Database Security
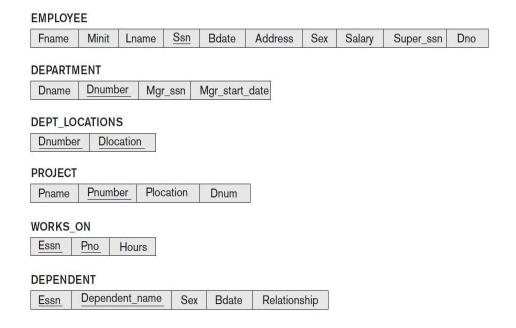
CSLM 654

1. How can privacy of data be preserved in a database?
2. What are some of the current outstanding challenges for database security?
3. Consider the relational database schema in figure given below. Suppose that all the relations were created by (and hence are owned by) user *X*, who wants to grant the following privileges to user accounts *A*, *B*, *C*, *D*, and *E*:

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

DEPT_LOCATIONS

Dnumber	Dlocation

PROJECT

Pname	Pnumber	Plocation	Dnum

WORKS_ON

Essn	Pno	Hours

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

    a. Account *A* can retrieve or modify any relation except DEPENDENT and can grant any of these privileges to other users.

    b. Account *B* can retrieve all the attributes of EMPLOYEE and DEPARTMENT except for Salary, Mgr_ssn, and Mgr_start_date.

    c. Account *C* can retrieve or modify WORKS_ON but can only retrieve the Fname, Minit, Lname, and Ssn attributes of EMPLOYEE and the Pname and Pnumber attributes of PROJECT.

    d. Account *D* can retrieve any attribute of EMPLOYEE or DEPENDENT and can modify DEPENDENT.

    e. Account *E* can retrieve any attribute of EMPLOYEE but only for EMPLOYEE tuples that have Dno = 3.

    f. Write SQL statements to grant these privileges. Use views where appropriate.

4. Suppose that privilege (a) of above question (3) is to be given with GRANT OPTION but only so that account A can grant it to at most five accounts, and each of these accounts can propagate the privilege to other accounts but without the GRANT OPTION privilege. What would the horizontal and vertical propagation limits be in this case?

5. Consider the relation shown in (d) in Figure below. How would it appear to a user with classification U? Suppose that a classification U user tries to update the salary of 'Smith' to $50,000; what would be the result of this action?

(a) EMPLOYEE

Name	Salary	JobPerformance		TC
Smith U	40000 C	Fair	S	S
Brown C	80000 S	Good	C	S

(b) EMPLOYEE

Name	Salary	JobPerformance		TC
Smith U	40000 C	NULL	C	C
Brown C	NULL C	Good	C	C

(c) EMPLOYEE

Name	Salary	JobPerformance		TC
Smith U	NULL U	NULL	U	U

(d) EMPLOYEE

Name	Salary	JobPerformance		TC
Smith U	40000 C	Fair	S	S
Smith U	40000 C	Excellent	C	C
Brown C	80000 S	Good	C	S