
NEC Network Queuing System V (NQSV) User's Guide

[Introduction]

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Preface

This guide explains introduction of NEC Network Queuing System V (NQSV) job management system.

The manual of NEC Network Queuing System V (NQSV) is composed by following user's guides.

Name	Contents
NEC Network Queuing System V (NQSV) User's Guide [Introduction]	This guide explains the overview of NQSV and configuration of basic system.
NEC Network Queuing System V (NQSV) User's Guide [Management]	This guide explains the various management functions of the system.
NEC Network Queuing System V (NQSV) User's Guide [Operation]	This guide explains the various functions that used by general user.
NEC Network Queuing System V (NQSV) User's Guide [Reference]	The command reference guide.
NEC Network Queuing System V (NQSV) User's Guide [API]	This guide explains the C programming interface (API) to control NQSV.
NEC Network Queuing System V (NQSV) User's Guide [JobManipulator]	This guide explains about the scheduler component : JobManipulator.
NEC Network Queuing System V (NQSV) User's Guide [Accounting & Budget Control]	This guide explains the functions of accounting.

February 2018	1st edition
July 2020	8th edition
December 2020	9th edition
March 2021	10th edition
July 2021	11th edition
December 2021	12 th edition

Remarks

- (1) This manual conforms to Release 1.00 and subsequent releases of the NQSV.
- (2) All the functions described in this manual are program products. The typical functions of them conform to the following product names and product series numbers:

Product Name	product series numbers
NEC Network Queuing System V (NQSV) /ResourceManager	UWAF00 UWHAF00 (Support Pack)
NEC Network Queuing System V (NQSV) /JobServer	UWAG00 UWHAG00 (Support Pack)
NEC Network Queuing System V (NQSV) /JobManipulator	UWAH00 UWHAH00 (Support Pack)

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About This Manual

Notation Conventions

The following notation rules are used in this manual:

Omission Symbol	...	This symbol indicates that the item mentioned previously can be repeated. The user may input similar items in any desired number.
Vertical Bar		This symbol divides an option and mandatory selection item.
Brackets	{ }	A pair of brackets indicates a series of parameters or keywords from which one has to be selected.
Braces	[]	A pair of braces indicate a series of parameters or keywords that can be omitted.

Glossary

Term	Definition
Vector Engine (VE)	The NEC original PCIe card for vector processing based on SX architecture. It is connected to x86-64 machine. VE consists of more than one core and shared memory.
Vector Host (VH)	The x86-64 architecture machine that VE connected.
Vector Island (VI)	The general component unit of a single VH and one or more VEs connected to the VH.
Batch Server (BSV)	Resident system process running on a Batch server host to manage entire NQSV.
Job Server (JSV)	Resident system process running on each execution host to manage the execution of jobs.
JobManipulator (JM)	JobManipulator is the scheduler function of NQSV. JM manages the computing resources and determines the execution time of jobs.
Accounting Server	Accounting server collects and manages account information and manages budgets.
Request	A unit of user jobs in the NQSV. It consists of one or more jobs. Requests are managed by the Batch Server.
Job	A job is an execution unit of user job. It is managed by Job Server.
Logical Host	A logical host is a set of logical (virtually) divided resources of an execution host.
Queue	It is a mechanism that pools and manages requests submitted to BSV.
BMC	Board Management Controller for short. It performs server management based on the Intelligent Platform Management Interface (IPMI).
HCA	Host Channel Adapter for short. The PCIe card installed in VH to connect to the IB network.
IB	InfiniBand for short.
MPI	Abbreviation for Message Passing Interface. MPI is a standard for parallel computing between nodes.
NIC	Network Interface Card for short. The hardware to communicate with other node.

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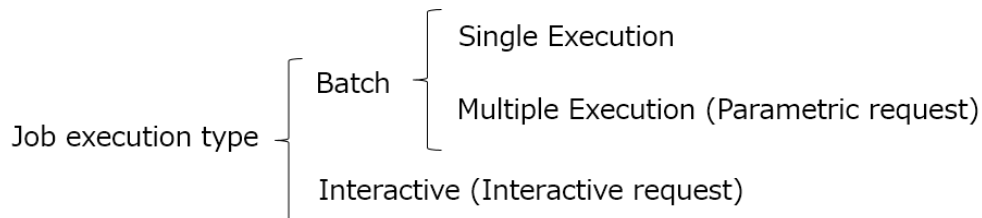
1. Overview of NQSV

1.1. About NQSV

The NEC Network Queuing System V (NQSV) is a batch processing system for high-performance cluster system(*1), which enables the maximum utilization of computing resources.

Overview of the NQSV's supporting are as follows.

1. NQSV supports the optimum resource assignment to jobs and the execution the jobs.
2. NQSV supports both batch-type and interactive-type as job execution type, also supports multiple execution, or parametric request, for batch-type.



3. NQSV has JobManipulator for the scheduler. JobManipulator supports the efficient resource management by load balance and backfill scheduling.
4. NQSV executes and manages a request by managing the calculation resources execution hosts, establishing queues and registering requests with queue by the cluster unit.
5. NQSV supports function that submit and operate requests. It also support various command for setting, operation and displaying information.
6. NQSV supports management of account data, setting of budget and setting of the accounting rate.
7. NQSV supports agent to notify failure of node to Batch server while managing execution hosts and to start execution hosts. And NQSV supports power supply control.
8. NQSV supports C language programming interface (API) for making original client commend or scheduler and operate NQSV.
9. NQSV supports following optional environment. For detail please refer to [Management].

- NQSV can dynamically configure a job execution environment in an execution host in conjunction with OpenStack (Software group for cloud environment building) or Docker (Software which can achieve container-based virtualization).
- NQSV can continue operation without it is down by duplicate (redundancy) of batch server, accounting server and JobManipulator (Redundancy Function)

(*1) Cluster is a set of connected job servers, various components and a batch server.

1.2. Components of NQSV

1.2.1. Host and components

Host (component) composition and number of host composition are as follows.

Host (component) composition

Composition of NQSV is a connection of related components to central batch server.

The explanation of each component is mentioned later.

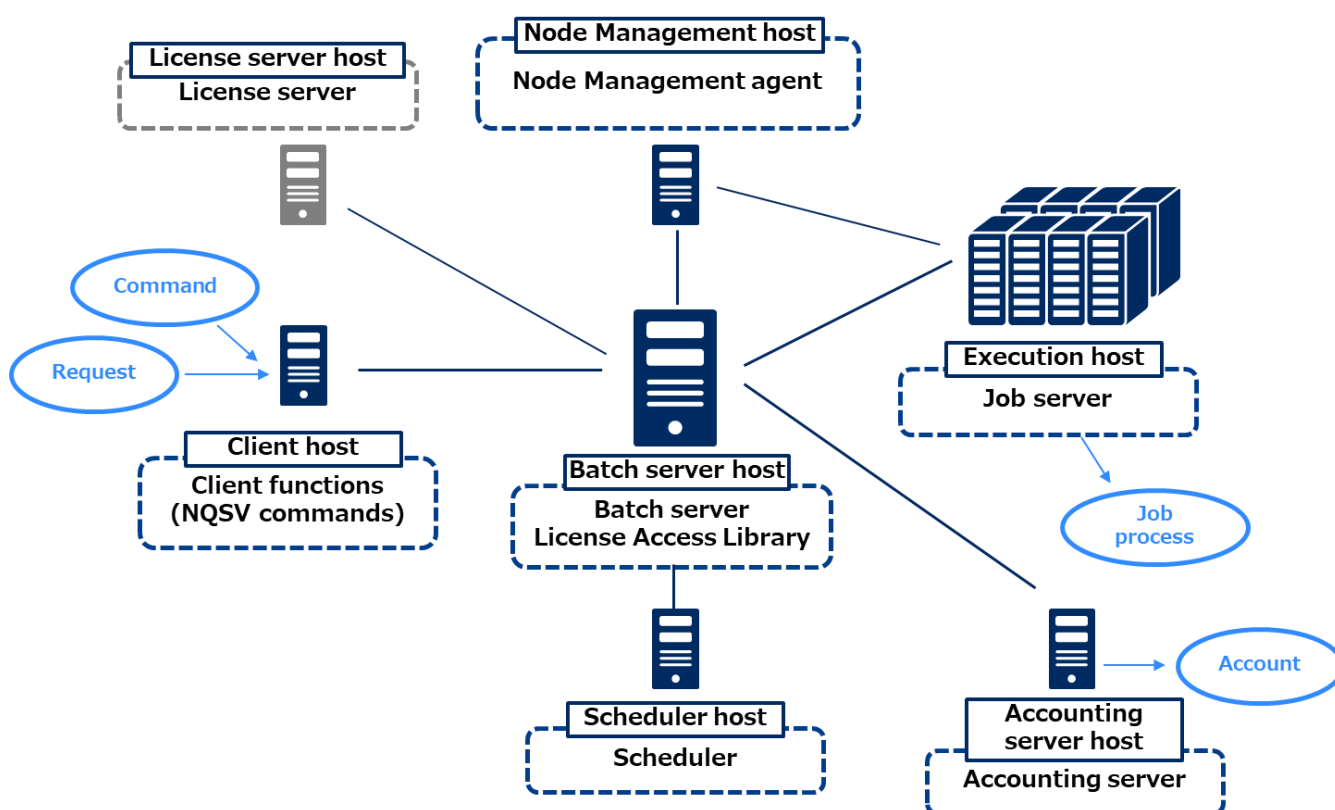


Figure 1.2-1 Large scale system

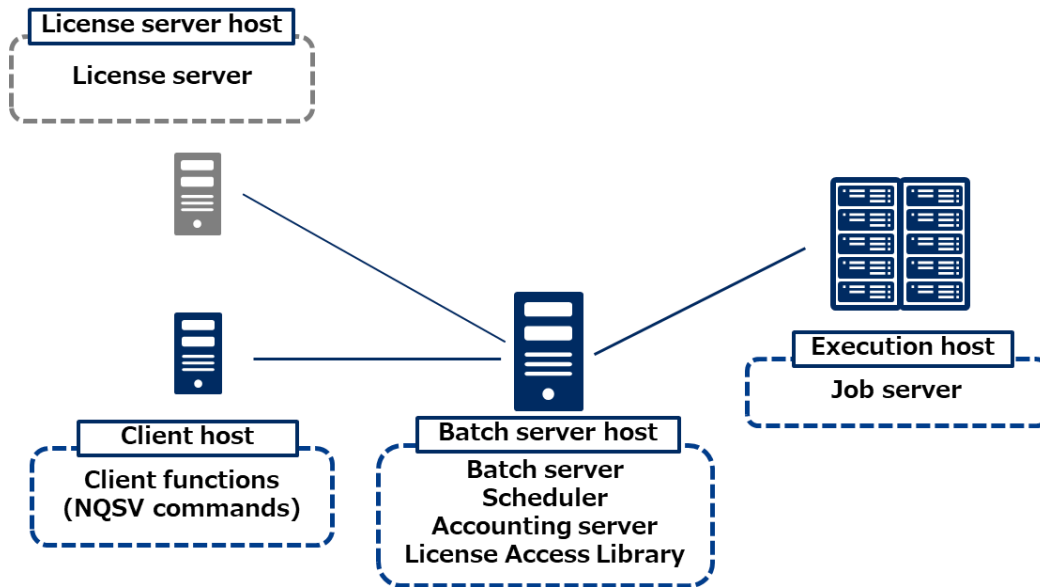


Figure 1.2-2 Small scale system

License server is a management server of Job server license and JobManipulator license.

Type of host and number of host composition

Composition of NQSV is following kind and number of hosts.

Batch server host

Batch server is a core component of NQSV. It manages requests.

Execution host

Execution host controls execution of jobs.

Client host

Submit request and do management operation of NQSV on Client host.

Scheduler host

Scheduler host provides the scheduling function. Start scheduler component JobManipulator on it.

Node Management host

Node Management host detect failure of execution hosts.

Accounting server host.

Account server hosts collects and manages account information. It also manages budget.

Hosts that we mention above are logical class by the function of NQSV. It is possible to all hosts are located on one physical machine. And it is also possible to each host is located on different host. When you locate execution host on a different machine from other hosts, maximum calculation resource are assigned to jobs.

Host	Number of hosts	note
Batch server host	1	A Batch server can manage at most 10240 of execution host
Execution host	1 to 10240	
Client host	1 to n	Client host can be located on Batch server host
Scheduler host	1 to n	Scheduler host can be located on Batch server host
Node Management host	1 to n	Node Management host can be located on Batch server host
Accounting server host	1	Accounting server host can be located on the same host of Batch server and Scheduler (JobManipulator).

Composition component

NQSV consists of following kind of component.

Batch server

Batch server (nqs_bsvd) permanently runs on Batch server host and the all NQSV is managed by it. Sometime it is called BSV.

Job server

Job server (nqs_shpd) permanently runs on execution host and the execution of job is managed by it. Sometime it is called JSV.

Scheduler

NQSV provides JobManipulator (nqs_jmd) as Scheduler. JobManipulator (nqs_jmd) permanently runs on Batch server host usually. Sometime it is called JM.

Client

Submit and operate of request, setting and operate of NQSV and using command for

displaying of information are done by Client.

Accounting server

Accounting server is server for collect and manage of accounting information. You can display accounting data, set the budget and set the accounting rate on the machine of this server.

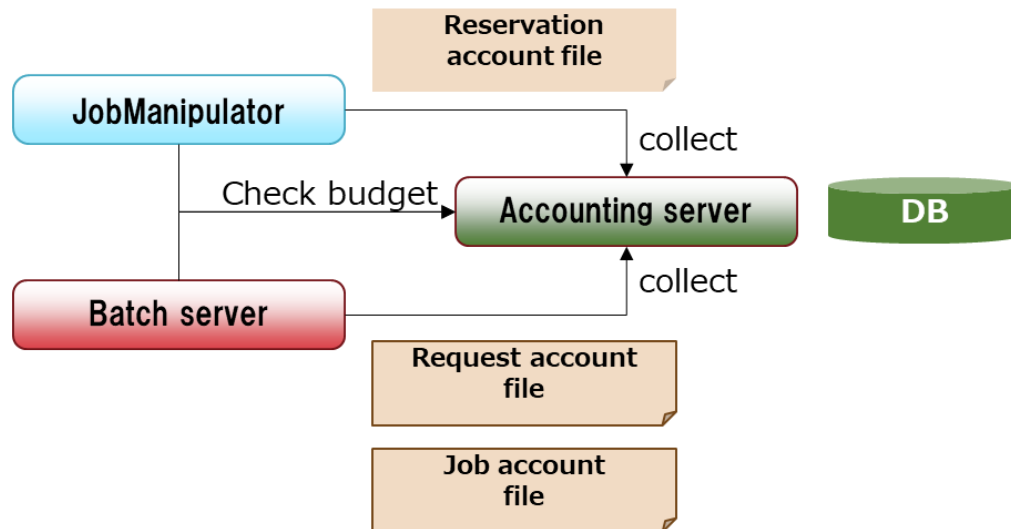


Figure 1.2-3 Collect and manage of accounting information

Node Management Server

Node Management Server detects failure and controls power supply.

Node Management Agent

Node Management agent permanently runs on Node Management host and is provides efficient failure management and power saving function.

License Server

License server is not a component of NQSV. It however is necessary for operation of NQSV. It manages license information of Aurora products all together.

About NQSV, it manages Job server license and JobManipulator license.

You need to purchase following licenses according to the number of equipped CPU of Job server.

- Job server license (NEC Network Queuing System V /JobServer)
- JobManipulator license (NEC Network Queuing System V /JobManipulator)

1.2.2. Submitting and Execution of Request

In this section, we explain logical components of NQSV.

Overview of NQSV's composition is as follows

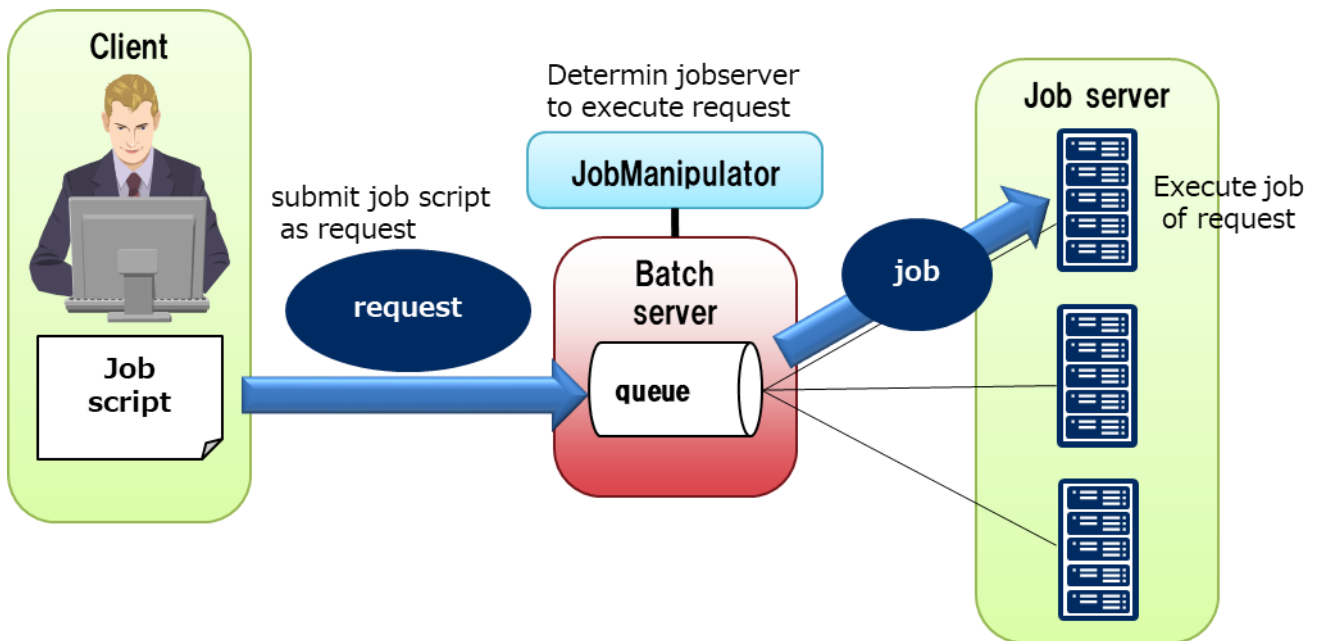


Figure 1.2-4 Flow of job execution

Queue

A queue is used to temporarily pool requests accepted by the NQSV batch system.

NQSV checks whether or not each request can be executed, and if it is executable, it is executed in order. The queue has default resource limit, such as elapsed time, memory size, etc. The user selects a queue suitable for the request and submits the request.

Requests Queue for request to be submitted

Three types of queues can be used in the NQSV: Batch Queue, Network Queue and Interactive Queue.

(1) Batch Queue

A Batch queue controls batch request execution.

(Please refer to [Management] Interactive Queue.)

(2) Interactive Queue

An interactive queue controls interactive request execution.

(Please refer to [Management] Interactive Queue.)

(3) Routing Queue

A routing queue controls routing of batch requests.

(Please refer to [Management] Routing Queue.)

File Staging Queue (network queue)

There is a network queue as the queue to perform file staging.

(For details of file staging, please refer to [Management] File Staging.)

A network queue is the queue uses to forward a staging file of the request between the client host and the executing host. The user cannot submit a request in this queue directly.

(Please refer to [Management] Network Queue.)

Queue State

Queue has the following states, which determine if requests can be accepted or if execution is allowed.

A queue state is divided roughly into two properties. One is whether a queue accepts requests or not, the other is whether to execute requests or not.

1. Accepts Requests or not

- ENABLED State

A queue accepts request submission in this state.

- DISABLED State

A queue does not accept request submission in this state.

2. Execute Requests or not

- ACTIVE State

A queue allows request execution in this state.

- INACTIVE State

A queue does not allow request execution in this state.

Queue states can be checked using following command.

- qstat(1)command -Q option (Queue Information) .
- qstat(1)command -Q,-f option (Detailed Queue Information)

(About details of the queue state, please refer to [Management] Queue Information and [Management]Queue State.)

Requests

A request is a basic processing unit in the NQSV batch system. Requests are managed by the batch server. Requests can be submitted and managed using NQSV functions.

Types of Requests

There are three types of requests:

- batch requests
- parametric requests(multiple execution mechanism of batch request)

- interactive requests

They are called requests in general.

In addition, there is a network request as a special request created and submitted by NQSV, not by the user. This is used to transfer the file to be staged between the client host and the execution host when the request submitted by the user is executed, and it is generated automatically by the batch server.

Batch Request

The batch request is a request for program execution. This request is executed by submitting a script to NQSV batch system. As it is possible to embed operation information for NQSV to comment part of this script, cumbersome option specifications can be eliminated when submitting batch requests. The `qsub (1)` command is used to submit a request.

(About operational details of a batch request, please refer to [Operation] Batch Request Operation.)

And a parametric request is multiple execution mechanism of batch request while changing an environment variable and an input/output file, which are designated in the script parameters.

(About operational details of a parametric request, please refer to [Operation] Parametric Request Operation.)

Interactive Request

An interactive request is assigned execution hosts immediately, and user can use the hosts interactively to handle the request. There are two types of interactive requests.

- session connection-type ... The interactive use connecting a session with execution host like `rlogin` command, using `qlogin(1)` command.
- remote execution-type ... The use of execution host from remote using the remote execution type conversation function (`qrsh(1)` command)

(`qstat(1)` -f option displays about details of request attributes, please refer to [Operation] State Check of Interactive Request.)

Requests and Jobs

A batch request in NQSV is a management unit for user jobs and is managed by the batch server. In contrast, a batch job is an execution unit of user jobs and is controlled by job servers.

(About details of a job, please refer to [Operation] Job Operation.)

Batch requests are uniquely identified by the batch request identifier (**Request ID**). Batch jobs are uniquely identified by the batch job identifier (**Job ID**) expressed by a pair of request ID of the parent batch request and job number.

- **The request ID**

The host name of the batch server and a serial number in the batch server.

It will be unique in NQSV for all kind of requests.

A batch request and interactive request are shown as follows.

`<Sequence number>.<BSV host name>`

[Example] 72.host1

A parametric request is shown as follows.

- Parametric request

`<Sequence number>[].<BSV host name>`

[Example] 73[]. host1

- Sub-request

`<Sequence number>[<Sub-request number*>].<BSV host name>`

* Number range designated in sub-request number :qsub -t is given.

[Example] 73 [5]. host1

- **Job ID**

The job number and the request ID. It will be unique in NQSV.

A serial number allocated to a batch job that has the same batch request (0 or an integer value larger than 0) as a parent.

Master job: A batch job whose job number is 0

Slave job: A batch job whose job number is larger than 1

A job of a batch request and interactive request is shown as follows.

`<Job number>:<Sequence number>.<BSV host name>`

[Example] 0:72.host1

A job of a sub-request of a parametric request is shown as follows.

`<Job number>:<Sequence number>[<Sub-request number>].<BSV host name>`

[Example] 0:73 [5]. host1

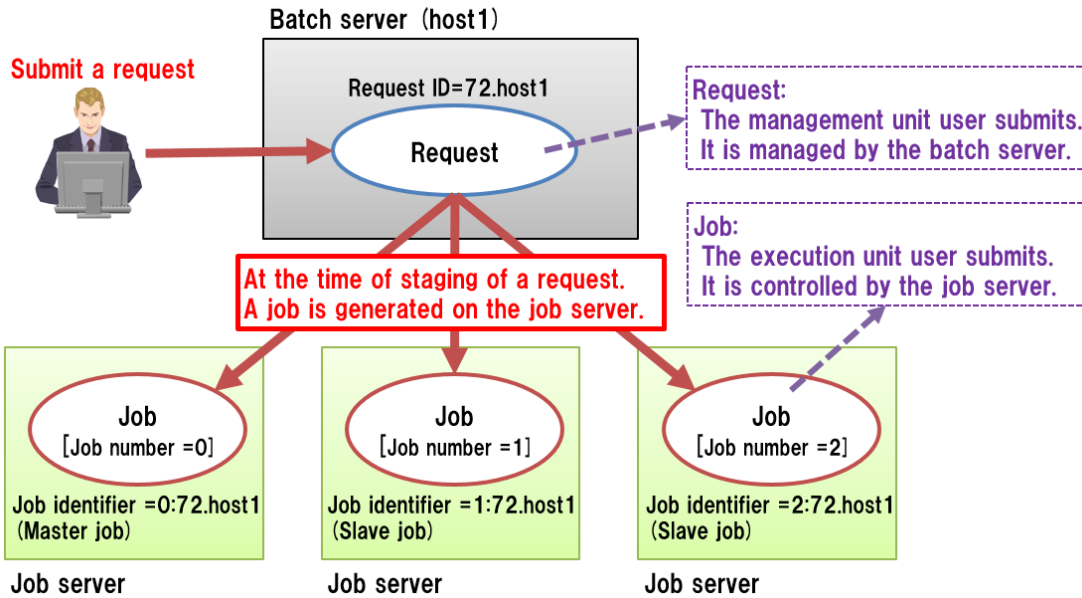


Figure 1.2-5 : Batch / Interactive request

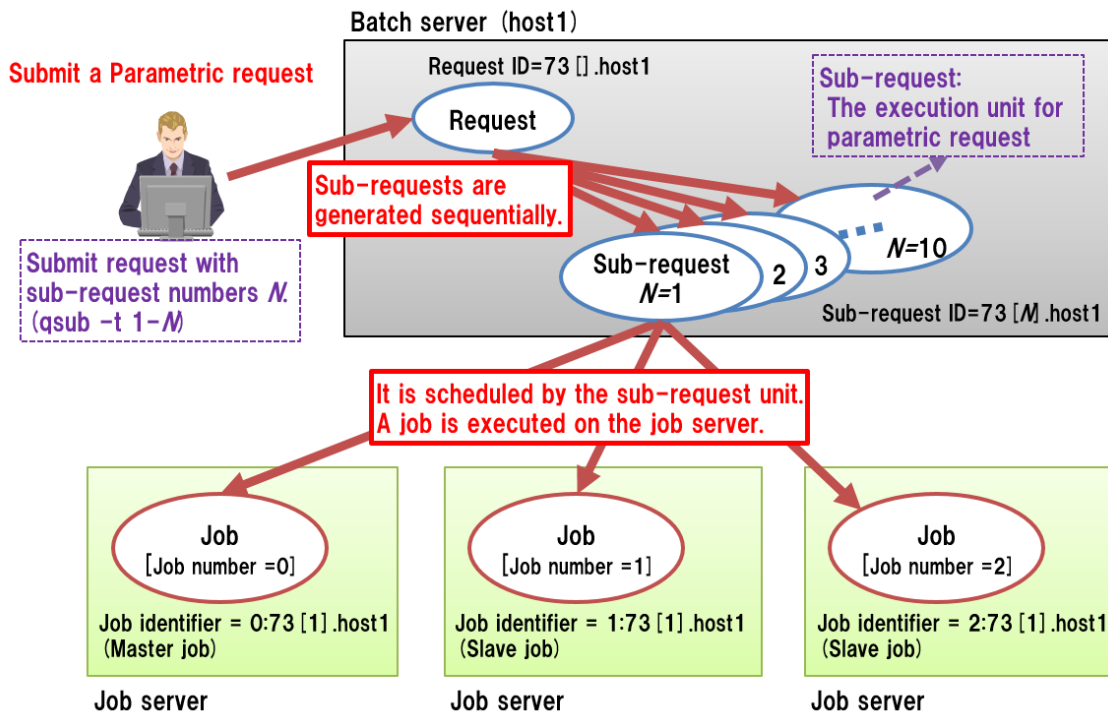


Figure 1.2-6 : Parametric request

Jobs and logical host

A job is a collection of processes to be executed on a job server and also an execution unit on an execution host.

On the other hand, a logical host indicates that resources of an execution host are divided logically (virtually) and assigned to a job. A logical host is associated with a job one-on-one. A logical host is

generated when a job starts and disappears when the job execution ends.

The correspondence between a job and logical host cannot be separated. A “job” in the following description indicates both a job and logical host.

*A logical host in NQSV defines resources of an execution host that are assigned to a job. Note that its meaning differs from a virtual machine of a general Linux virtualization technology.

Resource Limit for Request

Requests have resource limit as its attribute (parameter). Resource limit is necessary resource amount for execution the request. And Resources can be used only below the resource limit. Resource limits for requests can be specified with qsub, qlogin and qcrsh command -l option. (Please refer to [Operation] Resource Limit Options and [Reference] User’s Commands.)

The NQSV provides the following resource limits:

Resource Limit Value	Request	Job (Logical Host)	Process
Elapse Time Limit Value	✓	-	-
CPU Time Limit Value	-	✓	✓
Number of CPU Limit Value	-	✓	-
Open File Count Limit Value	-	-	✓
Memory Size Limit Value	-	✓	✓
Data Size Limit Value	-	-	✓
Stack Size Limit Value	-	-	✓
Core File Size Limit Value	-	-	✓
File Size Limit Value	-	-	✓
Virtual Memory Size Limit Value	-	✓	✓
Number of GPU Limit Value	-	✓	-
Number of VE node Limit Value	-	✓	-

Request Status

Requests transit pass through various states from submitted to executing. There possible states of a request are as follows: (please refer to [API] State Transition of Request.)

- ARRIVING State (ARI)
The request is being received from a routing queue.
- TRANSITING State (TRS)
The request is being transferred from a routing queue to another queue.

- **WAITING State (WAT)**
The request is waiting until the time when the execution is scheduled to start.
- **QUEUED State (QUE)**
The request is queued and scheduled for execution. It will transit to RUNNING state when the batch scheduler signals to start execution.
- **STAGING State (STG)**
Batch jobs or network request are generated. The stage-in files are transferred from client hosts to the execution host.
- **PRE-RUNNING State (PRR)**
The information required to execute batch jobs is being transferred to each job server. The master job synchronizes with all related slave jobs before execution. Pre-processing is performed and if an error occurs during processing, the request will return to the QUEUED state after cancelling each process up to that point backwards.
- **RUNNING State (RUN)**
Batch jobs associated with the batch request is being executed. In case of the MPI job, it transits to POST-RUNNING state as soon as the master job is finished.
The RUNNING state will be maintained as long as the master job is executed even though all slave jobs are completed to execute.
The finishing of the slave jobs does not give any influence to the state.
In case of the distributed jobs (non MPI job), the request transits to the POST-RUNNING state when all batch jobs are finished.
- **POST-RUNNING State (POR)**
Post-processing after completing execution of batch jobs is performed.
- **EXITING State (EXT)**
The standard/error output file and stage-out file of the request are transferred from the execution host to the client host.
- **HELD State (HLD)**
The request is not the target of scheduling and does not accept "run" or "restart" request from the scheduler.
If a checkpoint request has been issued during RUNNING state, the checkpoint restart file is generated in this (HELD) state.
- **SUSPENDING State (SUS)**
The request is waiting until all of its batch jobs are stopped.
- **SUSPENDED State (SUS)**
All the batch jobs for the request are stopped.
- **RESUMING State (SUS)**
The request is waiting until all of its batch jobs are restarted.

The state of the request is shown to a STT column by summary indication of the qstat (1) command. However, in summary display of request information, SUSPENDING, SUSPENDED and RESUMING state are shown as 'SUS'. (Please refer to [Operation] Check of Basic Information.)

1.3. Product composition

1.3.1. Product package composition

The correspondence between the Products, Packages and Group Names to be specified to yum command is as follows.

Product	Package	Group Name	
		nqsv-batch	nqsv-execution
NEC Network Queuing System V/ ResourceManager	NQSV-ResourceManager	✓	-
	NQSV-Client	✓	✓
	NQSV-API	✓	-
NEC Network Queuing System V/ JobServer	NQSV-JobServer	-	✓
NEC Network Queuing System V/ JobManipulator	NQSV-JobManipulator	✓	-

1.3.2. The product package outline

(1) NEC Network Queuing System V/ResourceManager

This package supply following functions.

- Batch server function as NQSV request acceptance, execution management, and resource management.
- Node management agent function as failure detection and power supply control.
- Accounting server function as collection and display of account information and budget management.
- Function for request submitting and request operation by user. Various command for setting, operation and display information of NQSV. User agent function.
- C language programming interface (API) for making original client commend or scheduler.

(2) NEC Network Queuing System V/JobServer

This package supply functions for execution control of jobs and collection of the resource information.

(3) NEC Network Queuing System V/JobManipulator

JobManipulator is the job scheduler which is tailored to mixed operation of single and multi-node job execution on the large-scale cluster system. It is based on FIFO mechanism and enables scheduling that assigns the earliest time for job execution by managing unused amount of calculation resources (CPU, memory and others).

[note]

Except for a package above-mentioned, the "license access library" is necessary for running of the batch server. About details of license and license access library, please refer to HPC software license management guide.

2. Making of Environment

This chapter describes the construction of NQSV in a typical cluster configuration.

2.1. Preparation

2.1.1. Preparation of Cluster Environment

We choose an example of a basic cluster configuration as follows. Actually, please prepare according to your environment.

Batch server host

Host name	IP address	Machine ID
bsv1.example.com	192.168.1.1	10

- Following hosts are located on Batch server host like Figure 1.2-2 Small scale system.
 - Scheduler host
 - Accounting server host
- Node Management host must be located on Batch server host if it is used.

Execution host (64 nodes)

Host name	IP address	Job server number
jsv00.example.com	192.168.1.100	0
jsv01.example.com	192.168.1.101	1
jsv02.example.com	192.168.1.102	2
:	:	:
jsv63.example.com	192.168.1.163	63

- The job server number must be assigned from 0 to 10239 uniquely in the batch server.

Client host

Host name	IP address
client1.example.com	192.168.1.10

User

NQSV administrator user	General user
root (root user name on Batch server host)	user1 (same user name between a Client host, a Batch server host and Execution host)

Queue

Batch queue name	Priority
execque1	10

Please carry out installation and setting of environment by root privilege.

Please carry out the qstat(1) command and submitting of request by the general user.

2.1.2. Preparation of License server

You need to purchase Job server license and JobManipulator license according to the number of equipped CPU of Job server which are operated by NQSV. Then please register them to License server.

At making of environment, following information of License server are necessary.

- host name
- port number

2.1.3. Confirmation of the port number NQSV uses

NQSV use default port number as follows. Change of port number is necessary if it is used for other purpose. To change the port number, please refer [Management] or [JobManipulator] or [Accounting & Budget Control]].

Server	Default port number	note
Batch server	602	The port number to accept requests from clients
Client	603	User agent
Scheduler	13000	
Accounting server	6542	The port number to receive account data
	4595	The port number for budget management
Compute node	604	Launcher daemon

If the firewall function in the OS is enabled, it is necessary to configure the above ports on each host to allow them to be used.

2.1.4. Setup the Yum Repository

- (1) Using the Yum Repository on Internet

If the yum repository is already set up, please begin from installation (update). If the NEC yum repository on the Internet is available, execute the following command. X.X-X is the latest version of TSUBASA-soft-release package. Please refer to SX-Aurora TSUBASA Installation Guide".

```
root# yum install https://sxauro ratsubasa.sakura.ne.jp/repos/TSUBASA-soft-release-X.X-X.noarch.rpm
```

The following example shows the description in the yum configuration file (/etc/yum.repos.d/TSUBASA-restricted.repo) to enable the yum repository for NQSV, one of the paid software.

```
root# vi /etc/yum.repos.d/TSUBASA-restricted.repo
[nqsv]
...
username=<Serial-Number>
password=<Lower 8 Digits of Serial-Number>
enabled=1 ← Change to 1 (from 0)
```

Enter the 16 digits of the serial number on the serial number card, excluding the hyphens, in the username field, the lower right eight digits in the password field, and 1 in the enabled field.

NEC

PPSupportPack:Product Serial Number Card

Product Name : PPSupportPack(NEC Network Queuing
System V 8 license) (1year 8H)

Product Code : **UWHAG00-H111E-I**

Product Serial : **AAAB-BAAB-BAAA-AAAG**
Number username password

(2) Using the Local Repository

If the yum repository is already set up, please skip ahead to **Getting NQSV Package**. Or please follow the steps below.

Download the following release package, which include the configuration files for the yum repository.

<https://sxaurooratsubasa.sakura.ne.jp/repos/TSUBASA-soft-release-X.X-X.noarch.rpm>

For the version of TSUBASA-soft-release package, please refer to "SX-Aurora TSUBASA Installation Guide".

Install and run the Apache HTTP server on the repository server.

```
root# yum -y install httpd
root# systemctl start httpd
root# systemctl enable httpd
```

Create a directory (/var/www/html/repos in the example below) on for the yum repository under the HTTP server document path (/var/www/html).

```
root# mkdir -p /var/www/html/repos
```

Place the file you have downloaded under the directory and install the release package.

```
root# cd /var/www/html/repos
root# yum install ./TSUBASA-soft-release-X.X-X.noarch.rpm
```

In order to enable the yum repository for NQSV, please edit the yum configuration file (/etc/yum.repos.d/TSUBASA-restricted.repo). The following example shows the description in the yum configuration file

```
root# vi /etc/yum.repos.d/TSUBASA-restricted.repo
[nqsv]
baseurl=http://address.or.name.of.server/repos/nqsv_e1X
:
enabled=1 ← change to 1 (from 0)
```

Specify the location of the local yum repository in the "baseurl=" line in the configuration file.

And 1 in the enabled field. Please refer to "SX-Aurora TSUBASA Installation Guide" for the OS version indicated by X.

Delete the yum cache.

```
root# yum clean all
```

Getting NQSV Package

To obtain NQSV, see **How to Set up and Update the Local Yum Repository** section on **SX-Aurora TSUBASA Installation Guide**. Please note that access to the files requires the username (the 16 digits of the serial number) and password (the lower eight digits of the serial number) of the PP support contract.

The following example shows the Serial Number Card. Enter the 16 digits of the serial number on the serial number card, excluding the hyphens, in the username field, the lower eight digits in the password field.

NEC

PPSupportPack:Product Serial Number Card

Product Name : PPSupportPack(NEC Network Queuing
System V 8 license) (1year 8H)

Product Code : **UWHAG00-H111E-I**

Product Serial : **AAAB-BAAB-BAAA-AAAG**
Number username password

Place the NQSV package you have downloaded under the directory and expand it.

```
root# cd /var/www/html/repos
root# unzip nqsv_elX.zip
root# rm *.zip
```


2.2. Installation

It is explained about installation of NQSV below. For the file name of the packages, and for how to install the packages, please refer to the release memo.

[Notes]

Please build after a license server starts and communication is in the possible state with that.

Please install by mentioned order by this section.

2.2.1. License Access Library

On the Batch server host, install the license access library (aurlic-lib) because it is necessary for running of the batch server. About details of license and license access library, please refer to HPC software license management guide.

```
root# yum install aurlic-lib
```

[Notes]

The license access library provides several function for Batch server to connect to a license server and get a license.

This library must be installed before installing of the Batch server because of dependence between Batch server and the library.

2.2.2. NQSV/ResourceManager

Please install NQSV/ ResourceManager package (NQSV-ResourceManager) on [Batch server host](#), Accounting server host and Node Management host as follows.

```
root# yum install NQSV-ResourceManager
```

When installing the following packages on the Batch server host together, it is possible to install the packages with the value of shell variable set to group name.

- NQSV/ResourceManager(NQSV-ResourceManager, NQSV-Client, NQSV-API)
- NQSV/JobManipulator(NQSV-JobManipulator)

```
root# /opt/nec/ve/sbin/TSUBASA-groups-remark.sh nqsv-batch  
root# yum group install nqsv-batch
```

[Notes]

It is possible to all hosts are located on one physical machine. And it is also possible to each host is located on different host.

Accounting server host

Accounting server must be built if you want to use it to collect, reference, and tally request and job account information, set budgets, and set billing rates. Accounting server host where the accounting server is located can be the same host as the batch server or Scheduler (JobManipulator), or it can be a different host. When you install the NQSV-ResourceManager package, accounting related modules are installed.

In addition, please configure the following settings to enable the collection of account information between NQSV servers and to access and display information on the accounting server from commands on other hosts.

- Installation of Accounting monitor

An accounting monitor must be installed on the host where the batch server and Scheduler (JobManipulator) are located. The NQSV-ResourceManager package contains the accounting monitor daemon and its accompanying commands.

- Installation of commands

AUI (Accounting User Interface) setting is required to refer to the accounting information of the accounting server from the client host. Install the NQSV-Client package on the client host. Please refer to "NEC Network Queuing System V (NQSV) User's Guide [Accounting and Budgeting] 2.2.2.4 AUI" for details.

Node Management host

It is necessary to build Node Management host to enable effective scheduling in case of a node failure, or to enable ECO scheduling function.

If you want to use such function please build it.

Node Management agent is included in this package.

Please install this package on Node Management host that manage execution host.

After installation, please start service unit of Node Management agent to notify failure of execution host to Batch server or to boot up execution host by NQSV. (Please refer to [Management] Node Management Agent Settings.)

Client host

Please install NQSV-Client package in NQSV/ResourceManager on [Client host](#) to submit request and to do management operation of NQSV.

```
root# yum install NQSV-Client
```

2.2.3. NQSV/JobManipulator

On the Batch server host, please install NQSV/JobManipulator package. The NQSV/JobManipulator can also be installed on the scheduler host, not on the [Batch server host](#).

```
root# yum install NQSV-JobManipulator
```

2.2.4. NQSV/JobServer

Please install the NQSV/JobServer packages on each [Execution host](#).

```
root# yum install NQSV-JobServer
```

When installing the following packages on the Execution host together, it is possible to install the packages with the value of shell variable set to group name.

- NQSV/ ResourceManager(NQSV-Client)
- NQSV/JobServer(NQSV-JobServer)

```
root# /opt/nec/ve/sbin/TSUBASA-groups-remark.sh nqsv-execution
root# yum group install nqsv-execution
```

After installing job server, start the NQSV launcher daemon (nqs_lchd) using the rc script (nqs_jsv).

```
root# systemctl start nqs-jsv.target
```

* It is not necessary to edit unit define file.

2.3. Configuration

2.3.1. Start Batch Server

(1) Set up license

When starting, the BSV connects to the license server and acquires the licenses to use on itself. Due to this, information about the connected license server needs to be preset on the BSV host. To do so, specify the host name and port number of the connected license server in the following file stored on the BSV host.

```
/opt/nec/aur_license/aur_license.conf
```

Specify the information as follows:

```
License_server_host = <host name>
```

Specify the host name of the license server.

```
License_server_port = <port number>
```

Specify the listening port number on the license server.

For details about the configuration file, see setting of the batch server on [Management]

(2) Selection of service unit

NQSV/ResourceManager Package includes the various service units for the batch server. There is also something unnecessary in these inside by the environment. Please establish it so that only the necessary service unit may start according to the environment. The following command is carried out for setting.

```
root# systemctl enable <UnitName> ...
```

Refer to the following table for the unit name designated as < UnitName>.

Unit Name	Description
nqs-bsv.service	Batch Server
nqs-asv.service	Accounting Server
nqs-acm.service	Accounting Monitor
nqs-nag.service	Node Management Agent
nqs-btu.service	Boot-up Daemon for Redundancy function

For example when using a server, the following command is carried out.

```
root# systemctl enable nqs-bsv.service
```

(3) Set up machine ID

At first, it is necessary to set up machine ID on the batch server host. A machine ID has an integer value of 32 bits, and it is used to identify NQSV. On NQSV, one machine ID is allocated to one batch server host.

(About details of the machine ID, please refer to [Management] Machine ID Management.)

The machine ID is registered on the batch server host by root privilege using the `nmapmgr(1M)` command as follows.

```
root# /opt/nec/nqsv/bin/nmapmgr
NMAPMGR>: create
NMAP_SUCCESS: Successful completion.
NMAPMGR>: add mid 10 bsv1.example.com
NMAP_SUCCESS: Successful completion.
```

It is possible to check the registered contents by the `show state` command of `nmapmgr`.

```
NMAPMGR>: show state
MachineID Type HostName
-----
      10 NQSV  bsv1.example.com
NMAPMGR>: exit
```

(4) Initialize the batch server database

The batch server database is initialize by executing `/opt/nec/nqsv/sbin/nqs_bsvd` with `-i` option by root privilege on the batch server host. (About initialization details of a batch server data base, please refer to [Management] Initializing Batch Server Database.)

```
root# /opt/nec/nqsv/sbin/nqs_bsvd -i
BatchServer database was initialized.
```

In addition, be sure to prepare the configuration file (`/etc/opt/nec/nqsv/nqsd.conf`) for describing the batch server settings.

```
root# touch /etc/opt/nec/nqsv/nqsd.conf
```

(5) Activate the batch server

After the database is initialized, activate the batch server.

```
root# /opt/nec/nqsv/sbin/nqs_bsvd
NQSV (DEBUG): gmq_attach_qcb: q0000: Attach QCB to queue.(NETWORK name `DefaultNetQue')
NQSV (DEBUG): gma_generate_event: q0000: (QST_CREATE qid 3.DefaultNetQue)
NQSV (DEBUG): gma_generate_event: q0000: (QSTV_CREATE qid 3.DefaultNetQue)
NQSV (DEBUG): gmq_attach_qcb: q0001: Attach QCB to queue.(ROUTING name `SysRoutingQue')
NQSV (DEBUG): gma_generate_event: q0001: (QST_CREATE qid 4.SysRoutingQue)
NQSV (DEBUG): gma_generate_event: q0001: (QSTV_CREATE qid 4.SysRoutingQue)
NQSV (INFO): Create request seq# file.
```

When a batch server has normally started, a message above-mentioned is indicated only once first.

When you can confirm the start of the batch server, please stop the batch server.

To stop:

```
root# /opt/nec/nqsv/bin/qmgr -Pm
Mgr: shutdown
Mgr: exit
```

Then start the service containing the batch server by systemd. If you want to start the service unit set in systemctl enable together, please execute the following command.

To start:

```
root# systemctl start nqs-bsv.target
```

(For details, please refer to [Management] Batch Server Activation. About details of batch server setting, please refer to [Management] Batch Server Setting.)

2.3.2. User Registration

Please add entries for the administrator user to manage NQSV on the NQSV and the users to execute a request and a job to User map file on the Batch server host.

User map file : /etc/opt/nec/nqsv/nqs_user.map

The user map file is used to define the mapping of remote user name and local username and access privileges to the NQSV. The meaning of each column of the user map file is as follows.

First column: access privilege to the NQSV

Second column: local user name (the user name on Batch server host)

Third column: remote use name (the user name on Execution host and Client host)

(For details of /etc/opt/nec/nqsv/nqs_user.map, please refer to [Management]User Management.)

The following lines are registered with /etc/opt/nec/nqsv/nqs_user.map file for the root user on the batch server host and user1 on the client host and execution host to enable submit and execute request.

PRIV_SCH	root	root:127.0.0.1/32
PRIV_MGR	root	root:192.168.1.1/32
PRIV_NON	root	root:0.0.0.0/0
PRIV_USR	user1	user1:192.168.1.0/24

The meaning is as follows.

2nd line :

The setting for the root user on Batch server host to access Batch server with manager privilege.

4th line:

The setting for accept submitting request from client host by user1. And the setting for executing jobs on Execution host by user1.

2.3.3. Client Environment

In this section we explain client environment.

The command and man data are installed in following paths.

- Command
 - User's command /opt/nec/nqsv/bin
 - Administrator's command /opt/nec/nqsv/sbin
- Man data
 - /opt/nec/nqsv/man/man1 (English)
 - /opt/nec/nqsv/man/ja (Japanese)

(About details, please refer to [Reference] User's Commands and [Reference] Administrator's Commands.)

(1) Setting for management operation of Batch server, operation of request and refer information

To submit a request and watch status of request, it is necessary to set configurations on Client host: a setting of the batch server the NQSV command connects and start daemon for transmission of an execution result file (= user agent).

When NQSV command executing, the batch server the command connects as default is set in /etc/opt/nec/nqsv/api_client.conf file on the client host. Please add the following line to /etc/opt/nec/nqsv/api_client.conf. About details of /etc/opt/nec/nqsv/api_client.conf, please refer to [Management] Setting of api_client.conf.

```
batch_server_host bsv1.example.com
```

User agent has to start on Client host.

Please start user-agent specifying batch server host name by root user on Client host.

```
root# /opt/nec/nqsv/sbin/nqs_uagd bsv1.example.com
```

An rc script is prepared to start/stop a job server. (For details, please refer to [Management] User Agent.)

(2) Setting for refer information and management operation of JobManipulator

To display information of JobManipulator and to do management operation of it you can use the JobManipulator command on a client host. The setting of it is as follows.

The file /etc/opt/nec/nqsv/nqs_jmd_cmdapi.conf is used for this setting. You should specify JobManipulator's running host name to jm_host in this file.

Add following line to /etc/opt/nec/nqsv/nqs_jmd_cmdapi.conf using editor with root privilege.

```
jm_host bsv.nec.co.jp
```

2.3.4. Setting of Execution host

Execution Host Registration and Job Server Start

Please register the execution host to execute jobs to a batch server. A batch server can manage at most 10240 nodes of execution host.

Job server to control a job is started on each execution host. The number to distinguish each job server (the job server number) is assigned from 0 to 10239 uniquely in the batch server.

Please register execution hosts by root user using attach execution_host sub-command of the qmgr command, specifying the execution host name and job server number.

```
root# qmgr -Pm
Mgr: attach execution_host host = jsv00.example.com job_server_id = 0
Attach Execution_Host (jsv00.example.com: JSVID = 0).
Mgr: attach execution_host host = jsv01.example.com job_server_id = 1
Attach Execution_Host (jsv01.example.com: JSVID = 1).
Mgr: attach execution_host host = jsv02.example.com job_server_id = 2
Attach Execution_Host (jsv02.example.com: JSVID = 2).
:
Mgr: attach execution_host host = jsv63.example.com job_server_id = 63
Attach Execution_Host (jsv63.example.com: JSVID = 63).
```

It is possible to confirm the registered execution host information by qstat command with -Et option (Execution host information).

```
$ /opt/nec/nqsv/bin/qstat -Et
ExecutionHost  JSVNO JSV      S OS      Release  Hardware  Load  Cpu  STT
-----
jsv00.example.c    0 LINKDOWN - --      --      --      -    -  INA
jsv01.example.c    1 LINKDOWN - --      --      --      -    -  INA
jsv02.example.c    2 LINKDOWN - --      --      --      -    -  INA
:
jsv63.example.c    63 LINKDOWN - --      --      --      -    -  INA
```

After registering execution hosts, please start a job server by start job_server sub-command of the qmgr command by root user.

* When the JobManipulator is used as a NQSV scheduler, please start all job servers to detect the resource information of execution hosts once before starting NQSV service.

```
root# qmgr -Pm
Mgr: start job_server all
Start Job_Server all Execution_Host.
```

A launcher demon (nqs_lchd) has to be started on each execution host to start a job server by the start

job_server sub-command of the qmgr command.

It is possible to confirm the start of the job server by qstat command with -Et option (Execution host information).

```
$ /opt/nec/nqsv/bin/qstat -Et
```

ExecutionHost	JSVNO	JSV	S	OS	Release	Hardware	Load	Cpu	STT
-----	-----	-----	-	-----	-----	-----	-----	-----	---
jsv00.example.c	0	LINKUP	-	Linux	4.18.0-147	x86_64	0.0	0.0	ACT
jsv01.example.c	1	LINKUP	-	Linux	4.18.0-147	x86_64	0.0	0.0	ACT
jsv02.example.c	2	LINKUP	-	Linux	4.18.0-147	x86_64	0.0	0.0	ACT
:									
jsv63.example.c	63	LINKUP	-	Linux	4.18.0-147	x86_64	0.0	0.0	ACT

A systemctl command is prepared to start/stop a job server. For details, please refer to [Management] Job Server Startup and [Management] Job Server Stop. Additionally about details of job server setting, please refer to [Management] Execution Host Management.)

On the environment that the job server is automatically started by systemd on the execution host that openibd is configured, you must add the following configuration to /usr/local/lib/systemd/system/nqs-jsv.service file.

```
[Unit] section
After=openibd.service
```

Assignment of VE and HCA

On SX-Aurora TSUBASA system, assignment feature of VE and HCA can be used.

In assignment feature of VE and HCA, the feature that the jobs using VEs is executed on the VE incorporated host is supported. To allocate HCA correctly, please locate the "device resource configuration file (/etc/opt/nec/nqsv/resource.def)" on execution host and set it. The structure of HCA is written on it. (For detail, please refer to [JobManipulator] 5.4 HCA Assignment Feature.) And to detect the HCA failure, please refer to [Management] 13.4 HCA

The number of incorporated VE into execution host is displayed by qstat -Ef command (Execution host information).

The followings are example of it.

```

$ qstat -Ef
Execution Host: host1
Batch Server = host1.example.com
Operating System = Linux (Red Hat Enterprise Linux Server release 7.4 (Maipo))
:
Vector Engine Information:
VE Node 0 = Cores: 8 Memory: 48GB Status: ONLINE OS_Status: ONLINE
VE Node 1 = Cores: 8 Memory: 48GB Status: ONLINE OS_Status: ONLINE
:

```

If you submit a request with "--venode" option(total number of VE node) or "--venum-lhost"(number of VE node per logical host) to the queue by which VH is bound, appropriate VE node is assigned to the jobs so that job is executed.

Assignment of GPU

GPGPU function supports the functionality to execute jobs using GPU(s) on a host that has necessary GPU(s). This function is automatically enabled if an execution host has GPU card(s) and nvidia-smi command is installed.

Whether GPGPU is enabled on each execution host can be checked using qstat -Ef command (Execution host information). GPU information is indicated with the command if GPGPU is enabled.

The followings are example of qstat -Ef command (Execution host information) output on an execution host on which GPGPU function is enabled.

```

$ qstat -Ef
Execution Host: host1
Batch Server = host1.example.com
Operating System = Linux
:
GPU Information:
Device[0]: GeForce 9800 GT
TotalGlobalMem = 511 MB
:

```

If an execution host doesn't support GPGPU, GPU information will not be indicated.

It is possible to execute a job in the state that proper GPU is allocated for each job by submitting a request to queue bound up with an execution host that supports GPGPU, using “qsub -l gpunum_job” with the Number of GPU Limit Value for each job.

2.3.5. JobManipulator Start

Start JobManipulator (nqs_jmd) on the scheduler host (batch server host) by using systemctl command. Further, the default of scheduler ID is 1.

```

root# systemctl start nqs-jmd.target

```

When JobManipulator is started first, the status of scheduling is stop. Scheduling is started by execution of following command using smgr(1M) command after starting JobManipulator.

```
root# smgr -Po
Smgr: start scheduling
Start Scheduling.
```

For details of the scheduler, please refer to [JobManipulator].

2.3.6. Queue Setting

Queues to accept and execute a request on the NQSV must be created.

(1) Create Queue

Please make a batch queue by create execution_queue sub-command of the qmgr command by root user, specifying the queue name and priority.

(Please refer to [Management] Create Batch Queue.)

```
root# /opt/nec/nqsv/bin/qmgr -Pm
Mgr: create execution_queue = execque1 pri=10
Queue execque1 created.
```

(2) Bind job server to the Queue

After that, please bind execution queue and job server by bind execution_queue job sever sub-command of the qmgr command by root user, specifying queue name and job server number.

(Please refer to [Management] Bind to Job Server and Scheduler)

```
root# /opt/nec/nqsv/bin/qmgr -Pm
Mgr: bind execution_queue job_server execque1 job_server_id=0
Bound Job_Server_ID (0) to Queue (execque1).
Mgr: bind execution_queue job_server execque1 job_server_id=1
Bound Job_Server_ID (1) to Queue (execque1).
Mgr: bind execution_queue job_server execque1 job_server_id=2
Bound Job_Server_ID (2) to Queue (execque1).
:
Mgr: bind execution_queue job_server execque1 job_server_id=63
Bound Job_Server_ID (63) to Queue (execque1).
```

It is possible to confirm the binding of the execution queue and the job server by qstat command with -Qe option (Queue information).

```
$ qstat -Qe

[EXECUTION QUEUE] Batch Server Host: bsv1

=====
QueueName      SCH JSVs ENA STS  PRI  TOT ARR WAI QUE PRR RUN POR EXT HLD HOL  RST SUS MIG STG CHK
-----
Execque1       -   64 DIS INA   10   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
-----
<TOTAL>                0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
-----
```


(3) Bind scheduler to the Queue

Bind execution queue and scheduler by “bind execution_queue scheduler” sub-command of the qmgr command by root user, specifying queue name and scheduler ID. The default of the scheduler ID is 1, so it is designated as scheduler_id=1 at below.

```
root# /opt/nec/nqsv/bin/qmgr -Pm
Mgr: bind execution_queue scheduler execque1 scheduler_id=1
Bound Scheduler_ID (1) to Queue (execque1).
```

It is possible to confirm the binding of the execution queue and the scheduler by qstat command with -Qe option (Queue information).

```
$ qstat -Qe
[EXECUTION QUEUE] Batch Server Host: bsv1
=====
QueueName      SCH JSVs ENA STS  PRI  TOT ARR WAI QUE PRR RUN POR EXT HLD HOL  RST SUS MIG STG CHK
-----
Execque1       1   64 DIS INA   10    0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
-----
<TOTAL>                0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
-----
```

(4) Starting the Queue

Please change the state of queue by the enable execution_queue sub-command of the qmgr command to accept requests submitted, or by start execution_queue sub-command of the qmgr command to execute the requests in the queue. (About queue setting details, please refer to [Management] Queue Management.)

```
root# /opt/nec/nqsv/bin/qmgr -Pm
Mgr: enable execution_queue = execque1
Enable Queue: execque1
Mgr: start execution_queue = execque1
Start Queue: execque1
```

It is possible to confirm the start execution queue by qstat command with -Qe option (Queue information).

```
$ qstat -Qe
[EXECUTION QUEUE] Batch Server Host: bsv1
=====
QueueName      SCH JSVs ENA STS  PRI  TOT ARR WAI QUE PRR RUN POR EXT HLD HOL  RST SUS MIG STG CHK
-----
Execque1       1   64 ENA ACT   10    0  0  0  0  0  0  0  0  0  0  0  0  0  0
-----
```

<TOTAL>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

2.3.7. Accounting and Budget Control

Before using the NQSV Accounting & Budget Control, perform the following environment settings. Please refer to [Accounting & Budget Control] for detail.

(1) Accounting Server Setting

- User map file

User can set or refer various data of the Accounting server under the NQSV user privilege. Therefore, when the Accounting server is placed on another host than the server that the Batch server is installed, the Accounting server host is required to be set as follows.

- User and group accounts are set as same as the Batch server host.
- /etc/opt/nec/nqsv/nqs_user.map file of the Batch server host must be copied to the Accounting server host.

Please refer to NQSV User's Guide [Management] for the format of the nqs_user.map file.

- Setting automatic start the Accounting Server daemon

To start the Accounting Server daemon automatically when the system starts, set as follows.

```
root# systemctl enable nqs-asv.service
```

- Account data rotation settings

If you run the system for a long time, account data will accumulate during that time. When the amount of account data increases, the display command takes a long time to operate. Therefore, it is necessary to delete or save the data other than those necessary for the current operation.

Use cron to run the sceditacct(1M) command periodically. Since sceditacct(1M) can specify the period of save, you can effectively delete or save the data in the account DB. See "NEC Network Queuing System V (NQSV) User's Guide [Accounting & Budget Control] 3.5.Saving Accounting Data" for more information on the configuration.

- Setting for using budget management

When the budget management function of NQSV is enabled, set the SBU_CHECK in configuration file (/etc/opt/nec/nqsv/asvd.conf) of Accounting server as follows. If you don't want to use budget management, this setting is not required.

```
SBU_CHECK=ON
```

When the budget management function of NQSV is enabled, please set the accounting rate (using sbuedit command) and the budget (using budgetedit command) on the Accounting server.

- Setting for using VE process accounting

When using the VE process accounting, it is necessary to enable the output of the process account of VEOS and set NQSV to aggregate the process account files. See "SX-Aurora TSUBASA Installation Guide 4.13 Process accounting settings" for details on VEOS settings. See " NEC Network Queuing System V (NQSV) User's Guide [Accounting & Budget control] 3.6 VE Process Accounting" for details on NQSV process accounting settings

(2) Accounting Monitor Setting

- Setting automatic start of the Accounting monitor

To start the Accounting monitor daemon automatically when the system starts, set as follows.

```
root# systemctl enable nqs-acm.service
```

- Account File Rotate Settings

The request/job/reservation account file used in the accounting monitor is appended to the data each time a request is executed. Therefore, the file size will increase if you do not set the rotation setting. If the file size continues to increase, you may not be able to send the data to the accounting server properly. Periodic rotation of account files is required for normal operation.

First, set up the accounting monitor configuration file (/etc/opt/nec/nqsv/acmd.conf) appropriately according to the operational status. Set the file size to start saving (TURN_SIZE) and the number of generations to be saved (TURN_SAVE). The default value is 500MB and 10 generations. Make sure that the file size is less than 2 GB.

Next, configure a periodic rotation process for your account files. It is necessary to set up the scturnacct(1M) command to be invoked periodically using cron. See " NEC Network Queuing System V (NQSV) User's Guide [Accounting & Budget Control] 3.5.Saving Accounting Data" for more information on the configuration.

(3) Batch server Setting

To use NQSV Accounting & Budget Control, perform the following environment settings to the batch server.

- Setting request accounting and job accounting

NQSV Accounting & budget control can collect NQSV request accounting information. To collect request accounting information and to use the NQSV budget control function, it is necessary to configure NQSV batch server to output request accounting files and job accounting files. Please configure this request accounting setting using the qmgr(1M) command on the NQSV batch server machine as follows.

```
root# /opt/nec/nqsv/bin/qmgr -P m
Mgr: set batch_server req_account ON
Set Req_Account ON.
Mgr: exit
```

* Change the settings after stopping the system operation.

* Do not set request accounting to OFF during NQSV Accounting & Budget control operation.

- Setting for Accounting server

For NQSV Accounting & budget control, the information about the Accounting server must be set to the environment of batch server so that the batch server can connect to the Accounting server.

To set the Accounting server information, set the host name of the Accounting server first as follows.

```
root# /opt/nec/nqsv/bin/qmgr -P m
Mgr: set batch_server acct_server host = acct-server
Set Acct Server Host.
Mgr: exit
```

* acct-server is Accounting server's hostname.

- Setting for resource reservation accounting

When the accounting function or budget control function for resource reservation sections generated by JobManipulator are needed, please set the resource reservation accounting function to ON by qmgr command as follows.

```
root# /opt/nec/nqsv/bin/qmgr -P m
Mgr: set batch_server reservation_acct = ON
Set Reservation Accounting
Mgr: exit
```

Note that the settings of resource reservation accounting function described above must be executed while the JobManipulator daemon program is down.

- Setting for Budget control

NQSV Accounting & budget control function supports pay-as-you-go charge based on resource usage. By using the budget control function, budget overruns can be checked when submitting requests and when creating resource reservation sections. When using the budget control function, it is necessary the budget control function of the Accounting Server should be enabled. To enable the budget control function, use the qmgr command's "set batch_server nqs_budget_chk" sub-command as follows.

```
root# /opt/nec/nqsv/bin/qmgr -P m
```

```
Mgr: set batch_server nqs_budget_chk = ON
Set NQS Budgetchk
Mgr: exit
```

- Display of settings

The batch server's settings for the NQSV Accounting & budget control function can be displayed by `qstat -Bf` option (Batch server information).

```
$/opt/nec/nqsv/bin/qstat -Bf
Accounting Server Host Name = localhost
:
Budget function = request,reservation
Request Accounting = ON
:
Reservation Accounting = ON
:
```

(4) Starting and stopping

Please start daemon after the operating environment is configured. In this section, how to start and stop the server and monitor daemons is described.

- Starting and Stopping Accounting server

To start and stop the Accounting server daemon, execute as follows.

To start:

```
root# systemctl start nqs-asv.service
```

To stop:

```
root# systemctl stop nqs-asv.service
```

- Starting and Stopping Monitor

To start:

```
root# systemctl start nqs-acm.service
```

To stop:

```
root# systemctl stop nqs-acm.service
```

2.3.8. Submit Request

When the above mentioned environment configuration ends, a request can be submitted from a client host.

A request is submitted by the `qsub` (1) command by `user1` user on the client host.

```
$ /opt/nec/nqsv/bin/qsub -q execque1 -l elapstim_req=200 --cpunum-lhost=1
uname --a
sleep 100
< Ctrl - d>
Request 0.bsv1.example.com submitted to queue: execque1.
$
```

A queue name is designated by `-q` option of the `qsub` command by an example. Also resource limits are set by `-l` option (Elapse Time Limit Value: 200) and by `--cpunum-lhost` (Number of CPU Limit Value: 1). In case of submitting batch request from standard input without creating shell script file as above,

input is completed by entering "Ctrl-d" and the batch request is submitted. The request ID will be printed on standard output.

It is possible to confirm the state of the request by using the qstat (1) command.

\$ /opt/nec/nqsv/bin/qstat													
RequestID	ReqName	UserName	Queue	Pri	STT	S	Memory	CPU	Elapse	R	H	M	Jobs
0.bsv1.example.	STDIN	user1	execque1	0	RUN	-	9.34M	0.30	92	Y	Y	Y	1
\$													

After the batch request is successfully executed, the standard output and standard error files will be returned to the current working directory and stored in the STDIN.o0 and STDIN.e0 respectively. In this example, the result of the execution "uname -a" is stored in the SDTIN.o0.

(About request making, submission, operation and state confirmation, etc., please refer to [Operation]Batch Request Operation.)

2.4. Update

We describe the update and uninstall of NQSV package in this section.

For the procedure of setting the yum repository, refer to 2.1.4 Setup the Yum Repository.

Before updating, stop all services which belongs to NQSV by using systemctl stop command. The procedure to stop the service is different depending on the configuration. Please refer [Management] 1. Unit Management for details.

When multiple JobManipulators are running, the management method will change in NQSV R1.06 and later versions. When updating from NQSV R1.05 or earlier to NQSV R1.06 or later, refer to "NEC Network Queuing System V (NQSV) User's Guide [JobManipulator] 2.5.3 Update from NQSV R1.05 or earlier to NQSV R1.06 or later".

Each package is updated using the yum command as follows. Please refer 1.3.1 for file name of each package.

```
root# yum update <file name of package>
```

If the installation was performed with group names specified, it is possible to update the software with the same group names.

```
root# yum group update <group name>
```

[Notes]

- When updating from an older version, be sure to create the configuration file (/etc/opt/nec/nqsv/nqsd.conf) on the batch server host if it does not exist.
 - If the account data of the old version and the new version are mixed, the account may not be processed correctly, so please save the account data according to the following procedure before updating.
 1. If there are running jobs, wait at least 5 minutes after the jobs are finished before stopping the operation.
 2. Temporarily set the "File size that scturnacct(1M) command starts to migrate accounting files (TURN_SIZE)" in the accounting monitor configuration file (/etc/opt/nec/nqsv/acmd.conf) to 0.
 3. Run the scturnacct(1M) command to migrate the old version of the account data.
 4. Restore the setting of TURN_SIZE in the accounting monitor configuration file (/etc/opt/nec/nqsv/acmd.conf).
-

2.5. Uninstall

Each package is uninstalled using the yum command as follows.

```
root# yum remove <file name of package>
```


Appendix.A Update history

8th edition

- 2.3.7 Accounting and Budget Control
Added description of VE process accounting settings
- 2.4 Update
Added description when using multiple JobManipulators

9th edition

- 2.3.1 Start Batch Server
Updated part of the setup steps.
- 2.4 Update
Added description of Notes.

10th edition

- 2.1.4 Setup the Yum Repository
Changed package version notation.
- 2.3.1 Start Batch Server
Update procedures.

11th edition

- 2.1.3 Confirmation of the port number NQSV uses
Added Launcher daemon's default port number.

12th edition

- 2.1.4 SX-Aurora TSUBASA yum repository changed.

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[Introduction]

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