EER exercises

# Ex0. Arconia

The Arconia is an apartment complex, the owner needs to keep track of the residents.

There are two types of residents: tenants and owners. We need their names.

A resident lives in a specific apartment (identified by a number), and given that residents move out and new ones move in occasionally, we must know when each resident started to live here, and when their residency ended. We keep this start-and-end-date history of who has lived in an apartment.

For the tenants we store their rent, and owners natually don't pay rent, given that they own their apartment, but they pay a fixed amount for utilities each month.

Owners enjoy the privilege of being allowed to rent one of our parking spots, at most one, each spot is identified by an id.

Tenants are responsible for cleaning the floors of the stories of the building. Each tenant has the responsibilty of a specify story on a specific month, so we need to store that to make a schedule overview.

And finally, we also need to store which story each apartment is on.

Parking spot also has a location, given by row and spot-number.

# Ex1. Bus Routes

Horsens Traffic Terminal needs a new database to keep track of their bus routes. You will design it.

We deal with bus-routes. A route is defined by its name, e.g. "2A". A route includes a number of stops, and multiple routes can use the same stop. A stop has a specific ID.

We have two types of stops, because the locations of the stops in the city is given by a street name, and a letter in case there are two stops on the same street. But we also have rural stops, and those roads can be miles long, so we find those stops by gps-coordinates: longitude and lattitude.

We want to indicate when a bus arrives at a stop, so for each stop we mark the minutes it takes to reach the stop, after the bus departured from the traffic terminal.

We also need to know the order of the stops of a route, you cannot just randomly drive around between stops.

The same route can be driven multiple times a day, so we have various departures, given by a start time. The arrival time of a stop, is given in minutes after departure.

A driver, (with name), is assigned to a specific departure. And we also need a bus for each departure. Busses are distinguished by licenseplate.

# Ex2. WebFlix

We wish to make a competitor to NetFlix.

When a new customer signs up, they create an account, with their email and their password.

And we also need to store which subscription type they chose.

Our platform has various types of media, both movies, documentaries and tv shows.

Each has a title, year it was released, and a short description.

For the documentaries we are interested in their run time and type.

Also run time for movies, but here we care about the genre.

For each country, it has a name, and we want to keep track of the current top 10 movies. We need the ordering of the movies in the top 10, as well.

A tv show has a number of seasons, each season has a season number and a release year. And each season has a number of episodes, here we need the episode number, title of the episode, and run time.

We allow an account to be used by multiple viewers, so an account can be associated with multiple profiles, each profile having a profile name, and we mark whether is should be child friendly.

A user can create a watch list for their profile so they can remember which of our media they would like to see later on.

# Ex3. Airport

VIA Airport (VIAA) outside of Horsens needs a new airport system.

VIAA has multiple terminals, each with several gates, and serves several airlines, which operate flights to various destinations. Terminals have an id, a name and a location, gates have an id and a location whereas as airline has an id, name and contact information.

Each airline has a fleet of aircraft that are used to operate flights. There are two types of aircraft: passenger and cargo. Passenger aircraft are used to transport passengers and their baggage, while cargo aircraft are used to transport cargo.

An aircraft has a make, model and registration number (like a cars registration number) which may change from time to time. Passenger aircraft also have a passenger capacity while cargo aircrafts have a cargo capacity.

The airport need to keep track of a passenger's name, contact info and the passport number which is unique, and their baggage which will get an id, has a weight and is sent on a flight. Cargo has the same attributes as baggage, it is also sent with a specific flight.

Each flight has a unique flight number, departure time, and arrival time. A flight leaves from a specific gate, and a flight arrives at a gate. Though obviously, either the arrival gate or departure gate is at a different airport.

The destination has an id and a name.

# Ex4. Musicify

In a far dystopian future Spotify has been hit by scandals and is shot down. Leaving a gap in the music streaming industry, minor companies are rushing to fill this gap with their own new system. Musicify is one such company. They want you to design their database. We’ll start with the EER

diagram, based on the following description:

We’ll have multiple types of users, the basic being the FreeUser. For each user we need email and password.

You can choose to create a subscription, of e.g. type ”monthly” or ”quater-yearly”, which will upgrade you to premium user.

Premium users can create playlists, which contains songs. Users can follow playlists. These playlists are ”owned” by the

premium user, so if that user deletes their user-profile, the playlist is deleted too.

The playlists should have title, description and a total length, i.e. how long is the total play

time.

The playlists are compiled of songs, each song having a title and a length. These songs are usually associated with an album (with a title and a publication year), which is owned by an artist.

Sometimes artists collaborate, so a song can have a multiple collaborating artists.

We’ll have two types of artists. We’ll want bands and solo artists. They obviously both have a name. Sometimes solo

artists can play in bands.

Albums have genres. And users can favourite albums, so they can easily find their favourite music in the app.

# Ex5. VIA

VIA is getting pretty tired of itslearning, so they want to switch to a new system, which means a new database. You must design the EER diagram based one the below description:

We need to keep track of multiple things:

Employees are identified by their initials, and we need first name, last name, their salary, phone number, and office, too. We have various types of employees, which will be described below.

Head of programmes lead study programmes. These programmes have both a unique short name and a longer, more descriptive name. Head of Programmes may lead multiple programmes, but a programme is lead by only one.

Teachers have a specialization, and some teachers take on a role of coordinator, where they coordinate with certain fellow teachers and, answer to a head of programme.

Programmes have courses, identified by a code, and they have a name, curriculum description and which semester they belong to. Teachers teaches courses, sometimes more teachers share a course.

Obviously, if a programme is terminated, the associated courses are also removed. Programmes are taught at certain campusses. Campusses have a name, e.g. Campus Horsens, Campus Nord, etc. And they have an address.

Students are signed up for a programme, and they follow courses. We need student number, first and last name, and their enrollment year.

Sometimes they also follow workshops. These are taught by fellow students, called instructors. We must keep track of their salary, and how many hours they work on the workshop.

Finally, some students are tutors for other students, they also receive a salary, and we mark how many hours they are assigned.

# Ex6. Car Rental

Here at VIA Car Rental we rent out cars. We are currently using spreadsheets for our data, but figured it was time to upgrade, as our business grows. Here’s the information we need to keep track of.

We rent out vehicles, two types, that is. We have passenger cars, and moving vans, depending on people’s needs. For any vehicle, we track the following information: the fuel type, license plate number, brand and model. Each vehicle has a fixed rental-price per day, and furthermore there’s an extra cost for each kilometer driven.

For the passenger cars we have both manual and automatic transmissions, so that information must be accessible. For the vans, the size of the trunk in cubic meters is relevant.

Customers rent cars by obtaining leases created by our clerks. For customers we need their names, driver’s license, address, and phone number. We also track their total number of rentals for bonus purposes.

A lease involves the leased vehicle, a customer, and the clerk creating the lease. We need the date of when the vehicle is picked up, and when it will be delivered. We mark the kilometers driven of the vehicle at pick up, and again at return, to calculate the extra expenses for kilometers driven. We offer improved insurance, so we must include, whether the customer accepted.

Upon return the total price of the lease is calculated, based on days rented, the extra insurance, and how many kilometers the customer drove.

We need to know which clerk created the lease in case of complaints or other problems.

As already hinted, we have employees. The clerks service the customers, managing leases and such. They are full-time employees.

We also have part-time employees, our cleaners, they clean the cars after their return. For cleaners we track how many hours per week they work. Cleaners clean cars, whenever they are returned. We need the time and date for each cleaning, and sometimes cleaners leave comments too, e.g. the vehicle was extra muddy.

If the cleaner finds new scratches on the vehicle, they add a description of the scratch to the vehicle’s list of prior scratches.

We have other employees too, e.g. accountants or customer service, but they do not have unique responsibilities regarding cars or leases, so we just consider them employees. For all employees we care about their name, phone number and hourly pay.