



Database Management Systems [CSE2007 - 138]

Marks: 50

Duration: 90 mins.

Part-A

Answer all the questions.

- 1) 1. Consider the following relations: (10)

Flights(flno: integer, from: string, to: string, distance: integer, departs: time, arrives:time)

Aircraft(aid: integer, aname: string, cruisingrange: integer)

Certified(eid: integer, aid: integer)

Employees(eid: integer, ename: string, sex:char,salary: integer)

Write the following queries in SQL,

- Find the eids of pilots certified for some Boeing aircraft. [2.5]
- Find the flight numbers of the flights that travel from 'Hyderabad' to 'Frankfurt'. [2.5]
- For all aircrafts with cruising range over 1000 miles find the name of the aircraft and the salary of the pilots certified for this aircraft. [2.5]
- Find the names of certified female pilots. [2.5]

- 2) Consider the following relations: (10)

Flights(flno: integer, from: string, to: string, distance: integer, departs: time, arrives:time)

Aircraft(aid: integer, aname: string, cruisingrange: integer)

Certified(eid: integer, aid: integer)

Employees(eid: integer, ename: string, sex:char,salary: integer)

Write the following queries in SQL:

- Print the names of pilots who can operate planes with cruising range over 3000 miles but are not certified on any Boeing Aircraft. [2.5]
- Print the name and salary of the non-pilot s whose salary is more than the average salary for pilots. [2.5]
- Find the names of pilots whose salary is less than the price of cheapest route from 'Los Angeles' to 'Honolulu'. [2.5]
- For each pilot who is certified on more than three aircrafts ,find the eid and the maximum cruising range of the aircraft for which he or she is certified. [2.5]

3)

- Consider the relation schema $R(A,B,C,D,E)$ Given the set of functional dependencies. (10)

$F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$

a. R is decomposed into $R_1(A,B,C)$ and $R_2(C,D,E)$. Determine if the decomposition is loss less or not. [5]

b. R is decomposed into $R_1 = (A, B, C)$, $R_2 = (A, D, E)$. Determine if the decomposition is a dependency -preserving decomposition or not. [5]

- 4) Suppose we have a database for an investment firm, consisting of the following attributes: B - Broker, O - Office of a broker I - Investor S - Stock Q - Quantity of stock owned by an investor D - dividend paid by a stock. Hence, the overall schema is $R = (B, O, I, S, Q, D)$. Assume that the following f.d. are required to hold on this database: $F = \{I \rightarrow B, IS \rightarrow Q, B \rightarrow O, O \rightarrow D\}$. (10)

1) List all the candidate keys for R . [3]

2) Give a lossless-join decomposition of R into BCNF. [5]

3) Give a lossless-join decomposition of R into 3NF preserving functional dependencies. Is your answer in BCNF?[2]

5) Consider the following relation schema: (10)

Employee (SSN, fname, lname, Supervisor_SSN, Bdate, Sex, Sal, Address)

Department (Dno, Dname, Mgr_SSN, Mgr_Start_Date)

Project (Pno, Ploc, Pname, DNum)

Write a SQL query to find the list of Project Numbers that involve an employee whose last name is 'Smith' as a manager of the department that controls the project.

Translate it into Relational Algebra Expression. Draw the initial query tree for this given query and show how the query tree is optimized by heuristic optimization algorithm. Show all query optimization steps by drawing query tree for each step

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