武漢理工大學

数据库系统原理 B

实验报告

题　　目	爱宠联盟数据库设计
学　　院	计算机与人工智能学院
专　　业	人工智能
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目录

1 实验思路

1.1 需求分析

首先，理解并分析业务需求，确定需要存储哪些数据以及这些数据之间的关系。

1.2 概念模型设计

创建一个高层次的数据模型，通常使用实体-关系图（ER 图）来表示数据实体、它们的属性以及实体之间的关系。

1.3 数据模型设计

将概念模型转换为数据模型，确定每个实体的属性，以及它们的数据类型、约束（如主键、外键、唯一性约束等）。

1.4 规范化

对数据模型进行规范化，以减少数据冗余并提高数据完整性。

1.5 创建数据库和表

使用 SQL 语句创建数据库和表，定义表的结构和约束。

1.6 事务处理

设计事务来处理数据的增删改查操作，确保数据库操作的原子性、一致性、隔离性和持久性。

1.7 查询设计

根据事务需求设计查询，以便能够检索和报告所需的信息。

2 实验环境

2.1 MySQL 8.0

确保 MySQL 数据库服务器已安装并运行在 windows 系统上。

2.2 Navicat Premium 16

下载并安装 Navicat Premium 16，它将作为数据库管理工具，用于连接、设计、操作和管理 MySQL 数据库。

2.3 连接 Navicat 到 MySQL 服务器

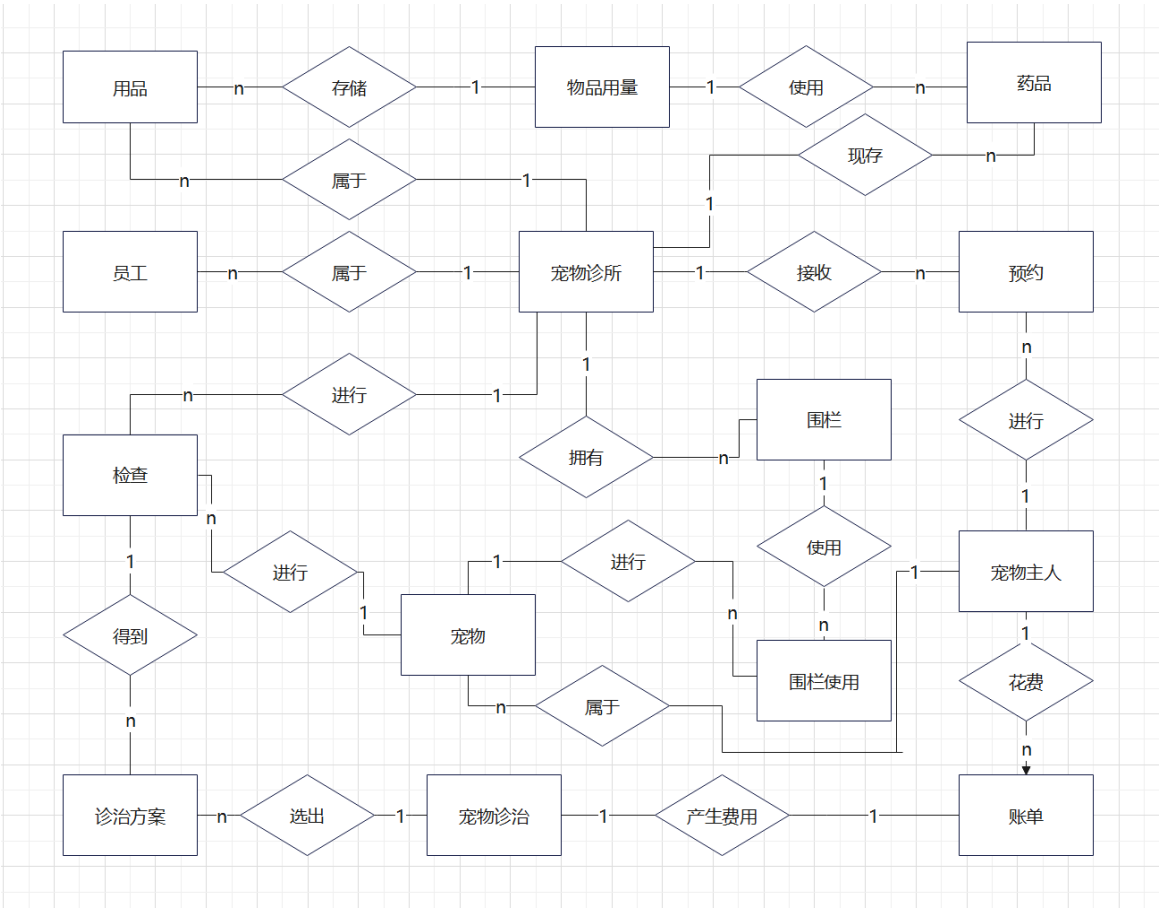
使用 Navicat Premium 16 创建一个新的数据库连接，输入 MySQL 服务器的相关信息，包括主机名、端口、用户名和密码。

2.4 创建数据库

在 Navicat 中创建一个新的数据库，命名为 pets，用于存储 Perfect Pets 的所有数据。

3 实验内容

3.1 概念模型设计（E-R 图）



3.2 数据模型设计

(a)诊所(诊所号码，街区，城市，州，邮编，电话号码，传真号码) （诊所号码是主键）

(b)员工(员工号码，姓名，街道，城市，州，邮编，电话号码，出生日期，性别，职位,社会保障号码，全年工资，诊所号) （员工号码是主键）

(c)宠物主人(诊所号码，宠物主人号码，姓名，街道，城市，州，邮编，电话号码) （诊所号码，宠物主任号码是主键）

(d)宠物(诊所号码，宠物号码，宠物名，宠物类型，宠物描述，出生日期，到所登记时间，宠物状态,宠物主人号码) （诊所号码，宠物号码是主键）

(e)检查(诊所号码，检查号码，检查日期，时间，员工号，宠物号，检查结果描述)（诊所号码，检查号码是主键）

(f)宠物诊治(诊治方案号，诊治方案的具体内容，宠物主人的花费，帐单) （诊治方案号是主键）

(g)诊治方案(诊所号码，检查号码，诊治方案号，日期，宠物号码，处方描述，诊治数量，开始时间，结束时间，额外事项) （诊所号码，检查号码，诊治方案号是主键）

(h)围栏(诊所号码，围栏号码，容量，状态) （诊所号码，围栏号码是主键）

(i)围栏使用(诊所号码，围栏号码，宠物号，检查号码，入栏日期，出栏日期，宠物在围栏中的信息) （诊所号码，围栏号码是主键）

(j)账单(账单号码，账单日期，宠物主人号码，宠物号码，检查号码，诊所号码，诊治方案号码，诊治费用，支付状态，支付日期，支付手段) （账单号码是主键）

(k)用品(项目号码，诊所号码，项目描述，储量，追加订货程度，追加订货数量，价格，类型) （项目号码和诊所号码是主键）

(l)药品(药品号码，诊所号码，药品名称，药品介绍，计量，配方，储存数量，记录级别，记录订货数量，价格) （药品号码和诊所号码是主键）

(m)预约(诊所号码，预约号码，宠物主人号码，姓名，电话号码，宠物号码，宠物类型，预约日期，时间) （诊所号码和预约号码是主键）

(n)物品用量(物品号码，诊所号码，物品名，单次用量，累计用量) （物品号码，诊所号码是主键）

3.3 参照完整性规则

(a)在“员工”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(b)在“宠物主人”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(c)在“宠物”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(d)在“检查”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(e)在“诊治方案”中的“检查号码”必须存在于“检查”的“检查号码”中。

(f)在“诊治方案”中的“诊治方案号”必须存在于“宠物诊治”的“诊治方案号”中。

(g)在“诊治方案”中的“宠物号码”必须存在于“宠物”的“宠物号码”中。

(h)在“围栏”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(i)在“围栏使用”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(j)在“围栏使用”中的“围栏号”必须存在于“围栏”的“围栏号”中。

(k)在“围栏使用”中的“宠物号码”必须存在于“宠物”的“宠物号码”中。

(l)在“围栏使用”中的“检查号码”必须存在于“检查”的“检查号码”中。

(m)在“用品”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(n)在“药品”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(o)在“预约”中的“诊所号”必须存在于“诊所”的“诊所号”中。

(p)在“预约”中的“宠物主人号码”必须存在于“宠物主人”的“宠物主人号码”中。

(q)在“预约”中的“宠物号码”必须存在于“宠物”的“宠物号码”中。

(r)在“物品用量”中的“诊所号”必须存在于“诊所”的“诊所号”中。

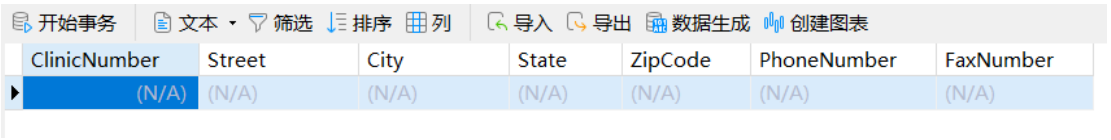
(s)在“物品用量”中的“物品号”必须存在于“用品”的“项目号”中或“药品”的“药品号”中。

(t)在“物品用量”中的“检查号码”必须存在于“检查”的“检查号码”中。

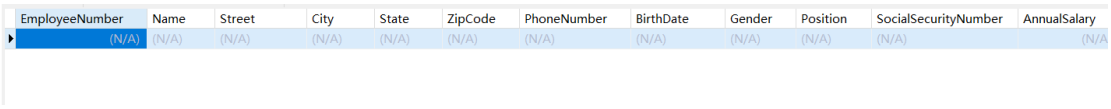
4 实验结果

4.1 创建 pets 数据库

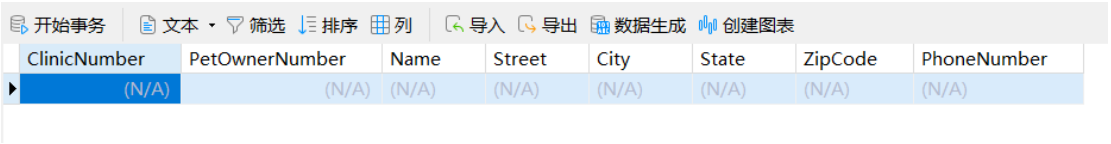
4.1.1 创建诊所表



4.1.2 创建员工表

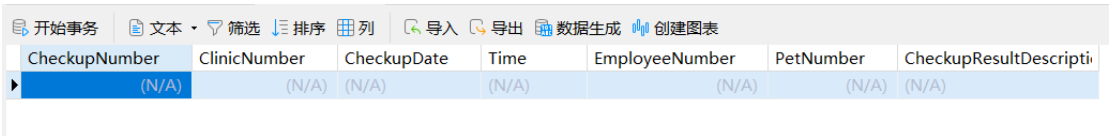


4.1.3 创建宠物主人表

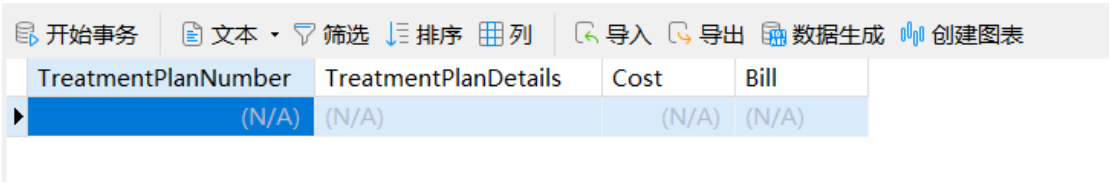


4.1.4 创建宠物表

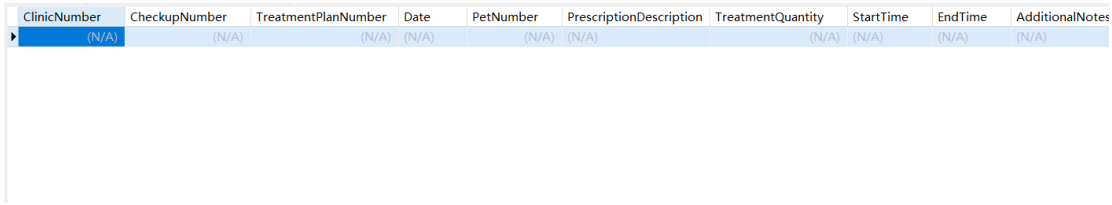
4.1.5 创建检查表



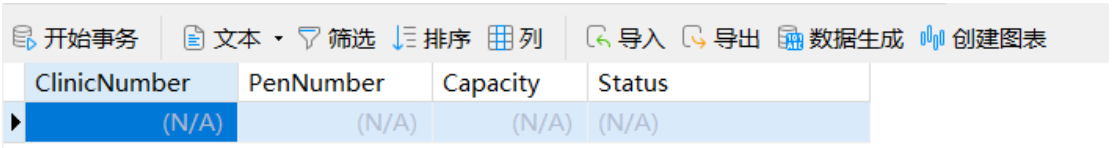
4.1.6 创建宠物诊治表



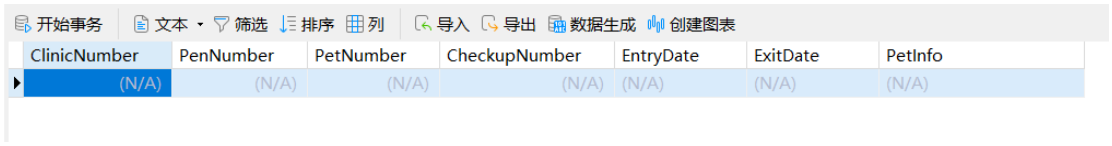
4.1.7 创建诊断方案表



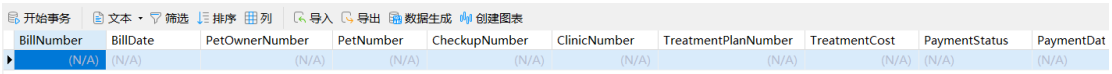
4.1.8 创建围栏表



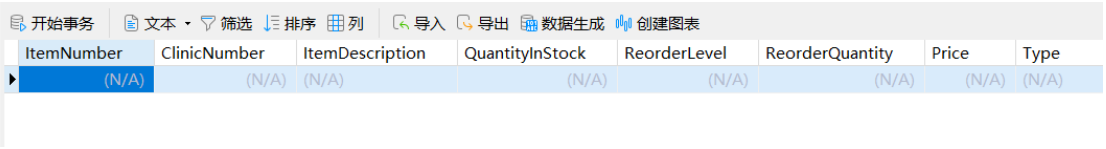
4.1.9 创建围栏使用表



4.1.10 创建账单表



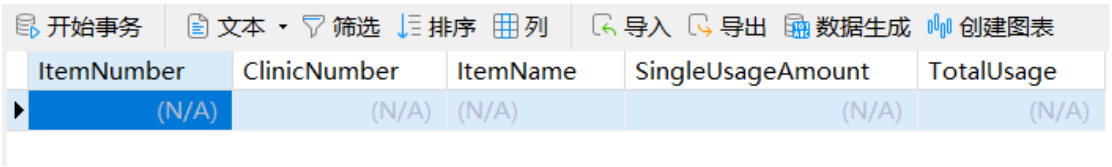
4.1.11 创建用品表



4.1.12 创建药品表

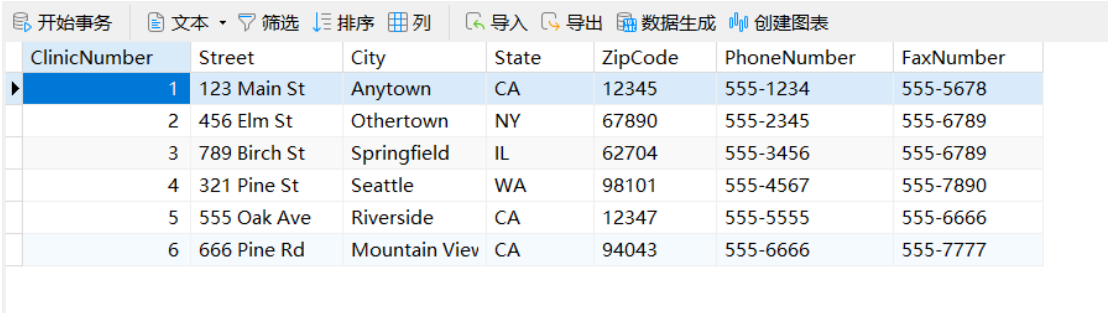
4.1.13 创建预约表

4.1.14 创建物品用量表



4.2 添加数据

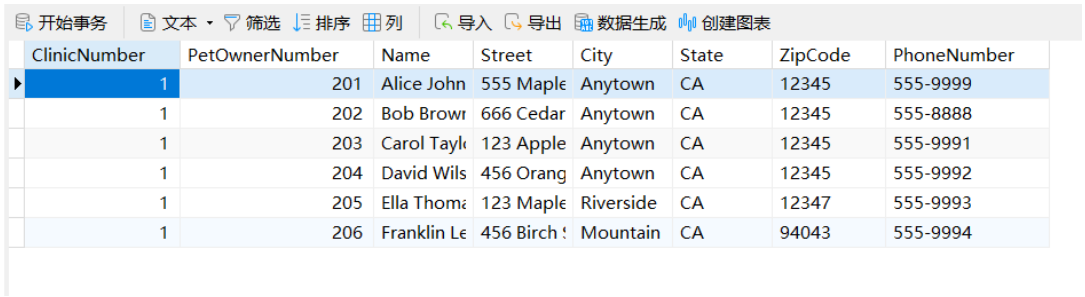
4.2.1 诊所表数据插入



4.2.2 员工表数据插入

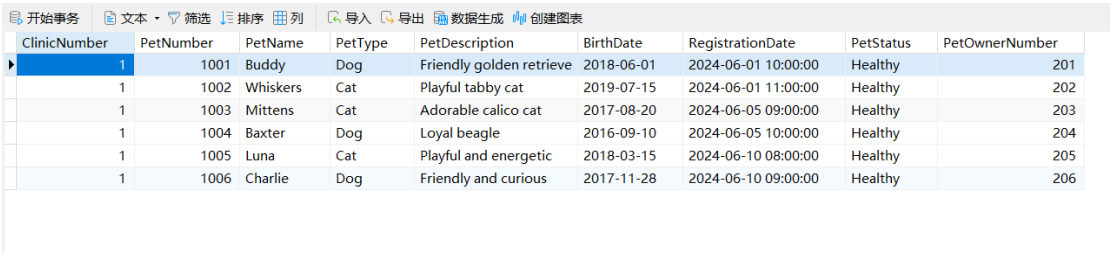
EmployeeNumber	Name	Street	City	State	ZipCode	PhoneNumber	BirthDate	Gender	Position	SocialSecurityNumber	AnnualSalar
101	John Doe	789 Oak St	Anytown	CA	12345	555-4321	1990-01-01	M	Vet	123-45-6789	50000
102	Jane Smith	321 Pine St	Othertown	NY	67890	555-5432	1992-05-15	F	Nurse	987-65-4321	40000
103	Emily Davi	987 Oak St	Springfield	IL	62704	555-7654	1985-08-15	F	Receptionis	123-45-6789	35000
104	Michael Br	654 Cedar St	Seattle	WA	98101	555-8765	1978-03-22	M	Technician	987-65-4321	42000
105	Samantha	555 Elm St	Riverside	CA	12347	555-7777	1990-02-20	F	Vet Assistar	111-22-3333	38000
106	Jacob Smi	666 Cedar Blvc	Mountain	CA	94043	555-8888	1985-07-30	M	Receptionis	222-33-4444	36000

4.2.3 宠物主人表数据插入



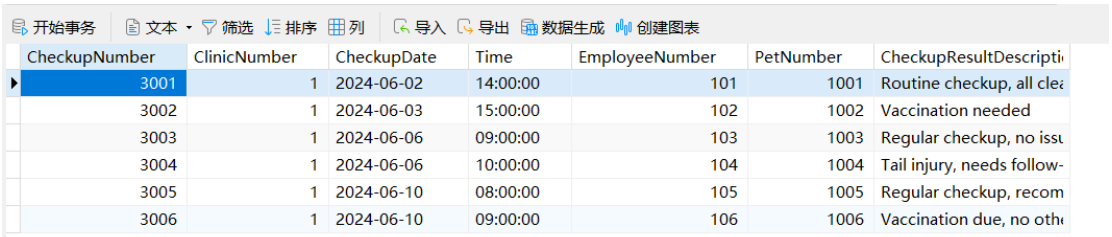
ClinicNumber	PetOwnerNumber	Name	Street	City	State	ZipCode	PhoneNumber
1	201	Alice John	555 Maple	Anytown	CA	12345	555-9999
1	202	Bob Brown	666 Cedar	Anytown	CA	12345	555-8888
1	203	Carol Tayl	123 Apple	Anytown	CA	12345	555-9991
1	204	David Wils	456 Orang	Anytown	CA	12345	555-9992
1	205	Ella Thoma	123 Maple	Riverside	CA	12347	555-9993
1	206	Franklin Le	456 Birch S	Mountain	CA	94043	555-9994

4.2.4 宠物表数据插入



ClinicNumber	PetNumber	PetName	PetType	PetDescription	BirthDate	RegistrationDate	PetStatus	PetOwnerNumber
1	1001	Buddy	Dog	Friendly golden retrieve	2018-06-01	2024-06-01 10:00:00	Healthy	201
1	1002	Whiskers	Cat	Playful tabby cat	2019-07-15	2024-06-01 11:00:00	Healthy	202
1	1003	Mittens	Cat	Adorable calico cat	2017-08-20	2024-06-05 09:00:00	Healthy	203
1	1004	Baxter	Dog	Loyal beagle	2016-09-10	2024-06-05 10:00:00	Healthy	204
1	1005	Luna	Cat	Playful and energetic	2018-03-15	2024-06-10 08:00:00	Healthy	205
1	1006	Charlie	Dog	Friendly and curious	2017-11-28	2024-06-10 09:00:00	Healthy	206

4.2.5 检查表数据插入



CheckupNumber	ClinicNumber	CheckupDate	Time	EmployeeNumber	PetNumber	CheckupResultDescripti
3001	1	2024-06-02	14:00:00	101	1001	Routine checkup, all clea
3002	1	2024-06-03	15:00:00	102	1002	Vaccination needed
3003	1	2024-06-06	09:00:00	103	1003	Regular checkup, no issu
3004	1	2024-06-06	10:00:00	104	1004	Tail injury, needs follow-
3005	1	2024-06-10	08:00:00	105	1005	Regular checkup, recom
3006	1	2024-06-10	09:00:00	106	1006	Vaccination due, no oth

4.2.6 宠物诊治表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

TreatmentPlanNumber	TreatmentPlanDetails	Cost	Bill
5001	Annual vaccination	50.00	Billed
5002	Dental cleaning	120.00	Pending
5003	Tail injury treatment	75.00	Billed
5004	Cat allergy medication	30.00	Pending
5005	Dental cleaning for cats	80.00	Billed
5006	Vaccination package for	60.00	Billed

4.2.7 诊断方案表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ClinicNumber	CheckupNumber	TreatmentPlanNumber	Date	PetNumber	PrescriptionDescription	TreatmentQuantity	StartTime	EndTime	AdditionalNote
1	3001	5001	2024-06-0	1001	Vaccination for rabies	1	14:30:00	15:00:00	No food after 8
1	3002	5002	2024-06-0	1002	Teeth cleaning and chec	1	15:30:00	16:30:00	Soft food for a
1	3003	5003	2024-06-0	1003	Medicinal cream for tail	1	09:30:00	10:00:00	Apply cream tw
1	3004	5004	2024-06-0	1004	Antihistamine for allergi	2	10:30:00	11:00:00	Monitor for sid
1	3005	5005	2024-06-1	1005	Dental cleaning	1	08:30:00	09:30:00	Advise soft foo
1	3006	5006	2024-06-1	1006	Annual vaccination	1	09:30:00	10:00:00	No swimming f

4.2.8 围栏表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ClinicNumber	PenNumber	Capacity	Status
1	1	10	Available
1	2	5	Occupied
1	3	8	Available
1	4	6	Under Maintenance
1	5	4	Available
1	6	3	Occupied

4.2.9 围栏使用表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ClinicNumber	PenNumber	PetNumber	CheckupNumber	EntryDate	ExitDate	PetInfo
1	1	1001	3001	2024-06-02	2024-06-03	Buddy stayed overnight
1	2	1002	3002	2024-06-03	2024-06-04	Whiskers stayed for den
1	3	1003	3003	2024-06-06	2024-06-07	Mittens stayed for obse
1	4	1004	3004	2024-06-06	2024-06-07	Baxter stayed for tail tre
1	5	1005	3005	2024-06-10	2024-06-11	Luna stayed for dental cl
1	6	1006	3006	2024-06-10	2024-06-11	Charlie stayed for vaccin

4.2.10 账单表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

BillNumber	BillDate	PetOwnerNumber	PetNumber	CheckupNumber	ClinicNumber	TreatmentPlanNumber	TreatmentCost	PaymentStatus	PaymentI
6001	2024-06-04	201	1001	3001	1	5001	50.00	Paid	2024-06-0
6002	2024-06-05	202	1002	3002	1	5002	120.00	Unpaid	(Null)
6003	2024-06-07	203	1003	3003	1	5003	75.00	Paid	2024-06-0
6004	2024-06-08	204	1004	3004	1	5004	60.00	Unpaid	(Null)
6005	2024-06-11	205	1005	3005	1	5005	80.00	Paid	2024-06-1
6006	2024-06-11	206	1006	3006	1	5006	60.00	Paid	2024-06-1

4.2.11 用品表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ItemNumber	ClinicNumber	ItemDescription	QuantityInStock	ReorderLevel	ReorderQuantity	Price	Type
7001	1	Syringe	200	50	100	1.50	Medical
7002	1	Food for dogs	150	30	50	25.00	Food
7003	1	Bandages	300	100	50	2.00	Medical
7004	1	Cat toys	150	50	20	5.00	Toy
7005	1	Catnip	200	50	100	3.00	Toy
7006	1	Dog leashes	150	30	20	10.00	Accessory

4.2.12 药品表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

MedicationNumber	ClinicNumber	MedicationName	MedicationDescription	Dosage	Prescription	QuantityInStock	StockLevel	ReorderQuantity
8001	1	Rabies Vaccine	Annual vaccination for d	1ml	Administer once a year	100	20	50
8002	1	Antibiotic	For treating bacterial inf	5mg/kg	As prescribed by vet	80	10	30
8003	1	Pain reliever	For post-surgery pain	10mg	Administer as needed	200	50	100
8004	1	Antifungal cream	For skin infections	Apply twic	As prescribed by vet	180	30	60
8005	1	Heartworm preventi	Monthly oral medicatior	Based on w	Administer once a mont	100	20	50
8006	1	Flea treatment	Topical application	As directec	Apply every 30 days	80	10	40

4.2.13 预约表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ClinicNumber	AppointmentNumber	PetOwnerNumber	Name	PhoneNumber	PetNumber	PetType	AppointmentDate	Time
1	9001	201	Alice Johnson	555-9999	1001	Dog	2024-06-10	10:00:00
1	9002	202	Bob Brown	555-8888	1002	Cat	2024-06-11	11:00:00
1	9003	203	Carol Taylor	555-9991	1003	Cat	2024-06-12	13:00:00
1	9004	204	David Wilson	555-9992	1004	Dog	2024-06-13	14:00:00
1	9005	205	Ella Thomas	555-9993	1005	Cat	2024-06-14	08:00:00
1	9006	206	Franklin Lee	555-9994	1006	Dog	2024-06-14	09:00:00

4.2.14 物品用量表数据插入

开始事务 文本 筛选 排序 列 导入 导出 数据生成 创建图表

ItemNumber	ClinicNumber	ItemName	SingleUsageAmount	TotalUsage
7001	1	Syringe	1.50	300.00
7002	1	Food for dogs	25.00	3750.00
7003	1	Bandages	2.00	600.00
7004	1	Cat toys	5.00	750.00
7005	1	Catnip	3.00	600.00
7006	1	Dog leashes	10.00	1500.00

4.3 事务查询

4.3.1 事务 a

```
1  --a事务
2  SELECT e.Name AS ManagerName, c.Street, c.City, c.State, c.
   ZipCode, c.PhoneNumber
3  FROM Employee e
4  JOIN Clinic c ON e.ClinicNumber = c.ClinicNumber
5  WHERE e.Position LIKE '%Manager%'
6  ORDER BY c.ClinicNumber;
```

消息 摘要 结果 1 剖析 状态

ManagerName	Street	City	State	ZipCode	PhoneNumber
Emily Davis	789 Birch S	Springfiel	IL	62704	555-3456

4.3.2 事务 b

```
SELECT
    po.Name AS PetOwnerName,
    po.PetOwnerNumber,
    p.PetName,
    p.PetType,
    p.PetDescription
FROM
    PetOwner po
JOIN
    Pet p ON po.PetOwnerNumber = p.PetOwnerNumber;
```

消息 摘要 结果 1 剖析 状态

PetOwnerName	PetOwnerNumber	PetName	PetType	PetDescription
Alice Johnson	201	Buddy	Dog	Friendly golden retrieve
Bob Brown	202	Whiskers	Cat	Playful tabby cat
Carol Taylor	203	Mittens	Cat	Adorable calico cat
David Wilson	204	Baxter	Dog	Loyal beagle
Ella Thomas	205	Luna	Cat	Playful and energetic
Franklin Lee	206	Charlie	Dog	Friendly and curious

4.3.3 事务 c

```
-- 假设宠物号为 1001 事务c
SELECT
    *
FROM
    Checkup
WHERE
    PetNumber = 1001;
```

消息 摘要 结果 1 剖析 状态

CheckupNumber	ClinicNumber	CheckupDate	Time	EmployeeNumber	PetNumber	CheckupResultDescripti
3001	1	2024-06-02	14:00:00	101	1001	Routine checkup, all clea

4.3.4 事务 d

```
-- 假设检查号为 3001,事务d
SELECT
    *
FROM
    TreatmentPlan
WHERE
    CheckupNumber = 3001;
```

消息 摘要 结果 1 剖析 状态

ClinicNumber	CheckupNumber	TreatmentPlanNumber	Date	PetNumber	PrescriptionDescription	TreatmentQuantity	StartTime	EndTime	AdditionalNc
1	3001	5001	2024-06-02	1001	Vaccination for rabies	1	14:30:00	15:00:00	No food after

4.3.5 事务 e

```
-- 假设宠物主人号为 201，事务e
SELECT
    *
FROM
    Bill
WHERE
    PetOwnerNumber = 202 AND PaymentStatus = 'Unpaid';
```

消息 摘要 结果 1 剖析 状态

BillNumber	BillDate	PetOwnerNumber	PetNumber	CheckupNumber	ClinicNumber	TreatmentPlanNumber	TreatmentCost	PaymentStatus	PaymentDate
6002	2024-06-0	202	1002	3002	1	5002	120.00	Unpaid	(Null)

4.3.6 事务 f

```sql
-- 假设日期为 '2024-06-26', 事务f
SELECT
    *
FROM
    Bill
WHERE
    BillDate <= '2024-06-26' AND PaymentStatus = 'Unpaid'
ORDER BY
    BillNumber;
```

消息 摘要 结果 1 剖析 状态

BillNumber	BillDate	PetOwnerNumber	PetNumber	CheckupNumber	ClinicNumber	TreatmentPlanNumber	TreatmentCost	PaymentStatus	PaymentDate
6002	2024-06-0	202	1002	3002	1	5002	120.00	Unpaid	(Null)
6004	2024-06-0	204	1004	3004	1	5004	60.00	Unpaid	(Null)

4.3.7 事务 g

```sql
SELECT
    p.PenNumber,
    p.Capacity,
    p.Status
FROM
    Pen p
JOIN
    Clinic c ON p.ClinicNumber = c.ClinicNumber
JOIN
    PenUsage pu ON p.PenNumber = pu.PenNumber AND p.ClinicNumber = pu.ClinicNumber
WHERE
    c.State = 'CA' AND
    p.Status = 'Available' AND
    pu.EntryDate < '2024-06-26' -- 确保围栏在给定日期之前是可预订的
ORDER BY
    c.ClinicNumber,
    p.PenNumber;
```

消息 摘要 结果 1 剖析 状态

PenNumber	Capacity	Status
1	10	Available
3	8	Available
5	4	Available

4.3.8 事务 h

```sql
--事务h
SELECT
    c.ClinicNumber,
    SUM(e.AnnualSalary / 12) AS TotalMonthlySalary
FROM
    Employee e
JOIN
    Clinic c ON e.ClinicNumber = c.ClinicNumber
GROUP BY
    c.ClinicNumber
ORDER BY
    c.ClinicNumber;
```

消息 摘要 结果 1 剖析 状态

ClinicNumber	TotalMonthlySalary
1	4166.666667
2	3333.333333
3	2916.666667
4	3500.000000
5	3166.666667
6	3000.000000

4.3.9 事务 i

```
--事务i
SELECT
    MAX(TreatmentCost) AS MaxCost,
    MIN(TreatmentCost) AS MinCost,
    AVG(TreatmentCost) AS AvgCost
FROM
    Bill;
```

消息 | 摘要 | 结果 1 | 剖析 | 状态

MaxCost	MinCost	AvgCost
120.00	50.00	74.166667

4.3.10 事务 j

```
--事务j
SELECT
    PetType,
    COUNT(*) AS TotalPets
FROM
    Pet
GROUP BY
    PetType
ORDER BY
    PetType;
```

消息 | 摘要 | 结果 1 | 剖析 | 状态

PetType	TotalPets
Cat	3
Dog	3

4.3.11 事务 k

```sql
--事务k
SELECT
    EmployeeNumber,
    Name
FROM
    Employee
WHERE
    Position IN ('Vet', 'Nurse') AND
    YEAR(BirthDate) <= 1974; -- Assuming the current year is 2024
ORDER BY
    Name;
```

消息 | 摘要 | 结果 1 | 状态

EmployeeNumber	Name
101	John Doe

4.3.12 事务 l

```sql
-- 假设诊所号为 1，日期为 '2024-06-14',事务l
SELECT
    *
FROM
    Appointment
WHERE
    ClinicNumber = 1 AND AppointmentDate = '2024-06-14';
```

消息 | 摘要 | 结果 1 | 剖析 | 状态

ClinicNumber	AppointmentNumber	PetOwnerNumber	Name	PhoneNumber	PetNumber	PetType	AppointmentDate	Time
1	9005	205	Ella Thom	555-9993	1005	Cat	2024-06-14	08:00:00
1	9006	206	Franklin Le	555-9994	1006	Dog	2024-06-14	09:00:00

4.3.13 事务 m

```sql
--事务m
SELECT
    ClinicNumber,
    COUNT(*) AS TotalPets
FROM
    Pet
GROUP BY
    ClinicNumber
ORDER BY
    ClinicNumber;
```

消息 | 摘要 | 结果 1 | 剖析 | 状态

ClinicNumber	TotalPets
1	6

4.3.14 事务 n

```
135  --事务n，改为2019-2023年
136  SELECT
137      *
138  FROM
139      Bill
140  WHERE
141      YEAR(BillDate) BETWEEN 2019 AND 2023
142  ORDER BY
143      BillNumber;
```

消息 摘要 结果 1 剖析 状态

BillNumber	BillDate	PetOwnerNumber	PetNumber	CheckupNumber	ClinicNumber	TreatmentPlanNumber	TreatmentCost	PaymentStatus	PaymentDate
6001	2020-06-0	201	1001	3001	1	5001	50.00	Paid	2024-06-04

4.3.15 事务 o

```
145  -- 假设宠物主人号为 201，事务o
146  SELECT
147      PetNumber,
148      PetName,
149      PetDescription
150  FROM
151      Pet
152  WHERE
153      PetOwnerNumber = 201;
```

消息 摘要 结果 1 剖析 状态

PetNumber	PetName	PetDescription
1001	Buddy	Friendly golden retrieve

4.3.16 事务 p

```
155  --事务p
156  SELECT
157      m.MedicationName,
158      m.QuantityInStock,
159      m.StockLevel,
160      m.ReorderQuantity,
161      c.ClinicNumber
162  FROM
163      Medications m
164  JOIN
165      Clinic c ON m.ClinicNumber = c.ClinicNumber
166  WHERE
167      m.QuantityInStock <= m.StockLevel
168  ORDER BY
169      c.ClinicNumber;
```

消息 摘要 结果 1 剖析 状态

MedicationName	QuantityInStock	StockLevel	ReorderQuantity	ClinicNumber
Pain reliever	200	300	100	1

4.3.17 事务 q

```sql
--事务q
SELECT
    ClinicNumber,
    SUM(CASE WHEN Type != 'Surgical' THEN Price * QuantityInStock ELSE 0 END) AS NonSurgicalTotalValue,
    SUM(CASE WHEN Type = 'Surgical' THEN Price * QuantityInStock ELSE 0 END) AS SurgicalTotalValue
FROM
    Supplies
GROUP BY
    ClinicNumber
ORDER BY
    ClinicNumber;
```

消息 摘要 结果 1 剖析 状态

ClinicNumber	NonSurgicalTotalValue	SurgicalTotalValue
1	7500.00	0.00

5 实验结果分析

在设计数据库时，我们首先定义了实体和它们的属性，然后根据业务需求建立了实体之间的关系。通过将这些实体转换为表，并为每个表定义了主键和外键，我们创建了一个关系模型，它能够满足 Perfect Pets 的所有业务需求。

在概念模型阶段，我们确保了所有必要的信息都被考虑到，并且每个实体的属性都被适当地定义。在数据模型阶段，我们通过创建表和列来实现了概念模型，同时确保了数据的完整性和一致性。

通过实施外键约束，我们保证了数据之间的关系是正确的，例如，每个宠物都与一个宠物主人相关联，每个检查都与一个特定的宠物和兽医相关联。此外，我们还定义了一些特定的约束，如唯一性约束和检查约束，以确保数据的准确性。

在事务需求方面，我们的数据库设计支持了所有的维护和查询事务。例如，我们可以轻松地添加或更新诊所、员工、宠物主人、宠物、检查、诊治方案、宠物诊治、围栏、账单、供应和预约的信息。此外，我们还可以执行各种查询，如列出未支付的账单、查找特定日期的预约情况或计算特定条件下的统计数据。

总的来说，我们的数据库设计是全面的，能够满足 Perfect Pets 的所有业务需求，并且具有很好的可扩展性和可维护性。随着业务的发展，我们可以轻松地对数据库进行调整和优化，以适应新的需求。

6 实验源代码

6.1 创建表

```
-- 创建诊所表
CREATE TABLE Clinic (
    ClinicNumber INT PRIMARY KEY,
    Street VARCHAR(255),
    City VARCHAR(255),
    State VARCHAR(255),
    ZipCode VARCHAR(20),
    PhoneNumber VARCHAR(20),
    FaxNumber VARCHAR(20)
);

-- 创建员工表
CREATE TABLE Employee (
    EmployeeNumber INT PRIMARY KEY,
    Name VARCHAR(255),
    Street VARCHAR(255),
    City VARCHAR(255),
    State VARCHAR(255),
    ZipCode VARCHAR(20),
    PhoneNumber VARCHAR(20),
    BirthDate DATE,
    Gender CHAR(1),
    Position VARCHAR(255),
    SocialSecurityNumber VARCHAR(20),
    AnnualSalary DECIMAL(10, 2),
    ClinicNumber INT,
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber)
);

-- 创建宠物主人表
CREATE TABLE PetOwner (
    ClinicNumber INT,
    PetOwnerNumber INT,
    Name VARCHAR(255),
    Street VARCHAR(255),
    City VARCHAR(255),
    State VARCHAR(255),
    ZipCode VARCHAR(20),
```

```
    PhoneNumber VARCHAR(20),
    PRIMARY KEY (PetOwnerNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber)
);

-- 创建宠物表
CREATE TABLE Pet (
    ClinicNumber INT,
    PetNumber INT,
    PetName VARCHAR(255),
    PetType VARCHAR(255),
    PetDescription TEXT,
    BirthDate DATE,
    RegistrationDate DATETIME,
    PetStatus VARCHAR(255),
    PetOwnerNumber INT,
    PRIMARY KEY (PetNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber),
    FOREIGN KEY (PetOwnerNumber) REFERENCES
PetOwner(PetOwnerNumber)
);

-- 创建检查表
CREATE TABLE Checkup (
    CheckupNumber INT,
    ClinicNumber INT,
    CheckupDate DATE,
    Time TIME,
    EmployeeNumber INT,
    PetNumber INT,
    CheckupResultDescription TEXT,
    PRIMARY KEY (CheckupNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber),
    FOREIGN KEY (EmployeeNumber) REFERENCES
Employee(EmployeeNumber),
    FOREIGN KEY (PetNumber) REFERENCES Pet(PetNumber)
);

-- 创建宠物诊治表
CREATE TABLE PetTreatment (
    TreatmentPlanNumber INT PRIMARY KEY,
    TreatmentPlanDetails TEXT,
```

```
    Cost DECIMAL(10, 2),
    Bill VARCHAR(255)
);

-- 创建诊治方案表
CREATE TABLE TreatmentPlan (
    ClinicNumber INT,
    CheckupNumber INT,
    TreatmentPlanNumber INT,
    Date DATE,
    PetNumber INT,
    PrescriptionDescription TEXT,
    TreatmentQuantity INT,
    StartTime TIME,
    EndTime TIME,
    AdditionalNotes TEXT,
    PRIMARY KEY (TreatmentPlanNumber, ClinicNumber,
CheckupNumber),
    FOREIGN KEY (CheckupNumber) REFERENCES
Checkup(CheckupNumber),
    FOREIGN KEY (TreatmentPlanNumber) REFERENCES
PetTreatment(TreatmentPlanNumber),
    FOREIGN KEY (PetNumber) REFERENCES Pet(PetNumber)
);

-- 创建围栏表
CREATE TABLE Pen (
    ClinicNumber INT,
    PenNumber INT CHECK (PenNumber < 30),
    Capacity INT,
    Status VARCHAR(255),
    PRIMARY KEY (PenNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber)
);

-- 创建围栏使用表
CREATE TABLE PenUsage (
    ClinicNumber INT,
    PenNumber INT,
    PetNumber INT,
    CheckupNumber INT,
    EntryDate DATE,
```

```
    ExitDate DATE,
    PetInfo TEXT,
    PRIMARY KEY (PenNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber),
    FOREIGN KEY (PenNumber) REFERENCES Pen(PenNumber),
    FOREIGN KEY (PetNumber) REFERENCES Pet(PetNumber),
    FOREIGN KEY (CheckupNumber) REFERENCES Checkup(CheckupNumber)
);

-- 创建账单表
CREATE TABLE Bill (
    BillNumber INT PRIMARY KEY,
    BillDate DATE,
    PetOwnerNumber INT,
    PetNumber INT,
    CheckupNumber INT,
    ClinicNumber INT,
    TreatmentPlanNumber INT,
    TreatmentCost DECIMAL(10, 2),
    PaymentStatus VARCHAR(255),
    PaymentDate DATE,
    PaymentMethod VARCHAR(255),
    FOREIGN KEY (PetOwnerNumber) REFERENCES
PetOwner(PetOwnerNumber),
    FOREIGN KEY (PetNumber) REFERENCES Pet(PetNumber),
    FOREIGN KEY (CheckupNumber) REFERENCES
Checkup(CheckupNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber),
    FOREIGN KEY (TreatmentPlanNumber) REFERENCES
TreatmentPlan(TreatmentPlanNumber)
);

-- 创建用品表
CREATE TABLE Supplies (
    ItemNumber INT,
    ClinicNumber INT,
    ItemDescription TEXT,
    QuantityInStock INT,
    ReorderLevel INT,
    ReorderQuantity INT,
    Price DECIMAL(10, 2),
    Type VARCHAR(255),
```

```
    PRIMARY KEY (ItemNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber)
);

-- 创建药品表
CREATE TABLE Medications (
    MedicationNumber INT,
    ClinicNumber INT,
    MedicationName VARCHAR(255),
    MedicationDescription TEXT,
    Dosage VARCHAR(255),
    Prescription VARCHAR(255),
    QuantityInStock INT,
    StockLevel INT,
    ReorderQuantity INT,
    Price DECIMAL(10, 2),
    PRIMARY KEY (MedicationNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber)
);

-- 创建预约表
CREATE TABLE Appointment (
    ClinicNumber INT,
    AppointmentNumber INT,
    PetOwnerNumber INT,
    Name VARCHAR(255),
    PhoneNumber VARCHAR(20),
    PetNumber INT,
    PetType VARCHAR(255),
    AppointmentDate DATE,
    Time TIME,
    PRIMARY KEY (AppointmentNumber, ClinicNumber),
    FOREIGN KEY (ClinicNumber) REFERENCES Clinic(ClinicNumber),
    FOREIGN KEY (PetOwnerNumber) REFERENCES
PetOwner(PetOwnerNumber),
    FOREIGN KEY (PetNumber) REFERENCES Pet(PetNumber)
);

-- 创建物品用量表
CREATE TABLE Useage (
    ItemNumber INT,
    ClinicNumber INT,
```

```
    ItemName VARCHAR(255),
    SingleUsageAmount DECIMAL(10, 2),
    TotalUsage DECIMAL(10, 2),
    PRIMARY KEY (ItemNumber, ClinicNumber),
    FOREIGN KEY (ItemNumber, ClinicNumber) REFERENCES
Supplies(ItemNumber, ClinicNumber),
);
```

6.2 插入数据

```
INSERT INTO Clinic (ClinicNumber, Street, City, State, ZipCode,
PhoneNumber, FaxNumber) VALUES
(1, '123 Main St', 'Anytown', 'CA', '12345', '555-1234',
'555-5678'),
(2, '456 Elm St', 'Othertown', 'NY', '67890', '555-2345',
'555-6789'),
(3, '789 Birch St', 'Springfield', 'IL', '62704', '555-3456',
'555-6789'),
(4, '321 Pine St', 'Seattle', 'WA', '98101', '555-4567',
'555-7890'),
(5, '555 Oak Ave', 'Riverside', 'CA', '12347', '555-5555',
'555-6666'),
(6, '666 Pine Rd', 'Mountain View', 'CA', '94043', '555-6666',
'555-7777');

INSERT INTO Employee (EmployeeNumber,Name, Street, City, State,
ZipCode, PhoneNumber, BirthDate, Gender, Position,
SocialSecurityNumber, AnnualSalary, ClinicNumber) VALUES
(101, 'John Doe', '789 Oak St', 'Anytown', 'CA', '12345',
'555-4321', '1990-01-01', 'M', 'Vet', '123-45-6789', 50000.00, 1),
(102, 'Jane Smith', '321 Pine St', 'Othertown', 'NY', '67890',
'555-5432', '1992-05-15', 'F', 'Nurse', '987-65-4321', 40000.00,
2),
(103, 'Emily Davis', '987 Oak St', 'Springfield', 'IL', '62704',
'555-7654', '1985-08-15', 'F', 'Receptionist', '123-45-6789',
35000.00, 3),
(104, 'Michael Brown', '654 Cedar St', 'Seattle', 'WA', '98101',
'555-8765', '1978-03-22', 'M', 'Technician', '987-65-4321',
42000.00, 4),
(105, 'Samantha Johnson', '555 Elm St', 'Riverside', 'CA', '12347',
'555-7777', '1990-02-20', 'F', 'Vet Assistant', '111-22-3333',
38000.00, 5),
```

```
(106, 'Jacob Smith', '666 Cedar Blvd', 'Mountain View', 'CA',
'94043', '555-8888', '1985-07-30', 'M', 'Receptionist',
'222-33-4444', 36000.00, 6);

INSERT INTO PetOwner (ClinicNumber, PetOwnerNumber, Name, Street,
City, State, ZipCode, PhoneNumber) VALUES
(1, 201, 'Alice Johnson', '555 Maple Ave', 'Anytown', 'CA', '12345',
'555-9999'),
(1, 202, 'Bob Brown', '666 Cedar Rd', 'Anytown', 'CA', '12345',
'555-8888'),
(1, 203, 'Carol Taylor', '123 Apple St', 'Anytown', 'CA', '12345',
'555-9991'),
(1, 204, 'David Wilson', '456 Orange St', 'Anytown', 'CA', '12345',
'555-9992'),
(1, 205, 'Ella Thomas', '123 Maple St', 'Riverside', 'CA', '12347',
'555-9993'),
(1, 206, 'Franklin Lee', '456 Birch St', 'Mountain View', 'CA',
'94043', '555-9994');

INSERT INTO Pet (ClinicNumber, PetNumber, PetName, PetType,
PetDescription, BirthDate, RegistrationDate, PetStatus,
PetOwnerNumber) VALUES
(1, 1001, 'Buddy', 'Dog', 'Friendly golden retriever',
'2018-06-01', '2024-06-01 10:00:00', 'Healthy', 201),
(1, 1002, 'Whiskers', 'Cat', 'Playful tabby cat', '2019-07-15',
'2024-06-01 11:00:00', 'Healthy', 202),
(1, 1003, 'Mittens', 'Cat', 'Adorable calico cat', '2017-08-20',
'2024-06-05 09:00:00', 'Healthy', 203),
(1, 1004, 'Baxter', 'Dog', 'Loyal beagle', '2016-09-10',
'2024-06-05 10:00:00', 'Healthy', 204),
(1, 1005, 'Luna', 'Cat', 'Playful and energetic', '2018-03-15',
'2024-06-10 08:00:00', 'Healthy', 205),
(1, 1006, 'Charlie', 'Dog', 'Friendly and curious', '2017-11-28',
'2024-06-10 09:00:00', 'Healthy', 206);

INSERT INTO Checkup (CheckupNumber, ClinicNumber, CheckupDate,
Time, EmployeeNumber, PetNumber, CheckupResultDescription) VALUES
(3001, 1, '2024-06-02', '14:00:00', 101, 1001, 'Routine checkup,
all clear'),
(3002, 1, '2024-06-03', '15:00:00', 102, 1002, 'Vaccination
needed'),
```

```
(3003, 1, '2024-06-06', '09:00:00', 103, 1003, 'Regular checkup,
no issues found'),
(3004, 1, '2024-06-06', '10:00:00', 104, 1004, 'Tail injury, needs
follow-up'),
(3005, 1, '2024-06-10', '08:00:00', 105, 1005, 'Regular checkup,
recommended dental cleaning'),
(3006, 1, '2024-06-10', '09:00:00', 106, 1006, 'Vaccination due,
no other issues');

INSERT INTO PetTreatment (TreatmentPlanNumber,
TreatmentPlanDetails, Cost, Bill) VALUES
(5001, 'Annual vaccination', 50.00, 'Billed'),
(5002, 'Dental cleaning', 120.00, 'Pending'),
(5003, 'Tail injury treatment', 75.00, 'Billed'),
(5004, 'Cat allergy medication', 30.00, 'Pending'),
(5005, 'Dental cleaning for cats', 80.00, 'Billed'),
(5006, 'Vaccination package for dogs', 60.00, 'Billed');

INSERT INTO TreatmentPlan (ClinicNumber, CheckupNumber,
TreatmentPlanNumber, Date, PetNumber, PrescriptionDescription,
TreatmentQuantity, StartTime, EndTime, AdditionalNotes) VALUES
(1, 3001, 5001, '2024-06-02', 1001, 'Vaccination for rabies', 1,
'14:30:00', '15:00:00', 'No food after 8 PM'),
(1, 3002, 5002, '2024-06-03', 1002, 'Teeth cleaning and check',
1, '15:30:00', '16:30:00', 'Soft food for a week'),
(1, 3003, 5003, '2024-06-06', 1003, 'Medicinal cream for tail',
1, '09:30:00', '10:00:00', 'Apply cream twice a day'),
(1, 3004, 5004, '2024-06-06', 1004, 'Antihistamine for allergies',
2, '10:30:00', '11:00:00', 'Monitor for side effects'),
(1, 3005, 5005, '2024-06-10', 1005, 'Dental cleaning', 1,
'08:30:00', '09:30:00', 'Advise soft food for a few days'),
(1, 3006, 5006, '2024-06-10', 1006, 'Annual vaccination', 1,
'09:30:00', '10:00:00', 'No swimming for a week');

INSERT INTO Pen (ClinicNumber, PenNumber, Capacity, Status) VALUES
(1, 1, 10, 'Available'),
(1, 2, 5, 'Occupied'),
(1, 3, 8, 'Available'),
(1, 4, 6, 'Under Maintenance'),
(1, 5, 4, 'Available'),
(1, 6, 3, 'Occupied');
```

```
INSERT INTO PenUsage (ClinicNumber, PenNumber, PetNumber,
CheckupNumber, EntryDate, ExitDate, PetInfo) VALUES
(1, 1, 1001, 3001, '2024-06-02', '2024-06-03', 'Buddy stayed
overnight after checkup'),
(1, 2, 1002, 3002, '2024-06-03', '2024-06-04', 'Whiskers stayed
for dental cleaning'),
(1, 3, 1003, 3003, '2024-06-06', '2024-06-07', 'Mittens stayed for
observation'),
(1, 4, 1004, 3004, '2024-06-06', '2024-06-07', 'Baxter stayed for
tail treatment'),
(1, 5, 1005, 3005, '2024-06-10', '2024-06-11', 'Luna stayed for
dental cleaning'),
(1, 6, 1006, 3006, '2024-06-10', '2024-06-11', 'Charlie stayed for
vaccination');

INSERT INTO Bill (BillNumber, BillDate, PetOwnerNumber, PetNumber,
CheckupNumber, ClinicNumber, TreatmentPlanNumber, TreatmentCost,
PaymentStatus, PaymentDate, PaymentMethod) VALUES
(6001, '2024-06-04', 201, 1001, 3001, 1, 5001, 50.00, 'Paid',
'2024-06-04', 'Credit Card'),
(6002, '2024-06-05', 202, 1002, 3002, 1, 5002, 120.00, 'Unpaid',
NULL, 'Cash'),
(6003, '2024-06-07', 203, 1003, 3003, 1, 5003, 75.00, 'Paid',
'2024-06-07', 'Credit Card'),
(6004, '2024-06-08', 204, 1004, 3004, 1, 5004, 60.00, 'Unpaid',
NULL, 'Cash'),
(6005, '2024-06-11', 205, 1005, 3005, 1, 5005, 80.00, 'Paid',
'2024-06-11', 'Debit Card'),
(6006, '2024-06-11', 206, 1006, 3006, 1, 5006, 60.00, 'Paid',
'2024-06-11', 'Cash');

INSERT INTO Supplies (ItemNumber, ClinicNumber, ItemDescription,
QuantityInStock, ReorderLevel, ReorderQuantity, Price, Type)
VALUES
(7001, 1, 'Syringe', 200, 50, 100, 1.50, 'Medical'),
(7002, 1, 'Food for dogs', 150, 30, 50, 25.00, 'Food'),
(7003, 1, 'Bandages', 300, 100, 50, 2.00, 'Medical'),
(7004, 1, 'Cat toys', 150, 50, 20, 5.00, 'Toy'),
(7005, 1, 'Catnip', 200, 50, 100, 3.00, 'Toy'),
(7006, 1, 'Dog leashes', 150, 30, 20, 10.00, 'Accessory');
```

```
INSERT INTO Medications (MedicationNumber, ClinicNumber,
MedicationName, MedicationDescription, Dosage, Prescription,
QuantityInStock, StockLevel, ReorderQuantity, Price) VALUES
(8001, 1, 'Rabies Vaccine', 'Annual vaccination for dogs', '1ml',
'Administer once a year', 100, 20, 50, 20.00),
(8002, 1, 'Antibiotic', 'For treating bacterial infections',
'5mg/kg', 'As prescribed by vet', 80, 10, 30, 15.00),
(8003, 1, 'Pain reliever', 'For post-surgery pain', '10mg',
'Administer as needed', 200, 50, 100, 5.00),
(8004, 1, 'Antifungal cream', 'For skin infections', 'Apply twice
daily', 'As prescribed by vet', 180, 30, 60, 8.00),
(8005, 1, 'Heartworm prevention', 'Monthly oral medication',
'Based on weight', 'Administer once a month', 100, 20, 50, 15.00),
(8006, 1, 'Flea treatment', 'Topical application', 'As directed',
'Apply every 30 days', 80, 10, 40, 12.00);

INSERT INTO Appointment (ClinicNumber, AppointmentNumber,
PetOwnerNumber, Name, PhoneNumber, PetNumber, PetType,
AppointmentDate, Time) VALUES
(1, 9001, 201, 'Alice Johnson', '555-9999', 1001, 'Dog',
'2024-06-10', '10:00:00'),
(1, 9002, 202, 'Bob Brown', '555-8888', 1002, 'Cat', '2024-06-11',
'11:00:00'),
(1, 9003, 203, 'Carol Taylor', '555-9991', 1003, 'Cat',
'2024-06-12', '13:00:00'),
(1, 9004, 204, 'David Wilson', '555-9992', 1004, 'Dog',
'2024-06-13', '14:00:00'),
(1, 9005, 205, 'Ella Thomas', '555-9993', 1005, 'Cat', '2024-06-14',
'08:00:00'),
(1, 9006, 206, 'Franklin Lee', '555-9994', 1006, 'Dog',
'2024-06-14', '09:00:00');

INSERT INTO Useage (ItemNumber, ClinicNumber, ItemName,
SingleUsageAmount, TotalUsage) VALUES
(7001, 1, 'Syringe', 1.50, 300.00), -- Assuming 200 syringes have
been used
(7002, 1, 'Food for dogs', 25.00, 3750.00), -- Assuming 150 kg of
food have been used
(7003, 1, 'Bandages', 2.00, 600.00), -- Assuming 300 bandages have
been used
(7004, 1, 'Cat toys', 5.00, 750.00), -- Assuming 150 toys have been
used
```

```
(7005, 1, 'Catnip', 3.00, 600.00), -- Assuming 200 units of catnip
have been used
(7006, 1, 'Dog leashes', 10.00, 1500.00); -- Assuming 150 leashes
have been used
```

6.3 事务查询

```
--a 事务
SELECT e.Name AS ManagerName, c.Street, c.City, c.State, c.ZipCode,
c.PhoneNumber
FROM Employee e
JOIN Clinic c ON e.ClinicNumber = c.ClinicNumber
WHERE e.Position LIKE '%Manager%'
ORDER BY c.ClinicNumber;

--事务 b
SELECT
    po.Name AS PetOwnerName,
    po.PetOwnerNumber,
    p.PetName,
    p.PetType,
    p.PetDescription
FROM
    PetOwner po
JOIN
    Pet p ON po.PetOwnerNumber = p.PetOwnerNumber;


-- 假设宠物号为 1001 事务 c
SELECT
    *
FROM
    Checkup
WHERE
    PetNumber = 1001;

-- 假设检查号为 3001,事务 d
SELECT
    *
FROM
    TreatmentPlan
WHERE
    CheckupNumber = 3001;
```

```sql
-- 假设宠物主人号为 201，事务 e
SELECT
    *
FROM
    Bill
WHERE
    PetOwnerNumber = 202 AND PaymentStatus = 'Unpaid';

-- 假设日期为 '2024-06-26'，事务 f
SELECT
    *
FROM
    Bill
WHERE
    BillDate <= '2024-06-26' AND PaymentStatus = 'Unpaid'
ORDER BY
    BillNumber;

-- 假设日期为 '2024-06-26'
SELECT
    p.PenNumber,
    p.Capacity,
    p.Status
FROM
    Pen p
JOIN
    Clinic c ON p.ClinicNumber = c.ClinicNumber
JOIN
    PenUsage pu ON p.PenNumber = pu.PenNumber AND p.ClinicNumber
= pu.ClinicNumber
WHERE
    c.State = 'CA' AND
    p.Status = 'Available' AND
    pu.EntryDate < '2024-06-26' -- 确保围栏在给定日期之前是可预订的
ORDER BY
    c.ClinicNumber,
    p.PenNumber;

--事务 h
SELECT
    c.ClinicNumber,
```

```
    SUM(e.AnnualSalary / 12) AS TotalMonthlySalary
FROM
    Employee e
JOIN
    Clinic c ON e.ClinicNumber = c.ClinicNumber
GROUP BY
    c.ClinicNumber
ORDER BY
    c.ClinicNumber;
--事务 i
SELECT
    MAX(TreatmentCost) AS MaxCost,
    MIN(TreatmentCost) AS MinCost,
    AVG(TreatmentCost) AS AvgCost
FROM
    Bill;

--事务 j
SELECT
    PetType,
    COUNT(*) AS TotalPets
FROM
    Pet
GROUP BY
    PetType
ORDER BY
    PetType;

--事务 k
SELECT
    EmployeeNumber,
    Name
FROM
    Employee
WHERE
    Position IN ('Vet', 'Nurse') AND
    YEAR(BirthDate) <= 1974; -- Assuming the current year is 2024
ORDER BY
    Name;

-- 假设诊所号为 1，日期为 '2024-06-14',事务 l
SELECT
```

```
    *
FROM
    Appointment
WHERE
    ClinicNumber = 1 AND AppointmentDate = '2024-06-14';

--事务 m
SELECT
    ClinicNumber,
    COUNT(*) AS TotalPets
FROM
    Pet
GROUP BY
    ClinicNumber
ORDER BY
    ClinicNumber;

--事务 n，改为 2019-2023 年
SELECT
    *
FROM
    Bill
WHERE
    YEAR(BillDate) BETWEEN 2019 AND 2023
ORDER BY
    BillNumber;

-- 假设宠物主人号为 201，事务 o
SELECT
    PetNumber,
    PetName,
    PetDescription
FROM
    Pet
WHERE
    PetOwnerNumber = 201;

--事务 p
SELECT
    m.MedicationName,
    m.QuantityInStock,
    m.StockLevel,
```

```
    m.ReorderQuantity,
    c.ClinicNumber
FROM
    Medications m
JOIN
    Clinic c ON m.ClinicNumber = c.ClinicNumber
WHERE
    m.QuantityInStock <= m.StockLevel
ORDER BY
    c.ClinicNumber;

--事务 q
SELECT
    ClinicNumber,
    SUM(CASE WHEN Type != 'Surgical' THEN Price * QuantityInStock
ELSE 0 END) AS NonSurgicalTotalValue,
    SUM(CASE WHEN Type = 'Surgical' THEN Price * QuantityInStock
ELSE 0 END) AS SurgicalTotalValue
FROM
    Supplies
GROUP BY
    ClinicNumber
ORDER BY
    ClinicNumber;
```

7 小组分工

王博钊：负责完成上机实验部分，辅助完成实验报告的撰写

代文博：负责撰写实验报告，辅助完成上机实验部分