CHAPTER 3

BPM Suite 11g: An Overview
PM Suite 11g is a key product offering within Oracle’s Fusion Middleware (FMW) product family and is a result of a great amount of R&D work. This represents the unification of BEA’s Aqualogic BPM (ALBPM) product and Oracle SOA features (such as human workflow, business rules, and process orchestration) into a unified BPM suite that is included in the Oracle FMW family of products.

Oracle has always regarded process management as an important discipline to pursue. Around a decade ago, Oracle released Oracle Workflow, which helped customers manage traditional workflow chores and connect information flows between human workers and computer applications. It was essentially a database application with a tool, the Workflow Builder, for modeling these workflows. This workflow product was subsequently embedded in the Oracle EBusiness Suite applications for managing workflows within the ERP application. Over time, demands on process management software tools increased and standards for process modeling and execution emerged. In June 2004, through the acquisition of Collaxa, Oracle added the industry-leading BPEL-based (Business Process Execution Language; www.oasis-open.org) process manager (BPEL PM) to its portfolio of Middleware offerings. Oracle continued investing in BPEL PM in order to maintain its market leadership in features and performance. As Oracle completed its product offering for SOA (Service Oriented Architecture), currently called SOA Suite, BPEL PM became the main vehicle for service orchestration.

In 2008, Oracle acquired BEA and gained ALBPM, then a market leading product for business-friendly process modeling and optimization. Post-acquisition, Oracle significantly increased its investment into the development of ALBPM and its unification into the FMW family of products. Besides excelling in process modeling, this unified BPM platform would also be capable of handling a diverse set of BPM use cases for modeling, execution, analytics, and optimization while handling extreme performance requirements, supporting complex UI and application integration challenges, and providing a platform that was easy to deploy and manage. The end result of this R&D exercise was BPM Suite 11g.

In this chapter, we will introduce the BPM Suite 11g product. We will start with a quick examination of the goals and challenges of a modern business process implementation and describe the architecture and the
functionalities of BPM Suite 11g within the context of such goals and challenges. Of course, this being an overview chapter, all treatment will be at a very high level, with the details deferred to subsequent chapters.

Building a Modern Process-based Business Application

As we mentioned in the last chapter, business processes are at the heart of how companies conduct themselves. They are key enablers of operational efficiency, are responsible for employee and customer satisfaction, and support business innovation and agility. In short, business processes are the foundations of healthy growth and sustained competitive advantage for companies. How do business processes solve such multidimensional business problems? Let’s explore this via an example from the credit card industry.

A credit card company is faced with solving the problem of handling requests for increases in credit limits from its customers. The current way of handling such requests in that company is mostly manual and often takes too long, thus frustrating the customers to the point where they either stop using their cards or switch to another credit card company. Sometimes credit limits are granted to undeserving customers, leading to an eventual loss of money to bad credit. This credit card company decides to undertake a BPM project to improve the situation.

At a basic level, the problem of granting additional credit to existing customers involves checking whether the customer are in good standing, adjusting their account, and informing them. However, real-life scenarios bring in additional considerations, some of which could be nontrivial. For example, in the case of this credit card company, the process improvement sponsors laid out certain success measures for the project that implied that the new process must significantly improve the level of process automation, manual steps must be resource-optimized so as to meet preset customer-facing SLAs (service level agreements) while keeping the operational costs down, and process logic must be such that the number of bad or faulty decisions will be significantly reduced. The project goals also mandated process invocations over multiple channels, such as customer self-service via the Web, phone call requests via call centers, and batch requests via B2B (business-to-business) channels from their business customer accounts.
and from their resellers. Visibility into the process transactions was another area that needed to be improved. In fact, requirements included visibility at different levels—for example, management dashboards, system-level reporting for the operations people, transaction-level drill down for process workers, and process completion status reporting to customers. All in all, this was about raising a critical business capability of the credit card company, namely, the credit limit increase service to a much higher level.

As the business analysts and process architects went to work designing a suitable solution, there were more things to take care of. In order to create the target (or the to-be) process, information about the current way of working (the as-is process) had to be gathered and analyzed for possible improvements, and a series of discussions needed to be held with all the stakeholders ranging from business groups to IT developers to operations teams to finalize the internal design and external features of the future solution. For such collaboration to be useful and disciplined, different participants would need different levels of access to the design assets, some would be able to modify them and some only review. It was clear that different participants preferred different interaction styles: business people liked lightweight web browser–based no-need-to-install software types of tools and were focused more on the process model and business logic, while the IT developers required access to more technical artifacts of the process. It also seemed highly desirable that discussions among the participants could be recorded when required so that design decisions could be easily revisited if necessary.

In order to ensure that only the right amount of credit increase is granted to a requesting customer, a whole set of rules involving credit usage history was deemed necessary. In trying to eliminate fraudulent transactions, signs for possible and probable cases needed to be identified. A variety of exception handling strategies had to be incorporated into the solution; some routine ones would require approvals through organizational hierarchies, while some others needed multiple people to collaborate to resolve the issue. The process needed to have the ability to handle events like interruption or suspensions, say, due to a call from a customer while his/her transaction is in flight or when an impasse is reached during a manual exception handling.

A wide variety of graphical elements like UIs and notification dashboards needed to be developed in order to present different kinds of
information to different participants involved in the execution of the process; these ranged from alerts on multiple devices to management dashboards to worker task lists. In many cases, these graphical display and interaction elements needed to be a part of a bigger web portal or an E2.0-style mash-up or collaborative workspace.

Of course, the process had to exchange information and in some cases triggering transactions within various enterprise applications. Consequently, security concerns around user access and data were highly relevant. The company identified several occasions where the process workers needed to look up documents associated with a particular process instance or to reference the company’s operating practices. In other words, integration with their document management system was also necessary. Additionally, the analysts and designers needed the ability to play out several what-if scenarios with respect to the process model, business logic, and resource assignments. There was also a concern as to how the process should be designed so as to make it resilient to change, particularly when certain decision logic would change in the future. Figure 3-1 captures, at a high level, the building blocks of a comprehensive BPM application.

**FIGURE 3-1.** The building blocks of a comprehensive BPM application
The business problem and its associated business process under scrutiny here is of only modest complexity. Yet, the task of creating a business-friendly, effective, and efficient solution would require a toolset that goes far beyond a process designer—it would need a full-palette business process–based application builder, a solution architecture and building blocks that afford easy change-edits, and an overall solution implementation methodology. Oracle BPM Suite 11g is such a platform—it is an enterprise-grade BPMS (Business Process Management Suite, as coined by the analyst firm Gartner) that is feature-wise comprehensive, provides role- or persona-based user interfaces and design environments, and has the ability to handle change efficiently. In order to better appreciate the capabilities of BPM Suite 11g let’s first examine the design goals and guidelines that were used to build this product.

**Design of BPM Suite 11g: Goals and Guiding Principles**

After the acquisition of BEA, during the unification phase of BEA’s BPM product (then called ALBPM) into the broader FMW ecosystem, Oracle significantly increased BPM R&D investment in order to create a BPMS that would preserve and strengthen the popular and unique features of ALBPM, but would also add a set of forward-looking capabilities. As a component of the FMW family, this unified BPM would be guided by the core guiding principles of FMW R&D:

- **Complete** The offering provides a comprehensive set of features so the designers or developers would not have to bounce from tool to tool to get their job done. In case of BPM Suite 11g this requirement translates to providing all the features and tool interaction styles necessary for a variety of participants, ranging from business analysts to IT developers, capabilities to handle different types of process types (for example, human-, document-, decision- and integration-centric processes, departmental and enterprise scopes, and so on), and support for different modeling components (such as BPMN, BPEL, rules, human tasks, and others).
Integrated The offering is not a loose cluster of tools, instead the tooling components are pre-integrated. This would benefit both development and operational activities. Designers or developers will not have to manage additional integrations to keep track of their work and the work-products (artifacts) as they move through multiple tools or modules during the course their work; IT operations will have a simpler platform to administer and manage. This requirement led to the unified development environment and execution and management infrastructure of BPM Suite 11g.

Open Where applicable, products adhere to leading industry standards and, in spite of pre-integration between product components, remain modular so as to provide customers with adequate choices for creating best-fit solutions. Additionally, the open platform will make it easy for customers to find a skilled work force. Consequently, BPM Suite 11g natively supports BPMN 2.0 (see www.omg.org), BPEL and other relevant WS-* standards, and XML-based manipulations. Also, where appropriate, it provides a rich library of Application Programming Interfaces (APIs) and facilitates connectivity to other applications via web services, messaging, and data imports/exports.

Best-of-breed Each component of the offering, on its own, is a best-in-class offering. This puts the focus on making the components and features of BPM Suite 11g comparable or ahead of market leaders in this industry segment.

Besides the preceding guidelines, BPM Suite 11g also added the following focus points in its product design considerations:

Leverage collaboration In today’s “age of digital interaction,” we increasingly use online media to engage in ad hoc interactions via electronic forums, chats, and web-based collaboration portals. BPM Suite 11g leverages these trends to facilitate fast and effective collaboration among diverse BPM participants.
Single model through entire BPM life cycle  

While collaboration among various participants is very beneficial to BPM adoption, it also brings forth the challenge of maintaining concurrency of all the process artifacts at all times. For example, it would be highly undesirable if modifications made by business analysts were not exactly conveyed to IT developers or vice versa, since the analysts and developers may use different interaction interfaces of the BPM toolset. Or, for example, the runtime version of the process turns out to not be exactly the same as the design-time version. BPM Suite’s design strategy is to adopt a common process model with a “What-You-Model-Is-What-You-Execute (WYMIWYE)” paradigm in order to avoid these so called lost in translation or roundtrip problems.

Built for adaption  

Due to the need of responding to ever-increasing competition in the marketplace, the redistribution of work between in-house and outsourced work forces, dynamic supply chains and distribution chain management, and the constant need to improve operational efficiency, business processes must evolve continually. Design considerations for BPM Suite 11g include many capabilities that help companies make their business processes change-resilient, make it easy to introduce changes to existing processes, and help them reuse assets from existing processes to create brand new ones rapidly. In addition to these design-time changes, it may sometimes become necessary to alter the actual execution steps of a business process from what it was originally designed for. For example, depending on the data associated with a particular process transaction, an approver may feel the necessity of adding additional approvers, or an exception handler may invite other experts to help resolve a special situation. These conditions reflect the runtime adaptability of the process. BPM Suite 11g provides capabilities that could handle such runtime changes as well.

End-to-end management and monitoring  

A great amount of value that business processes yield comes from the fact that these processes integrate, explicit or implicitly, many diverse computer applications and human user interfaces. However, such integration also poses the challenge of keeping track of the evolution of the process transactions,
end-to-end, and providing adequate visibility of the transactions to various process participants. BPM Suite 11g facilitates the monitoring of process transactions at multiple levels: transaction summaries, business events and activities, and system.

■ **Built-in process analytics** A set of design goals of BPM Suite 11g has to do with easily extracting useful information from business process transactions and presenting them to the interested subscribers in a timely manner. These may range from information leading to historical perspectives of transaction variables via traditional business intelligence applications to real-time information initiating additional human or system action. BPM Suite 11g facilitates the creation of process Key Performance Indicators (KPIs) by defining business indicators and process measurements at modeling time. Often such information is helpful in identifying cross-sell or up-sell opportunities, in taking proactive actions so as to avoid breach of SLAs, and in pursuing continuous process performance improvement.

■ **Leverage SOA Suite and FMW** Service Oriented Architecture (SOA) is a software application architecture based on loosely coupled packages of software functionalities termed “services.” SOA facilitates rapid assembly of composite applications functionality reuse, and insulates service consumers from modifications to portions of an application. A BPM application is often an ideal candidate to leverage SOA concepts, assets, and application building styles. Wherever applicable, BPM Suite 11g is designed to leverage SOA intrinsically. BPM Suite is part of the broader FMW family of products, which offers many tools that can be helpful in the context of building a comprehensive process-based business solution—for example, content management, security, business intelligence, portals, and the like. BPM Suite 11g is designed to either directly incorporate, or make it easy for the implementers to leverage, other relevant FMW components while designing or building their BPM solutions.
While some BPM projects may start small with low complexity, departmental scopes, or non-mission-critical applications over a relatively small period of time, larger multidepartment or enterprise-scope complex and mission-critical projects are sure to follow. It would be desirable to have the BPM technology platforms scale smoothly from the smaller to the larger projects without having to change products or project execution styles. Projects may scale due to the need for higher throughput or higher concurrency of user requests. Hence, a BPM Suite 11g design criterion is to include necessary features typical for high-quality enterprise-grade software tools, giving high performance, scalability, and reliability.

As depicted in Figure 3-2, the BPM Suite 11g product design essentially captured the preceding requirements in three architectural themes: persona or role-based tooling, social BPM, and unified process foundation. The remainder of this chapter will provide an overview of how BPM Suite 11g has implemented its features so as to deliver on the product design requirements and the architectural guidelines discussed thus far.

**FIGURE 3-2. Architectural approach for BPM Suite 11g product design**
BPM Suite 11g: Product Architecture and Functionality Overview

As mentioned before, BPM Suite 11g is a member of FMW, Oracle’s middleware and application infrastructure family of products. The FMW breadth ranges from application servers and messaging products to business integration, identity management, business intelligence, content and user interaction management, and enterprise performance management (see Figure 3-3). BPM Suite 11g installed on top of SOA Suite 11g provides BPM Suite 11g with a rich application integration capability often demanded by BPM applications.

The main purpose of this section is to provide a quick overview of how the BPM Suite product is composed and to summarize its important feature functionalities. Later chapters in this handbook go into deeper details of the functionalities and usage of BPM Suite 11g features.

FIGURE 3-3. Oracle FMW and BPM Suite 11g
Modeling and Simulation Tools
As we noticed in the credit card company example earlier, a typical BPM project requires several additional features besides the basic process flow. For example, incoming requests need to be mediated to figure out the expected follow-up actions within the BPM application; business rules are needed to derive a variety of decisions from available facts; groups of software services (often web services) may have to be orchestrated to create additional functionality; many heterogeneous computer applications and complex human tasks must be connected; and so on. In the following, we will briefly describe the key BPM Suite 11g modeling and simulation features and the philosophies behind them.

A BPM Project and Model-based Solution Architecture
Given the wide number of building blocks employed in a typical BPM solution, a high-level solution architecture philosophy is needed to guide the composition of the BPMS toolset and to provide a discipline for solution construction. BPM Suite accomplishes this challenge by recognizing a set of modeling components or constructs such as BPMN, BPEL, human workflow, business rules, and others and provides the realization of the final solution as a composite of these interrelated modeling components. Each modeling component is supported by the necessary modeling interfaces that are integrated within the BPM Suite development environment. This allows the modeler or the developer to focus only on the modeling interfaces necessary for their immediate work without the burden of all the modeling interfaces at once.

BPM Suite achieves this persona-based modeling by supporting two modeling and development front-ends: BPM Studio and Process Composer. BPM Studio is installed as a plug-in to JDeveloper, the Oracle FMW Integrated Development Environment (IDE), and provides all the modeling and development features of BPM Suite. Process composer, on the other hand, is a web browser–based interface that is designed mainly for business analysts for relatively higher-level interaction with the process artifacts. Composition of the BPM solution can start either from BPM Studio or from the Process Composer, and can be modified, refined, and enriched in either interface, often through the iterative cycles of modeling and development activities. Use of a common metadata store (MDS) ensures the work done
either in BPM Studio or Process Composer is applied to the same process model (see Figure 3-4). Once the implementation level details are incorporated, typically through BPM Studio, the process model is ready to be deployed to an application server instance (for example, Oracle WebLogic Server) and administered by Oracle Enterprise Manager.

**BPM Studio**

As already mentioned, BPM Studio is installed as a plug-in to Oracle FMW’s standard IDE framework, JDeveloper. It provides a comprehensive modeling and development environment for process-based applications. Its wide range of features includes the creation of artifacts related to process models based on BPMN 2.0 and BPEL languages, business rules, human tasks, and organizational models. Application analysts and designers can carry out what-if analyses and resource-optimize the solution using the simulation capabilities in BPM Studio. Leveraging the common infrastructure that BPM Suite shares with SOA Suite, BPM Studio also provides features for interaction with external and internal web services, request mediation and routing, data manipulation, user interaction via rich UI components and connectivity to Java components, files, databases, and applications. BPM Suite 11g uses a Business Catalog, which is a categorized list of assets and resources available to the BPM modeler and developer in the BPM Studio.
as well as to the web-based Process Composer. Assets are created by a process developer using the BPM Studio and include Process models, Human Tasks, Business Rules, and Services (web services, adapter services, and others). Figure 3-5 shows a screenshot of BPM Studio.

BPM Suite 11g supports modeling and execution of BPMN 2.0 models natively. BPM Studio supports this by providing all levels of BPMN modeling perspectives, namely Descriptive, Analytical, and Executable. BPM Studio provides mechanisms to assign different roles to different tasks consistent with the BPMN standard; the roles themselves can be mapped to physical groups and users which may be stored in an identity store such as LDAP. It supports persona-based profiles—for example, a process analyst persona gets access to only the BPM modeling features, while a developer...
persona also gets access to more technical features like XML manipulation, web services interaction, and Java components.

**Process Composer**

The web browser–based Process Composer component of BPM Suite 11g exposes modeling aspects that are typically of interest to business analysts, like the BPMN model, business rules, and task features of BPM Studio. Process Composer is designed to cater to project contributors who do not need to deal with IT system–oriented features or artifacts. This tool is also highly useful for accessing and browsing process models during collaboration sessions. Using its role-based access features, a business analyst can share and review the process models with various collaborators who may be granted a read-only access to the artifacts. Figure 3-6 presents a screenshot of Process Composer.

![A screenshot of Process Composer](ch03.ps)

**FIGURE 3-6.** A screenshot of Process Composer
Process Simulation

Often, what-if analysis of as-designed processes from the points of view of expected cost, performance, and resource utilization is necessary for design refinements. BPM Suite 11g provides a rich process simulation tool, currently accessible through BPM Studio, to accomplish this task. Simulation scenarios can be created by assigning probability distributions of various process events and resource and cost models. Multiple scenarios can be simulated simultaneously. Simulation outputs include charts of cost, time spent, and queue build-ups. Queue build-ups are overlaid on the process diagram (see Figure 3-7) for easy interpretation of the results; resources can be dynamically adjusted to resolve queue build-ups.

FIGURE 3-7. Process simulation in BPM Studio
UI Components and Use of ADF

Oracle Application Development Framework (ADF) is a comprehensive UI development framework based on the model-view-controller (MVC) paradigm for building enterprise-class web applications. ADF is also Oracle’s strategic UI framework and is used for Oracle’s next-generation web browser–based UIs across a wide range of applications, such as Fusion CRM, Fusion HCM, Oracle Enterprise Manager, and so on. ADF is also the foundation for Oracle WebCenter—Oracle’s portal and collaboration product.

ADF is a JSF–based UI framework that allows for visual and declarative development of complex web applications. It extends the JSF framework and adds a number of features, such as drag-and-drop designer, along with a rich selection of interactive controls and data visualization elements like charts, graphs and trees, transaction management, callable page flows (using ADF Task Flows), ADF binding, and so on. Figure 3-8 shows a high-level schematic of ADF.
All of the Oracle BPM 11g UI components, such as Process Composer and BPM Workspace, are also built using ADF. BPM Studio provides design-time tooling based on ADF that can be used to generate or custom-design human task forms (see Chapter 8, “Developing Rich User Interfaces for BPM with ADF,” for additional details of use of ADF in the BPM Suite 11g context.)

Business Rules
Use of business rules has increasingly become a necessary element in process-based application development. In many instances, business rules can easily capture decision-making mechanisms; they can help model business or process flow control logic including human task assignment. Rules tend to be more business-friendly than graph-based process models and thus can be easily understood and modified by business participants. By externalizing business rules—that is, setting them up outside of the usual procedural process model, execution behavior of a process-based application can be changed without having to redeploy the BPM project, consequently often avoiding the need for additional IT projects. Thus, business rules enhance the agility of process-based business applications.

BPM Suite 11g includes a richly featured business rules component with an easy-to-use user interface that is available via BPM Studio as well as through Process Composer. This business rules component can model both if-then-action as well as the decision table (collection of logical conditions) style specification of rules (see Chapter 6, “Mastering Business Rules,” for an in-depth discussion of BPM Suite 11g business rules capabilities).

Roles, Users, and Groups
While Oracle BPM Suite 11g leverages users, groups, and organizational hierarchies maintained in an organization’s preferred identity store, process-specific roles can also be defined within BPM Suite 11g. In addition to process-specific roles, BPM Suite allows the definition of Calendars and Holidays. Roles in BPM are used to define initial participants in human tasks in the process. Roles are of two types: Application roles that are based on a BPM project, and Enterprise roles that are defined externally in an LDAP store. A BPM role (that is, an Application role in the context of BPM Suite 11g projects) has one or more users or groups (from the organization’s identity stores) assigned to it. These assignments can be done either during
design time or at runtime using the BPM Workspace application. The actual users and groups are defined in an enterprise directory such as LDAP. Role definitions are shareable among BPM projects. Figure 3-9 presents a schematic showing these relationships.

**Human Tasks and Workflows**

Human tasks and workflow support in BPM Suite 11g is aligned with the WS-Human Task (a subspec of what is popularly known as BPEL4People) specification (see www.oasis-open.org). Accordingly, it separates the components that handle the execution of tasks from the process flows, connecting the two by a service interface for invocation and call-back (see Figure 3-10). Within the execution infrastructure of BPM Suite, human task components (called Human Workflow or HWF) are handled by a separate service engine. Thus, HWF components can be called by any of the other components or can be used directly. For example, BPMN and BPEL processes can invoke the same HWF components.
For task assignment and routing, business rules can be invoked from HWF; the integration between HWF and business rules offers the flexibility of decision making based on specific participants interacting with the human tasks. Oracle Unified Messaging Service (UMS) is used by HWF to deliver notifications through channels based on user preferences. Actionable e-mails capable of handling task interaction via inbound e-mails are also supported by HWF. (Refer to Chapter 7, “Advanced Human Task,” later in this book for more related details).

**Forms for Human Tasks**

BPM Suite 11g uses Oracle ADF as the default technology to create the human task forms or UIs. BPM Suite 11g includes wizards for automatic or user-guided generation of ADF Views and Task Flows. These UI elements can either be used as is or further modified in the ADF Designer.
The workflow service engine exposes a rich set of APIs, abstracted through ADF Data Control (ADF DC), for accessing and interfacing with the human tasks. In the ADF designer in BPM Studio, using ADF DC, designers can bind UI elements to human task data by simple drag-and-drop. Using ADF DC, designers can also create Microsoft Excel interfaces without the need for writing any code. The underlying APIs are also available in Java or as web services for designers wishing to create task UIs in technologies other than ADF or Excel. See Developing Rich User Interfaces for BPM with ADF for more details on how to create forms for human tasks.

**Agility with BPM Suite 11g: Handling Change**

Change imperatives are inevitable in business; they are increasingly more frequent due to the fast-changing competitive playing field. Business processes, therefore, carry the burden of handling many of these changes. An agile organization needs to have the ability to change affected business processes correctly and rapidly. BPM Suite 11g provides many capabilities that could be utilized to change existing business processes easily.

As already mentioned, BPM Suite 11g allows pervasive use of business rules for decision making, the dynamic binding of process activities that can capture process variances due to differences in process parameters like geography or product, and for human task assignment and routing. Using business rules, processes can be made change-resilient. Since rules can be changed outside of the core process and hot-deployed (in other words, done without the need for redeployment of the whole BPM project), the impact of change on existing processes is greatly minimized.

Rules provide a way to handle planned change patterns. In some situations, for example during some of the nontrivial exception handling, ad hoc changes to certain functionalities of business processes can be very helpful. BPM Suite 11g allows appropriately privileged process workers to reassign current tasks and reroute current or future tasks, including the addition of more participants. Additionally, process owners can alter the flow of in-flight process instances and also change certain data variables in-flight if they have appropriate privileges.

Of course, there can be changes that require modification to the basic definition of the process. As discussed earlier, Process Composer can handle incorporation of most such changes rapidly. Use of Process Composer
facilitates easier participation of business users and analysts in incorporating the changes to the existing process; these changed processes can be also be deployed without IT’s involvement, thus reducing time and cost. A built-in governance mechanism in BPM Suite 11g can be used to specify who-can-change-what, thus preventing undesirable modifications to the process definition.

**Process Analytics and Business Activity Monitoring**

Insight into the working of processes is often required to assess the process design or to track process performance, starting at the business activity level. Such insight and visibility are helpful in process design refinement and for correlating process performance with related business activities and KPIs. As depicted in Figure 3-11, BPM Suite 11g incorporates an audit service that can continuously audit a variety of process metrics and user-defined business indicators. Depending on the user’s choice, such audit information is pushed to a Process STAR schema and/or as events to Oracle Business Activity Monitoring (BAM), where they are captured in BAM Data Objects. Standard and customized dashboards can be built on top of the Process

![FIGURE 3-11. The BPM Suite audit service and process analytics](image)
STAR schema, or the information can be consumed by external business intelligence tools such as Oracle Business Intelligence Enterprise Edition (OBIEE) and others.

Oracle BAM includes a set of out-of-the-box dashboards for standard process metrics. For example, monitoring and visualization of overall process performance, the number of running or faulted instances, completion times of processes and process activities, the frequency of invocation of specific activities (for example, high-cost manual versus low-cost automatic), bottleneck trends within or across processes, and so on are provided out-of-the-box. Further customizations can be easily done using Oracle BAM Studio in order to create special visualizations and additional indicators, or to generate real-time actionable alerts. Figure 3-12 shows a sample BAM dashboard.

FIGURE 3-12. A sample BAM dashboard
Collaboration Components: Process Spaces

BPM Suite 11g leverages Oracle WebCenter for providing a collaboration framework as well as out-of-the-box collaboration facilities. The E2.0 features requirement discussed before is supported through a set of WebCenter Spaces called Process Spaces. WebCenter is a comprehensive platform for enterprise portals, web portals, and composite applications that is integrated with social media, collaboration, and content management infrastructure. WebCenter Spaces (sometimes referred to simply as “Spaces”) is built on top of the WebCenter framework and allows for creating dynamic online communities.

BPM Suite 11g provides three, Spaces out-of-the-box: one for design-time collaboration among the wide range of process modeling participants called Modeling Spaces, and two run-time spaces, namely Process Work Spaces and Process Instance Spaces aimed at mainly facilitating collaboration during process execution.

Process Modeling Spaces

Process Modeling Spaces provides a collaboration environment for the design and modeling phase of the BPM project. Process Modeling Spaces integrates the web-based modeling tool, Process Composer, with discussion, document management, calendar, to-do lists, and more. Once Process Spaces is installed, one Process Modeling Spaces is created out-of-the-box that can handle multiple projects and communities. If needed, customers can create additional Process Modeling Spaces using the provided template. Figure 3-13 shows a screenshot of a Process Modeling Spaces.

Process Work Spaces

Process Work Spaces is an out-of-the-box WebCenter Collaborative workspace that facilitates collaboration among various business workers who are interacting with the process. Often when working with processes, process participants exchange information using a variety of channels such as e-mail, instant messaging, and others. These interactions may also include exchanging documents that are relevant to the process being discussed, including currently applicable policies, expert tips for problem resolution, and so on. Also, frequently it is difficult to get a single view of the progress of the process and the related interactions.
Process Work Spaces provides a customizable single interface for collaborative business process management. The Process Work Spaces mash-up brings together a wide variety of information such as an active task list, a calendar showing a participant’s to-do list based on the progress of the business process, a dashboard showing business process metrics, and others. To aid collaboration on a business process, it also provides discussions, document attachments, and other items that are tightly integrated with the business process.

Similar to Process Modeling Spaces, installation of Process Spaces creates one out-of-the-box Process Work Spaces; process workers sign into this Spaces to access items related to their work and preference. Figure 3-14 shows a screenshot of a Process Work Spaces.
Process Instance Spaces

Process Instance Spaces is a dynamically created WebCenter Spaces for collaborating on a specific instance of a business process. A process worker can spin off an Instance Spaces for a particular process instance they may be working on. For example, in a home loan approval process, each loan application may require significant collaboration between the loan officer, the mortgage broker, the load processor, internal auditors, and others. There may be active discussion among these participants to decide whether to approve the loan or resolve certain details of the closing costs. In the event that a senior manager may have to approve the loan, say as an exception, (s)he may need quick access to the work of the other process participants in one place. Process Instance Spaces is an ideal solution for such requirements; it can help the participants pursue joint investigation activities, facilitate
discussions and keep track of an evolving case for a specific loan application process instance.

Figure 3-15 presents a screenshot of a Process Instance Spaces.

**Infrastructure Tools and Features**

One of the goals of a BPM project is to streamline business activities, making them simpler to work with and track. In many cases, BPM projects are undertaken to solve fairly complex business problems. As seen in the example from a credit card company (discussed earlier in this chapter), a BPM project may connect together a diverse set of modeling components such as BPMN- and BPEL-based process models, business rules, human tasks and workflows, document handling, event processing, the exchange of information with several computer applications, and the incorporation of
security and other operational policies. Thus, ordinarily speaking, process-based applications could become complex integration challenges of their own with consequential difficulties in modeling, development, execution, and maintenance of such integrated applications. BPM Suite is industry’s first solution that comprehensively addresses this challenge by providing a uniform process foundation that executes on a service-oriented execution infrastructure.

Assembling a BPM Application—Use of SCA
The first strategy that BPM Suite 11g employs in simplifying the creation of a BPM application is to leverage the assembly concept from the Service Component Architecture (SCA) standard (www.osoa.org). Per SCA, an application is composed from a set of components, and thus the application is termed an SCA composite. Figure 3-16 shows a schematic of an SCA component. It essentially consists of details corresponding to some
modeling paradigm (for example, in the case of BPM Suite 11g, BPMN, BPEL, business rules, and so on) as its body; and on the periphery, services and references as a means for invocation from multiple channels or components and connecting to multiple-end systems or components, respectively—along with a mechanism to parametrically alter the behavior of the component via properties. As shown in Figure 3-17, a SCA composite is simply wired from a collection of components. A SCA composite can include one or more of a particular component type. SCA provides a cleaner discipline to pursue either a top-down or a bottom-up approach to application design and to manage the resultant application across a range of its life-cycle phases. Use of SCA also simplifies deployment and versioning as the application is captured and dealt with as an assembly. BPM Suite 11g uses a metadata store (MDS) to collect and preserve the SCA artifacts.

![Schematic of a generic SCA composite](ch03.ps)

**FIGURE 3-17.** Schematic of a generic SCA composite
BPM Studio’s SCA Editor automatically creates and maintains the necessary SCA artifacts and this may be totally transparent to process analysts using Process Composer. SCA components created in BPM Studio get included in BPM Suite’s Business Catalog and become available to process analysts as modeling components in BPMN models.

Figure 3-18 shows an SCA composite for a BPM project in the SCA editor. Here a BPMN process component invokes one or more of the other components like human task, business rule, BPEL process, and mediator. Of course, any of these invoked components could also invoke one or more BPMN processes. In fact, the modeler has the flexibility to define as many of any of the allowed components, and connect (or wire) them, as the solution demands. The composite itself can be invoked in more than one way; the figure here shows two different invocations using two services it exposes. Also, the composite can connect to other services such as technology or application adapters or web services.

**FIGURE 3-18. A BPM application as an SCA composite**
Unified Process Foundation and Service Infrastructure
As shown in Figure 3-19, BPM Suite 11g uses a common execution infrastructure (also known as the Service Infrastructure) where plug-in service engines natively execute specific modeling components; BPMN, BPEL, Rules, Human Tasks, and Mediator are examples of such service engines used by BPM Suite. An application server like Oracle WebLogic Server provides the final runtime environment that hosts these service engines.

Using SCA and the common service infrastructure BPM Suite provides a foundation to unify all the modeling components like BPMN and BPEL process models, business rules, human tasks, and so on. This strategy yields very high modeling and development flexibility, and eases the task of tuning and managing the resulting BPM application. Also, this unified infrastructure helps in providing better design-time and end-to-end visibility into the application and the associated services and end-points.

FIGURE 3-19. Unified process foundation and service infrastructure of BPM Suite
Since BPM Suite shares the service infrastructure with Oracle SOA Suite, it automatically provides a rich collection of application integration features supporting the connection to Oracle Service Bus, application adapters, web services, service repositories, imaging and content management, Oracle Business Activity Monitoring (BAM), Oracle Complex Event Processing (CEP), Oracle Real-Time Decisions (RTD), and Oracle Security. Using this unified service infrastructure, BPM Suite also delivers an enterprise-grade operational platform that is highly performant, available, and reliable.

**Enforcing Security**

Security aspects of applications built with BPM Suite 11g can be classified under two main categories: the first is about user authentication and authorization, and the second is about access to services and data. As discussed earlier, BPM application–specific users and roles ultimately are mapped to corporate identity stores. BPM Suite uses Oracle Platform Security Services (OPSS) for integrating with identity directories such as Oracle Internet Directory (OID) Active directory, and any LDAP compliant directory. Consequently, the OPSS layer handles the configuration of identity providers for authentication and authorization. Oracle BPM web applications are also certified with multiple Single Sign On (SSO) providers—for example, Oracle SSO, Oracle Access Manager, Windows Native Authentication, and others.

For managing access to services and data including data encryption, BPM Suite 11g adopts a policy-driven approach. Oracle Web Services Manager (OWSM), a built-in component of the service infrastructure, manages the enforcement and auditing of security policies. In BPM Suite 11g, the creation of security policies can be separated from functional development and deferred to security experts. This strategy also allows security policies to be changed without requiring redeployment of the BPM Suite project. A BPM Suite application enables policy specification, enforcement, and audit. BPM Suite 11g supports the relevant WS-* standards for security policies that include access to services, passing of credentials between services, and data encryption. Security policy definitions are created in FMW Control of Oracle Enterprise Manager (the overall unified management console for FMW applications), while either BPM Studio or Oracle Enterprise Manager can be used to attach those security policies to
target interfaces. In addition, the configuration of credential stores and roles can be done at Enterprise Manager Console. One-way or two-way Secure Socket Layer (SSL) protocol can also be used in BPM Suite applications; however, OWSM provides additional security capabilities like Security Assertion Markup Language (SAML) for identity propagation, and Kerberos, username, or X509 tokens for authentication.

Operations, Administration, and Systems Monitoring/Management

Often IT solutions get rejected or considered failures if they pose a high operational complexity and cost. One of the key goals of BPM Suite 11g has been to provide a relatively simple framework to handle the operation, administration, and management (OA&M) chores for BPM applications. In the following, we will provide some highlights of the OA&M features of BPM Suite.

Oracle Enterprise Manager

Staying fully compliant with the core guiding principle of an integrated stack, BPM 11g is managed through the single monitoring and management console provided by Oracle Enterprise Manager (EM). Oracle FMW Control, part of the Oracle Enterprise Manager, allows system administrators to monitor and manage the health of the Oracle BPM 11g system—from the servers running BPM Suite 11g to individual instances of every process. FMW Control also provides runtime life-cycle management, such as deploying and un-deploying BPM applications (also known as composites per SCA vernacular), and starting, stopping, and retiring a specific version of the composites. Figure 3-20 shows a screenshot of Oracle Enterprise Manager.

Exception Handling

Exception handling in BPM Suite 11g can be done by either explicitly modeling business exceptions and associated process paths (that is, using BPMN constructs such as “catch” and “throw” events, even subprocesses, and patterns generated using such constructs) or using policy-driven declarative exception handling.
An exception handling policy, called the Fault Policy, contains one or more policies that define exceptions to be caught and the actions to be taken when such exceptions occur. The exception handling framework provides a choice of various actions such as retry, abort, and human intervention via Oracle Enterprise Manager, and custom actions created using Java. Fault Policies are generic and are not specific to any process. Process developers can attach appropriate policies during build time so that they are part of the deployment unit.

The exception handling policies are stored as XML files that define how different types of faults should be handled. This allows for nonintrusive exception handling that is completely separated from the process.

FIGURE 3-20. Screenshot of Oracle Enterprise Manager
Typically, system errors and exceptions such as network and database errors can also be handled using this framework. Oracle FMW Control (part of Oracle Enterprise Manager) is also used to manage faults and exceptions occurring during the execution of a process. It provides the administrator with options to abort, resume, fix data errors, and restart process instances.

It is worthwhile to note here that the policy-based exception handling strategy is typically well suited for system level exceptions, while business exceptions including situations where compensation logic may be needed are usually better handled via the BPMN-based patterns and applied where the exception is raised from.

**Deployment**

From a small single server deployment, suitable for development environments, to multiserver clustered deployments, Oracle BPM 11g is quite flexible in the ways it can be deployed. BPM 11g fully leverages high-availability and failover features provided by the underlying WebLogic application server. The supported deployment topologies include both active-active and active-passive patterns.

Oracle BPM 11g provides a set of command-line tools for automating the compilation, building, and deployment of BPM composite projects. The deployment tools can use a Configuration Plan that provides an easy way to modify environment specific values such as file system paths, network port number, URLs, database connection information, and others. A configuration plan is external to the composite application and applied to the composite application JAR file at deployment time. This allows for easy migration from one environment to another—for example, from test to production.

**BPM Suite Interplay with Related Technologies**

As we have shown thus far, BPM Suite 11g is a feature-wise comprehensive offering. However, there are many related technologies, both from Oracle stack as well from external vendors, that can also be leveraged along with BPM Suite to deliver yet higher value. In this section, we will explore some of them.
Visio and Other Modeling Tools
While BPM Suite includes a rich BPMN 2.0 process modeler, many customers would have existing process models in Visio and other process modeling tools. BPM Suite 11g includes a business process converter to import these models using XPDL 2.0 as an interchange format from Visio and other modeling tools that can export XPDL. It is widely expected that as BPMN 2.0 matures, different modeling tools and BPM Suites will be able to exchange BPMN 2.0 models without needing XPDL as an interchange format.

Decisioning
While BPM Suite includes a very capable and easy-to-use business rules component (which we have already mentioned briefly here and will be described in detail later in this book), there are scenarios where different decisioning technologies may be used with BPM 11g. Some of these decisioning products are:

- **Complex Event Processing (CEP)**  Oracle CEP (which from the packaging perspective is included in BPM Suite 11g) may be used alongside Oracle BPM Suit 11g to detect interesting business scenarios by looking for patterns in events emanating from BPM and elsewhere over windows of time. The BPM processes cannot only feed events to the pattern processor, but they can also be designed to adjust accordingly as different scenarios are detected or anticipated (Gartner calls this *Scenario Based Planning*). For example, a credit card issuer may relax its credit approval rules if it detects that a slowing economy is going to adversely impact the volume issued; if the company detects a continued deterioration of the economy in conjunction with increased defaults, it may put in place rules designed to weed out potential defaulters.

- **Real-Time Decisions (RTD)**  Oracle RTD (a separately licensed component) is a predictive analytics product that allows real-time intelligence to be instilled into business processes. Based on modeled objectives and observed outcomes, RTD can suggest decisions and actions to process participants. As the process unfolds and the outcomes of decisions become available, BPM can communicate it back to RTD, which then evolves its decision making.
For example, if a credit card issuing company wants to optimize its credit card issuing decisions to maximize business while minimizing defaults, it can use RTD as the recommendation engine powering the card issuing process.

- **Oracle Policy Automation (OPA)** Oracle Policy Automation (a separately licensed component) can be used to address the following scenarios:
  - Creating rules from existing policy documents (in Word or Excel).
  - Implementing guided questionnaires—for example, a set of rules may be used by a credit card issuing company to decide what information it needs to collect from various applicants.
  - Conclusion-driven reasoning (also known as backward-chaining), where a conclusion such as “Customer is eligible for credit increase” is supported by conditions.

**Content Management**
Oracle Universal Content Management (UCM) (restricted use license included) is integrated with Oracle BPM 11g so that:

- Task and process attachments can be specified to be stored in UCM
- UCM can be configured to kick off a process based on UCM events
- Process Spaces is pre-integrated with UCM and provides the community-based creation and sharing of documents, wikis, and blogs (which are also UCM content)

**Business Intelligence**
As mentioned earlier, Oracle BPM 11g includes a rich BAM product for end-to-end monitoring and alerting. However, certain types of analysis may require the capabilities of a business intelligence product. Also, as indicated before, Oracle BPM 11g provides views on top of its STAR schema to facilitate analysis by Oracle Business Intelligence (a separately licensed component) or other BI tools. Oracle BI also supports the concept of
actionable insights—kicking off BPM processes from BI dashboards to take corrective or other actions. Oracle BPM 11g can invoke BI to get a report included as part of a human task form so that the decision maker has the necessary insight to make a good decision. Finally, just as BPM Suite 11g is integrated with WebCenter Spaces, Oracle BI is integrated with WebCenter Spaces, too. A customer using these products from Oracle can very simply create composite portal interfaces—this is a business-user targeted task completed from the web interface itself using drag-and-drop editing of pages.

Summary

In this chapter, we provided a high-level overview of BPM Suite 11g. We covered the essentials of the product architecture and the drivers behind it, key product functionalities, and the ways this toolset could benefit those seeking to adopt BPM. As we described here, using the principles of social and collaborative interactions, role-based tooling, and unified execution infrastructure, BPM Suite 11g provides excellent capabilities to create, deploy, and manage full-featured, process-based business applications efficiently. Business empowerment, development agility, and operational ease are some of the immediate benefits of BPM Suite 11g. Along with insightful simulation, the use of business rules, multilevel monitoring and analytics, and its what-you-model-is-what-you-execute paradigm, BPM Suite 11g is an ideal product to handle incremental changes to existing processes and to pursue continuous process improvement. In the following chapters, we will delve into the finer details of many of the topics covered in this chapter.