ECE 466 Lab 3

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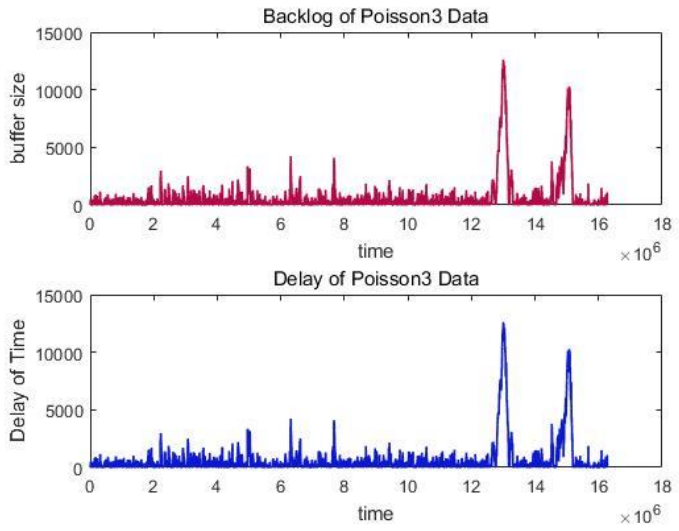
Part 0. Comments

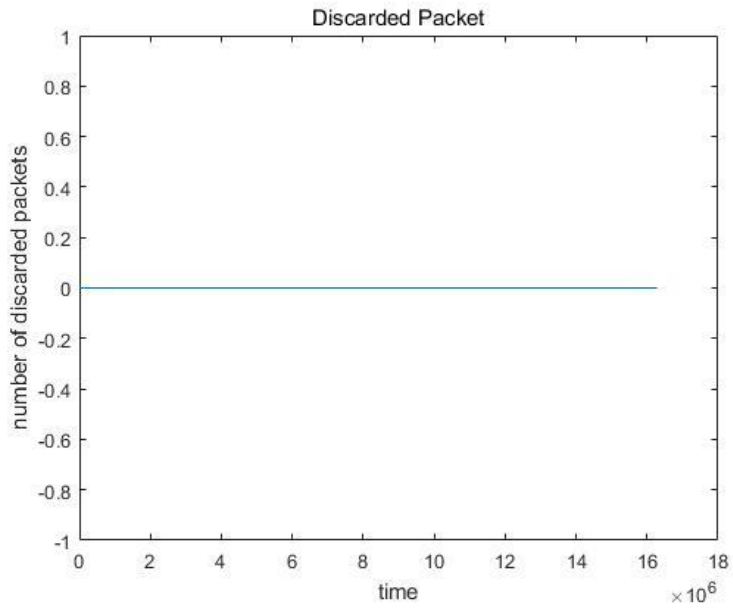
For this lab, even though the C is set to be 10 Mbps, but in the scheduler side, it is not able to reach 10Mbps for the device. The maximum of transmission rate is around 2.5 Mbps. This is because every time calling the function “Thread” in SchedulerSender file, it will takes about 2ms, and this will lower the sending rate from scheduler to sender. So only N = 1.0 Mbps will able to have no backlog in the following lab sections.

Part1. FIFO Scheduling

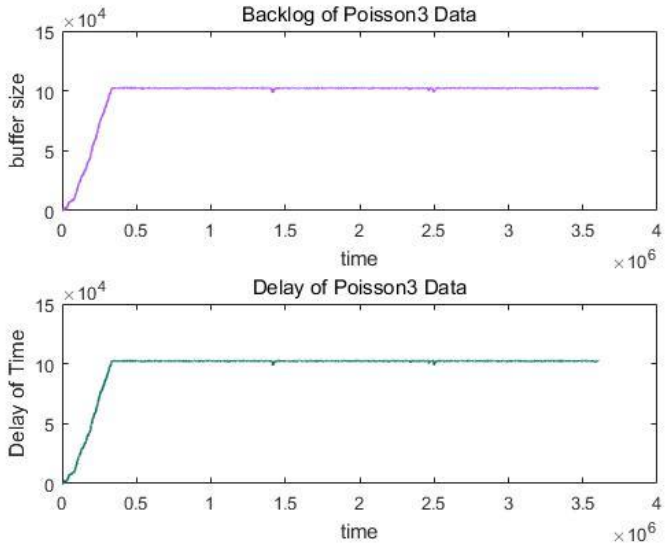
Exercise 1.3 Observing a FIFO Scheduler at different loads



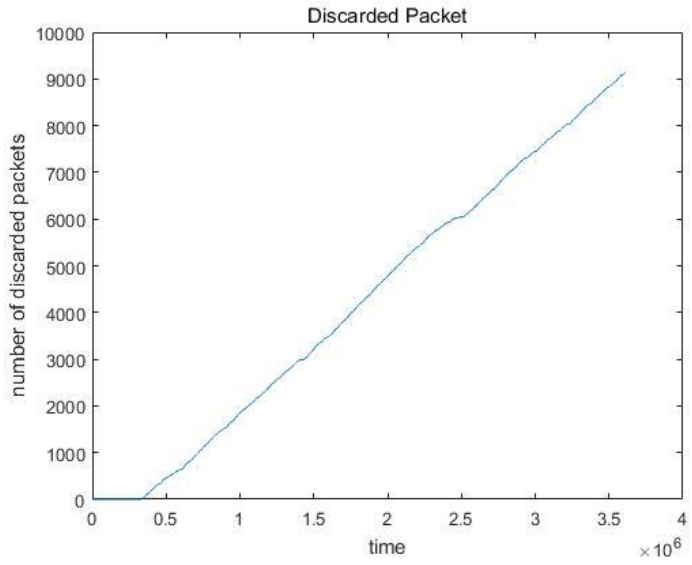
Plot1. The above graph shows the backlog of the Poisson Traffic with average rate of 1 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



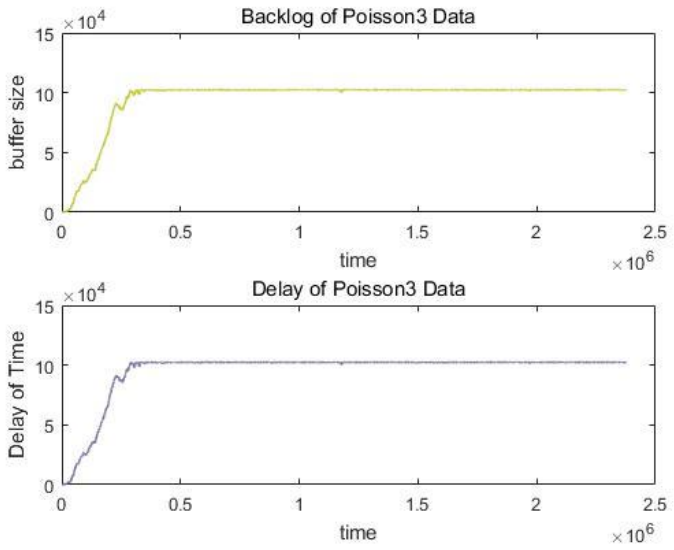
Plot2. Number of discarded packets in the Poisson Traffic with average rate of 1 Mbps



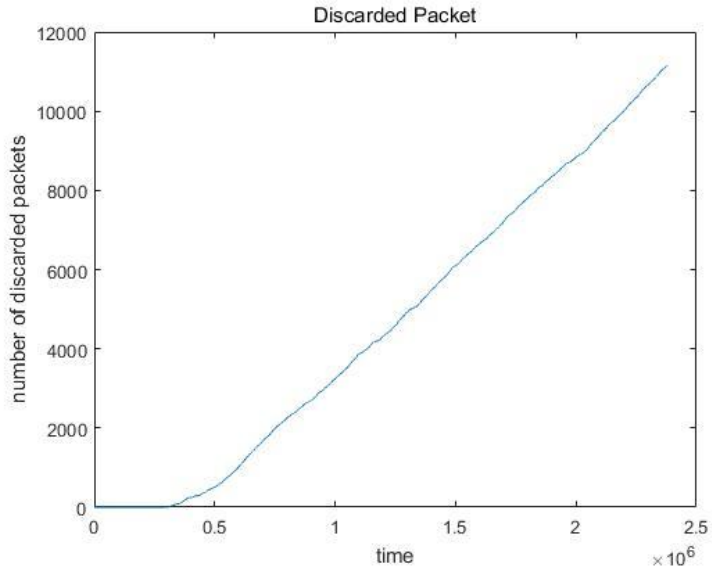
Plot3. The above graph shows the backlog of the Poisson Traffic with average rate of 5 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



Plot4. Number of discarded packets in the Poisson Traffic with average rate of 5 Mbps



Plot5. The above graph shows the backlog of the Poisson Traffic with average rate of 9 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time

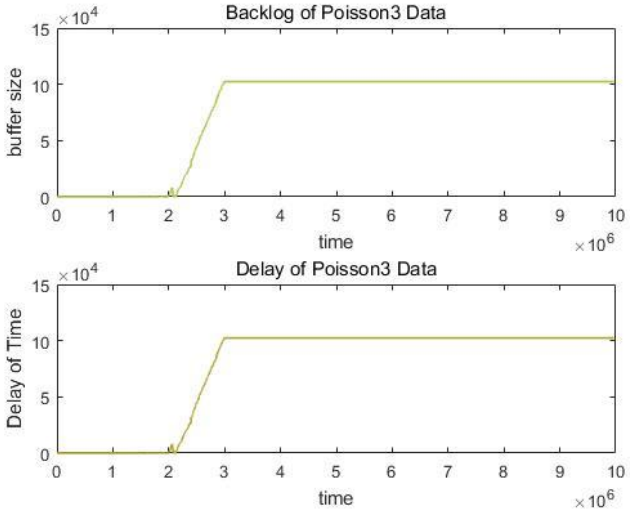


Plot6. Number of discarded packets in the Poisson Traffic with average rate of 9 Mbps

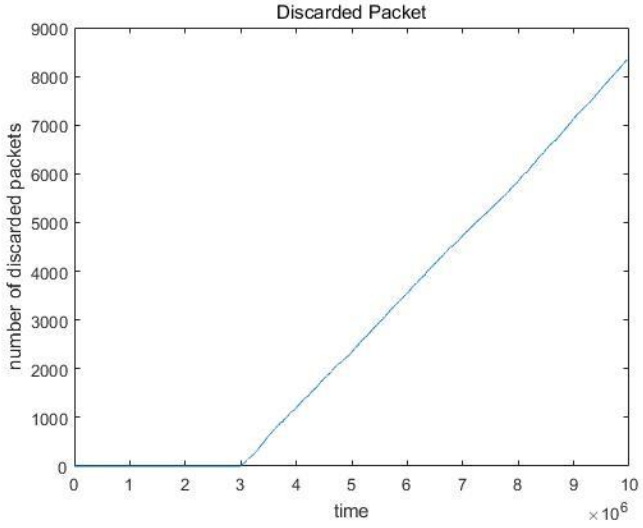
For the above graphs, we can see that if we increase the Traffic Generator average transmission rate, from N = 1 Mbps to N = 9 Mbps, there will be more backlog in the scheduler side. This is true because we increase the receiving rate but keep the output rate C = 10Mbps unchanged. When N = 1 Mbps, there is almost no discarded packets, because the backlog never reaches the maximum packet size. But for N = 5Mbps and 9Mbps, there are a great number of discarded packets, this is because the backlog of the both scheduler reaches its maximum size, and the sender is not able to transmit the packet as fast as the receiving side, and the packet will be dropped by the receiver.

Part2. Priority Scheduling

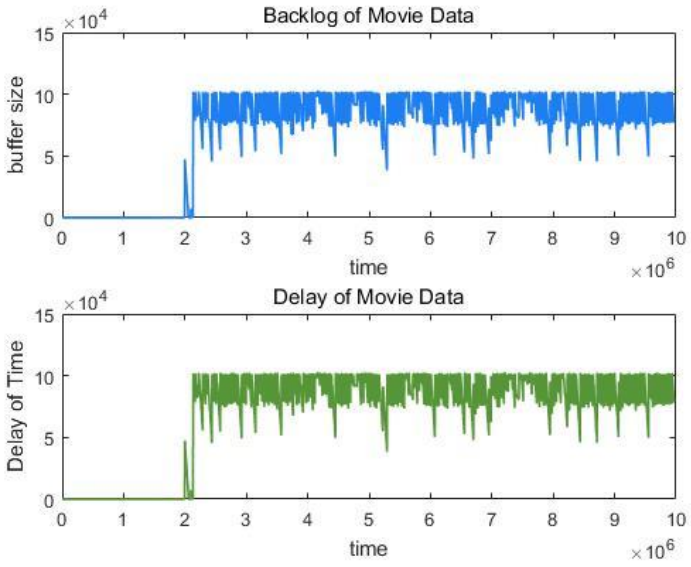
Exercise 2.3 Evaluation of the priority scheduler



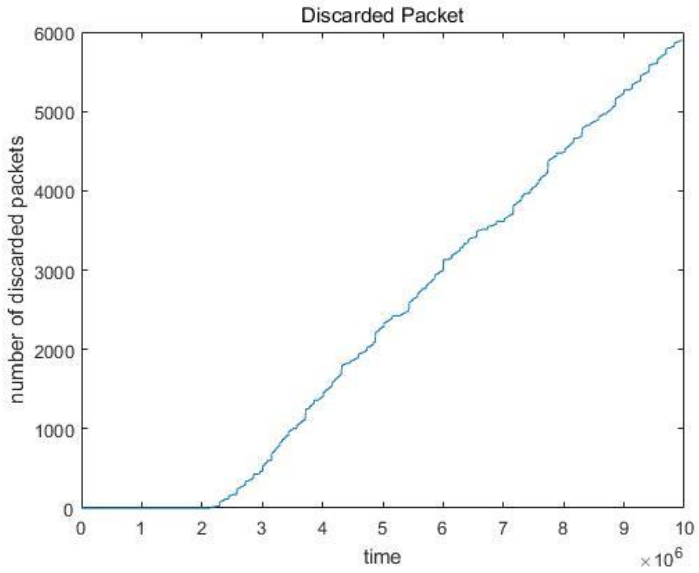
Plot7. The above graph shows the backlog of the Poisson Traffic with average rate of 1 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



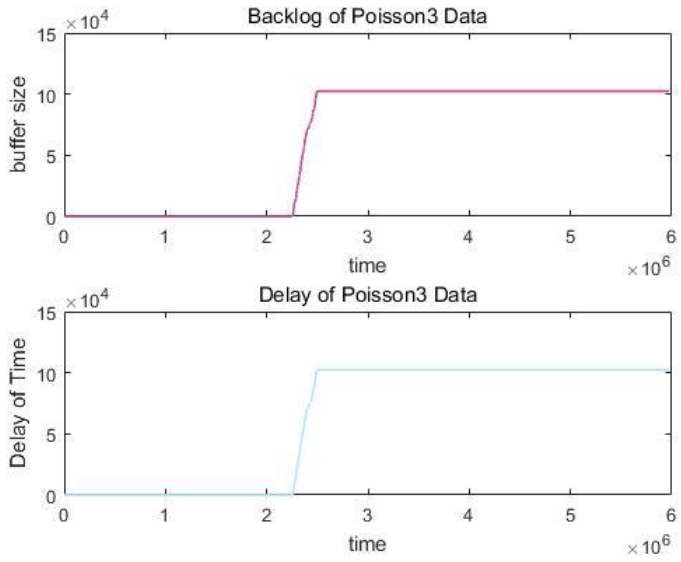
Plot8. Number of discarded packets in the Poisson Traffic with average rate of 1 Mbps



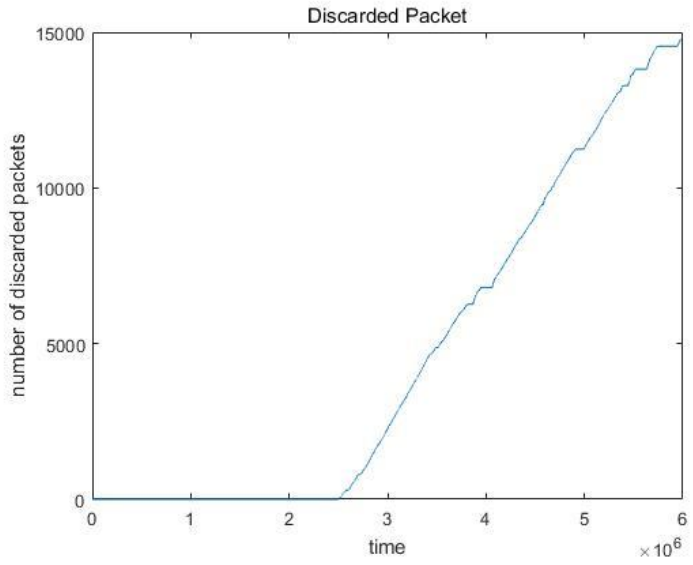
Plot9. The above graph shows the backlog of the Movie Trace Traffic with average rate of 15 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



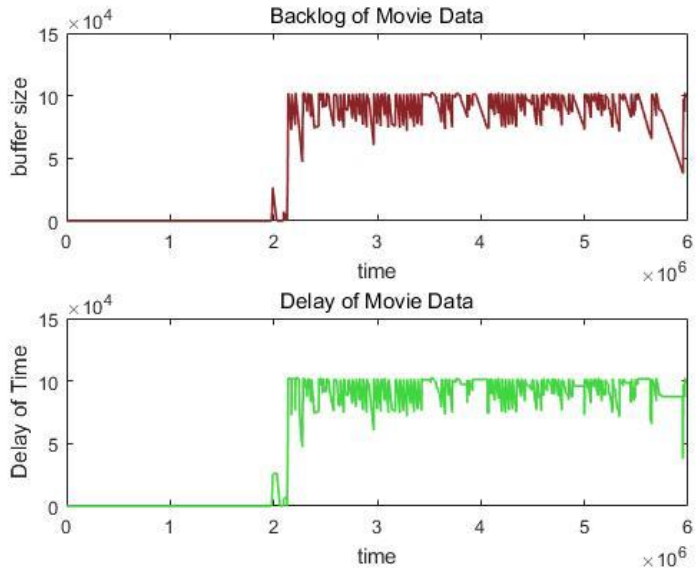
Plot10. Number of discarded packets in the Movie Trace



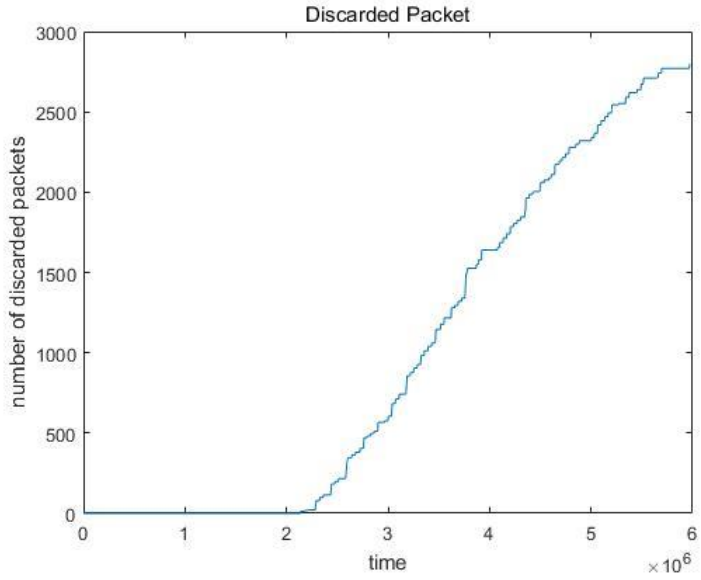
Plot11. The above graph shows the backlog of the Poisson Traffic with average rate of 5 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



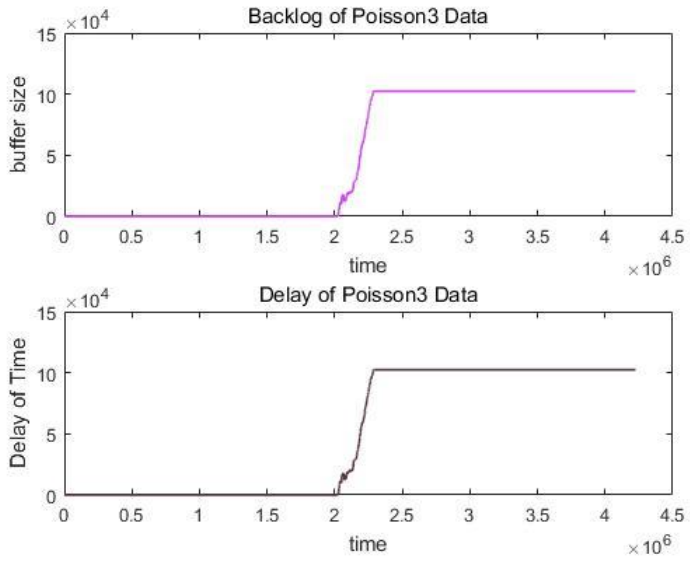
Plot12. Number of discarded packets in the Poisson Traffic with average rate of 5 Mbps



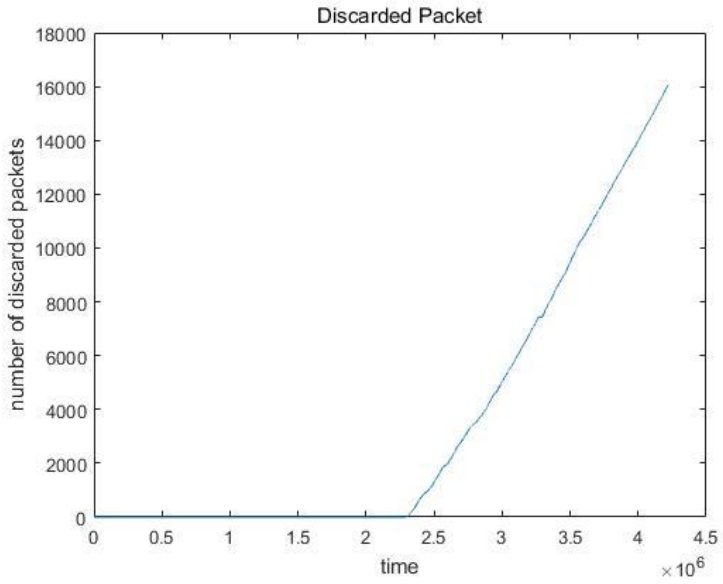
Plot13. The above graph shows the backlog of the Movie Trace Traffic with average rate of 15 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



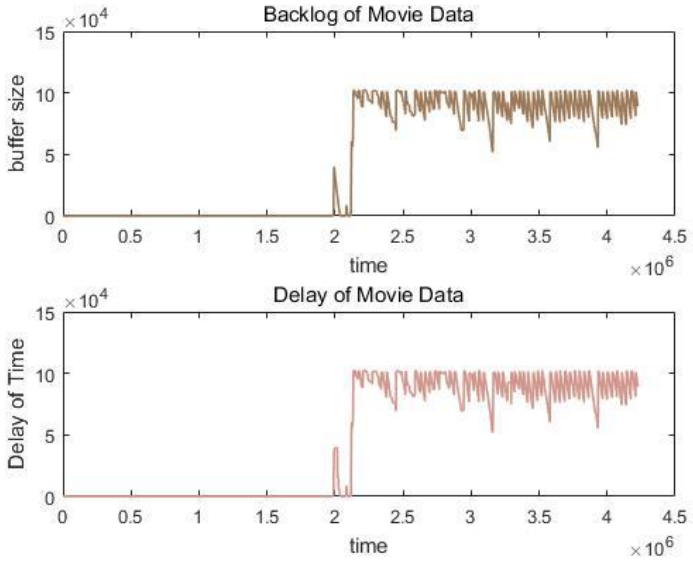
Plot14. Number of discarded packets in the Movie Trace



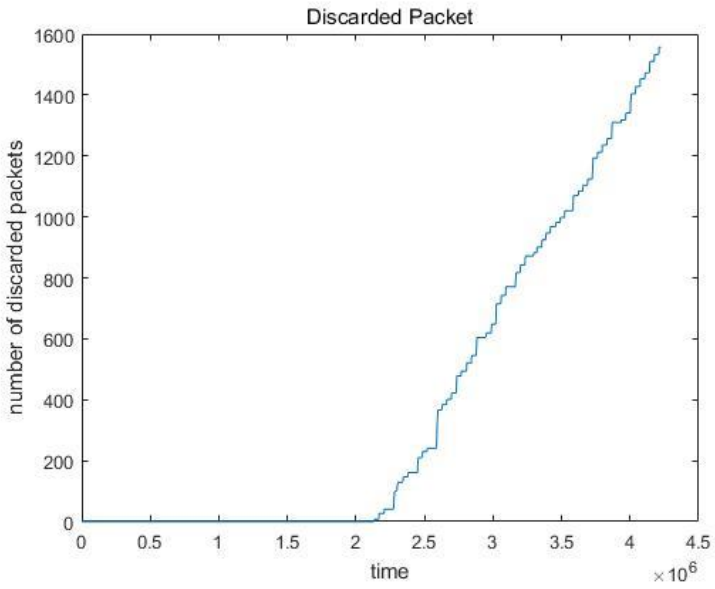
Plot15. The above graph shows the backlog of the Poisson Traffic with average rate of 9 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



Plot16. Number of discarded packets in the Poisson Traffic with average rate of 9 Mbps



Plot17. The above graph shows the backlog of the Movie Trace Traffic with average rate of 15 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time

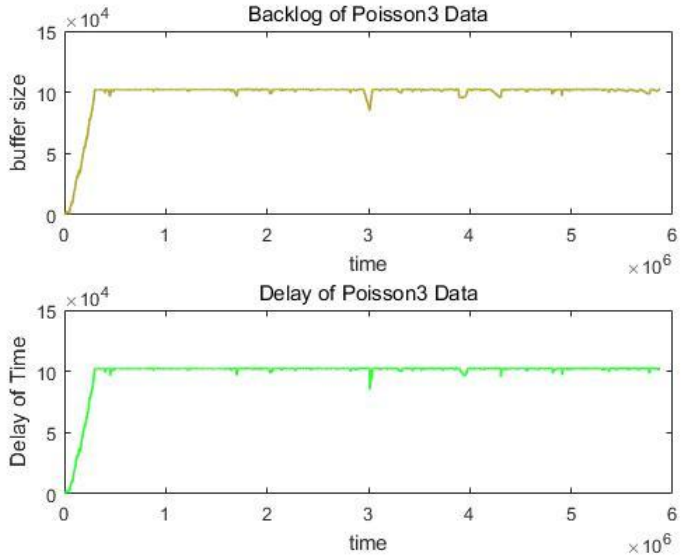


Plot18. Number of discarded packets in the Movie Trace

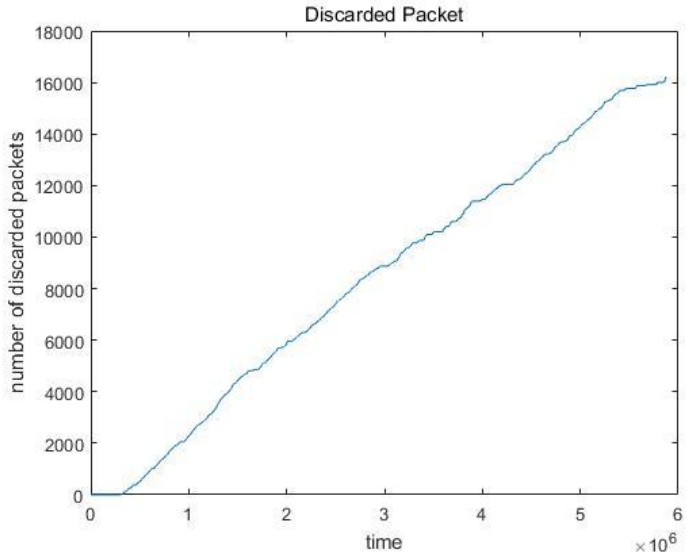
The above graphs show the scheduler with Movie Trace with higher priority and Poisson Traffic with lower priority. We can see that three sets of the graphs, with Poisson Traffic sending at the average transmission rate of N = 1Mbps, 5Mbps, 9Mbps respectively, and same rate for transmitting Movie Trace Traffic, the graphs almost have the similar trend. This is because the higher priority is with movie trace traffic. Even the Poisson traffic arrives, there always have Movie Trace traffic in the buffer, so the scheduler will always choose Movie trace traffic instead of Poisson. So even the traffic transmission rate of the Poisson traffic is different, the sending trend is similar.

Part3. Deficit Round Robin(DRR) Scheduling

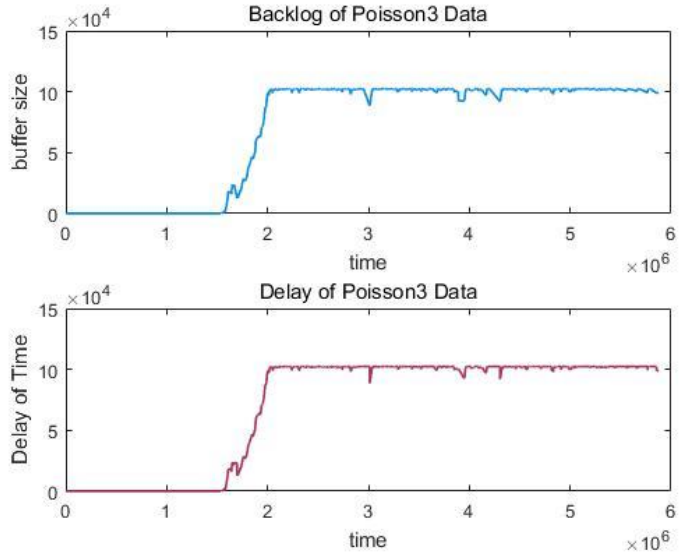
Exercise 3.2 Evaluation of a DRR scheduler: Equal Weights



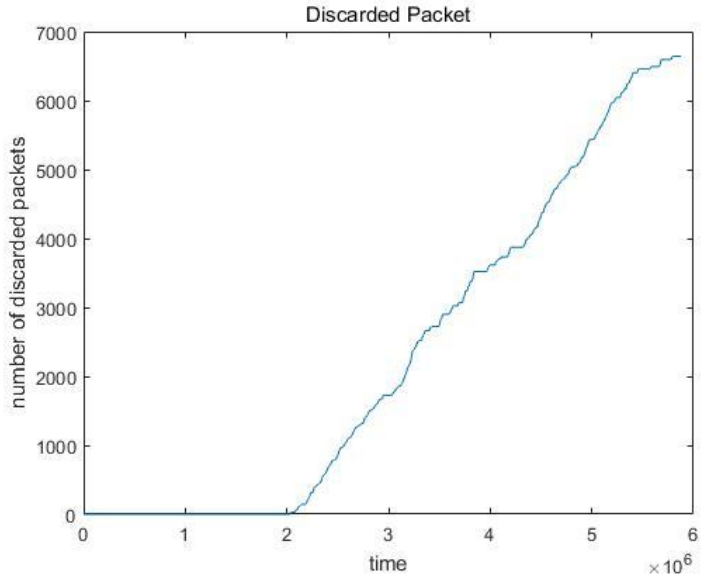
Plot19. The above graph shows the backlog of the Poisson Traffic with average rate of 8 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



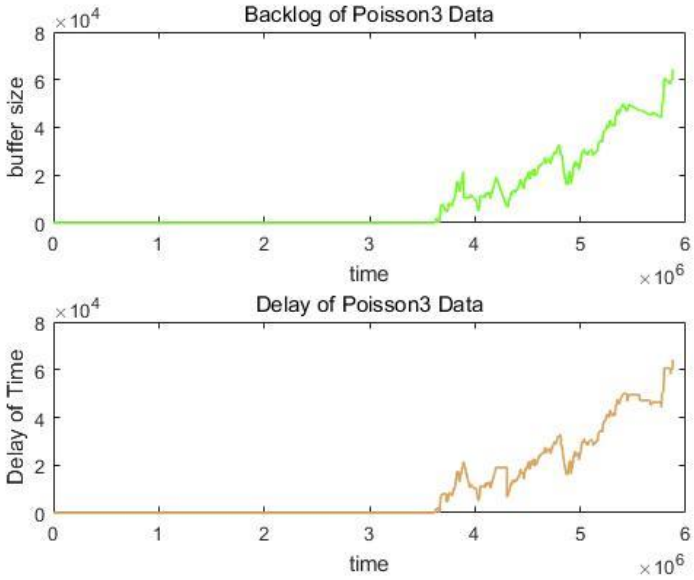
Plot20. Number of discarded packets in the Poisson Traffic with average rate of 8 Mbps



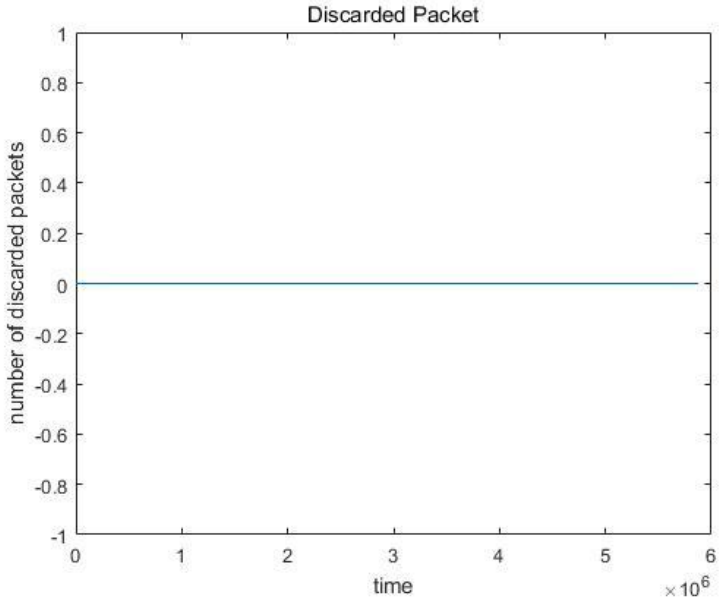
Plot21. The above graph shows the backlog of the Poisson Traffic with average rate of 6 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



Plot22. Number of discarded packets in the Poisson Traffic with average rate of 6 Mbps



Plot23. The above graph shows the backlog of the Poisson Traffic with average rate of 2 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time

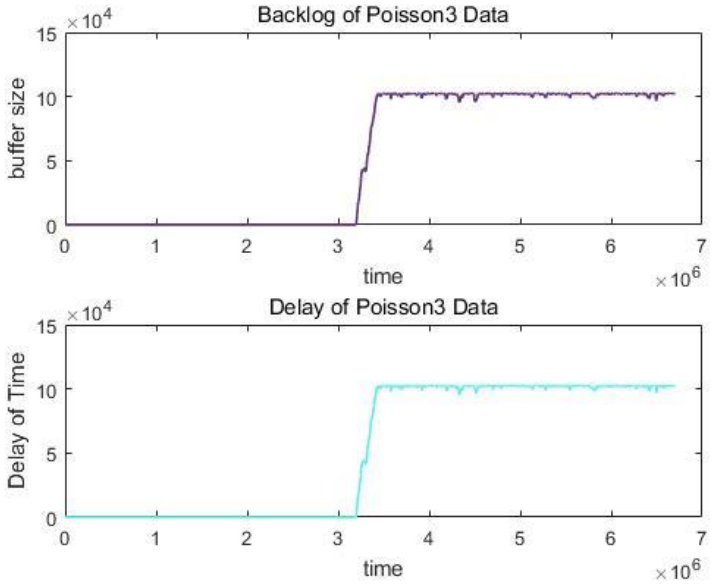


Plot24. Number of discarded packets in the Poisson Traffic with average rate of 2 Mbps

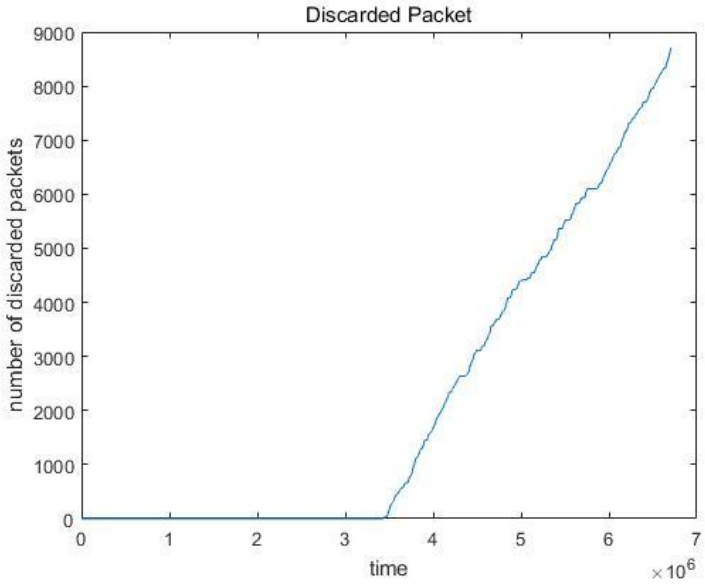
The above graphs show the three Poisson Traffic with different average transmission rate being scheduled by Deficit Round Robin Algorithm. As all three traffic has the same weight, so that three of the traffic occupy at least the same output rate C. We can see that the smaller the transmission rate, the less discard packet and less backlog in the scheduler.

Comparing with the Priority Scheduler, the packets been transmitted are fairly the same amount among three traffic generators in a given time frame. While Priority Scheduler will first consider the traffic in high priority buffer.

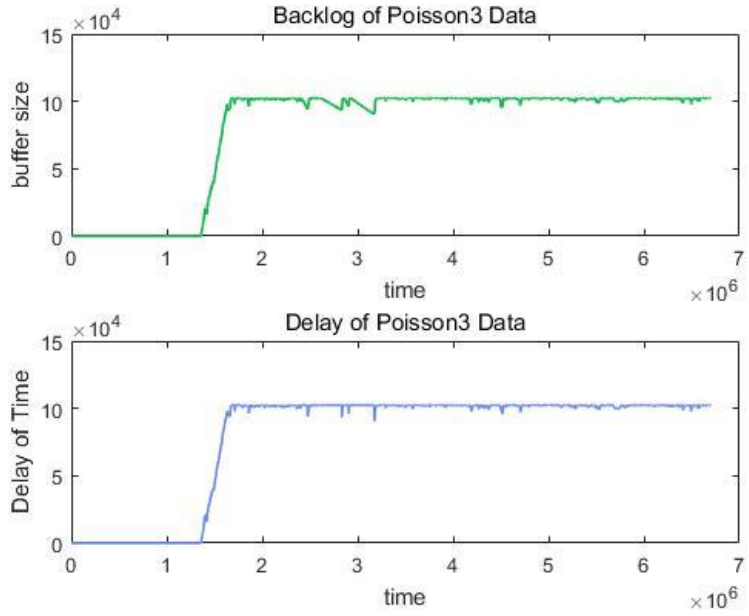
Exercise 3.3 Evaluation of a DRR scheduler: Different Weights



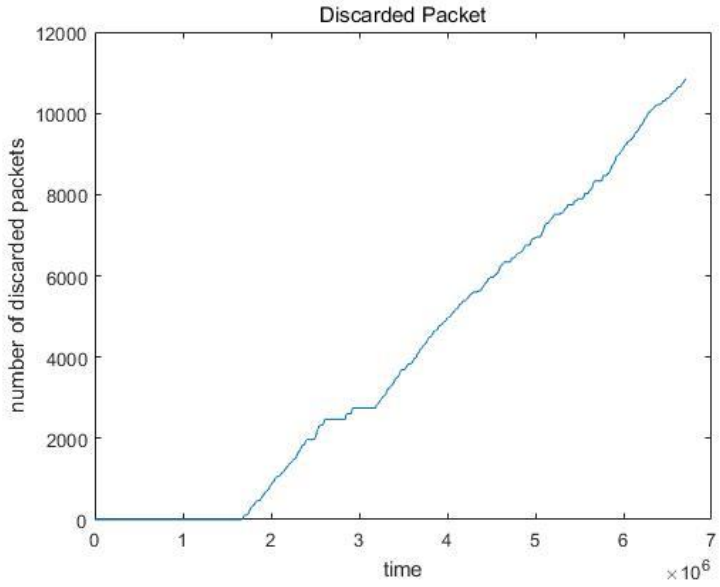
Plot25. The above graph shows the backlog of the Poisson Traffic with average rate of 8 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



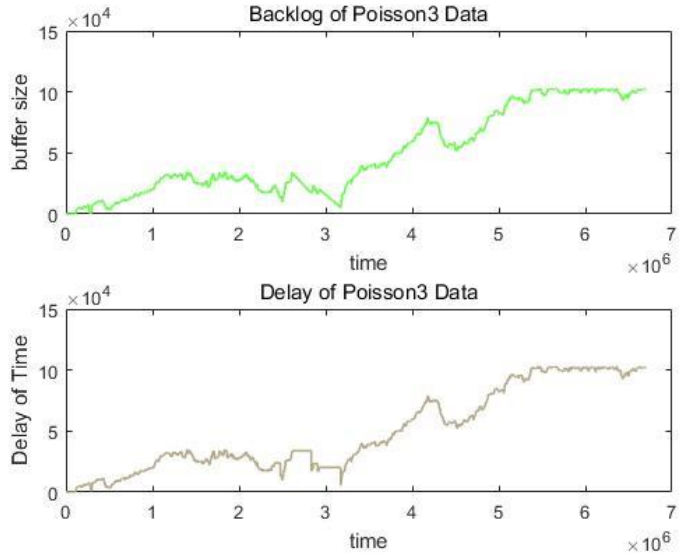
Plot26. Number of discarded packets in the Poisson Traffic with average rate of 8 Mbps



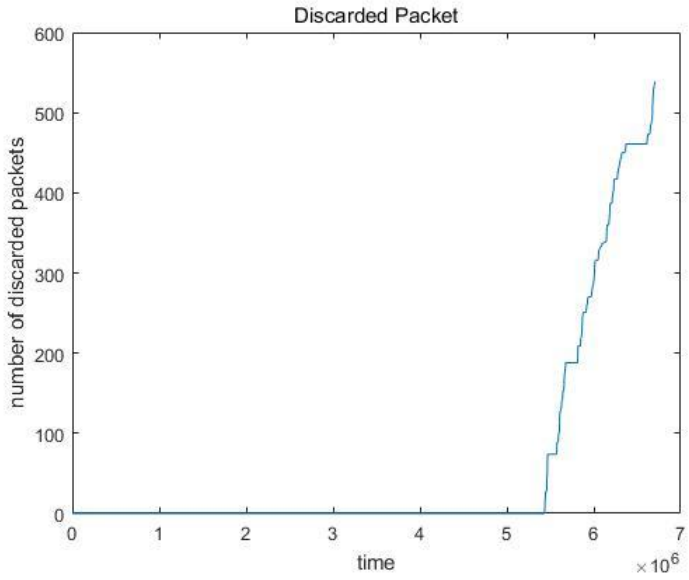
Plot27. The above graph shows the backlog of the Poisson Traffic with average rate of 6 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



Plot28. Number of discarded packets in the Poisson Traffic with average rate of 6 Mbps



Plot29. The above graph shows the backlog of the Poisson Traffic with average rate of 2 Mbps, and the bottom graph shows the delay and waiting time for the packet to transmit with respect to time



Plot30. Number of discarded packets in the Poisson Traffic with average rate of 2 Mbps

The above graphs show the three Poisson Traffic with different average transmission rate being scheduled by Deficit Round Robin Algorithm. As all three traffic has the different weight, so that the traffic with higher weight occupy more of the output rate C. This can also translate into every round, the flow with higher weight will gain more credit saves for the next round. We can see that this will change the behavior of the traffic sending from the DRR side.

Comparing with the theoretically expected values of a GPS scheduler, only the N = 2Mbps satisfied its requirement, and the other two generators have allocation less than requirement. So that there are more backlog in the scheduler.