Introduction To Selenium

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What is Selenium?

SELENIUM is a free (open-source) automated testing framework used to validate web applications across different browsers and platforms. You can use multiple programming languages like Java, C#, Python etc. to create Selenium Test Scripts. Testing done using the Selenium tool is usually referred to as Selenium Testing.

- ❑ Selenium Integrated Development Environment (IDE)
- ❑ Selenium Remote Control (RC)
- ❑ WebDriver
- ❑ Selenium Grid

Selenium Components

Selenium is not just a single tool but is a combination of different suites of software. Selenium has four components.
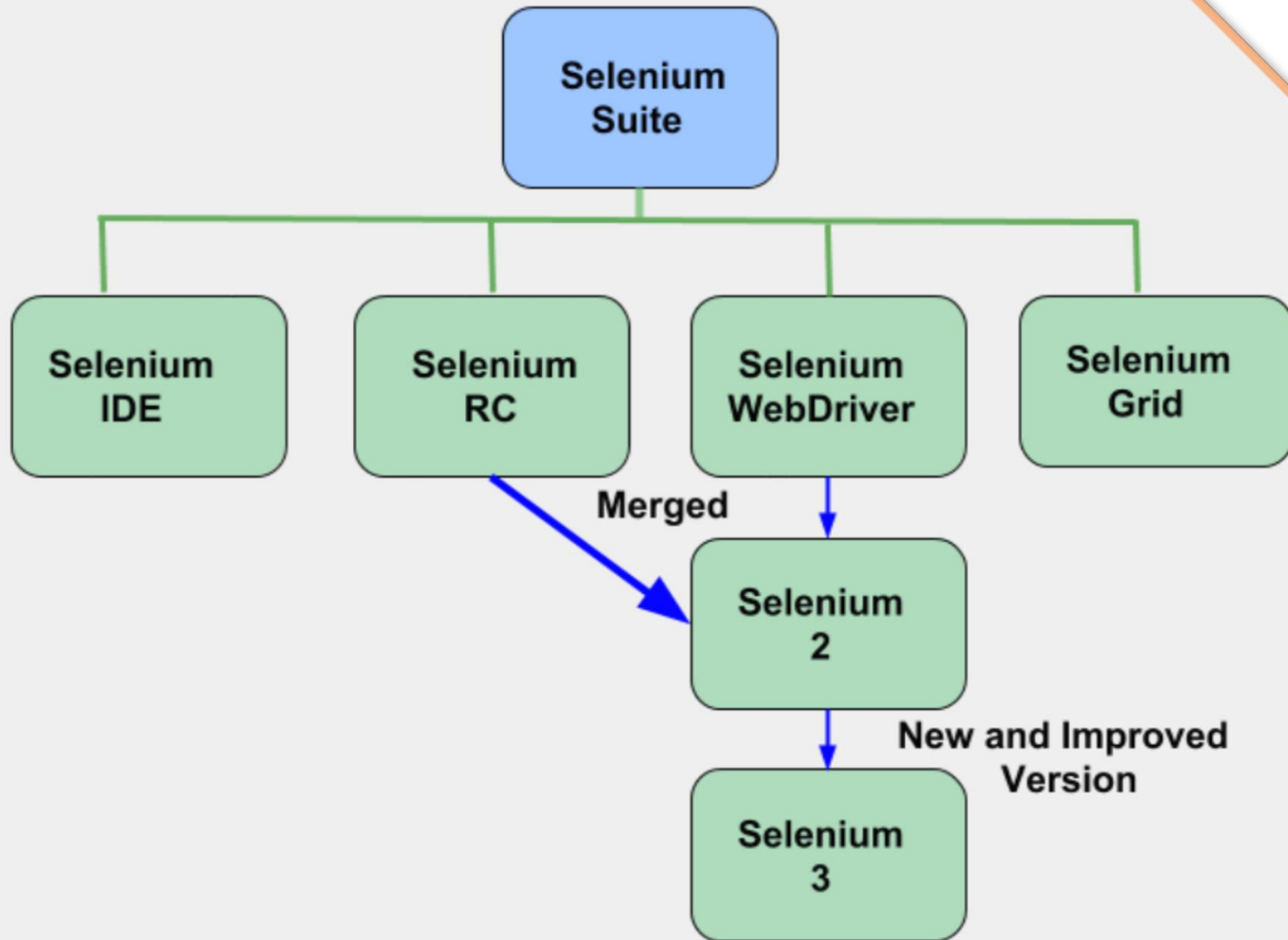
01 — **Selenium IDE (Integrated Development Environment)**

02 — **Selenium RC (Remote Control) – deprecated now**

03 — **Selenium WebDriver**

04 — **Selenium Grid**

Who developed Selenium?

Since Selenium is a collection of different tools, it had different developers as well. Below are the key persons who made notable contributions to the Selenium Project

Primarily, Selenium was created by Jason Huggins in 2004.

An engineer at **ThoughtWorks**, he was working on a web application that required frequent testing. Having realized that the repetitious Manual Testing of their application was becoming more and more inefficient, he created a JavaScript program that would automatically control the browser's actions. He named this program as the **"JavaScriptTestRunner"**.

Seeing potential in this idea to help automate other web applications, he made **JavaScriptRunner** open-source which was later re-named as **Selenium Core**.

Selenium IDE

Selenium Integrated Development Environment (IDE) is the simplest framework in the Selenium suite. It is a browser plugin to record and playback the operations performed on the browser. Selenium IDE plugins are available for Chrome and Firefox browsers. It doesn't support the programming features. **Selenese** is the language which is used to write test scripts in Selenium IDE.

Benefits of Selenium IDE

Very use to use and install

Has built-in test results reporting module

No programming experience is required

It is used to create and execute Test cases using Firefox or Chrome browsers

The user can easily record the Test scripts

The user can edit the Test scripts

The user can create Test Suites.

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Drawbacks of Selenium IDE:

It doesn't support iteration statements

It doesn't support error handling

No support for conditional statements

Available only in Firefox and Chrome

It does not support Database testing

It doesn't generate a detailed Test Reports summary.

Drawbacks

Selenium RC

Selenium RC is a testing tool used for web applications testing. It supports programming using RC. Using RC, we can test out applications in multiple browsers and also in multiple operating systems.
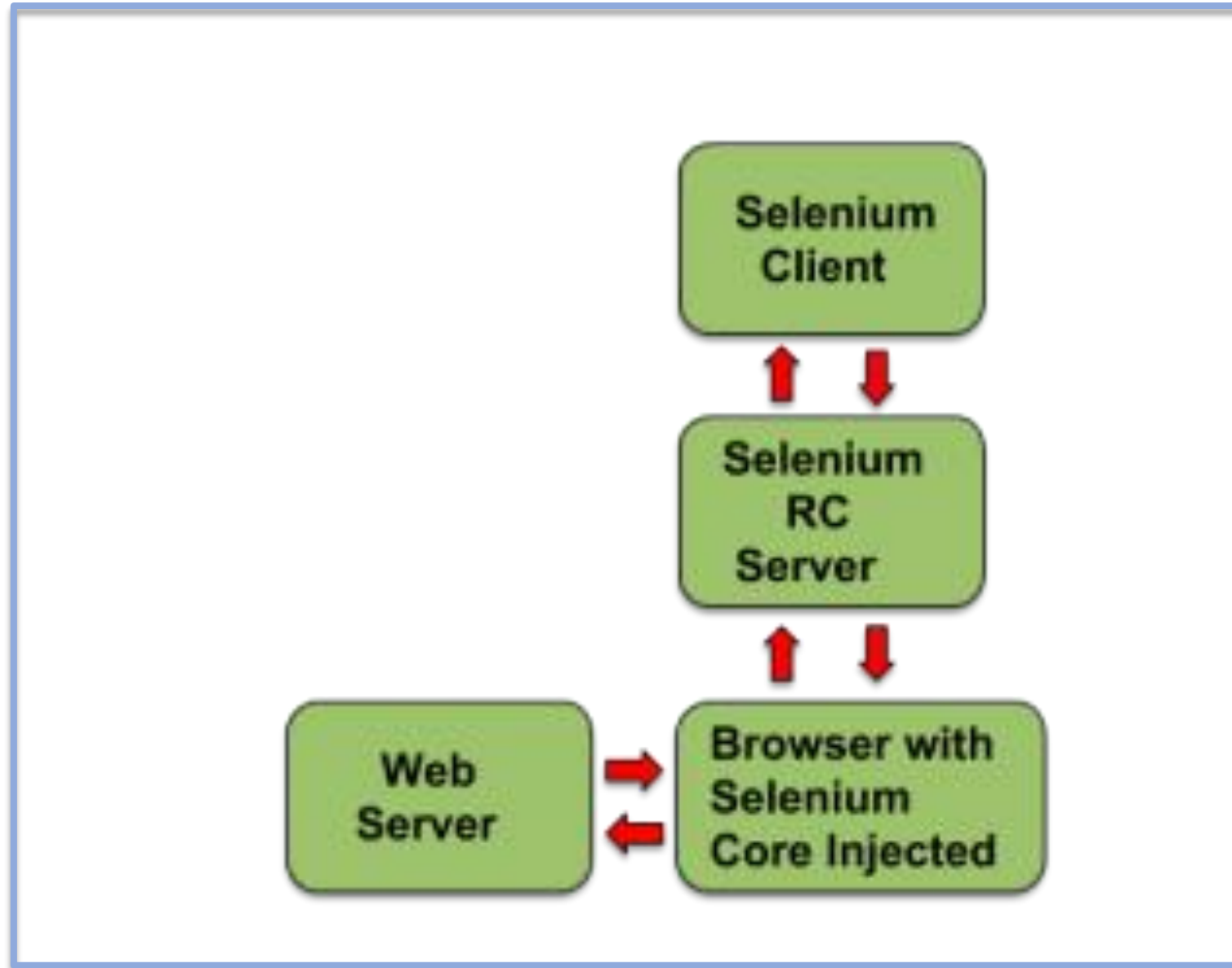
Selenium RC

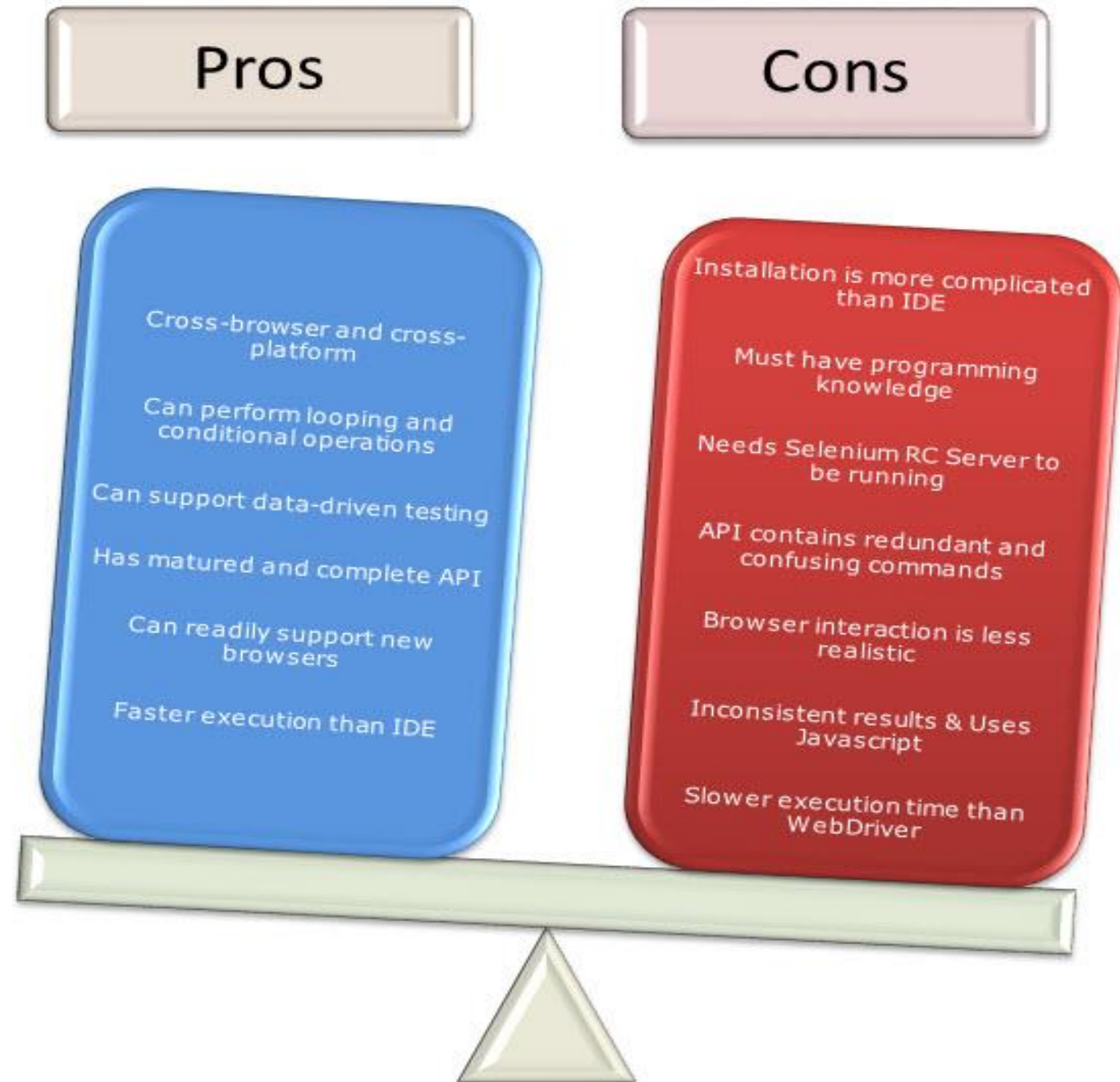Selenium RC has complex architecture hence slow in automation test execution. In Selenium RC, we need to launch a separate application called **Selenium RC** Server before we can start testing. Selenium RC server acts as a middleman between selenium commands and your browser. Selenium RC has been officially deprecated, you should use **WebDriver** or **IDE** to test your web applications.

Selenium RC

Selenium RC

| Pros	Cons
Cross-browser and cross-platform	Installation is more complicated than IDE
Can perform looping and conditional operations	Must have programming knowledge
Can support data-driven testing	Needs Selenium RC Server to be running
Has matured and complete API	API contains redundant and confusing commands
Can readily support new browsers	Browser interaction is less realistic
Faster execution than IDE	Inconsistent results & Uses Javascript
	Slower execution time than WebDriver

Selenium WebDriver

Selenium WebDriver is a web application testing tool introduced by eliminating the drawbacks of IDE and RC. It is simple in architecture and also easy to understand and use.
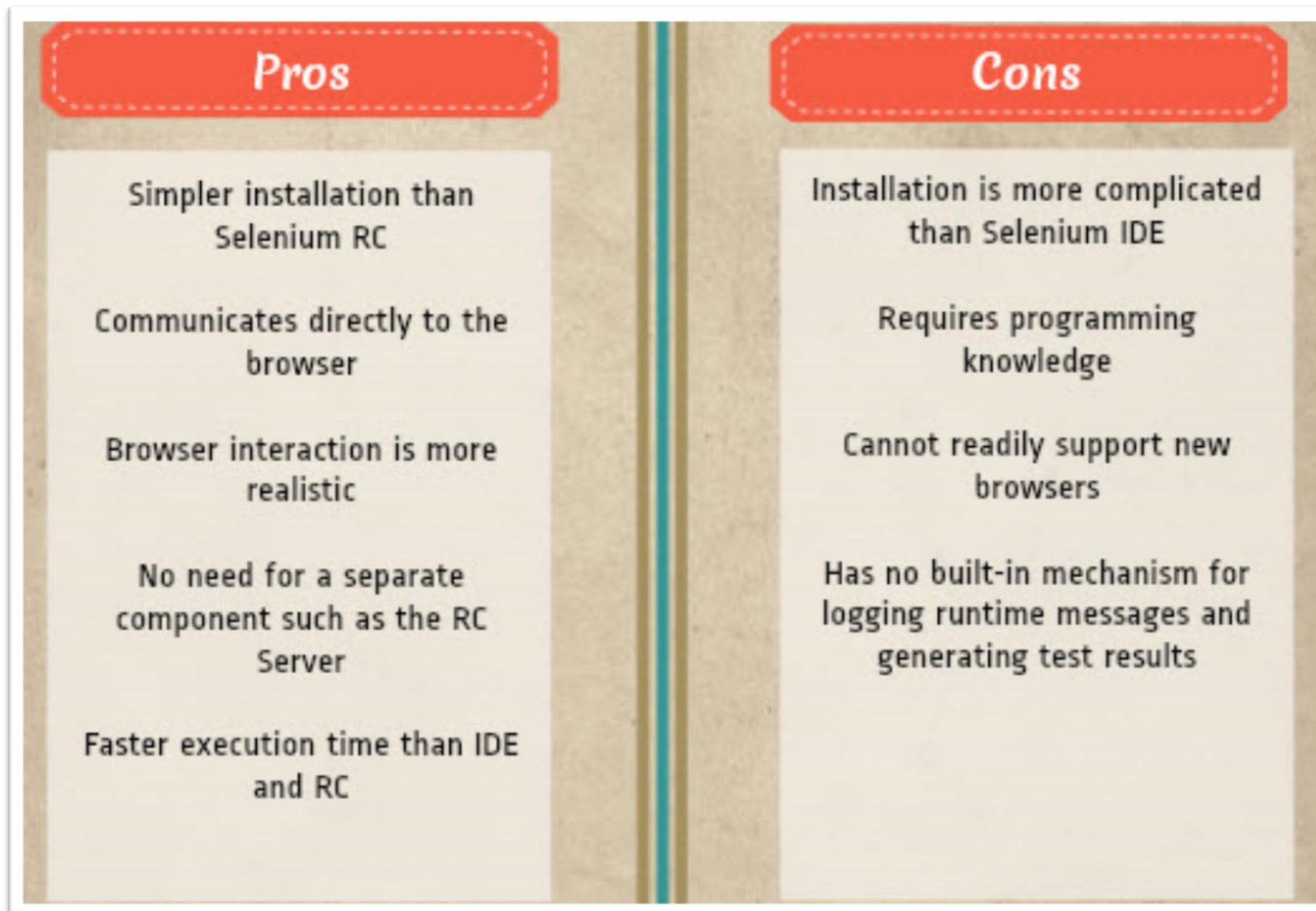
Selenium WebDriver Architecture
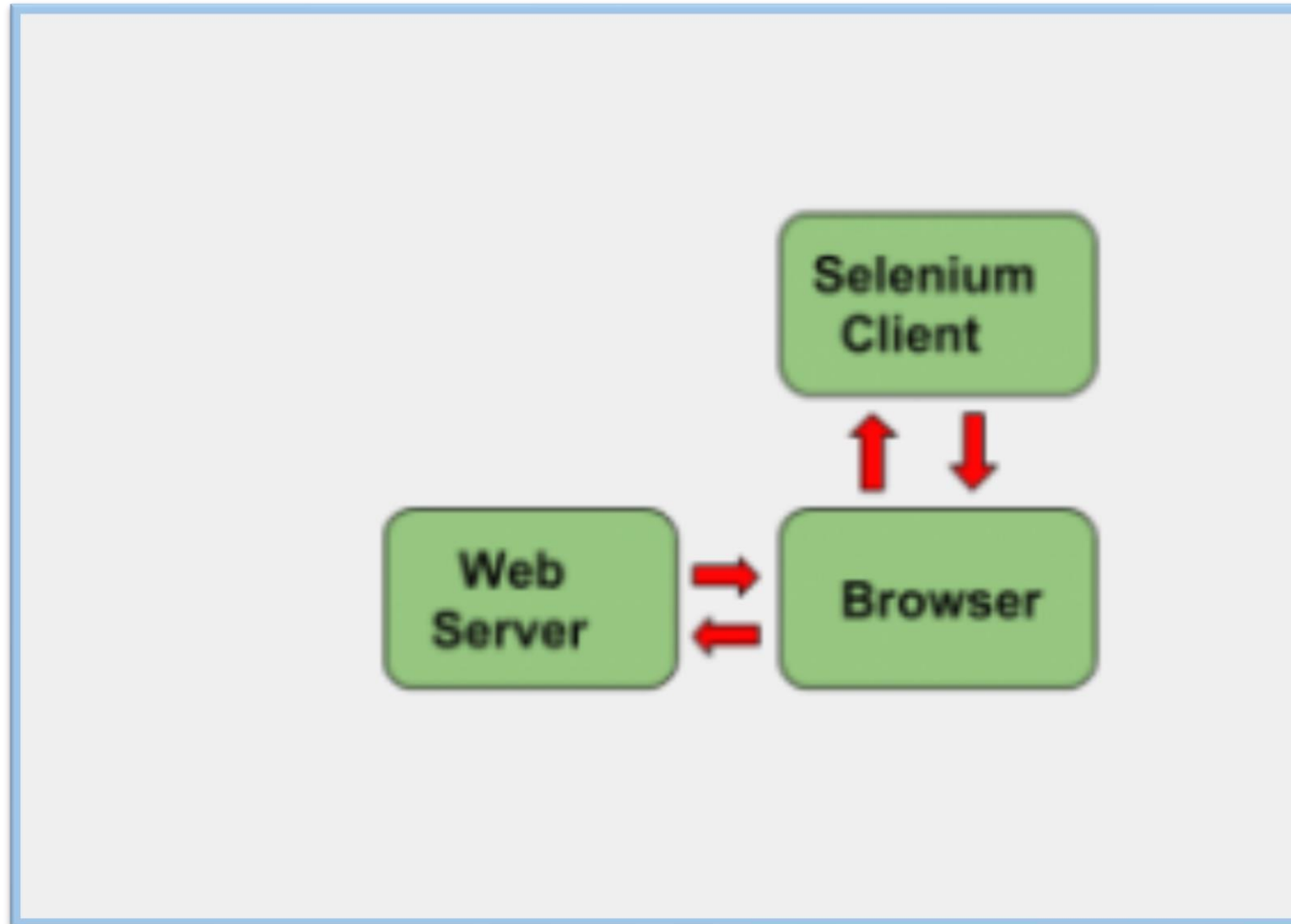
Selenium WebDriver Architecture

1. It is a well-designed object-oriented API developed to automate web and mobile software applications testing process

2. It is faster than Selenium RC

3. Selenium WebDriver directly talks to the browser

4. It's API is more concise than Selenium RC

Selenium WebDriver Architecture

5. It cannot readily support new browser, but RC can

6. It doesn't have a built-in command for automatic generation of test results

7. It doesn't support window base apps

8. It needs outside support for report generation activity like dependence on TestNG or Jenkins.

Selenium WebDriver Architecture

Pros

Simpler installation than Selenium RC

Communicates directly to the browser

Browser interaction is more realistic

No need for a separate component such as the RC Server

Faster execution time than IDE and RC

Cons

Installation is more complicated than Selenium IDE

Requires programming knowledge

Cannot readily support new browsers

Has no built-in mechanism for logging runtime messages and generating test results
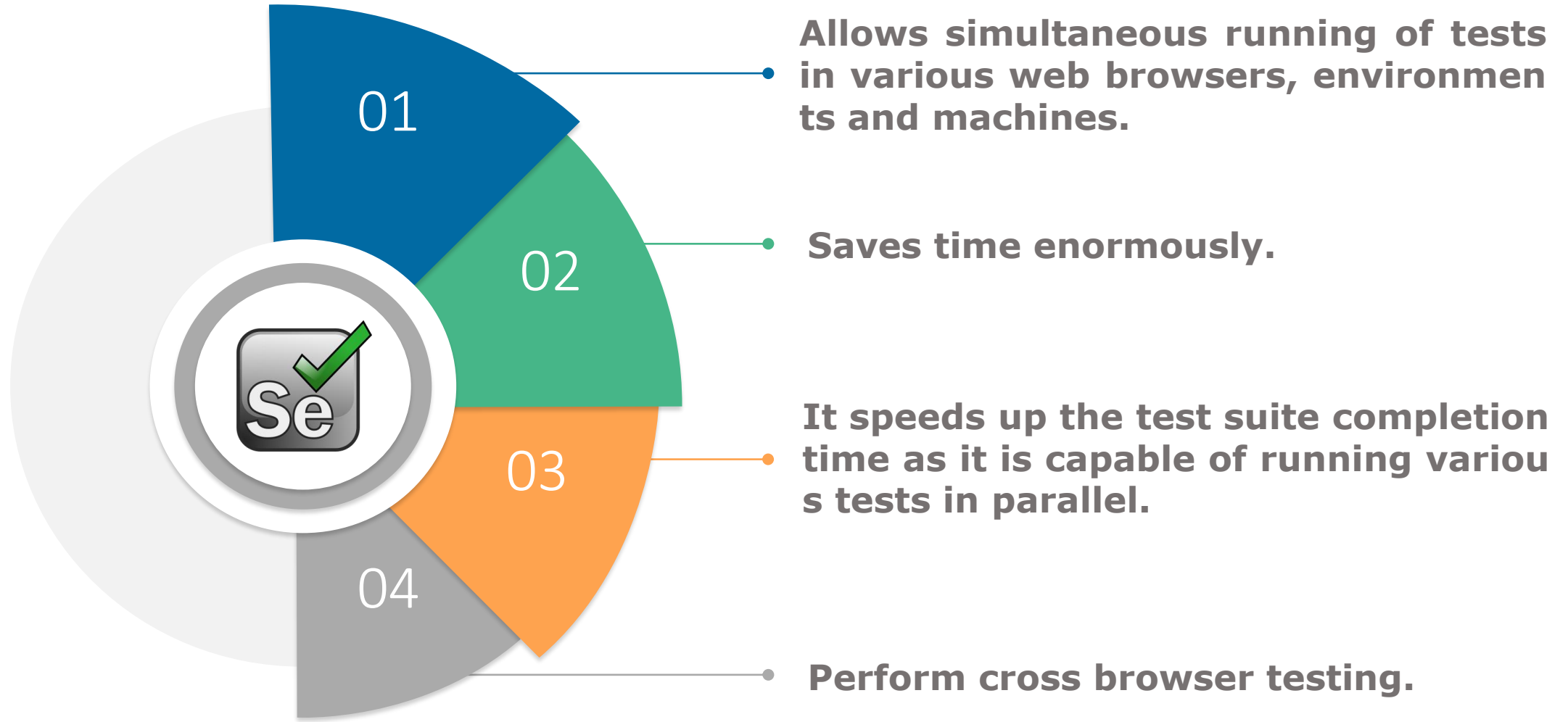
Selenium Grid

Selenium Grid is used to run Automation tests on multiple browsers across multiple operating systems, machines simultaneously. It supports Parallel Testing. It is used only for Test Execution.

Features

01 Allows simultaneous running of tests in various web browsers, environments and machines.

02 Saves time enormously.

03 It speeds up the test suite completion time as it is capable of running various tests in parallel.

04 Perform cross browser testing.

When to use Selenium Grid

You should use Selenium Grid when you want to do either one or both of the following:

When you run your tests against various browsers, operating systems, and machines all at the same time. This will ensure that the application you are testing is fully compatible with a wide range of browser operating system combinations.
Save execution time of your test suites. If you set up Selenium Grid to run, say, 5 tests at a time, then you would be able to finish the whole suite around 5 times faster.

Platforms supported by Selenium

Selenium works with different Operating systems, browsers, programming languages and Testing Frameworks.

Operating Systems:
- ❑ **Microsoft Windows**
- ❑ **Macintosh**
- ❑ **Linux**

Browsers:
- ❑ **Mozilla Firefox**
- ❑ **Google Chrome**
- ❑ **Internet Explorer**
- ❑ **Safari**
- ❑ **Opera etc.**

Programming Languages

❑ **Java**

❑ **C#.Net**

❑ **Perl**

❑ **Python**

❑ **Ruby**

❑ **PHP**

Testing Frameworks

❑ **C#.Net – NUnit**

❑ **Java – JUnit or TestNG**

❑ **Python – unittest, pyunit**

❑ **PHP – Behat + mink**

Advantages of Selenium

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1 It is an Open Source Software, you can check out its source code from its GitHub Repository.

2 It supports multiple Programming languages

3 It supports multiple Operating systems

4 It supports multiple browsers

5 It supports parallel testing.

Disadvantages of Selenium

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1 It supports only web based applications and does not support windows based applications

2 It is difficult to test Image related applications

3 It does not support built-in Report facility

4 It is difficult to use

5 Newly added features may not work properly

6 It does not support to test Captcha and Barcode readers

7 No ready vendor technical support available from anybody

8 Tester should have high programming language knowledge to write Selenium Automation Test Scripts.

Advantages of Selenium over QTP

Selenium	QTP
Open source, free to use, and free of charge.	Commercial.
Highly extensible	Limited add-ons
Can run tests across different browsers	Can only run tests in Firefox, Internet Explorer and Chrome
Supports various operating systems	Can only be used in Windows
Supports mobile devices	QTP Supports Mobile app test automation (iOS & Android) using HP solution called - HP Mobile Center
Can execute tests while the browser is minimized	Needs to have the application under test to be visible on the desktop
Can execute tests in parallel.	Can only execute in parallel but using Quality Center which is again a paid product.