Test Automation

The Power of Test Automation

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Manual Testing

A Solid Starting Point

Manual Testing

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- **Critical step** in the software development life cycle
- Forms the **basis** of quality assurance
- Involves the process of manually executing test cases without the use of any automation tools
- Requires testers to go through the application, step by step, to identify defects and ensure the application meets the specified requirements

The Importance of Manual Testing

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- Manual testing is **essential** for ensuring the quality of user experiences
- It allows testers to validate application behavior from an end-user perspective
- Human **intuition and creativity** play a significant role in exploring edge cases and unexpected scenarios
- Particularly useful in the **early stages** of development when the application is constantly changing
- Suitable for **exploratory**, **usability**, and **ad-hoc** testing

Advantages and Limitations of Manual Testing

- **Advantages**:
  - **Flexibility** -Testers can adapt to changes quickly and design test cases based on real-time understanding
  - **User-Centric** - Manual testing focuses on user experience, identifying issues that automated tests might miss
- **Limitations**:
  - Time-Consuming - Executing extensive test cases manually can be time-consuming and resource-intensive
  - Human Error - Manual testing is susceptible to human errors, leading to inconsistencies and false negatives

Test Automation

What Lies Ahead

What Do We Automate?

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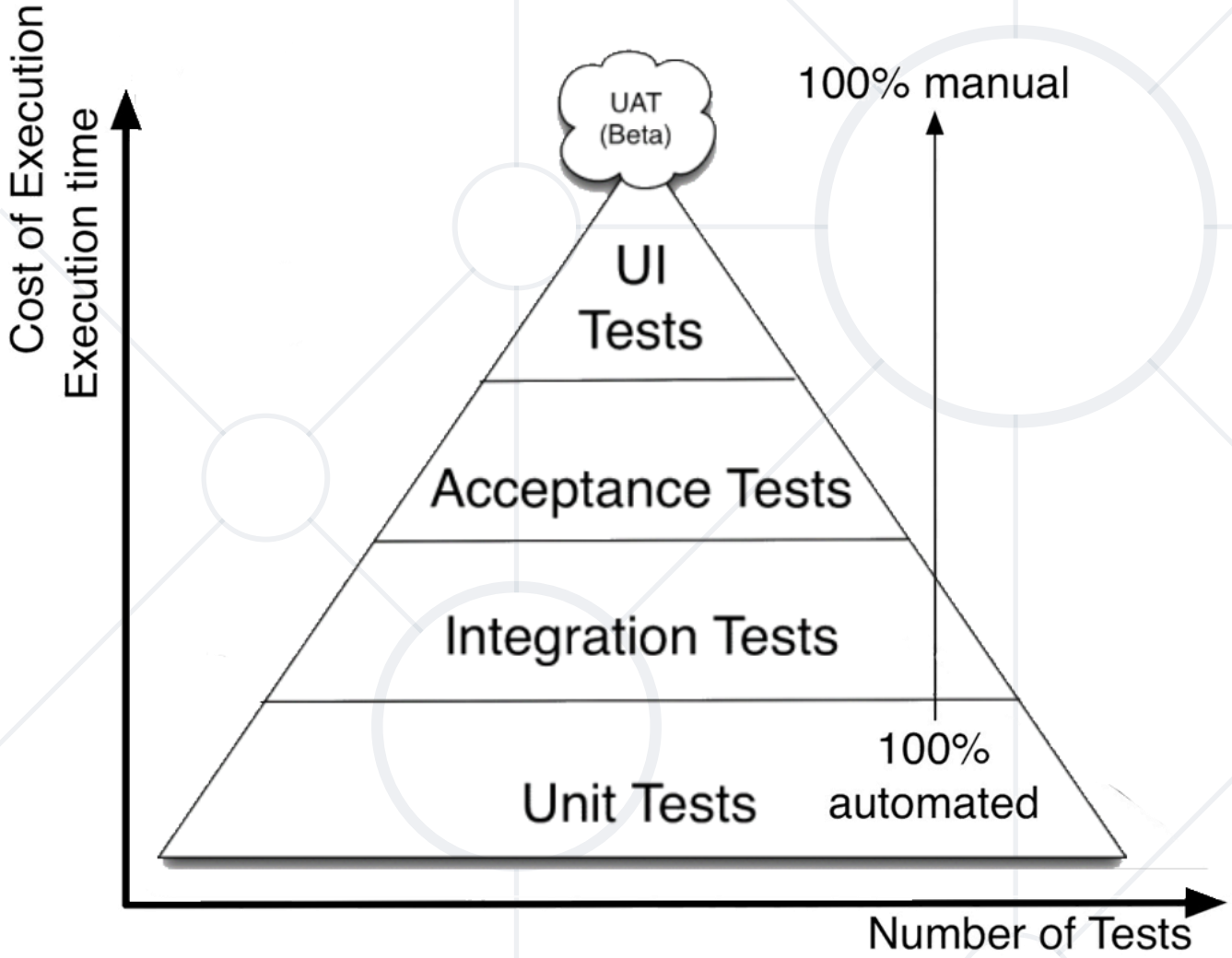
- Most of the test automation involves attempts to automate tasks that are:
  - Tedious
    - Such as **regression testing**
  - Difficult to do manually
    - Such as **performance testing**
- Test automation can also automate other parts of the test process

Test Automation Benefits

- Saving effort and time
- Consistency and repeatability
- Better coverage
- Objectiveness and test statistics
- Better predictability
- Customized defect reporting
- Unlimited iterations of test case execution
- Rapid feedback to developers

The Testing Pyramid



- **Unit tests**: fully automated
- **Integration tests**: fully automated
- **System tests** / **end-to-end** : automated (most of them)
- **Acceptance tests** / **UI tests**: partially automated

Myths About Automated Testing

- Automation can replace the human element
- Once automated, cost savings is a given
- Finds more bugs
- Every test case can be automated
- Testing can be fully automated
- One test tool is suitable for all tasks
- Automation is completely suitable for new functionality

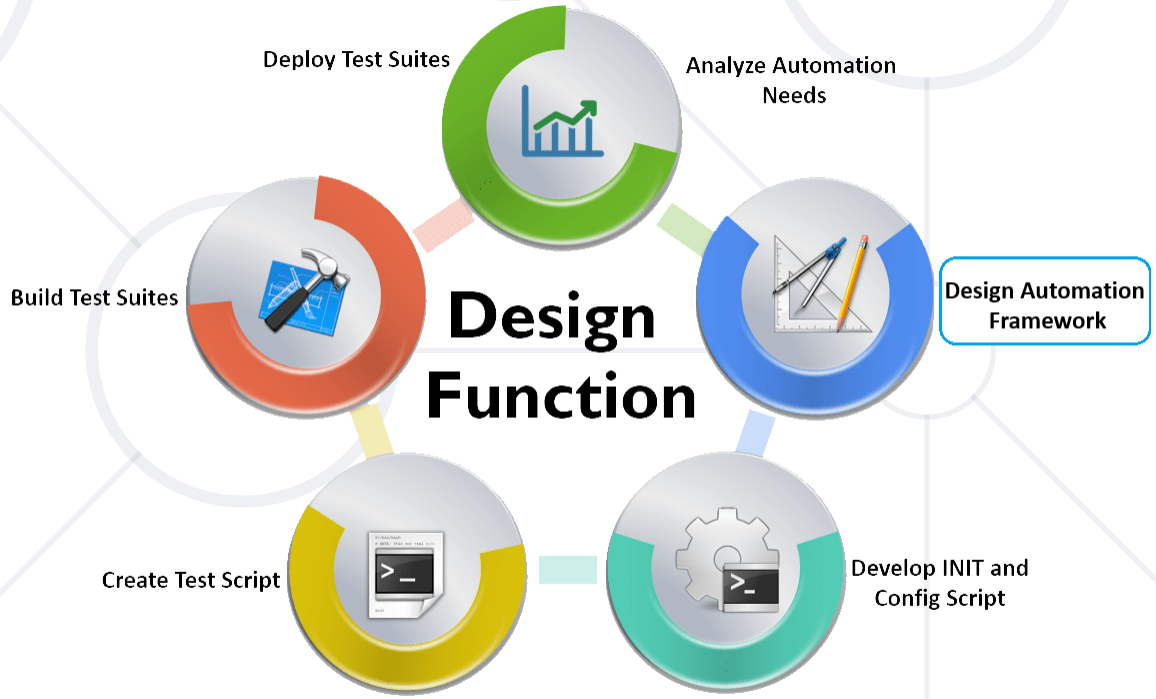
Manual Test Case => Automated Test

- The test case must be **repeatable**
- The expected results must be **consistent** and easily verified
- The test data for the manual test case must be **established**
- The **application** must be in a **stable state**
- The test case must **not** have a **dependency** on an external application that is not installed on the same test PC
- Test cases must be independent

Test Framework

What is Test Framework?

- Set of assumptions, concepts, and practices that provide a **working platform** or **support** for automated testing
- Properties of a testing framework:
  - It is **application independent**
  - It is easy to expand, maintain and sustain



Test Framework

- The Testing framework is responsible for:
  - **Defining the format** in which to express expectations
  - Creating a mechanism to interact with or control the **application under test**
  - **Executing** the tests
  - **Reporting** results

Unit Testing Framework

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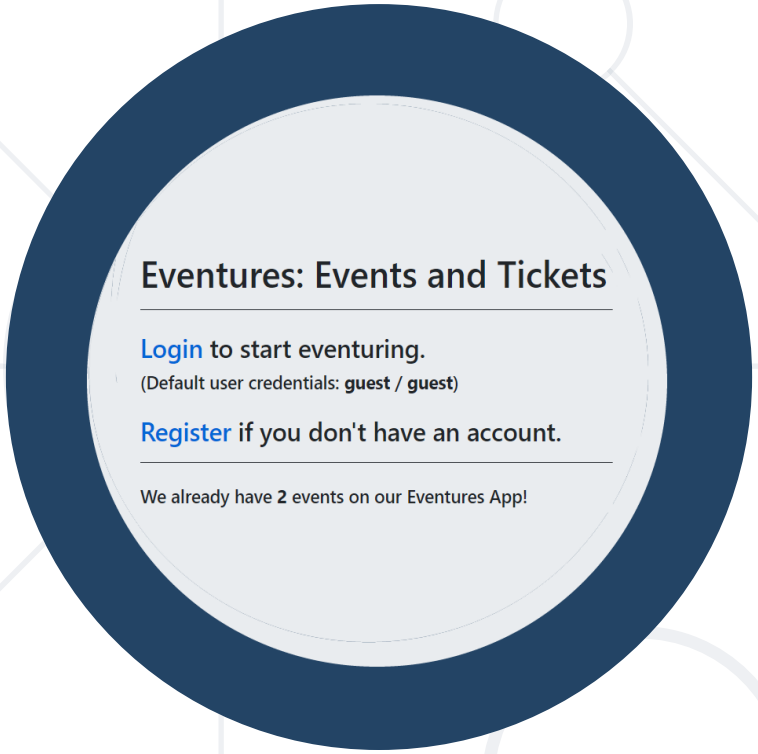
- **Specific category** that plays a pivotal role in software development
- Software tools to support **writing** and **running unit tests**
- Build tests and the **functionality to execute** the tests and **report** their **results**
- They can also be used as **development tools** on a part with **preprocessors** and **debuggers**
- Unit test frameworks can contribute to almost every stage of software development



Eventures Demo

https://github.com/QA-Automation-Testing-Demo/Eventures-3.0

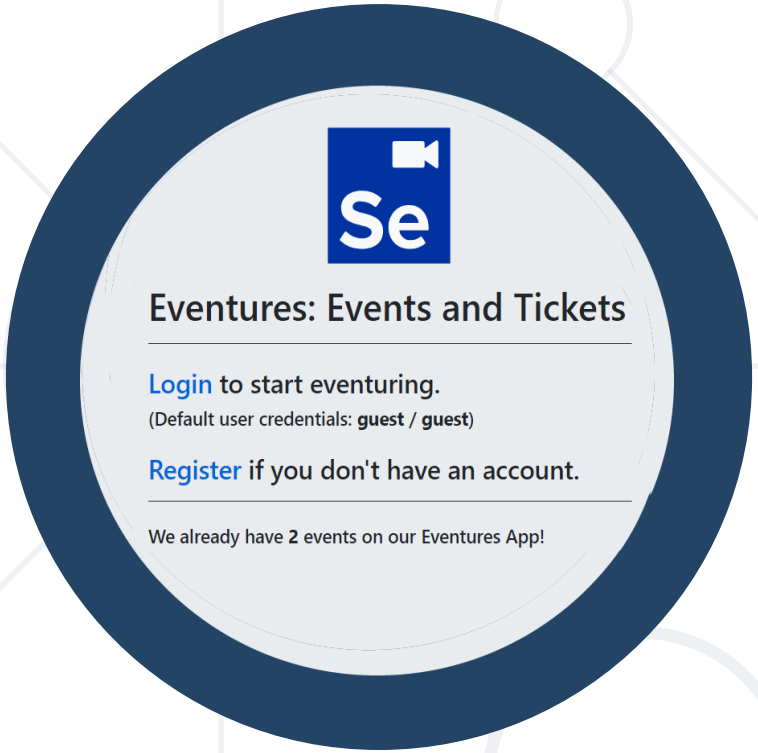
What is Selenium?

What is Selenium?

- A JavaScript based web testing tool
- Very popular open-source tool
- Supports testing web applications
  - On multiple browsers and operating systems
- Tests run directly in browser
- You can find the documentation here
  - https://www.selenium.dev

Selenium Tools

- Selenium is a collection of distinct software tools, each tailored to fulfill specific roles in the realm of test automation
- These tools collectively contribute to a comprehensive suite for efficient testing of web applications
  - **Selenium IDE**
  - **Selenium WebDriver**
  - **Selenium-Grid**



Selenium IDE

Record and Play Tests

Selenium IDE

- **Selenium IDE**, short for Integrated Development Environment
- User-friendly **browser extension**
- Simplifies the creation and execution of automated test scripts through a **record-and-playback** mechanism
- Suitable for those with **limited programming experience**
- Accessible **entry point** into test automation
- Limited scope

Test User Login

- **Test Case:** Test_User_Login
- **Description:** Verify that a registered user can log in to the Eventures web application
- **Steps:**
- Go to the "Login" page on the Eventures web application
- Fill in the login form with valid credentials (username and password)
- Click on the "Log in" button
- **Expected Results:** The user is successfully logged in, and a welcome message containing the username is displayed on the Home page

Record and Run User Login with Selenium IDE

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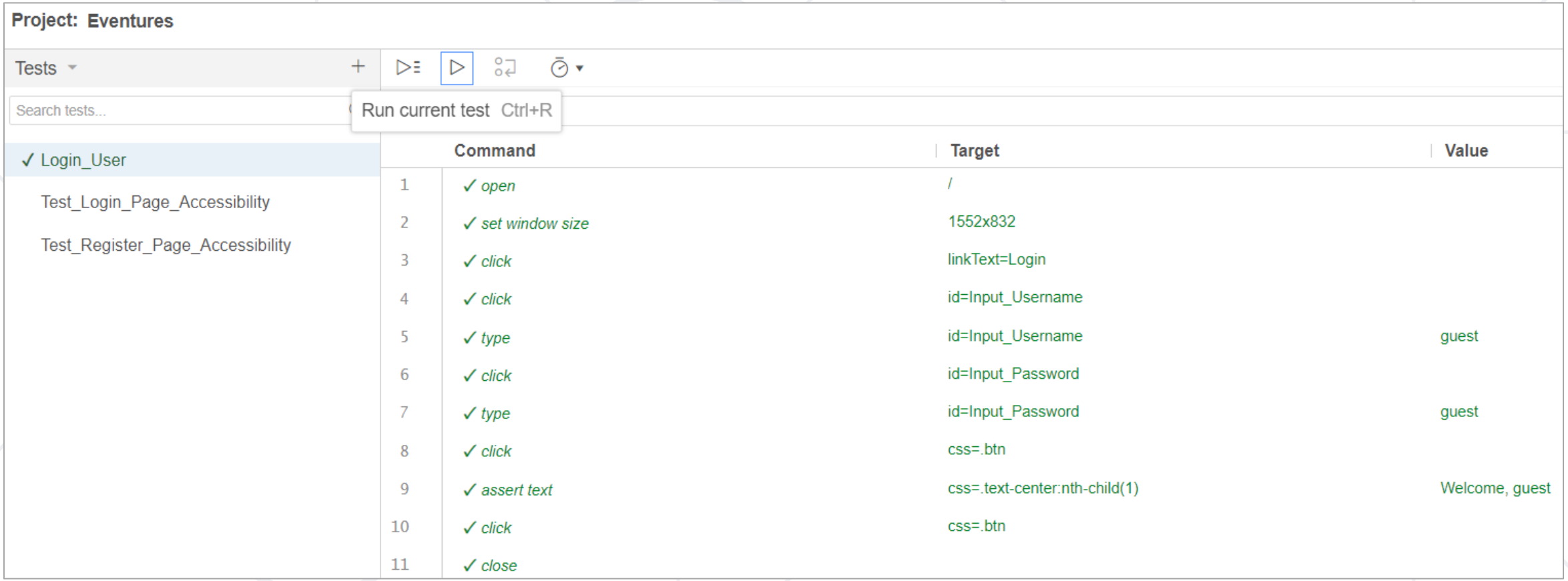

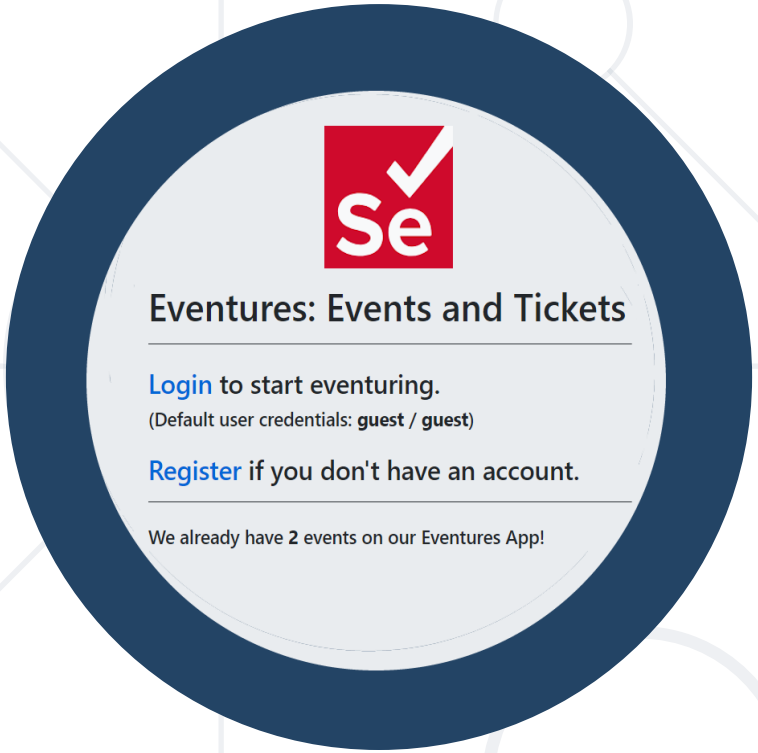

Selenium WebDriver

Programmatic approach

Selenium WebDriver

- Most **important component** of Selenium Suite
- Powerful and versatile framework for automating web browsers
- Programmatic control over web elements
- Precise test scenarios across different browsers
- Flexibility and support for multiple programming languages
- Seamlessly integrates into continuous integration and continuous delivery pipelines

Test User Login

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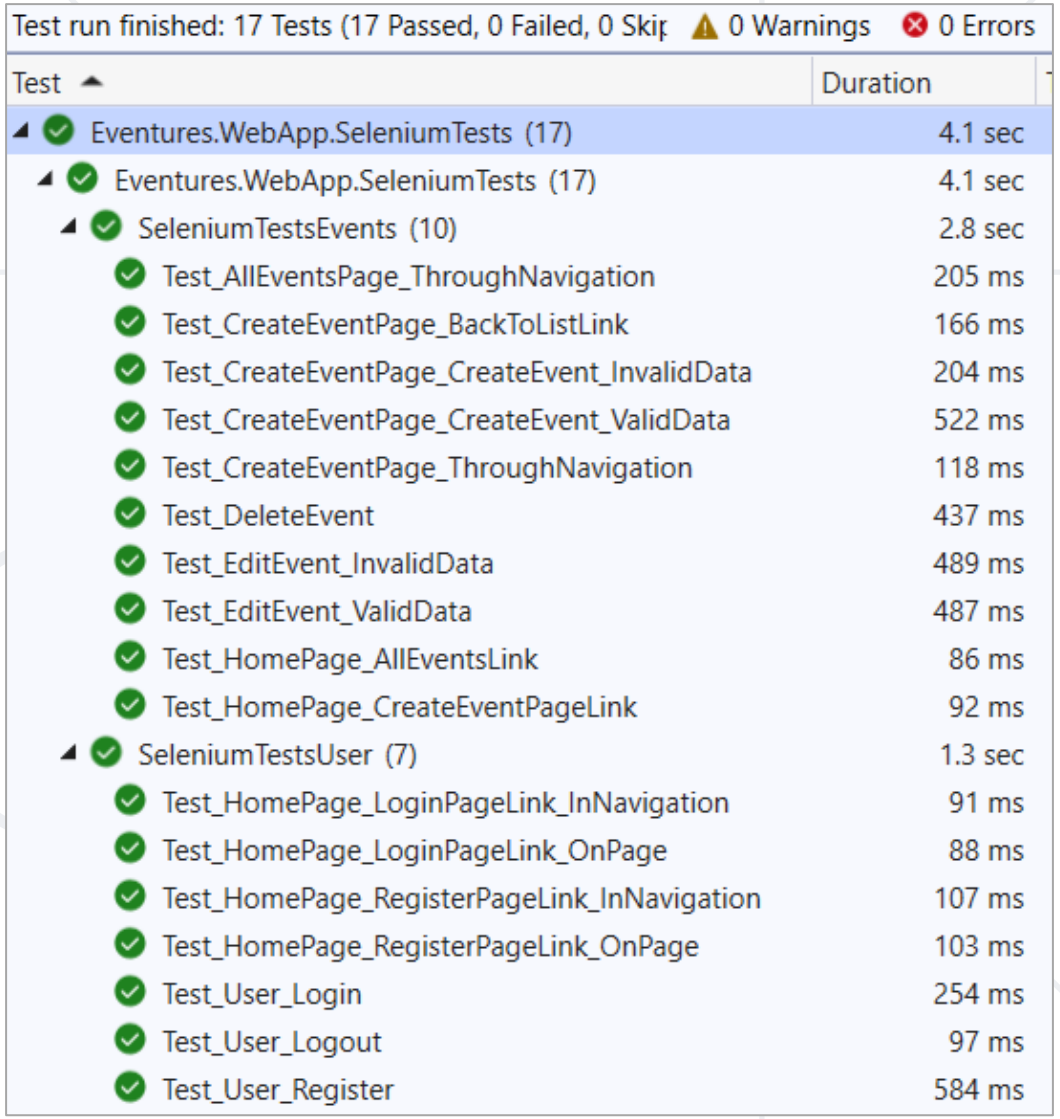
```
[Test, Order(2)]
0 references
public void Test_User_Login()
{
    // Arrange: go to the "Login" page
    driver.Navigate().GoToUrl(this.baseUrl + "/Identity/Account/Login");

    // Locate fields and fill them in with valid credentials
    driver.FindElement(By.Id("Input_Username")).SendKeys(username);
    driver.FindElement(By.Id("Input_Password")).SendKeys(password);

    // Act: locate and click on the "Login" button
    driver.FindElement(By
        .XPath("//button[@type='submit'][contains(.,'Log in')]"))
        .Click();

    // Assert user is redirected to the "Home" page and is logged in
    Assert.AreEqual(this.baseUrl + "/", driver.Url);
    Assert.That(driver.PageSource.Contains($"Welcome, {username}"));
}
```



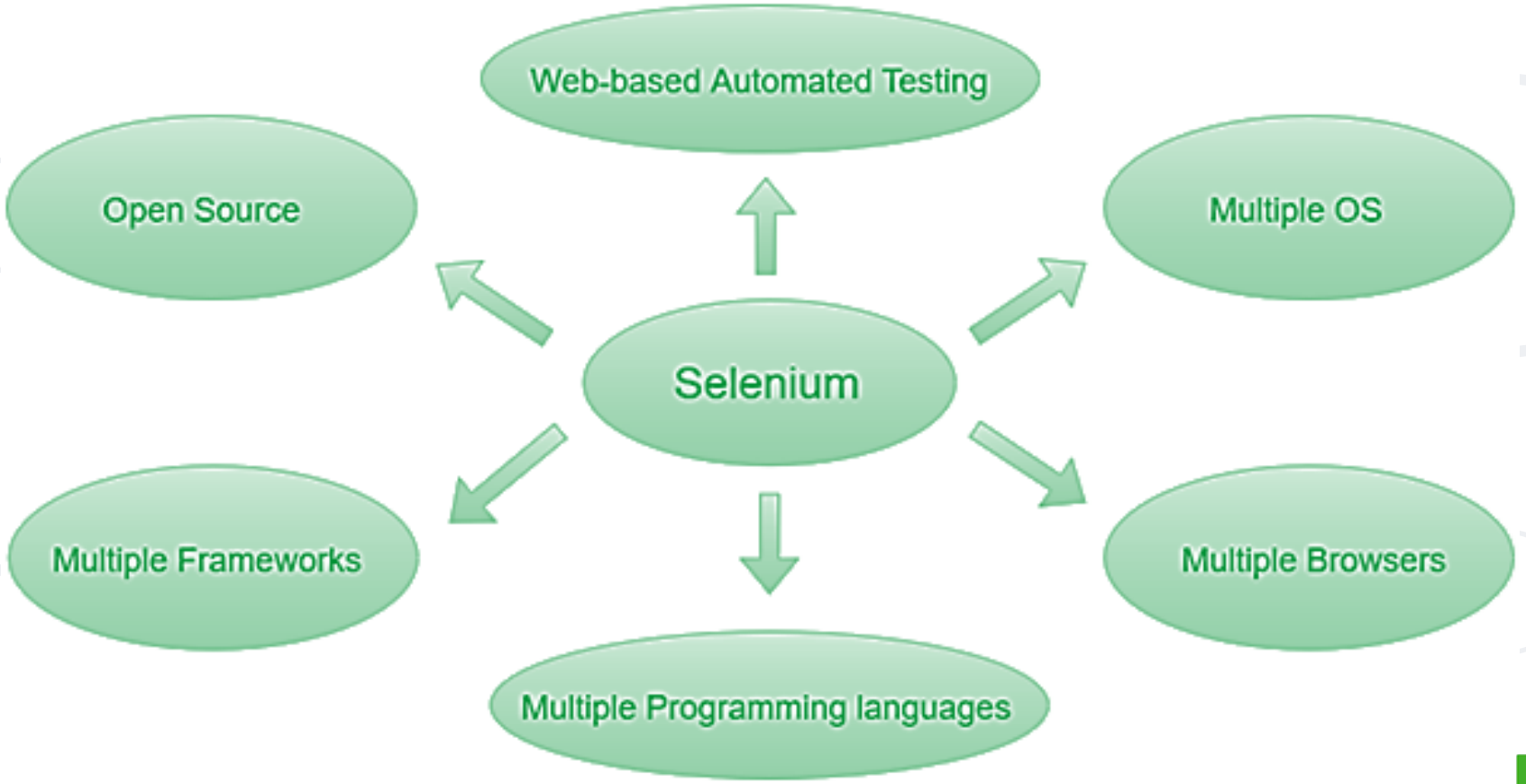
Selenium Grid

- Run tests on different machines against different browsers in parallel
  - Run tests **simultaneously** on different machines
- Follows the **Hub-Node Architecture** to achieve parallel execution of test scripts
  - The Hub is considered as master of the network and the other are the nodes

Selenium Stack

- Supports variety of platforms such as
  - Windows, Linux, Solaris and Macintosh
- Languages supported include
  - C#, Java, JavaScript, Perl, Python, Ruby, Kotlin
    - Most popular with Java and C#
- Browsers supported by Selenium include
  - Internet Explorer/Edge, Mozilla Firefox, Google Chrome and Safari

All about Selenium



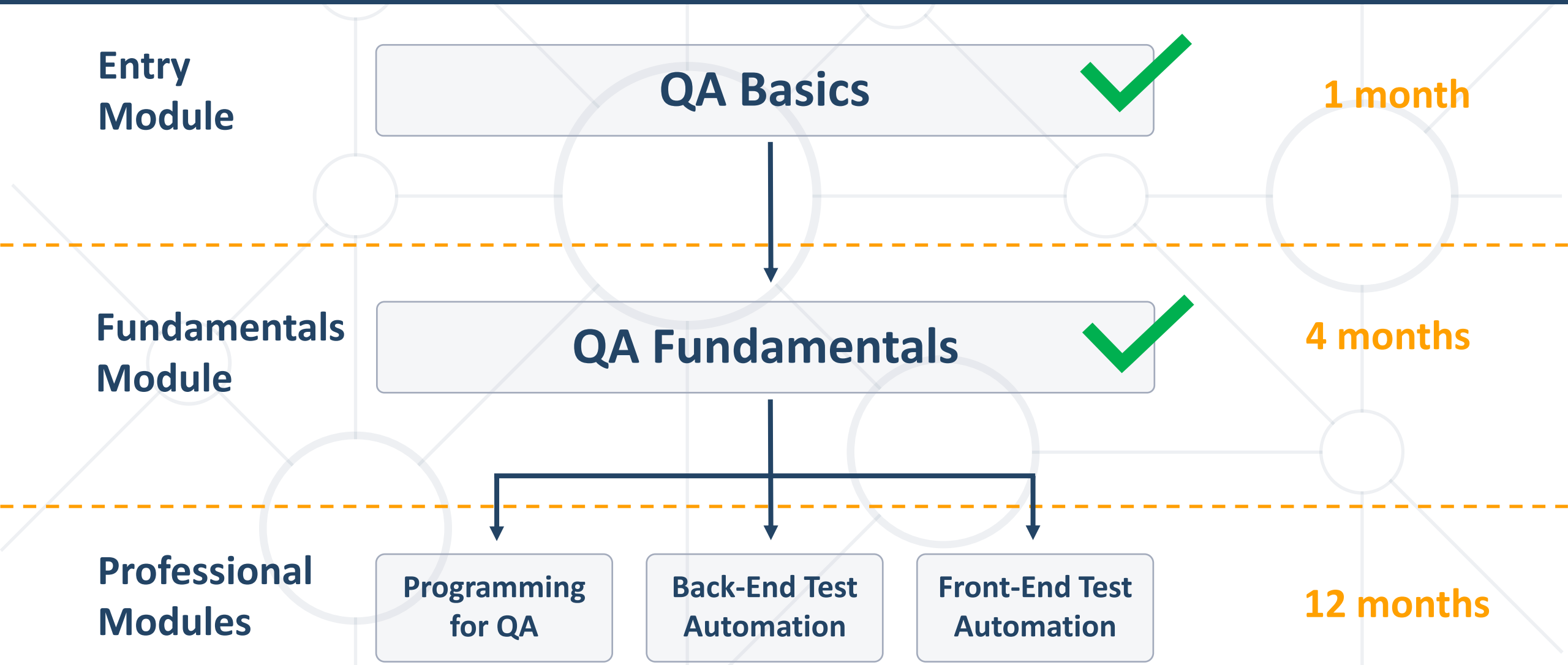
Selenium Features

- Open source
- Record and playback
- Export functionality
- Parallel execution
- Integration with Unit testing framework
- Requires fewer resources
- No need for server installation

The QA Curriculum

Become a QA Automation Engineer and Start a Job

Curriculum



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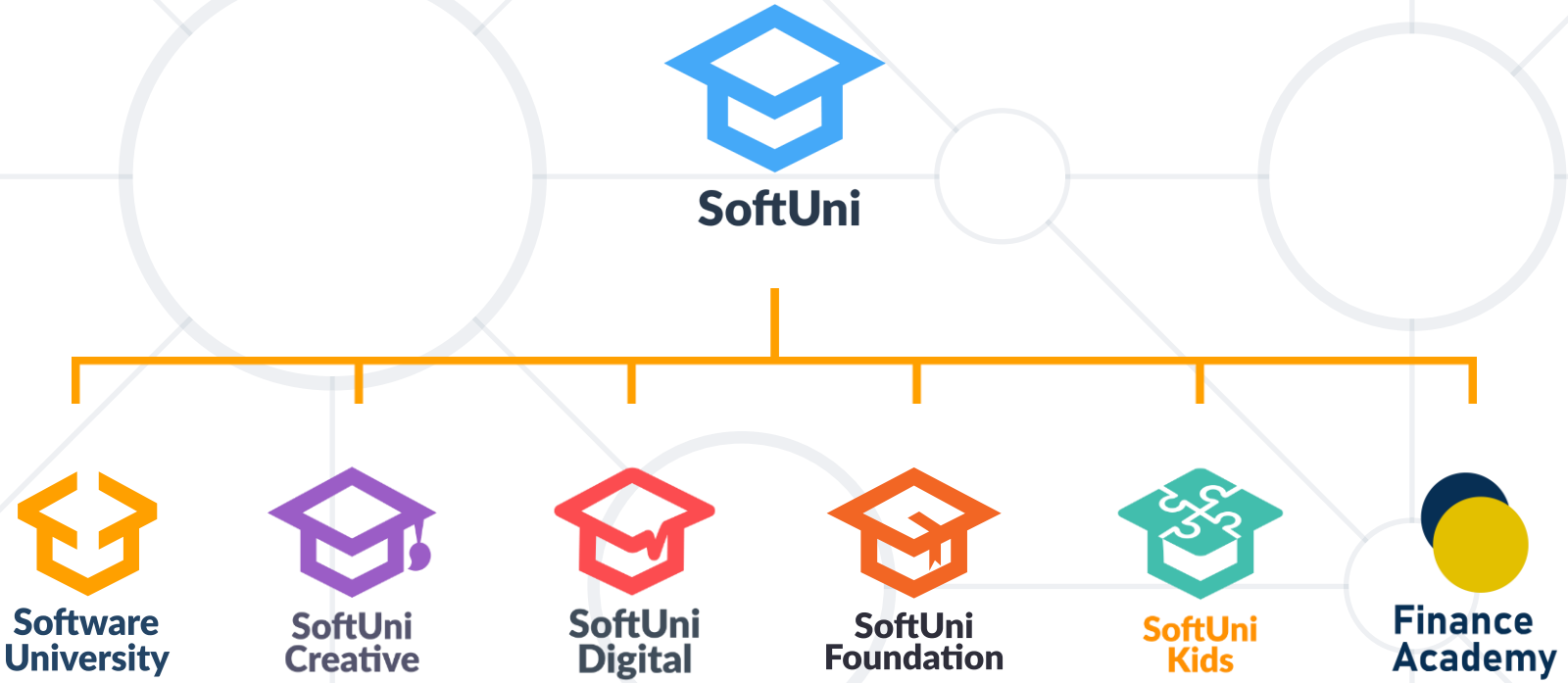
Summary

- Manual Testing
- What is Test Automation?
- What is Test Framework?
- What is Selenium?

Questions?



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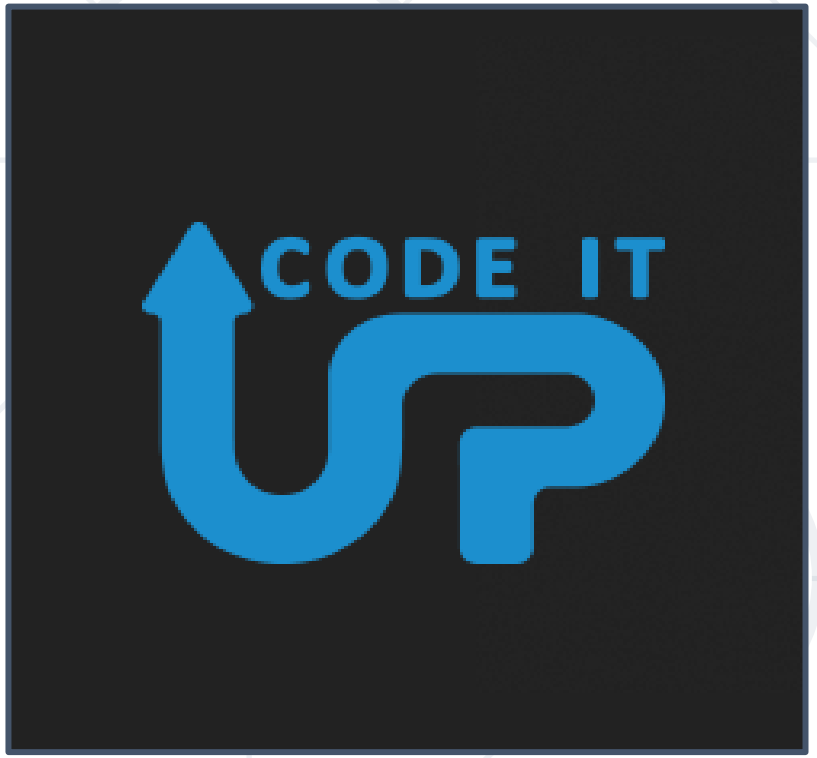

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