Alcatel-Lucent Applications Software Group

AND

Euranova Research & Development

Master Thesis Proposal

CONTEXT

EURANOVA

Euranova is a Belgian company founded in September 2008. Vision is: “To be a participative and transparent consulting company focused on knowledge capitalization”.

With an innovative point of view regarding the consulting world, the three founders have solid skills in various domains: information systems management, e-business projects, integration architectures, project handling, technology innovation, knowledge management and career management.

Euranova’s structure clearly distinguishes career management and customer relationship. It’s mainly based on entrepreneurial and avant-gardist career perception: opportunities (customer projects, innovative initiative, technology watch…) are anticipated on the long term and thus, deeply customizable.

Due to a major innovation and knowledge orientation, solutions suggested by Euranova include last technological or methodological innovations. Correlated with training dynamic and career management, knowledge and innovation are the main part of the daily consultant activities. Euranova’s internal knowledge management platform (Knowledge Plaza) illustrates this orientation by allowing information storage, structure and sharing.

Today, our operational strategy is clear: to collaborate with ambitious personalities which share our values of transparency, knowledge and diversity.

ALCATEL-LUCENT APPLICATIONS SOFTWARE GROUP

The Applications Software Group (which is mainly sponsored with **Alcatel-Lucent** multinational) develops innovative solutions for both service providers and enterprises. Service providers use the Group’s solutions to create innovative and profitable products for consumers, such as digital home management and rich media applications that span mobile and connected devices.

Through service providers as well as through direct channels, the Group enables enterprises to deploy applications to transform their customer service capabilities across multiple channels including internet, e-mail, phone and mobile.

The common focus is developing software that enriches the personal communications experience for people.

UNIVERSITY COLLABORATION

Together, Euranova and the Alcatel-Lucent Applications Software Group propose in this document 3 Master thesis subjects.

SUBJECT 1: RULE ENGINE IN EVENT DRIVEN ARCHITECTURE

CONTEXT

Nowadays, rule engines are used in IT infrastructures to evaluate basic rules. In such architectures, analysts translate the enterprise business processes into a set of computerized-processes and rules. For instance, a bank loan application could define the process for a bank loan acceptance as: (1) retrieving user information in a central data warehouse, (2) loading from ETL user profiles, (3) according to the information loaded from this user, asking to the rule engine if the loan can be accepted. The rule engine could be a set of rules like if the user has enough saved, if in the last three months he has not spent 2/3 of his revenues, etc.

This kind of rule engines could be used in real-time or high availability applications such as Next Generation IN (NgIN). For instance we could define rules for charging a call according to network information, like the localisation, the pre-paid units, etc. Or the network alarm management could use real-time information to infer a root cause analysis and even propose solutions to service provider operators. We could also imagine a real-time service orchestrator based on rules which could define which service to load according to network information. Today, there is no constructor able to provide such kind of rule engines in network applications.

On the other hand, more and more IT players propose new paradigms for executing rules in high availability architectures, such as the Complex Event Processing (CEP). These architectures allow to execute rules and to correlate asynchronously events over a specific period. Some applications are proposed for fraud detection, surveillance, RT risk management, market aggregation, etc. However, CEP rule engine have not reached the maturity of IT rule engines which still provide more flexibility and are better integrated in J2EE infrastructures.

Figure 1: Business monitoring application from Peoplesoft using CEP.

The aim of this master thesis is to study and to compare the two possible architectures for implementing a rule engine in Event Driven Architectures. In addition the student will propose architecture to integrate the JBoss rule engine to a JAVA real-time application server (The Red Hat Mobicents JAIN SLEE).

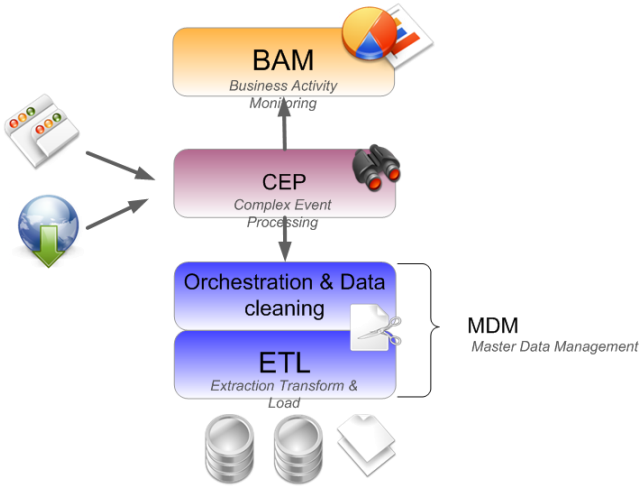

Figure 2: the integration of CEP architecture.

CONTRIBUTION

The thesis covers four aspects: (1) study of the JBoss Drools rule engine, (2) Survey of the Complex Event Processing in term of architecture and product, (3) A comparison between rule execution model in CEP and IT infrastructure, and finally (4) the implementation of a proof of concept by integrating JBoss Drools within the JAIN SLEE AS.

ORGANIZATION

The thesis is organized by the ULB in collaboration with Euranova Labs and Alcatel-Lucent Application Software Group R&D center at Namur.

The student will be coached by the R&D Team responsible for developing the OSP AS, a real-time AS deployed over 250 operators.

SUBJECT 2: SEMANTIC TRANSFORMATION OF ECORE MODEL

CONTEXT

The Model Driven Architecture (MDA) is becoming a standard approach for building software in industry. Starting from a model, describing the business logic, MDA tools can interpret and generate application from the model. EMF is the cornerstone of the MDA approach on the Eclipse platform. The EMF project is a modeling framework and code generation facility for building tools and other applications based on a structured data model. From a model specification described in XMI, EMF provides tools and runtime support to produce a set of Java classes for the model, along with a set of adapter classes that enable viewing and command-based editing of the model, and a basic editor.

If the MDA approach is becoming a de facto standard, the model transformation remains project specific. Indeed, the application development process often lead to transform a generic model (PIM: Platform Independent Model) to other specific model (PSM: platform specific model). For instance, there is no tool for transforming the class diagram into activity diagram, system event, or Entity relationship diagram. However some applications have already provided several transformation paradigms but really specific to particular protocol or application domains:

- XML Spy and the XSLT Transformation
- Talend Open Studio for ETL tools

Event if these tools provide intuitive and powerful user interfaces, they are not adapted to software engineering.

Alcatel-Lucent has been developing such model binding or weaving graphical editor for its JAVA Service Creation Environment. This Editor will be used for defining the transformation from the Database schema model and the corresponding GUI in JSF. The idea is to be able to define graphically the GUI representing the DB by transforming models. However, Alcatel-Lucent lacks of transformation semantic to express clearly a specific transformation.

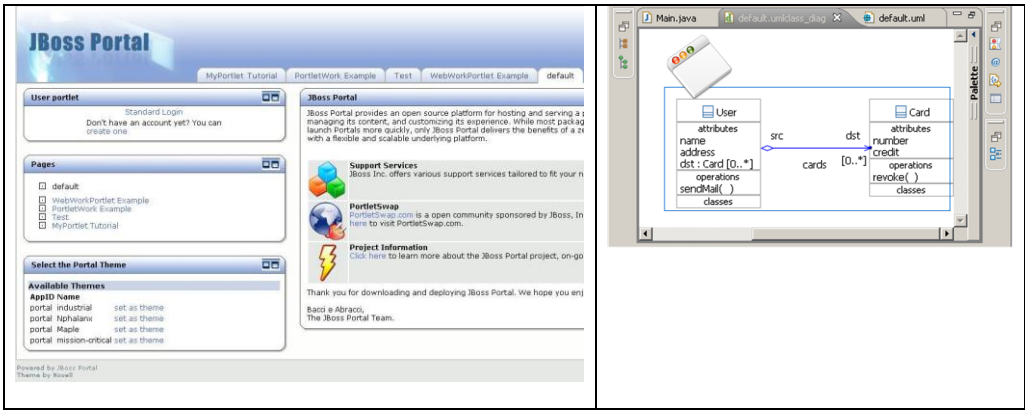

Figure 3: the model transformation will enable to define a set of transformations from the DB schema to the UI in web page.

The aim of this master thesis is to study the different transformation model tools such as Talend Open Studio, XML spy but also BPEL semantic and to propose a transformation semantic for transforming models. In addition the student will implement a prototype as a part of the open source project Wazaabi which is used as a base for the ALU binding editor.

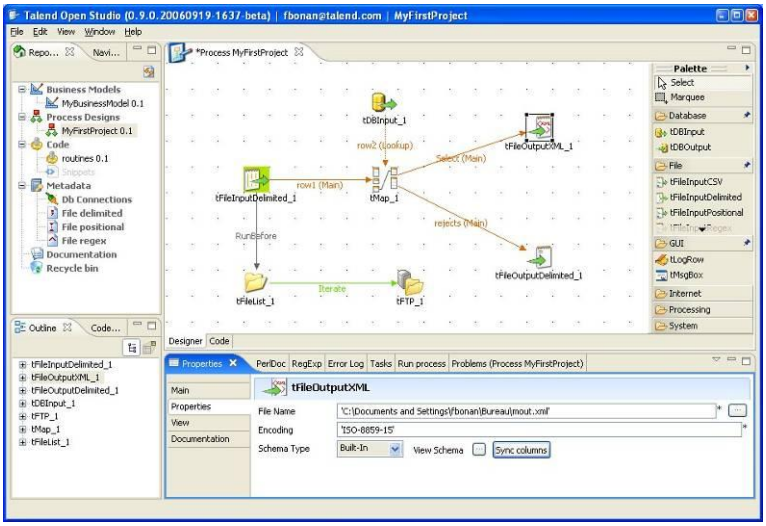

Figure 4: Talend Open Studio Transformation process optimized for ETL transformation.

CONTRIBUTION

The thesis covers four aspects: (1) study of the transformation semantic in BPMN, XSLT and ETL tools, (2) Study of the binding editor of the Wazaabi project, (3) proposing a transformation semantic and finally (4) implementing prototype of a set of transformations in the Wazaabi binding editor.

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SUBJECT 3: ENTERPRISE SERVICE BUS INTEGRATION

CONTEXT

Alcatel-Lucent Namur center addresses the problem to develop real-time services for NgIN and IMS but also to develop management applications for controlling and provisioning those services. For instance, the charging engine, used for the real-time billing must be managed by customer care web applications from operator shops (Mobistar teleboutique, Orange shops, etc.). In addition this kind of application must be able to integrate operator IT applications such as Customer Relationship management (CRM), SAP, accounting system, etc. Thus the generated code by IDEs must be able to integrate such IT infrastructure and exposing management features to other applications.

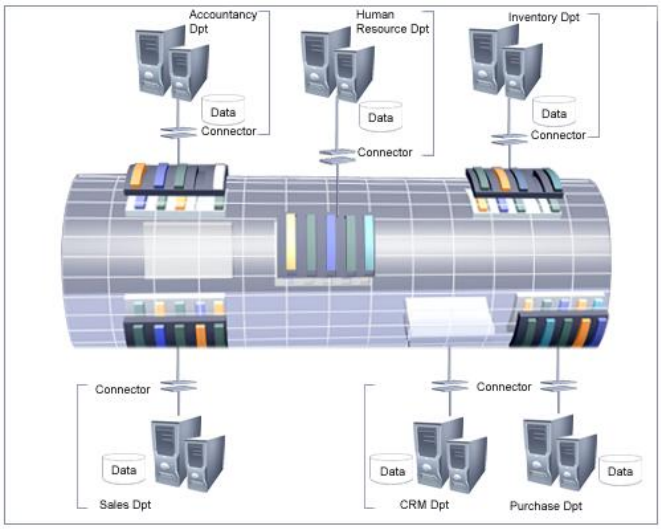

Figure 5: a schematic view of an enterprise service bus used for integrating different applications with different formats.

In IT architecture, a usual way to integrate different application having different communication formats is to provide an Enterprise Service Bus (ESB) as a common skeleton. Therefore Alcatel-Lucent management applications could be integrated with specific connectors, offering access to the RT platform management from the bus.

As shown by Figure 6, the RT platform is managed by a J2EE server, JBoss 5.0 and EJB 3.0. The aim of this thesis is define the requirement for integrating the J2EE management of the platform to the JBoss ESB. The student will first list the technical requirement to integrate such bus and after a technical analysis of the Alcatel-Lucent J2EE management, he will recommend and develop a flexible architecture to expose new management commands to the ESB.

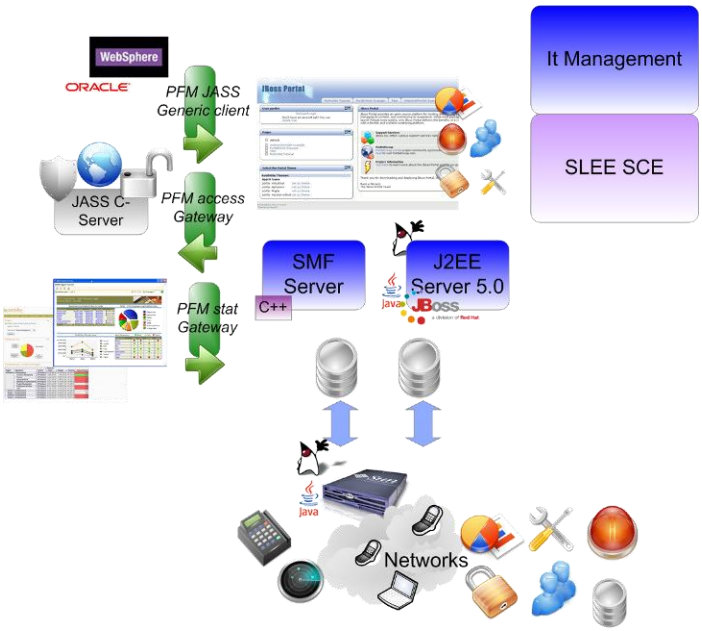

Figure 6: a simplified view of the ALU RT platform. With the network part managing access, alarms, RT DB, services, statistics, etc. and the "north" part dedicated to the management, based on JBoss 5.0 and EJB3.0. The aim of this Master is to integrate the J2EE part with the JBoss enterprise service bus.

CONTRIBUTION

The thesis covers four aspects: (1) studying of the JBoss ESB and Event Driven Architecture in general, (2) technical analysis of the J2EE management server and EJB 3.0 generation, (3) Studying of the JET Template generation and finally (4) proposing and implements architecture to expose new management command to ESB.

ORGANIZATION

The thesis is organized by the ULB in collaboration with Euranova Labs and Alcatel-Lucent Application Software Group R&D center at Namur.

The student will be coached by the R&D Team responsible for developing the OSP AS, a real-time AS deployed over 250 operators and J2EE specialist from the CTO R&D division.