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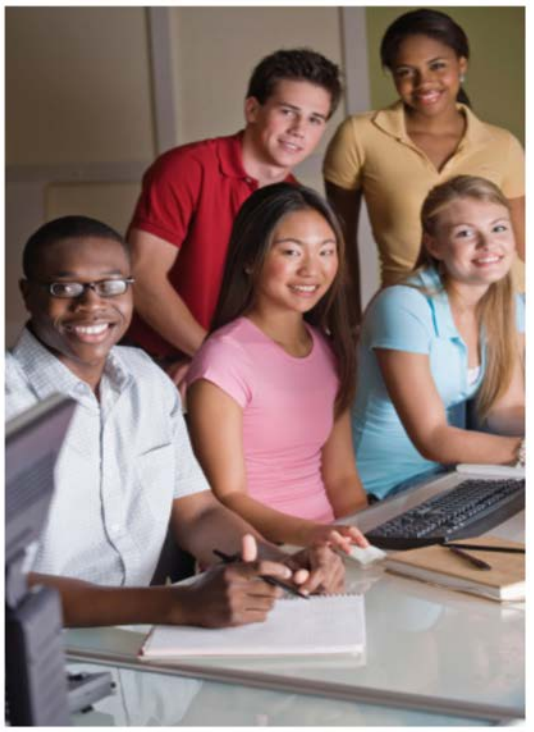
Database Programming with PL/SQL

15-4
Hiding Your Source Code



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Objectives

This lesson covers the following objectives:

- Describe the benefits of obfuscated PL/SQL source code
- Use the DBMS_DDL.CREATE_WRAPPED server-supplied procedure
- Describe how to use the Wrapper utility to obfuscate PL/SQL source code

Purpose

- Imagine that you have spent a lot of time and money inventing a completely new and different type of DVD player. You want people to buy and use it - of course - but you don't want them to look inside to find out how it works.
- If they did, they could steal your invention and make and sell the DVD player themselves.
- Similarly, when you create a clever PL/SQL package, you may want other users to execute it, but you don't always want them to be able to see the details of the package's source code.
- Let's examine how you can hide your source code from other users.

PL/SQL Source Code in the Data Dictionary

- You already know that when you create a PL/SQL program – procedure, function or package – the source code is loaded into the Data Dictionary, and you can see it using the Data Dictionary view USER_SOURCE:

```
CREATE OR REPLACE PROCEDURE mycleverproc
  (p_param1 IN     NUMBER, p_param2 OUT NUMBER)
IS BEGIN
  ... /* some clever but private code here */
END mycleverproc;
```

```
SELECT TEXT FROM USER_SOURCE
  WHERE TYPE = 'PROCEDURE' AND NAME = 'MYCLEVERPROC'
  ORDER BY LINE;
```

- If you now grant EXECUTE privilege on the procedure to other users, what can they see?

PL/SQL Source Code in the Data Dictionary

- SUSAN can describe your procedure.
- That's fine; she needs to know its parameters and their data types in order to invoke it successfully.
- Can she also see your source code?

```
You> GRANT EXECUTE ON mycleverproc TO susan;
```

```
Susan> DESCRIBE you.mycleverproc
```

Object Name	Argument	In Out	Datatype
MYCLEVERPROC	P_PARAM1	IN	NUMBER
	P_PARAM2	OUT	NUMBER

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PL/SQL Source Code in the Data Dictionary

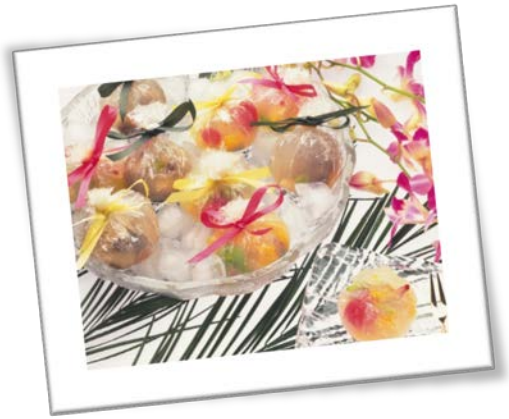
Yes, SUSAN can see your source code.

```
Susan> SELECT TEXT FROM ALL_SOURCE
         WHERE OWNER = 'YOU' AND TYPE = 'PROCEDURE‘
         AND NAME = ‘MYCLEVERPROC'
         ORDER BY LINE;
```

TEXT
PROCEDURE mycleverproc
(p_param1 IN NUMBER, p_param2 OUT NUMBER)
IS BEGIN
... /* some clever but private code here */
END mycleverproc;

Obfuscating PL/SQL Source Code

- Anyone who has EXECUTE privilege on a procedure or function can see your source code in ALL_SOURCE.
- We can hide the source code by converting it into a set of cryptic codes before we compile the subprogram.
- Hiding the source code is called *obfuscation*, and converting the source code to cryptic codes is called *wrapping* the code.
- When we compile the subprogram, only the wrapped code (the cryptic codes) are loaded into the Data Dictionary.

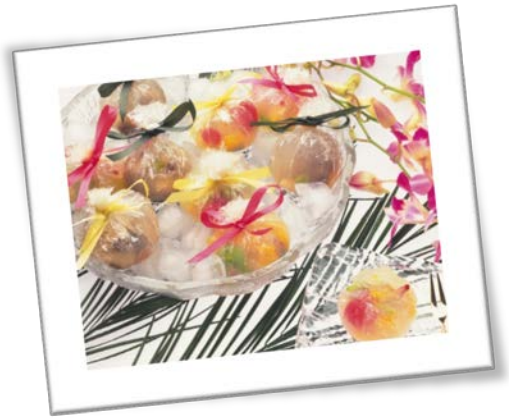


Obfuscating PL/SQL Source Code

- There are two ways to wrap the source code:
  - Using the DBMS_DDL.CREATE_WRAPPED Oracle-supplied package procedure
  - Using the PL/SQL wrapper utility program, WRAP.
- To use the WRAP utility you must be able to log into the database server computer, so we can't use this utility in Application Express.
- We can use the DBMS_DDL.CREATE_WRAPPED package and the end results are exactly the same.

Using the DBMS_DDL.CREATE_WRAPPED Procedure

- We must pass the complete code of our subprogram as a single IN argument with data type VARCHAR2.
- A PL/SQL VARCHAR2 variable has a maximum size of 32,767 characters, so this is the maximum size of our source code.
- Our source code is wrapped, and the wrapped code is automatically compiled.



Using DBMS_DDL.CREATE_WRAPPED: Example 1

- Here we obfuscate the code.

```
BEGIN
  DBMS_DDL.CREATE_WRAPPED
    ('CREATE OR REPLACE PROCEDURE mycleverproc
       (p_param1 IN     NUMBER, p_param2 OUT NUMBER)
      IS BEGIN
        ... /* some clever but private code here */
      END mycleverproc;');
END;
```

- What can SUSAN see now?

```
GRANT EXECUTE ON mycleverproc TO SUSAN;
```

Using DBMS_DDL.CREATE_WRAPPED: Example 1

SUSAN can still DESCRIBE your procedure to see the parameters and their data types, but the source code has been obfuscated.

```
Susan> SELECT TEXT FROM ALL_SOURCE
         WHERE OWNER = 'YOU' AND TYPE = 'PROCEDURE‘
         AND NAME = ‘MYCLEVERPROC'
         ORDER BY LINE;
```

```
PROCEDURE mycleverproc wrapped a000000 369 abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd
yoAPhESuJEupD01kt/blSuHDaFqvJCE2xU29PV2l2l9d/LkpW4KENa6uKMkOCk9trCAaA9D2 dfZpplAn9jmmh+AcQA==
```

Using DBMS_DDL.CREATE_WRAPPED: Example 1

- What happens when you view your own source code?

```
You> SELECT TEXT FROM USER_SOURCE
         WHERE TYPE = 'PROCEDURE‘AND NAME = ‘MYCLEVERPROC'
         ORDER BY LINE;
```

- Even you see only the obfuscated code, because the original source code has not been loaded into the Data Dictionary.
- Make sure you keep a private copy of the source code in case you want to modify it later!

```
PROCEDURE mycleverproc wrapped a000000 369 abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd abcd
yoAPhESuJEupD01kt/blSuHDaFqvJCE2xU29PV2l2l9d/LkpW4KENa6uKMkOCk9trCAaA9D2 dfZpplAn9jmmh+AcQA==
```

Using DBMS_DDL.CREATE_WRAPPED: Example 2

If the source code is long, it may be easier to assign it line by line to a VARCHAR2 variable and pass the variable as an actual parameter to the CREATE_WRAPPED procedure:

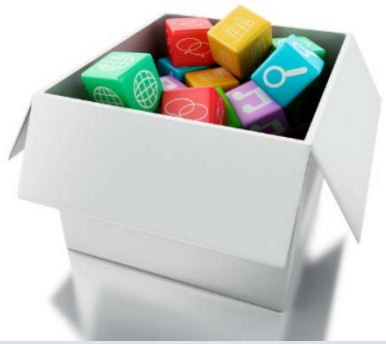
```
DECLARE
  v_code  VARCHAR2(32767);
BEGIN
  v_code := 'CREATE OR REPLACE FUNCTION myclevererfunc '
            || '(p_param1 IN NUMBER) ‘
            || ‘RETURN NUMBER IS BEGIN ‘
            || '... /* some even cleverer but private code
                */ '
            || 'END myclevererfunc;';
  DBMS_DDL.CREATE_WRAPPED(v_code);
END;
```

Wrapping Package Code

- You can wrap PL/SQL package body code just like procedures and functions:

```
BEGIN
  DBMS_DDL.CREATE_WRAPPED
    ('CREATE OR REPLACE PACKAGE BODY mycleverpack
     ...
     END mycleverpack;');
END;
```

- You can also try to wrap the package specification.
- You won't get an error, but the specification will *not* be obfuscated.
- Why not?



Using the PL/SQL Wrapper Utility

- To use the WRAP utility program, you must log into the operating system of your database server computer.
- There are three steps:
  1. Create a text file containing your complete unwrapped source code.
  2. Execute WRAP to create a second text file containing the wrapped code.
  3. Connect to the database and execute the wrapped text file as a script to compile the wrapped code into the Data Dictionary.

Using the PL/SQL Wrapper Utility: Example

Step:

1. Use a text editor to create a file containing your complete source code, starting with CREATE OR REPLACE … and ending with END …; Let's suppose the text file is called mysourcecode.sql.
2. Execute the WRAP utility at the operating system prompt (for example, a DOS prompt on Windows) and pass the name of your text file as an argument:

```
C:> WRAP INAME=mysourcecode.sql
```

   – This creates the wrapped code in a second file called `mysourcecode.plb`.

Using the PL/SQL Wrapper Utility: Example

Step:

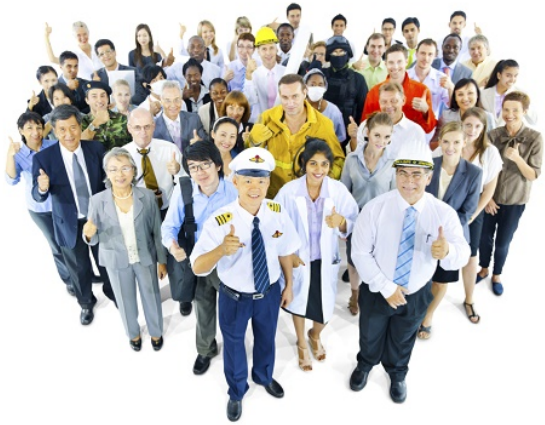
2. (continued): You can give your .plb file a different name:

```
C:> WRAP INAME=mysourcecode.sql ONAME=mywrappedcode.plb
```

3. Connect to the database and execute `mysourcecode.plb` as a script.
   - To do this in Application Express, choose SQL Workshop > SQL Scripts > Upload, choose your .plb file, then click Upload.
   - Then, execute the script just like any other script.
   - This compiles the wrapped PL/SQL code into the Data Dictionary.
   - Now, it can be executed just like any other PL/SQL subprogram.

Comparing the Two Methods for Wrapping Code

- Which method is better, `DBMS_DDL.CREATE_WRAPPED` or the Wrapper utility?
- For very large PL/SQL programs where the source code is more than 32,767 bytes, you must use the WRAP utility.
- For smaller programs, `DBMS_DDL.CREATE_WRAPPED` is easier because you don't need to log on to the database server machine, and everything is done in a single step.



Terminology

Key terms used in this lesson included:

- `DBMS_DDL.CREATE_WRAPPED`
- Obfuscation
- Wrapper utility
- Wrapping PL/SQL source code

Summary

In this lesson, you should have learned how to:

- Describe the benefits of obfuscated PL/SQL source code
- Use the DBMS_DDL.CREATE_WRAPPED server-supplied procedure
- Describe how to use the Wrapper utility to obfuscate PL/SQL source code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