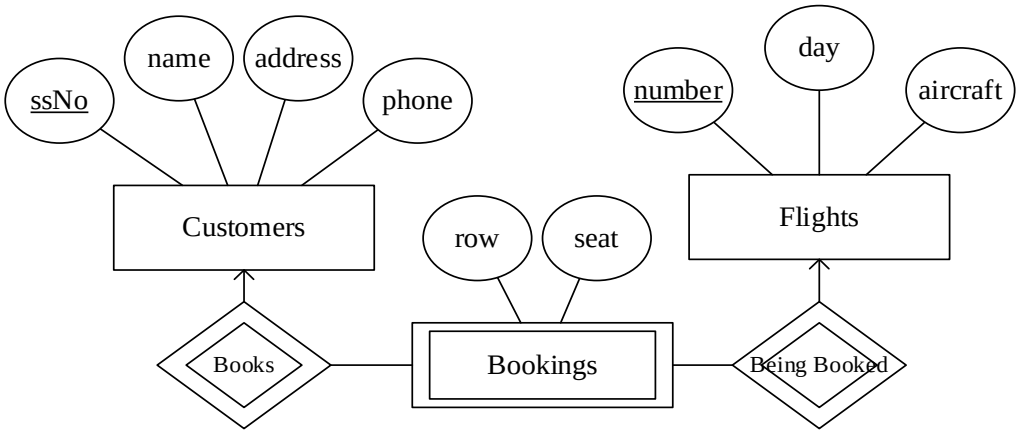
CSC370 (Database Systems) - Summer 2013, MIDTERM

Due: July 18, 2013, Starts: 12:30PM, Ends: 1:20PM, CUNNINGHAM#146, MARKS: 60

1. Write the SQL statements to create the database from this E-R diagram. (10 marks)

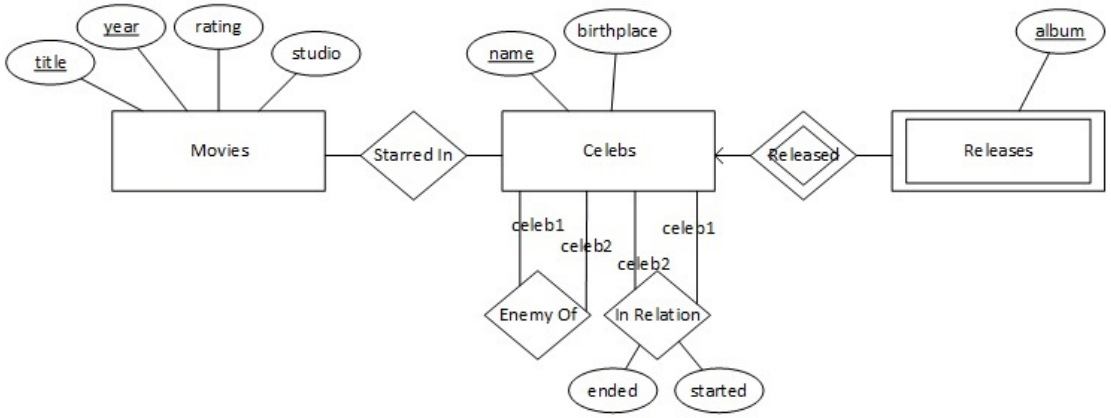



```
CREATE TABLE Customers (
ssNo CHAR(15) PRIMARY KEY,
name CHAR(100),
address  VARCHAR(250),
phone CHAR(15));

CREATE TABLE Flights (
number CHAR(20) PRIMARY KEY,
day DATE,
aircraft CHAR(25));

CREATE TABLE Bookings(
row INTEGER,
seat CHAR(2),
customer CHAR(15) REFERENCES Customers ON DELETE CASCADE,
flight CHAR(20) REFERENCES Flights ON DELETE CASCADE);
```

2. What is the E-R diagram of this schema? (10 marks)
Movies (title, year, rating, studio), **Celebs** (name, birthplace), **StarredIn** (celeb, movie) **Released** (celeb, album), **Relationships** (celeb1, celeb2, started, ended), **Enemies** (celeb1, celeb2)



3. Write SQL statements to find the movies where a celeb co-starred with another celeb he/she is (or has been) in relationship with. The result should be (celeb1 celeb2 movie) triples. (10 marks)

SELECT celeb1, celeb2, S1.movie AS movie
FROM StarredIn S1, StarredIn S2, Relationships
WHERE S1.movie=S2.movie AND ((S1.celeb=celeb1 AND S2.celeb=celeb2) OR (S1.celeb=celeb2 AND S2.celeb=celeb1))

4. Write SQL statements to find the celebs that have been in relationship with the same celeb. The result should be (celeb1, celeb2, celeb3) triples, meaning that celeb1 and celeb2 have been in relationship with celeb3. (10 marks)

```
(SELECT R1.celeb1 AS celeb1, R2.celeb1 AS celeb2, R1.celeb2 AS celeb3
FROM Relationships R1, Relationships R2
WHERE R1.celeb1<R2.celeb1 AND R1.celeb2=R2.celeb2)
UNION
(SELECT R1.celeb2 AS celeb1, R2.celeb2 AS celeb2, R1.celeb1 AS celeb3
FROM Relationships R1, Relationships R2
WHERE R1.celeb2<R2.celeb2 AND R1.celeb1=R2.celeb1)
```

5. Relations R and S are as follows:
   R(A,B): {(0,1), (2,3), (0,1), (2.4), (3,4), (3,1), (2,9)}
   S(B,C): {(0,1), (2,4), (2,3), (3,4), (0,2), (2,5), (3,4)}
   Compute $\gamma_{A,MAX(C)}(R \triangleright^{O} \triangleleft_{L} S)$ (10 marks)

Natural Left Outer Join

A	B	C
0	1	NULL
2	3	4
0	1	NULL
2	4	NULL
3	4	NULL
3	1	NULL
2	9	NULL

Group By A

A	B	C
2	3	4
2	4	NULL
2	9	NULL
0	1	NULL
0	1	NULL
3	4	NULL
3	1	NULL

MAX (C) in each group

A	MAX (C)
2	4
0	NULL
3	NULL

6. The semijoin of relations R and S, written $R \rhd\!< S$, is the set of tuples t in R such that there is at least one tuple in S that agrees with t in all attributes that R and S have in common. Give three different expressions in relational algebra that are equivalent to $R \rhd\!< S$. (10 marks)

   Assume common attributes between R and S are A=(a_1, a_2, …., a_n) and the other attributes in R are B=(b_1, b_2, …., b_m)

   i) $\Pi_{b_1,b_2,...,b_m,R.a_1,R.a_2,...,R.a_n} \sigma_{R.a_1=S.a_1 AND .... AND R.a_n=S.a_n} (R \times S)$

   ii) $R \rhd\!\lhd (\Pi_A S)$

   iii) $\sigma_{A..IN..(\Pi_A S)} R$

Free Space