ONESOURCE™ INDIRECT TAX INTEGRATION FOR SAP (BASIC US/CA)–5.2B

IMPLEMENTATION RECOMMENDATIONS FOR LOAD BALANCING AND FAILOVER

SAP JCO Integration (Basic US/CA)

VERSION 5220B

Document Version 1

THOMSON REUTERS®

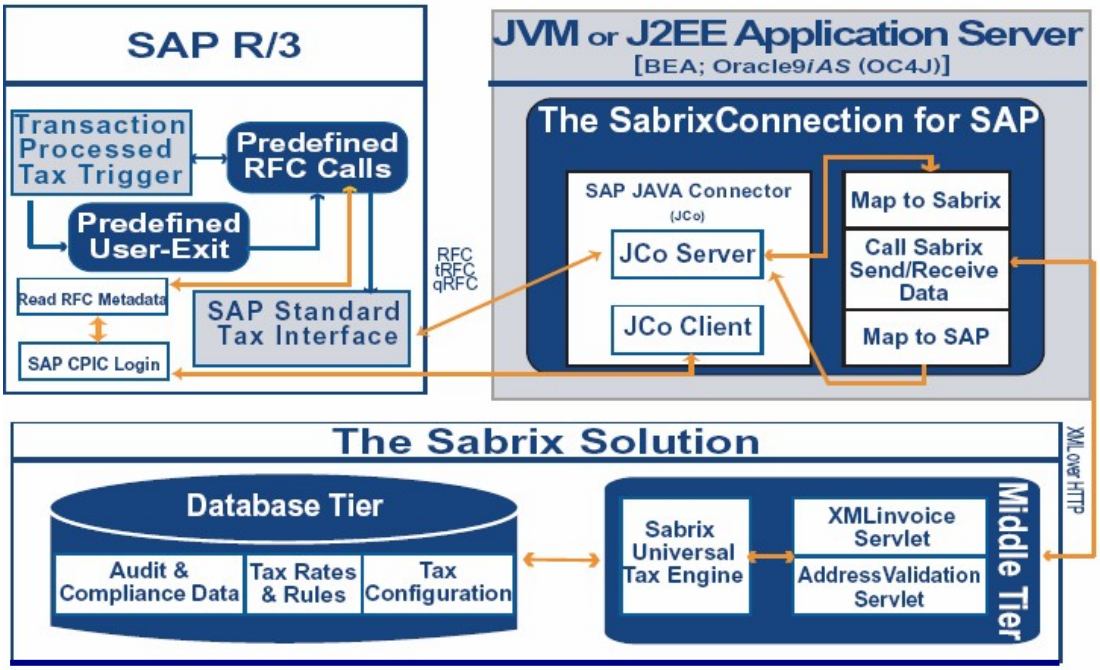
Introduction

Your ERP system is one of the “mission critical” applications in your IT landscape. Therefore, you pay close attention to architecture and setup issues regarding that system. Because the Sabrix Solution and its tax engine are directly connected and tightly integrated with your business transactions, you should also consider the SabrixConnection and Sabrix Solution part of this mission critical architecture. While the installation and setup of the SabrixConnection for SAP and the Sabrix Solution are simple tasks which can be accomplished in a very short time, you need to give special consideration to the overall architecture design of your SAP-Sabrix system integration to address both scalability and failover.

This document provides the IT professional an architecture overview, details on each integration component in relation to scalability and failover, and recommendations for a successful production setup. This document focuses primarily on the final production system architecture; for testing (QA) and development (DEV), less complex architectures are most likely appropriate.

This document is a supplement to the Sabrix Solution Installation Guide, the SabrixConnection for SAP Installation Guide, and the appropriate SAP documentation. Familiarity with these documents and adequate IT knowledge are assumed.

Before reading the rest of this paper, you need to understand how the Sabrix Solution integrates with the SAP system. The following diagram visualizes this integration; it is described in detail in the SabrixConnection for SAP Installation Guide.



SAP Setup

The SabrixConnection for SAP communicates with the SAP system using a defined RFC destination setup in SM59. To connect to the SAP system the SabrixConnection uses the SAP JCo Server method, a highly performing and scalable tool provided by SAP. The SAP JCo Server subscribes to the SAP RFC destination as a TCP/IP daemon process with a set of server threads and the gateway specified in the SabrixConnection as a **Registered** program. The SAP business transaction involving tax will be routed to the RFC destination designated for the tax interface; the SAP gateway will recognize all given RFC server threads registered to that

destination. Out of that set of server threads, the SAP system then uses an available thread to route the RFC request to the SabrixConnection. Several SAP configurations will impact this process:

RFC Destination Setup – Transaction SM59

When setting up an RFC destination for the external tax interface you will assign a gateway host and gateway port to be used by the SabrixConnection to connect to SAP. This gateway will then be used as the "broker" for your tax transactions based on the gateway configurations. By definition the JCo Server will use the central gateway of SAP to connect. The SabrixConnection is a JCo Server application utilizing the registration method on the RFC destination.

SAP Gateway Configuration – Transaction SMGW / RZ11

The SAP gateway can act as a load balancer on your SAP system as of release 4.6D. You configure this with the parameter value gw/reg_lb_level. The three options are:

0 No load balancing; the first free registered program is used.
1 The program with the lowest counter is used. Every time a registered program is assigned a request, the counter is increased by one.
2 The program with the least load is used. How the load is determined is based on configuration settings in SAP. (See the SAP documentation of *gw/reg_lb_level* for more detail).

The SAP default is 1, therefore load balancing is enabled. Sabrix highly recommends that you use load balancing on your gateway. For more details on configuring your gateway to work as a load balancer, please review the chapter "SAP Gateway - Load Balancing for Registered Programs" in the documentation provided to you by SAP or visit the SAP help portal at:

http://help.sap.com/saphelp_47x200/helpdata/en/51/aea438ec2a7e26e10000009b38f8cf/frameset.htm and http://help.sap.com/saphelp_nw04/helpdata/en/cb/6acf38422f0244b960236643e3cc46/frameset.htm.

SabrixConnection for SAP

The SabrixConnection for SAP is designed to address high transaction volumes by instantiating multiple server threads with SAP, each designed to handle one concurrent transaction at a time. The number of server threads per connection is defined in the *SabrixConnection.properties* file with the parameter name **num_server**. Since each connection will run in its own JVM, it is imperative to not only manage the number of servers per one connection instance, but to also divide the desired number of servers over multiple connections utilizing multiple JVM's (basically leading to a connection cluster). This can be achieved by starting multiple instances of the SabrixConnection either on the same server instance or on different instances.

Important Parameters for the SabrixConnection

Number of Threads (*num_servers*); this number specifies how many RFC server threads are created at startup of the SabrixConnection. This setting resides in the *SabrixConnection.properties* file, the default is 5 threads. The number of server threads needed depends on the expected number of concurrent transactions sent from SAP at one given time. You must consider user transactions, batch processes, and monthly closing processes (peak) to ensure that you specify an adequate number. Once the total number of server threads needed is determined, you should distribute that number over multiple instances of the SabrixConnection.

Number of Connection Instances: each SabrixConnection when started-up will allocate its own JVM space as a "Connection Instance". To load balance and have some simple failover redundance in the SabrixConnection we recommend that you start two or more SabrixConnection Instances at any given time.

JVM Memory Settings: the minimum / maximum memory allocated to the JVM at startup is based on the overall consumption of the SabrixConnection. The different components utilizing memory from the JVM are the connection core (approx. 20 MB) and the number of line items sent through at any given time. This parameter setting is maintained in the *IntegrationServerStartup.sh* or *InstallSabrix-NT.bat* files, the Sabrix default is set as *MEMARGS="-Xms512m -Xmx512m"*. Internal tests have shown that with a memory setting of 64 MB for the JVM a single transaction with a total of 5400 tax lines can be processed. With a setting of 5 threads, this would mean that with the above memory setting five concurrent invoices of 1080 lines could be managed by the SabrixConnection.

Recommendations:

Do not “over-allocate” the number of threads per connection; Sabrix has seen the best results with 5-6 threads. Keep the JVM memory settings for min and max the same to result in the best JVM performance.

Need to Know:

If the max memory threshold for the JVM is exceeded, the JVM (and the SabrixConnection for SAP) will crash and all threads part of the JVM will be lost. The SAP system will “release” these threads from the gateway pool, and transactions affected will return an error message indicating the failure to the end user.

Sabrix Solution Setup

The Sabrix Solution is designed to run on a web application server cluster; for example, multiple instances of the Sabrix Solution will serve incoming tax calculation requests and therefore balance the workload. One single database will be assigned to the server cluster holding your tax configuration, tax rates/rules, and your audit data. To enable the SabrixConnection for SAP to utilize this server cluster a load balancer needs to be installed between the Sabrix server cluster and the SabrixConnection. This load balancer will then receive the SabrixConnection call and route it to one of the Sabrix Solution clusters based on workload.

Sabrix Cluster Configuration

Setting up a Sabrix Solution cluster is dependent on the web application server used. For more information and assistance in setting up a cluster please contact Sabrix Professional Services for vendor-specific documentation or assistance.

Sabrix Side Load Balancer

The SabrixConnection for SAP connects to the Sabrix Solution over a single URL. If the Sabrix Solution is configured in a cluster, that URL is no longer unique, but changes dynamically based on which cluster the connection needs to talk to. A load balancer will be needed to route the SabrixConnection calls to the appropriate Sabrix Solution cluster. Some web application servers Sabrix Supports such as Oracle 10g and WebSphere, are shipped with a built-in load balancer. For all others you would need to either install the software or hardware load balancer of your choice.

System Failover

One other component of high system availability is to account for system failover in case of an unplanned system outage (crash). As an IT organization you have to consider to what degree any one of the applications that are part of your IT architecture can be out of commission. This is based on business criticality and user expectations. Failover (mirroring) is an important fault tolerance function of mission-critical systems that rely on constant accessibility. Failover automatically and transparently redirects requests from the failed or down system to a backup system that mimics the operations of the primary system.

There are four general approaches to system failover. In order of increasing availability, they are:

- No Failover
- Cold Failover
- Warm Failover
- Hot Failover

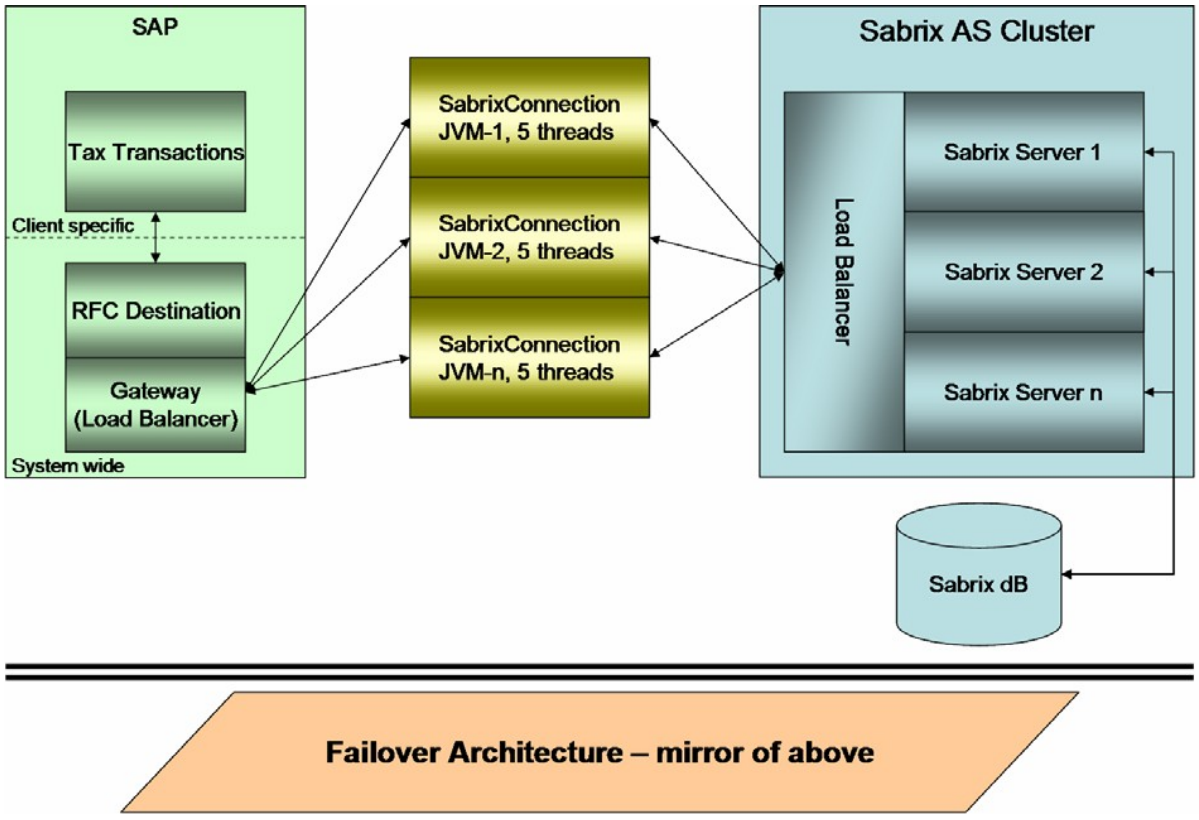
Each strategy has varying recovery time, expense, and user impact, as outlined in the following table.

Approach	Recovery Time	Expense	User Impact
No Failover	Unpredictable	No cost to low cost	High
Cold Failover	Minutes	Moderate	Moderate
Warm Failover	Seconds	Moderate to high	Low
Hot Failover	Immediate	Moderate to high	None

There are variations on each of these strategies; for example, many large enterprise clients have implemented hot failover and also use cold failover for disaster recovery.

It is important to differentiate between failover and disaster recovery. Failover is a methodology to resume system availability in an acceptable period of time, while disaster recovery is a methodology to resume system availability when all failover strategies have failed.

All options listed above can be supported for the Sabrix-SAP integration architecture. Building a failover architecture is not part of the Sabrix solution product architecture, but rather a choice of each company's IT organization which can require additional hardware or software.



Additional Information

For a detailed performance benchmark testing please request the following document from Sabrix Support:

Sabrix Solution - Oracle 10g Performance Benchmark

Conducted at the Oracle Enterprise Technology Center (ETC)
Atlanta, GA - February 2004