Cairo University
Faculty of Computers and Artificial Intelligence
Information Systems Department
Database Systems -1

Database Systems-1 Project

Project Instructions

- This is a team project of at least 5 members and 6 members at most.
- The members should be from the same group/lab or with the same lab TA.
- Each team will work on their assigned ideas which are described in the proposed systems shown below to work on.
- Fill the project cover with the following information.
    - Team members' names and IDs.
    - Your section number.
    - Your lab TA name.
    - Title of the project assigned to you.
    - Program (General, Special Giza, or Special Zayed)
- You are required to implement the proposed functionalities in the assigned project and propose your own when needed. (Write your own logic when required).
- All team members must participate in and contribute to the project.
- The 2 deliverables will be uploaded on Google Classroom and discussed with your TA.
    - **Phase 1:** Entity Relation Diagram (Saturday **4th May** 2025), discussed during the week.
    - **Phase 2:** Software Application + Conceptual ERD + Physical ERD + Implemented Database on MS SQL Server (Saturday **17th May** 2025), discussed during the week.

Classroom Submission

- Only one team member will upload the deliverables
- **Phase 1:** 1 PDF which includes the Cover Sheet + ERD + Requirements
    - **File Name Format: ProjectID-TA-Title-Phase 1. For Example (1-NourhanEl-Khodary-Online Recruitment Project-Phase 1).**
- **Phase 2:** 1 Zipped Folder Containing
    1. Software Application Code
    2. PDF including (Requirements + Conceptual ERD + Physical ERD)
    3. DDL File
    - **Folder Name Format: ProjectID-TA-Title-Phase 2. For Example (1-NourhanEl-Khodary-Online Recruitment Project-Phase 2).**

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General Instructions

- No Late submissions will be accepted.
- Cheating marking policy is **zero** for all cheating parties.

Phase 1: The system entity relationship diagram

- Students are required to construct the system's ERD (conceptual model)
- ERD should include at least 5 entities including at least 1 many-to-many relationship. Including Weak Entity (1 bonus)
- Primary keys and relationships should be clearly defined in the ERD.
- Review the system's entity relationship diagram with your TA (make updates if needed)

Phase 2: Software Application + Conceptual ERD + Corresponding Physical ERD + Implemented database on MS SQL Server

- Convert the conceptual ERD into a physical ERD.
- Submit both conceptual and physical ERD.
- Deliver the SQL Server database generated from the physical ERD with populated data.
- Implement an application program using C# (or other permitted languages) that includes at least:
    - 2 insert statements on 2 different tables.
    - 2 delete statements on 2 different tables (with conditions).
    - 2 update statements on 2 different tables (with condition).
    - Select data from any table(s) of the database.
    - Select data that involves more than one table of the database (using joins).
    - Generate 1 meaningful report (bonus).
    - Implement GUI (bonus).

Projects Table of Content

Project 1. Online Recruitment Project (Ex. https://wuzzuf.net/a/Online-Recruitment-Jobs-in-Egypt)

Description

An online recruitment system is a service that automates a company's recruiting needs by getting volumes of employment applications over the internet.

The beauty of online recruitment solutions lies in its accessibility and ease of use. Anywhere on the globe, designated individuals are able to receive process and keep a record of CV's within a web-based information power house.

Online recruitment benefits both job seekers and employers. Applicants have a simpler, more efficient application process, while employers are able to manage all applications in an efficient manner.

An online recruitment system can include the following functionalities:

- Signing up a new user (e.g. job seeker, employer)
- Updating a user details
- Adding/updating a vacancy (by employer)
- Showing a list of vacancies that satisfy certain criteria (e.g. industry, location, required experience…)
- Showing a list of job seekers that satisfy certain criteria (e.g. industry, location, experience…)
- Performing operations on vacancies: apply and save (by job seeker)
- Performing operations on vacancies: hide (by employer)

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. What was the most interesting job "title" that had maximum number of applicants?
   b. What was the announced job "title" that hadn't any applicants last month?
   c. Who was the employer with the maximum announcements last

	month? d. Who were the employers didn't announce any job last month? e. What were the available positions at each employer last month? f. For each seeker, retrieve all his/her information and the number of jobs he applied for

Project 2. Super Market (Ex. www.carrefouregypt.com)

Description	A Super Market that wants to develop a DB to keep track of its products & allow customers to buy online (www.carrefouregypt.com): • Sign up a new customer (by Admin or customer) • Update customer data (by Admin or customer) • Remove customer (by Admin or customer) • Add a new product (by Admin) • Remove product (by Admin) • Update the product details (by Admin) • Browsing products (by Admin or Customers) • Showing a list of all available products. • Showing a list of products that need to be re-stocked if below a specific quantity. • Showing a list of frequent customers to give them a discount voucher.
Requirements	***1.*** Draw the corresponding ERD for this project ***2.*** Convert the ERD to Physical model ***(DDL scripts)*** 3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***: a. What was the most bought product? (That had maximum number of customers) b. What was the product that has no customers for a specific month? (never bought) c. Who was the customer that did not buy any product since one year? d. Who was the customer that made the highest purchase this month? e. IS the supermarket selling electric appliances more or food products more? f. For each product, retrieve all its information and the number of customers who bought it.

Project 3. Course Management System (Ex. http://www.gradiance.com/)

Description

A course management system is a set of tools that enables the instructor to create online course content and post it on the web.

Course management system become an integral part of the upper education system. They create teaching and course management easier by providing a framework and set of tools for instructors. The executive aspects of such systems could include class schedules and therefore the ability to record students' grades. With relevance the teaching aspects, however, it might include learning objects, class exercises, quizzes and tests. The CMS might also include tools for real-time chat. The CMS tool additionally focuses on all aspects of teaching, learning and teacher-student interaction. Consider that each course has a specific category (example: databases, programming, software engineering, etc.).

A course management system can include the following functionalities:

- Signing up a new user (e.g. instructor, student)
- Updating a user details
- Adding/updating a course (by instructor)
- Adding exam for each course (by instructor)
- Showing a list of courses that satisfy certain criteria (e.g. course category, semester, studying year…)
- Showing a list of students that satisfy certain criteria (e.g. registered in a course, get a specific grade, passed a specific exam…)
- Performing operations on courses: apply and save (by student)
- Performing operations on courses: hide (by instructor)

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. What is the course with the highest number of registered students?
   b. What are the courses that are not assigned to the current semester?
   c. Who are the top five students for each course in a specific year?

	d. What is the category with the least number of students? e. Get the names of registered students in a specific course who didn't apply for any exam yet. f. Get a report of each course with its name, number of exams, and the highest grade for

Project 4. Games Rental System

Description

A game rental system provides an easy and cost-effective way to try out new games without having to buy every one.

Game rental is a risk-free way to try new games. Because it's so much cheaper than buying. Each game has a vendor who has the responsibility of developing the game.

The admin of the system is responsible for adding the games to be rented out by the clients. A games rental system should include the following functionalities:

- Signing up a new user (e.g. admin, client)
- Updating a user details
- Adding a game (by admin)
- Updating a game details (by admin)
- Browsing games
- Showing a list of games that satisfy certain criteria (e.g. year, vendor, category...)
- Performing operations on games: renting, returning.

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. What was the most interesting game that had maximum number of renters (clients)?
   b. What were the games that hadn't any renters (clients) last month?
   c. Who was the renter (client) with the maximum renting last month?
   d. Who was the vendor with the maximum renting out last month?
   e. Who were the vendors whose games hadn't any renting last month?
   f. Who were the vendors who didn't add any game last year?

Project 5. Movie Rental Management System

Description	The Movie Rental management system will provide subscribed members (users) with access to a library of movie tapes available of rental using devices capable of internet streaming. The purpose of the system is to track membership, tape inventory, and tape rental activity. For example: the system keeps track of user email address, a residence and business address, phone number, credit card number, etc. User credit card number is necessary to establish an account, including billing address. And tape identification number, tape's title, the rental charge, the supplier, and lead actor…. etc. along with the other required entities. An online recruitment system can include the following functionalities: • Signing up a new user/ member and system admin • Updating a user/member details • Adding/updating a movie tape • Showing a list of available movie genres • Showing a list of available movies under specific genre along with their prices, and their availability. • Browsing all movies • Displaying a list of movies that satisfy certain criteria (e.g. year, supplier, lead actor(s)...)
Requirements	1. Draw the corresponding ERD for this project ***2.*** Convert the ERD to Physical model ***(DDL scripts)*** 3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***: a. What was the most interesting movie genre(s) that had maximum number of rentals? b. What was the movie genre that hadn't any rental requests for the last month? c. What were the added movies for each genre and when? d. For each user/ member, retrieve all his/her information and the number of movies he/she rented. e. What are the top rented (in-demand) genres and what are their total sales?

	f. Who are the suppliers who didn't provide any movie in the last three months?

Project 6. Conference Management System

Description	The VLDB (Very Large Databases) conference is an international conference which is held every year in one city. A database is decided to maintain information about different occurrences of the VLDB conference. Each occurrence of the conference is identified by the year (unique) and described by city, location, chairman, an organizing committee, a set of participants, and a set of papers (articles). It is required to keep track of the total number of participants and papers for each conference occurrence. Each conference occurrence is organized as a set of sessions. Each session is identified by a number which is unique for all sessions of the same conference occurrence. In addition, a session is described by location, chairman, co-chairman, start time (month-day-hour-minute), end time (month-day-hour-minute), and a set of papers. Each paper (article) presented in any conference occurrence is identified by a number which is unique for all papers of the same occurrence. In addition, each paper is described by one or more authors (considered as participant in the conference occurrence), a type (research, tutorial, industrial, lecture... etc.), and a set of references (papers presented in previous occurrences of the conference). Each paper is presented in only one of the sessions of the conference occurrence. Each participant is identified by a number (unique), and described by a name, category (distinguished lecturer, chairman, member of an organizing committee, author... etc.) and E-mail address. A participant in any conference occurrence may pay certain fees which is determined according to his/her category. It is required to keep track of the total fees for each particular conference occurrence.
Requirements	1. Draw the corresponding ERD for this project ***2.*** Convert the ERD to Physical model ***(DDL scripts)*** 3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***: a. Which is the most referenced paper? b. Which is the paper that never referenced? c. What is the conference's occurrence that had the most referenced

	paper? d. Who are the participants that has no papers (participants but not authors)? e. What is the conference's occurrence that all its participants are authors? f. For each author, retrieve all his/her information and the number of papers published

Project 7. Task-Worker Matching

Description

A new startup aims at developing an application to help users find suitable workers (e.g. plumbers, carpenters, electricians, …etc.) to carry out specific tasks.

- The system should store some data about available workers on the system like: (unique number, name, one or more specialties, and locations he/she is ready to work in, available time slots) it should also be able to calculate when needed the worker's overall rating based on user rating after every achieved task).
- When clients first register to the app, before placing any requests, they need to fill in details like (client ID, name, phone, address, email address, payment info). The application might also need to save the overall workers' feedback about a certain client.
- The system should also list the offered tasks that might be requested and their data like (task ID, task name, required specialty for the task, average time needed to finish it, average task fee).
- When a client requests a certain task, the system should keep track of: (request ID, client ID, task ID, request address, request_placement time, preferred time slot for carrying out the task).
- When a request is executed, the app keeps data like: requestID, assigned worker ID, actual time taken, worker rating by client, client rating by worker, request status [e.g. open or finished client feedback (optional), worker feedback (optional).

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. Given a specific request, display the matching workers according to the specialty/ time/ location of the incoming request.

	b. Calculate the total due wage for each worker based on which tasks they achieved and their client ratings in each of those tasks during a given period of time. c. Answer which task/worker/specialty is requested the most /the least? d. For each specialty, which worker has best overall rating within a specific time interval? e. What is the specialty (in tasks) has no requests at all this month? f. Which worker got at least 4.5 out of 5 on every client rating he/she got?

Project 8. Food Ordering System Project

Description

An online food ordering system is an application that provide an easy way for customer to order their favorite meals and help restaurant to optimized and control over their restaurants.

The system is provided with the facilities to find out the favorite food of the customers, and the seasonal foods, or customers to add or modify and delete their feedbacks. Managing data of daily customers, managing data of daily sales and helping to do billing very easily.
-An online restaurant meal reservation system can include the following functionalities:

- Sign up a new customer (by customer or admin)
- Update a user details (by customer or admin)
- Remove customer (by customer or admin)
- Add/delete meal (by Admin)
- Update meal details (by admin)
- Edit Menu (by admin)
- Showing menu details (by admin or customer)
- Book order (by customer)
- Cancel order (by customer)
- Search for meal according to name (by customer)
- Search for meal according to price and category (by customer)
- Add/modify/delete feedback (by customer)
- Show a bill of order (by customer)

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. What was the most ordering meal?
   b. What was the order prices for each customer during last three months?
   c. What was the list of meals that not ordered by any customer?
   d. Who was the customer that made the highest order price this month?

	e. What was the list of meals that ordered by more than five times during last two months? f. For each customer, retrieve all his/her information and the number of orders

Project 9. Transportation System Project (Ex. Uber/Careem/SWVL)

Description

The term "transportation system" is used to refer to the equipment and logistics of transporting passengers and goods. It covers movement by all forms of transport, from cars, bikes, scooters and buses to boats, aircraft and even space travel.

The purpose of a transportation system is to coordinate the movement of people, goods and vehicles in order to utilize routes most efficiently.

When implemented, transportation systems seek to reduce transport costs and improve delivery times through effective timetabling and route management.

Periodic re-evaluations and the development of alternative routes allow for timely changes to the transportation system in order to maintain efficiency.

A transportation system can include the following functionalities:

- Signing up a new user.
- Updating a user details.
- Provide driver details.
- Adding/updating ways of a ride payment (Cash / Visa / MasterCard).
- Showing a list of vehicle types (e.g. bus/car/scooter).
- Provide trip details (driver name, license plate no, car type, contact number, ride time, ride fees, …).
- Provide ride ratings (Allow feedbacks).
- Provide ride history (All the rides for a certain user).
- Allow to enter promo codes.
- Provide booking service for the ride

Requirements

1. Draw the corresponding ERD for this project
2. Convert the ERD to Physical model ***(DDL scripts)***
3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***:
   a. What was the area that had the most/least ride requests last month?
   b. Who were the drivers with the maximum number of rides last month?

	c. For each driver, retrieve all his/her information and the number of rides he/she had. d. Which driver got at least 4.5 out of 5 on every user rating he/she got? e. Who were the drivers that didn't have any ride last month? f. What is the most type of vehicle (car, bus, and scooter) requested last month?

Project 10. Car Insurance Company System	
Description	A car insurance company works in the field of the investigation car accidents and pay the insurance amount to their customers. The customers own one or more cars and each car can be owned by one or more customers. Each car has associated with it zero to any number of recorded accidents. The car insurance company system can include the following functionalities: • Sign in • Add Customer • Update customer information • Delete customer • Add new car • Update car information • Delete car • Add accident • Update accident information • View accident information • Generate monthly reports for the total accidents
Requirements	1. Draw the corresponding ERD for this project ***2.*** Convert the ERD to Physical model ***(DDL scripts)*** 3. The proposed ERD has to be designed in a way that can answer inquiries such the follows (***you have to write SQL statement for each inquiry)***: a. Find the total number of people who owned cars that were involved in accidents in 2017. b. Find the number of accidents in which the cars belonging to Ahmed Mohamed were involved. c. Find the model with maximum number of accidents in 2017. d. Find the model with zero accidents in 2017. e. Retrieve all information of the customers who owned cars that were involved in accidents in 2017. f. Find the number of accidents in which cars belonging to a specific

	model were involved.