SWE 4603

Software Testing and Quality Assurance

Lecture 5 Part 2

Prepared By Maliha Noushin Raida, Lecturer, CSE
Islamic University of Technology

Lesson Outcome

- Function testing
- System testing
- User Acceptance testing
  - Alpha testing
  - Beta testing

Week 8 On:

- Chapter 7: Validation Activities

Function Testing

- function testing is the process of attempting to detect discrepancies between the functional specifications of a software and its actual behavior.
- Function testing can be performed after **unit and integration testing**, or whenever the **development team thinks that the system has sufficient functionality to execute some tests.**
- objective of function test is to measure the **quality of the functional (business) components of the system.**

Function Testing

- The function test must determine if each component or business event:
  - performs in accordance to the specifications
  - responds correctly to all conditions that may present themselves by incoming events/data.
  - moves data correctly from one business event to the next (including data stores)
  - is initiated in the order required to meet the business objectives of the system.

Function Testing

- Test cases need to be traced/mapped back to the appropriate requirement., a ***function coverage metric*** is used.

Functions/Features	Priority	Test Cases
F1	3	T2,T4,T6
F2	1	T1, T3,T5

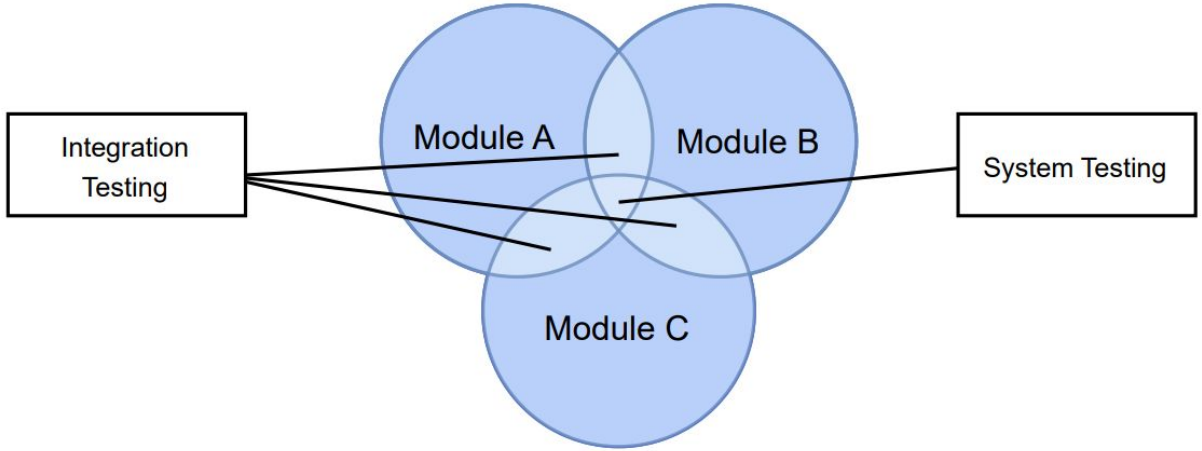
- An effective function test cycle must have a defined set of processes and deliverables.
- The primary processes/deliverables :
  - Test planning
  - Partitioning/functional decomposition.
  - Requirement definition
  - Test case design
  - Traceability matrix formation
  - Test case execution

System Testing

- function testing validates all the requirement functionality. Thus, system testing is not a process of testing the functions of a complete system or program.
- is a series of different tests to test the whole system on various grounds (functional & non functional) where bugs have the probability to occur. The ground can be performance, security, maximum load, etc.
- **SYSTEM TESTING** is a level of testing that validates the complete and fully integrated software product.
- The purpose of a system test is to evaluate the end-to-end system specifications.
- System Testing (ST) is a black box testing technique performed to evaluate the complete system.
- is usually carried out by a team that is independent of the development team in order to measure the quality of the system unbiased.

System Testing

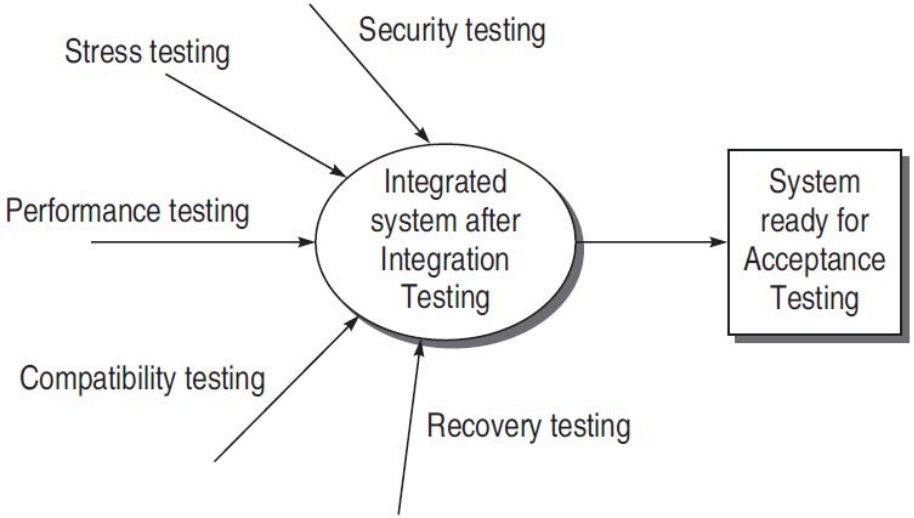
- If an application has three modules A, B, and C, then testing done by combining the modules A & B or module B & C or module A& C is known as Integration testing.
- Integrating all the three modules and testing it as a complete system is termed as System testing.



System Testing

System testing includes:

- Functional Testing
  - Validates functional requirements
- Performance Testing
  - Validates non-functional requirements

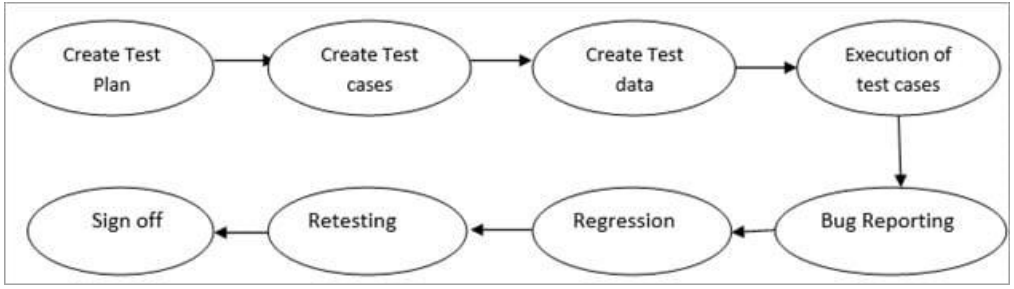


When we are system testing, we are testing all subsystems together

System Testing

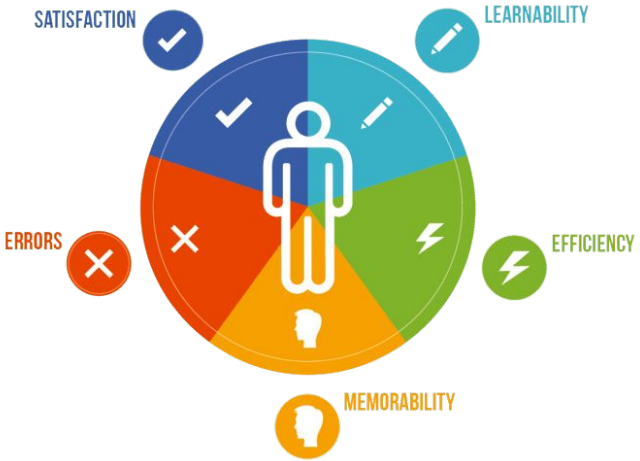
Steps in system Testing

1. The very first step is to create a Test Plan.
2. Create System Test Cases and test scripts.
3. Prepare the test data required for this testing.
4. Execute the system test cases and script.
5. Report the bugs. Re-testing the bugs once fixed.
6. Regression testing to verify the impact of the change in the code.
7. Repetition of the testing cycle until the system is ready to be deployed.
8. Sign off from the testing team.



Acceptance Testing

Testing is performed by the Client of the application to determine whether the application is developed as per the requirements specified by him/her.



Acceptance testing is the formal testing conducted to determine whether a software system satisfies its acceptance criteria and to enable clients to determine whether to accept the system or not.

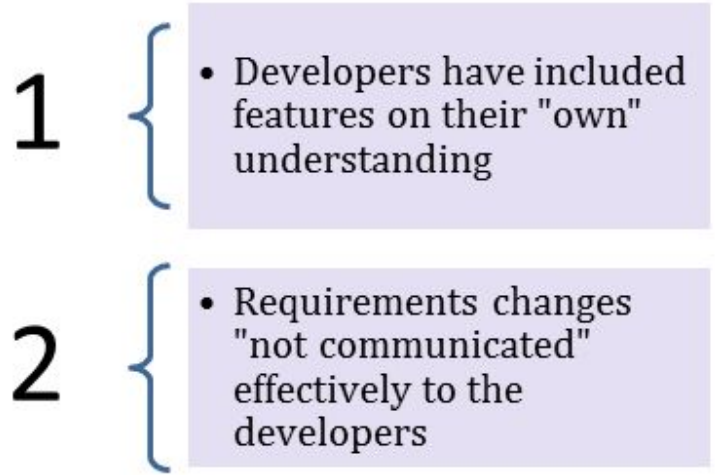
User Acceptance Testing

- UAT is a type of testing performed by the **end user** or **the client** to verify/accept the software system before moving the software application to the production environment.
- UAT is done in the final phase of testing after functional, integration and system testing is done.
- The main purpose of UAT is to validate the end to end business flow. It does NOT focus on Cosmetic errors, Spelling mistakes or System testing.
- User Acceptance Testing is carried out in a separate testing environment with production-like data setup.
- It is a kind of black box testing where two or more end-users will be involved. The Full Form of UAT is User Acceptance Testing.

User Acceptance Testing

Need of UAT:

- Developers code software based on requirements document which is their "own" understanding of the requirements and **may not actually be what the client needs from the software**.
- Requirements changes during the course of the project may not be communicated effectively to the developers.



Running acceptance tests ensures that no requirement change has happened in the meantime and that everything is as it should be to satisfy the customer.

User Acceptance Testing

Entry Criteria

- System testing is complete and defects identified are either fixed or documented.
- Acceptance plan is prepared and resources have been identified.
- Test environment for the acceptance testing is available.

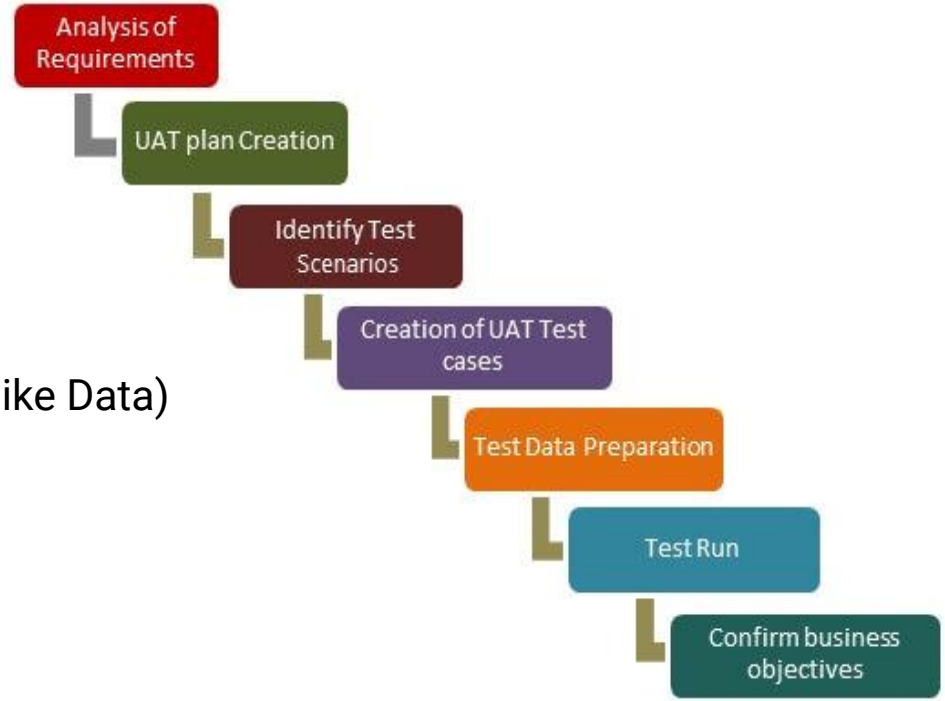
Exit Criteria

- Acceptance decision is made for the software.
- In case of any warning, the development team is notified.

User Acceptance Testing

Once Entry criteria for UAT are satisfied, following are the tasks need to be performed by the testers:

- Analysis of Business Requirements
- Creation of UAT test plan
- Identify Test Scenarios
- Create UAT Test Cases
- Preparation of Test Data(Production like Data)
- Run the Test cases
- Record the Results
- Confirm business objectives



User Acceptance Testing

How is UAT different from functional testing?

User Acceptance Tests

- consist of a set of test steps, which verify if specific requirements are working for the user.
- If the customer and the supplier agree on the product, the software development is done.

Functional test, on the other hand,

- tests specific requirements and specifications of the software.
- It lacks the user component.
- A functional test could conclude that the software meets its specifications.
- However, it doesn't verify if it actually works for the user.

User Acceptance Testing

Types of Acceptance Testing
Acceptance testing is classified into the following two categories:

- **Alpha Testing** Tests are conducted at the development site by the end users. The test environment can be controlled a little in this case.
- **Beta Testing** Tests are conducted at the customer site and the development team does not have any control over the test environment.

Alpha Testing

Alpha testing is one of the most common software testing strategy used in software development. Its specially used by product development organizations.

- This test takes place at the developer's site. Developers observe the users and note problems.
- Alpha testing is testing of an application when development is about to complete.
- Minor design changes can still be made as a result of alpha testing.
- Alpha testing is typically performed by a group that is independent of the design team, but still within the company, e.g. in-house software test engineers, or software QA engineers.

Alpha Testing

Advantages of Alpha Testing:

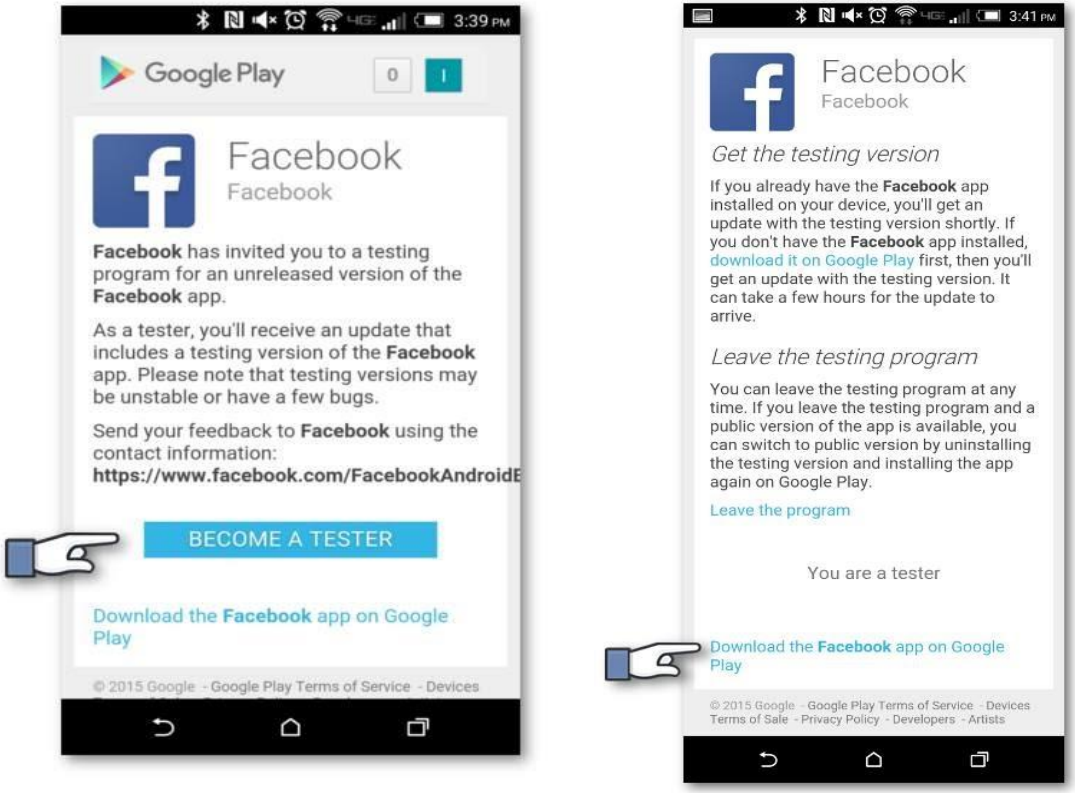
- Provides better view about the reliability of the software at an early stage
- Helps simulate real time user behavior and environment.
- Detect many showstopper or serious errors

Disadvantages of Alpha Testing:

- In depth functionality of the software cannot be tested as it is still under development stage.

Beta Testing

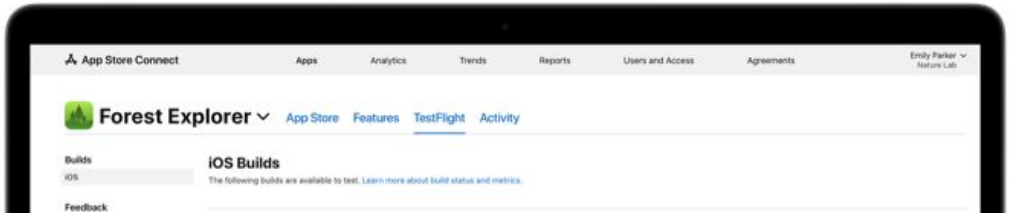
- Beta Testing, also known as “field testing”.
- Takes place in the customer’s environment and involves some extensive testing by a group of customers who use the system in their environment.
- Beta Testing is performed by "real users" of the software application in a "real environment" and can be considered as a form of external User Acceptance Testing.
- Beta version of the software is released to a limited number of end users of the product to obtain feedback on the product quality.
- Beta testing reduces product failure risks and provides increased quality of the product through customer validation.
- Beta Test provides a complete overview of the true experience gained by the end users while experiencing the product



*Real People, Real Environment, Real Product are the three **R's** of Beta Testing and the question that arises here in Beta Testing is **"Do Customers like the Product?".***

Beta Testing Made Simple with TestFlight

TestFlight makes it easy to invite users to test your apps and app clip experiences and collect valuable feedback before releasing your apps on the App Store. You can invite up to 10,000 testers using just their email address or by sharing a public link.



Beta Testing

Guidelines for Beta Testing:

- Don’t expect to release new builds to beta testers more than once every two weeks.
- Don’t plan a beta with fewer than four releases.
- If you add a feature, even a small one, during the beta process, the clock goes back to the beginning of eight weeks and you need another 3–4 releases.

Beta Testing

Advantages of Beta Testing:

- Reduces product failure risk via customer validation.
- Beta Testing allows a company to test post-launch infrastructure.
- Improves product quality via customer feedback
- Cost effective compared to similar data gathering methods

Disadvantages of Beta Testing:

- Doesn’t allow any control over the testing as it is carried out in real environment and not under the lab environment.
- Finding the right beta users and maintaining their participation could be a challenge

Alpha vs Beta Testing

Alpha Testing	Beta Testing
performed by Testers who are usually internal employees of the organization	performed by Clients or End Users who are not employees of the organization
performed at developer's site	performed at client location or end user of the product
Reliability and Security Testing are not performed in-depth Alpha Testing	Reliability, Security, Robustness are checked during Beta Testing
Long execution cycle may be required for Alpha testing	Only few weeks of execution are required for Beta testing

Phase Of Testing

- Alpha and Beta tests are typically carried for "off-the shelf" software or product oriented companies.
- The Phases of Testing for a product company typically varies from a service oriented organization.
- Following is the testing phase adopted by product firms

Phase Of Testing

Pre-Alpha: Software is a prototype. UI is complete. But not all features are completed. At this stage, software is not published.

Alpha: Software is near its development and is internally tested for bugs/issues

Beta: Software is stable and is released to a limited user base. The goal is to get customer feedback on the product and make changes in software accordingly

Release Candidate (RC): Based on the feedback of Beta Test, you make changes to the software and want to test out the bug fixes. At this stage, you do not want to make radical changes in functionality but just check for bugs. RC is not put out to the public

Release: All works, software is released to the public.