1. Find every department that has a location in Chicago

πσ (DEPT\_LOCATIONS )

DNUMBER (DLOCATION = Chicago)

1. Find every project managed by a department with a location in Chicago

πσ (DEPT\_LOCATIONS × PROJECT)

PROJECT.PNUMBER (DEPT\_LOCATIONS.DNUM=PROJECT.DNUM)

and (DEPT\_LOCATIONS.DLOCATION = Chicago)

1. Find every department whose manager works on a project managed by a department with a location in Chicago

πσ (DEPARTMENT × WORKS\_ON × DEPT\_LOCATIONS × PROJECT)

DEPARTMENT.DNUMBER (DEPARTMRNT.MGRSSN = WORKS\_ON.ESSN)

and(WORKS\_ON.PNO = PROJECT.PNUMBER)

and (DEPT\_LOCATIONS.DNUMBER = PROJECT.DNUMBER)

and (DEPT\_LOCATIONS.DLOCATION = Chicago)

1. Find every department that doesn’t have a location in Chicago

π (DEPARTMENT)- (π σ (DEPT\_LOCATIONS) )

DNUM DNUM (DLOCATION = Chicago)

1. Find every department that manages at least two projects

π σ(ρproject1(PROJECT) × ρproject1(PROJECT))

project1.DNUM (project1.PNUMBER != project2.PNUMBER)

and(project1.DNUM = project2.DNUM)

1. Find every employee who manages at least three departments

πσ (ρdp1(DEPARTMENT) × (ρdp2(DEPARTMENT) × ρdp3(DEPARTMENT)))

dp1.MGRSSN (dp1.MGRSSN = dp2. MGRSSN)

and (dp2.DNUMBER = dp3. DNUMBER))

and (dp1. DNUMBER!= dp2.DNUMBER)

and (dp1.DNUMBER != dp3.DNUMBER))

and (dp3.DNUMBER != dp2.DNUMBER))

1. Find every employee who neither has any supervisees nor manages any department

(π(EMPLOYEE) - π(DEPARTMENT)) ∩ (π(EMPLOYEE) - π(EMPLOYEE))

SSN MGRSSN SSN SUPERSSN

1. Find every employee who either has no supervisees or manages no department (or both)

(π(EMPLOYEE) - π(DEPARTMENT)) ∪ (π(EMPLOYEE) - π(EMPLOYEE))

SSN MGRSSN SSN SUPERSSN

9. Find every employee who supervisees exactly two other employees

πσ (ρep1(EMPLOYEE) ×( ρep2(EMPLOYEE) ×( ρep3(EMPLOYEE))

EMPLOYEE.SUPERSSN (ep1.SUPERSSN = ep2. SUPERSSN)

and(ep2. SUPERSSN = ep3. SUPERSSN)

and(ep1.SSN != ep2.SSN)

and(ep2.SSN != ep3.SSN)

and(ep1.SSN != ep3.SSN)