Project Topics

Software Engineering Lab

(CS29006)

Spring 2017

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Indian Institute of Technology Kharagpur

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P01: Railway Commodity Reservation System

(Professor Debasis Samanta)

Rail communication is an old-age and proven to be the safest mode of transportation. Further, Indian railway is one of the largest railway network in India. We are aware that for the Indian railways, there is a number of passenger reservation system known to the rail passengers and out of which the IRCTC RPS is the most sophisticated one and the most popular among public. In parallel to public transportation, Indian railways is also very much effective for commodity transportation. However, Indian railways is yet to launch any reservation mechanism for commodity transportation. This project is to take up this limitation and propose to develop a commodity reservation system.

Input:

- A database stating the network of transportation connectivity by rail cargos.
- Different cargos and their rout of movements, schedule, cost of transportation, whether express or normal service etc.

Functions:

- Availability check
- Booking a transportation
- Canceling a transportation

Output:

- Results on availability for a given date with capacity
- Booking confirmation
- Cancellation of an existing booking and confirmation

P02: Multimedia Content Protection System

(Professor Debasis Samanta)

Multimedia information like text, audio, video and any combination of those are most pervasive in almost every application fields namely Computer, Network, Smartphone and elsewhere. We also require a high degree of privacies of our own document. There is a problem that how such a document can be protected from unauthorized access. Of course, there are many methods such as using password, smartcard, biometrics, etc. are known. Nevertheless, the existing methods have their own limitations as robustness and cost issues. This project would aim to devise a (new) method and develop a user friendly and cost effective solution to the problem.

Input:
- A detail profile of the user, who wish to protect the document. The profile template will be finalized after a careful discussion with the team member (i.e., software engineer here).
- If any other input that might require.
- Document itself to be protected.

Functions:
- Encryption of document
- Decryption of document
- Opening a document under protection
- Deleting a document under protection
- Copying a document under protection

Output:
- Document after encryption
- Document after decryption
- Result on opening a document: success or failure; locking for three unsuccessful attempts
- Results on deleting a document under protection: success or failure; locking for three unsuccessful attempts
- Results on copying a document under protection: success or failure; locking for three unsuccessful attempts

P03: Delivery Agent System

(Professor Debasis Samanta)

There are many online shopping portals such as Flipkart, Amazon, Snapdeal, etc. are active in the Indian market. One major task is to deliver an online books products to the customers as first as possible in a cost-effective (cheapest) manner. A delivery agent system, which would automatically receive a delivery request from an online portal and identify the couriers, whom the delivery job can be assigned.

Input:
- Shipping details (source and destination) locations
- Couriers' details in different localities.
- Service offering for each courier company.

Functions:
- Booking delivery
- Status of delivery
- Cancellation of booking
- Delivery rescheduling
- Reward and penalty calculation
- Archiving record of past services

Output:
- Booking confirmation, if booking is successful.
- Reporting delivery status
- Cancellation of booking confirmation
- Update record on delivery rescheduling
- Update record and intimation on reward and penalty calculation
- Query generation on record of past service, given a courier agency.

P04: Social Networking

(Professor Sudip Misra)

We are living in the age of Social Networking like Facebook, LinkedIn, Google + etc. The objective is to develop a social networking application, which has the following basic features:

Operations:

- User can register into the application with their name, email id and password.
- Registered user may be able to login into the application.
- There should be options to get the basic information like date of birth, address, phone no, education, upload his/her picture, professional information, hobby etc.
- After login, user should be able to see their profile information.
- One should be able to add new friends.
- One should be able to see the basic profile information of their friend.
- One should be able to send messages to their friends.

Note: You can add other features, as you are familiar with different social networking sites and activities. Above points are only a few basic ideas of any social networking application.

P05: Online Campus Security Management System

(Sumana Maiti)

IIT Kharagpur has more than thousand security persons, who are instructed to give duties at different places within the campus. Additionally, they also maintain a routine, which contains all information, such as Date, Duty Start Time, Duty End Time, and Place. Most importantly, all the places are covered by at least one security person. If a security person takes leave, manual entry is done against that person. Finally, at the end of a month, the security persons get paid for their duties, while considering the number of leaves as well. You can see that the manual calculation/operation is a heavy task for the security manager. Therefore, the objective is to build an Online security management system through which entire security system within the campus can be controlled in an efficient manner.

Inputs:
- User Information
  - Security – (Name, Identity Number, Password)
  - Total number of security persons
  - Manager – (Name, Identity, Password)
- Place Information
  - Number of places identified by unique numbers

Operations:
- Security Person
  - Log-In
  - View duty date, place, start time, end time (upcoming 7 days schedule can be viewed)
  - Request manager to take leave or to do over duty
  - Request approved/declined
  - Number of leaves taken/ number of allowed leaves remaining
  - Log-Out
- Manager
  - Log-In
  - Create routine for upcoming 7 days for all persons considering leave requests
  - Approve/decline leave request
  - Monitoring
  - Log-Out

Outputs:

- Salary at the end of the month
- View routine

Constraints:

- All users MUST register themselves into the system.
- A security person can only check his/her own routine.
- Manager can check the status of all security persons.
- A fixed number of leaves are allowed. Beyond that, fixed amount will be deducted as fine.
- All security persons get same number of duties in a month.
- Adequate number of security persons are there to cover all places considering leave requests.
- A security person must not have duties in two different places at the same date and time.

P06: Airline Management System

(Sumana Maiti)

Airline Management System is a dedicated and highly configurable system for all airlines, which can be easily accessed by all users. It helps the users to book flights without visiting offline booking counters. This system can be accessible by any user from any location at any time. In such a system, a passenger should be able to view the availability of flights' details, as per their requirement. They can book the flights online and can also cancel the reservation. The administrator manages the passenger booking system and updates the reservation status.

Inputs:

- User Information

  - Passenger (Name, Email id, Password, Passport No, Passenger ID, Flight No, Source, Destination, Date, Time)

  - Administration (Admin_ID, Name, Email id, Contact no, Password).

- Flight Information

  - Domestic Flight(Type of Flight, Flight No, Source, Destination, In between stations, Date, Time, Type of class, Meal, Amount)

  - International Flight(Type of Flight, Flight No, Source, Destination, In between stations, Date, Time, Type of class, Meal, Amount)

Operations:

- Administrator

  - Login

  - Manage passengers

  - Update the passenger's status

- Passenger

  - Login

  - Edit Profile

  - Request to view the available flights as per requirement

  - Request for reservation

  - Ticket cancellation

Output:

- Display the available flights as per the user's requirement
- Display the confirmation of reservation (Display record/Error message)
- Print the ticket

Constraints:

- All the passengers must register themselves into the system.
- Login information contains only passenger id and password.
- To view the available flight details, passenger has to give source, destination, and date and time.
- After confirmation of reservation request, passenger can see the status.

P07: IIT Kharagpur Bus Service System

(TA: Abhishek Bera)

We know that our institute has a bus service for students. Can we make it more interesting? There should be a central bus service system through which different users can know the facility and avail the bus service. Required features of central bus service system are as follows:

1) HOME: User can enter the start point and end point to get the bus numbers, its entire route, timing etc.

Example: Suppose you a want to go to NALANDA complex from MS hall. You have to enter the start point as MS hall and end point as NALANDA hall. It will show you the bus availability, like:

2) BUS ROUTES: It will show the all the routes with their route number.

3) BUS STOP: User should able to enter the bus stop number. It will show the entire routes which are associated with the bus stop.

4) ROUTE: User should able to enter the route no. It will show the bus stop names associated with the route.

5) Booking: Any dept. can book the bus services for special events for the participants like international conference.

6) Availability: User can search for a particular date and get the information whether entire bus service (or a particular route) is available for that day or not.

7) Pickup and drop facility between Kharagpur railway station and IIT KGP : There are several occasions like Spring Fest when bus services are available from Kharagpur Railway Station. User can see the special events name, date, bus timing schedule pickup and drop location for those days.

8) Complain: User may register complain to the Bus Service Authority.

Some Advanced Features:

1. Routes can be linked with the google map, so that the route can be seen in google map.

NOTE: Above points are the basic guide lines for the application. It is expected from you that you are going add more features and make the application more useful and interesting.

P08: Here I Am

(TA: Kalyan)

"Here I Am" is all about a virtual friend who will assist in your daily life. Basic block of this idea is to build an application which acts as a personal assistant of users. How it works? Initially user has to feed the general information of themselves like age, sex, profession, hobby, education, information about work etc. Based on these input data, it helps user to maintain his/her daily activity, schedule, appointment etc. Some key features are stated below. The given key features are the basic guideline.

1. **General information**: This option takes the basic input of the user. It helps get the information about yourself like your personal data (generally the information which you give in social networking sites). This general information can be broken up like:

 a) Personal data: Name, sex, date of birth, email id, phone no., address, likes , dislikes etc.

 b) Education: User's educational background.

 c) Professional information: Basic information about user's profession. Name of the organization, your designation, role etc.

 d) Output: Based on the detail information about the user the application should generate the documented personal details like CV for that user.

2) **Reminder**: User can store his/her important schedule and gets the alert or notification of it.

 a) Input: User should have the option to enter the important dates, time and the brief about the event and save it.

 b) Output: User can search a particular date and see if there is any schedule for that date.

Some advances features:

1. User can search the information in web.

2. You can upload files, pictures etc. for future work. User can access those files or picture later.

3. Tracks the past records of user are meeting activities, so that user can see the past records as well.

4. Option to take a note of content of any conversation or meeting and save it to file. He or she can able to access those files in future.

Note: Since you are going to develop a web application for this, it is suggested to create a login option for multiple users. So that multiple user can register into this application and get their spaces. So you need to provide an option to register in the application for new user. Once they register, they will able to login.

Above points are the basic guide lines for the application. It is expected from you that you are going add more features and make the application more useful and interesting.

P09: Hall Management System

(TA: Ilora Maity)

1 Problem Description

In a hall management system like that of IIT KGP, students are accommodated in 20 Halls of Residence which are managed by HMC. These halls are administered by Wardens and Assistant Wardens (Mess, Maintenance, Allotment) with help of hall managers and supervisors.

Catering service is provided by the regular hall staff members in some of the halls, and for the remaining halls it has been outsourced to private agencies. Cleaning service is outsourced for all the halls of residence. Activities related to Mess operations and monitoring, sports and games, cultural events, library etc. are managed by various elected general secretaries and overseen by The Hall President.

You are required to design an equivalent Hall Management System (HMS). Some of the use cases are given in the next section. Your system should not be limited to the given use cases. Add more attractive features.

2 Use Cases for the HMS

2.1 Initial Hall Allocation

- The student pays the admission fees via ERP.

- ERP profile is generated and hall is allocated based on the student's category (BTech, MTech, MS or Phd).

- On the day of admission, the student submits the required documents at the hall and is allocated a room (single or sharing).

2.2 Change Hall

- HMC advertises for filling up vacant rooms in various halls.

- Student submits application.

- New hall is allocated based on seniority.

Variation: Mutual Change (Swapping) of Halls

- HMC advertises for mutual change (swapping) of halls.

- Two consenting bachelor students A and B fill up a common form.

- If student A from hall X is allowed to swap with student B from hall Y, then A will move to hall Y and occupy the same room allotted where B was staying and B will be allotted the room where A was staying. In hall X, the mess bill and other dues of student A will be levied on student B and in hall Y, the mess bill and other dues of student B will be levied on student A.

2.3 Submit a Complaint Related to Maintenance

- Student submits a complaint letter to hall manager/supervisor.
- If it is an addressable complaint, the hall manager/supervisor forwards it to Assistant Warden (maintenance).
- Assistant Warden (maintenance) addresses the problem with the help of HMC.

2.4 Submit a Complaint Related to Mess

- Student submits a complaint letter to General Secretary (Mess)/ writes in the complaint register.
- If it is an addressable complaint, General Secretary (Mess) forwards it to Assistant Warden (Mess).
- Assistant Warden (Mess) addresses the problem with the help of HMC.

2.5 Booking Guest Room in Hall

- Student submits an application to hall manager mentioning the duration and dates.
- If guest room is available for the requested time period, the hall manager approves the request.

3 Some Other Operations of the HMS

- Maintenance of student record.
- Maintenance of HMC employee record.
- Generating alert messages (or emails) for due fee payment.
- Display of general information of a hall.
- Query regarding vacancy in a hall.
- Query regarding staff recruitment (catering/cleaning) in a hall.

P10: E-Wallet Management System

(TA: Ilora Maity)

1 Problem Description

E-wallet is an online prepaid account where one can stock money, to be used when required. As it is a pre-loaded facility, consumers can buy a range of products from airline tickets to grocery without swiping a debit or credit card.

You are required to design a similar E-Wallet Management System (EMS). Some of the use cases are given in the next section. Your system should not be limited to the given use cases. Add more attractive features.

2 Use Cases for the EMS

2.1 Load E-Wallet

Customer loads his wallet via Credit/Debit card, Net Banking, IMPS or ATM card. The money is deposited with the Escrow bank (this is to ensure EMS does not cheat its customers).

Each Wallet is of two types:

- **Minimum KYC Wallet**: Minimum KYC wallet customers have to verify their mobile numbers and email (optional). Minimum KYC wallet customers can add a maximum of Rs 10,000 in a calendar month in their wallet. They can send money to other e-wallet customers not exceeding Rs 25,000 in a calendar month. They can also send money from their e-wallet to any bank account not exceeding Rs 25,000 in a calendar month. The total amount of of money that can be sent to another e-wallet customer and to a bank account can not exceed Rs 25,000 in a calendar month.

- **Full KYC Wallet**: Full KYC Wallet customers can hold a maximum amount of Rs 100,000 in their e-wallets at any point in time. There is no limit to the amount of money that can be added in a Full KYC e-Wallet as long as the total amount in the e-wallet does not exceed Rs 100,000. This means that Full KYC Wallet customers can spend much more than Minimum KYC Wallet customers and can also receive more cashback without crossing their wallet's monthly limits. Full KYC Wallet customers can send money to other e-wallet customers not exceeding Rs 25,000 in a calendar month. They can also send money from their e-wallet to any bank account not exceeding Rs 25,000 in a calendar month. The total amount of of money that can be sent to another e-wallet customer and to a bank account can not exceed Rs 25,000 in a calendar month.

2.2 Pay Merchant

1. **P2P transaction**
   1. Merchant shares his number with customer or the customer scans the merchant's code.
   2. Customer transfers the money to the merchant's wallet in accordance with the KYC status of the merchant.

2. **P2M transaction**

   1. The merchant registers with the Escrow Bank.

   2. e-wallet Data Center collects KYC documents and bank details of the merchant and registers merchant with the Escrow Bank.

   3. When customer pays merchant, customer's wallet is debited and a notification is sent to Escrow bank.

   4. The escrow bank then transfers this money into the bank account of merchant registered with it.

2.3 Transfer Money from E-Wallet to Bank Account

1. Log in to EMS.

2. Select `Send' option.

3. Select `Send to Bank' option.

4. Enter the Name you want to give to this beneficiary.

5. Enter the account number.

6. Enter the IFSC code of the branch. You can select the IFSC code from a dropdown.

7. Enter the amount you want to send. Minimum amount should be Rs xxx.

8. You can also enter the reason for sending money, however this is optional.

9. Select Send. Your money will be successfully transferred to the bank account.

3 Some Other Operations of the EMS

- **View Passbook**: Shows e-wallet balance.

- **Upgrade Wallet**: Wallets can be upgraded from minimum KYC to full KYC by providing full KYC details to the e-wallet Data Center.

Reference: https://paytm.com/care/paytmwallet/

P11: Inter IIT Tournament Management System

(TA: Affan)

1 Problem Description

Inter IIT Tournament is the annual sports tournament of the Indian Institutes of Technology. It is organized in December every year. The seven old IITs take turns hosting the event. Tournaments are held in 13 different sports, namely: Athletics, Badminton, Basketball, Cricket, Football, Hockey, Lawn Tennis, Squash, Swimming, Table Tennis, Volleyball, Water Polo, and Weightlifting.

You are required to design a similar Inter IIT Tournament Management System (IITMS). Some of the use cases are given in the next section. Your system should not be limited to the given use cases. Add more attractive features.

2 Use Cases for the IITMS

2.1 Change Schedule

1. Login as an organizer.
2. Select the sport and select the match.
3. Modify schedule and notify the players of both teams.

2.2 View Schedule

1. Login as a player with Player ID.
2. Select the sport and select `view schedule' option.
3. The entire schedule is displayed.

2.3 View Scoreboard

1. Login to the system.
2. Select sports and select `view scoreboard' option.
3. The specific scoreboard is displayed. Scoreboard of a particular match can also be displayed.

2.4 Update Scoreboard

1. Match official submits the details to the sports office after each match.
2. Organizer logs into the system.
3. Organizer updates the results in the scoreboard.

2.5 Initial Reporting of the Players

1. Teams report to the host IIT office and submit the required documents.
2. Hall is allocated to each team and ID card is given to each player.
3. Login credentials are created for each player and details of the players are recorded.

2.6 Addressing Complaints of Teams

1. Each team has a team manager who logs in and submits complaint.
2. The organizer is notified about the complaint.
3. The organizer addresses the issue and notifies the team manager.

2.7 Distribution of Playing Kits to the Players

1. Each player logs in and submits a request for the kits via portal.
2. Organizer is notified after each request.
3. Organizer checks inventory. If kits are available, informs the player the date and time to collect the kits.
4. If kits are unavailable, organizer tells the player to submit the request again after one day and closes the current request.
5. After giving the kits to a player, the organizer closes the his/her request.

3 Some Other Operations of the IITMS

- Ability to logging in the system and changing password (both for players and organizers).
- Apply for medical reimbursement in case of injured players.
- Notifying free players about matches where they can cheer for the other teams from the same IIT.
- Traveling allowance distribution to the players based upon their details.

P12: Hospital Management System (HMS)

(TA: Arijit Roy)

Hospital Management System (HMS) is powerful, flexible, and easy to use system, which is very helpful in a hospital environment, in order to maintain a hospital efficiently. Hospital Management System designed for multi-specialty hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to-end Hospital Management System (HMS) that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow.

In a HMS need to have entry of all the data related to patients, doctors, staffs, and administrator(s). Each patients admitted in the hospital needs to enter their personal information, which are accessible by authorized doctors and staffs. On the other hand, a patient should have access permission to download any medical report associated with him/her. Billing process should be included in the system, such that it can easily be update after each payment.

Inputs:

- Hospital information (name, address, branch, department, facilities)
- Employee information (name, employee id, address, contact details)
- Doctor information (name, employee id, address, contact details, specialization, degrees)
- Patient information (name, id, address, age, payment, others)

Output:

- Patient details
- Patients list
- Receipt generation
- Report generation

Constraints:

- All the users must register into the system though the web interface.
- All the users must login into the web interface through userid (must be unique) and password
- Patients should allow to get login him/her-self in order to collecting own information
- On login into the system, a doctor must be able to see the patients list under his/her observation
- One patient must not access the information of some other patients
- All the patients must be able to download all the medical report and bill as per his requirement by login into the system

Add, delete, and update must be reflect immediately in the system

P13: Payroll Management System (PMS)

(TA: Arijit Roy)

The Employee and Payroll Systems objective is to provide a system which manages the employee details, the Payroll activity done in a company depending upon the employees attendance and its calculation which is very huge. The users will consume less amount of time through computerized system rather than working manually. The system will take care of all the payroll activities like managing each employee's attendance, the number of leaves taken by that particular employee and calculation in a very quick manner and it avoids

Data storing is easier. Paper work will be reduced and the company staffs spend more time on monitoring the progress. The system is user friendly and easy to use. All the important data's will be stored in the database and it avoids any miscalculation.

The "Employee and Payroll System "is based on maintaining each employee records and calculating his/her salary depending on the workdays. The first activity is based on saving the employees details where each employee will be given a unique Employee ID. Now based on the no of days an employee attended per month, salary will be calculated by checking the no of workdays of a company and his/her basic salary and a separate salary slip will be provided for reference.

Inputs:
- Employee details (employee no, name, address, designation, department, achievements)
- Accounts details (salary of each employee, deduction, TA, DA, HRA, other allowance, PF)
- Leave information (no of leave taken by each employee)

Output:
- Salary slip
- Detailed salary report
- Deduction details
- Leave information

Constraints:
- Admin must have the permission to update the employee information manually
- Manager should be able to see the details of an employee
- Salary slip, detailed salary report, deduction details, and leave and information of a particular employee must not be accessible to another employee
- The leave information must be update automatically, if an employee takes leave.

P14: Examination Management System

(TA: Satendra Kumar)

The interest of universities/companies towards the online examination increasing day by day. The factors influence this interest consists of reduction of paper use, fast evaluation, cost reduction and much more such advantages. The Examination Management System (EMS) is software which enables companies to conduct examinations online in an efficient way.

The candidates and companies register themselves EMS, to avail the services. It is the responsibility of companies to add questions, related to various topics on which they want to examine the candidates. Candidate can choose exam time slots pre-decided by the company. Once the slot is chosen by the candidate, a notification mail will go to both candidates and organizing company end. During the exam, candidate can see the questions according to the test he/she attempts. The EMS can serve more than one company so one candidate can attempt multiple tests. However, he/she cannot attempt a particular test more than once in a specified duration of time.

Input to the System:
- Company Profile
- Candidate Profile
- Question bank and associated Answer
- Output of the system:
- Result of the examination
- Detail reports for the company

Constraints:
- The candidate can see the list of exam based on his/her eligibility.
- The company can see the list of candidates appearing for the different exam.
- During the exam, the candidate can switch between different questions.
- Candidate can see the result at the end of examination and able to print it.

P15: Smart Home Management System

(TA: Satendra Kumar)

"Smart Home" is the term commonly used to define a residence that has smart devices which are able to communicate with the central controller. The smart home management system is a system which enabled the automation of smart home. Typically it includes following Four Components:

Electronics Devices and Sensors: It includes devices such as air conditioning, TVs, computers, entertainment audio & video systems, and camera systems. In addition to that, it can include sensors (temperature, humidity, light, and sound) for environment sensing.

Wireless network: It is a medium of communication between the central controller and devices/sensors. e.g. Wifi.

Central Controller: The SHMS can operate in two modes (automatic and manual). In automatic mode, it receives streaming data from sensors and on/off the appliances according to the User Environmental Comfort range. However, in manual mode, it on/off the appliances according to the user request.

User Interface (e.g. Android App): It enables user and administrator to sign up and login before availing the services. After login user can give its Environmental Comfort range as per the offered services. The user can also see the available appliances and change its status (on/off) as per the preferences. There should be an option of registering a complaint in the case of system failure. After login the administrator can add new devices/sensors to the existing system. In addition to that he/she gets notified regarding the registered complaint. The billing calculation should be based on the energy consumed by the devices/ sensors. Moreover, the user should be notified through SMS in case of a general event(when operating in manual mode) and through SMS and Call in the case of any emergency.

System Inputs:

- User Personal Information: (name, email, age, gender, mobile number, security question)

- User Environmental Comfort range (Temperature, Humidity, Lighting, sound)

- System Administrator Details: (mailed, contact no.)

- Operating Mode (Automatic or manual)

- Appliances Information (Type, Power, Unique Id, Status)

- Sensor Information (Type, Id, operating range)

System Outputs:

- Electricity Billing Details.

- Complaint and Feedback

- Alert by SMS

- Alert by SMS and Call in case of Emergency

System Constraints:

- User/ Administrator must register with the SHMS to access the portal.
- The mobile number must be a 10 digit number.
- Login information consists of email address and password
- The each appliance and sensors assigned a unique ID
- User environmental comfort range must be in the operating range of sensors.
- Enable power saver mode only if operating mode is automatic.
- In manual mode, every time the operating status of appliances change system must show the current billing status.
- Every time user logins system must show current environmental condition.

P16: Cyber/Internet Cafe Management Software

(TA: Akash Mondal)

Internet Cafes use external softwares to manage allotment of systems, accounting and various other purposes. The specifications of a general Internet cafe are as follows:

There will be availability of different kind of systems in the cafe:

- Browsing Systems

- Gaming Systems

- Academics purpose Systems

There is availability of various types of printers and xerox machines for making hard copies of documents, examples:

- Plain Printer

- Colour Printer

- Simple Xerox Machine

Each system will be present at a terminal, which is represented by a unique terminal numbers.

The software requires initial configuration i.e, setting up the software for management of the internet cafe. Those steps are:

- Taking as input total no. of various systems present at the cafe along with their specifications. Software should have proper input arrangements for taking total no. of various systems like Browsing Systems, Gaming Systems, Academic Systems along with their specifications.

- Similarly, taking in inputs total no. of various printers and xerox machines along with their specifications.

- Define rates for various activities that are available at the internet cafe. Example, cost of browsing internet, playing games, taking printouts from a fixed arrangement.

- Age limit for various activities available at the internet cafe(OPTIONAL).

General Features expected from a finally Built software:

- Every customer must must submit their personal details like correct age, address, phone no., email address which will be saved in the database.

- Once, user mentions their System requirements and time needed(Gaming, Browsing, Printing etc..) software should allot him a Terminal where he/she may start a session.

- In case no terminal is idle, software should tell him the waiting time and terminal no. The only constraints is there shouldn't be any clash between allotments.

- Software should notify when a particular session is completed or time expires.

- The above is not required for printing devices. It can be assumes to be instantaneous operations.

- After Every usage, software should provide him the Amount he/she need to provide. This

includes using systems and printing both.

- All the System activity information need to be saved in database for conducting later enquires.

- All at the day end, The owner must be able see his/her total revenue. This must include division i,e. revenue by various systems, printing devices etc.

P17: Graphics Editor Software (GES)

(TA: Akash Mondal)

Those who are not familiar with any graphics editor at all, please try looking at the Graphics Drawing features available in either MS-Word or PowerPoint software. You can also examine any other Graphical Drawing package accessible to you such as AutoCAD. An understanding of the standard features of a Graphics Editor will help you understand the different features required for this problem.

It is required to develop a graphics editor software package to create line drawings involving several types of graphics entities. The graphics editor should support the following functionalities:

- Creating several types of geometric objects such as circles, ellipses, rectangles, lines, polygons, and texts associated with them.

- It should be possible to select an object by clicking a mouse button on the object icon. This icon should be shown in a highlighted color.

- Modifying various characteristics of an object such as its shape, size, location, color, fill style, line width, line style (dashed, dotted, continuous), etc. can be changed. For texts, the text content can be changed.

- Copying or moving the selected object to a different location, or deleting a selected object.

- Saving the created graphics on the disk under a user specified name. Loading a previously created graphics file from the disk.

- Importing bitmap pictures into specified positions in the drawing.

- Defining a rectangular area on the screen and zooming the area to fill the entire screen.

- A fit screen function to make the entire created graphics fit the screen by automatically adjusting the zoom and pan values.

- A pan function to shift the displayed drawing along any direction by a specified amount.

- A grouping function to handle complex drawings. A group can be formed by selecting a set of objects.A group can include other groups as well. A drawing object can be a member of at most one group. A group behaves as a single entity for move, copy and delete operations.

- A set of 10 clip boards should be provided to which one can copy various types of selected entities (including groups) for future use in pasting these at different places when required.

P18: Online Examination System

(TA: Kalyan)

Now-a-days, Online examination system has become popular for competitive examinations because of its unique features such as auto-evaluation, speed and accuracy. Moreover, it also helps environments by reducing the use of paper. In such a system, students are asked to select answers from multiple options given for a single question. Likewise, there are several questions which appear in the students' systems. The questions and multiple options are saved in a database along with desired answers. Typically, a student can edit an answer after saving it, however, editing cannot be done after submitting the answer. Another user is also there – administrator. The administrator can create, modify and delete questions and accordingly, the question is updated in the system.

Inputs:
- Subject Information with Code, so that all subjects can be identified using unique codes.
- User Information
- If Student- Student Information (Name, Roll No, Email Address, Contact Number, Password)
- If Administrator (Email Address, Password)
- Set of Questions with multiple answers for each stored in a database along with desired answers.

Operations:
- Administrator
  - Log-In
  - CREATE, MODIFY or DELETE questions. Accordingly, the question set must be updated.
  - Log-Out
- Student
  - Log-In (Time starts)
  - Answer the questions – SAVE and SUBMIT
  - Log-Out (Automatically logged out after Timeout)

Outputs:
- Display the result in DESCENDING order according to obtained marks with Roll Number.
- The result is also saved into a database for future use.

Constraints:

- All users MUST register themselves into the system.

- Same set of questions should appear to all students.

- Log-In information contains only Email Address and Password.

- After clicking on SUBMIT, selected answers cannot be changed.

- After clicking on SAVE, selected answers can be changed.

P19: Online Toll Plaza System

(TA: Samaresh Bera)

Now-a-days, cashless transaction is becoming popular among the users because it is easy to handle, and it does not require to carry cash in hand. Typically, in India, road tolls are collected from cars manually for which the cars need to stop to pay the toll fee. In contrast, the objective is to make the system Online, so that the toll fee is automatically deducted from the user. Therefore, users credit their Online account (consider this as eWallet), and money is automatically deducted when the cars pass the toll system. As a result, the users do not have to wait for manual toll fee payment. Concurrently, administrator can also view all transactions from anywhere. Finally, the administrator can view the total income in a day-to-day basis, and can also analyze the traffic pattern as well.

Inputs:
- User Information (Name, Car Number, Email Address, Password, Money in eWallet)
- Administrator Information (Email Address, Password)

Operations:
- User
  - Log-In
  - Credit in eWallet
  - Check eWallet Balance
  - Log-Out
- System
  - Check the car number
  - Required Fee Available
    - Allow the car to pass
    - Deduct money from eWallet
  - Required Fee NOT Available
    - Do Not Allow the car to pass
    - Fee Payment is done manually
  - Allow the car to pass
  - Total Income is stored in a database
- Administrator
  - Log-In

- View transactions
- View total income

Outputs:
- Display day-wise transactions to administrator
- User can view his/her own transactions

Constraints:
- All users MUST register themselves into the system with their car numbers.
- A user can only view his/her own transactions
- Administrator can view all transactions

P20: Online Health Monitoring System

(TA: Samaresh Bera)

Online health monitoring or Online patient monitoring system (OHMS) is a promising technology to enable patient monitoring outside the conventional clinical system, i.e., the patient can be monitored remotely. Consequently, such system increases the access to care the patients and decreases the delivery cost related to healthcare.

Typically, in OHMS, two type of users are there – doctors and patients. Different physiological parameters of the patient are monitored (using sensors), and the monitored data is stored in a server. The stored data is accessible from anywhere through user authentication. On the other hand, doctors can check the health status of a patient registered with the doctor. Therefore, the doctor can only access the physiological data of a patient if and only if he/she is registered with the doctor. Depending on the monitored values, adequate measures can be taken by the doctors. The patient can also view his/her health status. For authenticity, both the users need to login into the system.

Inputs:

- User Information
- Doctor – (Name, Email Address, Password)
- Patient – (Name, Email Address, Password, DOB)
- Predefined Sensors (such as temperature, blood pressure and heart rate)

Operations:

- Patient
  - Log-In
  - View health status
  - Ask doctor(s) to consult
  - Payment (Consultancy Fee)
  - Log-Out
- Doctor
  - Log-In
  - Monitor health status of registered patients to him/her
  - Ask patient(s) to consult
  - Log-Out

Outputs:

- Display health status
- Consult with doctors/patients

Constraints:

- All users MUST register themselves into the system.
- Age of patients automatically calculated using DOB information.
- Doctors can access the health information of patients registered to them only.
- Nobody can modify the stored information.
- A patient can only view his/her health status.

P21: Conference Management System

(TA: Barun Saha)

Scientific conferences publish latest innovations and outcomes in research work spanning across several domains. However, before a research paper is published – or even selected for publication – it must go through a rigorous peer review process. A Conference Management System (CMS) is a software that helps to manage and streamline such review process. EDAS [1] is an example of a CMS.

Organizing a conference is a huge task, and the responsibilities are shared by many people divided into different committees. In general, there are two large committees – the program committee (PC) and the organizing committee (OC). The PC consists of several people (both from academia and industry) who are experts in their respective areas. The role of PC members include pre-screening the submissions to ensure that appropriate quality of papers are considered. Subsequently, the PC members assign reviewers for each paper under consideration. Any given paper must have at least two reviewers assigned. However, if a reviewer declines to review a particular paper, new reviewer(s) must be assigned for it. Once all the reviews for all the papers are available, the PC members select a fraction of them for publication. The PC chair(s) oversee the entire review phase, and help in tie-breaking, if required.

The OC has 1-2 general chair(s) who oversee the entire conference organization process. The OC consists of smaller subcommittees with 1-5 members such as, publication chair(s), publicity chair(s), registration chair(s), web chair(s), and so on.

Once a conference has been planned, the OC chair(s) has to request the CMS to create an entry for the corresponding conference. The CMS provides a special link to make such requests online. After an entry for the conference is created, the OC chairs are given admin privileges, who, in turn, are responsible for adding the other relevant members. The URL linking the conference to the CMS is advertised. Authors access that URL, and upload their papers along with all other relevant inputs. After a pre-published deadline, the decision of a paper (accept or reject) together with reviewers' comments is visible to the authors. In case a paper is accepted, the authors should make changes as per the review comments, if relevant, and upload the camera-ready version within a specified deadline.

Inputs:
- Conference information (title, date, venue, topics covered, and deadlines)
- OC & PC information (email addresses of the members)
- User information (name, password, email address, affiliation, and areas of expertise [optional])
- Paper information (title, abstract , authors, affiliations, and PDF file)
- Review comments:
  - Rate the paper in a scale of 1-5
  - Detailed comments
  - Reviewer's opinion on whether to accept/reject the paper
- Final selection decision (paper id, accept/reject)

Outputs:
- Details of papers submitted
- Review decision (see the format of review comments)
- List of papers accepted
- Percentage of papers accepted

Constraints:
- All users must register with the CMS to access the portal
- A reviewer assigned for a paper may not be an existing user of the CMS; he/she must register in order to submit the review comments
- Login information consists of email address and password
- Each submitted paper is assigned a unique ID
- It is sufficient if only one author of a paper is registered to the CMS; he/she will be responsible for submitting the paper
- An author can view the review decision for his/her paper(s) only
- A reviewer can view information only about those papers for which he/she has been assigned a reviewer
- Only PC members can view all reviews for all papers

[1]: https://www.edas.info/

P22: Integrated Development Environment

(TA: Barun Saha)

A real-life software project consists of several files of source code, assets, dependencies, build rules, and so on. In such a case, managing and organizing every file by hand becomes tedious. An Integrated Development Environment (IDE) is often useful in such scenarios. NetBeans is an example of one such popular IDE.
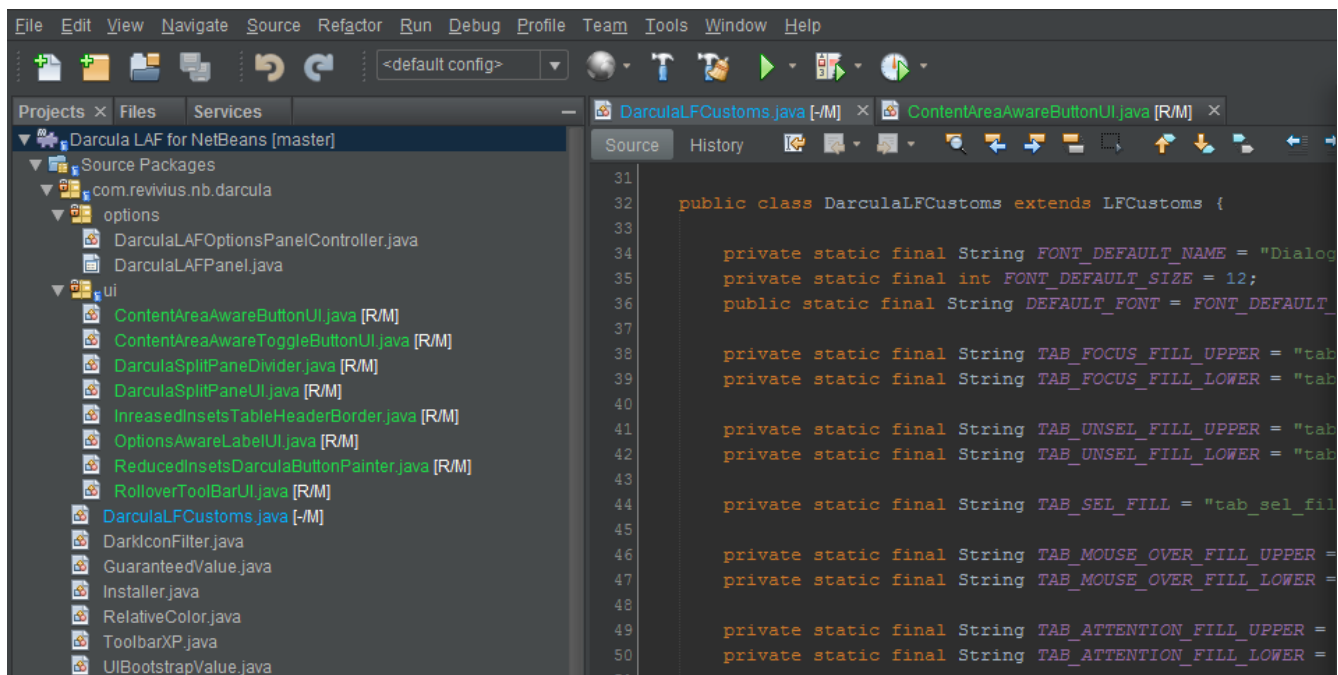
The Figure above shows a screenshot of NetBeans. The primary feature offered by any IDE is an advanced code editor, where one can write/edit source code as well as other files. The editor usually highlights the contents based on the type of the file. It also provides a tabbed view where all the files opened in the IDE are displayed (see Figure). Moreover, the autocompletion feature is often provided to help in the coding process. When the contents of an existing file is changed, the IDE provides an option to save them to the disk. In case the code is badly formatted (bad indentation), the IDE allows to automatically fix it.

A "project" constitutes the basic unit of work in an IDE; one must create a project (e.g., a C or Java project) in a specified directory to begin with. Once a project is added, new files/directories can be added to it. The contents of the project directory are often listed in a tree-like view to easily navigate across the files. Advanced functionality includes creation, renaming, and deletion of files from the tree view.

The real power of an IDE comes from several other additional features that are usually not present in a typical text editor. In particular, an IDE allows to build a project. In case of a C project, it would mean compiling all the source files and generating the binary executable. In case of a Java project, this would involve compiling the .java files. The output and status of a build are displayed in a subwindow. For

example, a build fails when there is at least a single compilation error. However, if there is no compilation error, the build process is successful.

The IDE also allows to run a project. Again, in the case of a C project, this would amount to executing the binary, whereas in a Java project, this would involve interpreting the class files. The output of execution is also displayed in a subwindow. There is also the "build and run" option, which combines these two steps – the project is compiled and executed if there is no compilation error. Additionally, an IDE also provides other very advanced features including, but not limited to, debugging a project, versioning, viewing file differences, adding libraries, and so on.

Inputs:
- Project (type, name, directory)
- Files (names and contents)
- Makefile (in case of a C project)
- In case of a Java project, class name containing the main() method

Outputs:
- Syntax highlighted and auto-formatted (indented) code
- Contents written to appropriate files in appropriate directories
- Build output
- Execution output

Constraints:
- A directory having the same name as the project is to be created; all files related to the project should reside inside it
- Only a single project can be created inside a given directory
- Assume that the programs take no inputs from users

Tutorial

Some useful concepts for application development in C.

Executing a Linux shell command from a C program

Use `system()` to execute any arbitrary shell command from within a C program. The function prototype is as follows.

```
#include <stdlib.h>

int system(const char *command);
```

For example, we can compile the Java classes as shown below.

```
system("javac *.java");
```

Displaying dialog boxes in a Linux terminal

The dialog command in Linux provides the capability of displaying a dialog box in the terminal. Various types of dialog boxes are available. For example, `dialog --infobox "Hello, world" 10 50` displays a simple box containing the text "Hello, world", as shown below.
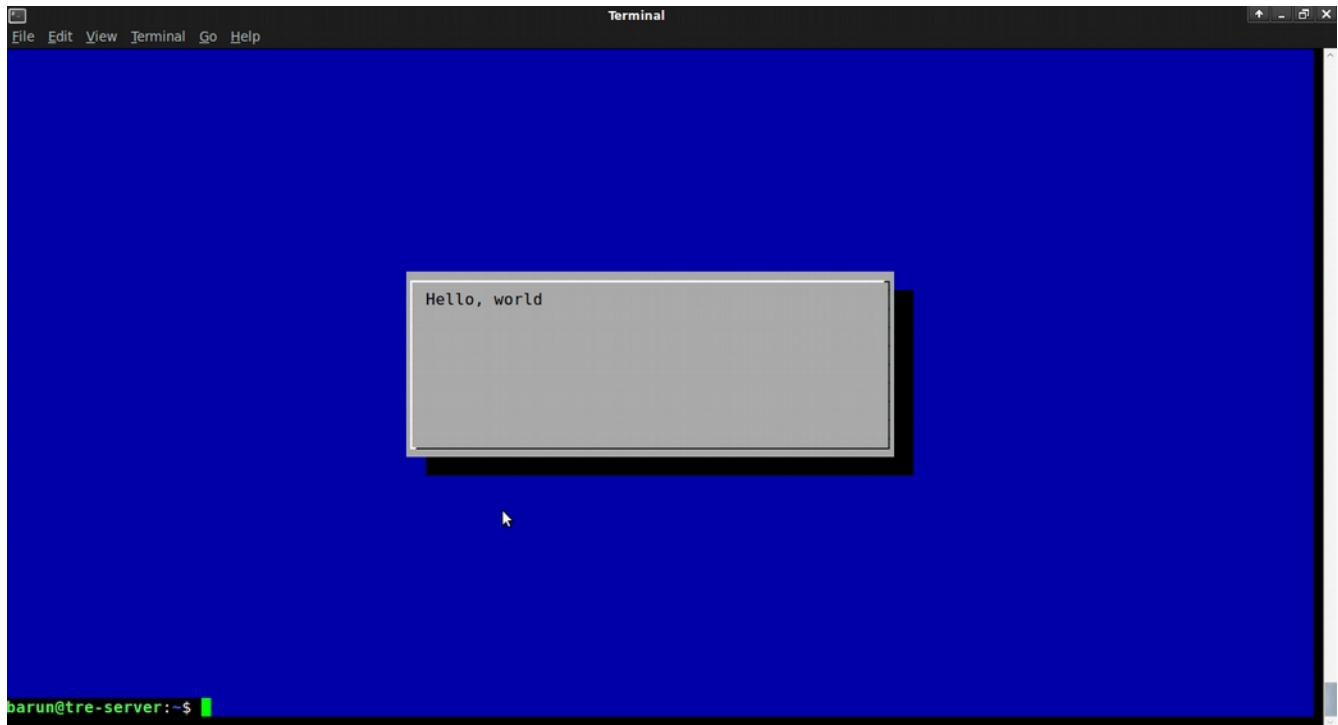
It is possible to save the output from the dialog boxes into files. However, what exactly is the output depends on the type of dialog box invoked. For example, the following command takes an input from the user and saves it into a file named `answer`. Note that the file `answer` would be overwritten every time the command is executed.

```
dialog --inputbox Title 10 50 2> answer
```

To view all the options available with dialog, simply type dialog in the terminal, and press enter.

Warning: Never use system() in real-life applications; use the exec family of functions instead.