CSE 414

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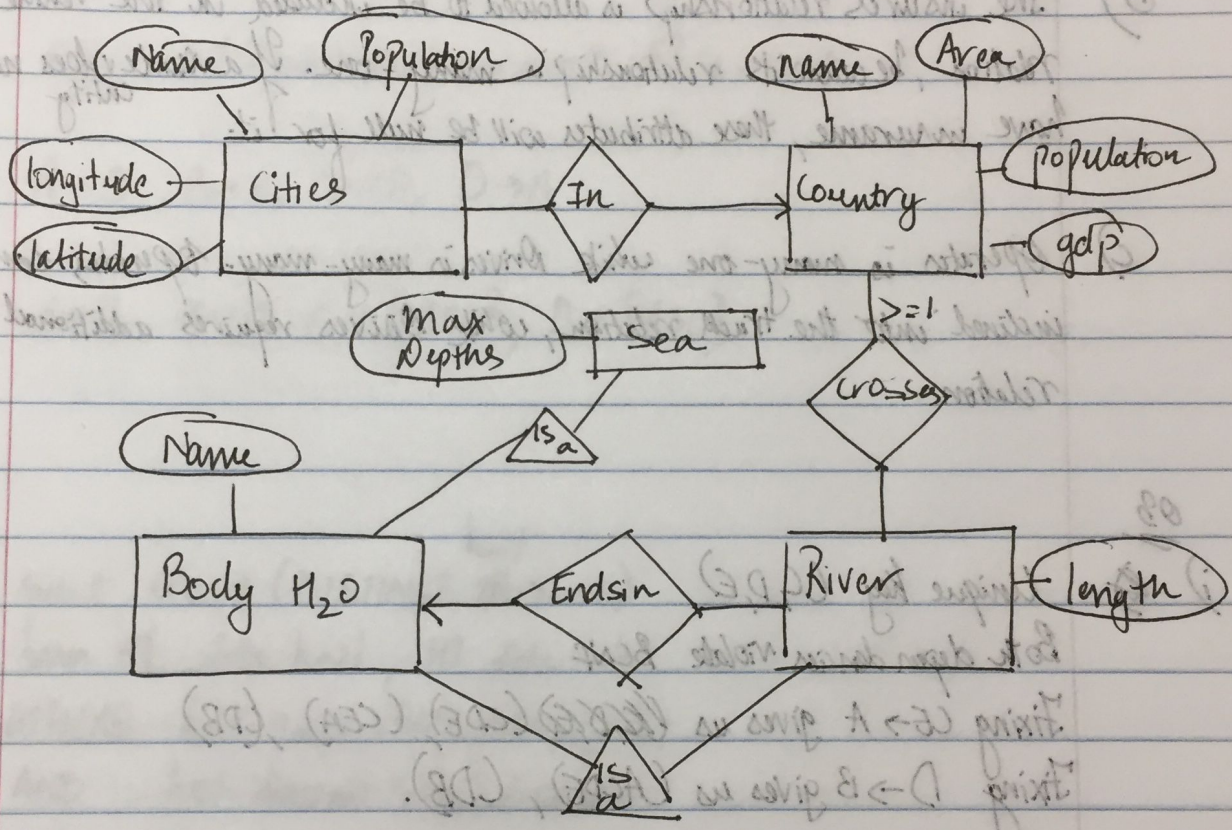
Homework 7

Q1



Q2

a) Insurance Co (name, phone)

Driver (licenseNo, Person.ssn)

Vehicle (licensePlate, year, InsuranceCo.name, maxLiability, maxLossDamage, Person.ssn)

Car (Vehicle.LicensePlate, make)

Person (ssn, name)

Truck (Vehicle.licensePlate, capacity, ProfessionalDriver.Driver.licenseNo)

ProfessionalDriver(Driver.licenseNo, medicalHistory)
NonProfessionalDriver(Driver.licenseNo)
Drives(Car.Vehicle.licensePlate, NonProfessionalDriver.Driver.licenseNo)

b) The 'insures' relationship is allowed to be included in the Vehicle relation, because its relationship is many-one. If a vehicle entity does not have insurance, these attributes will be null for it.

c) Operates is many-one while Drives is many-many. Operates can be included into the truck relation, while Drives requires additional relation.

Q3

i) Unique key (C, D, E)
Both dependencies violate BCNF
Fixing CE → A gives us (C, D, E) (CDE), (CEA), (DB)
Fixing D → B gives us (ACDE), (DB).

ii) Keys for this relation are (A, C, D), (B, C, D) and (C, D, E)
All dependencies violate BCNF.
Fixing BC → A will gives us (BCDE), (BCA)
Dependency A → E is gone, therefore this is not a dependency preserving decomposition.

Fixing $DE \rightarrow B$ will give us (CDE), (DEB), (BCA) which will be the final decomposition.

04

a) Only trivial dependencies can exist. $\{\}$ is a set.

b) $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, $D \rightarrow A$

c) $A \rightarrow B$, $B \rightarrow A$, $C \rightarrow \{ABD\}$, $D \rightarrow \{ABC\}$

05

ii)

```
Select COUNT (DISTINCT hw1.name)
from H1_data hw1, H1_data hw2
WHERE hw1.name = hw2.data
AND   hw1.discount != hw2.discount
# Answer: 86

SELECT COUNT(DISTINCT hw1.name)
FROM H1_data hw1, H1_data hw2
WHERE hw1.name = hw2.name
AND   hw1.month != hw2.month;
# Answer: 86
```

iii) The BCNF decomposition is ...

R1 (name, price)

R2 (name, month)

R3 (month, discount)

```
CREATE TABLE priceName (--R1
name varchar (20) primary key);

CREATE TABLE discountMonth (--R3
month varchar (20) primary key,
discount varchar (20));

CREATE TABLE monthName (--R2
name varchar(20) references priceName (name),
month varchar(20) references discountMonth (month));
```

iv)

```
insert into PriceName
SELECT DISTINCT name, cast (Price as real) as price
FROM H1_data;

insert into DiscountMonth
SELECT DISTINCT Month, discount
FROM H1_data;

insert into MonthName
SELECT name, month
FROM H1_data;
```