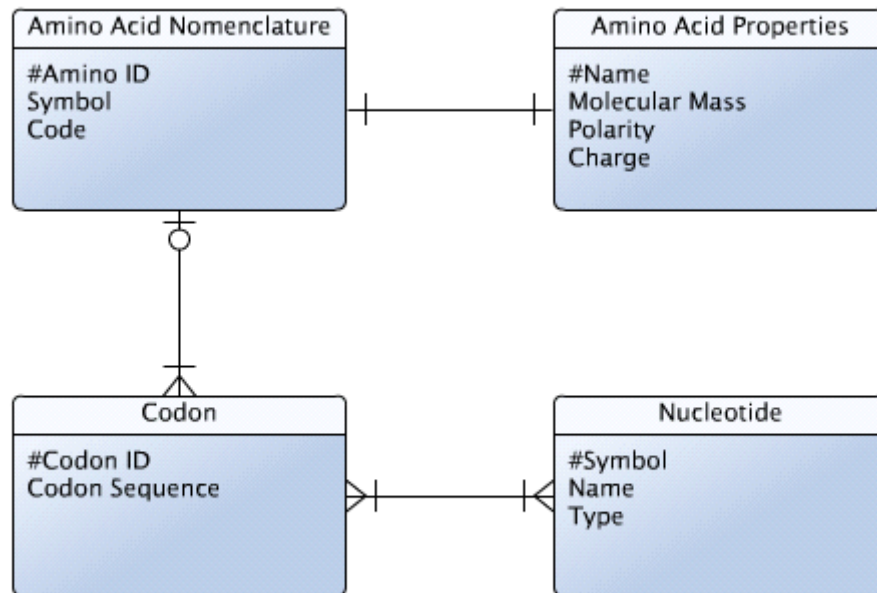


Compulsory Exercise 2 Innlevering

Jan-Kristoffer Brekke

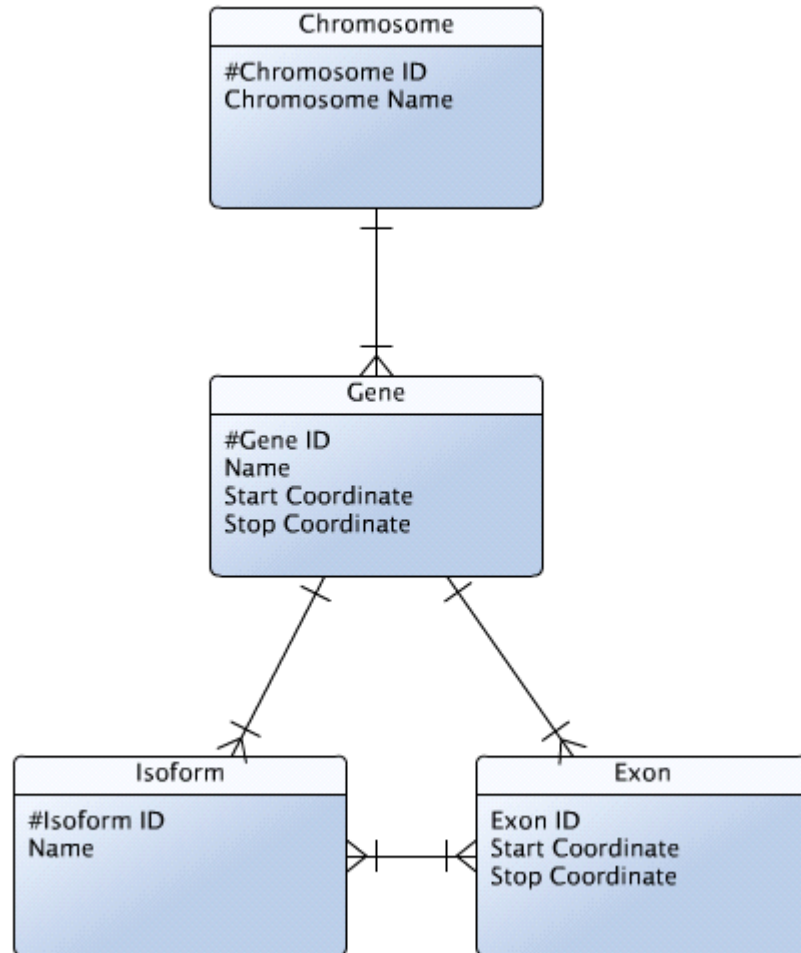
1)



2.i)

Gene, Exon, Isoform, Chromosome

2.ii)



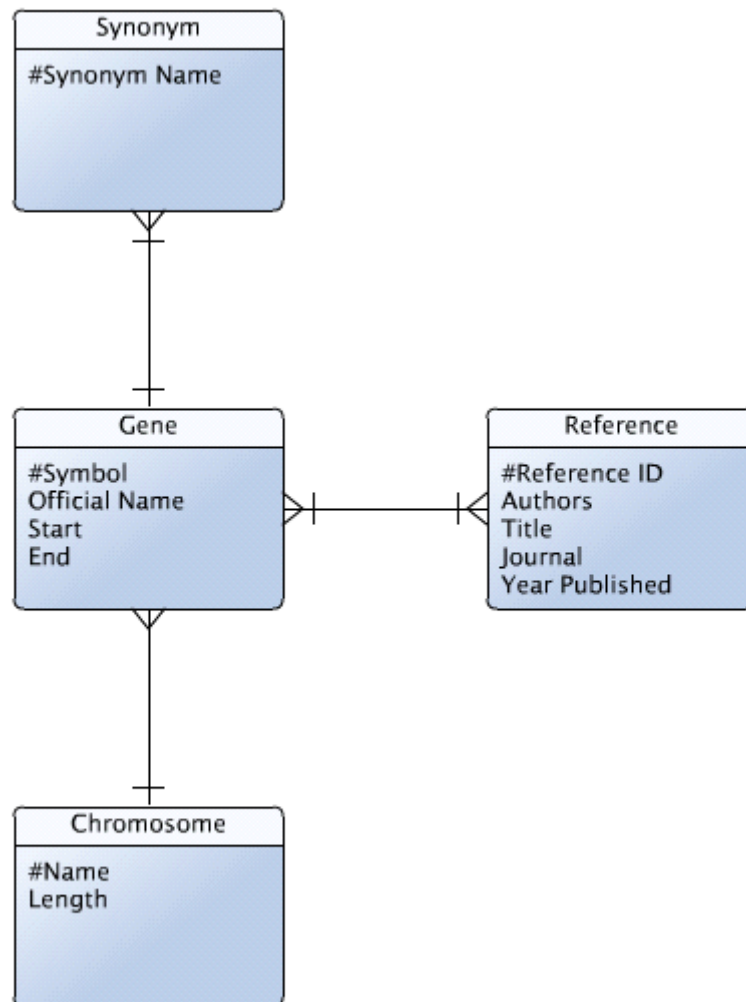
2.iii)

Gene(#Gene_ID, Name, Chromosome_ID*, Start_Coordinate, Stop_Coordinate)
Chromosome(#Chromosome_ID, Name)
Isoform(#Isoform_ID, Name, Gene_ID*)
Exon(#Exon_ID, Gene_ID*, Start_Coordinate, Stop_Coordinate)
Exon_In_Isoform(#Isoform_ID*, #Exon_ID*)

3.i)

Gene, Chromosome, Synonym, Reference

3.ii)



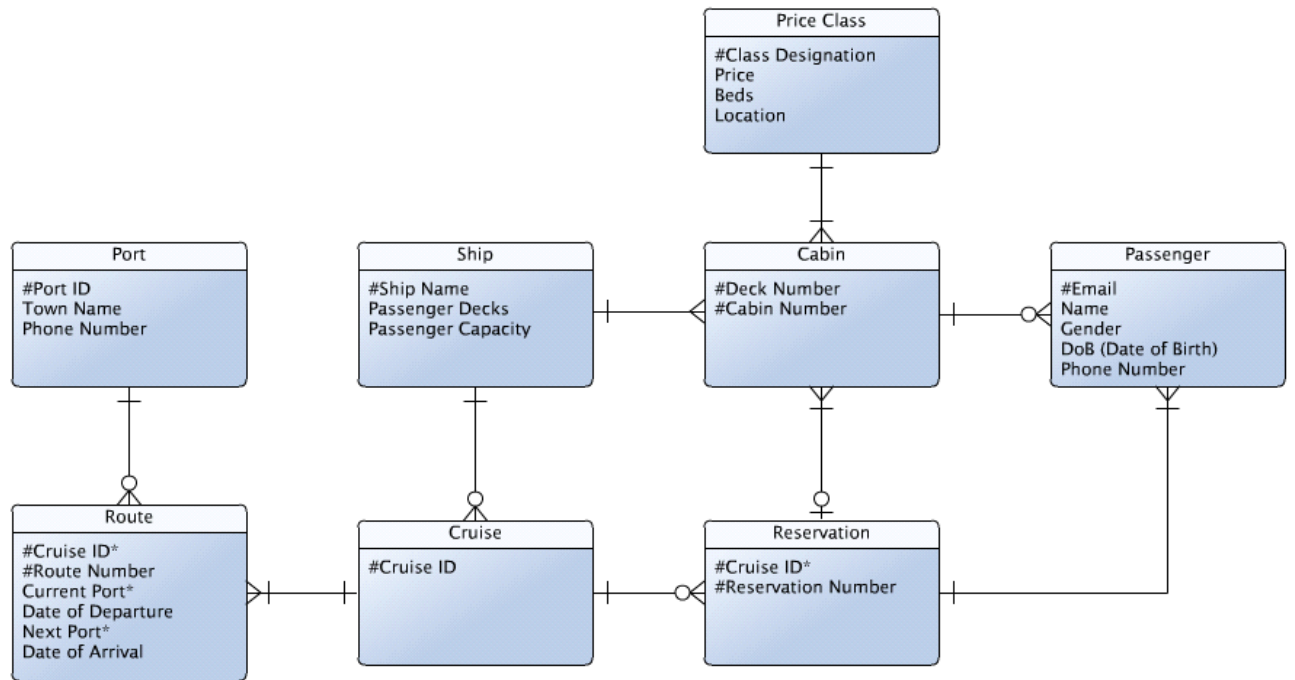
3.iii)

Gene(#Symbol, Official_Name, Start_Coordinate, Stop_Coordinate, Chromosome_Name, Chromosome_Length)
 Synonym(#Synonym_Name, #Gene_Symbol*, Official_Name*)
 Reference(#Reference_ID, #Gene_Symbol*, Authors, Title, Journal, Year_Published)

3.iv)

Gene(#Symbol, Official_Name, Start_Coordinate, Stop_Coordinate, Chromosome*)
 Chromosome(#Name, Length)
 Synonym(#Synonym_Name, Gene_Symbol*)
 Reference(#Reference_ID, Gene_Symbol*, Authors, Title, Journal, Year_Published)

4)



I was unsure whether or not I should include foreign keys in the diagram, but I felt it necessary to show foreign keys in the entity **Reservation** as it is part of the primary key, as well as in the entity **Route** as without them the purpose of the entity becomes somewhat unclear.

5.i)

First of all, the table Truck has no primary key. Which is a breach of 1NF. Assigning the attribute Registration_Number as the primary key for the table would fix this.

Secondly, the table contains a transitive dependency in the form of Registration_Number \rightarrow Model and Model \rightarrow Maximum_Weight such that Registration_Number \rightarrow Maximum_Weight. This is a breach of 3NF. Creating a new table Model(#Model_Name, Maximum_Weight), and removing Maximum_Weight from the table Truck and making Model a foreign key in the table Truck referencing the table Model, would fix this.

Thirdly, the inclusion of Assignment_Number in the table Truck may cause issues depending on circumstances in the real world. If a truck is capable of transporting only one single container at a time there is no problem, but if containers and trucks vary, respectively, in size and carrying capacity it is possible that a truck might be able to accommodate more than one container at a time. In it's current form the database will not be able to support trucks being given multiple overlapping assignments. Creating a new table to handle the connection between trucks and assignments would fix this.

5.ii)

Registration_Number \rightarrow Registration_Year

Registration_Number \rightarrow Model

Registration_Number \rightarrow Maximum_Weight (Transitive Dependency)

Registration_Number \rightarrow Assignment_Number

Model \rightarrow Maximum_Weight

5.iii)

{Registration_Number} is the only candidate key for the table Truck, because there is no superkey for the table that does not contain the attribute Registration_Number. We know this because {Registration_Year, Model, Maximum_Weight, Assignment_Number} is not a superkey, as it is possible that there exists two distinct trucks that were registered the same year, are of the same make and model, and thus also have the same maximum weight, and also have been given the same transport assignment.

Since {Registration_Number} is a superkey for the table Truck and also a proper subset of every other superkey for the table Truck, it follows that {Registration_Number} is the only possible candidate key for this table.

5.iv)

Assuming that container size and truck capacity can vary:

Truck(#Registration_Number, Registration_Year, Model*)

Model(#Model_Name, Maximum_Weight)

Transport(#Assignment_Number*, #Truck_Reg_Number*)

Assuming trucks can only carry a single container at a time:

Truck(#Registration_Number, Registration_Year, Model*, Assignment_Number*)

Model(#Model_Name, Maximum_Weight)