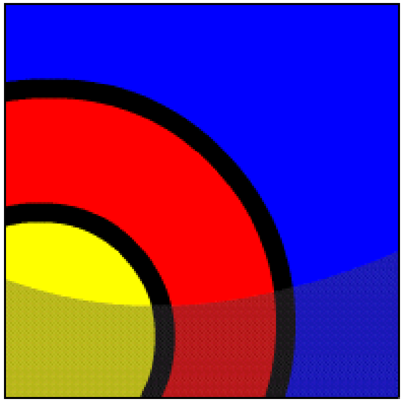
Review of Object Privileges

What Will I Learn?

In this lesson, you will review how to:

- List and explain several object privileges
- Explain the function of the EXECUTE object privilege
- Write SQL statements to grant and revoke object privileges



Why Learn It?

You already know that one of the benefits of PL/SQL subprograms is that they can be reused in many applications.

Users can call and execute subprograms only if they have the privileges to do so.

This lesson first reviews object privileges in general, then focuses in more detail on the privileges needed to execute a PL/SQL subprogram.

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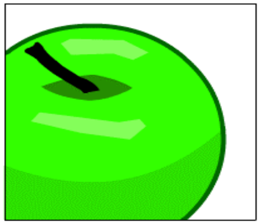

What Is an Object Privilege?

An object privilege allows the use of a specific database object, such as a table, a view or a PL/SQL procedure, by one or more database users.

When a database object is first created, only its owner (creator) and the Database Administrator are privileged to use it.

Privileges for all other users must be specifically granted (and maybe later revoked). This can be done by the object's owner or by the DBA.

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What Object Privileges Are Available?

Each object has a particular set of grantable privileges. The following table lists the privileges for various objects.

Object Privilege	Table	View	Sequence	Procedure
ALTER	X		X	
DELETE	X	X		
EXECUTE				X
INDEX	X			
INSERT	X	X		
REFERENCES	X	X		
SELECT	X	X	X	
UPDATE	X	X		

SELECT, INSERT, UPDATE, and DELETE privileges allow the holder (the grantee) of the privilege to use the corresponding SQL statement on the object.

For example, INSERT privilege on the EMPLOYEES table allows the holder to INSERT rows into the table, but not to UPDATE or DELETE rows.

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What Object Privileges Are Available? (continued)

Object Privilege	Table	View	Sequence	Procedure
ALTER	X		X	
DELETE	X	X		
EXECUTE				X
INDEX	X			
INSERT	X	X		
REFERENCES	X	X		
SELECT	X	X	X	
UPDATE	X	X		

The `ALTER` privilege allows the grantee to `ALTER` the table, while `INDEX` privilege allows the grantee to create indexes on the table. Of course, you can automatically do this on your own tables!

The `REFERENCES` privilege allows the grantee to check for the existence of rows in a table or view using foreign key constraints.

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Granting Object Privileges

Use the following syntax:

```
GRANT object_priv [(columns)]
ON object
TO {user|role|PUBLIC}
[WITH GRANT OPTION];
```

Syntax	Defined
object_priv	Is an object privilege to be granted
columns	Specifies a column from a table or view on which privileges are granted
ON object	Is the object on which the privileges are granted
user|role	Identifies the user or role to whom the privilege is granted
PUBLIC	Grants object privileges to all users
WITH GRANT OPTION	Allows the grantee to grant the object privileges to other users and roles

Examples:

```
GRANT INSERT, UPDATE ON employees TO TOM, SUSAN;

GRANT SELECT ON departments TO PUBLIC;
```

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Revoking Object Privileges

Use the following syntax:

```
REVOKE object_priv [(columns)]
ON object
FROM {user|role|PUBLIC};
```

Examples:

```
REVOKE INSERT, UPDATE ON employees FROM TOM, SUSAN;

REVOKE SELECT ON departments FROM PUBLIC;
```

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Using the EXECUTE Privilege With Stored Subprograms

To invoke and execute a PL/SQL subprogram, the user must be granted EXECUTE privilege on the subprogram.

Example:

```
CREATE OR REPLACE PROCEDURE add_dept ... ;
CREATE OR REPLACE FUNCTION  get_sal ...;

GRANT EXECUTE ON add_dept TO TOM, SUSAN;
GRANT EXECUTE ON get_sal  TO PUBLIC;
...
REVOKE EXECUTE ON get_sal FROM PUBLIC;
```

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What About the Objects Referenced Inside the Subprogram?

To invoke a subprogram, a user needs only EXECUTE privilege on the subprogram. He/she does NOT need any privileges on the objects referenced by SQL statements within the subprogram.

```
CREATE OR REPLACE PROCEDURE add_dept ...
IS BEGIN
...
  INSERT INTO DEPARTMENTS ... ;
...
END;

GRANT EXECUTE ON add_dept TO SUSAN;
```

The user (SUSAN) does not need INSERT (or any other privilege) on the DEPARTMENTS table.

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Someone Must Have Privileges on the Referenced Objects! Who Is It?

The subprogram owner (creator) must hold the appropriate privileges on the objects referenced by the subprogram. The owner’s privileges are checked when the subprogram is created or replaced, and also every time the subprogram is invoked.

In this example, TOM creates a procedure that SUSAN needs to invoke:

```
(Table owner or DBA): GRANT INSERT ON departments TO TOM;
(Tom) CREATE OR REPLACE PROCEDURE add_dept ...
        IS BEGIN
           ...
           INSERT INTO DEPARTMENTS ... ;
           ...
        END;
(Tom) GRANT EXECUTE ON add_dept TO SUSAN;
```

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Another Example:

BILL owns the STUDENTS and GRADES tables. HANNAH needs to create a procedure that JIEP needs to invoke:

```
(Hannah)CREATE OR REPLACE PROCEDURE student_proc ...
        IS BEGIN
           SELECT ... FROM bill.students JOIN bill.grades ...;
           UPDATE bill.students ...;
           ...
        END;

(Jiep)  BEGIN    hannah.student_proc(…);  END;
```

Who needs which privileges on which objects?

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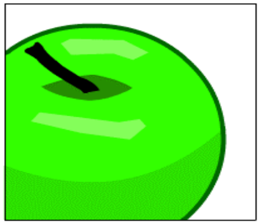

Terminology

Key terms used in this lesson include:

Object privilege

ALTER privilege

INDEX privilege

REFERENCES privilege

EXECUTE privilege

Summary

In this lesson, you reviewed how to:

- List and explain several object privileges
- Explain the function of the EXECUTE object privilege
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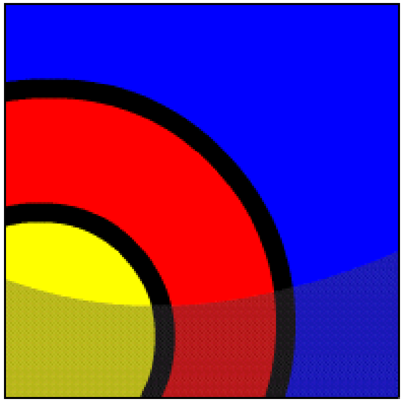

Try It / Solve It

The exercises in this lesson cover the following topics:

- Listing and explaining several object privileges
- Explaining the function of the EXECUTE object privilege
- Writing SQL statements to grant and revoke object privileges