CHAPTER 11

File I/O Revisited

Most web-based applications have two separate versions of the actual application - server application and client application. The Server application is the main application which contains most or all functionalities of the application and resides in a powerful device. The Client application is a miniature version of the server application and it contains only the essential functions required for the user. This division of responsibilities helps reduce the load of the server and improves the user experience simultaneously. In this task, you have to make both perspectives of an application and implement a shared file system which will work like the intermediary Internet.

11.1   Client Application

This application is simpler than the server application and is the first subtask to be completed. The application is a student information management system where the student can see and edit only his/her part of the information. The information of the student has the following details:

- Name of the student (30 characters maximum)

- Student ID (10 characters maximum)

- Address (50 characters maximum)

Each course has a separate set of information which are as follows:

- Name of Course (50 characters maximum)

- Course ID (10 characters maximum)

- Course Credit (real number)

The total marks of each course is the credit of the course multiplied by hundred. For example, a 3 credit course has 300 marks and a 2 credit course has 200 marks. The attained marks is the amount of marks achieved by a student and is different from the total mark.

The data of each student is stored in three text files namely - "student.txt", "course.txt" and "marks.txt". The first text file contains the student information, the second file contains the course information, and the third file contains the marks information linking the student and the course. An example of the three text files are given below:

```
Contents of 'student.txt':
Sadia Alam Nishita
190041105
IUT Female Halls of Residence
.....
Rafid Nahiyan Farabi
IUT Male Halls of Residence
0.0
.....
Rakin Abrar
190041221
```

```
IUT Male Halls of Residence
.....
Faria Ahmed
190041218
IUT Female Halls of Residence
.....
```

The CGPA is initially 0.0 and it will be calculated when one or more course information are added. The department, program, batch and section information needs to be calculated from the student ID. For example 190041131 means - batch 19 (1900), department of CSE (4), B.Sc. program (1), section 1 (1) and student number 31 (31). Assume there are four departments and the remaining departments are - MCE (1), EEE (2), and TVE (3). There are two programs in each department - Bachelor of Science or B.Sc. (1) and Higher Diploma or HD (2) (forget the actual structure of IUT for now). The course information and the marks information will be stored in their separate files as follows:

```
Contents of 'course.txt':
Structured Programming I
CSE 4107
3.00
.....
Structured Programming I Lab
CSE 4108
1.50
.....
```

This is another text file, and remember, in each text file, the first line saying "Contents of..." is not part of the file text.

```
Contents of 'marks.txt':
190041105
CSE 4107
245
.....
190041105
CSE 4108
130
.....
190041131
CSE 4107
235
.....
190041131
CSE 4108
135
.....
```

```
190041221
CSE 4107
230
.....
190041218
CSE 4108
115
.....
```

Now as you can understand, the CGPA for a student can be calculated from the existing files easily. The GPA of a student for each course can range from 2.00 to 4.00, where 40-49% is 2.00, 50-59% is 2.50, 60-69% is 3.00, 70-79% is 3.50 and 80-100% is 4.00. And for more than one subjects, the CGPA is the average of the GPA for different courses of a student. For example for 190041131 the CGPA is 3.75, which is the average of 3.50 (CSE 4107) and 4.00 (CSE 4108). The interface of the client application is shown below for better understanding.

```
Student Information System Initializing.
Enter your student ID: 190041131
Displaying Student Information:
Name:              Rafid Nahiyan Farabi
Address:           IUT Male Halls of Residence
Student ID:        190041131
Year of Admission: 2019
Program:           Bachelor of Science
Department:        CSE
CGPA:              3.75
Do you want to see your result in details?
1.  Yes
2.  No
Enter Choice:  1
Course:  Structured Programming I
Course ID:          CSE 4107
Course Credit:      3.00
Attained Marks:     235
Attained Grade:     A
Attained Grade Point: 3.50
Course:  Structured Programming I Lab
Course ID:          CSE 4107
Course Credit:      1.50
Attained Marks:     135
Attained Grade:     A+
Attained Grade Point: 4.00
Enter your student ID: 0
```

`Student Information System Terminating.`
It is to be noted that, if the choice "2. No" is given when asked for result in details, the interface will ask for student ID again. Any wrong student ID entered, or any student ID not in the system will show "Student ID not the system!" and ask for the student ID again. However, only when 0 is entered, the program will terminate. The contents of the files will follow the given format and no additional information can be added, except the addition of a new entry like - a new student, a new course, or a new mark entry.

11.2   Server Application

The server application will be implemented in your next lab task.