Our college seeks to modernize the registration system for subjects. We want to automate the process of entering information into the system through the inclusion of new functionalities.

1. The system must process the registration attempts considering: the registration status of the previous day, the available places of each subject, and the registration attempts of the day to be processed.

2. The enrollment status of each student for the previous day has the following structure:

a. RUT: unique code that identifies the student
b. NRCs: corresponds to the subjects that the student had registered until the previous day.

3. The list with the registration status of the previous day of all students, is in the file "student_enrollment_status.txt with the following format (example in Figure 1):

RUT, NRC1, NRC2, ...

```
17853674-5, 31315, 22301
15810048-7
23762081-k
19962608-6, 21048, 31315, 21212, 18440,17601
```

Figure 1. Example of " **student_enrollment_status**.txt"

4. Each subject to be registered has the following information:

a. NRC: unique code that identifies a subject and its parallel

b. subject quotas: number of students who can register the subject

5. The list of quotas available until the previous day of all subjects can be found in the " "quotas.txt" file with the following format (example in Figure 2):

```
21048, 24
23472, 17
21212, 6
31313, 0
31315, 32
```

Figure 2. Example of **"quotas.txt"**

6. For each registration attempt for a particular day, the following data is available:

a. RUT: unique code that identifies the student trying to enroll subjects
b. Time: Represented by an integer indicating the second of the day on which the registration attempt was received (value between 0 and 86400).
c. NRCs: corresponds to the subjects that the student intends to enroll

7. The list of Enrollement attempts can be found in the "enrollment_attempts.txt" file with the following format (example in Figure 3):

RUT, Time of registration, NRC1, NRC2, ...

```
15810048-7, 10200, 21048, 31315, 21212, 18440, 17601
17853674-5, 86000, 21048, 27424, 28650
23762081-k, 20202, 31315, 22301, 22302, 21048
15810048-7, 44326, 21048
17853674-5, 67677, 21048, 27424, 27001, 31315
```

Figure 3. Example of "**enrollment_attempts.txt**"

8. The system must process registration attempts on a first-come, first-served basis (those made earlier in the day are processed first).

9. A student may have multiple registration attempts registered. In those cases, the last attempt made on the day is the one to consider.

Considerations for input files

1. Regarding the format of the "quotas.txt" file, it is important to consider the following:

a. Duplicate NRC: if several records are associated with the same NRC, only consider the record that was read first.
b. NRC invalid format: If the NRC is not a positive integer, that record should be ignored.
c. Negative or decimal quota: if a record has a negative or decimal quota for a subject, that record must be ignored.

2. As for the format of the " student_enrollment_status.txt" file, it is important to consider the following:

a. Duplicate RUT: if several records are associated with the same Rut, only consider the record that was read first.
b. RUT invalid format: If a record has negative Rut, decimal, includes letters in the numeric part or has some other formatting error, that record should be ignored. (the rut has the format xxxxxxxx-x and is always all integers, but after the dash it can also be a k)
c. Valid Verifier Digit: assume the Rut check digit as correct in all records. (verirification digit is the number(or k) after the dash in the rut)
d. Duplicate NRC: If the same NRC is repeated multiple times in a record, only consider the first instance of that NRC in that record.
e. Non-existent NRC: If any of the NRCs in a record do not appear in the "quotas.txt" file, that record should be ignored.

3. As for the format of the "enrollment_attempts.txt" file, it is important to consider the following:

a. Non-existent RUT: If the RUT of a record does not appear in the "**student_enrollment_status.txt”** file, the record should be ignored.
b. valid time of enrollment If this field is invalid in a record (example: 90999), the record should be ignored.
c. Non-existent NRC: If any of the NRCs in a record do not appear in the **“quotas.txt"** file, that record should be ignored.

Mandatory Data Structure

• AVL tree to store the NRC of the **“quotas.txt"** subjects, along with the number of quotas available. Use the NRC as the key to the nodes.

• AVL tree to store the RUT of the students of “**enrollment_attempts.txt**”, together with the list of NRCs of their registered subjects. Use RUT without verification digit as the key of the nodes.

• Min Heap tree to store “**enrollment_attempts.txt**” enrollment attempts that the system will process. Use the enrollment time to determine priority.

Menu

Once the three input files are loaded, the system must work with the following menu on console:

1. Display subjects without quotas.

2. Add quotas to subject

3. Delete student

4. Process registrations of the day

5. Quit

Each of the menu features is explained below:

1. **Display subjects without quotas.** system must display by screen the list with the NRC and available quota of all subjects that have zero quota, ordered by NRC from lowest to highest.
2. **Add quotas to subject** The system must ask the user for the NRC of the subject and the number of quotas to be added. Once added, the NRC must be deployed alongside the new number of quotas. The NRC entered must be registered in the system, and the number of quotas to be added must be a value greater than zero.

3. **Delete student** The system must request the RUT without verification digit (verification digit is the number after the dash in the rut) of a student and must eliminate it from the system, deenrolling all the subjects that had enrolled. The NRC and the new number of **quotas** / available for all non-enrolled subjects must be deployed. The RUT entered must have been registered in the system before its deletion.
4. **Process registrations of the day** The system must process all registration attempts in the "**enrollment_attempts.txt**", input file, prioritizing attempts made earlier in the day:

    a. For a particular record of that file:

        i. If the RUT does not appear in the system, the registry should be ignored.
        ii. ii. If the person previously had subjects enrolled in the system, in this step the system should try to register those that were not assigned. In addition, the system must de-register the subjects that you had previously registered, but that do not appear in the register that is being processed.

    b. A particular subject:

        i. The student should not be enrolled if he has zero subject quota.
        ii. the student must be registered if he has a positive quota (decreasing the quota of that subject by one)

5. **Quit** Update the records in the **quotas.txt** and "**student_enrollment_status.txt"** files.
   Deletes all objects used in execution and closes the program.