CSE 132A Fall 2013: Database Systems Principles

Homework 1 – Solutions

Consider a human resource database of schema

Employee (Fname, Lname, SSN, Bdate, Address, Sex, Salary, Dno)
Department (Dname, Dnumber, Mgr_ssn, Mgr_start_date)
Project (Pname, Pnumber, Plocation, Dnum)
Works_on (Essn, Pno, Hours)
Dependent (Essn, Dependent_name, Sex, Bdate, Relationship)

in which each table’s underlined attributes represent its key, and in which the following foreign key constraints hold:

Employee.Dno references Department.Dnumber
Department.Mgr_ssn references Employee.SSN
Project.Dnum references Department.Dnumber
Works_on.Essn references Employee.SSN
Works_on.Pno references Project.Pnumber
Dependent.Essn references Employee.SSN

Express the following queries in SQL.
You are free to define intermediate views if you want. However, if you define a view, you should also add after its SQL definition a natural language description of what it returns.

1. Retrieve the names of all employees in department 5 who work more than 10 hours per week on the "ProductX" project.

SELECT e.Fname, e.Lname
FROM Employee e, Works_on w, Project p
WHERE e.SSN = w.Essn
AND p.Pnumber = w.Pno
AND e.Dno = 5
AND p.Pname = 'ProductX'
AND w.Hours > 10
2. For each project, list the project name and the total hours per week spent by employees on that project.

```sql
CREATE VIEW Total_per_Pno AS
    SELECT Pno, SUM(Hours) AS total
    FROM Works_on
    GROUP BY Pno;
```

```sql
SELECT p.Pname, t.total
FROM Project p, Total_per_Pno t
WHERE p.Pnumber = t.Pno;
```

3. Retrieve the average salary of all female employees.

```sql
SELECT AVG(Salary) AS AvgSal
FROM Employee
WHERE Sex = 'F'
```

4. Retrieve the names of all employees who work on every project.

```sql
CREATE VIEW Emps_who_do_not_work_on_some_project AS
    SELECT DISTINCT e.SSN
    FROM Project p, Employee e
    WHERE NOT EXISTS
        (SELECT * FROM Works_on w WHERE w.Essn = e.SSN AND w.Pno = p.Pnumber);
```

```sql
SELECT Fname, Lname
FROM Employee
WHERE SSN NOT IN Emps_who_do_not_work_on_some_project
```

5. List the names of all department managers who have no dependents.

```sql
SELECT DISTINCT e.Fname, e.Lname
FROM Department d, Employee e
WHERE d.Mgr_ssn NOT IN (SELECT Essn FROM Dependent)
    AND e.SSN = d.Mgr_ssn
```