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Software Testing

Lecture 4

Sri Lanka Institute of Information Technology
B. Sc. Special Honors Degree In Information Technology
Year 2 – Semester 2

We will study the following;

- What is Software Testing?
- The importance of software testing.
- The benefits of Software Testing
- Software testing answers questions
- Testing Levels
- Test Case Development
- Guidelines for new testers
- Testing Levels & Types
- Test Case Development
- Automation Testing

What is Software Testing?

- It is a vital part of the software lifecycle.
- The process of evaluating a system or its component(s) with the intent to find whether,

  it satisfies the specified requirements or not.
- Software testing also identifies important defects, flaws, or errors in the application code that must be fixed

- **SDLC vs STLC | Software Development Life Cycle | Software Testing Life Cycle**

Video link : https://www.youtube.com/watch?v=PhzYlopDCX0

A software system is a system of intercommunicating components based on **software forming part of a computer system** (a combination of hardware and software).

- Report on 737 Max 8 Boeing's MCAS flight control system

- Video link
- 1 Design https://www.youtube.com/watch?v=o6A6arPgXVc&t=8s
- 2 losses in a year https://www.youtube.com/watch?v=-PKWTrR6Xs0
- 3 Solutions https://www.youtube.com/watch?v=oRtBukGuBog&pp=ygUkYm9laW5nIDczNyBtYXggbWNhcyBzeXN0ZW0gZXhwbGFpbmVk

The benefits of Software Testing

- **Cost-Effective:** Testing any IT project on time helps you to save your money for the long term. In case if the bugs caught in the earlier stage of software testing, it costs less to fix.
- **Security:** People are looking for trusted products. It helps in removing risks and problems earlier.
- **Product quality:** Testing ensures a quality product is delivered to customers.
- **Customer Satisfaction:** The main aim of any product is to give satisfaction to their customers. UI/UX Testing ensures the best user experience.

Who does Testing?

- Large IT companies have a team with responsibilities to evaluate the developed software in context of the given requirements.
- In most cases, the following professionals are involved in testing a system
  - Software Tester
  - Software Developer
  - Project Lead/Manager
  - End User
- Different companies have different designations for people who test the software on the basis of their experience and knowledge such as Software Tester, Software Quality Assurance Engineer, QA Analyst, etc

Software testing answers questions.

- Does it really work as expected?
- Does it meet the users' requirements?
- Is it what the users expect?
- Do the users like it?
- Is it compatible with our other systems?
- How does it perform?
- How does it scale when more users are added?
- Which areas need more work?
- Is it ready for release?

With the answers to these questions?

- Save time and money by identifying defects early
- Avoid or reduce development downtime
- Provide better customer service by building a better application
- Know that we've satisfied our users' requirements
- Build a list of desired modifications and enhancements for later versions
- Identify and catalog reusable modules and components
- Identify areas where programmers and developers need training

What do we test?

- Focus on the core functionality
- the parts that are critical or popular
- Concentrate on the application's capabilities in common usage situations before going on to unlikely situations

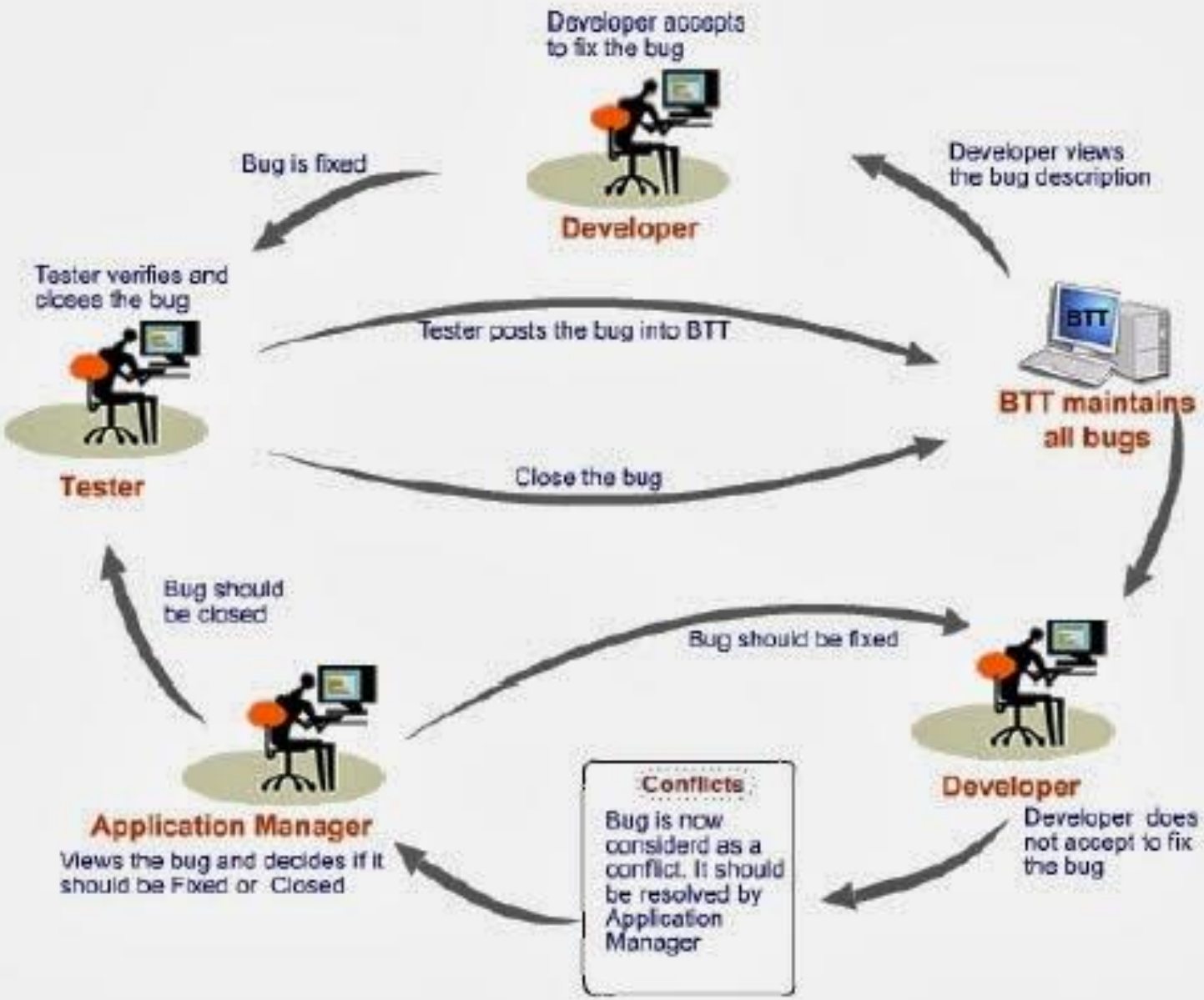
What makes a good tester?

- A great tester is a **quick and self-learner**.
- You do not HAVE to learn new stuff, you should WANT to learn it.
- You should be able to update yourself with new technologies, processes, tools, skills, etc. on a regular basis.

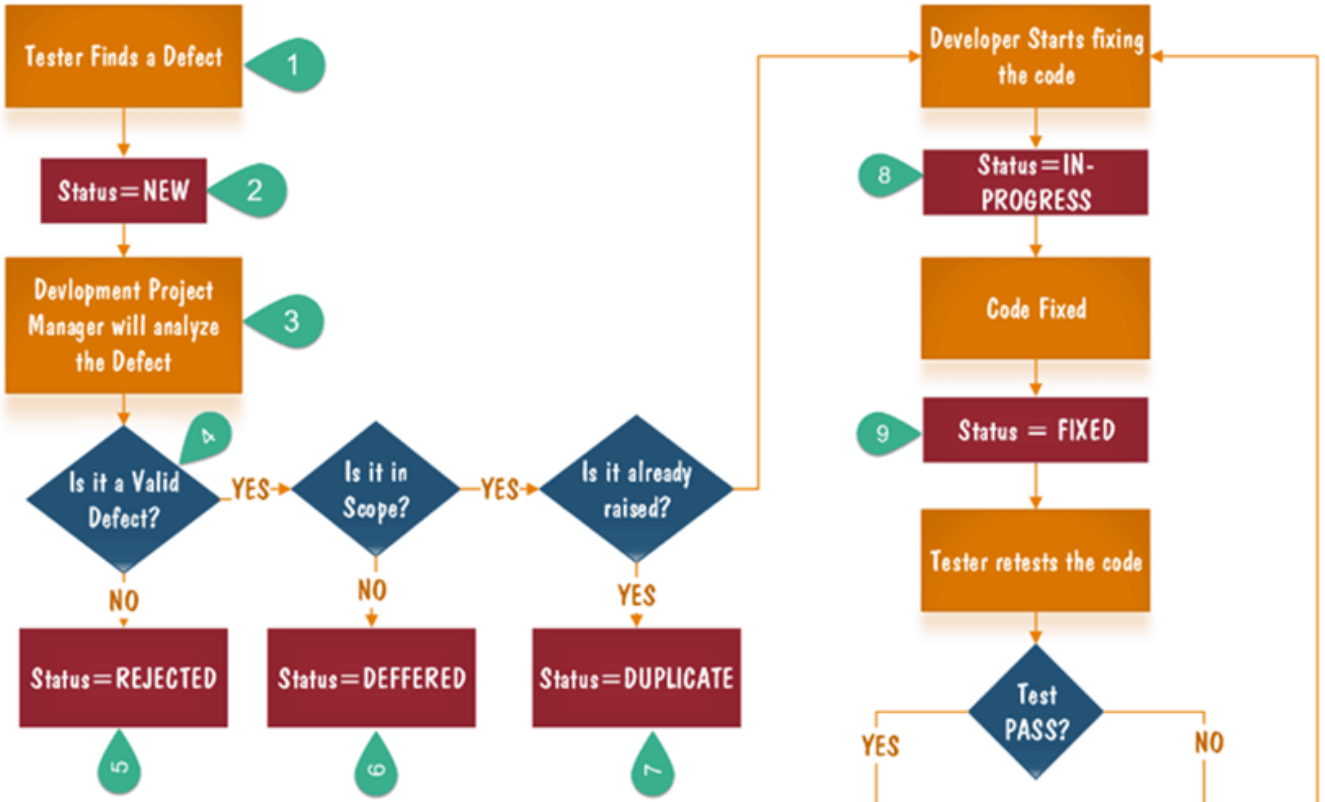
Guidelines for new testers

- Testing can't show that bugs don't exist.
- It is impossible to test a program completely - number of paths through the software is very large, and the specification is subjective to frequent changes
- Target environment and intended end user
- Be the customer
- Build your credibility
- Review competitive products.
- Follow standards and processes - As a tester, your need to conform to the standards and guidelines set by the organization

The Bug Life Cycle



Defect Bug Life Cycle



Video Link https://www.guru99.com/defect-life-cycle.html

STLC

1. Requirement analysts.
2. Test Planning.
3. Test Design.
4. Test Environment Setup.
5. Test Execution.
6. Test Closure.

Video link https://www.youtube.com/watch?v=jQbaoA1Sz-M&t=151s

Testing Levels

- **Unit Testing:**

To verify a single program or a section of a single program

- **Integration Testing:**

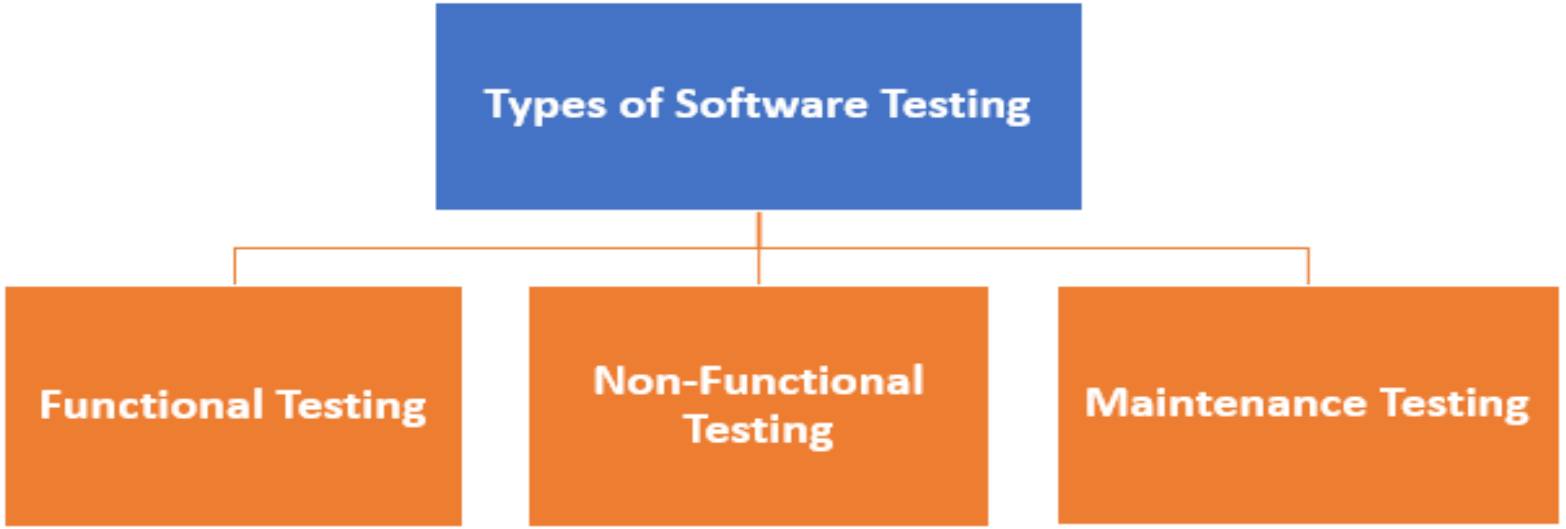
To verify interaction between system components.(Tests that check that modules work together in combination) Prerequisite: unit testing completed on all components

- **System Testing:**

To verify and validate behaviors of the entire system. Have all user stories been implemented and function correctly?

- **Acceptance Tests:**

Tests performed by the user to check that the delivered system meets their needs



Testing Category	Types of Testing
Functional Testing	Unit Testing, Integration Testing, Smoke, UAT (User Acceptance Testing
Non-Functional Testing	Performance, Endurance, Load, Volume, Scalability, Usability,
Maintenance	Regression, Maintenance

https://www.guru99.com/defect-life-cycle.html

Types of Testing

- Formal Testing
- informal Testing
- Manual Testing
- Automated Testing
- Black box Testing
- White box Testing
- Regression Testing 13
- Adhoc Testing
- Load Testing
- Stress Testings
- Performance Testing
- Usability Testing
- Recovery/Error Testing
- Security Testing
- Comparison Testing
- Smoke Testing

Test Case Development

- Test plan describes what to test, a test case describes how to perform a particular test. You need to develop test cases for each test listed in the test plan.

Test case ID : Each test case should have a unique ID.	**Test designed by:** Tester's Name
Test title: Should provide a concise, revealing description of the test case, such as " Reset Pass ". The title is important because it's often the first or only thing you see when you are scanning a list of test cases. Clear titles are the key to help testers to find quickly the right test cases.	**Test designed day:** Date when test was designed
Test priority (High/Medium/Low): It is useful while executing the test.	**Test executed by:** Who executed the test(tester)
Module name:	**Test executed day:** Date when test was executed
Description: A detailed description of the test case.	
Preconditions (if there are any): Any requirement that needs to be done before execution of this test case	
Dependencies (if there are any):	

Test steps:

- Test Steps section gives the tester a numbered list of the steps to perform in the system, which makes it easier to understand the test case.
- It is recommended to have 3-8 test steps per one test case. Too many steps make it difficult for developers and testers to reproduce the steps when a bug report is filed against the test case.

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Comments
	Inputs you are going to give (actual values)	Mention the expected result including error or message that should appear on the screen. The tester needs to know the expected result in order to assess whether the test case is successful	The output	if actual result is not the same as the expected result – fail	If there are some special conditions which is left in the above field

Test case ID :BU_001	Test designed by: Sujeepan
Test title: Test the Login Functionality in Banking	Test designed day: 03/08/2018
Test priority (High/Medium/Low): High	Test executed by: Isuru
Module name: Bank login screen	Test executed day: 08/08/2018
Description: Verify login with valid username and password	
Preconditions (if there are any): User has valid username and password	
Dependencies (if there are any):	

Test steps:

Navigate to Login Page
In the ' User Name' field, enter the username of the registered user.
In the 'Password' field, Enter the password of the registered user
Click 'Sign In' Button

Test ID	Test Inputs	Expected Output	Actual Output	Result (Pass/Fail)	Comments
BU_001	Username :suppu@gmail.com Password : 943170624V	Redirect to the Home Page	Redirect to the Home Page	Pass	
BU_001	Username : binthu@gmail.com Password :	Error message showing "Please enter the password"	Redirect to the Home Page	Fail	

Automation Testing

Automation Testing means using an automation tool to execute your test case suite.

Automated software testing is important due to following reasons:

- Manual Testing of all workflows, time and money consuming
- It is difficult to test for multilingual sites manually
- Automation does not require Human intervention. You can run automated test unattended (overnight)
- Automation increases the speed of test execution
- Automation helps increase Test Coverage Manual Testing can become boring and hence error-prone.

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Automation Testing Tools

Product	Selenium	Katalon Studio	Unified Functional Testing	TestComplete	watir
Available since	2004	2015	1998	1999	2008
Application Under Test	Web apps	Web (UI & API), Mobile apps	Web (UI &API), Mobile, Desktop, Packaged apps	Web (UI &API), Mobile, Desktop apps	Web apps
Pricing	Free	Free	$$$$	$$	Free
Supported Platforms	Windows Linux OS X	Windows Linux OS X	Windows	Windows	Windows Linux OS X
Scripting languages	Java, C#, Perl, Python, JavaScript, Ruby, PHP	Java/Groovy	VBScript	JavaScript, Python, VBScript, JScript, Delphi, C++ and C#	Ruby
Programming skills	Advanced skills needed to integrate various tools	Not required. Recommended for advanced test scripts	Not required. Recommended for advanced test scripts	Not required. Recommended for advanced test scripts	Advanced skills needed to integrate various tools
Ease of Installation and Use	Require advanced skills to install and use	Easy to setup and use	Complex in installation. Need training to properly use the tool	Easy to setup. Need training to properly use the tool	Advanced skills needed to integrate various tools

Few online courses

https://www.coursera.org/learn/uva-darden-agiletesting

https://www.edx.org/course/software-testingmanagement-usmx-umuc-stv1-2x-1

https://www.edx.org/course/formal-softwareverification

Summary

What is Software Testing & Why Testing is Important ? https://www.youtube.com/watch?v=TDynSmrzpXw

SDLC vs STLC Software Development Life Cycle Software Testing Life Cycle

https://www.youtube.com/watch?v=PhzYlopDCX0

Software Testing Life Cycle

https://www.youtube.com/watch?v=HylDB3bN6hQ

- Top 50 Manual Testing Interview Questions Software Testing Interview Preparation https://www.youtube.com/watch?v=Zkeqvl8cxGc
- Top 50 Software Testing Interview Questions & Answers Software Testing Training https://www.youtube.com/watch?v=dP1YzqKnnTo

Test Phase	Test Plan	Author	Technique	Run by
Unit Test	Code design	Designer	White Box, Black box, static	Programmer
Integration Test	Functional specification	Author of specification	Black box, white box, Top-down, bottom-up	Programming team
System Test	Requirements	Analyst	Black box, stress testing,performance testing	System test team
Acceptance Test	Requirements	Analyst/ customer	Black box	Analyst/customer
Alpha Test	No test plan		Black box	Selected set of users
Beta Test	No test plan		Black box	Any user
Regression Test	Functional specification/ Requirements	Analyst	Black box	Development team, system test team

End.