INFO20003 Database Systems

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Tutorial 3
2020.03.16

1. **Notice and Recap - 5min**

2. **Entity-Relationship (ER) modelling review - 15min**

3. **Case study - 25min**

4. **Conceptual model to logical model - 15min**

5. **Lab - 50min**

1. All of the teaching (lectures and tutorials) of this subject will be moved online starting from next week

2. Lecture: canvas recording

3. Tutorials: zoom meeting (link to be announced)

1. What are the three stages of design in development cycle?

   Conceptual: ER Model (abstract, general)

   Logical: relational model (specify the type of model)

   Physical: implementation (specify datatype, indexes…)

2. What is entity, attribute, and relationship?

   Entities: real-world object or concept distinguishable from other objects or concepts

   Attribute: description/features of a entity

   Relationship: Association among two or more entities.

Entity, weak entity, Attribute

Entities: real-world object or concept distinguishable from other objects or concepts

Concrete: student, book, person

Abstract: holiday, concept

Weak Entities: entities that require other entities to exist

example: a company insurance policy that insures an employee and any dependents

Attribute: characteristics representing an entity

Business rules to relationships

key constraints and participating constraints

Key constraints:

"upper bound" of the number of relationship that one

entity could participant in

At most

Key symbol: arrow

One-to-one, One-to-many, Many-to-many

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Business rules to relationships

Key constraints:

One-to-one

One-to-many

Many-to-many

Business rules to relationships

key constraints and participating constraints

Participating constraints:

"lower bound" of the number of relationship that one entity
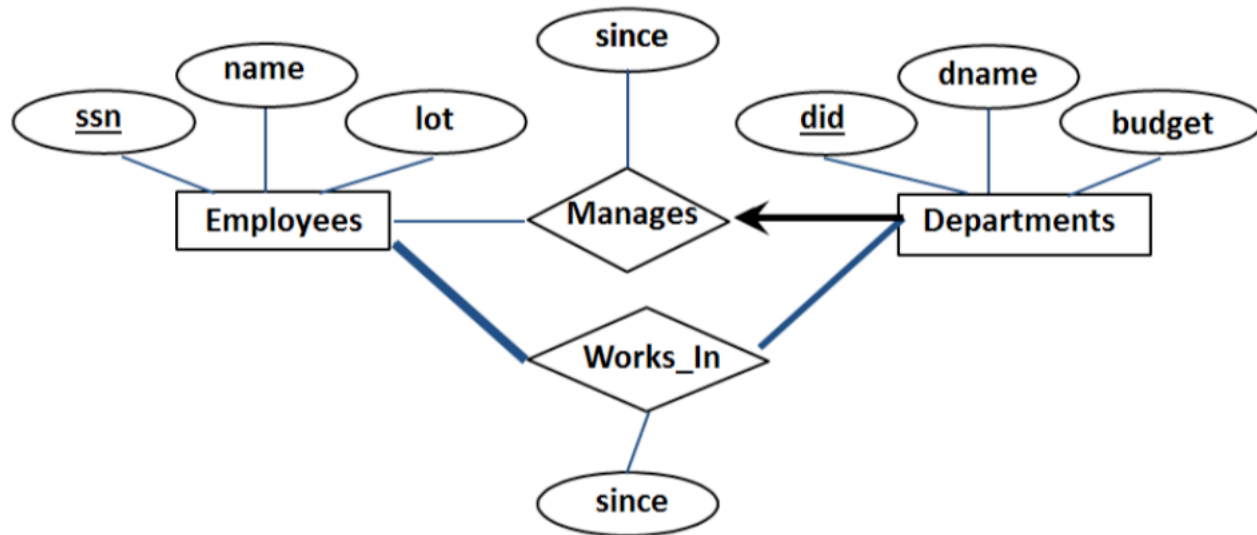
have to participant in

At least

Key symbol: bold/regular line

Total / Partial

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Business rules to relationships

Participating constraints:

Total

Partial

Any questions?

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A cinema chain operates a number of cinemas. Each cinema has several screens, numbered starting from 1. The chain keeps track of the size (in feet) and seating capacity of every screen, as well as whether the screen offers the Gold Class experience.

The cinema chain owns hundreds of movie projectors – both film projectors (16 mm and 35 mm) and digital projectors (2D and 3D). The chain stores key information about each projector, namely its serial number, model number, resolution and hours of use. Each movie screen has space for a single projector; technicians must be able to identify which screen each projector is currently projecting onto.

A wide range of movies are shown at these cinemas. The system should keep track of the last time a movie was shown on a particular screen. The marketing department needs to know the movie's title and year of release, along with the movie's rating (G, PG, M, MA15+ or R18+).

Each cinema has a numeric ID, name and address. For cinemas that are not owned outright, the business also keeps track of yearly rent. The system needs to be able to generate weekly activity reports for the chain's chief operating officer.
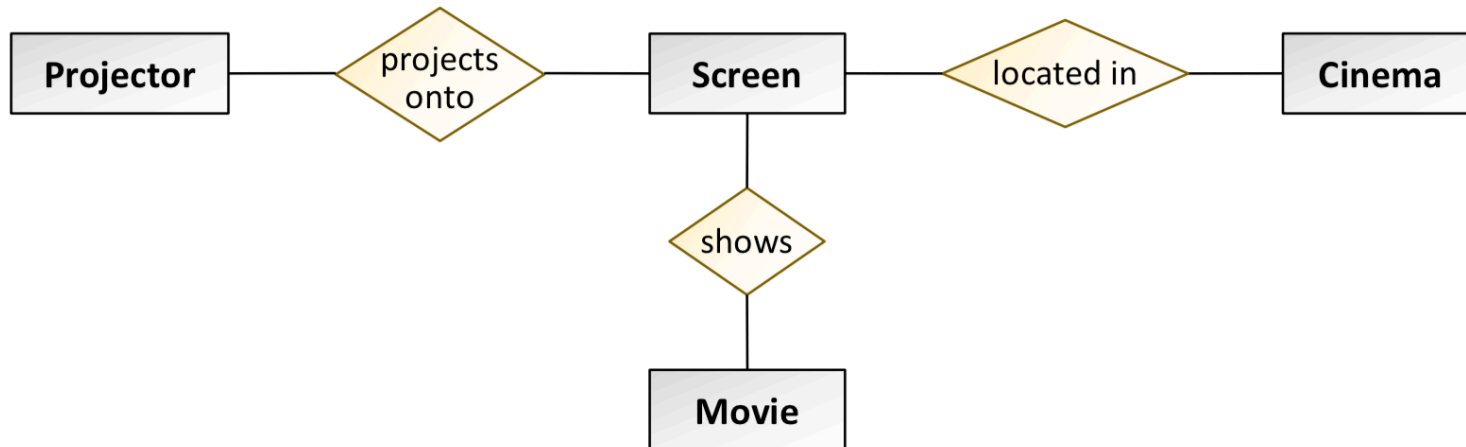
a. Revise last week's identified **entities**.

- Cinema

- Screen

- Projector

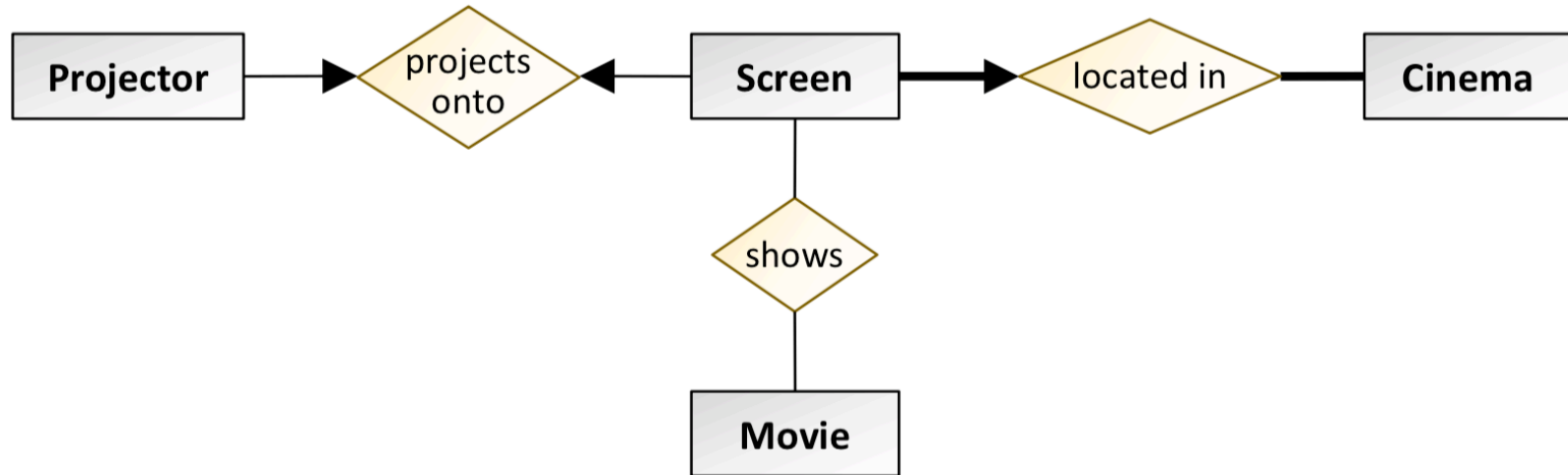- Movie

b. Form **relationships** between entities.

· Business rules first

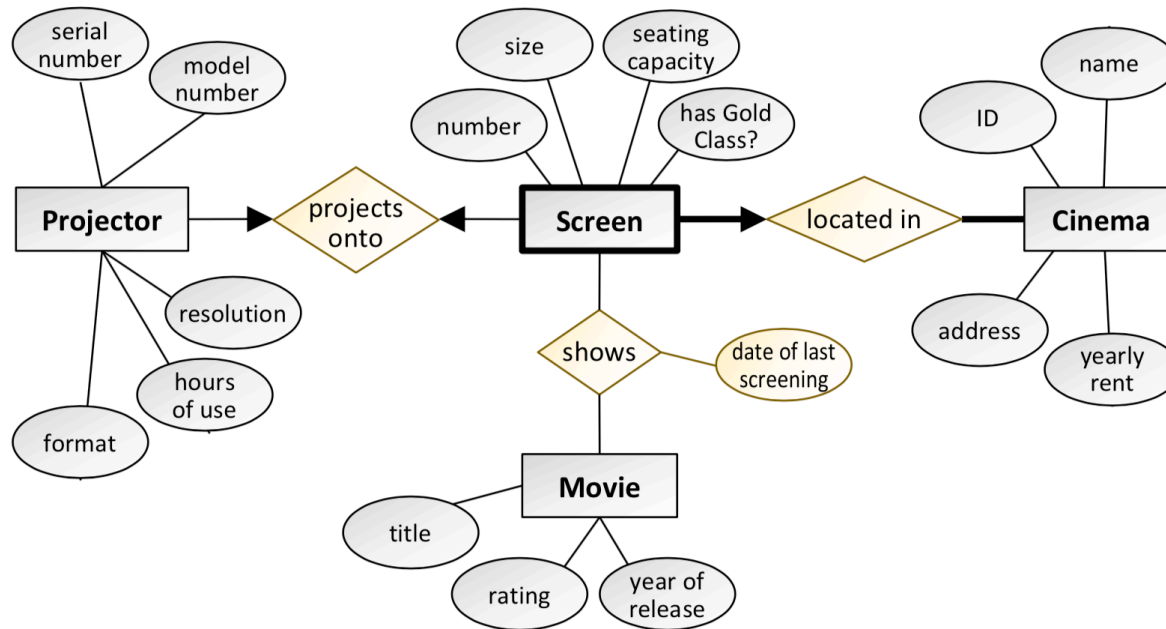do not use vague words like "has" to label your relationships.

c. Apply **constraints** (key constraints and participation constraints) to the relationships.

· Business rules first

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d. Add **attributes** which describe the entities and relationships.
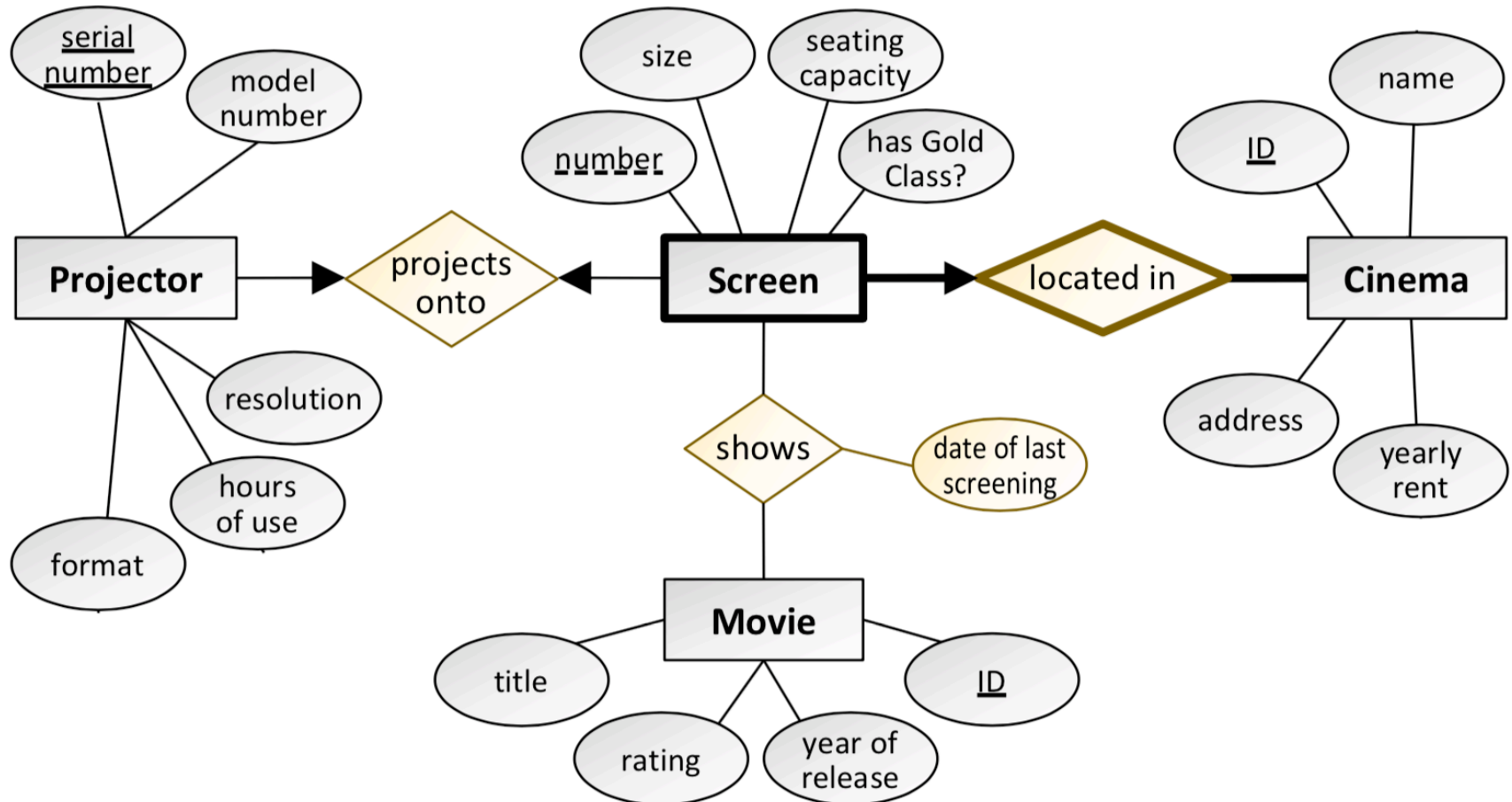
· Business rules first

Don't forget to look for attributes for the relationships in your model, not just the entities!

e. Finalise your conceptual model by marking **weak entities**, **identifying relationships** and **key attributes**.

· Business rules first, carefully consider all the entities with bold arrows coming out of them. Some of these could be weak entities

Each weak entity must have at least one weak (identifying) relationship!

a. What needs to be changed to convert a conceptual design to a logical design? Develop a logical design for the above case study.

1. Resolve multivalued attributes by splitting them into separate tables.

2. Resolve composite attributes by redrawing the component parts as separate attributes.

3. Resolve relationships by adding foreign keys and associative entities to the model, and placing relationship attributes in the correct location.

a. What needs to be changed to convert a conceptual design to a logical design? Develop a logical design for the above case study.

Cinema (<u>CinemaID</u>, Name, Address, YearlyRent)

Screen (<u>CinemaID</u>, <u>ScreenNumber</u>, Size, SeatingCapacity, HasGoldClass, ProjectorSerialNumber)
        FK   FK

MovieScreening (<u>CinemaID</u>, <u>ScreenNumber</u>, <u>MovieID</u>, DateOfLastScreening)
   FK   FK   FK

Movie (<u>MovieID</u>, Title, YearOfRelease, Rating)

Projector (<u>SerialNumber</u>, Format, ModelNumber, Resolution, HoursOfUse)

b. What will you change in the logical model to generate a physical model?

main change is to go through every

column and add a data type and NULL/

NOT NULL constraint

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b. What will you change in the logical model to generate a physical model?
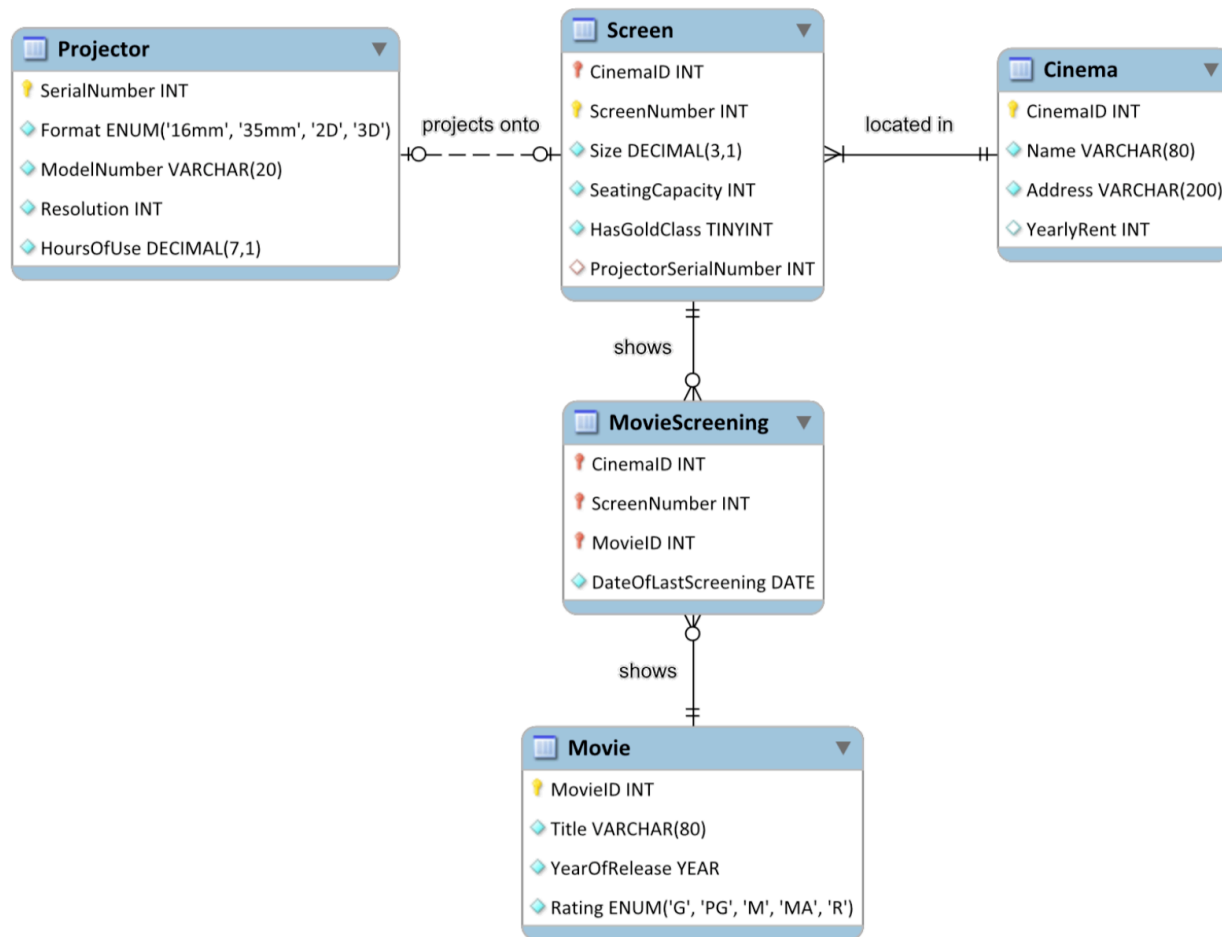
Any questions?

Please refer to Lab 3 on LMS

Let me know if you encounter with

any problem

familiarize yourself with creating models on workbench

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