How-to Guide
SAP NetWeaver ‘04

How To...
Scale Up
SAP Exchange Infrastructure
3.0

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Applicable Releases:
SAP NetWeaver ‘04
Exchange Infrastructure 3.0
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1 Scenario

Scaled system architectures consist of the central instance and additional dialog instances. Each dialog instance is connected to the database and executes exactly the same function. The central instance differs from a dialog instance in that it has Single Points of Failure (SPOFs). The SPOFs in an SAP Web Application Server (SAP Web AS) environment are the message server, the enqueue server, and the database. There is only one message server and one enqueue server for each Web application type (ABAP and Java).

A scaled architecture is used when the performance of a central system does not allow all requests to be processed in a specific timeframe or at all. To determine this, you can either use the SAP Quick Sizer to calculate the system resources based on the expected load, or by testing the system. By adding additional dialog instances, you scale up the available resources proportionally.

Within an SAP Exchange Infrastructure (SAP XI) installation, there are various possible resource shortages: on the SAP Web AS ABAP, for example, if ccBPM is used extensively, or on the SAP Web AS Java, if huge and complex mappings are executed. However, you should only scale the SAP Web AS Add-In installation (ABAP and Java in one system) with SAP Web AS Add-In dialog instances. By scaling the SAP Web AS Add-In installation homogeneously, the dialog instances will all look the same. If you change the layout or functionality of some dialog instances, for example, by activating specific adapters on only one SAP Web AS Java server node, this might create a new SPOF. To keep operational tasks as simple as possible, we recommend that you keep all dialog instances the same.

2 Introduction

There is a major difference between high availability (HA) and scaling. While HA deals with SPOFs by installing them in a HA cluster environment, scaling increases the overall system performance by adding additional dialog instances to the system. However, a scaled landscape would not be available at all if the SPOF, the central instance for SAP XI, was not available. The figure below shows what the most likely scaled system architecture looks like.

The central instance is installed in a cluster environment, plus additional dialog instances on different hosts.
For more information about high availability in SAP XI 3.0, see the High Availability Guide – SAP XI 3.0 on SAP Service Marketplace at service.sap.com/nw04 → Documentation → Operations → SAP XI

This How-To Guide provides an overview of:

- Installation of additional dialog instances (section 3.1)
- Additional configuration steps (section 3.2)
- Applying Support Package Stacks (section 3.3)

From a runtime perspective, the most interesting point in a scaled SAP XI landscape is communication. There are two different kinds of communication:

- Messaging, either from or to business systems, or between the Integration Server and the Adapter Engine
- Internal communication, for example, mapping requests, System Landscape Directory (SLD) requests, exchange profile requests, and so on

Due to specific restrictions, you must not change the exchange profile. All connections defined in the exchange profile should point to the central instance. RFC connections are established and SLD associations are created based on these parameters. If you have set the exchange profile parameters, it is not possible to apply RFC logon that is based on message server and logon group (due to the need for load balancing).

Note that the SLD associations might break if a host name other than that of the central instance is entered for the Integration Server.

To distribute the messaging load between all instances, you must configure an appropriate load balancing.

Section 3.2 describes:

- How to achieve load balancing with SAP tools
- All steps required to adapt the SAP XI configuration in order to use load balancing
Relevant SAP Notes

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3  The Step By Step Solution

3.1  Dialog Instance Installation

After SAP XI 3.0 installation and configuration on the central instance, you can install additional dialog instances. This section provides the delta information for installing a dialog instance. For more information, see the Installation Guides.

1. Installation Option ABAP Stack

   In SAPinst, select Dialog Instance Installation as the installation option.
2. Dialog Instance ABAP Stack  
Specify the following for the dialog instance:
- **System ID**
- **Instance Number**

The **Instance Host** field is filled with the host name or the value of the SAPinst command line parameter **SAPINST_USE_HOSTNAME**.

3. Central Instance ABAP Stack  
Enter the following for the central instance:
- **Instance Number**
- **Instance Host**

Additional information
The ABAP dialog instance requires an instance number as a technical identifier for internal processes. This number must be unique for the installation host. The instance-specific port number is required as a unique communication channel.
4. Instance Directories ABAP Stack

In a heterogeneous system environment, different executables are required for each operating system. To store the executables on the central instance host in platform-specific directories, select Yes, **locate executables on central instance host**.

In a heterogeneous environment we recommend that you select this option.

⚠️ Check whether heterogeneous installation is released in SAP Note 875322 and the Platform Availability Matrix.

5. Installation Option J2EE Stack

Select **Dialog Instance Finalization** as the installation option.
6. Central Instance J2EE Stack
   Specify the following for the central instance:
   - SAP System ID
   - Central Instance Host
   If the central instance runs on UNIX or OS400, select the corresponding checkbox.

3.2 Configuration

After installation, the dialog instance is fully functional. However, if you use the standard configuration, the dialog instance is not involved in the message exchange. This section describes how to make the adjustments necessary to fully utilize the entire distributed landscape.

⚠️ We recommend that you leave the exchange profile unchanged for a scaled SAP XI setup. In particular, no load balancing settings are reflected in any URLs defined in the exchange profile.

The HTTP destination `INTEGRATION_DIRECTORY_HMI`, as defined in transaction `SM59`, should not point to the load balancer, but directly to the central instance.

During installation, the exchange profile load is generated using information, for example host name or HTTP port, from the central instance. This information is not only used for internal communication, but also to register the SAP XI components with the SLD at runtime, and to identify the different components belonging to one SAP XI installation in the SLD.

Since the RMI (P4 port) protocol cannot be load balanced, and the above-mentioned registration process might fail if host names other than that of the central instance are used, we strongly recommend that you leave the exchange profile unchanged, so that all communication parameters point to the central instance.

3.2.1 Load Balancing Configuration

To distribute the load equally between multiple application servers, you must configure an appropriate load balancing. The HTTP and RFC protocol need load balancing to send messages to the Integration Server.

You can configure load balancing for the HTTP protocol by using the SAP Web Dispatcher or any third-party load-balancing tool. However, unlike third-party tools, the SAP Web Dispatcher can retrieve a list of all available instances from the SAP Web AS
ABAP message server. The SAP Web Dispatcher is part of the SAP Web AS ABAP kernel. For performance and network resource reasons, the SAP Web Dispatcher might be installed on separate hardware.

When you use the SAP Web Dispatcher, a request sent from the Integration Server to the Adapter Engine is routed through the SAP Web Dispatcher and the Internet Communication Manager. Due to the higher tcp-socket consumption, you may need to adapt kernel parameters at the operating-system (OS) level. For more information about the OS kernel parameters with regard to SAP Web Dispatcher, see SAP Note: 538405.

You configure load balancing for RFC communication by defining logon groups and connecting using the SAP Web AS ABAP message server.

For more information about the Web Dispatcher and logon groups, see SAP Help Portal at:


1. SAP Web Dispatcher

The easiest way to create an initial SAP Web Dispatcher configuration is to use the bootstrap option.

Open a command prompt and start the Web Dispatcher using the following command:

```
sapwebdisp –bootstrap
```

Enter the following parameters for the configuration:

- Message server host name
- Message server HTTP port (81<SysNr>)
- Desired SAP Web Dispatcher instance number
- Desired SAP Web Dispatcher HTTP port

The result is a functional Web Dispatcher.

For more detailed configuration options, see the online documentation.

2. Logon Groups

You maintain logon groups on the SAP Web AS ABAP by using transaction SMLG.

In this transaction you can create or delete new logon groups and instance assignments.

3.2.2 SAP XI Internal Communication

SAP XI uses both SAP Web AS ABAP and SAP Web AS Java at runtime. The Integration Server, the plain HTTP adapter, and the IDoc adapter are part of the SAP Web AS ABAP, whereas the other adapters and the Java mapping are located on the SAP Web AS Java. Therefore, there is some internal communication at runtime.

If a message is sent to the Integration Server through an adapter which resides on the Adapter Engine, for example the SOAP adapter or the file/FTP adapter, the message must be sent from the Adapter Engine to the Integration Server (AE to IS) for further processing. Messages that need to be delivered through a specific adapter need to be sent from the Integration Server to the Adapter Engine (IS to AE).
Within a scaled SAP XI environment, there are multiple instances of both the Integration Server and the Adapter Engine. To utilize each of these instances, you must configure an appropriate load balancing between the Integration Server and the Adapter Engine.

1. **AE to IS**
   
   The Adapter Engine uses the pipeline URL as defined for the Integration Server’s business system for sending messages to the Integration Server (sender adapter).
   
   Access the SLD and navigate to *Business Landscape*. Select the Integration Server’s business system and change the *Pipeline URL* so that it points to the load balancer (section 1).
   
   ! **The new settings are activated after a full CPA cache refresh.**

2. **IS to AE**
   
   The Adapter Engine’s messaging system registers its communication parameters, host name, and HTTP port with the SLD. These parameters are then read by the Integration Server and compiled into the target URL. The Integration Server sends the messages to this target URL if they are to be processed by the Adapter Engine (receiver adapter).
   
   To ensure that the Adapter Engines of all dialog instances are called, each J2EE server node must register the same parameters pointing to the load balancer with the SLD. To do this, you can change the global configuration, or change each cluster configuration consistently.
Start the Visual Administrator. On the *Global Configuration* tab page, navigate to *Server → Services → SAP XI AF CPA Cache*. Alternatively, you can make the setting using the GUI configuration tool.

Enter the following for the load balancer:
- Host name for `SLD.selfregistration.hostName`
- HTTP port for `SLD.selfregistration.httpPort`
- HTTPS port for `SLD.selfregistration.httpsPort`

Save the changes and restart the service.

Trigger a new Adapter Engine registration in the SLD. In the left frame of the Visual Administrator, navigate to *Server → Services → Deploy and choose Applications*. Restart the applications `com.sap.aii.af.cpa.app` and `com.sap.aii.af.app`, or restart the J2EE Engine.

Check that the self-registration was successful and that the new host name is available.

Call transaction **SXI_CACHE** and choose *Goto → Adapter Engine Cache*. Delete the current entry for the Adapter Engine. When a message is sent to the Adapter Engine, the entry is reread from the SLD. Verify that the new host name is used in *Adapter Engine URL*.

Verify that the new host name is stored in the SLD: Access the SLD and navigate to *Content Maintenance*. Select Class: *XI Adapter Framework* and the associated instances (Assoc's) for your Adapter Engine. On the next screen, in the *XI Adapter Hosted HTTP Service Port* section, choose *Basic URLs of Adapter Engine on <host>*. Verify that the new host
For more information, see SAP Note 804124.

As the default setting, the SAP XI internal RFC-based communication runs through the gateway of the central instance.

For performance reasons, we recommend that you keep the internal communication on the same host by using the Local Bundle. If you use this configuration option, the J2EE Engine’s JCo RFC provider registers its programs at the local gateway and the RFC-based communication between the Integration Server and the J2EE Engine remains on the local host.

Central Gateway vs. Local Bundle

For more information about the JCo RFC provider service, see the online documentation at:
help.sap.com/nw04 → SAP NetWeaver → Application Platform → Java Technology in SAP Web Application Server → Administration Manual → Server Administration → J2EE Engine Administration → Web Application Server Integration → JCo RFC Provider Service

3. RFC Local Bundle Configuration

In the Visual Administrator, for each server node navigate to Cluster → Server → Services → JCo RFC Provider Services. On the Runtime tab page, select the Local Bundle checkbox for the following RFC destinations:

-  AI_DIRECTORY_<SID>
-  AI_RUNTIME_<SID>
-  LCRSAPRFC_<SID>
-  SAPSLDAPI_<SID>

On the SAP Web AS ABAP, delete the gateway information for each of the above-mentioned RFC destinations in transaction SM59.

⚠️ Note that you must maintain the JCo RFC provider destinations separately for each server node. In
particular, you must select *Local Bundle* for each server node separately.

### 3.2.3 Connecting Application Systems

There are two different types of adapter for sending data from a sender application system to the Integration Server:

- Adapters that can be actively addressed, for example the ABAP proxy adapter, the plain HTTP adapter, the IDoc adapter
- Polling adapters, for example the file/FTP adapter and the mail adapter

From a configuration point of view, only adapters which can be actively addressed by the sender application systems are of interest. You must adapt the configuration within these application systems to reflect the load-balancing settings.

If receiver application systems use load balancing, the corresponding settings must be reflected in the receiver communication channels.
1. HTTP-Based Adapters

The configuration of the HTTP-based adapters depends on the application system. The target URL of the adapter must point to the load balancer (section 1).

The screenshot shows an example with an RFC destination pointing to the Integration Server. Application systems can use the RFC destination to communicate with the Integration Server using the ABAP proxy runtime.

2. IDoc Adapter

IDocs are sent to the Integration Server using RFC. In the sender system, change the corresponding RFC destination to use load balancing. Select Yes for Balance Load and enter the values for:

- Target System
- Message Server
- Logon Group (section 2)

3.3 Applying Support Package Stacks

The patch procedure for SAP NetWeaver ‘04 and all its applications is described in the Support Package Stack Guide available on SAP Service Marketplace. For more information about applying Support Package Stacks, see this guide at:

service.sap.com/nw04 → Documentation → Maintenance → SPS >= 15 → Support Package Stack Guide >= SPS 15; up to SP 14 use the respective guide, also available on the same page.

The patch sequence for SAP XI is:

1. Update the SAP Web AS ABAP.
   Either use the standard update or the downtime-minimized update.

2. Update the SAP Web AS Java.
   a. In an HA environment, update the SCS instance first.
   b. If you update the central instance, SAPinst turns on safe mode. In this mode, all dialog instances are stopped and only the central instance’s dispatcher and one server node are active. We recommend that you leave the Java cluster in safe mode after installation.

3. Update SAP XI applications using the SDM while the cluster is in safe mode.
4. Turn off the safe mode using the GUI configuration tool.

5. Update each SAP Web AS Java dialog instance.

Safe mode is available for SAP NetWeaver '04 SP 13 and higher. For lower patch levels you must enable the safe mode manually. You must switch off dialog instances during update of the SAP Web AS Java central instances. You can disable additional server nodes on the central instances and switch them to restart mode **NO** by using the jcmon tool (/usr/sap/<SID> //<instance>/j2ee/os_libs/jcmon pf=<path to profile>/<instance profile>).

For more information about the SAP Web AS Java cluster architecture, see SAP Help Portal at:


### 3.4 System Status Checks

These checks are helpful for checking if the load balancing settings configured above are actually used in the system landscape.

1. **SAP Web Dispatcher**

   Access the SAP Web Dispatcher Admin pages. To display the status of the J2EE server group, choose **Monitor Server Groups**

   ```
   http://<web dispatcher host>:<web dispatcher http>/sap/wdisp/admin/default.html
   ```

   Compare the result with the message server logon list:

   ```
   http://<central instance host>://<abap message server http port>/msgserver/text/logon
   ```

   Both lists should match.

   Bear in mind that all communication between the SAP Web Dispatcher and SAP Web AS Java goes through the ICM in a Web AS Add-In installation.

   Therefore, the Web Dispatcher administration page will show the SAP Web AS ABAP HTTP port even for SAP Web AS Java. In the example shown in the screenshot, HTTPS is not configured on the SAP
Web AS ABAP, therefore the Web Dispatcher shows the SAP Web AS Java HTTPS port.

2. Validate Load Balancing to the Adapter Engine

You can verify load balancing for messages sent from the Integration Server to the Adapter Engine (receiver adapters) by selecting the messages which have been processed by the different SAP Web AS Java server nodes.

If only one server node processes all received messages, this can cause errors in load balancing.

You can select the messages processed by a specific server node by using the monitoring page of the messaging system:


For sender adapters, select Sent Messages; for receiver adapters select Received Messages. In the right frame, choose Configure Table Columns, select the NodeID checkbox at the bottom of the following page, and choose Apply Settings.

As the result, the NodeID column (J2EE server node ID) is displayed in the List of Messages.

To determine the number of messages processed by a specific server node, use an enhanced filter and the node ID as a filter value.

⚠️ As of SAP NetWeaver '04 SP 17, you can check the status of each adapter on the different SAP Web AS Java server nodes by using the Adapter Monitoring page in the Runtime Workbench.
www.sdn.sap.com/irj/sdn/howtoguides