**Homework 4 for CS542 - Fall 2023**

**Assigned:** Wednesday September 20, 2023  
**Due:** Wednesday September 27, 2023 10 am ET (via CANVAS).   
**Maximum:** 100pts.   
**Note:** This homework is to be done by each student individually.   
**Purpose of homework:** To become familiar with the foundations of relational database querying.

**Problem 1: SQL Queries About Employment.** [100 pts]

Relation Emp

eid Integer,

ename Char Width 255,

age Integer,

salary Float,

PRIMARY KEY (eid);

relation Works

eid Integer,

did Integer,

pct\_time Integer,

PRIMARY KEY (eid,did),

FOREIGN KEY (eid) REFERENCES Emp (eid),

FOREIGN KEY (did) REFERENCES Dept (did);

relation Dept

did Integer,

dname Char Width 255,

budget Float,

managerid Integer,

PRIMARY KEY (did),

FOREIGN KEY (managerid) REFERENCES Emp (eid);

## Part 1:

1. SELECT ename, age FROM Emp

NATURAL JOIN (SELECT \* FROM Dept Natural JOIN Works)

WHERE dname = ‘Software’  
INTERSECT

SELECT ename, age FROM Emp  
NATURAL JOIN (SELECT \* FROM Dept NATURAL JOIN Works)

WHERE dname = ‘Hardware’;

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1. SELECT did, count(eid), sum(pct\_time)

FROM Works Natural Join Dept

GROUP BY did

HAVING sum(pct\_time)>1000;

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1. SELECT ename FROM Emp

MINUS

SELECT ename

FROM Emp NATURAL JOIN (SELECT \* FROM Dept NATURAL JOIN Works)

WHERE salary <= budget;

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1. SELECT DISTINCT D.managerid

FROM Dept D

INNER JOIN Emp M ON D.managerid = M.eid

WHERE NOT EXISTS (

SELECT \* FROM Dept D2

WHERE D2.managerid = M.eid AND D2.budget <= 1000000)

AND D.budget > 1000000;

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1. SELECT E.ename FROM Emp E JOIN Dept D ON E.eid = D.managerid

WHERE D.budget = (SELECT MAX(budget) FROM Dept);

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## Part 2:

We tried following queries with Emp table empty and tried inserting data into Dept table

INSERT INTO DEPT1 VALUES(111111, ‘FIN’, 12340, 456)

SQL developer will give error as it is integrity constraint

We tried following queries with Emp and Dept table empty, and tried inserting data into Works table

SQL developer will give error for: ‘Parent key not found’

We tried for the bigger dataset using following query instead of using the above Query no 4.

We noticed that when it comes to bigger dataset following query generates same result but in faster time. Because we havent used DISTINCT keyword.

SELECT D.managerid

FROM Dept D

INNER JOIN Emp M ON D.managerid = M.eid

WHERE NOT EXISTS (

SELECT \* FROM Dept D2

WHERE D2.managerid = M.eid AND D2.budget <= 1000000

)

AND D.budget > 1000000

GROUP BY D.managerid

HAVING COUNT(\*) = 1;