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Pruebas automatizadas

**Introduction**

Automated testing is a crucial step in the current software development industry. With automation testing we would not require human intervention to run our tests which verify the integrity of our software. Thus, with an initial investment for the development of this automation framework we can increase the speed of test execution, test coverage, and ultimately significantly increase the return on investment for this software development project. The following document demonstrates how and where the automated framework will assist the development team and the stakeholders.

**Scope**:

Android is in current development of the phone, calculator, and settings applications. The phone application has the functionality to call any emergency, national, and international phone numbers that the user may want to call. The calculator application offers the end user the ability to calculate with greater ease basic mathematical operations which include sum, subtraction, division and multiplication of any series of numbers including positive, negative and fractional numbers. The settings application offers the end user the ability to switch on and off both the Wi-Fi and airplane mode for convenience purposes.

Our teams’ goal is to provide these three applications with a QA certification which guarantees the proper functionality requirements for the end user without any bugs or critical errors which could put at risk the experience for an android user.

Our certification is reached when 95% of all of the test cases inside our test suite are passed without any outstanding bugs or issues.

The certification is based on android version 9 and include the following brands:

* Huawei Y9
* Motorola Moto G6
* Samsung prime

At the end of the development stage of our in-home framework we guarantee that it will run on the previously mentioned android versions and phone brands.

**Framework Mechanism:**

**SDK:** The current automation framework in development consists three external libraries, ADB shell, UI Automator and phone numbers. We also developed libraries which include a logger library to store the test execution results, a phone control library, validations library, and a calculator library. These libraries work in conjunction with the scripts where they are called to be executed.

**GUI:** A GUI or tester interface was not developed due to the project’s time restrictions and to reduce the overall project costs.

**Data integrity:** This framework validates the phone numbers that are being called, the operations that are calculated and the phone processes that are executed such as turning on or off the airplane mode.

**Auto reporting system:** After the execution and validation of the scripts the framework stores the results in a test log to validate the state of the respective test case, thus concluding if it passed or failed.

**Approach:**

The framework now has scripts which allows the automated testing of android based cellphones, using the ADB shell, UI Automator, and phone number libraries in conjunction with the libraries we have created.

First, we test the phones ability to place calls to either emergency, national or international numbers.

Secondly, we test the settings of the phone by switching on and off the airplane and Wi-Fi modes bases on their current status.

Lastly, we test the calculator app where we calculate a variety of operations including sum, subtraction, division and multiplication.

The scripts that were developed, constitute a test or functionality of the phone that is being tested and uses the libraries within our framework. The libraries are based on methods that are flexible and reusable which facilitate the development cycle. These libraries include but not limited to methods that control the phone, validate phone numbers, create a test logger, access the calculator app, etc.

The suites are built of various test cases which have a common functionality and allow our testing to be more robust.

Our framework then runs on an android device based on either android v9 and v10 and finally calls the settings, phone and calculator apps to run the series of tests.

**Architecture:**

The framework which was developed by our team is based on scripts, libraries, and test suites which are stored on a git repository. This framework offers the possibility to run all of our 53 test cases in a faster and more precise manner. As previously stated, this framework uses external libraries such as ADB shell, UI Automator, and phone number. It is based on the python 2.7 language and is run on our test servers which is our local laptop and currently run on the device Motorola Moto G6.

A close up of a logo

Description automatically generated

* Library / scripts: group of methods are called a library. The test cases use these libraries and the test suites group these test cases. The scripts allow for the end to end execution of the test cases.
* Repository: Framework is stored on GitHub where version control is handled.
* Framework: the entire wrap of the libraries, scripts, methods, documentation which present a solution to the testing problem.
* Test server: Where our framework is run, requires git to retrieve all of the changes made in the framework repository, python 2.7 to execute the scripts and ADB shell and UI Automator to adequately connect to the mobile device
* Mobile device: The target of the framework where the tests are executed, and its results are evaluated

**Level of effort:**

|  |  |  |
| --- | --- | --- |
| Tasks | Week 3 | Week 4 |
| Refactoring v1 | 3 |  |
| SDK and libraries | 2 | 2 |
| Methods | 5 | 5 |
| Scripts | 7 | 7 |
| Reporting system | 2 | 2 |
| Quality analysis | 10 | 5 |
|  |  |  |
| Hours | 45 | |
|  | Sprint 2 | |
|  | Version 1.1 | |
|  |  |  |
|  | Total hours: | 45 |
|  | Total USD: | $ 2,160.00 |

Note: The current level of effort is calculated based upon the current projects’ requirements and scope. As the project evolves and is completely defined the level of effort for the entire project will be updated.

Note 2: The total USD price is based on the average hourly wage of a Software Development Engineer Test or SDET in the United States which varies greatly by state but has a national median of 48 dls per hour.

**Return on Investment:**

In the current state of this automation framework and with the current scope and requirements a test suite was built which consists of 53 test cases, validating each of the functionalities of the current applications in development by android.

If manual testing were to be implemented an it is estimated, it would take approximately 5 hours per device to cover all of the test cases.

Each execution of the tests is planned at the end of each sprint after each build is completed. To reduce the time it would take to present the ROI more devices and versions could be added to be tested in the framework thus multiplying the hours needed to cover all of the test cases per device or adding more regression cycles within each sprint.

The following chart and graph present the ROI with one android device. Within the following sprints it will be updated to present the ROI with all of the devices and android versions we will be working with.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Iteration / Sprint | Manual testing | Automated testing | Man hours saved with automation |  |
| 1 | 7 | 46 | -39 |  |
| 2 | 14 | 47 | -33 |  |
| 3 | 21 | 48 | -27 |  |
| 4 | 28 | 49 | -21 |  |
| 5 | 35 | 50 | -15 |  |
| 6 | 42 | 51 | -9 |  |
| 7 | 49 | 52 | -3 |  |
| 8 | 56 | **53** | 3 | $ 144.00 |
| 9 | 63 | 54 | 9 | $ 432.00 |
| 10 | 70 | 55 | 15 | $ 720.00 |
| 11 | 77 | 56 | 21 | $ 1,008.00 |
| 12 | 84 | 57 | 27 | $ 1,296.00 |
| 13 | 91 | 58 | 33 | $ 1,584.00 |
| 14 | 98 | 59 | 39 | $ 1,872.00 |
| 15 | 105 | 60 | 45 | $ 2,160.00 |
|  |  |  | Total savings before subtracting initial investment | $ 9,216.00 |

**Benefits:**

After observing the chart, we can thoroughly conclude that automation offers a significant Roi, thus reducing the overall software development project costs. It can also offer a higher overall test coverage due to the greater number of tests that can be executed on the application. This increases the quality of the application as a whole.

Automation also offers the opportunity of reusability of the framework and methods that where created and can be utilized through different approaches.

As the automated framework can be executed unattended at any desired time of the day, manual testers can also focus on more complex tests which cannot be automated, increasing the possibility of finding a bug or issue earlier in the development lifecycle.