



Unleash Your DevOps Strategy by Synchronizing Application and Database Changes

Mark Kurtz, Software Sales Engineer
@ToadSC_CHI
Mark.kurtz@quest.com

MAY 16 & 17, 2018

CLEVELAND PUBLIC AUDITORIUM, CLEVELAND, OHIO

WWW.NEOOUG.ORG/GLOC

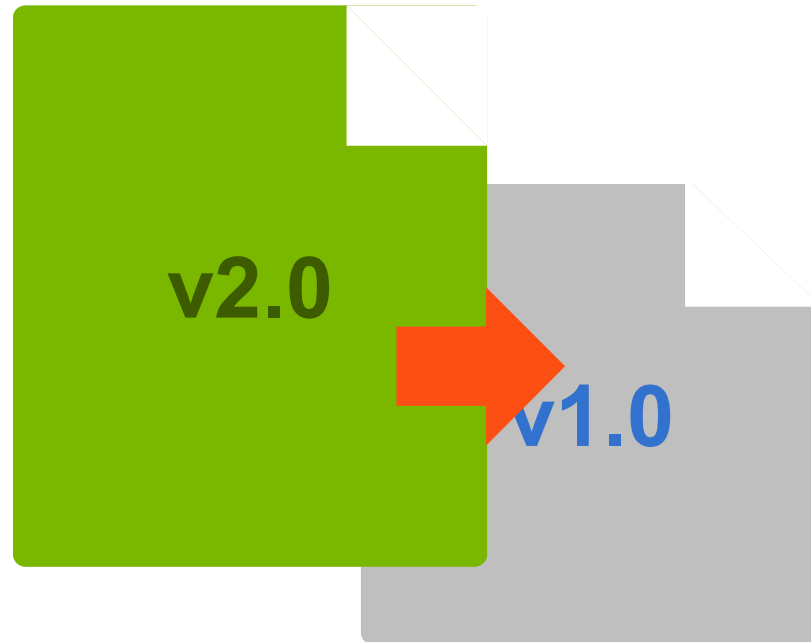


Agenda

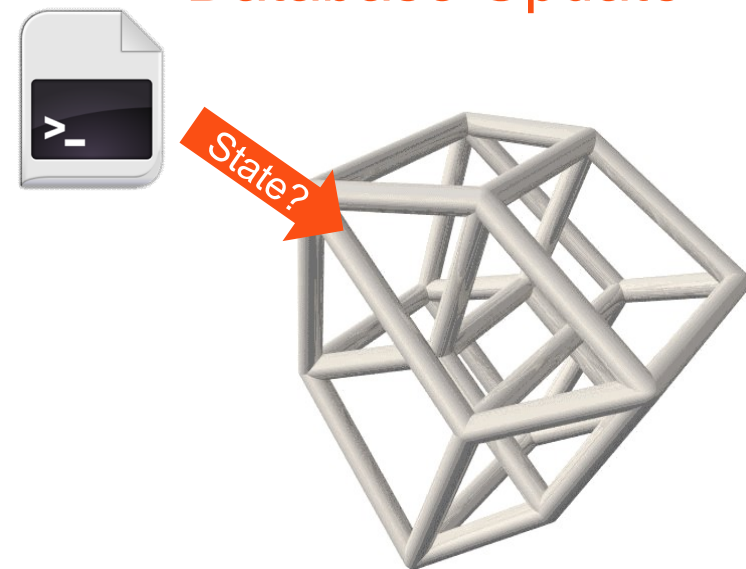
- The Challenges of Bringing Database Development into DevOps
- Redefining Database Development using Toad
- Making Database Development a part of CI/CD
- Resources
- Q&A

Database Environments are Inherently Risky

Application Update

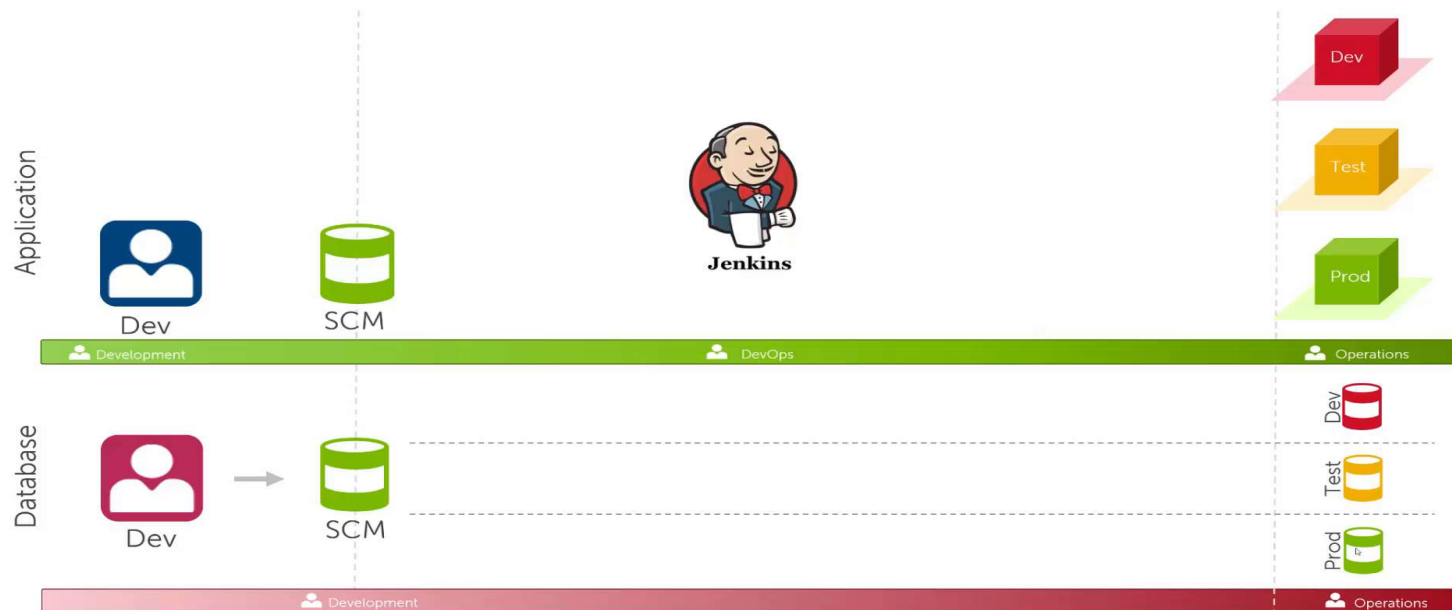


Database Update



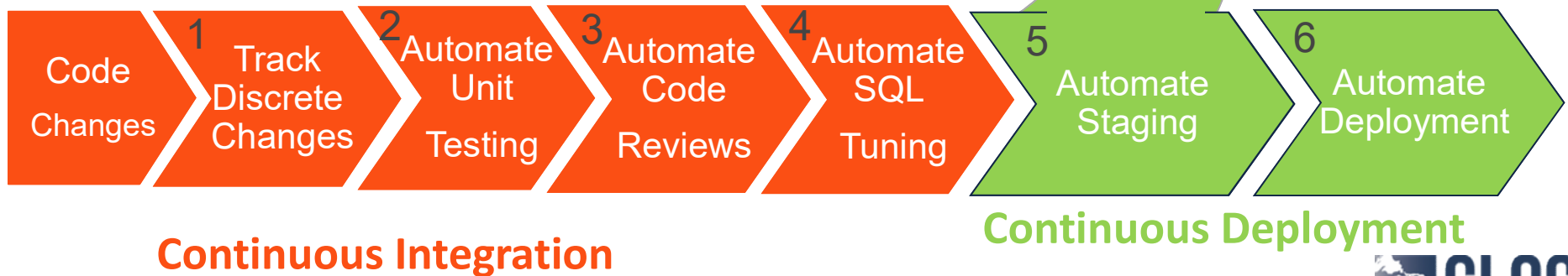
© Friedrich A. Lohmüller, 2012

The Challenge of Agile Database Development



Redefining Oracle Database Development using Toad

- ✓ Shorten development cycles
- ✓ Reduce risk
- ✓ Ensure quality
- ✓ Lower cost



Track changes with Team Coding & VCS integration

Why is this important?

- Ensures correct code versions are used during build.
- Ensures ongoing PL/SQL code/object integrity.
- Provides true collaborative development.

• Benefits:

- **Intuitive** – enables you to work directly on DB objects without worrying about checking-out/-in files.

• **Improves standards**– helps promote a team-based environment for ensuring code changes/updates are consistent. Eliminates backdoor changes.

• **VCS enabled** – works with version control systems like Git, Microsoft TFS, CVS, ClearCase, Perforce, and SVN.

• **Productivity** – seamlessly check-in and check- out objects directly from within Toad.

• **Policies** – optionally force PL/SQL regression test executions and minimum code review standards prior to code check-in.

Track changes with Team Coding & VCS integration

The screenshot displays the Team Coding Manager interface. On the left, a tree view shows a project structure under 'PHP_Demo(PHPLab)' with folders like 'PHPHOL', 'FUNCTION', 'IND', 'PAC', 'PRC', and 'TAB'. A context menu is open over the 'FUNCTION' folder, listing actions such as 'Check-out', 'Undo check-out', 'Check-in', 'Check-in all', 'Get latest version', 'Compare contents', 'Create new revision in the VCS', 'Configure...', 'Team Coding status...', 'VCS Logon...', 'Select VCS project...', 'Administer', 'Refresh', 'Expand/Collapse', and 'Code Analysis'. The 'Code Analysis' option is highlighted, and a sub-menu is visible with options: 'Run Code Analysis', 'Send to Code Analysis', and 'Clear Code Analysis scores'. On the right, a 'Tables' panel lists database tables with their last analyzed timestamps. The table list includes: COUNTRIES, CUSTOMER, DATA_TYPE1, DATA_TYPE2, DB_SHUTDOWN, DEPARTMENT, DEPARTMENTX, DEPT, DEPTX, EMP, EMPLOYEE, EMPLOYEEEX, EMPX, EMP_SAL_HIST, EMP_SAL_HISTX, EMP_SMALL, EMP_SMALLX, GRADE, GRADEX, JOBS, JOB_HISTORY, MOVIERENTAL, and MOVIEITITLE.

Table	Last Analyzed
COUNTRIES	5/5/2015 8:00:31 PM
CUSTOMER	5/5/2015 8:00:29 PM
DATA_TYPE1	5/5/2015 8:00:29 PM
DATA_TYPE2	5/5/2015 8:00:29 PM
DB_SHUTDOWN	5/5/2015 8:00:33 PM
DEPARTMENT	4/10/2015 10:32:35 A
DEPARTMENTX	4/10/2015 10:32:44 A
DEPT	4/10/2015 10:32:42 A
DEPTX	4/10/2015 10:32:45 A
EMP	4/10/2015 10:32:42 A
EMPLOYEE	4/10/2015 10:32:35 A
EMPLOYEEEX	4/10/2015 10:32:44 A
EMPX	4/10/2015 10:32:45 A
EMP_SAL_HIST	4/10/2015 10:32:41 A
EMP_SAL_HISTX	4/10/2015 10:32:45 A
EMP_SMALL	4/10/2015 10:32:41 A
EMP_SMALLX	4/10/2015 10:32:45 A
GRADE	4/10/2015 10:32:35 A
GRADEX	4/10/2015 10:32:44 A
JOBS	5/5/2015 8:00:31 PM
JOB_HISTORY	5/5/2015 8:00:32 PM
MOVIERENTAL	5/5/2015 8:00:29 PM
MOVIEITITLE	5/5/2015 8:00:29 PM

Automate PL/SQL unit testing with Toad Code Tester

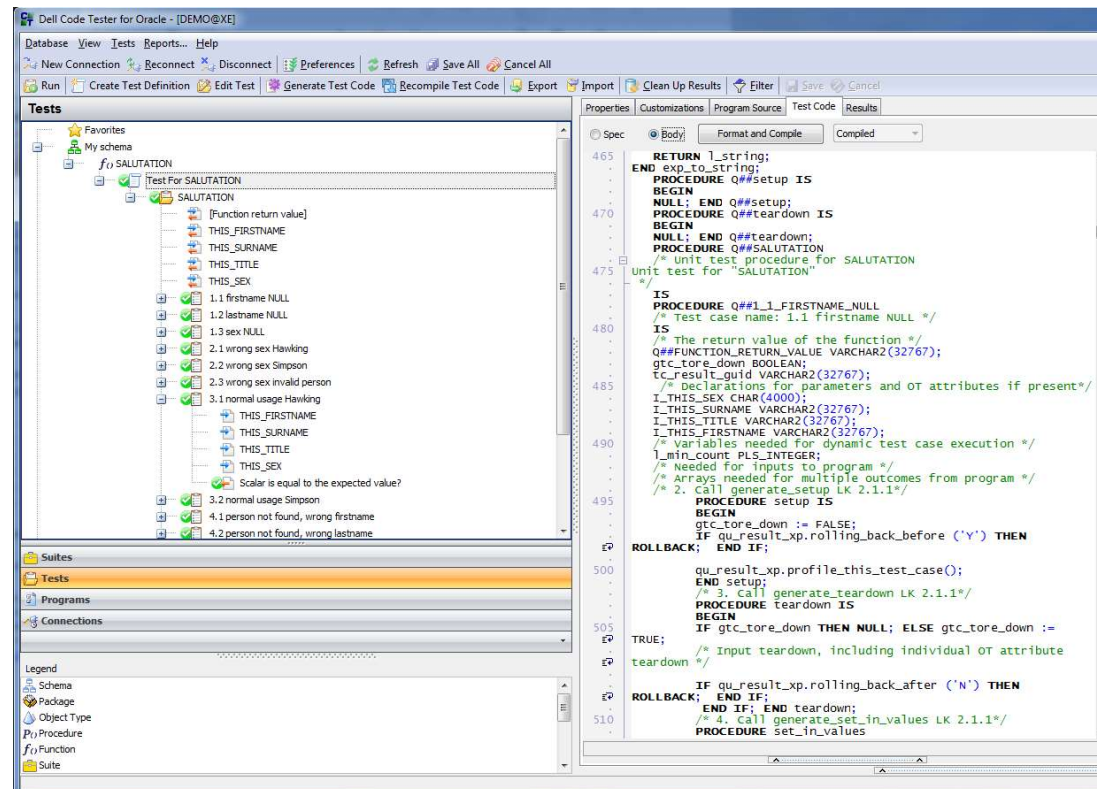
Why is this important?

- Ensures tests cover all operational use cases.
- Reduces the risk of bugs in production.
- Becomes part of Continuous Integration process.

Benefits:

- **Intuitive and fast** – enables you to think about code behavior as you define your tests – test code is generated automatically. Simply run your code and create your tests.
- **Persistent** – all unit tests are preserved for the life of the code, facilitating full regression test/code coverage reporting during ongoing code changes.
- **VCS enabled** – optionally require full regression test cycle during code check-in.
- **CI integration** – unit test executions become callable from a CI build process.

Automate PL/SQL unit testing with Toad Code Tester



Automate code reviews with Toad Code Analysis

Why is this important?

- Ensures consistent code quality standards are applied across an entire project.
- Becomes part of Continuous Integration process.

Benefits:

- **Intuitive and fast** – continuous parsing of code enables you to instantly see where code quality violations occur as you code.
- **Customizable** – different sets of rules can be defined per project – rules can be customized.
- **VCS enabled** – optionally require minimum code quality level during code check-in.
- **CI integration** – code reviews become callable from a CI build process.

Automate code reviews with Toad Code Analysis

The screenshot displays the Toad for Oracle Code Analysis interface. The main window shows the analysis results for the procedure `PROCEDURE_AX`. The interface includes a sidebar with navigation options, a central graph of the Maintainability Index, and a table of rule violations.

Procedure Analysis Summary:

Source Object	Run Date	Rules Included	Total Rule Violations	Rules Passed	Rules Failed	Errors
PROCEDURE_AX	01/04/2016 13:33:08	194	25	181	13	0

Rule Violations (All Rules) - 25:

- Properties
- Cursor Analysis
- Declaration Analysis
- DML Analysis
- Exception Analysis
- Procedure/Function Analysis
- Module Analysis
- Complexity Analysis
- Errors - 0

Rule 5816: Use CASE construct rather than DECODE.

Severity: Information | **Objective:** Readability | **Category:** SQL

Description: Prior to Oracle8i, the only option for a CASE-like structure in PL/SQL was the DECODE function, and it was only accessible via a SQL statement within your PL/SQL code. Oracle8i allowed developers to use the more intuitive CASE statement inside SQL. Oracle9i allowed developers to use CASE within PL/SQL programs. Use CASE construct instead of DECODE (especially for nested conditional tests). It is more standard and easier to understand. Example:

```
select decode (dummy, 'A', 1,
               'B', 2,
               'C', 3,
               'D', 4,
               'E', 5,
               'F', 6,
               '7')
into result
from dual;
```

is better written as:

```
BEGIN
  RESULT :=
    CASE dummy
      WHEN 'A'
      THEN 1
      WHEN 'B'
      THEN 2
    END;
```

SQL Code Snippet:

```
CREATE OR REPLACE PROCEDURE QUEST_PERF.PROCEDURE_AX
  _ID VARCHAR2(3);
  _NAME VARCHAR2(30);
  _COUNT NUMBER;
CURSOR C1 IS
  SELECT DPT_ID,
         DPT_NAME,
         COUNT(*)
  FROM EMPLOYEEX
  WHERE DPT_ID = EMP_DEPT
        AND EMP_SALARY >= 50000
  GROUP BY DPT_ID,
           DPT_NAME;
CURSOR C2 IS
  SELECT EMP_NAME
  FROM EMPLOYEE
  WHERE emp_id <= 12000
        OR decode(emp_id, 12110, 12000, 13000) = 12000;
BEGIN
  OPEN C1;
  LOOP
    FETCH C1 INTO V_ID, V_NAME, N_COUNT;
    EXIT WHEN C1%NOTFOUND;
  END LOOP;
  CLOSE C1;
  OPEN C2;
  LOOP
```

Automate SQL tuning with Toad Auto Optimize SQL

Why is this important?

- Provides a really simple way to tune poor SQL and PL/SQL before production.
- Cost of fixing in production can be exponentially higher and very disruptive for business.

Benefits:

- **Intuitive and fast** – based on patented re-write technology to directly fix the problem – not just offer advice.
- **No hidden costs** – does not use the Oracle EE Management Packs.
- **Evidence based** – provides different alternatives based on pre-defined performance goals.
- **Advanced optimization** – more advanced SQL optimization capabilities such as indexing available depending on developer's experience and permissions.

Automate SQL tuning with Toad Auto Optimize SQL

The screenshot displays the Toad for Oracle Auto Optimize SQL interface. The main window shows a list of alternatives with their execution statistics. The 'Original SQL' is selected, and the 'Best so far' alternative is highlighted. The interface includes a menu bar, a toolbar, and a status bar.

Statement to Tune:

```
1 SELECT MAX (EMP_SALARY)
2 FROM EMPLOYEE, DEPARTMENT
3 WHERE EMP_ID < 200000
4 AND EMP_DEPT = DPT_ID
5 AND DPT_ID < 'DDD'
```

Alternative 22 (Best so far):

```
1 SELECT /*+ NO_USE_NL (DEPARTMENT) */ MAX(EMP_SA
2 FROM EMPLOYEE,
3 DEPARTMENT
4 WHERE EMP_ID < 200000 + UID * 0
5 AND EMP_DEPT = DPT_ID
6 AND DPT_ID < 'DDD'
```

Execution Statistics:

Alternative	Elapsed Time
Alternative 22	0.23 secs
Alternative 19	0.24 secs
Alternative 23	0.24 secs
Alternative 25	0.26 secs
Alternative 24	0.28 secs
Alternative 4	0.31 secs
Original SQL	0.33 secs
Alternative 1	0.33 secs
Alternative 5	0.33 secs
Alternative 3	0.34 secs
Alternative 21	0.34 secs
Alternative 18	0.34 secs
Alternative 6	0.37 secs
Alternative 20	0.44 secs
Alternative 27	0.45 secs
Alternative 2	0.46 secs

Explain Plan:

Original SQL:

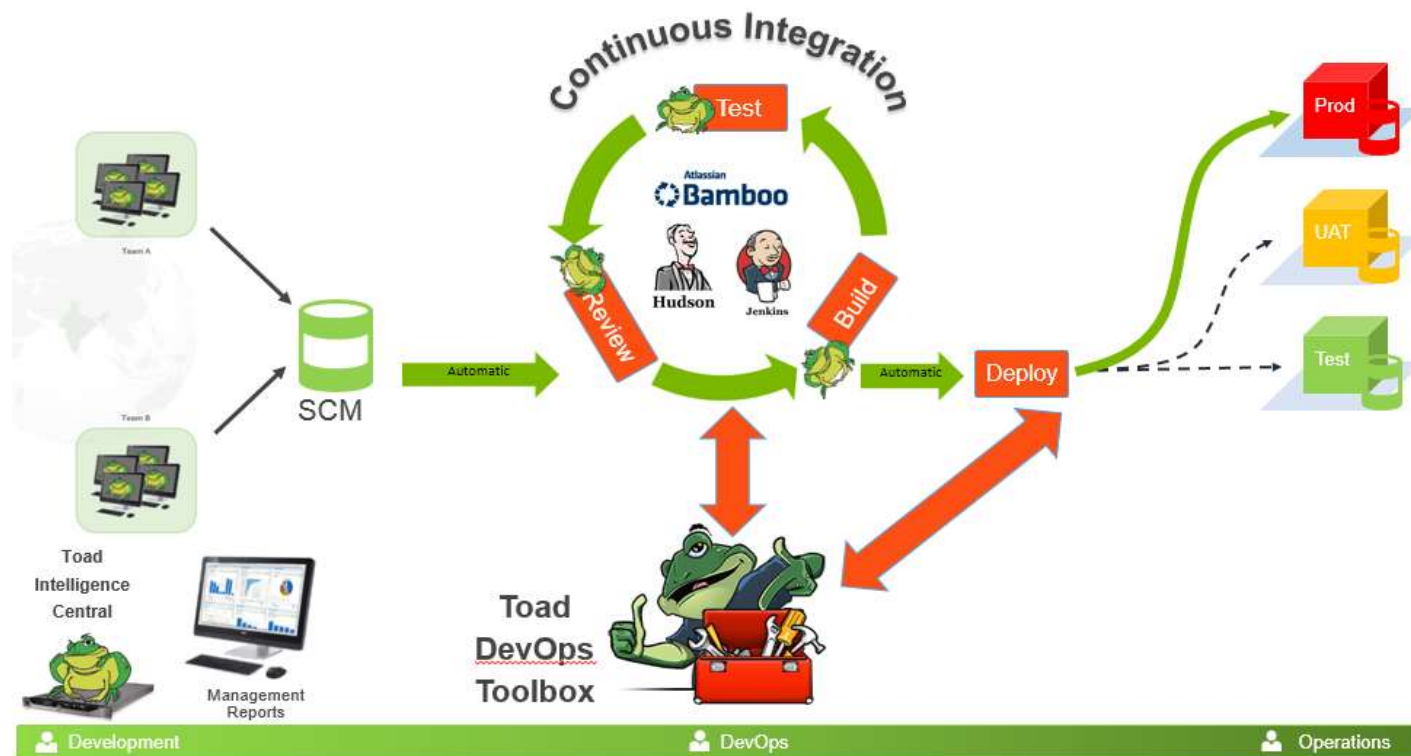
```
1 SELECT STATEMENT ALL_ROWS
2 Cost: 2,487 Bytes: 21 Cardinality: 1
3 9 SORT AGGREGATE
4 Bytes: 21 Cardinality: 1
5 8 NESTED LOOPS
6 Cost: 2,486 Bytes: 358,368 Cardinality: 22,398
7 5 HASH JOIN
8 3 HASH JOIN
9 1 INDEX RANGE SCAN INDEX QUEST_PERF.EMP
10 2 INDEX RANGE SCAN INDEX (UNIQUE) QUEST
11 4 INDEX FAST FULL SCAN INDEX QUEST_PERF.EMP
```

Alternative 22:

```
1 SELECT STATEMENT ALL_ROWS
2 Cost: 747 Bytes: 21 Cardinality: 1
3 5 SORT AGGREGATE
4 Bytes: 21 Cardinality: 1
5 4 HASH JOIN
6 1 INDEX RANGE SCAN INDEX (UNIQUE) QUEST_PERF.DEPARTMENT_PK
7 3 TABLE ACCESS BY INDEX ROWID TABLE QUEST_PERF.EMPLOYEE
8 2 INDEX RANGE SCAN INDEX (UNIQUE) QUEST_PERF.EMPLOYEE_PK
```


Making Database Development a part of Continuous Integration

Getting inside the CI process with Toad DevOps Toolbox



Toad DevOps Toolbox Features

- PL/SQL unit testing
- Static code review
- Database compare
- Schema compare
- Data compare
- Script execution



Publishing Management Reports with Toad Intelligence Central

Databases

Search...

All Databases

XE

DEMO

HR

QUEST_DEV

QUEST_PERF

QUEST_PROD

Code Quality: QUEST_PERF

Toad Code Rating

Overall Code Quality

1

Excellent

Halstead

Computational Complexity

94

Reasonable

McCabes

Cyclomatic Complexity

2.7

Simple

Maintainability

Index

108

High

Lines of Code

395

Comments

37

Functions

0

Packages

0

Procedures

30

Triggers

0

Views

0

Toad Code Rating



Excellent Okay

Code Tester



Pass Fail

Team Coding



Available Locked

Resources. Use Toad World



Select Language | ▼

Search

[LOGIN](#) | [REGISTER](#)

TRAINING
Toad Courseware

DOWNLOADS
Freeware & Trials

PLATFORMS
Database Blogs & Wikis

PRODUCTS
Discussion & Resources

Readers agree: Toad wins again (and again)

DBTA Readers dubbed Toad Development Suite as 2016's best in class.

[Try Toad for Free](#)



database
TRENDS AND APPLICATIONS
READERS' CHOICE AWARDS 2016

[Database Discussions](#)

[DBTA 2016 Awards](#)

[Idea Ponds](#)

[Toad World Academic Program](#)

[Free Web-based Training](#)

Popular on Toad World

[An example use of MapReduce](#)

[Invisible columns in Oracle 12c](#)

[2 awesome, free Toad Data Point tools that you may not know about](#)

**MAKE THE MOST OF
YOUR TOAD INVESTMENT**

WEB-BASED TRAINING IS A
PERFECT ACCOMPANIMENT
TO YOUR TOAD LICENSE

Words of Wisdom

[How to rename an ASM Diskgroup](#)

by Delby Gomez

[Moving data between different Oracle RDS](#)

by Wissem EL-Khlifi

[Using extended indicator variables in DB2 for z/OS](#)

by Craig Mullins

HOW TOAD WORLD WORKS



Resources

Your One-Stop Resource for Education, Expertise and
Collaboration www.toadworld.com



- Exclusive freeware downloads
- Free web-based product training
- Blogs and user forums
- Toad tips and tricks videos
- Direct access to Toad experts
- Toad news, events and more

Resources on Agile DB Development using Toad

- eBook – [“Getting Agile with Database Development”](#)
- eBook – [“DevOps for Oracle Databases”](#)
- Technical Brief - Toad Agile Cookbook – [Part 1](#), [Part 2](#), [Part 3](#)
- White Paper – [DevOps Comes to Database Developers and DBAs – It’s About Time](#)
- Video Q&A with The Register – [What’s Holding Back Database Teams in DevOps?](#)



Web-based training

- Self-paced, hands-on, **free!**
- Eight Toad for Oracle courses available:
 - Toad Fundamentals
 - DBA: Database Maintenance
 - DBA: Performance Management
 - DBA: Change Management
 - Dev: Functional Code Testing & Debugging
 - Dev: Version Control & Code Review
 - Dev: PL/SQL Profiling & SQL Optimization
 - What's New in Toad for Oracle 2016
- Register during installation or on Toad World
- Includes a course completion certificate



Thank You

MAY 16 & 17, 2018

CLEVELAND PUBLIC AUDITORIUM, CLEVELAND, OHIO

WWW.NEOOUG.ORG/GLOC