

Migrating to Oracle BPM from Oracle Workflow

An Oracle White Paper

March 2012

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INTRODUCTION

Oracle has always regarded process management as an important discipline to pursue. More than a decade ago, Oracle released Oracle Workflow, a tool used to manage traditional workflow chores and connect information flows between human workers and computer applications. It was essentially a database application and used a client tool, the Workflow Builder, a graphical modeling tool that lets users create, view, or modify business processes using drag and drop operations. This workflow product was later on also embedded in the Oracle E-Business Suite of applications for managing its workflows. Since then, the demands on process management have increased, and standards for process modeling and execution have emerged. Oracle is advising its customers using the Oracle Workflow version that is unattached to Oracle E-Business Suite also known as Standalone Workflow to consider migrating to the Oracle Business Process Management (BPM) Suite, the next generation of process technology from Oracle. The Oracle BPM Suite provides an integrated environment for developing, administering, and using business applications centered on business processes.

Oracle BPM simplifies achieving process management success with a complete solution for all types of processes by providing a unified process foundation, user-centric design, and social BPM interaction. It enables collaboration among process developers and process analysts while maintaining concurrency throughout the process lifecycle. For process modeling and implementation, process analysts can design business process models using Oracle BPM Studio, a tool installed as a plugin to Oracle JDeveloper. This is akin to the Workflow Builder modeling tool. Oracle BPM Studio supports Business Process Management Notation (BPMN) 2.0, a standard in modeling business processes. Moreover, BPM achieves persona-based modeling by also supporting a lightweight web browser-based interface that is designed mainly for business analysts more focused on process model and business logic. The Oracle BPM execution component provides a run-time environment for executing business processes in native BPMN notation. It also fulfills interactions with Human Workflow for processes requiring human actions and Business Rules for processes involving dynamic decision-making. In other words, BPMN provides a modeling notation for capturing business processes and interactions, and through a combination of graphical and supporting elements, allows a model to be populated with sufficient information to generate executable runtime processes.

Because Oracle Workflow and BPMN are both fundamentally graph flow languages, a process that is implemented in one can be implemented in the other. However, they have different models and this paper is intended to provide guidance for those customers who are familiar with Oracle Workflow and will be designing and implementing BPMN processes, either brand new ones, or ones which will replace existing Oracle Workflow processes.

This paper's primary focus is on aspects that differ between the two products and that developers should therefore be most aware of. It describes tips and best practices for migrating Oracle Workflows to Oracle BPM. It also describes features in Oracle BPM whose proper usage can ease this migration process.

HISTORICAL CONTEXT - STATEMENT OF DIRECTION

Oracle has announced product obsolescence for Oracle Workflow. In a Statement of Direction published in January 2006, Oracle indicated that new development by customers of human-centric workflow should be done with Oracle BPEL Process Manager. In a new SOD published in January 2007, Oracle recommended that customers who have Oracle Workflow processes in development or production that they plan to continue to enhance in the future should begin re-implementing those in BPEL. The SOD is available at:

<http://www.oracle.com/technetwork/middleware/ias/workflow-sod-089843.html>.

Since the SOD was published, Oracle's process technology has evolved to position Oracle BPM in the forefront of business process management. With its support for graph based BPMN language, Oracle BPM provides a significantly better migration target than block structured BPEL, which is primarily an execution language used for orchestration of business services. Leveraging this support of BPMN, Oracle has also included some migration utilities in its recent BPM releases.

ORACLE BUSINESS PROCESS MANAGEMENT (BPM)

The Oracle Business Process Management Suite is a complete set of tools for creating, executing, and optimizing business processes. The suite enables collaboration between Business and IT to automate and optimize business processes.

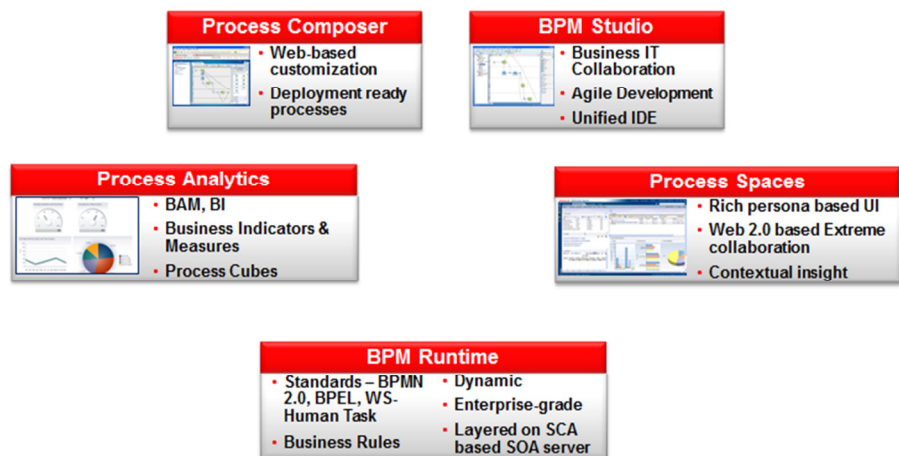


Figure 1: Oracle BPM Building Blocks

The Oracle BPM areas of functionality broadly include:

- Business driven Modeling
 - BPM Studio – JDeveloper-based design environment for IT and the technical side of the business incorporating years of best practice modeling design. IT users have access to full set of capabilities ranging from Java and Web Services development to

BPMN and BPEL; particularly relevant is access to all of SOA's zero-code adapters, transformation, and other capabilities. The model that is designed in BPM Studio is a 'what you see is what you execute' (WYSIWYE) model that eliminates synchronization issues between runtime and design time modifications – it is the same model.

- Process Composer – Targeted at line-of-business users, it allows business users to tailor-to-fit business processes and rules from a web based tool. With nothing to deploy on user's desktops, Process Composer enables a wide range of business participation with role-based privileges on resources and functions much like BPM Studio.
- BPM Runtime
 - Designed for end-to-end process management and integrates with Oracle and third party applications, and Business Intelligence
 - Standards based – supports BPMN 2.0 native runtime engine, BPEL, WS-HumanTask
 - Pervasive use of Business Rules. A rich business friendly Business Rules component is not only included and seamlessly integrated but is also pervasively used for enabling truly dynamic BPM; such usage includes – rules based work reassignment/delegation/balancing, rules based service selection, rules based task routing, rules based alert handling
 - Being layered on Oracle SOA Suite, it provides enterprise-grade performance, scalability, reliability, and manageability.
- BPM Monitoring and Work Management
 - BPM Workspace and Process Spaces – There are two flavors of work management portal available with Oracle BPM. The stand-alone work management portal is called BPM Workspace which business users can log into to perform tasks related to the business process and view the process instance audit trail information. There is also another web 2.0 flavor of the work management portal built on top of Oracle WebCenter called Process Spaces. Collaboration is a big focus of Process Spaces to ensure business and information technology alignment. It enables different channels such as wiki's, blogs and documentation aspects related to a specific process to be used as means of collaboration on a process.
 - Process Analysis – Process Analytics functionality within Oracle BPM Suite provides process performance monitoring and business monitoring through either BPM Workspace dashboards or Oracle BAM (Business Activity Monitoring), another component of Oracle BPM Suite. Out-of-the-box metrics for activities and processes include active instance count and average time to complete, broken out by process, activity, and participant. In addition to the predefined metrics, process designers can

create custom metrics using *business indicators*, a special type of process variable for Process Analytics measures and dimensions.

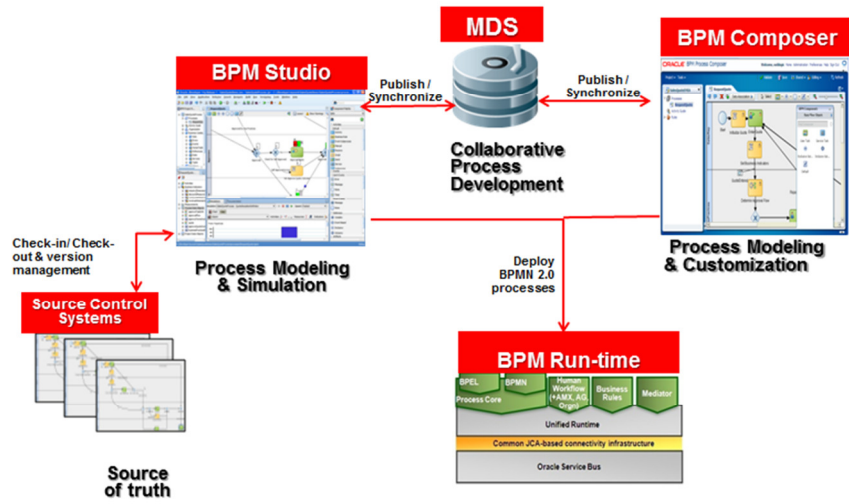


Figure 2: Collaborative Process Design

Oracle BPM 11g is a game-changer. It gives business analysts and executable process developers a common process model based on the BPMN 2.0 standard. At the same time, it is loaded with features for IT, starting with a world-class SOA Foundation...Put it all together and Oracle BPM 11g is probably a year ahead of its closest competitor

— Bruce Silver
BPMS Watch

For more details, please see the Oracle BPM Datasheet at <http://www.oracle.com/technetwork/middleware/bpm/overview/bpm-datasheet-132009.pdf> and documentation at <http://www.oracle.com/technetwork/middleware/bpm/documentation/index.html>. The site <http://www.oracle.com/technetwork/middleware/bpm/overview/index.html> is a great resource of information on Oracle BPM.

This paper lays most of its focus on the modeling aspect of the process management portfolio.

OVERVIEW OF BUSINESS PROCESS DESIGN

Business Process Modeling Notation, commonly referred to as BPMN, is a graphical representation for specifying business processes in a business process model. It has emerged as the de-facto for modeling and is a core enabler of the BPM initiative in the Enterprise Architecture World and is broadly accepted.

BPMN has built in support for asynchronous transactions, flow control, and compensating transactions. BPMN leverages XPath, XSLT, and XQuery for data manipulation.

The primary BPMN elements include the following:

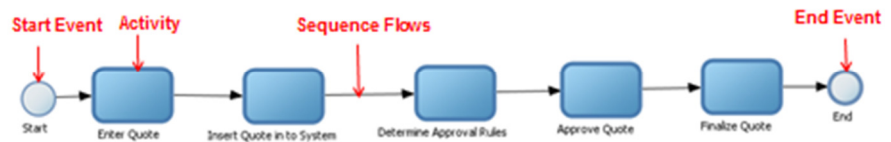
- Event – An event indicates something that happens during a process. It supports asynchronous communication with other processes, error handling and controlling flow logic

- Activity – An activity represents the kind of work that needs to be done. These can be identified by different tasks, and sub-processes.



Figure 3: Task Activities implemented in Oracle BPM

- Gateway – A gateway determines forking and merging of paths, depending on the conditions expressed
- Connecting Object – This is used to connect the above three elements to



each other

Figure 4: Sequence Flow BPMN Connection Object in Oracle BPM

A Process describes a sequence or flow of activities in an organization with the objective of carrying out work. A Process is depicted as a graph of Flow Elements, which are a set of Activities, Events, Gateways, and Sequence Flow. The sequence flow represents the order in which Tasks are carried out.

To learn more about BPMN, please visit the website at <http://www.bpmn.org>.

The Sales Quote example project is a real-world example of a business process using Oracle BPM features.

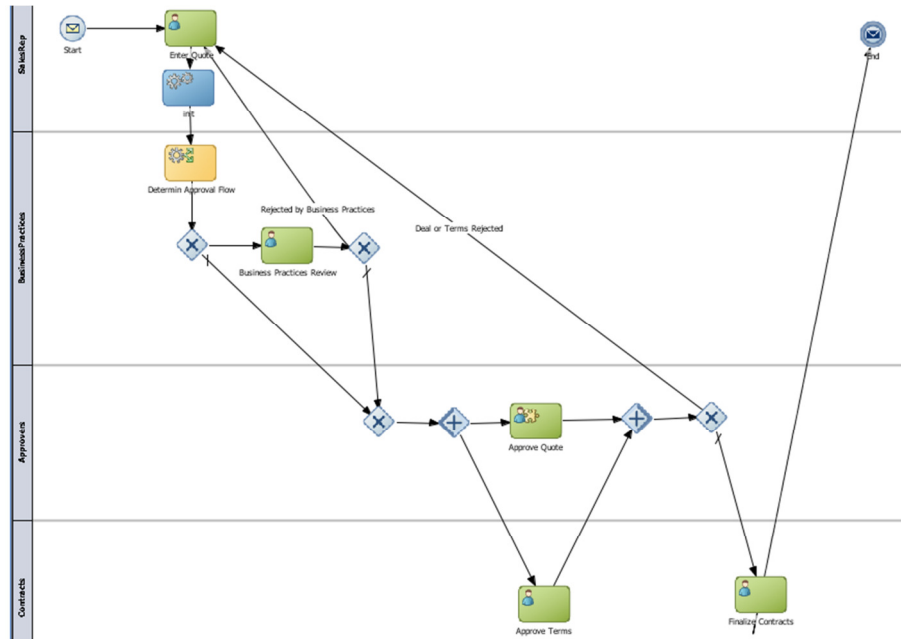


Figure 5: Oracle BPM: The Sales Quote Example Project

HUMAN TASKS IN BPM

Human tasks in BPM are fulfilled by the implementation of user tasks. Human tasks can be added by using a simplified interface within Oracle BPM. At runtime, when the flow control arrives at a user task, the control is passed from the BPMN process to the Oracle Human Workflow, and the control gets passed back to the BPMN process once the Human Tasks are completed. The Human Workflow Service is then responsible for routing the task to the various users, notifying them, and so on.

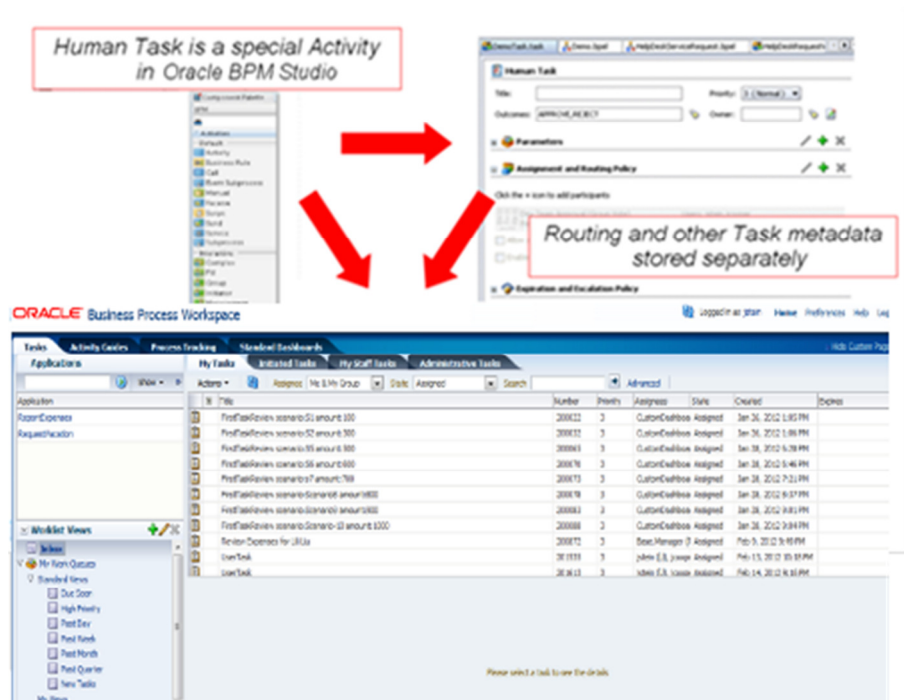


Figure 6: Human Workflow Overview

In summary, human tasks are modeled using a Human Task activity - the routing, assignment, notifications, escalation and other metadata is stored in a .task file, and at run time users can log into a Task List application to find and perform work.

Some of the salient features of the Human Workflow component are:

- Declarative pattern based routing – Common patterns such as Management Chain Escalation and Group Voting can be declaratively specified. Multiple patterns can be combined for sophisticated routing patterns.
- Assignment – Tasks may be assigned to individuals or groups (roles). Tasks may also be assigned dynamically based on process data enabling plugging in of any other assignment engine or rules based assignment.
- Nomination, Delegation and Reassignment – Supervisors and process owners may nominate or delegate tasks. Also, group owners may specify reassignment rules for redistributing work assigned to a group based on various load balancing algorithms. The reassignment feature addresses the scenarios addressed by the Role Resolution feature in Oracle Workflow.
- Declarative Escalations and Notifications – Escalations, notifications, and reminders may be declaratively specified. Rich set of notifications is supported and email notifications may be made actionable allowing someone to complete their task from their email.

For more details, please visit the Oracle Human Workflow page at <http://www.oracle.com/technetwork/middleware/human-workflow/overview/index.html>.

BUSINESS RULES

Business Rules is becoming a key component in a process-based application development. They can help capture complex decision-making mechanisms. They can help model business or process flow control logic including human task assignment. Business rules can be externalized, and hence execution behavior of the process-based application can be changed without any redeployment of the BPM project itself. Oracle BPM Suite includes an easy-to-use business rules component that is available via BPM Studio as well as through Process Composer. The component can model both *if-then-action* as well as the *decision-table*.

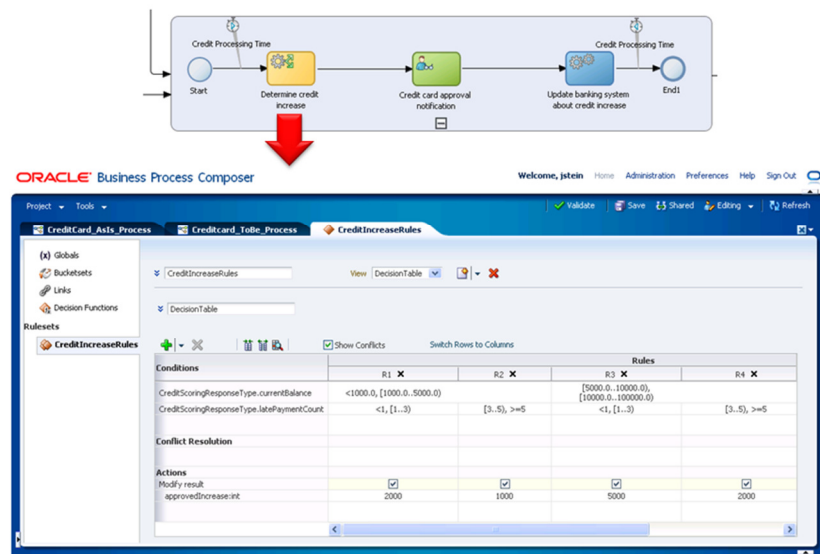


Figure 7: Oracle BPM: Built-In Business Rules

MIGRATION OUTLINE

Process Migration

Step 1. Classify Workflow Process: The first step in the migration should be to understand your Oracle Workflow Processes and classify them with the goal of identifying the right target technology. Oracle Workflow Processes may fall in the following categories:

- Process Navigator Flows: These should either be converted into ADF Task Flows for cases which warrant a modular approach for defining control flows or to Activity Guides in BPM Suite when the flow is a large-scale, long-running, multiuser process that

consumes and reuses various task flows and process orchestration is the controlling agent for the business process across multiple disparate systems.

- Page Flows: These should be migrated to ADF Task Flows.
- Simple Deferred Activities: If you are using Workflow to simply perform some DML activities on your tables, then you may want

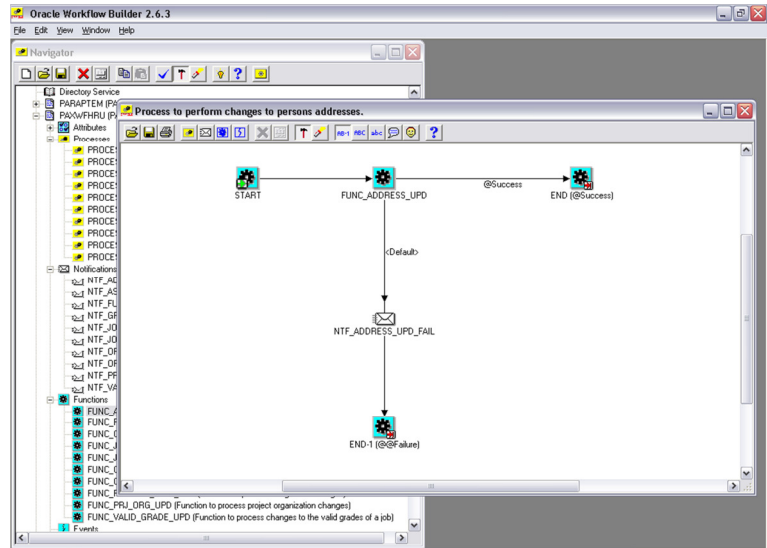


Figure 8: Example of a simple deferred activity

to not convert these to BPMN but rather raise an event, and use Mediator to invoke the needed activities on event receipt. If you choose, you can use BPMN as well.

- XML Transaction Flows: If you are using Oracle Workflow to model XML Transactions, you may want to simply use the transformation capabilities of Oracle Mediator. If you choose, you can use BPMN as well.
- Business Processes: Generally speaking these are the orchestration of system services and human tasks including approvals. This category should be migrated to BPMN as described in this document.
- Identify Business Services: Identify all the PL/SQL procedures and functions you are calling from Workflow. You should be able to call these directly from BPMN using either the DB adapter or Applications adapter, if the interaction is based on Oracle E-Business Suite. However, if you are accessing or setting item type from within your PL/SQL code you will need to change them as described in section Data Access below. In addition, all workflow

dependencies e.g. calls to workflow engine APIs, will need to be replaced.

- Identify all third-party APIs you are calling from Workflow. You should be able to call them from BPMN using the rich set of adapters provided in BPMN.

Step 2. Identify Users/Group Roles setup: See section on Roles, Users and Groups described below.

Step 3. Identify Workflow Dependencies:

- i. If you are using any Workflow engine APIs in your application code, some of these will need to be modified to use corresponding BPM XPath Extension functions or the native functionality provided by BPMN. BPM XPath functions enable the access of process and process data objects, arguments, and activity instance attributes.
- ii. Oracle BPM 11g includes a set of APIs that can be used to create and query process instances. These are documented at <http://www.oracle.com/technetwork/middleware/saasuite/documentation/bpm-e25378-01-488744.zip>

Step 4. Identify key Business Rules: You may want to implement the key business rules using Oracle Business Rules. Doing so externalizes the business rules – that is, by setting them outside of the procedural process model, runtime behavior of a process can be changed without the need to redeploy the BPM project. See the section on Business Rules above.

Step 5. Identify Approval Logic: Human Workflow enables powerful declarative pattern based approval. You may simplify the approval logic as described in Approval Flow (Human Workflow) below.

Step 6. Define Process Variables to be used: Understand the shape of the data variables that you will need and define the structure of these variables. These essentially get passed and used as Data Objects within BPMN.

Step 7. Define BPMN Process Flow: Understand the current flow and define it in BPMN. As of BPM 11gPS4FP, users can import existing Oracle Workflow models into BPM Studio 11g. This import process is described at <http://java.net/projects/oraclebpmsuite11g/downloads/directory/Samples/bpm-115-oracleworkflow-import>. It uses the sample Workflow demo process WFDEMO.wft as an example. The import process

establishes a basis for your migration process and is a starting point for subsequent implementation in BPMN. The section on Control flow below discusses the semantic differences between OWF flow and BPMN flow and how to map OWF Flow to BPMN flow.

Step 8. Fill out BPMN Details: Add BPMN details per the mapping outlined in section Constructs Mapping below.

Step 9. Deploy: Deploy the BPMN Process.

Data Migration

Due to the differences in the Oracle Workflow process and migrated BPMN process, it is not recommended to attempt migrating run time data from Workflow Tables to BPMN Runtime Tables. The value of the run time historical data is primarily for analytic purposes; therefore, instead plan on migrating runtime data to the appropriate analytic warehouse schema.

CONCEPTS MAPPING

Control Flow

Like in Oracle Workflow, BPMN provides different structures to control the flow of a process. These structures enable decisions as to which path a process instance takes based on different conditions. These structures are flow objects in the form of gateways which enable you to fork the flow of a process, timer events which define a path based on time conditions, message events based on the occurrence of a certain event, errors, and loop markers amongst others. Provided below is a brief description for each of these constructs:

Loops

In Oracle Workflow, loops are designed as a loop counter activity. A Loop Counter activity may be used to control the allowed number of iterations.

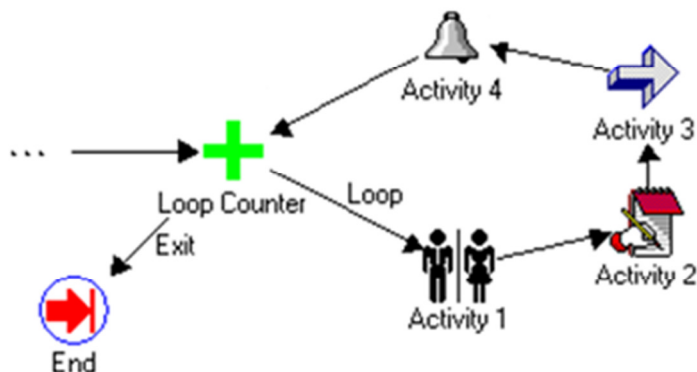


Figure 9: Oracle Workflow: Example Loop Counter Activity in a Branch

In BPMN, loop markers enable a sub process to run multiple times based on a certain condition or expression which has to be explicitly set. The loop marker can be configured to stop after a certain number of repetitions. The activities forming the loop in Oracle Workflow should be modeled as a looping sub-process with a loop condition specifying the number of loops. In addition, multi-instance markers can be configured to run a sub process for each of the elements on a set of data.

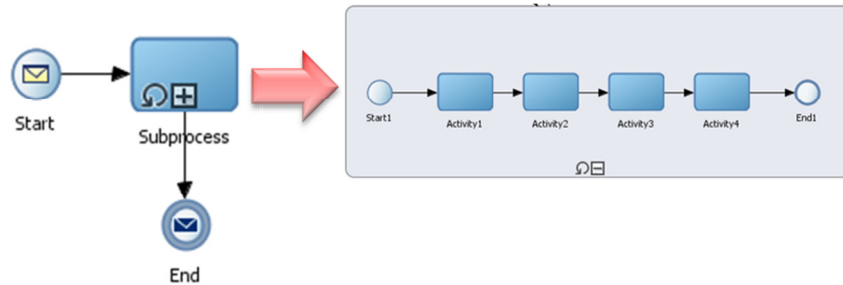


Figure 10: BPMN Loops using Loop Marker for a Sub-Process

Transitions / Branching

In Oracle Workflow, multiple transitions may be drawn from a node based on its result lookup as well as Any, Default, and Timeout. Parallel branching is implicitly defined if more than one transition is enabled (Any in parallel with Result based transition).



Figure 11: Transitions/Branching in Oracle Workflow

In BPMN, sequence flows connect the flow objects within a process, and determine the path a process token follows through the process. Sequence flows can be conditional or unconditional. Conditional sequence flows can be used to control the flow of a process based on defined conditions or expressions. Parallel paths in a process can be configured using parallel gateways which allow splitting up the process into two or more paths and when it is needed that all the paths be followed simultaneously.

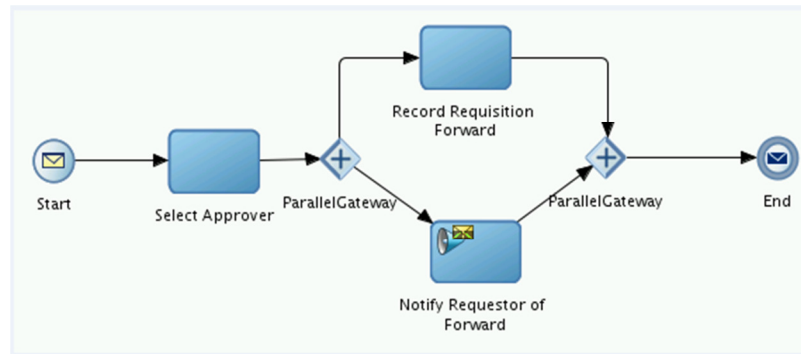


Figure 12: Transitions/Branching in BPMN

Timeout Transitions

In Oracle Workflow, Timeout transitions are drawn from a notification activity to some other activity to force the process to perform the other activity if the notification activity does not complete by a specific period of time.

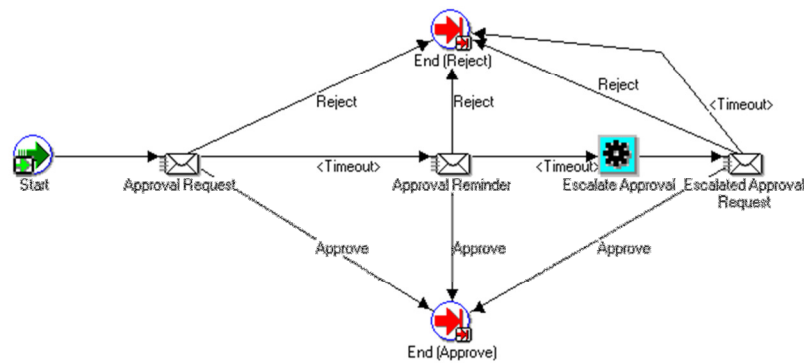


Figure 13: Notification Timeout in Oracle Workflow

Notification Timeout intervals can be defined declaratively within a single approval user task in Oracle BPM and the above Workflow model defined as shown below.

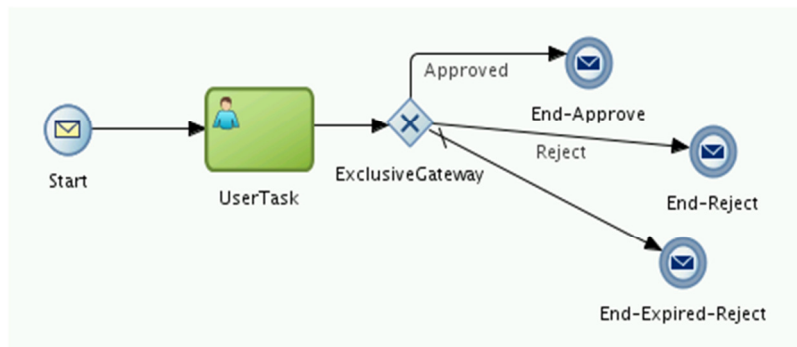


Figure 14: Notification Timeout defined within User Task in Oracle BPM

Email Notifications

Oracle Workflow implementations use email notifications prominently to designate a role to perform some human activity or simply to relay process-related information.

In Oracle BPM, the Notification Task can be used to configure notifications via e-mail, SMS, voice or IM. The roles for these are defined in an LDAP. Also see section on Roles, Users, and Groups described below. In addition, Human Tasks allow you to configure notifications to a user or role to let the user know when the status of the task changes.

Errors

Oracle Workflow allows defining the processing that should occur in case of an error by specifying an error handling process when a workflow process is being built.

Similarly, within BPMN, error events enable you to define how a process handles an abnormal situation. You can use error events to define different process flows for each of the errors that may occur in a business process. See section on Error Handling below.

Message Events

The concept of Message Events is similar in Oracle Workflow and in BPMN.

Mapping Oracle Workflow Control Flow to BPMN Control Flow

1. Understand the logic of your Oracle Workflow Control flow.
2. Identify the loops and looping conditions. Model these in BPMN by specifying looping conditions
3. Identify the fan-out points. Understand whether the fan-out is conditional branching or parallel branching. Identify the matching fan-in points. Model in BPMN using gateways.
4. Identify the usage of notification activities in Oracle Workflow. The equivalent functionality should be modeled using the Human Task Editor.
5. It is important to discern certain flow patterns within Oracle Workflow which can be equivalently modeled using tasks within Oracle BPM using declarative data. See the Approval Flow section below.
6. Error processes should be replaced to use error events in BPMN
7. All the message events should be identified and translated into the message event in BPMN that maps directly to functionality provided by Oracle Workflow.

Data Access

In Oracle Workflow, invoked PL/SQL code may access the Item attributes using WF_ENGINE APIs. Also, each activity returns a result suitable for result based transitioning.

```
procedure UpdateStatus (
  itemtype in varchar2,
  itemkey in varchar2,
  actid in number,
  funcmode in varchar2,
  resultout out varchar2) is
  l_po_number varchar2(20);
  l_po_status varchar2(20);
begin
  if ( funcmode = 'RUN' )
  then
    l_po_number :=
wf_engine.getitemattrtext(itemtype,
itemkey, 'PO_NUMBER)'
    l_po_status :=
wf_engine.getactivityattrtext(it
emtype, itemkey, actid,
'PO_STATUS)'

    PO_PKG.UpdateStatus(l_po_number,
l_po_status);

    resultout :=
'COMPLETE:<result>';

    return;
  end if;
end;
```

Figure 15: Data access in OWF within PL/SQL using WF_ENGINE API

In BPMN, the invoked activity cannot access process data. Any data it needs should be passed in as its input arguments via data associations and any data it needs to set should be passed as output arguments to the next flow object implementation. Note that the output of a BPMN activity is not limited to lookups. Alternatively, the data should be externalized and stored in a database from where both the process and the activity can access it.

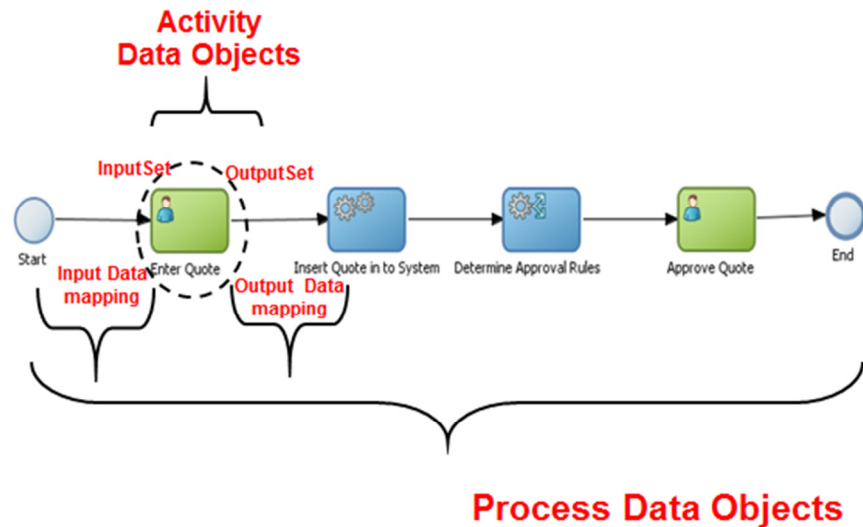


Figure 16: Arguments and Data Objects in BPMN

Roles, Users and Groups

Oracle Workflow users and roles are stored in the database, in the Oracle Workflow directory service. Oracle Workflow references this user and role information through the views WF_USERS (individual users), WF_ROLES (roles, which can have one or more users as members), and WF_USER_ROLES (associations of users with the roles).

Oracle BPM Suite leverages users, groups, and organizational hierarchies maintained in an organization's preferred identity store. In addition, process-specific roles can also be defined within BPM Suite 11g. In Oracle BPM, the areas of responsibility are mimicked by roles 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 has one or more users or groups assigned to it. Roles are logical and when the Oracle BPM project is deployed, the roles get mapped to LDAP roles or groups that correspond to users in a real-world organization.

Approval Flow (Human Workflow)

In Oracle Workflow, Approvals were modeled using complex loops, wait activities, notification activities, timeouts, etc.

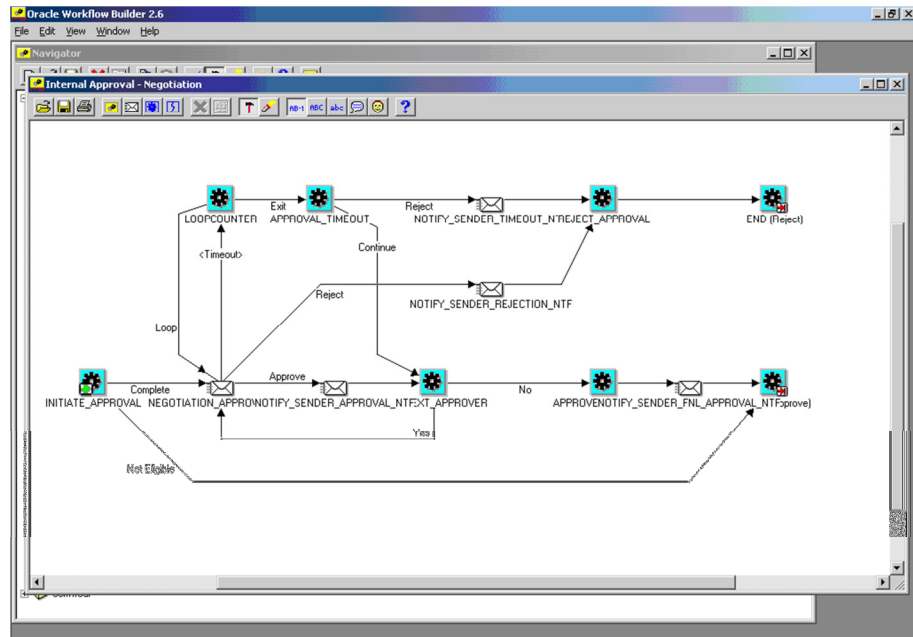


Figure 17: Approval Flow in Oracle Workflow

The Human Workflow component which is callable from a BPMN process enables most such flows to be modeled as tasks with declarative metadata which identifies user task extensions based on workflow approval patterns:

- User Task (Single Approver)
- Management Task (Sequential Management Chain)
- Voting Task (Parallel Voting Group)
- FYI Task (FYI Pattern)
- Complex Task (Full-fledged task editor)
- Initiate Task (User Initiate Task)

This in-built declarative support for human workflow patterns makes process visualization simpler and less prone to errors.

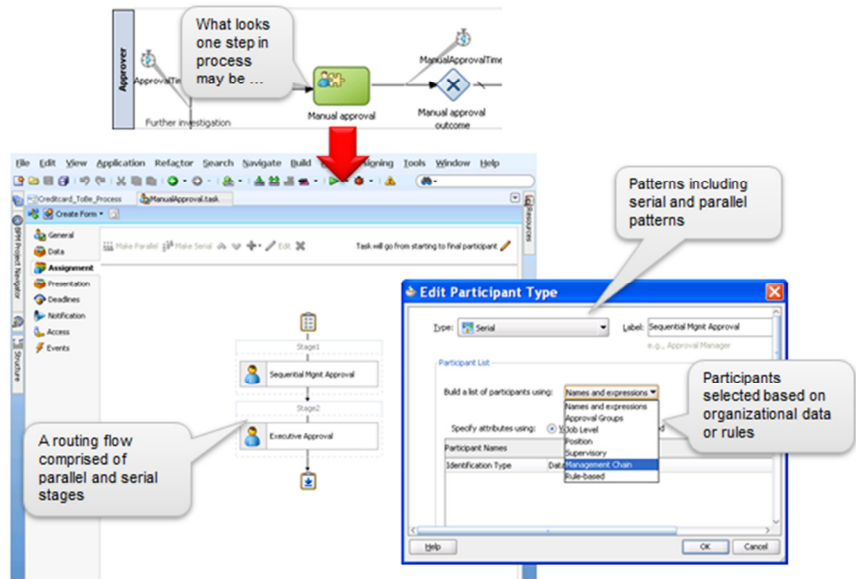


Figure 18: Patterns and Rule Based Routing

Error Handling

Error handling in Oracle Workflow is specified in an Error process. Oracle Workflow does not allow errors to be returned to callers. Instead, it lets developers define an error handling process assigned to a process, function, or event activity.

Exception Handling in BPM Suite can be done either by explicitly modeling business exceptions and associated process paths using BPMN constructs such as “catch” and “throw” events or by 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. The policies are stored completely separated from the process, thus allowing nonintrusive exception handling. This 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 BPMN-based patterns and applied where the exception is raised from.

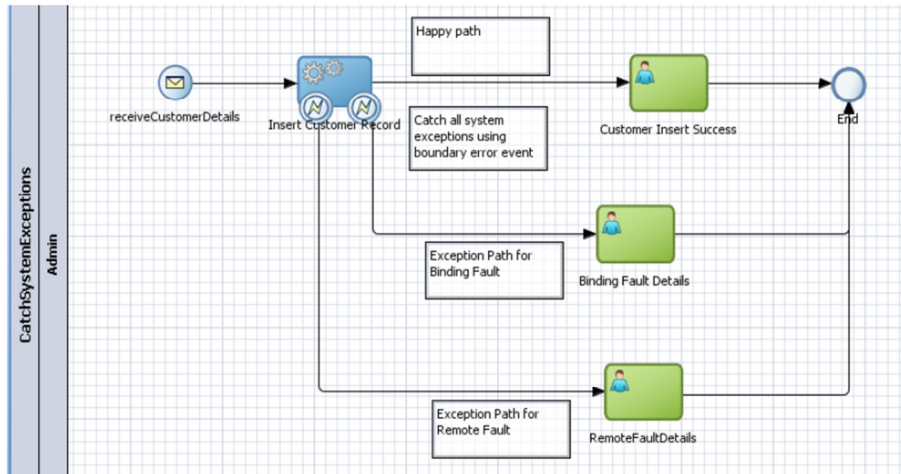


Figure 19: Exception Handling in Oracle BPM

Process Tracking, Monitoring and Administration

Oracle Workflow includes an Administrator Monitor component that lets users view and administer run time workflows.

Within Oracle BPM Suite, Process Work Spaces provides a customizable single interface for collaborative business process management. It brings up 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. Process Spaces creates one out-of-box Process Work Spaces at installation, where process workers sign in to access items related to their work and preference. There also exists Process Instance Spaces, 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 he may be working on.

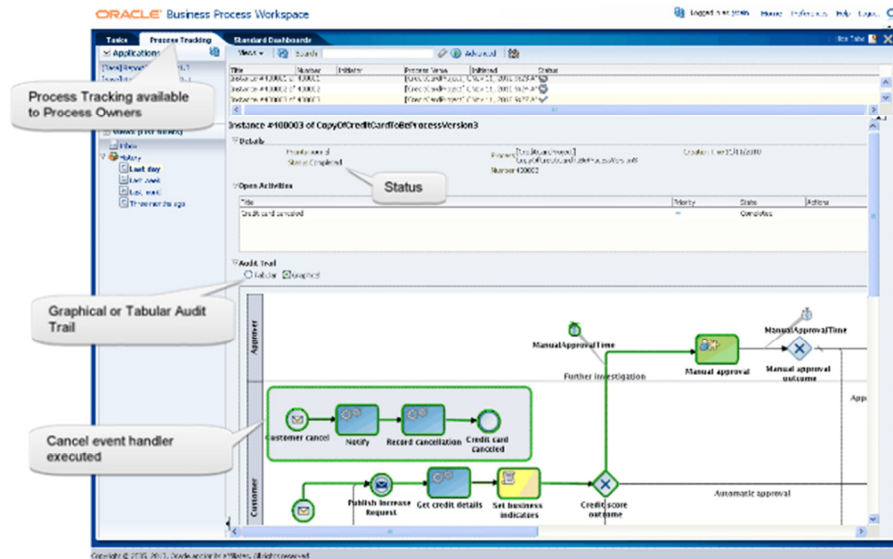


Figure 20: Process Work Space

For finer-grained component-level flow-trace tracking, users have access to a single, monitoring, and management console provided by Oracle Enterprise Manager (EM). EM also allows system administrators to monitor and manage the health of the Oracle BPM system.

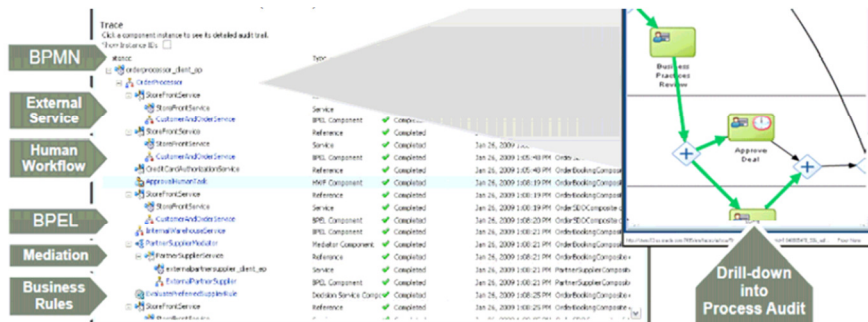


Figure 21: Process Audit Flow Trace in Oracle Enterprise Manager

CONSTRUCTS MAPPING

Overview

The following section provides a description of how Oracle Workflow constructs map to BPMN constructs:

Function Activity - PL/SQL and Java

When a workflow engine calls a stored procedure from a function activity, it usually passes in the item type and item key to the procedure. It also may accept a result when the procedure completes, which determines the next transition activity within the workflow. Within the procedure itself, there may be call outs to several of the

workflow engine APIs. Custom Java classes can also be created to be called by external Java function activities.

Workflow function activities calling PL/SQL code that does not make any references to workflow engine APIs may be mapped to a BPMN service task as follows:

- Step 1. Within the SOA Composite Editor, drag and drop either the DB adapter or the Applications adapter to the Partner Links section on the BPEL canvas
- Step 2. Follow the wizard to configure the adapter
- Step 3. Within Oracle BPM Studio, create a Service Task to make a call out to the activity associated with the DB or Applications adapter.

However, if the PL/SQL code uses WF_ENGINE APIs it may make the most sense to re-implement the activity logic in BPMN.

Custom Java classes will first need to be exposed as web services within Oracle JDeveloper, before wrapping them as a service task to be invoked by BPMN.

Another point to take into account is the transaction boundaries of the activity. The Workflow Engine traps errors produced by function activities by setting a save point before each function activity. By virtue of best practice, there are generally no commits within the PL/SQL procedure of a function activity. If an activity produces an unhandled exception, the engine performs a rollback to the save point, and sets the activity to the ERROR status. On the other hand, a service task is contained within its own transaction. When an error occurs within the service, no rollbacks happen. Instead, errors need to be explicitly caught, and compensatory logic needs to be modeled in to undo service actions where necessary.

Sub-processes

Similar to Oracle Workflow, sub processes in BPMN are used to organize processes so that they are clearer and easier to read. Sub processes are contained as part of the parent sub process. Sub processes behave like activities, and have incoming and outgoing sequence flows. They also contain data associations that define the data objects used within the sub process. Therefore, your Oracle Workflow sub processes will map to BPMN sub processes. However, unlike Oracle Workflow, which does not support using a sub process activity multiple times within a process hierarchy, sub processes within your BPMN process can be configured to repeat numerous times within the context of a process flow.

Note: There is an overhead involved in invoking a process similar to unnecessary use of sub process within Oracle Workflow; therefore, you will need to balance maintainability/reuse with performance.

Event Activities

Raise Event

In Oracle Workflow, a Raise event activity retrieves information about the event and raises the event to the Business Event System, which will then execute subscriptions to the event. The Throw Message Intermediate event in BPMN can be similarly used to send a message to another process. Alternatively, the Throw Signal Intermediate event is used to publish or broadcast a signal. Subsequently, processes configured to listen to the signal react to the broadcast.

Receive Event

The Receive event activity in Oracle Workflow maps to Receive task in BPMN. The Receive task can be used to trigger the start of a process. Alternatively, a Receive task can be placed within the process, so that it is only enabled to receive events after the process transitions to that activity, much like the behavior in Oracle Workflow.

Send Event

The Send Task in BPMN is used to send a message to another participant (or process). Once this message is sent, the task is complete and running of the process continues to the next task in the process flow. Any information that needs to be passed on to the event must be passed as data associations.

Standard Activities

And Activity

The Oracle Workflow 'And' activity should be modeled with BPMN Parallel Gateway Split and Merge constructs. Note that the Split and Merge constructs specify the forking as well as synchronization points, unlike the And activity which simply specifies the synchronization point.

The Split and Merge constructs execute multiple branches concurrently and merge on completion. The merge waits for all of the individual incoming sequence flows to complete before proceeding with the onward flow.

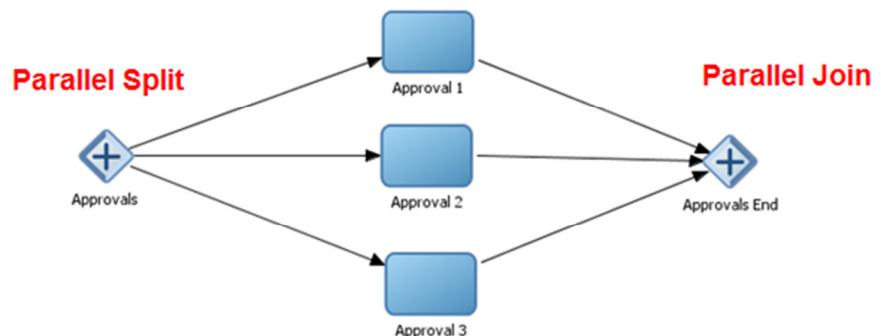


Figure 22: Parallel Gateway Example

Or Activity

In BPM, a Workflow 'Or' activity should be modeled using a Parallel and Complex Gateway configuration. The Parallel Gateway enables all forking branches to execute concurrently, and the Complex Gateway can be implemented to abort remaining flows with the arrival of the first sequence flow to reach the Complex Gateway.

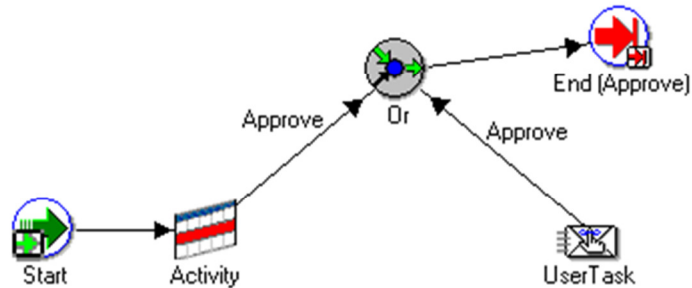


Figure 23: Oracle Workflow 'Or' Activity

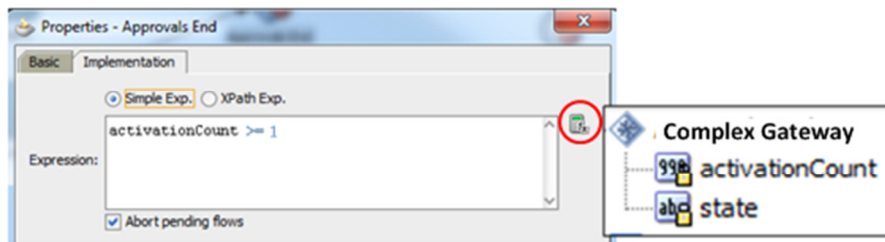
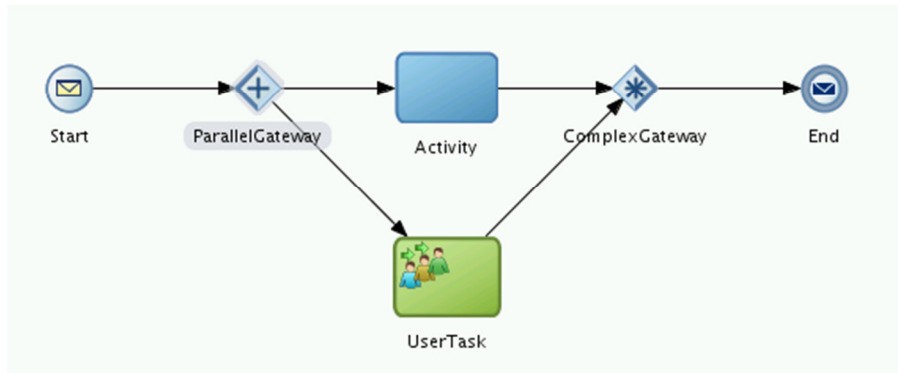


Figure 24: 'OR' represented as Parallel-Complex Gateway Configuration

Block Activity

The Message Catch intermediate event enables a process to receive a message from another process or service. A BPMN process can invoke an asynchronous operation and must wait for a callback operation before it can continue with its flow. In this way, the Message Catch Event can be used to delay a process until a condition is met, such as the completion of another process similar to a Block activity in Oracle Workflow.

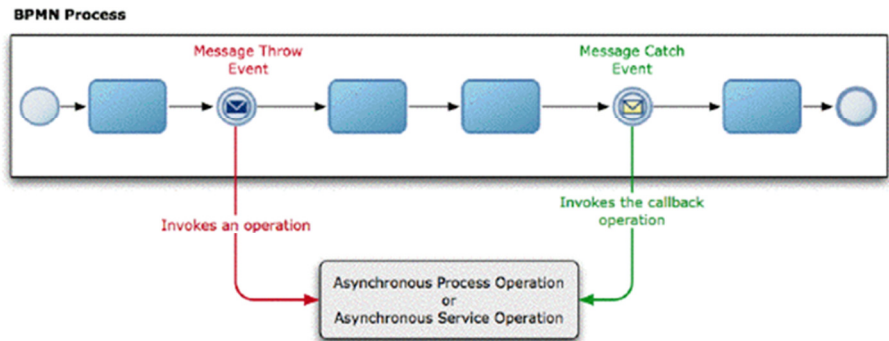


Figure 25: Message Catch Event

Comparison Activity

Comparisons can be performed using XPath expressions as evaluation conditions with Exclusive or Inclusive gateways. Also see Activity Result Based Transitions below.

Wait Activity

In BPMN, Timer Events can be used to add delays to the process flow by adding intermediate Timer Catch events. When the timer event is reached, the process waits the time specified in the timer event before moving to the next activity in the process. The Timer catch event can be configured to wait until a specific date or to wait for a certain period. In both cases you can choose to use a fixed value or to use an expression that specifies the corresponding date or interval.



Figure 26: Delaying the Process Flow

Defer Thread Activity / Defer

Oracle Workflow provides a Defer Thread activity as well as activity cost based deferring of activities to perform heavy processing in the background. BPMN has first class support for long running processes and does not require an explicit defer activity. To achieve the functionality of Deferring, message or signal events can be used to invoke asynchronous services and processes. The calling BPMN process is

automatically persisted any time it is waiting for a message to arrive or an event to happen.

Launch Process Activity

The Launch Process Activity in Oracle Workflow maps to the Call Activity in BPM. The Call Activity can invoke a process from another process (Also see Sub processes above).

NOOP Activity

The NOOP activity in Oracle Workflow can be modeled using the None Start, End or Intermediate events.

Loop Counter Activity

While there does not exist a BPMN construct that a loop counter activity can directly map to, the same can be achieved using a sub-process for the looping activities and overlaying that with a Loop Marker which enables defining number of times to loop through using an absolute number or XPath expression. Also see modeling of loops described above.

Role Resolution Activity

To facilitate role resolution, role information is typically associated with a user task rather than an activity. Roles are assigned to horizontal swim lanes that show graphically the roles responsible for completing user tasks within a process.

Notification Activity

The Notification task within Oracle BPM uses a predefined service to perform different types of notification. The users or groups who will receive notifications generated by the notification task can be derived from simple data objects or by using expressions.

Vote Yes/No Activity

Group voting is one of the declarative routing patterns supported by the human workflow component of Oracle BPM. This pattern routes work to a group of people in parallel and can be configured to proceed when the outcome is determinate instead of waiting for all responses.

Master-Detail Coordination Activities – Wait for Flow and Continue Flow

The Master-Detail coordination activities in Oracle Workflow can be attained using the Message Throw and Catch Signal events described above where a “detail” process can be invoked asynchronously by a “master” process and the “master” process continues until it reaches a Message Catch event, where it waits until it gets an answer from a callback operation invoked on the “detail” process.

Get Monitor URL Activity

In BPMN, no equivalent activity exists. Instead, for all monitoring activities, the centralized Enterprise Manager Console can be accessed.

Transitions

Activity Result Based Transitions

In BPMN, conditional transitions are modeled by writing expressions and conditions for the BPMN elements that allow them. These conditions help define the behavior of the element. For example, the flow of a process may be controlled using a conditional sequence flow that ensures that all credit card expenses above 1000 dollars be approved by a manager. As another example, a Timer Event may be used to evaluate a certain time interval to be returned as a Date/Time value. Oracle BPM provides a Simple expression builder or an XPath expression builder to define more complex expressions for evaluation on transitions. Note that this is more powerful functionality because:

- It enables activities to return any desired results instead of simple lookups
- Branching conditions may be based on not only the returned results from the immediate activity but also from any other activity as well as other data available to the process.

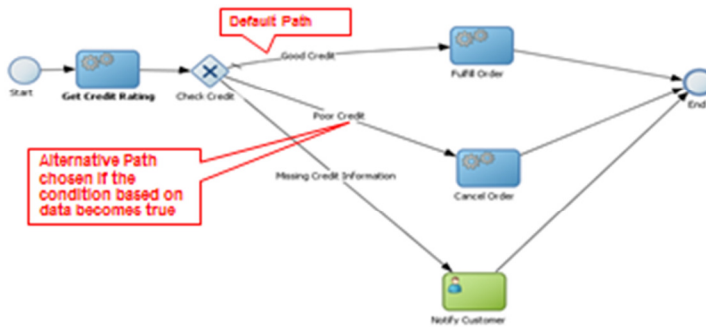


Figure 27: Activity Transition using Exclusive Data Gateway

The above picture shows conditional branching to three branches; with the third one being the fall back default (otherwise) path.

Timeout Transition

Within Workflow, Timeout transitions are defined from Notification activities to some other activity to force the process to perform the other activity if the notification activity times out. Notification activities are created using the SOA Human Task editor in a BPM suite installation. The Human Task can be assigned to a User Task activity within a BPMN process. Further, a deadline can be configured for this activity by using an interrupting Timer Catch event that leads to another point of the process when the activity reaches its deadline. Deadlines can

be configured to happen on a specific date, or for a period of time spent on the activity.

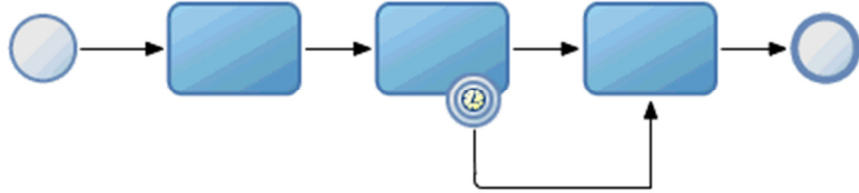


Figure 28: Using Timer Catch Event to timeout on Notification Activity

Lookups

Lookups are used in Oracle Workflow to do activity result based transitions. In BPMN, transitions are instead modeled using XPath condition expressions as discussed above. Therefore, lookups are not needed in BPMN. You can use process variables to store the results of activities, which may be any XML document and not just lookups.

Workflow Model Import Mapping Summary

As mentioned above, BPM PS4FP allows the import of Oracle Workflow graphical models into Oracle BPM Studio. This provides a jump-start for process analysts involved in the exercise of migration of Oracle Workflow to BPMN who can now continue modeling in BPMN rather than starting from scratch. It also provides a basis for developers to continue with subsequent implementation. It should be noted that only the process diagram is imported. None of the associated implementation is imported. It should also be noted that it may be better to make changes to the model to take advantage of features of BPM and BPMN. Certain aspects that need attention are:

- Item attributes are not imported. These need to be assessed and equivalent data objects be created.
- PL/SQL APIs or functions need rethinking in their implementation of service tasks specially in their internal references to Oracle Workflow engine APIs and attributes
- Error events need to be explicitly modeled in the imported diagram.
- While the import itself creates a one-to-one mapping for each construct, use the mapping summary table below to re-model certain activities to produce a valid BPM diagram.

The table below provides a summary of how the constructs from Oracle Workflow map to BPMN. Once imported, within BPM Studio, the construct in the column

‘Oracle Workflow’ is converted into the artifact in the column ‘BPM PS4FP’. Constructs that do not get automatically converted are simply referred to as ‘Activity’ in this column. These “generic” activities are targeted to be converted to the equivalent actual ‘Should Be’ construct in a future BPM release.

Oracle Workflow	BPM PS4FP	Should Be
Function	Service Task	Service Task
Sub-process	Sub-process	Sub-process
Raise Event	Activity	Throw Message/Signal Intermediate Event
Receive Event	Intermediate Event	Catch Message/Signal Intermediate Event
Send Event	Activity	Send Task
And	Parallel Gateway	Parallel Gateway
Or	Inclusive Gateway	Parallel-Complex Gateway
Block	Activity	Catch Message Intermediate Event
Comparison Activity	Activity	Exclusive Gateway with conditions, Inclusive Gateway with conditions (when “Any” is present)
Wait	Timer Event	Timer Event
Defer	Activity	N/A – call to asynchronous process via Message or Signal event
Launch Process	Activity	Call activity

NOOP	Activity	None Start, End or Intermediate events
Loop Counter	Activity	Looping sub-process using Loop Marker
Role Resolution	Activity	Service Task (It maybe more appropriately modeled inside Human Task)
Notification	User Task	User Task
Vote Yes/No	Activity	User Task
Master/Detail – wait for flow and continue	Link Event	Throw/Catch Signal Events
Get Monitor URL	Activity	N/A – EM access only
Activity result based transition	Condition flows	Condition flows
Timed Transition (timeout)	N/A	Attached Timer Event
Lookups	- Not needed -	- Not needed -

CONCLUSION

While there are differences between Oracle Workflow and BPMN, as a process and Workflow tool, Oracle BPM is an ideal replacement candidate for Oracle Workflow, but it is also more than just that. Existing Oracle Workflow processes can be converted and improved by migrating to a standards-based functionality of BPMN. Other benefits include:

- Ease-of-Use for business and process analysts, easy for end users to collaborate and innovate
- Improved user experience with functionally complete aspects of BPM – Modeling, Rules, BAM, Analytics
- Retaining existing investments by “service-enabling” and making reusable existing PL/SQL logic
- Easy integration with other systems or technology through an implementation of service and process based architecture built on industry standards
- Better insight and overview for operational purposes and impact analysis and decision-making
- Alignment with Oracle strategy going forward

It is for these reasons that Oracle BPM Suite indeed goes a long way toward delivering Business Process Management without barriers.



Migrating to Oracle BPM from Oracle Workflow

March 2012

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