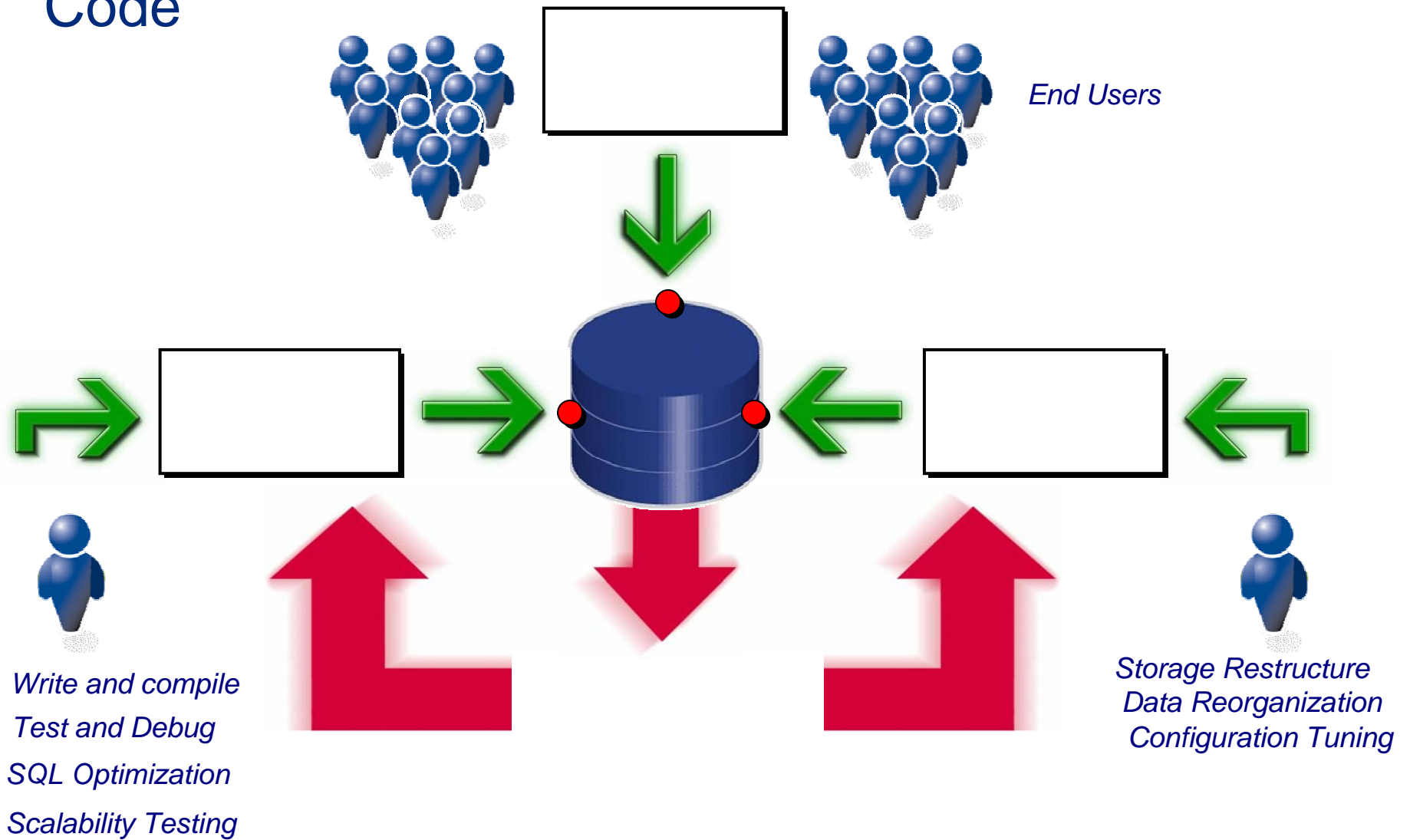


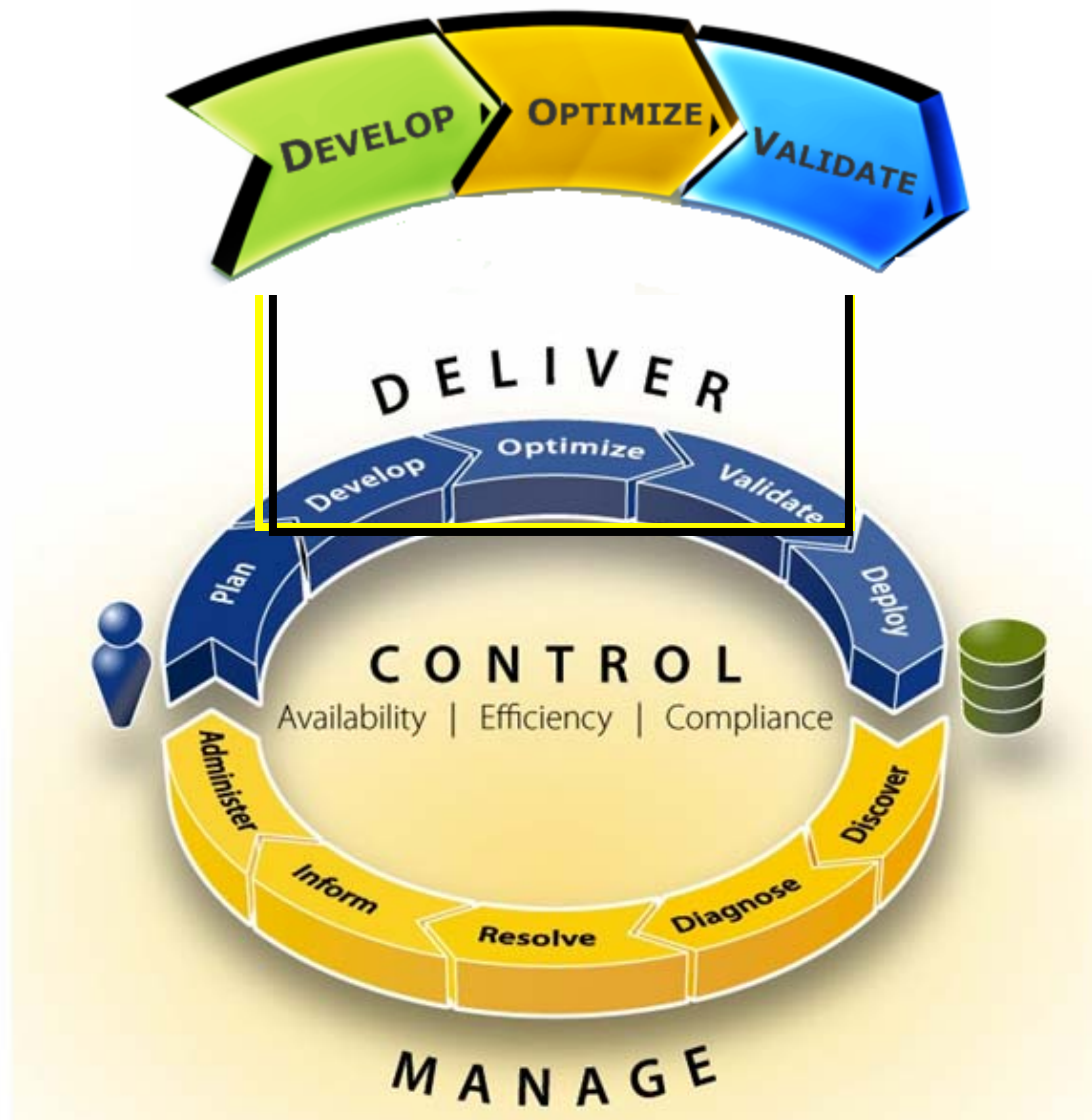
# Database Development Best Practices



# The Impact of Poor Quality and Performing Code



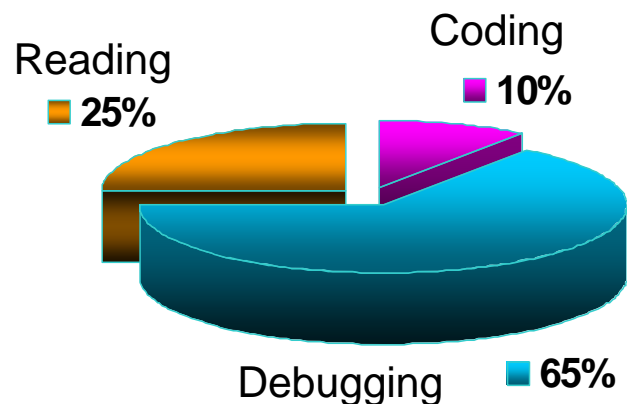
# Development Best Practices



# Deliver Quality Code

## Step 1: Develop

- Define tests to measure success objectively
- Write code, focusing on single program unit at a time
- Test unit of code
- Debug code
- Apply standard formatting



**Developer Resource Distribution**

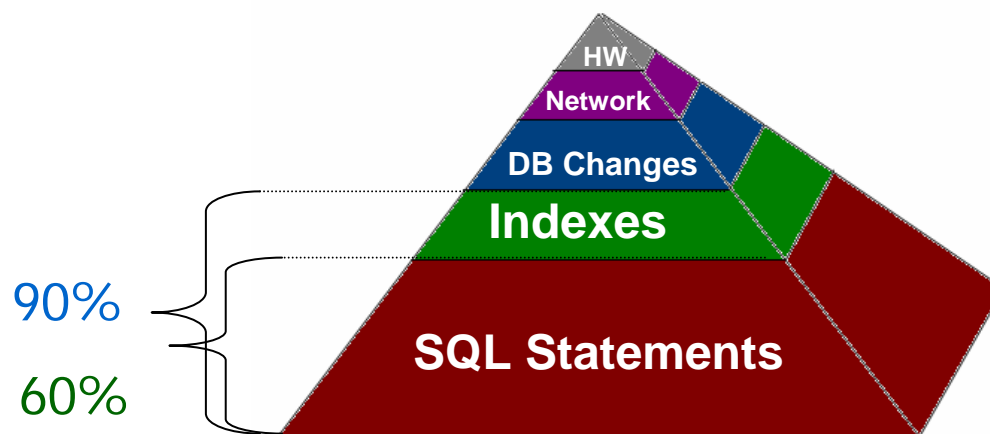
Source: GARTNER GROUP

- There can be as many as 20 to 30 bugs per 1,000 lines of software code. —[Sustainable Computing Consortium](#)
- 32% of organizations say that they release software with too many defects. —[Cutter Consortium](#)
- Developers spend about 80% of development costs on identifying and correcting defects. —[The National Institute of Standards and Technology](#)

# Deliver Optimal Code

## Step 2: Optimize

- Review coding best practices
- Proactively identify problematic SQL directly from the source code
- Automatically rewrite SQL code in every possible alternative



**Root of Database  
Performance Impact**

Source: Forrester Research

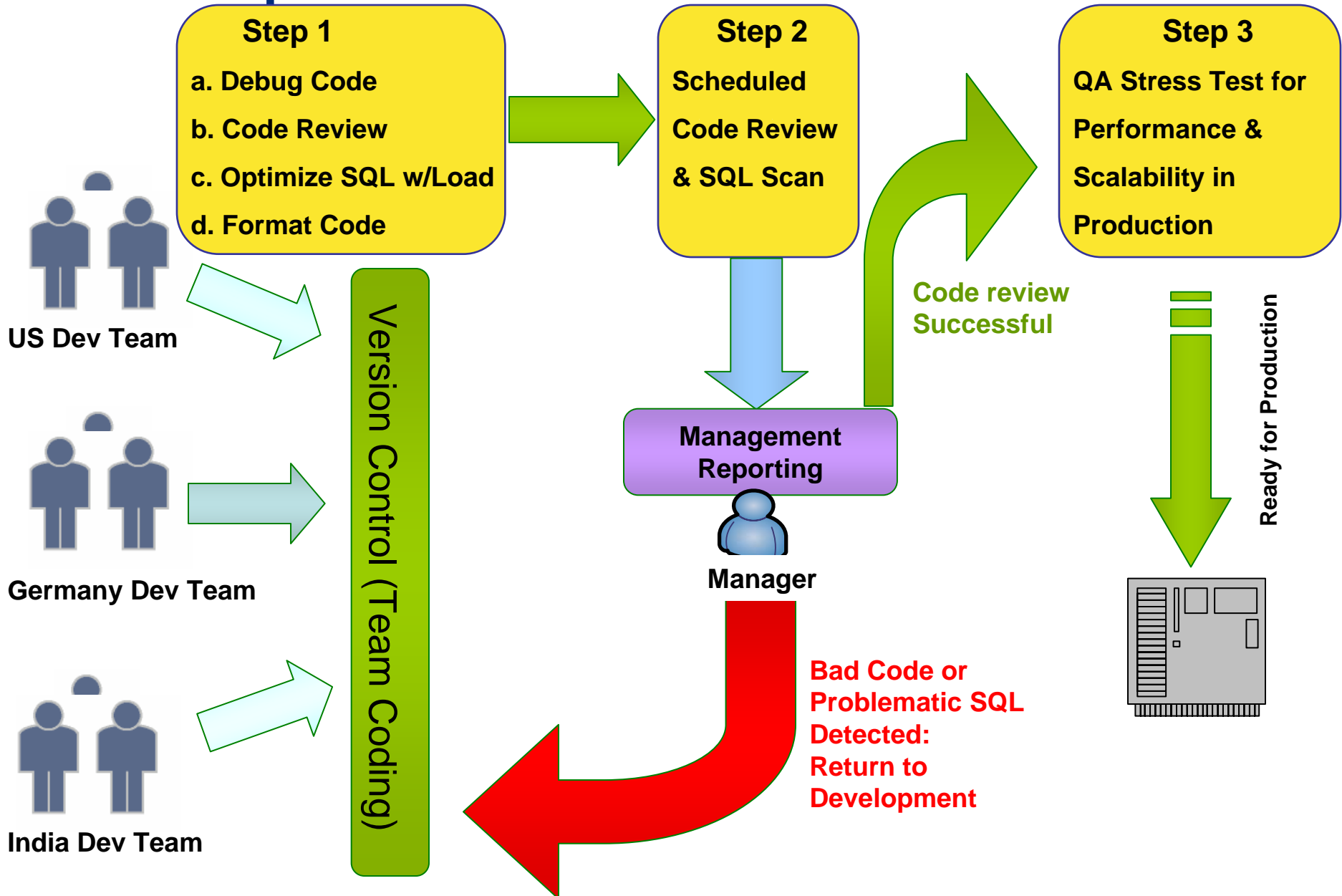
# Deliver Optimal Code

## Step 3: Validate

- Benchmark SQL alternatives for performance and scalability
- Ensure code will perform for production requirements before deployment
- Create management report that shows best practices have been adhered to

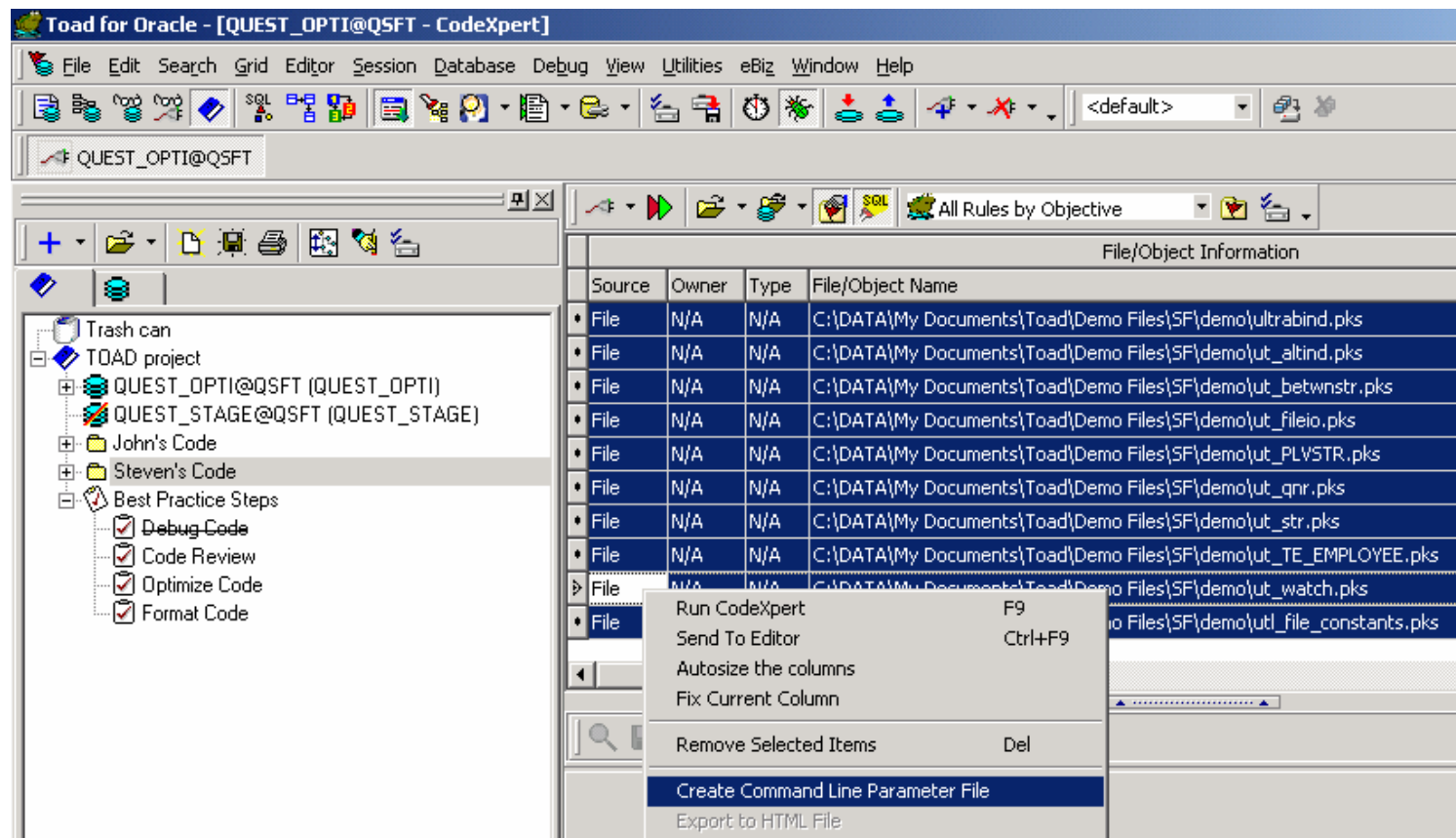


# Development Best Practices



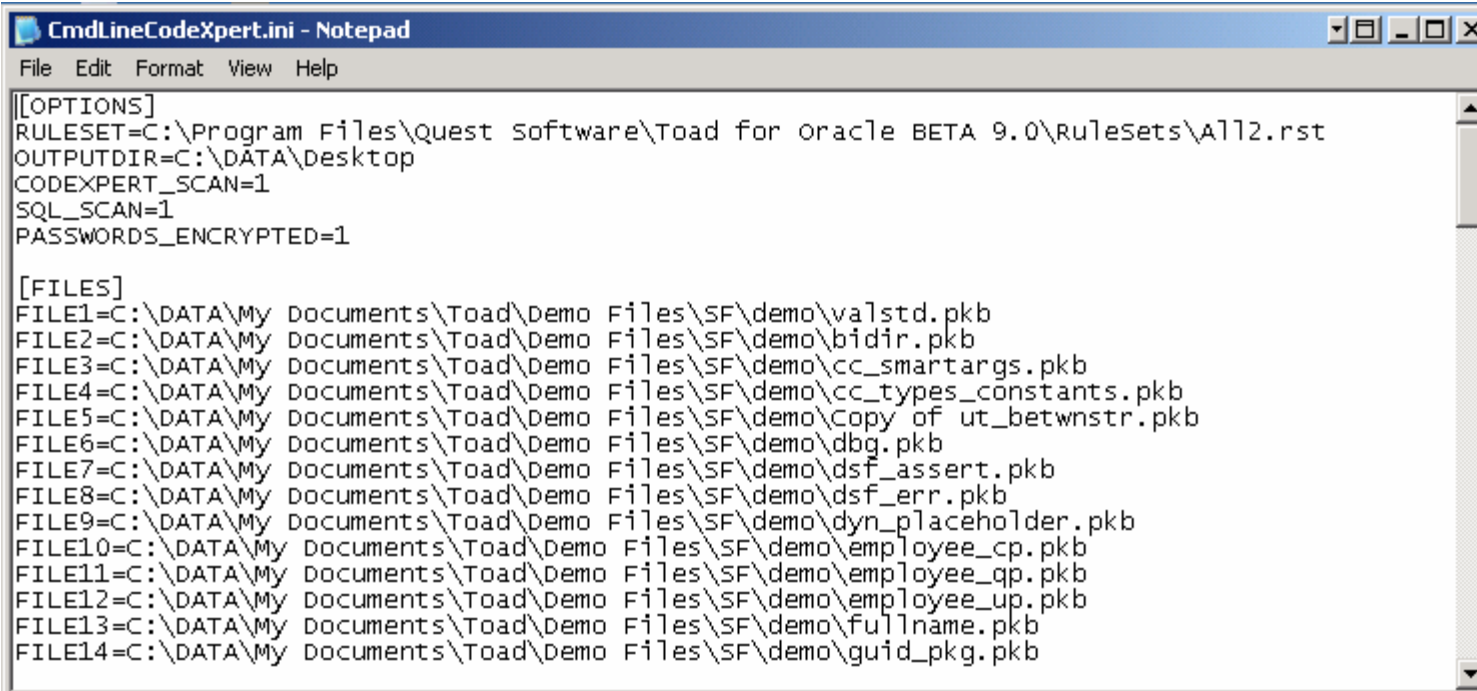
# Automated Code Reviews

1. Add the code folder to Toad Project Manager
2. Right-click to send to Code Xpert console
3. Right-click to create Code Review command line file



# Schedule Code Reviews

- Use a simple command line to schedule code review
  - Toad.exe CE=CmdLineCodeXpert.ini
- Passwords are encrypted

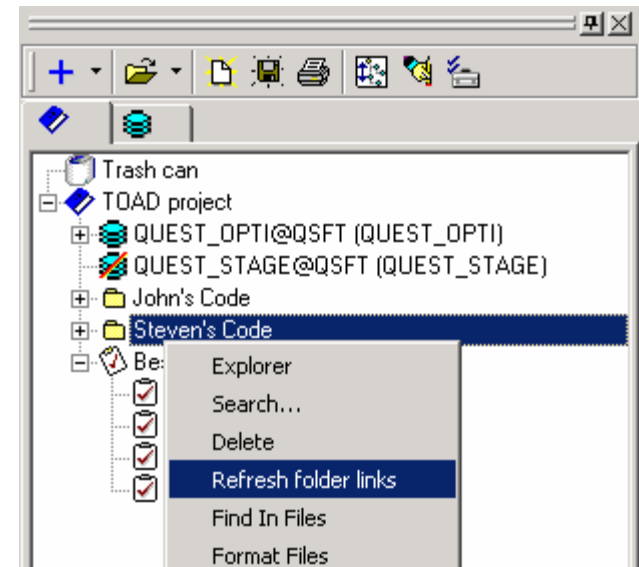


```
[[OPTIONS]
RULESET=C:\Program Files\Quest Software\Toad for Oracle BETA 9.0\RuleSets\All2.rst
OUTPUTDIR=C:\DATA\Desktop
CODEXPRT_SCAN=1
SQL_SCAN=1
PASSWORDS_ENCRYPTED=1

[FILES]
FILE1=C:\DATA\My Documents\Toad\Demo Files\SF\demo\valstd.pkb
FILE2=C:\DATA\My Documents\Toad\Demo Files\SF\demo\bidir.pkb
FILE3=C:\DATA\My Documents\Toad\Demo Files\SF\demo\cc_smartargs.pkb
FILE4=C:\DATA\My Documents\Toad\Demo Files\SF\demo\cc_types_constants.pkb
FILE5=C:\DATA\My Documents\Toad\Demo Files\SF\demo\Copy of ut_betwnstr.pkb
FILE6=C:\DATA\My Documents\Toad\Demo Files\SF\demo\dbg.pkb
FILE7=C:\DATA\My Documents\Toad\Demo Files\SF\demo\dsf_assert.pkb
FILE8=C:\DATA\My Documents\Toad\Demo Files\SF\demo\dsf_err.pkb
FILE9=C:\DATA\My Documents\Toad\Demo Files\SF\demo\dyn_placeholder.pkb
FILE10=C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_cp.pkb
FILE11=C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_qp.pkb
FILE12=C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_up.pkb
FILE13=C:\DATA\My Documents\Toad\Demo Files\SF\demo\fullname.pkb
FILE14=C:\DATA\My Documents\Toad\Demo Files\SF\demo\guid_pkg.pkb
```

## Adding New Code for Review

- In Toad Project Manager R/C to refresh folder contents before creating command line file
- Or, just manually add new source to command line text file



# Code Review Analysis

File/Object Information					Totals by Objective			
Source	Owner	Type	File/Object Name	Connection	Code Correctness	Maintainability	Efficiency	Readability
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\valstd.pkb	N/A	0 / 0	0 / 6	1 / 6	0 / 3
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\bidir.pkb	N/A	0 / 0	0 / 0	1 / 8	0 / 1
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\cc_types_constants.pkb	N/A	0 / 0	0 / 27	1 / 10	0 / 12
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\Copy of ut_betwnstr.pkb	N/A	0 / 0	0 / 4	1 / 4	0 / 2
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dbg.pkb	N/A	0 / 0	0 / 7	1 / 41	0 / 28
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dsf_assert.pkb	N/A	0 / 0	0 / 0	1 / 9	0 / 0
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dsf_err.pkb	N/A	0 / 0	0 / 2	1 / 0	0 / 0
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dyn_placeholder.pkb	N/A	0 / 0	0 / 8	1 / 6	0 / 0
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_cp.pkb	N/A	0 / 1	0 / 21	1 / 5	0 / 2
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_qp.pkb	N/A	0 / 0	0 / 4	1 / 4	0 / 1
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_up.pkb	N/A	0 / 0	0 / 12	1 / 7	0 / 4

All Rules by Objective Properties SQL Scan

- Code Correctness (0 Rules / 0 Occurrences)
- Efficiency (2 Rules / 4 Occurrences)
- Maintainability (2 Rules / 4 Occurrences)
  - CURSOR - 2610 (1 Occurrences) Limit use of weak REF CURSOR types.
    - (248, 7) TYPE weak\_rc IS REF CURSOR;
  - LITERAL - 4602 (3 Occurrences) Avoid use of literals in non-declarative parts
- Program Structure (3 Rules / 4 Occurrences)
- Readability (1 Rules / 1 Occurrences)

```

TYPE weak_rc IS REF CURSOR;
allows_cur weak_rc;
l_rows PLS_INTEGER;
retval EMPLOYEE_tp.EMPLOYEE_tc;
BEGIN
OPEN allows_cur FOR
'SELECT
    EMPLOYEE_ID,
    LAST_NAME,
    FIRST_NAME,
    MIDDLE_INITIAL,
    JOB_ID,
    MANAGER_ID,
    HIRE_DATE,
    SALARY,
    COMMISSION,
    DEPARTMENT_ID,
    EMPNO,
    ENAME,

```

# Code Review Properties

File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dyn_placeholder.pkb	N/A	0/0	0/8	1/6	0/0
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_cp.pkb	N/A	0/1	0/21	1/5	0/2
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_qp.pkb	N/A	0/0	0/4	1/4	0/1
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\employee_up.pkb	N/A	0/0	0/12	1/7	0/4
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\fullname.pkb	N/A	0/0	0/6	1/3	0/5

All Rules by Objective
Properties
SQL Scan

- Cursor Analysis
  - Cursor OPEN FOR (cursor variable) (5 Occurrences)
  - Explicit cursor CLOSEs (6 Occurrences)
  - Explicit cursor OPENs (6 Occurrences)
  - FETCH (7 Occurrences)
- Declaration Analysis
- DML Analysis
  - EXECUTE IMMEDIATE (2 Occurrences)
    - (540, 10) EXECUTE IMMEDIATE
    - (598, 10) EXECUTE IMMEDIATE
  - Implicit (SELECT INTO ) queries (6 Occurrences)
  - Maximum number of items in a SELECT list (8 Occurrences)
- Exception Handling Analysis
- Module Analysis
- Oracle Version Dependencies
  - v7.0 (1 Occurrences)
  - v7.3 (14 Occurrences)
  - v8.1.5 (4 Occurrences)
- Procedure/Function Analysis
  - Functions declared without parameters (2 Occurrences)

EXECUTE IMMEDIATE

```

SELECT COUNT(*) FROM EMPLOYEE
WHERE ' || where_clause_in
INTO retval;
END IF;
RETURN retval;
END tabcount;
-- Number of rows by primary key
FUNCTION pkycount (
  EMPLOYEE_ID_in IN EMPLOYEE_tp.EMPLOYEE_ID_t
)
RETURN PLS_INTEGER
IS
  retval PLS_INTEGER;
BEGIN
  SELECT COUNT(*)
  INTO retval
  FROM EMPLOYEE
  WHERE
    EMPLOYEE_ID = EMPLOYEE_ID_in
;
RETURN retval;
END pkycount;
-- Number of rows by unique index
FUNCTION num_I_EMPLOYEE_NAME (
  LAST_NAME_in IN EMPLOYEE_tp.LAST_NAME_t,
  FIRST_NAME_in IN EMPLOYEE_tp.FIRST_NAME_t,
  MIDDLE_INITIAL_in IN EMPLOYEE_tp.MIDDLE_INITIAL_t
)
RETURN PLS_INTEGER
IS
```

# Code Review – Problematic SQL



File/Object Information					Totals by Objective			
Source	Owner	Type	File/Object Name	Connection	Code Correctness	Maintainability	Efficiency	Readability
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\valstd.pkb	N/A	0 / 0	0 / 6	1 / 6	0 / 3
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\bidir.pkb	N/A	0 / 0	0 / 0	1 / 8	0 / 1
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\cc_types_constants.pkb	N/A	0 / 0	0 / 27	1 / 10	0 / 12
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\Copy of ut_betwnstr.pkb	N/A	0 / 0	0 / 4	1 / 4	0 / 2
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dbg.pkb	N/A	0 / 0	0 / 7	1 / 41	0 / 28
File	N/A	N/A	C:\DATA\My Documents\Toad\Demo Files\SF\demo\dsf_assert.pkb	N/A	0 / 0	0 / 0	1 / 9	0 / 0

All Rules by Objective Properties **SQL Scan**

- ◆ Invalid SQL (0 Occurrences)
- ☐ ▲ Problematic SQL (19 Occurrences)
  - ⊕ (22, 10) SELECT
  - ⊕ (58, 10) SELECT 1
  - ☐ (81, 10) SELECT
    - Full table scan with table size larger than the Problematic SQL Full Table Scan Thresho
  - ⊕ (109, 10) SELECT
  - ⊕ (221, 10) SELECT
  - ⊕ (254, 11) \*SELECT
  - ⊕ (287, 10) SELECT
  - ⊕ (404, 10) SELECT

```

SELECT
    EMPLOYEE_ID,
    LAST_NAME,
    FIRST_NAME,
    MIDDLE_INITIAL,
    JOB_ID,
    MANAGER_ID,
    HIRE_DATE,
    SALARY,
    COMMISSION,
    DEPARTMENT_ID,
    EMPNO,
    ENAME,
    CREATED_BY,
    CREATED_ON,
    CHANGED_BY,
    CHANGED_ON
FROM EMPLOYEE
WHERE
    
```



# Why Best Practices and Toad

- Toad has a huge user community and it is likely development teams are already familiar with Toad
- Toad has/ the needed functionality to significantly enhance the development process (code review and tuning)
- The Best Practices process is a simple extension of Toad's use
- By spreading the responsibility for quality code you help to remove the bottle necks
  - Manual code review team (they can't catch all the bad code)
  - QA responsible for quality and performance (Too much code to tune)



## Toad for Oracle v 9.0 is a Big Release!

- Toad for Oracle 9.0 has many enhanced capabilities, including:
  - **Reporting** – provides IT management with detailed insight into development practices through customizable reports that document team code quality.
  - **Code Xpert and Code Quality Repository** – enables database best practices through automated code reviews to ensure the highest code quality.
  - **Integrated Editors** – simplifies coding and increases productivity through a new single editor for application and database code with the ability to work fully offline.
- This is a HUGE deal because
  - New features simplify user workflow and enable Best Practice workflow

# Database Development Best Practices

