How To Scale Up SAP NetWeaver Process Integration

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Capability:
Service Bus

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## Document History

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<tr>
<td>1.10</td>
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## Typographic Conventions

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<td>File and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.</td>
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## Icons

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1. Business Scenario

Scaled system architectures consist of the primary application server (aka central instance) and additional application servers (aka 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 QuickSizer 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 Process Integration (SAP PI) 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 PI, was not available.

**Note**
This How-to guide should not be used for HA environments as the HA configuration is a scaled configuration per se. For HA setup and configuration, please refer to Technical Infrastructure Guide, Installation Guides and related notes (e.g., SAP Note 1052984).

This How-To Guide provides an overview of:

- Installation of additional dialog instances (section 3.1)
- Additional configuration steps (section 3.2)

From a runtime perspective, the most interesting point in a scaled SAP PI 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 PI configuration in order to use load balancing

![Scaled Exchange Infrastructure showing http and RFC based (incoming) communication](image-url)
3. The Step By Step Solution

3.1 Additional Application Server (Dialog Instance) Installation

After SAP PI installation and configuration on the primary application server (central instance), you can install additional application servers (dialog instances). For more information, see the Installation Guides.

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.

Recommendation

We recommend that you leave the exchange profile unchanged for a scaled SAP PI 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 PI components with the SLD at runtime, and to identify the different components belonging to one SAP PI 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.
Note
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.

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.

3.2.2 SAP PI Internal Communication

SAP PI 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 PI 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.

   **Note**

   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 JEE 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 configtool, navigate to template → services → com.sap.aii.af.cpa.svc.

   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 JEE cluster.

   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 name is used for **URL** and **SecureURL**.

**Note**

For more information, see SAP Note 804124.

As the default setting, the SAP PI 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 local addressing. If you use this configuration option, the JEE Engine’s JCo RFC provider registers its programs at the local gateway and the RFC-based communication between the Integration Server and the JEE Engine remains on the local host.

![Central Gateway vs. Local Bundle](image)

3. RFC Local Addressing Configuration

In the SAP NetWeaver Administrator, navigate to **Configuration Management → Infrastructure → Jco Rfc Provider**. On the **Server Configuration** tab page, set **Gateway Host to localhost** and **Gateway Service to sapgw$$**, on the **Repository Configuration** tab, set **Application Server Host to localhost** and **System Number to $$** for the following RFC destinations:

- **AI_RUNTIME_<SID>**
- **AI_VALIDATION_<SID>**

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

### 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.

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