01 – JMeter Basics

🎯Objective

Understand **what Apache JMeter is**, **why it is used**, and **where it fits** in real-world architectures like your organization's API ecosystem.

What is Apache JMeter?

Apache JMeter is an **open-source performance testing tool** used to:

- Test **REST APIs**, **Web Applications**, **Databases**, **Messaging systems**
- Simulate **multiple users** accessing a system at the same time
- Measure **performance, scalability, and stability**

Originally built for web testing, JMeter is now **API-first**.

Why Performance Testing Matters

Functional testing answers:

> ❓ Does the API work?

Performance testing answers:

> ❓ Will it still work when **5,000 users** hit it together?
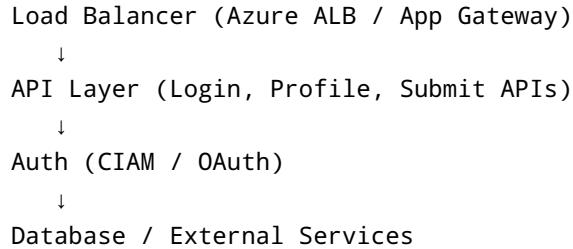
Real-world failures without performance testing

- Login API works for 1 user, fails at 500 users
- Database connection pool exhaustion
- Load balancer misconfiguration
- VM / Pod CPU saturation

Where JMeter Fits in Org Architecture

Typical enterprise flow:

```
Users / Apps
   ↓
```

```
Load Balancer (Azure ALB / App Gateway)
    ↓
API Layer (Login, Profile, Submit APIs)
    ↓
Auth (CIAM / OAuth)
    ↓
Database / External Services
```

JMeter replaces Users in this diagram.

What JMeter Actually Does

JMeter simulates **virtual users (threads)** that:

1. Send HTTP requests
2. Wait for responses
3. Measure response time
4. Validate correctness
5. Report results

Core JMeter Concepts (High-Level)

Concept	Meaning
Test Plan	Entire test definition
Thread Group	Users & load pattern
Sampler	Actual request (API call)
Listener	Result visualization
Config Element	Headers, variables

GUI vs Non-GUI Mode

GUI Mode

- Used for **learning & debugging**
- Easy to visualize requests
- ❌ Not suitable for heavy load

Non-GUI (CLI) Mode

- Used in **CI/CD & production testing**
- Faster, lighter, stable

```
jmeter -n -t test.jmx -l result.jtl
```

What JMeter Is NOT

❌A browser automation tool (not Selenium) ❌A functional testing replacement ❌A monitoring tool

It is a **load generator + measurement tool**.

Example: Simple Mental Model

```
1 Thread = 1 User
50 Threads = 50 Users
Each user hits the API independently
```

Key Takeaways

- JMeter simulates **load**, not UI behavior
- APIs are the **primary use case** today
- Understanding architecture is critical

Assignment (For Student)

1. Install JMeter 5.6+
2. Open GUI
3. Explore menu: Test Plan, Thread Group
4. Do NOT run any test yet

⏻Next file: **02_thread_group_basics.md**