**Importance Q&A For Microservices and Spring boot and other technologies**

1. **What is meaning of static and dynamic code analysis**

* **Static Code Analysis**

Static code analysis is the process of examining source code **without executing it**. It focuses on identifying code quality issues, vulnerabilities, and adherence to coding standards at the development stage.

**Key Features:**

* **Early Detection**: Identifies issues before the code is run or tested.
* **Automation**: Often performed using tools (e.g., SonarQube, Check style, Find Bugs).
* **Types of Issues Found**:
  + Syntax errors
  + Code smells
  + Security vulnerabilities
  + Non-compliance with coding standards

**Benefits:**

* Reduces bugs and vulnerabilities early in development.
* Improves maintainability by enforcing best practices.
* Saves time by catching errors before runtime testing.
* **Dynamic Code Analysis**

Dynamic code analysis involves analysing the behaviour of the application **during execution**. It focuses on runtime errors, performance bottlenecks, and vulnerabilities that appear when the code interacts with the environment.

**Key Features:**

* **Execution Required**: The application must be compiled and run.
* **Runtime Insights**: Detects issues that static analysis cannot, such as memory leaks or concurrency problems.
* **Types of Issues Found**:
  + Runtime exceptions
  + Performance bottlenecks
  + Security vulnerabilities during execution

**Tools Used:**

* Profiling and debugging tools like **JProfiler**, **Dynatrace**, or **JaCoCo** for test coverage.

**Benefits:**

* Identifies issues that depend on specific runtime environments.
* Ensures the application behaves as expected under various conditions.

**Key Differences**

| **Feature** | **Static Code Analysis** | **Dynamic Code Analysis** |
| --- | --- | --- |
| **When performed** | Before execution | During execution |
| **Focus** | Code structure and syntax | Application behaviour at runtime |
| **Tools** | SonarQube, Check style, Find Bugs | JProfiler, Dynatrace, JaCoCo |
| **Issues Found** | Bugs, code smells, standards violations | Runtime exceptions, performance issues |
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