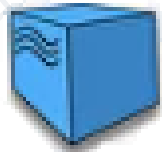


Test Automation Architecture

Selenium Grid, Selenoid and BrowserStack



Selenoid



Selenium Grid



BrowserStack



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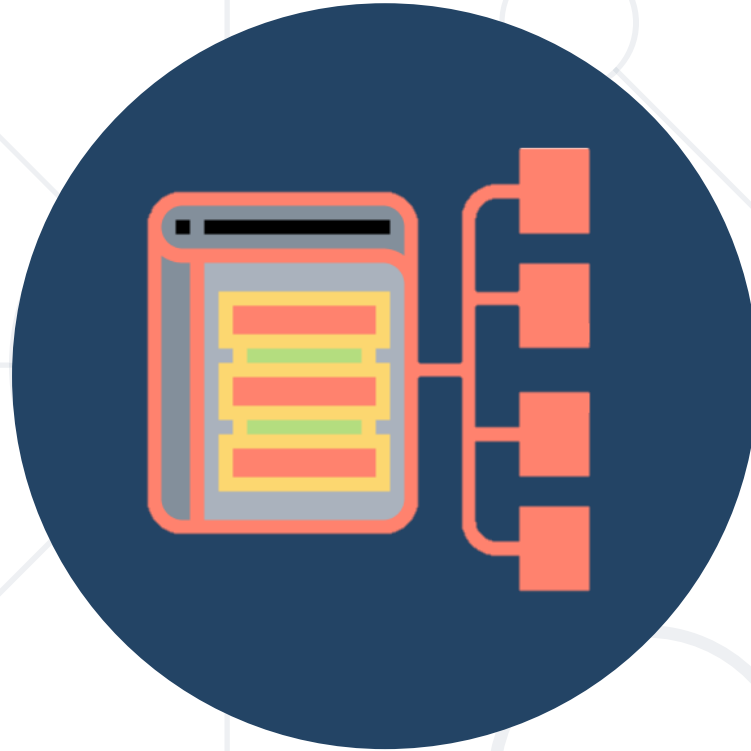
Have a Questions?

sli.do

#QA-FrontEnd

- 1. Test Automation Architectures**
- 2. Selenium Grid**
- 3. Selenoid**
- 4. BrowserStack**





Test Automation Architectures

The Foundation for Efficient Test Management

- **Structured framework** and **set of principles** that define how automated tests are designed, implemented, executed, and managed within a software development process
- It **encompasses the organization, technologies, tools,** and **methodologies** used to automate the testing of software applications



■ Test Scripts

- Automated scripts that perform the actual testing actions
- Written in programming languages or scripting languages
- Designed to mimic user interactions and verify application behavior

■ Test Runners

- Tools or frameworks that execute test scripts
- Manage the order and execution of tests
- Examples include QUnit, Nunit, Playwright and Selenium

- **Test Data Management**
 - Handling and organizing the data needed for tests
 - Ensuring that tests are repeatable and consistent
 - Includes test data creation, storage, and cleanup
- **Reporting Tools**
 - Tools that generate reports based on test results
 - Provide insights into test execution, success rates, and failures

- **Continuous Integration / Continuous Deployment (CI/CD) Integration**
 - Integrating automated tests with CI/CD pipelines
 - Ensuring that tests run automatically as part of the build and deployment process
 - Tools like Jenkins, Travis CI, and GitHub CI/CD facilitate this integration

- **Modularity**
 - Designing tests in small, reusable units
 - Enhances maintainability and scalability
- **Reusability**
 - Writing test scripts and components that can be reused across multiple tests
 - Reduces duplication and effort
- **Parallel Execution**
 - Running multiple tests simultaneously
 - Speeds up the testing process and improves efficiency

- **Scalability**

- Ensuring the architecture can handle an increasing number of tests and test environments
- Important for large and growing projects

- **Maintainability**

- Designing tests that are easy to update and maintain
- Ensures long-term viability of the test suite

- **Efficiency**
 - Speeds up test execution
 - Allows for more frequent testing cycles
- **Accuracy**
 - Reduces human error in repetitive testing tasks
 - Ensures consistent test results

- **Coverage**

- Enables comprehensive testing across different scenarios and environments
- Improves overall quality and reliability of the software

- **Resource Utilization**

- Optimizes the use of testing resources
- Allows for parallel execution and efficient management of test environments

- **Design principles** and **key components** can be done with your coding skills
- For efficiency, **use tools** to **run tests in parallel** and **across different environments**, e.g. operating systems (Windows, Linux, macOS) and browsers (Edge, Chrome, Opera)
- Such **tools** are:
 - **Selenium Grid**
 - **Selenoid**
 - **BrowserStack**





Selenium Grid

Purpose and Functionality

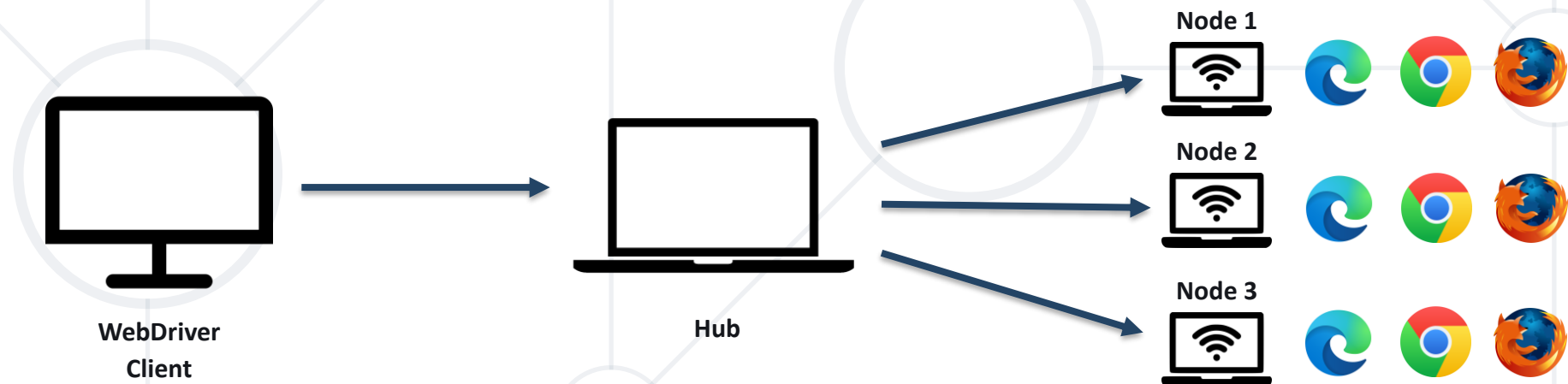
- Executes Selenium tests in parallel across multiple machines and browsers
- Distributes test execution across various environments to speed up the testing process
- Increases test suite efficiency by reducing overall testing time
- Documentation: [Grid | Selenium](#)



- **Parallel Test Execution** – multiple tests run simultaneously on different machines and browsers
- **Distributed Test Execution** – run on different machines, which can be configured with various operating systems and browser versions
- **Hub and Node Architecture**
 - **Hub**: The central point that receives all test requests. The Hub distributes the tests to different Nodes
 - **Node**: Machines that execute the tests. Each Node can be configured with different browsers and platforms

How Selenium Grid Works

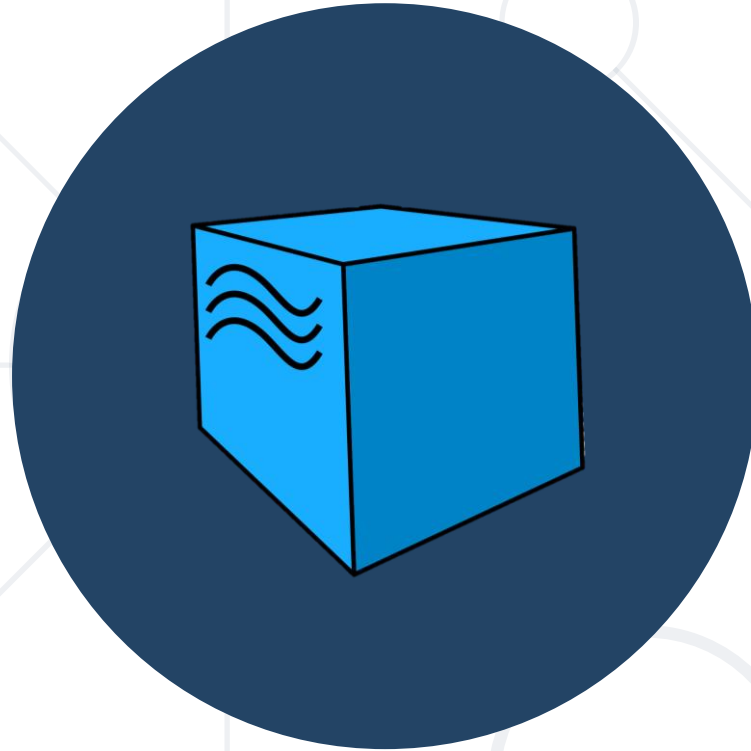
- The **Hub acts as the central server** that **manages test requests** and distributes them to appropriate Nodes
- **Nodes** are the **machines where the actual test execution happens**. They register with the Hub, indicating their capabilities (browsers, versions, platforms)





Live Demo

Selenium Grid (Lab)



Selenoid

Alternative to Selenium Grid

- Powerful, lightweight **alternative to Selenium Grid**
- Used to run **browser automation tests**
- **Supports a wide range of browsers**
- Scalable solution for **parallel test execution**
- Can handle **high loads with minimal resource consumption**
- **Documentation:**

[Selenium - A cross browser Selenium solution for Docker \(aerokube.com\)](https://aerokube.com)

- **Docker-Based**: Uses Docker containers to isolate browser instances, ensuring clean environments for each test
- **High Performance**: Capable of running hundreds of parallel browsers with low resource usage
- **Easy Configuration**: Configuration files (JSON format) are used to define browser versions and capabilities
- **Web UI**: Offers a web-based user interface to monitor and manage running browser sessions
- **Video Recording**: supports video recording of test sessions, which is useful for debugging and analysis



Live Demo

Selenium Grid (Lab)



BrowserStack

Cloud-based Testing Platform

- **Cloud-based testing platform**
- Supports **manual and automated testing across various environments**, e.g. browsers, OS, and mobile devices
- Provides **real-time access** to a wide range of **browsers, OS, and device combinations** without local infrastructure management

- **Cross-Browser Testing**

- Test on **various browsers and versions to ensure compatibility**
- Access to **real devices and browsers in the cloud**

- **Automated Testing**

- **Integrates with popular test automation frameworks like Selenium, Appium, and others**
- **Supports parallel test execution to speed up the testing process**

- **Live Testing**
 - Perform manual testing on real devices and browsers
 - Provides interactive debugging tools and developer tools
- **Continuous Integration**
 - Integrates with CI/CD tools like Jenkins, Travis CI, CircleCI, and others
 - Seamlessly integrates into the development workflow
- **Screenshots and Video Recording**
 - Capture screenshots and video recordings of test sessions for debugging and analysis



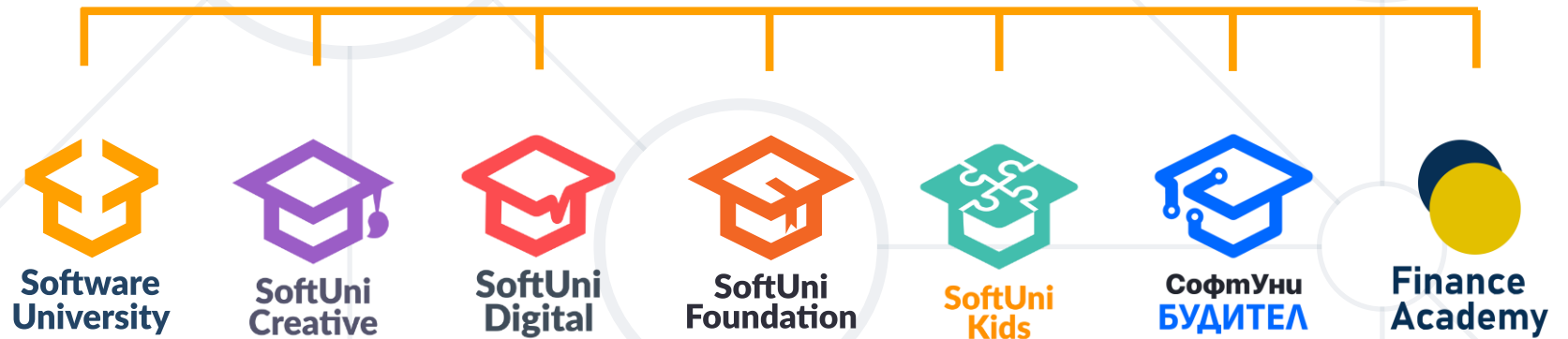
Live Demo

Selenium Grid (Lab)

- **Test Automation Architectures** – Key Components and Design Principles
- **Selenium Grid**
 - Hub
 - Nodes
- **Selenoid** – Alternative of Selenium Grid
- **BrowserStack** – Cloud-Based Testing Platform



Questions?



Diamond Partners



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