Chapter 10

**Testing and Change Management**

Topics

- Testing System Services
- Testing System Constraints
- Test and Change Management Documents
- Managing Change
- Traceability

Testing system services

- Informal testing
- Methodical testing
- Nonexecution-based (formal reviews)
  - Walkthroughs
  - Inspections
- Execution-based
  - Testing to specs
  - Testing to code
Walkthrough
- **Formal review meeting** but of a brainstorm flavor
- Can be conducted
  - In any development phase
  - On a regular basis (e.g. weekly)
- The **moderator** organizes and conducts the meeting
- **Participants** prepare prior to the meeting
- The **purpose** of the meeting is to identify and confirm the existence of a problem (defect), not to attempt to solve it

Inspection
- Similar to walkthrough but includes project managers
- Like walkthrough
  - To identify defects, not to solve them
- Unlike walkthrough
  - Conducted less frequently
  - Targets selected and critical issues
  - More formal and rigorous
  - Organized in a number of stages
    - Planning
    - Informational meeting
    - Meeting
    - Reinspection

Testing to specs
- Execution-based testing
  - Applies to software, not documents or models
- **Black-box testing**
- Refers to test requirements
  - Test case document - test scenario for the tester
  - Can be recorded in capture-playback tool
    - Regression testing
- Discovers defects difficult to find with testing to code
  - Missing functionality
- Cannot be exhaustive
**Testing to code**

- **Execution-based**
- **White-box (glass-box) testing**
- Exercises the code
- **Can be**
  - Supported by capture-playback tools
  - Many scripts must be written by the programmer rather than generated
  - Used for regression testing
- **Cannot be exhaustive**

**Testing system constraints**

- **Predominantly execution-based**
- **Includes**
  - User interface testing
  - Database testing
  - Authorization testing
  - Performance testing
  - Stress testing
  - Failover testing
  - Configuration testing
  - Installation testing

**User interface testing**

- **Starts in requirements phase**
  - Storyboarding
  - Windows in use case documents
  - GUI prototypes
- **Post-implementation GUI testing**
  - Developers
  - Testers
  - Customers (pilot tests)
  - Like many other kinds of tests, requires answering a wide range of questions and marking each question as
    - Passed
    - Passed conditionally (explanation required)
    - Failed
Database testing

- Inherent in many other kinds of tests
- Done as
  - Black-box and
  - White-box
- Tests needed for
  - Transaction processing
  - Performance
  - Concurrency
  - Authorization
- Some DB tests can be included as part of other tests
  - E.g. performance test would include DB performance

Authorization testing

- To verify the security mechanisms
  - In the Client and
  - In the Server
- Authentication
- Authorization
  - GUI to configure dynamically to authorization level of the user
  - Server permissions (privileges) granted to the user
    - To access server objects
    - To execute SQL statements
- Authorization design
  - User level
  - Group level
  - Role level

Other tests

- Performance testing
  - Transaction speed and throughput
  - Peak loads
- Stress testing
  - For abnormal demands
- Failover testing
  - For hardware, network and software malfunctions
- Configuration testing
  - For various software and hardware configurations
- Installation testing
  - For every installation platform
Test and change management documents

Business Use Case Document
- Feature 1
- Feature 2

Use Case Documents
- Use Case Req 1
- Use Case Req 2

Enhancements Document
- Enhancement 1
- Enhancement 2

Test Plan Document
- Test Case 1
- Test Case 2

Test Case Documents
- Test Req 1
- Test Req 2

Defects Document
- Defect 1
- Defect 2

Managing change

- Testing → defect
  - To be fixed
  - Enhancement

- Defect → change request
  - Undergo status changes
  - May be prioritized
  - Have owners
  - Are traced back to test and use case documents

- Managing change in multi-developer projects
  - Locking
  - Version control
Submitting change request

- Submitting
  - Entering defect or enhancement into project repository
  - Submitted status
  - Can result in automatic email notifications to interested team members

- Possible actions on submitted change request
  - Assign (to team member)
  - Modify (the change request)
  - Postpone
  - Delete (without fixing)
  - Close (probably after fixing)

Keeping track of change requests

- Assigned to a team member
- Only one team member can open it at a time
- Open state → Resolve state
  - Email notifications
- Resolve state → Verify state
- Charts and reports (project metrics)
  - Number of unassigned defects
  - Assignments to team members
  - Number of unresolved defects

Traceability

- Cost-benefit analysis for traceability
  - Traceability requires time and money
  - Projects can fail if change not traced and managed
  - Long term benefit – project management with metrics

- Levels of traceability
  - Use case requirements → defects
  - Use case requirements → test requirements → defects
  - Also system features, test verification points, enhancements, etc.
Use case → requirement

Use case requirements → test requirements

Test requirements → defects
Use case requirements → enhancements

- Defects are traced back to test requirements
- Enhancements are traced back to use case requirements
- Enhancements can also be traced back to defects (when a minor defect has been postponed to a future release of the product)

Summary

- Testing divides into
  - testing of system services and
  - testing of system constraints
- Testing of system services can be non-execution-based or execution-based.
- Testing of system constraints includes testing of user interface, database, authorization, performance, stress, failover, configuration, and installation
- Testing and change management require specialized documentation, such as test plans, test case documents, defect and enhancement documents
- Change request is normally either a defect or an enhancement
- A vital part of the change management tool relates to the establishing of traceability paths