Semantic Business Process Repository

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SBPR for Business Process Management

- Semantic technologies for automation throughout the BPM lifecycle
- Semantic business process models utilize:
  - Process ontologies
  - Reasoning
  - Querying capabilities
- SBPR: storage and management of business process modeling artifacts
Agenda

1. Functional requirements for the SBPR
2. Reasoning functionality based on the Integrated Rule Inference System (IRIS)
3. SBPR - the overall architecture
SBPMS Architecture

Figure: SBPMS Architecture
Functional Requirements

1. Storage of SBP models
2. CRUD operations
   - Create, retrieve, update and delete
3. Locking of SBP models
   - To support a multi-user environment
4. Versioning of SBP models
5. Query processing using reasoner
   - To exploit the embedded ontological knowledge in SBP models
Storage, Reasoning and Query Processing

1. SBPR stores instances of ontologies
   - Formalized in WSML-Flight
   - SBP models, references to organizational structures, business functions, SWS, enterprise information models, etc.

2. WSML-Flight reasoner with effective rule evaluation (using the Magic Sets and other optimization techniques)

3. Future steps:
   - Distributed reasoning (novel data model and reasoning algorithms)
   - Novel approaches to integrate reasoner with a scalable persistent storage
   - Loading only required datasets for reasoning
   - Materialization and incremental evaluation
Research Goal

Efficient and extensible reasoning engine for expressive rule-based languages (WSML Core/Flight/Rule), as well as description logic based languages (WSML-DL).

IRIS

Framework consisting of a collection of components which cover various aspects of reasoning with formally represented knowledge.
Integrated Rule Inference System - Mission

Research Goal
Efficient and extensible reasoning engine for expressive rule-based languages (*WSML Core/Flight/Rule*), as well as description logic based languages (*WSML-DL*).

IRIS
Framework consisting of a collection of components which cover various aspects of reasoning with formally represented knowledge.
Primary Objective

WSML-Flight Reasoner

Datalog with stratified negation.

1. Full Datalog support
2. Support for (stratified) default negation
3. Built-in predicates
4. Integrity constraints (for checking datatypes)

IRIS-Open Source

http://sourceforge.net/projects/iris-reasoner
Reasoning in IRIS

1. WSML2Reasoner: Flexible transformation framework of rule-based WSML to stratified Datalog
2. Translation of logical rules into relational algebra expressions and their optimization
3. Expression evaluation using relational algebra operations
SBPR Architecture

Semantic Business Process Repository API

Service Layer
- Lock Manager
- Version Manager
- IRIS Framework

Persistence Layer

Relational Database System

Figure: SBPR Architecture
Summary

- SBPR - Storage and management of business models utilizing semantics
- IRIS - Reasoning and querying over SBPR
- Scalability - Emphasize on handling large semantic datasets