

The Role of Automation in Reducing Testing Time for Banking Systems

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www.ijrah.com || Vol. 1 No. 1 (2021): November Issue

Date of Submission: 08-11-2021

Date of Acceptance: 26-11-2021

Date of Publication: 30-11-2021

ABSTRACT

Software testing is an activity designed to assess a program's quality and make improvements by finding errors and issues. Testing is a technique that is used to identify software flaws and confirm that the program has reached a certain level of quality in relation to certain characteristics. Players in the banking and financial sectors are up against several internal and external obstacles. They must concentrate on generating value for customers by emphasizing cost effectiveness and operational efficiency if they want to thrive. Automation is the only realistic possibility for doing this in the current economic and technological context. The adoption was made with cost-cutting and increased output in mind. Financial services is no exception to the major trends that are now reshaping many businesses, including growing digitalization, the widespread use of mobile phones, and simple internet access. Automation testing is a major factor in increasing the software testing team's test efficiency. Because it is not repeatable, inconsistent, or covered enough, manual testing may not always be useful. The software industry uses test automation as a solution to this. This essay will cover test automation, including its requirements, methods, applications, advantages over manual testing, and how to choose which test cases to automate. As a result, there are several testing tools on the market; we'll also talk about the Selenium automation tool.

Keywords- Software Testing, Banking and Financial Industry, Selenium Automation Tool, Test Automation, Increasing Digitization, Software Testing Team, Manual Testing, Quality.

I. INTRODUCTION

These days, the banking industry uses a variety of software programs to enhance operations, increase security, and provide better customer service. Software is more than simply a computer program; it also includes arrangement data and documentation that are necessary for the program to function properly [1]. A competent software developer must be well-versed in documentation as accurate documentation, maintained by a software bank that keeps track of all client data, is essential to a system's proper and effective operation. This explains why the banking system saves more time and why maintaining client information is easier for those with bank authorization [1, 2]. Software offers more cost-effective methods of reducing fraud and continuously enhancing the financial system. In order to improve the functionality and efficiency of the core banking system, the banking industry uses a greater variety of software [2, 3]. Different software is used by banks for different departments. Banks are able to maximize their resources

and improve operations in this way. Every business in the world is becoming more and more reliant on technology, and individuals are becoming less and less capable of functioning without it [3, 4].

The IT industry's technologies are essential to the COVID-19 pandemic and will continue to be so in the post-pandemic era [3, 4], particularly those that can manage the organization, lessen human labour, and guarantee business continuity [4]. In order to handle the impending organizational, economic, and managerial issues, the coronavirus pandemic has demonstrated the necessity of using new and future technologies [4, 5]. More quickly than in the past, technological advancements are happening now to keep ahead of the effects and gain new capabilities. Some writers make an effort to research every new, innovative, and developing technology that may be applied to lessen the effects of the COVID-19 epidemic. Artificial intelligence, robots, big data, cloud computing, virtual reality, and digital information technologies are among the technologies that are most frequently mentioned. Nah and Siau talked on

how information technology may be utilized to improve the resilience and continuity of corporate operations. This includes data analytics, AI, machine learning, robots, digital commerce, and the Internet of things. Automation has emerged as a crucial tool that businesses may use to adapt to this new paradigm of work. Numerous writers highlight the significance of automatization and robotization technologies and provide a concise synopsis of robotic uses during the epidemic [5, 6]. Nevertheless, comprehensive and methodical assessments of the robotic research related to the pandemic from the viewpoint of technology are still lacking [6, 7].

Robotic Process Automation (RPA) is a rapidly developing technology that automates business processes. It mimics human worker behavior by combining software, machine learning, artificial intelligence, and other learning capabilities with algorithms to automate manual tasks in workflow and process-related applications and operations. In essence, this technology allows software robots to take over monotonous, rule-based activities that humans would otherwise perform [6]. One of the most innovative and disruptive trends in digital transformation, robotic process automation (RPA) allows organizations to automate repetitive tasks, save money, save time, optimize resources, and maintain business continuity in the face of unforeseen and unanticipated crises. Additionally, it aids in guaranteeing that standard operating efficiency and customer service standards are upheld [6, 7].

By lowering expenses and boosting competitiveness, RPA technology improves financial outcomes. Above all, these solutions make it possible to develop innovative, sustainable practices that improve process efficiency. Examples of such practices include digitizing and automating particular operational tasks as well as the entirety of an enterprise's operations [6, 7]. With the current epidemic and unknown catastrophes in the future, this problem could be especially important [8].

Players in the banking and financial industries are up against a lot of internal and external obstacles [8]. They must concentrate on operational efficiency and cost-benefit analysis (Deloitte) (TCS) in order to provide value for customers in order to thrive [7, 8]. The current IT systems, which constantly communicate and integrate with one another, provide benefits but also create time- and money-consuming difficulties. Either significant IT transformation or broad business process improvement are required to further increase the intelligence of IT systems [9, 10]. Relying on outside parties to enhance process execution through business process outsourcing and offshoring is an alternative to IT.

Even yet, these projects are costly, time-consuming, intricate, and fraught with dangers of their own. In light of these difficulties, companies must alter the way they conduct business in order to guarantee a dependable, consistent, and cost-effective system for achieving client pleasure [9, 10]. Since automation ensures all of these advantages, the sector is transforming

itself aggressively in the direction of automation. Automation is gradually gaining traction, with financial and banking institutions spearheading the implementation of this technology.

In order to produce high-quality software that is free of errors and defects, software testing is an essential component of software development, and the process of automating software testing is essential to its success. Testing is crucial since it is the means by which software reliability is determined, and it accounts for around 50% of the software development expenditure allocated to software projects. There is a need to decrease human testing since software testing is labor-intensive and costly [8, 9]. Because faults are frequently unintentionally introduced into software during design and construction, software testing is essential. Today's software requires more rigorous testing and has to be tested on even more lines of code due to its increased complexity. Professor William Howden of the University of California, San Diego, stated in a paper that "any responsible effort to develop a software system must include testing." In essence, testing is carried out both automatically and manually [10].

Manual software testing is carried out by hand, requiring human analysis, assessment, and input [10]. Software test automation is the practice of employing an automated tool or utility to automate the stages of manual test cases in order to reduce the amount of time needed for testing. Testing may be done for reliability estimates, validation, verification, and quality assurance. Budget, timeliness, and quality are all traded off [10]. The primary focus of software engineering is software quality [10, 11]. The most popular method for guaranteeing software quality is testing.

Software testing is a collection of procedures used to identify bugs in software. It's a method for evaluating the software's quality [11]. There are two types of testing: automated testing and manual testing. Static testing is another name for manual testing. It is executed by the examiner. Dynamic testing is another name for automation testing. However, the issue is that it takes a lot of time and work [11, 12]. Therefore, automated testing is employed to address these issues. There are four different categories of automated testing: performance, security, correctness, and reliability testing. It uses automation technologies to automate the tasks involved in manual testing.

Automated testing may be performed quickly and are repeatable [12]. The market is filled with a variety of tools that are intended to test particular test environments and processes. The environment might be exceptional testing, performance, functional, or [12]. A pilot round of the relevant tool should be completed before choosing a testing tool based on how well it aligns with the checklist. When choosing a tool, cost is another crucial consideration [12].

II. AUTOMATION TESTING

a. Steps of Test Automation

Please typically, the test engineer is in charge of creating, deploying, and executing the scripts, while the automation manager chooses the tools to use. This step determines whether or not the project needs to be automated [12, 13]. Failure at this point has a more significant effect on how the project is carried out [13]. A test automation process's various stages are depicted in the following figure.

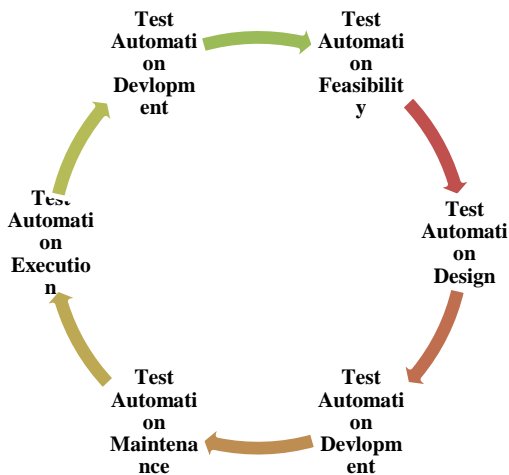


Figure 1 Steps of Test Automation. [7, 10]

b. When to Use Automation

1. Following implementation of the manual testing procedure, the anticipated outcomes.
2. Tested twice or more [10].
3. The built environment should be steady or consistent.

c. Advantages Compared to Hand Testing

Here are a few advantages of test automation:

1. Quick application development through a reduction in testing time
2. Consistent in character
3. Reliable.
4. Scripts can be reused [11].
5. Programmable.
6. Offers extensive coverage for regression testing without the need for extra resources.
7. An increase in output [12, 13].
8. Detailed logs of tests.
9. Scripts being executed on many platforms.
10. An increase in cost efficiency [13, 14].

d. Automate Test Cases

The choice of appropriate test cases for automation is crucial as it affects the budget and timeline for development. Automation tools do not do one-time testing [14, 15]. Furthermore, usability testing—which determines "How easy is the website to use?"—does not include automated testing. When testing produces unpredictable findings, this method is not helpful [15, 16].

- Automating tests that must be performed for each build is a good idea [16, 17].
- For automation, tests that employ several data values for the same activity are also required.
- Comparable tests that need differing platform execution [17].
- An automated tool is used to do regression testing.

III. APPLICATIONS

Web-based applications are tested using automation testing to identify application bugs and verify system security [18, 19].

Instead of employing more personnel, it offers an alternative to manual testing by utilizing automated testing to increase test automation and lower risk [19, 20]. Automation testing offers several tool kinds for test management. Automation tools are used to track defects effectively [21, 22].

Table 1 Testing by Automation vs. Manually. [22]

Information	Automation Testing	Manual Testing
Testing Types	Regression Testing	Usability Testing
Execution Speed	Fast to Execute	Less rapid than automated testing
Sequence	After Manual Testing	Prior to Automated Testing

IV. TOOLS FOR SOFTWARE TESTING

a. Selenium

The software Selenium is publicly accessible. This robust toolset may be used to easily construct web-based application test automation. Cross-browser testing and test execution across several browsers are made possible by Selenium [22, 23]. A number of languages are supported for scripting, including Python, Java, C#, and PHP. The assertion statements provided by Selenium provide a useful way to compare expected and actual results [23]. The elements that make up selenium are as follows:

1. Selenium IDE;
2. Selenium RC;
3. Selenium Grid.

- i. **Selenium IDE**
 - The integrated development environment (IDE) for Selenium testing is called the Selenium IDE for short. The test may be recorded, edited, and repeated. It is built as a Firefox extension. IDE for Selenium [23].
 - Gives users the option to save tests in HTML, Java, Ruby scripts, or any other format [23, 24].

- Installing Selenium Tools is a prerequisite for using them.
- Download the IDE for Firefox first from the Selenium HQ downloads page, then restart the browser [24].

The Selenium-IDE will then be shown under the Firefox Tools menu. With selenium, you can:

- For text encoding format setting [25].
- Default Page Time out Configuration.
- Offers the ability to capture the Base URL.
- Including the IDE Extension and Selenium Core.

The process of writing test cases:

- To first record and play test scenarios.
- Launch Firefox after installing the IDE [25, 26].
- Launch the recording application.
- Select Tools [◇] to launch the Selenium IDE.
- As you test the application, proceed with the different operations on it.
- Click the "stop recording" button after the recording is complete, then use the file menu to save the test case. It will be stored in HTML format by default [26].
- To play the exam that was recorded. Select the "run" button located on the user interface. Additionally, you have the ability to control the execution speed [27].
- The test result is visible at the bottom of the IDE window when the test has completed.

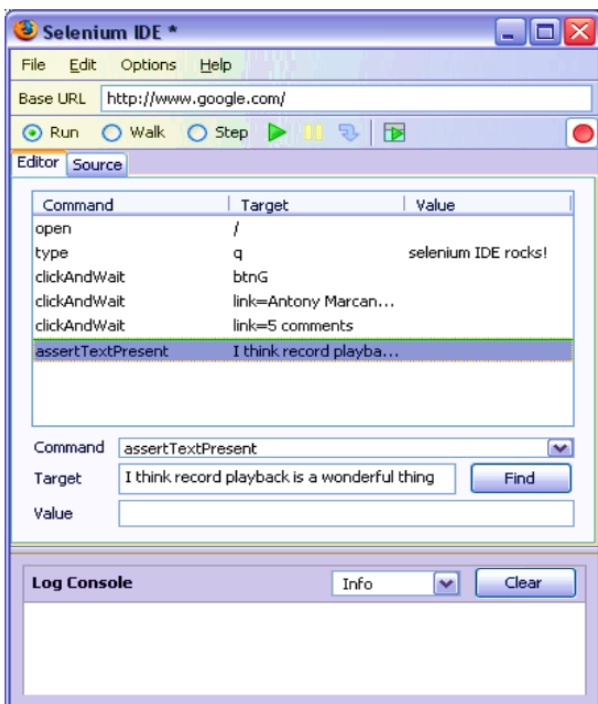


Figure 1 IDE-UI and Selenium. [24, 27]

ii. The Remote Control Selenium

- The answer for cross-browser testing is Selenium RC.
- The server is available on all platforms and is developed in Java [28, 29].

iii. Selenium Grid

- Test suites may be executed in many settings thanks to Selenium-Grid.

- With the aid of selenium-grid, several instances of Selenium-RC are executing on diverse operating system and browser setups [30].

V. CONCLUSION

One conclusion from this study article is without a doubt: automated testing is far more appropriate than manual testing. Adopting automation technologies is becoming imperative for all organizations; a methodical approach helps facilitate a seamless transition. The study advances scientific understanding and has applications for decision-makers in process automation who are considering implementing robotic process automation technologies.

- The method of test automation is used to reduce expenses and other overheads. Regression test time is reduced by automation, giving businesses the chance to raise the calibre of the software they produce. Since automation tools can complete tests more quickly than people.
- However, choosing a tool that is compatible with the checklist and choosing which test cases to automate are crucial for the efficacy of automation testing. Cost is another crucial consideration when choosing a gadget.
- While Selenium tests are used to verify workflow, exploratory testing cannot be replaced by them and they cannot be included in development builds.

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