Module: Capstone Project using Java
Qualification: Advanced Certificate In Web Development

LITHAN

IU 2. Test Planning

By the end of this session, you will be able to understand Test Planning

Contents

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S. No.	Topic Description	Required / Optional
01	Test Environment	Required
02	Optimal scheduling times for different tests	Required
03	Critical components of a phase test plan	Required
04	Executing Test Scripts	Required

Content

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- Content
  - Test Environment
  - Optimal scheduling times for different tests
  - Critical components of a phase test plan
  - Executing Test Scripts

What is a Test Environment

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- Setup of software and hardware to execute test cases by test team
- Allows the developers to test their modules without affecting the live production servers.
- Confined to use by both developers and testers
- Supports test execution with:
  - Hardware
  - Software
  - Network configured.
- Configured according to the need of the Application Under Test.

Key Areas to Setup in a Test Environment

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- System and applications
- Test data
- Database server
- Front end running environment
- Client operating system
- Browser
- Hardware includes Server Operating system
- Network
- Documentation required as:
  - Reference documents
  - Configuration guides
  - Installation guides
  - User manuals

Creating Test Data

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- Companies use a separate test environment to test the software product.
- Method used is to copy production data to test.
- Helps the tester to detect same issues as found in live production server
- Approach for copying production data to test data includes:
  - Set up production jobs to copy the data to a common test environment
  - All Personally Identifiable Information(PII)is modified with other sensitive data.
  - PII is replaced with logically correct data.
  - Remove data that is irrelevant to test.
- Tester copies data to their individual test environment.
- Tester modifies it as per their requirement.

Test Environment Checklist

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Test	Test Environment Checklist
Hardware	Check whether required equipment for testing is available?
	Check whether peripheral equipment is available?
Software / connections	Are the needed applications specified?
	For the new software does the test environment exist for the organization?
Environmental data	Check whether the standard test data sets are available?
	Do agreements with the test data owners about the test data exist?
Maintenance tools / processes	Check whether a single point of contact exist for test environment maintenance?
	Does agreement reached about the readiness and quality of the test environment?
	Do all members involved in the maintenance process are known?

Optimal scheduling times for different tests

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- One of the key factors that determine the success of the software testing and development team is whether they are able to present the finished product in a timely manner.
- Timely project delivery is completely dependent on time estimation of the project.
- Having a clear time schedule and sticking with it is crucial to build a good reputation and keep clients happy.
- It can be difficult to simply calculate the timeframe for a given testing project by simply eyeballing it.
- Although an expert can come pretty close at judging the optimal time requirements of a project.

Optimal scheduling times for different tests

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- According to the QA estimation statistics:
  - Testing of a single-component console application takes about 20% of its development time.
  - Testing of a two-component console application takes 20-30% of its development time.
  - Testing of an application with GUI - 30-35%, a distributed application with GUI - 35-50%.

- Each project and each team are unique that is why this time estimate is rather rough and does not include some risks.
- To make the estimate of testing time more accurate and realistic, you should use the method of decomposition, i.e. you should divide the process of testing into several parts and estimate the time for each of them.

Optimal scheduling times for different tests

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- Five common time estimation techniques that every tester should be aware of:
  - **Delphi Technique**

    ✓ The Delphi technique consists of carrying out surveys from experts to obtain an average final estimation of the time-effort that a task is likely to consume.

    ✓ Each team member is assigned a task to be estimated and they collect information in multiple rounds. At the end of each round, the feedback obtained is analyzed to reach a conclusion about how long the task is likely to take.

  - **Work Breakdown Structure**

    ✓ Work breakdown, in this case, refers to what we've been doing all along: deconstructing the project into its elementary components.

    ✓ Likewise, by breaking down the task into its detailed steps, team members can discover any functionalities, or even sub-functionalities, that they may have not considered in the original plan.

Optimal scheduling times for different tests

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- Five common time estimation techniques that every tester should be aware of (*continuation*):

  - **Three-Point Estimation**

    - ✓ The three-point estimation can be considered as a logical addition to the work breakdown structure technique.

    - ✓ After the project has been broken down into its component tasks, each task is given three types of time estimations (hence, three-point):

      1. Optimistic estimate (A) — this is the time estimate from heaven, where everything goes swimmingly and all the required conditions are met.

      2. Pessimistic estimate (B) — the time estimate from hell, a scenario where Murphy's Law is proven beyond doubt.

      3. Realistic estimate (R) — the most likely duration of the project under normal conditions.
      4. To find the value for the time estimate (E) of the project, simply use the following formula:

         $$E = (A + 4xR + B)/6$$

Optimal scheduling times for different tests

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- Five common time estimation techniques that every tester should be aware of (*continuation*):
  - **Planning Poker**

    - ✓ To estimate the time required for testing efforts on individual tasks, write down each task on a separate piece of paper, distribute to the team members and allow some time for a discussion to take place.

    - ✓ After the first round of discussion, each deck the numbered card that represents his estimate of how much work is involved in the story under discussion.

    - ✓ All estimates are kept private until each participant has chosen a card. At that time, all estimates are revealed and discussion can begin again

Optimal scheduling times for different tests

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- Five common time estimation techniques that every tester should be aware of (*continuation*):
  - **Functional Point Method**
    - ✓ In the functional point method, we assign each functional point a weighting that can range from simple (1) to medium (3) to complex (5). We then multiple the number of functional points in each category with the category weighting and add up the total.
    - ✓ The functional points total is then multiplied by the norm of 2 person-hours per functional point to arrive at the final time estimate for the whole project.

	Weighting	Functional points	Total
Complex	5	5	25
Medium	3	10	30
Simple	1	3	3
		Total FP	58
		Estimated Person hours /FP	2.0
		Total Person-hours	116 hours

What is a Test Schedule ?

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- Describes how the test is reviewed, tracked and approved.
- Directly correlated to the size of the project, efforts and costs involved.
- Test schedule includes:
  - Testing steps or tasks
  - Target start and end dates
  - Responsibilities
- Importance of Scheduling :
  - To commit to the timeliness of the project.
  - To estimate the resources required for the project execution.
  - To estimate the cost of the project for allocating funds and approval.

Test Schedule Template

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Test Schedule Template			
Test Schedule ID:	Describe the Test Schedule ID		
Product ID / Name:	Describe the Name of the Product / Project		
Product Version or Build:	Describe the Current Version or Build of the Product		
Present Owner :	Describe the Name of the owner of the Test Schedule Document at present		
Created On:	Describe the Date of Document created initially		
Review On:	Describe the Date on Document was last Reviewed & Updated		
Review By:	Describe the Name & Position of the Reviewer.		
Review Comments:	Describe the Comments		
Current Version:	Describe the Current Version of the Document		
Change Details:	Describe the Description of Change, Affected Section of the Test Plan		
Current Status:	Draft / In Process / Approved		
Signing Off Authority:	Name	Position	Signature, Date
	Describe the Name	E.g. QA Manager, Dev. Manager, Product Manager, Release Team Manager	

Sample Test Schedule with Activities & Grouping

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- Basic test activities to be performed during System Test.

Activity	Start	End	Person Days	Resource
Prepare Test Plan				
Review Test Plan				
Prepare Test Scripts				
Review Test Scripts				
Set up Test Environment/Configuration				

Sample Test Schedule with Activities & Grouping

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Activity	Start	End	Person Days	Resource
Maintain Test Environment				
Establish Test Procedures				
Promote Software from Development to Test Environment				
Execute Testing/Record Faults				
Re-execute Tests as Needed				
Provide Support/Resolve Faults				
Promote Software from Test to Development Environment				
Certify Application for Release to Beta Test Group				

Test Planning

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- A test plan is a document that defines the strategy that will be used to verify that the product or system is developed according to its specifications and requirements.
- It describes the scope of testing, testing techniques to be used, resources required for testing and the schedule of intended test activities. The scope helps in identifying test items and the features to be tested. A test plan also contain details of who will perform a given task.
- Basis for testing any software in a project.
- Ensures entrance criteria are used as input before start the execution.
- Provide guidelines to manage defects in testing.
- The test plan serves as a blueprint to conduct software testing activities as a defined process which is minutely monitored and controlled by the test manager.

Test Planning

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- Test Planning outlines:
  - Test strategy
  - Testing objectives
  - Resources (Users, Test environments and PCs)
  - Test schedule
  - Test Estimation
  - Test deliverables.

- A good test plan covers all the testing phases in Software Development Life Cycle (SDLC).

- The format of test plan document may vary with the type of product and the organizations. For larger and complex projects, you can prepare a master plan with high level details of overall requirements. The master test plan is supported by subsidiary test plans with the required details for testing of each component or module.

Importance of Test Plan

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- Making Test Plan has multiple benefits
  - Test Plan helps us determine the effort needed to validate the quality of the application under test.
  - Help people outside the test team such as developers, business managers, customers understand the details of testing.
  - Test Plan guides our thinking. It is like a rule book, which needs to be followed.
  - Important aspects like test estimation, test scope, Test Strategy are documented in Test Plan, so it can be reviewed by Management Team and re-used for other projects.
  - It provides schedule for testing activities. Hence, it provides you a baseline schedule to control and track your team's testing progress.
  - It outlines the resource requirements and equipment needs which are essential to carry out the testing process.
  - It can be shared with your client to give them insight about your testing process and gain their confidence.

How to write a Test Plan ?

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- Test Plan is the most important task of Test Management Process.
- Follow the seven steps below to create a test plan as per IEEE 829
  - Analyze the product
    - The first step towards creating a test plan is to analyze the product, its features and functionalities to gain a deeper understanding. Further, explore the business requirements and what the client wants to achieve from the end product. Understand the users and use cases to develop the ability of testing the product from user's point of view.
  - Design the Test Strategy
    - Once you have analyzed the product, you are ready to develop the test strategy for different test levels. Your test strategy can be composed of several testing techniques. Keeping the use cases and business requirements in mind, you decide which testing techniques will be used.
  - Define the Test Objectives
    - A good test plan clearly defines the testing scope and its boundaries. You can use requirements specifications document to identify what is included in the scope and what is excluded. Make a list of 'Features to be tested' and 'Features not to be tested'. This will make your test plan specific and useful.

How to write a Test Plan ?

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- Define Test Criteria
  - Test Criteria is a standard or rule on which a test procedure or test judgment can be based. There're 2 types of test criteria as following:
    - Suspension Criteria
    - Exit Criteria
- Resource Planning
  - The resource plan is a detailed summary of all types of resources required to complete the project task. The resource could be human, equipment and materials needed to complete a project
  - The resource planning is an important to factor of the test planning because helps in determining the number of resources (employee, equipment…) to be used for the project.
- Plan Test Environment
  - A testing environment is a setup of software and hardware on which the testing team is going to execute test cases.
- Schedule & Estimation
  - In the Test Estimation phase, the whole project breaks out into small tasks and the estimation for each task has been adding.
- Determine Test Deliverables
  - Test Deliverables is a list of all the documents, tools and other components that has to be developed and maintained in support of the testing effort.

Test Planning- Process

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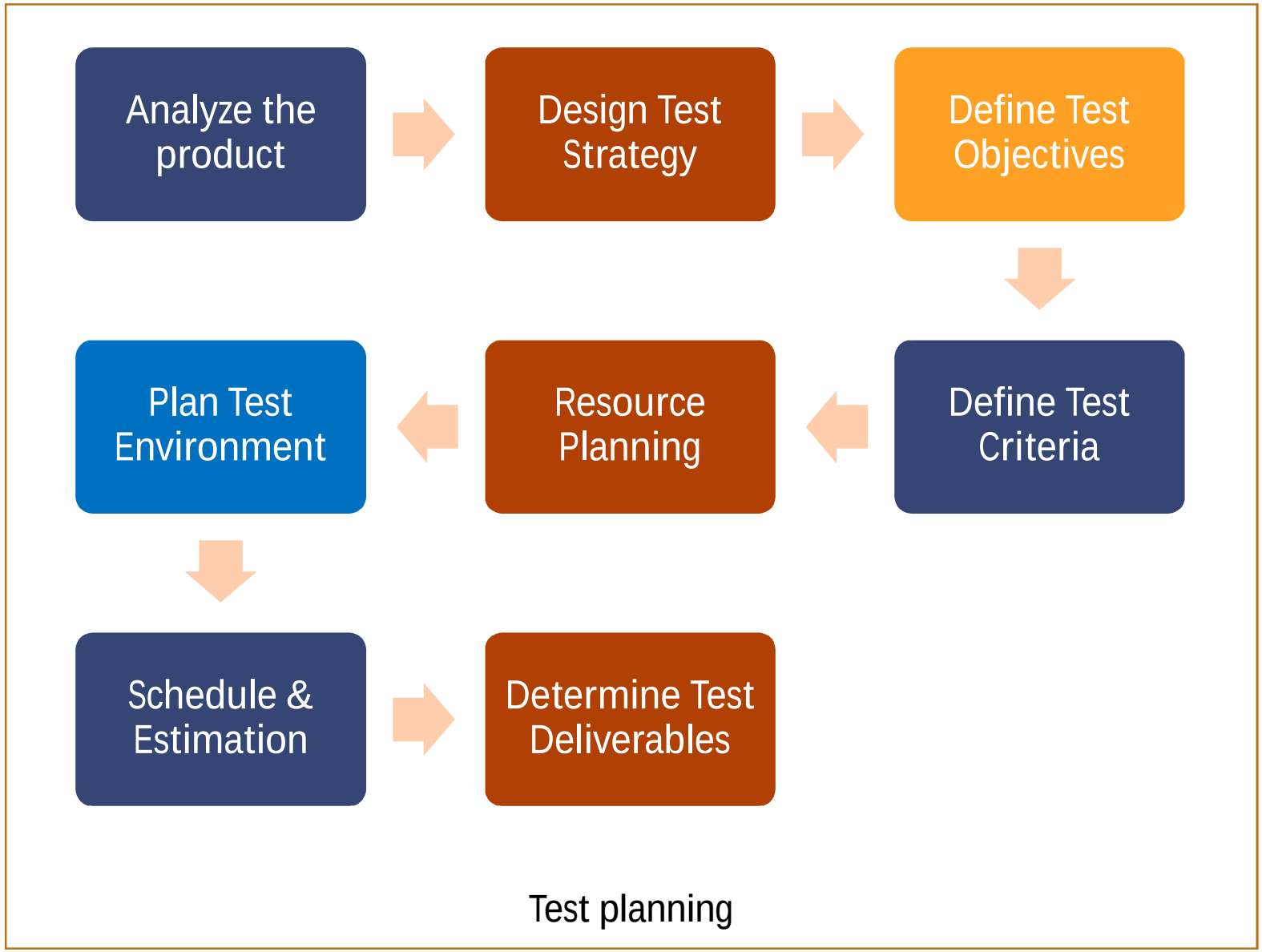

Test planning

Contents of a Test Plan

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S.No.	Contents	Description
1	Test plan identifier	Unique identifying reference
2	Introduction	Brief introduction about the project and to the document
3	Test items	Test item is a software item that is the application under test
4	Features to be tested	Feature that needs to tested on the testware
5	Features not to be tested	Identify the features and the reasons for not including as part of testing.
6	Approach	Details about the overall approach to testing
7	Item pass/fail criteria	Documented whether a software item has passed or failed its test
8	Test deliverables	The deliverables that are delivered as part of the testing process such as test plans.

Contents of a Test Plan (*continuation*)

LITHAN

S.No.	Contents	Description
9	Testing tasks	All tasks for planning and executing the testing
10	Environmental needs	Defining the environmental requirements such as hardware, software, OS, network configurations, tools required
11	Responsibilities	Lists the roles and responsibilities of the team members
12	Staffing and training needs	Captures the actual staffing requirements and any specific skills and training requirements
13	Schedule	States the important project delivery dates and key milestones
14	Risks and Mitigation	High-level project risks and assumptions and a mitigating plan for each identified risk
15	Approvals	Captures all approvers of the document, their titles and the sign off date

Contents of a Test Plan (*continuation*)

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S.No.	Contents	Description
9	Testing tasks	All tasks for planning and executing the testing
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Test Plan

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- As per IEEE 829 standards, the most important components of a Test Plan document had been listed in the previous table.
- However it is not mandatory to include each and every thing mentioned in the table.
- The test plan can miss many components from this checklist.

Suspension & Exit Criteria

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- Suspension Criteria
  - Specify the criteria used to suspend all or a portion of the testing activity:
    - Build containing serious defects which limit testing progress.
    - Significant change in requirements suggested by client.
    - Software/Hardware problems.
    - Assigned resources are not available when needed.
- Exit Criteria
  - Desirable conditions need to be met to proceed with the implementation:
    - No defects over a period of time
    - All the high priority/severity test cases has been executed
    - Deliverables are ready
    - High severity/ priority bugs are fixed

Exit Criteria

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Exit Criteria	Test Team	Technical Team	Notes
100% Test Scripts executed			
95% pass rate of Test Scripts			
No open Critical and High severity defects			
95% of Medium severity defects have been closed			
All remaining defects are either cancelled or documented as Change Requests for a future release			
All expected and actual results are captured and documented with the test script			
All test metrics collected based on reports			
Test Closure Memo completed and signed off			
Test environment cleanup completed and a new back up of the environment			

Resumption Criteria

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- Resumption occurs when the problems that caused the suspension have been resolved.
- Resumption Criteria
  - Specify the conditions need to be met to resume testing activities after suspension.
  - Specify the test items that must be repeated when testing is resumed.

Executing Test Scripts - Test Scenario & Test Case

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Test Scenario

- An item or a feature or a functionality to be tested in the application under test is called test scenario.
- Example
  - Ensure users are able to login to the application with valid user name & password.

Test Cases

- Test case consist of test case name, Precondition, steps / input condition, expected result.
- Derived from Test Scenarios.
- Contains lower level actions to be performed.
- Example
  - Test Case 1
    - Input User Email : shrinivas@Lithan.com Password : abcd
    - Click submit and the users should see the home screen
  - Test Case 2
    - Input User Email : shrinivas Password : abcd
    - Click submit and the system should show invalid email address as message.

Executing Test Scripts - Test Case Design

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- Design Test Scenarios
- Review the test basis.
  - Information required to start the test analysis and create test cases.
  - Documentation on which test scenarios based are:
    - Requirements
    - Use Cases
    - Design specifications
    - Product risk analysis
    - Architecture
    - Interfaces
- Create Test Cases
  - Identify test conditions.
  - Designing the tests.

Executing Test Scripts - Test Scenario Design Example

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- Test Case Scenarios are derived from Use Cases or Requirements.
- A typical Scenario list will look like below.

Use Case Id / Requirement Id	Scenario ID	Test Scenario	No. of Test Cases
UC0001	TS001	Check Customer Login with Valid Data	10

Executing Test Scripts Test Case Design Example

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- Consider Test Scenario : Check Login Functionality
  - Test Case 1: Check results on entering valid User Id & Password
  - Test Case 2: Check results on entering Invalid User ID & Password

Scenario Id	Test Case Id	Test Case	Preconditions	Test Step	Test Data	Expected Results	Actual Results	Pass / Fail
TS001	TC0001	Test Case 1	Flight Reservation Application must be installed	1. Go to site http://Indigo.com 2. Enter UserId 3. Enter Password 4. Click Submit	Userid = Indigo1 Pwd = JetAir1	User should Login into application	As Expected	Pass
TS001	TC0002	Test Case 2	Flight Reservation Application must be installed	1. Go to site http://Indigo.com 2. Enter UserId 3. Enter Password 4. Click Submit	Userid = Indigo1 Pwd = JetAir123	User should not Login into application	As Expected	Fail


THANK YOU