

Lab : Simulation of a M/M/1 queue with OMNeT++

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If needed, install OMNeT++ 6.0.1, by using the omnet++ installation guide available online.

<https://omnetpp.org/documentation/>

<https://omnetpp.org/download/>

Documentation

- The documentation for omnet++ is available online : see the omnet++ simulation manual.
- In addition to the source files as source of documentation, please refer to to the simulation manual if you have any questions.
- At the end of the installation process, **you will be prompted to install inet project in omnet++ : say yes and install the inet project.**

Tips

- To run a simulation, select the configuration file omnetpp.ini, and select "run as" -> "omnet++ simulation" in the menu.
- To analyze the results of a simulation, open a scalar or vector file in the subdirectory "results" and create an analysis file. You can browse results from the analysis tool.

Tasks

- Simulate a m/m/1 queue with **inet queueing** library and the omnet++ simulator.
- Take as basis the queueing tutorial from inet project. The path of the project is : inet/tutorials/queueing
- Set the parameters to 1s for the mean inter arrival time between packets with exponential probability distribution.
- Set the mean service time to 0,75 seconds with exponential probability distribution.
- Give the mathematical formula for the following metrics : mean queue size, mean waiting time in the queue.
- Simulate and compare the results with the mathematical formula.

- You will have to modify the sources to measure queueing time in simulation : set the arrival time field of the packets by adding one line to the sources at the right location in the appropriate source file.
- Comment the file PacketQueue.ned by explaining the lines of the source file, especially the statistics and signals parts.
- Add the following lines to the configuration file in order to replicate the simulation runs with various seeds :

```
repeat = 25
seed-set = ${runnumber}
```

- Run the simulation with the command line environment (cmdenv).
- Observe the results and explain why the results differ for each run.
- Examine the queue length vector average and queue length time average metrics.
- By simulating on a small horizon of time (5s for example), you can export the data and explain why these two metrics differ.
- Comment the source files involved in the simulation of the m/m/1 queue by explaining the various functions and the instructions they contain.