Architecture of Enterprise Applications 18 Workflow

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- Workflow
  - Basic concepts
- jBPM
  - Use jBPM
- Windows Workflow Foundation

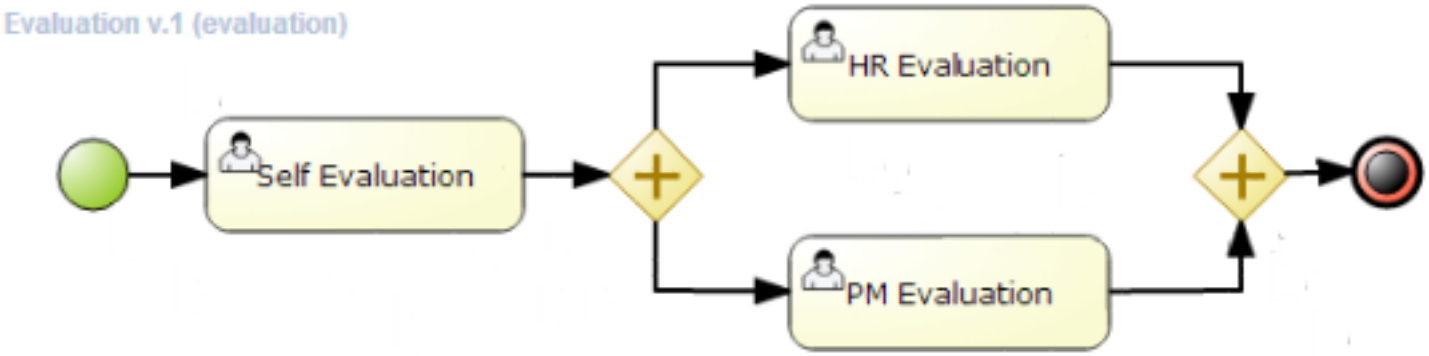
Workflow

- A **workflow**
  - consists of an orchestrated and repeatable pattern of business activity enabled by the systematic organization of resources into processes that transform materials, provide services, or process information.

- **Processes**:
  - A process is a more general notion than workflow and can apply to physical or biological processes, for instance.
- **Planning and scheduling**:
  - A plan is a description of the logically necessary, partially ordered set of activities required to accomplish a specific goal given certain starting conditions
- **Flow control**
  - is a control concept applied to workflows, to distinguish from static control of buffers of material or orders, to mean a more dynamic control of flow speed and flow volumes in motion and in process
- **In-transit visibility**
  - is a monitoring concept that applies to transported material as well as to work in process or work in progress, i.e., workflows.

What is jBPM?

- jBPM is a flexible Business Process Management (BPM) Suite.
  - It is light-weight, fully open-source (distributed under Apache license) and written in Java.
  - It allows you to model, execute, and monitor business processes throughout their life cycle.



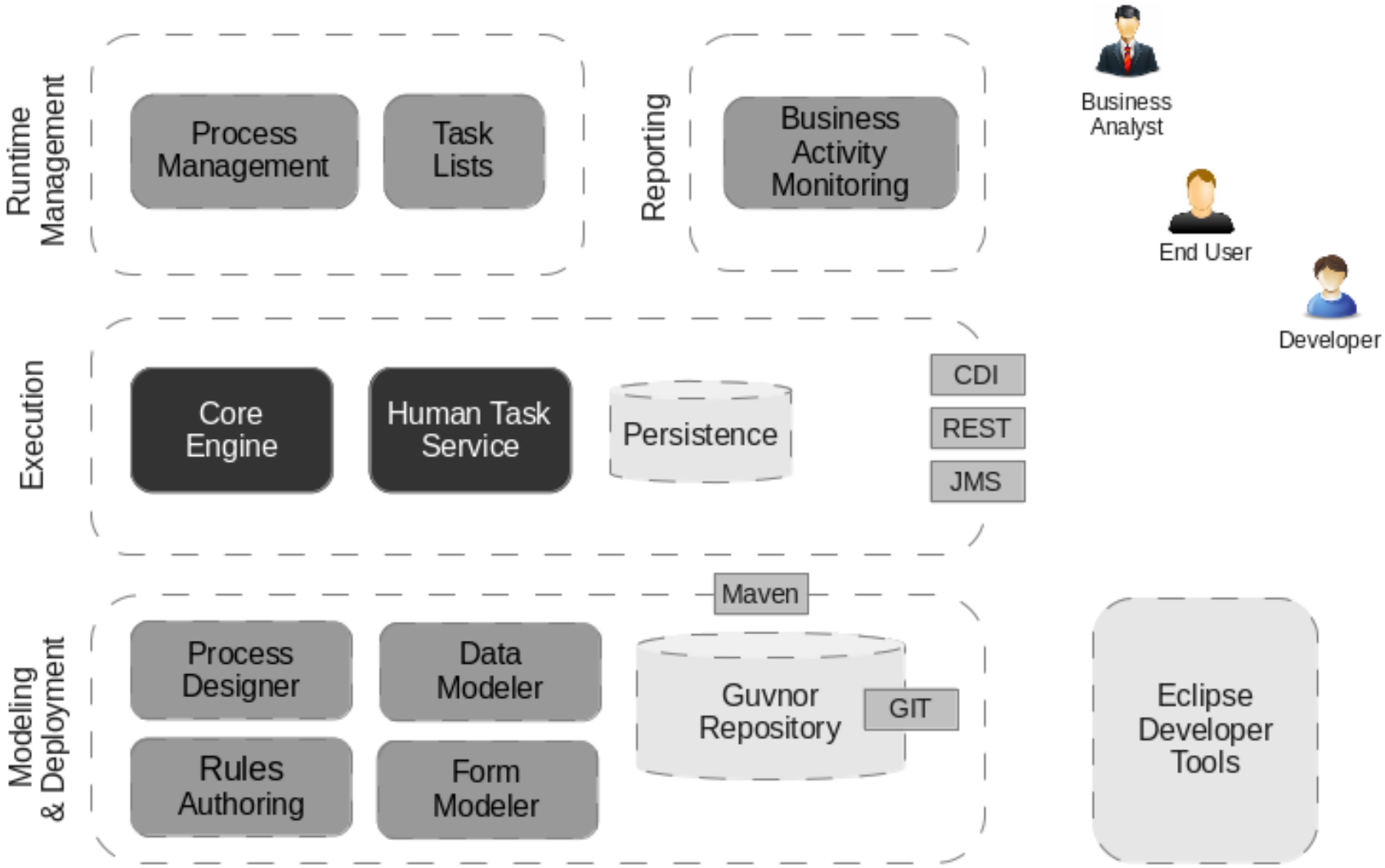
What is jBPM?

- A business process
  - allows you to model your business goals by describing the steps that need to be executed to achieve those goals, and the order of those goals are depicted using a flow chart.
- Business processes
  - need to be supported throughout their entire life cycle: authoring, deployment, process management and task lists, and dashboards and reporting.
- The core of jBPM is
  - a light-weight, extensible workflow engine written in pure Java that allows you to execute business processes using the latest BPMN 2.0 specification.
  - It can run in any Java environment, embedded in your application or as a service.

What is jBPM?

- On top of the core engine, a lot of features and tools are offered to support business processes throughout their entire life cycle:
  - Pluggable human task service based on WS-HumanTask for including tasks that need to be performed by human actors.
  - Pluggable persistence and transactions (based on JPA / JTA).
  - Web-based process designer to support the graphical creation and simulation of your business processes (drag and drop).
  - Web-based data modeler and form modeler to support the creation of data models and process and task forms
  - Web-based, customizable dashboards and reporting
  - All combined in one web-based workbench, supporting the complete BPM life cycle: Modeling and deployment - author your processes, rules, data models, forms and other assets
    - Execution - execute processes, tasks, rules and events on the core runtime engine
    - Runtime Management - work on assigned task, manage process instances, etc
    - Reporting - keep track of the execution using Business Activity Monitoring capabilities
    - Eclipse-based developer tools to support the modeling, testing and debugging of processes
    - Remote API to process engine as a service (REST, JMS, Remote Java API)
    - Integration with Maven, Spring, OSGi, etc.

Overview of jBPM?

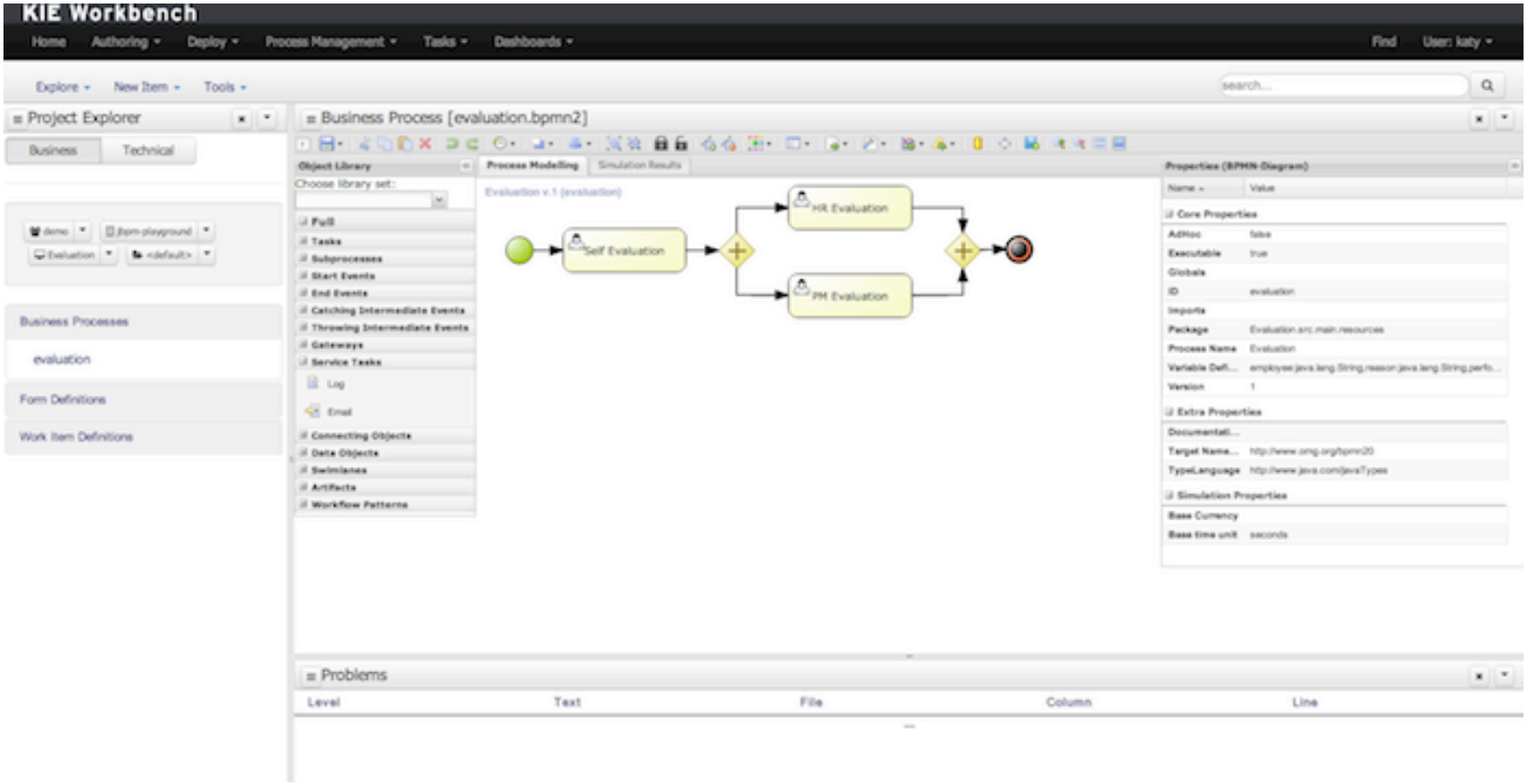


Core Engine

- The core jBPM engine is
  - the heart of the project.
  - It's a light-weight workflow engine that executes your business processes.
  - It can be embedded as part of your application or deployed as a service (possibly on the cloud).
  - Its most important features are the following:
    - Solid, stable core engine for executing your process instances.
    - Native support for the latest BPMN 2.0 specification for modeling and executing business processes.
    - Strong focus on performance and scalability.
    - Light-weight (can be deployed on almost any device that supports a simple Java Runtime Environment; does not require any web container at all).
    - (Optional) pluggable persistence with a default JPA implementation.
    - Pluggable transaction support with a default JTA implementation.
    - Implemented as a generic process engine, so it can be extended to support new node types or other process languages.
    - Listeners to be notified of various events.
    - Ability to migrate running process instances to a new version of their process definition

Process Designer

- The web-based designer allows you to model your business processes in a web-based environment.

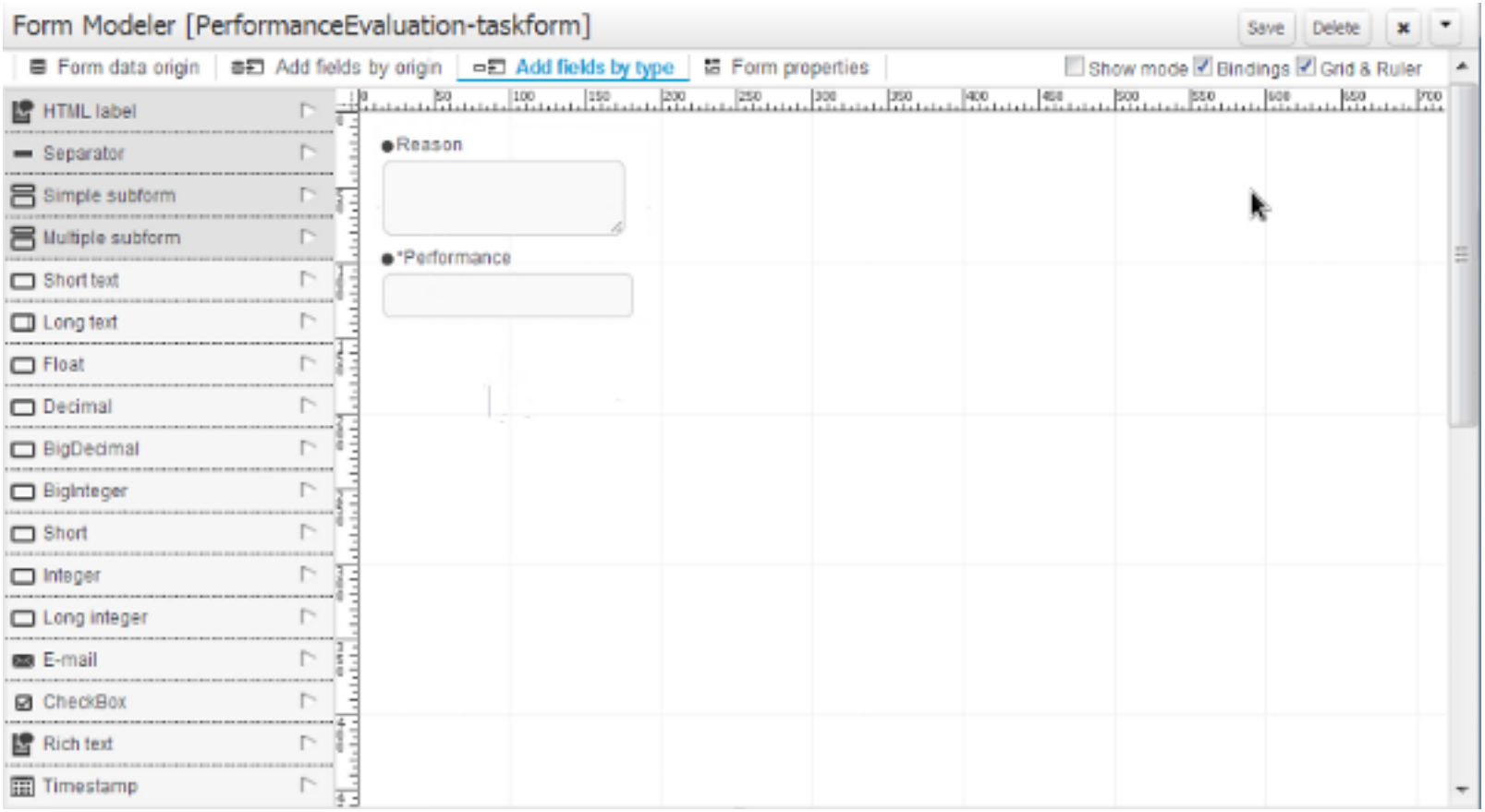


Data Modeler

- Processes almost always have some kind of data to work with.
- The data modeler allows non-technical users to view, edit or create these data models.
  - Typically, a business process analyst or data analyst will capture the requirements for a process or application and turn these into a formal set of interrelated data structures.
  - The data modelers is transparently integrate into the workbench.
  - Its main goals are to make data models into first class citizens in the process improvement cycle and allow for full process automation through the integrated use of data structures (and the forms that will be used to interact with them).

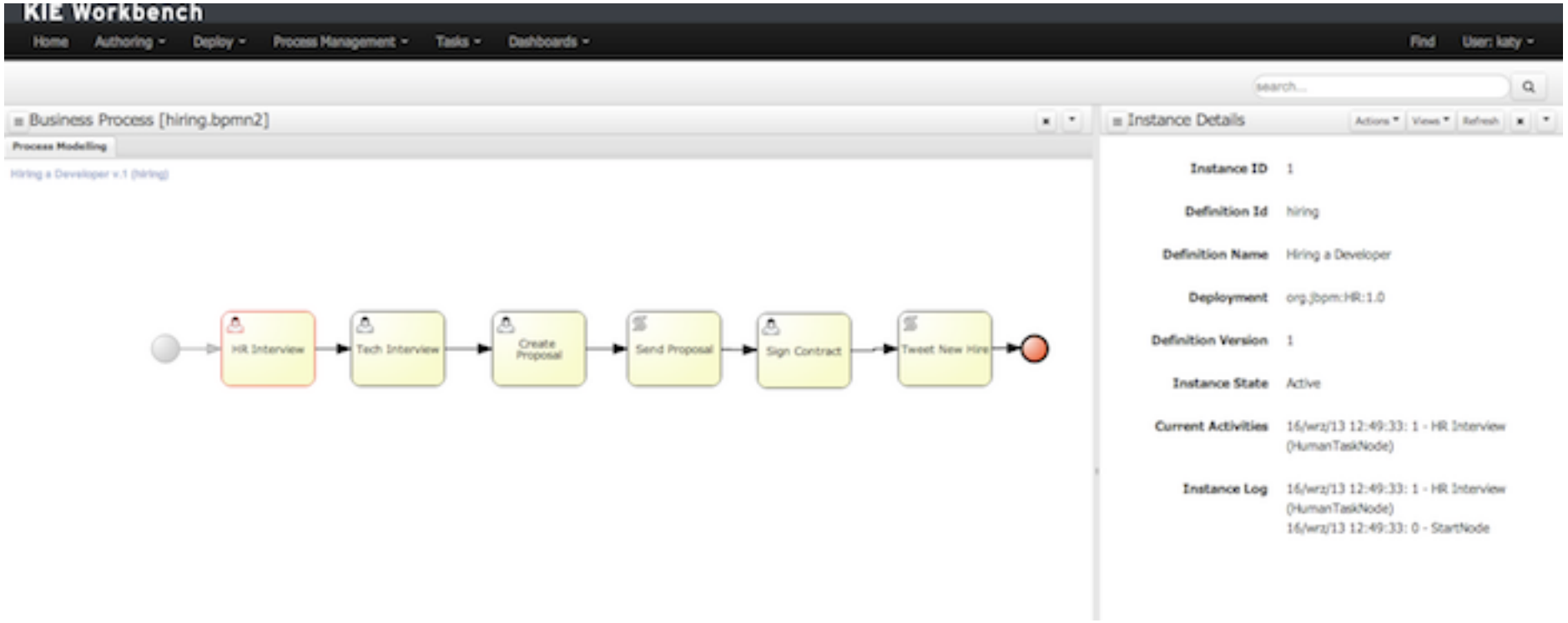
Form Modeler

- The jBPM Form Modeler is a form engine and editor that enables users to create forms to capture and display information during process or task execution, without needing any coding or template markup skills.



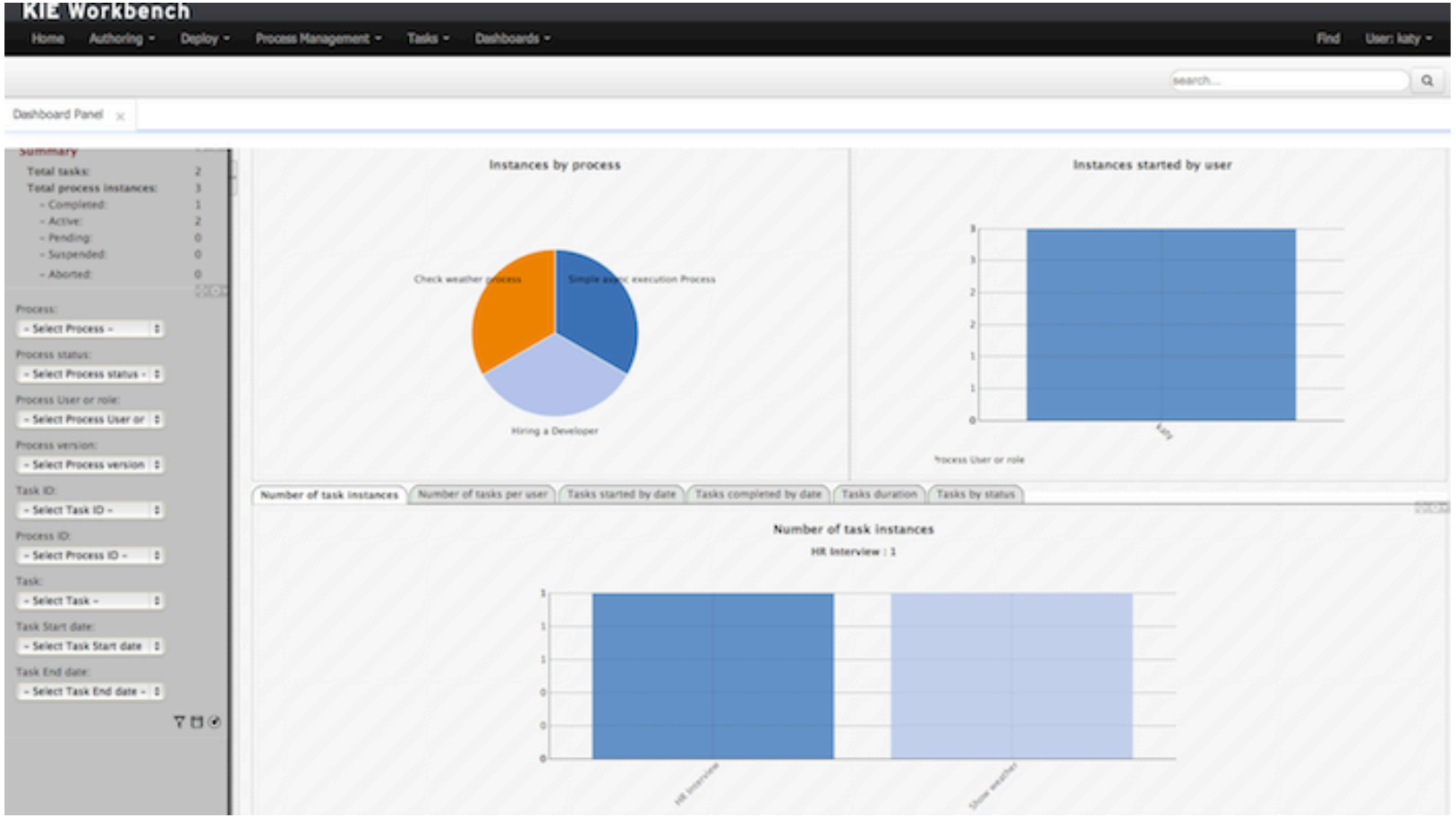
Process Instance and Task Management

- Business processes can be managed through a web-based management console.



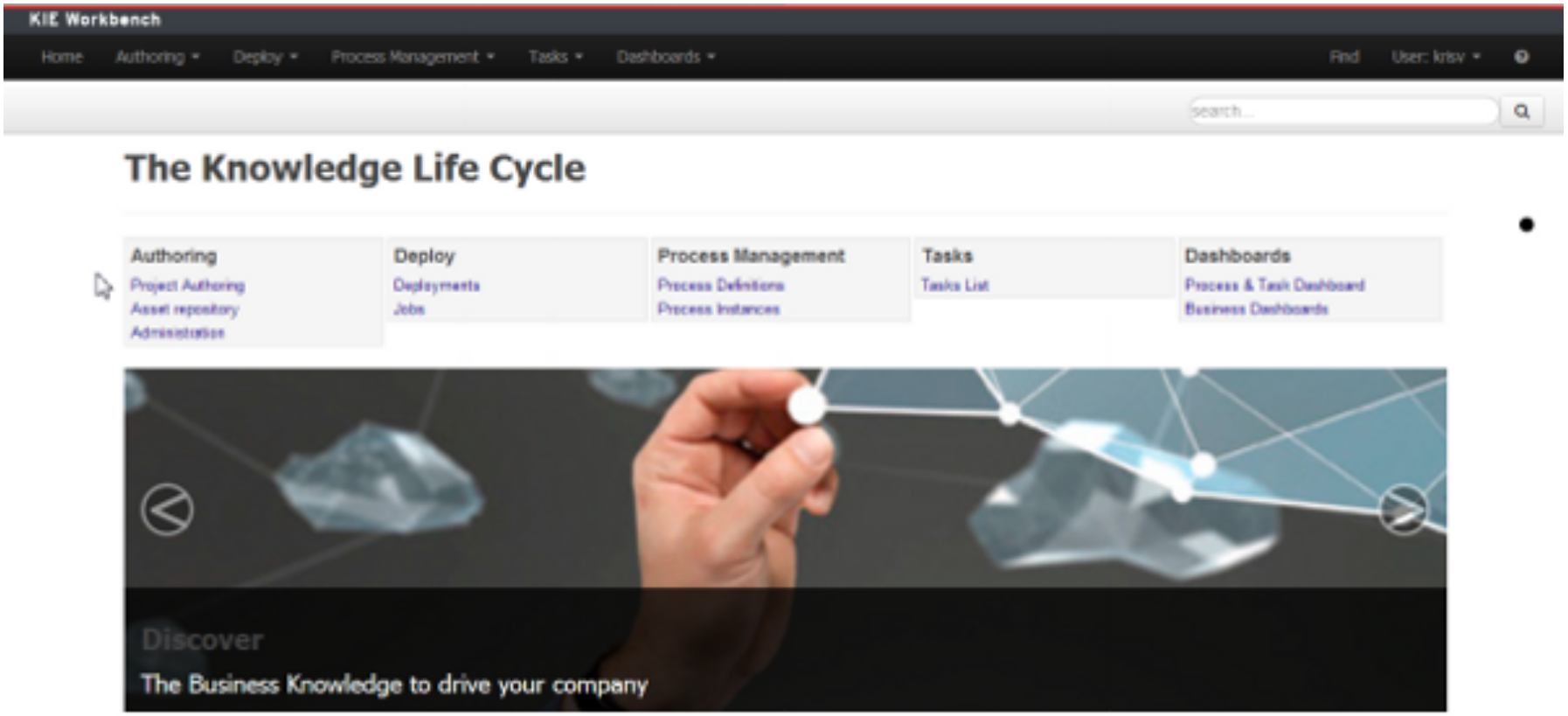
Business Activity Monitoring

- As of version 6.0, jBPM comes with a full-featured BAM tooling which allows non-technical users to visually compose business dashboards.



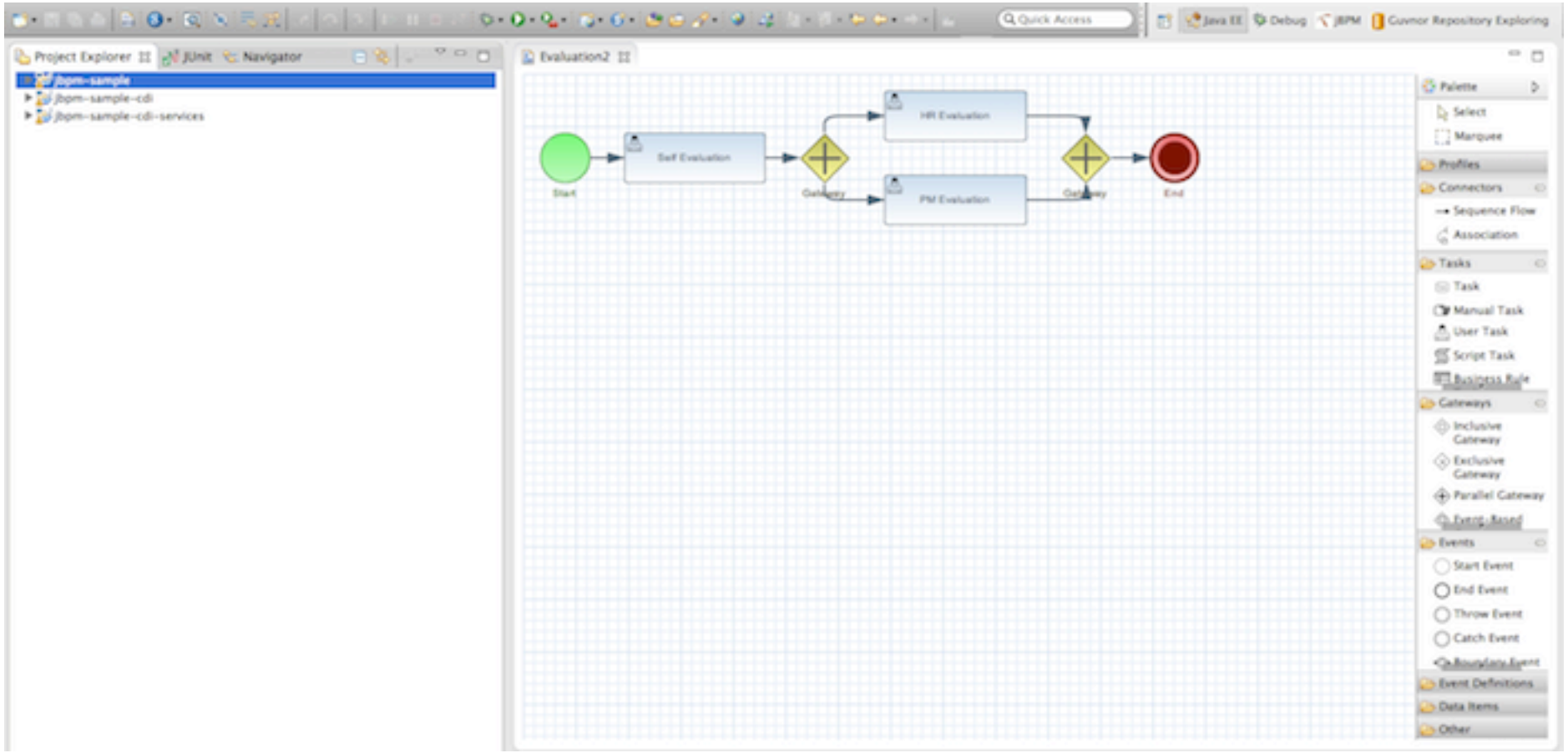
Workbench

- The workbench is the web-based application that combines all of the above web-based tools into one configurable solution.

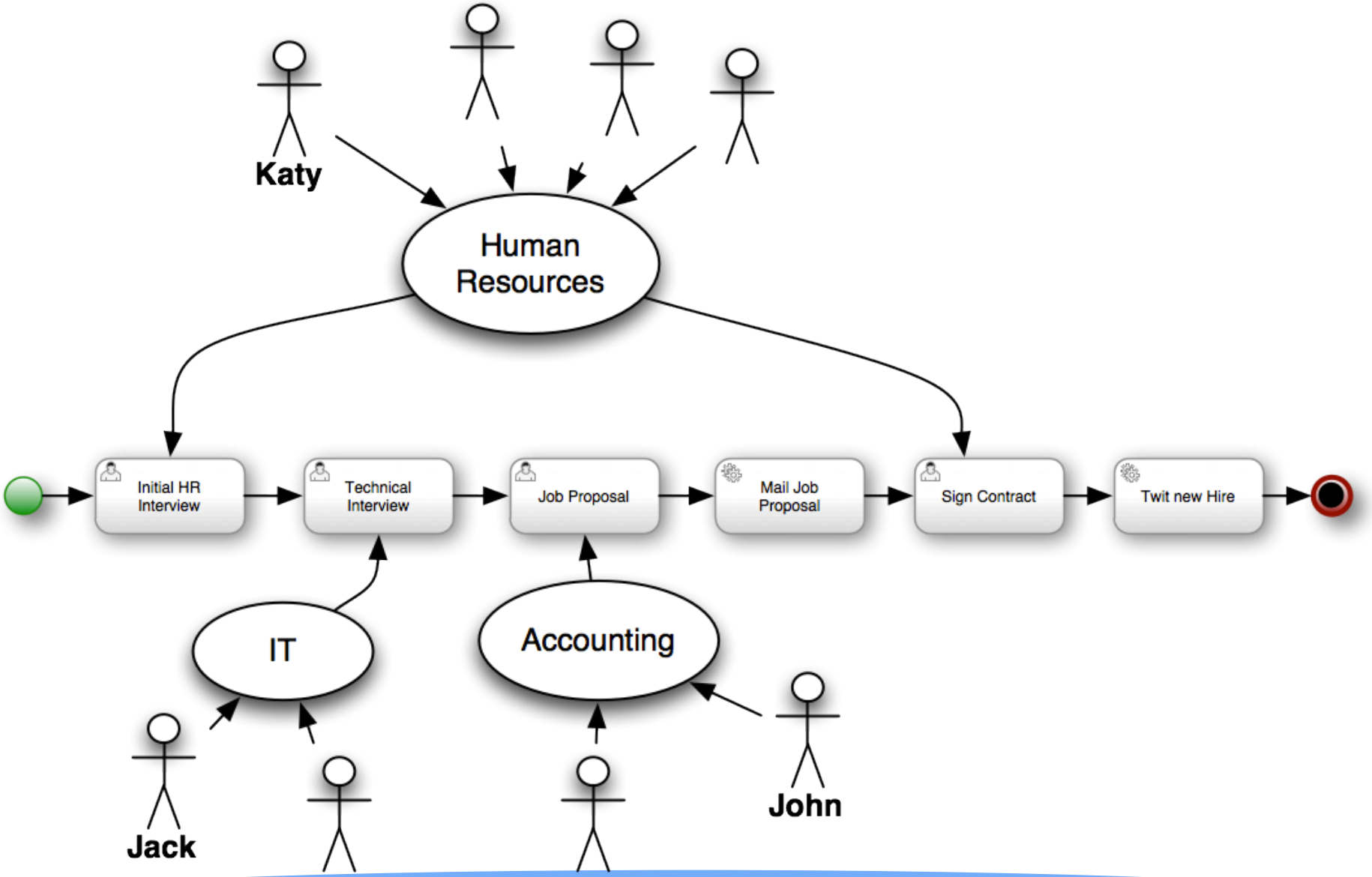


Eclipse Developer Tools

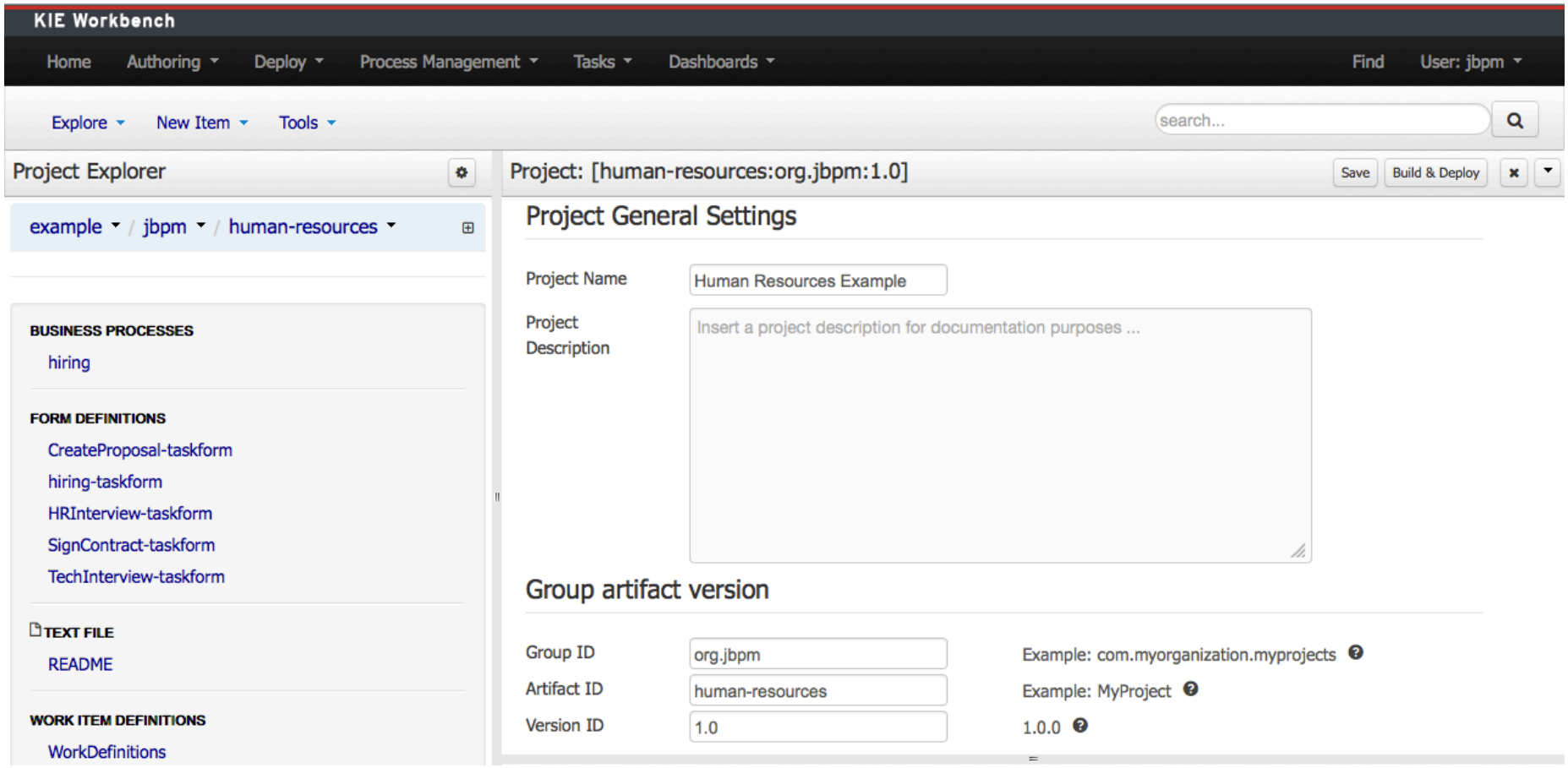
- The Eclipse-based tools are a set of plugins to the Eclipse IDE and allow you to integrate your business processes in your development environment.



Human Resources Example



The KIE Project: human-resources



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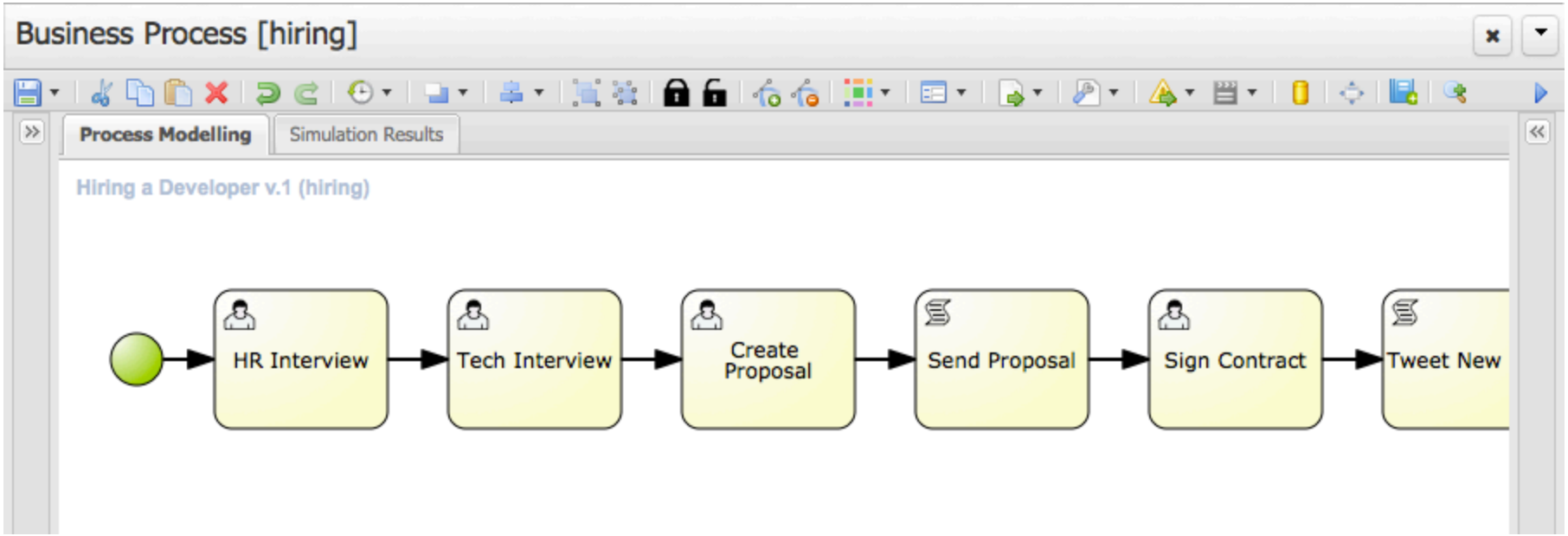
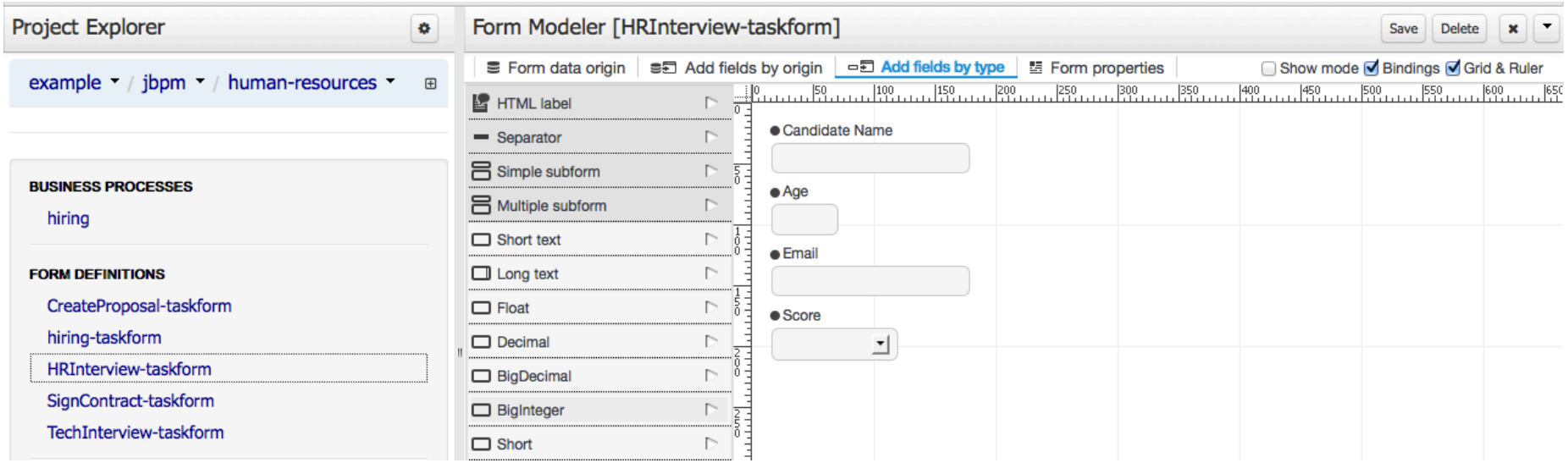
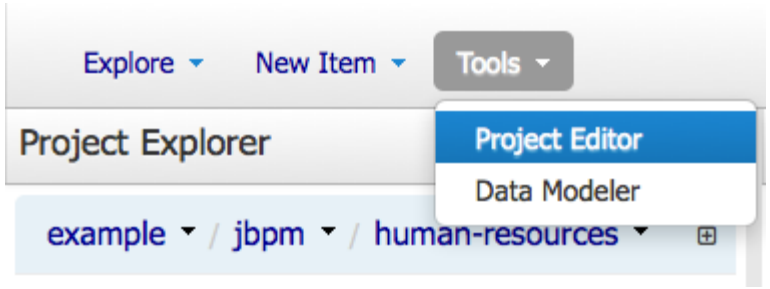
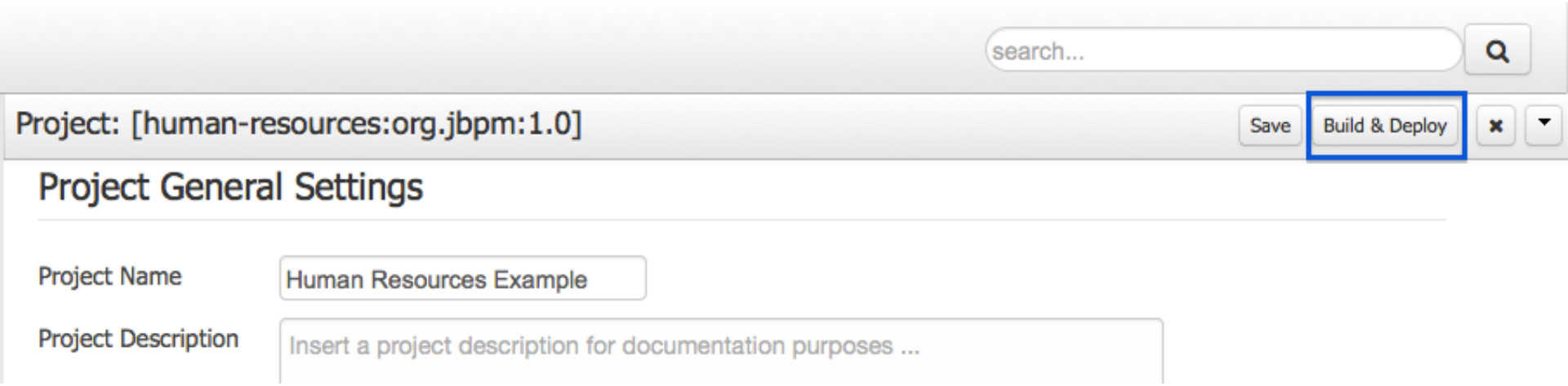


The KIE Project: human-resources

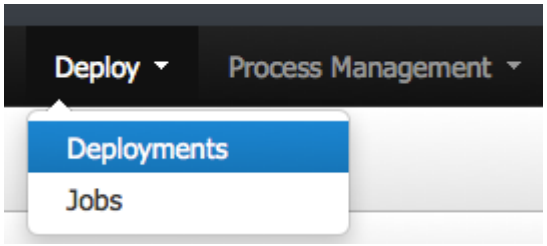


Building the Human Resources Example





Building the Human Resources Example



KIE Workbench

Home | Authoring | Deploy | Process Management | Tasks | Dashboards | Find | User: jbpm

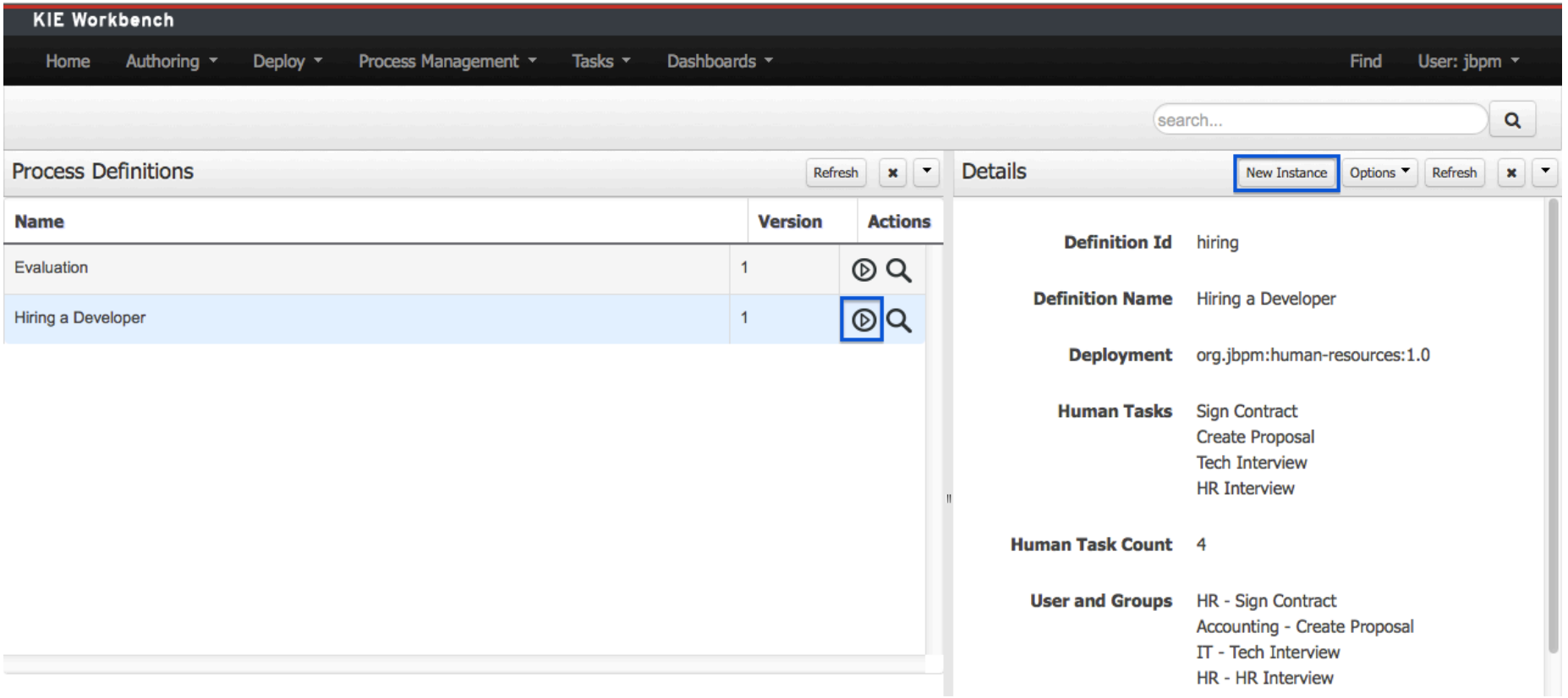
search...

Deployment Units

New Deployment Unit | Refresh

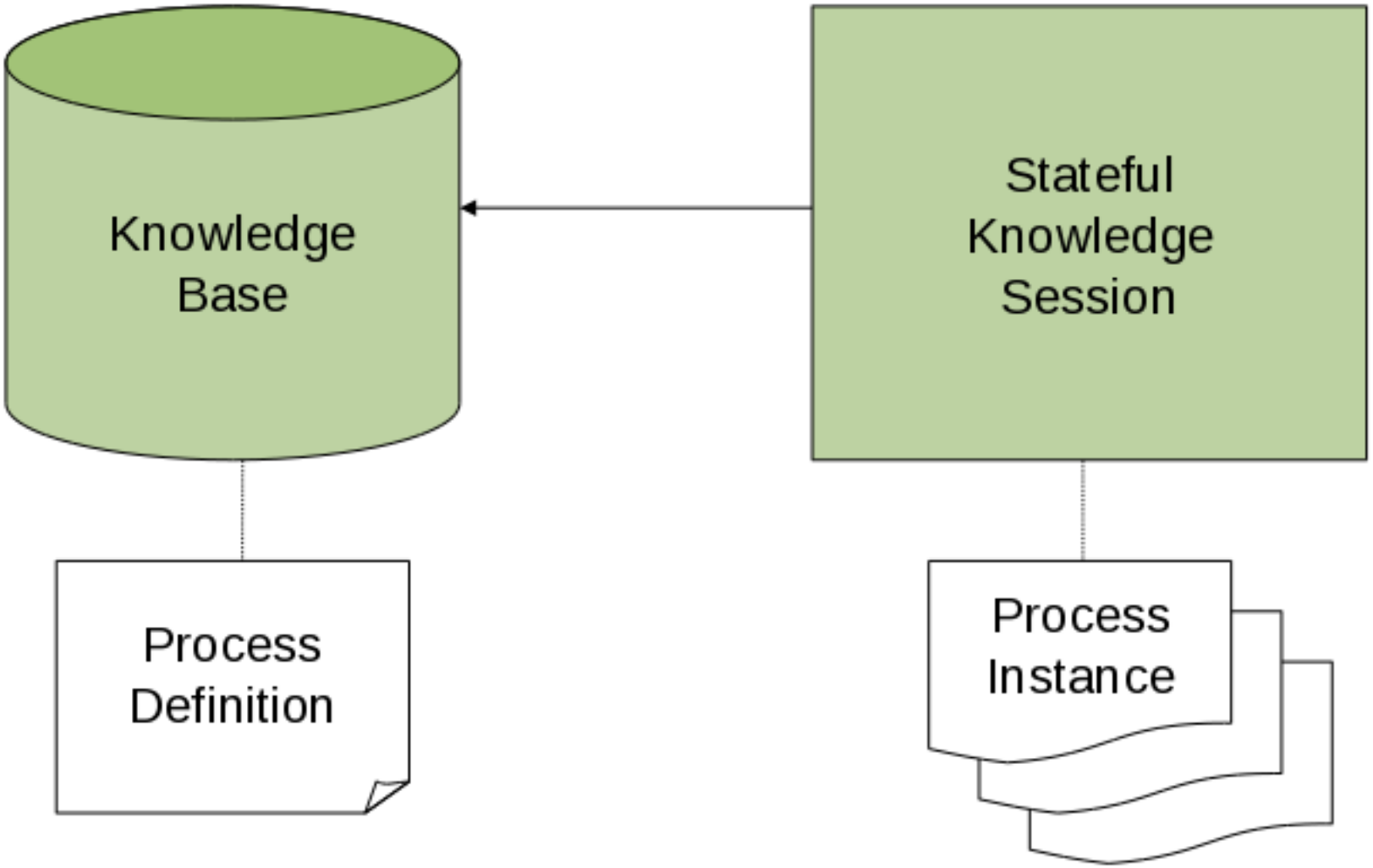
Deployment	Group ID	Artifact	Version	Kie Base Name	Kie Session Name	Runtime strategy	Actions
org.jbpm:evaluation:1.0	org.jbpm	evaluation	1.0	DEFAULT	DEFAULT	SINGLETON	⊘
org.jbpm:human-resources:1.0	org.jbpm	human-resources	1.0	DEFAULT	DEFAULT	SINGLETON	⊘

Create a new Process Instance

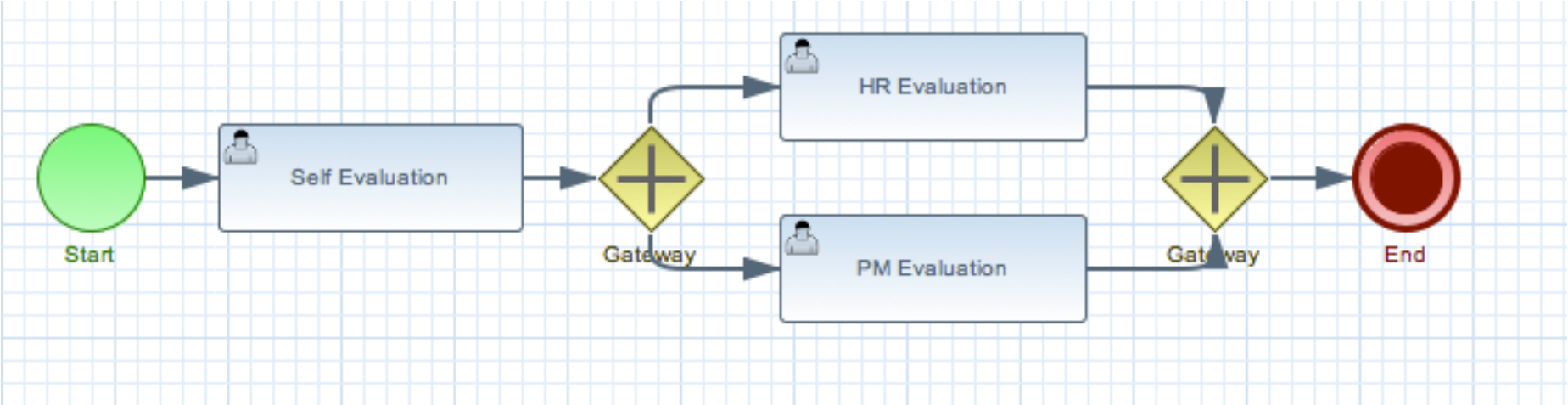


Create a new Process Instance

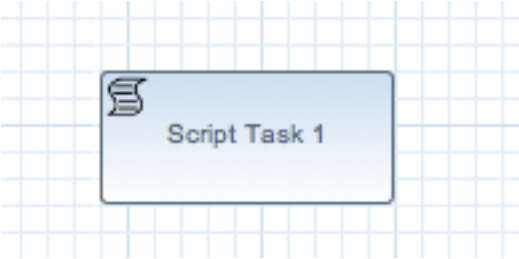
Core Engine

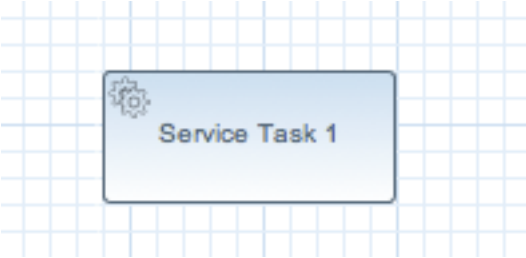

Knowledge Base
Stateful Knowledge Session
Process Definition
Process Instance

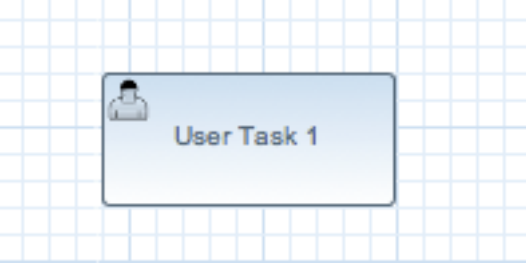
Processes

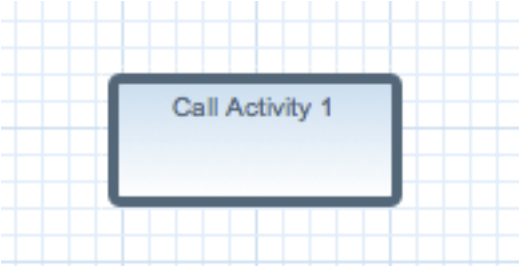

Start
Self Evaluation
Gateway
HR Evaluation
PM Evaluation
Gateway
End

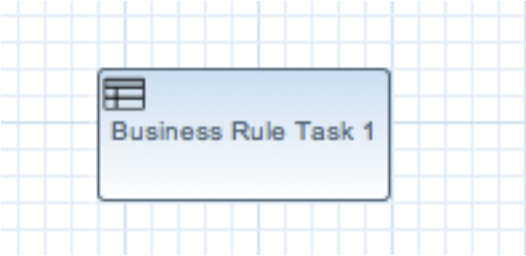
Processes - Activities

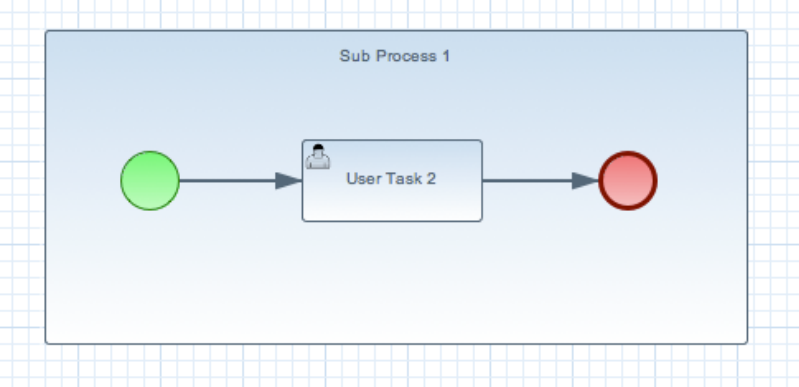




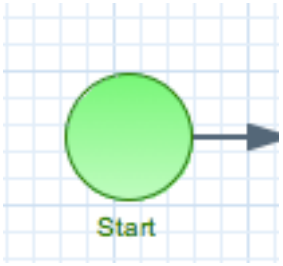


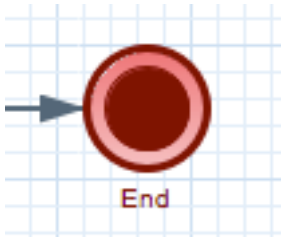




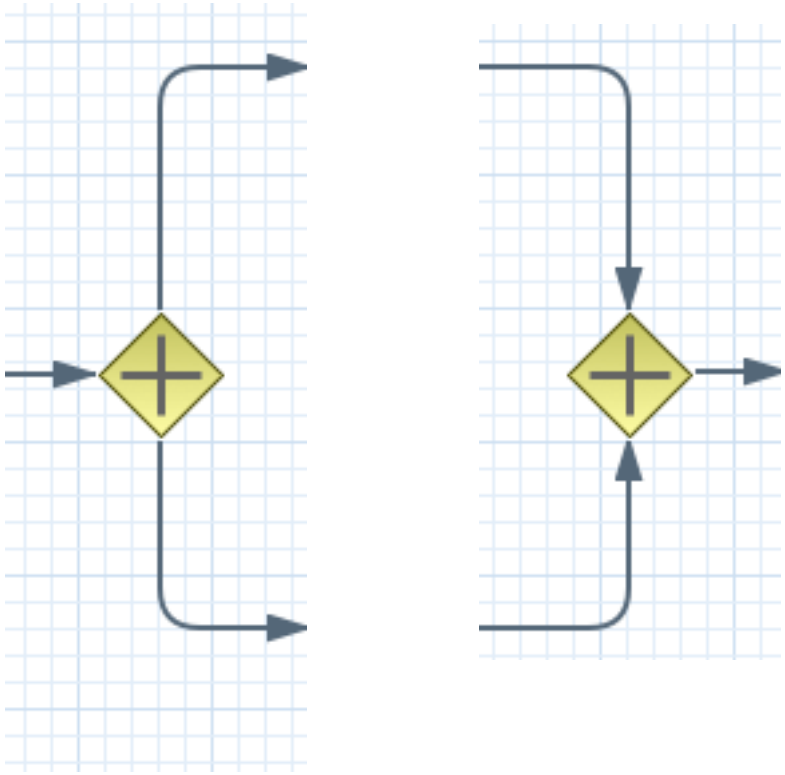


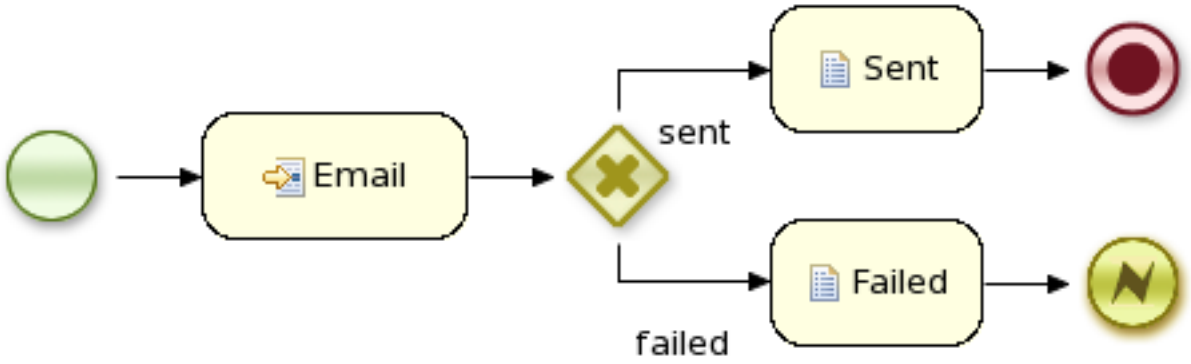
Processes - Envents



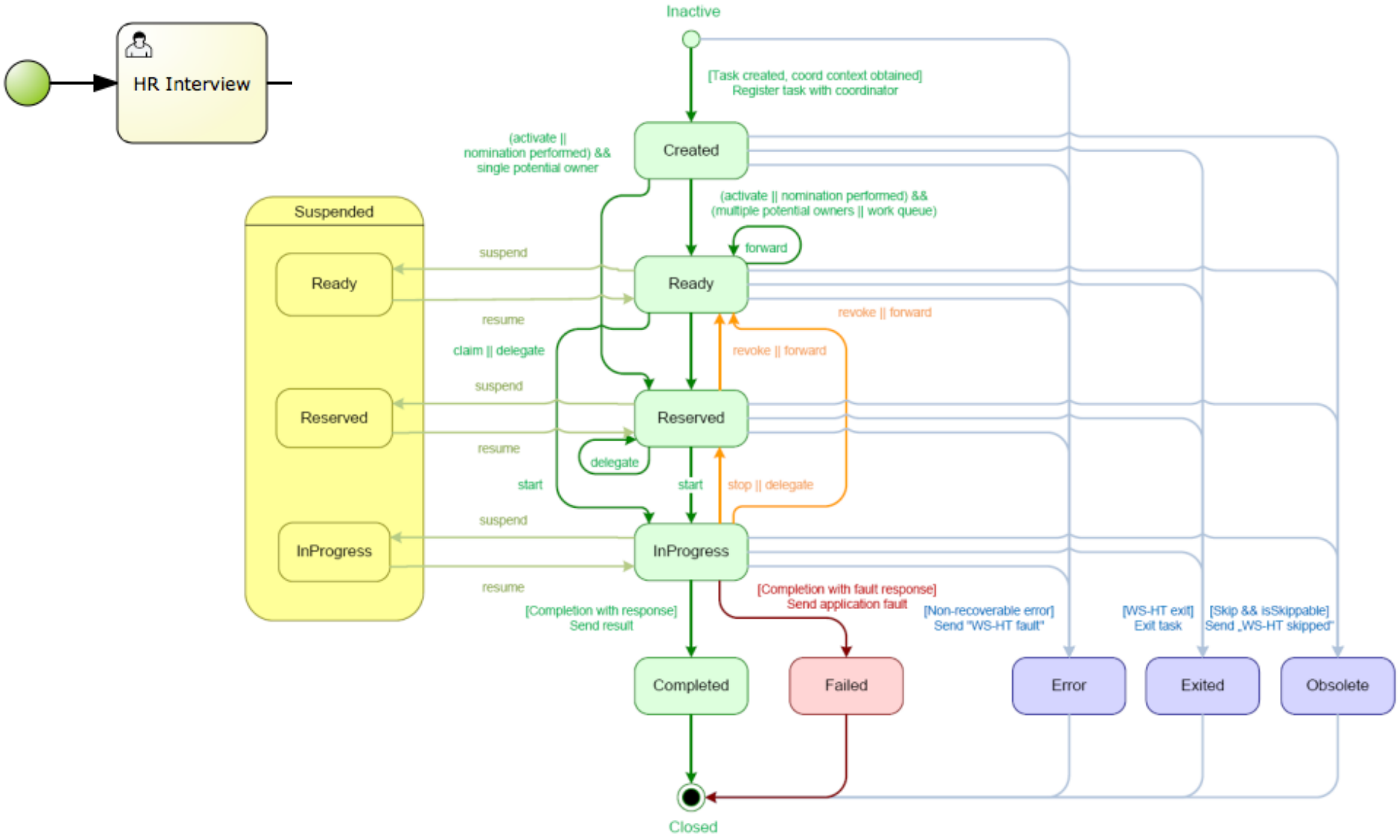


Processes - Gateways





Human Tasks


HR Interview
Inactive
[Task created, coord context obtained]
Register task with coordinator
(activate ||
nomination performed) &&
single potential owner
Created
(activate || nomination performed) &&
(multiple potential owners || work queue)
forward
Suspended
Ready
suspend
Ready
resume
revoke || forward
claim || delegate
revoke || forward
suspend
Reserved
Reserved
resume
delegate
start
start
stop || delegate
suspend
InProgress
InProgress
resume
[Completion with fault response]
Send application fault
[Completion with response]
Send result
[Non-recoverable error]
Send "WS-HT fault"
[WS-HT exit]
Exit task
[Skip && isSkippable]
Send „WS-HT skipped"
Completed
Failed
Error
Exited
Obsolete
Closed

Process Instance State

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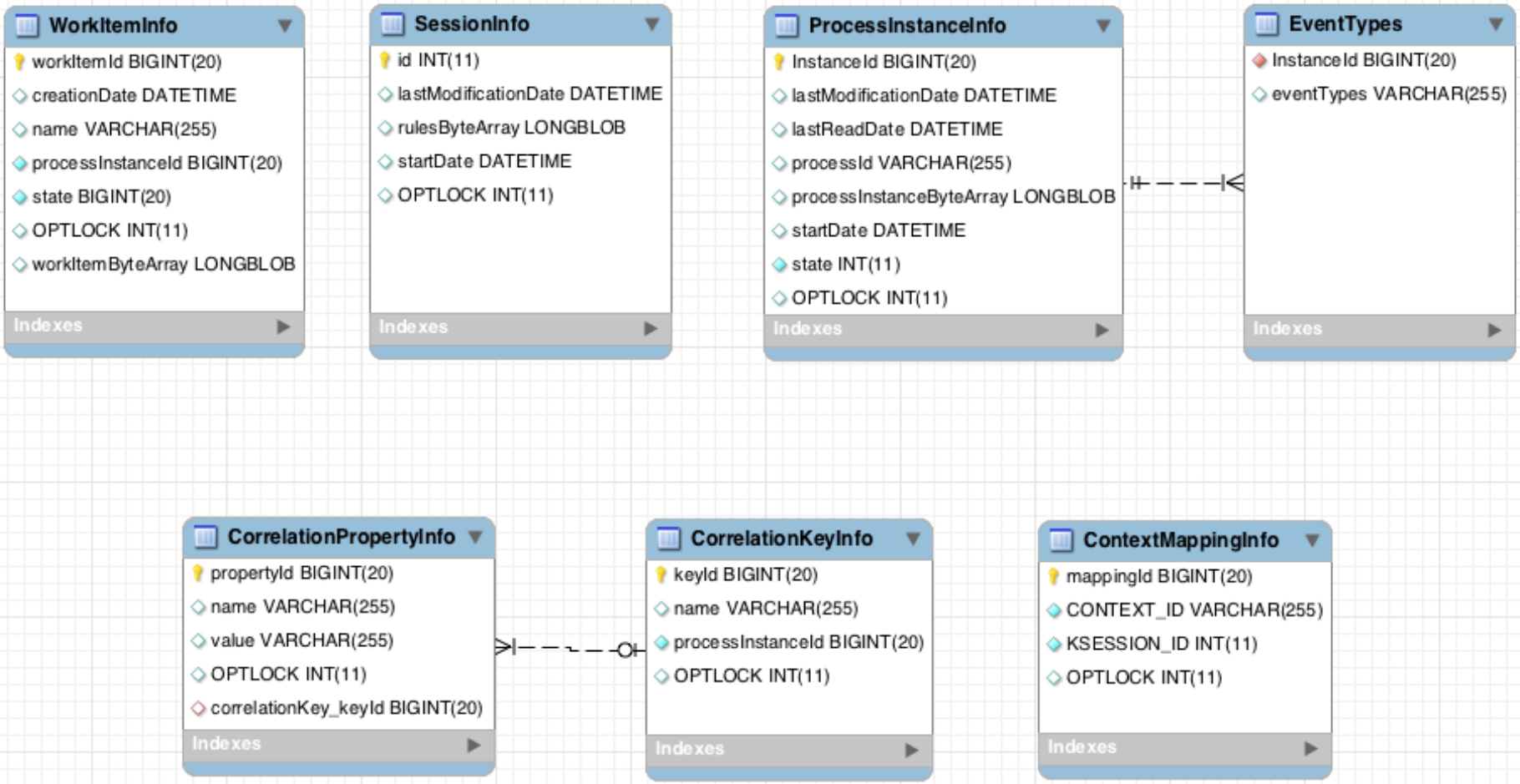
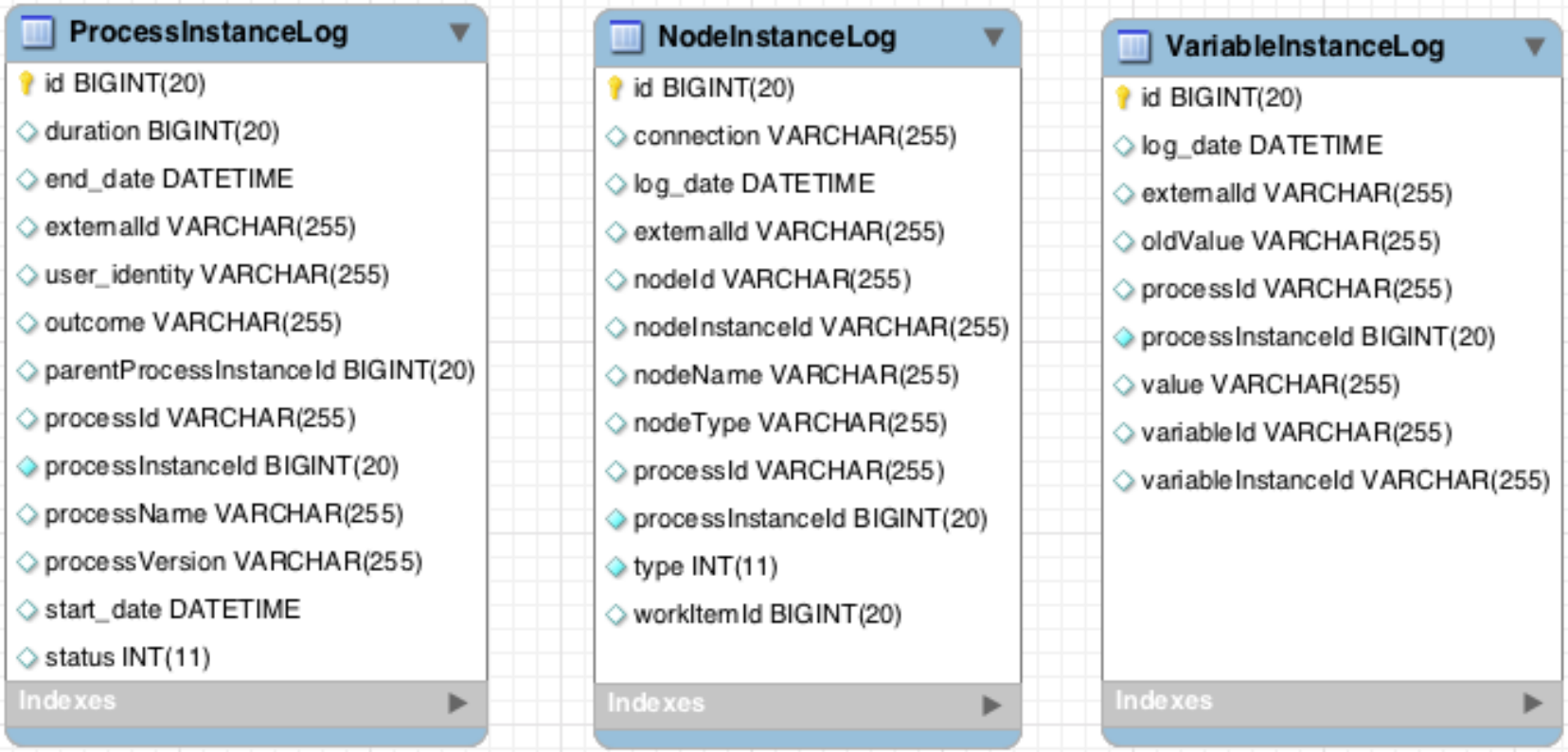
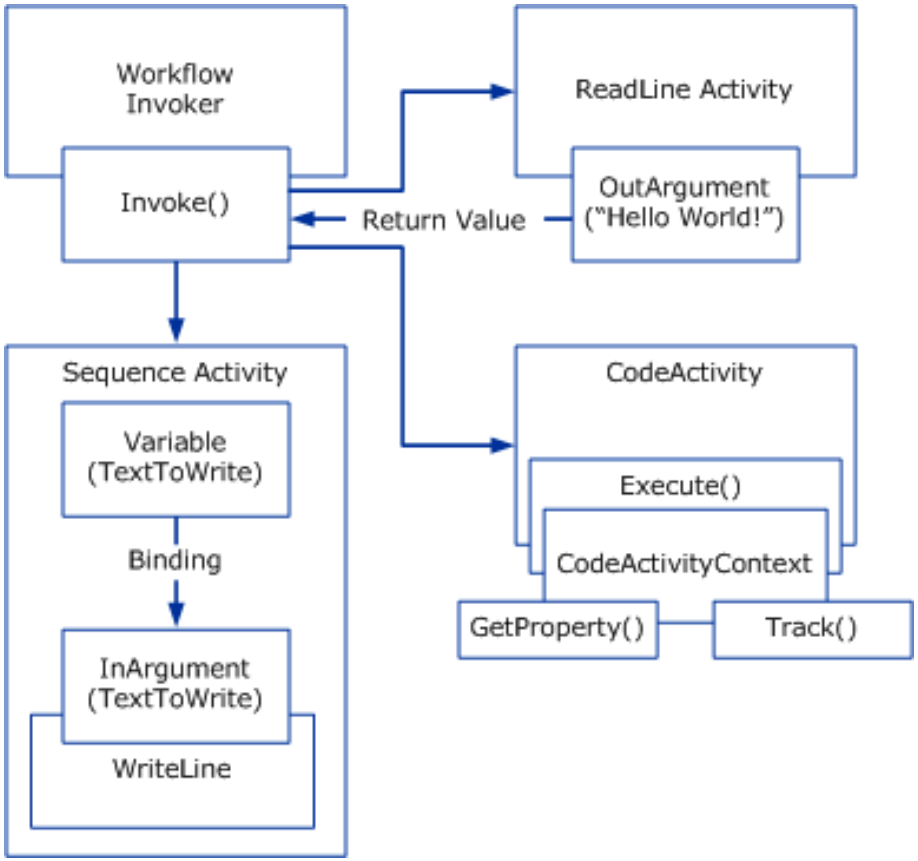


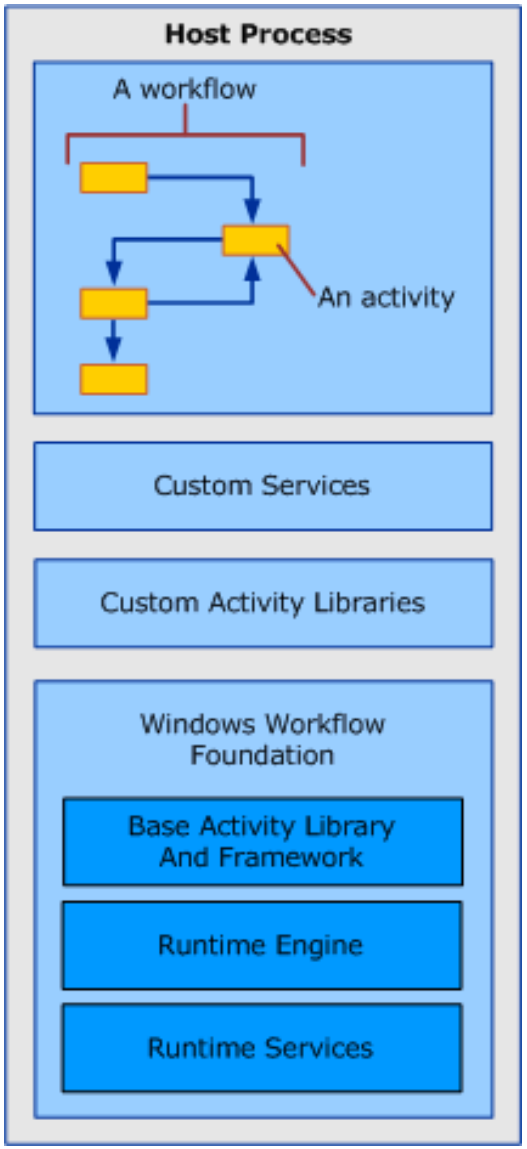
Audit Data


ProcessInstanceLog
id BIGINT(20)
duration BIGINT(20)
end_date DATETIME
externalId VARCHAR(255)
user_identity VARCHAR(255)
outcome VARCHAR(255)
parentProcessInstanceId BIGINT(20)
processId VARCHAR(255)
processInstanceId BIGINT(20)
processName VARCHAR(255)
processVersion VARCHAR(255)
start_date DATETIME
status INT(11)
Indexes
NodeInstanceLog
id BIGINT(20)
connection VARCHAR(255)
log_date DATETIME
externalId VARCHAR(255)
nodeId VARCHAR(255)
nodeInstanceId VARCHAR(255)
nodeName VARCHAR(255)
nodeType VARCHAR(255)
processId VARCHAR(255)
processInstanceId BIGINT(20)
type INT(11)
workItemId BIGINT(20)
Indexes
VariableInstanceLog
id BIGINT(20)
log_date DATETIME
externalId VARCHAR(255)
oldValue VARCHAR(255)
processId VARCHAR(255)
processInstanceId BIGINT(20)
value VARCHAR(255)
variableId VARCHAR(255)
variableInstanceId VARCHAR(255)
Indexes

Windows Workflow Foundation

- Workflow Run-time Engine





Document Approval Process

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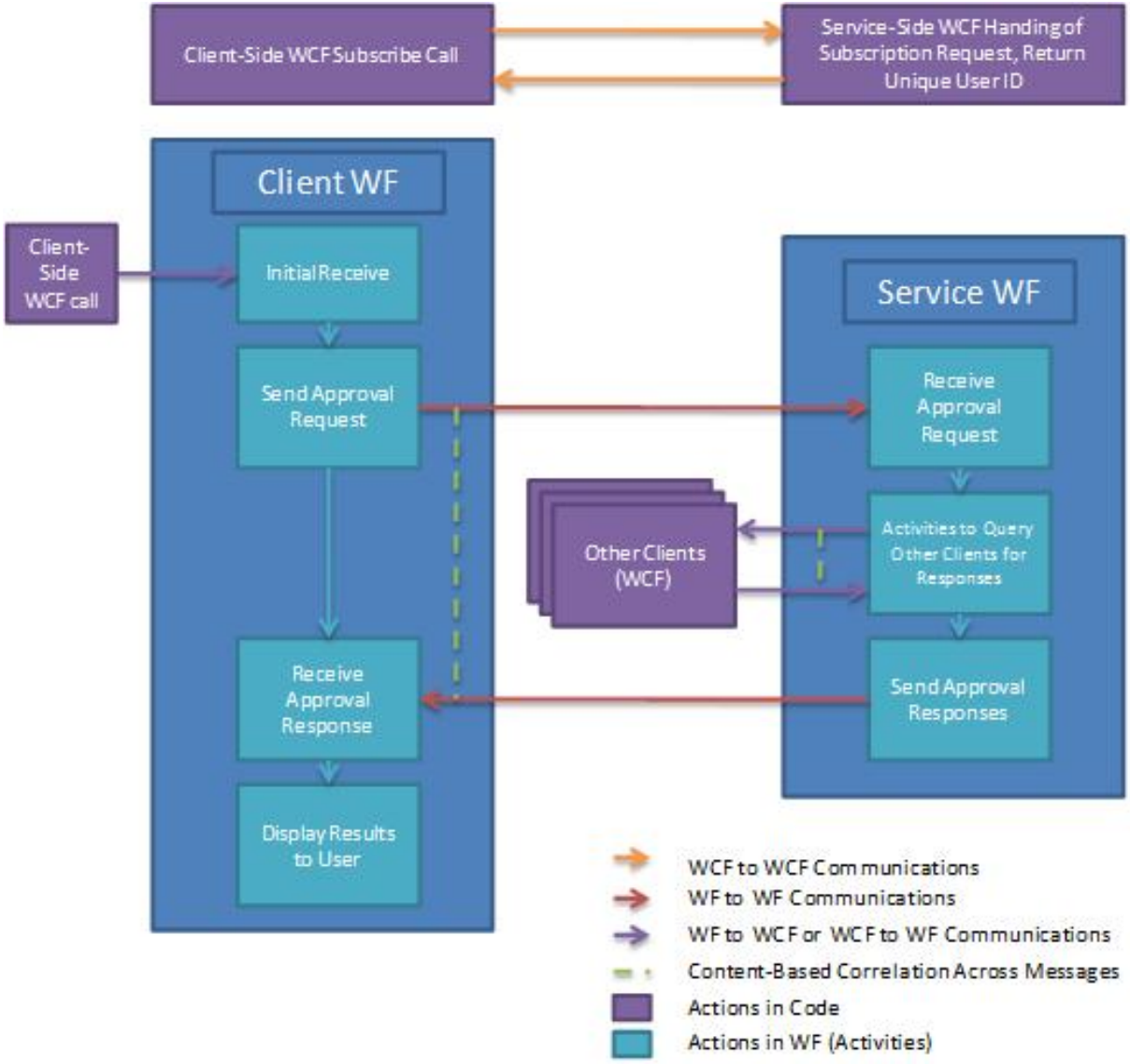

Project

- Requirement
  - Try jBPM. You can submit a separate project to demonstrate workflow application.
  - The workflow application your submitted could be a Document Approval System, in which the approval workflow can be altered easily by changing the description of workflow.

References

- jBPM Documentation
  - http://docs.jboss.org/jbpm/v6.0.1/userguide
- Windows Workflow Foundation
  - http://msdn.microsoft.com/en-us/library/dd489465(v=vs.110).aspx

Thank You!