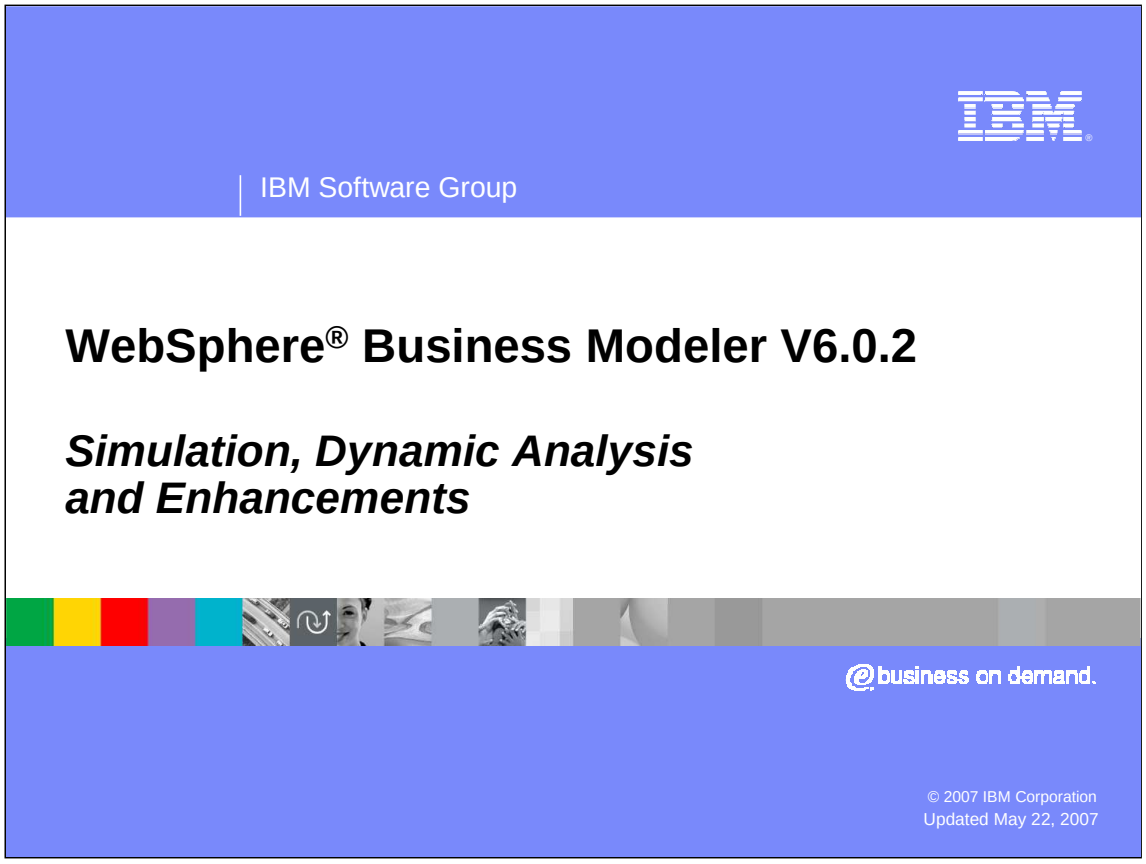


This presentation will focus on Simulation Support in WebSphere Business Modeler V6.0.2.

Goals

- Provide an overview of the simulation capabilities of WebSphere Business Modeler
- Describe simulation enhancements for V6.0.2

The goals for this presentation are to provide an overview of the simulation capabilities and describe enhancements to simulation support in WebSphere Business Modeler V6.0.2

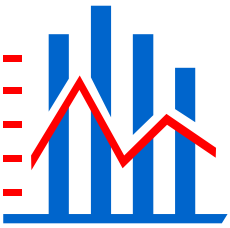
Agenda

- Overview of Simulation Capabilities and Options
- Simulation and Analysis Enhancements
- Summary

This section will provide an overview of simulation capabilities and available options.

Analysis overview

- Analysis of business processes, resources and organizations provides insight into current and future business performance
- Types of analysis
  - Static
  - Simulation Profile
  - Dynamic
- Each analysis provides different information at different times in business process development and optimization

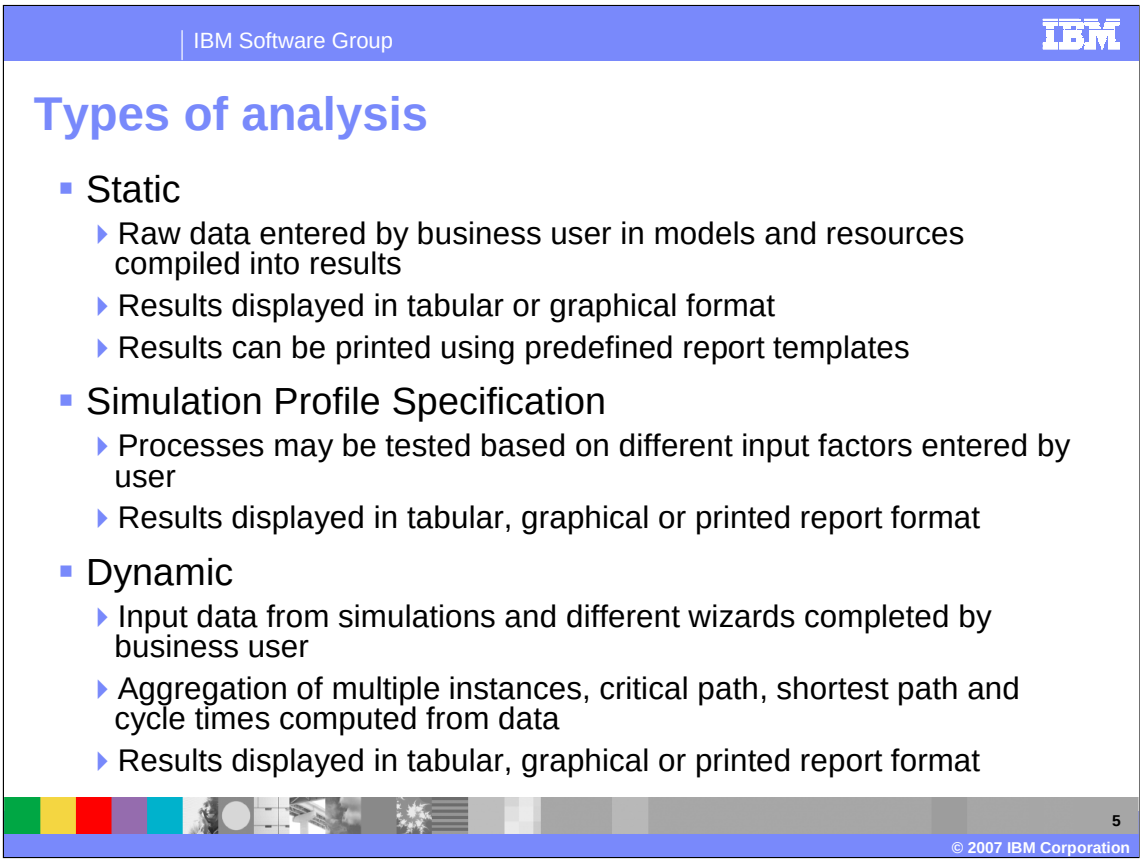


WebSphere Business Modeler V6.0 provides some of the best simulation capabilities in the industry by taking a business process, resources that the process uses, costs, availability, and profit and executing them in a simulation format. With these capabilities you can do various types of analysis on information representative of your actual environment. You can also check if a process produces expected results based on the specified parameters.

There are three types of analysis available: Static, Dynamic and Simulation Profile.

The dynamic analyses are very tightly coupled to the simulations, that is to say the simulation is run to produce the data used by the dynamic analysis reports.

Each type of analysis is very important at different stages within the development process and at different points in the development life cycle.



Static analysis can be performed after a process has been defined and values such as cost, duration, and availability assigned. Static analysis allows you to see the breakdown of a task to roles or to other types of qualifiers that are defined on a particular element. With this analysis, you can have reports generated for the different information such as a list of role availability or total resource costs. These reports can be defined using Crystal Reports, which is new support for WebSphere Business Modeler V6.0 or you can also define your own report formats. Reports and results can be printed using these templates or Crystal Report formats.

The simulations and the input used for them are the basis of the dynamic analysis, therefore it is very important to understand what all the inputs are. The simulation profile specification analysis displays the simulation settings for each of the activities in a simulation profile as a report.

Once the simulation has been run and the data generated based on the simulation profile, additional information can be obtained by running the dynamic analysis reports and better insight into business process potential performance can also be obtained.

Simulation analysis results in a tabular format of results and only through dynamic analysis can you utilize these results and dive deeper into the performance of a business process and get more information from the results.

You can obtain information about how different factors affect different parts of business process, look at things such as multiple instances, shortest path, longest path, critical path and costs associated with them.

Features of analysis with simulations

- Weighted average analysis provides a static, long-term view of the process; process simulation captures the shorter-term view
- Ability to model "what if" scenarios and compare results and replay a simulation of a process with changes to the model
- Sophisticated modeling and distribution for resources (individual and bulk), resource skills, resource allocations, cost, revenue and processing time
- Define multiple or individual resources on process tasks
- Simulation output provides detailed information regarding resource utilization levels, cost and cycle time calculations
- Powerful simulation engine supports conditional branching, steady-state model, run persistence, and multi-process concurrent simulation
- Supports multiple possible input distributions based on a calendar for varying data

The simulation engine in WebSphere Business Modeler V6.0 is the same basic simulation engine used in WebSphere Business Integration Modeler V5.1 and has the same simulation features.

The weighted average analysis feature provides a static and long term view of the process, whereas the process simulation captures the shorter-term view.

WebSphere Business Modeler has the ability to model different scenarios and compare results and replay a simulation of a process with some changes to the model.

It provides the capability to specify different resources, resource allocations, processing time, costs and revenue and allows you to define multiple resources.

Simulation output provides detailed information regarding resource utilization levels, cost and cycle time calculations and supports multiple possible input distributions, which are based on a calendar date for varying data.

Agenda

- Overview of Simulation Capabilities and Options
- Simulation and Analysis Enhancements
- Summary

This section will provide an overview of simulation enhancements in WebSphere Business Modeler V6.0.

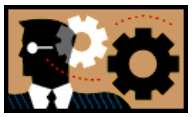
Section

Simulation and analysis

Simulation and analysis

Simulation and analysis: New and improved

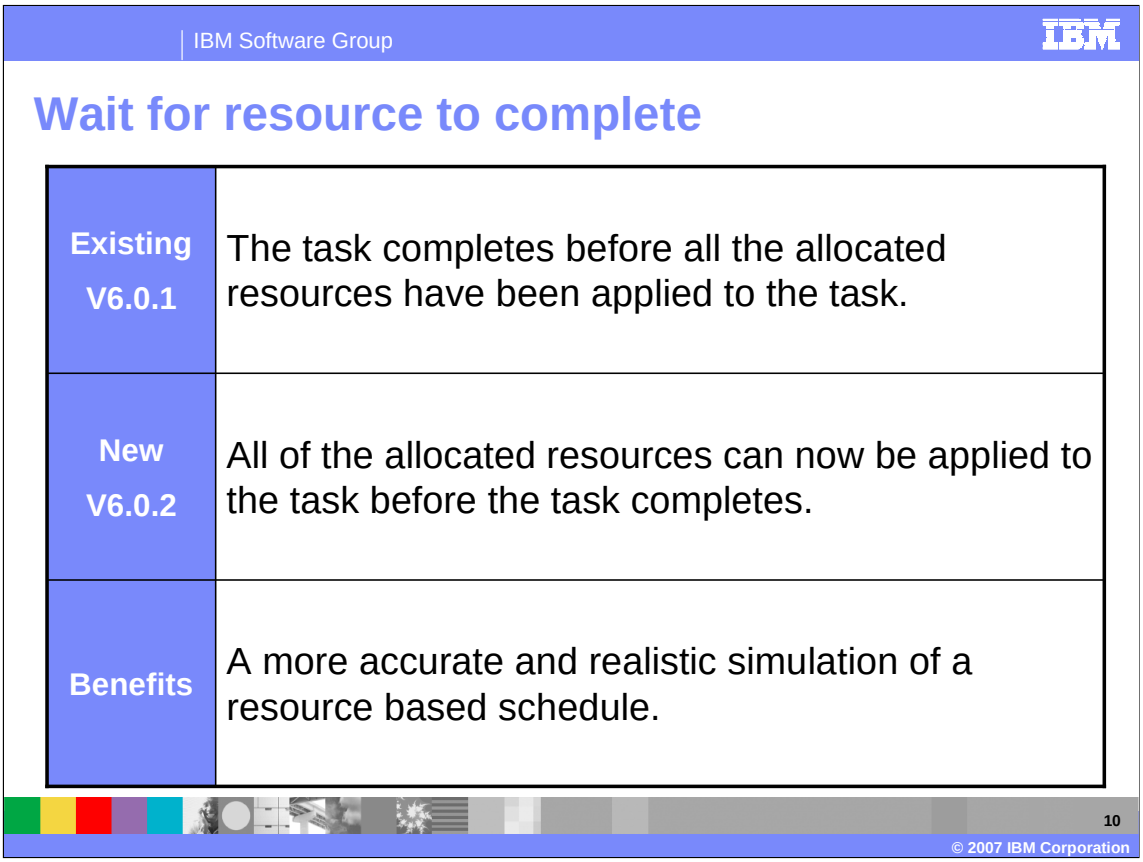
- Simulation
  - Wait for Resources to complete
  - Static Path Validation for Implicit Termination
  - Snapshot generation
    - Performance enhancements
    - Total number of Tokens removed from…
- Dynamic Analysis
  - Working duration added to analyses
  - Aggregating cost/duration to all levels
  - Selectable columns
  - Export to XML (Extensible Markup Language)
  - Separating and Capping static/dynamic case matching



With each release of WebSphere Business Modeler new features are added and some existing ones are refined.

Listed here are new and improved features in the area of Simulation and Dynamic Analysis. This this the bird's eye view. Notice that the focus is on performance, ease of use and accuracy.

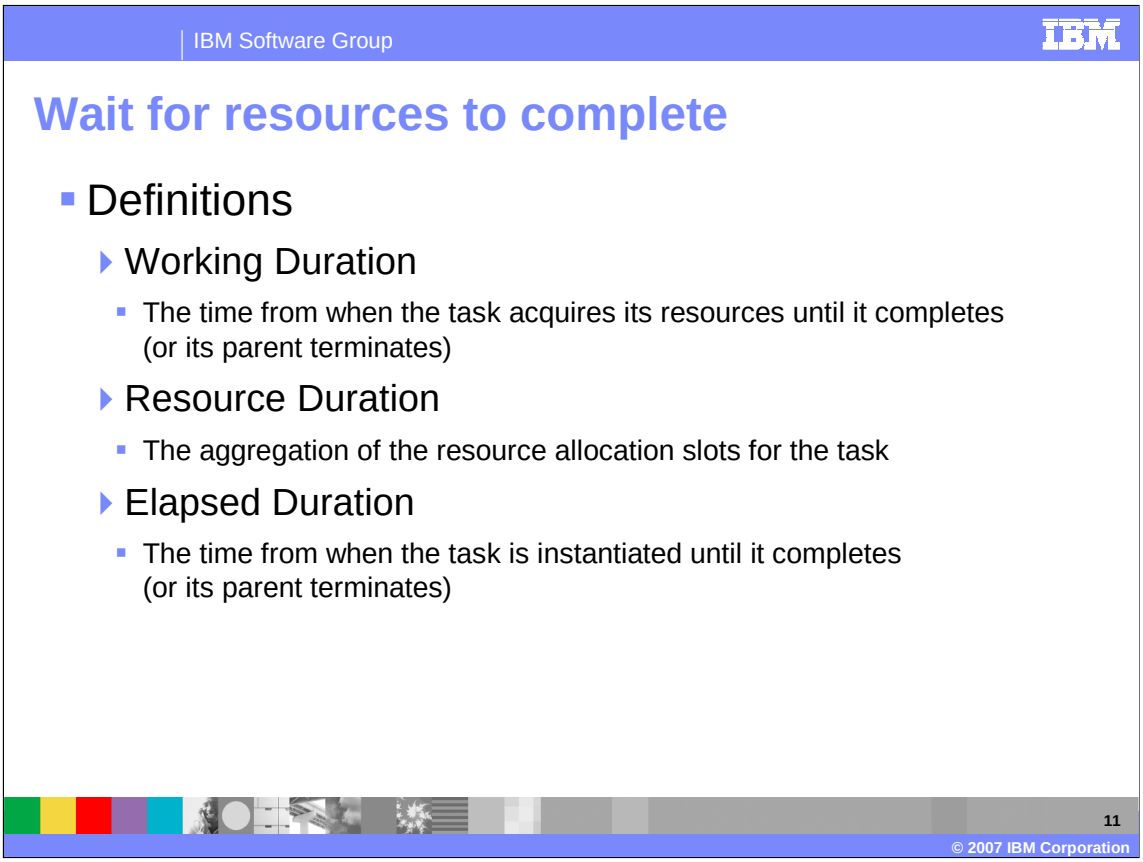
The remainder of the presentation will discuss each of these in detail.



Here you can see what was missing in version V6.0.1 and the benefits of the new feature.

In V6.0.1 there were cases where a certain resource or set of resources were assigned to a task and the task would complete before all the associated resources had a chance to complete their work.

This has been addressed in V6.0.2, resulting in a more accurate and realistic simulation of a resourced based schedule.



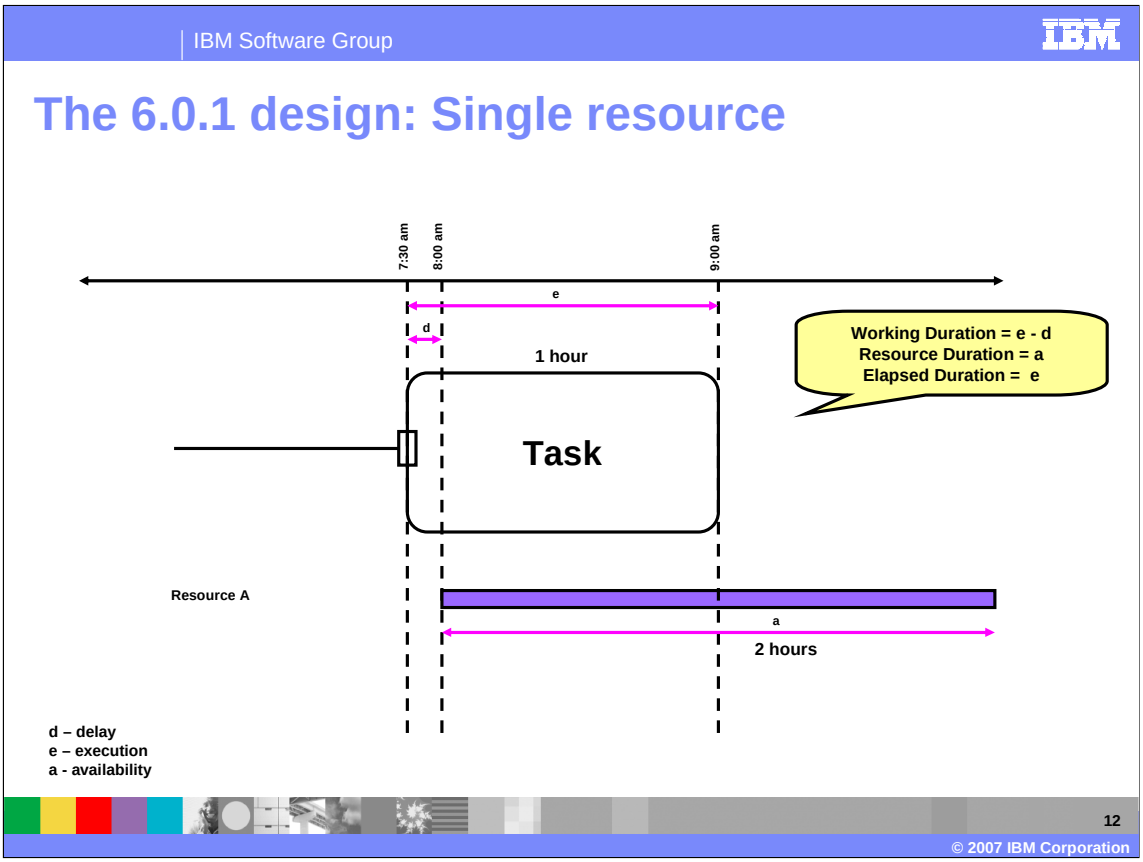
Before getting started lets define some basic definitions. Each of these play an important role in determining when the task is actually completed.

The working duration is the time the task spends doing the real work

The resource duration is a little trickier because there may be more that one resource assigned to do the task. Another way to state this definition, in a more general way, is to say, “The resource duration is the sum of all the resources assigned to do the task”.

The elapsed duration is the over all time that it takes to compete the task.

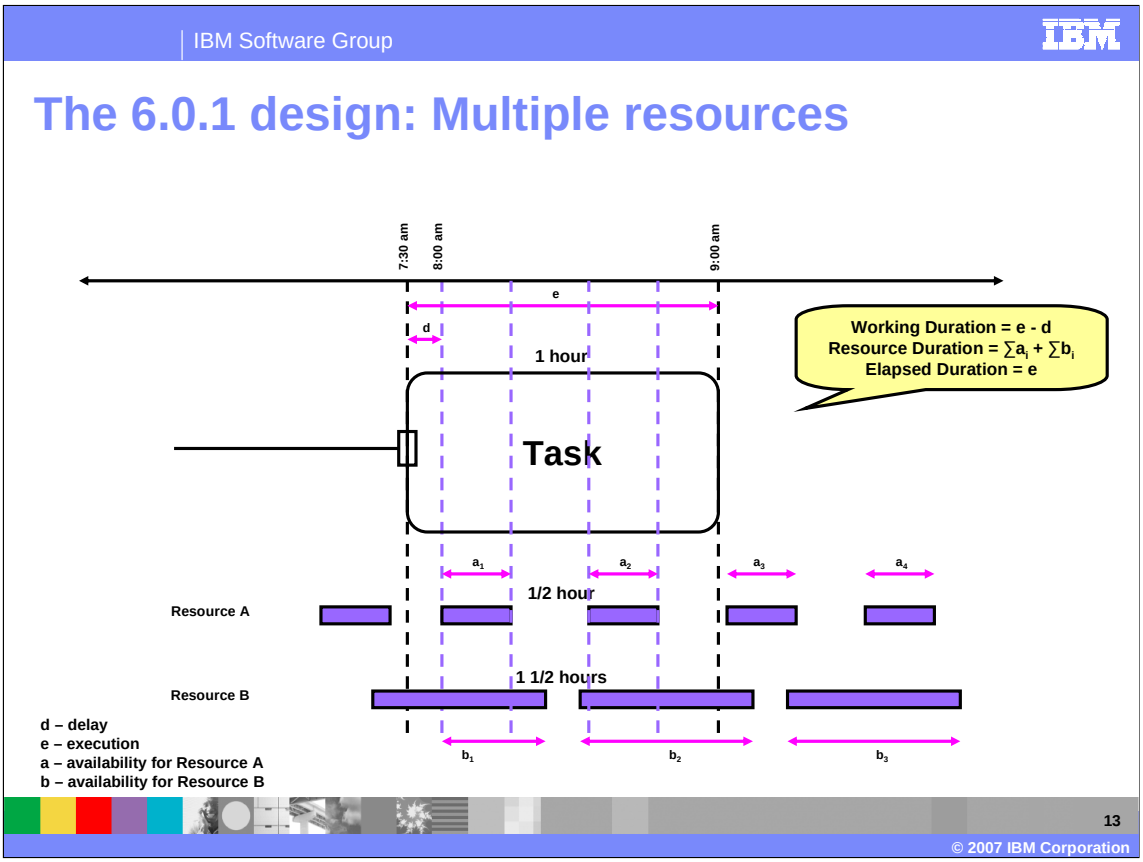
Lets take a closer look.



This is what it looks like with WebSphere Business Modeler V6.0.1.

This is the single resource scenario, that is to say there is only one resource assigned to the task.

You can see that the elapsed duration is the working duration with a little delay added to it and the resource duration is not considered.



Shown here is a scenario that uses multiple resources. It is basicaly the same except now the resource duration is the sum of the availability of the resources.

Looking at the resources more carefully, notice that ...

Resource A is available in 15 minute chunks.

Resource B is available in 40 minute chunks.

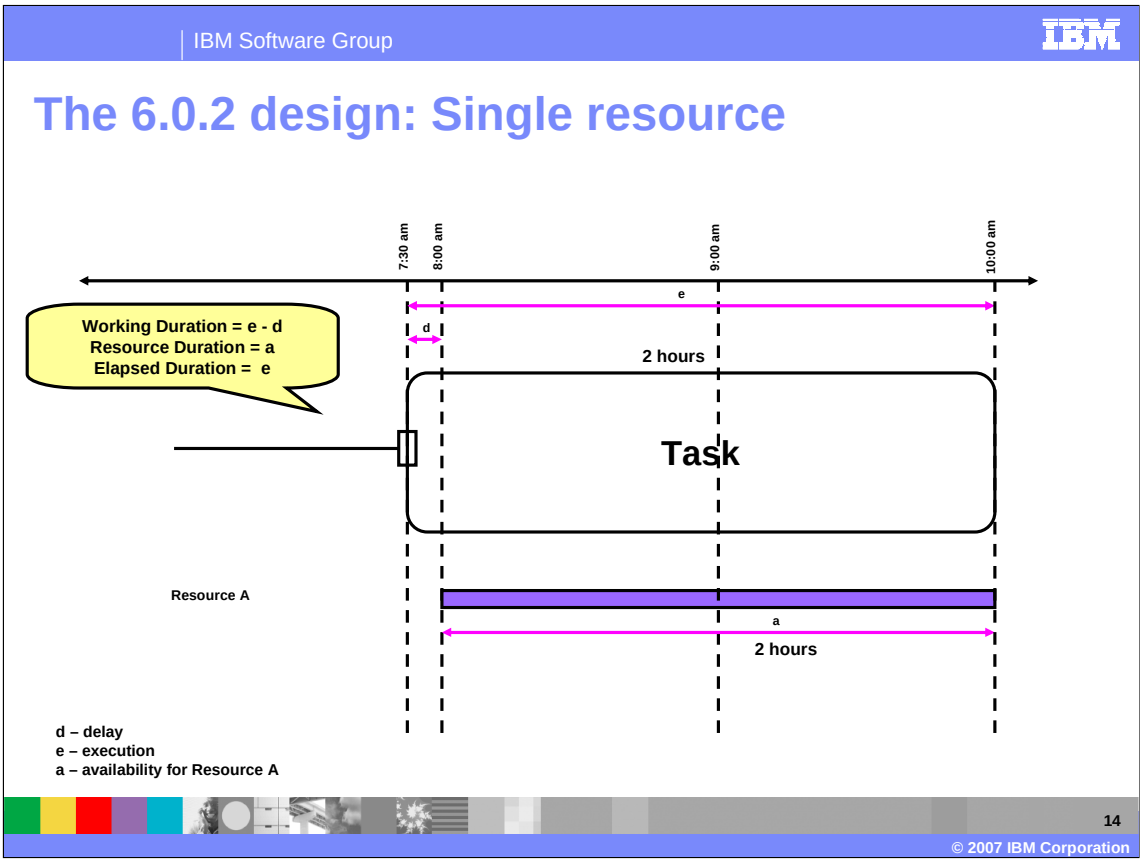
Resource A puts in a total 30 minutes.

Resource B puts in in about 50 to 60 minutes.

From the resource perspective...

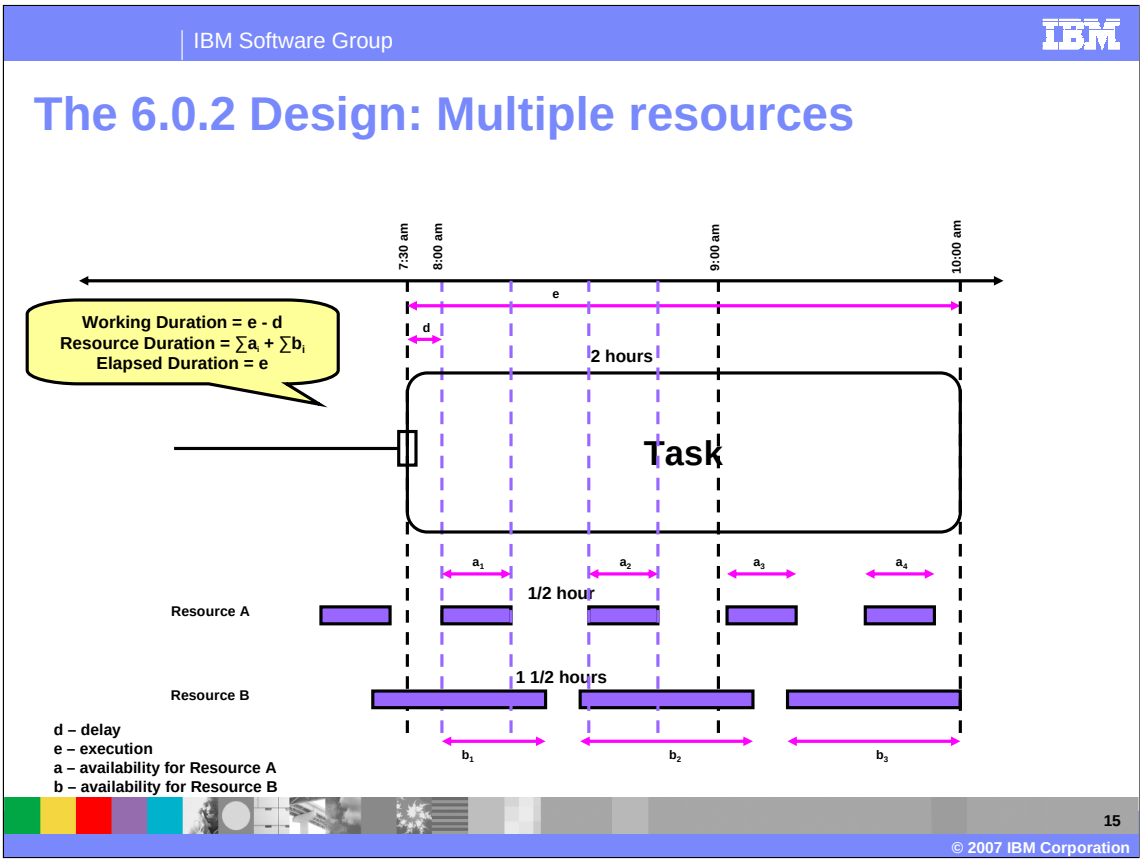
Only 1 ½ hour is actually used on a task that really takes 2 hours of resource.

This is not the behavior one would expect.



Here is a case with a single resource showing how it will behave in WebSphere Business Modeler V6.0.2

Notice that the total elapsed time and working duration have been stretched out to eable the resource to utilize all the time it has been allocated.



Shown here is the multiple resource scenario as it behaves in WebSphere Business Modeler V6.0.2.

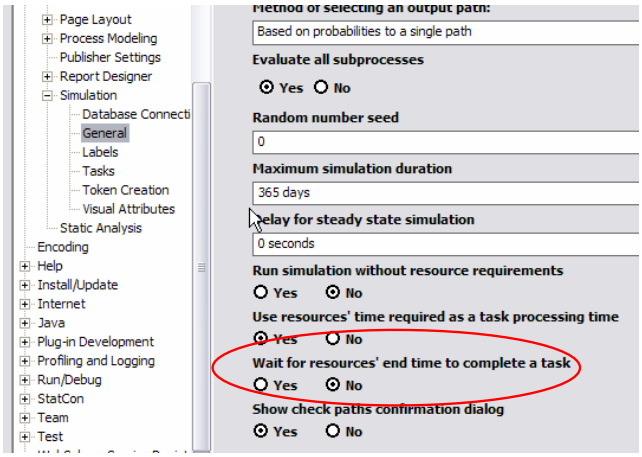
Resource A is available in 15 minute chunks, for a total of 1 hour.

Resource B is available in 40 minute chunks, for a total of 1 hour.

The total resource time is 2 hours, which it the time it takes to do the task.

Again the elapsed time and the working duration have been extended to allow the all the assigned resources to use their allocated time slots.

Simulation preferences: Wait for resources



- There is a new option available in the Simulation, General preferences.
- Not to be confused with the “Use resources…” option.

Now that you know what this new feature is about, where do you configure it so that it will be used in your simulations.

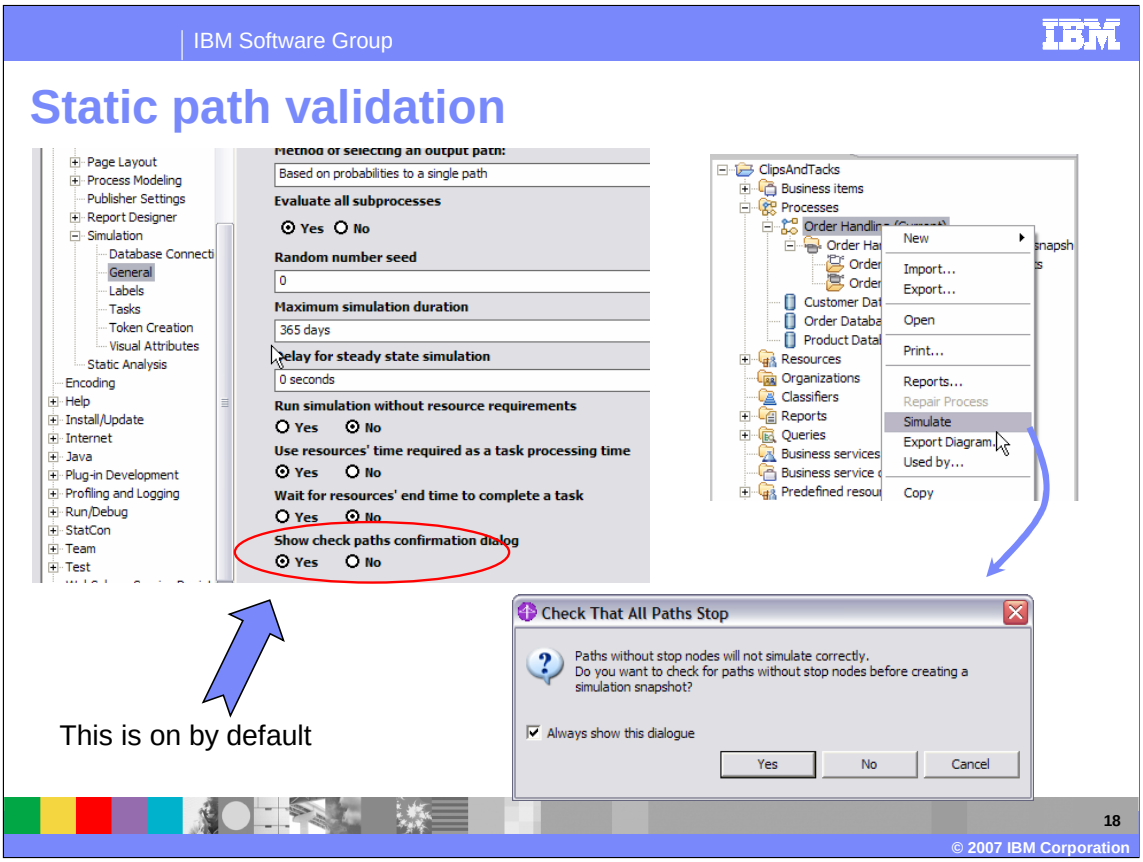
Like many of the new features we’ll be discussing, it's controlled in the preferences. In this case it is the General preferences under Simulation.

Static path validation for implicit termination

Existing V6.0.1	Business Processes without explicit stop nodes would cause the simulator to run to the end date without completing the simulation Before running a simulation a manual inspection of all the business processes must be made in order to locate any business processes that don't have a stop node.
New V6.0.2	Using the new Simulation Preference setting a warning dialog is presented, with an option to check for *implicit terminations*, which presents a list of the places that need to be terminated.
Benefits	Time is saved in identifying the implicit terminations and time is saved by not running simulations that will never terminate.

For a simulation to run properly it needs to know when to stop. With V6.0.1 the business analyst has to go thorough all the processes and sub-processes to ensure that they are properly terminated. If one is missed then the simulation will run until all the machine resources are exhausted.

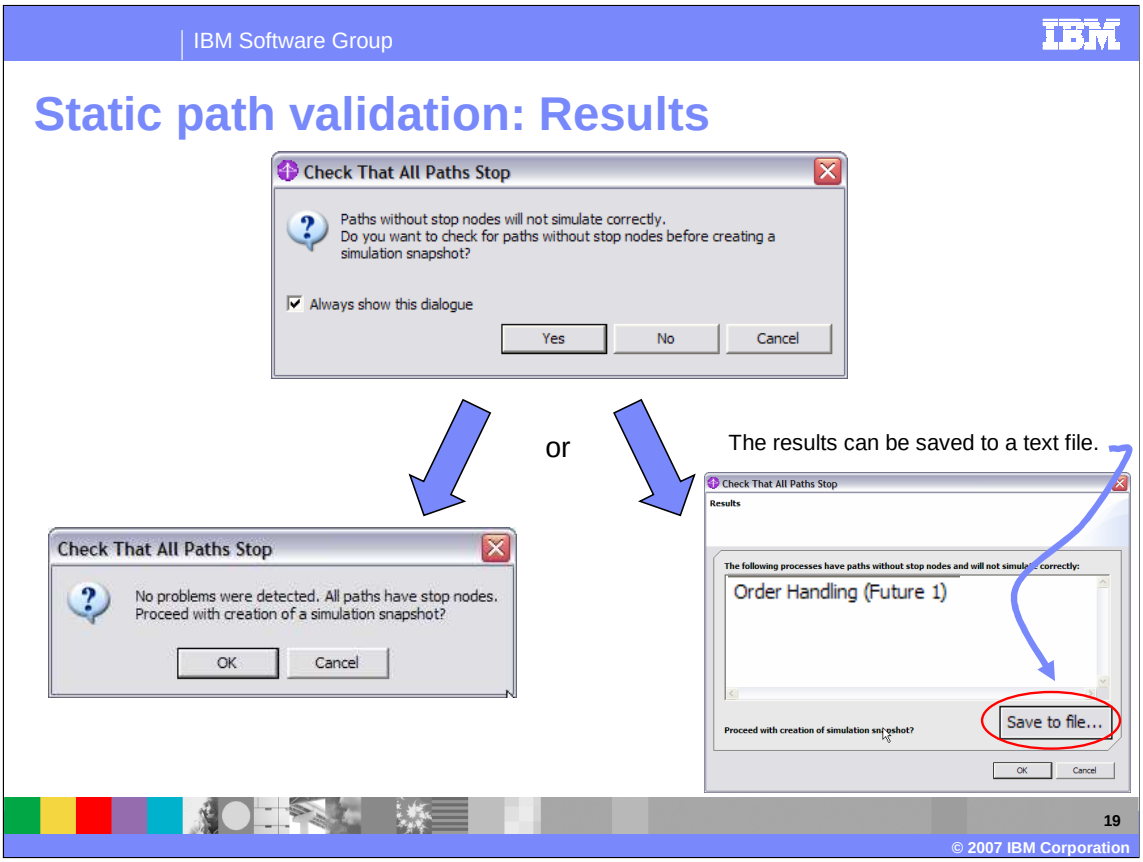
With V6.0.2, this check can now be done automatically just before running the simulation.



To set this option, go to the General Preferences again.

The “Show Check Paths Confirmation” dialog is circled in red. This is set to yes by default.

If this option is set to yes, then when a simulation is run you’ll be prompted with the “Check That all Paths Stop” dialog.

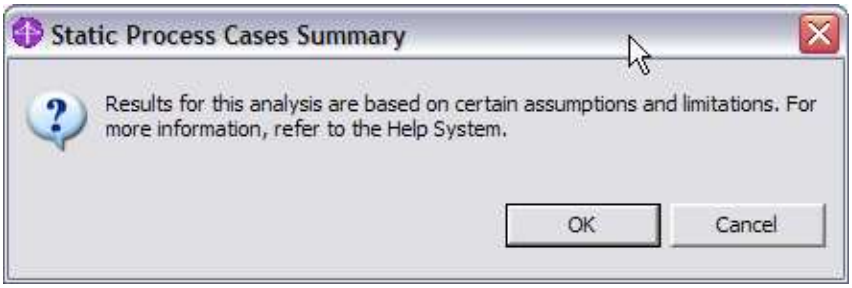


If you select yes you'll either get a confirmation that all the paths are terminated properly or you'll get a list of the processes that need to have the stop nodes added to them.

It will still be up to the business analyst to manually include the stop nodes where necessary. The benefit is that time won't be wasted on an incomplete simulation and the places where the stop nodes need to be added are listed so the time to make the changes will be dramatically reduced.

Saving the results to a text file will make it easier to make the corrections in a large model that has many places to correct.

Warning



There are certain cases where the static path validation cannot be made. In that case you may see this dialog.

The exception cases are described in the WebSphere Business Modeler Infocenter and help. They are listed on the next slide for your convenience.

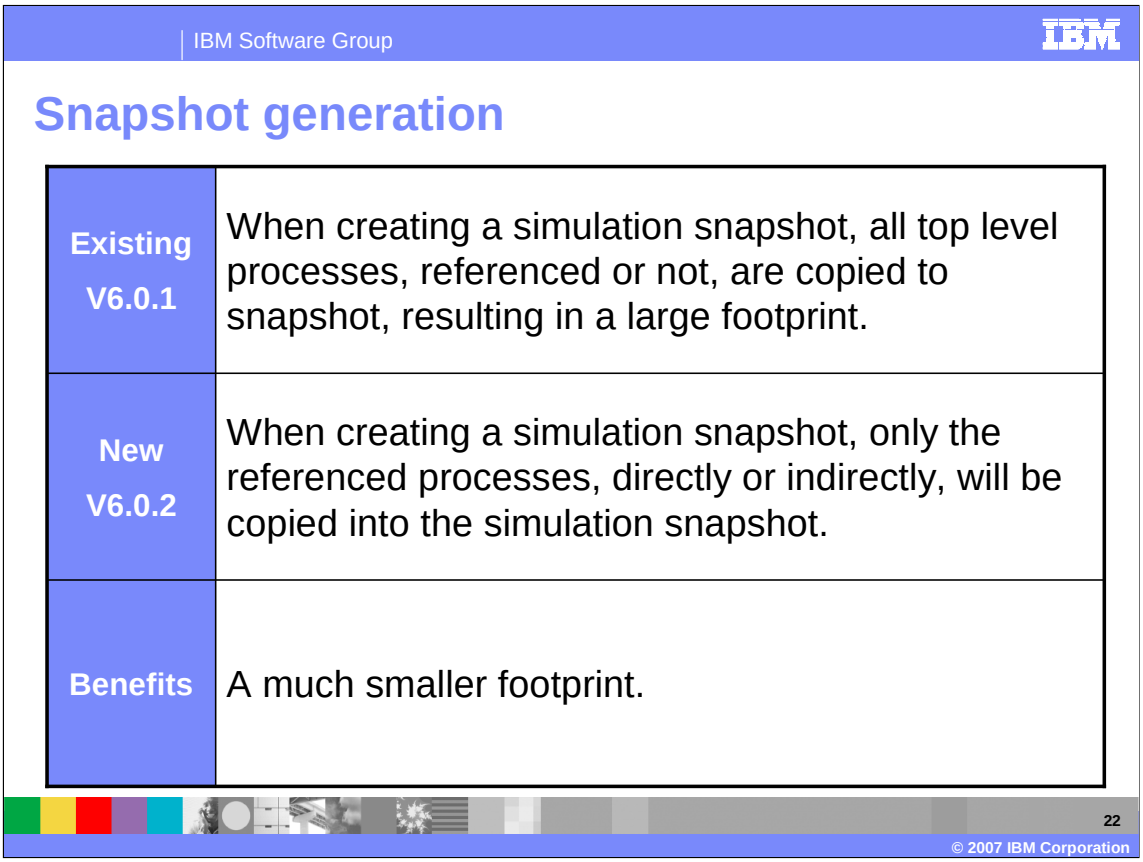
Limitations for static path analysis

- The results for static process case analysis are based on the following assumptions and limitations.
  - All inputs and outputs in the process are assumed to have a minimum and maximum of 1.
  - Repeated path cycles in the process flow are followed only once.
  - Method of selecting a path is set to **Based on probabilities to a single path.**
  - Decisions are exclusive and do not support outputs on multiple paths.
  - Each input and output can be used in only one input criterion or output criterion.
  - The following modeling constructs are not supported:
    - Repositories.
    - Notification broadcasters.
    - Notification receivers,
    - Observers.
    - Timers.
    - Maps.

Note: this is not new to 6.0.2 but is necessary to understand this when working with static path validation.

To find this information in the on-line help look of the topic, “Static process case summary analysis”.

Read this carefully and be familiar with it before running your simulations.



With V6.0.1 when a simulation snapshot is created all of the top level processes, whether they were referenced or not, are copied to the snapshot. For very large models where there are many snapshots, this creates an atypically large memory footprint.

In V6.0.2 when a simulation snapshot is created, only the processes that are referenced, either directly or indirectly are copied.

It should be noted that there are no preferences or options related to this improvement.

Working duration

Existing V6.0.1	There is no Working Duration reported in the Dynamic Analyses.
New V6.0.2	A new attribute for the Working Duration has been added to the Dynamic Analyses.
Benefits	A more accurate and meaningful report of the simulation.

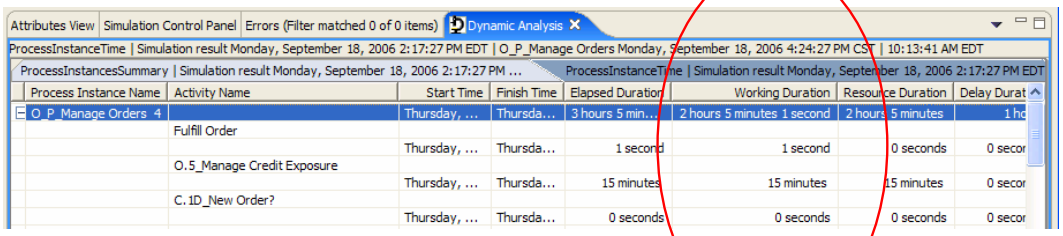
Moving on to the Dynamic Analysis,

The dynamic analysis reports now include the working duration in the output of certain Dynamic Analysis cases.

This provides the analyst with more meaningful reports as a result of the simulation.

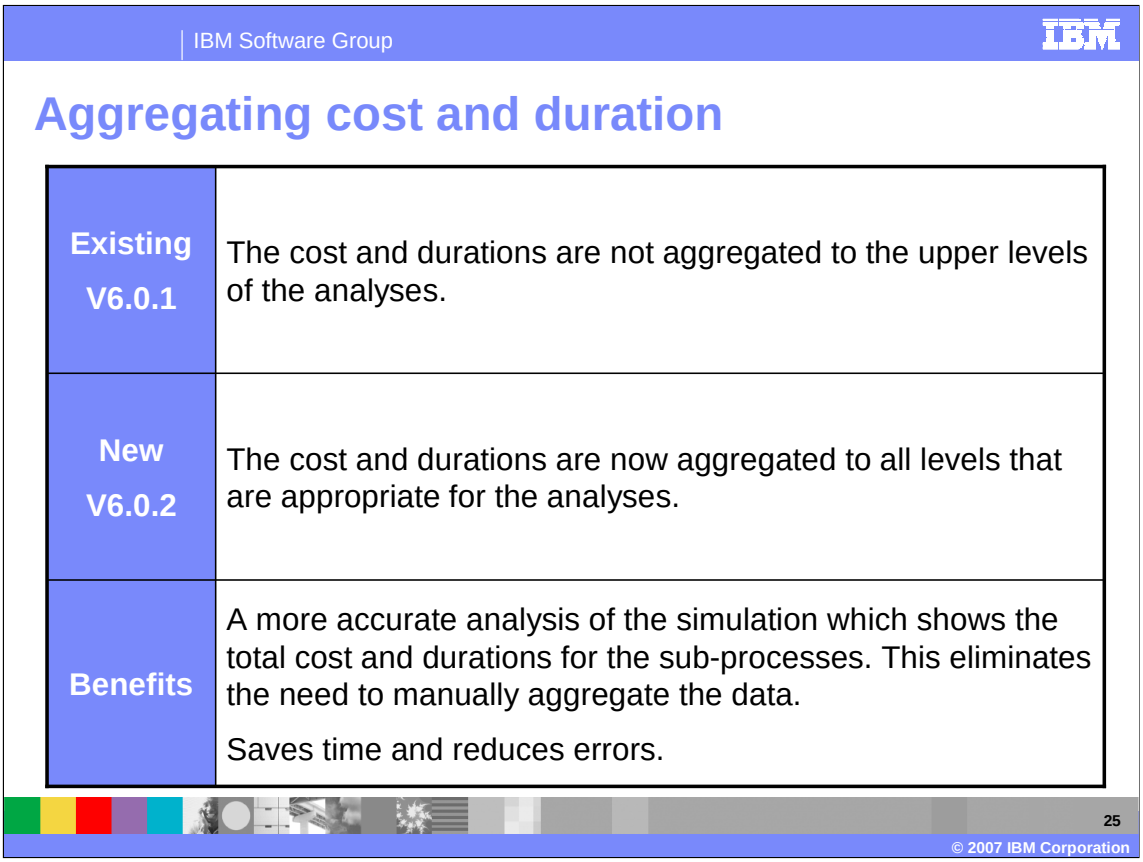
Working duration

- The Working Duration has been added to the following analyses:
  - Process Instances Summary
  - Process Instance Time
  - Static Cases Summary



These are the Dynamic Analysis cases that have the new working duration field added to them.

This is an example of “Process Instance Time” analysis with the new field added.

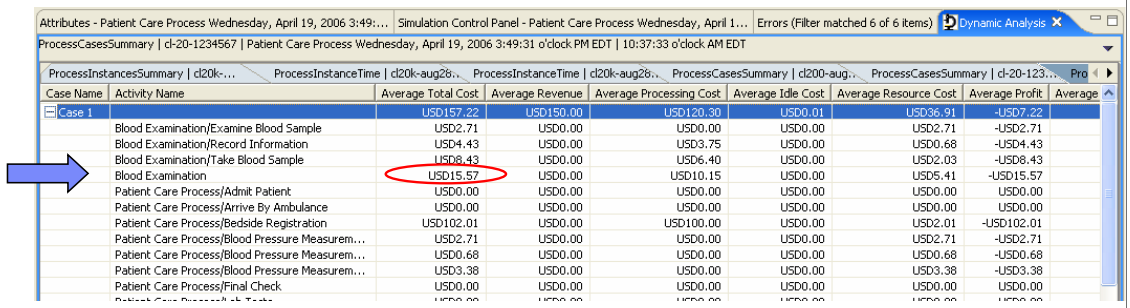


The cost and duration attributes are key attributes for understanding a business process. With V6.0.2 these attributes are now aggregated to all levels that are appropriate to the analysis.

By aggregating this information automatically, the analyst no longer has to manually aggregate them, saving time and reducing errors.

Aggregation of cost and duration

- In the example shown.
  - A call to the sub-process to do the blood examination
  - In the previous version of Modeler this value would be zero.
  - Now the total cost associate with the sub-process is aggregated and reported.



Shown here is an example of a report where there is a call to a sub-process to do some blood work. In the course doing the blood work there are several tasks which have a cost associated with them, such as, “take the sample”, “examine the blood” and “record the results”.

It is good to know the cost of each task but it is also good to know the total cost.

The blue arrow on the slide points to the total of $15.57, which is the aggregation of the three sub-tasks.

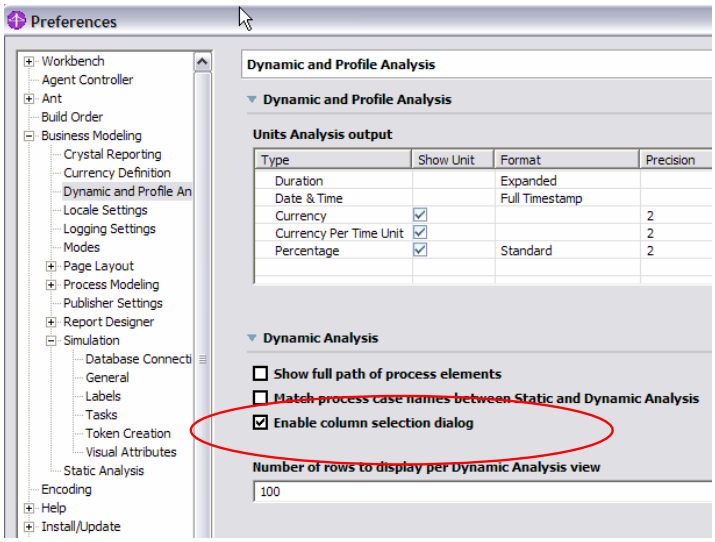
Selectable columns

Existing V6.0.1	The dynamic analyses generate reports with all the possible columns. There are no options to tailor the reports by the end user.
New V6.0.2	By enabling the *column selection dialog* in the **Dynamic and Profile Analysis** preferences, the user can hide the columns that are not part of their area of interest.
Benefits	More concise analysis and profile reports, tailored to the goals of the end user. This feature saves time in reading and understanding the output from a simulation analysis.

When getting a report there are many attributes (columns) that are reported. It is good to have all the information but quite often the business analyst is only interested in a small sub-set. Finding the information of interest can often be very tedious.

With V6.0.2, for certain case summaries, the analyst has the option to apply a filter to the columns and thus narrow the focus to the area of interest.

Enable the selection dialog

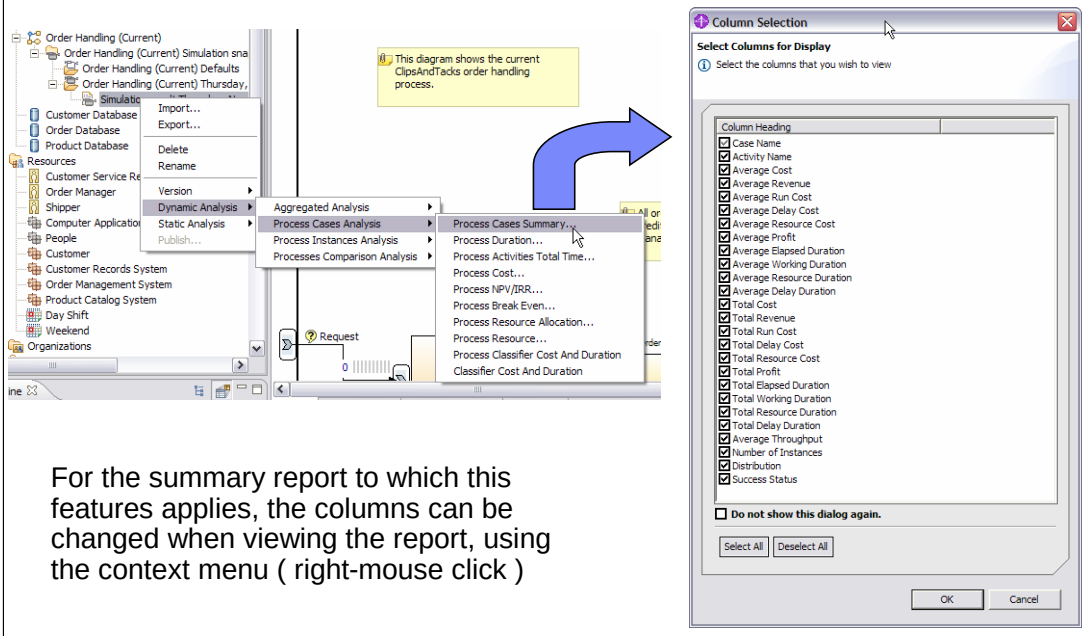


- Applies to:
  - Dynamic Analysis
    - Process Case Summary
    - Process Instance Summary
  - Profile Analysis
    - Static Case Summary

First note that this option only applies to the Process Cases Summary, Static Process Cases Summary and Process Instances Summary.

This option can be set as the global default from the Dynamic and Profile Analysis preferences and can be overridden for each individual report after the analysis has been run.

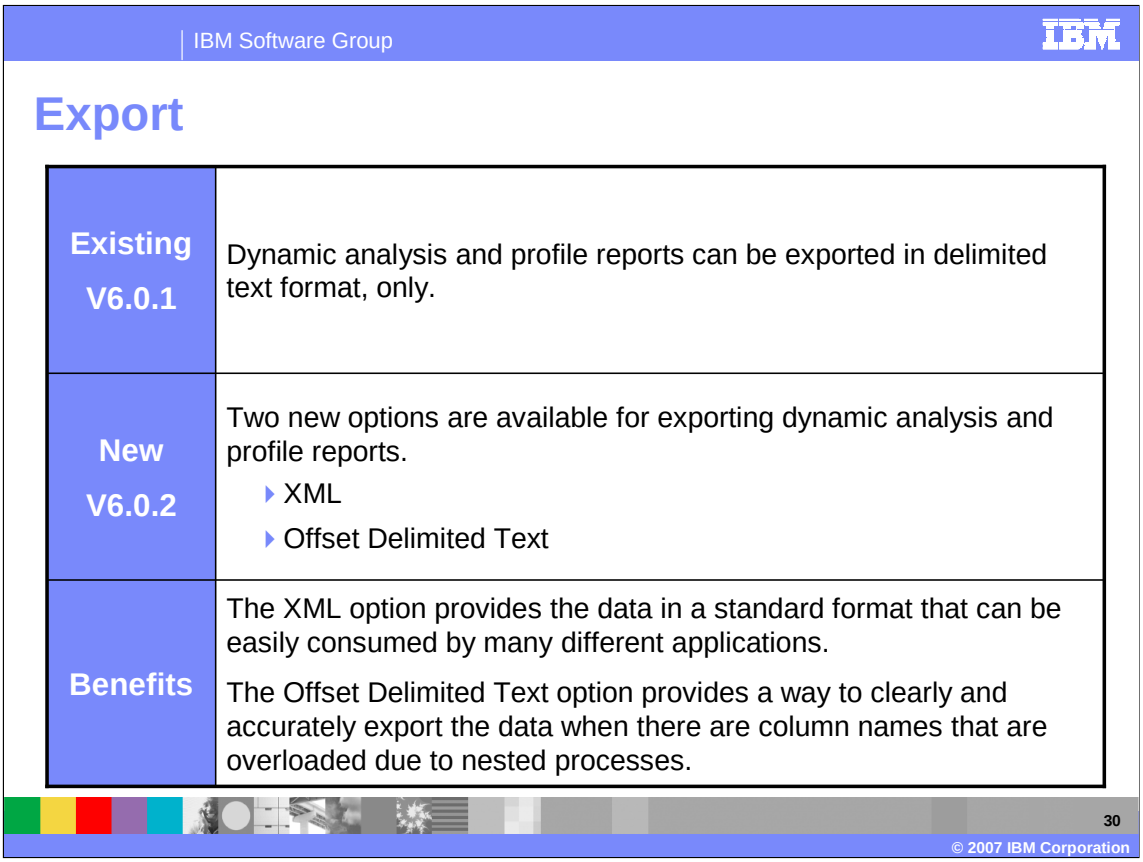
Selectable columns: Adding columns



For the summary report to which this features applies, the columns can be changed when viewing the report, using the context menu (right-mouse click)

If the option is set in the Dynamic and Profile Analysis preferences, then the column selection dialog will be presented when the analyst chooses to run one of the reports that support this feature. Those reports are the Process Cases Summary, Static Process Cases Summary and Process Instances Summary.

After the analysis has been run, the business analyst can change the columns by selecting the report and using the context menu (right-mouse-click) and selecting the option to change the columns. The column selection dialog will be displayed.

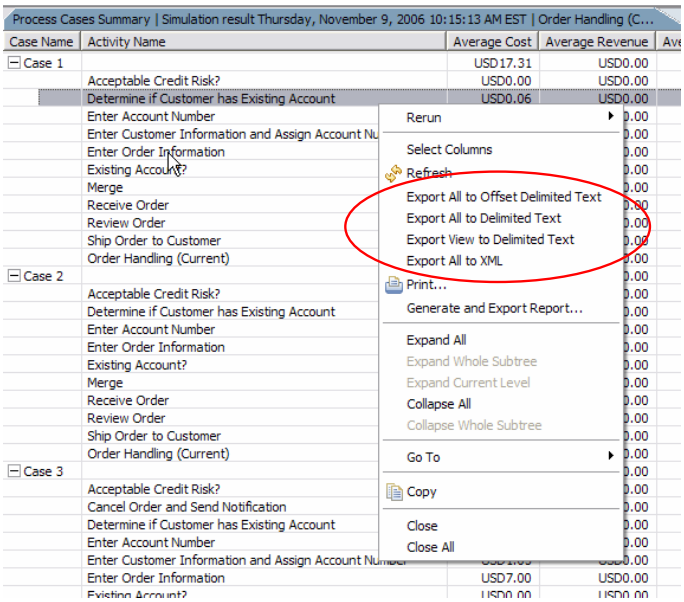


With WebSphere Business Modeler V6.0.2 the export options for the dynamic analysis reports have been expanded to include XML and offset delimited text.

The XML format is desirable because there are many external tools that can consume XML data. This allows for the incorporation of the data into other reporting tools.

The offset delimited text option solves a problem that occurs with delimited text output when there are different columns that have the same name. An example of this will be shown in the next few slides.

New export options



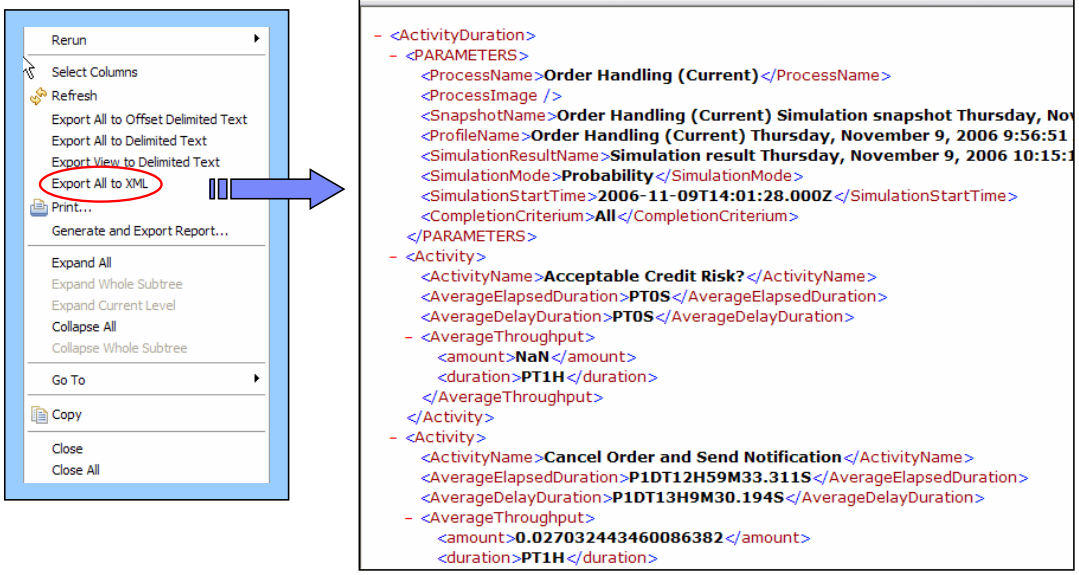
- Export All to XML
- Export All to Offset Delimited Text
  - Dynamic Analysis
    - Activity Cost
    - Activity Cost Per Time Unit
    - Activity Duration
    - Process Case Summary
    - Process Instance Cost
    - Process Instance Summary
    - Process Instance Time
  - Profile Analysis
    - Static Process Cases Summary

The export options are available from the context menu (right-mouse-click) of the report.

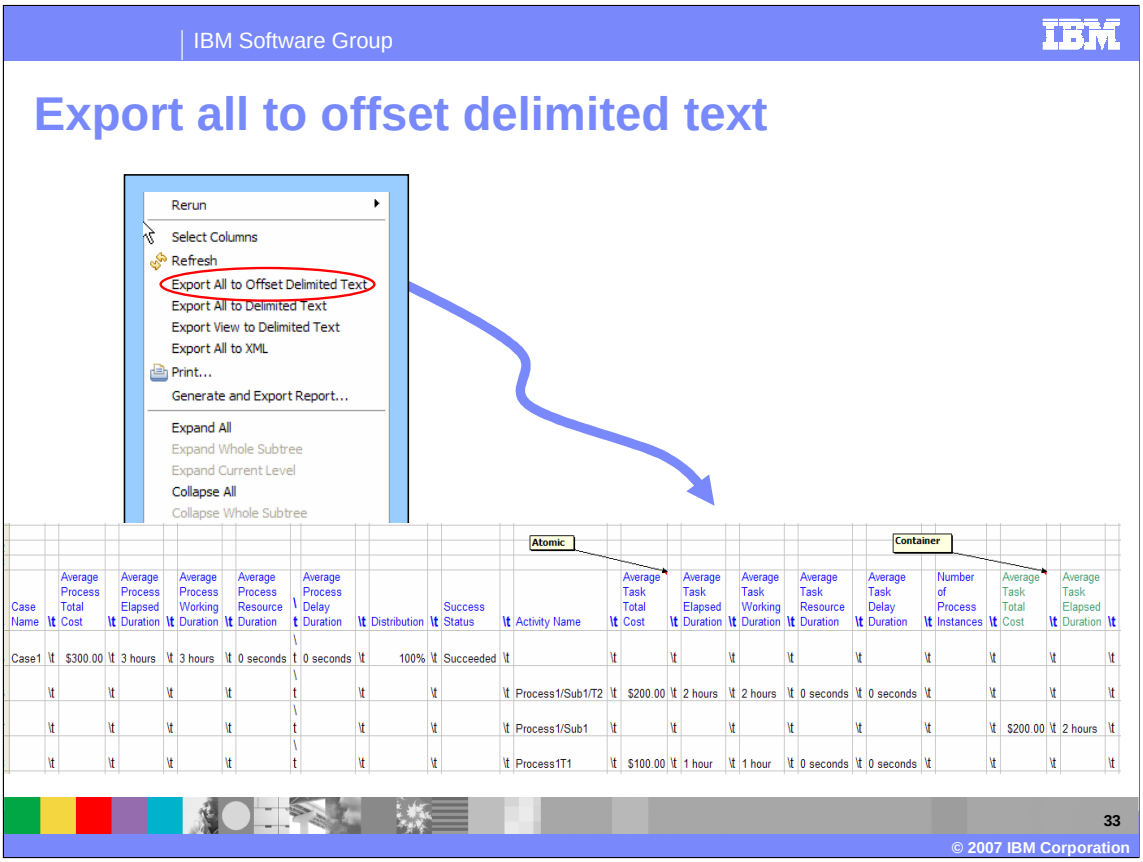
Note that the export to Offset Delimited Text is only supported for the certain case reports as listed in this slide.

Also notice the menu option for selecting the columns is also enabled for this report.

Export All to XML



Exporting ALL to XML will give you the familiar XML format as shown here.

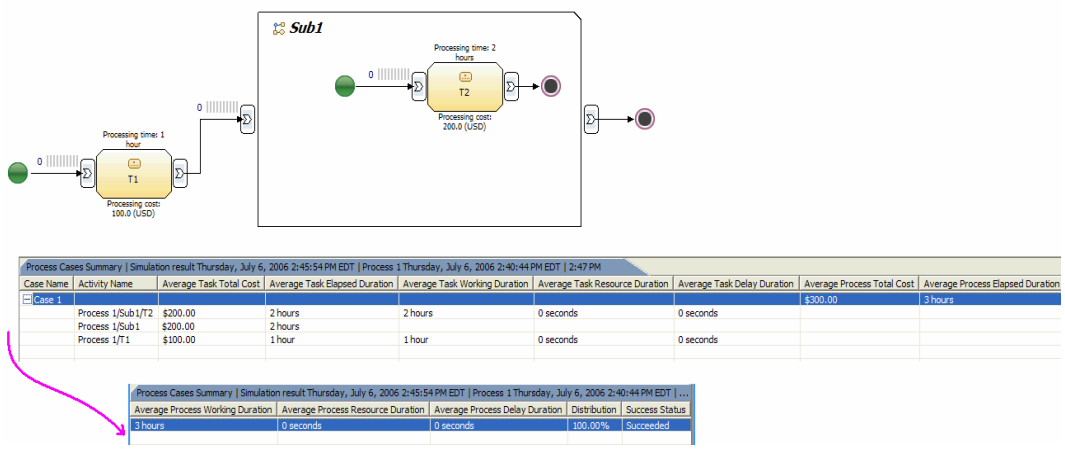


The report shown here is a report of a process that has a sub-process in it.

As a result, there are some columns that have the same name, as shown. There are the columns which are from the atomic tasks, the tasks inside the sub-process, and then there are the columns that belong to the next level up, the columns for the containing sub-process.

If the columns weren't offset the way they are then the information from the 2 different levels would be collapsed into one column, providing an incorrect and misleading representation of the analysis.

Export to offset delimited text



Process Cases Summary | Simulation result Thursday, July 6, 2006 2:45:54 PM EDT | Process 1 Thursday, July 6, 2006 2:40:44 PM EDT | 2:47 PM

Case Name	Activity Name	Average Task Total Cost	Average Task Elapsed Duration	Average Task Working Duration	Average Task Resource Duration	Average Task Delay Duration	Average Process Total Cost	Average Process Elapsed Duration
Case 1							$300.00	3 hours
	Process 1/Sub1/T2	$200.00	2 hours	2 hours	0 seconds	0 seconds		
	Process 1/Sub1	$200.00	2 hours					
	Process 1/T1	$100.00	1 hour	1 hour	0 seconds	0 seconds		

Process Cases Summary | Simulation result Thursday, July 6, 2006 2:45:54 PM EDT | Process 1 Thursday, July 6, 2006 2:40:44 PM EDT | ...

Average Process Working Duration	Average Process Resource Duration	Average Process Delay Duration	Distribution	Success Status
3 hours	0 seconds	0 seconds	100.00%	Succeeded

This picture shows the actual report before it was exported. There is information for three items, T1, Sub1 and T2.

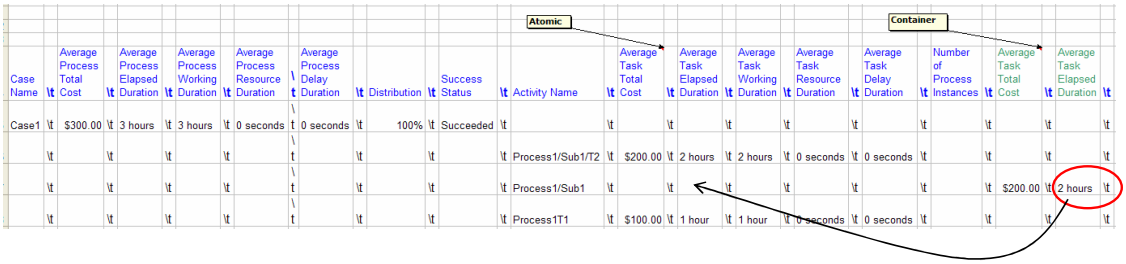
As shown by the second snippet, the Average Process Duration for the overall process is 3 hours.

This is because the value for Sub1 includes T2.

Export to offset delimited text

Additional columns are created for the container, Sub1, keeping them clear and distinct from the values of T2 which is inside Sub1.

In this way the overall values for the container can be distinguished from the elements it contains and they are not counted twice.



Case Name	Average Process Total Cost	Average Process Elapsed Duration	Average Process Working Duration	Average Process Resource Duration	Average Process Delay Duration	Distribution	Success Status	Activity Name	Average Task Total Cost	Average Task Elapsed Duration	Average Task Working Duration	Average Task Resource Duration	Average Task Delay Duration	Number of Process Instances	Average Task Total Cost	Average Task Elapsed Duration
Case1	$300.00	3 hours	3 hours	0 seconds	0 seconds	100%	Succeeded									
								Process1/Sub1/T2	$200.00	2 hours	2 hours	0 seconds	0 seconds			
								Process1/Sub1							$200.00	2 hours
								Process1T1	$100.00	1 hour	1 hour	0 seconds	0 seconds			

If the container values were placed in the same column as the elements it contains then the totals would be skewed, that is to say, 5 hours instead of 3 hours.

With the offset delimited text option, the columns with the same name are separated, that is they are offset, from the others with like name.

If the columns weren't separated then the total "average elapsed time duration" would be reported as 5 instead of 3 hours.

Before the introduction of the offset delimited text option, this would have been reported incorrectly as 5 hours when exporting to delimited text. Now with the offset delimited text option, the container is separated from the items it contains by offsetting the columns as shown.

Separating and capping static and dynamic case matching

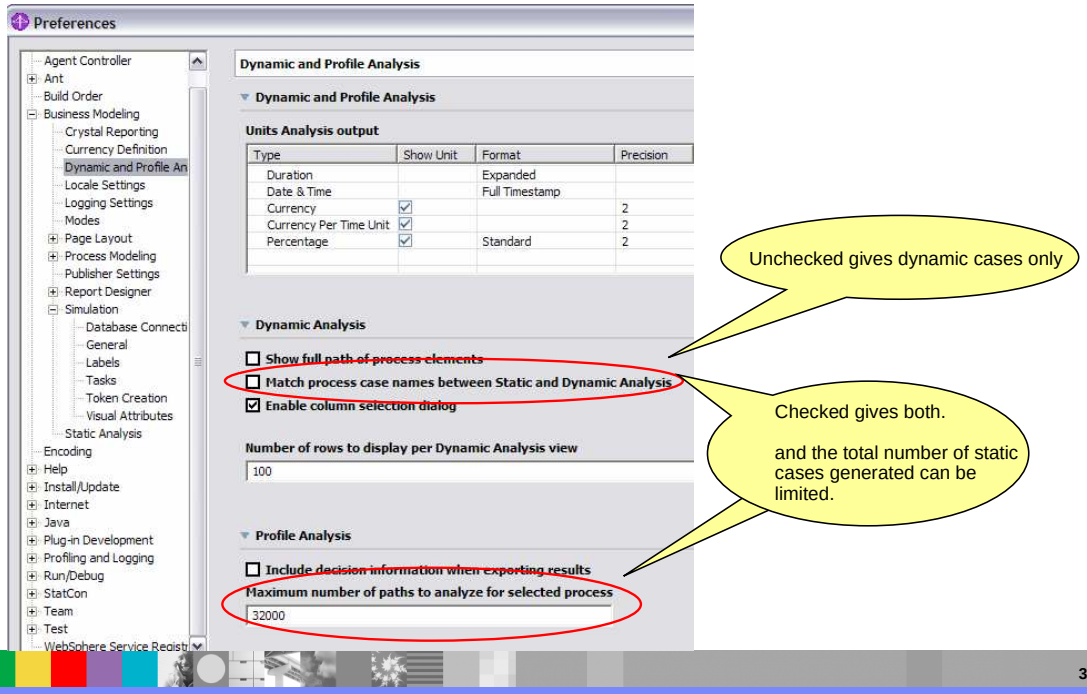
Existing V6.0.1	For very large and complex models there is no way to limit the number of static cases that are generated, resulting in very long running simulations that may eventually consume the memory and disk resources on the machine.
New V6.0.2	The number of static cases generated during the dynamic analysis can be limited and separated from the dynamic case calculations.
Benefits	More scalable solution for very large and complex models with many possible paths.

For a very large and complex business model, the static analysis has the potential to run for a very long time and eventually consume all the available resources on the machine.

With V6.0.1 the static analysis and the dynamic analysis are linked together. Whenever a dynamic analysis is run the static cases are also run. In the case of a very large and complex model there may be a situation where the dynamic analysis information cannot be obtained.

This issue is addressed in V6.0.2 with a slight change in the behavior of an existing Dynamic and Profile Analysis preference. A new entry field for entering a limit to the number of static cases that will be generated.

Managing static and dynamic cases



The existing preference is called, “match process case names between Static and Dynamic analysis”.

If this preference is unchecked then only the dynamic cases will be generated. It indicates that the analyst is not interested at all in the static cases.

If there is a need or interest in the static cases and the model is large and complex, then this preference should be enabled. The total number of static cases generated can be limited by the value specified in the entry field below, called, “maximum number of paths to analyze for selected process.

Summary

- Simulation of the business process is a key function of WebSphere Business Modeler
- WebSphere Business Modeler can generate static and dynamic analysis cases, each highlighting different aspects of the business process being analyzed.
- There are a full range of reporting options along with the ability to export the information for consumption by other tools.
  - New export options are available with V6.0.2
- There are many new and improved features in V6.0.2 in the areas of usability, performance and accuracy.

This discussion began with a brief overview of the simulation capabilities of WebSphere Business Modeler and illustrating its importance in the development of service oriented architectures.

The distinction between the static analysis and the dynamic analysis was made.

New and improved features were discussed.

The new features and improvements are in the areas of performance, usability and accuracy.

That is to say a smaller footprint for the snapshots, assistance in identifying un-terminated processes, setting limits on the number of static analysis cases generated, to mention a few.

For learning more about how to run a simulation see the demonstration associated with this topic.

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