Design and Analysis of Data Structures and Algorithms

Coursework Specification

An online subscription service company allows members (users) to borrow and use the following types of items for up to a week each time.

- Movies
- Music
- EBooks
- Licenced Software
- Games
- Courses

The conditions of usage are as follows:

- Each Item can be booked by up to 10 different users concurrently. The company might offer multiple instances of popular items, so more than 10 users can actually borrow /use the same title by accessing different items.
- Each user will be able to book up to 5 items at any one time
- Each user will be able to queue for up to 5 requested items at any one time – depending on how many items the user is already using at the time. The total number of items (borrowed and requested) cannot exceed five per user at any one time.
- Each item can be booked for use for a week and then it is automatically retrieved
- A user cannot place a request on an item that they are currently using.

Tasks:

1. Select appropriate data structure(s) to accommodate effective storage of data for the above subscription service.
2. Identify suitable algorithms that would allow the company to run the service as per the above conditions.
3. Produce Pseudo Code or any other form of software design for the software that you are going to implement.
4. Build the software to manage item bookings and user usage as per the above conditions.
   - The software must allow the user to borrow an item that is available
   - The user may place a request for an item that is currently unavailable
   - The software must automatically remove an item from a user's access upon the seven day period expiring
   - The software must enforce all conditions of usage specified above.
   - The system should allow the user to create new users
   - The system should allow the user to enter data as manual input or to read them from a CSV / text file.
   - The system should be able to search for an item based on the title or the Item Number.
5. Justify your choice of data structures and algorithms utilised and evaluate the outcome of your work in the format of a short report of about 800 words.

NOTES: Please note the following key instructions

Sample data will be provided, but students may feel that they want to use their own or supplement the given data. This is acceptable as long as the structure of the data is kept as shown below.

No "Hard-Coded" data will be accepted. In such a case the student will be awarded a mark of 30% or less for the coursework, depending on the detail of the submitted work.

Structure of data to be used

Item – Item No, Title, Number available

Member – Member ID, Member Name

Deliverables and due date

Formative Assessment – a Work-in-Progress submission is required by the 9th of February 2017. This should be in the form of an email to Elias.Pimenidis@uwe.ac.uk The email should be titled DADSA Formative Submission and must be sent from your UWE email address. A zip file containing all your work must be attached to the email. No marks will be awarded for this submission, but it is an essential prerequisite for your work to be submitted for summative assessment to be accepted.

Summative Assessment - By the due date (TBC) you should submit via Blackboard

- A zip file, containing the NetBeans project that implements the application. The project should include the test data files that you have used. All code must include suitable comments throughout to allow for clear mapping against the pseudocode provided.
- A word file that contains your choice and justification of data structures and search algorithms used and the completed pseudo code.

Marking Criteria

For the submitted work (Code and documentation 65 marks)

0- 21 little or no attempt at the assignment has been made OR few of the implemented classes compile.

22-26 some of the implementation compiles and is correct. The student can account in writing for what would be required to complete the implementation

27-35 from the list of tasks given above, 1 – 4 are correct and at least a reasonable attempt at 5 has been made. The implementation compiles and runs. The student is aware of what the problems and may be able to begin to suggest ways of correcting them. The submitted documentation is more or less complete.

36-45 A good attempt at meeting most of the requirements of the assignment has been made. The implementation compiles and runs and produces, or mostly produces the expected results. The student is able to evaluate the implementation, highlighting what the problems are and suggesting ways of correcting them. The submitted documentation is accurate and more or less complete.

46-55 the requirements of the assignment have been fully met. The code runs and produces the expected result observing all conditions specified. In writing, the student is able to evaluate what has been done and discuss what the alternatives/limitations are.

55-65 the requirements of the assignment have been met as above. In writing, the student is able to explain what has been done and discuss what the alternatives/limitations are. The whole is well commented, well presented, well documented. Input is error checked, output is helpful and complete. Overall, the work is of a professional standard.

Demonstration (35 marks)

0 Non-attendance.

0 – 10 the student is able to run the code but unable to explain it, even when prompted.

11 – 17 the student is hesitant about the code but able to explain it with prompting.

18 – 21 the student can explain the code as written but is unable to discuss alternatives or suggest where errors might have occurred

22 – 25 the student can explain the code as written and can discuss alternative solutions or suggest where errors might have occurred

26 - 35 the student can fluently explain the code as written. Alternatives can be discussed. Where there are failures of functionality, the student can suggest why these have occurred and explore solutions. Task 4 should be fully met.

Working Arrangements

This is an individual piece of work. You are expected to use Java to implement your answer. You should expect to spend approximately 24 hours completing this work.

Plagiarism

Whilst it is acceptable to discuss your assignment with your peers, this piece of work is intended as an individual assignment. Submissions that show similarities to other work will be subject to investigation according to University regulations.