MIDDLE EAST TECHNICAL UNIVERSITY

NORTHERN CYPRUS CAMPUS

DEPARTMENT
OF
COMPUTER ENGINEERING

CNG 351
Data Management and File Structures
Assignment 2

(6% of actual grade)

DUE DATE: 21 November 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. When designing with EER, 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. For logical mapping, you need to use the notation detailed in the Part 2 in page 7 for logical representation of a database. Please use that notation to reprsent relations, PKs (primary keys) and also FK (foreign keys).

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

5. 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.

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

PURPOSE

This assignment has two purpose: (1) to help you revise EER concepts and (2) to help you revise how to map an (E)ER design to a logical design. Therefore it has two parts.

GRADING

This assignment has two parts and each part will be 50 percent. Each part has two use cases and therefore, the overall grading will be as follows:

1. Part 1: Use Case 1: 25 points;
2. Part 1: Use Case 2: 25 points;
3. Part 2: Use Case 1: 20 points;
4. Part 2: Use Case 2: 25 points;
5. Report: 5 points. A good report means typewritten, complete (every section fulfilled), clear explanations in English (where relevant), and submitted via ODTUCLASS as one combined PDF document. The report's first page must be a title page which should clearly state team details and assignment number. Each use case should also include Assumptions written. The footer of all subsequent pages should be numbered in the format x of y (eg 2 of 6), etc.

PART 1: USE CASES

The overall goal of this part is to help you revise EER concepts. In the previous assignment we gave you four use cases and in this assignment, we are continuing with two of those which now have more detailed requirements. New requirements added are all underlined. You need to take your design from the previous assignment and extend it to meet the needs of the new added requirements and design them with EER. Please note that some of the previous requirements need to be also revised to encode them with EER. You should not just focus on the new, underlined requirements.

Use Case 1 – 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.
- In each world, there are a number of actors which can be either characters or enemies. Both enemies and characters have many different skills, a unique

name, health, level, and a character description, and all this information must be stored in the system. Additionally, for the enemies, the region that they can occur in the world must be kept in the system. The goal of the game is to kill these enemies. The system records the enemies in the game and also who kills these enemies.

- There can be two types of enemies: bosses and minions. Unlike the minions, the bosses have a power level which must be stored in the system.
- When a player's character kills an enemy, the enemy drops an item depending on the enemy type. If the enemy that the character kills is a minion the enemy drops one or more resources, if it is a boss, the enemy drops a craftable item. Therefore, the system needs to keep track of these two types of items: resource and craftable with a unique name.
- To use a craftable item, the player's character must craft the item with the required resources. Each craftable item requires one or more resources and these required resources can also be the items which are crafted before.
- The characters carry a bag to store the items. These bags are also shareable bags. That means, if a character drops the bag, another character can carry the same bag. A bag carries items but it also has a capacity.
- The 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 2 – 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 can be one of these two types: basic and premium. To register as a premium, members need to pay a registration fee, and the system should be able to store the amount that is paid and card details.

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.

The system needs to keep track of group information. Every group needs to have a unique name, and description and the group can be public or private. A basic member can join only public groups, but premium member can join both types of groups. A premium member can create and manage different groups. The system should allow more than one premium member to manage groups. The system also keeps track of the join date of members to groups.

The system has been modified to allow just premium members to 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. The job can belong to one of these categories: Engineering (where we need to keep track of the engineering type) and Medical (where we need to keep track of the medical field), however, the job advertisements do not need to be specified as such. 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.

PART 2 – USE CASES

When you do the logical mapping, in your report please use the following notation illustrated with the following example:

Employee

ssn	name	surname	dept_id[FK: Department: dept_id]

Department

dept_id	name	address

Notation Notes:

- Primary Key: represented with underline text;
- Foreign Key: represented with dotted underline text and the reference is represented with [FK: TargetRelation:targetRelationKey]

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. Their database designers provided a design for the given requirements – see Figure 1. You now need to map this design to a logical design that can be implemented. Please note that this is not directly created from the requirements given to you in the previous assignment – some changes have been done to the requirements given to you.

Use Case 2 – 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.Their database engineers already gone through their requirements and they designed the data requirements which is given in Figure 2. You now need to map this to a logical design that can be implemented. Please note that the requirements encoded in this figure are not the direct requirements given to you in the previous requirements – they have been significantly updated and changed.

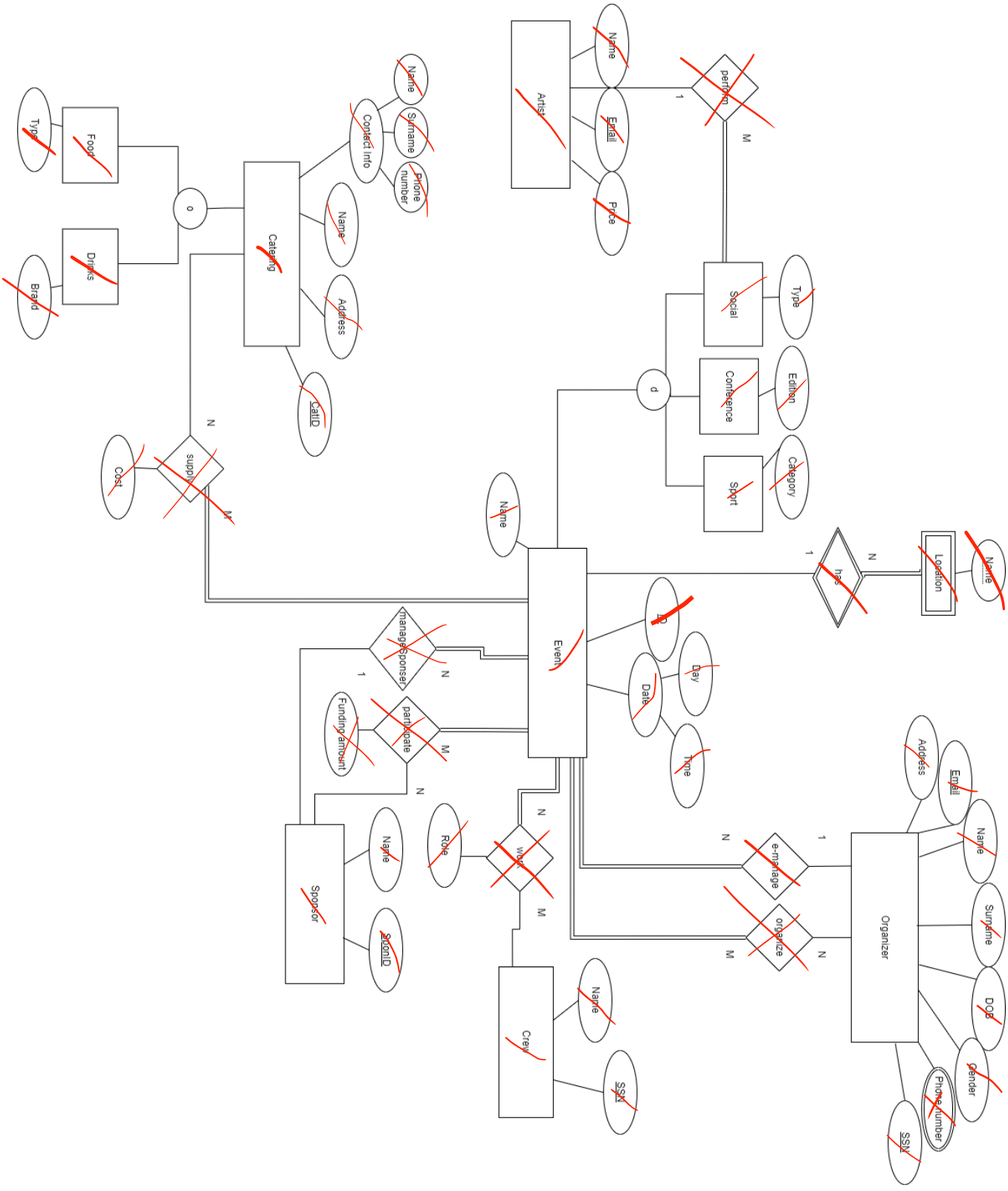

Figure 1: EER Diagram for Use Case 1

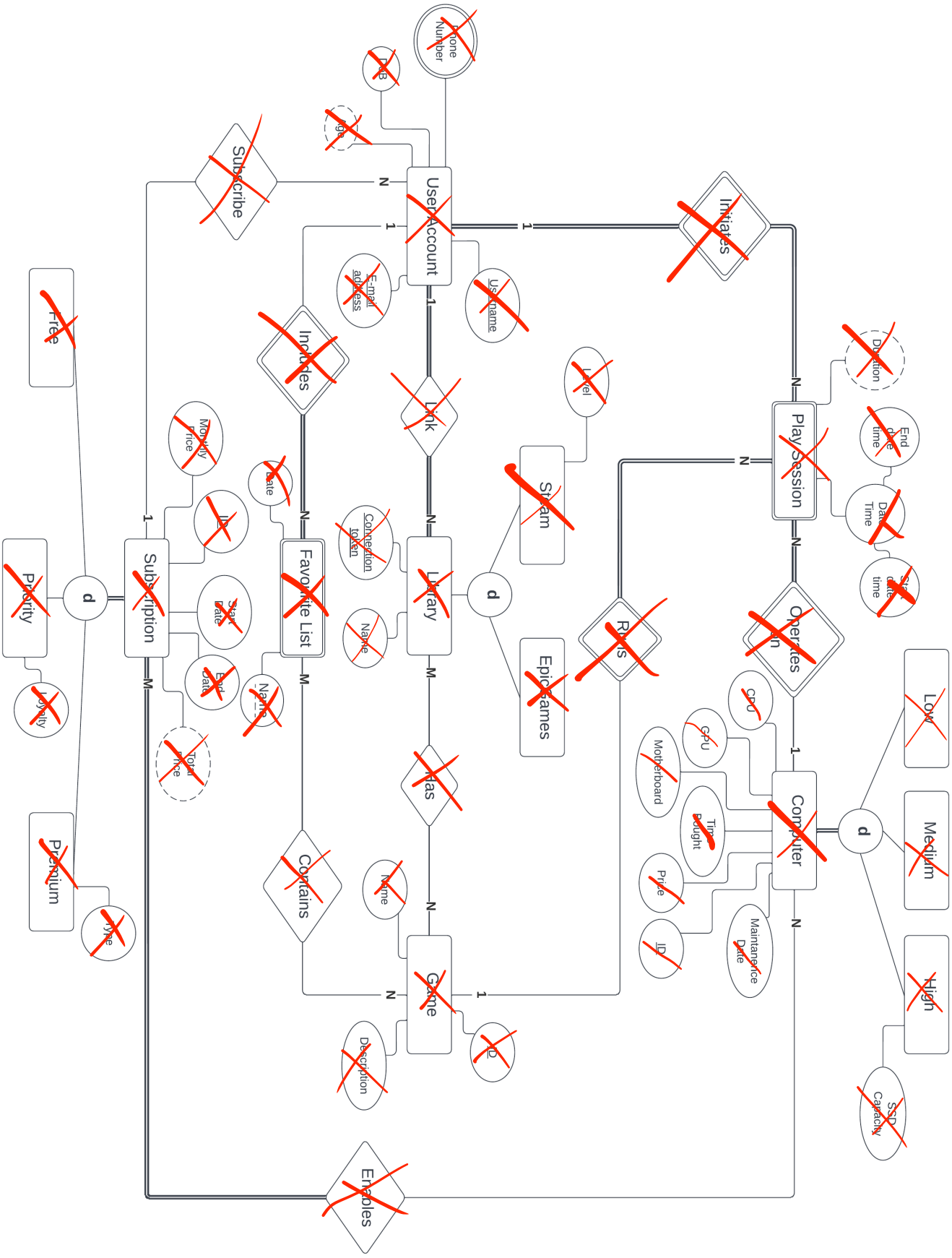

Figure 2: EER Diagram for Use Case 2