An SOA Solution Driven from Business Process Models using MDA: Methods and Lessons Learned

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Agenda

- Provide an Overview of Our Background
- Describe SOA-BPM Project Using MDA
- Our MDA Approach
- Hurdles to Overcome
- Lessons Learned

Our Background

- 1997 - We founded INHERIT, LLC
  - – Since its inception we were focused on driving software development from UML models
- 1999 – Developed initial version of our toolset
  - – Transformation engine built upon a declarative rules engine
- 2001 – OMG Coins term “MDA”
  - – We realized that OMG’s definition of MDA was very much in line with the software development approach we were pursuing
    - *Good news and bad news*
- 2003 – Developed MDA Express

Current Version of MDA Express

- Our transformation engine is called MDA Express
  - Provides a flexible environment that supports complete customization of architectural frameworks
  - Supports software development in any language
  - Provides multiple ways to preserve changes to generated artifacts during re-generation
  - Captures and incorporates system details from all types of UML Diagrams
  - Supports a combination of declarative rules that then execute a series of imperative statements
  - Works with Eclipse Modeling Framework (EMF) and Net Beans Meta Data Repository (MDR)

Applicable Experience

- Modeling Business Processes
  - Exposed to business process modeling mid 1990’s
  - Applied consistently on all of our projects
  - Formalized on BPM over the past two years

- Applying SOA Concepts
  - Began developing projects using elements of SOA in 2002
  - Currently working on very large scale SOA applications

- Applying “MDA” Concepts
  - Have developed numerous MDA projects since 1998

Proof-of-Concept Project

- 2006, January – asked to use MDA to develop a pilot project
  - We recognized that there would be business process and workflow elements to this project
    - *Good candidate for developing business process models*
    - *Need to leverage business processes*
  - We recognized that there were existing legacy systems that we thought would be good candidates for services
    - *There was a notion of atomic services that they wanted to share*
    - *It was a message oriented approach with loose coupling*
    - *We could wrap these into web services to create consistent access*
  - We recognized new services that we would need to develop
    - *Additional services to add that would offer value to other parts of the enterprise*
    - *Both non functional as well as business services*

Our MDA Approach

- MDA Express provides a mechanism to rapidly generate an application from domain models
  - Capture requirements from subject matter experts (SME)
  - Build representative UML models of the requirements (PIM)
  - Rules engine (Rete algorithm) applies a series of transformation rules and templates (Archetype) to create the downstream PSM and code/artifacts
  - Validate the requirements and re-generate as necessary
- Additional Tools Employed
  - Together Architect 2006 for Eclipse
  - JBoss Application Server
  - JBPM (workflow Engine)
  - Eclipse

Goals of the Project

- Client's Initial Goal
  - Prove that MDA is a viable approach to building software
    - *Apply MDA to a proof-of-concept project to begin to generate metrics*
    - *Validate or refute claims about MDA*
    - *Prove that MDA can be applied to an SOA application*
- Revised Goal
  - Figure out how to integrate Business Process Modeling with Service Oriented Architecture using MDA

Hurdles to Overcome

- Business Processes and SOA are complimentary, but a gap exists in how they map to each other
  - We felt that MDA would bridge this gap
- Using BPM in an MDA process
  - Needed to figure out how to take BPM and run MDA transformations
    - *We figured we could do it because our engine works with EMF*
- Needed a way to describe the message structure
  - Knew we could use a UML class diagram to capture the structure

Hurdles to Overcome (cont.)

- Needed to relate the BPM model to the UML model
  - Used the data object in BPM
- Capturing the contract for communication between services
  - Knew we could create a component diagram to define the contract
  - Use data object to mark the relationship between the BPM artifact and UML artifact
- How to add metadata that’s used in the transformation process
  - Knew how to use stereotypes in UML
  - How do we do the same thing with BPM models
    - *Together Architect has a concept of categories*

Lessons Learned

- MDA is the glue that can bring Business Process Modeling and SOA together
- A Belief exists that SOA and MDA are mutually exclusive
  - Need more education across the industry
  - Small proof-of-concept project will provide localized education
- Need a strong team lead who understands BPM, SOA, and MDA and how to integrate them
  - Provides direction to individual team members who may only know one of the technologies
  - Instills confidence across the team and client base

Lessons Learned

- An MDA approach allows for a well-architected solution under tight schedule and budget constraint
- MDA tools must support the development of applications that are built upon a variety of architectures, languages, and platforms
- An organization’s previous experiences with modeling may effect their willingness to adopt an MDA approach
  - Need to understand the benefits of modeling before they can discuss the benefits of MDA

Lessons Learned

- Management, Architects, and Developers may express various levels of resistance to MDA
  - Managers
    - *May not understand the significance if they do not fully understand their current processes or the software development lifecycle*
    - *Tend to delegate the evaluation of MDA to the technical people*
  - Architects/Developers
    - *May have had experiences with code generation in the past*
    - *Have worked hard to establish their value to their organization*
    - *Tend to believe that it is not possible that a "program" can do a better job*
      - It's the Monet syndrome
        - » *Asking developers to use MDA is like asking Monet to paint by numbers*

Lessons Learned

- Readiness to use MDA does not have anything to do with a tool
  - Do they have a process for capturing requirements?
  - Do they manage the requirement lifecycle?
  - Are they experienced at modeling their requirements?
  - Do they understand UML?
  - Do they have an enterprise vision for software development?
  - Does their organization dictate one or more architectural frameworks in a reference implementation document?

PSM Creations

- Created a class diagram of the message structure using a UML profile
  - XSD profile based on “Modeling XML Applications with UML” – David Carlson
- Created the logical data model for information that needed to be persisted
  - UML Profile based on “Refactoring Databases” - Scott Ambler
- Created a class diagram that captured the WSDL structure using an SOA profile
  - Profile for software service based on several things we read in the open space
- We generated an activity diagram to capture the business process model

Metrics

- PIM
  - 8 business process models of average complexity
  - Identified 6 services
  - 15 UML diagrams (component and class diagrams)

- PIM to PSM
  - 265 transformation rules were utilized
  - Created
    - *36 Packages*
    - *249 Classes*
    - *790 Attributes*
    - *230 Associations*

- PSM to Code
  - Used 220 Rules
  - Used 78 Templates
  - Created
    - *Files 250*
    - *Lines of Stuff (xml,JAVA,BPEL,WSDL,etc.) 32,480*

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