

SOLUTION PARTNER FOR SMART TECHNOLOGY



# User Guide

LENA Support

Version 1.3.4.2

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# Chapter 1. Overview

## 1.1. What is LENA?

LENA is a web middleware solution that includes all components necessary for serving JAVA J2EE Web Applications in Enterprise environments.

LENA consists of Server products that provide actual web services and a Web UI-based Manager Console for integrated management. Users can easily perform Server installation, Parameter configuration, and inter-product integration through the Manager Console, and with LENA's user-friendly UX/UI design, even users unfamiliar with web middleware solutions can quickly learn how to use them and acquire web middleware-related knowledge.

LENA provides various convenience features by consolidating years of operational know-how from web middleware operators in data center/cloud environments. Additionally, it provides Clustering with high availability and fault tolerance, and failure diagnostics/response functionality to stably process large-scale transactions and minimize service failures.

The following sections explain LENA's features in more detail.

## 1.2. LENA Features

### Enterprise Requirements Provision

LENA Web Application Server EE (J2EE Edition) supports J2EE specifications such as EJB, JTA/XA, JMS, JAX-WS required for executing Enterprise Web Applications. Additionally, it has achieved improvements in startup performance and Application Deploy performance compared to third-party WAS, and resource usage efficiency such as CPU/Memory has also been improved. For high availability, Session Server is provided by default in Enterprise Edition for essential Session Clustering.

### Open Source Compatibility Guarantee

LENA Web Server and LENA WAS are implemented on Open Source Base, ensuring perfect Open Source compatibility. Web Applications written on Open Source basis can be applied to LENA without separate modifications, greatly reducing transition effort. Additionally, using standard technologies for libraries and configuration resolves vendor dependency and strengthens users' IT ownership.

### Intelligent Failure Diagnostics/Response and Service Tracing

It can perform diagnostics based on pre-defined rules for representative failure situations such as Thread Pool Full / Hang / Out of memory and take appropriate measures. Based on real-time collected monitoring data, it analyzes and prevents failure situations through Fake Page bypass or forced restart before servers lead to actual failures, or minimizes failure time even if failures occur. Simultaneously, it provides related Dumps and Reports to enable cause analysis.

### Multi-Server Management and Centralized Operation

Multiple LENA Web Servers and LENA WAS can be grouped into a single Cluster, allowing control of multiple servers simultaneously through single operation. Stable application is possible through consistent configuration synchronization along with Graceful Restart or Rolling Restart. Additionally, Multi Control is supported for servers not grouped in clusters.

### Operational Differentiation Features

Provides various convenience features for easy operation of web middleware solutions. Using template-based simple and fast Server installation and Server replication features, desired

configuration sets can be built in a short time. Through Topology View, configuration and integration information between Server modules can be checked at a glance, improving visibility. Through Dashboard, Events and performance status of operating systems can be checked. Additionally, through Multi Account management, menu/resource access permission settings are possible, and operator Action Tracing, configuration update information History tracking, and Restore functionality are provided.

## 1.3. LENA Components and Key Concepts

LENA is provided through Binary Package and includes all necessary components. Components are broadly divided into two categories.

- Management Module for operating and managing LENA, including LENA Manager Console and LENA Node Agent.
- Server Module responsible for actual Web Service, including LENA Web Server, LENA WAS (Web Application Server), and LENA Session Server.

The following covers detailed descriptions of each component along with key concepts.

### 1.3.1. Management Module

#### LENA Manager

LENA Manager is a Web Application designed to configure and control all resources/functions of LENA through Web UI. Installation and start can be performed through scripts prepared in the LENA Package. To perform Server installation/management through LENA Manager, integration with Node Agent and Advertiser must be configured.

The following explains representative functions and concepts provided by LENA Manager. For detailed information not described below, refer to the "Operator Guide".

- **Dashboard**  
Check resource status and Events of LENA Node and Server
- **Server**  
Register LENA Node, install Web Server, WAS, Session Server, manage configuration, and control start/stop
  - **System**  
Minimum unit for managing LENA Node and Server. Multiple Nodes can be registered under one System, but one Node cannot be registered in multiple Systems.
  - **Node**  
Concept corresponding 1:1 with Node Agent. To execute commands on remote Servers from Manager, it must be done through Node Agent.
- **Cluster**  
Multi-Server management. Cluster configuration is only possible for Servers within one System, and one Server cannot belong to multiple Clusters.
  - **Server Cluster**  
Multiple LENA Web Servers and WAS can be managed as one group. Provides various convenience features such as configuration synchronization and integrated restart.
- **Resource**  
While not a Module provided by LENA, it defines specifications for resources that are closely integrated with LENA Server, using them as Resources. Resources can be set locally for each LENA WAS, but through the Resource menu, they can be set globally and commonly imported by WAS, avoiding duplicate work.

- **Database**

Defines physical specifications such as IP, Port, Driver of DBMS. Corresponds 1:1 with one DBMS.

- **Datasource**

Specifies JNDI Name, Url, User ID/Password for configuring DB Connection Pool in LENA WAS. Multiple Datasources can be configured under one Database.

- **Application**

Specifies the location and Context Path of the Application to be executed through LENA WAS.

- **Topology**

Expresses the configuration status of LENA Web Server, LENA WAS, LENA Session Server, etc. installed and integrated on LENA Manager in Topology Diagram format. Through this function, simple Server installation and start/stop control are also possible.

- **Diagnostics**

Equipped with resource monitoring for LENA Node and Server and various related functions.

### LENA Node Agent

LENA Node Agent corresponds 1:1 with Node when registering Node in LENA Manager, is installed by default in LENA Package, and can be started through prepared scripts. Main roles are handling commands for Servers under Node when executing commands through LENA Manager, and also performing the function of transmitting monitoring and status data to LENA Manager. One Node Agent per physical server is the default, but multiple Node Agents can be configured as needed. LENA Web Server, LENA WAS, and LENA Session Server are configured under LENA Node, and LENA Node is configured under one System.

## 1.3.2. Server Module

### LENA Web Server

LENA Web Server can transmit static content and integrates with LENA WAS in AJP or Reverse Proxy form, performing the front-end role for Web Application services provided by LENA WAS. Additionally, various optional additional functions can be used, with Domain/URI-based branching and Load Balancing functions and security layer (SSL) being representative.

### LENA WAS (Web Application Server)

LENA WAS executes Java Web Applications to provide Web Application services. It includes Datasource integration functionality for using DB Connection Pool and Session Server integration functionality for using Session Clustering. The following explains the two types of LENA WAS.

- **LENA WAS SE (Standard Edition)**

It consists only of Servlet Engine for processing Java Class files and JSP Engine for processing JSP files, and can only execute WAR Type Web Applications. Compared to LENA WAS EE, it has the advantage of being relatively lightweight and fast.

- **LENA WAS EE (Enterprise Edition)**

In addition to the Engine provided by LENA WAS SE, it supports J2EE specifications such as EJB Engine, JMS Engine, and can execute WAR/EJB/EAR Type Applications. Additionally, it supports XA Datasource for 2 Phase Commit.



LENA WAS internally mounts Advertiser Module, which collects LENA WAS's JVM internal monitoring results through JMX and transmits them to LENA Manager.

### LENA Session Server

LENA Session Server is provided to ensure high availability through WAS redundancy by sharing

sessions between multiple LENA WAS. It is provided by default when using LENA Enterprise Edition, and Session Clustering can be configured through Active-Active Clustering (bidirectional Active-Standby) with 2 LENA Session Servers. To use LENA Session Server, no separate configuration is needed in the Application, and it can be implemented with simple configuration in LENA Manager.



However, all objects stored in HTTP Session must be serializable (Serializable) to perform Session-clustering.

## 1.4. LENA Operation Method

Node Agent is installed on Nodes registered in Manager, and Advertiser is installed on Application Server.

Operators send control requests for Server (e.g., Start, Stop, Reload, Dump, configuration changes, etc.) to each Node Agent through Manager's UI, and Node Agent receives and executes the control.

Node Agent and Advertiser periodically transmit monitoring data to Manager, and operators can check resource status of each server through Manager's UI such as Monitoring Dashboard. For Session Server, it directly transmits its own monitoring data to Manager.

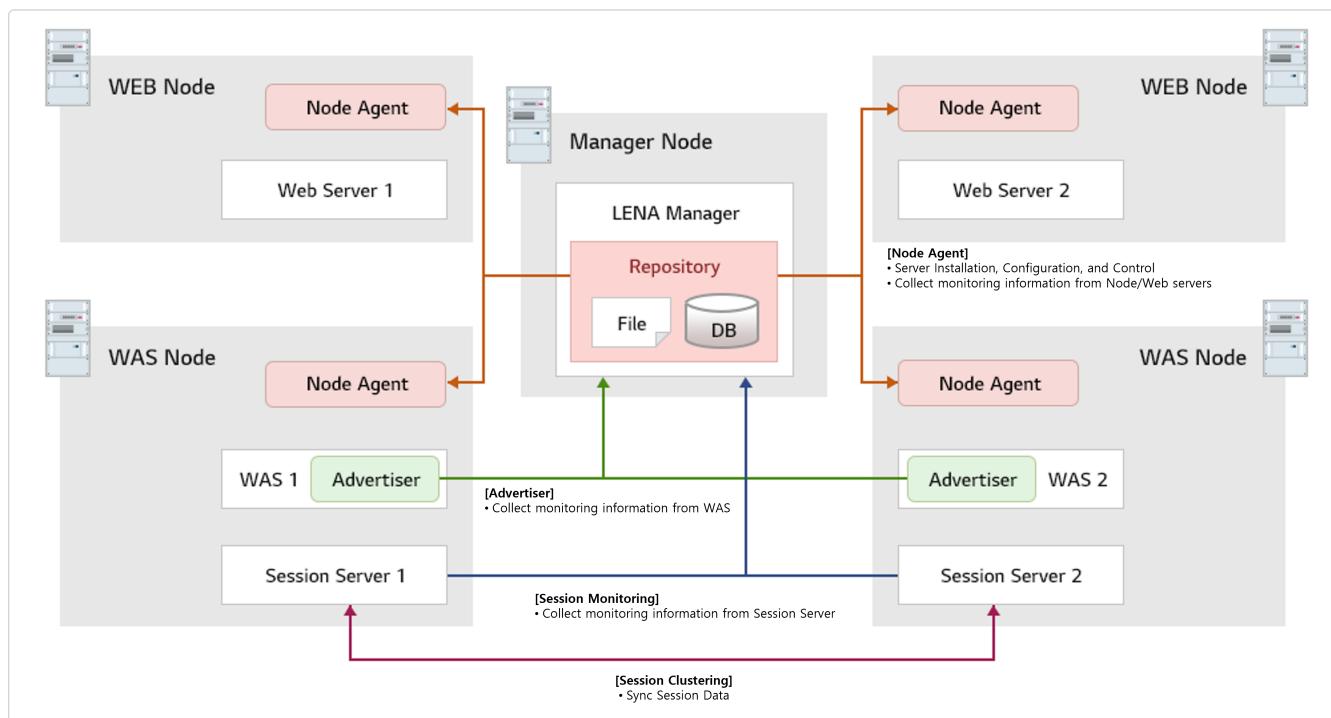


Figure 1. LENA Mechanism

Table 1. LENA Component Descriptions

Component	Description
Manager	Provides Server control through Agent and monitoring functionality
Repository	Mounts File/DB for Manager operation
Node	Mounts Node Agent. Server Module is installed under Node

Component	Description
Node Agent	<ul style="list-style-type: none"><li>- Server installation/replication/patch</li><li>- Server start/stop control</li><li>- Server configuration management</li><li>- Node, Web Server, WAS, Session Server status information</li><li>- Node, Web Server resource monitoring data provision</li></ul>
Advertiser	Provides WAS resource monitoring data
WAS	Provides Java Web Application services
Web Server	Integrates with WAS in Reverse Proxy form, performing front-end role for Web services
Session Server	<ul style="list-style-type: none"><li>- Integrates with WAS for Session Clustering to implement high availability</li><li>- Provides Session Server monitoring data</li></ul>

## 1.5. Edition-specific Provided Specifications

LENA is divided into Standard and Enterprise Edition according to the functional scope provided by Application Server. While Standard Edition supports Web Application-centered specifications, Enterprise Edition supports J2EE specifications such as JTA, JMS, EJB and provides Session Clustering. Functions or specifications provided by each Edition are as follows.

Table 2. Functions and Specifications by Edition

Function/Spec (LENA-Manager Standard)		Standard	Enterprise
Server	Web Server	●	●
	WAS (SE)	●	●
	WAS (EE)	-	●
	Session Server	-	●
Resource	Database	●	●
	DataSource (General)	●	●
	DataSource (XA)	-	●
	JTA	-	●
	JMS	-	●
	Application (WAR)	●	●
	Application (EJB, EAR)	-	●
Cluster		-	●
Topology		●	●
Security		●	●
Diagnostics	Monitoring	●	●
	Diagnostics/Response	-	●
Patch		●	●

(Legend: ● Provided, - Not provided)

# Chapter 2. Log In/Out

Provides functionality for logging in and out of the Manager.

## 2.1. Log In

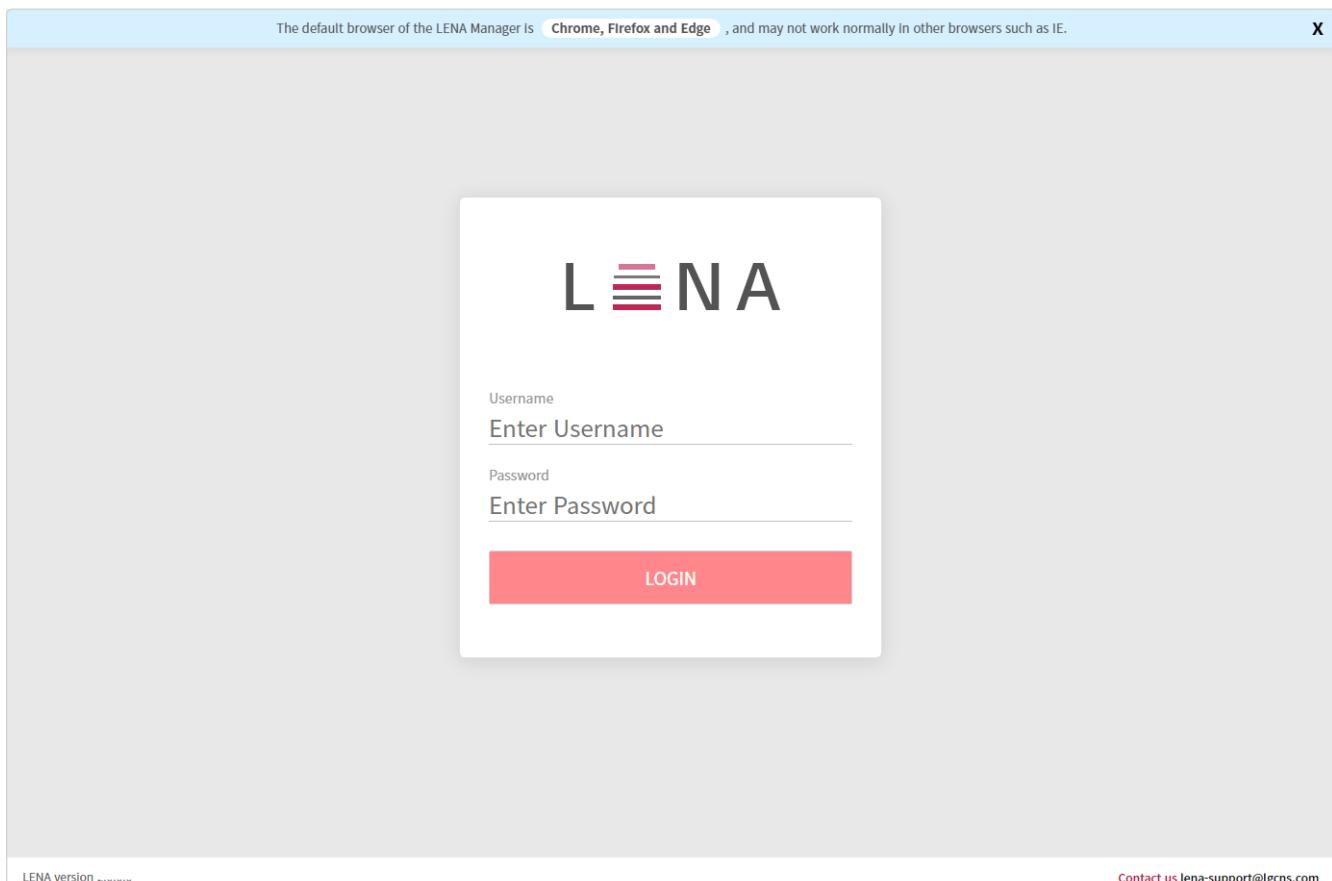


Figure 2. Manager Access Screen

You can log in by entering your user ID and password.

When attempting to log in, if there are 7 or more password errors, you cannot log in with that user. In such cases, the password must be reset through the console. (For detailed information, refer to the 'Manager admin password reset' section in the Appendix.)

### 2.1.1. OpenID Connect

When OpenID Connect is enabled in the Manager Environment of the Admin menu, the OpenID Connect toggle is activated on the login screen. Through the OpenID Connect toggle, you can log in via authentication providers such as Keycloak.

### 2.1.2. Language Settings

You can set the language to use in Manager from the Language option. (English, Korean, Chinese)



The installed version is displayed on the bottom left of the login page, and technical support contact information is displayed on the right.

## 2.2. Log Out

You can log out using the **door icon** on the top right of the Manager.

## 2.3. Theme Change

You can set the theme through the Dark Theme menu in the **gear icon** menu on the top right of the Manager. You can choose between light mode and dark mode.

# Chapter 3. Dashboard

Provides a summary of system configuration information, resource monitoring, events, licenses, and other information managed by the Manager.

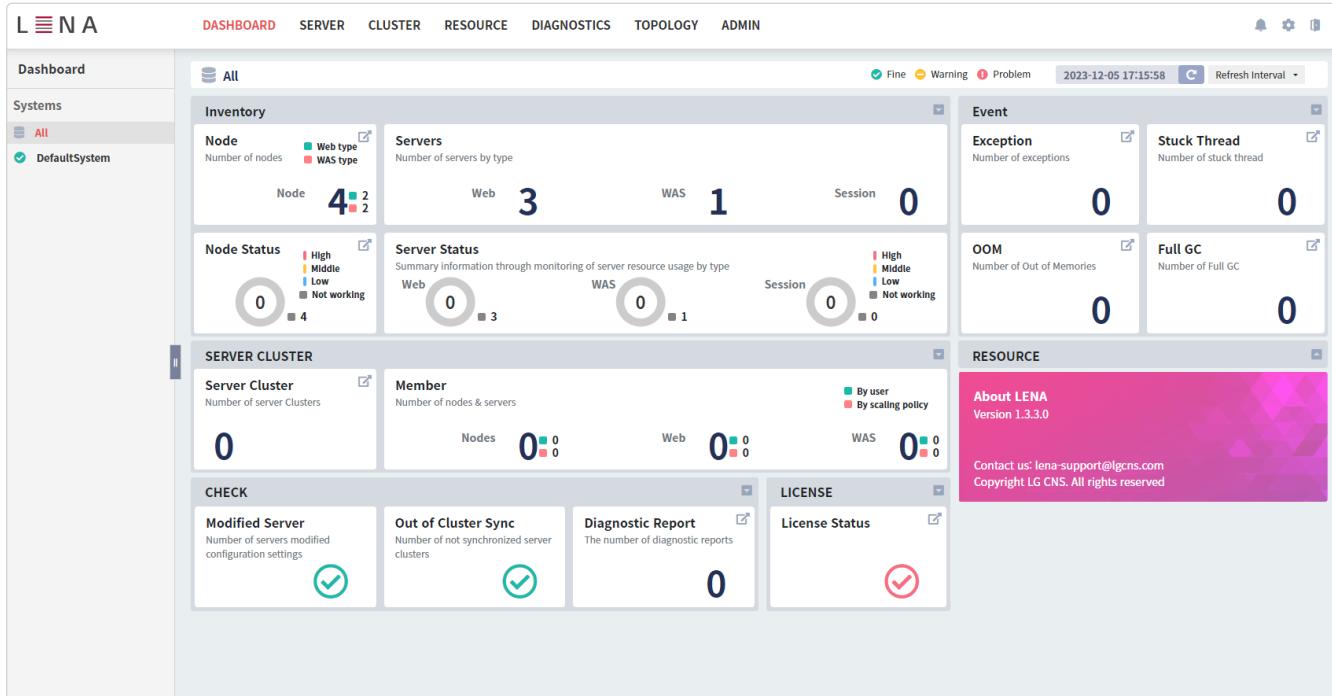


Figure 3. Dashboard

The system list on the left side of the screen provides a list of systems that the logged-in user has permissions for. All shows integrated information from all systems the user has permissions for.

Table 3. Dashboard Items

Item		Description	Notes
INVENTORY	Node	Number of Nodes included in the System	<p>Legend: Count by Node type</p> <ul style="list-style-type: none"> <li>• Web type : Number of nodes where Web Server can be installed</li> <li>• WAS type : Number of nodes where WAS, Session Server can be installed</li> </ul>
	Server	Count by Server type included in the System	
	Node Status	Resource usage (CPU, Memory, DISK) status of Nodes included in the System	<p>Legend</p> <ul style="list-style-type: none"> <li>• High / Middle / Low</li> <li>• Not working : Number of stopped Nodes (Agent)</li> </ul>
SERVER CLUSTER	Server Status	<p>Resource usage status of Servers included in the System</p> <ul style="list-style-type: none"> <li>• Web Server : CPU, Memory, Thread check</li> <li>• WAS : Heap Memory, Thread Pool check</li> <li>• Session : Heap Memory check</li> </ul>	<p>Legend</p> <ul style="list-style-type: none"> <li>• High / Middle / Low</li> <li>• Not working : Number of stopped or hung servers</li> </ul>
	Server Cluster	Number of server clusters	
	Member	Total number of servers by type belonging to server clusters	

<b>Item</b>		<b>Description</b>	<b>Notes</b>
CHECK	Modified Server	Whether servers requiring restart exist among Servers included in the System	EVENT
	Out of Cluster Sync	Whether Server Clusters requiring sync exist	
	Diagnostic Report	Number of reports issued after diagnostic process execution	
Exception	Number of Exceptions occurred in Servers included in the System		
Stuck Thread	Number of Stuck Threads occurred in Servers included in the System		
OOM	Number of Out Of Memory occurrences in Servers included in the System		
Full GC	Number of Full GC occurrences in Servers included in the System		RESOURCE
DB Resource	Number of Databases and Datasources registered and managed in the RESOURCE menu	<p>Datasource legend</p> <ul style="list-style-type: none"> <li>• Used : Number of Datasources currently in use by WAS</li> <li>• Not Used : Number of Datasources not currently in use by WAS</li> </ul>	LICENSE

# Chapter 4. Server

Provides a screen for managing Node, WAS, Web Server, Session Server, and Memory Cache Server.

You can check the number of Nodes and each Server within a specific System, and manage Node and Server status comprehensively in real-time.

## 4.1. System

System is a logical group that contains multiple Servers. "DefaultSystem" is provided by default, and users can create, modify, and delete Systems.

### 4.1.1. List

System list is provided in tree format on the left side of the screen.

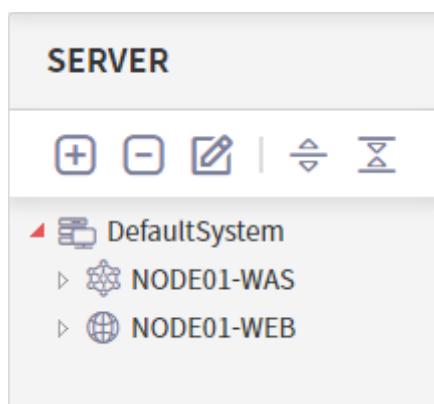


Figure 4. System List

### 4.1.2. Registration

1. Click the **Register(+) button** to create "Create System" in the list.
2. Enter the name of the system to create and press Enter.
3. Click the **OK button** to save.

**i** The permissions of the currently logged-in user are mapped to that System. That is, only users with the same permissions as the logged-in user can view that System. (Same applies to Node, Server, Resource)

### 4.1.3. Modification

1. Select the System to modify.
2. Click the **Edit(pencil) button** to change the name of the selected System, then press Enter.
3. Click the **OK button** to save.

### 4.1.4. Deletion

1. Select the System to delete.
2. Click the **Delete(-) button**.

3. Click the **OK button** to save.



Systems with Nodes underneath cannot be deleted. That is, only empty Systems can be deleted.

## 4.2. Node

Node is a physical Server that contains multiple WAS, Web Server, and Session Server instances.

### 4.2.1. List

You can manage each Node through the Node List.

Node List							WAS List	Web Server List	Session Server List
							Search <input type="text"/> Show <select>10</select> entries		
Status	* Name	* Type	Engine No.	* Address	* Port	* Manager Address			
	was-node	Application	EN8	10.81.209.117	16800	10.81.209.117			

1 to 1 of 1      Previous 1 Next

**Install**    **Register**    **Save**

Figure 5. Node List

The properties of Node are as follows.

Table 4. Node Properties

Item (* indicates required value)	Description	Notes
Node information change status	New/Modified/Deleted status of Node data	<b>+ icon</b> - Display change status when <b>Register</b> / <b>Edit(pencil)</b> button is clicked <b>- icon</b> - Display deletion pending when <b>Delete(trash can)</b> is clicked
Status	Current status of Node	<ul style="list-style-type: none"> <li>Started(v)</li> <li>Stop(□)</li> </ul>
Name(*)	Node name	
Type(*)	Node Type	All - Can install all types of Servers Application - Can install WAS and Session Server Web - Can install Web Server MDS - Can install Cache Server

Item (*) indicates required value)	Description	Notes
Engine	Engine type according to Node Type	Application - EN-7: Java EE 6 / Servlet 3.0 support - EN-8: Java EE 7 / Servlet 3.1 support - EN-9: Java EE 8 / Servlet 4.0 support - EN-10: Servlet 6.0 support Web - EN-A: JK, Proxy support - EN-N: Proxy, Net-Gateway support MDS - EN-R: Memory Cache support
Address(*)	Node IP address	
Port(*)	Node Agent port number	Default - 16800 (when Node Type is All or Application) - 16900 (when Node Type is Web) - 16700 (when Node Type is MDS)
Manager Address(*)	Manager IP address	
Button area	Displays Node information change and related function buttons	<b>Trash can icon</b> - Delete Node information <b>Pen icon</b> - Modify Node information <b>Terminal icon</b> - Provides SSH terminal functionality to the server where Node is installed <b>More icon</b> - Provides menu for JAVA Home setting and Start/Stop

## 4.2.2. Install

1. Click the **Install button** to prepare Node information registration.
2. Enter Node property values.
3. Click the **Save button** to save.

Table 5. Properties set during Install

Item (* indicates required value)	Description	Notes
Node Type	Node Type	Provides the following types: <ul style="list-style-type: none"> <li>• Application: Can install WAS and Session Server</li> <li>• Web: Can install Web Server</li> </ul>
Node Name(*)	Node name	
Node Address(*)	Node IP address	
Node Port(*)	Node Agent port number	Default : 16800 (when Node Type is All or Application), 16900 (when Node Type is Web)
User(*)	Node execution user account	For Node Type Application, cannot run with root account. For Node Type Web, use root only when Web Server Port must be 1024 or below.
Password(*)	Node execution user account password	
SSH Port	SSH port to access the corresponding Server	
LENA Home	Location where Node Agent will be installed	
JAVA Installation	Whether Java is installed	
JAVA Home	Installed Java path	



Install functionality is only supported in Linux environment.

### 4.2.3. Register

1. Click the **Register button** to change Node information to registrable state.
2. Enter Node's Name, Type, Address, Port, and Manager Address (default value is provided).
3. Click the **Save button** to save.

- Manager IP is automatically entered as Node's host IP.
- Depending on network configuration, automatically entered IP may differ from actual network IP.
- In this case, you must modify and enter the Manager IP.



#### 4.2.4. Modification

1. Click the **Edit(pencil) button** to change Node information to modifiable state.
2. Modify Node properties.
3. Click the **Save button** to save.

- When Node's Address or Port needs to be changed due to port policy or firewall policy changes, modify agent.conf settings and restart Node Agent.
- At this time, modify and enter Node's Address and Port information so that Manager can also know the changed information.



When saving modified information, if 'Occured Read Timeout' message occurs, check the following cases:



- Port is being used by something other than Node Agent
- Node Agent is hung
- Network problem exists

#### 4.2.5. Deletion

1. Click the **Trash can button** to change Node information to deletable state.
2. Click the **Save button**.



If Servers are registered under a Node, that Node cannot be deleted.



Uninstall is only supported in Linux environment, and is possible only when selecting one node to delete.

#### 4.2.6. Start

Can start nodes that are in stopped state.

1. Select the Start menu provided when selecting the **... button** in the rightmost column of the Node list, then a popup window appears.
2. Enter User, Password, and SSH Port number, then press the **Start button**.

#### 4.2.7. Stop

Can stop nodes that are in running state.

1. Select the Stop menu provided when selecting the **... button** in the rightmost column of the Node list, then a popup window appears.
2. Enter User, Password, and SSH Port number, then press the **Stop button**.

## 4.2.8. Change Java Home

Can modify JAVA Home path for Node and Servers installed on Node.

1. Modify JAVA Home Path.

- Node Java Home Path : Edit Node Java Home Path.
- Server Java Home Path : Edit JAVA Home path for selected servers. (Not supported in Web Node)

2. Press the **Save button**.

## 4.2.9. Node Terminal

Can access VM where target Node is installed through LENA Manager and use SSH terminal functionality.

To use this functionality, you must meet the following requirements:



- Node must be running and able to communicate with LENA Manager.
- OS where Node is installed must be Linux-based (Windows-based not supported).
- OS account for Node installation/execution must allow SSH access through password authentication.

This functionality reuses the connection between LENA Manager and Node, so no separate port work is necessary to use this terminal functionality.

Clicking the **terminal icon** in the Node list will show a popup screen for using the functionality, and entering the password of the OS account running Node Agent will execute the SSH terminal.

For detailed settings of Node Terminal functionality, refer to the following Manager Configuration settings.

Table 6. Manager Configuration(manager.conf) Node Terminal functionality setting options

Option key	Default value	Description
ssh.cmdCheck.mode.isWhitelist	true	- When true, controls commands using whitelist method. - When false, controls commands using blacklist method.
ssh.cmdCheck.idleTimeout	600 (second)	Disconnects connection after this time if no action is taken after terminal connection. (Minimum configurable value: 30)
ssh.cmdCheck.whitelist.view	view	Set 'view' or 'vi' commands to allow when using whitelist method, separated by ','
ssh.cmdCheck.whitelist	cd,clear,echo,ll,ls,ps,tail,exit	Set commands to allow when using whitelist method. (view, vi excluded)

Option key	Default value	Description
ssh.cmdCheck.blacklist	alias,chmod,chown,cp,dd,exec,rm,mkdir,mv,kill,sed,source,sudo,touch,vi	Set commands to prohibit when using blacklist method, separated by ''



Regardless of Manager Configuration settings, the following expressions cannot be used:

'|' cannot be used except for '| grep' case

'&&' cannot be used

'>' or '>>' cannot be used

'()' (sub shell) and \${}, and `` (backtick) cannot be used

## 4.3. WAS

Provides screens for managing WAS. Performs registration, modification, and deletion of Servers installed on Nodes, and can also install, remove, and clone Servers.

### 4.3.1. List

WAS can be managed through the WAS List.

WAS List								
<input type="text" value="Search"/> Show 10 entries								
	Status	Name	Address	Server ID	Type	Engine No.	HTTP Port	AJP Port
<input type="checkbox"/>	<span style="color: green;">✓</span>	daf-was-01	10.81.209.171	daf-was-01	Enterprise/SE	EN8	8480	8409 <span style="border: 1px solid red; padding: 2px;">Stop</span>
<input type="checkbox"/>	<span style="color: green;">✓</span>	daf-was-02	10.81.209.171	daf-was-02	Enterprise/SE	EN8	8580	8509 <span style="border: 1px solid red; padding: 2px;">Stop</span>

1 to 2 of 2      Previous 1 Next

Multi Action Install Clone + Register ✓ Save

Figure 6. Web Application Server List

WAS attributes are as follows.

Table 7. WAS Attributes

Item (* indicates required values)	Description	Notes
Server information change status	WAS data new/change/delete status and CheckBox for selection	
<b>+ icon</b> - Displays change status when <b>Register / Edit(pencil)</b> button is clicked	<b>- icon</b> - Displays scheduled for deletion when <b>Delete(trash)</b> is clicked	Status
Server status	Started (v) Stop (□) Error (!)	Name(*)
Server name		Address
Server IP address		Server ID
Server ID		Type
Server type	Standard Enterprise/EE Enterprise/SE	Engine
Server engine type	Engine refers to LENA's engine type and differs by WAS Java Spec version. - EN-7: Java EE 6 / Servlet 3.0 support - EN-8: Java EE 7 / Servlet 3.1 support - EN-9: Java EE 8 / Servlet 4.0 support - EN-10: Servlet 6.0 support	HTTP Port
HTTP port number		AJP Port
AJP port number		Start/Stop button

Item (* indicates required values)	Description	Notes
Server start and stop		Button area
Displays server information change and related function buttons		<b>Trash icon</b> - Delete server information
<b>Pen icon</b> - Edit server information	<b>Log file icon</b> - Provides Server Log Viewer functionality	<b>More icon</b> - Provides menu for performing Start/Stop

### 4.3.2. Install

1. Click the **Install button** to prepare for Server installation.
2. Enter Server Type, Server ID, etc.
3. Click the **Save button** to save.



- There may be differences between Servers actually installed on Nodes and Server information managed by Manager. (when installed via console)
- If Server ID duplication error occurs, use Register function to check additional information of installed Servers.

### 4.3.3. Clone

1. Click the **Clone button** to prepare for Server cloning.
2. Select the Server to clone from Node List. Clone Server ID and Clone Service Port are automatically entered.
3. Modify Clone Server ID and Service Port to desired values.

(Include External Source is available when cloning servers to other nodes and sets whether to clone application files deployed on the server to be cloned.)

4. Click the **Save button** to save.



- There may be differences between Servers actually installed on Nodes and Server information managed by Manager. (when installed via console)
- If Server ID duplication error occurs, use register function to check additional information of previously installed Servers.
- When remotely cloning WAS servers, Node's Engine No. must be the same to clone WAS servers.

#### 4.3.4. Register

1. Click the **Register button**.
2. Select the Server to register.
3. Click the **Save button** to save.



Installation is also possible from System > Application Server List Tab. However, the Node to install must be selected from Node List.

#### 4.3.5. Modification

1. Click the **Edit(pencil) button** to change Server information to modifiable state.
2. Modify Server attributes.
3. Click the **Save button** to save.

#### 4.3.6. Deletion

1. Click the **Delete(trash) button** to change Server information to deletable state.
2. Click the **Save button**.
3. Press the **OK button** to display a window for selecting deletion type.
  - Deregister : Delete Server information only from Manager DB and maintain physical Server engine (can be re-registered later via **Register button**)
  - Uninstall : Delete Server information from Manager DB and also delete physical Server engine
4. When Uninstall is selected, a window asking about log directory deletion is displayed.



When deleting WAS, the corresponding Server is deleted from the target list of service control (ADMIN > Security > Rule Applying menu).

Servers bound to Server Cluster cannot be deleted.



When use Server Delete Protection value is set to true in Manager Configuration area of ADMIN > Preference > Manager Environment menu, it can prevent servers from being uninstalled from Manager.

#### 4.3.7. Start/Stop

##### Single Start/Stop

1. Click the **Stop button** to stop the Server.
2. Click the **Start button** to start the Server.



- When stopping Server, WAS stops after all tasks being serviced are completed.
- If tasks are not completed even after Shutdown Timeout time in **General** tab, it is forcibly stopped.



When Server is started, a popup for viewing log files is executed. You can check whether Server started normally through the popup.



**Start button** is activated only when in startable state.

### Multi Start/Stop

1. Select multiple Servers to start or stop.
2. Click the **Multi Action button** at the bottom of Server list.
3. Select Action Type in popup window and click **Action button** to perform start or stop operations for multiple Servers.



After Start / Stop commands in popup screen, the requested command is not stopped even if popup is closed.

### Forced Stop/Restart

1. Click the **Additional function(...) button** at the far right of Server list.
2. Perform forced stop or forced restart.



When performing forced stop or restart, all currently serviced tasks are immediately stopped, so caution is required.

## 4.3.8. Configuration Information Management

Provides functionality to change Server configuration information. Select the Server name to change from Server list. For Standard Edition, General, Session, Logging, Web Configuration, Environment, Properties, Audit, Configuration Tree, History, Tuna tabs are provided, and backup is performed when modifying configuration information for restoration. Enterprise Edition additionally provides Container tab.



When changing Server configuration, Server restart is required to reflect modified items

### General

Manages general configuration information of Server. Port information, Connector information, and Stuck Thread related settings can be modified and saved.

Detailed contents of configuration information are as follows.

#### 1. Server Info

Represents main configuration values of Server.

Table 8. Main Configuration

Item (* indicates required values)	Description	Notes
HTTP Port(*)	HTTP port number	
AJP Port	AJP port number	HTTP port number - 71 (auto-calculated)

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
HTTPS Port	HTTPS port number	HTTP port number + 363 (auto-calculated)
Shutdown Port	Port for receiving Shutdown command string	HTTP port number - 75 (auto-calculated)
Install Path	Server installation path	
Java Home Path	Java Home path	
Minimum Heap Size(MB)(*)	Minimum Heap size to set in WAS (Megabyte)	Default : 2048
Maximum Heap Size(MB)(*)	Maximum Heap size to set in WAS (Megabyte)	Default : 2048
AppBase	Application Base directory	Modification is possible only when Server is in stop state or when no Application is deployed in appBase.
Jvm Route	Server's Unique Identifier	Values set in System Property take priority.  If not available, server.xml value is used  (Generated by combination of Hostname + Port)
Auto Deploy	Whether to automatically Deploy when application changes	Default : false  Detected when war file is re-uploaded to DocBase for each Application
Deploy On Startup	Whether to Deploy Application when WAS starts	Default : true
Shutdown Timeout(s)	Time to wait when tasks are running during Server shutdown (seconds)	Default : 86400

## 2. Connector

Represents Connector configuration values used by Server.

Table 9. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Default Value</b>
Protocol	Protocol type	HTTP/1.1, AJP/1.3

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Default Value</b>
port	Port number	
Redirect Port	Redirect port	Same as HTTPS Port
Connection Timeout(ms)	Time to wait for Request URI reception after Connector allows connection (ms)	HTTP : 20000, AJP : 60000
URI Encoding	Character Encoding for converting URI bytes	UTF-8
Server	Redefines Server Header for Http Response to prevent Server information exposure	Server
Max Threads	Maximum number of Threads that Connector can create	256
Min Spare Threads	Minimum number of Threads secured when creating Connector	10
Max Queue Size	Maximum length of Request Queue	Integer.MAX_VALUE
Packet Size	AJP packet size	8192
Enable Lookups	Whether to use DNS LookUp. Not using is advantageous for performance	false
Compression	Whether to compress HTTP message Body (off, on:Text only, force:all)	off
Tcp No Delay	Send TCP packets without delay	true

### 3. Stuck Thread

Represents Stuck Thread configuration values.

Table 10. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Threshold(s)	Minimum time for identifying Stuck Thread (s)	
Interrupt Thread Threshold	Minimum time for interrupting Stuck Thread (s)	To terminate n seconds after Stuck Thread identification, enter "Threshold+n" value

### 4. Service Endpoint

Represents Endpoint Address configuration values.

Table 11. Main Configuration

Item (* indicates required values)	Description	Notes
Service Endpoint Address	Representative service domain address of WAS	

## Session

Sets whether to use Session Cluster functionality.

### 1. Embedded Session Server mode

Select when Session Server module is embedded in WAS and operates. When Embedded Mode is selected in Session Server Mode item, it is displayed as Embedded Type in Session Server list in Server management screen.

Table 12. Main Configuration

Item (* indicates required values)	Description	Default Value
Embedded Host	Refers to the WAS	Own IP (cannot be changed)
Embedded Port(*)	Port information for Embedded Session Server to be used in the WAS	
Secondary Server Host(*)	Slave Server host IP	
Secondary Server Port(*)	Slave Server Port	
Multi Login Control	Whether to prevent dual login	false (when true, 3 items below are provided)
Logout Page when Multi Login check(Multi Login)	Screen to provide after terminating session of user who logged in first during dual login	
Logout Message when Multi Login check(Multi Login)	Message to show after terminating session of user who logged in first during dual login	
Excepted Page When Multi Login Check(Multi Login)	Exception URL for dual login check	

### 2. Standalone mode

Method of operating by connecting to separate Session Server. Select Standalone in Mode item.

When setting Primary Server and Secondary Server in Standalone mode, Session Server must be configured in advance.

Table 13. Main Configuration

Item (* indicates required values)	Description	Default Value
Primary Server Host(*)	Primary Session Server host	Enter manually selection allows setting external session server outside system
Primary Server Port(*)	Primary Session Server port	
Secondary Server Host(*)	Secondary Session Server host  Used only when connection with PrimaryServer is lost	Enter manually selection allows setting external session server outside system
Secondary Server Port(*)	Secondary Session Server port  Used only when connection with PrimaryServer is lost	
External Stored Session	Store Session objects in Session Server instead of local WAS	false
Share session in applications	Share Session objects between Multi Applications  Configurable only in Standalone Mode	false
Multi Login Control	Whether to prevent dual login	false (when true, 3 items below are provided)
Logout Page when Multi Login check(Multi Login)	Screen to provide after terminating session of user who logged in first during dual login	
Logout Message when Multi Login check(Multi Login)	Message to show after terminating session of user who logged in first during dual login	
Excepted Page When Multi Login Check(Multi Login)	Exception URL for dual login check	



Session functionality is provided in Enterprise Edition.

## Logging

Manages Server's Logging configuration information.

### 1. Log Home

Table 14. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Log Home(*)	Log Home path	When default is selected, set to logs folder under server installation directory, when Enter manually is selected Log Home Prefix item allows input of log directory home path
Retention Days(*)	Maximum retention days for logs	Default : 0(unlimited)

## 2. Access Log

Represents configuration values for Access logs for Requests.

Table 15. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Logging Directory	Log directory	Can be specified as absolute path or relative path of
Pattern	Layout of Logging field	
Prefix	Prefix of Log file	
Suffix	Suffix of Log file	

## 3. Handler List

Detailed contents of Handler configuration information are as follows.

Table 16. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Name(*)	Handler class name	
Type	Handler type	ConsoleHandler and FileHandler can be selected
Level	Handler log level	
Filter	Implementation of java.util.logging.Filter	
Formatter	Implementation of java.util.logging.Formatter	Default : java.util.logging.SimpleFormatter
Encoding	Handler Character Encoding	

Item (* indicates required values)	Description	Notes
Root Handler	Whether Root Logger	

## 4. Logger List

Detailed contents of Logger configuration information are as follows.

Table 17. Main Configuration

Item (* indicates required values)	Description	Notes
Name(*)	Specify Logger name	
Level(*)	Logger log level	
Handler(*)	Select which Handler Logger will use	ConsoleHandler is selected by default



Server's log configuration file is ()/conf/logging.properties.

## Web Configuration

Provides screen for managing Global web.xml configuration. Modify necessary items and click **Save button** at the bottom to save.

Detailed contents of configuration information are as follows.

### 1. Default Servlet

Table 18. Main Configuration

Item (* indicates required values)	Description	Default Value
Directory Listing	Whether to allow Directory Listing when Welcome file is not present	false
Readonly	Do not allow HTTP methods such as PUT, DELETE	true
Input Buffer Size	Input buffer size (bytes)	2048
Output Buffer Size	Output buffer size (bytes)	2048
File Encoding	File encoding	platform default
Show Server Info	Whether to display Server information when Directory Listing is allowed	true
Load On Startup(*)	Specify Servlet loading order when WAS starts	1 (negative: disable / 0: last)

### 2. JSP Engine

Table 19. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Default Value</b>
Check Interval(s)	When Development is false, cycle for checking jsp changes and recompilation (s)	0 (0: disabled / positive: enabled with that cycle)
Development	Whether Development. When Development is true, changes are checked with modificationTestInterval value as cycle	true
Generate String As Character Array	Whether to generate String as Char Array	false
Modification Test Interval(s)	Cycle for jsp change check when Development is true	4 (when 0: check every access)
Trim Spaces	Remove unnecessary whitespace from response to reduce response bytes	false
Java Encoding	Encoding when generating Java source	UTF8
Load On Startup(*)	Specify Servlet loading order when WAS starts	3

### 3. JSP Page Encoding

Table 20. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
URL Pattern	URL Pattern of JSP Page to apply Page Encoding	
JSP Page Encoding	Specify Page Encoding to apply	

### 4. Session

Table 21. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Session Timeout(m)	Session timeout time (minutes)	Default : 30

### 5. Welcome File List

Table 22. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
File(*)	Specify files to service in order when Directory index is called	

## Environment

Provides screen for managing JVM options, Start Shell configuration, and System Properties (provided only in Enterprise Edition). Modify through file editor and click **Save button** to save.

- JVM Env (/bin/setenv.sh): JVM options for Server execution

- Custom Env (/bin/customenv.sh): User custom environment variable configuration
- Base Env (/env.sh): Shell Script for Server startup



Do not modify JVM\_ROUTE value directly here, but use **Load button** in JvmRoute item in Server Info area of General tab to modify. If modified directly here, Manager DB information is not updated, causing DB value mismatch.

- System.properties(/conf/system.properties) (This item can only be checked in Enterprise Edition)
- Catalina.properties (/conf/catalina.properties): Server's Catalina configuration



is WAS's default installation directory.  
is originally used when creating directories to use multiple Instances for one WAS and specifying directories for each Instance, but in LENA, WAS and Instance have 1:1 relationship, so is used as .



By default, configuration cannot be modified as it is Disabled, but if you want to modify, click **Configuration button** in ADMIN > Manager Environment > Manager Configuration item and change the following configuration to false.

```
server.environment.envshell.readonly=false
```

## Properties

Provides screen for checking Server's System Properties and System Environments. Key Properties among System Properties are provided separately to check main information such as Server path, JAVA version, etc. Information can only be checked when Server is running.

## Container

For Enterprise Edition, provides functionality to change EJB Container configuration. If Server is started without container configuration, EJB required container is created with default configuration. If configuration changes other than default are needed, container must be created to change configuration.

### 1. Basic Configuration

Table 23. Basic Configuration

Item (* indicates required values)	Description	Notes
ID(*)	Container identifier	
Type(*)	Container type	

### 2. CMP\_ENTITY Configuration

Table 24. CMP\_ENTITY Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
CmpEngineFactory	Factory class name	Default : org.apache.openejb.core.cmp.jpa.JpaCmpEngineFactory

### 3. BMP\_ENTITY Configuration

Table 25. BMP\_ENTITY Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
PoolSize	Specify Bean pool size	Default : 10

### 4. STATELESS Configuration

Table 26. STATELESS Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
AccessTimeOut	Wait time between invocations (Specifies the time to wait between invocations)	Default : 0 (means no timeout)
MaxSize	Maximum number of Bean pool	Default : 10
MinSize	Minimum number of Bean pool	Default : 0
StrictPooling	Specify operation method when Pool reaches maximum. StrictPooling waits without increasing pool size	Default : true
MaxAge	Maximum time until removal from Pool (h)	Default : -1
ReplaceAged	Whether to Replace when MaxAge is reached	Default : true
ReplaceFlushed	Whether to Replace when flushed from pool	Default : false
MaxAgeOffset	MaxAge usage	Default : -1
IdleTimeout	Maximum time instance can be in idle state in pool (m)	Default : 0
GarbageCollection	Whether to allow garbage collection as mechanism to reduce pool	Default : false
SweepInterval	Cycle for container to clean pool and remove expired instances (m)	Default : 5
CallbackThreads	Thread Pool size. This value is shared by all Beans deployed in container	Default : 5
CloseTimeout	Maximum time to wait until pool closes and PostConstruct method is called (m)	Default : 5

### 5. SINGLETON Configuration

Table 27. SINGLETON Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
AccessTimeout	Wait time between invocations (Specifies the time to wait between invocations)	Default : 0 (means no timeout)

## 6. STATEFUL Configuration

Table 28. STATEFUL Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
AccessTimeout	Wait time between invocations (Specifies the time to wait between invocations)	Default : 0 (means no timeout)
Cache	Cache to manage Stateful bean instances	
Default : org.apache.openejb.cor.e.stateful.SimpleCache	Passivator	Specify Passivator class
Default : org.apache.openejb.cor.e.stateful.SimplePassiv ater	TimeOut(m)	Wait time between invocations (Specifies the time to wait between invocations)
Default : 20	Frequency	Cycle for bean cache to check idle beans (s)
Default : 60	Capacity	Bean pool size for Stateful SessionBean container
Default : 1000	BulkPassivate	Number of instances to passivate at once

## 7. MESSAGE Configuration

Table 29. MESSAGE Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
ResourceAdapter	Specify Resource Adapter	Default : Default JMS Resource Adapter
MessageListenerInterface	Specify MessageListener	Default : javax.jms.MessageListene r

Item (* indicates required values)	Description	Notes
ActivationSpecClass	Specify Activation Spec Class	Default : org.apache.activemq.ra.ActiveMQActivationSpec
InstanceLimit	Maximum number of Instances	Default : 10

## Audit

Function for collecting/managing events occurring in WAS.

Collected event information can be checked in event dashboard. For event dashboard related content, refer to [Event Dashboard](#).

Four types of Detection Rules can be set to collect events.

Table 30. OOM Detection Rule

Item	Description	Notes
Enable	Detects Out Of Memory Error occurrence	Default : true

Table 31. Stuck Thread Detection Rule

Item	Description	Notes
Enable	Detects Stuck Thread occurrence	Default : false



LenaStuckThreadDetectionValve is basically configured in server.xml, and LenaStuckThreadDetectionValve related configuration can be done in Stuck Thread item of SERVER > Server selection > General tab screen.

When user request processing time exceeds Threshold configuration value, event occurs and is sent to Manager.

Table 32. Full GC Detection Rule

Item	Description	Notes
Enable	Detects Full GC occurrence	Default : false

Table 33. Exception Detection Rule

Item	Description	Notes
Enable	Detects Exception occurrence by pattern	Default : false
Exception Class Pattern	Specify Exception pattern to detect. Exceptions inheriting the pattern are also detected. Maximum 10 can be specified, * pattern cannot be used. ex) abcdbc.ExampleException	
Exclude Exception Class Pattern	Specify Exception pattern to exclude from detection. Maximum 10 can be specified, * pattern cannot be used. ex) abcdbc.ExampleException	

Item	Description	Notes
Enable Full Stack	When Exception has multiple Causes, whether to display entire content instead of summary information	Default : true
Max Line of Stack's Cause	Number of Lines to express in Exception Stack Trace. Lines are collected for each Cause by the set number. Setting too large a number can cause load in collection and storage management	Default : 3



Exception classes that can be detected are not Exceptions included in Java's own library, but Exceptions of Application or Framework. Exception patterns must be defined to prevent too many events from occurring.



Audit functionality is provided in Enterprise Edition.

## Configuration Tree

Configuration files under /conf folder under WAS installation path can be managed through file editor.



User running Node Agent must have access permission to WAS configuration information files for modification. If access permission is not available, message that file cannot be edited due to no Write permission is displayed.

## History

Provides backup and restore functionality for configuration information. When configuration information is modified and saved, History is managed by type. Search by entering modification date and configuration file Type.

Click **View(magnifying glass) button** to view information of selected file, and click **Restore button** to restore to that configuration file.

### 4.3.9. Resource Management

When Resources menu under Server menu is selected, screen for managing Resource information related to that Server is displayed. By default, information for DataSource, JMS, JTA Resources can be managed. (JMS, JTA Resources are supported only for Enterprise Server)

Methods for setting Resources in WAS are as follows.



- Add : Click **New button** to add Resource. (Datasource, JMS possible)
- Delete : Click **Delete button** to delete Resource. (Datasource, JMS possible)
- Import : Click **Import button** to import Resources registered in RESOURCE menu. (Datasource, JMS, JTA possible)

#### DataSource

Provides functionality to manage JNDI DataSource that can be used by WAS Applications. JNDI can be set so all Applications running on Server can share and use, or JNDI can be set for each Application for use. For Enterprise Edition, JTA is supported so additional attributes are added.

## 1. Server DataSource Configuration

Set DataSource shared by all Applications running on Server. List of DataSources available on Server can be queried, and DataSource registration, modification, deletion is possible.

Connection test can also be performed to check DataSource status.

DataSource attributes are as follows. Attributes not visible on initial screen are displayed when **Expand all button** is clicked.

Table 34. DataSource Attributes

Item (* indicates required values)	Description	Notes
Scope	Scope for using DataSource	<p>Provides following scopes</p> <ul style="list-style-type: none"> <li>• Context: Datasource information is set in common context area so all Applications can share.</li> <li>• Global: Datasource information is set in GlobalNamingResource area, and each application individually sets and uses in DataSource Link List.</li> <li>• Global+ResourceLink: Datasource information is set in GlobalNamingResource area and Datasource link is set in common context area.</li> </ul>
JNDI Name(*)	JNDI name of Global DataSource	
Databases(*)	Set information of datasource to be used commonly	
Resource Name(*)	Name of Databases	
Address(Host/Port)(*)	IP and port to be used commonly	
Driver Class Name(*)	JDBC Driver class name	
URL(*)	JDBC URL	
User Name(*)	Connection username	

Item (* indicates required values)	Description	Notes
Password(*)	Connection password	when encryption is checked, password is encrypted and stored. Encryption is recommended for security.
Encryption Level	Specify encryption scope for authentication information	Default : Password only
DefaultAutoCommit	Auto Commit status of Connections created from Pool	Default : JDBC driver default value
Auto Reconnection	<p>Used when setting TestOnBorrow and TestWhileIdle values.</p> <p>When true/false, both values are set the same.</p> <p>When User Defined is selected, both values can be set directly by user</p>	
InitialSize	Initial number of Pool Connections	Default : 10
MaxActive	Maximum number of Pool Connections	Default : 100
MinIdle	Minimum number of Idle Connections	Default : 10
MaxIdle	Maximum number of Idle Connections	Default : 100
MaxWait(ms)	Maximum time to wait when no available Connection in Pool (ms)	Default : 30000
MinEvictableIdleTimeMi llis(ms)	Connections existing in Pool in idle state for longer than this time become removal targets (ms)	Default : 60000 (60s) (1800000 (30m) when XaDataSource = true)
ValidationQuery	Connection validity verification query	Default : null
ValidationInterval	Connection validity verification cycle (ms)	Default : 3000
TestOnBorrow	Before taking connection from Pool, perform query set in validationQuery to check connection validity	Default : default
TestOnReturn	Before returning connection to Pool, perform query set in validationQuery to check connection validity	Default : default
TestWhileIdle	For idle connections, perform query set in validationQuery to check connection validity	Default : default
LogValidationErrors	Whether to output errors when errors occur after validation query execution	Default : default(false)

Item (* indicates required values)	Description	Notes
TimeBetweenEvictionRunsMillis(ms)	Thread execution cycle for extracting unused Connections (ms)	Default : 5000
RemoveAbandoned	Whether to detect Connection loss	Default : default
RemoveAbandonedTimeout(s)	Timeout value for determining lost Connection (s)	Default : 60
LogAbandoned	Whether to log when processing Connection loss	Default : default
AbandonWhenPercentageFull	Abandon is performed only when Connection pool exceeds set occupancy rate	Default : 100
JdbcInterceptors	User-defined functionality can be added using flexible and pluggable interceptors	When setting QueryTimeout, enter QueryTimeoutInterceptor(queryTimeout=time(seconds))



When Default value is default instead of true or false, JDBC Driver's default value is used.

Additional attributes for Enterprise Edition are as follows.

Table 35. Enterprise Edition Additional Attributes

Item (* indicates required values)	Description	Notes
JtaManaged	Whether to use JTA	Default : false
XaDataSource	Whether to use XA	Default : false



- XaDataSource configuration can only be used when JTA is configured, and when XaDataSource is configured, validationInterval, logValidationErrors, abandonWhenPercentageFull attributes cannot be used.
- When DataSource is set to Context scope, all Applications share it.
- In EnterpriseServer, DataSource can also be set to Context scope, but Lookup is not possible in EJB. Setting to Global + ResourceLink scope is recommended for EnterpriseServer.
- Password encryption algorithm uses AES. Key value for encryption is managed as "datasource.key=keyvalue" in Manager LENA Home sub /repository/conf/manager.conf file and each WAS Home sub /conf/advertiser.conf.

## 2. Databases

When setting URL, register by creating Databases with information to be used commonly.

Click **Add(+) button** to create popup window.

- Enter Resource Name to distinguish Databases.
- Check automatically filled DriverClassName. Change if necessary.

c. Enter Address (IP and port) and save.

### 3. JDBC driver Upload

JDBC Driver library can be uploaded through Manager.

Click **Upload button** under DataSource detailed information to display upload screen as follows.

- Select file to upload through Search button. File to upload is JDBC Driver library, so only JAR format files can be selected.
- Click Upload button to upload selected file to target directory.
- Path where JDBC Driver file is uploaded is \${SERVER\_HOME}/lib/datasource.

### 4. Connection Test

Click **Connection Test button** in DataSource detailed screen to perform connection test for configured DataSource. When connection is successful, "JDBC Connection is successfully tested" message is displayed.

If "Driver Class[class name] does not exist." error message is displayed, check if corresponding driver class is properly uploaded and classpath is configured.

classpath is added in WAS details > Environment > JVM Settings.

Configuration Example



```
CLASSPATH="$\{CLASSPATH\}:$\{CATALINA_HOME\}/lib/datasource/ojdbc6.jar"
```

## JMS

For Enterprise Edition, JMS related Resources can be defined. Active MQ Resource Adapter, JMS Connection Factory, Queue, Topic configurations can be added, modified, deleted respectively.

Table 36. Main Configuration

Item (* indicates required values)	Description	Notes
ID(*)	Resource identifier	
Type(*)	Resource type	<p>Provides following types</p> <ul style="list-style-type: none"> <li>• ActiveMQResource Adapter</li> <li>• JMSConnectionFactory</li> <li>• Queue</li> <li>• Topic</li> </ul>

## 2. Active MQ Resource Adapter Configuration

Table 37. Main Configuration

Item (* indicates required values)	Description	Notes
BrokerXmlConfig	Broker configuration	Default : broker:(tcp://localhost:61616)?useJmx=false
ServerUrl	Broker address	Default : vm://localhost?waitForStart=20000&async=true
DataSource	Datasource for persistence messages	
StartupTimeout	Maximum startup wait time (s)	Default : 10

## 3. JMS Connection Factory Configuration

Table 38. Main Configuration

Item (* indicates required values)	Description	Notes
ResourceAdapter	Specify Resource Adapter to use	
TransactionSupport	Specify Global Transaction	Provides following types <ul style="list-style-type: none"> <li>• XA</li> <li>• LOCAL</li> <li>• NONE</li> </ul>
PoolMaxSize	Maximum number of physical connections to ActiveMQ broker	Default : 10
PoolMinSize	Minimum number of physical connections to ActiveMQ broker	Default : 0
ConnectionMaxWaitTime	Maximum connection wait time	Default : 5 Seconds
ConnectionMaxIdleTime	Maximum idle time before return	Default : 15 Minutes

## 4. Queue Configuration

Table 39. Main Configuration

Item (* indicates required values)	Description	Notes
Destination	Specify Queue name	

## 5. Topic Configuration

Table 40. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Destination	Specify Topic name	



JMS functionality is provided in Enterprise Edition and is available when Enterprise version WAS is installed.

## JTA

For Enterprise Edition, provides functionality to change Transaction Manager configuration.

To use Transaction Manager configuration with default settings, select Auto for Managed Type. (default during installation)

To change Transaction Manager configuration, select User Defined. (When User Defined is selected, Recovery option is defaulted to "No")

### 1. Main Configuration

Table 41. Main Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Managed Type	Select whether User Defined Transaction Manager	Default : Auto
ID(*)	Transaction Manager name	
Default TimeOut(min)	Specify Timeout	Default : 10 minutes
Type	JTA Type	
Recovery	Set whether to recover when Transaction error occurs	Logging configuration opens when Yes is selected

### 2. Transaction Recovery Logging(howl) Option

Table 42. Logging configuration for recovery when Transaction error occurs

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Directory	Directory location to create log files	Default : txlog
File Name	Log file name	Default : howl
File Extension	Log file extension	Default : log
Max Log Files	Maximum number of log files to create	Default : 2
Max Block Per File	Maximum number of blocks per file	Default : -1
Buffer Size	Buffer size (kb)	Default : 32
Max Buffers	Maximum buffer value	Default : 0
Min Buffers	Minimum buffer value	Default : 4

Item (* indicates required values)	Description	Notes
Adler32 Checksum	When both Adler32 Checksum and Checksum Enabled settings are "Yes", calculate checksum using Adler32 algorithm	Default : Yes
Checksum Enabled	Check Buffer Contents before recording to Disk	Default : Yes
Threads Waiting	Maximum number of waiting threads	Default : -1
Flush SleepTime	Total sleep time of ForceManager	Default : 50 Milliseconds



JTA functionality is provided in Enterprise Edition and is available when Enterprise version WAS is installed.

### 4.3.10. Application Deployment

#### List

Select SERVER menu at top of screen to query Server status. Select Application of Server to deploy from left menu. Provides screen for querying list of deployed Applications.

Application list items are as follows.

Table 43. Application List Items

Item	Description	Notes
Type	Form of Application to deploy	Only Enterprise WAS Type provides following types <ul style="list-style-type: none"> <li>• EJB</li> <li>• EAR</li> <li>• WAR</li> </ul>
Base Name	Base name	
Context Path	Context path	
DocBase	Application location	
Status	Application status	Provides following statuses <ul style="list-style-type: none"> <li>• Started(v)</li> <li>• Stop(□)</li> <li>• Error(!)</li> </ul>

Item	Description	Notes
	Action button	<p>Provides following functionalities</p> <ul style="list-style-type: none"> <li>• <b>Undeploy(trash) button</b></li> <li>• <b>Application Start button</b></li> <li>• <b>Application Stop button</b></li> <li>• <b>Application Reload button</b></li> </ul>
	View button	<p>Provides following functionalities</p> <ul style="list-style-type: none"> <li>• <b>web.xml View(document) button</b></li> </ul>

## Deploy

Attributes for deploying Application are as follows.

Table 44. Application Deployment Attributes

Item (* indicates required values)	Description	Notes
Application Type	Form of Application to deploy	<p>Only Enterprise WAS Type provides following types</p> <ul style="list-style-type: none"> <li>• EJB</li> <li>• EAR</li> <li>• WAR</li> </ul>
Context Path(*)	Context path	
unpackWAR	<p>Whether to execute after expanding WAR file.</p> <p>When value is false, deploy without expanding WAR file compression</p>	<p>Default : true</p>
DocBase(*)	Application location	<p>File can be uploaded through <b>Upload select(file) button</b></p>

### Application Upload

When there is no separate deployment system, applications can be uploaded through Manager.



1. After selecting server, select Applications to move to Application screen.
2. In Application Deploy area at bottom of Applications screen, click **Upload select(file) button** at right end of DocBase item to display file system screen.
3. Select target directory (Server side Host) to upload.
4. Click **Upload button** to create popup for selecting application files.
5. Select application file to deploy and click **Upload button** to upload selected file to target directory.

## Import

Click **Import button** to import and deploy Application information registered in [Resource] menu.

## Configuration Information Management

When Application Name is selected from Application list query screen, Application configuration management screen can be queried. Provides configuration and management functionality for Application Descriptor and DataSource.

Application configuration changes are possible only for selected Server.

## Application Settings

Manages information configured in Application Descriptor.

Click **Back(←) button** to return to Application list screen. Click **Expand all button** to configure additional Context attributes.

DocBase and ContextPath cannot be modified, and detailed information of attributes is as follows. Attributes not visible on initial screen can be checked by clicking **Expand all button**.

Table 45. Application Setting

Item (* indicates required values)	Description	Notes
DocBase(*)	Application's Document Base	
Context Path(*)	Context path	
unpackWAR	Whether to execute after expanding WAR file.  When value is false, WAR file compression is not expanded, and web application is just redeployed in compressed state	Default : true
reloadable	Whether to re-reflect when Application changes (Class File)	
privileged	Whether to use Container Servlet	

Item (* indicates required values)	Description	Notes
cookies	Whether to use cookie for session identifier communication	
useHttpOnly	Whether to block access to session ID using scripts on client side	
session Cookie Domain	When set, overwrites all domains set in web application. When not set, domain distinguished by web application is used	
session Cookie Name	When set, all session cookies are created with that name	Default : JSESSIONID
session Cookie Path	When set, web application uses that path	
useNaming	Set to use JNDI InitialContext for J2EE platform	Default : true



**Add Attribute button** can be used to add attribute values.

## DataSource Link List

Provides functionality to set Global DataSource to be used in Application.

DataSource link management attributes are as follows.

Table 46. DataSource Link Management Attributes

Item (* indicates required values)	Description
Name(*)	JNDI name to use in Application
JNDI Name(*)	JNDI name of Global DataSource
User Name	DataSource connection username
URL	JDBC URL
Description	Description of DataSource
+ icon	Click <b>New button</b> , <b>Edit(pencil) button</b> to display that selected DataSource information is being changed
- icon	Click <b>Delete(trash) button</b> to display that selected DataSource information is deleted

Click **New button** to add new configuration, and click **Save button** to save changed configuration.



Among Datasources configured in WAS, Datasources with Scope of Global or Global + ResourceLink appear as JNDI Name selection items when setting new configuration.

## 4.3.11. Server Log Viewer

Log Viewer button on right side of server list allows browsing log file contents under target server's Log Home path.



To use this functionality, the following must be satisfied.

- Node to which target server belongs must be running.

Click Log Viewer button in server list to check directories and files in tree structure based on target server's Log Home path.

When file is selected, file contents are queried, and when first selected, file contents from end of file up to predetermined size can be checked.

Use Load More, Load Previous buttons to query and check log file contents by predetermined size.

- When using Load Previous button and no more content to query (eg. beginning of file), Alert message that no more data can be read is displayed.
- When using Load More button and no more content to query (eg. end of file), message that no more data can be read is displayed at bottom of screen.

## 4.4. WEB

Provides screens for managing Web Servers with NODE Engine EN-A and EN-N. Registration, modification, and deletion of Web Servers installed on Nodes is possible, and start and stop operations can be performed.

### 4.4.1. List

Web Servers can be managed through the Web Server List.

Web Server List								
	Status	Name	Address	Server ID	Engine	HTTP Port	HTTPS Port	SSL
<input type="checkbox"/>	<input checked="" type="checkbox"/>	WEB01_8000	10.81.209.171	WEB01_8000	EN-A	8000	8363	N
1 to 1 of 1								
Previous 1 Next								
<a href="#">Multi Action</a>   <a href="#">Install</a>   <a href="#">Clone</a>   <a href="#"></a> <a href="#"></a>								

Web Server attributes are as follows.

Table 47. Web Server Attributes

Item (* indicates required values)	Description	Notes
Status	Server status	<p>Provides following statuses</p> <ul style="list-style-type: none"> <li>• Started(v)</li> <li>• Stop(□)</li> <li>• Error(!)</li> </ul>

Item (* indicates required values)	Description	Notes
Name(*)	Server name	
Address	Server IP address	
Server ID	Server ID	
Engine	Node Engine type	<ul style="list-style-type: none"> <li>• EN-A</li> <li>• EN-N</li> </ul>
Protocol Type	Active protocol type	<ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> </ul>
Port	HTTP/HTTPS port number	
Start/Stop button	Server start and stop	
Button area	Displays server information change and related function buttons	
<b>Trash icon</b> - Delete server information	<b>Pen icon</b> - Edit server information	<b>Log file icon</b> - Provides Server Log Viewer functionality

## 4.4.2. Install

1. Click the **Install button** to prepare for Server installation.
2. Enter Server ID and Service Port.
3. Click the **Save button** to save.



There may be differences between Servers actually installed on Nodes and Server information managed by Manager. (when installed via console)



If Server ID duplication error occurs, use Register function to check additional information of installed Servers.

## 4.4.3. Clone

1. Click the **Clone button** to prepare for Web Server cloning.

2. Select Node List to select Server to clone.

3. Enter Clone Server ID and Service Port.

(Include External Source is available when cloning servers to other nodes and sets whether to clone files in Document Root directory of server to be cloned.)

4. Click the **Save button** to save.



There may be differences between Servers actually installed on Nodes and Server information managed by Manager. (when installed via console)



If Server ID duplication error occurs, use Register function to check additional information of installed Servers.

#### 4.4.4. Register

1. Click the **Register button**.

2. Select the Server to register.

3. Click the **Save button** to save.

#### 4.4.5. Modification

1. Click the **Edit(pencil) button** to change Server information to modifiable state.

2. Modify Server attributes.

3. Click the **Save button** to save.

#### 4.4.6. Deletion

1. Click the **Delete(trash) button** to change Server information to deletable state.

2. Click the **Save button**.

3. Press the **OK button** to display a window for selecting deletion type.

○ Deregister : Delete Server information only from Manager DB and maintain physical Server engine (can be re-registered later via **Register button**)

○ Uninstall : Delete Server information from Manager DB and also delete physical Server engine

4. When Uninstall is selected, a window asking about log directory deletion is displayed.



Servers bound to Server Cluster cannot be deleted.



When use Server Delete Protection value is set to true in Manager Configuration area of ADMIN > Preference > Manager Environment menu, it can prevent servers from being uninstalled from Manager.

#### 4.4.7. Start/Stop

##### Single Start/Stop

1. Click the **Stop button** to stop the Server.

## 2. Click the **Start button** to start the Server.

When stopping Server, shutdown method varies according to Stop Mode in [General tab](#).



**Stop** : Basic shutdown option that does not guarantee currently serviced tasks.  
**Graceful Stop** : Shuts down after completing currently serviced tasks. (Service not guaranteed on Windows)



**Start button** is activated only when in startable state.

### Multi Server Start/Stop

1. Select multiple Servers to start or stop.
2. Click the **Multi Action button** at the bottom of Server list.
3. Select Action Type in popup window and click **Action button** to perform start or stop operations for multiple Servers.

### Forced Stop/Restart

1. Click the **... button** at the far right of Server list.
2. Perform forced stop or forced restart.

## 4.4.8. Configuration Information Management (EN-A)

Provides functionality to change configuration information of Web Server's EN-A engine. When Server is selected from Web Server list, it moves to screen for managing configuration information.

### General

General configuration values and Connection, Process information of Web Server can be edited.

Web Server's configuration information performs Validation on configuration files when saving, minimizing Server startup failures due to configuration file errors.

When configuration file error occurs, file is not saved and error message is displayed

Error message example



AH00526: Syntax error on line 253 Argument for 'Require all' must be 'granted' or 'denied'

Detailed contents of configuration information are as follows.

1. Server Info (env.sh and /conf/httpd.conf file management)

Table 48. Server Info

Item (* indicates required values)	Description	Notes
HTTP Port(*)	HTTP Port	

Item (* indicates required values)	Description	Notes
HTTPS Port(*)	HTTPS Port	
Staging HTTP Port	Service port used when starting in Staging mode	Used during Graceful restart  LENA uses basic nostage mode
Staging HTTPS Port	HTTPS port used when starting in Staging mode	Used during Graceful restart  LENA uses basic nostage mode
Install Path	Server installation path	
Document Root(*)	Basic folder path where documents provided by Web Server are stored	
Welcome Page	Define which file to use as initial page document of website	
Stop Mode	Option referenced when Web Server shuts down	Stop : Basic shutdown option that does not guarantee currently serviced tasks.  Graceful Stop : Shuts down after completing currently serviced tasks. (Service not guaranteed on Windows)
Directory/Path	Directory path where web documents are located to set which services and functions to allow/deny	
Directory/Options	Access control settings to apply to all files and directories under specified directory	Indexes : Prevents showing file list under Document Root when welcome page cannot be found  FollowSymLinks : Prevents accessing file system other than existing web documents under Document Root via symbolic links

Item (* indicates required values)	Description	Notes
Directory/Allow Override	Set which directives to allow for resource access control configuration files for each subdirectory under Document Root (generally AccessFileName : .htaccess)	<p>Provides following types</p> <ul style="list-style-type: none"> <li>* None : Do not allow any directives</li> <li>* All : All directives available</li> <li>* AuthConfig : Allow user authentication directives</li> <li>* FileInfo : Allow document type control directives</li> <li>* Indexes : Allow directory indexing control directives</li> <li>* Limit : Allow host access control directives</li> </ul>
Directory/Require	Verify whether authenticated users perform allowed Actions	

## 2. Connection Info (/conf/extra/httpd-default.conf file management)

Table 49. Connection Info

Item (* indicates required values)	Description	Notes
Timeout(s)(*)	Time for Server to wait and disconnect connection when no event occurs for certain time after connection between client and Server (s)	Default : 60
Keep Alive(*)	Whether specific process continues to handle specific user's request tasks	Default : On
Max Keep Alive Requests(*)	<p>Valid value when KeepAlive is On, process handles specific user's requests for specified number of times</p> <p>When this value is exceeded, that process dies and another process handles requests</p>	Default : 100
Keep Alive Timeout(s)(*)	Valid value when KeepAlive is On, timeout to disconnect connection when no request for set time (s)	Default : 5

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Request Read Timeout(s)(*)	Time to wait for receiving request header and body from user  If not received within set time, sends 408 REQUEST TIME OUT error	Default : header=20-40,MinRate=500 body=20,MinRate=500

### 3. Process Info (/conf/extrahttpd-mpm.conf file management)

Table 50. Process Info

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Start Servers(*)	Number of Server processes initialized when Web Server starts	Default : 2
Server Limit(*)	Maximum process value that MaxClients can create	Default : 8
Threads Per Child(*)	Number of Threads created by each child process	Default : 128
Thread Limit(*)	Maximum configurable value for ThreadsPerChild	Default : 128
Min Spare Threads(*)	When number of Idle Threads in Idle state is less than this value, Threads increase to this value and maintain	Default : 128
Max Spare Threads(*)	When number of Idle Threads in Idle state is more than this value, Threads decrease to this value and maintain	Default : 256
Max Request Workers(*)	Maximum number of Threads that all child processes can create	Default : 1024
Max Connection Per Child(*)	Maximum number of requests that child process can service. After processing this many requests, it terminates.	Default : 0 (0: unlimited)

When Web Server can use ppm event method, functionality to easily configure Process Info settings is provided.

The screenshot shows a configuration panel with a header containing a checked checkbox labeled 'Auto Calculation' and a button labeled 'Collapse all'. Below this is a row with a red asterisk and the label 'ServerLimit' followed by a question mark icon, and a text input field containing the value '10'.

When configuring Web Server's Process Info, checking Auto Calculation at top right provides convenient auto-calculation functionality in addition to validation of basic provided configuration values.

**i**

Rule	Validation	Auto Calculation
StartServer ServerLimit	-	
ThreadsPerChild ThreadLimit	-	
ThreadsPerChild + MinSpareThreads MaxSpareThreads		Auto-calculate MinSpareThreads, MaxSpareThreads when ThreadsPerChild changes
ServerLimit ThreadLimit MaxRequestWorkers		Auto-calculate MaxRequestWorkers when ServerLimit, ThreadLimit change

#### 4. Pagespeed Info

Table 51. Pagespeed Info

Item (* indicates required values)	Description	Notes
Enabled(*)	Whether to improve site speed by performing optimization on Resources provided by Web Server by applying mod_pagespeed	<p>Default : off</p> <p>Provides following options</p> <ul style="list-style-type: none"> <li>• on : Allow optimization for Resources</li> <li>• off : Stop additional optimization but allow access to already optimized Resources</li> <li>• unplugged : Stop optimization and deny access</li> </ul>
Rewrite Level(*)	Set Level of filters that module will rewrite	

Item (* indicates required values)	Description	Notes
Default : default(CoreFilters)  Provides following options  * CoreFilters : Contains filters considered safe for most websites in advance * OptimizeForBandwidth : Enhanced safety, suitable for use on sites that do not recognize Pagespeed * PassThrough : Enter all filters manually	File Cache Path(*)	Path of directory where cached Files are stored
	LogDirPath(*)	Path of directory to record Logs
	Enable Filters	List of filters to use
	Disable Filters	List of filters not to use
	Allow URI	URI including wildcard(*) for Resources to allow rewrite
ex) /js	Disallow URI	URI including wildcard(*) for Resources not to allow rewrite

## 5. SSL/TLS Security Info (/conf/extra/httpd-ssl.conf file management)

Table 52. SSL/TLS Security Info

Item (* indicates required values)	Description	Notes
Client TLS Protocol(*)	Configuration value defining protocol to use in SSL/TLS connection	Default : all -SSLv3 -TLSv1 -TLSv1.1
Client Cipher Suite(*)	Configuration value defining set of encryption algorithms to use in SSL/TLS connection	Default : HIGH:MEDIUM:!MD5:!RC4:!3DES

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Proxy TLS Protocol(*)	Configuration defining protocol for proxy server to use in SSL/TLS connection	Default : all -SSLv3 -TLSv1 -TLSv1.1
Proxy Cipher Suite(*)	Configuration value defining set of encryption algorithms for proxy server to use in SSL/TLS connection	Default : HIGH:MEDIUM:!MD5:!RC4:!3DES

## 6. Enable Custom

Table 53. Custom Configuration

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Custom Configuration	Add configurations that users want to add arbitrarily.	Stored separately in custom- <code>httpd.conf</code> file and managed.



When changing configuration, Server restart is required to reflect modified items.

## Connector

Manages information for linking Web Server and WAS.

Connector page is divided into JK and Proxy tabs according to linking method, and Connector configuration information according to module can be edited in each tab.

### JK

Edits configuration information when using JK(mod\_jk).

The screenshot shows the JK tab configuration interface. It includes three main sections: **Connector Info**, **Load Balancer**, and **URI Pattern Group**.

- Connector Info:** Contains fields for Type (ajp13), Request Read Timeout(s) (300), Socket Keep Alive (TRUE), Connection Pool Size (128), Connection Pool Timeout(s) (20), Log Format ("[%a %b %d %H:%M:%S %Y]"), Status Url (/jk-status/), Load Balancing Factor (1), Socket Connect Timeout(s) (5), Connect Timeout(s) (10), Connection Pool Min Size (32), Log Level (error), Status (Enable), and Status Allow IP (127.0.0.1). A **Save** button is at the bottom.
- Load Balancer:** Overview and Configuration tabs are shown. The Load Balancer List table has one entry: lb\_default, which maps to Target Servers WAS\_NODE / was\_8180 and WAS\_NODE / was\_8280, and belongs to URI Pattern Group ID uri\_pattern\_009 and uri\_selected\_test.
- URI Pattern Group:** Contains fields for URI Pattern Group ID (uri\_pattern\_009), VHost (vhost\_default), Mode (Standard selected), Patterns to be Included (\*.jsp), and Patterns to be Excluded (lb\_default). A **Save** button is at the bottom.

JK tab configuration is divided into three areas: Connector Info, Load Balancer, and URI Pattern Group as shown in the above screen.

## 1. Connector Info

Manages basic configuration values of JK.

This is a detailed view of the Connector Info section from the JK tab configuration. It lists various configuration parameters:

* Type	ajp13	* Load Balancing Factor	1
* Request Read Timeout(s)	300	* Socket Connect Timeout(s)	5
* Socket Keep Alive	TRUE	* Connect Timeout(s)	10
* Connection Pool Size	128	* Connection Pool Min Size	32
* Connection Pool Timeout(s)	20	* Log Level	error
* Log Format	"[%a %b %d %H:%M:%S %Y]"	* Status	Enable
* Status Url	/jk-status/	* Status Allow IP	127.0.0.1

Table 54. Connector Info (JK)

Item (* indicates required values)	Description	Notes
Type(*)	Protocol used when Web Server and WAS communicate. (ajp12, ajp13, ajp14, jni, lb and status can be used, but ajp13, lb, status are recommended.)	Default: ajp13
Load Balancing Factor(*)	Load balancing index of WAS. That is, work allocation ratio.	Default: 1

Item (* indicates required values)	Description	Notes
Request Read Timeout(s)(*)	Timeout(seconds) used for communication channel between JK and remote host. If remote host does not respond within specified timeout, JK generates error and retries. When set to 0(default), JK continues to wait for response in all socket operations.	Default: 300
Socket Connect Timeout(s)(*)	Threshold for time(seconds) taken to configure socket connection between JK and remote host. If socket connection cannot be configured within specified time, JK generates error and attempts reconnection.	Default: 5
Socket Keep Alive(*)	When firewall exists between Web Server and WAS, inactive connections are discarded, but when this attribute is TRUE, sends KEEP_ALIVE message to operating system to prevent firewall from disconnecting inactive connections.	Default: TRUE
Connect Timeout(*)	connectTimeout: Wait time(s) for cpong respond to cping request in ajp13 protocol after connection between JK and WAS is completed.	Default: 10
Connection Pool Size(*)	Number of connections maintained as connection pool between JK and WAS.	Default: 128
Connection Pool Min Size(*)	Minimum number of connections maintained as connection pool between JK and WAS.	Default: 32
Connection Pool Timeout(s)(*)	Specifies time(seconds) that JK must maintain before closing inactive sockets. When set to 0, disables socket closing.	Used together with WAS's connectionTimeout option. Default: 20
Log Level(*)	Specifies log level to be recorded in log file.	Default: error
Log Format(*)	Sets format for recording logs in log file.	Default: "[%a %b %d %H:%M:%S %Y]"
Status(*)	Whether to set Server status monitoring configuration value, Status Url and Allow IP can be configured when Enable is selected.	Default: Enable
Status Url(*)	URL for Server status monitoring.	Default: /jk-status/
Status Allow IP(*)	IP that can access Server status monitoring URL.	Default: 127.0.0.1

## 2. Load Balancer

Manages basic configuration and Workers of Load Balancer for load balancing.

Load Balancer area has Overview tab and Configuration tab. Overview tab can check overall information of currently created Load Balancer, and Configuration tab can configure detailed contents of Load Balancer.

**Load Balancer**

[Overview](#) [Configuration](#) [Collapse All](#)

**Load Balancer List**

Load Balancer ID	Target Server	URI Pattern Group ID
lb_default	WAS_NODE / was_8180 WAS_NODE / was_8280	uri_pattern_009 uri_selected_test
lb_test	WAS_NODE / was_8380 WAS_NODE / was_ee_8480	

Table 55. Load Balancer Info - Overview (JK)

Item (* indicates required values)	Description	Notes
Load Balancer ID	ID of currently created Load Balancer.	
Target Server	Basic information of Workers registered in Load Balancer. Displayed in 'Node Name/Server Name' format.	
URI Pattern Group ID	When Load Balancer is specified for specific URI Pattern, URI Pattern Group ID that the URI Pattern belongs to is displayed.	

**Load Balancer**

[Overview](#) [Configuration](#) [Collapse All](#)

**Load Balancer Info**

* Load Balancer ID	lb_default	<a href="#">Create</a> <a href="#">Delete</a>
Load Balancer Detail	* Sticky Session : TRUE	* Method : R[esponse]
	Session Cookie	

**Load Balancer Worker List**

Node Name	Server Name	Server Type	Redirect	Load Balancing Factor	Route ID	Order
WAS_NODE	was_8180	Standard	NONE	1	7c6cac1d0b6f06361	<a href="#">↑</a> <a href="#">↓</a> <a href="#">Edit</a>
WAS_NODE	was_8280	Standard	NONE	1	7c6cac1d0b6f06561	<a href="#">↑</a> <a href="#">↓</a> <a href="#">Edit</a>

[Add Worker](#)

Table 56. Load Balancer Info - Configuration (JK)

Item (* indicates required values)	Description	Notes
Load Balancer ID(*)	Name of Load Balancer.	'lb_' prefix is added.
Sticky Session(*)	Whether to support routing based on Session ID.	
Method(*)	Specifies method used by Load Balancer to determine appropriate Worker for load balancing.	
* R[equest] : Selects Worker with least requests. (Default)	* S[ession] : Selects Worker with least connected sessions.	* N[ext] : Similar to S[ession] but select when fewer Sessions need to be distributed.
* T[raffic] : Selects Worker with least network traffic between JK and AJP connector.	* B[usyness] : Selects Worker with least load based on number of requests.	Session Cookie

Workers are added with Add Worker button in Load Balancer Worker List table.

When Add Worker button is pressed, window for adding Worker is displayed on screen, and users can select servers managed by LENA Manager as Workers in this window. Added Workers are managed through following information.

Table 57. Load Balancer Worker List

Item (* indicates required values)	Description	Notes
Node Name	Node name of server that Worker points to.	
Server Name	Name of server that Worker points to.	
Server Type	Type of server that Worker points to.	Standard or Enterprise is displayed as value.
Redirect	When this Worker is in error state, sets Failover Worker to handle requests received by this Worker.	Default: NONE
Load Balancing Factor	Work allocation ratio, defines how much work this Worker will do compared to other Workers.	Default: 1
Route ID	Route ID of Worker.	
Order	Can change order between Workers.	

### 3. URI Pattern Group

Defines URI Mapping to pass requests coming to Web Server to WAS by checking URI patterns.

The screenshot shows the 'URI Pattern Group' configuration interface. It includes fields for 'URI Pattern Group ID' (set to 'uri\_default'), 'Mode' (set to 'Standard'), and 'VHost' (set to 'vhost\_default'). Below these are two sections: 'Patterns to be Included' and 'Patterns to be Excluded'. Under 'Included', there are entries for '/\*.jsp' and '/\*.do', both associated with 'lb\_default'. Under 'Excluded', there are no entries.

Table 58. URI Pattern Group (JK)

Item (* indicates required values)	Description	Notes
URI Pattern Group ID(*)	Name used for grouping and managing URI patterns. When URI Pattern Group used in Virtual Host, information about which Virtual Host is using it is displayed next to ID.	'uri_' prefix is added when Group is created.
Mode	Specifies whether to input URI patterns in format managed by LENA Manager or in user arbitrary format. Screen for inputting Patterns to be Included/Excluded or URI Patterns is displayed according to this item. If already saved pattern is in format managed by LENA Manager, it is automatically set to Standard, if in user arbitrary format, it is automatically set to Manual.	Standard: Input method according to LENA Manager URI Rule Manual: User arbitrary input method

Item (* indicates required values)	Description	Notes
Patterns to be Included	Input URI patterns to pass to WAS. Must select Load Balancer through right Select box to save. Can delete patterns through button.	Asterisk(*) meaning to allow all characters can be used, Hash(#), Equal(=) are not allowed.
Patterns to be Excluded	Input URI patterns not to pass to WAS. Can delete patterns through button.	Asterisk(*) meaning to allow all characters can be used.
URI Patterns	Used when inputting user arbitrary patterns.	



When changing configuration, Server restart is required to reflect modified items

## Proxy

Edits configuration information when using Proxy(mod\_proxy).

The screenshot shows the Apache Manager interface with the 'Connector' tab selected. The configuration is divided into four main sections:

- Connector Info:** Contains fields for Socket Connect Timeout(s) (5), Request Read Timeout(s) (300), DNS Lookup Interval(s) (0), and Background ServerFault Check Interval(s) (10). A 'Save' button is present.
- Load Balancer:** Shows an Overview with a Target Server of 127.0.0.1:1234 and a Uri Pattern Group ID of url\_default.
- URI Pattern Group:** Shows a Uri Pattern Group ID of url\_default, Mode set to Standard, and two patterns listed under 'Patterns to be Included': /\*.jsp and /\*.do.
- Enable Custom:** This section is currently collapsed.

Proxy tab configuration is divided into four areas: Connector Info, Load Balancer, URI Pattern Group, and Enable Custom.

### 1. Connector Info

Manages basic configuration values of Proxy.

The screenshot shows the 'Connector Info' configuration page. It contains the following fields:

* Socket Connect Timeout(s)	5	* DNS Lookup Interval(s)	0
* Request Read Timeout(s)	300	* Background ServerFault Check Interval(s)	10
* ServerFault Retry Time(s)	60		

A 'Save' button is located at the bottom right.

Table 59. Connector Info (Proxy)

Item (* indicates required values)	Description	Notes
Socket Connect Timeout(s)(*)	Time(s) for Apache httpd to wait until connection creation to backend is completed.	Default: 5
DNS Lookup Interval(s)(*)	DNS lookup interval. Set to 0 to disable function.	Default: 10
Request Read Timeout(s)(*)	Time(seconds) for Apache httpd to wait for transmitted data sent and received from backend.	Default: 300
Background ServerFault Check Interval(s)(*)	When Member connected to backend server is in error state, checks server at interval(seconds) set in this item and retransmits requests when server operates normally. Set to 0 to disable function.	Default: 10
ServerFault Retry Time(s)(*)	When Member connected to backend server is in error state, does not transmit any requests to that server until Apache httpd timeout(seconds) expires.	Background ServerFault Check Interval item is modifiable when 0. Default: 60

## 2. Load Balancer

Manages basic configuration and Members of Load Balancer for load balancing.

Load Balancer area has Overview tab and Configuration tab. Overview tab can check overall information of currently created Load Balancer, and Configuration tab can configure detailed contents of Load Balancer.

Load Balancer Overview		
Load Balancer ID	Target Server	URI Pattern Group ID
lb_default	127.0.0.1:1234	url_default

Table 60. Load Balancer Info - Overview (Proxy)

Item (* indicates required values)	Description	Notes
Load Balancer ID	ID of currently created Load Balancer.	
Target Server	Basic information of Members registered in Load Balancer. Displayed in 'Node Name/Server Name' or 'Address:Port' format.	
URI Pattern Group ID	When Load Balancer is specified for specific URI Pattern, URI Pattern Group ID that the URI Pattern belongs to is displayed.	

The screenshot shows the 'Load Balancer' configuration page. In the 'Load Balancer Info' section, there is a table with fields for Load Balancer ID (lb\_default), Sticky Session (TRUE), Session Cookie (JSESSIONID), Protocol Type (HTTPS), Method (R[quest]), SSL Enable (On), and two checkboxes for SSLProxyCheckPeerExpire and SSLProxyCheckPeerCN. In the 'Load Balancer Member List' section, there is a table with columns for Target Server (127.0.0.1:1234), Protocol Type (https), Redirect (NONE), Load Balancing Factor (1), Route ID, and Order. An 'Add Member' button is at the bottom.

Table 61. Load Balancer Info - Configuration (Proxy)

Item (* indicates required values)	Description	Notes
Load Balancer ID(*)	Name of Load Balancer.	'lb_ ' prefix is added.
Sticky Session(*)	Whether to support routing based on Session ID.	
Method(*)	Specifies method used by Load Balancer to determine appropriate Member for load balancing.	
* R[quest] : Selects Member with least requests. (Default)	* T[raffic] : Selects Member with least network traffic.	* B[usyness] : Selects Member with least load based on number of requests.
Session Cookie	Set when wanting to change Session Cookie name.	
Protocol Type(*)	Specifies protocol type of Member. Can only be changed when Member is not specified.	Default: HTTP
SSL Enable	Uses SSL/TLS protocol engine for Proxy.	This option cannot be configured and operates only according to Protocol configuration. Default: Off when HTTP, On when HTTPS
SSLProxyCheckPeerExpire	Checks if remote server certificate has expired.	Default: On
SSLProxyCheckPeerCN	Checks CN field of remote server certificate.	Default: Off

Members are added with Add Member button in Load Balancer Member List table. When Add Member button is pressed, window for adding Member is displayed on screen, and users can select servers managed by LENA Manager as Members in this window or directly input Member information to add.

Added Members are managed through following information.

Table 62. Load Balancer Member List

Item (* indicates required values)	Description	Notes
Target Server	<p>Basic information of server that Member points to.</p> <p>Displayed in Node Name/Server Name format for Members managed by LENA Manager, Address:Port format for Members not managed by LENA Manager.</p>	
Protocol Type	Protocol type used by Member.	
Redirect	When this Member is in error state, sets Failover Member to handle requests received by this Member.	Default: NONE
Load Balancing Factor	Work allocation ratio, defines how much work this Member will do compared to other Members.	Default: 1
Route ID	Route ID of Member.	Must be input when using Sticky Session.
Order	Can change order between Members.	

### 3. URI Pattern Group

Defines URI Mapping to pass requests coming to Web Server to WAS by checking URI patterns.

URI Pattern Group					
* URI Pattern Group ID	url_default				
Mode	<input checked="" type="radio"/> Standard <input type="radio"/> Manual				
Patterns to be Included	<table border="1"> <tr> <td>/*.jsp</td> <td><input checked="" type="checkbox"/> lb_default</td> </tr> <tr> <td>/*.do</td> <td><input checked="" type="checkbox"/> lb_default</td> </tr> </table>	/*.jsp	<input checked="" type="checkbox"/> lb_default	/*.do	<input checked="" type="checkbox"/> lb_default
/*.jsp	<input checked="" type="checkbox"/> lb_default				
/*.do	<input checked="" type="checkbox"/> lb_default				
Patterns to be Excluded					

Table 63. URI Pattern Group (Proxy)

Item (* indicates required values)	Description	Notes
URI Pattern Group ID(*)	<p>Name used for grouping and managing URI patterns.</p> <p>When URI Pattern Group used in Virtual Host, information about which Virtual Host is using it is displayed next to ID.</p>	'uri_ ' prefix is added when Group is created.
Mode	<p>Specifies whether to input URI patterns in format managed by LENA Manager or in user arbitrary format. Screen for inputting Patterns to be Included/Excluded or URI Patterns is displayed according to this item.</p> <p>If already saved pattern is in format managed by LENA Manager, it is automatically set to Standard, if in user arbitrary format, it is automatically set to Manual.</p>	<p>Standard: Input method according to LENA Manager URI Rule</p> <p>Manual: User arbitrary input method</p>
Patterns to be Included	<p>Input URI patterns to pass to WAS. Must select Load Balancer through right Select box to save. Can delete patterns through button.</p>	<p>Asterisk(*) meaning to allow all characters can be used, Hash(#), Equal(=) are not allowed.</p>

Item (* indicates required values)	Description	Notes
Patterns to be Excluded	Input URI patterns not to pass to WAS. Can delete patterns through button.	Asterisk(*) meaning to allow all characters can be used.
URI Patterns	Used when inputting user arbitrary patterns.	

Table 64. Enable Custom (Proxy)

Item (* indicates required values)	Description	Notes
Custom Configuration	Add configurations that users want to add arbitrarily.	Stored separately in custom-proxy.conf file and managed.



When changing configuration, Server restart is required to reflect modified items

## Virtual Host

Web Server's Virtual Host information can be registered/modified/cloned/deleted.

**Create button**, **Delete button** can register/delete Virtual Host, **Clone button** can clone, **Rename button** can change name.

Virtual Hosts with one or more Load Balancers applied cannot be deleted. If you want to delete that Virtual Host, first change Virtual Host ID of Load Balancer to different Virtual Host ID through Connector tab.

When SSL Enabled and Rewrite Enabled are checked, detailed item areas are additionally displayed as follows.

Detailed contents of configuration information are as follows.

### Managed files

- /conf/extra/vhost/{Virtual Host ID}.conf
- /conf/extra/rewrite/rewrite\_{Virtual Host ID}.conf
- /conf/extra/ssl/ssl\_{Virtual Host ID}.conf
- /conf/extra/vhost/custom\_{Virtual Host ID}.conf

Table 65. Virtual Host Info Configuration Information

Item (* indicates required values)	Description	Notes
Virtual Host ID(*)	Virtual Host name	
Port(*)	HTTP Port used by that virtual host	

Item (* indicates required values)	Description	Notes
Document Root(*)	Homepage directory location of that virtual host	Can be specified to same or subdirectory using Server's DocumentRoot variable \${DOC_ROOT}
Domain Name(*)	Domain name to identify virtual host	
Server Alias	ServerAlias used by virtual host	Can include wildcard characters (*.example.com)
Custom Log(*)	Web log file location of virtual host	
Directory/Path	Path from DocumentRoot	
Directory/Options	Access control settings to apply to all files and directories under specified directory	<ul style="list-style-type: none"> <li>-Indexes prevents showing file list under Document Root when welcome page cannot be found</li> <li>-FollowSymLinks prevents accessing file system other than existing web documents under Document Root via symbolic links</li> </ul>

Item (* indicates required values)	Description	Notes
Directory/Allow Override	Set which directives to allow for resource access control configuration files for each subdirectory under Document Root (generally AccessFileName : .htaccess)	<p>Provides following types</p> <ul style="list-style-type: none"> <li>• None : Do not allow any directives</li> <li>• All : All directives available</li> <li>• AuthConfig : Allow user authentication directives</li> <li>• FileInfo : Allow document type control directives</li> <li>• Indexes : Allow directory indexing control directives</li> <li>• Limit : Allow host access control directives</li> </ul>
Directory/Require	Verify whether authenticated users perform allowed Actions	
Connector Enable	Whether to configure virtual host Connector	
Connector Type/ID	When configuring virtual host Connector, select according to Jk/Proxy type	Displays Connector list created in Connector Tab.
Rewrite Enable	Whether to use Rewrite	
Rewrite Configuration	Detailed Rewrite configuration. Rewrites according to rules set in Rewrite Rule according to specified Rewrite Condition	
Enable Custom	Add configurations that users want to add to Vhost arbitrarily	Contents are generated and stored in separate file (/conf/http/vhost/custom/custom_default.conf).
SSL Enabled	Whether to use SSL	
SSL Port(*)	HTTPS Port	

Item (* indicates required values)	Description	Notes
SSL Certificate File(*)	SSL certificate path	
SSL Certificate Key File(*)	SSL certificate Key file path	
SSL Certificate Chain File	PEM-encoded server CA certificate file path	
SSL CA Certificate File	ROOT certificate path	
SSL Password	ROOT certificate password	
Https Redirect Enabled	Whether to use Http→Https Redirect	
SSL Log Separation	Whether to use SSL Log configuration separation	
SSL Custom Log(*)	SSL Custom Log configuration	
Enable SSL/TLS Security	SSL security configuration per VirtualHost	Instead of using General SSL/TLS security configuration, SSL/TLS security configuration is applied per VirtualHost.



When changing configuration, Server restart is required to reflect modified items

## Logging

Web Server's log configuration information can be edited.

Detailed contents of configuration information are as follows.

### 1. Log Home

Table 66. Log Home

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Log Home(*)	Log Home path	When default is selected, set to logs folder under server installation directory, when custom is selected Log Home Prefix item allows input of log directory home path
Retention Days(*)	Maximum retention days for logs	Default : 0(unlimited)

## 2. Error Log

Used when Web Server records errors that occur while processing diagnostic information and requests. When problems occur during Server startup or operation, check files at location set here first.

Table 67. Error Log

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Location(file/pipe)(*)	Specify Web Server's error log file location	
Log Level(*)	Specify how detailed to record error log file contents	

## 3. Log Format

Sets format to use for log files.

Table 68. Log Format

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Format(*)	Sets format for recording logs in log file	
Nickname(*)	Name of log format to use	

## 4. Log Format with logio

Table 69. Log Format with logio

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Format(*)	Sets format for recording logs in log file	Can measure bytes sent and received including request and head using %l and %O variables

Item (* indicates required values)	Description	Notes
Nickname(*)	Name of log format to use	combinedio requires mod_logio_module to be loaded

## 5. Log Env

Used when setting environment variables according to Request conditions.

Table 70. Log Env

Item (* indicates required values)	Description	Notes
Attribute(*)	HTTP request header (ex: Host, User-Agent, Referer, Accept-Language), one of request attributes (Remote_Host, Remote_Addr, Server_Addr, Request_Method, Request_Protocol, Request_RUI) or environment variable name associated with request	
Regex(*)	Perl compatible regular expression	
Env-variable name(*)	Variable name and value to set (optional) Varname, !varname or varname=value	
Case	Whether to distinguish case for Env-variable	With case : Distinguish case No case : No case distinction



When changing configuration, Server restart is required to reflect modified items

## Environment

Provides screen for managing JVM options, Start Shell configuration, etc. Modify through file editor and click **Save button** to save.

- Custom Env (/bin/customenv.sh): User custom environment variable configuration
- Base Env (/env.sh) - Shell Script for Server startup

By default, configuration cannot be modified. If you want to modify, click **Configuration button** in ADMIN > Manager Environment > Manager Configuration item and change the following configuration to false.



```
server.environment.envshell.readonly=false
```

## Configuration Tree

Web Server's \${SERVER\_HOME}/conf directory sub configuration files can be managed through file editor.



User running Node Agent must have access permission to Web Server configuration information files for modification. If access permission is not available, message that file cannot be edited due to no Write permission is displayed.

### History

Provides backup and restore functionality for configuration information. When configuration information is modified and saved, History is managed. Search by entering modification date.

Click **View(magnifying glass) button** to view information of selected file, and click **Restore button** to restore to that configuration file.

## 4.4.9. Configuration Information Management (EN-N)

Provides functionality to change engine configuration information of EN-N type Web Server. When Server is selected from Web Server list, it moves to screen for managing configuration information.

### General

General configuration values and Connection, Process information of Web Server can be edited.

Web Server's configuration information performs Validation on configuration files when saving, minimizing Server startup failures due to configuration file errors.

When configuration file error occurs, file is not saved and error message is displayed



Error message example

AH00526: Syntax error on line 253 Argument for 'Require all' must be 'granted' or 'denied'

Detailed contents of configuration information are as follows.

### 1. Server Info (/var/common\_value.env file management)

Server Info	
Install Path	/engn001/lenaw/1.3.n/servers/WEB01_8010
* Base Port	HTTP 8010
Welcome Page	index.html index.jsp
Stop Mode	Stop
Document Base	Directory Root Path: /engn001/lenaw/1.3.n/servers/WEB01_8010/htdocs Disable Symbolic Links: <input checked="" type="checkbox"/> Disable Auto Index: <input checked="" type="checkbox"/>
<input checked="" type="button"/> Save	

Table 71. Server Info

Item (* indicates required values)	Description	Notes
Install Path	Server installation path	
Base Port(*)	Port Type information and Port Number set during installation	Port Type cannot be changed, Port Number can be changed
Welcome Page	Define which file to use as initial page document of website	
Stop Mode	Server stop Mode	<ul style="list-style-type: none"> <li>• Stop</li> <li>• Graceful Stop</li> </ul>
Directory Root Path	Basic folder path where documents provided by Web Server are stored	
Disable Symbolic Links	Whether to not use Symbolic Link	Default : on (not used)
Disable Auto Index	Enable or disable directory listing output.	Default : on (disabled)

## 2. Additional Port Info (/var/tcp\_port.env, /var/udp\_port.env file management)

The screenshot shows a web-based administrative interface for managing ports. At the top, there's a header bar with a 'Port' link and a 'Collapse All' button. Below this, there are two main sections: 'TCP Port' and 'UDP Port'. The 'TCP Port' section contains a table with four columns: 'Port Alias', 'Port Number', 'Protocol Type', and 'Virtual Host ID'. One row is present in the table, showing 'httpPort1' as the alias, '8090' as the port number, 'HTTP' as the protocol type, and no virtual host ID assigned. Below the table are search and pagination controls ('Search', 'Show 10 entries'). At the bottom of the TCP section are 'Add Port' and 'Save' buttons. The 'UDP Port' section below it has a similar structure but is currently empty, displaying a message 'No data found.' with its own search and pagination controls.

Table 72. TCP Port

Item (* indicates required values)	Description	Notes
Port Alias(*)	Set Alias of port.	
Port Number	Specify port number.	
Protocol Type	Select protocol type.	

Item (* indicates required values)	Description	Notes
Virtual Host ID	Display Virtual Host ID using that Port.	Cannot change Port Alias when specific Virtual Host is using that Port.



TCP Protocol dedicated usage ports (Proxy(HTTP, HTTPS), Net Gateway(TCP))

Table 73. UDP Port

Item (* indicates required values)	Description	Notes
Port Alias(*)	Set Alias of port.	
Port Number	Specify port number.	
Protocol Type	Select protocol type.	
Virtual Host ID	Display Virtual Host ID using that Port.	Cannot change Port Alias when specific Virtual Host is using that Port.



UDP Protocol dedicated usage ports (Net Gateway)

### 3. Connection Info (/var/common\_value.env file management - related file /conf/http/lenan-http.conf)

The screenshot shows a configuration interface for 'Connection Info'. It includes fields for 'Send Timeout' (60), 'Client Header Timeout' (60), 'Keep Alive Timeout(s)' (5), and 'Client Body Timeout' (60). A 'Save' button is at the bottom right.

Table 74. Connection Info

Item (* indicates required values)	Description	Notes
Send Timeout(*)	Timeout time set for sending response to client. <b>This is timeout time between two consecutive write operations, not total response transmission timeout time.</b> If client receives nothing within time specified in send_timeout, connection is closed.	Default : 60
Keep Alive Timeout(s) (*)	Timeout time set for keeping connection between server and client open.	Default : 5

Item (* indicates required values)	Description	Notes
Client Header Timeout(*)	Time to read request header information, if <b>client does not send header within specified time</b> , request ends with 408(Request Time-out).	Default: 60
Client Body Timeout(*)	Time to read request body information, <b>this is timeout time between two consecutive read operations, not total request body transmission timeout time</b> . If client sends nothing within time specified in client_body_timeout, request ends with 408(Request Time-out).	Default: 60

#### 4. Process Info (/var/common\_value.env file management - related file /conf/lenan.conf)

The screenshot shows a configuration interface for 'Process Info'. It has sections for 'Worker Process' (set to 2) and 'Worker Connection' (set to 1024). There are 'Save' and 'Collapse All' buttons at the bottom.

Table 75. Process Info

Item (* indicates required values)	Description	Notes
Worker Process(*)	Define number of worker processes.	Default : 2
Worker Connection(*)	Set maximum number of simultaneous connections.	Maximum Request allowance: worker_processes * worker_connections



When changing configuration, Server restart is required to reflect modified items.

#### 5. Enable Custom (/conf/custom/custom.conf file management - related file /conf/lenan.conf)

[server 5 general enableCustom] | manual/server\_5\_general\_enableCustom.png

Table 76. Enable Custom

Item (* indicates required values)	Description	Notes
Custom Configuration	Input content that users can freely insert through custom.conf included in lenan.conf.	

### Connector

Manages information for linking Web Server and WAS(Backend).

Connector page is divided into Proxy and Net Gateway tabs according to protocol, and Connector configuration information according to module can be edited in each tab.

## Proxy

Edits configuration information when using Proxy(ngx\_http\_upstream\_module).

The screenshot shows the 'Proxy' configuration interface. The 'Connector' tab is active. The 'Connector Info' section contains fields for Proxy Read Timeout (300), Proxy Connect Timeout (5), Background ServerFault Check Interval (10), and ServerFault Retry Time (60). The 'Load Balancer' section shows a single entry: Load Balancer ID 'lb\_default' pointing to Target Server 'url\_default'. The 'URI Pattern Group' section shows a group named 'uri\_default' with mode 'Standard', including patterns to include (\*.jsp, \*.do) and patterns to exclude (ib\_default). Save buttons are located at the bottom of each section.

Proxy tab configuration is divided into three areas: Connector Info, Load Balancer, and URI Pattern Group as shown in the above screen.

### 1. Connector Info

Manages basic configuration values of Proxy.

This screenshot shows the 'Connector Info' section of the Proxy configuration. It includes fields for Proxy Read Timeout (300), Proxy Connect Timeout (5), Background ServerFault Check Interval (10), and ServerFault Retry Time (60). A 'Save' button is located at the bottom right.

Table 77. Connector Info (Proxy)

Item (* indicates required values)	Description	Notes
Proxy Read Timeout(*)	Timeout time set for reading response from backend server. This is timeout time between two consecutive read operations, not total response transmission timeout time. If backend server sends nothing within time specified in proxy_read_timeout, connection is closed.	Default: 300
Proxy Connect Timeout(*)	Define time limit for establishing connection with backend server. This time limit generally cannot exceed 75 seconds.	Default: 5

Item (* indicates required values)	Description	Notes
Background ServerFault Check Interval(*)	When Member connected to backend server is in error state, checks server at interval(seconds) set in this item and retransmits requests when server operates normally. Set to 0 to disable function.	Default: 10
Server Fault Retry Time(*)	When Member connected to backend server is in error state, does not transmit any requests to that server until timeout(seconds) expires.	Default: 60
Health Check Interval(*)	Checks server at interval(seconds) set for checking backend server status. Set to 0 to disable function.	Default: 60
DNS Lookup Interval(*)	DNS lookup interval. Set to 0 to disable function.	Default: 10



When Background ServerFault Check Interval and Health Check Interval are saved as 0

All LoadBalancer's Auto Server Fault Recovery values change to off, and new creation values are also fixed to off.

## 2. Load Balancer

Manages basic configuration and Members of Load Balancer for load balancing.

Load Balancer area has Overview tab and Configuration tab. Overview tab can check overall information of currently created Load Balancer, and Configuration tab can configure detailed contents of Load Balancer.

Load Balancer ID	Target Server	Pattern
lb_default	TEST_NODE1 / WAS1 TEST_NODE1 / WAS2	uri_default

Table 78. Load Balancer Info - Overview (Proxy)

Item (* indicates required values)	Description	Notes
Load Balancer ID	ID of currently created Load Balancer.	
Target Server	Basic information of Workers registered in Load Balancer. Displayed in 'Node Name/Server Name' format.	
Pattern	When Load Balancer is specified for specific URI Pattern, URI Pattern Group ID that the URI Pattern belongs to is displayed.	

The screenshot shows a web-based configuration interface for a load balancer. At the top, there's a navigation bar with 'Load Balancer' and a 'Collapse All' button. Below it, tabs for 'Overview' and 'Configuration' are visible, with 'Configuration' being active. The main area is divided into two sections: 'Load Balancer Info' and 'Load Balancer Member List'. In 'Load Balancer Info', fields include 'Load Balancer ID' (set to 'lb\_default'), 'Method' (set to 'Sticky Session'), 'Session Cookie' (set to 'JSESSIONID'), 'Timeout Retry' (set to 'Off'), and 'Auto Server Fault Recovery' (set to 'On'). Buttons for 'Create' and 'Delete' are also present. In 'Load Balancer Member List', a table lists a single member: 'WAS\_NODE\_01 / SE01\_8080' with 'Route ID' '2a713d37421d06161' and 'Weight' '1'. An 'Add Member' button is available at the bottom left, and a 'Save' button with a checkmark is at the bottom right.

Table 79. Load Balancer Info - Configuration (Proxy)

Item (* indicates required values)	Description	Notes
Load Balancer ID(*)	Name of Load Balancer.	'lb_' prefix is added.
Method(*)	Specifies method used by Load Balancer to determine appropriate Worker for load balancing.	
* Sticky Session : Route based on Session Cookie	* RoundRobin : Route in order of registered members	• IP Hash : Route based on Client's IP
* Least Connection : Route to side with fewer connections	Session Cookie(*)	Set when wanting to change Session Cookie name.
Default: JSESSIONID	Timeout Retry	Set when wanting to change Session Cookie name.
Default:Off When On is set, retransmits when Gateway Timeout occurs.	Auto Server Fault Recovery	Whether to use fox Directive

Members are added with Add Member button in Load Balancer MemberList table.

When Add Member button is pressed, window for adding Member is displayed on screen, and users can select servers managed by LENA Manager as Members in this window. Added Members are managed through following information.

Table 80. Load Balancer Member List

Item (* indicates required values)	Description	Notes
Target Server	Node name and server name of server that Member points to.	
Route ID	Route ID of Member	

Item (* indicates required values)	Description	Notes
Weight	Work allocation ratio, defines how much work this Worker will do compared to other Workers.	Default: 1

### 3. URI Pattern Group

Defines URI Mapping to pass requests coming to Web Server to WAS by checking URI patterns.

The screenshot shows the 'URI Pattern Group' configuration interface. It includes fields for 'URI Pattern Group ID' (set to 'uri\_default'), 'Virtual Host: default', 'Mode' (set to 'Standard'), and sections for 'Patterns to be Included' and 'Patterns to be Excluded'. The 'Patterns to be Included' section contains entries for '\*.jsp' and '\*.do', each associated with 'lb\_default'. A 'Save' button is at the bottom right.

Table 81. URI Pattern Group (Proxy)

Item (* indicates required values)	Description	Notes
URI Pattern Group ID(*)	Name used for grouping and managing URI patterns. When URI Pattern Group used in Virtual Host, information about which Virtual Host is using it is displayed next to ID.	Group creation adds 'uri_' prefix.
Mode	Specifies whether to input URI patterns in format managed by LENA Manager or in user arbitrary format. Screen for inputting Patterns to be Included/Excluded or URI Patterns is displayed according to this item. If already saved pattern is in format managed by LENA Manager, it is automatically set to Standard, if in user arbitrary format, it is automatically set to Manual.	<ul style="list-style-type: none"> <li>• Standard: Input method according to LENA Manager URI Rule</li> <li>• Manual: User arbitrary input method</li> </ul>
Patterns to be Included	Input URI patterns to pass to WAS. Must select Load Balancer through right Select box to save. Can delete patterns through button.	Asterisk(*) meaning to allow all characters can be used, Hash(#), Equal(=) are not allowed.
Patterns to be Excluded	Input URI patterns not to pass to WAS. Can delete patterns through button.	Asterisk(*) meaning to allow all characters can be used.
URI Patterns	Used when inputting user arbitrary patterns.	

### 4. Enable Custom

/conf/http/custom/custom\_http.conf file management - related file /conf/http/lenan-http.conf)

[server 5 web server proxy enable custom] | manual/server\_5\_web\_server\_proxy\_enable\_custom.png

Table 82. Enable Custom (Proxy)

Item (* indicates required values)	Description	Notes
Custom Configuration	Input content that users can freely insert through custom_http.conf included in lenan-http.conf.	



When changing configuration, Server restart is required to reflect modified items

## Net Gateway

Edits configuration information when using Net Gateway(ngx\_stream\_upstream\_module).

The screenshot shows the configuration interface for the Net Gateway. At the top, there are tabs for General, Connector, Virtual Host, Logging, Environment, Config Tree, History, Proxy, and Net Gateway. The Net Gateway tab is selected. Below the tabs, there are two main configuration areas: 'Connector Info' and 'Load Balancer'. The 'Connector Info' section contains fields for 'Proxy Timeout' (300), 'Proxy Connect Timeout' (5), and 'ServerFault Retry Time' (60). The 'Load Balancer' section has an 'Overview' tab selected, showing a table with columns 'Load Balancer ID' and 'Target Server', containing the entry 'lb\_default'.

Net Gateway tab configuration is divided into two areas: Connector Info and Load Balancer.

### 1. Connector Info

Manages basic configuration values of Net Gateway.

This screenshot shows the 'Connector Info' configuration area. It includes fields for 'Proxy Timeout' (300), 'Proxy Connect Timeout' (5), and 'ServerFault Retry Time' (60). There is also a 'Save' button at the bottom right.

Table 83. Connector Info (Net Gateway)

Item (* indicates required values)	Description	Notes
Proxy Timeout(s)(*)	Set time limit between two consecutive read or write operations in client or proxy server connection. If data is not transmitted within this time, connection is closed.	Default: 5
Proxy Connect Timeout(s)(*)	Define timeout for establishing connection with proxy server	Default: 10
ServerFault Retry Time(s)(*)	Time period during which server is considered unavailable after specified number of server communication failures occur, period during which server is considered unavailable.	Default: 60

### 2. Load Balancer

Manages basic configuration and Members of Load Balancer for load balancing.

Load Balancer area has Overview tab and Configuration tab. Overview tab can check overall information of currently created Load Balancer, and Configuration tab can configure detailed

contents of Load Balancer.

The screenshot shows a web-based interface for managing a load balancer. At the top, there's a navigation bar with 'Load Balancer' and tabs for 'Overview' and 'Configuration'. Below this is a section titled 'Load Balancer Overview' with two main fields: 'Load Balancer ID ~' containing 'lb\_default' and 'Target Server'.

Table 84. Load Balancer Info - Overview (Net Gateway)

Item (* indicates required values)	Description	Notes
Load Balancer ID	ID of currently created Load Balancer.	
Target Server	Basic information of Members registered in Load Balancer. Displayed in 'Address:Port' format.	

The screenshot shows the configuration page for a load balancer. It includes sections for 'Load Balancer Info' (with fields for Load Balancer ID set to 'lb\_default' and Method set to 'Least Connection') and 'Load Balancer Member List' (which lists a single member '127.0.0.1:3411' with weight 1). There are also 'Create' and 'Delete' buttons for managing members.

Table 85. Load Balancer Info - Configuration (Net Gateway)

Item (* indicates required values)	Description	Notes
Load Balancer ID(*)	Name of Load Balancer.	'lb_-' prefix is added.
Method(*)	Specifies method used by Load Balancer to determine appropriate Member for load balancing.	
* Round Robin : Route sequentially through registered member list	* IP Hash : Route based on Client IP	<ul style="list-style-type: none"> <li>Least Connection : Route to side with fewer connections based on Connection</li> </ul>

Members are added with Add Upstream button in Load Balancer Member List table.

When Add Upstream button is pressed, window for adding Upstream is displayed on screen, and users can directly input Upstream information to add in this window.

Added Upstreams are managed through following information.

Table 86. Load Balancer Member List

Item (* indicates required values)	Description	Notes
IP or DNS	Basic information of server that Upstream points to. Basically displayed in Address:Port format.	DNS can also be input.

<b>Item (* indicates required values)</b>	<b>Description</b>	<b>Notes</b>
Port	Port information used by Upstream.	
Weight	Work allocation ratio, defines how much work this Upstream will do compared to other Upstreams.	Default: 1 Cannot input 0 for work allocation (changes to default 1)

### 3. Enable Custom

/conf/stream/custom/custom\_stream.conf file management - related file /conf/stream/lenan-stream.conf)

[server 5 web server stream enable custom] |

## manual/server\_5\_web\_server\_stream\_enable\_custom.png

Table 87. Enable Custom (Net Gateway)

Item (* indicates required values)	Description	Notes
Custom Configuration	Input content that users can freely insert through custom_stream.conf included in lenan-stream.conf.	



When changing configuration, Server restart is required to reflect modified items

## Virtual Host

### Proxy

Proxy Web Server's Virtual Host information can be registered/modified/cloned/deleted.

**Create button**, **Delete button** can register/delete Virtual Host, **Clone button** can clone, **Rename button** can change name.

Virtual Hosts with one or more Load Balancers applied cannot be deleted. If you want to delete that Virtual Host, first change Virtual Host ID of Load Balancer to different Virtual Host ID through Connector tab.

When Enable SSL and Enable Rewrite and Enable Custom are checked, detailed item areas are additionally displayed.

Detailed contents of configuration information are as follows.

### Managed files

- /conf/http/vhost/vhost\_{Virtual Host ID}.conf
- /conf/http/vhost/vhost.list
- /conf/http/vhost/rewrite/rewrite\_{Virtual Host ID}.conf

- /conf/http/vhost/custom/custom\_{Virtual Host ID}.conf

Table 88. Virtual Host Info Configuration Information

Item (* indicates required values)	Description	Notes
Virtual Host ID(*)	Virtual Host name	
Domain Name	Domain name to identify virtual host	
IP(*)	Select protocol to be used by that virtual host (HTTP, HTTPS) IP used by that virtual host	
Port(*)	Port used by that virtual host	
SSL Enable	Whether to additionally use SSL, HTTPS service port to be used by that virtual host	When checked, need to use port from combo box for HTTPS service port (port information to use must be pre-registered as HTTPS port in General tab's Port Info)
SSL/SSLCertificateFile	SSL certificate path	
SSL/SSLCertificateKeyFile	SSL certificate Key file path	
SSL/SSLPASSWORD	SSL Password	When password is input, managed through AES256 encryption
SSL/Use HTTPS Redirect	Whether to use HttpHttps Redirect	
Document base/Directory Root Path	Homepage directory location of that virtual host	Can be specified to same or subdirectory using Server's DocumentRoot variable \${DOC_ROOT}
Document base/Disable Symbolic Links	Prevent accessing file system other than existing web documents under Document Root via symbolic links	
Document base/Disable Auto Index	Prevent showing file list under Document Root when welcome page cannot be found	

Item (* indicates required values)	Description	Notes
Document base/Allowed Methods	Allow access for specified http methods	
Document base/Deny IP	Deny access for specified networks or addresses	
Access Log/Alias	Set format for recording logs in log file	
Access Log/Location	Set location and name for log files	
URI	Select URI Pattern Group set in Connector Proxy Tab	Not required selection
Enable Rewrite	Whether to use Rewrite function, creates input window below when checked	Input content is generated and stored in separate file
Enable Custom	Whether to use Custom Configuration, creates input window below when checked	Input content is generated and stored in separate file (/conf/http/vhost/custom/custom_default.conf)

## Net Gateway

Net Gateway Web Server's Virtual Host information can be registered/modified/cloned/deleted.

**Create button**, **Delete button** can register/delete Virtual Host, **Clone button** can clone, **Rename button** can change name.

Virtual Hosts with one or more Load Balancers applied cannot be deleted. If you want to delete that Virtual Host, first change Virtual Host ID of Load Balancer to different Virtual Host ID through Connector tab.

The screenshot shows the Net Gateway configuration interface. At the top, there are tabs for 'Proxy' and 'Net Gateway'. Below them is a section titled 'Virtual Host List' with a table header: 'Virtual Host ID', 'IP', 'Port', and 'Protocol Type'. A message 'No data found.' is displayed. Below this is a 'Virtual Host Info' dialog box. It contains fields for 'Virtual Host ID' (with a red asterisk), 'IP' (0.0.0.0), 'Port' (TCP dropdown), 'Access Log' (common), 'Alias' (empty), 'Location(file|pipe)' (empty), and 'Load Balancer' (lb\_default). There is also a 'Cancel' button.

Detailed contents of configuration information are as follows.

## Managed files

- /conf/stream/vhost/vhost\_{Virtual Host ID}.conf

- /conf/stream/vhost/vhost.list
- /conf/stream/vhost/custom\_{Virtual Host ID}.conf

Table 89. Virtual Host Info Configuration Information

Item (* indicates required values)	Description	Notes
Virtual Host ID(*)	Virtual Host name	
IP(*)	Select protocol to be used by that virtual host (HTTP, HTTPS) IP used by that virtual host	
Port(*)	Port used by that virtual host	
Access Log/Alias	Set format for recording logs in log file	
Access Log/Location	Set location and name for log files	
Load Balancer	Select Load Balancer Group set in Connector Net Gateway Tab	
Enable Custom	Whether to use Custom Configuration, creates input window below when checked	Input content is generated and stored in separate file (/conf/stream/vhost/custom/custom_default.conf)

## Logging

Web Server's log configuration information can be edited.

The screenshot shows the 'Logging' tab selected in a navigation bar. Below it are four configuration sections:

- Log Home:** Set to 'default' (radio button selected), 'Retention Days' set to 30.
- Error Log:** 'Location(file|pipe)' set to '/engn001/lenaw/1.3.3.0/servers/web01\_8000/logs/error\_web01\_8000\_LNYISWB2\_%Y%m%d.log|86400', 'Log Level' set to 'error'.
- Log Format: Proxy:** 'Alias' set to 'common', 'Format' set to '\$http\_x\_forwarded\_for \$remote\_addr \$remote\_user [\$time\_local] "\$request" \$status \$body\_bytes\_sent'. Includes a '+ Add Log Format' and a 'Save' button.
- Log Format: Net Gateway:** 'Alias' set to 'common', 'Format' set to '\$remote\_addr [\$time\_local] \$protocol \$status \$bytes\_sent \$bytes\_received \$session\_time'. Includes a '+ Add Log Format' and a 'Save' button.

Detailed contents of configuration information are as follows.

## 1. Log Home

Table 90. Log Home

Item (* indicates required values)	Description	Notes
Log Home(*)	Log Home path	When default is selected, set to logs folder under server installation directory, when custom is selected Log Home Prefix item allows input of log directory home path
Retention Days(*)	Maximum retention days for logs	Default : 0(unlimited)

## 2. Error Log

Used when Web Server records errors that occur while processing diagnostic information and requests. When problems occur during Server startup or operation, check files at location set here first.

Table 91. Error Log

Item (* indicates required values)	Description	Notes
Location(file/pipe)(*)	Specify Web Server's error log file location	
Log Level(*)	Specify how detailed to record error log file contents	

## 3. Log Format : Proxy

Sets format to use for Proxy log files.

Table 92. Log Format : Proxy

Item (* indicates required values)	Description	Notes
Alias(*)	Name of log format to use	
Format(*)	Sets format for recording logs in log file	

## 4. Log Format : Net Gateway

Sets format to use for Net Gateway log files.

Table 93. Log Format : Net Gateway

Item (* indicates required values)	Description	Notes
Alias(*)	Name of log format to use	
Format(*)	Sets format for recording logs in log file	



When changing configuration, Server restart is required to reflect modified items

## Environment

Provides screen for managing JVM options, Start Shell configuration, etc. Modify through file editor and click **Save button** to save.

- Custom Env (/bin/customenv.sh): User custom environment variable configuration
- Base Env (/env.sh) - Shell Script for Server startup

By default, configuration cannot be modified. If you want to modify, click **Configuration button** in ADMIN > Manager Environment > Manager Configuration item and change the following configuration to false.



```
server.environment.envshell.readonly=false
```

## Configuration Tree

Web Server's \${SERVER\_HOME}/conf directory sub configuration files can be managed through file editor.



User running Node Agent must have access permission to Web Server configuration information files for modification. If access permission is not available, message that file cannot be edited due to no Write permission is displayed.

## History

Provides backup and restore functionality for configuration information. When configuration information is modified and saved, History is managed. Search by entering modification date.

Click **View(magnifying glass) button** to view information of selected file, and click **Restore button** to restore to that configuration file.

## 4.4.10. Server Log Viewer

Log Viewer button on right side of server list allows browsing log file contents under target server's Log Home path.



To use this functionality, the following must be satisfied.

- Node to which target server belongs must be running.

Click Log Viewer button in server list to check directories and files in tree structure based on target server's Log Home path.

When file is selected, file contents are queried, and when first selected, file contents from end of file up to predetermined size can be checked.

Use Load More, Load Previous buttons to query and check log file contents by predetermined size.

- When using Load Previous button and no more content to query (eg. beginning of file), Alert message that no more data can be read is displayed.

- When using Load More button and no more content to query (eg. end of file), message that no more data can be read is displayed at bottom of screen.

## 4.5. Session Server

Provides a screen for managing Session Server. You can register, modify, and delete Session Servers installed on Nodes, and execute start and stop shells.

### 4.5.1. List

You can manage each WAS through the Session Server List.

Session Server List					
Search: <input type="text"/> Show 10 entries					
Status	* Name	Address	Server ID	Type	Port
1 to 1 of 1					
<input checked="" type="checkbox"/>	SS01_5180	10.81.209.171	SS01_5180	Standalone	5180 <input type="button" value="Stop"/> <input type="button" value="Delete"/> <input type="button" value="Edit"/> <input type="button" value="More"/>
Previous 1 Next			<input type="button" value="Install"/>	<input type="button" value="Register"/>	<input checked="" type="button" value="Save"/>

Figure 7. Session Server List

The properties of Session Server are as follows.

Table 94. Session Server Properties

Item (* indicates required value)	Description	Notes
Status	Session Server status	<ul style="list-style-type: none"> <li>Started(v)</li> <li>Stop(□)</li> <li>Error(!)</li> </ul>
Name(*)	Session Server name	
Address	Session Server IP address	
Server ID	Server ID	
Type	Session Server type	<ul style="list-style-type: none"> <li>Standalone</li> <li>Embedded</li> </ul>
Port	Service port number	
Start/Stop button	Server start and stop	

Item (* indicates required value)	Description	Notes
Button area	Displays server information change and related function buttons	<b>Trash can icon</b> - Delete server information <b>Pen icon</b> - Modify server information <b>Log file icon</b> - Provides Server Log Viewer functionality <b>More icon</b> - Provides menu for performing Start/Stop



Session Server is a functionality provided by Enterprise Edition and is available when installing Enterprise version WAS.

#### 4.5.2. Install

1. Click the **Install button**.
2. Enter Server ID, Service Port, and Mirror Server IP/Port.
3. Click the **Save button** to save.



There may be differences between the information of Servers actually installed on Nodes and Servers managed by Manager. (When installing via console)



If a Server ID duplication error occurs, use the Register function to check previously installed Server information.

#### 4.5.3. Register

1. Click the **Register button**.
2. Click on the Server to register.
3. Click the **Save button** to save.

#### 4.5.4. Modification

1. Click the **Edit(pencil) button** to change Server information to modifiable state.
2. Modify Server properties.
3. Click the **Save button** to save.

#### 4.5.5. Deletion

1. Click the **Delete(trash can) button** to change Server information to deletable state.
2. Click the **Save button**.
3. Press the **OK button** to display a window for selecting deletion type.
  - Deregister : Delete Server information only from Manager DB and maintain physical Server engine (can be re-registered later via **Register button**)

- Uninstall : Delete Server information from Manager DB and also delete physical Server engine
4. Uninstall selection, a window asking to delete the log directory is displayed.



Servers linked to a Server Cluster cannot be deleted.



When the use Server Delete Protection value in the Manager Environment menu of ADMIN > Preference > Manager Environment is set to true, Manager can prevent the server from being uninstalled.

## 4.5.6. Start/Stop

1. Click the **Stop button** to stop the Server.
2. Click the **Start button** to start the Server.



Only when the Server is in a state where it can be started, the **Start button** is activated.

## 4.5.7. Setting Information Management

### General

Provides functionality to change Server settings. When you select a Server in the Session Server list, you will be taken to a screen to manage the settings.

The properties that can be changed in the environment settings are as follows.

1. Configuration

Table 95. Configuration

Item (* indicates required value)	Description	Notes
Host(*)	Server's Service Host (IP)	
Port(*)	Server's Service Port	
Mirror Server Host(*)	Pair Server's Host (IP)	
Mirror Serror Port(*)	Pair Server's Service Port	
Share session in applications	Setting for sharing Session between Multi Applications.	You must process this item with the same value in WAS.  Only available in standalone.

2. Connected WAS List

**Refresh button** to refresh the list.

Table 96. Connected WAS List

Item (* indicates required value)	Description	Notes
Server ID	WAS ID	
Host	Host name where WAS is installed	

### 3. Status (Provides Session Server status information)

**Refresh button** to refresh the list.

Table 97. Status

Item (* indicates required value)	Description
Session Count	Current number of Sessions
Logout Count	Number of Sessions logged out due to Logout request
Session Max Count	Maximum number of Sessions stored
Session Timeout	Session timeout time (ms)
Request Getnew Logout	Number of Logout responses for GET_FRESH Request received from WAS
Data From Nodes	Number of Sessions received from WAS
Request Getnew Nodata	Number of NODATA responses for GET_FRESH Request received from WAS
Request Getnew	Number of times increased when GET_SESSION Request was made from WAS
Pid	Process ID when Session is standalone
Request Getfresh Data	Number of times increased when GET_FRESH Request was received from WAS and the corresponding Session existed
Request Getfresh Logout	Number of times increased when GET_FRESH Request was received from WAS and the corresponding Session was Logout
Session Recv Lost	Number of Session receive losses
Logout From Nodes	Number of Logouts received from other WAs
Session Expired	Number of Sessions expired due to Session Time Out
Request Getfresh Nodata	Number of times increased when GET_FRESH_SESSION request was made from WAS and no data was found
Data From Secondary	Number of Data received from Slave server
Request Getfresh	Number of GET_FRESH Request requests from WAS

Item (* indicates required value)	Description
Logout From Secondary	Number of Logout requests received from Slave Server
Req Lost	Number of Request losses
Request Getfresh Secondary	Number of GET_FRESH Request requests from Slave Server
Resp Lost	Number of Response losses due to size of Response Queue exceeding
Request Getfresh Not New	Number of NOT_NEW responses for GET_FRESH Request received from WAS
Request Getnew Secondary	Number of times increased when GET_SESSION request was made from Slave Server

## Logging

You can edit the Session Server log settings.

The detailed contents of the settings are as follows.

### 1. Log Home

Table 98. Log Home

Item (* indicates required value)	Description	Notes
Log Home(*)	Log Home path	When default is selected, it is set to the logs folder under the server installation directory, and when manually selected, you can enter the log directory home path in the Log Home Prefix field
Retention Days(*)	Maximum retention days for logs	Default: 0 (unlimited)

## Environment

Provides a screen for managing Start Shell settings. Modify using a file editor and click the **Save button** to save.

- Base Env (\$CATALINA\_HOME/env.sh) - Shell Script for starting Server

By default, settings are disabled for modification, but if you want to modify them, click **Settings button** in ADMIN > Manager Environment > Manager Configuration to change the following settings to false.



```
server.environment.envshell.readonly=false
```

## 4.5.8. Server Log Viewer

You can search for log file contents under the Log Home path of the target Server via the Log Viewer button on the right side of the Server list.

To use this functionality, you must meet the following requirements.



- The Node to which the target Server belongs must be running.

Clicking the Log Viewer button on the Server list will allow you to check the directory and files based on the Log Home path of the target Server in a tree structure.

Selecting a file will allow you to view the file content, and when you first select it, you can check the file content up to a predetermined size from the end.

You can view and check the content of log files in a predetermined size using Load More and Load Previous buttons.

- When there is no more content to search (e.g., at the beginning of the file), a message "No more data to read" will be displayed in Alert.
- If you use Load More and there is no more content to search (e.g., at the end of the file), a message "No more data to read" will be displayed at the bottom of the screen.

## 4.6. Memory Cache Server

Provides a screen for managing Memory Cache Server. You can register, modify, and delete Memory Cache Servers installed on Nodes, and execute start and stop shells.

### 4.6.1. List

You can manage each Memory Cache Server through the Cache Server List.

[server 7 memory cache] | manual/server\_7\_memory\_cache.png

Figure 8. Cache Server List

The properties of Memory Cache Server are as follows.

Table 99. Memory Cache Server Properties

Item (* indicates required value)	Description	Notes
Status	Cache Server status	<ul style="list-style-type: none"> <li>• Started(v)</li> <li>• Stop(□)</li> <li>• Error(!)</li> </ul>
Name(*)	Cache Server name	
Address	Cache Server IP address	
Server ID	Cache Server ID	
Type	Cache Server type	<ul style="list-style-type: none"> <li>• Memory Cache Server(MCR)</li> <li>• Sentinel(MCRS)</li> </ul>
Port	Service port number	
Start/Stop button	Cache Server start and stop	
Button area	Displays server information change and related function buttons	<p><b>Trash can icon</b>        - Delete server information</p> <p><b>Pen icon</b>        - Modify server information</p> <p><b>Log file icon</b>        - Provides Server Log Viewer functionality</p> <p><b>More icon</b>        - Provides menu for performing Start/Stop</p>

## 4.6.2. Install

1. Click the **Install button**.
2. Enter Server ID, Service Port, and Mirror Server IP/Port.
3. Click the **Save button** to save.



There may be differences between the information of Servers actually installed on Nodes and Servers managed by Manager. (When installing via console)



If a Server ID duplication error occurs, use the Register function to check previously installed Server information.

### 4.6.3. Register

1. Click the **Register button**.
2. Click on the Server to register.
3. Click the **Save button** to save.

### 4.6.4. Modification

1. Click the **Edit(pencil) button** to change Server information to modifiable state.
2. Modify Server properties.
3. Click the **Save button** to save.

### 4.6.5. Deletion

1. Click the **Delete(trash can) button** to change Server information to deletable state.
2. Click the **Save button**.
3. Press the **OK button** to display a window for selecting deletion type.
  - Deregister : Delete Server information only from Manager DB and maintain physical Server engine (can be re-registered later via **Register button**)
  - Uninstall : Delete Server information from Manager DB and also delete physical Server engine
4. When Uninstall is selected, a window asking to delete the log directory is displayed.



When the use Server Delete Protection value in the Manager Environment menu of ADMIN > Preference > Manager Environment is set to true, Manager can prevent the server from being uninstalled.

### 4.6.6. Start/Stop

1. Click the **Stop button** to stop the Server.
2. Click the **Start button** to start the Server.



Only when the Server is in a state where it can be started, the **Start button** is activated.

### 4.6.7. Setting Information Management (Memory Cache)

#### General

Provides functionality to change Memory Cache Server settings.

The properties that can be changed in the environment settings are as follows.

1. Server

Table 100. Server

<b>Item (* indicates required value)</b>	<b>Description</b>	<b>Notes</b>
Install Path(*)	Memory Cache Server instance path	Cannot be modified
Port(*)	Server's Service Port	
Protocol(*)	Communication protocol	
Bind Address	IP address to allow external access to this instance	
Outbound Source Address	Own IP to notify when connecting to external Memory Cache Server	
Shutdown Timeout(s)	Maximum time to wait for server to shut down safely	
Shutdown On SIGTERM	Action to take when SIGTERM command is received	
Log Home(*)	Log Home path	
Log File Name	Log filename	If not set, no logs will be written
Log Level	Log level	
TLS Ciphers	TLS encryption algorithm	
TLS CA Certificate File	CA certificate	
TLS Certificate File	Public key certificate	
TLS Key File	Private key certificate	
TLS Key File Password	Private key password	

## 2. Performance

Table 101. Performance

<b>Item (* indicates required value)</b>	<b>Description</b>	<b>Notes</b>
Max Memory (Bytes)	Maximum memory that Memory Cache Server can use	
Max Memory Policy	Data deletion policy when memory usage reaches Max Memory	
Max Clients	Maximum number of clients that can connect simultaneously	
Timeout	Client connection timeout	
TCP Backlog	TCP Backlog setting	
TCP Keepalive	Client TCP keepalive setting	

## User

Supports Memory Cache Server account management (creation, deletion, management), and can control Memory Cache Server commands through user-specific permission management.

The properties that can be changed in the environment settings are as follows.

### 1. User

Table 102. User

Item (* indicates required value)	Description	Notes
Use ACL File	Whether to use ACL file	
ACL File	ACL file location	
Default User's Password	Default user password	Used when not using ACL file

### 2. User List

Table 103. User List

Item (* indicates required value)	Description	Notes
User	Created user ID	
Enabled	Whether to enable	

### 3. Rules

Table 104. Rules

Item (* indicates required value)	Description	Notes
User	User ID selected from User List	
Enable The User	Whether to enable user	
Password/ User Password	Whether to set password	
Password/ Set Password	User password	
Commands/ Allow	Whether to set Command permissions	
Commands/ Set Allowing Command	Detailed Command permission settings	
Key Permissions/ Use Key Permissions	Whether to set Key permissions	
Key Permissions/ Set Key Permissions	Detailed Key permission settings	

Item (* indicates required value)	Description	Notes
Pub/Sub Channels/ Use Pub/Sub Channels	Whether to set Pub/Sub permissions	
Pub/Sub Channels/ Set Pub/Sub Channels	Detailed Pub/Sub permission settings	

## Persistence

Supports RDB, AOF, and other settings for Memory Cache Server data backup.

The properties that can be changed in the environment settings are as follows.

### 1. Persistence Directory

Table 105. Persistence Directory

Item (* indicates required value)	Description	Notes
Directory	Persistence directory	

### 2. RDB

Table 106. RDB

Item (* indicates required value)	Description	Notes
Use RDB	Whether to use RDB backup	
Save / Seconds	Time criteria for performing RDB snapshot	
Save / Changes	Number of change operations within Seconds for performing RDB snapshot	If Changes number of operations occur within Seconds time, a Snapshot is taken.
RDB compression	Compresses text areas when performing RDB snapshot	
RDB checksum	Whether to generate checksum for RDB snapshot file	
File Name	RDB filename	
Stop Writes On Background Saving Error	Whether to stop write operations when errors occur during RDB snapshot	
RDB Delete Sync Files	Whether to delete sync files after RDB snapshot file creation	

### 3. AOF

Table 107. AOF

Item (* indicates required value)	Description	Notes
Use AOF	Whether to use AOF backup	
Auto AOF Rewrite Minimum Size	Minimum file size criteria for rewriting AOF file	If file size is smaller than this setting value, rewrite is not performed.
Auto AOF Rewrite percentage(%)	Rewrite is performed when it increases by the set percentage value based on Rewrite Minimum Size	
File Name	AOF filename	
AOF Load Truncated	How to load when AOF file end is truncated during loading	yes: load success (logs error), no: load failure
Append File Sync	Set synchronization method for Append Only file	
No Append File Sync On Rewrite	Disable Append Only file synchronization during AOF rewriting	

## Replication

Provides configuration management for Master and Slave, which is Redis backup architecture.

The properties that can be changed in the environment settings are as follows.

### 1. Master

Table 108. Master

Item (* indicates required value)	Description	Notes
General / Replica Timeout(s)	Connection timeout between Master and recognized replica(slave)	This value must be greater than Replica PING Replica Period(s).
General / Replica PING Replica Period(s)	Period for sending ping to replica	
General / Minimum Replicas To Write	Set minimum number of replica(slave) required for write operations	
General / Minimum Replicas Max Lag	Set upper limit for minimum replica(slave) delay time	
General / Replica Disable TCP No Delay	Whether to disable TCP_NODELAY option	
Diskless Replication / Replica Diskless Sync	Perform synchronization without using disk	
Diskless Replication / Replica Diskless Sync Delay(s)	Time to wait for next replica(slave) without synchronizing after first sync request arrives when not using disk	

Item (* indicates required value)	Description	Notes
Diskless Replication / Replica Diskless Sync Max Replicas	Maximum number of replicas allowed when synchronizing replica(slave) without using disk	

## 2. Slave

Table 109. Slave

Item (* indicates required value)	Description	Notes
General / Replica Announce IP	Own(slave) IP to notify Master	
General / Replica Announce Port	Own(slave) Port to notify Master	
General / Replica Serve Stale Data	Whether to continue service even when disconnected from Master	
General / Replica Priority	Set priority among replica(slave)	Promote slave with larger value to master
Master Information / Replica of	Master address to synchronize with	
Master Information / Master User	Master ID to synchronize with	
Master Information / Master Password	Master Password to synchronize with	
Diskless Replication / Replica Diskless Load	Whether to perform synchronization by loading rdb into memory without using disk	

## 4.6.8. Setting Information Management (Sentinel)

### General

Provides functionality to change Memory Cache Sentinel settings.

The properties that can be changed in the environment settings are as follows.

#### 1. Server

Table 110. Server

Item (* indicates required value)	Description	Notes
Install Path(*)	Memory Cache Sentinel instance path	Cannot be modified
Port(*)	Server's Service Port	
Log Home(*)	Log Home path	

Item (* indicates required value)	Description	Notes
Log File Name	Log filename	If not set, no logs will be written
Log Level	Log level	

## 2. Failover

Table 111. Failover

Item (* indicates required value)	Description	Notes
Master Info	Set Memory Cache Server(Master) to monitor status	
Quorum	Minimum number of Sentinel instances required to agree to confirm Master failure and promote new Master	
Auth User	Master ID	When setting account/permissions for Master access
Auth Password	Master password	When setting account/permissions for Master access
Down after milliseconds	Time to wait before determining Master is down	
Failover Timeout	Maximum time allowed to elect new Master and recover when Master failure occurs	
Down after milliseconds	Time to wait before determining Master is down	
Resolve Hostname	Whether to convert hostname to IP address	
TLS Replication	Whether to use TLS protocol for Master access	
TLS CA Certificate File	CA certificate	
TLS Certificate File	Public key certificate	
TLS Key File	Private key certificate	
TLS Key File Password	Private key password	

### 4.6.9. Server Log Viewer

You can search for log file contents under the Log Home path of the target Server via the Log Viewer button on the right side of the Server list.



To use this functionality, you must meet the following requirements.

- The Node to which the target Server belongs must be running.

Clicking the Log Viewer button on the Server list will allow you to check the directory and files based on the Log Home path of the target Server in a tree structure.

Selecting a file will allow you to view the file content, and when you first select it, you can check the file content up to a predetermined size from the end.

You can view and check the content of log files in a predetermined size using Load More and Load Previous buttons.

- When there is no more content to search (e.g., at the beginning of the file), a message "No more data to read" will be displayed in Alert.
- If you use Load More and there is no more content to search (e.g., at the end of the file), a message "No more data to read" will be displayed at the bottom of the screen.

# Chapter 5. Cluster

## 5.1. Server Cluster

Server Cluster is a group of Application Servers and Web Servers that run with the same configuration to provide the same service.

The screenshot shows the 'CLUSTER' tab selected in the top navigation bar. A cluster named 'def' is selected in the left sidebar. The main area displays the 'Overview' tab for the 'def' cluster. The 'Server Cluster Info' section shows the cluster name 'def', 'WAS type' as 'Standard', and 'Enable Scaling' set to 'FALSE'. The 'WAS List' section shows two servers: 'WAS\_NODE\_01' (Master) and 'WAS\_NODE\_02' (Slave). The 'Web Server List' section shows two servers: 'SERVER02-WEB' (Master) and 'WEB\_NODE\_01' (Slave). Both lists include columns for Status, Type, Node Name, Server Name, Server Config, Application, Resource, Session, and Start/Stop buttons.

Status	Type	Node Name	Server Name	Server Config	Application	Resource	Session	Start/Stop
✓	Master	WAS_NODE_01	daf-was-01	●	●	●	●	<span style="color:red;">■ Stop</span>
✓	Slave	WAS_NODE_02	daf-was-02	●	●	●	●	<span style="color:red;">■ Stop</span>

Status	Type	Node Name	Server Name	Server Config	Connect to WAS	Start/Stop
✓	Master	SERVER02-WEB	WEB02_8000	●	✗	<span style="color:red;">■ Stop</span>
✓	Slave	WEB_NODE_01	WEB01_8000	✗	✗	<span style="color:red;">■ Stop</span>

Figure 9. Server Cluster Screen

### 5.1.1. Server Cluster List

You can check the list of Server Clusters registered in the manager by selecting Server Cluster from the left menu.

The properties provided in the Server Cluster List table are as follows.

Table 112. Server Cluster Properties

Item	Description	Remarks
Select	Checkbox for deletion	
Server Cluster Name	Cluster name	
Servers	Number of each Server that constitutes the Server Cluster 1. WAS 2. Web	

### 5.1.2. Server Cluster Creation

In Server Cluster creation, you select the Application Server list and Web Server list to configure the Server Cluster.

1. Select the Server Cluster Group and click the **+New button** at the bottom of the Server Cluster list to display the new registration screen.
2. Enter the basic information of the Server Cluster.
  - Server Cluster Name: Enter the Server Cluster name.
  - WAS type: Select the Application Type to be used as a member of the Server Cluster. There are two types: Standard and Enterprise.
  - Enable Scaling: Select whether to use Auto Scaling functionality. This option cannot be changed after server cluster creation. (This functionality is only supported in Container Edition, and to use it, set scaling.enable to true in manager.conf.)
  - Description: Enter necessary descriptions related to the Server Cluster.
3. The server list corresponding to the selected Application Server Type is displayed in the Application server in server cluster area below. Click the desired server in Selectable Servers and press the **>> button** to move it to the Selected Servers area. Similarly in the Web Servers in server cluster area, click the desired server in Selectable Servers and press the **>> button** to move it to the Selected Servers area.
 

- One Server can only be assigned to one Server Cluster, so only Application Servers and Web Servers that are not mapped to other Server Clusters are displayed in the Selectable Servers list.
  - WAS instances with different Engine No. cannot be configured as one Server Cluster.
4. Click the **V Save button** to save.
5. You can confirm that the menu with the entered Server Cluster name has been added to the left tree.

### 5.1.3. Server Cluster Deletion

1. Select the Server Cluster Group from the left Server Cluster tree menu.
2. Check the checkbox in the Select column of the Server Cluster to be deleted in the Server Cluster List.
3. Click the **- Delete button** to delete.

### 5.1.4. Server Cluster Details

#### Overview

When you select a Server Cluster from the left menu or Server Cluster Group details, the Overview screen for the Server Cluster is displayed.

The items and buttons in the Server Cluster details area provide the following functions.

Table 113. Server Cluster Details Area Items and Buttons

Item or Button Name	Function
Server Cluster Name(*)	Server Cluster name

Item or Button Name	Function
WAS type(*)	Application Server type configured in the Server Cluster (cannot be changed)
Server Configuration Synchronization Policy	<p>Policy for handling errors during Server Cluster synchronization (<b>Sync button</b> selection)</p> <p>Server Configuration Synchronization Policy options are as follows. (Default: Force)</p> <ol style="list-style-type: none"> <li>1. Stop : Stop immediately when an error occurs during configuration synchronization</li> <li>2. Rollback : Perform full rollback when an error occurs during configuration synchronization</li> <li>3. Force : Skip the corresponding Server and proceed to the next when an error occurs during configuration synchronization</li> </ol>
Enable Scaling	Whether to use Auto Scaling functionality for Server Cluster (cannot be changed)
Description	Description of the Server Cluster
<b>Compare button</b>	<p>Compares the synchronization status of Application Servers, Web Servers, and Session Servers within the Server Cluster.</p> <p>The comparison items by Server type are as follows, and these are displayed in the respective columns of each Server list area below.</p> <p>Server Configuration, Application, Resource, and Session comparisons are based on the Master Server of each Server type.</p> <p><b>Application Server</b></p> <ul style="list-style-type: none"> <li>• Server Configuration : Whether Application Server configuration information is identical</li> <li>• Application : Whether Applications deployed on each Application Server are identical</li> <li>• Resource : Whether Resource configuration is identical</li> <li>• Session : Whether Session Server configuration for Session Clustering is identical</li> </ul> <p><b>Web Server</b></p> <ul style="list-style-type: none"> <li>• Server Configuration : Whether Web Server configuration information is identical</li> <li>• Connect to WAS : Whether it is connected to all Application Servers within the Server Cluster</li> </ul>

Item or Button Name	Function
<b>Sync button</b>	<p>Synchronizes Server Configuration, Application, Resource, and Session information of Application Servers within the Server Cluster.</p> <p>Synchronizes Server Configuration and WAS connection information of Web Servers within the Server Cluster.</p>
<b>Snapshot button</b>	<p>Saves the current status as a Snapshot for the synchronized Server Cluster. Generated Snapshots can be checked in the Snapshot tab.</p> <p>Snapshots include Application Source. Therefore, creating Snapshots excessively can occupy a lot of system disk space, so create them only when necessary and delete unnecessary Snapshots through the Snapshot tab.</p>
<b>Graceful button</b> <b>Restart</b>	<p>Sequentially restarts Web Servers and Application Servers within the Server Cluster. Since Graceful Stop is performed, the Server stops after all services being processed are terminated.</p> <p>The processing order is as follows. Procedures expressed in () are optional.</p> <ol style="list-style-type: none"> <li>1. Web Server Stop</li> <li>2. Application Stop</li> <li>3. (Application Source upload)</li> <li>4. Application Server Start</li> <li>5. (Start Web Server in staging port for testing with separate port)</li> <li>6. Web Server Start</li> </ol>
<b>V Save button</b>	Saves the changed Server Cluster details configuration.

## Synchronization Status Check

You can check the synchronization status of the Server Cluster by selecting the **Compare button** and then checking the results through the columns below each Server list.

When the status is identical or valid, it is displayed as **green circle icon**.

When the Server status is not identical, it appears as **red circle icon**, and clicking the corresponding icon displays a separate popup window where you can check detailed information by Server.

Also, clicking on the Server Name in each Server list allows you to navigate to the corresponding Server details screen.

- Application Server Server Configuration Details

The comparison results of configuration files are displayed. In the popup window, clicking the **magnifying glass button** next to the Detail item allows you to see the comparison results (last modification date, configuration file content) of the current configuration file compared to the Master server in detail.

- Application Server Application Details

The comparison results of Application deployment status are displayed.

- Application Server Resource Details

The comparison results of Application Server Resources are displayed.

- Application Server Session Details

The comparison results of Application Server Session configuration are displayed. The popup window provides session information configured on the Master Server.

- Web Server Server Configuration

The comparison results of configuration files are displayed. In the popup window, clicking the **magnifying glass button** next to the Detail item allows you to see the comparison results (last modification date, configuration file content) of the current configuration file compared to the Master server in detail.

- Web Server Connect to WAS

When the corresponding Web Server is only connected to all Application Servers belonging to the Server Cluster, it is displayed as **green circle icon** status, otherwise it is displayed as **red circle icon**. Clicking on **red circle icon** displays a separate popup window where you can check detailed information.

The popup window displays detailed information about whether all Application Servers connected to the Web Server are registered Servers in the Server Cluster (Web Server Status). Also, it displays detailed information about whether all Application Servers registered in the Server Cluster are connected to the corresponding Web Server (Application Server Status).

## Status Synchronization Execution

Server Cluster synchronization execution proceeds by selecting the **Sync button**. The results can be checked through the columns below each Server list.

## Graceful Restart

Graceful Restart functionality is used when performing restart of all servers within the Server Cluster while ensuring the completion of ongoing tasks. When executed, it proceeds through the following procedures. (Applied to all servers within the Server Cluster)

### 1. Before Graceful Restart starts

Clicking the Start Process button starts the Graceful Restart operation.

### 2. Web Server Stop phase

Performs Stop for Web Server. Web Server stops after all executing threads are terminated.

### 3. Application Server Stop phase

Performs Stop for Application Server. This phase is activated after all Web Servers are terminated.

### 4. Source deployment (optional) phase

Performs source deployment (upload) for Application Server. This phase can be omitted if there is a separate deployment system.

## 5. Application Server Start phase

Performs Start for Application Server. You can also check the start logs.

## 6. Start Web Server in Staging mode (optional) phase

Starts Web Server in Staging mode. (This phase is optional.) Through this, you can perform business testing with staging port in the same environment as production before opening to general users.

## 7. Web Server Start phase

Starts Web Server in Staging mode. (This phase is optional.) Through this, you can perform business testing with staging port in the same environment as production before opening to general users.

## 8. Graceful Restart completion

## WAS

This is a tab that manages the list and synchronization target information of Application Servers within the Server Cluster.

The detailed information of the server list at the top of the tab is the same as Overview.

### Synchronization Target Items

#### Server Configuration File Management

Selecting the **Configuration button** provides a popup window where you can set the Master Server selection for Application Server, specify configuration files to synchronize, and set whether to synchronize JDBC Drivers.

- Master Server

Specifies the Master Server among Application Servers within the Server Cluster.

- Server Configs for Synchronization

This is the list of files to be maintained with identical content in Application Servers within the Server Cluster. Basic file lists are registered when creating the Server Cluster, and you can add/delete files according to project circumstances. The file path is a relative path under the Application Server's Home.

- Sync JDBC Drivers

Selects whether to include all jar files under the Manager Repository path/lib/datasource/ folder in the synchronization target.



JDBC Drivers are only synchronized when the corresponding JDBC Driver does not exist on the target server to prevent errors due to Jar file replacement during Runtime.

### Application Management

When selecting a server from the Application Server list, you can check the Application detailed

information of the selected server through the Application tab below. The provided screen and functionality are identical to those described in [Application](#). Therefore, detailed explanations of functionality are omitted in this chapter.

## Resource Management

When selecting a server from the Application Server list, you can check the detailed information of DataSource, JMS, and JTA of the selected server through the DataSource, JMS, and JTA tabs below. The provided screen and functionality are identical to those described in [Datasource](#), [JMS](#), [JTA](#). Therefore, detailed explanations of functionality are omitted in this chapter.

## Session Management

When selecting a server from the Application Server list, you can check the Session detailed information of the selected server through the Session tab below. The provided screen and functionality are identical to those described in [Session](#). Therefore, detailed explanations of functionality are omitted in this chapter.

## WAS List Management

You can include or exclude Application Servers in the Server Cluster using the **Clone button**, **Join button**, or **Unjoin button**.

- Clone

Clicking the **Clone button** allows you to install a new server with the same configuration as the Master server and register it in the Server Cluster.

Table 114. Clone Popup Window Item Description

Item Name	Function
Post Processing Options	<ul style="list-style-type: none"> <li>• Cloned Server Start: Check whether to start server after cloning</li> <li>• All Web Server Sync: Synchronize with Web Server after cloning</li> <li>• All Web Server Graceful Restart : Whether to restart Web Server after cloning</li> </ul>
Node List	Node to install the server to be cloned
Clone Server ID / Clone Service Port	Enter the ID and Service Port of the Server to be cloned
Include External Source	Select Y if you want to clone the source as well when the application source of the server to be cloned is outside the server

- Join

Clicking the **Join button** adds an available Server among already created Application Servers to the Server Cluster.

- Unjoin

Clicking the **Unjoin button** deletes the Server registered in the Cluster from the Cluster list.

## Application Server Synchronization and Comparison

- Compare

Clicking the **Compare button** compares the synchronization status of Application Servers within the Server Cluster.

- Sync

Clicking the **Sync button** synchronizes Server Configuration, Application, Resource, and Session configurations of Application Servers within the Server Cluster.

## Rolling Restart

Rolling Restart is used when sequentially restarting Application Servers within the Server Cluster.

This is a function performed on servers to be restarted, so stopped servers are excluded. After selecting target servers from the server list, clicking the **Rolling Restart button** provides the Rolling Restart popup window.

In the popup window, users can set the start interval between servers and whether to Force Stop in the Execution option area before starting Rolling Restart. In the Rolling Restart area, you can check the status of selected servers performing sequential restart.

Table 115. Rolling Restart Popup Window Item Description

Node	Node name where the server is installed
Server	Server name
Server Status	Current start status of the server
Stop Status	Server stop operation status
Start Status	Server start operation status
Action	<b>Force Restart button</b> and <b>Next button</b> are provided for servers being restarted.
Interval	Remaining processing time for the server. After starting from the value set in the Interval of the Execution Option area and counting down to 0, the next server's restart is performed.
Elapsed time	Restart processing time

Table 116. Rolling Restart Popup Window Button Description

Button Name	Function
Start	Starts the restart of target servers shown in the popup window. It proceeds sequentially from the top of the table.
Pause	Temporarily pauses the restart operation. If stop/start is being performed, the executing command is not interrupted, but the next operation waits.
Resume	Resumes the restart operation. It starts from after the work completed before Pause.

Button Name	Function
Force Restart	When stop is not working normally, you can force stop and then start through this button. It is only shown on screen until the server being restarted completes stopping.
Next	When you want to proceed with the next server's restart operation immediately before the current server's restart operation is completed, you can perform the next server's restart through the Next button. Even if Next is performed, the restart operations of previous servers continue.

## Web Server

This is a tab that manages the list and synchronization target information of Web Servers within the Server Cluster.

The detailed information of the server list at the top of the tab is the same as Overview.

### Synchronization Target Items

#### Server Configuration File Management

Selecting the **Configuration button** provides a popup window where you can set the Master Server selection for Web Server and specify the list of configuration files to synchronize.

- Master Server :

Specifies the Master Server among Web Servers within the Server Cluster.

- Server Configs for Synchronization :

This is the list of files to be maintained with identical content in Web Servers within the Server Cluster. Basic file lists are registered when creating the Server Cluster, and you can add/delete files according to project circumstances. The file path is a relative path under the Web Server's Home.

### Connector

You can check and modify detailed connector information of the Web Server.

When selecting a server from the Web Server list, you can check the Connector detailed information of the selected server through the Connector tab below. The provided screen and functionality are identical to those described in [Connector](#). Therefore, detailed explanations of functionality are omitted in this chapter.

### Web Server List Management

You can include or exclude Web Servers in the Server Cluster using the **Clone button**, **Join button**, or **Unjoin button**.

- Clone

Clicking the **Clone button** allows you to install a new server with the same configuration as the Master server and register it in the Server Cluster.

Table 117. Clone Popup Window Item Description

Item Name	Function
Post Processing Options	<ul style="list-style-type: none"> <li>• Cloned Server Start: Check whether to start server after cloning</li> </ul>
Node List	Node to install the server to be cloned
Server ID / Clone Service Port	Enter the ID and Service Port of the Server to be cloned
Include External Source	Select Y if you want to clone the source as well when the source of the server to be cloned is outside the server

- Join

Clicking the **Join button** adds an available Server among already created Web Servers to the Server Cluster.

- Unjoin

Clicking the **Unjoin button** deletes the Server registered in the Cluster from the Cluster list.

## Web Server Synchronization and Comparison

- Compare

Clicking the **Compare button** compares the synchronization status of Web Servers within the Server Cluster.

- Sync

Clicking the **Sync button** synchronizes Server Configuration and Connect WAS of Web Servers within the Server Cluster.



When clicking the Web Server's Sync button, Web Server configuration synchronization and all Web Servers and WAS included in the Server Cluster are interconnected in a Full Mesh structure.

If you want to synchronize only configurations without changing to Full Mesh structure, it is recommended to configure Web Server and WAS each as separate Server Clusters.

## Rolling Restart

Rolling Restart is used when sequentially restarting Web Servers within the Server Cluster.

This is a function performed on servers to be restarted, so stopped servers are excluded. After selecting target servers from the server list, clicking the **Rolling Restart button** provides the Rolling Restart popup window.

In the popup window, users can set the start interval between servers and whether to Force Stop in the Execution option area before starting Rolling Restart. In the Rolling Restart area, you can check the status of selected servers performing sequential restart.

Table 118. Rolling Restart Popup Window Item Description

Node	Node name where the server is installed
Server	Server name
Server Status	Current start status of the server
Stop Status	Server stop operation status
Start Status	Server start operation status
Action	<b>Force Restart button</b> and <b>Skip button</b> are provided for servers being restarted.
Interval	Remaining processing time for the server. After starting from the value set in the Interval of the Execution Option area and counting down to 0, the next server's restart is performed.
Elapsed time	Restart processing time

## Snapshot

Clicking the Snapshot button in the Overview Tab displays a window for Snapshot creation, and clicking the Save button creates a Snapshot of the Server Cluster.

Snapshots can only be created when the Server Cluster is in a synchronized state.

The Snapshot tab provides a screen for managing the Snapshot list. It receives a date input to search Snapshot history. You can check detailed information about Snapshot history, and it also provides functionality to restore to a desired point in time.

Clicking the **list button** in the Detail item of the Snapshot list allows you to check detailed information about the corresponding snapshot.

Snapshot information is managed by each server, so servers added to the Cluster after creating a specific Snapshot are excluded from restoration to that Snapshot. (In this case, after Snapshot restoration, you need to perform Sync again for all servers to have the same configuration.) Also, if a specific server is deleted from the Cluster after Snapshot creation, all Snapshot information for that server is deleted. When creating Snapshots, source code is not copied to the Snapshot, and only basic configuration files, application configuration files, and enterprise.xml are included in the Snapshot.

When creating Snapshots, be careful as they can put a load on disk capacity. Also, generated Snapshots are not automatically deleted and must be manually deleted by users. Therefore, it is recommended to delete unnecessary Snapshots at appropriate times.

# Chapter 6. Resource

## 6.1. Database

When you select Database from the left menu, the Database Resource list is displayed.

Database				Total 1
Database List				
Select	Resource Name	Driver	Address(Host/Port)	
<input type="checkbox"/>	daf-app	org.mariadb.jdbc.Driver	10.81.200.54:5808	

Clone | New | Delete

Figure 10. Database List Screen

### 6.1.1. Database Registration

1. Click the **New button** in the Database Resource list to display the new registration screen.
2. Enter the input fields.
  - o Enter the Resource Name.
  - o Check the DriverClassName and select the driver for your desired vendor.
  - o Enter the Address (host/Port) information.
3. Click the **Save button** to save.

### 6.1.2. Database Modification

1. Select the checkbox of the Database Resource you want to modify from the Database Resource list.
2. Modify the Database Resource items and save.



When content is modified, it propagates to the DataSource Resource and WAS configuration connected to that Database Resource, so if there are DataSource Resources connected under that Database Resource, the input fields are disabled by default. Click the **Edit button** to enable modification.

## 6.2. DataSource

When you select DataSource from the left menu, the DataSource Resource list is displayed.

DataSource						
DataSource List						Total 1
Select	Resource Name	Database Name	Server Type	Scope	JNDI Name	
<input type="checkbox"/>	daf	daf-app	Standard	Global + ResourceLink	jdbc/petclinic	

Clone | New | Delete

Figure 11. DataSource List Screen

## 6.2.1. DataSource Registration

1. Click the **New button** in the DataSource Resource list to display the new registration screen.
2. Enter a logical name in the Resource Name field.
3. Set the Server Type. Server Type must be selected from Standard or Enterprise, and thereafter it can only be imported and used on servers of the same type.
4. Configure the detailed settings for DataSource (refer to the detailed item descriptions in [Server DataSource Settings])
5. Click the **Upload button** to register the Driver for that DataSource on the Manager server. Pre-registered Drivers are transmitted to the corresponding server when operators import them to the server.
6. Click the **Save button** to save.



JDBC Drivers uploaded to the Manager are transmitted to the corresponding server when operators import that DataSource Resource to the server. Transmitted JDBC Drivers are located in the {server home path}/lib/datasource directory and are automatically registered in the Classpath.

## 6.2.2. DataSource Modification

1. When you select a row you want to modify from the DataSource Resource list, the DataSource Resource modification screen is displayed.
2. Change the configuration you want to modify.
3. Click the **Save button** to save.

Resource

**— DataSource Configuration**

* Resource Name	daf	* Server Type	Standard
Driver File	mariadb-java-client-2.2.1-for-java-8-9.jar		
Scope	Global + ResourceLink	* JNDI Name	
* Databases	daf-app	jdbc/petclinic	
* DriverClassName	Maria DB	org.mariadb.jdbc.Driver	
* URL	jdbc:mariadb://10.0.1.201:3430/petclinic		
* Username	lena	* Password	
Encryption Level	Password only	DefaultAutoCommit	
AutoReconnection	false	default value of JDBC driver	

Save

**— Registered Server**

Node	Server	Address	Port	Connection Test
WAS-NODE1	daf-was-01	10.0.1.201:227	8480	<button>Connection Test</button>
WAS-NODE1	daf-was-02	10.0.1.201:227	8580	<button>Connection Test</button>
WAS-NODE2	daf-was-03	10.0.1.201:228	8480	<button>Connection Test</button>
WAS-NODE2	daf-was-04	10.0.1.201:228	8580	<button>Connection Test</button>

Figure 12. DataSource Detail Information Screen



When you save after modifying DataSource Resource information, the changed configuration propagates to the server where that DataSource Resource is used. When you restart the server where the configuration has propagated, that configuration is applied.



After importing a DataSource Resource set to Standard Type to a Standard server, the Server Type cannot be changed to Enterprise.



Note that when deleting a DataSource Resource after Classpath registration, the Classpath is not deleted.

### 6.2.3. DataSource Deletion

1. Select the checkbox of the DataSource Resource you want to delete from the DataSource Resource list.
2. Click the **Delete button** to delete.



If there are Registered Servers or Registered Applications that have imported from the Server or Application, that DataSource Resource cannot be deleted.

### 6.2.4. JDBC Driver Upload

1. Click the **Upload button** in the DataSource Resource registration or edit screen to display a screen where you can upload Driver Files.
2. Click the **File Selection button** to select the Driver File you want to upload from your local PC.
3. Click the **Upload button** to upload the Driver File to the Manager.

### 6.2.5. DataSource Import

The list of Servers using the created DataSource Resource by importing it (when Scope is Context, Global, Global + Link) or the list of Applications (when Scope is Application) is displayed in the lower area when viewing DataSource Resource details.

#### Importing DataSource from DataSource Detail Screen

DataSource Resources with Scope Context, Global, or Global + Link can register servers that import them.

1. In the DataSource management screen, select a specific DataSource Resource to navigate to the detail information screen.
2. Click the **Edit Server List button** to display a window where you can register and manage servers.
3. Specify the server to import that DataSource and move it to the right area.
4. Click the **Save button** to import the DataSource Resource to that server.



To delete an imported DataSource Resource from a server, move the target server to the left area and click the **Save button**.

## Importing DataSource from Individual Server

1. Select the Servers menu from the top of LENA Manager.
2. Click on the left side: Individual Web Application Server > Resources > DataSource tab to display a screen where you can view the DataSource Resource list for that server and add DataSource Resources.
3. Click the **Import button** to display a list of predefined DataSource Resources in a popup window.
4. Select the DataSource Resource you want to import.
5. Click the **OK button** to import that DataSource Resource.



When you import a DataSource Resource, connection information between that DataSource Resource and the server is internally created. Based on this connection information, configuration updates are delivered to that server when the DataSource Resource is modified.



Standard Servers cannot import Enterprise Type DataSource Resources. (They are not displayed in the list)



Imported DataSource Resource settings cannot be edited in Server settings. (Configuration information can be viewed but not modified) To change the configuration, go to the Resource > DataSource screen to make changes.

## 6.3. JTA

When you select JTA from the left menu, the JTA Resource list is displayed.

Transaction(JTA)				
— Transaction(JTA) List				
Select	Resource Name	TM ID	TM Type	
<input type="checkbox"/>	JTA1	JTA1		TransactionManager
<input type="checkbox"/>	JTA2	JTA2		TransactionManager

Total 2

Clone    New    Delete

Figure 13. JTA List Screen

### 6.3.1. JTA Registration

1. Click the **New button** in the JTA list to display the new registration screen.
2. Enter the values you want to configure. (For detailed settings, refer to "4.3.7 Server Configuration Information Management")
3. Click the **Save button** to save.

### 6.3.2. JTA Modification

1. When you select a row you want to modify from the JTA Resource list, the modification screen is displayed.
2. Enter the configuration you want to change.
3. Click the **Save button** to save.

The screenshot shows the 'Resource' tab selected in the top left. Under 'Transaction Manager Configuration', there are fields for Managed Type (Auto or User Defined), Resource Name (JTA1), ID (JTA1), Type (TransactionManager), and Default TimeOut(min) (10 Minutes). A 'Save' button is at the bottom right. Below this, the 'Registered Server' section shows a table with columns Node, Server, Address, and Port, indicating 'No data found.' A 'Total 0' label is at the top right of the table area. A 'Edit Server List' button is located at the bottom right of the table.

Figure 14. JTA Detail Information Screen



When you save after modifying JTA Resource information, the changed configuration propagates to the server where that JTA Resource is used. When you restart the server where the configuration has propagated, that configuration is applied.

### 6.3.3. JTA Deletion

1. Select the checkbox of the JTA Resource you want to delete from the JTA list.
2. Click the **Delete button** to delete.



If there are Registered Servers that have imported from the server, that JTA Resource cannot be deleted.

### 6.3.4. JTA Import

The list of servers using the created JTA Resource by importing it is displayed in the lower area when viewing JTA Resource details.

#### Importing JTA from JTA Detail Screen

In the JTA detail screen, you can modify the list of servers that are importing and using it.

1. In the JTA management screen, select a specific JTA Resource to navigate to the detail information screen.
2. Click the **Edit Server List button** to display a window where you can register and manage servers.
3. Specify the server to import that JTA Resource and move it to the right area.
4. Click the **Save button** to import the JTA Resource to that server.



To delete an imported JTA Resource from a server, move the target server to the left area and click the **Save button**.

#### Importing JTA from Individual Server

1. Select the Servers menu from the top of LENA Manager.
2. Click on the left side: Individual Web Application Server > Resources > JTA tab to display a screen where you can view the JTA Resource list for that server and add JTA Resources.
3. Click the **Import button** to display a list of predefined JTA Resources in a popup window.

4. Select the JTA Resource you want to import.
5. Click the **OK button** to import that JTA Resource.



When you import a JTA Resource, connection information between that JTA Resource and the server is internally created. Based on this connection information, configuration updates are delivered to that server when the JTA Resource is modified. Connection information can be viewed in the Resource > JTA screen.



Imported JTA Resource settings cannot be edited in server settings. (Configuration information can be viewed but not modified) To change the configuration, go to the Resource > JTA screen to make changes.

## 6.4. JMS

When you select JMS from the left menu, the JMS Resource list is displayed.

MessageService(JMS)			
MessageService(JMS) List			
Select	Resource Name	JMS ID	JMS Type
<input type="checkbox"/>	Queue	Queue	javax.jms.Queue
<input type="checkbox"/>	hello-Adapter	helloAdapter	ActiveMQResourceAdapter

Total 2

**Clone** | **+ New** | **- Delete**

Figure 15. JMS List Screen

### 6.4.1. JMS Registration

1. Click the **New button** in the JMS list to display the new registration screen.
2. When you select the type of JMS Resource to register, configuration information appropriate for the selected type is displayed below.
3. Enter the values you want to configure. (For detailed settings, refer to "4.3.7 Server Configuration Information Management")
4. Click the **Save button** to save.

### 6.4.2. JMS Modification

1. When you select a row you want to modify from the JMS Resource list, the modification screen is displayed.
2. Enter the configuration you want to change.
3. Click the **Save button** to save.

The screenshot shows the 'Resource' configuration screen. Under 'JMS Configuration', fields include 'Resource Name' (hello-Adapter), 'ID' (helloAdapter), 'Type' (ActiveMQResourceAdapter), 'BrokerXmlConfig', 'ServerUrl', 'DataSource', and 'StartupTimeout'. A 'Save' button is at the bottom right. Below it, under 'Registered Server', there is a table with columns Node, Server, Address, and Port, showing 'No data found.' A 'Total 0' label is at the top right of the table area. An 'Edit Server List' button is at the bottom right.

Figure 16. JMS Detail Information Screen



When you save after modifying JMS Resource information, the changed configuration propagates to the server where that JMS Resource is used. When you restart the server where the configuration has propagated, that configuration is applied.

### 6.4.3. JMS Deletion

1. Select the checkbox of the JMS Resource you want to delete from the JMS list.
2. Click the **Delete button** to delete.



If there are Registered Servers that have imported from the server, that JMS Resource cannot be deleted.

### 6.4.4. JMS Import

The list of servers using the created JMS Resource by importing it is displayed in the lower area when viewing JMS Resource details.

#### Importing JMS from JMS Detail Screen

In the JMS detail screen, you can modify the list of servers that are importing and using it.

1. In the JMS management screen, select a specific JMS Resource to navigate to the detail information screen.
2. Click the **Edit Server List button** to display a window where you can register and manage servers.
3. Specify the server to import that JMS and move it to the right area.
4. Click the **Save button** to import the JMS Resource to that server.



To delete an imported JMS Resource from a server, move the target server to the left area and click the **Save button**.

## Importing JMS from Individual Server

1. Select the Servers menu from the top of LENA Manager.
2. Click on the left side: Individual Web Application Server > Resources > JMS tab to display a screen where you can view the JMS Resource list for that server and add JMS Resources.
3. Click the **Import button** to display a list of predefined JMS Resources in a popup window.
4. Select the JMS Resource you want to import.
5. Click the **OK button** to import that JMS Resource.



When you import a JMS Resource, connection information between that JMS Resource and the server is internally created. Based on this connection information, configuration updates are delivered to that server when the JMS Resource is modified. Connection information can be viewed in the Resource > JMS screen.



Imported JMS Resource settings cannot be edited in server settings. (Configuration information can be viewed but not modified) To change the configuration, go to the Resource > JMS screen to make changes.

## 6.5. Application

When you select Application from the left menu, the Application Resource list is displayed.

Application			
Application List			
Select	Application Name	Application Type	DocBase
<input type="checkbox"/>	petclinic	war	/engn001/lena/petclinic.war
		<a href="#">Clone</a>	<a href="#">New</a> <a href="#">Delete</a>

Figure 17. Application List Screen

### 6.5.1. Application Registration

1. Click the **New button** in the Application list to display the new registration screen.
2. Enter the values you want to configure.
  - o If Application Type is WAR, additional configurable items are displayed. (For detailed settings, refer to [Application Settings](#))
3. Click the **Save button** to save.

### 6.5.2. Application Modification

1. When you select a row you want to modify from the Application Resource list, the modification screen is displayed.
2. Enter the configuration you want to change.
3. Click the **Save button** to save.

The screenshot shows the 'Resource' section of the application management interface. In the 'Application Configuration' section, fields include: Application Name (petclinic), Application Type (WAR), Context Path (/), DocBase (/engn001/lena/petclinic.war), Application File (petclinic.war), reloadable (No), cookies (default), sessionCookieDomain, sessionCookiePath, privileged (default), useHttpOnly (default), sessionCookieName, and useNaming (default). Buttons for 'Add Attribute' and 'Save' are present. In the 'Registered Server' section, there is a table with four rows: WAS-NODE1 (daf-was-01, 10.81.208.227, 8480), WAS-NODE1 (daf-was-02, 10.81.208.227, 8580), WAS-NODE2 (daf-was-03, 10.81.208.228, 8480), and WAS-NODE2 (daf-was-04, 10.81.208.228, 8580). A 'Total 4' label is at the top right of the table. A 'Edit Server List' button is located below the table.

Figure 18. Application Detail Information Screen



When you save after modifying Application Resource information, the changed configuration propagates to the Server where that Resource is used. The Server where the configuration has propagated will apply that configuration when restarted.

### 6.5.3. Application Deletion

1. Select the checkbox of the Application Resource you want to delete from the Application list.
2. Click the **Delete button** to delete.



If there are Registered Servers that have imported from the Server, that Application Resource cannot be deleted.

### 6.5.4. Application Upload

1. Click the **Upload button** in the Application Resource registration or edit screen to display a screen where you can upload Application Files.
2. Click the **File Selection button** to select the Application File you want to upload from your local PC.
3. Click the **Upload button** to upload the Application File to the Manager.

#### Application Import

The list of Servers that are using the created Application Resource by importing it is displayed in the lower area of the Application Resource detail view.

#### Importing Application from Application Detail Screen

In the Application detail screen, you can modify the list of Servers that are importing and using it.

1. In the Application management screen, select a specific Application Resource to navigate to the

detail information screen.

2. Click the **Edit Server List button** to display a window where you can register and manage Servers.
3. Specify the Server to import that Application and move it to the right area.
4. Click the **Save button** to import the Application Resource to that Server.



To delete an imported Application Resource from a Server, move the target Server to the left area and click the **Save button**.

## Importing Application from Individual Server

1. Select the Servers menu from the top of LENA Manager.
2. Click on the left side: Individual Web Application Server > Applications menu to display a screen where you can view the Application Resource list for that Server and add Application Resources.
3. Click the **Import button** to display a list of predefined Application Resources in a popup window.
4. Select the Application Resource you want to import.
5. Click the **OK button** to import that Application Resource.



When you import an Application Resource, connection information between that Application Resource and the Server is internally created. Based on this connection information, configuration updates are delivered to that Server when the Application Resource is modified. Connection information can be viewed in the Resource > Application screen.



Imported Application Resource settings cannot be edited in Server settings. (Configuration information can be viewed but not modified) To change the configuration, go to the Resource > Application screen to make changes.

# Chapter 7. Diagnostics

## 7.1. Monitoring Dashboard

### 7.1.1. Status Summary

The Monitoring Dashboard screen provides 3 tabs at the bottom, and the summary information provided at the top changes according to the selected tab.

The information provided by each tab is as follows.

#### Node Tab

Provides Server monitoring information by registered Node

#### Server Cluster Tab

Provides Server monitoring information by Server Cluster group

#### Service Cluster Tab

Provides Container monitoring information by Service Cluster group

You can set the query cycle for each piece of information, and for WAS, clicking the **popup button** in the Function column allows you to navigate to the detailed monitoring screen.

The Monitoring Dashboard screen is as follows.

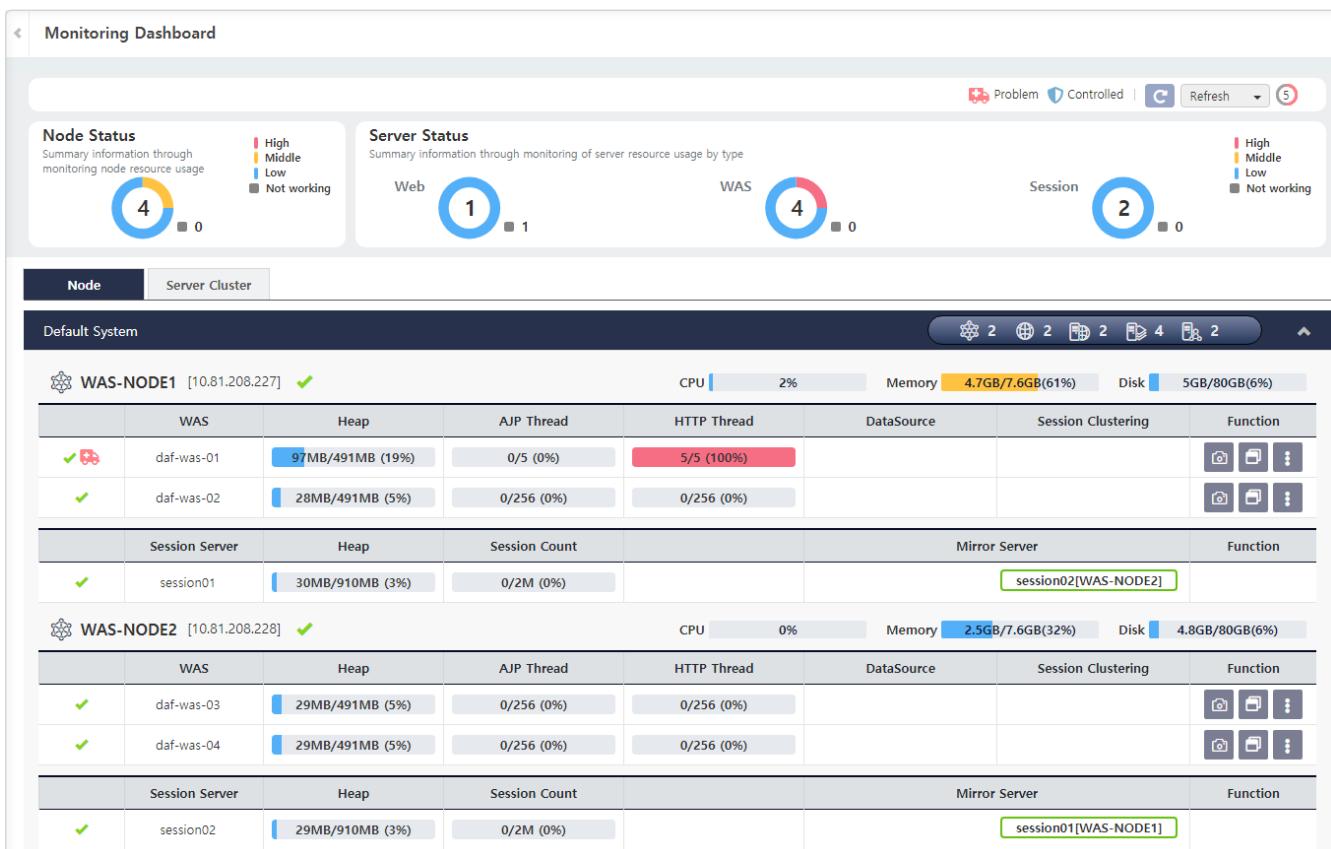


Figure 19. Monitoring Dashboard Node Tab Screen (1/2)

[diagnostics monitoring dashboard node tab mcr] |

### manual/diagnostics\_monitoring\_dashboard\_node\_tab\_mcr.png

Figure 20. Monitoring Dashboard Node Tab Screen (2/2)

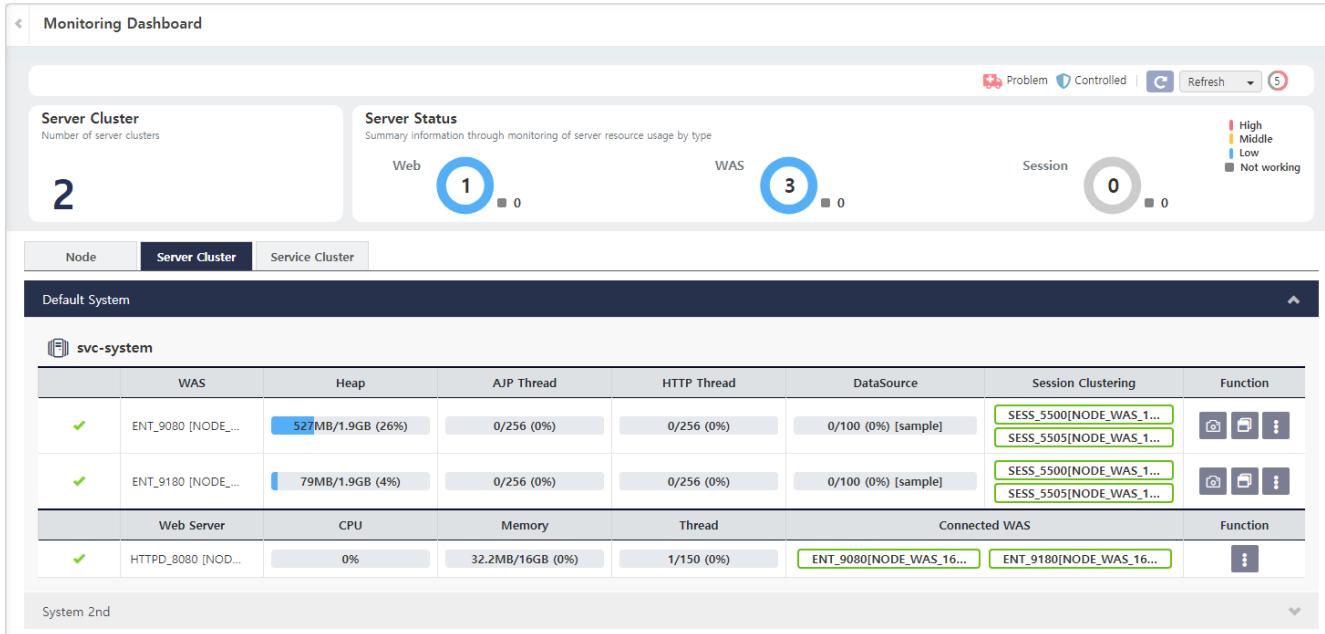


Figure 21. Monitoring Dashboard Server Cluster Tab Screen

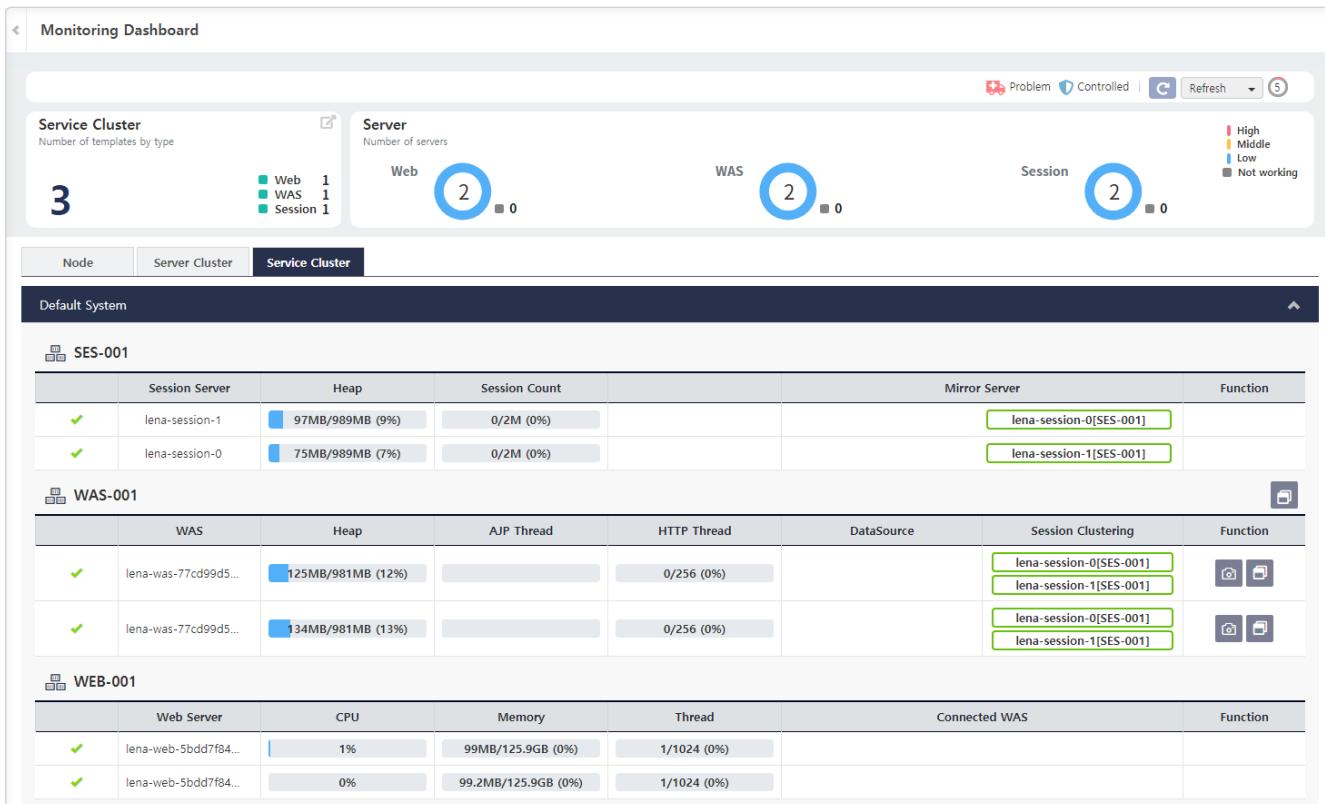


Figure 22. Monitoring Dashboard Service Cluster Tab Screen



The Service Cluster tab is a functionality provided in the Container Edition.

The attributes used in the Monitoring Dashboard screen are as follows. The colors of information provided in usage form can be changed using the Status Range attribute. (Refer to the monitoring basic settings subsection of this chapter)

Table 119. Node Status

Item	Description	Notes
CPU	Node CPU usage	Default setting is Low when below 60%, High when 80% or above.
Memory	Node Memory usage	Default setting is Low when below 60%, High when 80% or above.
Disk	Node Disk usage	This is the usage of the Disk where the Engine is installed, with default setting being Low when below 60%, High when 80% or above.

Table 120. Application Server Status

Item	Description	Notes
Status	Server start status, diagnostic result issuance status ( <b>ambulance icon</b> ), and automatic response execution status ( <b>shield icon</b> )	Unknown status is displayed when server status cannot be retrieved through Node Agent
Server Name	Server name	
Heap Memory	Heap Memory usage used in Application Server	
Thread Pool	Displays Request Thread usage managed by Application Server as a Pool by Connector (Ajp, Http)	
DataSource	Datasource Connection usage rate managed by Application Server as a Pool	
Session Clustering	Information about Session Server configured in Application Server and start status	Red means stopped state, green means running state, black means server existing outside the system

Table 121. Web Server Status

Item	Description	Notes
Status	Server start status	Unknown status is displayed when server status cannot be retrieved through Node Agent
Server Name	Server name	
CPU	Web Server process CPU usage	
Memory	Web Server process Memory usage	

Item	Description	Notes
Thread	Web Server Thread count (Active / Max)	
Connected WAS	Information about WAS connected to Web Server and start status	Red means stopped state, green means running state, black means server existing outside the system

Table 122. Session Server Status

Item	Description	Notes
Status	Server start status	Unknown status is displayed when server status cannot be retrieved through Node Agent
Server Name	Server name	
Heap	Heap Memory usage used in Session Server	
Session Count	Ratio of active Sessions	
Mirror Server	Information about Mirror Server and start status	Red means stopped state, green means running state, black means server existing outside the system

Table 123. Memory Cache Server Status

Item	Description	Notes
Status	Server start status, diagnostic result issuance status ( <b>ambulance icon</b> ), and automatic response execution status ( <b>shield icon</b> )	Unknown status is displayed when server status cannot be retrieved through Node Agent
Server Name	Server name	
CPU	CPU usage used in the server	
Memory	Memory usage used in the server	
Connection	Number of Connections currently connected from clients	
Replicas	Replicas connected to the server	

The following functionality is provided together to immediately control each server.

Table 124. Application Server Control Functions

Item	Description	Notes
Thread Dump	Generate Thread Dump	<b>Left button (Server Snapshot(dump)) &gt;</b> Select Dump List menu > Dump file can be downloaded
Active Service Dump	Create Active Service Dump	<b>Left button (Server Snapshot(dump)) &gt;</b> Select Dump List menu > Download Dump file
Heap Dump	Create Heap Dump	<b>Left button (Server Snapshot(dump)) &gt;</b> Select Dump List menu > Download Dump file
Forced Stop	Force server to stop	Forced to stop immediately without waiting
Forced Restart	Force server to restart	Forced to restart immediately without waiting
All Diagnostics Disable	Disable all diagnostic/response functions applied to the server	

The screenshot shows a 'Current State' section with three main dump types:

- Thread Dump:** One entry, LNMHSWS1\_daf-was-01\_20201210-203531\_tdump.txt, 24.95 KB, with a 'View' button.
- Active Service Dump:** Two entries, LNMHSWS1\_daf-was-01\_20201210-203548\_sdump.txt and LNMHSWS1\_daf-was-01\_20201210-203546\_sdump.txt, both 218 B, with 'View' buttons.
- Heap Dump:** One entry, LNMHSWS1\_daf-was-01\_20201210-203535\_hdump.hprof, 89.7 MB, with a 'View' button.

Each section has a 'Previous' and 'Next' link, and buttons for 'Thread Dump', 'Download', and 'Delete'.

Figure 23. Dump window

You can generate and download Heap Dump, Thread Dump, Active Service Dump. Generally, Dump is generated to investigate the cause of errors such as Out Of Memory in the server, excessive use of Thread Pool, or service delay.

Depending on the Dump type you want to generate, click **Thread Dump button**, **Active Service Dump button**, **Heap Dump button** to generate Dump. Generated Dump is stored in the Host where Web Application Server exists, Thread Dump in {log\_home}/logs/tdump, Active Service Dump in {log\_home}/logs/sdump, HeapDump file in {log\_home}/logs/hdump path.



**Delete button** can be clicked to delete Dump files. **Download button** can be clicked to download Dump files, and when downloading, the corresponding Dump file is also downloaded in zip format together with the system status Dump file.

The items in the Dump management screen are as follows.

Table 125. Dump screen items

Item	Description	Notes
File Name	Generated file name	Automatically generated with date string
Size	Size of generated file	
Status	System and Server status at the time of Dump execution	<p>System's CPU, Memory information and key resource usage information of Web Application Server are also generated together at the time of Dump generation.</p> <p><b>View button</b> can be clicked to check the generated Status value.</p>

Table 126. Web Server Control Functions

Item	Description	Notes
Forced Stop	Server forced shutdown	No waiting time, immediate forced shutdown
Graceful Stop	Server graceful shutdown	



If Monitoring information is not displayed, check if the registered Node/Server actually exists and if communication with Node/Server is in a good state.

Table 127. Memory Cache Server Control Functions

Item	Description	Notes
Start	Server start	
Stop	Server shutdown	

## 7.1.2. Detailed Status Monitoring

When you select **the middle button (View Detail Chart)** in the Function column of the Monitoring Dashboard, you can monitor detailed Thread, Memory, and service information.

### System Window

You can check Memory, Thread, and Service information of Web Application Server.

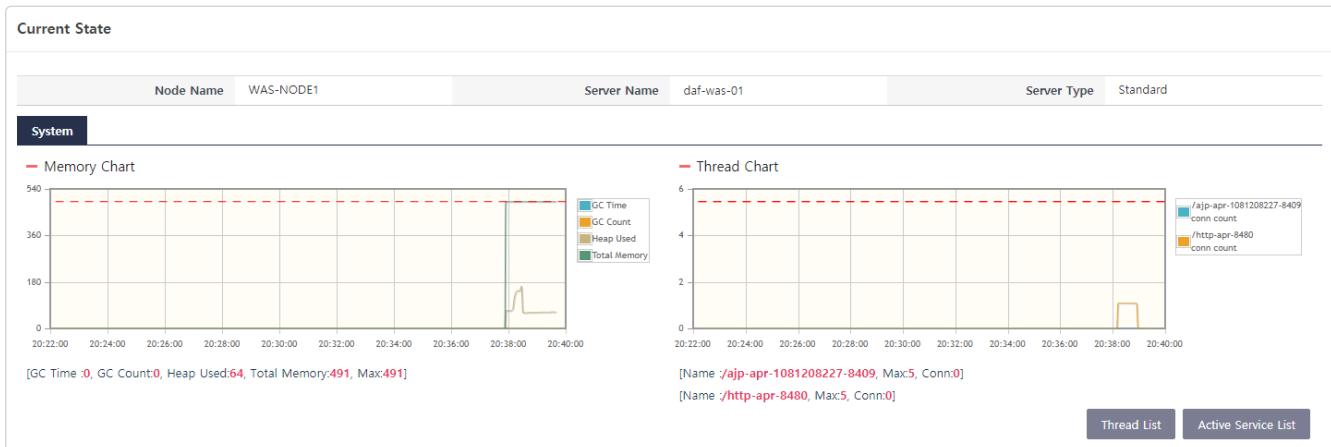


Figure 24. System Tab

### Memory Chart

Real-time Memory usage information is displayed. The information provided includes GC Time (Garbage Collection time), GC Count, Heap Used (Total Memory - Free Memory), Total Memory (total memory used on the server), and Peak Memory (maximum memory used). The red dotted line in the chart means the maximum available Heap Memory. Therefore, if the chart shows Heap Memory usage for a long time continuously close to the red dotted line, it should be noted.



The maximum value of Request Thread can be changed through the `maxThreads` property of the corresponding Web Application Server in the Server menu.

## Thread Chart

It is a Line Chart showing the usage of Request Thread managed by Web Application Server for processing user requests. The red dotted line in the chart means the maximum available Request Thread. Therefore, if the chart shows Request Thread count close to the red dotted line, it should be noted.



The maximum value of Request Thread can be changed through the `maxThreads` property of the corresponding Web Application Server in the Server menu.

## Thread List

You can check all Threads of Web Application Server. You can filter based on the Thread name or Thread status. The items in the Thread List are as follows.

Table 128. Thread List Items

Item	Description	Notes
Thread ID	Unique Thread ID	
Name	Thread name	
Stat	Thread status	<p>There are three states in total</p> <ul style="list-style-type: none"> <li>• RUNNABLE: Available Thread</li> <li>• WAITING: Thread waiting for a specific Action from another Thread</li> <li>• TIMED_WAITING: Thread with a specified waiting time</li> </ul>
CPU	CPU usage for the specified Thread	
Elapsed	Time taken for the Thread to execute	
Service Name	Service name executed by the Thread	

**+ button** can be clicked to view detailed information as follows.

Table 129. Thread detailed information items

Item	Description	Notes
threadId	Unique Thread ID	
threadName	Thread name	

Item	Description	Notes
state	Thread status	<p>There are three states in total</p> <ul style="list-style-type: none"> <li>• RUNNABLE: Available Thread</li> <li>• WAITING: Thread waiting for a specific Action from another Thread</li> <li>• TIMED_WAITING: Thread with a specified waiting time</li> </ul>
threadCpuTime	CPU time for the current Thread and all Threads	
threadUserTime	CPU time for the current Thread	
blockedCount	Total blocked	
blockedTime	Accumulated blocked time	
waitedCount	Total waited Threads	
waitedTime	Accumulated waited time	
lockOwnerId	ID of the Thread owning the locked Object	
lockName	Name of the locked Object	
lockOwnerName	Name of the Thread owning the locked Object	
stackTrace	stackTrace	

## Active Service List

You can check service information and Thread information for the service that is currently processing. The items in the Active Service List are similar to those in the Thread List, with the following additional items.

Table 130. Active Service List Items

Item	Description	Notes
Sql	Current SQL statement being executed	

## DataSource Window

You can check DataSource information configured in Application Server.

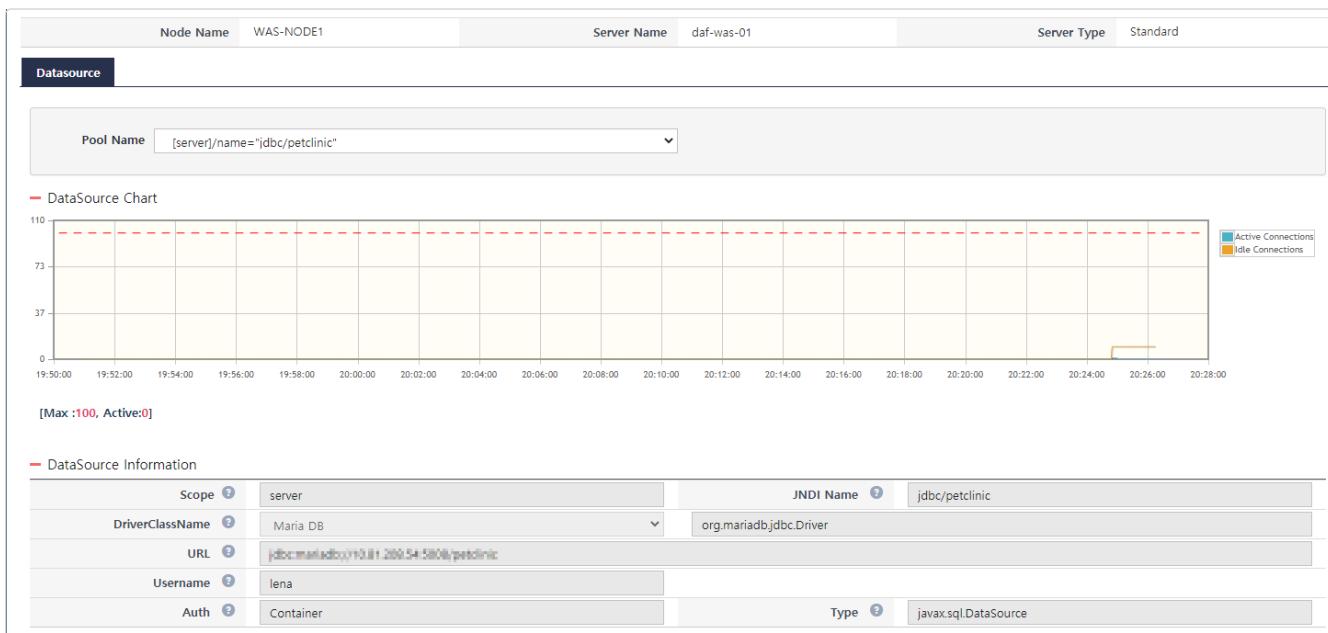


Figure 25. DataSource Tab Screen

## DataSource Chart

Active Connection count and Idle Connection count are displayed in real-time in the chart. The red dotted line in the chart means the maximum set Connection count. When Active Connections are close to the red dotted line, it should be noted. You can select DataSource in the combo box to monitor other DataSources.



The maximum Connection count can be changed through the maxConnection property in the DataSource registration screen.

## DataSource Information

You can check the configured settings of the specified Datasource.

### 7.1.3. Memory Cache Server

When you select **the left button (System)** in the Function column of the Monitoring Dashboard, you can monitor detailed service information.

#### System Window

You can check Memory, CPU, and Service information of Memory Cache Server.

[diagnostics memory cache system 01] | manual/diagnostics\_memory\_cache\_system\_01.png

[diagnostics memory cache system 02] | manual/diagnostics\_memory\_cache\_system\_02.png

#### CPU Chart

You can check CPU usage of Memory Cache Server over time.

#### Command Processing

You can monitor CPU usage of commands that Memory Cache Server is processing in real-time.

## Memory Chart

You can check Memory usage of Memory Cache Server over time. The items that can be monitored for Memory include Peak Memory (maximum memory used), Max Memory (maximum available memory), current memory usage, physical memory (RSS Memory), and physical memory usage relative to actual memory (RSS Ratio).

## Network Input/Output

You can monitor Network packet size that enters and leaves Memory Cache Server in real-time.

## Hit Ratio

It shows the success rate of data retrieval commands requested by clients.

## Key

You can check the total number of Keys for each DB in Memory Cache Server, and you can check the number of keys evicted and the time of the last eviction.

## Connected Client

You can check the number of Connections currently connected to clients over time, and you can also monitor the maximum number of simultaneous Connections and the number of Rejected Connections.

## Connected Client List

By clicking the Retrieve button, you can find the list of currently connected Clients, the last successful command, the time taken, Idle time, etc.

## Slog Log

You can view commands executed beyond the pre-defined time.

## 7.1.4. Monitoring Settings

You can set monitoring basic settings in the DIAGNOSTICS > Policy > Common Rule Setting menu. The settings are as follows.

Table 131. Monitoring related basic settings items

Item	Description	Default Value
Status Range	Sets the Low, Middle, High criteria for Resources in the Monitoring Dashboard.	60% or less means Low, 60% or more means Middle, 80% or more means High.
Diagnostics Interval	Sets the diagnostic cycle.	10000(ms)
Dump Limit	Limits the number of Dumps (Thread/ActiveService/Heap) per server directory (0 means unlimited)	200(items)

## 7.2. Analysis Dashboard

The Analysis Dashboard provides real-time failure analysis status information by system unit. The types of information provided are as follows.

- Performance Map
- Analysis Summary
- Instance Map

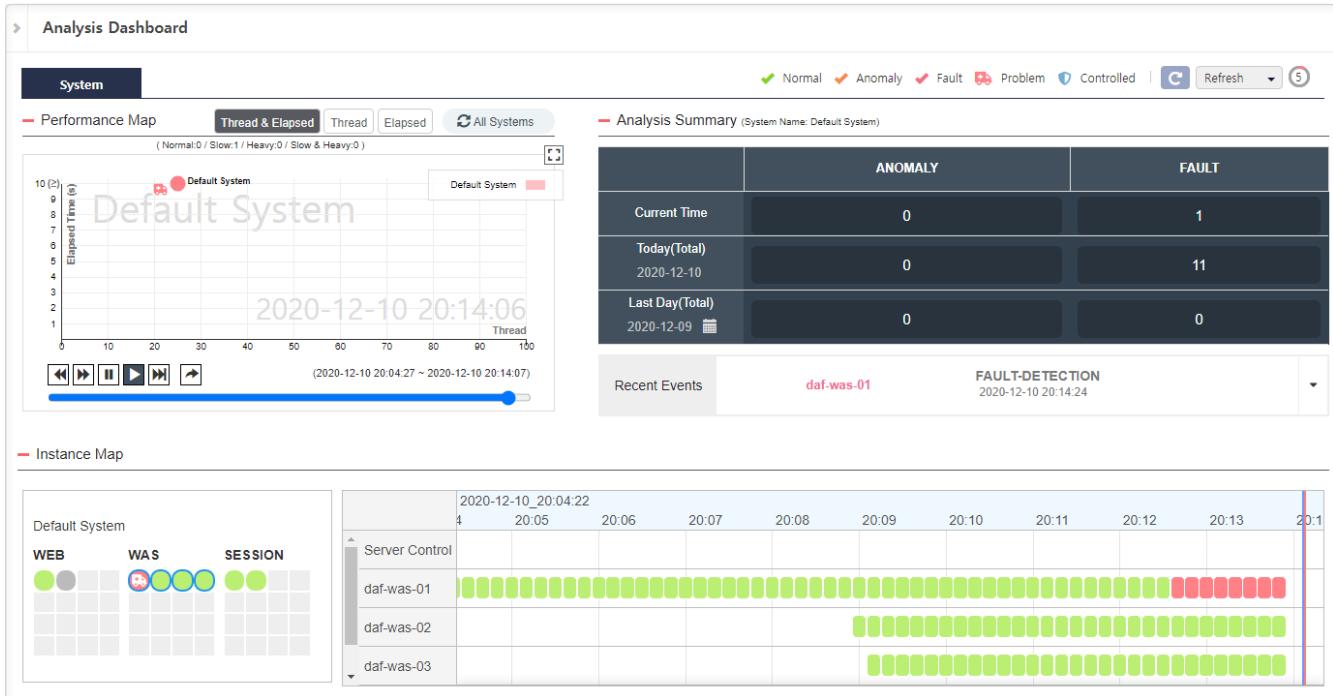


Figure 26. Analysis Dashboard

### 7.2.1. Performance Map

The Performance Map shown in the top left of the Analysis Dashboard provides system status information based on "Thread & Elapsed", "Thread", and "Elapsed" criteria respectively. Each system is displayed as a colored circle on the Chart. The colors by system status are as follows.

- Normal: Green
- Anomaly: Orange (Anomaly situation detected by diagnostic results)
- Fault: Red (Fault situation detected by diagnostic results)

The meanings of the X-axis and Y-axis in the Chart are as follows.

Table 132. Performance Map Chart X, Y-axis Meanings

Item	Description	Notes
Thread & Elapsed Chart	X-axis: Average Thread usage of Web Application Server within the system  Y-axis: Average response time of services performed in Web Application Server within the system	

Item	Description	Notes
Thread Chart	X-axis: 10-minute Time Line  Y-axis: Average Thread usage of Web Application Server within the system	
Elapsed Chart	X-axis: 10-minute Time Line  Y-axis: Average response time of services performed in Web Application Server within the system	

The System status summary information displayed at the top of the Chart is as follows.

Table 133. System Status Summary Information Items

Item	Description	Notes
Normal	Number of normal Systems	
Slow	Number of Systems with long response times	
Heavy	Number of Systems with high Thread pool usage	
Slow & Heavy	Number of Systems that are both Slow and Heavy	

You can view previous status information by manipulating the slide bar at the bottom of the Chart, and you can move through time by clicking **Previous 10 minutes icon**, **Next 10 minutes icon**, **Pause icon**, **Play icon**, **Move to current time icon**. When first entering the Dashboard, all systems are displayed, and you can select specific systems by clicking on systems or legends displayed in the Chart. To view all systems again, click the **All System icon** in the top right.

Right-clicking on a system icon allows you to perform the following functions.

Table 134. Functions Available When Right-clicking on System Icon

Item	Description	Notes
Topology View	Move to Topology View screen	
Service Analysis	Display System Detail popup window	
Monitoring	Move to Monitoring Dashboard screen	
Statistics	Move to Statistics screen	

The popup window displayed when clicking Service Analysis among the system right-click functions is as follows. The current status of Web Server, WAS, and Session Server is displayed on the left. On the right, you can see the Transaction Heat Map Chart, and you can check detailed information by dragging an area.

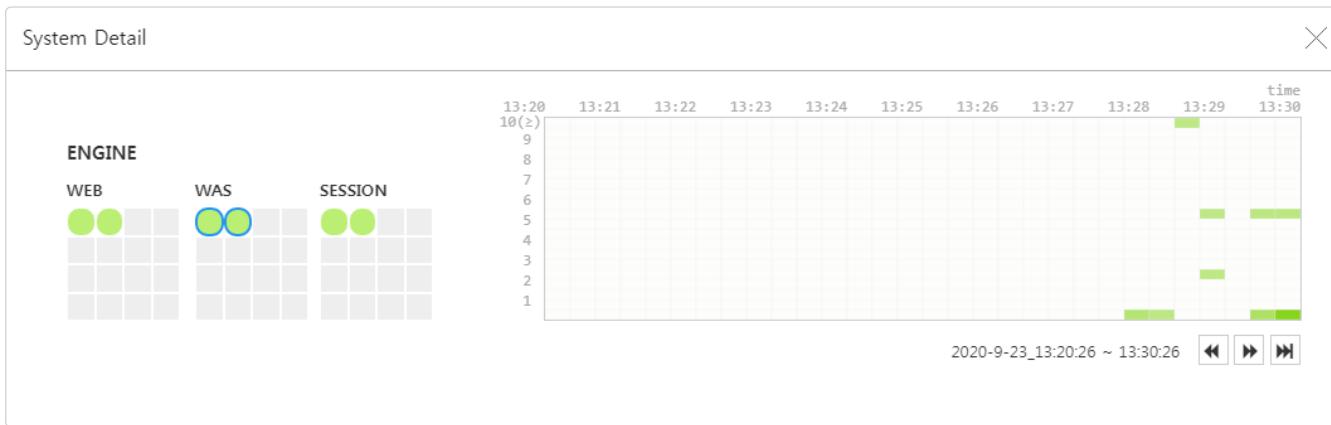


Figure 27. System Detail Screen



Transaction information only remains when collected through the Service Trace functionality in LENA Dashboard.

The following is the detailed information screen that can be viewed when selecting a specific Transaction from the Transaction list displayed after dragging the desired area in the Transaction Heat Map Chart.

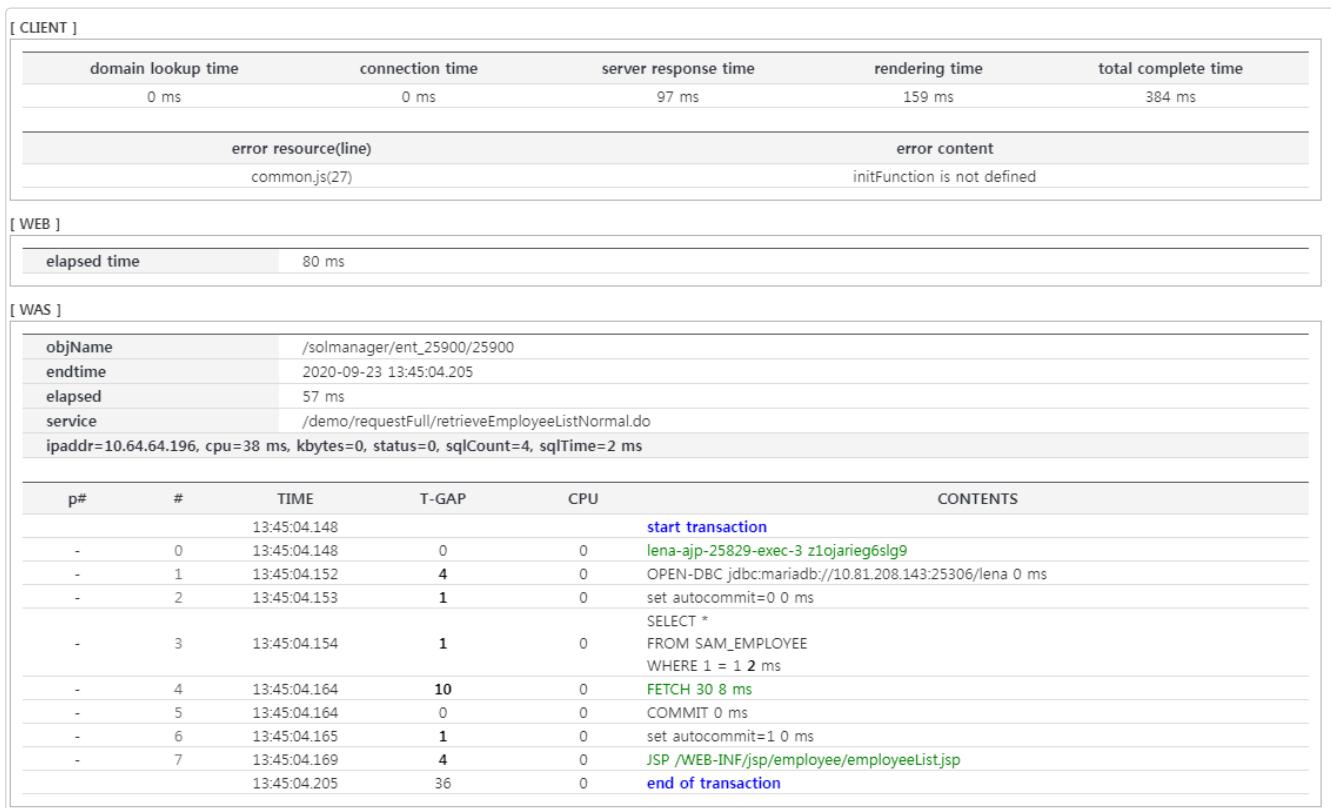


Figure 28. Transaction Detail Information Screen

The detailed information consists of data from CLIENT (user browser related), WEB (LENA Web Server related), and WAS (LENA Web Application Server related) perspectives. The items that can be viewed in each type of information are as follows.

Table 135. CLIENT Related Data Items

Item	Description	Notes
domain lookup time	Time for browser to perform domain lookup to connect to server	

Item	Description	Notes
connection time	Time for browser to establish connection with server	
server response time	Total time for browser to send request to server and receive response	
rendering time	Browser screen rendering time	
total complete time	Total time processed in browser	
error resource(line)	When script error occurs, the line where the error occurred	
error content	When script error occurs, the content of the error that occurred	

Table 136. WEB Related Data Items

Item	Description	Notes
elapsed time	Processing time performed in WEB	

## WAS Related Data Items

- Basic Information

Table 137. Basic Information

Item	Description	Notes
objName	Name of server that processed the request	
endtime	Request processing completion time	
elapsed	Request processing execution time	
service	Request service name	
ipaddr	IP information of the caller	
cpu	CPU usage time	
sqlCount	Number of queries executed	
sqlTime	Query execution time	

- Profile Information

Table 138. Profile Information

Item	Description	Notes
#	Index indicating the order of profile steps	
p#	Parent index if it's an internal step	
TIME	Time when the step started	
T-GAP	Difference between current step start time and previous step start time	

Item	Description	Notes
CPU	CPU usage time	
CONTENTS	Content of each step	



CLIENT and WEB related information is only collected when the E2E functionality is ON. It is OFF by default to minimize load.



Profile information is only collected when profile settings are ON in WAS. It is OFF by default to minimize load.

## 7.2.2. Analysis Summary

Shows summary information of currently detected diagnostic result counts, total diagnostic result counts that occurred today, and diagnostic result counts that occurred on previous days (Default: 1 day ago).

Table 139. Analysis Summary Information Items

Item	Description	Notes
Anomaly	Number of diagnostic results that are not in Fault status but need careful attention	
Fault	Number of diagnostic results diagnosed as Fault status	

Recent Events shows the most recently occurred diagnostic results, and clicking on an item allows you to check Report information.

## 7.2.3. Instance Map

When a specific system is selected in the Performance Map, you can see a Time Line Chart at the bottom of the screen showing server information within the system and diagnostic results. Servers are displayed in different colors according to their status, and you can toggle specific servers to show or hide them in the right Time Line Chart. After diagnosis, if Anomaly or Fault situations are detected, they are displayed in orange (Anomaly situation) or red (Fault) on the Time Line, and double-clicking on the area allows you to check the Report.

## 7.3. Event Dashboard

The Event Dashboard provides event status information that occurred in WAS.

Event information is generated in WAS and transmitted to the Manager via UDP. Event information sent by WAS is stored in the Manager's DB for a certain period (3 months), and detailed SQL and Exception Trace information for that event is stored for only 7 days due to large data size.

### 7.3.1. Event Types

There are 4 types of events as follows.

- Out Of Memory Error occurrence event in WAS
- Full GC occurrence event in WAS

- Stuck Thread occurrence event in WAS
- Exception occurrence event in WAS

WAS Exception events are generated and transmitted to the Manager in the following two situations.



- When an Exception is thrown outside the Servlet's service method for a user request
- When an Exception of a type configured by the user occurs

### 7.3.2. Event Management through Event Dashboard

You can manage Events collected in the Event Dashboard of LENA Manager.

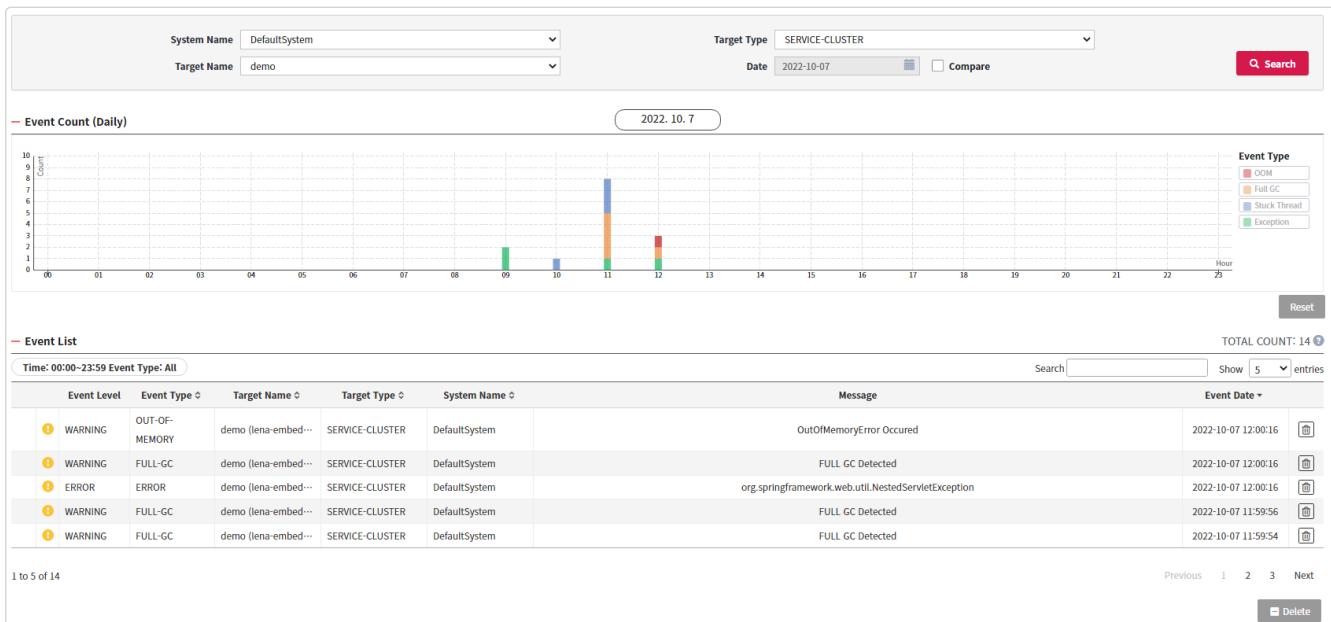


Figure 29. Event Dashboard

You can check event occurrence trends in daily bar charts. You can view all Systems or specify specific Systems or Servers for queries. Click the **Calendar button** to change the date.

The items in the event list are as follows.

Table 140. Event List Items

Item	Description	Notes
Event Level	Event level	<p>The following types exist. The 4 events are WARNING by default and can be changed.</p> <ul style="list-style-type: none"> <li>• INFO</li> <li>• WARNING(DEFAULT)</li> <li>• ERROR</li> <li>• CRITICAL</li> </ul>

Item	Description	Notes
Event Type	Event type	The following types exist <ul style="list-style-type: none"> <li>• OUT-OF-MEMORY</li> <li>• FULL-GC</li> <li>• STUCK-THREAD</li> <li>• ERROR</li> </ul>
Target Name	Target server name	WAS name or Service Cluster name
System Name	System name	
Message	Event message	Error events leave the name of the occurred Exception, and Stuck Thread events leave a message indicating that a Stuck Thread occurred
Event Date	Event occurrence time	
( <b>Delete button</b> )	Button to select when deleting an event	

Clicking on an individual event row allows you to check the following Event detailed information.

Event Detail
X

— Event Common Info

Event Level	WARNING	Event Type	FULL-GC
Target Name	daf-was-01 [WAS-NODE1] (LNMHSWS1:10.81.208.227)	Target Type	SERVER
System Name	Default System	Event Time	2020-12-10 20:24:18
Message	FULL GC Detected		

— Event Detail Info

Full GC Start Time	2020-12-10 20:24:17	Full GC End Time	2020-12-10 20:24:18
Previous Full GC Start Time	2020-12-10 20:24:13	Previous Full GC End Time	2020-12-10 20:24:13
Memory Usage Before Full GC (MB)	20.75	Memory Usage After Full GC (MB)	23.4

Figure 30. Event Detail Information Screen

The common items in Event detailed information are as follows.

Table 141. Common Items in Event Detailed Information (Event Common Info)

Item	Description	Notes
Event Level	Event level	The following types exist. <ul style="list-style-type: none"><li>• WARNING</li><li>• INFO</li><li>• ERROR</li><li>• CRITICAL</li></ul>
Event Type	Event type	The following types exist <ul style="list-style-type: none"><li>• OUT-OF-MEMORY</li><li>• FULL-GC</li><li>• STUCK-THREAD</li><li>• ERROR</li></ul>
Target Name	Target server name	WAS name or Service Cluster name
Target Type	Target server type	The following types exist <ul style="list-style-type: none"><li>• WAS</li><li>• SERVICE-CLUSTER</li></ul>
System Name	System name	
Event Date	Event occurrence time	

The detailed information items that differ by Event are as follows.

Table 142. Out Of Memory Event Detailed Information Items (Event Detail Info)

Item	Description	Notes
Heap Dump File Name	Name of the Heap Dump file automatically generated when Out Of Memory Error occurs	

Table 143. Full GC Event Detailed Information Items (Event Detail Info)

Item	Description	Notes
Full GC Start Time	Full GC start time	
Full GC End Time	Full GC end time	
Previous Full GC Start Time	Start time of the immediately previous Full GC	
Previous Full GC End Time	End time of the immediately previous Full GC	

Item	Description	Notes
Memory Usage Before Full GC (MB)	Memory usage before Full GC execution	
Memory Usage After Full GC (MB)	Memory usage after Full GC execution	

Table 144. Stuck Thread Event Detailed Information Items (Event Detail Info)

Item	Description	Notes
Service	Service URL	
Http Query	get parameters of the service URL	post data is not visible get parameter keys are displayed but values are masked
Threshold(ms)	Threshold value set in LenaStuckThreadDetectionValve	
Active Time(ms)	Processing time of the service when Stuck Thread is detected	
Stack Trace	Stack Trace at the time of Stuck Thread detection	

Table 145. Error Event Detailed Information Items (Event Detail Info)

Item	Description	Notes
Service	Service URL	
Http Query	get parameters of the service URL	post data is not visible get parameter keys are displayed but values are masked
Remote Addr	Client remote address	
Custom Info	User-defined code information	Key, Value specified by the user using custom Servlet Filter
Exception Trace	Trace of the occurred Exception	

## 7.4. Statistics

### 7.4.1. Annual Diagnostics/Response Statistics

The DIAGNOSTICS > Analysis > Diagnostics Trend menu provides annual diagnostic results by server through charts.

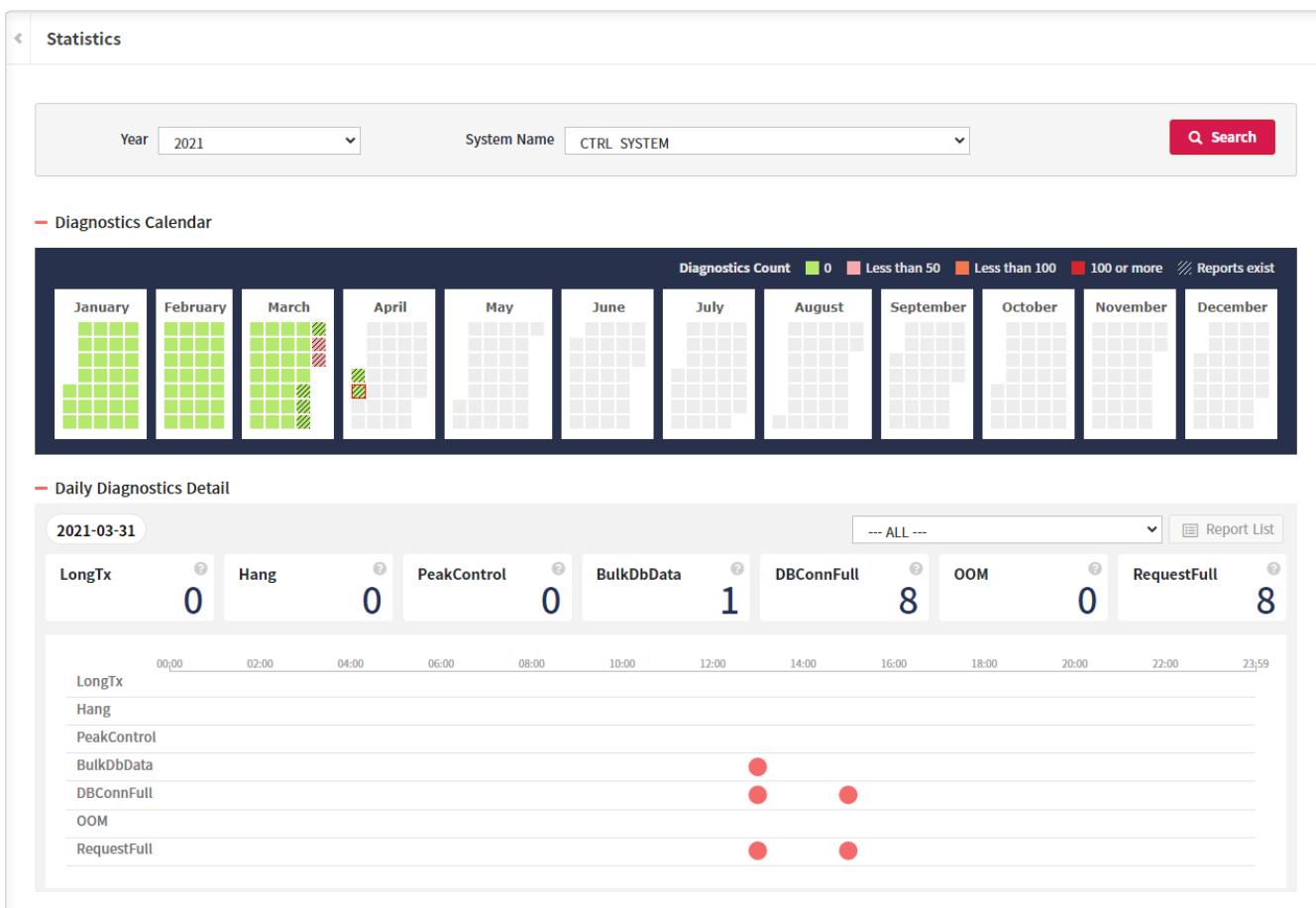


Figure 31. Statistics Screen

The following content can be checked in the above screen.

- Diagnostics Calendar
  - Each cell represents one day, and you can check the number of diagnostics that occurred on that day by hovering over a date in the annual statistics chart.
- Daily Diagnostics Detail
  - When you click on a specific date in the Diagnostics Calendar, a time-based diagnostic occurrence graph for the selected date is displayed at the bottom of the screen.

## 7.4.2. Reports

When diagnostics and response functionality is performed, Reports are automatically generated. Reports are stored for 7 days, and old Reports are automatically deleted.

### Diagnostics/Response Report List

In the DIAGNOSTICS > Analysis > Diagnostics Trend screen, after selecting a specific server, click the **Report List button** to view the diagnostics/response report list screen. The diagnostics/response report list screen is as follows.

Report				X
Show	10	entries	Search	
Node	APP_225_16800	Server	DIA_8580	Start Time 2021-03-31 13:36:29
APP_225_16800	APP_225_16800	DIA_8580		2021-03-31 13:37:29
APP_225_16800	APP_225_16800	DIA_8580		2021-03-31 15:41:52

1 to 3 of 3      Previous 1 Next

Figure 32. Diagnostics/Response Report List Screen

You can check the Report by selecting the **View button**.

## Report Common Information

The content of Reports is displayed differently according to diagnostic results, but they have the following common information.

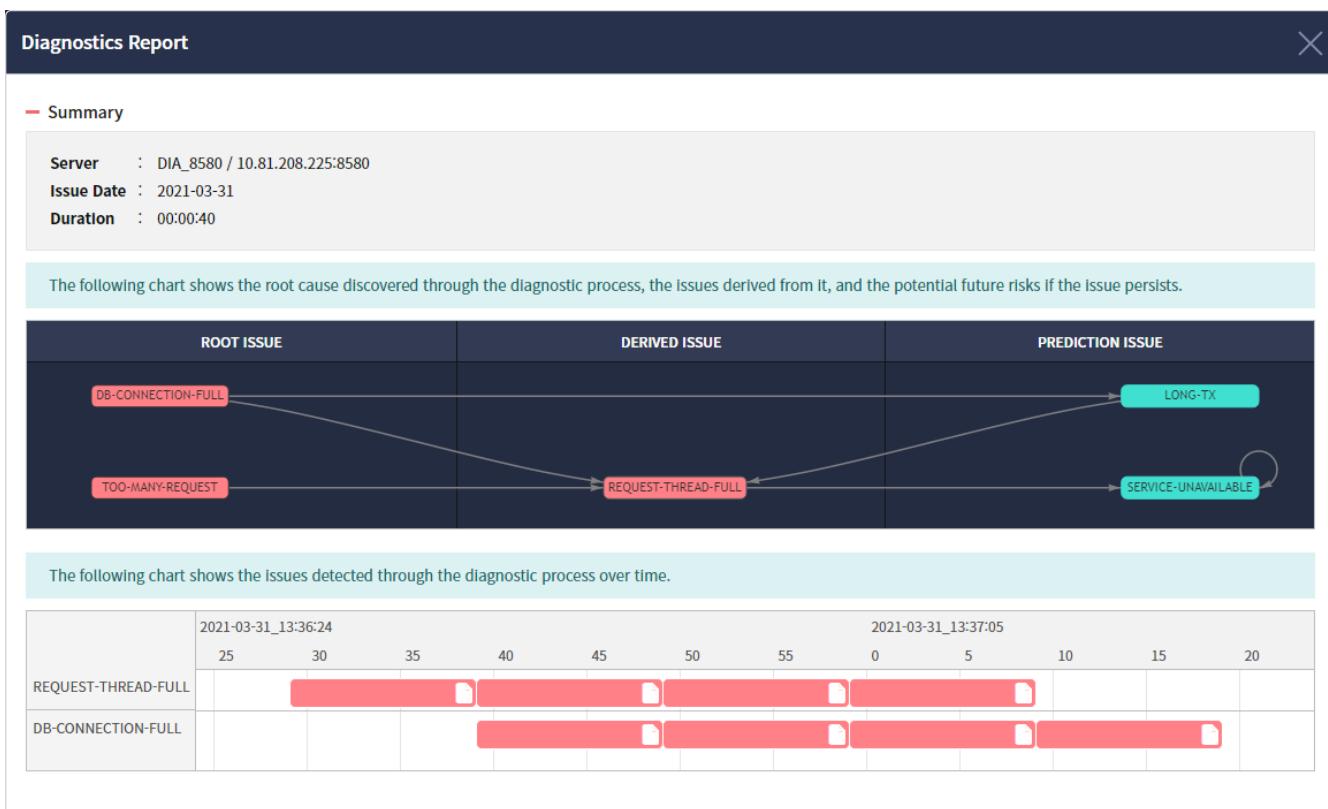


Figure 33. Diagnostics/Response Report Screen

As shown above, it provides a diagram of the causal relationship between diagnostic results detected during the period when abnormal phenomena persisted, and at the bottom of the screen, it shows when each diagnostic result was generated.



Anomaly situations mean situations where only some of the configured content in diagnostic/response Rules are satisfied and are displayed in orange, while Fault situations mean situations where all configured content in diagnostic/response Rules are satisfied and are displayed in red.

## Report Detailed Information

In the Time Line at the bottom of the Report, clicking on a specific diagnostic type at a specific time allows you to check detailed information as follows.

Diagnostics Report
X

- Summary

**Server** : DIA\_8580 / 10.81.208.225:8580  
**Issue Date** : 2021-03-31  
**Duration** : 00:00:40

The following chart shows the root cause discovered through the diagnostic process, the issues derived from it, and the potential future risks if the issue persists.

```

graph LR
    DB[DB-CONNECTION-FULL] --> RTF[REQUEST-THREAD-FULL]
    TMR[TOO-MANY-REQUEST] --> RTF
    RTF --> LT[LONG-TX]
    RTF --> SU[SERVICE-UNAVAILABLE]
    SU --> SU
  
```

The following chart shows the issues detected through the diagnostic process over time.

	2021-03-31_13:36:24					2021-03-31_13:37:05						
	25	30	35	40	45	50	55	0	5	10	15	20
REQUEST-THREAD-FULL					■	■						
DB-CONNECTION-FULL					■	■						

45 ▼

- Details

- Problem
- Root Cause : DB-CONNECTION-FULL
- Start Time : 2021-03-31 13:36:39
- Duration : 00:00:10
- Analysis Rule

The following are the rules that are set in the diagnostic process.

Request Pool(%)	
100	

- Fault Analysis Raw Data

The following is the data detected during the diagnosis process.

Service Name	Requested Count	Avg Elapsed Time	Max Elapsed Time	Min Elapsed Time
/dia/demo/dbConnFull/retriev...	1	33542	33542	33542
/dia/demo/dbConnFull/retriev...	1	33535	33535	33535
/dia/demo/dbConnFull/retriev...	1	33518	33518	33518
/dia/demo/dbConnFull/retriev...	1	33510	33510	33510
/dia/demo/dbConnFull/retriev...	1	33501	33501	33501

- Pre-Action for Fault Tolerance

- Service Control : N/A
- Dump : Thread Dump (N/A), Service Dump (N/A)

- Recommended Solution

FAKE-PAGE
PEAK-CONTROL
SCALING

Figure 34. Diagnostics/Response Report Detailed Information

The items in the Report detailed information are as follows.

Table 146. Report Detailed Information Items

Item	Description	Notes
Root Cause	Diagnostic item that is the cause	Refers to the diagnostic item that caused the diagnostic result, and if there is another diagnostic item that caused the diagnostic result, the other diagnostic item is displayed
Analysis Rule	Threshold set in diagnostic/response Rule	
Fault Analysis Raw Data	Back Data that serves as the basis for diagnosis	
Pre-Action for Fault Tolerance	Performed Action and Dump file names	
Recommended Solution	Actionable solutions	

The Back Data items by diagnostic/response type are as follows.

The Back Data for Request Full diagnostic Reports consists of information about the 5 most frequently called services.

Table 147. Back Data Items for Request Full Diagnostic Reports

Item	Description	Notes
Service Name	Service name	
Requested Count	Number of requests for that service	
Avg. Elapsed Time	Average response time for that service	
Max Elapsed Time	Response time of the service that took the longest among that service	
Min Elapsed Time	Response time of the service that took the shortest among that service	

The Back Data for bulk DB Data request diagnostic Reports consists of information about the 5 services that made the most bulk DB Data requests.

Table 148. Back Data Items for Bulk DB Data Request Diagnostic Reports

Item	Description	Notes
Service Name	Service name	
Count	Number of requests for that service	
Blocked Count	Number of blocked DB data queries	

The Back Data for DB Conn Full diagnostic Reports consists of information about the excessively

occupied DataSource Connection Pool.

Table 149. Back Data Items for DB Conn Full Diagnostic Reports

Item	Description	Notes
DataSource Name	DataSource name	
DB Connection Pool Usage Rate	DB Connection Pool usage rate	

Long Transaction diagnostic Report's Back Data consists of the 5 services that took the longest among the diagnostic target services.

Table 150. Back Data Items for Long Transaction Diagnostic Reports

Item	Description	Notes
Service Name	Service name	
Requested Count	Number of requests for that service	
Avg. Elapsed Time	Average response time for that service	
Max Elapsed Time	Response time of the service that took the longest among that service	
Min Elapsed Time	Response time of the service that took the shortest among that service	

Peak Control diagnostic Report's Back Data consists of the 5 services that took the longest among the diagnostic target services.

Table 151. Back Data Items for Peak Control Diagnostic Reports

Item	Description	Notes
Service Name	Service name	
Requested Count	Number of requests for that service	
Avg. Elapsed Time	Average response time for that service	
Max Elapsed Time	Response time of the service that took the longest among that service	
Min Elapsed Time	Response time of the service that took the shortest among that service	

OOM diagnostic Report's Back Data consists of OOM occurrence status and memory usage information.

Table 152. Back Data Items for OOM Diagnostic Reports

Item	Description	Notes
OOM Occurred	OOM occurred	
Heap Usage Rate	Heap Memory usage rate	
Full GC Count	Full GC count	

Item	Description	Notes
Memory Leak	Memory Leak occurred	
Heap Dump	File name if Heap Dump was generated	

Hang diagnostic Report's Back Data consists of server status and system resource information.

Table 153. Back Data Items for Hang Diagnostic Reports

Item	Description	Notes
Node CPU Rate	CPU usage rate of the system measured by Node Agent	
Node Memory Rate	Memory usage rate of the system measured by Node Agent	
Process CPU Rate	CPU usage rate of the server	
Full GC Count	Full GC count of the server	

### 7.4.3. Alerts

When Reports are generated through diagnostics/response, they can be checked through the **bell icon** in the top right of LENA Manager as follows.

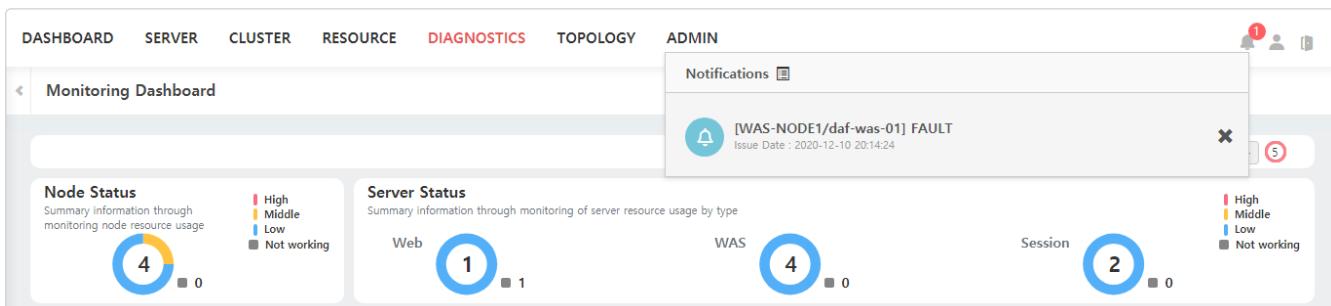


Figure 35. Diagnostics/Response Result Alert

When you select the alert content, you can immediately check the generated Report, and if you want to check the alert content and no longer display it, click the **x button**. When there are many alerts, you can select the **bell icon** in the top right of the Manager and then check them all at once in the Notifications screen.

Notifications							
* The notifications within one month can be searched.							
Search <input type="text"/> Show <input type="button" value="10"/> entries							
Name	Message	Confirm Message	Issue Date	Confirm Date	Confirm User		
daf-was-01	[WAS-NODE1/daf-was-01] FAULT		2020-12-10 20:14:24				

Figure 36. Bulk Check of Diagnostics/Response Result Alert List

Clicking the **Home icon** navigates to the diagnostic history screen for the selected alert. Clicking the **V icon** means that the selected alert has been checked, and alerts clicked this way will no longer be displayed in the **bell icon** in the top right of the Manager.



In the Notifications screen, you can check the history of past alerts within 1 month. Data older than 1 month is automatically deleted.

## 7.4.4. Thread Dump Analysis

Analyze thread dumps generated through LENA Manager and present them in an easily understandable format for users.

Prerequisites require a thread dump file within the server or service cluster.

### Report

Figure 37. Thread Dump Analysis Initial Screen

Select the 'DIAGNOSTICS' menu at the top of LENA Manager and click Thread Dump Analysis in Analysis on the left.

File Name	Size	Status
LSC15V208_demo_20231106_105124_tdump.txt	75.57 KB	true
LSC15V208_demo_20231106_105125_tdump.txt	75.57 KB	true
<b>LSC15V208_demo_20231106_105126_tdump.txt</b>	75.57 KB	true
LSC15V208_demo_20231106_105127_tdump.txt	75.57 KB	true
LSC15V208_demo_20231106_105128_tdump.txt	79.35 KB	true

Figure 38. Modal window to select the Thread Dump to analyze and generate the Report

Create Report button to confirm the modal window.

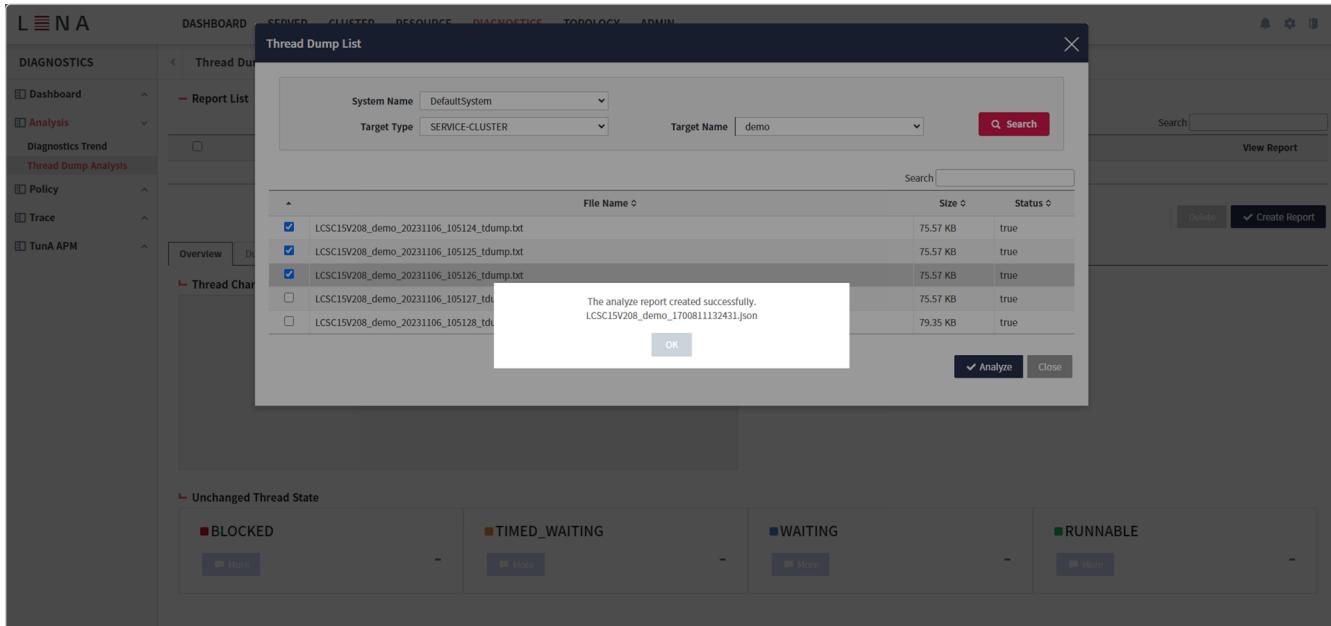


Figure 39. Screen showing successful Report generation after analyzing the Thread Dump file

Select System Name, Target Type, Target Name in order and click Search button to check the list of available Thread Dump files.

Select the Thread Dump file to analyze and click Analyze button to generate the Report.  
The path of the generated Report is as follows.

- (LENA-Manager installation path)/repository/monitoringDB/report

(You need to select 3-5 Thread Dump files for analysis.)

## Overview

	2022-07-18 14:26:58	2022-07-18 14:26:56	2022-07-18 14:31:09
<b>BLOCKED</b>	0	0	0
<b>TIMED_WAITING</b>	1	1	9
<b>WAITING</b>	16	16	11
<b>RUNNABLE</b>	7	7	6
<b>TOTAL</b>	24	24	26

Figure 40. Screen showing the analyzed Report file

### 1. Thread Change Thrend

You can check the state (State) change trend of Threads by graph and specific count by table.

### 2. Unchanged Thread State

Check the number of Threads that did not change in all analyzed Thread Dump files and click 'More' button to check detailed information.

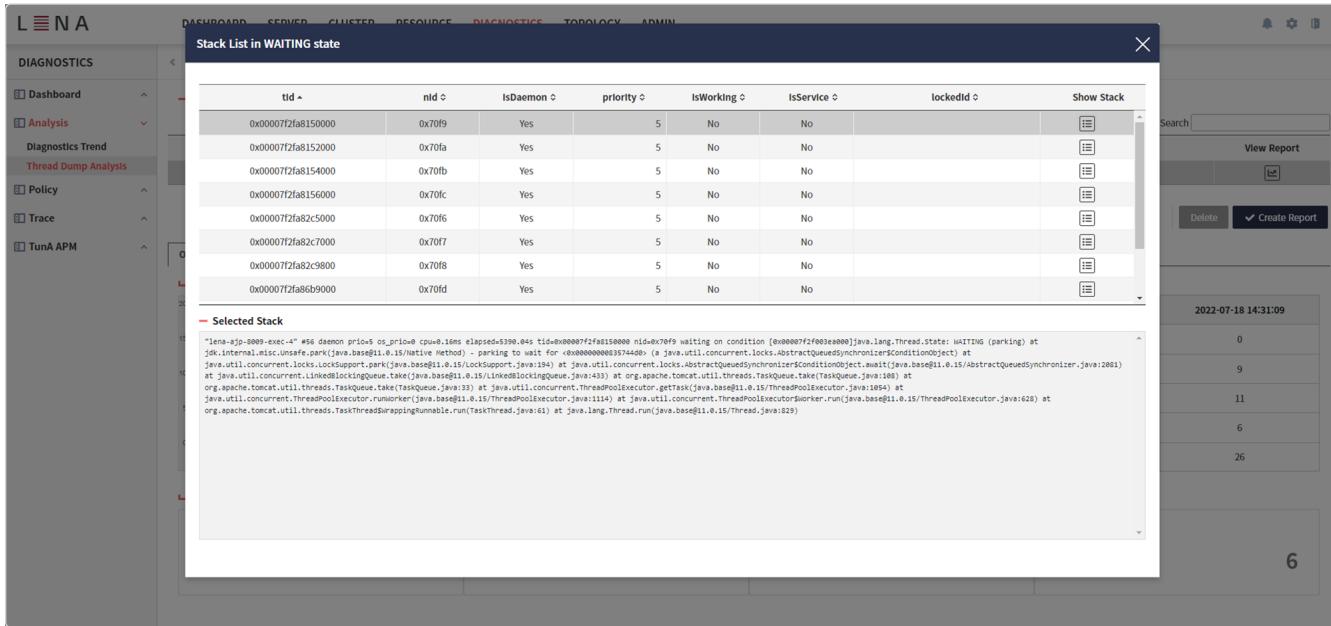


Figure 41. Information about Threads by state

## Dump Detail

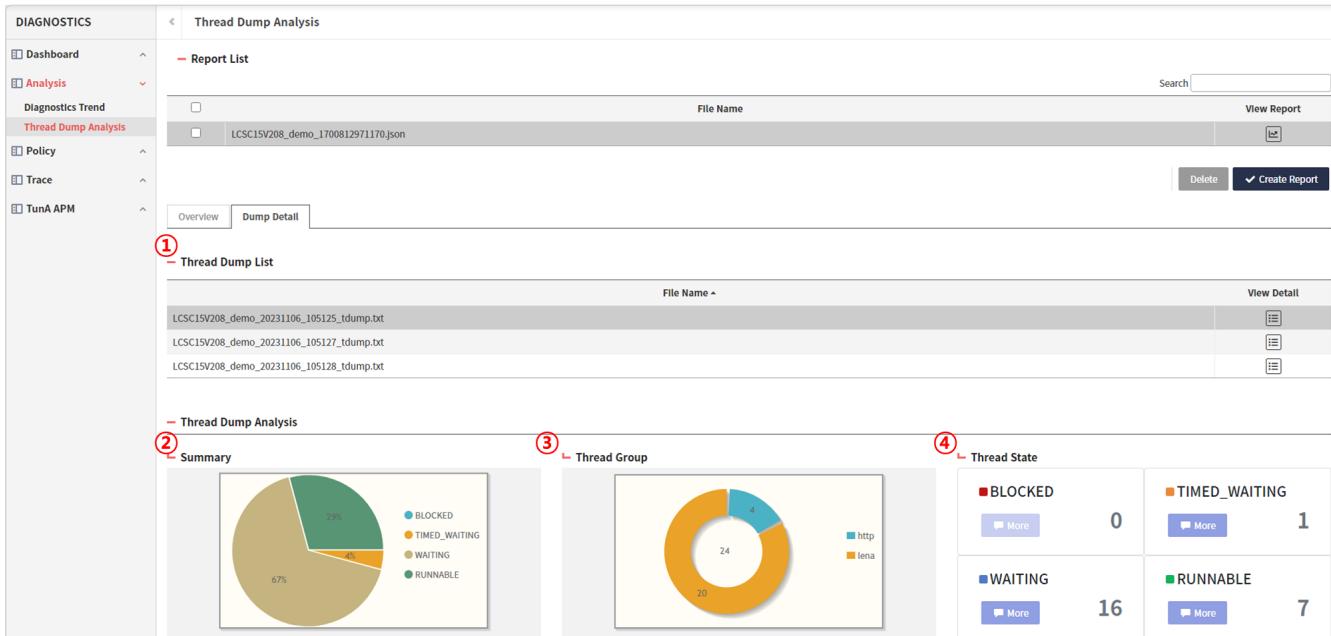


Figure 42. Screen showing Thread information for each analyzed Dump file

1. Thread Dump List  
List of analyzed Thread Dump files
2. Summary  
Thread state distribution of the corresponding Thread Dump
3. Thread Group  
Number of Threads grouped by workerThread defined in the Rule file
  - o Rule file path: (LENA-Manager installation path)/repository/conf/diagnostics/basic-parser.json
4. Thread State  
You can check detailed information by clicking 'More' button.

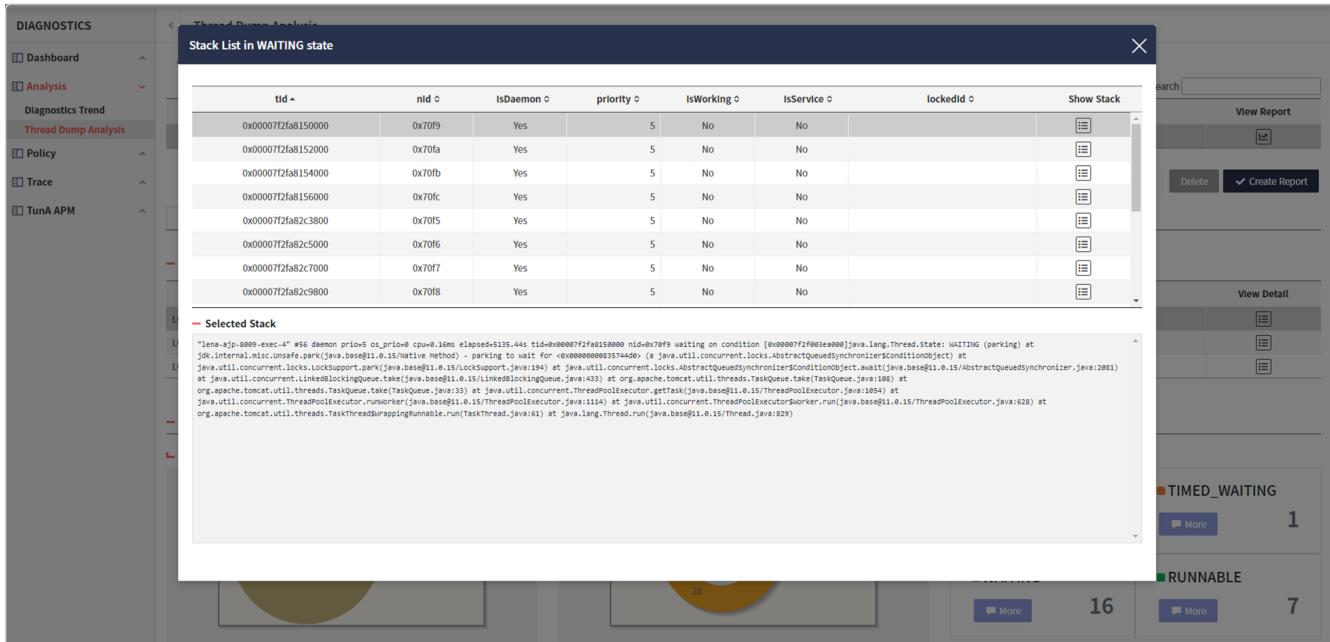


Figure 43. Thread information for the selected Thread Dump file

## 7.4.5. Diagnostics Pipeline

LENA Manager automatically analyzes Thread Dump and generates a Thread Dump Analysis Report and shares the abnormal phenomenon with users through alerts.

### Prerequisites

- Server Rule Setting Diagnostics Rule applied (for Thread Dump generation)
- Configure settings in `manager.conf`
  - `diagnostics.pipeline.enable=true` (default: false)
  - `diagnostics.pipeline.dump.count=5` (default: 5, range: 3-5)
  - `diagnostics.pipeline.interval=300` (default: 300, sec)

### Operation Sequence

1. Server overload causes Thread Dump
2. Automatic generation of Thread Dump Analysis Report and alert
3. Click the alert to navigate to the Thread Dump Analysis screen
4. Analyze the abnormal phenomenon

[diagnostics dump reportAlarm] | manual/diagnostics\_dump\_reportAlarm.png

Figure 44. Thread Dump Analysis Report generation alert

## 7.5. Diagnostics and Response

By using the diagnostics and response functionality, you can diagnose potential failures in advance and automatically perform appropriate responses to improve Server stability.

- The diagnostics function is a rule-based function that automatically determines the possibility of Server failure (or failure situations).
- The response function is a function that supports overcoming failure situations and providing

stable services through appropriate Server control based on diagnostic results.

The types of diagnostic targets are as follows.

- Excessive use of Request Pool (Request Full)
  - When all available Request Threads of the Server are exhausted due to excessive service requests, service requests may be delayed or fall into a service unavailable state. Based on Request Thread usage, it identifies whether there are excessive service requests, and automatically redirects those requests to a temporary page to maintain the Server in a stable state.
- Bulk DB Data Request
  - When a service processes large amounts of DB data, it may cause OOM phenomena, frequent Full GC causing server hang phenomena, etc., while using memory excessively. It identifies whether the service is making bulk DB data requests, and forcibly terminates that service to maintain the Server in a stable state.
- Excessive use of DB Connection Pool (Db Conn Full)
  - When DB Connections are excessively occupied due to DB processing time delays, WAS-DB network delays, DB locks, etc., services are delayed until they are allocated available DB Connections. When services waiting for DB Connection allocation accumulate and excessively occupy the Request Thread Pool, service failure states may occur. When all DB Connections of a specific DataSource are exhausted, it maintains the Server in a stable state by isolating failures through methods that reduce allocation wait times.
- Long-running Services (Long Transaction)
  - When services are delayed due to temporary network or inter-system problems, or when services that originally take a long time to execute exist, those services may excessively occupy the Server's available Request Threads, causing interference with other service execution. It ensures QoS for other services by limiting the Request Thread usage rate of long-running services.
- Server Operation Failure (Hang)
  - When the Server becomes in a Hang state where it cannot operate, not only are all tasks performed on the Server interrupted, but it may also affect the entire system where the Server is installed. When a Hang state is detected, it immediately restarts to resolve the Server's failure situation and prevent system-wide failure occurrence.
- Out of Memory Error Occurrence (OOM)
  - Out of Memory (OOM) errors may occur due to service logic errors or excessive Memory usage. When OOM occurs, the Server's normal operation cannot be guaranteed, so it quickly identifies OOM occurrence and automatically restarts promptly to overcome the Server's failure situation.
- User Surge (Peak Control)
  - When there are many user requests that exceed the Server's processing limits, service delays or failure states may occur. If user requests are concentrated on specific services only, controlling requests to enter in order can provide stable services while preventing user churn. It can also ensure QoS for other services.

### 7.5.1. Diagnostics/Response Rule Setting

You can set diagnostics/response rules in the DIAGNOSTICS > Policy > Diagnostics Rule Setting menu.

The screenshot shows a table-based interface for managing diagnostic rules. The columns include Rule Name, Condition(Fault), Report, Dump, and Server Control. The first rule, 'DEFAULT-DUMP-RULE', has a threshold of 100 and generates reports and dumps for both Thread and Service. The second rule, 'DEFAULT-NO-DUMP-RULE', also has a threshold of 100 but only generates reports. Action buttons for creating new rules are visible at the bottom.

Rule Name	Condition(Fault)	Action		
	Request Pool(%)	Report	Dump	Server Control
DEFAULT-DUMP-RULE	100	<input checked="" type="checkbox"/> Creation	<input checked="" type="checkbox"/> THREAD <input checked="" type="checkbox"/> SERVICE	<input type="checkbox"/> FAKE-PAGE
DEFAULT-NO-DUMP-RULE	100	<input checked="" type="checkbox"/> Creation	<input type="checkbox"/> THREAD <input type="checkbox"/> SERVICE	<input type="checkbox"/> FAKE-PAGE

Figure 45. Diagnostics Rule Setting Screen

It is organized by tabs for each diagnostics/response type, and basic Default Rules are provided. Click the **New button** to create a new rule, or select an existing rule to modify or delete it.

Two Default Rules are provided for each diagnostic item as follows.



- Rule that only generates reports after diagnosis
- Rule that generates reports and dumps after diagnosis (Action is provided disabled)

The rule setting items for each diagnostic type are as follows.

Table 154. Request Full Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
Request Pool(%)	Request Pool usage threshold	100
Report	Report generation (always Enable)	Enable
Dump	Dump type to generate when abnormality is detected <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	Action to perform when abnormality is detected <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• FAKE-PAGE: Redirect requests to temporary page (redirect page can be specified)</li> </ul>	NONE

Table 155. Bulk DB Data Request Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
RS Count	Threshold for number of DB Data records requested within service	10000

Item	Description	Default Value
Exceptional URI	Service URI to exclude from diagnosis	
Report	Report generation (always Enable)	Enable
Dump	Dump type to generate when abnormality is detected <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	Action to perform when abnormality is detected <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• THROW-EXCEPTION: Generate exception to forcibly terminate service</li> </ul>	NONE

Table 156. DB Conn Full Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
DB Connection Pool(%)	DB Connection Pool usage threshold	100
Report	Report generation (always Enable)	Enable
Dump	Dump type to generate when abnormality is detected <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	Action to perform when abnormality is detected <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• DB-CONN-CONTROL: Dynamically change Datasource Connection allocation wait time (wait time can be set)</li> </ul>	NONE

Table 157. Long Transaction Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
Elapsed Time(s)	Execution time threshold for diagnostic target service	300
Service Allow Rate(%)	Request Thread usage rate threshold allowed for diagnostic target service	50
Target URI	Target service URI	

Item	Description	Default Value
Report	Report generation (always Enable)	Enable
Dump	<p>Dump type to generate when abnormality is detected</p> <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	<p>Action to perform when abnormality is detected</p> <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• SERVICE-CONTROL: Redirect requests to temporary page (redirect page can be specified)</li> </ul>	NONE

Table 158. Hang Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
Timeout(ms)	Response wait time threshold after Health Check attempt to server	3000(ms)
Retry Count	Number of retries when Health Check fails on server	3
FullGC Duration(s)	Time interval to check Full GC count	60
FullGC Count	Full GC count	2
Report	Report generation (always Enable)	Enable
Dump	<p>Dump type to generate when abnormality is detected</p> <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> </ul>	Enable
Server Control	<p>Action to perform when abnormality is detected</p> <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• SHUTDOWN: Server shutdown</li> <li>• RESTART: Server restart</li> </ul>	NONE

The relationship between Hang diagnostic setting items is as follows.



- Fault condition: When a situation where there is no response for Timeout(s) after Health Check attempt due to server Hang is repeated Retry Count times, it is judged as a Fault situation and Action is performed
- Anomaly condition: If Full GC occurs FullGC Count times within FullGC Duration(s) interval, it is judged as an Anomaly situation and only a Warning report is generated without Action

Table 159. OOM Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
OUT OF MEMORY	OOM occurrence (judged as Fault situation)	Detection of occurrence without separate setting
Memory Leak	Memory Leak occurrence (judged as Anomaly situation)	Detection of occurrence without separate setting
Report	Report generation (always Enable)	Enable
Dump	Dump type to generate when abnormality is detected <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	Action to perform when abnormality is detected <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• SHUTDOWN: Server shutdown</li> <li>• RESTART: Server restart</li> </ul>	NONE

Table 160. Peak Control Diagnostic Rule

Item	Description	Default Value
Rule Name	Rule name	
Target URI	Peak Control target service URI	
Service Allow Rate(%)	Request Thread usage rate threshold allowed for diagnostic target service	50
Release Rate(%)	Request Thread usage rate threshold that becomes the condition for releasing abnormal situation	10
Report	Report generation (always Enable)	Enable

Item	Description	Default Value
Dump	Dump type to generate when abnormality is detected <ul style="list-style-type: none"> <li>• THREAD: Thread Dump</li> <li>• SERVICE: Active Service Dump</li> </ul>	Enable
Server Control	Action to perform when abnormality is detected <ul style="list-style-type: none"> <li>• NONE: Do not perform</li> <li>• PEAK-CONTROL: Redirect requests to temporary page (redirect page can be specified)</li> </ul>	NONE

## 7.5.2. Server Rule Setting

You can map diagnostics/response rules to servers and enable/disable them in the DIAGNOSTICS > Policy > Server Rule Setting menu.

Initially, no diagnostic rules are mapped, so you must first map diagnostics/response rules before performing enable/disable functions. You can map diagnostics/response rules to servers by clicking on each server's row as follows.

Server Rule Config X

[daf-was-01]'s rule

Diagnostics Type	Rule Name	Configure			
		Condition	Action		
			Report	Dump	Server Control
Request Full	DEFAULT-NO-DUMP-RULE	- Request Pool(%) : 100 - Creation	<input type="checkbox"/> THREAD <input type="checkbox"/> SERVICE	<input type="checkbox"/> FAKE-PAGE	
Bulk DB Data Request	DEFAULT-DUMP-RULE	- Result Set Count : 10000 - Exceptional URI :	<input type="checkbox"/> Creation	<input checked="" type="checkbox"/> THREAD <input checked="" type="checkbox"/> SERVICE	<input type="checkbox"/> THROW-EXCEPTION
DB Conn Full	DEFAULT-NO-DUMP-RULE	- DB Connection Pool(%) : 100 - Creation	<input type="checkbox"/> THREAD <input type="checkbox"/> SERVICE	<input type="checkbox"/> FAKE-PAGE	<input type="checkbox"/> DB-CONN-CONTROL (Wait Time: 3000 ms)
Long Transaction	DEFAULT-NO-DUMP-RULE	- Target URI : - Elapsed Time Limit(sec) : 300 - Service Allow Ratio(%) : 50	<input type="checkbox"/> Creation	<input type="checkbox"/> THREAD <input type="checkbox"/> SERVICE	<input type="checkbox"/> SERVICE-CONTROL
Hang	DEFAULT-DUMP-RULE	- Timeout(ms) : 3000 - RetryCount : 3 - Full GC Count(per sec) : 2/60	<input type="checkbox"/> Creation	<input checked="" type="checkbox"/> THREAD	<input type="checkbox"/> SHUTDOWN <input type="checkbox"/> RESTART
OOM	DEFAULT-DUMP-RULE	- Out of Memory Error Detection	<input type="checkbox"/> Creation	<input checked="" type="checkbox"/> THREAD <input checked="" type="checkbox"/> SERVICE	<input type="checkbox"/> SHUTDOWN <input type="checkbox"/> RESTART
<span style="border: 1px solid #ccc; padding: 2px 10px; margin-right: 10px;">Cancel</span> <span style="background-color: #0070C0; color: white; border: 1px solid #0070C0; padding: 2px 10px; font-weight: bold;">Save</span>					

Figure 46. Diagnostics Rule Mapping Screen

After diagnostics/response rules are mapped, you can enable/disable rules in the Server Rule Setting screen as follows.

The screenshot shows the 'Server Rule Setting' interface. It has a header with a back arrow and the title. Below the header, there's a 'Node' tab and a 'Default System' section. Under 'Default System', there are two sections: 'WAS-NODE1' and 'WAS-NODE2'. Each section contains a table with columns: Server Name, Request Full, Bulk DB Data Request, DB Conn Full, Long Transaction, Hang, and OOM. Each row in the table has a 'ON' or 'OFF' button.

Figure 47. Server Rule Setting Screen



Peak Control diagnostic rules are only set in the DIAGNOSTICS > Policy > Peak Control Rule Setting menu.

## 7.6. Trace

Trace records the movement path and time of a Request between LENA Servers to diagnose the cause for failure diagnosis. The Trace types provided by LENA are as follows.

- Session Trace
- Event Trace

You can use various functions through the sub-menus of the DIAGNOSTICS > Trace menu.

### 7.6.1. Session ID Search

You can check Session Trace information (which Server the Session exists in). To find a Session, the clustered Session Server must be running.

The screenshot shows the 'Session ID Search' interface. At the top, there are fields for Target Type (Node), Server Type (WAS Embedded or Standalone selected), Node (selected), Session Server (session1), and Session ID (TMA690289C30D55CA250F480EA09E14.acbab891d3e60363). A 'Search' button is at the bottom right. Below the search bar is a table titled 'Session ID Search' with columns: Server Type, Server Name, Create Time, Last Update Time, Last Access Time, Attribute, and Context. It lists sessions from Session Server and LENA Server.

Figure 48. Session Trace Screen

The query result items are as follows.

Table 161. Session Trace Query Result Items

Item	Description	Notes
Server Type	Server type	Session Server: LENA Session Server LENA Server: LENA Application Server

Item	Description	Notes
Server Name	Server name	For Session Server, the search target Server is Primary and the Slave Server of the search target server is Secondary
Create Time	Session creation time	
Last Update Time	Time when Session was last modified	
Last Access Time	Time when the Session was last called on the Server	
Attribute	Session Attribute	
Context	Application Context of the Session	

## 7.6.2. Event Trace

When an event judged as a failure occurs, you can check the Trace information of that Request.

Event Trace Result							
Status	Trace Time	UID	WEB	WAS	Event	SESSIONID	Detail
2020-12-10 20:47:29[070]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>
2020-12-10 20:47:29[074]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>
2020-12-10 20:47:29[080]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>
2020-12-10 20:47:29[083]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>
2020-12-10 20:47:29[083]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>
2020-12-10 20:47:29[088]	682f2a3c...	def-web03_LNMHSWB1	daf-was-01_LNMHSWS1			679C1A01B1119C1B5D5DA598003TF4AB...	<span>Q</span>

Figure 49. Event Trace Screen

Trace information is stored for only one week. The date when the event occurred is displayed in the Trace Date of the search conditions. The Status item in the search results indicates the importance of the occurred event.

Table 162. Event Trace Search Result Items

Item	Description	Notes
Trace Time	Processing completion time of the Request when the event occurred	Web Server completion time
UID	User ID that called the Request. If one User uses different browsers, UID is processed differently.	
WEB	Web Server that processed the Request	

Item	Description	Notes
WAS	WAS that processed the Request	
Event	Occurred Event	
SESSION ID	Session ID of the Request	
Detail	Button to check detailed information	

Click the **Detail Query button** in Detail of the search results to check detailed information. Each item is as follows.

Table 163. Detailed Information Items of Event Trace Information

Item	Description	Notes
Trace Time	Processing completion time of the Request when the event occurred	Web Server completion time
UID	User ID that called the Request. If one User uses different browsers, UID is processed differently.	
WEB	Web Server that processed the Request	
WAS	WAS that processed the Request	
Event	Occurred Event	
JVMRoute	JVMRoute value of the WAS that processed the Request	
SESSION ID	SESSION ID of the Request	
Session Server	Session Server that processed the Request	Displayed as Primary/Secondary Session Server of the connected WAS
URL	URL of the Request	

The events that are traced are as follows. (Event Codes can be checked by viewing Log files. The screen shows the codes as sentences.)

Table 164. Event Codes and Descriptions that are Traced

Event Code	Description	Notes
sywz	Session ID and JVMRoute information are different. (May occur when Failover occurs due to WAS failure.)	Session ID does not match with JVMRoute.
wxso	No Session information in WAS but Session information exists in Session Server. (May occur when Failover occurs due to WAS failure.)	Session does not exist in Application Server.
wosx	Session information exists in WAS but no Session information in Session Server. (May occur when two Session Servers are restarted.)	Session does not exist in Session Server.

Event Code	Description	Notes
wxsx	No Session information in WAS and no Session information in Session Server. (May occur when both Session Servers are stopped)	Session does not exist in any Server.
woxx	Session information exists in WAS but connection to Primary & Secondary session server is broken. (May occur when both Session Servers are stopped)	Session Server does not respond.
wxxx	No Session information in WAS and connection to Primary & Secondary session server is broken. (May occur when the Session in WAS times out and both Session Servers are stopped)	Session Server does not respond.



When sywz event and wxso event occur simultaneously in one Request, both events are displayed in one search result.

### 7.6.3. Trace Setting

The following is a screen for configuring Event/Time Trace settings.

Server Name	Trace On/Off	Type	Data	UID
daf-was-01	ON	ALL	UID	682f2a3c.5b4f7cf9c0202
daf-was-02	OFF	UDP	EVENT	
Server Name	Trace On/Off	Type	Data	UID
daf-was-03	OFF	UDP	EVENT	
daf-was-04	OFF	UDP	EVENT	

Figure 50. Trace Setting Screen

The Trace configuration items are as follows.

Table 165. Trace Setting Items

Item	Description	Notes
Trace On/Off	Whether to Trace	Applied without restart
Type	UDP: When Trace generation conditions are met, send Trace information to Manager via UDP LOG: When Trace generation conditions are met, save Trace information as Log ALL: When Trace generation conditions are met, use both UDP and LOG functions	

Item	Description	Notes
Data	EVENT: Record Trace when Event occurs UID: Record only Requests with the corresponding UID as Trace	
UID	Record only Requests with the entered UID as Trace	

## 7.7. TunA APM

TunA APM is a function that allows easy integration with LENA and TunA APM Tool to conveniently monitor user application performance. It can be used in Linux/Unix OS and VM installation versions based on LENA 1.3.2 version.

Integration and environment configuration can be performed through the sub-menus of the DIAGNOSTICS > TunA APM menu. The TunA APM menu configuration is as follows.

- Connection Management
- Module Management
- Install Management
- Host Management

### 7.7.1. Connection Management

Manages IP Address and Port information of TunA collection server and Web Server.

Performs tests to check if connection to TunA collection server is possible based on the IP Address and Port information entered by the user.

#### TunA Connection Information Input

Figure 51. TunA Connection Information Input Screen

#	Item	Description
①	TunA Address	Enter the IP Address of the TunA collection server.
②	TCP Port	Enter the TCP Port of the TunA collection server.
③	TunA Web Address	Enter the TunA Web Server IP Address.

#	Item	Description
④	HTTP Port	Enter the TunA Web Server HTTP Port.
⑤	<b>Save button</b>	Performs connection test for items ① ~ ④ entered by the user and saves the information to LENA Manager.

When TunA connection is successfully completed, it is displayed on the screen instead of the Save button, and you can modify and delete the previously entered TunA connection information through each button.



Figure 52. TunA Connection Information Input After Action Column

#	Item	Description
①	<b>Edit button</b>	Modifies TunA connection information.
②	<b>Delete button</b>	Deletes TunA connection information.

## TunA User Information Input

Figure 53. TunA User Information Input Screen

#	Item	Description
①	User ID	<p>Enter the user to be created in TunA. The prefix 'LENA_' is added to the entered user.</p> <ul style="list-style-type: none"> <li>User name rules: User names can be composed using English letters, numbers, Dash(-), and Underscore(_).</li> </ul>

#	Item	Description
②	<b>Check button</b>	Validates whether the entered user is correct and whether it is already registered in TunA. If it is a newly registered user in TunA, Owner is displayed in the User Type column, and if it is already registered in TunA, Guest is displayed. After completing this validation, you can enter or specify System Group. System Group is a concept used from TunA v2.6.0 to manage monitoring targets as groups. System Group is the basic unit of monitoring.

TunA User Information				
User ID	User Type	System Group	Last Update	Action
Default		Name		
(1) LENA_TESTUSER	(2) Owner	(3) (4) TESTGROUP	(5)	Add System Group (6) Save (7) Cancel

Figure 54. New User TunA System Group Input Screen

#	Item	Description
①	User ID	ID entered in user information.
②	User Type	User types are divided into Owner and Guest, and new users are displayed as Owner. Owner type users are given permissions to create, delete, and modify System Group lists.
③	Default	Sets the System Group to be used by default. The System Group set here is set as the default System Group when installing the Agent.
④	Name	Enter the System Group name you want to use. <ul style="list-style-type: none"> <li>System Group name rules: System Group names can be composed using English letters, numbers, Dash(-), and Underscore(_).</li> </ul>
⑤	Add System Group	Adds System Group.
⑥	Save	Saves the specified System Group and Default System Group information.
⑦	Cancel	Cancels current unsaved information and returns to the previous state.

TunA User Information					
User ID	User Type	System Group		Last Update	Action
		Default	Name		
① LENA_TESTUSER	② Guest	③ <input checked="" type="radio"/>	④ TESTGROUP	2023-06-02 15:29:53	<input type="button" value="Save"/> <input type="button" value="Cancel"/>

Figure 55. Existing User TunA System Group Input Screen

#	Item	Description
①	User ID	ID entered in user information.
②	User Type	User types are divided into Owner and Guest, and existing registered users are displayed as Guest. Guest type users, unlike Owner type users, are not given permissions to create, delete, and modify System Group lists and only have the right to select Default System Group.
③	Default	Sets the System Group to be used by default. The System Group set here is set as the default System Group when installing the Agent.
④	Name	System Group linked to existing registered users.
⑤	Save	Saves the specified Default System Group information.
⑥	Cancel	Cancels current unsaved information and returns to the previous state.

## TunA Connection Confirmation

Connection Management							
TunA Connection Information							
TunA Address		TCP Port		UDP Port		TunA Version	
2.8.0						2023-06-02 13:53:39	

TunA User Information				
User ID	User Type	System Group		Last Update
		Default	Name	
LENA_TESTUSER	Owner	TESTGROUP		2023-06-02 15:28:59

Open TunA

Figure 56. Open TunA Button Activated

When all necessary information is entered through TunA Connection Information and TunA User Information, you can use the button that connects to TunA as shown in the attached screen above. When you press the button, the TunA screen is displayed in a new browser window.

## 7.7.2. Module Management

Uploads TunA Agent files to LENA Manager and manages environment settings for TunA Agent. The Agent files provided by TunA consist of TunA Host Agent and TunA Java Agent, and each is provided in tar compressed file format.

Figure 57. Agent Module Upload Button

#	Item	Description
①	<b>Host Agent Upload button</b>	Opens Upload File dialog to upload TunA Host Agent file. If uploading the file again, it overwrites the previously uploaded file.
②	<b>Java Agent Upload button</b>	Opens Upload File dialog to upload TunA Java Agent file. If uploading the file again, it overwrites the previously uploaded file.

Figure 58. Agent Module Upload After Screen

#	Item	Description
①	Last Updated	Displays the time when the Agent file was uploaded.
②	Use Additional Configuration	Check if there are setting items to be commonly specified for each Agent. When the checkbox is checked, Additional Configuration items are displayed below this item, and when the checkbox is unchecked, Additional Configuration items are not displayed.

#	Item	Description
③	Additional Configuration	Text box that is activated when Use Additional Configuration is checked, where you write setting items to be commonly specified for each Agent. When installing the Agent in the Install Management step, the content written in this text box is included in the environment configuration file and installed.

### 7.7.3. Install Management

Manages target servers to install TunA Host Agent and TunA Java Agent and installs Agent files on servers.

Figure 59. Install Management Screen

#	Item	Description
①	Host List	List that manages TunA Host Agent installation. Lists of Hosts where Host Agent can be installed and lists of Hosts where Host Agent is installed are displayed.
②	<b>Add Host button</b>	Opens dialog to query and specify lists to be managed by Host List.
③	WAS List	List that manages TunA Java Agent installation. Lists of WAS where Java Agent can be installed and lists of WAS where Java Agent is installed are displayed.
④	<b>Add WAS button</b>	Opens dialog to query and specify lists to be managed by WAS List.

In Install Management, first select the Host or WAS to install TunA Agent and add it to the list (Host List, WAS List).

#### Host List Addition / Deletion / Modification

TunA Host Agent can install one Agent per Host. Therefore, in multi-node environments, one specific Node is selected for installation.

Add Host to Host List for installation. Proceed by clicking the Add Host button at the bottom of the Host List Table.

**Adding host**

Please select Node. You can select one Node per Host.

Available host list for TunA

①	Host Name	Host Ip	OS	Node Name	Port	LENA Home	Act. Status
<input type="checkbox"/>	LNLYEWS1	10.81.209.155	Linux	WASNODE_11	▼		
<input type="checkbox"/>	LNLYEWS2	10.81.209.156	Linux	WASNODE_12	▼		

Save Close

**Adding host**

Please select Node. You can select one Node per Host.

Available host list for TunA

②	Host Name	Host Ip	OS	Node Name	Port	LENA Home	Act. Status
<input checked="" type="checkbox"/>	LNLYEWS1	10.81.209.155	Linux	③ WASNODE_11	④ 16800	/engn001/lena/1.3.2.0	Add
<input type="checkbox"/>	LNLYEWS2	10.81.209.156	Linux	WASNODE_12	▼		

⑤ Save Close

Figure 60. Host Addition Dialog Screen

#	Item	Description
①	Available host list for TunA	Refers to the list of Hosts where Host Agent can be installed. Only Hosts containing Nodes registered or installed in LENA Manager can be checked.
②	Action Checkbox	Checkbox for selecting Host.
③	Node Selectbox	Selects Node to perform addition / deletion / modification operations.
④	Action Status	Displays what function will be performed on the Node selected by Node Selectbox. The displayed functions are as follows. <ul style="list-style-type: none"> <li>• Add: Specifies Host's Node and adds it to Host List.</li> <li>• Modify: Changes the specified Node to another Node.</li> <li>• Delete: Deletes the Node from the list.</li> </ul>
⑤	Save button	Performs the specified Action on the selected Node.

## WAS List Addition / Deletion

TunA Java Agent can install one Agent per WAS. Add WAS to WAS List for installation. This operation is performed by pressing the Add WAS button at the bottom of the WAS List table.

① OS	Node Name	Server Name	Port	Path	Act. Status
<input type="checkbox"/> Linux	WASNODE_12	WAS12_8180	8180	/engn001/lena/1.3.2.0/servers/WAS12_8180	
<input type="checkbox"/> Linux	WASNODE_11	WAS11_8180	8180	/engn001/lena/1.3.2.0/servers/WAS11_8180	

② OS	Node Name	Server Name	Port	Path	Act. Status
<input checked="" type="checkbox"/> Linux	WASNODE_12	WAS12_8180	8180	/engn001/lena/1.3.2.0/servers/WAS12_8180	③ Add
<input type="checkbox"/> Linux	WASNODE_11	WAS11_8180	8180	/engn001/lena/1.3.2.0/servers/WAS11_8180	

Figure 61. WAS Addition Dialog Screen

#	Item	Description
①	Available WAS list for TunA	Refers to the list of WAS where WAS Agent can be installed. Only WAS registered or installed in LENA Manager can be checked.
②	Action Checkbox	Checkbox for selecting WAS.
③	Action Status	Displays what function will be performed on the selected WAS. The displayed functions are as follows. <ul style="list-style-type: none"> <li>• Add: Adds WAS to WAS List.</li> <li>• Delete: Deletes the WAS from the list.</li> </ul>
④	Save button	Performs the specified Action on the selected WAS.

## Agent Installation

To install TunA Agent, targets where Agent will be installed must be added to Host List and WAS List as shown in the attached screen below.

The screenshot shows the 'Install Management' section of the LENA interface. On the left, a sidebar lists various management categories under 'DIAGNOSTICS'. The 'TunA APM' section is expanded, showing 'Connection Management', 'Module Management', and 'Install Management', with 'Install Management' currently selected. The main area displays two tables: 'Host List' and 'WAS List'. The 'Host List' table has columns for Host IP, Node Name, Path, and Installed Date. It shows two hosts: '10.81.209.133' (Node Name: WASNODE\_11, Path: /engn001/lena/1.32c0) and '10.81.209.134' (Node Name: WASNODE\_21, Path: /engn001/lena/1.32c0). The 'Installed Date' column contains '(2) Install' buttons, with one highlighted by a red box. The 'WAS List' table has columns for Node Name, Server Name, Port, Path, and Installed Date. It shows two nodes: 'WASNODE\_11' (Server Name: WAS11\_8180, Port: 8180, Path: /engn001/lena/1.32c0/servers/WASNODE\_11\_8180) and 'WASNODE\_12' (Server Name: WAS11\_8180, Port: 8180, Path: /engn001/lena/1.32c0/servers/WASNODE\_12\_8180). The 'Installed Date' column contains '(4) Install' buttons, with one highlighted by a red box. Buttons for 'Add Host' and 'Add WAS' are located at the bottom right of each table.

Figure 62. Install Management Screen with Host and WAS Added to Installation Target List

#	Item	Description
①	Host List	List that manages TunA Host Agent installation. Lists of Hosts where Host Agent can be installed and lists of Hosts where Host Agent is installed are displayed.
②	<b>Install button</b>	Installs TunA Host Agent on Host. When installation is completed normally, the time when Agent was installed is displayed.
③	WAS List	List that manages TunA Java Agent installation. Lists of WAS where Java Agent can be installed and lists of WAS where Java Agent is installed are displayed.
④	<b>Install button</b>	Installs TunA Java Agent on WAS. When installation is completed normally, the time when Agent was installed is displayed.

## 7.7.4. Host Management

Control and individual environment setting management of TunA Host Agent that performed installation work in Install Management is performed in Host Management.

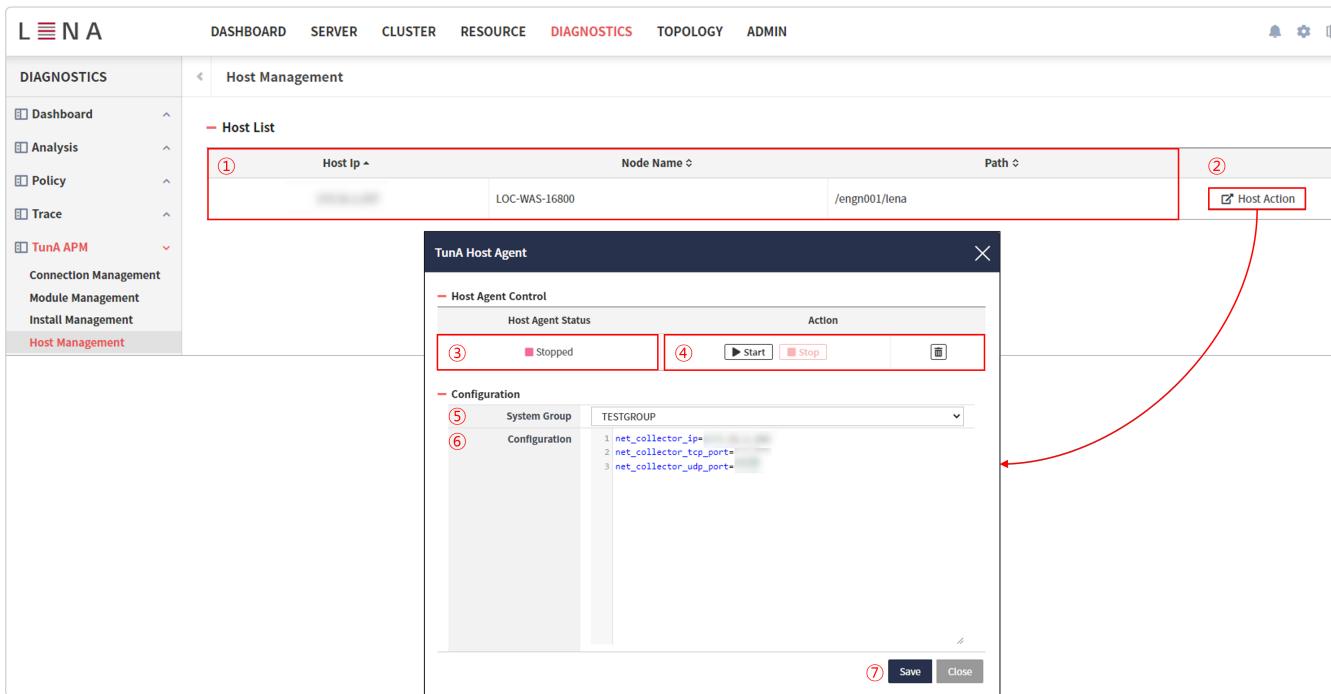


Figure 63. Host Management Screen

#	Item	Description
①	Host List	Displays list of Hosts where TunA Host Agent is installed.
②	<b>Host Action button</b>	Opens dialog to check status and perform control of TunA Host Agent.
③	Host Agent Status	Displays status of TunA Host Agent. The statuses that can be displayed are as follows. <ul style="list-style-type: none"> <li>Started: TunA Host Agent is in running state.</li> <li>Stopped: TunA Host Agent is in stopped state.</li> </ul>
④	<b>Action button</b>	Starts, stops, or deletes TunA Host Agent. Deletion is only activated when TunA Host Agent is in stopped state.
⑤	System Group	Selects System Group to which Host Agent belongs.
⑥	Configuration	Modifies Host Agent settings.
⑦	<b>Save button</b>	Saves modified Host Agent settings.

## 7.7.5. TunA Settings in WAS

Control and individual environment setting management of TunA Java Agent that performed installation work in Install Management is performed in the TunA tab of the WAS setting management screen.

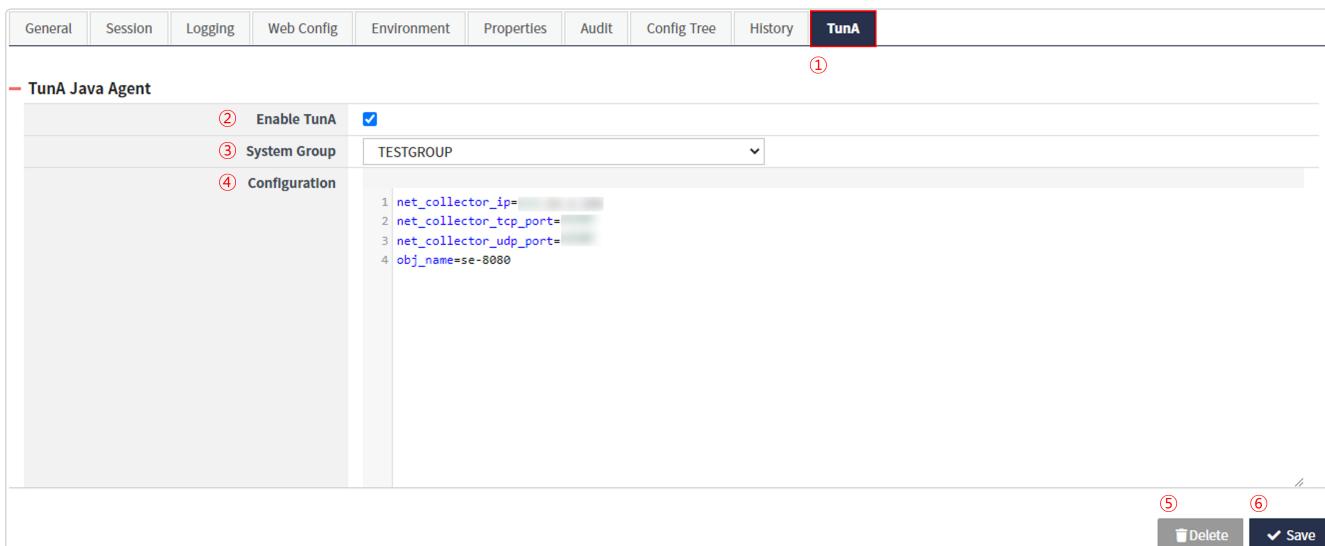


Figure 64. WAS - TunA Tab Screen

#	Item	Description
①	TunA Tab	Manages TunA Java Agent in the TunA Tab screen. When the TunA Tab is pressed, if the user is not registered or TunA Java Agent is not installed on WAS, a message requesting user registration and Agent installation is displayed on the screen.
②	Enable TunA Checkbox	Checks whether to use TunA Java Agent. This item is reflected when WAS starts.
③	System Group	Selects System Group to which Java Agent belongs.
④	Java Agent Configuration	Provides function to check and modify TunA Java Agent settings.
⑤	<b>Delete button</b>	Deletes TunA Java Agent. Only activated when WAS is in stopped state.
⑥	<b>Save button</b>	Saves TunA Java Agent settings.

# Chapter 8. Topology

You can see the configuration status of each system at a glance, and it provides installation and configuration functions, as well as resource monitoring and start/stop control.

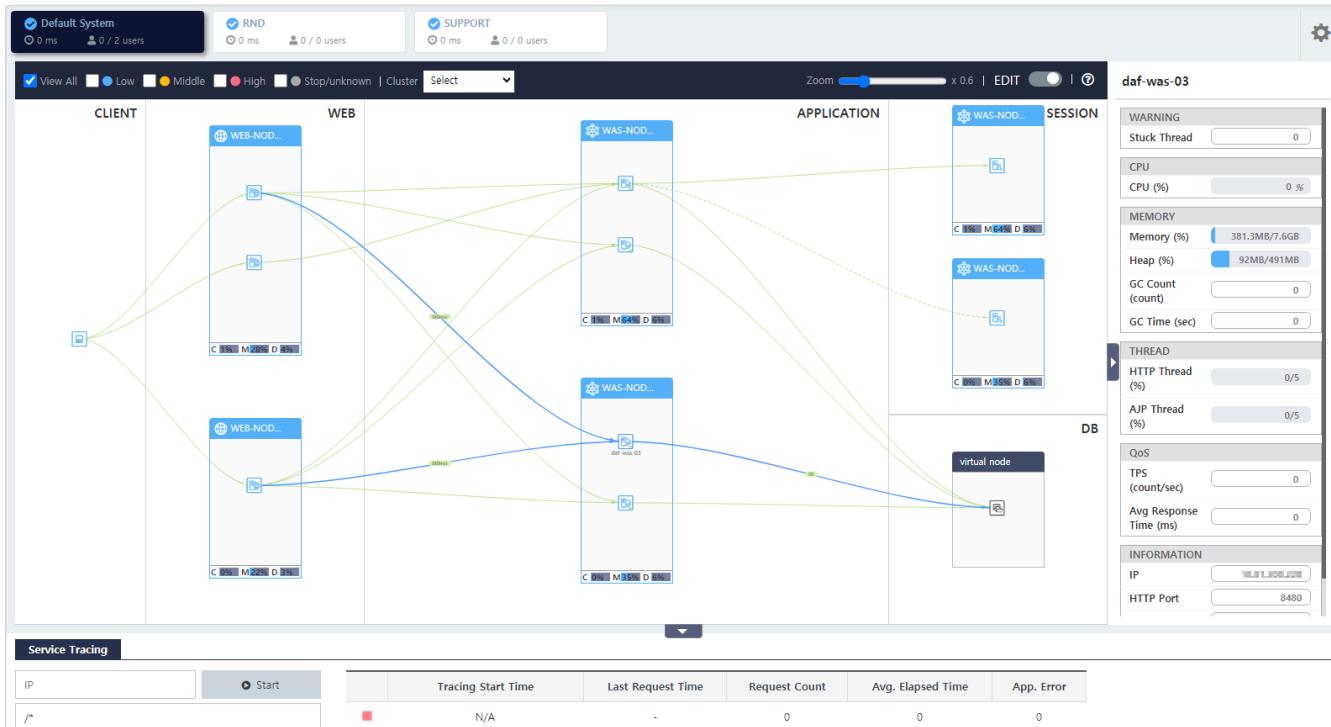


Figure 65. Topology Screen

## 8.1. Screen Configuration

It is divided into System area, Topology area, Resource monitoring area, and Service tracing area.

- System Area

Provides a list of registered Systems in card format.

The icon to the left of the system name in the card represents the system status, which is displayed in 3 levels based on the Resources constituting the system and diagnostic results.

- **Blue circle icon** : When all servers constituting the system have Low resource usage and diagnostic processes are not performed
- **Orange circle icon** : When all servers constituting the system have Middle or lower resource usage, or diagnostic process results are in Abnormal status
- **Red circle icon** : When some servers constituting the system have High resource usage, or diagnostic process results are in Fault status

The **clock icon** below the system name represents the average response time of WASs within the system, and the **user icon** represents the current number of users (in the last 5 minutes) / total users today.



The criteria for Low, Middle, and High resource usage can be changed in DIAGNOSTICS > Policy > Common Rule Setting > Dashboard items.

- Topology Area

Shows the configuration status of nodes and server instances by system in topology chart format. You can install and run Web Server, WAS, and Session Server installed on each Node, perform clustering, and check server status information. Additionally, you can configure integration between Web Server-WAS, WAS-Session Server, and WAS-Datasource.

- Resource Monitoring Area

Provides detailed resource monitoring information such as CPU and Memory of Nodes and Servers.

- Service Tracing Area

You can trace services based on specific Client IP and requested Service Pattern to check the number of requests, average response time, and number of service response errors.

Through the **Settings button** on the right side of the system list, you can change the following items:

#### Chart

- Refresh Interval : Data retrieval cycle for the topology area
- Refresh Topology Chart : Metadata consistency verification and restoration for drawing charts in the topology area

#### System List



- Selection of Systems to display in the System list and order change

#### Elements

- Show Endpoint : Setting for displaying the Endpoint area
- Show Edge Info : Setting for displaying detailed information on Edges
- Show Server Name : Setting for displaying server names

#### Transparency

- Node : Setting transparency for Nodes in the topology area
- Edge : Setting transparency for Edges in the topology area

## 8.2. Topology Area Details

In topology, information is displayed differently according to the view mode.

- View All : Shows all information.
- Low : Shows only instances with Low resource usage on servers.
- Middle : Shows only instances with Middle resource usage on servers.
- High : Shows only instances with High resource usage on servers.
- Stop/unknown : Shows only stopped instances.

Also, instances are activated and displayed by Cluster unit.



For WAS with diagnostic functionality configured, the diagnostic results of server status (Abnormal or Fault) are checked first before checking resource usage. If the status is determined to be in that state, it is displayed as High status.

## 8.2.1. Control [Edit: OFF]

Provides detailed monitoring information and control functions from Client to Database from an E2E (End to End) perspective.

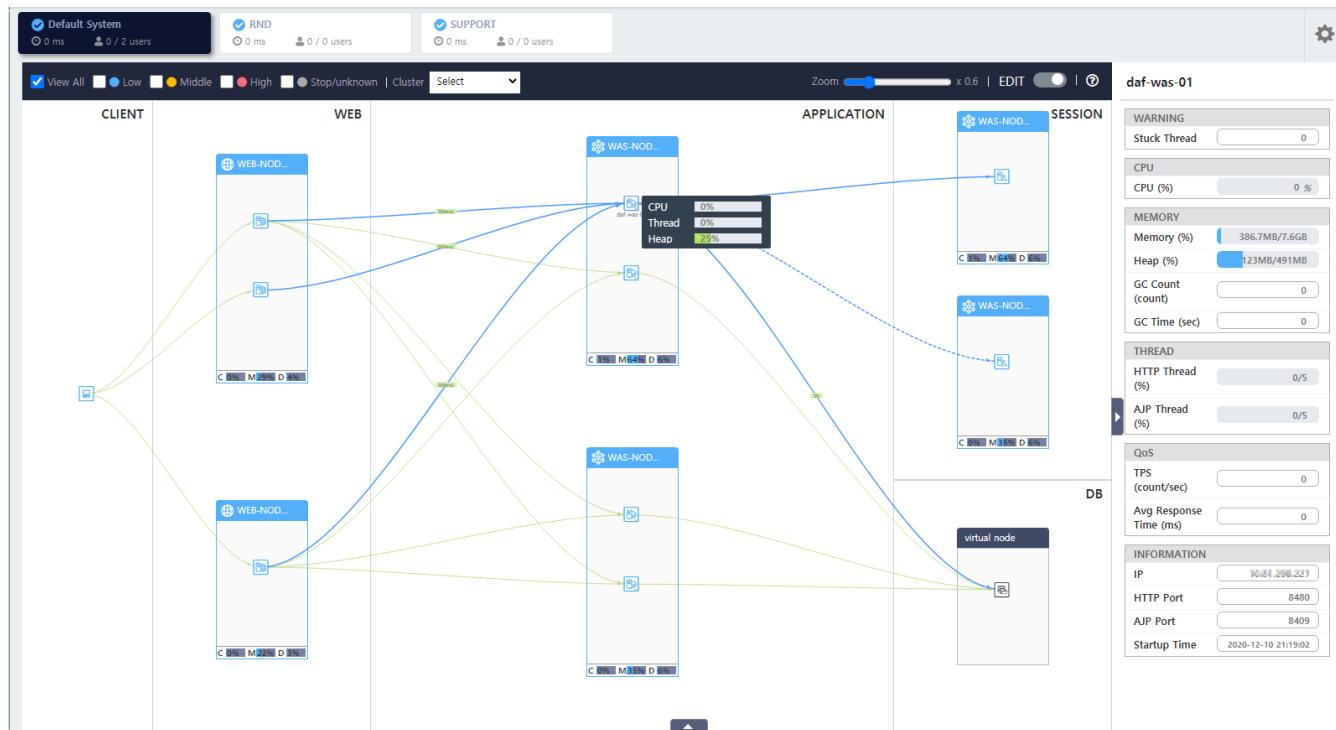


Figure 66. Topology Control [Edit: OFF]

### CLIENT Area

Client refers to users, and you can check the browser screen rendering time when users make requests to the Web Server and the content of script errors.

### WEB Area

The WEB area provides information about installed Web Nodes and Web servers and allows server control.

- Configuration Information

Web Node is the area where Web servers are installed, and you can check the server installation status by node.

- Monitoring Information

Web Node provides basic CPU, Memory, Disk status information by default.

When you hover over a Web Server, it provides CPU, Memory, Thread status information in a popup form.

When you select a Web Node and a Server, you can get real-time detailed monitoring information for each in the Resource Monitoring Area on the right side of the Topology Area.

- Node : CPU, Memory, Disc, Network and basic information
- Server : CPU, Memory, Thread, QoS and basic information
- Control Functions

Server provides three main control functions.

### 1. Server Control : Start, Stop, Service Control

Service Control provides uninterrupted deployment functionality. This is a method in which the source corrected for an error service is immediately deployed to the WAS and then the Web Server (timely server) that calls this WAS is configured to forward the error service to the timely server, thereby ensuring normal service provision.



To use this function, the LSC module must be enabled in the Web Server (`httpd-lsc.conf` file, change `LscEnable` to `On`, and restart the server).

After defining the control time, control conditions (Header, Cookie, URL) and the server to forward (<http://IP:Port>) to save, it connects incoming requests in real-time to the corresponding server according to the defined content, thereby providing service without server restart.

### 2. Move to : Configuration

### 3. Cluster : Compare, Sync, Snapshot, Graceful Restart

## APPLICATION Area

APPLICATION Area provides information about installed WAS Nodes and WAS servers and allows server control.

- Configuration Information

WAS Node is the area where WAS servers are installed, and you can check the server installation status by node.

- Monitoring Information

WAS Node provides basic CPU, Memory, Disk status information by default.

When you hover over a WAS Server, it provides CPU, Thread, Heap status information in a popup form.

When you select a WAS Node and a Server, you can get real-time detailed monitoring information for each in the Resource Monitoring Area on the right side of the Topology Area.

- Node : CPU, Memory, Disc, Network and basic information
- Server : Warning, CPU, Memory, Thread, QoS and basic information

- Control Functions

Server provides four main control functions.

1. Server Control : Start, Stop, Forced Stop
2. Dump : Thread Dump, Active Service Dump, Heap Dump
3. Move to : Configuration, Monitoring
4. Cluster : Compare, Sync, Snapshot, Graceful Restart

## SESSION Area

SESSION Area provides information about installed Session Nodes and Session servers and allows server control.

- Configuration Information

Session Node is the area where Session servers are installed, and you can check the server installation status by node.

- Monitoring Information

Session Node provides basic CPU, Memory, Disk status information by default.

When you hover over a Session Server, it provides CPU, Session Count, Heap status information in a popup form.

When you select a Session Node and a Server, you can get real-time detailed monitoring information for each in the Resource Monitoring Area on the right side of the Topology Area.

- Node : CPU, Memory, Disc, Network and basic information
- Server : CPU, Memory, Session Count and basic information

- Control Functions

Server provides two main control functions.

1. Server Control : Start, Stop
2. Move to : Configuration

## DB Area

DB Area provides information about the Database connected to WAS. The Database must be registered in the RESOURCE menu. Nodes are represented as virtual nodes to be consistent with other areas. Monitoring and control functions for each DB are not provided.

## Edge Information

The connection line means the connection between instances, or between an instance and a Database, and represents the average response time of the server and the number of connected connections.

- Client-WEB : Connection count (Average browser rendering completion time (ms)/Average Web Server response time (ms))
- WEB-APPLICATION : Active Connection count (Average WAS response time (ms))
- APPLICATION-DB : Active Datasource usage rate (%)

End to End monitoring functionality is set to off by default.

Therefore, to view the average browser rendering response time between Client-WEB or the average response time of the server, you must set it in the following order.

1. manager.conf file, set diagnostics.e2e.enable=true
2. In the httpd.conf file of the Web Server, uncomment httpd-eum.conf



```
<IfDefine MOD_EUM>
    #LENA E2E Monitoring Extension settings
    Include ${INSTALL_PATH}/conf/extra/httpd-eum.conf <-
Uncomment this line
</IfDefine>
```

3. Web Server's eum/eum.properties file, modify agent\_enable value to true

However, this function is not supported on window OS.

### 8.2.2. Control [Edit: ON]

When you select the **Edit button** in the upper right corner of the Topology Area, it switches to the editing mode. Here, you can provide node and instance installation functions within the system.

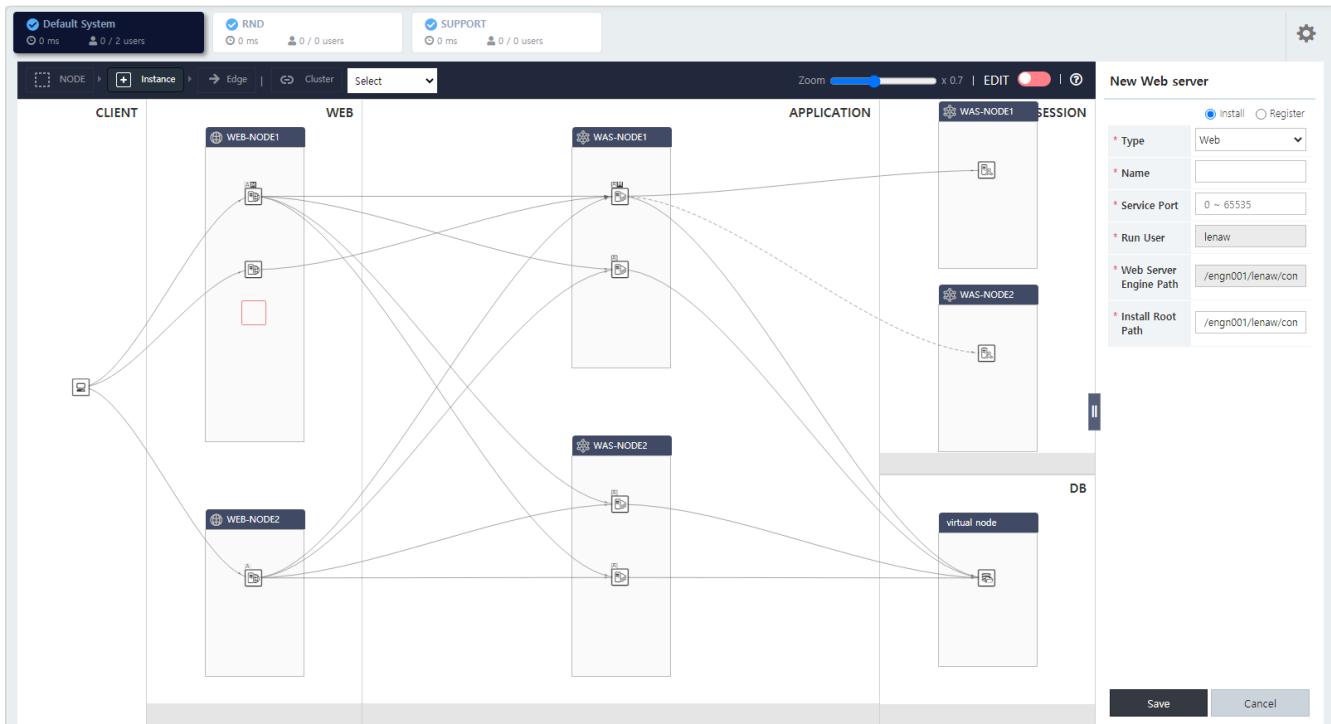


Figure 67. Topology Control [Edit: ON]

#### Node

The installation/modification/deletion operation of the Node is the same as **Node**, so only the usage method is described here.

- Installation

1. Select the **Node button** and click on the area you want to install above.
  2. Enter the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.
- Modification
    1. Select the node you want to change.
    2. Change the corresponding information in the detailed information area on the right side of the screen.
    3. Select the **Save button**.
  - Deletion
    1. Select the node you want to delete.
    2. Right-click and select Hide, Unregister, Uninstall from the menu.



When deleting a Node, there must be no servers installed in the Node.

## Instance

The installation/modification/deletion operation of the Server is the same as [server](#), so only the usage method is described here.

- Installation
  1. Select the **Instance button** and click on the Node above the area you want to install.
  2. Enter the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.



The list of Nodes with no servers installed in each area is provided in the gray background below the area, as a square button. If you want to install a server in an empty node, double-click the node button.

- Modification
  1. Select the server you want to change.
  2. Change the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.
- Deletion
  1. Select the server you want to delete.
  2. Right-click and select Unregister, Delete from the menu.

## Edge

Edge means the connection between servers, and you can connect servers within the WEB-APPLICATION, APPLICATION-SESSION, APPLICATION-DB areas.

- Connection
  1. Select the **Edge button** and drag from the starting server you want to connect to the destination server.

2. Enter the corresponding information in the detailed information area on the right side of the screen.
3. Select the **Save button**.



When connecting between APPLICATION-SESSION, the solid line means the Primary Server, and the dotted line means the Secondary Server.

- Change Connection Information
  1. Select the edge you want to change.
  2. Change the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.
- Disconnection
  1. Select the edge you want to delete.
  2. Select the Delete button in the menu of the right-click button.

## Cluster

You can set up Server Cluster functionality provided by the CLUSTER menu.

- Creation
  1. Select the **Cluster button**.
  2. Enter the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.
- Change
  1. Select the server cluster you want to change in the select box next to the **Cluster button**.
  2. Change the corresponding information in the detailed information area on the right side of the screen.
  3. Select the **Save button**.
- Deletion
  1. Select the server cluster you want to change in the select box next to the **Cluster button**.
  2. Select the **Delete button** in the detailed information area on the right side of the screen.

## 8.3. Service Tracing Area Details

After entering a specific server's IP or Service Pattern and selecting the **Start button**, you can trace services based on the entered information to check the number of requests and errors. During tracing, Xlog information is also provided on the right side of the service tracing area, so you can select xlog as needed to check detailed information.

To use the service tracing functionality, you must configure the following in order:

1. Set diagnostics.e2e.enable=true in the manager.conf file
2. Uncomment the httpd-eum.conf file in the httpd.conf file of the tracing target Web Server



```
<IfDefine MOD_EUM>
    #LENA E2E Monitoring Extension settings
    Include ${INSTALL_PATH}/conf/extra/httpd-eum.conf <--
        Uncomment this part
</IfDefine>
```

3. Modify the agent\_enable value to true in the eum/eum.properties file of the tracing target Web Server
4. Modify the enable.send.profile.info value to true in the advertiser.conf file of the tracing target WAS

Note: This functionality is not supported on Windows OS.

# Chapter 9. Admin

## 9.1. IAM

Manager provides user management and menu permission management functionality for each user.

### 9.1.1. Users

#### User List

The ADMIN > Users menu provides functionality to create, modify, and delete Manager users.

The screenshot shows a table with columns: \* User ID, \* User Name, \* Password, Change User ID, and Last Update. The table contains three rows of data:

* User ID	* User Name	* Password	Change User ID	Last Update
REST_API	REST API only	admin		2021-06-09
admin	administrator	admin		2014-12-04
lena@lgcns.com	administrator	admin		2014-12-04

At the bottom, there are buttons for New, Save, Previous, Next, and a search bar.

Figure 68. Users Screen

The properties of user management are as follows.

Table 166. User Management Properties

Item (* indicates required)	Description	Remarks
User ID(*)	User identifier	
User Name(*)	User name	
Password(*)	User password	Password must be at least 8 characters combining special characters, numbers, and letters
Change User ID	User who modified and created the user data	
Last Password Update	Date when user password was modified	
+ Icon	Click <b>New button</b> , <b>Edit button</b> to indicate that selected permission information is being changed	
- Icon	Click <b>Delete button</b> to indicate that selected permission information has been deleted	



By default, two users with administrator privileges and one API account are provided. It is recommended to add users beyond the provided users for use.

## User Registration

1. Click **New button** to prepare for new user registration.
2. Enter User ID, User Name, and User Password.
  - User passwords are encrypted and stored.
  - Passwords should be 8-20 characters combining uppercase/lowercase letters, numbers, and special characters (!@#\$%^+=-).
3. Click **Save button** to save user information.



- Password encryption uses hash algorithm (SHA-512).

## User Modification

1. Click **Edit button** to change the user name and user password.
  - User passwords are encrypted and stored.
2. Click **Save button** to save user information.
  - If login to Manager fails 7 times or more, the corresponding ID becomes locked and cannot be used.
  - To unlock the locked status, the password for that ID must be modified in the user management screen.
  - If there is no user logged into Manager to modify the password, you can run \$LENA\_HOME/bin/reset-manager-pw.sh to modify the password.



## User Deletion

1. Select the user to delete.
2. Click **Delete button** to change the user to deletable status.
3. Click **Save button** to save user information.



Users cannot be deleted when only one user remains.

## User Role Inquiry

Manager users must belong to at least one group to acquire menu usage roles. When a user is selected, the Roles for [User ID] table displays the roles assigned to the user.

## User Role Addition

1. Click on the user to add a role to, and view the roles currently assigned to the user.
2. Click **Add Role** to open the role list popup.
3. Select the desired role to add.
4. Click **Save button** to save the roles mapped to the user.

## User Role Deletion

1. Click on the user to add a role to, and view the roles currently assigned to the user.
2. Click **Delete button** to change the role to deletable status.

3. Click **Save button** to delete the role from the user.

## 9.1.2. Roles

Manager must create roles for menu-specific permission management. You can create, modify, and delete roles through the ADMIN > Roles menu.

### Role List

[admin roles] | manual/admin\_roles.png

Figure 69. Roles Screen

The properties of permission management are as follows.

Table 167. Permission Management Properties

Item (* indicates required)	Description	Remarks
Role ID(*)	Role identifier	
Role Name(*)	Role name	
Description	Description of the registered role	
Permissions	Permissions allowed for the role	
Change User ID	User who modified and created the role data	
Last Update	Date when role data was modified and created	
<b>+ Icon</b>	Click <b>New button</b> , <b>Edit button</b> to indicate that selected role information is being changed	
<b>- Icon</b>	Click <b>Delete button</b> to indicate that selected role information has been deleted	

### Role Creation

1. Click **New button** to prepare for new permission registration.
2. Enter Role ID, Role Name, and Role Description.
3. Click **Save button** to save role information.

### Role Modification

1. Select the role to modify.
2. Click **Edit button** to change the role name and role description.
3. Click **Save button** to save role information.

### Role Deletion

1. Select the role to delete.
2. Click **Delete button** to change the role to deletable status.
3. Click **Save button** to save role information.

## Role-Menu Mapping

You can configure accessible menus for each role created in LENA Manager. Select one role among the roles created through role selection to configure menu permissions. Select the menu to configure access control from the menu list showing all menus registered in LENA Manager and configure menu permissions.

### Menu Permission Inquiry

When you select the desired role from the role list, the menu access permissions for the selected role are displayed below.

 When adding Node, Server, Server Cluster, Resource in the sub-screens of "SERVER", "CLUSTER", "RESOURCE" menus, the added items are automatically displayed in the menu list of the "Menu Permission Management" screen.

Therefore, to add new menus, register and create each item in the "SERVER", "CLUSTER", "RESOURCE" sub-screens.

When changing permissions for a server, the same permissions must be reflected in the menus below.

- The corresponding server under "SERVER"
- The corresponding server under "CLUSTER"

If this is not followed and you configure permissions for some server menus under Server Cluster as follows (example, not recommended):

- Server under "SERVER": Has permission
- Server under "CLUSTER": No permission

 In this case, the menu and Server Cluster, Server permissions are expressed as follows:

- Number of servers constituting Server Cluster: Number of servers with permissions based on "CLUSTER" sub-server permissions
- Sub-menus of Server Cluster: Only servers with permissions based on "CLUSTER" sub-server menu permissions are visible
- Server list in Server Cluster's Overview, Application Server, Web Server tabs: Since it must show the configuration information of Server Cluster, all server lists are retrieved regardless of "CLUSTER" sub-permissions
- Server detail links in Server Cluster's Overview, Application Server, Web Server tabs: Since it's access to individual servers, access to servers without permissions under the "SERVER" menu is blocked

### Menu Permission Mapping

1. Select the menu to configure permissions.
  - When selecting permissions, permissions for menus are also displayed.
2. Select the menu to configure permissions from the menu list.
  - When selecting a menu, menu permissions are displayed in the menu permission list.
3. If permission changes are needed, select Y or N.

4. Click **Save button** to save menu permission information.

## 9.2. License

Manager provides functionality to view and renew currently applied licenses for each node.

### 9.2.1. License List

When you open the License screen, you can view the list of currently applied licenses by node.

You can verify the license status by checking the Status item.

License List							
	Node Name	System Name	Type	Core	Instance	License Term	Status
<input type="checkbox"/>	WAS_NODE_01	Trial System	Trial	UNLIMITED	UNLIMITED	2023/05/11 ~ 2023/06/10	Will be expired
<input type="checkbox"/>	WEB_NODE_01	Trial System	Trial	UNLIMITED	UNLIMITED	2023/05/11 ~ 2023/06/10	Will be expired
<input type="checkbox"/>	SERVER02-WAS	Trial System	Trial	UNLIMITED	UNLIMITED	2023/05/11 ~ 2023/06/10	Will be expired
<input type="checkbox"/>	SERVER02-WEB	Trial System	Trial	UNLIMITED	UNLIMITED	2023/05/11 ~ 2023/06/10	Will be expired

1 to 4 of 4      Previous 1 Next

[Check System Info](#) [Check Configuration](#) [Check Time Info](#)  [Upload](#)  [Restore](#)

Figure 70. License List Screen

### 9.2.2. License Details

When you click on a license in the license list, you can verify the detailed information of the license.

The detailed information items are as follows.

Table 168. License Detail Information Items

Item	Description	Remarks
Node Name	Node name	
Type	License classification	Trial, Standard
Customer Name	Purchasing customer company name	
System Name	Installed system name	
Issue No	License issue number	
Issue Date	License issue date	
License Term	License allowed period	
Lena Home	Lena Home path	
IP Address	Node's IP address	
Hardware ID	ID that recognizes H/W	MAC Address or Host name

Item	Description	Remarks
Contract CPU Core Limit	Maximum core count under contract	
CPU Core Limit	Actually measured core count	
Contract Instance Limit	Maximum instance count under contract	
Instance Limit	Actually measured instance count	
Contract Type	Contract type	Subscription, Perpetual
Node Type	Node type	WEB, WAS, MDS
LENA Version	LENA version	
Status	License validity status	



Notification messages are provided 15 days before the license expiration date. You can verify notification messages from the **bell icon** in the upper right corner of Manager.

### 9.2.3. License Upload / Recovery

#### Upload

Select the node to apply a new license from the node list and use the **Upload button** at the bottom of the list. When you click this button, a license upload popup window opens where you can find and upload the issued license file, and the license will be applied to the selected nodes.

#### Recovery

Select the node to recover the license from the node list and use the **Restore button** at the bottom of the list. When you click this button, the license is recovered from the backup file.

### 9.2.4. License-related System Status Check

In the license list view screen, select a Node and click **Check System Info button**, you can verify the system status required for license issuance.

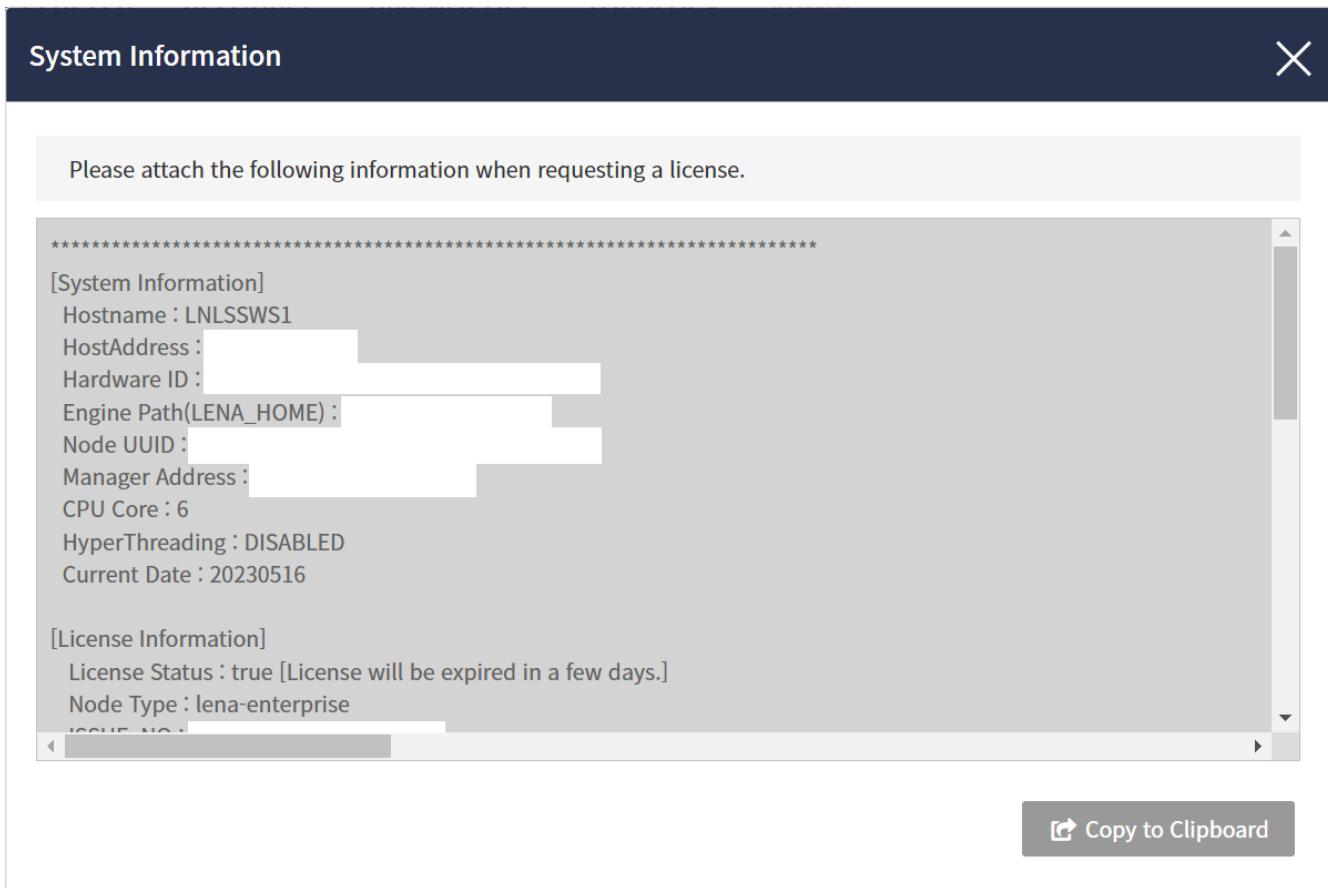


Figure 71. System Information

Shell Scripts are also provided in CLI environment to check license status for each node. The shell file is \${LENA\_HOME}/bin/check-license.sh. An example of the result of running this script is as follows.

## check-license.sh Execution Example

```
[bin]$ ./check-license.sh
*****
[System Information]
Hostname : solweb2
HostAddress : 127.0.0.1
Hardware ID : 52:54:00:E9:AC:A1 ( 52:54:00:E9:AC:A1 )
Engine Path(LENA_HOME) : /engn001/lena/dev
Node UUID : e46da220-db50-3854-84a0-7b61e1b6e7cd
Manager Address : 127.0.0.1:7700
CPU Core : 4
HyperThreading : DISABLED
Current Date : 20180705

[License Information]
License Status : true [License is valid.]
Node Type : lena-enterprise
ISSUE_NO : 201807041532438300001
TYPE : Standard
CUSTOMER_NAME : LG
SYSTEM_NAME : CNS
SYSTEM_TYPE : PROD
HARDWARE_ID : 52:54:00:E9:AC:A1
LENA_HOME : /engn001/lena/dev
CONTRACT_CPU_CORE_LIMIT : 8
CPU_CORE_LIMIT : 8
CONTRACT_INSTANCE_LIMIT : 8
INSTANCE_LIMIT : 8
MANAGER_ADDRESS : UNLIMITED
WEB_CONTRACT_CPUCOREDAY_LIMIT :
WEB_CPUCOREDAY_LIMIT : N
WAS_CONTRACT_CPUCOREDAY_LIMIT :
WAS_CPUCOREDAY_LIMIT : N
RE_ISSUEANCE :
USE_POSTPAID :
START_DATE : 20180501
END_DATE : 20190531
LICENSE_KEY :
H2VaDEE9fjF1vHBRsQeGXasYT514tBc6ebayNIdtVZ5/1j4/EM0mYf38karMTKgcLLmPMMFa8BOEft
5zRfBc/Ii0x1mDgy
j0+iq30ABfJoyAhY3nWBVJhBy7h0U3hzJWr1hyCuZMFAHquL4dinwWAqmJeL+jntJKFufD38vdF2Yw
KEoRNH9dGQnqXZHO
U8wQZmN4UHk5YB5/06YIUffNGU3wyzjfKCFF9Golu9zQAsSZ358ptjC/TBuY+ccvLa75H32XPxiNSS
xytn0hGFbcVc61kv
zi7YMNUnuEyDEQ/dhFKxJ17ijUQBZj5xbFQ9qUTzL1QKGLl+cbYVs6kvZg==
*****
```

The output items are the same as described in the previous section, and since they output basic information required for license issuance, they are utilized when requesting license issuance.



Among the output items, "HyperThreading" checks whether HyperThreading is used, and when HyperThreading is used, the core count is calculated as 2 times the physical core count.

### 9.2.5. Host-based License Check Configuration

License checks the target H/W according to the contract using Mac Address or Host name. Since the default configuration is based on Mac Address, to execute license check based on Host name, for Linux/Unix OS, open the start-agent.sh, check-license.sh files located in \${LENA\_HOME}/bin and each Application Server's setenv.sh file and modify them as follows.

start-agent.sh File Configuration (Add to variable \$JAVA\_OPTS)

```
JAVA_OPTS="$\{JAVA_OPTS\} -Dlicense.check-type=hostname"
```

check-license.sh File Configuration (Uncomment the following item)

```
_JAVA_OPTS="$\{_JAVA_OPTS\} -Dlicense.check-type=hostname"
```

Each Application Server's setenv.sh File Configuration (Uncomment the following item)

```
CATALINA_OPTS=" \$\{CATALINA_OPTS\} -Dlicense.check-type=hostname"
```

### 9.2.6. Time Information Inquiry

In the license list, select the node for which you want to check time information, then click **Check Time Info button**, you can verify the time and timezone information for the selected nodes.

## 9.3. Security (Service Control)

This is a functionality to restrict user requests to Application Server based on IP or URL.

### 9.3.1. Rule Setting (Rule Configuration)

When you want to control requests from specific IPs or URLs, configure new rules through the screen. Provides search functionality for convenience in new rule configuration and rule deletion. Server attributes applied to all applications can be processed as error pages.

The screenshot shows the 'Rule Setting' interface. At the top, there are search filters for 'Rule Type' (set to 'All') and 'Rule Name', followed by a 'Search' button. Below this is a table titled 'Rule Setting' with a total count of 1. The table columns are 'Rule Name', 'Rule Type', 'Description', and 'In Use'. A single row is listed: 'JOB' (Rule Name), 'IP with DateTime' (Rule Type), 'PM-JOB' (Description), and an 'x' icon in the 'In Use' column. Below the table are buttons for '+ New' and 'Delete'. The bottom section is titled 'Rule Detail' and contains fields for 'Rule Name' (JOB), 'Description' (PM-JOB), 'Rule Type' (Control with IP and Time), 'Allow/Deny IP' (Allow IP: [REDACTED], Deny IP: [REDACTED]), 'Control Time' (2023-05-16 ~ 2023-05-18), and 'Error Message(HTML)' (Error). A 'Save' button is at the bottom right.

Figure 72. Rule Setting Screen



The Use column in the Rule list indicates whether the corresponding rule is applied to the Application Server.

The configurable properties when adding rules are as follows.

Table 169. Configurable Properties When Adding Rules

Item (* indicates required)	Description	Remarks
Rule Name(*)	Name of the rule to add	
Description	Description of the rule to add	
Rule Type	Unit to control	IP, URL
Allow IP(*)	IP addresses to allow requests from	Can be entered in regex format
Deny IP(*)	IP addresses to deny requests from	Can be entered in regex format
Control Time(*)	Time unit to apply the rule	
Error Message(HTML)(*)	Error page to display for requests filtered by control	



If you apply a rule with control type "IP with DateTime" to an Application Server that is relayed through a Proxy Server, you may not be able to apply the rule because User IP cannot be obtained due to the Proxy Server's security characteristics.



Applied rules among created rules cannot be deleted.

### 9.3.2. Rule Applying (Rule Application)

Select one of the added rules to apply to the Application Server. Provides search functionality for rule

type, application unit, and rule name for convenience in application.

Select one from the rule list and use **shuffle buttons** in rule application to select the target to apply, then click **On/Off button** to apply and save. To exclude from the application target, also use **shuffle buttons** to exclude.

The screenshot shows the 'Rule Applying' screen. At the top, there are filters for 'Rule Type' (set to 'All') and 'Rule Name', followed by a 'Search' button. Below this is a table titled 'Applied Rule List' with columns: Rule Type, Rule Name, Target Server, and Status. One row is shown: 'IP with DateTime' (Rule Type), 'ddd' (Rule Name), 'ee\_9920' (Target Server), and a status icon. Underneath is a section titled 'Apply Rule' with two tables: 'Selectable Server List(Apply Off)' and 'Selected Server List(Apply On)'. Both tables have columns for Node Name and Server Name. In the 'Selectable' table, 'NODE01-WAS' and 'se\_9910' are listed. In the 'Selected' table, 'NODE01-WAS' and 'ee\_9920' are listed. Between the tables are four shuffle buttons (two up, two down). At the bottom right is an 'On/Off' button.

Figure 73. Rule Applying Screen

The properties used in the rule status and application screen are similar to the rule configuration screen, and the following properties are additional properties.

Table 170. Additional Properties

Item	Description	Remarks
Node Name	Node name under the registered system	
Server Name	Server name under the registered node	



When new targets are added to the selected rule, they are added to server.xml or context.xml according to the application unit, and when excluding from the applied targets, the rule configuration added to the above configuration files is deleted.

### 9.3.3. Service Control Log (Rule Application Result Inquiry)

The processing results for items with applied rules are output as a list. Provides search functionality for rule type, application unit, rule name, and log time for convenience in processing result verification.

The screenshot shows the 'Service Control Log' screen. At the top, there are filters for 'Rule Type' (set to 'All'), 'Rule Name', and a date range ('Controlled Date' from 2023-06-26 to 2023-06-27), followed by a 'Search' button. Below this is a table titled 'Service Control Log' with columns: Controlled Date, Address, Request URL, HTTP Method, and Rule Name. A message 'No data found.' is displayed at the bottom of the table. The total number of entries is 0.

Figure 74. Service Control Log Screen

The properties used in the processing list are as follows.

Table 171. Log Information Items

Item	Description	Remarks
Controlled Date	Processing time of the request with applied rule configuration	
Address	Processed remote address	
Request URL	URL of the processed request	
HTTP Method	HTTP Method of the processed request	
Rule Name	Name of the rule applied to process the request	

For rule history, you must configure the access filter log aggregation listener usage in the Manager's /conf/manager.conf configuration file to true. Logs are recorded in the access\_filter.log."date".txt file in each server's logs folder, and Manager periodically aggregates logs from each server and stores them in the database. (At this time, aggregated logs are backed up in access\_filter\_log."date".txt.gathered file) Aggregated logs in the database can be verified in the processing list screen.



The configuration example for the configuration file item in manager.conf is as follows.

```
#Whether to use access filter log aggregation listener and
operation cycle (seconds) default is false, 60
accessfilter.listener=false
accessfilter.interval=60
```

## 9.4. Notification configuration

You can configure notifications to be displayed in Manager and SNS information to be linked with notifications.

### 9.4.1. Manager Notification

When you open the Manager Notification menu, you can verify currently active notifications, and levels are classified as Critical, Warning, and Info.

If you uncheck the notification checkbox and save, even if a notification occurs, it will not be displayed on the bell icon.

Notifications that are not displayed on the icon can be verified by clicking the Notification Detail button in the upper right corner of the popup that appears when you click the bell icon.

### 9.4.2. SNS Notification

You can manage SNS information to be linked with notifications generated in Manager.

It operates based on WebHook and can be linked with SNS at the system level.

Table 172. Detailed Information Items for SNS to be Linked

Item	Description
Name	Name specified by the user
System	Name of the system to be linked
DuplicateTime(s)	If the same notification occurs consecutively within DuplicateTime(s), it is not linked to SNS.
Request	Method to send the request
Encoding	Encoding of the request
Header	You can input the request header, and if using multiple headers, separate them with line breaks.
Body	You can input the request body, and the replaceable parameters are as follows: \${alarmLevel} - Level of the generated alarm, \${message} - Message content
Webhook URL	URL to send the request to
SSL	Whether SSL authentication is required

Table 173. Types of Notifications to be Linked with SNS

Item	Description
AUDIT	When a notification occurs from items specified in the server's Audit configuration
DIAGNOSTICS	When a notification occurs that violates the DIAGNOSTICS Rule configured on the server
LICENSE	When a LICENSE-related notification occurs
INFO	When a notification related to server information occurs

After entering the configuration items, you can verify whether the request works normally through the Test button.

If the test is successful, save it through Save, then configure the item's on/off toggle to on to enable the linkage.

## 9.5. Patch

Provides patches for functional improvements and bug fixes of installed LENA.

Patches are provided in compressed file format and operate as independently running Java processes.

Patch functionality can be executed through CLI and Management UI, and in case of service issues during patching, you can restore to the original state through the Restore functionality.

The patch sequence is as follows.

1. Patch file upload

2. Manager patch application
3. Node patch application
4. Server (Application Server, Session Server) patch application
5. Patch commit

The recovery sequence is as follows.

1. Server patch recovery
2. Node patch recovery
3. Manager patch recovery
4. Recovery commit

Refer to the Appendix for CLI patching methods.

## 9.5.1. Overview

Provides patch file upload functionality and displays patch reflection status information for Manager and each Node's Node Agent.

### Patch File Upload

The Patch Info area displays detailed information of the highest version among patch files uploaded to the manager.

Table 174. Patch Info Items

Item	Description	Remarks
Patch File Ver.	Version information of the patch file	
Release Date	Release date of the patch file	
Patch Note	Click <b>Detail (Note) button</b> to view detailed patch note content.	Patch note popup display

The process of uploading patch files is as follows.

1. Click **Upload button**.
2. Verify if it's in patchable status, and if normal, display a popup for patch file upload



#### Patchable Status Conditions

1. All nodes registered in Manager must be in start status.
2. Patch must be in commit status.
3. Manager, node, and server must all be the same version.
4. No unregistered servers exist in manager.
  - a. If unregistered servers exist, register them in manager
  - b. If servers exist in the node engine's servers folder, delete that folder

3. When you select the patch file to upload, upload is automatically executed.



Uploadable files are zip and tar.gz, and if you try to upload other files, error messages will be displayed.

## Manager Patch

The Manager Info area displays the Manager's patch status and you can execute Manager patching and recovery.

The description of each item displayed on the screen is as follows.

Table 175. Manager Info Items

Item	Description	Remarks
Patch Status	Manager's patch application status <ul style="list-style-type: none"> <li>• <b>Sun icon</b> : Manager has applied the latest patch (up to date) status</li> <li>• <b>Cloud icon</b> : Manager has not applied the latest patch (patch available) status</li> </ul>	
Current Ver.	Manager's current version	
Patch Ver.	Patch version	
History	Button to view patch history	When handwork is required, <b>Detail (Note) button</b> is displayed in red.

When you click the **Detail (Note) button** displayed in the History item of the Manager Info screen, you can verify patch execution history through a popup window.

The description of each item displayed on the screen is as follows.

Table 176. History Items

Item	Description	Remarks
Action	Displays patch/restore history	
Patch Version	Version of the patch file that performed patch/restore	
Previous Version	Server version before applying patch/restore	
Timestamp	Time when patch/restore was applied	
Log/Handwork	<p><b>Detail (Note) button</b> provides execution result logs when selected.</p> <p><b>Handwork (Wrench) button</b> provides Handwork (additional manual work required) content when selected. When handwork is required, this button is displayed in red.</p>	

## Patch

Click the **Patch button** at the bottom of Manager Info to apply the latest patch.

The content described in Handwork is manual work required after patch execution, so you must execute and reflect the described content. After handwork, uncheck the checkbox at the bottom of the popup window, then the **Handwork button** in the Manager Patch Info screen changes to white.

When Manager patch is applied, you cannot perform functions such as Node installation/registration, Server installation/registration/cloning until you press the **Commit button** after applying patches to Node and Server.



After patching, you must clear the browser cache to use the patched version of Manager.

## Restore

Click the **Restore button** at the bottom of Manager Info to recover to the version before patching.

Recovery is performed when all nodes registered in Manager have patch status as Patch Available.

## Commit

After applying all patches to Manager, Node, and Server, press the **Commit button** to confirm. After confirmation, you cannot revert to the previous version.

## Node Patch

The Node Patch Status area shows the total count of servers with the latest patch applied and servers without patches applied, comprehensively for nodes registered in the manager.

The description of each item displayed on the screen is as follows

Table 177. Node Patch Status Items

Item	Description	Remarks
Status	Node's patch application status <ul style="list-style-type: none"> <li>• <b>Sun icon</b> : All servers have applied the latest patch (up to date) status</li> <li>• <b>Cloud icon</b> : Node Agent has not applied the latest patch (patch available) status</li> <li>• <b>Half circle icon</b> : Node Agent has applied the latest patch, but the latest patch has not been applied to servers installed on the Node status</li> <li>• <b>Exclamation icon</b> : Node agent is incompatible with lena-manager status.</li> </ul>	
Node name	Node name	
Address	Node's IP	

Item	Description	Remarks
Node Ver.	Node's current version	
Node Hotfix.	Node's Hotfix version	
History	Button to view patch history	When handwork is required, <b>Detail (Note) button</b> is displayed in red.
WAS	Web Application Server's patch status information <ul style="list-style-type: none"> <li>• Up To Date : Count of servers with latest patch applied</li> <li>• Patch Available : Count of servers without latest patch applied</li> </ul>	
Session Server	Session Server's patch status information <ul style="list-style-type: none"> <li>• Up To Date : Count of servers with latest patch applied</li> <li>• Patch Available : Count of servers without latest patch applied</li> </ul>	

Click **Node Patch button** to select a Node in the provided popup window, then proceed with patching or recovery for that Node.



Nodes installed in Windows OS environment perform patching through CLI, not Manager.

### Server Cluster Patch Status

Displays patch status for each Server Cluster.

The description of each item displayed on the screen is as follows.

Table 178. Server Cluster Patch Status Items

Item	Description	Remarks
Status	Cluster's patch application status <ul style="list-style-type: none"> <li>• <b>Sun icon</b> : All servers have applied the latest patch (up to date) status</li> <li>• <b>Cloud icon</b> : Some servers have not applied the latest patch (patch available) status</li> </ul>	
Cluster Group	Cluster group name	

Item	Description	Remarks
Cluster Name	Cluster name	
LENA Patch	Application Server's patch status information <ul style="list-style-type: none"> <li>• Up To Date : Count of servers with latest patch applied</li> <li>• Patch Available : Count of servers without latest patch applied</li> </ul>	

## 9.5.2. WAS

For Application Servers included in Node/Cluster, provides functionality to proceed with patching using the latest patch file uploaded to the manager, and in case of problems, restore to the status immediately before patch application.

### List

Search for servers to apply patches by group conditions (node unit, cluster unit).

Table 179. Application Server Patch Status Items

Item	Description	Remarks
Patch Status	Application Server's patch application status <ul style="list-style-type: none"> <li>• <b>Sun icon</b> : Latest patch applied (up to date) status</li> <li>• <b>Cloud icon</b> : Can apply latest patch (patch available) status</li> </ul>	
Node	Node name where Application Server is installed	
Name	Application Server name	
Type	Application server type <ul style="list-style-type: none"> <li>• Standard : Application Server Standard Edition</li> <li>• Enterprise : Application Server Enterprise Edition</li> </ul>	
Address	IP of the Node where Application Server is installed	
HTTP Port	Application Server's HTTP Connector port	
AJP Port	Application Server's AJP Connector port	

Item	Description	Remarks
Start/Stop	Application Server's start and stop execution	
Current Version	Application Server's currently installed version information	
Hotfix	Hotfix version information	
Patch Version	Version information to apply patch. When latest patch is applied, it displays 'N/A'.	Latest patch version uploaded to manager
History	View patch/restore history information applied to the server	



If Node Agent process kill or other reasons cause abnormal operation, server information for that node will not be displayed.

## Patch

1. Verify the server's stop status before applying patch (**Start button** activated status), and if not in stop status, click **Stop button** to stop the server.
2. Check the checkbox of the server to apply patch to. (Multiple checks possible)
3. Click **Patch button** to proceed with patching. A log popup will appear, and if there are items requiring manual work after patch completion, **Handwork (Wrench) button** is displayed in red in the Handwork column.
4. When you close the log popup, the server's patch status changes to **Sun icon**, and current ver, patch ver. display the currently applied patch version and N/A respectively.
5. Validation
  - a. Cannot apply patch when server is in start status
  - b. Cannot apply patch again to servers that already have the latest patch applied



When applying patches to servers, if it's the first time applying patches to that Node, internally the Node's patch is performed first, then server patching proceeds.

## Restore

1. Verify the server's stop status before applying recovery (**Start button** activated status), and if not in stop status, click **Stop button** to stop the server.
2. Check the checkbox of the server to apply recovery to. (Multiple checks possible)
3. Click **Restore button** to proceed with recovery. A log popup will appear.
4. When you close the log popup, the server's patch status changes to **Cloud icon**, and current ver, patch ver. display the previous version and patch file version respectively.
5. Validation
  - a. Cannot apply recovery when server is in start status
  - b. Cannot recover again after recovery (Manager recovery supports only 1 step)



After proceeding with server recovery, if no servers with patches applied exist on the Node, internally the Node's recovery is also performed together.

## History Inquiry

Click **Detail (Note) button** to view the most recent 5 patch/restore histories.

Table 180. History Items

Item	Description	Remarks
Action	Displays patch/restore history	
Patch Version	Version of the patch file that performed patch/restore	
Previous Version	Server version before applying patch/restore	
Timestamp	Time when patch/restore was applied	
Log/Handwork	<p><b>Detail (Note) button</b> provides execution result logs when selected.</p> <p><b>Handwork (Wrench) button</b> provides Handwork (additional manual work required) content when selected. When handwork is required, this button is displayed in red.</p>	

## 9.5.3. Session Server

For Session Servers, provides functionality to proceed with patching using the latest patch file uploaded to the manager, and in case of problems, restore to the status immediately before patch application.

### List

Search for servers to apply patches by group conditions (node unit).

Table 181. Session Server Patch Status Items

Item	Description	Remarks
Patch Status	<p>Session Server's patch application status</p> <ul style="list-style-type: none"> <li>• <b>Sun icon</b> : Latest patch applied (up to date) status</li> <li>• <b>Cloud icon</b> : Can apply latest patch (patch available) status</li> </ul>	
Node	Node name where Session Server is installed	

Item	Description	Remarks
Name	Session Server name	
Type	Session server type	
Address	Session Server's address	
Port	Session Server's port	
Start/Stop	Session Server's start and stop execution	
Current Version	Session Server's currently installed version information	
Hotfix	Hotfix version information	
Patch Version	Version information to apply patch. When latest patch is applied, it displays 'N/A'.	Latest patch version uploaded to manager
History	View patch/restore history information applied to the server	



If Node Agent process kill or other reasons cause abnormal operation, server information for that node will not be displayed.

## Patch

1. Verify the server's stop status before applying patch (**Start button** activated status), and if not in stop status, click **Stop button** to stop the server.
2. Check the checkbox of the server to apply patch to. (Multiple checks possible)
3. Click **Patch button** to proceed with patching. A log popup will appear, and if there are items requiring manual work after patch completion, **Handwork (Wrench) button** is displayed in red in the Handwork column.
4. When you close the log popup, the server's patch status changes to **Sun icon**, and current ver, patch ver. display the currently applied patch version and N/A respectively.
5. Validation
  - a. Cannot apply patch when server is in start status
  - b. Cannot apply patch again to servers that already have the latest patch applied



When applying patches to servers, if it's the first time applying patches to that Node, internally the Node's patch is performed first, then server patching proceeds.

## Restore

1. Verify the server's stop status before applying recovery (**Start button** activated status), and if not

- in stop status, click **Stop button** to stop the server.
2. Check the checkbox of the server to apply recovery to. (Multiple checks possible)
  3. Click **Restore button** to proceed with recovery. A log popup will appear.
  4. When you close the log popup, the server's patch status changes to **Cloud icon**, and current ver, patch ver. display the previous version and patch file version respectively.
  5. Validation
    - a. Cannot apply recovery when server is in start status
    - b. Cannot recover again after recovery (Manager recovery supports only 1 step)



After proceeding with server recovery, if no servers with patches applied exist on the Node, internally the Node's recovery is also performed together.

## History Inquiry

Click **Detail (Note) button** to view the most recent 5 patch/restore histories.

Table 182. History Items

Item	Description	Remarks
Action	Displays patch/restore history	
Patch Version	Version of the patch file that performed patch/restore	
Previous Version	Server version before applying patch/restore	
Timestamp	Time when patch/restore was applied	
Log/Handwork	<p><b>Detail (Note) button</b> provides execution result logs when selected.</p> <p><b>Handwork (Wrench) button</b> provides Handwork (additional manual work required) content when selected. When handwork is required, this button is displayed in red.</p>	

## 9.6. Preferences

### 9.6.1. Action Trace

Through Manager, logs are kept of the execution history of add/modify/delete operations performed by each user. Action Trace provides functionality to view/track these execution histories.

Action Trace													
Trace Date		2020-12-10	<input type="button" value="Calendar"/>	00	:	00	~	2020-12-10	<input type="button" value="Calendar"/>	23	:	59	<input type="button" value="Search"/>
<b>- Action Trace List</b>													
Search <input type="text"/>													
Trace Date	Client IP	User ID	Action	Status									
2020/12/10 19:35:28	10.0.5.51.100	admin	clone server	Success									
2020/12/10 19:35:27	10.0.5.51.100	admin	check service port	Success									
2020/12/10 19:35:12	10.0.5.51.100	admin	install server	Success									
2020/12/10 19:35:11	10.0.5.51.100	admin	check service port	Success									
2020/12/10 19:34:52	10.0.5.51.100	admin	clone server	Success									
2020/12/10 19:34:51	10.0.5.51.100	admin	check service port	Success									
2020/12/10 19:34:38	10.0.5.51.100	admin	clone server	Success									
2020/12/10 19:34:37	10.0.5.51.100	admin	check service port	Success									
2020/12/10 19:34:01	10.0.5.51.100	admin	clone server	Success									
2020/12/10 19:34:00	10.0.5.51.100	admin	check service port	Success									
2020/12/10 19:33:47	10.0.5.51.100	admin	create/update/delete session server	Success									
2020/12/10 19:33:33	10.0.5.51.100	admin	install server	Success									

Figure 75. Action Trace Screen

## History Inquiry

After entering search conditions and clicking, you can view the history. When you select one from the list, you can also verify detailed information.

The items displayed on the inquiry screen are as follows.

Table 183. History Detail Information Items

Item	Description	Remarks
Trace Date	Time when the Action was performed	
Status	Action execution result	Success : Success, Failure : Fail
Client IP	IP address of the user who performed the Action	
User ID	User ID who performed the Action	
Action	Name of the performed activity (Action)	
Method	Method name used for the Action	
Request	LENA Manager HTTP Request URL	
Input	Http Request Input parameters	

Among the above items, "Input" stores Request parameters as-is, so Server ID, Node ID, Server Cluster ID are displayed as data management Key values (serial numbers, "serverID=31" as shown in the capture screen). To view detailed information of the corresponding Server/Node/Cluster, utilize the "Search ID" functionality located at the bottom of the "Action Trace Detail" information. The input/output items of this functionality are as follows.

Table 184. Search ID Functionality Input/Output Items

Item	Description	Remarks
ID	<ul style="list-style-type: none"> <li>Left Combo : Choose between serverId / nodeId / serverClusterId</li> <li>Right : Enter the ID value from Input</li> </ul>	Input item
Data	Retrieved Server/Node/Cluster information	Output item

## 9.6.2. Documentation

You can download LENA introduction materials and manuals.

## 9.6.3. Manager Environment

Provides information for Manager environment configuration.

### Manager Environment

Provides information stored in env-manager.sh/bat among Manager environment configuration information.

- Manager Allow IPs : Configures IP items that can access the Manager.
- Java Home Path : Configures the java home path used by the Manager.

### Manager Configuration

Provides information stored in manager.conf among Manager environment configuration information.

Provides 2 items by default.

- use JMX for Server Status : Whether to retrieve server status information through JMX (default : false)

Table 185. When using JMX for Server Status: true, WAS Status display

Status	Status name	Description
	Started	Both WAS and Application are normally started
	Started(Warning)	WAS normally started, Application partially (or entirely) not started
	Stopped	WAS stopped
	Error	WAS Status verification impossible

- use Server Delete Protection : Whether to disable server deletion functionality in Manager (default : false)

Click the **configuration button** on the right side of the screen to verify and change detailed information.

## OpenID Connect Configuration

Configures login functionality through OpenID Provider that follows OpenID Connect standards. When enabled, you can verify the OpenID Connect Toggle button on the login screen.

Item	Description	Remarks
Enable	Whether to enable OpenID Connect login functionality	
Enable Auto User Creation	Whether to create a user when authentication succeeds from the authentication provider but the user doesn't exist in LENA	
Provider	Authentication provider	
Grant Type	Method for client to request tokens	authorization_code, password
Client ID	Unique identifier for the OpenID Connect client application	
Client Secret	Secret key used for authentication between client application and authentication server.	
Key for Login	Key name of UserInfo that maps to LENA Manager User ID.	
Authorization URL	URL used when redirecting users to the authentication provider for authentication	
Redirect URL	URL used when redirecting from authentication provider to Manager after login	
Token URL	URL used when requesting tokens from the authentication provider	
Userinfo URL	URL used when requesting user information from the authentication provider	
End Session URL	URL used when requesting session termination from the authentication provider	

## Metadata Refresh

Performs metadata consistency verification and restoration functionality used to draw system-specific configuration information as topology charts in the Topology menu.

## Reset manager address of all registered nodes

Provides functionality to collectively change the changed Manager Address to all nodes registered in the Manager.

# Chapter 10. Appendix

## 10.1. LENA System Requirements

The minimum requirements for installing and using LENA are as follows.

Category	JVM	CPU	Memory	Disk	Support OS	Remarks
Basic Installation Package	JDK 1.8 or higher	2 Core or higher	4 GB or higher	10GB or higher (excluding root)	Linux (CentOS 7 or higher) or Windows 7 or higher	Installation files provided for each component

## 10.2. Manager Supported Browsers

Browsers that can use Manager functions include Chrome/Edge (version 70 or higher) and Firefox (version 62 or higher). For IE, some functions may not work properly, so it is recommended to use other browsers. The recommended minimum browser size is 1680\*900.

## 10.3. Supported Specification Versions

Specification	Version	Remarks
Java Development Kit (JDK)	1.8~	
Java Servlet	3.1	
Java Server Pages (JSP)	2.3	
Expression Language (EL)	2.2	
JavaServer Pages Standard Tag Library (JSTL)	1.2	
Enterprise JavaBeans (EJB)	3.2	
Java Message Service (JMS)	1.1	
Java Transaction API (JTA)	1.2	
Java API for RESTful Services (JAX-RS)	2.0	
Java API for XML Web Services (JAX-WS)	2.2	

## 10.4. Manager DB File Backup

HSQL DB files for internal data management of Manager generate backup files periodically (daily). The generation location is \${LENA\_HOME}/repository/backup/database.

By default, backup information older than 30 days is deleted. If you want to change the retention period, open the manager.conf file in the \${LENA\_HOME}/repository/conf folder and enter

dbbackup.size=retention\_period, then restart Manager to change the retention period.

## 10.5. Manager Internal History Deletion

The history that Manager leaves internally is scheduled to be deleted periodically. The information being deleted is Action Trace history and Server History history.

By default, Action Trace history is retained for up to 30 days, and Server History history is retained for up to 90 days. If you want to change this retention period, open the manager.conf file in the \${LENA\_HOME}/repository/conf folder and enter actiontrace.size=retention\_period, serverhistory.size=retention\_period, then restart Manager to change the retention period.

## 10.6. Manager Admin Password Reset

If you lose the Manager admin user password or exceed the password error count, you must reset the password through the console.

1. Connect to the equipment where Manager is installed via console (telnet or ssh).
2. Execute the \${LENA\_HOME}/bin/reset\_manager\_pw.sh file.
3. Enter admin as the user to reset the password.
4. Enter the password to reset. Note that the password must be 8 characters or more, a combination of alphabet/numbers/special characters. The password is not displayed on the console for security reasons.

```
[bin]$ ./reset-manager-pw.sh

*****
* LENA Server Install ! *
*****


+-----+
--  
| 1. USER_ID is the user id to reset  
| ex : admin  
| 2. NEW_PASSWORD is the password to change  
| - password rule #1 : more than 8 length  
| - password rule #2 : inclusion of one or more alphabet characters  
| - password rule #3 : inclusion of one or more numerical digits  
| - password rule #4 : inclusion of one or more special characters
+-----+
--  
  
Input USER_ID for installation. (q:quit)  
administrator  
  
Input NEW_PASSWORD for installation. (q:quit)  
  
The password has been changed successfully.  
  
Execution is completed.!!
```

## 10.7. LENA Installation Recommended OS Parameters (CentOS Standard)

When installing LENA, it is recommended to set the max user processes value to 8192 or higher.

parameter	Recommended Value	Default Value
max user processes	8192	1024
open files	8192	1024

For CentOS, you can check the max user processes setting by running the 'ulimit -a' command as follows.

```
$ ulimit -a
core file size          (blocks, -c) 0
data seg size           (kbytes, -d) unlimited
scheduling priority     (-e) 0
file size               (blocks, -f) 8192
pending signals          (-i) 14891
max locked memory       (kbytes, -l) 64
max memory size         (kbytes, -m) unlimited
open files              (-n) 1024
pipe size                (512 bytes, -p) 8
POSIX message queues    (bytes, -q) 819200
real-time priority      (-r) 0
stack size               (kbytes, -s) 10240
cpu time                 (seconds, -t) unlimited
*max user processes     (-u) 1024*
virtual memory           (kbytes, -v) unlimited
file locks               (-x) unlimited
```

For CentOS, you can set the number of processes and open files using the commands 'ulimit -u' and 'ulimit -n'. To permanently reflect the above changes, add the ulimit execution command to each user's profile (.profile, .bash\_profile), or you can force the setting (CentOS standard).

```
*$ cat $HOME/.bash_profile
*.. (omitted)*
*ulimit -u 8192
*ulimit -n 8192
```

Another configuration method is to open the /etc/security/limits.conf (CentOS standard) file and set the maximum number of processes (nproc) and maximum number of open files (nofile).

```
*$ cat /etc/security/limits.conf
*.. (omitted)*
** soft nproc 8192
** hard nproc 8192
** soft nofile 8192
** hard nofile 8192
```

## 10.8. LENA Periodically Increasing Files

Item	Path	Deletion Cycle	Monthly Expected Increase	Remarks
Manager Regular Maintenance Logging	LENA_HOME/repository/monitoringDB/maintenance	6 months	10MB	Expected increase based on 6 servers Auto deletion
Manager Monitoring, Diagnostic Reports	LENA_HOME/repository/monitoringDB/{yyyyMMdd}	7 days	N/A	Auto deletion
Manager Diagnostic Statistics	LENA_HOME/repository/monitoringDB/statistics	Permanent	1MB or less	
Manager DB Backup Files	LENA_HOME/repository/backup/database	30 days	100MB or less	Auto deletion
Manager Logs	LENA_HOME/logs/lena-manager	30 days	100MB or less	Auto deletion
Agent Logs	LENA_HOME/logs/lena-agent	30 days	N/A	Auto deletion
Installer Logs	LENA_HOME/logs/lena-installer	Permanent	1MB or less	
Patch Applied Files	LENA_HOME/etc/patch	Permanent	N/A	Only generated during patching Can be deleted after patch completion
Patch Backup Files	LENA_HOME/etc/backup/lena-patcher	Permanent	N/A	Generated during patching Can be deleted after patch completion
Patch Logs	LENA_HOME/logs/lena-patcher	Permanent	N/A	Generated during patching Can be deleted after patch completion

Item	Path	Deletion Cycle	Monthly Expected Increase	Remarks
Server Instance Logs	Server instance installation path LENA_HOME/servers/server_id/logs	Permanent	Judged based on load	Path changeable
Server Instance History	Server instance installation path LENA_HOME/servers/server_id/history	Permanent	N/A	Only configuration file updates are generated when server settings are modified through Manager
Server Instance Snapshots	Server instance installation path LENA_HOME/servers/server_id/snapshot	Permanent	N/A	Only generated when creating Cluster Snapshot through Manager
WAS Dump Files	LENA_HOME/repository/monitoringDB/dump	Permanent	N/A	Only generated when performing WAS dump through Manager

## 10.9. Patch CLI (Command Line Interface)

Patch is a function provided for functional improvements and bug fixes of installed LENA. It is provided in compressed file format and operates as an independently running Java process.

The method of execution through Management UI is provided in [patch](#). Here, we explain how to patch and restore through CLI.

### 10.9.1. Patch File Upload and Extraction

Upload the received patch file to the server where LENA is installed individually using FTP, etc.

Extract the uploaded file to the location below and change the directory name to the version name. If uploaded through Manager, it is automatically extracted to the corresponding path.

```
Node/Server patch file path: /engn001/lena/1.3/etc/patch/{patch_version}
Manager patch file case: /engn001/lena/1.3/repository/patch/{patch_version}
```

## 10.9.2. Patch

### Node Patch

Execute patch.sh to patch the Node.

```
<patch_file_extraction_path>/bin/patch.sh lena-node
```



During Node patching, the Node will restart.

```
[bin]$ ./patch.sh lena-node

*****
* LENA Server Patch ! *
*****


2018-05-28 14:06:43:915 [INFO] Patch started to lena-node
2018-05-28 14:06:47:075 [INFO] Stopping node-agent
...
2018-05-28 14:06:52:595 [INFO] Starting node-agent
2018-05-28 14:06:52:748 [INFO] Patch completed to lena-node

===== Execution Result =====
MESSAGE : Patch succeeded
RESULT : Success
PATCH_HISTORY_ID : patch-20180528140643905
PATCH_TARGET : lena-node
PATCH_VERSION : 1.3.1.1
=====
patch is completed.!!
```

### Manager Patch

Execute patch.sh to patch the Manager.

manager patch

```
<patch_file_extraction_path>/bin/patch.sh lena-manager
```



During Manager patching, the Manager will restart.

```
[bin]$ ./patch.sh lena-manager

*****
* LENA Server Patch ! *
*****


2018-05-28 14:05:32:752 [INFO] Patch started to manager
2018-05-28 14:05:36:032 [INFO] Stopping manager
...
2018-05-28 14:05:46:062 [INFO] Starting manager
2018-05-28 14:05:47:066 [INFO] Patch completed to manager

===== Execution Result =====
MESSAGE : Patch succeeded
RESULT : Success
PATCH_HISTORY_ID : patch-20180528140532668
PATCH_TARGET : lena-manager
PATCH_VERSION : 1.3.1.1
=====

patch is completed.!!
```

## Server Patch

Execute patch.sh to patch individual servers.

It must be executed on the server where the node is installed, and executed separately for each LENA server installation type. Node patching must precede server patching.

WAS standard type patch

```
<patch_file_extraction_path>/bin/patch.sh lena-se
```

WAS enterprise type patch

```
<patch_file_extraction_path>/bin/patch.sh lena-ee
```

Session Server patch

```
<patch_file_extraction_path>/bin/patch.sh lena-session
```

Table 186. patch.sh input arguments and input items

Item	Description	Remarks
PATCH_TARGET	Patch target (input as argument of patch.sh)	lena-node lena-manager lena-se lena-ee lena-session
SERVER_ID	Server ID corresponding to the patch target	lena-node, lena-manager patching not required

```
[bin]$ ./patch.sh lena-ee

*****
* LENA Server Patch ! *
*****


2018-05-28 14:17:18:840 [INFO] Patch started to lena-se

Input SERVER_ID for execution. (q:quit)
wasEE_9100
...
2018-05-28 14:17:26:820 [INFO] Saving patch history
2018-05-28 14:17:26:842 [INFO] Patch completed to lena-se

===== Execution Result =====
MESSAGE : Patch succeeded
RESULT : Success
PATCH_HISTORY_ID : patch-20180528141639064
PATCH_TARGET : lena-ee
PATCH_VERSION : 1.3.1.1
=====
patch is completed.!!
```

### 10.9.3. History

Execute history.sh to check patch history. Basic history excludes restored history and shows it, while full history shows all history.

Basic history

```
<patch_file_extraction_path>/bin/history.sh
```

Full history

```
<patch_file_extraction_path>/bin/history.sh all
```

```
[bin]$ ./history.sh

*****
* LENA Server Patch ! *
*****


LENA Patch History
1 lena-node / patch-20180528140643905
- action : PATCH
- id : patch-20180528140643905
- target : lena-node
- serverId : lena-node
- oldVersion : 1.3.1.0
- patchVersion : 1.3.1.1
- backupRoot:
/engn001/lena/1.2/etc/backup/lena-patcher/backup-20180528140643903
- timestamp : 20180528140643905
- restored : false
- handwork-status : NO_WORK

2 lena-manager / patch-20180528140532668
- action : PATCH
- id : patch-20180528140532668
- target : lena-manager
- serverId : lena-manager
- oldVersion : 1.3.1.0
- patchVersion : 1.3.1.1
- backupRoot:
/engn001/lena/1.2/etc/backup/lena-patcher/backup-20180528140532666
- timestamp : 20180528140532668
- restored : false
- handwork-status : NEED_WORK
- start of handwork-detail
...
- end of handwork-detail

3 lena-ee / patch-20180528141639064
- action : PATCH
- id : patch-20180528141639064
- target : lena-ee
- serverId : wasEE_9100
- oldVersion : 1.3.1.0
- patchVersion : 1.3.1.1
```

```
- backupRoot:  
/engn001/lena/1.2/etc/backup/lena-patcher/backup-20180528141639062  
- timestamp : 20180528141639064  
- restored : false  
- handwork-status : NO_WORK  
  
history is completed.!!
```

## 10.9.4. Restore

Execute restore.sh to restore the applied patch. (When patch application problems occur)

When Restore is executed, files changed at the patch point are restored to their pre-change state.

```
<patch_file_extraction_path>/bin/restore.sh <PATCH_HISTORY_ID>  
  
(PATCH_HISTORY_ID is the id value retrieved from ./ history.sh)
```

```
[bin]$ ./restore.sh patch-20180423130610713  
  
*****  
* LENA Server Patch ! *  
*****  
  
2018-05-28 14:40:05:404 [INFO] Restore started to lena-ee  
...  
2018-05-28 14:40:05:532 [INFO] Restore completed to lena-ee  
  
===== Execution Result =====  
MESSAGE : Restore succeeded  
RESULT : Success  
=====  
restore is completed.!!
```

## 10.9.5. Version Check

Execute version.sh to check the patch status of currently installed servers.

```
<patch_file_extraction_path>/bin/version.sh
```

```
[bin]$ ./version.sh

*****
* LENA Server Patch ! *
*****


LENA Patch Information
1. Base Information
- Version : 1.3.1.1 (Up to date)
- LENA_HOME : /engn001/lena/1.3.1

2. lena-manager
2.1 - id : lena-manager / version : 1.3.1.1 (Up to date)

3. lena-se
3.1 - id : wasSE_9100 / version : 1.3.1.1 (Up to date)
3.2 - id : wasSE_9200 / version : 1.3.1.1 (Up to date)

4. lena-ee
4.1 - id : wasEE_9300 / version : 1.3.1.0 (Patch available to 1.3.1.1)
4.2 - id : wasEE_9400 / version : 1.3.1.0 (Patch available to 1.3.1.1)

5. lena-session
5.1 - id : session_5000 / version : 1.3.1.0 (Patch available to 1.3.1.1)
5.2 - id : session_5500 / version : 1.3.1.0 (Patch available to 1.3.1.1)

version is completed.!!
```

## 10.10. DBCP Additional Functions

Control Application Server through Database connection testing or generate logs for operations performed in DBCP.



Set through environment variables or JVM Options, with JVM Option settings taking priority.  
(If the same option is set in both environment variables and JVM Options, the JVM Option value is followed)



When using Application Server registered as a Windows service, only JVM Options can be set

### 10.10.1. Application Server Control

When starting the Application Server, if it cannot connect to the Database, or if pool creation, validation query failure, etc. are detected, the server is terminated.

Table 187. DBCP Additional Functions, Application Server Control

Environment Variable	JVM Option	Description	Default
SHUTDOWN_IF_DB_CONN_FAIL	lena.shutdownIfDbConnFail	When true, server terminates in Database connection / Pool creation failure / validation query failure situations	false

## 10.10.2. DBCP Logging

Logging for Datasource creation, Connection creation, Validation query execution, Borrow Connection, Return Connection / Detailed Stack Trace logging

Environment Variable	JVM Option	Description	Default
DBCLOG_ON	lena.dbclogOn	When true, logs during Datasource creation, Connection creation	false
DBCLOG_ON_DETAIL	lena.dbclogOnDetail	When true, logs Validation query execution, Borrow Connection, Return Connection (does not work if DBCLOG_ON is false)	false
DBCLOG_ON_STACKTRACE	lena.dbclogOnStacktrace	When true, adds Stack Trace information to logs.	false
DBCLOG_MAX_TRACE	lena.dbclogMaxTrace	Maximum number of Stack Traces to output in logs	5
DBCLOG_EXC_DBCP_PACKAGE	lena.dbclogExcDhcpPackage	Whether to exclude dhcp-related package information from Stack Trace logging	true

## 10.11. Manager Language Setting Change

You can change the language setting of LENA Manager.

Table 188. LENA Manager Configurable Languages

Language	Default
English(US)	0
Korean(KR)	

### 10.11.1. Language Setting Change Method

To turn on the language setting change function, first enter the following menu.

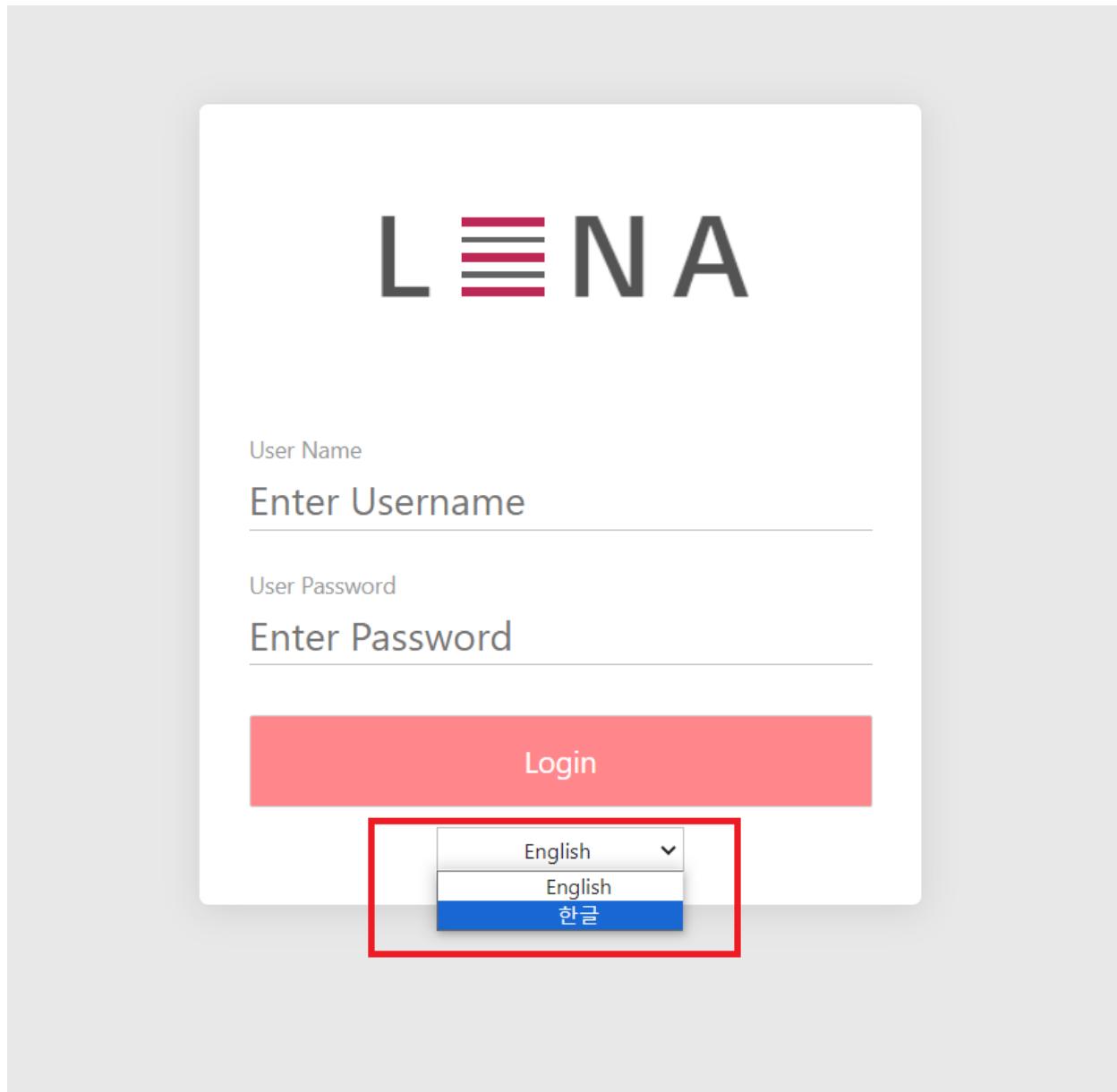
ADMIN > Preference > Manager Environment

(Based on default English setting)

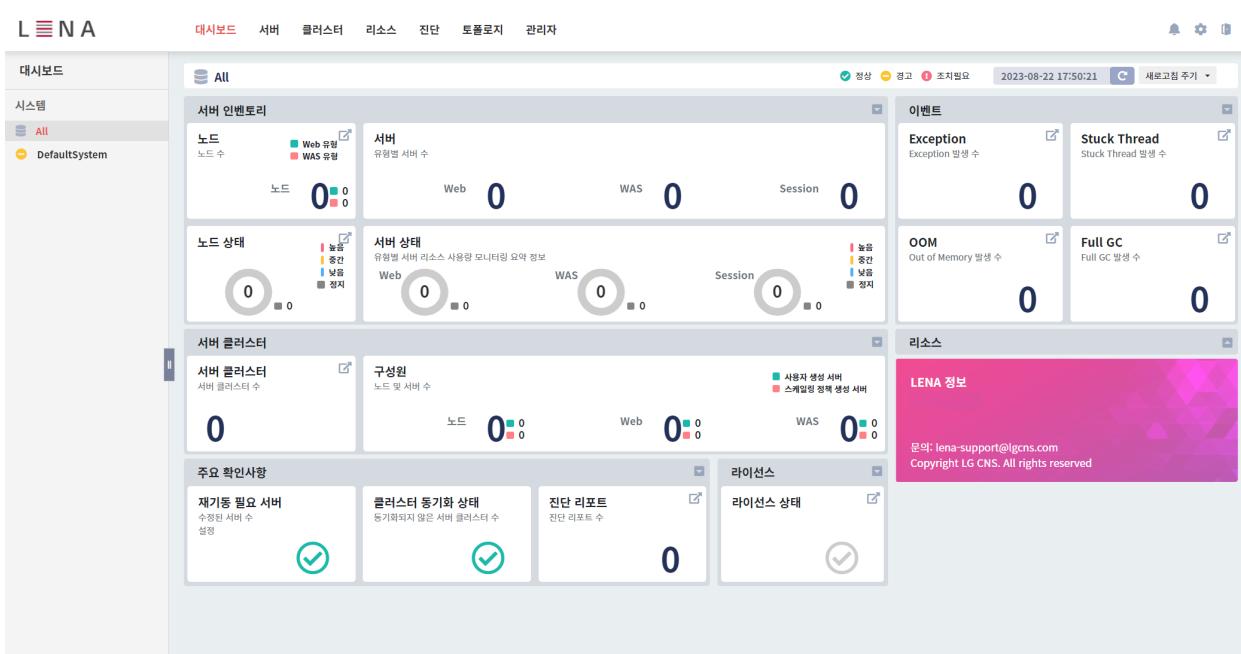
Click the gear button of Manager Configuration to open detailed settings and modify as follows.

```
...
9  # i18n On/off
10 lena.i18n.enable=true # false -> true
...
```

Now you can change the language setting on the Login Page. If you are logged in, log out and go to the Login page.



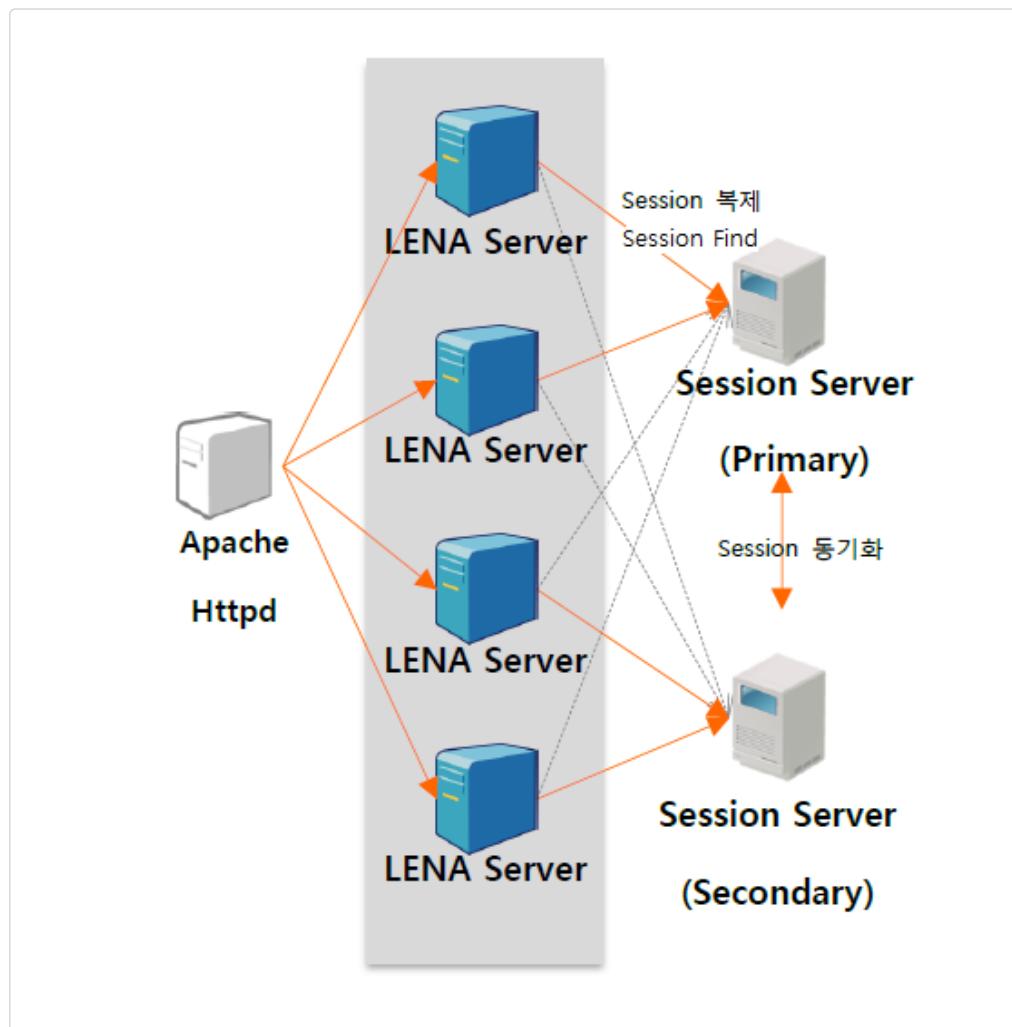
After selecting the language to use and logging in, you can use LENA Manager in the changed language.



## 10.12. Session Server Details

Application Server's Session Clustering installs a separate Session Server to share Sessions for Clustering. Session Server has Standalone mode that operates on a separate VM and Embedded mode that embeds the Session Server module in the Application Server.

### 10.12.1. Session Server Standalone Mode



## Installation

For installation method, refer to the [Install](#) section.

## Start/Stop and Startup Status Check

For start/stop and start status check, refer to [Start/Stop](#).

## Environment Configuration

The location where Session Server is installed is called \${ZODIAC\_HOME}. Session Server is located in the /servers folder under LENA home.

Environment configuration information is managed in \${ZODIAC\_HOME}/session.conf. Environment configuration configurable items are as follows.

Item	Description
server_id	server ID
server_name	server Name
primary_port	TCP listening port for this Session Server
session_max_count	Maximum HTTP session count

Item	Description
server_recv_queue_size	Queue size for processing requests from Secondary Server or Application Server (latest information changes / new registrations, Logout processing)
server_req_queue_size	Queue size for holding Session information requests from other Servers (Session information requests, latest information checks, etc.)
resp_queue_size	Queue size for holding responses to Session information requests from other Servers
send_queue_size	Queue size for holding Session information to send to other Servers
keep_alive_time	Interval for sending dummy messages to maintain TCP connection between Application Server and Session Server, must be smaller than so_timeout. It's good to match each Application Server's settings.
so_timeout	Read timeout in connection with Application Server
thread_request_handler	Number of Threads that process data in request Queue.
thread_data_handler	Number of Threads that process data in receive Queue.
debug_clustering	Whether to leave Debug Logs
enable_auto_was_sync	When set to true, sends Sync request to WAS that reconnected due to failure, etc. to sync WAS's Session data.
enable_auto_peer_sync	Whether to send Sync request to Secondary Session Server that reconnected (due to failure, etc.) to sync Slave Session Server's Session data
server_expire_sec	Time for server to expire HTTP session information (Session Timeout) When 0, uses the session timeout time set in the Application
server_expire_check_sec	Session Timeout check cycle. (unit: seconds)
secondary_host	Secondary session server address
secondary_port	Secondary session server port
enable_ready_after_sync	Whether to send Clustering service available status (Ready) to connected WAS after performing Session data synchronization with Secondary Server (true sends ready status after synchronization)
wait_server_ready_time_out	If ready status (Session Clustering service available status) is not achieved within this time, automatically creates ready status.
server_ready_time	Startup wait time for connection with Secondary Server (this value * 100 ms).
max_logoutset	Maximum number of logged out HTTP sessions
enable_auto_logout_sync	When true, during session entry information sync, logout information is also synced. (needed when not sticky but round-robin)

## Logs

Logs are written to \${LENA\_HOME}/logs/session-server/lena-[Session Name]\_[YYYYMMDD].log. To check logs, you can also execute \${ZODIAC\_HOME}/log.sh file.

```
[session_5002]$ ./log.sh

May 09, 2018 02:55:50 PM [ZODIAC] TCP listen 5002
May 09, 2018 02:55:54 PM [ZODIAC] ACCEPT NODE(Tomcat) /127.0.0.1:33138
May 09, 2018 02:55:55 PM [ZODIAC] SERVER_READY, no peer, time=5000
May 09, 2018 02:59:57 PM [ZODIAC] Zodiac Stop
May 09, 2018 03:00:00 PM [ZODIAC] Zodiac Session Server 1.3.0 20160420
May 09, 2018 03:00:01 PM [ZODIAC] TCP listen 5002
May 09, 2018 03:00:01 PM [ZODIAC] ACCEPT NODE(Tomcat) /127.0.0.1:33359
May 09, 2018 03:00:03 PM [ZODIAC] ACCEPT SERVER /127.0.0.1:46818
May 09, 2018 03:00:04 PM [ZODIAC] SYNC[session_5002] recv bulk
sessions : #0 recv bulk logout sessions : #0 recv bulk dupInfo : #0 2ms
May 09, 2018 03:00:04 PM [ZODIAC] SERVER_READY sync is done
May 09, 2018 03:00:05 PM [ZODIAC] TCP Primary name=session_5002
/127.0.0.1:5002
May 09, 2018 03:00:05 PM [ZODIAC] SYNC start 127.0.0.1:5002
May 09, 2018 03:00:05 PM [ZODIAC] SYNC Send bulk sessions send to
127.0.0.1:5002 #0 and logout session send : 0 and dupInfo send : 0
```

## Console

Zodiac Session Server can query Session Server information and perform Application Server Sync commands through JMX. Execute the console.sh file in \${ZODIAC\_HOME} to use Zodiac Session Server's JMX functionality.

```
[session_5002]$ ./console.sh  
=====zodiac session server JMX Console=====  
-----  
- Usage: ./console.sh <COMMAND> -  
- <COMMAND> is one of the following: -  
- 1. was_list -  
- 2. status -  
- 3. was_serverq -  
- 4. was_sync -  
- It needs WAS ID -  
- example: ./console.sh was_sync <was id> -  
- 5. search -  
- It needs SESSION ID. -  
- example: ./console.sh search <session id> -  
-----
```

The following is a description of console.sh commands.

- Application Server List

Shows the list of Application Servers currently connected to Session Server.

Execute shell command console.sh was\_list.

```
[session_5002]$ ./console.sh was_list  
=====zodiac session server JMX Console=====  
RUN OPERATION: getServerInfo  
  
RESULT:server=\{addr:/127.0.0.1:54001,name:wasEE7_29100,  
info:\{server_name=wasEE7_29100,pid=24915,hostname=solwas4,jvmName=bde0fbb29  
e8100285,context=/jpetstoreJTA;ROOT;/lena;/EPS;/HelloWorldWeb,type=INSTANCE}  
}server=  
\{addr:/127.0.0.1:33912,name:wasEE3_29100,  
info:\{server_name=wasEE3_29100,pid=10607,hostname=solmanager,jvmName=2b2451  
dd049f00285,context=/jpetstoreJDBC;ROOT;/jpetstore3,type=INSTANCE}\}
```

- Session Server Status

Shows the current status values of Session Server.

Execute shell command console.sh status.

```
[session_5002]$ ./console.sh status

=====zodiac session server JMX Console=====

RUN OPERATION:

getStatusString\{request_getfresh_logout:0,session_count:0,req_lost:0,reques
t_
getfresh_not_new:0,request_getfresh_nodata:0,request_getnew_secondary:0,sess
ion_expired:0,request_getnew_logout:0,session_timeout:1800,request_getnew_no
data:0,session_max_count:2000000
,logout_from_nodes:0,pid:32705,session_recv_lost:0,logout_from_secondary:0,r
equest_getfresh_secondary:0,request_getfresh:0,request_getnew:0,logout_count
:0,data_from_nodes:0,resp_lost:0,request_getfresh_data:0,data_from_secondary
:0}
```

- Session Server ServerQ Status

Shows the ServerQ status of Zodiac Session Server. ServerQ is a module that manages Application Server connections connected to Session Server. The data shown here is Queue information that holds Session information (data) sent from Application Server and Request information (Request).

Execute shell command console.sh was\_serverq.

```
[session_5002]$ ./console.sh was_serverq

=====zodiac session server JMX Console=====

PRINT ATTRIBUTEdataQ.size: 0requestQ.size: 0dataQ.overCnt:
0requestQ.overCnt: 0
```

- Session Id Search

Shows the Application Server List that has the Session matching the entered Session ID.

Execute shell command console.sh search [Session ID].

```
[session_5002]$ ./console.sh search
B38E30BDE5223BAA0221B9479AF3DDAF.6ef7931859a200285
=====zodiac session server JMX Console=====

RUN OPERATION: search

RESULT:\{'AE4_29100'=\{lastAccessTime='2018-05-24
15:55:48.503',context='ROOT',attributeNames=[sessiontest.counter,
ARGO_DUPLICATION_STATUS],lastUpdateTime='2018-05-24
15:55:48.501',addr='/127.0.0.1:44568',id=B38E30BDE5223BAA0221B9479AF3DDAF.6e
f7931859a200285,createTime='2018-05-24
15:55:43.241'\}}
```

- Application Server Session Sync

Execute when syncing Application Server's Session information to Session Server.

Execute shell command `console.sh was_sync [Application Server jvmName (value output as jvmName in was_list)]`.

```
[session_5002]$ ./console.sh was_list

=====zodiac session server JMX Console=====

RUN OPERATION: getServerInfo

RESULT:server=\{addr:/127.0.0.1:54001,name:wasEE7_29100,
info:\{server_name=wasEE7_29100,pid=24915,hostname=solwas4,jvmName=bde0fbb29
e8100285,context=/jpetstoreJTA;ROOT;/lena;/EPS;/HelloWorldWeb,type=INSTANCE\}
\}server=
\{addr:/127.0.0.1:33912,name:wasEE3_29100,
info:\{server_name=wasEE3_29100,pid=10607,hostname=solmanager,jvmName=2b2451
dd049f00285,context=/jpetstoreJDBC;ROOT;/jpetstore3,type=INSTANCE\}\}
```

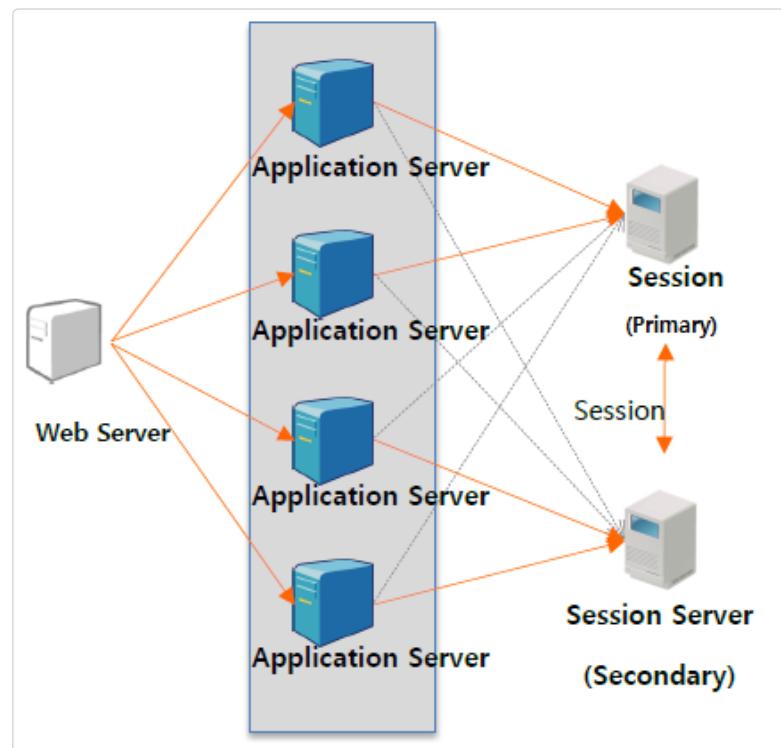
```
[session_5002]$ ./console.sh was_sync bde0fbb29e8100285

=====zodiac session server JMX Console=====

RUN OPERATION: serverSyncsync complete
```

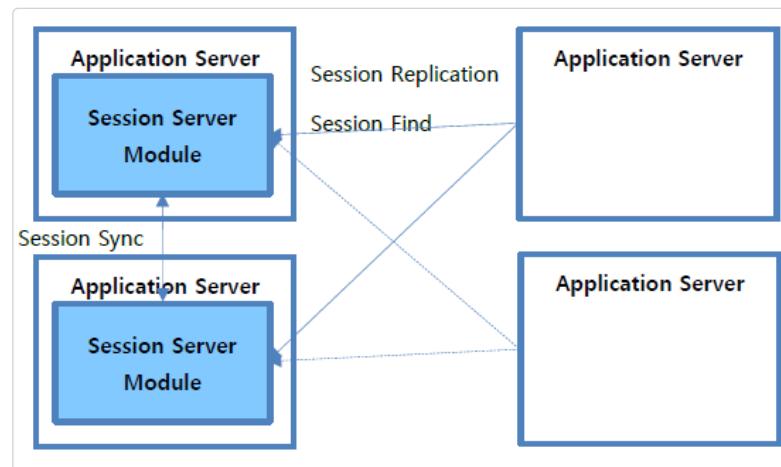
## Session Server Failover

Session Server is configured as Primary/Secondary and synchronizes Session information in real time. Since Application Server maintains connection with Primary/Secondary Session Server, when Primary Session Server failure occurs, failover to Secondary Session Server occurs from the point of failure detection.



## 10.12.2. Session Server Embedded Mode

Session Server Embedded mode is a method of embedding Session Server Module within Application Server.



### Environment Configuration

To configure Session Server in Embedded mode, set it in Manager's Application Server configuration screen or modify \${LENA\_HOME}/servers/[ApplicationServerName]/conf/session.conf.

The screenshot shows the 'Session Cluster' configuration section of the Manager's Application Server configuration screen. The 'Session Clustering Enable' field is set to 'Yes'. The 'Session Server Mode' is selected as 'Embedded Mode'. Under 'Embedded Host', 'WAS\_NODE\_01' is chosen as the host and port 'EE01\_B680'. Under 'Secondary Server Host', 'SERVER02-WAS' is chosen as the host and port 'EE02\_8780'. The 'Embedded Port' is set to 5351 and the 'Secondary Server Port' is set to 5352. The 'Multi Login Control' field is set to 'FALSE'. A 'Save' button is at the bottom right.

The description of items displayed on the screen is as follows.

Item	Description	Remarks
Session Server Mode	Select Embedded or Standalone Session Server's Client mode	
Embedded Host	Node name and server name of Session Cluster's Primary server	
Embedded Port	Service port of Session Cluster's Primary server	
Secondary Server Host	Node name and server name of Session Cluster's Secondary server	
Secondary Server Port	Service port of Session Cluster's Secondary server	
Multi Login Control	Whether to check multiple logins	false
Logout Page when Multi Login check (Multi Login)	Logout result page displayed to the user who logged in first when multiple logins occur	
Logout Message when Multi Login check (Multi Login)	Logout result message when multiple logins occur, provided to ajax Client in JSON format	
Expected Page When Multi Login Check (Multi Login)		

Manager has limited configurable values. Basically, follow the default settings.

Below are the environment configuration values that can be changed through session.conf file.

Item	Description	Default Value
enable_clustering	Whether to do Session clustering. If False, Session Server doesn't find sessions.	TRUE
debug_clustering	Whether to debug	FALSE
primary_host	Primary Session Server address  In Embedded mode, it's the Embedded Host value	127.0.0.1
primary_port	Primary Session Server port  In Embedded mode, it's the Embedded Port value	5005
secondary_host	Secondary Session Server address, only used when connection between Application Server and Primary Session Server is broken. In Embedded mode, it's the Slave Server Host value	127.0.0.1

Item	Description	Default Value
secondary_port	Secondary Session Server port, only used when connection between Application Server and Primary Session Server is broken In Embedded mode, it's the Slave Server Port value	5006
recv_queue_size	Queue size for processing Session information processing requests received from other Servers (latest information changes / new registrations, Logout processing)	512
req_queue_size	Queue size for holding Session information requests received from other Servers (Session information requests, latest information checks, etc.)	512
resp_queue_size	Queue size for holding responses to Session information requests received from other Servers	512
send_queue_size	Queue size for holding Session information to send to other Servers	512
keep_alive_time	Interval for sending dummy messages to maintain TCP connection between Application Server and Session Server, must be smaller than so_timeout.	3000
so_timeout	Read timeout in connection with Session Server	8000
tcp_open_try_interval	Interval for reconnection attempts when connection with Session Server is broken	5000
find_timeout	Time to wait for server response when Application Server searches for sessions during transactions. If there's no server response within this time, Application Server considers that the server doesn't have the session	500
wait_server_ready_cnt	When communication connection with Server is established but Server status is not ready, wait for maximum configured seconds. If -1, wait indefinitely.	-1
server_embedded	Whether to embed session server module. If true, embeds session server module.	false
max_logoutset	Size of set that stores logged out HTTP sessions	20000
check.duplication.login	Whether to check duplicate logins	false

Note 1) Other Servers: Connected Session Server or Clustered Application Server