⚙️ Performance Tuning & Optimization

**📄 Phase Description**

Work with **development** and **operations** teams to address identified performance issues:

* Optimize **code**, **database queries**, **configurations**, and **infrastructure**.
* Coordinate changes with dev and infra teams as needed.

**🎯 Key Objectives**

* 🔍 **Identify & resolve** performance bottlenecks.
* 💻 **Optimize** application code, database queries, and configurations.
* 📈 Ensure system meets performance requirements under **expected load**.

**🪜 Steps in Tuning & Optimization**

1️⃣ **🔍 Analyze Collected Data**

* Review performance results to detect slow response times, high CPU/memory usage, and other issues.
* Use monitoring tools to check **CPU**, **Memory**, **Disk I/O**, and **Network**.

2️⃣ **🛑 Identify Bottlenecks**

* Spot patterns such as slow functions, heavy queries, or resource limits.
* Common issues: inefficient code, slow DB queries, limited server resources, high network latency.

3️⃣ **💡 Optimize Code**

* Refactor inefficient sections to speed up execution.
* Example: Replace **nested loops** with better algorithms.

4️⃣ **🗄 Database Optimization**

* Tune SQL queries and add indexes to speed up operations.
* Example: Index frequently queried columns.

5️⃣ **⚙ Configuration Tuning**

* Adjust server/app settings for better performance.
* Example: Increase Java heap size to reduce garbage collection pauses.

6️⃣ **📦 Infrastructure Scaling**

* Scale **vertically** (more resources per server) or **horizontally** (more servers).
* Example: Add more load-balanced instances.