Comparison of API Testing Frameworks with examples

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Resumen

La prueba de API es una práctica que prueba el rendimiento,la confiabilidad, la seguridad y la funcionalidad de una API directamente a través de varias herramientas.Las pruebas de API incluyen servicios web SOAP y API REST con cargas útiles de mensajes XML o JSON.Es la forma mas adecuada de automatización de pruebas basadas en UI en términos de complejidad del sistema,ciclos de lanzamiento cortos y bucles de retroalimentación rápidos.(Prasad Acharya,2023)

SoapUI es una herramienta para probar servicios web,estos pueden ser los servicios web SOAP, así como los servicios web RESTFUL o los servicios basados en HTTP.(SoapUI,s.f)

Cypress es un framework de automatización de pruebas end-to-end (e2e) basado puramente en JavaScript y creado para la web moderna. Su objetivo es abordar los puntos débiles que enfrentan los desarrolladores o los ingenieros de control de calidad al probar una aplicación.(Ithreex Global,2023)

Abstract

API testing is a practice that tests the performance, reliability, security, and functionality of an API directly through various tools. API testing includes SOAP web services and REST APIs with XML or JSON message payloads. It's the most suitable form of UI-based test automation in terms of system complexity, short release cycles and fast feedback loops. (Prasad Acharya, 2023)

SoapUI is a tool for testing web services, they can be SOAP web services, as well as RESTFUL web services or HTTP-based services.(SoapUI,s.f)

Cypress is a purely JavaScript-based end-to-end (e2e) test automation framework built for the modern web. Its goal is to address the pain points that developers or QA engineers face when testing an application. (Ithreex Global, 2023)

Introduction

SOAP UI is the leading open source cross-platform API testing tool. It allows testers to execute automated functional, regression, compliance, and load tests on different web APIs. SOAP UI supports all the standard protocols and technologies to test all kinds of APIs. Its interface is simple, enabling both technical and non-technical users to use it seamlessly. (Hamilton, 2020)

On the other hand, Cypress is an all-in-one framework that includes libraries of assertions, mocks, and automatic end-to-end tests without using Selenium. Cypress runs a Node process that constantly communicates, synchronizes, and executes tasks, accessing both the front-end and back-end of the application and responding to events in real-time. (Cordero, 2018)

Some of the benefits of SOAP UI include performing functional testing within minutes, predicting errors to avoid losses, understanding workflow, and being a good option for performance testing.

Meanwhile, some of the benefits of Cypress include its ease of use, being an intuitive and easy-to-use platform that allows developers to create and manage websites and mobile applications efficiently. It also integrates easily with other tools and platforms, allowing developers to work with a wide variety of technologies and services. Additionally, Cypress is scalable and can handle large amounts of traffic and content seamlessly, making it an ideal choice for high-traffic websites and mobile applications.

1 Development

1.1 Soap UI

Main Functionalities

- SOAP 1.1 and 1.2 support.
- Incorporates a SOAP monitor to capture and analyze traffic.
- Inspects WSDL and REST Web Services (both WADL and WADLess) and displays them hierarchically.
- Automatically generates tests and SOAP requests for the operations defined in the WSDL or WADL descriptor.
- Allows to verify the conformity of a WSDL according to WS-I* standards.
- Optionally, Groovy scripting can be used to make test behavior dynamic.
- Supports several authentication methods: Basic, Digest, WS-Security and NTLM Web Service.
- Supports different attachment technologies: MTOM, SOAP with Attachments, Inline files for WSDL and MIME Attachments for REST.

- Message content verification with Xpath and Xquery.
- Versatility in the configuration of the load test, being able to indicate the limit (in time or requests), the number of attack threads, the HTTP method of the request (POST, GET, etc.).
- Allows to expose simulation Web Services (or mocking) with customizable response content. (SoapUi — Marco de Desarrollo de la Junta de Andalucía, s. f.)

Functional Tests

- Unit test: validates that each Web Service operation works as specified.
- Compatibility testing: validates that the result returned by the Web Service is compatible with its definition.
- Process testing: validates that a sequence of Web Service invocations executes a required business process.
- Data driven testing: validates that any of the above works as required by input data from external sources (e.g., a database or another Web service). (SoapUi — Marco de Desarrollo de la Junta de Andalucía, s. f.)

Advantages

- It provides a simple and user-friendly Graphical User Interface (GUI).
- Cross-platform desktop-based application.
- It supports all standard protocols and technologies such as HTTP, HTTPS, AMF, JDBC, SOAP, WSDL, etc.
- SoapUI costs less than all other test tools available in the market.
- It is also used as message broadcasting.
- It provides a fast and well-organized framework that generates lots of web services tests.
- It creates mocks where testers can test real applications.
- It supports drag and drop features to access script development.
- Transferring data from one response or source to different API calls without manual interaction in the SoapUI tool.
- It facilitates tester and developer teams to work together.
- SOAPUI tool provides the facility to get data from various sources of web service without developing any code. (SoapUI Tutorial - javatpoint, s. f.)

Disadvantages

- Security testing requires enhancements.
- The Mock response module should be more enhanced and simplified.
- It takes longer to request big data and dual tasks to test web services. (SoapUI Tutorial - javatpoint, s. f.)

1.2 Cypress

Main Functionalities

- Time Travel: Cypress can take snapshots as the test runs, and to demonstrate this, one can hover over the commands present in the Cypress Test Runner command log to see what happened precisely at each step.
- Debugging: No need to waste time figuring out why the test failed; instead, you can debug directly from developer tools that make spotting, reading, and stack tracing errors lightning fast.
- Consistent Results: Cypress tests runs directly on the browser. Therefore test results are quick, flake-free, and consistent.
- Test Runner: You can automatically run and see how your test work visually using Cypress Test Runner. You can create, view, and search test files using the runner. Also, you can switch and execute tests on different browsers from the Cypress runner interface.
- Record Test: Cypress Studio lets you write automated tests with minimal coding by recording your interaction with the application under test. It generates commands and assertions quickly.
- Cloud Testing: You can run your test on BrowserStack, Sauce Labs, pCloudy, LambdaTest, and many other cloud tools to extend the testing coverage and the velocity of test execution.
- Plugin Support: Cypress Plugins enable you to tap into, modify, or extend the internal behavior of Cypress. There are hundreds of plugins available for free, which you can easily install and use with Cypress. (ProgramBuzz, 2022)

Functional Tests

- Integration Testing: Cypress can conduct integration tests by interacting with multiple components or systems within a web application.
- Regression Testing: Cypress is suitable for performing regression tests, which involve retesting existing features to ensure they continue to work correctly after making changes to the code or user interface.

- Performance Testing: Cypress can also be used for performance testing, such as measuring page load time, application response speed, or API request performance.

Advantages

- Cypress framework captures snapshots at the time of test execution. This allows QAs or developers to hover over a specific command in the Command Log to see exactly what happened at that particular step.
- One doesn't need to add explicit or implicit wait commands in test scripts. Cypress waits automatically for commands and assertions.
- Developers or QAs can use Spies, Stubs, and Clocks to verify and control the behavior of server responses, functions, or timers.
- The automatic scrolling operation ensures that an element is in view before performing any action (for example Clicking on a button).
- Earlier Cypress supported only Chrome testing. However, with recent updates, Cypress now provides support for Firefox and Edge browsers.
- As the programmer writes commands, Cypress executes them in real-time, providing visual feedback as they run.
- Cypress carries excellent documentation. (Jash Unadkat, 2023)

Disadvantages

- Cypress is not as widely used as some of the other options available, so there may be less support available when you need it.
- It can be flaky, meaning tests can sometimes randomly fail for no apparent reason.
- It is currently only available for JavaScript projects. If you're using a language that Cypress doesn't yet support, you may have to look for an alternative. (Testrig, s. f.).

2 Conclusions

- As a conclusion, SoapUI and CyberPress are different tools used for different purposes in the IT field. SoapUI is a web services testing tool, while CyberPress is a digital content management platform.
- The choice between CyberPress and SoapUI will depend on your specific needs and goals. If you are interested in website creation and management, CyberPress is an excellent choice. On the other hand, if your main focus is on testing web services, SoapUI is the more suitable tool.

3 Recommendations

- When choosing an API testing tool is important to consider how each of the different options available in the market might be more suitable for certain purposes. The best API testing tool will always be the one that better fulfills the organization's or project's needs.
- CyberPress and SoapUI are powerful tools, and taking the time to learn and explore all of their features will allow you to take full advantage of their potential.

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