

9.4 Domain Relational Calculus: Query Language for Relational Databases

Query Examples: (These are the queries from problem 7.18 of the El-Masri/Navathe text).

- (1) Get names of all employees in department 5 who work more than 10 hours/week on the ProductX project.

```
{ x,y,z | (Exists s,a,b,c,d,e) (employee(x,y,z,s,a,b,c,d,e,5) and
      (Exists p,h) (works_on(s,p,h) and
      (Exists o,q) (project('ProductX',p,o,q) and h >= 10 ))) }
```

- (2) Get names of all employees who have a dependent with the same first name as themselves.

```
{ x,y,z | (Exists s,a,b,c,d,e,f) (employee(x,y,z,s,a,b,c,d,e,f) and
      (Exists g,h,i) (dependent(s,x,g,h,i))) }
```

- (3) Get the names of all employees who are directly supervised by Franklin Wong.

```
{ x,y,z | (Exists a,b,c,d,e,s,f) (employee(x,y,z,a,b,c,d,e,s,f) and
      (Exists m,n,p,q,r,t) (
      employee('Franklin',m,'Wong',s,n,o,p,q,r,t))) }
```

- (4) Get the names of all employees who work on every project.

```
{ x,y,z | (Exists s,a,b,c,d,e,f) (employee(x,y,z,s,a,b,c,d,e,f) and
      (Forall n,p,q,r) (project(n,p,q,r) ->
      (Exists h) (works_on(s,p,h)))) }
```

- (5) Get the names of employees who do not work on any project.

```
{ x,y,z | (Exists s,a,b,c,d,e,f) (employee(x,y,z,s,a,b,c,d,e,f) and
      not (Exists p,h) (works_on(s,p,h))) }
```

- (6) Get the names and addresses of employees who work for at least one project located in Houston but whose department does not have a location in Houston.

```
{ x,y,z | (Exists s,a,b,c,d,e,f) (
    employee(x,y,z,s,a,b,c,d,e,f) and
    (Exists p,h,n,q) (works_on(s,p,h) and
        project(n,p,'Houston',q)) and
    not dept_locations(f,'Houston') ) }
```

- (7) Get the names and addresses of employees who work for at least one project located in Houston or whose department does not have a location in Houston. (Note: this is a slight variation of the previous query with 'but' replaced by 'or').

```
{ x,y,z | (Exists s,a,b,c,d,e,f) (
    employee(x,y,z,s,a,b,c,d,e,f) and
    ((Exists p,h,n,q) (works_on(s,p,h) and
        project(n,p,'Houston',q)) or
    not dept_locations(f,'Houston') ) ) }
```

- (8) Get the last names of all department managers who have no dependents.

```
{ z | (Exists x,y,s,a,b,c,d,e,f) (employee(x,y,z,s,a,b,c,d,e,f) and
    (Exists m,n,q) (department(m,n,s,q) and
        not (Exists h,i,j,k) (dependent(s,h,i,j,k)))) ) }
```