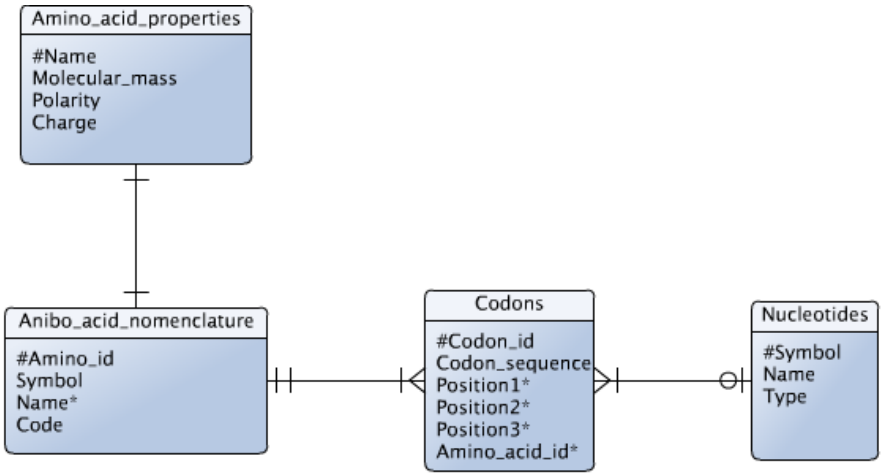
Jon Erik McWilliams

Inf 115 Assignment 2

Exercise 1



There are three connections between Codons and Nucleotides. All three connections are the same as the connection between Codons and Nucleotides represented in the EER diagram. These connections represent the link between position1, position2 and position3 and the Nucleotides table.

Exercise 2

i)

The entities are:

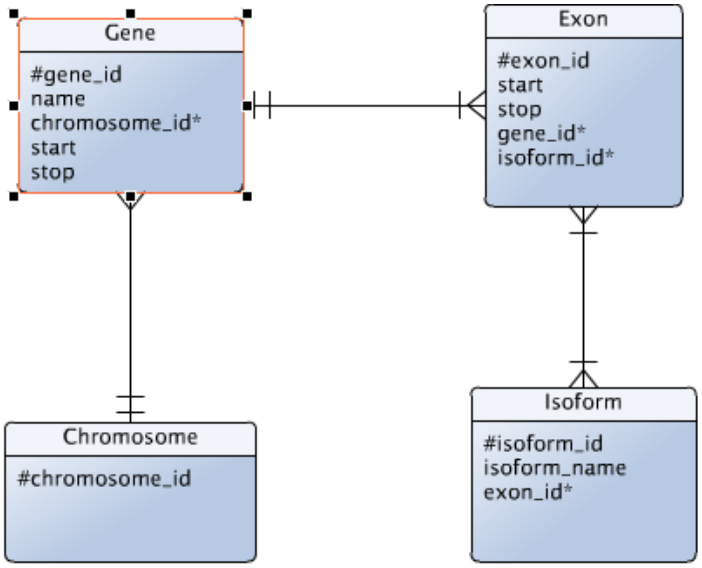
Chromosome

Gene

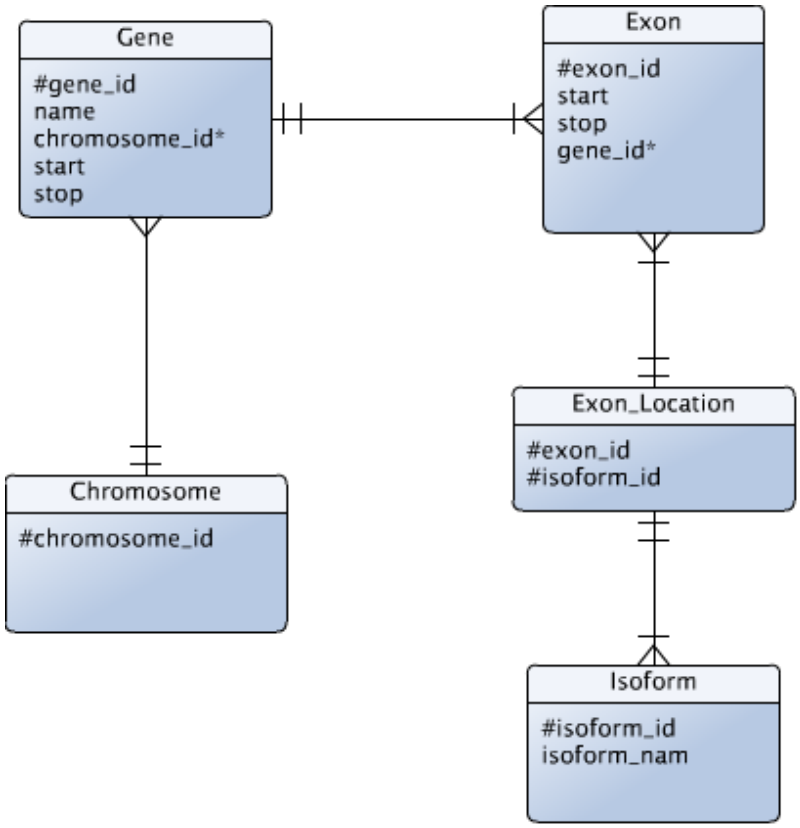
Exon

Isoform

ii)



iii)



I removed the many to many relationship by creating a bridge table between Exon and Isoform. Doing this helps to prevent cases where you would have multiple entries per attribute, which would violate the first rule for normalization.

There are no partial dependencies or transitive dependencies in this model so it conforms to third normal form.

Exercise 3

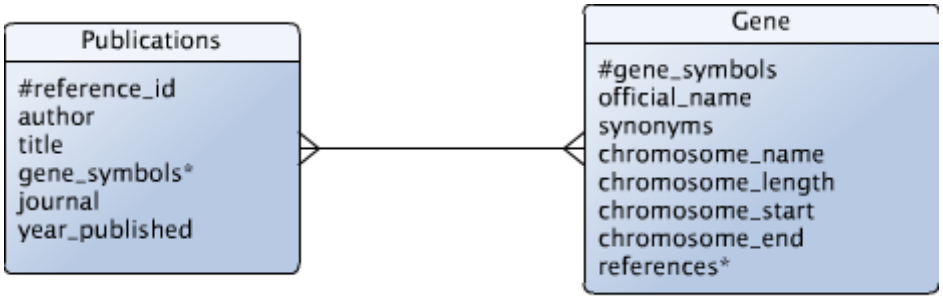
i)

The entities are:

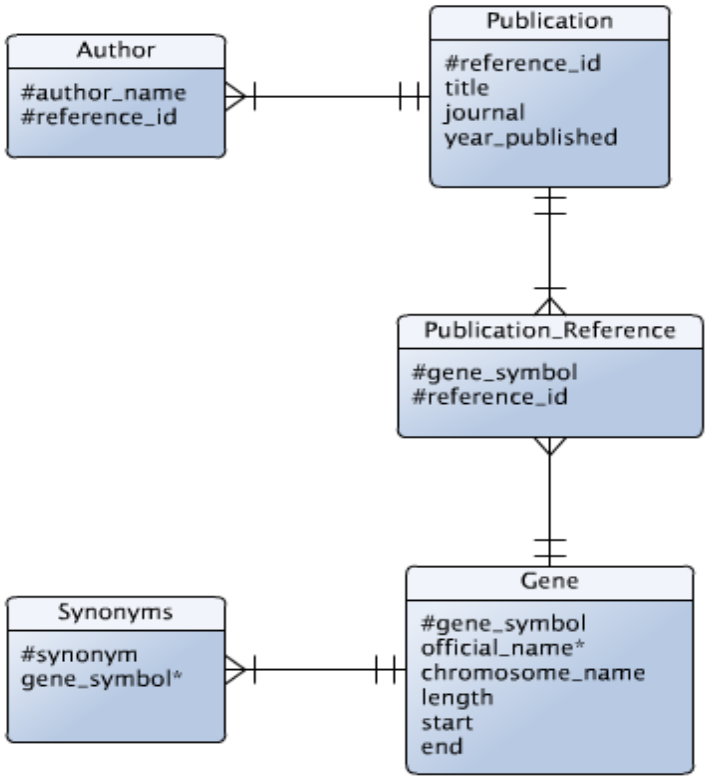
Publication

Gene

ii)



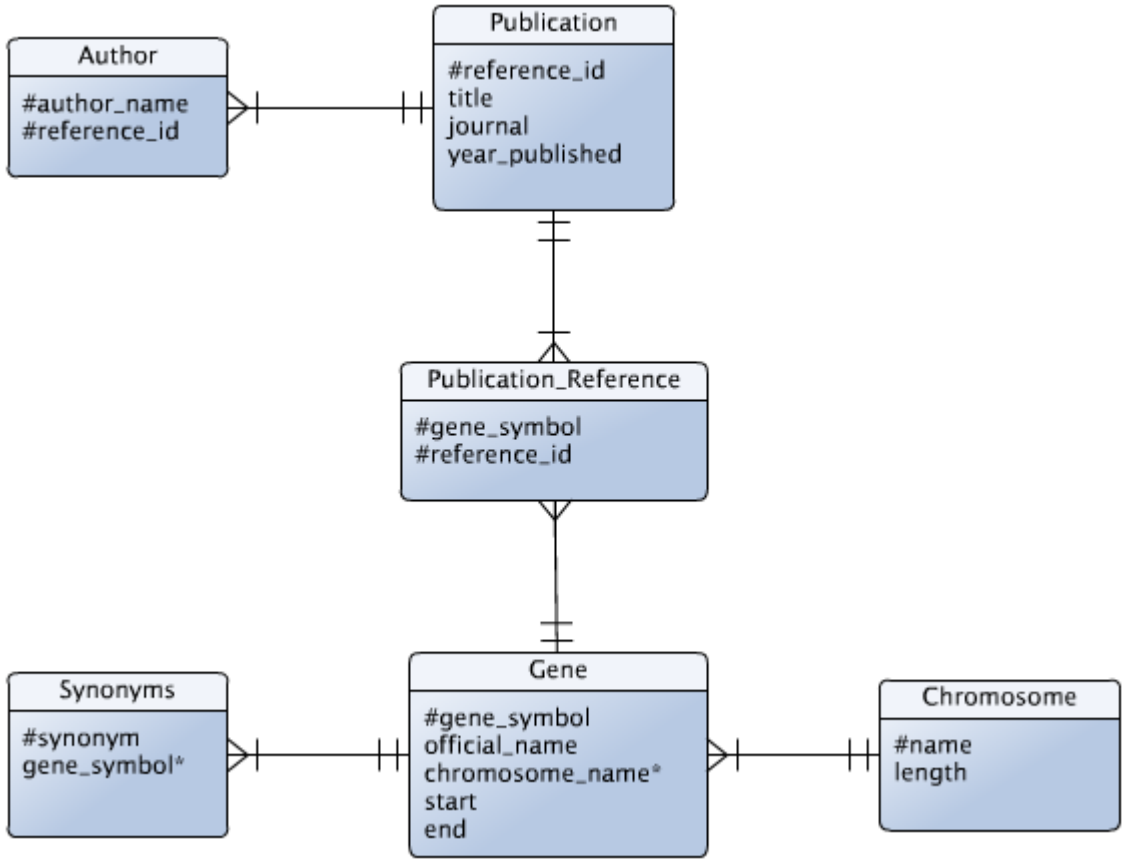
iii)



We do not have multiple entries in a single attribute so this model conforms to first normal form. It does not however conform to second normal form because ‘length’ in the Gene table is dictated by ‘chromosome_name’ rather than ‘gene_symbol’ since it is an attribute belonging to chromosome.

Since the exercise stated that there can be multiple authors per publication, I made a separate table for authors where the name and reference id are used as a candidate key so I can uniquely identify each author with each publication, since many authors can publish many papers and vice versa.

iv)



There are no partial dependencies or transitive dependencies and every primary key in this model is a super key so this conforms to BCNF.

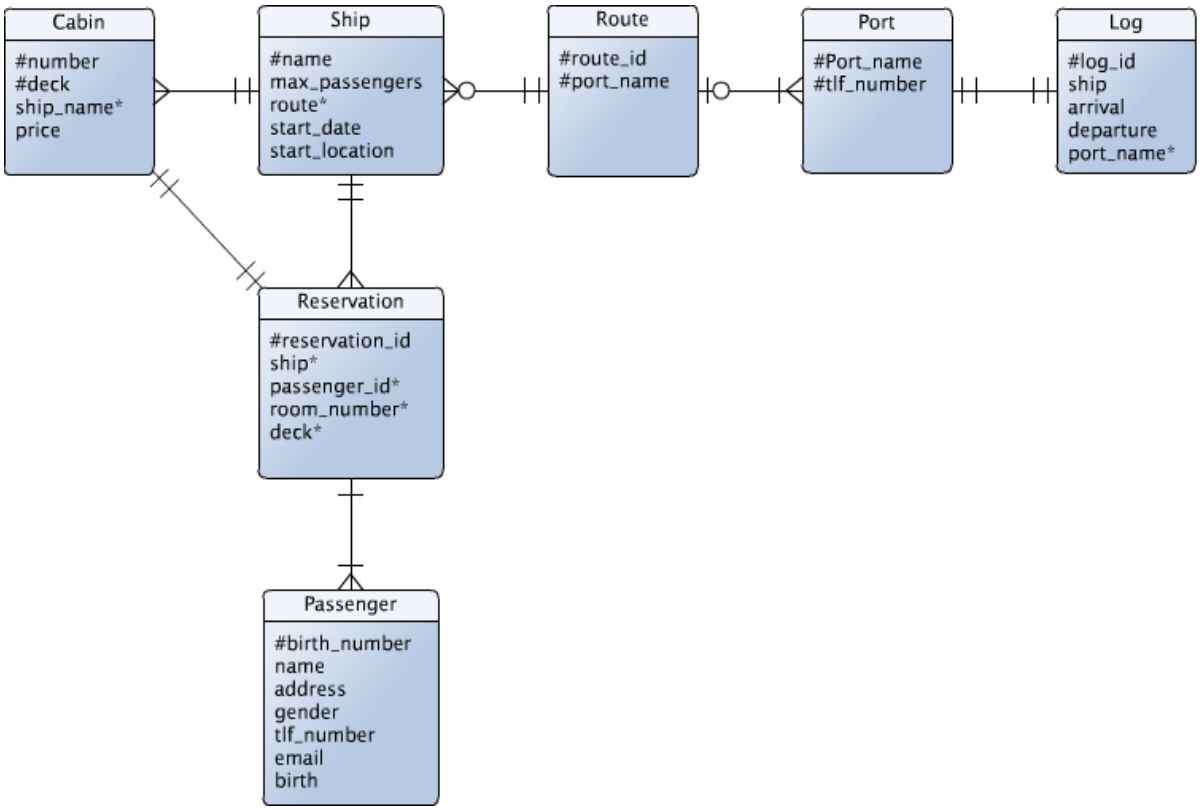
Exercise 4

Since a ship has one route, but a route can have multiple ports where each port can belong to more than one route, I have decided to set up the tables with route acting as a bridge table. This is to avoid having a many to many relationship directly between ship and ports.

Each port is given a log to store data regarding the arrival and departure of a ship at each port.

A ship has several reservations which can have many passengers. Passengers are identified by their birth number.

A loop is present between Ship, Reservation and Cabin, this is to have a more direct means of accessing appropriate data when dealing with different queries. I was informed that a loop is acceptable.



Exercise 5

i)

Since this is a database which stores information about assignments which have already been completed or are currently being completed, I would assume that one truck can be assigned to many assignments. This would cause a many to many relationship between Truck and Assignment which would involve having multiple assignment numbers under the attribute ‘assignment_number’ in the Truck table. This would breach the first normal form rule.

A solution would be to include a bridge table between Assignment and Truck.

A trucks model can also be split into a new table, this would avoid have too many duplicate values. Truck should also be given a primary key.

The cubic quantity value is never used in this model.

Another issue could be that when finding appropriate trucks to be assigned to an assignment, we would need to check that the trucks maximum carrying weight is enough to carry the container being used for the assignment. This would involve going through two tables in order to get to the third table, ‘Container type’, in order to check this data. This could result in confusing and convoluted queries.

ii)

reg_number -> { reg_year, model }

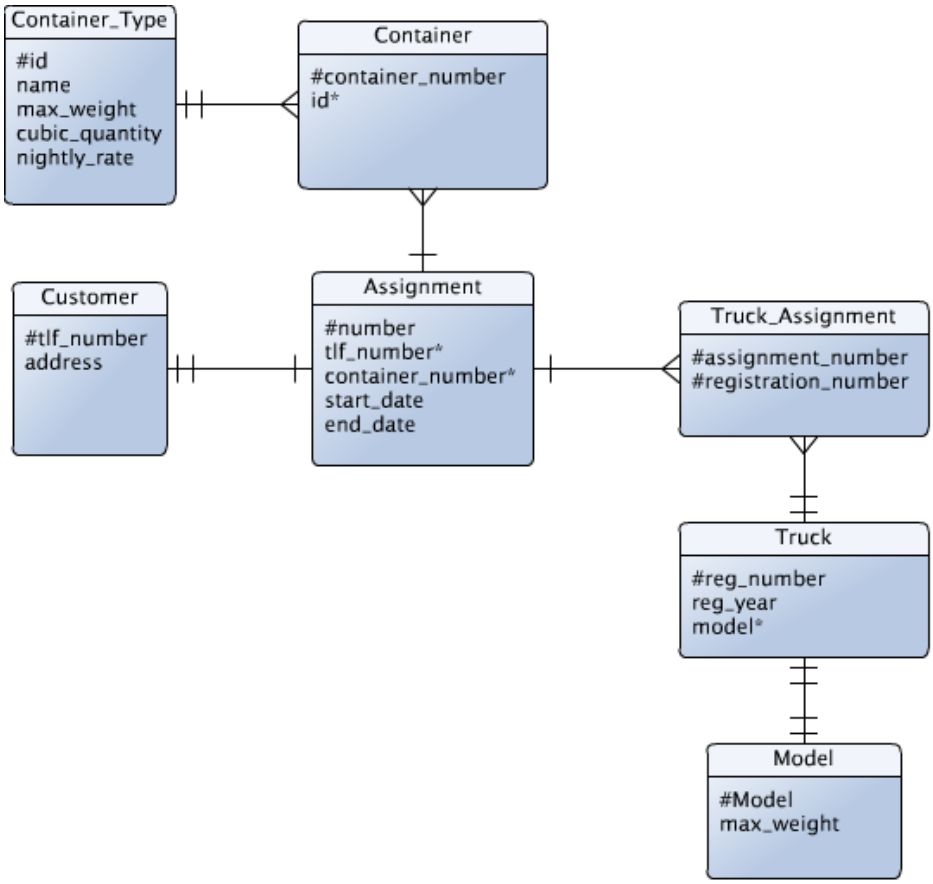
model -> max_weight

iii)

The candidate key for Truck is the reg_number attribute. A vehicles registration number is always unique.

The candidate key for Model is the model attribute.

iv)



I created a bridge table between Assignment and Truck so that we could have a many to many relationship between the two tables without the issue of multiple values per attribute. Every key is now a super key with no partial or transitive dependencies so this model should conform to BCNF.