WebSphere Education

Setting up and running simulations

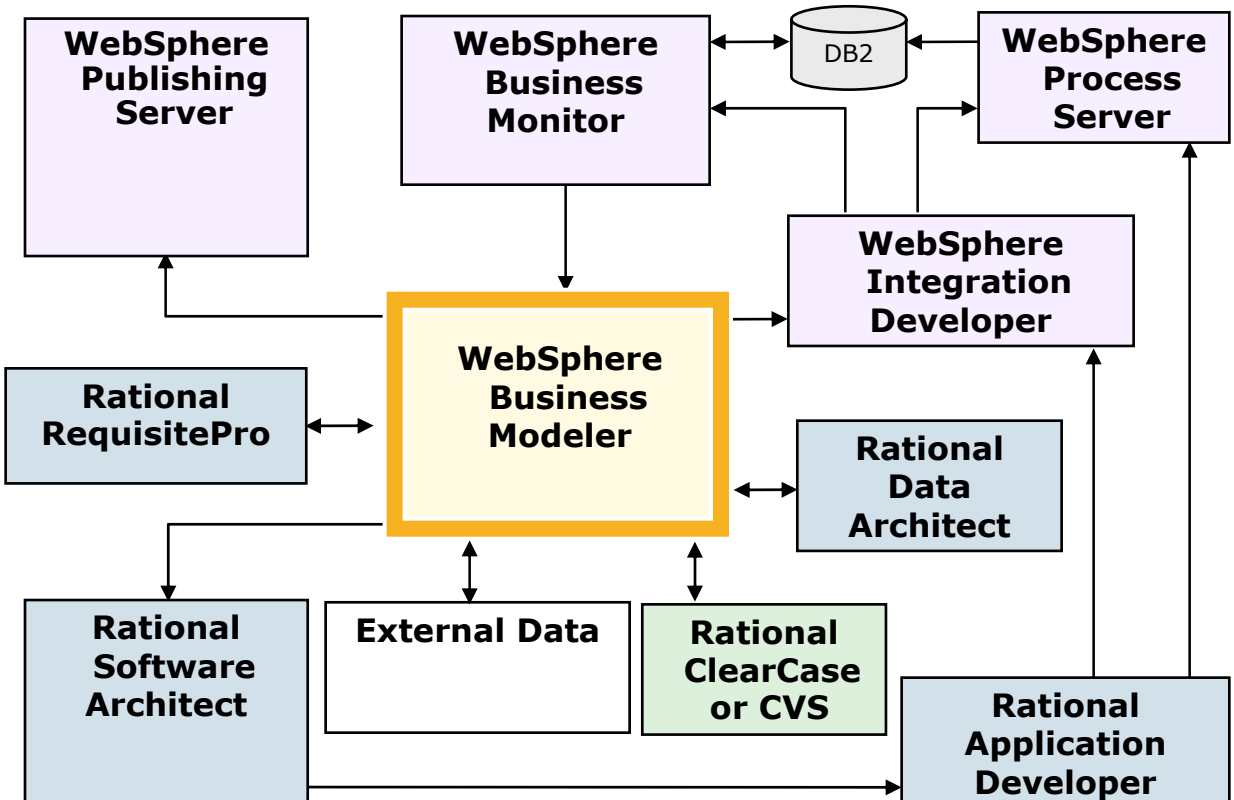
Unit 18

Unit objectives

After completing this unit, you should be able to:

- Describe element behavior in simulation
- Create a snapshot
- Define simulation attributes
- Define simulation preferences

Setting up and running simulations



Element behavior in simulation

- Process time and cost
  - Accumulated from the attributes of all the included element attributes
  - Process attributes are used if there are no elements inside
- Service time and cost
  - Attributes determine how it performs work
- Task and map
  - Attributes determine the time and cost of its work
  - Escalations in human tasks are not evaluated
  - Business rules tasks are treated like generic tasks (business rules not evaluated)
- Timer, broadcaster, receiver, repository, timetable
  - Attributes affect the behavior of the process
- Decisions, merges, forks and joins
  - Use attributes to affect the flow of the process through probabilities or expressions
- Roles and resources
  - Determine time and cost based on specified allocations
  - Resource attributes take precedence over role attributes
  - In human task, primary owner is treated as a normal resource or role requirement

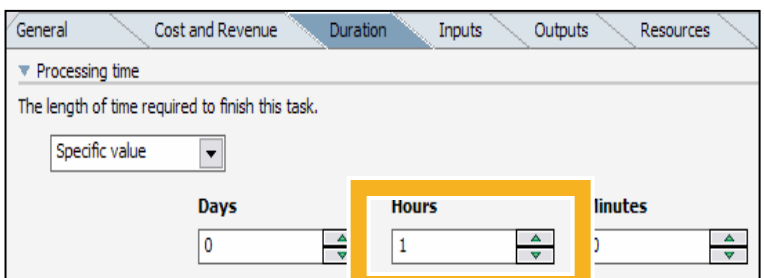
Role and resource behavior in simulations

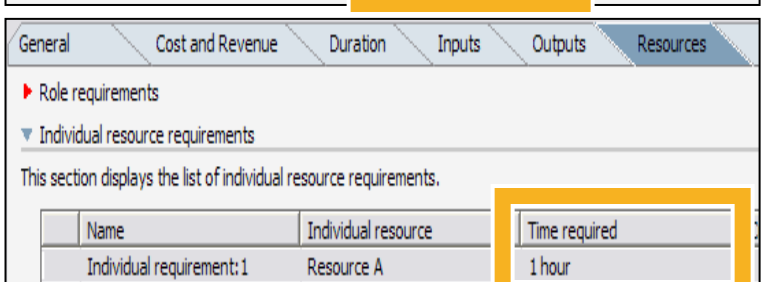
- Costs for resources and roles
  - If you define costs for both resources and roles, the resource cost takes priority.
    - Role cost is used only if no other cost is associated with the resource.
  - For a process containing an activity that has a requirement for a role.
    - The resource cost of the activity is based on the cost of the qualified resource that is allocated to the activity.

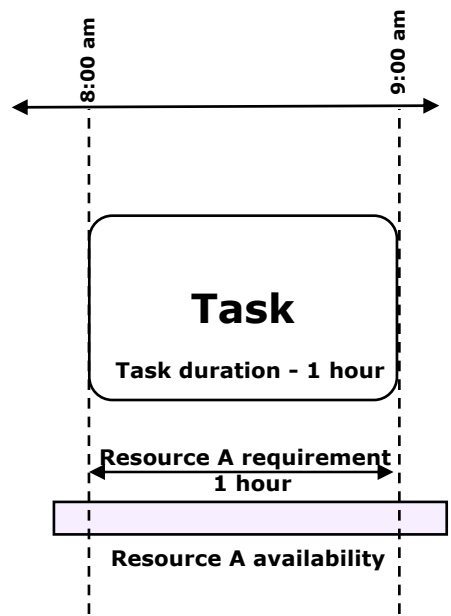
- Resource and role allocations
  - There are no rules to govern the role or resource allocation for simulations.
  - If a process instance ends before an activity role or resource allocation time is complete, the roles or resources are de-allocated from the activity and can be allocated to another activity.
  - A role or resource allocation may be split into multiple intervals, if the allocated role or resource is not continuously available for the entire duration of the resource requirement.

Task duration and resource requirements

- Duration is used to determine cycle time.
- Resource time required is used to determine cost.

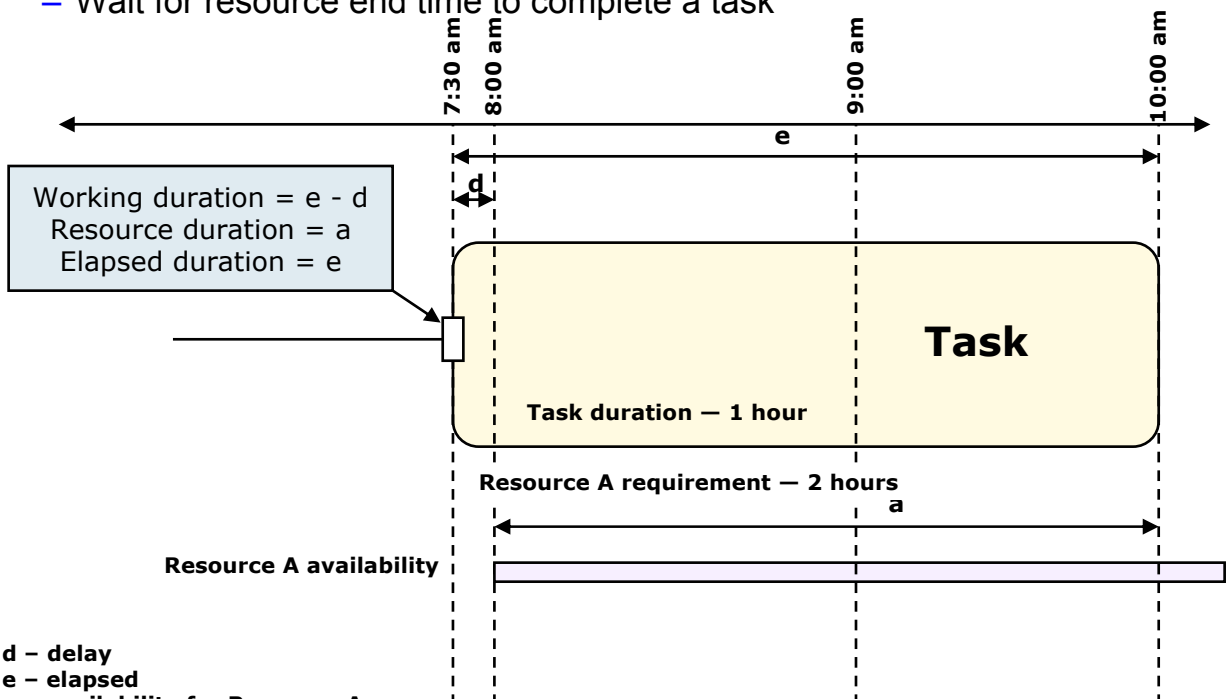






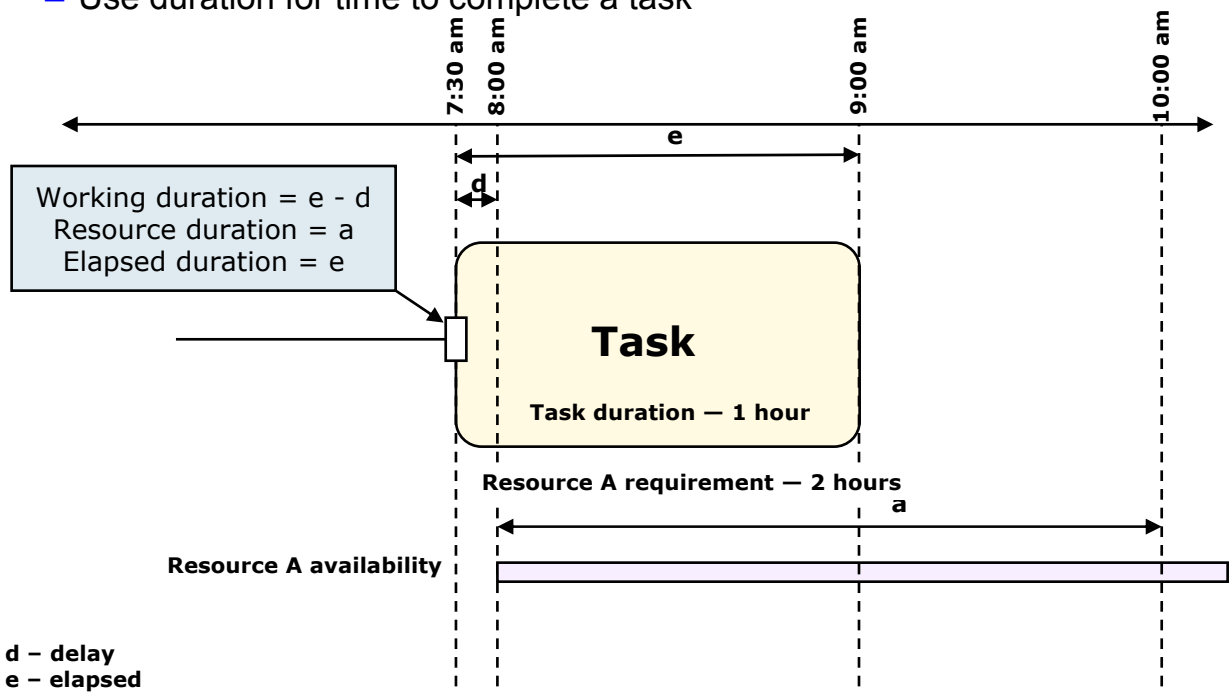
Single resource – task time equals resource time

- **Use resources' time required as a task processing time**
  - Set to "Yes"
  - Wait for resource end time to complete a task



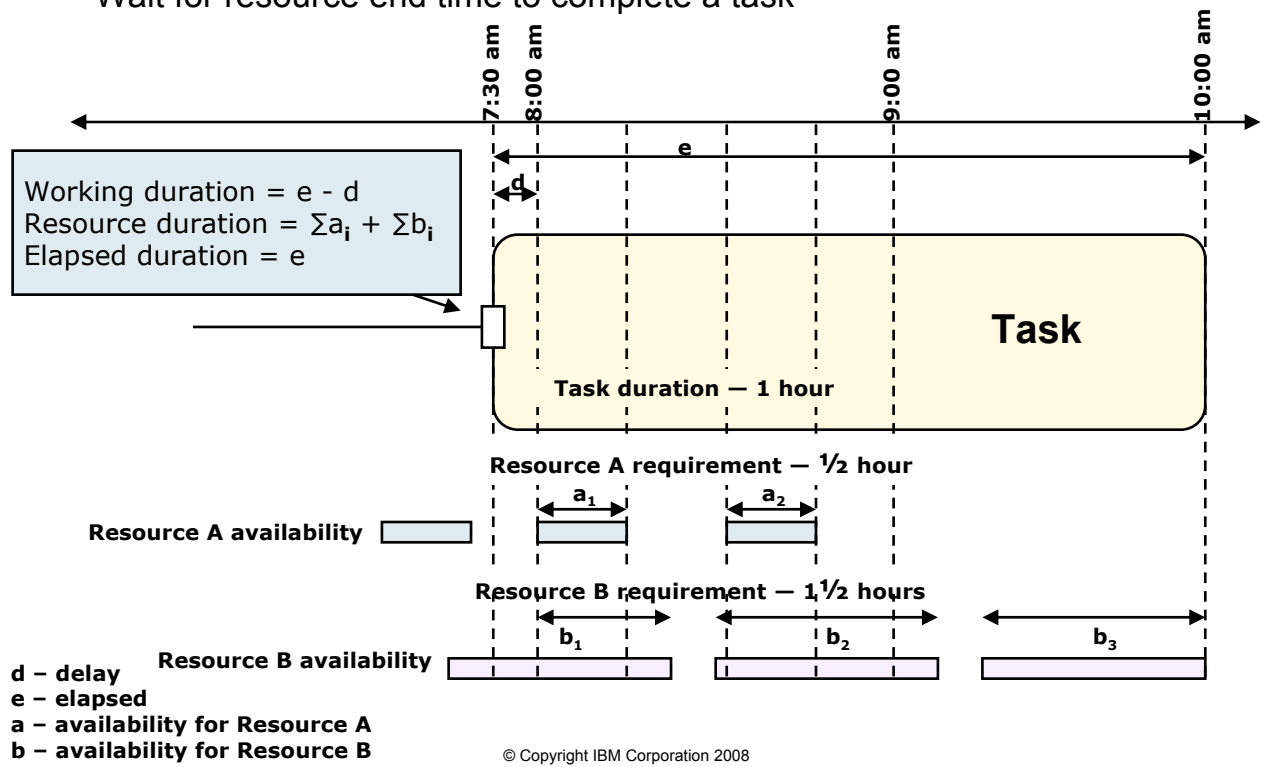
Single resource – task time equals set duration

- **Use resources' time required as a task processing time**
  - Set to "No"
  - Use duration for time to complete a task



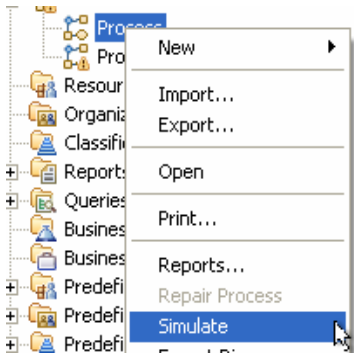
Multiple resources

- Task behavior with simulation preference set to “Yes”
  - Wait for resource end time to complete a task

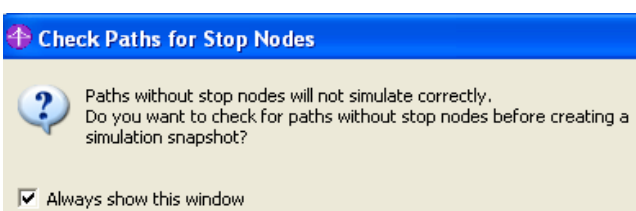


Creating a simulation snapshot

- To simulate a process, you must create a simulation snapshot.
  - Creating a simulation snapshot creates an initial simulation profile.



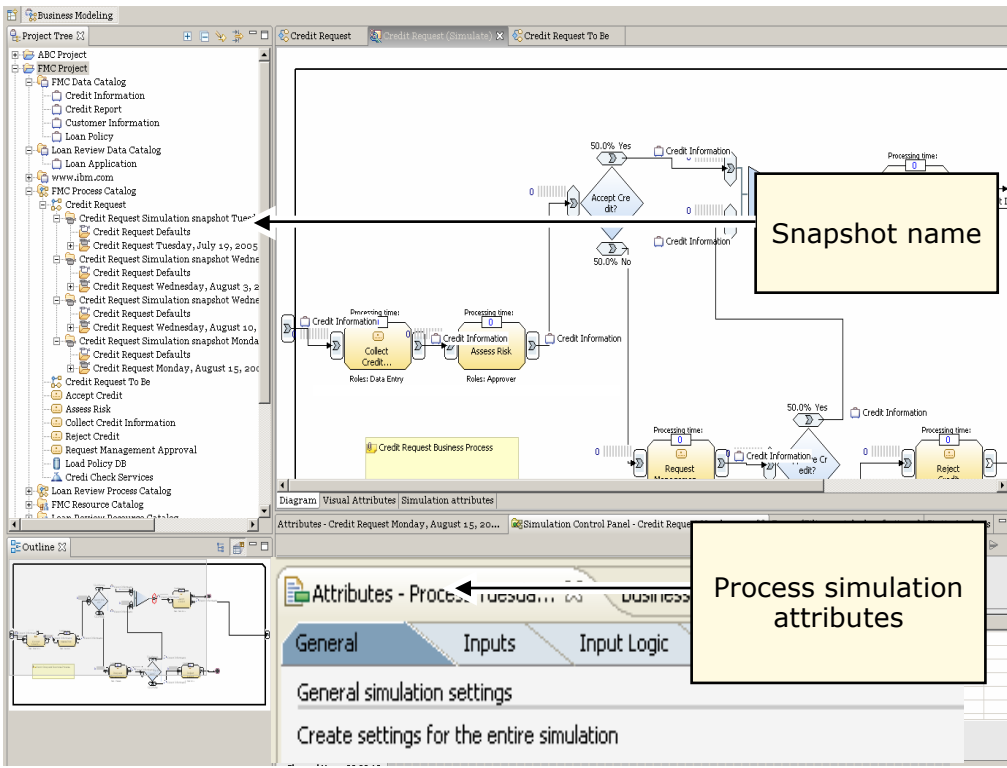
- The snapshot generator asks to check the stop nodes.
  - Every process must end with a stop node.
- A new simulation snapshot appears in the Project Tree.
  - Its name is made up of:
    - The name of the originating process
    - The words “simulation snapshot”
    - A timestamp
  - The simulation snapshot contains the simulation snapshot settings and an initial simulation profile.



- Fix critical errors before creating a snapshot.

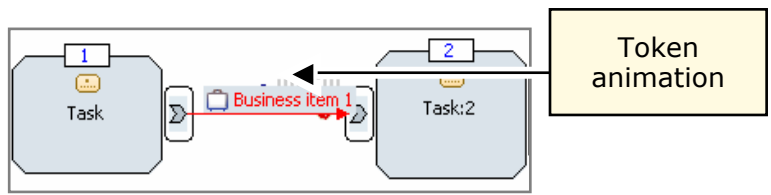
Simulation snapshot (1 of 2)

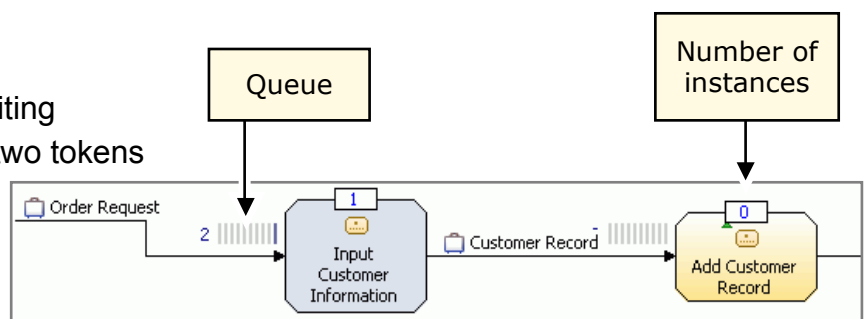
- The simulation snapshot opens in a tab over the process editor.
- Snapshot name
  - Rename to document settings
- Simulation attributes
  - Define the simulation behavior



Simulation snapshot (2 of 2)

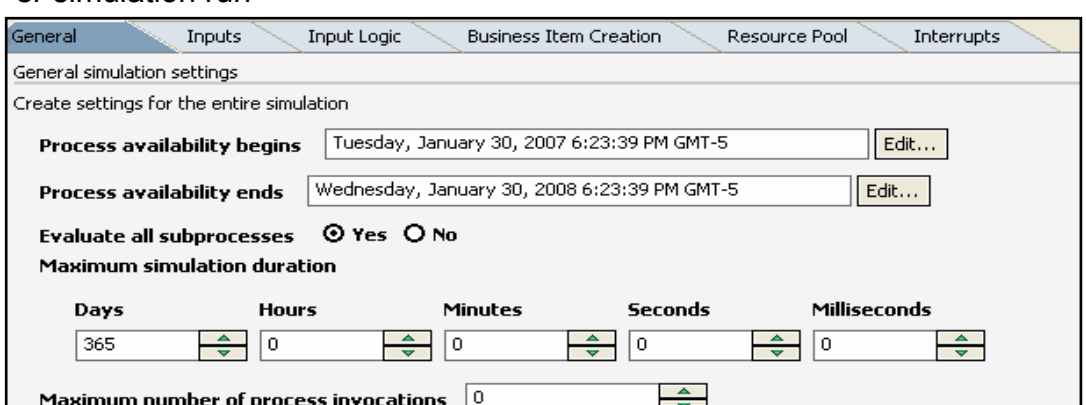
- Token animation
  - Watch the movement of tokens
  - Look for bottlenecks
- Activity color
  - Changes color when active
- Instances
  - Displays number of instances
- Queue
  - Number of tokens waiting
  - Each bar represents two tokens
- Animation is not necessary
  - Turning off shortens execution time





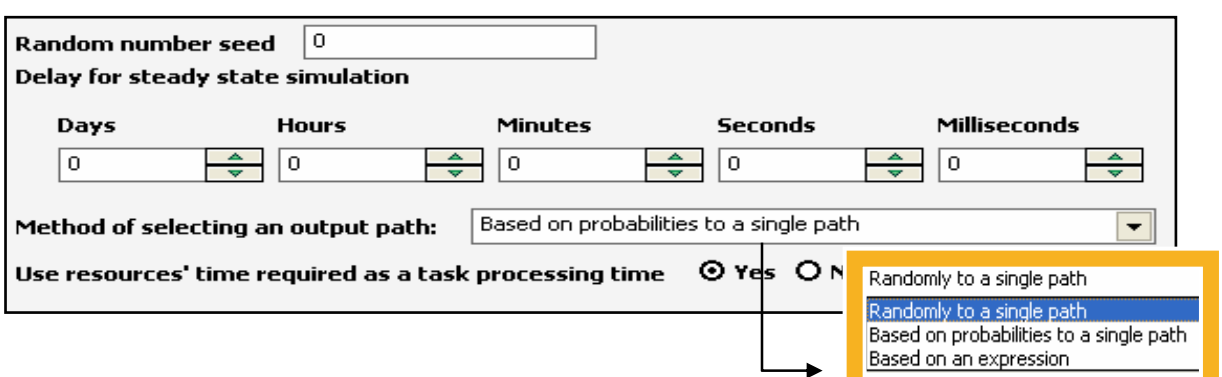
Simulation attributes: General (1 of 2)

- Process availability begins and Process availability ends
- Evaluate subprocesses
- Maximum simulation duration
  - Real time in which the simulation occurs
- Maximum number of process invocations
  - Per simulation run



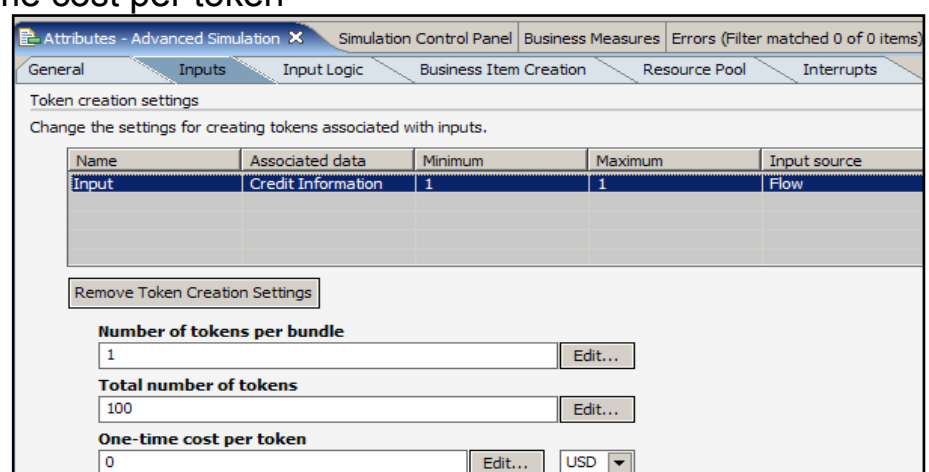
Simulation attributes: General (2 of 2)

- Random number seed
- Delay for steady state simulation
  - Virtual wait time before collecting statistics
  - Skip data collection during startup
- Method of selecting output path
- Use resources' time required as task process time



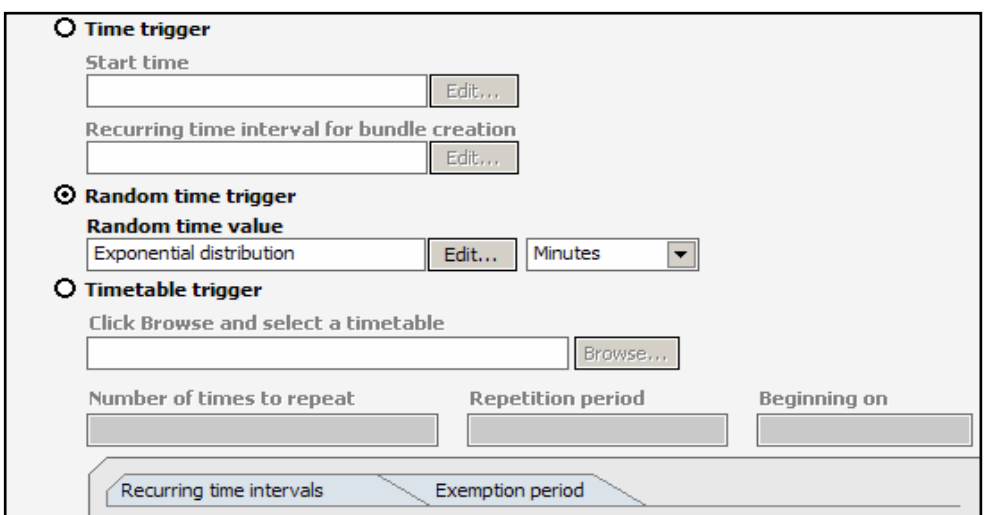
Simulation attributes: Inputs (1 of 2)

- Associate a token with a business item
  - The business item will arrive with the token
- Number of tokens per bundle
  - Number of tokens that arrive at the same time
- Total number of tokens
  - Number of tokens generated per run
  - Total tokens are grouped by bundle
- One-time cost per token



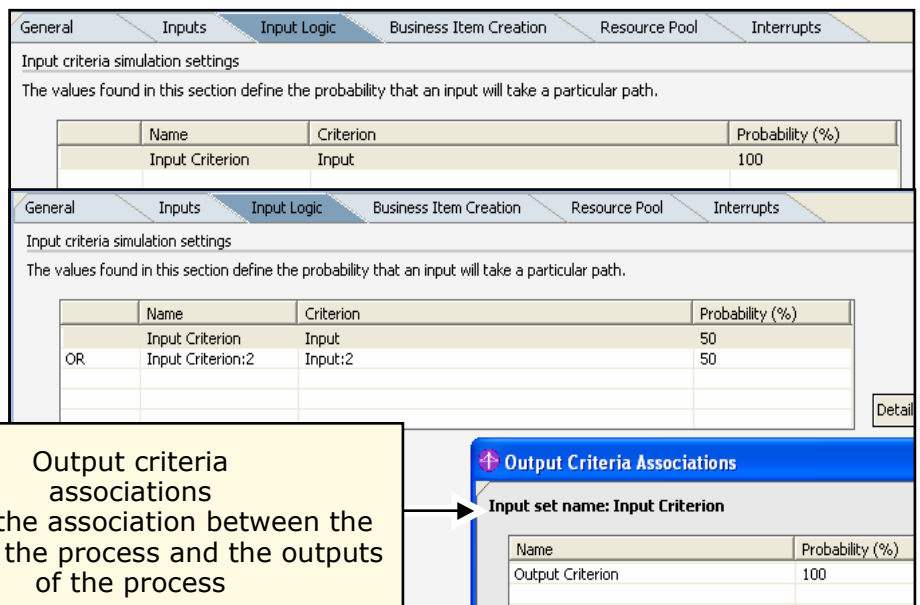
Simulation attributes: Inputs (2 of 2)

- Time trigger
  - Fixed interval with a start time
- Random time trigger
  - Select a statistical distribution for token generation
- Timetable trigger
  - Use a timetable to generate tokens



Simulation attributes: Input logic

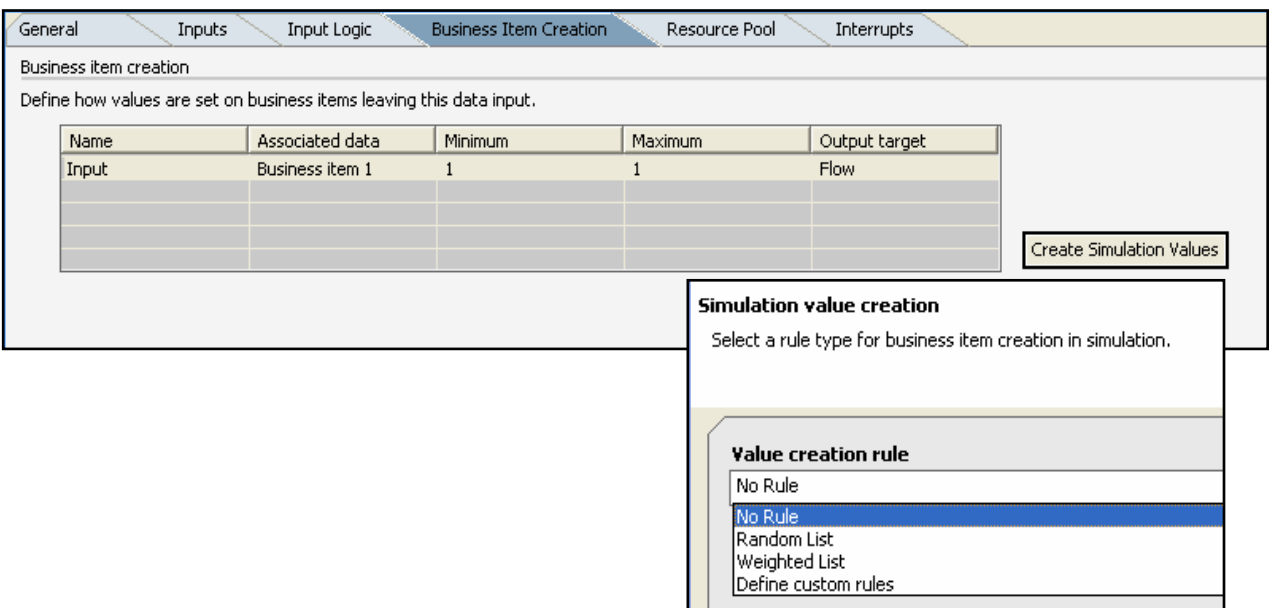
- Input criteria simulation settings:
  - For one process input: The probability of the input is 100%.
  - For multiple process inputs: Specify the probability of receiving each of the different inputs or combination of inputs.



Output criteria associations
Specify the association between the inputs of the process and the outputs of the process

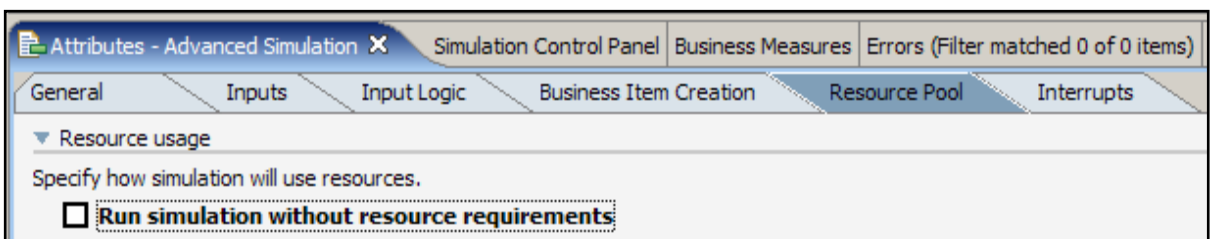
Simulation attributes: Business item creation

- Business item creation
  - Specifies the business items to be created by the process
- Create simulation values
  - Specifies the rule used to create business items



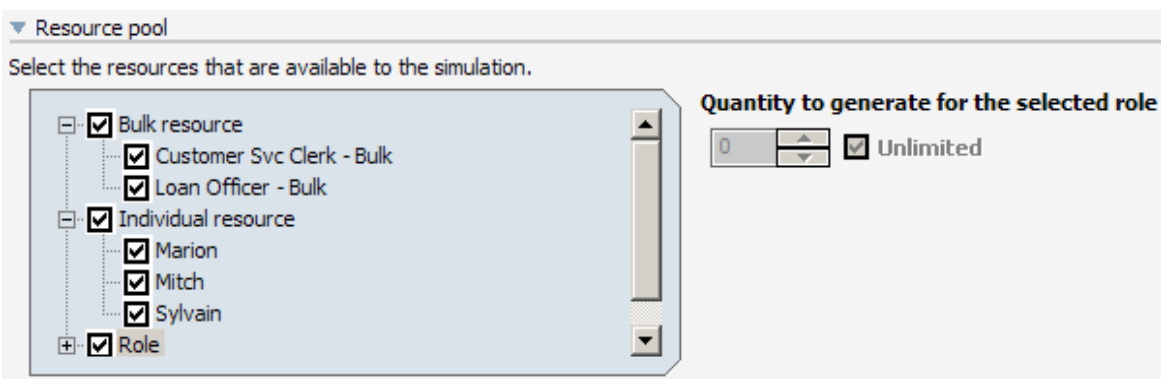
Simulation attributes: Resource pool (1 of 2)

- Resource usage
  - Run simulation without resource requirements.
    - Ignore the resource requirements.
    - Use to test the model without resources.



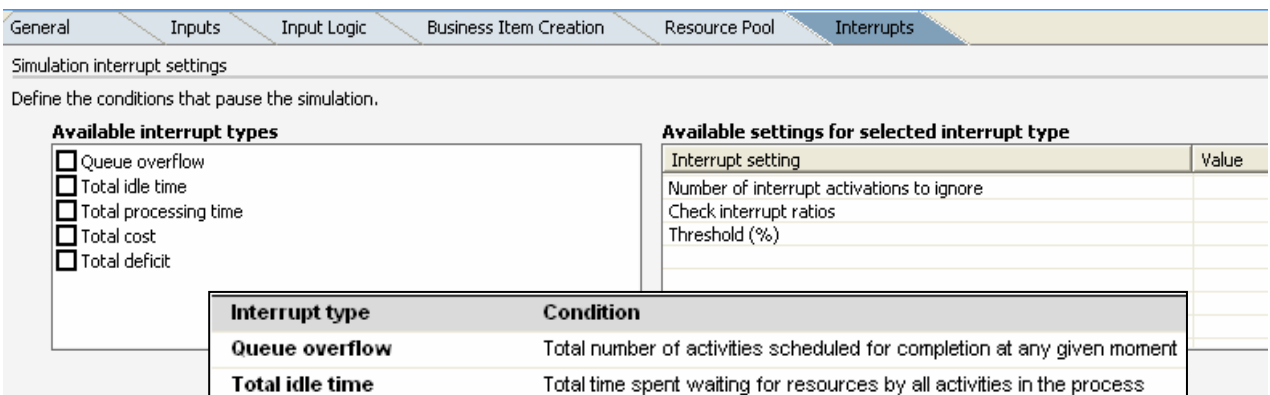
Simulation attributes: Resource pool (2 of 2)

- Resource pool
  - Select resources to be made available to the simulation.
    - By default, all resources defined in your project are available.
    - If the roles are checked, the simulation will supply as many roles as needed.
    - The number of roles can be limited.



Simulation attributes: Interrupts

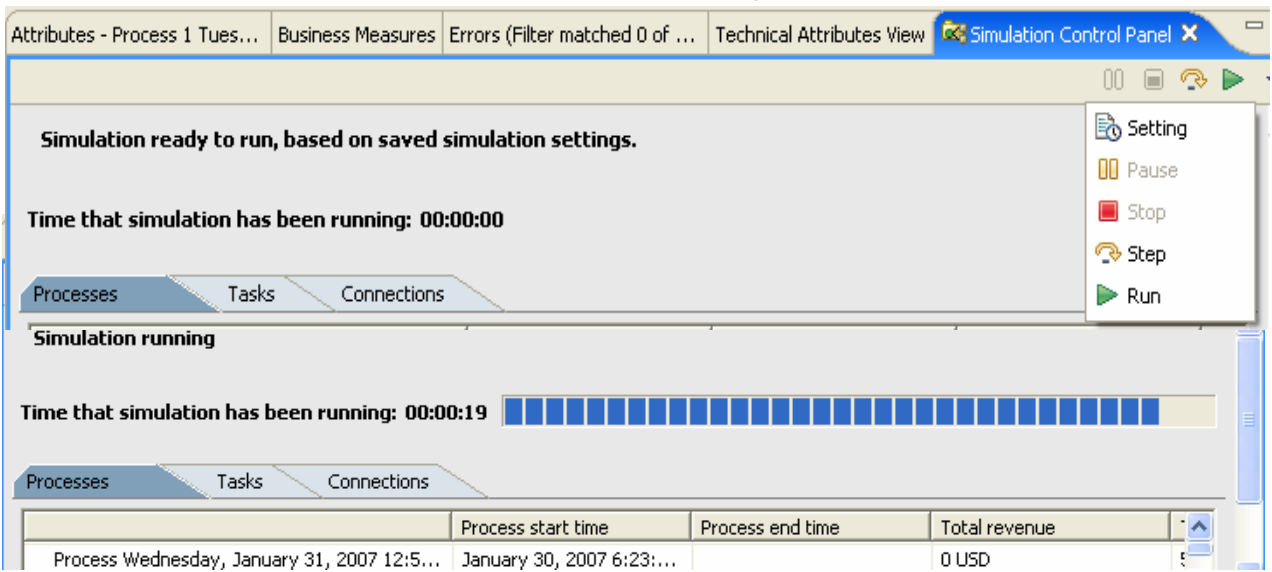
- Interrupts allow the monitoring of specific conditions.
  - Cost overruns, excessive times spent waiting for resources.
    - The simulation run is automatically suspended when a condition occurs.



Interrupt type	Condition
Queue overflow	Total number of activities scheduled for completion at any given moment
Total idle time	Total time spent waiting for resources by all activities in the process
Total processing time	Total processing time of all activities in the process
Total cost	Total cost of performing all activities within a process **Note:** This does not consider revenue generated by activities
Total deficit	Total cost minus revenue of all activities performed within a process

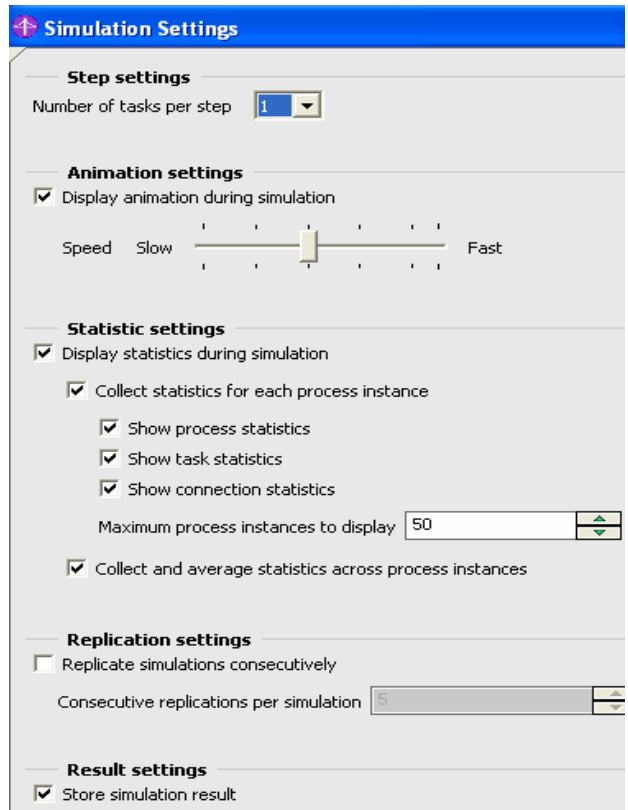
Simulation control panel

- The simulation control panel
  - Controls simulation settings and allows you to pause, stop, step, run a simulation
  - Shows time the simulation has been running
  - Shows data updated as model is running



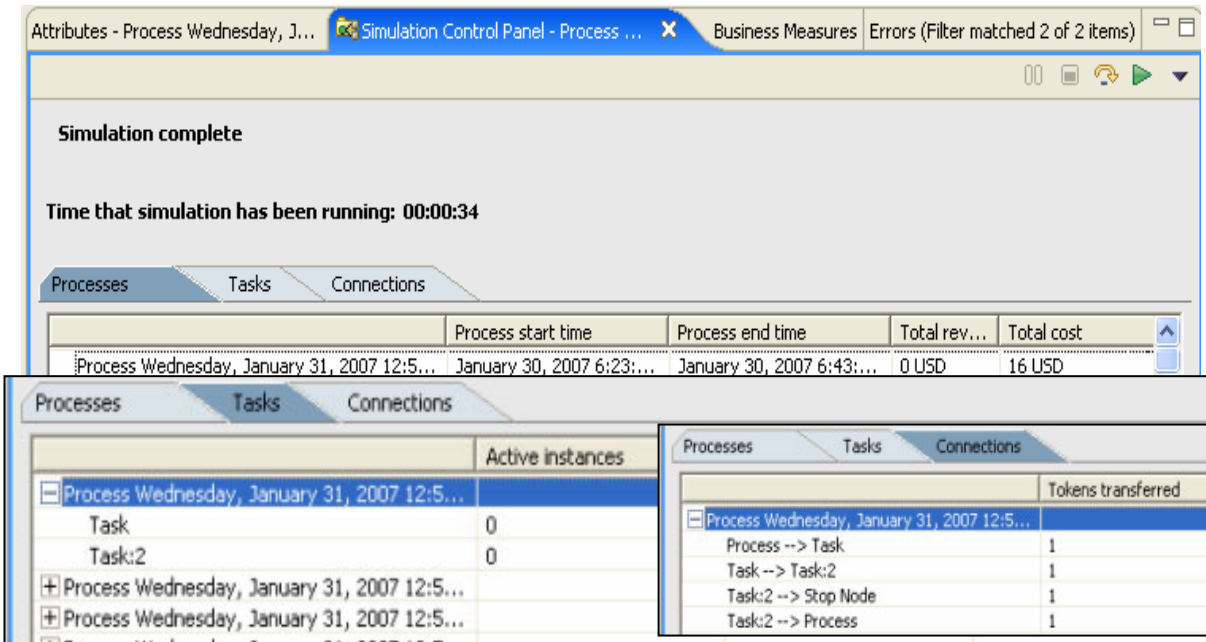
Simulation settings

- Simulation settings
  - Step settings
  - Animation settings
    - Display animation
    - Speed
  - Statistic settings
    - Specify what is displayed in statistics
  - Replication settings
  - Result settings



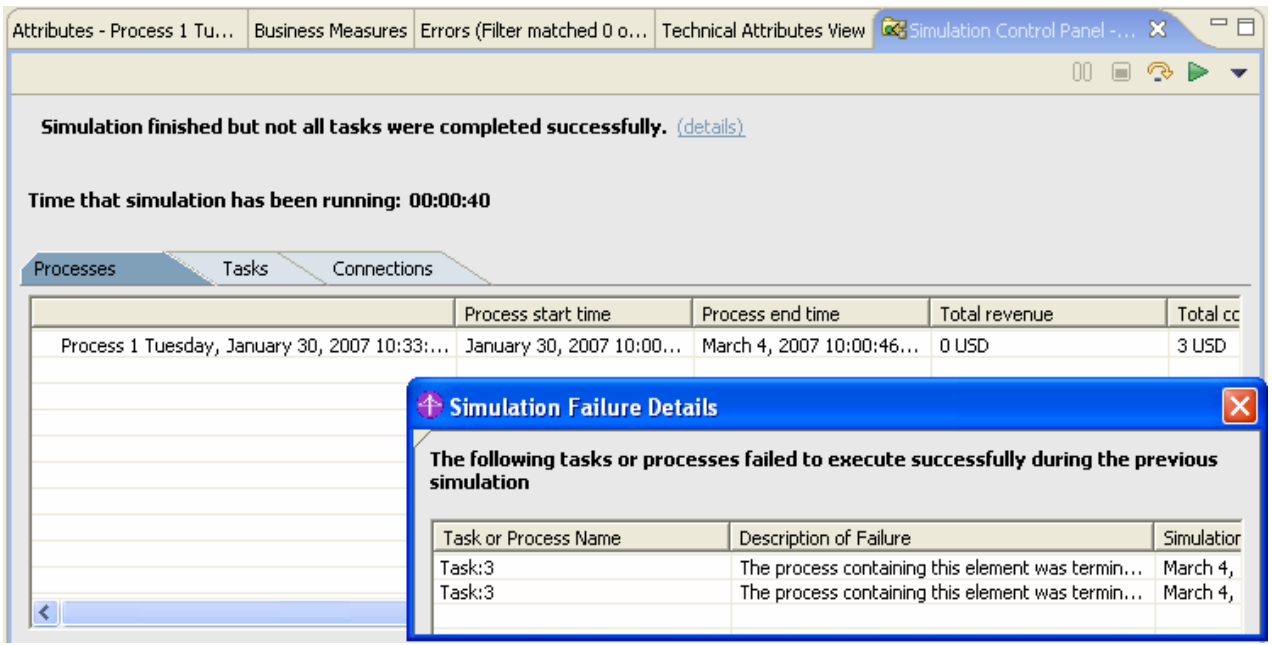
Simulation statistics

- Displayed in a tab over the attributes
  - Processes, tasks and connections
  - Check box — collect and display statistics across process instances

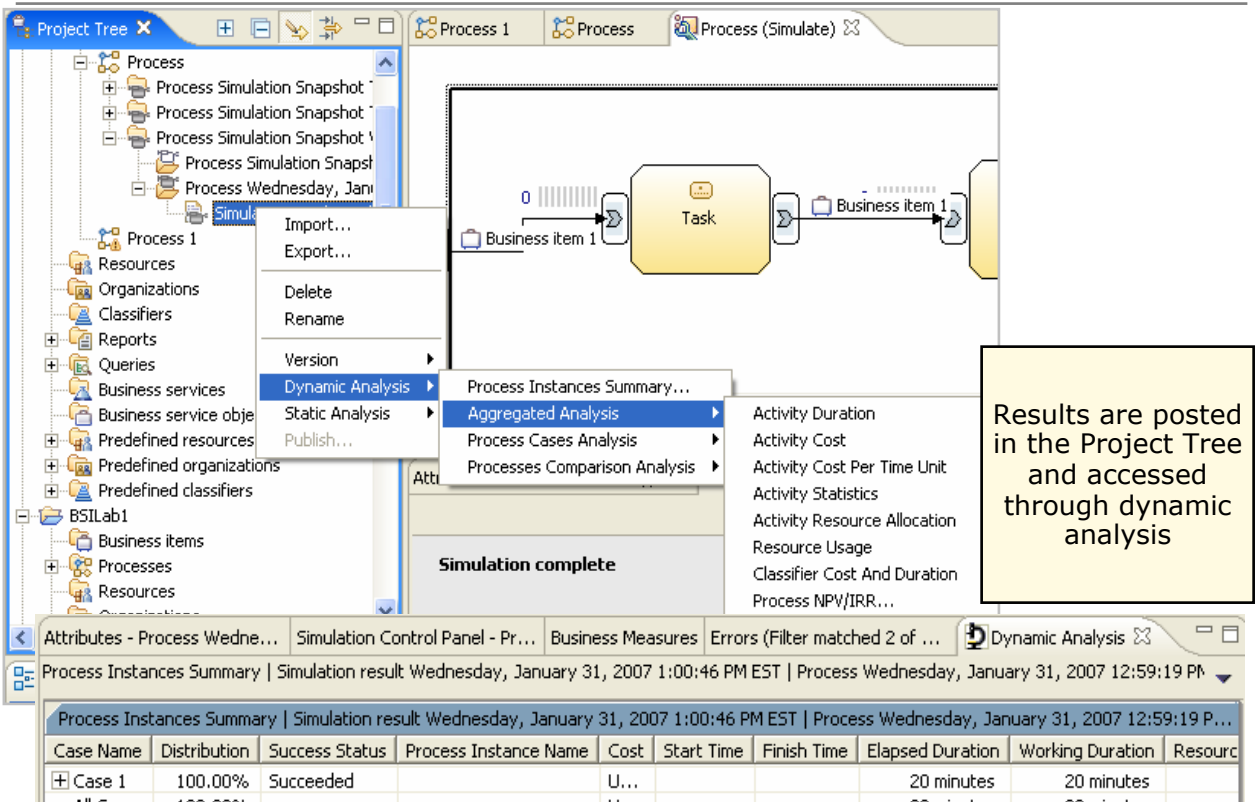


Simulation errors

- Simulation finished but not all tasks were completed successfully (includes details).



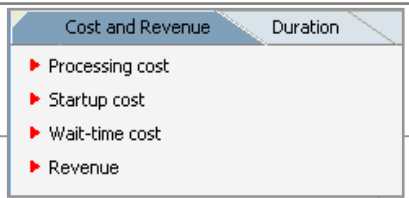
Simulation results



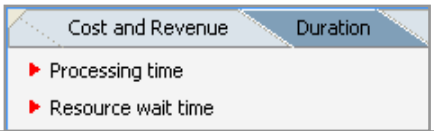
Results are posted in the Project Tree and accessed through dynamic analysis

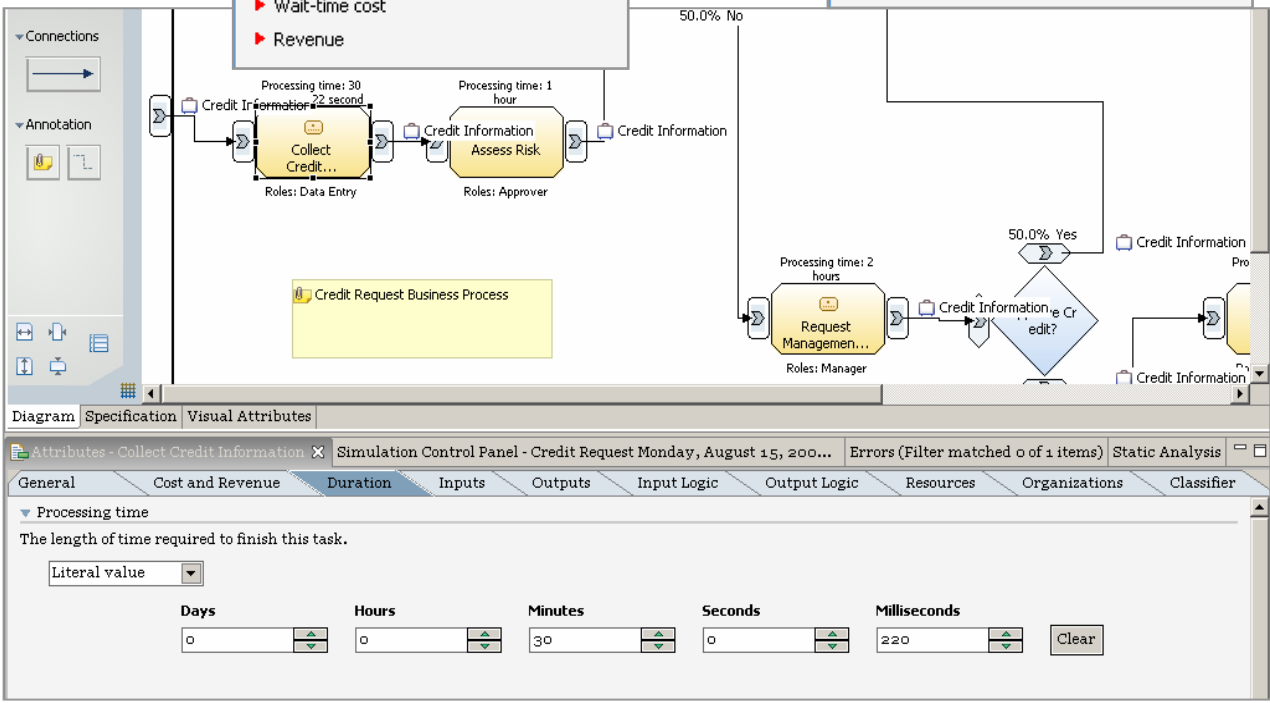
Changing model attributes in the simulation model

- Cost and revenue



- Duration





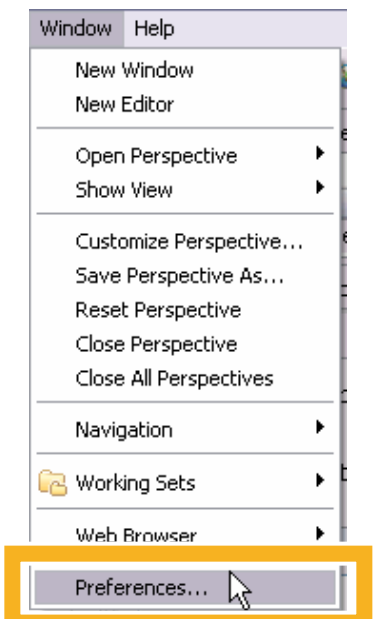
Setting simulation preferences

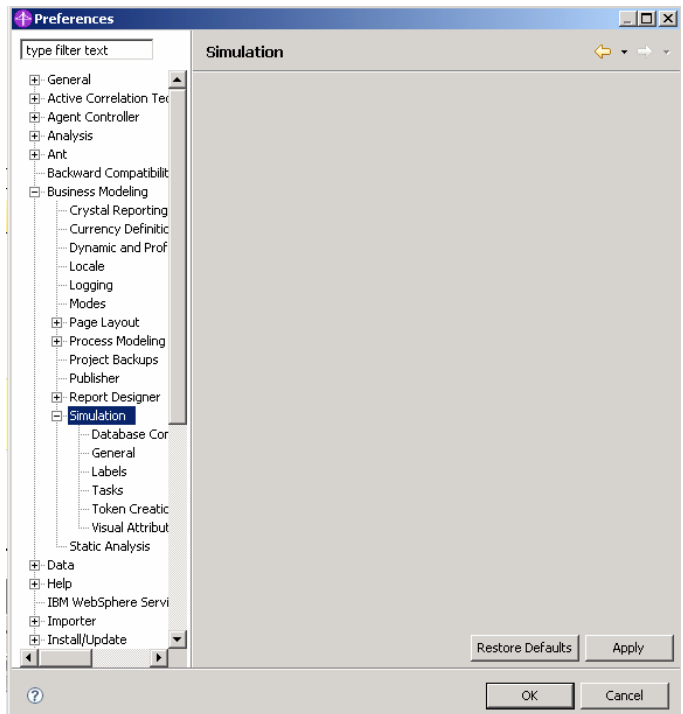
- Simulation attributes control the behavior of your simulation runs so that simulation snapshots and results reflect real-world behavior.

- Simulation attributes can be set at multiple levels.
  - At the highest level are the simulation preferences.
  - At the next level are the simulation snapshot settings.
  - At the lowest level are those in a particular simulation profile.

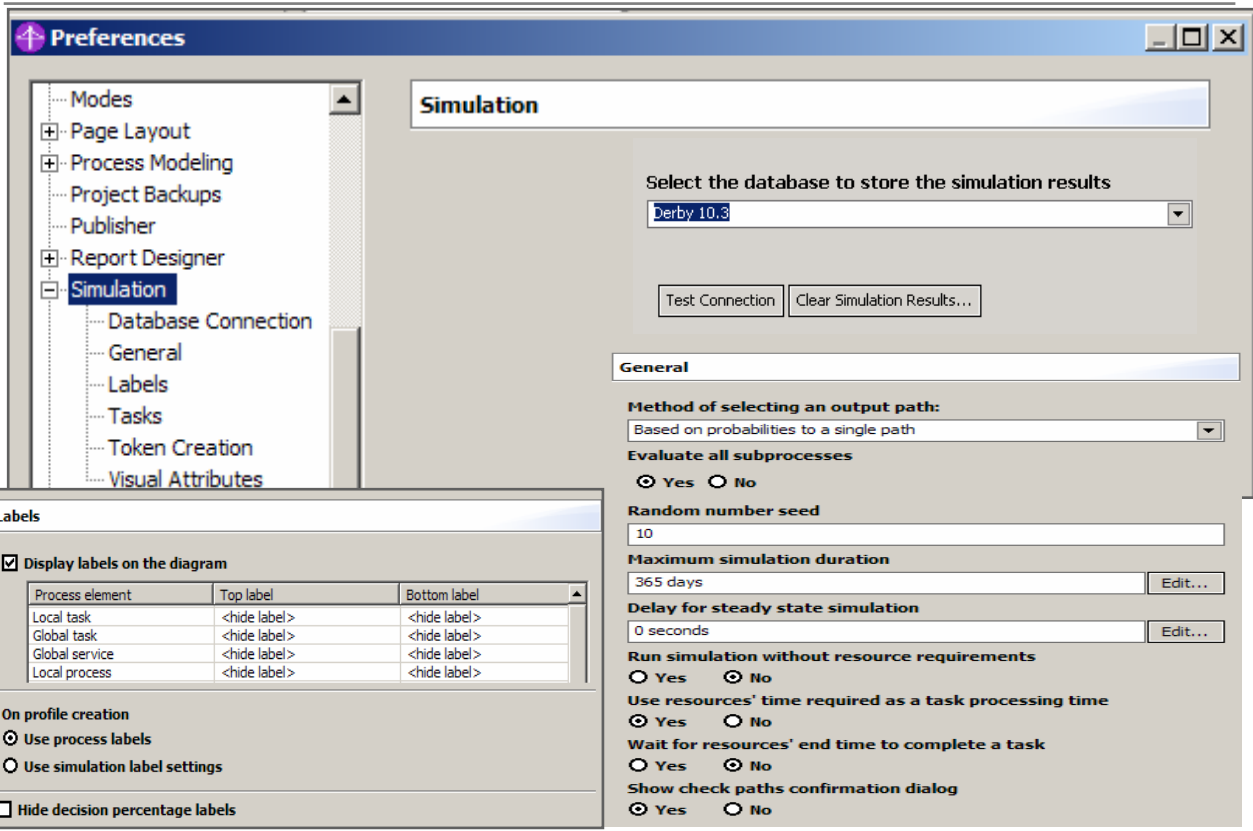
Simulation preferences

- At the highest level are the simulation preferences.
  - From the tool bar

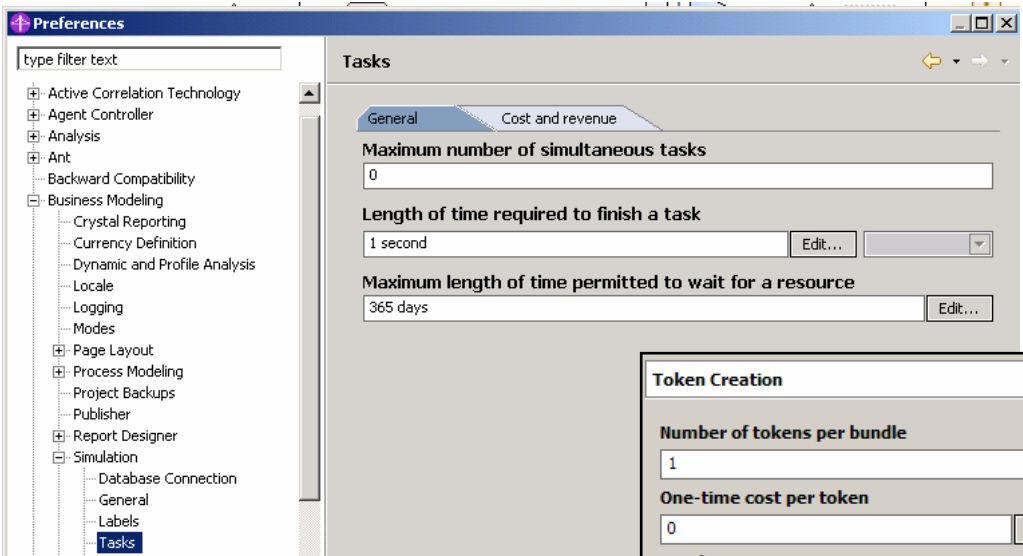


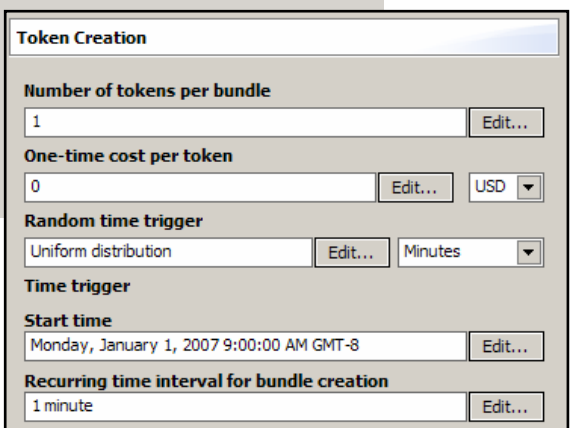


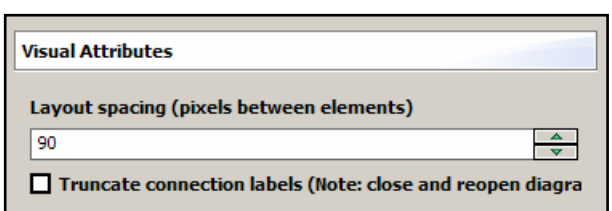
Simulation preferences: Database Connection, General, Labels



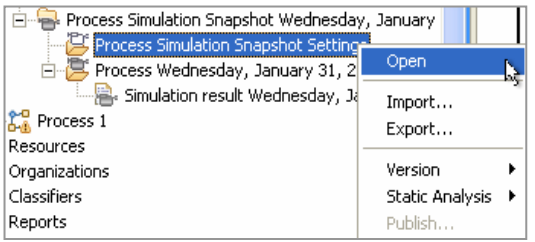
Simulation preferences: Tasks, Token Creation, Visual Attributes



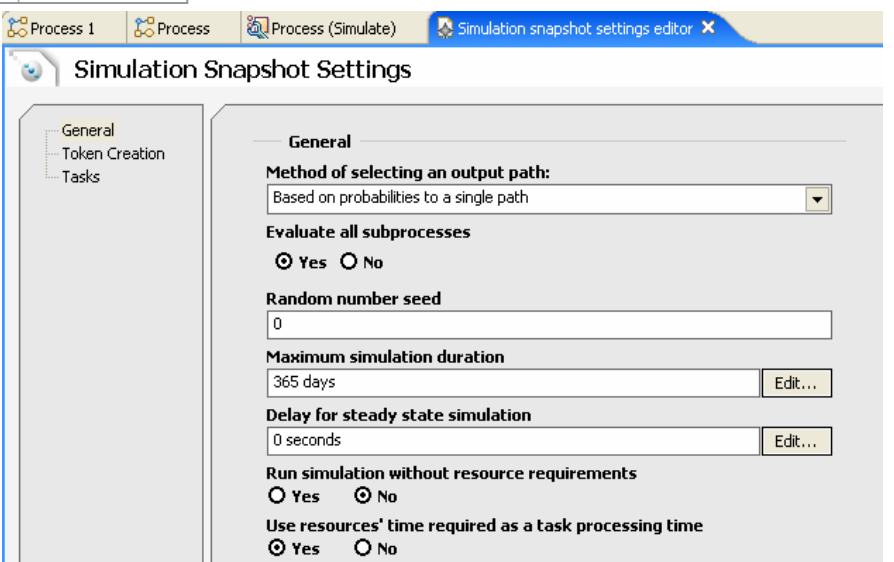




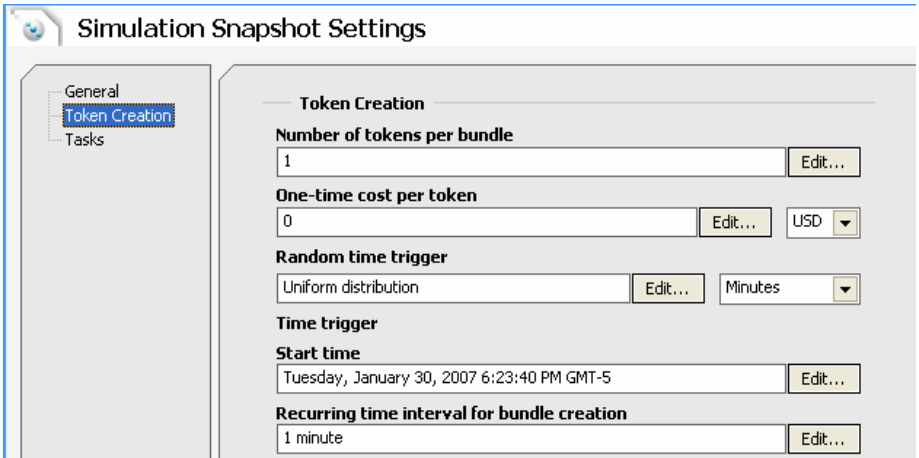
Simulation snapshot settings (1 of 2)



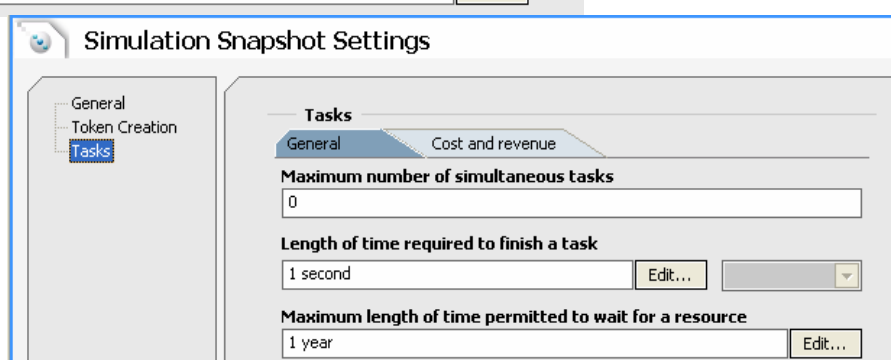
- Next level from the Project Tree
- Includes general settings, token creation settings and tasks settings



Simulation snapshot settings (2 of 2)



- Token creation and tasks settings



Checkpoint: Running simulations

Your instructor will review these questions with you as a group. If time permits, the instructor may provide you time to answer the questions on your own before the group discussion.

1. What is the difference between task duration and resource time requirements?
2. What is the function of a resource pool during simulation?
3. When is the purpose of an interrupt?
4. How do you turn off the animation during a simulation so that it runs more quickly?

Checkpoint solutions: Running simulations

1. Task duration is used to determine cycle time.
   Resource time requirements are used to calculate cost.

2. The resource pool allows the selected resources to be made available to the simulation.

3. Interrupts allow the monitoring of specific conditions such as cost overruns or excessive time spent waiting for resources. The simulation run is automatically suspended when a condition occurs.

4. In Simulation Settings, clear the “Display Animation during simulation” check box.

Unit summary

Having completed this unit, you should be able to:

- Describe element behavior in simulation
- Create a snapshot
- Define simulation attributes
- Define simulation preferences

Exercise overview

In this exercise, you will:

- Run a process simulation
- Use global simulation settings
- Run a simulation with global simulation attributes
- Use local simulation attributes
- Run a simulation with local simulation attributes