

Database Design Project 2 – Katie McGrath

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Question 1

Identify and list the entities, relationships and multiplicities for the MTU Thoroughbreds clinic chain. (25 Marks)

Entities:

1. Clinic → Physical clinic location.
2. Staff → Any employees.
3. Horse → The animal.
4. Owner → Owner of a horse.
5. Consultation → Visits for examination.
6. Prescription → The relationship between consultations and treatments.
7. Treatment → Any medical procedure.

Relationships & Multiplicities:

1. Clinic → Staff
 - One to Many
 - One clinic has multiple staff members.
 - Each staff member works at one clinic.
2. Staff → Clinic
 - One to one.
 - One staff member manages one clinic.
 - Each clinic has one manager.
3. Clinic → Horse
 - One to Many
 - One clinic has multiple registered horses.
 - Each horse is registered at one clinic.

4. Owner → Horse

- One to Many
- One owner can own multiple horses.
- Each horse has one owner.

5. Staff → Consultation

- One staff member can do multiple consultations.
- Each consultation is done by one staff member.

6. Horse → Consultation

- One to Many
- One horse can have many consultations.
- Each consultation is for one horse.

7. Consultation → Prescription → Treatment

- Many to Many
- One consultation can result in multiple treatments.
- One treatment can be prescribed in multiple consultations.

Question 2

List and associate all attributes with the appropriate entities and relationships. Include all primary and foreign keys. (5 Marks)

Entity Attributes:

Clinic

- clinicNo → Primary Key (PK)
- address
- phone
- managerStaffNo → Foreign Key (FK)

Staff

- staffNo → Primary Key (PK)
- firstName
- lastName

- address
- dateOfBirth
- salary
- position
- clinicNo → Foreign Key (FK)

Owner

- ownerNo → Primary Key (PK)
- name
- address
- phone

Horse

- horseID → Primary Key (PK)
- name
- dateOfBirth
- colour
- ownerNo → Foreign Key (FK)
- clinicNo → Foreign Key (FK)

Consultation

- consultNo → Primary Key (PK)
- consultDate
- diagnosis
- staffNo → Foreign Key (FK)
- horseID → Foreign Key (FK)

Treatment

- treatNo → Primary Key (PK)
- cost

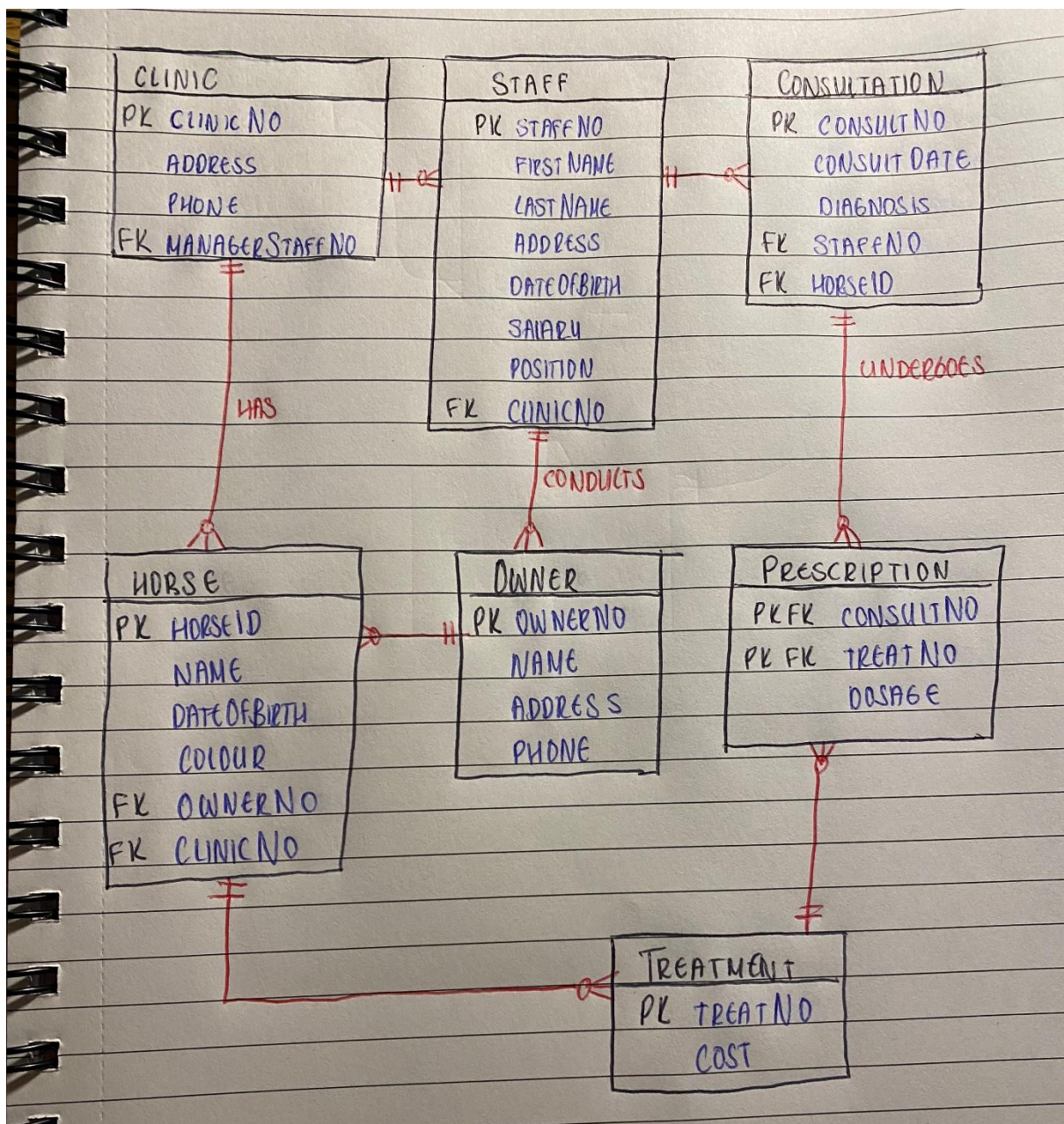
Prescription

- consultNo → Foreign Key (FK), Primary Key (PK)

- treatNo → Foreign Key (FK), Primary Key (PK)
- dosage

Question 3

Using your answers to parts (a) & (b) attempt to represent the data requirements of the MTU Thoroughbreds Clinics as a single ER diagram. You could use a diagram tool like Visual Paradigm to complete this task. Incorporate an image of the diagram into your assignment submission. (40 Marks)



Question 4

Verify that the ER model drawn in part (c) adheres to the process of Normalisation through its various stages to BCNF. Clearly identify the correct stage of normalization for each table. You should also carry out normalization that may be necessary to ensure all tables are in BCNF. (10 Marks)

2NF – Removing Partial Dependencies

All tables are already in 2NF as there are no partial dependencies.

3NF – Removing Transitive Dependencies

There are no transitive dependencies in the tables.

BCNF – Every Determinant is a Candidate Key

- Every table only has the Primary Key and no other Candidate keys.
- All functional dependencies have determinants that are superkeys.

Question 5

Once you are satisfied with your design in part (c) & (d), write SQL CREATE TABLE statements to create each table in the MySQL DBMS with all constraints included. You should complete this as ONE SQL script. Once the tables are created, write ONE SQL script that inserts at least TWO records into each table.

(20 Marks)

MySQL Code

```
CREATE DATABASE IF NOT EXISTS MTUThoroughbredsClinic;
USE MTUThoroughbredsClinic;

CREATE TABLE Clinic (
  clinicNo VARCHAR(10) PRIMARY KEY,
  address VARCHAR(255) NOT NULL,
  phone VARCHAR(15) NOT NULL,
  managerStaffNo VARCHAR(10),
  UNIQUE(phone)
);
```

```
CREATE TABLE Staff (  
  staffNo VARCHAR(10) PRIMARY KEY,  
  firstName VARCHAR(50) NOT NULL,  
  lastName VARCHAR(50) NOT NULL,  
  address VARCHAR(255),  
  dateOfBirth DATE,  
  salary DECIMAL(10,2),  
  position VARCHAR(50),  
  clinicNo VARCHAR(10),  
  FOREIGN KEY (clinicNo) REFERENCES Clinic(clinicNo)  
);
```

```
CREATE TABLE Owner (  
  ownerNo VARCHAR(10) PRIMARY KEY,  
  name VARCHAR(100) NOT NULL,  
  address VARCHAR(255),  
  phone VARCHAR(15),  
  UNIQUE(phone)  
);
```

```
CREATE TABLE Horse (  
  horseID VARCHAR(10) PRIMARY KEY,  
  name VARCHAR(50) NOT NULL,  
  dateOfBirth DATE,  
  colour VARCHAR(30),  
  ownerNo VARCHAR(10),  
  clinicNo VARCHAR(10),  
  FOREIGN KEY (ownerNo) REFERENCES Owner(ownerNo),  
  FOREIGN KEY (clinicNo) REFERENCES Clinic(clinicNo)  
);
```

```
CREATE TABLE Consultation (  
  consultNo VARCHAR(10) PRIMARY KEY,  
  consultDate DATE NOT NULL,  
  diagnosis TEXT,  
  staffNo VARCHAR(10),  
  horseID VARCHAR(10),  
  FOREIGN KEY (staffNo) REFERENCES Staff(staffNo),  
  FOREIGN KEY (horseID) REFERENCES Horse(horseID)  
);
```

```
CREATE TABLE Treatment (  
  treatNo VARCHAR(10) PRIMARY KEY,  
  cost DECIMAL(8,2) NOT NULL  
);
```

```
CREATE TABLE Prescription (  

```

```

consultNo VARCHAR(10),
treatNo VARCHAR(10),
dosage VARCHAR(100),
PRIMARY KEY (consultNo, treatNo),
FOREIGN KEY (consultNo) REFERENCES Consultation(consultNo),
FOREIGN KEY (treatNo) REFERENCES Treatment(treatNo)
);

ALTER TABLE Clinic
ADD FOREIGN KEY (managerStaffNo) REFERENCES Staff(staffNo);

INSERT INTO Clinic (clinicNo, address, phone) VALUES ('CL001', '123 Main Street,
Cork City, Co. Cork', '021-1234567'),
('CL002', '456 Oak Avenue, Dublin 2, Co. Dublin', '01-7654321');

INSERT INTO Staff (staffNo, firstName, lastName, address, dateOfBirth, salary,
position, clinicNo) VALUES ('ST001', 'John', 'Smith', '78 Pine Road, Cork', '1980-05-15',
'55000.00', 'Senior Veterinarian', 'CL001'),
('ST002', 'Mary', 'Jones', '32 Elm Street, Cork', '1985-08-22', '48000.00', 'Veterinarian',
'CL001'),
('ST003', 'Robert', 'Brown', '15 Maple Drive, Dublin', '1978-12-10', '60000.00', 'Clinic
Manager', 'CL002'),
('ST004', 'Sarah', 'Wilson', '29 Birch Lane, Dublin', '1990-03-30', '45000.00',
'Veterinarian', 'CL002');

UPDATE Clinic SET managerStaffNo = 'ST001' WHERE clinicNo = 'CL001';
UPDATE Clinic SET managerStaffNo = 'ST003' WHERE clinicNo = 'CL002';

INSERT INTO Owner (ownerNo, name, address, phone) VALUES ('OW001', 'Michael
Murphy', '10 Hilttop Road, Cork', '087-1234567'),
('OW002', 'Emma O'Connor', '25 Valley View, Dublin', '086-9876543'),
('OW003', 'David Walsh', '5 Seaside Avenue, Galway', '085-1122334');

INSERT INTO Horse (horseID, name, dateOfBirth, colour, ownerNo, clinicNo) VALUES
('H001', 'Thunder', '2018-04-12', 'Bay', 'OW001', 'CL001'),
('H002', 'Lightning', '2019-07-25', 'Chestnut', 'OW001', 'CL001'),
('H003', 'Spirit', '2017-11-03', 'Black', 'OW002', 'CL002'),
('H004', 'Bella', '2020-02-18', 'Gray', 'OW003', 'CL002');

INSERT INTO Consultation (consultNo, consultDate, diagnosis, staffNo, horseID)
VALUES
('CON001', '2024-01-15', 'Leg strain', 'ST001', 'H001'),
('CON002', '2024-01-20', 'Infection', 'ST002', 'H002'),
('CON003', '2024-02-01', 'Feed allergy', 'ST003', 'H003'),
('CON004', '2024-02-10', 'Dental check', 'ST004', 'H004'),
('CON005', '2024-02-25', 'Follow-up', 'ST001', 'H001');

```

```
INSERT INTO Treatment (treatNo, cost) VALUES
```

```
('TR001', 85.00),  
( 'TR002', 45.00),  
( 'TR003', 35.00),  
( 'TR004', 120.00),  
( 'TR005', 28.00);
```

```
INSERT INTO Prescription (consultNo, treatNo, dosage) VALUES
```

```
('CON001', 'TR001', '10mg injection'),  
( 'CON001', 'TR005', '5mg twice daily'),  
( 'CON002', 'TR002', '500mg once daily'),  
( 'CON003', 'TR003', 'Apply twice daily'),  
( 'CON004', 'TR004', 'Standard procedure'),  
( 'CON005', 'TR005', '2.5mg once daily');
```

```
SELECT 'Clinic' as Table_Name, COUNT(*) as Record_Count FROM Clinic
```

```
UNION ALL
```

```
SELECT 'Staff', COUNT(*) FROM Staff
```

```
UNION ALL
```

```
SELECT 'Owner', COUNT(*) FROM Owner
```

```
UNION ALL
```

```
SELECT 'Horse', COUNT(*) FROM Horse
```

```
UNION ALL
```

```
SELECT 'Consultation', COUNT(*) FROM Consultation
```

```
UNION ALL
```

```
SELECT 'Treatment', COUNT(*) FROM Treatment
```

```
UNION ALL
```

```
SELECT 'Prescription', COUNT(*) FROM Prescription;
```