



# Assignment Project Exam Help

## Database Security – Part 1

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## Introduction

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- Why database security?



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...

**Example:** Consider a payroll database, it must

- Salaries may not be disclosed to arbitrary users of the database;
- Salaries can only be modified by users that are properly authorized.



## Introduction

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against

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- Stop users without database access from h

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- Stop users with database access from perf database which are not required to perform t



## Comprehensive Database Security<sup>1</sup>

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<sup>1</sup> Oracle database 11g security: data masking, Jonathan Penn, Forrester Research



## Main Objectives of Database Security

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Available



## Threats to Databases

- A potential **breach of security** that, if successful, will have a certain impact on databases

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## Threats to Databases

• A potential **breach of security** that, if successful, will have a certain impact on databases.



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## Threats to Databases

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- A potential breach of security that, if successful, will have a certain impact on databases.



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accidental acts,

*e.g., students are allowed to see their grades (and possibly) to modify them.*

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## Threats to Databases

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- A potential **breach of security** that, if successful, will have a certain impact on databases.

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- **Loss of integrity:** data should not be corrupted by accidental acts,

*e.g., students are allowed to see their grades (obviously) to modify them.*

- **Loss of availability:** data should remain accessible to those who have legitimate access rights,

*e.g., a lecturer is allowed to change grades of students.*



## Control Measures

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- Restrict access to the database system,

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e.g., know the average salary of a department,  
the salary of a particular person

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- Prevent data to flow into unauthorized

e.g., avoid covert channels.

### 4 Data encryption

- Protect sensitive data during storage and transmission,  
e.g., passwords and credit card information.



## Inference Attack<sup>2</sup>

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<sup>2</sup>Inference Attacks to Statistical Databases: Data Suppression, Concealing Controls and Other Security Trends, 2000



## Inference Attack - Examples

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*87% of 248 million US citizens could be uniquely identified by a combination of gender, date of birth and a five-digit ZIP code.*

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## Inference Attack - Examples

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S in  
we happen to know that Peter is the oldest employee  
we infer the salary of Peter through aggregation qu

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## Inference Attack - Examples

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(1) We could repeatedly ask: "*How many employees are greater than X?*" until the answer is 1.

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(2) Then we could ask: "*what is the average salary of all employees whose age is greater than X?*".