# **Case Study 1: Testing a Loan Management System (LMS)**

## Background:

A private bank has developed a **Loan Management System (LMS)** to streamline its loan processing operations.  
The LMS allows customers to:

* Apply for various types of loans (personal, housing, vehicle loans).
* Automatically calculate **EMI** (Equated Monthly Installment) based on inputs.
* Receive **loan approval or rejection** based on eligibility criteria.

## Key Features of LMS:

* **Data Processing Module**: Collects and processes customer details like income, liabilities, and credit scores.
* **Calculation Module**: Computes EMI, interest rates, and penalties based on loan terms.
* **Decision-Making Module**: Approves or rejects loans using business rules and customer eligibility.
* **User Roles**:
  + Customer
  + Bank Manager
  + Auditor

## Problem Statement:

Before launching the LMS, the bank must ensure **high reliability and accuracy** through **rigorous software testing**.  
You have been appointed as the **Software Testing Lead** and are responsible for designing an effective **White Box Testing** strategy.

## Scope of White Box Testing:

* **Data Processing Tests**:
  + Validate that all customer inputs (income, liabilities, etc.) are correctly captured and processed.
* **Calculation Correctness Tests**:
  + Verify the accuracy of EMI and interest computations.
* **Control Flow Graph (CFG) and Cyclomatic Complexity Analysis**:
  + Analyze the complexity of the loanApprovalDecision() method to ensure that all logical paths are tested and manageable.

## Testing Objectives:

* Ensure correct and secure processing of loan applications.
* Validate all financial calculations (EMI, penalties, interest).
* Measure the decision logic's complexity and optimize code structure.
* Verify that components like the EMI calculator are **reusable** across other banking applications.

## Challenges in Testing:

* **High Decision Complexity**:
  + Multiple conditional paths based on varying eligibility criteria (income brackets, credit scores, existing loans, etc.).
* **Need for Reusability**:
  + Ensure that modules (like EMI Calculator) are modular, easy to maintain, and can be reused in future banking products.

# As the Testing Lead:

You must plan white box testing activities such as:

* Preparing test cases for data processing and calculation correctness.
* Drawing Control Flow Graphs (CFG) for critical modules.
* Computing Cyclomatic Complexity.
* Suggesting design improvements if complexity is too high.

# Deliverables:

* White Box Testing Plan
* CFG Diagrams and Complexity Metrics
* Test Results and Recommendations

# Purpose of this Case Study:

Understand how to **apply White Box Testing concepts** like:

* Control flow analysis
* Complexity measurement
* Data validation
* Module reusability in a **real-world software project**.