Project Phase 3

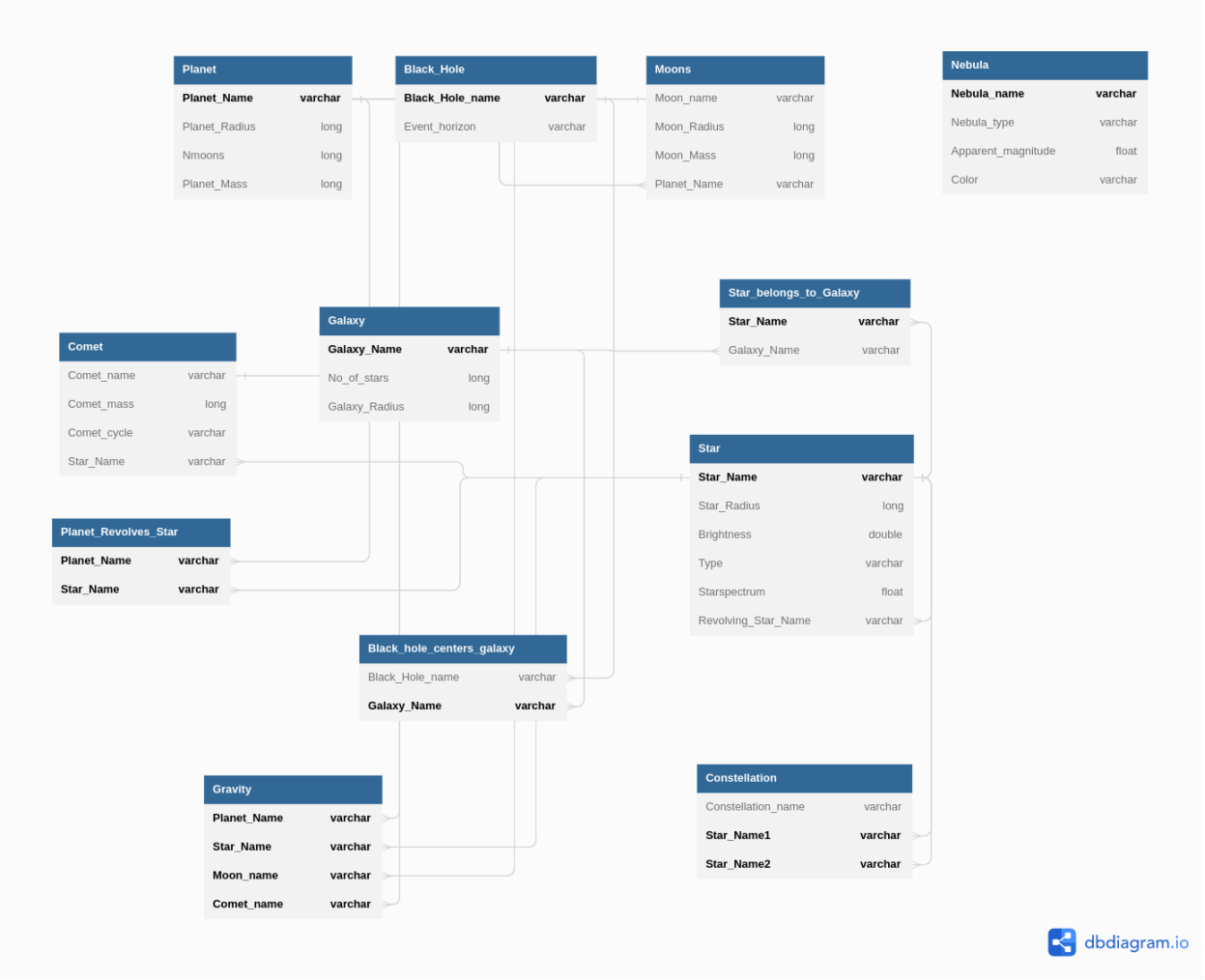
Team 51

Converting ER to relational model

For each entity type we first created a new relation(table) and put in it the name of the entity type along with all the attributes.

We also encoded the relationship types by either including the foreign key in of the relations (preferably in 1:1 relationship types or 1:N, eg – moons revolving a planet) or otherwise creating a new table such as in constellation planet_revolves_star and appropriately declaring the primary keys and foreign keys.

Star spectrum is given a default type of float.

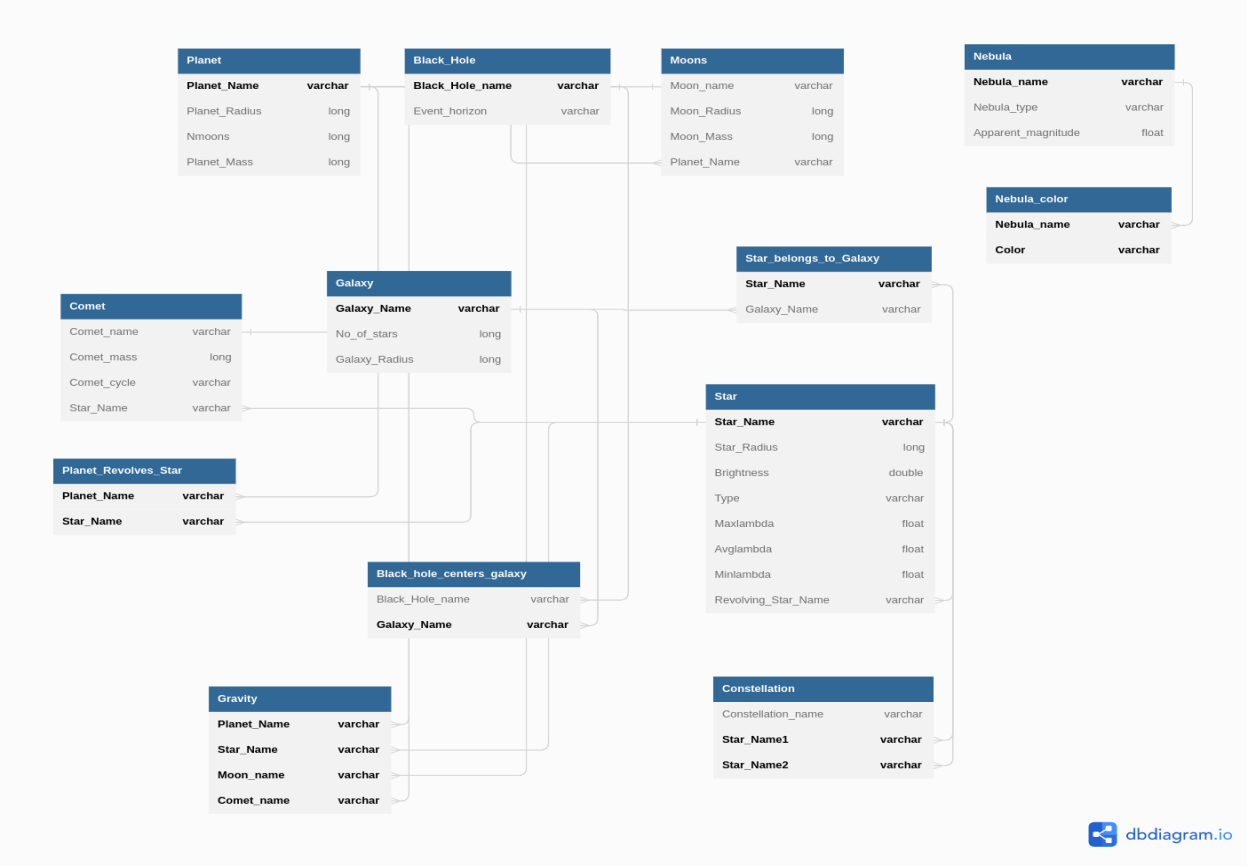


Converting to 1NF

For converting to 1NF we took out the multivalued attribute nebula_color from nebula and created a new relation called nebula_color with both nebula_name and color as the primary key

We also replaced the composite attribute Star spectrum (which is also a candidate key) by the three separate attributes of max, avg and min lambda.

There are no more multivalued or composite keys in any relation and we do not have any nested relations and therefore we have the relational model in 1NF form.



Converting to 2NF

As we only have 1 primary key in each relation or all the attributes being the primary key in a relation (except for constellation) then every non prime attribute is fully functionally dependent on the primary key.

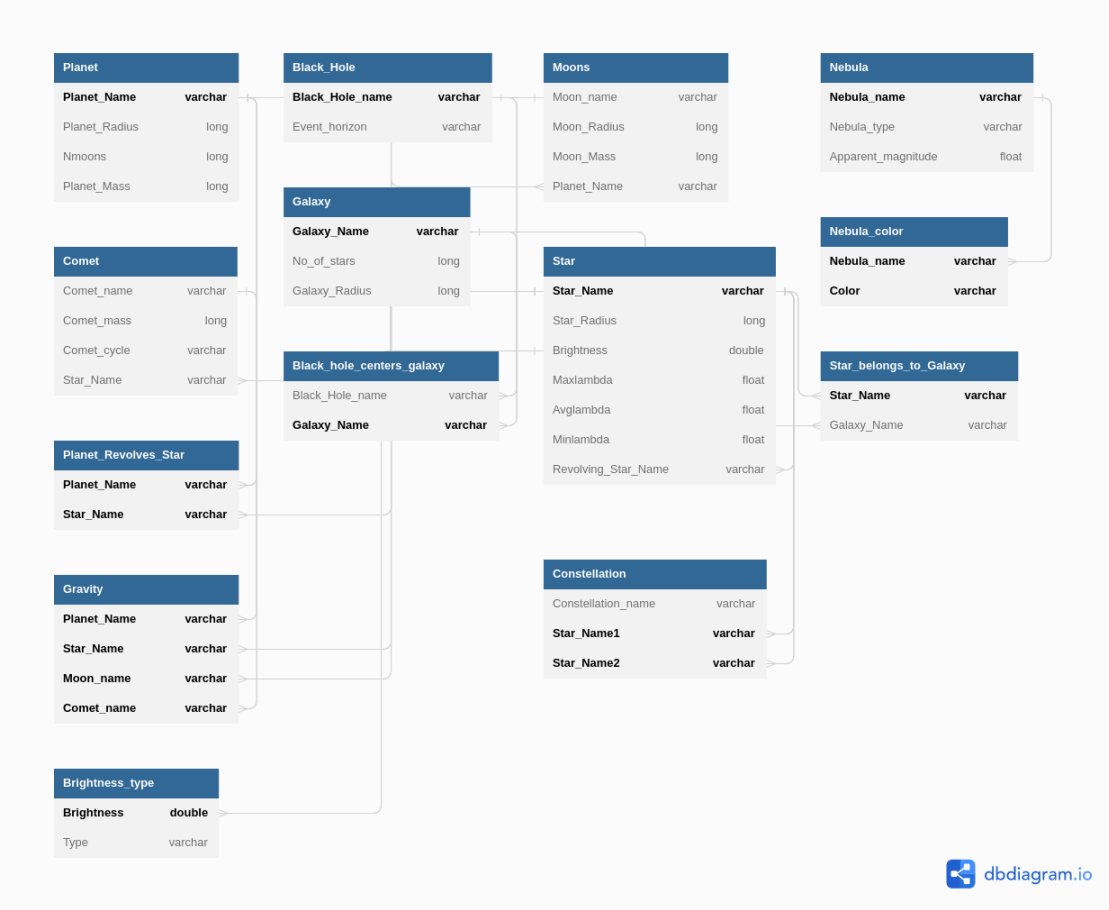
Also, since a star can participate in multiple constellations, but two stars belong to only one constellation (as mentioned below), therefore, constellation is fully functionally dependent on both the star names.

Therefore, the relational model is in 2NF.

Converting to 3NF

Since the type of a star can be determined based on its brightness, we make a new brightness_type relation with brightness as the primary key. Otherwise Star_Name->Brightness and Brightness->Type holds and brightness is not a candidate key.

Any transitive dependency through the wavelengths should not be of concern since they are a candidate key.



The resources we have used here is dbdiagram.io to make the database

Due to the limitations of the tool, we are not able to show the following

- Maxlambda, Avglambda, Minlambda (star spectrum) are candidate keys
- Moon_name is a partial key

Changes we have made for this from our actual ER diagram

- We have limited the gravity relation to only 4 entities as our before relation has 7 entities in it
- A star can participate in multiple constellations but two stars together can only participate in one constellation.
- Also, we are using the definitions of 1NF, 2NF and 3NF from the slides presented in the class.

As the page size is also little constrained we would like to add the following code we used for making this database image

```
table Planet{
   Planet_Name varchar PK
  Planet_Radius long
  Nmoons long
  Planet_Mass long

}

table Black_Hole{
  Black_Hole_name varchar PK
  Event_horizon varchar

  }

table Moons{
    Moon_name varchar
    Moon_Radius long
    Moon_Mass long
    Planet_Name varchar [ref: > Planet.Planet_Name]

  }

table Nebula{
  Nebula_name varchar PK
  Nebula_type varchar
  Apparent_magnitude float

}

table Comet{
  Comet_name varchar
  Comet_mass long
  Comet_cycle varchar
  Star_Name varchar [ref: > Star.Star_Name]
}

table Galaxy{
  Galaxy_Name varchar PK
  No_of_stars long
  Galaxy_Radius long
}

table Star{
  Star_Name varchar PK
  Star_Radius long
  Brightness double
  Maxlambda float
  Avglambda float
  Minlambda float
  Revolving_Star_Name varchar [ref: > Star.Star_Name]
}

table Brightness_type{
  Brightness double PK [ref: > Star.Brightness]
  Type varchar
}

table Nebula_color{
  Nebula_name varchar PK [ref: > Nebula.Nebula_name]
  Color varchar PK

}

table Planet_Revolves_Star{
  Planet_Name varchar PK [ref: > Planet.Planet_Name]
  Star_Name varchar PK [ref: > Star.Star_Name]
}

table Black_hole_centers_galaxy{
  Black_Hole_name varchar [ref: > Black_Hole.Black_Hole_name]
  Galaxy_Name varchar PK [ref: > Galaxy.Galaxy_Name]

}

table Constellation{
  Constellation_name varchar
  Star_Name1 varchar PK [ref: > Star.Star_Name]
  Star_Name2 varchar PK [ref: > Star.Star_Name]

}

table Star_belongs_to_Galaxy{
  Star_Name varchar PK [ref: > Star.Star_Name]
  Galaxy_Name varchar [ref: > Galaxy.Galaxy_Name]
}
```