Home assignment set 4: Scheduling

September 26, 2018

Problem 1

Consider two flows sharing a link. The packet sizes are one unit, and the link can transmit one packet in one time unit. Give the scheduling under GPS and PGPS for the following cases.
a) Both of the flows generate bursty traffic, both of them generating 4-4 packets at times 0,8,16, etc. The weights of the flows are the same.
b) The same packet generation, but now the weights of the flows are 2:1. How are the packets served now? What is the effect of the weights?
c) Again, the two flows generate 4-4 packets, but now at times 0,6,12, etc. The weights are 2:1 again. What is the effect of weights now?

Problem 2

This problem aims at providing an example for the M/M/1-PS queue.

Consider a wireless access point (or base station) that shares downstream bandwidth equally among requests.The transmission rate is 10Mbit/s, and no loss happens due to the bandwidth sharing. Large file downloads are initiated randomly by a large population, the file sizes are considered to be exponential. The average file size is 1MByte. Assume, file downloads are initiated with a rate of 0.5 per second. Answer the following questions:
- How much time does it take in average to download a file, if noone else is downloading?
- Give the Markov Chain of the system.
- What is the probability that the network is empty?
- What is the mean number of concurrent downloads and time to download a file?
- Express the probability that the instantaneous rate a download receives is less than 1Mbit/s.

Problem 3

Consider the respective parts of H. Zhang, Service disciplines for guaranteed performance service in packet-switching networks, Proceedings of the IEEE, Oct. 1995. (That is, the description of the scheduling algorithms, performance summary tables 2 and 4 and related explanatory text.)
a) Compare WFQ and WF2Q considering the complexity of the scheduling decisions and the achieved performance (select performance parameters). In what scenarios is it beneficial to use WF2Q?
b) Compare Jitter-Earliest-Due-Date and Stop-and-Go, considering the complexity of the scheduling decisions. Explain the achieved delay and delay jitter limits.