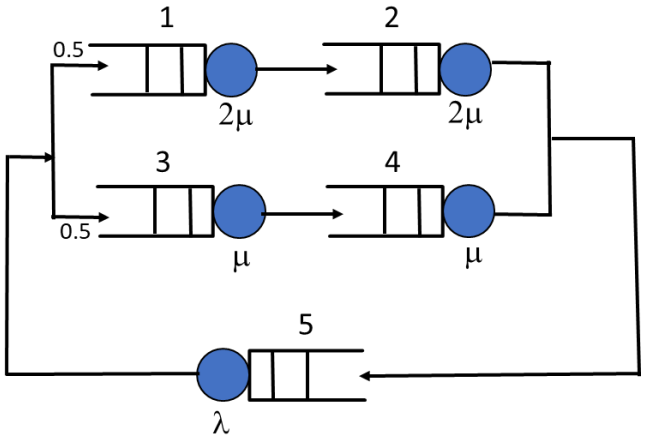
EECS 863
Spring 2022
Closed Networks
Project 4

Provide your results in the form of a technical report using the provided format.
See: **Technical Report Format**
**http://www.ittc.ku.edu/~frost/EECS_563/Technical%20Report%20Format-2019.pdf**
Also see this paper for advice on writing technical reports.
See: **Paper on writing technical reports**
**http://www.ittc.ku.edu/~frost/EECS_563/Writing%20Technical%20Reports.pdf**
Do not pad your reports, all figures and tables must be discussed in the text.

Here a virtual circuit uses a sliding window protocol with a window size of 4. The systems randomly select to send packets over two paths, in one path all the links operate at C b/s and on the other path all links operate at 2C b/s. Each path has two links. A closed network for this system is given below. Assume the external arrival rate is R=C, i.e, $\mu=\lambda$ and set $\mu=1$.




1) Construct a simulation of this system.
   a) Assume exponential service times and find:
      i) Mean node (queue/server) size
      ii) Mean node (queue/server) time (delay)
      iii) Node utilization
2) Repeat assuming uniformly distributed message lengths with the same mean service time, i.e., for nodes 3 and 4 the message length distribution is uniform between 0 and $2/\mu$, while for nodes 1 and 2 the message length distribution is uniform between 0 and $1/\mu$.
3) Discuss the impact of the different message length distributions on the system performance.

For example closed network see
http://www.ittc.ku.edu/~frost/EECS_563/LOCAL/Extend_Models_2019-v10/Close_Net_Example-ES10.mox