

## Oracle SOA Suite – Oracle BPEL Process Manager

Automate Business Process for Business Process Optimization



## EXECUTIVE OVERVIEW

Changing markets, increasing competitive pressures and evolving customer needs are placing greater pressure on IT to deliver greater flexibility and speed. In response to these challenges, leading companies are adopting Service-Oriented Architecture (SOA) as a means of delivering on these requirements by overcoming the complexity of their application and IT environments. SOA represents a fundamental shift in the way new applications are designed, developed, and integrated with legacy business applications, and facilitates the development of enterprise applications as modular business services that can be easily integrated and reused.

Within a SOA environment it is critical to be able to wire together services into end-to-end business processes and composite applications. Oracle BPEL Process Manager supports a 100% standard approach to orchestrating systems and services into end-to-end process flows. It provides a unique combination of breadth of platform, maturity, platform independence and ease-of-use and is designed to be used alongside a broad range of technologies and protocols for integrating with heterogeneous back-end systems.

Oracle SOA Suite is a standards-based best of breed suite that enables you to build Service-Oriented Application and deploy them to your choice of middleware platform. It consists of (i) a Integrated Service Environment (ISE) to develop services; (ii) a multi-protocol Enterprise Service Bus (ESB) to integrate applications; (iii) a services registry for discovering and managing the lifecycle of services; (iv) a BPEL-based orchestration engine to tie services into business processes; (v) a business rules engine to enable business policies to be captured and automated; (vi) a Web Services management and security solution to enforce authentication and authorization policies on services and to monitor services and processes for compliance to SLAs; (vii) a Business Activity Monitoring (BAM) solution to gain real-time visibility into business entities and their interactions, and enable services to be optimized, and, (viii) an Enterprise Portal for employees, customers and partners to access content, access relevance performance metrics, collaborate and take actions via interaction with business processes.

Oracle SOA Suite can help you achieve greater organizational flexibility better than any other solution in the market. It can reduce your costs and middleware complexity better than any other solution. Finally, it can help you to achieve the best total value of opportunity.

## INTRODUCTION

Today, every organization is faced with the need to predict changes in the global business environment, to rapidly respond to competitors, and to best exploit organizational assets to prepare for growth. Your enterprise application infrastructure can either help you meet these business imperatives or it can impede your ability to change. To help you, your infrastructure must:

- Improve your ability to predict and respond to change
- Enhance organizational productivity
- Simplify your information technology environment
- Leverage existing investments

In order to deliver on these requirements and overcome the complexity of their IT environments, leading companies are adopting Service-Oriented Architecture (SOA). SOA represents a fundamental shift in the way new applications are designed, developed, and integrated with legacy business applications, and facilitates the development of enterprise applications as modular business services that can be easily integrated and reused.

A very important capability within a SOA environment is the ability to wire together services into business processes and composite applications. Oracle BPEL Process Manager provides high-performance, reliable execution of service-oriented business processes defined with the BPEL standard. This provides an enterprise blueprint for reducing the cost and complexity of integration projects.

Oracle SOA Suite is a standards-based best of breed suite that enables you to build Service-Oriented Application and deploy them to your choice of middleware platform. It consists of:

1. An Integrated Service Environment (ISE) to develop services
2. A multi-protocol Enterprise Service Bus (ESB) to integrate applications
3. A Services Registry for discovering and managing the lifecycle of services
4. A BPEL-based orchestration engine to tie services into business processes
5. A Business Rules Engine to enable business policies to be captured and automated
6. Web Services management and security solution to enforce authentication and authorization policies on services and to monitor services and processes for compliance to SLAs
7. A Business Activity Monitoring (BAM) solution to gain real-time visibility into business entities and their interactions, and enable services to be optimized
8. An Enterprise Portal for employees, customers and partners to access content, access relevance performance metrics, collaborate and take actions via interaction with business processes.

The cost and complexity of integration projects can be significantly reduced through the use of a service-oriented architecture (SOA) that facilitates efficient reuse of system and application components by defining them as services that can be requested through an industry-standard protocol.

-Ken Vollmer and Mike Gilpin  
Integration in a Service-Oriented World  
July 6, 2004.

Service-oriented architecture (SOA), Web services standards and the Business Process Execution Language (BPEL) are changing the economics of integration and enabling organizations to create a more agile IT infrastructure. This white paper describes why these new standards and an SOA approach change the integration landscape and how the Oracle BPEL Process Manager (BPEL PM) provides a mature and reliable implementation as a key part of the Oracle SOA platform products.

## BUSINESS NEEDS

Today, every organization is faced with the need to predict changes in the global business environment, to rapidly respond to competitors, and to best exploit organizational assets to prepare for growth. Your IT infrastructure can either help you meet these business imperatives or it can impede your ability to change. To help you, your infrastructure must:

### Improve Your Ability to Predict and Respond to Change

Improve your organization's visibility to business events by enabling you to develop and roll out new business services quickly; by modernizing your legacy systems and applications; by helping you to optimize business processes in response to market dynamics. Organizations have more and more heterogeneous systems to integrate together through both organic growth and through mergers and acquisition. At the same time, a more dynamic and competitive business landscape has emerged, with a global marketplace, consolidation in many industries and the off-shoring phenomenon. The combination of packaged applications and languages like Java or C# for custom development is no longer sufficient to meet IT requirements in this environment. The challenge is to be able to maintain and evolve internal systems at the speed of business. Many companies are finding that the bottlenecks to growing their business, rolling out new services and improving business processes are within IT. What companies require is the ability to create an agile IT infrastructure to improve their ability to predict and respond to change.

### Enhance Organizational Productivity and Optimize Key Business Processes

Facilitate better decisions with accurate business intelligence; help employees to find the information they need and share it collaboratively with others; and provide employees and customers with the information they need when and where they need it. Organizational productivity also comes from having visibility into key business processes to facilitate improvement – the focus of Business Process Management (BPM). Even leading-edge technology companies have been slow to adopt BPM. This is due to a myriad of factors, including the inherently difficult nature of the problem, lack of standards, and crowded vendor space. However, the Holy Grail is to be able to automate business processes easily, provide visibility and auditability into them, and address new regulatory requirements such as Sarbanes-Oxley. And achieve all of this while leveraging industry standards. Heterogeneous systems and IT silos, each with its respective security and access infrastructures, are a barrier to achieving greater organization productivity and automated business processes that can be easily monitored and optimized.

“Using Oracle SOA Suite products allows us to flexibly define business rules to change as customer's needs change...incorporating standards available for SOA like Web services.”

—J.R. Jesson  
CTO, Applications & Industry  
Frameworks  
EDS

## **Simplify Your Information Technology Environment**

Provision, deploy, monitor and manage a single cohesive infrastructure. Many companies are trying to slim down their IT costs and streamline their development processes by standardizing on compete platforms from a single vendor. However, increased merger and acquisition activity means that organizations cannot ever “complete” this task. Mergers between two (or more) organizations that have each standardized on different application and technology platforms are commonplace. This means that choosing open and “hot pluggable” software that can interoperate with other platforms and even run natively on alternative infrastructure becomes a strategic way companies can future proof decisions made today.

## **Leverage Existing Investments**

A modular, open, and extensible architecture allows you to adopt SOA in a heterogeneous environment without needing to remove or replace your existing systems, and in an incremental fashion. Many organizations have realized that they can better leverage their IT investments. However, they need an incremental approach that can help them adopt a new architecture – namely, SOA. Many, if not most, systems and applications are not yet Web service enabled and may not support the standards that are core to SOA (XML, WSDL, etc). Organizations need to be able to adopt these standards and move toward a new architecture incrementally, without requiring the big bang approach that was typical of previous generations of expensive, proprietary integration solutions. Few companies can consider re-implementing existing systems from scratch and therefore must be able to move to a more flexible architecture through an evolutionary process. Hence, companies are looking to leverage their existing investments and incrementally adopt SOA.

## **ORACLE BPEL PROCESS MANAGER VALUE PROPOSITION**

Oracle BPEL Process Manager enables business processes to be modeled, automated, and monitored. Unlike code-generation techniques for automating business process, BPEL Process Manager includes a native BPEL (Business Process Execution Language) engine that executes the processes. This approach not only enables reuse, but also enables visibility into in-flight business processes at the individual and aggregate level (the latter being provided by Oracle BAM), and lays the foundation for close-loop business process management, process improvement and compliance.

Oracle BPEL Process Manager provides a comprehensive, standards-based and easy to use solution for creating, deploying and managing cross-application business processes with both automated and human workflow steps. It provides high-performance, reliable execution of service-oriented business processes defined with the BPEL standard. Its native support for standards such as BPEL, XML, XSLT, XPATH, JMS, JCA and Web Services makes it an ideal solution for creating integrated business processes that are truly portable across platforms. It also provides audit trails for both completed and in-flight processes, and process history that enables process improvement. Finally, the Oracle BPEL Process Manager is a



100%, native BPEL engine that coexists happily with existing middleware technologies and platforms and provides an unrivaled process portability and vendor flexibility.

The remainder of this section discusses the evolving business integration market, the role of industry standards such as BPEL in this evolution, requirements for a Web services orchestration solution, and the capabilities offered by Oracle BPEL Process Manager for Web services orchestration.

## **BUSINESS PROCESS INTEGRATION GOES MAINSTREAM**

An enterprise's business processes provide the most important point of competitive differentiation. The collaborative definition and flawless execution of processes enable an organization to provide more competitive products and services, reduce costs, improve customer service, and react more quickly to changing market conditions.

This is not a new problem. However, traditional integration solutions have been proprietary, expensive, and highly complex, enabling only the highest end of integration projects. While standards such as J2EE Connector architecture (JCA), Java Messaging Service (JMS), and XML were developed and adopted to solve different aspects of this problem over time, a widely agreed upon standard for comprehensive process orchestration has been lacking. The emergence of BPEL as the clear standard for business process management and workflow now extends the capabilities of mainstream developers to implement service-oriented, process-centric applications.

Implementing an industry standard for orchestrating business processes and Web services not only accelerates the implementation and deployment of new integration projects, but also reduces the overall cost of management, modification, extension, and redeployment of existing processes. In addition to tactical time and cost savings, this provides a strategic advantage: superior responsiveness to changing market conditions. As an added benefit, customers who have adopted BPEL have already seen the promise of vendor independence and process portability become a reality.

"BPEL will emerge as the leading industry standard for Web services flow composition (0.8 probability)."

—David Smith  
Gartner

## **SOA AND BPEL – INDUSTRY STANDARDS FOR INTEROPERABILITY**

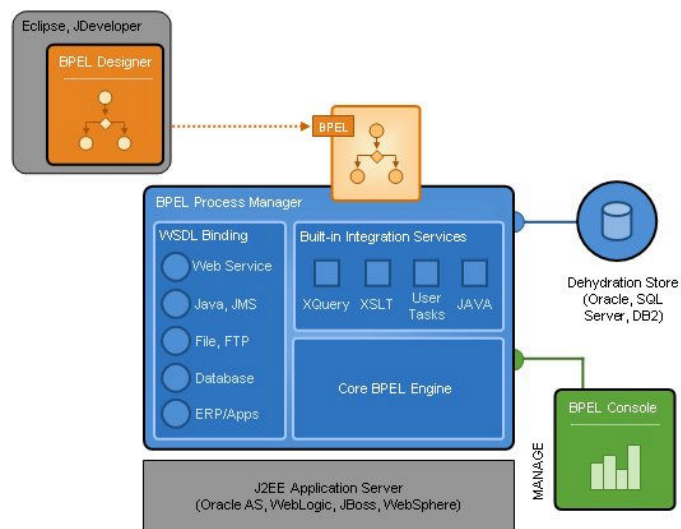
The term "Web services" refers to a set of interoperability standards (WSDL, XML and XML Schema, SOAP, JMS, JCA, etc.) that simplify integration with heterogeneous systems throughout the extended enterprise. The same way standards like SQL revolutionized access to structured data and HTTP and HTML standardized the way people access content and applications, Web services and BPEL are transforming intranets and the internet into a true distributed computing platform and allow heterogeneous systems to cooperate simply and reliably.

Unlike process standards that have been proposed in the past, BPEL, driven by the OASIS standards body and layered on Web services standards like XML Schema and WSDL, has achieved the critical support and endorsement from the industry's leading vendors. BPEL is a

comprehensive standard that satisfies real-world requirements is production-proven and has the support of major infrastructure and application vendors such as Oracle, Microsoft, IBM, SAP, BEA and Sun.

Oracle BPEL Process Manager provides high-performance, reliable execution of service-oriented business processes defined with the BPEL standard. This provides an enterprise blueprint for reducing the cost and complexity of integration projects. Specifically, Oracle BPEL Process Manager delivers:

- A comprehensive, native BPEL engine, allowing organizations to design, develop and deploy their business processes in a standard, vendor-independent fashion
- A mature and production-proven BPEL process management solution that customers can purchase and use today
- A rich set of tools for typical integration requirements – adapters for connectivity to back-end systems, transformation tools and engine, human workflow services. And all of these tools are built with the same single-minded focus on standards as the core BPEL engine. As shown in Figure 1.



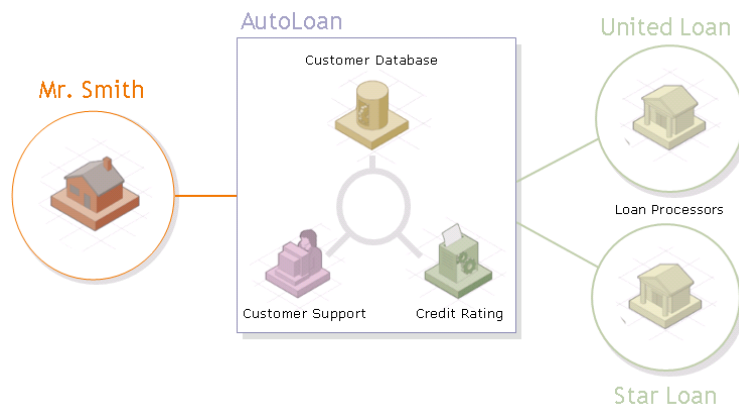
**Figure 1: Oracle BPEL Process Manager**

## MAKING WEB SERVICES WORK

Business and people that work together need their applications to work together. IT applications today typically must be built upon, and integrated with, a wide variety of existing systems, services and business processes. This has turned most J2EE or Microsoft .NET developers into “integration developers” and made multi-language and protocol interoperability a mainstream requirement.

Let’s take the example of a loan procurement application implemented by a company named “AutoLoan”. Through its on-line portal, AutoLoan offers loans to consumers who apply for financing of used car purchases. The AutoLoan application will leverage several trading

partners who provide the actual financing as well as existing information systems and legacy applications for customer information, credit ratings, etc. In addition, AutoLoan needs the system to support interactions with people, such as customer service representatives. This is shown Figure 2.



**Figure 2: Auto Loan Flow Process**

The standards emerging around Web service orchestration such as SOAP, WSDL, XML Schema and BPEL enable AutoLoan to address their integration and business process management requirements in a vendor independent fashion. And beyond just leveraging these standards, AutoLoan wants to build their system with a loosely-coupled, service-oriented architecture so that they will be able to get the efficiency of highly integrated systems while minimizing the cost, time and resources required to build and maintain them.

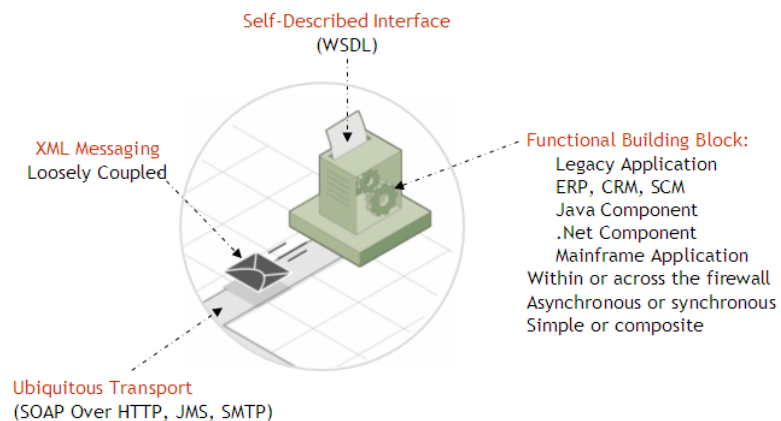
What makes this example particularly interesting is that it requires both integration of existing functionality and new application development. Hence, implementing the system requires AutoLoan to integrate disparate developer skills, methodologies and infrastructures into a maintainable application. It is these needs that are driving the market toward Web services as a standard service interface and BPEL for process orchestration. Note, by the way, that the AutoLoan example includes internet/B2B style integration, A2A/intranet integration and human workflow tasks in its requirements. The standards and products described here fit all of these models equally well.

Making Web services work is a two-step process: first you publish them and then you orchestrate them. Publishing means making the services available through some standard interface/API. Orchestration means assembling and coordinating those services into a manageable business application. The next section examines the specific requirements for publishing services in a SOA approach.



## PUBLISHING WEB SERVICES

Publishing a service takes a piece of functionality that already exists, such as within an ERP system, a legacy application, a Java component or a .Net component, and making it available over the network so that it can be easily integrated into applications. The standards surrounding Web services include a standard way of describing the interface to a service (WSDL), a data model (XML and XML Schema) and are flexible enough to support nearly any protocol – shown in Figure 3.



**Figure 3: Service Publishing**

You can think of a published web service as a building block that receives an XML request message, does some processing and generates a set of XML response messages. The details of the service interface are defined using a WSDL file contract. The actual transport and exchanges of messages can be implemented using ubiquitous protocols such as HTTP, JMS, JCA, Java and SMTP.

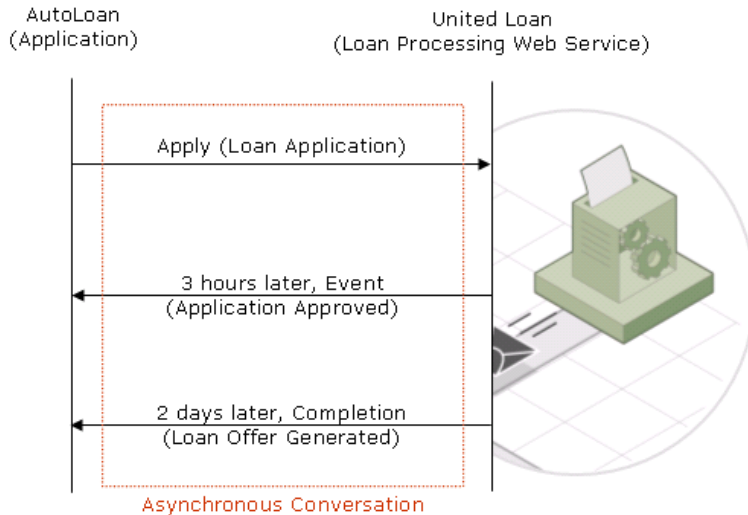
In our AutoLoan example, American Loan and Star Loan publish their loan financing capabilities as web services that accept loan applications, return loan offers and issue loan policies upon acceptance of an offer. American Loan uses the open source Axis toolkit from Apache and Star Loan uses Microsoft .Net for publishing their respective services.

Keep in mind that the definition of Web services, as used here, includes non-SOAP/XML building blocks to accommodate performance requirements and direct integration with existing messaging infrastructures and applications. In our AutoLoan example, the credit rating functionality is a CICS transaction, which is published on an MQSeries message bus. In this case, we can use the Java Messaging Service (JMS) API to access and consume that published functionality reliably and asynchronously. By using a flexible binding framework like WSIF from Apache, AutoLoan can use a 100% standard BPEL process to orchestrate both the Web services/SOAP operations and the JMS messages.

## ORCHESTRATING WEB SERVICES WITH BPEL

### Asynchronous Messaging

Part of the challenge of building the loan procurement application is to assemble the presentation logic, local business logic and the published services into a manageable service-oriented application.



**Figure 4: Asynchronous Conversation**

In order to achieve reliability, scalability and adaptability, interactions with Web services will have to support both synchronous and asynchronous messaging styles. In the AutoLoan example, the application interacts with the credit rating system through JMS and with the loan processors through SMTP and HTTP. In addition, an EJB might be used to interface to a custom J2EE loan servicing application and synchronous Web services as interfaces to .NET-based systems. This is shown visually in Figure 4.

Generally speaking, some of the services in an enterprise will already be implemented and may define only synchronous interfaces. Other services may exist as asynchronous messages or be implemented as part of the development of a new application using asynchronous Web services protocols. In all of these cases, a process or service which will integrate with other services, within or outside of an enterprise, needs to be able to gracefully handle situations where services may become unavailable at unpredictable times. This requires that a process flow use asynchronous messaging styles and effective exception management if it is to avoid the brittleness of a tightly-coupled architecture.

### Orchestration

The emergence of asynchronous messages and Web services as building blocks for applications introduces new challenges. In particular, the synchronous request-reply programming model is giving way to a conversational model based on asynchronous interactions across loosely-coupled web services.

Here, we define orchestration logic as the business logic that sequences, coordinates and manages conversations among web services. Such orchestration logic can be as simple as a single two-way conversation or as complex as a non-linear, multi-step business transaction with exception handling and compensation logic – see Figure 5.

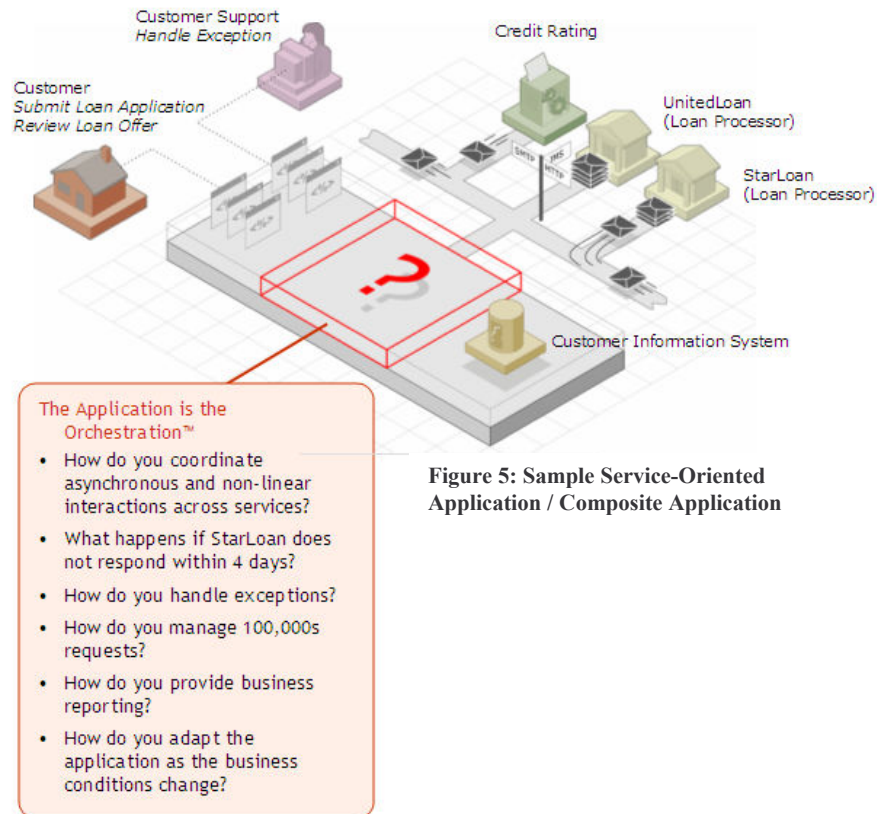


Figure 5: Sample Service-Oriented Application / Composite Application

In the AutoLoan example, the orchestration logic includes extracting the customer profile from an existing database, requesting the credit rating from an internal service and then asking the two loan processors in parallel to process the loan application.

### A Common Set of Requirements

Implementing and managing the orchestration logic of service-oriented applications entails a consistent set of infrastructure-level requirements. In this section, we will review those requirements in the context of the sample AutoLoan application and see how they are addressed by the BPEL standard and the Oracle BPEL Process Manager.

#### Req. #1: Open standards (Java/J2EE, JMS, XML, SOAP, WSDL)

How do you leverage your existing investment and knowledge in Java and J2EE? How can you adopt an Oracle technology platform, yet interoperate with systems, services and applications from other vendors?

The Web services standards today offer unprecedented interoperability and a fraction of the cost of proprietary EAI platforms. The Oracle BPEL Process Manager is built from the

ground-up with native support for these standards, enabling both interoperability and portability for applications and business processes.

Specific standards supported by BPEL PM and the Oracle Web services stack include:

BPEL 1.1 (full) and 2.0 (partial), HTTP 1.0 and 1.1, SOAP 1.1, SOAP with Attachments, WS-Addressing 1.0, WSDL 1.1, WS-I Basic Profile 1.0, WS-Policy, WS-Security 1.0 and UDDI v3.

The Oracle BPEL Designer is available as a plug-in for Eclipse and JDeveloper and offers a rich visual design paradigm with standard BPEL save format. The JDeveloper plug-in is shown in Figure 6. It requires no import, export or code generation of BPEL – it just builds and maintains standard BPEL processes natively.

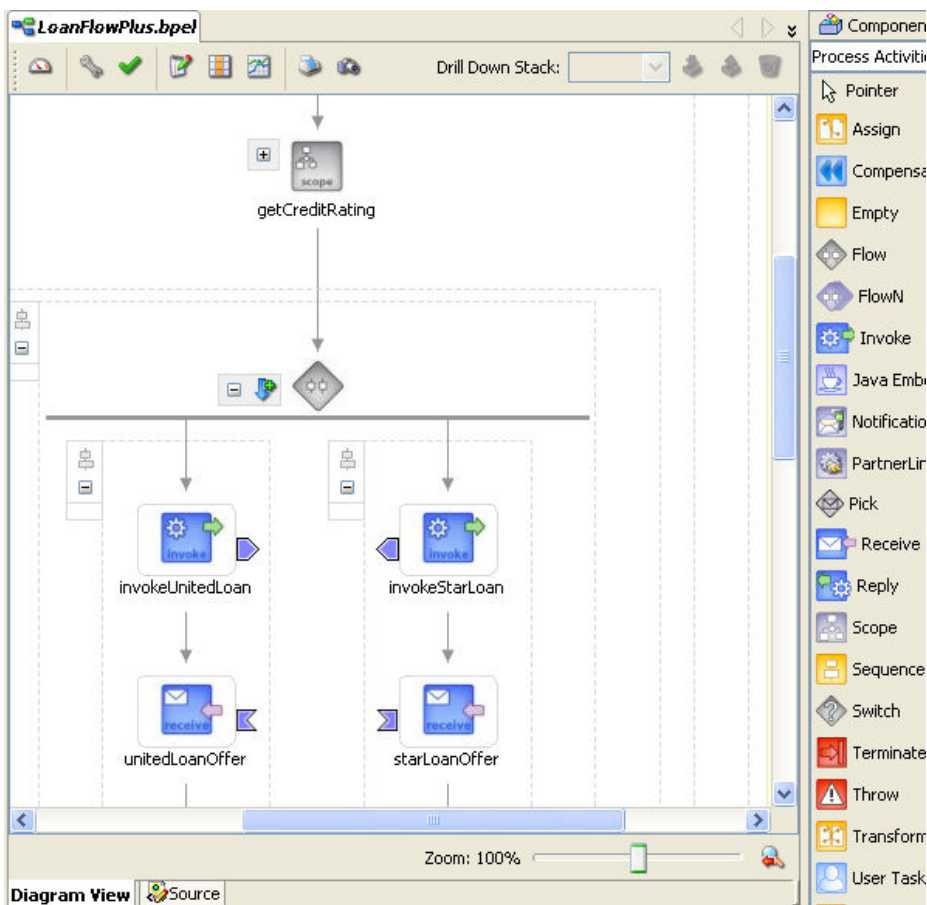


Figure 6: BPEL Designer Plug-in for Oracle JDeveloper

"In order for Edmunds.com to expand our B2C and B2B industry leadership, we must continue to evolve. By building on the Oracle BPEL Process Manager platform, we can scale as we need to and benefit from the built-in performance, reliability and flexibility required to handle our site's high volume of traffic and data."

- Rob Patton  
Executive Director,  
Business Intelligence & Data  
Architecture  
Edmunds.com

#### **Req. #2: State and context management**

How do you coordinate, store and manage the state of each conversation while still utilizing asynchronous messaging? How do you correlate each response to a set of actions? The Oracle BPEL Process Manager solves these problems at the infrastructure level, with seamless support for the “dehydration” of long-running processes and correlation of asynchronous messages.

#### **Req. #3: Loosely-Coupled Services**

How do you model each conversation so that the overall application (or service implementation) can be easily adapted as the business conditions change? How easily can you add a new loan processor to the loan procurement application? BPEL and the Web services standards enable a loosely coupled, coarse-grained design pattern that lends itself to efficient implementation of services-oriented architectures (SOA). An Enterprise Service Bus (ESB) approach, leveraging messaging technology from Oracle OR other vendors, can increase the loose coupling of services and provide even greater flexibility.

#### **Req. #4: Human Workflow / Manual Tasks**

How do you incorporate people and manual tasks into your BPEL processes without making them non-standard? How can a final approval step by the customer or a manual loan approval process at StarLoan be supported? While the BPEL standard does not itself cover manual tasks, it has rich support for asynchronous services. Therefore, Oracle supports a manual task service, so that people and manual steps can be included in 100% standard BPEL processes. The nascent “BPEL4People” proposal aims to standardize such an approach and Oracle supports this effort.

#### **Req. #5: Adapters for Connectivity to Back-end Systems**

How do you incorporate existing packaged applications, mainframes, message-oriented middleware and other systems and applications into your business processes? While Web services are gaining traction rapidly as an integration approach, most systems and applications within an enterprise are not yet available through a Web services interface. As such, the Oracle BPEL Process Manager supports adapters to hundreds of back-end systems, with easy-to-use design-time tools for browsing those systems and support for native protocols and interfaces for optimal performance and transaction support. This means that existing systems usually do not need to be modified or wrapped as Web services to access them from standard BPEL processes.

#### **Req. #6: Transformation of Data**

How do you transform data between the different representations used by back end systems – many of which may not even be XML. While BPEL has support for XPATH and a built-in assign activity for simple data transformations, the Oracle BPEL Process Manager builds on this foundation by supplying components for incorporating XSLT and XQuery transformations into standard BPEL processes. A rich visual transformation tool is bundled which supports XSLT natively and has the ability to do “auto-mapping” and define re-usable

dictionaries. In addition, as with the rest of the platform, any 3<sup>rd</sup> party tools which support XSLT can be easily incorporated into the design-time experience.

### Req. #7: Open Nested Transactions

Conversations can span a long period of time and include multiple responses. How do you combine multiple non-linear conversations into a business transaction? How do you track the history of the conversations so that they can be compensated if necessary? BPEL includes a compensation mechanism for the implementation of long-running transactions - even when the component services do not use a common transaction protocol.

### Req. #8: Scalability and Reliability

What happens when you need to upgrade a server but cannot afford to stop running your integration applications? What happens when the loan procurement application becomes successful and needs to scale to handle 100,000s of transactions per day? The Oracle BPEL Process Manager can be easily clustered for both fault-tolerance/failover and to handle increasing transaction volume. A single BPEL process instance can be created on one server, automatically relocate to another server if a server failure occurs (including during the execution of a process), and then complete on a third server based on distribution of load.

### Req. #9: Management, Administration and Business Visibility

What happens if a customer support rep needs to cancel a submitted loan application request? How do you provide administrators and executives with aggregate process statistics and instance level business visibility? The Oracle BPEL Process Manager includes unparalleled management and administration capabilities, supporting the easy development of custom dashboards and views on top of process statistics. The BPEL Console is shown in Figure 7.

ORACLE BPEL Console

Manage BPEL Domain | Logout | Support

Dashboard			
Deployed BPEL Processes		In-Flight BPEL Process Instances 1 - 4	
Name	Instance	BPEL Process	Last Modified ↑
BAReservationDemo	<b>2107 : Instance #2107 of TaskActionHandler</b>	TaskActionHandler (v. 1.0)	12/13/05 5:02:57 PM
CreditRatingService	<b>2105 : Instance #2105 of StarLoanWithWorkflow</b>	StarLoanWithWorkflow (v. 1.0)	12/13/05 5:02:56 PM
LoanFlowPlus ( v. 1.0 ) ★	<a href="#">2103 : Loan Flow Plus- Dave Shaffer</a>	LoanFlowPlus (v. 1.0)	12/13/05 5:02:54 PM
LoanFlowPlus ( v. owsm )	<b>2006 : PeopleTracker: Jim Clark</b>	peopletracker (v. 1.0)	12/13/05 12:02:23 PM
PearsonDemo			
StarLoan			
StarLoanWithWorkflow			
TaskActionHandler			
TaskManager			
Test	Recently Completed BPEL Process Instances ( <a href="#">More...</a> )		
UnitedLoan	✓ 2106 : Instance #2106 of UnitedLoan	UnitedLoan (v. 1.0)	12/13/05 5:02:54 PM
peopletracker	✓ 2104 : Instance #2104 of CreditRatingService	CreditRatingService (v. 1.0)	12/13/05 5:02:53 PM
	⚠ 2102 : Loan Flow Plus- Dave Shaffer	LoanFlowPlus (v. owsm)	12/13/05 5:02:24 PM
	2004 : Instance #2004 of MyPeopletracker2	MyPeopletracker2 (v. 1.0)	12/13/05 11:26:56 AM
	✓ 2003 : PeopleTracker: Mikael Ottosson	peopletracker (v. 1.0)	12/13/05 9:59:55 AM

Deploy New Process

Logged to domain: default

Oracle BPEL Console v10.1.2.0.0

Figure 7: Oracle BPEL Process Manager Console



### Req. #10: Version Control

Imagine that you have 10,000 active loan application requests and that you need to update the orchestration logic to reflect some new policy. How do you gracefully phase-in and out multiple versions of your orchestration logic? The Oracle BPEL Process Manager supports “side-by-side versioning” of processes so that flow logic can be upgraded for new instances while existing instances execute against the flow logic that existed at their time of creation.

### Req. #11: Audit Trails

How do you trace the history of all the conversations related to a specific loan request? Can you provide non-repudiation and view the messages exchanged with specific services after the fact? The Oracle BPEL Process Manager automatically maintains audit trail information, supporting both a graphical and textual representation of process status and history. In addition, the audit trail can be easily customized to ensure that it is meaningful and complete based on the business semantics of the process. An audit trail for a loan flow process is shown in



Figure 8: BPEL Process Audit Trail Shown in Oracle BPEL Console

### Req. #12: Support for Existing Infrastructure (“Hot Pluggable”)

Do you have existing application server and messaging infrastructure and expertise that you want to maintain? Would you like to be able to run BPEL processes on different platforms

on a project-by-project basis? The Oracle BPEL Process Manager runs on top of all the major application servers, including Oracle application server, WebSphere, WebLogic and JBoss. Production deployment platforms include Windows, Linux, Solaris, AIX and HP/UX. The database used as a dehydration store can be Oracle, SQL Server, DB2 or others.

For all these requirements, the Oracle BPEL Process Manager implements the BPEL standard religiously and provides infrastructure software enabling developers to work at a higher level of abstraction when implementing services-oriented applications. A BPEL server provides portability and a broad developer network for the problem of process integration, and many vendors including IBM, Microsoft, BEA, SAP and open-source vendors have publicly committed to support the BPEL standard.

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## MICROSOFT INTEROPERABILITY

The Oracle BPEL Process Manager integrates well with any middleware technologies from a wide variety of vendors. However, we specifically see many customer environments which include a mixture of Microsoft and J2EE technologies and BPEL PM is particularly well suited for such an ecosystem. In fact, many code examples ship with the product or are otherwise available to illustrate exactly how to accomplish this seamless integration.

Specific interoperability with Microsoft technologies include:

- *Sharepoint portal and .NET UIs interacting with BPEL processes* - BPEL processes can be invoked from any client which understand Web services and user task GUIs can reside in any interface. BPEL PM ships with a code example of a C# client for a human task orchestrated via BPEL.
- *Interoperability with .NET Web services* - Many customers use Oracle BPEL PM to orchestrate Web services published from .NET. Code examples of this are also bundled with the product.
- *Microsoft Active Directory* - BPEL PM's built-in identity service is tested specifically with Microsoft Active Directory (as well as iPlanet LDAP and Oracle OID). This means that user directories in Microsoft Active Directory can be used for human worklist task assignment as well as security, role based access control, or other interactions with directory services.

- *Microsoft SQL Server as BPEL PM dehydration store* - SQL Server is supported as a dehydration store for BPEL PM and we have production customers using this configuration today.
- *DB Adapter support for SQL Server* - The database adapter bundled with BPEL PM supports Microsoft SQL Server, as well as many other databases.
- *Orchestrate MSMQ messages* - Through the JMS adapter bundled with BPEL PM and the JMS bridge to MSMQ, BPEL processes running on Oracle BPEL PM can orchestrate MSMQ messages and we have production customers doing this successfully today.
- *Workflow Integration* – Workflows in BPEL PM can leverage Microsoft WinForms or Microsoft Office InfoPath documents. In addition, workflow routing and approvals in Oracle BPEL Process Manager can be integrated with appropriate identities and roles, potentially stored in Microsoft Active Directory.
- *Integration with Microsoft Office documents* - BPEL PM can be used to interact with many kinds of Microsoft Office documents, from Excel spreadsheets to Microsoft Exchange email servers. Again, code examples are available to illustrate how this can be done. One such example is a “Sales Forecast Process” which demonstrates how a BPEL process can email trading partners with an Excel spreadsheet template as an email attachment. The process then waits for the partners to email back completed sales forecasts, again as spreadsheet attachments to emails, and the BPEL process can automatically aggregate and share the results.

## WHY ORACLE?

### Realize Greater Organizational Flexibility

Throughout the Oracle SOA suite, a religious focus on standards means that organizations that choose a best-of-breed approach are not required to adopt the entire platform. In keeping with this philosophy, the Oracle BPEL Process Manager runs on top of and alongside products from other vendors – application servers, rules engines, databases and others. This is a very powerful mechanism for organizations to gain IT agility because the lasting commitment that a customer makes is to the underlying standards, not to a single product or vendor.

Besides the ability to deploy into heterogeneous IT infrastructure environments, the Oracle BPEL Process Manager can help you achieve greater organizational flexibility than any other solution in the market in four important ways:

- *Service-Oriented Applications* – Oracle BPEL Process Manager enables rapid development of service-oriented applications that can be deployed and managed on a 100% standard platform. Through the bundled WSIF binding framework and available adapters, it also allows you to access existing applications and legacy systems as services without rewriting or wrapping them.

- *Business Process Monitoring and Optimization* – Oracle BPEL Process Manager provides you with out of the box audit trails for processes executing across your enterprise and makes it easy to feed events from BPEL processes to the Oracle BAM server for creating rich real-time dashboards..
- *Developer Productivity and Ease of Use* – The Oracle BPEL Process Manager increases developer productivity by providing a rich visual development environment and full set of tools without compromising on standards. Both the design-time and run-time environments are available for download and developers should be up and running building their first BPEL processes within minutes.

Oracle BPEL Process Manager supports: a range of application servers including IBM WebSphere and JBoss; leading business rules engines such as Ilog Jrules and Fair Isaac BLAZE; any LDAP V3 compliant directory such as Active Directory, iPlanet and Novell; leading messaging services such as IBM MQ, SonicMQ, Tibco as well as Oracle AQ.

- *Own Your Business Processes* – Many organizations consider their business processes to be the most valuable and proprietary information they have. Because the Oracle BPEL Process Manager provides more standard and native support for the BPEL standard than any other product on the market today, adopting it enables organizations to own their business processes in a way never previously possible. By developing those processes in standard BPEL and running them on the Oracle BPEL Process Manager, portability is maximized and architectures are more “future-proof”. Even at this stage of the BPEL standard, we have seen several organizations begin

developing BPEL processes using tools from non-Oracle vendors and then switch to Oracle’s BPEL Process Manager. This switch would have been very difficult and required a total re-write if proprietary business process management tools had been used.

## Eliminate Middleware Complexity

Oracle SOA Suite is the most comprehensive, standard and integrated SOA suite in the industry. The Oracle BPEL Process Manager is well integrated with the other components in the Oracle SOA Suite. Specifically, the following products work hand-in-hand with BPEL PM to provide a full SOA platform suite experience for organizations that prefer to go with a single-vendor solution:

- *Oracle Web Services Manager* – Enables Policy-based security to secure services and business processes developed in Oracle BPEL Process Manager and to encrypt communications between business processes and services.
- *Oracle Enterprise Service Bus* - Messaging services, routing, transformation and adapters at the bus level. Oracle BPEL Process Manager already includes messaging, routing, transformation and adapters. However, these capabilities have also been packaged into Oracle ESB. Both products share a common metadata model, a common deployment and management model, which eases application development, deployment and application change.

- *Oracle Adapters & B2B* – System connectivity. Available adapters include application adapters: Oracle, SAP, Peoplesoft, JD Edwards, Siebel, and custom adapters; database adapters: Oracle 8i and above, MS SQL Server, IBM DB2 UDB, Sybase, Informix, JDBC/ODBC; adapters for connectivity with messaging systems: Oracle AQ, MQ Series, TIBCO, JMS; support for multiple Transports: SOAP, HTTP[S], SMTP, FTP[S], Flat File; and legacy adapters: CICS, IMS/DB, IMS/TM, VSAM, 3270; and adapters for partner connectivity – RosettaNet, AS1, AS2, EDI on VAN, UCCNet, custom define.

### Achieve Best Total Value of Opportunity

Oracle BPEL Process Manager can help you achieve the best total value of opportunity by means of three cost reduction strategies:

- *Develop and Deploy Applications Faster* – As a component of the market’s only integrated SOA Suite, Oracle BPEL Process Manager greatly reduces the overall cost of architecting, developing, deploying, and managing applications. Leveraging a full SOA suite, alongside the 100% standard approach that minimizes the developer learning curve, means that applications are built faster, they can be put into production sooner, and their associated benefits can be realized sooner.
- *Reduce Application Deployment Costs* – Oracle BPEL Process Manager is designed to leverage grid computing to lower costs by deploying enterprise applications on modular, low-cost hardware and storage. Scalability and high availability for BPEL processes can be achieved through adding additional nodes rather than large monolithic servers.
- *Enable a “Stepping-Stone” Approach to SOA* – Oracle BPEL Process Manager offers the lowest cost and complexity and greatest support for standards of any business process integration product on the market. Taken together, these mean that organizations can achieve ROI on even small projects. This enables tactical, incremental steps toward a strategic vision of SOA rather than requiring a “big bang” approach that is risky and requires large up-front investments.

## CUSTOMER PROOFPOINTS

### Belgacom

Belgacom is the leading telecommunications company in Belgium and a market leader in a

number of areas, including retail and wholesale fixed-line telephony services, mobile communications services and broadband data, and internet services. In addition to its activities in Belgium, Belgacom provides voice and data



“Our industry is very competitive. My team is constantly looking for ways to improve customer service, introduce new product offerings, and make an impact to the bottom line.”

—Serge Bauve,  
Manager  
Belgacom

connectivity and capacity services to telecommunications operators and service providers worldwide.

Belgacom's existing proprietary systems did not support SOA for standards compliance, reuse or rich exception management. They needed improved insight into core business processes and management and administration of those processes was complicated by high volume of transactions, numerous steps required for each process, difficulties integrating heterogeneous systems, and unique handling requirements

Belgacom deployed the Oracle BPEL Process Manager, which now runs hundreds of production BPEL processes and handles thousands of DSL provisioning and repair transactions per day using Oracle databases, JBoss application servers, and proprietary and legacy systems. Belgacom chose Oracle BPEL Process Manager because it was built from the ground up for BPEL and is 100% standards compliant. Oracle's long-term SOA vision, product and deployment support, and application-server agnostic approach were also key factors. Oracle BPEL Process Manager improved customer service through the ability to accept batch files from an FTP order management system and real-time processing of requests from customer service applications (via Web services). The IT department is now able to track processes in real time for better customer support and has shortened time to execute activations/deactivations, thus lowering operating expenses. Belgacom creates and reuses business processes to automate service offerings with BPEL PM, shortening time-to-market for new services

### **Fidelity Information Services**

Fidelity National Financial, Inc., number 261 on the Fortune 500 is the nation's largest title insurance company. Its majority-owned subsidiary Fidelity Information Services, Inc. ("FIS"), is a leading provider of technology solutions, processing services and information services to the financial services and real estate industries. FIS' software processes nearly 50 percent of all U. S. residential mortgages, has processing and technology relationships with 45 of the top 50 U.S. banks and has clients in more than 50 countries.

Fidelity eXpress Enterprise Services (XES) is an integrated suite of standards-based banking components that provide robust functionality through a service-oriented architecture. With XES, financial services institutions can implement business process management capabilities and ensure system interoperability across the enterprise. XES provides an extensive inventory of services using the Interactive Financial eXchange (IFX) standard protocol and also supports proprietary XML and other legacy formats.



The integration of XES with Oracle BPEL Process Manager allows financial institutions to streamline business processes and lower operational costs by providing best practice,



enterprise-wide standards and consistency, and automating multi-step host application activities.

Utilizing a service-oriented architecture, XES delivers operational efficiencies by allowing financial institutions to leverage their services and business processes across the enterprise. In addition, XES provides the business process, transaction, and integration management framework that is essential to enabling BPM. Using self-contained business functions represented by discrete web services, organizations can leverage these functions across multiple processing systems. "BPEL is an evolving standard across the industry and we wanted a strong partner who would help us lead our customers with a technology solution and strategy," said Frank Sanchez, president, leveraged product development for Fidelity Information Services. "Oracle BPEL Process Manager delivers the capability and future that we needed for XES and our core banking solutions. Combining BPEL with the industry standard IFX provides a very leverageable and efficient solution to the financial services market."

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—Frank Sanchez, President Leveraged Product Development

Fidelity Information Services.

## CONCLUSION

Oracle SOA Suite is a standards-based best of breed suite that enables you to build Service-Oriented Application and deploy them to your choice of middleware platform. Oracle SOA Suite can help you achieve greater organizational flexibility better than any other solution in the market. Further, it can reduce your costs and middleware complexity better than any other solution. Finally, It can help you to achieve the best total value of opportunity.

Business and people that work together need their applications and services to work together. This is driving the industry move to SOA and BPEL, which promise significant benefits in terms of adaptability, ease-of-integration, portability and interoperability.

The Oracle BPEL Process Manager, a component of Oracle SOA Suite, provides the infrastructure necessary to make this promise a reality – a 100%, native BPEL engine that coexists happily with existing middleware technologies and platforms. Oracle BPEL PM is built from the ground up on Web services standards and BPEL, providing enterprises that adopt it with unrivaled process portability and vendor flexibility For more information and to download a trial version of the Oracle BPEL Process Manager, visit <http://otn.oracle.com/products/ias/bpel>.

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