Structured Systems

Outcome: Stepwise refinement for Structured Systems and building structured programs

Instructions

Students shall work in teams of two drawn from the same tutorial group. A team may choose any of the projects given below. Within a tutorial group a project can be chosen by only one team. A plagiarism check will be carried out and, if found, then the plagiarized projects shall be awarded zero marks irrespective of who has plagiarized from whom.

There are three parts to each problem.

1. Add on any additional feature that you consider desirable/necessary. To make your project realistic. Expand the project write-up to include the additional features
2. Design the program structure and then draw the modular structure.
3. Implement the resulting program.

The two parts, A and B are to be submitted within one week.

1. An online food ordering system accepts orders from customers and delivers at customer address. Items are selected from a menu and the total bill amount is calculated. Selected items may be put in a cart and addition, deletion of items in the cart is possible. Once the order is confirmed, the time taken for delivery is intimated and the order can be tracked. There are several payment modes, cash/wallet/bank transfer/credit/debit card on delivery or pre-paid. Orders placed may be cancelled if delivery time exceeds 10% of specified time.
2. A system supplier receives requests from clients and prepares a quotation which it sends to the client. The client may ask for clarifications which are then supplied. If an order is received then the supplier checks to see if it can assemble the system. If not then it places an order for missing parts, assemble the system and delivers it.
3. The student registration system handles on-time and late registration of all students for all courses. The courses may be regular, repeat or short term. It handles all registration changes up to the last date for adding/dropping courses. It interacts with the attendance and examination system
4. A program for railway reservation is to be designed. The reservation system allows operations to book and cancel. In both cases, customers are required to fill the request form and present it to the clerk who enters the information in the computer screen. Assume that the reservation system is for one passenger per form only. The booking task involves checking availability, receiving payment and confirming the booking. Passengers may be put on the waiting list. For cancellation, the booking is checked, cancellation charges are calculated and a refund made. Cancelations may be made by confirmed or waitlisted passengers. Remember that cancelations require adjustment of the waiting list.
5. An Institute wants to computerize its admission process from receipt of applications to printing of admission letter. The received application is checked for completeness. A test is administered and a merit list of students is prepared. Shortlisted candidates are invited for an interview and a list of selected candidates is prepared along with a wait list of 50% of seats available. Candidates are asked to pay fees and register for the program.
6. A flight reservation system for the internet is to be built. Clients enter the passenger name, starting airport and the destination airport. They choose the class of travel, economy, business, or first class. They have to enter the date of travel. The system does the booking unconditionally. Payment is accepted by credit card. We can abandon the transaction before payment is invoked. It is possible to cancel a booking on payment of penalty. Or to change the date of travel.
7. A library processes book requests. Books can be issued, reserved, returned in time or returned late. Late returns have a penalty of 5 rupees per day which the borrower pays. The system calculates the amount of penalty and issues an invoice. The library enters the borrower name, book title, date of issue and expected date of return when a borrower borrows a book. A borrower can borrow upto 4 books. Reservations of books means that a queue is maintained for each book in which the name of the borrower reserving the book is entered. A reservation once made can be withdrawn.
8. A conference has many events: workshops, tutorials, panel discussions, and paper presentation sessions. Participants for these have to pay registration fees which are different for each event. A registration system takes as input, participant details and the events that she wishes to register for. It calculates the total fees, and issues an invoice. At any time during the registration process, the participant may change the events that she wants to register, abort the process, clear the data and start again.
9. A blood bank receives and issues blood in units of one bottle. A donor is a volunteer who enters details of his/her blood group and rhesus factor as well as name and address. Once the blood is collected it is tested to identify diseases. If there is an incurable disease then the donor is black-listed and no blood is ever taken from him/her again.If the disease is curable, the blood is thrown away and the donor is allowed to come later. If, blood is taken, then the donor is entitled to receive from the blood bank the amount of blood donated. A donor may donate blood many times. A pass book giving information of the total blood donated is maintained. Blood is issued based on a request from the recipient.
10. Companies come to an Institution to recruit students. Each company has its own profile: Name address, turnover, and core business area. A company conducts a drive for recruitment on a certain date , time and venue. Each drive may be for one or more jobs. It offers a number of jobs; each job is described by its job title, job qualification, and starting salary. Again for each job title there is a student eligibility criteria that specifies the minimum percentage of marks and maximum number of failed subjects. For different jobs the company may hold different rounds of test, for example, any one or more of aptitude test, technical test, group discussion and interview. Information about company profile, jobs offered, eligibility, and nature of test is shared with students. The Institute applies the eligibility criteria on all students to identify eligible students who are then informed the date, time of the test. Further, the number of students who appeared and cleared a given round of tests is kept track of.
11. Students register for a number of courses. A course may have one or more components, lecture, tutorial, laboratory, project etc. A teacher is assigned for each component. The list of registered students in the course component is made available to the teacher who marks student attendance for each scheduled contact session (one or more hours). Attendance is monitored three times in a semester. In each monitoring, all students whose attendance is below 75% are issued a notice informing them of their shortage. Such students are allowed to continue in the semester after the first two monitorings. However, they are barred from sitting in examinations if they are short of attendance even in the third monitoring. Further at the end of the third monitoring, students are given attendance marks: if attendance is above 90% then 10 marks, between 80 and 90% then 8 marks and between 75 and 80 percent then 6 marks. No marks are given for attendance below 75%.
12. Personal details of an admitted student are to be kept. The previous academic record prior to the qualifying examination as well as of the qualifying examination are needed. For each semester of study in the programme, end semester result is maintained including full details of reappear, RLA, Detention, absence from examination etc. For each semester the registration details of the student are needed.
13. The passport office receives applications for making passports. The processing of applications involves obtaining an address verification report. Thereafter passports are sent to applicants.
14. An ATM system is to be built. It allows withdrawal of cash from savings and current bank accounts as well balance inquiry from a start date to an end date.
15. Adhar cards are issued to applicants. Applications are received and address verification is done. Thereafter, applicants are invited to reach the Adhar office where their fingerprints and iris scanning is done. Identity cards have a validity of 5 years. Upon expiry of this period card holders are invited to reapply. Again the same process as for the first card is followed. If a card holder does not respond at any stage, then the card issuing process is aborted.
16. A hotel reservation system allows for booking and cancellation of hotel rooms. Applicants may request for rooms of different categories and for a specified period. Rooms can be booked on rack rates or on packages for which discounted rates are prescribed. Payment for rooms booked is taken in advance for the first day of booking. At the time of cancellation a flat rate of cancellation is levied. Balance is returned back to the applicant.
17. This project is aimed at developing a central Recruitment Process System for the HR Group of a company. The company keeps record of employees who have left, retired, or are removed from service. Besides replacing such employees, the HR department may also be asked to recruit against completely new positions. The salary structure, designation structure are decided by the HR department and recruitment steps are initiated. These include storing applicant data, conducting interviews, and issuing appointment letters to selected candidates.
18. This project is aimed at developing a patient billing software system for a hospital. Patients may be out-patients and in-patients. Patients are admitted and based on expected treatment an advance is taken from them. This is adjusted against expenses on tests, medicines, surgery etc. that are incurred on the patient. For in-patients expenses include room rent and boarding expenses as well. There are different rooms at different rates and also there are general wards where charges are on a per bed basis.
19. Consider a retail bank which collects money from customers and in return gives them an interest at pre determined rate. Our objective is to automate this process of interest calculation. The system developed should calculate interest daily for each account having balance more than zero at the correct interest rate. Every month the cumulative interest calculated will be credited to the customer account after deducting tax at 10% of the interest paid. There can be different kinds of deposit accounts, savings, fixed term for one year, three years and greater than 5 years. The interest rates for these are as announced from time to time. Customers may also take loans from the bank for different periods, amounts and interest rates. Again, interest is calculated for different customers that they should pay by a specified date failing which they are declared as non-performing accounts.
20. This project is aimed at developing a Sales and Inventory Management System (SIMS) for a departmental store. This system can be used to store the details of the inventory of products, update the inventory based on the sale details, produce receipts for sales, generate sales and inventory reports periodically etc. SIMS also has an admin component that is used by the administrators for performing admin level functions such as adding new items to the inventory, changing the price of an item etc.