

END TERM MAJOR PROJECT REPORT

(27th February 2022 – 13th May 2022)

ON

IPM Product Testing With IPM

Project report submitted in partial fulfilment of the requirement for
the degree of Bachelor of Technology

Under the guidance of

Dr. Mrityunjay Singh

AT



COGNIZANT TECHNOLOGY SOLUTIONS

Submitted by:

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B. TECH (INFORMATION TECHNOLOGY)

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SESSION (2018-2022)



PROJECT REPORT UNDERTAKING

I Mr Karan Sharma Roll No. 181317 Branch COMPUTER SCIENCE ENGINEERING is doing my internship with **COGNIZANT TECHNOLOGY SOLUTIONS**.

As per procedure I must submit my project report to the university related to my work that I have done during this internship.

I have compiled my project report. But due to COVID-19 situation which has led to work from situation due to which my project mentor in the company is not able to sign my project report.

So, I hereby declare that the project report is fully designed/developed by me and no part of the work is borrowed or purchased from any agency. And I will produce a certificate/document of my internship completion with the company to Training and placement cell whenever the internship gets over.

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DECLARATION

Cognizant does not allow the project material to be used beyond the said guidelines, I Karan Sharma am aware and appropriately create the project report without violating any compliance.

Allocation of technology track depends on the following circumstances student capability, business demand and location where it can be offered. Students Progress is regularly monitored via various assessments namely Assess type 1 and Assess Type 2 which provides a weekly performance of a intern.

Learning curriculum as per the learning track assigned to the interns. The learning path include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, code SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. During the internship every interns progress were closely monitored by the coaches.

The projects completed in the internship duration will vary from development, to enhancements, research, scripting across technologies like Java, Selenium, TestNG, Agile, XML, SOAPUI, POASTMAN, RESTAPI, IBM BPM , Pega.

Projects in Service industry mostly require Digital skills. These projects were a combination of business aligned business case that cognizant delivers to its clients or internal projects to address Cognizant's business needs.

Internship is for a period of 3 to 6 months, during your 8th semester. The internship dates vary with the buisness unit demands.

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Certificate by Supervisor

This is to certify that the work which is being presented in the project report titled **“IPM Product Testing with Selenium”** in partial fulfilment of the requirements for the award of the degree of B.Tech in Computer Science And Engineering and submitted to the Department of Computer Science And Engineering, Jaypee University of Information Technology, Waknaghat is an authentic record of work carried out by Karan Sharma(181317) during the period from January 2022 to May 2022 under the supervision of Dr. Shubham Goel, Department of Computer Science and Engineering, Jaypee University of Information Technology, Waknaghat.

Karan Sharma

(181317)

The above statement made is correct to the best of my knowledge.

Dr. Shubham Goel

Computer Science & Engineering and Information Technology

Jaypee University of Information Technology, Waknaghat,

ACKNOWLEDGEMENT

It was a privilege for me to work as a full-time intern at “**COGNIZANT TECHNOLOGY SOLUTIONS**” under the supervision of Ms. Supriya SanthanKrishnan.

This report describes the training that underwent, for the duration of 27 February 2022 - 13th May 2022 at intern at “**COGNIZANT TECHNOLOGY SOLUTIONS**” an American multinational technology company that provides business consulting, information technology and outsourcing services. It is headquartered in Teaneck, New Jersey, United States. Cognizant is part of the NASDAQ-100 and trades under CTSI.

I would like to express our sincere gratitude of the all the people who have helped and supported me throughout. I am deeply indebted to Ms. Rohini Priya E (Programmer Trainee Techno Campus Office (TCO)STPI), Mr. Rakesh & Ms. Sonal (External Trainer & Mentor) and other fellow colleagues at **COGNIZANT TECHNOLOGY SOLUTIONS** for organizing an effortless internship program, efficiently and providing me valuable resources and for their cooperation and willingness to share their expertise and knowledge and to devote their precious time to discuss related topics.

The help and co-operation extended by the staff at **COGNIZANT TECHNOLOGY SOLUTIONS** is fully acknowledged. I thoroughly enjoyed my entire internship program and would like to thank everyone at **COGNIZANT TECHNOLOGY SOLUTIONS** for their guidance and support.

KARAN SHARMA
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ABSTRACT

This report describes the internship that I did with “COGNIZANT TECHNOLOGY SOLUTIONS”, Gurgaon Office, during the period of February to June 2022. The project assigned to me was “QUALITY ENGINEER WITH SELENIUM AND JAVA AND IPM”. The report itself sheds light on the various process and concepts I have learned as a full-time intern.

The primary objective of the internship was to learn software testing and automation using a web automation tool called “Selenium”. Selenium driver serves as an interface that allows programmer to write scripts in languages such as Python, JavaScript, Java, etc. to automate various tasks on browsers such as Chrome, Firefox, etc.

Quality engineering and assurance (QEA) is a subtype of quality management that incorporates ensuring that quality control measures and checks are applied at every step of product or software development. It's the act of having quality assurance (QA) and quality engineering

During the project Selenium driver along with java was to use automate testing of web applications. Also, JSON/XML formats were used to communicate with APIs and JavaScript was used for form validation in various hands-on task provided to us.

This internship will deal with testing the various functionality and working of the various websites. We will use JAVA and work with spring core, selenium, and sql to achieve good results and test every functionality.

CHAPTER I
INTRODUCTION

INTRODUCTION

ABOUT COGNIZANT

Cognizant (Nasdaq-100: CTSI) is one of the world's leading professional services companies, transforming clients' business, operating, and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build, and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 194 on the Fortune 500 and is consistently listed among the most admired companies in the world.

India is a crucial piece of our global business strategy, with global delivery centres in Mumbai, Bangalore, Chennai, Coimbatore, Gurgaon, Hyderabad, Kochi, Kolkata, and Pune.

Cognizant works in the information technology consulting domain by providing various services and products that help the businesses to grow.

Cognizant has generated a total Revenue of 18.5 Billion USD in 2021. And has emerged in the 185th spot in the Fortune 500 company's list in 2021.

Cognizant has various subsidiaries namely MarketRx, Soft Vision, Bolder HealthCare Solutions LLC, Cognizant Quick Left and much more .

Devbridge is one of the biggest acquisitions of Cognizant with a deal size of \$268 million on December 9, 2021.

About the Chief Executive Officer of Cognizant

Chief Executive Officer of Cognizant is Brian Humphries . His initial steps in the industry started from Compaq . He has also worked for organizations like Hewlett Packard . He began his journey in Hewlett-Packard as a Director of Financial Communications and further he also became the Vice President of Growth Markets Organization/Emerging Markets. He also offered his services on the post of President of Enterprise Solutions to Dell EMC. Further he joined Vodafone and served as its Chief Executive Officer. And further he brought his finest leadership to Cognizant and has been leading Cognizant as the Chief Executive Officer



COMPANY'S MARKET PRESENCE

Cognizant has been serving clients in every domain from automotive industry to the utilities industry. Cognizant has a very diversified client base .

Cognizant has provided its services to Disney which works in the media and entertainment market, Manchester United which is a sports club.

Cognizant has also served clients in Banking domains, Retail sectors ,Travel & Hospitality, Education Sector , healthcare sector and various other sectors. Cognizant has served a long list of clients and offered them there various IT services in order to serve there business demands.

SERVICES OFFERED BY COGNIZANT

Application Services & Modernization
Artificial Intelligence
Cloud Enablement
Cognizant Infrastructure Services
Cognizant Security
Core Modernization
Digital Engineering
Digital Experience

Enterprise Application Services
Internet of Things
Quality Engineering & Assurance
Digital Strategy
Business Process Services
Enterprise Services
Industry & Platform Solutions
Intelligent Process Automation

Business Aligned Project is providing for an experience of real time problem solving in Agile methodology.

Cognizant has collaborated with Udemy to provide world class learning videos for the evolving future of work. These Udemy programs are woven into a learning path, empowering you to plan and learn at your style.

The program also connects you with Subject Matter Experts to get the professional guidance on your queries in the learning journey.

COGNIZANT IN INDIA

On 20 Jan 1994 Cognizant registered its branch in Chennai, Tamil Nadu, India with the legal name Cognizant Technology Solutions India Private Limited. The other centres of the company are in Bangalore, Chennai, Coimbatore, Gurgaon, Noida, Hyderabad, Kochi, Kolkata, Mangalore, Mumbai, and Pune.

Cognizant is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. On its 2021 rankings of Top Companies, LinkedIn ranked Cognizant #2 in India. LinkedIn said that the Top Companies are investing in employee success, career development, and equity and inclusion to ensure they continue to be among the best workplaces for employee growth now, and in a post-pandemic world.

"We are happy to be named to the LinkedIn Top Companies list in India," said Rajesh Nambiar, Chairman and Managing Director, Cognizant India. "As we transform the companies the world relies on, our people are our differentiator. We are focused on supporting the many ways our associates can make a positive impact at Cognizant – on their clients, on society, on each other and on their own lives."

Cognizant Named a Top Employer in India by LinkedIn and Forbes Magazine, Launches Humanitarian Effort, Operation C3, in Support of India's Fight Against COVID-19

Cognizant commitment to Indian society stems from the long-term presence in the country and the over 200,000 Indian associates to whom the company owes much of its success. Earlier this week, Cognizant made a new commitment: to help the country and its people overcome the humanitarian crisis created by the pandemic. Named Operation C3: Cognizant Combats COVID-19, the effort includes donations of \$1.5 million (approximately INR 10 Crores) through the Cognizant Foundation to operationalize response efforts with partners across India; and an additional \$2 million (approximately INR 15 Crores) in emergency funding to UNICEF in India to help address acute shortages in life-saving oxygen, and to deploy medical and testing supplies.

In addition to the above, earlier this month, Cognizant announced that it would cover the vaccination cost of more than 600,000 people in India, including its more than 200,000 full-time employees and their dependents in the country, as well as approximately 50,000 people comprising contingent staff such as contract, support and security personnel, and their families.

Cognizant has notched two other "Best Employer" accolades in recent months, both awarded by Forbes Magazine: "World's Best Employers" and "Best Employers for Diversity."

"We are incredibly proud to be named to these Forbes lists for Best Employers," said Shantanu Jha, Chief People Officer, Cognizant India. "For us, it means that we are creating conditions where every person can thrive, and we work relentlessly to ensure we lean into that commitment. Through our network of associate groups, Diversity and Inclusion programs and leadership accountability measures, we are ensuring our people feel connected to the organization and to one another. We want them to feel empowered to share their ideas and perspectives, and comfortable showing up as their true and authentic selves."

Cognizant India is one of the most prominent global distribution centres for Cognizant Technology Solutions, and it plays an important role in market outsourcing services in addition to consultancy and IT-related solutions.

ABOUT COGNIZANT ACADEMY

As Cognizant continues its path to become ‘fit for growth,’ Cognizant Academy contributes towards that goal by enabling associates who would make that happen.

Being the in-house learning and development wing of the organization, Cognizant Academy is focused on making associates future-ready through role-based and business-aligned learning solutions.

Generation Cognizant (Gen C) Program encourages you to be more autonomous learners during guided self-learning hours, completing the learning objectives on your own pace and style, and get ready for the hands-on practice time



Figure 1: Academy at a glance

Gen C learning program engages young talents with a comprehensive learning pathway, giving the millennials an opportunity to interact with Subject Matter Experts (SME), understand the corporate environment, and groom themselves.

Cognizant emphasizes on Learner Autonomy where students take charge of their own learning, with the available tools and resources. More focus is on “learning” than “teaching”. Get ready to embark your own learning adventure.

Cognizant Academy’s goal is to create a vibrant learning culture and climate, Academy embodies the spirit of collaboration between the organization and individual associates to realize one common aspiration

PROGRAM HIGHLIGHTS

- The complete learning journey is formalized using adult learning principles, where problem solving and applying the skills gained are given more importance than conceptual learning.
- Learner Autonomy is encouraged via Flipped Classroom, where the learning platform offers world class learning resources, and students would not be constrained by tutelage of an instructor.
- Get mentored by SME, whose motivation and guidance will help you accelerate in the learning journey.

This program encourages you to be more autonomous learners during guided self-learning hours, completing the learning objectives on your own pace and style, and get ready for the hands-on practice time.

SELF-LEARNING TIME	PRACTICE TIME
Going through the Learning Objectives	Getting guidance from Subject Matter Expert
Trying to accomplish the learning objectives by accessing learning resources	Deep diving on to the learning concepts and solve a problem statemen

LEARNING JOURNEY

The learning journey contains 2 stages, followed by a Business Aligned Project.

STAGE 1 –QEA BASICS

- Functional Testing and Soft Skills
- Java Programming and Soft Skills
- Web UI, Data Source and Soft Skills

STAGE 2 –SELENIUM WITH PEGA LEARNING PATH.

- Pega Training
- Configurations, WebDriver basics with Pega
- Selenium Automation Techniques with Pega
- Selenium Web driver With POM and Apache POI with Pega
- Automation Testing - Selenium with TestNG
- Digital Technologies

Business Aligned Project is providing for an experience of real time problem solving in Agile methodology.

Cognizant has collaborated with Udemy to provide world class learning videos for the evolving future of work. These Udemy programs are woven into a learning path, empowering you to plan and learn at your style.

The program also connects you with Subject Matter Experts to get the professional guidance on your queries in the learning journey.

The program continuously evaluates if you can apply those self-learnt skills to solve a business problem. Depicted below are the three key learning components, which are distributed across the learning journey for the purpose of continuous evaluation.

SCHEDULING OF LEARNING COMPONENTS

The overall duration of this program is 12 weeks. From the day 1 of the program, every day will have some learning components to be completed by the GEN C.

The detailed student handbook will have the day-wise schedule. All the learning components have to be completed as specified in the day-wise schedule. These components will be auto scheduled in your specific learning paths as per the given schedule.

INNOVATIVE LEARNING MODELS IN 2020

The Gen C (Generation Cognizant) Program stretches across the entire timeline of a campus hire's learning journey from the time he/she accepts the offer letter from the company -to the first year of his/her tenure in the organization. There is a robust learning strategy put in place across each of the stages.

- Modern Flipped Classroom
- Branding @ Campus Events
- Leader Engagement
- Heartfulness Workshops & Webinars Active Volunteering

LEARNING RESOURCES TO ACCESS FROM HOME

1. For Classroom Learning



2. For Self paced Courses



3. For Pega Learning



4. Classroom Experience



TECHNICAL COURSES AND BEHAVIORAL TRAINING

Course Name	The Complete 2022 Software Testing Bootcamp
Course Type	Software & Business Courses
Course provider	Udemy
Instructors	Tarek Roshdy, QA Engineer
Requirements	<ol style="list-style-type: none"> 1. No prior knowledge about the field is required 2. Basic computer & mobile using skills (you need to be able to use them as an end user) 3. Good knowledge of English Language
Course Content	<ol style="list-style-type: none"> 1. Basic Concepts of Software Testing 2. Test case & Bug Report Writing 3. Black-Box Test Techniques 4. Requirements Review & Test Scenarios Writing using Trello 5. Implementing the test process on a Test Management Tool (Testlink) 6. Basics of Agile methodologies & Agile Testing 7. How to use Application Lifecycle Management Tool (JIRA) 8. White-Box Test Techniques 9. Basics of API Testing

Course Name	Selenium Webdriver MasterClass
Course Type	Software and Buisness
Course provider	Udemy
Instructors	Nan
Requirements	Absolutely none.
Course Content	<ol style="list-style-type: none"> 1. TestNG and Selenium WebDriver 2. JUnit / TestNG, ANT, Report generation, batch execution SVN and MAVEN 3. Github 4. Continuous Integration - Jenkins / Hudson 5. Data-Driven Framework 6. Hybrid (Keyword + DataDriven) Framework 7. Page Object Model with factories 8. Java Collection Framework 9. Cucumber Framework Designing

Course Name	Postman API Testing
Course Type	Software and buisness
Course provider	Udemy
Instructors	Raghav Pal
Requirements	None
Course Content	<ol style="list-style-type: none"> 1. Introduction 2. Collections 3. Variable 4. Environments 5. Test Scripts Creation 6. Data Driven Testing 7. Authorization 8. Command Line and Jenkins 9. Workspaced Monitors documentation 10. Remote Execution 11. Soap Api Testing 12. Api Chaining 13. Mock API

Course Name	WebServices/Rest API Testing with SoapUI +Real time Projects
Course Type	Software and buisness
Instructors	Rahul Shetty
Requirements	None
Course Content	<ol style="list-style-type: none"> 1. Understand the nature of email communication 2. Understand the importance of knowing intended audience 3. Know appropriate structures for email messages 4. Know strategies for managing email inbox

Course Name	Learn API Technical Writing:JSON and Xml for Writers.
Course Type	Udemy
Instructors	Peter Gruenbaum
Requirements	<ol style="list-style-type: none"> 1. No prerequisites for this course - A computer with Internet
Course Content	<ol style="list-style-type: none"> 1. Introduction 2. Json 3. XML

Course Name	Java Database Connection: JDBC and MySQL
Course Type	Software and Buisness
Instructors	Chad Durby
Requirements	None
Course Content	<ol style="list-style-type: none">1. Introduction2. Getting Started with JDBC3. Performing Basic JDBC Operations4. Calling Stored Procedures5. Transactions and MetaData6. Handling BLOBs and CLOBs7. Database Configuration

CHAPTER II
LITERATURE SURVEY

LITERATURE SURVEY

Document [4] [5] contains a detailed description of how the selenium tool works [7]. Gojare et al. Provided the Selenium Framework Utility section, steps to generate screenshots, different types of test kits, how to customize test reports, and finally a result to customize reports [8].

[5] [6] The Selenium server consists of a server component that is used to accept requests from the Remote Web Controller class of Selenium clients. Driver API for running tests for web browsers on a server. The final component is Selenium Grid, which Selenium Server implements in command line options for grid functions.

It contains a central hub and nodes for numerous scenarios and preferred browser functions. .Grid is a tool that allows parallel tests to be run on different computers and different browsers at the same time, which affects the minimized execution time.

EXAMINATION OF RESULT

After the test run, the result can be checked in the recording field. It shows that the test case passed and there is no error. When the test case is executed, error messages and information are displayed showing the development in the log.

Panel repeating even though the Record tab was not selected. These messages are often useful for debugging test cases. The Delete button deletes the recording and the Information button allows you to select different levels of information to be recorded. The Reference tab is the default selection when entering or changing Selenium commands and parameters in Table mode. 18 of 44 Documentation for the current command is displayed in table mode. When entering or modifying commands in either table or source mode, it is very important to confirm that the parameters specified in the Target and Value fields must match the parameters specified in the Parameter List in the Reference window.

RESEARCH QUESTION

How does the Selenium Framework reduce the time required for quality assurance?

The aim of this research [3][4] is to measure the time efficiency that the Selenium Framework offers when implemented in the test suite. Test suite in the case of a company.

Finally, the investigation comes to the benefit of using the Selenium framework for automating tests based on the statistical result.

In addition, the thesis aims to provide a complete guide for the implementation of the Selenium framework with language programming (Java) for testing web application automation.

This thesis suggests an explanation for the above problem (the need for test automation). However, it is not certain that this is the only contributing factor to the problem. From there, the author conducts research to identify the real cause of the problem with openness to new hypotheses or ideas (Shuttleworth 2008). With all these factors in mind, the work uses an abductive research approach.

The author of the above thesis chooses Design Science as the research method for the following reasons:

First, it is a research method that includes a solution approach and increases the need for change towards a better future (Barab & Squire 2014. Second, design exists from a research practice to create an artifact to solve the specified problem, analyze the result, and demonstrate the findings to the audience (Peffer,

Tuunanen, Rothenberger & Chatterjee 2008, 6) .The researcher then makes a proposal for development A thorough evaluation of the artifact and is then performed to arrive at a conclusion on the results.

There are five different methods for evaluating data in Design Science . For the purposes of this work, an observational method is used to collect data and a descriptive method with scenarios to analyze their performance.

Throughout the development progress, the author keeps track of field notes, memos, behavioral logs, or triggers during the observations. The data is then analyzed under a descriptive scenario and compared to previous behavior before developing the artifact to measure the effectiveness of the artifact. and restriction.

The author of the work observes and collects the time data required to run the test suite. Out of 50 use cases, there are 44 automation test cases, as there can be more than one assertion in a test case. This means that there are test cases that have the same initial state.

After working a lot on various cases the author has found how to make out one condition for comparing thee two scenarios.

Following are the conditions:

Given that in two months of development (four sprints), one developer needs to perform the entire functional testing for four times each sprint, the Equation 1 refers to a method of calculating the time he/she needs to spend on:

CHAPTER III
SYSTEM DEVELOPMENT

SYSTEM DEVELOPMENT

SOFTWARE DEVELOPMENT LIFECYCLE

A Software Development Lifecycle Model tells us about the types of activities executed at every stage in a software development project, and how the ventures relate to one another aptly and chronologically.

1. SDLC is the elision of Software Development Life Cycle.
2. It is furthermore called as Software Development Process.
3. SDLC is a complex set apart assignments executed at each parade in the product up gradation measure.
4. ISO/IEC 12207 is a global typical for programming wheel of life measures. It is said to be
5. the streamer that sets every one of the assignments needed for fabricating and looking after programming.

TYPES OF SDLC

1. Sequential
2. Iterative and Incremental

SEQUENTIAL SOFTWARE DEVELOPMENT

A sequential development model expresses the software development process as a continuous, progressive flow of activities. This implies that any stage in the advancement, interaction should start when the past stage is finished. In principle, there is as such no cover of stages, yet by and by, it is useful to have early input from the accompanying stage.

ADVANTAGES	DISADVANTAGES
1. Cost Effective	1. Rigid
2. Less time taking	2. Absence of central authority
3. Suitable for different geographical positions	3. Lack of intuitiveness
4. It's linear	4. No centrality of the client
5. Maximized customer satisfaction	
6. No pre knowledge required	

WATERFALL MODEL

In the Waterfall model, the maturing ventures are completed one after another. In this model, test ventures only occur after all other maturing activities have finally been out righted. Its diagrammatic portrayal looks like a course of cascades.

V-MODEL

Disparate the Waterfall model, the V-model mingles the test operations all round the development process, executing the principle of before time testing.

Agile



SCRUM

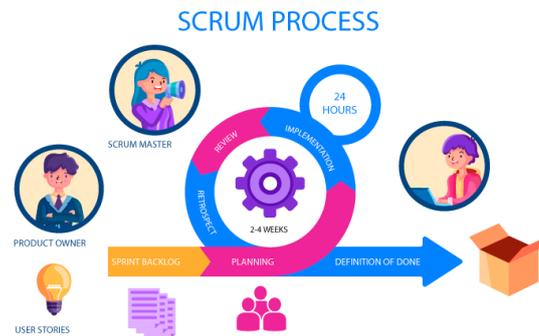
Scrum is basically a framework developed for project management which increases the efficiency and productiveness of business Units.

Scrum is a framework for developing and delivering products in a diverse and complex environment.

Scrum consists of various sprints. Each Sprint has a duration of 1-4 weeks.

Scrum further consists three roles that are :

1. Scrum Master
2. Product Owner
3. Development Team

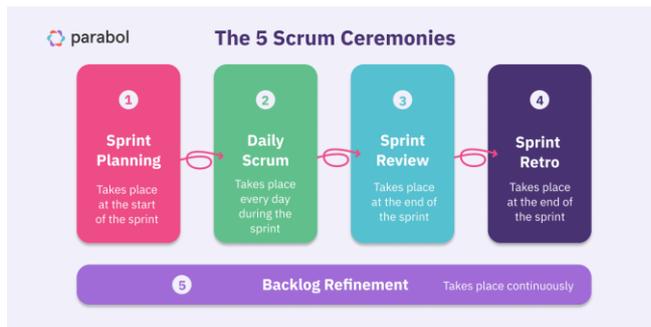


Each replay assumes to be rather small (e.g., hours, days, or a few weeks), and the trait redoes are correspondingly trivial, such as one or two intensifications and/or hardly some new features.

Scrum Ceremonies

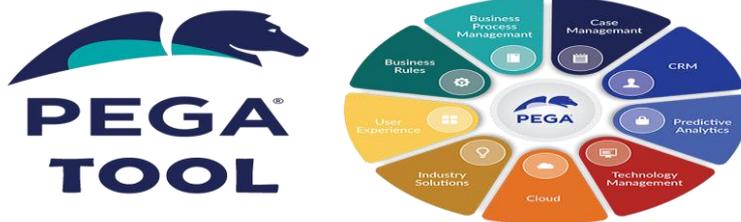
There are four scrum ceremonies in a sprint. Following are the scrum ceremonies:

1. Sprint Planning
2. Daily Scrum
3. Sprint Review
4. Sprint Retrospective
5. BackLog Refinement



Pega

Pega is basically a Business process management tool Used by various businesses in order to support their working . And therefore and low code demanding tools used by various organizations to fulfill there business demands. Due to various tools and services that pega has been offering its clients has made pega quite popular among the tech giants in the IT service industry.



INCREMENTAL AND ITERATIVE DEVELOPMENT

Incremental Model is an interaction of programming advancement where prerequisites isolated into numerous independent modules of the product improvement cycle. In this replica, every single module goes through the necessities, intent, execution, and trial stages. Each ensuing advent of the segment adds magnitude to the earlier discharge. The interaction gets going until the entire skeleton attains.

In the Iterative Model, you can begin with a portion of the product determinations and build up the main adaptation of the product. After the main form on the off chance that there is a need to change the product, another rendition of the product is made with another emphasis. Each arrival of the Iterative Model will result in a definite and fixed period that is called cycle.

This replica sanctions the coming by to antecedent stages, in which the diversities made discretely. The rearmost yield of the venture recharged towards the varnish of the Software Development Life Cycle measure.

SOFTWARE TESTING

Software testing can be called as an affair which comprises several distinct activities or jobs. Of which execution is only one of these jobs

Software testing does the following:

1. gauges the quality of the software
2. risk of software failure in operation is reduced
3. Software Testing \neq Test Execution

TEST PROCESS

There is nobody with an all inclusive programming test measure, yet there are basic arrangements of test exercises without which testing will be more averse to accomplish its set up destinations.

TEST LEVELS

Test levels are gatherings of test exercises that are coordinated and overseen together. Each test level is an occasion of the test interaction. Test levels are identified with different exercises inside the product improvement lifecycle.

Testing Principles:

- (i) All tests should adhere to the customer's specifications.
- (ii) We need to hire a third party to test our programme.
- (iii) Exhaustive testing is impossible. Because we require the most testing possible based on the application's risk assessment.
- (iv) Before doing any tests, make sure they are all set out.
- (v) It follows the Pareto rule, which claims that 80% of software mistakes are caused by 20% of programme components.
- (vi) Begin with little parts and work your way up.

Types of Testing:

1. Unit Testing It concentrates on the tiniest aspect of software development. We test a single unit or a collection of interconnected components. The programmer frequently does this by using sample input and watching the accompanying outputs.

2. Integration Testing The goal is to take unit-tested components and use them to create a design-driven programme structure. Integration testing involves combining a number of components to generate a result.

(a) Testing in a Black Box: It's a validation tool.

We disregard the internal working mechanisms and concentrate on the result.

(b) White Box Testing:

- It's a verification tool.

This section is concerned with internal mechanics, or how the output is generated.

3. Functional Testing Functional testing is a sort of testing that aims to determine whether each application feature functions in accordance with the programme requirements. The result of each function is compared to the relevant requirement to see if it meets the end user's expectations.

TEST CASE WRITING

A bunch of preconditions, inputs, activities (where relevant), anticipated outcomes and post conditions, created dependent on test conditions. It involves

- | | |
|--------------------|---------------------|
| 1. Test Case Title | 2. Pre-Conditions |
| 3. Test Steps | 4. Expected Results |
| 5. Test Suite | 6. Test Environment |
| 7. Actual Results | 8. Status |
| 9. Defect Report | |

Defect Report - Documentation of the event, nature, and status of a deformity. Wherein a blemish or inadequacy in a work item where it doesn't meet its prerequisites or particulars is a deformity.

HTML

Originally, HTML was developed with the intention of defining the structure of documents such as headings, paragraphs, lists, and so on. facilitate the exchange of scientific information between researchers.

HTML describes the purpose of text. Then, it's up to the web browser to know what to do with that text.

Today, HTML is widely used to format web pages using various tags available in the HTML language. HTML is a MUST have for college students and professionals to become a great software developer, especially if they are in the web development field.

1. Creating a Website: We can create a website or customize an existing web template if we know HTML well.
2. Web Designer: HTML and CSS design is an essential skill for web designer. To increase the speed and performance of your website, it is good to know HTML for the best results.
3. Other Languages - Once one is familiar with the basics of HTML, other related technologies such as Javascript, PHP, or Angular will become easier to understand.

Hyper Text Mark-up Language - 5 is another protocol to HTML that allows us to create fun and intelligent web pages using HTML tied to the 2004 advanced usage universe. HTML consists of simply presenting the fundamentals of The Book That Is Integrated with the Web to introduce sound and video to allow for separate utilities, geographic areas, and neighborhood stores for client-side data. With the improvement of HTML-5, it has a wide range of uses in the mixed media header [6]. Incentive for website specialists and engineers. Cross-level HTML-5 HTML-5 strengthens the cross-level display of website pages on PCs, tablets, smartphones and smart TVs. HTML-5 is still a busy design and there are fewer program architects. Websites also receive HTML5 components. HTML5 also strengthens territory administrations, open organizations, for example SVG and XML dataset agreements, and excellent illustration too. The main preferred position for designers and programs is to have the option to achieve more without having to do or allow numerous exclusive advancements to create large website pages, updated structures, and online applications.

HTML stands for hypertext markup language and it is the standard markup language for creating web pages and web applications it is also used to describe the structure of web pages using markup now the html5 is basically the fifth version of HTML and is a core technology markup language of Internet that is used for structuring and presenting the content for worldwide web now the html5 standard was finalized and released in 2014 and it is exactly what HTML should have been.

One very important application of HTML is for Elements inspection or locating elements.

Everything we see on the web page like button, link, text, drop box etc is an element. Before automating the elements or make any any actions on the elements, we need to locate them. When we locate the elements using HTML, Selenium can take action on them and perform required tasks.

XPATH

Xpath is basically a query language or syntax which is used to find a node or a set of nodes in either an XML or HTML document.

Localizing a web part has always been the most important part of developing automation scripts. Finding a correct, effective, and accurate tracking device has always been the pain point in any automation test development process. It has made QA engineers to think beyond ID, Name, Class, Link, or TagName as locators. XPath has always been a popular locator among QAs, especially for locating dynamic elements. XPath in Selenium offers various xpath functions and axes (relationships) with which effective XPaths of web elements can be written and a unique locator for web parts can be defined.

We can create XPath using

1. Attributes	2. Texts
3. Dynamic elements	4. Combining text and attributes
5. Using parent-child relationship	6. Using ancestor-descendant relationship

ABSOLUTE XPATH VS RELATIVE XPATH

RELATIVE XPATH

This involves searching in the whole document with the help of specific attributes, text or using relationships to make searching possible when unique text, attributes or other elements are not available. There are different ways to search for elements using Relative XPath as is mentioned in the previous section.

ABSOLUTE XPATH

This approach requires providing starting point to the root and provide all the child and descendants tags with precision and without missing any of them which can prove to be risky in the future. This is because a web page is dynamic and we won't be able to locate the elements as they will not stay in the same position.

COMPARING ABSOLUTE XPATH AND RELATIVE XPATH FOR USAGE ON A WEB PAGE IN REAL TIME

Since we must provide a precise information about the element when using Absolute XPath and failure to do so can result in huge errors for the future, this XPath is not recommended for usage on a real time application or web page which involves a dynamic nature of elements that keep changing positions.

Due to this particular reason, Relative XPaths are preferred to be used more often for locating or inspecting elements on a dynamic web page which is what exists in a real time scenario.

XPATH FUNCTIONS

When working in a dynamic web environment, we find it hard to locate a specific web part using common attributes like name, class, and so on. Several different elements might be having similar properties, e.g. same types of names or class names. XPath features that exist may not be very efficient because in such a case a simple XPath could return more than a single element. To overcome these kind of scenarios, XPath in Selenium provides XPath functions that can be used to write effective XPaths to uniquely identify elements.

1. Contains()
2. Starts-with()
3. Text()
4. AND operator
5. OR operator

CSS SELECTORS

Cascading style sheets which is a way of describing the presentation of the elements in a web page. Basically, the CSS selector combines an element selector and a selector value that can be used to identify certain elements on a website. As with XPath, the CSS selector can be used to find web parts with no ID, class or name. They represent representations of strings of HTML tags, attributes, ID and class.

Finding an element on the web page can be a challenge, especially in today's scenarios where all other web pages are dynamically planned and the web parts created / rendered based on that needs to be dynamic. The static attribute for a dynamic element is quite difficult. Like most of the time, these elements do not have consistent attribute values. Therefore, the direct use of locators such as ID, name,

link, partial link etc. is not possible. Finding the correct web part is the prerequisite for creating a UIbased automation test script, especially a Selenium automation script.

This is where CSS selectors come in because CSS is powerful enough to identify most of the web element present on the website. It can also identify elements that do not have constant attribute values, which makes it the first choice for any automation designer. Because it's closer to the code, it's considered one of the fastest ways to find items on a web page. Now let's see how to syntactically create a CSS selector for a web part.

So it is basically a way of locating the elements so that styling can be provided to the elements and some actions can be taken on the elements and data can be retrieved from them which can be used for testing purposes.

JSON & XML

JSON and XML are used widely in API technical writing

API

Application Programming Interface defines how two or more pieces of software talk to each other. It emphasizes how multiple devices can interact with each other.

Good API documentation is also important.

JSON and XML are two types of structured data that doesn't necessarily fit into a table (eg a tree) XML is basically based on HTML. JSON is also popularly used.

COLLECTIONS

With involvement of data types, structured data also consists of groups of data. For eg an array or dictionaries. In structured data, we can have:

1. Dictionaries of lists
2. Lists of Dictionaries
3. Dictionaries of Dictionaries
4. Any levels or combinations

We can have complex trees of data. API responses almost always have structured data involved. But API requests can only sometimes have structured data

JSON

1. JavaScript refers to a programming language
2. JSON was created to hold the structured data to be used in JavaScript
3. Lately JSON has been used in all kinds of applications
4. It has now become a popular way of sending data for the Web APIs.

JSON has become popular due to evolving digital environment and efficiency turning a key characteristics of businesses to make things work with reduced resource utilization and productive orientation.

JSON mostly consists of various data types like Strings, numbers, booleans and Nulls. It also consists of arrays, objects and nesting of all these structures. We can put arrays inside objects, objects inside arrays, arrays inside arrays and so on. Often, a JSON file is one big object with lots of objects and arrays inside.

It accepts a variety of data types, including Strings, numbers, booleans , and Nulls. Arrays, artifacts, and the nesting of these two constructs are also supported. Arrays may be placed within objects, arrays within objects, arrays within arrays, and so on. A JSON file is usually one large object containing several objects and arrays.

XML

Full Form of XML is Extensible Markup Language. It is a text-based markup language derived from the Standard Generalized Markup Language (SGML). XML tags identify the data and are used to store and organize the data instead of specifying how to display it as HTML tags. It is used to display the data. XML will not replace HTML in the near future, but it does open up new possibilities by taking over many successful HTML functions. There are many important functions of XML that make it useful in a variety of systems and solutions - XML is extensible - XML allows you to create your own self-describing tags or languages to suit your application. XML contains the data, it doesn't present it - XML lets you store the data regardless of how it is presented. XML was initiated by an organisation named as the World Wide Web Consortium (W3C) and is made available as an open standard.

When it comes to API requests, they can either use JSON and XML. It depends on the needs and goals of the organisation or the product.

When a particular request is made, it usually specifies which format to use which will suit it in the best way possible. If an API uses both JSON and XML, then typically XML does not have attributes to allow easy mapping between the two formats. Below is an example of API documentation.

JAVASCRIPT

JavaScript is one of the most popular languages in the world It is used in browsers to develop interactive web pages. But now JavaScript can even be used to build

1. Web/Mobile Apps
2. Real time networking apps(Chats/Video calls)
3. Command line tools IV. Games

Web/Mobile Apps II. Real time networking apps(Chats/Video calls) III. Command line tools IV. Games.

We can also use JavaScript outside of browsers too. This means that we can use JavaScript as backend for web and mobile applications. We can combine JavaScript with HTML by adding it to either the or the portion of the HTML.

It is a good habit to add JavaScript in the tag rather than the because the script is passed from the top and we include the script inside the head, it will be busy parsing it instead of focusing on the content. HTML is about content and JavaScript is about the behavior which refers to separation of contents.

JavaScript can be defined as programming or scripting language which can help us to implement complex functions on websites. Whenever a webpage is more than just there displaying static information, it will display timely content updates, interactive maps, 2D animations /. With 3D graphics, scrolling video jukeboxes, etc., you can bet that JavaScript is likely involved. It is the third level on the level of standard web technologies, two of which are HTML and CSS.

1. HTML is the markup language with which we structure our web content and give it meaning, for example by defining paragraphs, headings and data tables or by embedding images and videos in the page.
2. CSS is a language with style rules that we use to apply styles to our HTML content, such as: define background colors and fonts and distribute our content over several columns.
3. JavaScript is a scripting language that you use to create dynamic, refreshing content, control multimedia content, animate images, and just about anything else.

JAVA

Java is an extensively valuable programming language that is class-based, object-arranged, and planned to have as few execution conditions as could sensibly be anticipated. It is relied upon to let application engineers make once, run wherever (WORA), inferring that arranged Java code can run on all stages that help Java without the necessity for recompilation. Beginning in 2019, Java was quite possibly the most notable programming vernaculars being utilized by GitHub, particularly for client worker web applications.

REAL WORLD APPLICATIONS

There are numerous spots where Java is utilized in reality, beginning from an online trading site to android applications, from logical application to money related applications like electronic exchanging frameworks, from games like Minecraft to work area applications like Eclipse, Netbeans, and IntelliJ, from an open-source library to J2ME applications, and so forth.

JAVA VIRTUAL MACHINE

Java Virtual Machine (JVM) is a motor that gives runtime states to push the Java Code or applications. It switches over Java byte code into machines language. JVM is a masterpiece of Java Run Environment (JRE). In other programming dialects, the compiler will produce machine code for specific structures. In any case, Java compiler produces code for a Virtual Machine

DATA TYPES

PRIMITIVE DATA TYPES	NON-PRIMITIVE DATA TYPES
Primary data forms include integer, character, short, large, float and double.	They comprise classes, interfaces, and arrays.

OBJECT-ORIENTED PROGRAMMING SYSTEM

Object-oriented programming System (OOPS) is a programming perspective ward on "objects" that contain data and procedures. The essential part of thing masterminded composing PC programs is to construct the flexibility and common sense of activities. It joins data and its conduct (techniques) in a singular area (object) makes it all the more clear how a program works.

CONCEPTS OF OBJECT-ORIENTED PROGRAMMING SYSTEM

Class: It is a conference of near components. For instance, you had a class called "Costly Cars". Its properties (data) can be cost or speed of these vehicles. While the systems may be performed with these vehicles are driving, easing back down, etc.

Objects: An object can be designated as a development of a class, and there can be different adaptations of a class in a program. For example - seat, bike, marker, pen, table, vehicle, etc.

Inheritance: Classes can share, acquire or "acquire" properties and techniques that have a place with existing classes. This allows you to reuse existing code and reduces the time you spend coding. A class

that gets from another is known as a derived class or a young person class. A class that shares its properties and methodologies is known as a base class or parent class.

Polymorphism: alludes to the capacity of a strategy to be utilized in various manners, that is, it can take various structures at various occasions (poly + morphs). There are two sorts of polymorphism: compile time polymorphism and run time polymorphism.

Compile time (static) polymorphism happens when a technique is over-burden; that is, the point at which the contention utilized with the strategy is changed. This is done to get various outcomes. A case of this would propose various names for being the President of a nation, which would get you various outcomes each time – yet they would in any case be known as the President.

Run time (dynamic) polymorphism happens when the techniques itself are changed. At the point when you needn't bother with a President yet a Prime Minister, you would need to supersede the current strategy.

Abstraction: Information deliberation alludes to the procedure of just showing applicable properties and techniques to deal with an item, while concealing the rest. Information deliberation lets you lessen the multifaceted nature (clearly) of a program and is an enormous bit of leeway offered by classes in OOP dialects.

Encapsulation: Embodiment alludes to keeping objects with their strategies in a single spot. It likewise ensures the trustworthiness of the information – keeps it from being unnecessarily modified by confining access to the information, ideally by concealing it from outside components.

INTERFACES IN JAVA

Like a class, an interface can have techniques and factors, however the strategies pronounced in an interface are naturally unique (just strategy signature, no body).

1. If a class executes an interface and doesn't give strategy bodies to all capacities indicated in the interface, at that point the class must be announced theoretical.
2. A Java library model is, Comparator Interface. On the off chance that a class executes this interface, at that point it tends to be utilized to sort an assortment.

EXCEPTION HANDLING

The Exception Handling in Java is one of the incredible instrument to deal with the runtime blunders so typical progression of the application can be kept up.

The java.lang Throwable class is the root class of Java Exception order which is acquired by two subclasses Exception and Error.

Types of Exceptions:

1. Built-in Exceptions
2. User Defined Exceptions

JAVA EXCEPTION KEYWORDS

Try	The "try" keyword is utilized to determine a square where we should put an exemption code. The attempted square should be trailed by either get or at last. That is to say, we can't utilize the square alone.
catch	The "catch" square is utilized to deal with the exemption. It must be gone before by the attempt square which implies we can't utilize the catch square alone. It tends to be trailed by a long last square later.
finally	The "finally" square is utilized to execute the significant code of the program. It is executed whether a special case is dealt with or not.
throw	The "throw" catchphrase is utilized to toss a special case.
throws	The "throws" catchphrase is utilized to announce exemptions. It doesn't toss a special case. It determines that there may happen to be a special case in the technique. It is constantly utilized with strategy signature.

STRINGS

String is an arrangement of characters. In java, objects of String are permanent which implies a steady and can't be changed once made.

1. char charAt(int list) - Restores the character at the predefined list.
2. int compareTo(Object o) - Examines this String to another Object.
3. int compareTo(String anotherString) -Examines two strings lexicographically.
4. int compareToIgnoreCase(String str) - Examines two strings lexicographically, disregarding case contrasts.
5. String concat(String str) - Connects the predefined string as far as possible of this string.
6. boolean equals(Object anObject) -Looks at this string to the predetermined item.
7. int indexOf(int ch) -Returns the list inside this string of the principal event of the predetermined character.
8. int indexOf(String str) -Restores the file inside this string of the primary event of the predefined substring.
9. int lastIndexOf(int ch, int fromIndex) -Restores the file inside this string of the last event of the predetermined character, looking in reverse beginning at the predefined record.
10. int lastIndexOf(String str) -Restores the file inside this string of the furthest right event of the predetermined substring.

STRINGBUFFER

Java StringBuffer class is an alterable (modifiable) string. The StringBuffer class in java is similar to the String class with the exception that it is impermanent. For example, it very well may be changed.

CONSTRUCTOR	DESCRIPTION
StringBuffer()	makes an unfilled string support with the underlying limit of 16.
StringBuffer(String str)	creates a string support with the predetermined string.
StringBuffer(int capacity)	creates an unfilled string support with the predefined limit as length.

ARRAYS IN JAVA

An array is a holder object that holds a fixed number of estimations of a solitary kind. The length of a cluster is set up when the exhibit is made. After creation, its length is fixed.

In Java all exhibits are powerfully allocated.

Exhibits can contain native's information types just as objects of a class contingent upon the meaning of cluster. If there should arise an occurrence of natives information types, the real qualities are put away in bordering memory areas. If there should be an occurrence of objects of a class, the genuine items are put away in the load section.

COLLECTIONS IN JAVA

Collection framework in Java provides an architecture to handle and manipulate objects. It has implementations for various data structures, which have very different use cases some are faster for storage or retrieval others store data in a certain way and so on. Java collection is a bundle of single objects. It provides many interfaces like Set, List, Queue, HashSet, etc.

ARRAYLIST

ArrayList class in java is a resizable array which very similar to vectors in C++. It is implemented in java.util package. ArrayList provides many different functions for manipulating ArrayList from adding elements, removing elements, sorting elements.

JAVA DATABASE CONNECTIVITY WITH MYSQL

To interface Java applications with the MySQL database, we have to follow 5 after advances.

In this model we are utilizing MySql as the database. So we have to know the following information for the MySql database:

1. Driver class: The driver class for the MySql database is `com.mysql.jdbc.Driver`.
2. Connection URL: The association URL for the mysql database is `jdbc:mysql://localhost:3306/sonoo` where jdbc is the API is running, we may likewise utilize IP address. We may utilize any database, in such case, we have to supplant the sonoo with our database name.
3. Username: The default username for the mysql database is root.
4. Password: It is the secret phrase given by the client at the hour of introducing the MySQL database. In this model, we are going to utilize root as the secret key.

INTRODUCTION TO MYSQL

SQL means Structured Query Language. It is a standard language used to have conversations with the databases. SQL is an exceptional programming language that is utilized to confederate with databases. It works by grasping and breaking down information bases that incorporate information fields in their tables.

MySQL is a community database and the board shell. It gives a UI to us to connect with the database. The application is employed for a vast scope of causes, counting details warehousing, online trading, and logging applications. The most familiar use for MySQL notwithstanding is with the final intent of a web information base.

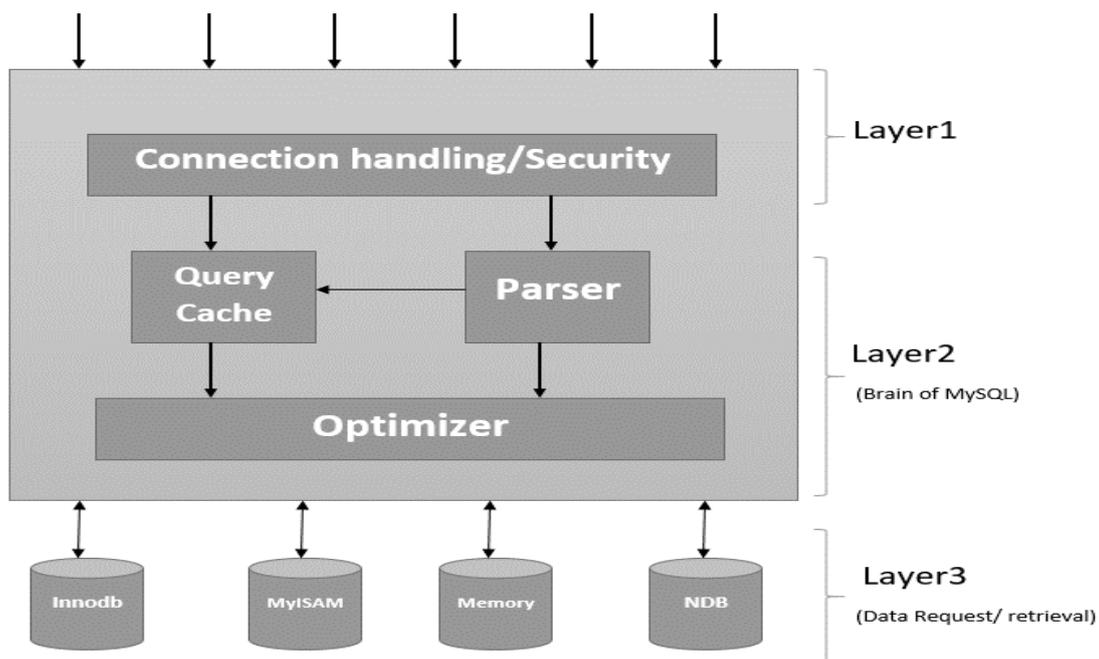


Figure 2: MySQL CLIENT

RELATIONAL DATABASE MANAGEMENT SYSTEM

A relational data set touches on to a data set that reserves statistics in a well-structured group, availing lines, and segments. Hence it is easier to find and ingrain obvious traits under the details base. The social design makes it tenable to sprint doubts across unrelated tables immediately.

INSTALLATION OF MYSQL

Step1: The initial step is to go to the site www.dev.sql.com and introduce MySQL for the necessary working framework.

Step2: Ensuing to acquaint the MySQL with your system, fire setting up the workbench stage where you can create the inquiries.

Step3: At the point when you open the workbench, a secret phrase brief will spring up and you must enter the root secret word that you made during the establishment procedure.

Step4: Then comes the time when you can make your first database inside the workbench.

DATA DEFINITION LANGUAGE

Information definition language is a grammar for manufacturing and switching data set items like tables, lists, and clients. DDL manifestations are like a PC programming language for setting apart information frameworks, particularly data set blueprints. The common statements used are: CREATE, ALTER, DROP, TRUNCATE.

DATA TYPES

Numeric Data type:

INT: Whole numbers

FLOAT(M,D): Decimal numbers(approx.)

DECIMAL(M,D): Decimal numbers(precise)

Non-Numeric Data type:

CHAR(N): Fixed length character

VARCHAR(N): Varying length character

ENUM('M','F'): Value from a characterized list

BOOLEAN: True or False qualities

Date and Time type:

DATE: Date(YYYY-MM-DD)

DATETIME: Date and time (YYYY-MM-DD HH-MM-SS)

TIME: Time(HH-MM-SS)

YEAR: Year(YYYY)

PRIMARY AND FOREIGN KEYS

PRIMARY KEY	FOREIGN KEY
An essential key is a field in a table which exceptionally recognizes each column/record in a data set table. Essential keys should contain unusual calibre. An essential key segment is not allowed to have NULL qualities. A table has just one essential key, which may contain single or various fields.	This imperative is utilized to forestall activities that would annihilate joins between tables.

MODIFYING TABLES

Adding and Removing Tables To include another segment in the current made table the language structure is: "Include COLUMN <COL NAME> <DATATYPE>".

To expel the section from a table the grammar is: "DROP COLUMN <COL NAME>".

Furthermore, to eradicate all the data from inside the tables abbreviate request is used.

DATA MANIPULATION LANGUAGE

A DML is customarily a sublanguage of a more sizeable data set language like SQL, with the DML containing a chunk of the controllers in the language. Read-only choosing of data is some of the time accepted as being vital for a different DQL, however it is steadily allied and at times likewise thought to be a part of a DML. The common commands under DML are: INSERT, SELECT, UPDATE, DELETE.

JOINS

Joins permit to recover information from different tables in a solitary select articulation. To join two tables there should be a related segment between them. There are various sorts of joins, for example, inward join, left join, right join.

INNER JOIN	LEFT JOIN	RIGHT JOIN
Inward join will recover information just when there is coordinating qualities in both the tables.	Left join will recover all the information from the left table and the coordinating lines from the correct side of the table.	The correct join will recover the information from the correct table and coordinating columns of the left table.

SUBQUERIES

Subqueries are the inquiries that are settled inside different questions. The subqueries can be utilized in a SELECT, INSERT, UPDATE, or DELETE question. The settled question could be in the WHERE provision or in the FROM. There are two kinds of subqueries to be specific, non-corresponded subquery and related subquery.

NON-CORRELATED SUBQUERY

In this sort of subquery, the inward question can run freely of the external inquiry. Inward questions run first and produce an outcome set and which is then utilized by the external inquiry.

CORRELATED SUBQUERY

In this sort of subquery, the internal question runs for each line in the external inquiry. Here the internal question cannot run freely of the external inquiry.

NORMALIZATION

Standardization is the procedure of effectively sorting out the information into the database. It is fundamentally done to expel the excess information and to just store the related information in a table. The advantages of standardization are:

1. Reduce the extra room
2. Reduce addition, update, and cancellation inconsistencies
3. Improve inquiry execution
4. Reduce the extra room
5. Reduce addition, update, and cancellation inconsistencies
6. Improve inquiry execution

Following are the degrees of standardization:

1st typical structure (1NF)
3rd typical structure (3NF)

2nd typical structure (2NF)
Boyce and Codd typical structure (BCNF)

FIRST NORMAL FORM (1NF)

The standards in the main typical structure are that a table is in the 1NF if:

1. There are no rehashed lines of information
2. The sections just contain a solitary worth
3. The table has an essential key

SECOND NORMAL FORM (2NF)

The standards in the subsequent ordinary structure are that a table is in the 2NF if:

1. They fit in with 1NF.
2. Every segment that is anything, but an essential key of the table is subject to the entire of the essential key

THIRD NORMAL FORM (3NF)

The guidelines in the third typical structure are that a table is in the 3NF if:

1. They fit in with 2NF .
2. Every segment that is not the essential key is just subject to the entire of the essential key.

AUTOMATED TESTING

Manual tests refer to the concept of running test cases through human interaction [5] [7]. In contrast, developers can run a series of test cases 36 of 44 with a machine or software and compare the results with the expected result [5] [7]. In other words, the test automation contains a collection of the test script that is to be executed without human hindrance [5] [6]. There are 3 levels of automated testing.

WHEN TO USE AUTOMATED TESTING

It is recommended that the testing methodology be assessed and planned prior to each sprint or development. Test automation is a promising candidate for regression testing (retesting the existing product and features that are changed or developed with new ones). Regression testing¹⁶ helps ensure that the newly published version or changes do not affect previous ones. Repeated tests that are unlikely to change during the development cycle or sprint should be tweaked to be automated.

SELENIUM WEBDRIVER

INTRODUCTION TO SELENIUM

Selenium is a collection of different range of tools and libraries that allow the developers to automate web browsers. It provides different extension that emulate user interaction with browsers. It provides drivers that allow the developers to automate the browser. More than that it provides infrastructure for implementations of W3C Specification of WebDriver that allows the developer to write code for all major web browsers. It is an Open-Source UI automation tool. It was created in 2004 by a Thought Works engineer. Selenium WebDriver was later introduced later in 2006.

COMPONENTS OF SELENIUM

SELENIUM IDE

- Selenium IDE is Record and Play base Tool.
- Selenium IDE is basically a Browser Plugin, which is compatible with Mozilla Only.
- It is easy to learn, use and install.
- User is not allowed to put conditions in IDE.

SELENIUM RC

- Selenium RC stands for Remote Control
- RC is the first automated web testing tool that allowed users to use a programming language they prefer
- User can use Java, C#, PHP, Perl, Ruby, and Python with Selenium RC.

SELENIUM WEBDRIVER

- Selenium WebDriver is better than Selenium IDE and RC
- Selenium WebDriver is more stable than RC
- WebDriver, unlike Selenium RC, does not rely on JavaScript for Automation. It controls the browser by directly communicating with it.
- Selenium WD supports multiple Programming language. Java, C#, Python, PHP, Perl, Ruby.

SELENIUM GRID

- Selenium Grid is tool to use for Parallel Execution.
- Selenium Grid is compatible with RC and WD both
- It works like an Execution Engine for Selenium Tests.
- Enables simultaneous running of tests in multiple browsers and environments
- Utilizes the hub-and-nodes concept. The hub acts as a central source of Selenium commands to each node connected to it.

SELENIUM INSTALLATION SYSTEM REQUIREMENTS

To Install Selenium test suite with Java, one must have Java environment running, the following are the system requirements:

1. Java Runtime Environment (JRE) on the native computer: Java Software Development Kit (JDK) comes with JRE integration. Download and install JDK at Oracle official website for Java (Oracle 2018), users can select which operating system they are using.
2. Install Eclipse IDE (Integrated Development Environment) at Eclipse official website.
3. Download Selenium WebDriver based on the browser, to run test scripts on a specific browser, and place the driver in path linked.

JAVASCRIPT EXECUTOR

Javascript executor is an interface in Selenium Webdriver that helps automation testers to work through various javascript applications.

Javascriptexecutor in Selenium helps the webdriver to work with various HTML tags.

MAVEN

Maven is a product by apache software foundation . Maven is a package builder that provides extensive feasibility of usage for the user as it provides an easy addition of packages into the project by the use of page object model or the pom.xml file through which the user can add dependency which further helps to add the external libraries consisting of various JAR files required by the project.

Maven eases the build process ,provides uniform build system and provides easy migration of features to new system.



CHAPTER IV
Learning Track

WEEK-1

Functional Testing

In the initial stage we covered the basics of qea which consisted of Functional testing . Functional Testing

Checking functions by emulating business scenarios, based on functional requirements. Black-box testing is a common way to verify functions.

Basics of automation Testing

We were taught how to automate the testing process and how to make automation testing simpler yet efficient in order to complete the desirous tests.

Integrated Capability Test (ICT)

We were continuously tested by these ICT's. Our progress was continuously monitored by these ICT's . And we were assessed by the end of every week to check our progress.

Week 2&3

Programming with Java

Basics of how to program with java was taught to us . We were taught all the Syntax and various utilities of java . We were also taught the application of java in real world test scenarios.

Week 4

Data Source (SQL)

We were taught about DBMS and its various commands in which we learned various queries and how to use them . We came across various DDL(Data Definition Language), DML(Data Manipulation Language)and TCL(Transaction Control Language) commands.

BPM BASICS

We were taught about Business Process Management and Various tools for BPM.

Week 5

BASICS of PEGA

In the fifth week we were taught about pega and how the pega system works and how is it used as a business Process Management tool.

Week 6

WebDriver Basics with PEGA Training

In the sixth week we were introduced to Selenium and how the selenium works and how it can be used to automate testing

Week-7

Automation Techniques and Dynamic XPath with Pega Training

In the seventh week we were taught about XPath and how to use these XPath in order to locate the Web elements using these XPath.

Mini-project

In the seventh week we were assigned with the mini-projects . Project was to be done individually by the interns. And all the required deliverables were required to be met by the intern.

Week-8

WebDriver with POM and Apache POI with PEGA Training

In the eighth week we were introduced to apache POI in which we learned how we can access excel files using apache POI. And we also learned about the POM(Page Object Model).

Week 9 & 10

Selenium with TestNG and Pega Training

In the ninth and tenth week we were introduced to concepts of testNG and how to use its annotations in order to integrate and simplify the testing process.

Hackathon Project

In the ninth and tenth week we were assigned the a hackathon project in which teams of 5-6 members were created and we were assigned with the problem statement and the deliverables of the project that we had to produce by testing those outcomes.

Week 11 & 12

Integerated Capability Test(ICT)

In the eleventh week we were assessed for whole of the training it was summarized test in which all of our concepts on automation testing that we learned in this was taken into test and we were assessed further.

Main Project

In the eleventh and twelfth week we were assigned with the main project in which teams of 5-6 members were created and we were assigned with the problem statement and the deliverables of the project that we had to produce by testing those outcomes. We worked on proper BPM tools and automated the test process in it.

CHAPTER V
CONCLUSION

CONCLUSION

Over the past few years, developers all over the world have been constantly working and developing the applications to provide better software as well, quality software for users. With the use of different methodologies as well as philosophies that help in development. Over the years Agile methodology has come forward to for better development and customer satisfaction.

Selenium is considered the first choice for automation for web-based applications for testing them. Ever since the inception of Selenium it has been the primary choice for automation and testing because of the popular languages it supports and use of selenium is easy and should be considered if testing of web application is to be done as the tests can be replicated on various machines and the test coverages provides extensive coverage that allow the developers to make robust and quality software within budget and providing customer satisfaction and well-built products.

Through this Internship, Software testing and automation of testing using selenium was performed and learning process was immense and the learning and aid provided was sufficient for learning development for automation and testing. Selenium was not the only technology that was used during this internship. Many different technologies like JavaScript, SQL, HTML and CSS were also heavily used in this internship. Overall, the learning process was immensely yielding, and the learning gathered from the were extremely beneficial.

FUTURE WORK

As Software's is being developed and most of them are web-based applications, this makes the testing more important for the software to provides a reliable way to develop software and that makes a quality product and due to huge number of applications with varying levels of complexity makes automation as a perfect candidate for providing vital test coverage with speed as well as efficiency that makes a quality product. Software testing, just like software development is an important part of the whole process of getting a product or an application to get to market, henceforth automation of testing is the way to be taken to reduce time to market time and increase the quality of software as well as decreasing the cost of development.

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