

EEE101 – ASSESSMENT 8

Assessment Number	8
Contribution to Overall Marks	30%
Issue Date	21 November 2014
Submission Deadline	1600, 24 December 2014

Assessment Objective

This assessment aims at evaluating students' ability to work in a team. You will be assigned to a group randomly and your group is expected to deliver a software product in the C programming language, which meets the specifications given by a customer before the due date. This project is generally too complicated to be completed by one or two software programmers. Being a team player means you are expected not only to apply the knowledge gained during the lectures, laboratory classes and assignments to specify, design, implement, test and document your own code but also to cooperate with your teammates so that the whole project will be delivered on time with a good quality.

Grouping

There are 300 students enrolled in this module, they will be divided into 60 groups, each of which consists of 5 students. Each group will be randomly formed. Each group will also be randomly allocated one of the six projects detailed here.

Final Deliverables

Each group should submit the following:

1. A report (a single MS-Word or PDF file), which applies the Software Development Process (SDP) (presented in Lecture 1, and applied in all other assignments) to the developed system/program. The five main steps of SDP are:
 - a) Problem Statement: formulate the problem.
 - b) Analysis: determine the inputs, outputs, variables, etc.
 - c) Design: define the list of steps (the algorithm) needed to solve the problem.
 - d) Implementation: the C source codes (have to be included in the report).
 - e) Testing: explain how the program has been tested and verified.
2. All the C source codes and the final executable demonstration file. The source codes must be

commented appropriately for implementation.

3. A simple program manual (MS-WORD, or PDF), describing your programs basic functionality (how it works), known bugs, and functionality status.
4. A personal contribution statement (1 page) from each member of the group that describes (i) how he or she contributed to the group, (ii) what are the main technical difficulties he or she encounters in the project.

NOTE: All group members must submit one personal contribution statement. This may lead to different marks for different members of the same group. If necessary, the module leader might call for a short oral test for certain groups.

Submission Procedure

All of the above-mentioned files/deliverables must be zipped into a single file (RAR, ZIP, 7Z are all acceptable). Then, the coordinator of each group must submit this single file on ICE using his/her account.

Marking Scheme

This assessment requires the routine of code development using the software development process.

The general marking scheme is shown as follows:

Documentation (55%)		
	Overall Quality of Report	10%
	Specifications	10%
	Analysis	10%
	Algorithm Design	10%
	Testing	10%
	User manual	5%
Coding (45%)		
	Implementation/coding style	35%
	Robustness	10%

A detailed marking scheme is attached

General Guidelines

The project descriptions are deliberately given in the form of simple customer specifications, which (as in the real world) are incomplete and often ambiguous, rather than a set of exact functional specifications. The group members should work methodically together (as the developers in a real world software project) to:

1. Analyze and formalize the customer specifications (at this stage, the various design choices and the software features can be subject to the group's creativity).
2. Design and decompose the functional and programmatic aspects of the problem and allocate constituent tasks to each group member. You are expected to use a top-down design which can then be modularized so that the tasks for each member can be clearly determined. Designs which mimic object oriented programming (by using abstract data types) are encouraged although not required.
3. Implement the product with frequent meetings to report progress and decisions to each other and re-evaluate the agreed courses of action.
4. Implement test procedures, debug and correct the program. Each module should be independently testable. Testing of each module and the program as a whole should be performed.
5. Finalize the deliverables.

The given specifications are only basic and most of the design choices should be made in your group meetings. The systems described within the different projects have a variety of different features and the disambiguation of the customer specifications can be based to the student's logic and real life experience.

Assessment will be based on whether the product/program offers reasonable functionality and features (for the group size, allocated time and project difficulty), its design quality, flexibility, robustness, software bugs and other stated deliverables.

If the group cannot implement all of the system features mentioned, it is better to have a few features fully working without run-time crashes than none of the required features working properly due to bugs or disrupting ripple effects between modules in the project. However, the corresponding marks deduction will be applied depending on the missing features.

Project A: Railway Information System

Overall description:

Your team is employed by a railway company for the implementation and delivery of a software system responsible for a large part of the operations of the company.

Customer specifications:

The system must be able to store the trains, journeys and passengers of the company during the years of its operation. There are two types of trains:

- T123 – 4 seats/beds (namely seat A, seat B, seat C and seat D) in each train compartment. This train has 10 compartments.
- T456 – 6 seats/beds (namely seat A, seat B, seat C, seat D, seat E and seat F) in each train compartment. This train has 15 compartments.

The sources and destinations of the currently available trains (for simplicity, assume only direct long distance journeys) are allocated from a set of city stations which can be potentially extended. Passengers can be allocated to specific trains and seats.

The system should be able to provide functionality to the different users listed below:

- An administrator who can include new trains, prices, dates, train stations and perhaps new trains for each of the two available types.
- A ticket agent who can flexibly search for a specific train journey inquired for by a customer. When the customer reserves or books a ticket, then the required details must be stored. Such information includes train ID, payment details, expiration date of reservation, route, allocated seat, viewing facilities of the seating plan, etc. Facilities to amend this information must be provided.
- A manager who can retrieve statistics about the company's operation, such as the number of trains of each type, total passengers per journey, total revenue, etc.

Project B: Library Information System

Overall description:

The library of ABC town needs a new electronic rental system and your team is employed to build it.

Customer specifications:

The implemented system should be able to handle the basic operations of a university library including the following features:

- It must be able to store the set of books including their author(s), title, ISBN, subject, loan type (normal, short loan, no-take-out), shelf-mark, loan status, number of copies, etc. Also, it should provide options for altering the details of a book, mark it as lost / damaged / ordered, etc.
- Registration of a new library user as teacher or student with varying privileges (e.g., teacher can keep books for more days), which can be altered for any existing user at any time.
- Search for a particular book and allocate a book to a specific borrower for a specific time period. Also, implement returns and renewals.
- It prints the list of available books and borrowed books.
- Provide borrower statistics (e.g. about the number of books) to a particular account.

Project C: DVD Rental System

Overall description:

Your team is employed by a DVD rental company to implement a software product for storing films and handling the customer rentals for each branch.

Customer specifications:

The implemented video-rental system should be able to provide facilities to:

- Store movie titles, number of copies, title information (e.g., directors and actors) and type of the film (e.g. films for children or films not suitable for children).
- Store customers' information, identifiable by a unique pass number. Customer information should include name, age, telephone, address, pending charges, rental history, etc.

The main users will be:

- The branch manager, who will be able to introduce new titles and rental copies to the system, set/alter charges, specify rental duration type, delete and amend title details.
- The registration desk where all new customers can join. Customer details and likely rental restrictions will be recorded (e.g. customers under the age of 15 cannot rent any films which are not suitable for children). Also, the desk will be able to alter information on existing customers.
- The rental desk where existing customers return or rent titles and pay charges and penalties. This system should provide facilities for search by title, actor and/or movie director.

Project D: Parking Management System

Overall description:

Your team is employed for the implementation of a parking payment system in a university carpark.

Customer specifications:

The parking space consists of:

- A 100x20 rectangular grid of car slots (namely CS1);
- A 5x10 rectangular grid of e-bike slots with electrical recharge plug provided (namely CS2) so that e- bikes can be recharged;
- A 10x10 rectangular grid of e-bike slots without recharge facility (namely CS3).

When a car enters, its registration is recorded and a specific slot in CS1 is allocated. This allocation is determined automatically by a random process. When an e-bike enters, the e-bike driver is asked to select either a slot in CS2 or CS3. According to the selection, a specific slot in CS2 or CS3 will be allocated (also using a random process).

The system can also provide the facilities to have regular customers (teachers, students or visitors), where their accounts accumulate the charges, so that they can pay when they are asked to, or have pre-paid parking time.

The system should allow the following users to operate as follows:

- A manager who can set/change the charge tables, create/amend regular customer accounts (which should include names, addresses and car registration numbers) and also credit the existing accounts of the registered customers. Note that slots must be charged more in CS2 than CS3 and similarly slots must be charged more in CS1 than CS2. Also, teachers have special discounts and it is free for students.
- An entrance desk operator records the information of either a registered regular customer or a casual customer (via the car/e-bike plate number). Also, the allocation of a car slot should be provided by the system.
- An exit desk operator who can free a previously allocated car slot, charge the leaving customer accordingly and record exit times.

Project E: Hotel Management Information System

Overall description:

Your team is employed by the conference center hotel to implement a software system responsible for the overall management of room booking and customer records.

Customer specifications:

The hotel contains 100 rooms (10 per floor) and four classes (A,B,C and VIP) of room. Each room is assigned a single price class. The software system must provide functionality for the following types of users:

- The manager who can set/amend classes for each room and the price per class. Each room is assigned a single price class. The manager can also provide a fixed discount percentage on the regular price for rooms booked at least one month prior to the arrival day, group bookings or any other special circumstances.
- The booking operator, who can register a customer (by recording their name, address, telephone number, hotel VIP member card no.). If the customer has no hotel VIP member card, he/she cannot book any VIP room. He/she will be asked to apply for a hotel VIP member card.
- A search facility should be provided for room availability and dates. Additionally, the operator can book one or more rooms to a registered customer and at a regular or discounted price.
- The check-in operator who records the arrival of a customer in the system, and can change certain details, such as period of stay or room if possible or customer details, etc.
- The check-out operator should be able to record customer leaving times, calculate charges or even move the payment from regular to discounted price if the customer was dissatisfied.

Project F: Bank Information System

Overall description:

Your team is employed by a bank to implement a system for the management of banking affairs.

Customer specifications:

The system must be able to store a number of different customers who have opened an account with the bank. Each customer can have one or more accounts and each account is uniquely identifiable by an account number generated by the system. The system should be able to provide the following functionality:

- Register a new customer and store details such as name, address, telephone number, 6-digit personal identification number (PIN) number (security code for using the card) as well as some extra information (e.g., type of identification presented for joining the bank), etc.
- Add/delete/amend accounts for an existing customer. Also, change the status of an account (blocked, inactive, active).
- Register a deposit made into an account, and record all related information (date, sum, type of deposit (cash, cheque, transfer)).
- Register a withdrawal from an account, and record all related information. Withdrawal requires the customer to enter their PIN number
- Implement single or recurrent transfers of money between accounts. Related information to be recorded is setting date, starting date, ending date, account numbers, customers, etc.
- The system will automatically award the customer a platinum credit card if his/her average account balance exceeds RMB 50,000 over the last 6 months. Then the identifiable credit card number will be uniquely generated by the system.
- Present management statistics about the bank customers, such as number of customers, number of accounts, average accounts per customers, (average) account balances, etc.