

Traffic

This assignment is part of module 6 and 7, and replaces Game of Life.

The Dutch government wants to track where every car in the Netherlands is by equipping each car with a short-range transmitter. When a car passes detectors that have been installed in the road surface, the transmitter sends the license plate number (kenteken) to these detectors. All detectors are connected to a central computer, that stores these license plate numbers in a file, as well as the id of the detector that received the license plate number, and the time at which the license plate number was received.

This system can be used to detect which cars are going over the speed limit, as long as the distance between two detectors is known. To figure this out, a file with the following structure is used:

- The first line contains the maximum number of cars that can be on the road between the two detectors at the same time.
- The second line contains the year, month, date, and time (hh:mm:ss) on which this measurement started.
- The last line contains the year, month, date, and time on which this measurement ended.
- All other lines contain the number of the detector (1 or 2), the time on which some car passed the detector, and the license plate number of that car.

Example input (actual input files can be found on Canvas):

```
20
2018 08 31 09:00:00
1 09:00:00 OZ-15-ZU
1 09:00:07 97-YC-51
1 09:00:10 NV-71-PU
2 09:00:21 OZ-15-ZU
[...]
2 09:04:58 CN-70-OT
2018 08 31 09:05:00
```

You can assume that the detectors are on a one-way road, the distance between the two detectors is 200 meters, and the maximum speed on that piece of road is 50 km/h. Write a program that does the following:

- Print the date and amount of time that the measurement took in total, as well as the total number of cars that passed in that time frame, and the average amount cars that passed per minute.
- Print a list of the license plate numbers of all cars that passed the speed limit, as well as the average speed of that car, and the time at which the car passed the second detector.
- Print the average speed between all cars that have passed both sensors.
- Print the license plate numbers of all cars that are still between the two sensors.

Example output:

This measurement took place on 2017 03 10 and took 00:15:00.
During this measurement 102 cars passed both sensors (average 6.8 per minute).

The following cars went over the speed limit:

GH-23-NN - 68 km/h - 12:56:19
NV-71-PU - 56 km/h - 12:58:37
CN-70-OT - 70 km/h - 13:06:30
18-IP-VU - 59 km/h - 12:56:19

The average speed of all cars during this measurement is 41.9 km/h.

The following cars are currently between the two sensors:

45-HH-97
0F-UZ-13

Note: these measurements can take very long, which means that a lot of cars have to be processed. For maximum points, write your program in such a way that only relevant information is stored to make it as efficient as possible (if a car has passed both sensors and did not go over the speed limit, there is no reason to store data about that car).