CSC 212 – Data Structures Spring 2017

Programming Project 2

Due no later than midnight 03.24.17

Printer Simulation

For this project, you are to modify the printer simulation implemented in PrinterSimulation.py (part of queues.zip posted on the course site under Source Code) to make it possible to investigate how adding another printer to the lab would affect wait times. Given a configuration with two printers, if one printer is busy and a print task is submitted to a empty queue, the task is dispatched to the idle printer. If both printers are busy, the task is enqueued to a common queue until a printer frees up. If both printers are free when a task is submitted, the task is assigned to the printer with the higher page rate. Note that the simulation should still allow the user to specify a configuration with 1 printer. Also, assumptions about how frequently print tasks are submitted should remain unchanged.

The modified simulation should also make it possible for the user to specify the minimum and maximum size of a print task (In the code provided, the range is 1-20). As before, the size of the print task is a random integer that falls within the specified range.

The simulation configurations should be specified in an input file sim_config.txt that the program reads. The program should not prompt the user for any input. The input file should contain the following values in the exact order specified, one per line:

- Duration of simulation in seconds (valid range is 3600-36000).
- Number of simulation experiments (valid range is 1-100. In the existing program, this value is set to 10).
- Minimum task size (must be in range 1-100)
- Maximum task size (must be in range 1-100 and >= minimum)
- Number of printers (must be 1 or 2)
- Page rate of printer 1 (must be in the range 1-50)
- Page rate of printer 2 (if number of printers is 1, this value would not be specified)

The input file contains 6 or 7 integers, depending on whether 1 or 2 printers were specified.

Your program must implement input validation (Using exception handling and conditional statements as appropriate) to detect format error and out of range errors. Appropriate error messages should be output to the terminal, after which point the program should terminate.

The program should output to a file named sim_out.txt the average wait time for each experiment along with the length of the queue when the simulation terminated, and finally the overall average wait time for all experiments. To help you test your program, you provided with 5 sample runs of the solution with different input files (see below). Run your program with the same inputs. The results you obtain should come very close from the ones shown in the table.

Make sure your code is readable and well commented, especially code you've modified or added.

Submission Instructions

Save your beautifully commented and readable code in a file named project2.py. In a comment block at the beginning of the program, include your name and the state of the implementation. Upload to your shared Google folder no later than **midnight on Friday 03.24.17**.

Contents of sim_config.txt	Output from simulation program
36000 10 1 40 1 15	Average Wait 47.11 secs 0 tasks remaining. Average Wait 34.06 secs 0 tasks remaining. Average Wait 45.15 secs 0 tasks remaining. Average Wait 44.81 secs 1 tasks remaining. Average Wait 36.89 secs 0 tasks remaining. Average Wait 46.70 secs 0 tasks remaining. Average Wait 47.14 secs 0 tasks remaining. Average Wait 41.17 secs 1 tasks remaining. Average Wait 30.52 secs 0 tasks remaining. Average Wait 37.76 secs 0 tasks remaining. Overall average wait time: 41.13 secs
36000 10 1 40 2 10 5	Average Wait 23.35 secs 0 tasks remaining. Average Wait 81.12 secs 0 tasks remaining. Average Wait 29.10 secs 0 tasks remaining. Average Wait 24.21 secs 0 tasks remaining. Average Wait 21.19 secs 0 tasks remaining. Average Wait 20.78 secs 2 tasks remaining. Average Wait 15.81 secs 0 tasks remaining. Average Wait 39.79 secs 0 tasks remaining. Average Wait 20.95 secs 0 tasks remaining. Average Wait 12.19 secs 0 tasks remaining. Overall average wait time: 28.85 secs
36000 10 1 40 2 10 10	Average Wait 4.88 secs 0 tasks remaining. Average Wait 8.17 secs 0 tasks remaining. Average Wait 10.11 secs 0 tasks remaining. Average Wait 12.59 secs 0 tasks remaining. Average Wait 10.98 secs 0 tasks remaining. Average Wait 9.70 secs 0 tasks remaining. Average Wait 19.61 secs 0 tasks remaining. Average Wait 3.53 secs 0 tasks remaining. Average Wait 16.31 secs 0 tasks remaining. Average Wait 12.08 secs 0 tasks remaining. Overall average wait time: 10.80 secs
36000 10 1.5 40 2 10 10	Format error: minimum task size. Exiting.
36000 10 1 40 3 10 10	Invalid number of printers. Exiting.