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 Document
- 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

Feature 1
Feature 2

Use Case Req 1
Use Case Req 2

Enhancement 1
Enhancement 2

Test Case 1
Test Case 2

Test Req 1
Test Req 2

Defect 1
Defect 2

Test case document

Managing change
- Testing → defect
- Defect → change request
  - To be fixed
  - Enhancement
- Defects and enhancements
  - 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
  - Allocations 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 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.