Testing with utPLSQL

Made Easy with SQL Developer

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Introduction

Test Automation

"The use of software
separate from the software being tested
to control the execution of tests
and the comparison of
actual outcomes with predicted outcomes."

Source: https://en.wikipedia.org/wiki/Test_automation

Testing Scope in Database Development

Every component of an application
that is deployed in the database.

For example:
Types, packages, procedures, functions,
views, triggers, constraints.

utPLSQL

Core Testing Framework

- Schema in the database
- No repository
- Annotation based tests

ORACLE DATABASE

Development

- Realtime Reporter
- Code Coverage, Code Templates, etc.




Test Automation

- Command Line Client
- Maven Plugin Maven
- Various Reporters

JUnit  TFS

sonarqube COVERALLS 





Test Declaration

```
CREATE OR REPLACE PACKAGE test_package_name AS
   --%suite

   --%test
   PROCEDURE procedure_name;
END;
```

--%displayname(<description>)
--%test(<description>)
--%tags(<tag>[,...]
--%throws(<exception>[,...])
--%beforeall
--%afterall
--%beforeeach
--%aftereach
--%beforetest([...])
--%aftertest([...])
--%rollback(manual)
--%disabled

--%suite(<description>)
--%suitepath(<path>)
--%tags(<tag>[,...]
--%displayame(<description>)
--%beforeall([...])
--%afterall([...])
--%beforeeach([...])
--%aftereach([...])
--%rollback(manual)
--%disabled
--%context
--%endcontext

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Test Implementation

```
CREATE OR REPLACE PACKAGE BODY test_package_name AS
   PROCEDURE procedure_name IS
      l_actual   SYS_REFCURSOR;
      l_expected SYS_REFCURSOR;
   BEGIN
      open l_actual for select * from dept where deptno != 30;
      open l_expected for select * from dept;
      ut.expect(l_actual).to_equal(l_expected).join_by('DEPTNO');
   END procedure_name;
END;
```

Matcher:

be_between, be_empty, be_false, be_greater_than, be_greater_or_equal, be_less_or_equal, be_less_than, be_like, be_not_null, be_null, be_true, contain, **equal**, have_count, match

Extended options for refcursor, object type, JSON, nested table and varray:

- include(<items>)
- exclude(<items>)
- unordered
- **join_by**(<items>)

Test Run

```
SET SERVEROUTPUT ON SIZE UNLIMITED
EXEC ut.run('test_package_name')
```

List of ...
- [schema.]package[.procedure]
- [schema]:suitepath[.context][.procedure]

List of ...
- tag (include)
- -tag (exclude)

```
test_package_name
  procedure_name [.03 sec] (FAILED - 1)

Failures:

  1) procedure_name
       Actual: refcursor [ count = 3 ] was expected to equal: refcursor [ count = 4 ]
       Diff:
       Rows: [ 1 differences ]
         PK <DEPTNO>30</DEPTNO> - Missing:  <DEPTNO>30</DEPTNO><DNAME>SALES</DNAME><LOC>CHICAGO</LOC>
       at "SCOTT.TEST_PACKAGE_NAME.PROCEDURE_NAME", line 8 ut.expect(l_actual).to_equal(l_expected)
                                                                              .join_by('DEPTNO');

Finished in .034792 seconds
1 tests, 1 failed, 0 errored, 0 disabled, 0 warning(s)
```

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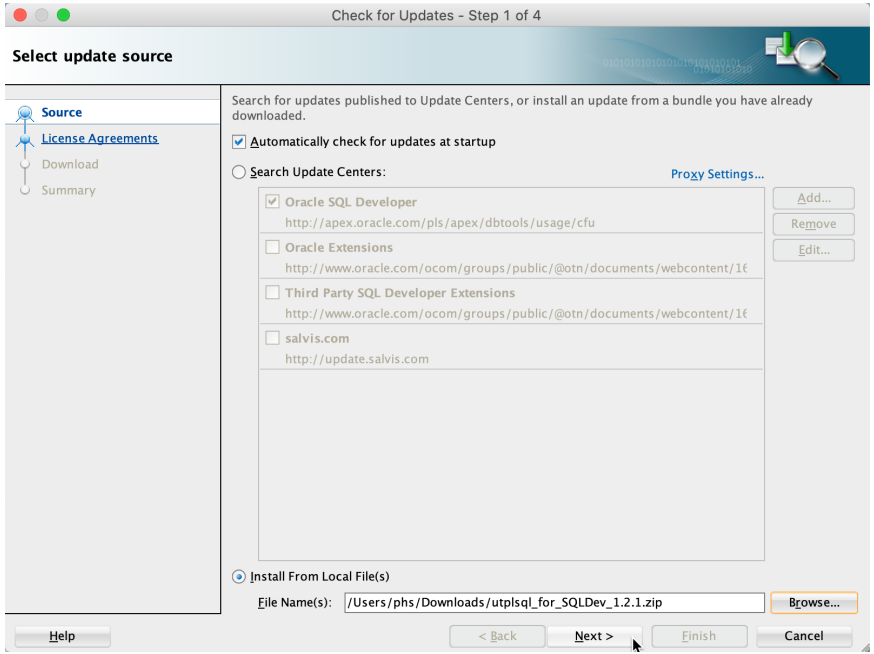
Installation

Install utPLSQL Core Testing Framework

- Download utPLSQL.zip from https://github.com/utPLSQL/utPLSQL/releases
- Unzip utPLSQL.zip
- cd source
- sqlplus / as sysdba @install_headless.sql
  - User UT3
  - Password XNtxj8eEgA6X6b6f
  - Tablespace USERS

Install utPLSQL for SQL Developer from File *)

- Download utplsql_for_SQLDev_*.zip
  from https://github.com/utPLSQL/utPLSQL-SQLDeveloper/releases
- Start SQL Developer
- Select "Check for Updates..." in the help menu *)
- Use the "Install From Local File" option
  to install the previously downloaded
  "utplsql_for_SQLDev_*.zip" file
  - User must have read/write access
    to SQL Developer installation directory
  - Run as Administrator, if required
- Restart SQL Developer



*) You can also configure an Update Center, see https://github.com/PhilippSalvisberg/sqldev-update

Build & Run Tests in SQL Developer

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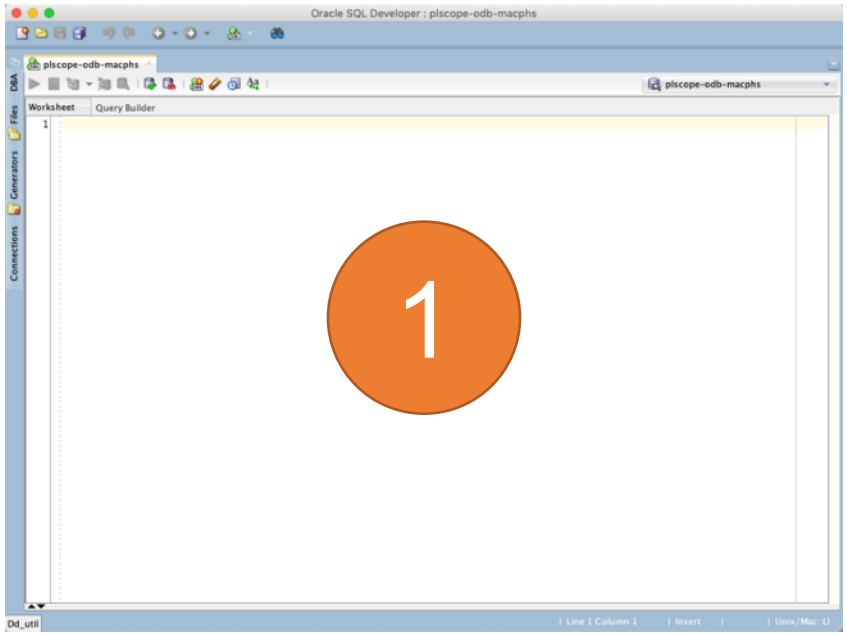
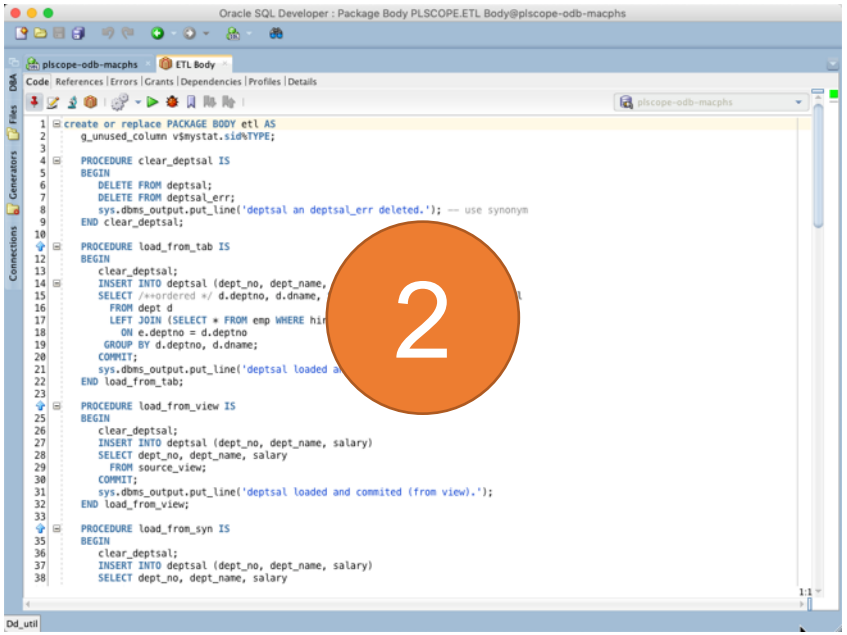
Starting Point?





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Run Code Coverage Reports in SQL Developer

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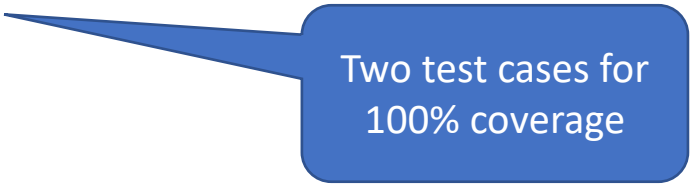
Code Coverage – Defintion

"A measure used to describe the
degree to which the source code of a program is executed
when a particular test suite runs."

Source: https://en.wikipedia.org/wiki/Code_coverage

Line Coverage

```
CREATE OR REPLACE FUNCTION f(a IN INTEGER) RETURN INTEGER IS
BEGIN
    IF a IS NULL THEN
        RETURN 0;
    ELSE
        RETURN a*a;
    END IF;
END f;
/
```



Code Block Coverage (12.2 and higher)

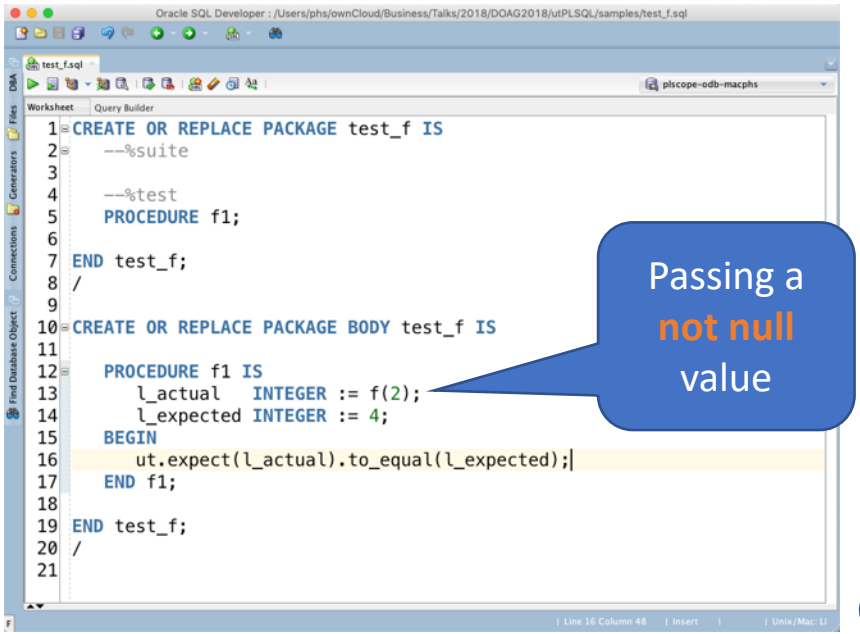
```
CREATE OR REPLACE FUNCTION f(a IN INTEGER) RETURN INTEGER IS
BEGIN
   IF a IS NULL THEN RETURN 0; ELSE RETURN a*a; END IF;
END f;
/
```

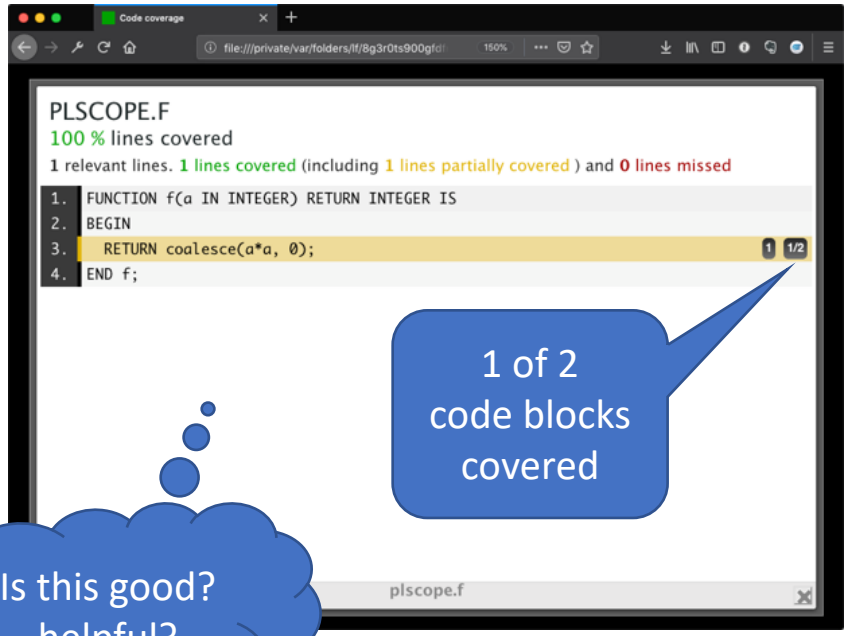
Two test cases for 100% coverage

```
CREATE OR REPLACE FUNCTION f(a IN INTEGER) RETURN INTEGER IS
BEGIN
   RETURN coalesce(a*a, 0);
END f;
/
```

One test case for 100% coverage when passing NULL

utPLSQL – Line & Code Block Coverage





Is this good? helpful?

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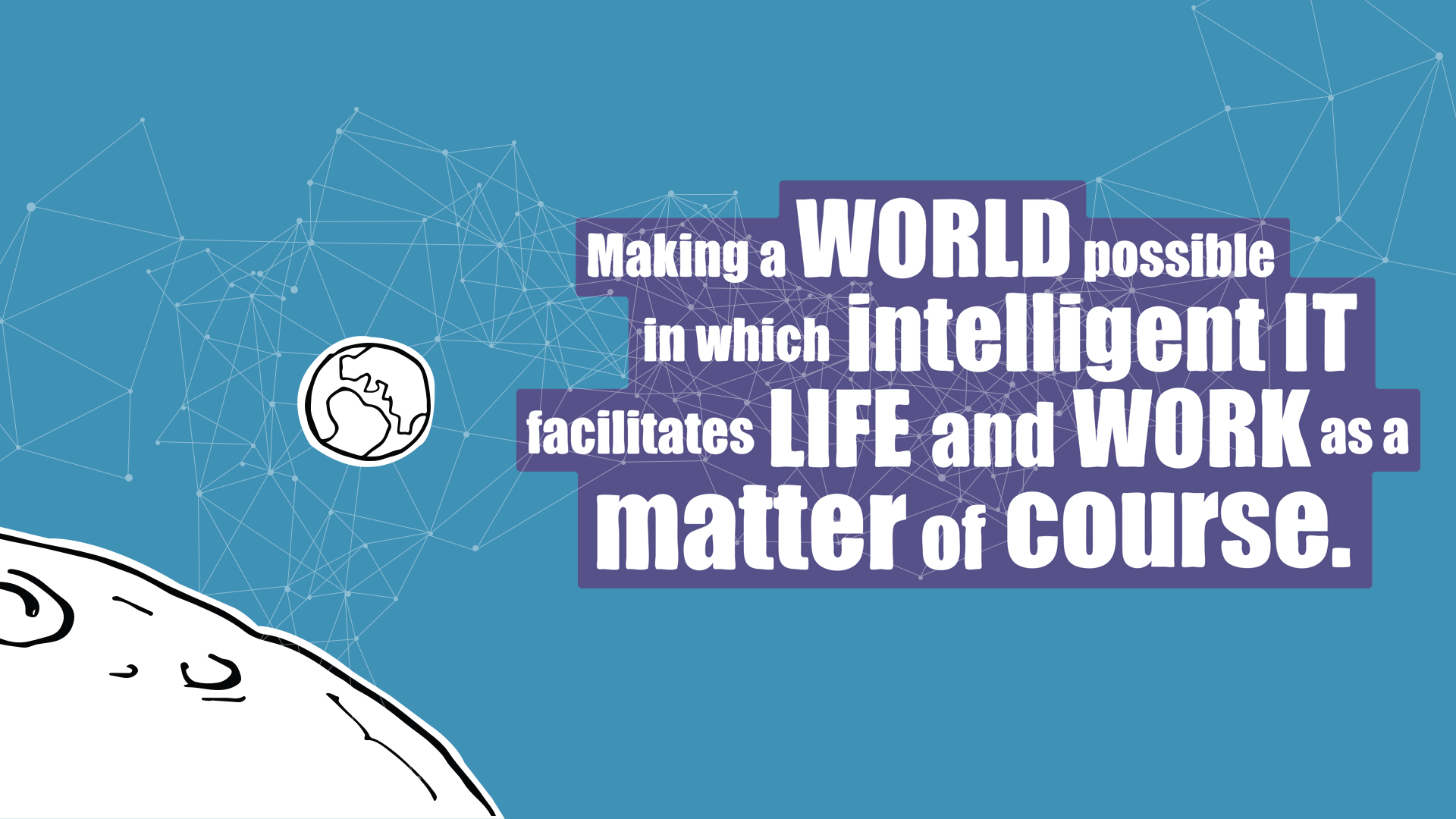
Core Messages

The First Step Is the Hardest

- **Set up a test-friendly environment**
  - Install utPLSQL core testing framework
  - Install SQL Developer for utPLSQL

- **Start with tests**
  - to reproduce bugs
  - for new requirements

- **utPLSQL will change how you code**
  - Write smaller units
  - Isolate code that is difficult to test


Making a WORLD possible
in which intelligent IT
facilitates LIFE and WORK as a
matter of course.