Purpose of Queries:

The queries were chosen to showcase database functionalities including aggregations, joins, filtering, and pattern matching to gain meaningful insights from the database. Each query involves specific aspects of species and habitat management, while considering applications such as research and operational planning. More specific purposes of individual queries are listed below:

1. Climatic conditions summary by habitat type
- Purpose: Summarize the climatic conditions across different habitat types, displaying the average temperature and elevation for each type.
- Features used: GROUP BY aggregate query; query averages two DECIMAL fields.

2. Species rescued during October 2024
- Purpose: To list all species rescued in October 2024, along with their height and rescue date.
- Features used: WHERE statement that uses wildcards for pattern matching.

3. Species and their assigned enclosures
- Purpose: To list species, their animal group, weight, and monitor the enclosures they are assigned to.
- Features used: OUTER JOIN joining the table with the <null> foreign key; .

4. Mammal species involved in studies
- Purpose: To identify mammal species that have been the focus of at least one study.
- Features used: INNER JOIN joining together three tables; HAVING that breaks down an aggregate query by some categorical factor.

5. Researchers involved in species studies
- Purpose: To display researchers associated with studies of specific species, including the study descriptions.
- Features used: INNER JOIN joining together three tables.

Queries:

-- QUERY 1: Climatic conditions summary by habitat type.
SELECT habitat_name, AVG(avg_temp) AS avg_temperature, AVG(elevation) AS
avg_elevation
FROM Habitat_type ht
INNER JOIN Habitat h ON ht.habitat_type_id = h.habitat_type_id
GROUP BY 1
ORDER BY 1;

Query 1 Output:

habitat_name	avg_temperature	avg_elevation
Desert	35.500000	20.0000
Forest	25.500000	200.0000
Grassland	30.000000	50.0000
Mountain	15.000000	1500.0000
Wetland	25.000000	585.0000

-- QUERY 2: Return all species rescued during October 2024.
SELECT species_name, height, rescue_date
FROM `group-s09_db`.`Species`
WHERE rescue_date LIKE '%2024-10-%'
ORDER BY species_name;

Query 2 Output:

species_name	height	rescue_date
Bengal Tiger	120.50	2024-10-01
Oak Tree	1200.00	2024-10-20
Polar Bear	250.00	2024-10-10

-- QUERY 3: Shows species and what enclosure they are assigned to.
SELECT sp.species_name, an.animal_group, an.weight, en.enclosure_desc
FROM `group-s09_db`.`Species` sp
LEFT OUTER JOIN `group-s09_db`.`Animal` an
        ON sp.species_id = an.species_id
LEFT OUTER JOIN `group-s09_db`.`Enclosure` en
        ON an.enclosure_number = en.enclosure_number
HAVING animal_group IS NOT NULL
ORDER BY sp.species_name;

Query 3 Output:

species_name	animal_group	weight	enclosure_desc
African Elephant	Mammal	540.00	Grassland habitat
Bengal Tiger	Mammal	220.75	Large land enclosure
Golden Eagle	Bird	15.20	Water-based enclosure
Green Iguana	Reptile	7.50	Small aquatic habitat
Lhasa Apso	Mammal	20.00	NULL
Polar Bear	Mammal	480.00	Large land enclosure

-- QUERY 4: Returns mammal species involved in studies.
SELECT species_name, COUNT(st.species_id) as cnt, animal_group
FROM Species sp
INNER JOIN Study st ON sp.species_id = st.species_id
INNER JOIN Animal a ON sp.species_id = a.species_id
GROUP BY 1, 3
HAVING animal_group = "Mammal"
ORDER BY 1;

Query 4 Output:

species_name	cnt	animal_group
African Elephant	1	Mammal
Bengal Tiger	1	Mammal
Polar Bear	1	Mammal

-- QUERY 5: Shows Which researchers were involved in species studies.
SELECT species_name, study_desc, last_name, first_name
FROM Species sp
INNER JOIN Study st ON sp.species_id = st.species_id
INNER JOIN Researcher r ON st.study_id = r.study_id
ORDER BY 1;

Query 5 Output:

species_name	study_desc	last_name	first_name
African Elephant	Conservation efforts for African Elephants.	Davis	Eve
Bamboo	Studying growth rate of Bamboo species.	Williams	Carol
Bengal Tiger	Study on Bengal Tiger habitat.	Smith	Alice
Cactus	Researching water retention in Cactus.	Brown	David
Golden Eagle	Tracking migration patterns of Eagle.	Johnson	Bob

EER Diagram:

Study
- 🔑 study_id INT
- ◇ study_title VARCHAR(45)
- ◇ study_desc VARCHAR(45)
- ◇ start_date DATE
- ◇ end_date DATE
- 🔴 species_id INT

Indexes

Species
- 🔑 species_id INT
- ◇ species_name VARCHAR(45)
- ◇ height DECIMAL(10,2)
- ◇ rescue_date DATE
- ◇ release_date DATE

Indexes

Species_habitat
- 🔑 species_id INT
- 🔑 habitat_id INT

Indexes

Habitat
- 🔑 habitat_id INT
- ◇ avg_temp DECIMAL(10,2)
- ◇ elevation INT
- 🔴 habitat_type_id INT
- ◇ soil_type_id INT

Indexes

Habitat_type
- 🔑 habitat_type_id INT
- ◇ habitat_name VARCHAR(45)
- ◇ habitat_desc VARCHAR(45)

Indexes

Soil_type
- 🔑 soil_type_id INT
- ◇ soil_name VARCHAR(45)
- ◇ soil_desc VARCHAR(45)

Indexes

Researcher
- 🔑 researcher_id INT
- ◇ first_name VARCHAR(45)
- ◇ last_name VARCHAR(45)
- ◇ date_of_birth DATE
- ◇ study_id INT
- ◇ supervisor_id INT

Indexes

Plant
- 🔑 species_id INT
- ◇ plant_group VARCHAR(45)
- ◇ upright_yn BIT(1)

Indexes

Animal
- 🔑 species_id INT
- ◇ animal_group VARCHAR(45)
- ◇ weight DECIMAL(10,2)
- 🔴 enclosure_number INT

Indexes

Enclosure
- 🔑 enclosure_number INT
- ◇ enclosure_area DECIMAL(10,2)
- ◇ aquatic_yn BIT(1)
- ◇ enclosure_desc VARCHAR(45)

Indexes