

Assignment 1

Q1. A company keeps track of company employees, departments & projects. Company is organized into departments. Each department has a unique name, unique number & a particular employee who manage the department. The database also keeps track of start date when that employee begins managing that department. The database also keeps track of start date when that employee begins managing that department. A department may have several locations. A department controls number of projects each of which has a unique name, unique number & single location. Each employee's name, social security number, address, salary & birth date is also stored. An employee is assigned to one department, but may work on several projects which are not necessarily controlled by same department. Number of hours/week that an employee works on each project is also kept track of database also keeps track of direct supervision of each employee.

Information about dependents of each employee for insurance purposes is also kept.

Design an ER model.

Q2. Each pharmaceutical company is identified by a name & phone no. For each drug, the name & formula must be recorded. Each drug is sold by a given pharmaceutical company & the trade name identifies the drug uniquely from among the products of that company. Each pharmacy has a name, address & phone no. Every doctor has at least one patient. Each pharmacy sells several drugs & has a price for each. A drug could be sold at several pharmacies & a price would differ from one pharmacy to another. Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients & patients could obtain prescription from several doctors. Each prescription has a date & a quantity associated with it. Pharmaceutical companies have long term contracts with pharmacies. A pharmaceutical company can have contract with several pharmacies & a pharmacy can have contract with several pharmaceutical companies. For each contract you need to store, start date, end date & terms of contract. Pharmacies appoint a supervisor for each contract. Patients are identified by SSNo and their names, age & address. Doctors are also identified by SSNo. For each doctor, name, specialty & years of experience must be recorded.

Q3. Each hotel has a name, address & an owner name has 200 rooms & each room has a unique room no., a category & charges. Each hotel caters to the need of customers. It also has a no. of employees who serve the customers. For each employee his name, a unique emp-id, salary, his job profile & no. of working hours must be recorded. For each customer, his name, phone no, address, mode of payment & a unique customer-id must be recorded. A customer can order food having a price & category as veg or non-veg. For each order, order date, unique order no. & sales price should be saved.

Assignment 2

- Q1. Given Employee {ID, Name}. Select the name of all employees whose ID<105.
- Q2. Given assignment {empno,prodno,jobno}, Job_function{Jobno, title}. Get the product number of assignments whose development teams have a chief programmer.
- Q3. Given Assignment {empno, prodno,jobno}.Find the coworkers in all projects.
- Q4. Given Product {prodno,prod_name,prod_details} developed by {prodno,empno}.Find all the employees who developed both the heapsort & binary search modules.
- Q5. Given Project {projectno,projectname,chief_architect}, employee{empno,empname}, assigned_to{projectno,empno}

Use the above database schema for following questions :

- Q6. Get empno of employees working on project comp353?
- Q7. Get details {empname & empno} of employees working on project comp353?
- Q8. Get empname & empno of employees working on database project?
- Q9. Get empname & empno of employees working on both comp353 & comp354?
- Q10. Find employee number of employees who do not work on project comp453.
- Q11. Get employee number of employees who work on all projects.

Assignment 3

Create the following tables:

student (**sid**, sname, sex, age, year, gpa)

dept (**dname**, numphds)

prof (**pname**, dname)

course (**dname**, **cno**, cname)

major (**dname**, **sid**)

section (**dname**, **cno**, **sectno**, pname)

enroll (**sid**, **dname**, **cno**, **sectno**, grade)

Queries

1. Print the names of professors who work in departments that have fewer than 50 PhD students.
2. Print the names of the students with the lowest GPA.
3. For each Computer Sciences class, print the class number, section number, and the average gpa of the students enrolled in the class.
4. Print the names and section numbers of all classes with more than six students enrolled in them.
5. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.
6. Print the names of departments that have one or more majors who are under 18 years old.
7. Print the names and majors of students who are taking one of the College Geometry courses.
8. For those departments that have no major taking a College Geometry course print the department name and the number of PhD students in the department.
9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.
10. Print the age difference between the oldest and the youngest Computer sciences major.
11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.
12. Print the ids, names and GPAs of the students who are currently taking **all** the Civil Engineering courses.

Assignment 4

Q1: If we decompose the schema $R=(A,B,C,D,E)$ into $R_1(A,B,C)$ and $R_2(A,D,E)$. Show that the decomposition is lossless if the following set of functional dependencies hold: $A \rightarrow BC$, $B \rightarrow D$, $CD \rightarrow E$ and $E \rightarrow A$.

Q2: Normalize the given relation of a university database upto third normal form:

Defaulters_list (StudentNo, Studentname, degree, branch, semester, amount)

Satisfying the following functional dependencies:

StudentNo $\rightarrow$ Studentname, degree, semester, branch, amount

Branch $\rightarrow$ amount

Q3: Given $R(A,B,C,D,E,F,G)$ and a set of functional dependencies $F=\{A \rightarrow B, BC \rightarrow DE, AEF \rightarrow G\}$. Find $\{A,C\}^+$.

Q4: Given $F= \{A \rightarrow B, BC \rightarrow D, BC \rightarrow E, AEF \rightarrow G, B \rightarrow G\}$ find super key and candidate key.

Q5: Given 2 sets F_1 and F_2 of functional dependencies of a relation:

$F_1: A \rightarrow B, AB \rightarrow C, D \rightarrow AC, D \rightarrow E$

$F_2: A \rightarrow BC, D \rightarrow AE$

Are these 2 sets equivalent?