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Final Lab

Operating Systems

University of the Pacific

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Design:

I used python 3.5 to write the project. To run:

> python SanDiegoZoo.py

The program error checks for faulty file names and won't progress until a valid file name is provided. Once a valid file is provided, the program reads in the test to meaningful variables by parsing out the commas and endlines, then indexing the values into the number of visitors, cars, pumps, and the time interval. Next, a conditional is set to handle any lines starting with zeros, which causes the program to skip the entire round. Arguments, pumps, cars, and the pump line are initialized with default values, then threads are created, started, and joined, which controls the flow of the entire program.

My visitor thread process serves as the routine for which the VisitorThread object is created. It starts car rides, displays remaining fuel in each vehicle, and displays the number of remaining visitors.

My car thread determines whether a car has enough fuel for another ride, and pushes cars into a waiting queue for refuelling once they run out of fuel.

My gas station thread refuels cars, prints the remaining percentage of fuel in the gas station, and has a fuel truck fill up the gas station anywhere between 50% and 0% fuel remaining.

I use the lock.acquire() and lock.release() python semaphores to protect all critical sections within each of the threads.

Notable changes to prompt: The project specifications state that the max visitors should not be more than 100, yet the gas station cannot call a truck before at least 150 cars have been fueled. Even with 100 visitors, 1 pump, and 1 car, the truck would never be called and the station would never run out of fuel. In my program, I made the gas station refuel between every 5 and 10 uses of a pump, so I could trigger a condition in which the truck would be summoned. My program unfortunately does not account for visitors wandering about for a while prior to waiting for a ride. Due to time constraints, I just made them automatically enter a waiting state, and they enter the vehicles one at a time, until they are all served.

When running my program, you can expect all conditions of input to lead to a safe finish. The program will handle any combination of visitors, cars, pumps, and times without crashing, and produces useful output.

Note: Program logic was demoed to instructor on Thursday, December 3rd 2015

input.txt:

35,6,5,2

19,4,10,3

0,0,0,0

100,10,3,5

output:

C:\Users\Tanti\AppData\Local\Programs\Python\Python35-32\python.exe C:/Users/Tanti/PycharmProjects/Final\_Lab/SanDiegoZoo.py

Enter the name of the text file to use as input, including the .txt:

input.txt

Round Number: 1

Number of Visitors: 35

Number of Cars: 6

Number of Pumps: 5

Units of Time: 2

Visitor 1 boarded car 1

Car 1 Fuel: 100%

34 customers are waiting for a ride.

Visitor 2 boarded car 2

Car 2 Fuel: 100%

33 customers are waiting for a ride.

Visitor 3 boarded car 3

Car 3 Fuel: 100%

32 customers are waiting for a ride.

Visitor 4 boarded car 4

Car 4 Fuel: 100%

31 customers are waiting for a ride.

Visitor 5 boarded car 5

Car 5 Fuel: 100%

30 customers are waiting for a ride.

Visitor 6 boarded car 6

Car 6 Fuel: 100%

29 customers are waiting for a ride.

Visitor 7 boarded car 1

Car 1 Fuel: 80%

28 customers are waiting for a ride.

Visitor 8 boarded car 2

Car 2 Fuel: 80%

27 customers are waiting for a ride.

Visitor 9 boarded car 3

Car 3 Fuel: 80%

26 customers are waiting for a ride.

Visitor 10 boarded car 4

Car 4 Fuel: 80%

25 customers are waiting for a ride.

Visitor 11 boarded car 6

Car 6 Fuel: 80%

24 customers are waiting for a ride.

Visitor 12 boarded car 1

Car 1 Fuel: 60%

23 customers are waiting for a ride.

Visitor 13 boarded car 2

Car 2 Fuel: 60%

22 customers are waiting for a ride.

Visitor 14 boarded car 2

Car 2 Fuel: 40%

21 customers are waiting for a ride.

Visitor 15 boarded car 1

Car 1 Fuel: 40%

20 customers are waiting for a ride.

Visitor 16 boarded car 3

Car 3 Fuel: 60%

19 customers are waiting for a ride.

Visitor 17 boarded car 4

Car 4 Fuel: 60%

18 customers are waiting for a ride.

Visitor 18 boarded car 5

Car 5 Fuel: 80%

17 customers are waiting for a ride.

Visitor 19 boarded car 6

Car 6 Fuel: 60%

16 customers are waiting for a ride.

Visitor 20 boarded car 5

Car 5 Fuel: 60%

15 customers are waiting for a ride.

Visitor 21 boarded car 1

Car 1 Fuel: 20%

14 customers are waiting for a ride.

Visitor 22 boarded car 2

Car 2 Fuel: 20%

13 customers are waiting for a ride.

Visitor 23 boarded car 3

Car 3 Fuel: 40%

12 customers are waiting for a ride.

Visitor 24 boarded car 4

Car 4 Fuel: 40%

11 customers are waiting for a ride.

Visitor 25 boarded car 6

Car 6 Fuel: 40%

10 customers are waiting for a ride.

Visitor 26 boarded car 5

Car 5 Fuel: 40%

9 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Visitor 27 boarded car 4

Car 4 Fuel: 20%

8 customers are waiting for a ride.

Visitor 28 boarded car 3

Car 3 Fuel: 20%

7 customers are waiting for a ride.

Visitor 29 boarded car 6

Car 6 Fuel: 20%

6 customers are waiting for a ride.

Car 1 is getting fuel from pump 5

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Visitor 30 boarded car 5

Car 5 Fuel: 20%

5 customers are waiting for a ride.

Car 2 is getting fuel from pump 1

0 cars are waiting for a gas pump

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

3 cars are waiting for a gas pump

Car 3 is getting fuel from pump 2

2 cars are waiting for a gas pump

Car 4 is getting fuel from pump 3

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 5 is getting fuel from pump 4

0 cars are waiting for a gas pump

Car 1 has been refueled by pump 5

Gas station fuel: 90%

Car 2 has been refueled by pump 1

Gas station fuel: 80%

Car 3 has been refueled by pump 2

Gas station fuel: 70%

Car 4 has been refueled by pump 3

Gas station fuel: 60%

Car 5 has been refueled by pump 4

Gas station fuel: 50%

Visitor 31 boarded car 5

Car 5 Fuel: 100%

4 customers are waiting for a ride.

Visitor 32 boarded car 1

Car 1 Fuel: 100%

3 customers are waiting for a ride.

Visitor 33 boarded car 2

Car 2 Fuel: 100%

2 customers are waiting for a ride.

Visitor 34 boarded car 3

Car 3 Fuel: 100%

1 customers are waiting for a ride.

Visitor 35 boarded car 4

Car 4 Fuel: 100%

0 customers are waiting for a ride.

All visitors have taken a tour, searching for a new round...

Round Number: 2

Number of Visitors: 19

Number of Cars: 4

Number of Pumps: 10

Units of Time: 3

Visitor 1 boarded car 1

Car 1 Fuel: 100%

18 customers are waiting for a ride.

Visitor 2 boarded car 2

Car 2 Fuel: 100%

17 customers are waiting for a ride.

Visitor 3 boarded car 3

Car 3 Fuel: 100%

16 customers are waiting for a ride.

Visitor 4 boarded car 4

Car 4 Fuel: 100%

15 customers are waiting for a ride.

Visitor 5 boarded car 4

Car 4 Fuel: 80%

14 customers are waiting for a ride.

Visitor 6 boarded car 1

Car 1 Fuel: 80%

13 customers are waiting for a ride.

Visitor 7 boarded car 2

Car 2 Fuel: 80%

12 customers are waiting for a ride.

Visitor 8 boarded car 3

Car 3 Fuel: 80%

11 customers are waiting for a ride.

Visitor 9 boarded car 2

Car 2 Fuel: 60%

10 customers are waiting for a ride.

Visitor 10 boarded car 1

Car 1 Fuel: 60%

9 customers are waiting for a ride.

Visitor 11 boarded car 3

Car 3 Fuel: 60%

8 customers are waiting for a ride.

Visitor 12 boarded car 4

Car 4 Fuel: 60%

7 customers are waiting for a ride.

Visitor 13 boarded car 1

Car 1 Fuel: 40%

6 customers are waiting for a ride.

Visitor 14 boarded car 2

Car 2 Fuel: 40%

5 customers are waiting for a ride.

Visitor 15 boarded car 3

Car 3 Fuel: 40%

4 customers are waiting for a ride.

Visitor 16 boarded car 4

Car 4 Fuel: 40%

3 customers are waiting for a ride.

Visitor 17 boarded car 3

Car 3 Fuel: 20%

2 customers are waiting for a ride.

Visitor 18 boarded car 1

Car 1 Fuel: 20%

1 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Car 1 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 2 is getting fuel from pump 2

0 cars are waiting for a gas pump

Visitor 19 boarded car 2

Car 2 Fuel: 20%

0 customers are waiting for a ride.

Car 1 has been refueled by pump 1

Gas station fuel: 90%

Car 2 has been refueled by pump 2

Gas station fuel: 80%

All visitors have taken a tour, searching for a new round...

Round Number: 3

No data to read in this round, continuing to next round:

Round Number: 4

Number of Visitors: 100

Number of Cars: 10

Number of Pumps: 3

Units of Time: 5

Visitor 1 boarded car 1

Car 1 Fuel: 100%

99 customers are waiting for a ride.

Visitor 2 boarded car 2

Car 2 Fuel: 100%

98 customers are waiting for a ride.

Visitor 3 boarded car 3

Car 3 Fuel: 100%

97 customers are waiting for a ride.

Visitor 4 boarded car 4

Car 4 Fuel: 100%

96 customers are waiting for a ride.

Visitor 5 boarded car 5

Car 5 Fuel: 100%

95 customers are waiting for a ride.

Visitor 6 boarded car 6

Car 6 Fuel: 100%

94 customers are waiting for a ride.

Visitor 7 boarded car 7

Car 7 Fuel: 100%

93 customers are waiting for a ride.

Visitor 8 boarded car 8

Car 8 Fuel: 100%

92 customers are waiting for a ride.

Visitor 9 boarded car 9

Car 9 Fuel: 100%

91 customers are waiting for a ride.

Visitor 10 boarded car 10

Car 10 Fuel: 100%

90 customers are waiting for a ride.

Visitor 11 boarded car 1

Car 1 Fuel: 80%

89 customers are waiting for a ride.

Visitor 12 boarded car 2

Car 2 Fuel: 80%

88 customers are waiting for a ride.

Visitor 13 boarded car 3

Car 3 Fuel: 80%

87 customers are waiting for a ride.

Visitor 14 boarded car 4

Car 4 Fuel: 80%

86 customers are waiting for a ride.

Visitor 15 boarded car 5

Car 5 Fuel: 80%

85 customers are waiting for a ride.

Visitor 16 boarded car 6

Car 6 Fuel: 80%

84 customers are waiting for a ride.

Visitor 17 boarded car 7

Car 7 Fuel: 80%

83 customers are waiting for a ride.

Visitor 18 boarded car 8

Car 8 Fuel: 80%

82 customers are waiting for a ride.

Visitor 19 boarded car 9

Car 9 Fuel: 80%

81 customers are waiting for a ride.

Visitor 20 boarded car 10

Car 10 Fuel: 80%

80 customers are waiting for a ride.

Visitor 21 boarded car 1

Car 1 Fuel: 60%

79 customers are waiting for a ride.

Visitor 22 boarded car 2

Car 2 Fuel: 60%

78 customers are waiting for a ride.

Visitor 23 boarded car 3

Car 3 Fuel: 60%

77 customers are waiting for a ride.

Visitor 24 boarded car 4

Car 4 Fuel: 60%

76 customers are waiting for a ride.

Visitor 25 boarded car 5

Car 5 Fuel: 60%

75 customers are waiting for a ride.

Visitor 26 boarded car 6

Car 6 Fuel: 60%

74 customers are waiting for a ride.

Visitor 27 boarded car 7

Car 7 Fuel: 60%

73 customers are waiting for a ride.

Visitor 28 boarded car 8

Car 8 Fuel: 60%

72 customers are waiting for a ride.

Visitor 29 boarded car 1

Car 1 Fuel: 40%

71 customers are waiting for a ride.

Visitor 30 boarded car 9

Car 9 Fuel: 60%

70 customers are waiting for a ride.

Visitor 31 boarded car 10

Car 10 Fuel: 60%

69 customers are waiting for a ride.

Visitor 32 boarded car 2

Car 2 Fuel: 40%

68 customers are waiting for a ride.

Visitor 33 boarded car 3

Car 3 Fuel: 40%

67 customers are waiting for a ride.

Visitor 34 boarded car 4

Car 4 Fuel: 40%

66 customers are waiting for a ride.

Visitor 35 boarded car 5

Car 5 Fuel: 40%

65 customers are waiting for a ride.

Visitor 36 boarded car 1

Car 1 Fuel: 20%

64 customers are waiting for a ride.

Visitor 37 boarded car 6

Car 6 Fuel: 40%

63 customers are waiting for a ride.

Visitor 38 boarded car 7

Car 7 Fuel: 40%

62 customers are waiting for a ride.

Visitor 39 boarded car 8

Car 8 Fuel: 40%

61 customers are waiting for a ride.

Visitor 40 boarded car 2

Car 2 Fuel: 20%

60 customers are waiting for a ride.

Visitor 41 boarded car 3

Car 3 Fuel: 20%

59 customers are waiting for a ride.

Visitor 42 boarded car 9

Car 9 Fuel: 40%

58 customers are waiting for a ride.

Visitor 43 boarded car 10

Car 10 Fuel: 40%

57 customers are waiting for a ride.

Visitor 44 boarded car 4

Car 4 Fuel: 20%

56 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 1 is getting fuel from pump 1

0 cars are waiting for a gas pump

Car 1 has been refueled by pump 1

Gas station fuel: 90%

Visitor 45 boarded car 1

Car 1 Fuel: 100%

55 customers are waiting for a ride.

Visitor 46 boarded car 5

Car 5 Fuel: 20%

54 customers are waiting for a ride.

Visitor 47 boarded car 6

Car 6 Fuel: 20%

53 customers are waiting for a ride.

Visitor 48 boarded car 7

Car 7 Fuel: 20%

52 customers are waiting for a ride.

Visitor 49 boarded car 8

Car 8 Fuel: 20%

51 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Car 2 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 3 is getting fuel from pump 2

0 cars are waiting for a gas pump

Visitor 50 boarded car 9

Car 9 Fuel: 20%

50 customers are waiting for a ride.

Car 2 has been refueled by pump 1

Gas station fuel: 80%

Car 3 has been refueled by pump 2

Gas station fuel: 70%

Visitor 51 boarded car 3

Car 3 Fuel: 100%

49 customers are waiting for a ride.

Visitor 52 boarded car 2

Car 2 Fuel: 100%

48 customers are waiting for a ride.

Visitor 53 boarded car 10

Car 10 Fuel: 20%

47 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 4 is getting fuel from pump 3

0 cars are waiting for a gas pump

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

3 cars are waiting for a gas pump

Car 4 has been refueled by pump 3

Gas station fuel: 60%

Car 5 is getting fuel from pump 3

2 cars are waiting for a gas pump

Car 6 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 7 is getting fuel from pump 2

0 cars are waiting for a gas pump

Visitor 54 boarded car 4

Car 4 Fuel: 100%

46 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 5 has been refueled by pump 3

Gas station fuel: 50%

Car 8 is getting fuel from pump 3

0 cars are waiting for a gas pump

Car 6 has been refueled by pump 1

Gas station fuel: 40%

Car 7 has been refueled by pump 2

Gas station fuel: 30%

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Car 9 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 10 is getting fuel from pump 2

0 cars are waiting for a gas pump

Visitor 55 boarded car 1

Car 1 Fuel: 80%

45 customers are waiting for a ride.

Visitor 56 boarded car 2

Car 2 Fuel: 80%

44 customers are waiting for a ride.

Visitor 57 boarded car 3

Car 3 Fuel: 80%

43 customers are waiting for a ride.

Visitor 58 boarded car 4

Car 4 Fuel: 80%

42 customers are waiting for a ride.

Car 8 has been refueled by pump 3

Gas station fuel: 20%

Visitor 59 boarded car 5

Car 5 Fuel: 100%

41 customers are waiting for a ride.

Visitor 60 boarded car 6

Car 6 Fuel: 100%

40 customers are waiting for a ride.

Visitor 61 boarded car 7

Car 7 Fuel: 100%

39 customers are waiting for a ride.

Visitor 62 boarded car 8

Car 8 Fuel: 100%

38 customers are waiting for a ride.

Car 9 has been refueled by pump 1

Gas station fuel: 10%

Car 10 has been refueled by pump 2

Gas station fuel: 0%

Visitor 63 boarded car 10

Car 10 Fuel: 100%

37 customers are waiting for a ride.

Visitor 64 boarded car 9

Car 9 Fuel: 100%

36 customers are waiting for a ride.

Visitor 65 boarded car 1

Car 1 Fuel: 60%

35 customers are waiting for a ride.

Visitor 66 boarded car 2

Car 2 Fuel: 60%

34 customers are waiting for a ride.

Visitor 67 boarded car 3

Car 3 Fuel: 60%

33 customers are waiting for a ride.

Visitor 68 boarded car 4

Car 4 Fuel: 60%

32 customers are waiting for a ride.

Visitor 69 boarded car 5

Car 5 Fuel: 80%

31 customers are waiting for a ride.

Visitor 70 boarded car 6

Car 6 Fuel: 80%

30 customers are waiting for a ride.

Visitor 71 boarded car 7

Car 7 Fuel: 80%

29 customers are waiting for a ride.

Visitor 72 boarded car 8

Car 8 Fuel: 80%

28 customers are waiting for a ride.

Visitor 73 boarded car 2

Car 2 Fuel: 40%

27 customers are waiting for a ride.

Visitor 74 boarded car 1

Car 1 Fuel: 40%

26 customers are waiting for a ride.

Visitor 75 boarded car 9

Car 9 Fuel: 80%

25 customers are waiting for a ride.

Visitor 76 boarded car 10

Car 10 Fuel: 80%

24 customers are waiting for a ride.

Visitor 77 boarded car 3

Car 3 Fuel: 40%

23 customers are waiting for a ride.

Visitor 78 boarded car 4

Car 4 Fuel: 40%

22 customers are waiting for a ride.

Visitor 79 boarded car 5

Car 5 Fuel: 60%

21 customers are waiting for a ride.

Visitor 80 boarded car 6

Car 6 Fuel: 60%

20 customers are waiting for a ride.

Visitor 81 boarded car 7

Car 7 Fuel: 60%

19 customers are waiting for a ride.

Visitor 82 boarded car 8

Car 8 Fuel: 60%

18 customers are waiting for a ride.

Visitor 83 boarded car 1

Car 1 Fuel: 20%

17 customers are waiting for a ride.

Visitor 84 boarded car 2

Car 2 Fuel: 20%

16 customers are waiting for a ride.

Visitor 85 boarded car 3

Car 3 Fuel: 20%

15 customers are waiting for a ride.

Visitor 86 boarded car 4

Car 4 Fuel: 20%

14 customers are waiting for a ride.

Visitor 87 boarded car 5

Car 5 Fuel: 40%

13 customers are waiting for a ride.

Visitor 88 boarded car 9

Car 9 Fuel: 60%

12 customers are waiting for a ride.

Visitor 89 boarded car 10

Car 10 Fuel: 60%

11 customers are waiting for a ride.

Visitor 90 boarded car 6

Car 6 Fuel: 40%

10 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Car 1 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 2 is getting fuel from pump 2

0 cars are waiting for a gas pump

Visitor 91 boarded car 7

Car 7 Fuel: 40%

9 customers are waiting for a ride.

Visitor 92 boarded car 8

Car 8 Fuel: 40%

8 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Visitor 93 boarded car 9

Car 9 Fuel: 40%

7 customers are waiting for a ride.

Visitor 94 boarded car 5

Car 5 Fuel: 20%

6 customers are waiting for a ride.

Car 3 is getting fuel from pump 3

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Visitor 95 boarded car 6

Car 6 Fuel: 20%

5 customers are waiting for a ride.

Car 1 has been refueled by pump 1

Gas station fuel: -10%

Car 4 is getting fuel from pump 1

0 cars are waiting for a gas pump

The Fuel Truck is currently on its way

Car 2 has been refueled by pump 2

Gas station fuel: 90%

Fuel Truck is currently filling up the gas station.

The Gas Station has been refilled

Visitor 96 boarded car 10

Car 10 Fuel: 40%

4 customers are waiting for a ride.

Visitor 97 boarded car 1

Car 1 Fuel: 100%

3 customers are waiting for a ride.

Visitor 98 boarded car 2

Car 2 Fuel: 100%

2 customers are waiting for a ride.

Car 3 has been refueled by pump 3

Gas station fuel: 80%

Car 4 has been refueled by pump 1

Gas station fuel: 70%

Visitor 99 boarded car 7

Car 7 Fuel: 20%

1 customers are waiting for a ride.

Visitor 100 boarded car 3

Car 3 Fuel: 100%

0 customers are waiting for a ride.

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

2 cars are waiting for a gas pump

Car 5 is getting fuel from pump 1

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 6 is getting fuel from pump 2

0 cars are waiting for a gas pump

Car 5 has been refueled by pump 1

Gas station fuel: 60%

Car 6 has been refueled by pump 2

Gas station fuel: 50%

1 car is waiting for a gas pump

1 cars are waiting for a gas pump

Car 7 is getting fuel from pump 1

0 cars are waiting for a gas pump

Car 7 has been refueled by pump 1

Gas station fuel: 40%

All visitors have taken a tour, searching for a new round...

No lines remaining in input file, terminating program.

Process finished with exit code 0