

# 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.

## Description and accomplishment of the final project:

Our final project creates an "Endanger Database", which provides users with the ability to search for information pertinent to endangered species in various countries and living environments. In addition, it enables users to identify animal rescue organizations that are accountable for different countries. This database features the option for users to update existing information and insert new data to enhance its current state. With filtering capabilities, users may tailor the data presented to them based on their preferences. Furthermore, it incorporates advanced functionality that utilizes SQL query techniques, allowing users to conduct specific searches for desired information.

## How our final schema differed from the schema we turned in:

We did not change our final schema from the last schema we turned in.

### Copy of the schema:

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

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

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

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

CREATE TABLE CountriesPartOf (
    CountryName   CHAR(20) PRIMARY KEY,
    Capital       CHAR(20) UNIQUE,
    Population    INTEGER NOT NULL,
```

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```
        OfficialLanguage  CHAR(20) NOT NULL,
        Continent       CHAR(20) NOT NULL,
        FOREIGN KEY (Continent)
            REFERENCES Continents(Name)
            ON DELETE CASCADE
) ;
```

  

```
CREATE TABLE ResponsibleFor (
        CountryName      CHAR(20),
        OrganizationAddress  CHAR(60),
        PRIMARY KEY (CountryName, OrganizationAddress),
        FOREIGN KEY (CountryName)
            REFERENCES CountriesPartOf(CountryName)
            ON DELETE CASCADE,
        FOREIGN KEY (OrganizationAddress)
            REFERENCES ORGANIZATIONS_4(Address)
            ON DELETE CASCADE
) ;
```

  

```
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
) ;
```

  

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

  

```
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,
```

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

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
);

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,
    FOREIGN KEY (Countries)
        REFERENCES CountriesPartOf(CountryName)
        ON DELETE CASCADE
);

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

CREATE TABLE Help (
    WorkerID       INTEGER,
    Address        CHAR(60),
    ScientificName CHAR(300),
    Services       CHAR(150) NOT NULL,
    PRIMARY KEY (WorkerID, Address, ScientificName),
    FOREIGN KEY (WorkerID, Address)
```

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```
        REFERENCES WorkersWorkIn(ID, Address)
        ON DELETE CASCADE,
    FOREIGN KEY (ScientificName)
        REFERENCES EndangeredAnimal(ScientificName)
        ON DELETE CASCADE
) ;

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

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
) ;

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

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

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

CREATE TABLE Affect (
    ThreatID          INTEGER,
    EnvironmentName   CHAR(50),
    Biome             CHAR(30),
    FOREIGN KEY (EnvironmentName)
        REFERENCES NaturalDisaster(EnvironmentName)
        ON DELETE CASCADE
) ;
```

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```
        DateLastAffected    DATE NOT NULL,
        PRIMARY KEY (ThreatID, EnvironmentName, Biome),
        FOREIGN KEY (ThreatID)
            REFERENCES NaturalDisaster(ThreatID)
            ON DELETE CASCADE,
        FOREIGN KEY (EnvironmentName, Biome)
            REFERENCES LivingEnvironment(Name, Biome)
            ON DELETE CASCADE
) ;

CREATE TABLE Reduce (
    WorkerID INT,
    Address VARCHAR(60),
    ThreatID INT,
    MitigationMeasure VARCHAR(100)
) ;

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

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

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

**Data in each relation after we ran SQL script**

Table: Organizations_1	
Name	PhoneNumber
Canada Rescue Organization	+1-111-234-5678
Toronto Rescue Organization	+91-111-234-6789
America Rescue Orgaization	+86-222-234-5678
Sweden Rescue Organization	+21-222-234-6789
Rhodes Rescue Organization	+11-111-111-2222

Table: Organizations_3	
Name	FundedBy
Canada Rescue Organization	Jordan
Toronto Rescue Organization	Messi
America Rescue Orgaization	Lionel
Sweden Rescue Organization	Patrice
Rhodes Rescue Organization	Margo

Table: Organizations_4	
Address	Name
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 Orgaization
456-DEF Street, Shanghai, China	Sweden Rescue Organization
567-EFG Street, Beijing, China	Rhodes Rescue Organization

Table: WorkersWorkIn			
ID	Name	Gender	Address
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: Continents	
Name	NumberOfCountries
North America	23
Asia	49
Europe	50
Africa	54
South America	12

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Table: CountriesPartOf				
CountryName	Capital	Population	OfficialLanguage	Continent
Canada	Ottawa	30000000	English	North America
United States	Washington DC	33100000	English	North America
China	Beijing	140000000	Chinese	Asia
Vietnam	Hanoi	100000000	Vietnamese	Asia
France	Paris	123456789	French	Europe
South Africa	NULL	12345678	English	Africa
Brazil	NULL	1234566780	Portuguese	South America

  

Table: ResponsibleFor				
CountryName	OrganizationAddress			
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: LivingEnvironment				
Name	Biome			
Rocky Mountains	Tundra			
Tibetan Plateau	Grassland			
Yangtze Plain	Mixed forest			
Mekong Delta	Wetland			
Alps Mountains	Alpine			
South Africa Plateau	Grassland			
Planalto Brasileiro	Grassland			

  

Table: Contains		
CountriesName	EnvironmentName	Biome
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

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ScientificName	CommonName	Type	Habitat	Appearance
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

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Table: EndangeredIn					
ScientificName	Countries	Status	Population	"DATE"	
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Vietnam	Critically Endangered	75	DATE '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	DATE '2010-04-02'	
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	DATE '2014-09-10'	
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Infraorder: Cetacea, Family: Phocoenidae, Genus: Neophocaena, Species: N. asiaeorientalis	China	Critically Endangered	80	DATE '2008-07-15'	
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Proboscidea, Family: Elephantidae, Genus: Loxodonta, Species: L. cyclotis	South Africa	Critically Endangered	60	DATE '2016-06-19'	

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Table: Live

ScientificName	EnvironmentName	Biome
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Rocky Mountains	Tundra
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Tibetan Plateau	Grassland
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Yangtze Plain	Mixed forest
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: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Alps Mountains	Alpine
Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	South Africa Plateau	Grassland

## CPSC304: Group 65 Milestone 4

Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Perissodactyla, Family: Rhinocerotidae, Genus: Rhinoceros, Species: Rhinoceros sondaicus	Planalto Brasileiro	Grassland
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: Reduce

WorkerID	Address	ThreatID	MitigationMeasure
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

DescriptionOfThreat	ThreatSeverity
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

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Table: Threats\_2

ThreatID	PlaceIdentified	DescriptionOfThreat	"DATE"
1	Yangtze River in China	Water pollution	TO_DATE('2012-06-30', 'YYYY-MM-DD')
2	Mekong Delta in Vietnam	Lack of food	TO_DATE('2014-02-18', 'YYYY-MM-DD')
3	South Africa Plateau in South Africa	Harmed or killed by tigers	TO_DATE('2020-08-21', 'YYYY-MM-DD')
4	South Africa Plateau in South Africa	Drought	TO_DATE('2009-01-20', 'YYYY-MM-DD')
5	Yangtze River in China	Being hunted	TO_DATE('2017-03-21', 'YYYY-MM-DD')
6	Yangtze Plain in China	Typhoon	TO_DATE('2015-04-25', 'YYYY-MM-DD')
7	Rocky Mountain in the United States	Hurricane	TO_DATE('2016-02-01', 'YYYY-MM-DD')
8	Hida Mountain in Japan	Snowstorm	TO_DATE('2014-01-12', 'YYYY-MM-DD')
9	Yangtze Plain in China	Flood	TO_DATE('2010-07-21', 'YYYY-MM-DD')
10	Pacific Ocean	Harmed or killed by sharks	TO_DATE('2001-12-15', 'YYYY-MM-DD')
11	South Africa Plateau in South Africa	Harmed or killed by lions	TO_DATE('2009-08-15', 'YYYY-MM-DD')
12	Amazon Rain Forest in Brazil	Harmed or killed by snakes	TO_DATE('2002-02-15', 'YYYY-MM-DD')
13	Rocky Mountain in Canada	Harmed or killed by bears	TO_DATE('2009-07-15', 'YYYY-MM-DD')

Table: NaturalDisaster

ThreatID	Type
4	Drought
6	Typhoon
7	Hurricane
8	Snowstorm
9	Flood

Table: Predator

ThreatID	Name
3	Tigers
10	Sharks
11	Lions
12	Snakes
13	Bears

Table: Harm

ThreatID	ScientificName
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

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Table: Food\_1

DescriptionOfFoodSource	Seasonality
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

Name	DescriptionOfFoodSource
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

FoodName	ScientificName
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

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Table: Affect			
ThreatID	EnvironmentName	Biome	DateLastAffected
4	South Africa Plateau	Yangtze Plain	TO_DATE('2020-08-31', 'YYYY-MM-DD')
6	Yangtze Plain	Mixed forest	TO_DATE('2022-06-30', 'YYYY-MM-DD')
7	Rocky Mountains	Tundra	TO_DATE('2021-07-25', 'YYYY-MM-DD')
8	Yangtze Plain	Mixed forest	TO_DATE('2019-01-10', 'YYYY-MM-DD')
9	Yangtze Plain	Mixed forest	TO_DATE('2017-02-13', 'YYYY-MM-DD')

  

Table: Help			
WorkerID	Address	ScientificName	Services
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
11	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

## All SQL queries and where they are in code

1. INSERT Operation: (In file MyHttpHandler, line 693)

Example of INSERT:

```
INSERT INTO Organizations_4  
VALUES ('a', 'Canada Rescue Organization')
```

2. DELETE Operation: (In file MyHttpHandler, line 571 to 581)

Example of DELETE:

```
DELETE FROM Organizations_1  
WHERE Name='Canada Rescue Organization' OR  
      Name='Toronto Rescue Organization'
```

3. UPDATE Operation: (In file MyHttpHandler, line 501 to 511)

Example of UPDATE:

```
UPDATE Organizations_4  
SET Name='Rhodes Rescue Organization'  
WHERE (Address='345-CDE Street, New York, NY, US'  
      AND Name='America Rescue Organization' )  
     OR (Address='456-DEF Street, Shanghai, China'  
      AND Name='Sweden Rescue Organization' )
```

4. SELECTION Operation: (In file MyHttpHandler, line 428 to 435)

Example of SELECTION:

```
SELECT *  
FROM Contains  
WHERE CountriesName<>'China'
```

5. PROJECTION Operation: (In file MyHttpHandler, line 632 to 638)

Example of PROJECTION:

```
SELECT ID,Name  
FROM WorkersWorkIn
```

6. JOIN Operation: (In file MyHttpHandler, line 356 to 367)

Example of JOIN:

```
SELECT WorkerID,Services  
FROM Harm NATURAL JOIN Help  
WHERE ThreatID<>1
```

7. Aggregation with GROUP BY: (In file MyHttpHandler, line 293)

Example of Aggregation with GROUP BY:

```
SELECT WorkerID,COUNT(*)  
FROM Help  
GROUP BY WorkerID
```

8. Aggregation with HAVING: (In file MyHttpHandler, line 233 to 238)

Example of Aggregation with HAVING:

```
SELECT ThreatSeverity,COUNT(*)  
FROM Threats_1  
GROUP BY ThreatSeverity  
HAVING ThreatSeverity>6
```

9. Nested Aggregation with GROUP BY: (In file MyHttpHandler, line 155)

Example of Nested Aggregation with GROUP BY:

```
SELECT PlaceIdentified, COUNT(*)  
FROM Threats_2 t2 NATURAL JOIN Threats_1 t1  
GROUP BY PlaceIdentified  
HAVING MAX(t1.ThreatSeverity) >= ALL (SELECT ThreatSeverity  
FROM Threats_1)
```

10. DIVISION Operation: (In file MyHttpHandler, line 88 to 94)

Example of DIVISION:

```
SELECT EA.*  
FROM EndangeredAnimal EA  
WHERE NOT EXISTS (SELECT LE.Name, LE.Biome  
FROM LivingEnvironment LE
```

```
WHERE NOT EXISTS (SELECT *
                  FROM Live L
                 WHERE L.ScientificName =
                       EA.ScientificName AND
                       L.EnvironmentName =
                       LE.Name AND L.Biome =
                       LE.Biome))
```

## Screenshots of before/during/after each SQL query

### 1. INSERT Operation:

Before:

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

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 |

[Back](#)

During:

Insert to:

Organizations\_4 ▾

Values:

Address:

Name:

[Back](#)

After:

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

**perform**

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 |  
a | Canada Rescue Organization |

[Back](#)

2. DELETE Operation:

Before:

Select from:

Organizations\_1 ▾

Attributes:

All  
 Name  
 PhoneNumber

**perform**

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 |

[Back](#)

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

**perform**

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 |  
a | Canada Rescue Organization |

[Back](#)

During:

Select from:

Organizations\_1 ▾

Attributes:

Name,PhoneNumber

Delete:

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 |

[Back](#)

After:

Select from:

Organizations\_1 ▾

Attributes:

All  
 Name  
 PhoneNumber

America Rescue Organization | +86-222-234-5678 |  
Sweden Rescue Organization | +21-222-234-6789 |  
Rhodes Rescue Organization | +11-111-111-2222 |

[Back](#)

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

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 |

[Back](#)

3. UPDATE Operation:

Before:

## CPSC304: Group 65 Milestone 4

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

**perform**

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 |  
[Back](#)

During:

Select from:

Organizations\_4 ▾

Choose attribute to be updated:

Address  
 Name

Choose values to be updated:

**Get all values**

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 |

New value: Rhodes Rescue Organizatio

**Update**

[Back](#)

After:

Select from:

Organizations\_4 ▾

Attributes:

All  
 Address  
 Name

**perform**

345-CDE Street, New York, NY, US | Rhodes Rescue Organization |  
456-DEF Street, Shanghai, China | Rhodes Rescue Organization |  
567-EFG Street, Beijing, China | Rhodes Rescue Organization |  
[Back](#)

### 4. SELECTION Operation:

Before:

Select from:

Contains

Attributes:

All  
 CountriesName  
 EnvironmentName  
 Biome

Brazil | Planalto Brasileiro | Grassland |  
Canada | Rocky Mountains | Tundra |  
China | Tibetan Plateau | Grassland |  
China | Yangtze Plain | Mixed forest |  
France | Alps Mountains | Alpine |  
South Africa | South Africa Plateau | Grassland |  
Vietnam | Mekong Delta | Wetland |

[Back](#)

During:

Select from:

Contains

Attributes:

All  
 CountriesName  
 EnvironmentName  
 Biome

Where: CountriesName  <>  China

Result will show here [Back](#)

After:

Select from:

Contains

Attributes:

All  
 CountriesName  
 EnvironmentName  
 Biome

Where: CountriesName  <>  China

Brazil | Planalto Brasileiro | Grassland |  
Canada | Rocky Mountains | Tundra |  
France | Alps Mountains | Alpine |  
South Africa | South Africa Plateau | Grassland |  
Vietnam | Mekong Delta | Wetland |

[Back](#)

## 5. PROJECTION Operation

Before:

Select from:

WorkersWorkIn

Attributes:

All  
 ID  
 Name  
 Gender  
 Address

11 | 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 |

[Back](#)

During:

Select from:

WorkersWorkIn

Attributes:

All  
 ID  
 Name  
 Gender  
 Address

Result will show here [Back](#)

After:

Select from:

WorkersWorkIn

Attributes:

All  
 ID  
 Name  
 Gender  
 Address

11 | Alice |  
100 | John |  
101 | Ben |  
[Back](#)

## 6. JOIN Operation

Before:

Select from:

Harm

Attributes:

All  
 ThreatID  
 ScientificName

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 |  
[Back](#)

Select from:

Help

Attributes:

All  
 WorkerID  
 Address  
 ScientificName  
 Services

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 |  
11 | 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 |  
[Back](#)

During:

Select from:

Table1: Harm

Table2: Help

Attributes:

All  
 ThreatID  
 ScientificName  
 WorkerID  
 Address  
 Services

Where: ThreatID  <>  1

Result will show here [Back](#)

After:

Select from:

Table1: Harm

Table2: Help

Attributes:

All  
 ThreatID  
 ScientificName  
 WorkerID  
 Address  
 Services

Where: ThreatID  <>  1

100 | Recycle and buy sustainable product |  
101 | Host a community fundraising event |  
11 | Boycott of purchasing illegal products that come from endangered species |  
[Back](#)

## 7. Aggregation with GROUP BY:

Before:

Select from:

Help

Attributes:

All  
 WorkerID  
 Address  
 ScientificName  
 Services

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 products |  
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 |  
11 | 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 |  
[Back](#)

During:

Select from:

Table: Help

Attributes:

ScientificName  
 WorkerID  
 Address  
 Services  
 COUNT(\*)

Group by:

ScientificName  
 WorkerID  
 Address  
 Services

Result will show here [Back](#)

After:

Select from:

Table:

Attributes:

ScientificName  
 WorkerID  
 Address  
 Services  
 COUNT(\*)

Group by:

ScientificName  
 WorkerID  
 Address  
 Services

11 | 1 |  
100 | 2 |  
101 | 2 |  
[Back](#)

8. Aggregation with HAVING:

Before:

Select from:

Threats\_1

Attributes:

All  
 DescriptionOfThreat  
 ThreatSeverity

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 |  
[Back](#)

During:

Select from:

Table: Threats\_1 ▾

Attributes:

DescriptionOfThreat  
 ThreatSeverity  
 COUNT(\*)  
 AVG(ThreatSeverity)

Group by:

DescriptionOfThreat  
 ThreatSeverity

Having: ThreatSeverity ▾ > ▾ 6

Result will show here [Back](#)

After:

Select from:

Table: Threats\_1 ▾

Attributes:

DescriptionOfThreat  
 ThreatSeverity  
 COUNT(\*)  
 AVG(ThreatSeverity)

Group by:

DescriptionOfThreat  
 ThreatSeverity

Having: ThreatSeverity ▾ > ▾ 6

7 | 2 |  
8 | 3 |  
[Back](#)

9. Nested Aggregation with GROUP BY:

Before:

## CPSC304: Group 65 Milestone 4

Select from:

Threats\_1

Attributes:

All  
 DescriptionOfThreat  
 ThreatSeverity

[perform](#)

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 |

[Back](#)

Select from:

Threats\_2

Attributes:

All  
 ThreatID  
 PlaceIdentified  
 DescriptionOfThreat  
 DATE

[perform](#)

1 | Yangtze River in China | Water pollution | 2012-06-30 00:00:00.0 |  
2 | Mekong Delta in Vietnam | Lack of food | 2014-02-18 00:00:00.0 |  
3 | South Africa Plateau in South Africa | Harmed or killed by tigers | 2020-08-21 00:00:00.0 |  
4 | South Africa Plateau in South Africa | Drought | 2009-01-20 00:00:00.0 |  
5 | Yangtze River in China | Being hunted | 2017-03-21 00:00:00.0 |  
6 | Yangtze Plain in China | Typhoon | 2015-04-25 00:00:00.0 |  
7 | Rocky Mountain in the United States | Hurricane | 2016-02-01 00:00:00.0 |  
8 | Hida Mountain in Japan | Snowstorm | 2014-01-12 00:00:00.0 |  
9 | Yangtze Plain in China | Flood | 2010-07-21 00:00:00.0 |  
10 | Pacific Ocean | Harmed or killed by sharks | 2001-12-15 00:00:00.0 |  
11 | South Africa Plateau in South Africa | Harmed or killed by lions | 2009-08-15 00:00:00.0 |  
12 | Amazon Rain Forest in Brazil | Harmed or killed by snakes | 2002-02-15 00:00:00.0 |  
13 | Rocky Mountain in Canada | Harmed or killed by bears | 2009-07-15 00:00:00.0 |

[Back](#)

During:

Perform the following query:  
Find the number of threats occurred at the PlaceIdentified,  
ONLY include threats where the maximum ThreatSeverity at one place  $\geq$  all other ThreatSeverity.

[perform](#)

Result will show here [Back](#)

After:

Perform the following query:  
 Find the number of threats occurred at the PlaceIdentified,  
 ONLY include threats where the maximum ThreatSeverity at one place  $\geq$  all other ThreatSeverity.

[perform](#)

This is the query performed:

```
SELECT PlaceIdentified, COUNT(*)
FROM Threats_2 t2 NATURAL JOIN Threats_1 t1
GROUP BY PlaceIdentified
HAVING MAX(t1.ThreatSeverity) >= ALL (SELECT ThreatSeverity FROM Threats_1)
```

Query results:

Yangtze River in China | 2 | [Back](#)

## 10. DIVISION Operation:

Before:

Select from:

[LivingEnvironment](#)

Attributes:

All  
 Name  
 Biome

[perform](#)

Alps Mountains | Alpine |  
 Mekong Delta | Wetland |  
 Planalto Brasileiro | Grassland |  
 Rocky Mountains | Tundra |  
 South Africa Plateau | Grassland |  
 Tibetan Plateau | Grassland |  
 Yangtze Plain | Mixed forest |  
[Back](#)

Select from:

[EndangeredAnimal](#)

Attributes:

All  
 ScientificName  
 CommonName  
 Type  
 Habitat  
 Appearance

[perform](#)

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. asiatica | 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 |  
[Back](#)

During:

Select from:

Find all endangered animals that live in all living environments

[perform](#)

Result will show here [Back](#)

## CPSC304: Group 65 Milestone 4

After:

Select from:  
 Find all endangered animals that live in all living environments  
[perform]

This is the query performed:  
SELECT EA.\*  
FROM EndangeredAnimal EA  
WHERE NOT EXISTS  
(SELECT LE.Name, LE.Biome  
FROM LivingEnvironment LE  
WHERE NOT EXISTS (SELECT \*  
FROM Live L  
WHERE L.ScienificName = EA.ScienificName AND L.EnvironmentName = LE.Name AND L.Biome = LE.Biome))

Query results:  
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 |  
[Back](#)