SOFTWARE TESTING CONCEPTS

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Agenda

Testing Types

- **White box testing**
  - Statement Coverage
  - Decision Coverage
  - Loop Coverage

- **Black box testing**

  - **Functional Testing**
    - Smoke Testing
    - Sanity Testing
    - System Testing
    - Regression Testing
    - Concurrency Testing
    - Ad-hoc Testing
    - Compatibility Testing
    - Integration Testing
    - User Acceptance (UAT) Testing

  - **Non Functional Testing**

    - ✓ **Usability Testing**
    - ✓ **GUI Testing**
    - ✓ **Performance Testing**
      - Base Line Testing
      - Load Test
      - Stress Test
      - Endurance Test
      - Spike Test
    - ✓ **Security Testing**

White Box Testing

- It is done by the developer.
- It is used to test the internal logic (coding) of the module.

White Box Testing Techniques

Statement Coverage - Execute all statements at least once
Example: a+b =c

Decision Coverage - Execute each decision direction at least once
Example: If Then Else, Do While, etc

Loop Coverage - Execute each loop at least once
Example: For, Do Until etc…

Black Box Testing

Functional:

1. **Smoke Testing**
   - Smoke testing is the initial testing process exercised to check whether the software under test is ready/stable for further testing.
   - Prior to start *Smoke testing* few test cases need to created once to use for smoke testing. These test cases are executed prior to start actual testing to check **critical functionalities of the program is working fine**.
   - This set of test cases written such a way that all functionality is verified but not in deep.

2. **Sanity Testing**
   - Always done on tested build.
   - Major functionality is checked in depth, this test is narrow and deep.
   - Subset of Regression Testing.

3. **System Testing**
   - System testing of software is testing conducted on a complete, integrated system (application as a whole) to check whether it satisfies client requirement.

4. **Regression Testing**
   - Re-testing the application after fixing the issue.
   - And also ensure that fixing this issue should not affect any other functionality in the application.

5. **Concurrency Testing**
   - Multi-user testing geared towards determining the effects of accessing the same application code, module or database records.

6. **Ad-hoc Testing**

- Testing the software randomly to find out defects. Tester will do it after completion of the all the test cases executed.

7. **Compatibility Testing**
   - Testing conducted on the application to evaluate the application's compatibility with the computing environment like OS, Web browser, Database etc…
   - It is a Functional testing.

8. **Integration Testing**

   In integration testing the individual tested units are grouped as one and the interface between them is tested. Integration testing identifies the problems that occur when the individual units are combined i.e it detects the problem in interface of the two units. Integration testing is done after unit testing.

   Integration Testing Techniques

   - Top-down Approach
   - Bottom-up Approach

   Top-down Approach

   - Begins testing from the top of the module hierarchy and works down to the bottom.
   - If the lower interfacing modules or programs are not ready then it is replaced by STUB.

   STUB is a temporary Low Level Module which is does not do any action when LLM is under construction or not ready.

   Bottom-up Approach

   - Begins testing from the bottom of the module hierarchy and works up to the top.
   - It requires the development of Driver Modules which provide the test input, call the module or program and display test output.

   Driver is temporary high Level Module which will be used when main module is not developed.

9. **User Acceptance (UAT)Testing**
   - Testing conducted by the client to evaluate the system compliance as per the business requirements.
   - Done by Client.

   Alpha Testing
   - Testing the application by the client in development site when development is nearing to completion.
   - Client can report defects if there in application.

   Beta Testing

- Testing the application by the end users in client site to make sure that the changes made in Alpha testing is fixed or not.
- Testing done after completion of development.

Non Functional:

Usability Testing

- Testing application to see how well real users use the system.

GUI Testing

- GUI testing is a process to test application's user interface and to detect if application is functionally correct.
- Handles keyboard and mouse events, how different GUI components like menu bars, toolbars, dialogs, buttons, edit fields, list controls, images etc.
- Reacts to user input and whether or not it performs in the desired manner.

Performance testing:

Software performance testing is a means of quality assurance (QA). It involves testing software applications to ensure they will perform well under their expected workload.

The following tests will be performed as part of performance testing.

- **Base Line Test**
- **Load Test**
- **Stress Test**
- **Endurance Test**
- **Spike Test**

Base Line Test: Perform the test with 15-20% of target load.

Load Test: 1. Perform with actual load for three cycles

2. Steady state duration is minimum one hour.

Stress test: 1.Perform the load test and then slowly ramp up the load step by step.
2. Disable think times

Endurance testing: Perform load test for 10 -14 hours to identify the memory leaks.

Spike testing: Spike testing is done by suddenly increasing the number of load or load generated by user by a very large amount.

Security Testing:

Security testing is basically a type of software testing that’s done to check whether the application or the product is secured or not. It checks to see if the application is vulnerable to attacks, if anyone hack the system or login to the application without any authorization.