GPS and WFQ Implementation

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Abstract:Implementation of weighted fair queueing (WFQ) packet GPS multiplexer that handles packets for four different queues or customers. We will assume that the weights for the four queues are $\phi_1 = 0.1$, $\phi_2 = 0.2$, $\phi_3 = 0.3$ and $\phi_4 = 0.4$.

I. Implementation of WFQ

The following guideline is followed in the implementation of the WFQ :

- The virtual time process $V(t)$ is simulated, as if there were a GPS scheduler operating.
- When a packet arrives into the scheduler, it is marked with its virtual finish time in the GPS scheduler.
- When a packet is selected for transmission, it is transmitted completely.
- After completion of service of a packet, the next packet to be transmitted is the one that has the smallest virtual finish time among all the packets in the multiplexer. (Ties can be broken in various ways - for example, by smallest queue index if the tie is between packets of several queues).

II. Input File used for the Simulation

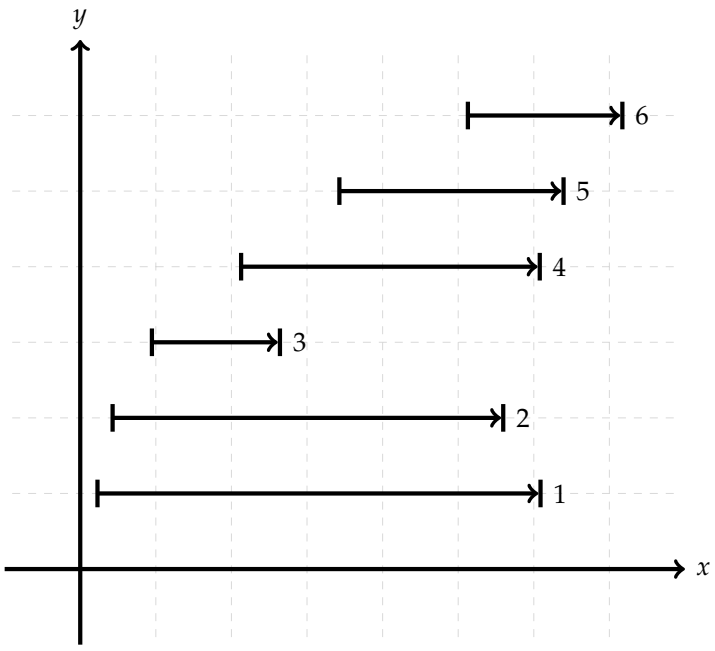
```
1;0.2;1000;1
2;0.4;1500;2
3;0.92;1000;4
4;2.1;1500;4
5;3.4;1000;3
6;5.1;1000;2
```

III. Output Obtained From the Simulation

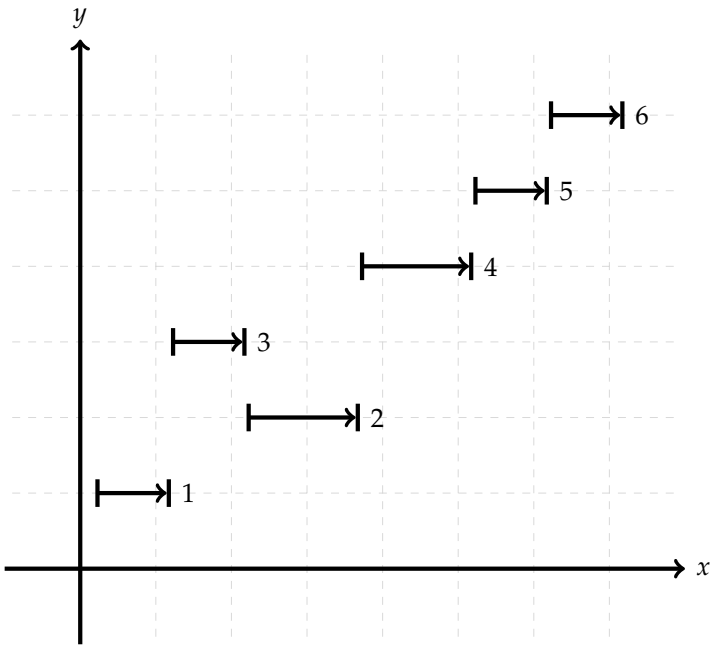
```
Output Using a GPS Scheduler
Packet Id:3      Service Start Time:0.92         Departure Time:2.67
Packet Id:2      Service Start Time:0.4          Departure Time:5.62381
Packet Id:4      Service Start Time:2.1          Departure Time:6.10714
Packet Id:1      Service Start Time:0.2          Departure Time:6.11714
Packet Id:5      Service Start Time:3.4          Departure Time:6.42191
Packet Id:6      Service Start Time:5.1          Departure Time:7.2

Output Using a WFQ Scheduler
Packet Id:1      Service Start Time:0.2          Departure Time:1.2
Packet Id:3      Service Start Time:1.2          Departure Time:2.2
Packet Id:2      Service Start Time:2.2          Departure Time:3.7
Packet Id:4      Service Start Time:3.7          Departure Time:5.2
Packet Id:5      Service Start Time:5.2          Departure Time:6.2
Packet Id:6      Service Start Time:6.2          Departure Time:7.2
```

IV. Visualization of the GPS Scheduler



V. Visualization of the WFQ Scheduler



VI. Discussion

We have the following observations from the output of the implementation of the WFQ and GPS multiplexer :

- The departure times of the last packets of the two schedulers are the same. This is something which we had expected.
- Notice that the order of departures in the two multiplexers is the same. In GPS, Packet 3 is the first one to depart and in WFQ, packet 1 is the first one to depart.