

## Implementing Automated Software Testing

Neha Kaul



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#### **Arcler Press**

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## **ABOUT THE AUTHOR**



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## LIST OF ABBREVIATIONS

API	application	programming	interface

REPL read-eval-print loop

TDD test-driven development

UI user interface

## DEDICATION

To my wonderful husband, Sibin, you have been a source of constant support and encouragement.

To my parents, Virender and Anita, who always pushed for tenacity. To my sister, Nidhi, for your wisdom and unconditional love.

## PREFACE

Software systems are an essential component of our day-to-day lives. Software has morphed into one of our most basic necessities. We depend on software to accomplish routine tasks and activities in our lives. The impact that software has made in this world is enormous. Software applications are engaged on a large scale in both essential and non-essential sectors across the world. The immensity of the involvement and impact of software in the world is enormous. Software applications and systems help in completing complex tasks in an easier and cost-effective way which has improved the quality of life of millions of people.

The relevance of software will only increase in the future. Software will continue to increase in complexity as it is going to be used to solve the biggest problems faced by the world. It is a proven fact that as the complexity of software rises, the challenges associated with software testing and software maintenance will subsequently rise too. Complex software solutions created to solve complicated problems are destined to have an element of complexity in the process of testing as well. It is a known fact that there is a direct relation between the quality of a software system and testing. Effective testing is thought of as a measure of efficiency and quality of software. Testing is a vital non-skippable step in the software development lifecycle.

The field of software testing has grown considerably since its origin in the early 1900s. Testing of software helps instill confidence in the quality of the software to its users and stakeholders. It is advisable that software be evaluated and tested thoroughly as it is vulnerable to a range of potential attacks that may be of a malicious nature. Comprehensive testing and evaluation of any software solution is paramount to identifying vulnerabilities in the system and shield it from potential attacks. The lack of quality testing is one of prime reasons for the failure of software systems resulting in significant losses for the stakeholders, clients, and users. One can assume with certainty that software testing is a determining factor in the success of a software solution.

Over the last few decades, the field of software testing has grown exponentially. A branch of software testing namely automation testing has helped reshape the way in which testing is done. Automation testing is the exercise of executing tests automati-

cally in a repetitive manner. This branch of study concentrates of execution of repetitive tests, management of the test data and the utilization of the results to ameliorate and improve the quality of software. In this book, we will investigate the automation testing field within software testing. The advantages of this type of testing will be discussed in brief. Further, different software solutions that perform automation testing will be presented and examined in this book. The implementation of different automated software systems will be presented in detail. Detailed practical implementations of automated software applications covering different types of testing scenarios have been provided in this book. This book assumes that the audience is familiar with the basic concepts of software testing.

## CHAPTER

## SOFTWARE TESTING: DEFINITION AND IMPORTANCE

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In this chapter, we shall investigate the definition of software testing in brief and the importance of software testing in the SDLC lifecycle.

#### **1.1. WHAT IS SOFTWARE TESTING?**

Software Testing is an activity of evaluating a software system and its components to check if the software system meets its specifications. It can be described as the process of examining software with the intention of verifying whether the requirements have been met by the software under test (Beizer, 2003).

In elementary terms, it can be described as an activity or procedure of running/executing a software application or system with the purpose of pinpointing any errors, bugs, gaps, or missing/incomplete requirements that were not present in the initial requirements.

The definition of testing according to the ANSI/IEEE 1059 standard is (Singh and Singh, 2012):

"A process of analyzing a software item to detect the differences between existing and required conditions (that is defects/errors/bugs) and to evaluate the features of the software item."

The two main goals of the process of software testing are:

- Verification and validation of the requirements; and
- Bug detection to improve the quality of the software.

Based on the way in which tests are carried are out and who/what carries out the test, software testing is divided into two broad categories: manual testing and automation testing.

### **1.2. IMPORTANCE OF SOFTWARE TESTING**

Software Testing is considered to be an important part of the software development life cycle. The need for software testing originated from the desire to provide some proof that a software system works as required. The need to prove the validity of software led to the creation of Software Testing as a discipline. The initial implementation of software testing demonstrated the benefits of testing to the software community which made it very popular in the software community. In addition to detecting bugs/errors with the intention of improving the quality of the software, testing also helped with providing metrics regarding quality of the product.

Some of the advantages of software testing are:

- Early Detection of Errors/Bugs: Software testing helps find errors early in the software development process so that fewer errors or bugs are found once the product has been developed. When a software product is in the development phase, there is a possibility that one or more developers will make a mistake during the coding process. There could be several reasons for them making an error, such as lack of programming knowledge, lack of expertise in the programming language and syntax, improper understanding of the requirements, incorrect algorithmic implementation, insufficient experience in the subject matter, or just a simple human error. The software testing process helps locate simple or complex errors/omissions in the code. In the case of enterprises that adopt Agile and DevOps processes, the testing process is iterative, and hence bugs are identified and fixed promptly. This iterative process helps in effectively managing the software development and helps understand potential areas of complexity in the requirements, thereby improving the quality of the product.
- **Improved Product Maintenance and Product Performance:** After a software product has been released on to the market it goes into its maintenance phase. Defects that come up after the release of the product are handled by the maintenance teams.

In most cases, maintenance teams designed to handle service requests post-product deployment are small in number. Therefore, should there be a large number of defects reported after the deployment of the software product, the maintenance team would not be well-equipped to handle the workload and become saturated with maintenance-related work. If they are unable to address all the requests coming their way in a timely manner, customer satisfaction could be threatened. Higher number of defects found after the product is in the hands of the customer can further damage customer and stakeholder relations. Furthermore, a significant number of defects could necessitate use of additional resources to help fix the defects leading to monetary losses. By use of software testing methodologies, early detection of issues is possible which helps in the maintenance phase of the product. If the product has been well tested and is of good quality, the number of defects is therefore less, and the maintenance team's job is reduced. A well tested software product is highly likely to have an exponential success rate and generate only trivial issues after it has been released in the market.

Along the same lines one can say that a product that has been thoroughly tested will generate good results. Needless to say, but to incur a gain on the financial markets, a product must be of good quality and perform exceptionally well which makes testing absolutely indispensable. A software product will do well on the market if it functions correctly and produces fewer defects (Mills, Dyer, and Linger, 1987). This can be achieved only through thorough testing. During the continuous examination by means of software testing, the product will undergo repeated testing throughout its lifecycle, weeding out unwanted bugs as and when they are detected. The product is validated and re-validated over time increasing its accuracy. More the software is tested; more it is understood and examined critically which leads to better performance. An oversimplification of this statement is – a software product that is well tested will perform well. This can only be attained by the help of software testing.

• Enhanced Product Quality: In order to realize the view of the software proposed by the client or stakeholders, it is highly desired that the system do what it is supposed to do in an efficient manner. The software development phase must correctly implement the software requirements correctly to attain the desired effect for the customer. In the end, a software product is mostly provided as a service to the customers and hence it is essential that the product delivers the value promised to the customer. This is where software quality comes into place.

Software testing is a precursor to software quality as it validates the requirements and the functioning of the software system. Tests performed in a repeated manner on the software system assure that the most common use case scenarios have been covered. This helps in providing a product that functions well and does not fail during execution. Rigorous testing ensures that scenarios of execution of the software with different inputs have been done and that the software matches its expectations. The more a software application is tested, the lesser the chances are of finding a major flaw or defect, thereby guaranteeing the quality of the product.

Furthermore, software testing can uncover hidden or tricky issues resulting in an added benefit to the overall health of the software product. Moreover, a software product that is sufficiently tested produces better results and is more reliable. Acquiring accurate results of execution is an excellent measure of the quality of the software product. The better the product is tested, the better it performs consequently improving its quality.

• **Cost Effective:** Contrary to the popular belief, software testing is successful in reducing long terms costs of a software product. The development of a software solution is a complex process made up of several stages in its life cycle. If issues or bugs are detected during the initial phases of the development cycle, the cost of rectifying the mistakes is less. As the stages of the software development process move towards release it becomes harder and costlier to correct errors. An error found after the product has been released would incur maintenance costs and costs pertaining to releasing an updated version of the software. A similar defect found in the development phase would not cost the same. Testing done at an early stage in an iterative manner is helpful in identifying all possible defects before the product is handed off to the users.

Issues found after the software product has been released incur losses that are not just of a monetary nature. In additional to reduced sales of the product due to its poor quality, if an application has several defects that are present in the final product there could be loss in terms of reputation and customer satisfaction. If customers are not satisfied with the product, they could switch to using other products of a similar nature. They could lose trust in the company and be wary of entering into a professional relationship with the same firm in the future which is less than ideal for the company.

Software testing, on the other hand, is an excellent tool for avoiding such disastrous results. It serves as a pocket-friendly approach over time. It is an investment that will benefit the project in terms of its budget and quality. Additionally, proper testing uncovers more defects which in turn reduces the maintenance costs which ends up as an economical decision in the end. The price that is paid by implementing software testing practices is definitely worth the returns acquired owing to the success of the well-tested and accurately functioning software product.

• **Customer Satisfaction:** The primal intent of designing and releasing a software product is to deliver a product that meets the expectations of the customer. The goal of the entire process of development is to provide the best possible product to the customer and ensure that he is satisfied with the product. As the customer/stakeholder is the one paying for the product, his/her

satisfaction is primordial to its success. The company providing the software product, in turn, wishes to ensure this by providing the customer the best possible experience while using their product.

The experience the customers have with the product, directly and indirectly, dictate the value of the software in the market. If the product given to the customers is of a great caliber its value will only rise in the market. If the product quality is trusted by the clients using the product, the loyalty of the clients is gained. Additionally, if the product garners more customers its success increases as chances of getting term clients rises.

A software product does not function properly more than 40% of the time fails to gain the trust of the customer. A product that does not work at all times, that has unusual behavior for the same inputs, is considered to be unstable and unreliable. Unsatisfactory experiences with the product do not help gain the customer's confidence. It is important that user's or customer's experience with the product is a good one, else they might end up looking for other products in the market. Customer's confidence can be gained if the product performs well which can only be achieved through detailed testing. Detailed and thorough testing is the only way to ensure that a customer's experience with the product is a positive one. Repeated testing of different use cases that will be executed by the customer is a good way to check if the product works as designed for the customer. Testing done in an iterative manner which is also continuous is ideally a good way to uncover defects, fix them and retest them in the next iteration. It will help reduce defects, improve the accuracy of the software system thereby paving the way for a product of good quality which the customer can trust.

• **Better Business:** Any organization providing a software product which is supposed to be released in the market is in the market to provide a service to the customers and to make profit. The market to which any software products are released is a critical place where all new products are introduced to the public. Any company that produces software products is counting on the software to do well to make profits and stay afloat as a business. As discussed in the previous point, customers do not look too kindly on software systems that do not work correctly. They might be skeptical of adopting the product if they are not completely satisfied with its performance. If the product does not do well and is disliked by its customers, there is a chance that the product fails in the market. Failure on the part of the software could result in significant losses financially. The company could end up failing and incurring a debt. If things do not go well, they might even have to shut down their operations. This usually happens in the case of start-ups or small enterprises, and financial loss is a dire outcome for such organizations.

An infallible way to assure that the company's product and in turn the company's business performs well is to test it thoroughly. This process would elevate the quality of the software product which in turn would gain the customer's support and appreciation which eventually would increase the product's global success. The only way of avoiding product failure is to ensure that the product performs well is to ensure its quality, its validity and establishing the client's trust. This can be achieved with the help of software testing. Testing the product in depth before introducing it would help deliver a system that is robust, of good quality and user friendly. This in turn, would help build long-lasting client relationships and retain the customers which would help the business stay afloat and generate profit.

# 2

## AUTOMATED SOFTWARE TESTING

CHAPTER

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This chapter introduces the concept of automated software testing. We cover the benefits of automated software testing followed by its classification and descriptions of each type of classification.

#### **2.1. INTRODUCTION**

Automated testing is the implementation of software tools to automate the manual process of reviewing and validating a software product (Dustin, Rashka, and Paul, 1999). Test automation is used to perform automation of tasks that are repetitive in nature and perform testing tasks that are difficult to perform in a manual setting. Automation Testing is a technique of software testing which follows the basic principle of software testing which is to test the product and then compare the expected results with the actual outcomes. The difference is that in case of automated testing, this process is done by means of an automation testing tool or test scripts.

Automated software testing is in most cases done by using an automation tool. This is so that the quality assurance team can focus on other tests that require manual intervention and input. Doing so will increase the test coverage and render the project scalable. The automated type of software testing is usually well matched and compatible with large-scale software development projects that require testing of the same sections again and again and projects that have already covered an initial iteration of manual testing. In the next section, we look at some advantages of automated software testing.

#### 2.2. BENEFITS OF AUTOMATION TESTING

One of the rudiments of the agile delivery process is the development of software using automation testing. The agile process aims to achieve continuous delivery of the software and automation testing is the only course of action to sustain such a continuous delivery model. Automated software testing serves to increase test coverage, reduce the testing costs, increase testing productivity, and achieve and sustain continuous delivery of the software (Collins et al., 2012).

The earliest origins of automation in the field of software testing can be linked to automation in the automotive industry in 1947 done by the company Ford that created an automation department (Groover, 2020). The automobile industry used the word 'automation' to expound the augmented use of automatic devices and controls in production lines that were mechanized. The word 'automation' was conceived in 1946 by D.S. Harder who worked as an engineering manager the Ford Motor company at that point in time (Groover, 2020). Although this is a term that is widely used in the context of manufacturing, it is also employed in other domains to describe a wide range of systems that implement a considerable amount of substitution of either electrical, mechanical, or computerized action for human intelligence and/or action.

One of the earlier works in the field of automation testing was a paper written in the year 1962 titled 'Automatic program testing' by G. Renfer presented at the 3<sup>rd</sup> conference of the Computing and Data Processing Society. This paper described the creation/programming of testing packages that would be used for standardization of test procedures and promoted efficient use of machine's time (Renfer, 1962).

In the late 1900s (1970s–1980s) the field of automation testing got more traction and test tools capable of automation soon became available ("Test automation," 2021). The field of automation testing has grown exponentially since then. Now, it is a discipline, and the evolution of this field has given birth to exciting career opportunities for students studying software engineering and professionals alike.

Automated testing in software helps the process of software development become more robust, productive, and capable of delivery in fast iterative cycles. Let us look at some of the benefits of implementing automation in software projects:

• **Reduced Long-Term Costs:** The initial cost of investing in automation testing is a little steep which is a deterrent for most companies. But contrary to popular belief, automation in software testing has proven to be worth the primary payoff. It is proven to be more cost efficient as compared to manual testing. Analysis has shown that over a period this method of testing helps you break even.

Although manual testing is needed in some cases, it does not allow the execution of tests in a repetitive manner. Manually repeating tests is more expensive, arduous, and demanding. Over time, repeating tests in a manual fashion increases the cost of testing your software application.

On the other hand, in contrast to manual testing, automated software testing is inexpensive because once the scripts for testing have been generated; they can be reused any time with incurring any supplementary costs. Despite the initial hurdles in terms of money for the adoption and implementation of automation testing, the pros of automation outweigh the cons, in this case, money. One must remember that the size and depth of adoption of automation testing determines the return on the initial investment in automation. The more one uses automation and creates tests, the higher the returns accrued. The higher the number of test cases and test suites, the better the returns on the money spent for adoption of automation.

What automation testing does is that it liberates time that could be used to focus on cases where manual testing is necessary. Larger and more challenging issues such as customer inputs, improvements, and functionalityrelated topics can be covered by the quality assurance team. Automation helps reduce the need for revising the code several times, and in due time, it pays for itself. Furthermore, every time the code of the software is changed, the automated tests can be re-executed as many times as desired with no supplementary overhead and cost. Another way to be cost-effective by using automated testing is to execute tests in a parallel manner. Instead of running the test cases or test suite or test scripts individually, one can use parallel testing, thereby allowing you to execute multiple tests that are automated at the same time. This way, considerable amount of time and effort is reduced. The sizeable reduction in terms of execution time of automated tests can then be put to good use to take care of other needs of the project.

• Faster Software Development and Delivery: Automation of testing in software allows one to execute tests that can be executed repeatedly and with speed. This will save a lot of time that would have been spent on manual testing. The testing team would not have to wait for longer periods of time to obtain the results of execution of the tests. They would obtain the results in a few hours which would help them give feedback, if any, to the development team rapidly so that they could correct the defects. Once the code is changed, rerunning the tests would incur no overhead; one must simply execute the scripts again. This not only reduces time, but all reduces the development cycle and helps release the product frequently. Owing to the rapid execution of test cases and the repeatable quality of the tests, automation easily augments the speed in which the software is developed. Key benefits of shorter testing times by the use of automation are as follows:

- i. Short Cycle of Development: As testing is faster compared to manual testing, issues are found and fixed faster, which reduces the time of a regular iteration of software development.
- **ii. Frequent Software Releases:** As testing is done at a faster rate, an iteration of the development cycle is completed in lesser time, which in turn helps release more versions of the software, which is desirable (Mantyla et al., 2015).
- iii. **Prompt Changes to the Application:** Owing to the reduced testing time, any modifications or updates to the software can be brought about in a rapid manner. Also, as the development cycle is shorter with automated testing, any changes that are implemented can also be released quickly.
- iv. Rapid Time-to-Market: As the development and testing life cycle is shortened by use of automation in the software testing process, it is no surprise that the time required to deliver the product is reduced as well (Limaye, 2019). Thanks to automated testing, the product can be delivered to market in a shorter time frame which works in the favor of the company. The use of automation in testing will boost the development process and reduce the overall waiting time to release the product into the market.
- 1. Growth in the Productivity of the Team: A distinct gain offered by automating the tests is that no individual intervention by a person is needed to execute the automated tests. This means that the tests can be executed at night in bulk or in parallel and the results can be repeated the next morning. As automated tests execute on their own and in a repeatable manner, nobody from the quality assurance team needs to be present in person and run them and monitor them. This helps plan the testing process so that automated tests are carried out at night, the results monitored early next morning, and feedback given to the development team immediately upon harvesting the results. This reduces the time spent between execution of the tests and fee-

dback given to the development team. The developers do not have to spend time testing extensively thereby saving their time and allowing them to focus on other development focused tasks. Same goes for the quality assurance engineers who can spend less time on testing and focus on tasks that need human intervention. In short, the team in general now has time to concentrate on critical tasks rather than spend their time on testing which gives their productivity and motivation a boost.

2. Test Accuracy: Automation testing reduces the human interaction and intervention into repeatable tests to a minimum. This eliminates the chances of human error that could be made by any person during the testing an application repeatedly. One must remember that executing and repeating the same tests repeatedly can become monotonous for a quality assurance engineer. The engineer can lose interest or become tired of doing the same thing over and over again which could result in him making mistakes and missing things. This can be eliminated by use of automation in software testing. With automation, there are likely to be no human errors during the process of testing as a machine would be executing the tests. The test cases that are generated by an automation tool are more precise and ideally cover all the possible scenarios which will reduce the risk of failures. In general, the tests conducted by use of automation have a high chance of being accurate. Reduced error in the testing process will lead to product releases that are free of defects.

This can also help the quality assurance team as it frees up their time to focus on critical issues. They can switch their attention from doing a repetitive and mind-numbing task to interesting critical issues such as exploratory testing, customer needs, generation of additional automation scripts and so on. The quality assurance team is free to perform manual testing on areas they feel need more inspection and attention. The benefit of using automation is that the time gained by the test engineers can be used to draw insights from the tests that might not be noticed by test automation.

**3. Higher Product Quality and Performance:** As automating testing gives us the capability of generating and executing thousands of test cases in parallel at the same time, the software application is tested extensively. The possibility of developing automated test cases increases the number of tests that can be executed thereby granting extensive coverage of the application.

As more than thousands of tests can be executed simultaneously and on different platforms and different devices, in-depth testing can be guaranteed which would result in the software being a better-quality product. Chances are that with increase in test coverage, most of the potential issues would be uncovered which means that the product would perform well. Different hardware and operating system configurations on which the software can work will be covered with ease by means of software testing. Many tests, including complex ones, can be created in a short time which leads to producing a system that is of high caliber.

4. Rapid Feedback Loop: Yet another reward of using automation in software testing is that due to the rapidity of executions of tests, the reports are obtained sooner. This means the developers receive the reports and the feedback instantly and they can then quickly set about correcting any issues found during testing. They can immediately start working on issues raised by the iteration of automation testing. They can react more quickly to the report rather than in a few weeks in case of manual testing. They do not have to wait and recall what they coded a week back as the results are received not long after the code was written and therefore it is fresh in their minds. This helps the developers maintain the context under which they wrote the code.

This is primarily of use when the software system is already released to the market. In such cases, any defects found post-deployment need to be fixed quickly and testing such defects and their fixes manually will only slow down the response time. Comparatively, when test automation is used, any changes or modifications to the system will be done quickly and the application will be released in a short span of time. This will help maintain the customer's trust. Thus, owing to the rapid feedback loop the productivity and responsiveness of the team increases, which further provides better user experience resulting in a satisfied customer.

5. Continuous Integration/Continuous Delivery and DevOps (Development and Operations): Automation testing is one of the pillars for the process of DevOps and continuous delivery of software products. Currently, most software projects implement the Continuous Integration/Continuous Delivery and DevOps practices. In a delivery pipeline that is programed to perform continuous integration and delivery of the software product, there is a need to test every little code modification (or code commit) done which is not possible unless one has automated testing. It is not feasible to test every code modification quickly and in an efficient manner when a continuous delivery pipeline is implemented where a software release is delivered several times in a week. To test the product effectively in the given time frame is next to impossible which why is automation comes in to save the day. Automation and CI/CD methodologies go hand in hand as automation helps implement development cycles that are short by allowing the quality assurance team to test each delivery/version of the product rapidly. This way the product is tested after every change in an efficient and fast-paced manner. By using automation testing the implementation of CI/CD and DevOps practices becomes effortless.

### **2.3. TYPES OF AUTOMATION TESTS IN SOFTWARE**

To decide the automation test suite that you wish to implement in a particular project, it is important to know the type of the automation test that you wish to include in your project. The type of automation test helps define the test suite that the project will implement. Depending on your software application there are different types of testing that could be potentially automated.

Automation of tests can be classified in different ways based on the type of functional testing, the type of testing (unit testing, regression testing, etc.), or the phase of software development life cycle.

#### 2.3.1. Automation Based on Type of Functional Testing

- 1. Functional Test Automation: Automated tests can be designed based on the functionality of the application under test (Polo et al., 2013). Functional testing is used to test the business logic of the software system (Beizer, 1995). The logic with which the system is implemented is tested using functional testing which means that this type of testing can be automated as well. Automation of functional tests would entail the writing of scripts that validate the business logic of the system. The test script meant for automation must also be capable of validating the functionality that is expected from the application.
- 2. Non-Functional Test Automation: Another way in which one can decide the automated test suite is to base the tests on

non-functional aspects of the project. Non-functional tests are used to test the non-functional parameters or requirements of the software project. Non-functional parameters consist of parameters such as performance, database, scalability, security, etc. These requirements are static in nature which makes it easier for them to be included in automated tests. Such requirements can remain static or constant for the test suites or they can also be scaled depending on the size of the software application and the hardware and/or operating system requirements.

#### 2.3.2. Automation Based on Type of Testing

There exist several types of testing such as unit testing, regression testing, smoke testing, integration testing, security testing, etc. (Beizer, 2003).

Some of these types of tests that can be automated are:

• Unit Tests: It is one of the most common tests used and run by developers. A unit is nothing but a test that is used to test a particular part or particular functionality implemented by a certain part of code (Pugh and Ayewah, 2007). In short, a unit can be anything from a small method to a function. The gist is that the unit performs a single functionality that needs to be tested. A unit test is a script that tests a specific code by means of initializing it, calling the different methods and functions in the code, and checking the values returned by the method or function.

Unit tests are generally written by developers/programers locally as a part of the standard TDD (test driven development) practices. Most of the unit test are built to test the code of the software application and are usually in built in the code of the software itself. Unit tests are written by the developers but in recent times automation engineers or testers may be required to write them as well. Such tests are used by developers to check if the particular code behaves as it is supposed to without errors. Executing a unit test and obtaining a positive result (no defects) means that the code compiles well, that it does not have issues and that it is working as designed. Unit tests do not target complicated and highly functional aspects of the software application because they usually target just the code. This makes it easier for one to automate these tests. The developer can just write the tests and execute them whenever he wants.

• **Integration Tests:** This is the test that verifies whether all the modules function correctly once integrated with one another. This

type of testing is used to test the software system by combining all the modules or integrating all the modules and sub-modules and checking whether the functionality desired is achieved after the amalgamation (Beizer, 2003). An integration test, in most cases, is a code level script which means that when writing such a test we do not run the user interface (UI). An integration test tests the entire process that involves several objects that interact with one another.

Integration testing can be done through different means such as through API testing or by use of mocking. An integration test would require a little more work for its creation as the test team has to set up a lot of data and consider complex processes and how different modules interact with one another. This test might also require a mock database. Although the initial configuration for an integration test is a little high, once automated, it is very easy to add new modules to the software and test their integration. Therefore, an integration test is considered to be good candidate for automation. Additionally, to eliminate the initial effort required, one can always make use of automation frameworks that reduce the initial workload.

• **Smoke Tests:** These are tests that are performed to ensure the stability of the software application. It is used to guarantee that the core functionality provided by the software is working as expected (Chauhan and Kumar, 2014). This is a type of a functional test that covers the important and crucial functions of the software. This type of test is carried out to guarantee that the application can be tested additionally does not 'catch fire' which is where the name 'Smoke Test' comes from. Smoke tests are generally tests that are run after the application build is done (Antunes and Vieira, 2012). This means that after a full build is done, smoke tests are run to check if the application still works at its core before any more tests are run. This helps determine issues in the application early in the development cycle.

Usually, smoke tests are not large in number which means that the test suite would be small as well because only the core functionalities are tested. But, as smoke tests are executed after every build, they are executed several times. Hence, it is another prime candidate for automation. Since it is repetitive in nature, automation will reduce the manual labor required to perform the smoke tests. It makes sense to automate smoke tests as they are a precursor to any further testing that needs to be performed by the quality assurance team. Smoke tests are functional in nature and based on the type

of software application being developed, critical features and paths can be outlined to be tested and automated by the quality assurance team (Chauhan and Kumar, 2014).

• **Regression Tests:** It is the test that is done when a new module/ component is added to check that the new module has not impacted the existing modules in any way. It is a test that makes sure that the new addition to the software has not affected the existing modules and their features in any way (Beizer, 2003). In other words, this test ensures that the old code works exactly the way it worked before without any issues or 'regressions.' This test is usually performed to ensure the validity of the application after new changes have been added to it.

Regression tests are usually performed once a new module has been added to the software system and been tested on its own. Unlike integration testing which is carried out to check the functionality of different modules with each other, regression testing is performed to check if old defects have been reintroduced into the software application after some code changes have taken place. This test is ordinarily done after the new modules have been tested on its own which means that it is executed after every iteration of the test process. As regression tests are performed quite often, they are one of tests that can be easily automated. As regression tests are repeated in each iteration where the main tests stay the same and a few tests are added after each new module is tested, it is usually automated. Due to frequency of execution of regression tests, most quality assurance teams try to automate them.

• Security Tests: These are usually functional and non-functional type of tests that check the software system for any vulnerabilities. Security tests are done to uncover any weaknesses in the system. They reveal potential areas of weakness in the software application that can be exploited by someone with a malicious intent. In most cases, security is critical to the acceptance of the software application. It is done to ensure that that software application being built is robust. This type of testing covers a wide range of parameters such as authorization, authentication, safety protocols, etc., that are used to test the system and help enhance its security and increase robustness. The goal is to uncover signs of weakness in the system.

The security tests may vary from application to application, but based on the system being built, a set of security tests tailored for the system under consideration can be proposed and executed. As such tests are usually static in nature and would not change regularly, they can be easily automated. The ways in which one tests the basic authentication and authorization of a software application is a testing standard and hence security tests can be automated with ease (Potter and McGraw, 2004).

• **Performance Tests:** It is a non-functional type of test that aims to test the response of the software under test. This testing is one of the most frequently implemented testing techniques amongst all the different non-functional testing. A performance test aims to observe the way the software application responds under normal conditions. The intent is to check if the expected network load is handled well by the system and that the performance falls under acceptable standards. For instance, the response time to open a website should ideally not be longer than a minute under normal circumstances. If it takes more than a minute, it means that it does not respond well to the load it receives. The load that can be handled by the system is tested using performance tests. Responsiveness and stability of the software to handle its regular influx of requests is measured and evaluated by performance tests.

In most cases, the expected system load and expected responsiveness of the software is already determined before the development has started. Performance tests determine whether the system responds the way it is supposed to respond under regular working conditions. The parameters are usually pre-defined and do not vary that much making performance tests a good pick for automation.

• Acceptance Tests: These are tests that evaluate the software system based on its functionalities, its behavior, and capabilities. In short, these tests inspect the software system for its readiness to be deployed and released to the market. This test checks whether the business needs of the client are satisfied by the system. Acceptance testing implies that the system is ready to be evaluated by the potential users of the system (Humble and Farley, 2010). It entails the testing of the acceptability of the system by the end-user or the business user. The software application is tested and evaluated by means of acceptance tests, and it is decided by the stakeholders/clients/customers whether

the software application is acceptable for the purpose of the final delivery or not. Acceptance testing is additionally used to establish the conformity of the terms of the contract and legal requirements by the software system. Whether the software system satisfies its legal and regulatory needs/standards is checked at this point of testing, and an informed decision is made. A variety of things are tested here, such as the end user's acceptance, the contractual or legal acceptance, the operational acceptance, and in some cases, alpha and beta acceptance tests are carried out too.

The validity of the software system for real-time uses by a real-world user in a target or simulated environment is performed in the case of acceptance tests. The idea behind executing these tests is to assure that the software application works the way it is supposed to and that it meets the needs of the user. This type of test serves to ensure that the user can execute the business processes seamlessly without complications. The intent is to guarantee that the end-user/customer can interact with the software system in a hasslefree and consistent manner. The software system is tested for acceptance and validation of its requirements and to ensure that it works as mentioned in the contract. The legal and contractual testing focuses on verifying that the software system complies to the agreed-upon criteria of acceptance as documented in the contract. Acceptance test focuses on the software and makes sure that the ensure that regulatory standards at regional and national level have been met by the software.

In simpler terms, acceptance tests are highly functional tests that determine how acceptable the software is to the end-users (Humble and Farley, 2010). This test is usually the final step in the testing process before the software can be released. As acceptance criteria is pre-defined in the contract, these tests can be thought of and determined quite early in the software development phase. This makes it a good test for automation. As the criteria for acceptance will already be known prior to the start of development, the test cases and the test suite for acceptance can be prepared in advance and hence easily automated which would reduce the load on the quality assurance team.

#### 2.3.3. Phase of Testing

Another way or type of automation is automation that is performed based on the phase of software testing. The primary phases where testing can be automated are:

- 1. Unit Testing Phase: As can be inferred from the name 'unit testing,' this phase of testing focuses on testing and evaluating individual units or components of a software application (Beizer, 2003). Unit tests are executed during the course of development, ideally by the development team before they hand over the system to the quality assurance for testing. Unit testing is usually done manually by the development team (Beizer, 2003). This phase of testing is ordinarily the first phase of testing which is done mostly manually. But, with a little planning and discussion, it can also be automated.
- Application Programming Interface (API) Testing Phase: It 2. tests the business layer of the software application under test. Software applications that are built on APIs and that support API architecture usually employ API testing (Bangare et al., 2012). Any software system that is based on API architecture can implement API testing. This type of testing is meant to validate the business layer of the software system by inspecting the response time of the APIs used in the application for all the requests. Several test combinations of request-response for various APIs that the application in built on are executed. APIs are akin to middlemen that connects different systems used by the software application in a smooth manner. Due to its nature, API testing is usually done after the software development is complete to guarantee that a smooth integration within the systems and the software under test. API testing is a flexible process which could be conducted prior or after the UI Testing phase. As API tests are of a typically fixed nature that follows the theme of request-response, it is an excellent contender for automation. As API testing is like integration testing, some teams include API testing within their integration tests.
- **3.** User Interface (UI) Testing Phase: This phase is the last phase of testing in case of a large group of software projects. The UI is the what the customers/users interact with and hence is an important part of the testing process. UI testing is carried out by quality assurance engineers or testers after the application has been deemed to be stable by the other tests (McGraw and Hovemeyer, 1996). This phase focuses on examining the frontend of the software, its functionality and the look and feel of the application. This phase is focused on replicating the most

authentic user experience in a test environment and finding any issues when a potential user interacts with the system. UI testing is a functional test where the business logic is examined and evaluated. The functionality and the UI elements or the frontend of software system are tested tests (McGraw and Hovemeyer, 1996). The idea is to mimic a real-life scenario of use of the software system and find any underlying issues in the working of the software.

The UI tests can be automated as the scenarios are known to the quality assurance team. Based on the specifications of the software system, UI acceptance criteria can be defined at the time of validation of the software design and updated after each iteration of the development cycle in case of an agile process. An agile process can be useful when UI tests need to be automated. Currently, automation of the UI tests is a practice that is commonplace due to advanced software practices that help automation tests.

Now that we have covered different types of automation testing, we shall delve in different software tools that can be used for the process of automation testing in the next section.

## 2.4. DIFFERENT AUTOMATION TESTING SOFTWARE

In this section we list some of the commonly used software for automation testing.

Name	Brief Description						
Selenium	It is an open-source automation testing platform that is recom- mended for automation testing of web projects.						
Katalon Studio	It is a commercial automation testing tool that can be used for testing API, web applications and mobile applications. Access to the studio is free for individuals but the enterprise version is priced.						
Ranorex	It is a commercial automation testing tool that helps automate web applications, standalone applications, and mobile ap- plications.						
HP UFT (QTP)	UFT (previously known as QTP) is a licensed, paid automa- tion testing tool that can automate Web, Desktop, Mobile, Oracle, SAP, and Java applications. This tool is known for its cross-browser testing capabilities.						
Watir	This is an open-source library developed in Ruby language which can be used to automate web applications.						

Telerik Test Studio	Telerik Test Studio is a licensed, paid automation tool which is used to test desktop, web, and mobile applications.
Appium	It is an open-source test automation framework that can be used for testing native applications, mobile applications, and hybrid applications.
Serenity	It is a free open-source library that aids in writing automated acceptance tests.
TestComplete	TestComplete is an automation test tool for GUI testing and is capable of testing desktop, web, and mobile applications ( <i>TestComplete</i> , 2022).
Silk Test	Silk test is a licensed automation tool for functional and regression testing developed by microfocus which supports cross-browser testing and can test desktop applications, web applications, mobile applications, web applications, enterprise applications and rich client applications.

Over the next chapters, we will study the following three automation testing tools: Katalon Studio, Watir, and Ranorex Studio.

# CHAPTER 3

### **KATALON STUDIO**

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In this chapter, we cover the automation tool Katalon Studio. This chapter introduces Katalon Studio, covers its installation process, and them demonstrates its use.

#### **3.1. INTRODUCTION**

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Katalon Studio is a robust and easy-to-use automation tool which was initially released in January 2015. It was first released with an engine that was selenium-based. It is an automation testing tool that was designed to create scripts for automation without having to code. The platform is a simple and straightforward tool for automation that does not require in depth knowledge of programming. It is an excellent automation tool that supports testing on multiple platforms and allows execution of automated GUI tests. Additionally, this platform permits execution of tests on a variety of operating systems (Eriez, 2009).

Katalon studio offers desktop, API, Mobile, and Web solutions. Katalon studio offers an excellent IDE that is easy to use and generate automated test scripts (Eriez, 2009). It was initially released as a free solution but now boasts of an Enterprise version that was introduced to provide additional options. But the basic Katalon Studio version that was intended for individual users still is free of charge (Katalon | Simplify Web, API, Mobile, Desktop Automated Tests, 2022). In the upcoming section, we shall look at the process to install Katalon Studio on your machine.

#### **3.2. INSTALLATION**

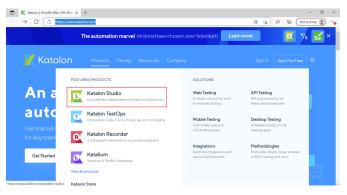
Katalon Studio is very easy to install on any machine of your choice. Here, we install the version designed for individual users on a 64-bit Windows 10 operating system.

The steps followed are as follows:

• First, navigate to the Katalon studio website: Katalon | Simplify Web, API, Mobile, Desktop Automated Tests.

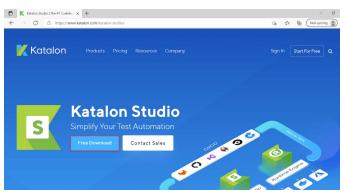


Go to Products and select the product 'Katalon Studio'



• Select the free download option.

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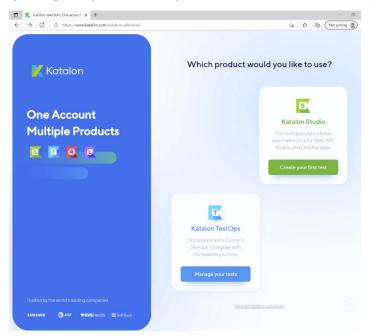


• The site will prompt you to create a free account.

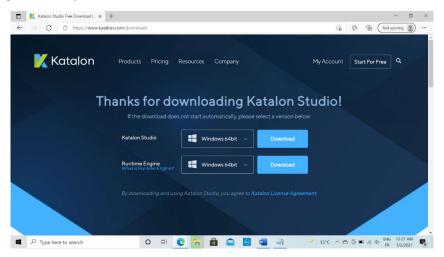
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	Get started

We create an account and click on the 'Get Started!' button. You will receive an email asking you to verify your account. Once your account is verified, you can log into your account.

Once you log into your account you are directed to the following page:



Two options are provided namely Katalon Studio and Katalon TestOps. We will be focusing on Katalon Studio in this book. Hence, we click on the link that says, 'Create your first test' ('Create Your First Test,' 2022). This will redirect us to the download page where the download will begin instantly.



Once the download terminates, extract the package, and start the installation by clicking on 'katalon.exe' which will launch the tool.

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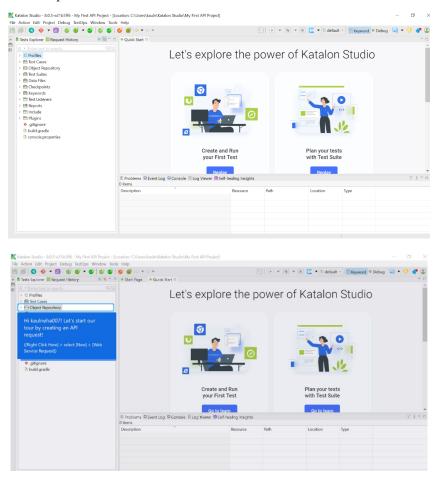
To activate Katalon studio, you will need to enter the credentials that you used when signing up for the free account (Eriez, 2019).

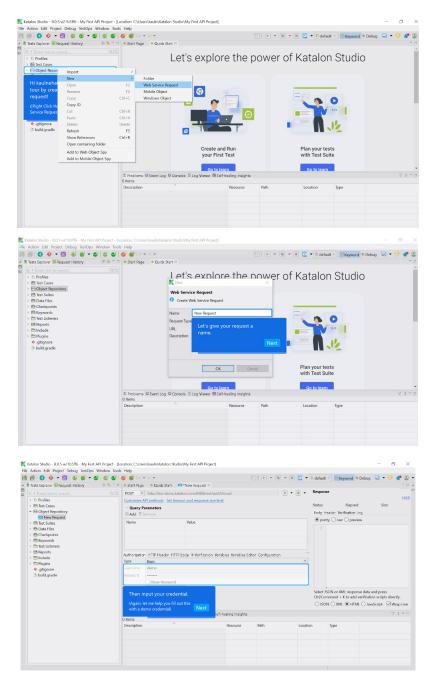
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Once the product has been activated, the **Quick Guide** screen is displayed which guides you through the significant features.

At the end of the introduction, Katalon Studio suggests creating a new project which we follow. Then, we proceed to creating and running a test case as prompted by the quick guide by clicking on 'Create and Run your First Test.'

The steps followed are:





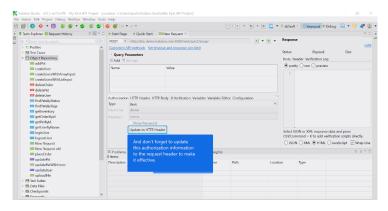
You are prompted to configure the endpoint. A simple POST request is configured.

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Further, we can set up authorization for granting access to the request. We choose basic type of authorization.

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We proceed to update the authorization information to the header.



We click on the HTTP header tab to check if the header has been updated.

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The headers tab can be used to add additional headers. Once the header is verified, we are prompted to check the request body.

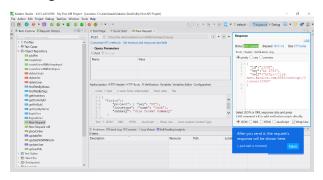
As shown in the screenshot below, the request body is in a simple JSON form.

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Now that the basic parameters of the request are in order, we save the request, and we can simply execute the API to test if it works. We click on the play button at the top right corner of the request screen to execute the request.

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The response is shown in the response tab located right next to the request tab on its right.

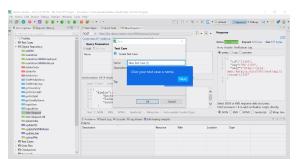


As we can see, we receive a proper response to the request.

We are now further prompted to add this test case to a test suite. Adding to a test suite allows us more control over the test cases.

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We click on the '+' button to create a new test suite and add this test case to the test suite.



We provide a name for the test suite and proceed.

The editor view of the test suite is presented, which allows to configure the test suite.

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We are directed to check the script view of the test suite. Here, we can see the code that is generated when a test suite is created. If you wish to program the suite in a specific way, it can be done from the script view.

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We do not make any changes to the script and save the test suite. We now proceed to execute the test suite by clicking on the play button at the top as shown in the screenshot below:

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The results of the test suite are shown in the log viewer section at the bottom of the screen.

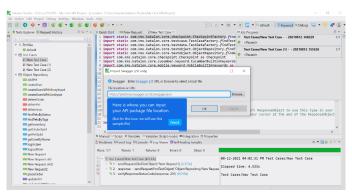
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Once the test has been completed, we check if the request was sent correctly by looking at test case results. We can see that the request was sent correctly, and that the status code of the response was 201(OK).

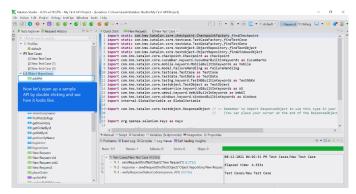
We proceed to importing multiple requests from another source. We go to the 'Import API' tab and click on 'OpenApi2' to open a sample API from the sample source files.

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We are led to a window that asks for the file location to import the API. A pre-defined link is provided for the purpose of the demonstration. We click on OK to import the API.



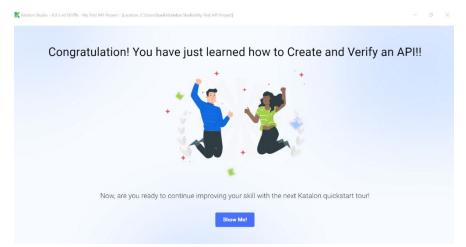
The addPet API is imported successfully into our repository. We doubleclick to open the sample API we just imported.



As we can see from the screenshot below, the newly imported API looks like the API we created and ran previously.

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ica delotePet		except they we					
Kall deleteUser		from your curr					
IndPetsByStatus IndPetsByTags		environments					
a getinventory		SoapUI or Swa				Select JSON or XML response data and	
a getOrderByld						Ctrl/Command + K to add verification s	cripts directly.
getPetByld						O ISON O XML @ HTML O JavaSo	.ipt 🗹 Wrap Line
setUserByName		T Backlane D Front	og @Corsole = Log Viewe	Of all heading headship			
loginUser		C PIODERS VEVENIL	og Console in tog viewe	a serviceing insigns			
logoutUser		Runs: 1/1 Pass	ies: 1 Follures: 0	Errors: 0 Skips: 0			
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III New Request old			equest/fincTestObject/New R	equest") (2.373x)			
III New Request2				et("Object Repository/New Reque	Elapsed time: 4.5	336	
= placeOrder		Tel To 3 - verifyR	esponseStatusCode/respons	a, 201) (0.010s)	Test Cases/New Te	st Case	
updatePet	~						
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This ends the demonstration, and we can click on the 'Clap!' button to advance to the end.



Additional tours are provided by Katalon that can be followed to learn how to create tests for different types of solutions such as web, API, and mobile.

The Quick Guide menu can be accessed again later from the Help menu (Help  $\rightarrow$  Quick Start Page). In the next section, we shall look at a few examples that demonstrate how to use Katalon studio for developing test cases and test suites for web services.

#### **3.3. PRACTICAL IMPLEMENTATIONS/EXAMPLES**

In this section, we learn how to use Katalon Studio with the help of some examples.

• Example 1: Rest API Testing Using Katalon Studio: In this example, we learn how to automate testing of restful web services using Katalon Studio. We use a dummy rest API that is freely available – JSONPlaceholder – Free Fake REST API (typicode. com) (JSONPlaceholder – Free Fake REST API, 2022).

It is an online REST API provider that one can use whenever test/ dummy data is needed in your project (JSONPlaceholder – Free Fake REST API, 2022).

The steps to test restful web services are as follows:

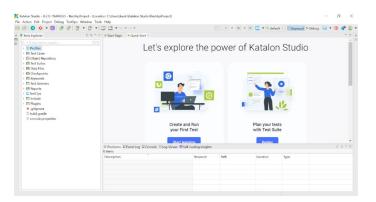
1. Open Katalon studio and create a new project.

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THE	New	lestops window loo			Project	1
	New Sample Project Open Project Import Selenium IDE Project		> Ctrl+O		Folder Test Case	
	Clean up Save Save All Import Settings Import Ketwords		,		Web Service Request Test Data Package	
	RestAPIProject FirstRestAPIProject My First API Project	C:\Users\kauln\Katal	atalon Studio\RestAPIProject on Studio\FirstRestAPIProject n Studio\My First API Project		Groovy Script	
0	Quit  Quit  Cuite  Cuite Cuite Cuite  Cuite Cuite  Cuite					
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2. Create a new web project.

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lew Project						
Please enter proje	ect informat	ion				
Name	RestApiPro	oject				
Туре	• Web	O API/Web Service	◯ Desktop	⊖ Generic		0
Project	Blank					~
Repository URL						
Location	C:\Users\k	auln\Katalon Studio			Bro	wse
						^
Description						
	Generat	e .gitignore file				
		e build.gradle file				
			C	ιK	Cance	

Enter a name for the project and click on the OK button. The project is created as shown below:



3. We now add the rest API to the project. To add the restful API to this project, right click on object repository, then go to New  $\rightarrow$  Web service request.

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		Add to Web Object Spy Add to Mobile Object Sp	w		your First Test		with Test Su	te			
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4. The following window prompt for entering the details of the Web service request pops up.

K New	>	<
Web Servic	e Request	
1 Create W	eb Service Request	
Name	GetUsers	
Request Type	RESTful	~
URL	URL	
Description	,	^
		1
	OK Cancel	

In this example, we will be using the 'users' resource from the online rest API provider JSONPaceHolder. Hence, we give the name 'GetUsers.'

We select the type of Request, RESTful in our case. We can also provide the API URL (URL of the dummy REST API). The URL could be left blank at this step.

We click 'OK' to create the request.

The request is created as shown below:

Tests Explorer	E % * 0	GetUsers 🗄										
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		Description			Resource	Path	Locat	ion	Type			

5. We now edit the request to update the URL, http method and other API-related details.

	alon Studio - 8.2.0 19d49265 - RestApiProj Iction Edit Project Debug TestOps Wir			auln\Katalon Studio\Rest	ApiProject)							-	o i	×
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ə 📘	lests Explorer	E 🖏 🗆 🗉	GetUsers	52									~ :	
88			GET Y	https://jsonplacehold	er.typicode.com/users			<b>&gt;</b> • • •	Respon	se				
	D Profiles		Customize A	P1 methods Set timeor	at and response size limit								HA	\$
	🖽 Test Cases		· Query P	arameters					Status:	Bapsec		Sizes		
	Diject Repository		⊞ Add T⊺						Body H	eader Verification I	og			
	GetUsers Test Suites		Name		Value				pret	ty 🔿 raw 🔿 previ	/iew			
	Data Files		TYNITH!		10124									
	Checkpoints     Exception     Keywords     Test Listeners													
	E Reports		Authorizatio	Authorization HTTP Header HTTP Body 12 Verification Variables Variables Editor Configuration										
	TestOps Include		Type											
	Plugins			Update to HTTP Head	21									
	.gitignore													
	D build.gradle													
	console.properties													
										SON or XML respon mmand + K to add			inactive	
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			2 Problems 0 items		≥ ELog Viewer BSelf-h	ealing Insights							812:	
			Description			Resource	Path	Loc	ation	Type				

Here, we have updated the URL to https://jsonplaceholder.typicode. com/users, which is the GET request that gets all the users' information as follows:

[ { "id": 1,

```
"name": "Leanne Graham",
"username": "Bret",
"email": "Sincere@april.biz",
"address": {
"street": "Kulas Light",
"suite": "Apt. 556",
"city": "Gwenborough",
"zipcode": "92998-3874",
"geo": {
"lat": "-37.3159",
"lng": "81.1496"
}
},
"phone": "1-770-736-8031 x56442",
"website": "hildegard.org",
"company": {
"name": "Romaguera-Crona",
"catchPhrase": "Multi-layered client-server neural-net",
"bs": "harness real-time e-markets"
}
},
ł
"id": 2,
"name": "Ervin Howell",
"username": "Antonette",
"email": "Shanna@melissa.tv",
"address": {
"street": "Victor Plains",
"suite": "Suite 879",
"city": "Wisokyburgh",
"zipcode": "90566-7771",
```

```
"geo": {
"lat": "-43.9509",
"lng": "-34.4618"
}
},
"phone": "010-692-6593 x09125",
"website": "anastasia.net",
"company": {
"name": "Deckow-Crist",
"catchPhrase": "Proactive didactic contingency",
"bs": "synergize scalable supply-chains"
}
},
ł
"id": 3,
"name": "Clementine Bauch",
"username": "Samantha",
"email": "Nathan@yesenia.net",
"address": {
"street": "Douglas Extension",
"suite": "Suite 847",
"city": "McKenziehaven",
"zipcode": "59590-4157",
"geo": {
"lat": "-68.6102",
"lng": "-47.0653"
}
},
"phone": "1-463-123-4447",
"website": "ramiro.info",
"company": {
```

```
"name": "Romaguera-Jacobson",
"catchPhrase": "Face to face bifurcated interface",
"bs": "e-enable strategic applications"
}
},
ł
"id": 4,
"name": "Patricia Lebsack",
"username": "Karianne",
"email": "Julianne.OConner@kory.org",
"address": {
"street": "Hoeger Mall",
"suite": "Apt. 692",
"city": "South Elvis",
"zipcode": "53919-4257",
"geo": {
"lat": "29.4572",
"lng": "-164.2990"
}
},
"phone": "493-170-9623 x156",
"website": "kale.biz",
"company": {
"name": "Robel-Corkery",
"catchPhrase": "Multi-tiered zero tolerance productivity",
"bs": "transition cutting-edge web services"
}
},
ł
"id": 5,
"name": "Chelsey Dietrich",
```

```
"username": "Kamren",
"email": "Lucio Hettinger@annie.ca",
"address": {
"street": "Skiles Walks",
"suite": "Suite 351",
"city": "Roscoeview",
"zipcode": "33263",
"geo": {
"lat": "-31.8129",
"lng": "62.5342"
}
},
"phone": "(254)954-1289",
"website": "demarco.info",
"company": {
"name": "Keebler LLC",
"catchPhrase": "User-centric fault-tolerant solution",
"bs": "revolutionize end-to-end systems"
}
},
ł
"id": 6,
"name": "Mrs. Dennis Schulist",
"username": "Leopoldo Corkery",
"email": "Karley Dach@jasper.info",
"address": {
"street": "Norberto Crossing",
"suite": "Apt. 950",
"city": "South Christy",
"zipcode": "23505-1337",
"geo": {
```

```
"lat": "-71.4197",
"lng": "71.7478"
}
},
"phone": "1-477-935-8478 x6430",
"website": "ola.org",
"company": {
"name": "Considine-Lockman",
"catchPhrase": "Synchronized bottom-line interface",
"bs": "e-enable innovative applications"
}
},
ł
"id": 7,
"name": "Kurtis Weissnat",
"username": "Elwyn.Skiles",
"email": "Telly.Hoeger@billy.biz",
"address": {
"street": "Rex Trail",
"suite": "Suite 280",
"city": "Howemouth",
"zipcode": "58804-1099",
"geo": {
"lat": "24.8918",
"lng": "21.8984"
}
},
"phone": "210.067.6132",
"website": "elvis.io",
"company": {
"name": "Johns Group",
```

```
"catchPhrase": "Configurable multimedia task-force",
"bs": "generate enterprise e-tailers"
}
},
"id": 8.
"name": "Nicholas Runolfsdottir V",
"username": "Maxime_Nienow",
"email": "Sherwood@rosamond.me",
"address": {
"street": "Ellsworth Summit",
"suite": "Suite 729",
"city": "Aliyaview",
"zipcode": "45169",
"geo": {
"lat": "-14.3990",
"lng": "-120.7677"
}
},
"phone": "586.493.6943 x140",
"website": "jacynthe.com",
"company": {
"name": "Abernathy Group",
"catchPhrase": "Implemented secondary concept",
"bs": "e-enable extensible e-tailers"
}
},
"id": 9,
"name": "Glenna Reichert",
"username": "Delphine",
```

```
"email": "Chaim McDermott@dana.io",
"address": {
"street": "Dayna Park",
"suite": "Suite 449",
"city": "Bartholomebury",
"zipcode": "76495-3109",
"geo": {
"lat": "24.6463",
"lng": "-168.8889"
}
},
"phone": "(775)976-6794 x41206",
"website": "conrad.com",
"company": {
"name": "Yost and Sons",
"catchPhrase": "Switchable contextually-based project",
"bs": "aggregate real-time technologies"
}
},
{
"id": 10,
"name": "Clementina DuBuque",
"username": "Moriah.Stanton",
"email": "Rey.Padberg@karina.biz",
"address": {
"street": "Kattie Turnpike",
"suite": "Suite 198",
"city": "Lebsackbury",
"zipcode": "31428-2261",
"geo": {
"lat": "-38.2386",
```

```
"lng": "57.2232"
}
},
"phone": "024-648-3804",
"website": "ambrose.net",
"company": {
"name": "Hoeger LLC",
"catchPhrase": "Centralized empowering task-force",
"bs": "target end-to-end models"
}
]
```

This dummy REST API returns a record of 10 users.

In addition to the URL, we can edit other information such as Authorization, HTTP Headers, Request Body, etc. Since this is a dummy API there is no authorization information entered. But, in real-life cases, this information should ideally be provided.

6. To test this URL, we simply click on the play button located right next to URL.

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		Description	^		Resource	Path	Lo	ation	Туре			

7. The response of the Request is shown in the 'Response' section on the right end.

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i: • Enter test to search > □ Profiles > □ Tost Cases ■ Object Repository ■ Coljects		Customize	<ul> <li>https://jsonplacehole</li> <li>API methods Set times</li> <li>Parameters</li> <li>Remove</li> </ul>		nit		• • • •	Response     Status 200 016     Bapsed: 641 ms     Size: 992 b     Body Header Verification Log     © pretty Oran O preview			
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		III Problem 0 items Description	s © Event Log © Conso	le ≣Log Viewer 🖾 Se	F-healing Insights Resource	Path	Locat		) XML () HT	ML O JavaScript	Vrap Lir

We can expand the Response window to see the response details as follows:

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	+ + Response		
stomize API methods Set timeout and response size limit	Status 800.00 Elapsed: 641 ms Size: 992 bytes	1	HAR
Query Parameters	Body Header Verification Log		
add Liternove Value	pretty      raw      preview		
thorization   @ Verification Variables Variables Fd., Configuration	<pre>2 { ( signal ).</pre>		
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We can confirm that the status of the request is OK (return code 200), and that the response contains the data from the 'users' resource from JSONPlaceHolder.

The response can be viewed in different formats such as XML, html, and JavaScript.

8. Our API request is set; the next step is to create a Test case for the API. To create a test case for this REST API, we go to Project Section, right-click on 'Test Cases' and select New → Test Case.

Tests Explorer		3 • 🖾 🖾 •			• 🐵 • 🔟 🛄 • 🛛 detau	At 🕤 🔤 Keyword 🍬 Debug 🖳 🗌	00	*
i leso opiorei	E	😫 🗥 🗆 🖬 GetUse	HS <sup>22</sup>					
		Q C GET	https://jsonplaceholder.typ	👻 🕂 👻 Response				
> D Profiles		Customiz	e API methods					
> 🗂 Test Cas	New	> Fr	ider e size limit	Status: 200 OK	Elapsed:641 ms	Size:992 bytes		
✓	Open		st Case	Body Header Verification	Log			
GetU	Rename		T Remove	pretty      raw      prev	iew			
> El lest Suit	Сору	CHUC		1.41				
>  Checkpc	Copy ID	lame	Value	2 * 1				
> E Keyword	Cut	Cul+X		3 "id": 1,	"Leanne Graham",			
> Tiest Liste	Paste	Ctrl+V		5 "usernar	" "Bret",			
> El Reports	Delete			6 "email":	"Sincere@april.biz"			
> C TestOps	Befresh	ES thorizat	tion Variables Variables Ed., Configure		": ( t": "Kulas Light",			
> 🛅 Include	Shraw References	Ctrl+B		9 "suite	"Apt. 556".			
> Ett Plugins	Open containing folder	Curra ye	No Authorization		"Gwenborough"			
🔶 .gitignor 🔔			Update to HTTP Header	11 zipoc 12 geo :	de": "92998-3874",			
B build.gradk				13 "lat	"-37.3159",			
	sperties			14 O . "Ing	* "81.1496"			
Console.pro				Select ISON or XML respo	nse data and press Ctrl/Commar	nd + K to add verification scripts dire	ctly.	
El console.pro					AL O JavaScript Wrap Line			
El console.pro								
El console.pro					a Charlotter E map our			
El console.pro			ns 🔍 Event Log 🔍 Console 🗏 Log Vie		a Charlotter E hispon			1
El console.pro		0 items		ewer 🗟 Self-healing Insights				1
H console.pro					Location	Туре		1
El console pro		0 items		ewer 🗟 Self-healing Insights		Туре		1

The following window requesting the basic details of the new test case is displayed:

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Test Case		
1 Create	fest Case	
Name		
Description		^
		~
Тад		
	OK Cancel	

We provide a name for the test case.

🔀 New		×
Test Case		
1 Create	Test Case	
Name	GetUserDataTest	
Description		^
		~
Тад		
	OK	Cancel

Once the name has been entered, click on 'OK' to create the test case. The test case is created as shown below:

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Tests Explorer	E % F 0	* Start Page * Qui	ck Start 🛛 🔤 GetUsers	#I GetUserDataTest ≈		-
		🗄 Add 💌 🔍 Recent	keywords 💌 🗉 Delete	I Move up I Move down If Edit tags	© Set default view	🐵 Add to test suite 💌 🗳 View Test Run Histor
		Item	Object		Ovigut	Devolption
		* Manual @ Script 3	Variables Variables (S</td <td>cript mode) #Integration # Properties</td> <td></td> <td></td>	cript mode) #Integration # Properties		
			.og © Console ≣ Log V ses:1 Failures:0	iewer 🖾 Self-healing Insights Errors: 0 Skips: 0		0 • <b>H</b> ê i ~
			lesponseStatusCode(get)	est(findTestObject("GetUsers")) (1.557s) JsersResponse, 200) (0.013s)	12-27-2021 02:36:35 Elapsed time: 2.228 Test Cases/GetUserD	

9. We now provide different parameters to test the API.

In this example, we provide three keywords/parameters that we use to test the API and its response. Keywords are like test parameters that can be used to program/configure the test case.

To add keywords, we click on the 'Add' button and click on 'Web Service Keywords' as follows:

I change in the state state and a state of the state	lests Explorer	E % = 0	GetUsers El GetUserDataTest 8							
1 Politik     1 Politik				uter a	More un El	Monan down	a clause di ca	default date	Add to test as	to 👻 🔽 Maar Test Pup Likte
2. Problems © Event Log © Console ≅ Log Viewer @ Set-healing Insights 7 1 = 0 items			Veb UI Kryword Mobile Kryword Cuarnier Kryword Call Karlow Call Karl Carlow Call Karl Carl Decision-making Statements Exception Handling Statements Exception Handling Statements Einary Statement Aster Statement Method Call Statement	>					Add to test su	do - La Yiew Root Ruin Histo
The second			™ Manual ☉ Script X Variables ☉ Varia	bles (Scr	ipt mode) 🛤 h	ntegration II	Properties			
Description Resource Path Location Type				Log Vies	wer 🔞 Self-hez	ling Insights				91-
			Description			Resource	Path	Location	Туре	

When we click on this, a new entry is added to our test case, and we can select the keyword of our choice from the drop-down list.

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fests Explorer	🖲 😒 — O	* Start Page * Quic	: Start 🚥 GetUsers	E *GetUserDataTes					
		B Add 💌 🛛 Recent I	reywords 💌 🗏 Delete	🗄 Move up 🗏 Move	down if Edit tag	© Set default view	Add to	test suite 💌 🗳 View Test Run Hist	
© Profiles		Item	Object	Input	Output	Descriptio	n		
El GettikerDataTest		Comment	~						
Cettbors     Texture     Data Hes     Data Hes     Deta Hes     Deta Hes     Detapoints     Keywords     NetUpents     TextUpent     TextUpent     Detapoints     Deta		Contains String Delay Get Ulement Prop Get Ulement Cou Get Har File Gene Get Response Sta Send Request Send Request Send Request An Set Har File Gene Verity Checkpoint	int ration rus Code d Verify ration	static void delay flowControl) Delay execution f throws: StepFaledE Parameters:	KW_CATEGORIZE (Number second, or a specific time () coption mber of seconds t	FailureHandling	Ÿ		
		W Manual @ Script 201	wiables ©Variables (Se	riot model #Fintear	tion ill Properties				
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The three Web Service keywords that we are adding in this example are as follows:

**a.** Send Request: This is used to call the API URL. This keyword is used to send an HTTP request to the web server ([WS] Send Request, 2022).

To add the 'Send Request' keyword, we select it from the available dropdown:

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The following entry is added to the test case:

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		Description	^		Resource	Path	Location	Туре		

As we can see from the screenshot above, the Object is null here. We edit the object to select the correct API Request.

In this example, we call the getUsers web service request that we created previously as follows:

🔀 Test	Object Input				$\times$
Object <sup>*</sup>	Type Test Ol	oject 🖂		(9 Recent	~
Enter te	xt to search				Q
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No.	Name	Туре	Default value	Description	
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		_			
			OK	Cancel	

Additionally, we need to save the output of the request to a variable by setting the 'Output' field. This variable will be used in next two keywords of the test case. We edit the entry to add a variable name to the 'Output' field as shown below:

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> 🗅 Profiles	Item	Object	Input	Output	Description				
<ul> <li>✓ En Test Cases</li> <li>✓ GetUserDataTest</li> </ul>		GetUsers		GetUsersResponse					
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**b.** Verify Response Status Code: This keyword is used to verify response status code received from a call to a web service API ([WS] Verify Response Status Code, 2022).

To add this keyword, we click on the 'Add' button and select 'Web Service Keywords' as done in the previous step.

We select the option 'Verify Response Status Code' from the dropdown:

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<ul> <li>0 = 0 motion</li> <li>0 =</li></ul>		Item 1 Sand Request 2 as Status Code V 2 as Status Code V 2 as Status Code V 2 as Status String Delay Get Liement Poop Get Liement Poop Get Liement Poop Code I are The Gener Sand Request Sand Request	erty Value nt ation tus Code d Verify ation	Input	Output GetUsensResponse	Description		
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A second entry is added to the test case as follows:

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<ul> <li>Enter text to search</li> <li>D Profiles</li> </ul>					n 🗷 Edit tags 🌣 Set default view		<ul> <li>View Test Run Histor</li> </ul>	
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	Problems © Event Log © Console = Log Viewer      Self-healing Insights     Y 1 =							
	Description		Res	ource Path	Location	Type		

We now edit the input column to choose the input parameter 'responseObject' which is the 'getUsersResponse' variable defined in the previous keyword/item and the parameter 'expectedStatusCode' which we set to 200 (OK).

No.	Param Name	Param Type	Value Type	Value
1	responseObject	ResponseObject	Variable	getUsersResponse
2	expectedStatusCode	Integer	Number	200
<				
			ОК	Cance

Once these values are set, we click on 'OK.' The changes are reflected as shown below:

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**c. Contains String:** This keyword as its name implies, verifies that a particular text appears in the response received from a call to a web service API ([WS] Contains String, 2022).

To add this keyword, we follow the same process as before: Add  $\rightarrow$  Web Service Keywords and then selecting the option 'Contains String' from the dropdown list.

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<ul> <li>If Test Cases</li> <li>If GetUsedDataTest</li> </ul>		- 1 - Send Request		Input		getUsersResponse	Description		
		-* 2 - Verify Respon		getUsers5	esponse; 200				
<ul> <li>★ (B) Optimizery</li></ul>		Contains String Delay Get Bernent Prop Get Bernent Frou Get Bernents Cou Get Har File Gene Get Response Sta Send Request Send Request Send Request Werly Checkpoint Werly Element Pri Verly Element Te	ant ration itus Code d Verity ration t operty Value	StringCor static boo (con.kms String str com.kms.) Verify that service call throws:	s katalon.core. ustants.KW CA learn contains? .katalon.core.t ing, boolean u katalon.core.m an expected te:	estabject.ResponseO seRegex, odel.FailureHandlin d: appear in the return	bject response, 19 flowControl)		
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#### An entry is created as follows:

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		Description		Resource	Path	Location	Туре		

We edit the input column to add the string value that we wish to search for as follows:

	🕻 Inp	out					$\times$
	No.	Param Name	Param Type	Value Type	Value		
	1	response	ResponseObject	Variable	getUsersResp	onse	
	2	string	String	String	"Leanne Grah	am"	
	3	useRegex	Boolean	Boolean	false		
	<						>
l	`						-
					OK	Cancel	

In the input parameters, first we set the ResponseObject parameter to 'getUsersResponse' which is the variable we created in step a. Then, we set the value of the string that will be searched as part of the 'Contains String' keyword. Here we set the value to be 'Leanne Graham' which is the first entry from API response 'getUsers.' Lastly, we set the 'useRegex' parameter which indicates whether the given text is a regular expression. We set this value to false and click on 'OK.'

Once done, we click on the save icon at the top left of the screen to save all the changes. The changes are reflected in the third entry as shown below:

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10. The last step is to execute the test case. To execute this test case, we simply click on the play button/icon at the top.

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				st(findTestObject("GetUsers")) (1.557s)	Elapsed time: 2.228s		
		B % 2 verifyf		sersResponse, 200) (0.013s)			

As observed from the image above, the test case is executed with success. Details of the test case including the different keywords executed, time elapsed, time taken by each keyword for execution, etc., can be found in the Log Viewer tab at the bottom of the screen.

In the next example, we will create additional test cases followed by a test suite.

• **Example 2: Creating a Test Suite:** A test suite is a collection of test cases. This can be done by adding multiple test cases and then executing the test suite in a single go.

In this example, we will learn how to create and execute test suites. First, we will create another test case and then create a test suite that executes all the test cases in the test suite.

The steps to be followed are:

1. In the current project, we first create a new API request that get the details of a particular user by passing the user id in the REST API URL. Go to Object Repository  $\rightarrow$  New  $\rightarrow$  Web Service Request and create a new request.

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We provide the following URL to get data of the user with the id 2: https://jsonplaceholder.typicode.com/users/2.

2. To test this, we click on the play icon and execute the request.

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As we can see from the above screenshot, the response contains details of the user with the id 2.

3. We now proceed to create a test case for this API as follows by going to Test Cases  $\rightarrow$  New  $\rightarrow$  Test Case.

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We proceed to add the following keywords to this test case to test the request: Send Request, Verify Response Status Code and Contains String.

a. Send Request:

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# b. Verify Response Status Code:

No.	Param Na	Param Ty	Value Type	Value	
1	responseOl	ResponseO	Variable	getSingleUserResponse	
2	expectedSta	Integer	Number	200	

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## c. Contains String:

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Now that the parameters of the test case have been added, we can execute the test case.

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			GetSingleUserDataText (2.1)			L 11:25:39 PN Test Cases/GetSingleUserD	ataTest
				Request(findTestObject)*GetSingleUserDe	Elapsed ti	ime: 2.187s	
				inglet/serflesponse, 200) (0.015s) sponse, "Ervin Howell", falsel (0.014s)			

As we can see, the test case executes successfully.

4. Now that we have a couple of test cases, we will proceed to create a test suite in this step. To do this, we go to 'Test Suites,' right click on it and go to 'New' and click on 'Test Suite' as shown below:

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			B Add • Becent keywords • B	🗉 Add to test suite 💌 🛄 Vi	ew Test Run History		
> D Profiles			Item Object	Input	Output	Description	
✓ El Test Cases	Interference     I		* 1 - Send Request GetSingleUse		getSingleUserResponse		
El Getther			2 - Verify Response	getSingleUserResponse; 200			
Il Gebuser			- 3 - Contains String	getSingleUserResponse; "Ervin Howell"; \$	alse		
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			1 - To Test Cases/GetSingleUserData	Test (2.182s) 12	-27-2021 11:25:39 PM	Test Cases/GetSingleUse	DataTest
			3 1 - getSingleUserResponse	= sendRequest(FindTestObject("GetSingleUserDa	epsed time: 2,182s		
			B 2 - verifyResponseStatusCo	cde(getSingleUserResponse, 200) (0.015s)	apsed time: 2.1825		

The following window pops up:

K New		×
Test Suit		
1 Create	Test Suite	
Name	TestUserDetails	
Description		^
		~
	ОК	Cancel

We provide the name of the suite and click on 'OK.' The test suite is created as shown below:

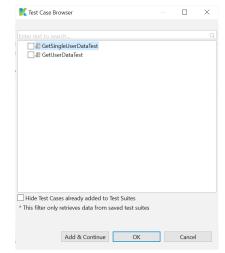
Tests Explorer	R 54 P 0	* Start Page * Quick Start 🛄 Get	SingleUserData 🛛 GetSingleUserD	ataTest 🛛 TestUser	Details II			
		Execution Information						
<ul> <li>D Profiles</li> <li>M Test Cases</li> </ul>		B Add 11 Delete 11 Move Up 16 Mov		🗖 View Test Run History 😑 Show Data Binder				
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		Description	Resource	Path	Location	lype		

5. We now proceed to add the test cases to the test suite in this step.

To add test cases to the suite, we simply click on the 'Add' button at the top:

Katalon Studio - 8.2.0-19d49265 - RestApiPr File Action Edit Project Debug TestOps V 🗎 🗿 🔇 � ▾ 🗵   🐲 🕸   😭	Vindow Tools	Help		\RestApiProject]	×   1	• • 🕷 • 🗉 🔯 •
Best Explore     End Explore     End Explore     End Exectly     End Exec	<u>ः %</u> = व व्यव	· Execution	Information elete   Move Up	GetSingleUserData	E GetSingleUserDataTest	☐ TestUserDetails ∺

A window that prompts us to select test cases from the current project is displayed:



We select both the test cases and add them to the suite by clicking on 'OK.'

K Test Case Browser			$\times$
Enter text to search			Q
🗹 🗉 GetSingleUserDataTest			
🗹 🗄 GetUserDataTest			
Hide Test Cases already added to Test Suites			
* This filter only retrieves data from saved test suites			
	_		
Add & Continue OK		Cancel	

The test cases are added to test suite.

			• ~ •			<b>&gt;</b> • (#) • (=)			
Tests Explorer				GetSingleUserData	E GetSingleUserDataT	est 🗄 TestUserDetails	1		- 1
Enter text to search	<u>aa</u>	• Execution	Information						
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6. To execute the test suite, we click on the play icon at the top.

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The test suite containing the two test cases is executed successfully.

• **Example 3: Verifying the Response Count:** In this example, we will study the use of the 'Verify Elements Count' keyword.

This keyword helps verify the number of elements that were expected in the response of a web service request ([WS] Verify Elements Count, 2022).

In this example, we will add this keyword to the getUserDataTest test case that we created in Example 1.

The steps are as follows:

1. Open the 'getUserDataTest' test case in Katalon Studio.

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2. Click on 'Add' and select 'New Web Service Keyword' as shown in the image below:

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3. From the dropdown list, select the option 'Verify Elements Count'

Tests Explorer	n 15 ** 0	* Start Page * Qu	ick Start 🗖 GetUsers	El "GetUserDataTes				
R + Enter test to searchQ		B Add • B Recen		<ul> <li>View Test Run History</li> </ul>				
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An entry is added to the test case as follows:

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	Q.Q. ■Add ▼ ■ Recent keywords ▼ ■	Delete 🗄 Move up 🗟 Move down	🗹 Edit tags 🔅 Set defai	ult view	Add to test suite	<ul> <li>Wiew Test Run History</li> </ul>
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> En Include	0 items					
Plugins     Jilignore     In build.gradle     Console.properties	Description	Resource	Path	Location	Type	

4. Double click on the input cell to open the Input dialog as shown below:

No	. Param Na	Param Type	Value Type	Value	
1	response	ResponseObject	String		
2	locator	String	String		
3	count	Integer	Number	0	
<					>

5. Edit this dialog to provide the response and count value as follows:

No.	Param Name	Param Type	Value Type	Value	
1	response	ResponseObject	Variable	getUsersResponse	
2	locator	String	String		
3	count	Integer	Number	10	
<					2
-					
				OK Cancel	

As you can see in the screenshot above, we have set the ResponseObject as 'getUsersResponse' which is the variable that captures the result of the request as defined in Example 1. As 'getUsersData' request returns 10 user records, we set the value for the 'count' parameter to 3. Once we enter this information, we click on 'OK.'

The changes are made to the entry as shown below:

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<ul> <li>Tindode</li> <li>Plagns</li> <li>gatignore</li> <li>build-grade</li> <li>Console properties</li> </ul>		0 items Description			Resource	Path	Location	Туре	

Click on the 'Save' button to save the changes to the test case.

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<ul> <li>D Profiles</li> <li>D Profiles</li> <li># Ext Constraints</li> <li># Entropy of the protocol</li> <li># E</li></ul>		Rem - 1 - Send Request - 2 - Weilly Respons - 3 - Contains String - 4 - Weilly Remont Manual © Script X V R Problems © Event Loo D Remo	e g S S Griables ⊕ Variable	getUsers8 *getUsers9 s (Script mode) ●		)	Output getUsersResponse te	Description	7 !-
Developer     Developer     Developer     Developer     Developer     Developer     Developer		Description			Resource	Path	Location	Туре	

6. Test the newly updated test case by clicking on the play icon.

Tests Explorer	E % * 1	* Start Page * Quick Start GetUsers	El GetUserDataTest 11	Run (Ctrl + SHR + A)	
		Add - Recent keywords - Delete		gs © Set default view	🖲 Add to test suite 🝷 🖾 View Jest Run History
Choldes     Choldes		Them Object  1. Send Recent Get2ves  2. Verify Response  3. Controls String  4. Verify Unments  Manual I - Script X: Vanables = Vanables (5)	Input getLiserBetponse, 200 getLiserBetponse, "Learne Gehar getLiserBetponse, "1:10		Designion
<ul> <li>Emission reports</li> <li>E TestOps</li> <li>Emission reports</li> </ul>		1 Problems @Event Log @ Console 3 Log W			0 • <b>1</b> 8 1 7
Bugine     Bugine     Bugine     Distignate     Distignate     Console properties		Parse:         Tellers:         Tellers:           *         Beta Caserolite/HeeDitabler(2520)         >           *         Beta Caserolite/HeeDitabler(2500)         >           *         Beta Caserolite/HeeDitabler(2500)         >           *         Beta Caserolite/HeeDitabler(2500)         >           *         Beta Caserolite/HeeDitabler(2500)         >           *         4 - verifyElements/CountigetUsersR         >	kersResponse, 200) (0.013s) se, "Leanne Graham", false) (0.014s)		

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<ul> <li>D Profiles</li> <li>E Test Cases</li> <li>GetSingleUserDataTest</li> <li>F GetUserDataTest</li> </ul>		Item -* 1 - Send Request -* 2 - Verify Respons -* 3 - Contains String	e	Input getUsersResponse: 200 getUsersResponse: "Learne		Out; petU	Crastory - Cristian     Test Cases/GetUserDataTest - Chrome - 20211231_082910     Crassed > - Chrome     Test Cases/GetUserDataTest - Chrome - 20211231_082716	1/
<ul> <li>         Object Repository         GetSingleUserData     </li> </ul>		*4 - Verify Elements		getUsersResponse: ": 10		•	Chossed> - Chrome	
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D build.gradie D console.properties		<ul> <li>To 2 - verifyRes</li> <li>To 3 - contains!</li> </ul>	ponseStatusCode( String(getUsersRes	equest(findTestObject("GotUsers")) getUsersResponse, 2001 (0.018s) ponse, "Leanne Graham", falce) (0.0 srsResponse, "', 10) (0.045s)	Elap		ime: 2.598s s/GetUserDataTest	

As we can see from the screenshot above the test case executes successfully.

- Example 4: Verifying the Element Property Value:
- 1. Open the 'getSingleUserData' test case in Katalon Studio.

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De Purgins     orginaria     orginaria     console.properties		Description		Resource	Path	Location	Тура		

2. Click on 'Add' and select 'Web Service Keyword.' From the dropdown list, select 'Get Element Property Value.'

Tests Explorer	* Start Page * Quick Start E								
	Add      Add      Recent keywords	II Delete 8	8 Move up 🐵	Move down 📧	Edit tags 🔍 Set defa	ult view	Add to test suite	<ul> <li>View Test Run Hist</li> </ul>	tor
Profiles     Test Cases     E GetIPAddressesTest     E GetSingleUserDataTest     E GetUnerDataTest     E GetUserDataTest     Disk Repository	Item × 1 - Send Request × 2 - Verify Response Status Co 3 - Contains String Verify Element Property Value	de V	eUserData		Response; 200 Response; "Livin Ho	well': false	Output getSingleUserResponse	Description	
GettiNukdeesses     GettiNukdeesses     GettiNukdeesses     GettingdulserData     GettingdulserData     GettingdulserData     Test Subtex     Dettas Fres     Dettas Fres     GettingdulserData     Dettas Fres     GettingdulserData     Dettas Fres     GettingdulserData     Dettas Fres     GettingdulserData     Dettas Fres     De	Yorky Checkpoint Mery Denner Teart Verly Denner Teart Verly Canadi Checkpoint Verly Canadi Checkpoint Verly Canade Than Or Equal Verly Canade Than Or Equal Verly Loss Than Or Equal Verly Verly Match Mathemy Frot Equal Denny Peerly Not Equal Denny Peerly Not Match Denny Mathemy Frot Equal		StringCons static book (com.kms.k String loca com.kms.ke Verily that t in the return throws:	katalon.core.ar tants.KW_CATE ran verifyEleme atalon.core.test tor, Object valu stalon.core.mod	el.FailureHandling	iect response, flowControl) serty volue appear	~	A 1	
<ul> <li>□ El nolade</li> <li>□ El púgino</li> <li>• glignore</li> <li>&gt; bulkzgudie</li> <li>&gt; console properties</li> </ul>	Desolption ^			Resource	Path	Location	Туре		

An entry is added to the test case keywords list as shown below:

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Tests Explorer	89,40	* Start Page * Quick Start 🗄 Ge	tSingleUserDataTest #					
* * Inclue tent to search     * * Enclue     20 Proble     * © Inclue     20 Proble     20 Pro		Add      Add      Recent keywords      Term	Object GetSingleUserData	Input getSingleUserR	-		Add to test suite Output getSingleUserResponse	<ul> <li>Z View Test Run History Description</li> </ul>
>  Checkpoints >  Keywords >  Test Listeners		< ★ Manual ☉ Script & Variables ☉ Var	iables (Scrint mode). #	internation El Pro	mentios			>
> 🛤 Reports > 🛄 TestOps		Problems     PEvent Log     Console     Oitems						î
> Entode ⇒ Phopos ⇒ gitignore ⇒ build.gradie ↑ console.properties		Description		Resource	Path	Location	Туре	

3. We click on the input cell to display the Input Window as follows:

🚺 Inp	put				×
No.	Param Name	Param Type	Value Type	Value	
1	response	ResponseObject	String		
2	locator	String	String		
3	value	Object	Null	null	
<					
<					>
				ОК	Cancel

4. We are prompted to enter the parameters response object and the locator field. Here, the response object is the variable 'getSingleUserResponse' that was created in Example 2 when we created the 'getSingleUserDataTest' test case. The locator parameter is the used to specify the location of the JSON property that we wish to locate in the returned data. Here, we provide the value 'email' as this is the JSON path (location of the email field in the response body).

In the test case 'getSingleUserDataTest', we get the details of the user with the id 2. In this example, we will check if the element has the correct value for the property 'email', which should be 'Shanna@melissa.tv.' To do this, we enter the value 'Shanna@melissa.tv' in the last parameter, which is the value parameter.

The Input has now been updated as follows:

No.	Param Name	Param Type	Value Type	Value	
1	response	ResponseObject	Variable	getSingleUserResponse	
2	locator	String	String	"email"	
3	value	Object	String	"Shanna@melissa.tv"	
<					
`					

The entry in the test case is updated as shown below:

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	* Start Page * Quick Start 80						
I finter text to search.     D Profiler	Add      Add      Pecent keywords	Delete      Move up	Move down IZ E	dit tags 😳 Set default vi	and a second	Add to test suite	<ul> <li>Wew Test Run Histo</li> </ul>
C Profiles     B Test Cases     B Cet PubliceoursTest	Item -* 1 - Send Request	Object GetSingleUserData	Input			Output getSingleUserResponse	Description
IT GetSingleUserDataTest	- 2 - Verity Response Status Cod - 3 - Contains String			Response: "Ervin Howell"			
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TestOps     Tochade	0 items	L Log varver to set he	ang nagna				
Incluse	Description		Resource	Path	Location	lype	

5. The last step is the execution of the test case which can be launched by clicking on the play icon at the top.

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<ul> <li>E restOps</li> <li>E include</li> <li>E Hughs</li> <li>B bulk grade</li> <li>bulk grade</li> <li>console properties</li> </ul>	Description		Resource	Path	Location	Туре		

The test case is executed correctly, as visible in the screenshot below:

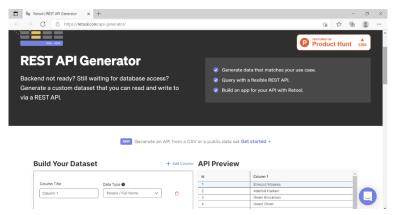
ests Explorer	* Start Page * Ouick Start &	GatCin and I have Data Task 12	-	🗆 🐖 Job Progress 👘 👘
			Move down iff Edit tags @ Set default v	The Constitution Date Test Channel
© Profiles #1 Test Cases	Item	Object	Input	executive control of the second se
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2 GetSingleUserDataTest	-* 2 - Verify Response Status Co	de	getSingleUserResponse; 200	20211231 151305
al GetUserDataTest	-* 3 - Contains String		getSingleUserResponse; "Ervin Howell	
E Object Repository	-* 4 - Verify Element Property Ve	lue	getSingleUserResponse; "email"; "Shar	
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a console.properties	3 2 - verityResponseStatu		inse, 200) (0.010s)	ime: 2.3075
	🔽 👘 3 - containsString(getSi			s/GetSingleUserDataTest
			onse, "email", "Shanna@m	

• Example 5: Verifying the Element Property Value with a User-Defined Web Service: In this example, we will look at the keyword 'Element Property Value' keyword. This keyword helps check whether an element in the wen service's response object has the expected value for an element ([WS] Verify Element Property Value, 2022).

In this example, we will define a new web service request and add this keyword to test the property field in the response of this request.

The steps followed are:

1. First, we will use an online tool to generate a Rest API of our choosing. In this example, we will use the tool Retool-REST API Generator(https://retool.com/api-generator/) to create an API of our own. We navigate to the site.



2. We build a dataset of our choosing. For this example, we have created a list of IP Addresses as follows:

Retool Custome	ers Integrations Templates F	ricing		Docs	Book a demo
Build Your Data	set	+ Add Column	API Preview		
			id	IP Address	
Column Title	Data Type 🔕		1	126.166.29.224	
IP Address	Numbers / IP Address		2	29.115.8.80	
IP ADDIESS	rumbers / iP Address	U	3	142.215.69.178	
			4	242.40.107.76	
			5	209.23.76.215	
			6	26.177.49.14	
				67.173.188.107	
			8	32.213.31.187	
			9	209.23.76.215	
			10	117.183.13.182	
CONFIGURATION					

3. We click on the 'Generate API' button in the 'Configuration' section to generate the API.

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Column The         Date Type         1         1 126 (182.322           # Address         Number // P Address         0         2         24111.840           # Address         Number // P Address         0         4         24421.01.840           # Address         Number // P Address         0         4         2442.01.241.01           # Control (1997)         P Address         0         10         202.274.01           # Control (1997)         0         10         107.183.01.01           # Optimized State         0         10         117.183.01.02						IP Address		
(Plastinis)         NUMBER/1/PLASTINIS         0         3         142215843/14           4         342445179         3         30237213           6         32477814         -           7         6/773148/07         -           6         32177814         -           7         6/773148/07         -           6         32131107         -           9         107308107         -           10         1177813.149         -		Column Title	Data Type 🕒			126.166.29.224		
3         142,114,8178           4         242,410,778           5         200,33,413           6         201,778,414           7         201,33,113           6         201,33,113           9         202,33,119           19         117,113,13,182		ID Address	Numbers / IP Aritimes V	~		29.115.8.80		
4         242.45778           5         703.73.11           7         4773.143.197           8         292.73.147           9         292.73.147           8         292.73.147           9         292.73.147           10         117.143.142		in Address	- Indirectory in Address		3	142.215.69.178		
8         200.27.213           6         24.77.814           7         67.73.149           8         22.33.107           6         22.33.107           9         201.37.214           10         117.08.13.197					4	242.40.107.76		
0         24.77.2.14           7         0.17.3.14.10           8         202.37.311           9         107.2.14.10           10         117.16.3.14.20					5	209.23.76.215		
7         67.73.184.97           8         92.73.1107           9         100.837.913           10         117.788.33.107					6	26.177.49.14		
8         322133197           9         200238419           10         11718313182					7	67.173.188.107		
10 117.183.13.182					8	32.213.31.187		
CONFIGURATION					9	209.23.76.215		
					10	117.183.13.182		
API Name data # Rows 10 ~		CONFIGURATION						
API Name duta # Rows 10								
Preview: https://retoslapi.dev//data Size: 1 KB								
Generate API								

The API is generated successfully. You can find the definition in lower half of the page as shown below:

3 https://retool.com/	'api-generator/				ID 31	e q	tò	Σ)I	
Retool Customer	s Integrations	Templates Pricing		Docs	Book a de	omo		Try for f	re
	Generate AP1		Showing 10 results				±	c	1
Endpoint URL	https://retoolapi.de	·/Diffeta/data							
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HTTP method endpoints	Method type GET	Endpoint				0			
HTTP method endpoints	Method type GET GET filter	Endpoint /PYNXa/data /PYNXa/data7/P Address=	value			0 0	ору		
HTTP method endpoints	Method type GET GET filter GET by id	Endpoint Prinka/data Prinka/data Prinka/data Prinka/data/1 Prinka/data/1	value			0 0 0	ору ору		
	Method type GET GET filter GET by Id GET paginate	ts here (generated with json-server Endpoint /P/YXXa/data /P/YXXa/data3P Address= /P/YXXa/data31 /P/YXXa/data2_page=28_J	value			0 0 0 0 0	ору ору ору		
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4. We click on the endpoint URL to get the data. It is shown below:

```
늘 Retool | REST API Generator
                                       ×
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 C
                       Ô
                          https://retoolapi.dev/PjYkXa/data
E
  {
    "id": 1,
    "IP Address": "126.166.29.224"
  },
  {
    "id": 2,
    "IP Address": "29.115.8.80"
  },
  {
    "id": 3,
    "IP Address": "142.215.69.178"
  },
  {
    "id": 4,
    "IP Address": "242.40.107.76"
  },
  {
    "id": 5,
    "IP Address": "209.23.76.215"
  },
  {
    "id": 6,
    "IP Address": "26.177.49.14"
  },
  {
    "id": 7,
    "IP Address": "67.173.188.107"
  },
  {
    "id": 8,
    "IP Address": "32.213.31.187"
  },
  {
    "id": 9,
    "IP Address": "209.23.76.215"
  },
  {
   "id": 10,
   "IP Address": "117.183.13.182"
  }
1
```

 Now that the API has been created, we proceed to create a new Web Service Request in Katalon Studio. We right-click on 'Object Repository,' go to New → Web Service Request.

Tests Explorer			Start Page * Quick Start II					- 0
			Lat's a	plore the p	ower a	fKatala	o Ctudio	í
<ul> <li>▷ Profiles</li> <li>♥ I Test Cases</li> <li>I GetSing</li> <li>I GetUses</li> </ul>	gleUserDataTest		Letsex	plote the f	Jower c		1 Studio	
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<ul> <li>Keywore</li> <li>Test List</li> <li>Reports</li> <li>TestOps</li> <li>Include</li> <li>Plugins</li> <li>gligno</li> <li>build.gr</li> </ul>	Cut Poste Delete Refresh Show References Open containing folder Add to Web Object Spy	Ctrl+V Delete F5	Problems © Event Log © Console ® Log Vierns		Path	Location	J <u>k</u> Type	¥ 1 * c
Keywore     Keywore     Test List     Reports     TestOps     Include     Plugins     gligno     build.gr	Cut Poste Delete Refresh Show References Open containing folder Add to Web Object Spy	Ctrl+V Delete F5	Problems © Event Log © Console ® Log Vierns		Path	Location	Jýga Typa	¥ 1 = c

We then enter the name, description, and URL of this request as follows:

🔀 New		$\times$
Web Servic	•	
Create We	eb Service Request	
Name	GetIPAddresses	
Request Type	RESTful	$\sim$
URL	https://retoolapi.dev/PjYkXa/data	
Description	Get a list of IP Addresses	$\sim$
		~
	OK Cancel	

The Rest API request is created successfully as shown below:

Tests Explorer	E 🕲 🗆 🗆	* Start Page	* Quick Start	GetIPAddresses 11								
		GET ~	https://retoolapi.dev/F	jYkXa/data			• • •	Response				
> © Profiles ♥ ➡ Test Cases		Customize A		t and response size limit				Status: Body Hea	Size:	н		
If a catus obtained     Control of the catus     Control of the c		Name Authorization Type	n HTTP Header HTTP Bo No Authorization Update to HTTP Heade	Value dy II Verification Variab	les Variables Ed	itor Configuration		1 Select JSC Ctrl/Comr	raw preview	ation scripts direct		
> C TestOps > C Include		Problems      Event Log      Console      Log Viewer      Self-healing Insights     O Items							71			
Plugins     Jitignore     build.gradie     console.properties		Description			Resource	Path	Locati	on	Type			
in consolidations												

6. In this step, we run the request to see if it returns the data by clicking on the play icon located at the end of the request bar.

Tests Explorer	8 😣 M D	* Start Page	* Quick Start	GetIPAddresses 11								
F · Friter text to search > D Profiles * 簡 lest Casses 日 Cattional Man Data Lest		Customize	arameters	PYKXa/data ut and response size lim	it		• 🕂 •	Response Status:	Uapsed:	Sia	r.	HA
Il Gettischladett Il Gettischladett Il Gettischladett II Gettischladett Gettischladett Gettischladett Gettischladett II Gettischladett II		Add T Name		Value lody @ Verification Vari	ibles Variables Ed	itor Configuration	•=	© pretty C	or XML response data and + K to add wrifian	tion scripts	directly	
> Katologia > El Include		Problems      Pevent Log      Console      Elog Viewer      Self-healing Insights     Disease									71	- 6
<ul> <li>Plagins</li> <li>gittpore</li> <li>gittpore</li> <li>Plaufid gradie</li> <li>Placeschaproperties</li> </ul>		Description			Resource	Path	Locati	on Ty	ipe			

The results are displayed in the response tab as shown as follows:

Tests Explorer	🗏 🍕 🗥 🗆 ★ Sta	t Page * Qui	k Start Get/PAddresse				Aault + │ EE Keyword ≫ Del		
	ાલ GET	<ul> <li>https://</li> </ul>	etoolapi.dev/PIYkXa/data			🕨 🕂 🛨 🛛 Res	ponse		
> © Profiles	Custo	mize API metho	ds Set timeout and response	e size limit					
<ul> <li>In Test Cases</li> <li>all GetSingleUserDataTest</li> <li>all GetUserDataTest</li> </ul>		ery Parameters Satus: 2000 Elapsed: 1647 ms S Ed IT Henory Body Header Verification Log							bytes
Chjoct Repository     Get/Piddresses     Get/Piddresses     Get/Didresses     Get/Lisers     Get/Lisers     Test/LiserDetails	Nan	0	Value				pretty Oraw Opreview 1 • [ 2 • [ 3 "If Address" "126.166.29.224"		
TestUserDetails     Data Files	Autho	ization HTTP H	ader HTTP Body 🗟 Verificat	ion Variables Variables E	ditor Configuration		5 1.		
Checkpoints     Exception     Exception     Exception     Exception     Exception	Туре		orization to HTTP Header			Ctrl	7 0 "id" t 2, ect JSON or XML response d (Command + K to add wrifi JSON () XML () HTML ()	cation scripts dir	
C TestOps     Disclude	E Pro		og @Console 📑 Log Viewe		7				
> 🛅 Include				Resource	Path	Location	Type		
> 🛅 Include > 🛅 Plugins 🔶 .gitignore 🗅 build.gradle	Descr	ption							
Include     Im Plugins     Optignore		ption							
Til Include     Til Plugins     Gitignore     Duild.gradle		ption							

We can verify that a list of 10 IP addresses is present in the response.

7. We now proceed to create a test case to test this web service. We go to 'Test Cases,' right-click 'Test Cases', then go to New  $\rightarrow$  Test Case.

Tests Explorer		e te ministra il	* Start Page * Quick Sta	rt 🔤 GettPAddresses 🔅					
			GET * https://retool	api.dev/PjYkXa/data			• • •	Response	
> D Profiles > El Test Case El GetSir El GetUs	New	E	> Folder	et timeout and response size lin	nit			Statue 200 00 Flapsed: 164 Body Header Verification Log	17 ms Size:941 byte
<ul> <li>Object R</li> <li>GetP</li> <li>GetP</li> <li>GetU</li> <li>Tost Suite</li> <li>Tost Suite</li> <li>Tost Suite</li> <li>Checkpo</li> <li>Moverd</li> <li>Mise Luste</li> <li>Reports</li> </ul>	Roname Copy Copy ID Cot Pasto Delete Refresh Show References Open containing folder	Contex Contex Contex Devices Prices Contex Contex	horization HTTP Header		iables Variables Ec	ditor Configuration	** *	pretty O raw O preview         i = 1	a" 1 0" data and press rification scripts directly.
> C TestOps > D Include			Il: Problems Event Log E 0 Rems	Console 🗏 Log Viewer 🗐 Sel	f-healing Insights				¥ 1
<ul> <li>En Plugins</li> <li>gitignore</li> <li>build.grade</li> <li>console.prop</li> </ul>			Description		Resource	Path	Locatio	n Type	

We provide the test case name and click on 'OK' to create the test case as follows:

K New		$\times$
Test Case		
1 Create	Test Case	
Name	GetIPAddressesTest	
Description		^
		~
Tag		
	OK Cancel	

The test case is added to the list of test cases as displayed below:

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Tests Explorer	E % ** 5	* Start Page #	Ouick Start 💦 🔤 GetiP	Addresses El GetIPAdd	essesTest 10			
		🗄 Add 🔻 🔍 R	ecent keywords 📼 🖺 D	elete 🗄 Move up 🗟 Move	down 🗷 Edit tags 🌼	Set default view	Add to test suite	<ul> <li>View Test Run Histor</li> </ul>
<ul> <li>&gt; 0 holds</li> <li>&gt; 0 holds</li> <li>= 1 holds</li> <li>= 0 hold</li></ul>		Item	Object	Input	Output	Description		
> 🛅 Reports				les (Script mode) ■ Integr .og Viewer  Self-healing				81
IsstOps Include		0 items		and the set raining	in sign s			
<ul> <li>&gt; ■ Photo:e</li> <li>&gt; ■ Photo:e</li> <li>&gt; gitignore</li> <li>&gt; build.gradle</li> <li>&gt; console.properties</li> </ul>		Description		Reso	urce Path	Location	Туре	

8. In this step, we proceed to adding keywords to the test case. Note that to use the 'Verify Element Property Value' variable ([WS] Verify Element Property Value, 2022), we first need to get the response of the API and store in a variable using the 'Send Request' keyword ([WS] Send Request, 2022). This variable will be used to access the results when defining the 'Verify Element Property Value' keyword.

We add the keywords as follows:

a. Send Request:

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		B Add • Becent keywords • If Del	ete E Nove up	Move down	f Edit tags IO Set	default view	E Add to test suit	e 💌 🖾 View Test Run Hist
D Profiles     Biter Cases     all GetPhiddressesText     B GetSingleUserOctallect		Web UI Reyword Mobile Reyword Cacumber Reywords	Input		Output	Description		
B GetUserDataTest     El GetUserDataTest     El Object Repository     GetERAdormen     GetSingleUserData		Web Senice Keyword Windows Keyword Castorn Keyword Call Test Case						
GetJoers  Tot Saltes  For Saltes  Construction Data  Construction  Const		Decision-making Statements Looping Statements Branching Statements Exception Handling Statements						
mit Checoportus		Binary Statement Assert Statement Method Call Statement		Nintegration III	Properties			
K TestOps		Method	Verver 68 Self	healing Insights				0.0
Thinkade     Thinkade     Thinkade     Johnson     Aphignore     Aphignore     Aphignore     A build goodle     A consolectroperties		Desciption		Resource	Path	Location	Type	

We select 'Send Request' from the options in the dropdown list, which adds an entry to the test case.

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Tests Explorer	E 5 7 8	* Start Page	* Quick Start 👘 GottP	Widnesses - 21 GettR#	ddrososilest >				
<ul> <li>Enter text to search</li> <li>D Profiles</li> </ul>		B Add • 01	lecent keywords 💌 🖱 D	elete 🗄 Move up 🗟 N	ove down III i	idit tags © Set d	lefault view	B Add to test suite	<ul> <li>Wew Test Run Histor</li> </ul>
Bist Case     Contended and the     Bist Case     Contended and the     Bist Case     Contended and     Contended     Contended     Contended     Contended     Contended     Contended      Contend      Contended      Contend      Contended      Co			Object Insulation of the second secon	Input		dpod	Description		
Elli Reports     Eli TestOps			venting Console Til						¥ 1 *
If indude     If Plugins     gitignore     Dibuild.gradle		Description		R	isource	Path	Location	Тура	
It console,properties									

We proceed to select the object input as follows:

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Object	Type Test C	)bject		③ Recent	Ŧ
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	GetSingleUse GetUsers	erData			
<b>Variabl</b>		🛙 Clear 🗈 N	Aove up 🗉 Move da	own	
		Clear 🗈 N Type	Nove up 🕔 Move do	Description	
🗄 Add	🗊 Delete 🗐				
🗄 Add	🗊 Delete 🗐				

We add a variable to the 'Output' column, which stores the response returned by request.

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lests Explorer	8 📚 🗆 🗆	* Start Page * Quick	Start GetIPAddr	esses all GetIPAddres	ses lest 13			
E • Enter text to search		🗄 Add 💌 🕲 Recent ke	eywords 💌 🗊 Delete	🖲 Move up 🛞 Move d	own 🖻 Edit tags 🌣 Se	et default view	Add to test suite	<ul> <li>View Test Run Histor</li> </ul>
C Profiles     Ent Cases		Item	Object	Input	Output	Description		
Entropy of the second sec		1 - Send Request	GetIPAddresses		response			
		* Manual OScript XV	ariables 🕫 Variables (S	cript model III Integrati	on El Properties			
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<ul> <li>The Houlde</li> <li>The Magins</li> <li>gelignore</li> <li>build-gradie</li> <li>console properties</li> </ul>		Description	A	Resour	Path	Location	Type	

#### **b.** Verify Element Property Value: We proceed to add the keyword 'Verify Element Property Value' to the test case.

To do this, we add another web service keyword using the 'Add' button and select the keyword 'Verify Element Property Value' from the dropdown list.

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Tests Explorer	🖻 😚 ° 📄 🚸 Start Page 🔺 Quick Start 🚥 GetIPA					
E × Enter text to search > ℃ Profiles ■ Test Cases ■ GettPAddresses lest	Q.C. ® Add ▼ ® Recent keywords ▼ II Dek Item Object → 1 - Send Request GetIPAddresses ♥ Verify Element P ▼	te 🗈 Move up 🗈 Mo	ve down M Edit tags © Se Output response	t default view Description	Add to test suite	<ul> <li>View Test Run Histo</li> </ul>
E Gettion/gotten/tablet     E Gettion/gotten/tablet     E Gettion/gotten/tablet     Gettion/gotten/table     Gettion/gotten/table     Gettion/gotten/table     Gettion/gotten/table     Gettion/gotten/table     Gettion/gotten/table     Testion/table     Testion/table     Dettion/table     Dettion/table     Dettion/table     Dettion/table     Dettion/table     Dettion/table     Dettion/table     Dettion/tablet     Dettion/ta	Contains String Delay Get Llement The Property Value Get Llement That Get Flements Count Get Response States Code Send Request And Welfy Set Lar File Generation Verfty Chackpoint Welfy Linemet Regent Value M V Verful Linemet	StringConstan static boolean (com.kms.kata String locator, com.kms.katal Verify that there	alon.core.annotation.Key ±KW_CATEGORIZE ELER werly/ElamentPropertyUa lon.core.testobject.Respon Object value. on.core.model.FailureHan is an element with expected data from a web service cal xception	IENT) lue seeObject response, dling flowControl) d property value appear		
> Eth Reports > C TestOps	Problems Problems Console Console Log Console Log Console Con	y Viewer 😫 Self-healin	Insights			71-
Im Indude     Im Plugins     Gignore     Dibuild.oradle	Description ^	Ret	ource Path	Location	Туре	
P console.properties						

A second entry is added to the test case.

80

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Tests Explorer	E \$ 7 5	* Start Page * Quick	Start 🔤 GetiPAdd	enses El "GetIPAc	dressesTest 22				2
E      Construction that to search.     Construction that to search.     Construction that the search of the		Add    Add	Object GetIPAddresses	The Move up a More input	e down ≥ Edit Outpu respor	at .	t view Description	C Add to test suite	C Wew Test Run Histor
> 🛅 Keywords > 🛅 Test Listeners > 🛗 Reports		N Manual ⇔ Script X Va S Problems ■ Event Loc				arties			81-
> CTestOps > Iminclude		0 items							
Include     Plagins     Plagins     defiginore     build gradie     console properties		Description		Res	surce F	Path	Location	lype	

We edit the input column to search for a particular value from the response:

No.	Param Name	Param Type	Value Type	Value	
1	response	ResponseObject	Variable	response	
2	locator	String	String	"[0].id"	
3	value	Object	Number	1	
<					
<b>`</b>					

Here, the first parameter we enter is the response parameter. We set it to response which is the output of the API request.

The next parameter we enter is the locator parameter which is the location of the element that we want to check. Here, based on the test data that we created, we want to check that the value of the first element's id property is 1, so, the value we enter for the locator parameter is [0].id. The value [0].id tells Katalon Studio to locate the first record from the data and find the property called id within this record.

The last parameter we enter is the expected value of the field/property specified in the locator. Here, we are checking the first record where the value of the 'id' field is 1. We click on 'OK' to update the input.

The input is updated, and we then save the test case by clicking on the 'Save' icon located at the top left section of the window.

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Tests Explorer	E 😫 🗥 D	* Start Page * Quick:	Start 🛛 📼 GetiPAdo	resses E GetIPAddres	esTest 🔅			
E + Enter text to search D Profiles		Add      Add      Recent ke	ywords 💌 🕅 Deleti Object	Move up  Move di	own III Edit tags © Se Output	t default view Description	Add to test suit	<ul> <li>View Test Run History</li> </ul>
<ul> <li>€ Test Cases</li> <li>CestTinglet Leet Data lest</li> <li>E GetSinglet Leet Data lest</li> <li>E GetSinglet Leet Data lest</li> <li>E Object Repository</li> <li>E GetSinglet VestBate</li> <li>GetSinglet VestBate</li> <li>GetSinglet VestBate</li> <li>GetSinglet VestBate</li> <li>E GetSinglet Data lest</li> <li>E Test Soties</li> <li>E Checkpoints</li> </ul>		1 - Send Request 2 - Verify Element I		response; "(0),id"; 1	response			
E Keywords     Test Listeners     E Reports		N Manual ⇔Script X Va						
TestOps		E Problems Event Log	Console Log	/iewer 🖾 Self-healing Ins	ghts			A 1 -
<ul> <li>Enclude</li> <li>Enclude</li> <li>Grignore</li> <li>build.gradie</li> <li>console.properties</li> </ul>		Description		Resourc	e Path	Location	Туре	

9. We execute the test case by clicking on the play icon at the top.

Tests Explorer	R 💁 🔍 D	* Start Page * Quick	Start GattPAddra	sses El Get/PAddresses	fact 11	* Job Progress
E • Enter text to search				Move up 🗄 Move down		20211231_124904
# Tost Casos		Item	Object	Input	Output	Passed> - Chrome
21 Get/PAddressesTest		-* 1 - Send Request			response	Test Cases/GetIPAddressesTest - Chrome - 1/1
E GetSingleUserDataTest		* 2 - Verify Element I		response; "[0].id"; 1		20211231_124752
E GetUserDataTest						Passed> - Chrome
Diject Repository						Test Cases/GetUserDataTest - Chrome - 20211231_120756 1/1
GetIPAddresses						o <passed> - Chrome</passed>
GetSingleUserData						Test Cases/GetSingleUserDataTest - Chrome -
GetUsers						20211231 111257 1/1
El lest Suites     El Testi kerDetails						<passed> - Chrome</passed>
Data Files						Test Carer/GetSingleHeerDataTest - Chrome -
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Test Listeners		W Manual 42 Cryint 3" We	viabler © Veriabler (Sr	ript mode) #Integration	E Propertier	
Reports				over Self-healing Insight		0 - 1 -
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Plugins		1	PAddressesTest (2.587s)		12-21-2	321 12:49:06 PM Test Cases/GetIPAddressesTest
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Console.properties				onse, "(0Lid", 1) (0.047s)	Elapsed	time: 2.587s
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					rest ca	es/decirAddresses/esc

The test case passes successfully as shown above.

• Example 6: Testing a SOAP Web Service Request: In the previous examples we studied different ways in which REST API requests can be tested. In this example, we will cover the creation of a SOAP web service request followed by creation of test cases for a SOAP request using Katalon Studio.

The steps are:

1. First, we create the SOAP request. This is done in the same manner that we created a REST request.

To create a SOAP request, we go to Object Repository  $\rightarrow$  New  $\rightarrow$  Web Service Request.

Tests Explorer	8970	* Start Pag	e * Quick Start II					
<ul> <li>Profiles</li> <li>Test Cases</li> <li>GetIPAddresses</li> <li>GetSingleUserE</li> <li>GetUserDataTie</li> </ul>	DataTest		Let's ex	plore	the power	r of Katalon S	tudio	
- El Object Repositi	Import		9					
GetIPAddre	New	>	Folder	CER				
GetUsers	Open	F3	Web Service Request	<b>N</b>	-			
✓	Rename	F2	Mobile Object			0		
I TestUserDete	Сору	Orl+C	Test Object					
🖻 Data Files	Copy ID		Windows Object		V			
Checkpoints	Cut	Ctrl+X	e		1			
<ul> <li>Keywords</li> <li>(default pack)</li> </ul>	Paste	Ctrl+V						
> Test Listeners	Delete	Delete						-
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> C TestOps > TestOps	Show References Open containing folder	Ctrl+R	Passes: 0 Failures: 0	Errors: 0	Skips: 0			
Plugins	Add to Web Object Spy							
gitignore     build.gradie	Add to Mobile Object Spy							
Console propertier		100						
Console properties	5							

The following window pops up and prompts us to provide details of the SOAP request.

K New		×
Web Servio	e Request	
\rm 1 Create We	eb Service Request	
Name	PrintHello	
Request Type	SOAP	~
URL	URL	
Description		~
		~
	OK	Cancel

At this point, we provide just the name of the web service request. We need to select the Request Type which is 'SOAP.' The URL can be left blank. The description is optional too.

We click on 'OK' to create the request.

The request is created as shown below:

Tests Explorer	E 😫 ** 0	* Start Page	* Quick Start	PrintHello								
Bath Equival     Construction	<u>a</u> aa	SCIAP WSDLURL Service Endp Set function Set function Type	v joint joint leader R No Authorization Update to HTTP	- limit equest Message n	2 Wrification Va	riables Variables Edito	v Loa	(F) • (H) • I Service Function d New Content guaration ***	Response Status: Body Hoeder Verifi  Protty Crew	Elapsed: cation Log	Size:	HA
Second Seco		Nume of t	Passes: 0	Pailures: 0	those of	Supp. 0						

2. We proceed to use a freely available WSLD that prints 'Hello <name>' where name is a value entered in the request body.

In this example, we use the following site: Learn web services (https://www.learnwebservices.com/).

The WSDL provided is as follows:

http://www.learnwebservices.com/services/hello?WSDL

We access this URL in the browser to see the WSDL definition.



3. In Katalon Studio, in the SOAP request we just created, we provide the WSDL URL and click on the 'Load Service Function' to load the functions provided by the SOAP request.

Tests Explorer	n % = n 🔺	Start Page	* Ouick Start	PrintHello									- 0
Construction	QIQ S W Se Se A	ICAP SDL URL SDL URL arvice Function arvice Endpoin at timeout and uthorization F impe N	https://www.	learnwebservice: limit iquest Message	s.com/services/h		Load Ser	v	Response Status: Body Heade pretty C	Elapsed: r Verification Log naw	Size:		HA
E Checkpoints     Keywords     fit (default package)     En Text Listeners	2	Problems 🗐	Event Log © Co	onsole 🖺 Log Vi	ewer 🖪 Self-heal	ing Insights			Vrap Line	,	• • E	<u>8</u> 1	
El Bapots     El Bapots     El Bapots     El Estóps     Estóps     El Estóps     Estóp	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Passes: 0	Failures: 0	Errors: 0	Skips: 0							

When we click on the button 'Load Service Function' the service functions are fetched from the web service.

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Once the functions have been fetched, we can see them in the 'Service Function' tab as shown below:

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Tests Explorer			* Quick Start	*PrintHello	11			<b>•</b> • <b>•</b> •	Response				
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PrintHello      Elset Suites     EntitiseDetails     EntitiseDetails     Deta Files     Checkpoints     ElsetSuiteses     ElsetSuiteses		2 Problems	€ventLog ■0	Console 🗏 Log Vi	ewer 🖪 Self-heal	ing Insights			✓ Wrop Line		• •	<b>1</b>	
Begont     Consols     Co		Runs: 0/1	Passes: 0	Failures: 0	Errors: 0	Skips: 0							

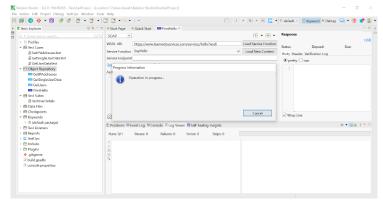
4. We now need to provide the body of the message to be able to execute the request. By default, it is empty as shown below:

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	ala saap v			• • •	Response				на
D Profiles	WSDL URL https://www.learnwel	services.com/services/helio?wsdl		Load Service Function	Status:	Elapsed:	Sin	e	10/3
E GetPAddressesTest	Service Function Styffelio		~	Load New Content	Body Header Ve				
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5. To load the request body, we click on 'Load New Content.'

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The Service function fetches the content of the WSDL request.



Once the operation is terminated, the Request message is populated with the request body as shown below:

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<ul> <li>● glignore</li> <li>▷ build.gradie</li> <li>▷ console.properties</li> </ul>	Runs: 0/1	Passes: 0 Fallures: 0 Errors: 0 Skips: 0							

We have also provided the 'Service Endpoint' value that contains the available services list for the WSDL.

When we access the link https://www.learnwebservices.com/services we see the list of available services as displayed in the screenshot below:

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Available SOAP services:						
HelloEndpoint • SayHello	Endpoint address: https://www.learnwebservices.com/services/hello WSDL : <u>http://earnwebservices.com/services/hello/Hello/Adjoint/Service</u> Target namespace: http://earnwebservices.com/services/hello					
TempConverterEndpoint <ul> <li>CelsiusToFahrenheit</li> <li>FahrenheitToCelsius</li> </ul>	Endpoint address: https://www.learnwebservices.com/services/tempconverter WSDL: <u>http://learnwebservices.com/services/tempconverter?TempConverter?IndpointService</u> Target namespace: http://learnwebservices.com/services/tempconverter					

We edit the request body and change the name to 'NIK' as shown below:

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> D Profiles	^	WSDL URL	https://www.leamwebservices.com/services/hello?wsdl		Load Service Function	Status: Elapsed:	Size	HAR
<ul> <li>E GetIPAddressesTest</li> </ul>		Service Function	SayHello	~	Load New Content	Body Header Verification Log	5420.	
#I GetSingleUserDataTest		Service Endpoint	https://www.learnwebservices.com/services/hello			pretty O raw		
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<ul> <li>Object Repository</li> <li>GetIPAddresses</li> </ul>		Authorization H	TTP Header Request Message 🛛 Verification Variables Variab	eles Editor C	onfiguration			
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🛩 📾 Test Suites			oapenv:Body>					
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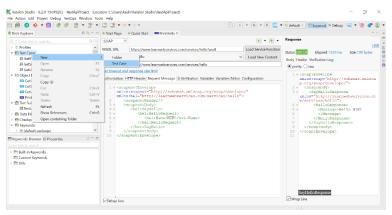
6. We execute the SOAP request by clicking on the play icon at the top.

The results are available in the Response tab on the right. It is as follows:

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<ul> <li>U Promes</li> <li>M Test Cases</li> </ul>	^	WSDL URL	https://www.learnwebservices.com/services/hello?wsdl	Load Service Functio	In Status 200 OS Elapsed: 1359 ms Size: 198 bytes
E GetIPAddressesTest		Service Function	SayHello	Y Load New Content	Body Header Verification Log
副 GetSingleUserDataTest		Service Endpoint	https://www.learnwebservices.com/services/hello		pretty O raw
E GetUserDataTest		Set timeout and	response size limit		1 + <soapienvelope< td=""></soapienvelope<>
Object Repository     GetIPAddresses		Authorization H	TTP Header Request Message 2 Verification Variables Variables Editor	Configuration	xming:goap="http://schemas.xmigoa
GetSingleUserData     GetSingleUserData     GetUserX     FrinitVello      DetStatus     GetStatus     GetStatus     GetStatus     GetStatus     GetStatus     GetStatus     Status     GetStatus     GetStatus	v	xm1na xm1ns 2 <s 3 &lt; <s 4 * 5 * 6 * 7 8 9 <!--</td--><td>wern Envelage wern Envelage Ender Status (//schemen / schemen /</td><td>pe/" "&gt;</td><td>p.org/acap/emulop/"&gt; p.org/acap/emulop/"&gt; p.org/acap/emulop/ p.org/acap/emulop/"&gt; p.org/acap/emulop///&gt; p.org/acap/emulop/ p.org/acap/emulop/emulop/ p.org/acap/emulop/ p.org/acap/emulop/e</td></s </s 	wern Envelage wern Envelage Ender Status (//schemen / schemen /	pe/" ">	p.org/acap/emulop/"> p.org/acap/emulop/ p.org/acap/emulop/"> p.org/acap/emulop///> p.org/acap/emulop/ p.org/acap/emulop/emulop/ p.org/acap/emulop/ p.org/acap/emulop/e
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As visible from the screenshot above, we can see the response which contains the message 'Hello NIK!.'

7. Now, we proceed to test this web service request. To create a test case, we go to Test Cases  $\rightarrow$  New  $\rightarrow$  Test Case.



We are asked to provide the name, description, and tag. We provide the name and leave the other optional fields blank.

🔀 New		×
Test Case		
1 Create	fest Case	
Name	TestPrintHello	
Description		^
		~
Tag		
	ОК	Cancel

We click on 'OK' to proceed.

The test case is created as follows:

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Tests Explorer		-	Quick Start Printh					
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## 8. We proceed to add keywords to the test case as follows:

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> D Profiles <ul> <li>► Test Cases</li> <li>■ GetIPAddressesTest</li> </ul>	^	Web UI Keyword Mobile Keyword Cucumber Keywords	In	put	Output	Description			
El GetSingleUserDataTest	GetUserDataTest  TestPrintHello  Doject Repository  GetIPAddresses	Web Service Keyword							
TestPrintHello     Diject Repository     GetIPAddresses		Windows Keyword Custom Keyword Call Test Case							
Control Contr	Decision-making Statements Looping Statements Branching Statements Exception Handling Statements Binary Statement Assert Statement Method Call Statement	>							
Keywords Browser E Properties	0 • 0	Method							
> I Built-In Keywords Custom Keywords > Utils									

First, we need to add the 'Send request' keyword to call the web service request and store the response in a variable which will be used in the next keywords.

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<ul> <li>D Profiles</li> <li>Est Cases</li> <li>GetlPAddressesTest</li> <li>GetSingleUserDataTest</li> </ul>	^	Item Object Send Request  Comment Concatenate	CompileStatic	Output	Description	
II Gettler/Darlet I Test/initide Gett/PAdresses GettPAdresses Gettlers Catures Phristillo Catures Initide/Data Initide	~	Contains String Deby Get Bernent Property Value Get Bernent Texten Get Hus file Constantion Get Hus file Constantion Get Response Status Code Seed Request And Verlity Set His File Generation Verlity Checkpoint v	StringConstants.KW static com.kms.kata sendRequest(com.ku request, com.kms.ka flowControl) Send a HITP Request Parameters: request - the ol	CATEGORIZE_REQUES) lon.core.testobject.Respo ns.katalon.core.testobjec talon.core.model.Failure	nseObject et.RequestObject eHandling P Request.	
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We select the 'PrintHello' object/web service request in the object Input column.

K Test	Object Input				$\times$
Object	Type Test Ob	iject ~		③ Recent	•
Enter te	ext to search				Q
GET	GetIPAddresse	S			
GET	GetSingleUserl	Data			
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			ve up 🕓 Move do		
No.	Name	Туре	Default value	Description	
			ОК	Cancel	
			UK	Cancel	

We click on 'OK' to select the PrintHello web service request.

We also add a variable 'response' to the output field as shown in the screenshot below:

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D Profiles     End Test Cases     End Test Cases     End Test Cases     End Test Cases     End Test End Test     End Test End Test	^	Item = 1 - Send Reg	Object PrintHello	Input	Output response	Description		
CetUserDataTest     TestPrintHella     Disect Repository     GetIPAdresses     GetIPAdresses     GetSingleUserData     GetIVers								
PrintHello      Test Suites      TestUserDetails      Checkpoints      Kowords								
Keywords Browser III Properties	0 = 5							
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The next variable that we add is the 'Verify Response Status Code' to check whether the request returns a 200 (OK) request. The entry is created as follows:

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Tests Explorer	8470	* Start Page * Quick Start	PrintHello 🕹 Test	PrintHello 😫			
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> © Profiles ✓ ⊞ Test Cases	^	Item -* 1 - Send Request	Object PrintHello	Input	Output response	Description	
間 GetIPAddressesTest 値 GetSingleUserDataTest		2 - Verify Response Status (	lode	~;; 0			
III GetUserDataTest							
Object Repository							
GetIPAddresses GetSingleUserData							
GetUsers PrintHello							
<ul> <li>PrintHelio</li> <li>Fest Suites</li> </ul>							
TestUserDetails     Data Files							
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Keywords Browser 🖽 Properties	0 ° •						
<ul> <li>Built-in Keywords</li> <li>Custom Keywords</li> </ul>							
D Utils							

We edit the Input column and provide values for the parameters responseObject and expectedStatusCode. We select the 'response' variable that we created during creation of the 'Send Request' variable. For the expectedStatusCode we enter 200 as it is what is expected.

No.	Param Name	Param Type	Value Type	Value	
1	responseObject	ResponseObject	Variable	response	
2	expectedStatusCode	Integer	Number	200	
<					>

The entry is updated as shown below:

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		🗄 Add 🔻 🔍 Recent keywords	Delete 🗈 Move	up 🐵 Move down 🖉 Edit t	tags 🗢 Set default view	Add to test suite	<ul> <li>View Test Run History</li> </ul>
D Profiles     M Test Cases     R GattPAddressesTest	^	Item -* 1 - Send Request	Object PrintHello	Input	Output	Description	
GestingktberDublet     GestingktberDublet     GestingktberDublet     GestingktberDuble     GestingktberDuble	v	2 - Verity Response Status C	ide	response; 200			
Keywords Browser 💷 Properties	0 * 8						
Enter took to operation							

The next keyword that we add is the 'Verify Element Text' keyword that is used for checking the element's text from the response returned by the web service.

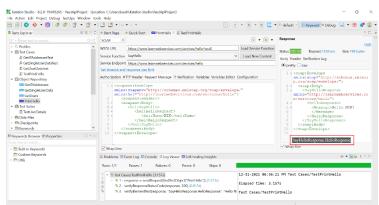
Tests Explorer	8 2 7 0	* Start Page * Quick Start	PrintHello 81	estPrintHello 🛛				
8 • Enter text to search.		Add      Recent keywords	🕈 🗊 Delete 🔅 Mov	e up 🛞 Move down 🕼 Edit t	ags 🗢 Set default view	8	Add to test suite	View Test Run History
D Profiles     Ent Cases     If GetIPAddressesTest     GetSingleUserDataTest	^	Item ~ 1 - Send Request ~ 2 - Verify Response Status Co Verify Element Text	Object PrintHello	Input response: 200	Output response	Description		
El GettlerChaller El TestPiettino Cotter Repository El GettPAdresses El GettPAdresse El Articles El States El Estates El Estates Estates Estates Estates Estates Estates Es	v	Verify Checkpoint Verify Element Property Value Verify Lements Count Verify Creater Than Verify Creater Than Or Equal Verify Creater Than Or Equal Verify Creater Than Or Equal Verify Match Verify Match Verify Not Tigual Verify Not Tigual	©c Str sta (ce Str cor Ver returnet thr	ompileStatic om.km.katalon.core.annote ingConstantL.KW.CATEGOR ic boolean verifyElementTe m.km.katalon.core.testobje ing locator.String text. r.km.katalon.core.model.Fe fy that there is an element wit uned data from a web service own: StepPailedException	IZE_ELEMENT) xt ct.ResponseObject resp ilureHandling flowCan h expected text appear in	onse,		
Keywords Browser E Properties	0~0							
Bulf-in Keywords     Costom Keywords     Utils								

We now need to edit the input column.

No.	Param Name	Param Type	Value Type	Value	
1	response	ResponseObject	String		
2	locator	String	String		
3	text	String	String		
<					_
·					

In the input, we provide the following values:

- **a. ResponseObject: Response:** This value is the variable 'response' created in the first step.
- **b. Locator:** This is the location of the element in the response of the web service request. This value for the field can be found in the soap request's response as shown below:



As visible from the screenshot above, the location of the field 'message' is SayHelloResponse.HelloResponse. We provide this value to the locator field.

**c. Text:** This parameter is the value of the 'message' property which is 'Hello NIK!.'

< Inp	put			
No.	Param Na	Param Ty	Value Type	Value
1	response	ResponseO	Variable	response
2	locator	String	String	"SayHelloResponse.HelloResponse"
3	text	String	String	"Hello NIK!"
				OK Cancel

We click on 'OK' to add the changes which are reflected in the entry as shown below:

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D Profiles     El Test Cases     all Get(PAckbrossesTest	^	Item •• 1 - Send I		Object PrintHelio	Input			Output response	Description	
all GetSingleUserDataTest			Response Status Code		response; 20					
B GetUkerDataTest		- 3 - Verily	Element Test		response; "S	yHelloResponse.He	NoResponse"; "Helio NII	2.		
El lestPrintHello										
<ul> <li>E Object Repository</li> </ul>										
GetIPAddresses										
GetSingleUserData										
GetUsers										
PrintHello										
Test Suites										
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9. We run the test case by clicking on the play icon.

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<ul> <li>&gt; 0: Profiles</li> <li>&gt; 0: Profiles</li> <li>&gt; B: Part Case</li> <li>B: GetSingleiserbrantet</li> <li>B: GetSingleiserbrantet</li> <li>B: Instituteiselo</li> <li>B: Instituteiselo</li> <li>Control Propository</li> <li>Control Profile</li> </ul>	~	Bern + 1 - Send Request + 2 - Welly Response Satus Code 3 - Verily Eement Ret	Object PrintHello	Input response: 20 response; "5		oftesponse"; "Helio NIC	Output response	Description
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R • Enter text to search	QIC			p ⊕ Move down ⊯ Edit tags ⊕ Set de		Test Cases/TestPrintHello - Chrome - 20211231_183619 <passed> - Chrome</passed>	1/1
<ul> <li>✓ E Test Cases</li> <li>Æ GetlPAddressesTest</li> </ul>	î	Item -* 1 - Send Request	Object PrintHello	Input		Test Cases/TestPrintHello - Chrome - 20211231_183612 <passed> - Chrome</passed>	1/1
E GetSingleUserDataTest Æ GetUserDataTest Æ TouPrintHollo		× 2 - Verify Response Status Cod × 3 - Verify Element Text		response; 200 response; "SøyHelloResponse.He		Test Cases/TestPrintHello - Chrome - 20211231_183606 <pre><passed> - Chrome</passed></pre>	1/1
<ul> <li>El Object Repository</li> <li>GetIPAddresses</li> </ul>						Test Cases/TestPrintHello - Chrome - 20211231_183557 <pre></pre> <pre></pre>	1/1
CettingleloserData     CettingleloserData     Cetting     PrintHelio     Test Suster     TestUserDetais     TestUserDetais     Deta Files     Cetepoints     Keywords	~					Test Cases/TestPrintHollo - Chrome - 20211231_183316 4Passed> - Chrome	1/1
Keywords Browser  Properties							
Bult in Keywords     Custom Keywords     Utils		<ul> <li>* Test Cases/RestPrintHello (3.</li> <li>&gt; To 1 - response = sendRequ</li> <li>To 2 - verifyResponseStatus</li> </ul>	ELog Viewer @ Se allures: 0 Erro 157s] est(findTestObject("F Code(response, 200)	iff-heading Insights rs: 0 Skips: 0 12-31 hintHelio'') (2.373s)	ed ti	0 - 10 06:36:21 PM Test Cases/TestPrintHello me: 3.1575 (TestPrintHello	> =

The test case is executed as shown below:

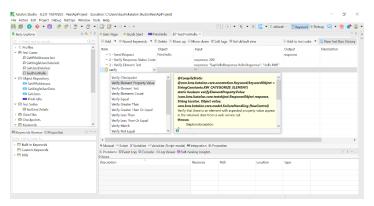
As seen from the results of the test case, the test case passed successfully.

10. In this test case, we can also use the 'Verify Element Property Value' to check the value of the message.

This is done as follows:

We click on 'Add' then select 'Web Service Keyword.' From the dropdown, we select the keyword 'Verify Element Property Value.'

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To Profiles     Ent Cases     All GetIPAddressesTest	^	Web UI Keyword Mobile Keyword Cucumber Keywords	tt Hello	Input response: 20	0		Output response	Description
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TestPrintHello     Diject Repository     GetIPAddresses		Windows Keyword Custom Keyword Call Test Case						
GetSingleUserData GetUsers PrintHello Test Suites TrotUserDetails		Looping Statements Branching Statements						
> ⊜ Data Files > ⊜ Checkpoints → ⊜ Køywords	v	Binary Statement Assert Statement Method Call Statement						
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An entry is added to the test case as shown in the screenshot below:

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		Add      Add      Recent keywords	T Delete S Move	up 🐵 Move down 🗷	Edit tags 🗘 Set de	fault view	Add to test suite	C View Test Run History
<ul> <li>D Profiles</li> <li>I Ret Cases</li> <li>III GettiPAddesses/Ret I</li> <li>III GettiPAddesses/Ret I</li> <li>III GettiPAddesses/Ret I</li> <li>III GettiPAddesses</li> <li>IIII GettiPAddesses</li> <li>IIII GettiPAddesses</li> <li>GettiPAddesses</li> <li>GettiPAddesses</li> <li>GettiPAddesses</li> <li>GettiPAddesses</li> </ul>	^	Item 1 - Send Request 2 - Verify Response Status Cod 3 - Verify Element Text 4 - Verify Element Property Vel		Input response; 200 response; "Sa "1; 11; null		lloResponse"; "Hello NIK!"	Output response	Description
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		<						
Built-in Keywords Custom Keywords Utils		* Manual © Script & Variables © Va El Problems © Event Log © Console 0 items Description			Path	Location	Туре	81-

We edit the 'Input' column and provide the three parameters: request, locator, and value. These values are the same as done in Step 8.

No.	Param Name	Param Type	Value Type	Value
1	response	ResponseObject	String	"response"
2	locator	String	String	"SayHelloResponse.HelloRespons
3	value	Object	String	"Hello NIK!"
<				>
				OK Cancel

We click on 'OK' to register the changes to the input column. The changes are registered as shown below:

		🗳 🗳 • i o • o •			010-0	🖣 🖷 🔽 🕶 🖻 de	Taux · El Keyword	w Debug 🔤 - 🔟 💁 V
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		Description		Resource	Path	Location	Туре	

We click on the play icon to run the test case.

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Enter text to search     D Profiles	0.00	Add      Add      Pecent keywords      1	Delete III Move	up 🗵 Move down 🖬	fEdit tøgs ⊉ Set de	efault view	H Add to test suite	<ul> <li>View Test Run History</li> </ul>
✓ I Test Cases	Â	Item * 1 - Send Request * 2 - Verify Response Status Code * 3 - Verify Element Text.	Object PrintHello	response; 20		loResponse": "Hello NIK!"	Output response	Description
all GetUserDataTest all RestinetHol ■ BetSheatHol GatShapkUserData ■ GatShapkUserData ■ GatShapkUserData ■ faitaHol ■ TestExerData ■ TestExerData ■ CaseContest ■ CaseContest	v	- 4 - Verly Dement Property Valu				dofesponse", "Nelo NIXT		
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		Description		Resource	Path	Location	Type	

The test case executes successfully as follows:

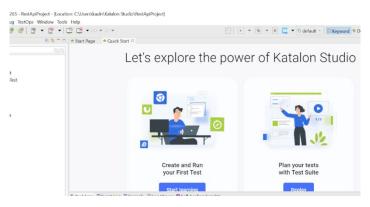
🗄 🖗 🔕 🔶 🕶 🔯 🛷 🔗 🖺	• <u>*</u> •	😳 📑 💌 🗢 💌		E 🕨 💌	. • ۱	🔲 💆 🔻 🖯 default 🔹 🖾 Keyword 🍬	Debug 🔛 🔻 🏦	- 🕐 🤅
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		B Add ▼      Recent keywords ▼	Delete 🗄 Move i	ip 🔅 Move down 📽 Edit tags 🔍 Set		Test Cases/TestPrintHello - Chrome - Passed - Chrome	20211231_193017	1/
1 Polis     1 Polis      Polis     Polis      Polis		Rem = 1 - Send Request = 2 - Verily Response Status Code = 3 - Verily Filement Respective Value - 4 - Verily Filement Property Value	Object PrintHollo	Input response: 200 response: "SayHelioResponse response: "SayHelioResponse	HelioRe HelioRe	Test Cases/TestPhintHello - Chrome (Tasado - Orome (Tasado - Orome (Tasado - Orome (Tasado - Orome (Tasado - Orome (Tasado - Orome (Tasado - Orome	20211231 183619 20211231_183612	0 0 0
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		*         Test Cases/TestPrintHelia (3.11)           *         The second end of the seco	st(findTestObject(" ode(response, 200 inse, "SayHelloRes	PrintHello")) (2.389s) ((0.013s) ponse.HelloResponse", "Hello NI Tes	psed ti	l 07:30:19 PM Test Cases/TestPri ime: 3.158s s/TestPrintHello	ntHello	

• **Example 7: Defining Custom Keywords:** Katalon Studio provide a wide range of built-in keywords that are available for testing different types of projects. But an interesting feature offered by Katalon Studio is that it allows users to define custom keywords. Customer keywords can be used to extend the functionality provided by Katalon studio (Introduction to Custom Keywords, 2022).

Once we define a new custom keyword, it can be used in test cases just like the other built-in keywords that we have seen until now.

The steps to be followed are explained below:

1. First, we navigate to the 'Keywords' option in the Tests Explorer as shown below:



2. We create a new package by right-clicking on 'Keywords' and going to New  $\rightarrow$  Package.

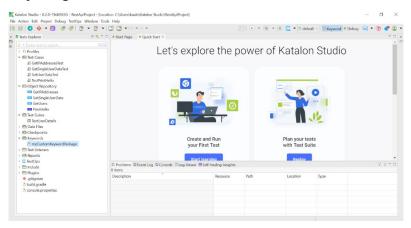
We can also create a new package by going to File  $\rightarrow$  New  $\rightarrow$  Package.

Tests Explorer			* Start Page * Quic	k Start #			• 🗉 🖸 • 0 dela	alt - EKeyword *		
> D Profiles > El Test Case # GatIP!	Custom Keyword Plugin Import Excort	,		Let's e	explore the	power (	of Katalor	n Studio		
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al GetUs al TestPri al GetSt al GetSt al GetSt al GetSt al GetSt al GetSt al FestUs blast File blast File blast Suite al GetSt al Ge		F3 F2 Ctrl+C Ctrl+X Ctrl+V Delete F5 Ctrl+R	Keyword	0	Create and Run your First Test		Plan your ter with Test Su			
> Test Listene > Eth Reports	13									
> Em Haports > C TestOps					Start learning		Replay			
> 🛅 Include			Problems Event Lo Ditems	og Console 🗉 Lo	Wewer Self-healing Insights				81-	
<ul> <li>Plugins</li> <li>gitignore</li> <li>build.gradk</li> <li>console.pro</li> </ul>			Description		Resource	Path	Location	Type		

The New Package dialog appears:

🚺 Nev	N	×
-	<b>vord Package</b> eate Keyword Package	Ť
	myCustomKeywordPackage	
Nume	ingeastorikeywordrackage	
	ОК	Cancel

We provide the name and click on 'OK' to create the package. The package is created as shown below:



3. We now proceed to create a new Keyword in this package. To do this, we right click on the newly created package name and navigate to New → Keyword.

		🖸 🕒 • i e •			L	* 🔳 🔯 • 🖻 defau	n Meyword + c	wood and .	
Tests Explorer		* Start Page	Quick Start 22						-
			1			C 1 / 1	O1 1'		
> D Profiles			Lets	s explore the	power c	of Katalor	Studio		
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all GetIPAddressesTest	Custom Keyword F	lugin							
GetSingleUserDataTes	Export								
E GetUserDataTest	New	2	Package						
all TestPrintHello	Open	F3	Keyword						
GetIPAddresses	Rename	F2					•		
GetSingleUserData	Copy	Ctrl+C	E				0		
GetUsers	Copy ID						50		
PrintHello	Cut	Ctrl+X							
v # Test Suites	Paste	Ctrl+V			-		10-		
El TestilsecDetails	Delete	Delete							
> 🕋 Data Files	Refresh	F5							
>  Checkpoints	Show References	Ctrl+R							
	Open containing for	sider		Create and Run		Plan your tes	ts		
Keywords		1		your First Test		with Test Sui			
myCustomKeywordPad				,					
<ul> <li>myCustomKeywordPad</li> <li>Test Listeners</li> </ul>	age.								
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myCustomKeywordPad     mTest Listeners     MReports     ErstOps     Miclude     Mlude		0 items	rent Log © Console =	Log Viewer 🖾 Self-healing Insights			Туре		A I -

The create new Keyword dialog opens as follows:

🔀 New		×
Keyword		
Choose new key	a package and class name to create words.	
Package	myCustomKeywordPackage	Browse.
Class Name		
Generate	e sample keywords for Web	
_	e sample keywords for Mobile	
Generate	e sample keywords for API	
	C OK C	ancel

As seen from the screenshot above, the package name is already prefilled as we had selected the package before entering the menu.

We provide the name of the keyword class as shown in the screenshot below. By default, the naming rules followed are like those of the Java language which means that the name of a class cannot start with a number, contain spaces, or have special characters in it. The naming convention for the Java language suggests creating a class name using a noun or a noun phrase and following the camel case rule where the first letter of each word is capitalized which helps better manage the project (Joy et al., 2000).

🔀 New				$\times$
Keyword				
Choose new key		e and class name to	create	
Package	myCusto	mKeywordPackage		Browse
Class Name	printMsg			
Generate	e sample k	eywords for Web		
_		eywords for Mobile		
Generate	e sample k	eywords for API		
	0	ОК	Can	cel

We can also create a new Keyword by going to File  $\rightarrow$  New  $\rightarrow$  Keyword from the main menu. The only difference when using this option is that the Package name will not be pre-selected in the Package field in the New Keyword dialog, one would have to browse and choose the package manually.

Once, we click on 'OK' the keyword class is added to the custom package as shown below:

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We now proceed to create a new keyword by defining a method in this newly created keyword class. In this example, we define a keyword called test that simply prints a message 'Message is:' followed by the value of the argument/parameter provided. The keyword can be defined in either groovy or java which are both compatible in Katalon Studio. The newly added keyword is shown below:

on Edit Project Debug TestOps Window Tools Help			
Q ♦ • Q   Ø Ø   Ø • Q • Q • Q •   0 • • • •   Ø • Ø #   8 • Ø	🗠 📄 🖛 🐘 🛄 🔽 🛡 default	🕐 🖾 Keyword 🗣 Debug 🛛 📼 👻	•
<pre>https://www.interfactor.com/interfactor.c</pre>	×		

Once we add the keyword, we save the file.

4. We now proceed to implement this keyword in one of our test cases. We proceed to edit the 'GetUsersDataTest' test case. We go to 'Add' and select the option 'Custom Keyword' as shown below:

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Tests Explorer	e 🍕 e 🙃	* Start Page * Quick Start & GetUser	DataTest =					0
		B Add 🔻 Becent keywords 💌 🕆 Dele	te 🗉 Move up	Move down	🗹 Edit tags 🔍 Set def	ault view	Add to test suit	e 🝷 🗳 View Test Run Histor
2         0 holds         (A)           2         0 holds         (A)           4         6 off-Advances         (A)           4         6 off-Advances         (A)           4         6 off-Advances         (A)           4         6 off-Advances         (A)           5         6 off-Advances         (A)           6         6 off-Advances         (A)           8         6 off-Advances         (A)           9         6 off-Advances         (A)           9         (A)         (A)           4         (A)         (A)           9         (A)         (A)           4         (A)         (A)           4         (A)         (A)           4         (A)         (A)		Web UI Koywood         Modalik Koywood           Modalik Koywood         Koywood           Carumher Keywood         Woldwon Koywood           Cola Line Cola Statement         >           Description melling Statement         >           Discription Statement         >           Bioregin Statement         >           Bioregin Statement         >           Bioregin Statement         >           Monto Call Statement         >           Method Call Statement         >	getUse		Output getUsensResponse	Description		
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<ul> <li>Include</li> <li>It Plugins</li> <li>.ghignore</li> <li>build.gradle</li> <li>console.properties</li> </ul>		Description		Resource	Path	Location	Type	

A dropdown list of all the available custom keywords is provided as shown below:

Tests Explorer	E 9	* Start Page * Quick	Start El Matthe	CataTer 11				ult • Keyword •	
E . Inter text to search		B Add - Recent ke			Move down	Edit tags O Set def	ault view	B Add to test suite	<ul> <li>Wew Test Run Histor</li> </ul>
Profiles     Profiles     Bett Cases     Bett PAddresses lest     BettPAddresses lest     BettPAddresses lest     BettPAddresses     TestPrintHelo     Clojet Reporting     CleftReporting     GettPAddresses		Rem - 1 - Sond Request - 2 - Verify Respons - 3 - Contains String - 4 - Verify Dements - eprintMag text = v myCustom Reywood myCustom Reywood	e I I dPackage printMsp	getUsers getUsers etuset	Response: 200 Response: "Lear Response: "': 11 o <sup>1</sup> Object CustomKe		Description	ling, test	
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> C TestOps > D Indude		Manual      Script X Variables     Wandales (Script mode)     Mintegration     Wintegration     Wintegratin     Wintegration     Wintegratin     Wintegration     Wintegrat							¥ 1 -
<ul> <li>Plagins</li> <li>gitignore</li> <li>build.gradle</li> <li>Console.properties</li> </ul>		Description			Resource	Path	Location	Type	

We select the keyword that we created which is 'myCustomeKeywordPackage.printMsg.test.'

We provide the value 'test' for the ARG parameters that we defined in the custom keyword. This is shown below:

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		B Add ▼      ® Recent keywords ▼      Ê Delete	Nove up 🛞 Move do	wn 🕼 Edit tags 🗢 Set defaul	view	🖲 Add to test suite 💌 🛄 View Test Run History
	~	Inter - 1 - Sond Request - 2 - Wely Response Main Code - 3 - Creating Siding - 4 - Wely Generation Coast - 5 - regCasterReywordPickage print/tag ber - 5 - regCasterReywordPickage print/tag ber	Object GetUsers	Input getUsersResponse: 200 getUsersResponse: "Lea getUsersResponse: "): 1 Test		Desciption
Keywords Browser E Properties	0 * 8					
> 2 Built-In Koywords > 2 Custom Keywords > 2 Utils		د				

We run the test case by clicking on the play icon at the top. The test case executes with success. This is visible in the screenshot below:

3 8 3 🚸 - 🛛 🛷 %	2 · 2 ·	🖞 🗳 • Io • - •		[▶] ▼ [♥] ▼	• 🗏 🔯 = 🛈 default -	🗏 Keyword 👻 Debug 🔤 👻 禶 🤹
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		□ Add 💌 □ Recent keywords 💌 🖩 Delete 🗉 N	fove up 🐵 Move down 🚿 E	idit tags 🔍 Set defaul	Test Cases/GetUser Passeda - Chrome	DataTest - Chrome - 20220101_235118 1/1
) D holfs     ) D holfs     D hat Case     20 hat Case	~	hen -1.5-end Rogaet -2.Venly Reporte Statu Code -2.Venly Report Statu Code -3.Costaline Statu -4.Venly Remark Coast -5.myCatorial/public/statu print/log.ted -5.Wenly Remark Coast -5.Wenly Remark Coa	GetUsers 9 9 9 7 1	nput etUsersResponse: 200 etUsersResponse: "Le etUsersResponse "?; 1 ets"		,
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		Burst 1/1 Passes: 1 Failures: 0	Errors 0 Skips 0	_		
> 100 Built-in Keywords > 100 Custom Keywords > 100 Units		Nume         1         Nature: 0           • <t< td=""><td>indTestObject("GetUsers")) (1 Response, 200) (0.013s) Leanne Graham", false) (0.009 Irise, **, 10) (0.037s)</td><td>.496s) Elapsed</td><td>22 11:51:20 PM Test time: 2.234s es/GetUserDataTest</td><td>Cases/GetUserDataTest</td></t<>	indTestObject("GetUsers")) (1 Response, 200) (0.013s) Leanne Graham", false) (0.009 Irise, **, 10) (0.037s)	.496s) Elapsed	22 11:51:20 PM Test time: 2.234s es/GetUserDataTest	Cases/GetUserDataTest

In this example, we added a simple test case to study how a custom keyword can be added. In real-life scenarios, meaningful keywords that help extend/enhance the quality of testing must be used.

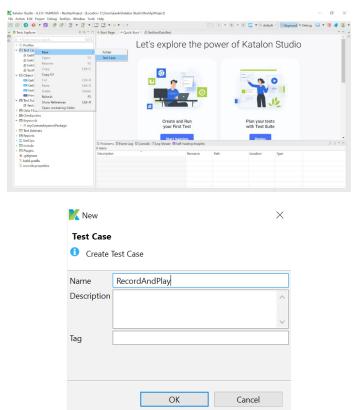
Additionally, Katalon provides us with readily available sample custom keywords for Web, Mobile, and API projects. The documentation is available here: https://docs.katalon.com/katalon-studio/docs/sample-custom-keywords.html.

• Example 8: Recording and Playback Using Katalon Studio: An excellent feature that Katalon Studio has to offer is record and playback option. We can record the activities that we perform on our machine or in our browser using Katalon Studio and then play them again as part of our test cases. This feature helps test an application in a more efficient way. A tester can just record a test case once and then repeat the same test case with different values again and again without having to write or script thousands of test cases which would definitely save on time.

In this example, we shall see how to create a test case that records actions performed in the Web Browser and records it.

The steps are:

1. We first create a new Test case and name it 'RecordAndPlay.'



2. Once we click on 'OK' after providing the name, it is added to the list of test cases. To record the user actions in a Web Browser, we navigate to the toolbar at the top and click on the 'Record Web' button as shown below:

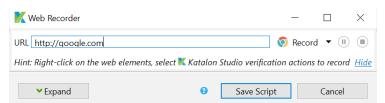
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Tests Explorer Record Web   🧐 🖱	* Start Page * 0	Juick Start 🛛 🗟 GetUserl	DataTest ERcordAn	iPlay =				
Enter text to search	🗄 Add 💌 🔍 Rec	ent keywords 💌 🖺 Dele	te 🗏 Move up 🗟 Move	down 🗷 Edit tags 🔅	iet default view	Add to test suite	<ul> <li>View Test Run Histor</li> </ul>	
© Police ■ Inst Cares ■ Inst Parentey ■ Inst Parentey	Item	Object	Input	Output	Description			
Keywords     MnyCustomKeywordPackage     Inst Listeners								
A Reports		X Variables O Variables					21-	
C TestOps	Problems      Prent Log      Console      Elog Viewer      Self-healing Insights     Console      T     Console     T     Console     T							
Include ■ Plugins ♦ .gitignore holid.gradle P console.properties	Description		Reso	irce Path	Location	Туре		

3. The Record dialog appears and asks for information such as the URL to access and the browser that we wish to open such Chrome, Firefox, etc.

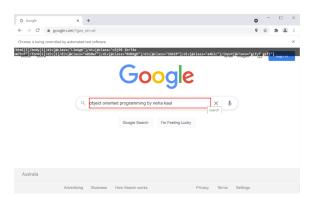
K Web Recorder	—		$\times$
URL http://demoaut.katalon.com/	🦻 Record	• (II)	
Hint: Right-click on the web elements, select Ҝ Katalon Studio verificatio	n actions i	to record	<u>Hide</u>
✓ Expand Save Script		Cancel	

By default, the URL provided is http://demoaut.katalon.com/

In this example, we update the URL to google.com and keep the browser selection at Chrome which is the default value.

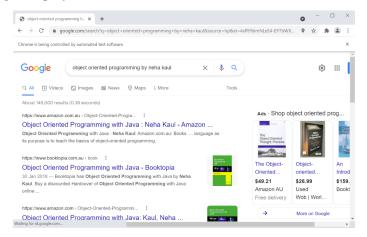


4. We click on 'Record' to start recording actions taken in the browser. When we click on the 'Record' button, a Chrome Browser with the URL http://google.com opens as shown below:



We enter the text 'object-oriented programming by Neha Kaul' in the google search bar and click on enter.

Google displays the results as follows:



5. We close the browser opened by automation and click on the Stop button in the Web Record Dialog:



Once we stop recording, the Web Recorder dialog is updated with actions that we performed in the browser. This is shown below:

K Web Recorder					-		$\times$				
URL http://google.com					🧔 Record	• (II					
Hint: Riaht-click on the w	Hint: Right-click on the web elements, select K Katalon Studio verification actions to record Hide										
RECORDED ACTIONS Sheet a reader of the web clements, sheet a reader of the reader of t											
🗄 Add 🔻 🕲 Recent key	ywords 🔻 🖥 Rem	ove 🗈 Mo	ove Up 🗉			0	•				
Item	Object	Input		Output	Descripti						
-× 1 - Open Browser											
→ 2 - Navigate To Url		"https://w	ww.goo								
-× 3 - Set Text	input_q	"object or	iented p								
-× 4 - Send Keys	input_q	Keys.chor	d(Keys.El								
-× 5 - Set Text	input_q	"object or	iented p								
🔫 6 - Close Browser											
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Add Delete Clea	r 🗈 Move up 🗟 N	love dow	ı								
No. Name Typ	pe Default v	alue	Descriptio	on M	a						
▲ Collapse		0	Sav	ve Script	:	Cancel					

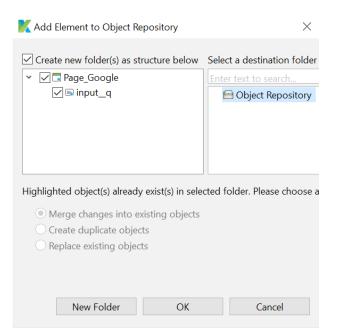
6. If we are happy with the test case, we can save the script. If not, you can record again.

To save the script generated, we click on the 'Save Script.'

🔣 Web Record	ler						_		$\times$
URL http://goo	ogle.com						🧔 Recor	d 🔻 (	
Hint: Right-click	TIONS					S	how Capti		
E Add ▼ ◎ F Item -× 1 - Open		words Object	▼ ■ Rem	ove ® M	love Up 🛛	Move     Output		oti	•
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▲ Collapse	e			0	Sav	ve Script		Cance	el

When we save the script, we are prompted to also save the element that we browsed (google page in this case) to the object repository.

To do this, click on 'OK' in 'Add Element to Object Repository' dialog as follows:



Once we save the element, it is added to the Object Repository as shown below:

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	이 C @ Add ♥ @ Recent ke	🗄 Add 💌 🖗 Recent keywords 💌 🗊 Delete 🖹 Move up 🗟 Move down 🖉 Edit tags 🌣 Set default view 👘 Add to test suite 💌 🖾 View Test Run Histor									
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We can also see that the test cases have an entry pertaining to each action that we took while recording.

7. To run the test case, we click on the play button at the top.

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The test case is executed successfully.

# CHAPTER

### WATIR

4

### CONTENTS

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4.3. Examples	.127

This chapter describes the testing tool Watir. In this chapter, we learn what this tool is, how to install it and how to use it for automation testing.

Watir is an open-source library meant for test automation which develop in the Ruby language. The full form of Watir is Web Application Testing in Ruby and Watir is pronounced as "Water." This tool helps testers develop automated tests for testing web applications. The automation tool is independent of the language in which the application under test is written. Watir supports the following web browsers: Firefox, Chrome, Internet Explorer, Edge, and Safari (Watir Project, 2009).

This tool is developed in Ruby and is available as a RubyGems install. This automation tool is created with the intent of interacting with a web browser in the same way as humans. Watir mimics user actions such filling online forms, clicking on different links, opening tabs, etc. (Watir Project, 2009).

The latest version of Watir is 7.1.0. Since it is developed in Ruby, it requires a user of this tool to possess elementary knowledge of Ruby. To run Ruby code, you need to install a Ruby interpreter (Watir Project, 2009).

## 4.1. IMPORTANT WATIR COMMANDS AND TERMINOLOGY

In this section, we cover some Watir basic commands that will help us start with this tool ("Module: Watir," 2022).

• Loading the Watir Library:

require 'watir'

• Opening a Browser:

browser = Watir::Browser.new:firefox

browser = Watir::Browser.new:chrome

- browser = Watir::Browser.new:ie
  - Opening the Default Browser:
- browser = Watir::Browser.new

• Opening a URL

browser.goto "http://mysite.com"

• Refreshing the Browser browser.refresh

• Closing the Browser browser.quit browser close

• Check if Button is Enabled browser.button(:id => "button").enabled?

• Get the Button Text browser.button(:id => "button").text

Button Click
 browser.button(:id => "button").click

• Take a Screenshot

Browser.screenshot.save "filename.png"

• Maximize Browser Window browser.window.maximize

Set Text Field Value

browser.text field(:id => "textField").set "test"

• Get Text Field Value

browser.text\_field(:id => "textField").value

• Clear Text Field Value browser.text\_field(:id => "textField").clear

Select Checkbox
 browser.checkbox(:id => "checkbox1").set
 browser.checkbox(:id => "checkbox1").set(true)

Unselect Checkbox

browser.checkbox(:id => " checkbox1").clear browser.checkbox(:id => " checkbox1").set(false)

• Check if Checkbox is Selected browser.checkbox(:id => " checkbox1").set?

• Select from Dropdown List dropdownList = browser.select(id: 'names') dropdownList.select(text: 'Tom') dropdownList.select "Tom" • Clear Dropdown List Selection dropdownList.clear

• Select Radio Button browser.radio(:id => "radioButton").set

• Check if Radio Button is Selected browser.radio(:id => " radioButton ").selected

 Click on a Hyperlink Text browser.link(:text =>"Test").click browser.link(:text => /Test/).click

• Wait until a Condition Becomes True

browser.link(:text => /Edit/).wait until(&:present?)

browser.text\_field(name: "test").wait\_until(&:present?).click

browser.text\_field(name: "test").wait\_until(timeout: 30, &:present?)

• Sleep for Set Duration

Sleep 10

• Check if the Browser Includes a Certain Text (this will print true/ false)

```
browser.text.include? 'Apple'
```

Use puts to print the output:

puts browser.text.include? 'Apple'

### 4.2. WATIR INSTALLATION

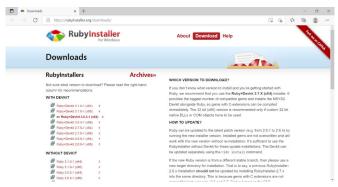
In this section, we look at the installation process for Watir.

The installation process for Watir is straightforward. The online documentation provided on their official website is accurate, helpful, and up to date.

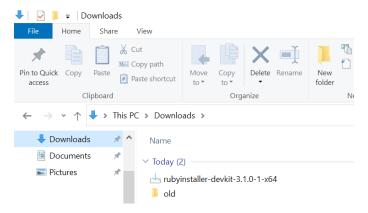
In this book, we will be installing Watir on a windows machine.

The steps followed are:

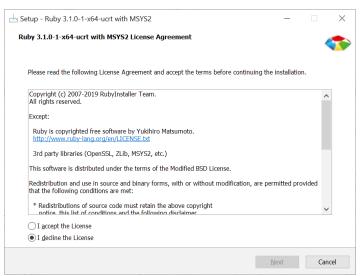
1. The first step is to install a Ruby Interpreter as it is required to run code written in the Ruby language. To install the Ruby Interpreter for windows, we go to the following site https://rubyinstaller.org/ downloads/ and download the latest ruby interpreter for windows.



We download the 64-bit 3.1.0-1 version of the installer.

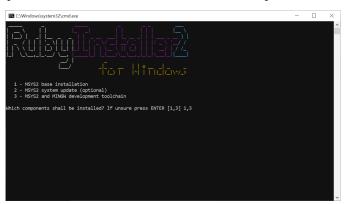


2. We run the ruby installer and follow the setup as follows:

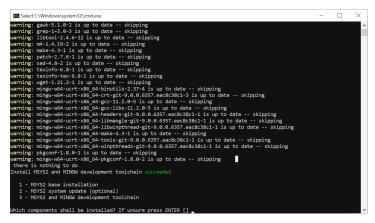


📥 Setup - Ruby 3.1.0-1-x64-ucrt wit	h MSYS2		-		×
Select Components Which components should be insta	alled?			<	<b>*</b>
you are ready to continue.	o install; clear the components you do r	not want	to install. Click N		
✓ Ruby-3.1.0 base files ✓ Ruby R1 and HTML documenta ✓ MSYS2 development toolChain	tion 2021-12-30			37.5 MB 40.7 MB 861.6 MB	
ATTENTION: MSYS2 is already pr re-installed. Additional installed pa and must be re-installed.	esent in C:\Ruby31-x64\msys64. It will scman packages will be removed. Some	l be delete gems mi	ed now and ther ight not work af	erwards	
Current selection requires at least	942.7 MB of disk space.				
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Setup - Ruby 3.1.0-1-x64-ucrt wit	n MSYS2		_		×
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P	Click Finish to exit Setup. ∠ Run 'ridk install' to set up MSYS2 MSYS2 is required to install gems wi	and dev ith C exte	elopment toolch ensions.	ain.	
<b>B</b>	https://rubyinstaller.org https://groups.google.com/group/ru https://github.com/oneclick/rubyinst				

3. Once the setup is complete, a command prompt window opens and asks us to install additional components that are needed as part of the installation. The window that opens is as follows:



We choose option 1 and 3 and click on the 'Enter' button on our keyboard.



The installation is successful, and we are again prompted to install it. But, as visible in the screenshot above, there are no options within the square brackets which means that the installation of all the compulsory components is complete. We click on enter and the window terminates.

4. The next step is to install water using ruby gems.

To install watir, we first open a new command prompt window. To install watir we simply need to run the following command:

gem install watir

Let us first try to understand the command that we will execute.

A gem is like a package that you can download and install. A gem is

nothing but a collection of Ruby code that we put into a "collection" that we can name later (Pargal, 2020). The Gems software permits us to download, install, and make use of ruby packages. Each software package that is downloaded is called a "gem" and each "gem" contains a packaged Ruby application or a Ruby library.

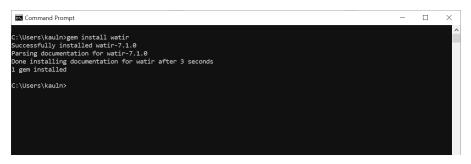
The gem install command allows us to specify the gems that we want to use and the versions of the gems that we wish to use (Pargal, 2020).

In simpler terms, the 'gem install' command extracts the gem and places it into a directory on your machine. Here, we are installing the watir package to our system.

This is shown below:

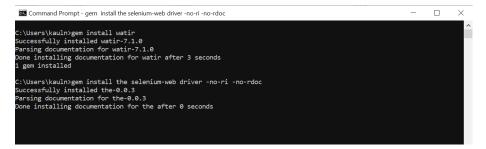


Watir is installed successfully as shown in the image below:

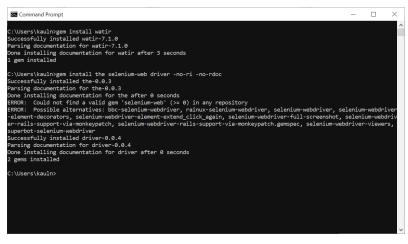


5. We then proceed to install the necessary drivers to run watir test cases and suites.

We begin by installing the selenium web driver in this step. The command to install it is: sudo gem install selenium-webdriver —no-ri —no-rdoc his is shown below:



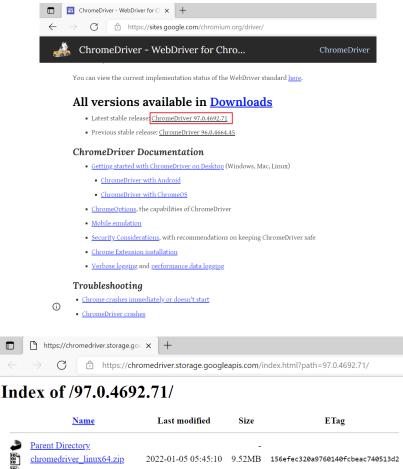
#### On running the command, selenium web driver is installed.



6. The next webdriver that we install is the browser driver. We install the web driver for google chrome called the chromedriver. This

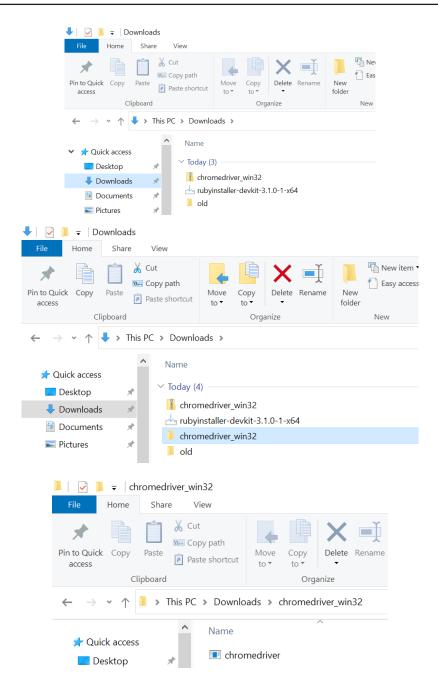
is done by going to the ChromeDriver website and downloading the chromedriver for the chrome browser installed on the test machine.

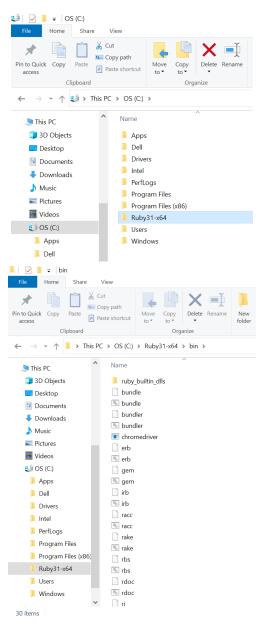
In this case, since we are using the version 97 of chrome web browser, we download the corresponding chromedriver for windows.



10	the other of the starte starte		210 21.12	
	chromedriver_mac64.zip	2022-01-05 05:45:13	7.89MB	952c27f9ca42748db82b15f8c0c59d3c
	chromedriver_mac64_m1.zip	2022-01-05 05:45:15	7.48MB	bb0e354876e64b8725b620d482247dff
	chromedriver_win32.zip	2022-01-05 05:45:17	5.89MB	58ac3bf76466773680a5fe04b69ad1d3
101 01 10	notes.txt	2022-01-05 05:45:22	0.00MB	0fe69c56feb42175dd29cf69e4f38e9d

Once we have downloaded the chromedriver, we proceed to extract it and paste a copy of the chrome driver in the bin folder of our Ruby installation.

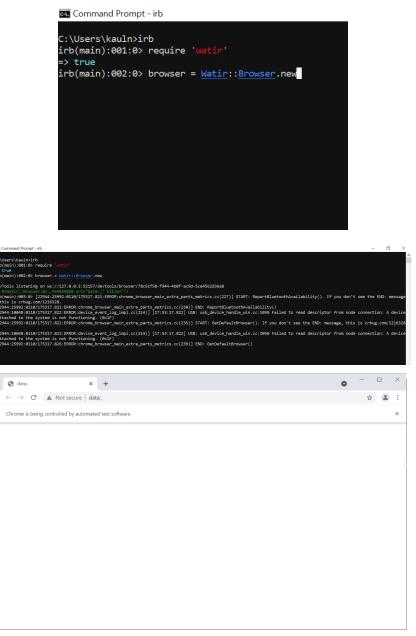




As seen from the screenshot above, we have successfully added the chrome driver to the following location: C:\Ruby31-x64\bin.

7. To test the successful addition of the chromedriver we run the following command in an irb session: browser = Watir::Browser. new.

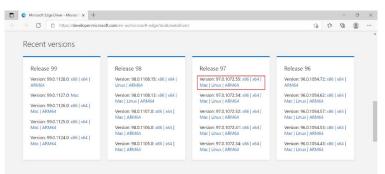
We do not need to provide the browser name as the default browser for Watir is chrome.



As we can see, a chrome web page is opened confirming that the driver has been installed correctly.

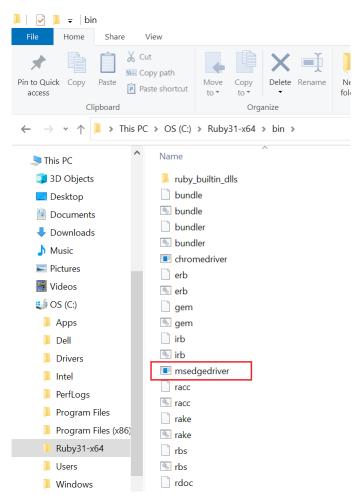
8. We proceed to install the driver for Microsoft Edge in this step.

To install the webdriver for Edge, first, we check the version of Microsoft installed on the system and then proceed to download the web driver for that version.



We extract the webdriver and paste it in the bin folder of our ruby installation.

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To test whether we are able to open a Microsoft Edge browser using Watir, we open an irb session. irb or IRB stands for Interactive Ruby Shell which is a REPL (read-eval print loop) for programming in the objectoriented scripting language Ruby (Cross Browser Automation Testing Using Watir, 2019).

We run the following command in an open irb session:

Browser = Watir::Browser.new:edge

In this command, we specify the browser that we wish to open because watir will open a Google Chrome browser by default.



command Prompt - ino					· ^
C:\Users\Kauln>irb irb(msin):001:0> require 'watir'					
=> true irb(main):002:0> browser = <u>Watir</u> ::B <u>rowser</u> .new:edge					
DevTools listening on ws://127.0.0.1:53335/devtools/browser/a500b0af-4482-46cb-81e0-d00f88739132					
>> foid:r:Brows-B6788172e upi=dsta:" tile="> Ho(main)0830 2 [25523:855:0101010872.783:EBROR:chrome_browser_main_extra_parts_metrics.cc(251)] 57ART: GetDefaultBrowser(). If Houg.com/1215252 [25532:25480:0101/189742.789:EBROR:device_event_log_impl.cc(214)] [18:07:42.789] USB: usb_device_handle_vin.cc:1050 Failed to read					
attached to the system is not functioning. (0x1F) [25528:25408:0110/180742.790:ERROR:device_event_log_impl.cc(214)] [18:07:42.790] USB: usb_device_handle_win.cc:1050 Failed to read	descriptor	from no	de conne	ection: /	device
attached to the system is not functioning. (0x1F) [25528:2555:0110/180742.794:EBROR:chrome_browser_main_extra_parts_metrics.cc(255)] END: GetDefaultBrowser()					
[25528:25408:0110/180742.797:ERROR:profile_manager.cc(1076)] Cannot create profile at path C:\Users\kauln\AppData\Local\Microsoft\t [25528:25408:0110/180742.797:ERROR:profile_manager.cc(2067)] Cannot create profile at path C:\Users\kauln\AppData\Local\Microsoft\t					
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Microsoft Edge is being controlled by automated test software.					$\times$
1					

As we can see from the screenshot above, a Microsoft edge browser tab is opened which indicates that our web driver has been picked up.

This concludes the basic installation of Watir. In the next section, we look at different examples that demonstrate the creation of test cases and automation using watir.

### **4.3. EXAMPLES**

In this section, we look at writing test cases and implementing test suites using watir and ruby gems.

• Example 1: Creating a Simple Test Case to Open the Default Browser: In this example, we will write a simple test case and execute it using watir.

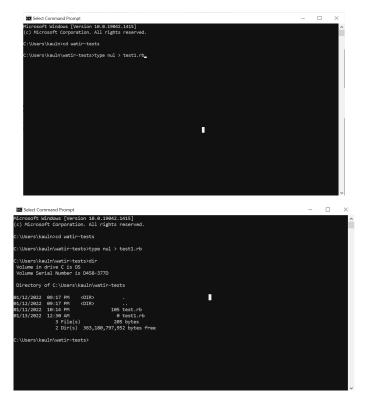
The steps followed are:

1. We open a command prompt and create a folder named watirtests as shown below:

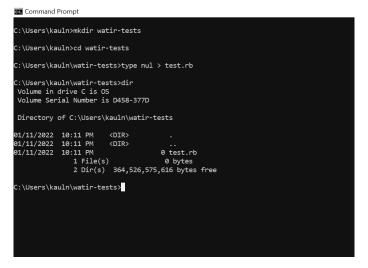


2. We open the folder and create a new ruby file named test.rb in this folder.





3. We check the contents of the folder to check that the file is created.



4. We proceed to the folder where the file 'test.rb' is created and proceed to edit it.

<mark>┃   ☑ ┃ =</mark>   wa File Home	atir-tests Share View						
Pin to Quick Copy access	Paste A Cut Paste Paste shortcut	Move Copy to* Copy	Ne <sup>r</sup> fold				
CI	ipboard	Organize					
$\leftarrow \  \  \rightarrow \  \   \checkmark \  \   ($	> This PC > OS (C:)	> Users > kauln > watir-tests					
E Desktop	🖈 ^ Name	^					
🖊 Downloads	s 🖈 🔍 🛒 test						
懂 Documents	s 🖈						

We edit the file as follows:

AND			
*test - Notepad		_	×
Elle Edit Format View Help			
require 'watin' browser = Watin::Browser.new:edge browser.gcto "https://www.google.com/" browser.close			^
			~
Ln 4, Col 14 100% Winde	lows (CRLF)	UTF-8	

Let us look at the commands that we have entered.

The first line of our code says  $\rightarrow$  require 'watir'

This statement is like a declaration and here we communicate the fact that we will be needing the Watir library to run this code. This line of code ensures that the Watir library gets loaded.

The second statement is  $\rightarrow$  browser = Watir::Browser.new:edge

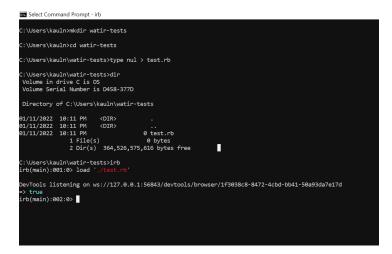
In this command we specify the browser that we are using.

The next command is → browser.goto "https://google.com"

Here, we specify the URL that we wish to open in the Edge browser.

The last command is  $\rightarrow$  browser.close

5. Now, we proceed to executing the test case from the command line by using the load command as shown in the screenshot below:



The test case is executed and the URL google.com is opened in the Microsoft Edge browser as shown below:

Google	× +									×
$\leftarrow$ $\rightarrow$ x (d	https://www.google.com					20	£^≡	Ē		
Microsoft Edge is being co	ontrolled by automated test soft	ware.								$\times$
About Store					Gmail	Images			Sign i	n
		C								
		<b>G0</b>	ogle							
			•							
	( Q				Ŷ					
		Google Search	I'm Feeling Lucky							
Australia										
	Advertising Business	How Search works		Privacy	Terms	Settings				

• Example 2: Opening the Default Browser Using Watir: In this example, we will write a simple test case where we open the google search page in the default web browser Google chrome.

The steps we follow are:

1. First, we create new file in the folder watir-tests named 'test1.rb.'

🔤 Command Prompt	-	×
Microsoft Windows [Version 10.0.19042.1415] (c) Microsoft Corporation. All rights reserved.		^
C:\Users\kauln>cd watir-tests		
C:\Users\kauln\watir-tests>nul > <u>t</u> est1.rb		
📕 🛛 🔁 📕 🗢 🛛 watir-tests		
File Home Share View		

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ļ	狊 This	5 PC		^	Name			^		
	30	O Objects			🐺 test					
	Desktop				🐺 test1					
	🖆 Documents									
	🖊 D	ownloads	5							

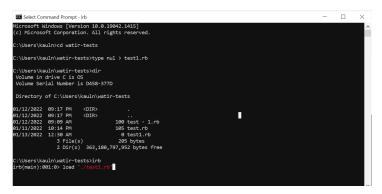
### 2. We edit this file as follows:

lest1 - Notepad				-		×
<u>Eile Edit Format View Help</u>						
require 'watir': browser = Watir::Browser.new browser.goto "https://www.google.com/" browser.close						^
						$\sim$
	Ln 4, Col 14	100%	Windows (CRLF)	UTF-8	В	.4

The test1.rb file content is very similar to the file test.rb created in the previous example except the browser command. In this example, we simply change the second statement where we set the browser.

In this example, we do not specify the browser so that the default browser is opened.

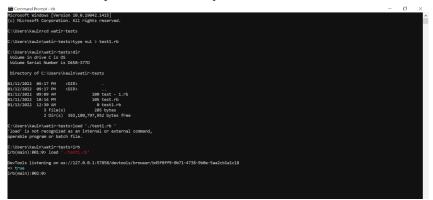
3. We save the file and proceed to run this file from the command line.



4. The test is executed and the URL google.com is opened in the default browser which is Google Chrome.

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÷ → X 🔒 goog	gle.com					\$	)
hrome is being controlled	by automated test software						
About Store				Gmail Images		Sign in	1
	91			ţ			
		Google Search	I'm Feeling Lucky	•			
		Google Search	Thi Peeling Looky				
Australia							

The test is completed successfully as shown below:



We can also run the ruby test case directly by double-clicking on the file which is an executable. We choose to run it from the command line to see if any errors are thrown. The command line helps us debug any issues that might arise. This example is a very simple example of a test case but in the case of complex test cases, it is always easier to run from the command line.

• **Example 3: Using the Maximize Command:** In this example, we look at the maximize command to maximize the browser when opened.

The steps to follow are:

1. First, we create a new ruby file in the same location as before and name it 'maximize-window.rb.'

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Pin to Quick Copy access	Paste Cut Copy path Paste shortcut ipboard	Move to* Copy to* Copy to* Copy Delete Rename Copy Copy
CI	ippoard	Organize
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😓 This PC	^ Name	
🧊 3D Objects	🐺 maxi	imize-window
📃 Desktop	🐺 test1	
🖆 Documents	s 🔍 🐺 test	
🖊 Downloads	;	

2. We edit this file to maximize the browser as follows:

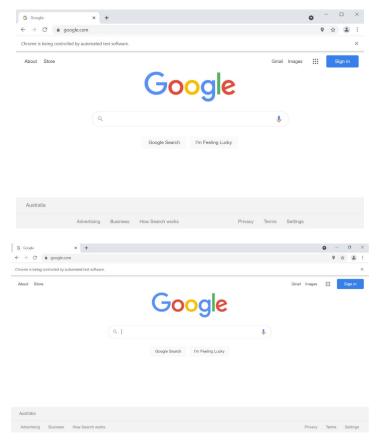
🧐 maximize-window - Notepad
<u>F</u> ile <u>E</u> dit F <u>o</u> rmat <u>V</u> iew <u>H</u> elp
require 'watir'
browser = Watir::Browser.new
browser.goto "https://www.google.com/"
browser.window.maximize
browser.close

As visible in the screenshot above, we make use of browser.window. maximize command to maximize the browser window.

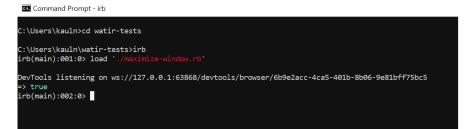
3. We execute this ruby file from the command prompt.



4. The automation executes the ruby commands and opens the URL configured in the file using Google chrome. This window is then maximized.



The test executes with success.



• Example 4: Searching for a Text in a Simple html form Using Watir: In this example, we use watir to test a simple html form.

The steps are as follows:

1. First, we create a simple html form in the same directory as our tests.

In this page, we add a button that redirects to another html page when clicked.

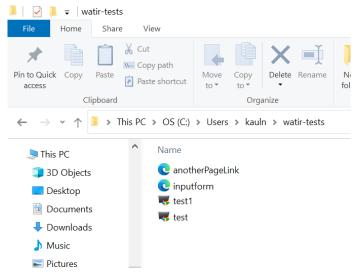
The main page is as follows:

As seen from the content of the file above, we have a simple html page with a label and button which is redirected to the page 'anotherPageLink. html' when clicked.

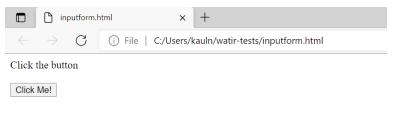
The contents of the file 'anotherPageLink.html' are as follows:

anotherPageLink - Notepad			-		$\times$
Eile Edit Format View Help					
<pre>percent genp &lt;(DOCTYPE html&gt; <html></html></pre>					^
					$\sim$
	Ln 6, Col 8	100% Window	vs (CRLF) U	TF-8	

These files can be viewed in directory as follows:



We double-click on the file 'inputform' to open it in the Microsoft edge browser.



On click on the 'Click Me!' button, the redirected page is opened as shown below:

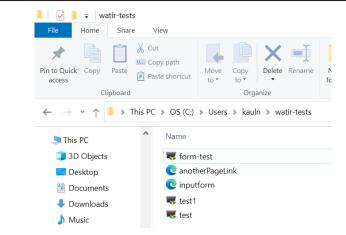
	anotherPageLink.htm $ ightarrow$ C i Film		eLink.html	×	+
$\leftarrow$	$\rightarrow$	С	(i) File   C	:/Users/k	xauln/watir-tests/anotherPageLink.html

# Hello!!!!

2. We proceed to create a new ruby file in the same directory.



os Command	d Prompt						-	×
C:\Users\ka	auln\watir-te	sts>type nul >	form-test.rb					^
Volume in	auln\watir-te drive C is O rial Number i	IS						
Directory	of C:\Users\	kauln\watir-te	sts					
01/15/2022		<dir></dir>						
01/15/2022		<dir></dir>						
01/14/2022	10:55 PM	7	7 <mark>anotherPageLink.ht</mark>	ntml				
01/15/2022	10:27 AM		0 form-test.rb					
01/14/2022	10:53 PM	26	3 inputform.html					
01/11/2022	10:14 PM	10	5 test.rb					
01/13/2022	12:40 AM	10	0 test1.rb					
	9 File(s	) 2,2	46 bytes					
	2 Dir(s)		160 bytes free					
C:\Users\ka	uln\watir-te	sts>						



3. We proceed to edit the file 'form-test' as follows:



The test case we created is very simple. Let us go through it step by step.

The first step is a common step that is needed for all test cases to be executed using 'Waitr.'

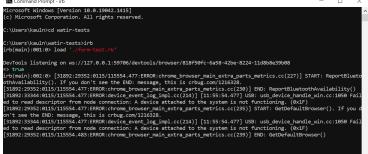
The second statement is where we open the browser and save it in a variable which we will be used in the further steps. Here, we choose to open the default browser which is chrome.

The third statement is where we instruct that the html form be opened.

The fourth statement is where we provide the instruction to click on the button and provide its id to watir. We make use of the 'wait\_until' command which waits until the given conditions become true (Watir Project – Waiting, 2009). The condition we give is that we wait until the button is present in the browser form before clicking it.

4. We run the file from the command line as follows:





The browser is opened, and the link is clicked.



Hello!!!!

• Example 5: Using Watir to Test an html for an Take a Screenshot: In this example, we build upon the previous example where we test an html file containing a button which when clicked

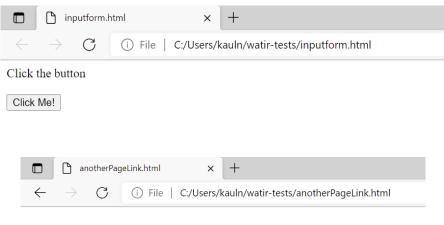
redirects to another html page. Here, we will take screenshots during the execution of the test case and save them.

The watir command to take a screenshot and save it is:

browser.screenshot.save

Let us see how this this is implemented. The steps we follow are:

1. We first open the html page manually.



# Hello!!!!

2. We create a new test file named 'form-test\_screenshot.rb.' We create this file in the same location as the input form.

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File Home	Share View	/					
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<ul> <li>3D Objects</li> <li>Desktop</li> <li>Documents</li> </ul>		€ anoth € form € form € form	-test	nk	^		

3. We edit the file to add commands where we take a screenshot.

```
form-test_screenshot - Notepad

Eile Edit Format View Help

require 'watir'

b = Watir::Browser.new

b.goto('file:///C:/Users/kauln/watir-tests/inputform.html')

b.screenshot.save 'mainform.png'

b.button(name: "btnclick").wait_until(&:present?).click

b.screenshot.save 'linkedPage.png'

b.close
```

In this test case, we open the html page, take a screenshot, then click on the 'Click me' button and take a screenshot again before closing the browser.

We use the following command:

b.screehshot.save 'filename.png'

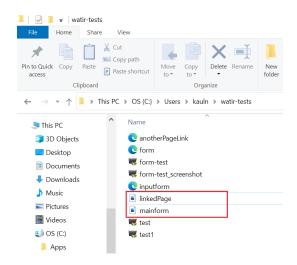
The above command takes a screenshot and saves it in the current repository with the file name provided.

4. We run the file using the command prompt.

🔤 Command Prompt - irb



The screenshots are created in the same location as the test cases:



### Click the button

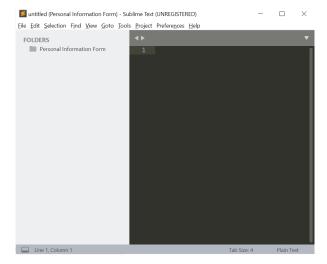
Click Me!

# Hello!!!!

- Example 6: Using Watir to Test an html Form to Test Various Web Elements: In this example, we use watir to test a sample html form that accepts input and performs basic CRUD operations on records such as addition, editing, and deleting.
- 1. First, we create a simple html project containing a form, a CSS stylesheet and a JavaScript controlling the CRUD actions.

We make use of an HTML editor called Sublime Text (2000) to edit the files in our html project.

We open Sublime Text and create a new folder named 'Personal Information Form' as follows:



We proceed to create a project structure with an index.html file, a CSS folder containing a CSS file and a JS folder containing a JavaScript file.

This is shown below:

📁 u	ntitleo	d (Personal	Inform	nation	Form)	- Subli	ime Text (	UNREGISTERI	ED)
<u>F</u> ile	<u>E</u> dit	Selection	Find	View	<u>G</u> oto	Tools	Project	Preferences	Help
FC	DLDE	RS					<b>4</b> ►		
$\nabla$	📄 P	Personal Inf	ormat	ion Fo	rm				
	•	CSS							
	,	/* stylesh	eet.css	;					
	•	js							
		/* scriptO	nClick	.js					
	<>	index.htm	al						

We look at each of the files in detail:

#### a. Index.html:

ion Form\index.html (Personal Information Form) - Sublime Text (UNREGISTERED)



o x

As seen from the form above, we have created a simple form with four fields in a table separated by div tabs. A submit button is provided at the end to submit the data. A second table is created to display the data. At the end, we have a script element specifying the script to be used for the actions.

b. scriptOnClick.js:

```
criptOnClick.js (Personal Information Form) - Sublime Text (UNREGISTERED)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     ۵
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ×
Preferences Help
          scriptOnClick is
                                                                       onFormSubmit() {
validate()) {
/ar userFormData = readuserFormData();
f (selectedRow == null)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Œ.
                                                                                            insertNewUserRecord(userFormData);
                                                                                               updateUserRecord(userFormData);
                                   ction resetPersonalInformationForm() {
    document.getElementById("fullName").value = "";
    document.getElementById("lalgNuhee").value = "";
    document.getElementById("streetAddress").value = "";
    document.getElementById("age").value = "";
}
                                      tion renduce=formWate() {
    wor useformWate() {
        wor useformWate() {
            wor useformWate()
            science()
            science
                                   tion insertHexdSerRecord(ddts) {
    vor table = document.getElementBj/d("userlist").getElementsByTagName('tbody')[0];
    vor nedWor = table.insertBW.ordBie.lengtN);
    celli = newBow.insertColl(0);
    celli = newBow.insertColl(0);

                                      tion onEditUser(td) {
    selecteR0w = td parentElement, parentElement;
    document.ptElementById("fillEsee").value = selecteR0w.cells[0].innerHTML;
    document.ptElementById("stagNaber").value = selecteR0w.cells[1].innerHTML;
    document.ptElementById("stagNaber").value = selecteR0w.cells[3].innerHTML;
    document.ptElementById("stage").value = selecteR0w.cells[3].innerHTML;
    documentById("stage").value = selecteR0w.cells[3].innerHTML;

                                      tion updateUserRecord(userFormDats) {
    selecteRow.cells[0].innerHTML = userFormData.fullName;
    selecteRow.cells[].innerHTML = userFormData.liggNumber;
    selecteRow.cells[].innerHTML = userFormData.age;
    selecteRow.cells[].innerHTML = userFormData.age;

                                   Check User validation

invalid = true;

i (documert.getElementById("fullName").value -= "") {

i Valid = false;

______cocumert_getElementById("fullNamevalidate").classList.remove("hide");
                                                              document.getElementById("fullNamevalidate").classList.remove("hide");
lse {
isValid = true;
if ('document.getElementById("fullNamevalidate").classList.contains("hide"))
                                                                                    document.getElementById("fullNamevalidate").classList.add("hide");
                                                      (document.getElementById("bldgNumber").value -- "") {
    isValid = false;
    document.getElementById("bldgNumbervalidste").classList.remove("hide");
    alement.getElementById("bldgNumbervalidste").classList.remove("hide");

                                                              dacuments
La {
iWAlid = true;
lf (idocument.getElement8yId("bldgNumbervalidate").classList.contains("hide"))
}
                                                      (document.getElementById("streetAddress").value == "") {
    isValid = false;
    document.getElementById("streetAddressvalidate").classList.remove("hide");
    alse f
                                                            document.getLiementById("streetAddressvalidate").classList.contains("hide"))
if ('document.getElementById("streetAddressvalidate").classList.contains("hide"))
                                                      (doument.getilementById("age").value == "`) {
    doument_file
    file
    doument_file
    file
    ivalid - true;
    if (doument_getilementById("agevalidate").classList.remove("hide");
    if (doument_getilementById("agevalidate").classList.contains("hide"));

                                         tion onDeleteUser(td) {
    ff (confine('Are you sure to delete this user record ?')) {
        row = td_paretElement.parentElement;
        document.getElementByld('userlist').deleteRow(row.rowIndex);
        resetDersonalInformationForm();
```

This file consists of several functions that perform CRUD operations such as insert, update, and delete. In addition to these methods, this file contains a validation method that validates whether each field is filled and throws an error if its empty.

**c. Stylesheet.css:** This file is a CSS file that defines the style for different elements of the html form.



2. We proceed to open the html file in the browser and fill out the form to check if it works.

	Personal%20Information	%20Form/index.html			10 1	A 9	è 😩	
		User Inform	ation					
User Information Form								
Enter Full Name								
Building Number								
Enter building number								
Street Address		Full Name	Building Number	Street Address	2	ge	Action	
Enter Street Address								
Age								
Enter User Age								
Submit								

We fill in some dummy data.

	User Inform	mation				
ser Information Form						
ull Name						
Joe						
tuilding Number						
Smith						
treet Address	Full Name	Building Number	Street Address	Age	1	Action
93 Diagon Alley						
ige	- 12 C					

We click on Submit to process the data and display it in the adjoining table.

Personal User Information x +     O    O    File   C:/Users/kauln/watir	-tests/Personal%20Information%20Form/inc	dex html		16	£ €		
		formation			- U		
User Information Form							
Enter Full Name							
Building Number							
Enter building number	Full Name	Building Number	Street Address	Age	Actio		
Street Address	Joe	Smith	93 Diagon Alley	25	Ec	lit Delet	e
Enter Street Address							
Age							
Enter User Age							
Enter User Age							
Submit							

The data is displayed in the table as shown above.

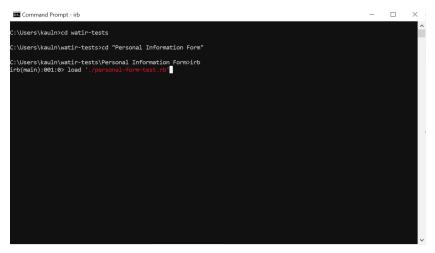
3. We proceed to create a test case that does the same actions that we performed.

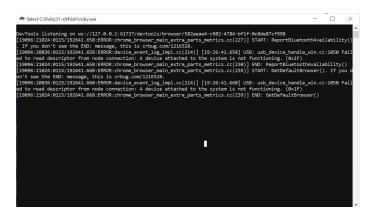
🖌	Ţ Pe	rsonal Ir	nform	ation Form							
File	Home	Share	N	/iew							
Pin to Quick access	Сору	Daste Paste		t py path ste shortcut	Move to *	Copy to *	X Delete	Rename	New folder	™ New item ▼ Easy access ▼	Prc
	Cl	ipboard				Orga	nize			New	
$\leftarrow \  \  \rightarrow$	* ↑	Ì → TI	his PC	» OS (C:)	<ul> <li>Users</li> </ul>	> kauli	n≯wa	tir-tests 3	Persor	nal Information Fo	orm
🍤 This	PC		^	Name			^				
<b>)</b> 31	) Objects			CSS							
📃 De	esktop			📕 js							
🗎 De	ocuments	5		💽 inde	¢						
🕹 De	ownloads	;		🐺 perso	onal-form	n-test					

4. We edit this file to perform the actions of creating records automatically. The contents of this test case are as follows:



## 5. We run this file from the command line as follows:





6. The test is executed successfully, and the record is created as shown below:

ſ	Personal User Information × +								<b>)</b>	- 0		×
	$\leftrightarrow$ $\rightarrow$ $\mathcal{C}$ $\bigcirc$ File   C:/Users/kauln/watir-tests/Pers	onal%20Inf	ormation%	620Form/	index.html					$\dot{\mathbf{x}}$	-	:
	Chrome is being controlled by automated test software.											×
		U	ser Inf	orma	tion							Â
Г												
	User Information Form											
	Full Name											
	Harry Potter											
	Building Number											
	4											
	Street Address		Full N	ame	Building Nu	mber	Street Addre	:55	Age	Actio	n	
	Privet Drive											
	Age											
	13	÷										
	Submit											
L												-
	Personal User Information x +								V	-	٥	×
4	$E \rightarrow \mathbb{C}$ () File   C:/Users/kauln/watir-tests/Personal%20Inf	ormation%20	Form/index	html					Ċ	\$	n (8	1
-	Throme is being controlled by automated test software.											×
	U	ser Info	rmation									
Γ												
	User Information Form											
	Full Name											
	Harry Potter Building Number											
	4										_	
	Street Address	Full Nan	Potter	Building	Number 4	Stre	et Address Privet Drive	Age 13	Action	Delete	_	
	Privet Drive	nany	Tour				THINK DING	13	100	Lociele.		
	Age											
	13 0											
	Submit											
Ш												

Ø Example 7: Testing the Edit Functions in an html Form Using Watir: In this example, we will test the edit functionality of the html form that we created in the previous example. 1. We begin by first testing the editing functionality. We enter data into the form and submit it. The data is loaded and then we click on the edit link to edit the data.

User Infor	nation					
Full Name	Building Number	Street Address	Age	Action		
Harry Potter	4	Privet Drive	13	Edi	t Delete	
						_

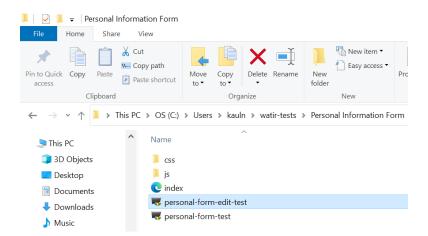
We edit the Street address and age of the same user record.

Personal User Information x +						- 0	×
$\leftrightarrow \rightarrow$ C $\odot$ File   C/Users/kauln/watir-tests/Personal%20Informat	ion%20Form/index.htm			ŵ	1		
	User Inform	nation					
User Information Form Full Name							
Harry Potter							
Building Number							
4	Full Name	Building Number	Street Address	Age	Actio		
Street Address	Harry Potter	4	Privet Drive	13	E	lit Delete	
Privet Drive Street							_
Age							
15							
Submit							

We click on submit to register the changes.

Personal User Information x +     O O File   C:/Users/kauln/watir-tests/Perso	- 10 201 f			ធ	- ¢ @	0	
Crosens/kauin/water-tests/Perso	nanszumormation%zu+orm/index.nt	mi		70	£= ⊕		
	User Infor	mation					
User Information Form							
Full Name							
Enter Full Name							
Building Number							
Enter building number	Full Name	Building Number	Street Address	Age	Action		
Street Address	Harry Potter	4	Privet Drive Street	15	Edit	Delete	2
Enter Street Address							
Age							
Enter User Age							
Submit							

2. We proceed to create a test for this scenario. In the same folder as the index.html file, we create a new ruby file named personal-form-edit-test.rb.



We edit this file and create a watir test case that performs the same actions for deleting a user as we did manually.

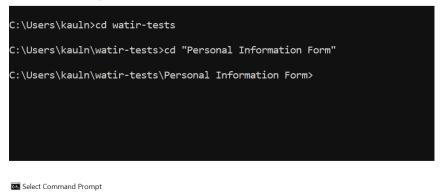
```
personal-form-edit-test - Notepad
File Edit Format View Help
require 'watir'
browser = Watir::Browser.new :chrome
browser.goto('file:///C:/Users/kauln/watir-tests/Personal%20Information%20Form/index.html')
fullName = browser.text_field(name: 'fullName')
fullName .exists?
fullName .set 'Harry Potter'
bldgNumber = browser.text_field(name: 'bldgNumber')
bldgNumber.exists?
bldgNumber.set '4'
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive'
age = browser.text_field(name: 'age')
age.exists?
age.set '13'
browser.button(name: "submit").wait_until(&:present?).click
#display the links on the page
puts browser.links.collect(&:text)
#click the 'Edit link'
browser.link(:text => /Edit/).wait_until(&:present?)
browser.link(:text => /Edit/).click
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive Street'
age = browser.text field(name: 'age')
age.exists?
age.set '11
sleep 30
browser.button(name: "submit").wait_until(&:present?).click
sleep 30
```

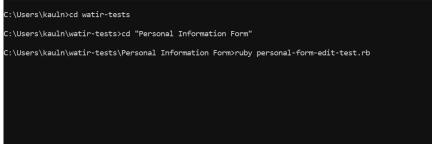
In this test case, we add to the previously created test case 'personaltest.rb.' So, this new test consists of opening the form, adding a record, and submitting it. We now add the steps to edit a record that is displayed in the table. First, we click on the edit link using the 'browser.link' functionality. After clicking the link, we proceed to edit some information in the user. As we can see from the screenshot of the code above, we edit the fields Street Address and age. We set the Street address to 'Privet Drive Street' and age to 11. 3. The next step is to execute the test case.

We run the test case from the command prompt as follows:



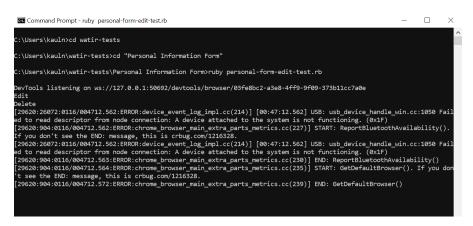
Command Prompt





Note that here we use the command 'ruby <filename.rb> to execute the test case. This is an easier way of running ruby files.

The test case is executed as shown below:

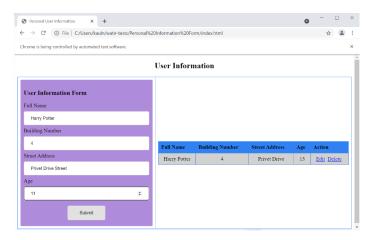


4. The automation opens the page in the Chrome browser by default and the changes are made.

First, the data is entered, and the table is populated with the entered data. This is shown below:

rome is being controlled by automated test software.					
frome is being controlled by automated test software.					
	User Inform	nation			
User Information Form					
Full Name					
Enter Full Name					
	Full Name	Building Number	Street Address	Age	Action
Building Number Enter building number	Full Name Harry Potter	Building Number	Street Address Privet Drive	<b>Age</b>	Action Edit Delete
Building Number					
Building Number Enter building number Street Address					

Then, the 'Edit' link is clicked and the information pertaining to that record is loaded in the form. The new changes are made in the form as shown below:



The 'Submit' button is clicked to register the changes as seen below:

Personal User Information × +				0	- 🗆	×
← → C ③ File   C:/Users/kauln/watir-tests/Personal%	20Information%20I	Form/index.html			\$	÷
Chrome is being controlled by automated test software.						×
	User Infor	mation				Ì
User Information Form Full Name						
Enter Full Name						
Building Number						
Enter building number	Full Name	Building Number	Street Address	Age	Action	
Street Address	Harry Potter	4	Privet Drive Street	11	Edit Delete	
Enter Street Address						
Age						
Enter User Age						
Submit						

• **Example 8: Deleting a User Record from an html Page:** In this example, we build up on the previous example and proceed to delete a user record after the editing is done. Here, we would be accessing the form, populating the form, creating a record, editing it, and then deleting the record.

The steps are:

1. First, we open the html page to test the delete link. We create a record and then click on the 'Delete' link.

Personal User Information x +     O     O     File   C/Users/kauln/watir-tests/Person	al%20Information%20Form/index.ht	ml		16	¢.	۵	
	User Infor						
User Information Form							
Enter Full Name							
Building Number							
	Full Name	Building Number	Street Address	Age		ction	
Enter building number				_	_		
Enter building number Street Address	Harry Potter	4	Privet Drive Street	11		Edit 1	Delete
-	Harry Potter	4	Privet Drive Street	11		Edit I	Delete
Street Address Enter Street Address	Harry Potter	4	Privet Drive Street	11		Edit 1	Delete
Street Address	Harry Potter	4	Privet Drive Street	11		Edit 1	<u>Delete</u>

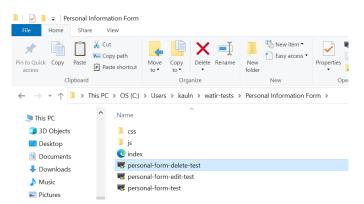
A popup dialog asks us to confirm if we want to proceed with the deletion. We click on 'OK.'

Personal User Information x +     O    O    File   C/Users/Kauln/wa	tis tests (Demonstly 2016 for	ention# 20Form Sedan bi	w.l		16	¢.	-	0	
User Information Form	This page s				16	7=	A		
Full Name									
Enter Full Name									
Building Number									
Enter building number		Full Name	Building Number	Street Address	Age	٨	ction		
Street Address		Harry Potter	4	Privet Drive Street	11		Edit	Delete	
Enter Street Address									
Age									
Enter User Age									
Submit									

The record is deleted from the table is shown below:

O File   C:/Users/kauln/watir-tests/Pe	rsonal%20Information%20F	orm/index.html		1	3 6	۲		
	Us	er Inform	ation					
User Information Form Full Name								
Enter Full Name								
Building Number								
Enter building number								
Street Address		Full Name	Building Number	Street Address	Age		Action	
Enter Street Address								
Age								

2. We then create a new test file in the same location as the html form and name it 'personal-form-delete-test.rb.'



We edit this file in notepad and add the commands that would click on the 'Delete' link. In this example, like the previous one, we build up on the test case that we wrote previously. Thus, our new test case for testing the deletion link consists of opening the page, entering a record, editing it, saving it followed by the delete action.

This is shown below:

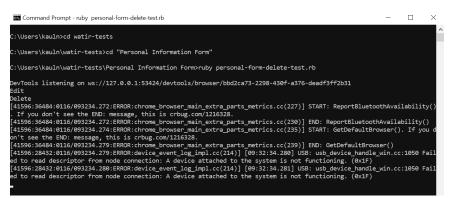
```
personal-form-delete-test - Notepad
<u>Eile Edit Format View Help</u>
require 'watir'
browser = Watir::Browser.new :chrome
browser.goto('file:///C:/Users/kauln/watir-tests/Personal%20Information%20Form/index.html')
fullName = browser.text_field(name: 'fullName')
fullName .exists?
fullName .set 'Harry Potter'
bldgNumber = browser.text_field(name: 'bldgNumber')
bldgNumber.exists?
bldgNumber.set '4
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive'
age = browser.text_field(name: 'age')
age.exists?
age.set '13'
browser.button(name: "submit").wait_until(&:present?).click
#display the links on the page
puts browser.links.collect(&:text)
#click the 'Edit link
sleep 30
browser.link(:text => /Edit/).wait_until(&:present?)
browser.link(:text => /Edit/).click
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive Street'
age = browser.text_field(name: 'age')
age.exists?
age.set '11'
sleep 30
browser.button(name: "submit").wait_until(&:present?).click
#click the 'Delete' link
browser.link(:text => /Delete/).wait until(&:present?)
browser.link(:text => /Delete/).click
#click OK on alert confirmation
browser.alert.exists?
browser.alert.text
browser.alert.ok
sleep 30
```

We make use of the browser.link command to check if the link exists and then click on it. Then we confirm that we wish to delete the record. We have added sleep commands throughout the test case to be able to slow down the test and take screenshots.

### 3. We run the test from the command line as shown below:



#### The test is executed as shown below:



4. The automation launches the chrome browser and actions entered in the test case are performed.

The record is first entered and then edited.

Personal User Information × +				0	- 🗆	
$\leftrightarrow$ $\rightarrow$ $C$ $\odot$ File   C:/Users/kauln/watir-tests/Personal%2	0Information%20Fo	rm/index.html			\$	)
Chrome is being controlled by automated test software.						
	User Inforn	nation				
User Information Form Full Name						
Enter Full Name						
Building Number						
Enter building number	Full Name	Building Number	Street Address	Age	Action	
Street Address	Harry Potter	4	Privet Drive	13	Edit Delete	
Enter Street Address						
Age						
Enter User Age						
Submit						

				0			
→ C ③ File   C:/Users/kauln/watir-tests/Personal%2	OInformation%20F	orm/index.html			¢		
ome is being controlled by automated test software.							
	User Infor	mation					
	1						
ser Information Form							
ull Name							
Harry Potter							
uilding Number							
4	Full Name	Building Number	Street Address	Age	Action		
treet Address	Harry Potter		Privet Drive	13	Edit E	Delete	
Privet Drive Street							
ge							
11 0							
Submit							
							_
					_	-	
				0			
	0Information%20F	orm/index.html		0	- \$	•	
→ C () File   C:/Users/kauln/watir-tests/Personal%2	0Information%20F	orm/index.html		0		•	
→ C () File   C:/Users/kauln/watir-tests/Personal%2	0Information%20F User Infor			0			
→ C () File   C:/Users/kauln/watir-tests/Personal%2				0			
→ C ◎ File   C/Users/Audin/Watin-tests/Personal% prome is being controlled by automated test software.				0		•	
C © File C/Users/kauln/watin-tests/Personal% rome is being controlled by automated test software. User Information Form				o			;
O File C/Users/Audin/Watin-tests/Personal%     wome is being controlled by automated test software.  User Information Form				0			:
O Tiel CrUsers/Audit/Watir-tests/Personal%2 rome is being controlled by automated test software.  User Information Form Full Name Enter Full Name				0			:
O Tel CAUesr/Audit/Watir-tests/Personal%2 rome is being controlled by automated test software.  User Information Form Pull Name Enter Full Name	User Infor	mation			¢		:
C O Fiel CAUsers/Audit/Watir-tests/Personal%2 rome is being controlled by automated test software.  User Information Form Full Name Enter Full Name Bioliding Number Enter building number	User Infor	mation Building Number	Street Address	Age	☆ Action	1	:
C O Fiel CAUsers/Audit/Watir-tests/Personal%2 rome is being controlled by automated test software.  User Information Form Full Name Enter Full Name Bioliding Number Enter building number	User Infor	mation	Street Address Privet Drive Street		¢	1	
O Rel CAUers/Auln/Watin tests/Personal%2  vome is being controlled by automated test software.  User Information Form Full Name Enter Full Name Binking Number Enter building number Stort Address Enter Street Address	User Infor	mation Building Number		Age	☆ Action	1	
O     O     Ife     C/JUSES/Audin/Watin-tests/Personal%2 trome is being controlled by automated test software.  User Information Form Full Name Enter Full Name Building number Enter building number Storet Address Enter Street Address	User Infor	mation Building Number		Age	☆ Action	1	2
O     O     Fee     C/Jseer/Audin/watir-tests/Personal%  trome is being controlled by automated test software.  User Information Form Full Name Enter Full Nam Enter Full Nam Enter Full Name Enter Full Name Enter Full	User Infor	mation Building Number		Age	☆ Action	1	>

The edited record is saved, as shown in the screenshot above.

The delete link is clicked which opens the confirmation popup as shown below:

Personal User Information × +					0	- 0	
$\leftrightarrow$ $\rightarrow$ C $\odot$ File   C:/Users/kauln/wat	tir-tests/Personal%	20Information%20F	orm/index.html			\$	-
Chrome is being controlled by automated test sc		elete this user record		Cancel			:
User Information Form							
E . E							
Enter Full Name							
Enter Full Name Building Number							
		Full Name	Building Number	Street Address	Age	Action	
Building Number		Full Name Harry Potter	Building Number 4	Street Address Privet Drive Street	<b>Age</b> 11	Action Edit Delet	te
Building Number Enter building number			-				t <u>e</u>
Building Number Enter building number Street Address			-				te
Building Number Enter building number Street Address Enter Street Address			-				te

The 'OK' button on the confirmation alert dialog is clicked and the record is deleted successfully as shown below:

Personal User Information × +				0	- 🗆	>
← → C ③ File   C:/Users/kauln/watir-tests/Personal%20Int	formation%20For	m/index.html			*	)
Throme is being controlled by automated test software.						>
U	ser Inform	ation				
User Information Form						
Full Name						
Enter Full Name						
Building Number						
Enter building number						
Street Address	Full Name	Building Number	Street Address	Age	Action	
Enter Street Address						
Age						
Enter User Age						
Submit						

• Example 9: Canceling a Deletion Request on an html Page Using Watir: In this example, we will proceed to delete a user record, but cancel the operation.

We proceed to complete all the operations from the previous example and when we get the confirmation alert, we cancel the operation.

The steps are as follows:

1. We create a new record and click on the 'Delete' link.

Personal User Information x +						$\rightarrow$	0	×
$\leftrightarrow$ $\rightarrow$ $\bigcirc$ $\bigcirc$ File   C:/Users/kauln/watir-tests/Personal%20Info	rmation%20Form/index.html			20	£j≣	Ð		6
	User Inform	nation						
User Information Form Full Name								
Harry Potter								
Building Number								
4	_							
Street Address	Full Name	Building Number	Street Address		Age	А	ction	
Privet Drive								
Age								
11								
Submit								

	tests/Personal%20Information%20Form/index.h					¢	
	User Info	rmation					
ser Information Form							
ull Name							
Enter Full Name							
uilding Number							
Enter building number			outo servoro -	100	0	ST-10-1	
treet Address	Full Name	Building Number	Street Address	Ag		Lction	
Enter Street Address	Harry Potter	4	Privet Drive Street	1	1	Edit	Delete
ge							
Enter User Age							
Personal User Information x + $\rightarrow$ $\bigcirc$ $\bigcirc$ $\bigcirc$ $fic   C/Usert/Rault/wait $	-tests/Persona%20mformation%20Form/index1	ıtml		£0		-	0
	This page says			Ŷô			
		12		Ŷð			
	This page says	12		îð			
← → C O File   C/Users/kauln/wati	This page says	12		10			
G ⊙ File   C/Users/Rauln/wat           User Information Form	This page says	12		ŝ			
<ul> <li>↔ O O File   C/Users/Rauln/wat</li> <li>User Information Form</li> <li>Full Name</li> </ul>	This page says	12		10			
<ul> <li>↔ O O File C/Users/Rauln/wat</li> <li>User Information Form</li> <li>Full Name</li> <li>Enter Full Name</li> </ul>	This page says	12	Street Address	ίο Age		њ (	
<ul> <li>         G          File C/Users/Faulth/watt     </li> <li>         Uver Information Form     </li> <li>         Full Name     </li> <li>         Enter Full Name     </li> <li>         Building Number     </li> </ul>	This page says Are you sure to delete this user record	12 OK Cancel	Stret Address Prive Drive Street		f2 ( Act	њ (	B -
C  C  C  C  C  C  C  C  C  C  C  C  C  C	This page says Are you sure to delete this user record	Canod Canod Building Number		Age	f2 ( Act	ion (	B -
C Street Address Enter Street Address Age C Street Street Address	This page says Are you sure to delete this user record	Canod Canod Building Number		Age	f2 ( Act	ion (	B -
C  C  C  C  C  C  C  C  C  C  C  C  C  C	This page says Are you sure to delete this user record	Canod Canod Building Number		Age	f2 ( Act	ion (	B -

We click on 'Cancel' to cancel the delete operation.

$\leftrightarrow$ $\rightarrow$ $\bigcirc$ $\bigcirc$ File   C:/Users/kauln/watir-tests/Perso	nal%20Information%20Form/index.h	ntml		ŵ	¢= @		•
	User Info	rmation					
User Information Form Full Name							
Enter Full Name							
Building Number							
Enter building number	Full Name	Building Number	Street Address	Age	Action	1	
Street Address	Harry Potter	4	Privet Drive Street	11	Edi	it Delete	e
Enter Street Address							
Age							
Enter User Age							
Submit							

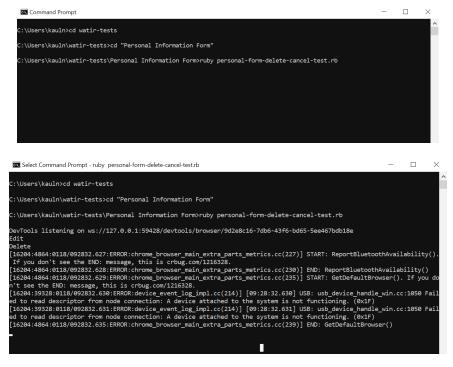
2. We create a new ruby test file named personal-form-deletecancel-test.rb. The test case is very similar to the previous example but here we click on cancel instead of ok when the alert confirmation message pops up.

📜 🛛 📝 📜 🗢 🛛 Perso	onal Information Form			
File Home	Share View			
Pin to Quick Copy access	Cut Cut Copy path		Rename New folder	Easy access • Properties
Clipb	oard	Organize	N	lew Op
$\leftarrow \rightarrow \checkmark \uparrow $	This PC      OS (C:)     Name	> Users > kauln > watir	-tests > Personal I	nformation Form
🧊 3D Objects	📜 css			
📃 Desktop	📕 js			
Documents	C index			
Downloads	🔫 perso	nal-form-delete-cancel-tes	t	
Music	🐺 perso	onal-form-delete-test		
Pictures	🐺 perso	onal-form-edit-test		
Videos	🤜 perso	onal-form-test		

#### 3. The contents of the test case are as follows:

```
📃 personal-form-delete-test - Notepad
<u>File</u> <u>Edit</u> Format <u>View</u> <u>H</u>elp
require 'watir'
browser = Watir::Browser.new :chrome
browser.goto('file:///C:/Users/kauln/watir-tests/Personal%20Information%20Form/index.html')
fullName = browser.text_field(name: 'fullName')
fullName .exists?
fullName .set 'Harry Potter'
bldgNumber = browser.text_field(name: 'bldgNumber')
bldgNumber.exists?
bldgNumber.set '4'
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive'
age = browser.text_field(name: 'age')
age.exists?
age.set '13'
browser.button(name: "submit").wait_until(&:present?).click
#display the links on the page
puts browser.links.collect(&:text)
#click the 'Edit link'
sleep 30
browser.link(:text => /Edit/).wait_until(&:present?)
browser.link(:text => /Edit/).click
address = browser.text_field(name: 'streetAddress')
address.exists?
address.set 'Privet Drive Street'
age = browser.text_field(name: 'age')
age.exists?
age.set '11'
sleep 30
browser.button(name: "submit").wait_until(&:present?).click
#click the 'Delete' link
browser.link(:text => /Delete/).wait_until(&:present?)
browser.link(:text => /Delete/).click
#click OK on alert confirmation
browser.alert.exists?
browser.alert.text
browser.alert.close
sleep 30
```

4. To run the test, we execute the ruby file from the command prompt. This is shown below:



5. The file is executed, and the automation executes the commands from the test file one by one in the default browser.

A record is created as shown below:

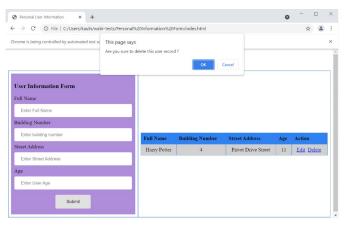
Personal User Information × +				0	
→ C ② File   C;/Users/kauln/watir-tests/Personal%	20Information%20Fo	rm/index.html			\$
Chrome is being controlled by automated test software.					
	User Inform	nation			
User Information Form					
Full Name					
Enter Full Name					
Building Number					
Enter building number	Full Name	Building Number	Street Address	Age	Action
Street Address	Harry Potter	4	Privet Drive	13	Edit Delete
Enter Street Address					
Age					
Enter User Age					
Submit					

	Personal User Information × +				0	- r	-	×				
	← → C ③ File   C:/Users/kauln/watir-tests/Personal%20	Information%20Fo	rm/index.html			\$		÷				
	Chrome is being controlled by automated test software.							×				
	- User Information											
ſ								Ы				
	User Information Form											
	Full Name											
	Harry Potter											
	Building Number											
	4	Full Name	Building Number	Street Address	Age	Action						
	Street Address	Harry Potter	4	Privet Drive	13	Edit Dek	ete					
	Privet Drive Street							1				
l	Age											
	11 🔹											
	Submit											

The delete link for this record is clicked and the alert dialog pops up.

Personal User Information × +				•	- 0
$\rightarrow$ C ( ) File   C/Users/kauln/watir-tests/Personal9	620Information%20P	orm/index.html			\$
hrome is being controlled by automated test software.					
	User Infor	mation			
User Information Form Full Name					
Enter Full Name					
Building Number					
Enter building number	Full Name	Building Number	Street Address	Age	Action
Street Address	Harry Potter	4	Privet Drive Street	11	Edit Delete
Enter Street Address					
Age					
Enter User Age					

The automation clicks on 'Cancel' and the entry remains.

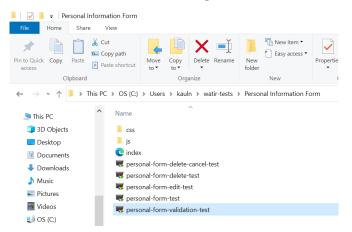


	Personal User Information × +				0	- 0
User Information       Form       Full Name       Enter Full Name       Enter balding number       Enter balding number       Enter Street Address       Age       Enter User Age	ightarrow C ( ) File   C:/Users/kauln/watir-tests/Personal%	20Information%20F	Form/index.html			☆ 🏝
User Information Form       Full Name       Eritar Full Namo       Brailding Number       Eritar Full Name       Brailding Number       Eritar Stroet Address       Age	hrome is being controlled by automated test software.					
Full Name       Enter Full Name       Building Number       Enter building number       Street Address       Enter Street Address       Age       Enter User Open		User Infor	mation			
Enter Full Name Building Number Enter building number Street Address Enter Street Address Age Enter User Age	User Information Form					
Building Number     Street Address     Age       Enter building number     Street Address     Age       Enter Street Address     Harry Potter     4     Privet Drive Street     11     Edit Delate       Age     Enter User Age     Enter User Age     Enter User Age     Enter User Age	Full Name					
Eriter Udeir App	Enter Full Name					
Full Name     Building Number     Street Address     Age     Action       Street Address     Harry Potter     4     Privet Drive Street     11     Edit Delate       Enter Street Address     Enter Street Address     Age     Enter Street Address     Inter Street Address	Building Number					
Enter Street Address Age Enter User Age	Enter building number	Full Name	Building Number	Street Address	Age	Action
Age Entier User Age	Street Address	Harry Potter	4	Privet Drive Street	-11	Edit Delete
Enter User Age	Enter Street Address					
	Age					
Submit	Enter User Age					

- **Example 10: Validating the Fields:** In this example, we will test the simple validation implemented on all the 4 fields on the personal information form.
- 1. First, we test the validation on the form manually. This form has a validation implemented on all the input fields that shows error message when you try to submit a field that is empty.

Personal User Information × +     O    O    File   C/Users/kauln/watir-tests/Pers	onal%20Information%20Form/index.html			៍ត	₹ <sup>1</sup> ≣	¢		
	User Inform	ation						
User Information Form								
Full Name								
Enter Full Name								
Building Number								
Enter building number								
Street Address	Full Name	Building Number	Street Addres	55	Age		Action	
Enter Street Address								
Age								
Enter User Age								
Submit								
Personal User Information × +							-	0
Personal User Information x +    C O File   C/Users/Aculty/watir-tests/Person	sa%20Information%20Form/index.html				50	£_∃		•
-	hal%20information%20Form/index.html User Inform	ation			\$a	ć		0
→ G ③ File   C/Users/Rauln/watin-tests/Person		ation			ŝ	£≡		0
O O File C/Users/kauln/watin-tests/Person r Information Form		ation			â	£'≡		0
C     C     File     C/Merr/kadr/water-tests/Perior  r Information Form Name Full name should not be empty!		ation			ŝ	ć		0
C     C     File     C/Users/kadivivatie*tests/Perior      Information Form Name Full name should not be empty!  toter Full Name		ation			î0	¢		•
C     G     File     C/Users/kadivioatie tests/Perior      Information Form  Name Full mane should not be empty!  stor Full Name  ding Number Building number should not be empty!		ation			ŝ	¢		۲
C O File C/Meer/kaulr/watertestu/Person      Information Form Name Full mane should not be enpty!      ther Full Name      Inter Building number should not be enpty!      ther building number			Rubling Number				G.	۲
C O File C/Merr/kaufr/water/rests/Person  I Information Form  I Mane Station is the empty!  State Fill Name  Manual Multiling number should not be empty!  at Address Street Address should not be empty!		ation Full Name	Building Number	Street /				O Actio
C     C     File     C/Mserv/kadr/water/sets/Perior  r Information Form Nnne Full name should not be empty! totor Full Name ding Number: Building number should not be empty! toto building number et Address. Street Address should not be empty! ther Street Address.			Building Number				G.	۲
C     C     File     C/Users/kady/water-testu/Perior  r Information Form Name Full name should not be empty!  store Full Name full name full name full name full name full dates full challes full dates full dates full dates full dates full full full full full full full ful			Building Number				G.	۲
C     C     File     C/Mserv/kadr/water/sets/Perior  r Information Form Nnne Full name should not be empty! totor Full Name ding Number: Building number should not be empty! toto building number et Address. Street Address should not be empty! ther Street Address.			Building Number				G.	۲

2. We create a new test file named personal-form-validation-test.rb.

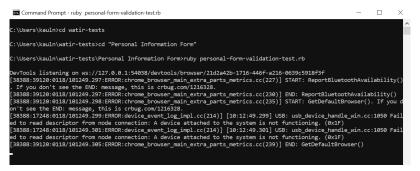


The contents of this file are as follows:

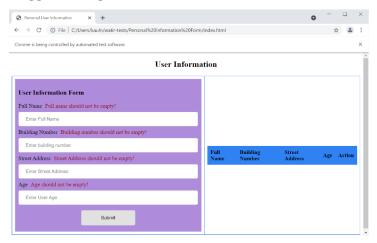


#### 3. We execute the test from the command prompt as shown below:





4. The automation mimics our actions and click on the 'Submit' button without entering any data first. The validation errors appear as expected.



The data is then entered by the automation except for the 'Age' field.

Personal User Information × +			•			×
$\leftarrow$ $\rightarrow$ C ( ) File   C:/Users/kauln/watir-tests/Personal%20Information%20Form	n/index.html				* 4	:
Chrome is being controlled by automated test software.						×
User Inform	ation					
User Information Form						
Full Name Full name should not be empty!						
Harry Potter						
Building Number Building number should not be empty!						
4	Full	Duibling	Street			
Street Address Street Address should not be empty!	Name	Building Number	Address	Age	Action	
Privet Drive						
Age Age should not be empty!						
Enter User Age						
Submit						

As clear from the screenshot below, all fields except the 'Age' field are filled in the form.

Fersonal User Information x +	0	- 0	-	×
← → C (③ File   C:/Users/kauln/watir-tests/Personal%20Information	%20Form/index.html	\$		1
Chrome is being controlled by automated test software.				×
User In	formation			Í
<b>User Information Form</b> Full Name				
Harry Potter				
Building Number				
4				J
Street Address	Full Name Building Number Street Address A;	ge Act	ion	IJ
Privet Drive				
Age Age should not be empty!				
Enter User Age				
Submit				

On submitting this incomplete form, we get the validation error for the 'age' field as follows:

	Personal%20Information%	20Form/index.h	ıtml			\$
rome is being controlled by automated test software.						
	User Infe	ormation				
User Information Form						
Full Name						
Harry Potter						
Building Number						
4						
		Full Name	Building Number	Street Address	Age	Action
Street Address						
Street Address Privet Drive						
Privet Drive						
Street Address Privet Drive Age Age should not be empty! 13	•					

Finally, a value is entered for this field and the record is created.

Personal User Information × +				0	- 0
→ C ③ File   C:/Users/kauln/watir-tests/Personal%2	0Information%20Fo	rm/index.html			\$
hrome is being controlled by automated test software.					
	User Inforn	nation			
User Information Form					
Full Name					
Enter Full Name					
Building Number					
Enter building number	Full Name	Building Number	Street Address	Age	Action
Street Address	Harry Potter	4	Privet Drive	13	Edit Delete
Enter Street Address					
Age					
Enter User Age					
Submit					

• **Example 11: Manipulating Multiple Records:** In this example, we will be testing the personal information form by populating it with multiple records and performing crud actions on the records.

The sequence of events that we will follow in this example are as follows:

- a. Creating three records;
- b. Editing a record;
- c. Testing the validation of a field;
- d. Deleting a record;
- e. Canceling a deletion.

The steps are as follows:

1. First, we complete the actions manually in the browser.

Three records are created first.

<ul> <li>O File   C/Users/kauln/watir-tests/Personal%20</li> </ul>	Information%20Form/index.htm	6		ŵ	5'≡	Ē		Г
	User Inform	nation						
User Information Form								
Full Name								
Harry Potter								
Building Number								
4								
Street Address	Full Name	Building Number	Street Address		Age	A	ction	
Privet Drive								
Age								
11								
Submit								
Submit								
Pt Personal User Information x +						-	0	
$ \begin{array}{ c c c c c } \hline & \mbox{Personal User Information} & x & + & \\ \hline & & & &$				ŝ	ţ:			
	Information%20Form/index.htm User Inform			≨ô	¢:			
→ C ③ File   C/Users/Aauln/watin-tests/Personal%20				Ŷð	ţ:			
O File   C/Uken/Audin/watin-tests/Personal/820  Ser Information Form				Ŷð	ţ:			
O File   C/Uker/Akadiv/watir-tests/Personal/820  ser Information Form				îð	£≞			
C     O     Re     C/Users/Audit/watr-tests/Perional/h20     Serc Information Form all Name Enter Full Name				îð	ţ			
C     O File   Cr/UservMaultyvastr-tests/Personal%20 Sect Information Form all Name Enter Full Name	User Inform	nation	Start blaz			Ð		
C      File   C/User/Audit/watir-test/PeronalPage      Set Information Form     dil Name      Ender full Name      Ender full Name      Ender full Name	User Inform		Street Address Privet Dree	\frac{1}{2}		Action	8	
C     O     File     C/Users/Audit/watir-tests/PeronalPi20     Sec Information Form     all Name     Enter full Name     Enter full Name     Enter full Name	User Inform	nation Building Number		Age		Action		8
C     O     Tile     C/Users/kadityoutr-tests/Perional/h20     Ser Information Form      With Name      Enter Parties      Certor subling number      teet Address      Enter Street Address	User Inform	nation Building Number		Age		Action	8	£
C     O     Tile     C/Users/kadiyout/retets/Perional/R20     Ser Information Form     Mill Name     Enter Full Namo     Enter full Namo	User Inform	nation Building Number		Age		Action	8	2
C      C/UseryKaultywatr-test/Peronal/h20      Sert Information Form all Name Enter Full Name Enter Subst Rusher Enter Streat Autons Enter Streat Autons	User Inform	nation Building Number		Age		Action	8	2

G G File   C/Users/kauln/watir-tests/Personal%20fr				10 1	•	-
	User Informa	ntion				
User Information Form						
Full Name						
Ronald Weasley						
Building Number						
1	Full Name	Building Number	Street Address	Age	Action	
Street Address	Harry Potter	4	Privet Drive	11	Edit	Delete
Diegon Alley						
Age						
11	•					
Submit						
Personal User Information x +     O O File   C/Users/kauln/watir-tests/Personal%204					-	0 >
C > C U Hit   C/Users/kaulin/water-tests/Personar%20H				19 21	Œ	8 1
	User Informa	ition				
User Information Form						
Full Name						
Enter Full Name						
Building Number						
Enter building number	Full Name	Building Number	Street Address	Age	Action	
Street Address	Harry Potter	4	Privet Drive		Edit	
Enter Street Address	Ronald Weasley	1	Diagon Alley	п	Edit	Delete
Age						
Enter User Age						
Submit						
	nformation%20Form/index.html			50 S		0
		tion		58 S		0
	tformation%20Form/index.html User Informa	ıtion		5 <u>6</u> 5		
		ntion		\$ S		
C O File   Crüteen/kaule/water-tests/Personal%20e           User Information Form		ntion		5ê 5		
O File   C/Usen/kauln/walin-tests/Personal%20ir		ıtion		50 5		
C III C(UtersAudiovation tests/Renormaliti20)  User Information Form Full Name Fernions Gauge		tion		<u>6</u> 1		
C  O File   CyberyAudityhati-tertyPersonalt201 User Information Form Trail Name		ntion Bubbles Number	Stret Address	Se S		
C O File   C/UseryAualityNation testuyPersonalR2000 User Information Form Full Name Persona Corages Balding Number 12	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
C      O      Re   C(lber/Audr/safe-tests/Resoul8/209      User Information Form     Tell Name     Pression Grager Building Number  Building Number	User Informs	Building Number		Age	E G	I Delete
C O File   Cyllers/Audit/water-tests/Personal%209  User Information Form  Full Name  Persions Grange  Paiding Number  12  22  Stert Alfress  Genraud Placa	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
C      O      The   C(liters/knalt/water-tests/knewalk/200      Veer Information Form      Full Name      Harmono Garage      Padlag Number      2      Street Address	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
C O File   Cilleri Akado hasto-testo, Personaliti 201      User Information Form     Full Nawe     Permona Grange     Building Nauber     12     Seeri Address     Germada Pites     Age     1	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
Full Name Permana Carager Pauling Number 12 Severt Adress Grivmald Place Age	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
C O File   Cilleri Akado hasto-testo, Personaliti 201      User Information Form     Full Nawe     Permona Grange     Building Nauber     12     Seeri Address     Germada Pites     Age     1	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
O     O     Tite     C(Liters,Assuityheastin-teetstyleensonallis2er      Harminia Granger      Teet Information     Form     Teet     Teet     Teet     Gennudd Pitce      Age     T     Sudenst      Sudenst	User Informs	Building Number 4	Privet Drive	Age 11	Action	I Delete
C      C      The Cuber Adulty water-tests/innoval/2027      Verent Information Form      Full Name      Persons Garge      State      Table       Second Data Information      Ape      T      Personal Gar Information	User Inform: Full Name Hary Potter Roadd Wandey	Building Number 4	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
C      C      The Cuber Adulty water-tests/innoval/2027      Verent Information Form      Full Name      Persons Garge      State      Table       Second Data Information      Ape      T      Personal Gar Information	User Inform: Full Name Hary Potter Roadd Wandey	Building Number 4	Privet Drive	Age 11 11	Action Edit	I Delete
C O File   Cilleri Akado hasto-testo, Personaliti 201      User Information Form     Full Nawe     Permona Grange     Building Nauber     12     Seeri Address     Germada Pites     Age     1	User Inform: Full Name Hary Potter Roadd Wandey	Babling Number 4 1	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
	User Inform: I Many Patter Rould Weakly	Babling Number 4 1	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
	User Inform: I Many Patter Rould Weakly	Babling Number 4 1	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
	User Inform: I Many Patter Rould Weakly	Babling Number 4 1	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
	User Inform: I Many Patter Rould Weakly	Babling Number 4 1	Privet Drive	Age 11 11	Action Edit	<ul> <li>The second second</li></ul>
	User Informa Information Infor	ation	Proof Drive Dialog Alley	Age II II II	Le Co	- I Delete
	User Inform: Hary Poter Road Weaky	ation	Prove Dave Dialog Alley	Age 11 11	Action Edit Set	<ul> <li> I</li> <li>Delete</li> <li>Delete</li> </ul>
	User Informa If May Poter Rouald Weakly amadom/2019m/index.lond User Informat If any Poter Hary Poter Hary Poter	Building Number 4 1 1 stion Building Number 4	Street Address Prove Drive Pro	Аде 11 11 11 11	х Сонструкций (р. 1996) Сонструкций (р. 1996) Сонструки (р. 1996) Сонстру	
	User Informa Information Infor	Building Number       4       1	Street Address Street Address Privet Divide Address	Арг   11   1   1   1   1   1   1   1   1 	х Сіля Е.бс Е.бс Сб Сб Сб Сб Сб Сб Сб Сб Сб Сб	T <u>Delete</u>
	User Informa If May Poter Rouald Weakly amadom/2019m/index.lond User Informat If any Poter Hary Poter Hary Poter	Building Number 4 1 1 stion Building Number 4	Street Address Prove Drive Pro	Арг   11   1   1   1   1   1   1   1   1 	х Солония Калания	

Then, we edit the  $2^{nd}$  record by clicking on the edit link located at index 1. For watir, the indexes begin at 0 (Watir Project, 2017).

<ul> <li>O G G File   C/Users/kauln/watir-tests/Personal%20</li> </ul>	Information%20Form/index.html			58 5	• @ @	
	User Informa	ntion				
User Information Form						
Full Name						
Ronald Weasley						
Building Number	Full Name	Building Number	Street Address	Age	Action	
1	Harry Potter	4	Privet Drive	11	Edit Dels	te
Street Address	Ronald Weasley	1	Dialog Alley	11	Edit Del	
Dialog Alley	Hermione Granger	12	Grimmauld Place	11	Edit Dela	te
Age		1				
11						

While editing, the 'address' field is left empty to test if the validation error is thrown. The validation error is thrown as seen in the image below:

	User Information					
User Information Form						
Full Name						
Enter Full Name						
Building Number	Full Name	Building Number	Street Address	Ave	Action	
Enter building number	Harry Potter	-	Privet Drive	11	Edit Del	ete
Street Address Street Address should not be empty!	Ronald Weasle	y 1		11	Edit Del	-
Enter Street Address	Hermione Gran	ger 12	Grimmauld Place	11	Edit Del	ete
Age						
Enter User Age						

The address is then filled, and the record is updated.

Personal User Information x +					- 1	o ×
$\leftarrow \rightarrow$ C $\odot$ File   C/Users/kauln/watir-tests/Personal%20Information%20Form/index	html		50	£^≡	<b>@</b>	) <mark>0</mark>
User Info	ormation					
User Information Form						
Full Name						
Ronald Weasley						
Building Number	Full Name	Building Number	Street Address	Age	Action	
1	Harry Potter	4	Privet Drive	11	Edit I	Delete
Street Address Street Address should not be empty!	Ronald Weasley	1		11	Edit I	Delete
The Burrow	Hermione Granger	12	Grimmauld Place	11	Edit 1	Delete
Age						
11						
Submit						

$\leftrightarrow$ $\rightarrow$ $\odot$ $\odot$ File   C:/Users/kauln/watir-tests/kauln/watir-tes	ersonal%20Information%20Form/index.html			50	¢ @		
	User Informa	ation					
User Information Form							
Full Name							
Enter Full Name							
Building Number	Full Name	Building Number	Street Address	Age	Action	c.	
Enter building number	Harry Potter	4	Privet Drive	11	Edi	Delete	e
Street Address	Ronald Weasley	1	The Burrow	11	_	Delete	
Enter Street Address	Hermione Granger	12	Grimmauld Place	11	Edi	t Delete	e
Age							
Enter User Age							

# We then proceed to deleting the last record.

		User Inform:	tion				
ser Information Form							
ull Name							
Enter Full Name							
uilding Number							
Enter building number		Full Name	Building Number	Street Address	Age	Action	
treet Address		Harry Potter	4	Privet Drive	11		t Delete
Enter Street Address		Ronald Weasley	1	The Burrow Grimmauld Place	11		t Delete
ge		Hermione Granger	12	Grimmauld Place	11	Edi	t Delete
Entor Usor Ago Submit							
Submit		formation%20Form/index.html			៌៖	-	0
Submit	This pag	je says			10 T	-	0
Submit	This pag		OK Cancel		G 1	- @	•
Submit	This pag	je says	OS Canad		îa 1	-	0
Submit Presonal User Information x + Core Information Form Pull Name Enter Full Name	This pag	je says	OC Canal		10 1	- @	0
Submit  Personal User Information x +  Core Information Form  User Information Form  Ender Full Name  Ender Full Name  Building Number	This pag	je says	OC Carol Building Number	Street Address	10 1	ー 企 @ Action	0
Submit  Personal User Information x +  Content of the CrUters/Raudhyla  User Information Form  Util Name Enter Full Name	This pag	ge says to delete this user record ?		Street Address Privet Drive		Action	
Submit Personal User Information x + C O File   CAlberry/kaudry/o User Information Form Ull Name Ender Ful Name Building Number Ender building number Street Address	This pag	ge says urver to delete this user record ? Full Name	Building Number		Age	Action Edit	8
Submit  Personal User Information x +  Content of the CrUters/Raudhyla  User Information Form  Util Name Enter Full Name	This pag	pe says are to delete this user record ? Full Name Harry Potter	Building Number 4	Privet Drive	Age 11	Action Edit	2 Delete

The record is deleted as shown below:

> O O File   C:/Users/kauln/watir-tests/Perso	nal%20Information%20Form/index.html			ŵ	ti 🕒		
	User Informa	ation					
User Information Form							
Full Name							
Enter Full Name							
Building Number							
Enter building number	Full Name	Building Number	Street Address	Age	Action	(	
Street Address	Harry Potter	4	Privet Drive	11	Edi	Delete	c
Enter Street Address	Ronald Weasley	1	The Burrow	11	Edi	Delete	c
Age							
Enter User Age							

The last thing we do is to click on the delete link for the  $2^{nd}$  record and then cancel the deletion request.

	User Inform  Full Name Hary Potter Ronald Wensley	Building Number 4 1	Street Address Privet Drive The Burrow	13 Age 11 11	-	a if Delete if Delete
vill Name Enter Full Name Enter building number Enter Stock Address Enter Stock Address Enter User Age Enter User Age	Full Name Hary Poner	Building Number 4	Privet Drive	11	Ed	it <u>Delete</u>
all Name Ester Full Name Milling Number Enter building number Erter Kittend Addross Br Enter User Age Ester User Age	Harry Potter	4	Privet Drive	11	Ed	it <u>Delete</u>
Enter Ful Norro Building Number Enter building rumber Street Address Enter Street Address Enter User Age Enter User Age	Harry Potter	4	Privet Drive	11	Ed	it <u>Delete</u>
Building Number Enter building number Street Address Enter Street Address Exter User Age Exter User Age	Harry Potter	4	Privet Drive	11	Ed	it <u>Delete</u>
Enter building number Street Address Enter Street Address Enter User Age Enter User Age	Harry Potter	4	Privet Drive	11	Ed	it <u>Delete</u>
Street Address Enter Stroot Address Age Enter User Age Submit	Harry Potter	4	Privet Drive	11	Ed	it <u>Delete</u>
Enter Stroot Addross Age Enter User Age Submit				_	_	
Age Enter User Age Submit	Ronald Weasley	1	The Burrow	11	Ed	it Delete
Enter User Age						
Submit						
P. Decond like Information x +						
Decoval Devinformation						
O File   C/Users/kauln/watir-tests/Perso	nal%20Information%20Form/index.html			4	1 @	- 0
	This page says			10	t	
	Are you sure to delete this user record ?					
		OK Cancel				
ser Information Form						
all Name						
Enter Full Name						
ailding Number						_
Enter building number	Full Name	Building Number	Street Address	Age	Actio	
reet Address	Harry Potter	4	Privet Drive	11	_	dit Delete
Enter Street Address	Ronald Weasley	1	The Burrow	11	E	dit Delete
ge						
Enter User Age						
Submit						

O 💿 File   C:/Users/kauln/watir-tests/Personal%20Info	rmation%20Form/index.html			16	£≞ (	à (2	þ
	User Informa	tion					
User Information Form Full Name							
Enter Full Name							
Building Number							
Enter building number	Full Name	Building Number	Street Address	Age	Act	on	
Street Address	Harry Potter	4	Privet Drive	11	1	idit Del	ete
Enter Street Address	Ronald Weasley	1	The Burrow	11	1	idit Del	ete
Age							
Enter User Age							

2. The next step is to create a test file. We create the test file in the same location as before.

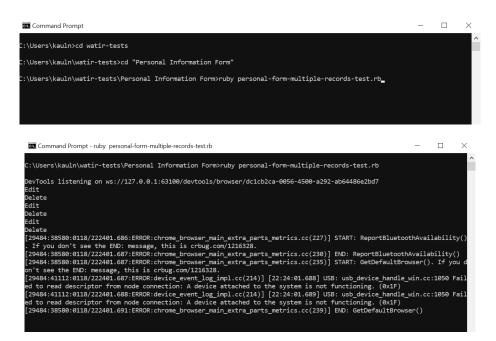
📙 🛛 🛃 🗧 Personal Informat	ion Form
File Home Share Vie	ew
Pin to Quick Copy Paste Copy	
	<ul> <li>OS (C:) &gt; Users &gt; kauln &gt; watir-tests &gt; Personal Information Form &gt;</li> </ul>
<ul> <li>This PC</li> <li>3 D Objects</li> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> </ul>	Name Conservation Name Conserv
📢 OS (C:)	🐺 personal-form-validation-test

We edit this file and write the commands that we need to complete all the actions we did manually.

The contents of this file are as follows:

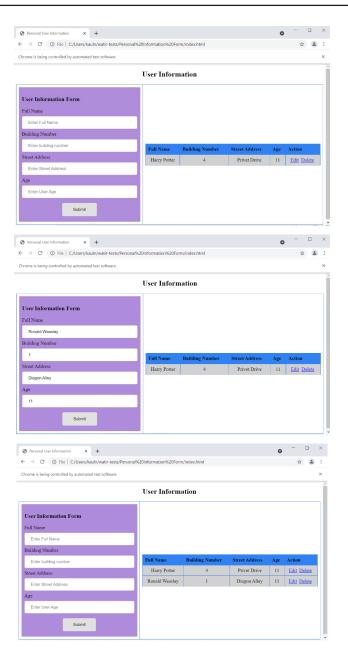
```
sonal-form-multiple-records-test - Notepad
dit Format View Help
re 'watir'
er = Watir::Browser.new :chrome
er.goto('file:///C:/Users/kauln/watir-tests/Personal%20Information%20Form/index.html')
ame = browser.text_field(name: 'fullName')
ame .exists?
ame .set 'Harry Potter'
umber = browser.text_field(name: 'bldgNumber')
umber.exists?
umber.set '4'
ss = browser.text field(name: 'streetAddress')
ss.exists?
ss.set 'Privet Drive'
browser.text_field(name: 'age')
kists?
et '11'
er.button(name: "submit").wait_until(&:present?).click
ame = browser.text field(name: 'fullName')
ame .exists?
ame .set 'Ronald Weasley'
umber = browser.text_field(name: 'bldgNumber')
umber.exists?
umber.set '1'
ss = browser.text_field(name: 'streetAddress')
ss.exists?
ss.set 'Diagon Alley'
browser.text field(name: 'age')
xists?
et '11'
er.button(name: "submit").wait_until(&:present?).click
ame = browser.text field(name: 'fullName')
ame .exists?
ame .set 'Hermione Granger'
umber = browser.text field(name: 'bldgNumber')
umber.exists?
umber.set '12
ss = browser.text_field(name: 'streetAddress')
ss.exists?
ss.set 'Grimmauld Place'
browser.text_field(name: 'age')
kists?
et '11'
er.button(name: "submit").wait until(&:present?).click
lay the links on the page
prowser.links.collect(&:text)
< the 'Edit' link and edit the 2nd record with index 1
er.link(:text => /Edit/).wait until(&:present?)
er.link(:text => /Edit/, :index => 1).click
ss = browser.text_field(name: 'streetAddress')
ss.exists?
the validation by entering empty address while editing
ss.set ''
er.button(name: "submit").wait until(&:present?).click
the address again and submit
ink(:text => /Edit/).wait_until(&:present?)
er.link(:text => /Edit/, :index => 1).click
ss = browser.text field(name: 'streetAddress')
ss.exists?
ss.set 'The Burrow'
er.button(name: "submit").wait_until(&:present?).click
te the 3rd record at index 2
ir.link(:text => /Delete/).wait_until(&:present?)
er.link(:text => /Delete/, :index => 2).click
```

3. We execute the ruby file from the command prompt as follows:



4. The automation executes the actions described in the ruby file. First, the records are created.

Personal User Information × +				0	- 0	
ightarrow C $ ightarrow$ File   C:/Users/kauln/watir-tests/Personal%20II	nformation%20Forr	m/index.html			\$	
hrome is being controlled by automated test software.						
τ	Jser Inform	ation				
User Information Form						
Full Name						
Harry Potter						
Building Number						
4						
Street Address	Full Name	Building Number	Street Address	Age	Action	
Privet Drive						
Age						
11 \$						
Submit						



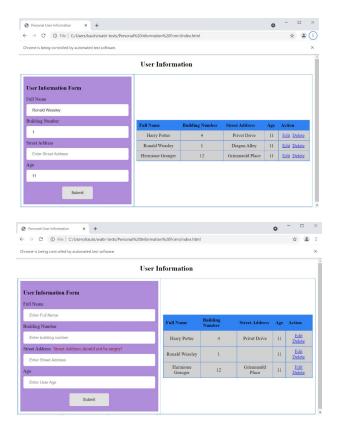
nformation × +						0	
File C:/Users/kauln/watir-tests/Per	rsonal%20Information%20For	n/index.html					
ontrolled by automated test software.							
	User Inform	ation					
ation Form							
anger							
ber							
	Full Name	Building Num	ber Street	Addre	ss	Age	1
	Harry Potter	4	Priv	et Driv	re	11	
lace	Ronald Weasley	1	Diag	on All	ey	11	T
						0	~
Personal User Information × +				0			^
← → C ③ File C:/Users/kauln/watir-		/index.html			ŕ		:
Chrome is being controlled by automated test sortw							^
	User Informa	tion					
User Information Form							
Full Name							
Enter Full Name							
Building Number	Full Name	Building Number	Street Address	Age	Action		
Enter building number	Harry Potter	4	Privet Drive	11	_	Delete	
Street Address	Ronald Weasley	1	Diagon Alley	11	Edit	Delete	
Enter Street Address	Hermione Granger	12	Grimmauld Place	11	Edit	Delete	
Age							
Enter User Age							

Then, the second record is edited, and the validation on the 'address' field is tested. We edit the  $2^{nd}$  record by providing the index in the 'browser. link' command as follows:

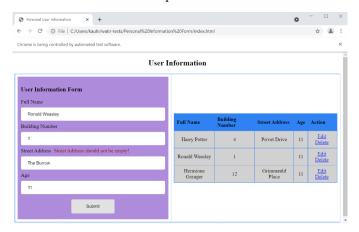
browser.link(:text => /Edit/,:index => 1).click

In watir, the index begins at 0 (Watir Project, 2017).

rome is being controlled by automated test software.					
	User Informa	ntion			
User Information Form					
Full Name					
Ronald Weasley					
Building Number	Full Name	Building Number	Street Address	Age	Action
1	Harry Potter	4	Privet Drive	11	Edit Delete
Street Address	Ronald Weasley	1	Diagon Alley	11	Edit Delete
Diagon Alley	Hermione Granger	12	Grimmauld Place	11	Edit Delete
Age					
11					



Once the validation for the 'address' field is tested, data is entered into the address field and the record is updated. This is shown below:



→ C ③ File   C:/Users/kauln/watir-tests/	Personal%20Information%20Form	v/index.html			\$
frome is being controlled by automated test software.					
	User Inform:	ation			
User Information Form					
Full Name					
Full Name					
Enter Full Name	Full Name	Building Number	Street Address	Age	Action
Enter Full Name	Full Name Harry Potter	Building Number 4	Street Address Privet Drive	Age	Action Edit Delete
Enter Full Name Building Number Enter building number		-		_	
Building Number	Harry Potter	4	Privet Drive	11	Edit Delete
Enter Full Name Building Number Enter building number Street Address	Harry Potter Ronald Weasley	4	Privet Drive The Burrow	11	Edit Delete

The automation proceeds to deleting the last record. This is done by providing the index of the delete link in the 'browser.link' command as follows:

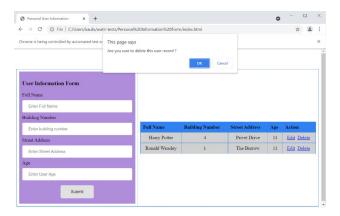
browser.link(:text => /Delete/,:index => 2).click

→ C ③ File   C/Users/kauln/wat	ir-tests/Persona	1%20Information%20Form	vindex.html			京 🏯	
hrome is being controlled by automated test sc		yS a delete this user record ?	OK Care				
User Information Form Full Name Enter Full Name							
Building Number		Full Name	Building Number	Street Address	Age	Action	ï
Enter building number		Harry Potter	4	Privet Drive	11	Edit Delete	1
Street Address		Ronald Weasley	1	The Burrow	П	Edit Delete	1
Enter Street Address		Hermione Granger	12	Grimmauld Place	11	Edit Delete	1
Age						1	1
Enter User Age							

The record is deleted as shown:

Personal User Information × +				0	- 🗆
	%20Information%20Form	vindex.html			☆ 🏝
hrome is being controlled by automated test software.					
	User Inform:	ation			
User Information Form					
Enter Full Name					
Building Number					
Enter building number	Full Name	Building Number	Street Address	Age	Action
Street Address	Harry Potter	4	Privet Drive	11	Edit Delete
Enter Street Address	Ronald Weasley	1	The Burrow	н	Edit Delete
Age					
Enter User Age					

Next, the automation tries to delete the  $2^{nd}$  record from the remaining records. The alert confirmation dialog opens, and the automation cancels this request.



The delete operation is canceled as shown below:

hrome is being controlled by automated test software.					
	User Inform	ation			
User Information Form					
Enter Full Name					
Building Number					
Enter building number	Full Name	Building Number	Street Address	Age	Action
Street Address	Harry Potter	4	Privet Drive	11	Edit Delete
	Ronald Weasley	1	The Burrow	11	Edit Delete
Enter Street Address					

• **Example 12: Testing Checkboxes on a UI Page:** In this example, we test a simple html page containing checkboxes using watir. We will also be using an IDE to edit and run our watir test case.

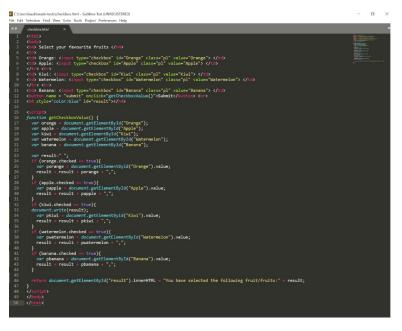
The steps are as follows:

1. First, we create a simple html page containing a few checkboxes. We create a new file named checkbox.html in the 'watir-tests' folder.

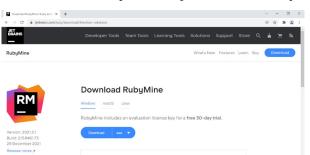
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2. We edit this file using an html file editor to add the required html and JavaScript code needed to display checkboxes and display the selected values.

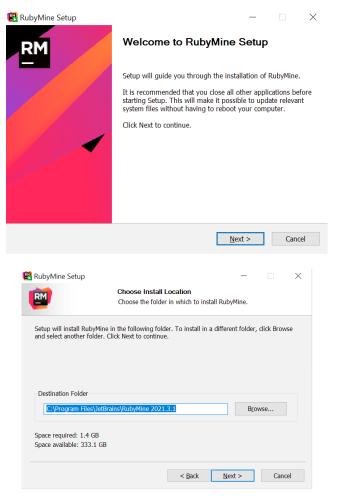
The contents of this file are as follows:



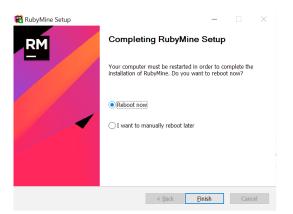
3. We will now proceed to creating a ruby file and write our test case using watir. Before that, we install the RubyMine IDE from the JetBrains website: https://www.jetbrains.com/ruby/



We download the exe for windows and proceed with the setup.



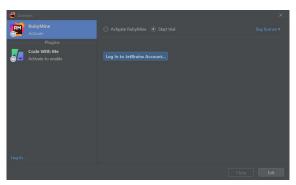
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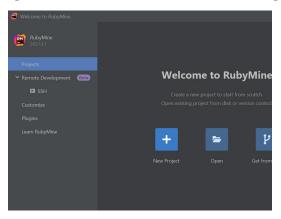
Once we reboot the system, we open the IDE. We accept the user agreement and proceed.

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When the IDE opens, the first thing you are asked to do is to activate your account. Here, we start a free 30-day trial. RubyMine IDE is a commercially licensed IDE (RubyMine: The Ruby on Rails IDE by JetBrains, 2022).

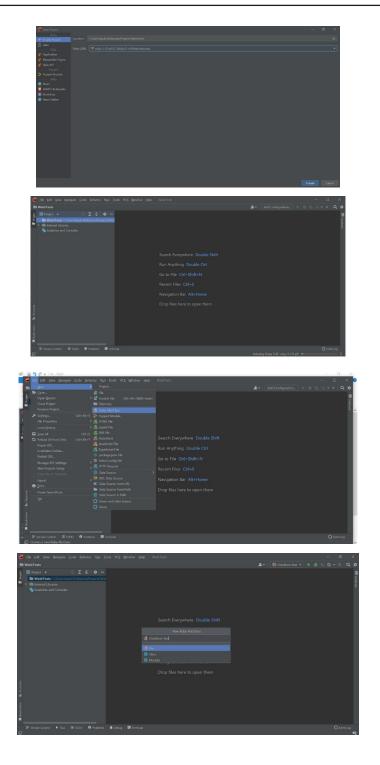


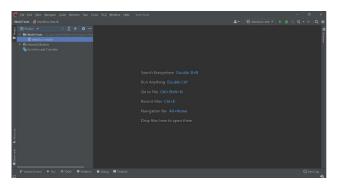
Once we setup an account, we can access the Welcome page.



4. We proceed to create a new project as follows:







5. We edit this file to add a test case that tests the html form we created in Step-1.

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In this test case, we open the html page in the browser and then make use of the checkbox command to select the checkboxes using the ids for the checkbox values. Here, we select three options: orange, apple, and watermelon.

6. We now run the test case by clicking on the run button at the top.

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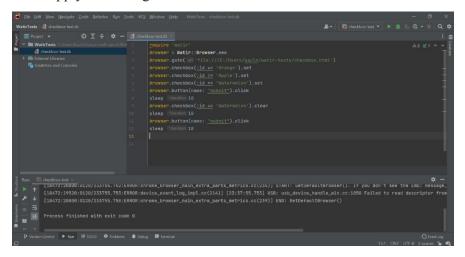
The automation launches the browser and selects the checkboxes. Then the submit button is clicked.

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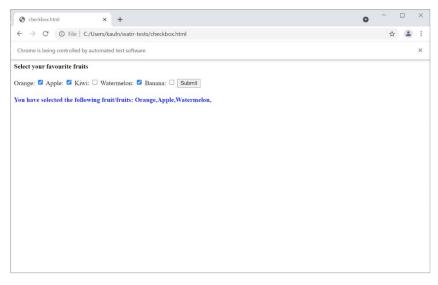
The test case is executed with success as seen in the screenshot above.

7. We can also unselect the values that we selected. This can be done by using the watir command clear. The command is: browser. checkbox(:id => 'id').clear

We apply this change in the checkbox-test.rb file as follows:



8. We run the test case and observe its behavior.

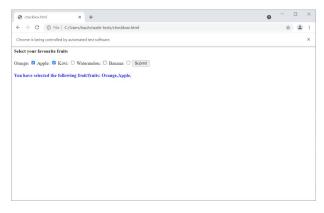


First, the three fruits Orange, Apple, and Watermelon are selected and the submit button is pressed. This gives us the text saying that these fruits have been selected.

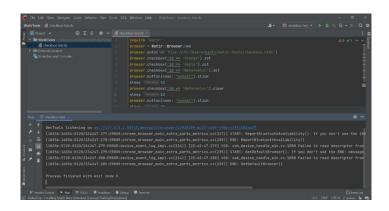


As clear from the screenshot above, the checkbox for 'Watermelon' has been unselected.

Now, the submit button is pressed and the text changes to reflect the checkboxes that are selected as shown below:



The test case is successful, which is also reflected in the console output as follows:



# 5

# **RANOREX STUDIO**

CHAPTER

# CONTENTS

5.1. Setup and Installation	192
5.2. Ranorex Studio Basics	199
5.3. Examples	201

Ranorex Studio is a powerful tool designed to automate tests for web applications, mobile applications, and standalone applications. This tool provides excellent GUI Testing features for web, mobile, and desktop applications. It is a tool that is straightforward to use and people with a non-coding background can easily create automated tests. It is a versatile tool that supports parallel testing, cross-browser testing and allows for remote testing too. A variety of coding languages are supported by this tool such as .Net, HTML, Java (Ranorex, 2017).

This tool allows users to build test cases and automate them quickly. Some additional features of this tool are: regression testing, keyword-driven testing, data-driven testing, and cross-browser testing (Ranorex, 2017).

Before we begin working with the tool, we need to download and install the Ranorex Studio. Ranorex provides a trial version available for download which is easily accessible on their website.

### 5.1. SETUP AND INSTALLATION

To download the tool, you need to register on their official website with a business email address. On successful registration, a link is sent to your email so you could download and install the trial version. If you do not have a valid business email, then you can directly contact the sales them and they would help you with downloading a trail version (Ranorex, 2017).

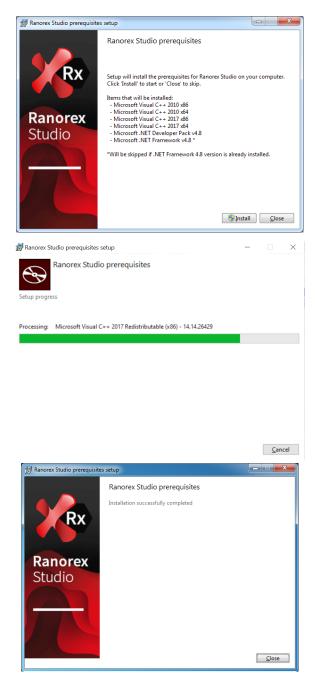
On successful registration on the official Ranorex website, you are sent a link to download the trial version.

Click on the link provided and download the trial version of Ranorex.

A zip file is downloaded on your local machine and the contents of the zip provided are as follows:

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Follow the instructions provided in the README file. The first step is to install the prerequisites.



Once the prerequisites are installed successfully, we proceed to installing Ranorex by clicking on the MSI installer package provided.

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		Next	Cancel	

We click on 'Next.'

🐕 Ranorex Studio Setup
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End User License Agreement
READ THE FOLLOWING TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS SOFTWARE.
THIS AGREEMENT APPLIES TO ANY KIND OF USAGE OR ACCESS TO THE SOFTWARE, WHETHER PURCHASED DIRECTLY OR INDIRECTLY.
BY CLICKING ON THE "I AGREE" BUTTON BELOW, ACCESSING
I accept the terms in the License Agreement
Print Back Next Cancel



We accept the End User License Agreement and click on 'Next.' We are asked to provide the location where Ranorex studio would be installed. You can use the location selected by default or navigate to a location of your choice. Here, we install Ranorex in the default location which is in Program Files.

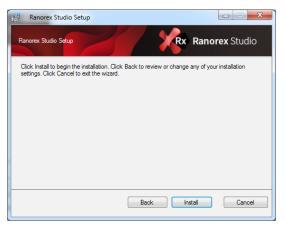
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Destination Folder Specify where to install Ranorex Studio.	Rx	Ranorex Studio
Install Ranorex Studio to:		
C:\Program Files (x86)\Ranorex\Studio		
Change		
	Back	lext Cancel

We then choose the features that we wish to install. Here, we select all features. But you can choose the features you wish to install based on you testing requirements.

For example, if the application that you are testing is never run-on Firefox, then you can choose to omit the Firefox Add-on from the setup.



To start the installation, we click in 'Install.'



The installation starts and the status is updated.

Installing Ranorex Studio	
Installing Ranorex Studio	
Please wait while Ranorex Studio is being installed.	
Status: INSTALL	
Back Next Cancel	

The installation takes a few minutes. On completion of the installation process, the following window appears:

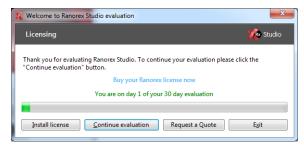


The 'Launch Ranorex Studio when setup exits' is checked by default. We click on 'Finish' to open Ranrex Studio.

We are prompted to the licensing window that asks us to provide a license or start a free 30-day trial.



Here, we choose the 30-day free trial option.



We click on 'Continue evaluation' which then opens the Ranorex Studio configuration window and asks us to choose a theme.

🞾 Ranorex Studio configuration	×
Ranorex Studio	
Get started wi	th Ranorex Studio
usage statistics for internal purposes such as	ve Ranorex Studio. This is why we may collect auditing, data analysis, and research. We collect ou can turn off usage statistics at any time in the mse.
Yes, I want to participate a Collection of usage statistic	nd share my usage statistics is cannot be turned off for beta or trial versions.
More information	
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	Save and continue

We select a theme after which we can begin creating a project. This is done in Section 5.3.

Note that to be able to use Ranorex Studio after its trial period of 30 days, you must obtain a license. Before we move forward with the creation of the first test case, let us look at a few basic details of this tool in the next section.

# **5.2. RANOREX STUDIO BASICS**

In this section, we learn different components that form a part of Ranorex Studio.

## 5.2.1. Views

Ranorex Studio provides three important views (Ranorex, 2017).

- 1. **Project View:** This is a view that is common for most IDE's and it permits you to view all the files in the current project. The project view is composed of the project, different libraries that are used by the project and the application, the repository file, modules, and all the files that are needed to execute the project. The project view also permits working on multiple projects in a single solution.
- 2. Module View: This displays the test steps and permits users to execute single or multiple steps. A user can view the individual test modules here. Different modules can be combined to create a series of automated suites.

The module browser is made up of two types of folders. They are:

- **i. Groups:** These are nothing but a collection of different items. All the module groups are listed here.
- **ii. Modules:** This section lists all the modules in the project. This section lists all the recordings and the project's code files. Additionally, any variables that have been defined in the recordings are found here as well.

The primary use of the module browser is to view the modules, dragdrop the modules and automation groups and reuse them.

**3. File View:** The file view is shown when you double-click on a file name in an open project from the Project View or the Module View. If you double click on any file name, it is opened in the file view much like any editor. For example, if you want to view the recordings in more detail, you can double click on the recording file, and it is displayed in File view. With the help of this view users can display all the available files such as the This view displays all the available files in the project such as the Recordings, the repository, action tables, code modules, reports, etc.

#### 5.2.2. Components

The main components of the Ranorex Studio Tool are (Ranorex, 2017):

• Ranorex Recorder: It is a useful device that helps users record the activities as test steps and providing interesting playback and editing options. Different experiments can be done by exploring the recordings, editing them, retesting, and fine-tuning the recordings. The activities that are recorded can be adjusted physically in the activity table, which is an interesting feature provided by this tool. Ranorex is interesting in its design as the activities recorded and the UI components related to the activities performed are stored separately (different modules), which makes it easier to perform changes and update the test cases.

Another useful feature of this tool is that users can record the actions performed by the mouse in addition to allowing recording of the console. This feature is very useful in the case of UI testing. Once these movements are recorded, they are available for editing/updating in the Recorder activity table, where you can perform a host of operations on the recordings. You are allowed to adjust the test cases and your recordings to suit all your testing needs. Although the Recorder is a device and can be used independently, it can be easily coordinated with other components such the spy, the models, etc.

• **Ranorex Spy:** It is a versatile test automation tool that is beneficial for UI testing as it consists of an object recognition tool. This tool is the Ranorex Spy. The Tanorex Spy is a tool that is used for object recognition which helps locate and identify the UI elements in the screen/website that is being tested (Peischel et al., 2011).

The Ranorex Spy is like a scanner that locates and scans the UI elements of an application. This helps in understanding the UI components of the application that help in writing better test cases to test the application. It permits analysis of the application from the UI viewpoint and allows the ability to discern different elements of the UI with incredible ease (Peischel et al., 2011). This scanning tool provides us with UI data mapping relative to the XPath. We shall cover this in the upcoming sections. This tool helps in creating tests/recordings that test the modules of the UI correctly. The Ranorex Spy can see the details of the UI components of the application that is under test, and it provides a hierarchical representation of the UI elements which is extremely helpful when creating test cases.

- Ranorex Repository: It consists of all the UI elements that are being analyzed. The Ranorex repository provides a view in which the UI elements are mapped logically. Any UI element that is being tested is found in this repository. The repository is a component of Ranorex Studio which is usually used in coordination with Ranorex Spy and Ranorex Recorder. The repository is like a storage unit that is used to create and store mappings of the UI components that help in UI testing by providing insights into the components of the application under test. The repository portrays the UI components used in the application under test in a logical manner set by its UI mapping. The repository stores and displays the UI elements in a tree-like structure. Each item in this structure has a 'RanoreXPath' that is used to identify the component/ element and helps in creating test cases that interact with the UI components of the application that is being tested. A repository is created automatically for every test project created in Ranorex Studio. The repository file has the extension '.rxrep.'
- **Ranorex Test Suite Runner:** As its name suggests, is a program that executes the test suites created in Ranorex Studio (Peischel et al., 2011). The runner is opened automatically on double-clicking a test suite file in the application. The test suite is a standalone application which means that if you click on the file without opening Ranorex studio, it will simply execute the test suite in the Runner.

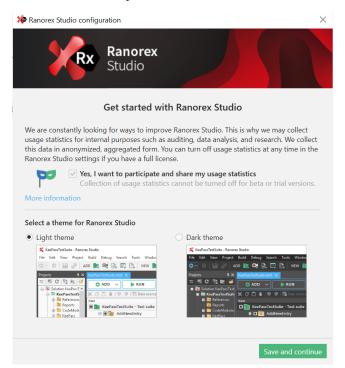
The Ranorex Test Suite Runner can be used to execute specific test cases, entire test suites or just specific modules/folders. To execute entire test suites, run certain test cases and smart folders, or just run a specific module (Ranorex, 2017). Each time a test suite is run, a test report is created. Tests can be integrated with other applications such as Jenkins, DevOps tools, etc., and run from there as well.

Now that we have looked at the components of Ranorex Studio we shall see practical examples demonstrating how to use Ranorex Studio to create test cases and test suites.

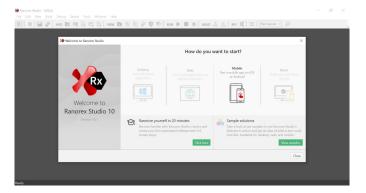
## **5.3. EXAMPLES**

• Example 1: Creating Your First Test Case in Ranorex Studio: In this example, we will create a test project in Ranorex Studio. As this would be the first time that we open Ranorex Studio and we do not have any projects created, the Ranorex Studio Configuration page is displayed.

We choose the theme and proceed.



Once we select a theme, the RocketStart solution wizard appears and prompts us to choose the type of test project that we want to create.



Here, we create a web project. We provide a name for the project and choose the location for the project and click on 'Continue.'

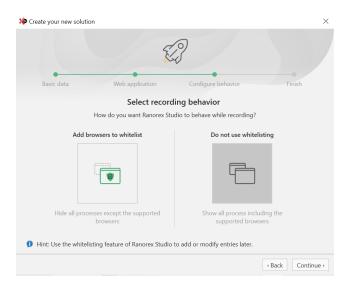
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The wizard then requests us to provide the URL that we wish to test and the browser that we are going to use.

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In this example, we use the URL provided by default and select 'Chrome' as the browser and click on 'Continue.'

We are then prompted to choose if we wish to use whitelisting. In this case, we do not use whitelisting.



## We click on 'Continue.'

X Create your new solution	$\times$
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Basic data Web application Configure behavior Finish	
Almost there	
Read what's next and then click Finish to create your solution and get started in Ranorex Studio.	
What's next?	
Once your solution has been created, you'll find yourself in the working environment of Ranorex Studio.	
• To the right of it, you'll see the tutorial panel. It will guide you through the next steps in becoming familiar with the basics.	
If you get stuck, take a look at our User Guide for more help.	
The tutorial panel on the right will guide you through the next steps.	
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We click on 'Finish' to create our project, which opens in Ranorex Studio as shown below:

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As we can see clearly in the screenshot above, in the Projects Tab, we have the solution items such as the recording file, the repository file, the reports folder, the configuration files, etc.

When we provide the URL while creating the project, a test case is created by default. A recording file containing basic actions such as opening the browser, accessing the URL, and closing the browser was created by default. On the right-hand side of the window, we have the tutorial page that guides us in creating our very first project. In the right-hand bottom corner, we also have the Intercom Chat window where we can ask any queries that we might have regarding the tool.

To run the test case that was created, we click on the play icon located on the toolbar. When we play this test case, it opens the Chrome Browser, opens the URL http://www.ranorex.com and then closes the browser.

After the execution of the test case, we receive the test case result and summary as shown below:

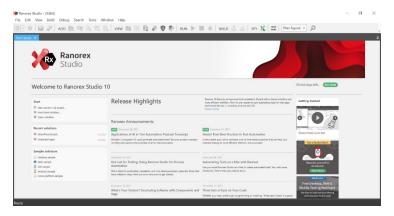
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The test case summary provides details of the test case, such as the status of the test case (Success/Failed/Blocked), the steps of the test case, and details of the machine/system that ran the test case.

This example showed us the creation of a web project in Ranorex. In the next example, we will look at one of the sample projects provided by Ranorex and try to understand how it is configured.

Ø **Example 2: Understanding a Sample Solution:** In this example, we shall look at the sample solution provided by Ranorex and try to look at how it is configured.

When we relaunch Ranorex, the start page is displayed. From the start page, we navigate to the 'Sample Solutions' tab and click on 'Desktop sample.'



We open the Desktop example in Ranorex Studio. This is a sample that implements a Keepass Test suite where the keepass functionalities such as adding an entry, deleting an entry, adding a credential, deleting a credential, adding a group, deleting a group, etc., are tested.

The Desktop example is launched in Ranorex Studio as shown below:

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Recordings		3 StartAndLogin	Bound variable: 1		
- C. app.config		B 2 AddEntryByRecording	CevConnector_Credentials	- 1	
- Assembly(nfo.cs		- DM AddEntry	Bound variables: 6		
		DM ValidateEntry	Bound variable: 1		
ule browser	* ×	DeleteEntry	Bound variable: 1		Intercom chat
sh., (F3)	P	B AddEntryByCodeModule	CsvConnector_Credentials		
KeePassTestSuite		AddCredentialEntry	Bound variables: 6		Hi there 🕷
		Di ValidateEntry	Bound variable: 1		
		DeleteEntry	Bound variable: 1		If you have a question, don't be shywe are happy to help!
		B AddEntryWithArguments	CsvConnector_Credentials B Rows 2		Need help deciding if Ranorex Studio is the right solution for you
		AddEntryByUserCodeAction	Bound variables: 6		test automation goals? Ask our pre-sales staff for input on your test automation strategy.
		ValidateEntry	Bound variable: 1		
		DeleteEntry	Bound variable: 1		Additional resources:
		G. ITTAROOMAN			Learn Ranorex Studio with our webinars
					Consult our User Guide for in-depth documentation

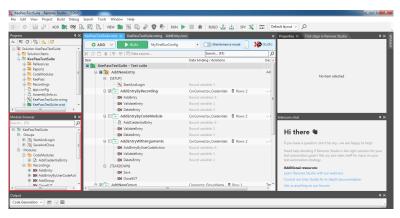
In the project view, we can see that it contains the files of the Solution – KeePass Test suite.

The module browser contains two folders: Groups and Modules.

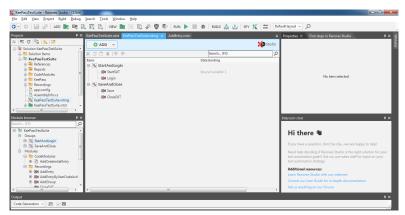
- The Groups folder consists of two groups: StartAndLogin and SaveAndClose.
- The Modules folder consists of additional two folders: CodeModules and Recordings.

The CodeModules consists of a.cs file which is a code file and consists of code written for the test suite.

The Recordings folder is composed of all the recordings that form a part of the test suite. A total of 12 recordings are present in this folder. Each recording is part of a test case that is outlined in the KeepassTestSuite.rxtst file which we will cover shortly. A file with the extension.rxtst is a Ranorex Test suite file. (rxtst is equivalent to 'Ranorex test suite file').

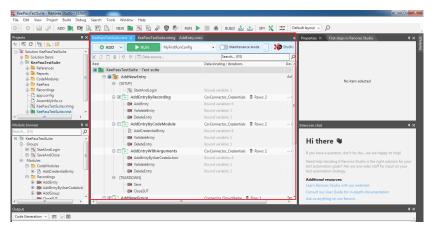


In Groups, if we double-click on 'StartAndLogin,' the groups are displayed as shown below:



As we can see clearly from the screenshot above, the items in the group are display in file view. We can see that the Groups folder has two items, and each item is comprised of two recordings. A recording file is indicated by the small camera icon before the name of the file.

To better understand how the recordings, work, we need to see the KeePassTestSuite.rxtst file as shown below:



As we can see from the screenshot above, each recording is part of test case folder that is defined in this file.

In this sample solution, in the first folder/module of the test suite, each test case is adding an entry to Keepass using different ways. The first test case 'AddEntryByRecording' focuses on adding an entry via recording only. The second test case 'AddEntryByCodeModule' adds an entry using the code module file 'AddCredentialEntry.' The third test case tries to add entry by providing arguments in the test case. The last part of this module is the teardown where the Keepass data is saved and closed.

Each of these test cases in the first module, have three common types of recordings: add entry, validate entry, and delete entry.

Let us take a brief look at each of these recordings in brief.

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The AddEntry recording is as follows:

This recording consists of several mouse clicks, entering of keys, clicking on 'OK' buttons, etc.

If we expand the AddEntry recording in the module browser, we can see that it is made up some variables that are entered at runtime:

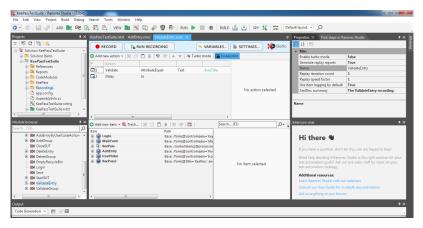
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- varTitle - varURL									
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If we double-click on any one of the variables, the variables window pops up as follows:

		able(s) Copy variable from repository -
Name		Default value
<ul> <li>varUserna</li> </ul>		admin
<ul> <li>varPassw</li> </ul>	ord	demo123
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varIconIn	dex	1
varExpire		1 Year
<ul> <li>varTitle</li> </ul>		WordPressDemo

The values displayed in the window above are the values that are entered during the execution of the test.

The validateEntry recording is as follows:



This recording is smaller as compared to the AddEntry recording and is made up of 2 actions. One action is the validate action which validates whether the entered password and re-entered password match.

The deleteEntry recording is as follows:

KeePassTestSuite - Ranorex Studio - (32bit File Edit View Project Build Debuc		Help				- 0 <b>- x</b>
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This recording consists recording of different mouse clicks relative to the opened window that close the window.

The second module of the test suite consists of the 'AddNewGroup' test case where a new group is added, validated, and delete from Keepass.

Edit View Project Build Debug		😨 🕏 🛛 RUN 🕨 🔳	🕷 🛛 BUILD 📩 📩 SPY	🗶 🏥 De	fault layout 👻 🔎
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-C AssemblyInfo.cs	DeleteEntry	Bound variable: 1			Create a recording of a desktop application
3K KeePassTestSuite.rxtmg	[TEARDOWN]				Web test
🗄 📾 KeePassTestSuite.rxtst	- ® Save				Create a recording of a web application
E KeePassTestSuiteRepository.rxr	CloseSUT				Mobile test
-B Program.cs	R → AddNewGroup	Connector_GroupName	tow: Test Case: Add new group to	o KeePass, v	Mobile test Build a web or app test on a mobile device
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The Teardown section consists of logging into Keepass, emptying the recycle, saving the changes and closing it.

Now that we have covered a few of the basics in the sample test suite, we proceed to run the test suite by click on the green play icon located on the toolbar.

When we click on the play button, the test suite is launched. A command window is launched that initializes the test suite and logs the events.

2022/01/03 07:15:45.475][Info ][Test]: Test Suite 'KeePassTestSuite' started. 2022/01/03 07:15:45.505][Info ][Test]: Smart Folder 'AddNewEntry' started. 2022/01/03 07:15:45.638][Info ][Test]: Test Module 'StartSUT' started. 2022/01/03 07:15:45.73][Info ][Test]: Test Module 'StartSUT' started. 2022/01/03 07:15:45.73][Info ][Test]: Test Module 'StartSUT' completed with figure for variable \$varApplicationPath in normal mode. 2022/01/03 07:15:45.73][Info ][Test]: Test Module 'StartSUT' completed with figure for variable \$varApplicationPath in normal mode. 2022/01/03 07:15:46.628][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:46.628][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:46.628][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:46.608][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:46.608][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:46.608][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:57.468][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:57.468][Info ][Test]: Test Module 'Login' started. 2022/01/03 07:15:57.468][Info ][Test]: Test Module 'Login' completed with starts'] 2022/01/03 07:15:57.930][Info ][Test]: Test Module 'Login' completed with starts'] 2022/01/03 07:15:57.930][Info ][Test]: Test Case 'AddEntryByRecording': data 2022/01/03 07:15:57.933][Info ][Test]: Test Module 'AddEntry' started.	C:\Users\user\Documents\Ranorex\RanorexStudio Projects\Samples\KeePassTestSuite\KeePassT	es 🗆 🗆 💌
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The login page is shown:

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i Ready			Press 'Pause' key to abort. Press 'Shift'+'Pause' keys	to skip delays and timeouts.

The automation proceeds to logging in and begins creating a new entry as follows:

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First, a new entry is created using the variables declared in the 'AddEntry' recording.

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The entry is added as shown below:

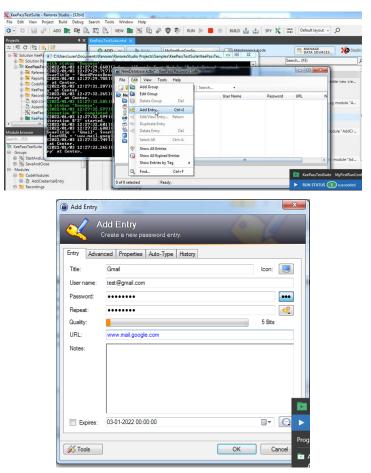
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Once the entry is created, the automation deletes the entry and save the database.

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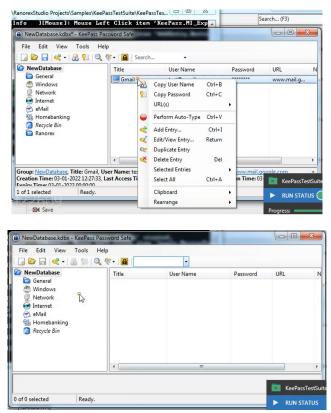
Next, the automation logs in again and adds another entry using the credentials file.



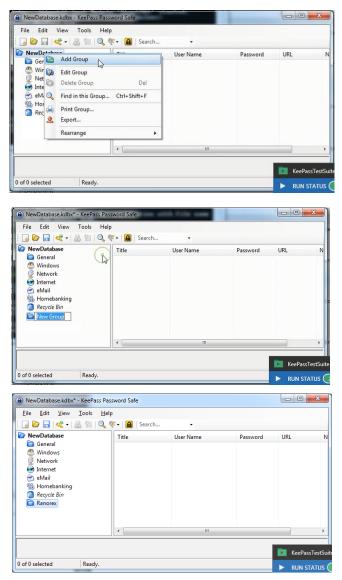
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The credentials are added as shown below:

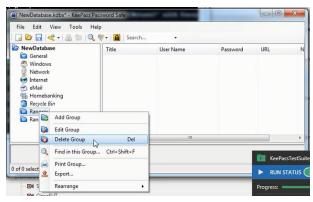
Once the credentials are added and validated, the entry is deleted.



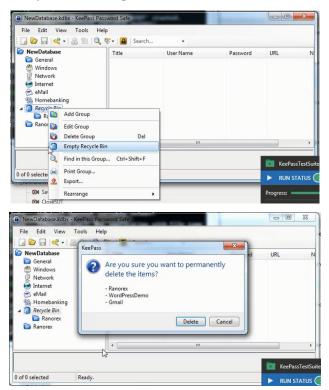
After the entry is deleted, the next part of the test suite is executed where a new group is added after which the recycle bin is emptied.



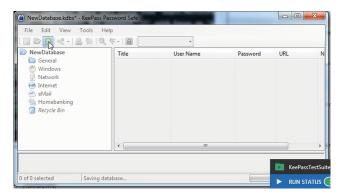
Once the group is added, it is deleted.



Next, the recycle bin is emptied.



The items created are deleted and the keepass database is saved.



This step concludes the test suite.

Once the test is completed, the test suite result summary is displayed as shown below:

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The summary details the test suite and the test case that were executed as part of the test suite. Additional details such as the execution time, machine details, etc., are provided as well.

• Example 3: Create a Test Suite for a Desktop Calculator Application: In this example, we download a sample calculator application and create a test suite that records and tests its functionality.

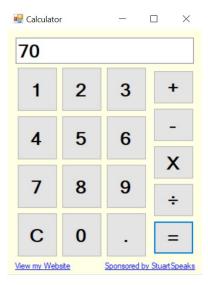
The steps followed are:

- 1. We download a sample calculator application from the following website: https://basic-calculator.en.softonic.com/
- 2. Once the calculator application is downloaded, we navigate to the downloads folder and launch it.

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The application opens and we perform a few actions:

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3. Once we have checked that the application works fine, we close it and proceed to create a new solution in Ranorex Studio. We first open Ranorex Studio.

We navigate to File  $\rightarrow$  New  $\rightarrow$  Solution Wizard to create a new solution.

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CalculatorTest		1/5/2022	Wouldn't it be great if N co	uld generate automated texts? Randrex product manager otential of Al for text automation.	In this master post, we've collected a set of time-tested practices that can help your software testing be more efficient, effective, and successful.	Get a Rocket Start
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WordPressSample		1/3/2022		repeatable, and rule-based processes, especially those that are some resources to get started.	limitations. Here's what you need to know.	Start Now
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WordFressSample_1						Free Desktop, Web &
			November 19, 2021		November 11, 2021	
Sample solutions				Structuring Software with Components and		Mobile Testing Webinars See how to improve your testing

4. We are prompted to choose the type of application that we would like to test. We select 'Desktop' from the available options.

	How do you want to start?						
Welcome to	Desktop Test a Windows application	Web Test a web application on different browses	Mobile Test a mobile app on IOS or Android	Blank Build your test from scratch			
Ranorex Studio 10 Version 10.1		f in 20 minutes th Ranorex Studio's basics and comated software test in 6 Click here		is to see Ranorex Studio's t an idea of what a test coul sktop, web, and mobile. View samples			

5. We provide the solution name and location as follows:

🎾 Create your new solution			×
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Basic data	Select application	Configure behavior	Finish
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Additional options			
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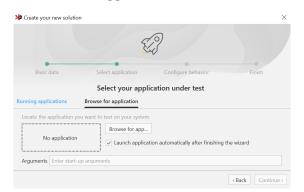
We click on 'Continue' to proceed.

6. We are then prompted to choose the application that we wish to test.

The following window appears:

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The above window asks us to choose the application that we would like to test. We go to 'Browse for application' tab.

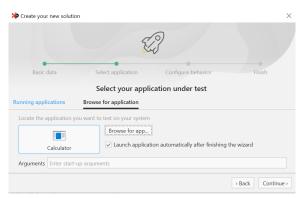


We click on the 'Browse for app.' button:

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	Select your appli	cation under test	
Running applications	Browse for application		
Locate the application y	ou want to test on your system		
No application	Launch applicat	ion automatically after finishing t	he wizard
Arguments Enter start-	up arguments		
			<pre> Back Continue &gt;</pre>

We browse to the 'Downloads' folder where we downloaded the calculator application and select it.

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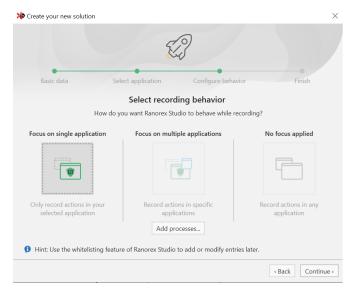
It is added successfully to the solution as shown below:

Note that we keep the 'Launch application automatically after finishing the wizard' option selected because we want to the calculator app to be launched when the project is opened.

We click on 'Continue' to proceed with the project creation.

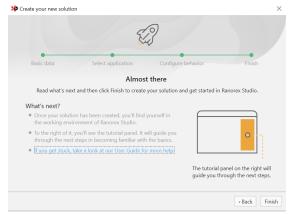
7. We are asked to configure the behavior of Ranorex while recording for a test case.

We select the first option which is 'Focus on single application.' We select this option as this will record only the actions performed by the 'Calculator' application and ignore any other applications that are running simultaneously on the machine.



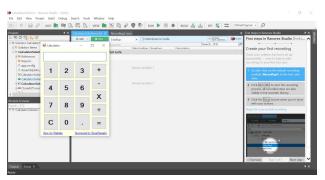
We click on 'Continue' to advance with the creation of the solution.

8. We click on 'Finish' to end the wizard and create the solution.

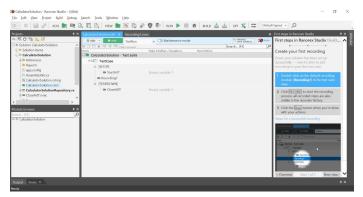


We click on finish to complete the wizard and create the new solution.

The solution is created and when its opened and the calculator application is launched with the solution as shown below:

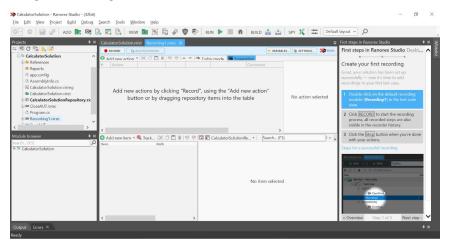


9. We see the CalculatorSolution test suite as follows:

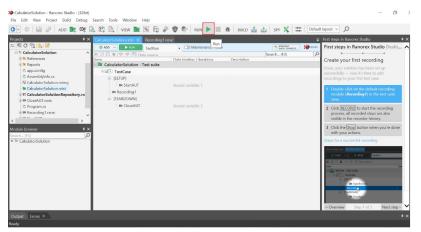


By default, the test suite is created with a test case that has a setup, an empty recording, and a teardown section.

We click on 'Recording1' and navigate to the recording1.rxrec file and can begin recording for the test suite.



10. To begin recording for the test case, we click on the record button.



The record window is displayed in the corner of the screen along with the calculator application in the center as shown below:



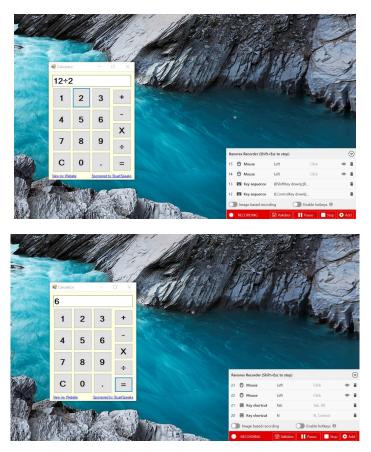
We begin recording by performing simple operations as follows:

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As we can see, each keystroke is recorded in the Ranorex Recorder at the left corner of the screen.



We keep on recording a few actions.



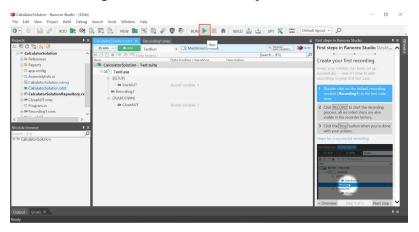
Once we are done with our recording, we can see that the file 'Recording1. Rxrec' is now updated with the actions that we recorded.

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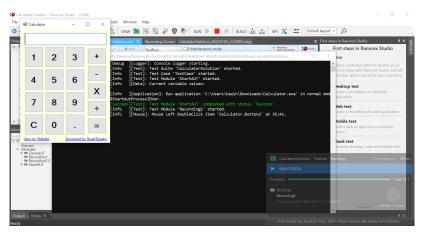
As we can see from the screenshot above, each movement has been recorded.

11. The last step would be to execute the test suite containing the updated recording.

We click on the green run button at the top to execute the test suite.



The test suite launches and goes on to repeat the actions that we performed earlier.



After the test case is executed, a test summary report is generated.

The test suite executes successfully as visible in the Test case result summary shown below:

CalculatorSolution - Ranorex Studio - (32bit)				- Ø ×
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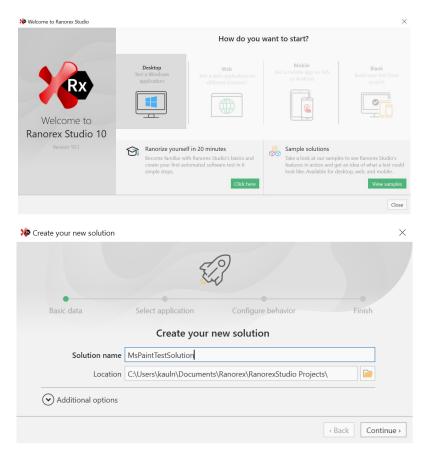
• Example 4: Creating a Test Suite for Paint Application on Your Location Machine: In this example, we shall test the application Microsoft paint using Ranorex Studio. We will perform actions in the paint application and proceed to save the file as 'test.bmp' in the 'Pictures' Folder.

The steps taken are as follows:

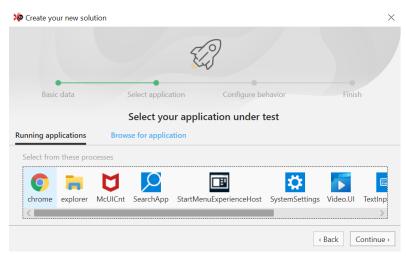
1. We create a new solution using the New Solution creation wizard.

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	N MyTes				1/5/2022		lest Practices in Test Automation		Not Just for Testing: Using Ranorex Studio for Process Autom	ation Watch the wa	ebinars and get the		
	K MyRe	tWebSolutio			1/4/2022	In this master post,	we've collected a set of time-tested practices the	at can help your	RPA is ideal for predictable, repeatable, and rule-based processes, especially those	a that 101 on to	est automation		
	N KeePa	ssTestSuite			1/4/2022	software testing be	e more efficient, effective, and successful.		have validation steps. Here are some resources to get started.		atch Now		
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2. We choose the type of application to be 'Desktop' and provide the details of the test solution, such as the name and location.

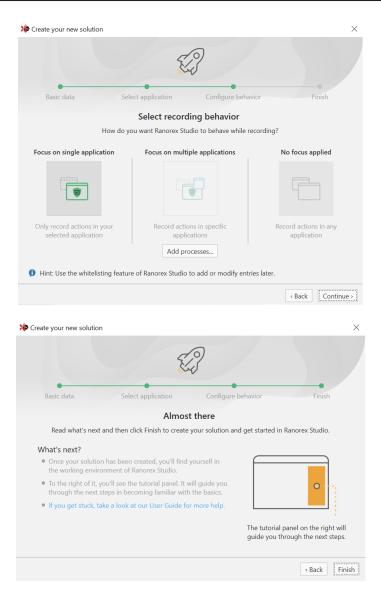


## 3. We choose the paint application in the next step.



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4. We choose the recording behavior and complete the setup as follows:



5. The new solution is now created with a Test suite containing a single test case which is made up of a setup and teardown step and an empty recording by default. This is shown below:

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The paint application is opened on launch of the solution as well.

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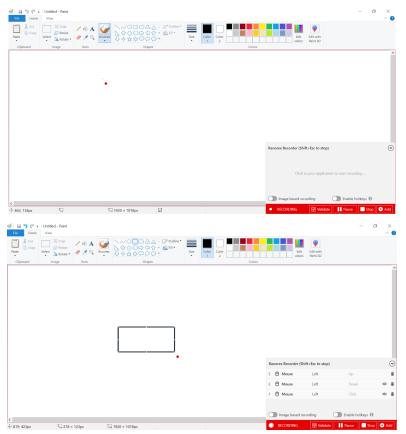
We open the empty recording file.

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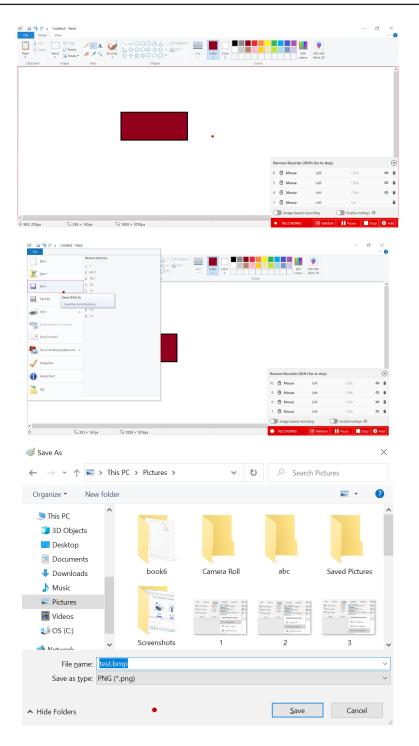
6. We begin recording actions that we will perform in the paint application.

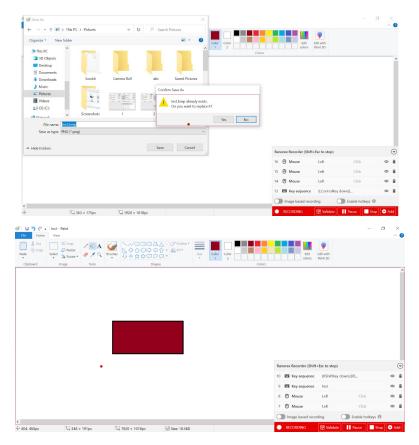
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We proceed to create a simple shape in the application and save the file as 'test.bmp.' The Ranorex recorder located at the right-hand bottom corner of the screen starts recording our actions.



Note that each keystroke that we performed is recorded by the Ranorex recorder.

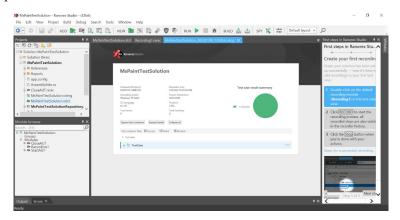




7. Once the recording is complete, we can see that the empty recording file that we saw in the last step is now filled with entries containing the actions we took while recording.

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We run the test suite by click on the play icon located in the toolbar at the top.



As visible from the screenshot above, the test suite runs successfully.

• **Example 5: Creating a Test Suite for a Demo Website:** In this example, we shall create a test solution for a web application.

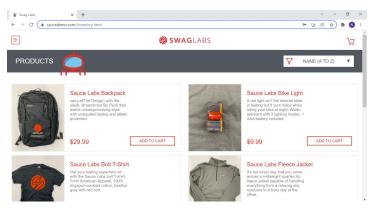
We create a Ranorex solution for an online demo web application using their solution creation wizard and create a test suite for it.

The steps are as follows:

- 1. We first access a demo website available online. For this exercise, we go to a sample demo website provided by SwagLabs: https://www.saucedemo.com/ (Swag Labs, 2022).
- 2. We open the application and login to the demo application using one of the accepted usernames and the password.

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(Swag Labs, 2022)



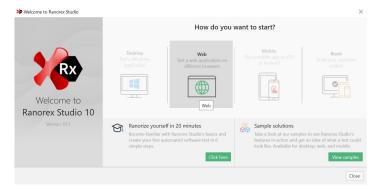
(Swag Labs, 2022)

As we can see, a sample set of products is available for purchase in the demo application.

3. To test this demo website, we open Ranorex Studio and create a new Web Solution that tests this website as follows:

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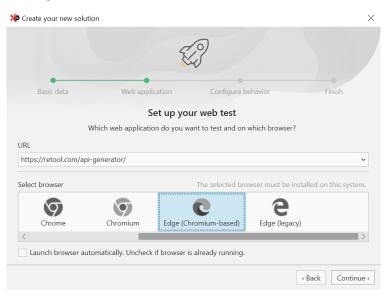
4. We select the Web solution as we are testing a web application.



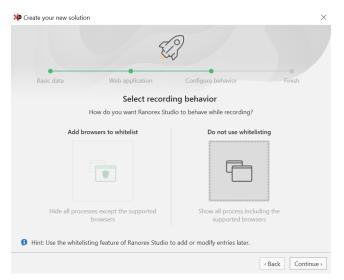
5. We proceed to provide the name of the solution and the location.

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6. We set up the test by providing the URL of the web application and select the browser that we wish to use. In this case, we use the Edge browser.



7. We then proceed to select the behavior of the way in which the recordings would take place. We choose not to use whitelisting in this example.



8. We finalize the solution and click on 'Finish' to complete the setup.

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Read what's nex	t and then click Finish to creat	e your solution and get	started in Ranorex Studio.
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	you'll see the tutorial panel. It steps in becoming familiar wi		0
• If you get stuck, t	ake a look at our User Guide f	for more help.	
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9. On creation of the web solution, a basic test suite with a single test case containing the setup, an empty recording and teardown module is created as shown below:

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We proceed to view the empty recording file as shown below:

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10. We begin recording by clicking on the 'Record' button and start recording activities that we perform on the demo web application that we are testing.

The web application is launched, and the login page opens.

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(Swag Labs, 2022)

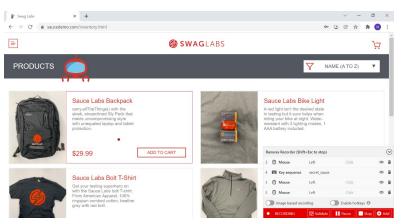
We choose the username 'standard\_user' from the list of accepted usernames and enter the password provided on the demo site.

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(Swag Labs, 2022)

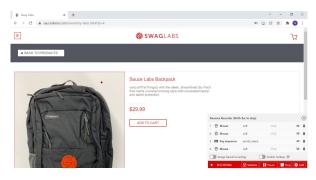
As can be seen from the Ranorex recorder visible in the right-hand bottom corner, each keystroke and action are being recorded.

On logging into the website, the following page with a list of products appears.



(Swag Labs, 2022)

For the test case recording, we select the first option to see it in detail.



(Swag Labs, 2022)

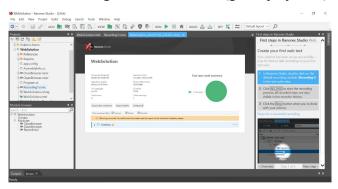
The item we selected appears in detail as clear in the screenshot above.

We stop the recording at this point.

When we stop recording, we can see that the file 'Recording1.rxrec' is now updatd with all the actions that we performed.

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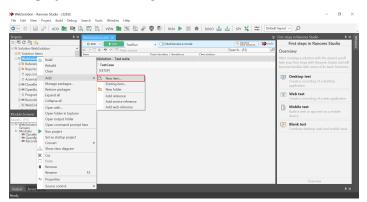
11. We proceed to execute the test suite with the test case that we just recorded clicking on the run button (green play icon) at the top.



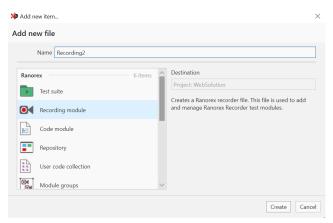
As seen from the test results summary above, the test suite is executed successfully.

12. Now, we proceed to create a new test case that runs the scenario of an incorrect or locked out user login. In this test case, we will try to login using a username that is 'locked out' of the demo system and cannot login in.

To create a new test case, we go to the Projects tab, right click on the WebSolution project name, and go to Add  $\rightarrow$  New Item.

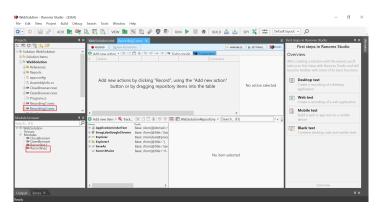


The Add new item dialog appears and we choose 'Recording module.'



We name it as 'Recording2' for the purpose of this example, but ideally meaningful names should be given to each recording based on the test case that is being recorded.

We click on 'Create' to create the new recording. It is added to project as demonstrated by the screenshot below:



13. We proceed to start recording events in the newly created 'Recording2.rxrec' file by clicking on the record button.

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The recording starts and the demo website is launched as follows:

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(Swag Labs, 2022)

Note that the Ranorex recorder appears in the right-hand bottom corner and starts recording every action that we do on the application under test.

We login using the test username that fails on login, which is the 'locked out user' and the password 'secret sauce.'

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When we click on the 'LOGIN' button, we get an error saying that user has been locked out.

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#### (Swag Labs, 2022)

This action concludes our recording and hence we press the 'stop' button on the Ranorex recorder.

As visible from the screenshot below, the actions we performed are recorded in newly created recording file.

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14. We can test the recording independently of other recordings by clicking on the 'Run Recodring' button as shown below:

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15. On running the recording, we get a result summary just like on executing the test suite.

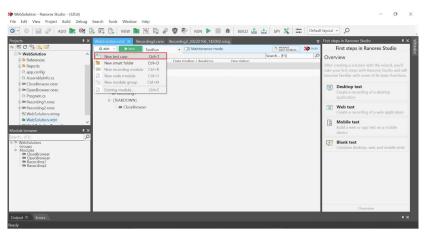
The following report provides us details of the execution of recording2 and we can see that it has executed successfully.

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16. We now proceed to add this newly created recording to a new test case which is added to the test suite.

This is done as follows:

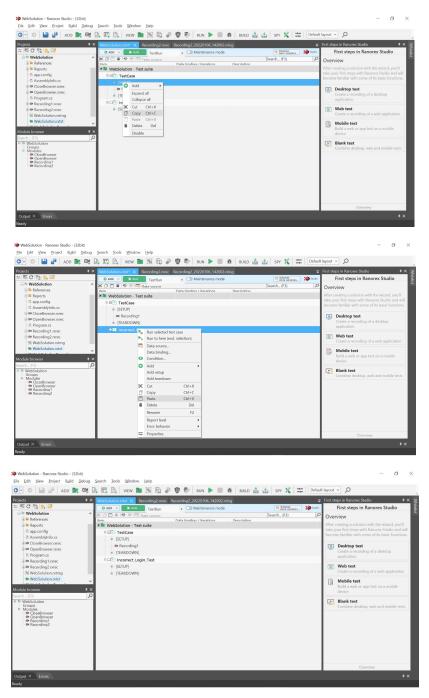
First, we navigate to the test suite file and click on 'Add' and then go to 'New Test Case.'



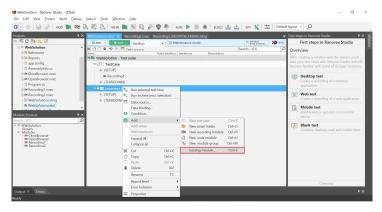
A new test case is added, and we rename it to 'Incorrect\_Login\_Test' as shown:

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We proceed to adding the setup and teardown modules to the newly added test case by copy-pasting them from the previous test case as follows:



As clearly visible from the screenshot above, the new test case 'Incorrect\_ Login\_Test' now has a setup and teardown module. We continue and add 'Recording2' to this test case by right-clicking on the test case name and going to Add  $\rightarrow$  Existing module...



We select the option 'Existing module' as we wish to choose Recording2, which we have already created in the previous steps.

The 'Select Test Module' window appears, and we select Recording2 from the list of modules.

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We click on 'OK' to add the recording to the newly created test case.

As can be seen in the image below, the newly created test case now has Recording2 in it.

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Now that we have completed the second test case, we save the test suite file and execute it by clicking on the play icon located in the toolbar.

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							Overview

As can be seen from the results above, the test suite containing the following two test cases has been executed with success:

- Opening the demo website, logging in and clicking on an item to view its details; and
- Opening the demo website and logging in with a locked-out user.
- 17. As the name of the first test case is not very meaningful and does not accurately describe the test case, we update its name and description and then re-run the test suite.

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The test suite runs successfully as shown in the screenshot above.

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# **Implementing Automated Software Testing**

Software systems are an essential component of our day-to-day lives. Software has morphed into one of our most basic necessities. We depend on software to accomplish routine tasks and activities in our lives. The impact that software has made in this world is enormous. Software applications are engaged on a large scale in both essential and non-essential sectors across the world. The immensity of the involvement and impact of software in the world is enormous. Software applications complex tasks in an easier and cost-effective way which has improved the quality of life of millions of people.

The relevance of software will only increase in the future. Software will continue to increase in complexity as it is going to be used to solve the biggest problems faced by the world. It is a proven fact that as the complexity of software rises, the challenges associated with software testing and software maintenance will subsequently rise too. Complex software solutions created to solve complicated problems are destined to have an element of complexity in the process of testing as well. It is a known fact that there is a direct relation between the quality of a software system and testing. Effective testing is thought of as a measure of efficiency and quality of software. Testing is a vital non-skippable step in the software development lifecycle.

The field of software testing has grown considerably since its origin in the early 1900s. Testing of software helps instill confidence in the quality of the software to its users and stakeholders. It is advisable that software be evaluated and tested thoroughly as it is vulnerable to a range of potential attacks that may be of a malicious nature. Comprehensive testing and evaluation of any software solution is paramount to identifying vulnerabilities in the system and shield it from potential attacks. The lack of quality testing is one of prime reasons for the failure of software systems resulting in significant losses for the stakeholders, clients, and users. One can assume with certainty that software testing is a determining factor in the success of a software solution.

Over the last few decades, the field of software testing has grown exponentially. A branch of software testing namely automation testing has helped reshape the way in which testing is done. Automation testing is the exercise of executing tests automatically in a repetitive manner. This branch of study concentrates of execution of repetitive tests, management of the test data and the utilization of the results to ameliorate and improve the quality of software. In this book, we will investigate the automation testing field within software testing. The advantages of this type of testing will be discussed in brief. Further, different software solutions that perform automation testing will be presented and examined in this book. The implementation of different automated software systems will be presented in detail. Detailed practical implementations of automated software applications covering different types of testing scenarios have been provided in this book. This book assumes that the audience is familiar with the basic concepts of software testing.



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