

Vertical integration of a production system with SAP Web AS and Signsoft intelliBO at TRW Airbag Systems

Abstract

In March 2004, znt carried out a project based on SAP NetWeaver (SAP WAS 6.40, XI, Portal) for TRW Airbag Systems GmbH. The project intended the vertical integration of TRW's production system in SAP. This article describes the project and the experiences gained with the new SAP technologies and the persistence tool intelliBO from Signsoft.

znt

The znt-Richter group is an internationally active IT service company. Its main competence comprises the development of products and solutions in the field of enterprise application integration.

The customer

TRW Airbag Systems forms part of the TRW group, a leading international automotive supplier with its headquarters in the USA. TRW Airbag Systems GmbH is one of the international leaders in the area of air bag gas generators.

The project

Early in 2004, TRW engaged znt to realize an integration project. The project consisted in integrating 30 production lines for air bag gas generators into the SAP R/3 system. These production lines were distributed over several production sites. The solution was realized in cooperation with antagone AG. It went on-line at several sites in November 2004.

Within the project, TRW focused on two main objectives:

1. Optimization of business processes regarding production logistics:
 - improvements of data quality
 - reduction of stock by introducing storage locations at production lines using real-time consumption notifications
 - establishment of a reliable on-time supply for production lines
 - avoidance of unnecessary commissioning
2. Improvements of the IT landscape

SAP R/3 release 4.7 has been introduced. Now, the benefits of an enterprise service architecture are to be made accessible for the company step by step.

 - establishment of a reference architecture
 - evaluation of SAP NetWeaver technology, training TRW
 - preparation for integrating further business processes

The initial situation at TRW was similar to the situation of many other companies: The business processes at company level are very well represented by the SAP R/3 system. And, production is automated to a great extent and supported by process control systems. However, in between of the ERP and the production system there is the proverbial "swivel chair" occupied by an employee that is transferring data manually from one system to the other.

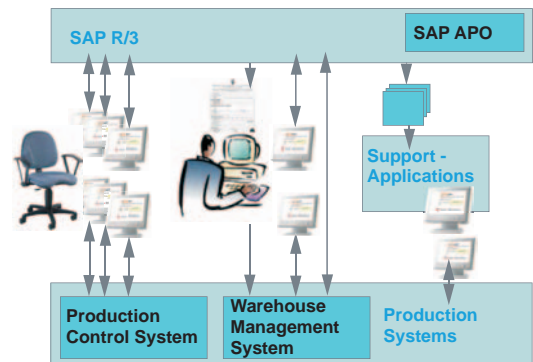


Fig. 1 – Initial situation

In the new situation, orders with its parts lists are dispatched automatically according to the APO planning facility. Feedback of material consumption and completion of products is given in real time. One important facility at the integration level is a sophisticated stock control system supervising the material stock at the production lines and triggering a replenishment when necessary.

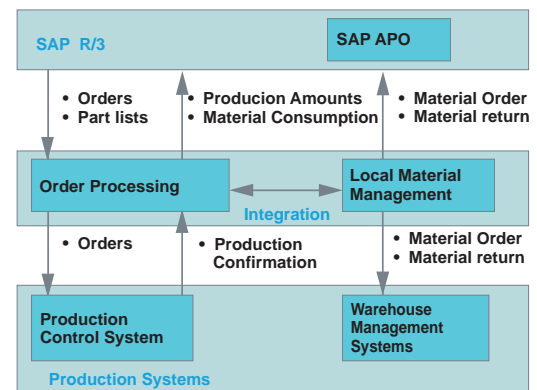
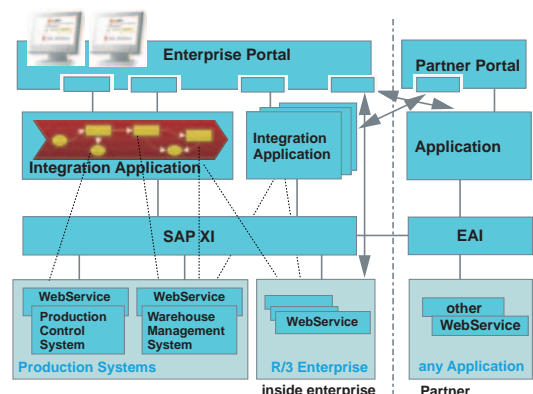


Fig. 2: Integration scenario

System architecture

The application was built according to the enterprise service architecture on top of an SAP NetWeaver (WAS 6.40, XI, and Enterprise Portal 6.0).



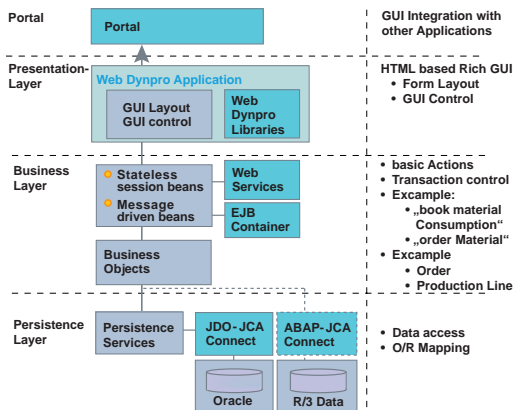
TRW plans to use SAP Enterprise Portal as a central point for interaction with the ERP-System. Therefore, the user interface of the application was designed to integrate smoothly into a web portal.

As for GUI technology, the decision fell on Java and WebDynpro, which will facilitate the development of rich web user interfaces in future versions. All system interfaces were implemented as web services. They are connected to each other by

means of the SAP Exchange Infrastructure (XI). This implementation decision was compulsory as the idea of an Enterprise Service Architecture requires all interfaces to be available via XI to any other application.

The integration solution is deployed as a J2EE application in the application container of a SAP WAS 6.40.

Application design follows the J2EE multi-tier architecture pattern.

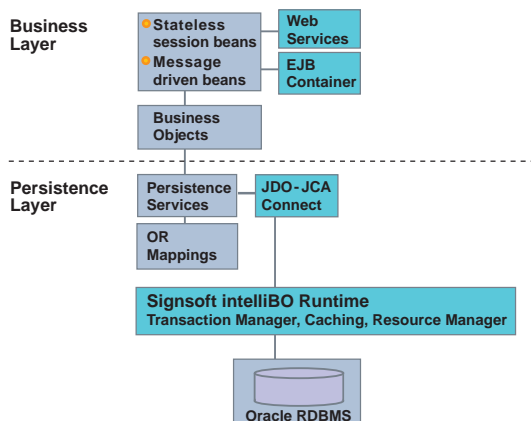


The presentation layer is represented by a WebDynpro application. SAP provides WebDynpro to efficiently develop rich web user interfaces for web browsers. The znt development crew was amazed by the possibilities of WebDynpro in comparison to other web frameworks.

In the business layer, complex functions were realized to guaranty an on-demand replenishment of storage locations along the production lines. Thus, WebDynpro components do not directly access data in the R/3 system but use a business layer instead. Business logic is encapsulated into Enterprise JavaBeans. These EJBs represent business services and provide functions such as „book consumptions“ or „order materials“. Below there are the actual business objects („order“, „production line“).

Being a full fledged J2EE application server, SAP WAS offers a number of possibilities to provide persistence for business objects. On the one hand there are Java/J2EE related methods such as JDBC and CMP (container managed persistence), and on the other hand there is WebDynpro, which offers a direct access to R/3 data for Java applications.

CMP has been ruled out due to performance issues and implementation overhead. Using direct JDBC access would have caused additional implementation efforts as well. Keeping data in the R/3 system was neither possible as a sharp distinction between the ERP system's functions and the application was indispensable.



Consequently, JDO (Java Data Objects) was chosen to provide persistence as it features an elegant and light-weight mapping of Java objects to a relational database schema. Tracing all access to persistent objects, JDO enables a transparent synchronization of Java objects with the database data.

JDO is non-intrusive, so changes to the business objects were not required. Taking into consideration that JDO will enter forthcoming J2EE standards, it seems to be a good choice to employ this persistence standard to cope with relatively complex object models.

SAP WAS 6.40 is shipped with an integrated JDO implementation. However, this implementation still lacked some essential features to be applicable in complex applications. Evaluating different JDO implementations, znt finally chose intelliBO by Signsoft to be best suitable for the project.

Business objects are made persistent by JDO, and storage of data is managed by an Oracle database.

The information for mapping Java classes to database tables is stored in XML files. To keep these XML files consistent with the object model, znt built a generator to automatically generate JDO descriptor files and Java object classes out of UML models.

Project experience

Employing SAP WAS 6.40 early in 2004 was of course challenging since this product was still part of the Ramp-up program. However, TRW and znt opted to use this product for its promising architectural features.

Looking back, we can say it was worth the endeavour. All objectives could be met on schedule, regarding both TRW's reference architecture as well as implemented functionality. Initial problems with the SAP WAS 6.40 could be sorted together with the SAP support. As time passed, SAP WAS 6.40 became a stable application platform. IntelliBO proofed itself one more time to be an efficient and flexible way to cover the persistence aspect of a Java application. As developers with many years of experience in Java/J2EE application design, we are convinced that the concepts of SAP NetWeaver form a technology with a promising future. Even if other application servers or EAI solutions are more elaborated in one aspect or the other, SAP's strategy to provide full integration of its business applications seems to be more substantial to us.

Prospects

Employing SAP NetWeaver, TRW chose a consistent path to establish an enterprise service architecture.

Signsoft intelliBO is a persistence solution to efficiently realize applications with both conventional J2SE technologies as well as with J2EE technologies in a managed environment of an application server.

More projects based on intelliBO are currently being developed at znt.

In cooperation with its partner antagon AG, znt is going to offer its ten years of experience in the field of SAP R/3 and J2EE applications to a broader clientele.

For that, an independent EAI department was founded at the beginning of 2004 to offer application development as well as training, project coaching and consulting for adopting SAP NetWeaver.

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