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*Week-6 |* ST Job Ready Program

*Green Energy*

Implementing Electricity Demand forecasting

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# 1.Boundary value Analysis

Boundary value is a type of functional Testing against the requirement of the system specification. It will test the boundary values as valid and invalid partitions. The input values have its maximum and minimum boundary values. Foe every input variable check we must do Minimum value, just above the minimum value, middle value, Just below maximum value and maximum value.

Example:

Consider the fields take value 0-9(include 0)

Boundary Value Analysis for the field :

|  |  |  |
| --- | --- | --- |
| Invalid | valid | invalid |
| Minimum -1 | Min,min+1,nominal,max-1,max | Max+1 |
| -1 | 0,1,5,8,9 | 10 |

# 2.Decision Table Testing

Decision Table testing is a software testing technique in Blackbox testing technique. It is a table way of representation of input against the same set of rules, conditions, and behaviours. It is an effective tool for both complex software testing and requirements.

The conditions are indicated as value True or False.

The Table must contain four parts.

1. Condition Stub
2. Action Stub
3. Condition Entries
4. Action Entries

|  |  |  |
| --- | --- | --- |
|  | **stub** | **Entries** |
| Conditions | Cases1  Case2  Case3 |  |
| Actions | Action1  Action2  Action3 |  |

**Example: Login page**

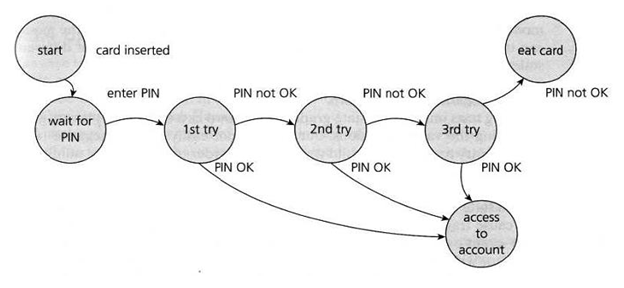
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Rule 1 | Rule 2 | Rule 3 | Rule 4 |
| **Conditions** | | | | |
| Valid User Name | **F** | **T** | **T** | **T** |
| Valid Password | **-** | **F** | **T** | **T** |
| Adequate balance in the account | **-** | **-** | **F** | **T** |
| **Actions** | | | | |
| Login accepted | **F** | **F** | **T** | **T** |
| Amount transferred | **-** | **-** | **F** | **T** |

# 3.State transition Testing

It is another Black Box Testing technique, basically to test the systems or application against different input condition passed in a sequence. It is performed to check the changes in states through different input conditions and the state is observed. The state transition testing has four main components States, Transition, Events and Actions.

**Objective of State transition Testing** are to test the behaviour of the system under different input, Testing the change in the transition state of the application and to test the performance of the system.

**State transition diagram for atm machine:**



The state diagram shows Seven states and only four possible events.

S1: Start, S2: Wait for PIN, S3: 1st Try, S4: 2nd try, S5: 3rd try, S6: Access to account, S7: East Card.

Events are:

Event1: Card inserted, Event2: Enter PIN, Event3: PIN OK, Event4: PIN not OK.

# 4.Equivalence Class Partitioning

It is a type of Blackbox Testing or specification-based testing techniques in which we grouped input data into logical partitions called equivalence classes. Instead of testing all the combination of input data, we can only choose or pass any of the test data from the particular class.

For example: consider an application that accepts a numeric number as input with value 10 to 100 and find its square.

The equivalence classes are

1. Number between 10 to 100
2. Number between 0 to 9
3. Number greater than 100
4. Negative numbers
5. Alphabets
6. Special characters.

# 5.Use case testing

This technique helps to identify test cases that cover entire system, from start to finish.

A use case is a description of a particular use of the system by an actor. The use case captures the functional requirements of the system and also defined the outcomes of errors during the system use. It has use widely at system or acceptance level.

**Use** case name: Cash withdrawal

**Actor**: Customer, Bank

**Description**: the use case describes how the customer use the ATM system to withdraw cash from the account.

Pre-condition:

1.ATM system is online

2.The ATM system has sufficient cash available.

**Normal Work flow:** contains set of actions that the customer has to do on the system.

# 6.Whitebox testing

This software testing is also known as glass box testing, code-based testing, Transparent Testing and Open box testing. As the name indicates, this technique is used to test the software internal coding and infrastructure. It will verify input and output flow Through the application which will improve design, usability and security.

**In white box testing we will verify**

* Internal security holes
* Broken and poorly structures paths in the coding process
* The flow of specific inputs through the code
* Expected output
* The functionality of conditional loops
* Testing of each statement, object and function on an individual basics.

**White box testing has two basic steps**

1. Understand the source code
2. Create test cases and execute

**Some important Whitebox testing techniques**

* Code coverage
* State coverage
* Branch coverage
* Condition coverage
* Multiple condition coverage
* Finite state machine coverage
* Path coverage
* Control flow testing
* Dataflow testing

# 7.Decision Coverage Testing

It is a white box testing technique. Testing the decision outcomes in the programs is called Decision coverage testing. The number of decision control structure that have been executed in the program source code.

Decision coverage= (number of decision/branch outcomes exercised)/Total number of decision outcomes in the source code) \*100.

.

# 8.Statement coverage testing.

It is a another Whitebox testing technique. The number of statements that have been successfully executed in the program source code.

Statement coverage = (number of statement executed)/ (Total number of statements) \* 100.

# 9.Creating a summary report.

summary report is a very important document as it helps the stakeholders to make decisions on product releases. It contains key information about testing, like scope of testing, tests executed, defect raised, overall quality recommendations etc., It is also including the key activities performed in the software development lifecycle for any release and what is the overall outcome.

**Summary report must include sections like relevant information such as**

* Test Objective: What is the objective of testing.
* Test Application Overview: - Overview or functionality of testing we going to do
* Test Scope: -In scope features and out of scope features.
* Test Approach: -
* Test environment details: - Platforms, Software, Browser Combination.
* Testing Matrix-Test planned vs Test execution, Test pass/fail.
* Defect Summary: - Table of total defect, Status of the defect.
* Overall Summary: summarise the overall aspects and quality of the product.

# 10.Incident / Defect Report

Defect and incident also know a bug Report. It is a document including all the details of defect which is identified by a tester for future reference and helps the developer to fix it as soon as possible. Defect report template contains following details.

ID, Project name, Product name, Release version, Module, Detected Build Version, Summary, Description, Steps to replicate, Actual Result, Expected Result, Attachment, Defect Severity, Defect Priority, Reported By, Assigned To, Status.

# 11.Creating a Test plan

It is a document which include all future testing related activities. The documents have a standard and also there are 15 attributes in the Test plan documents which is related to the application what the testers are going to test.

* Objective: What is the aim of the test plan.
* Scope: What are the features going to test and not to test.
* Testing Methodology: Types of testing are we going to test, Component testing, integration testing, performance testing (web application). Depends on the application.
* Approach: writing the Test scenarios, Test cases and flow chart.
* Assumptions: Proper requirements FRS, SRS etc.,
* Risk:
* Mitigation Plan: Purpose of the mitigation plan to hold a backup plan is to avoid the percentage of error.
* Role and Responsibilities: Each and every person has special responsibility.
  + 1. Test manager -Set up the environment for testing.
    2. Test Lead -Assigning module for test engineers, Approving the test cases.
    3. Test engineers -understanding requirements, test cases writing, defect reporting. Etc.
* Scheduling: Scheduling the days for the each and every testing activity.
* Defect Tracking: Use some defect tracking tool to identify every defect and fix it.
* Test Environment/Test Bed: Platform which is used for the application to test
* Entry and Exit criteria: These are the testing condition which should be met before we start and end testing.
* Test Automation: Features are to be automated, tools we are going to use as part of automation.
* Deliverables

# 12. Creating a Test Procedure.

A formal specification of the test cases to be applied to one or more target programme modules is known as a test method. Executable test procedures exist. The target modules are subjected to a test procedure by a process known as the VERIFIER, which also generates an exception report outlining any failed test cases.

# 13.Debugging and confirmation testing.

**Debugging** is the process to correct the bugs found during testing.

**Confirmation Testing**: It is the new emerging terminology replacing the word re testing. when a defect is resolved, a tester re-runs the same test once again in order to confirm the fix of defects. Another way it says that re test a particular test which failed initially and after the developers has worked on it, fix it and we are run the same test to make sure that the defect has resolved. This process is a called confirmation test.

# 14. Representation of the V model, showing where the fundamental Test Process fits in.

A testing phase was created for each phase of the development life cycle according to the V model of testing. Any model should have testing carried out at every stage, from requirements to maintenance. The V-Model illustrates the connections between each stage of the development life cycle and the testing stage that goes along with it.

# 15.Steps required in the review process

The review process has included following main activities:

* Planning: Defining the scope, estimating the effort and time, identifying the roles and responsibilities, selecting people to assigning the activities, Defining Entry and exit criteria and check the entry criteria are met.
* Initiate Review: Distributing the work product, Physically or electronically to distribute the work products, Explaining the scope, objective and process to the participants.
* Individual review: Reviewing all the parts of the work product, noting is there any potential defects, recommendation and questions related to the work product.
* Issue communication and analysis: communicating the identified potential defects, analysing, assigning ownership and status to them.
* Fixing and reporting: Creating Defect reports, communicating defects to the appropriate team or person, recording the status, gathering matrix, checking the exit criteria are met.

# 16.List three roles in the formal review.

A typical formal review will include following roles.

**Author**: Create the work product which is under review

Fixes the potential defects in the work product.

**Management**: He/she is the person responsible for review planning

Decides the execution of reviews

Assigning the rest of the staff, budget and time.

Monitor ongoing process of review under cost effective.

Control decisions in the event of inadequate outcomes.

**Facilitator**: when review held, the facilitator makes sure the effectiveness of the meeting.

Acts as a mediator, if necessary, in various point of view.

He/she is the important person which depends on the success of the review meeting.

Other important roles in the formal reviews are **Review leader, reviewers and Scribe.**

# 17.List three potential outcomes of a review.

* Reviews assist in understanding missing requirements, design flaws, and unmaintainable code in addition to helping to detect errors.
* By fixing errors in the early phases of work products, the development team's productivity increases and timeframes are shortened. This is because this will help to make the work products clear and unambiguous.
* cost savings as a result of fewer errors in the finished software.

# 18.List four different categories of risk

* **Schedule risk**: - The delivery of the project is impacted by the incorrect schedule. These risks are primarily related to being behind schedule, which prevents timely project development and has an immediate impact on project delivery.
* **Technical risk**: - Technical risks are defined as functional risks or performance risks, which indicates that they are mostly related to a product's functionality or the performance of its software component.
* **Budget risk**: - Financial risks that are mostly brought on by budget overruns are referred to as budget-related hazards. Always manage the project's finances in accordance with what has been decided, as improper management of the finances will result in budget worries and budget hazards.
* **Operational risk**: - Operational risk relates to procedural risk, which indicates that these are risks that arise during project development because of incorrect process execution in day-to-day operational tasks.

# 19.The difference between economic risk and project risk.

**Economic risk** is the risk associate with the financial and other economic factors on the project. Economic risk has a direct impact in the project risk such as revenue and expenses amount and accordingly the company’s profit.

**Project Risk** may be the negative impact on project’s ability to achieve its objective. It will include Project issues, Organizational issues, technical issues, Political issues and suppliers’ issues.

# 20.The purpose of test policy and test strategy.

**Test Policy:** The Test Policy document is a high-level document which overarching objectives of an organization in performing test activities created by the Senior managers in the team in association with the stakeholders.

It contains Outline adjectives of the testing, business value delivered to the organization which justifies the cost of quality, test objectives, methods to measure test efficiency, test process.

**Test Strategy:** The purpose of Test strategy documents to give a formal description o f how a software product will be tested. What are the testing levels we performed**.** Documents contains details of general testing methods used by the organization.

It contains Scope, Test Approaches, Test environment and Testing Tools.

# 21.Phases in the testing process

* Planning
* Monitoring and control
* Analysis and design
* Implementation and execution
* Test closure activities.

# 22.Steps happening at every activity

**Test planning**: Understand the goal and objective of the customer and also the final goal of the project. Understand the risk which testing is intended to address.

Deicide which components, system or module are in the test scope.

Decide the objective of testing based on the feedback and verify. The software meets the requirement.

**Test Monitoring and control:** Identifying any interruption in each test process need to monitor and control. Always monitor actual progress to planned progress. It is a ongoing activity by comparing actual against the planned test.

**Test analysis and design:** In this phase first thing to remember what to test. Test basis analysis and identify the testable features.

Define Test conditions and elaborate it. Identify the Test data

**Test implementation and execution:** To verify Have everything to test and are all tests run.

During the implementation phase develop test cases and prioritise them.

Create test suits and prepare environment.

During the execution phase, Execute the test cases, record the outcomes with detailed version, compare actual result to expected result, report incidents and retest the defects is fixed to ensure the corrected.

**Test Closure:** This phase will collect all the data from the completed activities.

Plan deliverables have been delivered-Test strategy/plans, test cases, all incident reports have been resolved. Finalise and archive test ware for later use.

# 23.Roles and Responsibilities

|  |  |  |
| --- | --- | --- |
| QA leader | He/she has a clear understanding of testing process and methodology.   |  | | --- | | He/she is the point for inter and intra departmental interaction  Deciding test budget and schedule  Preparing status report, checking availability of resources.  Planning pre and post-test meeting. | |
| Test Lead | |  | | --- | | He/she familiar in test development, design and data management.  Expertise in technical skills.  Provide support for customer interface, staff planning and supervision and progress updates.  Assisting software testing team, arranging walk-through, implement test process. | |
| Test Engineers | |  | | --- | | Test engineers can have different expertise based on which they are assigned a role in an organization. | |

# 24.Deliverables

List of test deliverables in the test process are:

* Test strategy
* Test plan
* Effort estimation report
* Test scenarios
* Test cases/scripts
* Test Data
* Requirement Traceability Matrix
* Defect Report
* Test execution Report
* Test summary report
* Test incident report
* Test Closure Report
* Release note
* Installation and configuration guide
* Test status report
* Weekly status report

PROJECT QUESTIONS:

## 1. BVA of mobile number filed.

The requirement is incomplete as the filed accepts 10-digit numbers, (that means 10 Numerical characters), it means it will accept 10-digits starting from 0 loke 0000000001,01203443513, these are accepted.

So, considering this as the valid input, usually take lowest 10-digit number allowed to the largest 10-digit number allowed.

Invalid input is the number below 10-digit number and above the largest 10-digit numbers.

|  |  |  |
| --- | --- | --- |
| Invalid | valid | invalid |
| Minimum -1 | Min, min+1, nominal, max-1, max | Max+1 |
| 9999999999(9 times 9) | 0000000001, 123564789 | 00000000000(11 times 0) |

## 2. create a decision table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Rule 1 | Rule 2 | Rule 3 | Rule 4 |
| **Conditions** | | | | |
| Valid Email | **F** | **F** | **T** | **T** |
| Valid address | **F** | **T** | **F** | **T** |
| **Actions** | | | | |
| Form submitted | **F** | **F** | **F** | **T** |

## 3.State transition Testing

It is Blackbox testing technique which include different states and transition from one state to another state with the same input. It is helpful when the system needs to test different state transitions.

In Valid email, address

In Valid email, address

**Valid invalid**

**invalid**

Form submitted

Form can’t submit

In the above diagram whenever user enter the correct Email and Address the form should be submitted, otherwise the error message will generate.

## 5.Use case Testing.

Use case testing is a technique that helps to identify some test cases to exercise the whole system on a basis of start to finish.

For example:

ATM Machine :

|  |  |  |
| --- | --- | --- |
|  | Step | Description |
| Main Success scenario  A: Actor  S. System. | 1 | A. Insert Card |
| 2 | S: Validates card and asks for PIN |
| 3 | A: Enters PIN |
| 4 | S: Validate PIN |
| 5 | S: Allows access to account |
| Extension | 2a | Card not valid  S: Display message and reject card |
| 3a | PIN not valid  S: Display message and ask for re-entry(twice) |
| 4a | PIN invalid 3 times  S: Eat card and exit |

Use case examples are:

* Insert Card
* Validates card and asks for PIN
* Enter PIN
* Validate PIN
* Allows access to account.

List of Extensions are

* + - 2a Card not valid
    - 3a PIN no valid
    - 4a Pin invalid for 3rd time

## 6.What is Decision/Statement Coverage testing? Explain with one example.

Decision and statement coverage testing both coming under the Whitebox testing technique. It will demonstrate internal coding design and infrastructure.

**Decision/Branch coverage:** it is states that each branch or output of a decision is tested.ie., Statements in both True and false branches need to be tested. It means 100% coverage of testing.

**Statement Coverage:** It is states that to make sure every statement in the code is executes at least once. Main purpose for this testing is to cover all the executable statements or possible path in source code.

Example1.

|  |  |
| --- | --- |
| If Age>17  Display Error Message  End if  . | (This would require 2 test to achieve 100% decision coverage,1 test case for the statement coverage.) |

Example2:

|  |  |
| --- | --- |
| If Age<17  Display Error message  Else  Display ‘customer OK!’  End If | (We will need 2 test case to achieve 100% decision coverage and also 2 test cases for statement coverage) |

## 7. Create a test summary including the points you will test in this project.

The Test summary is the final report of all the test activities which had done in the project with the final result of a testing project as well.

This document should hand over to the stakeholder to finalise the project to release. If the report contains any defect remaining, the stakeholder can make a decision about the release until all the defects are fixed.

Test summary report: Green Energy

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test Report | | | | | | | |
| Executed | | Passed  Failed  Total number of testcase. | |  | | (Number of test cases) | |
| Pending No of test case | | | | | | | |
| In progress. No of test case | | | | | | | |
| Blocked No of test case | | | | | | | |
| Sub Total No of test case | | | | | | | |
| Function | Description | | %TCsEXecuted | %Tcs Passed | TCs pending | | Priority |
| Day ahead electricity | Predict the Day ahead electricity | |  |  |  | |  |
| Week ahead electricity | Predict the Week ahead electricity | |  |  |  | |  |
| Short Term Electricity | Predict the Short Term ahead electricity | |  |  |  | |  |

## 8.Defect Name and summary in the defect report.

In every defect report we need to specify some area of defect in the following order to concise details about what defects are identified, what action steps make the defects show up, Expected result, actual result, status and state of the defects.

In this project says the Employee attendance details is missing.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Defect ID | Defect Name | Steps to reproduce | Expected result | Actual result | State | Status |
| 1 | Launching the application as logged in using valid credential, the employee attendance details is not available. | 1.Launch URL  2.Logged in  3.Employee attendance detail page click | 1.User should be able to see the page | Page not visible.  Logged in not successful | open | severity |

## 9. When making a test plan, what features will you mention for this project?

A Test plan is document describing the scope, approach, resources and scheduled of intended test activities.

Scope: The components of the system to be tested.

* Day ahead electricity
* Week Ahead Electricity
* Short Term Electricity.

## 10.In the test procedure, what will be your first step?

In the test procedure planning is the important step. identify and assess the test plan to quantify the resources they are going to test implemented software solution. Then they will develop the test plan to follow an equivalent pattern, but it may vary in different project as to support the corresponding product.

## 11.What are you doing in confirmation testing?

Conformation testing is called as Re-testing and the aim of this test to verify the impact of the changes after fixing the bug in particular module. when a defect is resolved, a tester re-runs the same test once again in order to confirm the fix of defects

## 12.What will you do in the requirement gathering process in this project as per the V model?

Requirement gathering is process of listing all the needs of the customer to define what is a system is about and also the its goal. Gather the vision form the stakeholders, customers, users or vendors and often act as reference to develop the system.

Requirement gathering process include following steps:

* Assign role
* Interview stakeholders
* Gather and document
* List assumption and requirement
* Get Approval
* Monitor progress.

## 13.What are you doing in peer review?

Peer review serves the primary function of defect detection. The peer may be a technical expert who operates independently of management. The peers should prepare a report with a list of the issues that have been resolved at the conclusion of the review.

## 14.What will you do if you find anything wrong in the requirement document during the review?

We must record the flaw if we discover that the requirement is unclear or incorrect. The next step is to notify the project owner or other leadership about the risk so that they can make the issue visible and determine any potential effects.

## 15. What is the importance of the review process?

By identifying flaws in the product early on in the development phase, product quality can be improved. Additionally, it lessens the need for rework, increasing efficiency.

The Benefits of Review are:

* Reduction in user reported defects
* Increase customer satisfaction
* Increased productivity
* Process improvement through removal of systematic defects
* Team building.

## 16. Explain what risk in testing is.

The possibility of a future event with negative repercussions is what is meant by risk. The likelihood of the incident and its potential impact on any harm establish the level of risk.

## 17.Give one example of economic risk and project risk in this project.

**Economic risk:** So far, the management of Green is willing to spend $500,00 over 1 year to achieve the software with desired accuracy. After implementing the new features in the software might affect in economic or financial factor of the product is called as Economic risk.

**Project Risk:** The organizational expectation of the new feature is all about the accuracy of the forecasting engine. If there is any variation is the percentage of accuracy might be the project risk.

## 18. What is a test strategy?

It is high level testing document which can be followed by a predefined template.

General way of testing approach within an organization level and independent of any specific project

There are some key components to be covered in test strategy:

* Scope and Environment
* Testing Approach
* Test environment specification
* Testing tool
* Release management
* Risk analysis
* Reviews and approvals.

## 19.In which phase we are performing regression testing.

In test execution phase after unit test and integration test, the regression test will do.

Whenever a new feature is developed or when an existing feature is improved or if there are any UI updates made regression test will happen to check the if there is any impact on the product.

In waterfall methodology the regression testing is run when the product is developed completely. In Agile methodology, there are two type of Regression is happening one is iteration regression and other is Full regression Testing,

## 20. What will you do during the Integration phase of testing?

Most organization the component testing (unit testing and Integration testing job is part of Developers. In organization that have implemented test driven development, testers may be involved in it.

Once all the modules are accessible, testers test them all at once to ensure that the data flow and interface are interoperable. The end consumer can view the product if there are no defects found.

## 21.Explain the role of QA at the beginning of the project and the end of the project?

Requirements gathering is a process that every project goes through. To find document flaws as soon as feasible, QA must be included in the phase. Even at the requirement gathering stage, QA will be involved to gain product expertise, spot logical inconsistencies and conflicts, point out parts that need to be better defined or handled, and provide input on user stories, among other things. QA can also interact with the customer to ask questions and clarify their doubts. There are some essential points the QA must take care of:

* Planning: -Establishing a plan for every process
* Selecting Tool: -Each tool they are selecting should be justified by the requirements of the project
* Training: - Adequate preparation of the team and training the team about the quality standards they should be focus on.
* Inspection: -controlling the process and improving in every level.

**At the end of the project**: QA will help the development team to identify the problems early in performing rigorous testing, in order to make sure or guarantee a quality product to the customer to achieve their satisfaction and business needs in the market. Offer a test summary report that reflecting the quality of the software under test.

## 22.What will you deliver at the end of testing?

Basically, test deliverables or test artefacts are products that were created as a result of a project or other activity that was required to generate the desired result. These artefacts are pass it to the stakeholders or the end-users of a software project during the Software development life cycle. In each phase of the development life cycle the tester would prepare different artifacts. These will contain a report or a document that outlines what we tested, how it was tested, as well as the scope, methodology, outcomes, problems found, and other pertinent information. The following significant test deliverables will be shared with the customers:

1. Test Plan document
2. Test design document
3. Test case document
4. Test management and plan document
5. Test summary
6. Test closure.