











Query 1. Retrieve the name and address of all employees who work for the ‘Research’ department.

RESEARCH\_DEPT ← σDname=‘Research’(DEPARTMENT)

RESEARCH\_EMPS ← (RESEARCH\_DEPT https://img.brainkart.com/imagebk12/rVTstI4.jpgDnumber=DnoEMPLOYEE)

RESULT ← πFname, Lname, Address(RESEARCH\_EMPS)

As a single in-line expression, this query becomes:

πFname, Lname, Address (σDname=‘Research’(DEPARTMENT https://img.brainkart.com/imagebk12/rVTstI4.jpgDnumber=Dno(EMPLOYEE))

Query 2. For every project located in ‘Stafford’, list the project number, the controlling department number, and the department manager’s last name, address, and birth date.

STAFFORD\_PROJS ← σPlocation=‘Stafford’(PROJECT)

CONTR\_DEPTS ← (STAFFORD\_PROJS https://img.brainkart.com/imagebk12/rVTstI4.jpgDnum=DnumberDEPARTMENT)

PROJ\_DEPT\_MGRS ← (CONTR\_DEPTS https://img.brainkart.com/imagebk12/rVTstI4.jpgMgr\_ssn=SsnEMPLOYEE)

RESULT ← πPnumber, Dnum, Lname, Address, Bdate(PROJ\_DEPT\_MGRS)

Query 3. Find the names of employees who work on *all* the projects controlled by department number 5.

DEPT5\_PROJS ← ρ(Pno)(πPnumber(σDnum=5(PROJECT)))

EMP\_PROJ ← ρ(Ssn, Pno)(πEssn, Pno(WORKS\_ON))

RESULT\_EMP\_SSNS ← EMP\_PROJ ÷ DEPT5\_PROJS

RESULT ← πLname, Fname(RESULT\_EMP\_SSNS \* EMPLOYEE)

Query 4. Make a list of project numbers for projects that involve an employee whose last name is ‘Smith’, either as a worker or as a manager of the department that controls the project.

SMITHS(Essn) ← πSsn (σLname=‘Smith’(EMPLOYEE))

SMITH\_WORKER\_PROJS ← πPno(WORKS\_ON \* SMITHS)

MGRS ← πLname, Dnumber(EMPLOYEE https://img.brainkart.com/imagebk12/rVTstI4.jpgSsn=Mgr\_ssnDEPARTMENT)

SMITH\_MANAGED\_DEPTS(Dnum) ← πDnumber (σLname=‘Smith’(MGRS))

SMITH\_MGR\_PROJS(Pno) ← πPnumber(SMITH\_MANAGED\_DEPTS \* PROJECT)

RESULT ← (SMITH\_WORKER\_PROJS ∪ SMITH\_MGR\_PROJS)

Query 5. List the names of all employees with two or more dependents.

*T*1(Ssn,No\_of\_dependents)←EssnℑCOUNT Dependent\_name(DEPENDENT)

*T*2 ← σNo\_of\_dependents>2(*T*1)

RESULT ← πLname, Fname(*T*2 \* EMPLOYEE)

Query 6. Retrieve the names of employees who have no dependents.

ALL\_EMPS ← πSsn(EMPLOYEE)

EMPS\_WITH\_DEPS(Ssn) ← πEssn(DEPENDENT)

EMPS\_WITHOUT\_DEPS ← (ALL\_EMPS – EMPS\_WITH\_DEPS)

RESULT ← πLname, Fname(EMPS\_WITHOUT\_DEPS \* EMPLOYEE)

**OR**

πLname, Fname((πSsn(EMPLOYEE) – ρSsn(πEssn(DEPENDENT))) \* EMPLOYEE)

Query 7. List the names of managers who have at least one dependent.

MGRS(Ssn) ← πMgr\_ssn(DEPARTMENT)

EMPS\_WITH\_DEPS(Ssn) ← πEssn(DEPENDENT)

MGRS\_WITH\_DEPS ← (MGRS ∩ EMPS\_WITH\_DEPS)

RESULT ← πLname, Fname(MGRS\_WITH\_DEPS \* EMPLOYEE)