

# Java<sup>TM</sup>magazin

Internet & Enterprise Technology

## Java Mail

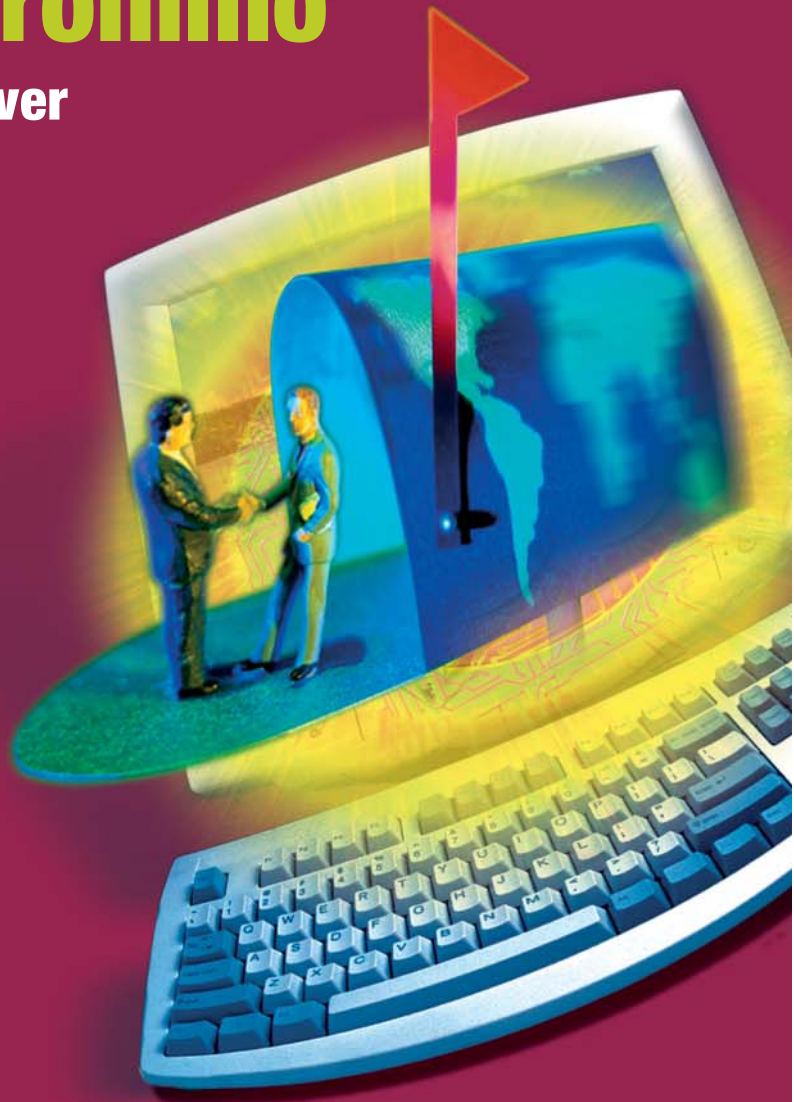
Eigene Mailsysteme

James

Java Magazin reprint for Signsoft GmbH

## Server Geronimo

... der neue Java-Server  
von Apache?



**Connecting Worlds**  
Implementation of an Enterprise Integration Project at Eurofighter

# Implementation of an Enterprise Integration Project at Eurofighter

from Walter Lang, Alexander Lang and Andreas Holubek

## Connecting Worlds

The procurement department is responsible for monitoring and controlling complex logistic operations. In this department information from partners in the Eurofighter consortium is being merged with information from suppliers. In order to support this process of information consolidation a Supplier-Management-Information-System (SMIS) had to be created. Using standard modern web technology a number of the business requirements could already be fulfilled, but the main challenge of the project was posed by the need to integrate and consolidate data across several software systems.

The first question when starting a project like this is: Which goals are to be achieved using what budget? So within a project a number of aspects have to be considered to create a technological foundation for all future projects. What at first glance seems to be an attempt to create the philosopher's stone has been made possible by today's technology. Drafting the system, the following requirements had to be considered:

- maximum transparency of every business process and optimum decision support
- good acceptance among users of four European countries
- good usability
- maintainability: high productivity when implementing change requests of business units and cost reduction for the realisation of changes
- complete representation and fast realisation of new requests of the business units using agile and iterative processes
- corporation-wide consistent architecture
- light-weight web architecture
- very high performance, stability and availability for all applications
- integrated development process from analysis to deployment

Particularly the very long lifetime projected for the application as well as the completely integrated development process from analysis (OOA => UML) to build process and delivery using Cruise Control had to be taken into account.

To fulfil the requirements, a project organisation and a technical architecture had to be created, which provide optimum support to project members and allow each of them to adopt several roles within the team. In order to avoid the need for a distribution of the software created by the project a J2EE architecture was chosen. An additional advantage resulted from the fact, that the user interface required only a web browser, thus easing the effort for user training. Furthermore a short release cycle could be realised (updates are simply deployed on the server). For best cost control proven software products (Apache, Tomcat, Ant, Eclipse ...) and existing components have been used.

### Architectural concept

Basic guidelines have been provided for the architecture of the application to secure optimum cost control while on the other

hand integrating data across several databases. The most important principles were the following:

- Separation of presentation, business and data logic
- Modularisation according to a service oriented architecture (SOA) model.
- Use of standard infrastructure components
- J2EE technology
- JDO as light-weight persistence technology (Signsoft intelliBO)
- Description of business objects in UML
- An SQL Server for business warehouse (Cubes)
- Tamino XML Server for storing hierarchical data and as XML integration server
- XML as the central format for data transfer
- LDAP as central user-directory

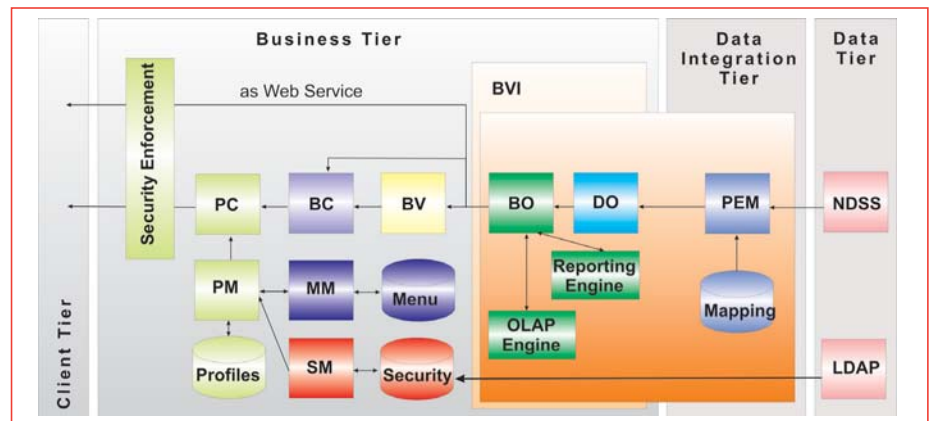


Fig 1: Architectural Overview

As already mentioned, several databases had to be integrated. This could be achieved using the JDO implementation Signsoft intelliBO which supports persisting data via JDBC as well as in Tamino XML Server.

Figure 1 provides an overview of the most important architecture components. The meaning of the abbreviations is as follows:

- BC = business component: a well-defined technical unit
- BV = business view: reusable technical component
- BVI = business view include: encapsulation of data object
- BO = business object: an object of the business domain
- DO = data object
- PEM = PersistenceManager: Encapsulation of data access on Oracle and Tamino using JDO
- NDSS = native data storage system
- MM = Menu Manager: a security component – the personalised menu structure
- SM = SecurityManager: Responsible for the use of the ACE/ACL
- PM = ProfileManager: aligns MenuManager and SecurityManager
- PC = ProfileController: provides runtime information

Explaining the function of each of the architecture components in detail would go beyond the scope of this article. The following sections instead describe some of the aspects in depth.

## Security

A portal allows for definition of user and task specific views. Each of the views gets a security policy assigned. Thus system-wide user synchronization can be done automatically with the help of LDAP calls. A separate administration of users will therefore not be necessary. Role assignment has been designed in a way that enables the business unit (more exactly the appropriate administrator) to “activate” certain business components for a user, freeing the IT personnel from this task. Using this people centric approach a role-based user interface for accessing applications, services and information has been created.

## Business Information (OLAP/Views)

Relevant data are deposited in so-called business cubes to allow a more flexible way of reporting. Decision-relevant operational data are preserved which need to be consolidated using summation and aggregation algorithms when transferred into the Business Warehouse. A Manager will for instance probably not be interested in the individual positions of an instalment plan but in the figures for quarters and years. The consolidation leads to reduced response times when accessing stored data. Data integration follows the so-called ETL (Extraction, Transformation, Load) principle. Thus the data for information and analysis are available to the user at the time of processing. The user can view the management information provided in a number of formats.

## Ad-hoc-Reporting

Supplying OLAP cubes makes ad hoc reporting possible. New business views can be created instantly and analysed in a web application. The use of MS Office products enables the user to process customised analyses without the support of the IT department. Due to the easiness of exporting from the web application the data are available locally and can be processed in combination with other data within Excel (pivot table).

## Management Business Views

Displaying management information with the help of business components facilitates the presentation of data in diagrams and tables. Managers can browse the business information in an intuitive way. Users can navigate (drill-down/roll-up) through business objects.

## Integration der Datenbasis (JDO)

Integrating the heterogenous data sets was a particular challenge. In addition to the Tamino XML Database of Software AG, relational databases in Oracle and the SQL Server had to be accessed. This has been achieved using the JDO implementation intelliBO by Signsoft. So the application could be developed against a single persistence interface (JDO) while the actual access to the different datastores is managed

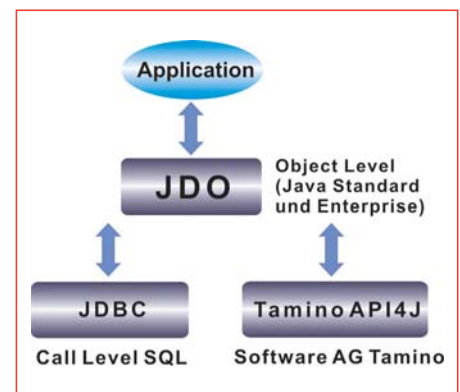


Fig 2: JDO Application Development

by intelliBO. The principle is illustrated in Fig. 2.

## Build-Management

Many challenges of the IT had to be solved within the project. An architecture developed which meets the demands on modern software systems. Within the EF ESA (Eurofighter Enterprise Service Architecture) a lifecycle management (build process) has been created that supports every phase of the project, in particular the analysis of business processes using UML, the implementation and the deployment process including as well as the controlling. The project BugZilla supports the change management, bug-tracking and the project planning for applications and systems.

To support the agile and iterative project process and guarantee short release cycles, a concept has been created with the help of standard tools. Classes are being generated from UML use case and class diagrams. The generated classes serve as a starting point for the creation of business objects. The versions of business components based on these generated classes are managed in CVS. That allows for controlling an automated deployment process with Ant, CruiseControl and the Junit testing. A CruiseControl task also controls the production process of the ELT. All of these components enable Eurofighter to solve the current as well as the future challenges of complex IT systems. Employment of SOA from the beginning allows for potential changes without having to change the current IT environment.

Due to the fact that the project affected the transparency of data, the name Web-

BITS (Business Information Transparency Service) has been formed by Eurofighter. The achieved transparency of data within the company and the flexible architecture enables Eurofighter to swiftly and individually integrate new internal and external sources of data and additional business processes. Moreover, a solid technological foundation has been laid, on which very different projects within Eurofighter will be realised.

## Realisation

In addition to solely technical project implementations like SMIS based on the Web-BITS architecture a number of other projects have already been realised. One of these is the Eurofighter Resource Management System (ERMS), which enables employees to book rooms for meetings, gadgets like beamers or even order coffee. The ERMS is already in productive use at Eurofighter's.

Besides the actual reporting and consolidation of data employed in SMIS, an additional requirement for this project was transaction capability because the resources had to be booked there. Furthermore, the security concept had to be expanded in such a way that in one BV only data can be manipulated which are actually assigned to the respective user. The architecture proved expandable enough and able to serve various purposes without requiring to much effort from the team of the original project.

New requirements are considered with respect to their compatibility with the architecture and ways are found not to compromise the original service oriented approach. With the help of intelliBO it is made possible to display data from each of the different datasources (Tamino XML Server, JDBC sources Oracle and MS SQL Server) alternatively as BO or as XML data. Thus a flexible and consistent data layer exists, which provides support for the roles of both database administrator and J2EE developer. Also the role quality assurance has been set up within the project to always ensure that enhancements fit into the existing architecture and will be accepted by the users. During the implementation it could be proven that the architecture chosen is open and flexible and meets the demands of a modern IT environment.

## Conclusion

The newly created IT environment (Web-BITS) not only serves as a bridge between a number of IT systems but also links users, information, business processes and applications. Furthermore a process model evolved which suits both intranet projects and distributed systems and offers a steady foundation for future e-business projects. Thus, new projects can be developed and implemented on the basis of a proven architecture and in short time. The risk of developing future applications has been dramatically reduced.

The Eurofighter architecture allows for the automation of the development process from analysis to deployment. Additionally the use of the software reduces costs and standardises access to data, so that professional decision making has been eased. Thanks to the flexible architecture any data source and system could be integrated. Consequently the operating costs of the infrastructure could be reduced and the inputs of the new IT architecture could be used as basis for future development.

Due to the portal approach the different requests could be realised fast and cost-efficient. The user has the same "look & feel" independent of the application being used.

*Walter Lang is project leader at Eurofighter GmbH and responsible for business architecture, data model, and OOAD.*



Fig 3: Lifecycle Management

*Alexander Land is project leader at Eurofighter GmbH and responsible for QA, implementation, databases and software architecture.*

*Andreas Holubek is the Chief Software Architect at Signsoft. He has written several articles for JavaMagazine and is a regular conference speaker.*

## Links & Literature

- [1] Signsoft intelliBO: [www.intelliibo.de](http://www.intelliibo.de)
- [2] JDO: [java.sun.com/products/jdo/](http://java.sun.com/products/jdo/)
- [3] Hartmut Messerschmidt, Kai Schweinsberg: OLAP mit dem SQL Server – Eine Einführung in Theorie und Praxis, dpunkt, 2003
- [4] BugZilla: [www.BugZilla.org](http://www.BugZilla.org)
- [5] Cruise Control: [cruisecontrol.sourceforge.net](http://cruisecontrol.sourceforge.net)

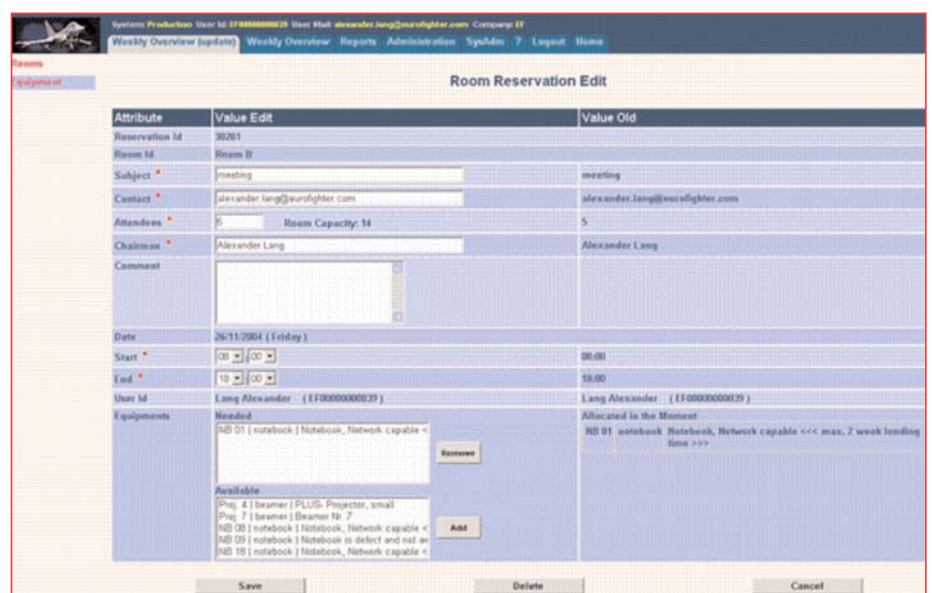


Fig 4: Room Reservation Example