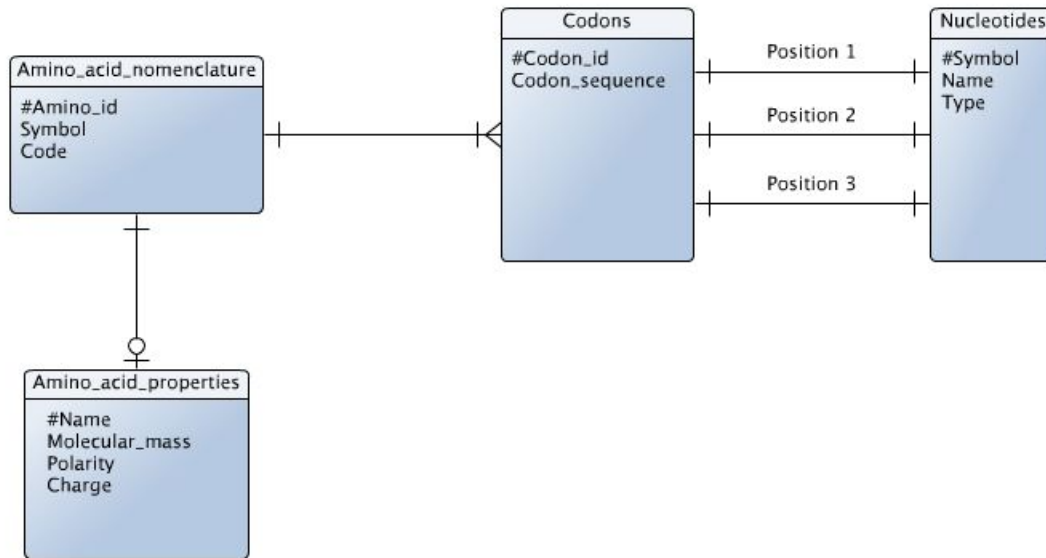


Oppgave 1.

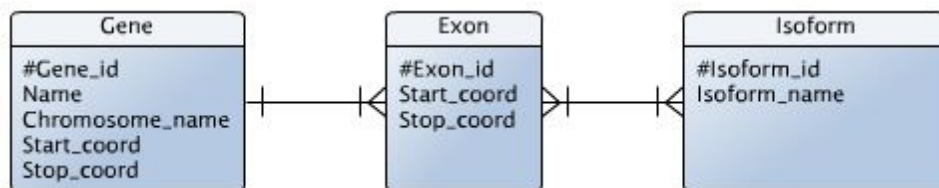


Oppgave 2.

i)

Gene, Exon, Isoform, and the connection entity Isoform_exons (represented as a many to many relationship in the ERD)

ii)



iii)

Gene_id -> Name
 Gene_id -> Chromosome_name
 Gene_id -> Start_coord
 Gene_id -> Stop_coord
 Exon_id -> Exon_start_coord
 Exon_id -> Exon_stop_coord
 Exon_id -> Gene_id
 Isoform_id -> isoform_name

Gene(**#Gene_id**, Name, Chromosome_name, Start_coord, Stop_coord)
 Exon(**#Exon_id**, Exon_start_coord, Exon_stop_coord, Gene_id*)

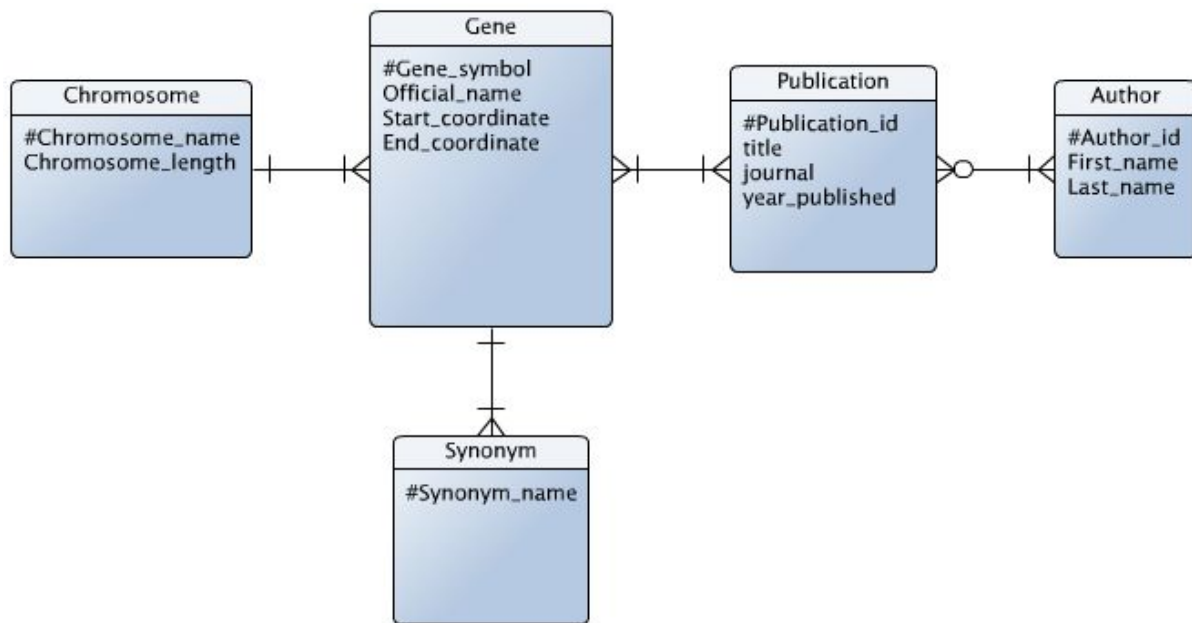
Isoform(**#Isoform_id**, Isoform_name)
 Isoform_Exons(**#Isoform_id***, **#Exon_id***)

Oppgave 3.

i)

Chromosome, Gene, Publication, Author, Synonym, Reference (connection entity),
 Author_Publication (connection entity) where the connection entities are represented
 with a many to many relationship in the ERD.

ii)



iii)

1NF

Chromosome(**#Chromosome_name**, Chromosome_length)
 Gene(**#Gene_symbol**, Official_name, Chromosome_name*, Start_coordinate,
 End_coordinate)
 Synonym(**#Synonym_name**, Gene_symbol*)
 Reference(**#Gene_symbol***, **#Publication_id***, publication_title) -> 2NF violation
 Publication(**#Publication_id**, journal, year_published)
 Author_Publication(**#Author_id***, **#Publication_id***)
 Author(**#Author_id**, First_name, Last_name)

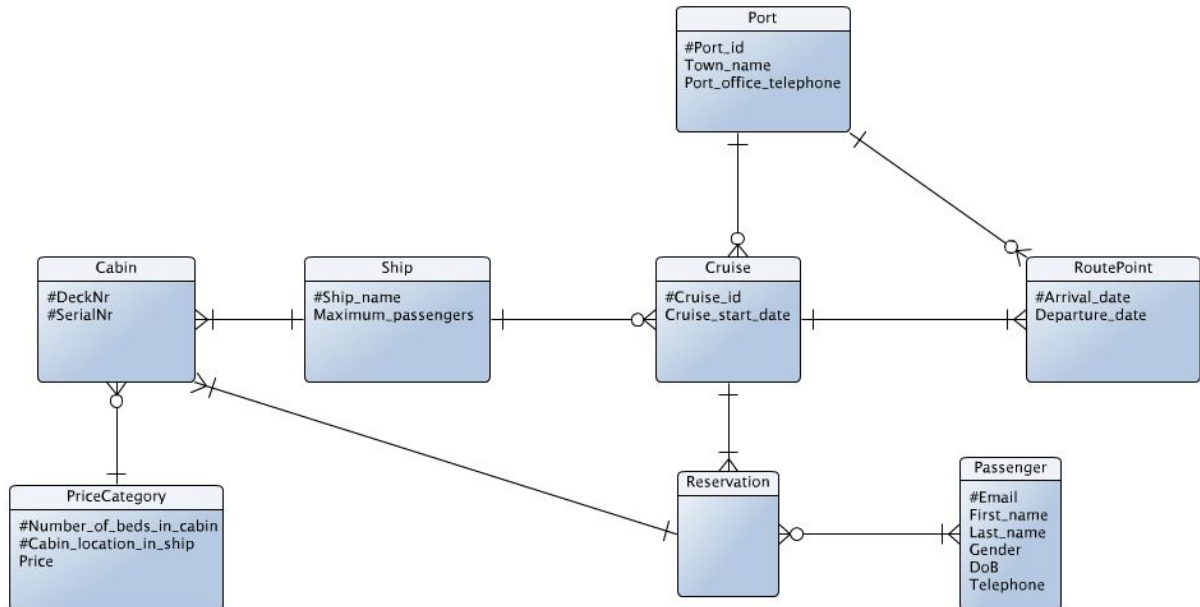
iv)

BCNF

Chromosome(**#Chromosome_name**, Chromosome_length)
 Gene(**#Gene_symbol**, Official_name, Chromosome_name*, Start_coordinate,
 End_coordinate)
 Synonym(**#Synonym_name**, Gene_symbol*)
 Reference(**#Gene_symbol***, **#Publication_id***)
 Publication(**#Publication_id**, publication_title, journal, year_published)

Author_Publication(**#Author_id***, **#Publication_id***)
 Author(**#Author_id**, First_name, Last_name)

Oppgave 4



Disclaimer: several composite primary keys in the diagram, but since it not showing the weak entities, only parts of these composite keys are shown. For an example RoutePoint has a composite primary key consisting of Port_id,Cruise_id and the Arrival_date.

Oppgave 5

Container_type (**#Type_id**, Type_name, Max_weight, Cubic_quantity, Nightly_rate)
 Container (**#Container_number**, Type_id*)
 Customer (**#Telephone_number**, Address)
 Assignment (**#Assignment_number**, Telephone_number*, Container_number*, Start_date, End_date)

Assignment_number -> Telephone_number
 Assignment_number -> Container_number
 Assignment_number -> Start_date
 Assignment_number -> End_date
 Container_number -> Type_id
 Type_id -> Type_name
 Type_id -> Max_weight
 Type_id -> Cubic_quantity
 Type_id -> Nightly_rate
 Telephone_number -> Address

Truck (Registration_number, Registration_year, Model, Maximum_weight, Assignment_number*)

i)

This is a problematic setup with regards to redundancy, which would cause problems every time we would want to create, update or delete rows in tables affected by this redundancy (update anomalies).

With this setup and the business rule that multiple trucks can be involved with one assignment we use the Registration_number as our primary key. Instead of having the truck properties that is not inclined to change in one table and the assignment connection in another we end up with more redundant information which is bad with regards to space requirements and data integrity to name a few. We also see that we can determine the Maximum_weight from the Model. This tells us our table has a transitive dependency.

ii)

Registration_number -> Registration_year

Registration_number -> Model

Registration_number -> Maximum_weight

Registration_number -> Assignment_number

Model -> Maximum_weight

iii)

The Registration_number is the candidate key for the Truck table.

iv)

Transportation(**#Assignment_number***, **#Registration_number***)

Truck (**#Registration_number**, Registration_year, Model*)

TruckModel(**#Model**, Maximum_weight)