A Business-oriented Architecture Compliant with Semantic SOA

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Abstract

Although SOA helps IT peoples better deliver on the changing needs of the business, it focus only on the technology of the business, not the business itself. Moreover, it does not address the semantic interoperability issue while it works well in syntactic interoperability.

Business process improvement has been identified as the top business priority in a recent survey by Gartner. This paper combines business process management and business rules management to present a business-oriented architecture adopting a semantic SOA environment-WSMX to allow the IT and business world align with each other to transform technical capability into business agility.

Keywords: Business-oriented Architecture, Business Process Management, Business Rules Management, Semantic SOA, WSMX

1. Introduction

The key to remain competitive in the rapidly changing world of 21st century is the ability of an enterprise to react flexibly and quickly to technology and market changes. The information technology (IT) world and the business world must align with each other to transform technical capability into business agility.

From the business perspective, the business agility can be achieved by improving existing business processes. In a recent survey of 1,400 CIOs by Gartner Executive Programs, the top business priority identified by CIOs was business process improvement [1].

On the other hand, more and more IT groups are implementing Service-Oriented Architecture (SOA) to support business process improvement. SOA provides a bridge between the business and IT worlds. The primary goal of SOA is to align the business world with the world of IT in a way that makes both more effective [2]. The business processes across value chains should be adequately managed and optimized by using business process management systems (BPMS).

Business processes are governed and guided by the business rules and policies. Although many BPMS claim to support rules, a separate business rules management system (BRMS) is still needed, because in reality, BPMS and BRMS serve fundamentally different and complementary purposes. In many cases, we need to use them together to fully achieve the goals of agility, alignment, compliance and the rest.

This paper presents a business-oriented

architecture (BOA) combining both BPMS and BRMS by adopting a semantic SOA (SSOA)- Web Services Execution Environment (WSMX) [3]. Section two briefly introduces BPMS and BRMS. Section three discusses the advantages and disadvantages of SOA. Section four describes WSMX and the related technologies and tools. The BOA will be presented in section five. The paper concludes in section six.

2. BPMS and BRMS

(1) BPMS

A business process is viewed as any set of activities performed by an organization that is initiated by an event, transforms information, materials and/or business commitments, and produces an output.

A BPMS is a solution for managing the efficiency and effectiveness of business processes throughout the organization, by modeling, automating, managing and optimizing any business process. Figure 1 depicts a BPMS framework.
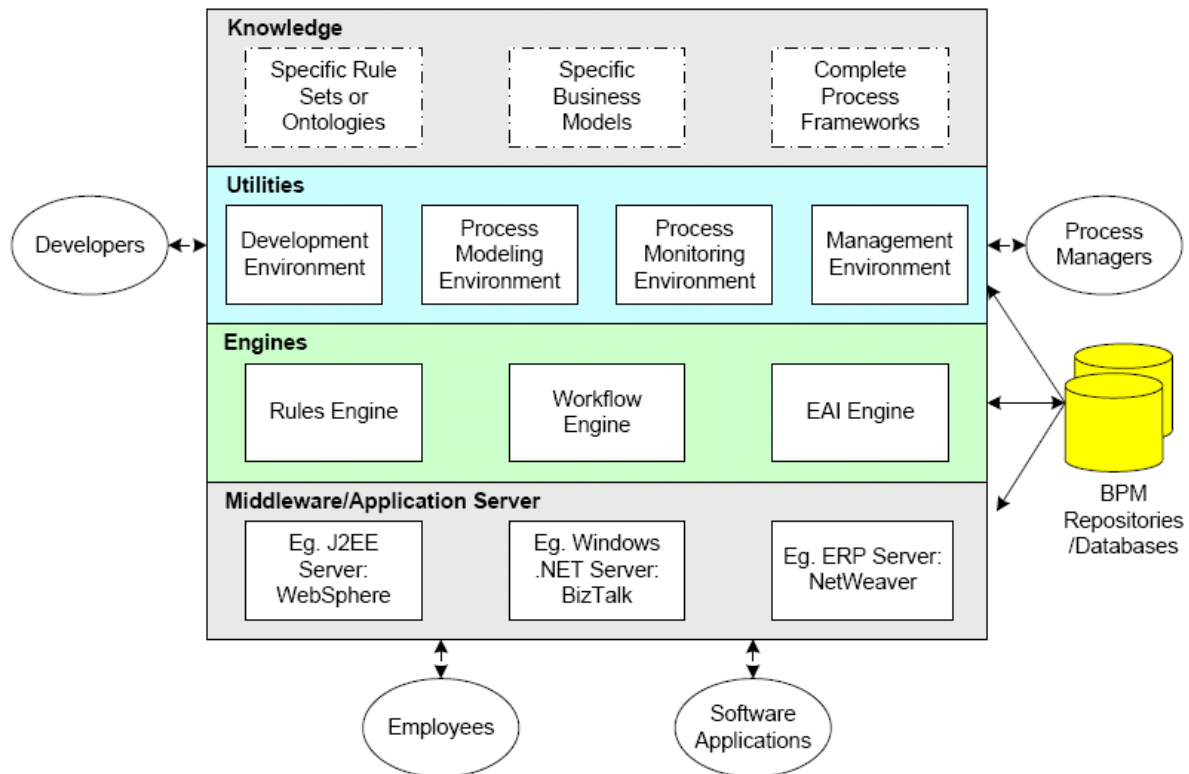

Figure 1. The BPMS framework (Source: Harmon Keynote[4])

(2) BRMS

A business rule is a rule that is under business jurisdiction. 'Under business jurisdiction' is taken to mean that the business can enact, revise and discontinue business rules as it sees fit. Business rules are expression of business policy in a form that is comprehensible to business users and executable by a rule engine.

A BRMS is an environment for designing, developing, and deploying

business rule applications. With a BRMS, developers and architects can externalize the business logic from the traditional code of an application. By externalizing the business logic from a business application with

business rules, IT users can develop and run the business logic independently of the application. A BRMS solution JRules of ILOG is shown in Figure 2 [5].
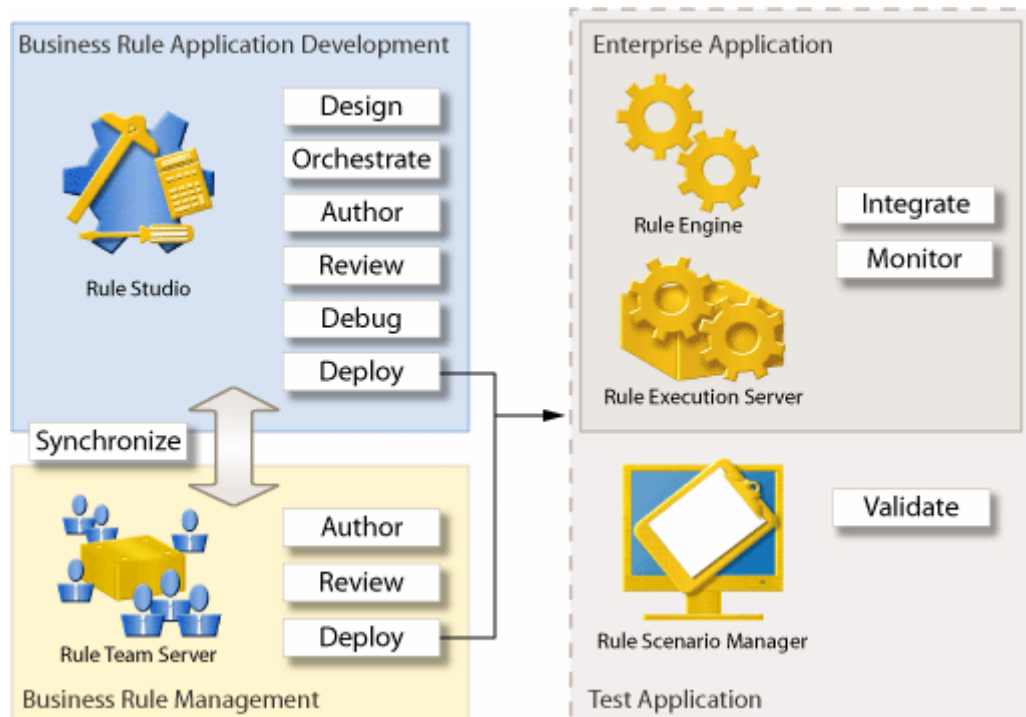

Figure 2. A BRMS (Source: ILOG JRules)

3. SOA advantages and disadvantages

There are two major advantages of SOA. First, the business processes and rules can be extracted and abstracted from the traditional monolithic applications that require weeks to implement the smallest change. A loosely-coupled infrastructure is much easier to change than tightly-coupled one. Second, services in SOA are exposed using industry-standards to facilitate the interoperability of heterogeneous resources and services.

Nevertheless, SOA can only resolve the syntactic interoperability problems so that the human interferences are still needed.

The semantic interoperability issues will demand machine accessible and semantically-enriched descriptions to the SOA implementations, that is a SSOA which can empower enterprises with automatic service discovery and composition, dynamic integration, and runtime process optimization capabilities without human intervention.

4. WSMX and the related technologies

WSMX is a reference implementation for Web Service Modeling Ontology (WSMO) [6] using the Web Service Modeling Language (WSML) [7] language.

WSMO is a conceptual model with ontologies for describing SWS. It is based on the Web Service Modeling Framework (WSMF) [8] which consists of four main elements: Ontologies, Goals, Web Services and Mediators. Mediators are connectors between components with mediation facilities for handling heterogeneities and resolving mismatches.

WSMX is an event-driven execution environment which facilitates the interoperation of SWSs through dynamic discovery, selection, composition, mediation and invocation of required services. WSMX consists of a WSMX Core and several

WSMX components and their wrappers, namely, Communication Manager, Resource Manager, Parser, Discovery, Selector, Data Mediator, Process Mediator, Choreography, Orchestration and WSMO Reasoner (see Figure 3).

The WSMX related tools include: Web Services Modeling Toolkit (WSMT) [9], DERI Ontology Management Environment (DOME) [10] and WSMO Studio [11].

The details of the functionalities of the WSMX Core, WSMX components, WSMX wrappers and the related tools can be found in [12].
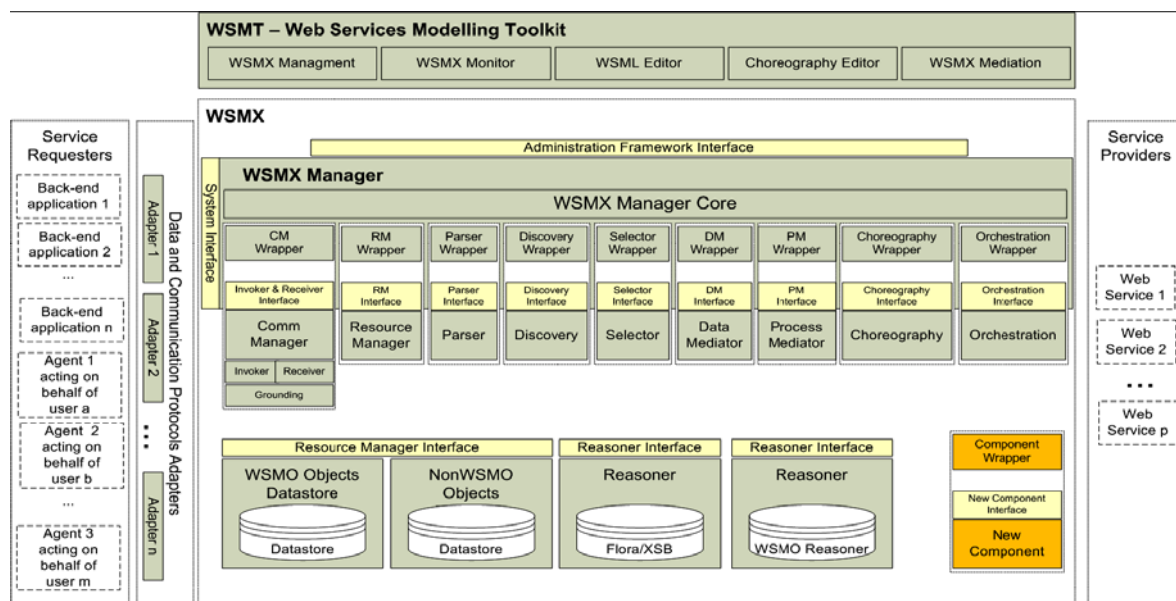

Figure 3. WSMX Archtecture [3]

5. Business-oriented Architecture

Although SOA helps IT groups better deliver on the changing needs of the business, it focus only on the technology of the business. Its goal is to simplify how information and discrete functions are

accessed by the business, but it does not describe the business itself. Furthermore, the tools needed for process improvement are different than the tools needed for service implementation and management. Therefore, we need a BOA combining BPMS and BRMS to work together within the WSMX environment which is presented in figure 4.

The BOA consists of five layers, namely, application layer, business logic layer, SSOA layer, semantic web service (SWS) layer and persistence layer. WSMX is changing the way BRMS and BPMS work together. Any BPMS that can invoke a web service can execute business logic managed by a BRMS such as business rule and decision logic. A better way to think of BRMS is as part of the SSOA and SWS layer of the BOA. Like ordinary business services, business rules and decision rules have their own repository and governance infrastructure. The BPMS simply orchestrates them, along with other process activities, via standards-based interfaces.
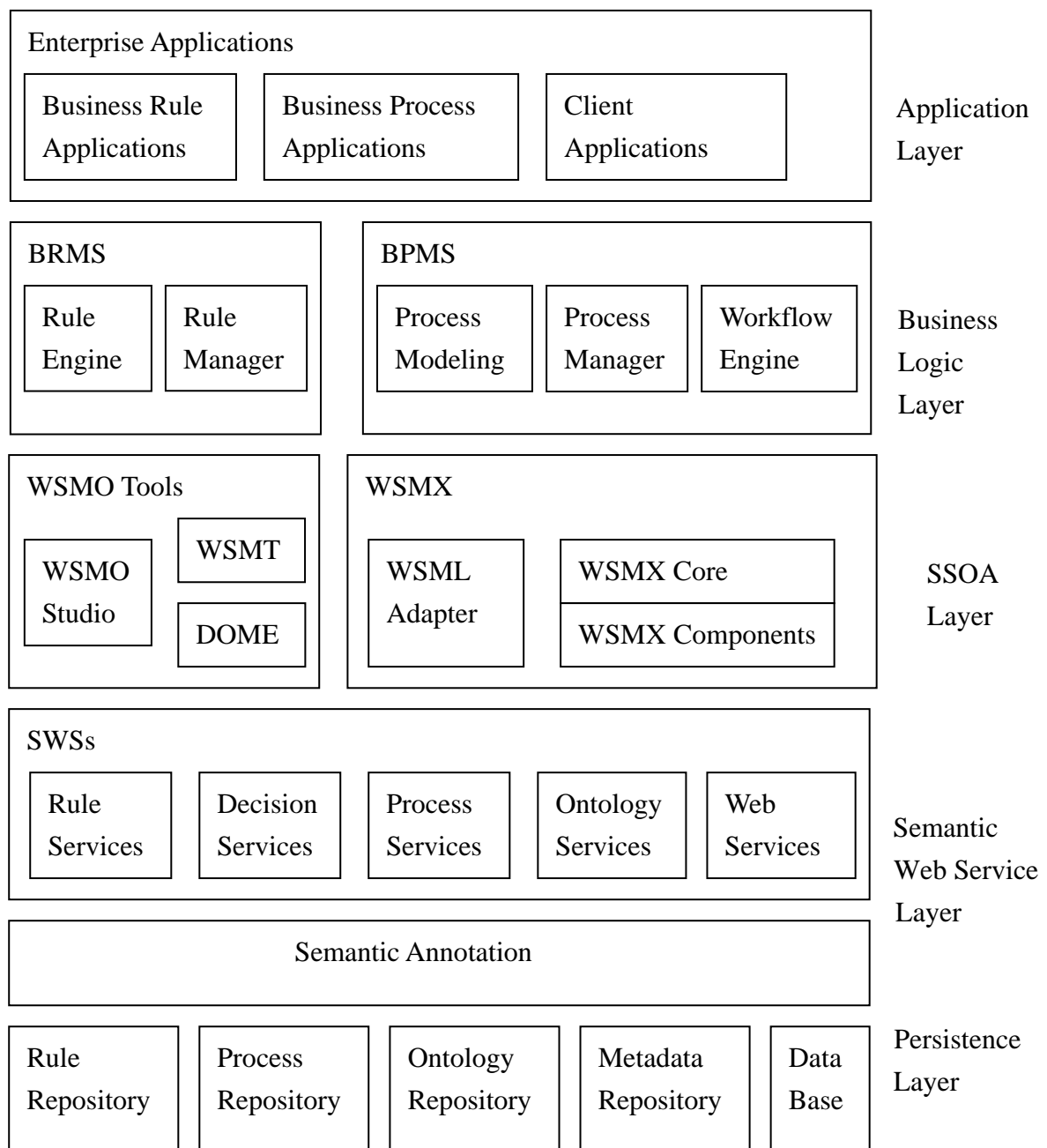
Enterprise Applications			Application Layer
Business Rule Applications	Business Process Applications	Client Applications	

BRMS			BPMS				Business Logic Layer
Rule Engine	Rule Manager		Process Modeling	Process Manager	Workflow Engine		

WSMO Tools
- WSMO Studio
- WSMT
- DOME

WSMX
- WSML Adapter
- WSMX Core
- WSMX Components

SSOA Layer

SWSs
Rule Services	Decision Services	Process Services	Ontology Services	Web Services

Semantic Web Service Layer

Semantic Annotation

Rule Repository	Process Repository	Ontology Repository	Metadata Repository	Data Base

Persistence Layer

Figure 4. Business-oriented Architecture

6. Conclusion

This paper presents a semantically enabled business-oriented architecture adopting WSMX which allows SOA and BRMS and BPMS to work hand-in-hand so that they can ideally complement one another to ensure the IT and business world can align with each other.

In essence, the business logic such as rule logic and process logic can be extracted from ordinary application services and semantically annotated as SWS within the BOA which makes adaptation to change condition much easier and increases the business agility as well. For example, if we can quickly examine the rules used in any specific process and identify the rules to be altered, all we need is to change the related business rules without any coding efforts. That makes the whole change process much more efficient.

Furthermore, with the strong mediation capabilities of WSMX, the semantic interoperability problems of heterogeneous resources and services can be easily resolved.

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一個依循語意服務導向架構之業務導向架構

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摘要

雖然服務導向架構有助於資訊人員支援業務變化的需求，但其較注重支援業務的科技而非業務本身，而且，它雖有助於語法上之互通性卻無法解決語意上之互通性問題。

根据最近Gartner之調查報告顯示業務流程之改善乃企業最優先之考量，本文乃結合業務流程管理與業務規則管理在語意服務導向架構WSMX的環境下提供一個業務導向架構，可讓資訊科技與商務彼此配合以將技術能力轉化成業務靈敏度。

關鍵詞：業務導向架構，業務流程管理，業務規則管理，語意服務導向架構，WSMX