COMPSCI 3DB3

Assignment 1

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Analysis

This analysis will briefly show how all the requirements are being met and how they will be translated to the final ER diagram. We will go through this process for all import sentences based on their appearance order in the description.

Each cinema has a unique name and an address.

Cinema is an entity. It has two attributes current name and address, with address being its primary key.

In the past, cinema names have changed (e.g., due to renovations and grant reopenings).

This reminds us to add a new attribute names past name to Cinema entity.

Per cinema, the system will also maintain information per room.

Room should be a weak entity of cinema.

Each room has a unique number within the cinema (e.g., smaller cinemas have Room one to Room five).

The weak entity Room should have an room number attribute as the partial key.

Per room, the system can keep track of the characteristics of the cinema installation. These characteristics include . . .

Screen, Projector, Sound system should be weak entities of the room, because they all have multiple attributes. We also assume there is an unique equipment id for each of these equipment to act as their partial key. The available accessibility should be an attribute, as it only has an atom information.

Finally, per room the system also needs to know the exact seat arrangement, as the online system will allow customers to order tickets for specific seats.

This reminds us to has Seat as an weak entity for Room.

Hence, the system keeps track, per room, of each seat and—per seat—its location in the room, the row it is in, and the seat number (within the row).

The Seat should have two attributes row and number, with both acting as their partial key for distinguishing.

Furthermore, some seats are standard reserved for disabled people.

All seat should have an additional disable attribute, which is a boolean type.

Second, the system needs to store information for each screening.

Screening is an entity.

Each screening is assigned a single room and timeslot.

This rules the relationship between Room and Screening as many (partial) - to - one (total). We suggest attach the start time and end time as an attribute to Screening, as it added to the relationship, it could easily mix things up. In addition, here we suggest adding an unique screening number (primary key) for each screening with different time slot, this can be easily implemented by automatically generated by system.

the system distinguishes between three types of screenings: normal screenings will show a single film and will be offered via normal ticket prices; special screenings can show one-or-more films with a special ticket price, e.g., a marathon with a higher ticket price or a classic film at a reduced ticket price; and private screenings (as part of hired rooms).

We have three sub entity by ISA relation to Screening: Normal Screening, Special Screening, and Private Screening. Due to the principle of reducing redundancy, we only need one attribute price attached to their super entity Screening. Different prices can be expressed just by number.

This film information is provided by the film distributors in a standard format: for now, the system represents this external information via an entity Film with an attribute fid.

Film is an entity with the attribute fid as its primary key.

For each public screening, the system keeps track which films are shown.

Film has relationship showing with Screening. It should be noticed, for different type of Screening, they can show multiple or one films. This kind of relation is showed in ER diagram: each Normal Screening can show exactly one film, while each other types of screening should show at least one Film (many, total).

Via an (online) sale, customers can buy one or more tickets for a specific screening and that are assigned a seat on sale.

Customer is an entity, who participates many times in a Sale relationship. We assume each customer should have an unique uid generated by the system. In practice, we may also need to create attributes like last name, first name, and phone number for them.

For each sale, we keep track of how they are made (online, ticket machine, at the counter) and whether the sale was related to a reservation.

Sale relationship should have two attributes: channel (which means the selling channel e.g. online, ticket machine, or counter) and is a reservation.

Customers that do not feel comfortable with paying online can reserve their seats online and buy a ticket for these reservations at the counter (these reservations will be cancelled 45 minutes before the start of the film).

This requirement has been met by the Sale relationship.

Furthermore, we keep track of the paid price (which can depend on coupons, special actions, payment method, or room and film options).

The Sale relationship has an unique transaction number as the primary key and some attributes such as paid price, coupons, special actions, payment method. We omit the room and file options here, because each Sale relation already connected with these information in our module. Because Sale is an relationship, when attaching an weak entity to it, we should use aggregation here. The details are showed in the ER diagram.

If a screening will show multiple films (as part of special screening), then each of these films will be shown in the same room and the ticket of the customer assign the same seat during each film.

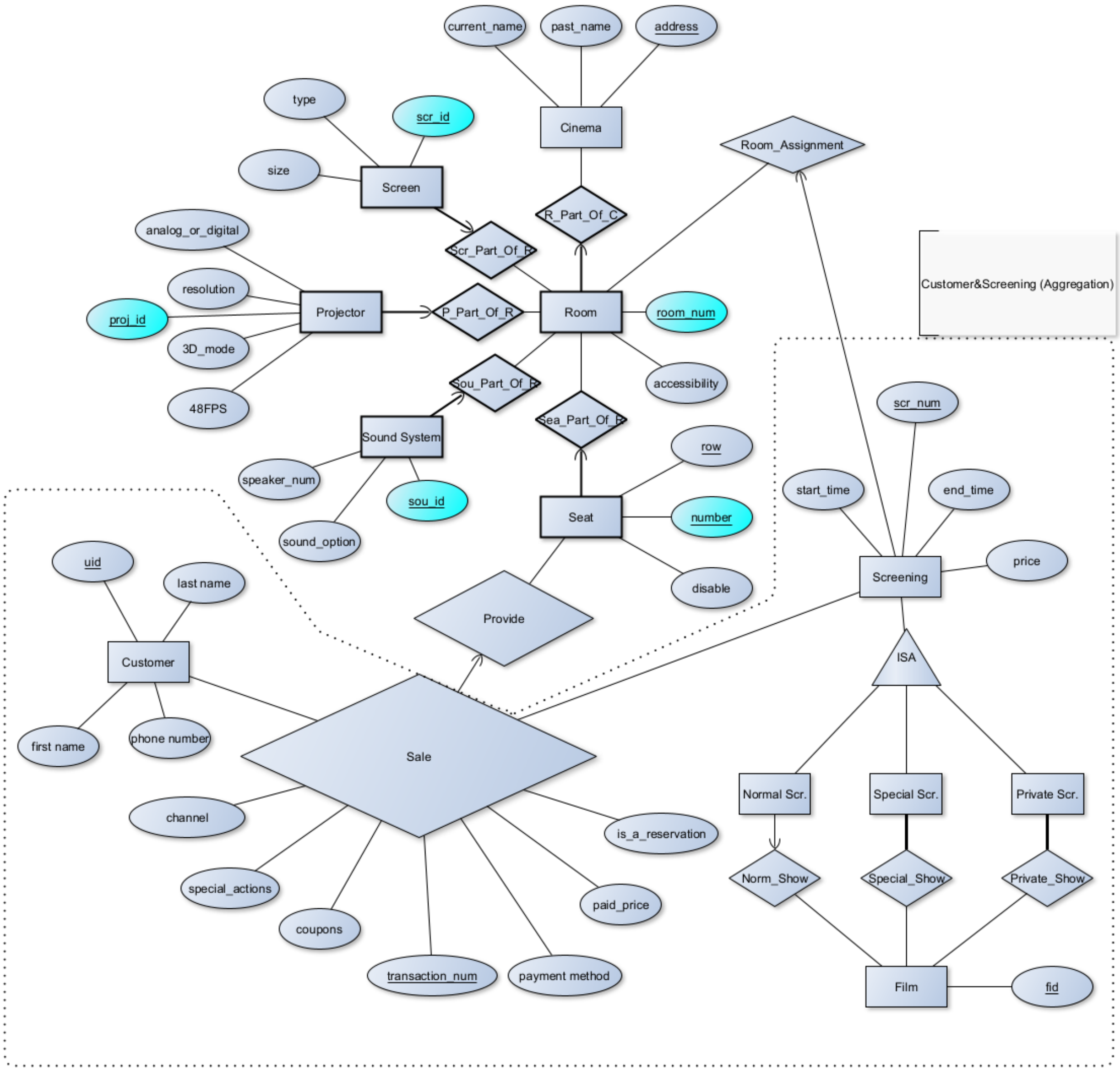
First, a new relationship called Room Assignment between Room and Screening is created, which is a many (partial) - to - one (total) relationship. Note: we treat time slot as an attribute of Screening. That is why the room can participate many times in this relation.

Second, the Seat entity, instead of Room should participate at most once to Sale relationship based on the fact that in a particular time slot, a seat can only be owned by one customer. Here, Sale should evolve to an tenary relationship among Seat, Screening, and Customer. However, the using of the tenary relationship can be further optimized to an aggregation between Customer and Screening, connected with the Seat entity.By doing this, we can have a new but import constraint – The aggregated entity, which we call Customer&Screening can participate exactly once (one, total) in the Provide relationship.

ER Diagram

Note:

- Because in the yEd app, there is no dotted lines to help us distinguish a partial key, we used a blue node for partial key.
- Also the thick line is for many, total, as the professor mentioned recently.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past_name
address
type
scr_id
Cinema
Room_Assignment
size
Screen
R_Part_Of_C
analog_or_digital
Scr_Part_Of_R
Customer&Screening (Aggregation)
resolution
proj_id
Projector
P_Part_Of_R
Room
room_num
3D_mode
48FPS
Sou_Part_Of_R
accessibility
scr_num
Sound System
Sea_Part_Of_R
row
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Seat
number
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end_time
sound_option
price
uid
last name
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ISA
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phone number
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channel
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coupons
transaction_num
payment method
Film
fid