Entity Relationship Assignment

Answer Sheets

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Declaration

In submitting this project, I declare that the project material, which I now submit, is my own work. Any assistance received by way of borrowing from the work of others has been cited and acknowledged within the work. I make this declaration in the knowledge that a breach of the rules pertaining to project submission may carry serious consequences.

Part 1: Entities and Attributes:

We have decided on five entities for our project and have a full understanding of why these entities are necessary for our company.

1. Cinemas
2. Employees
3. Customers
4. Movies
5. Viewing Times

Cinemas:

1. **Branch** is an attribute of the entity *Cinemas* as you need to locate the location of each cinema around the country and list their Screens, Employees and customers and finally managers. Is a primary key as the branch identifies each cinema.
2. **Screen** is an attribute of the entity *Cinemas* as each cinema has to have screens to provide their service.
3. **Employees** is a key attribute of the entity *Cinemas* as you need employees in each branch to run the cinema.
4. **Managers** is another key attribute of the entity *Cinemas* as they manage the working of the establishment.
5. **Customers** is the final key attribute to the entity *Cinemas* as customers provide income for the company to stay in business.
6. **Number of employees** is an example of a derived attribute as it can be derived from one or more attributes.
7. **Cinema_ID** is considered as our primary key.

Employees:

1. **First Name** is an attribute of the entity *Employees* to provide identification of the employees by their first name. Also an example of a complex attribute.
2. **Last Name** is an attribute of the entity *Employees* also to provide identification of the employees by their last name. Also an example of a complex attribute.
3. **Sex** is an attribute of the entity *Employees* to provide information about the employees based on their gender.
4. **Branch** is an attribute of the entity *Employees* to state which branch they belong to as there are different branches employees belong to across all cinemas.
5. **Managers** is the final attribute of the entity *Employees* as there are different managers across all cinemas for different branches.

6. **Experience** is an example of a derived attribute as it can be derived from one or more attributes.
7. **Branch_id** is an example of a foreign key as is as a specific ID that identifies the employees branch.
8. **Employees_id** is considered as our primary key.

Customers:

1. **Customer FName LName** is an attribute of the entity *Customers* as we need to be able to identify customers by their first and last name. it can also be identified as a complex attribute.
2. **Customer Number** is an attribute of the entity *Customers* that provides a number that is associated with each customer as a way to identify them more efficiently than using their name. is an example of a foreign key as it's a different way to identify a customer.
3. **Email** is an attribute of the entity *Customers* that displays the customers email as a means of contact with them. Also considered as a multivalued attribute as multiple emails could be.
4. **Sex** is an attribute of the entity *Customers* that states the customers gender which helps in identifying them.
5. **Phone Number** is an attribute of the entity *Customers* that is needed as a means of contact also.
6. **Customers_ID** is considered as our primary key.

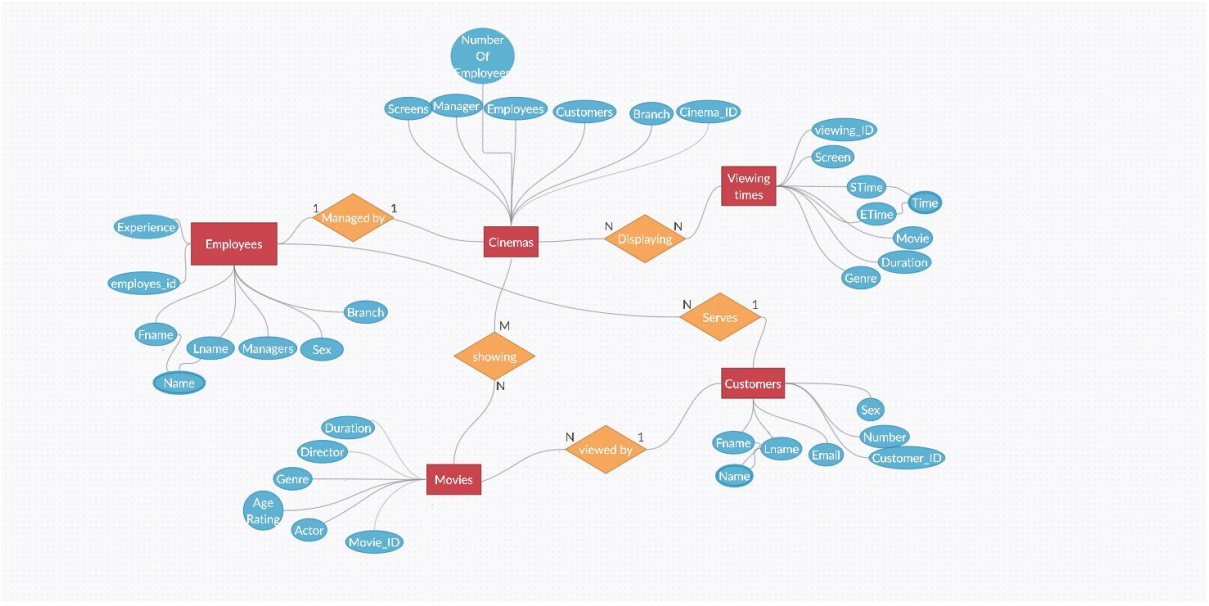
Movies:

1. **Duration** is an attribute of the entity *Movies* that states the duration of each movie as there are different movies on show at different times in the cinemas.
2. **Director** is an attribute of the entity *Movies* that states the director of each movie to distinguish between movies.
3. **Actors** is an attribute of the entity *Movies* that lists the actors in each movie.
4. **Genre** is an attribute of the entity *Movies* that states the category that the movie falls into (i.e. action, comedy etc). Is a multivalued attribute as there are many categories.
5. **Age Rating** is an attribute of the entity *Movies* that states the age requirement to view the film.
6. **Movie_ID** is considered as our primary key.

Viewing Times:

1. **Screen** is an attribute of the entity *ShowTimes* that displays the screen that the movies being shown are being played in, which is needed to allocate a movie to a particular screen.
2. **Start Time, End Time (Time)** is an attribute of the entity *ShowTimes* that states the time the movie starts and ends at, this is needed so movies being shown in the same theatre don't clash.
3. **Movie** is an attribute of the entity *ShowTimes* that displays the name of the movies being shown.
4. **Duration** is an attribute of the entity *ShowTimes* that states the length of each movie so other movies in the same theatre can be scheduled.
5. **Genre** is an attribute of the entity *ShowTimes* that categorizes each movie being shown based on the viewing category it falls into (i.e. romance, thriller etc.). Is a multivalued attribute as there are many categories.
6. **Viewing_ID** is considered as our primary key.

Part 2: E-R Diagram



We have decided on five relationships for our project and have a full understanding of why these relationships are necessary for our company.

1. Managed by
2. Displaying
3. Showing
4. Serves
5. Viewed by

Managed by:

This relationship is needed between the two entities ‘Employees’ and ‘Cinemas’, as Employees are vital to keeping the cinema running smoothly and efficiently and also managing the branch's facilities. The relationship between them can be defined as a **1:1** as employees can only manage one cinema at a time and a cinema has a specific number of employees.

Displaying:

This relationship is needed between the two entities ‘Cinemas’ and ‘Viewing times’ is important as showings cannot take place if there are no cinemas. The relationship between them can be defined as **N:N** as there can be multiple viewing times in different cinemas.

Showing:

This relationship is needed between the two entities ‘Cinemas’ and ‘Movies’, as Cinemas main purpose is to display movies. The relationship between them can be defined as **N:M** as many cinemas can be displaying many different movies at a time.

Serves:

This relationship between the two entities ‘Employees’ and ‘Customers’ is necessary as customers cannot be served food, drink or tickets without employees. The relationship between them can be defined as **N:1** as many employees can serve a single customer, but a single employee cannot serve many customers.

Viewed By:

This relationship is needed between the two entities ‘Movies’ and ‘Customers’ as if there are no movies to watch there would be no customers. The relationship between them can be defined as **N:1** as there can be many customers viewing one film, but there cannot be a single customer viewing multiple movies.

Part 3: E-R to Relational Mapping

For this part of the assignment we will be using the ER-to-Relational Mapping Algorithm, the steps are as follows.

1. **Mapping of Regular Entity Types**
2. **Mapping of Weak Entity Types**
3. **Mapping of Binary 1:1 Relationship Types**
4. **Mapping of Binary 1:N Relationship Types**
5. **Mapping of Binary M:N Relationship Types**
6. **Mapping of Multivalued Attributes.**
7. **Mapping of N-ary Relationship Types.**

Step One: Mapping of Regular Entity Types

List out the primary keys associated with each entity.
These are our primary keys:

Entity	Primary Key
Viewing Times	viewing_ID
Movies	movie_ID
Customers	customer_ID
Employees	employee_ID
Cinemas	Cinema_ID

Step Two: Mapping of Weak Entity Types

Primary keys as foreign keys in associated weak entities should be included here.

Entity	Foreign Key
Viewing Time	Duration
Movie	Duration

Step Three: Mapping of Binary 1:1 Relationship Types

Choose an approach from:
Foreign Key, Merged Relationship or Cross-reference /Relationship Relation.

In our case, **The Foreign Key** approach was chosen.

Managed By
'Employees' is mapped to 'Cinemas' via a **1:1** relationship as a single employee can only work in a single cinema.

Step Four: Mapping of Binary 1:N Relationship Types

Serves
'Employees' is mapped to 'Customers' via an **N:1** relationship due to the fact that many employees can serve one customer at a time.

Managed By
'Employees ' is mapped to 'Cinemas' through a **1:1** relationship because an employee can only work in one cinema.

Showing
'Cinemas' is mapped to 'Movies' via an **M:N** relationship as many cinemas can show many showings of many movies.

Displaying
'Cinemas' is mapped to 'Viewing Times' through an **N:N** relationship as there can be many viewing times in each cinema.

Viewed By
'Movies' is mapped to 'Customers' via an N:1 relationship because one movie can be viewed by many customers at a time.

Step Five: Mapping of Binary M:N Relationship Types

A cinema can have many showings of movies, which correlates to a cinema having more than one movie screen in operation at a time.

Step Six: Mapping of Multivalued Attributes

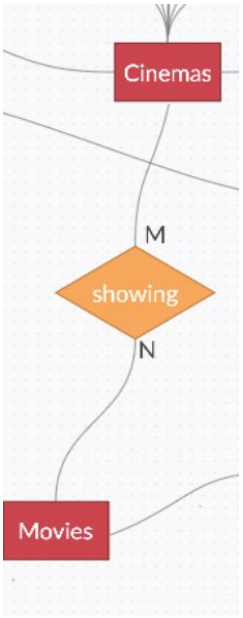
The attribute Time in the entity Viewing Time stands for STime (start time) and ETime (end time).

Step Seven: Mapping of N-ary Relationship Types

There are no N-ary relationships contained in our map.

A **Partition constraint** defines the least number of relationships of which an entity has to participate in.

Total Participation is when each entity in the set of entities is involved in one relationship. An example on our ER diagram would be the **M:N** relationship between the entities as many cinemas can be displaying many movies at a time.



Partial Participation is when each entity does not participate in a relationship, an example of this would be the 1:1 relation in our diagram would be the Employees to Cinemas relation. The relationship is like this as an employee must manage a cinema and a cinema must have employees for it to be run.