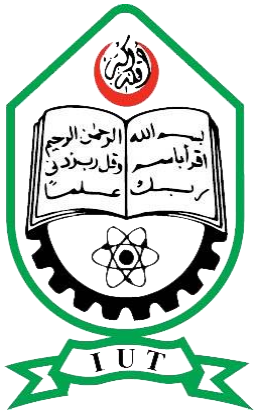
CSE 4308
Database Management Systems Lab
Lab 08
“Cascading Delete”, “Views” and “Roles”



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Cascading Delete

A foreign key with cascade delete means that if a record in the parent table is deleted, then the corresponding records in the child table will automatically be deleted.

Phone_Number

Phone_No	Opened	Outgoing	Customer
02134	12-06-2018	50,000	2
05468	21-01-2010	12,500	1
05698	01-12-2019	25,520	3
01234	22-04-2014	6,120	4

Foreign key referencing Cust_ID

Customer

Cust_ID	Name	Age	Gender	Occu.
1	A	123	M	Doctor
2	B	213	F	Teacher
3	C	321	O	Engineer
4	D	221	M	-----

Cascading Delete Syntax

```
--General Syntax
CREATE TABLE TABLE_NAME
(… … …,
… … …,
CONSTRAINT constraint_name FOREIGN KEY(…) REFERENCES REFERENED_TABLE(…) ON DELETE CASCADE
);
```

```
CONNECT Owner/test123;

CREATE TABLE CUSTOMER
(
        Cust_ID INT,
        Name VARCHAR2(20),
        Age INT,
        Gender VARCHAR2(1),
        Occupation VARCHAR2(10),
        CONSTRAINT customer_pk PRIMARY KEY(Cust_ID)
);

CREATE TABLE PHONE_NUMBER
(
        Phone_No INT,
        Opened DATE,
        Outgoing NUMBER(10,5),
        Customer INT,
        CONSTRAINT phone_number_pk PRIMARY KEY(Phone_No),
        CONSTRAINT phone_number_fk1 FOREIGN KEY(Customer) REFERENCES CUSTOMER(Cust_ID) ON DELETE CASCADE
);
```

Cascading Delete Demonstration

The CUSTOMER Table

```
SQL> CREATE TABLE CUSTOMER
  2  (
  3  Cust_ID INT,
  4  Name VARCHAR2(20),
  5  Age INT,
  6  Gender VARCHAR2(1),
  7  Occupation VARCHAR2(10),
  8  CONSTRAINT customer_pk PRIMARY KEY(Cust_ID)
  9  );

Table created.

SQL> INSERT INTO CUSTOMER VALUES(1,'A',25,'M','Doctor');

1 row created.

SQL> INSERT INTO CUSTOMER VALUES(2,'B',30,'F','Teacher');

1 row created.

SQL> INSERT INTO CUSTOMER VALUES(3,'C',35,'0','Engineer');

1 row created.

SQL> INSERT INTO CUSTOMER VALUES(4,'D',18,'M',NULL);

1 row created.
```

Cascading Delete Demonstration

The PHONE_NUMBER Table

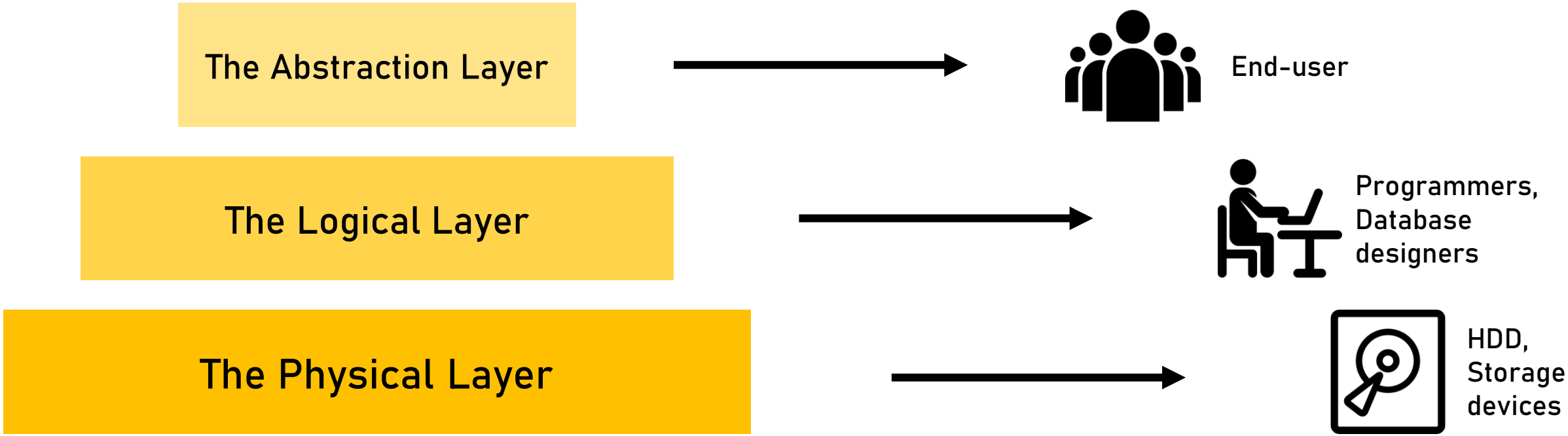
```
SQL> CREATE TABLE PHONE_NUMBER
  2  (
  3  Phone_No INT,
  4  Opened DATE,
  5  Outgoing NUMBER(10,5),
  6  Customer INT,
  7  CONSTRAINT phone_number_pk PRIMARY KEY(Phone_No),
  8  CONSTRAINT phone_number_fk1 FOREIGN KEY(Customer) REFERENCES CUSTOMER(Cust_ID) ON DELETE CASCADE
  9  );

Table created.

SQL> INSERT INTO PHONE_NUMBER VALUES(2134,TO_DATE( '12_Jun_2018' , 'DD_MON_YYYY' ),50000,2);

1 row created.

SQL> INSERT INTO PHONE_NUMBER VALUES(5468,TO_DATE( '21_Jan_2010' , 'DD_MON_YYYY' ),12500,1);

1 row created.

SQL> INSERT INTO PHONE_NUMBER VALUES(5698,TO_DATE( '01_Dec_2019' , 'DD_MON_YYYY' ),25520,3);

1 row created.

SQL> INSERT INTO PHONE_NUMBER VALUES(1234,TO_DATE( '22_Apr_2014' , 'DD_MON_YYYY' ),6120,4);

1 row created.
```

Final Outcome

```
SQL> SELECT * FROM CUSTOMER;

   CUST_ID NAME                      AGE G OCCUPATION
---------- -------------------- ---------- - ----------
         1 A                            25 M Doctor
         2 B                            30 F Teacher
         3 C                            35 0 Engineer
         4 D                            18 M

SQL> SELECT * FROM PHONE_NUMBER;

  PHONE_NO OPENED      OUTGOING   CUSTOMER
---------- --------- ---------- ----------
      2134 12-JUN-18      50000          2
      5468 21-JAN-10      12500          1
      5698 01-DEC-19      25520          3
      1234 22-APR-14       6120          4

SQL> DELETE FROM CUSTOMER WHERE CUST_ID=4;

1 row deleted.

SQL> SELECT * FROM CUSTOMER;

   CUST_ID NAME                      AGE G OCCUPATION
---------- -------------------- ---------- - ----------
         1 A                            25 M Doctor
         2 B                            30 F Teacher
         3 C                            35 0 Engineer

SQL> SELECT * FROM PHONE_NUMBER;

  PHONE_NO OPENED      OUTGOING   CUSTOMER
---------- --------- ---------- ----------
      2134 12-JUN-18      50000          2
      5468 21-JAN-10      12500          1
      5698 01-DEC-19      25520          3

SQL>
```

Views

-A virtual relation or table defined by a query, that essentially contains the results of the query.
-NOT precomputed and stored, rather, the view is computed by executing the query every time the view is used.



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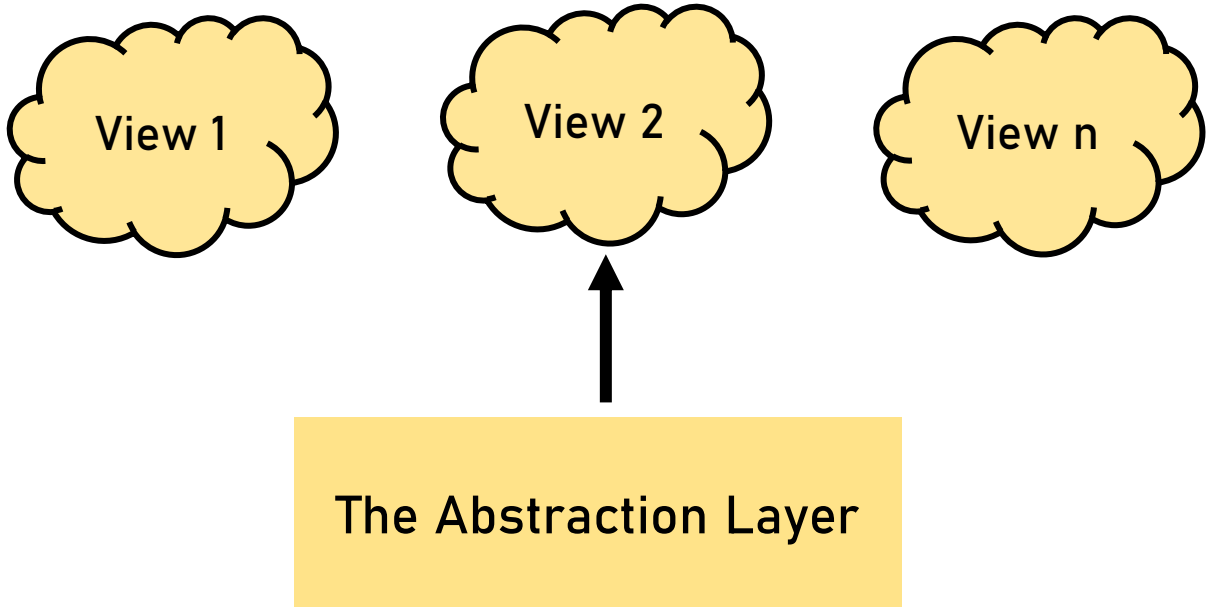

Views Syntax

Phone_Number

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02134	12-06-2018	50,000	2
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Customer

Cust_ID	Name	Age	Gender	Occu.
1	A	123	M	Doctor
2	B	213	F	Teacher
3	C	321	O	Engineer
4	D	221	M	-----

Views Syntax

```
--General Syntax for dropping a View

DROP VIEW VIEW_NAME;

--General Syntax for creating a View

CREATE OR REPLACE VIEW VIEW_NAME AS
<query>

CREATE VIEW VIEW_NAME AS
<query>
```

```
--Create a new view named CUSTOMER_INFO

CREATE OR REPLACE VIEW CUSTOMER_INFO AS
SELECT Name, Gender, Occupation, Phone_No, Opened FROM CUSTOMER, PHONE_NUMBER
WHERE PHONE_NUMBER.Customer = CUSTOMER.Cust_ID;


--Example query on views

SELECT NAME, OCCUPATION FROM CUSTOMER_INFO;
```

Views Demonstration

```
SQL> CREATE OR REPLACE VIEW CUSTOMER_INFO AS
  2  SELECT Name, Gender, Occupation, Phone_No, Opened FROM CUSTOMER, PHONE_NUMBER
  3  WHERE PHONE_NUMBER.Customer = CUSTOMER.Cust_ID;

View created.

SQL> SELECT * FROM CUSTOMER_INFO;

NAME                 G OCCUPATION   PHONE_NO OPENED
-------------------- - ---------- ---------- ---------
B                    F Teacher          2134 12-JUN-18
A                    M Doctor           5468 21-JAN-10
C                    0 Engineer         5698 01-DEC-19

SQL> SELECT NAME, OCCUPATION FROM CUSTOMER_INFO;

NAME                 OCCUPATION
-------------------- ----------
A                    Doctor
B                    Teacher
C                    Engineer

SQL> UPDATE CUSTOMER
  2  SET NAME = 'X'
  3  WHERE CUST_ID = 1;

1 row updated.

SQL> SELECT * FROM CUSTOMER_INFO;

NAME                 G OCCUPATION   PHONE_NO OPENED
-------------------- - ---------- ---------- ---------
B                    F Teacher          2134 12-JUN-18
X                    M Doctor           5468 21-JAN-10
C                    0 Engineer         5698 01-DEC-19

SQL>
```

Role-Based Access Control

-Create roles
-Grant specific privileges to those roles
-Grant roles to other roles
-Grant roles to specific users

Requirements

1. Customers should be able to view their information.
2. An operator should be able to update customer information.

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Role-based Access Control Syntax

```
--General Syntax for creating and deleting a role

CREATE ROLE ROLE_NAME;
DROP ROLE ROLE_NAME;

--General Syntax for granting privileges on a specific table to a role
GRANT PRIVILEGE_NAME ON TABLE_NAME TO ROLE_NAME;

--General Syntax for granting a role to another role
GRANT ROLE_NAME_1 TO ROLE_NAME_2;
```

```
--Connect to the server as the owner of the whole database
CONNECT Owner/testPassword;
--Create an example customer and an example operator
CREATE USER EXAMPLE_CUSTOMER_1 IDENTIFIED BY PASSWORD;
CREATE USER OPERATOR_1 IDENTIFIED BY test123;
GRANT CREATE SESSION TO EXAMPLE_CUSTOMER_1;
GRANT CREATE SESSION TO OPERATOR_1;
--Create a read-only role and grant it permission to view the Customer table
CREATE ROLE ROLE_READ_ONLY_CUSTOMER;
GRANT SELECT ON CUSTOMER TO ROLE_READ_ONLY_CUSTOMER;
--Create a role that can modify Customer table information
CREATE ROLE ROLE_MODIFY_CUSTOMER;
GRANT ROLE_READ_ONLY_CUSTOMER TO ROLE_MODIFY_CUSTOMER;
GRANT INSERT ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;
GRANT DELETE ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;
GRANT UPDATE ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;
--Grant the created roles to the users
GRANT ROLE_READ_ONLY_CUSTOMER TO EXAMPLE_CUSTOMER_1;
GRANT ROLE_MODIFY_CUSTOMER TO OPERATOR_1;
```

Demonstration

```
SQL> CREATE USER EXAMPLE_CUSTOMER_1 IDENTIFIED BY PASSWORD;

User created.

SQL> CREATE USER OPERATOR_1 IDENTIFIED BY test123;

User created.

SQL> GRANT CREATE SESSION TO OPERATOR_1;

Grant succeeded.

SQL> GRANT CREATE SESSION TO EXAMPLE_CUSTOMER_1;

Grant succeeded.

SQL> GRANT CREATE SESSION TO OPERATOR_1;

Grant succeeded.

SQL> CREATE ROLE ROLE_READ_ONLY_CUSTOMER;

Role created.

SQL> GRANT SELECT ON CUSTOMER TO ROLE_READ_ONLY_CUSTOMER;

Grant succeeded.
```

Demonstration

```
SQL> CREATE ROLE ROLE_MODIFY_CUSTOMER;

Role created.

SQL> GRANT ROLE_READ_ONLY TO ROLE_MODIFY_CUSTOMER;

Grant succeeded.

SQL> GRANT INSERT ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;

Grant succeeded.

SQL> GRANT DELETE ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;

Grant succeeded.

SQL> GRANT UPDATE ON CUSTOMER TO ROLE_MODIFY_CUSTOMER;

SQL> GRANT ROLE_READ_ONLY TO EXAMPLE_CUSTOMER_1;

Grant succeeded.

SQL> GRANT ROLE_MODIFY_CUSTOMER TO OPERATOR_1;

Grant succeeded.
```

Demonstration

```
SQL> CONNECT EXAMPLE_CUSTOMER_1/PASSWORD;
Connected.

SQL> SELECT TABLE_NAME, OWNER FROM ALL_TABLES WHERE OWNER IN 'EXAMPLE_CUSTOMER_1';

no rows selected

SQL> SELECT * FROM CUSTOMER;
SELECT * FROM CUSTOMER
              *
ERROR at line 1:
ORA-00942: table or view does not exist

SQL> SELECT * FROM Owner.CUSTOMER;

   CUST_ID NAME                      AGE G OCCUPATION
---------- -------------------- ---------- - ----------
         1 X                            25 M Doctor
         2 B                            30 F Teacher
         3 C                            35 0 Engineer

SQL> INSERT INTO Owner.CUSTOMER VALUES (4,'D',55,'F','Doctor');
                    *
ERROR at line 1:
ORA-01031: insufficient privileges
```

Thank You!