SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
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Department of Artificial Intelligence and Data Science

23ITT203 Object Oriented Software Engineering

Unit Testing

Introduction to Unit Testing

Definition:

- Unit Testing is a type of software testing where individual units or components of a software are tested independently to ensure that each unit is working correctly.
- Unit Testing is the first level of testing in SDLC.
- It ensures that every small part of the software performs as expected.
- Proper unit testing saves time, effort, and money in later stages of development.

What is a Unit?

A unit means the smallest testable part of a software like:

- Function
- Method
- Procedure
- Class
- Module

Purpose of Unit Testing

- To test each part of the software individually.
- To detect errors at the earliest stage of development.
- To verify the correctness of the smallest part of the program.

Characteristics of Unit Testing

- Done by Developers
- White Box Testing technique is used
- Automated testing tools are commonly used
- Fast and cost-effective testing
- Helps in reducing overall debugging time

Process of Unit Testing

- Step 1: Understand the functionality of the unit
- Step 2: Write test cases for the unit
- Step 3: Execute the test cases
- Step 4: Compare actual output with expected output
- Step 5: Fix defects if any
- Step 6: Retest the unit

Process of Unit Testing

Example: Function to add two numbers

python

```
def add(a, b): return a + b
```

Test Cases for add() function:

Test Case ID	Input	Expected Output	Actual Output	Result
TC1	2, 3	5	5	Pass
TC2	-2, -3	-5	-5	Pass
TC3	0, 5	5	5	Pass
TC4	'a', 2	Error	Error	Pass

Tools Used for Unit Testing

Tool Name	Language Support
JUnit	Java
NUnit	.NET
PyTest	Python
TestNG	Java
xUnit	C#

Advantages of Unit Testing

- Bugs are detected early
- Helps in code reusability
- Simplifies integration
- Provides better documentation of code
- Saves time and cost during later stages

Disadvantages of Unit Testing

- Cannot detect integration errors
- Writing test cases takes extra time
- Maintenance of test cases is required
- Complex for large projects

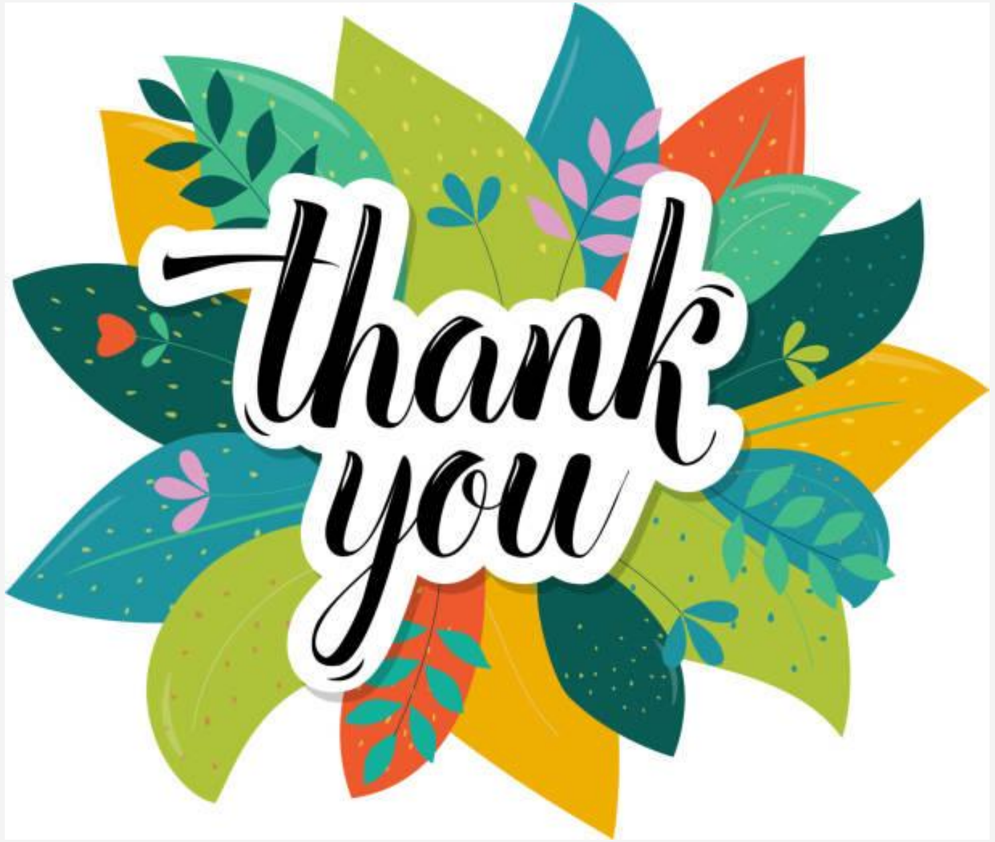
Difference Between Unit Testing & Integration Testing

Unit Testing	Integration Testing
Testing individual units	Testing combined units/modules
Done by Developer	Done by Testers
White Box Testing	Black Box/White Box Testing
Easy to detect bugs	Complex to detect bugs

Real-life Example for Easy Understanding

Example: WhatsApp App

Unit	Functionality	Unit Testing Activity
Login Module	Enter Mobile Number & OTP	Test Login Function
Message Module	Send & Receive Message	Test Send/Receive Functions
Profile Module	Update Profile Picture	Test Profile Update Function


thank
you