

QEA(Quality Engineering & Assurance Services)
WITH JAVA AND SELENIUM

Internship report submitted in partial fulfilment of the
requirement for the degree of

Bachelor of Technology

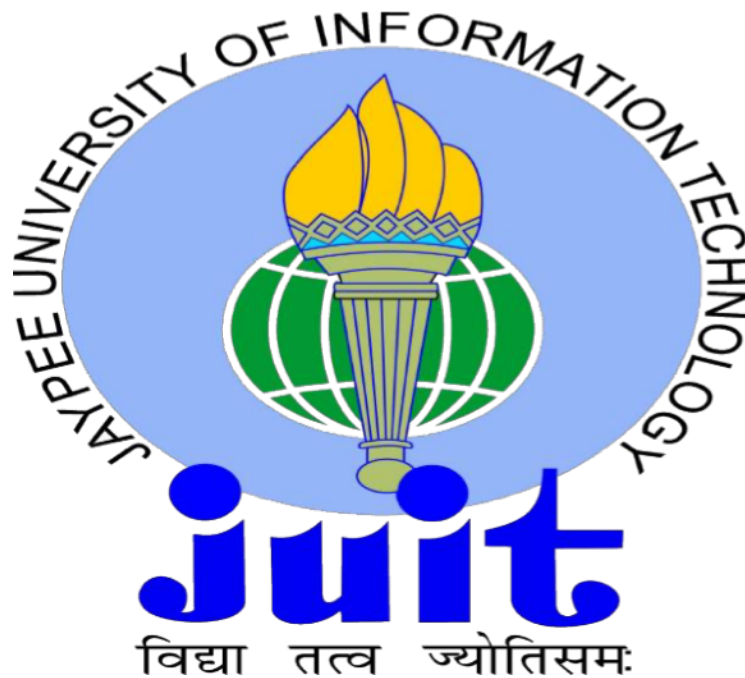
In

**Computer Science and Engineering/Information
Technology**

By

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to



Department of Computer Science & Engineering and
Information Technology

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Waknaghat, Solan-173234, Himachal Pradesh

Candidate's Declaration

I hereby declare that the work presented in this report entitled “QEA WITH JAVA AND SELENIUM” in the partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science and Information Technology, Jaypee University of Information Technology ,Waknaghat is a record of my own work and carried out over a period from March 2021 to May 2021 under the supervision of **Rohinipriya E**(Coach (HR) at Cognizant).

The matter embodied in the report has not been submitted for the award of any other degree or diploma.



Garima Sharma (171386)

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Rohinipriya E

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Dated: 20/05/2021

Acknowledgement

I would like to express my deep sense of gratitude and indebtedness to **Dr. Amit Kumar**, Department of Computer Science & Engineering and Information Technology, my supervisors for their guidance, support, motivation and encouragement throughout the completion of this work. Their eagerness to listen to my problems, their educative comments, their advices for the timely and successful completion of this work has been exemplary.

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LIST OF ABBREVIATIONS

API – Application Programming Interface

CSS – Cascading Style Sheets

DOM – Document Object Model

GUI – Graphical User Interface

HTML – Hyper Text Markup Language

HTTP – Hypertext Transfer Protocol

IDE – Integrated Development Environment

IE – Internet Explorer

POM – Page Object Model

QA – Quality Assurance

VCS – Version Control System

SaaS – Software as a Service

XML – Extensive Markup Language

XPATH – XML Path Language

TRAINING SCHEDULE

- **DAY 1 TO DAY 5 :** Software testing, writing test cases, Basics of Agile Fundamentals and SDLC
- **DAY 6 TO DAY 10:** Basics of Java Programming
- **DAY 11 TO DAY 15:** Framework support utilities, Project Build tools, JDBC
- **DAY 16 TO DAY 20:** Web UI: HTML XPath and CSS Selectors, JavaScript Basics
- **DAY 21 TO DAY 25:** SQL and Database Design, API Technical Writing
- **DAY 26 TO 30:** Automation concepts, Selenium configuration, Selenium basics

ABSTRACT

When it comes to automated testing, Selenium is the first thing that comes to mind for automated web applications.

Selenium is a useful tool because it is an open source and portable software testing framework for web applications that support multiple languages such as Java, C #, Ruby, and Python.

Choosing the right language depends on the test application, the supporting community, the existing frameworks for automation testing, ease of use, aesthetics and a powerful architecture integration.

Java is a popular programming language. A good community of developers who create scripts and troubleshooting helped make Java the language of choice for app developers. Therefore, documenting selenium test cases with Java has several advantages: Selenium is compatible with Java. Therefore, testers can use the active community of donors and detailed documentation to record test cases.

Like other popular languages like Python, Java is more widely used in business programs compared to other programming languages such as Python, so integrating Selenium testing is easy. People are accustomed to the depth of the tongue when it comes to selenium.

CHAPTER - 1

INTRODUCTION

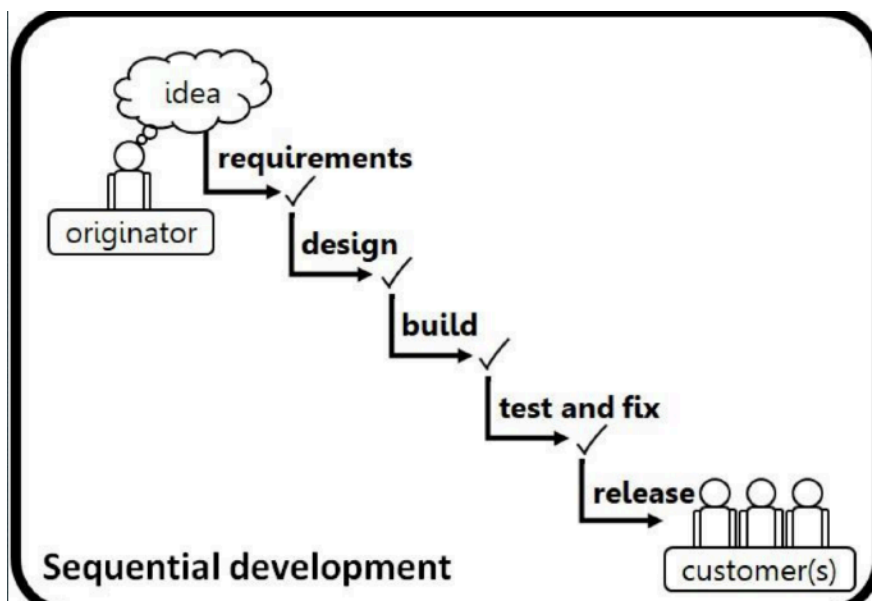
1.1 SOFTWARE TESTING

There are many skills and technologies used to develop a project in Selenium using Java

1.1.1 MODELS

The software development lifecycle refers to the activities involved in developing software and how the activities are logically and chronologically related.

- A consecutive sequential development model defines a software development process as a continuous, sequential process of work.
- This means that each phase of the development process must begin when the previous phase is over. In theory there is no overlap of the section, but in practice it helps to get an answer for the next phase in advance



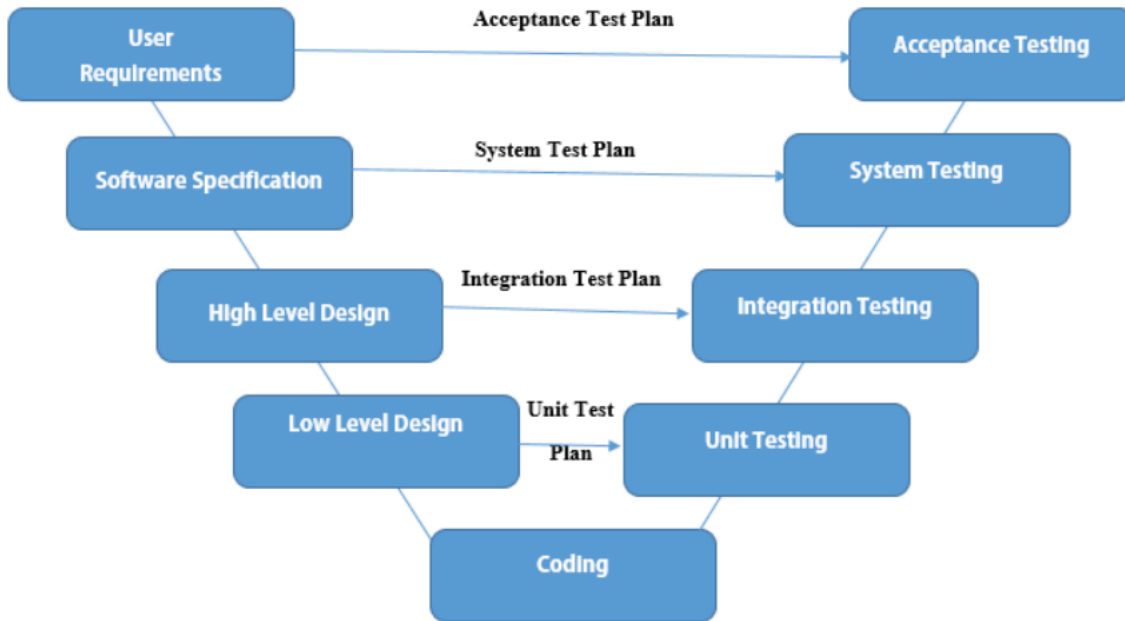
Waterfall Model

- In the Waterfall model, development activities are completed sequentially.
- In this model, the exploration of testing involved activities take place only after all other development tasks have been completed



V-MODEL

Unlike the Waterfall model, the V-model incorporates a testing process throughout the development process, using the principle of pre-test.



- Software testing is a way to check software quality and reduce the risk of software failure

1.1.2 GOALS OF TESTING

1. Work-product evaluation
2. Fulfilling the requirements
3. Growing Confidence
4. Providing information to Stakeholders
5. Preventing defects
6. Finding defects
7. Reduce risks
8. Compliance with the Laws
9. Objectives may vary

There are some test process activities that are beneficial to complete the testing process. These are mentioned below by order:

- TEST PLANNING
- TEST MONITORING & CONTROL
- TEST ANALYSIS
- TEST DESIGN
- TEST IMPLEMENTATION
- TEST EXECUTION
- TEST COMPLETION

1.1.3 TYPES OF TESTING

There are many types of Testing. These include:

1. **Functional Testing** : This involves testing the main functions of the software which includes the basic things that the software should be able to do.
2. **Non-functional Testing** : It tests how the system performs. For eg: the speed of the software, the response time, performance testing, usability, ease of use, security etc. It is usually answered in a range.
3. **Black box Testing**: In this type of testing, we test without looking at the internal structure of the software.
4. **White box Testing**: Input is provided to the software and the internal structure like database, APIs of the software is also taken into account.
5. **Regression Testing** : The part of the software that is not changed is tested during retesting when the developer makes a change to the software

1.1.4 TEST CASE WRITING

A test case refers to a set of preconditions, inputs, actions (where applicable), expected results and postconditions, developed based on test conditions.

1.1.5 DEFECT REPORT

An imperfection or deficiency in a work product where it does not meet its requirements or specifications.

1.2 AGILE METHODOLOGY

1.2.1 AGILE MODEL

The importance of agile is quick or versatile. "Agile technique model" may be defined as a software program improvement method that refers to iterative improvement. Agile methods divide duties into smaller iterations, or the elements do now no longer consist of direct long-term planning.

The necessities of the venture are determined at the start of the improvement technique. Plans concerning the variety of iterations, length and scope of every generation are genuinely described in advance. Each generation is viewed as a "time frame" for the agile technique model.

Breaking the whole venture down into smaller elements enables limit venture chance and decrease basic venture lead time necessities. Each generation includes a team going through a complete software program improvement cycle, planning, necessities analysis, design, coding, and testing, before demonstrating a running product to the customer.

The Agile model has various phases.

- **Phases of Agile Model**

1. **Necessities gathering:** At this stage, we need to characterize the prerequisites, accumulate the business openings, and plan the time and exertion needed to make the undertaking. With this data, we can assess the specialized and monetary benefit.
2. **Plan:** When we've analyzed the venture, examining with partners to layout prerequisites, we can utilize the client stream chart or the serious level UML outline to uncover the highlights of ongoing abilities and show how it will be seen on our present framework.
3. **Development/Iteration:** When the group characterizes the necessities, the work starts, the architects and engineers begin chipping away at their task pointed toward executing a practical item. The item goes through a few phases of progress with the goal that it contains insignificant and basic usefulness.
4. **Testing:** At this stage, the quality control group will survey the exhibition of the items and search for the deformity.
5. **Deployment:** In this stage, the group delivers an item for the clients' work space.
6. **Feedback:** After dispatching the item, the last advance is input. This gives the group input on the item and works through the criticism.

After going through the phases of Agile model, a project is said to be completed and deployed. And the feedback is received through the customers which helps make changes or improvements for the future softwares.

1.2.2 AGILE VALUES

Agile has some core values which are followed strictly:

1. *Individuals and interactions over Processes and Tools*: Do not use tools that become a burden for other developers and or/ testers or use them in a different way.
2. *Working software over comprehension documentation*: Having a small version or a prototype that has some working is more important than writing requirements and presenting to customer for feedback.
3. *Customer collaboration over Contract Negotiation*: The relationship that we have with the customer is more important than the contract that we had with him/her.
4. *Responding to change over following a plan*: In traditional softwares, we have a rigid plan and there's a rare chance anything will be changed. But Agile says that responding to change is more important than following a strict unchanging plan. So we should welcome the change and use it to our favour

The following Agile values are helpful in maintaining a unique approach to software development . Abiding by these values help not only maintain good relations with the customers but also maintain maximum efficiency and a healthy approach to completion of the certain project or software in any organisation.

In contrast to conventional approaches to product development, which are known to have long development cycles, agile principles promote the minimization of the time between brainstorming and market launch. The idea is to put a functional product in the hands of the customer as quickly as possible. The feedbacks are then fed back into the product development process and used to provide information about future versions.

1.3 ORGANISATION

- i In Chapter 1, Introduction and basic idea used in designing the project is mentioned.
- ii Chapter 2 Literature review is given, includes various research papers on testing and use of Selenium to compare results and get a deeper understanding of the project scope
- iii In Chapter 3, System Development is discussed which includes software configuration and hardware configuration, and technologies in which the training has been given and how it will contribute to building the project
- iv In Chapter 4, Selenium requirements is shown with the help of examples from various Selenium working environments
- v In Chapter 5, Conclusion and Future scope of the subject is presented.

CHAPTER - 2

ORGANISATION PROFILE

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 where the learning platform offers world class learning resources and would not be constrained for their value

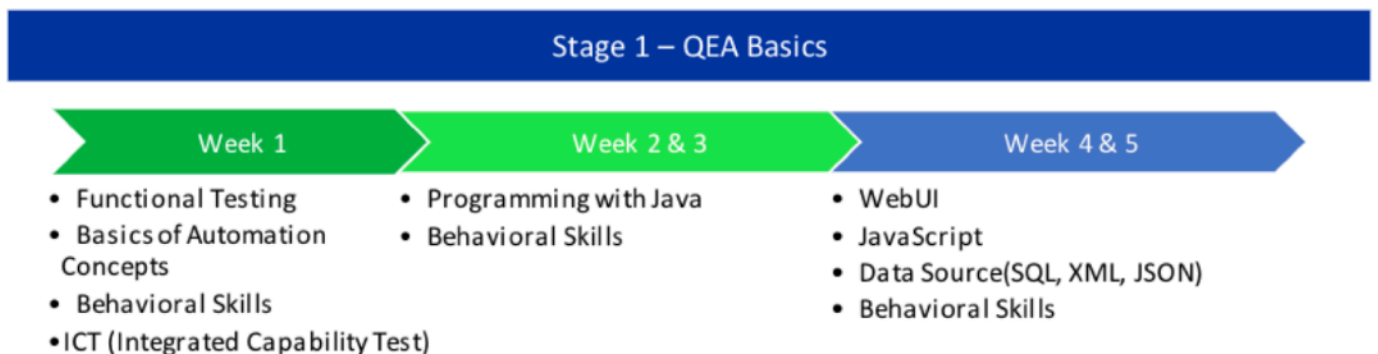
It is applicable to interns as well as GEN Cs

PROGRAM SEQUENCE FOR TRAINING

Recommended Program Sequence

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

- Stage 1 – QEA Basics
- Stage 2 – Selenium with Digital Technologies
- Business Aligned Project will provide you an experience of real time problem solving in Agile methodology.



VALUES:

The values of the organization are as follows:

- *Valuing People*

We believe that our success depends first and foremost on people. By respecting people in everything we do, we will develop and maintain high quality, mutually beneficial relationships with our clients, professional colleagues, referral sources, vendors, community members and each other.

- *Building Client Relationships*

We seek to earn long-term client loyalty by developing a deep understanding of each client's business and personal goals, by demonstrating unwavering reliability and integrity in our work and by acting as an independent and objective advisor to our clients.

- *Upholding Quality and Integrity*

We will maintain an environment where a commitment to quality, honesty, respect, fairness and professional ethics governs the actions and decisions of everyone within our firm.

Keys to Success:

- Complete the work with full honesty.
- Complete the work on time.
- Complete the assessment.
- Complete the project within schedule time.
- Try to learn as much as possible from the SME, Trainer, mentor.

- Open to learn anything taught.

Objectives:

The objectives of Cognizant are:

- The overall objective is to focus the activities towards its specialized services and to become a leader in this niche in the country.
- Growth - To expand the business at a rate that is both challenging and manageable, serving the market with innovation and adaptability.

CHAPTER - 3

SYSTEM DEVELOPMENT

Here is described the technologies used for the fulfillment of the project

TECHNOLOGIES TRAINED

3.1 CLIENT SIDE

3.1.1 HTML

Initially, HTML was created determined to characterize the construction of records like headings, passages, records, etc. work with the trading of logical data between analysts.

Today, HTML is broadly used to design website pages utilizing different labels accessible in the HTML language. HTML is a MUST have for undergrads and experts to turn into an incredible programming designer, particularly on the off chance that they are in the web improvement field.

- Making a Website: We can make a site or tweak a current web format on the off chance that we know HTML well.
- Web Designer: HTML and CSS configuration is a fundamental ability for website specialist. To speed up and execution of your site, it is nice to know HTML for the best outcomes.
- Different Languages -Once one knows about the essentials of HTML, other related advancements, for example, Javascript, PHP, or Angular will get more obvious.

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 HML5 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.

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.

3.1.2 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

- Attributes
- Texts
- Dynamic elements
- Combining text and attributes
- Using parent-child relationship
- Using ancestor-descendant relationship
- Using preceding and following 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 have to 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.

Some **XPATH FUNCTIONS** described below

- contains()
- starts-with()
- text()
- AND operator
- OR operator

3.1.3 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 UI-based 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.

- Creating CSS selectors using attributes

Syntax: TagName[Att1 = Value]

- We cannot use text in CSS selectors to search for elements. So we only rely upon attributes.

CSS Selector Reference		
Selector	Example	Description
#id	#txtUsername	Select element with id="txtUsername"
.class	..button	Select element with class="button"
element1 element2	form input	Select <input> element inside <form> element
element1>element2	form>input	Select <input> element where parent is a <form> element
element1+element2	span+input	Select <input> element placed immediately after element
[attribute='value']	[name='txtUsername']	Select elements with name="txtUsername"
element[attribute='value']	input[name='txtUsername']	Select <input> element with attribute name="txtUsername"
element[attribute^='value']	input[name^='txtUser']	Select <input> element with attribute name starts with value "txtUser"
element[attribute\$='value']	input[name\$='name']	Select <input> element with attribute name ends with value "name"
element[attribute~='value']	input[name~='User']	Select <input> element with attribute name containing the value "User"
element[attribute1='value1'][attribute2='value2']	input[name='txtUsername']input[id='txtUsername']	
element:nth-of-type(N)	form:nth-of-type(4)	Select fourth <input> element inside <form>
:nth-child(N)	form:nth-child(4)	Select fourth element within <form>

Below are some references that are helpful in using CSS selectors to locate elements for Selenium

3.1.4 JSON & XML

JSON and XML are used widely in API technical writing

API: Application Programming Interface characterizes how at least two bits of programming converse with one another. It underlines how multiple gadgets can connect with one another.

For Web APIs, programming designers need to know:

- What the solicitation resembles so the worker can get it
- What the reaction resembles so they can sort out the information
- The first Web API was created by Ebay

company_name	string (50)	Contact's company
job_title	string (50)	Contact's job title
last_name	string (50)	Contact's last name
work_phone	string (50)	Contact's Work phone number
home_phone	string (50)	Contact's home phone number
source_details	string (255)	How contact was created, value is API key if created using API
+ addresses	array	Mail addresses for the contact
+ notes	array	Notes associated with the contact.
+ lists	array	Contactlists that the contact is a member of
- email_addresses	array	Array of contact's email addresses, Currently only one email address is supported for each contact.
id	string	Email Address ID
opt_out_date	string	If the contact has a status of OPTOUT, this field displays the date the OPTOUT occurred
status	string	Email address status, valid values: <ul style="list-style-type: none"> • ACTIVE: Contact is an active member of a contactlist • UNCONFIRMED: Contact has not confirmed their email address • OPTOUT: Contact has unsubscribed from the account owner's account and is on the Do Not Mail

- API allows developers to create apps that mash up the data from different sources

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:

- Dictionaries of lists
- Lists of Dictionaries
- Dictionaries of Dictionaries
- 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

JavaScript Object Notation

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

JSON 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.

XML

XML alludes to Extensible Markup Language. It is a text based markup language got from the Standard Generalized Markup Language (SGML). XML labels recognize the information and are utilized to store and sort out the information as opposed to indicating how to show it as HTML labels. It is utilized to show the information. XML won't supplant HTML soon, however it opens up additional opportunities by taking over numerous effective HTML capacities. There are numerous significant elements of XML that make it valuable in an assortment of frameworks and arrangements - XML is extensible - XML allows you to make your own self-depicting labels or dialects to suit your application. XML contains the information, it doesn't present it - XML lets you store the information paying little heed to how it is introduced. XML was started by an association named as the World Wide Web Consortium (W3C) and is made accessible as an open norm.

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 ususally 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.

3.1.5 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:

- I. Web/Mobile Apps
- II. Real time networking apps(Chats/Video calls)

III. Command line tools

IV. Games

JavaScript code can run on browsers with default JavaScript engines that is present in the browsers.

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 `<head>...</head>` or the `<body>...</body>` portion of the HTML.

It is a good habit to add JavaScript in the `<body>` tag rather than the `<head>` 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 *seperation 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 show convenient substance refreshes, intuitive guides, 2D activitys/. With 3D designs, looking over video jukeboxes, and so forth, you can wager that JavaScript is likely included. It is the third level fair and square of standard web advancements, two of which are HTML and CSS.

- HTML is the markup language with which we structure our web substance and give it importance, for instance by characterizing sections, headings and information tables or by inserting pictures and recordings in the page.
- CSS is a language with style decides that we use to apply styles to our HTML content, for example, characterize foundation tones and text styles and disperse our substance more than a few sections.

- JavaScript is a prearranging language that you use to make dynamic, reviving substance, control interactive media content, invigorate pictures, and pretty much whatever else. These three levels build very well on top of each other.

3.2 SERVER SIDE

3.2.1 SQL

SQL is a structured query language, a computer language used to store, manipulate, and retrieve data that is stored in relational databases. SQL is the standard language for the Relation Database System. All relational database management systems such as MySQL, MS Access, Oracle, Sybase, Informix, Postgres. and SQL Server has SQL as their language to be used for the database.

When you run an SQL command against an RDBMS, the system determines how best to carry out your request, and the SQL engine determines how to interpret the task. These components contain several components: Query Dispatcher, Optimization Engines, Classic Query Engine, and SQL Query Engine, and so on. The Classic Query Engine processes all non-SQL queries, but the SQL Query Engine does not process any logical files.

3.2.2 JDBC (Java Database Connectivity)

JDBC allows a Java Application to be connected to a relational database.

It's basically a standard API which provides portable access to various databases. Thus there is no need to develop code for different databases. JDBC supports a large number of databases such as Oracle, DB2, MySQL, SQL Server, Postgre etc.

JDBC Architecture

- 1. JDBC Driver** - Provides connection to the database. It converts standard API calls to low level calls for your specific database
- 2. JDBC Driver Manager** - DriverManager helps to connect any application based on database connection string. In JDBC 4.0, the JDBC drivers are automatically loaded based on the classpath
- 3. Packages used** - java.sql and javax.sql

Development Process

- 1.** Get a connection to database
- 2.** Create a statement object
- 3.** Execute SQL query
- 4.** Process Result Set

JDBC is basically a specification that maintains a collection of interfaces that allow portable access to a particular database. Java can be used to write various types of executable files, such as:

- Java applications
- Java applets
- Java servlets
- Java Server Pages (JSP)
- Enterprise JavaBeans (EJB)

All of these various executable files can consume a JDBC driver to access a database and use stored data. JDBC provides the functionality of code

independence so that Java programs can contain code irrespective of the type of database.

PREPARED STATEMENT

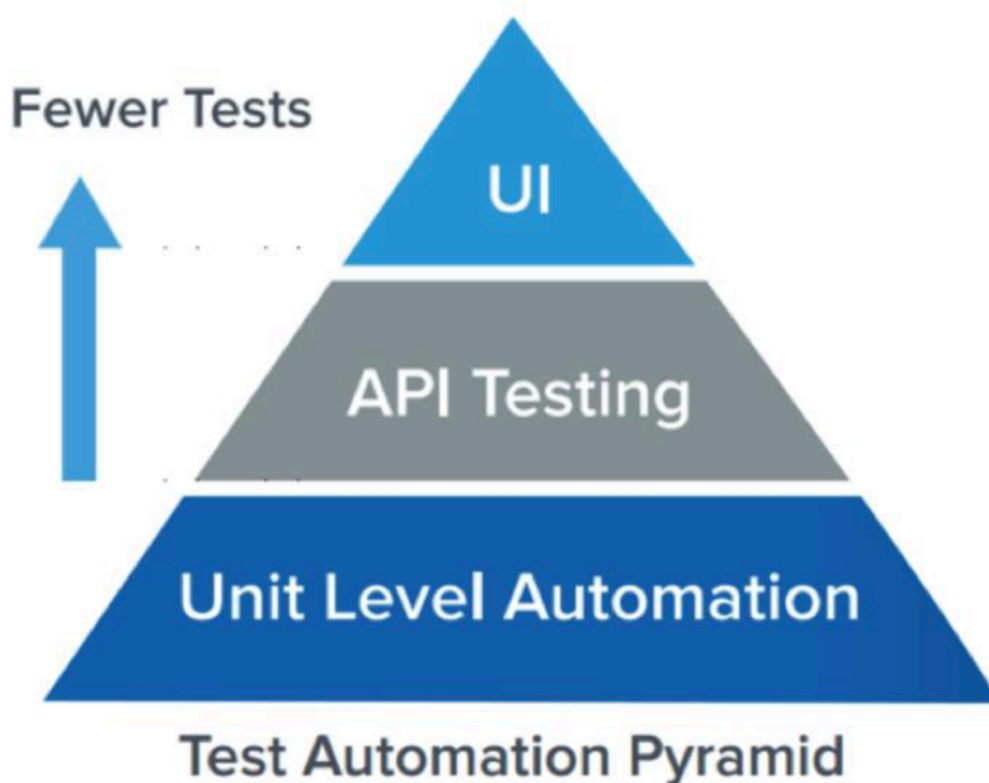
A prepared statement is a pre-compiled SQL statement. It has the following benefits:

- Makes it easier to set SQL parameter values
- Prevent against SQL dependency injection attacks
- May improve application performance

CHAPTER - 4

PERFORMANCE ANALYSIS

There are a variety of factors that affect the performance of a software. For performing testing using Selenium, there are some **requirements** that have to be fulfilled so that the quality is maintained and the testing is performed in a smooth and accurate manner.



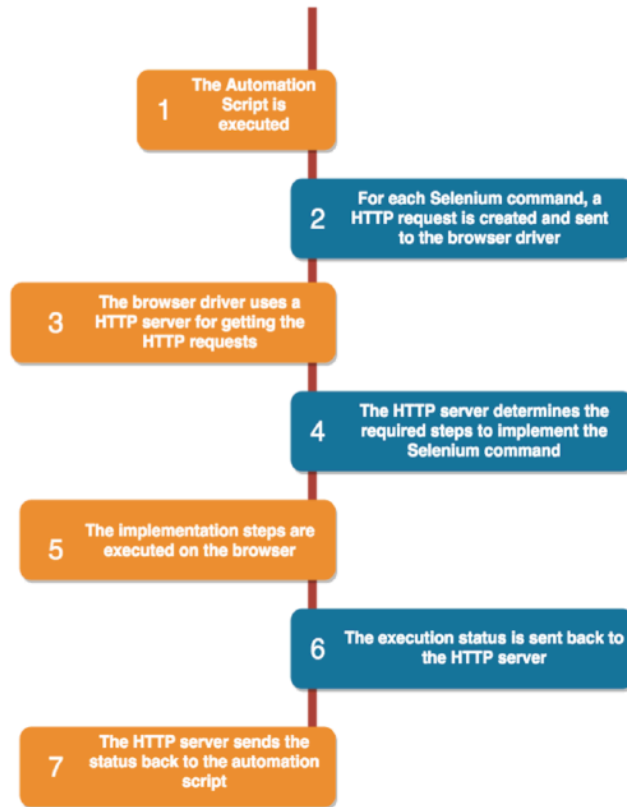
4.1 Selenium WebDriver

4.1.1 Selenium Introduction

Selenium is an open source programming testing structure that was found in 2004 by Jason Huggins under Apache 2.0. is basically a third party open source tool. It is not itself a programming language. Compatible languages include Java, C#, Ruby, JavaScript, Python, PHP etc. I have been trained in Java as the compatible language with Selenium.

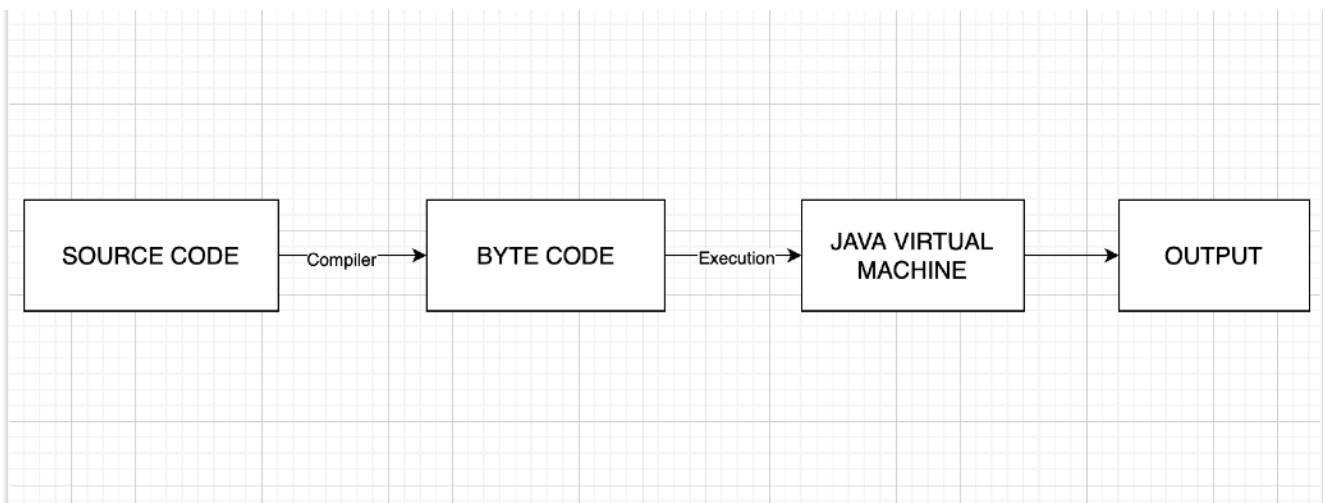
Selenium is utilized to impersonate the association between end clients in a web application by controlling the program's web regulator. As yet there are a few segments of Selenium:

- Selenium IDE - A Firefox module empowers analyzers to record and play back communication steps on a site with Selenium Core mix. A setting menu with a rundown of designated spots and affirmations (Selenium 2018)
- Selenium Core: A Javascript-based apparatus to run the test script (an assortment of orders) written in Selenium. Doesn't need establishment on the test worker on the test gadget. t approach (Selenium 2018)
- Selenium WebDriver: The most mainstream device in test computerization for web applications. Selenium WebDrivers permits engineers to aggregate and run a start to finish test suite with their API. In light of different experiments, the device breezes through the assessment script from Selenese to Selenium Core and controls the program without interfacing with a far off worker, except if it isn't the local PC. This abbreviates the association time and velocities up execution season of the test.



4.2 JAVA

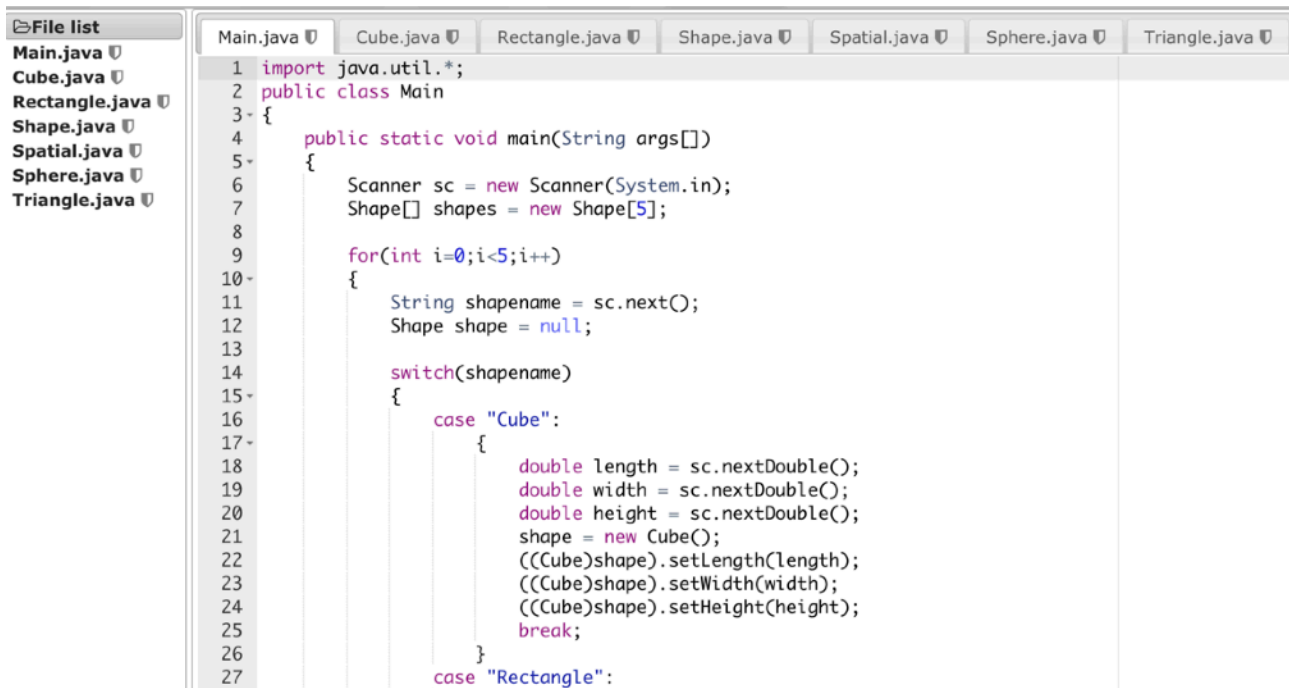
4.2.1 Java Programming Language



From the above diagram, since the source code is converted to byte code, this byte code can be executed on any platform using the JVM provided that Java is installed on the platform. Therefore it is platform independent.

Java was created by Sun Microsystems in 1995 as a programming and coding for numerous stages. As an incorporated language, Java empowers engineers to compose code once and execute it anyplace. Until 2016, Java was the most mainstream programming. Language with 9 million engineers (Wikipedia 2018), a lot of documentation accessible, and local area support. A Java Software Development Kit (SDK), which contains a compiler, a translator and a documentation generator, is needed for creating Java programs. The actual language offers incredible apparatuses with IDE. Notwithstanding JUnit for unit tests, Java is a decent possibility for test robotization.

4.2.2 JAVA HANDS-ON ASSIGNMENTS



The screenshot shows an IDE window with a file list on the left and a code editor on the right. The file list includes Main.java, Cube.java, Rectangle.java, Shape.java, Spatial.java, Sphere.java, and Triangle.java. The code editor displays the following Java code:

```

1 import java.util.*;
2 public class Main
3 {
4     public static void main(String args[])
5     {
6         Scanner sc = new Scanner(System.in);
7         Shape[] shapes = new Shape[5];
8
9         for(int i=0;i<5;i++)
10        {
11            String shapename = sc.next();
12            Shape shape = null;
13
14            switch(shapename)
15            {
16                case "Cube":
17                {
18                    double length = sc.nextDouble();
19                    double width = sc.nextDouble();
20                    double height = sc.nextDouble();
21                    shape = new Cube();
22                    ((Cube)shape).setLength(length);
23                    ((Cube)shape).setWidth(width);
24                    ((Cube)shape).setHeight(height);
25                    break;
26                }
27                case "Rectangle":

```

```

ArrayException.java
1 import java.util.*;
2 public class ArrayException{
3     public int arr[],size,index;
4     public String getPriceDetails()
5     {
6         System.out.println("Enter the number of elements in the array");
7         Scanner input = new Scanner(System.in);
8         try
9         {
10            size = input.nextInt();
11            size = Integer.parseInt(String.valueOf(size));
12            arr= new int[size];
13            System.out.println("Enter the price details");
14            for(int i=0;i<size;i++)
15            {
16                arr[i]=input.nextInt();
17            }
18
19            System.out.println("Enter the index of the array element you want to access");
20            index=input.nextInt();
21
22            return("The array element is "+arr[index]);
23        }
24
25        catch(ArrayIndexOutOfBoundsException e)
26        {
27            return("Array index is out of range");
28        }
29
30

```

4.2.3 Maven : Project Build Tool

Maven is a build tool which helps developer in building a project.

- A build tool is a tool that automates everything related to building the software project
- We require third party libraries/ frameworks to develop our application
- Maven has a centralised location called central repository where we just need to define what dependencies and what versions of dependencies we require and that file contains the POM file.
- All dependencies and support plugins that we need for the project are defined in the POM file
- All dependencies mentioned in the POM file are resolved during compilation.
- By just defining new dependencies inside the POM.xml file, we are able to download it inside our project directories.

Benefits of Maven Tool

If our project is dependent upon 100s of dependencies, we don't need to list them down in a separate file. And if we share our project somewhere else on the remote location, we don't need to hand over all the external dependencies. All the dependencies would be inbuilt. And Maven will automatically download all the dependencies.

4.3 XML HANDS-ON ASSIGNMENT

```
Employee.xml
1 <Departments>
2   <Department>
3     <deptid>1</deptid>
4     <dname>Sales</dname>
5     <Employee>
6       <empid>1001</empid>
7       <name>Tom</name>
8       <salary>20000</salary>
9       <email>tom@gmail.com</email>
10      <phoneno>9874563210</phoneno>
11    </Employee>
12    <Employee>
13      <empid>1002</empid>
14      <name>Sam</name>
15      <salary>25000</salary>
16      <email>sam@gmail.com</email>
17      <phoneno>0</phoneno>
18    </Employee>
19    <Employee>
20      <empid>1003</empid>
21      <name>Shiny</name>
22      <salary>20000</salary>
23      <email>0</email>
24      <phoneno>9876543210</phoneno>
25    </Employee>
26  </Department>
27 </Department>
28 </Department>
```

4.4 JAVASCRIPT HANDS- ON

```

index.html script.js
2 var arr=[];
3 function validateExpense()
4 {
5     //DO NOT CHANGE THIS FUNCTION
6     var month=document.getElementById('monthname').value;
7     var items=document.getElementsByName('exp');
8
9     if(month)
10    {
11        for(var i=0; i<items.length; i++)
12            arr[i]=items[i];
13        if(validateMonthNameFormat(month))
14        {
15            document.getElementById("result").innerHTML = "Expenses for the month of "+month+" include : <br/>"+arr[0].value+ "<br/>"+arr[1].value;
16        }
17        else
18            document.getElementById("result").innerHTML = "Invalid month name";
19    }
20    else
21        document.getElementById("result").innerHTML = "Month name missing" ;
22 }
23
24 function validateMonthNameFormat(month)
25 {
26     // Fill your code here
27     // find if the month is valid by checking if it is equal to "Jan" or "Feb" or "Mar" and so on..
28     // return true or false
29
30     if(month=="Jan"||month=="Feb"||month=="Mar"||month=="Apr"||month=="May"||month=="Jun"||month=="Jul"||month=="Aug"||month=="Sep"||month=="Oct")
31     {
32         return true;

```

OUTPUT

Validate Month & Display Expenses

Month name

List of expenses

- Food Expenses
- House Rent
- Travel Expenses
- Medical Expenses
- Clothing Expenses

Validate

4.4 SQL HANDS-ON

★ query.sql

```

1 select cars.car_id, cars.car_name, cars.car_type
2 from cars left join rentals
3 on cars.car_id=rentals.car_id
4 where cars.car_id not in(select rentals.car_id from rentals)
5 order by cars.car_id;

```


CHAPTER - 5

CONCLUSION

In the course of recent years, development groups everywhere on the world have been taking a stab at better execution by exploring different avenues regarding diverse advancement philosophies, and Agile practice approaches as one potential competitor.

Selenium is one of the most desired picks for builders in the software program industry. According to BusinessWire, Selenium is the maximum famous web testing device which has a humongous three hundred percentage boom in process postings over the last 3 years. Tech studies large Gartner has additionally mentioned that Selenium has the best adoption rate in open-supply automation checking out tools. With a whole lot dialogue round this topic, the very last phrase we will say is that for specialists who need to construct their profession in Selenium, the sector is packed with possibilities to prosper. Also, automation being the cornerstone of the tech world, people with abilities on this generation can leverage large advantages for the imminent years.

Future scope: As test packages are taken into consideration to be the subsequent massive factor for lots businesses worldwide, test automation marketplace developments are step by step growing up with large call for with Selenium. Many pinnacle companies internationally rely upon Selenium sources for his or her check automation needs. If you're prepared to dive deep into check automation and advantage superior degree knowledge in it, then Selenium will assist you to land in a higher and profitable role on your career.

However, no software program has ever been produced without bugs; this really illustrates that the want for automation trying out is ever. Hence the destiny seems brilliant for Selenium with countless opportunities.

This training has enabled to study a lot many tools and technologies which are crucial in the learning path of any IT industry member whether it is a tester or a developer.

The skills learned in training will not only help in building up the final project for Selenium testing, but also help improve skills for the future. Technologies like JavaScript, Xpath, SQL , MAVEN etc are highly beneficial and have a high scope for future careers and requirements.

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I have compiled my project report. But due to COVID-19 situation 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'll produce a certificate/ document of my internship completion with the company to TnP Cell whenever COVID-19 situation gets normal.

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