# Process Simulation Example

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Simulation is a technique that helps business analysts simulates the execution of business process for studying the resource consumption (e.g. Human resources, devices, etc.) throughout a process, identifying bottlenecks and improving the current business by process refinement and resources re-allocation. Simulacian is the tool that assists you to perform simulation. It includes not only the visual simulation ability, but also charts generation functions. In this tutorial, we will study a business process of performing body check, and make use of simulacian to find out the possible changes that can make the process more efficient.

1.   Download the project Body Check.vpp attached with this tutorial.

2.   Start Logizian.

3.   Open *Body Check.vpp*

4.   Open the business process diagram *Body check process*.

5.   Study the process. The diagram models the current process of performing body check in a health center. It starts from processing a client's registration by receptionist, then the nurse check the client's blood pressure, the X-Ray specialist test the client's lung function, and finally the body-check officer prepare a report and present it to user.
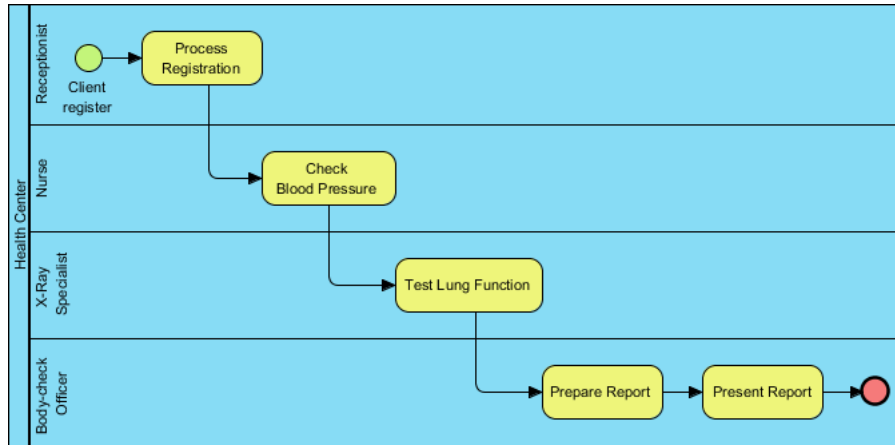

Now, we want to know the answer of the following questions, which simulacian can help:

•   How long it takes to finish a process?

•   What is the optimal allocation of resources like staff (e.g. specialist), rooms (e.g. Meeting room) or devices/machines (e.g. X-Ray machine)?

•   Does the process works well against a large amount of clients?

6.   In order to run simulacian, we need to provide additional information to the business process diagram, such as the current resource consumptions and durations of each activity. Right click on the diagram background and select **Diagram Type** > **Simulacian** from the popup menu. The **Simulacian Control Panel** will appear for you to set simulacian details like resource consumption and duration of activities.
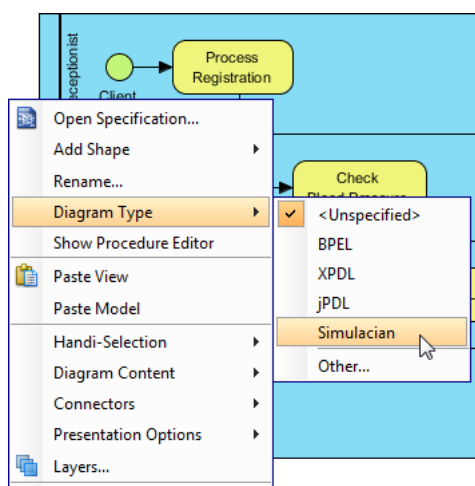
7. Let's start by recording the resource consumption of the current process. On the right hand side of the diagram you can configure the resources that is available to the process. Available resources mean the resources that can be used, but not necessarily be used. For example, the health center may have 20 wheelchairs available, while only 5 to 6 is needed. Now, click **Add** to add an available resource *X-Ray Room*, typed *Room* with *2* as amount. Add also a resource *Meeting Room*, typed *Room* with *1* as amount. Other resources like wheelchairs, toilets are irrelevant to the process, and can be ignored.
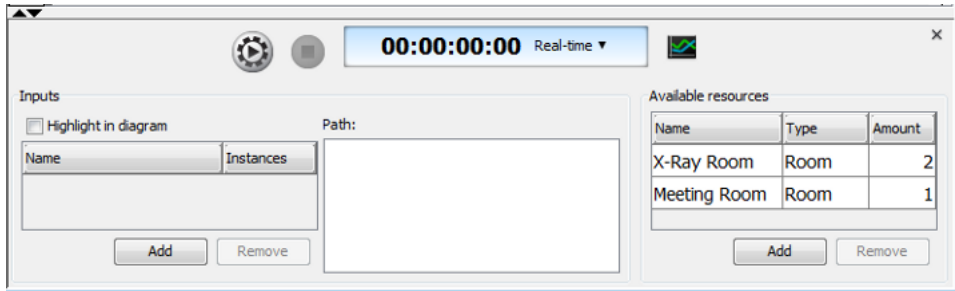

8. The testing of lung function need to be done in an X-Ray room. Select task Test Lung Function in diagram. At the **Simulacian Control Panel** click **Add** for **Required Resources** and select *X-Ray Room* from the popup menu. Keep amount be *1* as only one room is needed to perform a lung function testing.
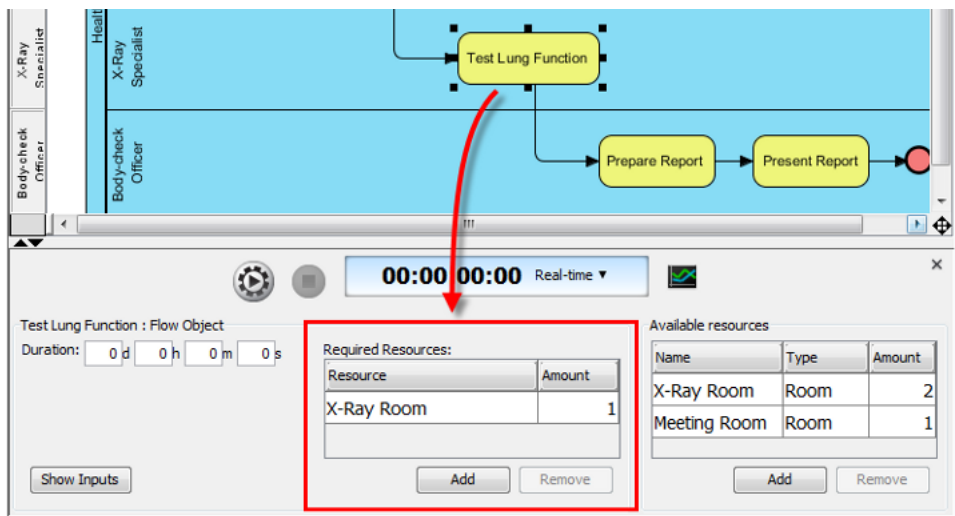
9. Select the task *Present Report*. Add *Meeting Room* as a required resource with 1 as amount.
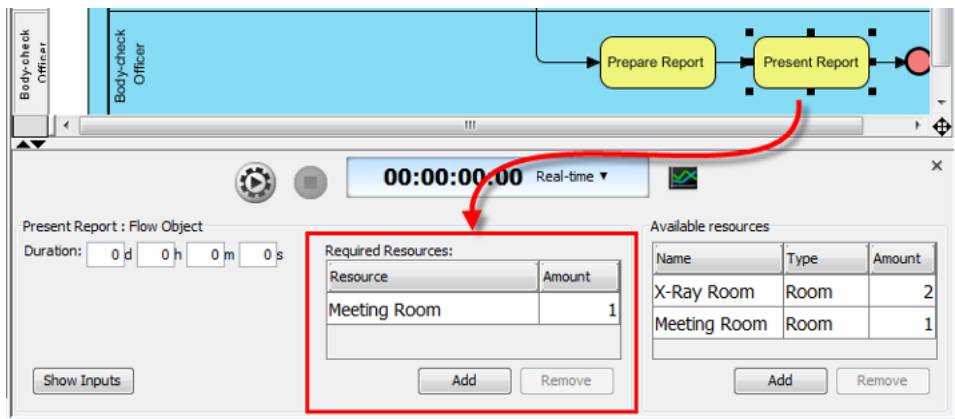
10. We also need to set the duration of completing each task. Select task *Process Registration*. Set at the **Simulacian Control Panel** its duration to be 3, meaning that it takes 3 minutes to complete a registration process.
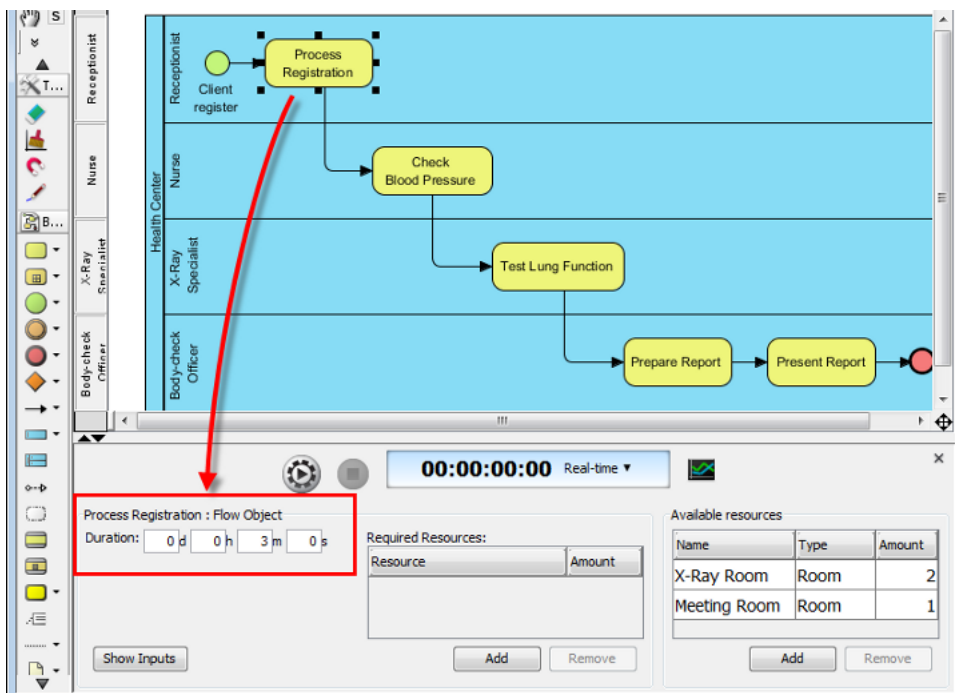

11. Set the duration of other tasks.

Task	Duration
Check Blood Pressure	2 minutes
Test Lung Function	6 minutes

Prepare Report	2 minutes
Present Report	5 minutes

12. The lanes such as *Receptionist*, *Nurse*, etc are the participants of the body check process. They are also resources that can affect the efficiency of process. We need to set the number of each lane. Select lane *Receptionist* in diagram and set instance to be *1* at the **Simulacian Control Panel**. This mean that one and only one receptionist is taking part in this process.
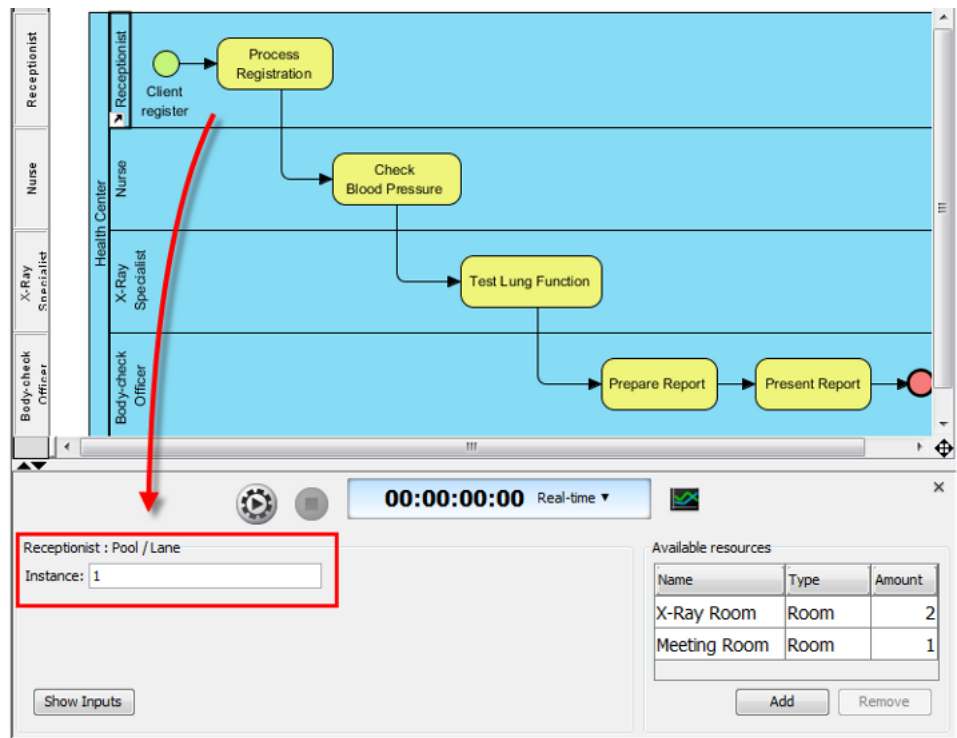

13. Set the instances of other lanes.

Lane	Instance
Nurse	1
X-Ray Specialist	1
Body-check Officer	1

14. Click **Show Inputs** at the **Simulacian Control Panel**. Inputs are ways of running through the process. If a process contains gateways, you can define multiple inputs to represent the execution of different paths due to the forking.

15. Take this process as example. Click **Add** to add an input, with name *Peak hour, 10* as instances. This means that at peak hour(s), there will be 10 clients who need to perform body check. With this setting, the path (as presented in the Path list) will be executed 10 times during process simulation.
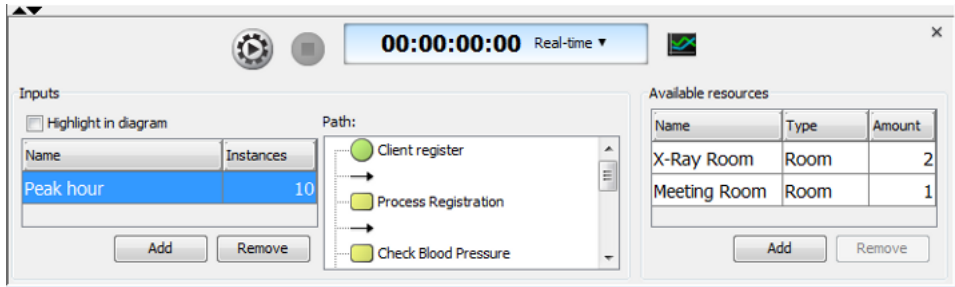
16. Click the **Start** button to start process simulation.
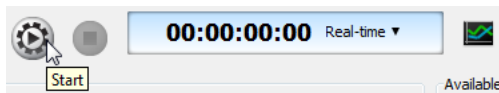
17. Study the simulacian outcome. Below is a description of some of the key area that you should pay attention to:
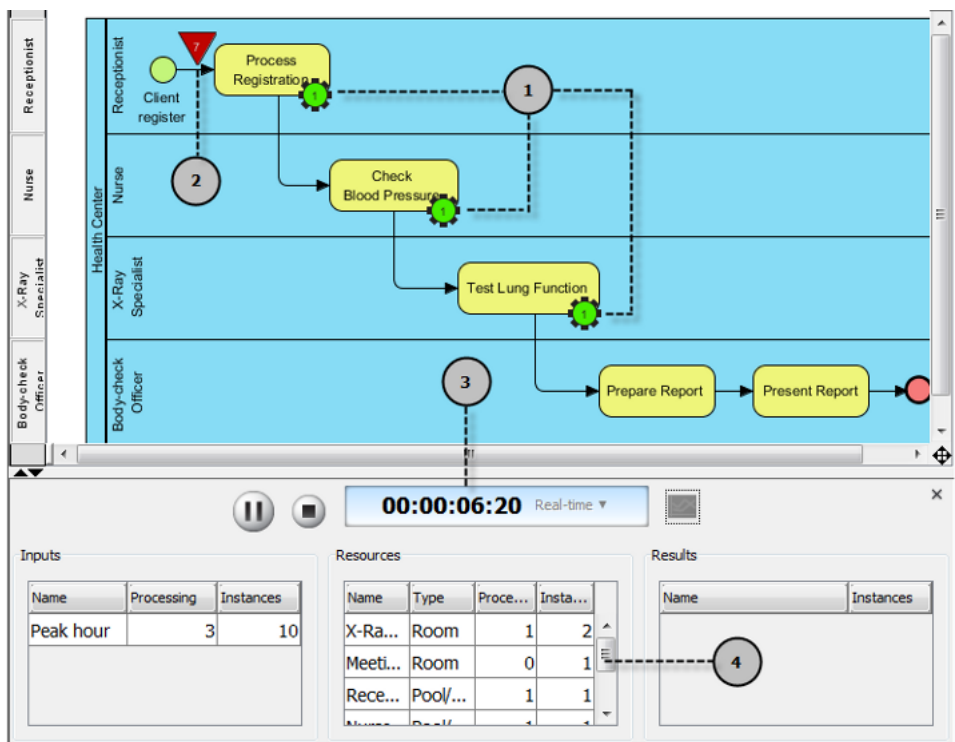

No.	Description

1	The green running circle stands for job(s) that is/are executing at the attaching task/activity. The number inside the circle stands for the number of jobs being executed.
2	The red inverted triangle stands for job(s) that is waiting to be executed. The number inside the triangle stands for the number of pending jobs. It is attached to the end of flow to represent the need of being executed by the coming flow object.
3	The clock shows the time elapsed.
4	The Resources table show the dynamic resource consumption. It will be updated throughout the process simulation to reflect the use of resources at particular instant.

18. If we want to wait until the process simulation to finish, this may take about an hour since we are simulating in real time scale. Click **Stop**. Change the scale to **10 mins scale** and play again.
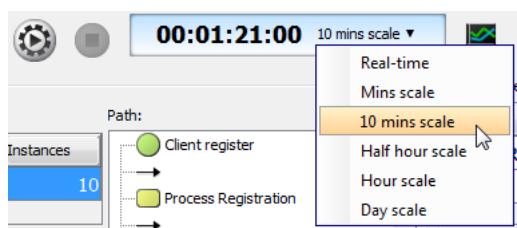

19. The pace is increased. By observing the occurrence of inverted triangle, we can determine where the bottleneck occur, if any, and to think of the possible improvements in further. With this body check process, we notice there are always pending jobs at task *Test Lung Function*.
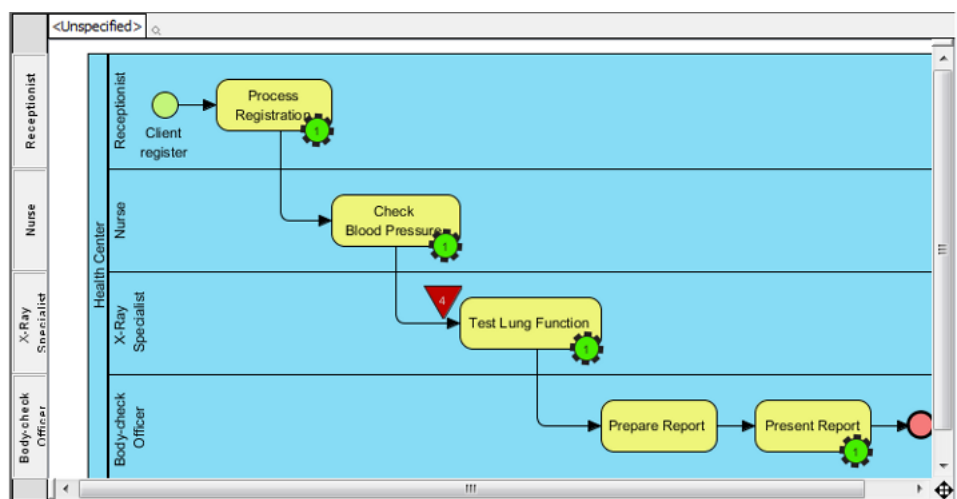
20. Now, we need to decide how to improve the process. Since the bottleneck is at lung function testing, we need to decide how to speed it up. There are several possible actions we can do:

    • Reduce the duration of lung function testing

   • Employ more specialist(s) to share the work load

    Since the duration of proper lung function testing is fixed, the first action is impossible. We shall take the second action.

21. Select lane *X-Ray Specialist*, change instance from 1 to 2.
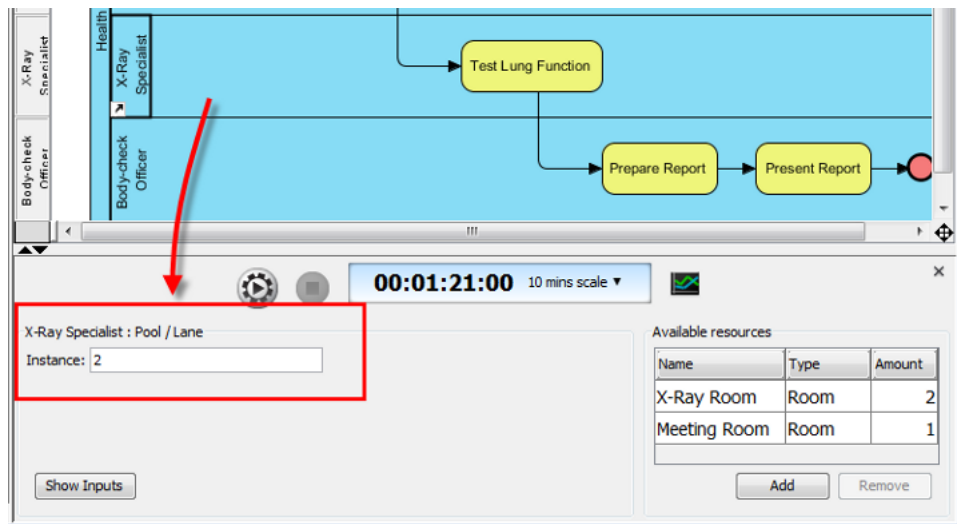
22. Click **Start** to simulate again.

23. Strangely, the time it takes to finish the process remain the same, why? If you observe the simulacian outcome, you can see that the task *Test Lung Function* is no longer the bottleneck, due to the addition of X-Ray specialist. However, the tasks *Prepare Report* and *Present Report* now become the bottleneck.
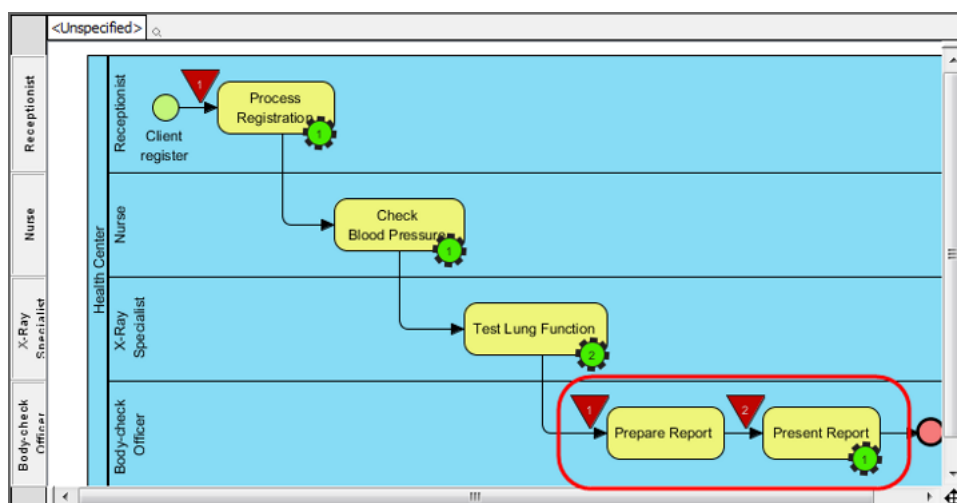
24. Let's employ one more body check officer to help. Select lane *Body-check Officer*, change instance from 1 to 2.
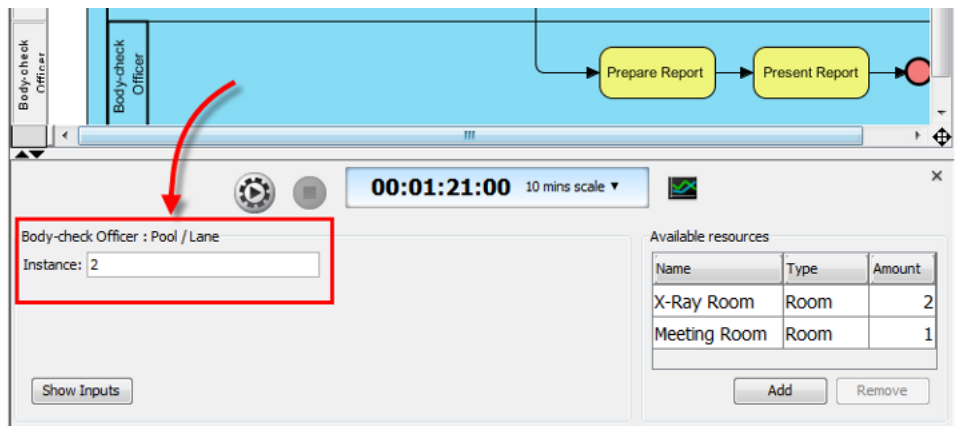

25. Further to employing an officer to help, we need to reserve one more meeting room. Change the amount of available meeting room from 1 to 2.


26. Simulate again.

27. It now takes 50 minutes to complete the whole process. By comparing with the original process, the improvements reduce 30 minutes operation time in total.
There are other possible solutions instead of employing more staff. For example, we can computerize the process by not presenting report to client, but to print it out with clear description on each checked item, and let the client read himself. We may also buy advanced X-Ray machines to speed up the lung function testing process. Simulacian does not recommend a solution to you, but to let you execute your idea of improvements easily through updating diagram content and resource allocation, and give you figures to show the effect of changes, to help you decide the best solution.

28. Sometimes, just by watching the simulacian outcome is not enough in finding out the bottleneck, especially when the diagram is large, and have many, many bottlenecks. In such cases, you can produce charts for simulacian outcome, which helps quantify resource consumption and queuing time for each activity. Click **Simulacian Charts** in **Simulacian Control Panel**.
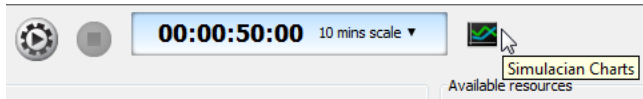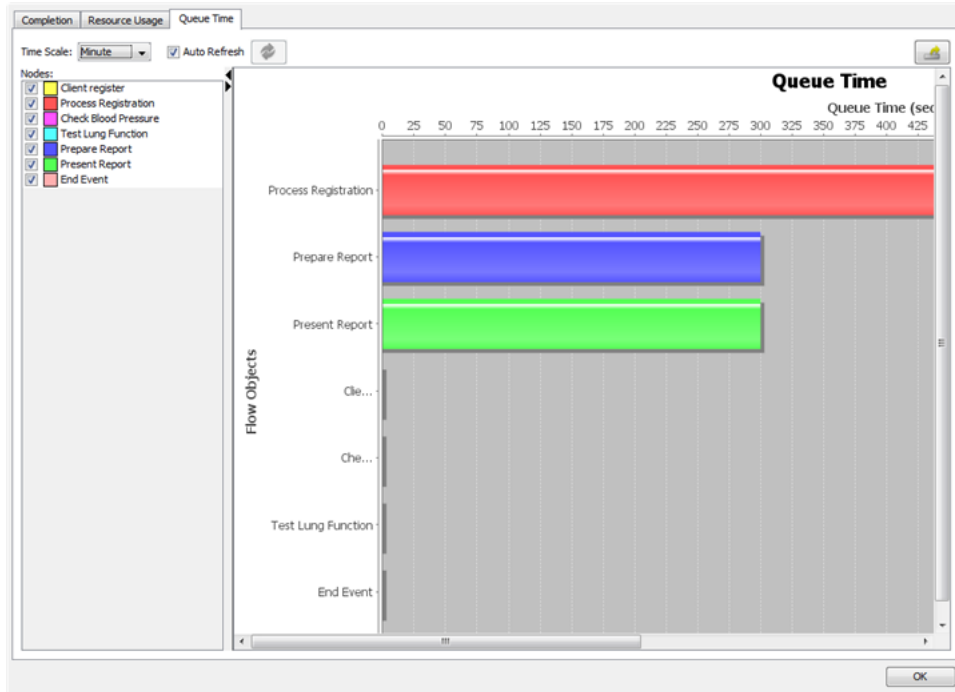
29. Study the chart in **Completion** page. The chart show the status of inputs completion against time. Remember we have set 10 instances to input *Peak* hour? From the chart you can see the completion of the 10 instances throughout the process simulation. As time goes by, there will be more inputs being completed, and less inputs being processing.
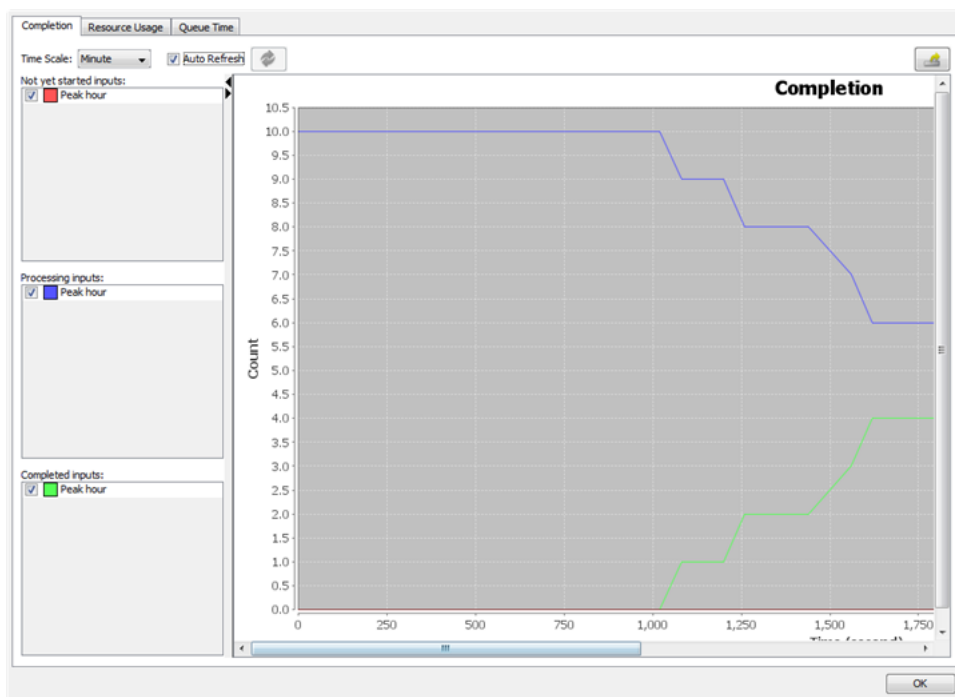
30. Open the **Resource Usage** page. The chart here shows the level of resource consumption. In this example, both X-Ray room and meeting room are fully used (100%) within the process, which is ideal. But if you try to add 3 to 4 available X-Ray rooms, and review the chart, you will see that the peak usage will be less than 100% because some rooms are idles throughout the whole process. By studying this chart, you can adjust the amount of resources to apply to the process.
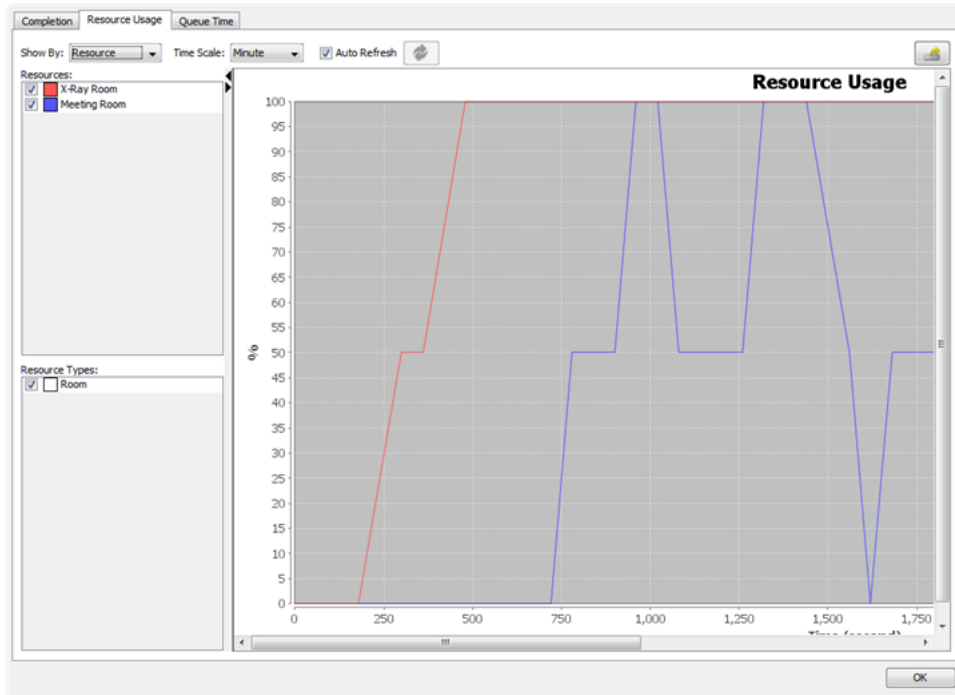
31. Open the **Queue Time** page. The chart here shows the time the flow objects spent on waiting, which corresponds to the time an inverted triangle appear during simulacian. By studying the chart, we know that process registration now takes over 10 minutes in waiting, prepare and present report still take over 4 minutes after the improvement. By studying this chart, you can decide whether further improvements need to be carried out.

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(http://www.visual-paradigm.com/product/lz/)

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