Automating BPM with SWS Technologies

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Introduction

Business Process Management

Improvements using SWS

Summary & Outlook
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Improvements using SWS

Summary & Outlook
SAP Research

Research department of SAP

SAP Research - Core Parts

- SAP Inspire
  Corporate Venturing (0.5-2y)
- SAP Research
  Applied Research (3-5y)

Involved in public funded research projects

Joint PhD program with different universities
The global Research- & Development network of SAP

- Bangalore
- Tokyo
- Budapest
- Shanghai
- Tel Aviv
- Sofia
- Dresden
- Karlsruhe
- Walldorf
- Darmstadt
- Belfast
- Montreal
- Palo Alto
- Sophia
- Antipolis

SAP Labs
SAP Research
Motivation

DIP

- EU founded research project
- Semantic Web Services = Web services + Semantic Web technology
- Automation of certain task in Web service lifecycle, for example:
  - Discovery
  - Mediation
  - Composition

SAP enterprise SOA

- Basis architecture for next generation SAP software
- Currently under development

Application of SWS in “enterprise SOA”
Industrial Motivation

Business Requirements
- Flexible adoption of business processes
- Integrability with business partners

Enablers for Flexible Business
- Facilitate re-use of components
- Increase manageability of systems
- Ability to integrate within heterogeneous business landscape
- Connect manager’s business view with technician’s system configuration perspective
- Make relationships between processes explicit
Industrial Motivation

SAP Solution – “enterprise SOA”

- Based on open Web service standards
- Enterprise Service = Web service + business semantic
- Flexible architecture

Business Solutions
- Manager’s View Layer
- Documentation
- Business Scenarios

Business Process Platform
- Business View Layer
- mySAP Business Suite
- Composite Applications

SAP NetWeaver
- Technical Layer
- Acts as Application Server
- Allows Manual Integration
Industrial Motivation

Business Process Management (BPM)
- Part of “enterprise SOA”
- Manual modeling

Improvement of BPM
- Automation
- By Semantic Web Services (Web services + semantic Web technology)
- Automation of Web service lifecycle tasks (eg. Discovery, Mediation, Composition)

Application of SWS in “enterprise SOA”
SAP enterprise SOA

- Based on open Web service standards
- Enterprise Service = Web service + business semantic
- Flexible architecture

Enablers for Flexible Business

- Facilitate re-use of components
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High-Level Overview of SAP enterprise SOA

- **Business Solutions**
  - Manager’s View Layer
  - Documentation
  - Business Scenarios

- **Business Process Platform**
  - Business View Layer
  - mySAP Business Suite
  - Composite Applications

- **SAP NetWeaver**
  - Technical Layer
  - Acts as Application Server
  - Allows Manual Integration
Real-World Process

Example Logistics Process

- Part of an “Order-to-Cash” process

- Carrier-Shipper interaction is frequently occurring

- Maintenance and dynamic changes are a major problem

Shipper

Carrier
Overview of BPM Implementation

BPM-based implementation

- SAP Research toolset
  - Prototypes
  - Not part of SAP products

- Necessary implementation steps
  1. Domain expert creates a graphical representation of the process
  2. Connect process steps to services operations
     a. Locate appropriate service
     b. Create mappings for input and output messages
  3. Deploy completed process to repository

Advantages

- Design time flexibility
Single-Party BPM Implementation
Cross-Organizational BPM Implementation

Public vs. private processes
- Hide confidential process details
- Present partners a process view

Collaborative Business Processes (CBP)
- Process involving different parties
BPM Tasks

Manual development tasks

- Manual integration of business processes
  - Creation of the CBP by linking of process steps

- Manual alignment of interfaces
  - Mapping of service messages

- Hard-coded choice of business partner
  - Service selection during design time

Automating BPM
Possible BPM Improvements

Goals

- Suggest CBP automatically
  - Composition

- Integrate arbitrary Web service interfaces
  - Mediation

- Dynamic runtime selection of appropriate service
  - Selection

Automating BPM using SWS technologies
Focus on design time in this talk

- Mediation
- Composition

Implementation steps

1. Lift syntactical service descriptions
2. Create SWS representations of processes
3. Create message mappings
4. Compose CBP
Automating BPM by SWS – Lifting

Input
- XSDs (part of WSDL), domain ontology

Output
- Relation between message elements and ontology concepts

Realization
- Matching XSDs and domain ontology
- Composite matcher
Automating BPM by SWS – Create SWS Representations

Input
- Lifting, WSDLs, public processes

Output
- Workflows for use in composer

Realization
- For each party we need...
  - ...its messages as ontology concepts
  - ...behavioral constraints (UML2AD representation for ILOG composer)
- Shipper
  - WSDL message → ontology concept (input from lifting)
  - WSDL operation → input & output node constructions, connected via seq’al edge
  - public process → control nodes in UML2AD
- Carrier
  - WSDL message → ontology concept (input from lifting)
  - WSDL operation → input & output node constructions, connected via seq’al edge
  - Trivial fork-join process over all input & output constr → control nodes in UML2AD
Automating BPM by SWS – Create Message Mappings

Input
- Liftings of XSDs, domain ontology

Output
- Executable mapping between 2 messages
  - SAP XI
  - XSLT engine

Realization
- Connect message elements that are lifted to similar ontology concepts
- Propose possible complex mapping to user
Automating BPM by SWS – Compose CBP

Input
- SWS representation, mappings

Output
- Composed workflow

Realization
- Basically, connect corresponding inputs & outputs (SWS represent’n)
- Which inputs & outputs correspond is input from mapping step
- Connect corresponding inputs & outputs via mapping where needed (input from mapping)
  ➔ Impl. By existing composer technologies
Design time architecture

- Domain Ontology
- Public Process A
  - Import
  - Lifting Engine
- Public Process B
  - Import
  - Lifting Engine
- Mapping Engine
  - Align.
  - Semantic Process Desc.
- Composition Engine
  - Mapp.
  - CBP

- Maestro
Summary

- Approach to apply Semantic Web Services technology to business process management
  - Automatically suggest CBP
  - Automatically generate message mappings
  - Automatically choose appropriate service during run time
- Integration in state-of-the-art BPM tool
- Results are presented to user for checking

Outlook

- Currently implementing the presented approach
- Add Semantic Web Service technology to improve runtime
  - Dynamic service selection
  - Adaptive / fault tolerant BPM solution
Questions?

Q&A