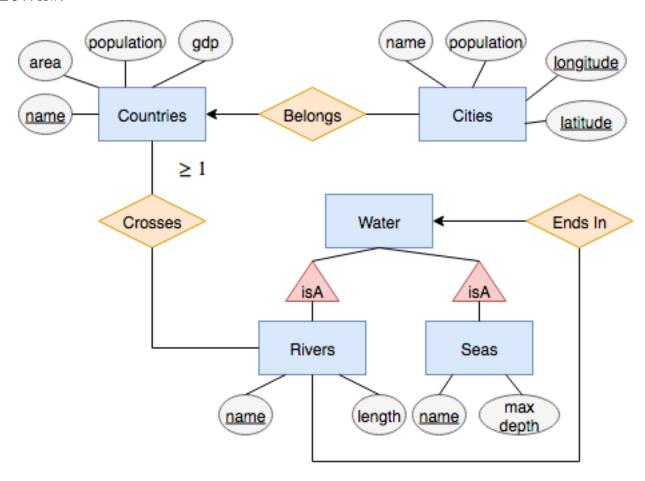
CSE 344 Hw7



```
-- The relationship 'insures' is represented in the Vehicles table
-- where there is an attribute called maxLiability. Since this is a
-- many to one relationship, there is no separate relations for 'insures'.

-- The relationship 'drives' is a many to many relation so it has its own
-- separate table whereas the relationship 'operates' is a many to one
-- relation and so it's incorporated in the Truck table.

CREATE TABLE Vehicle (
   licencePlate varchar(50) PRIMARY KEY,
   year integer,
   maxLiability float,
   name varchar(50),
   ssn integer,
   FOREIGN KEY (name) REFERENCES InsuranceCo(name)
   FOREIGN KEY (ssn) REFERENCES Person(ssn)
);
```

```
CREATE TABLE Car (
 make varchar(50),
 lp varchar(50),
 FOREIGN KEY (lp) REFERENCES Vehicle(licencePlate)
);
CREATE TABLE Truck (
 capaciy varchar(50),
 lp varchar(50),
 pd_ssn integer,
 FOREIGN KEY (lp) REFERENCES Vehicle(licensePlate),
 FOREIGN KEY (pd_ssn) REFERENCES ProfessionalDriver(pd_ssn)
);
CREATE TABLE InsuranceCo (
 name varchar(50) PRIMARY KEY,
 phone integer
);
CREATE TABLE Person (
 ssn integer PRIMARY KEY,
 name varchar(50)
);
CREATE TABLE Driver (
 driverID integer,
 d_ssn integer,
 FOREIGN KEY (d_ssn) REFERENCES Person(ssn)
);
CREATE TABLE NonProfessionalDriver (
 nd_ssn integer,
 FOREIGN KEY (nd_ssn) REFERENCES Driver(d_ssn)
);
CREATE TABLE ProfessionalDriver (
 medicalHistory varchar(50),
 pd_ssn integer,
 FOREIGN KEY (pd_ssn) REFERENCES Driver(d_ssn)
);
CREATE TABLE Drives (
 nd_ssn integer REFERENCES NonProfessionalDriver,
 lp varchar(50) REFERENCES Car,
 PRIMARY KEY (nd_ssn, lp)
);
```

3. R(A,B,C,D,E) with functional dependencies $D \rightarrow B$, $CE \rightarrow A$.

Use $D \rightarrow B$:

Decompose R into R1(D, B) and T(A, C, D, E)

T violates $CE \rightarrow A$ so we need to further decompose T

Use $CE \rightarrow A$:

Decompose T into R2(A, C, E) and R3(C, D, E)

Final relations: R1(\underline{D} , B), R2(\underline{C} , \underline{E} , A), and R3(\underline{D} , \underline{C} , \underline{E})

S(A,B,C,D,E) with functional dependencies $A \rightarrow E$, $BC \rightarrow A$, $DE \rightarrow B$.

Use DE \rightarrow B:

Decompose S into S1(D, E, B) and T(A, C, D, E)

T violates $A \rightarrow E$ so we need to further decompose T

Use $A \rightarrow E$:

Decompose T into S2(A, E) and S3(A, C, D)

Final relations: $S1(\underline{D}, \underline{E}, B)$, $S2(\underline{A}, E)$, and $S3(\underline{A}, C, D)$

4. All sets of attributes are closed.

Functional Dependencies: A \rightarrow BCD, B \rightarrow ACD, C \rightarrow ABD, and D \rightarrow ABC

The only closed sets are {} and {A,B,C,D}.

Functional Dependencies: $A \rightarrow A, B \rightarrow B, C \rightarrow C$, and $D \rightarrow D$

The only closed sets are {}, {A,B}, and {A,B,C,D}

Functional Dependencies: $A \rightarrow B, B \rightarrow A, C \rightarrow DAB$, and $D \rightarrow CAB$