

Techniques of Static Testing



Static Techniques

- Static Testing The Definition
- Reviews and the Test Process
- Review Process
- Static Analysis



Static Techniques

- Static testing techniques involve examination of the project's documentation, software and other information about the software products **without executing them** with the intention of finding errors/faults.



Reviews and the Test Process

- **Benefits of reviews:**

- Find faults/errors early in the development lifecycle
- Reduce the defects in delivered systems
- Improve the specification, design and code

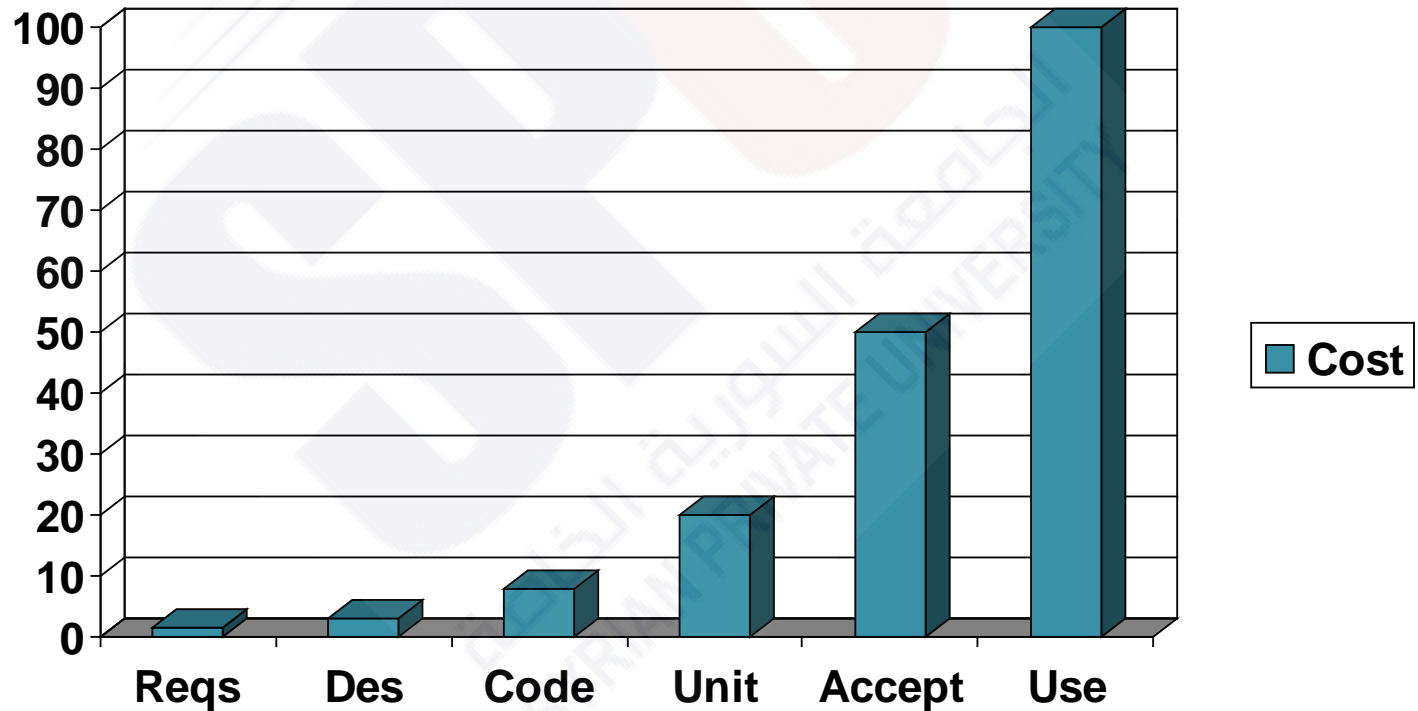
Benefits of test process:

- Determine the root causes of defects and measures for preventing recurrence
- Education and training of developers and other project staff



Reviews and the Test Process

Why , because Defects Costs



Reviews and the Test Process

- Static technique is a Preventive Action
While Dynamic technique is a detective action .



Reviews and the Test Process

- What to review and How ,

- **What :**

- Source Code
 - Software Design
 - System requirement
 - Integration requirements
 - Test Cases
 - Any Artifact (Work product)

- How :**

there is tools that help in Code analysis , also some helps with ambiguity analysis , some you have to **READ**



Reviews and the Test Process

- Detect faults as they are introduced –i.e. early detection and correction
- Reduce the risk of error/fault propagation
- Detect defects that Dynamic test execution unlikely to find, e.g. requirement spec defects
- Shorten development timescales
- Reduce fault levels in delivered software
- Lower cost and shorten testing timeframes
- Lower cost over the life of the software
- Create development productivity improvements
- Reliably evaluates progress and capability
- Educates and trains participants
- Improve communication between project teams



Review Process

- Informal Review
- Formal Review Process

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Review Process

- Informal Review
 - No Formal Review Process employed
 - “Desk checking”, looking for possible problems
 - The author of material checking his or her own material, possibly with one other peer (pair programming)
 - Possibly a technical lead reviewing design and code
 - Usually undocumented but useful, cheap and widely used
 - This technique may be applied in low risk situations
 - No metrics kept, review findings are not configured items
 - **Weaknesses** – do not find as many faults as formal reviews



Review Process

- Formal Review Process
 - A walkthrough is a review of authored material led by the author and attended by a group of the author's peers
 - The material is presented by the author to the peer group, who focus on learning about the material, improving it and recording defects
 - Peer group should include development, operation representatives, target audience, etc.
 - Examples are Dry Runs or Scenario playing to validate product
 - Sessions can be formal or informal
 - Review sessions often open-ended (not time-boxed)
 - Pre-meeting preparation often involved
 - **Weaknesses** – do not find as many defects as technical reviews and inspections



Review Process

- Reviews goes more formal in **technical reviews** then **inspection reviews**
- Management OR Leader (Not author) may be involved
- Strict agenda and feed back is required
- Pre meeting and Post meeting activities are mandatory



Formal Review Process

- Planning
- Kick-off
- Review Overview – optional
- Preparation
- Review Meeting
- Rework
- Follow-up
- Repeat Review - optional



Formal Review Roles

Manager	decides on the execution of reviews, allocates time in project schedules and determines if the review objectives have been met
Moderator	the person who leads, plans and runs the review May mediate between the various points of view and is often the person upon whom the success of the review rests
Author	the writer or person with chief responsibility for the document(s) to be reviewed
Reviewers	Individuals with a specific technical or business background (also called checkers or inspectors) Identify and describe findings (e.g. defects) Take part in any review meetings
Scribe/Recorder	documents all the issues, problems and open points that were identified during the meeting



Formal Review Process

- Planing
 - Define Entry and Exit Criteria (for most formal reviews)
 - Ensure that the volume of material to be reviewed is appropriate
 - Identify roles, participants and establish a time and place for the review



Formal Review Process

- Kick Off
 - Distribute the material to the participants
 - Explain objectives, process and material to be reviewed
 - Obtain copies of the relevant review and report templates
 - Create checklists of areas to cover and distribute
 - checklists can make reviews more effective and efficient
 - E.g. a checklist based on perspectives such as user, maintainer, tester or operations
 - or a checklist of typical requirements problems to focus on
 - Make sure entry criteria has been/will be met



Formal Review Process

- Review Overview – optional
 - Required for new or difficult material
 - Overviews:
 - educate the participants
 - allow participants to focus on technical content
 - describe where the material fits in the system and in the development process
 - focus on any complex functionality
 - highlight any changes and explain the need for these changes



Formal Review Process

- Preparation
 - Each participant reviews the material to:
 - learn about the material
 - note suspected defects
 - record questions
 - In some circumstances, depending on the expertise of the participants, the moderator may ask certain participants to concentrate on particular aspects of the material during preparation



Formal Review Process

- Review Meeting

- The material is read to the participants by the reader
- Defects are raised by the participants and recorded by the recorder
- Participants may make decisions about categorising and even handling the defects – though usually avoid ‘solutioning’
- Deliverables may include meeting minutes
- For Inspections - Pass or fail and repeat review decisions are usually made by the moderator
- The preparation time and the actual time may be recorded



Formal Review Process

- Rework

- The author must resolve all defects found during the review by reworking the material as recommended by the review report
- Note, the cost of rework is NOT included in the cost of reviews



Formal Review Process

- Repeat Review (optional)
 - If the material has been passed as is or if the rework is minor, no further reviews are required
 - If a repeat review is required (e.g. if significant re-work was required) a repeat review must be scheduled with the same participants to verify the revised material



Formal Review Process

- **Follow-up**
 - Check the corrections to the material and account for all recorded defects
 - If necessary, schedule a repeat review for the corrected material
 - Inform management of the status of the corrected material
 - Add the defect data from the review to the project statistics database – enables process improvement!
 - Complete and sign the review report and forms (Inspections)
 - Ensure exit criteria met



Formal Review Process

- Successful review recommendations
 - Each review has a clear predefined objective
 - The right people are involved
 - Defects found are welcomed (Authors must leave their ego at the door!)
 - Defects are expressed objectively – no cornering the author – make it a positive experience!
 - Review techniques are applied suitable to the review
 - Checklists used if appropriate – focus the review effort
 - Roles pre-defined – avoid duplication and increase effectiveness
 - Training is given in review techniques- especially for Inspections
 - Management buy in – schedule in review activities and effort
 - There is an emphasis on learning and process improvement



Static Analysis

- **static analysis:** Analysis of software artifacts, e.g. requirements or code, carried out without execution of these software artifacts.

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Static Analysis

- Usually done by Development team
- Using mainly a programming tools
- Issues type found
 - Unreachable code
 - Undeclared variables
 - Parameter type mismatches
 - Uncalled functions and procedures
 - Possible array bound violations
 - Security Violations
 - Inconsistent interface between modules and components
 - Incorrect variable usage
 - Syntax checking
 - Violations of code standards
 - Use of variables without first defining them
 - variables that are declared but never used
 - Use of variables after they have been “killed”



Static Analysis

- Tools :
 - Static analysis tools are typically used by developers
 - Used mainly before and during Component and Component Integration testing
 - The tools check against predefined rules or programming standards
 - Also by designers during software modelling
 - Static analysis tools may produce a large number of warning messages
 - Hence the need to use the tools effectively (or can't see the wood for the trees!)
 - Compilers may offer some support for static analysis, including the calculation of metrics

