Animal Shelter Database Management System

Project Scope: The objective of this project is to design and implement a user-friendly interface for the Animal Shelter Management System Database. This implementation encompasses all phases of the database development life cycle, ensuring the database is functional, efficient, and meets user requirements.

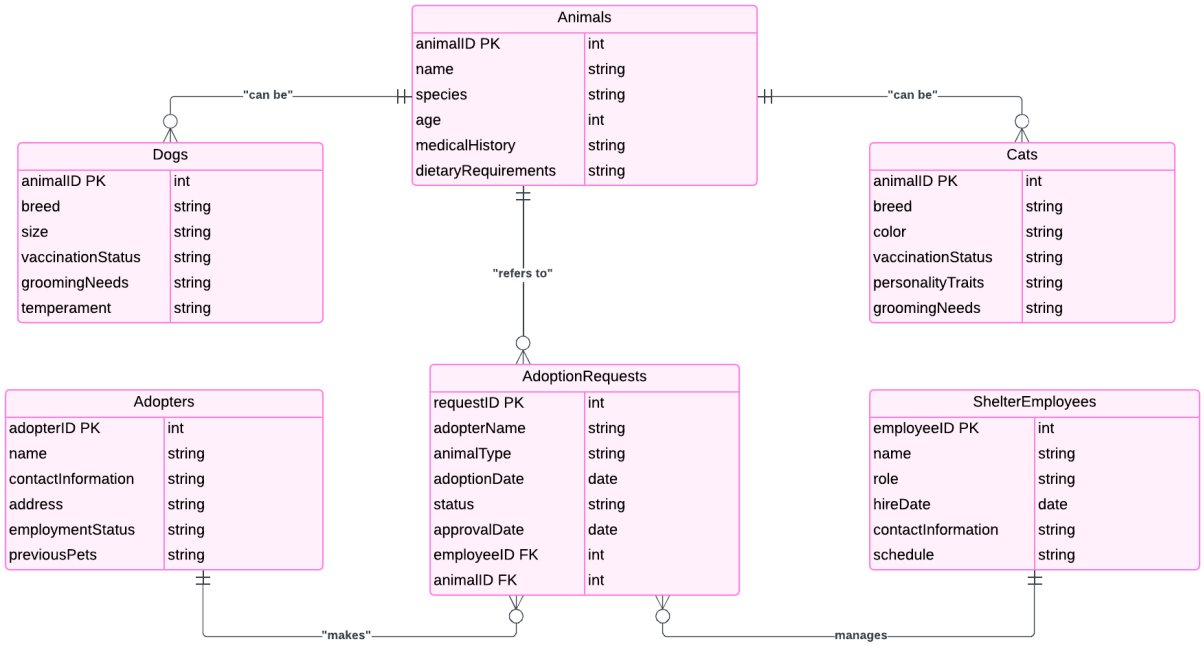
Database Development Life Cycle Phases

1. Requirements Gathering

- **Functional Requirements:**
    - Store detailed information about animals, adopters, employees, and adoption requests.
    - Support CRUD (Create, Read, Update, Delete) operations for all database entities.
    - Enable secure user authentication for adopters and shelter staff.
    - Provide real-time access to adoption request statuses and animal medical history.
- **Non-functional Requirements:**
    - The system should be scalable to support additional animal species.
    - Ensure high availability and data integrity.
    - Provide a response time of under 2 seconds for database queries.
    - Employ robust security measures to protect sensitive user and animal data.

2. Design

- **Entity-Relationship Diagram (ERD):** The ERD represents the relationships between key entities such as Animals, Adopters, Adoption Requests, Employees, Dogs, and Cats. Specific relationships include:
    - One-to-One: Animals to Dogs/Cats.
    - One-to-Many: Adopters to Adoption Requests, Employees to Adoption Requests.



- **Relational Schema:**
    - **Admin login:** username, password, id.
    - **Adopter login:** adopterID, username,password.
    - **Animals:** animalID, name, species, age, medicalHistory, dietaryRequirements, adoptionStatus.
    - **Dogs:** animalID, breed, size, vaccinationStatus, groomingNeeds, temperament.
    - **Cats:** animalID, breed, color, vaccinationStatus, personalityTraits, groomingNeeds.
    - **Adopters:** adopterID, adopterName, contactInformation, address, employmentStatus, previousPets.
    - **AdoptionRequests:** requestID, adopterID, employeeID, animalID, adopterName, animalType, adoptionDate, status, approvalDate.
    - **ShelterEmployees:** employeeID, name, role, hireDate, contactInformation, schedule

- **Relational Tables**

1. Admin login:

1 adminlogin

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
username	varchar(50)		No					
password	varchar(255)		No					
id	int(11)		No		auto_increment			

2. Adopter login:

2 adopterlogin

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
adopterID	int(11)		No		auto_increment	-> adopters.adopterID ON UPDATE RESTRICT ON DELETE RESTRICT		
username	varchar(50)		No					
password	varchar(255)		No					

3. **Adopters Table**
    - **Primary Key:** adopterID
    - **Attributes:** name, contactInformation, address, employmentStatus, previousPets

3 adopters

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
adopterID	int(11)		No		auto_increment			
adopterName	varchar(50)		No					
contactInformation	varchar(100)		Yes	NULL				
address	text		Yes	NULL				
employmentStatus	varchar(20)		Yes	NULL				
previousPets	varchar(100)		Yes	NULL				

4. **AdoptionRequests Table**
    - **Primary Key:** requestID
    - **Foreign Keys:** adopterID (Adopters), employeeID (ShelterEmployees), animalID (Animals)
    - **Attributes:** adopterName, animalType, adoptionDate, status, approvalDate

4 adoptionrequests

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
requestID	int(11)		No		auto_increment			
adopterID	int(11)		Yes	NULL		-> adopters.adopterID ON UPDATE RESTRICT ON DELETE RESTRICT		
employeeID	int(11)		Yes	NULL		-> shelteremployees.employeeID ON UPDATE RESTRICT ON DELETE RESTRICT		
animalID	int(11)		Yes	NULL		-> animals.animalID ON UPDATE RESTRICT ON DELETE RESTRICT		
adopterName	varchar(50)		Yes	NULL				
animalType	varchar(20)		Yes	NULL				
adoptionDate	date		Yes	NULL				
status	varchar(20)		Yes	NULL				
approvalDate	date		Yes	NULL				

5. **Animals Table**
    - **Primary Key:** animalID
    - **Attributes:** name, species, age, medicalHistory, dietaryRequirements

5 animals

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
animalID	int(11)		No		auto_increment			
name	varchar(50)		No					
animalType	varchar(20)		No					
age	int(11)		Yes	NULL				
medicalHistory	text		Yes	NULL				
dietaryRequirements	text		Yes	NULL				
adoptionStatus	varchar(20)		Yes	Not Adopted				

6. **Cats Table**
    - **Primary Key:** animalID (foreign key to Animals)
    - **Attributes:** breed, color, vaccinationStatus, personalityTraits, groomingNeeds

6 cats

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
animalID	int(11)		No			-> animals.animalID ON UPDATE RESTRICT ON DELETE RESTRICT		
breed	varchar(30)		No					
color	varchar(20)		Yes	NULL				
vaccinationStatus	varchar(15)		Yes	NULL				
personalityTraits	varchar(50)		Yes	NULL				
groomingNeeds	varchar(50)		Yes	NULL				

7. **Dogs Table**
    - **Primary Key:** animalID (foreign key to Animals)
    - **Attributes:** breed, size, vaccinationStatus, groomingNeeds, temperament

7 dogs

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
animalID	int(11)		No			-> animals.animalID ON UPDATE RESTRICT ON DELETE RESTRICT		
breed	varchar(30)		No					
size	varchar(15)		Yes	NULL				
vaccinationStatus	varchar(15)		Yes	NULL				
groomingNeeds	varchar(50)		Yes	NULL				
temperament	varchar(50)		Yes	NULL				

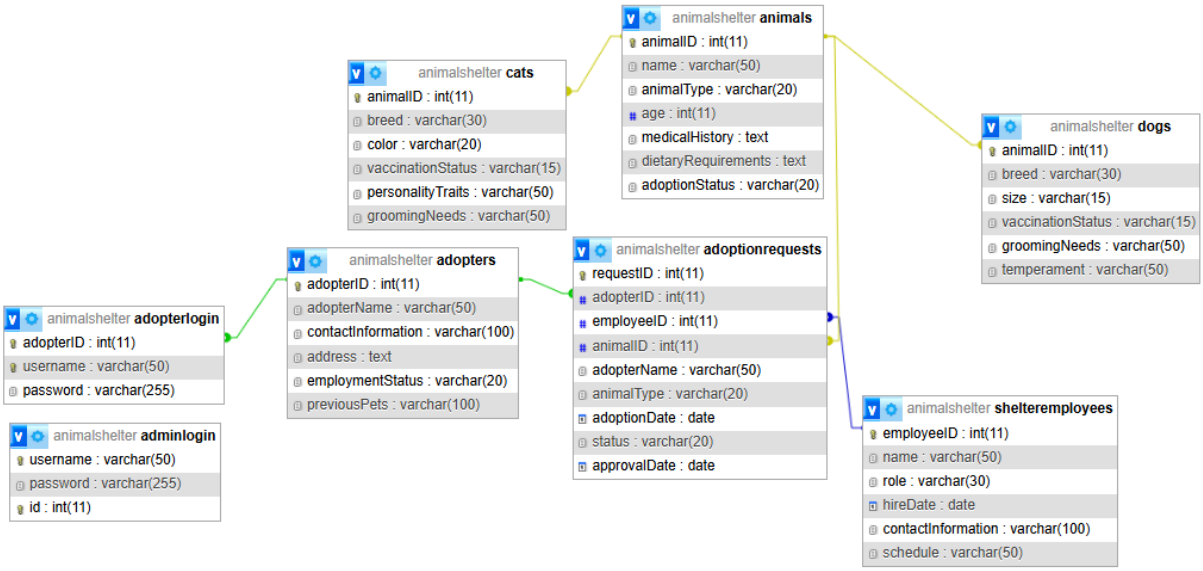
8. **ShelterEmployees Table**
    - **Primary Key:** employeeID
    - **Attributes:** name, role, hireDate, contactInformation, schedule

8 shelteremployees

Creation: Jan 18, 2025 at 03:46 PM

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
employeeID	int(11)		No					
name	varchar(50)		No					
role	varchar(30)		Yes	NULL				
hireDate	date		Yes	NULL				
contactInformation	varchar(100)		Yes	NULL				
schedule	varchar(50)		Yes	NULL				

Schema:



- **Normalization:** The database schema is normalized to the third normal form (3NF) to eliminate redundancy and maintain data consistency.

  For example, Dogs and Cats inherit their animalID from the Animals table, separating general attributes like name and species from specific attributes like breed and groomingNeeds.

3. Implementation

- **Database Tools:**
  - **DBMS:** MySQL.
  - **Development Environment:** XAMPP with phpMyAdmin for easy local database management.
- **Tables and their Structures**

1. **Animals**
   - **Purpose:** Stores details of all animals housed in the shelter.
   - **Fields:**
     - animalID: Unique identifier for each animal (Primary Key).
     - name: Name of the animal.
     - species: Type of animal (e.g., Dog, Cat).

- age: Age of the animal.
- medicalHistory: Medical records or issues of the animal.
- dietaryRequirements: Specific dietary needs of the animal.

2. **Dogs**
   - **Purpose:** Holds additional details about dogs in the shelter.
   - **Fields:**
     - animalID: Foreign Key referencing Animals(animalID).
     - breed: Breed of the dog.
     - size: Size of the dog (e.g., Small, Medium, Large).
     - vaccinationStatus: Vaccination status of the dog.
     - groomingNeeds: Grooming requirements.
     - temperament: Behavioral traits.
3. **Cats**
   - **Purpose:** Holds additional details about cats in the shelter.
   - **Fields:**
     - animalID: Foreign Key referencing Animals(animalID).
     - breed: Breed of the cat.
     - color: Color of the cat's coat.
     - vaccinationStatus: Vaccination status of the cat.
     - personalityTraits: Behavioral traits.
     - groomingNeeds: Grooming requirements.
4. **ShelterEmployees**
   - **Purpose:** Tracks employees managing shelter operations.
   - **Fields:**
     - employeeID: Unique identifier for employees (Primary Key).

- name: Name of the employee.
- role: Role or designation (e.g., Veterinarian, Coordinator).
- hireDate: Date of joining.
- contactInformation: Employee's contact details.
- schedule: Work schedule of the employee.

5. **Adopter**

- **Purpose:** Stores information about individuals applying to adopt animals.
- **Fields:**
  - adopterID: Unique identifier for adopters (Primary Key).
  - name: Name of the adopter.
  - contactInformation: Adopter's contact details.
  - address: Residential address.
  - employmentStatus: Employment status of the adopter.
  - previousPets: List of pets previously owned by the adopter.

6. **AdoptionRequests**

- **Purpose:** Records requests for animal adoption.
- **Fields:**
  - requestID: Unique identifier for requests (Primary Key).
  - adopterID: Foreign Key referencing Adopters(adopterID).
  - employeeID: Foreign Key referencing ShelterEmployees(employeeID).
  - animalID: Foreign Key referencing Animals(animalID).
  - adopterName: Name of the adopter making the request.
  - animalType: Species of the animal (e.g., Dog, Cat).

- adoptionDate: Date the request was made.
- status: Status of the request (e.g., Approved, Pending, Rejected).
- approvalDate: Date the request was approved/rejected.

- **Relationships and Constraints**

1. **Foreign Key Constraints:**
    - Dogs and Cats reference Animals to ensure all dogs and cats are valid shelter animals.
    - AdoptionRequests references Animals, Adopters, and ShelterEmployees to maintain data consistency.
2. **Primary Key Constraints:**
    - Each table has a primary key to uniquely identify records.
3. **Data Integrity:**
    - Foreign key constraints enforce relationships and prevent orphan records.
4. **Indexes:**
    - Primary keys and foreign keys are indexed for faster lookup and join operations.

- **Data Population**

Sample data was inserted into each table to simulate real-world scenarios.

1. **Animals Table:**
    - Populated with 20 animals of different species (dogs and cats).
    - Each animal has detailed records about age, medical history, and dietary requirements.

Example Table:

animalID	name	species	age	medicalHistory	dietaryRequirements
1	Max	Dog	3	Healthy	Normal Diet
6	Whiskers	Cat	3	Healthy	Normal Diet
18	Lily	Cat	3	Allergic to pollen	Vegetarian Diet

2. **Dogs Table:**
    - Populated with 10 records of dogs, detailing their breed, size, vaccination status, grooming needs, and temperament.

Example Table:

animalID	breed	size	vaccinationStatus	groomingNeeds	temperament
1	Labrador	Medium	Vaccinated	Weekly grooming	Friendly

3. **Cats Table:**
    - Populated with 10 records of cats, detailing their breed, color, vaccination status, personality traits, and grooming needs.

Example Table:

animalID	breed	color	vaccinationStatus	personalityTraits	groomingNeeds
6	Siamese	Gray	Vaccinated	Curious	Monthly grooming

4. **ShelterEmployees Table:**
    - Populated with 2 employees, specifying their roles, contact information, and schedules.

Example Table:

employeeID	name	role	hireDate	contactInformation	schedule
1	John Doe	Veterinarian	2020-05-10	johndoe@email.com	9 AM - 5 PM
2	Jane Smith	Adoption Coordinator	2021-08-15	janesmith@email.com	10 AM - 6 PM

5. **Adopters Table:**

   - Populated with 5 adopters, detailing their contact information, employment status, and history with pets.

Example Table:

adopterID	name	contactInformation	address	employmentStatus	previousPets
1	Alice Johnson	alice@email.com	123 Maple Street	Employed	Dog, Parrot
2	Bob Brown	bob@email.com	456 Oak Avenue	Employed	None
3	Clara White	clara@email.com	789 Pine Road	Self-Employed	Cat
4	David Green	david@email.com	321 Elm Street	Unemployed	Rabbit, Fish
5	Emily Black	emily@email.com	654 Cedar Lane	Employed	Dog, Cat

6. **AdoptionRequests Table:**

   - Records 5 adoption requests, with varying statuses (approved, pending, rejected).

Example Table:

requestID	adopterName	animalType	adoptionDate	status	approvalDate
1	Alice Johnson	Dog	2025-01-05	Approved	2025-01-06
5	Emily Black	Dog	2025-01-15	Pending	NULL

- **DATABASE creation:**

➢ **CREATE Database:**

```
MariaDB [(none)]> create database animalshelter;
Query OK, 1 row affected (0.165 sec)
```

➢ **USE database**

```
MariaDB [(none)]> use animalshelter;
Database changed
```

- **CREATE adminLogin table:**

```
MariaDB [animalshelter]> CREATE TABLE `adminlogin` (
    ->   `username` varchar(50) NOT NULL,
    ->   `password` varchar(255) NOT NULL,
    ->   `id` int(11) NOT NULL
    -> );
Query OK, 0 rows affected (0.071 sec)
```

- **DESCRIBE adminLogin table:**

```
MariaDB [animalshelter]> describe adminlogin;
+----------+--------------+------+-----+---------+-------+
| Field    | Type         | Null | Key | Default | Extra |
+----------+--------------+------+-----+---------+-------+
| username | varchar(50)  | NO   |     | NULL    |       |
| password | varchar(255) | NO   |     | NULL    |       |
| id       | int(11)      | NO   |     | NULL    |       |
+----------+--------------+------+-----+---------+-------+
3 rows in set (0.039 sec)
```

- **INSERT INTO adminLogin table:**

```
MariaDB [animalshelter]> INSERT INTO `adminlogin` (`username`, `password`, `id`) VALUES
    -> ('jeeha123', '$2y$10$YZpz1LIX2rLkB85rty4UbOnQ42k91fMAZ9Ti7WTgstkkRFlI6kJfG', 1),
    -> ('Yahya', '$2y$10$BmEw6nirRvMbnwe4xuUIleIYJxExNE7iaRgH3NJ1/9RlKo4OGBs0O', 2);
Query OK, 2 rows affected (0.012 sec)
Records: 2  Duplicates: 0  Warnings: 0
```

- **CREATE adopterLogin table:**

```
MariaDB [animalshelter]> CREATE TABLE `adopterlogin` (
    ->   `adopterID` int(11) NOT NULL,
    ->   `username` varchar(50) NOT NULL,
    ->   `password` varchar(255) NOT NULL
    -> );
Query OK, 0 rows affected (0.064 sec)
```

- **DESCRIBE adopterLogin table:**

```
MariaDB [animalshelter]> describe adopterlogin;
+-----------+--------------+------+-----+---------+-------+
| Field     | Type         | Null | Key | Default | Extra |
+-----------+--------------+------+-----+---------+-------+
| adopterID | int(11)      | NO   |     | NULL    |       |
| username  | varchar(50)  | NO   |     | NULL    |       |
| password  | varchar(255) | NO   |     | NULL    |       |
+-----------+--------------+------+-----+---------+-------+
3 rows in set (0.034 sec)
```

- **INSERT INTO adopterLogin table:**

```
MariaDB [animalshelter]> INSERT INTO `adopterlogin` (`adopterID`, `username`, `password`) VALUES
    -> (1, 'jeeha123', '$2y$10$FJylwIeB2iYpoFEsK4Eeau3T2hcaPL85Orki83XfuKYgsTS.RNc0m'),
    -> (2, 'saadimran', '$2y$10$k5C7k29cuwqfZuc.8WcYq.vy1UTY0R1UN9S0U7yqkzM.160Fn3CrW');
Query OK, 2 rows affected (0.013 sec)
Records: 2  Duplicates: 0  Warnings: 0
```

- **CREATE table Animals:**

```
MariaDB [animalshelter]> CREATE TABLE `animals` (
    ->   `animalID` int(11) NOT NULL,
    ->   `name` varchar(50) NOT NULL,
    ->   `animalType` varchar(20) NOT NULL,
    ->   `age` int(11) DEFAULT NULL,
    ->   `medicalHistory` text DEFAULT NULL,
    ->   `dietaryRequirements` text DEFAULT NULL,
    ->   `adoptionStatus` varchar(20) DEFAULT 'Not Adopted'
    -> );
Query OK, 0 rows affected (0.064 sec)
```

- **DESCRIBE Animal Table :**

```
MariaDB [animalshelter]> describe animals;
+---------------------+-------------+------+-----+-------------+-------+
| Field               | Type        | Null | Key | Default     | Extra |
+---------------------+-------------+------+-----+-------------+-------+
| animalID            | int(11)     | NO   |     | NULL        |       |
| name                | varchar(50) | NO   |     | NULL        |       |
| animalType          | varchar(20) | NO   |     | NULL        |       |
| age                 | int(11)     | YES  |     | NULL        |       |
| medicalHistory      | text        | YES  |     | NULL        |       |
| dietaryRequirements | text        | YES  |     | NULL        |       |
| adoptionStatus      | varchar(20) | YES  |     | Not Adopted |       |
+---------------------+-------------+------+-----+-------------+-------+
7 rows in set (0.029 sec)
```

- **INSERT into Animals Table :**

```
MariaDB [animalshelter]> INSERT INTO `animals` (`animalID`, `name`, `animalType`, `age`, `medicalHistory`, `dietaryRequirements`, `adoptionStatus`) VALUES
    -> (1, 'Max', 'Dog', 5, 'Healthy', 'Normal Diet', 'Adopted'),
    -> (2, 'Bella', 'Dog', 3, 'Vaccinated', 'High Protein Diet', 'Not Adopted'),
    -> (3, 'Charlie', 'Dog', 7, 'Hip Dysplasia', 'Low Fat Diet', 'Not Adopted'),
    -> (4, 'Luna', 'Dog', 2, 'Allergic to chicken', 'Grain-Free Diet', 'Not Adopted'),
    -> (5, 'Buddy', 'Dog', 6, 'Fractured leg healed', 'High Protein Diet', 'Not Adopted'),
    -> (6, 'Whiskers', 'Cat', 3, 'Healthy', 'Normal Diet', 'Not Adopted'),
    -> (7, 'Mittens', 'Cat', 4, 'Kidney issues', 'Low Sodium Diet', 'Not Adopted'),
    -> (8, 'Daisy', 'Cat', 2, 'Allergic to dust', 'Vegetarian Diet', 'Adopted'),
    -> (9, 'Shadow', 'Cat', 5, 'Dental issues', 'Soft Diet', 'Not Adopted'),
    -> (10, 'Simba', 'Cat', 6, 'Healthy', 'Normal Diet', 'Not Adopted'),
    -> (11, 'Rocky', 'Dog', 4, 'Recovered from flu', 'Normal Diet', 'Not Adopted'),
    -> (12, 'Milo', 'Cat', 1, 'Vaccinated', 'High Protein Diet', 'Not Adopted'),
    -> (13, 'Oscar', 'Cat', 2, 'Sensitive to cold', 'Special Cat Food', 'Not Adopted'),
    -> (14, 'Bubbles', 'Dog', 8, 'Arthritis', 'Special Senior Diet', 'Not Adopted'),
    -> (15, 'Coco', 'Dog', 9, 'Healthy', 'Normal Diet', 'Not Adopted'),
    -> (16, 'Goldie', 'Cat', 5, 'Eye infection healed', 'Low Carb Diet', 'Not Adopted'),
    -> (17, 'Buddy', 'Dog', 4, 'Healthy', 'Regular Diet', 'Not Adopted'),
    -> (18, 'Lily', 'Cat', 3, 'Allergic to pollen', 'Vegetarian Diet', 'Not Adopted'),
    -> (19, 'Duke', 'Dog', 10, 'Recovered from injury', 'High Protein Diet', 'Not Adopted'),
    -> (20, 'Jasper', 'Cat', 7, 'Obesity', 'Low Calorie Diet', 'Not Adopted'),
    -> (21, 'Kiddo', 'Cat', 2, 'Good Health', 'Normal Diet', 'Not Adopted'),
    -> (22, 'mitto', 'Dog', 2, 'Good Health', 'Normal Diet', 'Not Adopted');
Query OK, 22 rows affected (0.042 sec)
Records: 22  Duplicates: 0  Warnings: 0
```

- **SELECT from Animals Table :**

```
MariaDB [animalshelter]> select* from animals;
+----------+----------+------------+------+----------------------+---------------------+----------------+
| animalID | name     | animalType | age  | medicalHistory       | dietaryRequirements | adoptionStatus |
+----------+----------+------------+------+----------------------+---------------------+----------------+
|        1 | Max      | Dog        |    5 | Healthy              | Normal Diet         | Adopted        |
|        2 | Bella    | Dog        |    3 | Vaccinated           | High Protein Diet   | Not Adopted    |
|        3 | Charlie  | Dog        |    7 | Hip Dysplasia        | Low Fat Diet        | Not Adopted    |
|        4 | Luna     | Dog        |    2 | Allergic to chicken  | Grain-Free Diet     | Not Adopted    |
|        5 | Buddy    | Dog        |    6 | Fractured leg healed | High Protein Diet   | Not Adopted    |
|        6 | Whiskers | Cat        |    3 | Healthy              | Normal Diet         | Not Adopted    |
|        7 | Mittens  | Cat        |    4 | Kidney issues        | Low Sodium Diet     | Not Adopted    |
|        8 | Daisy    | Cat        |    2 | Allergic to dust     | Vegetarian Diet     | Adopted        |
|        9 | Shadow   | Cat        |    5 | Dental issues        | Soft Diet           | Not Adopted    |
|       10 | Simba    | Cat        |    6 | Healthy              | Normal Diet         | Not Adopted    |
|       11 | Rocky    | Dog        |    4 | Recovered from flu   | Normal Diet         | Not Adopted    |
|       12 | Milo     | Cat        |    1 | Vaccinated           | High Protein Diet   | Not Adopted    |
|       13 | Oscar    | Cat        |    2 | Sensitive to cold    | Special Cat Food    | Not Adopted    |
|       14 | Bubbles  | Dog        |    8 | Arthritis            | Special Senior Diet | Not Adopted    |
|       15 | Coco     | Dog        |    9 | Healthy              | Normal Diet         | Not Adopted    |
|       16 | Goldie   | Cat        |    5 | Eye infection healed | Low Carb Diet       | Not Adopted    |
|       17 | Buddy    | Dog        |    4 | Healthy              | Regular Diet        | Not Adopted    |
|       18 | Lily     | Cat        |    3 | Allergic to pollen   | Vegetarian Diet     | Not Adopted    |
|       19 | Duke     | Dog        |   10 | Recovered from injury | High Protein Diet  | Not Adopted    |
|       20 | Jasper   | Cat        |    7 | Obesity              | Low Calorie Diet    | Not Adopted    |
|       21 | Kiddo    | Cat        |    2 | Good Health          | Normal Diet         | Not Adopted    |
|       22 | mitto    | Dog        |    2 | Good Health          | Normal Diet         | Not Adopted    |
+----------+----------+------------+------+----------------------+---------------------+----------------+
22 rows in set (0.003 sec)
```

- **CREATE Dogs Table:**

```
MariaDB [animalshelter]> CREATE TABLE `dogs` (
    ->   `animalID` int(11) NOT NULL,
    ->   `breed` varchar(30) NOT NULL,
    ->   `size` varchar(15) DEFAULT NULL,
    ->   `vaccinationStatus` varchar(15) DEFAULT NULL,
    ->   `groomingNeeds` varchar(50) DEFAULT NULL,
    ->   `temperament` varchar(50) DEFAULT NULL
    -> );
Query OK, 0 rows affected (0.066 sec)
```

- **DESCRIBE Dogs Table:**

```
MariaDB [animalshelter]> describe dogs;
+-------------------+-------------+------+-----+---------+-------+
| Field             | Type        | Null | Key | Default | Extra |
+-------------------+-------------+------+-----+---------+-------+
| animalID          | int(11)     | NO   |     | NULL    |       |
| breed             | varchar(30) | NO   |     | NULL    |       |
| size              | varchar(15) | YES  |     | NULL    |       |
| vaccinationStatus | varchar(15) | YES  |     | NULL    |       |
| groomingNeeds     | varchar(50) | YES  |     | NULL    |       |
| temperament       | varchar(50) | YES  |     | NULL    |       |
+-------------------+-------------+------+-----+---------+-------+
6 rows in set (0.021 sec)
```

- **INSERT into Dogs Table:**

```
MariaDB [animalshelter]> INSERT INTO `dogs` (`animalID`, `breed`, `size`, `vaccinationStatus`, `groomingNeeds`, `temperament`) VALUES
    -> (1, 'Labrador', 'Medium', 'Vaccinated', 'Weekly grooming', 'Friendly'),
    -> (2, 'Beagle', 'Medium', 'Vaccinated', 'Weekly grooming', 'Energetic'),
    -> (3, 'Golden Retriever', 'Large', 'Vaccinated', 'Bi-weekly grooming', 'Gentle'),
    -> (4, 'Bulldog', 'Medium', 'Vaccinated', 'Occasional grooming', 'Calm'),
    -> (5, 'German Shepherd', 'Large', 'Vaccinated', 'Bi-weekly grooming', 'Loyal'),
    -> (11, 'Poodle', 'Small', 'Vaccinated', 'Frequent grooming', 'Intelligent'),
    -> (14, 'Rottweiler', 'Large', 'Vaccinated', 'Bi-weekly grooming', 'Confident'),
    -> (15, 'Chihuahua', 'Small', 'Vaccinated', 'Occasional grooming', 'Alert'),
    -> (17, 'Boxer', 'Large', 'Vaccinated', 'Weekly grooming', 'Playful'),
    -> (19, 'Siberian Husky', 'Large', 'Vaccinated', 'Weekly grooming', 'Active'),
    -> (22, 'Libra', 'small', 'Vaccinated', 'Monthly', 'Gentle');
Query OK, 11 rows affected (0.045 sec)
Records: 11  Duplicates: 0  Warnings: 0
```

- **SELECT from Dogs Table :**

```
MariaDB [animalshelter]> select* from dogs;
+----------+-----------------+--------+-------------------+--------------------+-------------+
| animalID | breed           | size   | vaccinationStatus | groomingNeeds      | temperament |
+----------+-----------------+--------+-------------------+--------------------+-------------+
|        1 | Labrador        | Medium | Vaccinated        | Weekly grooming    | Friendly    |
|        2 | Beagle          | Medium | Vaccinated        | Weekly grooming    | Energetic   |
|        3 | Golden Retriever| Large  | Vaccinated        | Bi-weekly grooming | Gentle      |
|        4 | Bulldog         | Medium | Vaccinated        | Occasional grooming| Calm        |
|        5 | German Shepherd | Large  | Vaccinated        | Bi-weekly grooming | Loyal       |
|       11 | Poodle          | Small  | Vaccinated        | Frequent grooming  | Intelligent |
|       14 | Rottweiler      | Large  | Vaccinated        | Bi-weekly grooming | Confident   |
|       15 | Chihuahua       | Small  | Vaccinated        | Occasional grooming| Alert       |
|       17 | Boxer           | Large  | Vaccinated        | Weekly grooming    | Playful     |
|       19 | Siberian Husky  | Large  | Vaccinated        | Weekly grooming    | Active      |
|       22 | Libra           | small  | Vaccinated        | Monthly            | Gentle      |
+----------+-----------------+--------+-------------------+--------------------+-------------+
11 rows in set (0.001 sec)
```

- **CREATE Cats Table:**

```
MariaDB [animalshelter]> CREATE TABLE `cats` (
    ->   `animalID` int(11) NOT NULL,
    ->   `breed` varchar(30) NOT NULL,
    ->   `color` varchar(20) DEFAULT NULL,
    ->   `vaccinationStatus` varchar(15) DEFAULT NULL,
    ->   `personalityTraits` varchar(50) DEFAULT NULL,
    ->   `groomingNeeds` varchar(50) DEFAULT NULL
    -> );
Query OK, 0 rows affected (0.063 sec)
```

- **DESCRIBE Cats Table:**

```
MariaDB [animalshelter]> describe cats;
+-------------------+-------------+------+-----+---------+-------+
| Field             | Type        | Null | Key | Default | Extra |
+-------------------+-------------+------+-----+---------+-------+
| animalID          | int(11)     | NO   |     | NULL    |       |
| breed             | varchar(30) | NO   |     | NULL    |       |
| color             | varchar(20) | YES  |     | NULL    |       |
| vaccinationStatus | varchar(15) | YES  |     | NULL    |       |
| personalityTraits | varchar(50) | YES  |     | NULL    |       |
| groomingNeeds     | varchar(50) | YES  |     | NULL    |       |
+-------------------+-------------+------+-----+---------+-------+
6 rows in set (0.031 sec)
```

- **INSERT Into Cats Table:**

```
MariaDB [animalshelter]> INSERT INTO `cats` (`animalID`, `breed`, `color`, `vaccinationStatus`, `personalityTraits`, `groomingNeeds`) VALUES
    -> (6, 'Siamese', 'Gray', 'Vaccinated', 'Curious', 'Monthly grooming'),
    -> (7, 'Persian', 'White', 'Vaccinated', 'Affectionate', 'Daily grooming'),
    -> (8, 'Maine Coon', 'Brown Tabby', 'Vaccinated', 'Gentle', 'Weekly grooming'),
    -> (9, 'Bengal', 'Spotted Brown', 'Vaccinated', 'Playful', 'Occasional grooming'),
    -> (10, 'Russian Blue', 'Blue-Gray', 'Vaccinated', 'Shy', 'Monthly grooming'),
    -> (12, 'Ragdoll', 'Cream and Gray', 'Vaccinated', 'Laid-back', 'Weekly grooming'),
    -> (13, 'Scottish Fold', 'Orange Tabby', 'Vaccinated', 'Curious', 'Monthly grooming'),
    -> (16, 'Abyssinian', 'Ruddy Brown', 'Vaccinated', 'Energetic', 'Occasional grooming'),
    -> (18, 'Birman', 'Seal Point', 'Vaccinated', 'Loving', 'Weekly grooming'),
    -> (20, 'Sphynx', 'Pink', 'Vaccinated', 'Social', 'Regular skin cleaning'),
    -> (21, 'Persian', 'White', 'Vaccinated', 'Gentle', 'Monthly');
Query OK, 11 rows affected (0.038 sec)
Records: 11  Duplicates: 0  Warnings: 0
```

- **SELECT from Cats Table:**

```
MariaDB [animalshelter]> select* from cats;
+----------+--------------+----------------+-------------------+-------------------+-----------------------+
| animalID | breed        | color          | vaccinationStatus | personalityTraits | groomingNeeds         |
+----------+--------------+----------------+-------------------+-------------------+-----------------------+
|        6 | Siamese      | Gray           | Vaccinated        | Curious           | Monthly grooming      |
|        7 | Persian      | White          | Vaccinated        | Affectionate      | Daily grooming        |
|        8 | Maine Coon   | Brown Tabby    | Vaccinated        | Gentle            | Weekly grooming       |
|        9 | Bengal       | Spotted Brown  | Vaccinated        | Playful           | Occasional grooming   |
|       10 | Russian Blue | Blue-Gray      | Vaccinated        | Shy               | Monthly grooming      |
|       12 | Ragdoll      | Cream and Gray | Vaccinated        | Laid-back         | Weekly grooming       |
|       13 | Scottish Fold | Orange Tabby  | Vaccinated        | Curious           | Monthly grooming      |
|       16 | Abyssinian   | Ruddy Brown    | Vaccinated        | Energetic         | Occasional grooming   |
|       18 | Birman       | Seal Point     | Vaccinated        | Loving            | Weekly grooming       |
|       20 | Sphynx       | Pink           | Vaccinated        | Social            | Regular skin cleaning |
|       21 | Persian      | White          | Vaccinated        | Gentle            | Monthly               |
+----------+--------------+----------------+-------------------+-------------------+-----------------------+
11 rows in set (0.000 sec)
```

- **CREATE Shelter Employee Table:**

```
MariaDB [animalshelter]> CREATE TABLE `shelteremployees` (
    ->   `employeeID` int(11) NOT NULL,
    ->   `name` varchar(50) NOT NULL,
    ->   `role` varchar(30) DEFAULT NULL,
    ->   `hireDate` date DEFAULT NULL,
    ->   `contactInformation` varchar(100) DEFAULT NULL,
    ->   `schedule` varchar(50) DEFAULT NULL
    -> );
Query OK, 0 rows affected (0.080 sec)
```

- **DESCRIBE Shelter Employees Table:**

```
MariaDB [animalshelter]> describe shelteremployees;
+--------------------+--------------+------+-----+---------+-------+
| Field              | Type         | Null | Key | Default | Extra |
+--------------------+--------------+------+-----+---------+-------+
| employeeID         | int(11)      | NO   |     | NULL    |       |
| name               | varchar(50)  | NO   |     | NULL    |       |
| role               | varchar(30)  | YES  |     | NULL    |       |
| hireDate           | date         | YES  |     | NULL    |       |
| contactInformation | varchar(100) | YES  |     | NULL    |       |
| schedule           | varchar(50)  | YES  |     | NULL    |       |
+--------------------+--------------+------+-----+---------+-------+
6 rows in set (0.195 sec)
```

- **INSERT into Shelter Employees Table:**

```
MariaDB [animalshelter]> INSERT INTO `shelteremployees` (`employeeID`, `name`, `role`, `hireDate`, `contactInformation`, `schedule`) VALUES
    -> (1, 'John Doe', 'Veterinarian', '2020-05-10', 'johndoe@email.com', '9 AM - 5 PM'),
    -> (2, 'Jane Smith', 'Adoption Coordinator', '2021-08-15', 'janesmith@email.com', '10 AM - 6 PM');
Query OK, 2 rows affected (0.013 sec)
Records: 2  Duplicates: 0  Warnings: 0
```

- **SELECT from Shelter Employees Table:**

```
MariaDB [animalshelter]> select* from shelteremployees;
+------------+------------+---------------------+------------+---------------------+--------------+
| employeeID | name       | role                | hireDate   | contactInformation  | schedule     |
+------------+------------+---------------------+------------+---------------------+--------------+
|          1 | John Doe   | Veterinarian        | 2020-05-10 | johndoe@email.com   | 9 AM - 5 PM  |
|          2 | Jane Smith | Adoption Coordinator | 2021-08-15 | janesmith@email.com | 10 AM - 6 PM |
+------------+------------+---------------------+------------+---------------------+--------------+
2 rows in set (0.000 sec)
```

- **CREATE Adobters Table:**

```
MariaDB [animalshelter]> CREATE TABLE `adopters` (
    ->   `adopterID` int(11) NOT NULL,
    ->   `adopterName` varchar(50) NOT NULL,
    ->   `contactInformation` varchar(100) DEFAULT NULL,
    ->   `address` text DEFAULT NULL,
    ->   `employmentStatus` varchar(20) DEFAULT NULL,
    ->   `previousPets` varchar(100) DEFAULT NULL
    -> );
Query OK, 0 rows affected (0.068 sec)
```

- **DESCRIBE Adopters Table:**

```
MariaDB [animalshelter]> describe adopters;
+--------------------+--------------+------+-----+---------+-------+
| Field              | Type         | Null | Key | Default | Extra |
+--------------------+--------------+------+-----+---------+-------+
| adopterID          | int(11)      | NO   |     | NULL    |       |
| adopterName        | varchar(50)  | NO   |     | NULL    |       |
| contactInformation | varchar(100) | YES  |     | NULL    |       |
| address            | text         | YES  |     | NULL    |       |
| employmentStatus   | varchar(20)  | YES  |     | NULL    |       |
| previousPets       | varchar(100) | YES  |     | NULL    |       |
+--------------------+--------------+------+-----+---------+-------+
6 rows in set (0.030 sec)
```

- **INSERT into Adopters Table:**

```
MariaDB [animalshelter]> INSERT INTO `adopters` (`adopterID`, `adopterName`, `contactInformation`, `address`, `employmentStatus`, `previousPets`) VALUES
    -> (1, 'Wajeeha Naeem', 'wajeeha@example.com', 'Islamabad , Pakistan', 'Employed', 'Null'),
    -> (2, 'Saad Imran Toori', '03216226321', 'Sihala, ISL, PAK', 'Self - Employeed', 'cat');
Query OK, 2 rows affected (0.014 sec)
Records: 2  Duplicates: 0  Warnings: 0
```

- **SELECT from Adopters:**

```
MariaDB [animalshelter]> select* from adopters;
+-----------+-----------------+-------------------+---------------------+------------------+--------------+
| adopterID | adopterName     | contactInformation | address             | employmentStatus | previousPets |
+-----------+-----------------+-------------------+---------------------+------------------+--------------+
|         1 | Wajeeha Naeem   | wajeeha@example.com | Islamabad , Pakistan | Employed         | Null         |
|         2 | Saad Imran Toori | 03216226321       | Sihala, ISL, PAK    | Self - Employeed | cat          |
+-----------+-----------------+-------------------+---------------------+------------------+--------------+
2 rows in set (0.002 sec)
```

- **CREATE Adoption Requests Table:**

```
MariaDB [animalshelter]> CREATE TABLE `adoptionrequests` (
    ->   `requestID` int(11) NOT NULL,
    ->   `adopterID` int(11) DEFAULT NULL,
    ->   `employeeID` int(11) DEFAULT NULL,
    ->   `animalID` int(11) DEFAULT NULL,
    ->   `adopterName` varchar(50) DEFAULT NULL,
    ->   `animalType` varchar(20) DEFAULT NULL,
    ->   `adoptionDate` date DEFAULT NULL,
    ->   `status` varchar(20) DEFAULT NULL,
    ->   `approvalDate` date DEFAULT NULL
    -> );
Query OK, 0 rows affected (0.064 sec)
```

- **DESCRIBE Adoption Request Table :**

```
MariaDB [animalshelter]> describe adoptionrequests;
+--------------+-------------+------+-----+---------+-------+
| Field        | Type        | Null | Key | Default | Extra |
+--------------+-------------+------+-----+---------+-------+
| requestID    | int(11)     | NO   |     | NULL    |       |
| adopterID    | int(11)     | YES  |     | NULL    |       |
| employeeID   | int(11)     | YES  |     | NULL    |       |
| animalID     | int(11)     | YES  |     | NULL    |       |
| adopterName  | varchar(50) | YES  |     | NULL    |       |
| animalType   | varchar(20) | YES  |     | NULL    |       |
| adoptionDate | date        | YES  |     | NULL    |       |
| status       | varchar(20) | YES  |     | NULL    |       |
| approvalDate | date        | YES  |     | NULL    |       |
+--------------+-------------+------+-----+---------+-------+
9 rows in set (0.046 sec)
```

- **INSERT into Adoption Request Table:**

```
MariaDB [animalshelter]> INSERT INTO `adoptionrequests` (`requestID`, `adopterID`, `employeeID`, `animalID`, `adopterName`, `animalType`, `adoptionDate`, `status`, `app
rovalDate`) VALUES
    -> (1, 1, 1, 1, 'Wajeeha Naeem', 'Dog', '2025-01-24', 'Approved', '2025-01-17'),
    -> (2, 2, 1, 8, 'Saad Imran Toori', 'Cat', '2025-01-24', 'Approved', '2025-01-17');
Query OK, 2 rows affected (0.014 sec)
Records: 2  Duplicates: 0  Warnings: 0
```

- **SELECT from Adoption requests:**

```
MariaDB [animalshelter]> select* from adoptionrequests;
+-----------+----------+------------+---------+-----------------+------------+--------------+----------+--------------+
| requestID | adopterID | employeeID | animalID | adopterName     | animalType | adoptionDate | status   | approvalDate |
+-----------+----------+------------+---------+-----------------+------------+--------------+----------+--------------+
|         1 |         1 |          1 |       1 | Wajeeha Naeem   | Dog        | 2025-01-24   | Approved | 2025-01-17   |
|         2 |         2 |          1 |       8 | Saad Imran Toori | Cat        | 2025-01-24   | Approved | 2025-01-17   |
+-----------+----------+------------+---------+-----------------+------------+--------------+----------+--------------+
2 rows in set (0.000 sec)
```

4. Testing

- **Functional Testing:**

SQL-Queries

1. Select all animals in the shelter:

SELECT * FROM Animals;

Query Result:

animalID	name	animalType	age	medicalHistory	dietaryRequirements	adoptionStatus
1	Max	Dog	5	Healthy	Normal Diet	Adopted
2	Bella	Dog	3	Vaccinated	High Protein Diet	Not Adopted
3	Charlie	Dog	7	Hip Dysplasia	Low Fat Diet	Not Adopted
4	Luna	Dog	2	Allergic to chicken	Grain-Free Diet	Not Adopted
5	Buddy	Dog	6	Fractured leg healed	High Protein Diet	Not Adopted
6	Whiskers	Cat	3	Healthy	Normal Diet	Not Adopted
7	Mittens	Cat	4	Kidney issues	Low Sodium Diet	Not Adopted
8	Daisy	Cat	2	Allergic to dust	Vegetarian Diet	Adopted
9	Shadow	Cat	5	Dental issues	Soft Diet	Not Adopted
10	Simba	Cat	6	Healthy	Normal Diet	Not Adopted
11	Rocky	Dog	4	Recovered from flu	Normal Diet	Not Adopted
12	Milo	Cat	1	Vaccinated	High Protein Diet	Not Adopted
13	Oscar	Cat	2	Sensitive to cold	Special Cat Food	Not Adopted
14	Bubbles	Dog	8	Arthritis	Special Senior Diet	Not Adopted
15	Coco	Dog	9	Healthy	Normal Diet	Not Adopted
16	Goldie	Cat	5	Eye infection healed	Low Carb Diet	Not Adopted
17	Buddy	Dog	4	Healthy	Regular Diet	Not Adopted
18	Lily	Cat	3	Allergic to pollen	Vegetarian Diet	Not Adopted
19	Duke	Dog	10	Recovered from injury	High Protein Diet	Not Adopted
20	Jasper	Cat	7	Obesity	Low Calorie Diet	Not Adopted
21	Kiddo	Cat	2	Good Health	Normal Diet	Not Adopted
22	mitto	Dog	2	Good Health	Normal Diet	Not Adopted

2. Select all dogs from the shelter:

SELECT * FROM Dogs;

Query Result:

animalID	breed	size	vaccination Status	groomingNeeds	temperament
1	Labrador	Medium	Vaccinated	Weekly grooming	Friendly
2	Beagle	Medium	Vaccinated	Weekly grooming	Energetic
3	Golden Retriever	Large	Vaccinated	Bi-weekly grooming	Gentle
4	Bulldog	Medium	Vaccinated	Occasional grooming	Calm
5	German Shepherd	Large	Vaccinated	Bi-weekly grooming	Loyal
11	Poodle	Small	Vaccinated	Frequent grooming	Intelligent
14	Rottweiler	Large	Vaccinated	Bi-weekly grooming	Confident
15	Chihuahua	Small	Vaccinated	Occasional grooming	Alert
17	Boxer	Large	Vaccinated	Weekly grooming	Playful
19	Siberian Husky	Large	Vaccinated	Weekly grooming	Active
22	Libra	small	Vaccinated	Monthly	Gentle

3. Select adopters who have previously owned pets:

SELECT * FROM Adopters WHERE previousPets IS NOT NULL;

Query Result:

adopterID	adopterName	contactInformation	address	employmentStatus	previousPets
1	Wajeeha Naeem	wajeeha@example.com	Islamabad , Pakistan	Employed	Null
2	Saad Imran Toori	03216226321	Sihala, ISL, PAK	Self - Employeed	cat
0	jiya	03471667177	street 3	self employeed	cats

4. Select all animals older than 3 years:

SELECT * FROM Animals WHERE age > 3;

Query Result:

animalID	name	animalType	age	medicalHistory	dietaryRequirements	adoptionStatus
1	Max	Dog	5	Healthy	Normal Diet	Adopted
3	Charlie	Dog	7	Hip Dysplasia	Low Fat Diet	Not Adopted
5	Buddy	Dog	6	Fractured leg healed	High Protein Diet	Not Adopted
7	Mittens	Cat	4	Kidney issues	Low Sodium Diet	Not Adopted
9	Shadow	Cat	5	Dental issues	Soft Diet	Not Adopted
10	Simba	Cat	6	Healthy	Normal Diet	Not Adopted
11	Rocky	Dog	4	Recovered from flu	Normal Diet	Not Adopted
14	Bubbles	Dog	8	Arthritis	Special Senior Diet	Not Adopted
15	Coco	Dog	9	Healthy	Normal Diet	Not Adopted
16	Goldie	Cat	5	Eye infection healed	Low Carb Diet	Not Adopted
17	Buddy	Dog	4	Healthy	Regular Diet	Not Adopted
19	Duke	Dog	10	Recovered from injury	High Protein Diet	Not Adopted
20	Jasper	Cat	7	Obesity	Low Calorie Diet	Not Adopted

5. Select adoption requests that are still pending:

SELECT * FROM AdoptionRequests WHERE status = 'Pending';

Query Result:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
0	0		4	jiya	dogs		Pending	

Projection (Selecting specific columns)

6. Select only the names and species of all animals:

SELECT name, animalType FROM Animals;

Query Result:

name	animalType
Max	Dog
Bella	Dog
Charlie	Dog
Luna	Dog
Buddy	Dog
Whiskers	Cat
Mittens	Cat
Daisy	Cat
Shadow	Cat
Simba	Cat
Rocky	Dog
Milo	Cat
Oscar	Cat
Bubbles	Dog
Coco	Dog
Goldie	Cat
Buddy	Dog
Lily	Cat
Duke	Dog
Jasper	Cat
Kiddo	Cat
milto	Dog

7. Select adopter names and contact information:

SELECT adoptername, contactInformation FROM Adopters;

Query Result:

adoptername	contactInformation
Wajeeha Naeem	wajeeha@example.com
Saad Imran Toori	03216226321
jiya	03471667177

8. Select employee names and their roles:

SELECT name, role FROM ShelterEmployees;

Query Result:

name	role
John Doe	Veterinarian
Jane Smith	Adoption Coordinator

9. Select the names and adoption dates of adoption requests:

SELECT adopterName, adoptionDate FROM AdoptionRequests;

Query Result:

adopterName	adoptionDate
Wajeeha Naeem	2025-01-24
Saad Imran Toori	2025-01-24

10. Select only the breed and size of dogs:

SELECT breed, size FROM Dogs;

breed	size
Labrador	Medium
Beagle	Medium
Golden Retriever	Large
Bulldog	Medium
German Shepherd	Large
Poodle	Small
Rottweiler	Large
Chihuahua	Small
Boxer	Large
Siberian Husky	Large
Libra	small

Joining (Combining data from multiple tables)

11. Join AdoptionRequests with Animals to get information on animals requested for adoption:

SELECT ar.requestID, a.name AS animalName, ar.adopterName, ar.adoptionDate

FROM AdoptionRequests ar

JOIN Animals a ON ar.animalID = a.animalID;

Query Result:

requestID	animalName	adopterName	adoptionDate
1	Max	Wajeeha Naeem	2025-01-24
2	Daisy	Saad Imran Toori	2025-01-24

12. Join Adopters with AdoptionRequests to get adopter details along with their requests:

SELECT ad.name AS adopterName, ar.animalType, ar.adoptionDate, ar.status

FROM Adopters ad

JOIN AdoptionRequests ar ON ad.adopterID = ar.adopterID;

Query Result:

adopterName	animalType	adoptionDate	status
Wajeeha Naeem	Dog	2025-01-24	Approved
Saad Imran Toori	Cat	2025-01-24	Approved

13. Join ShelterEmployees with AdoptionRequests to find which employee processed which request:

```
SELECT se.name AS employeeName, ar.adopterName, ar.animalType, ar.status
FROM ShelterEmployees se
JOIN AdoptionRequests ar ON se.employeeID = ar.employeeID;
```

Query Result:

employeeName	adopterName	animalType	status
John Doe	Wajeeha Naeem	Dog	Approved
John Doe	Saad Imran Toori	Cat	Approved

14. Join Dogs and Animals to get dog-specific details:

```
SELECT a.name, d.breed, d.size, d.groomingNeeds
FROM Dogs d
JOIN Animals a ON d.animalID = a.animalID;
```

name	breed	size	groomingNeeds
Max	Labrador	Medium	Weekly grooming
Bella	Beagle	Medium	Weekly grooming
Charlie	Golden Retriever	Large	Bi-weekly grooming
Luna	Bulldog	Medium	Occasional grooming
Buddy	German Shepherd	Large	Bi-weekly grooming
Rocky	Poodle	Small	Frequent grooming
Bubbles	Rottweiler	Large	Bi-weekly grooming
Coco	Chihuahua	Small	Occasional grooming
Buddy	Boxer	Large	Weekly grooming
Duke	Siberian Husky	Large	Weekly grooming
mitto	Libra	small	Monthly

15. Join Cats and Animals to get cat-specific details:

SELECT a.name, c.breed, c.color, c.personalityTraits

FROM Cats c

JOIN Animals a ON c.animalID = a.animalID;

name	breed	color	personalityTraits
Whiskers	Siamese	Gray	Curious
Mittens	Persian	White	Affectionate
Daisy	Maine Coon	Brown Tabby	Gentle
Shadow	Bengal	Spotted Brown	Playful
Simba	Russian Blue	Blue-Gray	Shy
Milo	Ragdoll	Cream and Gray	Laid-back
Oscar	Scottish Fold	Orange Tabby	Curious
Goldie	Abyssinian	Ruddy Brown	Energetic
Lily	Birman	Seal Point	Loving
Jasper	Sphynx	Pink	Social
Kiddo	Persian	White	Gentle

Aggregation (Summarizing data)

16. Count how many animals are in the shelter:

SELECT COUNT(*) AS totalAnimals FROM Animals;

Query Result:

totalAnimals
22

17. Find the average age of animals in the shelter:

SELECT AVG(age) AS averageAge FROM Animals;

Query Result:

averageAge
4.5455

18. Count how many adoption requests are pending:

SELECT COUNT(*) AS pendingRequests FROM AdoptionRequests WHERE status = 'Pending';

Query Result:

pendingRequests
1

19. Find the number of dogs in the shelter:

SELECT COUNT(*) AS totalDogs FROM Dogs;

Query Result:

totalDogs
11

20. Find the number of cats in the shelter:

SELECT COUNT(*) AS totalCats FROM Cats;

Query Result:

totalCats
11

Subqueries (Queries within queries)

21. Find adopters who have made at least one adoption request:

SELECT name FROM Adopters

WHERE adopterID IN (SELECT adopterID FROM AdoptionRequests);

Query Result:

adoptername
Wajeeha Naeem
Saad Imran Toori
jiya

22. Find animals that have been requested for adoption but not approved yet:

SELECT * FROM Animals

WHERE animalID IN (SELECT animalID FROM AdoptionRequests WHERE status = 'Pending');

Query Result:

animalID	name	animalType	age	medicalHistory	dietaryRequirements	adoptionStatus
4	Luna	Dog	2	Allergic to chicken	Grain-Free Diet	Not Adopted

23. Find the employee who has processed the most adoption requests:

```
SELECT employeeID, COUNT(*) AS requestsProcessed
FROM AdoptionRequests
GROUP BY employeeID
HAVING COUNT(*) = (SELECT MAX(requestsProcessed) FROM
(SELECT employeeID, COUNT(*) AS requestsProcessed
FROM AdoptionRequests
GROUP BY employeeID) AS subquery);
```

Query Result:

employeeID	requestsProcessed
1	2

24. Find animals that have been adopted by adopters who have previously owned pets:

```
SELECT a.name
FROM Animals a
WHERE a.animalID IN
(SELECT animalID FROM AdoptionRequests WHERE adopterID IN
(SELECT adopterID FROM Adopters WHERE previousPets IS NOT NULL));
```

Query Result:

name
Max
Luna
Daisy

25. Find the most common animal type requested for adoption:

```
SELECT animalType, COUNT(*) AS requestCount
FROM AdoptionRequests
GROUP BY animalType
ORDER BY requestCount DESC
```

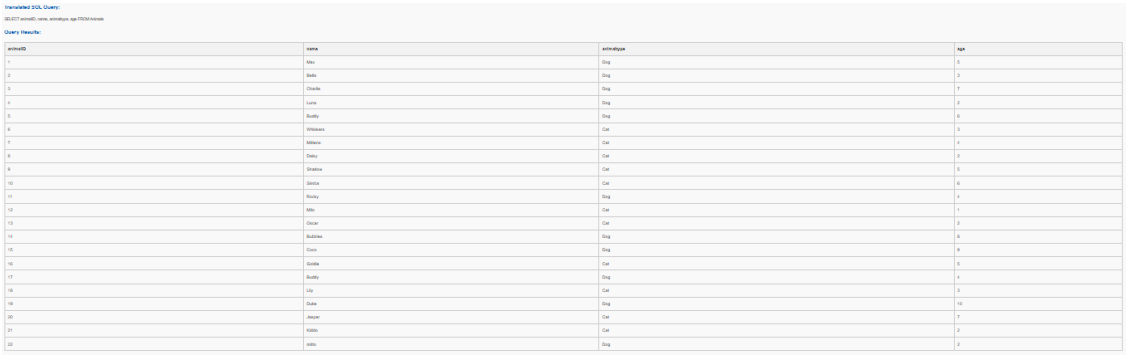
LIMIT 1;

animalType	requestCount
dogs	1

Relational Algebra Queries

1. **Find all animals in the shelter (Animals table):**

   π(animalID, name, animaltype, age)(Animals)



2. **List all dog breeds in the shelter:**

   π(breed)(Dogs)

Translated SQL Query:

```
SELECT breed FROM Dogs
```

Query Results:

breed
Labrador
Beagle
Golden Retriever
Bulldog
German Shepherd
Poodle
Rottweiler
Chihuahua
Boxer
Siberian Husky
Libra

3. **List all adopter names:**

   π(adoptername)(Adopters)

Translated SQL Query:

```
SELECT adoptername FROM Adopters
```

Query Results:

adoptername
jiya
Saad Imran Toori
sami
Wajeeha Naeem

4. **Find all adoption requests that are still pending:**

σ(status = 'Pending')(AdoptionRequests)

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE status = 'Pending'
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
3	1		10	wajeeha naeem	cat		Pending	

5. **List the names and ages of all animals that are 5 years or older:**

π(name, age)(σ(age >= 5)(Animals))

Translated SQL Query:

```
SELECT * FROM Animals WHERE age >= 5
```

Query Results:

animalID	name	animalType	age	medicalHistory	dietaryRequirements	adoptionStatus
1	Max	Dog	5	Healthy	Normal Diet	Adopted
3	Charlie	Dog	7	Hip Dysplasia	Low Fat Diet	Not Adopted
5	Buddy	Dog	6	Fractured leg healed	High Protein Diet	Not Adopted
9	Shadow	Cat	5	Dental issues	Soft Diet	Not Adopted
10	Simba	Cat	6	Healthy	Normal Diet	Not Adopted
14	Bubbles	Dog	8	Arthritis	Special Senior Diet	Not Adopted
15	Coco	Dog	9	Healthy	Normal Diet	Not Adopted
16	Goldie	Cat	5	Eye infection healed	Low Carb Diet	Not Adopted
19	Duke	Dog	10	Recovered from injury	High Protein Diet	Not Adopted
20	Jasper	Cat	7	Obesity	Low Calorie Diet	Not Adopted

6. **Find all animals that are cats (only from the Cats table):**

π(animalID,breed, color)(Cats)

Translated SQL Query:

```
SELECT animalID, breed, color FROM Cats
```

Query Results:

animalID	breed	color
6	Siamese	Gray
7	Persian	White
8	Maine Coon	Brown Tabby
9	Bengal	Spotted Brown
10	Russian Blue	Blue-Gray
12	Ragdoll	Cream and Gray
13	Scottish Fold	Orange Tabby
16	Abyssinian	Ruddy Brown
18	Birman	Seal Point
20	Sphynx	Pink
21	Persian	White

7. **Find all animals adopted by a specific adopter (e.g., Adopter with ID 1):**

   π(animalID, adopterName)(σ(adopterID = 1)(AdoptionRequests))

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE adopterID = 1
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
1	1	1	1	Wajeeha Naeem	Dog	2025-01-24	Approved	2025-01-17
3	1		10	wajeeha naeem	cat		Pending	

8. **Find all animals requested for adoption and the status of the request:**

   π(animalID, status)(AdoptionRequests)

Translated SQL Query:

```
SELECT animalID, status FROM AdoptionRequests
```

Query Results:

animalID	status
1	Approved
8	Approved
10	Pending

9. **List all adoption requests for dogs (only from the AdoptionRequests for animals marked as dogs):**

π(requestID, adopterName, animalType)(σ(animalType = 'Dog')(AdoptionRequests))

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE animalType = 'Dog'
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
1	1	1	1	Wajeeha Naeem	Dog	2025-01-24	Approved	2025-01-17

10. **List the names of adopters who have previously owned pets:**

π(name)(σ(previousPets IS NOT NULL)(Adopters))

Translated SQL Query:

```
SELECT * FROM Adopters WHERE previousPets IS NOT NULL
```

Query Results:

adopterID	adopterName	contactInformation	address	employmentStatus	previousPets
1	Wajeeha Naeem	wajeeha@example.com	Islamabad , Pakistan	Employed	Null
2	Saad Imran Toori	03216226321	Sihala, ISL, PAK	Self - Employeed	cat

11. **Find adopters who have requested a specific animal (e.g., Animal with ID 3):**

π(adopterName)(σ(animalID = 10)(AdoptionRequests))

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE animalID = 10
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
3	1		10	wajeeha naeem	cat		Pending	

12. **Find all shelter employees who have processed adoption requests:**

π(name)(ShelterEmployees ⋈ AdoptionRequests)

Query Result:

name
John Doe

13. **Find all animals that have a pending adoption request:**

π(animalID, adoptername)(Animals ⋈ σ(status = 'Pending')(AdoptionRequests))

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE status = 'Pending'
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
3	1		10	wajeeha naeem	cat		Pending	

14. **List all adopters who have requested both dogs and cats:**

π(adopterID)(AdoptionRequests ⋈ animalType = 'Dog') ∩ π(adopterID)(AdoptionRequests ⋈ animalType = 'Cat')

Query Result:

adopterID
1

15. **Find all animals that have been adopted (status is approved):**

π(animalID, name)(Animals ⋈ σ(status = 'Approved')(AdoptionRequests))

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE status = 'Approved'
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
1	1	1	1	Wajeeha Naeem	Dog	2025-01-24	Approved	2025-01-17
2	2	1	8	Saad Imran Toori	Cat	2025-01-24	Approved	2025-01-17

16. **Find the number of animals in the shelter:**

ρ(animalsCount)(π(animalID)(Animals))

Translated SQL Query:

```
SELECT animalID FROM Animals
```

Query Results:

animalID
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

17. **List the breed and size of all dogs (from the Dogs table):**

π(breed, size)(Dogs)

Translated SQL Query:

```
SELECT breed, size FROM Dogs
```

Query Results:

breed	size
Labrador	Medium
Beagle	Medium
Golden Retriever	Large
Bulldog	Medium
German Shepherd	Large
Poodle	Small
Rottweiler	Large
Chihuahua	Small
Boxer	Large
Siberian Husky	Large
Libra	small

18. **Find the names of employees who have handled adoption requests for animals with a specific breed (e.g., 'Golden Retriever'):**

    $\pi(\text{name})(\text{ShelterEmployees} \bowtie (\sigma(\text{breed} = \text{'Golden Retriever'})(\text{Dogs}) \bowtie \text{AdoptionRequests}))$

Translated SQL Query:

```
SELECT * FROM Dogs WHERE breed = 'Golden Retriever'
```

Query Results:

animalID	breed	size	vaccinationStatus	groomingNeeds	temperament
3	Golden Retriever	Large	Vaccinated	Bi-weekly grooming	Gentle

19. **List all animals and their corresponding adoption request status:**

    $\pi(\text{animalID, status})(\text{Animals} \bowtie \text{AdoptionRequests})$

20. **List all animals in the shelter that have been adopted by a specific adopter (e.g., Adopter with ID 2):**

    $\pi(\text{animalID, name})(\text{Animals} \bowtie \sigma(\text{adopterID} = 2)(\text{AdoptionRequests}))$

Translated SQL Query:

```
SELECT * FROM AdoptionRequests WHERE adopterID = 2
```

Query Results:

requestID	adopterID	employeeID	animalID	adopterName	animalType	adoptionDate	status	approvalDate
2	2	1	8	Saad Imran Toori	Cat	2025-01-24	Approved	2025-01-17

- **Performance Testing:**

  Measured query response times to ensure they met performance requirements. The performance time of each query is very short which make this DBMS efficient.

  For example:

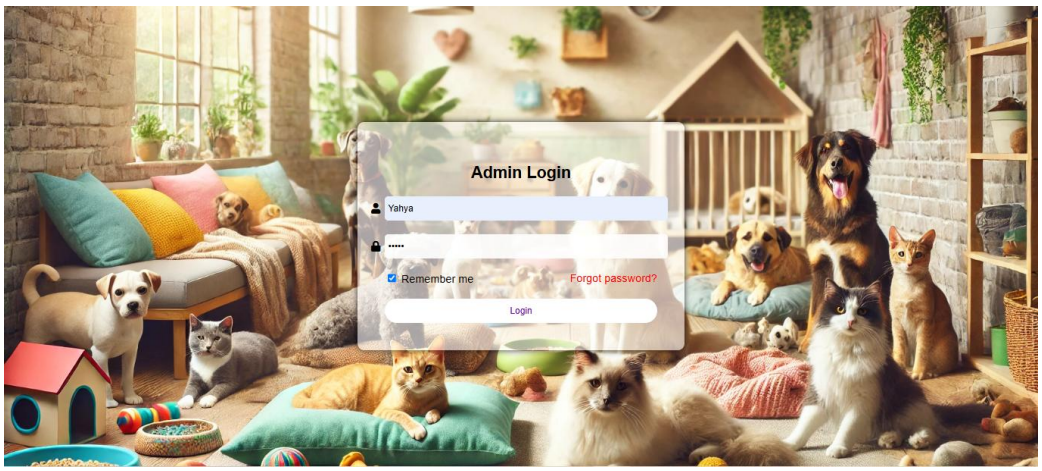
```
MariaDB [animalshelter]> select* from adopters;
+-----------+-----------------+--------------------+---------------------+-----------------+--------------+
| adopterID | adopterName     | contactInformation | address             | employmentStatus | previousPets |
+-----------+-----------------+--------------------+---------------------+-----------------+--------------+
|         1 | Wajeeha Naeem   | wajeeha@example.com | Islamabad , Pakistan | Employed        | Null         |
|         2 | Saad Imran Toori | 03216226321        | Sihala, ISL, PAK    | Self - Employeed | cat          |
+-----------+-----------------+--------------------+---------------------+-----------------+--------------+
2 rows in set (0.002 sec)
```

Here the run time of query of this is 0.002 which show efficiency of this DBMS.

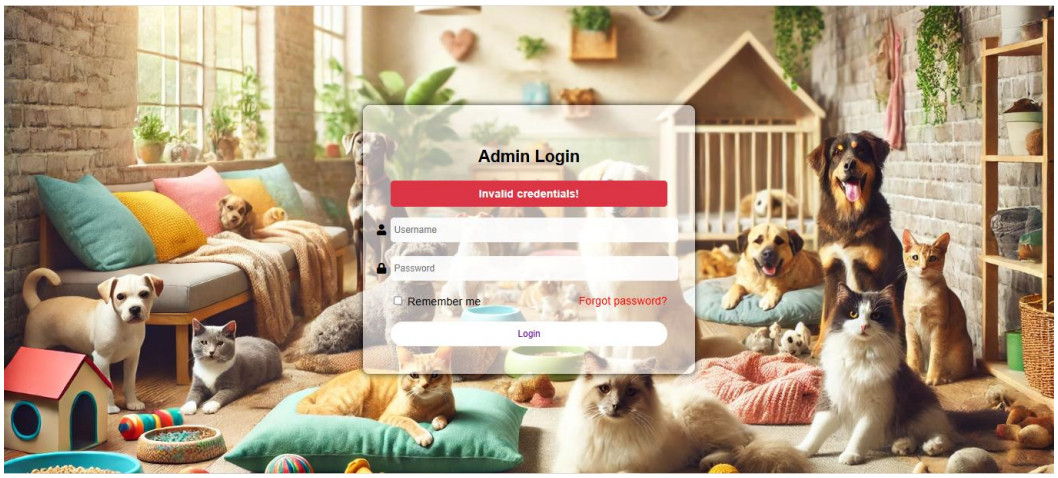
- **Security Testing:**
  - Confirmed secure user authentication with hashed passwords.

Admin Login:

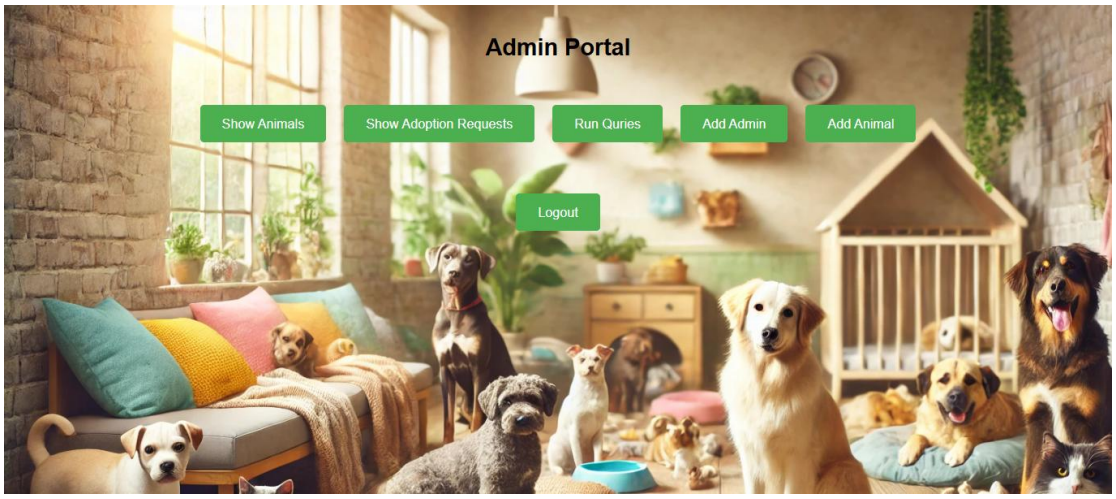
Access Accepted:



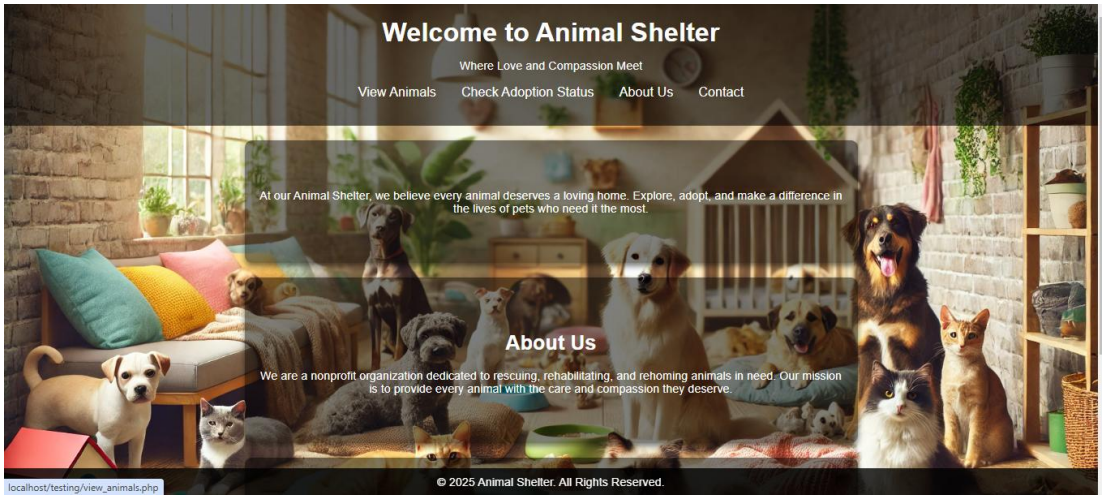
Access Denied:



- Verified role-based access controls for database operations.
  - **Administrator Role:** Full access to create, modify, delete, and manage all tables.



- **Adopter Role:** Restricted to viewing available animals and their own adoption records.



- **Backup and Recovery:**
  - Tested database backup using MySQL export.
  - Successfully restored the database to verify recovery functionality.

Conclusion

The Animal Shelter Management System Database was successfully designed, implemented, and tested. The project demonstrated the application of the database development life cycle and met all functional and non-functional requirements. The user-friendly interface enhances usability while maintaining robust data security and integrity. This system is scalable and adaptable to future needs, ensuring its utility for shelter operations.