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11.10

Load balancing is a key feature for ensuring SMP scalability. XI makes use of load balancing by using multiple Web AS instances. In XI, load balancing is especially useful in inbound request processing. You can use outbound load balancing if the receiver application or component is prepared for and can benefit from load balancing (for example, a receiving IDoc or RFC application is addressed using its message server to distribute the load).

The following table shows areas where XI can use load balancing for inbound processing:

Protocol	Component	Load Balancer	Description
HTTP	Integration Server	HTTP Load Balancer	IS pipeline entry processing using HTTP load balancing.
HTTP	Adapter Framework	HTTP Load Balancer	Adapter Framework inbound processing using HTTP load balancing.
RFC	IDoc Adapter	Message Server	IDoc Adapter inbound processing using logon load balancing.
RFC	RFC Adapter	SAP Gate-way	RFC sender channel can register multiple processing threads at a client system's gateway.
RFC	Mapping Run-time	SAP Gate-way	JCo RFC Provider service registers multiple threads at IS gate-way for receiving mapping requests; these JCO server threads then call an application thread for mapping execution.
RFC	qRFC	qRFC scheduler	qRFC scheduler distributes load across available Web AS in-stances (can be controlled by RFC server groups).

Different components can be used as the HTTP load balancer (hardware or software), for example:

- SAP Web Dispatcher
- Hardware Load Balancer
- Web Switch

1. HTTP

The number of ICM processes (and therefore Web AS instances) is important for HTTP request processing. Besides processing HTTP inbound requests and forwarding them to their respective handler work process, ICM processes also process HTTP client outbound requests (that is, work processes sending HTTP requests using plain HTTP or SOAP outbound adapters).

If you are using several Web AS instances, there are three possible solutions for load balancing of inbound HTTP traffic (without using an external component such as HW Load Balancer):

Message server

Every client uses the message server HTTP port for addressing purposes (parameter *ms/http_port*). The disadvantage with this solution is that the message server sends an HTTP redirect to the client, which then resends the request to the specified server, thus causing additional network load.

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Web Dispatcher

A Web Dispatcher can forward HTTP requests. It also gets current load information from the message server to inform the distribution of requests to the lower load. This causes no additional network load and is the preferred solution for load balancing in Web AS instances. Logon groups can be used to control the distribution.

Manual Distribution

In this case, load distribution is performed by client applications, which send requests directly to different ICM processes. For example, the adapters are used in parallel, each sending to one specific ICM process. (https://twitter.com/flipbeans)

2. RFC Logon

Scenarios using the RFC protocol (RFC Adapter, IDoc) benefit from RFC logon load balancing, which is a standard Web AS function. RFC requests are forwarded by the Web AS message server, which collects information about Web AS instance load. Logon groups can be used to control the distribution.

3. SAP Gateway

A server application can register several times at a Web AS gateway with the same program ID. (The program ID is configured in transaction *SM59 RFC Destinations – TCP/IP Connections*). The gateway process then uses request counters and a round-robin algorithm to distribute requests to registered server programs (this is called load distribution by multiple gateway registration).

Mapping Runtime

Each rfcengine thread of a J2EE server registers at a specific Web AS gateway. The mapping service is called by a work process using the RFC destination *AL_RUNTIME_JCOSEVER*. This ensures load distribution between rfcengine threads. It is important to note that each J2EE server registers the bulk of its rfcengine threads at servicestartup. This may lead to a suboptimal distribution if using several J2EE server nodes.

The gateway process then dispatches the first mapping requests to server node 0, the next to server node 1. The gateway process is not aware of the J2EE configuration. It only dispatches requests to registered server applications. If you encounter such a situation, you can distribute parallel load to several J2EE servers by:

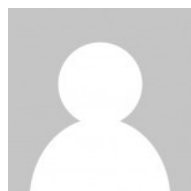
- Lowering the number of rfcengine threads per server node for destination *AL_RUNTIME_** (depending on the number of parallel mapping requests). You configure the number of rfcengine threads (number of processes) for each RFC destination within the JCo RFC Provider service of a J2EE server (using Visual Administrator).
- Using the local gateway. Using local gateways for the mapping runtime instead of one central gateway ensures that more J2EE servers process mapping requests in parallel and prevents overload of the central gateway. To enable the use of an instance's local gateway, just delete the gateway option of the RFC destination *AL_RUNTIME_JCOSEVER* in *SM59*. Mapping requests are then distributed to local J2EE server nodes using the local gateway. Therefore, there must be a configured J2EE server node up and running with every Web AS instance.

RFC Adapter

The RFC adapter can also make use of the multiple server registration feature. This means that an RFC sender channel within the Adapter Framework can register several JCo server threads at a client systems' gateway.

4. qRFC

The qRFC scheduler implements load distribution by RFC server groups and by managing available work process resources (see *SMQR -> Goto -> QRFC Resources*). For a short overview of scheduler configuration and functions, see SAP Note 369007.



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