



# Introduction to Business Model Simulation

ActiveVOS Designer

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## Business Process Modeling and Simulation

ActiveVOS™ Designer accelerates business process design and model-driven development and integration by enabling better collaboration between business analysts, process architects and developers.

This is achieved as a result of allowing business analysts to generate better-defined processes, using intuitive BPMN-compliant process diagrams and documentation of goals, Key Performance Indicators (KPI) and requirements. With the launch of ActiveVOS 7, BPMN notation is the default view when creating and editing business processes in ActiveVOS Designer.

Business Process Modeling Notation (BPMN) is the standard for modeling business process flows. Created initially by the Business Process Management Initiative (BPMI) and later adopted by the Object Management Group (OMG), it is a rich notation that simplifies the modeling of complex processes. BPMN has been developed with the primary goals of being easy to use and readily understandable by business and technology users.

The ActiveVOS Designer business process model simulator extends and complements its business process modeling functions with analytical capabilities. Process architects can use the simulation capability to evaluate the impact of new processes or proposed changes to existing processes in a model environment through the creation of “what-if” scenarios. Simulation enables examination and testing of options prior to actually implementing them in the “real” environment. Since simulation approximates reality, it also permits the inclusion of uncertainty and variability into the forecasts of process performance.



The following table summarizes the features and benefits of leveraging ActiveVOS Designer business process model simulation.

<b>Feature</b>	<b>Benefit</b>
BPMN simulation that supports all of BPMN's rich semantics, such as intermediate events and control flows	Essentially any business process can be described using BPMN and then simulated at the BPMN level by a process architect. Coupled with model import from Visio and XPD, this enables process architects to quickly build simulation models
User-defined Key Performance Indicators (KPI), coupled with a powerful simulation engine, provide the ability to create and capture new KPIs as the simulated model is executed.	Use simulation to improve the business process beyond the default KPIs, such as resource utilization and cycle time. Examples include cost and profit, operational risk metrics and quality metrics.
Simultaneous simulations of multiple business processes with shared resources help identify resource contentions and bottlenecks Flexible resource modeling supports resource pools and alternative resources	Predicting and highlighting resource bottlenecks and utilization issues allows the design of optimal human-centric business processes and work flows.
Visible animation of the flow of business objects	Reduces the learning curve by allowing the operational flow to be viewed directly and the effects of process changes are immediately visible.
Analysis of simulation output using Microsoft Excel	Use Microsoft Excel's analysis capability to study simulation results. Simulation results are exported to Microsoft Excel for off-line analysis and reporting. This analysis can be used to plan new "what if" scenarios to be implemented and tested (at the BPMN level) prior to committing resources to implementation.

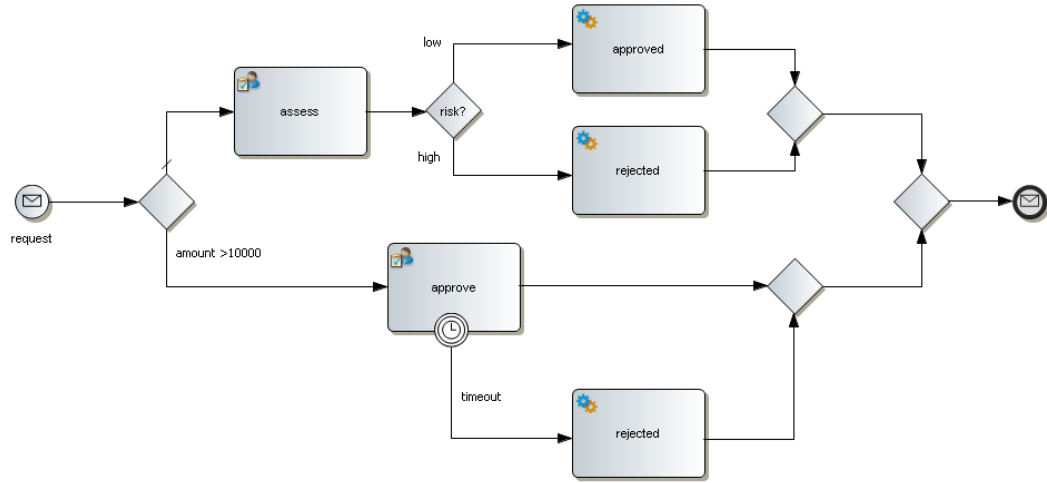
## Example

The remainder of this paper describes some of the capabilities of model simulation with respect to a Loan Approval process which is described below. After reviewing this document, we suggest you start with the following links for a more in-depth look at model simulation:

- Video (approx 18 minutes):  
[http://www.activevos.com/indepth/b\\_capabilities/m\\_DesignerModelSimulation/SimulationModel.html](http://www.activevos.com/indepth/b_capabilities/m_DesignerModelSimulation/SimulationModel.html)
- Sample project:  
[http://www.activevos.com/cec/samples/content/sample-BPM\\_Simulation/doc/index.html](http://www.activevos.com/cec/samples/content/sample-BPM_Simulation/doc/index.html)

The loan approval model represents a mortgage approval/denial process.

1. There are two primary tasks; **Assess**, to assess credit risk; and **Approve**, to review the loan application. The model uses three types of resources— *assessor*, *approver* and *supervisor*. The primary resource for the **Assess** task is the *assessor* and the primary resource for the **Approve** task is the *approver*. The *supervisor* can be assigned either task.
2. Upon receiving the loan request, if the loan amount is below a specified threshold and the credit risk is low, the loan can be approved without going through the approval process. Otherwise, the loan application must be routed for approval.
3. According to the mortgage company's service level agreement with its customers, the company is required to complete a loan application in 4 hours. If the loan application review cannot be completed, the company is required to notify users and pay fines.



Using simulation, the process architect plans to discover:

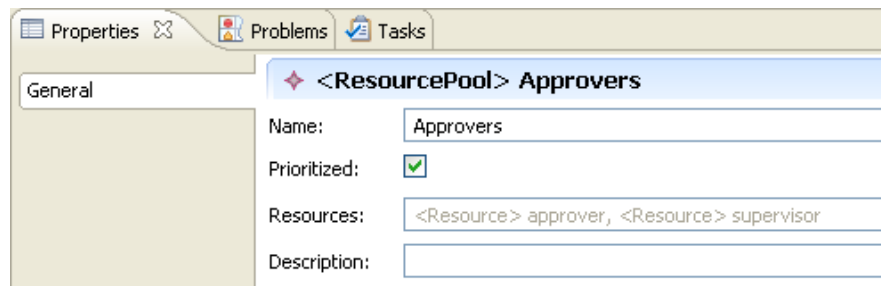
- The average cycle time for processing a credit application
- Resource utilization
- The resources needed for various loan application flows to meet the service level agreement
- Activity-based costing and accounting
- Quality of service—percentage of loan applications that would be rejected because of timeout

Simulation will be used to generate results that then can be further analyzed using Microsoft Excel.

## Modeling resources

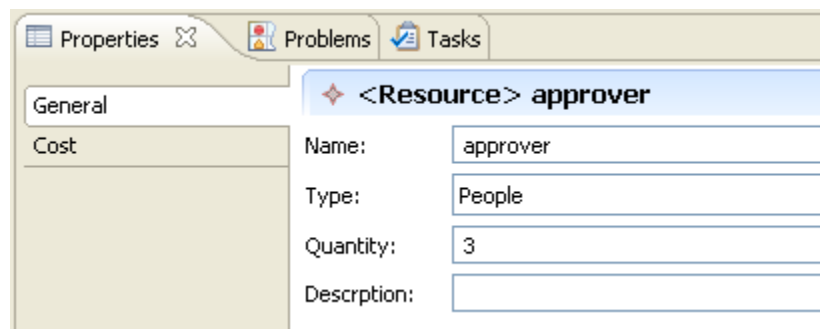
Two resource pools (assessor pools and approver pools) and three types of bulk resources (assessor, approver and supervisor) are used for this simulation. Both pools are prioritized and the assessor and approver are given priority in their respected groups.

You can also model a resource cost structure that includes base cost, utilization cost and availability.



The screenshot shows a software interface with a 'Properties' tab selected. The main area displays the configuration for a resource pool named '<ResourcePool> Approvers'. The configuration includes:

- Name: Approvers
- Prioritized:
- Resources: <Resource> approver, <Resource> supervisor
- Description: (empty field)

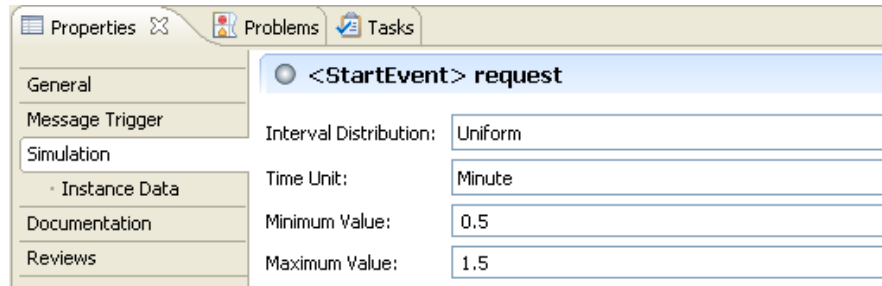


The screenshot shows a software interface with a 'Properties' tab selected. The main area displays the configuration for a resource named '<Resource> approver'. The configuration includes:

- Name: approver
- Type: People
- Quantity: 3
- Description: (empty field)

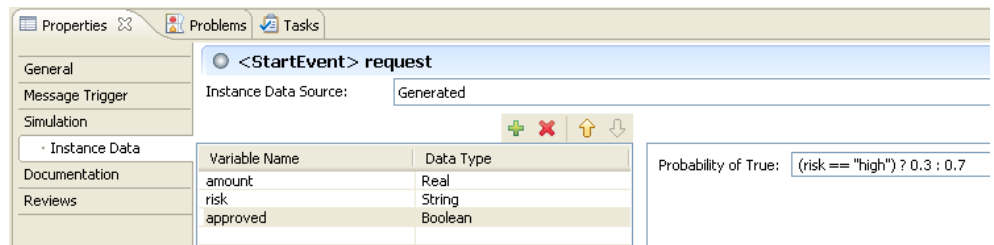
## Preparing the simulation input

You can specify an instance arrival rate and instance data to drive the simulation. ActiveVOS Designer supports four different distribution methods (uniform, constant, normal and exponential) to model arrival rate distribution.



Instance data is optional. ActiveVOS Designer supports two ways to specify the input data; it can be generated or it can be imported directly from either Microsoft Excel or flat file.

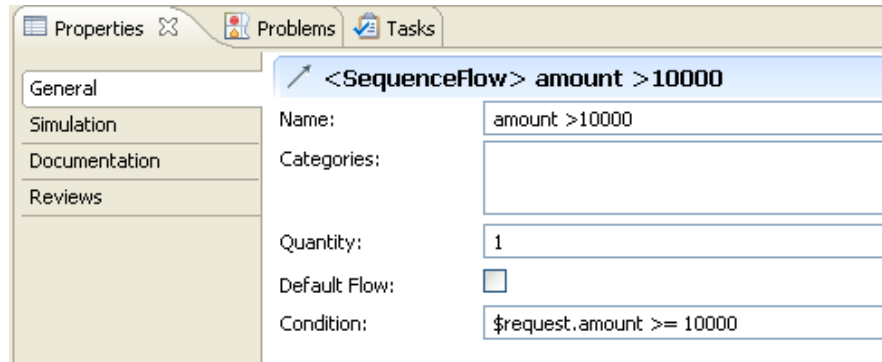
In this example, we generate instance data. Note that in this example, the “approve” column is based on another column called “risk.” If risk is high, then the approval rate is 30%; otherwise it is 70%.



Simulation parameter can be either expressed as a constant or an expression. Mozilla’s Rhino JavaScript engine is used for this purpose.

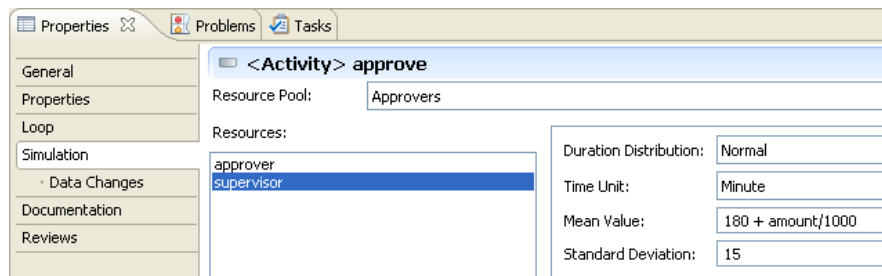
## Specifying sequence flow branch condition

You can specify the branch condition using either a probability or an expression.



## Specifying resource processing time and waiting time

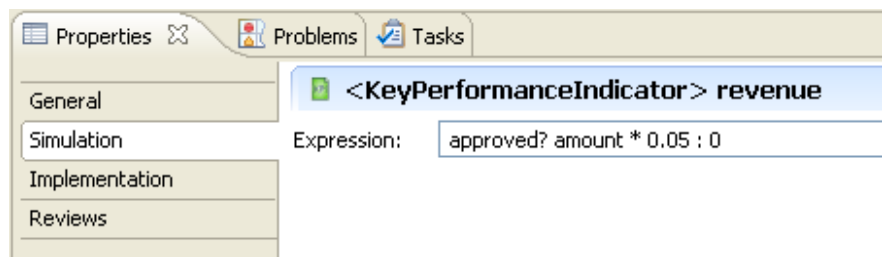
Resource pools are associated with activities that require resources. Resource processing time can be specified for each resource type in the pool. You can choose from different distribution models and use either a constant value or an expression to simulate the resource processing time.



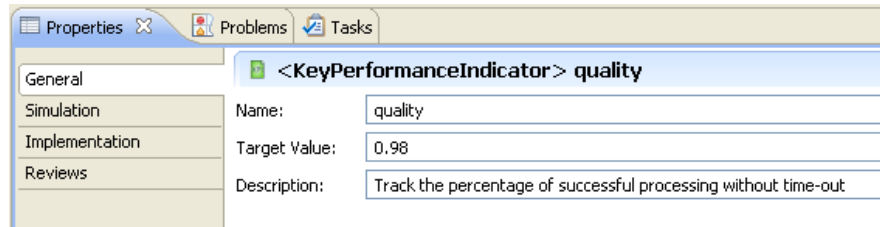
## Specifying additional KPIs

You can define additional KPIs to be captured during simulation. The KPIs, along with other information (cycle time, cost, and instance data), will be saved and exported to Microsoft Excel for further analysis.

In this example, we define two KPIs: one called *revenue* that is 5% of loan amount if the loan is *approved* (approved? amount \* 0.05 : 0). We further define a variable called *approved*. It will be set to TRUE when if the loan was approved and set to FALSE when rejected.



The other KPI *quality* is used to track whether the loan is rejected because of timeout.

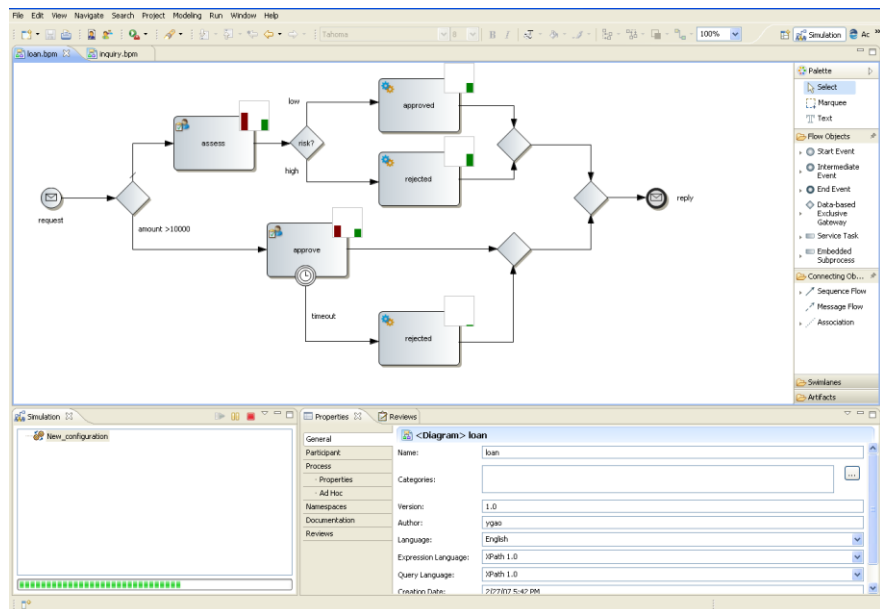


## Running a simulation

Use the Run Simulation command to start the simulation. A *configuration* is used to execute different simulation strategies. Each configuration can be saved and used again later. The configuration parameters include:

- Business process model(s) to simulate—you can select one or more business process model to simulate
- Simulation time
- Reference calendar time
- Tracing log
- Microsoft Excel output template

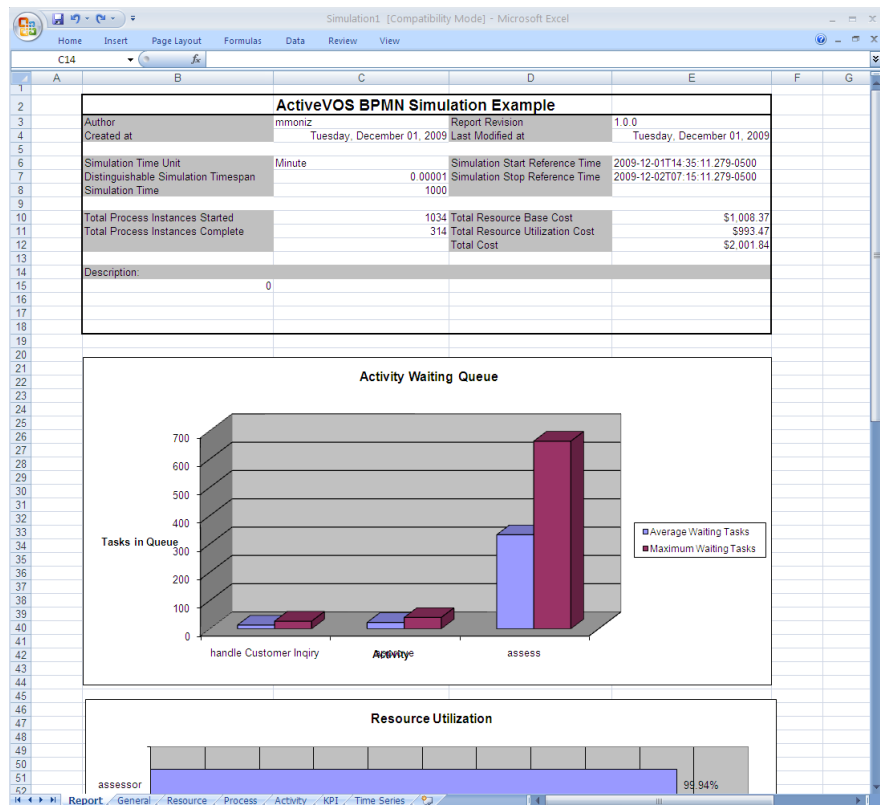
Once the simulation starts, it switches to animation mode, where you can monitor the flow of information and use tool tips to see the details of specific activities. You can pause, cancel and restart the simulation any time.



## Analyzing simulation output

Simulation results are automatically saved as a Microsoft Excel file for further analysis. (Users can modify the Microsoft Excel template to meet their needs.) The simulation output includes data captured in summary form, as well as detailed activities and resources utilized information captured for each instance.

In this example, the simulation indicates Assessor is under-utilized and Approver and Supervisor are overloaded. Possible actions include readjusting resources or changing the business process (more loans can be approved via assessor, for example), or based on a risk assessment automating a portion of the approval using a service.





## About Active Endpoints

Active Endpoints ([www.activevos.com](http://www.activevos.com)) is the leading developer of visual orchestration systems. VOS empowers line of business project teams to create applications using services and industry standards, making their businesses more agile and effective. Active Endpoints' ActiveVOS promotes mass adoption of SOA-enabled applications by focusing on accelerating project delivery time with a standards-based, easy to use system. Active Endpoints is headquartered in Waltham, MA with development facilities in Shelton, CT.

To find out how Active Endpoints can help your business, visit <http://www.activevos.com>, call +1 781 547 2900, or email us at [info@activevos.com](mailto:info@activevos.com).