SNS COLLEGE OF TECHNOLOGY

Kurumbapalayam (Po), Coimbatore – 641 035

An Autonomous Institution

Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

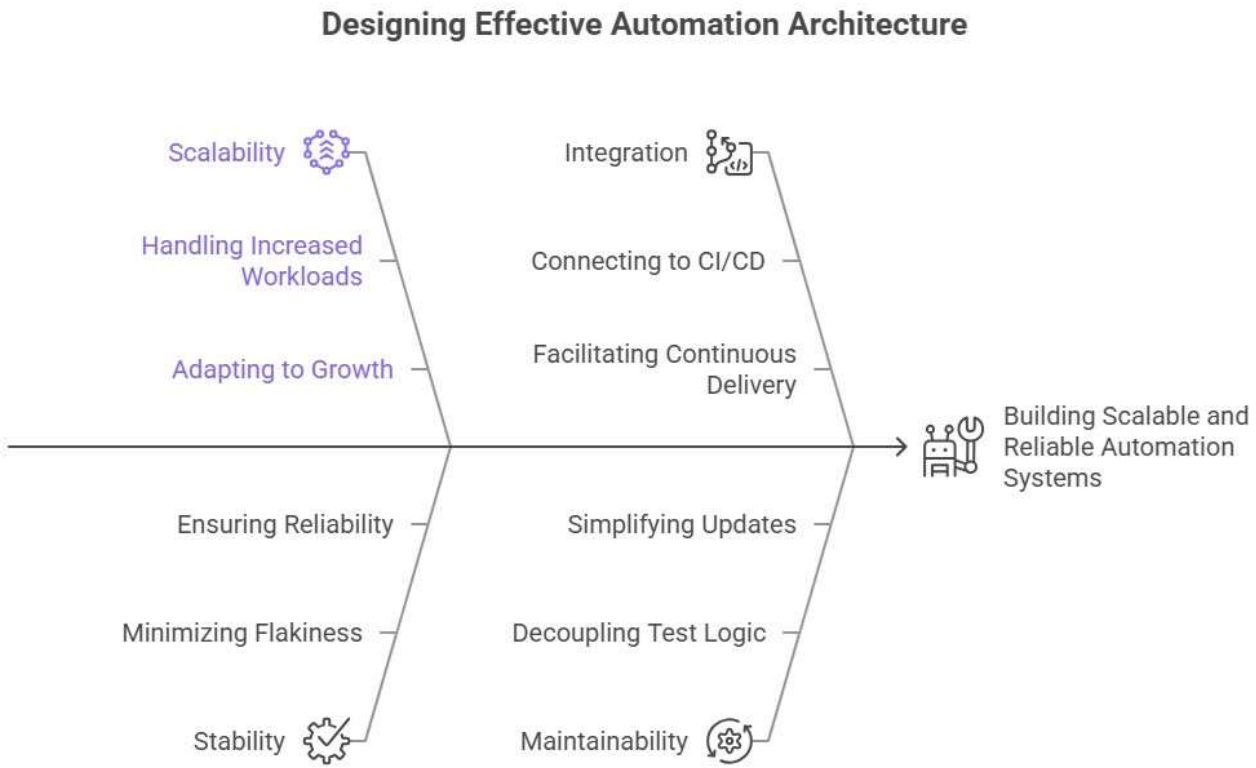
COURSE NAME: 23ITO201- Software Testing (OPEN ELECTIVE)

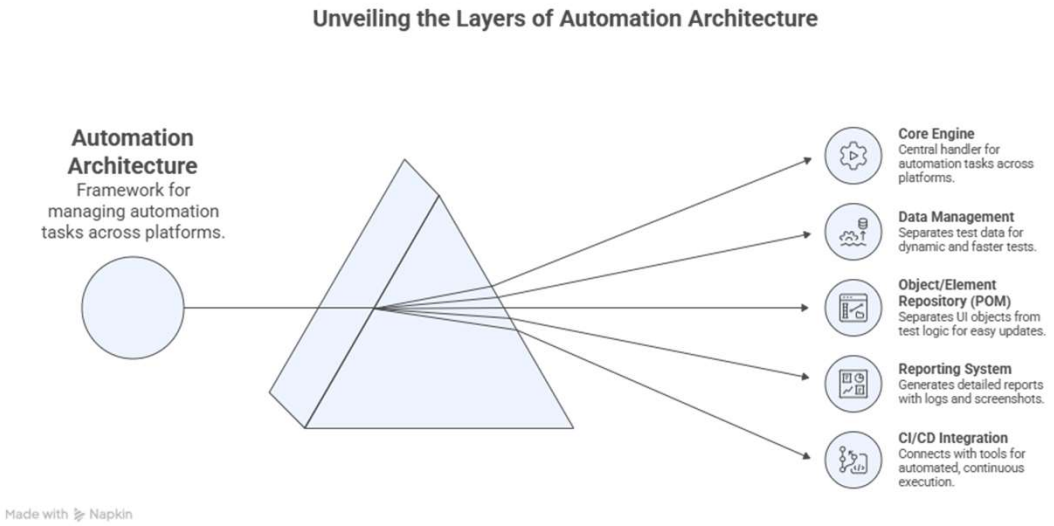
III YEAR / VI SEMESTER

Unit 5 - TEST AUTOMATION

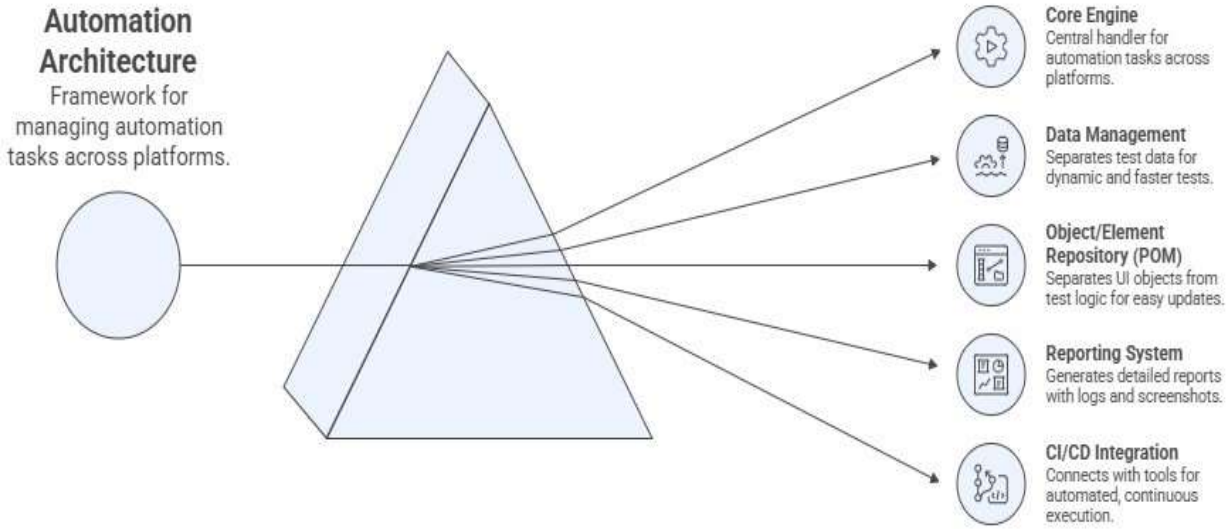
Topic : Design and Architecture for Automation

Empathy


Designing Effective Automation Architecture
Scalability
Handling Increased Workloads
Adapting to Growth
Integration
Connecting to CI/CD
Facilitating Continuous Delivery
Building Scalable and Reliable Automation Systems
Ensuring Reliability
Minimizing Flakiness
Stability
Simplifying Updates
Decoupling Test Logic
Maintainability


Unveiling the Layers of Automation Architecture
Automation Architecture
Framework for managing automation tasks across platforms.
Core Engine
Central handler for automation tasks across platforms.
Data Management
Separates test data for dynamic and faster tests.
Object/Element Repository (POM)
Separates UI objects from test logic for easy updates.
Reporting System
Generates detailed reports with logs and screenshots.
CI/CD Integration
Connects with tools for automated, continuous execution.
Made with Napkin

Unveiling the Layers of Automation Architecture




Parallelism & Sharding
Accelerates testing through distributed execution
API/Service Level Prioritization
Focuses on faster, stable checks
Modular Design
Promotes reusability and maintenance
Standardization & Security
Ensures consistency and risk reduction
Enhancing Architectural Efficiency

Automation System Layering Challenges

UI/Device Handler

Platform interactions are specific

Component Layer

Reusable functions are diverse

Task Layer

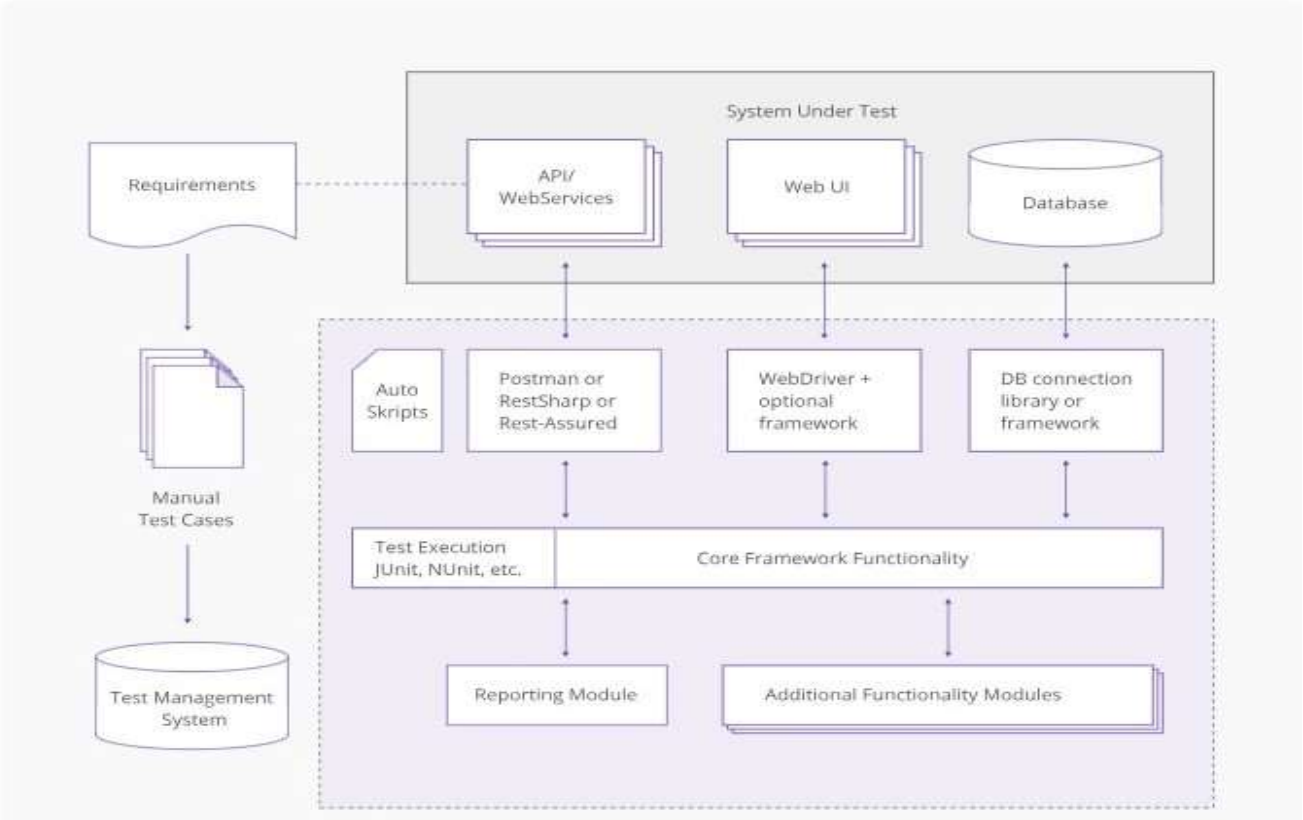
Application functions are granular

Business Layer

High-level logic is complex

Popular Tools & Implementation

Characteristic	Description	Examples	AI/Modern Trends	Orchestration
Frameworks	Web UI/API testing	Selenium WebDriver, Playwright	N/A	N/A
AI/Modern Trends	Automating test creation	2025/2026 trends	Using AI for automation	N/A
Orchestration	CI/CD tools	Jenkins, GitHub Actions	AI-enabled orchestrators	Zapier for business workflows


System Under Test
Requirements
API/
WebServices
Web UI
Database
Auto
Skripts
Postman or
RestSharp or
Rest-Assured
WebDriver +
optional
framework
DB connection
library or
framework
Manual
Test Cases
Test Execution
JUnit, NUnit, etc.
Core Framework Functionality
Test Management
System
Reporting Module
Additional Functionality Modules

Activity

1. What Automation Architecture Means

It's the **structured design of systems** that perform tasks automatically with minimal human effort. Good architecture ensures the system is:

•Scalable (can grow)

•Reliable (works consistently)

•Efficient (saves time and cost)

2. Core Components of Automation Architecture

1. Input Layer (Data Collection)

•Sensors, user inputs, forms, APIs

•Example: Attendance system → biometric scanner / mobile app

MCQs on Automation Design & Architecture

1. What is the main goal of automation architecture?

A) Increase manual work

B) Reduce efficiency

C) Perform tasks with minimal human intervention

D) Eliminate data

✅ **Answer:** C

2. Which layer is responsible for collecting data?

A) Output Layer

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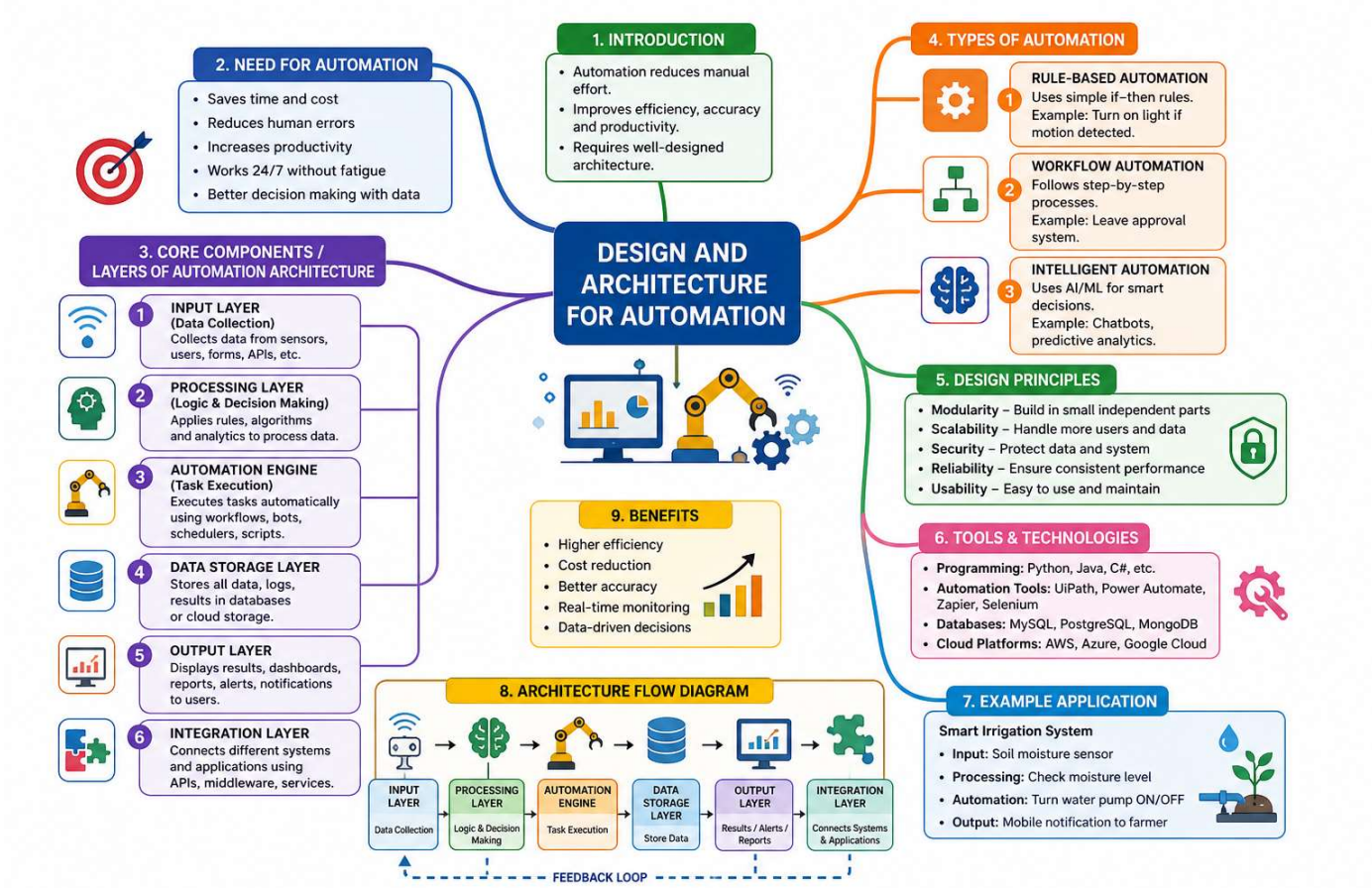
B) Input Layer

C) Processing Layer

D) Storage Layer

✅ **Answer:** B

MINDMAP


DESIGN AND ARCHITECTURE FOR AUTOMATION
1. INTRODUCTION
Automation reduces manual effort.
Improves efficiency, accuracy and productivity.
Requires well-designed architecture.
2. NEED FOR AUTOMATION
Saves time and cost
Reduces human errors
Increases productivity
Works 24/7 without fatigue
Better decision making with data
3. CORE COMPONENTS / LAYERS OF AUTOMATION ARCHITECTURE
1 INPUT LAYER (Data Collection) Collects data from sensors, users, forms, APIs, etc.
2 PROCESSING LAYER (Logic & Decision Making) Applies rules, algorithms and analytics to process data.
3 AUTOMATION ENGINE (Task Execution) Executes tasks automatically using workflows, bots, schedulers, scripts.
4 DATA STORAGE LAYER Stores all data, logs, results in databases or cloud storage.
5 OUTPUT LAYER Displays results, dashboards, reports, alerts, notifications to users.
6 INTEGRATION LAYER Connects different systems and applications using APIs, middleware, services.
4. TYPES OF AUTOMATION
1 RULE-BASED AUTOMATION Uses simple if–then rules. Example: Turn on light if motion detected.
2 WORKFLOW AUTOMATION Follows step-by-step processes. Example: Leave approval system.
3 INTELLIGENT AUTOMATION Uses AI/ML for smart decisions. Example: Chatbots, predictive analytics.
5. DESIGN PRINCIPLES
Modularity – Build in small independent parts
Scalability – Handle more users and data
Security – Protect data and system
Reliability – Ensure consistent performance
Usability – Easy to use and maintain
6. TOOLS & TECHNOLOGIES
Programming: Python, Java, C#, etc.
Automation Tools: UiPath, Power Automate, Zapier, Selenium
Databases: MySQL, PostgreSQL, MongoDB
Cloud Platforms: AWS, Azure, Google Cloud
7. EXAMPLE APPLICATION
Smart Irrigation System
Input: Soil moisture sensor
Processing: Check moisture level
Automation: Turn water pump ON/OFF
Output: Mobile notification to farmer
8. ARCHITECTURE FLOW DIAGRAM
INPUT LAYER Data Collection
PROCESSING LAYER Logic & Decision Making
AUTOMATION ENGINE Task Execution
DATA STORAGE LAYER Store Data
OUTPUT LAYER Results / Alerts / Reports
INTEGRATION LAYER Connects Systems & Applications
FEEDBACK LOOP
9. BENEFITS
Higher efficiency
Cost reduction
Better accuracy
Real-time monitoring
Data-driven decisions

TEXT BOOKS	
1.	Srinivasan Desikan and Gopalaswamy Ramesh, ―Software Testing – Principles and Practices, Pearson Education, 2006.
REFERENCES	
1.	Ilene Burnstein, ―Practical Software Testing, Springer International Edition, 2003
2.	Edward Kit, Software Testing in the Real World – Improving the Process‖, Pearson Education, 1995
3.	Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4.	Aditya P. Mathur, ―Foundations of Software Testing _ Fundamental Algorithms and Techniques, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.
5.	https://www.geeksforgeeks.org/software-testing/automation-testing-software-testing/

THANK YOU!

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