



ORACLE
DATABASE **11g**

Real Application Testing: Life-Demo

Ulrike Schwinn und Maik Sandmann

ORACLE Deutschland B.V. & Co.KG

Real Application Testing – Stand der Dinge

- Einsetzbar ab 9.2.0.8, aktueller Stand 11.2.0.2
- Option der Datenbank, Diagnostic und Tuning Pack empfohlen
- Integration in EM und PL/SQL API
- Mögliche Szenarien:
 - Last – und Performanztests
 - Migrationen / Upgrades
 - Architekturwechsel, z.B. Single Instance / RAC
 - Plattformwechsel
 - Feature-Tests (Komprimierung, TDE, etc.)
- Verwendbar auch mit
 - SAP, Exadata, Siebel, usw.

Vorteile

- Ohne zusätzliche Installation und Skripte
- Plattformunabhängigkeit
- Unterschiedliche Release-Unterstützung (Note 560977.1)
- Erzielte Ergebnisse und Berichte beinhalten anerkannte Metriken
- Integrierte Tuning-Empfehlungen
- Nutzung einer graphischen Oberfläche mit Grid Control und Database Control
- Realer Lasttest vs. synthetische Tests



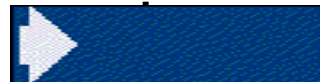
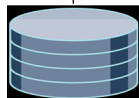
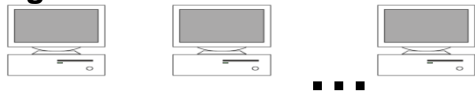
Database Replay

Setup der Demo

Produktivsystem

10.2.0.4

Clients: Swingbench simuliert Sessions

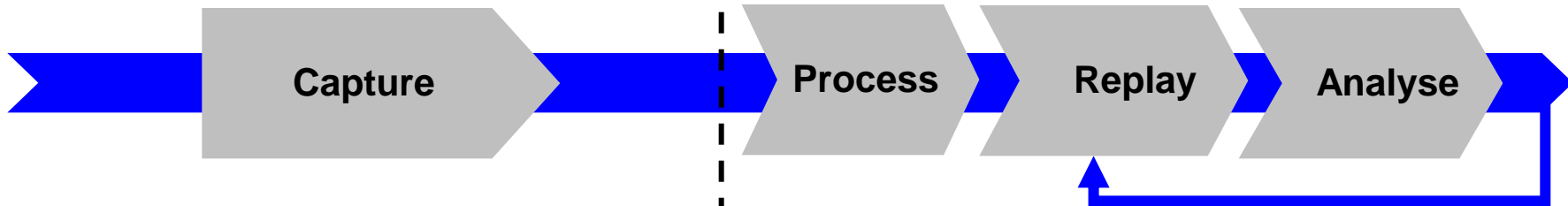
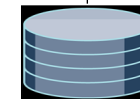


Testsystem

11.2.0.2



1 Workload
Replay
Client (WRC)



Database Replay – Setup Szenarien

- Eine Umgebung
 - Produktion, Test und WRC
- Zwei Umgebungen
 - 1. Maschine: Produktion
 - 2. Maschine: Test und WRC
- Mehrere Umgebungen
 - 1. Maschine: Produktion
 - 2. Maschine: Test
 - Client Maschine für WRC (Instant Client Installation)
 - Download von OTN (Basic Instant Client und WRC)
 - Zugriff auf preprocessed Dateien gewährleisten!

Database Replay - Ablauf



- **Produktivsystem**

1. Schritt : Workload Capture

- Vorbereitung des Testsystems (Backup, Flashback, NLS etc.)
- Laden des aufgenommenen Workloads auf das Testsystem

- **Testsystem**

2. Schritt: Processing

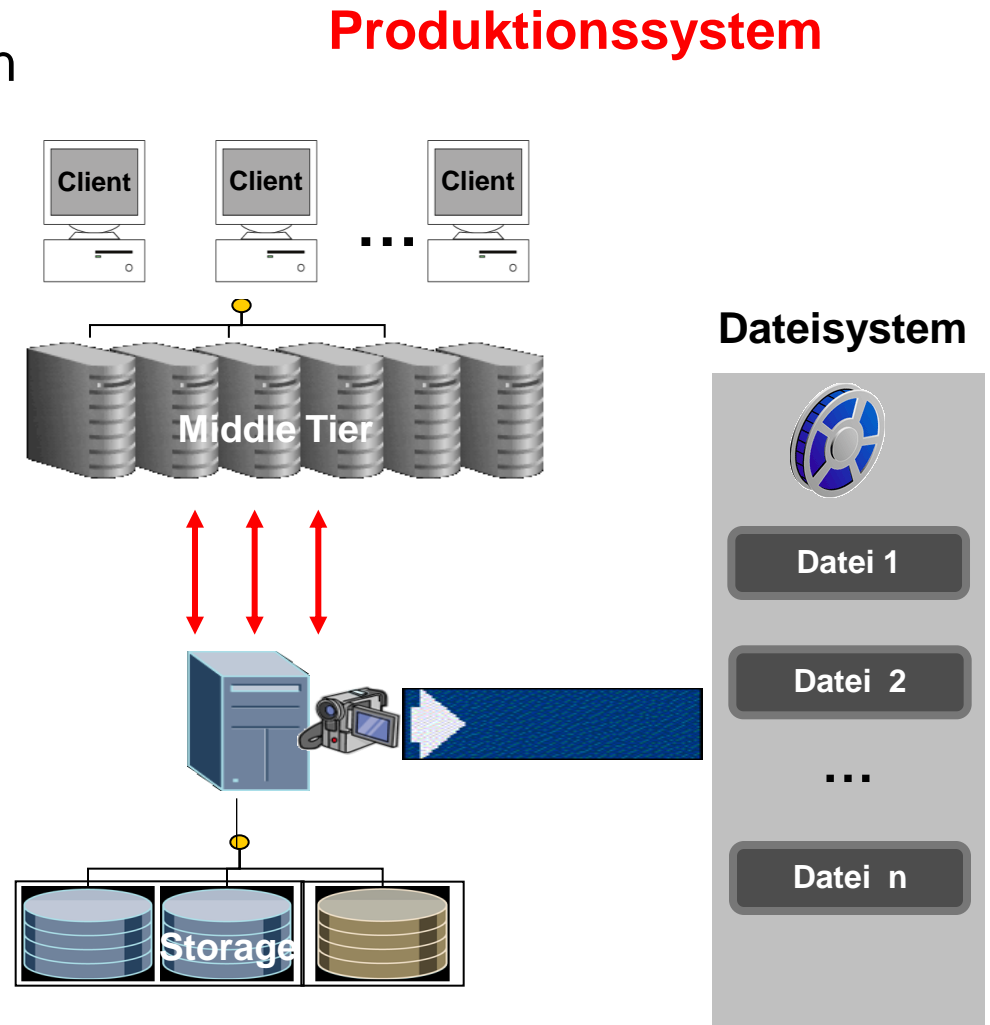
3. Schritt: Replay Workload mit Workload Replay Clients

4. Schritt: Analysen mit Reports



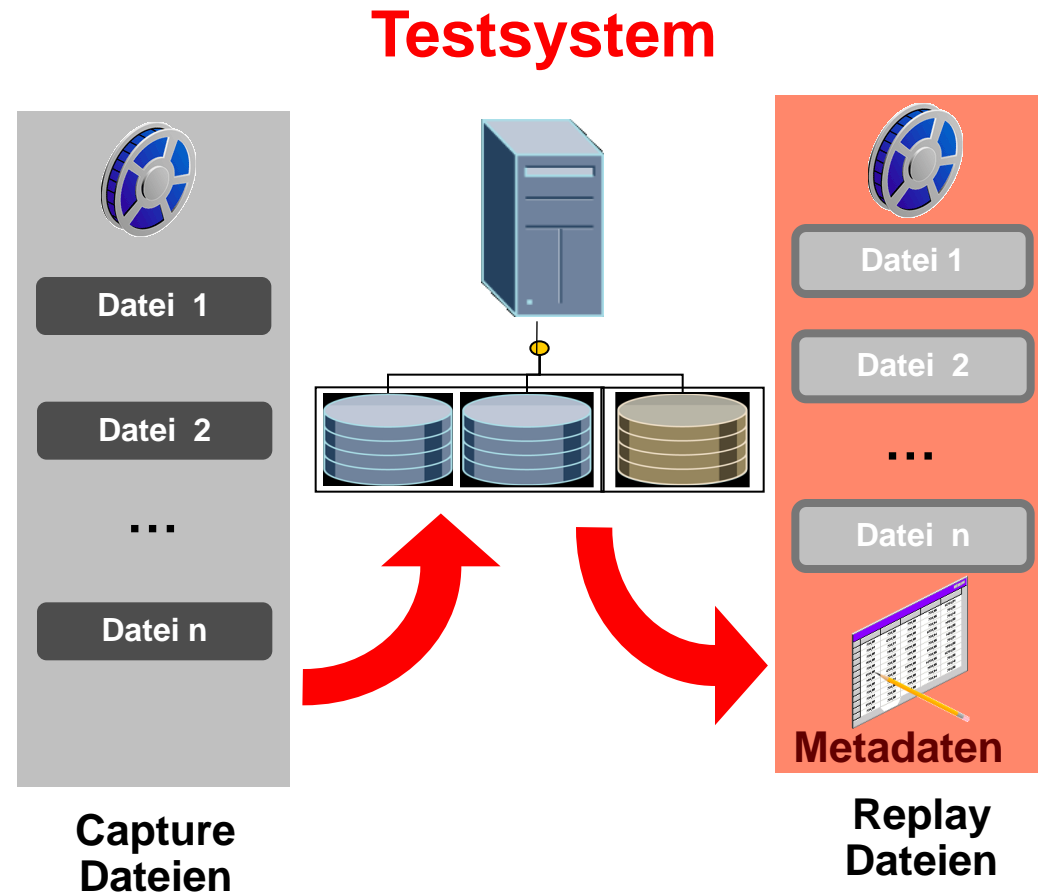
Schritt 1: Workload Capture

- Speicherung der Informationen in binären plattformunabhängigen Dateien
- Capture ab 9.2.0.8 (Note beachten)
- Einschränkungen beachten
- Filter sind möglich:
 - Inclusion/Exclusion Filter
 - Filter Attribute
 - User, Program, Module, Action, Service, Session ID



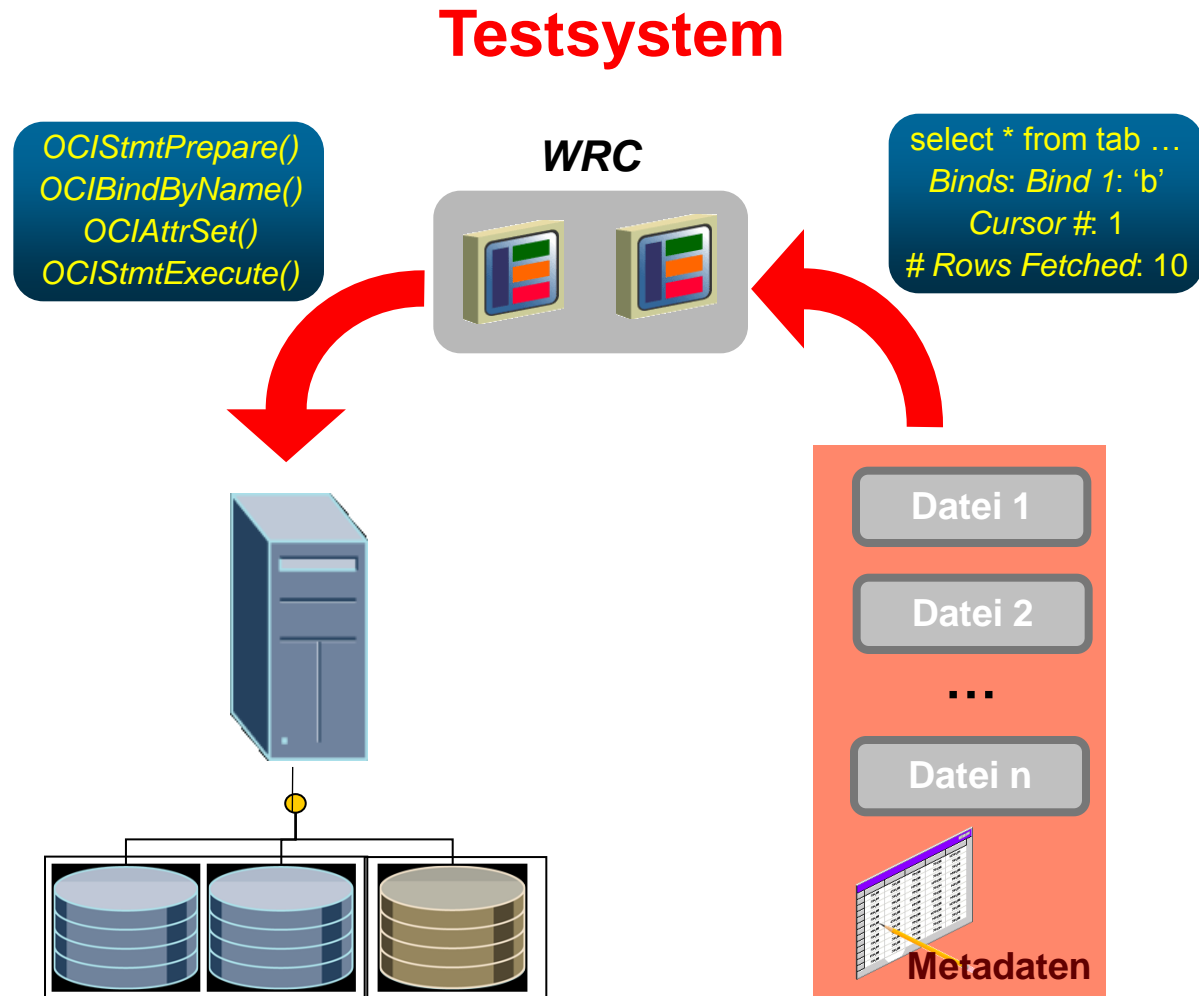
Schritt 2: Process Workload Dateien

- Processing Operation transformiert Capture Daten in abspielbares Format
- Danach ist die Wiederholung des “processed Workloads beliebig häufig möglich
- 11.2.0.2: Start des Workload Analyzers möglich



Schritt 3: Workload Replay

- Berücksichtigung des Timings, der Concurrency und Abhängigkeiten des Capture Systems (Produktionssystem)
- WRC ist ein spezielles Programm zum Lesen der Workload Dateien und Abspielen auf dem Testsystem
- Anstarten von mehreren Replay Clients ist möglich
- Ab 11.2: Einsatz von Filtern möglich (API)
- 11.2.0.2: Integration in SPA





SQL Performance Analyzer (SPA)

SQL Performance Analyzer

- Ausführung und Bewertung eines **SQL-Workloads** in unterschiedlichen Umgebungen nach unterschiedlichen Metriken
- Nutzbar für:
 - Performanceanalysen von SQL Workloads
 - Exadata Simulationen
- Voraussetzung: **SQL Tuning Sets (STS)**
 - Automatisch generierbar im Enterprise Manager
 - Geringer Overhead!
 - STS schon in 10g
 - nutzbar in 9i: SQL Trace ist in STS umwandelbar

Ablauf

- Erfasse SQL mit STS während Replay
- Transportiere STS (optional)



SPA:

- **Ausführung VORHER**
 - Veränderungen durchführen
- **Ausführung NACHHER**
- **Performance Vergleich nach unterschiedlichen Metriken wie**
Elapsed Time, CPU Time, Disk Reads, Buffer Gets, Direct Writes, I/O Interconnect Bytes ...



Bonustrack: Neuigkeiten

SPA Erweiterungen

- In 11g Release 2 (11.2.0.1)
 - Automatisch mehrere **Testausführungen**
 - **Active Reports** für die offline Analyse
 - **Vergleich** von verschiedenen SQL Tuning Sets zweier ähnlicher Workloads
 - Neuer Workflow für **Database Upgrade**
- Mit Patchset 11.2.0.2
 - Neuer Workflow für **Optimizer Statistics Refresh**
 - Vollständige Nutzung im **Active Data Guard**

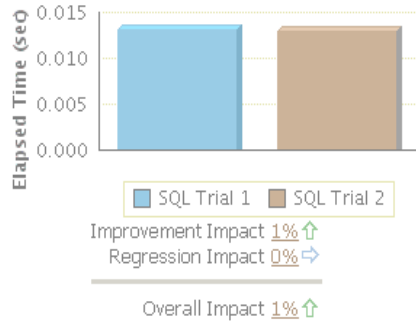
SPA Active Report

Save Mail

SQL Tuning Set Name TEST1
STS Owner SYS
Total SQL Statements 8
SQL Statements With Errors 1

Global Statistics

Projected Workload Elapsed Time



SQL Stat



Top 10 SQL Statements Based on Impact on Workload

https://scloud037.de.oracle.com:7799?event=...

The report will be sent as an html attachment.

* From

* To

TIP Use ',' for multiple recipients

Attached is the report for SQL Performance Analyzer task SYSTEM.TESTSPA.

Message
Lieber Kollege x,
könntest Du bitte über den SPA-Report lesen und mir ein paar Tipps dazu geben

Cancel Send

Done Trusted sites 100%

Integrierte Workflows

SQL Performance Analyzer

Page Refreshed Sep 28, 2010 3:33:37 PM CEST View Data Real Time: 15 Second Refresh

SQL Performance Analyzer allows you to test and to analyze the effects of changes on the execution performance of SQL contained in a SQL Tuning Set.


SQL Performance Analyzer Workflows

Create and execute SQL Performance Analyzer Task experiments of different types using the following links.

- [Upgrade from 9i or 10.1](#) Test and analyze the effects of database upgrade from 9i or 10.1 on SQL Tuning Set performance.
- [Upgrade from 10.2 or 11g](#) Test and analyze the effects of database upgrade from 10.2 or 11g on SQL Tuning Set performance.
- [Parameter Change](#) Test and compare an initialization parameter change on SQL Tuning Set performance.
- [Optimizer Statistics](#) Test and analyze the effects of optimizer statistics changes on SQL Tuning Set performance.
- [Exadata Simulation](#) Simulate the effects of a Exadata Storage Server installation on SQL Tuning Set performance.
- [Guided Workflow](#) Create a SQL Performance Analyzer Task and execute custom experiments using manually created SQL trials.

SQL Performance Analyzer Tasks

Select	Name	Owner	Last Modified	Current Step Name	Type	Status	SQLs Processed	Steps Completed
	No SQL Performance Analyzer Tasks available.							

 TIP For an explanation of the icons and symbols used in the following table, see the [Icon Key](#)

Database Replay Erweiterungen

- In 11g Release 2 (11.2.0.1)
 - Weniger **Einschränkungen**
 - **Replay Filter** Support
- Mit Patchset 11.2.0.2
 - **Database Replay** und **SPA Integration**
 - **Workload Analyzer**

Workload Analyzer

- Neues regelbasierendes Werkzeug um Workload Capture zu beurteilen (... Qualität, Problemfälle, Abspielbarkeit ...)
- Optionaler Bestandteil des Preprocessing-Vorgangs
- Gibt Empfehlungen
- Automatisch mit DB Control oder API (11.2.0.2)
- Auch OTN Download möglich:
 - <http://www.oracle.com/technetwork/database/features/manageability/db-replay-analyzer-172990.html>

Workload-Analyzer Start



Preprocess Captured Workload: Database Version

Database orcl
Version 11.2.0.2.0
Capture Name rat1
Logged In As SYS

[Cancel](#) [Step 1 of 3](#) [Next](#)

The current database version is 11.2.0.2.0.

Continue only if you intend to replay the captured workload on a database of the same version.

Advanced

Run the Workload Analyzer to find potential replay problems in the captured workload (Recommended).

[Cancel](#) [Step 1 of 3](#) [Next](#)

[Database](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

Copyright © 1996, 2010, Oracle. All rights reserved.

Oracle, JD Edwards, PeopleSoft, and Retek are registered trademarks of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.

[About Oracle Enterprise Manager](#)

Workload-Analyzer Empfehlungen

Workload Capture Analyzer Report

Capture Details

Capture Directory

/home/oracle/rat

Summary of Findings

Finding	Maximum Workload Impact
PL/SQL	98 %
Non captured workload	7 %

Findings and Recommendations

[PL/SQL](#)

Maximum Workload Impact: 98 % of DB Time

Rationale

If the replay is much slower than expected, try to run in unsynchronized mode.

Action

A significant part of your workload comes from PL/SQL.

If the PL/SQL blocks or functions have 'complicated' logic or multiple commits in them, they are hard to synchronize and they behavior might change during replay. You might see a different workload profile during replay if this is the case.

[Non captured workload](#)

SPA Integration



Capture Workload: Options

Database orcl
Logged In As SYS

[Cancel](#) [Back](#) [Step 2 of 5](#) [Next](#)

Database Restart Options

A database restart prior to a workload capture is recommended to ensure a complete and accurate capture. Not restarting could capture in-flight transactions, which may adversely affect the replay of subsequent captured transactions.

- Do not restart the database prior to the capture.
- Restart the database prior to the capture.

SQL Performance Analyzer

SQL Performance Analyzer allows you to test and to analyze the effects of changes on the execution performance of SQL contained in a SQL Tuning Set.

- Capture SQL statements into a SQL Tuning Set during workload capture.

Workload Filters

Workload filters can customize the workload to be captured. By default, most external client requests made to the database are captured. Refer to the Oracle Real Application Testing User's Guide for more information.

Integration von DB Replay in Application Testing Suite (Beta)

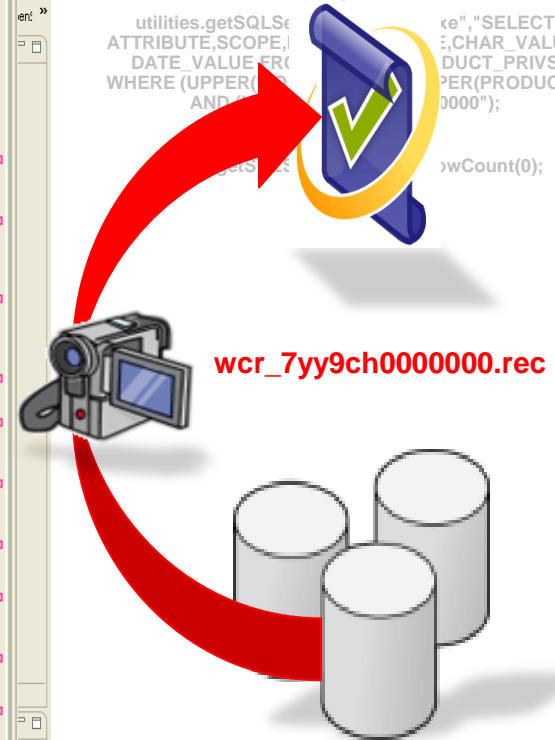
```
OpenScript (Tester) - C:\Oracle\ATSOFT\MyDatabaseScript - OpenScript
File Edit Script Tools View Run Help

*MyDatabaseScript

utilities.getSQLService().define("xe",
    "oracle.jdbc.driver.OracleDriver",
    "jdbc:oracle:thin:@samstation:1521:orcl", "administrator",
    deobfuscate("6GaD7eW3kGVe5TKHmUI/+w=="));
}

/**
 * Add code to be executed each iteration for this virtual user.
 */
public void run() throws Exception {
    beginStep("[1] Session: 23");
    {
        utilities.getSQLService().query(2, "xe",
            "SELECT USER FROM DUAL\u0000");
        {
            utilities.getSQLService().assertRowCount(1);
        }
        utilities
            .getSQLService()
            .query(
                4,
                "xe",
                "SELECT ATTRIBUTE,SCOPE,NUMERIC_VALUE,CHAR_VALUE,DATE_VALUE FROM SYSTEM.PRODUCT_PRIVS
            {
                utilities.getSQLService().assertRowCount(0);
            }
        utilities
            .getSQLService()
            .query(
```

```
public void run() throws Exception {
    beginStep("[1] Session: 23");
    {utilities.getSQLService().query(2, "xe", "SELECT USER
      FROM DUAL\u0000");
      {
        utilities.getSQLService().assertRowCount(1);
      }
    }
    utilities.getSQLSe
    ATTRIBUTE,SCOPE,I
    DATE_VALUE FR
    WHERE (UPPER(P
    AND
    "xe", "SELECT
    CHAR_VALUE,
    DUCT_PRIVS
    PER(PRODUCT)
    0000");
    >RowCount(0);
  }
```



Informationen

- Datenbank Community
 - <http://tinyurl.com/100OracleTipps>
- Handbuch: Real Application Testing User's Guide
- Metalink Notes: 560977.1
- Weitere Veranstaltungen
 - DOAG Veranstaltung in Nürnberg