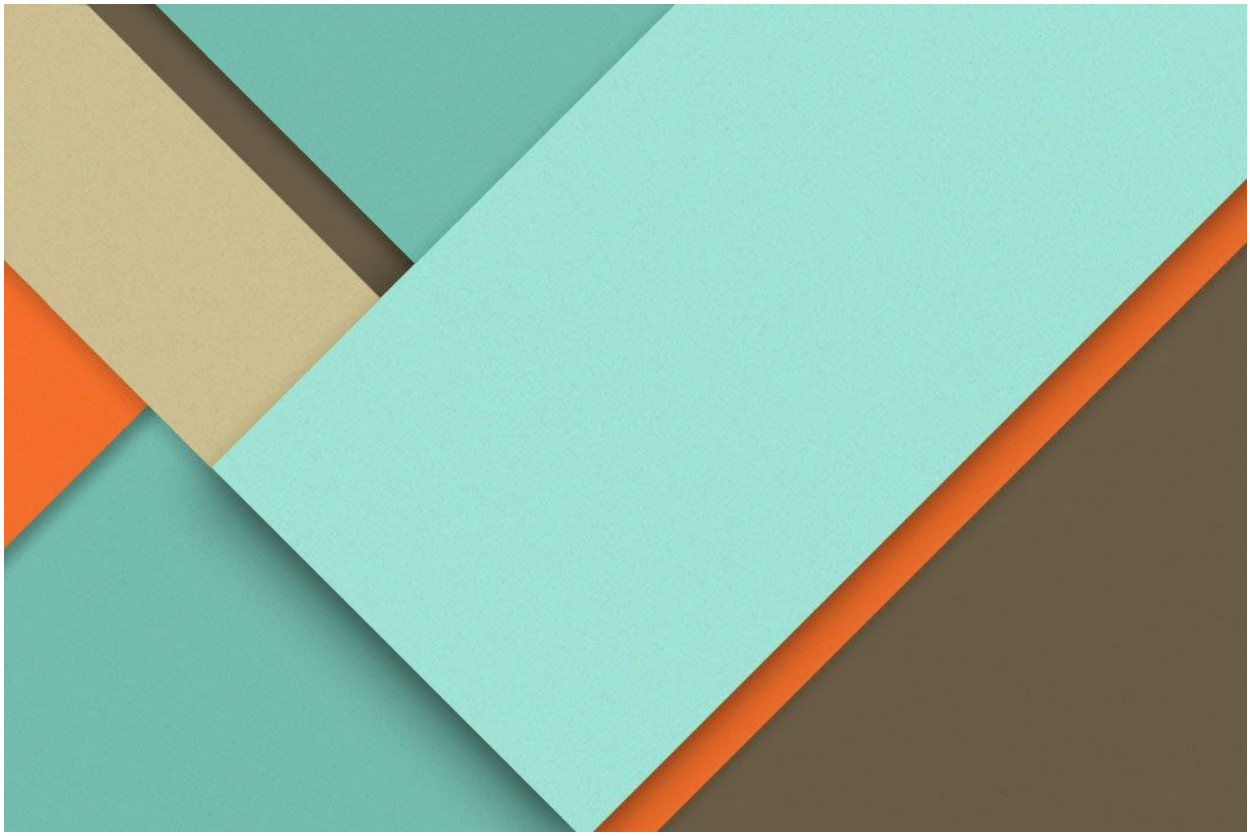

Relational Modelling

Project Phase # 3

Data And Applications

18.09.2020

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Overview

1 NF and Relational Model

1. Multivalued attributes:

For each attribute that was not atomic, a separate table was created.

- Terrain of each zone
- Feature images
- Service Timings
- Species Common names
- Species Habitats
- Report Co-authors
- Study- In this case, we created tables to provide functionality of multiple species and multiple data in a study.
-

2. Subclasses:

Features were subclassed into Lodging, Public Facilities, View Points, Trail by means of a table which contains the feature id, the zone it is in and the national park of that zone.

3. Locations:

Throughout the database, every location 1. (compound attribute) is represented in terms of attributes latitude and longitude. In most tables it is decimal while in some it is varchar(after geohashing).

4. Relationships:

For 1:1, 1:N, N:1 relationships, we introduced foreign keys on the side with N. In the case of M : N relations, we created a separate table for each relation.

2 NF

1. Scientific Classification:

We observed that there was a functional dependency among the attributes of the entity Species. The genus of the species(prime attribute) directly determined the Kingdom, Class, Family and Order of the Species. Therefore a separate Relation “Scientific Classification” was created, relating the genus to the respective Kingdom, Class, Family and Order.

2. Permit:

The permit allotted to each researcher has a definite permit-expiration date. In other words, permit-expiration date was functionally dependent on permit-id. Thus a separate Relation containing just the permit-id and the permit expiration date was created.

3 NF

1. Publishing Status:

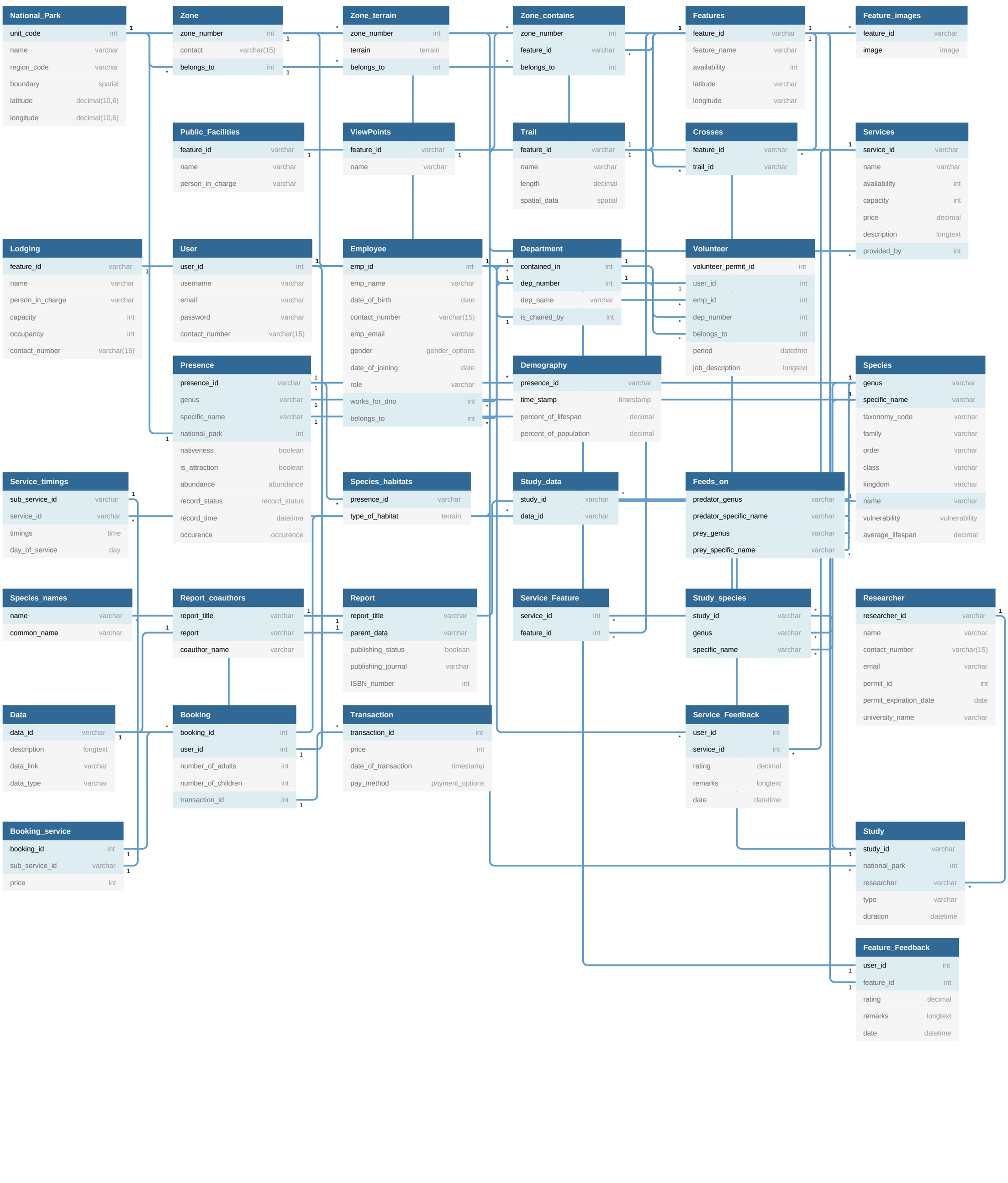
We divided the Relation Report into another relation “Published” since the ISBN number (a non prime attribute) directly determined the publishing status of the report. We chose ISBN number as a non prime attribute in earlier models since there can be various reports which were not published and would have ISBN number attribute as null.

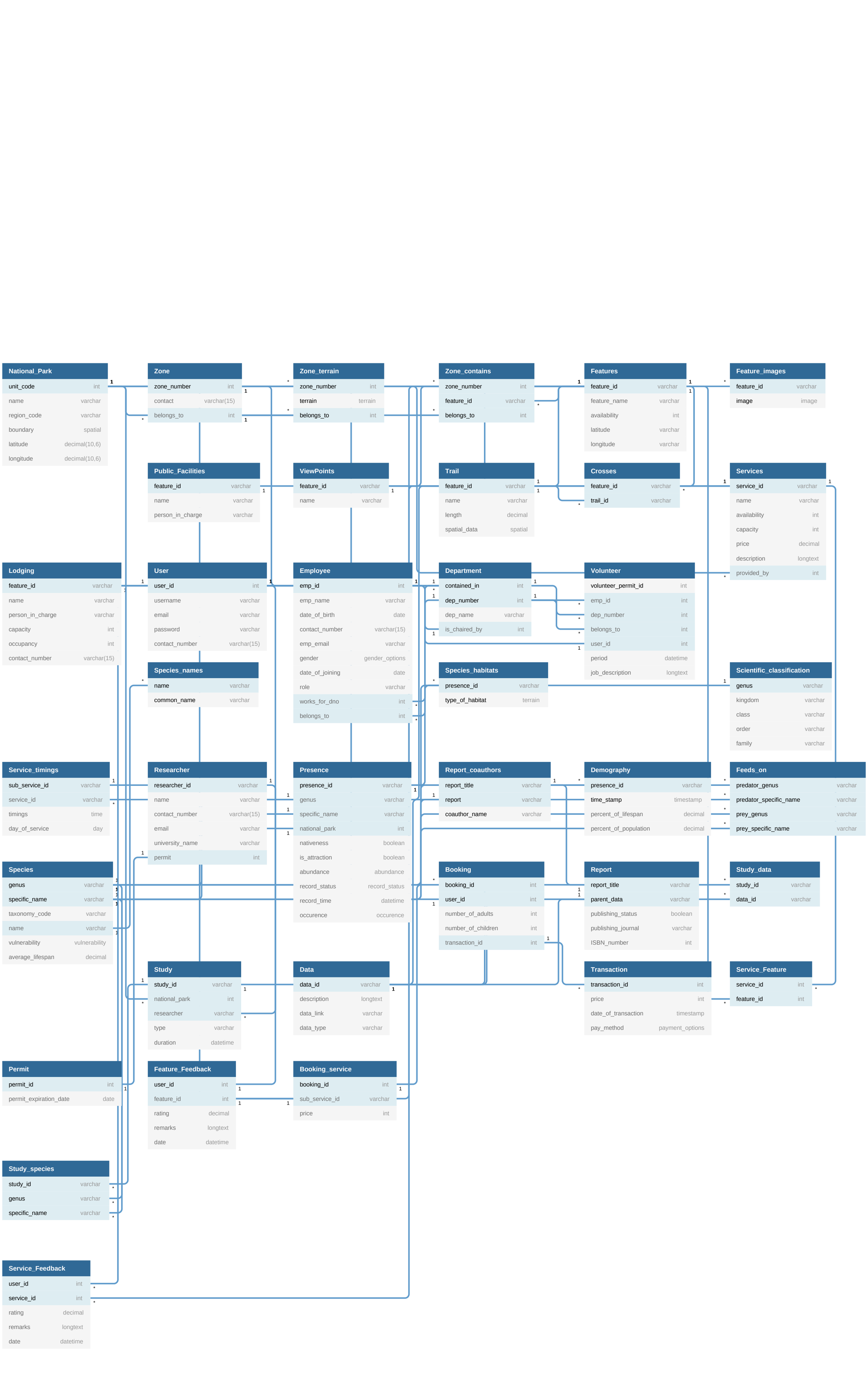
2. Scientific Classification Returns:

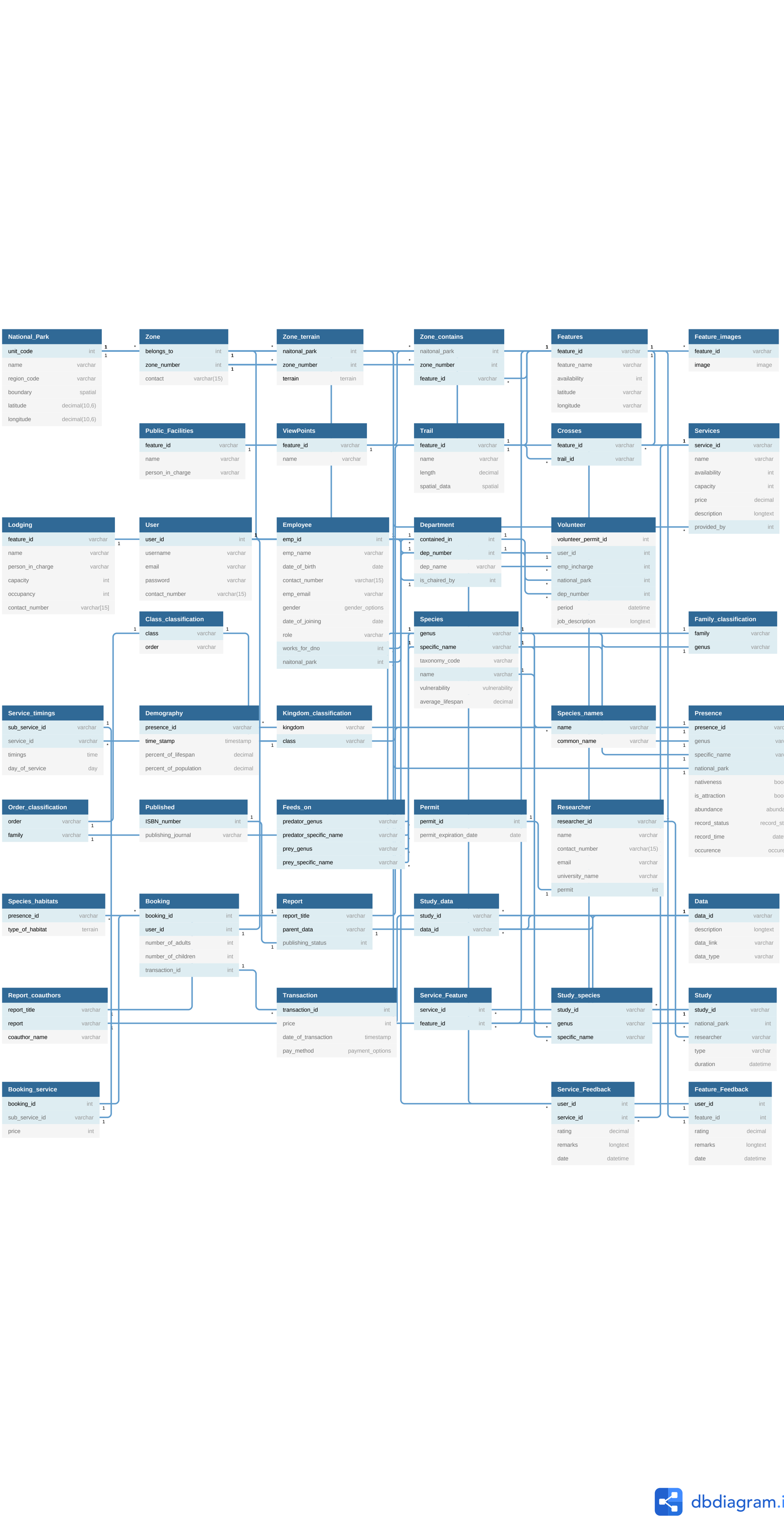
We observed that in the newly created relation “Scientific Classification” the following dependencies were present.

1. Class $\longrightarrow$ Kingdom
2. Order $\longrightarrow$ Class
3. Family $\longrightarrow$ Order

As each attribute was non-prime, there was a violation of the Third Normal Form. Thus all of the dependencies with their respective attributes were stored as separate relations.




National_Park
unit_code int
name varchar
region_code varchar
boundary spatial
latitude decimal(10,6)
longitude decimal(10,6)
Zone
zone_number int
contact varchar(15)
belongs_to int
Zone_terrain
zone_number int
terrain terrain
belongs_to int
Zone_contains
zone_number int
feature_id varchar
belongs_to int
Features
feature_id varchar
feature_name varchar
availability int
latitude varchar
longitude varchar
Feature_images
feature_id varchar
image image
Public_Facilities
feature_id varchar
name varchar
person_in_charge varchar
ViewPoints
feature_id varchar
name varchar
Trail
feature_id varchar
name varchar
length decimal
spatial_data spatial
Crosses
feature_id varchar
trail_id varchar
Services
service_id varchar
name varchar
availability int
capacity int
price decimal
description longtext
provided_by int
Lodging
feature_id varchar
name varchar
person_in_charge varchar
capacity int
occupancy int
contact_number varchar(15)
User
user_id int
username varchar
email varchar
password varchar
contact_number varchar(15)
Employee
emp_id int
emp_name varchar
date_of_birth date
contact_number varchar(15)
emp_email varchar
gender gender_options
date_of_joining date
role varchar
works_for_dno int
belongs_to int
Department
contained_in int
dep_number int
dep_name varchar
is_chaired_by int
Volunteer
volunteer_permit_id int
emp_id int
dep_number int
belongs_to int
user_id int
period datetime
job_description longtext
Species_names
name varchar
common_name varchar
Species_habitats
presence_id varchar
type_of_habitat terrain
Scientific_classification
genus varchar
kingdom varchar
class varchar
order varchar
family varchar
Service_timings
sub_service_id varchar
service_id varchar
timings time
day_of_service day
Researcher
researcher_id varchar
name varchar
contact_number varchar(15)
email varchar
university_name varchar
permit int
Presence
presence_id varchar
genus varchar
specific_name varchar
national_park int
nativeness boolean
is_attraction boolean
abundance abundance
record_status record_status
record_time datetime
occurence occurence
Report_coauthors
report_title varchar
report varchar
coauthor_name varchar
Demography
presence_id varchar
time_stamp timestamp
percent_of_lifespan decimal
percent_of_population decimal
Feeds_on
predator_genus varchar
predator_specific_name varchar
prey_genus varchar
prey_specific_name varchar
Species
genus varchar
specific_name varchar
taxonomy_code varchar
name varchar
vulnerability vulnerability
average_lifespan decimal
Booking
booking_id int
user_id int
number_of_adults int
number_of_children int
transaction_id int
Report
report_title varchar
parent_data varchar
publishing_status boolean
publishing_journal varchar
ISBN_number int
Study_data
study_id varchar
data_id varchar
Study
study_id varchar
national_park int
researcher varchar
type varchar
duration datetime
Data
data_id varchar
description longtext
data_link varchar
data_type varchar
Transaction
transaction_id int
price int
date_of_transaction timestamp
pay_method payment_options
Service_Feature
service_id int
feature_id int
Permit
permit_id int
permit_expiration_date date
Feature_Feedback
user_id int
feature_id int
rating decimal
remarks longtext
date datetime
Booking_service
booking_id int
sub_service_id varchar
price int
Study_species
study_id varchar
genus varchar
specific_name varchar
Service_Feedback
user_id int
service_id int
rating decimal
remarks longtext
date datetime
dbdiagram.io



dbdiagram.io

```
Enum terrain {
  Marshland
  Desert
  Savannah
  Mountainous
  Forest
  Tundra
}

Enum gender_options {
  Male
  Female
  Others
}

Enum vulnerability {
  Extinct
  Extinct from wild
  Critically Endangered
  Endangered
  Vulnerable
  Near Threatened
  Least Concern
}

Enum abundance {
  rare
  common
  uncommon
}

Enum occurence {
  Full Year
  Seasonal
}

Enum record_status {
  Verified
  Non Verified
}
```

```
Enum payment_options {
  mobile transfer
  credit card
  net banking
  cash
  cheque
  debit card
}
```