

4. Timetable

Some years ago a periodic timetable was introduced in the eastern half of the country. It means that trains start from the terminus at the same time in every hour and according to the timetable they call at each station at the same time. The number of travellers has increased due to the easily plannable journey.

File *train.txt* contains the arrival and departure times of a few trains on the Szeged-Budapest line. The lines of the file contain five values separated by tabs, four integers and a character. The first number is the train identifier, the second is the station identifier, the third and fourth are the hour and minute of a time. The character indicates whether the train arrives at the given station (A) or departs from it (D) at the given time.

The number of lines is at most 1000, the train and station identifiers are integers between 0 and 20. The value of hour is between 0 and 23, the value of minute is between 0 and 59. Stations are numbered from 0 according to distance, trains are numbered from 1 according to the time of departure and they take every possible value.

The file records the actual journey of the trains. The data are in chronological order, within that – with the exception of the terminus – the arrival always precedes the departure. We know that each train starts from station number 0 and reaches its destination, stops at each station and no train overtakes another.

For example:

...				
2	0	6	45	D
1	4	6	49	A
1	4	6	50	D
2	1	6	58	A
1	5	7	0	A

The first line shows that train number 2 starts from the terminus at 6 hours 45 minutes. The next line shows that train number 1 arrives at station number 4 at 6 hours 49 minutes.

Create a program that uses the data in file *train.txt* to answer the following questions. Save the source code of the program as *timetable*. (When writing the program, you do not have to check the correctness and the validity of the data given by the user, you may assume that the data available correspond to the description.)

Before you display the result of exercise parts that require printing on the screen, display the exercise number on the screen (for example: **Exercise 5.**). If you request data from the user, display the expected type of the value. Displaying without accents is also acceptable.

1. Read the contents of file *train.txt*.
2. Display on the screen the number of trains and stations stored in the file, including the two termini.
3. Determine the station where a train waited for the longest time. Give the identifier of the train and the station and the length of the waiting. If there were several such cases, it is enough to display only one.
4. Read the identifier of a train and the hour and minute values of a time. Use these data for the subsequent exercises.
5. The scheduled journey time is 2 hours 22 minutes on this line. Display on the screen the number of minutes by which the journey time of the train with the entered identifier differed

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from this value. For example: “The journey time of train number 5 was 2 minutes shorter than scheduled.”, “The journey time of train number 5 was exactly as scheduled.” or “The journey time of train number 5 was 3 minutes longer than scheduled.”

6. Write the times of arrival of the train with the entered identifier at each station into file *journeyX.txt*. In the file name X should be replaced by the entered train identifier.
7. Give the position of the trains on their way at the entered time, that is, trains that have already left the terminus but have not reached their destination yet. It is recommended to check the following times during testing: 6:50, 8:45, 9:05, 10:04, 10:20.

Example for formatting the text outputs:

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Exercise 2.  
Number of stations: 11  
Number of trains: 12  
  
Exercise 3.  
Train number 5 waited at station number 6 for 10 minutes.  
  
Exercise 4.  
Enter the identifier of a train: 2  
Enter a time (hour minute): 7 16  
  
Exercise 5.  
The journey time of train number 2 was 2 minutes longer than  
scheduled.  
  
Exercise 7.  
Train number 1 was waiting at station number 6.  
Train number 2 was running between stations number 2 and 3.
```

The contents of file *journey2.txt*:

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Station number 1: 6:58  
Station number 2: 7:11  
Station number 3: 7:31  
Station number 4: 7:48  
Station number 5: 7:59  
Station number 6: 8:11  
Station number 7: 8:45  
Station number 8: 8:51  
Station number 9: 9:0  
Station number 10: 9:9
```