

ASSIGNMENT 2

Files Included

main.cpp

plotGraphs.py

The network simulation is based on three objects:

Source

```
int sourceId;  
double rate;  
int bandwidth;
```

Packet

```
int packetId;  
int sourceId;  
double genTimestamp;  
double transTimestamp;  
double queueTimestamp;  
double sinkTimestamp;
```

Event

```
int eventType;  
int packetId;  
double timeStamp;
```

Simulation

The simulation runs for 1000 seconds.

Initially, all packets are generated according to poisson distribution and the given average packet generation rate of a source (λ). An event is added to the priority queue for packet generation of each packet and source time is updated.

When a packet is successfully generated, another event is created to transmit the packet from source to switch as per source's bandwidth.

When a packet reaches the switch, it is added to the queue if the queue size is infinite or if the queue has space left, otherwise it is dropped.

If the queue is empty, an event is generated to transmit the packet from queue to sink and switch time updated else the packet waits to reach the front of the queue.

In the first and second question, all sources have same average packet generation rate (λ) which is increased from given rate to rate+5 and queue size is infinite. Average delay (sink time- generation time) is calculated and average queue size is calculated.

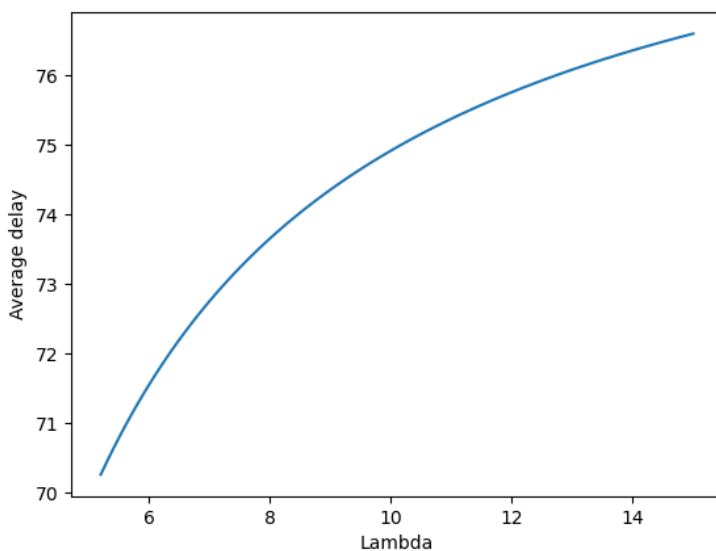
In the third experiment, all sources have unique average packet generation rate and queue size is infinite. Bandwidth is increased from given bandwidth to bandwidth+10 and the average delay for each source is calculated.

In the fourth experiment, all sources have unique average packet generation rate and queue size is limited. Bandwidth is increased from given bandwidth to bandwidth+10 and the packet drop rate for each source is calculated.

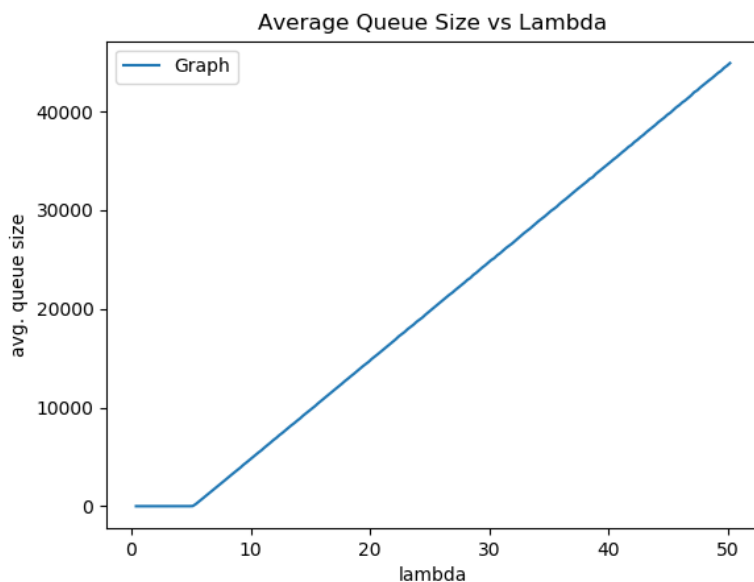
Results

```
sachan@CLOUD-DESK:~/Documents/VI Semester/CS358/Lab/Lab 2/1901CS43$ ./main
Switch queue limit: 50
Enter packet size: 10
Number of sources: 4
Enter source bandwidth: 15
Enter switch bandwidth: 50
Packet Generation Rate (lambda) for all sources: 5
Unique packet Generation Rate (lambda) for source 1: 3
Unique packet Generation Rate (lambda) for source 2: 4
Unique packet Generation Rate (lambda) for source 3: 5
Unique packet Generation Rate (lambda) for source 4: 6
```

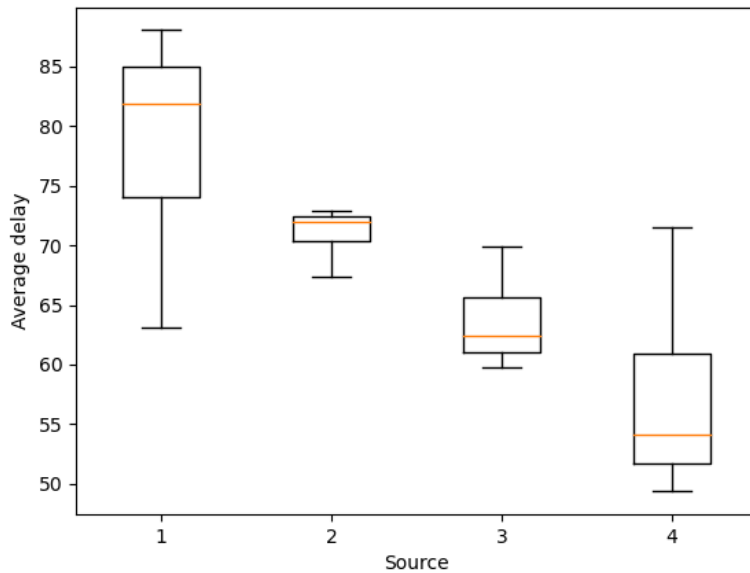
1. Assuming λ_i to be same for each source, plot the average delay for each packet with respect to λ



2. Assuming λ_i to be same for each source, plot the average queue size with respect to λ



3. Assuming unique λ_i values for each source, using a box plot show the average delay for each packet for each source.



4. Assuming unique λ_i values for each source, using a box plot show the average packet drop for each source.

