



THE UNIVERSITY OF
MELBOURNE

INFO20003 Database Systems

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Tutorial 3
2021.03.15



- 1. Entity-Relationship (ER) modeling review
- 15min**
- 2. Case study - 25min**
- 3. Conceptual model to logical model -
10min**



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

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

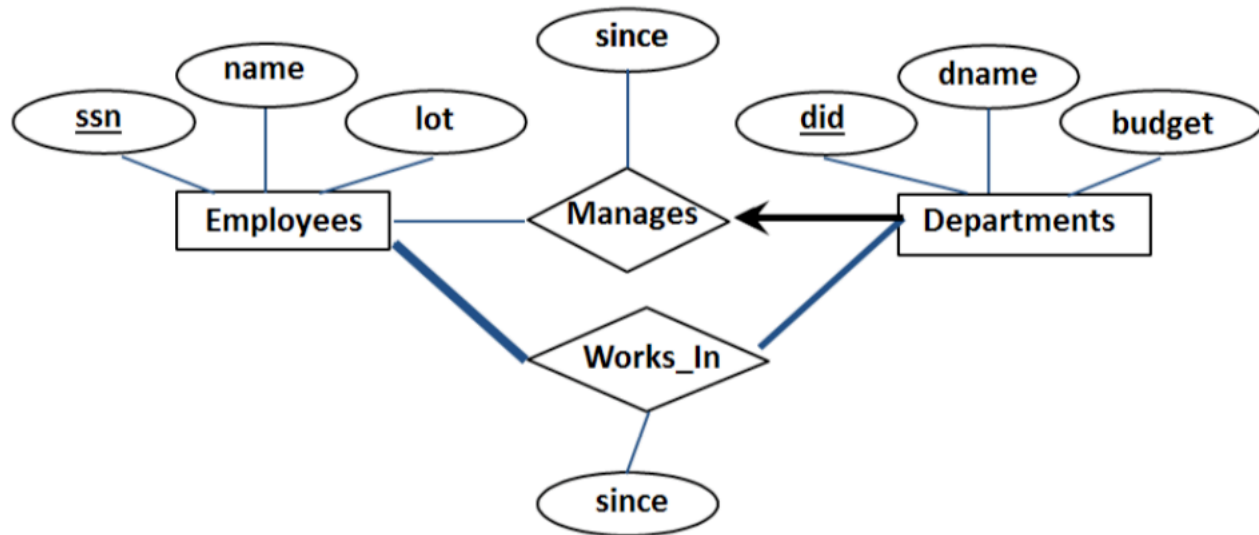
Key symbol: **bold/regular line**

Total / Partial

Business rules to relationships

Participating constraints:

Total



Partial

Any questions?



Group/Individual case study

- 1. Already have a study group and they are all in this tut?**
 - **Message me the name of all group members**
- 2. No group yet but happy to join some groups.**
 - **No need to do anything**
 - **I'll randomly allocate you to some groups**
- 3. Don't want be in a group for now?**
 - **Totally fine, please message me about this**

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+).

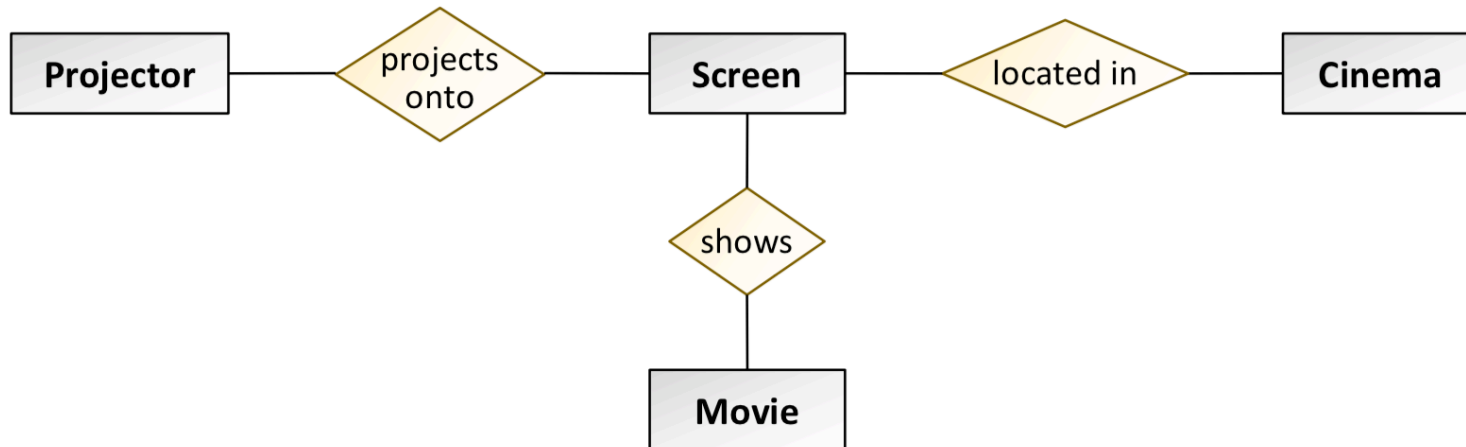
Each cinema has a numeric ID, name and address. For cinemas that are not owned outright, the business also keeps track of yearly rent. The system needs to be able to generate weekly activity reports for the chain's chief operating officer.

a. Revise last week's identified **entities**.

- Cinema
- Screen
- Projector
- Movie

b. Form **relationships** between entities.

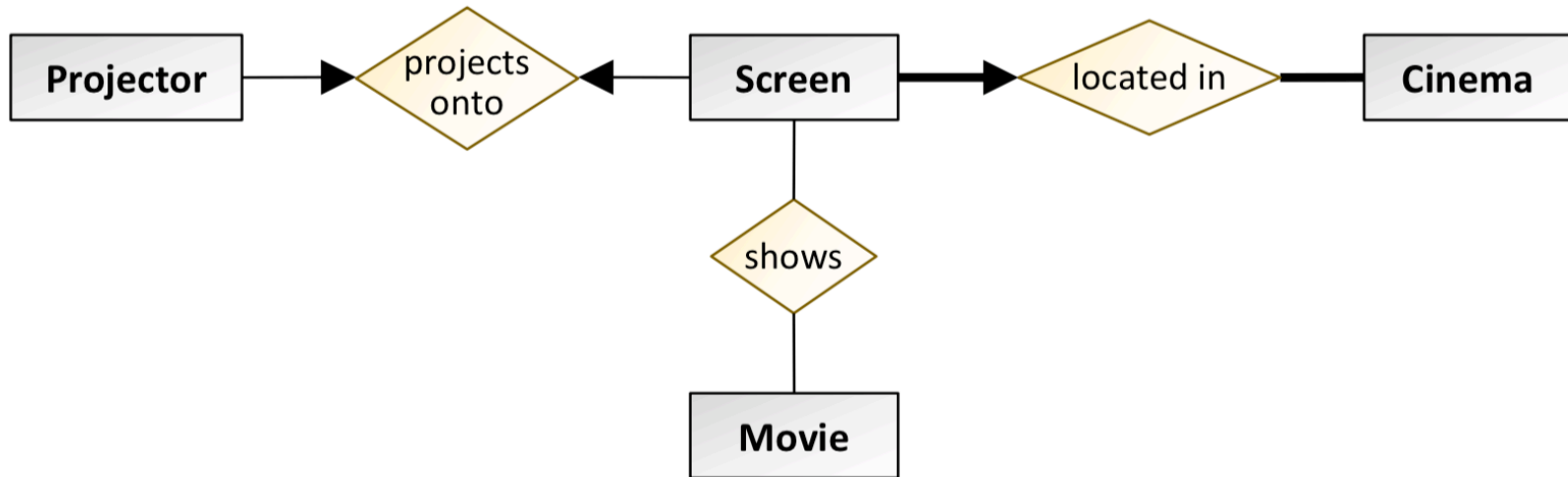
- Business rules first



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

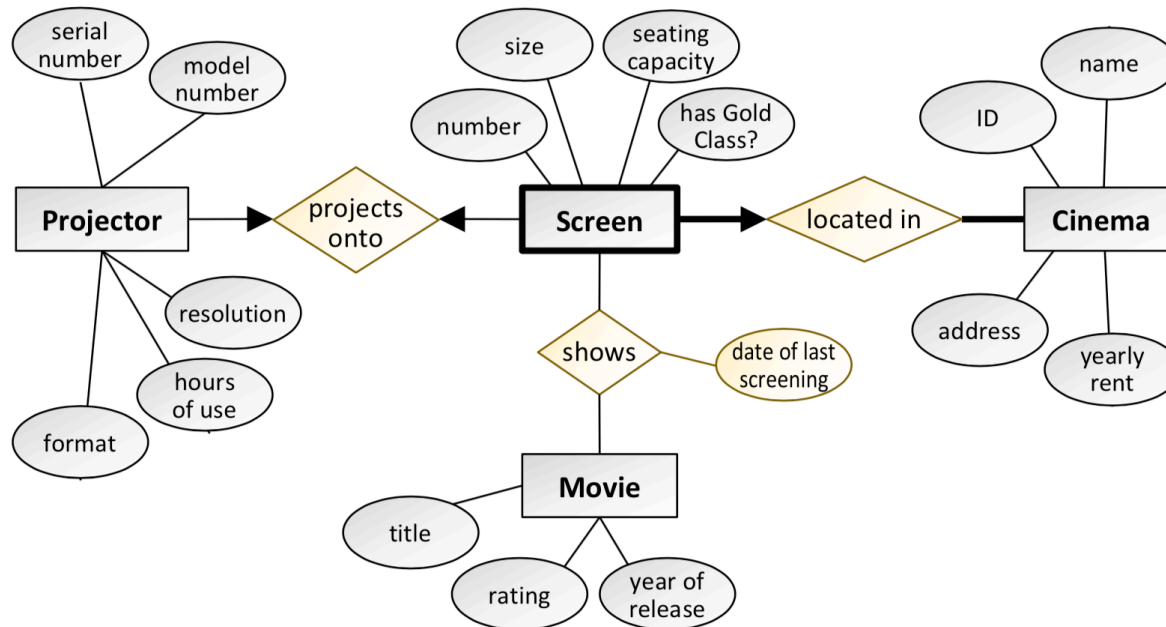
c. Apply **constraints** (key constraints and participation constraints) to the relationships.

- Business rules first



d. Add **attributes** which describe the entities and relationships.

- Business rules first

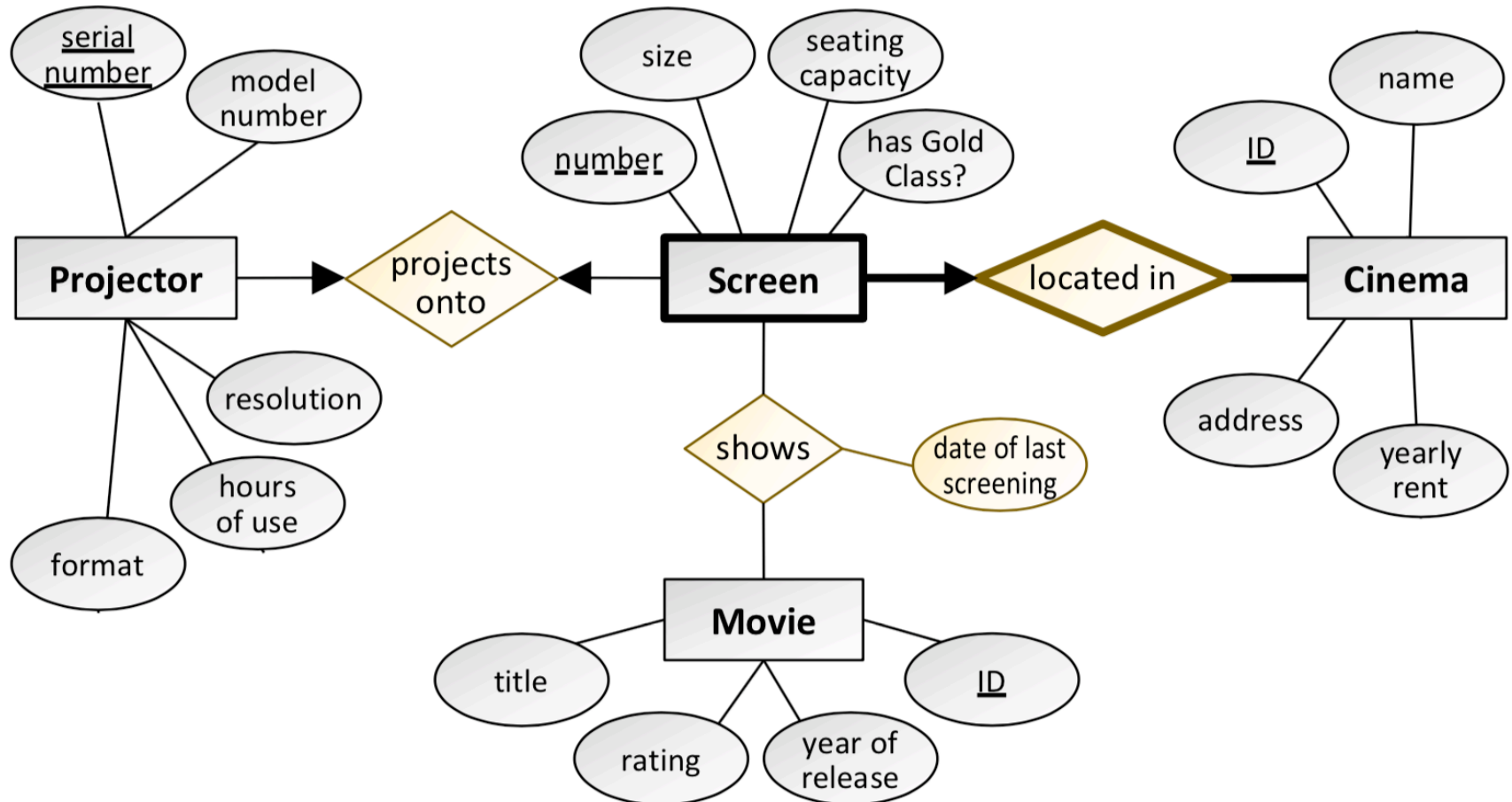


Don't forget to look for attributes for the relationships in your model, not just the entities!



e. Finalize 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 (CinemaID, Name, Address, YearlyRent)

Screen (^{FK}CinemaID, ScreenNumber, Size, SeatingCapacity, HasGoldClass, ^{FK}ProjectorSerialNumber)

MovieScreening (^{FK}CinemaID, ^{FK}ScreenNumber, ^{FK}MovieID, DateOfLastScreening)

Movie (MovieID, Title, YearOfRelease, Rating)

Projector (SerialNumber, Format, ModelNumber, Resolution, HoursOfUse)



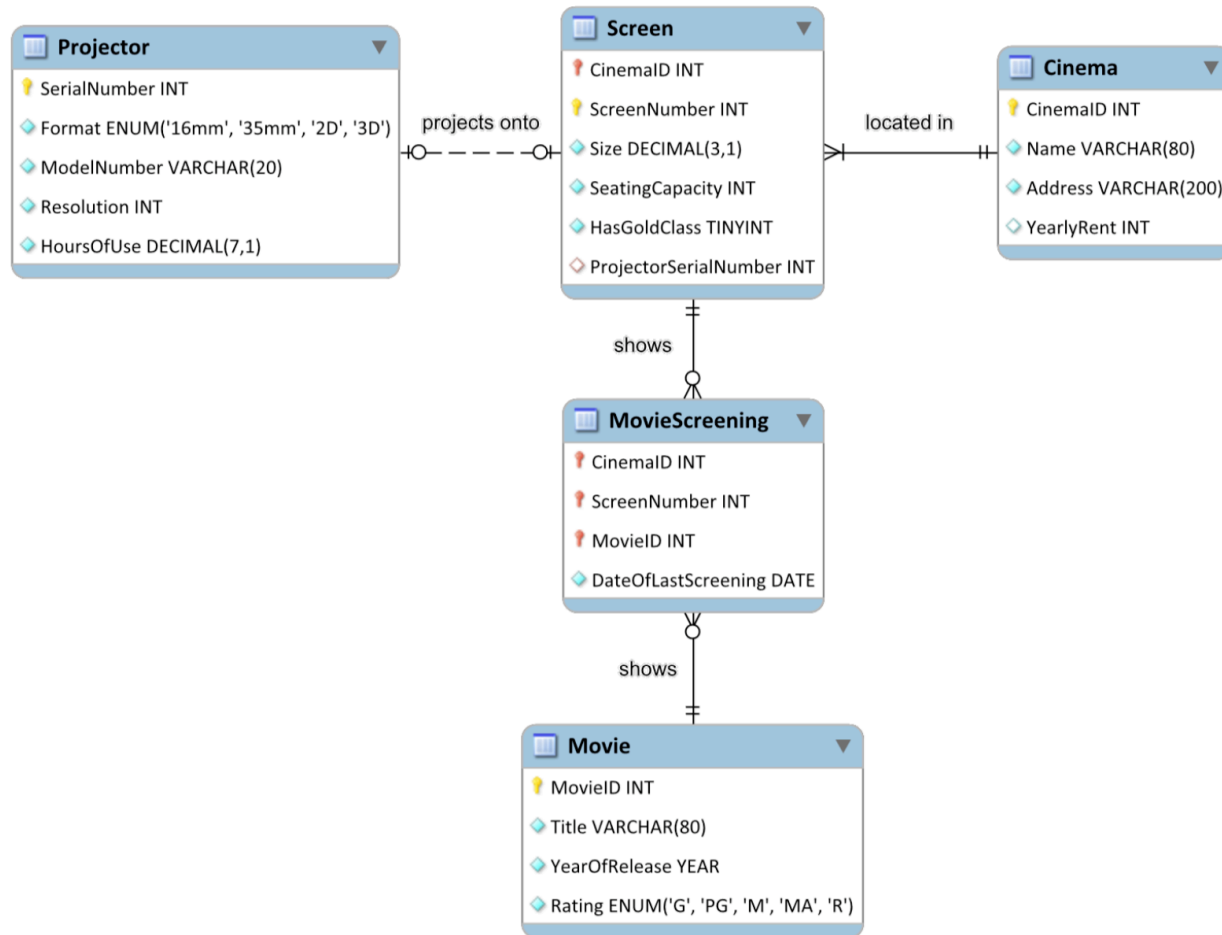
b. What will you change in the logical model to generate a physical model?

main change is to go through every

column and add a data type and NULL/

NOT NULL constraint

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



Any questions?