

Test Case Planning

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Last time

- Software testing
 - Philosophy: black-box vs. white-box
 - Elements: test case, test procedure, test coverage, incident



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Test Case

A test case is a set of actions performed on a system to determine if it satisfies software requirements and functions correctly. It describes a particular scenario to be tested.

- It helps guide the tester through a sequence of steps to evaluate whether a software application is working as required by the end-user
- Typically, test cases for a given module are grouped into a test suite. More often than not, a test session will include many test cases because there will usually be more than one specific scenario to be tested



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But... this is still NOT enough...

Test Case Description

TC02 - Login Page - Authenticate Successfully on gmail.com

Last updated on: 29th Nov 2021, Last Saved by: Jake Bartlett

A registered user should be able to successfully login at gmail.com

PRECONDITION: the user must already be registered with an email address and password.

ASSUMPTION: a supported browser being used.

TEST STEPS:

1. Navigate to gmail.com
2. In the 'email' field, enter the email address of the registered user
3. Click the 'Next' button
4. Enter the password of the registered user
5. Click 'Sign in'

EXPECTED RESULTS:

A page displaying the gmail user's inbox should load, showing any new messages at the top of the page



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Scenario Example

- **Scenario:** E-Commerce Website – User Login
 - **Objective:** Test whether users can successfully log in to the e-commerce website.
 - **Assumptions:**
 - The login page exists.
 - User has registered and has valid credentials.



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Step 1: Identify the Test Scenario

- **Test Scenario:**
 - **Example:** User enters valid credentials and clicks the login button.
 - **Goal:** Validate if the user can log in with correct credentials.
- **Other Possible Scenarios:**
 - Invalid username
 - Invalid password
 - Empty fields



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Step 2: Define Preconditions

- **Preconditions:**

- User is already registered on the platform.
- The e-commerce website is accessible.
- The browser is open, and the user is on the login page.



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Step 3: Write Test Steps

- **Step-by-Step Test Case Example:**

- Open the e-commerce website.
- Navigate to the login page.
- Enter valid username in the username field.
- Enter valid password in the password field.
- Click on the "Login" button.



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Step 4: Define Expected Results

- **Expected Results:**

- After clicking the "Login" button, the user should be redirected to the homepage.
- A welcome message with the user's name should be displayed.
- User's session should be active.



Step 5: Outline Postconditions

- **Postconditions:**

- The user is logged in and redirected to the homepage.
- A session cookie is stored for the logged-in user.



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Test Case Example: User Login with Valid Credentials

Test Case ID	TC_001
Test Scenario	User Login with Valid Credentials
Preconditions	User is registered and on the login page
Test Steps	<ol style="list-style-type: none"> 1. Enter valid username 2. Enter valid password 3. Click login button
Expected Result	User is redirected to homepage and sees a welcome message
Postconditions	User session is active, homepage is displayed



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Negative Test Case Example

- **Test Scenario:** User attempts to log in with an incorrect password.
- **Expected Result:**
 - User receives an error message: "Invalid credentials."
 - User is not redirected to the homepage.
- **Postconditions:**
 - User remains on the login page.
 - No session is created.



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Step 6: Actual Results & Test Execution

- **Actual Result:**
 - Compare the actual outcome with the expected result.
 - Document any differences or failures.
- **Test Execution Example:**
 - If user enters correct credentials, but no redirect occurs → Log as an incident.



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Order Pizza Text Box

- Let's consider the behavior of an Order Pizza Text Box
 - Pizza values 1 to 10 are considered valid. A success message is shown
 - While value 11 to 99 are considered invalid for order and an error message will appear, "Only 10 Pizza can be ordered"



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Due to time and budget considerations, it is **not** possible to perform exhausting testing for each set of test data, especially when there is a large pool of input combinations.

We need an easy way or techniques that can **select** test cases **intelligently** from the pool of test-case

Equivalence Class Partitioning
Boundary Value Analysis

Equivalence Class Partitioning

- In this technique, input data units are **divided** into **equivalent partitions** that can be used to derive test cases which reduces time required for testing because of **small number of test cases**
 - It divides the input data of software into different equivalence data classes
 - You can apply this technique where there is a range in the input field



← Equivalent classes



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Boundary Value Analysis

- It's widely recognized that the **input values at the extreme ends of the input domain cause more errors in the system**
- Boundary Value Analysis technique is used to identify **errors at boundaries rather than finding those that exist in the center** of the input domain

Boundary Value Analysis is the next part of **Equivalence Partitioning** for designing test cases where **test cases are selected at the edges of the equivalence classes**.



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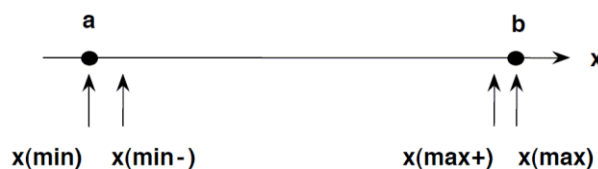
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Boundary Value Analysis

- Boundary testing is the process of testing between **extreme ends** or **boundaries between partitions** of the input values
- The basic is to select input variable values at their:
 - Minimum
 - Just above the minimum
 - Just below the maximum
 - Maximum



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Example: Equivalence and Boundary Value

- Let's consider the behavior of an Order Pizza Text Box
 - Pizza values 1 to 10 are considered valid. A success message is shown
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Example: Equivalence and Boundary Value

- Test condition
 - Any Number greater than 10 entered in the Order Pizza field (let say 11) is considered invalid
 - Any Number less than 1 that is 0 or below, then it is considered invalid
 - Numbers 1 to 10 are considered valid
 - Any 3 Digit Number say -100 is invalid

We cannot test all the possible values because if done, the number of test cases will be more than 100.



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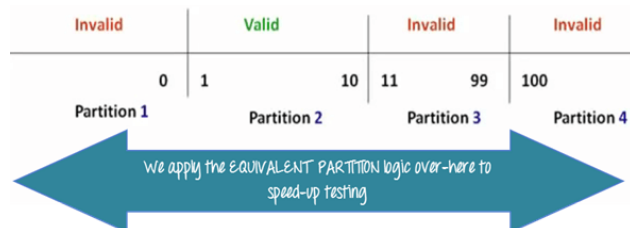
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Example: Equivalence and Boundary Value

- Test condition
 - Any Number greater than 10 entered in the Order Pizza field (let say 11) is considered invalid
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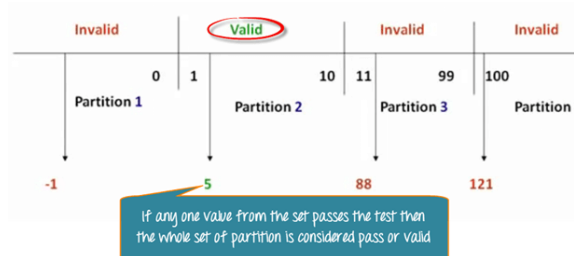
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Example: Equivalence and Boundary Value

- Then we pick only one value from each partition for testing
- The hypothesis behind this technique is that **if one condition/value in a partition passes all others will also pass**
- Likewise, **if one condition in a partition fails, all other conditions in that partition will fail**



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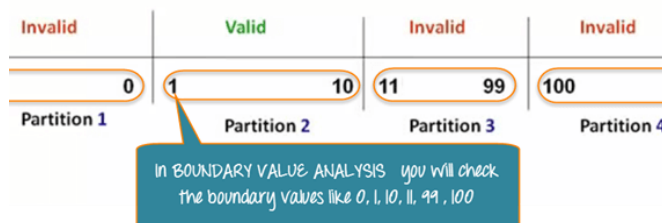
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Example: Equivalence and Boundary Value

- In Boundary Value Analysis, you test boundaries between equivalence partitions...



Instead of checking one value for each partition, you will check the values at the partitions like 0, 1, 10, 11 and so on. You test values at both **valid** and **invalid boundaries**.



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Another Example

- An application allow the user to enter the password of length 8-12 characters (minimum 8 and maximum 12 characters).

	Invalid Equivalence Class	Valid Equivalence Class	Invalid Equivalence Class
Equivalence Class Partitioning	<8	8-12	>12
Boundary Value Analysis	any text with 7 characters	any text with 8 characters any text with 12 characters	any text with 13 characters



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Benefits of Writing Test Cases

You'll find gaps in the design early

You'll find usability issues

New hires can pick up and test the application without much training

It builds empathy for the users of your product

It helps you and others learn the product



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Scenario Example: Online Banking – Transfer Funds

- **Scenario:**

- A user wants to transfer money between two accounts in an online banking system.
- **Objective:** Ensure that the fund transfer functionality works correctly for different input values.

- **Assumptions:**

- The user is logged in and has at least two active accounts.
- Both accounts have sufficient balance.



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Step 1: Identify Equivalence Classes (ECP)

- **Valid Input Equivalence Classes:**

- Transfer amount is within the allowed range (e.g., \$1 to \$10,000).
- Both source and destination accounts are active.

- **Invalid Input Equivalence Classes:**

- Transfer amount is below minimum (e.g., \$0 or negative).
- Transfer amount exceeds maximum allowed limit (e.g., \$10,000).
- Source or destination account is inactive.
- Source and destination accounts are the same.



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Step 2: Define Test Cases Using ECP

- **Test Case 1: Valid Transfer**

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$500 (within valid range).
- **Expected Result:**
 - Transfer is successful, and balance is updated in both accounts.

- **Test Case 2: Invalid Transfer (Amount Below Minimum)**

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$0 (below valid range).
- **Expected Result:**
 - System displays an error message: "Transfer amount must be greater than \$0."



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Step 3: Apply Boundary Value Analysis (BVA)

- **Valid Input Boundaries:**

- Minimum transfer amount: \$1
- Maximum transfer amount: \$10,000

- **Invalid Input Boundaries:**

- Below minimum: \$0
- Above maximum: \$10,001.



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Step 4: Define Test Cases Using BVA

• Test Case 3: Transfer at Minimum Boundary

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$1 (minimum valid amount).
- **Expected Result:**
 - Transfer is successful.

• Test Case 4: Transfer at Maximum Boundary

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$10,000 (maximum valid amount).
- **Expected Result:**
 - Transfer is successful



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Step 5: Define Negative Test Cases Using BVA

• Test Case 5: Transfer Below Minimum Boundary

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$0 (below minimum valid amount).
- **Expected Result:**
 - System displays an error message: "Invalid transfer amount."

• Test Case 6: Transfer Above Maximum Boundary

- **Input values:**
 - Source and destination accounts are active.
 - Transfer amount is \$10,001 (above maximum valid amount).
- **Expected Result:**
 - System displays an error message: "Transfer amount exceeds the maximum allowed limit."



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Complete Test Case Matrix for Transfer Funds Scenario

Test Case ID	Test Scenario	Input	Expected Result
TC_001	Valid transfer	\$500	Successful transfer
TC_002	Invalid transfer – amount below minimum	\$0	Error: "Transfer amount must be greater than \$0"
TC_003	Transfer at minimum boundary	\$1	Successful transfer
TC_004	Transfer at maximum boundary	\$10,000	Successful transfer
TC_005	Invalid transfer – amount below minimum boundary	\$0	Error: "Invalid transfer amount"
TC_006	Invalid transfer – amount above maximum boundary	\$10,001	Error: "Transfer amount exceeds the maximum allowed limit"



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Summary

- **Equivalence Class Partitioning (ECP)**
 - Groups test cases based on similar input values, reducing redundant testing.
- **Boundary Value Analysis (BVA)**
 - Ensures that edge cases at the boundaries of input ranges are tested, often where bugs occur.
- **Application**
 - Both techniques streamline test planning and improve the likelihood of uncovering errors.



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Class is
over,
questions?

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