

Project 1 - Markovian Queue Implementation

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Contents

1 Data Structures

- Min Heap to store the requests ordered by time. Event that occurs in the most near future is stored at the root of the heap. Max heap size is dependent on the requests generated. In the current project, heap size is dependent on L (no. of terminals) since each terminal cannot generate another request until current request from the terminal is processed by the system.
- Queue to store the requests that arrived at the system but servers are busy. Max queue size is order of K (Queue size).

2 ReadMe

- main.c contains the main simulation program (run_simulation API).
- utils.c is used to store data structures and generate exponential random variables.
- utils.h contains the structures and API used by main.c and implemented in utils.c
- input.in contains the input to be given to the program. Following is the input style.
 - no. of events to be generated for each run, 'run'
 - no. of terminals, L
 - queue size, K

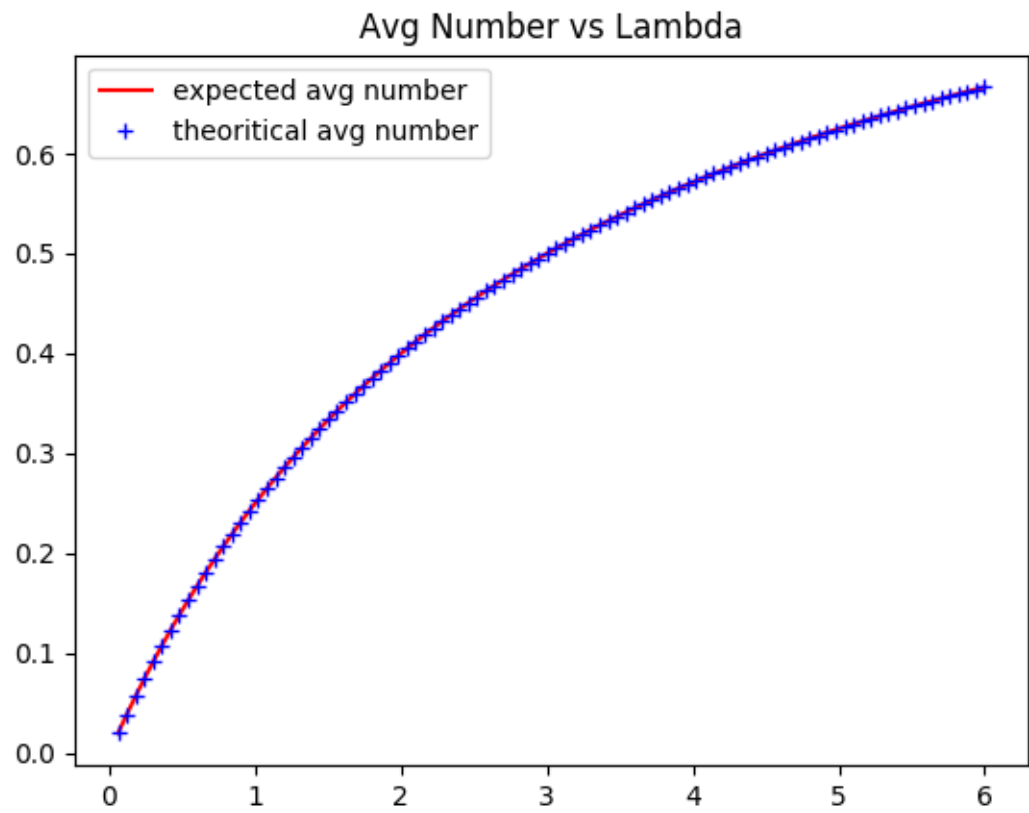
- no. of servers, m
 - service time of each server, ' μ '
- `plotter.py` python script to generate the graphs of output obtained from simulation.
- `avg_output` file contains the output as λ , expected no., theoretical expected no., expected time, theoretical expected time, blocking probability, theoretical blocking probability, utilization of the system, theoretical utilization of the system.
- `q-simulator` executable to be run.
- `run_script` shell script file to build and run the simulation. Use following method to run the simulation.
 - modify `input.in` as per above instructions
 - `./run_script.sh`

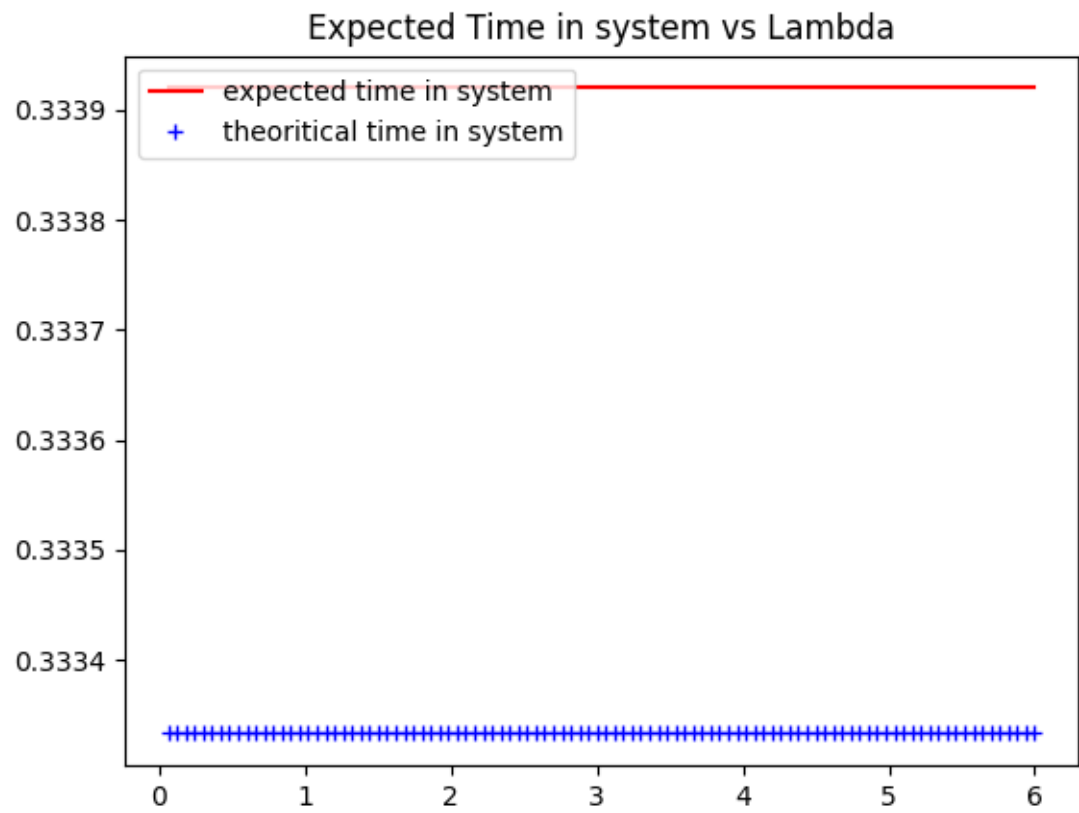
3 Dependencies

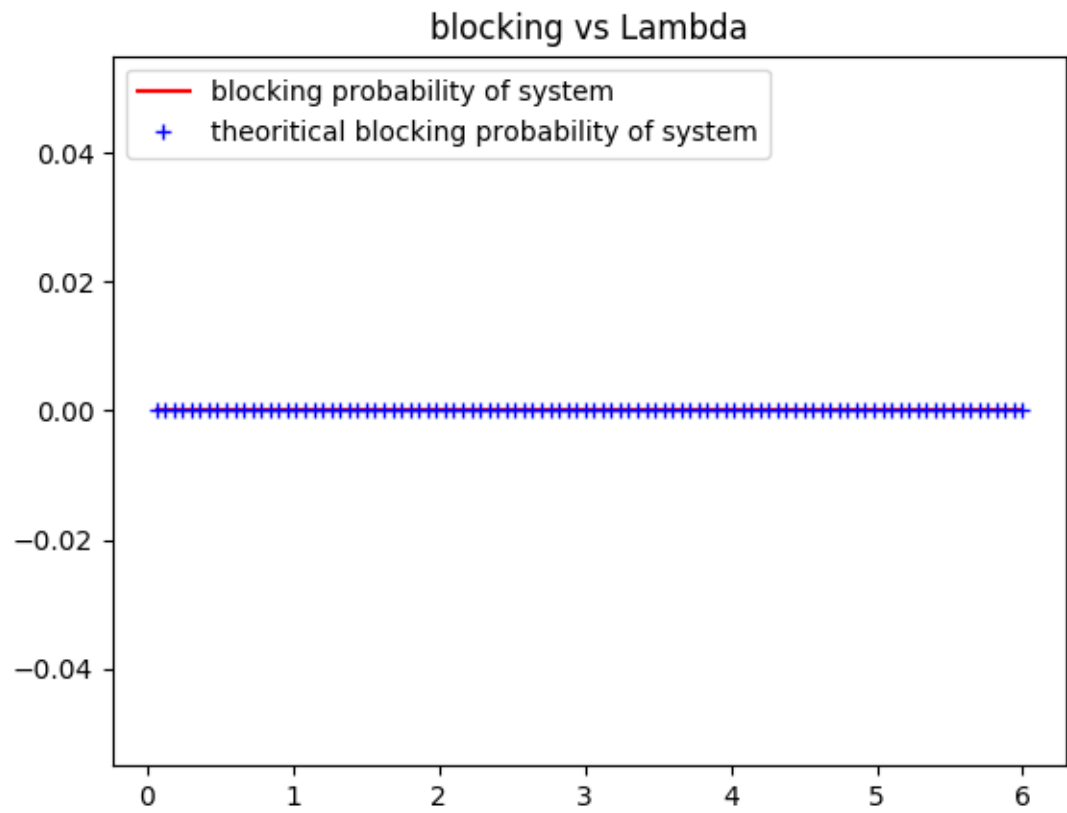
- gcc compiler
- python3. For python2 or 2.7, `run_script` needs to be modified to enable python2.

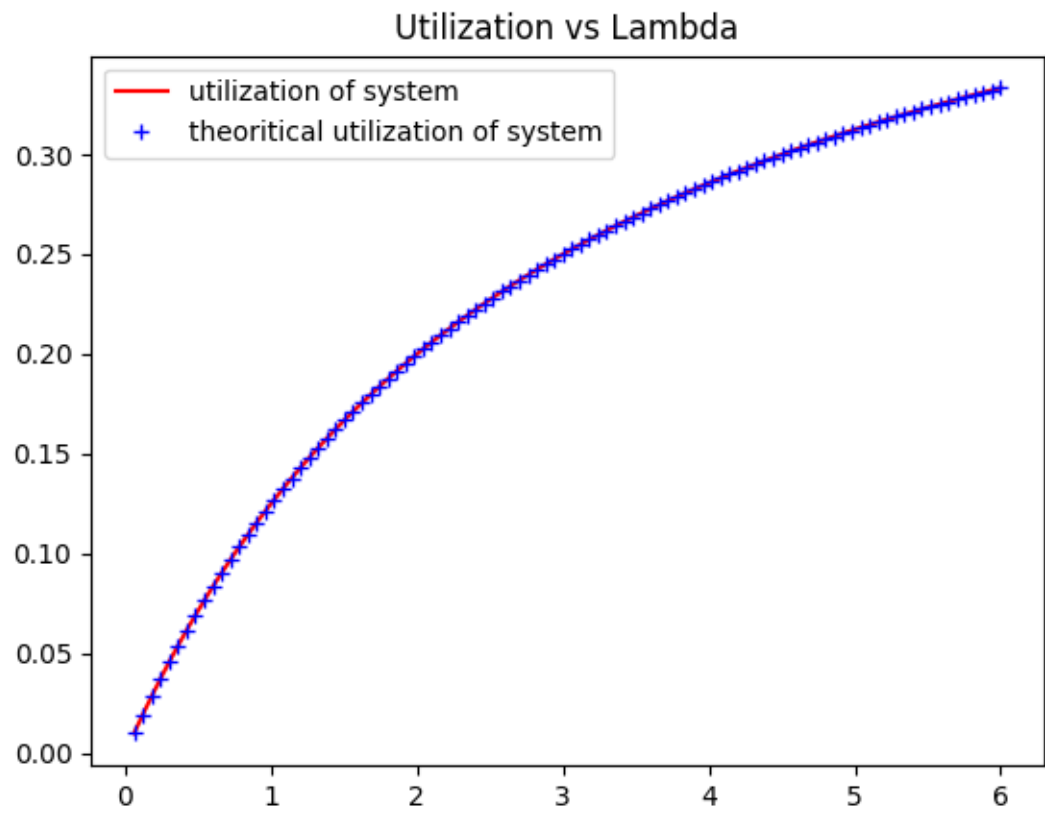
4 OUTPUTS

4.1 L1, K4, M2, U3

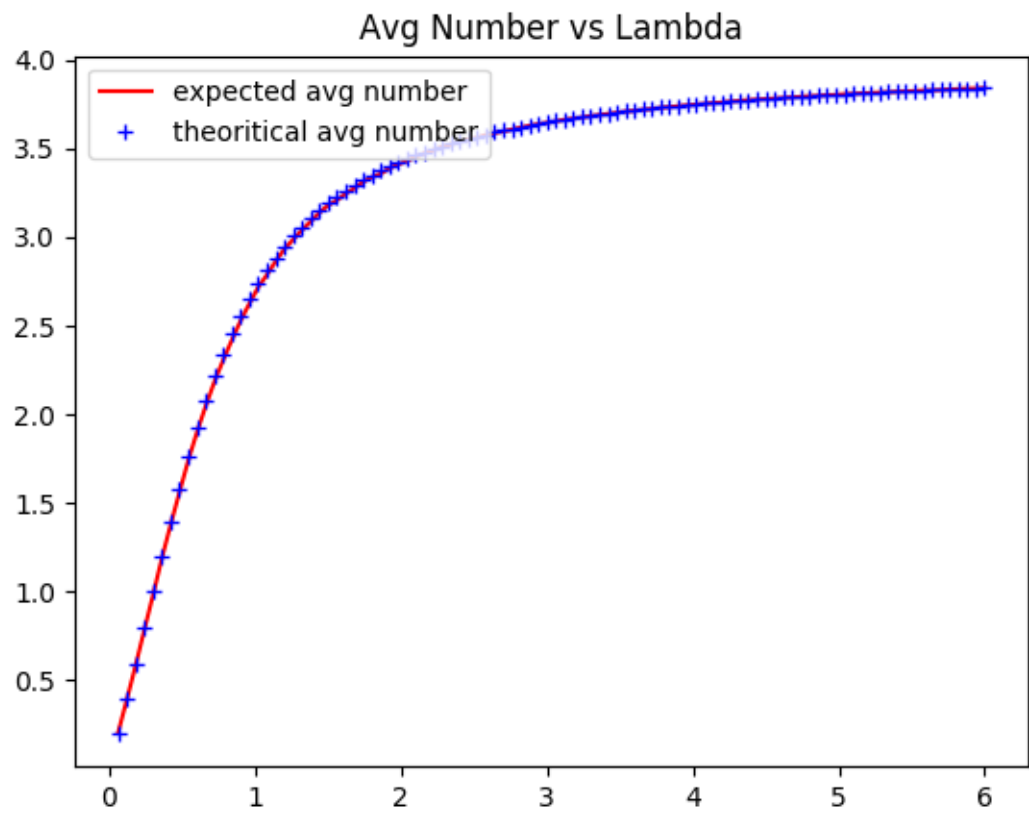


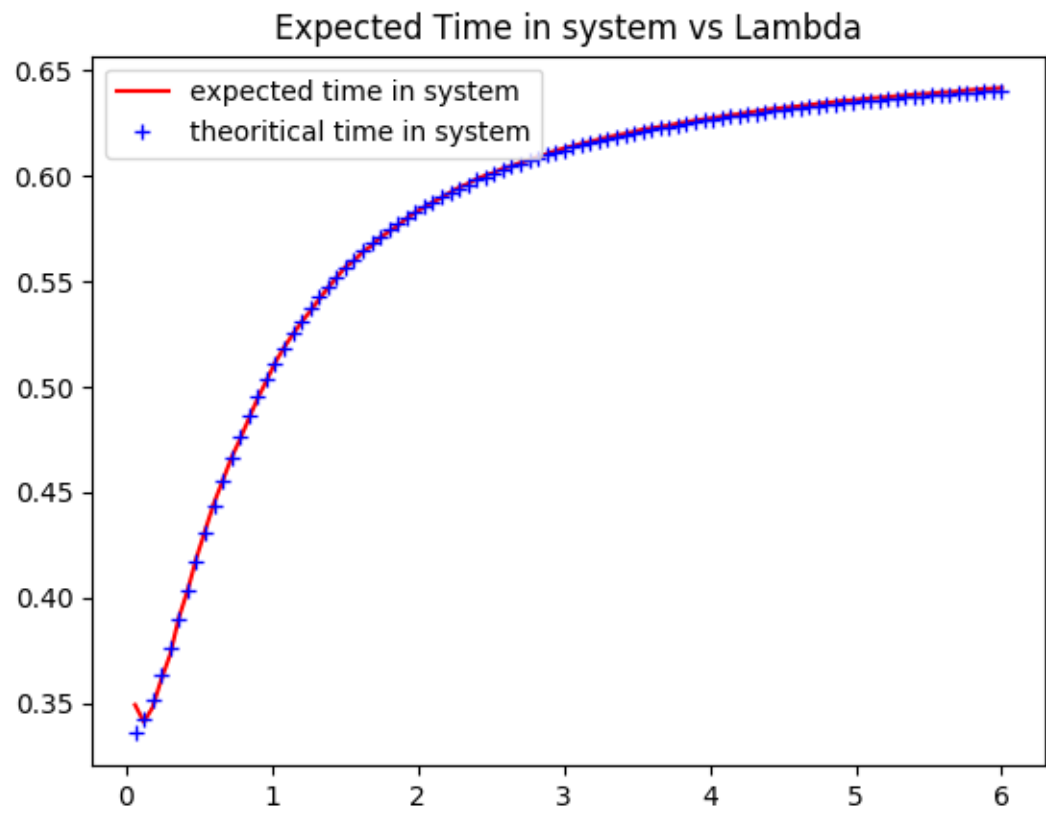


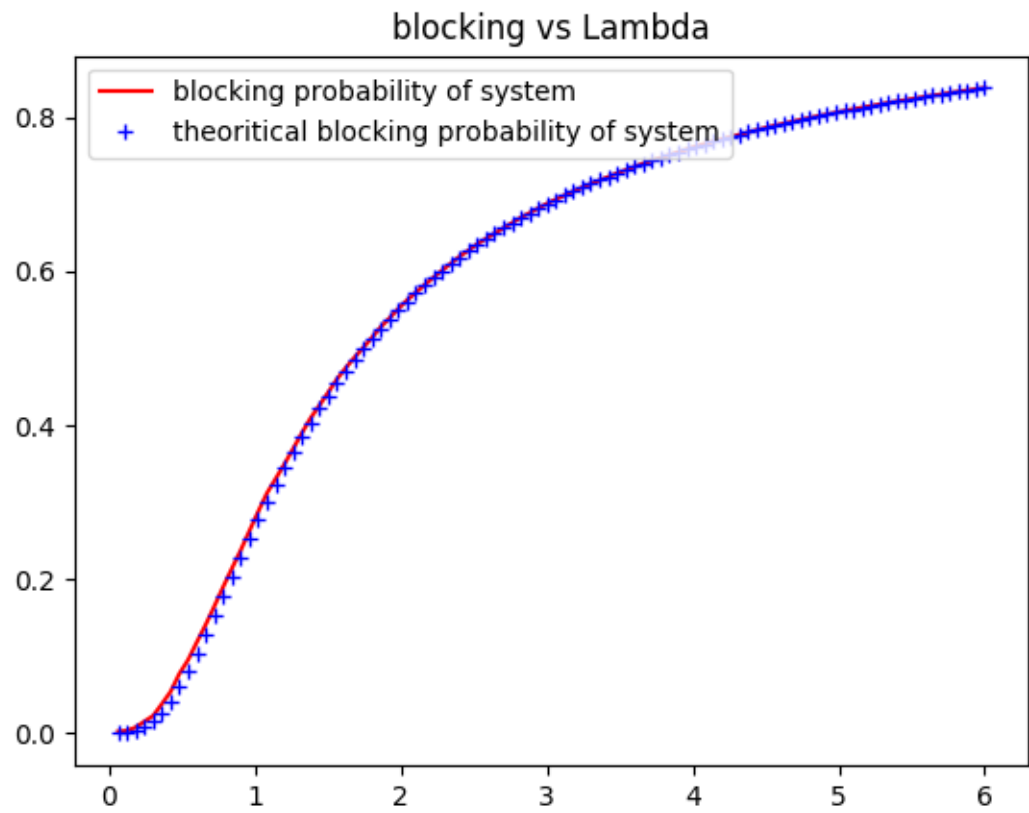


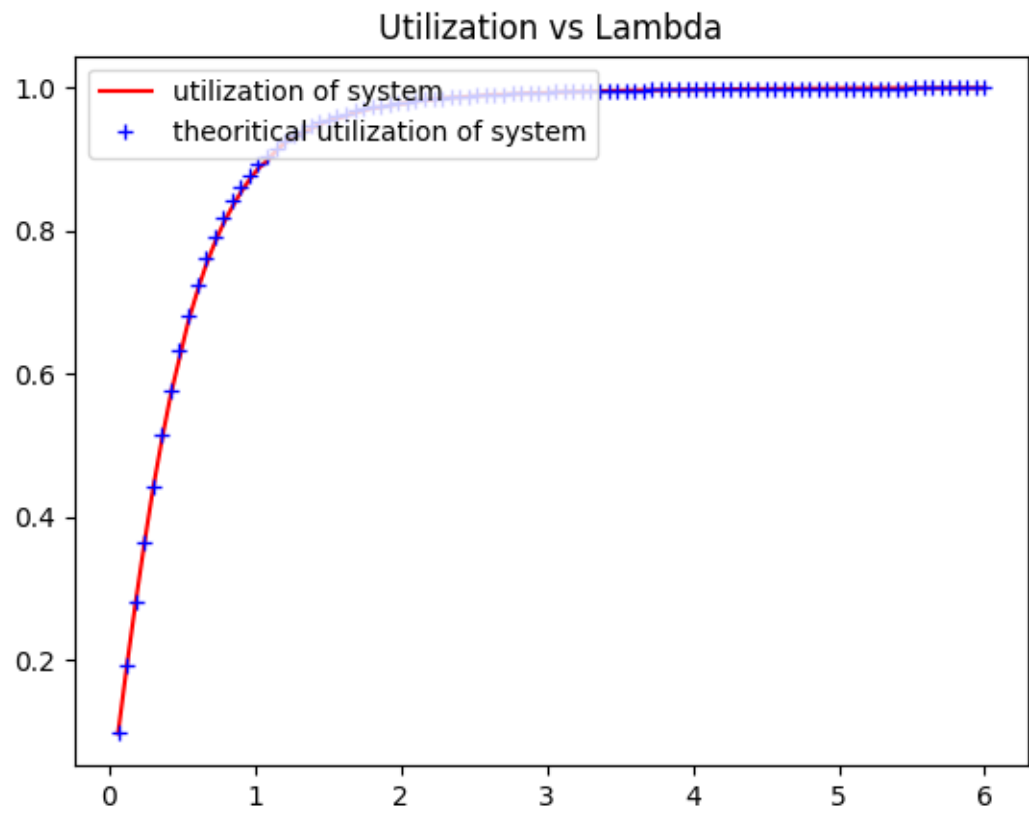


4.2 L10, K4, M2, U3

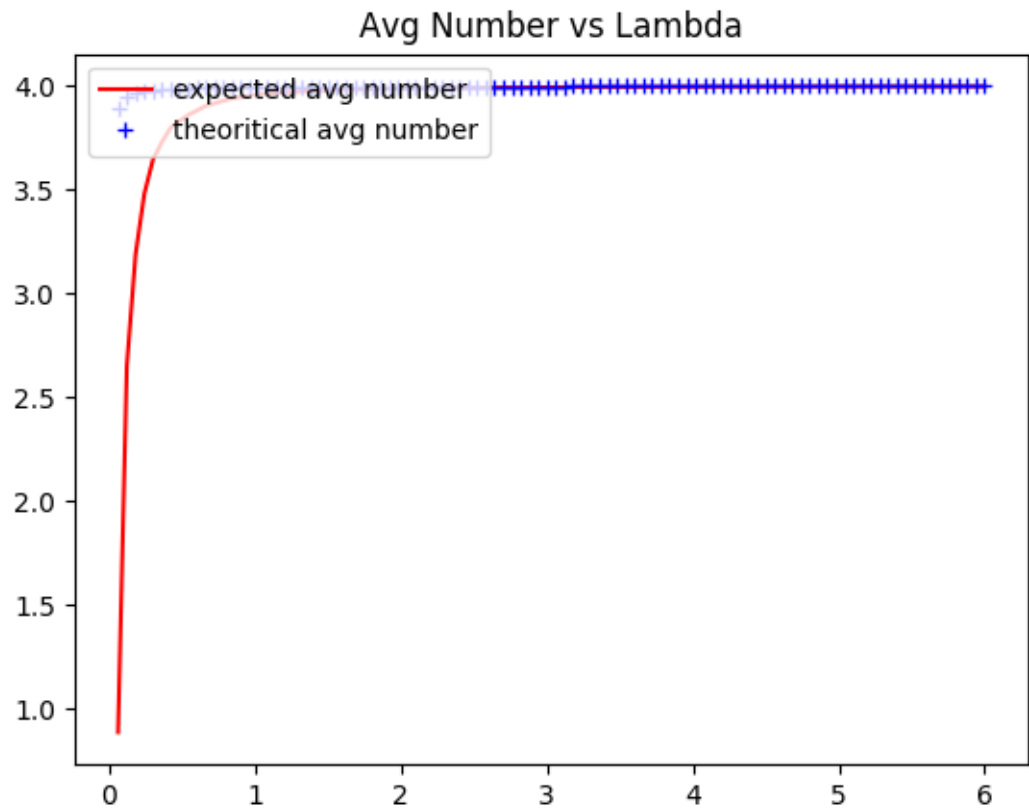


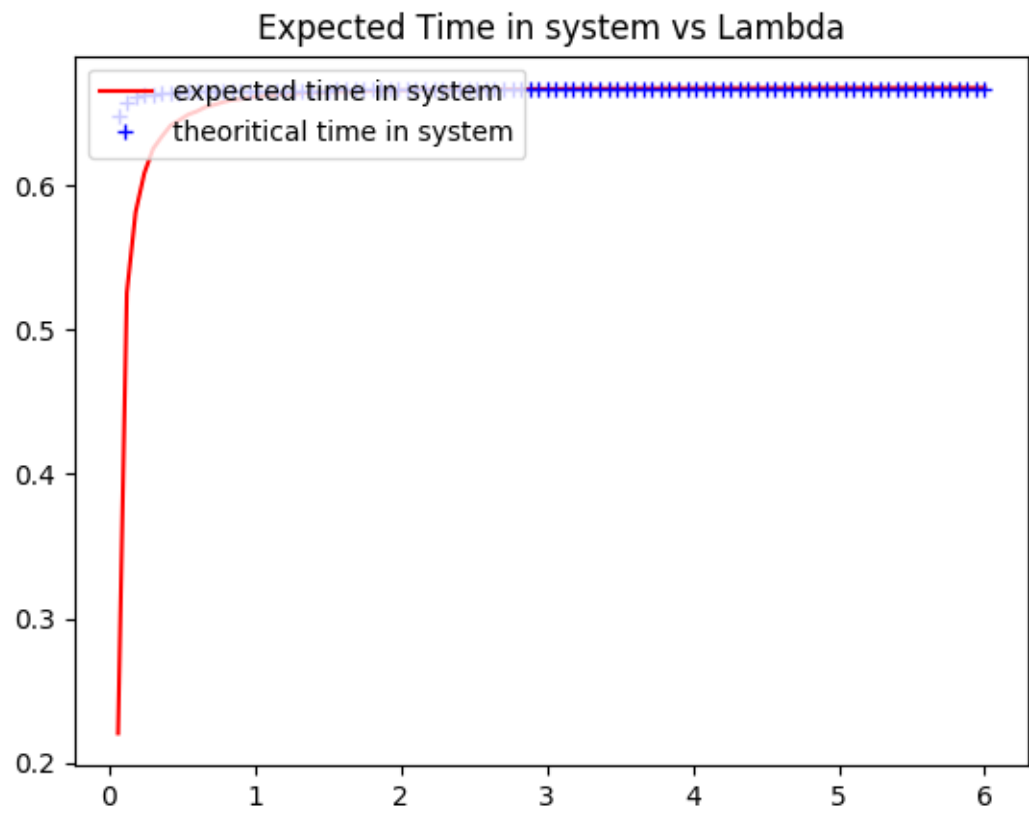


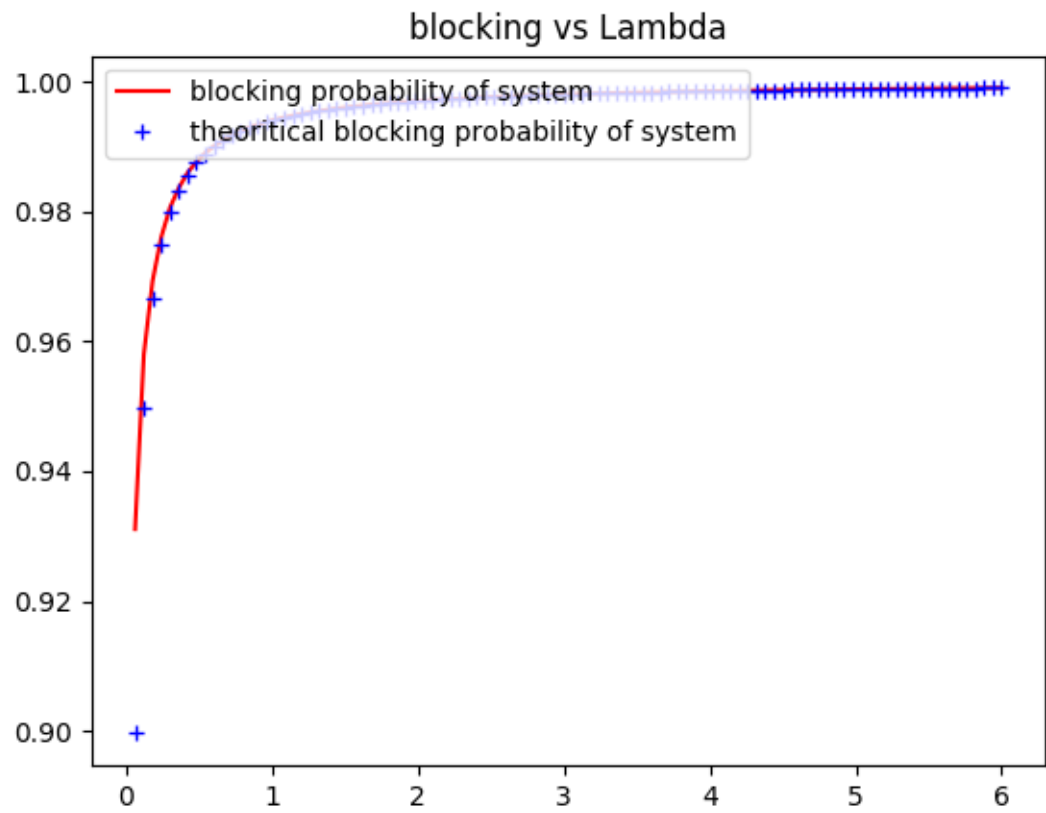


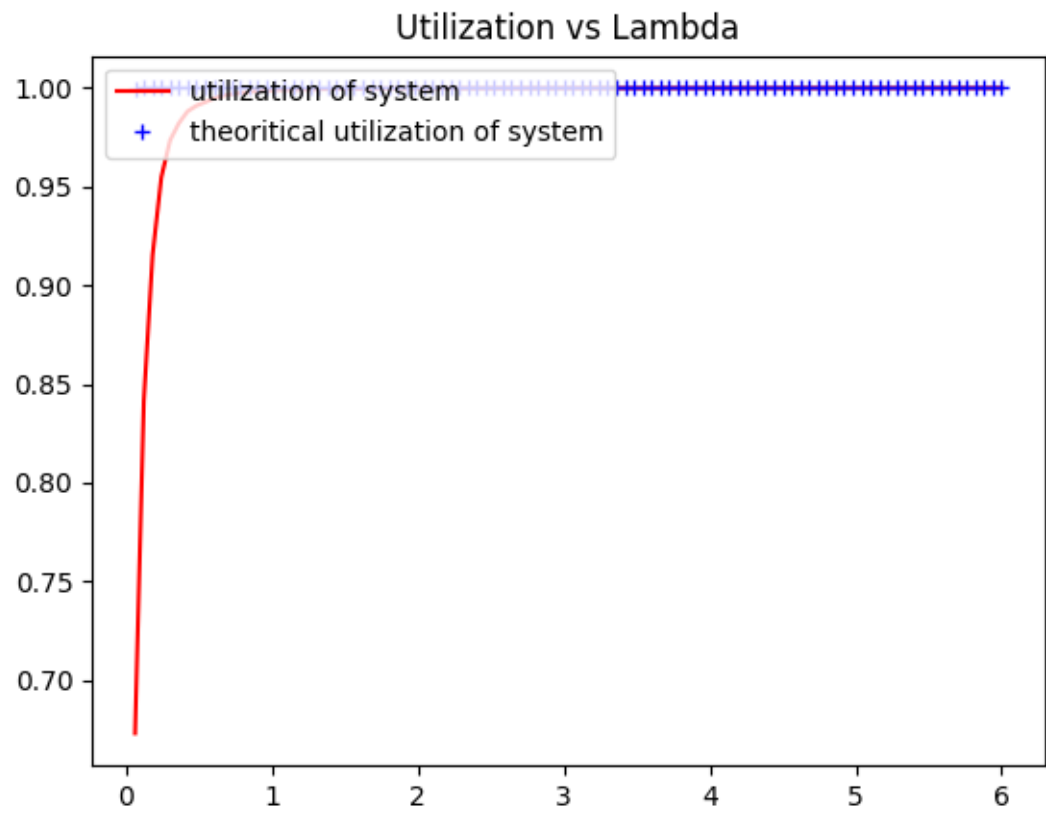


4.3 L1000, K4, M2, U3

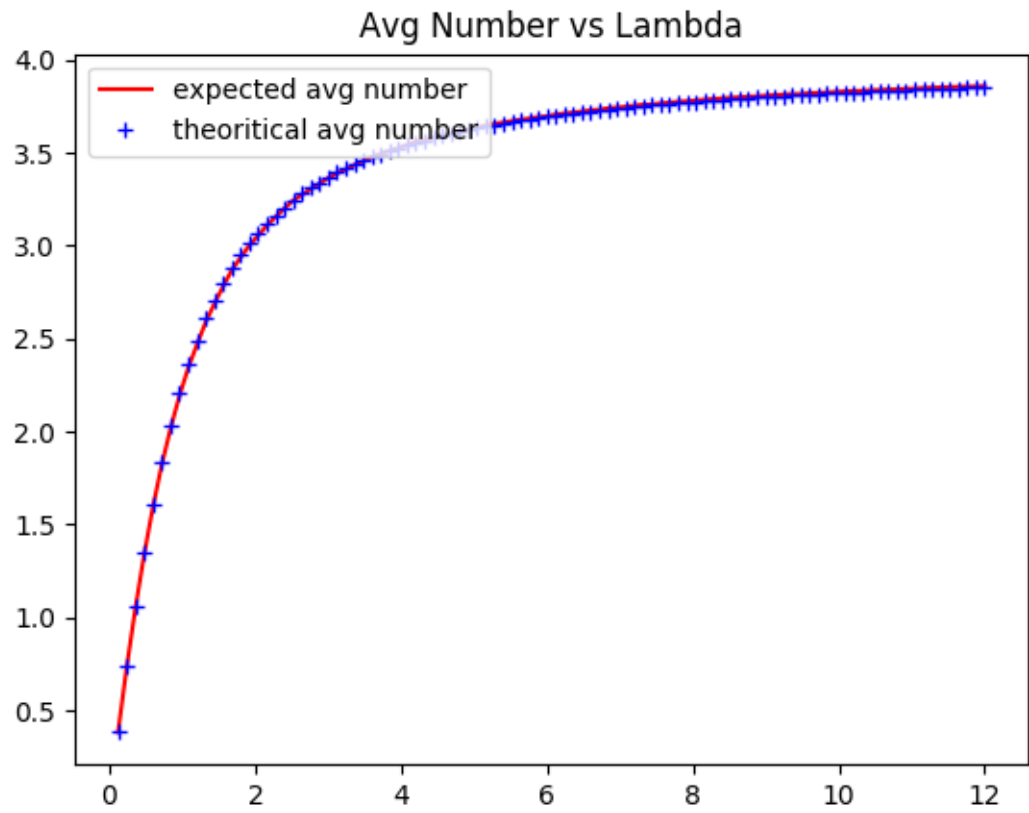


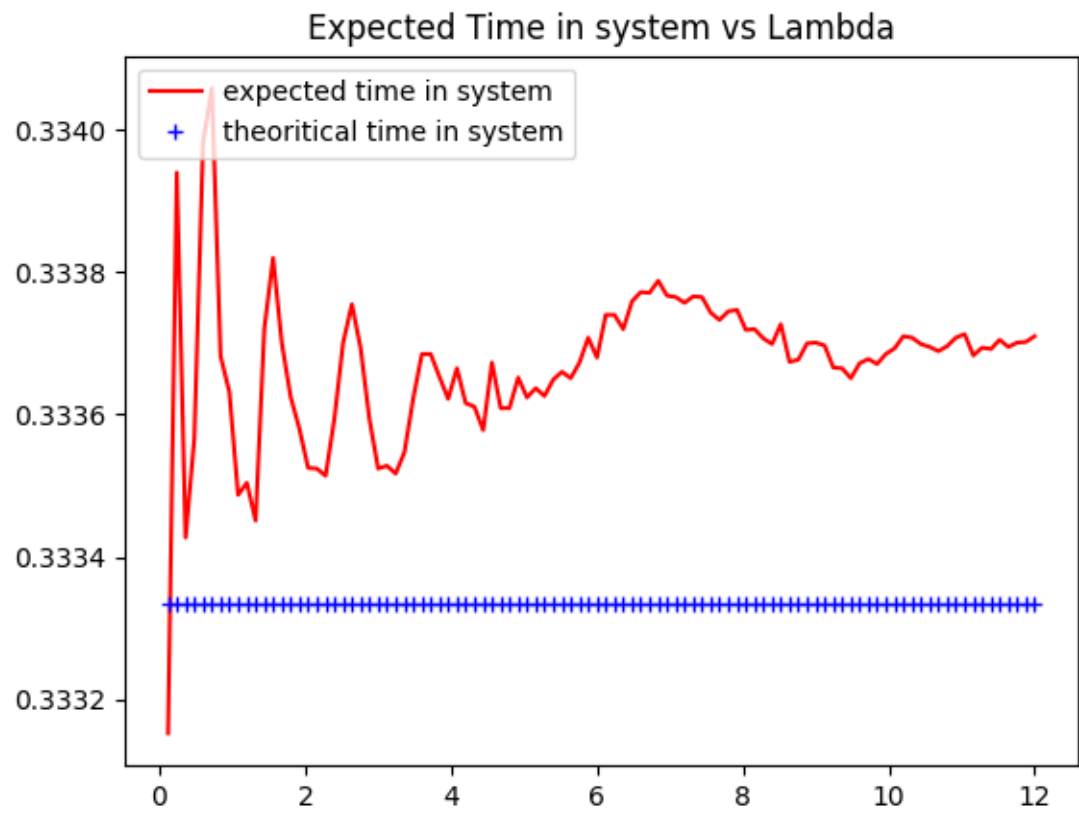


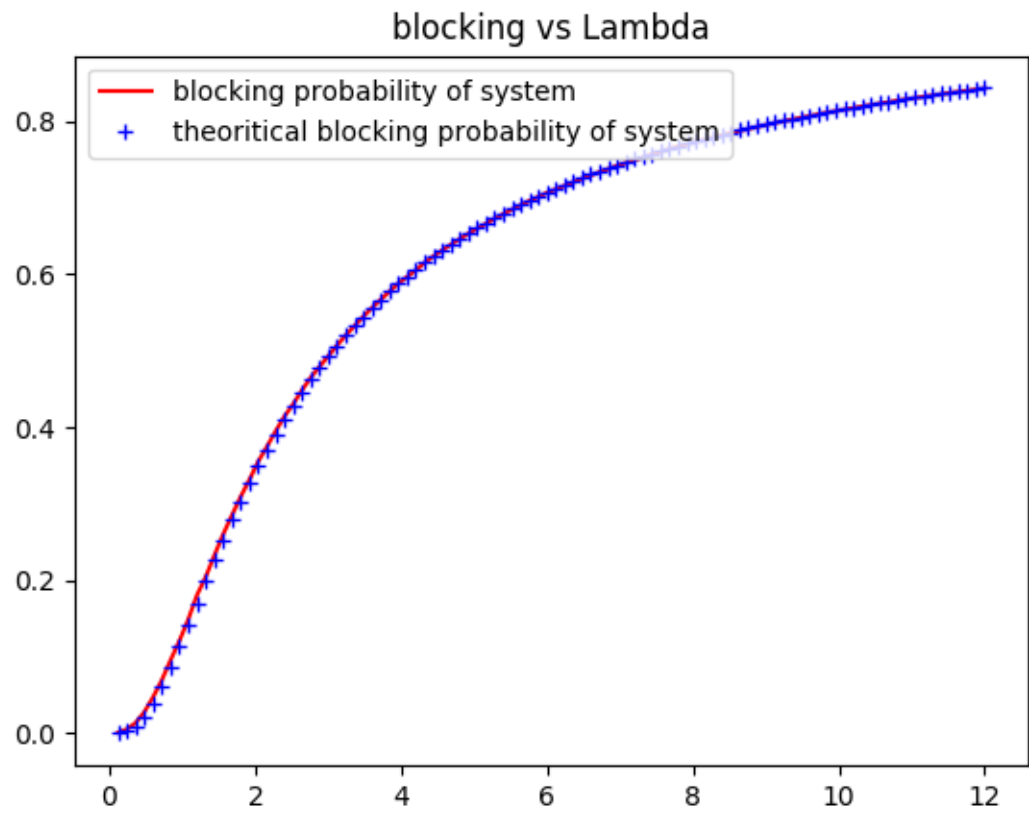


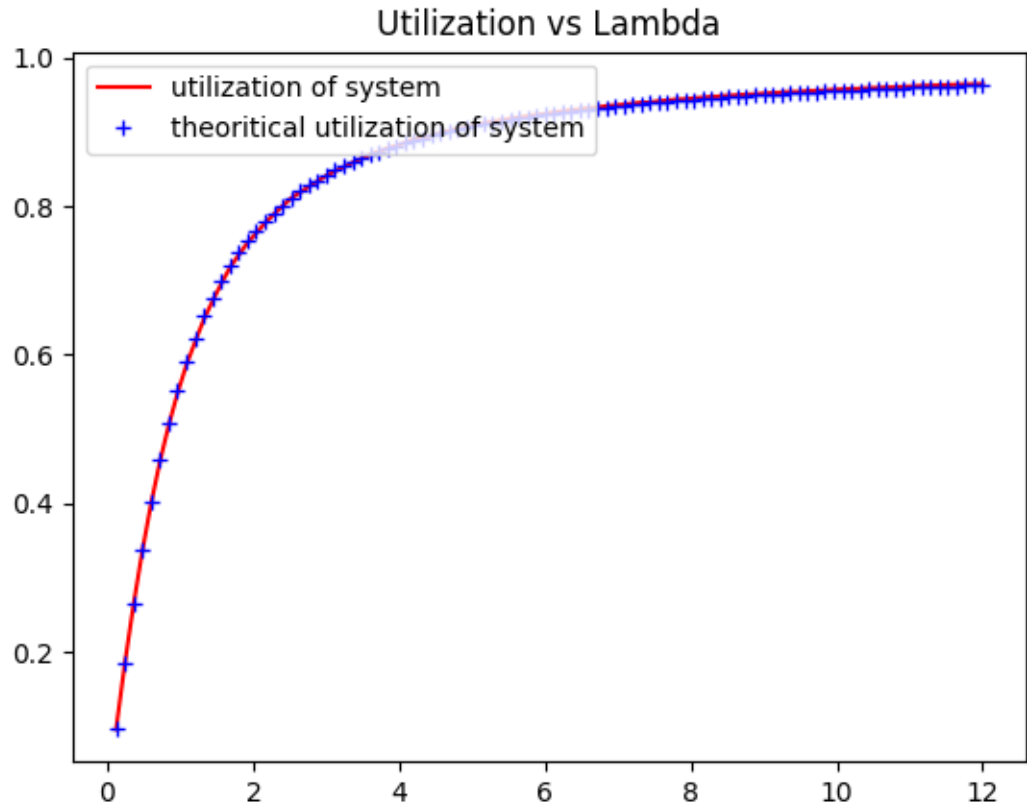


4.4 L10, K4, M4, U3









5 Limitations

Heap size is set to 1000 in utils.h. As long as number of events at any point of time is not more than 1000, simulator is fine. However we can modify the value and run the script again. Script builds the code and runs the simulation again.