



IBM Software Group

# P17 System Testing

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### Module 4 : Functional Testing

**Rational** software



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“As soon as we started programming, we found out to our surprise that it wasn’t as easy to get programs right as we had thought...I can remember the exact instance when I realized that a large part of my life from then on was going to be spent in finding mistakes in my own programs.”

Maurice Wilkes, computer pioneer



## Module Objectives

After completing this module, you will be able to:

- Define functional testing
- Explain the focus of functional testing
- List the types of functional test triggers



## Defining Functional Testing

The main objective of functional testing is to *verify* that each function of the software application operates in accordance with the *written* requirement specifications.



## Functional Testing ...

- Is a black-box process
- Is not concerned about the actual code
- Focus is on validating features
- Uses external interfaces, including
  - ▶ Application programming interfaces (APIs),
  - ▶ Graphical user interfaces (GUIs),
  - ▶ Command line interfaces (CLIs).



## Functional Testing Key Points

- Functional Testing acts as the “First Customer” for the product.
- Functional tests are also performed on products which do not directly interact with but provide functionality to other products via an API (e.g. print driver)
- Functional testing is performed in a controlled environment and usually is tested only in a subset of the supported environment.



## Functional Testing Focus

The main focus of Functional Testing is to verify that the function provided matches the function documented in the written requirement specifications for the product. Specifically, Functional Testing covers the following focus areas:

- Mainline function
- Error conditions
- Recovery
- Basic usability
- Accessibility
- Global enablement
- Vulnerability
- Regression



# Functional Testing Focus

## Mainline Function and Error Conditions

Focus	Description
Mainline function	Focuses on testing the main functions of the application. Because of this, mainline function testing often overlaps with other Functional Testing focus areas.
Error conditions	Testing for error conditions uses inputs that are outside of the scope of valid parameters and deviate from use cases. This includes exploring boundary conditions, driving error paths, and displaying all error messages.





# Functional Testing Focus

## Recovery and Basic Usability

Focus	Description
Recovery	The purpose of recovery testing is to ensure that the recovery function meets the recovery requirements. Recovery requirements specify how an application recovers from an error.
Basic usability	Functional Testing does not include formal usability testing, but all Functional Testing testers are expected to watch for and report obvious usability problems that customers might encounter when trying to use the product.



# Functional Testing Focus

## Accessibility and Global Enablement

Focus	Description
Accessibility	The U.S. Government has mandated standards for accessibility in a law known as Section 508 of the Rehabilitation Act. Software that is used by the U.S. Government must meet these standards.
Global enablement	Functional Testing includes verifying that a product's features support localization.



# Functional Testing Focus Vulnerability and Regression

Focus	Description
Vulnerability	Functional Testing testers must examine and verify all of the security elements designed into the system, in the same way the mainline functions are tested.
Regression	Test cases for important functions are rerun at appropriate points in <i>every</i> release, even if the functionality was unchanged since the last time the test was run. A test case might also be rerun once a fix is applied to verify the fix. This re-verification of previous test cases is called regression testing.



## Functional Test Triggers

Trigger	Description
Coverage	Useful for mainline function testing, globalization, accessibility and regression testing, as well as basic usability testing.
Variation	Useful when creating tests for all Functional Testing focus areas
Sequencing	Useful for error, vulnerability, and recovery testing.
Interaction	Useful for mainline function and basic usability testing as well as error, vulnerability, and recovery testing.



## Coverage Triggers

A functional tester tests the login code by using the browser interface to enter a valid user ID and password. This straightforward attempt to exercise code for the single function of logging on is referred to as a **coverage trigger**.



## Variation Triggers

Using the same single login function but using a variety of values for the user ID and password. Attempts to exercise code with these combinations of parameters are classified as **variation triggers**. Variation triggers test boundaries as well as valid and invalid values.



## Sequencing Triggers

A **sequencing trigger** in the functional test level is when you use the sequence of steps or discrete tests as the main condition of the test. The sequence itself is the trigger you use to find a class of defects.

For example, when testing the login function you check to see if a given sequence functions properly (such as invalid login, invalid login, and then valid login), rather than just testing the valid and invalid logins independently.



## Interaction Triggers

A trigger is classified as an **interaction trigger** when it starts an interaction among two or more bodies of code.

For example, the `LoginAction()` code calls a routine named `LoginSite()` that gets the registered user's information from the database and logs them into the tool.

When the methods are run independently they run successfully, but they fail when run together, this is an interaction trigger.

The interaction involves more than a simple serial sequence of actions.





## Module summary

- Functional verification test involves testing that each function of a product meets the documented requirements.
- Functional verification test can include the testing of:
  - ▶ Main functions and Error conditions
  - ▶ Recovery code and Basic usability
  - ▶ Accessibility and Global enablement
  - ▶ Vulnerability and Regression
- Functional verification test triggers include:
  - ▶ Coverage triggers
  - ▶ Variation triggers
  - ▶ Sequencing triggers
  - ▶ Interaction

