DATABASE SECURITY
(ELECTIVE – II)

Course code: 15CS2217

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Pre-Requisites:
1. Students must have undergone the Standard Database Design and Management Course.
2. Students are expected to have experience with one of the commercial databases such as Oracle or SQL Server 2000.

Course Outcomes: At the end of the course the student will be able to
CO1: Comprehend the fundamental nature of database security challenges.
CO2: Analyzing and designing a security model for the database defined.
CO3: Handle Security issues.
CO4: Develop Security Models for Data bases.
CO5: Analyze various security issues belongs to databases and can develop security to applications on databases.

UNIT I: (10-Lectures)
Database Basics: Overview of Relational Model, SQL, Building of database, Manipulation of data. Goals of Database Security, access points of database security, database security levels, and menaces to databases Database security methods and methodologies

UNIT II: (10-Lectures)
Security controls: flow control, inference control and access control, Database Application Security models – Types of users, access matrix model, access modes model, commonly used application types. Classes of access control: Discretionary access control (DAC), Mandatory access control (MAC) and Role based Access control (RBAC), Discretionary Access Control (DAC) mechanisms such as capabilities,

profiles, access control lists, passwords, and permission bits will be discussed.

UNIT III: (10-Lectures)

RBAC based security models features like User role assignment, Support for role relationships and Constraints, Assignable privileges will be discussed.

a) MAC based security models discussions will be on how access control policy decisions are made beyond the control of the individual owner of an object?
b) Information leakages through covert channels and inference channels. Security support in popular commercial database packages.
c) Implementing Fine Grained access controls with views.

UNIT IV: (10-Lectures)

Virtual Private databases: need for VPDs, Implementing VPD using views. The Database Security Design includes the controls that will be implemented to restrict users from accessing information, based on how the information is classified and the security model. For Example;- Restricting the rights a user has to access information, Restricting the rights a user has to perform certain functions, e.g. only letting a system user drop tables Tracking activities in the database to provide an audit trail if needed.

UNIT V: (10-Lectures)

APPLICATION SECURITY- SQL Injection and Defensive programming (An approach to improve software and source code, in terms of: General quality - Reducing the number of software bugs and problems. Making the source code comprehensible - the source code should be readable and understandable so it is approved in a code audit.) Auditing process, auditing models, application of Auditing Statistical database security, Database privacy – Hippocratic databases.

TEXT BOOKS:

1. Database Security by Silvano Castano, Fugini, Martella, Samarati – Addison Wesley (Chapters 1, 3,4,and 5)
2. Implementing Database Security and Auditing: Includes Examples for Oracle, SQL Server, Db2 Udb, Sybase. Ben-Natan, R. B. 2005, Digital Press