Midterm - CS5200 DBMS 2024 Spring

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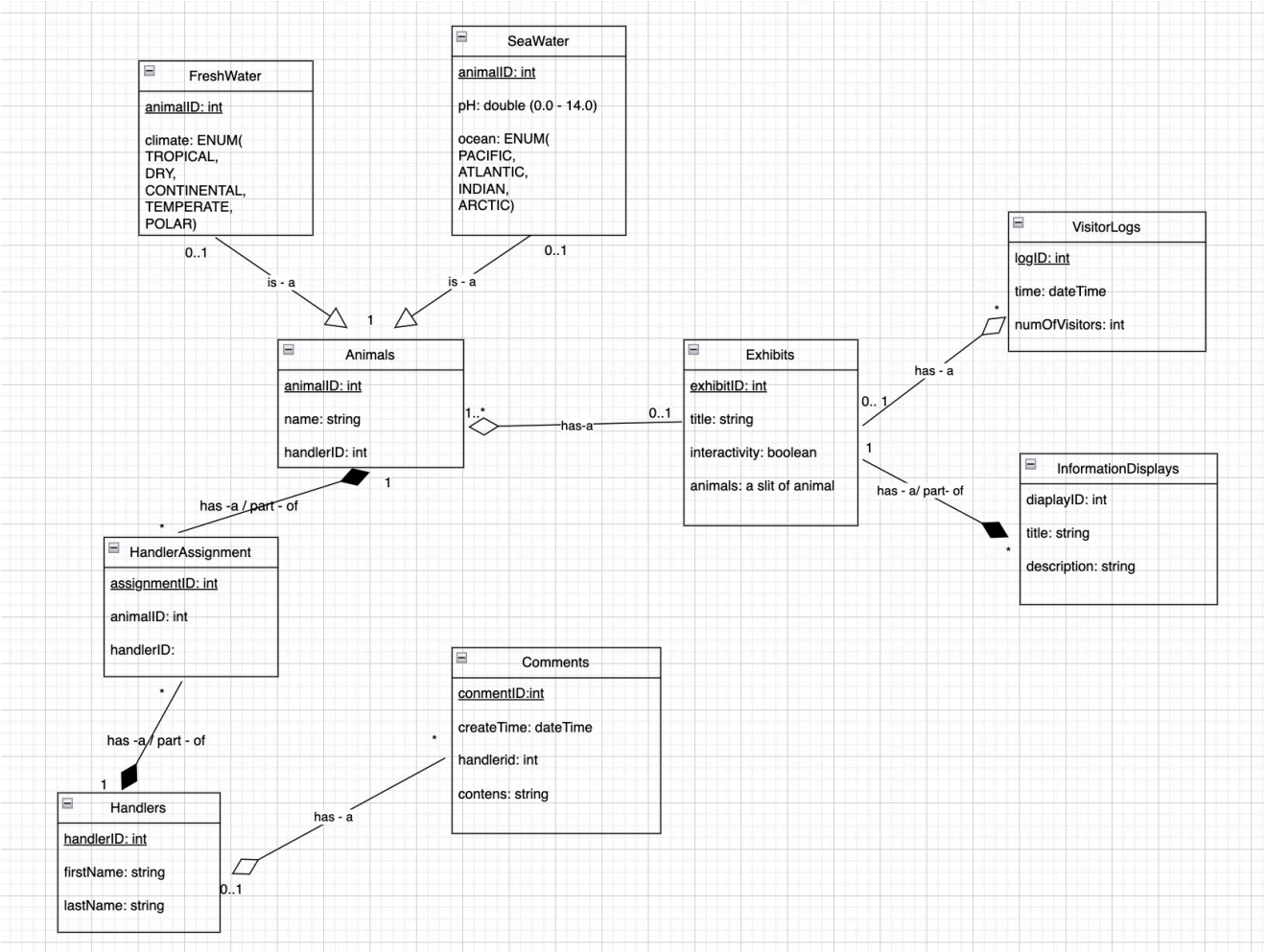
1. Database design: draw the UML Diagram for the data model. (35 pts)



2. Database Design: create the tables for the relational data model and modify data. (30 pts)

2.1

```
CREATE SCHEMA IF NOT EXISTS DocumentApplication;
USE DocumentApplication;


DROP TABLE IF EXISTS EditMap;
DROP TABLE IF EXISTS Slides;
DROP TABLE IF EXISTS Spreadsheets;
DROP TABLE IF EXISTS Documents;
DROP TABLE IF EXISTS Users;
```

```
CREATE TABLE Users (
    UserName VARCHAR(255) NOT NULL,
    First VARCHAR(255),
    Last VARCHAR(255),
    CONSTRAINT pk_Users_UserName PRIMARY KEY (UserName)
);


CREATE TABLE Documents (
    FileName VARCHAR(255) NOT NULL,
    Title VARCHAR(255) NOT NULL,
    Created TIMESTAMP NOT NULL DEFAULT CURRENT_TIMESTAMP,
     CONSTRAINT pk_Documents_FileName PRIMARY KEY (FileName)
);


CREATE TABLE Slides (
    FileName VARCHAR(255) NOT NULL,
    SlideCount INT NOT NULL DEFAULT 0,
    CONSTRAINT pk_Slides_FileName PRIMARY KEY (FileName),
    CONSTRAINT fk_Slides_FileName FOREIGN KEY (FileName) REFERENCES
Documents(FileName)
);


CREATE TABLE Spreadsheets (
    FileName VARCHAR(255) NOT NULL,
    RowCount INT NOT NULL DEFAULT 0,
    ColumnCount INT NOT NULL DEFAULT 0,
    CONSTRAINT pk_Spreadsheets_FileName  PRIMARY KEY (FileName),
    CONSTRAINT fk_Spreadsheets_FileName FOREIGN KEY (FileName) REFERENCES
Documents(FileName)
);


CREATE TABLE EditMap (
    EditId INT AUTO_INCREMENT,
    UserName VARCHAR(255) NOT NULL,
    FileName VARCHAR(255) NOT NULL,
    PRIMARY KEY (EditId),
    UNIQUE (UserName, FileName),
    CONSTRAINT fk_Users_FileName FOREIGN KEY (UserName) REFERENCES
Users(UserName),
    CONSTRAINT fk_Documents_FileName FOREIGN KEY (FileName) REFERENCES
Documents(FileName)
);
```

```
-- 2.2.1
INSERT INTO Users (UserName, First, Last) VALUES ('Jae', 'First1', 'Last1');
INSERT INTO Users (UserName, First, Last) VALUES ('Lia', 'First2', 'Last2');

-- 2.2.2
INSERT INTO Documents (FileName, Title) VALUES ('deck1', 'draft');
INSERT INTO Slides (FileName, SlideCount) VALUES ('deck1', 10);

-- 2.2.3
INSERT INTO EditMap (UserName, FileName) VALUES ('Jae', 'deck1');
INSERT INTO EditMap (UserName, FileName) VALUES ('Lia', 'deck1');

-- 2.2.4
UPDATE Documents SET Title = 'final' WHERE FileName = 'deck1';

-- 2.2.5
LOAD DATA LOCAL INFILE '/tmp/users.csv'
INTO TABLE Users
FIELDS TERMINATED BY ','
ENCLOSED BY '"'
LINES TERMINATED BY '\n'
IGNORE 1 LINES;
```

3. Working with data: write SELECT statements to answer the questions. (35 pts)

```
-- 3.1
SELECT
   P.Manufacturer,
   P.Model,
   COUNT(SH.ServiceId) AS CNT
FROM
   Planes P
INNER JOIN ServiceHistory SH ON P.PlaneId = SH.PlaneId
GROUP BY
   P.Manufacturer,
   P.Model
ORDER BY
   COUNT(SH.ServiceId) DESC
LIMIT 10;


-- 3.2
SELECT
   R.UserName,
   SUM(F.Distance) AS TotalDistance
FROM
   Reservations R
```

```
INNER JOIN Flights F ON R.FlightId = F.FlightId
WHERE
    F.ActualDeparture > TIMESTAMP '2024-01-01' AND
    F.Canceled = FALSE
GROUP BY
    R.UserName
ORDER BY
    SUM(F.Distance) DESC
LIMIT 10;


-- 3.3
SELECT
    P.PlaneId,
    SUM(F.Distance) AS TotalDistance
FROM
    Planes P
LEFT JOIN Flights F ON P.PlaneId = F.PlaneId
    AND F.ActualDeparture >= '2024-01-01'
    AND F.ActualDeparture < '2024-02-01'
    AND F.Canceled = FALSE
GROUP BY
    P.PlaneId;


-- 3.4
SELECT
    (COUNT(CASE WHEN F.ActualArrival > F.ScheduledArrival OR F.Canceled = TRUE THEN 1
END) * 100.0 / COUNT(*)) AS PercentageLateOrCanceled
FROM
    Flights F;


-- 3.5
SELECT
    R.UserName,
    COUNT(*) AS NumberOfReservations
FROM
    Reservations R
GROUP BY
    R.UserName
ORDER BY
    NumberOfReservations DESC
LIMIT 10;


-- 3.6
SELECT
    T.UserName,
    SUM(IFP.Amount) AS TotalSpent
```

```
FROM
    Travelers T
LEFT JOIN InFlightPurchases IFP ON T.UserName = IFP.UserName
GROUP BY
    T.UserName;

-- 3.7
SELECT
    R.UserName,
    IFNULL(SUM(IFP.Amount), 0) / COUNT(R.ReservationId) AS AvgAmountSpentPerReservation
FROM
    Reservations R
LEFT JOIN InFlightPurchases IFP ON R.UserName = IFP.UserName
GROUP BY
    R.UserName
HAVING
    COUNT(R.ReservationId) > 0;
```