MIDDLE EAST TECHNICAL UNIVERSITY

NORTHERN CYPRUS CAMPUS

DEPARTMENT

OF

COMPUTER ENGINEERING

CNG 351
Data Management and File Structures
Assignment 1

(6% of actual grade)

DUE DATE: 06 November, Sunday, 2022, 23:55 (Cyprus Time)

IMPORTANT RULES

1. Use a graphical tool such as Lucidchart or Draw.io.

   - Lucidchart can be used to design and create your solution. You can find a full tutorial on ER diagrams and Lucidchart here:
     `https://www.lucidchart.com/pages/er-diagrams`.
     Please make sure that you use **Chen notation** for your design, other notations will not be accepted.

     For Lucidchart, please ensure that you have an educational account. **To get an educational account, you need to sign up with your METU mail addresses from the following link:**
     `https://lucid.app/pricing/lucidchart`
   - Draw.io can also be used to draw your diagram. You can find the full details here: `www.draw.io/`.

2. Any assumptions must be explicitly explained. If your assumptions do not make sense in the given requirements content or conflict with the requirements or similarly, if you assume and did not specify the assumption, you will lose points from that part of your design.

3. Create a PDF file for your solution, and upload only one PDF file to ODTUClass, one team member is enough to upload the solution.

4. Assignments will be completed by a team of two people. Therefore, for this first assignment please make sure that you form a team and continue to work with that team throughout the semester.

5. Please submit a report that includes a cover page with the team details including their names/surnames and also student IDs.

PURPOSE

The main purpose of this assignment is to review modelling of a relational database from requirements by using Entity-Relationship Diagrams (ERD).

GRADING

This assignment includes four use cases for different database applications. The data requirements of each of these use cases need to be modelled with ERD and the grading will be as follows:

1. Use Case 1: 20 points;

2. Use Case 2: 25 points;

3. Use Case 3: 25 points;

4. Use Case 4: 25 points;

5. Report: 5 points. A good report means type written, complete (every section fulfilled), with clear explanations in English (where relevant), and submitted via ODTUCLASS as one combined PDF document. The first page of the report must be a title page which should clearly state team details and assignment number. Each use case should also include *Assumptions* clearly written. The footer of all subsequent pages should be numbered in the format x of y (eg 2 of 6), etc.

USE CASES

Use Case 1 – MENTOR (Metu EveNT OrganiseR) (20 pts)

Event organisation is a complex task; many events occur at METU NCC. You have to keep track of the events, the organiser details, the sponsors, etc. To ease the process of maintaining such details, you received funding to create an application for METU NCC. This application needs a back-end database, and the requirements are identified as follows:

- First of all, the system needs to keep track of the events. Each event will be identified with a unique identifier. The important event details are the date of the event, the location of the event and the type of the event. Please note that the event can take place in multiple places; for example, the event might start at the Culture and Convention Center and finish at the main restaurant. The event type can be one of the following: Concert, Dinner, Entertainment, Cultural, and academic activity.

- An event can be organised by a group of staff, and the system needs to keep track of them. The system needs to keep track of the organizer's information, such as name and surname, SSN, date of birth (dob), gender, mail, telephone number, and address. Even though there can be multiple organisers, only one of them will be the main contact for the event, which must be recorded in the system.

- An event always has at least one sponsor, but of course, there can be multiple sponsors for an event. The system needs to store the information of sponsors responsible for funding the events, such as the sponsor's name and sponsorship amount. Please note that some sponsors can sponsor multiple events, and the sponsorship amount for these events can differ. If there are multiple sponsors, one is always the main sponsor, and the system needs to keep track of that.

- For each event, a crew is also hired to support the event. Each crew member is assigned a specific task for an event, such as obtaining equipment, providing transportation for artists, etc. The system needs to keep track of the crew hired, including their names and SSN. The system also records the role of a crew in that event. A crew member can also work on different events.

- Each event will also have artists performing at the event. The system will contain information about the Artists, such as the artist's name, contact information such as email and the performance cost. The same artists can be invited to different events, but events cannot occur without an artist.

- At each event, food is also supplied by a catering service. The system will record information about the company that supports the event's catering. An event can have food and drink supplies from different multiple catering organisations. The system will keep track of the catering company name, contact info, address, and the type of food they supply. They can supply two categories of food: Food and Drink.

Use Case 2 – Survive (25 pts)

Survive is an online multiplayer game where multiple players join a world and try to survive. You are going to implement this game, but first, you need to design the back-end database, which has the following data requirements:

- This game needs to maintain the player details. For each player, the details such as name, surname, date of birth, and e-mail address must be kept in the system.

- To play the game, one player must first create a world with a unique name. The creation date and time must be stored in the system. After creating the world, multiple players will join the world to play the game. The system will store all the players that joined a world to play. To play the game, each player who joins the game must select a character among ten different characters and join the world with the selected character. Each player can only have one character in the world.

- Characters have different skills, names, health, level, and character description, and all this information must be stored in the system.

- In each world, there are a number of enemies. Enemies have the same characteristics as the characters in the game. The goal of the game is to kill these enemies. The system records the enemies in the game and also who kills these enemies.

- When a player's character kills an enemy, the enemy drops a collectable resource and the character carries a bag to store these collectable resources. These bags are also shareable bags. That means, if a character drops the bag,

another character can carry the same bag. A bag carries collectable resources but it also has a capacity.

- These collectable resources can also be unlocked. The system records who unlock them. If a character wants to use these resources they have to unlock them. Once these resources are unlocked, one or more artifacts will be unleashed out of these collectable resources.

- At the end of the game, whoever has the bag with the most artefacts will be the winner of the game.

Use Case 3 – FindJob (25 pts)

FindJob is a social networking site that aims to allow people connect to other professionals and find a job in North Cyprus. Users and employers can connect through FindJob's social network and build real-world professional relationships. FindJob aims to create groups, publish articles, publish job postings and allow users to create profiles and post photos, and more. This social network site requirements will be as follows.

Users need to create an account to become a member in FindJob where they need to add their name (first name, last name), date of birth, email, gender, age, phone number, address (street, city, and postcode), and nationality.

Members need to create a personal profile and add details such as their educational backgrounds, the country they are currently in, and their current working status (whether they are working or searching for a job). They can also record a name for a profile. Also, they should add their different interests and hobbies.

Members can connect with other members on the platform if they exist. The system needs to keep tack if the member accepted or rejected the connection.

Members can invite other people to join. In each invitation, the system needs to keep track of the date and the message it contains, and the contact email. Once the invitation is accepted, that is also recorded by the system.

Every member can make a post which can include text, photos or videos. Every post should have an ID, and the system needs to keep track of the post's content and date of posting.

A member can create and join different groups. The system should keep track of this information. Every group needs to have a unique name, description, and group type (public or private). The system should allow more than one member to manage groups.

Every member can take an online assessment and earn a badge for different skills. For example, a member can take a C programming assessment. If they pass, they should be rewarded with a badge. If the members fail, they can only retake the assessment. The assessment can only be retaken three times within a year.

Besides the individual members, FindJob can also be used by companies. The company needs to register to the system by adding the company location, their branches' list (includes the name of the branches), and the total number of employees. The system should keep track of the list of the employees that are working in the companies that are already members of FindJob.

A company can add job position advertisements to the system. Jobs need to have a unique ID, name, description, post date, closing date, and list of the required skills. Then, FindJob members can apply to these job positions. Of course, members can apply to as many positions as they like. The system should keep track of the information about the jobs the member applied to if the application is submitted, saved, or incomplete job application, and the date.

Use Case 4 – NCCCloud (25 pts)

NCCCloud is a recent established company aiming to provide cheap cloud gaming solutions in Northern Cyprus. For this purpose, you have been hired to design their database system for the company.

To use NCCCloud, people first need to create a user account. For this purpose, the system will take a unique username, a unique email address, one or more phone numbers and the date of birth of the user. In addition to these, the system should store the age of the user to filter out games with mature or dangerous content if needed.

Similar to many platforms, NCCCloud does not contain any games in its system and needs to use game digital distribution services such as Steam or Epic Games. The system should store a name, and a unique connection token to the distribution services, i.e, game libraries. It is a necessity that each user should link at least one library to NCCCloud to create an account.

Upon user account creation, the system will obtain and store the details of the supported games in the linked library. The system will store a name, unique ID, and description containing the release year of the game, overall rating in the loaded library, and a summary for each game. In NCCCloud, each created account will be accompanied by a favourite games list. This list will include the list of games the user plays the most frequent. The system needs to keep track of the favourite list and the games included.

To provide the cloud service, NCCCloud has many computers placed in its headquar-

ters. Each computer is allocated to the users using a subscription-based method. Each user needs to have a subscription to be able to access computers. For each subscription, the type of the subscription is tracked (e.g., premium vs student), along with the monthly price, start and end date of the subscription and the total price. Since each computer is assigned based on the subscription, the system should also store which subscription has access to which computer. However, it is important that not all the computers owned by NCCCloud are allocated for the clients. For each computer, thesystem should store the hardware details of the computer such as its cpu, gpu, motherboard etc. Additionally, it should also store the time they bought, and price as well as the latest maintenance date.

Lastly, NCC cloud wants to track the games played, their duration and which computers are allocated for their playing time in order to schedule maintenance and make improvements accordingly. For this reason, the system stores a session info which contains a game, user and an allocated computer. In addition, the start and end date-time of each play session is stored when the session is initiated. System should use this information to track the time spent in each game session.