EE436L: Database Engineering

Department of Electrical Engineering
University of Engineering and Technology Lahore

Semester Spring 2019
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Lab Project File

Purpose of the Project

Analyze, specify, design, implement, document, and demonstrate an information system of a real world application. The list of applications and its details are provided in the next section. You are required to use the Classical Methodology for Database Development as covered in the lecture contents. The system should be implemented using a relational DBMS that supports standard SQL queries.
In no circumstances, you can use automatically generated SQL queries software or automatically mapped programming objects into the database or any pre-programmed function available on the internet.

Project Phases

The three phases of the project cover the following work-processes from the Classical Methodology for Database Development.

No	Phase	Due Date
I	Analysis and Specification	April 7th, 2019
II	Design	April 28th, 2019
III	Implementation and Testing	Before the final week of semester*
IV	Demonstration	During last week*

*exact schedule will be announced later

Phase I (hard copy + soft copy)

The deliverables include:

1. A cover page listing names and roll numbers of all of the members in the team with their respective sections, email addresses, and title of the project.

2. A brief abstract of the project indicating your final deliverables precisely.
3. Enhanced Entity Relationship (EER) Diagram.
4. Information Flow Diagram *(can be found in "Database Design Methodology")*
5. A list of logical constraints that will be enforced. Do not include any constraints that can be shown in the ER diagram, but rather semantic and business logic related constraints. **You are required to include at least five constraints, although a fully-specified system will have more than that. Constraints that can be specified directly using ER notation will not count toward the five required.**
6. Any assumptions made including explanations.
7. Tasks performed by each group member. (Be fair in this evaluation as I trust you completely in this aspect)

Notes:

- The EER must capture the constraints of the system that can be modeled in EER as much as possible whenever applicable, that is, total participation, super/sub class, weak entities.
- The design of your system must satisfy all the constraints. You are allowed to make up additional assumptions and constraints as long as they do not conflict with the specified constraints and requirements. If possible, those additional assumptions and constraints should be modeled and included in the ER diagram. You must turn in a hard copy of your report and a soft copy that will be checked through turnitin for plagiarism.

Phase II (hard copy + soft copy)

1. Cover Page
2. Copy of the ER Diagram (either from phase I (with any revisions) or from the solution provided).
3. Relational Schema Diagram (with primary and foreign keys identified, referential integrity is shown by arrows).
4. Create Table statements, including domain constraints, integrity constraints, primary keys, and foreign keys.
5. SQL statements for each task.
6. Tasks performed by each group member. (Be fair in this evaluation as I trust you completely in this aspect)

Phase III

A complete demonstration of your project as website designed in PHP and HTML. Prior to the demo, create your own data set. The database has to be populated with this data set of at-least 15 entries prior to the demo. **5% will be deducted from the grade otherwise.**

Implement a working application with all functionality described in the project description. Your source code should be mailed by the deadline.
Deliverables for Phase 3 are:

1. Copy of the Create Table statements from phase II (with any revisions).
2. Source code (documented) for your system (soft copy).

3. A set of working SQL statements for all project tasks.
4. A functional application with embedded SQL statements that accesses your database.
5. Tasks performed by each group member. (Be fair in this evaluation as I trust you completely in this aspect)

Grading

The project will consist of three phases (deliverables) as well as a final demonstration. Phase I and Phase II of the project are each worth 25% credit and phase III is worth 50% credit of the marks assigned to the final project.

List of Projects

1. Online Car Rental System
2. Automatic Timetable and Course Management System (Advanced algorithm skills will be required to do this project, so it will have extra weightage)
3. Online Job Portal
4. E-shopping store Application
5. E-book download Application
6. University Academic Management System
7. Hospital Management System
8. Library Management System
9. Pharmacy Management System
10. Cricket World Cup management system

APPLICATION DESCRIPTION

1. Online Car Rental System

Car Rental is a simple online car rental service application. There are primarily 3 types of users of this system: Employees, Members, and Administrators. Using this application, anybody can become members and rent a car anywhere on the campus on an hourly basis. Employees use this application to manage cars, their locations if need be, informing the members in case of delay, etc. The administrator can view administrative reports as explained in the later sections. Employees, members, and administrators are mutually exclusive.

All users are uniquely identified by his or her Username. A valid Username and Password combination is required to log in to the system. If the user provides invalid login credentials, an error message should be displayed and the user should be redirected / returned to the login screen.

If someone is a new user, who doesn't have an account with the system, needs to create an account by clicking ‘New User?’. He/She needs to register before using the application. We assume that the administrator already has his credentials in the database. A new user can enter his basic information using the screen and form containing all the basic information of the user and its type.

Retrieving a forgotten password is an optional functionality but is not required to be implemented. Once a user logs into the system, he would be directed to the ‘Homepage’ screen which would be different for member and employee. Henceforth, when an administrator logs in, he should be directly navigated to the reports page (explained later).

The homepage of ‘member’ would give the user options of renting a car, entering and viewing personal information, and viewing his rental history. Please note that it is mandatory for the user to enter his personal information for the first time before he can use the ‘Rent a car’ functionality.

The personal information page will consist of 3 sections: General Information, Membership Information, and Payment Information. In the General Information section, the user would be required to enter basic information like First Name, Middle Initial, Last Name, Email Address, Phone Number, and Address. The Membership Information section requires the user to choose a driving plan which is of 3 types: Occasional Driving plan, Frequent Driving plan, and Daily Driving plan. The plan details can be viewed by clicking on ‘View Plan Details’ link which navigates the user to the Driving Plans screen. Each driving plan may or may not have a monthly payment, some percentage of discount on the hourly cost of the car being rented, and annual fees. A user cannot choose more than one driving plan. After making this selection, the user moves on to the payment information section where he is required to enter his card details such as Name on the card, Card Number, CVV, Expiry Date, Billing Address. Note that the user should not be allowed to proceed forward without filling in the payment information. Clicking ‘Done’ saves all this information in the database. All this information can be updated at any time by changing the details on this page and clicking done again.

Each car, identified by a vehicle serial number, has a model name (Honda Civic, Audi A3, Suzuki Alto, Infinity G37, Ford Escape, etc.), a type (Hatchback, Hybrid, Convertible, SUV, Sedan), color, hourly rental rate, daily rental rate, seating capacity, transmission type, Bluetooth connectivity (optional), an auxiliary cable (optional). Each location has a ‘car capacity’, which is the number of cars it can hold in its parking space. (We are assuming that all the locations have a parking lot where the cars would be kept). Every location would have at least one car. There may be multiple models of cars available for a particular type and for a particular model, there can be many units of cars. A user can rent a car by selecting a pickup time, return time, and location. The location is chosen from the drop down list, which would show all the locations at which cars are kept on campus. Selecting the pickup time, return time, and location is mandatory. Also a user cannot book a car for more than 2 days. If the user does not make a selection for the car he wants, he should be shown all the cars in the chosen location. To make a selection, he can either ‘Choose by model’ or by ‘type’. Based on this selection, another dropdown box would list all the cars for that particular model or type. For example, if the user selects the option ‘Choose by type’ then the drop down box next to this one should list all the different types, that is, Hatchback, Hybrid, Convertible, etc. Clicking ‘Search’ would navigate the user to the Car availability page. Also note that we are assuming that the user returns the car to the same location at the selected return time.

The employees who work for this application have a different set of functions available to them. When an employee logs in to the system, he can use a different homepage to manage cars which involve adding new cars and changing existing car locations. He can also put in service requests for maintenance of cars. The user is also supposed to give a time by which he would arrive. The employee needs to add a charge of minimum 50$ per hour as late fee on the user's account. So if a user is going to be 2 hours late there would be a charge of $100 on his account. Also if there is another member who had booked the car, which is now going to be late, then the employee needs to inform this other member and show him other available options. To do this, he needs to view user information by selecting the 'Rental Request Change' option and make appropriate changes.

The employees can use the manage cars option to add a new car or change car locations. To add a car, the user needs to enter all the details of the car as a form. Multiple cars of the same model cannot be kept at the same location. The same screen can also be used to change the locations of cars. To do this, the employee needs to choose the current location of the car. Once the location has been selected, he needs to select a car from the dropdown list which auto populates with the names of cars in that location.

There are 4 reports, which are required at the homepage of administrator of the website. While writing SQL statements for these reports, use as few SQL statements as possible. In some cases, you might need to use a separate SQL statement to calculate totals. The important thing to remember is to let the database do the work. Don't simply pull in all the needed information and do the grouping/aggregation using programming language constructs.

1. Revenue Generated Report (Vehicle number, Vehicle Name, Reservation Revenue, Late fee Revenue)
2. Location Preference Report (Month, Location, No. of Reservations, Total no. of hours)
3. Frequent User Report (User Name, Driving Plan, No. of reservations)
4. Maintenance History Report (Vehicle Name, Date-time, Problem)

2. Automatic Timetable and Course Management System

Time Table Generator is a web based application which guides you about time table management System. Even though most college administrative work has been computerized, the timetable scheduling is still mostly done manually due to its inherent difficulties. The manual timetable scheduling demands considerable time and efforts. The lecture-timetable scheduling is a Constraint satisfaction problem in which we find a solution that satisfies the given set of constraints. A University semester timetable is a temporal arrangement of a set of lectures and classrooms in which all given constraints are satisfied. Creating such timetables manually is complex and time-consuming process. By automating this process with computer assisted timetable generator can save a lot of precious time of administrators who are involved in creating and managing course timetables.

Since every college has its own timetabling problem, the commercially available software packages may not suit the need of every college. Hence you have to develop practical approach for building lecture course timetabling system, which can be customized to fit to any colleges timetabling problem. The college lecture-timetabling problem asks you to find some time slots and classrooms which satisfy the constraints imposed on offered.

The proposed system is a website, which allows the student a good user interface also it provides a good user interface to admin & faculties, and they can easily get the required information. The website must provide a variety of facilities to students, admin and faculties.

System Actors/users

- Admin
- Teacher/Consultant/Faculty
- Student

The website should include the following pages with proper use case approach,

- User Log in (Admin, Teacher, Student)
- Data Update (Student will add/drop his courses, teacher will add/drop his constraints, admin will add/drop course assignment)
- Add/Edit/Delete Course
- Add/Edit/Delete Classroom Data
- Generation of timetable
- Verification of generated timetable
- Notify change in timetable
- Display user specific timetable
- Log-out option

3. Online Job Portal

This project is aimed at developing an online search Portal for the Placement Details for job seekers. The system is an online application that can be accessed throughout the organization proper login provided. This system can be used as an Online Job Portal for job seekers. Job Seekers logging should be able to upload their information in the form of a form and data must be saved in a proper database. Visitors/Company representatives logging in may also access/search any information put up by Job aspirants and will post the job which should be notified to the users to their homepage. There are the following actors/users of this project.

Admin: Admin will add all the qualifications, skill, experience, city, state, country and update and delete information about the job provider or job seeker he can also search for the job seeker and he can send notice to offer the job to job seeker and he can also see the jobs add by the job provider.

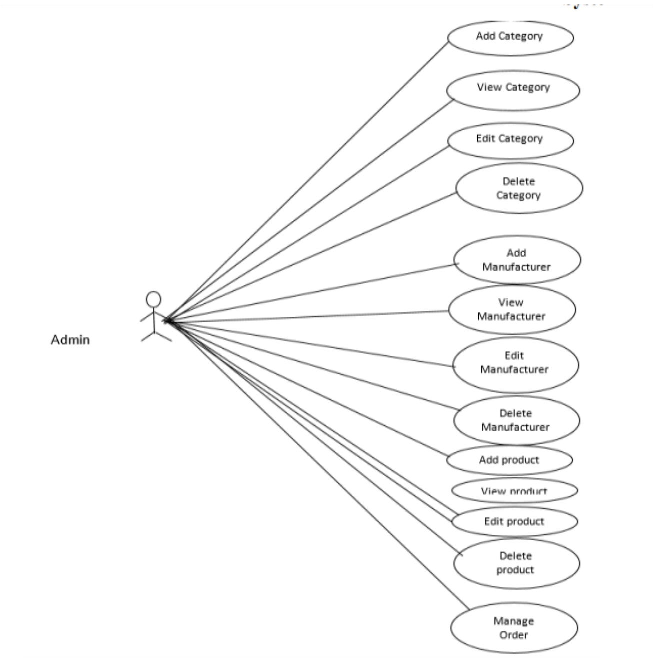
Job Seeker: Job Seeker register himself and fill the profile given by admin and after login he will search for the job on various conditions and he can change his profiles and resume and he can apply for the jobs based on various conditions. He can see the response of the company and he can call the company person for the interview.

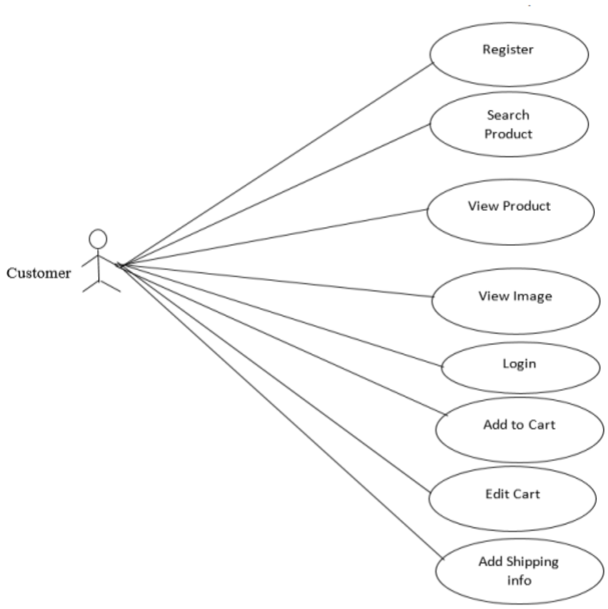
Job provider: Job Provider register himself and his company and after login he will add new job and he can search for the job seekers on various condition and he can offer the job to job seeker according to the job profile and he can also see the response from the job seekers and send the mail.

The project must contain all the information about the reports generated by the admin based on the particular job seeker, particular job provider, all job seeker and job provider, all jobs generated by the job providers, and job search based on every attribute.

4. E-shopping store Application

For the detail of this system, you can work and replicate any local e-shopping website like Daraz.pk, lootlo, ishopping.pk, homeshopping etc. The generic use case models of admin and customer is shown below.


Admin
Add Category
View Category
Edit Category
Delete Category
Add Manufacturer
View Manufacturer
Edit Manufacturer
Delete Manufacturer
Add product
View product
Edit product
Delete product
Manage Order


Customer
Register
Search Product
View Product
View Image
Login
Add to Cart
Edit Cart
Add Shipping info