1. Retrieve the first and last names of employees that work in department 1 or department 4.

$$DEP1\_DEP4\_EMPS \leftarrow \sigma_{Dnumber=1 \ OR \ Dnumber=4} (EMPLOYEE)$$

$$RESULT \leftarrow \pi_{Fname, Cname} (DEP1\_DEP4\_EMPS)$$

Fname	Lname
Alicia	Zelaya
Jennifer	Wallace
Ahmad	Jabbar
James	Borg

2. Retrieve the names of all departments with a location in 'Stafford'.

$$DEP\_LOC \leftarrow \sigma_{Dlocation = 'Stafford'} (DEPT\_LOCATIONS)$$

$$DEP\_NUM \leftarrow \pi_{Dnumber} (DEP\_LOC)$$

$$RESULT \leftarrow \pi_{Dname} (DEPARTMENT * DEP\_NUM)$$

Dname
Administration

3. Retrieve the SSNs of all employees that work more than 10 hrs per week on project number 1.

$$EMP\_WORK \leftarrow \sigma_{Hours > 10.0} (\sigma_{Pno = 1} (WORKS\_ON))$$

$$EMP\_PROJ \leftarrow (EMP\_WORK \bowtie_{Essn = Ssn} EMPLOYEE)$$

$$RESULT \leftarrow \pi_{Ssn} (EMP\_PROJ)$$

EMPLOYEE

Ssn
123456789
453453453

4. Retrieve the first and last names of employees in department 5 who work more than 10 hours per week on the 'Product X' project.

$PROJ\_X \leftarrow \sigma_{Pname = 'Project X'} (PROJECT)$

$PNOS(PNOS) \leftarrow \pi_{Pnumber} (PROJ\_X)$

$ESSN \leftarrow \pi_{Essn, Pno} (WORKS\_ON) / PNOS$

$MORE\_HOURS \leftarrow \pi_{Hours > 10} (ESSN)$

$RESULT \leftarrow \pi_{Fname, Lname} (MORE\_HOURS)$

Fname	Lname
John	Smith
Joyce	English

5. Retrieve the first and last names of employees directly supervised by "Franklin Wong".

$WONG \leftarrow \sigma_{Fname = 'Franklin' \ AND \ Lname = 'Wong'} (EMPLOYEE))$

$WONG\_SSN \leftarrow \pi_{ssn} (WONG)$

$WONG\_SUPERVISED \leftarrow \pi_{super\_ssn} (WONG\_SSN)$

$RESULTS \leftarrow \pi_{Fname, Lname} (WONG\_SUPERVISED)$

Fname	Lname
John	Smith
Ramesh	Narayan
Joyce	English

6. For each project, list the project name and the total hours per week (by all employees) spent on that project

$\quad$ RESULT $\longleftarrow$ $_{Pname}\mathcal{F}_{TOTAL\ HOURS}$ (PROJECT $\bowtie_{Pnumber\ =\ Pno}$ WORKS_ON)

Pname	TOT(HOURS)
Product X	52.5
Product Y	37.5
Product Z	50.0
Computerization	55.0
Reorganization	25.0
New benefits	55.0

7. Retrieve the SSNs of the employees who work on every project.

$\quad$ EMP_PRO(SSN) $\longleftarrow$ $_{Essn}\mathcal{F}_{COUNT\ Pno}$ (WORKS_ON)

$\quad$ TOTAL_PRO (TotalP) $\longleftarrow$ $\mathcal{F}_{COUNT\ Pnumber}$ (PROJECT)

$\quad\quad$ ALL_PRO $\longleftarrow$ (EMP_PRO $\bowtie_{Pcount\ =\ TotalP}$ (TOTAL PRO))

$\quad\quad$ RESULT $\longleftarrow$ π_{Ssn} (ALL_PRO * EMPLOYEE)

Ssn

Empty, because no employees work on every project

8. For each department, retrieve the department name, and the maximum salary of employees working in that department.

$$\text{RESULT} \leftarrow {}_{Dname}\mathcal{F}_{MAXIMUM\ Salary}(\text{EMPLOYEE} \bowtie_{Essn=Ssn} \text{DEPARTMENT})$$

Dname	Max (Salary)
Research	40000
Administration	43000
Headquarters	55000