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Step 2)
2 Relations from the first step:

```
create table Divides_Into(
  departmentID INTEGER NOT NULL,
  hospitalName VARCHAR(50),
  PRIMARY KEY(hospitalName, departmentID),
  FOREIGN KEY(hospitalName) REFERENCES Hospital(hospitalName) ON DELETE NO
ACTION,
  FOREIGN KEY(departmentID) REFERENCES Department(departmentID) ON DELETE NO
ACTION);


create table Doctor_WORKS_IN (
  profession VARCHAR(70),
  Doctor_SSN VARCHAR(50),
  experience INTEGER,
  hospitalName VARCHAR(50) NOT NULL,
  PRIMARY KEY(Doctor_SSN),
  FOREIGN KEY(Doctor_SSN) REFERENCES Person(SSN) ON DELETE NO ACTION,
  FOREIGN KEY(hospitalName) REFERENCES Hospital(hospitalName) ON DELETE NO
ACTION);
```

As requested, selected relations are connected through a primary key and a foreign key.
Moreover, the hospital name component of the Hospital_Divides_Into is the primary key in that
table but also it is a foreign key for the Doctor_WORKS_IN table.

Step 3)
Inserted 10 rows to each table. Also, inserted required tables to get a more accurate result.
insert into Hospital values("+90 216 578 58 66", "Kadikoy", "Acıbadem Kadikoy");
insert into Hospital values("+90 212 444 58 66", "Maslak", "Acıbadem Maslak");
insert into Hospital values("+90 212 338 58 66", "Zeytinburnu", "Koç University Hospital");
insert into Hospital values("+90 212 655 58 66", "Avcılar", "Istanbul University Cerrahpaşa
Faculty of Medicine");
insert into Hospital values("+90 212 782 58 66", "Avcılar", "Istanbul University Istanbul Faculty
of Medicine");
insert into Hospital values("+90 216 986 58 66", "Altunizade", "Academic Hospital");
insert into Hospital values("+90 212 233 58 66", "Yesilkoy", "Acıbadem International Hospital");
insert into Hospital values("+90 216 120 58 66", "Bakırkoy", "Acıbadem Bakırkoy");

```sql
insert into Hospital values("+90 216 132 58 66", "Nisantasi", "American Hospital");
insert into Hospital values("+90 216 154 58 66", "Avcılar", "Avcılar Hospital");

insert into Department values("1","+90 216 578 58 66","1","Cardiology");
insert into Department values("2","+90 212 444 58 66","2","Dermatology");
insert into Department values("3","+90 212 338 58 66","3","Endocrinology");
insert into Department values("4","+90 212 655 58 66","4","Gastroenterology");
insert into Department values("5","+90 212 782 58 66","5","Hematology");
insert into Department values("6","+90 216 986 58 66","6","Infectious Disease");
insert into Department values("7","+90 212 233 58 66","7","Nephrology");
insert into Department values("8","+90 216 120 58 66","8","Neurology");
insert into Department values("9","+90 216 132 58 66","9","Oncology");
insert into Department values("10","+90 216 154 58 66","10","Orthopedics");

insert into Divides_Into values("1", "Acıbadem Kadikoy");
insert into Divides_Into values("2", "Acıbadem Maslak");
insert into Divides_Into values("3", "Koç University Hospital");
insert into Divides_Into values("4", "Istanbul University Cerrahpaşa Faculty of Medicine");
insert into Divides_Into values("5", "Istanbul University Istanbul Faculty of Medicine");
insert into Divides_Into values("6", "Academic Hospital");
insert into Divides_Into values("7", "Acıbadem International Hospital");
insert into Divides_Into values("8", "Acıbadem Bakırkoy");
insert into Divides_Into values("9", "American Hospital");
insert into Divides_Into values("10", "Avcılar Hospital");

insert into person values('Demirhan Izer ', '27' ,'M','253 888 55 355');
insert into person values('Kadir Izer','22','M','987 654 32 109');
insert into person values('Ilter Akgun','19','M','567 890 12 345');
insert into person values('Utku Akgun','32','M','876 543 21 098');
insert into person values('Kerem Kiranbagli','47','M','234 567 89 012');
insert into person values('Mert Coskuner','55','M','789 012 34 567');
insert into person values('Emre Coskuner','33','M','456 789 01 234');
insert into person values('Ahmet Emre Eser ','22','M','345 678 90 123');
insert into person values('Erdem Ozcan','63','M','210 987 65 432');
insert into person values('Faruk Kara','11','M','654 321 09 876');

insert into Doctor_WORKS_IN values("Cardiology", "253 888 55 355","1", "Acıbadem Kadikoy");
insert into Doctor_WORKS_IN values("Cardiology", "987 654 32 109","2", "Acıbadem Kadikoy");
insert into Doctor_WORKS_IN values("Endocrinology", "567 890 12 345","3", "Koç University Hospital");
insert into Doctor_WORKS_IN values("Gastroenterology", "876 543 21 098","4", "Istanbul University Cerrahpaşa Faculty of Medicine");
insert into Doctor_WORKS_IN values("Hematology", "234 567 89 012","5", "Istanbul University Istanbul Faculty of Medicine");
```

insert into Doctor_WORKS_IN values("Infectious Disease", "789 012 34 567","6", "Academic Hospital");
insert into Doctor_WORKS_IN values("Nephrology", "456 789 01 234","7", "Acıbadem International Hospital");
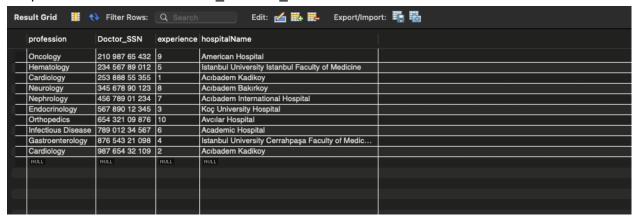insert into Doctor_WORKS_IN values("Neurology", "345 678 90 123","8", "Acıbadem Bakırkoy");
insert into Doctor_WORKS_IN values("Oncology", "210 987 65 432","9", "American Hospital");
insert into Doctor_WORKS_IN values("Orthopedics", "654 321 09 876","10", "Avcılar Hospital");

Step 4)

Snapshot of select * from Divides_Into:

departmentID	hospitalName
1	Acıbadem Kadikoy
2	Acıbadem Maslak
3	Koç University Hospital
4	Istanbul University Cerrahpaşa Faculty of Medic…
5	Istanbul University Istanbul Faculty of Medicine
6	Academic Hospital
7	Acıbadem International Hospital
8	Acıbadem Bakırkoy
9	American Hospital
10	Avcılar Hospital

Snapshot of select * from Doctor_WORKS_IN:

profession	Doctor_SSN	experience	hospitalName
Oncology	210 987 65 432	9	American Hospital
Hematology	234 567 89 012	5	Istanbul University Istanbul Faculty of Medicine
Cardiology	253 888 55 355	1	Acıbadem Kadikoy
Neurology	345 678 90 123	8	Acıbadem Bakırkoy
Nephrology	456 789 01 234	7	Acıbadem International Hospital
Endocrinology	567 890 12 345	3	Koç University Hospital
Orthopedics	654 321 09 876	10	Avcılar Hospital
Infectious Disease	789 012 34 567	6	Academic Hospital
Gastroenterology	876 543 21 098	4	Istanbul University Cerrahpaşa Faculty of Medic…
Cardiology	987 654 32 109	2	Acıbadem Kadikoy
NULL	NULL	NULL	NULL

Step 5.
Writing a query in English:
Display the SSN's of the doctors who work in American Hospital's oncology department.
Translating it to relational algebra:
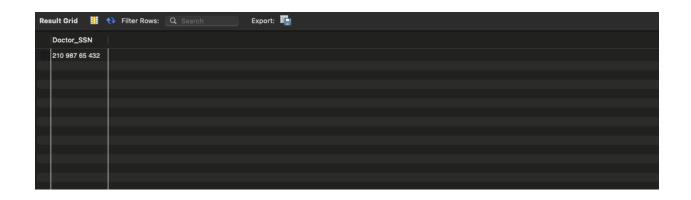$\Pi(DWI.SSN)(\sigma HDI.hospitalName='AmericanHospital' \wedge DWI.profession='Oncology'(HDI \bowtie DWI))$

Step 6.
Translating the relational algebra to the SQL query:
select DWI.DoctorSSN
from Hospital_Divides_Into as HDI ,Doctor_WORKS_IN as DWI

where HDI.hospitalName = 'American Hospital' and DWI.profession ='Oncology';
Snapshot of the result :

Doctor_SSN
210 987 65 432

Step 7.
For each hospital display the average work experience.
SELECT DI.hospitalName, AVG(DWI.experience)
FROM Divides_Into AS DI, Doctor_WORKS_IN AS DWI
WHERE DWI.hospitalName = DI.hospitalName
GROUP BY DI.hospitalName;

Snapshot of the result:

hospitalName	AVG(DWI.experience)	
Academic Hospital	6.0000	
Acıbadem Bakırkoy	8.0000	
Acıbadem International Hospital	7.0000	
Acıbadem Kadikoy	1.5000	
American Hospital	9.0000	
Avcılar Hospital	10.0000	
Istanbul University Cerrahpaşa Faculty of Medic...	4.0000	
Istanbul University Istanbul Faculty of Medicine	5.0000	
Koç University Hospital	3.0000	

Step 8:
Adding a check constraint for the Doctor_WORKS_IN:

```
ALTER TABLE Doctor_WORKS_IN
ADD CONSTRAINT DOCTOR_EXPERIENCE
CHECK (
        hospitalName IN (SELECT HDI.hospitalName
                FROM Divides_Into HDI, Doctor_WORKS_IN DWI
                WHERE DWI.hospitalName = HDI.hospitalName)
);
```

This constraint checks the insertions through the table. Whenever a user tries to insert a Doctor who is working in a not existing hospital it will give an error.
Inserted line :
insert into person values('D I ', '27' ,'M','253 888 55 354');

insert into Doctor_WORKS_IN values("Cardiology", "253 888 55 354","11", "Acıbadem Antalya");

Note: inserted a new person because there is a need for a person to create a doctor in DOCTOR_WORKS_IN table.