

**Pune Vidyarthi Griha's
College of Engineering & S. S. Dhamankar Institute of Management , Nashik**

DEPARTMENT OF COMPUTER ENGINEERING

Subject :- Laboratory Practice IV

Semester – I

Academic Year 2022-23

Laboratory Practice IV

Elective III - 410244(C): Cyber Security and Digital Forensics

Elective IV 410245 (D): Software Testing and Quality Assurance

(BE Computer-2019 Pattern)

DEPARTMENT OF COMPUTER ENGINEERING

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Laboratory Practice IV

Elective III - 410244(C): Cyber Security and Digital Forensics

Experiment No: Group A-1

Problem Definition:

Write a program for Tracking Emails and Investigating Email Crimes. i.e. Write a program to analyze e-mail header

Prerequisite:

Application Layer Protocols

Learning Objective:

1. To understand how Mails are transferred from Sender to Receiver.
2. To Understand Email related Parameter.

Theory:

Introduction

Analysis of email is especially important not just because email may be used to communicate about things that we might be interested in for an investigation, but because it is a comparatively permanent and public record of those communications. In the case of a phone call, there is only the record that a call took place; in a spoken conversation, there may be no record at all. Conventional mail can be virtually untraceable, and paper documents are easily destroyed. Email, however, is unique; when a message is sent, the entire message is stored for both the sender and the receiver, and records of the mail being sent are stored on dozens of servers that the message passes through before arriving at its destination. There are a number of ways to analyze email, including: data mining techniques, which may be applied to large or small data sets; straightforward searching of a user's email for certain content; and in-depth analysis of an individual email's lineage.

E-mail system comprises of various hardware and software components that include sender's client and server computers and receiver's client and server computers with required software and services installed on each. Besides these, it uses various systems and services of the Internet. The sending and receiving servers are always connected to the

Internet but the sender's and receiver's client connects to the Internet as and when required.

An e-mail communication between a sender '*Alice*' having e-mail address '*alice@a.com*' and recipient '*Bob*' having e-mail address '*bob@b.com*' is shown in figure 1. '*Alice*' composes an e-mail message on her computer called client for '*Bob*' and sends it to her sending server 'smtp.a.org' using *SMTP* protocol. Sending server performs a lookup for the mail exchange record of receiving server '*b.org*' through Domain Name System (*DNS*) protocol on *DNS* server '*dns.b.org*'. The *DNS* server responds with the highest priority mail exchange server '*mx.b.org*' for the domain '*b.org*'. Sending server establishes *SMTP* connection with the receiving server and delivers the e-mail message to the mailbox of '*Bob*' on the receiving server. '*Bob*' downloads the message from his mailbox on receiving server to local mailbox on his client computer using *POP3* or *IMAP* protocols. Optionally, '*Bob*' can also read the message stored in his server mailbox without downloading it to the local mailbox by using a Webmail program.

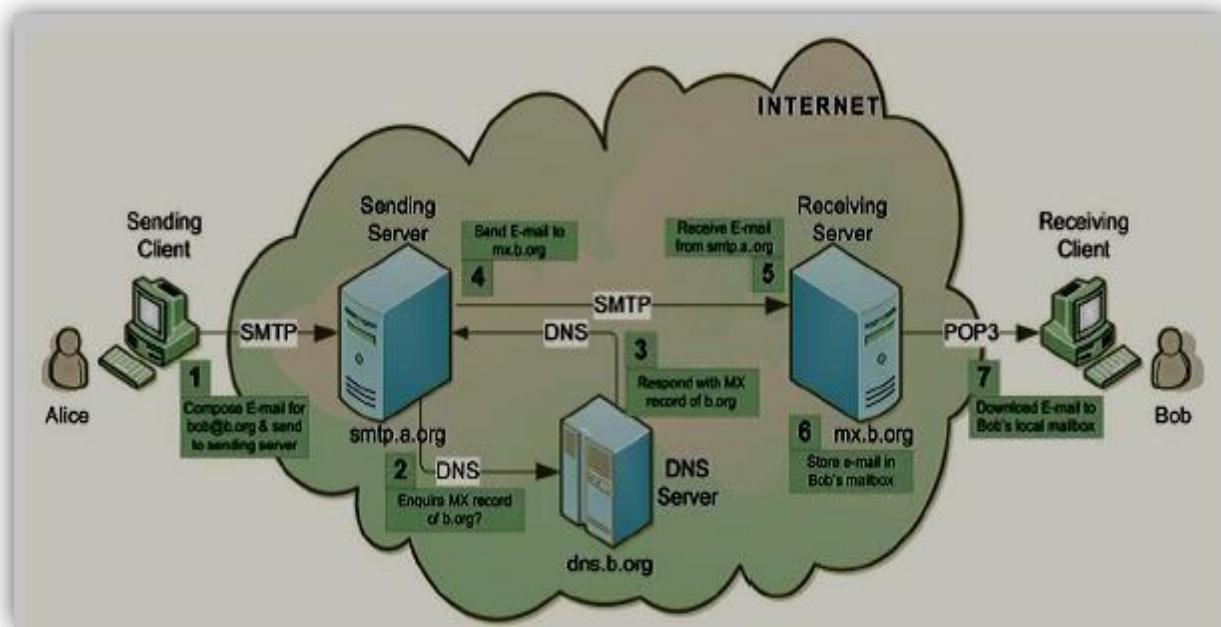


Figure 1: E-mail communication between a sender '*Alice*' and recipient '*Bob*'

E-MAIL ACTORS, ROLES AND RESPONSIBILITIES

E-mail is a highly distributed service involving several actors that play different roles to accomplish end-to-end mail exchange. These actors fall under “User Actors”, “Message Handling Service (*MHS*) Actors” and “Administrative Management Domain (*ADMD*) Actors” groups.

User Actors are people, organizations or processes that serve as sources or sinks of messages. They can generate, modify or look at the whole message. User Actors can be of following four types (Table 1):

User Actor Type	Roles and Responsibilities
Author	<ul style="list-style-type: none"> ▪ Responsible for creating the message, its contents, and its list of Recipient addresses. ▪ The MHS transfers the message from the Author and delivers it to the Recipients. ▪ The MHS has an Originator role that correlates with the Author role.
Recipient	<ul style="list-style-type: none"> ▪ The Recipient is a consumer of the delivered message. ▪ The MHS has a Receiver role that correlates with the Recipient role. ▪ A Recipient can close the user-communication loop by creating and submitting a new message that replies to the Author e.g. an automated form of reply is the Message Disposition Notification (MDN)
Return Handler	<ul style="list-style-type: none"> ▪ It is a special form of Recipient that provides notifications (failures or completions) generated by the MHS as it transfers or delivers the message. ▪ It is also called Bounce Handler.
Mediator	<ul style="list-style-type: none"> ▪ It receives, aggregates, reformulates, and redistributes messages among Authors and Recipients. ▪ It forwards a message through a re-posting process. ▪ It shares some functionality with basic MTA relaying, but has greater flexibility in both addressing and content than is available to MTAs. It preserves the integrity and tone of the original message, including the essential aspects of its origination information. It might also add commentary. ▪ It does not create new message that forwards an existing message, Reply or annotation. ▪ Some examples of mediators are: Alias, ReSender, Mailing Lists, Gateways and Boundary Filter.

All types of Mediator user actors set HELO/EHLO, ENVID, RcptTo and Received fields. Alias actors also typically change To/CC/BCC and MailFrom fields. Identities relevant to ReSender are: From, Reply-To, Sender, To/CC/BCC, Resent-From, Resent-Sender, Resent-To/CC/BCC and MailFrom fields. Identities relevant to Mailing List processor are: List-Id, List-*, From, Reply-To, Sender, To/CC and MailFrom fields. Identities relevant to Gateways are: From, Reply-To, Sender, To/CC/BCC and MailFrom fields.

Message Handling Service (MHS) Actors are responsible for end-to-end transfer of messages. These Actors can generate, modify or look at only transfer data in the message. MHS Actors can be of following four types (Table 2):

MHS Actor Type	Roles and Responsibilities
Originator	<ul style="list-style-type: none"> ▪ It ensures that a message is valid for posting and then submits it to a Relay. ▪ It is responsible for the functions of the Mail Submission Agent. ▪ It also performs any post-submission that pertain to sending error and delivery notice. ▪ The Author creates the message, but the Originator handles any transmission issues with it.
Relay	<ul style="list-style-type: none"> ▪ It performs MHS-level transfer-service routing and store-and-forward function by transmitting or retransmitting the message to its Recipients. ▪ It adds trace information but does not modify the envelope information or the semantics of message content. ▪ It can modify message content representation, such as changing the form of transfer encoding from binary to text, but only (as required) to meet the capabilities of the next hop in the MHS. ▪ When a Relay stops attempting to transfer a message, it becomes an Author because it sends an error message to the Return Address.
Gateway	<ul style="list-style-type: none"> ▪ It connects heterogeneous mail services despite differences in their syntax and semantics. ▪ It can send a useful message to a Recipient on the other side, without requiring changes to any components in the Author's or Recipient's mail services.
Receiver	<ul style="list-style-type: none"> ▪ It performs final delivery or sends the message to an alternate address. ▪ It can also perform filtering and other policy enforcement immediately before or after delivery.

For networks, a port means an endpoint to a logical connection. The port number identifies what type (application/service offered) of port it is. The commonly used default port numbers used in e-mail are shown in Table 3. A complete list of default port numbering assignment is given in

Port No	Protocols/Services	Description
25	SMTP SMTP e-mail server	Simple Mail Transfer Protocol - core Internet protocol used to transfer from client to server (MUA to MTA) and server to server (MTA to MTA)
110	POP3 POP e-mail server	Post Office Protocol allows clients (MUA's) to retrieve stored e-mail
143	IMAP IMAP(4) e-mail server	Internet Message Access Protocol provides a means of managing e-mail messages on a remote server and retrieve stored e-mail
465	SMTPTS WSMTP (SSMTP) protocol over TLS/SSL	SMTP via SSL encrypted connection (Unofficial)
993	IMAPS SSL encrypted IMAP	IMAP via SSL encrypted connection
995	POP3S SPOP SSL encrypted POP	POP via SSL encrypted connection
587	MSA	Outgoing Mail (Submission)
80	HTTP	Webmail
443	HTTPS	Secure Webmail

Analyzing an Individual Email

Although webmail will feature prominently in this section, the analysis of a particular email's lineage is much broader and can be applied to any email. A simple view of the path of an email from a sender to a client is presented in Figure 2. The email originates from the sender, whether from a local email client or a webmail application. When the email is sent, it is first sent to a Simple Mail Transfer Protocol (SMTP) server. That server forwards it to other SMTP servers until it finally reaches the destination server. On reaching its destination, the email is sent to a Post Office Protocol (POP) server, or any number of similar mail-delivery servers (IMAP is another, and webmail services may use their own servers for this purpose). The receiving client then connects to that server, retrieves the message, and allows the recipient to read it.

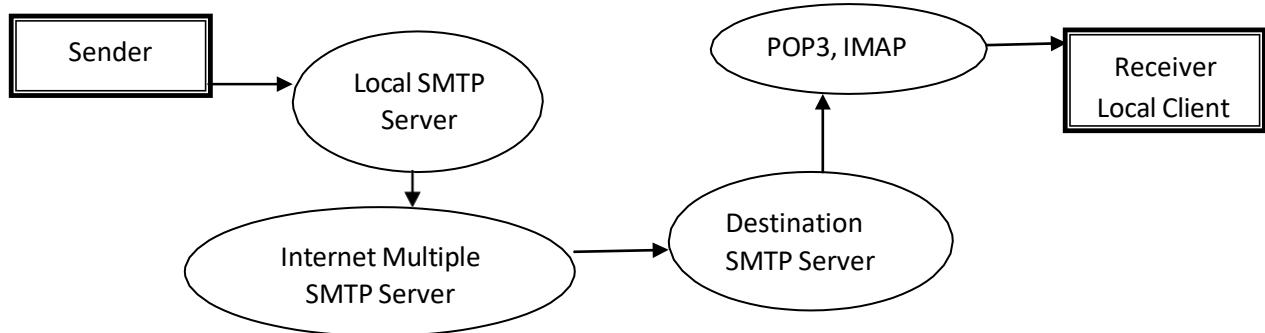


Figure 2: Path of an email from a sender to a client

When the email is sent and when it is received, those respective servers add their own information to the email's header, and most likely log the action. Access to those logs may be required for much analysis, but specifics are outside of the scope of this paper. Considerable information can be gleaned from the header alone.

Suppose Moses, with the address moses@nmt.edu, sends an email from his office on the New Mexico Tech campus to his similarly named friend, with the email address thenewmoses@gmail.com. The subject of this email is "Snakes," and the content "Fish."

Below is the entire theoretical email, including all headers.

```
From: moses@nmt.edu
Subject: Snakes
Date: September 25, 2021 9:35:29 PM
MDT To: thenewmoses@gmail.com
X-Gmail-Received: ca493ed685a8e9ae77165ab2ce345127e5b310b4 Delivered-
To: thenewmoses@gmail.com
Received: by 10.90.33.15 with SMTP id g15cs279684agg; Mon, 25 Sep
2021 20:35:32 0700 (PDT)
Received: by 10.35.113.12 with SMTP id q12mr526602pym; Mon, 25 Sep 2021
20:35:32 -0700 (PDT)
Received: from mailhost.nmt.edu (mailhost.NMT.EDU
[129.138.4.52]) by mx.gmail.com with ESMTP id 36si2059018nza.
2021.09.25.20.35.32; Mon, 25 Sep 2021 20:35:32 -0700 (PDT)
Received: from localhost (localhost.localdomain [127.0.0.1]) by
localhost.localdomain (Postfix) with ESMTP id 09FF4436164 for
<thenewmoses@gmail.com>; Mon, 25 Sep 2021 21:35:32 -0600
(MDT) Received: from mailhost.nmt.edu ([127.0.0.1]) by localhost
(mailhost.nmt.edu [127.0.0.1]) (amavisd-new, port 10024) with
ESMTP id 11225-05 for <thenewmoses@gmail.com>; Mon, 25 Sep 2021
21:35:30 -0600 (MDT)
Received: from [192.168.1.2] (cs-fitch017.nmt.edu [129.138.21.110])
by mailhost.nmt.edu (Postfix) with ESMTP id 6FD4B436030 for
<thenewmoses@gmail.com>; Mon, 25 Sep 2021 21:35:30 -0600
(MDT) Return-Path: <moses@nmt.edu>
Received-Spf: pass (gmail.com: best guess record for
domain of moses@nmt.edu designates 129.138.4.52 as
permitted sender) Mime-Version: 1.0 (Apple Message
framework v752.2)
Content-Transfer-Encoding: 7bit
Message-Id: <77E313EF-271F-4AD0-A8D3-81263BF7B083@nmt.edu>
```

Content-Type: text/plain; charset=US-ASCII;
 format=flowed X-Mailer: Apple Mail (2.752.2)
 X-Virus-Scanned: by amavisd-new-2.3.1 (20050509) (RHEL AS) at
 nmt.edu Fish

E-MAIL IDENTITIES:

Field Name	Set By	Field Description
Layer: Message Header Fields (Identification Fields)		
Message-ID:	Originator	Globally unique message identification string generated when it is sent.
In-Reply-To:	Originator	Contains the Message-ID of the original message in response to which the reply message is sent.
References:	Originator	Identifies other documents related to this message, such as other e-mail message.
Layer: Message Header Fields (Originator Fields)		
From:	Author	Name and e-mail address of the author of the message
Sender:	Originator	Contains the address responsible for sending the message on behalf of Author, if not omitted or same as that specified in From field.
Reply-To:	Author	E-mail address, the author would like recipients to use for replies. If present it overrides the From field.
Layer: Message Header Fields (Originator Date Fields)		
Date:	Originator	It holds date and time when the message was made available for delivery.
Layer: Message Header Fields (Informational Fields)		
Subject:	Author	It describes the subject or topic of the message.
Comments:	Author	It contains summarized comments regarding the message.
Keyword:	Author	It contains list of comma separated keywords that may be useful to the recipients e.g. when searching mail.
Layer: Message Header Fields (Destination Address Fields)		
TO:	Author	Specifies a list of addresses of the recipients of the message. These addresses might be different from address in RcptTo SMTP commands
CC:	Author	Generally same as To Field. Generally a To field specifies primary recipient who is expected to take some action and CC addresses

Execution Steps

- Open the Email which you want to analyze header
- Click on the right side three vertical dot(more) and select show original.
- New tab will be open then copy header information which you want to analyze.
- Open <https://www.whatismyip.com/email-header-analyzer> website.
- Copy the header information and click on analyze button.
- Then You will see the header analysis on screen.

Assignment Question:

1. Why to Analyze Email Header?
2. What Fields are analyzed during Email Analysis Header?
3. Which Readymade Tools are Available for Analyzing E-Mail Header?
4. Explain Email Architecture in Detail?
5. What is POP3, IMAP, SMTP, and MIME?

Conclusion:

E-mail is a widely used and highly distributed application involving several actors that play Different roles. These actors include hardware and software components, services and protocols which provide interoperability between its users and among the components along the path of transfer. Cybercriminals forge e-mail headers or send it anonymously for illegitimate purposes which lead to several crimes and thus make e-mail forensic investigation crucial.

Assignment Group A-2

Problem Definition:

Implement a program to generate and verify CAPTCHA image.

Prerequisite:

Basics of PYTHON

Learning Objectives:

1. Understand the use of CAPTCHA Image.
2. Generation and Verification of it.

New Concepts:

1. CAPTCHA generation
2. Functions used like RANDOM

Theory

Introduction

A **CAPTCHA** (an acronym for "Completely Automated Public Turing test to tell Computers and Humans Apart") is a type of challenge-response test used in computing to determine whether or not the user is human. The most common type of CAPTCHA was first invented by Mark D. Lillibridge, Martin Abadi, Krishna Bharat and Andrei Z. Broder. This form of CAPTCHA requires that the user type the letters of a distorted image, sometimes with the addition of an obscured sequence of letters or digits that appears on the screen. Because the test is administered by a computer, in contrast to the standard Turing test that is administered by a human, a CAPTCHA is sometimes described as a reverse Turing test. Actually CAPTCHA is used as a simple puzzle hurdle, which restricts various automated

programs to sign-up E-mail accounts, cracking passwords, spam sending, privacy violation etc. This CAPTCHA actually challenges a particular automated program, which is trying to access some private zone. So, CAPTCHA helps in preventing access of personal mail accounts by some un-authorized automated spamming programs

Characteristics:-

CAPTCHAs are by definition fully automated, requiring little human maintenance or intervention to administer. This has obvious benefits in cost and reliability.

By definition, the algorithm used to create the CAPTCHA must be made public, though it may be covered by a patent. This is done to demonstrate that breaking it requires the solution to a difficult problem in the field of artificial intelligence (AI) rather than just the discovery of the (secret) algorithm, which could be obtained through reverse engineering or other means.

Modern text-based CAPTCHAS are designed such that they require the simultaneous use of three separate abilities—invariant recognition, segmentation, and parsing—to correctly complete the task with any consistency.

1. Invariant recognition refers to the ability to recognize the large amount of variation in the shapes of letters. There are nearly an infinite number of versions for each character that a human brain can successfully identify. The same is not true for a computer, and teaching it to recognize all those differing formations is an extremely challenging task.
2. Segmentation, or the ability to separate one letter from another, is also made difficult in CAPTCHAs, as characters are crowded together with no white space in between.
3. Context is also critical. The CAPTCHA must be understood holistically to correctly identify each character. For example, in one segment of a CAPTCHA, a letter might look like an “m.” Only when the whole word is taken into context does it become clear that it is a “u” and an “n.”

Each of these problems pose a significant challenge for a computer, even in isolation. The presence of all three at the same time is what makes CAPTCHAs difficult to solve.

Why we Prefer Captcha rather other security measures?

1. To Protect Website's Registration Forms –

Many Websites like Hotmail, Gmail, Yahoo, Facebook etc. offers free registration. It is necessary to protect these website's registrations so that it ensures the registered user is a human not a program or bot. Captcha Code is used to protect the Registration Form Submission Programmatically.

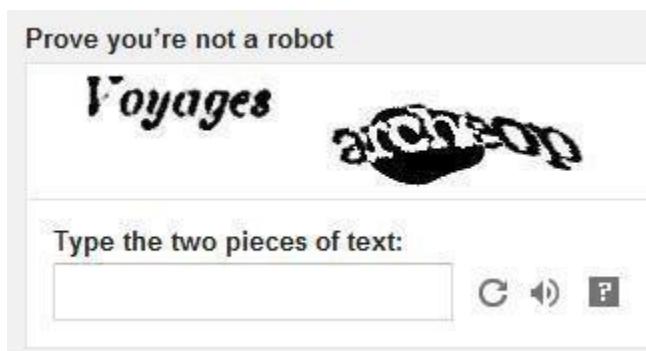


Figure 1:- Gmail Registration Form Captcha Code Image Screen Capture

2. To Prevent Comment Spams in Blogs –

Captcha Code is used in the comment form so that only human can comment on a post otherwise spammers can flood hundreds of comments to a single post.

3. To Protect Email Address Scrapping –

Spammers crawl the web in the search of Email address posted in the clear text (e.g. **email@website.com**). You can protect your email address either by using Captcha to hide the email address, one can solve the Captcha before showing the Email address or by using alternative trick to post Email Address in the format of email at website dot com.

4. To Protect from Search Engine Bots –

Many Html tags are available to specifying indexing condition to Search engine bots. To prevent a website or specific webpage from search engine crawling, it is desirable to use

html meta tag but sometimes it is not completely sure that the webpage is fully protected from search engine crawlers and large companies who needs a high security uses Captcha rather than to use only meta tags to protect their highly public protected and confidential Web Pages.

Application of CAPTCHA:-

Applications of CAPTCHAs

CAPTCHAs have several applications for practical security:

- **Preventing Comment Spam in Blogs.** Most bloggers are familiar with programs that submit bogus comments, usually for the purpose of raising search engine ranks of some website (e.g., "buy penny stocks here"). This is called comment spam. By using a CAPTCHA, only humans can enter comments on a blog. There is no need to make users sign up before they enter a comment, and no legitimate comments are ever lost!
- **Protecting Website Registration.** Several companies (Yahoo!, Microsoft, etc.) offer free email services. Up until a few years ago, most of these services suffered from a specific type of attack: "bots" that would sign up for thousands of email accounts every minute. The solution to this problem was to use CAPTCHAs to ensure that only humans obtain free accounts. In general, free services should be protected with a CAPTCHA in order to prevent abuse by automated scripts.
- **Protecting Email Addresses From Scrapers.** Spammers crawl the Web in search of email addresses posted in clear text. CAPTCHAs provide an effective mechanism to hide your email address from Web scrapers. The idea is to require users to solve a CAPTCHA before showing your email address.
- **Online Polls.** In November 1999, <http://www.slashdot.org> released an online poll asking which was the best graduate school in computer science (a dangerous question to ask over the web!). As is the case with most online polls, IP addresses of voters were recorded in order to prevent single users from voting more than once. However, students at Carnegie Mellon found a way to stuff the ballots using

programs that voted for CMU thousands of times. CMU's score started growing rapidly. The next day, students at MIT wrote their own program and the poll became a contest between voting "bots." MIT finished with 21,156 votes, Carnegie Mellon with 21,032 and every other school with less than 1,000. Can the result of any online poll be trusted? Not unless the poll ensures that only humans can vote.

- **Preventing Dictionary Attacks.** CAPTCHAs can also be used to prevent dictionary attacks in password systems. The idea is simple: prevent a computer from being able to iterate through the entire space of passwords by requiring it to solve a CAPTCHA after a certain number of unsuccessful logins. This is better than the classic approach of locking an account after a sequence of unsuccessful logins, since doing so allows an attacker to lock accounts at will.
- **Search Engine Bots.** It is sometimes desirable to keep WebPages unindexed to prevent others from finding them easily. There is an html tag to prevent search engine bots from reading web pages. The tag, however, doesn't guarantee that bots won't read a web page; it only serves to say "no bots, please." Search engine bots, since they usually belong to large companies, respect web pages that don't want to allow them in. However, in order to truly guarantee that bots won't enter a web site, CAPTCHAs are needed.
- **Worms and Spam.** CAPTCHAs also offer a plausible solution against email worms and spam: "I will only accept an email if I know there is a human behind the other computer." A few companies are already marketing this idea.

Advantages:

1. Distinguishes between a human and a machine
2. Makes online polls more legitimate
3. Reduces spam and viruses
4. Makes online shopping safer
5. Diminishes abuse of free email account services

Disadvantages:

1. Sometimes very difficult to read
2. Are not compatible with users with disabilities
3. Time-consuming to decipher
4. Technical difficulties with certain internet browsers
5. May greatly enhance Artificial Intelligence

Algorithm:

1. Start
2. Import **image.captcha** from ImageCaptcha
3. Generate captcha by **generate(captcha_text)**
4. For randomly captcha generation use function **random.randint()**
5. Create an image to write a captcha text
6. End

Assignment Questions:

1. What is Full Form of CAPTCHA?
2. Write down different forms of CAPTCHA?
3. Why CAPTCHA is needed?
4. Explain the uses of different captcha as per Requirement?

Conclusion:

Hence we conclude that CAPTCHA is used to distinguished Human and Machine and Provide Security to Programs.

Assignment Group A-3

Problem Definition: Write a Computer Forensics Application Program in Java/Python/C++ for recovering Deleted Files and Deleted Partitions.

Prerequisite:

- a) Knowledge about Partitions in Ubuntu. b) Path of Trash folder.

Learning Objectives:

- Understand the concept of Recovery of deleted files.
- Implementation of recovery of deleted Partitions.

New Concepts:

- a. Recovery of files in LINUX OS.

Theory

Introduction

Have you accidentally deleted an important file because you are in a habit of using "Shift+Del" rather than delete only?? Well don't panic. There are many utilities in Ubuntu and other Linux distributions which helps you in recovering the so called "permanently deleted" files. Actually when you delete a file permanently (accidentally or intentionally), It doesn't get removed from your hard disk. It gets stored in certain blocks of the storage device and they continue to exist in the blocks unless you overwrite them with newer files. There are many Tools available to recover permanently deleted files Scalpel.

Scalpel is a platform independent command based tool which is small yet very powerful. But, if the file is deleted i.e. by just pressing Delete button the file is stored in Trash folder in Ubuntu OS. So it is easy to recover the deleted files from Trash Folder. Just we need to know the path of trash folder.

Path is: ="/home/gurukul/.local/share/Trash/files"

There are sub-Folders in Trash Folder namely :

1. files- contains files which are deleted
2. info- contains information of files deleted
3. expunged

Introduction to file systems:

File systems are one of the things any newcomer to linux must become acquainted with. In the world of Microsoft you never really have to worry about it, the default being NTFS. Linux however, being built on a world of open source and differing opinions, is not limited in this way and so the user should have an understanding of what a file system is, and how it affects the computer.

At the core of a computer, it's all 1s and 0s, but the organization of that data is not quite as simple. A *bit* is a 1 or a 0, a *byte* is composed of 8 bits, a kilobyte is 1024 (i.e. 2) bytes, a megabyte is 1024 kilobytes and so on and so forth. All these *bits* and *bytes* are permanently stored on a Hard Drive. A hard drive stores all your data, any time you save a file, you're writing thousands of 1s and 0s to a metallic disc, changing the magnetic properties that can later be read as 1 or 0. There is so much data on a hard drive that there has to be some way to organize it, like a library of books and the old card drawers that indexed all of them, without that index, we'd be lost. Libraries, for the most part, use the Dewey Decimal System to organize their books, but

there exist other systems to do so, none of which have attained the same fame as Mr. Dewey's invention. File systems are the same way. The ones most users are aware of are the ones Windows uses, the vFat or the NTFS systems, these are the Windows default file systems.

Ubuntu (like all UNIX-like systems) organizes files in a hierarchical tree, where relationships are thought of in terms of children and parent. *Directories* can contain other directories as well as *regular files*, which are the "leaves" of the tree. Any element of the tree can be referenced by a *path name*; an *absolute path name* starts with the character / (identifying the *root directory*, which contains all other directories and files), then every child directory that must be traversed to reach the element is listed, each separated by a / sign.

Main directories

The standard Ubuntu directory structure mostly follows the File system Hierarchy Standard, which can be referred to for more detailed information.

Here, only the most important directories in the system will be presented.

/bin is a place for most commonly used terminal commands, like ls, mount, rm, etc.

/boot contains files needed to start up the system, including the Linux kernel, a RAM disk image and bootloader configuration files.

/dev contains all *device files*, which are not regular files but instead refer to various hardware devices on the system, including hard drives.

/etc contains system-global configuration files, which affect the system's behavior for all users. **/home** home sweet home, this is the place for users' home directories.

/lib contains very important dynamic libraries and kernel modules

/media is intended as a mount point for external devices, such as hard drives or removable media (floppies, CDs, DVDs).

/mnt is also a place for mount points, but dedicated specifically to "temporarily mounted" devices, such as network filesystems.

/opt can be used to store addition software for your system, which is not handled by the package manager.

/proc is a virtual filesystem that provides a mechanism for kernel to send information to processes.

/root is the **superuser**'s home directory, not in **/home/** to allow for booting the system even if **/home/** is not available.

/sbin contains important administrative commands that should generally only be employed by the superuser.

/srv can contain data directories of services such as HTTP (**/srv/www/**) or FTP.

/sys is a virtual filesystem that can be accessed to set or obtain information about the kernel's view of the system.

/tmp is a place for temporary files used by applications.

/usr contains the majority of user utilities and applications, and partly replicates the root

directory structure, containing for instance, among others, /usr/bin/ and /usr/lib.

/var is dedicated variable data that potentially changes rapidly; a notable directory it contains is /var/log where system log files are kept. **Steps to Partition HardDisk Drive in Ubuntu:-**

Step 1. If you are trying to format or partition your hard drive it is assumed that bios is able to detect the device. To determine the path and other specific information about your drive open a terminal window and enter this command:

sudo lshw -C disk

Step 2. After entering this command Ubuntu should return something similar to this. Take note of the “logical name” because this will be used throughout the partitioning process if done via terminal window.

```
tv@ubuntu:~$ sudo lshw -c disk
[sudo] password for tv:
PCI (sysfs)
  *-cdrom:0
    description: DVD-RAM writer
    physical id: 0
    bus info: scsi@0:0.0.0
    logical name: /dev/cdrom0
    logical name: /dev/cdrw0
    logical name: /dev/dvd0
    logical name: /dev/dvdrw0
    logical name: /dev/sr0
    capabilities: audio cd-r cd-rw dvd dvd-r dvd-ram
    configuration: status=open
  *-cdrom:1
    description: DVD-RAM writer
    physical id: 1
    bus info: scsi@1:0.0.0
    logical name: /dev/cdrom1
    logical name: /dev/cdrw1
    logical name: /dev/dvd1
    logical name: /dev/dvdrw1
    logical name: /dev/sr1
    capabilities: audio cd-r cd-rw dvd dvd-r dvd-ram
    configuration: status=open
  *-disk
    description: SCSI Disk
    physical id: 0.0.0
```

Step 3. The part we will be most concerned with will be the hard drive information that is displayed in the terminal window.

```
*-disk
  description: SCSI Disk
  physical id: 0.0.0
  bus info: scsi@2:0.0.0
  logical name: /dev/sda
  size: 20GB (21GB)
  capabilities: partitioned partitioned:dos
  configuration: signature=00066f5f
tv@ubuntu:~$
```

If you plan on using the hard drive only for Ubuntu then the recommended file system to use is either ext3/ext4 depending on whether or not you need backwards compatibility with previous versions of Linux. If you will need to share files between Ubuntu and Windows machines fat 32 is the recommended file system to use, but NTFS will also work well also.

Partition using command line in Terminal: Step

1. Start **fdisk** with this command



```
tv@ubuntu:~$ sudo fdisk /dev/sda
[sudo] password for tv: █
```

Step 2. Press “**m**” then hit **enter**. This will return a menu like the one below showing all of the available commands for the fdisk program.

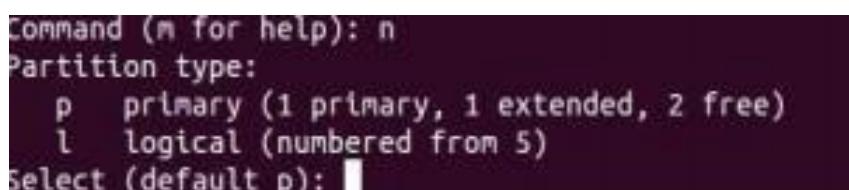


```
tv@ubuntu:~$ sudo fdisk /dev/sda
[sudo] password for tv:

Command (m for help): m
Command action
  a  toggle a bootable flag
  b  edit bsd disklabel
  c  toggle the dos compatibility flag
  d  delete a partition
  l  list known partition types
  m  print this menu
  n  add a new partition
  o  create a new empty DOS partition table
  p  print the partition table
  q  quit without saving changes
  s  create a new empty Sun disklabel
  t  change a partition's system id
  u  change display/entry units
  v  verify the partition table
  w  write table to disk and exit
  x  extra functionality (experts only)

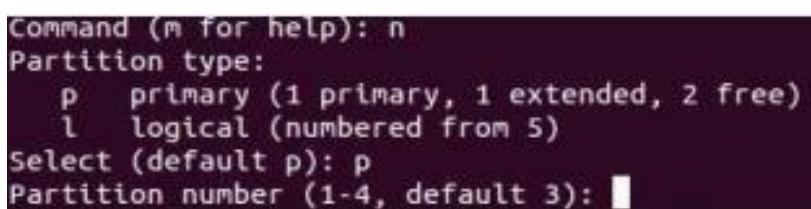
Command (m for help): █
```

Step 3. Since we want to add a new partition press “**n**” and then **enter**.



```
Command (m for help): n
Partition type:
  p  primary (1 primary, 1 extended, 2 free)
  l  logical (numbered from 5)
Select (default p): █
```

Step 4. To create a primary partition (what we want) press “**p**” and then hit **enter**.



```
Command (m for help): n
Partition type:
  p  primary (1 primary, 1 extended, 2 free)
  l  logical (numbered from 5)
Select (default p): p
Partition number (1-4, default 3): █
```

Step 5.

If you only want 1 partition press “**1**” and hit **enter**. You may be provided with a default response, you may choose this as the Partition number if you would like. Next you will be prompted for the locations of where you would like the first and last sectors of the partition to be. You may again be provided with default responses choose these if you want.

Step 6.

Now choose **w** to write the partition to the disk. Type “**w**” then press enter. Your drive is now partitioned. Now we need to format it. By default Linux will recognize this partition as **dev/sdb1**.

Step 7. To format the partition with an ext3 filesystem.

```
sudo mkfs -t ext3 /dev/sdb1
```

Algorithm:

1. Start
2. Initialize variables as path="/home/gurukul/.local/share/Trash/files"
infopath="/home/gurukul/.local/share/Trash/info"
3. Check the list of files present in files folder.
4. Find the path of file to restore it using info folder.
5. Copy the contents of file which is deleted and is in Trash folder into new file at original location.
6. Delete the file from Trash folder.
7. End

Mathematical Model:

```
I= P (path of trash folder) Functions:
re.findall(r'/.*',line)
destipath.lstrip(['[') destipath.rstrip(']')
destipath[:-1]
destipath[1:] Output:
R- Recovered file
```

Assignment Questions:

1. What is Path of Trash folder in Ubuntu and what are the different folders?
2. How to see hidden files and filesystem of ubuntu?
3. What are different file systems in Ubuntu also state main directories of it??
4. How to list different files and what are the various options of ls used for file related function?

Conclusion:

Hence we conclude that using **Forensics Application Program in Python** we can **recover Deleted Files.**

Assignment Group A-4

Write a program for Log Capturing and Event Correlation

Prerequisite:

- Latest version of Squid should be used.(version 2.5 or greater)
- A web server for testing purpose which can be used instead of Internet.
- Squid Version greater than 2.6 is required for Transparent squid proxy configuration in this lab.
-

Learning Objectives:

- To understand how Log Records are generated for Further Analysis.

New Concepts:

- Squid and Sarg

Theory

Introduction:

- During the period of development of internet, users are allowed for unlimited access to the resources due to less number of users. So there were less issues related to accessing speed over internet.
- With the increase in internet usage, many issues raised related to accessing speed, effective bandwidth utilization etc. One method of overcoming these issues is, maintaining a copy of webpage visited by a user in the cache so that the other user who visits the same webpage will access the same website within a short period of time. This method not only increases the accessing speed but also helps in utilizing the bandwidth effectively.
- The above said functionality can be achieved by maintaining a proxy server through which all the users in the organization or a group access the internet. The most widely used proxy server in Linux is Squid Proxy, which is free software released General Public License.

- Squid provides proxy and cache services for Hyper Text Transfer Protocol (HTTP),

File Transfer Protocol (FTP), and various other protocols.

To configure a system as a proxy server, one should have a sufficient amount of memory for maintaining the cache which in turn increases the performance.

- In case if the internet connection is not available, setup one host as a web server in place of internet and assign the IP address to the proxy server network interface in the network, used by web server instead of public IP address assigned to that interface.

Steps to Configure Squid Proxy:

Installation of Squid Package

A Squid proxy server is generally installed on a separate server than the Web server with the original files. Squid works by tracking object use over the network. Squid will initially act as an intermediary, simply passing the client's request on to the server and saving a copy of the requested object. If the same client or multiple clients request the same object before it expires from Squid's cache, Squid can then immediately serve it, accelerating the download and saving bandwidth.

```
sudo apt update
sudo apt -y install squid
```

Accessing the Proxy Server configuration file

To configure squid proxy server we need to edit the `sudo gedit /etc/squid/squid.conf`

file and the default location of squid.conf file varies from distribution to distribution and from version to version. We can edit the configuration file using vi editor through command prompt.

```
sudo gedit /etc/squid/squid.conf
```

Then the content of the configuration file can be viewed as shown below in the figure.

```

Terminal
File Edit View Terminal Tabs Help
C:\Windows\system32\cmd.exe
# WELCOME TO SQUID 2.6.STABLE18
#
# This is the default Squid configuration file. You may wish
# to look at the Squid home page (http://www.squid-cache.org/)
# for the FAQ and other documentation.
#
# The default Squid config file shows what the defaults for
# various options happen to be. If you don't need to change the
# default, you shouldn't uncomment the line. Doing so may cause
# run-time problems. In some cases "none" refers to no default
# setting at all, while in other cases it refers to a valid
# option - the comments for that keyword indicate if this is the
# case.
#
# OPTIONS FOR AUTHENTICATION
#
# TAG: auth_param
# This is used to define parameters for the various authentication
# schemes supported by Squid.
#
1,0-1 Top

```

Editing the squid configuration file

```
sudo gedit /etc/squid/squid.conf
```

Search the TAG: auth_param and paste the following acl

```

auth_param basic program /usr/lib/squid/basic_ncsa_auth /etc/squid/passwd
auth_param basic children 5
auth_param basic realm Squid Basic Authentication
auth_param basic credentialsttl 2 hours
acl auth_users proxy_auth REQUIRED
http_access allow auth_users

#search localnet and paste line in last

acl localnet src 192.168.60.70
>sudo service squid3 restart

```

Specifying the interface and port number on which the proxy server should listen.

By default, the proxy server will listen on all the available network interfaces on the system for requests. For Example, if one interface card is assigned a public ip from which it is connected to internet and the other interface card is assigned an ip address which belongs to your local area network. Then in order to make your proxy server to listen for requests from your Local Area Network through a particular port, then change the variable http_port 3128 in the squid configuration file to desired ip address and port number in the format shown below.

http_port <ip address belonging to LAN>:<port number>

Example: For example, if your proxy server has an ip address 192.168.60.70 which belongs to the local area network 192.168.60.0/24 and you want the server to listen for requests from your LAN through a particular port say 3456, then you can change the variable http_port as shown.

```
http_port 192.168.60.70:3456
```

Assigning Access Controls

By default, no user machine is allowed to connect to the proxy server except the localhost. To allow the local machines access your proxy server, locate the acl section in the squid configuration file starting with acl and at the end of the last acl line specify your access

control. For example to allow local area network 192.168.60.0/24 machines to access your proxy server, specify the acl as

```
acl mylan src 192.168.60.0/255.255.255.0
```

In the above example, mylan specifies the name of my access control. We can specify any name other than my lan for access control. src specifies the source network.

Allow or Deny based on Access Control.

After specifying the access control for your local LAN, we need to provide allow permission for the specified LAN using http_access variable in the squid configuration file as shown in the example below.

Example: To allow the above specified access control (i.e acl mylan src 192.168.60.0/255.255.255.0), we need to specify the http_access variable as
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Hyderabad

http_access allow mylan

Here mylan specifies the access control used. Suppose if we want to allow all the networks except the 192.168.60.0/24 network to access the proxy then we can specify the http_access variable as

```
http_access deny !mylan
```

In the above line, !mylan specifies except mylan network.

Note:

The above specified http_access variable should be specified before the line

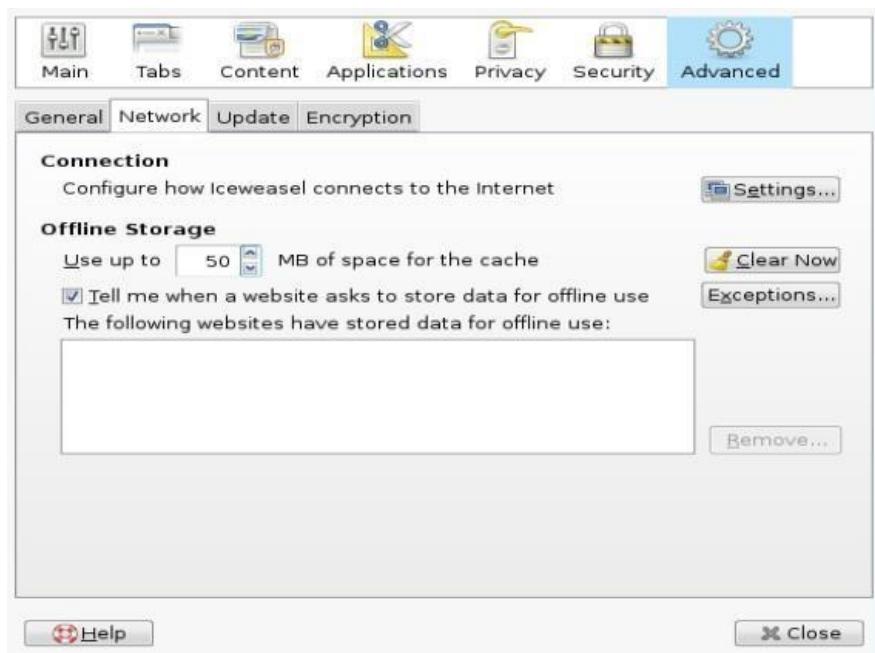
http_access deny all in the configuration file.

Saving the changes and exit the gedit Editor

After making appropriate changes to your configuration file exit the vi editor window by pressing Esc followed by :wq!. Here wq specifies save changes and exit the configuration file.

Testing the Squid configuration

To test the squid configuration, open a browser in any one of the pc in local area network or on the proxy server and specify the proxy settings as the ipaddress of the proxy server and port on which it is listening for requests. For example, in firefox web browser if we want to set the proxy settings in the browser window goto **Edit -->Preferences** and window similar to shown below will be displayed.



Now select Advanced tab, and under advanced tab click on Network tab and click on Settings option under Connection field. Then a window similar to the shown below will be displayed.



SARG – Squid Analysis Report Generator and Internet Bandwidth Monitoring Tool

SARG is an open source tool that allows you to analyze the squid log files and generates beautiful reports in HTML format with information's about users, IP addresses, top accessed sites, total bandwidth usage, elapsed time, downloads, access denied websites, daily reports, weekly reports and monthly reports.

The SARG is very handy tool to view how much internet bandwidth is utilized by individual machines on the network and can watch on which websites the network's users are accessing.

Installing Sarg from Source

The ‘**sarg**’ package by default not included in **RedHat** based distributions, so we need to manually compile and install it from source tar ball. For this, we need some additional pre- requisites packages to be installed on the system before compiling it from source.

```
$ sudo apt-get install sarg
```

Configuring Sarg

Now it's time to edit some parameters in SARG main configuration file. The file contains lots of options to edit, but we will only edit required parameters like:

Access logs

path

Output

directory

Date

Format

Overwrite report for the same date.

Open sarg.conf file with your choice of editor and make changes as shown below.

```
# vi /usr/local/etc/sarg.conf [On RedHat based systems]
```

Now Uncomment and add the original path to your squid access log file. # sarg.conf

```
# TAG: access_log file
# Where is the access.log file
# sarg
-l file
access_log /var/log/squid/access.log
```

Next, add the correct Output directory path to save the generate squid reports in that directory. Please note, under Debian based distributions the Apache web root directory is '/var/www'. So, please be careful while adding correct web root paths under your Linux distributions.

```
# TAG: output_dir
# The reports will be saved in that
directory # sarg -o dir
output_dir /var/www/html/squid-reports
```

Set the correct date format for reports. For example, 'date_format e' will

display reports in ‘dd/mm/yy’ format.

```
# TAG: date_format  
#       Date format in reports: e (European=dd/mm/yy), u  
(American=mm/dd/yy), w (Weekly=yy.ww)  
  
#  
date_format e  
  
Next, uncomment and set Overwrite report to  
'Yes'. # TAG: overwrite_report yes|no  
  
# yes - if report date already exist then will be overwritten.  
# no - if report date already exist then will be renamed to filename.n,  
filename.n+1 #  
  
overwrite_report yes
```

That's it! Save and close the file.

Step 3: Generating Sarg Report

Once, you've done with the configuration part, it's time to generate the squid log report using the following command.

```
# sarg -x      [On RedHat based systems]
```

Assessing Sarg Report

The generated reports placed under '/var/www/html/squid-reports/' or '/var/www/squid-reports/' which can be accessed from the web browser using the address.

[reports OR](http://localhost/squid-</p></div><div data-bbox=)

<http://ip-address/squid-reports>

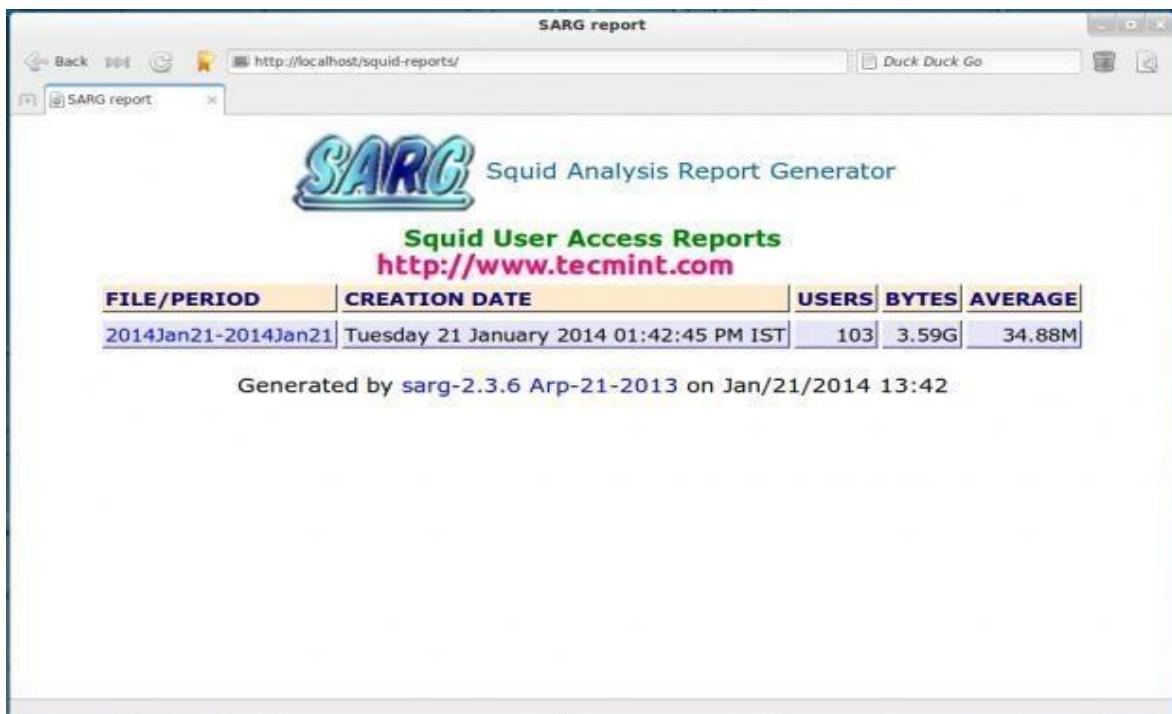


Fig.1 Sarg Main Window

The screenshot shows the User report window titled "User report". The URL in the address bar is http://localhost/squid-reports/2014jan21-2014jan21/172_16_18_204/172_16_18_204. The page features the "SARG" logo and the text "Squid Analysis Report Generator". Below this is the heading "Squid User Access Reports" with details: Period: 2014 Jan 21, User: 172.16.18.204, Sort: bytes, reverse. A table lists the user's access details:

ACCESSED SITE	CONNECT	BYTES	%BYTES	IN-CACHE-OUT	ELAPSED TIME	MILLISEC	%TIME	
dm.mistat.com	31.24K	48.20M	100.00%	100.00%	0.00%	00:00:01	1,125	100.00% DENIED
TOTAL	31.24K	48.20M	1.34%	100.00%	0.00%	00:00:01	1,125	0.00%
AVERAGE		0	34.88M			07:04:46	25,486,705	0.97%

At the bottom, it says "Generated by sarg-2.3.6 Arp-21-2013 on Jan/21/2014 13:42".

Fig2.User Report

SARG report for 2014 Jan 21

<http://localhost/squid-reports/2014jan21-2014jan21/index.html>

Duck Duck Go

SARG report for 2014 Jan 21

Squid User Access Reports
Period: 2014 Jan 21
Sort: bytes, reverse

Top users

<http://www.tecmint.com>

Top sites
Sites & Users
Downloads
Denied accesses
Authentication Failures

NUM	USERID	CONNECT	BYTES	%BYTES	IN-CACHE-OUT	ELAPSED TIME	MILLISEC	%TIME
1	pg	126.35K	3.29G	91.57%	5.21%	94.79%	725:57:08	2,613,428,253 99.55%
2	172.16.18.204	31.24K	48.20M	1.34%	100.00%	0.00%	00:00:01	1,125 0.00%
3	172.16.21.231	2.01K	34.10M	0.95%	3.87%	96.13%	00:09:35	575,937 0.02%
4	172.16.21.153	1.81K	30.61M	0.85%	3.20%	96.80%	00:08:33	513,197 0.02%
5	172.31.235.102	2.33K	28.89M	0.80%	5.85%	94.15%	00:21:18	1,278,828 0.05%
6	172.16.144.195	1.52K	21.46M	0.60%	6.45%	93.55%	00:10:07	607,122 0.02%
7	172.16.23.66	998	15.12M	0.42%	5.84%	94.16%	00:04:27	267,226 0.01%
8	172.16.23.207	667	11.71M	0.33%	3.21%	96.79%	00:03:18	198,418 0.01%
9	172.16.20.162	1.62K	10.94M	0.30%	0.32%	99.68%	00:13:24	804,194 0.03%
10	172.16.64.116	557	8.48M	0.24%	3.48%	96.52%	00:03:22	202,662 0.01%

Fig 3. Specific Date

Top sites

<http://localhost/squid-reports/2014jan21-2014jan21/topsites.html>

Duck Duck Go

Top sites

Squid Analysis Report Generator
Squid User Access Reports
Period: 2014 Jan 21

Top 100 sites

<http://www.tecmint.com>

NUM	ACCESSED SITE	CONNECT	BYTES	TIME	USERS
1	dm.mistat.com	31.24K	48.20M	0:00:01	1
2	172.16.16.36:9090	9.79K	157.22M	0:49:52	12
3	images.mid-day.com	4.50K	70.32M	0:18:21	2
4	pagead2.googlesyndication.com	3.86K	61.63M	0:14:08	26
5	maharashtratimes.indiatimes.com	3.03K	13.42M	0:08:59	1
6	www.google-analytics.com	2.63K	1.96M	0:07:41	82
7	googleads.g.doubleclick.net	2.63K	18.15M	0:17:34	76
8	www.mid-day.com	2.52K	47.09M	0:22:37	87
9	archive.mid-day.com	2.48K	53.65M	0:37:11	2
10	fbcdn-profile-a.akamaihd.net:443	2.36K	49.91M	91:51:04	1
11	b.scorecardresearch.com	2.29K	1.00M	0:03:41	82
12	safebrowsing-cache.google.com	2.04K	56.36M	0:10:21	1
13	www.juxtconsult.com	1.93K	1.23M	0:22:55	1
14	newmail.mid-day.com	1.84K	13.46M	0:30:09	12
15	economictimes.indiatimes.com	1.80K	3.77M	0:04:14	1
16	navbharattimes.indiatimes.com	1.75K	13.76M	0:08:27	1
17	epaper2.mid-day.com	1.65K	11.39M	0:35:33	9

Fig 4. Top Accessed Sites

NUM	ACCESSED SITE	USERS
1	01cefa72.f5b4ddd0	pg
2	0.gravatar.com	pg
3	0-p-04-frc3.channel.facebook.com:443	pg
4	0-p-06-ash2.channel.facebook.com:443	pg
5	0-p-06-frc1.channel.facebook.com:443	pg
6	0-p-07-ash2.channel.facebook.com:443	pg
7	0-prn1.channel.facebook.com:443	pg
8	0.r5o3z5keqo.wc.lognormal.net	pg
9	0.tqn.com	pg
10	10138630.log.optimizely.com	pg
11	101greatgoals.disqus.com	pg
12	124.124.40.62	pg
13	124.124.40.62:1935	pg
14	125-events.olark.com	pg
15	131788053.log.optimizely.com	pg
16	172.16.16.36:9090	172.16.144.195 172.16.21.144 172.16.21.153 172.16.21.2 172.16.21.231 172.16.21.79 172.16.22.158 172.16.23.143 172.16.23.207 172.16.23.66 172.16.64.116 172.31.235.102

Fig 5. Top Sites and Users

USERID	IP/NAME	DATE/TIME	ACCESSED SITE
pg	172.16.176.138	21/01/2014-04:52:19	http://adserver.adtechus.com/addyn/3.0/5359.1/2807582/0/225/ADTECH;cfp=1;rndc=1390263508;
pg	172.16.20.236	21/01/2014-08:59:37	http://whois.net/whois/gajkesari.com
		21/01/2014-09:00:05	http://whois.net/whois/gajkesari.com
		21/01/2014-09:00:32	http://whois.net/whois/gajkesari.com
		21/01/2014-09:00:49	http://whois.net/whois/gajkesari.com
		21/01/2014-09:01:02	http://whois.net/whois/gajkesari.com
		21/01/2014-09:01:39	http://who.is/whois/www.gajkesari.com
pg	172.16.48.214	21/01/2014-09:05:50	http://www.gstatic.com/chat/sounds/chat_message_52df20dbc4522c398abba5d0b6377131.mp3
pg	172.16.20.236	21/01/2014-09:31:47	http://who.is/whois/wonder-touch.com
		21/01/2014-09:35:02	http://who.is/whois/wonder-touch.com

Fig 6. Top Downloads

SARG Squid Analysis Report Generator

Squid User Access Reports
Period: 2014 Jan 21
Denied

http://www.tecmint.com

USERID	IP/NAME	DATE/TIME	ACCESSED SITE
172.16.16.211	172.16.16.211	21/01/2014-12:05:04	aus3.mozilla.org:443
		21/01/2014-10:48:34	fhr.data.mozilla.com:443
		21/01/2014-11:04:30	fhr.data.mozilla.com:443
		21/01/2014-12:04:38	fhr.data.mozilla.com:443
		21/01/2014-12:11:25	services.addons.mozilla.org:443
		21/01/2014-12:11:25	versioncheck-bg.addons.mozilla.org:443
		21/01/2014-12:11:25	versioncheck-bg.addons.mozilla.org:443
		21/01/2014-12:11:25	versioncheck-bg.addons.mozilla.org:443
172.16.21.234	172.16.21.234	21/01/2014-04:22:23	http://sl.informer.com
172.16.24.230	172.16.24.230	21/01/2014-07:31:41	http://www.msftncsi.com
172.16.26.1	172.16.26.1	21/01/2014-12:36:39	http://172.16.25.252
172.16.26.2	172.16.26.2	21/01/2014-12:30:10	http://sa.windows.com
		21/01/2014-12:30:10	http://sa.windows.com
		21/01/2014-12:30:13	http://sa.windows.com
		21/01/2014-12:31:38	http://sa.windows.com
		21/01/2014-12:31:58	http://sa.windows.com
172.16.26.3	172.16.26.3	21/01/2014-10:13:52	addons.mozilla.org:443
		21/01/2014-08:54:31	aus3.mozilla.org:443
		21/01/2014-08:48:35	http://archive.mid-dav.com

Fig 7. Denied Access

SARG Squid Analysis Report Generator

Squid User Access Reports
Period: 2014 Jan 21
Authentication Failures

http://www.tecmint.com

USERID	IP/NAME	DATE/TIME	ACCESSED SITE
172.16.144.114	172.16.144.114	21/01/2014-12:21:26	accounts.google.com:443
		21/01/2014-12:21:27	accounts.google.com:443
		21/01/2014-12:21:27	accounts.google.com:443
		21/01/2014-12:21:28	accounts.google.com:443
		21/01/2014-12:21:30	accounts.google.com:443
		21/01/2014-12:21:30	accounts.google.com:443
			77 more authentication failures not shown here...
172.16.144.130	172.16.144.130	21/01/2014-09:24:09	ent-shasta-rrs.symantec.com:443
		21/01/2014-09:34:46	ent-shasta-rrs.symantec.com:443
		21/01/2014-09:45:09	ent-shasta-rrs.symantec.com:443
		21/01/2014-09:05:01	http://172.16.16.70:8014
		21/01/2014-09:47:23	http://ad.goo.mx
		21/01/2014-09:04:59	http://defender:8014
		21/01/2014-09:05:01	http://defender:8014
		21/01/2014-09:05:00	http://defender.midcorn.mid-dav.com:8014

Fig 8. Authentication Failures

Assignment Questions:

1. Why to Configure Proxy Server?
2. What is SARG?
3. Which Parameter is there in SARG Report?
4. What do you mean by Log and Event Co-relation?

Conclusion:

By configuring this Network Administrator can easily analyze the Network Traffic and Bandwidth Utilization.

Assignment Group A-5

Problem Definition:

Design and Implement of Honeypot

Problem statement: Study and Implementation of Honeypot

Learning objective:

- To learn the concept of Honeypot
- To study the representation, implementation of Honeypot.

Learning outcome:

- Use honeybot tool to capture packets and configure tools and systems to enter unknown unauthenticated IP.

Software and hardware requirement:

- 64 bit machine
- Windows 7/8 Operating System

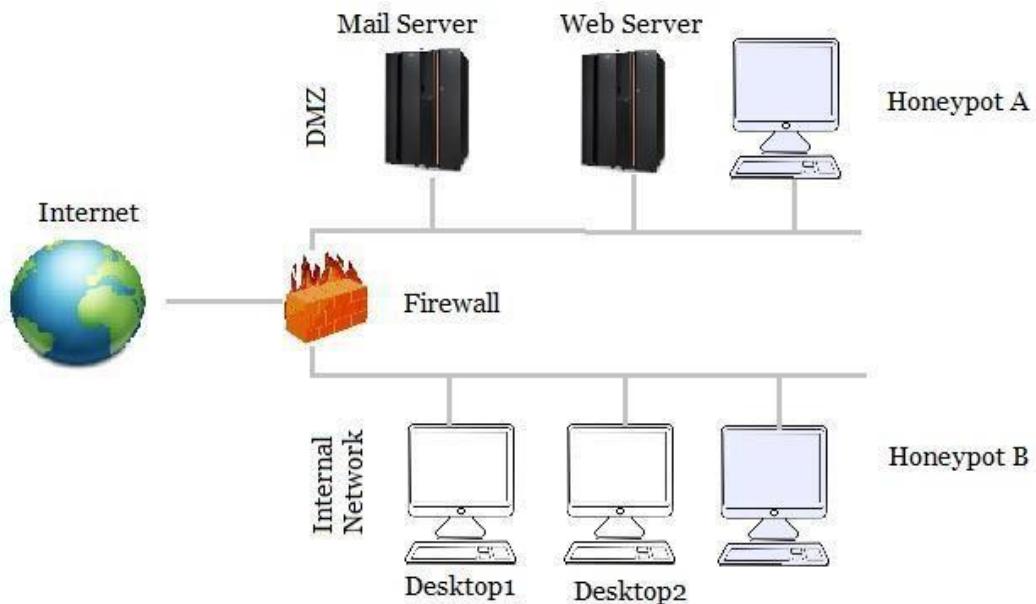
Theory:

Honeypot:

It is a computer system. There are files, directories in it just like a real computer. However, the aim of the computer is to attract hackers to fall into it to watch and follow their behavior. So we can define it as a fake system which looks like a real system. They are different than other security systems since they are not only finding one solution to a particular problem, but also they are eligible to apply variety of security problems and finding several approaches for them. For example, they can be used to log

Malicious activities in a compromised system; they can be also used to learn new threats for users and creating ideas how to get rid of those problems.

Honeypots are security resources that have no production value; no person or resource should be communicating with them. Any activity sent their way is suspect. Any traffic initiated by the honeypot means the system has most likely been compromised. Any traffic sent to the honeypot is most likely a probe, scan, or attack. With a honeypot, nothing is expected. To better understand the concepts of honeypots, let's take a look at the following example of honeypot deployments. Refer figure 11.1.



The purpose here is to demonstrate to you that honeypots can come in many different flavors, and they can achieve different things. However, they are both honeypots because they share the same definition and concepts. With the intent using systems as a honeypots, to determine if there is any unauthorized activity happening within your DMZ.

Honeypots passively capture any traffic or activity that interacts with them

Types of Honeypots:

There are two general types of honeypots:

Production honeypots are easy to use, capture only limited information, and are used primarily by companies or corporations. They are capturing a limited amount of information; mostly low interaction honeypots are used. security administrator watches the hacker's movements carefully and tries to lower the risks that may come from it towards the company

Research honeypots are complex to deploy and maintain, capture extensive information, and are used primarily by research, military, or government organizations. The objective is to learn how to Protect a system better, they do not bring any direct value to the security of an organization Honeypots are increasingly used to provide early warning of potential intruders, identify flaws in security strategies, and improve an organization's overall security awareness. "Honeypots can simulate a variety of internal and external devices, including Web servers, mail servers, database servers, application servers, and even firewalls. As a software development manager, we can regularly use honeypots to gain insight into vulnerabilities in both the software my team writes and the OS upon which we depend."

A honeypot is a security resource whose value lies in being probed, attacked, or compromised. This means that whatever we designate as a honeypot, it is our expectation and goal to have the system probed, attacked, and potentially exploited.

Legal issues with honeypots

While deploying and start using a honeypot, there are some legal issues that a person should know about. Every country has different laws regarding to honeypot usage and information capturing. These regulations are related to data security, collection of data and finally how to use honeypots. All these different laws are based on the quality of the data that a honeypot can capture and a person who is deploying it. Privacy and data leads us to confidentiality term in network security. Our example is being a network administrator in a company.

Practical implementation

We are starting with low interaction honeypot and then continue on a middle level of interaction to finally conclude with a high level of interaction.

- **Starting to honeypot,**

We started with Honeyd as low level interaction honeypot and then we will move on medium level interaction honeypots. Every honeypot has specific and different attitudes. We will explain them one by one.

- **HoneyBOT is a medium interaction honeypot for windows.**

A honeypot creates a safe environment to capture and interact with unsolicited and often malicious traffic on a network. HoneyBOT is an easy to use solution ideal for network security research or as part of an early warning IDS. The logging capability of a honeypot is far greater than any other network security tool and captures raw packet level data even including the keystrokes and mistakes made by hackers. The captured information is highly valuable as it contains only malicious traffic with little to no false positives. Honeypots are becoming one of the leading security tools used to monitor the latest tricks and exploits of hackers by recording their every move so that the security community can more quickly respond to new exploits.

- **How does it work?**

HoneyBOT works by opening a range of listening sockets on your computer which are designed to mimic vulnerable services. When an attacker connects to these services they are fooled into thinking they are attacking a real server. The honeypot safely captures all communications with the attacker and logs these results for future analysis. Should an attacker attempt an exploit or upload a rootkit or trojan to the server the honeypot environment can safely store these files on your computer for malware collection and analysis purposes. Following figure shows implementation of honeypot.

- **Installing and Securing Your Honeypot**

A honeypot is intentionally put in harms way so it is critical to carry out some security precautions on your honeypot computer before deployment on any network. Install HoneyBOT on a dedicated computer or virtual machine. Update the operating system with security updates and use an antivirus product. You want your honeypot to be as free as possible from legitimate traffic so in broad terms we can consider any traffic to the honeypot to be malicious in nature. Remember that we are attracting attackers to intrude into this system so precautions are important.

- **Network Placement**

If you place HoneyBOT inside the internal network where it is secured by perimeter defences it should never to be attacked. Any malicious traffic captured in this situation would indicate that another computer inside the network is already compromised or that the perimeter defences have been breached. In this configuration HoneyBOT is acting as an intrusion detection system. If you place HoneyBOT on an external network or internet you will attract higher volumes of unsolicited network traffic. Direct internet placement is the most common setup with HoneyBOT being on the network DMZ.

- **Windows Services, SMB and NetBIOS**

You should disable any Windows services that are not required for the machine to operate as they offer an attacker a possible avenue of attack. HoneyBOT cannot listen on a port that is already in use by a Windows service. Some of the services that you may choose to disable include Messenger, ClipBook, COM+, FTP Publishing, SMTP, SNMP, TCP/IP NetBIOS Helper, Telnet, WWW Publishing.

SMB (CIFS) provides name resolution, network browsing and printing services over TCP/IP. To disable SMB open the Network Connections window, right click the adapter and select Properties and uninstall Client For Microsoft Networks and File And Printer Sharing. SMB services may also be provided over NetBIOS (NBT). To disable NetBIOS open the Device Manager window, select Show Hidden Devices, expand Non-Plug And Play Drivers and disable NetBios Over Tcpip.

If you are monitoring your honeypot via a remote desktop tool then you should change the default listening port to a random high numbered port.

Finally, before starting HoneyBOT take a baseline of the current listening services by opening a command shell and launching netstat with the -ano option. Any listening services that you are unable to disable need to be blocked at the firewall.

- **Firewall**

A firewall will prevent unsolicited connections from reaching your computer. In order for HoneyBOT to communicate you need to customise your firewall rules to allow incoming connections. If you are using a software firewall you should create an exception for HoneyBOT.

- **HoneyBOT Options**

Select Options from the View menu to configure HoneyBOT.

Automatically Start Engine: The server engine will start automatically when the application is started.

Enable Sound Alert: Plays a short sound each time an event occurs.

Capture Binaries: If this option is enabled HoneyBOT will attempt to capture malware and other files and save them to the \HoneyBOT\Captures\ folder. If this option is enabled you should add an exception in your antivirus software to exclude this folder from its scan.

Automatically Rotate

Log: Each day at midnight HoneyBOT will save the current log file and start a new log file.

Server Name: The alias name of the HoneyBOT server given to the remote machine.

- **Email Alerts**

Enter your email address and SMTP server information to receive daily email updates from HoneyBOT.

- **Exports**

Select the Export Logs to CSV option to create a daily extract of your log file as a CSV file.

Exported logs are saved in the \HoneyBOT\Logs\ folder. You can also choose to participate in the centralised log program and have your log files uploaded to the HoneyBOT website.

- **Syslog**

Select to send connection events to a Syslog server. Enter the Syslog server IP address and

port.

- **Bindings**

Only applicable to multihomed machines. Provides support for multiple networks so HoneyBOT can bind to one or all detected networks. Enter the IP address that you want HoneyBOT to bind to. If the IP address is not valid and more than one IP address is available you will be prompted to select an address when the server engine starts.

- **Updates**

Select to have HoneyBOT check for updates on startup. There are two update types that may occur. A service update is a minor update to the server listening services, if a service update is available you will be prompted to install the update. An application update notification will occur if a new version of HoneyBOT is available.

- **Services and Profiles**

Select to edit the TCP and UDP services started by the HoneyBOT engine. You can add a new port, edit and disable an existing port, or delete the port configuration entirely.

By default HoneyBOT will open more listening ports than a typical computer and this may alert an attacker to its presence. You can choose to limit your honeypot exposure to just a handful of ports that more closely resembles a real operating system. By loading a profile you can quickly emulate common operation system setups like an SQL Server, IIS Server, Exchange Server, etc.

- **Whitelist**

You may find HoneyBOT is interacting with services on your network that are legitimate and not a cause for alarm. You can whitelist the source machine by adding the IP and port to the whitelist settings. When a machine is whitelisted HoneyBOT will no longer accept connections from that machine.

- **Debug**

The debug window will display application messages and socket events that occur during typical application operation.

- **Event Navigation**

The event tree on the left shows the ports that have been probed and remote addresses

that have connected to HoneyBOT. The event list at the top right will display all connection attempts including the attributes of the connection. The packet list at the bottom displays each packet transmitted and received between the remote machine and the HoneyBOT server. You can expand the event tree and filter the events displayed by selecting an item in the list.

Advantages of honeypots

There are many security solutions available in the market. Anyone can browse the variety of choices through internet and find the most suitable solution for their needs. Honeypots can capture attacks and give information about the attack type and if needed, thanks to the logs, it is possible to see additional information about the attack. New attacks can be seen and new security solutions can be created by looking at them. More examinations can be obtained by looking at the type of the malicious behaviors. It helps to understand more attacks that may happen. Honeypots are not bulky in terms of capturing data. They are only dealing with the incoming malicious traffic. Therefore, the information that has been caught is not as much as the whole traffic. Focusing only on the malicious traffic makes the investigation far easier.

Disadvantages of honey pots

We can only capture data when the hacker is attacking the system actively. If he does not attack the system, it is not possible to catch information. If there is an attack occurring in another system, our honeypot will not be able to identify it. So, attacks not towards our honeypot system may damage other systems and cause big problems. There is fingerprinting disadvantage of honeypots. It is easy for an experienced hacker to understand if he is attacking a honeypot system or a real system. Fingerprinting allows us to distinguish between these two. It is not a wanted result of our experiment. The honeypot may be used as a zombie to reach other systems and compromise them. This can be very dangerous.

Assignment:

Q1.What is Honey Pot?

Q2.What are different types of Honey Pot?

Q3.What is Malware Honey Pot?

Q4. What is Database honey pot?

Q5.What is Honey nets?

Q6. Which are two popular reasons or goals behind setting up a Honey Pot?

Conclusion:

Hence, we have successfully studied concept of Honeypot in which we have set different network setting and set different drivers to identify unauthenticated access in our system

Experiment No: Group B-1

Problem Definition:

To implement a basic function of Code Division Multiple Access (CDMA) to test the orthogonality and autocorrelation of a code to be used for CDMA operation. Write an application based on the above concept.

Prerequisite:

Basic Concept of Code Division Multiple Access

Learning Objective:

1. To provide a high quality of voice with almost no noise during the calls.
2. To Understand working of CDMA through common channel.

Theory:

Introduction

CDMA is a channelization protocol for Multiple Access, where information can be sent simultaneously through several transmitters over a single communication channel.

It is achieved in below steps:

- A signal is generated which extends over a wide bandwidth.
- The code which performs this action is called spreading code.
- Later on, a specific signal can be selected with a given code even in the presence of

many other signals.

- It is mainly used in mobile networks like 2G and 3G.

How does CDMA work?

To see how CDMA works, we have to understand orthogonal sequences (also known as chips).

Let N be the number of stations establishing multiple access over a common channel.

Then the properties of orthogonal sequences can be stated as follows:

1. An orthogonal sequence can be thought of as a $1 \times N$ matrix.

Eg: $[+1 -1 +1 -1]$ for $N = 4$.

2. Scalar multiplication and matrix addition rules follow as usual.

Eg: $3.[+1 -1 +1 -1] = [+3 -3 +3 -3]$

Eg: $[+1 -1 +1 -1] + [-1 -1 -1 -1] = [0 -2 0 -2]$

3. Inner Product: It is evaluated by multiplying two sequences element by element and then adding all elements of the resulting list.

- o Inner Product of a sequence with itself is equal to N

$$[+1 -1 +1 -1].[+1 -1 +1 -1] = 1 + 1 + 1 + 1 = 4$$

- o Inner Product of two distinct sequences is zero

$$[+1 -1 +1 -1].[+1 +1 +1 +1] = 1 - 1 + 1 - 1 = 0$$

- o To generate valid orthogonal sequences, use a Walsh Table as follows:

- o Rule 1:

$$W_1 = [+1]$$

- o Rule 2:

$$W_{2N} = \begin{bmatrix} W_N & W_N \\ W_N & \overline{W_N} \end{bmatrix}$$

Where $\overline{W_N}$ = Complement of W_N (Replace +1 by -1 and -1 by +1)

Example:

$$W_2 = \begin{bmatrix} +1 & +1 \\ +1 & -1 \end{bmatrix}$$

$$W_4 = \begin{bmatrix} +1 & +1 & +1 & +1 \\ +1 & -1 & +1 & -1 \\ +1 & +1 & -1 & -1 \\ +1 & -1 & -1 & +1 \end{bmatrix}$$

- Each row of the matrix represents an orthogonal sequence. Hence we can construct sequences for $N = 2^M$. Now let's take a look at how CDMA works by using orthogonal sequences.

Procedure:

1. The station encodes its data bit as follows.
 - +1 if bit = 1
 - -1 if bit = 0
 - no signal(interpreted as 0) if station is idle
2. Each station is assigned a unique orthogonal sequence (code) which is N bit long for N stations
3. Each station does a scalar multiplication of its encoded data bit and code sequence.
4. The resulting sequence is then placed on the channel.
5. Since the channel is common, amplitudes add up and hence resultant channel sequence is sum of sequences from all channels.
6. If station 1 wants to listen to station 2, it multiplies (inner product) the channel

sequence with code of station S2.

7. The inner product is then divided by N to get data bit transmitted from station 2.

:Example: Assume 4 stations S1, S2, S3, S4. We'll use 4×4 Walsh Table to assign codes to them.

$$C_1 = [+1 +1 +1 +1]$$

$$C_2 = [+1 -1 +1 -1]$$

$$C_3 = [+1 +1 -1 -1]$$

$$C_4 = [+1 -1 -1 +1]$$

Let their data bits currently be:

$$D_1 = -1$$

$$D_2 = -1$$

$$D_3 = 0 \text{ (Silent)}$$

$$D_4 = +1$$

$$\text{Resultant channel sequence} = C_1.D_1 + C_2.D_2 + C_3.D_3 + C_4.D_4$$

$$= [-1 -1 -1 -1] + [-1 +1 -1 +1] + [0 0 0 0] + [+1 -1 -1 +1]$$

$$= [-1 -1 -3 +1]$$

Now suppose station 1 wants to listen to station 2.

$$\text{Inner Product} = [-1 -1 -3 +1] \times C_2$$

$$= -1 + 1 - 3 - 1 = -4$$

Data bit that was sent = $-4/4 = -1$.

Code:

```
import numpy as np
```

```
c1=[1,1,1,1]
```

```
c2=[1,-1,1,-1]
```

```
c3=[1,1,-1,-1]
```

```
c4=[1,-1,-1,1]
```

```
rc=[]
```

```
print("Enter the data bits :")
```

```
d1=int(input("Enter D1 :"))
```

```
d2=int(input("Enter D2 :"))
```

```
d3=int(input("Enter D3 :"))
```

```
d4=int(input("Enter D4 :"))
```

```
r1=np.multiply(c1,d1)
```

```
r2=np.multiply(c2,d2)
```

```
r3=np.multiply(c3,d3)
```

```
r4=np.multiply(c4,d4)
```

```
resultant_channel=r1+r2+r3+r4;
```

```
print("Resultant Channel",resultant_channel)

Channel=int(input("Enter the station to listen for C1=1 ,C2=2, C3=3 C4=4 :"))

if Channel==1:
    rc=c1

elif Channel==2:
    rc=c2

elif Channel==3:
    rc=c3

elif Channel==4:
    rc=c4

inner_product=np.multiply(resultant_channel,rc)

print("Inner Product",inner_product)

res1=sum(inner_product)

data=res1/len(inner_product)

print("Data bit that was sent",data)
```

Assignment Questions:

- 1.What is CDMA?
- 2.Explain the features of CDMA?
- 3.What are advantages and disadvantages of CDMA?

Conclusion: The CDMA will allow many signals to be transmitted at the same channel at the same time.

Laboratory Practice IV

Elective IV 410245 (D): Software Testing and Quality Assurance

Assignment No.: - 1

Write TEST Scenario for Gmail Login Page

Test Cases – Login Page

Following is the possible list of functional and non-functional test cases for a login page:

Functional Test Cases:

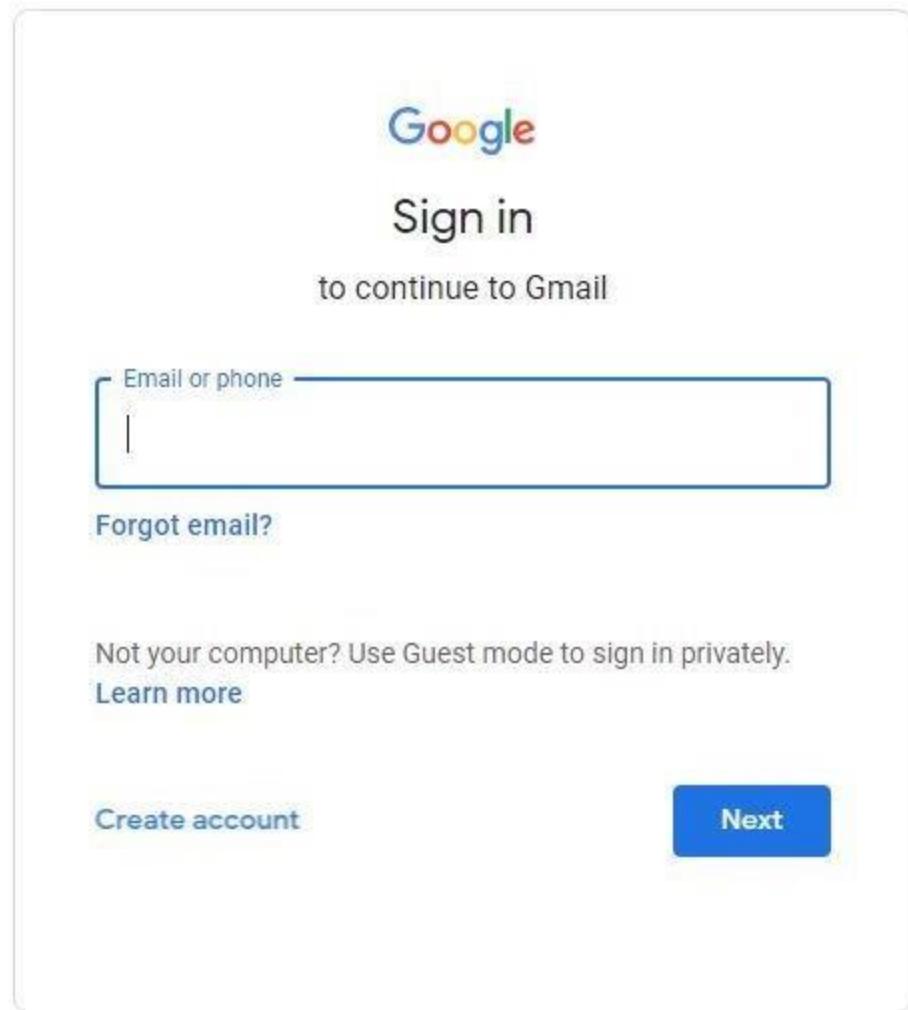
Sr. No.	Functional Test Cases	Type- Negative/ Positive Test Case
1	Verify if a user will be able to login with a valid username and valid password.	Positive
2	Verify if a user cannot login with a valid username and an invalid password.	Negative
3	Verify the login page for both, when the field is blank and Submit button is clicked.	Negative
4	Verify the ‘Forgot Password’ functionality.	Positive
5	Verify the messages for invalid login.	Positive
6	Verify the ‘Remember Me’ functionality.	Positive
7	Verify if the data in password field is either visible as asterisk or bullet signs.	Positive
8	Verify if a user is able to login with a new password only after he/she has changed the password.	Positive
9	Verify if the login page allows to log in simultaneously with different credentials in a different browser.	Positive
10	Verify if the ‘Enter’ key of the keyboard is working correctly on the login page.	Positive
	Other Test Cases	
11	Verify the time taken to log in with a valid username and password.	Performance & Positive Testing
12	Verify if the font, text color, and color coding of the Login page is as per the standard.	UI Testing & Positive Testing
13	Verify if there is a ‘Cancel’ button available to erase the entered text.	Usability Testing
14	Verify the login page and all its controls in different browsers	Browser Compatibility & Positive Testing.

Non-functional Security Test Cases:

Sr. No.	Security test cases	Type- Negative/ Positive Test Case
1	Verify if a user cannot enter the characters more than the specified range in each field (Username and Password).	Negative
2	Verify if a user cannot enter the characters more than the specified range in each field (Username and Password).	Positive
3	Verify the login page by pressing 'Back button' of the browser. It should not allow you to enter into the system once you log out.	Negative
4	Verify the timeout functionality of the login session.	Positive
5	Verify if a user should not be allowed to log in with different credentials from the same browser at the same time.	Negative
6	Verify if a user should be able to login with the same credentials in different browsers at the same time.	Positive
7	Verify the Login page against SQL injection attack.	Negative
8	Verify the implementation of SSL certificate.	Positive

We can take an Example of Gmail Login page. Here is the image of it.

Test Cases for Gmail Login page



English (United States) ▾

Help

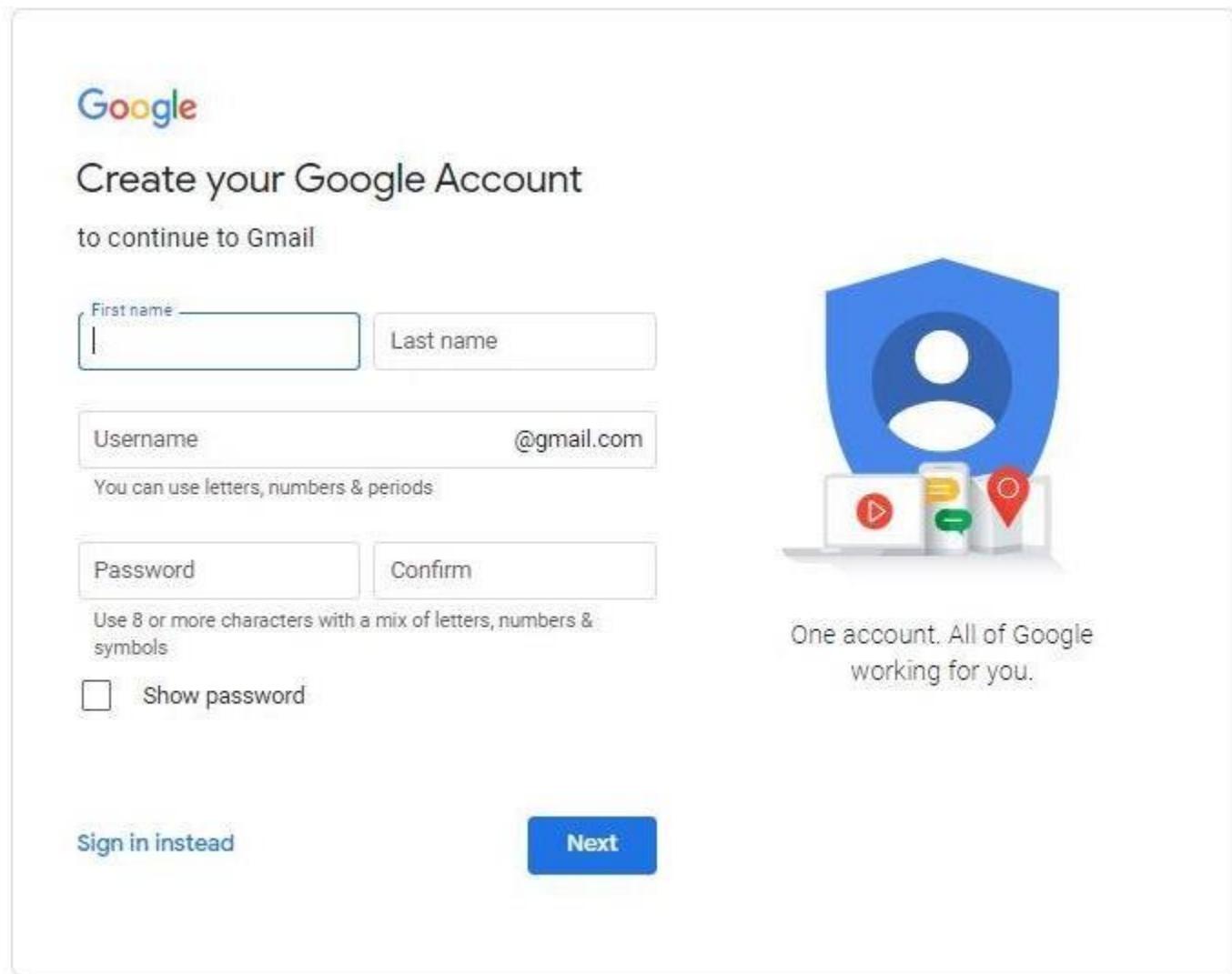
Privacy

Terms

Sr. No.	Test Scenarios
1	Enter the valid email address & click next. Verify if the user gets an option to enter the password.
2	Don't enter an email address or phone number & just click the Next button. Verify if the user will get the correct message or if the blank field will get highlighted.
3	Enter the invalid email address & click the Next button. Verify if the user will get the correct message.
4	Enter an invalid phone number & click the Next button. Verify if the user will get the correct message.
5	Verify if a user can log in with a valid email address and password.
6	Verify if a user can log in with a valid phone number and password.

Sr. No.	Test Scenarios
7	Verify if a user cannot log in with a valid phone number and an invalid password.
8	Verify if a user cannot log in with a valid email address and a wrong password.
9	Verify the 'Forgot email' functionality.
10	Verify the 'Forgot password' functionality.

Test Scenarios for the Sign-up page



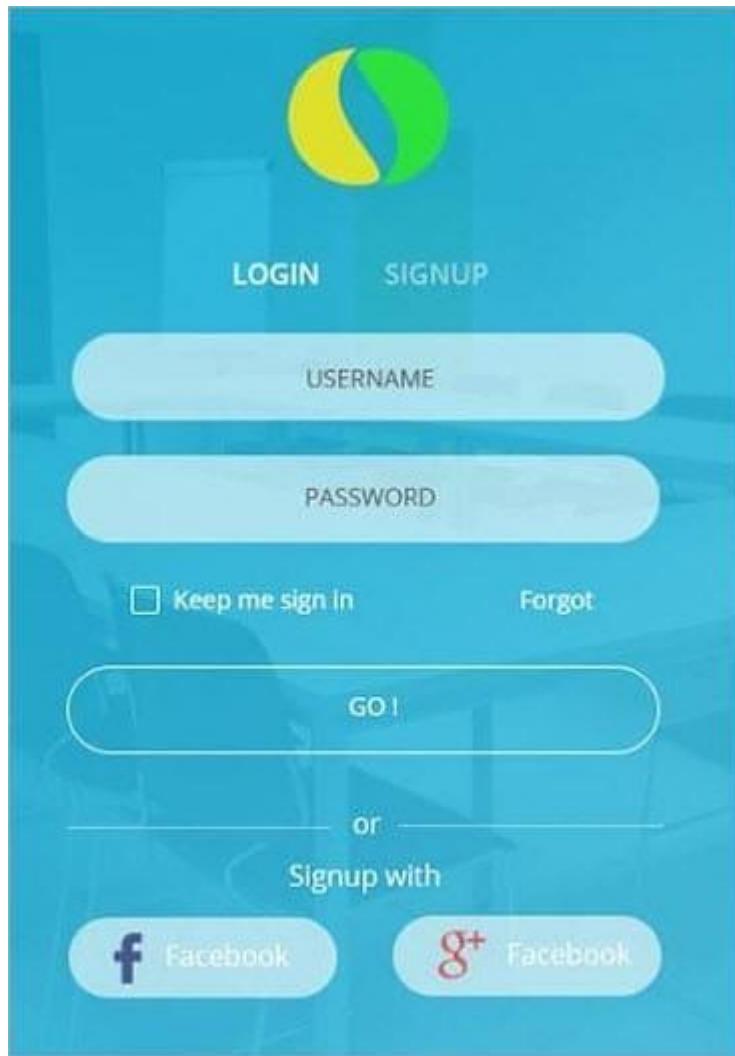
The screenshot shows the 'Create your Google Account' page. At the top, it says 'to continue to Gmail'. Below that are input fields for 'First name' (with a placeholder 'John') and 'Last name' (with a placeholder 'Doe'). Further down are fields for 'Username' (with a placeholder '@gmail.com') and 'Password' (with a placeholder 'password123'). A note below the password field says 'Use 8 or more characters with a mix of letters, numbers & symbols'. There is a checkbox for 'Show password'. At the bottom left is a link 'Sign in instead' and a blue 'Next' button. At the bottom right are links for 'Help', 'Privacy', and 'Terms'. The URL in the address bar is 'https://accounts.google.com/signup'.

Test Scenarios for the Sign-up page

- 1) Verify the messages for each mandatory field.

- 2) Verify if the user cannot proceed without filling all the mandatory fields.
- 3) Verify the age of the user when the DOB is selected.
- 4) Verify if the numbers and special characters are not allowed in the First and Last name.
- 5) Verify if a user can sign-up successfully with all the mandatory details.
- 6) Verify if a user can log in with the valid details.
- 7) Verify if the Password and Confirm Password fields are accepting similar strings only.
- 8) Verify if the Password field will prompt you for the weak passwords.
- 9) Verify if duplicate email address will not get assigned.
- 10) Verify that hints are provided for each field on the form, for the ease of use.

Test Scenarios for the Login page of Mobile Application



- 1) Verify if a user can log in with a valid username and password.

- 2) Verify if a user cannot log in with an invalid username or password. Check permutation and combinations of this.
- 3) Verify the ‘Keep me Sign In’ option. If this check box is selected, then the user should not get logged out even after exiting the app.
- 4) Verify if this check box is not selected by default.
- 5) If the user has signed up with Facebook or social media, verify that the user can log in with those credentials or not.
- 6) Verify the Forgot password functionality.
- 7) Verify if the login page fits the mobile screen. The user should not have to scroll the screen.

Conclusion

While writing test cases for login or sign-up page write the test cases for all the fields. There should be a combination of both positive and negative test cases. Try to cover the performance, security, and functional scenarios.

The login page is the page with fewer controls, so even though it is looking simple for testing, it should not be considered as an easy task.

Also many a time it is the first impression of an application, so it should be perfect for user interface and usability.

Assignment No.: 2

Test Scenario for Gmail – Inbox Functionality

Test Case for Gmail – Inbox Functionality

- 1) Verify that a newly received email is displayed as highlighted in the Inbox section.
- 2) Verify that a newly received email has correctly displayed sender email Id or name, mail subject and mail body(trimmed to a single line).
- 3) Verify that on clicking the newly received email, the user is navigated to email content.
- 4) Verify that the email contents are correctly displayed with the desired source formatting.
- 5) Verify that any attachments are attached to the email and are downloadable.
- 6) Verify that the attachments are scanned for viruses before download.
- 7) Verify that all the emails marked as read are not highlighted.
- 8) Verify that all the emails read as well as unread have a mail read time appended at the end on the email list displayed in the inbox section.
- 9) Verify that count of unread emails is displayed alongside ‘Inbox’ text in the left sidebar of Gmail.
- 10) Verify that unread email count increases by one on receiving a new email.
- 11) Verify that unread email count decreases by one on reading an email (marking an email as read).
- 12) Verify that email recipients in cc are visible to all users.
- 13) Verify that email recipients in bcc are not visible to the user.
- 14) Verify that all received emails get piled up in the ‘Inbox’ section and get deleted in cyclic fashion based on the size availability.
- 15) Verify that email can be received from non-Gmail email Ids like – yahoo, Hotmail etc.

Test Cases for GMail – Compose Mail Functionality

- 1) Verify that on clicking ‘Compose’ button, a frame to compose a mail gets displayed.
- 2) Verify that user can enter email Ids in ‘To’, ‘cc’ and ‘bcc’ sections and also user will get suggestions while typing the emailIds based on the existing emailIds in user’s email list.
- 3) Verify that the user can enter multiple comma-separated emailIds in ‘To’, ‘cc’ and ‘bcc’ sections.
- 4) Verify that the user can type Subject line in the ‘Subject’ textbox.
- 5) Verify that the user can type the email in the email-body section.
- 6) Verify that users can format mail using editor-options provided like choosing font-family, font-size, bold-italic-underline, etc.
- 7) Verify that the user can attach file as an attachment to the email.
- 8) Verify that the user can add images in the email and select the size for the same.
- 9) Verify that after entering emailIds in either of the ‘To’, ‘cc’ and ‘bcc’ sections, entering Subject line and mail body and clicking ‘Send’ button, mail gets delivered to intended receivers.
- 10) Verify that sent mails can be found in ‘Sent Mail’ sections of the sender.
- 11) Verify that mail can be sent to non-gmail emailIds also.
- 12) Verify that all sent emails get piled up in the ‘Sent Mail’ section and get deleted in cyclic fashion based on the size availability.
- 13) Verify that the emails composed but not sent remain in the draft section.
- 14) Verify the maximum number of email recipients that can be entered in ‘To’, ‘cc’ and ‘bcc’ sections.

- 15) Verify the maximum length of text that can be entered in the ‘Subject’ textbox.
- 16) Verify the content limit of text/images that can be entered and successfully delivered as mail body.
- 17) Verify the maximum size and number of attachment that can be attached with an email.
- 18) Verify that only the allowed specifications of the attachment can be attached with an email/
- 19) Verify that if the email is sent without Subject, a pop-up is generated warning user about no subject line.
Also,

20) Verify that on accepting the pop-up message, the user is able to send the email.

Assignment No.: - 3

Write Test cases in excel sheet for Social Media application or website

Sample Test Case Template With Test Case Examples

Every day I keep on getting several requests for a Test Case Template. I'm surprised that many testers are still documenting test cases with Word docs or Excel files.

Most of them prefer excel spreadsheets because they can easily group test cases by test types and most importantly they can easily get test metrics with Excel formulas. But I'm sure that as the volume of your tests goes on increasing, you will find it extremely difficult to manage.

If you are not using any Test case management tool, then I would strongly recommend you to use an open-source tool to manage and execute your test cases.

Test case formats may vary from one organization to another. However, using a standard test case format for writing test cases is one step closer to setting up a testing process for your project.

It also minimizes Ad-hoc testing that is done without proper test case documentation. But even if you use standard templates, you need to set up test cases writing, review & approve, test execution and most importantly test report preparation process, etc. by using manual methods.

Also, if you have a process to review the test cases by the business team, then you must format these test cases in a template that is agreed by both the parties.

Recommended Tools

Before continuing with the Test case writing process, we recommend downloading these Test case management tools. This will ease your test plan and test case writing process mentioned in this tutorial.

1) TestRail

TestRail is a web-based tool for test cases and test management. It helps QA and development teams with the efficient management of test cases, plans, and runs. It gives centralized test management, powerful reports & metrics, and increased productivity. It is a scalable and customizable solution. It can be used by small as well as large teams.

Features:

- 1) TestRail makes tracking test results easier.
- 2) It seamlessly gets integrated with bug trackers, automated tests, etc.
- 3) Personalized to-do lists, filters, and email notifications will help with boosting productivity.
- 4) Dashboards and activity reports are for easy tracking and following the status of individual tests, milestones, and projects.

2) Katalon Studio

Katalon Studio is an all-in-one, simple automation tool for web, API, mobile, and desktop trusted by over 850,000 users.

It simplifies automation for those without a coding background to create automation test cases from manual tests' steps, a rich library of project templates, record & playback, and a friendly UI.

3) Testiny

Testiny – a new, straightforward test management tool, but much more than just a slimmed-down app.

Testiny is a fast-growing web application built on the latest technologies and aims to make manual testing and QA management as seamless as possible. It is designed to be extremely easy to use. It helps testers perform tests without adding bulky overhead to the testing process.

Don't just take our word for it, take a look at Testiny yourself. Testiny is perfect for small to mid-sized QA teams looking to integrate manual and automated testing into their development process.

Features:

- 1) Free for open-source projects and small teams with up to 3 people.
- 2) Intuitive and simple out of the box.
- 3) Easily create and handle your test cases, test runs, etc.
- 4) Powerful integrations (e.g. Jira, ...)
- 5) Seamless integration in the development process (linking requirements and defects)
- 6) Instant updates – all browser sessions stay in sync.
- 7) Immediately see if a colleague has made changes, completed a test, etc.
- 8) Powerful REST API.
- 9) Organize your tests in a tree structure – intuitive and easy.

Standard Fields of a Sample Test Case Template

There are certain standard fields that need to be considered while preparing a Test case template.

Project Name:	
Test Case Template	
Test Case ID: Fun_10	Test Designed by: <Name>
Test Priority (Low/Medium/High): Med	Test Designed date: <Date>
Module Name: Google login screen	Test Executed by: <Name>
Test Title: Verify login with valid username and	Test Execution date: <Date>

password	
Description: Test the Google login page	
Pre-conditions: User has valid username and password	
Dependencies:	

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to login page	User= example@gmail.com	User should be able to login	User is navigated to dashboard with successful login	Pass	
2	Provide valid username	Password: 1234				
3	Provide valid password			login		
4	Click on Login button					

Post-conditions:

User is validated with database and successfully login to account. The account session details are logged in database.

Several standard fields for a sample Test Case template are listed below.

- 1) Test case ID: Unique ID is required for each test case. Follow some conventions to indicate the types of the test. For Example, ‘TC_UI_1’ indicating ‘user interface test case #1’.

- 2) Test priority (Low/Medium/High): This is very useful during test execution. Test priorities for business rules and functional test cases can be medium or higher, whereas minor user interface cases can be of a low priority. Testing priorities should always be set by the reviewer.
 - 3) Module Name: Mention the name of the main module or the sub-module.
 - 4) Test Designed By: Name of the Tester.
 - 5) Test Designed Date: Date when it was written.
 - 6) Test Executed By Name of the Tester who executed this test. To be filled only after test execution.
 - 7) Test Execution Date: Date when the test was executed.
 - 8) Test Title/Name: Test case title. For example, verify the login page with a valid username and password.
 - 9) Test Summary/Description: Describe the test objective in brief.
 - 10) Pre-conditions: Any prerequisite that must be fulfilled before the execution of this test case. List all the pre-conditions in order to execute this test case successfully.
 - 11) Dependencies: Mention any dependencies on other test cases or test requirements.
-
- 12) Test Steps: List all the test execution steps in detail. Write test steps in the order in which they should be executed. Make sure to provide as many details as you can.
 - 13) Test Data: Use of test data as an input for this test case. You can provide different data sets with exact values to be used as an input.
 - 14) Expected Result: What should be the system output after test execution? Describe the expected result in detail including the message/error that should be displayed on the screen.
 - 15) Post-condition: What should be the state of the system after executing this test case?
 - 16) Actual result: The actual test result should be filled after test execution. Describe the system behavior after test execution.
 - 17) Status (Pass/Fail): If the actual result is not as per the expected result, then mark this test as failed. Otherwise, update it as passed.
 - 18) Notes/Comments/Questions: If there are any special conditions to support the above fields, which can't be described above or if there are any questions related to expected or actual results then mention them here.
- Add the following fields if necessary:**
- 1) Defect ID/Link: If the test status fails, then include the link to the defect log or mention the defect number.
 - 2) Test Type/Keywords: This field can be used to classify tests based on test types. For Example, functional, usability, business rules, etc.

- 3) Requirements: Requirements for which this test case is being written for. Preferably the exact section number in the requirement doc.
- 4) Attachments/References: This field is useful for complex test scenarios in order to explain the test steps or expected results using a Visio diagram as a reference. Provide a link or location to the actual path of the diagram or document.
- 5) Automation? (Yes/No): Whether this test case is automated or not. It is useful to track automation status when test cases are automated.

One More Test Case Format (#2)

The test cases will differ depending upon the functionality of the software that it is intended for. However, given below is a template that you can always use to document the test cases without bothering about what your application is doing?

Test Scenario ID		Test Case ID					
Test Case Description	I	Test Priority					
Pre-Requisite		Post-Requisite					
Test Execution Steps:							
S.No	Action	Inputs	Expected Output	Actual Output	Test Browser	Test Result	Test Comments

Sample Test Cases

Based on the above template, below is an example that showcases the concept in a much understandable way. Let's assume that you are testing the login functionality of any web application, say Facebook.

An ideal test case template

Below is a template which you can always use for documenting the test cases without bothering with what your application is doing.

Test Scenario ID		Test Case ID					
Test Case Description		Test Priority					
Pre-Requisite		Post-Requisite					
Test Execution Steps:							
S.No	Action	Inputs	Expected Output	Actual Output	Test Browser	Test Result	Test Comments

Example Scenario

Based on the above template, below is an example that showcases the concepts in a more understandable way.

Suppose you are testing the login functionality of any web application, say Facebook. Below are the test cases for the same:

Test Scenario ID	Login-1	Test Case ID	Login-1A
Test Case Description	Login – Positive test case	Test Priority	High
Pre-Requisite	A valid user account	Post-Requisite	NA

Test Execution Steps:

S.N o	Action	Inputs	Expected Output	Actual Output	Test Browser	Test Result	Test Comments
1	Launch application	https://www.facebook.com/	Facebook home	Facebook home	IE -11	Pass	[Priya 12/17/2016 11:44 AM]: Launch successful
2	Enter correct Email & Password and hit login button	Email id : test@xyz.com Password: *****	Login success	Login success	IE -11	Pass	[Priya 12/17/2016 11:45 AM]: Login successful

Test Scenario ID	Login-1	Test Case ID	Login-1B
Test Case Description	Login – Negative test case	Test Priority	High
Pre-Requisite	NA	Post-Requisite	NA

Test Execution Steps:

S.No	Action	Inputs	Expected Output	Actual Output	Test Browser	Test Result	Test Comments
1	Launch	https://www.facebook.com/	Facebook	Faceboo	IE -11	Pass	[Priya 12/17/2016

	application	ok.com/	home	k home			11:44 AM]: Launch successful
2	Enter invalid Email & any Password and hit login button	Email id : invalid@xyz.com Password: *****	The email address or phone number that you've entered doesn't match any account. Sign up for an account.	The email address or phone number that you've entered doesn't match any account. Sign up for an account.	IE -11	Pass	[Priya 12/17/2016 11:45 AM]: Invalid login attempt stopped
3	Enter valid Email & incorrect Password and hit login button	Email id : valid@xyz.com Password: *****	The password that you've entered is incorrect. Forgotten password ?	The password that you've entered is incorrect . Forgotten password?	IE -11	Pass	[Priya 12/17/2016 11:46 AM]: Invalid login attempt stopped

Samples from a Live Project

Below is examples from a live project that demonstrates how all the above listed tips and tricks are actually implemented:

Test Scenario Group	Test Case Id	Test Case Description	Test Env	Test Input	Expected Result	Actual Result	Test Browser	Executed Date	Test Results	Executed Date	Test Results	Defect Status
2 Search	Search-1	Search for Patient only in Copia										
3 Search	Search-2	Search for Patient only in IMS										
4 Search	Search-3	Search for Patient in both Copia & IMS										
5 Search	Search-4	Search by first name										
6 Search	Search-5	Search by last name										
7 Search	Search-6	Search by patient id										
8 Search	Search-7	Search with partial name										
9 Search	Search-8	Search with partial patient id										
10 Search	Search-9	Update Patient profile a) address flow from HRA to IMS										
12 Search	Search-10	Search recent history										
13 Search	Search 11	Search on different first name & lastname gives lastname										
14												
15 HRA	HRA-1	Edit patient profile on search page										
16	HRA-2	Verify all HRA data flowed to IMS										
17												

Summary Bugs IMS-Search Interaction Quick Actions HRA Personal Health History ... + : 4 |

Timestamp	Description	Which Page?	Issue Type	Screenshot	Urgency	Browser	Re-test Date	Testing Comments
1	Clicking on enter after entering data closes the modal Steps: a) Click on 'Create New Patient' b) Enter patient name and click enter							
2 2/7/13 17:08	c) Create patient modal is closed	Login	Error or Bug	None	Medium	Firefox	2/21/2013	Pending
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								

Summary Bugs IMS-Search Interaction Quick Actions HRA Personal Health History ... + : 4 |

Test Scenario Group	Test Case Id	Test Case Description	Test Input	Expected Result	Actual Result	Test Browser	Executed Date	Test Results
2 Health records								
3 Health History	PH 1	High Cholestrol:	a) Yes and on medication b) Yes but not on medication	how old were you at time of dx? how old were you at time of dx?	how old were you at time of dx? how old were you at time of dx?	Chrome,IE, Firefox		
4								
5	PH 2	High Blood Pressure:	a) Yes and on medication b) Yes but not on medication	what does your blood pressure range, on average? what does your blood pressure range, on average?	what does your blood pressure range, on average? what does your blood pressure range, on average?	Chrome,IE, Firefox		
6								
7								
8								
9	PH 3	Diabetes:	a) Yes and on medication b) Yes but not on medication a) Yes and on medication	how old were you at time of dx? how old were you at time of dx? what type of dm do you have?	how old were you at time of dx? how old were you at time of dx? what type of dm do you have?	Chrome,Firefox		
10								
11								
12								

Assignment No.: - 4

Create Defect Report for Any application or web application

Sample Bug Report

The Sample, Bug/Defect Report given below will give you an exact idea of how to report a Bug in the Bug Tracking Tool?

Here is an Example scenario that caused a Bug:

Let's assume that in your application under test you want to create a new user with user information, for that you need to login into the application and navigate to the USERS menu -> New User, then enter all the details in the 'User form' like, First Name, Last Name, Age, Address, Phone etc.

Once you enter all this information, you need to click on the 'SAVE' button in order to save the user. Now you can see a successful message saying, "New User has been created successfully".

But when you entered into your application by logging in and you have navigated to the USERS menu -> New user, entered all the required information to create the new user and clicked on SAVE button.

BANG! The application crashed and you got one error page on the screen. (Capture this error message window and save it as a Microsoft paint file)

Now, this is a Bug scenario and you would like to report this as a BUG in your Bug-Tracking Tool.

How Will You Report This Bug Effectively?

Sample Bug Report

Here is a sample Bug Report for the above-mentioned example:

(Note that some 'Bug Report' fields might differ depending on your bug tracking system)

SAMPLE BUG REPORT

Bug Name: Application crashes upon clicking the SAVE button while creating a new user.

Bug ID: (It will be automatically created by the BUG Tracking tool once you save this bug).

Area Path: USERS menu -> New Users

Build Number: Version Number 5.0.1

Severity: HIGH (High/Medium/Low) or 1

Priority: HIGH (High/Medium/Low) or 1

Assigned to: Developer-X

Reported By: Your Name

Reported On: Date

Reason: Defect

Status: New/Open/Active (Depends on the Tool you are using)

Environment: Windows 2003/SQL Server 2005

Description: Application crashes upon clicking the SAVE button while creating a new user, hence unable to create a new user in the application.

Steps to Reproduce:

- 1) Login into the Application.
- 2) Navigate to the Users Menu -> New User
- 3) Filled out all the user information fields.
- 4) Clicked on the ‘Save’ button.
- 5) Seen an error page “ORA1090 Exception: Insert values Error...”
- 6) See the attached logs for more information (Attach more logs related to the bug..IF any)
- 7) Also see the attached screenshot of the error page.

Expected Result: On clicking the SAVE button, you should be prompted to a successful message “New User has been created successfully”.

(Attach ‘application crash’ screenshot. IF any)

Save the Defect/Bug in the BUG TRACKING TOOL. You will get a Bug ID that you can use for further bug reference.

Default ‘New Bug’ mail will go to the respective developer and the default module owner (Team leader or manager) for further action.

How To Write A Good Bug Report? Tips And Tricks

Why a good Bug Report?

If your Bug report is effective, then its chances of getting fixed are higher. So fixing a bug depends upon how effectively you report it. Reporting a bug is nothing but a skill and in this tutorial we will explain how to achieve this skill.

“The point of writing a problem report (bug report) is to get bugs fixed” – By Cem Kaner. If a tester is not reporting a bug correctly, then the programmer will most likely reject this bug stating it as irreproducible. This can hurt the tester’s morals and sometimes the ego too. (I suggest not to keep any type of ego. ego’s like “I have reported the bug correctly”, “I can reproduce it”, “Why has he/she rejected the bug?”, “It’s not my fault” etc.,).

Qualities of a Good Software Bug Report

Anyone can write a Bug report. But not everyone can write an effective Bug report. You should be able to distinguish between an average bug report and a good bug report.

How to distinguish between a good and bad Bug Report? It's very simple, apply the following characteristics and techniques to report a bug.

Characteristics and Techniques

#1) Having a clearly specified Bug Number: Always assign a unique number to each bug report. This, in turn, will help you identify the bug record. If you are using any automated bug-reporting tool then this unique number will be generated automatically each time you report a bug.

Note the number and a brief description of each bug that you reported.

#2) Reproducible: If your bug is not reproducible, then it will never get fixed.

You should clearly mention the steps to reproduce the bug. Do not assume or skip any reproducing steps. The bug which is described Step by step is easy to reproduce and fix.

#3) Be Specific: Do not write an essay about the problem.

Be Specific and to the point. Try to summarize the problem in minimum words yet in an effective way. Do not combine multiple problems even if they seem to be similar. Write different reports for each problem.

Effective Bug Reporting

Bug reporting is an important aspect of Software Testing. Effective Bug reports communicate well with the development team to avoid confusion or miscommunication.

Good Bug report should be **clear and concise** without any missing key points. Any lack of clarity leads to misunderstanding and slows down the development process as well. Defect writing and reporting is one of the most important but neglected areas in the testing life cycle.

Good writing is very important for filing a bug. The most important point that a tester should keep in mind is **not to use a commanding tone** in the report. This breaks morale and creates an unhealthy work relationship. Use a suggestive tone.

Don't assume that the developer has made a mistake and hence you can use harsh words. Before reporting, it is equally important to check if the same bug has been reported or not.

A duplicate bug is a burden in the testing cycle. Check out the whole list of known bugs. At times, the developers may be aware of the issue and ignore it for future releases. Tools like Bugzilla, which automatically searches for duplicate bugs, can also be used. However, it is best to manually search for any duplicate bug.

The import information that a bug report must communicate is **“How?” and “Where?”** The report should clearly answer exactly how the test was performed and where the defect occurred. The reader should easily reproduce the bug and find out where the bug is.

Keep in mind that the **objective of writing a Bug report** is to enable the developer to visualize the problem. He/She should clearly understand the defect from the Bug report. Remember to provide all the relevant information that the developer is seeking.

Also, bear in mind that a bug report would be preserved for future use and should be well written with the required information. **Use meaningful sentences and simple words** to describe your bugs. Don't use confusing statements that waste the time of the reviewer.

Report each bug as a separate issue. In case of multiple issues in a single Bug report, you can't close it unless all the issues are resolved.

Hence, it is best to **split the issues into separate bugs**. This ensures that each bug can be handled separately. A well-written bug report helps a developer to reproduce the bug at their terminal. This will help them diagnose the issue as well.

How To Report A Bug?

Use the following simple Bug report template:

This is a simple Bug report format. It may vary depending upon the Bug report tool that you are using. If you are writing a bug report manually then some fields need to be mentioned specifically like the Bug number – which should be assigned manually.

Reporter: Your name and email address.

Product: In which product you found this bug.

Version: The product version, if any.

Component: These are the major sub-modules of the product.

Platform: Mention the hardware platform where you found this bug. The various platforms like 'PC', 'MAC', 'HP', 'Sun' etc.

Operating system: Mention all the operating systems where you found the bug. Operating systems like Windows, Linux, Unix, SunOS, and Mac OS. Also, mention the different OS versions like Windows NT, Windows 2000, Windows XP etc, if applicable.

Priority: When should a bug be fixed? Priority is generally set from P1 to P5. P1 as "fix the bug with the highest priority" and P5 as "Fix when time permits".

Severity: This describes the impact of the bug.

Types of Severity:

- **Blocker:** No further testing work can be done.
- **Critical:** Application crash, Loss of data.
- **Major:** Major loss of function.
- **Minor:** Minor loss of function.
- **Trivial:** Some UI enhancements.
- **Enhancement:** Request for a new feature or some enhancement in the existing one.

Status: When you are logging the bug into any bug tracking system then by default the bug status will be 'New'.

Later on, the bug goes through various stages like Fixed, Verified, Reopen, Won't Fix, etc.

Assign To: If you know which developer is responsible for that particular module in which the bug occurred, then you can specify the email address of that developer. Else keep it blank as this will assign the bug to the module owner, if not the Manager will assign the bug to the developer. Possibly add the manager's email address to the CC list.

URL: The page URL on which the bug occurred.

Summary: A brief summary of the bug, mostly within 60 words or below. Make sure your summary is reflecting on what the problem is and where it is.

Description: A detailed description of the bug.

Use the following fields for the description field:

- **Reproduce steps:** Clearly, mention the steps to reproduce the bug.
- **Expected result:** How the application should behave on the above-mentioned steps.
- **Actual result:** What is the actual result of running the above steps i.e. the bug behavior.

These are the important steps in the bug report. You can also add “Report Type” as one more field which will describe the bug type.

Report Types include:

- 1) Coding error
- 2) Design error
- 3) New Suggestion
- 4) Documentation issue
- 5) Hardware problem

Important Features in Your Bug Report

Given below are the important features in the Bug report:

#1) Bug Number/id

A Bug number or an identification number (like swb001) makes bug reporting and the process of referring to bugs much easier. The developer can easily check if a particular bug has been fixed or not. It makes the whole testing and retesting process smoother and easier.

#2) Bug Title

Bug titles are read more often than any other part of the bug report. This should explain all about what comes in the bug. The Bug title should be suggestive enough that the reader can understand it. A clear bug title makes it easy to understand and the reader can know if the bug has been reported earlier or has been fixed.

#3) Priority

Based on the severity of the bug, a priority can be set for it. A bug can be a Blocker, Critical, Major, Minor, Trivial, or a suggestion. Bug priorities can be given from P1 to P5 so that the important ones are viewed first.

#4) Platform/Environment

OS and browser configuration is necessary for a clear bug report. It is the best way to communicate how the bug can be reproduced.

Without the exact platform or environment, the application may behave differently and the bug at the tester's end may not replicate on the developer's end. So it is best to clearly mention the environment in which the bug was detected.

#5) Description

Bug description helps the developer to understand the bug. It describes the problem encountered. A poor description will create confusion and waste the time of the developers as well as testers.

It is necessary to communicate clearly about the effect of the description. It's always helpful to use complete sentences. It is a good practice to describe each problem separately instead of crumpling them altogether. Don't use terms like "I think" or "I believe".

#6) Steps to Reproduce

A good Bug report should clearly mention the steps to reproduce. These steps should include actions that may cause the bug. Don't make generic statements. Be specific on the steps to follow.

A good example of a well-written procedure is given below

Steps:

- Select product Abc01.
- Click on Add to cart.
- Click Remove to remove the product from the cart.

#7) Expected and Actual Result

A Bug description is incomplete without the Expected and Actual results. It is necessary to outline what the outcome of the test is and what the user should expect. The reader should know what the correct outcome of the test is. Clearly, mention what happened during the test and what the outcome was.

#8) Screenshot

A picture is worth a thousand words. Take a Screenshot of the instance of failure with proper captioning to highlight the defect. Highlight unexpected error messages with light red color. This draws attention to the required area.

Some Bonus Tips To Write A Good Bug Report

Given below are some additional tips on how to write a good Bug report:

#1) Report the problem immediately

If you find any bugs while testing, then you do not need to wait to write a detailed bug report later. Instead, write a bug report immediately. This will ensure a good and reproducible Bug report. If you decide to write the Bug report later on then there is a higher chance to miss the important steps in your report.

#2) Reproduce the bug three times before writing a Bug report

Your bug should be reproducible. Make sure that your steps are robust enough to reproduce the bug without any ambiguity. If your bug is not reproducible every time, then you can still file a bug mentioning the periodic nature of the bug.

#3) Test the same bug occurrence on other similar modules

Sometimes the developer uses the same code for different similar modules. So there is a higher chance for the bug in one module to occur in other similar modules as well. You can even try to find the more severe version of the bug you found.

#4) Write a good bug summary

Bug summary will help the developers to quickly analyze the bug's nature. A poor quality report will unnecessarily increase development and testing time. Communicate well with your bug report summary. Keep in mind that the bug summary can be used as a reference to search for the bug in the bug inventory.

#5) Read the Bug report before hitting the Submit button

Read all the sentences, wordings and steps that are used in the bug report. See if any sentence is creating ambiguity that can lead to misinterpretation. Misleading words or sentences should be avoided in order to have a clear bug report.

#6) Do not use abusive language.

It's nice that you did a good work and found a bug but do not use this credit for criticizing the developer or to attack any individual.

Sample Bug Reports For Web And Product Applications

Bug report sample 1: Web Project bug report

Summary: In CTR (Click through ratio) 'Total' row calculation is wrong

Product: Example product

Version: 1.0

Platform: PC

URL: (Provide url of page where bug occurs)

OS/Version: Windows 2000

Status: NEW

Severity: Major

Priority: P1

Component: Publisher stats

Assigned To: developer@example.com

Reported By: tester@example.com

CC: manager@example.com

Bug Description:**Reproduce steps:**

- 1) Go to page: (Provide URL of page where bug occurs)
- 2) Click on ‘Publisher stats’ link to view publisher’s revenue detail stats date wise.
- 3) On page (Provide URL of page where bug occurs) check CTR value in ‘Total’ row of CTR stats table.

Actual result: Calculation of ‘Total’ row in CTR table is wrong. Also Individual row CTR for each publisher is not truncated to 2 digits after decimal point. It’s showing CTR like 0.042556767

Expected result: Total CTR= (Total clicks/Total searches)*100

[Attach bug screenshot if any]

Please fix the bug.

Sample bug report 2: Application product Bug report sample**Application testing scenario:**

Lets assume in your application you want to create a new user with his/her information, for that you need to logon into the application and navigate to USERS menu > New User, then enter all the details in the User form like, First Name, Last Name, Age, Address, Phone etc. Once you enter all these need to click on SAVE button in order to save the user and you can see a success message saying, “New User has been created successfully”. Now you entered into your application by logging in and navigate to USERS menu > New user, entered all the information and clicked on SAVE button and now the application crashed and you can see one error page on the screen, now you would like to report this BUG.

Now here is how we can report bug for above scenario:

Bug Name: Application crash on clicking the SAVE button while creating a new user.

Bug ID: The BUG Tracking tool will automatically create it once you save this.

Area Path: USERS menu > New Users

Build Number:/Version Number 5.0.1

Severity: HIGH (High/Medium/Low)

Priority: HIGH (High/Medium/Low)

Assigned to: Developer-X

Created By: Your Name

Created On: Date

Reason: Defect

Status: New/Open/Active – Depends on the Tool you are using

Environment: Windows 2003/SQL Server 2005

Description:

Application crash on clicking the SAVE button while creating a new user, hence unable to create a new user in the application.

Steps To Reproduce:

- 1) Logon into the application
- 2) Navigate to the Users Menu > New User
- 3) Filled all the fields
- 4) Clicked on ‘Save’ button
- 5) Seen an error page “ORA1090 Exception: Insert values Error...”
- 6) See the attached logs for more information
- 7) And also see the attached screenshot of the error page.

Expected: On clicking SAVE button should be prompted to a success message “New User has been created successfully”.

Save the defect/bug in the BUG TRACKING TOOL.

Assignment No.: - 5

Installation of Selenium grid and selenium Web driver java eclipse (automation tools).

Managing user experience is pivotal for software development. Test automation enables user preferences and convenience to remain at the center of the development process while saving time and effort. That is why comprehensive automation testing has become necessary to retain customers and meet their expectations. With significantly shorter time frames for development, Selenium Testing, in particular, has become an integral part of the development to facilitate automated testing of web applications.

Selenium is the most popular automated tool in existence today. 59.5% of people consider Selenium for Cross Browser Testing because of the robustness and flexibility it offers by supporting multiple languages like Java, C#, Python, Perl, Ruby, etc. However, a majority (67%) of the Selenium users prefer Java as their language for Selenium Testing.

This article discusses how to configure Selenium in Eclipse to use Selenium for Java.

Table of Contents

- Prerequisites for configuring Selenium in Eclipse
- How to configure Selenium in Eclipse
- Conclusion

Prerequisites for configuring Selenium in Eclipse

Install Java
Download Java SE Development Kit 16.0.2 according to the Windows, Linux, or macOS platform being used.

Java SE Development Kit 16.0.2

This software is licensed under the Oracle Technology Network License Agreement for Oracle Java SE

Product / File Description	File Size	Download
Linux ARM 64 RPM Package	144.87 MB	jdk-16.0.2_linux-aarch64_bin.rpm
Linux ARM 64 Compressed Archive	160.73 MB	jdk-16.0.2_linux-aarch64_bin.tar.gz
Linux x64 Debian Package	146.17 MB	jdk-16.0.2_linux-x64_bin.deb
Linux x64 RPM Package	153.01 MB	jdk-16.0.2_linux-x64_bin.rpm
Linux x64 Compressed Archive	170.04 MB	jdk-16.0.2_linux-x64_bin.tar.gz
macOS Installer	166.6 MB	jdk-16.0.2_osx-x64_bin.dmg
macOS Compressed Archive	167.21 MB	jdk-16.0.2_osx-x64_bin.tar.gz
Windows x64 Installer	150.58 MB	jdk-16.0.2_windows-x64_bin.exe
Windows x64 Compressed Archive	168.8 MB	jdk-16.0.2_windows-x64_bin.zip

Source

Run the JDK Installer by double-clicking on the file name in the download location and following the instructions on the instruction wizard. Alternatively, silently install JDK by entering the following command:

```
jdk.exe /s
```

Install Eclipse IDE

The Eclipse Installer 2021-06 R now includes a JRE for macOS, Windows and Linux.



Get Eclipse IDE 2021-06

Install your favorite desktop IDE packages.

Download x86_64

Download Packages | Need Help?

Tool Platforms



Eclipse Che

Eclipse Che is a developer workspace server and cloud IDE.



ORION

A modern, open source software development environment that runs in the cloud.

Install Selenium

Download and Install Selenium to be set up in Eclipse.

Install Browser Driver

For Cross Browser Testing, download the relevant Browser Driver – ChromeDriver (for Chrome), GeckoDriver (for Firefox), SafariDriver(for Safari), and InternetExplorerDriver and MSEdgeDriver (IE and Edge respectively). Place these Browser Driver files in a directory that is part of the environment PATH. This will allow a command-line call to the programs to execute them irrespective of the working directory.

Install Java Language Bindings

Version 3.141.59 (2018)

Changelog

API Docs

The screenshot shows the Selenium website's language bindings section. It features five cards, each representing a programming language:

- C#**: Shows the C# logo (a purple hexagon with a white 'C#' symbol). Below it, it says "Stable: 3.14.0 (August 02, 2018)" and "Beta: 4.0.0-beta4 (June 07, 2021)". Underneath are links for "Changelog" and "API Docs".
- Ruby**: Shows the Ruby logo (a red gem-like shape). Below it, it says "Stable: 3.142.6 (October 04, 2019)" and "Beta: 4.0.0beta4 (June 07, 2021)". Underneath are links for "Changelog" and "API Docs".
- Java**: Shows the Java logo (a stylized flame over a blue wave). Below it, it says "Stable: 3.141.59 (November 14, 2018)" and "Beta: 4.0.0-beta-4 (June 07, 2021)". Underneath are links for "Changelog" and "API Docs".
- Python**: Shows the Python logo (a yellow and blue snake icon). Below it, it says "Stable: 3.141.0 (November 01, 2018)" and "Beta: 4.0.0.b4 (June 07, 2021)". Underneath are links for "Changelog" and "API Docs".
- JavaScript**: Shows the JavaScript logo (a yellow square with the letters 'JS' in black). Below it, it says "Stable: 3.6.0 (October 06, 2017)" and "Beta: 4.0.0-beta.4 (June 07, 2021)". Underneath are links for "Changelog" and "API Docs".

How to configure Selenium in Eclipse

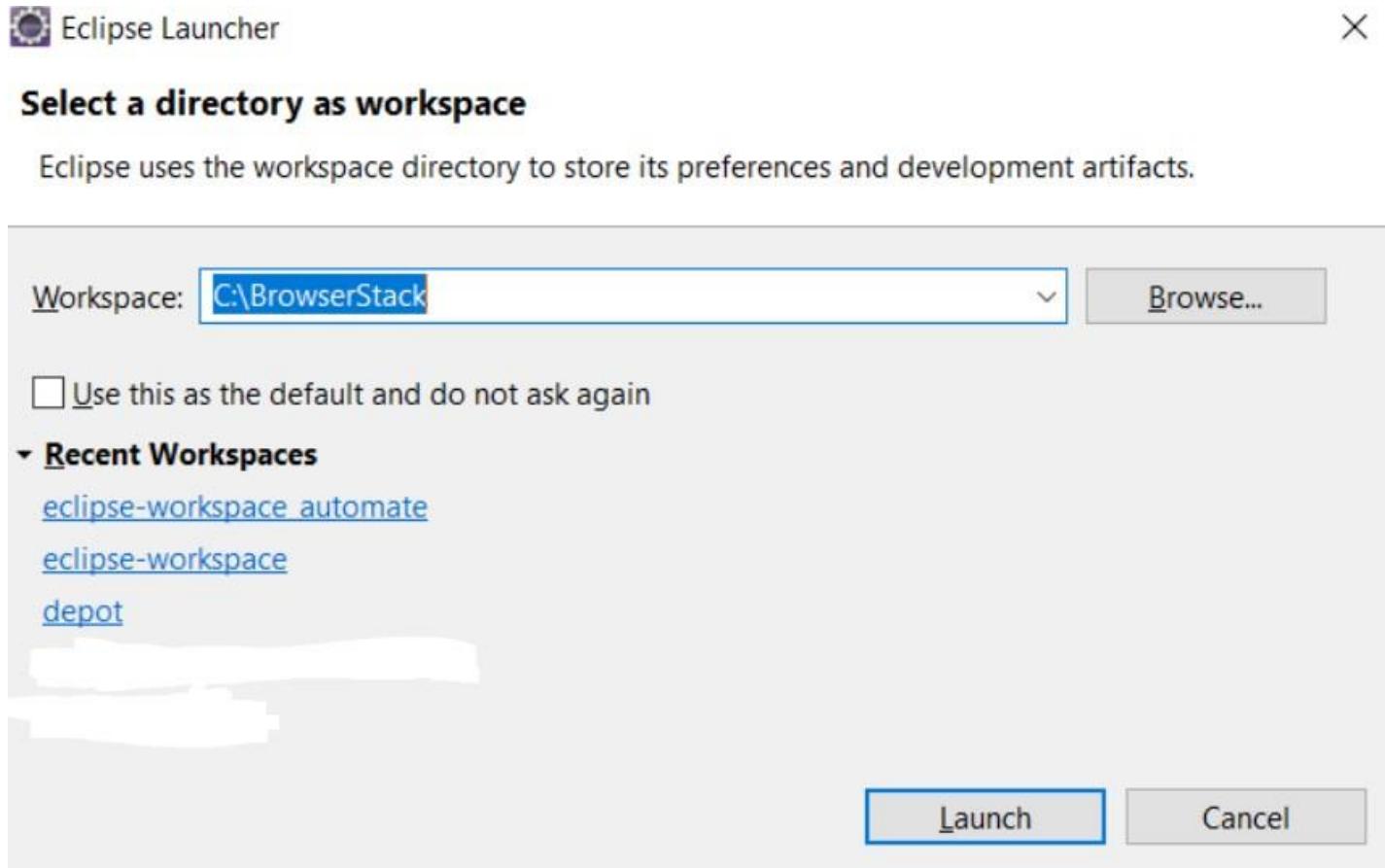
Here are the steps to configure Selenium Webdriver with Eclipse:

Step 1: Launch Eclipse

To launch Eclipse double click on the eclipse.exe file in the download location.

Step 2: Create Workspace in Eclipse

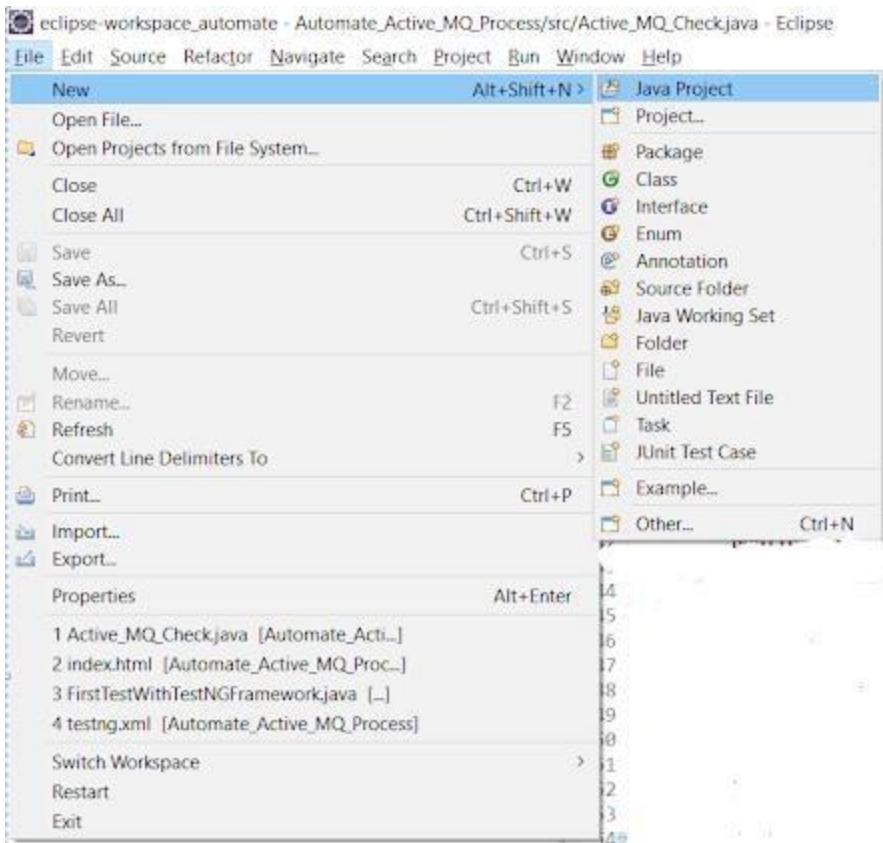
This workspace named “C:\BrowserStack” is like any other folder, which will store all the test scripts. Launch the BrowserStack workspace.



Creating Workspace in Eclipse

Step 3: Create New Java Project in the BrowserStack Workspace

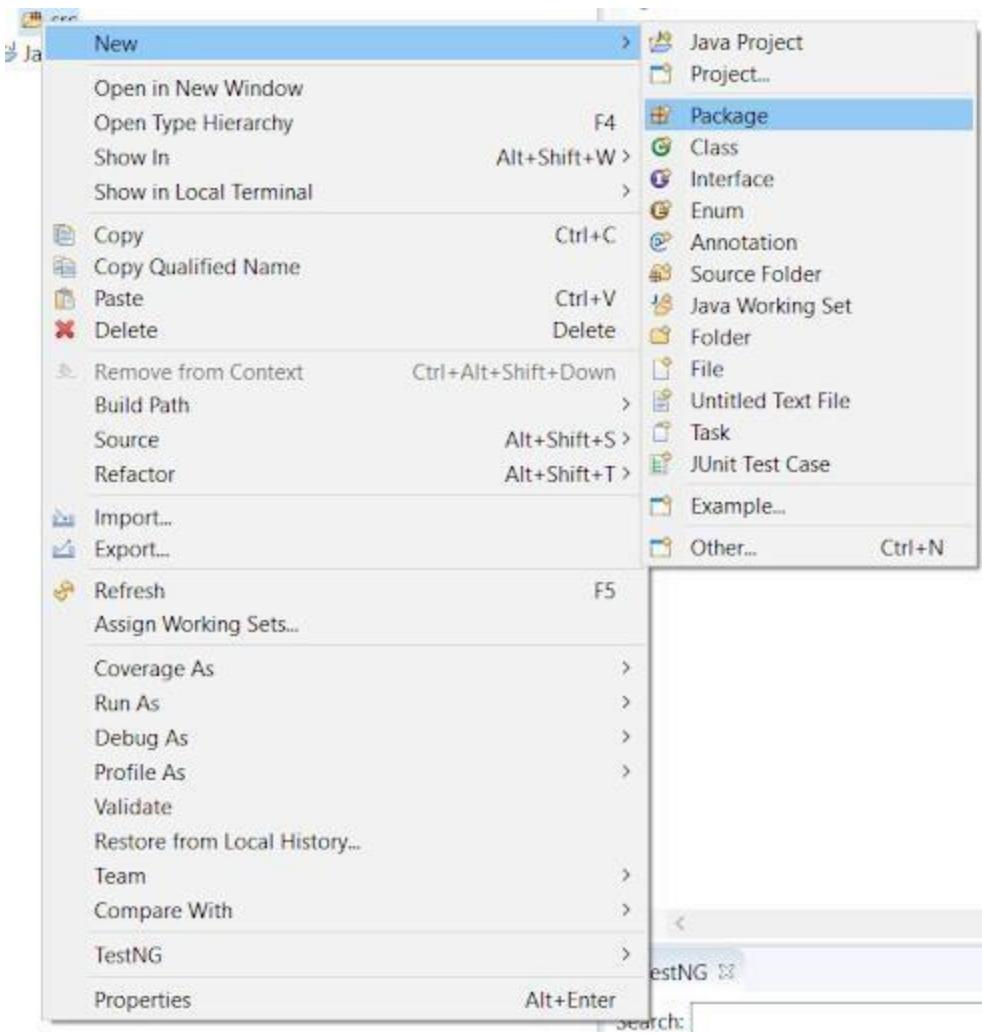
Create a new Java Project by clicking on File > New > Java Project and name it.



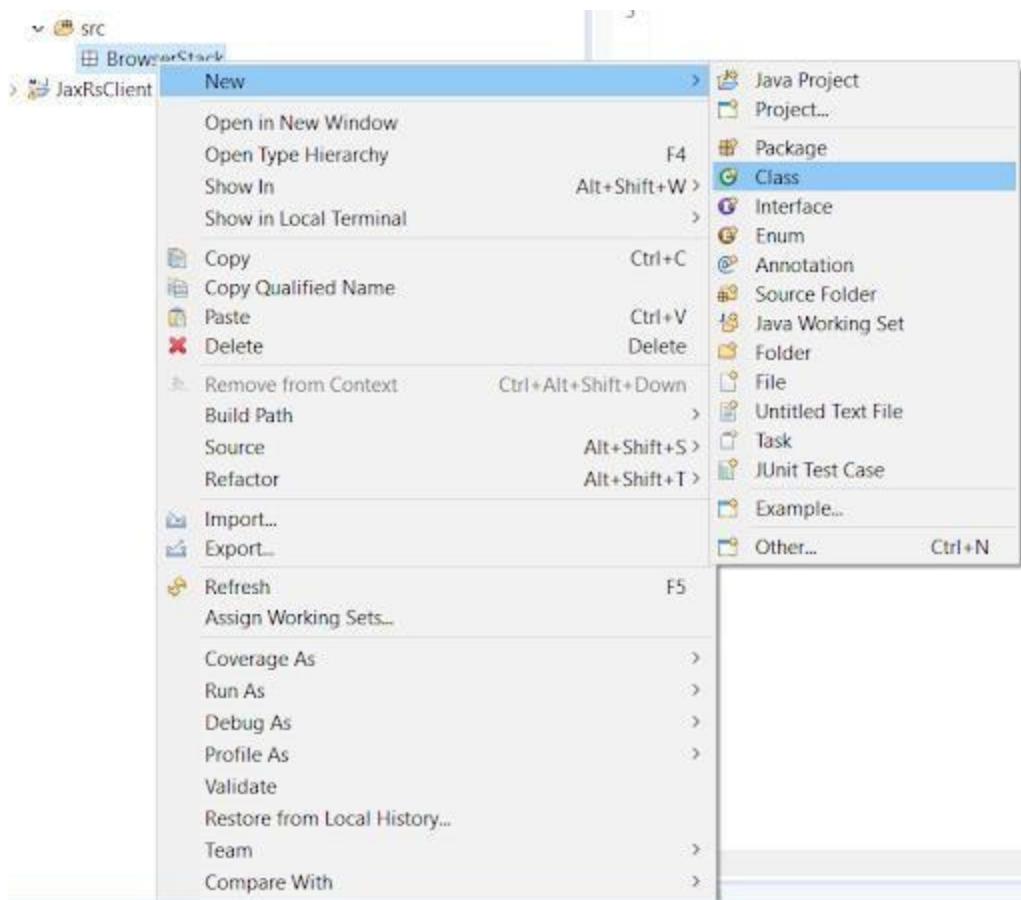
Creating a new Java Project

Step 4: Create Package and Class under the Java Project

By clicking on the src folder (which is the source folder), create a new package and name it (BrowserStack). Then right-click on the package name and create a class.



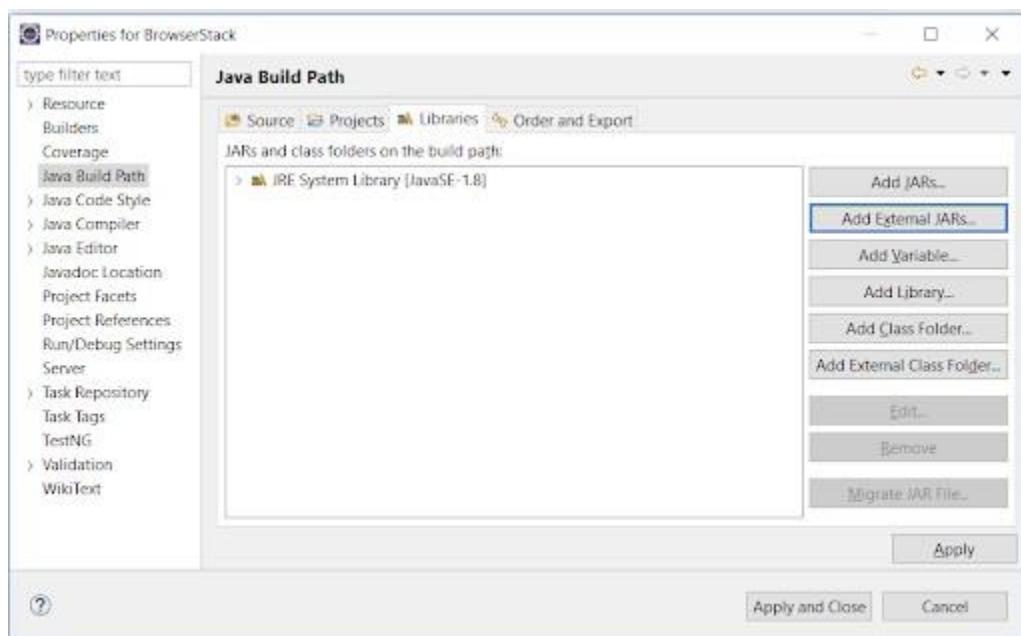
Creating Package in the Java Project



Creating Class in the BrowserStack Package

Step 5: Add Selenium JARs to the Java Project in Eclipse

To add the Selenium Jars to the BrowserStack Java right click on the BrowserStack Project folder and select the Properties option. In the properties window, click on the Java Build Path and Add External JARs. Browse and add the downloaded Selenium JARs i.e. Client Combined JAR and all the JARs under the Libs folder, then click Apply and Close.



Adding Selenium JARs in the BrowserStack Project

This configures Selenium with Eclipse, making it ready to execute the first test script.

Conclusion

Automation testing using Selenium with Java has simplified software development. Being an open-source tool, it provides an opportunity to speed up the time of execution and remove errors for a better user experience.

Java is quite popular among the developers, given the extensive support being available, making it a preferred choice as a Selenium Client Language Binding. Selenium with Java has proved helpful in optimizing regression testing and cross browser testing. With the support of Continuous Integration tools like Jenkins, Selenium with Java can be used in continuous delivery models.

However, to make testing more efficient and get accurate results every time, all Selenium tests must be run on real browsers and devices for accurate results. Start running tests on 2000+ real browsers and devices on BrowserStack's real device cloud. Run parallel tests on its Cloud Selenium Grid to get faster results without compromising on accuracy. Identify all bugs and offer a high-end UX/UI to the users by running automated tests in real user conditions with BrowserStack Automate.

STQA Mini Project No. 1

Title

Mini-Project 1: Create a small application by selecting relevant system environment/platform and programming languages. Narrate concise Test Plan consisting features to be tested and bug taxonomy. Prepare Test Cases inclusive of Test Procedures for identified Test Scenarios. Perform selective Black-box and White-box testing covering Unit and Integration test by using suitable Testing tools. Prepare Test Reports based on Test Pass/Fail Criteria and judge the acceptance of application developed.

Problem Definition:

Perform Desktop Application testing using Automation Tool like JUnit generate Test Report by Using tool like Apache Maven.

Prerequisite:

Knowledge of Core Java, Basic Concepts of Unit Testing, Test Cases Writing using Junit etc tool

Software Requirements:

JDK 1.8, Eclipse java photon-R version, TestNG

Hardware Requirement:

PIV, 2GB RAM, 500 GB HDD, Lenovo A13-4089Model.

Learning Objectives:

We are going to learn how to Prepare Test Cases inclusive of Test Procedures for identified Test Scenarios.

Perform selective Black-box and White-box testing covering Unit and Integration test by using suitable Testing tools. also Prepare Test Reports based on Test Pass/Fail Criteria

Outcomes:

You are able to understand Unit and Integration testing with Tool with Test Report.

Theory Concepts:

What is Unit Testing?

Unit Testing of software applications is done during the development (coding) of an application.

The objective of Unit Testing is to isolate a section of code and verify its correctness. In procedural programming a unit may be an individual function or procedure

The goal of Unit Testing is to isolate each part of the program and show that the individual parts are correct. Unit Testing is usually performed by the developer.

Unit Testing Tools

There are several automated tools available to assist with unit testing. We will provide a few examples below:

1. [**Jtest**](#): Parasoft Jtest is an IDE plugin that leverages open-source frameworks (Junit, Mockito, PowerMock, and Spring) with guided and easy one-click actions for creating, scaling, and maintaining unit tests. By automating these time-consuming aspects of unit testing, it frees the

developer to focus on business logic and create more meaningful test suites.

2. [Junit](#): Junit is a free to use testing tool used for Java programming language. It provides assertions to identify test method. This tool test data first and then inserted in the piece of code.
3. [NUnit](#): NUnit is widely used unit-testing framework use for all .net languages. It is open source tool which allows writing scripts manually. It supports data-driven tests which can run in parallel.
4. [JMockit](#): JMockit is open source Unit testing tool. It is code coverage tool with line and path metrics. It allows mocking API with recording and verification syntax. This tool offers Line coverage, Path Coverage, and Data Coverage.
5. [EMMA](#): EMMA is an open-source toolkit for analyzing and reporting code written in Java language. Emma support coverage types like method, line, basic block. It is Java-based so it is without external library dependencies and can access to the source code.
6. [PHPUnit](#): PHPUnit is a unit testing tool for PHP programmer. It takes small portions of code which is called units and test each of them separately. The tool also allows developers to use pre-define assertion methods to assert that system behave in a certain manner.

Those are just a few of the available unit testing tools. There are lots more, especially for C languages and Java, but you are sure to find a unit testing tool for your programming needs regardless of the language you use.

Extreme Programming & Unit Testing

Unit testing in Extreme Programming involves the extensive use of testing frameworks. A unit test framework is used in order to create automated unit tests. Unit testing frameworks are not unique to extreme programming, but they are essential to it. Below we look at some of what extreme programming brings to the world of unit testing:

- Tests are written before the code
- Rely heavily on testing frameworks
- All classes in the applications are tested
- Quick and easy integration is made possible

Bug taxonomy

Bug taxonomies help in providing fast and effective feedback so that they can easily identify possible reasons for failure of the software. Using bug taxonomy, a large number of potential bugs can be grouped into few categories.

Whenever a new bug is reported, using bug taxonomy, a tester can easily analyse and put that bug into any of these categories.

At the end of testing, Testers can understand the type of categories of bugs that frequently occurred and thereby in successive rounds of testing he can focus on writing more test cases that would help to detect such bugs. In addition, test leaders can guide their testers to focus on such frequently occurring bugs.

The summary of the Bug Taxonomy is given below,

- Requirements, Features, and Functionality Bugs
- Structural Bugs
- Data Bugs
- Coding Bugs
- Interface, Integration, and System Bugs
- Test and Test Design Bugs
- Testing and Design Style

What is Integration Testing?

In integration Testing, individual software modules are integrated logically and tested as a group. A typical software project consists of multiple software modules, coded by different programmers. integration Testing focuses on checking data communication amongst these modules. Hence it is also termed as 'I & T' (Integration and Testing), 'String Testing' and sometimes 'Thread Testing

Integration Test Case:

Integration [Test Case](#) differs from other test cases in the sense it **focuses mainly on the interfaces & flow of data/information between the modules**. Here priority is to be given for the **integrating links** rather than the unit functions which are already tested.

Sample Integration Test Cases for the following scenario: Application has 3 modules say 'Login Page', 'Mail box' and 'Delete mails' and each of them are integrated logically.

Here do not concentrate much on the Login Page testing as it's already been done in [Unit Testing](#). But check how it's linked to the Mail Box Page.

Similarly Mail Box: Check its integration to the Delete Mails Module.

Test Case ID	Test Case Objective	Test Case Description	Expected Result
1	Check the interface link between the Login and Mailbox module	Enter login credentials and click on the Login button	To be directed to the Mail Box
2	Check the interface link between the Mailbox and Delete Mails Module	From Mail box select the an email and click delete button	Selected email should appear in the Deleted/Trash folder

Desktop Application Testing by Using Junit Tool

What is Junit?

JUnit is a framework for implementing testing in Java.

It provides a simple way to explicitly test specific areas of a Java program, it is extensible and can be employed to test a hierarchy of program code either singularly or as multiple units.

Why use a testing framework? Using a testing framework is beneficial because it forces you to explicitly declare the expected results of specific program execution routes. When debugging it is possible to write a

test which expresses the result you are trying to achieve and then debug until the test comes out positive. By having a set of tests that test all the core components of the project it is possible to modify specific areas of the project and immediately see the effect the modifications have on the other areas by the results of the test, hence, side-effects can be quickly realized.

JUnit promotes the idea of first testing then coding, in that it is possible to setup test data for a unit which defines what the expected output is and then code until the tests pass. It is believed by some that this practice of "test a little, code a little, test a little, code a little..." increases programmer productivity and stability of program code whilst reducing programmer stress and the time spent debugging.

JUnit is a simple open source Java testing framework used to write and run repeatable automated tests. It is an instance of the xUnit architecture for unit testing framework. Eclipse supports creating test cases and running test suites, so it is easy to use for your Java applications.

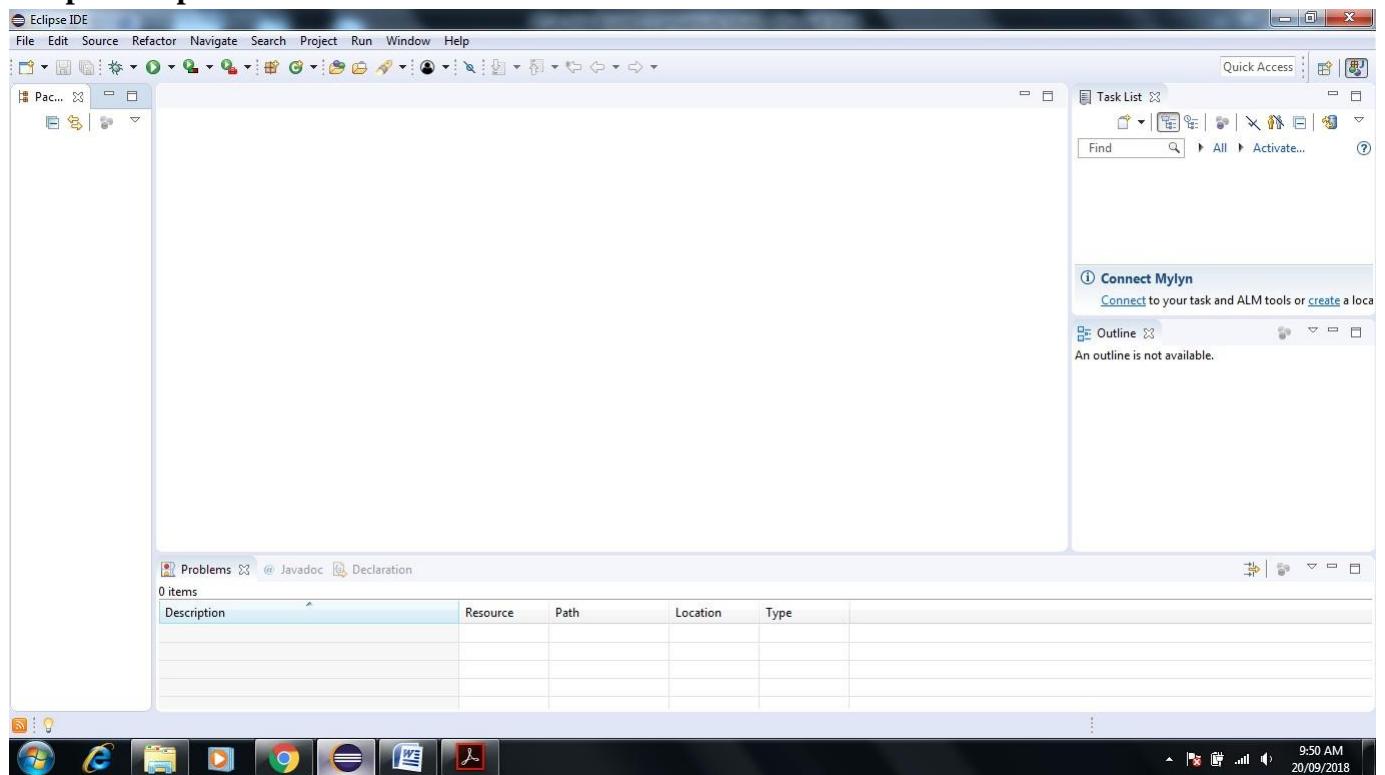
JUnit features include:

- Assertions for testing expected results
- Test fixtures for sharing common test data
- Test suites for easily organizing and running tests
- Graphical and textual test runners

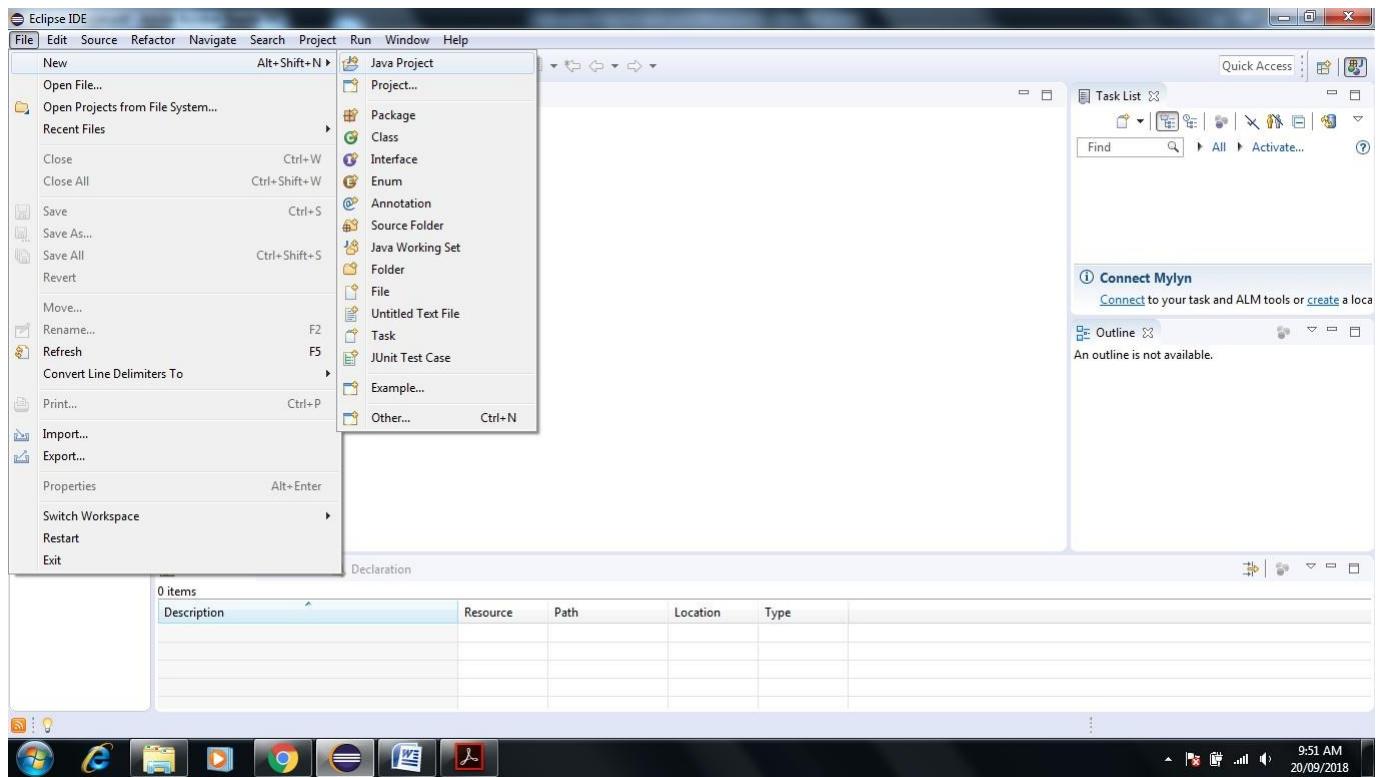
How to Create Simple Junit Test in Eclipse IDE

1. Download JDK 1.8 and Eclipse latest version here we are using eclipse-java-photon-R-win32.

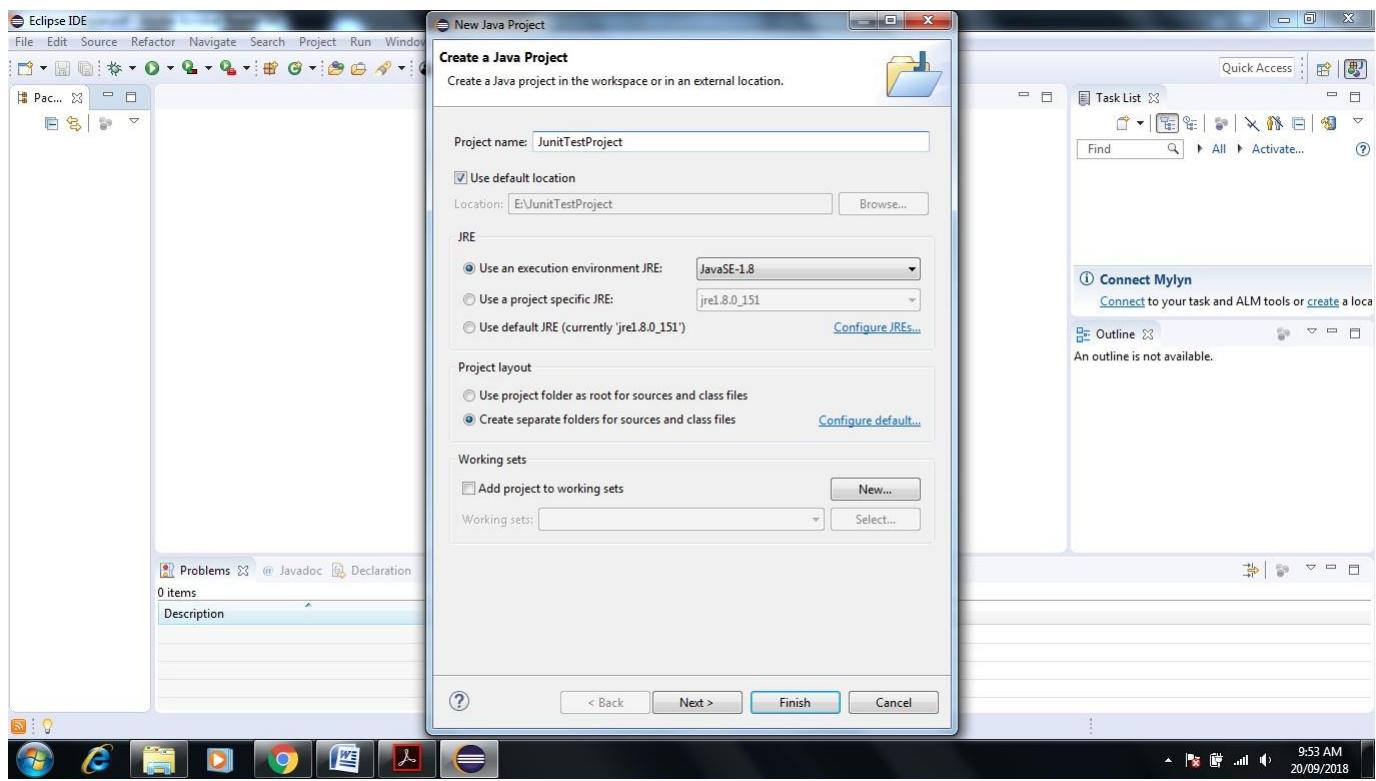
2. Open Eclipse IDE



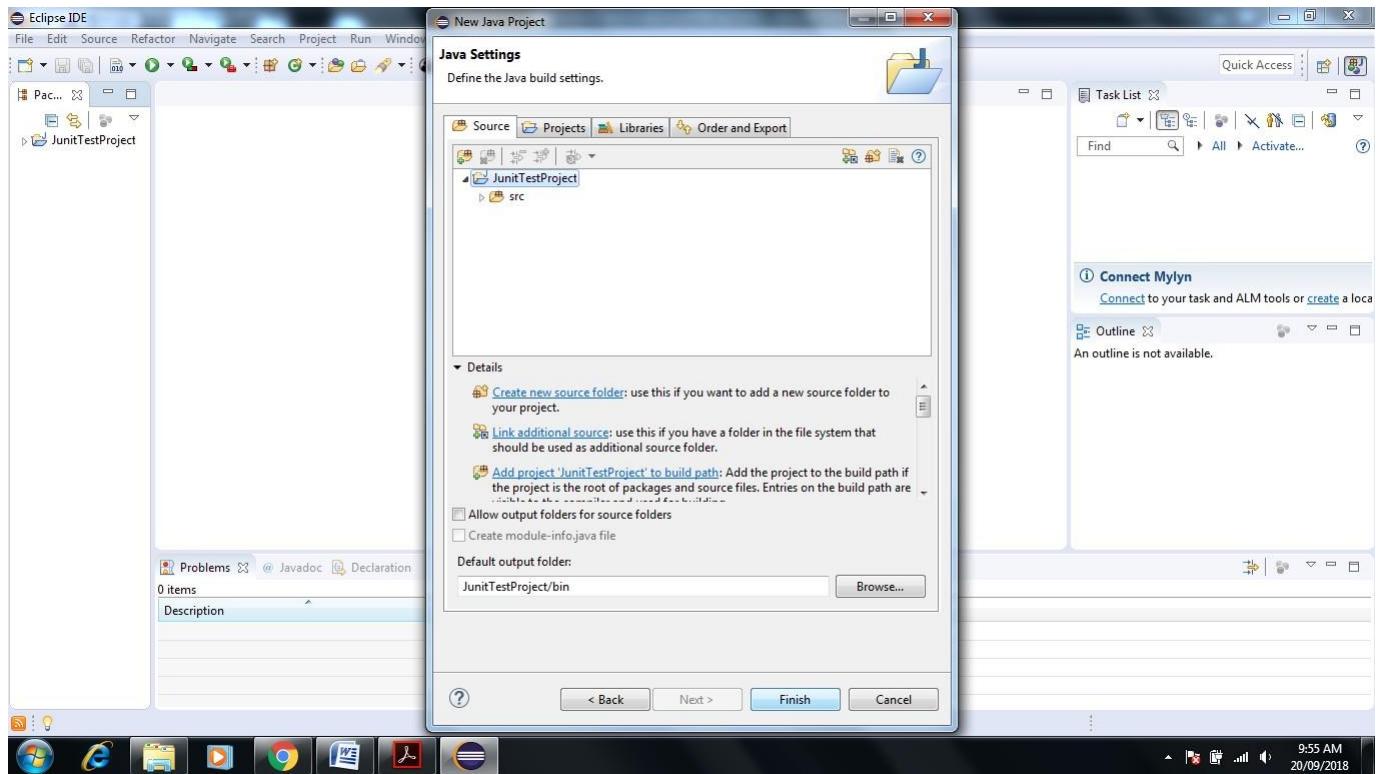
3. Go to File and Select New -> Create New Java Project



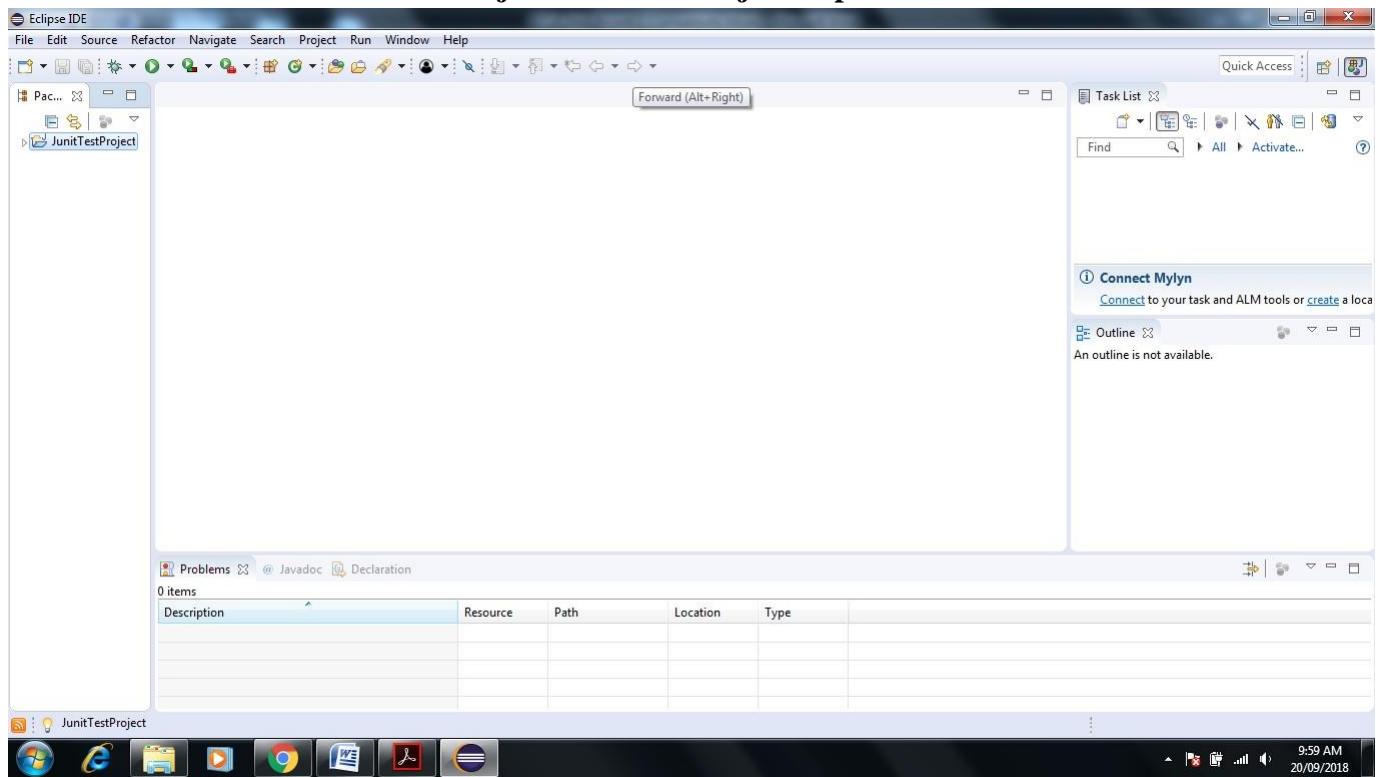
4. Give JunitTestProject name to the project and check use project folder as root for source and class files



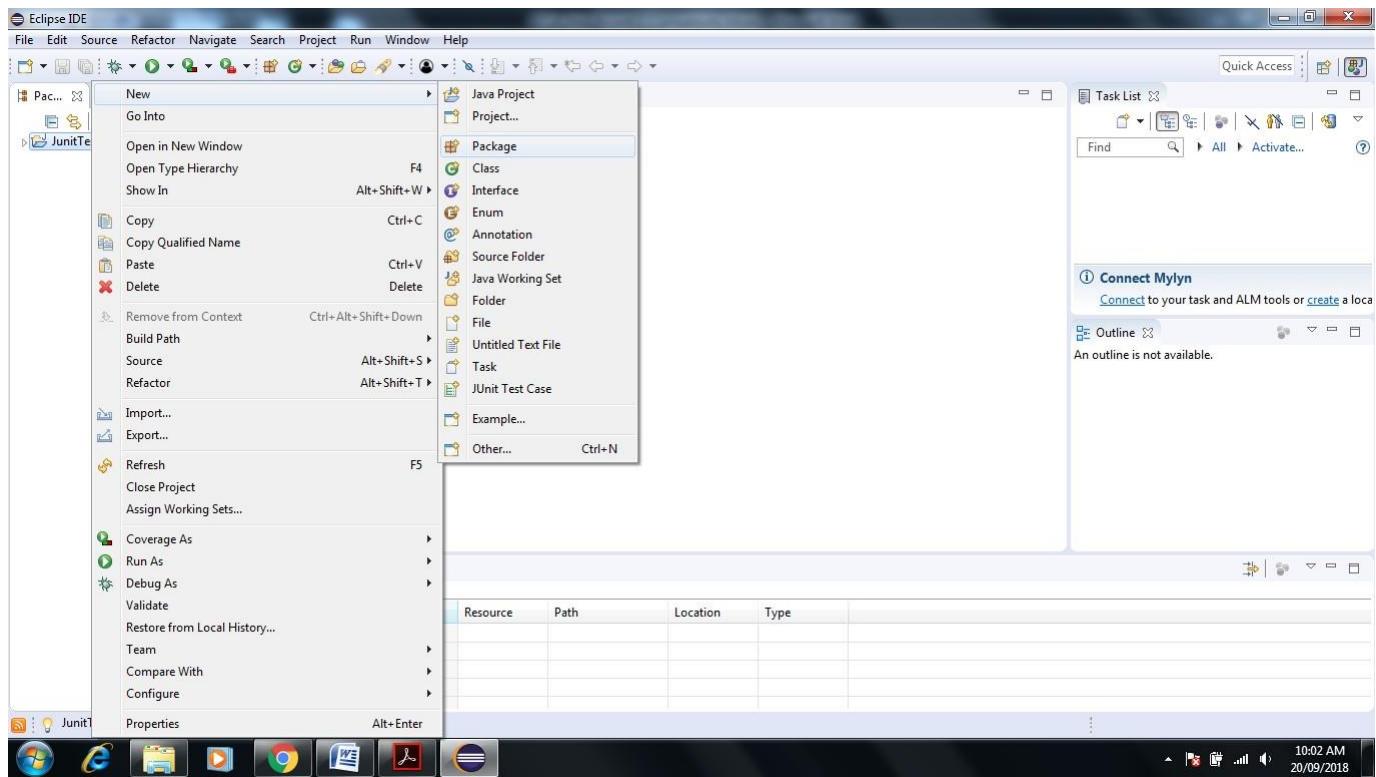
5. Click on Next-> Next Screen will Appear-> Click Finish



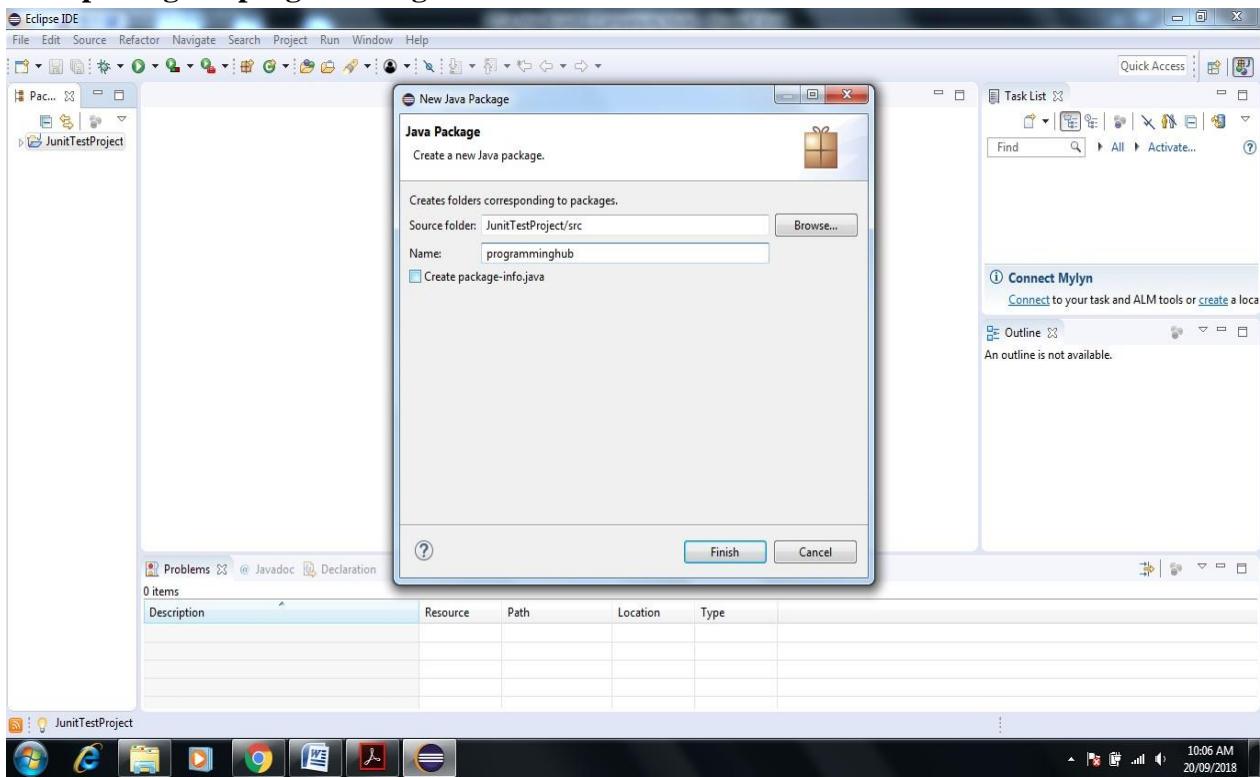
6. Next Screen Shown JunitTestProject Folder in Project Explorer



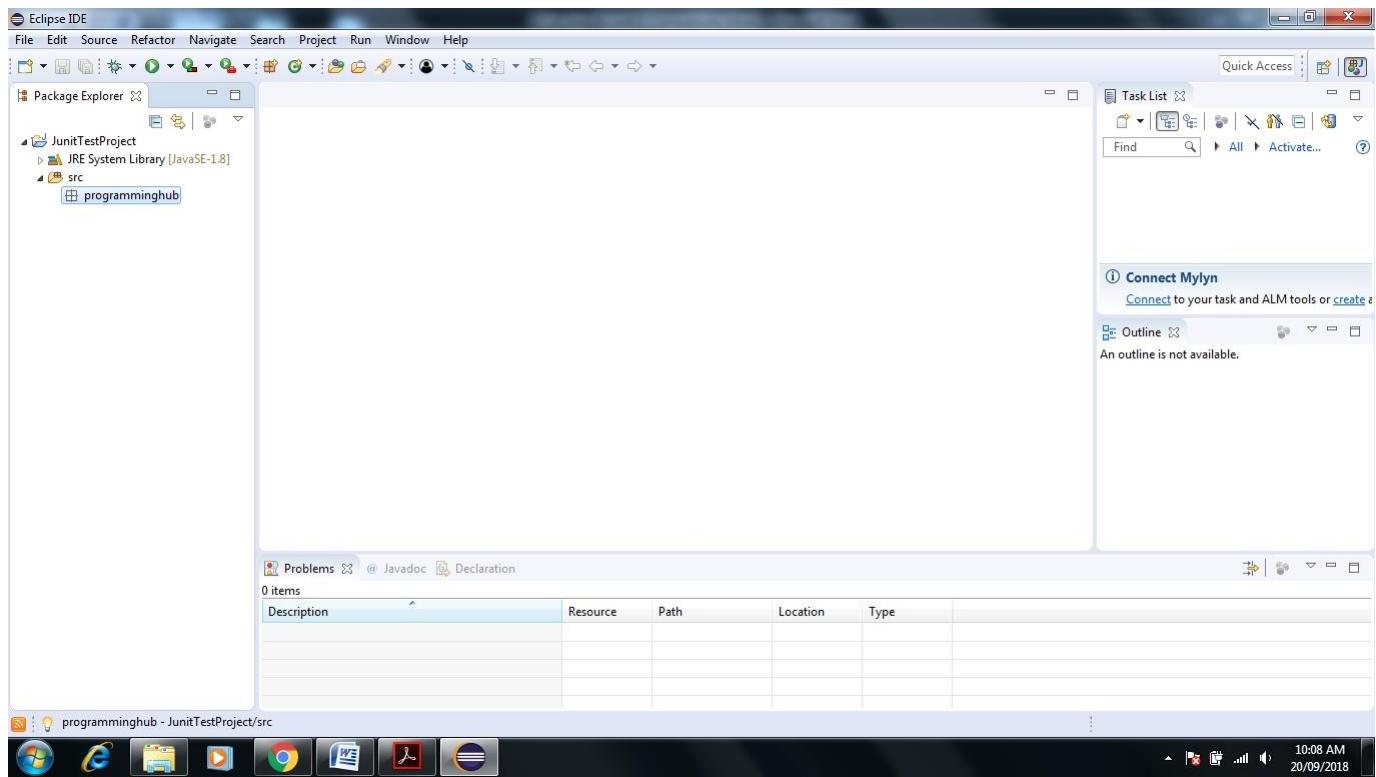
7. Right Click on Folder name JunitTestProject->New->Package



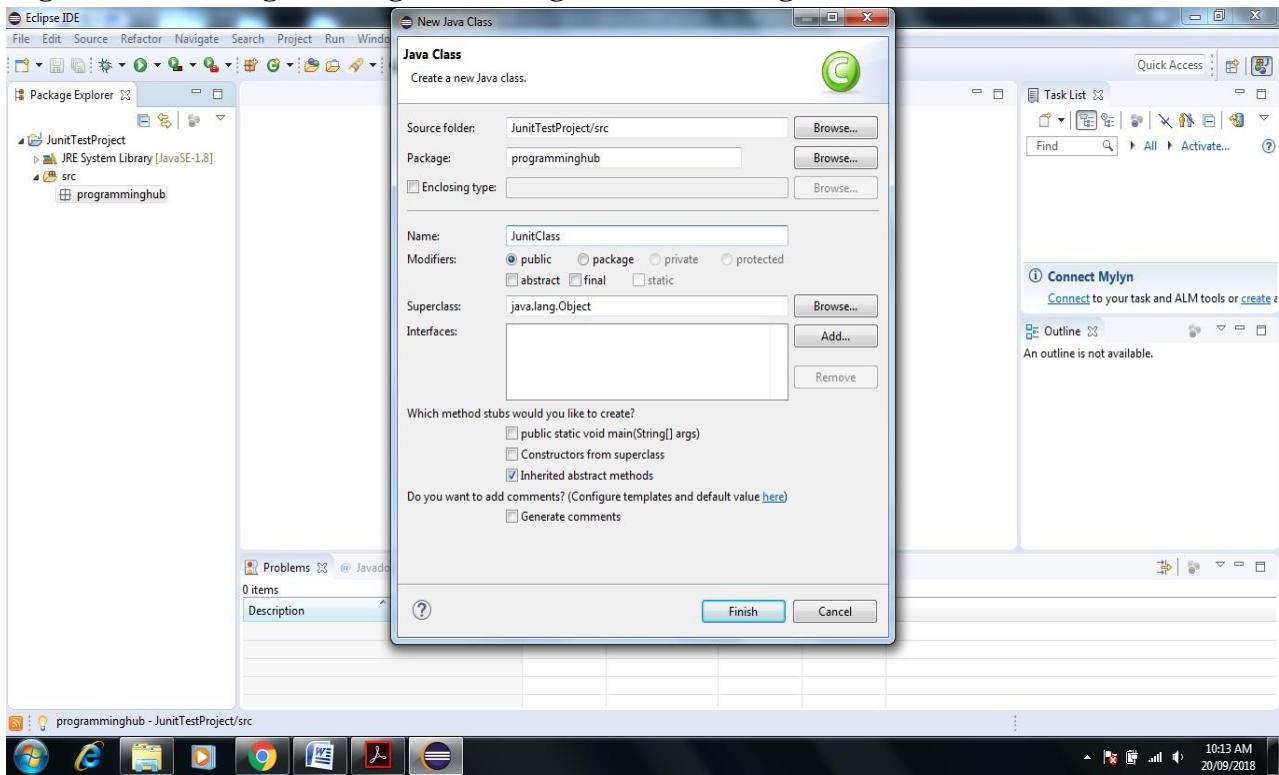
8. Name package as programming hub-> Click on Finish



9. See the Programming hub package see in project Explorer Screen of Eclipse



10. Right Click on Programminghub Package->New->Class give the name JunitClass->Click Finish.



11. Next screen will appear

JunitTestProject/src/programminghub/JunitClass.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Package Explorer

JunitTestProject

JRE System Library [JavaSE-1.8]

src

programminghub

JunitClass.java

JunitClass.java

```
1 package programminghub;
2
3 public class JunitClass {
4
5 }
6
```

Task List

Find All Activate...

Connect Mylyn

Outline

programminghub

JunitClass

Problems

Description Resource Path Location Type

Writable Smart Insert 6:1

12 Write a small program with only two functions Add and Multiplication

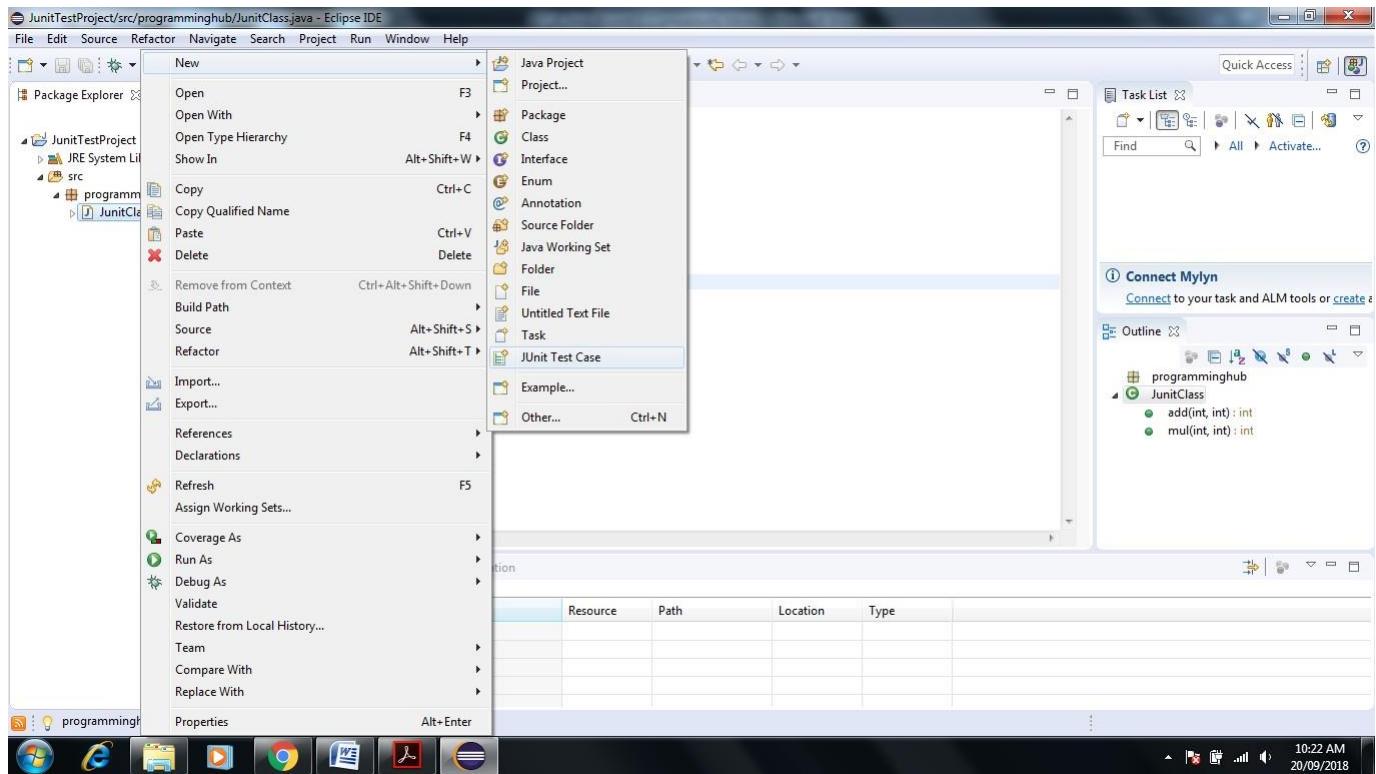
The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** JUnitTestProject/src/programminghub/JunitClass.java - Eclipse IDE
- Menu Bar:** File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help
- Toolbar:** Standard Eclipse toolbar icons.
- Package Explorer:** Shows the project structure:
 - JunitTestProject
 - JRE System Library [JavaSE-1.8]
 - src
 - programminghub
 - JunitClass.java
- Editor:** JunitClass.java code editor with the following content:

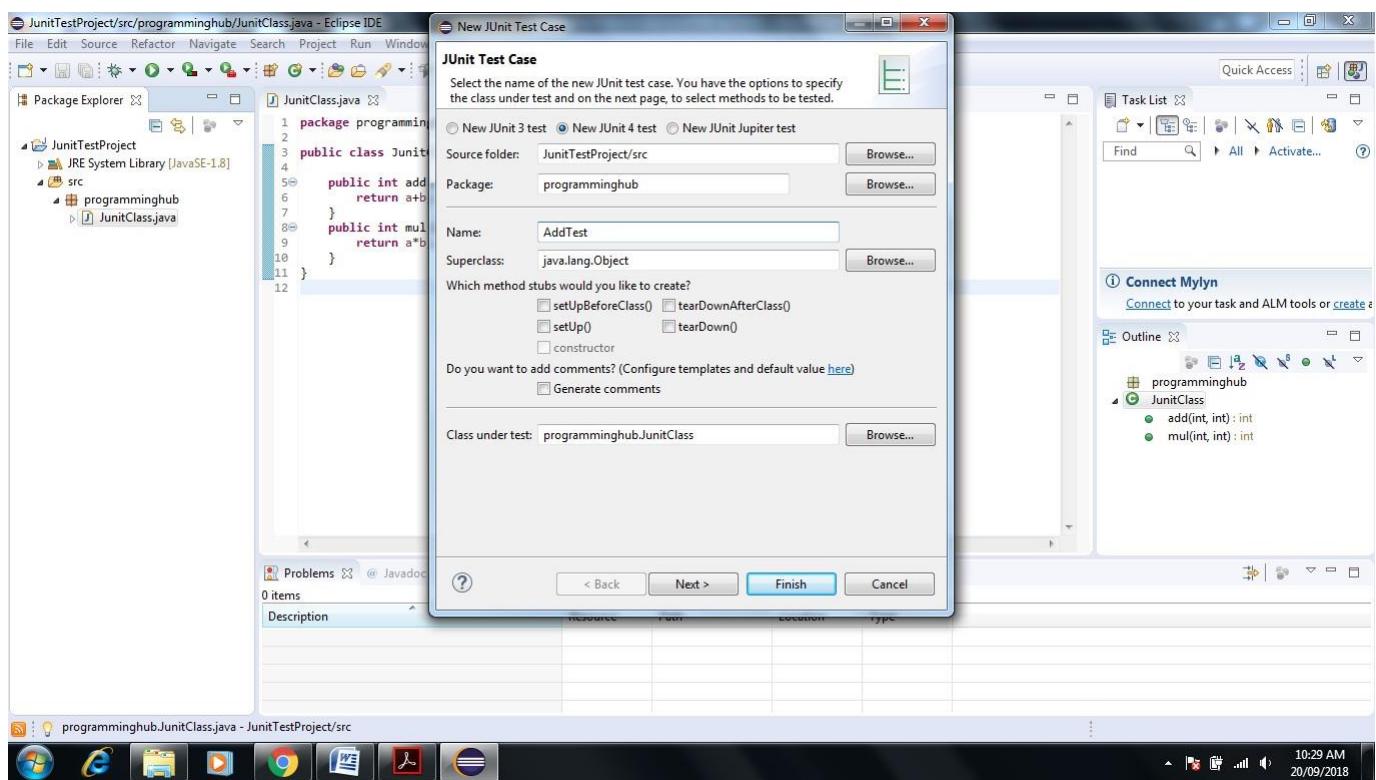
```
1 package programminghub;
2
3 public class JunitClass {
4
5     public int add(int a,int b) {
6         return a+b;
7     }
8     public int mul(int a,int b) {
9         return a*b;
10    }
11 }
```
- Task List:** Quick Access panel with Task List, Find, and other search/filter options.
- Outline:** Shows the class structure:
 - programminghub
 - JunitClass
 - add(int, int): int
 - mul(int, int): int
- Problems:** Problems view showing 0 items.
- Bottom Bar:** Writable, Smart Insert, and a timestamp (12:11). The system tray shows icons for network, battery, and date/time (10:19 AM, 20/09/2018).

13. Write Test Cases for Java Program

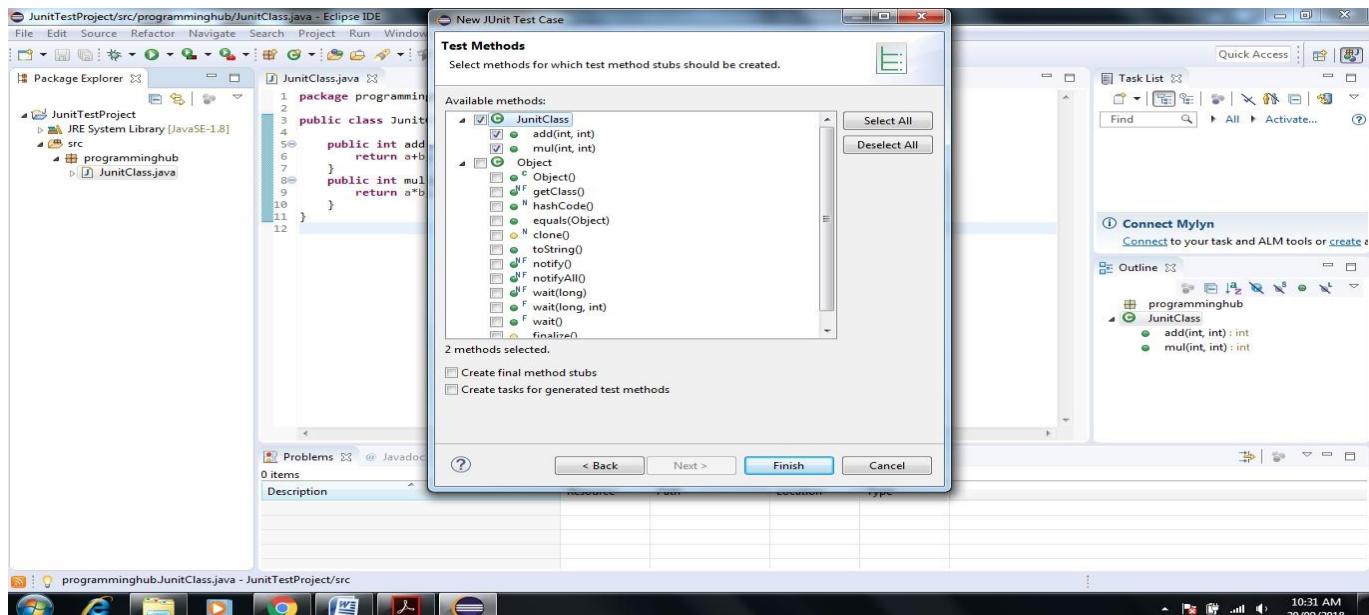
Right click on Junitclass-> New-> Click on Junit Test Cases



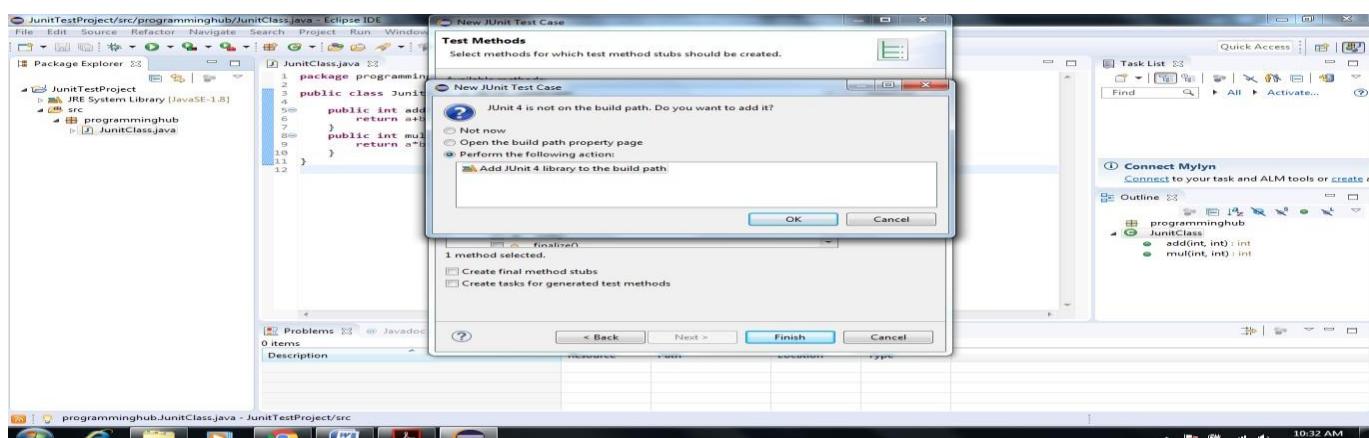
14. Name test suite as AddTest and choose New JUnit4 test



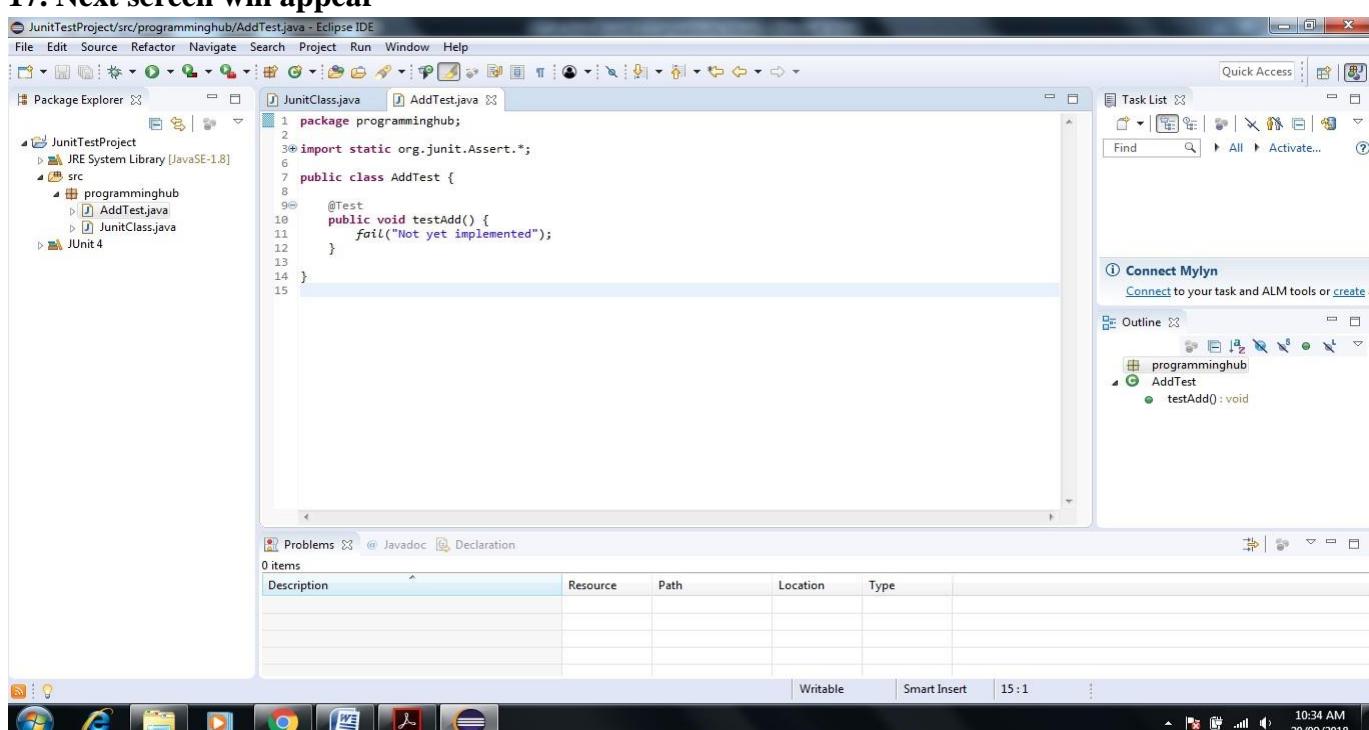
15. Click on add Checkbox



16. Click on Next-> Ok



17. Next screen will appear



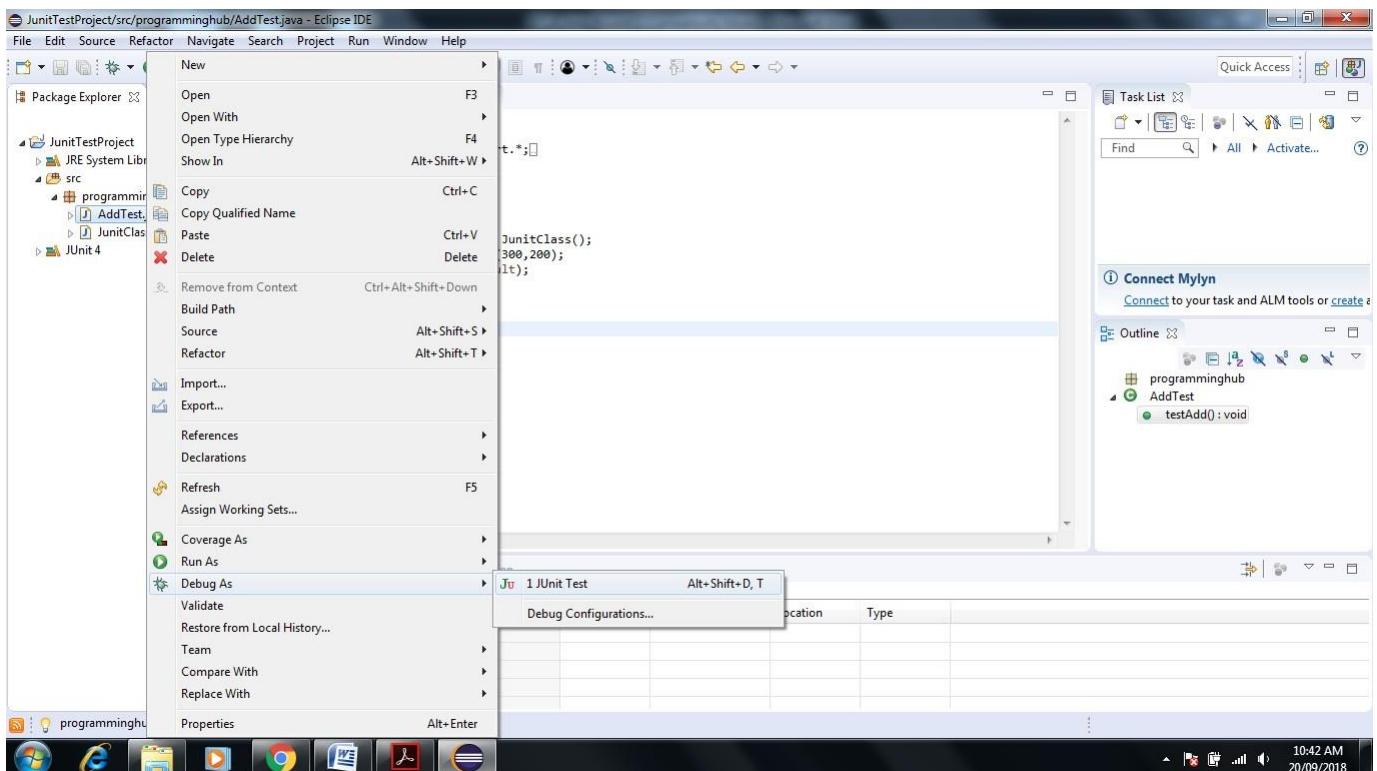
18. Write a code for Test case addition of two number inside AddTest

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** JunitTestProject/src/programminghub/AddTest.java - Eclipse IDE
- Menu Bar:** File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help
- Toolbars:** Standard toolbar with icons for New, Open, Save, Cut, Copy, Paste, Find, etc.
- Left Sidebar:** Package Explorer showing JunitTestProject, src folder containing programminghub (with AddTest.java and JunitClass.java), and JUnit 4.
- Central Editor:** AddTest.java code editor with the following content:

```
1 package programminghub;
2
3 import static org.junit.Assert.*;
4
5 public class AddTest {
6
7     @Test
8     public void testAdd() {
9         JunitClass junit=new JunitClass();
10        int result=junit.add(300,200);
11        assertEquals(500,result);
12    }
13
14 }
15
16 }
```
- Right Sidebar:** Task List, Outline, Problems, Javadoc, Declaration, and a table for the Problems view.
- Bottom Status Bar:** Shows the date and time: 10:39 AM 20/09/2018.

19. Let us run AddTest test case. Right click AddTest-> Debug As->JUnit Test



20. Result of test case is as follows. It shows 0 error and 0 failure and green color test bar which means that test case has run successfully(Green Color Bar Indicate)

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** JunitTestProject/src/programminghub/AddTest.java - Eclipse IDE
- Toolbar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Package Explorer:** Shows a single package: programminghub.
- JUnit View:** Displays "Finished after 0.631 seconds" with "Runs: 1/1", "Errors: 0", and "Failures: 0".
- Code Editor:** Shows the AddTest.java code with a green status bar indicating success.
- Outline View:** Shows the class AddTest and its method testAdd().
- Problems View:** Shows 0 items.
- Task List:** Shows a search bar and a list of tasks.
- Failure Trace:** Shows no failures.
- Bottom Bar:** Shows the Windows taskbar with various icons and the system clock at 10:44 AM on 20/09/2018.

21. Let us purposely give wrong input in assertEquals method or unexpected result here we write 501 instead of 500 indicate wrong addition result

The screenshot shows the Eclipse IDE interface with the following details:

- Title Bar:** JunitTestProject/src/programminghub/AddTest.java - Eclipse IDE
- Toolbar:** File Edit Source Refactor Navigate Search Project Run Window Help
- Package Explorer:** Shows a single package: programminghub.
- JUnit View:** Displays "Finished after 0.631 seconds" with "Runs: 1/1", "Errors: 0", and "Failures: 0".
- Code Editor:** Shows the AddTest.java code with a brown status bar indicating failure.
- Outline View:** Shows the class AddTest and its method testAdd().
- Problems View:** Shows 0 items.
- Task List:** Shows a search bar and a list of tasks.
- Failure Trace:** Shows no failures.
- Bottom Bar:** Shows the Windows taskbar with various icons and the system clock at 10:46 AM on 20/09/2018.

22. Now test case should fail.(Brown Color Bar Indicate) So again run AddTest as follows

JunitTestProject/src/programminghub/AddTest.java - Eclipse IDE

```

1 package programminghub;
2
3 import static org.junit.Assert.*;
4
5 public class AddTest {
6
7     @Test
8     public void testAdd() {
9         JunitClass junit=new JunitClass();
10        int result=junit.add(300,200);
11        assertEquals(501,result);
12    }
13
14 }
15
16
17 }
```

Failure Trace

- java.lang.AssertionError: expected:<501> but was:<500>
- at programminghub.AddTest.testAdd(AddTest.java:13)

Problems

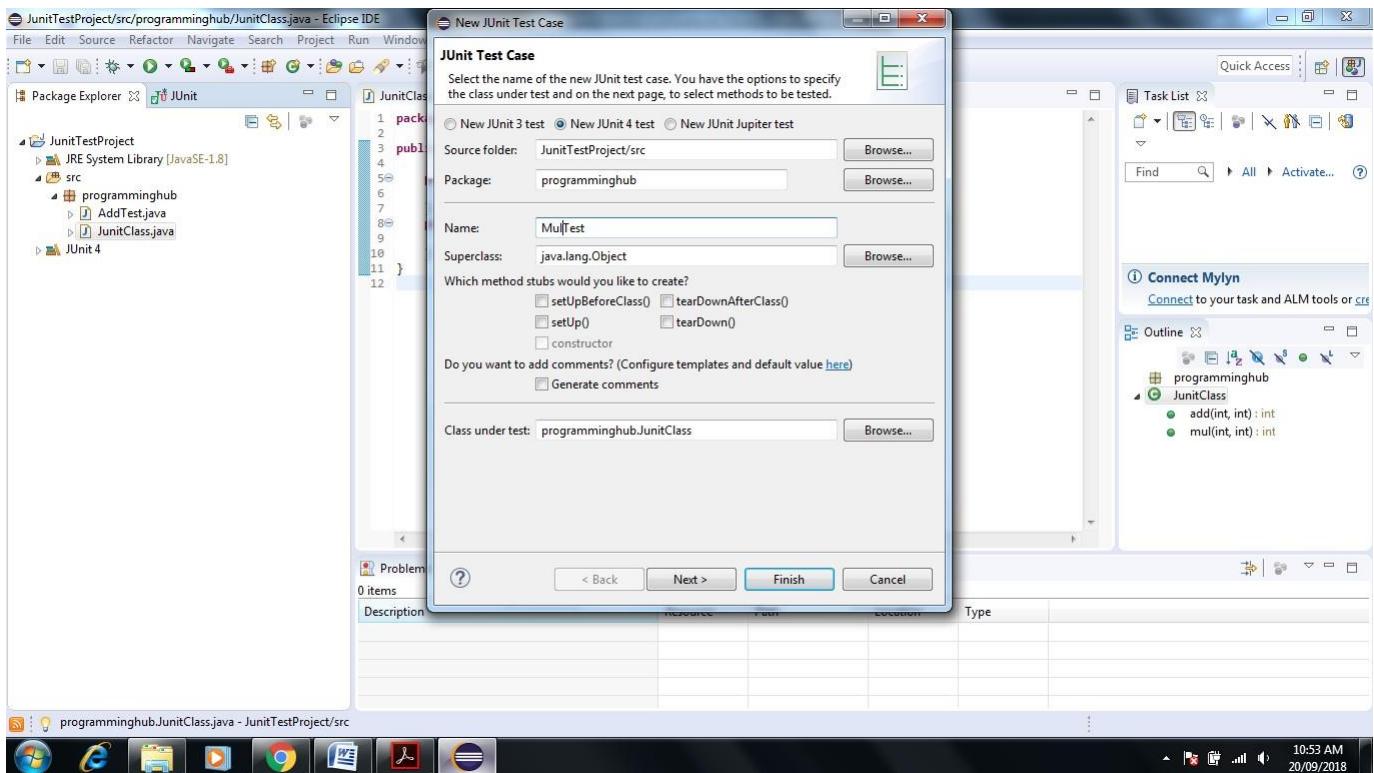
Description	Resource	Path	Location	Type

Outline

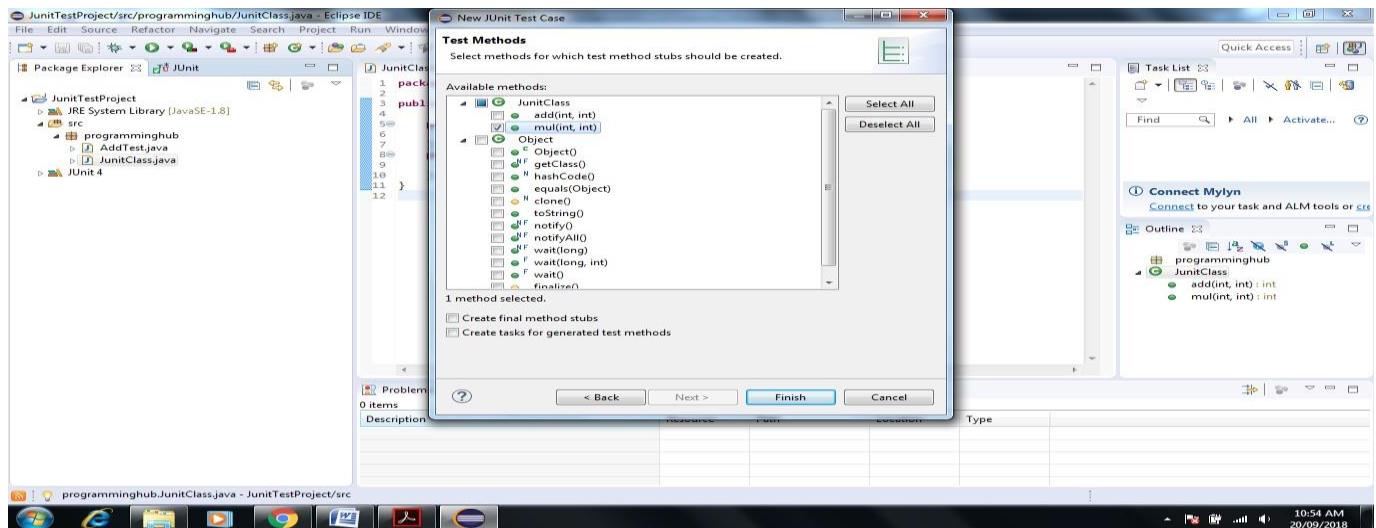
- programminghub
 - AddTest
 - testAdd(): void

23. Similarly you can Create Test case for Multiplication Function

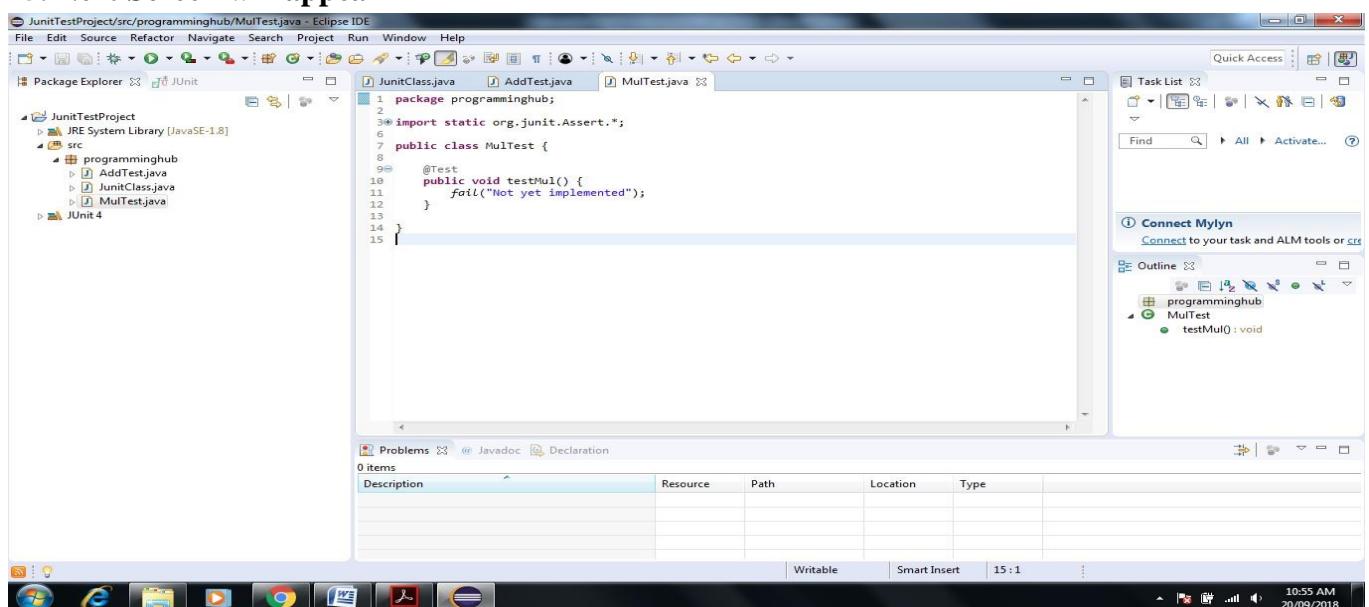
Click on Project Explorer Screen-> Right Click on JunitClass->New->JUnit Test Case-> Give name MulTest.



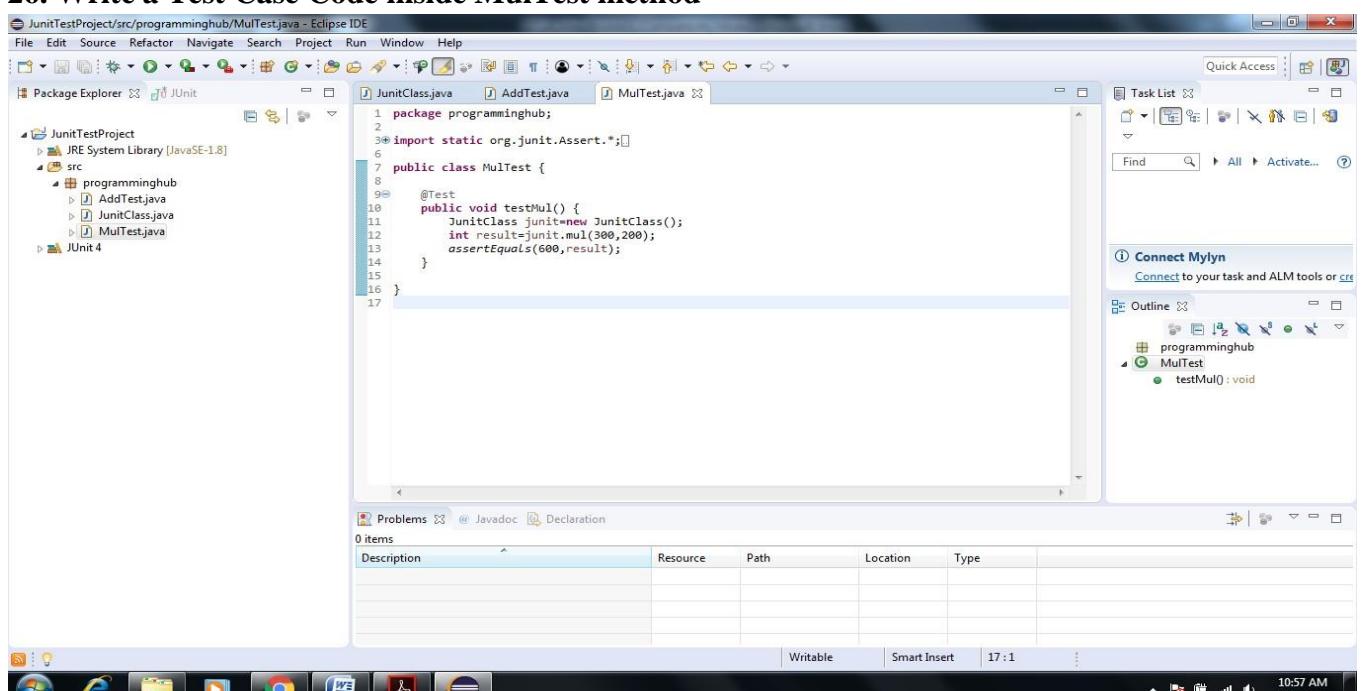
24. Click on Next ->Select Mul Check Box -> Click Finish



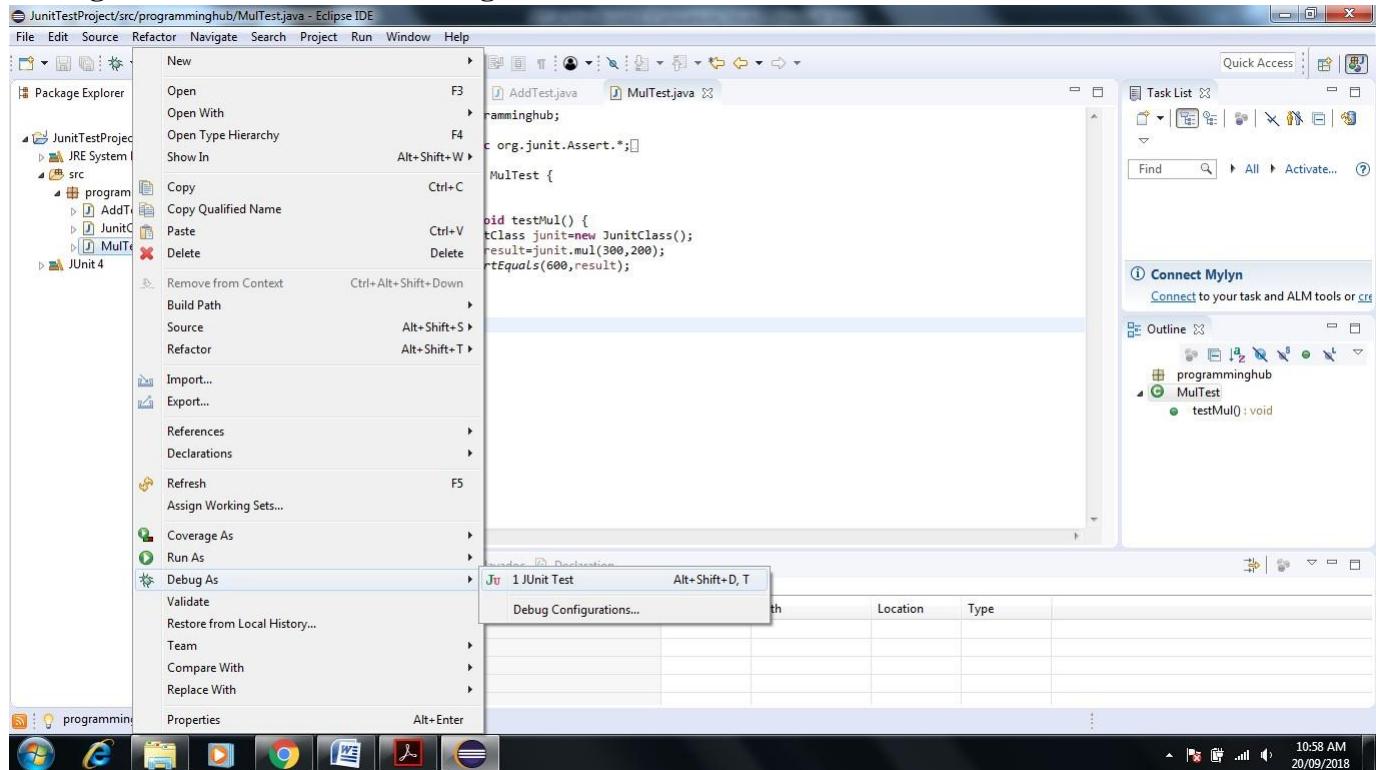
25. Next Screen will appear



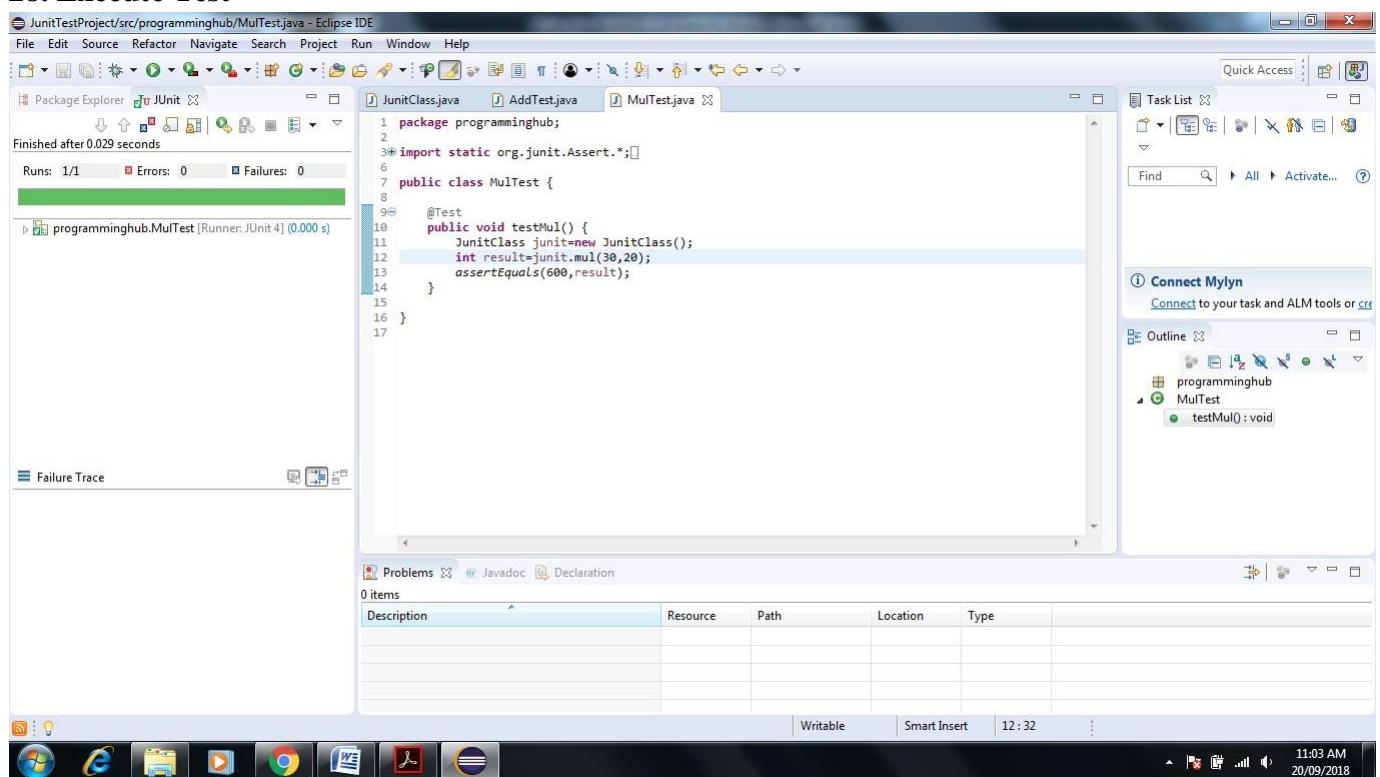
26. Write a Test Case Code inside MulTest method



27. Right Click on MulTest->Debug->JUnit Test

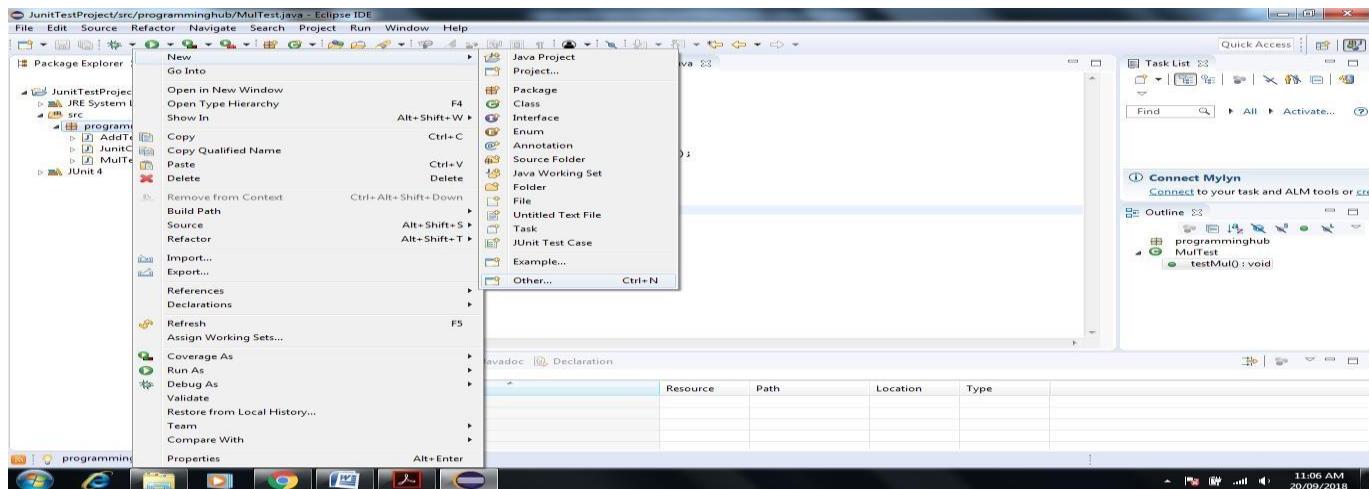


28. Execute Test

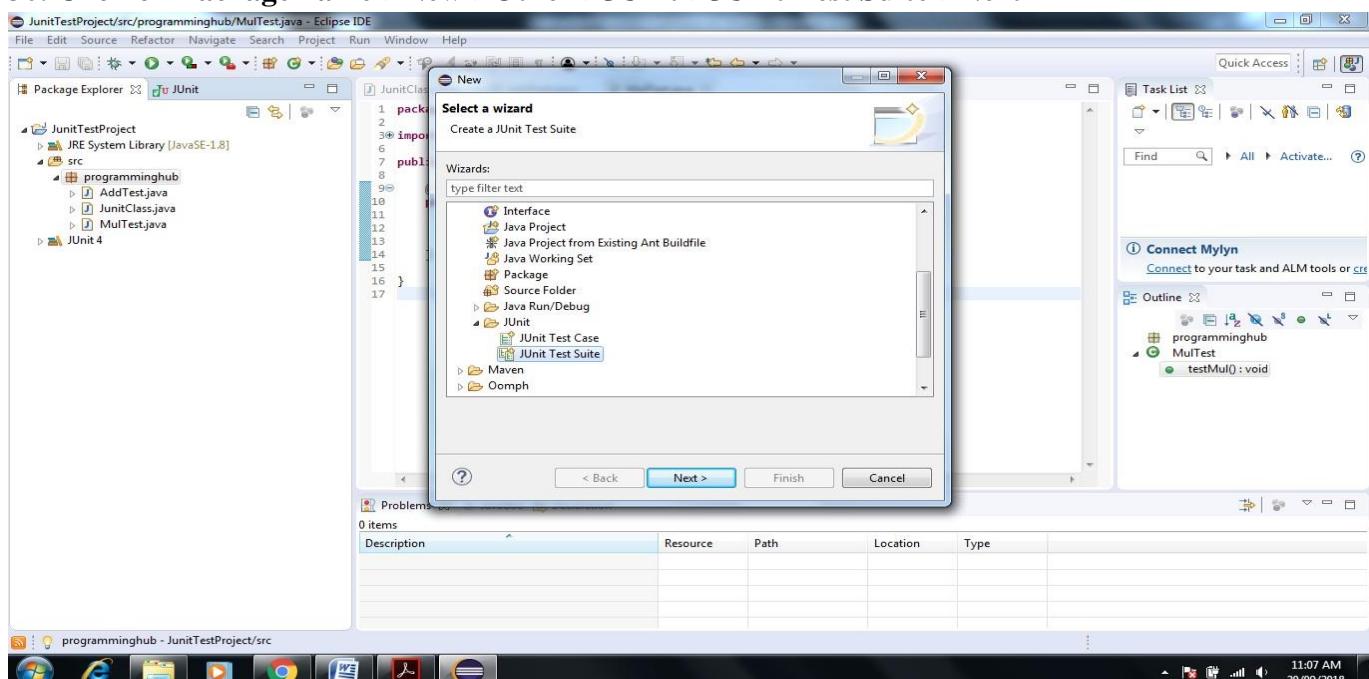


Test Suite – it is used to test multiple test cases at one time.

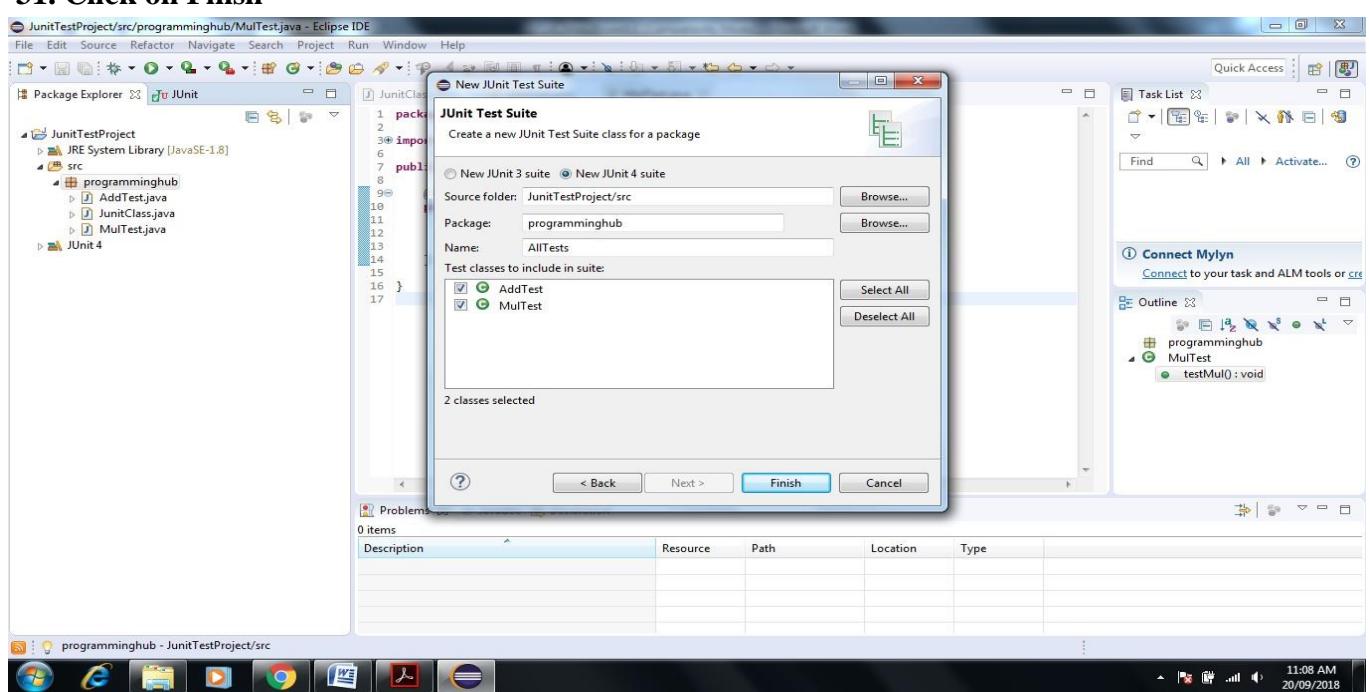
29. Now let us create Test Suite both add and mul test cases in one time



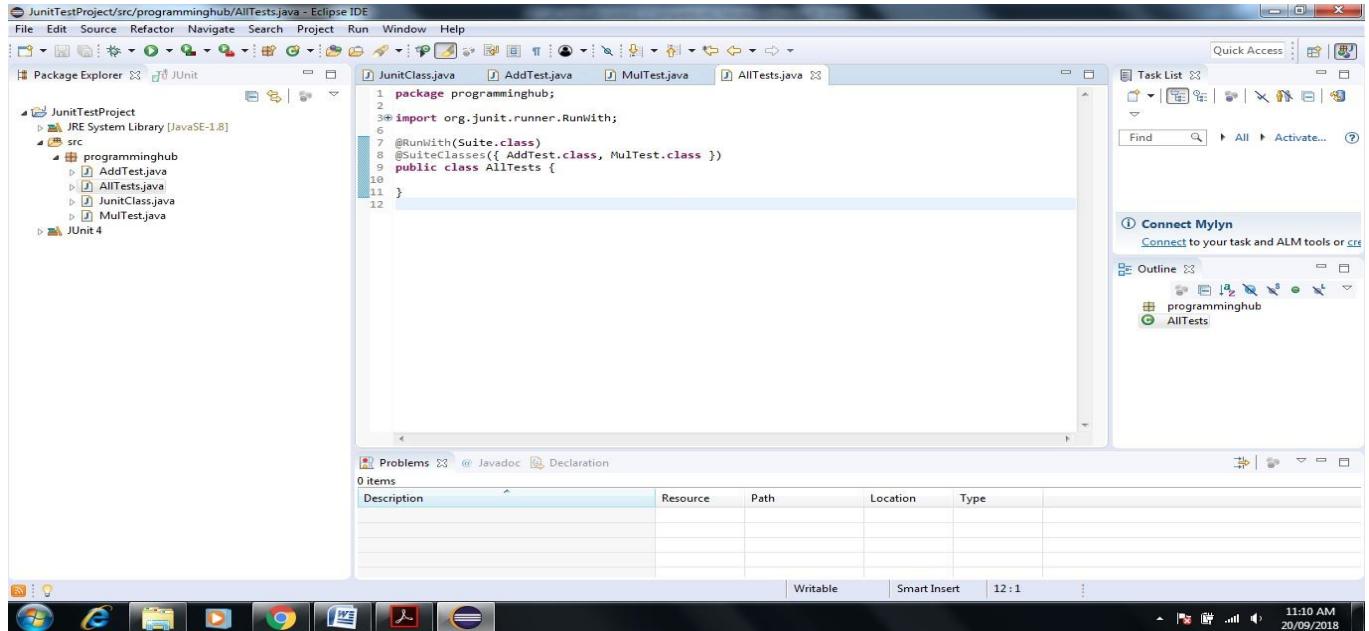
30. Click on Package name->New->Other->JUnit->JUnit Test Suite->Next



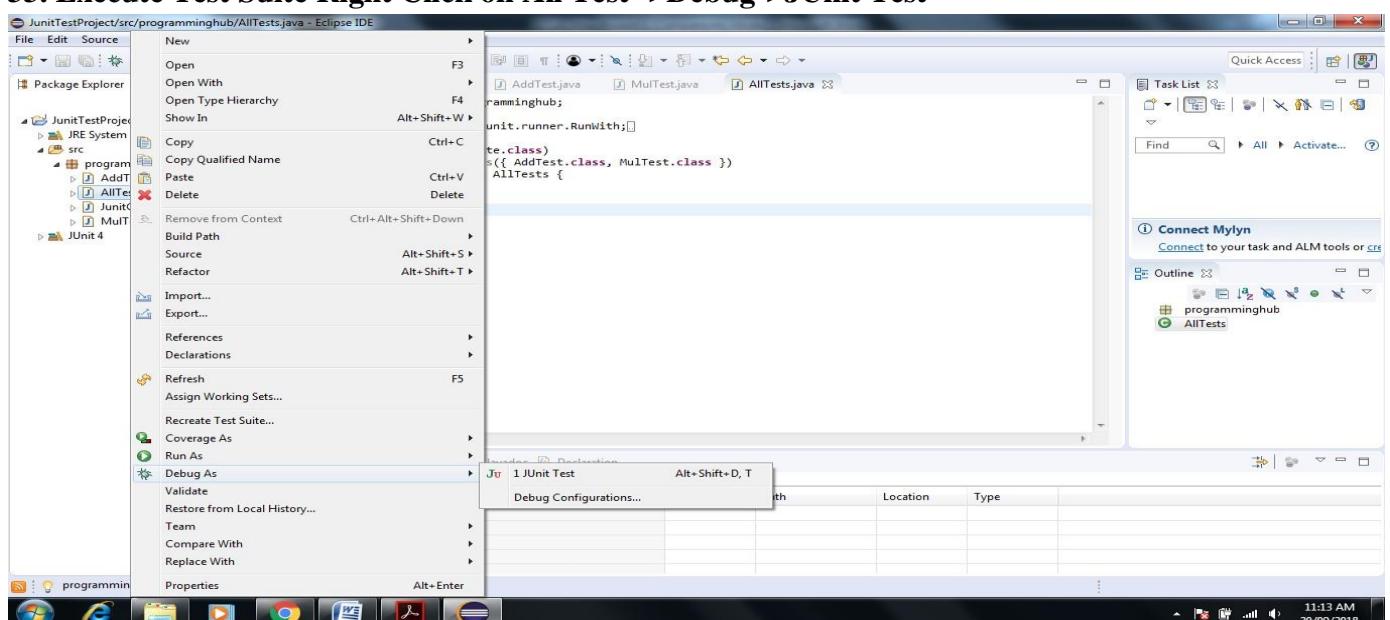
31. Click on Finsh



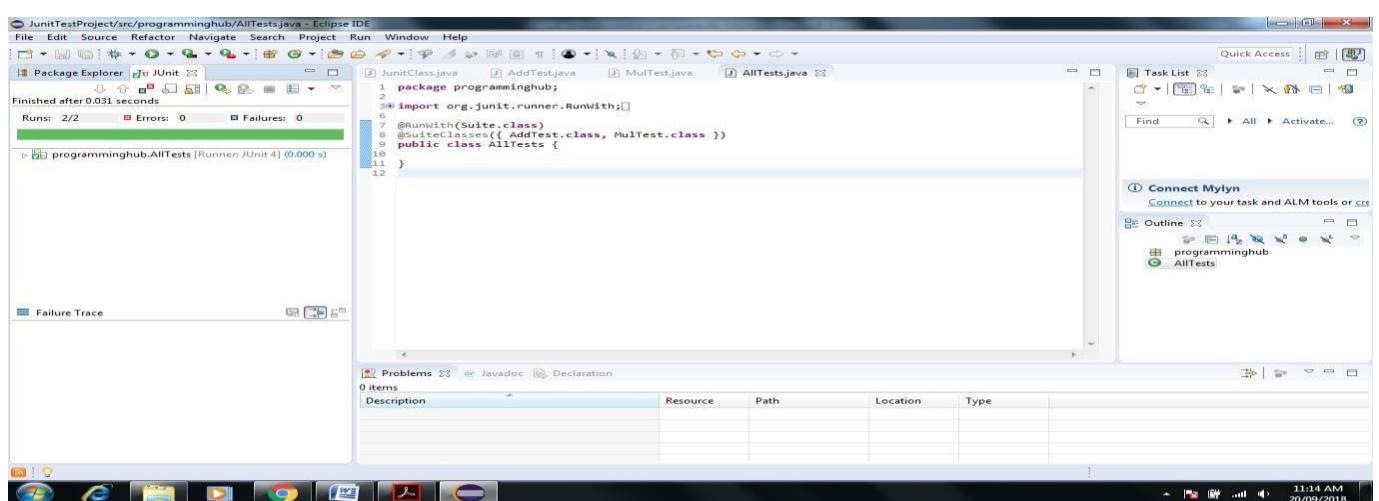
32. Next Screen Appear that automatically create Test Suite for Add and Mul



33. Execute Test Suite Right Click on All Test ->Debug->JUnit Test



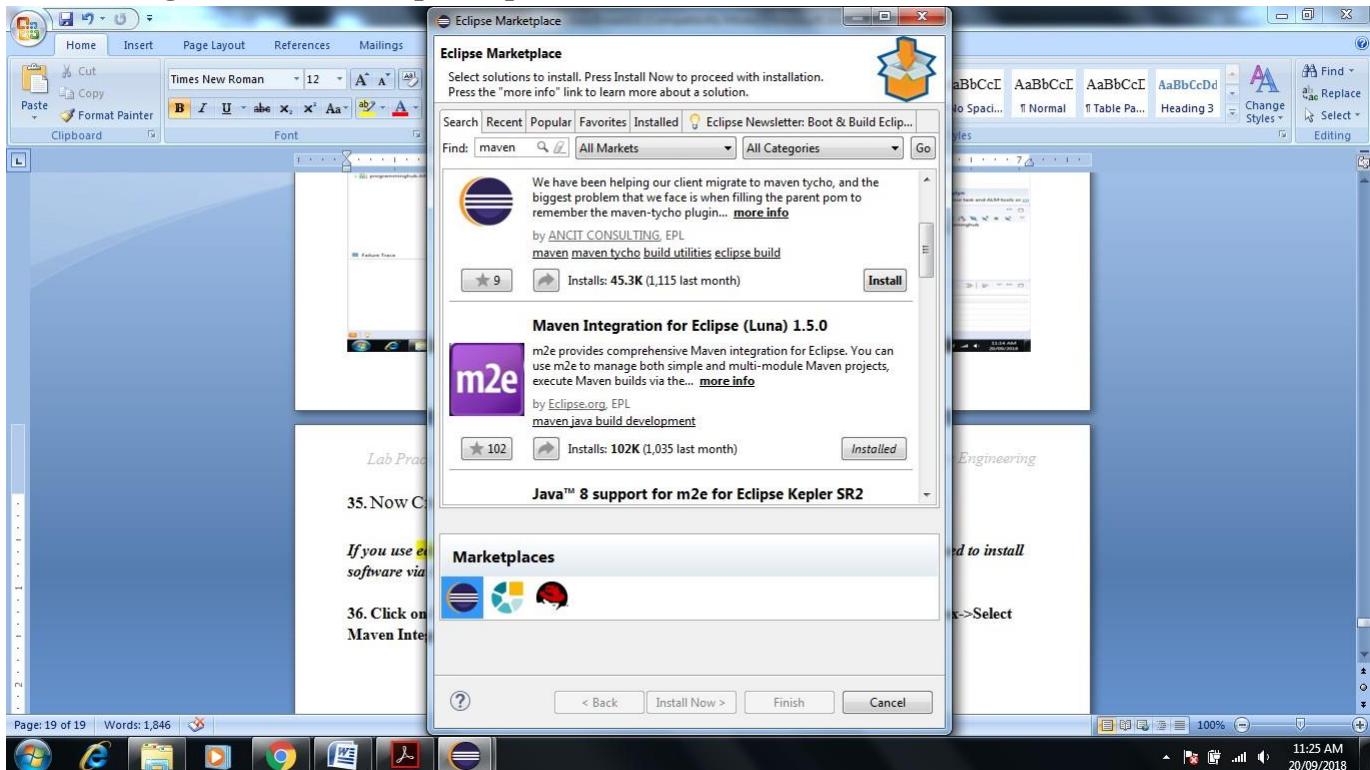
34. Test Suite Executed successfully Test suite fails even if a single test case among all fails.



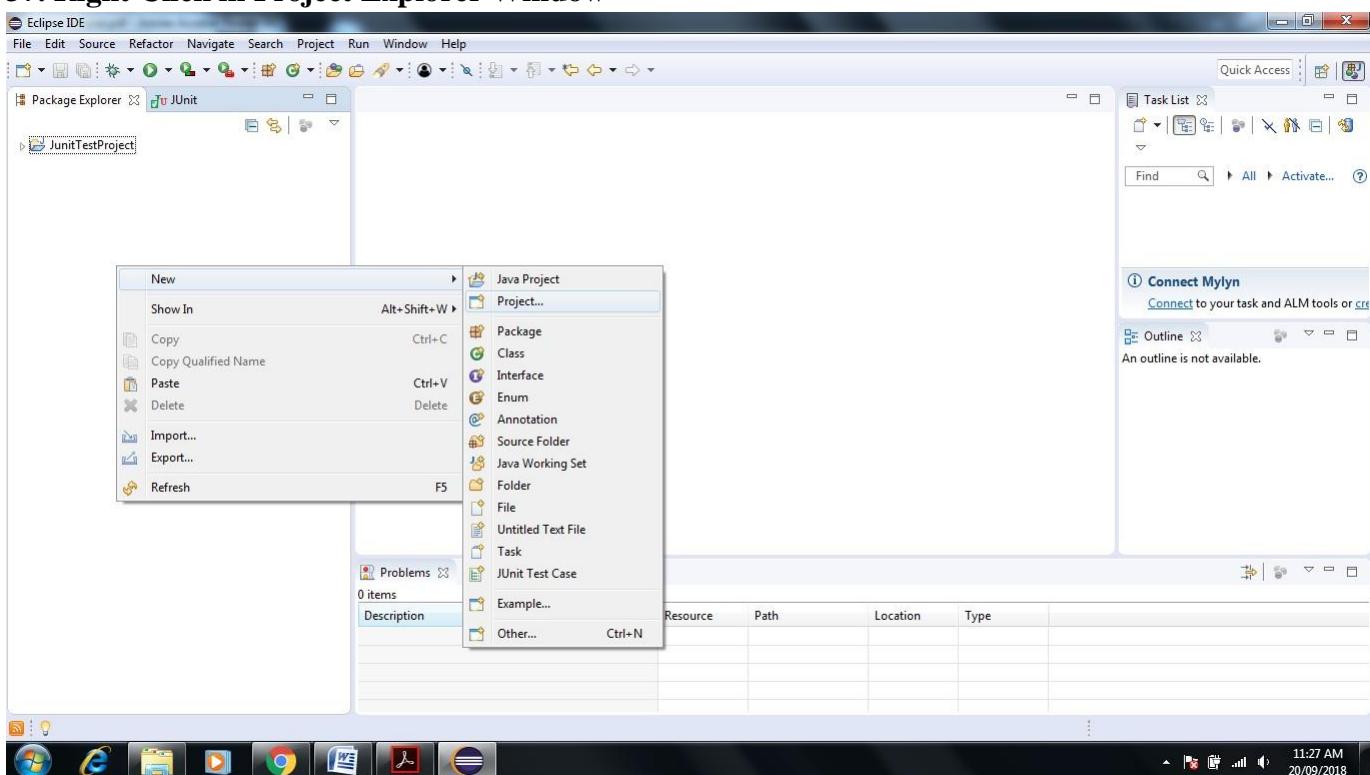
35. Now Create Test Report Using Apache Maven

If you use **eclipse-java-photon-R-win32** Version it include Maven in built installed so no need to install software via Eclipse help Install Software Option

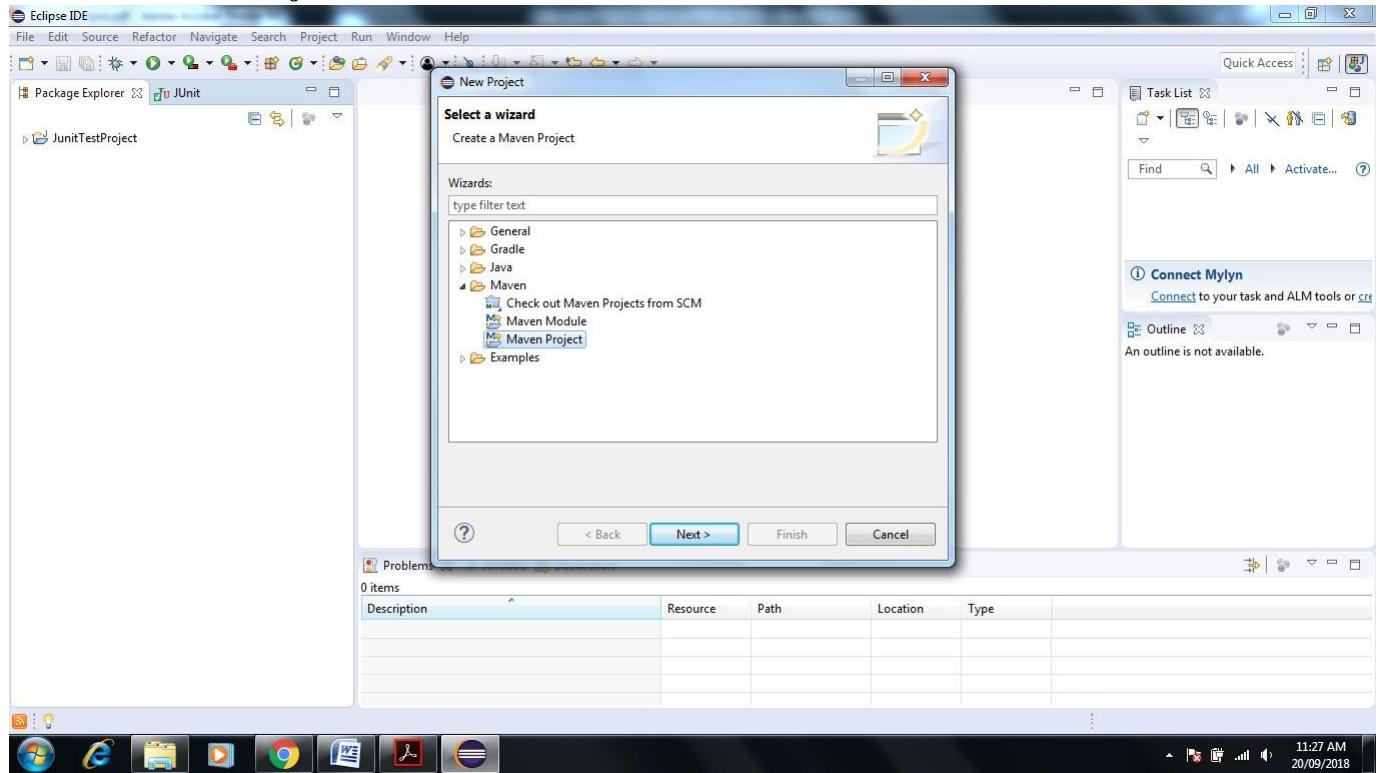
36. Click on Help in Eclipse->Eclipse Marketplace->Enter Maven Keyword in Search box->Select Maven Integration version as per requirement->Click on Install



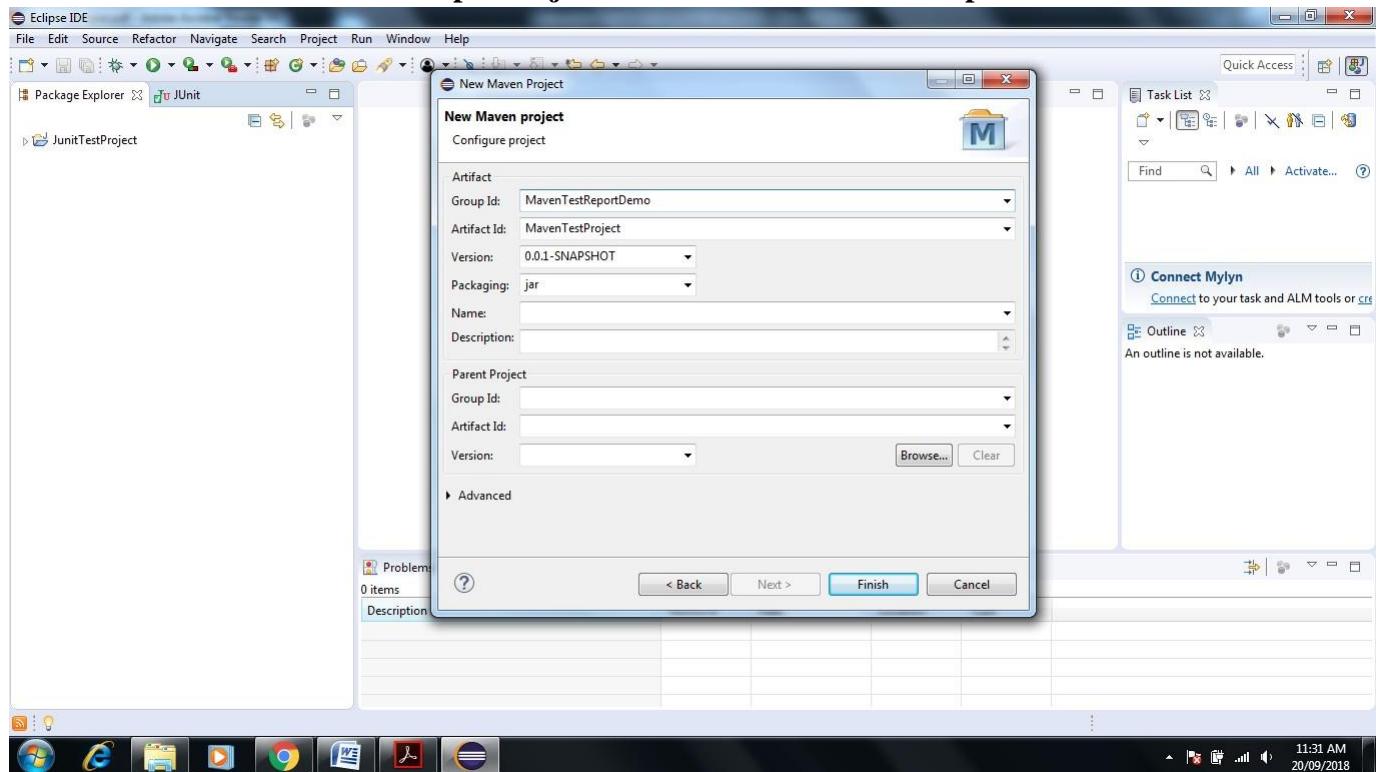
37. Right Click in Project Explorer Window



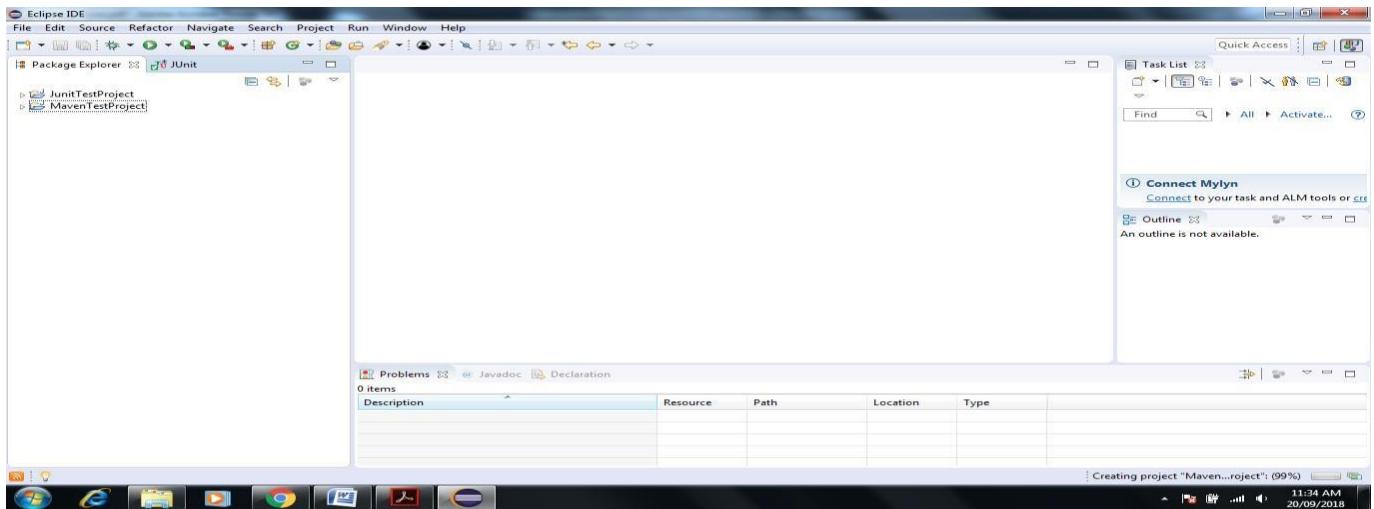
38. Go to Maven Project-> Click Next



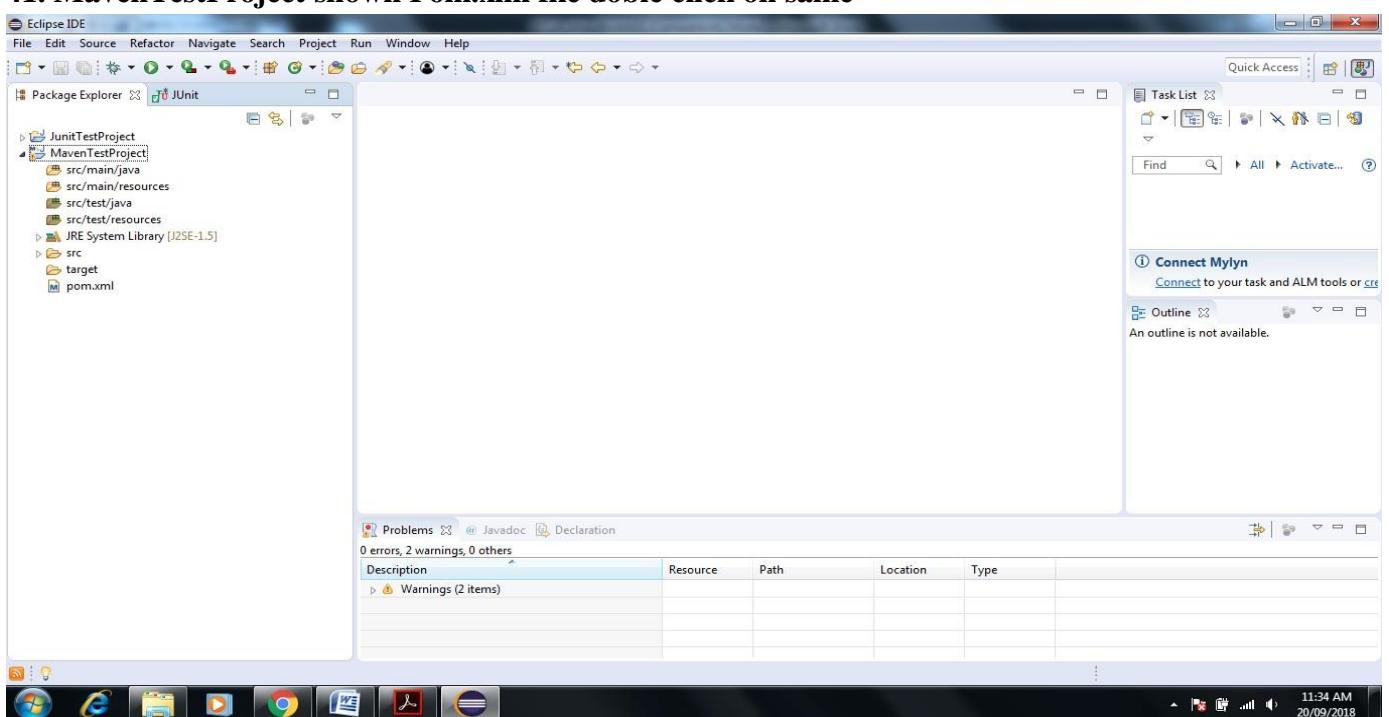
39. Select Check Box Create Simple Project-> Click Next-> Give Group Id and Artifact name



40. Click on Finish-> Next Screen Appear

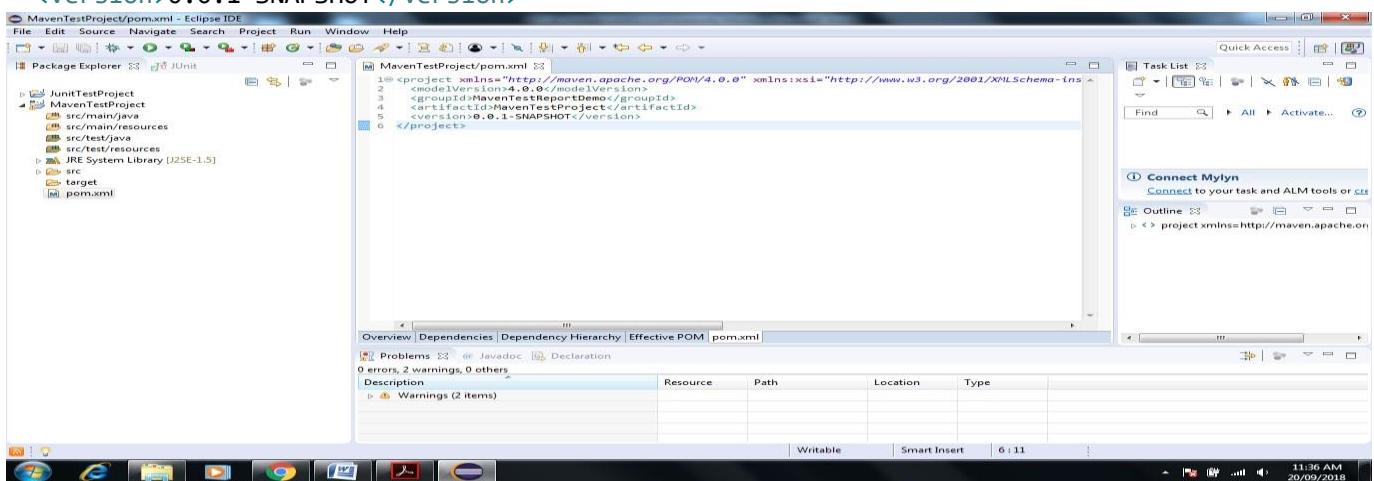


41. MavenTestProject shown Pom.xml file doble click on same

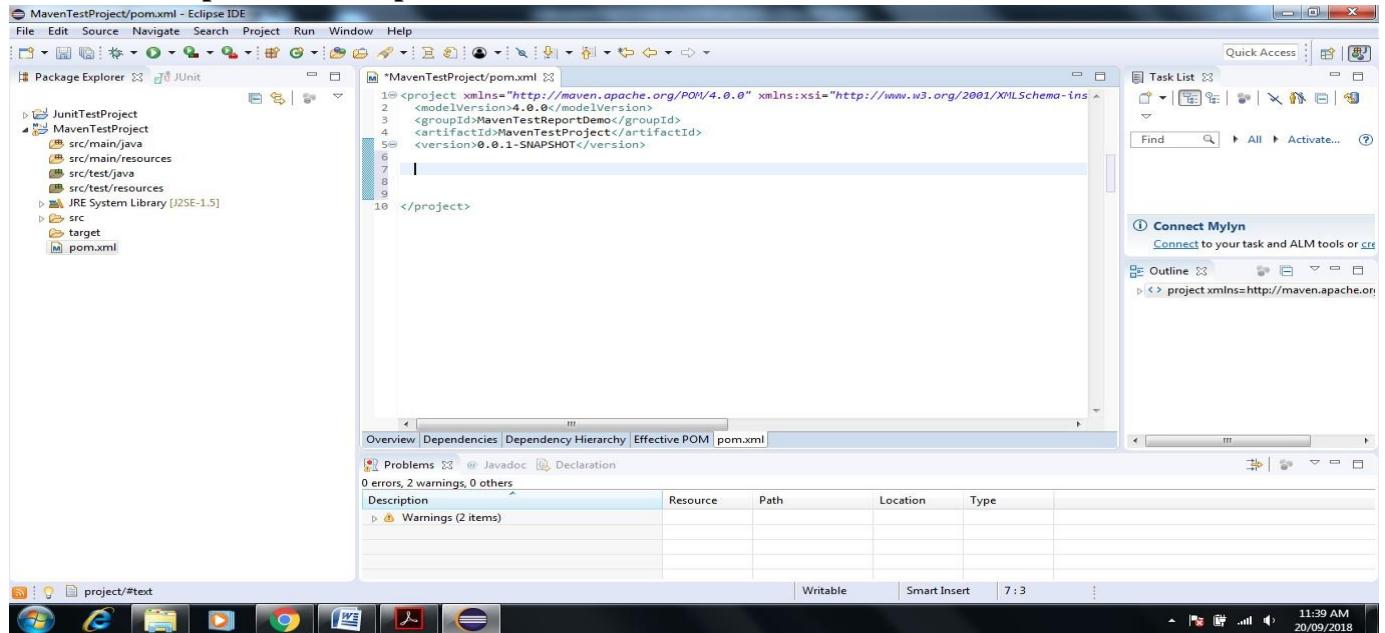


42. it shown some description like

```
<modelVersion>4.0.0</modelVersion>
<groupId> MavenTestReportDemo </groupId>
<artifactId> MavenTestProject </artifactId>
<version>0.0.1-SNAPSHOT</version>
```



43. We add dependencies to pom.xml of Junit and Selenium



44. To add dependency → Go to Google.com->Enter Maven repository-> in Search box on Site Enter Junit

The screenshot shows a Google search results page for "Maven repository". The search bar contains "Maven repository". Below the search bar, there are filters for All, News, Books, Images, Videos, More, Settings, and Tools. The main content area displays search results for Maven repositories, including links to mvnrepository.com, Central, and TutorialsPoint. On the right side, there is a sidebar for "Apache Maven" with a logo, a brief description, and links to "People also search for" Spring Framework, Eclipse, Gradle, Apache Tomcat, and Jenkins.

45. after Enter keyword Junit inside Seach box then Enter->it shown another Site Maven Repository for Junit Select that site.

Google Maven repository - Google

Maven repository

All News Books Images Videos More Settings Tools

About 1,08,00,000 results (0.54 seconds)

Maven Repository: Search/Browse/Explore
mvnrepository.com

Popular Categories: Aspect Oriented · Actor Frameworks · Application Metrics · Build Tools · Bytecode Libraries · Command Line Parsers · Cache ...

Junit

Maven Repository: spring
Spring TestContext Framework. Last Release on Sep 7, 2018 ...

Central
URL: http://central.maven.org/maven2/. Jars, 3,116,199 ...

Categories
JavaServlet(TM) Specification, CDDLGPL, 10,126 · Java ...

Maven Repositories - TutorialsPoint
https://www.tutorialspoint.com/maven/maven_repositories.htm · Maven Repositories - Learn Maven in simple and easy steps starting from basic to advanced concepts with examples including Overview, Environment Setup, ...

Aspect Oriented
The byteman jar merges the byteman-agent jar contents with ...

Aws-java-sdk-sqs
The AWS Java SDK for Amazon SQS module holds the client ...

Build Tools
A minimal build system interpreting Maven-style pom.xml files. Last ...

Apache Maven Software

Maven is a build automation tool used primarily for Java projects. Maven addresses two aspects of building software: first, it describes how software is built, and second, it describes its dependencies. Wikipedia

Developed by: Apache Software Foundation
Written in: Java

People also search for

View 15+ more

SPR Eclipse Gradle Apache Tomcat Jenkins

Feedback

Junit site:mvnrepository.com

All Books Images Videos News More Settings Tools

About 1,94,000 results (0.34 seconds)

Maven Repository: junit » junit
https://mvnrepository.com/artifact/junit/junit · JUnit JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck. ... Mastering Unit Testing Using Mockito and JUnit (2014) by Sujoy ...

Maven Repository: junit
https://mvnrepository.com/artifact/junit · junit » junit-depCPALCPL. JUnit is a regression testing framework written by Erich Gamma and Kent Beck. It is used by the developer who implements unit tests ...

Maven Repository: junit » junit » 4.12
https://mvnrepository.com/artifact/junit/junit/4.12 · JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck. ... Mastering Unit Testing Using Mockito and JUnit (2014) by Sujay Acharya.

Repositories: CentralAsposeRedhat GASONatype Used By: 75,164 artifacts
License: EPL 1.0 Date: (Dec 04, 2014)

Maven Repository: junit » junit » 4.11
https://mvnrepository.com/artifact/junit/junit/4.11 · JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck. ... Mastering Unit Testing Using Mockito and JUnit (2014) by Sujay Acharya.

Repositories: CentralAdobeAsposeGeomajas... License: CPAL 1.0CPL 1.0
Categories: Testing Frameworks Used By: 75,281 artifacts

https://mvnrepository.com/artifact/junit

46. Click on Maven Repository-JUnit it open another site-(<https://mvnrepository.com/artifact/junit>)

Maven Repository:junit X https://mvnrepository.com/artifact/junit

MVNREPOSITORY

Indexed Artifacts (12.3M)

Search for groups, artifacts, categories Search Categories | Popular | Contact Us

Home » junit

Group: JUnit

Sort: popular | newest

1. JUnit
junit » junit

78,839 usages EPL

JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck.

Last Release on Dec 4, 2014

2. JUnit
junit » junit-dep

1,437 usages CPL | CPAL

JUnit is a regression testing framework written by Erich Gamma and Kent Beck. It is used by the developer who implements unit tests in Java.

Last Release on Nov 14, 2012

Related Books

	How to use JUnit (2016) by Van Nguyen
	JUnit with examples (2016) by Mr Sagar Salunke

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▶ FREE MIGRATIONS
▶ INSTANT SETUP
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https://mvnrepository.com/artifact/junit/junit

47. Click on JUnit-> Open and click on latest version as shown below (here 4.12x)

Maven Repository:junit X https://mvnrepository.com/artifact/junit/junit

MVNREPOSITORY

Indexed Artifacts (12.3M)

Search for groups, artifacts, categories Search Categories | Popular | Contact Us

Home » junit » junit

JUnit

JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck.

License	EPL 1.0
Categories	Testing Frameworks
Tags	testing junit
Used By	78,839 artifacts

Note: This artifact was moved to:
org.junit.jupiter » junit-jupiter-api

Central (24)	Redhat GA (3)	Redhat Early-Access (2)	JBoss 3rd-party (1)	Alfresco (1)
Version	Repository	Usages	Date	
4.12	Central	34,788	Dec, 2014	
4.12-beta-3	Central	30	Nov, 2014	
4.12-beta-2	Central	31	Sep, 2014	
4.12-beta-1	Central	31	Jul, 2014	
4.11	Central	22,754	Nov, 2012	
	Central	22	Oct, 2012	

https://mvnrepository.com/artifact/junit/junit/4.12

48. Copy above dependency to paste in pom.xml in Maven in Eclipse

Indexed Artifacts (12.3M)

JUnit > 4.12
JUnit is a unit testing framework for Java, created by Erich Gamma and Kent Beck.

License	EPL 1.0
Categories	Testing Frameworks
Organization	JUnit
HomePage	http://junit.org
Date	(Dec 04, 2014)
Files	pom (23 KB) jar (307 KB) View All
Repositories	Central Aspose Redhat GA Sonatype
Used By	78,839 artifacts

Maven Gradle SBT Ivy Grape Leiningen Buildr

```
<!-- https://mvnrepository.com/artifact/junit/junit -->
<dependency>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.12</version>
    <scope>test</scope>
</dependency>
```

Include comment with link to declaration

Copied to clipboard!

49. Add `<dependencies>` tag before pasting as shown below

```

<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId> MavenTestReportDemo </groupId>
  <artifactId> MavenTestProject </artifactId>
  <version>0.0.1-SNAPSHOT </version>
  <dependencies>
  </dependencies>
</project>

```

50. Now Paste the above code in between `<dependencies>` tag then save pom.xml file

```

<!-- https://mvnrepository.com/artifact/junit/junit -->
<dependency>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.12</version>
    <scope>test</scope>
</dependency>

```

```

<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>MavenTestReportDemo</groupId>
  <artifactId>MavenTestProject</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <dependencies>
    <!-- https://mvnrepository.com/artifact/junit/junit -->
    <dependency>
      <groupId>junit</groupId>
      <artifactId>junit</artifactId>
      <version>4.12</version>
      <scope>test</scope>
    </dependency>
  </dependencies>
</project>

```

51. Now it gets reflected in Maven by adding Junit jars

```

<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>MavenTestReportDemo</groupId>
  <artifactId>MavenTestProject</artifactId>
  <version>0.0.1-SNAPSHOT</version>
  <dependencies>
    <!-- https://mvnrepository.com/artifact/junit/junit -->
    <dependency>
      <groupId>junit</groupId>
      <artifactId>junit</artifactId>
      <version>4.12</version>
      <scope>test</scope>
    </dependency>
  </dependencies>
</project>

```

52. Same process can be repeated for Selenium server

Go to Google-> Enter Maven Repository->Enter Selenium Server in Search box->Enter

Google Maven repository

About 1,08,00,000 results (0.54 seconds)

Maven Repository: Search/Browse/Explore

mvnrepository.com/ Popular Categories · Aspect Oriented · Actor Frameworks · Application Metrics · Build Tools · Bytecode Libraries · Command Line Parsers · Cache ...

selenium

Maven Repository: spring Spring TestContext Framework. Last Release on Sep 7, 2018 ...

Central URL: http://central.maven.org/maven2/ Jars, 3,116,199 ...

Categories JavaServer(TM) Specification, CDDLGPLGPL, 10,126 - Java ...

Maven Repositories - TutorialsPoint https://www.tutorialspoint.com/maven/maven_repositories.htm ▾ Maven Repositories - Learn Maven in simple and easy steps starting from basic to advanced concepts with examples including Overview, Environment Setup, ...

Apache Maven Software maven

Maven is a build automation tool used primarily for Java projects. Maven addresses two aspects of building software: first, it describes how software is built, and second, it describes its dependencies. Wikipedia

Developed by: Apache Software Foundation Written in: Java

People also search for spr eclips gradle apache tomcat jenkins

View 15+ more

Feedback

53. Click on First Link of Website-> Click on latest version

Google selenium server site:mvnrepository.com

About 47,700 results (0.42 seconds)

Maven Repository: org.seleniumhq.selenium » selenium-server https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server ▾ Selenium automates browsers. That's it! What you do with that power is entirely up to you. License, Apache 2.0. Categories, Web Testing.

Maven Repository: org.seleniumhq.selenium https://mvnrepository.com/artifact/org.seleniumhq.selenium ▾ org.seleniumhq.selenium » selenium-serverApache. Selenium automates browsers. That's it! What you do with that power is entirely up to you. Last Release on ... Selenium Server · Selenium Server Standalone · Selenium Java · Selenium API

Maven Repository: org.seleniumhq.selenium » selenium-server ... https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server/.../usages ▾ Artifacts using Selenium Server Standalone (32) ... automation framework designed to extend and enhance the capabilities provided by Selenium (WebDriver).

Maven Repository: org.seleniumhq.selenium » selenium-server » 2.48.0 https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server/2.48.0 ▾ Selenium Server » 2.48.0. Selenium automates browsers. That's it! Selenium Webdriver. Software Automation Testing Secrets Revealed Part 2 (2016)

Maven Repository: org.seleniumhq.selenium » selenium-server » 2.28.0 https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server/2.28.0 ▾ https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server/2.28.0 ... or Functional Automation Testing: Your Beginners ...

Maven Repository: org.seleniumhq.selenium

Home > org.seleniumhq.selenium > selenium-server

Selenium Server Selenium automates browsers. That's it! What you do with that power is entirely up to you.

License Apache 2.0

Categories Web Testing

Tags testing, selenium, server, web

Used By 249 artifacts

Version	Repository	Usages	Date
3.14.x	Central	6	Aug, 2018
3.13.x	Central	8	Jun, 2018
3.12.x	Central	9	May, 2018
3.11.x	Central	13	Mar, 2018
3.10.x	Central	2	Mar, 2018
3.9.x	Central	7	Feb, 2018
3.8.x	Central	14	Dec, 2017
3.7.x	Central	1	Nov, 2017

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54. Copy Code in Maven Tab

The screenshot shows the Maven Repository website at <https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server/3.14.0>. The page displays information about the Selenium Server 3.14.0 artifact, including its license (Apache 2.0), categories (Web Testing), homepage (<http://www.seleniumhq.org/>), and repositories (Central). A graph shows indexed artifacts from 2004 to 2018, with a count of 12385K. Below the graph, a dependency code snippet is shown:

```
<!-- https://mvnrepository.com/artifact/org.seleniumhq.selenium/selenium-server -->
<dependency>
    <groupId>org.seleniumhq.selenium</groupId>
    <artifactId>selenium-server</artifactId>
    <version>3.14.0</version>
</dependency>
```

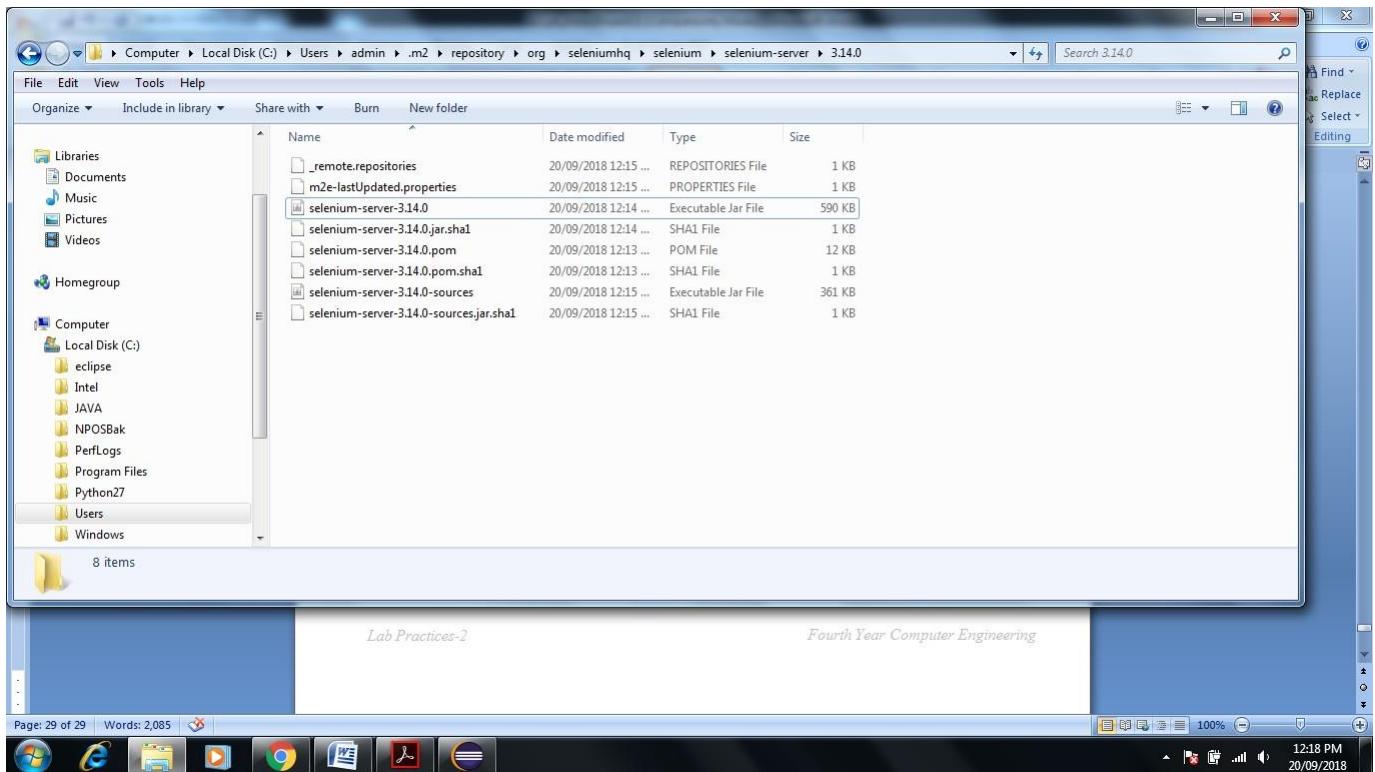
A message indicates "Copied to clipboard!"

55. Paste in pom.xml file in between <dependencies> tag

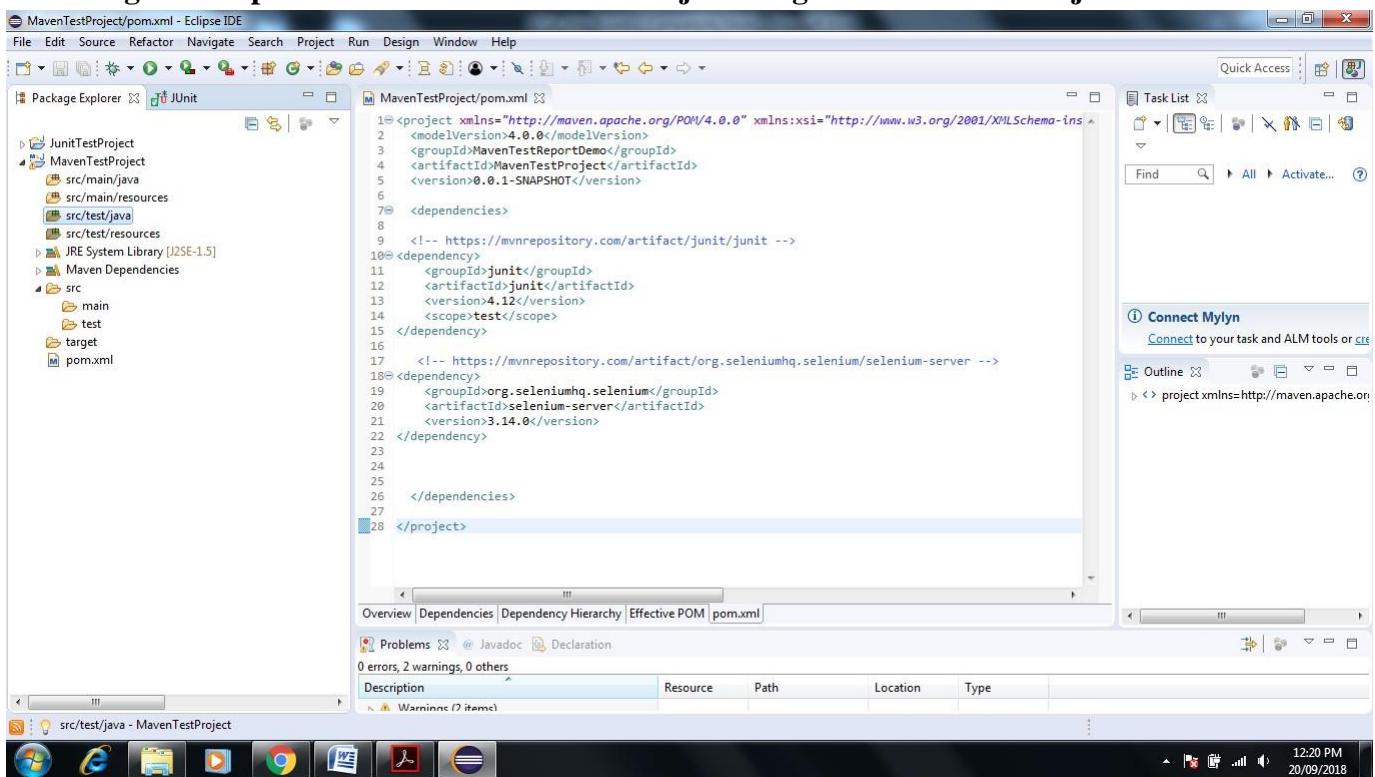
The screenshot shows the Eclipse IDE interface with a project named "MavenTestProject". The "pom.xml" file is open in the editor, showing the XML code for a Maven project. The "dependencies" section is highlighted with a blue selection bar. The code includes dependencies for JUnit and Selenium Server:

```
<dependencies>
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>4.12</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.seleniumhq.selenium</groupId>
        <artifactId>selenium-server</artifactId>
        <version>3.14.0</version>
    </dependency>
</dependencies>
```

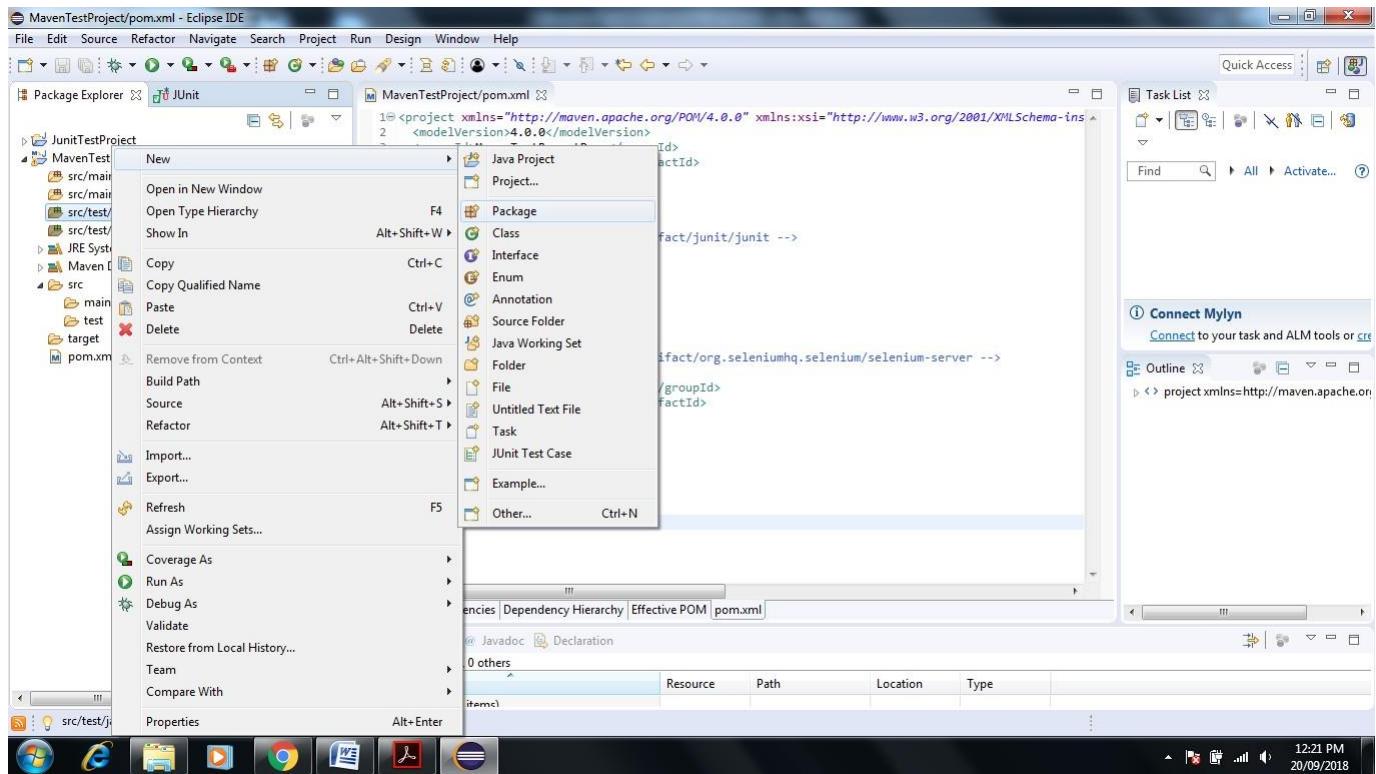
56. Now Go to C:\Users\admin\.m2\repository\org\seleniumhq\selenium\selenium-server\3.14.0 Check the latest selenium server version.



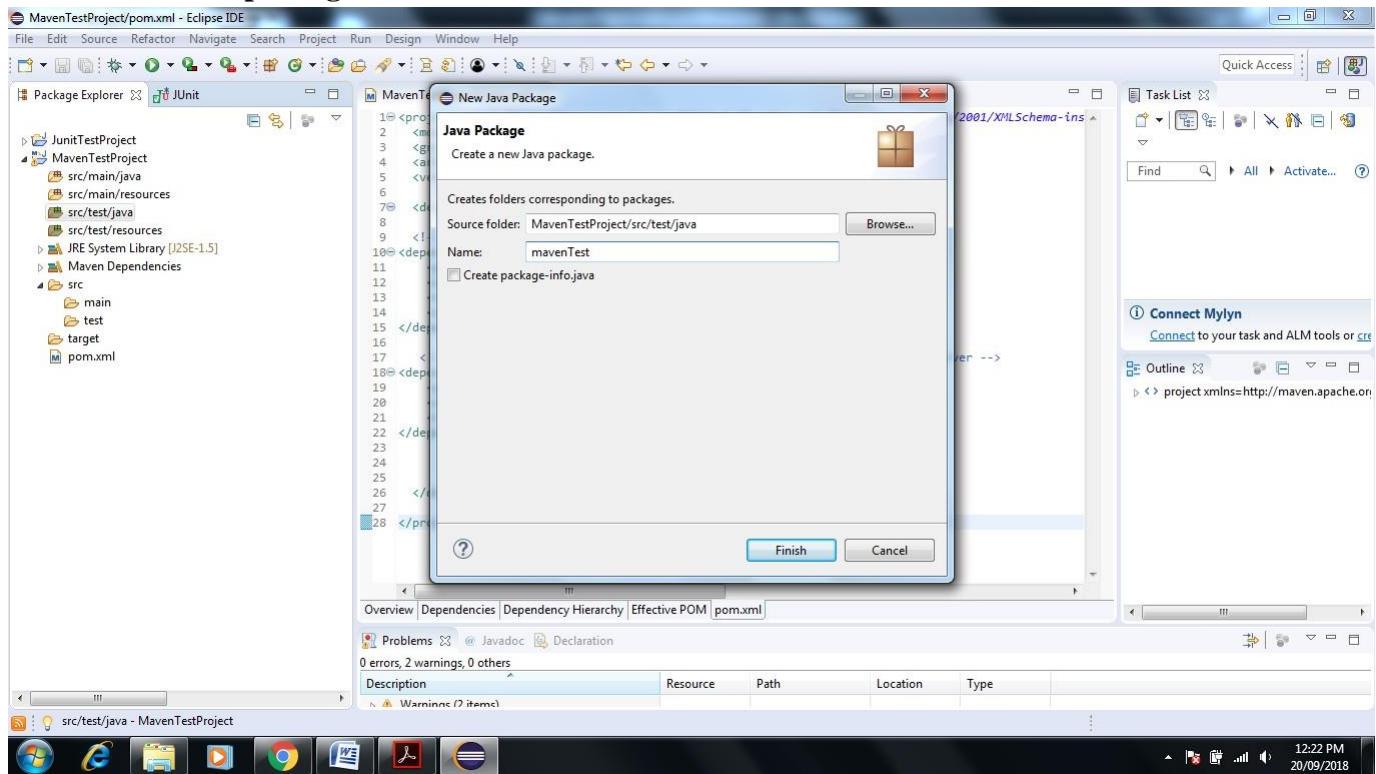
57. Now go to Eclipse -> Click on Maven Test Project->Right Click on src/test/java



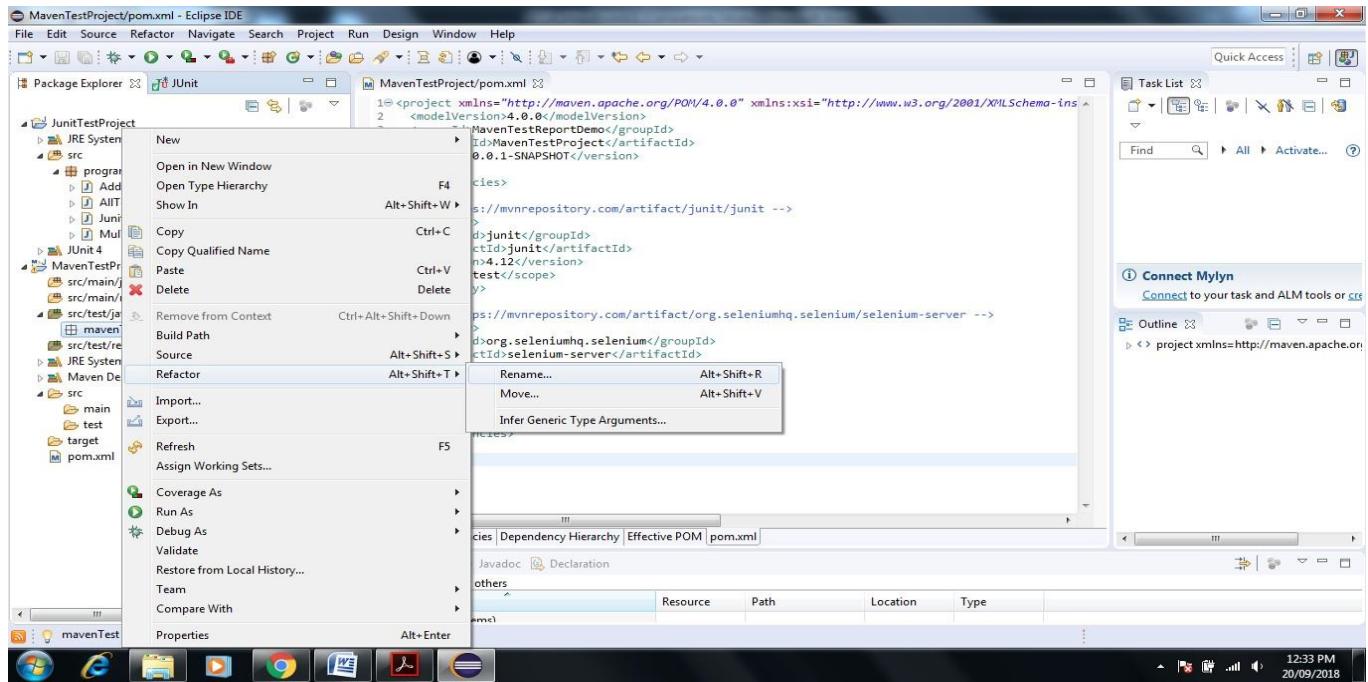
58. Click New->Package



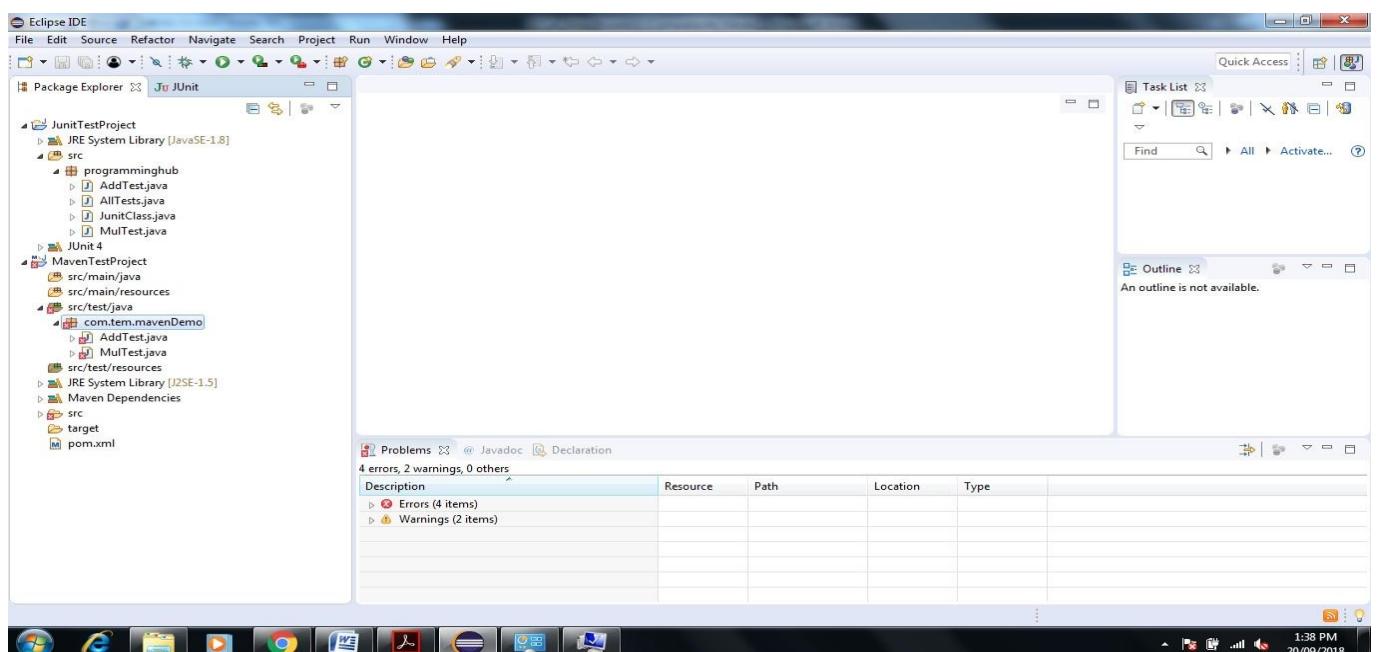
59. Give name to package mavenTest



60. It shows the mavenTest Package under src/test/java folder now rename same by right click on mavenTest Click on Refactor->Rename->give another name com.tem.mavenDemo->Click on ok



61. rename as com.tem.mavenDemo



62. Download Apache Maven Select that binary apache-maven-3.5.4-bin

Operating System No minimum requirement. Start up scripts are included as shell scripts and Windows batch files.

Files

Maven is distributed in several formats for your convenience. Simply pick a ready-made binary distribution archive and follow the [installation instructions](#). Use a source archive if you intend to build Maven yourself.

In order to guard against corrupted downloads/installations, it is highly recommended to verify the signature of the release bundles against the public [KEYS](#) used by the Apache Maven developers.

Link	Checksums	Signature
Binary tar.gz archive	apache-maven-3.5.4-bin.tar.gz	apache-maven-3.5.4-bin.tar.gz.asc
Binary zip archive	apache-maven-3.5.4-bin.zip	apache-maven-3.5.4-bin.zip.asc
Source tar.gz archive	apache-maven-3.5.4-src.tar.gz	apache-maven-3.5.4-src.tar.gz.asc
Source zip archive	apache-maven-3.5.4-src.zip	apache-maven-3.5.4-src.zip.asc

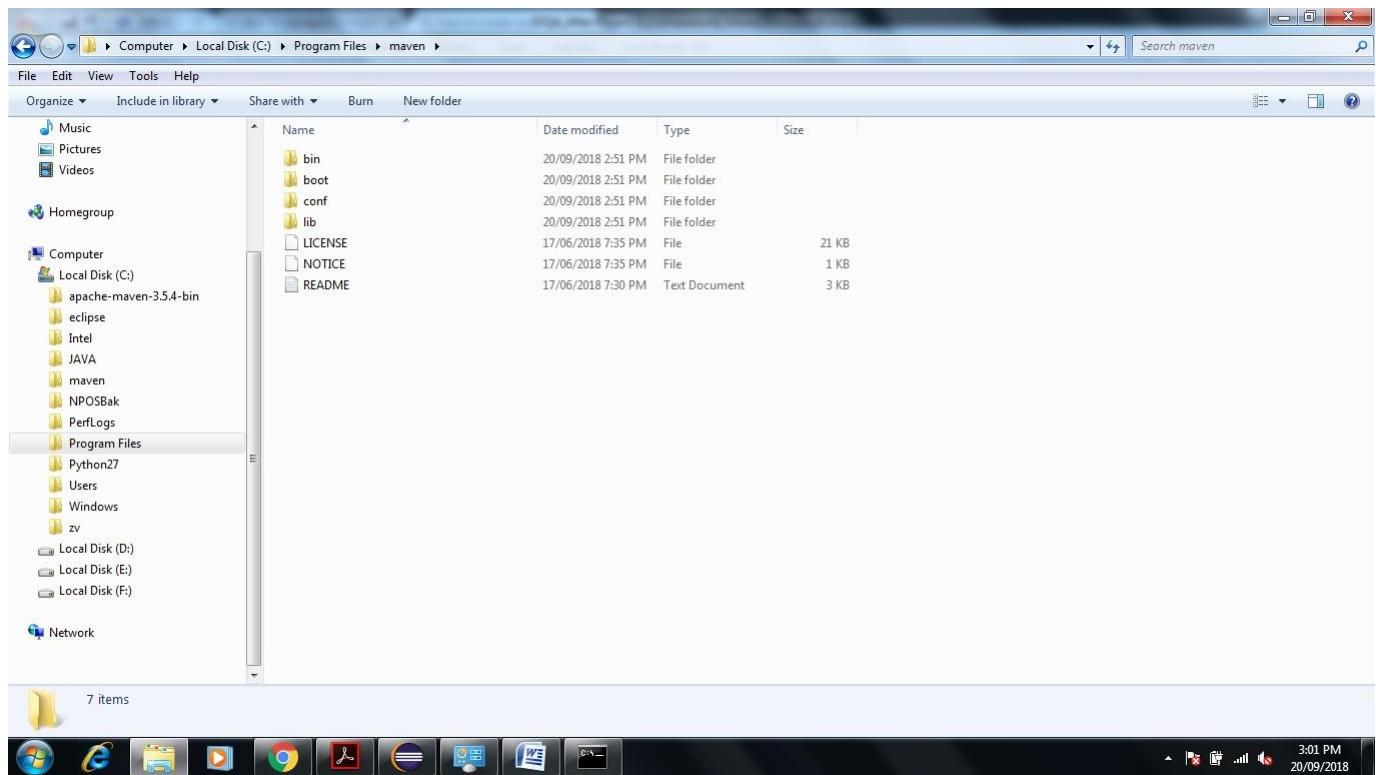
- [Release Notes](#)
- [Reference Documentation](#)
- [Apache Maven Website As Documentation Archive](#)
- All current release sources (plugins, shared libraries,...) available at <https://www.apache.org/dist/maven/>
- latest source code from source repository
- Distributed under the [Apache License, version 2.0](#)

Previous Releases

It is strongly recommended to use the latest release version of Apache Maven to take advantage of newest features and bug fixes.

If you still want to use an old version you can find more information in the [Maven Releases History](#) and can download files from the [archives](#) for versions 3.0.4+ and legacy

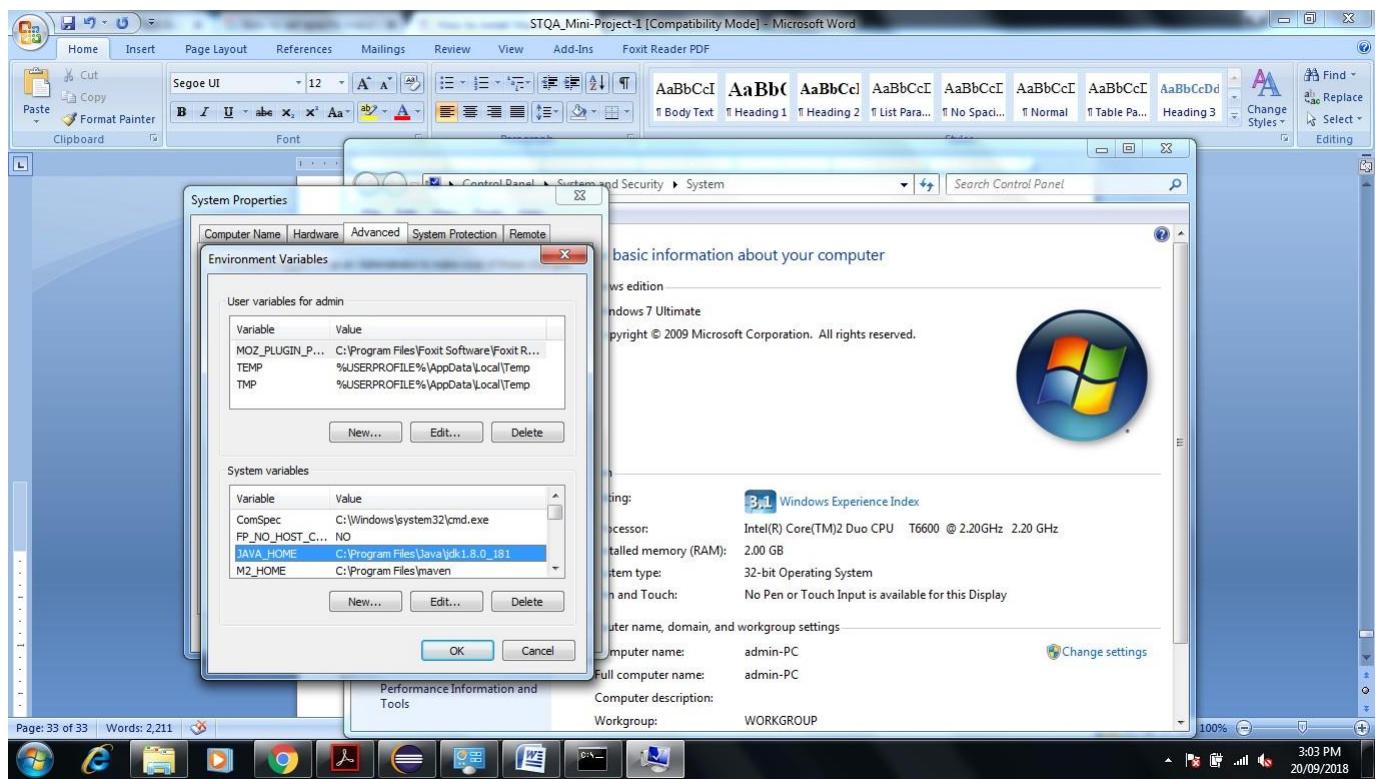
63. after Download->go to Program File->create one folder give name maven-> now extract the downloaded file in maven folder



64. Environment Setup Very Important Steps to Generate Report

1. JDK and JAVA_HOME

Make sure JDK is installed, and "**JAVA_HOME**" variable is added as Windows environment variable. Our JDK installed in Program File ->JAVA->JDK 1.8.0



2. Set Path of Add **M2_HOME** and **MAVEN_HOME**

Create new system variable name M2_HOME and MAVEN_HOME separately set variable value → C:\Program Files\maven

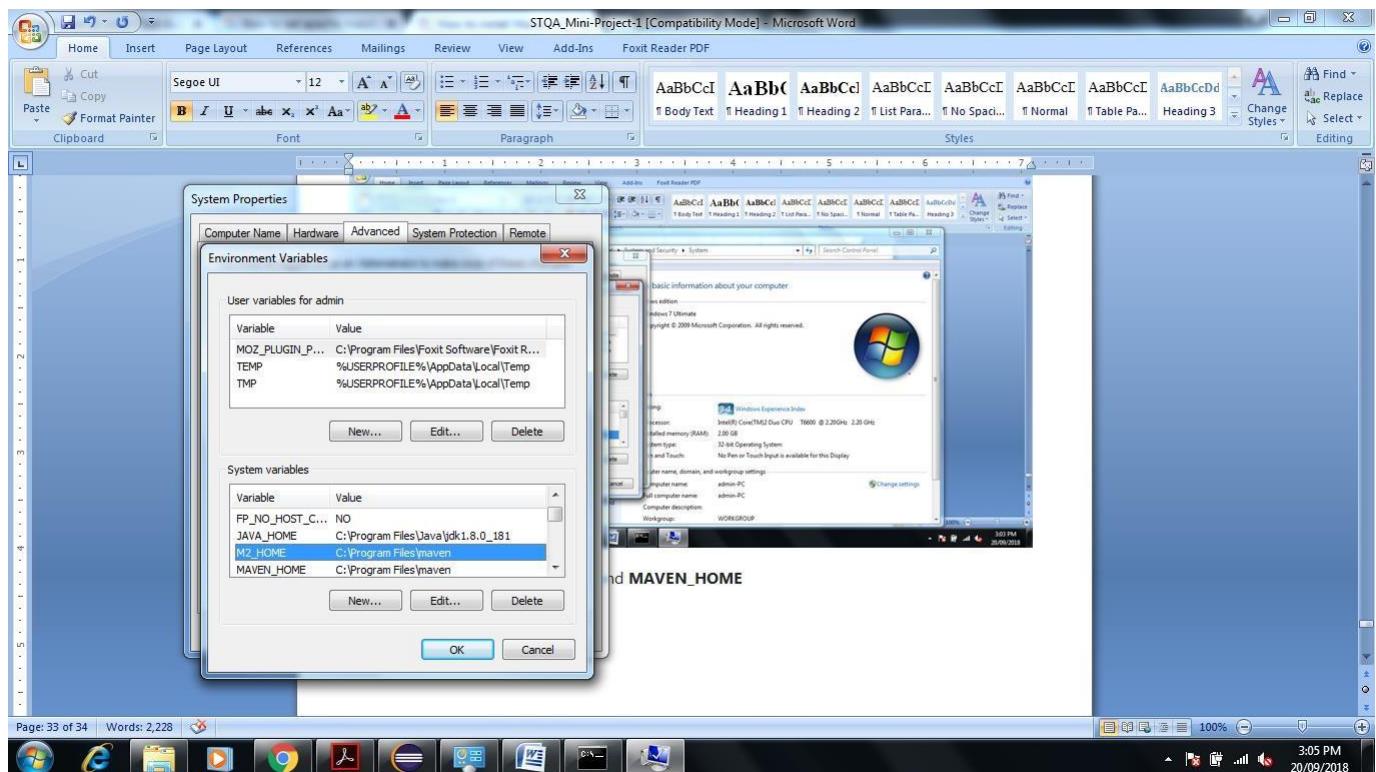


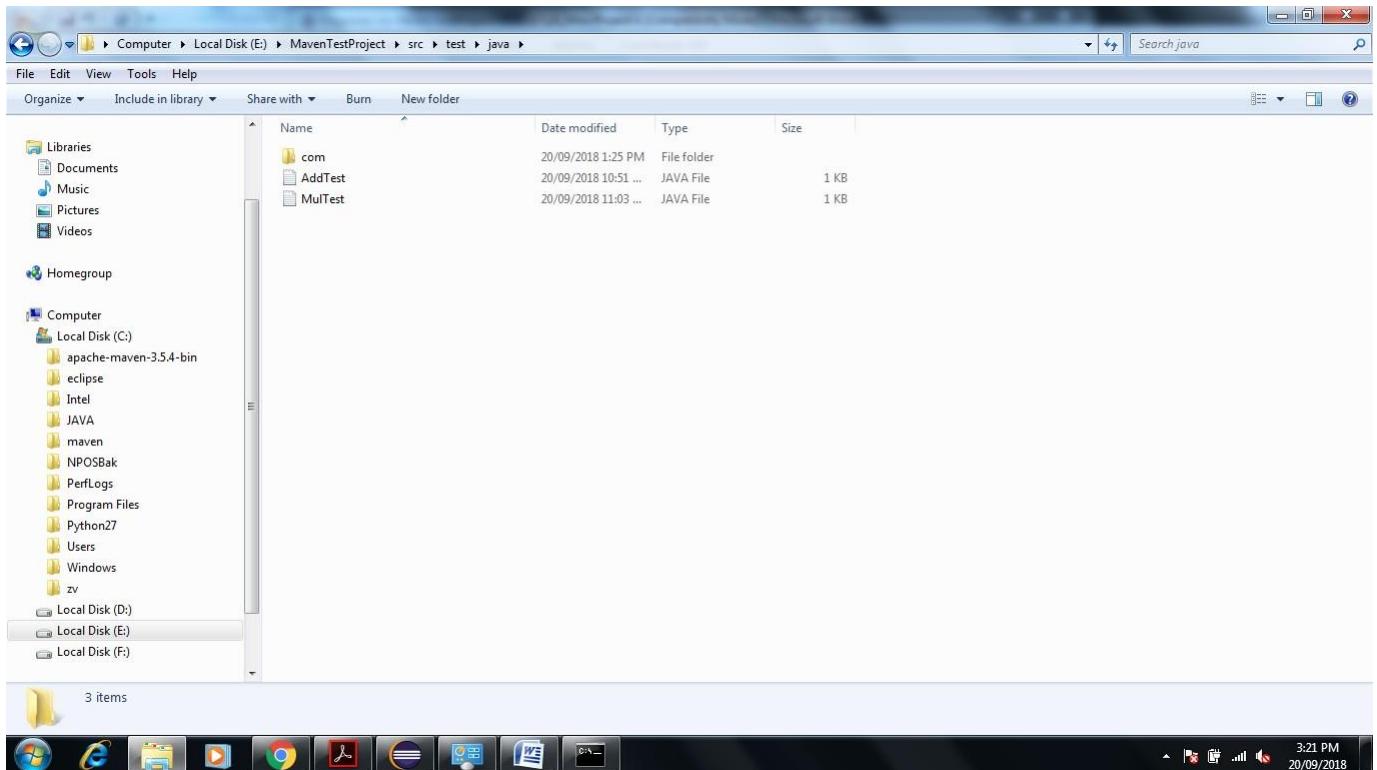
Figure Shows the Path of M2_HOME & MAVEN_HOME same.

3. Update PATH Variable as per following

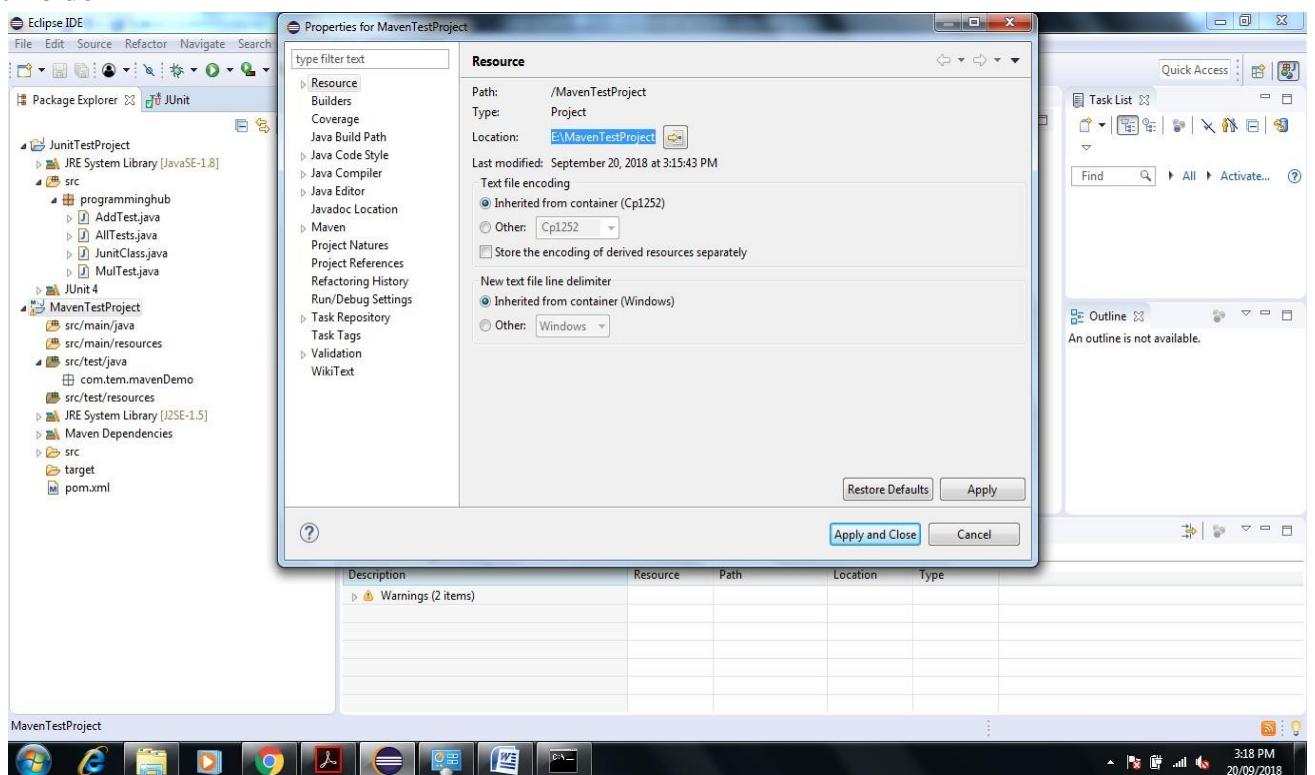
C:\Program Files\maven%MAVEN_HOME%\bin;%M2_HOME%\bin;

4. Verification

Now copy Previous Created JUnit Test case java file Add Test and Mul Test Paste Externally in E:\ MavenTestProject\src\test\java



Now Open Eclipse Right Click on MavenTestProject->Properties→Resources→Copy Path of Project Folder



Now go to command prompt→E:\MavenTestProject>mvn clean

```

Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright © 2009 Microsoft Corporation. All rights reserved.

C:\>cd MavenTestProject
E:\>> MavenTestProject
'mavenTestProject' is not recognized as an internal or external command,
operable program or batch file.

E:\>>cd MavenTestProject
E:\MavenTestProject>mvn clean
[INFO] Scanning for projects...
[INFO] [INFO] --- MavenTestReport Done: MavenTestProject >-
[INFO] [INFO] Building MavenTestProject 0.0.1-SNAPSHOT
[INFO] [INFO] [jar:jar]
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.pom
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.pom (3.9 kB at 748 B/s)
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/22/maven-plugins-22.pom
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/22/maven-plugins-22.pom (13 kB at 34 kB/s)
[INFO] [INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ MavenTestProject ---
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.pom
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.pom (4.1 kB at 11 kB/s)
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/sonatype/spice/spice-parent/16/spice-parent-16.pom
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/sonatype/spice/spice-parent/16/spice-parent-16.pom (8.4 kB at 22 kB/s)
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/sonatype/forge/forge-parent/5/forge-parent-5.pom
[INFO] Downloaded from central: https://repo.maven.apache.org/maven2/org/sonatype/forge/forge-parent/5/forge-parent-5.pom (8.4 kB at 23 kB/s)
[INFO] Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.jar
[INFO] Downloaded From central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.jar (226 kB at 196 kB/s)
[INFO] [INFO] Deleting E:\MavenTestProject\target
[INFO] [INFO] BUILD SUCCESS
[INFO] [INFO] Total time: 15.007 s
[INFO] [INFO] Finished at: 2018-09-20T15:15:43+05:30
[INFO] [INFO] 'cmd' is not recognized as an internal or external command,
operable program or batch file.

E:\MavenTestProject>mvn -version
Apache Maven 3.5.4 (4cedded0938998edf8bf061f1ceb3cfdeccf443fe; 2018-06-18T00:03:14+05:30)
Maven home: C:\Program Files\maven\bin\.
Java version: 1.8.0_181, vendor: Oracle Corporation, runtime: C:\Program Files\Java\jre1.8.0_181\jre
Default locale: en_US, platform encoding: Cp1252
OS name: "windows 7", version: "6.1", arch: "x86", family: "windows"
'cmd' is not recognized as an internal or external command,
operable program or batch file.

E:\MavenTestProject>

```

Enter E:\MavenTestProject>mvn –version

```

Administrator: C:\Windows\system32\cmd.exe
E:\>> MavenTestProject>mvn --version
Apache Maven 3.5.4 (4cedded0938998edf8bf061f1ceb3cfdeccf443fe; 2018-06-18T00:03:14+05:30)
Maven home: C:\Program Files\maven\bin\.
Java version: 1.8.0_181, vendor: Oracle Corporation, runtime: C:\Program Files\Java\jre1.8.0_181\jre
Default locale: en_US, platform encoding: Cp1252
OS name: "windows 7", version: "6.1", arch: "x86", family: "windows"
'cmd' is not recognized as an internal or external command,
operable program or batch file.

E:\MavenTestProject>

```

To run test suite or all test cases under project, give command mvn test

Enter E:\MavenTestProject>mvn test

This Command is Used to See the Test Report

You can even run individual test cases. Give command mvn test –Dtesttestcasename

Eg. mvn test -Dtest=AllTest

The screenshot shows a Windows desktop environment. On the left, a command prompt window titled 'Administrator: C:\Windows\system32\cmd.exe' displays the output of the Maven 'mvn test -Dtest=AllTest' command. The output shows the build process, including the compilation of Java code and the execution of unit tests. On the right, a Microsoft Word document titled 'Compatibility Mode - Microsoft Word' is open, showing a simple document with the text 'project, give command mvn test'. The status bar at the bottom of the screen indicates the date as 20/09/2018 and the time as 3:44 PM.

```
E:\MavenTestProject>mvn test -Dtest=AllTest
[INFO] Scanning for projects...
[INFO] [ MavenTestReportDemo : MavenTestProject ] >-
[INFO] Building MavenTestProject 0.0.1-SNAPSHOT
[INFO]   [ jar ]
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ MavenTestProject ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ MavenTestProject ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ MavenTestProject ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ MavenTestProject ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] Changes detected - recompiling the module!
[WARNING] File encoding has not been set, using platform encoding Cp1252, i.e. build is platform dependent!
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ MavenTestProject ---
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-booter/2.12.4/surefire-booter-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-booter/2.12.4/surefire-booter-2.12.4.pom (3.0 kB at 614 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-api/2.12.4/surefire-api-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-api/2.12.4/surefire-api-2.12.4.pom (2.5 kB at 6.4 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-common/2.12.4/surefire-common-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-common/2.12.4/surefire-common-2.12.4.pom (5.5 kB at 13 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugin-tools/maven-plugin-annotations/3.1/maven-plugin-annotations-3.1.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugin-tools/maven-plugin-annotations/3.1/maven-plugin-annotations-3.1.pom (1.6 kB at 30 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugin-tools/maven-plugin-tools/3.1/maven-plugin-tools-3.1.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugin-tools/maven-plugin-tools/3.1/maven-plugin-tools-3.1.pom (16 kB at 30 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/reporting/maven-reporting-api/2.0.9/maven-reporting-api-2.0.9.pom
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 3.848 s
[INFO] Finished at: 2018-09-20T15:53:21+05:30
[INFO] cmd' is not recognized as an internal or external command,
operable program or batch file.
E:\MavenTestProject>mvn test -Dtest=AllTest
[INFO] Scanning for projects...
[INFO] [ MavenTestReportDemo : MavenTestProject ] >-
[INFO] Building MavenTestProject 0.0.1-SNAPSHOT
[INFO]   [ jar ]
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ MavenTestProject ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ MavenTestProject ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ MavenTestProject ---
```

The screenshot shows a Windows desktop environment. On the left, a command prompt window titled 'Administrator: C:\Windows\system32\cmd.exe' displays the output of the Maven 'mvn test -Dtest=AllTest' command. The output shows the build process, including the compilation of Java code and the execution of unit tests. On the right, a Microsoft Word document titled 'Compatibility Mode - Microsoft Word' is open, showing a simple document with the text 'THE END*****'. The status bar at the bottom of the screen indicates the date as 20/09/2018 and the time as 3:56 PM.

```
E:\MavenTestProject>mvn test -Dtest=AllTest
[INFO] Scanning for projects...
[INFO] [ MavenTestReportDemo : MavenTestProject ] >-
[INFO] Building MavenTestProject 0.0.1-SNAPSHOT
[INFO]   [ jar ]
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ MavenTestProject ---
[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ MavenTestProject ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ MavenTestProject ---
```

Conclusion

In this way using JUnit and Maven Automation tool we are Perform Unit Testing and Prepare Test Report of same.

Assignment Question

1. Write any Five Tool for White Box and Black Box Testing Purpose.

STQA Mini Project No. 2

Title

Create a small web-based application by selecting relevant system environment/platform and programming languages. Narrate concise Test Plan consisting features to be tested and bug taxonomy. Narrate scripts in order to perform regression tests. Identify the bugs using Selenium WebDriver and IDEand generate test reports encompassing exploratory testing.

Problem Definition:

Perform Web testing and identify the bugs using Selenium WebDriver and IDEand generate test reports encompassing exploratory testing.

Prerequisite:

Knowledge of Core Java

2.4 Software Requirements:

Eclipse photon R latest Version, JAVA 1.8, selenium-server-standalone-3.13.0 Chromedriver.exe

2.5 Hardware Requirement

PIV, 2GB RAM, 500 GB HDD, Lenovo A13-4089Model.

2.6 Learning Objectives:

We are going to learn how Identify the bugs using Selenium WebDriver and IDEand generate test reports encompassing exploratory testing.

2.7 Outcomes:

You are able to Web Testing using Automation Tool like Selenium Web driver and IDE

2.8 TheoryConcepts:

What is Selenium?

Selenium is a free (open source) automated testing suite for web applications across different browsers and platforms.

Selenium is a suite of software tools to automate Web Browsers.

- It is an Open source suite of tools mainly used for Functional and Regression Test Automation.

Selenium is a free (open source) automated testing suite for web applications across different browsers and platforms.

It is quite similar to HP Quick Test Pro (QTP now UFT) only that Selenium focuses on automating web-based applications. Testing done using Selenium tool is usually referred as Selenium Testing.

- **Selenium supports various Operating environments.**

- ✓ MS Windows
- ✓ Linux
- ✓ Macintosh etc...

- **Selenium supports various Browsers.**

- ✓ Mozilla Firefox
- ✓ IE
- ✓ Google Chrome
- ✓ Safari
- ✓ Opera etc...

Note: **Selenium IDE supports Mozilla Firefox only.**

- **Selenium supports various programming environments to write programs (Test scripts)**

- ✓ Java
- ✓ C#
- ✓ Python
- ✓ Perl
- ✓ Ruby
- ✓ PHP

History of the Selenium Project

Selenium first came to life in 2004.

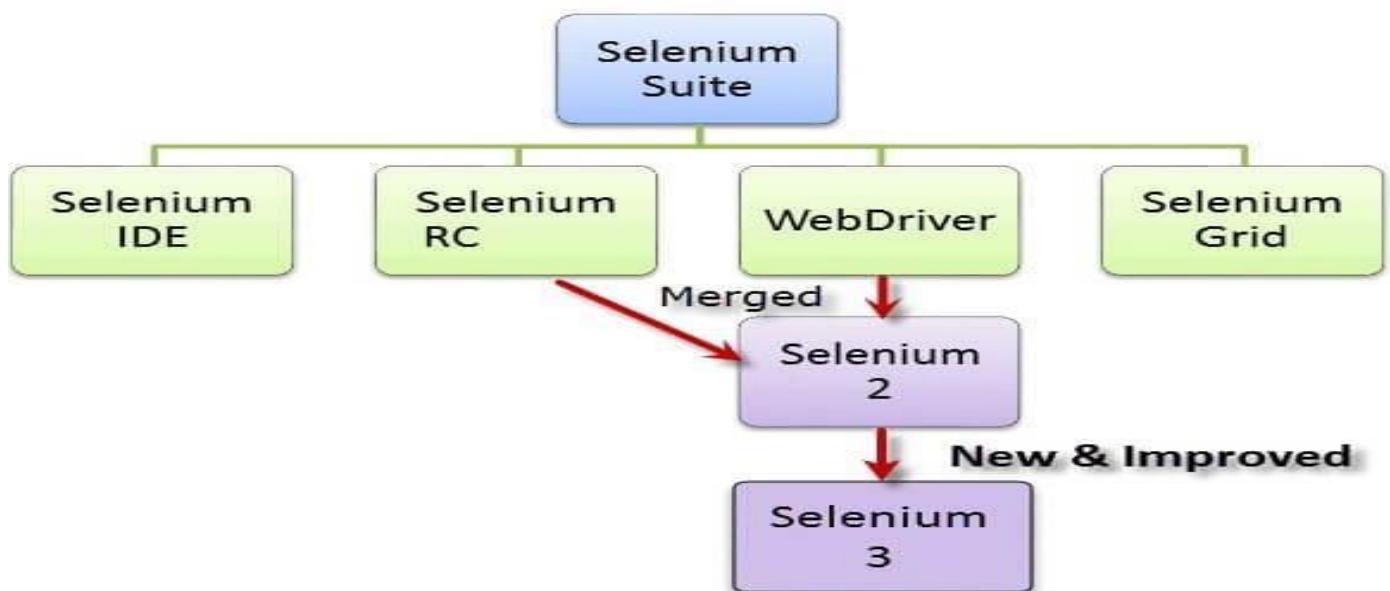
- In 2006, Selenium WebDriver was launched at Google.
 - In 2008, the whole Selenium team decided to merge Selenium WebDriver with Selenium RC in order to form more powerful tool called Selenium 2.0
- ✓ **Selenium 1**
(Selenium IDE + Selenium RC + Selenium Grid)
 - ✓ **Selenium 2**
(Selenium IDE + Selenium RC + Selenium WebDriver + Selenium Grid)

Selenium's Tools Suite

Selenium is not just a single tool but a suite of software's, each catering to different testing needs of an organization.

It has four components.

- Selenium Integrated Development Environment (IDE)
- Selenium Remote Control (RC)
- WebDriver
- Selenium Grid



Brief Introduction Selenium IDE

It is a Firefox browser plug in, used to create and execute Test cases.

1. Selenium IDE Features:

- Create Test Cases, Test suites (We can Record test cases or type Test steps using element locators and Selenese commands)
- Edit Test Cases
- Execute Test cases, Test suites
- Debug Test Cases.
- Enhance Test Cases
- Export Test cases to other formats (java, ruby etc...)

Note: selenium IDE Test case default format is .html

2. Drawbacks of Selenium IDE

- It supports Mozilla Firefox browser only.
- It doesn't support Programming logic/features to enhance Test cases.
- It doesn't support Data Driven Testing.
- It is not suitable for complex test case design.
- No centralized maintenance of Objects/Elements

3. Selenium RC (* Out dated) -Currently, Selenium RC is still being developed but only in maintenance mode.

4. Selenium WebDriver

- ✓ It is a Programming interface to create and execute Test cases.

Selenium IDE has IDE but doesn't have Programming interface

- ✓ Selenium WebDriver has Programming interface but doesn't have IDE
- ✓ It communicates Directly to the browser.
- ✓ No need of Separate Server such as RC Server
- ✓ UFT/QTP has both IDE as well as Programming interface
- ✓ Faster Execution than IDE & RC

- **Selenium WebDriver supports various programming environments to write programs.**

- ✓ Java,
- ✓ C#
- ✓ Perl
- ✓ Python
- ✓ Ruby
- ✓ PHP

- Using Element/Object locators/properties and Webdriver Methods we can create and execute Test cases.
- Selenium Webdriver supports various browsers to create and execute test case/test script/test

Note: **Browser driver varies from one browser to another.**

- **Selenium WebDriver supports various operating environments**

- ✓ MS Windows
- ✓ Linux Macintosh etc...

Drawback of Selenium WebDriver

- It doesn't generate detailed Test Reports.
- No centralized maintenance of Object/elements
- It requires Programming Knowledge
- cannot support the readily new browser
- Installation is More Complicated than Selenium IDE
- No built-in mechanism for logging runtime message

5. Selenium Grid

- Selenium Grid is used to execute tests across multiple browsers, operating environments and machines in parallel.
- Selenium Grid 2 supports Selenium RC Tests as well as Selenium WebDriver Tests.
 - i) Selenium WebDriver to create Test cases using element locators and Webdriver methods.
 - ii) Java Programming to enhance test cases.
 - iii) TestNG Framework to group test cases, execute test batches and generate detailed test reports.

Features:

- Enables **simultaneous running of tests in multiple browsers and environments**.
- **Saves time** enormously.
- Utilizes the **hub-and-nodes** concept. The hub acts as a central source of Selenium commands to each node connected to it.

Note on Browser and Environment Support

- Because of their architectural differences, Selenium IDE, Selenium RC, and WebDriver support different sets of browsers and operating environments.

	Selenium IDE	WebDriver
Browser Support	Mozilla Firefox	Internet Explorer versions 6 to 11, both 32 and 64-bit Microsoft Edge version 12.10240 & above (partial support some)

	Selenium IDE	WebDriver
		<p>functionalities under development)</p> <p>Firefox 3.0 and above</p> <p>Google Chrome 12.0. and above</p> <p>Opera 11.5 and above</p> <p>Android - 2.3 and above for phones and tablets (devices & emulators)</p> <p>iOS 3+ for phones (devices & emulators) and 3.2+ for tablets (devices & emulators)</p> <p>HtmlUnit 2.9 and above</p>
Operating System	Windows, Mac OS X, Linux	All operating systems where the browsers above can run.

- **Note:** Selenium WebDriver is termed as the successor of Selenium RC which has been deprecated & officially announced by SeleniumHQ.

How to Choose the Right Selenium Tool for Your Need

Tool	Why Choose?
Selenium IDE	<ul style="list-style-type: none"> • To learn about concepts on automated testing and Selenium, including: • Selenese commands such as type, open, clickAndWait, assert, verify, etc. • Locators such as id, name, xpath, css selector, etc. • Executing customized JavaScript code using runScript • Exporting test cases in various formats. • To create tests with little or no prior knowledge in programming. • To create simple test cases and test suites that you can export later to RC or WebDriver. • To test a web application against Firefox only.
Selenium RC	<ul style="list-style-type: none"> • To design a test using a more expressive language than Selenese • To run your test against different browsers (except HtmlUnit) on different operating systems. • To deploy your tests across multiple environments using Selenium Grid.

Tool	Why Choose?
	<ul style="list-style-type: none"> • To test your application against a new browser that supports JavaScript. • To test web applications with complex AJAX-based scenarios.
WebDriver	<ul style="list-style-type: none"> • To use a certain programming language in designing your test case. • To test applications that are rich in AJAX-based functionalities. • To execute tests on the HtmlUnit browser. • To create customized test results.
Selenium Grid	<ul style="list-style-type: none"> • To run your Selenium RC scripts in multiple browsers and operating systems simultaneously. • To run a huge test suite, that needs to complete in the soonest time possible.

Advantages of Selenium

- i) It is an Open source Software.
- ii) It supports various Operating environments (Windows, Linux, Mac etc...)
- iii) It supports various browsers (IE, Mozilla Firefox, Chrome, safari, Opera etc...)
- iv) It supports various programming environments (Java, Perl, Python, Ruby and PHP)
- v) It supports parallel Test execution.
- vi) It uses less Hardware resources.

Disadvantages of Selenium

- i) It supports Web based Applications only.
- ii) No reliable support from anybody.
- iii) No centralized maintenance of Elements/objects
- iv) Difficult to setup environment.
- v) Difficult to use.
- vi) Limited support for Image based testing.
- vii) New features may not work properly.
- viii) No other tool integration for test management & No built in Reporting facility.

Selenium Versus UFT

Selenium	UFT / QTP
1) Open Source	Vendor tool, License is required.
2) Supports various OS Environments.	MS Windows only.
3) Supports various Programming Environments	VBScript only.
4) No Object Repositories	Local and Shared object Repositories.
5) No built-in Reporting feature.	Built-in reporting feature.
6) Selenium WebDriver has no IDE and Selenium IDE has no Programming Interface.	UFT has both IDE and Programming Interface.
7) Uses less Hardware resources.	Uses more Hardware resources
8) Difficult to setup environment and use.	Easy to setup and use.
9) Limited support for Image Testing	Rich support for Image Testing
10) No Reliable support	Support from HP
11) No other tool integration for Test management.	UFT can be integrated with ALM/QC for Test Management.
12) New features may not work properly.	New features will work properly.
13) No Add ins for supporting Application Environments.	Add ins are required for supporting Application environments.
14) Supports Web Applications only	Supports Desktop and Web Applications.
15) No Authorized Certification	Authorized Certification program.

What is TestNG?

TestNG is a powerful testing framework, an enhanced version of JUnit which was in use for a long time before TestNG came into existence. NG stands for 'Next Generation'.

TestNG framework provides the following features –

- Annotations help us organize the tests easily.
- Flexible test configuration.
- Test cases can be grouped more easily.
- Parallelization of tests can be achieved using TestNG.
- Support for data-driven testing.
- Inbuilt reporting.

2.8.9 Step by Step Tutorial

1. First of Download Latest Eclipse java photon-R version.
2. Download latest [selenium-server-standalone-3.13.0.jar](#) File from following link

<https://www.seleniumhq.org/download/> here on site 3.14.0 version is latest

The screenshot shows the SeleniumHQ website with the URL <https://www.seleniumhq.org/download/>. The page title is "[SeleniumConf Chicago] Tickets are on sale (while supplies last)! Go [HERE](#) for details". The main content area is titled "Downloads". It includes sections for "Selenium Downloads", "Previous Releases", "Source Code", and "Maven Information". There are links for "Donate to Selenium" via PayPal and "through sponsorship" from BrowserStack and SAUCE LABS. The "Selenium Standalone Server" section notes that the Selenium Server is needed for running WebDriver. It provides links for "Download version 3.14.0" and "To run Selenium tests exported from the legacy IDE, use the [Selenium Html Runner](#)". The "The Internet Explorer Driver Server" section requires InternetExplorerDriver. The "Selenium Client & WebDriver Language Bindings" section links to "32 bit Windows IE or 64 bit Windows IE CHANGELOG". The bottom of the page shows a toolbar with various browser icons and a status bar indicating 2:04 PM on 9/29/2018.

3. Download and Extract [Chromedriver.exe](#) for windows on any drive of computer.

<http://chromedriver.chromium.org/downloads> here 2.42 is latest version

The screenshot shows the ChromeDriver download page at <http://chromedriver.chromium.org/downloads>. The title is "ChromeDriver - WebDriver for Chrome". The left sidebar has navigation links for CHROMEDRIVER, CAPABILITIES & CHROMEOPTIONS, CHROME EXTENSIONS, CHROMEDRIVER CANARY, CONTRIBUTING, DOWNLOADS, GETTING STARTED (Android, ChromeOS), LOGGING (Performance Log, Mobile Emulation), NEED HELP? (Chrome doesn't start or crashes immediately, Chromedriver crashes, Clicking issues, DevTools window keeps closing, Operation not supported when using remote debugging). The right side features a "Downloads" section for the "Latest Release: ChromeDriver 2.42". It says "Supports Chrome v68-70" and lists "Changes include:" with a bulleted list of fixes. The bottom of the page shows a toolbar with various browser icons and a status bar indicating 2:08 PM on 9/29/2018.

MAC+ tech https://chromedriver.storage.googleapis.com/index.html?path=2.42/

Index of /2.42/

Name	Last modified	Size	ETag
Parent Directory		-	
chromedriver_linux64.zip	2018-09-13 19:30:37	3.85MB	acfcc29fb03df9e913ef4c360a121ad1
chromedriver_mac64.zip	2018-09-13 18:14:11	5.75MB	3fc0e4a97cbf2c8c2a9b824d95e25351
chromedriver_win32.zip	2018-09-13 21:11:33	3.42MB	28d91b31311146250e7ef1afbcd6d026
notes.txt	2018-09-13 21:23:09	0.02MB	18ddf6fc9f9d8dd668fa44ab77d06bdd

https://chromedriver.storage.googleapis.com/2.42/chromedriver_win32.zip
 2:09 PM 9/29/2018

4. After Download Extract same on any Drive here I m extract on D Drive and my path of that exe file is **D:\my document\Download\chromedriver_win32**

Computer > New Volume (D:) > my document > Download >

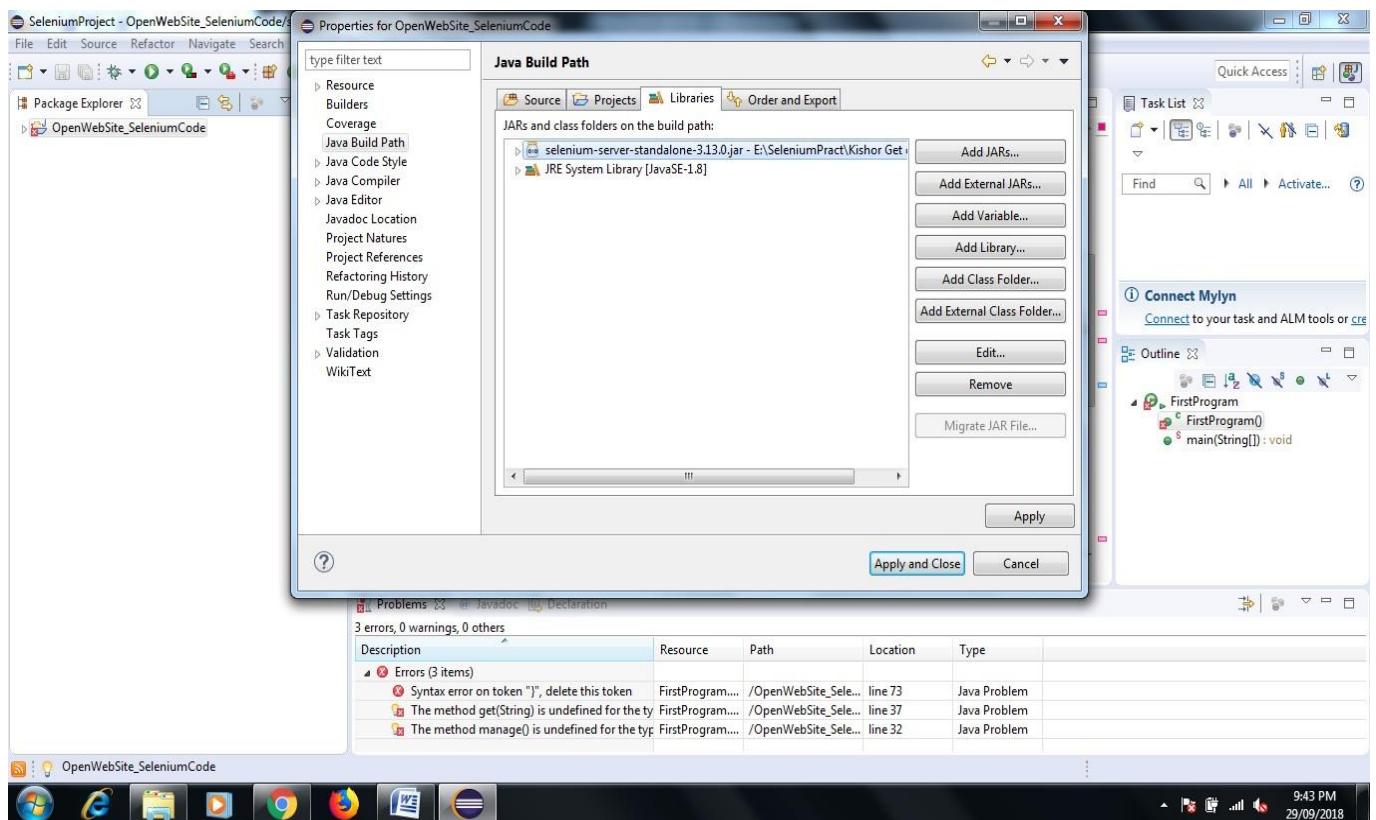
Organize Open E-mail New folder

Name Date modified Type Size

- 41_2018_09_03_101005_F_E_Basic_Civil_a... 9/3/2018 2:08 PM Nitro PDF Docum... 51 KB
- 41_2018_09_04_107002_Engineering_Physi... 9/4/2018 2:19 PM Nitro PDF Docum... 53 KB
- 41_2018_09_04_107001_Engine... 52 KB
- 41_2018_09_06_107001_Engine... 65 KB
- 41_2018_09_08_110003_Fundar... 52 KB
- 265-1225-1-PB 249 KB
- 2018-09-03-11-27-23-630_1535 95 KB
- 2018-09-03-11-27-27-997_ALH... 35 KB
- 179701848_ExamForm 255 KB
- 179702088_ExamForm 255 KB
- a60c6554eda66129177176107... 57 KB
- Academic Calendar for Engine... 540 KB
- ADMISSION 2018-19 ENQUIRY 32 KB
- AJS Research proposal 25 KB
- ALL YEARS TT - Final 19 KB
- assignment-no-3-matrix 23 KB
- attendanceSummary_Report1 19 KB
- BE 13 KB
- c5f66ee7270aa932072533c26b... 23 KB
- Properties 3,500 KB
- chromedriver_win32 1,105 KB
- ChromeSetup 132 KB
- circular-no-125 179 KB
- Dates of Commencement and Conclusio... 86 KB
- db7c1fd79a1dfa3f8f96a75163327cb4cf0e... 7,617 KB
- disk-drill-win 49,718 KB
- eclipse-inst-win32 15 KB
- EDC contact for book test 9/22/2018 11:38 AM Microsoft Word D... 9/29/2018 2:09 PM
- chromedriver_win32 Date modified: 9/29/2018 2:10 PM Date created: 9/29/2018 2:09 PM
WinRAR ZIP archive Size: 341 MB

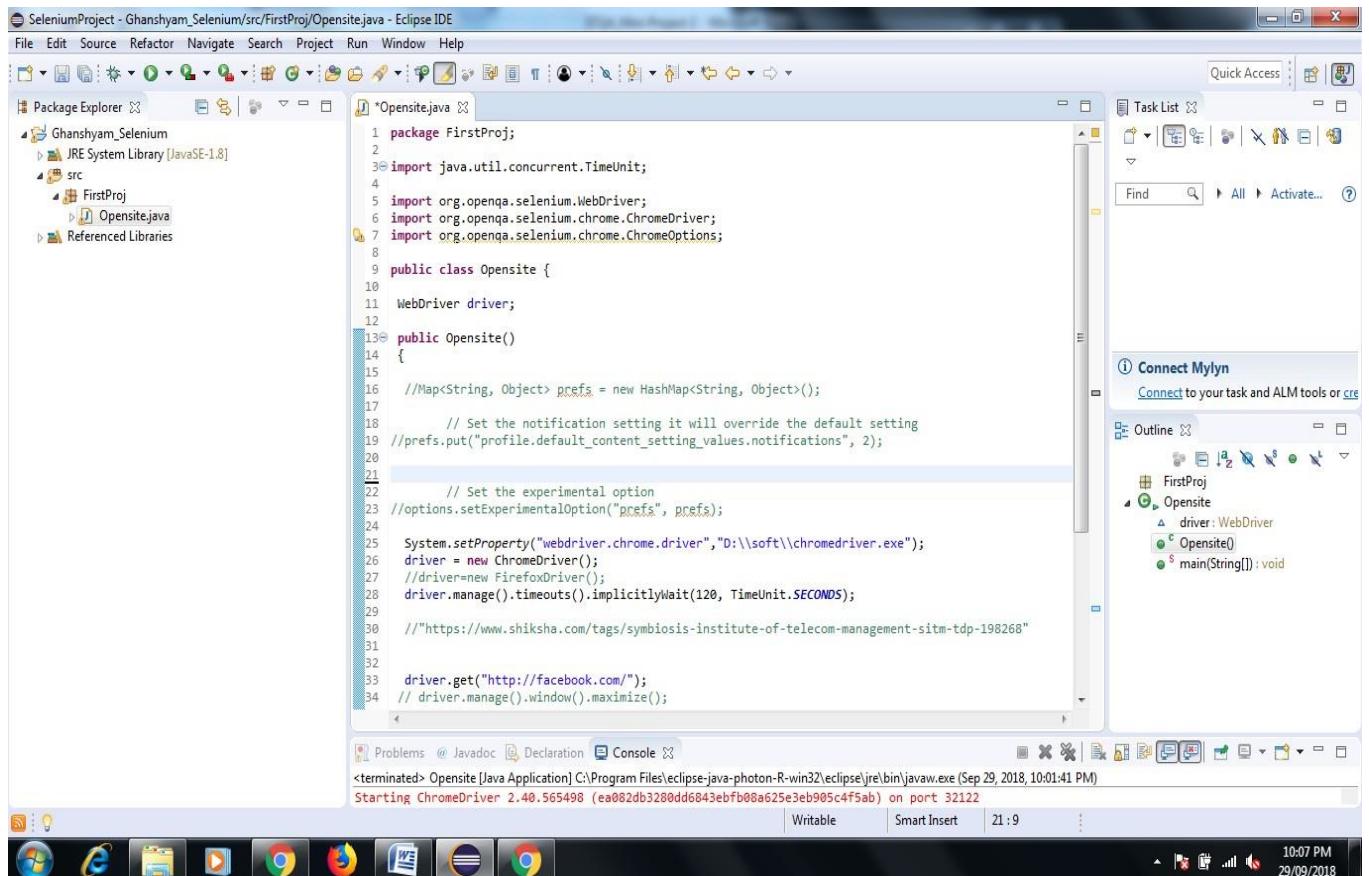
2:10 PM 9/29/2018

5. Now Open Eclipse IDE----> Create Java Project-> Right Click Project Name→Properties→Java Build Path→Libraries→Add External JAR→ add **selenium-server-standalone-3.13.0 jar** →Apply and Close.



6. Now Want **Open the chrome browser with facebook.com page via Selenium Web driver Java Coding** so here we need to write Java Code in Class file which we already created

7. Here in My Program I Create **Ghanshyam_Selenium Java Project Folder name** and **Opensite.java is my class file** so write java code in this class file



8. Right click on java program, select Run As and > "Java Application". After Code Successfully Run now see the output in Console Prompt

```

SeleniumProject - Ghanshyam_Selenium/src/FirstProj/Opensite.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer Ghanshyam_Selenium JRE System Library [JavaSE-1.8]
src FirstProj Opensite.java Referenced Libraries
* * Opensite.java
1 package FirstProj;
2
3 import java.util.concurrent.TimeUnit;
4
5 import org.openqa.selenium.WebDriver;
6 import org.openqa.selenium.chrome.ChromeDriver;
7 import org.openqa.selenium.chrome.ChromeOptions;
8

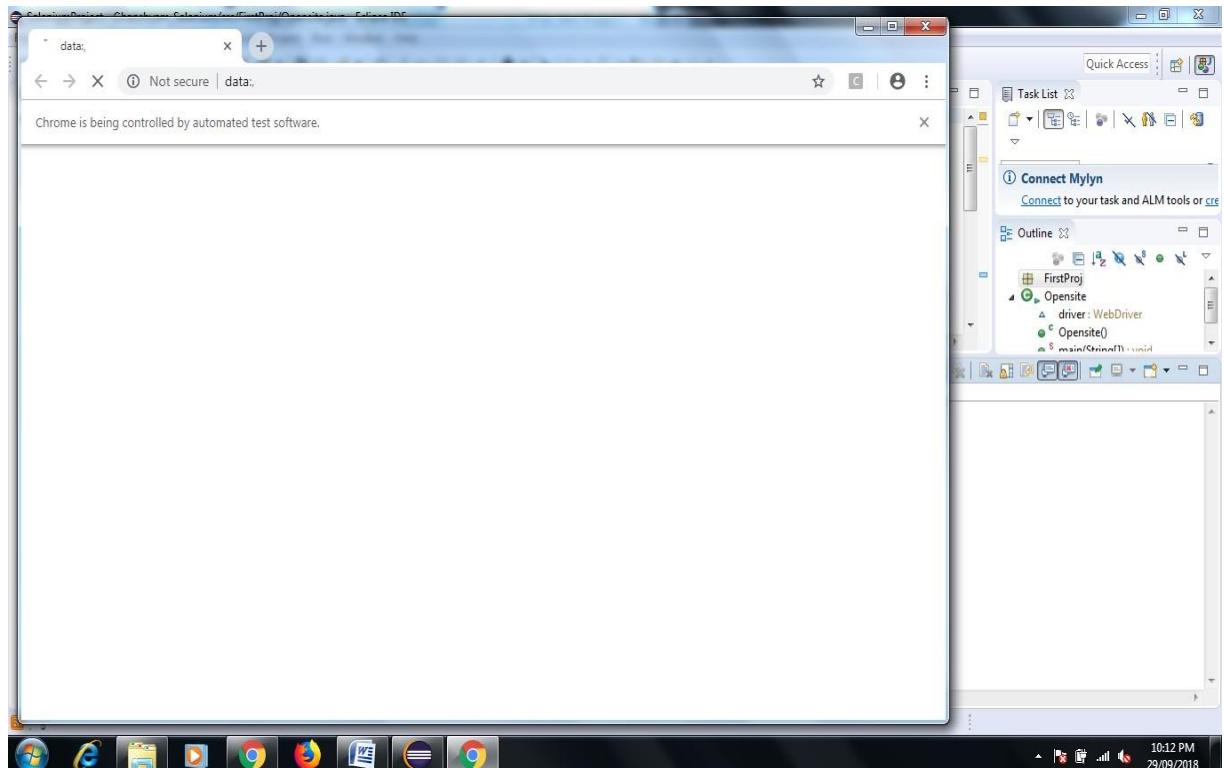
Problems Javadoc Declaration Console
<terminated> Opensite [Java Application] C:\Program Files\eclipse-java-photon-R-win32\eclipse\jre\bin\javaw.exe (Sep 29, 2018, 10:01:41 PM)
Starting ChromeDriver 2.40.565498 (ea082db3280dd6843ebfb08a625e3eb905c4f5ab) on port 32122
Only local connections are allowed.
[1538288724.192][WARNING]: Timed out connecting to Chrome, retrying...
Sep 29, 2018 10:02:06 PM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: OSS

```

9. Now Your browser Open Automatically it shown data;

10. one more message display chrome is being controlled by Automated Test Software

It mean we open chrome browser and facebook.com page by selenium web driver java code Successfully.



In this way Our First Module Run Successfully.

Module-2 In This Project I want to collect all Rating Feedback related our college available on website Justdial.com

1. Create One Java Project Folder Give Name → Review Demo → Now Create One Class File give name Practo.com
2. Right Click Project Name → Properties → Java Build Path → Libraries → Add External JAR → add selenium-server-standalone-3.13.0 jar → Apply and Close.
3. Similarly Copy the Chromedriver.exe file on my D Drive `D:/soft/chromedriver.exe` in this way.
4. Now Start right writing code for Practo.java to Collect all review of any Hospital.

Here I want search all feedback of **SNJB-s-Late-Sau-Kantabai-Bhavarlalji-Jain-College-Of-Engineering-Neminagar-Chandwad**

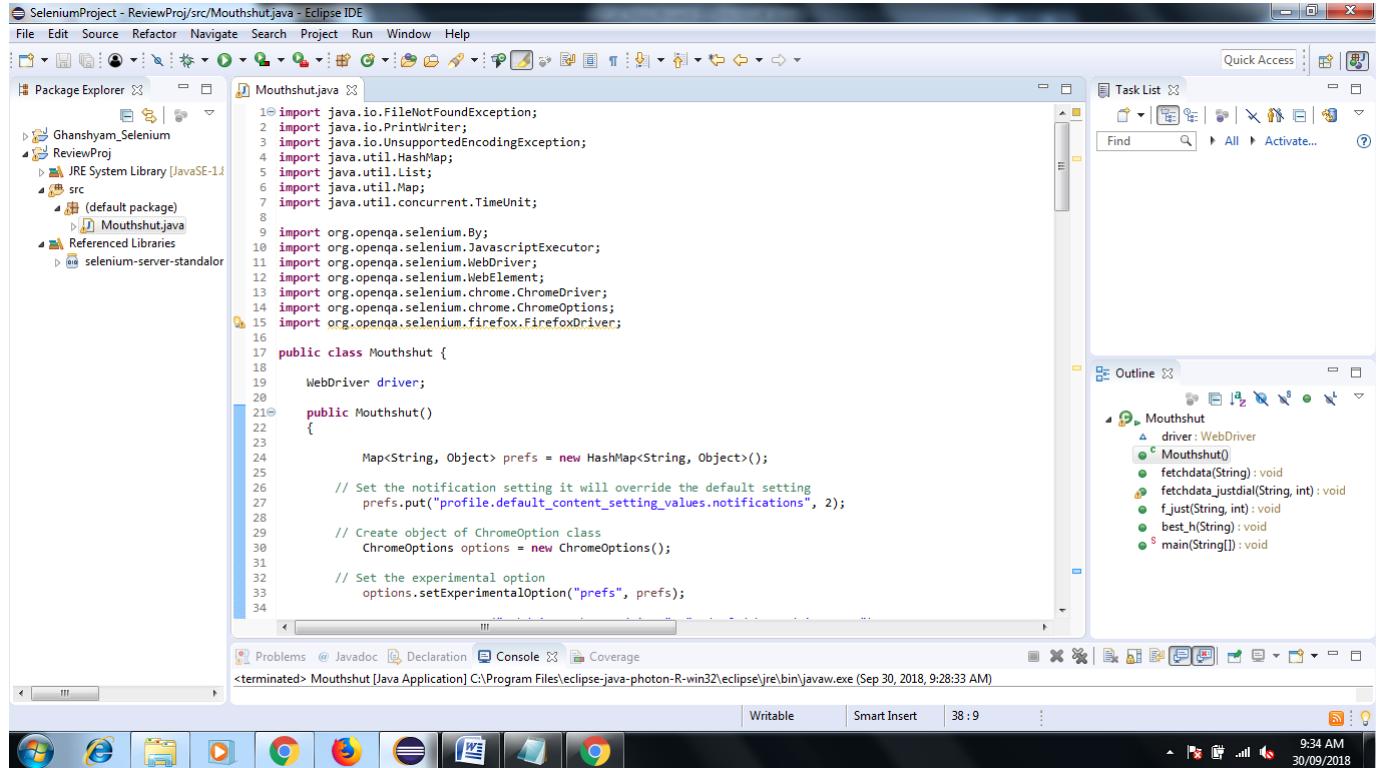
Link of Feedback of All Customer-

https://www.justdial.com/Nashik/SNJB-s-Late-Sau-Kantabai-Bhavarlalji-Jain-College-Of-Engineering-Neminagar-Chandwad/0253PX253-X253-151019113056-B2P9_BZDET/reviews/page-6

5. Now to save Feedback of all pages here I create one text file give name `C:\Users\admin\eclipse-workspace\SeleniumProject\ReviewProj\Snjb.txt`

Now First of All Execute Code here my file name Mouthshut.java

Mouthshut.com is website like Justdial.com



The screenshot shows the Eclipse IDE interface with the following details:

- Project Explorer:** Shows the project structure with packages Ghanshyam_Selenium and ReviewProj, and a source folder src containing the file Mouthshut.java.
- Mouthshut.java Content:** The code imports various Selenium and Java libraries, defines a class Mouthshut with a constructor, and sets up ChromeDriver options.
- Outline View:** Shows the class structure with methods like Mouthshut(), fetchdata(String, int), f_just(String, int), best_h(String), and main(String[]).
- Task List:** Displays a search bar and a list of tasks.
- Console:** Shows the command "terminated> Mouthshut [Java Application] C:\Program Files\eclipse-java-photon-R-win32\eclipse\jre\bin\javaw.exe (Sep 30, 2018, 9:28:33 AM)".
- Bottom Bar:** Includes icons for file operations and system status.

After Execution Code Mouthshut.java Chrome Browser Opened Automatically with Specified website you can also see the output of rating in console as well as file you created.

SeleniumProject - ReviewProj/src/Mouthshutjava - Eclipse IDE

File Edit Source Refactor Navigate Project Run Window Help

Package Explorer

Mouthshut.java

```

1 import java.io.FileNotFoundException;
2 import java.io.PrintWriter;
3 import java.io.UnsupportedEncodingException;

```

Problems Declaration Console Coverage

```

<terminated> Mouthshut [Java Application] C:\Program Files\eclipse-java-photon-R-win32\ eclipse\jre\bin\javaw.exe (Sep 30, 2018, 9:28:33 AM)
Starting ChromeDriver 2.40.565498 (eaa82db3280dd6843ebfb08a625e3e905c4f5ab) on port 40918
Only local connections are allowed.
Sep 30, 2018 9:28:41 AM org.openqa.selenium.remote.ProtocolHandshake createSession
INFO: Detected dialect: OSS

```

```

Name: Mr Ajay
Post :Good

Name: Mr Vaibhav
Post :Excellent

Name: Jayesh Jadhav
Post :Excellent

Name: Mr Yash
Post :Good

Name: Mr Prathmesh
Post :Very Good

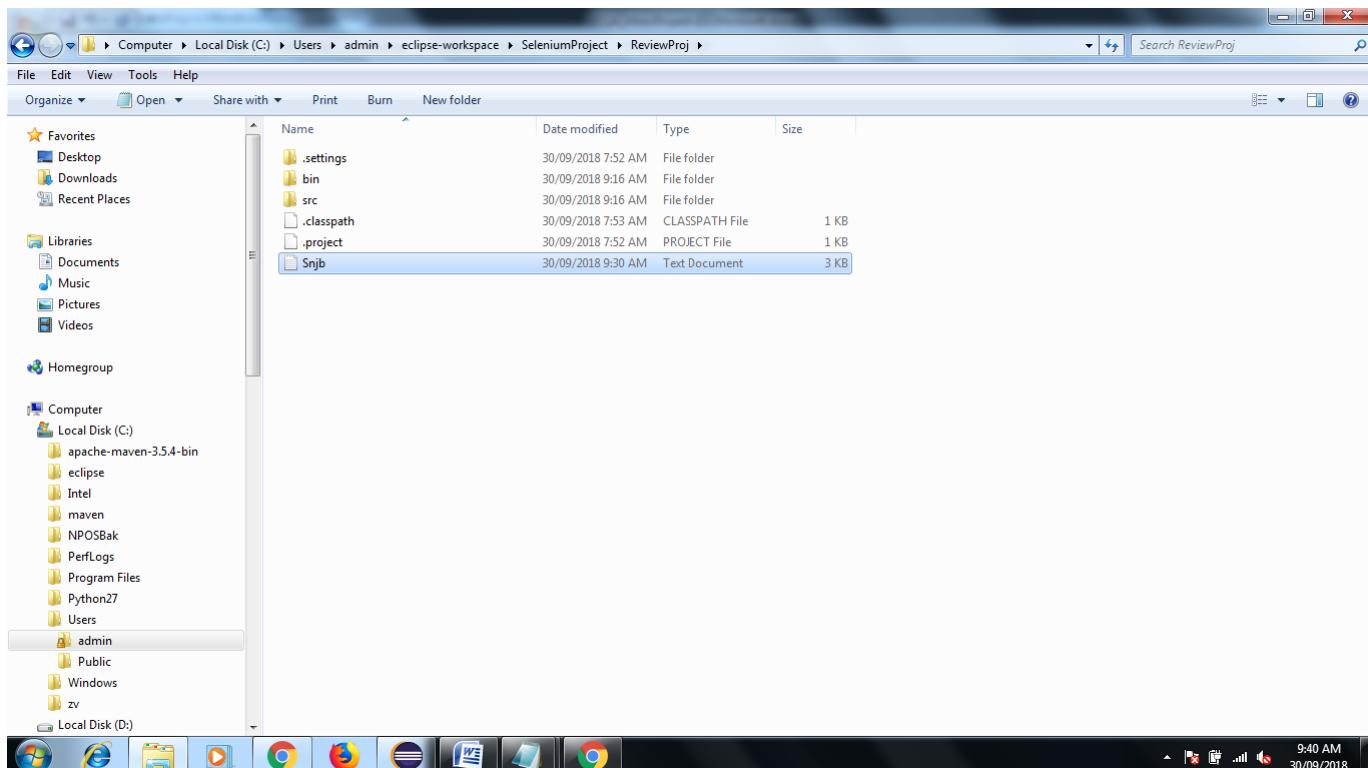
Name: Mr Amit

```

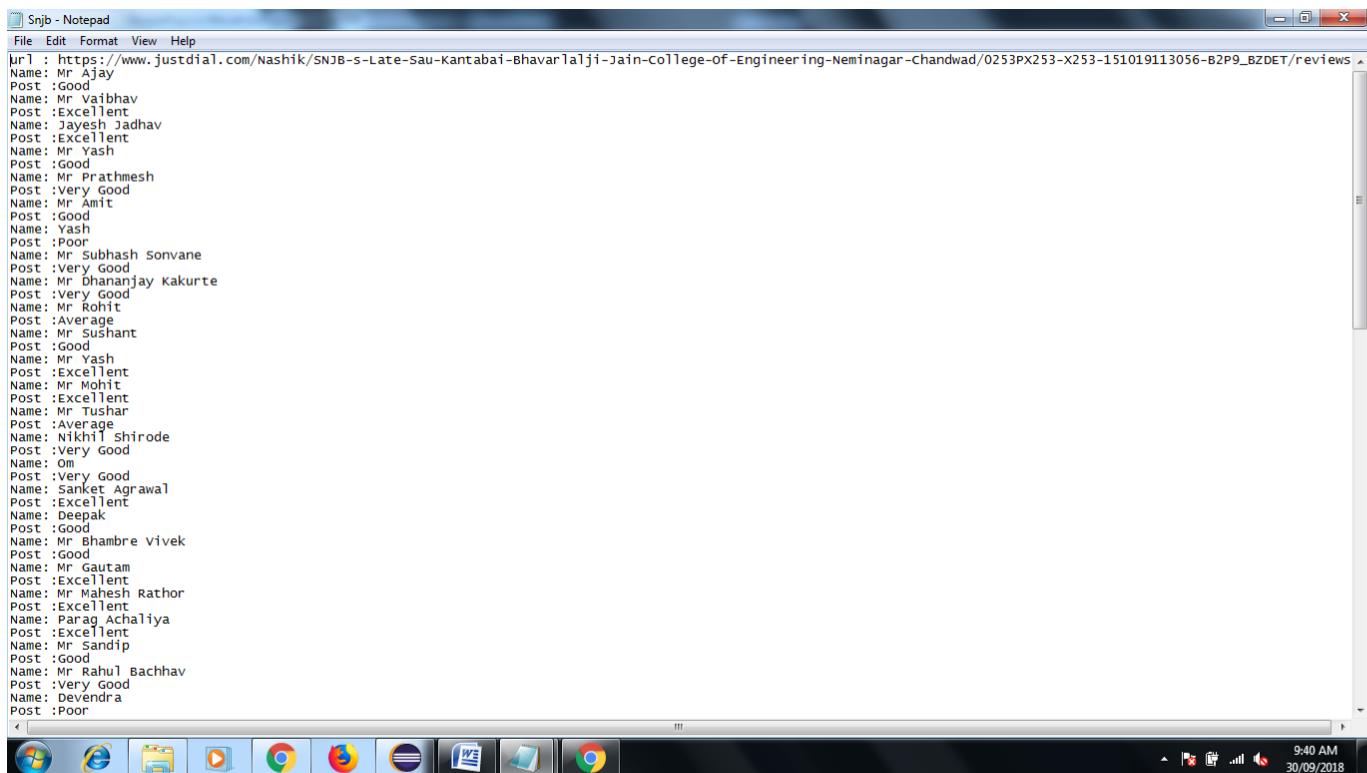
9:38 AM 30/09/2018

Now Lets Check the Feedback of All Customer go to your Eclipse Workspace Path my path is

C:\Users\admin\eclipse-workspace\SeleniumProject\ReviewProj\Snjb.txt



After Open Txt File See the Output



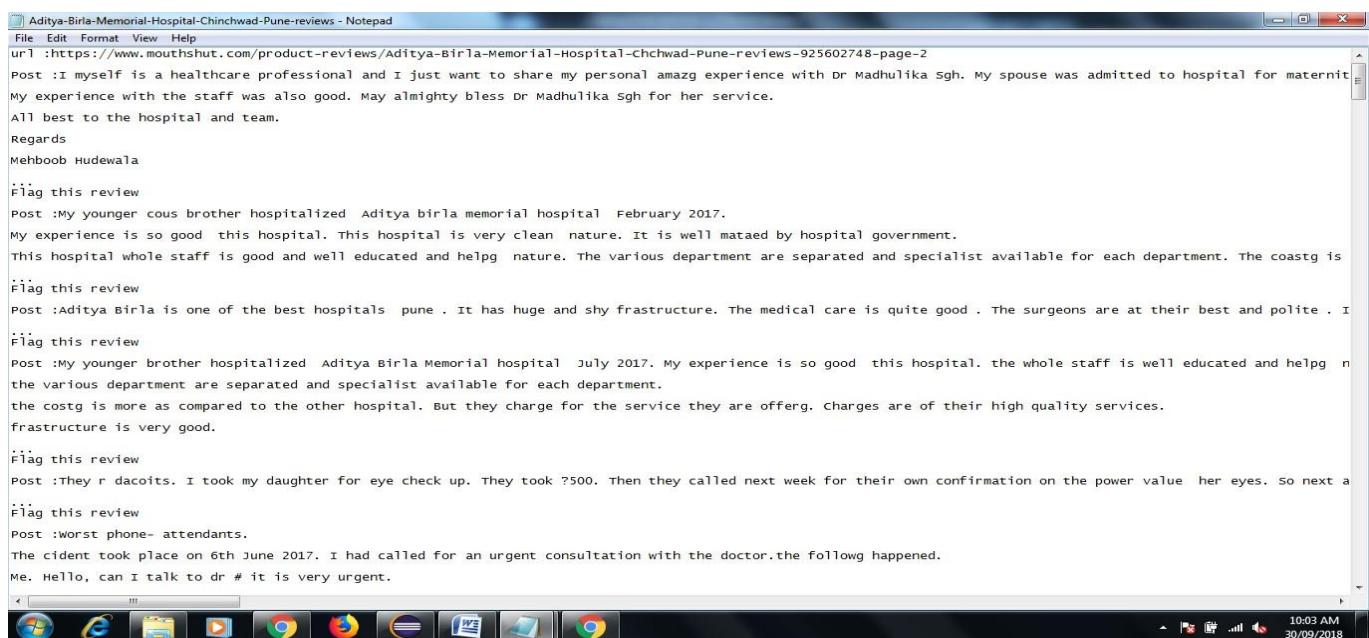
A screenshot of a Windows Notepad window titled "Snjb - Notepad". The window contains a large amount of text, which appears to be a list of reviews collected from the website https://www.justdial.com/Nashik/SNJB-s-Late-Sau-Kantabai-Bhavarlalji-Jain-College-Of-Engineering-Neminagar-Chandwad/0253PX253-X253-151019113056-B2P9_BZDET/reviews. The reviews include names like Mr. Ajay, Mr. Vaibhav, Jayesh Jadav, Mr. Yash, Mr. Prathmesh, Mr. Amit, Mr. Dhananjay Kakurte, Mr. Rohit, Mr. Sushant, Mr. Yash, Mr. Mohit, Mr. Anshar, Nikhil Shirode, Om, Sanket Agrawal, Deepak, Mr. Bhambre Vivek, Mr. Gautam, Mr. Mahesh Rathor, Parag Achaliya, Mr. Sandip, Mr. Rahul Bachhav, Devendra, and others. The reviews range from "Poor" to "Excellent" and "Very Good". The Notepad window has a standard Windows title bar and taskbar at the bottom.

In This you can Collect all different kind of colleges, hospital rating and review from various website like mouthshout.com, Justdial.com via Selenium Web driver Tool

Module-3 Now I want Collect Review of Aditya-Birla-Memorial-Hospital-Chinchwad-Pune

Link- <https://www.mouthshut.com/product-reviews/Aditya-Birla-Memorial-Hospital-Chinchwad-Pune-reviews-925602748-page-2>

After Execution of Code-



A screenshot of a Windows Notepad window titled "Aditya-Birla-Memorial-Hospital-Chinchwad-Pune-reviews - Notepad". The window contains a list of reviews collected from the website <https://www.mouthshut.com/product-reviews/Aditya-Birla-Memorial-Hospital-Chinchwad-Pune-reviews-925602748-page-2>. The reviews are from users like "I myself", "Mehboob Hudewala", and "They r dacoits". The reviews describe the hospital's facilities, staff, and services, including positive experiences and some complaints about costs and service charges. The Notepad window has a standard Windows title bar and taskbar at the bottom.

Selenium IDE:

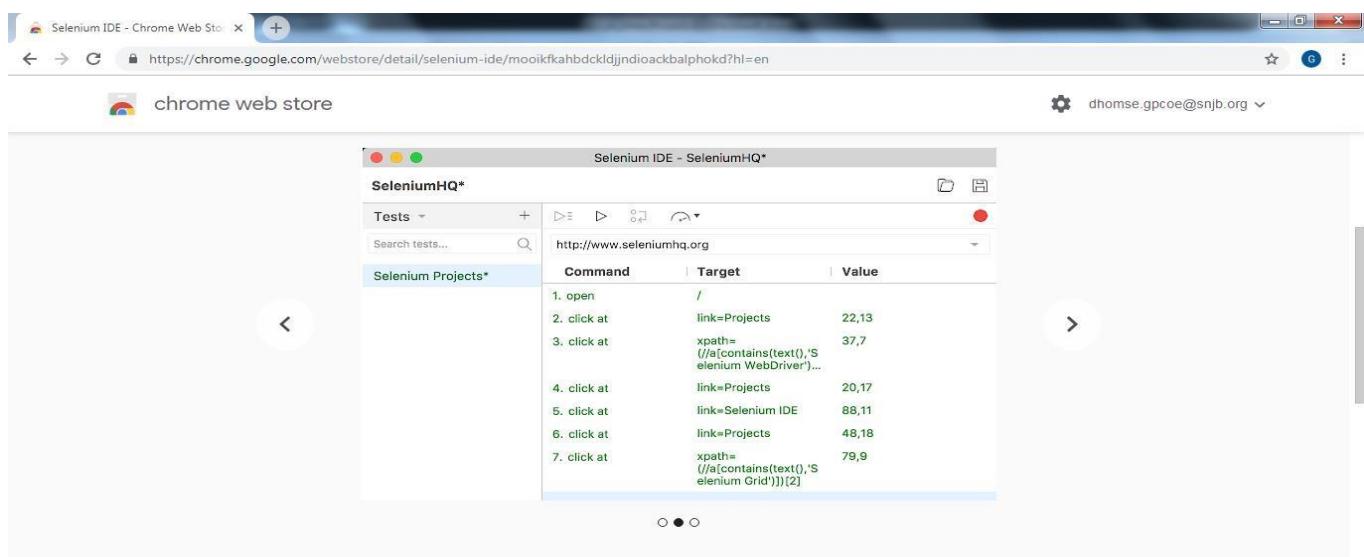
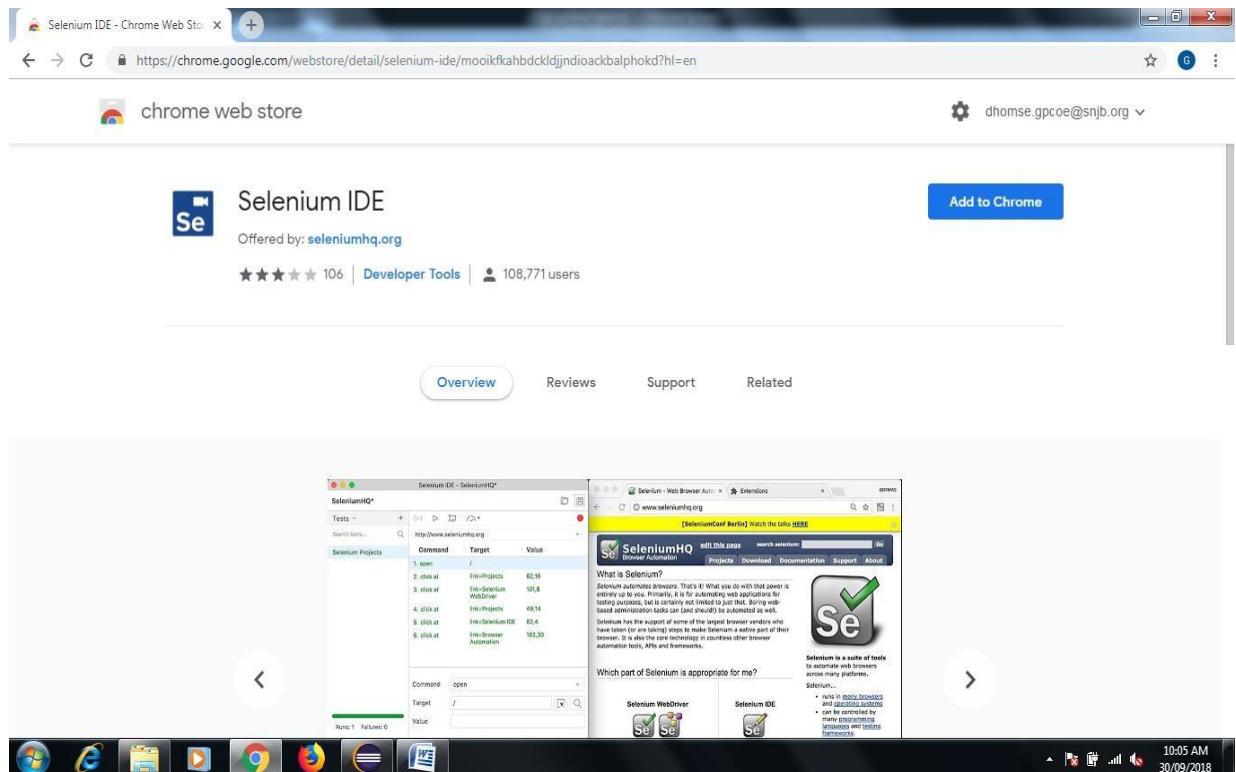
1. Download Selenium IDE Chrome Extension from following Link

<https://chrome.google.com/webstore/detail/selenium-ide/mooikfkahbdckldijndioackbalphokd?hl=en>

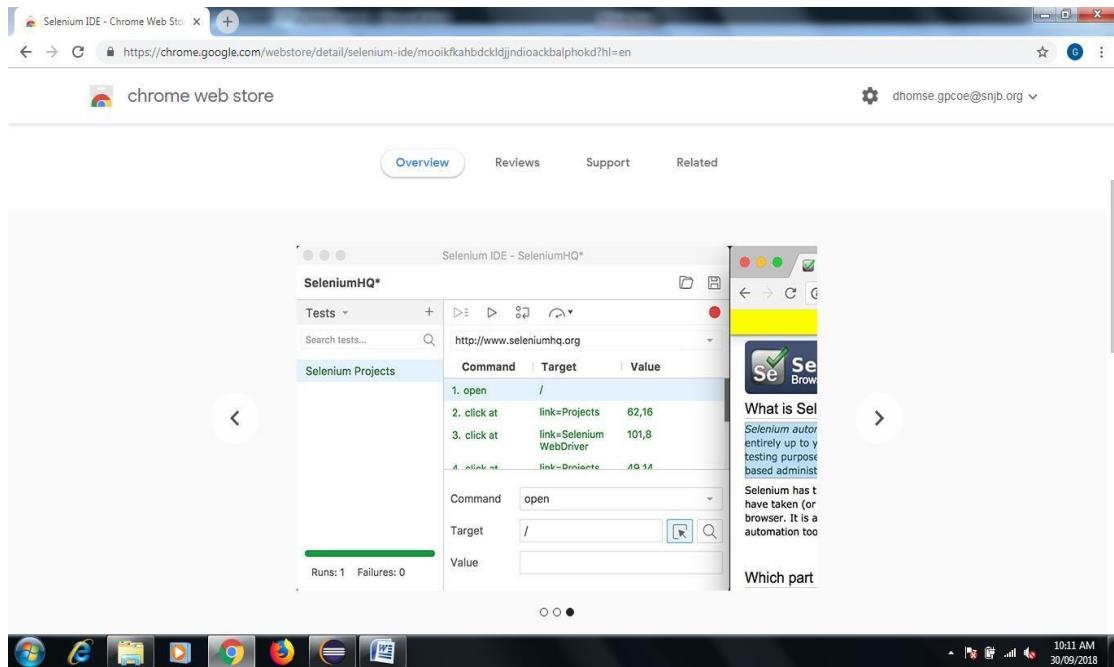
2. Click on Add to Chrome

3. Check the icon on of IDE Square in right side after browser after successfully installation to chrome

4. Now Click on record button do some operation on website...see the report in console of IDE command target and value....in this way you also find out xpath etc information.



You can also check the Automated Test Case Pass or Fails see the following figure



Oral Question

1. What is the difference between Selenium and QTP?
2. What is mean by Bug taxonomy?
3. How to verify error and message in selenium webdriver?
4. What are the different types of drivers available in WebDriver?
5. What are the different types of locators in selenium?

Conclusion

In this way you learn how to use Selenium Open Source Tool for perform Automation Testing on web based application.