Process Integration Architecture – Replication Layers in SAP Application Systems

Applies to:
SAP NetWeaver Process Integration IT Scenarios in Version 2004s

Summary
This document shows you the different layers used for information replication in SAP application systems based on SAP NetWeaver technology. It provides a detail of each layer and shows how they interact.

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Author Bio
Daniel has been working with SAP technology since 1996, and in 1997 he joined SAP. Over the last 9 years he has worked on more than 35 projects plus consulting, training and presales activities. At SAP, he started as an ABAP and RFC (C++) consultant later began to work with ALE interfaces, doing quality assurance, development optimization, in-house software development and design, and then CRM Internet Sales implementation and interface architecture design. After that, he has been leading development and integration teams using SAP BC and XI. In 2005 he joined the SAP NetWeaver Regional Implementation Group.
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Replication Layers in SAP Application Systems

General
When you replicate information using RFC or IDOC protocol, some layers are reused, and a clear understanding of them and their capabilities is required to correctly design process integration among systems.

(Yellow arrows represent synchronous communication).
Typical transaction stages involved in information replication

When you replicate information asynchronously you normally have intermediate transactions, as shown in the following picture.

Each transaction represents a unit of work, an information temporary stage, and since any of these transitions might find an exceptional situation that stops and rollback the process to the previous state, it is necessary to analyze how to restart processing in every step.

Since you have the possibility to stop processing at every transaction, service level agreements requirements are normally lower compared to synchronous replications where a client application is waiting for an answer. In fact, intermediate transactions normally do not apply to synchronous replications.

The following points explain in detail the most important tasks that every transaction executes from one sender to one receiver.

Business Application Layer to Application Linking

- Retrieve replication information and optionally update business application information as required.
- Create application linking information
- Commit the transaction

Application Linking to Communication Layer

- Retrieve information from the application linking layer
- Create communication packages with a communication transaction identifier.
- Update processed application linking information status.
- Commit the transaction

Communication Layer to XI and from XI to Communication Layer

These steps won't be explained in detail, read the tRFC, qRFC, RFC APIs and XI documentation to go into detail.
Communication Layer to Application Linking

- Retrieve information from the communication layer
- Create application linking information.
- Delete communication document.
- Commit the transaction.

Application Linking to Business Application Layer

- Retrieve information from application linking layer
- Update the business application layer using business application layer APIs.
- Update the application linking layer status and create relationships
- Commit the transaction

Layers in Detail
Understanding the different layers in detail will allow you to design better integration scenarios.

Business Application Layer
This layer represents the business application itself. All the business objects and logics are inside the layer. This is the only non-technical layer.

Every information request is used to update this layer in the business application layer of another system.

Extraction and Insertion Layer
This layer has catalogs of function modules and programs with business application logic that retrieve or update information.

SAP Application Systems also have business object repositories that allow an object oriented access to this layer.

References for systems running on SAP WAS usage type ABAP:

Replication Administration and Application Link Layer
This layer basically provides the following features:

- Application level monitoring
- Static Routing
- Filter information that is not required based on static rules or dynamic content.
- Perform value conversion at field level (usually used to convert data very closely related to the application system.
- Keep information to link the communication packages, the intermediate documents and application data.
• Provides technical and application level acknowledgements.
• Help to recover the system after database problems.
• Workflow capabilities for manual processing, monitoring and error handling.
• Serialization (https://service.sap.com/sap/support/notes/752194 )
• High performance extraction and posting

Currently SAP application systems use this layer only for asynchronous communications.
Reference for systems running on SAP WAS usage type ABAP:
http://service.sap.com/ale
SAP CRM also has also an independent technology called the CRM integration services that won’t be discussed in this document:

Communication Layer
This layer handles the communication at transactional and communication protocol level.
The transactional framework ensures that the exactly once and exactly once in order qualities of service are achieved.
Reference for systems running on SAP WAS usage type ABAP: (RFC and ICM):
http://help.sap.com/saphelp_erp2005vp/helpdata/en/6f/1bd5b6a85b11d6b28500508b5d5211/frameset.htm