQE administrators as an example for site-specific modification and inclusion in their World Wide Web (WWW) server environment.

To configure the software, follow the steps in the *target_root* `/craysoft/www/README` file.

Online Document Reader Software

7.2

When you select `Online Document Reader Software` from the installation menu to install the software, the files are copied from the CD-ROM to the *target_root* `/craysoft/craydoc` directory. The space requirements for the online browser and documentation are approximately 16.3 Mbytes to 18.8 Mbytes, depending upon the system.

The following NQE online documentation is provided through the CrayDoc documentation reader:

- *Introducing NQE*, publication IN–2153, which provides an overview of NQE functionality, describes how to access documentation online, and provides basic user-level troubleshooting information.
- *NQE User's Guide*, publication SG–2148, which provides more detailed user-level information than *Introducing NQE*, such as how to do user tasks by using either the NQE graphical user interface (GUI) or the command-line interface, how to customize your environment, and so on. This publication may also be accessed online by using the NQE GUI help function.
- *NQE Administration*, publication SG–2150, which provides information on configuring, monitoring, and controlling NQE.

CrayDoc is based on the *Dyna* Text product by Electronic Book Technologies.

To configure the online documentation, complete the following steps:

1. Either copy the sample `.ebtrc` file (in the *target_root* `/craysoft/craydoc/data` directory) to each user's home directory as `.ebtrc`, or set the `EBTRC` environment variable in the systemwide profile or login.
2. Add the CrayDoc directory (*target_root* `/craysoft/craydoc/bin`) to each user's search path.

To start the online browser, use the following command:

```
cdoc
```

Select the `Reader Guide for UNIX` book from the available books panel and click on `OPEN` to bring up the documentation for the online browser. The *CrayDoc Reference Card*, publication SQ–6101, that is included with your release package describes basic browser operations.

Installing Using addnode [8]

You can install NQE without access to the CD-ROM by using the NQE addnode(8) command from systems that have installed and exported the NQE directory tree by using NFS.

> **Note:** You can mount CD-ROMs on systems that have a CD-ROM drive and use NFS to export it to systems without CD-ROM drives. For instructions on this procedure, see subsection A.3, page 69.

The addnode(8) command makes copies of NQE master server, execution server , or client software available from the system on which you installed NQE to other systems that are NFS cross-mounted.

For example, you may have installed NQE master server software on hosta and want to distribute execution server software to hostb. The resulting downloaded NQE system on hostb will use the files on hosta for the read-only files on hostb. This means you do not have to duplicate files in your batch complex if they require only read-only access. The addnode command copies files and directories that must be written to hostb and used locally on hostb. The nqeinfo file for hostb points the NQE software on hostb to the appropriate read-only files on hosta; it also points the software on hostb to the NQE spool directory on hostb for appropriate writable files and subdirectories. Because many of the NQE executable files are set UID (suid) images, the NQE files on the hosta file system must be exported to hostb and have root access.

Installing without access to the CD-ROM involves the following:

- NFS exporting and mounting of the NQE installation area
- Running the addnode(8) command

The following subsections describe the procedure to add an execution server and a client, respectively.

Adding an execution server

8.1

In the following example, the configuration consists of AIX systems named `hosta` and `hostb`. `hosta` is a file server for `hostb`. `hosta` is the NQE master server, and you want to install NQE execution server software on `hostb`. NQE has been installed on `hosta` in an NFS file system called `/opt/craysoft`. The `/opt/craysoft` file system will be NFS cross-mounted on `hostb` as `/remote/opt/craysoft`.

The file system on which you install the NQE software (the target root directory) can have any name. In this example, NQE is installed on `hosta` in an NFS file system called `/opt/craysoft`. The NQE spool directory and the NQE license file are installed in `/usr/spool/nqe` and `/usr/craysoft/license.dat`, respectively. You do not have to install these files in these specific file systems, but you must install the NQE spool directory and the license file in identically named directories on all systems. The names you use must be the same ones you used when you installed NQE by using the installation tool.

Figure 6 illustrates the location of the NQE software on the two systems. The dashed lines show remote NFS files that `hostb` accesses from `hosta`.

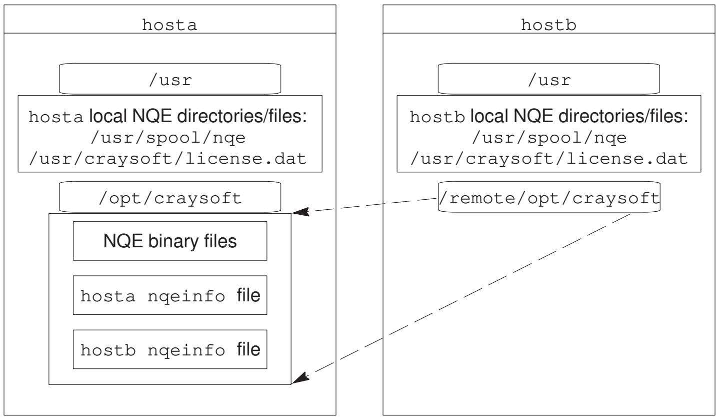

Figure 6. `addnode` execution server example

First complete all of the necessary steps on `hosta`, and then complete the installation on `hostb`.

The first three steps make the NFS `/opt/craysoft` file system available to `hostb`. The final steps create the `nqeinfo` configuration file for `hostb` and its NQE spool directory.

1. Log in to `hosta` as `root` (or set user to `root`).
2. Export the `/opt/craysoft` file system to `hostb` so that it has read and write access by adding the following line to the `/etc/exports` file:

```
/opt/craysoft -root=hostb
```

If you prefer read-only access, add the following line instead:

```
/opt/craysoft -ro,root=hostb
```

3. Export the file system by using the following command:

```
hosta# exportfs /opt/craysoft
```

4. Execute the `addnode` command. The `-e` option specifies that you are creating an execution server. The `-d` option provides the directory name on `hostb` to which NQE will write its database and spool directories. The `-r` option provides the name of the target root file system on `hostb`.

```
hosta# addnode -e -d /usr/spool/nqe -r /remote/opt hostb
```

Note: You must add the machine ID of `hostb` to the NQS database on `hosta` as described in subsection 9.1, page 45.

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To finish the installation on hostb, complete the following steps:

1. Log in to hostb as root (or set user to root).
2. Create the local mount point (if it does not already exist) by using the following command:

```
hostb# mkdir -p /remote/opt/craysoft
```

3. Mount the /opt/craysoft file system on hostb by using the following command:

```
hostb# /etc/mount hosta:/opt/craysoft /remote/opt/craysoft
```

4. Make the NQE binary files and scripts available for use by setting your PATH environment variable, as follows:

```
hostb# export PATH=/remote/opt/craysoft/nqe/bin:/remote/craysoft/nqe/etc:$PATH
```

5. Copy the license file from hosta (/usr/craysoft/license.dat) to the identical path name on hostb.
6. Bring up NQE locally by using the following command:

```
hostb# nqeinit
```

Note: You must add the machine ID of hosta to the NQS database on hostb as described in subsection 9.1, page 45.

Adding a client

8.1.1

In the following example, the configuration consists of AIX systems named hosta and hostc. hosta is a file server for hostc. hosta is an NQE master server, and you want to make hostc an NQE client system. NQE is installed on `hosta` in an NFS file system called `/opt/craysoft`. This file systems will be NFS cross-mounted on `hostc` as `/remote/opt/craysoft`.

Figure 7 illustrates the location of the NQE software on the two systems. The dashed line shows remote NFS files that `hostc` accesses from `hosta`.

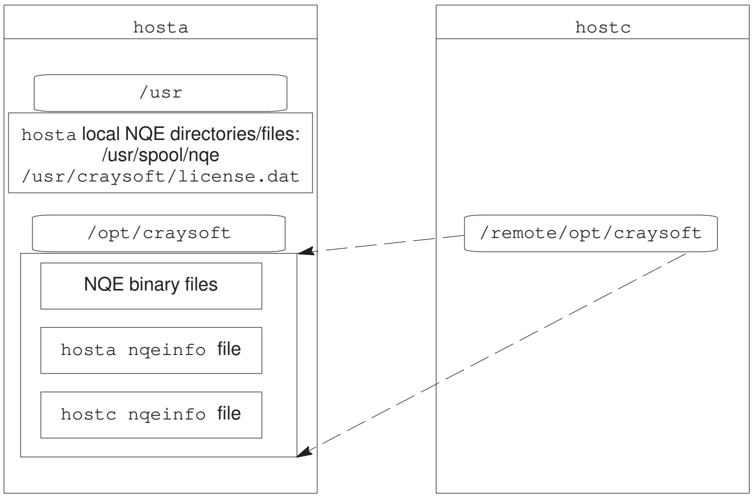


Figure 7. `addnode` client example

To cross-mount the NQE client on `hostc`, perform all of the necessary steps on `hosta`, and then complete the installation on `hostc`. To begin the installation on `hosta`, complete the following steps:

1. Log in to `hosta` as `root` (or set user to `root`).
2. Export the `/opt/craysoft` file system to `hostc` so that it has read and write access by adding the following line to the `/etc/exports` file:

```
/opt/craysoft -root=hostc
```

If you prefer read-only access, add the following line instead:

```
/opt/craysoft -ro,root=hostc
```

3. Export the file system by using the following command:

```
hosta# exportfs /opt/craysoft
```

To finish the installation on hostc, complete the following steps:

1. Log in to hostc as root (or set user to root).
2. Create the local mount point (if it does not already exist) by using the following command:

```
hostc# mkdir -p /remote/opt/craysoft
```

3. Mount the /opt/craysoft file system on hostc by using the following command:

```
hostc# /etc/mount hosta:/opt/craysoft /remote/opt/craysoft
```

4. Link the nqeinfo file on hosta to /etc/nqeinfo on hostc:

```
hostc# ln -s /remote/opt/craysoft/nqe/3.0/hosta/nqeinfo /etc/nqeinfo
```

Configuring Components [9]

This section describes how to configure specific NQE components.

Installing multiple NQS servers

9.1

If you are installing more than one NQS server (NQS servers are part of NQE master server and execution server software), you must add NQS machine identifiers (mids) to each NQS database. A *mid* identifies a specific NQS system in the batch complex; it is used for communication among NQS systems.

NQE clients do not need mids.

Each NQS server automatically generates its own mid, which is based on the host's TCP/IP address. The NQS server is aware of its own mid, but you must configure its database to include the other NQS server mids in your batch complex.

The following example explains how mids are added. If you have one NQE master server named `rain` and two NQE execution servers named `gust` and `wind`, all three NQS systems must define each other's mids.

On each system, you would use commands such as the following as input to the NQS `qmgr` utility (*xxx*`.site.com` is the fully qualified Internet address, which is optional):

```
$ cd /usr/craysoft/nqe/3.0/bin
$ ./qmgr
$ Qmgr:
$ Qmgr: add mid rain  rain.site.com
$ Qmgr: add mid gust  gust.site.com
$ Qmgr: add mid wind  wind.site.com
$ Qmgr: show mid
MID        PRINCIPAL NAME   AGENTS     ALIASES
--------   --------------   ------     -------
10642700   rain             nqs        rain.site.com
10642716   gust             nqs        gust.site.com
10642717   wind             nqe        wind.site.com
```

You would enter these commands on each NQS server system.

You do not enter the commands on client systems or issue `add mid` commands for client systems.

You must define all possible network routes as aliases.

You can enter a mid number you define (rather than using the system-generated mid), as in the following example:

```
Qmgr: add mid 12 rain rain.site.com
```

In this example, `rain` has a mid of `12`.

It is perhaps simpler not to define your own mid number. If you do not define a specific mid, NQE uses the low-order 31 bits of the Internet address for the specified host, taken from your system's `/etc/services` file. Because the mid is created automatically, you do not have to specify it when you enter the command line on any server in the complex.

Configuring FTA NPPA

9.2

You can use File Transfer Agent (FTA) network peer-to-peer authorization (NPPA) to authorize users to transfer files without transferring passwords across the network. NPPA can be used to authorize both batch and interactive file transfers. It uses the `ftua` and `rft` user commands on the local system and the `ftad` daemon on the remote system. NPPA only works if you have a flat user name space; that is, the user name of an FTA user must be the same on both systems.

The FTA domains `inet` and `nqe` are set up to use NPPA by default. You do not have to make changes to the FTA domain configuration to use NPPA in these domains.

> **Note:** For UNICOS systems running NQE 2.0 or earlier in your network, you cannot use `ftua` to connect to a UNICOS platform (whether it is a Cray Research system-to-Cray Research system or a workstation-to-Cray Research system) because UNICOS systems running the earlier versions of NQE do not support `ftad`. NQE version 3.0 running on UNICOS does support `ftad`.

Each system that is going to use NPPA must be configured with the authentication information that it will send to another system during session setup, and with the authentication information that it will expect to receive from other NPPA systems. This authentication information consists of an S-key (security key) and a password, both of which are alphanumeric strings. The first S-key and password pair defined on each system is designated as the primary S-key and password pair for that system.

When a user starts `ftua` or `rft` and uses a domain configured for NPPA, the system encrypts its primary S-key and password pair and sends it to the system with which it is attempting to establish a connection. The remote system performs a similar encryption for each S-key and password pair on its list of expected authorization information and accepts the connection when it finds a match.

To configure network peer-to-peer authorization, the administrator must establish the primary S-key and password pair for each system. These S-key and password pairs can be the same for all systems, or they may differ.

The first S-key set up on each system becomes the primary S-key, which is sent to remote systems during connection establishment. After defining the primary S-key on a system, the administrator adds all the S-key and password pairs for all the hosts that will be authorized to open NPPA connections to that system.

To configure network peer-to-peer authorization, you must assign S-keys on all systems (including NQE clients) that will use NPPA.

To assign S-keys, use the `skey -addkey` *keylabel* command, as follows:

```
# skey -addkey key1
Enter key password
Verification
```

Note: To add or delete S-keys, you must be `root`.

Alternatively, if FTA is running on the system, you also can use the `fta -addkey` command. The effect of the two commands is identical.

To display the keys on the system, use the `-showkey` option, as follows:

```
# skey -showkey

Keys on this system

 1) key1 -  Primary Key
```

To delete S-keys, use the `skey -delkey` *keylabel* command.

Section 9

Creating redundant master servers

9.3

Running redundant NQE master servers ensures that all of the execution servers can still communicate with a master server even if a network failure occurs.

When you install execution servers, specify all of the hosts on which you will run master servers so that collectors can send data to all Network Load Balancer (NLB) servers.

If you will use the NQE database and NQE scheduler, the NQE database server can be run on only one master server in the complex. Specify the name of this server in the configuration editor screen when you install the software, as described in subsection 5.7, page 29.

On NQE clients, you can set the `NLB_SERVER` environment variable to point to several hosts. The first host specified is the first one queried for information. For more information on setting environment variables, see *Introducing NQE*, publication IN–2153.

Warning: The job dependency feature does not provide synchronization of events over multiple master servers. If you will use job dependency and redundant master servers, you must read the information about job dependency in *NQE Administration*, publication SG–2150.

Solving Problems [10]

This section describes problems you may have with the installation and possible actions to correct the errors.

To obtain support for NQE, contact the Cray Research Customer Support center as described in subsection 10.8, page 61. Before you contact Customer Service, check all of the problems listed in this section. Keep a record of what you find as you go through this list.

The path names used in this subsection assume the default target root and NQE directory tree of `/usr/craysoft`. Your target root directory can be different than `/usr`.

10.1 Installation tool not functioning

If you receive the `cannot open display` message when you run the installation procedure, you must set your `DISPLAY` environment variable to point to the workstation you are using for the installation. For more information preparing for the installation, see subsection 5.1, page 21.

10.2 No `SERVER` or `DAEMON` lines in `license.dat`

If you have an unlimited user license for NQE, you do not need either `SERVER` or `DAEMON` records in your FLEXlm `license.dat` file, and you **must not** start any FLEXlm daemons. If you do try to start them, the command aborts with an error message. If you correctly place your `license.dat` file in `/usr/craysoft`, and your NQE master server can access this directory, execution servers, and clients, NQE will function correctly .

To determine whether you have a limited user license, check the `FEATURE` record that has `nqs_fl` as the second field. If the sixth field contains a nonzero value, you have a limited user license.

If you have a limited user license and you do not have `SERVER` or `DAEMON` records in your `license.dat` file, the file has been damaged in transit or

Section 10

was generated incorrectly. You should contact Cray Research Customer Service. Have available the TCP/IP host names of the systems on which you will run FLEXlm and the systems on which you have master and execution servers.

NQE components not running

10.3

To ensure that NQE components are running, complete the following steps:

- Ensure that the daemons are running as described in subsection 10.4, page 53.
- Determine whether the NLB server daemon is up and running by using the following command:

```
/usr/craysoft/nqe/bin/nlbconfig -ping
```

- Determine whether the nqsdaemon is up and running by using the following command:

```
/usr/craysoft/nqe/bin/qping -v
```

- Determine the systems that are candidates for accepting requests based on current NLB policies by using the following command:

```
/usr/craysoft/nqe/bin/nlbpolicy -p nqs
```

- Display load-balancing and NQS request information by selecting the `Load` button on the NQE GUI or by using the `cload`(1) command.
- Display information about queues by using the `cqstatl -f` command.
- Determine the status of your license server by using the following command:

```
lmstat -c /usr/craysoft/license.dat
```

If all of these steps display nonerror information, your NQE software is ready for use.

Daemons not running

10.4

To ensure that the daemons are running, complete the following steps:

1. Log in as `root`.
2. Depending on which `ps` command you have in your search path, use either the `ps -e` or `ps -aux` command. Some systems truncate the daemon names in your `ps` display.

If one or more of the daemons shown in Table 3, page 53, and Table 4, page 54, are not running, NQE is not operational. You should have received an error from the `nqeinit` script or have an error in the NQS `/usr/spool/nqe/log/nqslog` log file.

You also can check the license manager log files for any error information.

Table 3 describes the daemons on the master server:

Table 3. Master server daemons

Component	Daemons
Collector	`ccol`*NLBportnumber*
FLEXlm	`lmgrd` and `craysoftd`
FTA	`ftad` (when FTA NPPA transfers are active)
	`fta` (when any FTA transfers are active)
Load balancer	`nlbserver`
NQE database	`monitor`, `scheduler`, and `lws`
NQS	`logdaemon`, `netdaemon`, and `nqsdaemon`

Table 4 describes the daemons on the execution server.

Table 4. Execution server daemons

Component	Daemons
Collector	`ccol`*NLBportnumber*
FTA	`ftad` (when FTA NPPA transfers are active)
	`fta` (when any FTA transfers are active)
NQE database	`lws`
NQS	`logdaemon`, `netdaemon`, and `nqsdaemon`

If you have checked all of the problems described in subsection 10.3, page 52, and the NQE daemons still are not running, try the following steps:

- Ensure that you have added the necessary NQE port numbers to your `/etc/services` file. You may have already had these port numbers assigned to other daemons and not realized it. Or you may have made a typing error when you entered the information.
- Ensure that you have not installed an execution server when you meant to install a master server, or installed only client software. Client software contains only commands; it has no daemons.
- Check the `/usr/craysoft/nqe/3.0/`*host*`/nqeinfo` file for typing errors. This file records your choices during installation. The *host* is the TCP/IP host name of the machine on which you installed the software. Ensure that all of the information in this file is correct. If not, you should reinstall the software as described in subsection 10.7, page 61.

To ensure that NQE is running properly, try the following steps:

- Ensure that the `nqenlb` and `nqebatch` queues exist, are enabled, and are started on each execution server by using the NQE `cqstatl` command.

- Unless you have an unlimited user license, ensure that the license manager daemon `lmgrd` and the vendor daemon `craysoftd` are installed and running on each license server node by using the FLEXlm `lmstat -a` command.
- Ensure that TCP/IP is running between all NQE clients and servers by using the `telnet` and `ftp` commands between the client and server systems.
- Ensure that NQS validation is correct by checking that you have a valid account on all NQS servers and that the submitting user name matches the user name at the executing NQS server.

  Check that the submitting account has either a `.rhosts` or `.nqshosts` file in the home directory on each NQS server. Entries must have the format *hostname username* .
- Examine the NQS log file for any error messages. The NQS log file contains messages from the various NQS daemon processes, messages indicating successful completion of events, and messages indicating specific errors that may have occurred.

  To determine the NQS log file path name, use the following `qmgr` command:

  ```
  show parameters
  ```

  To increase the amount of information recorded in the log file, use the following `qmgr` command:

  ```
  set message_types on all
  ```

FLEXlm man pages not accessible

10.5

FLEXlm commands that let you administer the software; FLEXlm commands are documented on man pages that are provided with the NQE product. (For the NQE file structure, see Figure 13, page 90.) To view FLEXlm man pages, ensure that /*target_root* `/craysoft/flexlm/man` is included in your `MANPATH`.

Errors in using client commands

10.6

This subsection lists some possible problems and solutions you may have in using NQE client commands.

Commands do not execute

10.6.1

Before you can use the NQE commands, you must add the NQE `bin` and `etc` directories to your search path. Before you can use the man pages (which tell you about the NQE commands and command options), you must add the NQE `man` directories to your search path. For a description of how to set these variables, see *Introducing NQE*, publication IN–2153.

`ctoken generation failure` messages

10.6.2

If you submit requests by using the `cqsub` command and receive `ctoken generation failure` messages in the NQS log, it indicates that NQS tried to use FTA to deliver output files and did not find a user-supplied password, a `.netrc` file, or an NPPA S-key. The log also contains a message that the FTA transfer failed.

When NQS returns output, it tries to use FTA. FTA checks first for a user-supplied password on the `cqsub` command. (To determine the syntax used to specify the FTA password, see the description of the `-e` option on the `cqsub` (1) man page.)

If no password was supplied, FTA will try to send the output to the host and user (with an associated password) by using the user's `.netrc` file on the NQS execution host. If no `.netrc` file exists, FTA will try to send the file by using NPPA. If you have not defined S-keys as described in subsection 9.2, page 47, you will receive `ctoken generation failure` messages.

NQS will then try to return the output by using `rcp`.

You can ensure that you do not receive the messages by any of the following methods:

- Ensure that users supply a password on the `cqsub` command line.

- Ensure that users have a `.netrc` file on the NQS execution host that contains an entry for the destination host and user name and an associated password.
- Configure NPPA as described in subsection 9.2, page 47.
- Change the configuration of the FTA default `inet` domain so that the `nopassword` flag is not set. *NQE Administration*, publication SG–2150, describes how to make changes to the FTA configuration.

10.6.3 `Connection failed` messages

If you receive `connection failed` messages, ensure that your `NQS_SERVER` environment variable is set to a host that is running an NQS server . You do not have to specify the host port number unless the NQS server is configured with a NQS port that is different from the default provided during installation (which is 607).

If a transient network error condition exists that allows the connection to be retried, you will receive messages such as the following:

```
Retrying connection to NQS_SERVER on host ice (127.111.21.90) . . .
Retrying connection to NQS_SERVER on host ice (127.111.21.90) . . .
QUESRV:  ERROR:  Failed to connect to NQS_SERVER at ice [port 607]
NETWORK:  ERROR:  NQS network daemon not responding
```

These messages indicate that the command received a `connection refused` error from the `connect()` system call or that an address it is trying to use is temporarily in use. This could be true, for example, because the server is just coming up, is not listening, or the network is busy. NQS retries its connection to the server for 30 seconds.

10.6.4 `cload` display fails

If your `cload` display fails, ensure that your `NLB_SERVER` environment variable is set to a host that is running an NLB server. You do not have to specify the host port number unless the NLB server is configured with a

NLB port that is different from the default provided during installation (which is 604).

`Authorization failure` messages

10.6.5

The default validation type in NQS is file validation. File validation requires a `.rhosts` (or `.nqshosts`) file in the home directory of your account on all of the NQS server systems on which your request may run. This applies even if your target NQS server is your local machine.

For summary information about validation files, see *Introducing NQE*, publication IN–2153. For a complete description, see the *NQE User's Guide*, publication SG–2148. To access these manuals online, use the `cdoc`(1) command.

If you encounter authorization failure messages, consider these alternatives:

- A `.rhosts` (or `.nqshosts`) file may not exist for the user name under which the request will run. This may be the case if the `$HOME` environment variable points to a location that does not have these files.
- The proper *hostname-username* pair is not contained in a validation file. When the `.nqshosts` file exists, NQS ignores the `.rhosts` file.

Requests seem lost

10.6.6

If you cannot locate your request, try the following options:

- Check to see whether NQS sent you a mail message. This message may help you to determine the cause of the problem.
- In the NQE GUI, display all of your requests in NQS batch queues in the complex by using the left mouse button to click on the `Status` button.
- Perhaps the request has completed. Check for the standard output and standard error files that the request produced. Unless you specified a different location for these files, they should be in the directory from which you submitted your request.

If you used an alternative user name, try the home directory of the user name you used to submit the request.

Check your home directory on the NQS server at which your request executed.

For more information about locating output, see subsection 10.6.8, page 59.

Requests seem to be stuck

10.6.7

If the request seems to be sitting in a queue and not executing, access the NQE GUI. Using the left mouse button, click on the `Status` button to display the list of your requests. Using the left mouse button, double-click on the request name in question to display its detailed status.

Two common status subcodes you may see are as follows:

- Destination unavailable, which means NQE is trying to send the request to another destination but that host is not available. If no available batch queues match the NQS policy, your request waits until a matching batch queue is available.
- License unavailable, which means the request is waiting for a license. Either the license manager is not running, or all licenses are currently checked out.

Cannot locate output

10.6.8

If you do not specify another location, by default, NQS will place your output files in the directory you were in when you submitted the request. If the files are not where you expected them to be, you should have mail from NQS telling you where it sent your output.

Check your home directory on the NQS server at which your request executed. If you used an alternative user name, try the home directory of the user name you used to submit the request.

NQS tries the following methods to return your output to you:

1. NQS tries to send the output over an NQS protocol.

2. NQS tries to use FTA as described in subsection 10.6.2, page 56.
3. NQS tries to use `rcp`, which works if you have a `.rhosts` entry for the execution server on your submitting system.
4. NQS sends you mail stating that it could not deliver your output to its first destination. It places your output in your home directory on the server that executed your request.
5. If for some reason NQS cannot write to your home directory on the server that executed your request (for example, if the permissions on your home directory are `r-xr-xr-x`), it writes the output to the `$NQE_NQS_SPOOL/private/root/failed` directory.

10.6.9 `Non-secure network port` messages

NQE clients are installed with set UID (`suid`), are owned by `root`, and use secure ports. This means that clients that use any previous NQE release are rejected if they try to connect to another release level of NQE server. The following messages are displayed:

```
QUESRV: ERROR: Failed to retrieve status information
QUESRV: ERROR: Non-secure network port verification error at
transaction peer
QUESRV: ERROR: Received response NONSECPORT (01462) for
transaction NPK_QSTAT
```

If you receive these messages, you should upgrade your client software.

10.6.10 NQS seems to be running slowly

If NQS appears to be running slowly, you may need to edit the `/etc/hosts` file.

Because NQS supports networks of machines, it uses the `gethostbyname` system call to get the host information for a request. The implementation makes calls to this routine while processing all requests, including requests that are submitted on a local machine for execution on the local machine.

The gethostbyname system call looks up the host name by doing a sequential search of the /etc/hosts.bin binary file (or the text version /etc/hosts if the binary file does not exist).

The bigger the host file, and the further down in the file the local machine name appears, the longer it will take for the system call to complete, and the longer the nqsdaemon will take to process requests.

To solve this problem, edit the /etc/hosts file so that the local machine appears at the top of the file, then use the mkbinhost file to make a new copy of the binary /etc/host.bin file.

Reinstalling the software

10.7

If you want to reinstall the software, complete the following steps:

1. Stop all NQE daemons by using the nqestop(8) command. If this does not stop all of them, or does not work, you can use the kill −9 command to stop them. You also must stop the license manager daemons by using the lmdown −c /usr/craysoft/license.dat command (or /opt/craysoft/license.dat for Solaris systems).
2. Delete the /usr/craysoft and /usr/spool/nqe directory trees (or the /opt/craysoft and /opt/spool/nqe directory trees for Solaris systems) and all files underneath them.
3. Reinstall the software as described in section 5, page 21.

Calling Customer Service

10.8

To obtain support for NQE, contact Cray Research Customer Service. The cs_support(7) man page and the Service and Support card included in the CraySoft package list telephone numbers and electronic mail addresses for Customer Service.

You also can send a facsimile (fax) to 404–631–2226. To obtain service, you must have your CraySoft product customer number.

Before you call Customer Service, have the following information ready to help with your problem:

- The exact error messages and unexpected behavior you are seeing.
- The `ps` displays of all daemons that are running on the systems with which you are having problems.
- A list of NQE binary files, their paths, their protections, and sizes.
- The `qstat -f` output from all queues in the batch complex.
- Hardware platforms, model numbers, system software levels, and additional software patches applied to your NQE platforms.
- Accounting information, if any, about the exit status of any daemons or commands aborting (such as copies of the corresponding NQE log file and any error messages sent to the user).

Mounting/Unmounting CD-ROMs [A]

This appendix provides system-specific information on mounting and unmounting CD-ROMs. Examples of the following topics are provided:

- Mounting CD-ROMs in the drive
- Unmounting (ejecting) CD-ROMs
- Exporting and mounting CD-ROM file systems over NFS

Mounting local CD-ROMs

A.1

The following subsections provide examples of how to mount CD-ROMs on NQE systems.

AIX systems

A.1.1

The following steps mount a CD-ROM from `/dev/cd0` onto mount point `/usr/cdrom`:

1. Create the mount point if it does not exist:

   ```
   mkdir /usr/cdrom
   ```

2. Use the `mount` command to mount the device:

   ```
   mount -v cdrfs -o ro /dev/cd0 /usr/cdrom
   ```

To simplify the `mount` command, add the relevant information to the `/etc/filesystems` file. In this example, you would add the following:

```
/usr/cdrom:
  dev       = /dev/cd0
  vfs       = cdrfs
  mount     = false
  options   = ro
  account   = false
```

If you add this information to the file, the following command mounts the CD-ROM:

```
mount /usr/cdrom
```

HP-UX systems
A.1.2

The following steps mount a CD-ROM drive connected as device 2 on SCSI controller 0 (device `/dev/dsk/c201d2s0`) onto mount point `/usr/cdrom`.

1. Create the mount point if it does not exist:

   ```
   mkdir /usr/cdrom
   ```

2. Use the `mount`(1M) command to mount the device:

   ```
   mount -t cdfs -o ro /dev/dsk/c201d2s0 /usr/cdrom
   ```

This example is taken from a series 700 workstation with a CD-ROM drive configured at SCSI target 2. Other HP-UX systems may require different device entries.

To simplify the `mount` command, add the relevant information to the `/etc/checklist` file. In this example, you would add the following:

```
/dev/dsk/c201d2s0 /usr/cdrom cdfs ro 0 0 0
```

If you add this information to the file, the following command mounts the CD-ROM:

```
mount /usr/cdrom
```

IRIX systems

A.1.3

IRIX provides the `mediad`(1M) daemon that monitors the removable media devices on a system. For examples on configuring the daemon to monitor CD-ROM devices and mount the media automatically, see the `mediad`(1M) man page.

> **Note:** When mounting a CD-ROM on an SGI system, you must specify the `notranslate` option on the `mount`(1M) command. If you omit this option, directory names will be translated into lowercase and the NQE software will not load properly.

By default, `mediad` runs and mounts CD-ROM media on the `/CDROM` file system, but if it has been disabled, the following steps manually mount a CD-ROM drive connected as device 4 on SCSI controller 0.

1. Create the mount point if it does not exist:

```
mkdir /usr/cdrom
```

2. Use the `mount`(1M) command to mount the device:

```
mount -t iso9660 -o notranslate,ro /dev/scsi/sc0d4l0 /usr/cdrom
```

`eoe2.sw.cdrom` must be installed in order to use the `iso9660` file system type.

To simplify the `mount` command, add the relevant information to the `/etc/fstab` file. In this example, you would add the following:

```
/dev/scsi/sc0d4l0  /usr/cdrom  iso9660  notranslate,ro  0  0
```

If you add this information to the file, the following command mounts the CD-ROM:

```
mount /usr/cdrom
```

DEC OSF/1 systems
A.1.4

The following steps mount a CD-ROM from device `/dev/rz4c` onto mount point `/usr/cdrom`.

1. Create the mount point if it does not exist:

```
mkdir /usr/cdrom
```

2. Use the `mount`(1M) command to mount the device:

```
mount -t cdfs -o ro,nodefperm /dev/rz4c /usr/cdrom
```

To simplify the `mount` command, add the relevant information to the `/etc/fstab` file. In this example, you would add the following:

```
/dev/rz4c  /usr/cdrom  cdfs  ro,nodefperm  0  0
```

If you add this information to the file, the following command mounts the CD-ROM:

```
mount /usr/cdrom
```

Solaris systems
A.1.5

On Solaris systems, the Volume Management daemon, `vold`(1M), automatically mounts the CD-ROM when it is inserted at mount point `/cdrom/cdrom0`. Mount commands are not necessary. After you insert the CD-ROM, you can access it by using the `/cdrom/cdrom0` mount point.

By default, `vold`(1M) runs, but if it has been disabled, the following steps mount a CD-ROM drive connected as device 6 on SCSI controller 0.

1. Create the mount point if it does not exist:

```
mkdir /usr/cdrom
```

2. Use the `mount`(1M) command to mount the device:

```
mount -F hsfs -o ro /dev/dsk/c0t6d0s0 /usr/cdrom
```

If `vold`(1M) is not running on your system, consult the `hsfs`(7) and `mount`(1M) man pages for further information on mounting the CD-ROM.

To simplify the `mount` command, add the relevant information to the `/etc/vfstab` file. In this example, you would add the following:

```
/dev/dsk/c0t6d0s0  /dev/rdsk/c0t6d0s0  /usr/cdrom  hsfs  -  no  ro
```

If you add this information to the file, the following command mounts the CD-ROM:

```
mount /usr/cdrom
```

SunOS systems

A.1.6

On SunOS systems, the Volume Management daemon, `vold`(1M), automatically mounts the CD-ROM when it is inserted at mount point `/cdrom/cdrom0`. Mount commands are not necessary. After you insert the CD-ROM, you can access it by using the `/cdrom/cdrom0` mount point.

By default, `vold`(1M) runs, but if it has been disabled, the following steps mount a CD-ROM drive connected as device 6 on SCSI controller 0:

1. Create the mount point if it does not exist:

```
mkdir /usr/cdrom
```

2. Use the `mount`(1M) command to mount the device:

```
mount -t hsfs -o ro /dev/sd6a /usr/cdrom
```

If `vold`(1M) is not running on your system, consult the `mount`(1M) and `fstab`(5) man pages for further information on mounting the CD-ROM.

Unmounting (ejecting) local CD-ROMs

A.2

The following subsections provide examples of how to unmount CD-ROMs on NQE systems.

AIX systems

A.2.1

To eject the CD-ROM media, use the `umount`(1M) command to unmount the media:

```
umount /usr/cdrom
```

After you have issued the command, press the eject button on the drive. The CD-ROM will not eject until you unmount the media.

HP-UX systems

A.2.2

To eject the CD-ROM media, use the `umount`(1M) command to unmount the media:

```
umount /usr/cdrom
```

After you have issued the command, press the eject button on the drive. The CD-ROM will not eject until you unmount the media

IRIX systems

A.2.3

To eject a CD-ROM, floppy disk, or tape, use the `eject`(1) command. If the floppy disk or CD-ROM is mounted, `eject`(1) will try to unmount it before it ejects the media.

You also can eject the media manually by pressing the eject button on the drive after you unmount the media.

DEC OSF/1 systems

A.2.4

To eject the CD-ROM media, use the umount(1M) command to unmount the media:

```
umount /usr/cdrom
```

After you have issued the command, press the eject button on the drive. The CD-ROM will not eject until you unmount the media

Solaris systems

A.2.5

To eject a CD-ROM, floppy disk, or tape, use the eject(1) command. If the floppy disk or CD-ROM is mounted, eject(1) will try to unmount it before it ejects the media.

You also can eject the media manually by pressing the eject button on the drive after you unmount the media.

SunOS systems

A.2.6

To eject a CD-ROM, floppy disk, or tape, use the eject(1) command. If the floppy disk or CD-ROM is mounted, eject(1) will try to unmount it before it ejects the media.

You also can eject the media manually by pressing the eject button on the drive after you unmount the media.

Exporting and mounting CD-ROMs over NFS

A.3

Sometimes it may be desirable to install the NQE software on a system that does not have a CD-ROM drive. To do this, you can mount the CD-ROM on a system that has a CD-ROM drive and use NFS to export the CD-ROM file system to the system without the CD-ROM drive. Sharing the CD-ROM (reusing the CD-ROM media) involves the following:

- NFS exporting and mounting of the CD-ROM file system
- Running the installation tool as described in section 5, page 21

You must mount the file system to allow set UID (suid) execution. This is done on the origin (mounting) host (the NFS client) either in the mount command or in the automounter map files (if you are using automount).

Exporting file systems

A.3.1

To make a mounted CD-ROM file system available to other workstations, you first must verify that at least one nfsd(1M or 8) daemon is running on the NFS server. The nfsd daemon runs on a server machine to service NFS requests from client machines. The NFS load on your NFS server will dictate the number of nfsd daemons required on that host, but at least one nfsd daemon must be running to export file systems over NFS.

Different systems have different procedures for exporting file systems. The following subsections describe how it is accomplished on supported NQE platforms.

Exporting on AIX, HP-UX, IRIX, and SunOS

A.3.1.1

On AIX, HP-UX, IRIX, and SunOS platforms, file systems are exported by editing the /etc/exports file and then by executing the exportfs command. Consult the man pages for the following systems:

Platform	Man pages
AIX, HP-UX, and IRIX	exports(4), exportfs(1M), and showmount(1M)
SunOS	exports(5), exportfs(8), and showmount(8)

The following procedure demonstrates how to export the local file system /usr/cdrom from host hosta to hosts hostb and hostc.

1. Edit /etc/exports. Its contents in this example would include the following line:

```
/usr/cdrom hostb:hostc
```

2. Export the new file system, as follows:

```
# exportfs /usr/cdrom
```

3. Verify that the file system is exported by examining the /etc/xtab file. The showmount command displays only the name of the exported file system, not the options with which it was exported, as shown in the following example:

```
# cat /etc/xtab
/usr/cdrom hostb:hostc
# showmount –e hosta
/usr/cdrom
```

Exporting on OSF/1
A.3.1.2

On OSF/1 platforms, file systems are exported by editing the /etc/exports file and then by executing the mountd(8) command. Man pages for exports(4) and mountd(8) are available.

The following procedure demonstrates how to export the local file system /usr/cdrom from host hostd to hosts hostb and hostc.

1. Edit /etc/exports. Its contents in this example would include the following line:

```
/usr/cdrom hostb hostc
```

The list of host names is separated by white space, not with commas or colons.

2. Export the new file system, as follows:

```
# exportfs /usr/cdrom
```

3. Verify that the file system is exported. Because no /etc/xtab file exists, use the showmount(8) command, as follows (the options are not visible):

```
# showmount -e hostd
Exports list on hostd:
usr/cdrom        hostb,hostc
```

Exporting on Solaris
A.3.1.3

On Solaris platforms, file systems are exported by editing the /etc/dfs/dfstab file and then by executing the share or shareall(1M) command. Man pages for share(1M), shareall(1M), showmount(1M), and dfstab(4) are available. The dfstab file contains share(1M) commands for automatic execution when the system boots and goes into multiuser mode.

The following procedure demonstrates how to export local file system /usr/cdrom from host hostc to hosts hostb and hosta.

1. Edit /etc/dfs/dfstab. Its contents in this example would include the following line:

```
share -F nfs -o hostb:hosta /usr/cdrom
```

2. Export the new file system by executing either the share or shareall command:

```
# shareall
```

3. Verify that the file system is exported either by examining the /etc/dfs/sharetab file or by executing the showmount(1M) command.

Mounting file systems
A.3.2

All of the supported NQE workstation platforms allow set UID (`suid`) execution on NFS-mounted file systems by default, which lets you set the user ID on execution of set UID executable files. If a file system is mounted `nosuid`, it will not allow execution of set UID programs by way of that mount.

The following procedure demonstrates how to mount the remote file system `/usr/cdrom` from host `hosta` on host `hostb` at `/tmp/cdrom` with set UID execution allowed.

1. Create the local mount point, as follows:

```
# mkdir -p /tmp/cdrom
```

2. Execute the `mount` command.

   Options must precede the remote file system name and the local mount point name, as follows:

```
# mount -o suid hosta:/usr/cdrom /tmp/cdrom
```

   The `-o suid` option is not required, because this is the default on all supported workstation platforms.

   On AIX platforms, you must specify the target host, the local directory, and the target directory, as follows:

```
# mount -n target_host /usr/craysoft /tmp/craysoft
```

The default information for file systems (both local and remote) resides in different places on different systems, as shown in Table 5. For more information on configuring the appropriate files, see the system-specific man pages and documentation.

Table 5. File system information

Platform	File	Man page
AIX	`/etc/filesystems`	`filesystems`(4)
HP-UX	`/etc/checklist`	`checklist`(4)
IRIX	`/etc/fstab`	`fstab`(4)
OSF/1	`/etc/fstab`	`fstab`(4)
Solaris	`/etc/vfstab`	`vfstab`(4)
SunOS	`/etc/fstab`	`fstab`(5)

After you have exported and mounted the CD-ROM file system, install the software on the target host as described in section 5, page 21.

NQE Configuration [B]

This section introduces the concepts of NQE configuration for NQE administrators and discusses the following topics:

- NQE servers and clients
- Execution server complex (batch complex) configuration
- NQS queue structure
- NQE database and scheduler structure

NQE servers and clients

B.1

NQE consists of a network of servers and clients. The initial configuration of NQE contains the following types of machines:

- NQE *master servers* contain all NQE components. To distribute work among all NQE execution servers, a master server runs an NLB server; it also runs the NQE database and the NQE scheduler. A master server also contains all of the software that clients and execution servers contain, and they can function as execution servers in your execution server complex. Only one NQE master server is required in an execution server complex, although there may be more.

  Optionally , you can use the NQE scheduler and NQE database rather than the NLB to schedule work. This option lets users submit requests to a central storage database to be analyzed by the scheduler and submitted to NQS. Only one master server in the complex will run the NQE database server.

- NQE *execution servers* contain NQE client software. In addition, they also contain the NQS, FTA, NLB collectors, and the NQE database lightweight server (LWS). These additional components have the following functions:
  - NQS schedules and initiates batch requests.
  - FTA transfers files.
  - NLB collectors collect and communicate system load information to the NLB server so that the NLB can provide NQS with a list of servers, in order of preference, to run a request and provide status information upon request.
  - The LWS obtains request information from the NQE database, verifies validation, submits the copy of a request to NQS, and obtains exit status of completed requests from NQS.
- NQE *clients* contain software so users may submit, monitor, and control requests by using either the NQE graphical user interface (GUI) or the command-line interface. From clients, users also may monitor request status, delete or signal requests, monitor machine load, and receive request output using the FTA.

Figure 8 shows the NQE components that reside on each type of machine.

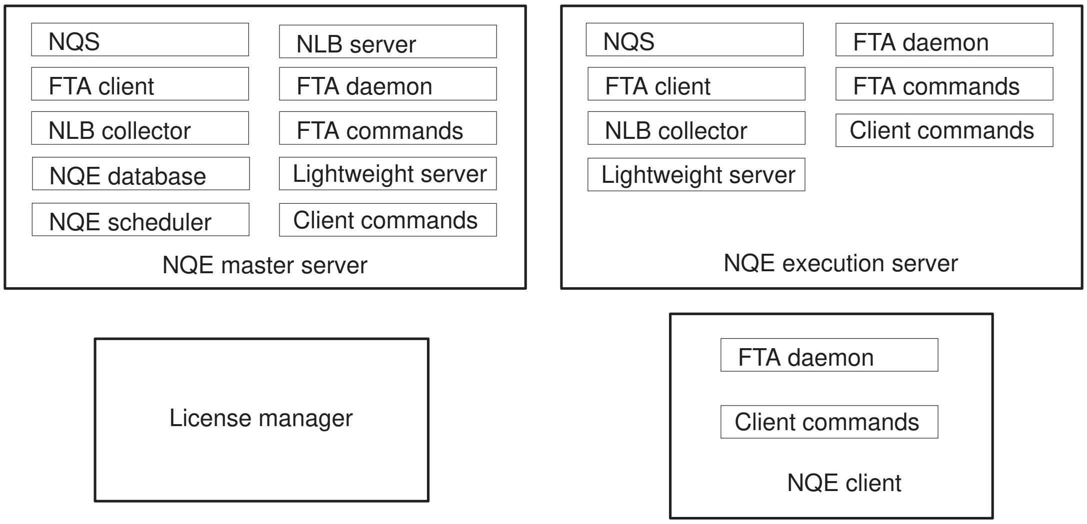


Figure 8. NQE software component location

NQE uses the FLEXlm *license manager* to license the product. Before you can run NQE, a license manager must be installed and running. The license manager can run on any server or on another (nonserver) host.

The NLB collector is run on all NQE execution servers to collect the following:

- NQS request status data
- Host load information for destination selection

The collector is configured by default to report the system batch queue as `nqebatch@`*hostname* and to send information to the NLB server on the NQE master server.

Batch complex configuration

B.2

This subsection describes NQE networks and gives you information about selecting servers. You can expand the examples to suit the needs of your particular network.

Simple network

B.2.1

A *simple network* has one server to execute batch requests and has some clients, as shown in Figure 8.

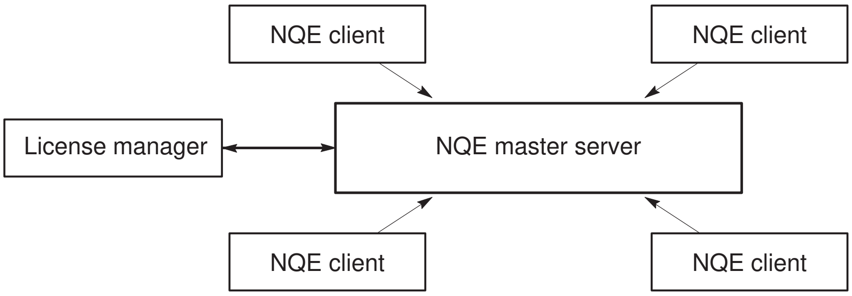


Figure 9. Simple NQE network

NQE load-balanced network

B.2.2

An *NQE load-balanced network* has one NQE master server, multiple NQE execution servers, and multiple clients, as shown in Figure 10. Clients submit work to an NQE load-balancing queue on any server. In this network, requests are sent to any server in an NQE batch complex. To set up a quorum, the license manager is placed on each server.

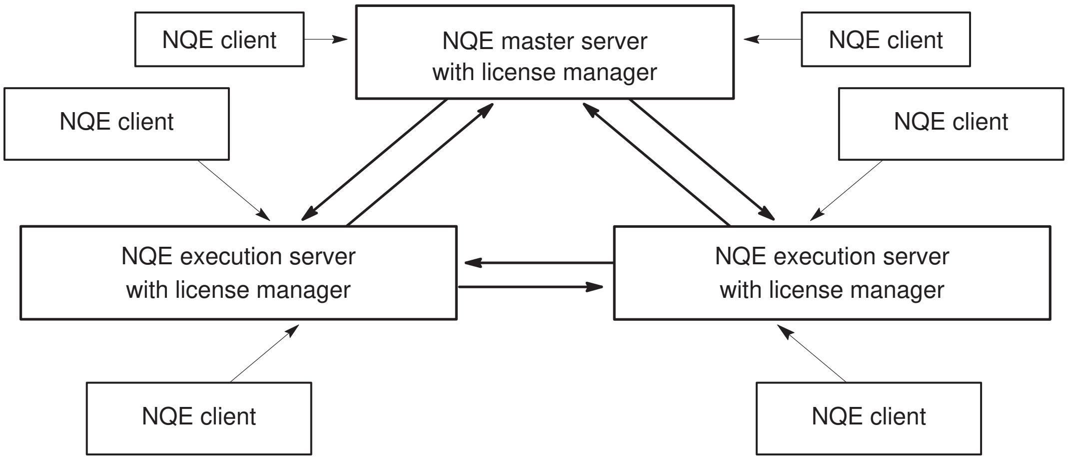


Figure 10. NQE load-balanced network

NQE scheduler network
B.2.3

An *NQE scheduler network* has one NQE master server, multiple NQE execution servers, and multiple clients, and is in this sense the same as the load-balanced network shown in Figure 10. The difference between the two networks is how work is scheduled, as described in subsection B.4, page 83.

Server considerations
B.2.4

The following types of NQE machines can exist in the batch complex:

- At least one NQE master server for the NQE batch complex that has high availability . The NLB load-balancing server and NQE database server runs on this machine.
- Typically , additional NQE execution servers exist that have sufficient CPU cycles to be used for executing batch requests. However, in a simple network, this might be the same host as the master server.

- Typically, many workstations are designated as NQE clients, which do not provide batch execution cycles to the NQE batch complex.
- At least one FLEXlm license server must be running. For more information on how licensing affects access to NQE services, see appendix C, page 85.

Load-balancing policies

B.2.5

NQE comes configured with a default NQS load-balancing policy that assumes all of your execution servers are of similar speed and that you want requests sent to the system that has the lowest CPU load. You can alter this policy or create others to suit your needs. For example, you could create policies that weigh and normalize differences in system CPU, or you could create policies that define sets of systems with important characteristics (some systems might run a given application, some systems might be for compiling, and so on). *NQE Administration*, publication SG–2150, describes how to define and implement load-balancing policies.

NQE scheduler and NQE database options

B.2.6

In certain environments, it is not sufficient to choose a destination for a request by using NLB policies. For example, you may want to wait to send requests to a machine until its idle CPU is greater than 90%, or you may want to allow only one request per user on one machine.

In such cases, you can use the NQE scheduler and NQE database. For a summary of how the NQE scheduler and NQE database are structured, see subsection B.4, page 83. For more information, see *NQE Administration*, publication SG–2150.

NQS queue structure

B.3

NQS supports two types of queues: *batch* queues, which initiate requests, and *pipe* queues, which route work to appropriate destinations for execution or further routing. A *destination selection* queue is a pipe queue that uses load-balancing to route requests. These pipe queues are associated with policies.

When requests enter a destination-selection queue, NQS queries the NLB for a list of destinations. The list is ordered based on the policy. When multiple destinations fit the policy, NQS tries the first destination. If for some reason the first destination cannot accept the request, NQS tries the second, and so on.

When you submit a request, NQS places it in the default queue unless you specify otherwise. NQE is shipped with the following queues configured:

- The destination-selection queue `nqenlb`, which is the default for request submission.
- The batch queue `nqebatch`, which handles local batch request submissions and accepts requests from other destination-selection queues in the complex.

This configuration uses the NLB to send requests to the most appropriate system, based on an NLB policy. The default NLB policy, called `nqs`, sends batch requests to the system that has the lowest CPU load.

If users submit requests to the `nqebatch` queue, the request runs on the local NQS execution server.

Part of the configuration process is to define these queues and to interconnect the different instances of NQS to form the NQE complex.

The `NQS_SERVER` environment variable points to the NQS server that handles NQE request submission. If you want your request run on another NQS server explicitly, you can change the `NQS_SERVER` environment variable to point to another host running NQS. You must have access to an account on this host and must have set up NQS validation as described in *Introducing NQE*, publication IN–2153.

Figure 11, page 82, shows how the default NQE configuration would look in a network that had one NQE master server and two NQE execution servers. The `nqebatch` queue on each NQS system is configured by default to allow no more than six requests to run at one time and to allow no more than two requests from a user to run at one time. If the queue is full (running the predefined number of requests), requests wait in the `nqebatch` queue until an opening occurs, or until the queue limits are changed.

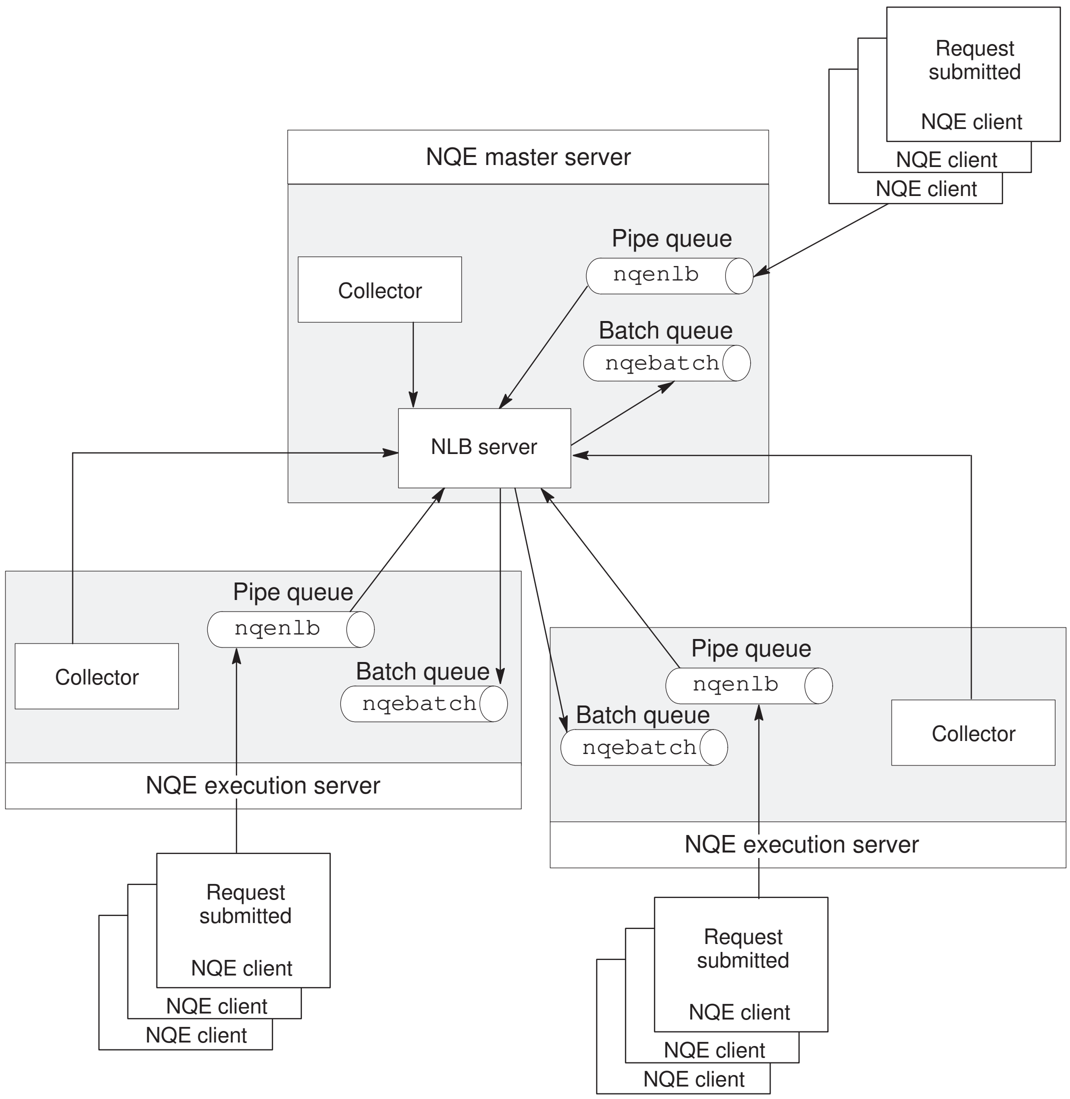


Figure 11. Default NQE queue structure

NQE database and scheduler structure

B.4

The NQE database and NQE scheduler let clients submit work to the NQE central storage database on the master server. The scheduler analyzes the requests in the database and selects when and on which NQE execution server the request will run.

The NQE scheduler and database components are shown in Figure 12.

The database server system task serves connections from clients (either locally or in the network) to access data in the database.

The monitor system task monitors the state of the databases and which system tasks are connected.

The scheduler application analyzes data in the database and makes scheduling decisions.

The light-weight server (LWS) system task obtains request information from the database, checks authorization files locally, submits request to NQS, and obtains their exit status.

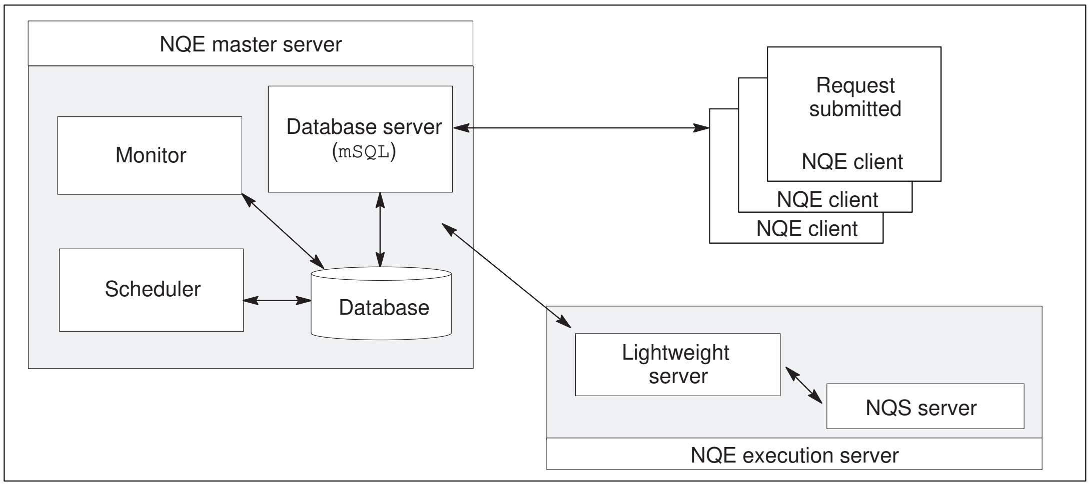


Figure 12. NQE database and NQE scheduler components

Licensing Process [C]

NQE uses FLEXlm licenses to implement its license policy. By understanding the goals and implementation of this policy, you can decide how many licenses you need for your users. You can obtain license keys from Cray Research Customer Service, as described in the NQE licensing ordering instructions shipped with the NQE package.

The following are the goals of the CraySoft NQE license strategy:

- Allow users easy access to NQE client commands, checking out licenses only when these client commands are actually used.
- Allow customers to purchase and add more licenses easily.

When NQE master servers and execution servers start up, they check out a node-specific (called a *node-locked*) license. The FTA client process is referred to as `fta_nl` in the license file. The NQS server, NQS daemon, NQE collector, and NQE scheduler processes are referred to as `nqs_nl` in the license file.

Each time a request is scheduled to run, a *floating license* is checked out by the execution server on behalf of the user who submitted the request. This license is referred to as `nqs_fl` in the license file.

Appendix C

Licensing process example

C.1

The following example shows how licensing works.

When `jane` on the NQE client `palm01` submits a request to her local NQS server `palm`, the request either executes on `palm` or goes to another NQS server . If it executes on `palm`, the NQS server on `palm` checks out a floating license for `jane` from `palm01` just before execution. If all licenses are in use, her request waits in a “queued for license” state. This is logged in the NQS log file; on the NQE GUI status display the substatus code is `lm`.

When `jane` on `palm01` obtains a license, she keeps it until the request has completed execution. After the request has completed, the license is checked back in and available for use.

Although not all client commands cause licenses to be checked out in NQE 3.0, Cray Research may, in a later release, also begin licensing these client commands.

Running redundant licensing servers

C.2 If your network has multiple execution servers, you may want to consider running a set of three license servers to ensure the availability of your licenses if a system failure occurs. You must decide which hosts you want to use as license servers. These do not have to be the same hosts as the NQE servers, but they can be.

You provide the names of these license servers to the customer service representative when you obtain your license, and they are included in your license file.

The three license servers issue licenses as a *quorum* , which is a strict majority of the servers listed in the license file. In a three-server configuration, the quorum lets you lose one of the servers (for instance, because of a network failure) and still grant licenses. If two servers go down, no licenses are granted until one of the servers that is down reestablishes communication with the server that is up.

For example, you might have a redundant server configuration that runs the FLEXlm daemons on the hosts `host5`, `host2`, and `host6`. Only host

`host2` is an NQE server. The resulting `license.dat` file would look like the following file:

```
# add_checksum: using license file ”/tmp/license.dat”
# ++++ Start of the license file >>>>
#>
SERVER host5 HOSTNAME=host5 7169
SERVER host2 HOSTNAME=host2 7169
SERVER host6 HOSTNAME=host6 7169
DAEMON craysoftd /usr/bin
FEATURE nqs_fl craysoftd 3.000 1-Jan-00 50 DB5850A675BC94CECA3A ”nqs_connections” ANY
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host1
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host1
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host2
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host2
FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host3
FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host3
#<
# ---- <<<< end of the license file
# Checksum info
#
# 147: SERVER host5 HOSTNAME=host5 7169
# 147: SERVER host2 HOSTNAME=host2 7169

# 147: SERVER host6 HOSTNAME=host6 7169
# 210: DAEMON craysoftd /usr/bin
# 149: FEATURE nqs_fl craysoftd 3.000 1-Jan-00 50 DB5850A675BC94CECA3A ”nqs_connections” ANY
# 155: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host1
# 117: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host1
# 156: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host2
# 118: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host2
# 157: FEATURE nqs_nl craysoftd 3.000 1-Jan-00 0 1B4860351E2C7D802026 ”nqs_server” HOSTNAME=host3
# 119: FEATURE fta_nl craysoftd 3.000 1-Jan-00 0 6BA380D56B2A0518C534 ”fta_client” HOSTNAME=host3
#  91: (overall file checksum)
```

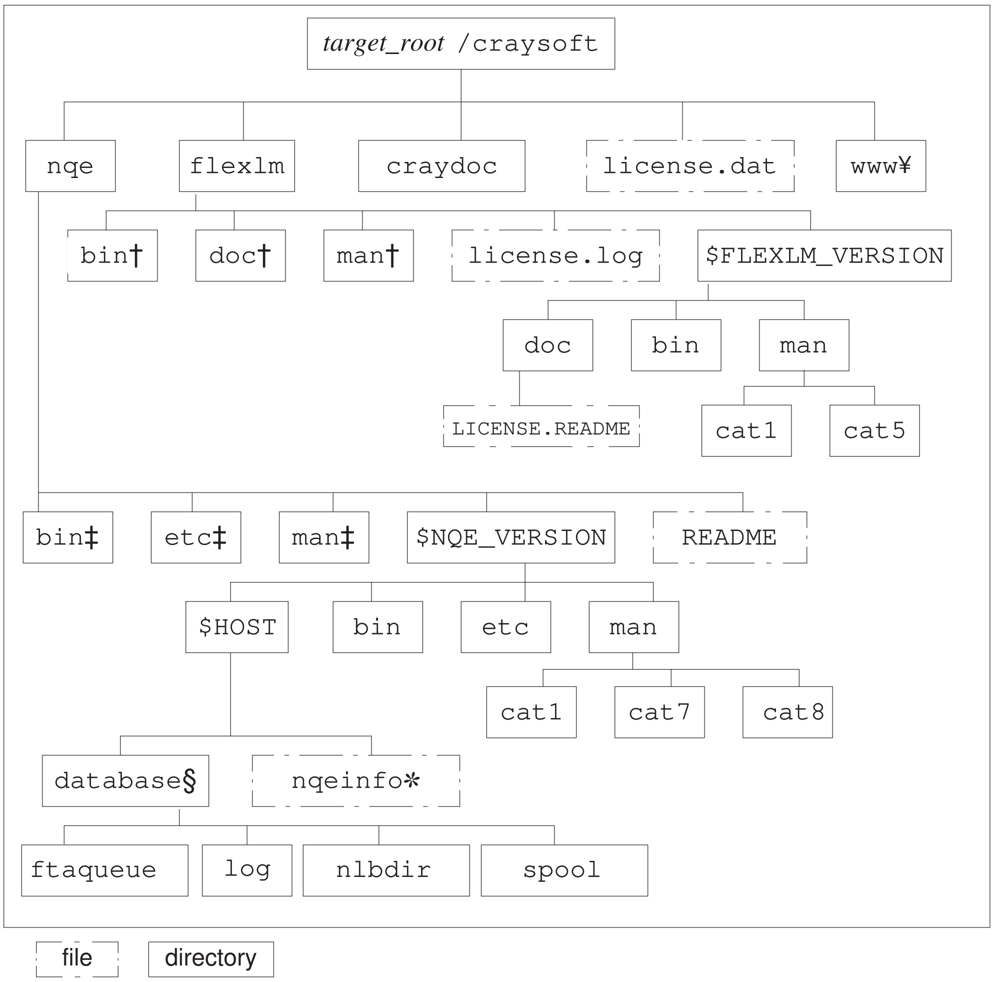
NQE File Structure [D]

This appendix shows the NQE file structure that is created when you install the NQE software.

Figure 13, page 90, shows the NQE file structure, which also includes `/usr/bin/craysoftd`, a symbolic link to the license daemon found in the *target_root* `/craysoft/flexlm/bin` directory.

Figure 14, page 91, shows the World Wide Web (WWW) file structure provided with NQE.

Appendix D



† Symbolic link to *target_root* /craysoft/$FLEXLM_VERSION/*directory*
‡ Symbolic link to *target_root* /craysoft/nqe/$NQE_VERSION/*directory*
§ Symbolic link to NQE_SPOOL as defined in the nqeinfo file
* /etc/nqeinfo is a symbolic link to this file
¥ File structure shown in Figure 14

Figure 13. File structure

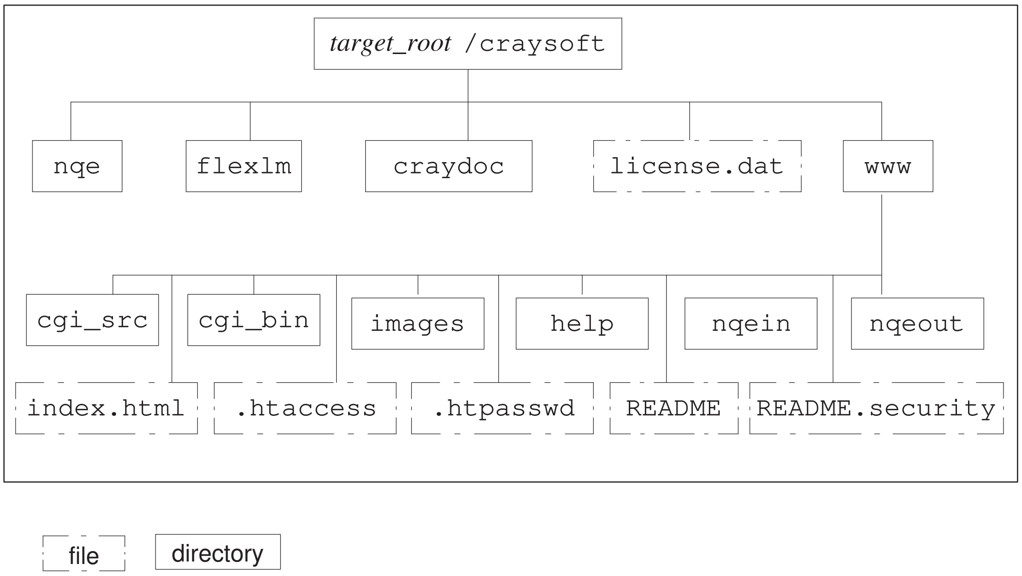


Figure 14. www file structure

Appendix D

Man Page List [E]

The `man` command provides online help on all NQE commands. To view a man page online, type `man` *commandname*.

You must ensure that your `MANPATH` is set properly; it must include the path name of the NQE man pages. The default name is `/usr/craysoft/nqe/man`, except on Solaris systems where it is `/opt/craysoft/nqe/man`.

User-level man pages

E.1

The following user-level online man pages are provided with your NQE software:

User-level man page	Description
`cdoc`(1)	Brings up the CrayDoc online documentation reader , from which you can access the NQE documentation
`cevent`(1)	Posts, reads, and deletes job-dependency event information
`cload`(1)	Provides an X Window System display of machine load information
`cqdel`(1)	Deletes or signals to a specified batch request
`cqstatl`(1)	Provides a line-mode display of requests and queues on a specified host
`cqsub`(1)	Submits a batch request to NQE
`ftua`(1)	Transfers a file interactively (this command is issued on an NQE server only)
`ilb`(1)	Executes a load-balanced interactive command

Appendix E

User-level man page	Description
nqe(1)	Provides a graphical user interface (GUI) to NQE functionality
qalter(1)	Alters the attributes of one or more NQS requests (this command is issued on an NQE server only)
qchkpnt(1)	Checkpoints an NQS request on a UNICOS system (this command is issued on an NQE server only)
qdel(1)	Deletes or signals NQS requests (this command is issued on an NQE server only)
qlimit(1)	Displays NQS batch limits for the local host (this command is issued on an NQE server only)
qmsg(1)	Writes messages to stderr, stdout, or the job log file of an NQS batch request (this command is issued on an NQE server only)
qping(1)	Determines whether the local NQS daemon is running and responding to requests (this command is issued on an NQE server only)
qstat(1)	Displays the status of NQS queues, requests, and queue complexes (this command is issued on an NQE server only)
qsub(1)	Submits a batch request to NQS (this command is issued on an NQE server only)
rft(1)	Transfers a file in a batch request (this command is issued on an NQE server only)

Application interfaces man pages

E.2

The following online man pages are provided with your NQE software to help those who must develop applications that others might use to perform work using NQE, such as writing a scheduler or modifying the NQE GUI:

Application interface man page	Description
`nqeapi`(3)	Describes general NQE functions for formatted lists
`nqe_get_policy_list`(3)	Queries the NLB to retrieve a formatted list of hosts that match a specified policy
`nqe_get_request_ids`(3)	Returns a list of all NQS request IDs known
`nqe_get_request_info`(3)	Returns a list of all information known about a specific NQS request ID from a specified NLB server
`nqe_request_delete`(3)	Deletes a specific NQS request
`nqe_request_submit`(3)	Submits a batch request to NQS

For more detailed information, you also may want to read a reference book about Tcl or Tk, such as the *Tcl and the Tk Toolkit* by John K. Ousterhout (Addison Wesley publisher) or *Practical Programming in Tcl and Tk* by Brent B. Welch (Prentice Hall publisher).

Product support man page

E.3 The cs_support(7) online man page is provided with your NQE software; it includes international product support telephone numbers.

Administrator-level man pages

E.4 The following administrator-level online man pages are provided with your NQE software:

Administrator -level man page	Description
addnode(8)	Copies NQE server or client software to additional systems
ccollect(8)	Starts and manages an NLB or network job status (NJS) collector
csuspend(8)	Suspends NQE batch activity
fta(8)	Performs file transfer management
ftad(8)	Invokes the FTA file transfer protocol server
inst(8)	NQE installation tool
nlbconfig(8)	Configures and maintains the NLB server
nlbpolicy(8)	Queries the NLB server
nlbserver(8)	Starts an NLB server
nqedbmgr(8)	NQE database administration
nqeinit(8)	Starts NQE
nqestop(8)	Stops NQE

Administrator-level man page	Description
`nqsfts`(8)	File transfer service for NQS
`qconfigck`(8)	Verifies the NQS configuration of customized variables
`qmgr`(8)	Enters the NQS queue manager subsystem
`qstart`(8)	Starts NQS
`qstop`(8)	Stops NQS
`skey`(8)	FTA daemon network peer-to-peer authorization management

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Reader's Comment Form

NQE Installation SG–5236 3.0

Your reactions to this manual will help us provide you with better documentation. Please take a moment to complete the following items, and use the blank space for additional comments.

List the operating systems and programming languages you have used and the years of experience with each.

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How did you use this manual: _____in a class _____as a tutorial or introduction _____as a procedural guide _____as a reference _____for troubleshooting _____other

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