COMM1822

Term 2 2022

Introduction to Databases for Business Analytics

Week 10 Data Control Language (DCL)

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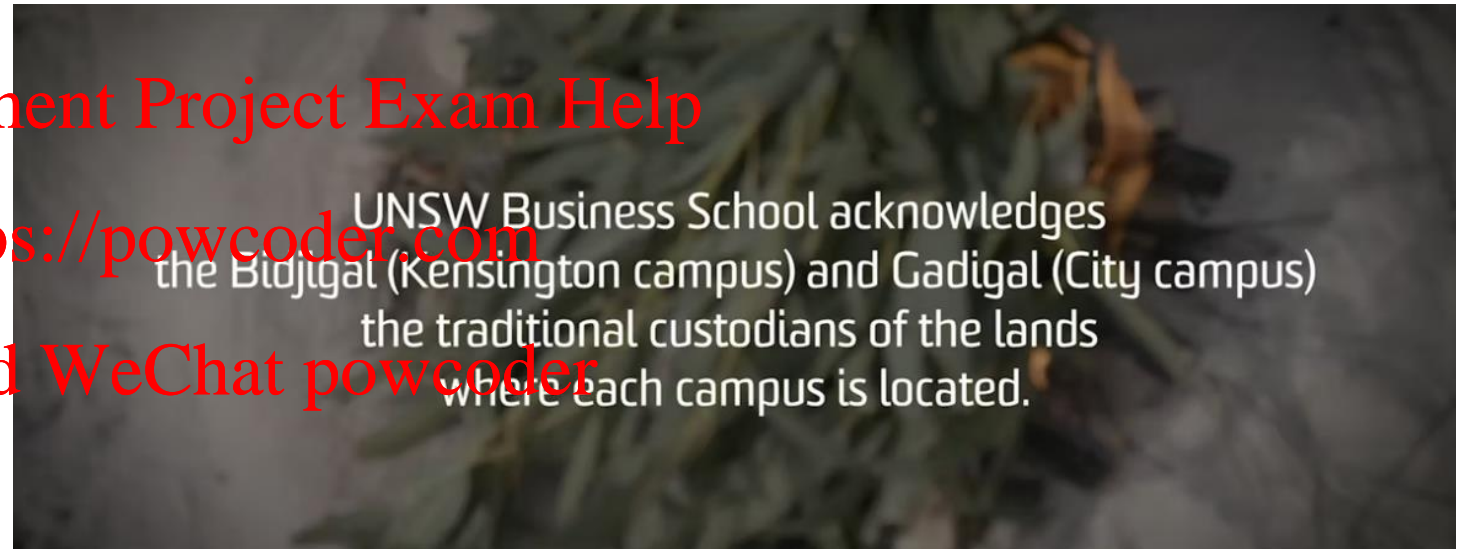
UNSW Business School. (2022, May 7). *Acknowledgement of Country* [online video]. Retrieved from https://vimeo.com/369229957/d995d8087f

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W10 Learning Outcomes

❑ Data Security and Access Control

❑ Key Components in Access Control

❑ Commands of Data Control Language

Data Security

❑ **Data** is a **valuable resource** that must be strictly controlled and managed, as with any **corporate resource.**

❑ Part or all of the corporate data may have strategic importance and therefore needs to be kept **secure** and **confidential**.

❑ **Mechanisms** that protect the database against **intentional or accidental threats**.

❑ Security considerations do not only apply to the data held in a database. **Breaches** of security **may affect other parts of the system**, which may in turn affect the database.

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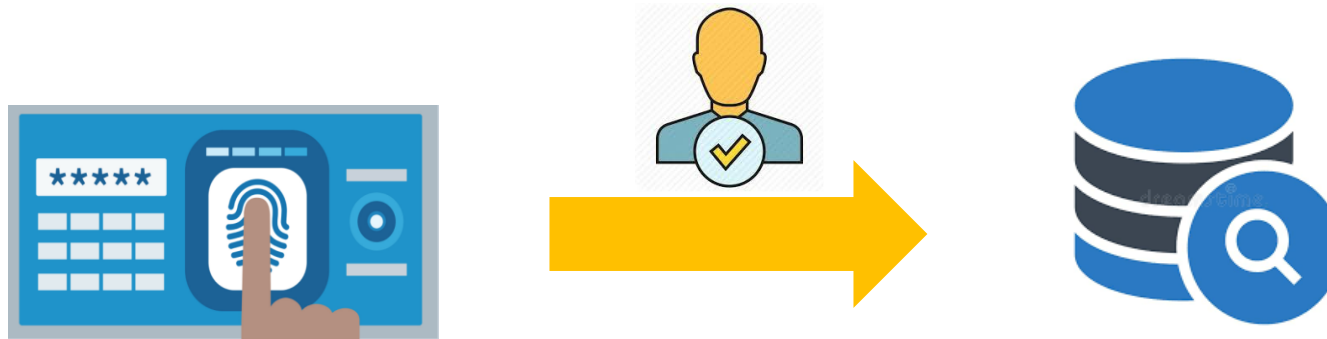SYDNEY

Access Control

❑ Access control is a fundamental component of data security.

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❑ Access control is a process that is integrated into an organization's IT environment.

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Data Access Control

Access control is

- a combination of **security technology** and **mechanism** in place to protect **confidential information**
- to minimize the **risk of access**
- instantiated by **authorization**
- **implemented with Data Control Language (DCL) in SQL**

If **o** is an object, authorization answers the question "Who is trusted to access **o**?"

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Authorization in Database

CIA Triad for Information Security

- **Confidentiality** means that data, objects and other resources are protected from unauthorized viewing and other access.
- **Integrity** means that data is protected from unauthorized changes to ensure that it is reliable and correct.
- **Availability** means that authorized users have access to the systems and the resources when they need them (denial-of-service is a threat to data availability).
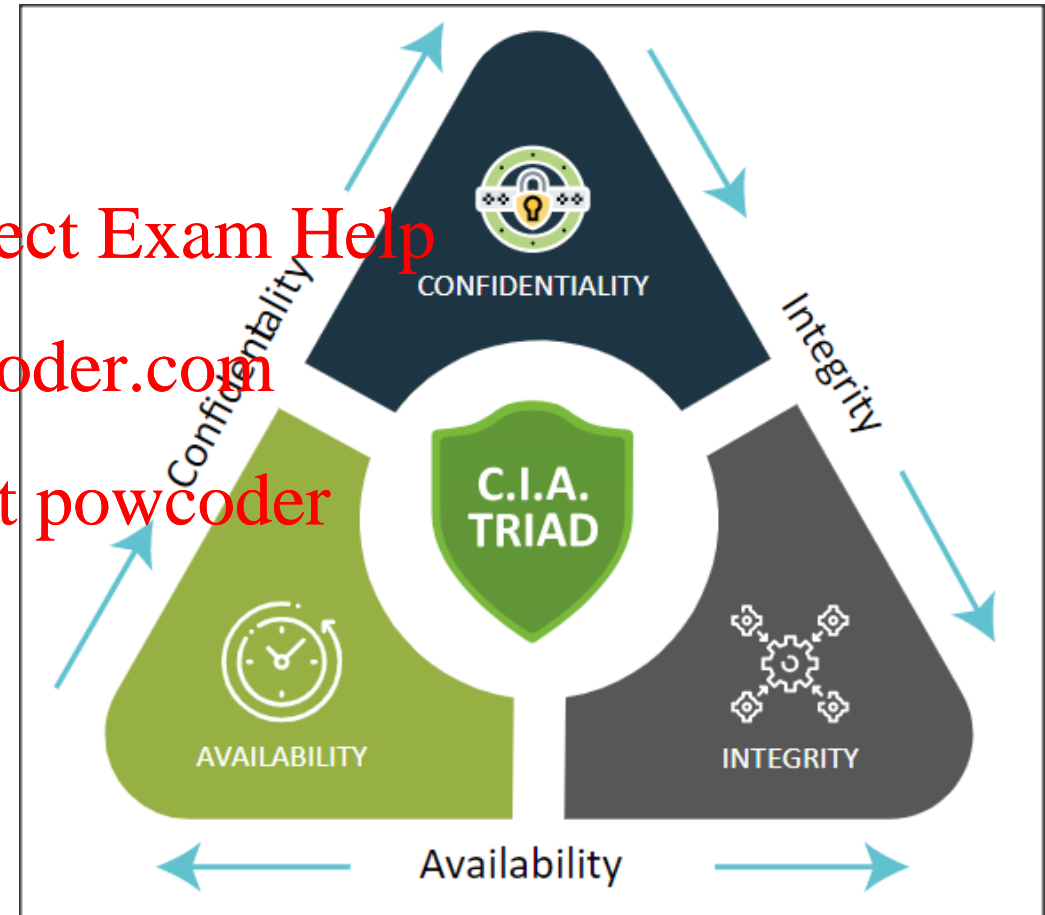
Key Components in Access Control

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Key Components in Access Control

❑ **Authentication**: is the initial process of establishing the identity of a user

❑ **Authorization**: specifies access rights and privileges to resources to determine whether the user should be granted access to data or make a specific transaction

Authorization Components

❑ Authorization defines **who** can **access** **which object** in a database.

Who - Types of users
▸ a single user or a group of users

Privilege - Types of accesses:
▸ select, insert, update, delete

Types of database objects
▸ tables, attributes, views

who

how

what

Database Object – View

A view does not store any data. A view only behaves like a table. And it is just a named query stored in the database.
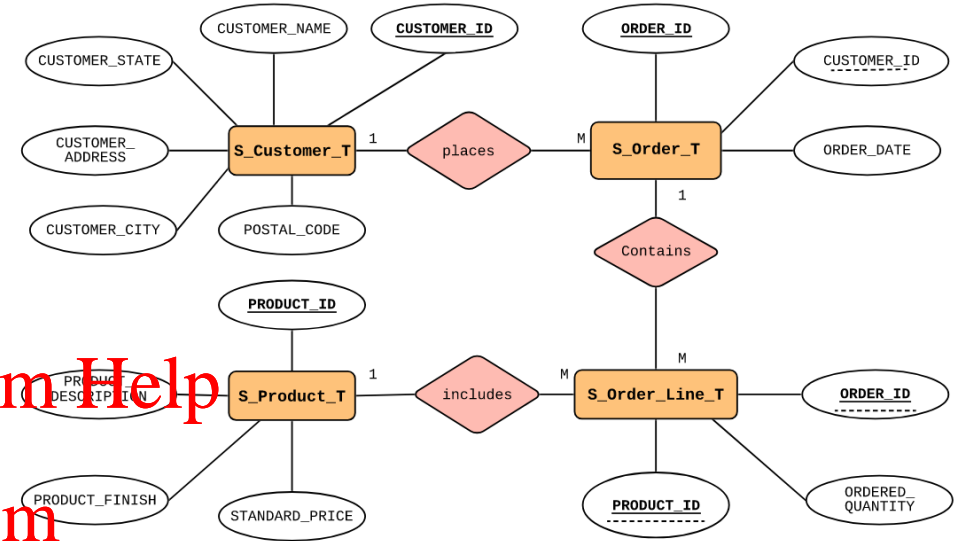
create view mybest_view as
    select customer_address, customer_city
    from s_customer_t;

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ER diagram showing S_Customer_T, S_Order_T, S_Product_T, S_Order_Line_T with attributes CUSTOMER_NAME, CUSTOMER_ID, ORDER_ID, CUSTOMER_STATE, CUSTOMER_ADDRESS, CUSTOMER_CITY, POSTAL_CODE, ORDER_DATE, PRODUCT_ID, PRODUCT_DESCRIPTION, PRODUCT_FINISH, STANDARD_PRICE, ORDERED_QUANTITY; relationships: places (1:M), Contains (1:M), includes (1:M)

Result of mybest_view

Results	Explain	Describe	Saved SQL	History

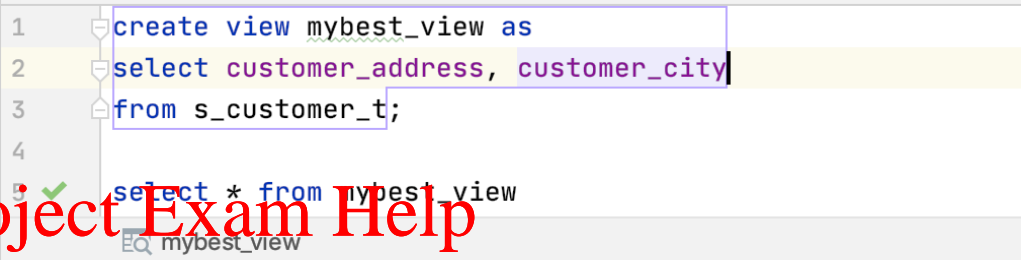| CUSTOMER_ID	CUSTOMER_NAME	CUSTOMER_ADDRESS	CUSTOMER_CITY	CUSTOMER_STATE	POSTAL_CODE
1	Contemporary Casuals	1355 S Hines Blvd	Gainesville	FL	32601-2871
2	Value Furniture	15145 S.W. 17th St.	Plano	TX	75094-7743
3	Home Furnishings	1900 Allard Ave.	Albany	NY	12209-1125
4	Eastern Furniture	1925 Beltline Rd.	Carteret	NJ	07008-3188
5	Impressions	5585 Westcott Ct.	Sacramento	CA	94206-4056
6	Furniture Gallery	325 Flatiron Dr.	Boulder	CO	80514-4432
7	Period Furniture	394 Rainbow Dr.	Seattle	WA	97954-5589
8	Calfornia Classics	816 Peach Rd.	Santa Clara	CA	96915-7754
9	M and H Casual Furniture	3709 First Street	Clearwater	FL	34620-2314

View

❑ create view mybest_view as
   select customer_address, customer_city
   from s_customer_t;

❑ select * from mybest_view;

```
1  create view mybest_view as
2  select customer_address, customer_city
3  from s_customer_t;
4
5  select * from mybest_view
   mybest_view
```

36.MYBEST_VIEW ×

| | 15 rows | | | | | | Tx: Manual | | | | | DDL |

	CUSTOMER_ADDRESS	CUSTOMER_CITY
1	365 Hines Blvd	Gainesville
2	15145 S.W. 17th St.	Plano
3	1900 Allard Ave.	Albany
4	1925 Beltline Rd.	Carteret
5	5585 Westcott Ct.	Sacramento
6	325 Flatiron Dr.	Boulder
7	394 Rainbow Dr.	Seattle
8	816 Peach Rd.	Santa Clara
9	3709 First Street	Clearwater

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View

❏ View: is the dynamic result of one or more relational operations operating on the base relations to produce another relation.

❏ A view is a virtual relation that does not actually exist in the database, but is produced upon request by a particular user, at the time of request.

❏ A user can have access to a view, but not to the whole table.

❏ A view selects a subset of rows & attributes. View allows a database user to have access to some but not all rows or attributes.

View

Table

CUSTOMER_ID	CUSTOMER_NAME	CUSTOMER_ADDRESS	CUSTOMER_CITY	CUSTOMER_STATE	POSTAL_CODE
1	Contemporary Casuals	1355 S Hines Blvd	Gainesville	FL	32601-2871
2	Value Furniture	15145 S.W. 17th St.	Plano	TX	75094-7743
3	Home Furnishings	1900 Allard Ave.	Albany	NY	12209-1125
4	Eastern Furniture	1925 Beltline Rd.	Carteret	NJ	07008-3188
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Commands of Data Control Language (DCL)

DCL Commands

❑ **Grant**: is used to give user access privileges to a database

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❑ **Revoke**: is used to revoke authorization (to take back
permissions from the user) https://powcoder.com

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❑ **Deny**: explicitly prevents a user from receiving a particular
permission.

DCL Commands

- The grant statement is used to give user access privileges to a database
    grant <privilege list>
    on <relation name or view name>
    to <user list>
    [WITH GRANT OPTION]
    e.g., **grant** select **on** emp_view **to** liud22;

- <user list> can be any of the below:
    - a user-id
    - *public*, which allows all valid users the privilege granted

- The grantor of the privilege must already hold the privilege on the specified item (i.e., database administrator).

Common Privileges in DCL

- **Select:** allows read access to a relation, or the ability to query using the view

- **Insert:** allows insert access to a relation

- **Update:** we can use update(column-name) to specify update on a column

- **Delete:** allows delete data from a relation

- **Execute**: only for procedure or functions (this is for PL/SQL - Procedural Language for SQL)

- **All**: used as a short form for all the allowable privileges

DCL Commands – Privilege to Grant Privileges

With grant option: allows a user who is granted a privilege to pass the privilege on to other users.

Example:

‣ DBA: grant select on emp to U1 with grant option

grant select
on emp
to U1;

DCL Commands – Revoking Database Access

- The **revoke** statement is used to revoke authorization (to take back permissions from the user)

> **revoke** <privilege list>

> **on** <relation name or view name>

> **from** <user list>

- Example: revoke select from U1, U2 and U3 on emp

revoke select

on emp

from U1, U2, U3;

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Example 1

- Suppose we allow a database user "liud22" to see all the columns in **EMP** table except the salary column.

EMP

Emp_ID	Emp_Name	Salary

- Solution

create view emp_view **as**
    select Emp_ID, Emp_Name
    from EMP;

grant select **on** emp_view **to** liud22;

Example 2

Suppose we allow the user "liud22" to see all columns in **s_customer_t** table except the customer_address column.

s_customer_t

customer_id	customer_name	customer_address	customer_city	customer_state	postal_code

Solution

create view customer_view as
       select customer_id, customer_name, customer_city, customer_state, postal_code
       from s_customer_t;

grant select on customer_view to liud22;

Questions

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