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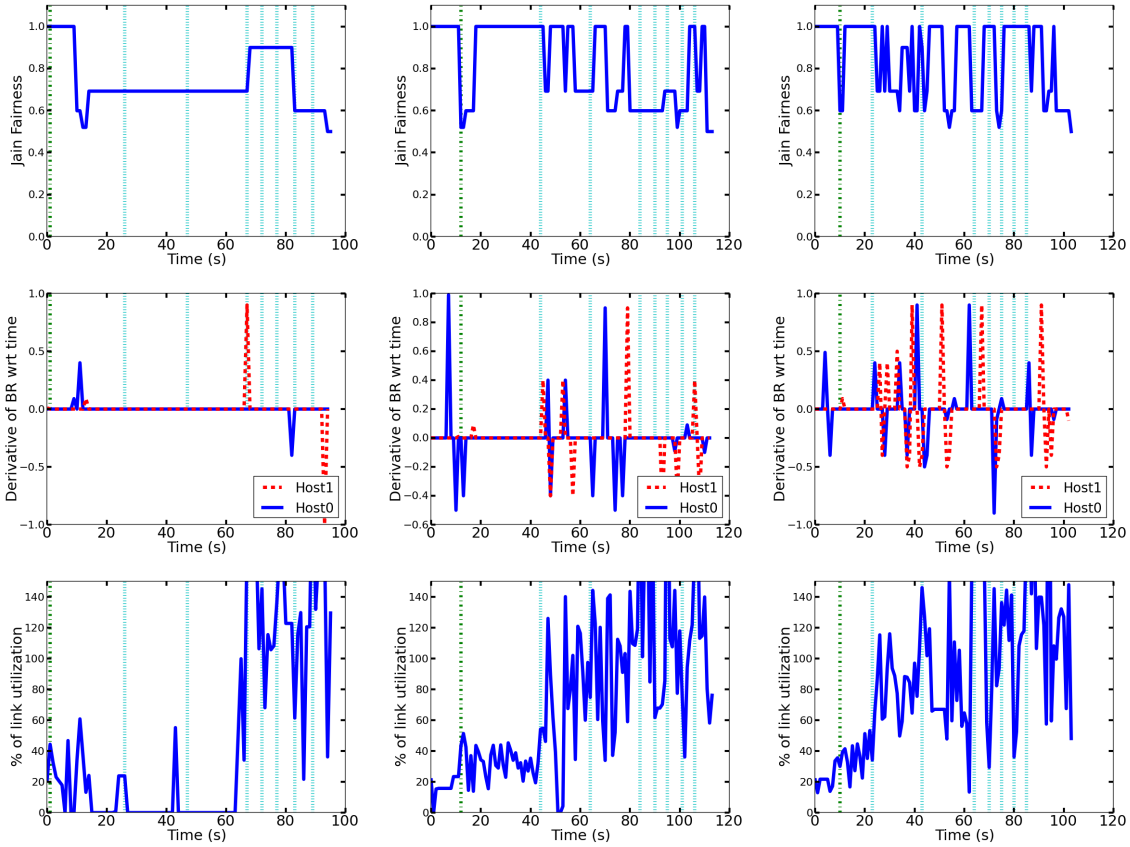
Project 3 Writeup

First column is for alpha = 0.1, second is for alpha = 0.5, and third is for alpha = 0.9:



We see that the fairness for alpha = 0.1 is fairly constant, staying mainly around 0.7. As alpha increases, the fairness fluctuates a lot more, and averages around 0.8. We would expect that at smaller values of alpha, the instantaneous throughput for each client would be close to its average throughput. Since neither client should be at a disadvantage in the long run, their average throughputs should be the same, implying their instantaneous throughputs should be about the same, and so the fairness would be good. At higher values of alpha, the instantaneous throughputs depend on shorter intervals, whose average throughputs have a wider variance, so it would seem the chance that the throughputs vary is higher, and you would expect fairness to fluctuate a lot. While our second prediction, that the fluctuation is higher with higher alpha, holds, the first prediction, that low alpha gives more fairness, does not hold very much, because the fairness stays at around 0.7. Perhaps this is at lower values of alpha it takes longer to respond to changes in throughput, so an initial difference could be harder to overcome.

For the smoothness, we see that at lower values of alpha the bit rate stays constant most of the time, while at higher values of alpha the bit rate changes more. This is of course expected because if we wait the current throughput a lot compared to the average throughput, this weighted average can change much more quickly, so the bit rate will change more often.

For the link utilization, we would expect that high values of alpha would provide more utilization, since they respond faster to changes in the link capacity. This appears to mostly be true, since the utilization for alpha = 0.1 is noticeably lower than for the two higher values of alpha. However, between alpha = 0.5 and alpha = 0.9, using alpha = 0.9 only provides a marginal advantage in the utilization. This could be because you should take a change in the instantaneous link capacity with a grain of salt: it probably doesn't mean that the link itself has fundamentally changed, so you should consider the previous average somewhat, or you might try to send too much just because the link happened to be fast a few seconds ago.