CPSC 304 Project Cover Page

Milestone #: 2

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Group Number: 65

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)
In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia.

Project: Endanger DB.

Project Summary

The idea of this project is an application for an information reference database for individuals who encounter wildlife to check if a species of animal they may not be familiar with is endangered. The domain would be in biology / ecology as information about specific animals can be queried. The database will also provide contact information for potentially specific animal rescue organizations in the local area if an endangered species is injured so proper help and surveying can assist in preserving the animal population.

The domain aspect we are trying to model by this database should allow us to do several functions. The domains we will be modeling include: continents, country, organizations, animals, food, living environment, and threats.

ER Diagram Changes

We have made two changes based on the suggestion by our TA.

1) In our entity threats we included ThreatID to allow for multiple threats to be found at the same location and same day. Our prior entity and primary key used would have only allowed us to create a single threat for a specific place and time which is limiting and does not accurately match with real world scenarios.
2) ISA hierarchy specification updated. We keep our implementation of our ISA hierarchy to specify that both are partial disjoint.

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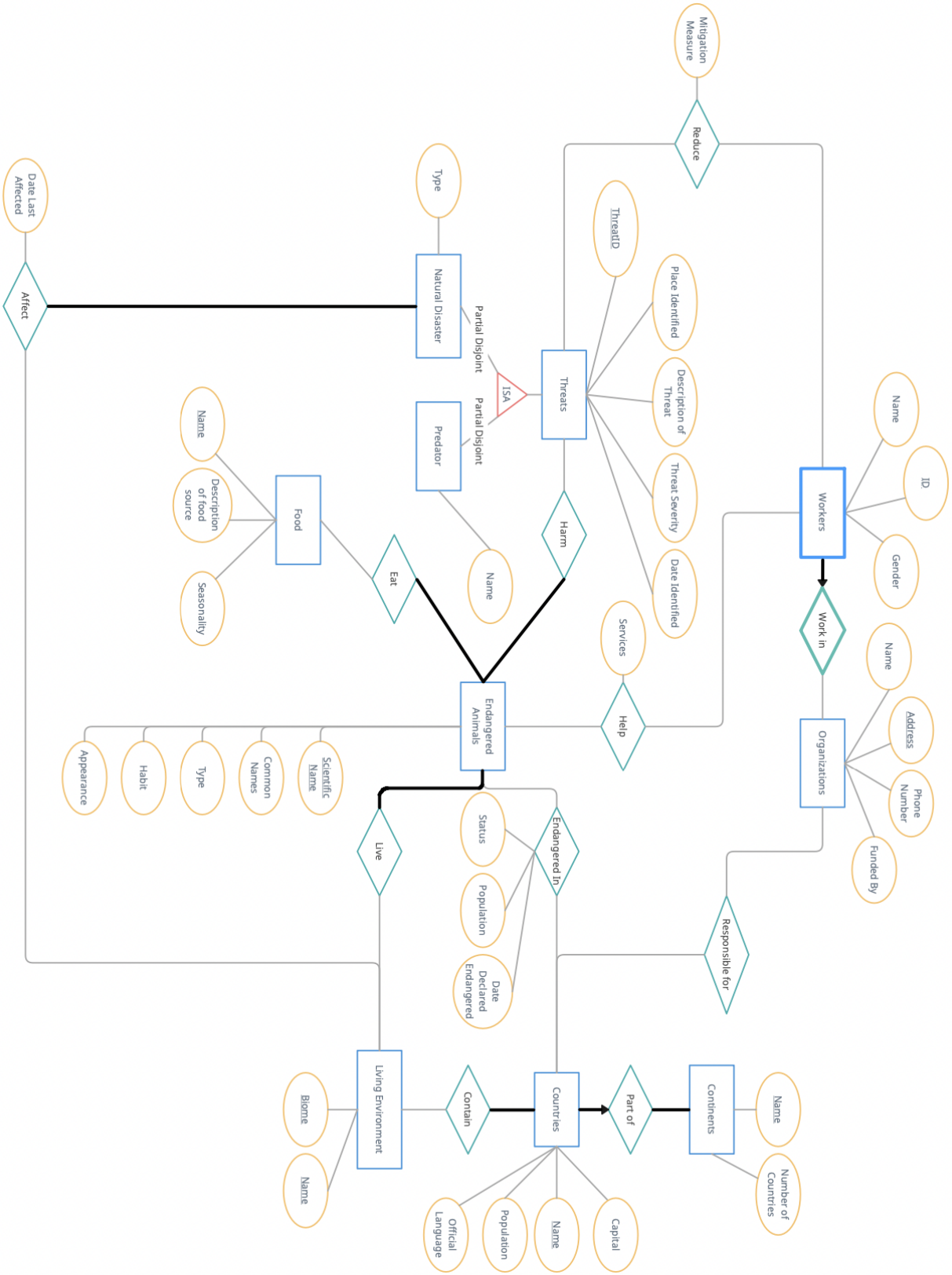

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Relational Schema

WorkersWorkIn (combined Workers, Worked in, Organizations)
WorkersWorkIn(ID:integer, Name:char[20], Gender:char[10], Address:char[60])
Primary Key: ID, Address
Foreign Key: Address References Organizations(Address)
NON-NULLS: Name

Organizations
Organizations(Address:char[60], Name:char[40], PhoneNumber:char[20], FundedBy: char[20])
Primary Key: Address
NON-NULL: Name

ResponsibleFor
ResponsibleFor(CountryName:char[20], OrganizationAddress: char[60])
Primary Key: CountryName, OrganizationAddress
Foreign Key: CountryName References CountriesPartOf(CountryName), OrganizationAddress References Organizations(Address)

Continents
Continents(Name:char[20], NumberOfCountries:integer)
Primary Key: Name
NON-NULL: NumberOfCountries

CountriesPartOf (combines countries, part of)
CountriesPartOf(CountryName:char[20], Capital:char[20], Population:integer, OfficialLanguage:char[20], Continent:char[20])
Primary Key: CountryName
Candidate Key: Capital
Foreign Key: Continent References Continents(Name)
Unique: Capital
Not Null: Continent, Population, OfficialLanguage

Contains
Contains(CountriesName:char[20], EnvironmentName:char[50], Biome:char[30])
Primary Key: CountriesName, EnvironmentName, Biome
Foreign Key: CountriesName References CountriesPartOf(CountryName), (EnvironmentName,Biome) References LivingEnvironment(Name,Biome)

LivingEnvironment
LivingEnvironment(Name:char[50], Biome:char[30])
Primary Key: Name, Biome

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EndangeredAnimal
EndangeredAnimal(ScientificName:char[300], CommonName:char[30], Type:char[20], Habitat:char[30], Appearance:char[400])
Primary Key: ScientificName
NON-NULL: CommonName, Type, Habitat, Appearance

EndangeredIn
EndangeredIn(ScientificName:char[300], Countries:char[20], Status:char[40], Population:integer, Date:SQL-DATE)
Date will be using SQL date data type format
Primary Key: ScientificName, Countries
Foreign Key: ScientificName References EndangeredAnimal(ScientificName), Countries References CountriesPartOf(CountryName)
NON-NULL: Status, Population, Date

Live
Live(ScientificName:char[300], EnvironmentName:char[50], Biome:char[30])
Primary Key: ScientificName, EnvironmentName, Biome
Foreign Key: ScientificName References EndangeredAnimal(ScientificName), (EnvironmentName, Biome) References LivingEnvironment(Name, Biome)
NON-NULL: EnvironmentName, Biome

Help
Help(WorkerID:integer, Address:char[60], ScientificName:char[300], Services:char[150])
Primary Key: WorkerID, Address, ScientificName
Foreign Key: (WorkerID, Address) References WorkersWorkIn(ID, Address), ScientificName References EndangeredAnimal(ScientificName)
NON-NULL: Services

Reduce
Reduce(WorkerID:integer, Address:char[60], ThreatID:integer, MitigationMeasure:char[100])
Primary Key: WorkerID, Address, ThreatID
Foreign Key: (WorkerID, Address) References WorkersWorkIn(ID, Address), ThreatID References Threats(ThreatID)
NON-NULL: MitigationMeasure

Threats
Threats(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], ThreatSeverity:integer, Date: SQL-DATE)
Date will be using SQL date data type format
Primary Key: ThreatID
NON-NULL: PlaceIdentified, DescriptionOfThreat, ThreatSeverity

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NaturalDisaster
NaturalDisaster(ThreatID:integer, Type:char[30])
Primary Key: ThreatID
NON-NULL:Type

Predator
Predator(ThreatID:integer, Name:char[30])
Primary Key: ThreatID
NON-NULL: Name

Harm
Harm(ThreatID:integer, ScientificName:Char[300])
Primary Key: ThreatID, ScientificName
Foreign Key: ThreatID References Threats(ThreatID), ScientificName References EndangeredAnimal(ScientificName)

Food
Food(Name:Char[30], DescriptionOfFoodSource:Char[100], Seasonality:Char[30])
Primary Key: Name

Eat
Eat(FoodName:Char[30], ScientificName:Char[300])
Primary Key: FoodName, ScientificName
Foreign Key: FoodName References Food(name), ScientificName References EndangeredAnimal(ScientificName)

Affect
Affect(ThreatID:integer, EnvironmentName:char[50], Biome:char[30], DateLastAffected: SQL-Date)
Date will be using SQL date data type format
Primary key: ThreatID, EnvironmentName, Biome
Foreign key: ThreatID References NaturalDisaster(ThreatID), (EnvironmentName, Biome) References LivingEnvironment(name, biome)
NON-NULL: DateLastAffected

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Functional Dependencies

Relation: WorkersWorkIn
ID->Name, Gender, Address

Relation: Organizations
Address->Name, PhoneNumber, FundedBy
Name->PhoneNumber, FundedBy
PhoneNumber->Name

Relation: ResponsibleFor
OrganizationAddress->CountryName

Relation: Continents
Name->NumberOfCountries

Relation: CountriesPartOf
CountryName->Capital, Population, OfficialLanguage, Continent
Capital->CountryName, Population, OfficialLanguage, Continent

Relation: EndangeredAnimal
ScientificName->CommonName, Type, Habitat, Appearance

Relation: EndangeredIn
ScientificName, Countries->Status, Population, Date

Relation: Help
ID, Address, ScientificName->Services

Relation: Reduce
WorkerID, Address, ThreatID->MitigationMeasure

Relation: Threats
ThreatID->PlaceIdentified, DescriptionOfThreat, ThreatSeverity,Date
DescriptionOfThreat->ThreatSeverity

Relation: NaturalDisaster
ThreatID->Type

Relation: Predator
ThreatID->Name

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Relation: Food
Name->DescriptionOfFoodSource, Seasonality
DescriptionOfFoodSource->Seasonality

Relation: Affect
ThreatID, EnvironmentName, Biome->DateLastAffected

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Normalization

Table: WorkersWorkIn (combined Workers, Worked in, Organizations)
WorkersWorkIn(ID:integer, Name:char[20], Gender:char[10], Address:char[60])
FD: ID->Name, Gender, Address

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: ID, Address
Foreign Key: Address References Organizations(Address)

Table: Organizations
Organizations(Address:char[60], Name:char[40], PhoneNumber:char[20], FundedBy: char[20])
FD: Address->Name, PhoneNumber, FundedBy
Name->PhoneNumber, FundedBy
PhoneNumber->Name
Primary Key: Address

Last two FDs violate BCNF, so we need to decompose the relation.
BCNF decomposition:
FDs become: Address->Name, Address->PhoneNumber, Address->FundedBy, Name->PhoneNumber, Name->FundedBy, PhoneNumber->Name.
Name->PhoneNumber violates BCNF in Organizations(Address:char[60], Name:char[40], PhoneNumber:char[20], FundedBy: char[20]):
Organizations_1(Name:char[40], PhoneNumber:char[20]),
Organizations_2(Address:char[60], Name:char[40], FundedBy: char[20])

Name->FundedBy violates BCNF in Organizations_2(Address:char[60], Name:char[40], FundedBy: char[20]):
Organizations_3(Name:char[40], FundedBy: char[20]),
Organizations_4(Address:char[60], Name:char[40])

Decomposed relations:
Organizations_1(Name:char[40], PhoneNumber:char[20]),
Organizations_3(Name:char[40], FundedBy: char[20]),
Organizations_4(Address:char[60], Name:char[40])

Organizations_1(Name:char[40], PhoneNumber:char[20])
Primary Key: Name
Candidate Key: PhoneNumber

Organizations_3(Name:char[40], FundedBy: char[20])
Primary Key: Name

Organizations_4(Address:char[60], Name:char[40])

Primary Key: Address
Foreign Key: Name References Organizations_1(Name)

Table: ResponsibleFor
ResponsibleFor(CountryName:char[20], OrganizationAddress: char[60])
FD: OrganizationAddress->CountryName

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: CountryName, OrganizationAddress
Foreign Key: CountryName References CountriesPartOf(CountryName), OrganizationAddress References Organizations_4(Address)

Table: Continents
Continents(Name:char[20], NumberOfCountries:integer)
FD: Name->NumberOfCountries

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: Name

Table: CountriesPartOf (combines countries, part of)
CountriesPartOf(CountryName:char[20], Capital:char[20], Population:integer, OfficialLanguage:char[20], Continent:char[20])
FD: CountryName->Capital, Population, OfficialLanguage, Continent
Capital->CountryName, Population, OfficialLanguage, Continent

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: CountryName
Candidate Key: Capital
Foreign Key: Continent References Continents(Name)

Table: Contains
Contains(CountriesName:char[20], EnvironmentName:char[50], Biome:char[30])
No FDs, so the relation is in BCNF form.
Primary Key: CountriesName, EnvironmentName, Biome
Foreign Key: CountriesName References CountriesPartOf(CountryName), (EnvironmentName,Biome) References LivingEnvironment(Name,Biome)

Table: LivingEnvironment
LivingEnvironment(Name:char[50], Biome:char[30])
No FDs, so the relation is in BCNF form.
Primary Key: Name, Biome

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Table: EndangeredAnimal
EndangeredAnimal(ScientificName:char[300], CommonName:char[30], Type:char[20], Habitat:char[30], Appearance:char[400])
FD: ScientificName->CommonName, Type, Habitat, Appearance

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: ScientificName

Table: EndangeredIn
EndangeredIn(ScientificName:char[300], Countries:char[20], Status:char[40], Population:integer, Date:SQL-DATE)
ScientificName, Countries->Status, Population, Date

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: ScientificName, Countries
Foreign Key: ScientificName References EndangeredAnimal(ScientificName), Countries References CountriesPartOf(CountryName)

Table: Live
Live(ScientificName:char[300], EnvironmentName:char[50], Biome:char[30])
No FDs, so the relation is in BCNF form.
Primary Key: ScientificName, EnvironmentName, Biome
Foreign Key: ScientificName References EndangeredAnimal(ScientificName), (EnvironmentName, Biome) References LivingEnvironment(Name, Biome)

Table: Help
Help(WorkerID:integer, Address:char[30], ScientificName:char[300], Services:char[150])
FD: ID, Address, ScientificName->Services

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: WorkerID, Address, ScientificName
Foreign Key: (WorkerID, Address) References WorkersWorkIn(ID, Address), ScientificName References EndangeredAnimal(ScientificName)

Table: Reduce
Reduce(WorkerID:integer, Address:char[60], ThreatID:integer, MitigationMeasure:char[100])
FD: WorkerID, Address, ThreatID->MitigationMeasure

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: WorkerID, Address, ThreatID
Foreign Key: (WorkerID, Address) References WorkersWorkIn(ID, Address), ThreatID References Threats_2(ThreatID)

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Table: Threats

Threats(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], ThreatSeverity:integer, Date: SQL-DATE)
FD: ThreatID->PlaceIdentified, DescriptionOfThreat, ThreatSeverity,Date
DescriptionOfThreat->ThreatSeverity
Primary Key: ThreatID

The second FD violates BCNF, so we need to decompose the relation.

BCNF Decomposition:

FDs become: ThreatID->PlaceIdentified, ThreatID->DescriptionOfThreat, ThreatID->ThreatSeverity, ThreatID->Date, DescriptionOfThreat->ThreatSeverity.
DescriptionOfThreat->ThreatSeverity violates BCNF in Threats(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], ThreatSeverity:integer, Date: SQL-DATE):

Threats_1(DescriptionOfThreat:char[100], ThreatSeverity:integer),
Threats_2(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], Date: SQL-DATE)

Decomposed relations:

Threats_1(DescriptionOfThreat:char[100], ThreatSeverity:integer),
Threats_2(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], Date: SQL-DATE)

Threats_1(DescriptionOfThreat:char[100], ThreatSeverity:integer)
Primary Key: DescriptionOfThreat

Threats_2(ThreatID:integer, PlaceIdentified:char[40], DescriptionOfThreat:char[100], Date: SQL-DATE)
Primary Key: ThreatID
Foreign Key: DescriptionOfThreat References Threats_1(DescriptionOfThreat)

Table: NaturalDisaster

NaturalDisaster(ThreatID:integer, Type:char[30])
FD: ThreatID->Type

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: ThreatID

Table: Predator

Predator(ThreatID:integer, Name:char[30])
FD: ThreatID->Name

No FD violates BCNF, so the relation is in BCNF form.
Primary Key: ThreatID

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Table: Harm
Harm(ThreatID:integer, ScientificName:Char[300])
No FDs, so the relation is in BCNF form.
Primary Key: ThreatID, ScientificName
Foreign Key: ThreatID References Threats_2(ThreatID), ScientificName References EndangeredAnimal(ScientificName)

Table: Food
Food(Name:Char[30], DescriptionOfFoodSource:Char[100], Seasonality:Char[30])
FD: Name->DescriptionOfFoodSource, Seasonality
DescriptionOfFoodSource->Seasonality
Primary Key: Name

The second FD violates BCNF, so we need to decompose the relation.
BCNF decomposition:
FDs become: Name->DescriptionOfFoodSource, Name->Seasonality, DescriptionOfFoodSource->Seasonality
DescriptionOfFoodSource->Seasonality violates BCNF in Food(Name:Char[30], DescriptionOfFoodSource:Char[100], Seasonality:Char[30]):
Food_1(DescriptionOfFoodSource:Char[100], Seasonality:Char[30]),
Food_2(Name:Char[30], DescriptionOfFoodSource:Char[100])

Decomposed relations:
Food_1(DescriptionOfFoodSource:Char[100], Seasonality:Char[30]),
Food_2(Name:Char[30], DescriptionOfFoodSource:Char[100])

Food_1(DescriptionOfFoodSource:Char[100], Seasonality:Char[30])
Primary Key: DescriptionOfFoodSource

Food_2(Name:Char[30], DescriptionOfFoodSource:Char[100])
Primary Key: Name
Foreign Key: DescriptionOfFoodSource References Food_1(DescriptionOfFoodSource)

Table: Eat
Eat(FoodName:Char[30], ScientificName:Char[300])
No FDs, so the relation is in BCNF form.
Primary Key: FoodName, ScientificName
Foreign Key: FoodName References Food_2(Name), ScientificName References EndangeredAnimal(ScientificName)

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Table: Affect

Affect(ThreatID:integer, EnvironmentName:char[50], Biome:char[30], DateLastAffected: SQL-Date)
FD: ThreatID, EnvironmentName, Biome->DateLastAffected

No FD violates BCNF, so the relation is in BCNF form.
Primary key: ThreatID, EnvironmentName, Biome
Foreign key: ThreatID References NaturalDisaster(ThreatID), (EnvironmentName, Biome) References LivingEnvironment(Name, Biome)

SQL DDL

Table: WorkersWorkIn (combined Workers, Worked in, Organizations)

```
CREATE TABLE WorkersWorkIn (
        ID                  INTEGER,
        Name                CHAR(20) NOT NULL,
        Gender              CHAR(10),
        Address             CHAR(60),
        PRIMARY KEY (ID, Address),
        FOREIGN KEY (Address)
                REFERENCES Organizations_4(Address)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

Table: Organizations_1

```
CREATE TABLE Organizations_1 (
        Name                CHAR(40) PRIMARY KEY,
        PhoneNumber         CHAR(20) UNIQUE
);
```

Table: Organizations_3

```
CREATE TABLE Organizations_3 (
        Name                CHAR(40) PRIMARY KEY,
        FundedBy            CHAR(20)
);
```

Table: Organizations_4

```
CREATE TABLE Organizations_4 (
        Address             CHAR(60) PRIMARY KEY,
        Name                CHAR(40) NOT NULL,
        FOREIGN KEY (Name)
                REFERENCES Organizations_1(Name)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

Table: ResponsibleFor

```
CREATE TABLE ResponsibleFor (
        CountryName         CHAR(20),
        OrganizationAddress  CHAR(60),
        PRIMARY KEY (CountryName, OrganizationAddress),
        FOREIGN KEY (CountryName)
                REFERENCES CountriesPartOf(CountryName)
```

```
            ON DELETE CASCADE
            ON UPDATE CASCADE,
        FOREIGN KEY (OrganizationAddress)
            REFERENCES Organization_4(Address)
            ON DELETE CASCADE
            ON UPDATE CASCADE
);
```

Table: Continents

```
CREATE TABLE Continents (
        Name                CHAR(20) PRIMARY KEY,
        NumberOfCountries   INTEGER NOT NULL
);
```

Table: CountriesPartOf (combines countries, part of)

```
CREATE TABLE CountriesPartOf (
        CountryName         CHAR(20) PRIMARY KEY,
        Capital             CHAR(20) UNIQUE,
        Population          INTEGER NOT NULL,
        OfficialLanguage    CHAR(20) NOT NULL,
        Continent           CHAR(20) NOT NULL,
        FOREIGN KEY (Continent)
            REFERENCES Continents(Name)
            ON DELETE CASCADE
            ON UPDATE CASCADE
);
```

Table: Contains

```
CREATE TABLE Contains (
        CountriesName       CHAR(20),
        EnvironmentName     CHAR(50),
        Biome               CHAR(30),
        PRIMARY KEY (CountriesName, EnvironmentName, Biome),
        FOREIGN KEY (CountriesName)
            REFERENCES CountriesPartOf(CountryName)
            ON DELETE CASCADE
            ON UPDATE CASCADE,
        FOREIGN KEY (EnvironmentName, Biome)
            REFERENCES LivingEnvironment(Name, Biome)
            ON DELETE CASCADE
            ON UPDATE CASCADE
);
```

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Table: LivingEnvironment

```
CREATE TABLE LivingEnvironment (
        Name                CHAR(50),
        Biome               CHAR(30),
        PRIMARY KEY (Name, Biome)
);
```

Table: EndangeredAnimal

```
CREATE TABLE EndangeredAnimal (
        ScientificName      CHAR(300) PRIMARY KEY,
        CommonName          CHAR(30) NOT NULL,
        Type                CHAR(20) NOT NULL,
        Habitat             CHAR(30) NOT NULL,
        Appearance          CHAR(400) NOT NULL
);
```

Table: EndangeredIn

```
CREATE TABLE EndangeredIn (
        ScientificName      CHAR(300),
        Countries           CHAR(20),
        Status              CHAR(40) NOT NULL,
        Population          INTEGER NOT NULL,
        Date                DATE NOT NULL,
        PRIMARY KEY (ScientificName, Countries),
        FOREIGN KEY (ScientificName)
                REFERENCES EndangeredAnimal(ScientificName)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (Countries)
                REFERENCES CountriesPartOf(CountryName)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

Table: Live

```
CREATE TABLE Live (
        ScientificName      CHAR(300),
        EnvironmentName     CHAR(50) NOT NULL,
        Biome               CHAR(30) NOT NULL,
        PRIMARY KEY (ScientificName, EnvironmentName, Biome),
        FOREIGN KEY (ScientificName)
                REFERENCES EndangeredAnimal(ScientificName)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
```

```
    FOREIGN KEY (EnvironmentName, Biome)
        REFERENCES LivingEnvironment(Name, Biome)
        ON DELETE CASCADE
        ON UPDATE CASCADE
);
```

Table: Help

```
CREATE TABLE Help (
    WorkerID            INTEGER,
    Address             CHAR(60),
    ScientificName      CHAR(300),
    Services            CHAR(150) NOT NULL,
    PRIMARY KEY (WorkerID, Address, ScientificName),
    FOREIGN KEY (Worker ID, Address)
        REFERENCES WorkersWorkIn(ID, Address)
        ON DELETE CASCADE
        ON UPDATE CASCADE,
    FOREIGN KEY (ScientificName)
        REFERENCES EndangeredAnimal(ScientificName)
        ON DELETE CASCADE
        ON UPDATE CASCADE
);
```

Table: Reduce

```
CREATE TABLE Reduce (
    WorkerID            INTEGER,
    Address             CHAR(60),
    ThreatID            INTEGER,
    MitigationMeasure   CHAR(100) NOT NULL,
    PRIMARY KEY (WorkerID, Address, ThreatID),
    FOREIGN KEY (WorkerID, Address)
        REFERENCES WorkersWorkIn(WorkerID, Address)
        ON DELETE CASCADE
        ON UPDATE CASCADE,
    FOREIGN KEY (ThreatID)
        REFERENCES Threats_2(ThreatID)
        ON DELETE CASCADE
        ON UPDATE CASCADE
);
```

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Table: Threats_1

```
CREATE TABLE Threats_1 (
        DescriptionOfThreat   CHAR(100) PRIMARY KEY,
        ThreatSeverity        INTEGER NOT NULL
);
```

Table: Threats_2

```
CREATE TABLE Threats_2 (
        ThreatID              INTEGER PRIMARY KEY,
        PlaceIdentified       CHAR(40) NOT NULL,
        DescriptionOfThreat   CHAR(100) NOT NULL,
        Date                  DATE,
        FOREIGN KEY (DescriptionOfThreat)
                REFERENCES Threats_1(DescriptionOfThreat)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

Table: NaturalDisaster

```
CREATE TABLE NaturalDisaster (
        ThreatID              INTEGER PRIMARY KEY,
        Type                  CHAR(30) NOT NULL
);
```

Table: Predator

```
CREATE TABLE Predator (
        ThreatID              INTEGER PRIMARY KEY,
        Name                  CHAR(30) NOT NULL
);
```

Table: Harm

```
CREATE TABLE Harm (
        ThreatID              INTEGER,
        ScientificName        CHAR(300),
        PRIMARY KEY (ThreatID, ScientificName),
        FOREIGN KEY (ThreatID)
                REFERENCES Threats_2(ThreatID)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (ScientificName)
                REFERENCES EndangeredAnimal(ScientificName)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

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Table: Food_1

```
CREATE TABLE Food_1 (
        DescriptionOfFoodSource     CHAR(100) PRIMARY KEY,
        Seasonality                 CHAR(30)
);
```

Table: Food_2

```
CREATE TABLE Food_2 (
        Name                        CHAR(30) PRIMARY KEY,
        DescriptionOfFoodSource     CHAR(100),
        FOREIGN KEY (DescriptionOfFoodSource)
                REFERENCES Food_1(DescriptionOfFoodSource)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

Table: Eat

```
CREATE TABLE Eat (
        FoodName            CHAR(30),
        ScientificName      CHAR(300),
        PRIMARY KEY (FoodName, ScientificName),
        FOREIGN KEY (FoodName)
                REFERENCES Food_2(Name)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (ScientificName)
                REFERENCES EndangeredAnimal(ScientificName)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

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Table: Affect

```
CREATE TABLE Affect (
        ThreatID            INTEGER,
        EnvironmentName     CHAR(50),
        Biome               CHAR(30),
        DateLastAffected    DATE NOT NULL,
        PRIMARY KEY (ThreatID, EnvironmentName, Biome)
        FOREIGN KEY (ThreatID)
                REFERENCES NaturalDisaster(ThreatID)
                ON DELETE CASCADE
                ON UPDATE CASCADE,
        FOREIGN KEY (EnvironmentName, Biome)
                REFERENCES LivingEnvironment(Name, Biome)
                ON DELETE CASCADE
                ON UPDATE CASCADE
);
```

INSERT Statements

Table: WorkersWorkIn (combined Workers, Worked in, Organizations)

```
INSERT
INTO WorkersWorkIn
VALUES (001, 'James', 'male', '123-ABC Street, Vancouver, BC, Canada'),
       (010, 'Jason', 'male', '234-BCD Street, Toronto, OA, Canada'),
       (011, 'Alice', 'female', '345-CDE Street, New York, NY, US'),
       (100, 'John', 'male', '456-DEF Street, Shanghai, China'),
       (101, 'Ben', 'male', '567-EFG Street, Beijing, China');
```

Table: Organizations_1

```
INSERT
INTO Organizations_1
VALUES ('Canada Rescue Organization', '+1-111-234-5678'),
       ('Toronto Rescue Organization', '+91-111-234-6789'),
       ('America Rescue Organization', '+86-222-234-5678'),
       ('Sweden Rescue Organization', '+21-222-234-6789'),
       ('Rhodes Rescue Organization', '+11-111-111-2222');
```

Table: Organizations_3

```
INSERT
INTO Organizations_3
VALUES  ('Canada Rescue Organization', 'Jordan'),
        ('Toronto Rescue Organization', 'Messi'),
        ('America Rescue Organization', 'Lionel'),
        ('Sweden Rescue Organization', 'Patrice'),
        ('Rhodes Rescue Organization', 'Margo');
```

Table: Organizations_4

```
INSERT
INTO Organizations_4
VALUES ('123-ABC Street, Vancouver, BC, Canada', 'Canada Rescue Organization'),
       ('234-BCD Street, Toronto, OA, Canada', 'Toronto Rescue Organization'),
       ('345-CDE Street, New York, NY, US', 'America Rescue Organization'),
       ('456-DEF Street, Shanghai, China', 'Sweden Rescue Organization'),
       ('567-EFG Street, Beijing, China', 'Rhodes Rescue Organization');
```

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Table: ResponsibleFor

```
INSERT
INTO ResponsibleFor
VALUES ('Canada', '123-ABC Street, Vancouver, BC, Canada'),
       ('Canada', '234-BCD Street, Toronto, OA, Canada'),
       ('United States', '345-CDE Street, New York, NY, US'),
       ('China', '456-DEF Street, Shanghai, China'),
       ('China', '567-EFG Street, Beijing, China');
```

Table: Continents

```
INSERT
INTO Continents
VALUES ('North America', 23),
       ('Asia', 49),
       ('Europe', 50),
       ('Africa', 54),
       ('South America', 12);
```

Table: CountriesPartOf (combines countries, part of)

```
INSERT
INTO CountriesPartOf
VALUES ('Canada', 'Ottawa', 30000000, 'English', 'North America'),
       ('China', 'Beijing', 1400000000, 'Chinese', 'Asia'),
       ('Vietnam', 'Hanoii', 100000000, 'Vietnamese', 'Asia'),
       ('France', 'Paris', 123456789, 'French', 'Europe'),
       ('South Africa', 12345678, 'English', 'Africa'),
       ('Brazil', 1234566780, 'Portuguese', 'South America');
```

Table: Contains

```
INSERT
INTO Contains
VALUES ('Canada', 'Rocky Mountains', 'Tundra'),
       ('China', 'Tibetan Plateau', 'Grassland'),
       ('China', 'Yangtze Plain', 'Mixed forest'),
       ('Vietnam', 'Mekong Delta', 'Wetland'),
       ('France', 'Alps Mountains', 'Alpine'),
       ('South Africa', 'South Africa Plateau', 'Grassland'),
       ('Brazil', 'Planalto Brasileiro', 'Grassland');
```

Table: LivingEnvironment

```
INSERT
INTO LivingEnvironment
VALUES ('Rocky Mountains', 'Tundra'),
       ('Tibetan Plateau', 'Grassland'),
```

('Yangtze Plain', 'Mixed forest'),
('Mekong Delta', 'Wetland'),
('Alps Mountains', 'Alpine'),
('South Africa Plateau', 'Grassland'),
('Planalto Brasileiro', 'Grassland');

Table: EndangeredAnimal

INSERT
INTO EndangeredAnimal
VALUES ('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus', 'Javan rhino', 'Mammal', 'Southeast Asia', 'Javan rhinos are smaller than the Indian rhinoceros, and are close in size to the black rhinoceros'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis', 'Amur leopard', 'Mammal', 'Northern China', 'Amur leopard can easily be differentiated from other leopard subspecies by its thick, pale cream-colored fur, Particularly in winter'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Suborder:Haplorhini, Infraorder: Simiiformes, Family: Hominidae, Subfamily: Homininae, Genus: Gorilla, Species: G. beringei, Subspecies: G. b. beringei', 'Mountain gorillas', 'Mammal', 'East Africa', 'The fur of mountain gorilla, often thicker and longer than that of other gorilla species, enables them to live in colder temperatures'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis', 'Yangtze finless porpoise', 'Mammal', 'Yangtze River in China', 'A finless porpoise can grow up to 2.27m in length and weigh up to 71.8kg'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis', 'African forest elephant', 'Mammal', 'West Africa', 'The African forest elephant has grey skin, which looks yellow to reddish after wallowing');

Table: EndangeredIn

INSERT
INTO EndangeredIn
VALUES ('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus', 'Vietnam', 'Critically Endangered', 75, 2011-05-28),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis', 'China', 'Critically Endangered', 100, 2010-04-2),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Suborder:Haplorhini, Infraorder: Simiiformes, Family: Hominidae, Subfamily:

Homininae, Genus: Gorilla, Species: G. beringei, Subspecies: G. b. beringei', 'South Africa', 'Critically Endangered', 50, 2014-09-10),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis', 'China', 'Critically Endangered', 80, 2008-07-15),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis', 'South Africa', 'Critically Endangered', 60, 2016-06-19);

Table: Live

INSERT
INTO Live
VALUES ('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus', 'Mekong Delta', 'Wetland'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis', 'Tibetan Plateau', 'Grassland'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Suborder:Haplorhini, Infraorder: Simiiformes, Family: Hominidae, Subfamily: Homininae, Genus: Gorilla, Species: G. beringei, Subspecies: G. b. beringei', 'South Africa Plateau', 'Grassland'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis', 'Yangtze Plain', 'Mixed forest'),
('Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis', 'South Africa Plateau', 'Grassland');

Table: Help

INSERT
INTO Help
VALUES (100, '456-DEF Street, Shanghai, China', 'Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis', 'Recycle and buy sustainable product'),
(101,'567-EFG Street, Beijing, China', 'Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis', 'Host a community fundraising event'),
(100, '456-DEF Street, Shanghai, China', 'Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis', 'Sponsor endangered animals'),

(101,‘567-EFG Street, Beijing, China’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis’, ‘Protect wildlife habitats’),
(011, ‘345-CDE Street, New York, NY, US’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis, ‘Boycott of purchasing illegal products that come from endangered species’);

Table: Reduce

```
INSERT
INTO Reduce
VALUES (100, ‘456-DEF Street, Shanghai, China’, 1, ‘Pick up litter in river’),
        (100, ‘456-DEF Street, Shanghai, China’, 4, ‘Artificial rainfall’),
        (101, ‘567-EFG Street, Beijing, China’, 1, ‘Use chemicals to clean water’),
        (001, ‘123-ABC Street, Vancouver, BC, Canada’, 2, ‘Provide food’),
        (010, ‘234-BCD Street, Toronto, OA, Canada’, 3, ‘Build nature reserves’);
```

Table: Threats_1

```
INSERT
INTO Threats_1
VALUES (‘Water pollution’, 8),
        (‘Lack of food’, 6),
        (‘Harmed or killed by tigers‘, 6),
        (‘Drought’, 8),
        (‘Being hunted’, 8),
        (‘Typhoon’, 7),
        (‘Hurricane’, 7),
        (‘Snowstorm’, 5),
        (‘Flood’, 5),
        (‘Harmed or killed by sharks’, 6),
        (‘Harmed or killed by lions’, 6),
        (‘Harmed or killed by snakes’, 6),
        (‘Harmed or killed by bears’, 6);
```

Table: Threats_2

```
INSERT
INTO Threats_2
VALUES (1, ‘Yangtze River in China’, ‘Water pollution’, 2012-06-30),
        (2, ‘Mekong Delta in Vietnam’, ‘Lack of food’, 2014-02-18),
        (3, ‘South Africa Plateau in South Africa’, ‘Harmed or killed by tigers‘, 2020-08-21),
        (4, ‘South Africa Plateau in South Africa’, ‘Drought’, 2009-01-20),
        (5, ‘Yangtze River in China’, ‘Being hunted’, 2017-03-21),
        (6, ‘Yangtze Plain in China’, ‘Typhoon’, 2015-04-25),
        (7, ‘Rocky Mountain in the United States’, ‘Hurricane’, 2016-02-01),
```

(8, ‘Hida Mountain in Japan’, ‘Snowstorm’, 2014-01-12),
(9, ‘Yangtze Plain in China’, ‘Flood’, 2010-07-21),
(10, ‘Pacific Ocean’, ‘Harmed or killed by sharks’, 2001-12-15),
(11, ‘South Africa Plateau in South Africa’, ‘Harmed or killed by lions’, 2009-08-15),
(12, ‘Amazon Rain Forest in Brazil’, ‘Harmed or killed by snakes’, 2002-02-15),
(13, ‘Rocky Mountain in Canada’, ‘Harmed or killed by bears’, 2009-07-15);

Table: NaturalDisaster

INSERT
INTO NaturalDisaster
VALUES (4, ‘Drought’),
(6, ‘Typhoon’),
(7, ‘Hurricane’),
(8, ‘Snowstorm’),
(9, ‘Flood’);

Table: Predator

INSERT
INTO Predator
VALUES (3, ‘Tigers’),
(10, ‘Sharks’),
(11, ‘Lions’),
(12, ‘Snakes’),
(13, ‘Bears’);

Table: Harm

INSERT
INTO Harm
VALUES (1, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis’),
(2, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus’),
(3, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Suborder:Haplorhini, Infraorder: Simiiformes, Family: Hominidae, Subfamily: Homininae, Genus: Gorilla, Species: G. beringei, Subspecies: G. b. beringei’),
(4, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis’),
(5, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis’);

Table: Food_1

INSERT

INTO Food_1
VALUES (‘Leaves, young shoots, grass, twigs’, ‘Spring’),
(‘Strong-scented carrion’, NULL),
(‘Bamboo and fruits’, ‘Spring’),
(‘Small fish, molluscs and crustaceans’, NULL),
(‘Pinecone and nuts’, ‘Spring’);

Table: Food_2
INSERT
INTO Food_2
VALUES (‘Leaves’, ‘Leaves, young shoots, grass, twigs’),
(‘Carrion’, ‘Strong-scented carrion’),
(‘Bamboo’, ‘Bamboo and fruits’),
(‘Small marine animals’, ‘Small fish, molluscs and crustaceans’),
(‘Nuts’, ‘Pinecone and nuts’);

Table: Eat
INSERT
INTO Eat
VALUES (‘Leaves’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus’),
(‘Carrion’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Feliformia, Family: Felidae, Subfamily: Pantherinae, Genus: Panthera, Species: P. pardus, Subspecies: P. p. orientalis’),
(‘Bamboo’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Primates, Suborder:Haplorhini, Infraorder: Simiiformes, Family: Hominidae, Subfamily: Homininae, Genus: Gorilla, Species: G. beringei, Subspecies: G. b. beringei’),
(‘Small marine animals’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis’),
(‘Leaves’, ‘Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis’);

Table: Affect
INSERT
INTO Affect
VALUES (4, ‘South Africa Plateau’, ‘Grassland’, 2020-08-31),
(6, ‘Yangtze Plain’, ‘Mixed forest’, 2022-06-30),
(7, ‘Rocky Mountains’, ‘Tundra’, 2021-07-25),
(8, ‘Yangtze Plain’, ‘Mixed forest’, 2019-01-10),
(9, ‘Yangtze Plain’, ‘Mixed forest’, 2017-02-13);