

Database Security

Objectives

- Discuss database elements
- Explain database access control
- Understand how database security is threatened

What is a database?

- A database is a structured collection of data that is accessed by one or more applications
- Databases are usually stored relationally, meaning that items are linked to each other
- For example:
 - Student Data - name, birthday, student id, address
 - Healthcare Data – name, birthday, patient id, address, doctor, date of visit
 - Website Data – name, username, password, email, secret questions

Database elements

- Most databases are relational
 - Columns are used for particular type of data. Name for example
 - Rows are unique values for a primary key
- Elements include
 - Primary key – example: student id
 - Foreign key – example: major
- Language
 - SQL
- DBMS – Database Management System
 - Consists of database, users, tools to manipulate data

Database Access Control

- Most SQL languages and programs give 2 types of access
 - Grant
 - Revoke
- Rights can include:
 - Select
 - Insert
 - Delete/Drop
 - Update

Database Access Control - RBAC

- Role based access control is used to increase security
- Can be much more granular than “Read, Write, Execute” rights
- Can be put on almost anything
- Examples:
 - Database owner
 - Administrator
 - System Administrator
 - End User
 - Report Service

Understanding why databases are important

- Organizations live off databases
- Customer data
- Financial data
- Security data

Threats

- SQL injection
 - Goal is to extract information from database
 - One of the most common types of attack
 - Exploited through insecure web applications
 - If application has permissions, attacker can do nearly anything they want, including deleting or modifying data
- Inference
 - Attacker can use queries to “infer” database structure or content
 - Occurs when too much access is given to a user
- Encryption
 - Database encryption is usually not performed
 - Attacker may be able to grab unencrypted data if encryption is not performed
 - Encryption becomes essential to secure data