

Bus Simulation Write-Up

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For this simulation I was tasked with determining whether the bus company should invest in more buses for the route or buy larger buses for the route. I was asked to condense this simulation to two scenarios with two different collections of buses for each simulation to determine the best choice. The two simulations I have tested are at low and high intensity times. For the low intensity, I let the average inter-arrival rate equal 1 passenger arriving every 4 minutes. This means our load variable would be equal to 240. For the high intensity situation, I set the rate equal to 2 passengers every minute. This means our load variable would be equal to 30.

For the low intensity situation, I tested and found with 4 normal buses the simulation runs at approximately equilibrium as the stats tend to stay relatively constant. Therefore, I decided to test the simulation with 4 normal buses compared to just 3 extended buses. I provided the 2 most important statistics the bus company wanted in the Data table at the bottom, but also reviewed other statistics such as the average wait time, average ride time, and maximum queue length. In the case with normal buses the simulation produced passenger miles per gallon(PMPG) of 44, while for the extended buses this was just 39. Likewise, the situation with normal buses produced an average travel time of 1150 seconds or about 19 minutes, while for the extended buses this was 1250 seconds or about 21 minutes. Since the bus company obviously wants to maximize PMPG and minimize the average travel time, it appears in the situations with lower passenger intensity the bus company is better off adding more normal buses, rather than switching to extended buses.

Now for the high intensity situation, I tested and found with 8 normal buses the simulation runs at approximately equilibrium as the stats tend to stay relatively

constant. Therefore, I decided to test the simulation with 8 normal buses compared to just 7 extended buses. Similarly, I provided the 2 most important statistics the bus company wanted in the Data table at the bottom, but also reviewed other statistics such as the average wait time, average ride time, and maximum queue length. In the case with normal buses the simulation produced passenger miles per gallon(PMPG) of 169, while for the extended buses this was just 155. Likewise, the situation with normal buses produced an average travel time of 1322 seconds or about 22 minutes, while for the extended buses this was 1240 seconds or about 21 minutes. Since the bus company obviously wants to maximize PMPG and minimize the average travel time, it appears in the situations with higher passenger intensity the bus company might be better off with extended buses compared to adding more normal buses.

In conclusion, the decision this simulation makes really depends on how often the passenger intensity is low or high. With more knowledge of aspects like real passenger intensities throughout the day, or how much the bus company values PMPG compared to average travel time, and more time to analyze all the statistics, this simulation could provide a more accurate model and give a better conclusion on what actions the bus company should take. However, with the provided knowledge this simulation concludes that at lower intensity times the bus company should use more normal buses, but use extended buses at higher intensity situations.

Data

	Low Intensity (Load = 240)	
	PMPG Average	Average Travel Time
4 Normal Buses	44	1150
3 Extended Buses	39	1250

	High Intensity (Load = 30)	
	PMPG Average	Average Travel Time
8 Normal Buses	169	1322
7 Extended Buses	155	1240