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RESEARCH OF TECHNOLOGIES FOR AUTOMATED TESTING

Annotation. The research the core technologies of automated testing, revealed their features, advantages and disadvantages and on this basis it was concluded regarding their scope.

Keywords: WebDriver, Selenium, IBM Rational Robot, IBM Rational Performance Tester, IBM Rational Functional Tester, IBM Rational Quality Manager, SilkPerformer, TestComplete, HP QuickTest Professional, JUnit.

Introduction. The programming, like any human activity, is almost impossible without errors. And if the early stages of the process of debugging programs because of their rather primitive is not represent a major problem, it is now traditional methods of test development can no longer provide high-quality testing of modern software systems. It is therefore becoming increasingly popular automated testing.

The main purpose of test automation — reducing the cost of test program after its modernization. Periodically repeated the same type of test are time-consuming in the development cycle. Automation reduces the testing phase and releases the main resource of the company — working time experts. Other, no less obvious benefit of such testing — improving the quality of testing ensures product reliability.

The aim is to consideration the most popular technologies of automated software testing, such as Selenium, IBM Rational, SilkPerformer, TestComplete, HP QuickTest Professional, JUnit, compares them to effective use in different applications**.**

The main part. The first technology, Selenium — a tool for the automated management of browsers. The most popular field is the use of Selenium test automation of web applications. However, using Selenium, you can automate any other routine actions performed through the browser.

Development of Selenium is supported by manufacturers of popular browsers. They adapt browsers for closer integration with Selenium, and sometimes even implement native support for Selenium in your browser. Selenium is a central component of a number of other tools and frameworks automation; it supports desktop and mobile browsers, as well as allows you to develop automation scripts in almost any programming language.

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Selenium 2.0 includes two previously independent project — Selenium Remote Control and WebDriver. Selenium WebDriver is a set of libraries for managing browsers. In Selenium 2.0 can use all the advantages of Selenium WebDriver, and Selenium RC (in compatibility mode WebDriver). The developers recommend the use of a tool Selenium WebDriver in places where not cope Selenium RC.

The main difference that separates WebDriver and Selenium RC, is in the method of interaction with the browser. Selenium RC sends commands to the browser by using special JavaScript core Selenium Core. This approach allows provide a cross-browser compatibility (Selenium 1.0 can with relative ease to work with different browsers). WebDriver, unlike Selenium RC, interacts with the browser through the native interface.

At present there are such drivers:

- HtmlUnitDriver — universal driver that does not require installing the browser;
- FirefoxDriver — driver for Firefox;
- InternetExplorerDriver — driver for IE;
- ChromeDriver — driver for Google Chrome;
- OperaDriver — driver for Opera;
- SafariDriver — driver for Safari;
- AndriodDriver — driver for mobile browser to Android OS;
- IphoneDriver — driver for mobile browser to iPhone.

Each browser has its own native interface, which imposes some difficulties with the support of different browsers in WebDriver. Using the native interface also leads to inconvenience — pressing any key in the process of passing can "bring down" test. At the same time, it provides a number of advantages, such as speed, user actions are emulated as closely as possible (for example, tests for WebDriver not see the hidden elements of the interface).

Both an advantage and a disadvantage of Selenium RC is the use Selenium Server Standalone. On the one hand the use of server simplifies logging results, which greatly simplifies writing automated tests, on the other hand — increases time passage the test. Moreover, it can not be used for testing of pages on a mobile device.

The disadvantage WebDriver compared with the classic RC is have difficulty imitation of such actions as pointing the mouse cursor. On the other hand WebDriver,

as the real user cannot work with concealed elements or, for example, cannot enter text in the box, completely overlapping each element.

Next, consider the technology from IBM Rational, represented by the four instruments.

IBM Rational Robot — a universal means of test automation of general purpose for development teams performing functional testing of client-server applications. Makes it possible to identify a software problem by expanding the test scenarios by means of conditional logic, allowing you to fully embrace the application under test. Allows to create testing scenarios with a call external DLL libraries or executable modules.

IBM Rational Performance Tester — tool of load and stress testing, with which you can identify system performance problems and their causes. Allows you to create tests without writing code, and does not require any programming skills. Provides a flexible way of modeling and emulation of various user loads. Performs data collection and integration data of the server resources and application performance, received in real-time.

IBM Rational Functional Tester — a set of tools for automated testing, allows you to perform functional and regression testing, user interface testing and data-driven testing. The tool uses technology ScriptAssure (seamless validation of dynamic data) and the function of matching the pattern that improve stability testing scenarios under conditions of frequent changes in user interface applications. Testers can choose the scripting language to develop and test setup: Java in Eclipse or Microsoft Visual Basic Net in the environment Visual Studio.

IBM Rational Quality Manager — a solution for the implementation of processes and quality control testing, support group members cooperate on the development of software products, enabling them to share information, to use automation tools to reduce project schedule, as well as generate reports on project performance to make informed decisions. Rational Quality Manager can be supplemented by means of resource management testing Rational Test Lab, which provides accounting resources (servers), their booking, automated test environment deployment on the server and run scripts testing, and reporting on the use of testing resources. Rational Quality Manager and Rational Test Lab are based on an open platform Jazz, which provides a standard interface and convenient opportunities to integrate with partners and other manufacturers.

Next, consider the SilkPerformer — not a free tool for automated load testing web-based systems at various levels of complexity. The tool was created by Borland,

which now acquired the British company Micro Focus. SilkPerformer is a powerful and at the same time easy to use tool load and stress testing of enterprise-class. Visual script and the ability to testing multiple application environments with thousands of concurrent virtual users allows you to thoroughly check the reliability of enterprise applications, performance and scalability, before they are deployed, regardless of their size and complexity. Powerful cause analysis and reporting management tools help isolate problems and make decisions quickly, thereby minimizing test cycle and accelerate time to market. Significantly reduced the cost of identifying defects in n-tier enterprise applications by testing the functionality, interoperability and performance of remote components early in the design cycle, before the construction of client applications. Can quickly generate load scripts for Web services, .NET, EJB and Java RMI objects. In addition, there is the possibility of using unit testing in Java and .NET.

Next, consider the TestComplete — platform for functional test automation developed by SmartBear Software. TestComplete provides testers the ability to create automated tests for Microsoft Windows, Web, Android and IOS apps. Tests can be written, scripted or created manually using the Keyword Driven Testing, and used for automated playback and recording errors. Keyword Driven Testing — a visual representation of the test scripts when each action (mouse clicks, keystrokes, selecting items in the list, etc.) are matched keywords. A few key words are combined into actions. TestComplete is convenient because it allows you to create scripts based on major programming languages, and also carries out quality Quality Control with direct access to most of the internal properties and methods. Among the shortcomings can be identified in unreliable work platform, especially in the long-term testing procedures, as well as the support of only one process at a time.

Next was reviewed HP QuickTest Professional (QTP) — one of the leading automated functional testing tool, which is the flagship product from HP in its lineup. For the development of automated tests QTP uses language VBScript. Unlike some other products for automated functional testing (for example, TestComplete, IBM Rational Robot), QTP allows you to control the generated script text in the process of recording user actions, due to which decreases the time required for the development of the test. In QTP information about all objects on-screen interface is stored in a special repository (Object Repository), that a new user can seem opaque. Defaults for selection of the essential properties of each object type screen interface can be configured separately, for example, a window may be determined by a header and a column of the table - the width and the sequence number in the table. There is a built-in mechanism for comparing text data using regular expressions.

The last of the instruments examined JUnit — library for unit testing software in Java. Mainly used for unit testing Java projects, but can be used with Selenium WebDriver to automate testing of web applications. JUnit has been ported to other languages, including PHP (PHPUnit), C# (NUnit), Python (PyUnit), Fortran (fUnit), Delphi (DUnit), Free Pascal (FPCUnit), Perl (Test:Unit), C++ (CPPUnit), Flex (FlexUnit), JavaScript (JSUnit), COS (COSUnit).

JUnit has the following advantages: a test environment, does not require monitoring by the user at runtime, allows you to run multiple tests simultaneously and displays messages about all errors during testing.

JUnit is used for unit testing, which allows you to check the correctness of the individual modules of the source code of the program. The advantage of this approach is to isolate the separately taken module from other. JUnit 4 test classes can be played like using an integrated development environment, for example, Eclipse, and using the command line interface. Through the use of annotations in JUnit 4 uses a flexible fixture model. Annotations allow to perform the same fixture for each test or just once for the entire class, or not to implement it at all.

The disadvantages of JUnit is the impossibility of modeling multithreaded situations (run multiple tests simultaneously allows you to track the time of their completion) and a sharp increase in the volume configuration with an increase in the number of classes and possible alternatives to running.

Conclusion. After analyzing all the basic tools can be seen that each product has its own advantages, disadvantages and scope of use. To work with different browsers best suited Selenium, which generates the highest quality reports with optional plug-in Thucydides. SilkPerformer best approach to stress testing in large enterprise applications. HP QuickTest Professional is very effective in almost all applications, but requires knowledge of VBScript. IBM Rational Robot is a fairly outdated means uncomfortable with the programming language, but it is a reliable and universal for any client-server applications. IBM Rational Performance Tester is unique of its kind, as it allows to verify the performance and scalability of the application before use it in real conditions, and remove the detected deficiencies before they lead to serious problems. JUnit allows to isolate the individual modules of the program source code and test them independently of each other, as well as very easy to use and has the ability to extension with the help of special rules and startup parameters.

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