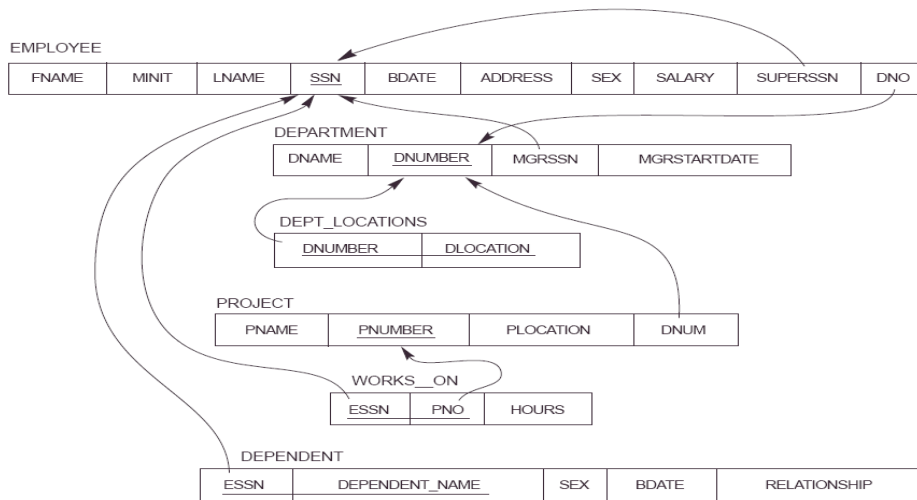


Relational Algebra

Given the following set of tables:



You can use the Relational Algebra Calculator to test your code
<https://dbis-uibk.github.io/relax/calc/local/uibk/local/0>

(1) Retrieve the names (fname,lname) of employees who work more than 10 hours per week on the 'ASTU' project. ("ASTU" is project name.)

PI fname,lname (SIGMA ssn=essn(SIGMA pname='ASTU'(SIGMA hours >= 10(works_on JOIN project) JOIN employee)))

(2) Retrieve the names (fname, lname) of all employees who work on at least one project.

PI fname,lname (employee JOIN project)

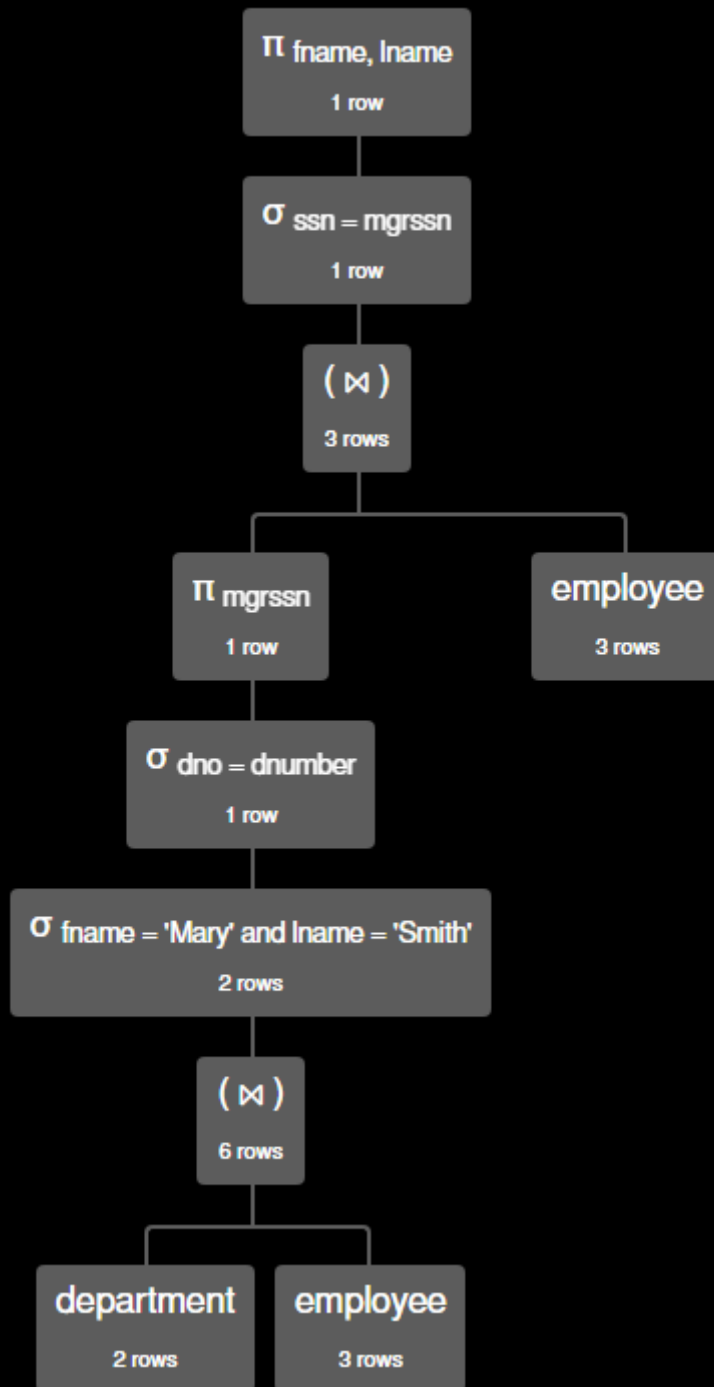
(3) Retrieve the locations of "CPE" department. ("CPE" is department name).

PI dlocation(dept_locations) JOIN PI dnumer (SIGMA dname='CPE'(department)) JOIN PI dnumber (dept_locations)

(4) Find the name (fname,lname) of the direct supervisor of "Mary Smith". ("Mary Smith" is an employee).

PI fname,lname (SIGNMA ssn=mgrssn (PI mgrssn (SIGMA dno=dnumber (SIGMA fname='Mary' ^ lname='Smith' (department JOIN employee))) JOIN employee))

5) Draw the query tree for question #4



Here is some sample code that shows how to create relations with data that can be used in the relational algebra editor. Change the data and code to fit your database

group: work

```
employee = {  
  fname, mname, lname, ssn, bdate, address, sex, salary, supperssn, dno
```

```
  'jim',0,'him',01,22-FEB-98,121Road,'M',20000,01,10  
  'jake',1,'cim',02,22-FEB-98,121Road,'M',20000,02,20  
  'Mary',2,'Smith',03,23-MAY-97,122Road,'F',20000,03,10  
}
```

```
department = {  
  dname,dnumber,mgrssn,mgrstartdate
```

```
  'wood',10,01,22-FEB-12  
  'garden',20,08,22-FEB-13  
}
```

```
dept_locations = {  
  dnumber,dlocation
```

```
  10, 'sacramento'  
  20, 'san jose'  
  30, 'oakland'  
}
```

```
project = {  
  pname,pnumber,plocation,dnum
```

```
  'ASTU',777,'Mars',10  
  'TEST',999,'Moon',20  
}
```

```
works_on = {  
  essn,pno,hours
```

```
  01,777,19  
  02,999,9  
}
```

```
dependent = {
```

essn,dependent_name,sex,bdate,relationship

01,'jimmy','M',22-MAY-23,'Son'
}