CMPT 354

Assignment 1

1. ρ Smiths (π eid (σ ename = Smith (Employees)))

   ρ SWorks_on (π eid, pid (Smiths $\bowtie$ Works_on))

   ρ SProjects (π eid, did (SWorks_on $\bowtie$ Projects))

   π eid, dname (SProjects $\bowtie$ Departments)

2. ρ EandS (ename $\rightarrow$ name, supereid $\rightarrow$ eid)(π ename, supereid (Employees)) // attribute name change for easy join
   ρ names (ename $\rightarrow$ sname)(π name, ename (EandS $\bowtie$ eid Employees)) // ends up with table with columns name (employee name) and sname (their supervisor name)

3. ρ_D (π did (Departments))

   ρ_P (π pid, did (Projects))

   ρ EandD (π eid, did (Works_on $\bowtie$ P)

   EandD / D

4. ρ_S (π salary (Employees))

   ρ_{S2} (salary $\rightarrow$ salary2) (π salary (Employees))

   ρ_{SS} (S $\bowtie_{salary > salary2}$ S2) // now salary 2 contains all of the salary except for the max

   ρ_{MaxS} (S - $\pi_{salary2}$ (SS)) // set difference between the 2 to get the max salary

   π eid (Employees $\bowtie$ MaxS)

5. This query cannot be formulated in RA. To get the number of Projects we would need an aggregate function of some sort, and the basic operations cannot do that

6. ρ_{P2} (pid $\rightarrow$ pid2, did $\rightarrow$ did2) (π pid, did (Projects))
   ρ_P (π pid, did (Projects))

   π did (P $\bowtie_{pid \neq pid2 \text{ AND } did = did2}$ P2) // different project but same department