

PROJECT REPORT
ON
“CRM Automation Testing”
SUBMITTED TO
ROURKELA INSTITUTE OF MANAGEMENT STUDIES
(As a partial fulfillment of the requirement for the award of degree)
FOR
“MASTER IN COMPUTER APPLICATIONS”
(2022-2024)
SUBMITTED BY
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She is found fit and approved for the award of "**Master in Computer Applications**" Degree.

To the best my knowledge this work has not been submitted for the award of any other degree.

I wish all success in his life.

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DECLARATION

I, **HOMA NAZNI**, hereby declare that the project report entitled “**CRM Automation Testing**” is of my work. The above work I submitted to “**Biju Patnaik University of Technology Rourkela**” for the award of “**Master in Computer Applications**” Degree.

To the best of my knowledge, this work has not been submitted or published anywhere for the award of any degree.

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ABSTRACT

The CRM automation testing is the process of validation that your customer relationship management system fully meets the requirements and doesn't disrupt your business processes.

This proposes a hybrid model for managing customer relationships and delivering a good quality CRM product which includes functional, integration, performance, security, usability testing, and regression testing over the course of CRM evolution.

Automation testing is a gift in the testing world that automates the testing procedure and decreases human efforts. It's a new boom to the testing world if developers have to meet the fast-paced development deadlines in the software market.

Proper functioning of automation testing requires a professional team that chooses the best tool and exercises it. Automation testing with a variety of tools ensures the best quality product.

CONTRIBUTION OF INDIVIDUAL TEAM MEMBERS

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BARSHANA	2205260003	Java framework ,writing the test scripts , thesis
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GANTT CHART

ID	TASK NAME	NO. OF DAYS	BAR REPRESENTATION
1	Project Management		
1.1	Project Initiation	5	
1.2	Project Planning	9	
2	Analysis	15	
3	Design	25	
4	Implementation	35	
5	Testing	4	
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INTRODUCTION

1.1 Preface

Automation testing is increasing in software industries. When it is properly implemented, it will have a lot of benefits. It is also kept in mind what tasks are worth automating. The tasks performed a single time should not be automated because the effort needed to automate such tasks usually does not pay off.

Testing is a key area, and applying automation in it will decrease the timelines for SDLC. Using the automation testing tools helps to remove the barriers of manual testing by reducing the development cost and bugs in the application and enhancing the product's quality.

Software is the medium or platform for performing a task in the system. Software is developed by following the SDLC process, i.e. software development life cycle in which software has to pass through many phases, and testing is one of its major phase that shows the result of all the efforts made in developing process of software upto now.

Software testing is not a one-time process, as the developer test the software until it is declared error-free. It checks whether the software is showing the expected output per input. Software testing is done by the testers who test cases repeatedly to gain output according to the requirement in two ways: **a) manually and b) automatically.**

Every project or software goes through a testing procedure, and the type of testing method depends on various factors like the budget, expertise, suitability, requirement and timeline of the project. When the tester writes the testing script manually and tests the software until it functions properly known as manual testing & when this manual testing process becomes automatic, it can be defined as **automatic testing**.

Manually when testers write the test cases and execute them repeatedly, known as manual testing, which is time-consuming and the test results are not sure. So to recover these drawbacks, automation testing came into

existence. With automation testing, developers or testers keep everything in their hands, boosting the product's productivity.

Manual testing is best suitable for usability testing, Ad-hoc testing and usability testing. In contrast, automation testing is best suited for areas like load testing, regression testing, repeated execution and performance testing. Automation helps companies take new features to market instantly in the testing world and ensure a bug-free user experience.

"Automation testing refers to the automatic testing of the software in which developer or tester write the test script once with the help of testing tools and framework and run it on the software. The test script automatically test the software without human intervention and shows the result (either error, bugs are present or software is free from them)."

Automation testing needs manual effort when creating initial scripts, and further process is performed automatically to compare the actual testing result with expected results. This can be performed at these levels a) unit-level automation, b) API testing c) user interface.

1.2 Goal and Objective(s) of Automation Testing:

The objectives are specific actions that help to achieve bigger automation testing goals.

1. ENHANCING SOFTWARE QUALITY AFTER EACH ITERATION.

QA specialists apply automation to check software specifications after each iteration. Along with bug detection, they focus on bug prevention and localization. For this, it is necessary to cover all possible scenarios of

software behavior. Well-written automation tests can work as bug-repellents and prevent mistakes that are expensive to fix.

2. IMPROVING STABILITY AND RELIABILITY.

Modeling stress situations and seemingly impossible scenarios (peak traffic, a huge amount of users requesting the same feature, etc.) helps to discover how an app behaves in unusual circumstances. It, in turn, allows preventing crashes and lags if such situations happen. To avoid introducing new risks, any test-specific code is plugged in by the test and only in a test environment.

3. HELPING TO UNDERSTAND THE SYSTEM UNDER TEST.

A system under test, or simply SUT, refers to the thing that is currently tested. Automated tests help to explore numerous “What if...” scenarios. Without them, the team would need to pore through code. Instead, a QA engineer turns on a debugger, runs a test, and sees how code works.

4. CREATING TESTS THAT ARE EASY TO RUN.

The tests should be fully automated so it is possible to run them without any effort. They should also be self-checking (detect and report errors without manual inspection) and repeatable (suitable for multiple uses). Ideally, QA engineers should be able to run each test independently.

5. CREATING TESTS THAT ARE EASY TO MAINTAIN.

When QA professionals write automated tests, they still need to focus on testing, not on the code for automation. Thus, tests should be easy to write, read, understand, and modify in the future. They should require minimal maintenance when the system evolves.

6. EXPANDING TEST COVERAGE.

QA engineers aim to cover the widest test area possible. To check all user scenarios, they need to execute hundreds of test cases, validate boundary

and edge cases, ensure the compatibility with different devices and browsers. Automation can cover both functional and UI testing.

7. BOOSTING QA ENGINEERS' EFFECTIVENESS AND MOTIVATION.

We aren't trying to say that our QA engineers unmotivated or fail to work effectively ☺ Still, manual testing is an error-prone job. Repeating the same test cases frequently with only slight changes can get frustrating. Needless to remind that there are many time-consuming low-level tasks. Automation leaves more time for QA engineers to focus on challenging and uncommon issues, like exploratory testing and risk analysis.

1.3 The Motivation Problem:

We have a motivation problem in [Customer Relationship Management](#) (CRM). CRM vendors promise high returns, but up to 70% of CRM solutions might [fail to improve the bottom line](#). Many believe the [top cause of CRM failure is too few incentives](#) to motivate customer-oriented behaviors among employees. I suggest that is an incorrect assumption.

The real issue behind CRM failure is a complete misunderstanding of human motivation. Peak motivation (for CRM use and all other behaviors) is about satisfying our inner, most human desires.

Solving the motivation problem requires a daring shift in perspective, away from rewards and punishments, and toward an integrative, people-oriented approach to CRM. Putting this perspective into action can supercharge our people with *self-determination* and unleash CRM's great potential.

The Double-Click: Current State and Misconceptions About CRM

CRM's spectacular failure rates are old news. In 2003, [Fjermestad and Romano](#) analyzed 13 case studies to conclude that up to half of CRM implementations might fail, partly due to a lack of motivation to use the CRM.

The impact is staggering. In the early 2000's [Hershey](#) lost \$100 million in sales over two years due to its CRM issues. [Cigna's \\$1 billion CRM investment failed in minutes](#) on launch, costing them 6% of all its customers ([Bohling et al.](#), 2006). Far from being isolated issues, researchers suggest 70% of CRM solutions might have failed to improve the bottom line, pointing to a mix of causes, including people, technology, process and strategy ([Awasthi & Sangle](#), 2012).

Current State of CRM

Now, fast-forward to 2015. CRM hegemons ([Salesforce](#), [SAP](#), [Adobe](#), [Microsoft](#) and [Oracle](#)) battle it out for a growing market worth \$26.3B ([Gartner, 2016](#)). Gartner hailed CRM leaders that year for having a fully-featured suite of modular sales, e-commerce, marketing and customer service products, promising innovation, automation and holistic vision. The market was set for double digit growth. The CRM industry was on the cutting edge in process, technology and strategy. Concern over people was still secondary, but research suggested CRM users should be a top priority.

Forrester analysts [Leggett and Schooley](#) (2016) reported a 2015 survey which showed the top perceived causes of problems for CRM deployments were related to people. People problems accounted for 38% of the vote, ahead of strategy, technology and process concerns.

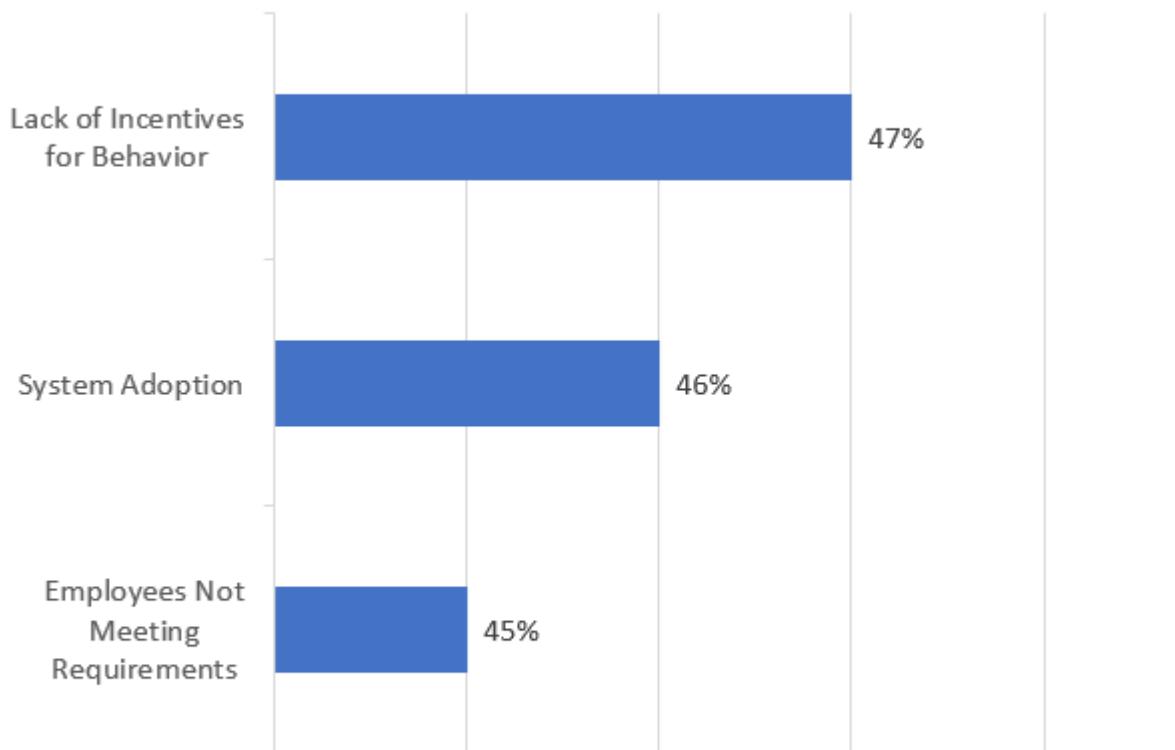
In fact, the top 3 reported issues with CRM initiatives were all people problems:

1. Lack of employee rewards for customer-oriented behaviors (47%),
2. System adoption issues (46%),

3. Employees not meeting business and technology requirements (45%).

Meanwhile, CSO Insights found in 2018 that [less than half of CRM systems are adopted](#) by over 90% of the salespeople within organizations. All of this suggests CRM leaders should first care about their people who use and adopt the CRM system.

Most Common Issues on CRM Initiatives



Base: 215-222 sales, marketing, customer service, or IT professionals who have been involved in a CRM technology project

Source: Leggett & Schooley, 2016

Problems with Motivation: Old Habits Die Hard

Take a step back. Imagine yourself in your people's shoes. Honestly, who gets up in the morning just wishing they can enter data in their CRM again? Maybe we don't pay them enough. Wait — hold that thought, please.

Traditionally, employers relied on incentives and heavy-handed process enforcement to do the job ([Bassett-Jones & Lloyd](#), 2005). Rewards and punishments were seen as apex motivation for the human machine out on the production line. This approach hasn't stood the test of time (or science), but old habits die hard.

Employers still push and prod their CRM users all the time, so much that it's [baked into our CRM](#) as quotas, employee monitoring and analytics, all dedicated to pampering, reminding and policing. As a CRM consultant, I've seen it done. It doesn't work as well as we would expect.

Disciplinarian sternness backfires with negative emotion. Meanwhile, incentives only motivate insofar as [adequate reward is expected](#), although giving extra is not always motivating ([Herzberg, Mausner & Snyderman](#), 1959; [Dewhurst, Guthridge & Mohr](#), 2009). It's about people problems, not boot camp discipline or reward programs. The stick-and-carrot mentality might just be another reason people don't use their CRM right.

Let's do a quick recap of the common misconceptions in motivation for CRM:

- **Misconception #1:** Technology, strategy, and process solve the motivation problem in CRM.
Reality: People are the root cause of the motivation problem in CRM.
- **Misconception #2:** The customers are your top concern in customer relationship management.
Reality: Your people are the top concern in customer relationship management. They manage the relationship, after all.
- **Misconception #3:** You can motivate top CRM performance with rewards and disincentives.
Reality: Rewards and punishments don't create ultimate motivation by themselves.

So what's the right approach to motivation? There's one framework that stands above the rest: Self-Determination Theory.

A Case for Self-Determination

There's an alternate hypothesis about solving our motivation problem. Here's the guiding premise: **motivation can come from within; people grow and manage themselves best when they are motivated from within**. Given that, our goal is straightforward — appeal to the right *kind* of motivation, so that our people wake up in the morning *wishing* they can spend the rest of the day playing in the CRM to their full ability.

If this sounds absolutely crazy, then maybe that's the reason we're not doing the right thing. We *think* it's crazy, without giving it a second thought. Let's think differently.

What Is Self-Determination?

Self-determination is the personal, self-directed decision to act in a way which is fully aligned with one's perceived personal beliefs, goals and emotions ([Deci & Ryan, 1985; 2000](#)). You might have heard about something called [*intrinsic motivation*](#): people acting out of their own will to pursue challenge and growth, without having to rely on any external influences to make them act. The two ideas are similar and they both converge on a simple concept: **motivation can come from within**.

We can reward and discipline employees all we want, but at the end of the day, they must have the motivation to do the work themselves. Consequently, it would be ideal to shift their approach to the job (and CRM) from a mindset of "I have to work" to a mindset of "I'd like to work." We have a framework for that.

Self-Determination Theory (SDT)

Self-Determination Theory (SDT), comprehensively formalized by Ryan and Deci in 1985, is the framework behind self-determination. SDT claims that motivation coming from within is the ultimate kind of motivation; it pushes us to grow and achieve extraordinary feats of ability. SDT contrasts that kind of *intrinsic motivation* with *extrinsic motivation*, which is motivation derived from external causes to act a certain way, such as promise of reward (like a paycheck) or the threat of punishment.

Autonomy, Competence & Relatedness

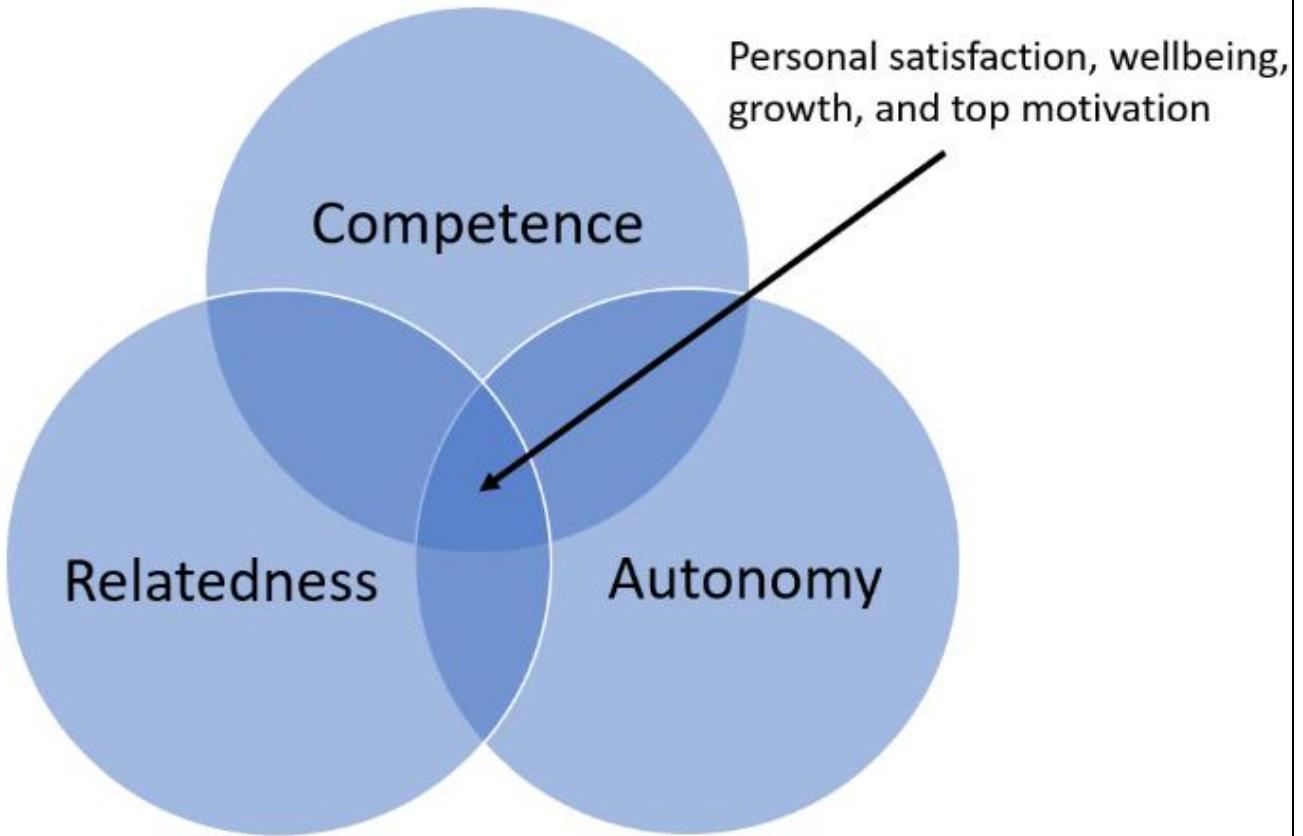
There are three components of intrinsic motivation. These components exist in concert with one another, and we all need some degree of all three to be intrinsically motivated. They are:

- **Autonomy** — We need actions to feel authentic and voluntary. To the degree that people believe they are compelled to act by some external force (like threat or reward), they are not acting with full autonomy. To feel autonomy, people need to think they are the causes of their actions. We want to do what feels true to ourselves.
- **Competence** — We want to get a sense of increasing mastery over our craft and environment. People want to feel effective. They take joy in growing, learning, and advancing themselves. They need an optimal challenge.
- **Relatedness** — We all have a deep desire to be with others — to belong and matter to people who might care for us. We want to be accepted. More than that, we want to be secure in knowing that if we are our true selves, as far as we can act or change, we will still be accepted. We are intrinsically motivated to activity which gives us a chance to connect with others in a meaningful way.

So What's the Big Deal?

Beautifully, the theory captures an idea which is easily forgotten in our transactional relationship to work. SDT assumes that all people have a natural tendency to grow to their full, integrated potential. SDT restated that people are not machines; they are living, breathing, thinking beings, each with their own needs, relationships, dreams, habits and histories. They are always works in progress.

The Three Components of Intrinsic Motivation



Three basic human needs which are essential to personal satisfaction, wellbeing, growth, and peak motivation: Autonomy, Relatedness, and Competence.

With that, Ryan and Deci unexpectedly started a firestorm in management and psychology. Their theory would go on to endorse thousands of academic papers, derive at least six [sub-theories](#), create communities and a [dedicated SDT research center](#), be validated across a range of industries, and revolutionize our very understanding of what it means to be human ([Ryan & Deci](#), 2017). Covering it all is beyond the scope of this article, but rest assured that self-determination is *not* an idealist fiction; it's applied, scientific reality.

And the reality is: **people grow and manage themselves best when they are motivated from within.** Controlling people with threats and rewards does not get us the best kind of people we can have. We rely on our inner qualities.

Now, let's turn our attention back to CRM.

The Alternate Hypothesis: Self-Determination Is Key to CRM Motivation

Self-Determination theory presents us with an alternate hypothesis about CRM difficulties. The issue with CRM initiatives is not the lack of incentive for customer-oriented behavior. **The top issue with CRM is limited intrinsic motivation** (that is, low autonomy, relatedness, and competence).

Rewards, like pay and promotions, are extrinsic motivators which cannot reliably promote peak motivation among CRM users. The customer-orientation only takes away from a focus on our people. Our people should come first, before customers, so that customers get the greatest value from CRM.

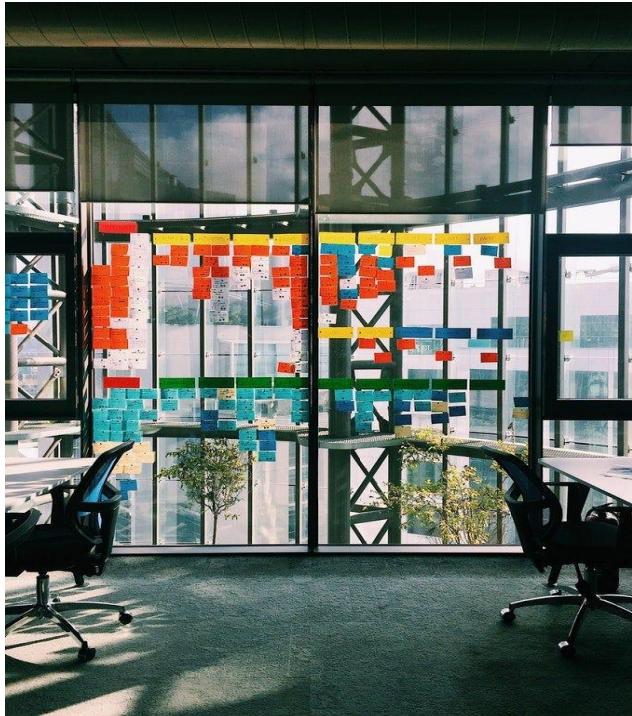
One more time: who cares for our customers?

“Clients do not come first. Employees come first. If you take care of your employees, they will take care of the clients.”

— Richard Branson, Founder of Virgin Group

Testing the Hypothesis: Addressing Components of CRM Motivation

We can test that hypothesis right now. We just need a transformative shift in perspective on what makes our CRM users tick. We need to give them self-



determination throughout their user journey. In other words, we must ensure our people must use the CRM with autonomy, relatedness, and competence.

Now, put your business analyst hats on, folks, and think carefully. There's not a one size fits all approach to self-determination. Each organization has a different culture, structure, goals and circumstances, so you must decide what's best for your team.

With that said, here are, in broad strokes, suggestions on how we can run that experiment, each addressing a different component of intrinsic motivation.

Inspire Agility (Autonomy)

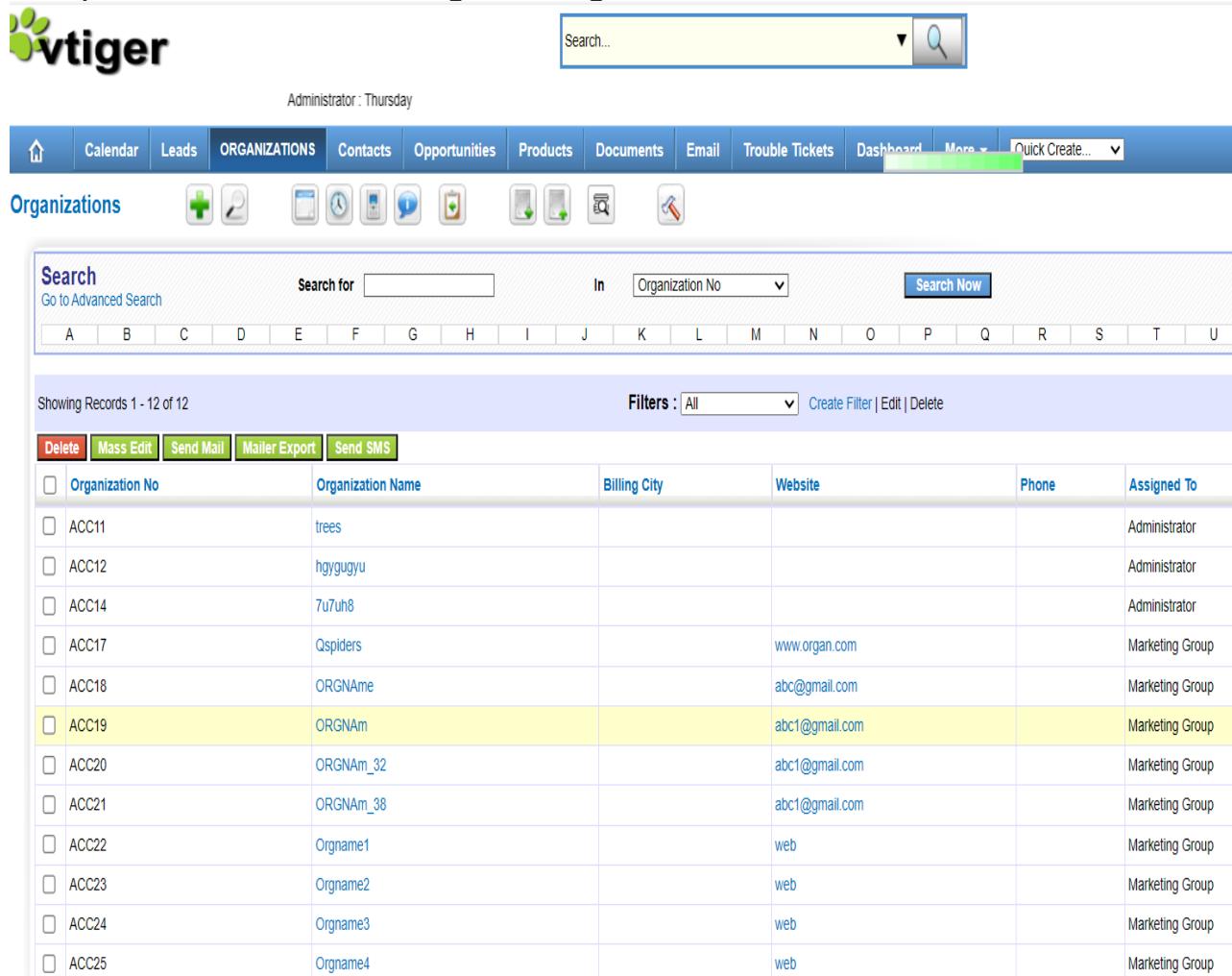
In 2001, Beck et al. changed the world by signing the [Agile Manifesto](#). The core idea was simple but revolutionary: teams must be self-organizing and individual-focused in [mindset and methodology](#). Corporate projects were never the same. In revolt against bureaucratic methods of management, employees took notice and the concept spread like wildfire ([Abbas, Gravell & Wills](#), 2008). Agility is now a core feature across the corporate landscape. Now, that's autonomy at work.

Agile methodologies touch on all aspects of self-determination. They rely on autonomy, as well as trusting teamwork (relatedness) and showing continuous results (competence). However, it is that voluntary self-organization and resistance to railroaded process

management which might truly bring individuals to experience a sense of autonomy on projects. Let's bring that to CRM.

A Snapshot of Vtiger CRM Application

The picture below is showing the “Organization Module”



The screenshot shows the Vtiger CRM application interface for the Organization module. At the top, there is a navigation bar with links for Home, Calendar, Leads, ORGANIZATIONS (which is highlighted in blue), Contacts, Opportunities, Products, Documents, Email, Trouble Tickets, Dashboard, More, and Quick Create. Below the navigation bar is a search bar with a magnifying glass icon. The main title is "Organizations". Underneath the title are several icons for creating new records and managing existing ones. A search section allows users to search by name or organization number. Below this is a grid of organization records, each with a checkbox, organization number, name, billing city, website, phone number, and assigned to person. The grid includes records such as ACC11, ACC12, ACC14, ACC17, ACC18, ACC19, ACC20, ACC21, ACC22, ACC23, ACC24, and ACC25. The "ACC19" record is highlighted with a yellow background.

	Organization No	Organization Name	Billing City	Website	Phone	Assigned To
<input type="checkbox"/>	ACC11	trees				Administrator
<input type="checkbox"/>	ACC12	hgugugyu				Administrator
<input type="checkbox"/>	ACC14	7u7uh8				Administrator
<input type="checkbox"/>	ACC17	Qspiders		www.organ.com		Marketing Group
<input type="checkbox"/>	ACC18	ORGName		abc@gmail.com		Marketing Group
<input type="checkbox"/>	ACC19	ORGName		abc1@gmail.com		Marketing Group
<input type="checkbox"/>	ACC20	ORGName_32		abc1@gmail.com		Marketing Group
<input type="checkbox"/>	ACC21	ORGName_38		abc1@gmail.com		Marketing Group
<input type="checkbox"/>	ACC22	Orgname1		web		Marketing Group
<input type="checkbox"/>	ACC23	Orgname2		web		Marketing Group
<input type="checkbox"/>	ACC24	Orgname3		web		Marketing Group
<input type="checkbox"/>	ACC25	Orgname4		web		Marketing Group

1.4 Project Overview/ Specification:

Businesses run on relationships with their current and past customers. Their experience with the business influences their own and their peer's decisions for any transaction. Gone are the days when personal meetings were conducted with the customers to strengthen the ties. Today, we need customer relationship management software to do the same work but much faster, efficiently, and on a very large scale. Such software when integrated into the system for the first time cannot be trusted blindly for practical applications. CRMs are a lot more complex than just shaking hands and therefore require thorough testing after the integration. It ensures that the end goals of adopting a CRM are met and the organization is able to streamline their business operations from the customer's as well as their end.

What is CRM testing?

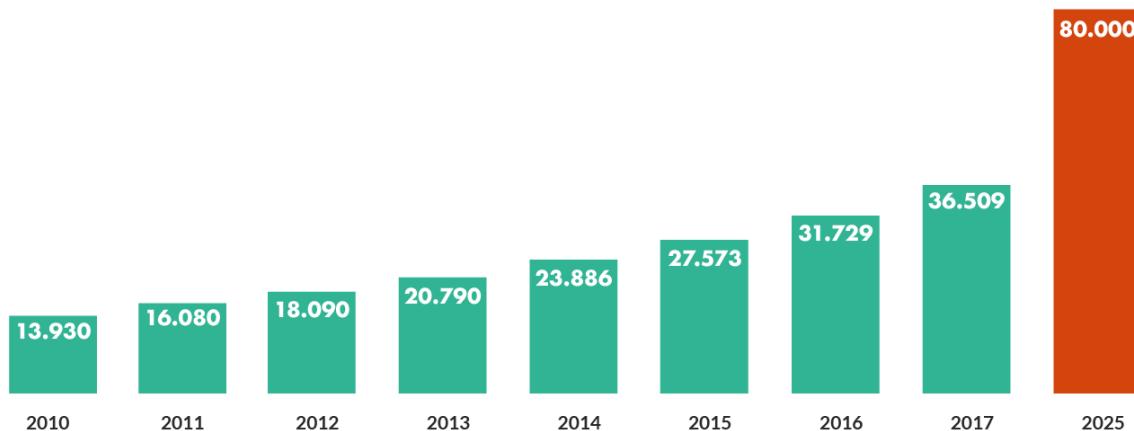
CRM testing is the process of verifying the integration of CRM software into the application and exploring any glitches in the complete connected structure. A subprocess of [software testing](#), it helps understand the compatibility of CRM with the application and whether or not it aligns with the organization's performance expectations or not.

CRM testing involves benchmark analysis in various domains such as functional, performance, usability, and security. Since a CRM tool alone would be responsible for a lot of communication and bookkeeping, the testing process ensures that this system works as intended as a complete system meeting the business requirements and smoothing out the manual work.

Why is CRM testing important?

CRMs have proven to be one of the most essential parts of not only relationship management but also managing data and making use of it. This has made the CRM industry [grow at a staggering rate of 13.5%](#) with an [expected revenue of \\$80 billion](#) by 2025. Today, [more than 91% of businesses](#) that have more than 11 employees use CRMs. These data points show how integral CRMs have become and their position in the organization's priority structure.

CRM SOFTWARE REVENUE FORECAST (MILLIONS OF U.S. DOLLARS)



CRM testing, therefore, becomes an important job because the above benefits (as displayed by data) can only be reaped if the system is reliable and working correctly. Each step used in a CRM is based on the data reflecting each customer. If the data is not recorded or analyzed correctly, the chances of miscommunication increase which may weaken the relationship with the customer. Moreover, CRMs contain logic within themselves. For instance, if X happens then Y should happen. Such logic

needs to be tested thoroughly as the occurrence of Y is what will drive the business relations and work as the core of the system.

Benefits of CRM testing

For people just starting their journey in CRM testing, it may seem a little vague to understand the long-term benefits of adopting such a system. While extremely small businesses (less than 10 employees) can still manage manually, today or tomorrow, the team needs to match up their infrastructure to the scaling factor by introducing CRM in it. This brings a long list of benefits with the most highlighted ones as follows:

Compatibility of the system

The primary thing an organization is looking forward to while testing the CRM software is its compatibility with the current application. Since the CRM and the application both have large, complex modules, there can be a lot of holes when they both collaborate. If these two do not mix well together, it would not matter how rich the CRM tool is and what benefits it offers. As a team, this is the primary target to achieve through CRM testing.

Efficient data analysis

Data analysis works differently in different CRM tools. The core part, however, looks at analyzing the gathered data and creating visuals out of it to connect another pipeline from it. For instance, data analysis can help understand the most visited page or product and provide offers on it to drive sales ahead.

Depending on the tool developers use, CRM can also provide recommendations and sales analytics to collaborate with other team members including marketing and customer support. Such efficient data analysis is not possible manually, especially when the organization is dealing with millions or more user hits monthly or quarterly.

Enhance application performance

All the data and recommendations provided by the CRM will directly boost growth and customer engagement. CRM testing helps explore the strong and weak areas of the application while also suggesting the next possible step in business growth. The data provided by CRM helps strategize and analyze the areas within the teams and their work. This helps ensure that the application is not only strong from the outside but also from the inside and that can be confirmed only by testing the infrastructure.

Cost reduction

All the work done by a CRM tool used to be done manually by a dedicated team majorly on Excel sheets. Moreover, depending on the requirements, the team may use multiple other applications for which trained resources are required. With CRM in place, these resources can be replaced with those that know how to run just a single tool, and that too does not require much manual intervention. With this reduction in application numbers and team size, organizations [save up to 29%](#) of the original costs easily.

Error reduction

Hectic manual work always opens up the scope for errors that may or may not be exposed before production. This certainly proves harmful for the organization as the data gathering will be erroneous leading to wrong analysis and misleading customer-targeted campaigns from multiple teams. In addition, organizations bear the costs of rectification of such errors while the data lost would never be recovered. CRM testing helps close these open cracks in the system while ensuring that the system is automated and works without any errors.

Helps facilitate customer relations

CRM testing ensures that the application or tool does what it is aimed for. If everything is set in the right place, the team gets personalized data with respect to clients that help the organization deal with them individually on a much deeper level. Such actions deepen customer relations, ultimately boost growth, and help retain customers over a long time.

These points emphasize a great deal why CRM testing is essential and should be conducted before integrating the software into the production version.

CRM testing scope

The testing scope of CRM defines what needs to be tested in the software and how it needs to be tested. It is an important document determining the essential parts of the application that are documented for the future as well. It also helps keep everything organized in a single place to understand the test's effectiveness and ultimately measure the quality of the application. However, testing scope will differ from CRM to CRM and how many elements the organization has integrated into the application. This can be measured by certain factors that determine the CRM scope.

- Type of CRM: Testing scope varies based on the type of CRM used in the application. If the CRM has fewer modules or is just analytical, the scope will be direct and shorter as there are fewer things to test.

- Complexity of integration: How integral an organization has kept the CRM software also affects the testing scope. A high-complexity integration will take a lot more test cases and data in the scope than a simple direct one.
- Team size: The size of the team includes the collaboration of multiple teams into a single CRM. One CRM can satiate requirements from a lot of domains hence creating overlapping processes. If the total number of team members is large, the test scope needs to be expanded with inclusions from all of them. Hence, the test cases will be of multiple varieties from each domain that will take time in construction as well as execution.
- User base size: The user base size is also a factor that affects the CRM testing scope. This is because as the user base increases, so does the campaign size and the work a CRM tool has to do. The test scope will also aim to find the bottlenecks and threshold values of the system. A large user base will test scalability and all these factors will go down inside the documentation for current and future uses.
- Test requirements: Next comes the test requirements which represent the type of testing as planned by the team. If the testing domains are fewer (such as only functional), the test scope will reflect the same.
- Security testing: Finally, if the application concerns security of any type at any part of the CRM, it affects the test scope in the same way. The test scope will define the security loopholes, where are the vulnerabilities, and how is the team tackling them from various angles.

These factors are generalized and can be fit into any CRM software. However, the actual list of factors that affect CRM testing scope may have a few more added points depending on the type of application we are working on and the project's requirements (at present and in the future).

[CRM Testing Setup Plan](#)

To initiate and successfully conclude CRM testing, the team needs to focus on each step carefully. This includes carefully dissecting them into sub-steps and focusing on each of those smaller areas for better results. The overall process starts with designing, then preparing for testing using the design,

and at last launching all the steps to set up the testing phases. The details about them are explored in their respective sections.

CRM testing process design

The CRM testing process needs a design crafted by experts to be followed till the launch. This starts by selecting the team members. The team needs to be experienced and know how CRM testing is done and modify their testing methods according to the current project and its requirements.

Once the team members are selected, the next process is planning different stages of the CRM testing. This is the crucial part and in general, takes a big chunk of time. Here, a lot of dimensions are explored according to expertise. For instance, end-to-end risk analysis explores the risk of the system. Another dimension is finalizing the types of tests to run or testing types to adopt and on which parts of the application. If the requirement is for [automated web app testing](#), then automation applications according to the team's expertise are required. Similarly, for AI-based testing, [AI-driven testing tools](#) are required.

CRM testing preparation

Once all the details are designed and documented, the team needs to be prepared with all the arrangements so that they are ready for execution. All the requirements are set up as close to production as possible so that the team can divide their work and start testing. This requires documentation, software configurations, server configurations (if any), CRM integration and configuration, etc.

CRM testing launch

Till this step, the design and preparations are ready and everything is set up. The only things that remain in this step are the test data and execution of tests. To achieve this, we create a test set directory based on the test scope and finally execute tests to create a report and bugs from it.

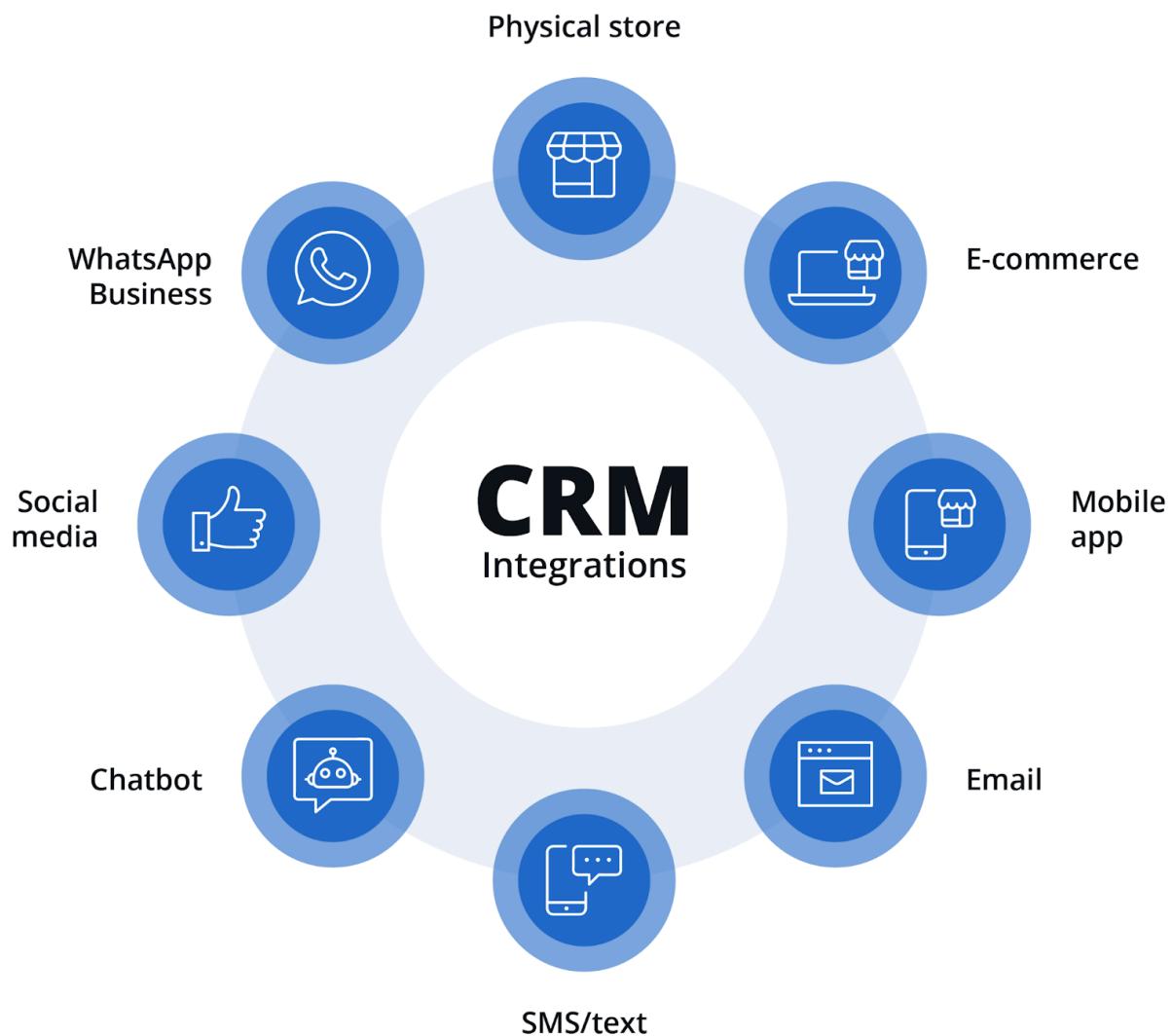
Following this plan produces satisfactory results and will help create a robust testing infrastructure for a long time.

Essential steps for CRM testing (checklist)

The CRM testing will include a lot of steps to ensure that the standalone tool and the integrated system work as expected from all angles. While a few of them may be omitted or added based on the type of project the team is working on, the essential ones will (and must) always be adopted as they have proven their importance with time.

Testing the integration of software

Once integrated into the main application, the CRM tool works as a center for most of the things. For instance, this image shows various components attached to CRM (which may differ with each organization):



1.5 Hardware Specifications:

- 8GB RAM
- 512GB Hard disk

- Processor should be greater than i3

1.6 Software Specifications:

- Windows: 8,10,11
- Language:Core JAVA
- Database: MS Excel

1.7 Organization of the project:

The entire purpose of this project is to test a CRM product or tool in a automated way using a Java Framework having all the beneficiaries fore.g :all the oops concepts .Java testing frameworks serve as essential tools for developers, testers, and QA engineers engaged in test automation. These frameworks **simplify the creation and execution of tests by establishing a structured set of rules, guidelines, and requirements.**

Testing frameworks are an essential part of any successful automated testing process. They can reduce maintenance costs and testing efforts and will provide a higher return on investment (ROI) for QA teams looking to optimize their agile processes.

The goal of this article is to walk through the most common types of frameworks used today and the benefits and disadvantages of each. For QA professionals new to automated testing, or those who need a quick refresher, this article will provide a high-level overview of each type of framework and how they can contribute to the success of any automated testing process.

What is a Test Framework?

Before diving into the most common types of frameworks and their benefits, let's clarify what a test automation framework actually is. A testing framework is a set of guidelines or rules used for creating and designing test cases. A framework is comprised of a combination of practices and tools that are designed to help QA professionals test more efficiently.

These guidelines could include coding standards, test-data handling methods, object repositories, processes for storing test results, or information on how to access external resources.

While these are not mandatory rules and testers can still script or record tests without following them, using an organized framework typically provides additional benefits that would otherwise be missed out on.

Benefits of a Test Automation Framework

Utilizing a framework for automated testing will increase a team's test speed and efficiency, improve test accuracy, and will reduce test maintenance costs as well as lower risks. They are essential to an efficient automated testing process for a few key reasons:

- Improved test efficiency
- Lower maintenance costs
- Minimal manual intervention
- Maximum test coverage
- Reusability of code

Types of Automated Testing Frameworks

There are six common types of test automation frameworks, each with their own architecture and differing benefits and disadvantages. When building out a test plan, it's important to [choose the framework that is right for you](#).

- Linear Automation Framework
- Modular Based Testing Framework
- Library Architecture Testing Framework
- Data-Driven Framework
- Keyword-Driven Framework
- Hybrid Testing Framework

Data-Driven Framework

Using a data-driven framework separates the test data from script logic, meaning testers can store data externally. Very frequently, testers find themselves in a situation where they need to test the same feature or function of an application multiple times with different sets of data. In these instances, it's critical that the test data not be hard-coded in the script itself, which is what happens with a Linear or Modular-based testing framework.

Setting up a data-driven test framework will allow the tester to store and pass the input/ output parameters to test scripts from an external data source, such as Excel Spreadsheets, Text Files, CSV files, SQL Tables, or ODBC repositories.

The test scripts are connected to the external data source and told to read and populate the necessary data when needed.

Advantages of a Data-Driven Framework:

- Tests can be executed with multiple data sets.
- Multiple scenarios can be tested quickly by varying the data, thereby reducing the number of scripts needed.
- Hard-coding data can be avoided so any changes to the test scripts do not affect the data being used and vice versa.
- You'll save time by executing more tests faster.

Disadvantages

- You'll need a highly-experienced tester who is proficient in various programming languages to properly utilize this framework design. They will need to identify and format the external data sources and to write code (create functions) that connect the tests to those external data sources seamlessly.
- Setting up a data-driven framework takes a significant amount of time.

One recommended approach for implementing a hybrid framework for automated testing, is to find a tool that can quickly and easily adapt to your processes. [When choosing an automated testing tool](#), you should look for one that is flexible and can support a wide range of applications and languages. This will enable your team, regardless of background and skill set, to contribute to your testing efforts. [TestComplete, our automated testing tool](#) that allows QA teams to create and run UI and functional tests across mobile, desktop and web applications, provides a comprehensive environment for building and maintaining automated testing projects.

The Main Organization of the project

The front end of the entire project is designed using HTML. Then we designed the backend part using Core JAVA and Selenium Webdriver which is connected to the front-end part and the database we have used here is MS Excel to store the data used in testing process. We went through the overall application setup and tested it thoroughly to make the application a smooth and as user-friendly as possible so that each and every user can access it well. After completion of the entire project, we set up the report by classifying the entire report into several headings and sub points and then we described the entire project.

When so many things are connected to one centralized element, the integration becomes complex. Consider an example where a user recharges their connection through the ChatBot feature on the web application. It has to send an SMS, an email, maybe a WhatsApp message, and many other things no matter transaction proceeds or fails. Integration, therefore, does not only concern how a particular element works in isolation but how all the components blend. Since CRM connects to a large number of elements, this process becomes harder to test and demands a lot more from a tester than say, [API testing](#) which is much simpler in execution.

Testing the performance

One of the primary issues with having a system with one element connected and operating so many other elements is the cost of performance. When so

many tasks need to be executed, it takes a load on the overall performance and the reasons for which the end-user does not care about. A slower application will remain to be received negatively by the public no matter what the cause is. Hence, the testing team needs to weigh down on performance and test it from every worst scenario to cut down on troubles in the future.

Testing the data accuracy and consistency

People behind operating CRM are going to play with the data all the time. The collection, analysis, and representation of data stand as a core pillar for developing as well as adopting customer resource management software. Naturally, this has to be perfect in its working so that whatever patterns and data other team members see, are always reliable so that further strategies can be derived from it that ultimately draws the revenue. Therefore, testing teams should keep their data-related tests as exhaustive as possible to keep all the loopholes closed as there will be no way to verify the accuracy once the tests are cleared and CRM is launched in production.

Testing the usability

The usability of the application determines how easy it is to use the CRM software. The people using CRM software will belong to both technical and non-technical departments. The usability should be such that even if a beginner from any team operates the application, they should be able to get everything where they expected without needing external help. Also, usability testing should ensure that what a CRM is trying to display is clear to the user. For instance, the panel displaying the heading “Average Order Value” should display the average order value per customer only. If it displays something else, the software may not be labeled as usable. It is always recommended to test the usability of the application with actual users who are unaware of the software and how it works. This method always provides good results.

Testing all the features and functionalities

The features and functionalities of CRM are tested under functionality testing. This type of testing ensures that the features CRM claims to exist

work as expected in all the scenarios including operating systems, browsers, specifications, etc. This can be divided into two large groups. The first group tests whether the feature works or not in general. For instance, if the feature is about sending an email on subscribing newsletter, the “Subscribe” button should work correctly and the user should receive an email. Moreover, the newsletter subscriber list should have added an entry after the mail is sent. The second group is not concerned about the functionality working but whether it is working in different environments or not. For this group, testers perform cross-browser testing that ensures it's working on real devices and browsers. This is important to conduct because the end user might be using any browser or any system and the organization cannot risk providing buggy CRM software as it handles essential elements such as data and marketing-related tasks.

Testing new changes with regression

Regression testing helps analyze the effect of new changes on old code to ensure that every other feature that has already been published is still working fine. It is a measure of the overall application's performance and how stable the application is just before production.

Testing all the possibilities by exploration

Exploratory testing is exploring all the possibilities without any set criteria to understand how the software will behave when a user operates randomly. This is a great way to uncover loopholes that could have been missed with strategic testing and automation. It improves the CRM quality and how it behaves with the user as all the patterns become predictable.

Testing the security of the application

Where there is data and direct customer connection, there has to be a security testing phase that checks how secure the application is. Security testing helps define the system's reliability before any user operates on it. Any security vulnerability is a threat to personal as well as company data and can incur huge losses in case of a breach. It should be done under

expert guidance and is mandatory in every code change (or version release).

These steps define different angles to focus on and keep the working of the integrated tool as intact as possible.

How do you perform a CRM test?

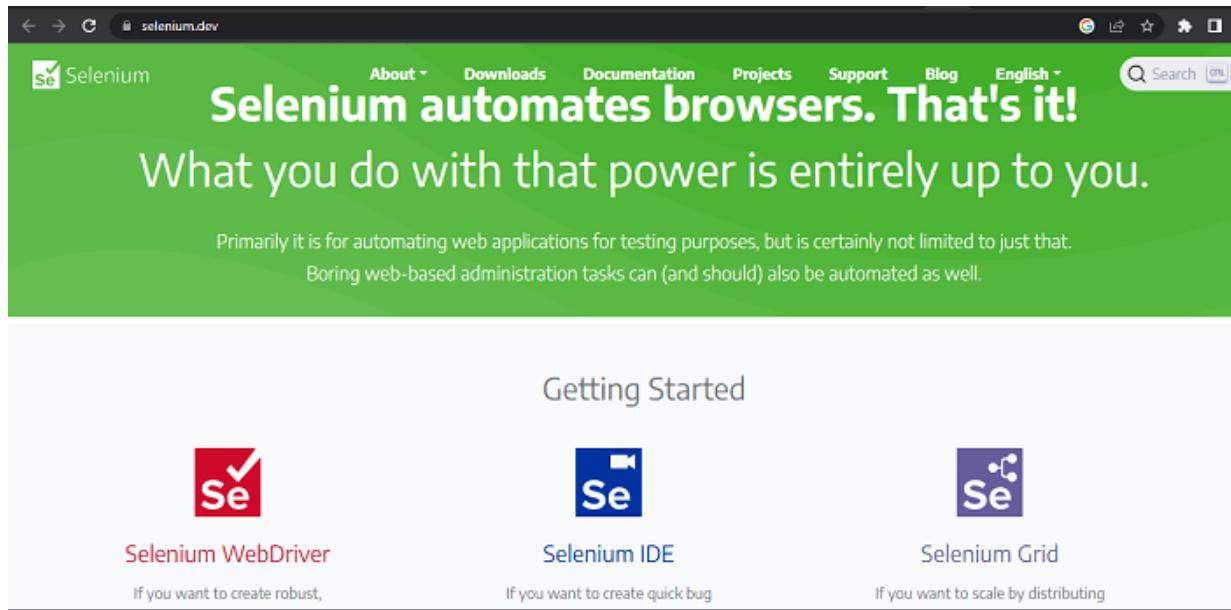
Finally, we are ready to execute test cases and perform actual testing on the CRM after learning about the theoretical aspects of it. For this, we continue in three stages:

- Writing or recording the test cases.
- Selecting the correct specification for test case runs.
- Execute the tests.

The Tools Used in the automation

Automation testing is conducted by using automation tools. Selecting the appropriate tool for testing is quite difficult and important as the success of an automation test depends on it. Here are some automation testing tools used by testers nowadays:

Selenium:



The screenshot shows the official Selenium website at selenium.dev. The header features the Selenium logo and navigation links for About, Downloads, Documentation, Projects, Support, Blog, and English. A search bar is also present. The main banner has a green background with the text "Selenium automates browsers. That's it!" in large white font, followed by "What you do with that power is entirely up to you." Below the banner, a subtext explains the tool's purpose: "Primarily it is for automating web applications for testing purposes, but is certainly not limited to just that. Boring web-based administration tasks can (and should) also be automated as well." The page then branches into three sections: "Getting Started" with icons for WebDriver, IDE, and Grid, each accompanied by a brief description and a link.

When it comes to automation, selenium is one of the popular open-source automation testing tools used in testing different web applications. It is a customizable tool available in many languages and browsers worldwide. This prime tool is used by quality analysts (junior testers to lead testers) to carry out test automation.

No matter how best a tool is, it has some pros and cons. Let's understand:

Advantage	Disadvantage
It is an open-source tool freely available to everyone. Therefore, anyone can download it and use it for free.	Selenium is best suited for testing web applications, but when it comes to testing native mobile apps, hybrid apps and desktop apps, selenium is not a good option.
It is a flexible tool that is adopted and adapted by companies according to their needs.	Selenium failed to provide expected tech support in testing compared to the paid tools.
Selenium can support any project written in any language.	Testing with selenium doesn't support generating testing reports, and testers

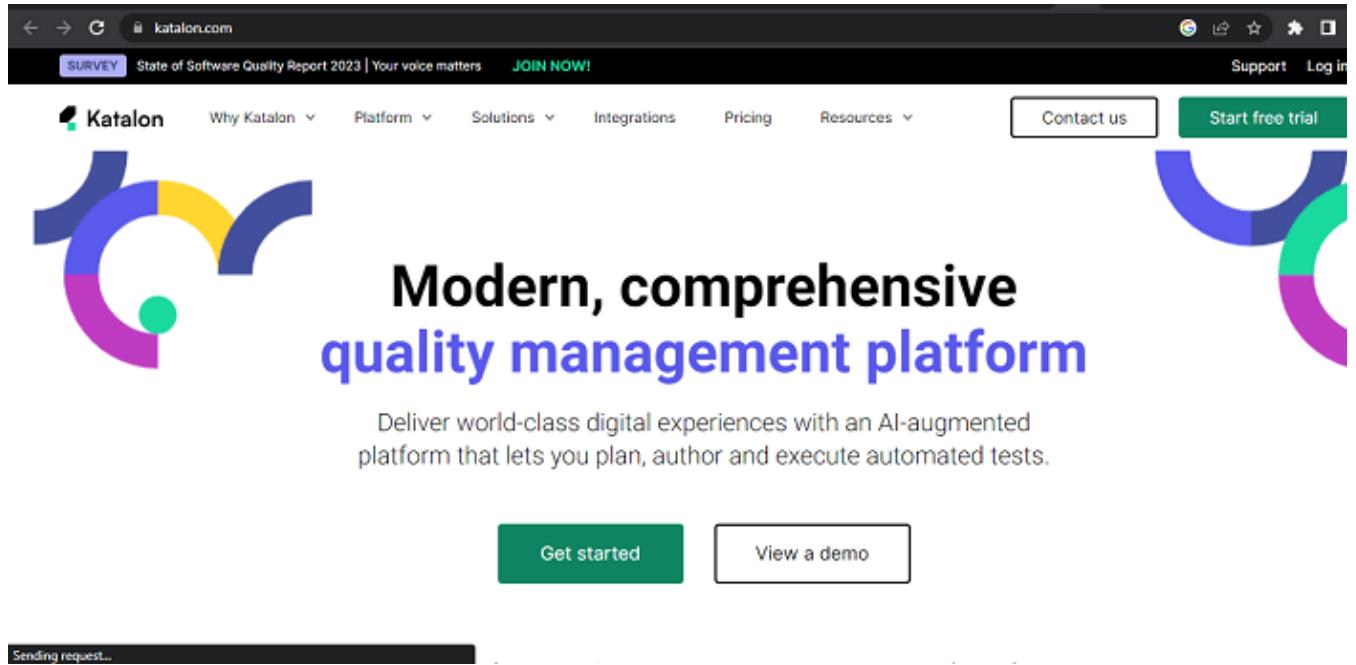
some projects using Java and PHP have to use frameworks like JUnit and languages can use selenium to test TestNG to generate them. both.

Selenium also supports devices and In test management task, selenium lack platforms like iPhone, Android and built-in tools that result in a Blackberry for testing mobile web communication gap between testers and applications. developers.

The tester can perform parallel testing Selenium takes a lot of time and using the selenium grid, which expertise to set up due to several plugins reduces the execution time and tools needed in automation testing improves productivity. that can only be done with manual configuration.

With programming languages, selenium also supports various operating systems (Windows, Unix, Linux and Mac) and different browsers (Firefox, Opera, Google, and Safari).

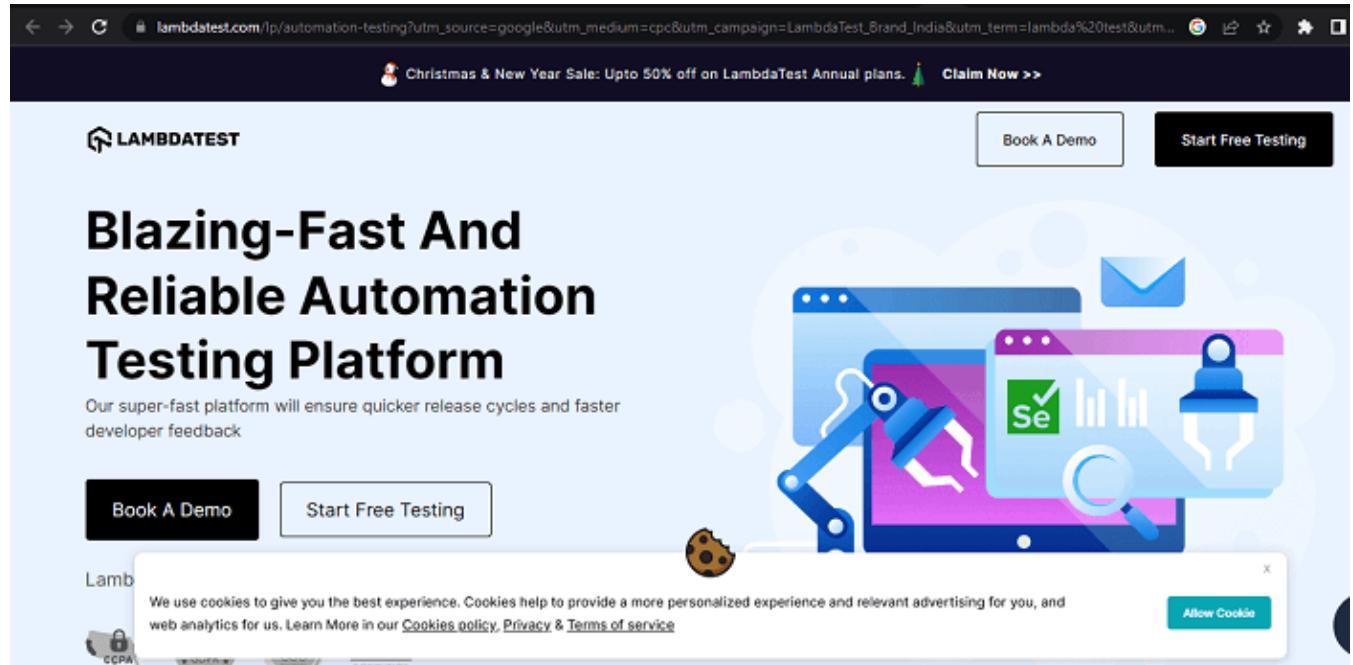
Katalon:



The screenshot shows the Katalon website homepage. At the top, there's a banner for a "State of Software Quality Report 2023" with a "JOIN NOW!" button. Below the banner is the Katalon navigation menu with links like "Why Katalon", "Platform", "Solutions", "Integrations", "Pricing", "Resources", "Contact us", and a prominent green "Start free trial" button. To the left of the main content area is a large, stylized circular logo composed of blue, yellow, purple, and green segments. The main heading reads "Modern, comprehensive quality management platform". Below the heading is a subtext: "Deliver world-class digital experiences with an AI-augmented platform that lets you plan, author and execute automated tests." At the bottom of the page, there's a progress bar labeled "Sending request...".

Katalon is a cross-browser and free licensed tool developed in 2015. It is used for automation testing of web interfaces, APIs and mobile (iOS and Android). This tool relies on the automation frameworks of Appium and Selenium.

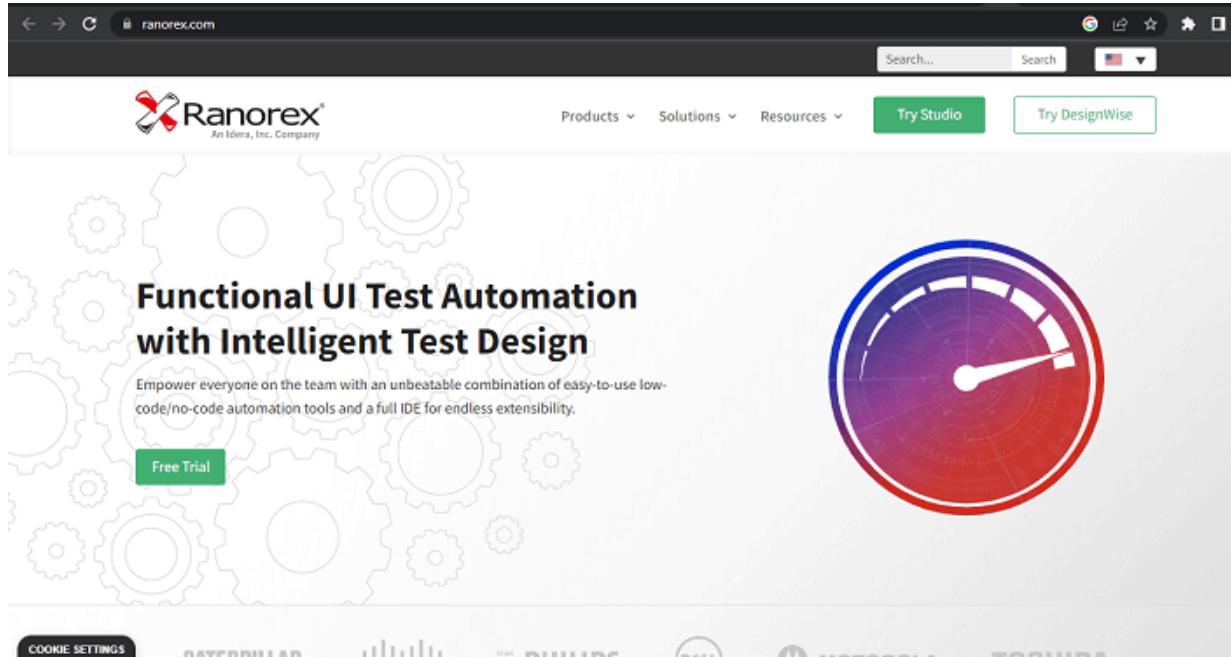
- With Katalon, testers can perform local and remote testing and support sequential and parallel executions. One feature is a dual scripting interface that makes a non-coding skill user to use a straightforward interface.
- Lambada test** is a cloud-based automation tool that allows testers to record real-time browser compatibility testing. It is best suited for mobile and desktop applications that allow testing (manual and automatic) of more than 2000 operating systems, devices and browsers. The Lambada test supports various frameworks and tools, like a playwright, Appium, Cypress, Tiako, Selenium, XCUITest, Espresso, Puppeteer and many more. It is a powerful tool where test execution takes place in a better way because here tester can track the issues and sort them out. It also integrates with various CD/CI tools like Travis CI, Circle CI, Jenkins, etc.



- **Test complete:** One of the top automation testing tools for web applications, desktop and mobile, in which the tester can build and run functional UI tests by replay capabilities, robust records and scripting in your languages (javascript, VB script, Python etc.). You can search for this automation testing tool on www.testmo.com, developed by Smartbear software.
- **Subject 7:** It is an all-rounder cloud-based automation testing tool that can empower anyone to become an automation expert. It is a codeless test automation solution that reduces test maintenance, accelerates test authoring and scales effortlessly. It supports end-to-end, functional, API, regression, and database testing with non-functional testing (including security, load and accessibility).
- This tool easily integrates with Agile/DevOps tooling using in-app integrations, native plugins and open APIs.

The screenshot shows the homepage of subject-7.com. At the top, there's a navigation bar with links for HOME, SOLUTION, PRICING, RESOURCES, CUSTOMERS, COMPANY, CONTACT, and DEMO. The main heading is "CODELESS TEST AUTOMATION" in large blue letters, followed by "FOR DEVOPS AND AGILE" in smaller blue letters. Below this, a text block reads: "Subject7 enables "true" codeless automation. Our platform accelerates test authoring and maintenance and scales with parallel cloud execution out of the box." A "LEARN MORE" button is present, along with three small circular icons below it. To the right of the text is a large image of several white, rounded spheres of varying sizes. At the bottom left, it says "Subject7, Inc. Copyright © 2022". At the bottom right, there are links for Facebook, LinkedIn, Twitter, and Instagram.

Ranorex: It is one of the automation testing tools designed for mobile, desktop and web applications. It is a beneficial tool in many ways as it allows: codeless test creation, replaying testing phases, and recording and reusable test scripts. It saves testers time by offering a sharable repository and video reporting of test execution. With these features, it is best suited for beginners and experts.

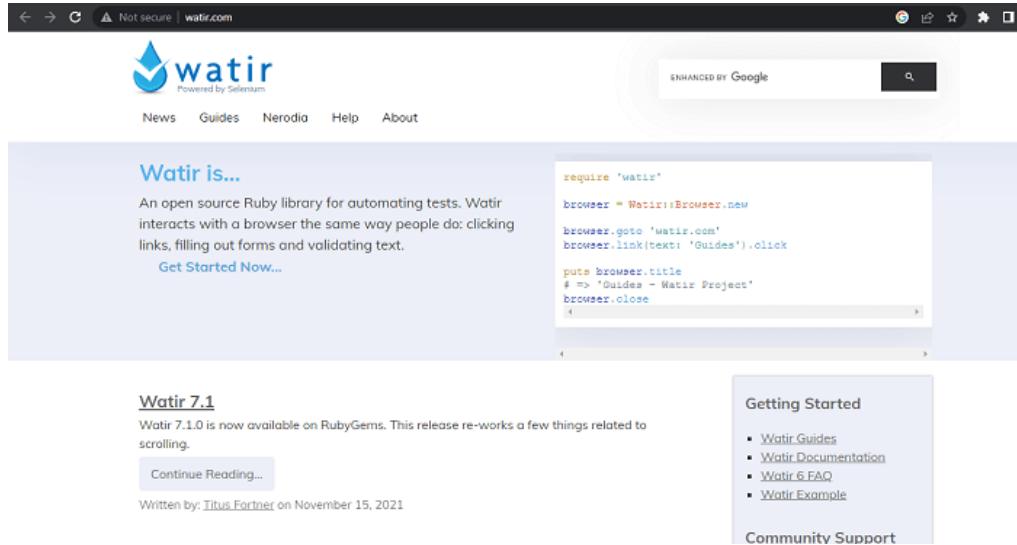


- Appium:** An open-source test automation framework specially designed to test the mobile application (Android and iOS platforms). It is a client-based server architecture that supports multiple programming languages for writing tests like JavaScript, PHP, Java, Python etc. It provides cross-platform testing and reusability of code in testing and also can record the gestures as code.



- Watiz:** This open-source automation tool can be pronounced as "water" and is the best QA automation tool that integrates with BDD tools like Cucumber, RSpec etc. It also supports IE on Windows, and with web drivers, it supports web browsers (Firefox, Opera and headless browser HTML unit).

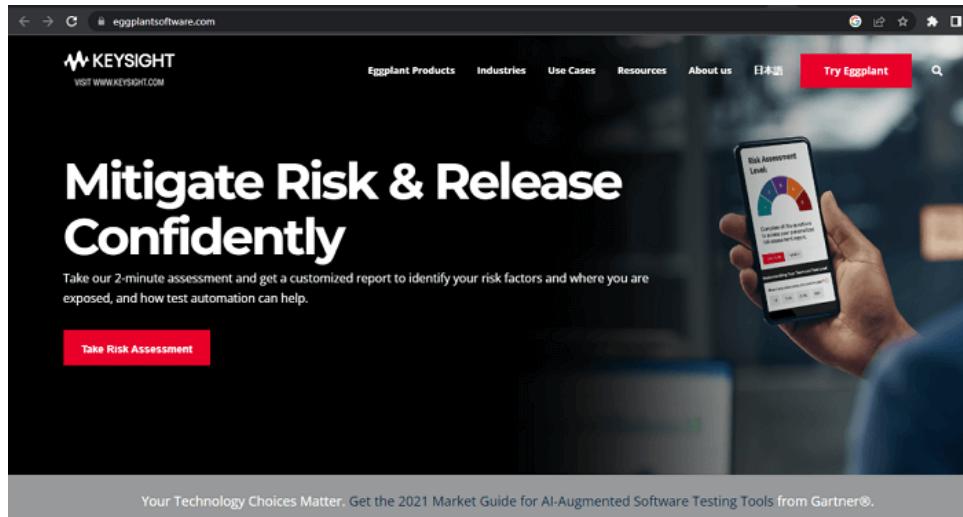
- Rather, its scripting language is ruby, but it can automate web applications developed in any language.



Eggplant:

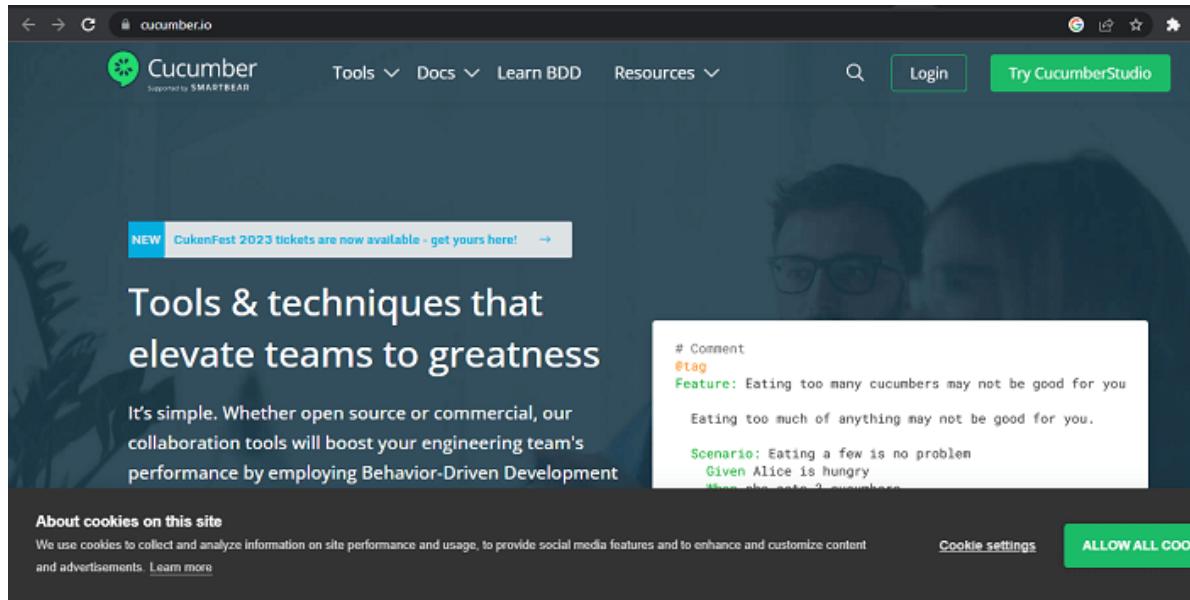
- For different types of testing, Test Plant developed Eggplant, considered a suite of tools for automation testing where different types of testing are performed by each tool. Its performance testing tool (Eggplant Performance) handles the stress testing, performance and load, and the functional testing tool looks what the name indicates.

Other automation testing tools work on an object-based approach, but Eggplant follows an image-based approach. In this testing tool, testers interact with the applications as same as end users will interact. Eggplant Digital Automation Intelligence is used by the tester, particularly for GUI and application testing.

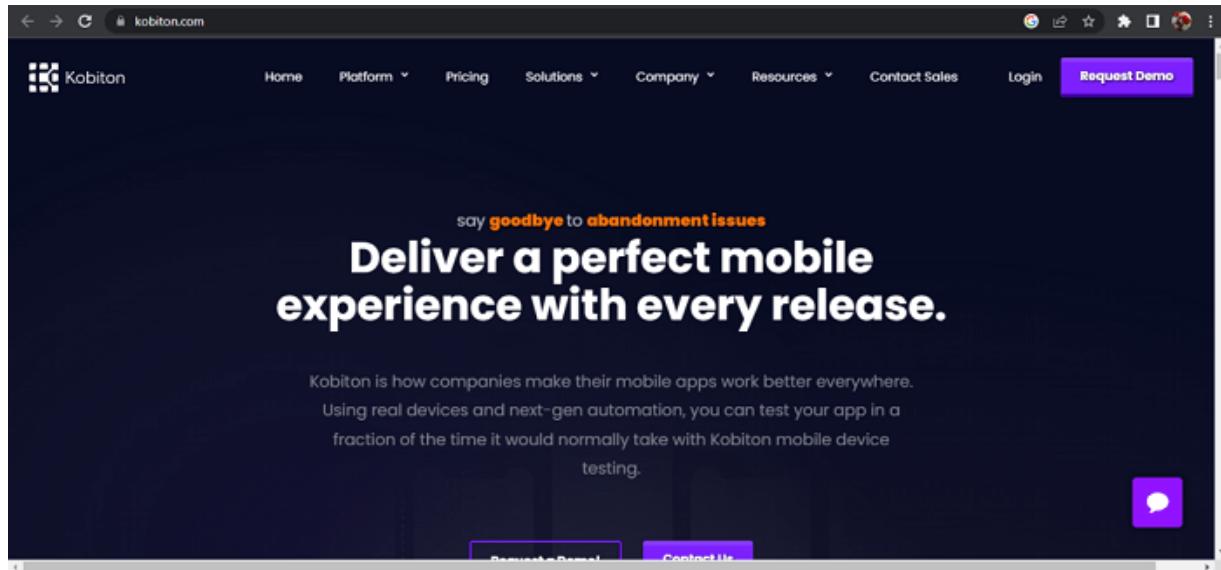


Cucumber: Technically, the cucumber automation tool is the right choice for quality analyst testers that focus on the end-user experience above all the factors. Therefore, it is called BBD(behavioural-driven development tool). It is an open-source automation tool that supports various languages such as Scala, Java, groovy, Ruby etc.

In cucumber, a tester can get end-to-end testing framework support where test code is written in a simple language (English) known as Gherkin, which can be executed on a different framework. It is the best tool from a business perspective as it supports behaviour-driven development in which business analysts and product owners write test scenarios to enact the system behaviour.



- Kobiton:** Kobiton is a wonderful cloud-based platform automation testing tool for mobile and IoT (internet of things) continuous testing (manual and automated). Functionality, compatibility, visual and UX and performance testing can be automated using the AI-driven scriptless approach of Kobiton. This tool supports Katalon Studio, Selenium Web Driver and Appium with CI/CD integrations like Jenkins, TeamCity, GitHub etc. Kobiton can capture screenshots and user interactions via recording videos. It is the fastest processing mobile testing tool that keeps up with DevOps' speed.

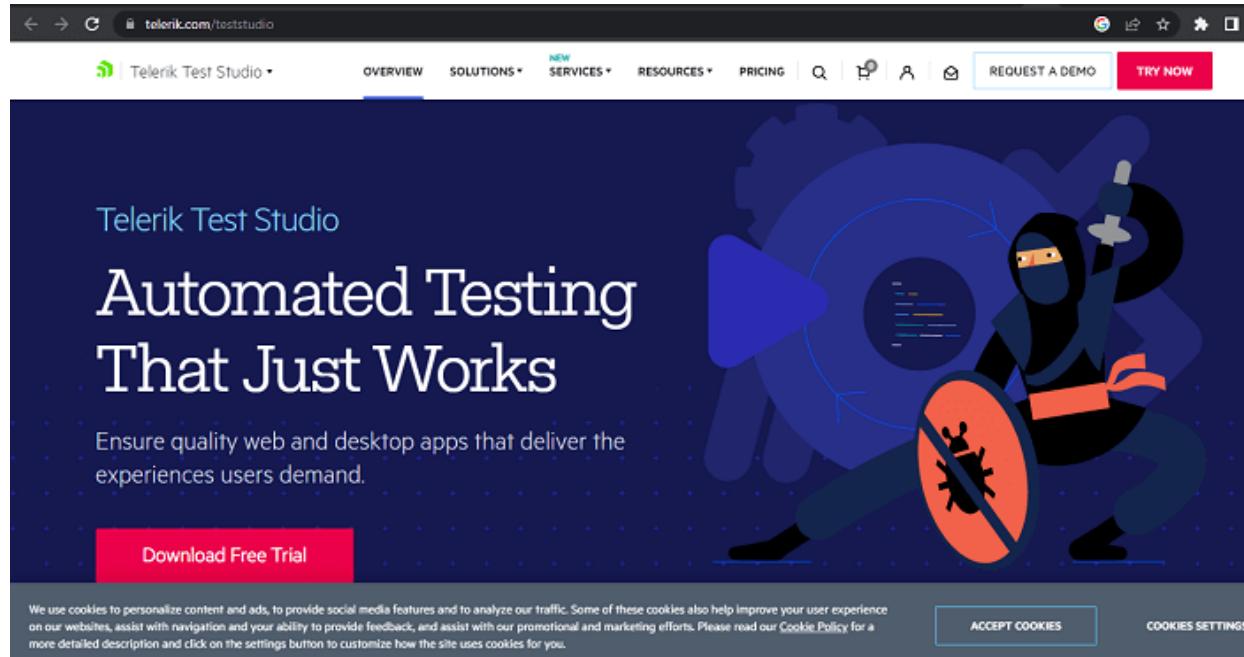


- **Telerik Test Studio:** Telerik has launched this latest automation tool named Test Studio which is a record and playback tool and supports all these:

- - cross-browser
 - Scripting language VB.Net and C#
 - Automating applications such as JavaScript, MVC, Ruby, WPF, HTML5, PHP, Android, Angular, Silverlight, iOS and PHP.

Tests can be scheduled with this tool, and further can be executed in parallel, and reports are also provided by it.

For better performance and results, it connects with source control systems such as GIT and Team Foundation Server and further does continuous testing.



Telerik Test Studio

Automated Testing That Just Works

Ensure quality web and desktop apps that deliver the experiences users demand.

[Download Free Trial](#)

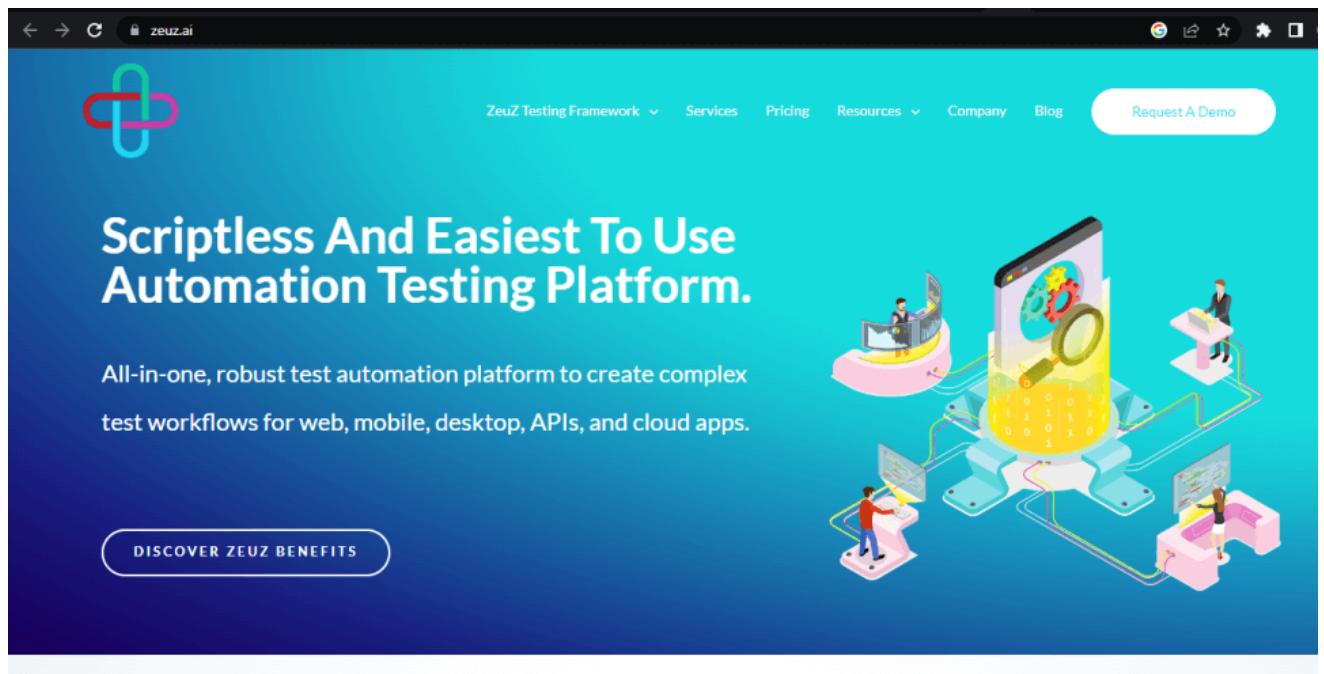
We use cookies to personalize content and ads, to provide social media features and to analyze our traffic. Some of these cookies also help improve your user experience on our websites, assist with navigation and your ability to provide feedback, and assist with our promotional and marketing efforts. Please read our [Cookie Policy](#) for a more detailed description and click on the settings button to customize how the site uses cookies for you.

[ACCEPT COOKIES](#) [COOKIES SETTINGS](#)

- **Cypress:** Like cucumber, this automation tool focuses on end-to-end testing with modern JavaScript frameworks. It has various features like it provides in-depth and detailed documentation, having an inbuilt large number of libraries, DOM manipulation and shadow DOM. Powerful end-to-end testing scenarios with lightning fast test creation and execution can be created with DOM. It has some advantages and disadvantages too.

Advantage	Disadvantage
Fastest test creation and execution	Learning curve
Specializing in end-to-end testing	Lack of support for iframes
Excellent detail and in-depth documentation	Works with browsers like Chrome and other Chromium-based

- **ZeuZ:** This tool is one of the simple, robust, scriptless and AI-assisted click and test automation framework tools that provide to-end automation. It works on cross platforms such as API, mobile, cloud services, web, desktop and IoT. It is the complete package as it does regression, performance, and management and run manual +automated, data-driven tests, UI and functional testing.
- ZeuZ is equipped with intelligent debugging, collaboration features, rich reporting, CI/CD integration, notifications and batch updates. It does recording and playback all the test cases. It does advanced debugging and flexible deployment. ZeuZ has a built-in waiting mechanism and AI-powered object identification. It's a trail automation test available for free.



- **Tenjin Online:** A 5th-generation testing tool that supports manual and automation test execution in which having technical knowledge is not mandatory as it is a codeless tool. It provides SaaS-based solutions to test efficiently. It can test applications from anywhere, anytime, because it doesn't require critical configuration or skills that also make easy execution of

functional and UI tests. It allows cross-browser testing and an efficient and quick independent test platform. All the Tenjin online tool features reduce testing time and cost by upto 75%.

The screenshot shows the Tenjin Online website. At the top, there's a navigation bar with links for FEATURES, RESOURCES, PRICING, VIDEOS, ABOUT US, and CONTACT, along with a Sign-Up button. Below the navigation is a large section titled "End to End Automation testing for Dev/QA Teams (Web & Mobile)". This section includes a list of benefits:

- No complex setups
- Self-assisted
- Automated testing for web and mobile apps
- Create tests 6X faster
- Extend the platform effortlessly with add-ons
- Zero test maintenance

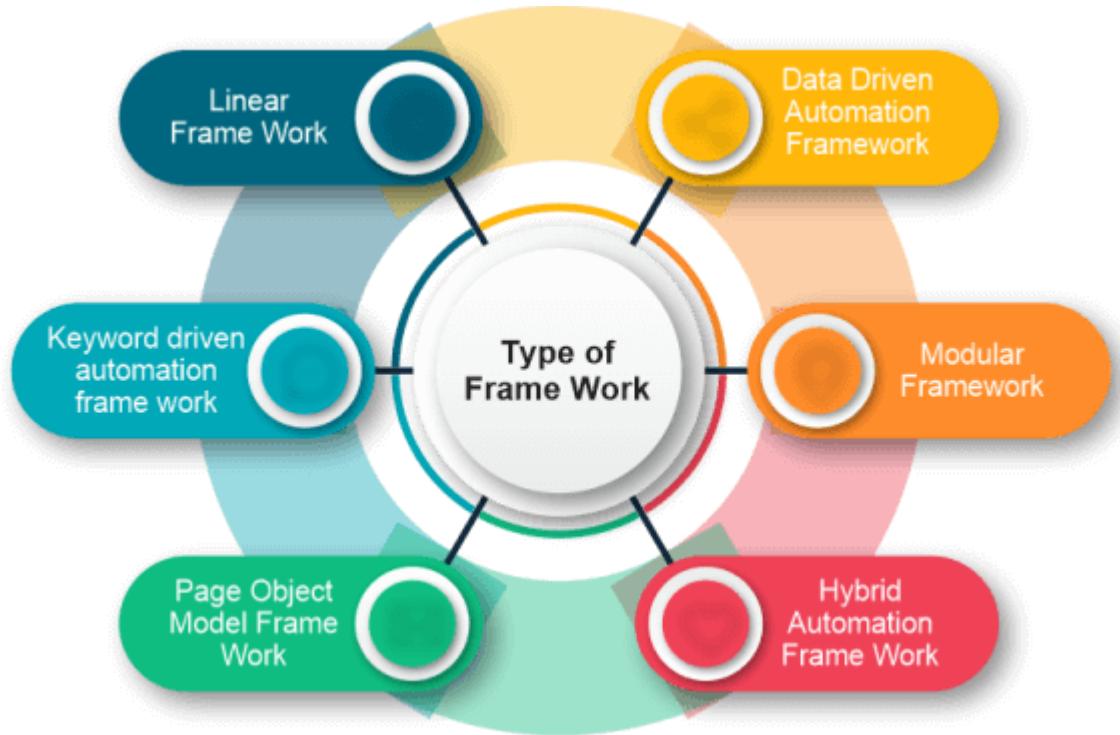
On the right side of this section is a cartoon illustration of a person sitting at a desk with a laptop, surrounded by icons representing a monitor, a lamp, and a plant.

Advantages of automation testing

- It saves time and cost in testing and provides an increment in the efficiency of testing.
- Automation testing improves the accuracy of testing
- With automation, more cycles can be achieved
- It also ensures consistency in testing
- Its test scripts can be reusable
- Ability to cover the test application features widely
- Automation testing results are reliable
- In this testing, human intervention is not required
- Speedily executes the testing process frequently and thoroughly

The framework used in automation software testing

Automation testing is executed on a few frameworks:



Linear Framework

One of the simplest frameworks that act as a record and playback model. In this tester write the simple code to run the test cases without sequential steps and modularity

Data-driven automation framework

The data-driven automation framework can perform both negative and positive test cases. All the test case data inputs are stored in the extension files and tables from where values are read during the execution of test scripts.

-
- **Modular automation framework**
-

A modular automation framework is best suited to run large test scripts as it divides the test scripts into independent modules that hierarchically interact with each other. These small independent modules are tested easily because it's easy to create required test scenarios.

Hybrid automation framework

Hybrid is always a combination; here, keyword-driven and data-driven frameworks are combined in which test data and keywords are externalized. Test data is stored in an excel or properties file, whereas keywords are maintained in a separate java file.

Page object model framework

In this framework, the tester doesn't need to write the code repeatedly because an object for the UI element is created that can be recalled later for testing. This feature of the POM framework results in less code usability and verbosity and reduces time consumption in writing test scripts.

Keyword-driven automation framework

In KDF, the keywords are separated for a common set of functions and instructions, due to which automation speeds up. In this scripting technique, keywords are associated with actions like closing and opening a browser, mouse-click events, and others. During testing, all the keywords are recalled to perform specific steps, and these keywords are maintained in a file along with the actions they perform.

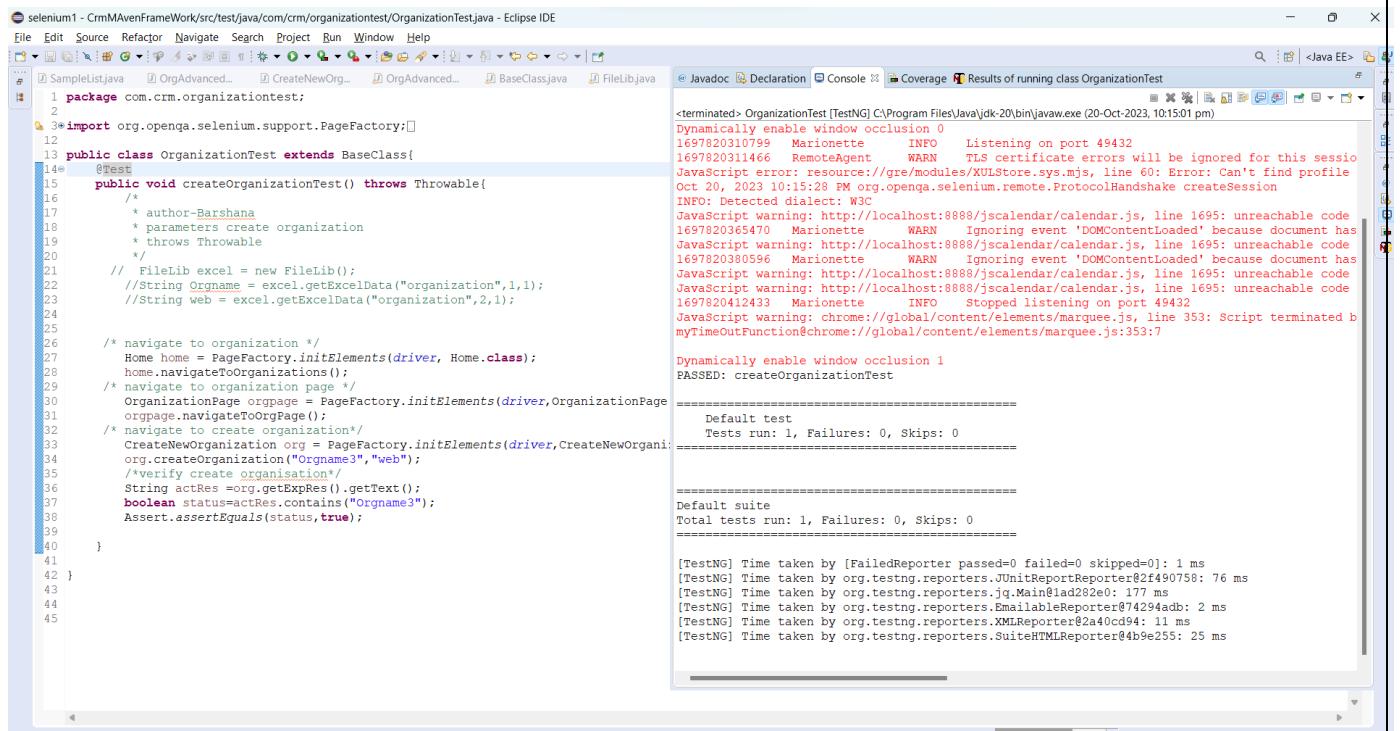
Some myths about automation testing

- **Automation testing is expensive-** It's a myth because it is developed to reduce time, testing effort and resource requirements. If the automation process is followed correctly will save the project cost in the long run.
- **It is possible to do 100% automation-** We have learnt that some of the test cases' exploratory and usability can't be automated, which stated that 100% automation is impossible.
- **It will finish manual testing jobs-** It's humans who made things automatic that ease the use of tools. But this ease in automation testing decreases the need for only manual testers; now, the company needs full-stack or dual-role testers capable of working on both automation and manual testing.
- **A developer can be a good automation tester** -Rather, a developer develops the whole software but doesn't have a tester perspective for testing the software. Therefore, a developer has command of coding, but a tester can think beyond testing.
- **Anyone can do automation testing** - Today, various automation tools are freely available on the internet, and the testing procedure is too. Still, a normal software user couldn't understand the technicality and carry out the testing. To do this, one must know about testing.

All these three stages require at least one capable tool that can manage automation test runs, easy test scripting, integrations, reporting, collaboration, and preferably other features to facilitate all of this. For this demonstration, we are picking up [Selenium WebDriver 3.141](#) and there are solid reasons for this choice:

Execute the tests

Finally, the tests can be executed simply by pressing Run here on the same selected configuration. Different tools will provide different interfaces that the testers need to be aware of. Once the tests are executed, reports are generated as follows:

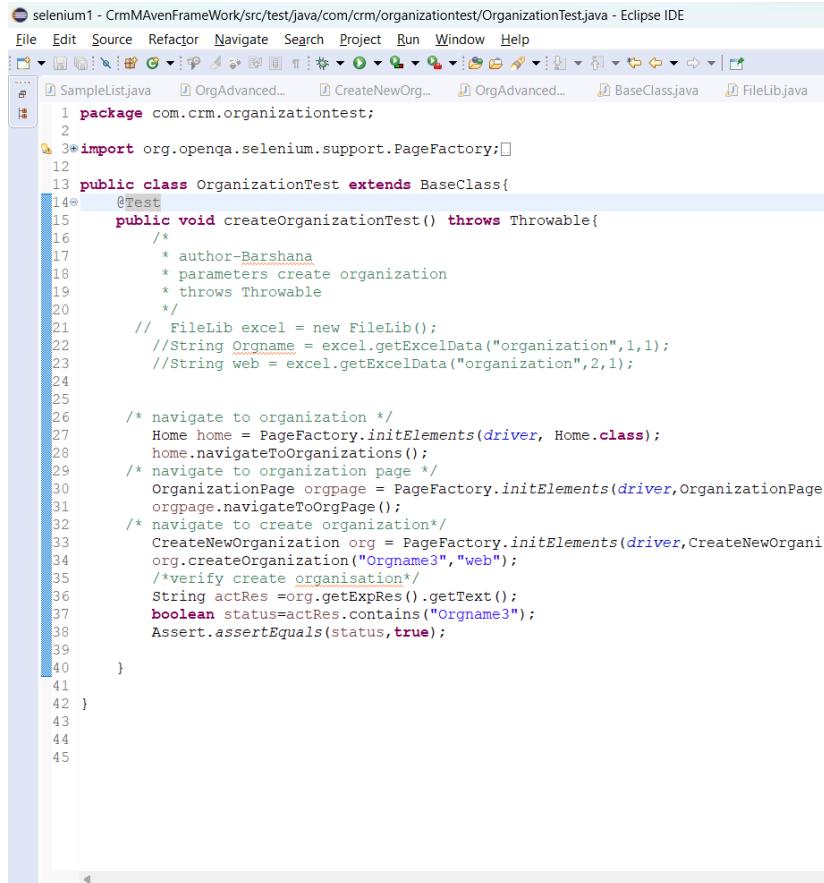


```

selenium1 - CrmAvenFrameWork/src/test/java/com/crm/organizationtest/OrganizationTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
SampleListJava OrgAdvanced... CreateNewOrg... OrgAdvanced... BaseClassJava FileLib.java
1 package com.crm.organizationtest;
2
3 import org.openqa.selenium.support.PageFactory;
4
5 public class OrganizationTest extends BaseClass{
6 @Test
7 public void createOrganizationTest() throws Throwable{
8     /*
9      * author-Barshana
10     * parameters create organization
11     * throws Throwable
12     */
13     // FileLib excel = new FileLib();
14     //String Orgname = excel.getExcelData("organization",1,1);
15     //String web = excel.getExcelData("organization",2,1);
16
17     /* navigate to organization */
18     Home home = PageFactory.initElements(driver, Home.class);
19     home.navigateTOorganizations();
20     /* navigate to organization page */
21     OrganizationPage orgpage = PageFactory.initElements(driver,OrganizationPage.class);
22     orgpage.navigateTOOrgPage();
23     /* navigate to create organization*/
24     CreateNewOrganization org = PageFactory.initElements(driver,CreateNewOrganization.class);
25     org.createOrganization("Orgname3","web");
26     /*verify create organisation*/
27     String actRes =org.getExpRes().getText();
28     boolean status=actRes.contains("Orgname3");
29     Assert.assertEquals(status,true);
30
31 }
32
33
34
35
36
37
38
39
40
41
42
43
44
45

```

Dynamically enable window occlusion 0
1697820310799 Marionette INFO Listening on port 49432
1697820311466 RemoteAgent WARN TLS certificate errors will be ignored for this session
JavaScript error: resource://gre/modules/XULStore.sys.mjs, line 60: Error: Can't find profile Oct 20, 2023 10:15:28 PM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: W3C
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820365470 Marionette WARN Ignoring event 'DOMContentLoaded' because document has JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820380596 Marionette WARN Ignoring event 'DOMContentLoaded' because document has JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820412433 Marionette INFO Stopped listening on port 49432
JavaScript warning: chrome://global/content/elements/marquee.js, line 353: Script terminated by myTimeoutFunction(chrome://global/content/elements/marquee.js:353:7)
Dynamically enable window occlusion 1
PASSED: createOrganizationTest
=====
Default test
Tests run: 1, Failures: 0, Skips: 0
=====
Default suite
Total tests run: 1, Failures: 0, Skips: 0
=====
[TestNG] Time taken by [FailedReporter passed=0 failed=0 skipped=0]: 1 ms
[TestNG] Time taken by org.testng.reporters.JUnitReportReporter@2f490758: 76 ms
[TestNG] Time taken by org.testng.reporters.jq.Main@1ad282e0: 177 ms
[TestNG] Time taken by org.testng.reporters.EmailableReporter@74294adb: 2 ms
[TestNG] Time taken by org.testng.reporters.XMLReporter@2a40cd94: 11 ms
[TestNG] Time taken by org.testng.reporters.SuiteHTMLReporter@4b9e255: 25 ms



```

selenium1 - CrmMAvenFrameWork/src/test/java/com/crm/organizationtest/OrganizationTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
SampleList.java OrgAdvanced... CreateNewOrg... OrgAdvanced... BaseClass.java FileLib.java
1 package com.crm.organizationtest;
2
3 import org.openqa.selenium.support.PageFactory;
4
5 public class OrganizationTest extends BaseClass{
6     @Test
7     public void createOrganizationTest() throws Throwable{
8         /*
9          * author-Barshana
10         * parameters create organization
11         * throws Throwable
12         */
13         // FileLib excel = new FileLib();
14         //String Orgname = excel.getExcelData("organization",1,1);
15         //String web = excel.getExcelData("organization",2,1);
16
17         /* navigate to organization */
18         Home home = PageFactory.initElements(driver, Home.class);
19         home.navigateToorganizations();
20         /* navigate to organization page */
21         OrganizationPage orgpage = PageFactory.initElements(driver,OrganizationPage.class);
22         orgpage.navigateToorgPage();
23         /* navigate to create organization*/
24         CreateNewOrganization org = PageFactory.initElements(driver,CreateNewOrganization.class);
25         org.createOrganization("Orgname3", "web");
26         /*verify create organisation*/
27         String actRes =org.getExpRes().getText();
28         boolean status=actRes.contains("Orgname3");
29         Assert.assertEquals(status,true);
30
31     }
32 }
33
34
35
36
37
38
39
40
41
42
43
44
45

```

When the test case is passed that means the particular module or the particular test scripts are ready and that module of the application is free from any type of **bug** or **defect**.

The screenshot shows a Java IDE window displaying the results of a TestNG test run. The title bar reads "Results of running class OrganizationTest". The console tab is active, showing the following output:

```
<terminated> OrganizationTest [TestNG] C:\Program Files\Java\jdk-20\bin\javaw.exe (20-Oct-2023, 10:15:01 pm)
Dynamically enable window occlusion 0
1697820310799 Marionette INFO Listening on port 49432
1697820311466 RemoteAgent WARN TLS certificate errors will be ignored for this session
JavaScript error: resource://gre/modules/XULStore.sys.mjs, line 60: Error: Can't find profile
Oct 20, 2023 10:15:28 PM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: W3C
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820365470 Marionette WARN Ignoring event 'DOMContentLoaded' because document has
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820380596 Marionette WARN Ignoring event 'DOMContentLoaded' because document has
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
JavaScript warning: http://localhost:8888/jscalendar/calendar.js, line 1695: unreachable code
1697820412433 Marionette INFO Stopped listening on port 49432
JavaScript warning: chrome://global/content/elements/marquee.js, line 353: Script terminated by
myTimeOutFunction@chrome://global/content/elements/marquee.js:353:7

Dynamically enable window occlusion 1
PASSED: createOrganizationTest

=====
Default test
Tests run: 1, Failures: 0, Skips: 0
=====

=====
Default suite
Total tests run: 1, Failures: 0, Skips: 0
=====

[TestNG] Time taken by [FailedReporter passed=0 failed=0 skipped=0]: 1 ms
[TestNG] Time taken by org.testng.reporters.JUnitReportReporter@2f490758: 76 ms
[TestNG] Time taken by org.testng.reporters.jq.Main@1ad282e0: 177 ms
[TestNG] Time taken by org.testng.reporters.EmailableReporter@74294adb: 2 ms
[TestNG] Time taken by org.testng.reporters.XMLReporter@2a40cd94: 11 ms
[TestNG] Time taken by org.testng.reporters.SuiteHTMLReporter@4b9e255: 25 ms
```

selenium1 - CrmMAvenFrameWork/src/test/java/com/crm/organizationtest/OrganizationTest.java - Eclipse IDE

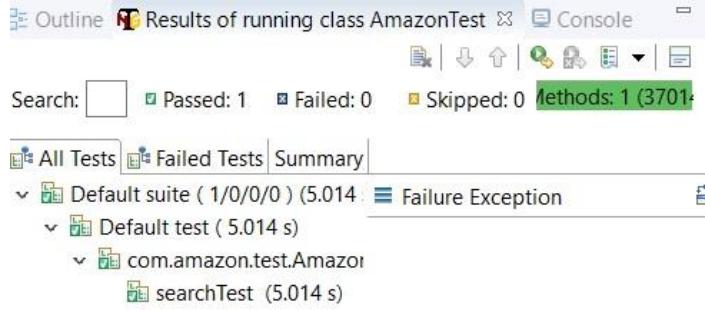
File Edit Source Refactor Navigate Search Project Run Window Help

Package Explorer ContactTest... CampTest.java testng.xml CrmMAvenFram...

```

1 package com.crm.organizationtest;
2
3 import org.openqa.selenium.support.PageFactory;
4 import org.testng.Assert;
5 import org.testng.annotations.Test;
6
7 import com.crm.commonLib.BaseClass;
8 import com.crm.commonLib.FileLib;
9 import com.crm.objectRepository.CreateNewOrganization;
10 import com.crm.objectRepository.Home;
11 import com.crm.objectRepository.OrganizationPage;
12
13 public class OrganizationTest extends BaseClass{
14     @Test
15     public void createOrganizationTest() throws Throwable
16     /*
17         * author-Barshana
18         * parameters create organization
19         * throws Throwable
20     */
21     FileLib excel = new FileLib();
22     String Orgname = excel.getExcelData("organization");
23     String web = excel.getExcelData("organization");
24
25
26     /* navigate to organization */
27     Home home = PageFactory.initElements(driver, Home.class);
28     home.navigateToOrganizations();
29     /* navigate to organization page */
30     OrganizationPage orgpage = PageFactory.initElements(driver, OrganizationPage.class);
31     orgpage.navigateToOrgPage();
32     /* navigate to create organization*/
33     CreateNewOrganization org = PageFactory.initElements(driver, CreateNewOrganization.class);
34     org.createOrganization(Orgname, web);
35     /*verify create organisation*/
36     String actRes = org.getExpRes().getText();
37     boolean status=actRes.contains(Orgname);
38     Assert.assertEquals(status,true);
39
40 }
41
42 }

```



The screenshot shows a test results interface with the following details:

- Outline | Results of running class AmazonTest | Console
- Search: []
- Status: Passed: 1, Failed: 0, Skipped: 0, Methods: 1 (3701)
- Navigation: All Tests, Failed Tests, Summary
- Suite: Default suite (1/0/0/0) (5.014 s)
- Test: Default test (5.014 s)
- Method: com.amazon.test.Amazon (5.014 s)
- Method: searchTest (5.014 s)

They can now be shared with other team members while the test data remains saved inside the central account that can be accessed by authorized members. Hence, just to note, collaborative features are also important in the tool you choose for CRM testing.

The Types of bugs found while doing functional testing using Selenium Webdriver

1.

The screenshot shows the vtiger CRM interface. The top navigation bar includes tabs for 'Administrator - Settings - vtiger' and 'Create Issue - Jira'. Below the bar is the vtiger logo and a search bar. The main menu at the top has links for Home, Calendar, Leads, Organizations, Contacts, Opportunities, Products, Documents, Email, Trouble Tickets, Dashboard, More, and Quick Create. On the left, a sidebar menu is open under 'Communication Templates', specifically 'Mail Merge'. The main content area displays the 'Settings > Mail Merge Templates > New Template' page. A red box highlights the 'Template File' section, which contains a file input field with the value 'barshana.docx'. Other fields visible include 'Description' and 'Module' (set to 'Leads'). At the bottom right of the form are 'Save' and 'Cancel' buttons.

2.

Administrator - Settings - vtiger Create Issue - Jira localhost:8888/index.php?module=Settings&action=TaxConfig&parenttab=Settings&disable=true&taxname=tax1 120% Administrator

vtiger Search... Quick Create...

Home Calendar Leads Organizations Contacts Opportunities Products Documents Email Trouble Tickets Dashboard More ...

Users & Access Management

- Users
- Roles
- Profiles
- Groups
- Sharing Access
- Fields Access
- Audit Trails
- User Login History

Studio

- Module Manager
- Picklist Editor
- Picklist Dependency Setup
- Menu Editor

Communication Templates

- Mail Merge
- Notification Schedulers
- Inventory Notifications
- E-mail Templates
- Company Details

Other Settings

- Currencies

Settings > Tax Calculations
Manage different types of tax rates for taxes, such as Sales Tax, VAT etc.

Product & Service Taxes

	Add Tax	Edit
Sales	10.000 %	<input checked="" type="checkbox"/>
Service	12.500 %	<input checked="" type="checkbox"/>
GST	3.000 %	<input checked="" type="checkbox"/>
VAT	4.500 %	<input type="checkbox"/>

Shipping & Tax

	Add Tax	Edit
VAT	4.500 %	<input checked="" type="checkbox"/>
Sales	10.000 %	<input checked="" type="checkbox"/>
Service	12.500 %	<input checked="" type="checkbox"/>

[Scroll to Top]

Activate Windows
Go to Settings to activate Windows.

localhost:8888/index.php?module=Settings&action=TaxConfig&parenttab=Settings&disable=true&taxname=tax2

File Upload This PC > Desktop Search Desktop 120% Administrator

Type here to search Email Trouble Tickets Dashboard More ... Quick Create...

File name: Open Cancel

Studio

- Module Manager
- Picklist Editor
- Picklist Dependency Setup
- Menu Editor

Communication Templates

- Mail Merge
- Notification Schedulers
- Inventory Notifications
- E-mail Templates
- Company Details

Other Settings

- Currencies
- Tax Calculations

File Upload

1click actiTIME bars1 barsha barsha2 barshana code Comcast_testCase Eclipse Java 2018-12 Eclipse Jee 2018-12

Address 40-41-42, Sivasundar Apartments, Flat D-II, S

City Chennai

State Tamil Nadu

Postal Code 600 042

Country India

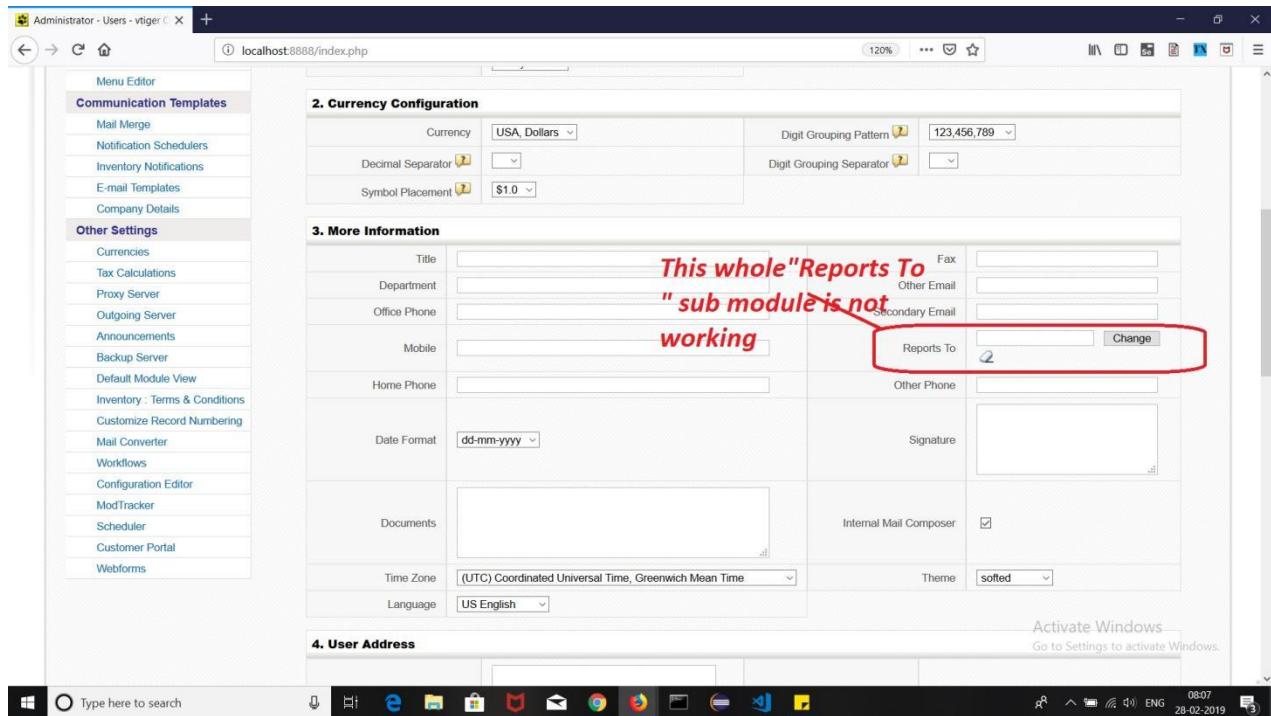
Phone +91-44-5202-1990

Fax +91-44-5202-1990

Website www.vtiger.com

Activate Windows
Go to Settings to activate Windows.
[Scroll to Top]

4.



This whole "Reports To" sub module is not working

The screenshot shows the 'Administrator - Users' configuration page in vtiger CRM. The left sidebar lists various settings like Communication Templates, Other Settings, and User Address. The main area has three sections: '2. Currency Configuration', '3. More Information', and '4. User Address'. In '3. More Information', there is a 'Reports To' field which is highlighted with a red box. A red annotation above the box states: 'This whole "Reports To" sub module is not working'.

5.

Administrator - Users - vtiger CRM

localhost:8888/index.php

Customer Portal Webforms

Time Zone: (UTC) Coordinated Universal Time, Greenwich Mean Time | Theme: softed

Language: US English

4. User Address

Street Address	Country
City	Postal Code
State	

This full area is clickable for browsing

5. User Photograph

Upload Photograph	Browse... 3.gif [barsha.jpg] sel
-------------------	-------------------------------------

(Only jpg, gif, bmp and png images)

6. User Advanced Options

Reminder Interval	None
-------------------	------

7. Asterisk Configuration

Asterisk Extension	Receive Incoming Calls
--------------------	------------------------

8. Home Page Components

Home Page Dashboard	Show	Hide
Top Organizations	Show	Hide
Top Opportunities	Show	Hide

Activate Windows - Go to Settings to activate Windows.

Type here to search

08:24 28-02-2019

6.

Administrator - Users - vtiger CRM

localhost:8888/index.php

Customer Portal Webforms

Time Zone: (UTC) Coordinated Universal Time, Greenwich Mean Time | Theme: softed

Language: US English

4. User Address

Street Address	Country
City	Postal Code
State	

5. User Photograph

Upload Photograph	Browse... 3.gif [barsha.jpg] sel
-------------------	-------------------------------------

(Only jpg, gif, bmp and png images)

6. User Advanced Options

Reminder Interval	None
-------------------	------

7. Asterisk Configuration

Asterisk Extension	Receive Incoming Calls
--------------------	------------------------

8. Home Page Components

Home Page Dashboard	Show	Hide
Top Organizations	Show	Hide
Top Opportunities	Show	Hide

Activate Windows - Go to Settings to activate Windows.

Even if new file is getting imported, the old imported file is visible, due to which the user(beginner) may get confused.

Type here to search

08:24 28-02-2019

7.

The screenshot shows the vtiger CRM interface. At the top, there's a header bar with a logo, a search bar, and a URL indicating the page is at `localhost:8888/index.php?action=index&module=Home`. Below the header is the vtiger logo. A navigation bar with tabs for Home, Calendar, Leads, Organizations, Contacts, Opportunities, Products, Documents, Email, and Tickets is visible. A red box highlights a 'Last Viewed' module in the center of the screen. This module contains a 'Tag Cloud' section with a large white cloud icon and the text 'TAG CLOUD'. To the right of the tag cloud is a 'My Recent FAQs' section with the message 'No Data Found' and a 'Question Product Name' table with one row labeled 'Scroll'. On the far right, there's a 'Pending Activities' section with the message 'No Data' and a 'More' link.

8.

Last viewed is clickable but not working

9.

Barshana Mustaffa - Projects - + localhost:8888/index.php?module=Project&action=EditView&return_action=DetailView&parenttab=Support 110% ... ☆ Administrator · Thursday Barshana Mustaffa Projects

Duplicate Project No - Click here to Configure the Project No

Creating New Project

Project Information

*Project Name	shelter	Project No	<input type="text"/>
Start Date	28-02-2019 (dd-mm-yyyy)	*Assigned To	<input checked="" type="radio"/> User <input type="radio"/> Group Barshana Mustaffa
Target End Date	28-02-2019 (dd-mm-yyyy)	Actual End Date	28-02-2019 (dd-mm-yyyy)
Status	In Progress	Type	—none—
Related To	Organizations		

Custom Information

Target budget	<input type="text"/>	Url	<input type="text"/>
Priority	—none—	Progress	—none—

Description Information

Description	<input type="text"/>
-------------	----------------------

Activate Windows
Go to Settings to activate Windows.

Windows Type here to search e m a i l f o r e s t o r e s k y n d o c s 09:03 28-02-2019

10.

Barshana Mustaffa - Project Tasks - + localhost:8888/index.php?module=ProjectTask&action=EditView&return_action=DetailView&parenttab=Support 110% ... ☆ Administrator · Thursday Barshana Mustaffa Project Tasks

Duplicate Task No - Click here to Configure the Task No

Creating New Project Task

Project Task Information

*Task Name	write test cases	Task No	<input type="text"/>
Priority	normal	Type	operative
Task Code	<input type="text"/>	*Related To	shelter
*Assigned To	<input checked="" type="radio"/> User <input type="radio"/> Group Barshana Mustaffa		

Custom Information

Progress	—none—	Worked Hours	<input type="text"/>
Start Date	28-02-2019 (dd-mm-yyyy)	End Date	28-02-2019 (dd-mm-yyyy)

Description Information

Description	<input type="text"/>
-------------	----------------------

Activate Windows
Go to Settings to activate Windows.

Windows Type here to search e m a i l f o r e s t o r e s k y n d o c s 09:09 28-02-2019

Cost of executing CRM tests

A CRM is a major module of any application. It holds a lot of responsibilities and acts from the center to many other modules. Therefore, its testing cannot be taken lightly and we need to make sure the testing phase is of the highest quality to produce an application of the same standard. Naturally, there are a lot of concerns regarding the costs associated with it. In this section, we can deduce a rough formula in various situations to understand how much money can we expect to be listed in the expense sheet each month.

CRM testing can be done in two ways:

- In-house.
- Outsource.

Calculating costs for in-house CRM testing

The first method is setting up our own infrastructure and in-house team to conduct testing in all the release versions. Such an arrangement has the following costs:

- Infrastructure costs.
- People costs.
- Tool costs (optional).

Infrastructure costs include the cost of setting up the infrastructure as well as maintaining it. For CRM type of software, maintaining an infrastructure would majorly mean procuring new devices including mobile devices, desktops, laptops, chrome devices, etc. This will keep coming into your bills as long as the application is live.

The second cost is the people costs i.e. how much are we spending on people. This expense will be in the form of salaries and training. An in-house setup requires two teams – one for setting up a lab and the other purely for

testing purposes. Considering there are X members in total and on average the team spends Y dollars on them per month, the total expense becomes:

Number of members x Money spent on each member

This number depends on the type of team acquired. An experienced team will demand more money but the quality of work will not suffer. A mix of both is preferable, therefore.

The final variable in the total costs is money spent on the tool. An organization can opt for a pre-made tool from a third party and may pay the costs for it. This can be either per member per month or unlimited members per month depending on the tool. If the organization decides to make the tool themselves, then they need to hire developers for the same and the costs are added again to the people cost. It is recommended to opt for third-party tools if the requirements can be satisfied by any one of them. In-house development invites a lot of additional expenses and maintenance overheads.

Calculating costs for outsourced CRM testing

The costs accumulated when CRM testing is outsourced are fairly simple and straightforward. Here, we cut down all the additional overheads while just paying for the testing part to a third party. However, the quotation changes based on the requirements. Some organizations would want experienced testers while some may ask for at least 2000 test cases (for example). As an organization changes its demands, the price fluctuates accordingly.

In such scenarios too, the company has to hire a team to oversee all the processes and be the point of contact for the internal testing team and the third-party organization. This adds up to the cost but the number of people is limited and hence the costs are minimal.

Best practices for CRM testing

CRM testing can be conducted most efficiently and fruitfully if the following practices are followed:

- Plan before implementation : It is extremely important to plan everything before implementation in CRM testing. This is because backtracking and modifying the design is cost-heavy. CRM includes too many modules with integration with many other native ones. It makes things complex and the only way to avoid a mess is to plan every little thing and just stick to the plan.

- Test data is irreplaceable: The job of CRM revolves around data. It stores and analyzes data that helps move other jobs in the pipeline. Hence, it is important to ensure that all these things work perfectly, especially the analytical part. The best way to achieve that is by performing CRM testing with exhaustive test data of multiple kinds. This phase should never be skipped and performed no matter how deeply CRM is integrated for data-related purposes.
- Hire an experienced team: CRM is an integral part of the application and even more than that, it helps plan future strategies and create customer relations that bring revenue. Testing such software based on theoretical knowledge like a beginner may end up passing bugs into production. As mentioned earlier, CRM bugs are expensive to fix and incur high costs of rectification. An experienced team knows such software inside out and areas where they can spot hidden bugs or fatal errors.
- Mix automation and manual: A good practice to follow in CRM testing is to mix automation and manual wherever one is required. CRM testing cannot be fully automated or be fully manual. While we can increase the automation coverage as much as possible, a few elements would still need manual verification and as a tester, we should always analyze such parts. This mix is what will help test each angle of the software and enhance the overall quality.

With these simple and effective practices, we also invite the reader's suggestions and comments based on their experience in the below section. It will help explore other practices that have been invented with personal experiences but are equally effective in implementation.

Choosing a solution provider for CRM testing

While selecting a solution provider for CRM testing, the testers should know how to go ahead and make this selection. This helps them select the most optimum solution for them and facilitates their work during and post-testing phase.

- Alignment with business requirements: The highest priority for choosing a CRM testing solution is to check its alignment with the business requirements. Different businesses work on different principles and CRM tools being integrated software has a

responsibility to verify all of them. It is also true that there cannot be a single universal CRM for all businesses. Therefore, analyze the business requirement and shortlist testing tools based on the same in the first stage.

- Wide testing domain: CRM testing tool has to be equipped with all the major testing types even if the requirement is not currently. As the product grows, sooner or later, the team will be required to widen their testing span and that generally means exploring other testing domains. It is better, therefore, to just start with such a tool from the start and avoid moving all the data to another in the future.
- Wide device range: CRM tools will be viewed and operated through multiple devices and browsers installed on them. To test this part, the CRM testing solution should be able to run a few tests on each of the target device ranges. This can only be achieved if the testing solution supports so many tools and this is something to keep in mind while selecting a CRM testing solution.
- Scalable: The organization grows each day and the resources that make its existence possible grow with it too. One such resource is the CRM tool and its scalability may affect its performance if not tested properly. In such situations, the team requires a tool that does not fear large scales and can test at equal efficiency no matter what the size is. Moreover, the tool must help prepare for future numbers preferably through load testing which can be considered as a part of scalable operations.

Once all these things are sorted, the tool that gets finalized would just require personal adjustments according to the project and the team and you are good to go!

CRM testing challenges

CRM tools have evolved a lot today and bring perfection to each of their modules. This helps in easing out the testing part as all we need to take care

of are external entities. Therefore, even though these challenges are limited in number, they do need to be explored for better preparation.

- Measuring data accuracy: The most challenging part of CRM testing is measuring data accuracy. Most of the work we take out from a CRM tool is related to data and all the future steps depend on it. If it is not accurate, the organization may destroy its relationship with the customer by providing wrong messages. There are tools to measure the accuracy but it would still need a lot of manual work which makes this job time-consuming.
- Cross-browser testing: The number of devices currently used in the market is astonishing. To receive accurate data for each of them, the tool needs to be tested on these devices before releasing the application. This is a challenging task as it becomes humanly impossible to manually conduct all the tests on each of the devices. Thankfully, tools like Testsigma eliminate all the overheads in these cases.
- Planning: To chalk out a plan for CRM testing is a tough job because of the number of elements a CRM tool has. These elements are not only complex in themselves but also attach various other application modules after integration. Therefore, what a testing team starts once cannot be retraced back if it does not execute well. To perfectly design the planning part with so many complexities poses a tough challenge to the team.

While these challenges cannot be ignored and will consume a lot of time, certain steps can help the team overcome them easily.

Overcoming CRM testing challenges

To overcome CRM testing challenges, the team should adopt the following steps:

- Focus on test data: As mentioned, data accuracy is a challenge and of the highest priority when it comes to CRM. Therefore, to ensure that our data never lies, we need to test it with large amounts of practical data. Spend time curating this list and keep adding chunks of new data at frequent intervals.

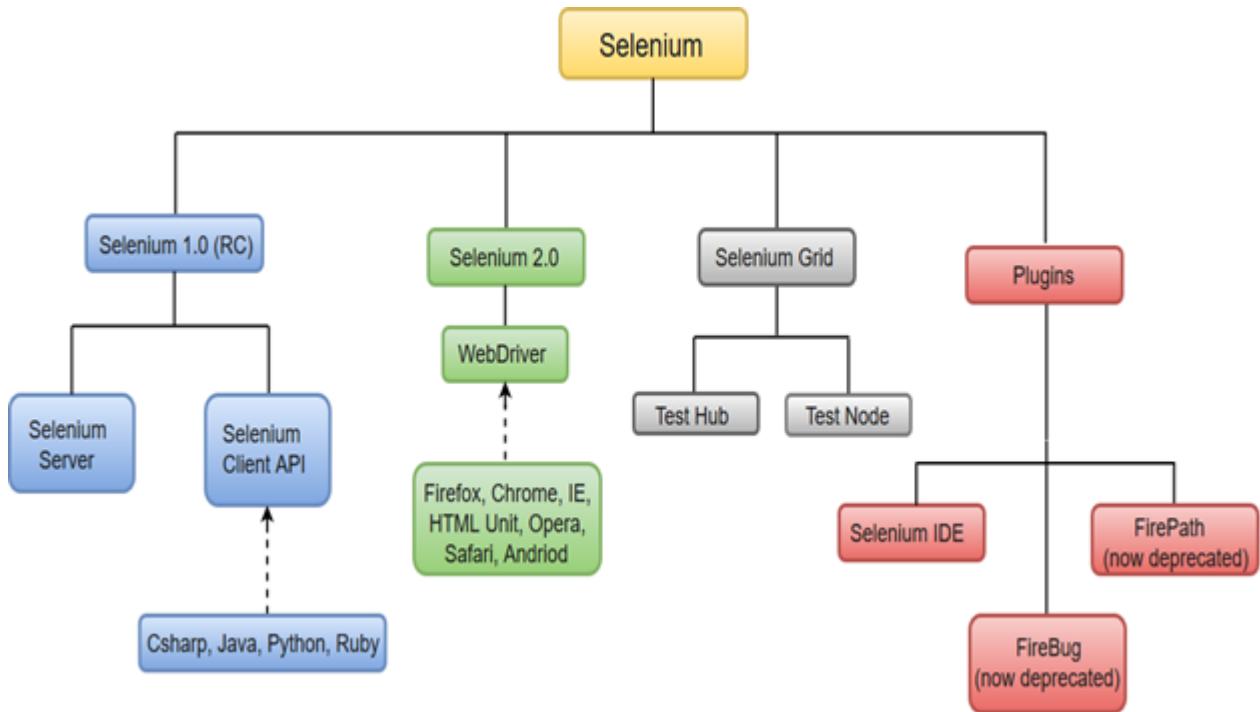
- Adopt an online tool: It is always better to adopt an online tool for cross-browser testing rather than building an on-premise lab. The cloud-based tools like Testsigma take care of all the new and old devices including the maintenance and networking part. With such a tool all you need to do is write tests and execute on the selected specifications.
- Document everything: To overcome not only the planning phase but a lot of other challenges, it is advisable to document everything in a report. This helps in keeping records, retrospect on previous steps, and creating an archive for each team member and beyond the department as well.

Along with this, it is also recommended to mix certain practices that you feel will save time in accordance with your testing patterns. Observing your style of testing along with generic methods provides fruitful results in the long term.

Selenium WebDriver Tool

Selenium WebDriver is the most important component of Selenium Tool's Suite. The latest release "Selenium 2.0" is integrated with WebDriver API which provides a simpler and more concise programming interface.

The following image will give you a fair understanding of Selenium components and the Test Automation Tools.



Selenium WebDriver was first introduced as a part of Selenium v2.0. The initial version of Selenium i.e Selenium v1 consisted of only IDE, RC and Grid. However, with the release of Selenium v3, RC has been deprecated and moved to legacy package.

In WebDriver, test scripts can be developed using any of the supported programming languages and can be run directly in most modern web browsers. Languages supported by WebDriver include C#, Java, Perl, PHP, Python and Ruby.

Before learning the concepts of Selenium WebDriver, you should be well versed with any of the supported programming languages. Currently, Selenium Web driver is most popular with Java and C#. For this tutorial, we are using Selenium with java. You can refer to the links given below to learn basic as well as advance concepts of Java and C#:

Selenium WebDriver performs much faster as compared to Selenium RC because it makes direct calls to the web browsers. RC on the other hand needs an RC server to interact with the browser.

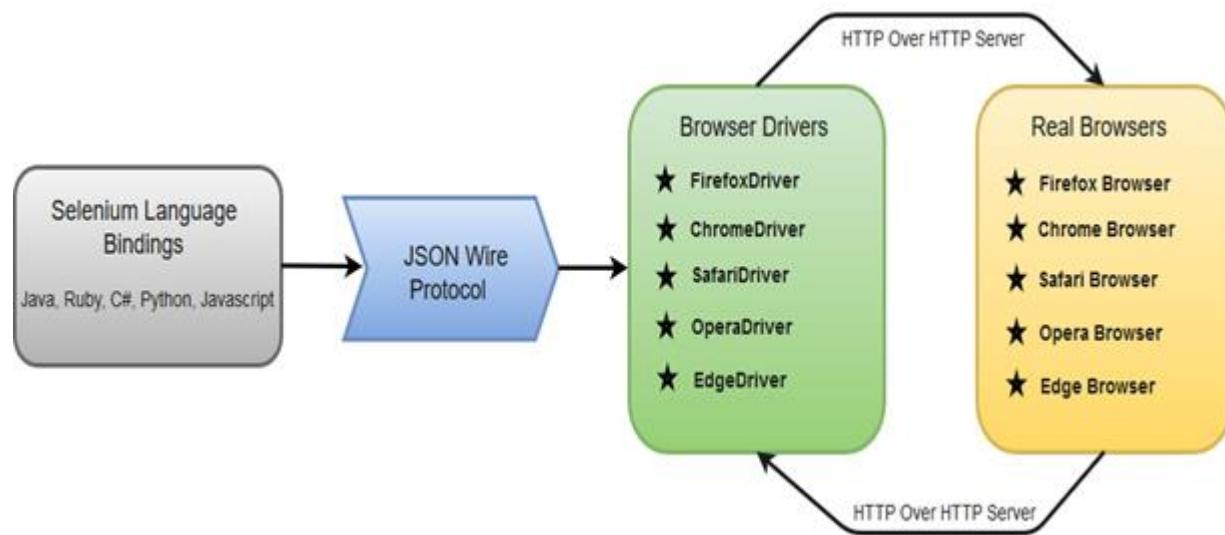
WebDriver has a built-in implementation of Firefox driver (Gecko Driver). For other browsers, you need to plug-in their browser specific drivers to communicate and run the test. Most commonly used WebDriver's include:

- Google Chrome Driver
- Internet Explorer Driver
- Opera Driver
- Safari Driver
- HTML Unit Driver (a special headless driver)

Selenium WebDriver- Architecture

Selenium WebDriver API provides communication facility between languages and browsers.

The following image shows the architectural representation of Selenium WebDriver.



There are four basic components of WebDriver Architecture:

- Selenium Language Bindings
- JSON Wire Protocol
- Browser Drivers
- Real Browsers

Browser Drivers

Selenium uses drivers, specific to each browser in order to establish a secure connection with the browser without revealing the internal logic of browser's functionality. The browser driver is also specific to the language used for automation such as Java, C#, etc.

When we execute a test script using WebDriver, the following operations are performed internally.

- HTTP request is generated and sent to the browser driver for each Selenium command.
- The driver receives the HTTP request through HTTP server.
- HTTP Server decides all the steps to perform instructions which are executed on browser.
- Execution status is sent back to HTTP Server which is subsequently sent back to automation script.

Browsers

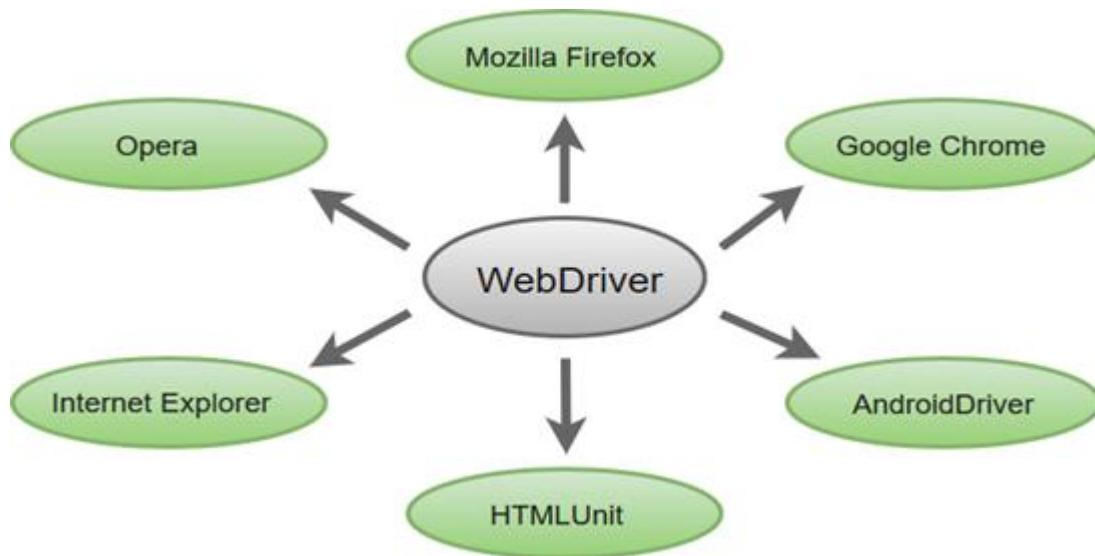
Browsers supported by Selenium WebDriver:

- Internet Explorer
- Mozilla Firefox
- Google Chrome
- Safari

Selenium WebDriver- Features

Some of the most important features of Selenium WebDriver are:

- **Multiple Browser Support:** Selenium WebDriver supports a diverse range of web browsers such as Firefox, Chrome, Internet Explorer, Opera and many more. It also supports some of the non-conventional or rare browsers like HTMLUnit.

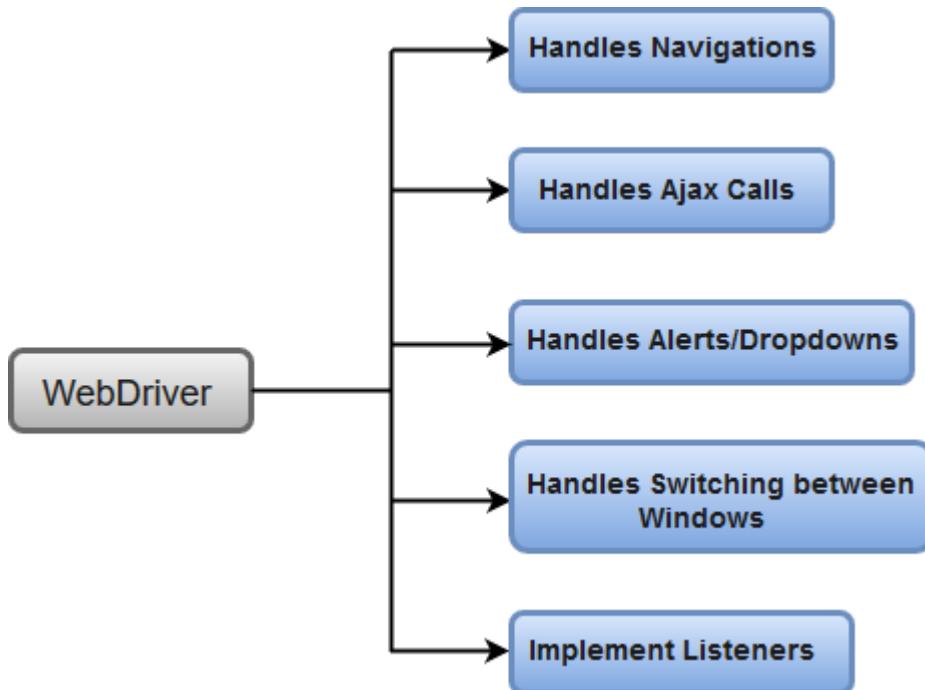


- **Multiple Languages Support:** WebDriver also supports most of the commonly used programming languages like Java, C#, JavaScript, PHP, Ruby, Pearl and Python. Thus, the user can choose any one of the supported programming language based on his/her competency and start building the test scripts.
- **Speed:** WebDriver performs faster as compared to other tools of Selenium Suite. Unlike RC, it doesn't require any intermediate server to communicate with the browser; rather the tool directly communicates with the browser.



- **Simple Commands:** Most of the commands used in Selenium WebDriver are easy to implement. For instance, to launch a browser in WebDriver following commands are used:
WebDriver driver = new FirefoxDriver(); (Firefox browser)
WebDriver driver = new ChromeDriver(); (Chrome browser)
WebDriver driver = new InternetExplorerDriver(); (Internet Explorer browser)

- **WebDriver- Methods and Classes:** WebDriver provides multiple solutions to cope with some potential challenges in automation testing. WebDriver also allows testers to deal with complex types of web elements such as checkboxes, dropdowns and alerts through dynamic finders.



What is Selenium?

Selenium is an open-source framework that is used to automate the testing process over web applications. The interface allows writing test scripts in various programming languages on web applications spread across several platforms and browsers.

One of the key aspects of Selenium is that it is not a single tool, but a suite of tools. The Selenium as a whole consists of four different tools, and each tool has its own set of specific features.

The four different tools are the following:

Selenium supports several browsers like Chrome, Safari, Firefox, Mozilla, etc. Then, there are multiple programming languages that can be used to create Selenium test scripts, such as Ruby, Python, Java, C#, etc.

Out of all the languages that could be used to write scripts in Selenium, Java emerges to be the most popularly used programming language.

There is just one tool that comes to mind when anyone thinks of automating the testing of web applications, and that's Selenium. [Selenium](#) is one of the most popular DevOps tools widely used today due to its supportive and excellent features. But, choosing a tool is not it; you have to choose the right [programming language](#) to be used with your tool, and this when Java comes to the rescue. This article will help you learn everything you need to know about how to use Selenium with [Java](#).

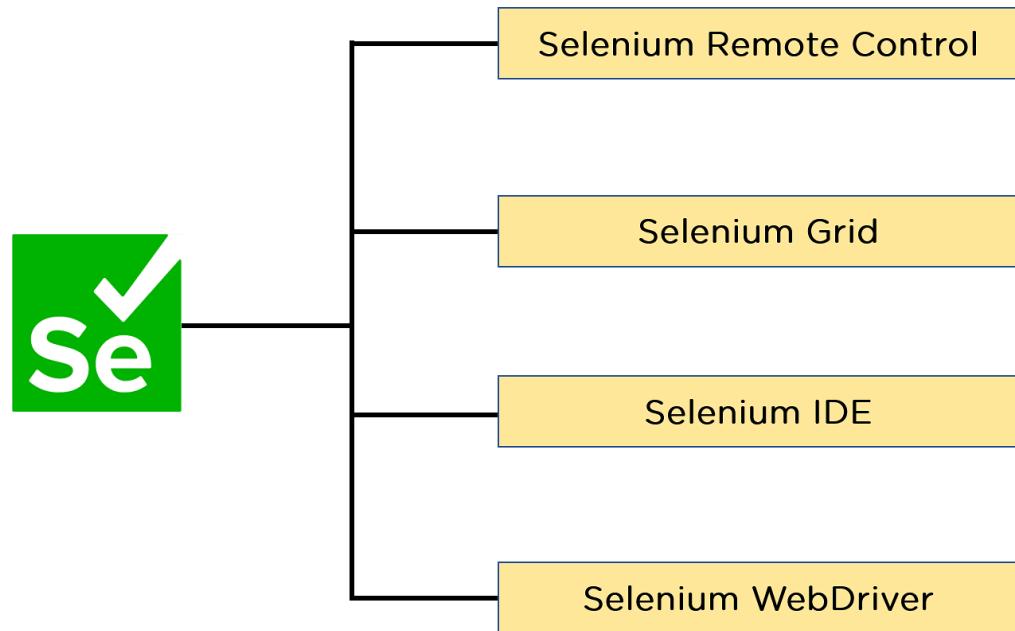
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Now, the question arises - why is this so?

Why is Java Preferred with Selenium?

Selenium and Java turn out to be a perfect blend to run automated tests on different web browsers. Java turns out to be the most preferred language by the professionals who use Selenium in their day-to-day lives.



Some of the reasons why Java is preferred with Selenium are:

- Java has a wide network of active software developers who actively contribute to writing test cases. This not only helps the Java community to grow but also helps the Selenium testers.
- The execution of programs is faster in Java as compared to any other programming language.
- Today, Java is more widely used than other languages, so integrating the Selenium tests with Java is comparatively easier.

Let's have a look at some steps needed to begin with using Selenium with Java.

Using Selenium with Java

This section shall explain all the steps needed to set and then run a test through Selenium with Java bindings.

Several components are a must-have for automation testing.

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Java Installation

-

The first and the most basic requirement to write and run Java programs is a Java Development Kit (JDK), which includes JRE or Java Runtime Environment.

To download and install Java, all you need to do is:

- [Download Java](#)
- Install Java
- Set the environment path.

Once this is done, to verify, go to the command prompt and type java -version. If Java is successfully installed, it will show the version of Java installed in your system.

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Eclipse Installation

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There is always a need for a platform where the developers can write and run their codes, and one such platform or IDE is Eclipse. Eclipse is the most sought after Java IDEs across the world.

To download and install Eclipse, all you need to do is

- Go to their official website and [download Eclipse](#).
- After downloading, extract the downloaded files.
- An eclipse.exe icon will appear in the Eclipse folder.

-

Selenium Client and WebDriver Language Bindings

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There are multiple languages that Selenium WebDriver supports and each of these languages have their client driver. Since we are concerned about Java, we require the ‘Selenium Java Client Driver’.

To download the client driver, you need to go to the [Selenium official website](#). There you can see several client drivers concerning different languages that Selenium supports:

Selenium Client & WebDriver Language Bindings

In order to create scripts that interact with the Selenium Server (Remote WebDriver) or create local Selenium WebDriver scripts, you need to make use of language-specific client drivers.

While language bindings for [other languages exist](#), these are the core ones that are supported by the main project hosted on GitHub.

LANGUAGE	STABLE VERSION	RELEASE DATE	ALPHA VERSION	ALPHA RELEASE DATE	LINKS
Ruby	3.142.6	October 04, 2019	4.0.0alpha7	November 10, 2020	Download Alpha Changelog API Docs
Java	3.141.59	November 14, 2018	4.0.0-alpha-7	November 10, 2020	Download Alpha Changelog API Docs
Python	3.141.0	November 01, 2018	4.0.0.a7	November 10, 2020	Download Alpha Changelog API Docs
C#	3.14.0	August 02, 2018	4.0.0-alpha07	November 10, 2020	Download Alpha Changelog API Docs
JavaScript	3.6.0	October 06, 2017	4.0.0-alpha.8	December 04, 2020	Download Alpha Changelog API Docs

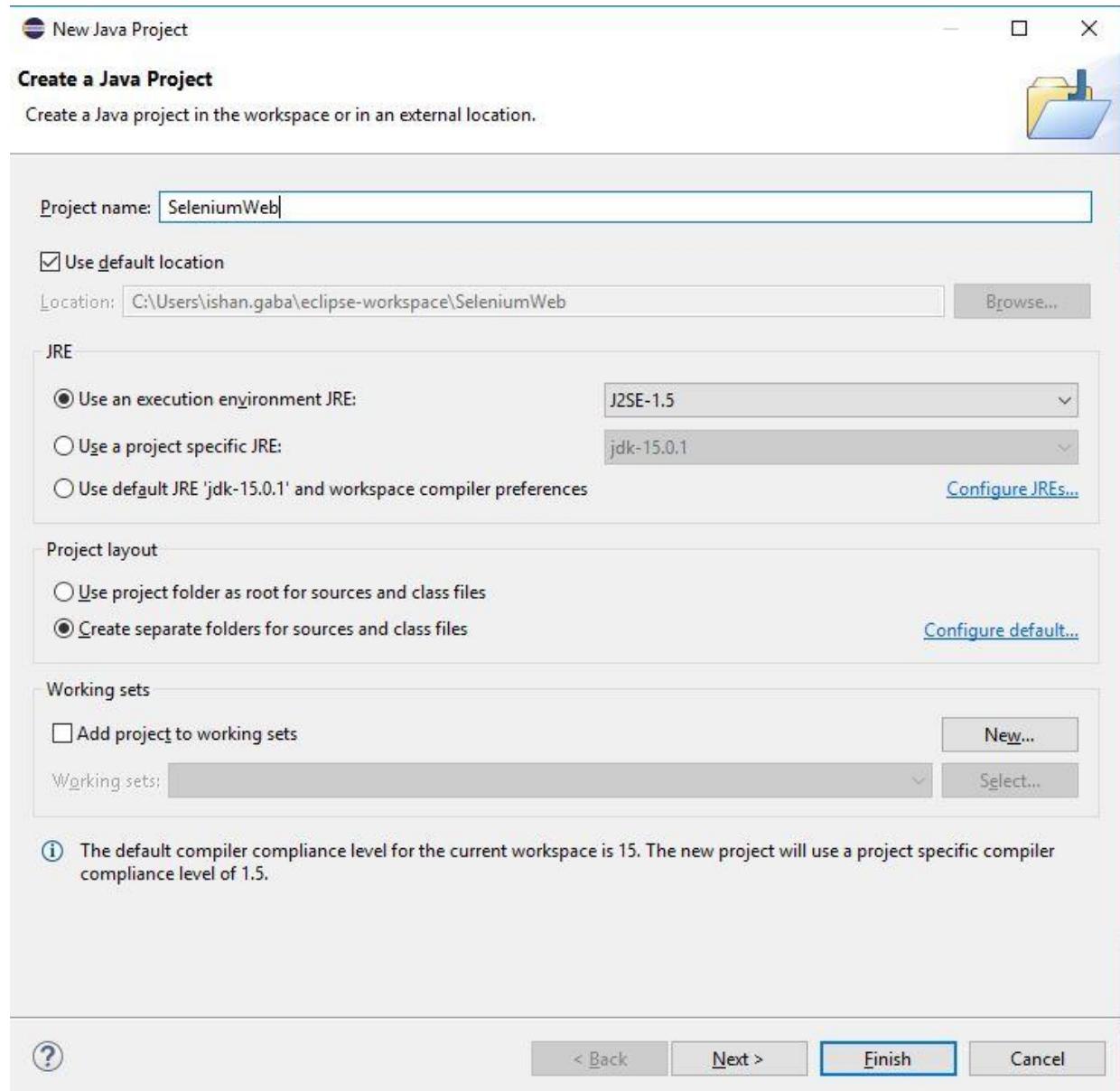
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Configuration of Selenium WebDriver with Eclipse

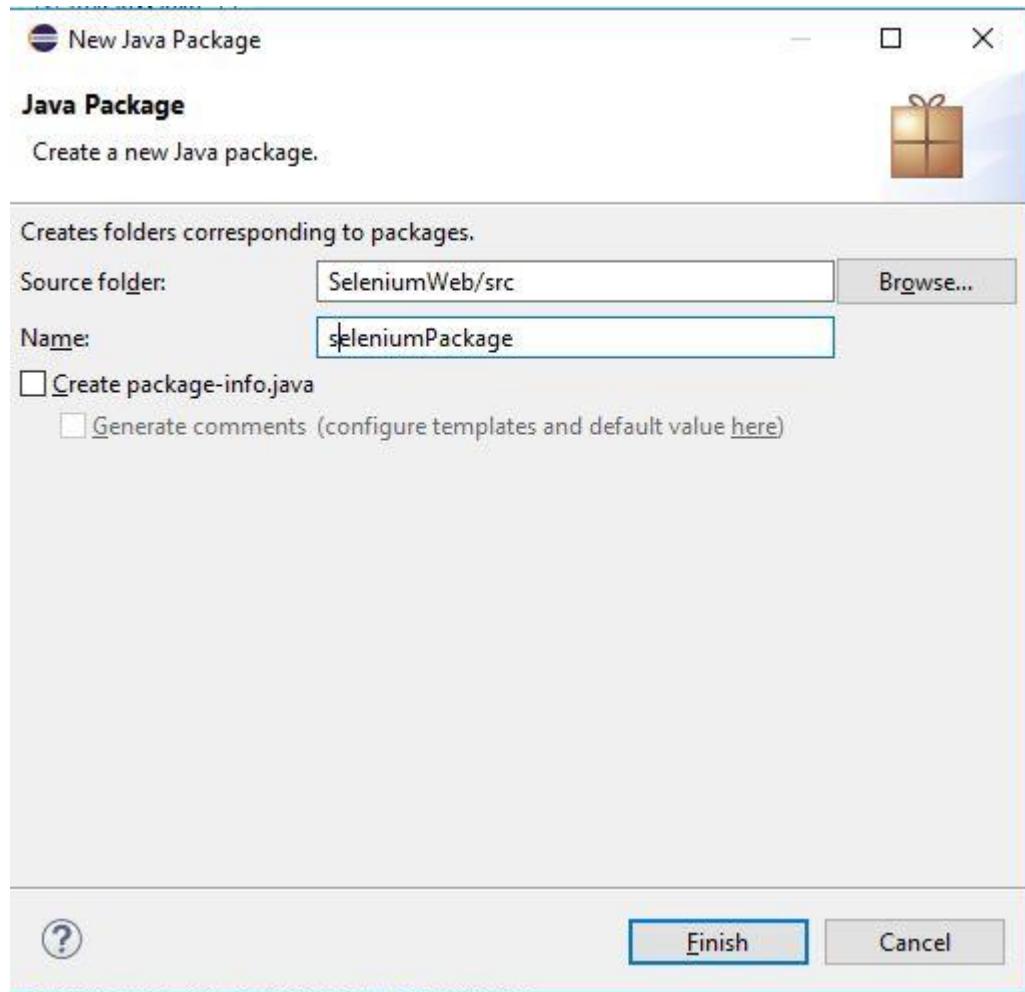
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This is the most crucial step to start with Selenium. The steps to configure Selenium WebDriver with Eclipse are:

- Launch Eclipse (Double-clicking on the `eclipse.exe` file).
- Create a workspace.
- Then, create a new Java project:
 - File -> New -> Java Project



- Then once the project is created, right-click on the project and create a package under it.
 - New -> Package



- Then, right-click on the package and make a new class.
 - New -> Class

After the class is created, it is time to add Selenium jar files to the project.

To add jar files:

- Right-click on the project folder and go to properties.
- In the dialog box that appears, navigate to the “Java Build Path”.
- Click on “Add External JARs”

Then add the jar files downloaded and click on “Apply and Close”.

Now, Eclipse is all set to execute any Selenium test script.

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First Test Using Selenium with Java

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The first script that we have used here is a simple script that opens 'facebook.com' on the Chrome browser.

To use the Chrome browser, it is necessary to have the driver executable.

To get the driver executable:

- Go to the official [Selenium website](#).
- Go to the third-party driver browser section.
- Download the executable for the specific browser.

After it is downloaded, all you need to do is put the code in your eclipse window.

Here's the snippet of the code we have used:

```
import java.util.concurrent.TimeUnit;  
  
import org.openqa.selenium.WebDriver;  
  
import org.openqa.selenium.chrome.ChromeDriver;  
  
public class SeleniumClass {  
  
    public static void main(String[] args) {  
  
        System.setProperty("webdriver.chrome.driver",  
                           ".\\Driver\\chromedriver.exe");  
  
        WebDriver driver=new ChromeDriver();
```

```
driver.manage().timeouts().implicitlyWait(10,  
    TimeUnit.SECONDS);  
  
driver.manage().window().maximize();  
  
driver.get("https://www.facebook.com");  
  
driver.close();  
  
}  
  
}
```

By now, you would have realized why Java is the most widely used programming language with Selenium. In the article, you learned the basics of Selenium and how Selenium can be used with Java. We also saw how to incorporate Selenium with Java with a hands-on demo, in which, towards the end, we saw how to run our first Selenium test script in Eclipse.

If you have any questions for us, let us know in the Selenium comment section with the Java article, and we shall have our experts answer them for you.

Choosing a language to run your automated tests solely depends on the developer or tester, or may vary depending on the project or that particular organization.

CONCLUSION

Automation testing is a gift in the testing world that automates the testing procedure and decreases human efforts. It's a new boom to the testing world if developers have to meet the fast-paced development deadlines in the software market.

Proper functioning of automation testing requires a professional team that chooses the best tool and exercises it. Automation testing with a variety of tools ensures the best quality product.

REFERENCES

Java Tutorial: <https://www.javatpoint.com/java-tutorial>

C# Tutorial: <https://www.javatpoint.com/c-sharp-tutorial>

Source: Automated Testing Goals & Objectives - QA Madness Software testing company