# CASE TOOLS & SOFTWARE TESTING METHODOLOGIES LABORATORY (R17A0589)

## LAB MANUAL AND RECORD

## B.TECH (III YEAR – II SEM)

## (2019-2020)

## DEPARTMENT OF INFORMATION TECHNOLOGY

MALLAREDDY COLLEGE OF ENGINEERING & TECHNOLOGY
LIVE TO LEARN & LEARN TO SHARE

## MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**
Recognized under 2(f) and 12 (B) of UGC ACT 1956
Affiliated to JNTUH, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified
Maisammaguda, Dhulapally (Post Via. Hakimpet), Secunderabad – 500100, Telangana State, India

## DEPARTMENT OF INFORMATION TECHNOLOGY

**Vision**

- To acknowledge quality education and instill high patterns of discipline making the students technologically superior and ethically strong which involves the improvement in the quality of life in human race.

**Mission**

- To achieve and impart holistic technical education using the best of infrastructure, outstanding technical and teaching expertise to establish the students into competent and confident engineers.
- Evolving the center of excellence through creative and innovative teaching learning practices for promoting academic achievement to produce internationally accepted competitive and world class professionals.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

**PEO1 – ANALYTICAL SKILLS**

- To facilitate the graduates with the ability to visualize, gather information, articulate, analyze, solve complex problems, and make decisions. These are essential to address the challenges of complex and computation intensive problems increasing their productivity.

**PEO2 – TECHNICAL SKILLS**

- To facilitate the graduates with the technical skills that prepare them for immediate employment and pursue certification providing a deeper understanding of the technology in advanced areas of computer science and related fields, thus encouraging to pursue higher education and research based on their interest.

**PEO3 – SOFT SKILLS**

- To facilitate the graduates with the soft skills that include fulfilling the mission, setting goals, showing self-confidence by communicating effectively, having a positive attitude, get involved in team-work, being a leader, managing their career and their life.

**PEO4 – PROFESSIONAL ETHICS**

- To facilitate the graduates with the knowledge of professional and ethical responsibilities by paying attention to grooming, being conservative with style, following dress codes, safety codes, and adapting themselves to technological advancements.

## PROGRAM SPECIFIC OUTCOMES (PSOs)

After the completion of the course, B.Tech Information Technology, the graduates will have the following Program Specific Outcomes:

1. **Fundamentals and critical knowledge of the Computer System:-** Able to Understand the working principles of the computer System and its components , Apply the knowledge to build, asses, and analyze the software and hardware aspects of it .

2. **The comprehensive and Applicative knowledge of Software Development:** Comprehensive skills of Programming Languages, Software process models, methodologies, and able to plan, develop, test, analyze, and manage the software and hardware intensive systems in heterogeneous platforms individually or working in teams.

3. **Applications of Computing Domain & Research:** Able to use the professional, managerial, interdisciplinary skill set, and domain specific tools in development processes, identify the research gaps, and provide innovative solutions to them.

## PROGRAM OUTCOMES (POs)

**Engineering Graduates will be able to:**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design / development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. **Life- long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

Maisammaguda, Dhulapally Post, Via Hakimpet, Secunderabad – 500100

## DEPARTMENT OF INFORMATION TECHNOLOGY

## GENERAL LABORATORY INSTRUCTIONS

1. Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed into the lab.
2. Plan your task properly much before to the commencement, come prepared to the lab with the synopsis / program / experiment details.
3. Student should enter into the laboratory with:
   a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for the lab session.
   b. Laboratory Record updated up to the last session experiments and other utensils (if any) needed in the lab.
   c. Proper Dress code and Identity card.
4. Sign in the laboratory login register, write the TIME-IN, and occupy the computer system allotted to you by the faculty.
5. Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.
6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.
7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.
9. Students must take the permission of the faculty in case of any urgency to go out ; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.
10. Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

**Head of the Department** **Principal**

**Course Educational Objectives:**

The objectives of this laboratory are:

1. Understand how UML supports the entire OOAD process.
2. Become familiar with all phases of OOAD.
3. Be able to understand the essential characteristics of tools used for designing a model.
4. Understand different software testing tools and their features
5. Manage the project from beginning to end
6. Define, formulate and analyze a problem
7. To learn how to write software testing documents, and communicate with engineers invarious forms. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

**Course Outcomes:**

Upon the completion of practical course Case tools & Software testing Lab, the student will be able to attain the following things:

1. Able to understand the history, cost of using and building CASE tools.
2. Ability to construct and evaluate hybrid CASE tools by integrating existing tools.
3. Understand the myths and facts of software testing.
4. Analyze and design test cases using black box testing technique which includes decision tables domain testing and transition testing.
5. Analyze and design test cases for a white box testing technique which includes path testing, data flow graphs and matrix representation for a given problem.
6. Execute how to run test script wizard and Execute how to do performance testing using testing tools including Selenium and JMeter respectively.
7. Demonstrate the importance of testing and its role in need of software development

## CASE TOOLS & STM LIST OF PROGRAMS

**Introduction**

CASE tools known as Computer-aided software engineering tools is a kind of component- based development which allows its users to rapidly develop information systems. The main goal of case technology is the automation of the entire information systems development life cycle process using a set of integrated software tools, such as modelling, methodology and automatic code generation. Component based manufacturing has several advantages over custom development. The main advantages are the availability of high quality, defect free products at low cost and at a faster time. The prefabricated components are customized as per the requirements of the customers. The components used are pre-built, ready-tested and add value and differentiation by rapid customization to the targeted customers. However the products we get from case tools are only a skeleton of the final product required and a lot of programming must be done by hand to get a fully finished, good product. Characteristics of CASE:
Some of the characteristics of case tools that make it better than customized development are;

It is a graphic oriented tool.

It supports decomposition of process. Some typical CASE tools are:
Unified Modeling Language

Data modeling tools, and

Source code generation tools

## UNIFIED MODELING LANGUAGE

### Introduction

The unified modeling language (UML) is a standard language for writing software blue prints of the system.

**Definition:**

The UML is a language for

- Visualizing
- Specifying
- Constructing
- Documenting

the artifacts of a software system.

- UML is a language that provides vocabulary and the rules for combing words in that vocabulary for the purpose of communication.
- Vocabulary and rules of a language tell us how to create and real well formed models, but they don‟t tell you what model you should create and when should create them.

Building Blocks of the UML:

The vocabulary of the UML encompasses three kinds of building blocks:

1. Things
2. Relationships

3. Diagrams

Things are abstractions that are first-class citizens in a model; Relationships tie these things together;
Diagrams group interesting collections of things.

## Things

Things are the most important building blocks of UML. There are four kinds of things in the UML.

1. Structural things
2. Behavioral things
3. Grouping things
4. Annotational things

### 1) STRUCTURAL THINGS:

Structural things are the nouns of the UML models.

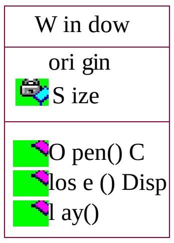
These are static parts of the model, representing elements that are either conceptual or physical.

There are seven kinds of Structural things.

1. Class
2. Interface
3. Collaboration
4. Use case
5. Active class
6. Component
7. Node

**Class:**

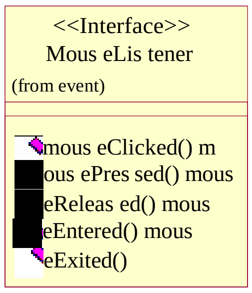
A class is a description of a set of objects that shares the common attributes, operations, relationships, and semantics. A class implements one or more interfaces.Graphically, a class is represented as a rectangle, usually including its name, attributes and operations, as shown below.

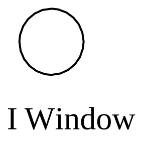


**Interface:**

An interface is a collection of operations that specify a service of a class or component. An interface describes the externally visible behavior of that element.

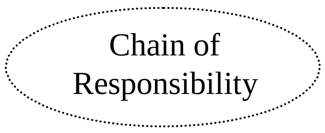
Graphically the interface is rendered as a circle together with its name.





**Collaboration:**

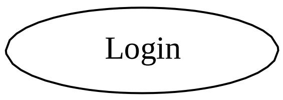
Collaboration defines an interaction and is a society of roles and other elements that work together to provide some cooperative behavior that‟s bigger than the sum of all the elements. Graphically, collaboration is rendered as an ellipse with dashed lines, usually including only its name as shown below.



**UseCase:**

Use case is a description of a set of sequence of actions performed by a system for a specific goal for the system.

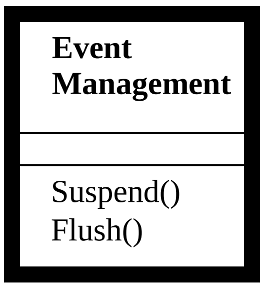
Graphically, Use Case is rendered as an ellipse with dashed lines, usually including only its name as shown below.



**ActiveClass:**

An active class is a class whose objects own one or more processes or threads and therefore can initiate control activity.

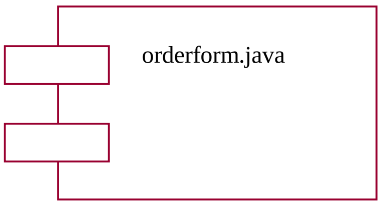
Graphically, an active class is rendered just like a class, but with heavy lines usually including its name, attributes and operations as shown below.



**Component:**

Component is a physical and replaceable part of a system that conforms to and provides the realization of a set of interfaces.

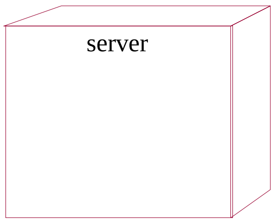
Graphically, a component is rendered as a rectangle with tabs, usually including only its name, as shown below.



**Node:**

A Node is a physical element that exists at run time and represents a computational resource, generally having at least some memory and often, processing capability.

Graphically, a node is rendered as a cube, usually including only its name, as shown below.



**2) BEHAVIORAL THINGS:**

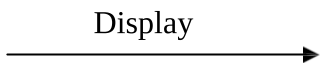
Behavioral things are the dynamic parts of UML models.

These are the verbs of a model, representing behavior over time and space.

***1) Interaction:***

An interaction is a behavior that consists of a set of messages exchanged among a set of objects(elements) within a particular context to accomplish a specific task.

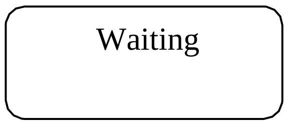
Graphically, a message is rendered as a direct line, almost always including the name if its operation, as shown below.



***2) State Machine:***

A state machine is a behavior that specifies the sequence of states of an object in its life cycle. It defines the sequence of states an object goes through in response to events.

Graphically, a state is rendered as a rounded rectangle usually including its name and its sub-states, if any, as shown below.



***3)* GROUPING THINGS:**

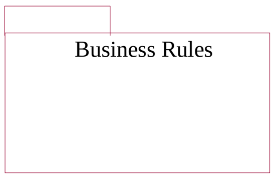
Grouping things are the organizational parts of the UML models. These are the boxes into which a model can be decomposed.

There is one primary kind of grouping thing with “package”.

**Package:**

A package is a general-purpose mechanism for organizing elements into groups.

Package is the only one grouping thing available for gathering structural and behavioral things.



Package

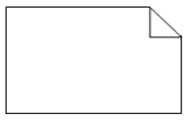
***4)* ANNOTATIONAL THINGS:**

An notational things are the explanatory parts of the UML models.

An notational things can be defined as a mechanism to capture remarks, descriptions, and comments of UML model elements.

**Note:** A note is simply a symbol for rendering constraints and comments attached to an element or a collection of elements.

Graphically a note is represented as a rectangle with dog-eared corner together, with a textual or graphical comment, as shown below.



Note

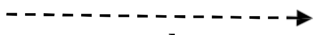
**RELATIONSHIPSINTHEUML:**

Relationship is another most important building block of UML. It shows how elements are associated with each other and this association describes the functionality of an application. There are four kinds of relationships in the UML:

1. Dependency
2. Association
3. Generalization
4. Realization

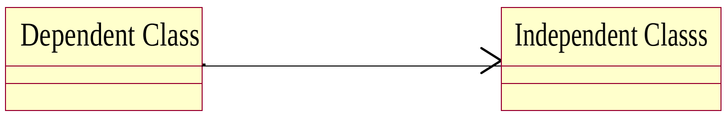
***Dependency***

Dependency is a relationship between two things in which change in one element also affects the other one.



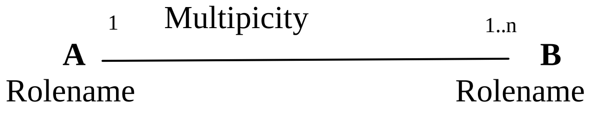
Dependency

Ex:



***Association:***

Association is basically a set of links that connects elements of an UML model. It also describes how many objects are taking part in that relationship.

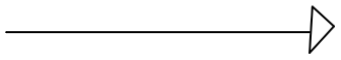


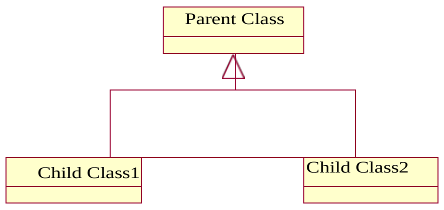
**Association**

***Ex:Generalization:***

Generalization can be defined as a relationship which connects a specialized element with a generalized element. It basically describes inheritance relationship in the world of objects.

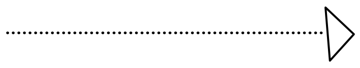
Ex:



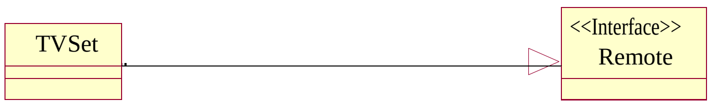


***Realization:***

Realization can be defined as a relationship in which two elements are connected. One element describes some responsibility which is not implemented and the other one implements them. This relationship exists in case of interfaces.



Ex:



<u>**DIAGRAMSINUML:**</u>

All the elements, relationships are used to make a complete UML diagram and the diagram represents a system.

The visual effect of the UML diagram is the most important part of the entire process.

Each UML diagram is designed to let developers and customers view a software system from a different perspective and in varying degrees of abstraction.

UML diagrams are the ultimate output of the entire system.

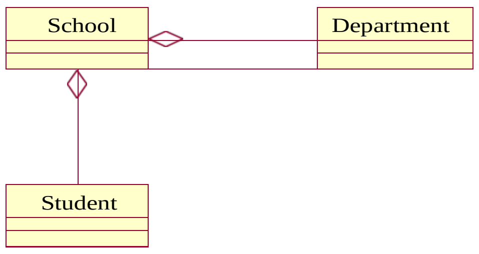
A diagram is the graphical presentation of a set of elements ,most often rendered as a connected graph of vertices(things) arcs (relationships).

UML includes the following nine diagrams:

1) Class diagram
2) Object diagram
3) Use case diagram
4) Sequence diagram
5) Collaboration diagram
6) Activity diagram
7) State chart diagram
8) Deployment diagram
9) Component diagram

## 1. ClassDiagram

Class diagram is a diagram that shows a set of classes, interfaces, and collaborations and their relationships. Class diagrams address the static design view or the static process view of the system.
Graphically it is represented as follows:-

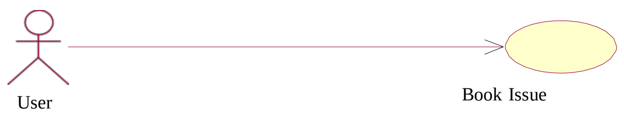


## 2. ObjectDiagram

Object diagram shows a set of objects and their relationships. These diagram the static design view or static process view of a system.

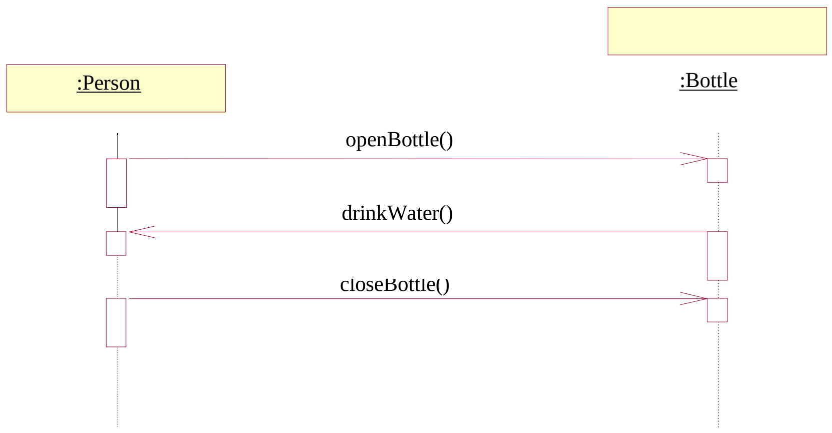
## 3. UsecaseDiagram

Use Case diagram shows a set of use cases and actors (a special kind of class) and their relationships. These diagrams address the static use case view of a system. Graphically it is represented as follows:-



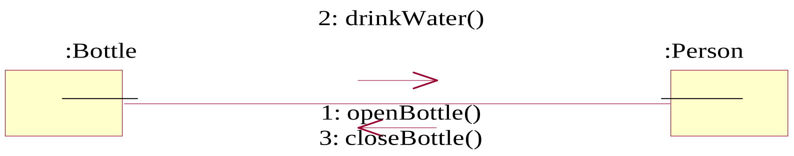
## 4. SequenceDiagram

Sequence diagram are interaction diagrams. This diagram emphasizes the time-ordering of messages. These diagrams address the dynamic view of a system. Sequence Diagram displays the time sequence of the objects participating in the interaction. This consists of the vertical dimension (time) and horizontal dimension (different objects).Graphically it is represented as follows:-



## 5 Collaboration Diagram

Collaboration diagram are also interaction diagrams. These diagrams emphasizes the structural organization of the objects that send and receive messages. These diagrams address the dynamic view of a system. Collaboration Diagram displays an interaction organized around the objects and their links to one another. Numbers are used to show the sequence of messages.Graphically it is represented as follows:-



## 6. Statechart Diagram

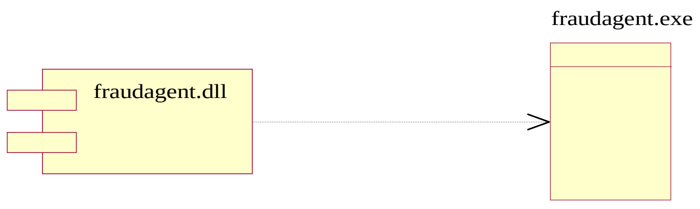
State chart diagram shows a state machine, consisting of states, transitions, events and activities. These diagrams address the dynamic view of the system. State Chart diagram displays the sequences of states that an object of an interaction goes through during its life in response to received stimuli, together with its responses and actions.

## 7 .Activity Diagram

Activity diagram is a special kind of a state chart diagram that shows the flow from activity to activity within a system. These diagrams address dynamic view of a system. Activity Diagram displays a special state diagram where most of the states are action states and most of the transitions are triggered by completion of the actions in the source states. Graphically it is represented as follows:-

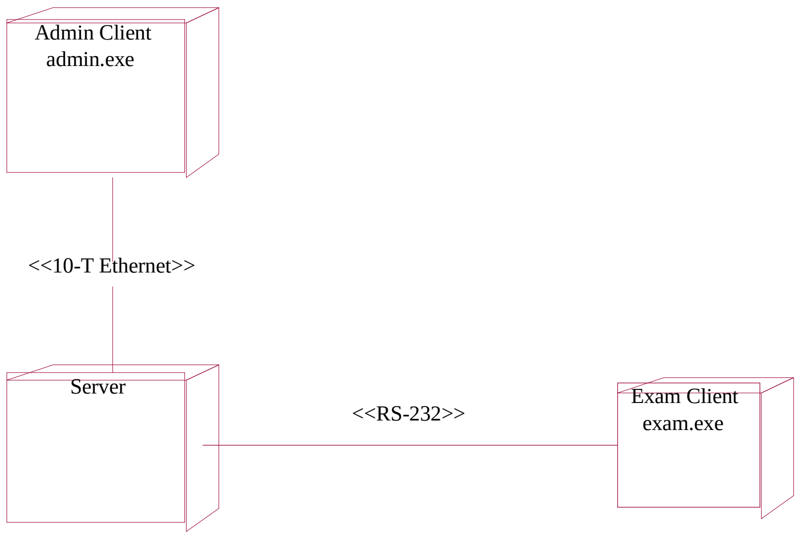
## 8. **ComponentDiagram**

Component diagram shows the organizations and dependencies among a set of components. These diagrams address the static implementation of view of a system. Component Diagram displays the high level packaged structure of the code itself. Dependencies among components are shown, including source code components, binary code components, and executable components. Some components exist at compile time, at link time, at run times well as at more
than one time.Graphically it is represented as follows:-



## 9. **Deployment Diagram**

Deployment diagram shows the configuration of run-time processing nodes and the components that live on them. These diagrams address the static deployment view of architecture. Deployment Diagram displays the configuration of run-time processing elements and the software components, processes, and objects that live on them. Software component instances represent run-time manifestations of code.
Graphically it is represented as follows:-



Experiment 1

# ATM System

# Automatic Teller Machine (ATM)

**Description of ATM System**

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash, a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank‟s computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) – both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned – except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between anytwo accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to thecard.
5. A customer must be able to abort a transaction in progress bypressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.)

If the bank determines that the customer‟s PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.

If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction.

The ATM will provide the customer with a printed receipt for each successful transaction, showing the date, time, machine location, type of transaction, account(s), amount, and ending and available
balance(s) of the affected account ("to" account for transfers).

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

**Objectives**

The objective of this software is similar to ATM software installed in ATM center. It should first validate the pin in the ATM card. Then the type of transaction is enquired and the information from the customer is validated. If it is a withdrawal the amount is asked. After the money is delivered the transaction just made is updated in the database where the customer‟s information is stored.

**Scope**

The scope of the project is to design an ATM system that will help in completely automatic banking this software is going to be designed for withdrawal and deposit of money and register the transaction in the database where the customer‟s information is stored.

**A) Name of the experiment: C**lass diagram for ATM System

**1. AIM**: To design and implement ATM system through Class Diagram

**Purpose:**

The purpose of the class diagram is to model the static view of an application. The class diagrams are the only diagrams which can be directly mapped with object oriented languages and thus widely used at the time of construction. The UML diagrams like activity diagram, sequence diagram can only give the sequence flow of the application but class diagram is a bit different. So it is the most popular UML diagram in the coder community. So the purpose of the class diagram can be summarized as:

- Analysis and design of the static view of an application.
- Describe responsibilities of a system.
- Base for component and deployment diagrams.
- Forward and reverse engineering.

**Contents:**

Class diagrams commonly contain the following things

- Classes
- Interfaces
- Collaborations
- Dependency, generalization and association relationships

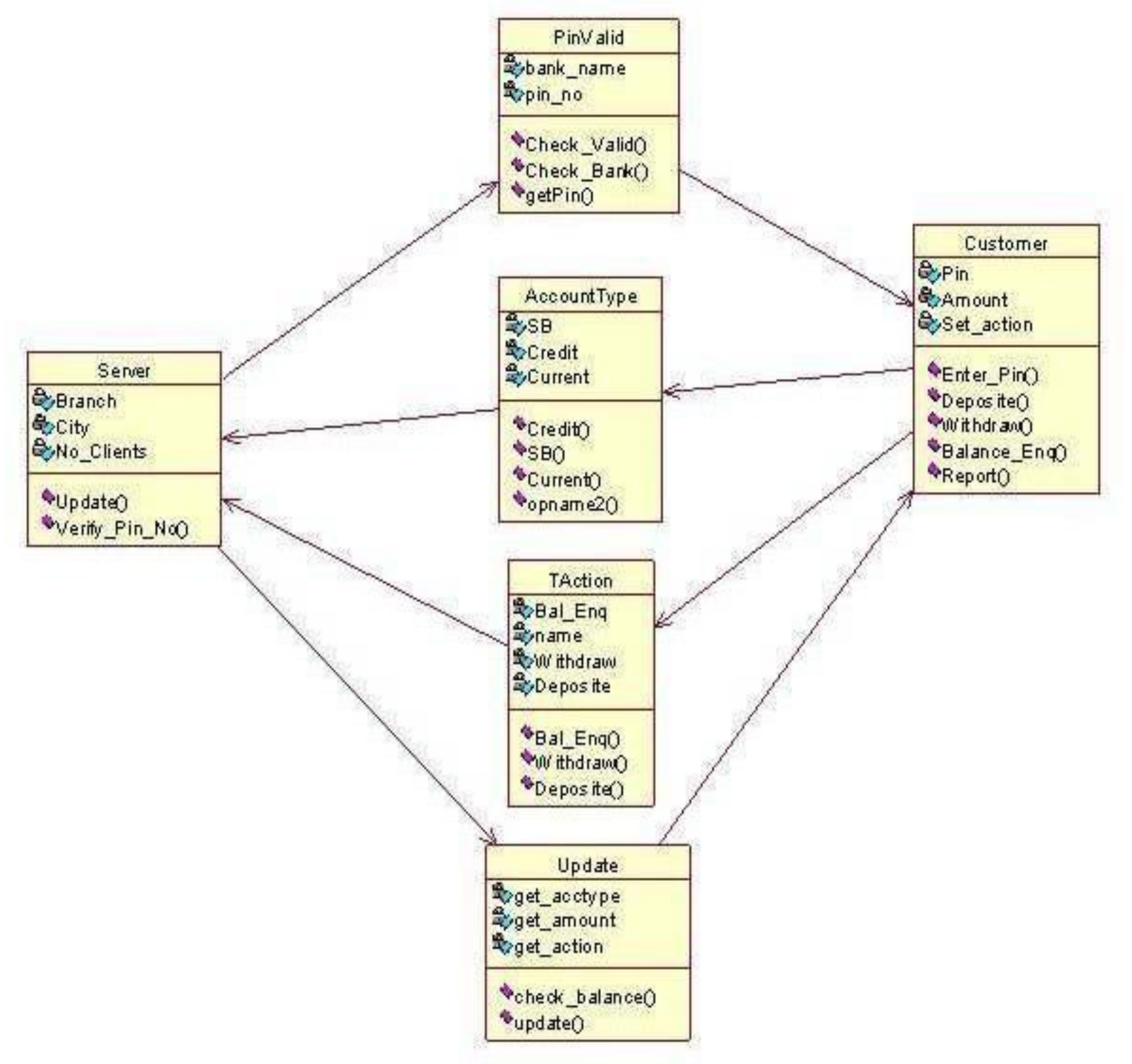
**Procedure:-**

**Step1**: First Classes are created.

**Step2**: Named as PinValid, Account Type, Transaction, Update, Server, Customer classes are created.

**Step3:** Appropriate relationships are provided between them as association.

**DIAGRAM:**



**Inferences:**

1. understand the concept of classes
2. identify classes and attributes and operations for a class
3. model the class diagram for the system

**Applications:**

Online transaction
Online banking

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**B) NAME OF EXPERIMENT:** Use case diagram for ATMSystem.

**AIM: To** design and implement ATM System through Use case Diagram.

**Purpose:**

The purpose of use case diagram is to capture the dynamic aspect of a system. Because other four diagrams (activity, sequence, collaboration and State chart) are also having the same purpose. So we will look into some specific purpose which will distinguish it from other four diagrams. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. So when a system is analyzed to gather its functionalities use cases are prepared and actors are identified.

So in brief, the purposes of use case diagrams can be as follows:

- Used to gather requirements of a system.
- Used to get an outside view of a system.
- Identify external and internal factors influencing the system.
- Show the interacting among the requirements are actors.

**<u>Procedure:</u>**

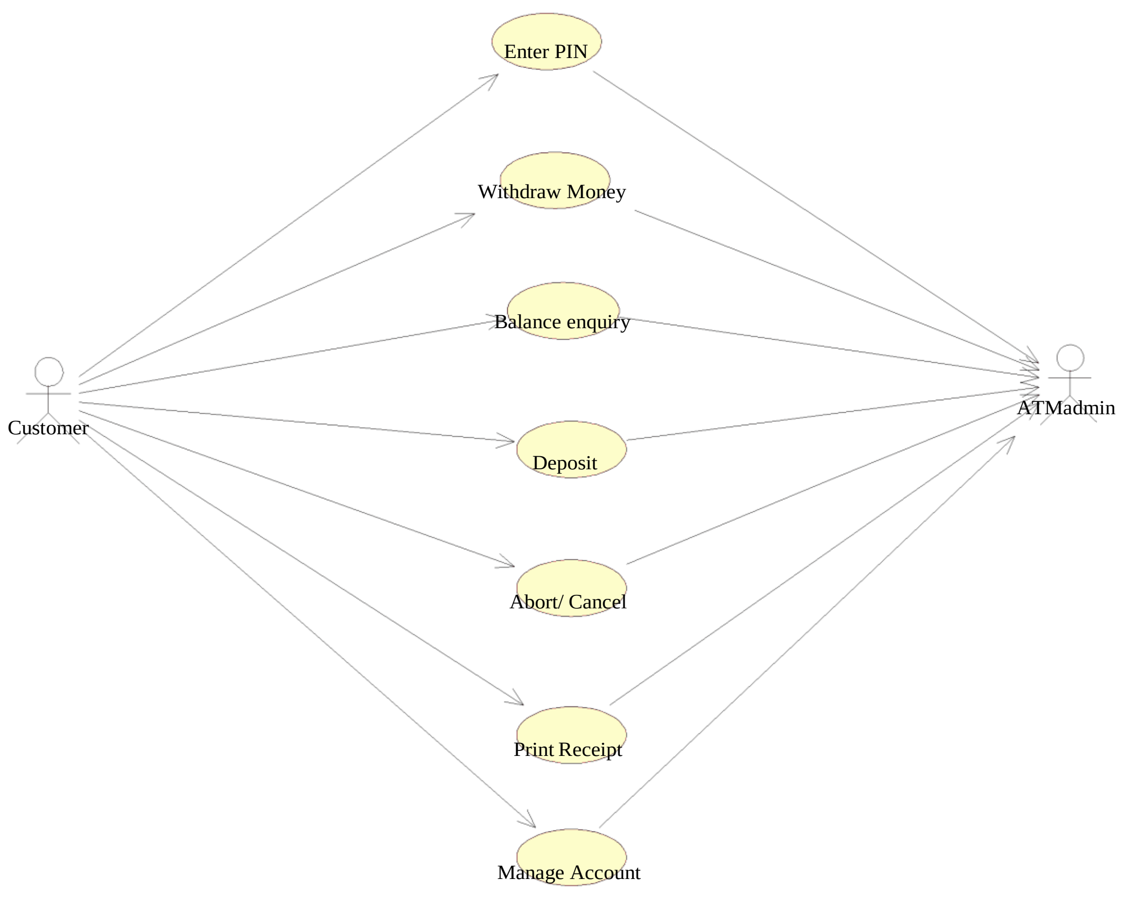
**Step1:** First an Actor is Created and named as User/Customer.

**Step2:** Secondly a system is created for ATM.

**Step3:** A use case Enter PIN, Withdraw money is created and connected with user as association relationship.

**Step4**: Similarly various use cases like Deposit money, Balance Enquiry, Manage Account etc are created and appropriate relationships are associated with each of them.

**DIAGRAM:**



## <u>Withdrawal UseCase</u>

A withdrawal transaction asks the customer to choose a type of account to withdraw from (e.g. checking) from a menu of possible accounts, and to choose an amount from a menu of possible amounts. The system verifies that it has sufficient money on hand to satisfy the request before sending the transaction to the bank. (If not, the customer is informed and asked to enter a different amount.) If the transaction is approved by the bank, the appropriate amount of cash is dispensed by the machine before it issues a receipt. A withdrawal transaction can be cancelled by the customer pressing the Cancel key any time prior to choosing the amount.

## <u>Deposit UseCase</u>

A deposit transaction asks the customer to choose a type of account to deposit to (e.g. checking) from a menu of possible accounts, and to type in amount on the keyboard. The transaction is initially sent to the bank to verify that the ATM can accept a deposit from this customer to this account. If the transaction is approved, the machine accepts an envelope from the customer containing cash and/or checks before it issues a receipt. Once the envelope has been received, a second message is sent to the bank, to confirm that the bank can credit the customer‟s account – contingent on manual verification of the deposit envelope contents by an operator later.

A deposit transaction can be cancelled by the customer pressing the Cancel key any time prior to inserting the envelope containing the deposit. The transaction is automatically cancelled if the customer fails to insert the envelope containing the deposit within a reasonable period of time after being asked to do so.

**InquiryUseCase**

An inquiry transaction asks the customer to choose a type of account to inquire about from a menu of possible accounts. No further action is required once the transaction is approved by the bank before printing the receipt. An inquiry transaction can be cancelled by the customer pressing the Cancel key any time prior to choosing the account to inquire about.

**ValidateUserUsecase:**

This use case is for validate the user i.e. check the pin number, when the bank reports that the customer‟s transaction is disapproved due to an invalid PIN. The customer is required to re-enter the PIN and the original request is sent to the bank again. If the bank now approves the transaction, or disapproves it for some other reason, the original use case is continued; otherwise the process of re-entering the PIN is repeated. Once the PIN is successfully re-entered

If the customer fails three times to enter the correct PIN, the card is permanently retained, a screen is displayed informing the customer of this and suggesting he/she contact the bank, and the entire customer session is aborted.

**PrintBillusecase**

This usecase is for printing corresponding bill after transactions (withdraw or deposit, or balance enquiry, transfer) are completed.

**ManageAccount**

This use case is for updating corresponding user accounts after transactions (withdraw or deposit or transfer) are completed.

**RESULT:**

**Inferences:**
1. Identification of use cases.
2. Identification of actors.

## <u>INTERACTIONDIAGRAMS</u>

We have two types of interaction diagrams in UML. One is sequence diagram and the other is a collaboration diagram. The sequence diagram captures the time sequence of message flow from one object to another and the collaboration diagram describes the organization of objects in a system taking part in the message flow.

So the following things are to be identified clearly before drawing the interaction diagram:

1. Objects taking part in the interaction.
2. Message flows among the objects.
3. The sequence in which the messages are flowing.
4. Object organization.

**Purpose:**

1. To capture dynamic behavior of a system.
2. To describe the message flow in the system.
3. To describe structural organization of the objects.
4. To describe interaction among objects.

**Contents of a Sequence Diagram**

Objects
Focus of control
Messages
Life line

**Contents of a Collaboration Diagram**

Objects
Links
Messages

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**C) NAME OF EXPERIMENT:** Sequence diagram for ATMSystem.

**AIM: To** design and implement ATM System through Sequence Diagram.

**Procedure:-**

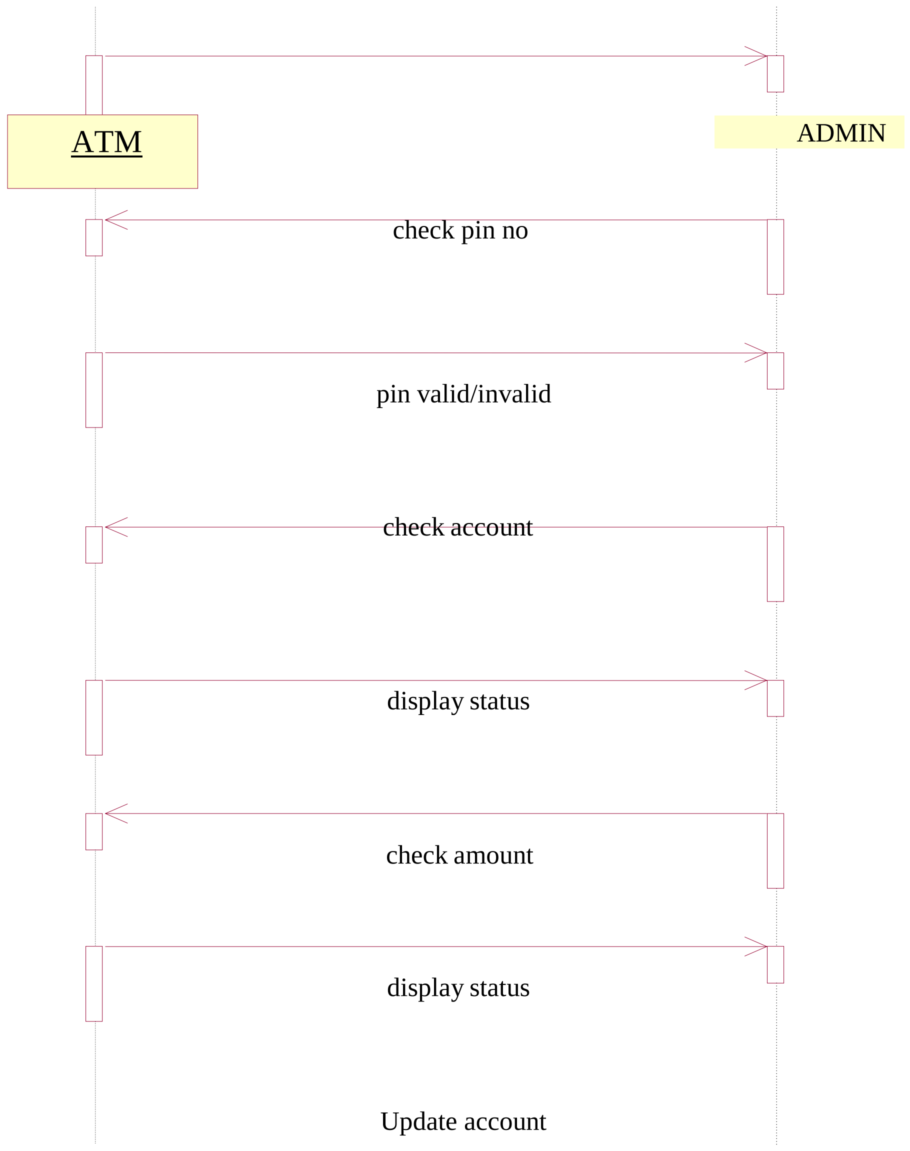
**Step1:** First An actor is created and named as user.

**Step2:** Secondly an object is created for Atm.

**Step3:** Timelines and lifelines are created automatically for them.

**Step4**: In sequence diagram interaction is done through time ordering of messages. So appropriate messages are passed between user and ATM is as shown in the figure.

**DIAGRAM:**



## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**D) NAME OF EXPERIMENT:** collaboration for ATM System.

**AIM:** To design and implement ATM System through Collaboration diagram.

**<u>Procedure:-</u>**

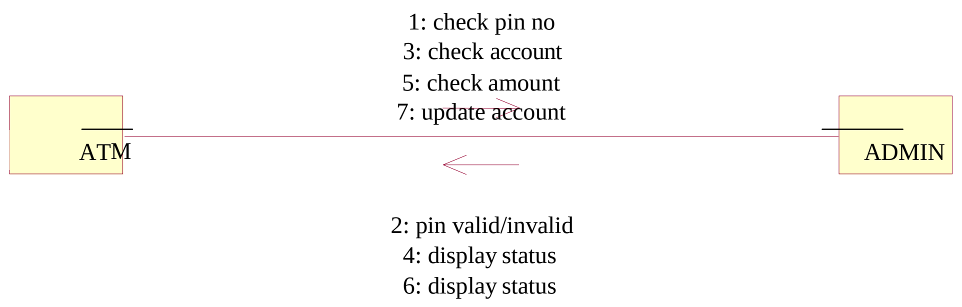
**Step1:** First an actor is created and named as user.

**Step2:** Secondly an object is created for ATM.

**Step3:** In collaboration diagram interaction is done through organization.

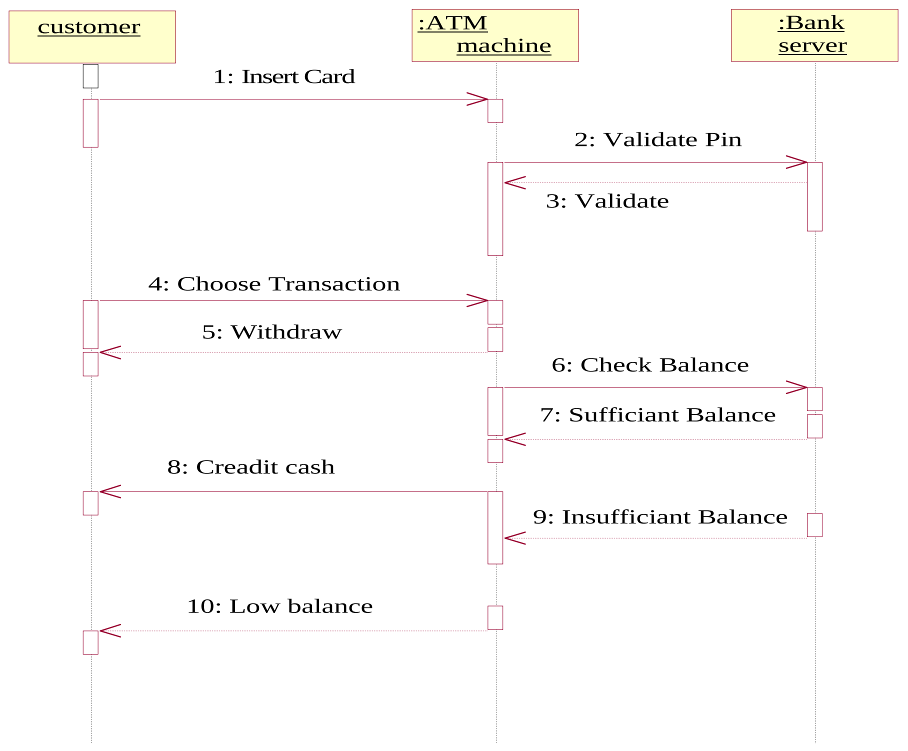
**Step4:** So appropriate messages are passed between user and ATM as shown in the figure.

**DIAGRAM:**

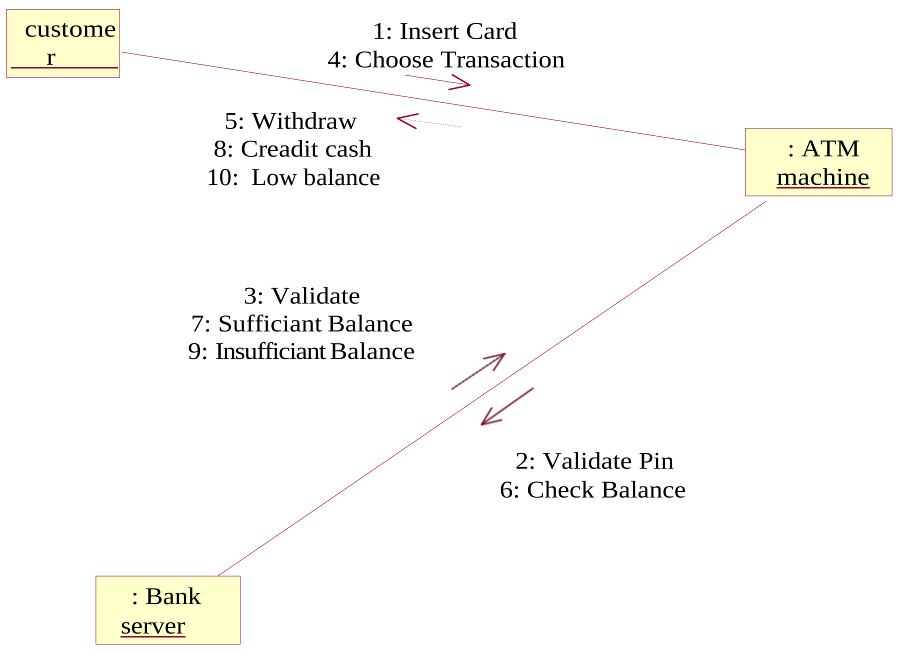


## WITHDRAW UseCase:

SEQUENCE DIAGRAM

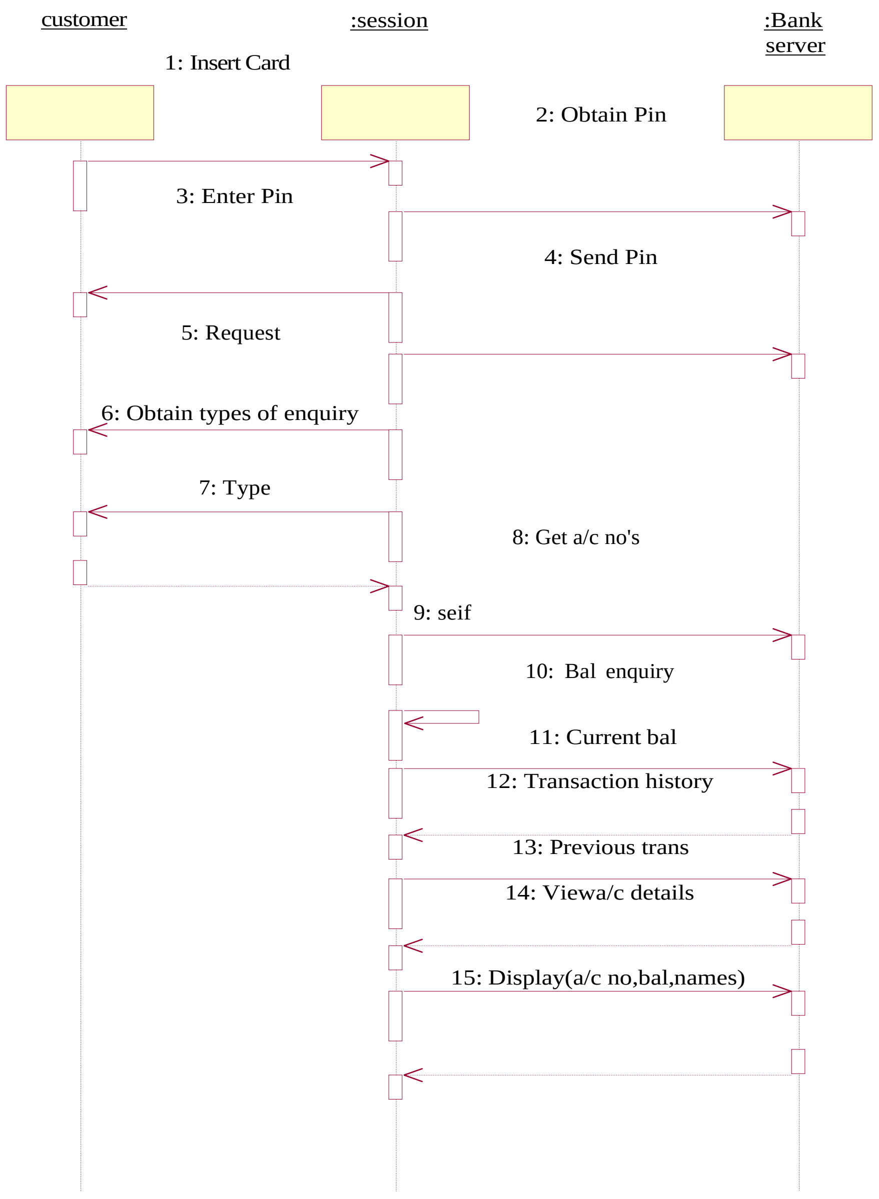


COLLABORATION DIAGRAM

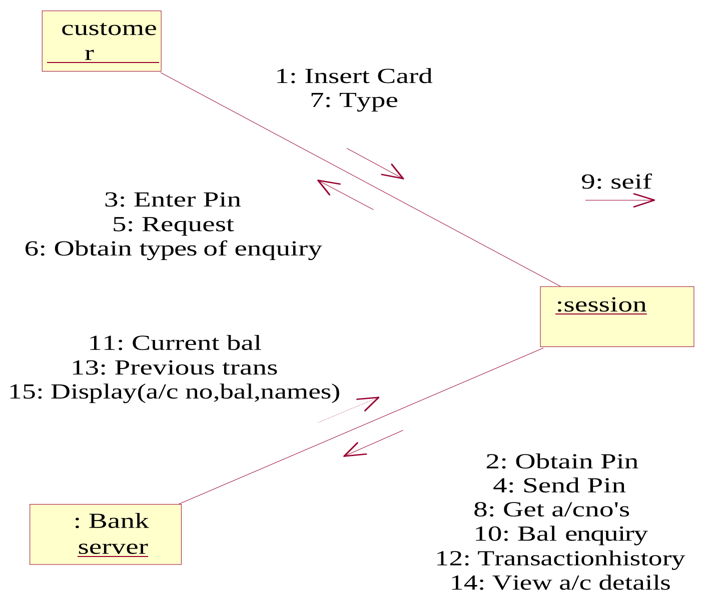


## ENQUIRY UseCase:

## SEQUENCE DIAGRAM:

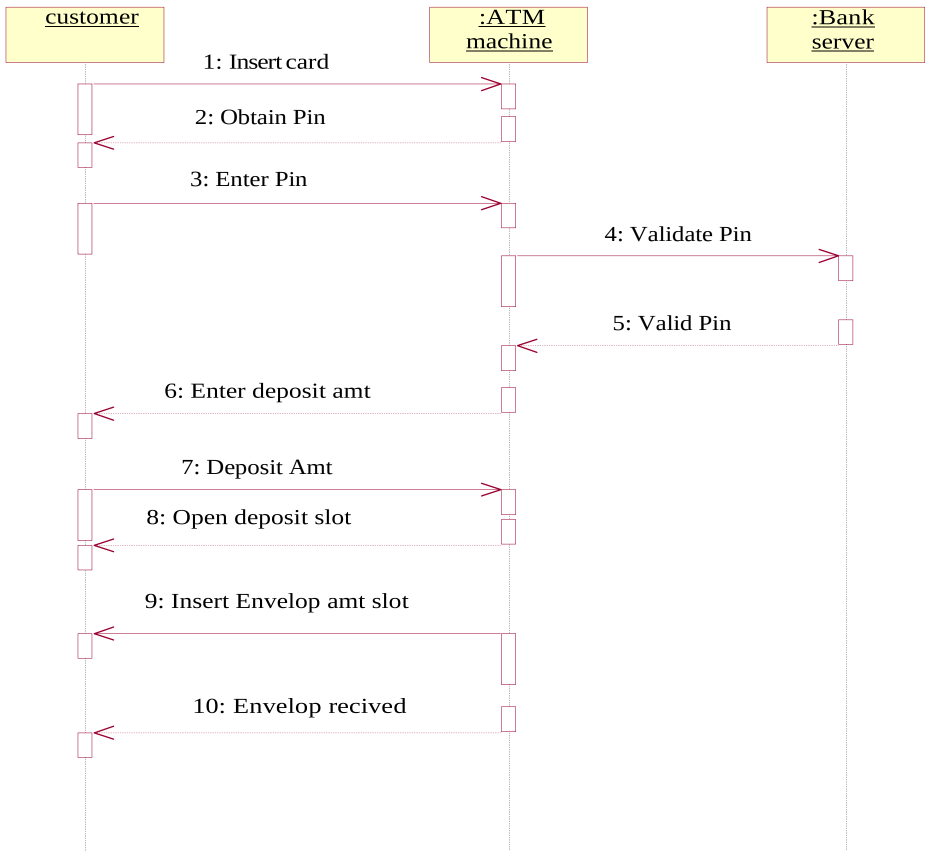


## COLLABARATION DIAGRAM:

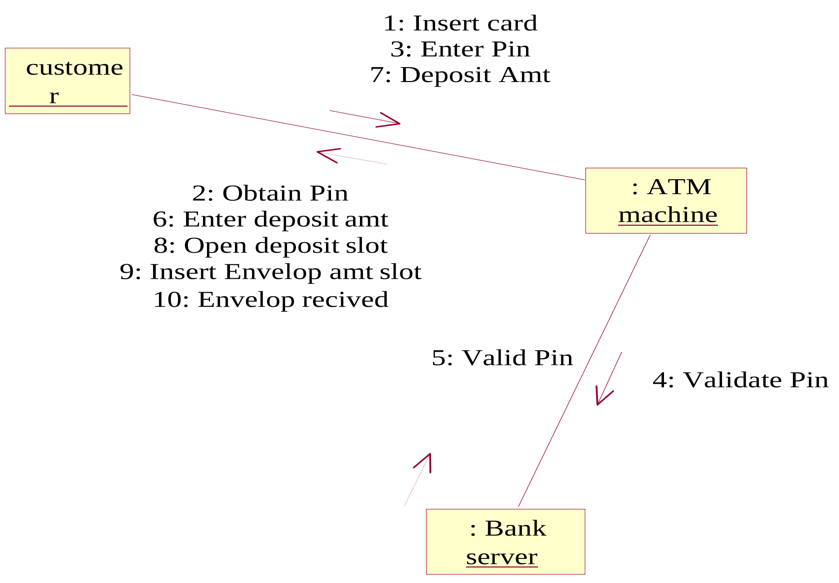


## DEPOSIT UseCase:

## SEQUENCE DIAGRAM:



**COLLABARATION DIAGRAM:**



## STATECHART Diagram

State Chart diagram is used to model dynamic nature of a system. They define different states of an object during its lifetime. And these states are changed by events. State chart diagram describes the flow of control from one state to another state.

States are defined as a condition in which an object exists and it changes when some event is triggered. But the main purpose is to model reactive system.

**Contents**

- Simply state and composite states
- Transitions, including events and actions

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**E) NAME OF EXPERIMENT:** State chart diagram for ATMSystem.

**AIM:** To design and implement ATM System through State Chart diagram.

**Purpose:**

Following are the main purposes of using State chart diagrams:

1. To model dynamic aspect of a system.
2. To model life time of a reactive system.
3. To describe different states of an object during its life time.
4. Defines a state machine to model states of an object.

**Procedure:-**

**Step1:** First after initial state control undergoes transition to ATM screen.

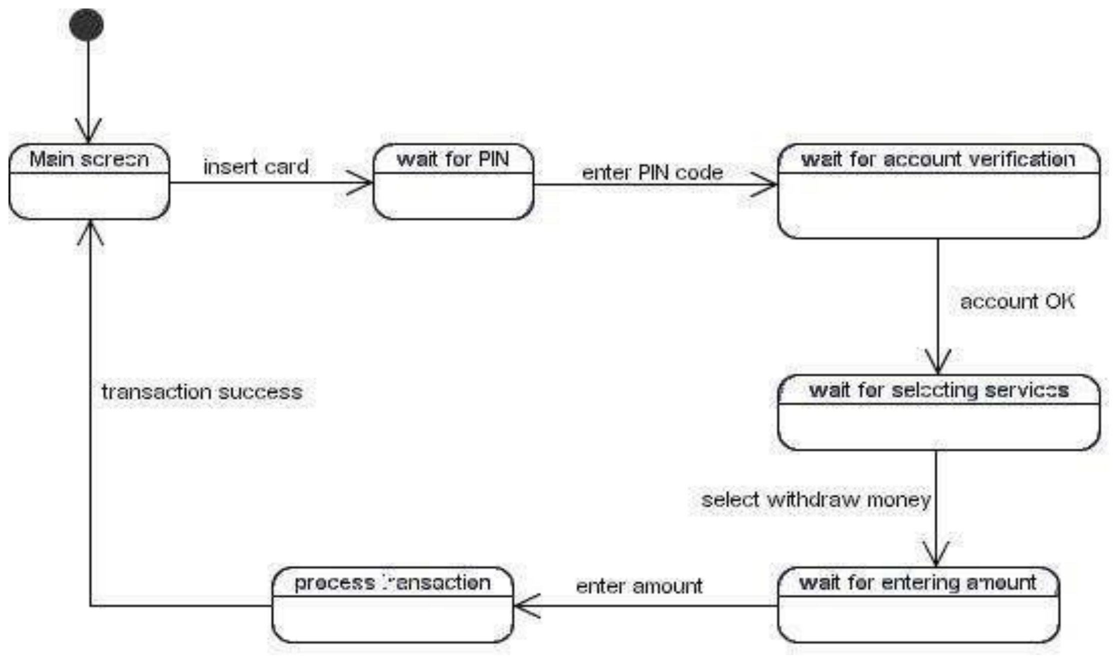
**Step2:** After inserting card it goes to the state wait for pin.

**Step3:** After entering pin it goes to the state account verification.

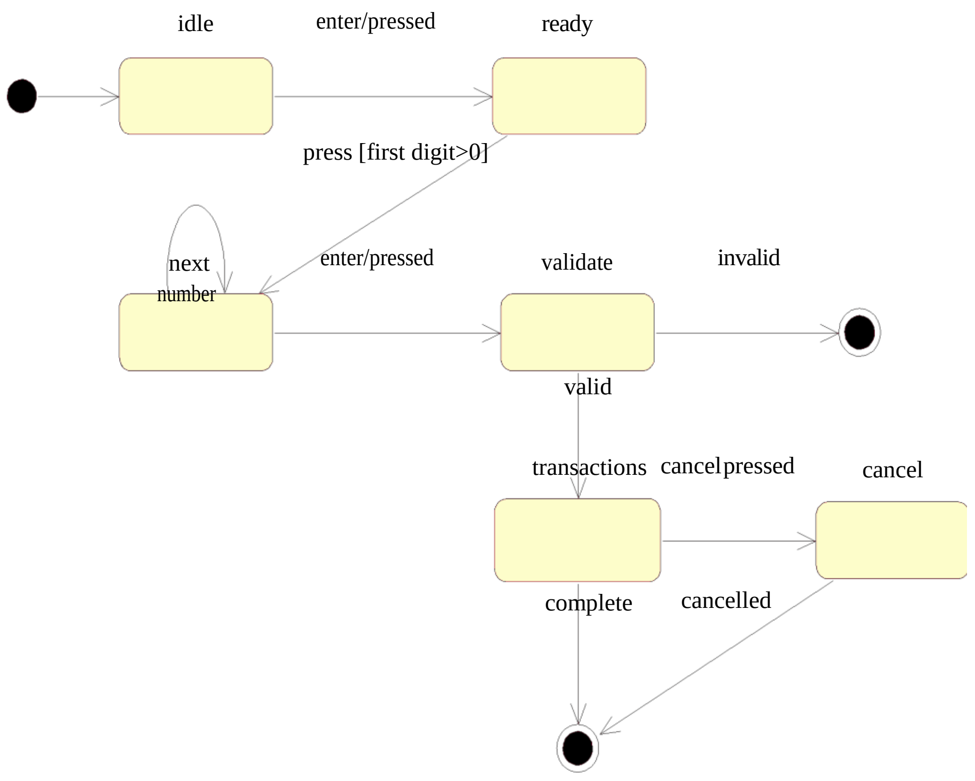
**Step4:**. In this way it undergoes transitions to various states and finally reaches the ATM screen state as shown in the fig.

**DIAGRAM:**

**STATE CHART DIAGRAM**



STATE CHART FOR ATM



## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**F) NAME OF EXPERIMENT:** Activity diagram forATM System.

**AIM:** To design and implement ATM System through Activity Diagram**.**

**THEORY:** An activity diagram shows the flow from activity to activity .An activity is an ongoing non atomic execution within a state machine .Activities ultimately results in some action, which is made up of executable atomic computations. We can use these diagrams to model the dynamic aspects of a system.

Activity diagram is basically a flow chart to represent the flow form one activity to another . The activity can be described as an operation of the system. So the control flow is drawn from one operation to another. This flow can be sequential, branched or concurrent. Activity diagrams deals with all type of flow by using elements like fork, join etc.

**Contents**

Initial/Final State, Activity, Fork & Join, Branch, Swim lanes

**Fork**
A fork represents the splitting of a single flow of control into two or more concurrent Flow of control. A fork may have one incoming transition and two or more outgoing transitions, each of which represents an independent flow of control. Below fork the activities associated with each of these path continues in parallel.

**Join**
A join represents the synchronization of two or more concurrent flows of control. A join may have two or more incoming transition and one outgoing transition. Above the join the activities associated with each of these paths continues in parallel.

**Branching**
A branch specifies alternate paths takes based on some Boolean expression Branch is represented by diamond Branch may have one incoming transition and two or more outgoing one on each outgoing transition, you place a Boolean expression shouldn"t overlap but they should cover all possibilities.

**Swimlane:**
Swimlanes are useful when we model workflows of business processes to partition the activity states on an activity diagram into groups. Each group representing the business organization responsible for those activities, these groups are called Swimlanes .

**<u>Procedure:-</u>**

**Step1:** First initial state is created.

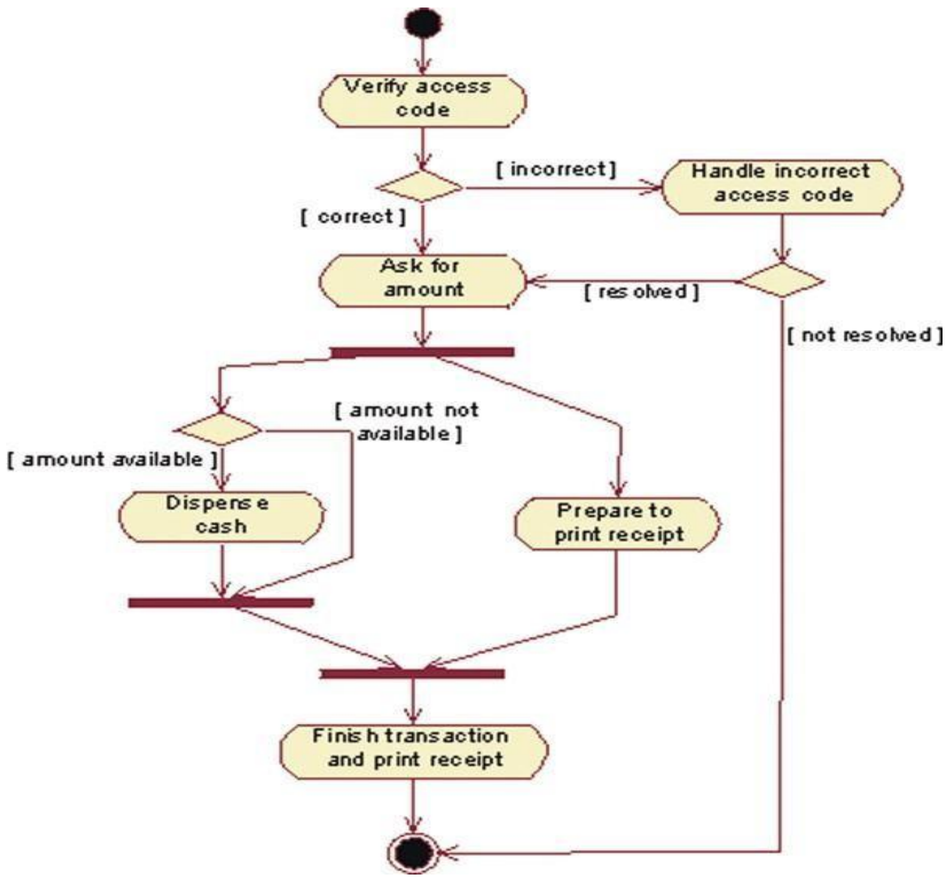
**Step2:** After that it goes to the action state insert card.

**Step3:** Next it undergoes transition to the state enter pin

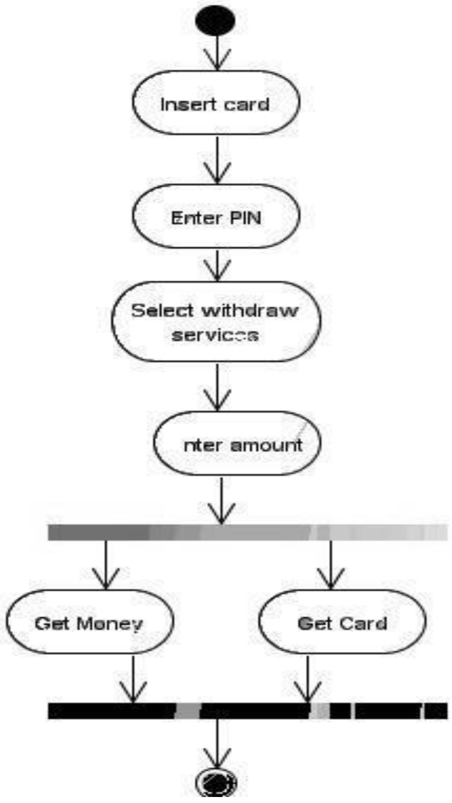
**Step4**: In this way it undergoes transitions to the various states.

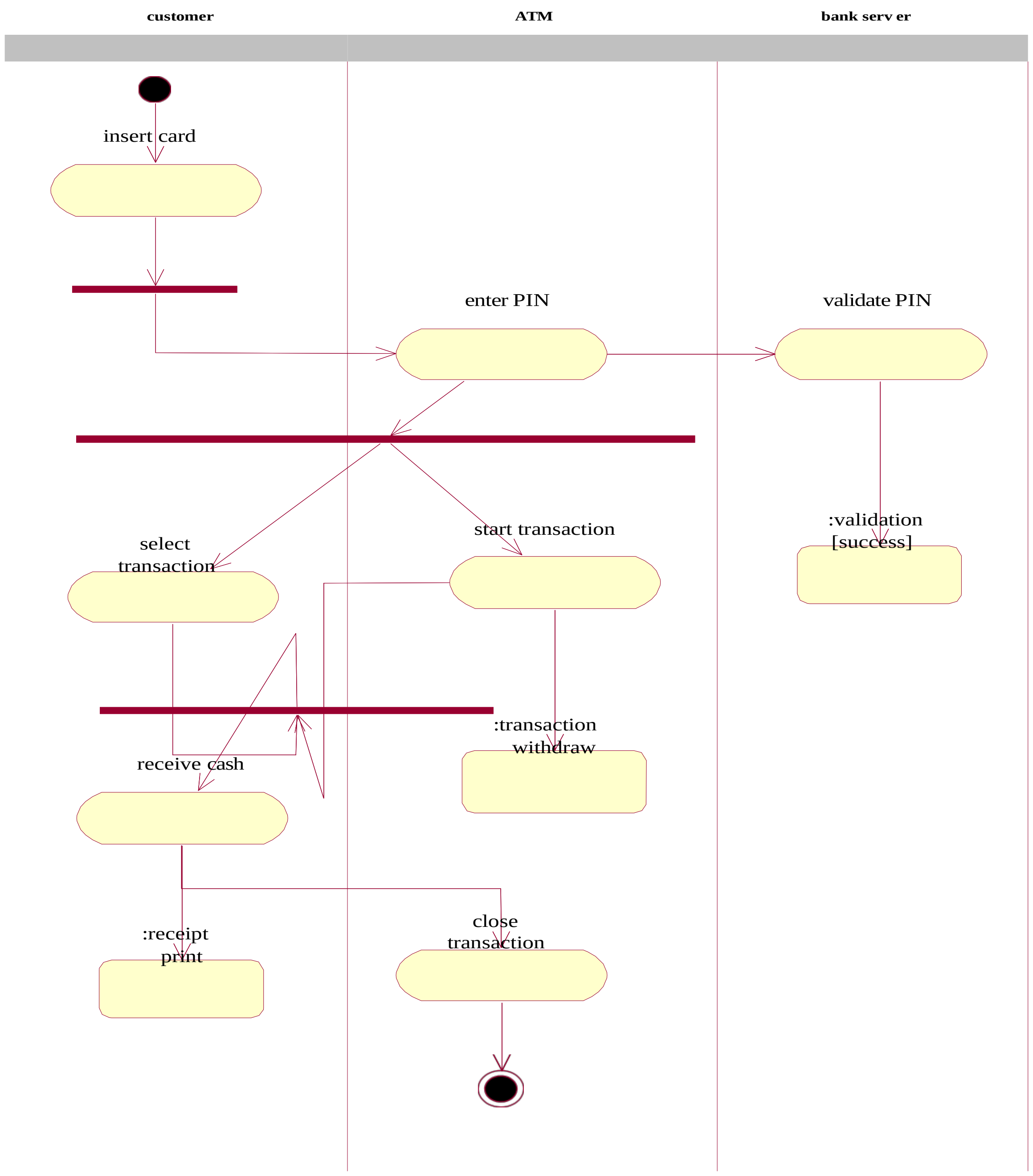
**Step5:** Use forking and joining wherever necessary.

DIAGRAM: Activity diagram for Transactions:



Activity diagram for Withdraw:





**Inferences:**

1. Identify the action states of the objects .
2. Understand the transitions and events for various objects.

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**G) NAME OF EXPERIMENT:** Component diagram for ATMSystem.

**AIM:** To design and implement Component diagram for ATM System**.**

**THEORY:**

Component diagrams are used to model physical aspects of a system. Physical aspects are the elements like executables, libraries, files, documents etc which resides in a node. So component diagrams are used to visualize the organization and relationships among components in a system. These diagrams are also used to make executable systems.

**Purpose:**

Component diagrams can be described as a static implementation view of a system. Static implementation represents the organization of the components at a particular moment. A single component diagram cannot represent the entire system but a collection of diagrams are used to represent the whole.

Before drawing a component diagram the following artifacts are to be identified clearly:

a. Files used in the system.
b. Libraries and other artifacts relevant to the application.
c. Relationships among the artifacts.
d. Now after identifying the artifacts the following points needs to be followed:

e. Use a meaningful name to identify the component for which the diagram is to be drawn.
f. Prepare a mental layout before producing using tools.
g. Use notes for clarifying important points.

**Contents**

Components, Interfaces, Relationships

**<u>Procedure:-</u>**

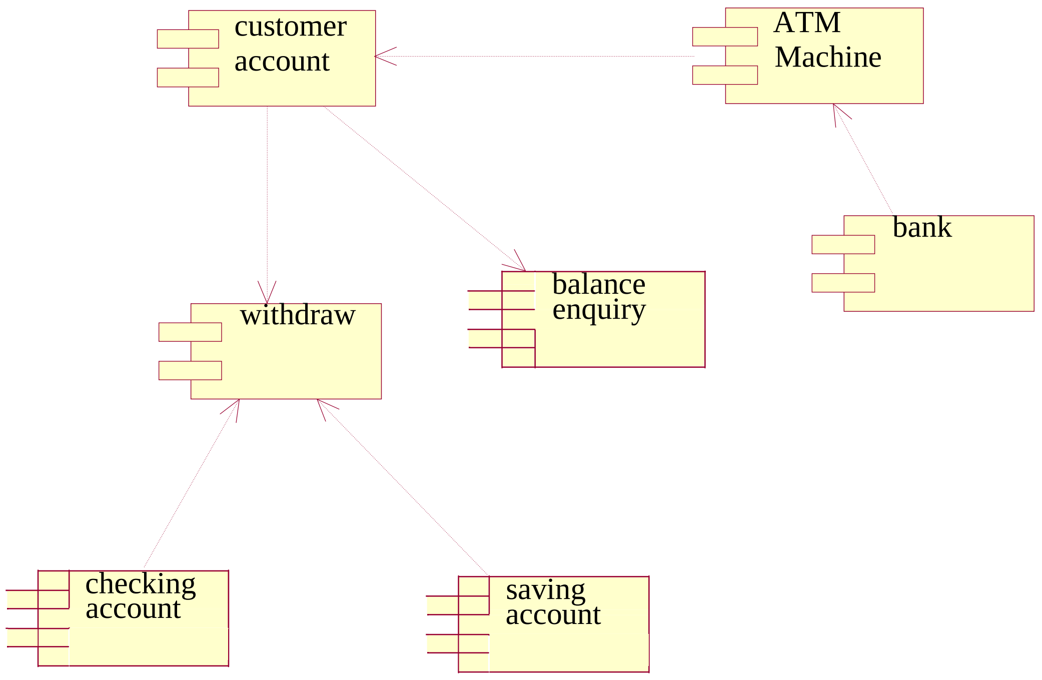
**Step1:** First user component is created.

**Step2:** ATM system package is created.

**Step3:** In it various components such as withdraw money, deposit money, check balance, transfer money etc. are created.

**Step4:** Association relationship is established between user and other components.

**DIAGRAM:**



## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**H) NAME OF EXPERIMENT:** Deployment diagram for ATM System**.**

**AIM:** To design and implement ATM System through Deployment diagram.

**Purpose:**

Deployment diagrams are used to visualize the topology of the physical components of a system where the software components are deployed. So deployment diagrams are used to describe the static deployment view of a system. Deployment diagrams are used for describing the hardware components where software components are deployed. Component diagrams and deployment diagrams are closely related. Component diagrams are used to describe the components and deployment diagrams shows how they are deployed in hardware.

**Contents:** Nodes, Dependency & Association relationships

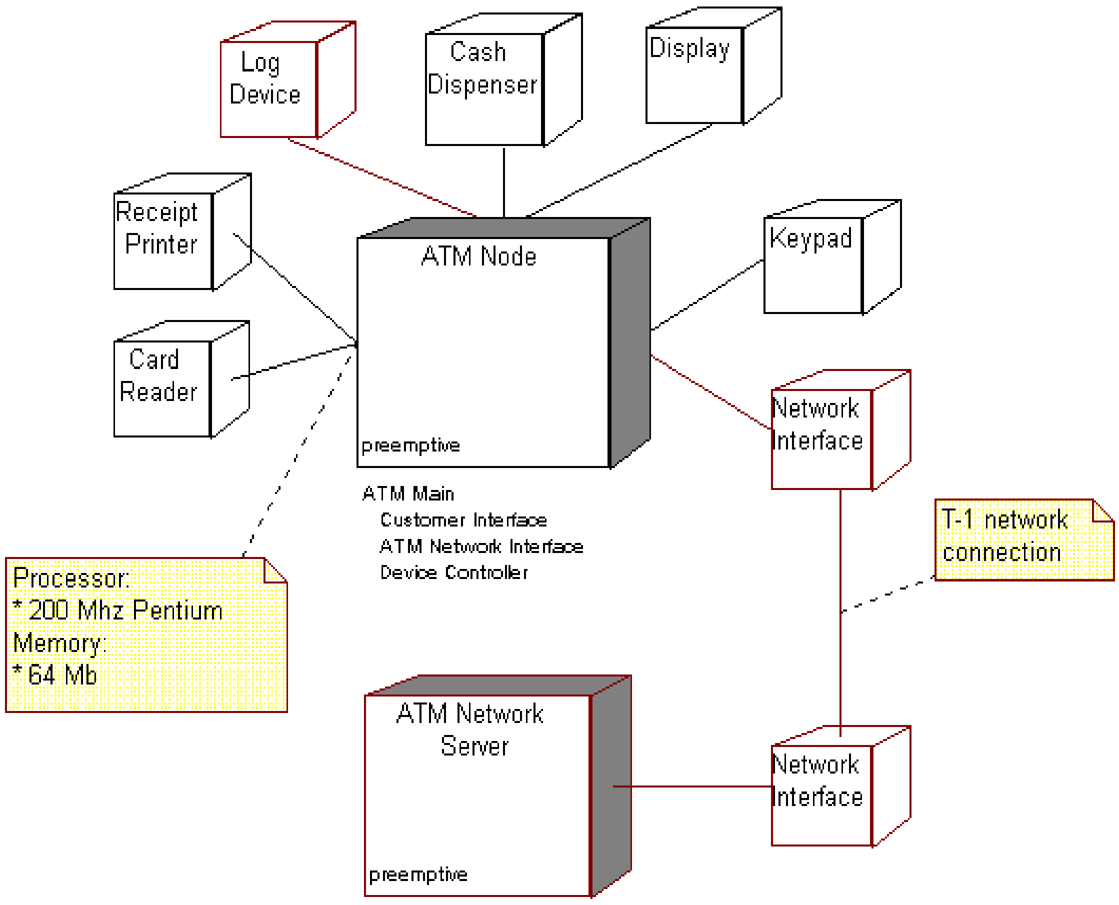
**Procedure:-**

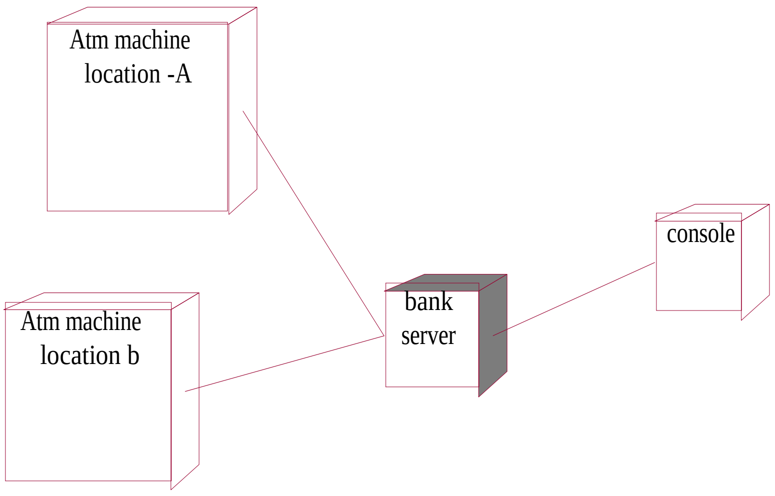
**Step1:** First user node is created

**Step2:** various nodes withdraw money, deposit money, and check balance, transfer money etc. are created.

**Step4:** Association relationship is established between user and other nodes.

**Step5:** Dependency is established between deposit money and check balance.





## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

# SOFTWARE TESTING

**EXPERIMENT: 1**

**NAME OF THE EXPERIMENT:** Write program in C language to demonstrate the working of the following constructs

**i.)do..while:**

**Syntax:**

```
    Iteration-statement:
do
{
Statements
 while( expression ) ;
```

**Example:**

```
#include<stdio.h>
#include<conio.h>
#include <stdio.h>

main()
{


    nt i = 10;

    do{
           printf("Hello %d\n", i );
           i = i -1;
            if( i == 6 )
            {
                break;
            }
        }while ( i > 0 );
}
```

**ii.) while**

```
while(condition)
{
Loop body
Increment or decrement;
    }
```

**Example:**

```
#include<stdio.h>

    int main()

  {
              int counter, howmuch;

              scanf("%d", &howmuch);
              counter = 0;
              while ( counter < howmuch)
              {
              counter++;
              printf("%d\n", counter);
              }
              return 0;
  }
```

**iii) if…else**

**syntax:**

```
  if( condition 1 )
           statement1;
        else if( condition 2 )
           statement2;
        else if( condition 3 )
           statement3;
        else
           statement4;
```

**Example:**

```
        #include<stdio.h>
int main(){
          int x,y;
          printf("Enter value for x :");
          scanf("%d",&x);
          printf("Enter value for y :");
          scanf("%d",&y);
          if ( x > y ){
                    printf("X is large number - %d\n",x);
          }
          else{
                    printf("Y is large number - %d\n",y);
          }
          return 0;
}
```

**iv) switch**

**syntax**

```
                swithch(int/char const)
                {
                       Case const 1:stm1;
                       Break;
                       Case const 2:stmt2;
                       Break;
                   }
            }
             default: stmt n;
            Break;
          }
```

**Example:**

```
#include <stdio.h>


 int main() {
      int color = 1;
      printf("Please choose a color(1: red,2: green,3: blue):\n");
      scanf("%d", &color);


      switch (color)
       {
        case 1:
            printf("you chose red color\n");
            break;
        case 2:
            printf("you chose green color\n");
            break;
        case 3:
            printf("you chose blue color\n");
            break;
        default:
            printf("you did not choose any color\n");
    }
    return 0;
}
```

**v) for Syntax:**

```
for (initialization; condition; increment/decrement)
{
        //body of the loop
}
```

Example:

```
    #include <stdio.h>

int main()
{
        int x;
            /* The loop goes while x < 10, and x increases by one every loop*/ for ( x = 0; x
    < 10; x++ )
        {

            /* Keep in mind that the loop condition checks the
            conditional statement before it loops again. consequently,
            when x equals 10 the loop breaks. x is updated before the
            condition is checked. */

                printf( "%d\n", x );
          }
          getchar();
  }
```

## RECORD NOTES

# RECORD NOTES

# RECORD NOTES

## RECORD NOTES

**EXPERIMENT: 2**

**NAME OF THE EXPERIMENT:**

Write a C program that uses functions to perform the following:

i) Multiplication of Two Matrices*/

```
#include<stdio.h>
#include<conio.h>
Void main()
{
         int a[10][10], b[10][10], m[10][10], i, j, p, q, r, s, k; clrscr ();
         printf(—enter the size of A Matrix‖);
         scanf(—%d %d‖, &p, &q);
         printf(—Enter the size of B Matrix ‖);
         scanf(—%d %d —, &r, &s);
         if(q=r)
         {
            printf(—Enter the elements of matrix A:\n‖);
            for(i=0; i<p; i++)
               {
                  for(j=0; j<q; j++)
                    {
                       scanf(—%d‖, &a[i][j]);
                     }
                }
              printf(—Enter the elements of matrix b:\n‖); for(i=0;
              i<r; i++)
                {
                   for(j=0; j<s; j++)
                     {
                       scanf(—%d‖, &b[i][j]);
                     }
                }
               for (i=0; i<p; i++)
                 {
                    for(j=0; j<s; j++)
                      {
                         m[i][j]=0;
                         for(k=0; k<q; k++)
                         {
                         m[i][j] =m[i][j] +a[i][j] * b[k][j];
                         }
                 }}

           Printf(—matrix multiplication is:\n‖);
         for(i=0; i<p; i++)
          {
           for(j=0; j<s; j++)
            {
                 Printf(—%d\t‖, m[i][j]);
            }
```

```
        ` Printf(—\n‖);
          }
          }
else
printf(—matrix multiplication is not possible‖);
getch();
}
```

**FAILURE CASES:**

**output:**

1. Enter the size of a: 2 3
   Enter the size of b: 2 3

Matrix multiplication is not possible.

**Reason to fail:** to do multiplication of matrices the number of columns in matrix —a[] should be equal to number of rows in matrix —b‖.

2. Enter the size of a: p q
   Enter the size of b: q s

Matrix multiplication is not possible.

**Reason to fail:** to do multiplication of matrices the number of columns in matrix —a‖ should be equal to number of rows in matrix —b‖, and rows & columns should be integer values.

3. Enter the size of a: 1.5 2
   Enter the size of b: 2 3

Matrix multiplication is not possible.

**Reason to fail:** to do multiplication of matrices the number of columns in matrix —a‖ should be equal to number of rows in matrix —b‖, and rows & columns should be integer values.

4. Enter the size of a: 350 480 Enter
   the size of b: 480 620

Matrix multiplication is not possible.

**Reason to fail:** size of buffer will be not be sufficient to handle this multiplication.

5. Enter the size of a: -1 -2
   Enter the size of b: -2 3

Matrix multiplication is not possible.

**Reason to fail:** to do multiplication of matrices the number of columns in matrix —a‖ should be equal to number of rows in matrix —b‖, and rows &
columns should be positive integer values.

**viva questions:**

1. syntax for multiplication
2. syntax for matrix multiplication
3. what the logic for matrix multiplication?

## RECORD NOTES

# RECORD NOTES

# RECORD NOTES

## EXPERIMENT: 3

**NAME OF THE EXPERIMENT:** Test Cases for Functionalities of ATM system

**Purpose**:

This document describes the software requirements and specification (SRS) for an automated teller machine (ATM) network. The document is intended for the customer and the developer (designers, testers, maintainers). The reader is assumed to have basic knowledge of banking accounts and account services. Knowledge
and understanding of Unified Modeling Language (UML) diagrams is also required.

**Scope:**

The software supports a computerized banking network called ‗Bank24„. The network enables customers to complete simple bank account services via automated teller machines (ATMs) that may be located off premise and that need not be owned and operated by the customer„s bank. The ATM identifies a customer by a cash card and password. It collects information about a simple account transaction (e.g., deposit, withdrawal, transfer, bill payment), communicates the transaction information to the customer„s bank, and dispenses cash to the customer. The banks provide their own software for their own computers. The
‗Bank24„ software requires appropriate record keeping and security provisions. The software must handle concurrent accesses to the same account correctly.

**Intended Audience:**

The intended audience of this SRS consists of:

- Software designers
- Systems engineers
- Software developers
- Software testers
- Customers

The actors of the system are:

1. User
2. ATM Machine
3. Bank

**Product Perspective:**

An automated teller machine (ATM) is a computerized telecommunications device that provides the customers of a financial institution with access to financial transactions in a public space without the need for a human clerk or bank teller. On most modern ATMs, the customer is identified by inserting a plastic ATM card with a magnetic stripe or a plastic smartcard with a chip, that contains a unique card number and some security information, such as an expiration date or CVC (CVV). Security is provided by the customer entering a personal identification number (PIN).

**Product functions:**

Using an ATM, customers can access their bank accounts in order to make cash withdrawals (or credit
card cash advances) and check their account balances.
The functions of the system are:

1. Login
2. Get Balance Information
3. Withdraw Cash
4. Transfer Funds

**Operating Environments:**

The hardware,software and technology used should have following specifications:

- Ability to read the ATM card.
- Ability to count the currency notes.

-  Touch screen for convenience.
-  Keypad(in case touchpad fails)
-  Continuous power supply.
-  Ability to connect to bank„s network.
-  Ability to validate user.

**Design/implementation constraints:**

Login:

Validate Bank Card

-  Validate for Card Expiration Date
-  Validate that the card's expiration date is later than today's date
-  If card is expired, prompt error message "Card is expired"

Validate for Stolen or Lost Card

-  Validate that the card is not reported lost or stolen
-  If card is lost, prompt error message, "Card has been reported lost"
-  If card is stolen, prompt error message, "Card has been reported stolen"

Validate for Disabled Card

-  Validate that the card is not disabled
-  If card is disabled, prompt error message, "Card has been disabled as of <expiration date>"

Validate for Locked Account

Validate that the account is not locked

-  If account is locked, prompt error message "Account is locked"

Validate PIN

-  Validate that the password is not blank
-  If PIN is blank, prompt error message "Please provide PIN"
-  Validate that the password entered matches the password on file
-  If password does not match, prompt error message "Password is Incorrect"

Lock Account

-  If number ofconsecutive unsuccessful logins exceeds three attempts, lock account

Maintain Consecutive Unsuccessful Login Counter

Increment Login Counter

For every consecutive Login attempt, increment logic counter by 1.

Reset login counter to 0 after login is successful.

Get Balance Information

Withdraw Cash

Transfer Funds

**Assumptions and Dependencies:**

-  Hardware never fails
-  ATM casing is impenetrable
-  Limited number of transactions per day (sufficient paper for receipts)
-  Limited amount of money withdrawn per day (sufficient money)

External Interface Requirements

User interfaces

The customer user interface should be intuitive, such that 99.9% of all new ATM users are able to complete their banking transactions without any assistance.

Hardware interfaces

The hardware should have following specifications:

- Ability to read the ATM card
- Ability to count the currency notes
- Touch screen for convenience
- Keypad (in case touchpad fails)
- Continuous power supply
- Ability to connect to bank„s network
- Ability to take input from user
- Ability to validate user

Software interfaces

The software interfaces are specific to the target banking software systems. At present, two known banking systems will participate in the ATM network.

- State Bank
- Indian Overseas Bank

Safety requirements:

Must be safe kept in physical aspects, say in a cabin

- Must be bolted to floor to prevent any kind of theft
- Must have an emergency phone outside the cabin
- There must be an emergency phone just outside the cabin
- The cabin door must have an ATM card swipe slot
- The cabin door will always be locked, which will open only when user swipes his/her ATM card in the slot & is validated as genuine

Security requirements:

- Users accessibility is censured in all the ways
- Users are advised to change their PIN on first use
- Users are advised not to tell their PIN to anyone
- The maximum number of attempts to enter PIN will be three

Some of the possible Bugs on ATM machine?

1. 1.Successful insertion of ATM card
2. Unsuccessful operation due to insert card in wrong angle
3. Unsuccessful operation due to invalid account Ex: other bank card or time expired card
4. successful entry of PIN number
5. un successful operation due to enter wrong PIN number 3times
6. successful selection of language
7. successful selection of account type
8. unsuccessful operation due to invalid account type
9. successful selection of withdraw operation
10. successful selection of amount to be withdrawl
11. successful withdraw operation

12. unsuccessful withdraw operation due to wrong denominations
13. unsuccessful withdraw operation due to amount is greater than day limit
14. unsuccessful withdraw operation due to lack of money in ATM
15. unsuccessful withdraw operation due to amount is greater than possible balance
16. unsuccessful withdraw operation due to transactions is greater than day limit
17. unsuccessful withdraw operation due to click cancel after insert card
18. unsuccessful withdraw operation due to click cancel after insert card & pin number
19. unsuccessful withdraw operation due to click cancel after insert card , pin number & language
20. unsuccessful withdraw operation due to click cancel after insert card , pin number , language &account type
21. unsuccessful withdrawal operation due to click cancel after insert card , pin number, language ,account type & withdrawal operation
22. unsuccessful withdrawal operation due to click cancel after insert card , pin number, language ,account type ,withdrawal operation &amount to be withdraw.

# RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## EXPERIMENT: 4

**NAME OF THE EXPERIMENT: Test cases for Banking Applications**

Banking applications are considered to be one of the most complex applications in today's software development and testing industry. **What makes Banking application so complex?** What approach should be followed in order to test the complex workflows involved? In this article we will be highlighting different stages and techniques involved in testing Banking applications. **The characteristics of a Banking application are as follows:**

- Multi tier functionality to support thousands of concurrent user sessions
- Large scale Integration , typically a banking application integrates with numerous other applications such as Bill Pay utility and Trading accounts
- Complex Business workflows
- Real Time and Batch processing
- High rate of Transactions per seconds
- Secure Transactions
- Robust Reporting section to keep track of day to day transactions
- Strong Auditing to troubleshoot customer issues
- Massive storage system
- Disaster Management.

The above listed ten points are the **most important characteristics of a Banking application.**

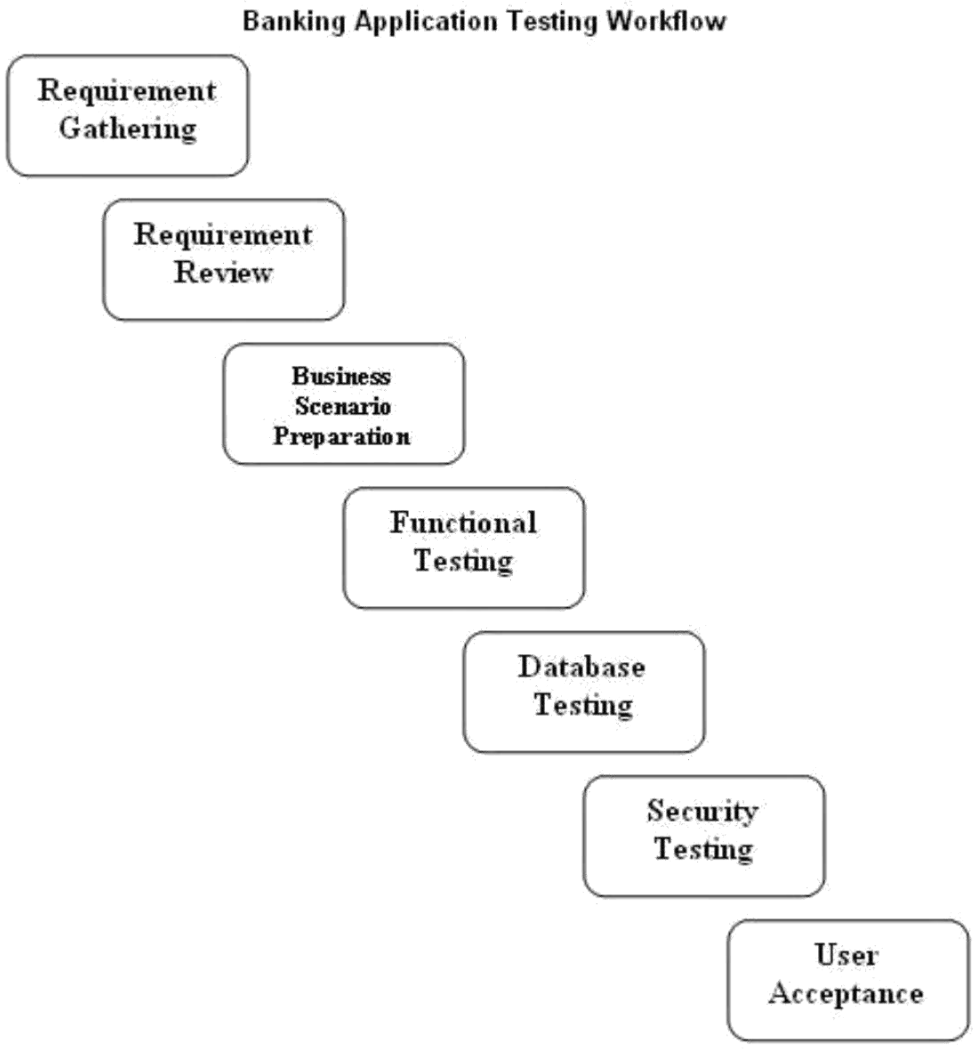
Banking applications have multiple tiers involved in performing an operation. For Example, a **banking application may have:**

1. Web Server to interact with end users via Browser
2. Middle Tier to validate the input and output for web server
3. Data Base to store data and procedures
4. Transaction Processor which could be a large capacity Mainframe or any other Legacy system to carry out Trillions of transactions per second.

If we talk about testing banking applications it requires an **end to end testing methodology involving multiple software testing techniques to ensure:**

- Total coverage of all banking workflows and Business Requirements
- Functional aspect of the application
- Security aspect of the application
- Data Integrity
- Concurrency
- User Experience

**Typical stages involved in testing Banking Applications** are shown in below workflow which we will be discussing individually.



**1)** Requirement **Gathering:**

Requirement gathering phase involves documentation of requirements either as Functional Specifications or Use Cases. Requirements are gathered as per customer needs and documented by Banking Experts or Business Analyst. To write requirements on more than one subject experts are involved as banking itself has multiple sub domains and one full fledge banking application will be the integration of all. For Example: A banking application may have separate modules for Transfers, Credit Cards, Reports, Loan Accounts, Bill Payments, Trading Etc.

**2) Requirement Review:**

The deliverable of Requirement Gathering is reviewed by all the stakeholders such as QA Engineers, Development leads and Peer Business Analysts. They cross check that neither existing business workflows nor new workflows are violated.

**3) Business Scenario Preparations:**

In this stage QA Engineers derive Business Scenarios from the requirement documents (Functions Specs or Use Cases); Business Scenarios are derived in such a way that all Business Requirements are covered. Business Scenarios are high level scenarios without any detailed steps, further these Business Scenarios are reviewed by Business Analyst to ensure all of Business Requirements are met and its easier for BAs to review high level scenarios than reviewing low level detailed Test Cases.

**4)** Functional Testing:

In this stage functional testing is performed and the usual software testing activities are performed such as:

**Test Case Preparation:**
In this stage Test Cases are derived from Business Scenarios, one Business Scenario leads to several positive test cases and negative test cases. Generally tools used during this stage are Microsoft Excel, Test Director or Quality Center.
**Test Case Review:**
Reviews by peer QA Engineers
**Test Case Execution:**
Test Case Execution could be either manual or automatic involving tools like QC, QTP or any other.

**5)** Database Testing**:**

Banking Application involves complex transaction which are performed both at UI level and Database level, Therefore Database testing is as important as functional testing. Database in itself is an entirely separate layer hence it is carried out by database specialists and it uses techniques like

-  Data loading
-  Database Migration
-  Testing DB Schema and Data types
-  Rules Testing
-  Testing Stored Procedures and Functions
-  Testing Triggers
-  Data Integrity

**6) Security Testing:**

Security Testing is usually the last stage in the testing cycle as completing functional and non functional are entry criteria to commence Security testing. Security testing is one of the major stages in the entire Application testing cycle as this stage ensures that application complies with Federal and Industry standards. Security testing cycle makes sure the application does not have any web vulnerability which may expose sensitive data to an intruder or an attacker and complies with standards like OWASP.

In this stage the major task involves in the whole application scan which is carried out using tools like IBM Appscan or HP WebInspect (2 Most popular tools).

Once the Scan is complete the Scan Report is published out of which False Positives are filtered out and rest of the vulnerability are reported to Development team for fixing depending on the Severity.

Other **Manual tools for Security Testing** used are: Paros Proxy, Http Watch, Burp Suite, Fortify tools Etc.

Apart from the above stages there might be different stages involved like Integration Testing and Performance Testing.

In today„s scenario **majority of Banking Projects are using**: Agile/Scrum, RUP and Continuous Integration methodologies, and Tools packages like Microsoft„s VSTS and Rational Tools.

As we mentioned RUP above, RUP stands for Rational Unified Process, which is an iterative software development methodology introduced by IBM which comprises of four phases in which development and testing activities are carried out.

**Four phases are:**
i) Inception
ii) Collaboration
iii) Construction and
iv) Transition
RUP widely involves IBM Rational tools.

In this article we discussed **how complex a Banking application could be** and what are the **typical phases involved in testing the application**. Apart from that we also discussed current trends followed by IT industries including software development methodologies and tools.

Test cases for opening bank account

**1. Input parameters checking -**

Name

-Date of Birth -

Photo -Address

Proof -Identity

proof

-Introducers (if applicable) -

PAN card

-Initial deposit

-Whether checkbook / ATM card / Online banking facilities are needed or not -Customer

signature

**Type of account -**

Savings account -Salary

account -Joint account -

Current account -

Secondary account -RD

account

-Account for a company

**Test cases**

-Checking mandatory input parameters -Checking

optional input parameters -Check whether able to

create account entity.

-Check whether you are able to deposit an amount in the newly created account (and thus updating the balance)

-Check whether you are able to withdraw an amount in the newly created account (after deposit) (and thus updating the balance)

-Check whether company name and its pan number and other details are provided in case of salary account

-Check whether primary account number is provided in case of secondary account

-Check whether company details are provided in cases of company's current account

-Check whether proofs for joint account is provided in case of joint account

-Check whether you are able deposit an account in the name of either of the person in an joint account.

-Check whether you are able withdraw an account in the name of either of the person in an joint account.

-Check whether you are able to maintain zero balance in salary account

-Check whether you are not able to maintain zero balance (or mini balance) in non-salary account.

**<u>viva questions</u>**

1. Can you explain boundary value analysis?
2. Can you explain equivalence partitioning?
3. Can you explain random/monkey testing?
4. What are semi-random test cases?
5. What is negative and positive testing?
6. How did you define severity ratings in your project?

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**EXPERIMENT: 5**

**NAME OF THE EXPERIMENT: Test plan document for Library Management System**

The Library Management System is an online application for assisting a librarian in managing a book library in a University. The system would provide basic set of features to add/update clients, add/update books, search for books, and manage check-in / checkout processes. Our test group tested the system based on the requirement specification.

**INTRODUCTION**

This test report is the result for testing in the LMS. It mainly focuses on two problems: what we will test and how we will test.

**Result**

**GUI test**

Pass criteria: librarians could use this GUI to interface with the backend library database without any difficulties

Result: pass

**Database test**

Pass criteria: Results of all basic and advanced operations are normal (refer to section 4)

Result: pass

**Basic function test**

**Add a student**

Pass criteria:

- Each customer/student should have following attributes: Student ID/SSN (unique), Name, Address and Phone number.
  Result: pass
- The retrieved customer information by viewing customer detail should contain the four attributes.
  Result: pass

**Update/delete student**

Pass criteria:

- The record would be selected using the student ID Result:
  pass
- Updates can be made on full. Items only: Name, Address, Phone number Result: pass
- The record can be deleted if there are no books issued by user.
  Result: Partially pass. When no books issued by user, he can be deleted. But when there are books Issued by this user, he was also deleted. It is wrong.
- The updated values would be reflected if the same customer's ID/SSN is called for.
  Result: pass
- If customer were deleted, it would not appear in further search queries.
  Result: pass

**Add a book**

Pass criteria:

- Each book shall have following attributes: Call Number, ISBN, Title, Author name.
  Result: pass
- The retrieved book information should contain the four attributes.
  Result: pass

**Update/delete book**

Pass criteria:

- The book item can be retrieved using the call number Result: did not
  pass. Can not retrive using the call number
- The data items which can be updated are: ISBN, Title, Author name Result: passThe book can be deleted

only if no user has issued it.

Result: partially pass. When no user has issued it, pass. When there are user having issued it, did not pass

-  The updated values would be reflected if the same call number is called for Result: pass
-  If book were deleted, it would not appear in further search queries. Result: pass

**Search for book**

Pass criteria:

-  The product shall let Librarian query books„ detail information by their ISBN number or Author or Title.
   Result: pass
-  The search results would produce a list of books, which match the search parameters with following Details: Call number, ISBN number, Title, Author Result: pass
-  The display would also provide the number of copies which is available for issue Result: pass
-  The display shall provide a means to select one or more rows to a user-list Result: pass
-  A detailed view of each book should provide information about check-in/check out status, with the borrower„s information.
   Result: pass
-  The search display will be restricted to 20 results per page and there would be means to navigate from sets of search results.
   Result: pass
-  The user can perform multiple searches before finally selecting a set of books for check in or checkout. These should be stored across searches.
   Result: pass
-  A book may have more than one copy. But every copy with the same ISBN number should have same detail information.
   Result: pass
-  The borrower„s list should agree with the data in students„ account
   Result: pass

**Check-in book**

Pass criteria:

-  Librarians can check in a book using its call number

   Result: pass
-  The check-in can be initiated from a previous search operation where user has selected a set of books.
   Result: pass
-  The return date would automatically reflect the current system date. Result: did not pass.
-  Any late fees would be computed as difference between due date and return date at rate of 10 cents a day.
   Result: did not pass
-  A book, which has been checked in once, should not be checked in again Result: pass

**Check-out book**

Pass criteria:

-  Librarians can check out a book using its call number Result: pass
-  The checkout can be initiated from a previous search operation where user has selected a set of books.
   Result: pass
-  The student ID who is issuing the book would be entered
   Result: pass
-  The issue date would automatically reflect the current system date. Result: did not pass

- The due date would automatically be stamped as 5 days from current date. Result: did not pass

- A book, which has been checked out once, should not be checked out again Result: pass
- A student who has books due should not be allowed to check out any books Result: did not pass
- The max. No of books that can be issued to a customer would be 10. The system should not allow checkout of books beyond this limit.
  Result: pass

**View book detail**

Pass criteria:

- This view would display details about a selected book from search operation Result: pass
- The details to be displayed are: Call number, IBN, Title, Author, Issue status (In library or checked out), If book is checked out it would display, User ID & Name, Checkout date, Due date
  Result: for checkout date and due date, did not pass
- Books checked in should not display user summary
  Result: pass
- Books checked out should display correct user details. Result:
  pass

**View student detail**

**Pass criteria:**

- Librarians can select a user record for detailed view Result:
  pass
- The detail view should show:

  a.User name, ID, Address & Phone number Result:
  pass
  b. The books issued by user with issue date, due date, call number, title Result: did not pass
  c. Late fees & Fines summary and total
  Result: did not pass
- The display should match existing user profile Result:
  pass
- The books checked out should have their statuses marked Result: pass
- The book search query should show the user id correctly. Result: pass

**Network test**

Pass criteria: Results of operations (ping, ftp and ODBC connectivity check) are normal

Result: did not test this item, because no enough machines and no available envirenment.

**Viva questions**

1. How to create a test plan document for Library Management System?
2. what is object repository

3. How many test cases can u write 1) File - open dialog box in notepad please write 5 if software failed in customer environment what we called a)error b)fault c)defect d)failure

4.What test plan should contains?

5. What is test strategy?
6. Define test Plan?What is the difference between Master Test Plan and Test Plan?

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**EXPERIMENT: 6**

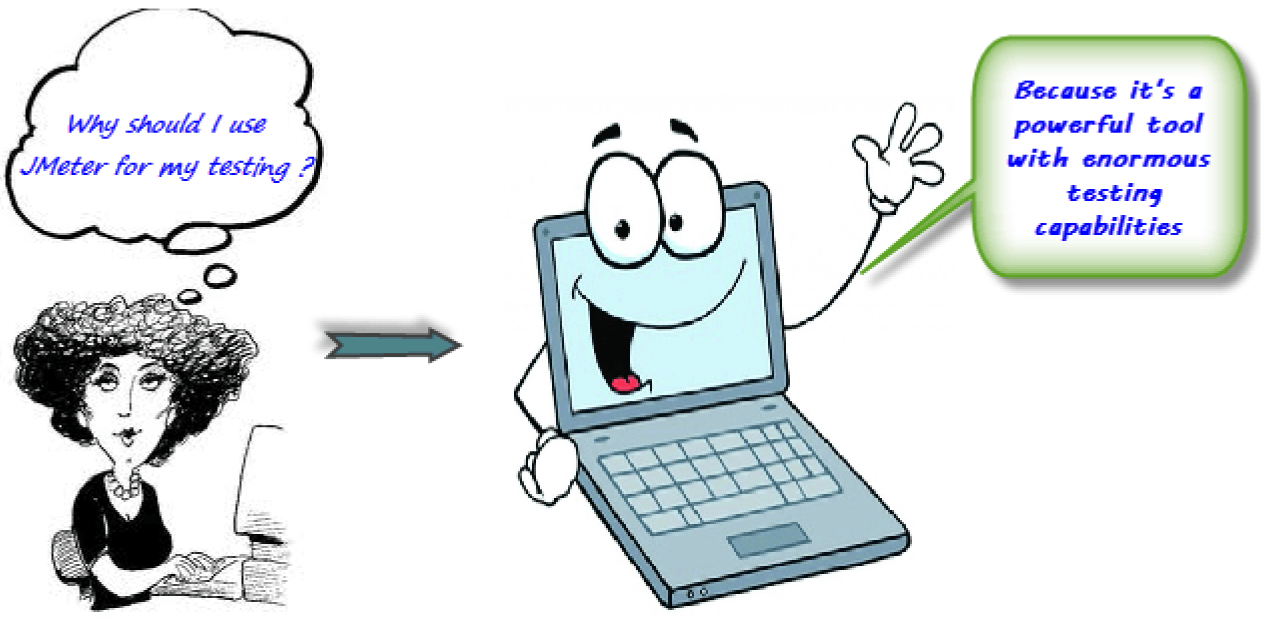
**NAME OF THE EXPERIMENT:** Study of Any Testing Tool( Jmeter)

## What is JMeter? Why it is used?

The **Apache JMeter**$^{TM}$ is pure Java **open source** software, which was first developed by Stefano Mazzocchi of the Apache Software Foundation, designed to load test functional behavior and measure performance. You can use JMeter to analyze and measure the performance of web application or a variety of services. Performance Testing means testing a web application against heavy load, multiple and concurrent user traffic. JMeter originally is used for testing Web Application or FTP application.

Nowadays, it is used for a functional test, database server test etc.

## Why JMeter?


Why should I use JMeter for my testing ?
Because it's a powerful tool with enormous testing capabilities

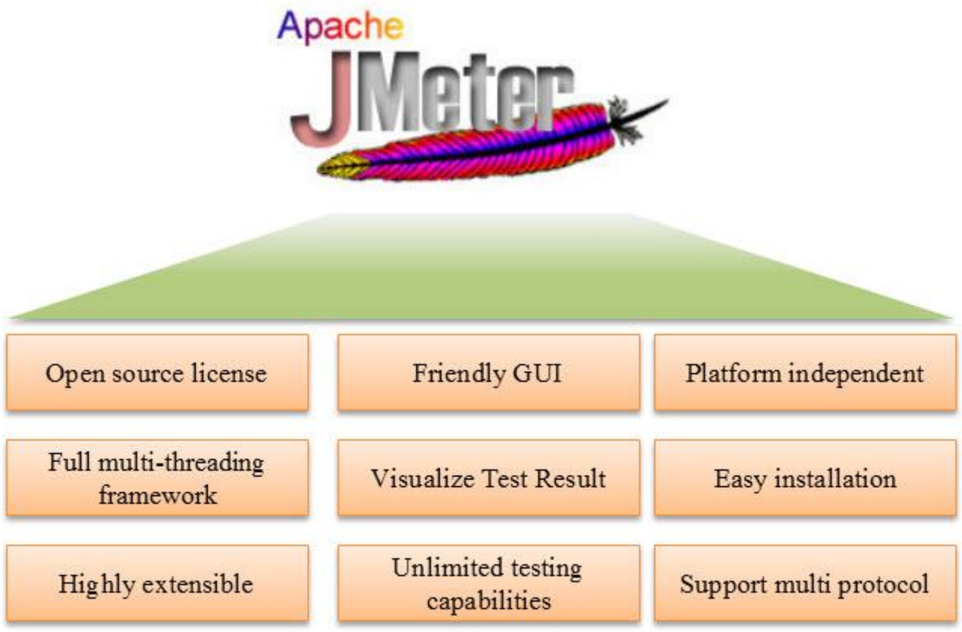
Have you ever **tested** a web server to know how efficiently it works? How many concurrent users can a web server handle?

Let say that one day, your boss asks you to do **performance testing** of www.google.com for 100 users. What would you do?

I want to do performance testing of google.com for 100 users
Got it! I can use JMeter to test this web site

It's not feasible to arrange 100 people with PC and internet access simultaneously accessing google.com Think of the infrastructure requirement when you test for 10000 users (a small number for a site like google). Hence you need a software tool like JMeter that will simulate real-user behaviors and performance/load test your site.

## JMeter Advantages

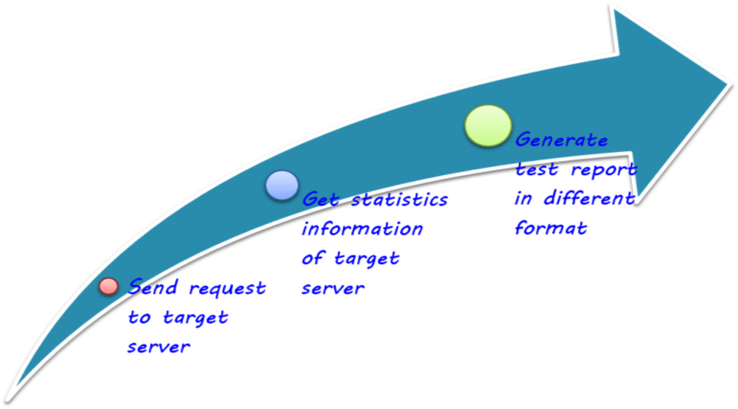


- **Open source license**: JMeter is totally free, allows developer use the source code for the development
- **Friendly GUI**: JMeter is extremely easy to use and doesn't take time to get familiar with it
- **Platform independent**: JMeter is 100% pure Java desktop application. So it can run on multiple platforms
- **Full multithreading framework**. JMeter allows concurrent and simultaneous sampling of different functions by a separate thread group
- **Visualize Test Result:** Test result can be displayed in a different format such as chart, table, tree and log file
- **Easy installation**: You just copy and run the *.bat file to run JMeter. No installation needed.
- **Highly Extensible**: You can write your own tests. JMeter also supports visualization plugins allow you to extend your testing
- **Multiple testing strategy**: JMeter supports many testing strategies such as Load Testing, Distributed Testing, and Functional Testing.
- **Simulation**: JMeter can simulate multiple users with concurrent threads, create a heavy load against web application under test
- **Support multi-protocol**: JMeter does not only support web application testing but also evaluate database server performance. All basic protocols such as HTTP, JDBC, LDAP, SOAP, JMS, and FTP are supported by JMeter
- **Record & Playback - Record** the user activity on the browser and simulate them in a web application using JMeter
- **Script Test**: Jmeter can be integrated with Bean Shell & Selenium for automated testing.

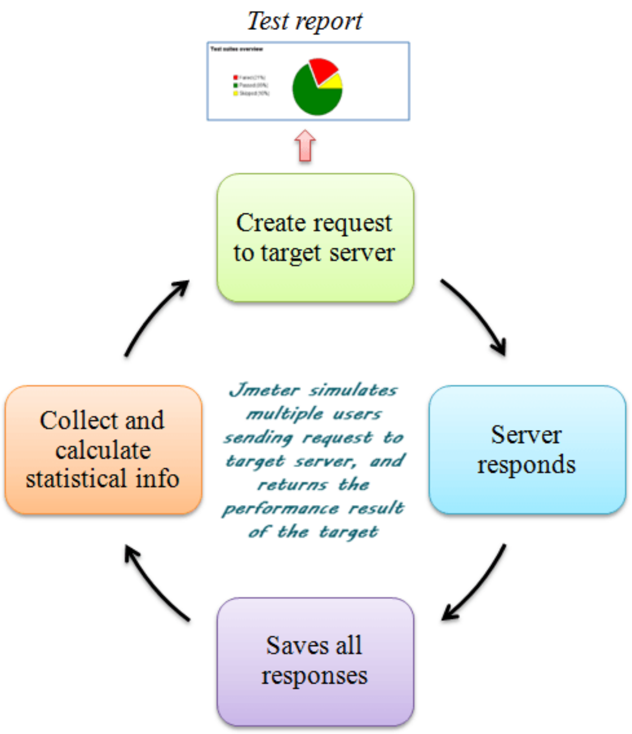
## How does JMeter work?

The basic workflow of JMeter as shown in the figures below

JMeter simulates a group of users sending requests to a target server, and return statistics information of target server through graphical diagrams

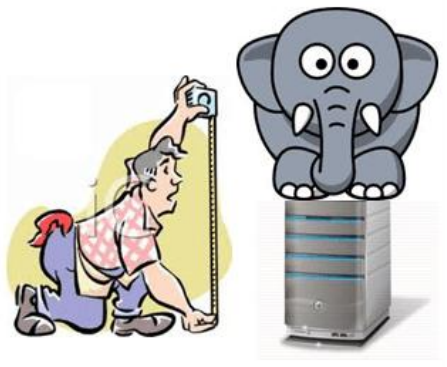

Send request to target server
Get statistics information of target server
Generate test report in different format

The completed workflow of JMeter as shown in the figure below


Test report
Create request to target server
Server responds
Saves all responses
Collect and calculate statistical info
Jmeter simulates multiple users sending request to target server, and returns the performance result of the target

## How to Use JMeter for Performance & Load Testing

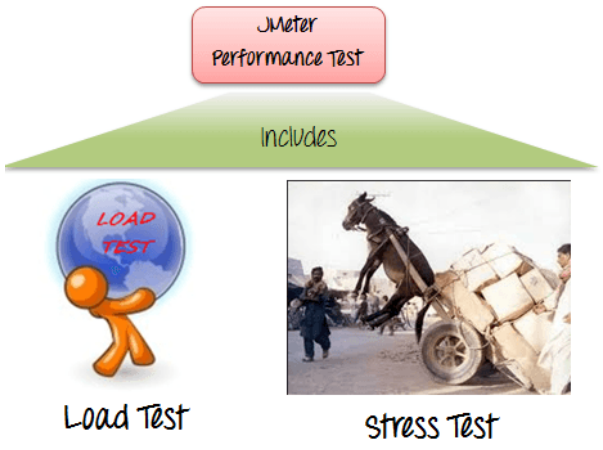
Performance Testing is crucial to determine that the web application under test will satisfy **high load** requirements. It can be used to analyze overall server performance under heavy load.



Apache JMeter testing tool offers following **benefit** in Performance Testing

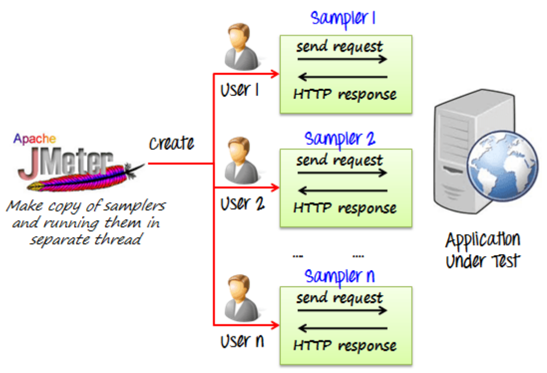
- JMeter can be used to test the performance of both **static** resources such as JavaScript and HTML, as well as **dynamic** resources, such as JSP, Servlets, and AJAX.
- JMeter can **discover** maximum number of concurrent users that your website can handle
- JMeter provides a variety of graphical analyses of performance reports.

JMeter Performance Testing includes:



- **Load** Testing: Modeling the expected usage by simulating multiple user access the Web services concurrently.
- **Stress** Testing: Every web server has a maximum load capacity. When the load goes beyond the limit, the web server starts responding slowly and produce errors. The purpose of the Stress Testing is to find the maximum load the web server can handle.

The figure below shows how JMeter load Testing simulates the heavy load:



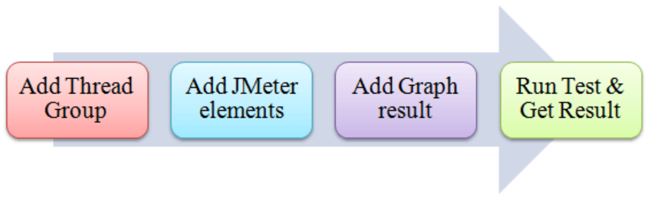
## Create a Performance Test Plan in JMeter

In this tutorial, we are doing a performance analysis of Google.com for 1000 users

Before testing the performance of target web application, we should determine-

- **Normal Load**: Average number of users visit your website
- **Heavy Load**: The maximum number of users visit your website
- What is your **target** in this test?

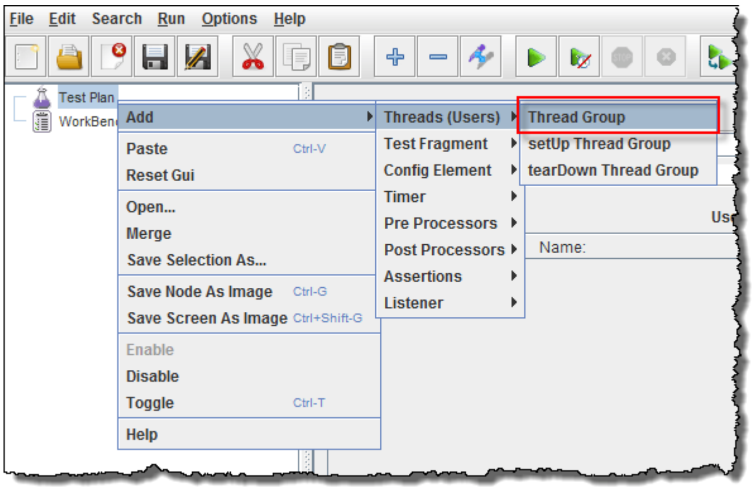
Here is the **roadmap** of this practical example



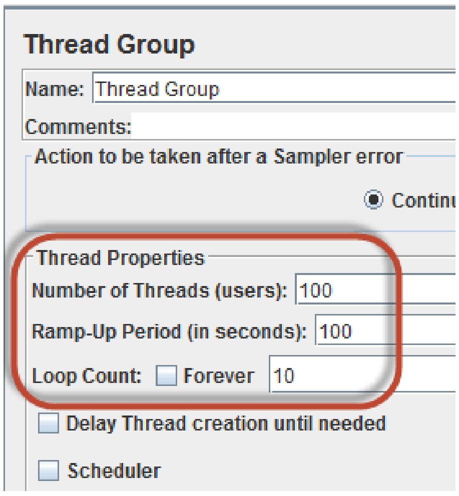
## Step 1) Add Thread Group

1. Start **JMeter**
2. Select **Test Plan** on the tree
3. Add **Thread Group**

Right click on the "Test Plan" and add a new thread group: **Add -> Threads (Users) -> Thread Group**



In the Thread Group control panel, enter Thread Properties as follows:


Thread Group

Name: Thread Group

Comments:

Action to be taken after a Sampler error

● Continu

Thread Properties

Number of Threads (users): 100

Ramp-Up Period (in seconds): 100

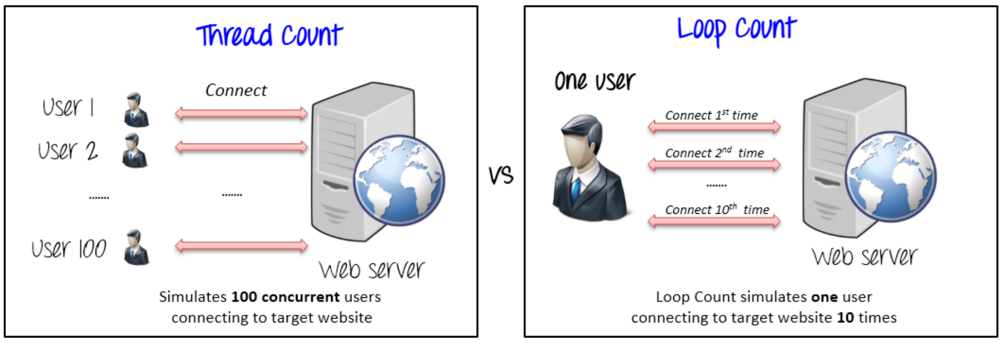
Loop Count: ☐ Forever 10

☐ Delay Thread creation until needed

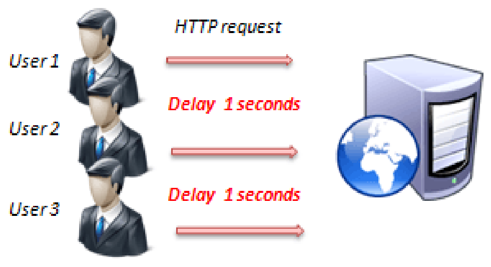
☐ Scheduler

- **Number of Threads**: 100 (Number of users connects to the target website: 100)
- **Loop Count**: 10 (Number of time to execute testing)
- **Ramp-Up Period**: 100

The Thread Count and The Loop Counts are **different.**



Ramp-Up Period tells JMeter how long to **delay** before starting the next user. For example, if we have 100 users and a 100-second Ramp-Up period, then the delay between starting users would be 1 second (100 seconds /100 users)

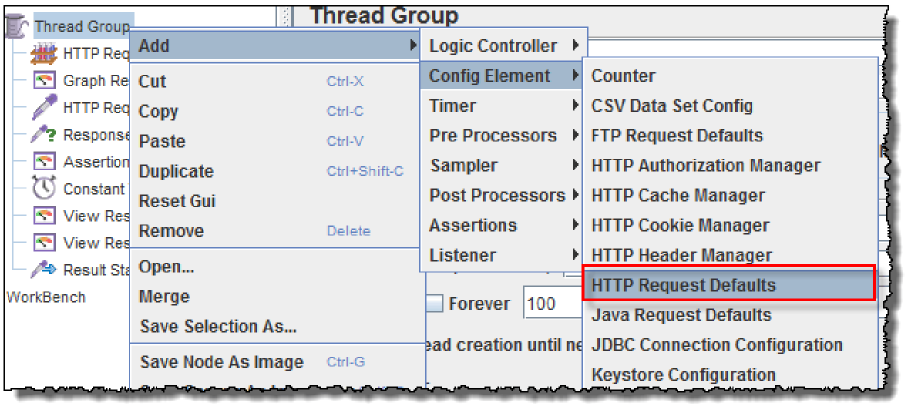


## Step 2) Adding JMeter elements

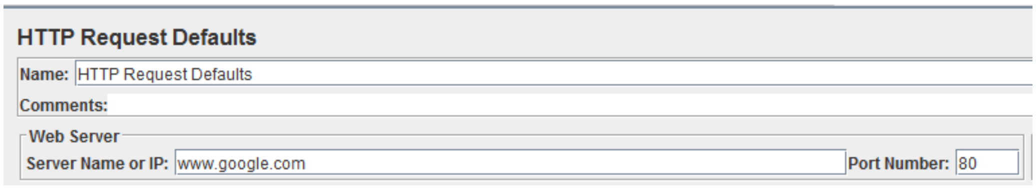
Now we determine what JMeter elements in this test. The elements are

- **HTTP request Default**

This element can be added by right-clicking on the Thread Group and selecting: **Add** -> **Config Element** -> **HTTP Request Defaults.**



In the HTTP Request Defaults control panel, enter the Website name under test (http://www.google.com)



HTTP Request Defaults

Name: HTTP Request Defaults

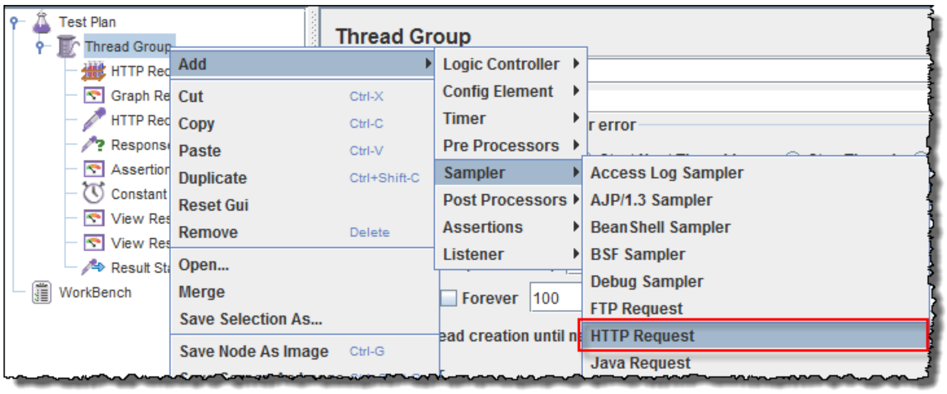
Comments:

Web Server

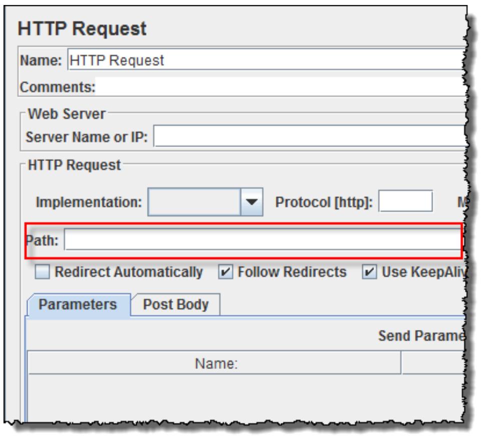
Server Name or IP: www.google.com Port Number: 80

- **HTTP Request**

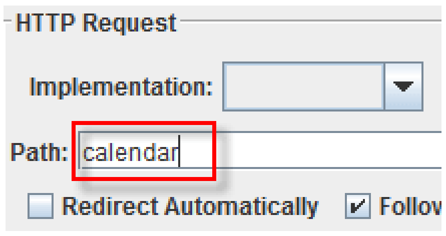
Right-click on Thread Group and select: **Add** -> **Sampler** -> **HTTP Request**.



In HTTP Request Control Panel, the Path field indicates which **URL request** you want to send to Google server.



For example, if you enter "*calendar*" in Path field. JMeter will create the URL request http://www.google.com/calendar to Google server



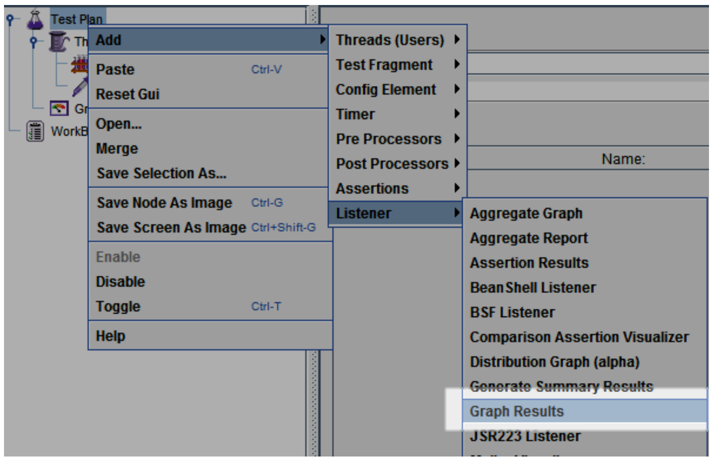
If you keep the Path field blank JMeter will create the URL request http://www.google.com to Google server.

**In this test, you keep the Path field blank to make JMeter create the URL request http://www.google.com to Google server.**

## Step 3) Adding Graph result

JMeter can show the test result in Graph format.

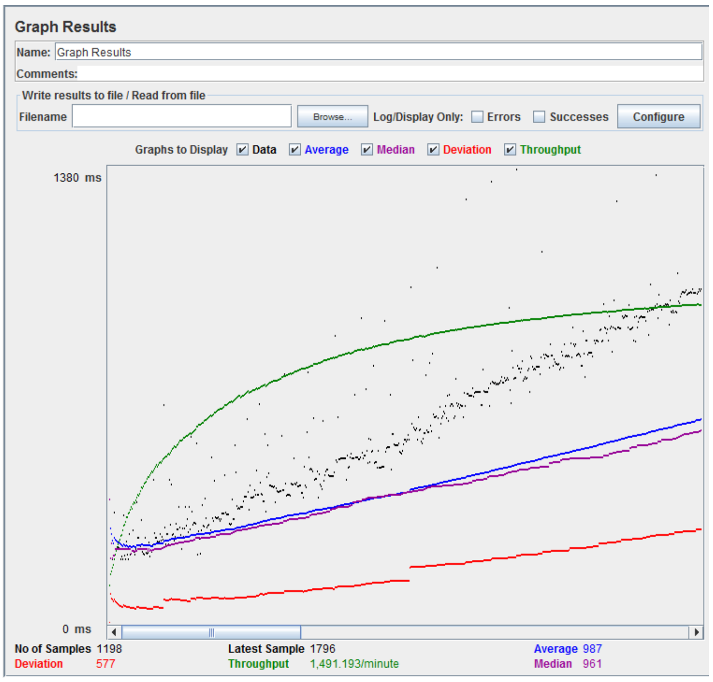
Right click Test Plan, **Add** -> **Listener** -> **Graph Results**



## Step 4) Run Test and get the test result

Press **the Run** button (Ctrl + R) on the Toolbar to start the software testing process. You will see the test result display on Graph in the real time.

The picture below presents a graph of a test plan, where we simulated 100 users who accessed on website www.google.com.



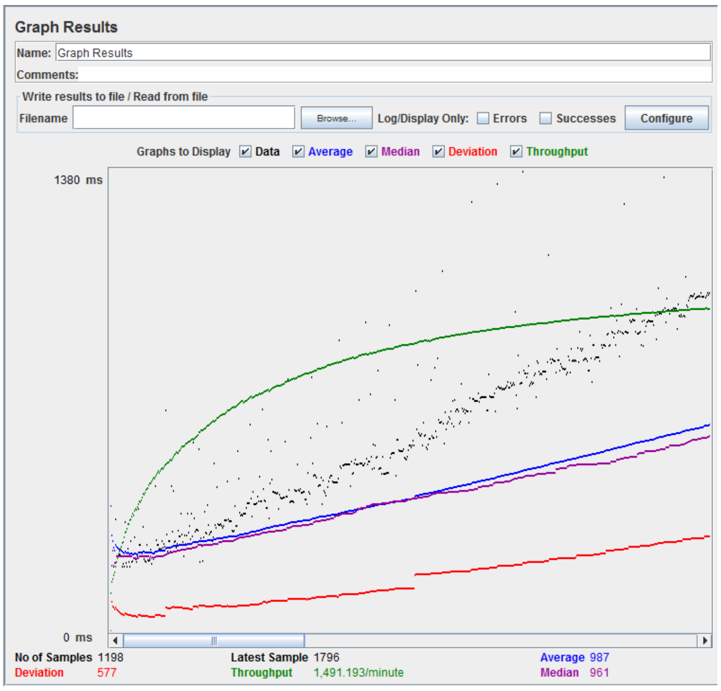
Name: Graph Results
Comments:
Write results to file / Read from file
Filename
Log/Display Only: ☐ Errors ☐ Successes
Graphs to Display ✓ Data ✓ Average ✓ Median ✓ Deviation ✓ Throughput

```
No of Samples 1198     Latest Sample 1796                  Average 987
Deviation     577      Throughput    1,491.193/minute      Median  961
```

At the bottom of the picture, there are the following statistics, represented in colors:

- Black: The total number of current samples sent.
- Blue: The current average of all samples sent.
- Red: The current standard deviation.
- Green: Throughput rate that represents the number of requests per minute the server handled

Lets analyze the performance of Google server in below figure.


Name: Graph Results
Comments:
Write results to file / Read from file
Filename
Log/Display Only: ☐ Errors ☐ Successes
Graphs to Display ✓ Data ✓ Average ✓ Median ✓ Deviation ✓ Throughput

```
No of Samples 1198     Latest Sample 1796                  Average 987
Deviation     577      Throughput    1,491.193/minute      Median  961
```

To analyze the performance of the web server under test, you should focus on 2 parameters

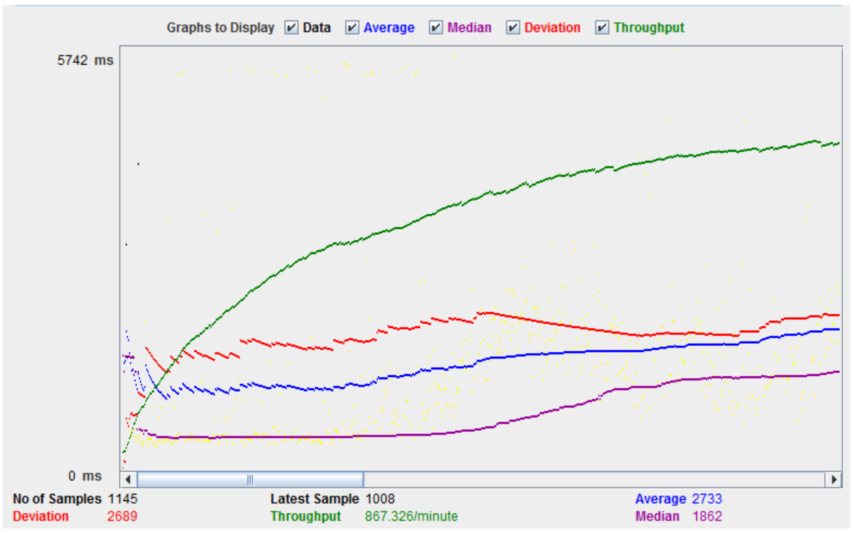
- Throughput
- Deviation

The **Throughput** is the most important parameter. It represents the ability of the server to handle a heavy load. The **higher** the Throughput is, the **better** is the server performance.

In this test, the throughput of Google server is 1,491.193/minute. It means Google server can handle 1,491.193 requests per minute. This value is quite high so we can conclude that Google server has good performance

The **deviation** is shown in red **-** it indicates the deviation from the average. The **smaller** the **better**.

Let compare the performance of Google server to other web servers. This is the performance test result of website http://www.yahoo.com/ (You can choose other websites)



No of Samples 1145
Deviation 2689
Latest Sample 1008
Throughput 867.326/minute
Average 2733
Median 1862

The throughput of a website under test http://www.yahoo.com is 867.326/minutes. It means this server handle 867.326 requests per minute, lower than Google.

The deviation is 2689, much higher than Google (577). So we can determine the performance of this website is less than a Google server.

**NOTE:** The above values depend on several factors like current server load at Google, your internet speed, your CPU power etc. Hence, it's very unlikely that you will get the same results as above.

## Troubleshooting:

If you face the issue while running the above scenario ... do the following

1. Check whether you are connecting to the internet via a proxy. If yes, remove the proxy.
2. Open a new instance of Jmeter
3. Open the PerformanceTestPlan.jmx in Jmeter
4. Double Click on Thread Group -> Graph Result
5. Run the Test

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

**EXPERIMENT: 7**

**NAME OF THE EXPERIMENT:** Study of any web testing tool (e.g. Selenium)

**What is Selenium?**

JavaScript framework that runs in your web browser Works anywhere JavaScript is supported Hooks for many other languages Java, Ruby, Python Can simulate a user navigating through pages and then assert for specific marks on the pages All you need to really know is HTML to start using it right away

**Selenium IDE**

Selenium **I**ntegrated **D**evelopment **E**nvironment (IDE) is a Firefox plugin that lets testers to record their actions as they follow the workflow that they need to test.

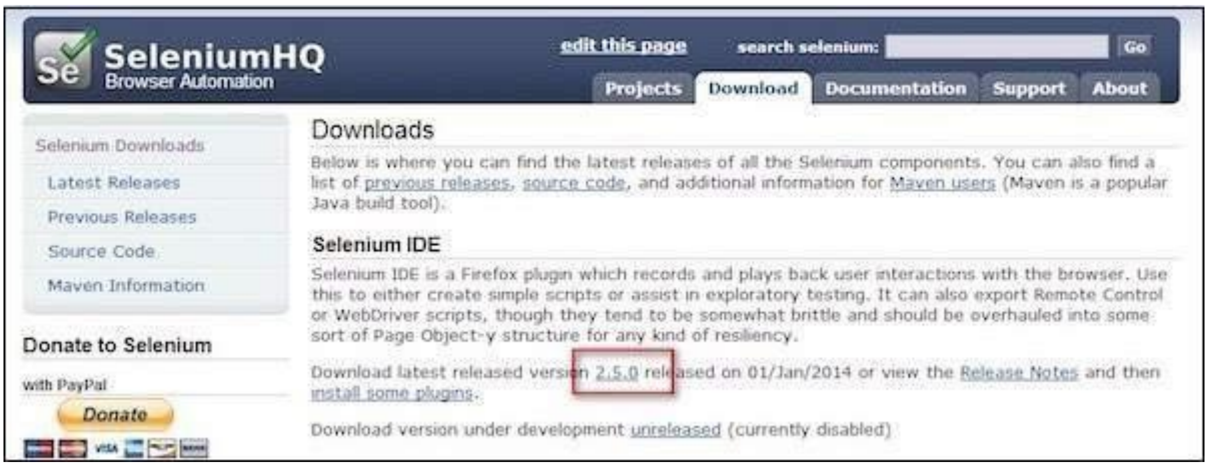
It provides a Graphical User Interface for recording user actions using Firefox which is used to learn and use Selenium, but it can only be used with Firefox browser as other browsers are not supported.

However, the recorded scripts can be converted into various programming languages supported by Selenium and the scripts can be executed on other browsers as well.

Selenium- IDEDownload

**Step 1** − Launch Firefox and navigate to the following URL - http://seleniumhq.org/download/.

Under the Selenium IDE section, click on the link that shows the current version number as shown below.



Downloads

Below is where you can find the latest releases of all the Selenium components. You can also find a list of previous releases, source code, and additional information for Maven users (Maven is a popular Java build tool).

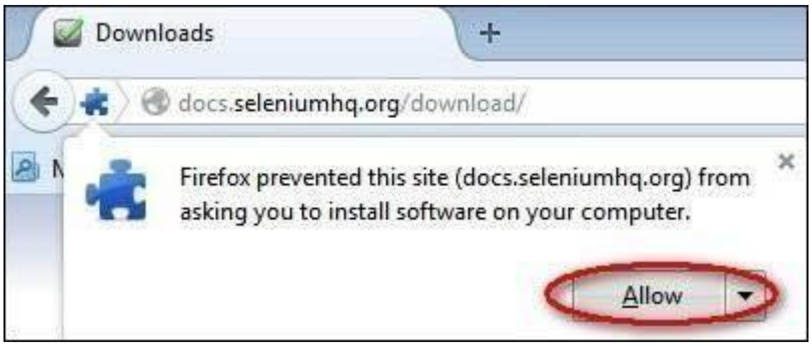
Selenium IDE

Selenium IDE is a Firefox plugin which records and plays back user interactions with the browser. Use this to either create simple scripts or assist in exploratory testing. It can also export Remote Control or WebDriver scripts, though they tend to be somewhat brittle and should be overhauled into some sort of Page Object-y structure for any kind of resiliency.

Download latest released version 2.5.0 released on 01/Jan/2014 or view the Release Notes and then install some plugins.

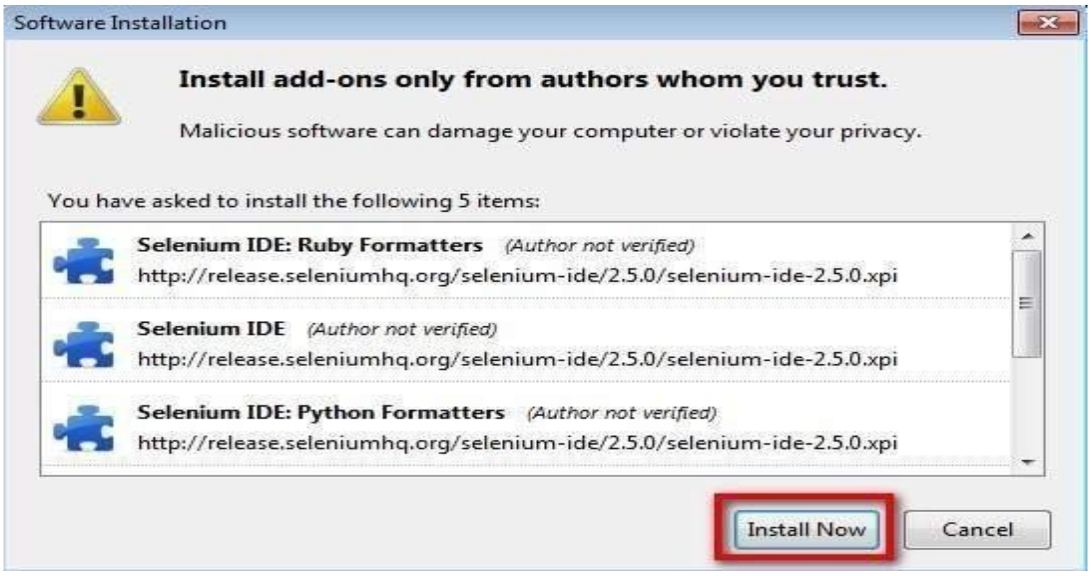
Download version under development unreleased (currently disabled)

**Step 2** − Firefox add-ons notifier pops up with allow and disallow options. User has to allow the installation.



Firefox prevented this site (docs.seleniumhq.org) from asking you to install software on your computer.

**Step 3** − The add-ons installer warns the user about untrusted add-ons. Click 'Install Now'.



Software Installation

**Install add-ons only from authors whom you trust.**

Malicious software can damage your computer or violate your privacy.

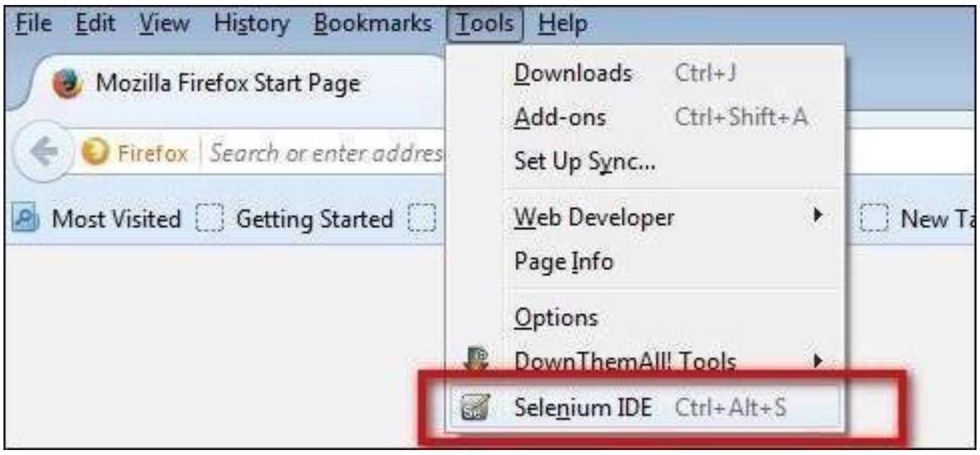
You have asked to install the following 5 items:

**Selenium IDE: Ruby Formatters** *(Author not verified)*
http://release.seleniumhq.org/selenium-ide/2.5.0/selenium-ide-2.5.0.xpi

**Selenium IDE** *(Author not verified)*
http://release.seleniumhq.org/selenium-ide/2.5.0/selenium-ide-2.5.0.xpi

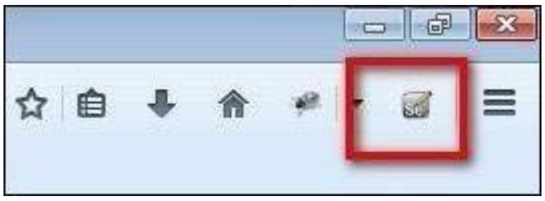
**Selenium IDE: Python Formatters** *(Author not verified)*
http://release.seleniumhq.org/selenium-ide/2.5.0/selenium-ide-2.5.0.xpi

**Step 4** − The Selenium IDE can now be accessed by navigating to Tools >>Selenium IDE.



File Edit View History Bookmarks Tools Help
Mozilla Firefox Start Page
Firefox Search or enter address
Most Visited Getting Started New Ta
Downloads Ctrl+J
Add-ons Ctrl+Shift+A
Set Up Sync...
Web Developer
Page Info
Options
DownThemAll! Tools
Selenium IDE Ctrl+Alt+S

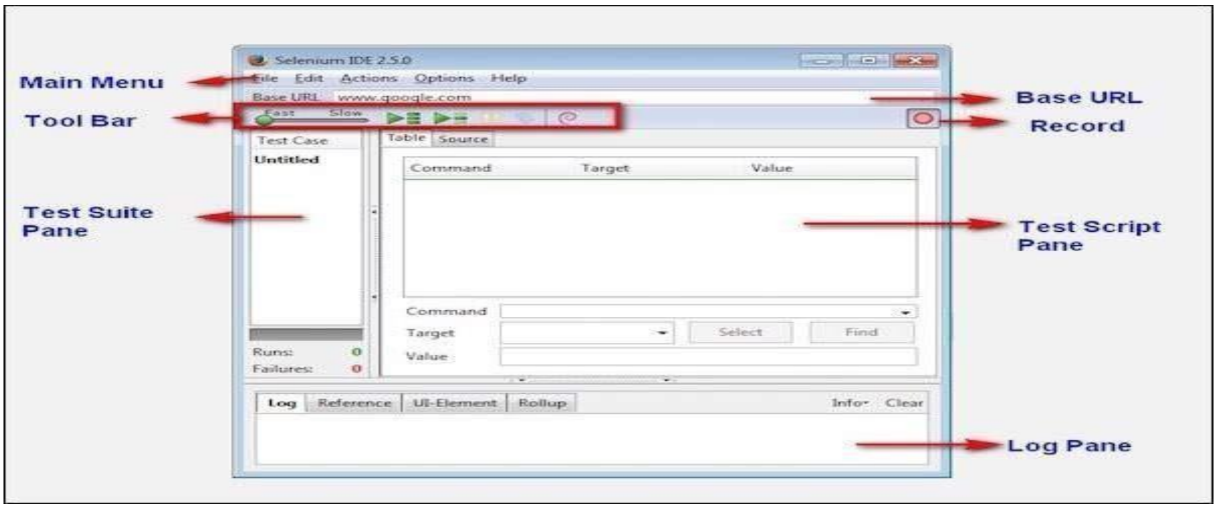
**Step 5** − The Selenium IDE can also be accessed directly from the quick access menu bar as shown below.



**Selenium IDE Features**

This section deals with the features available in Selenium IDE.

The following image shows the features of Selenium IDE with the help of a simple tool-tip.



The features of the record tool bar are explained below.

| Control | Control Name | Description |
|---|---|---|
| Fast Slow | Speed Control | This helps in controlling the speed of the test case runs. |
| ▶≣ | Run All | Executes the entire test suite that contains multiple test cases. |
| ▶≡ | Run | Executes the currently selected test. |
| ⏸ ▶ | Pause/Resume | Allows user to pause or resume the script execution. Enabled only during the execution. |
| ↴ | Step | Helps user to debug the test by executing only one step of a test case at a time. |
| ▶ | Test Runner Mode | Allows user to execute the test case in a browser loaded with the selenium Core. It is an obsolete functionality that likely to be deprecated. |
| ◎ | Apply Rollup Rules | This features allows repetitive sequences of selenium commands to be grouped into a single action. |

| | | |
|---|---|---|
| ● | Record | This features helps user to Records the user's browser actions. |

**Creating Selenium IDE Tests**

This section deals with how to create IDE tests using recording feature.

The following steps are involved in creating Selenium tests using IDE −

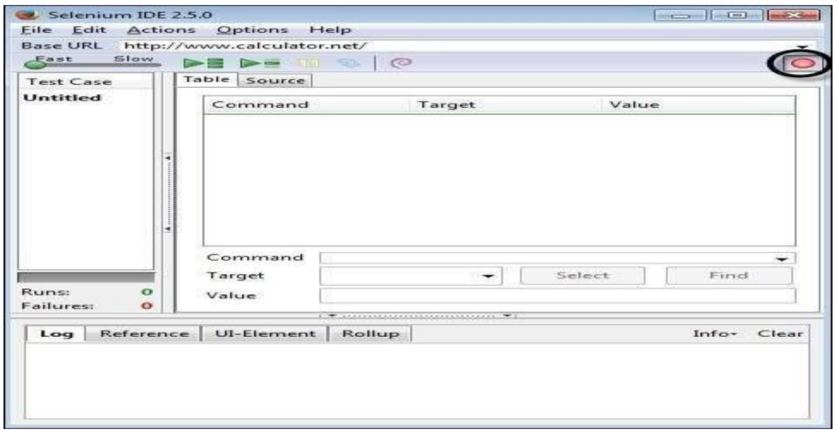
- Recording and adding commands in a test
- Saving the recorded test
- Saving the test suite
- Executing the recorded test

Recordingand Adding CommandsinaTest

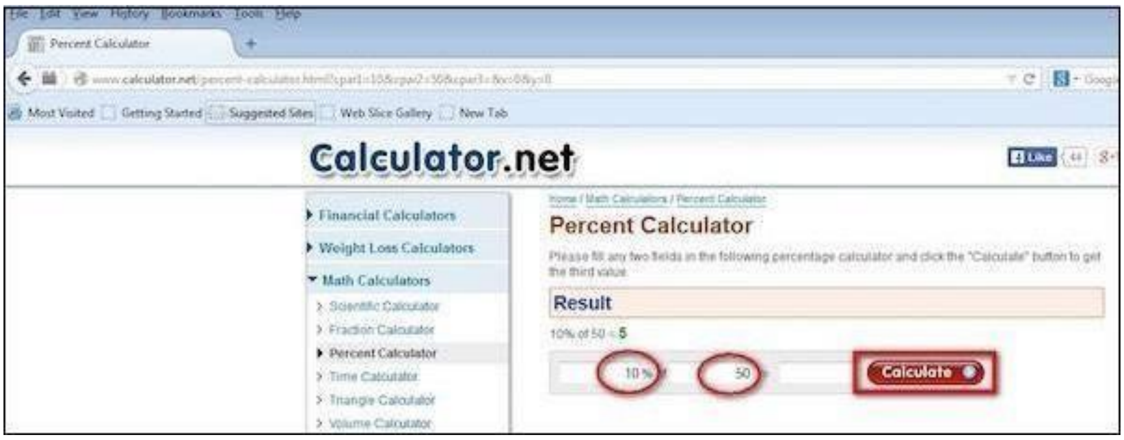
We will use www.ncalculators.com to demonstrate the features of Selenium.

**Step 1** − Launch the Firefox browser and navigate to the website - https://www.ncalculators.com/

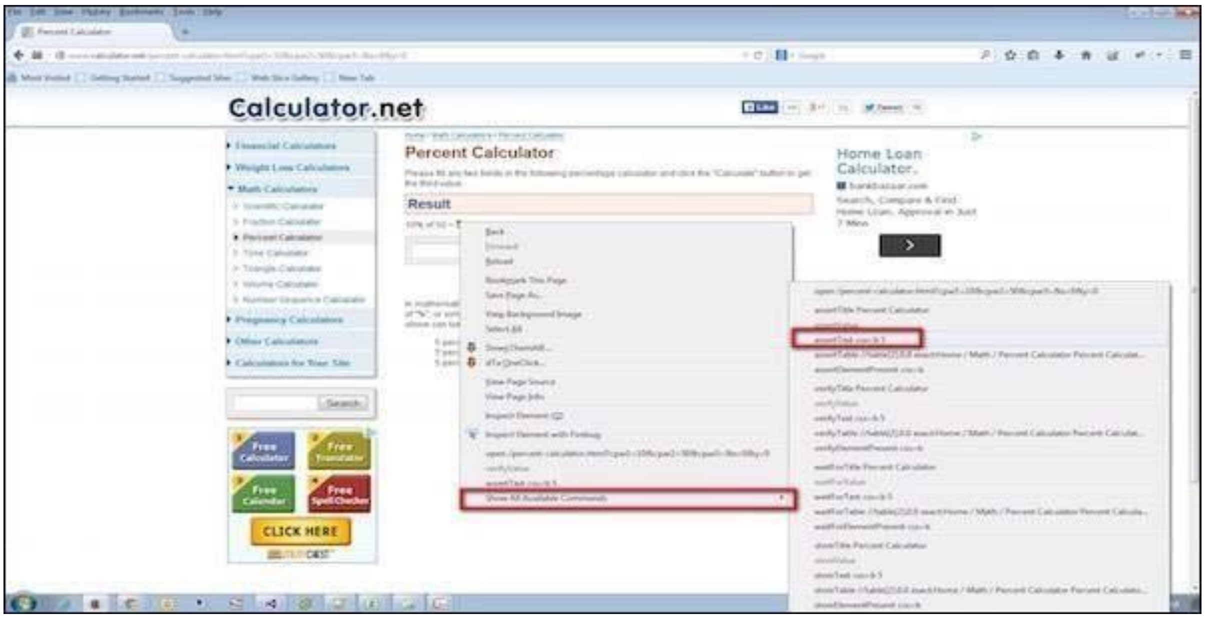
**Step 2** − Open Selenium IDE from the Tools menu and press the record button that is on the top-right corner.



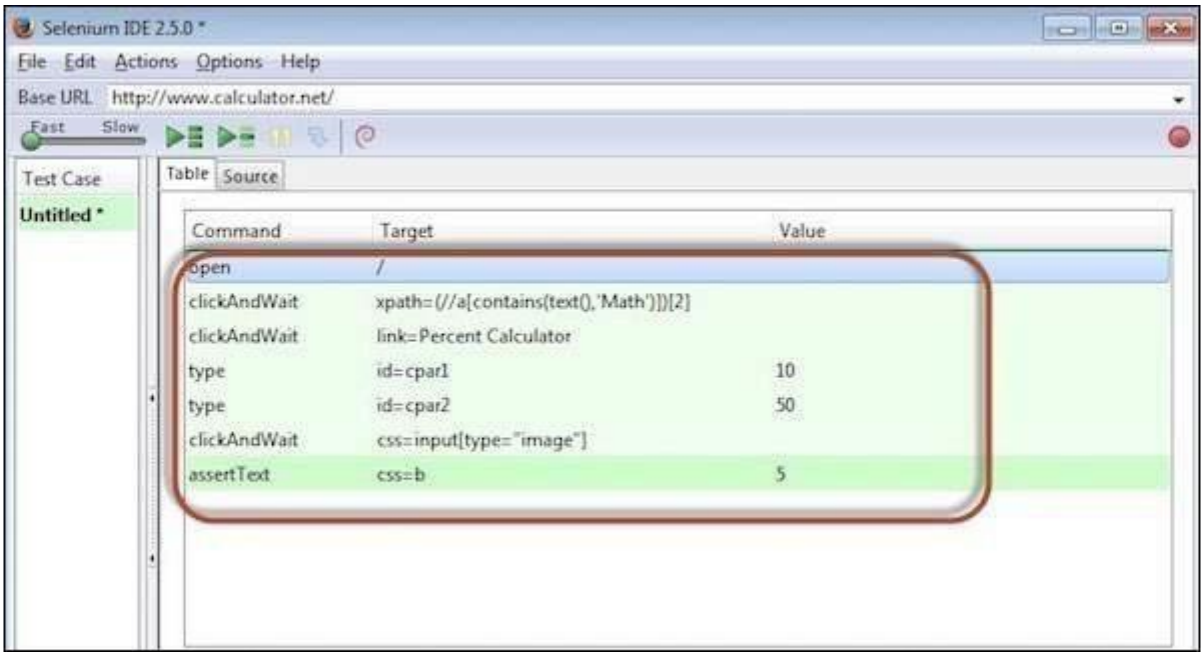
**Step 3** − Navigate to "Math Calculator" >> "Percent Calculator >> enter "10" as number1 and 50 as number2 and click "calculate".



**Step 4** − User can then insert a checkpoint by right clicking on the webelement and select "Show all available commands" >> select "assert text css=b 5"



**Step 5** − The recorded script is generated and the script is displayed as shown below.



Base URL http://www.calculator.net/

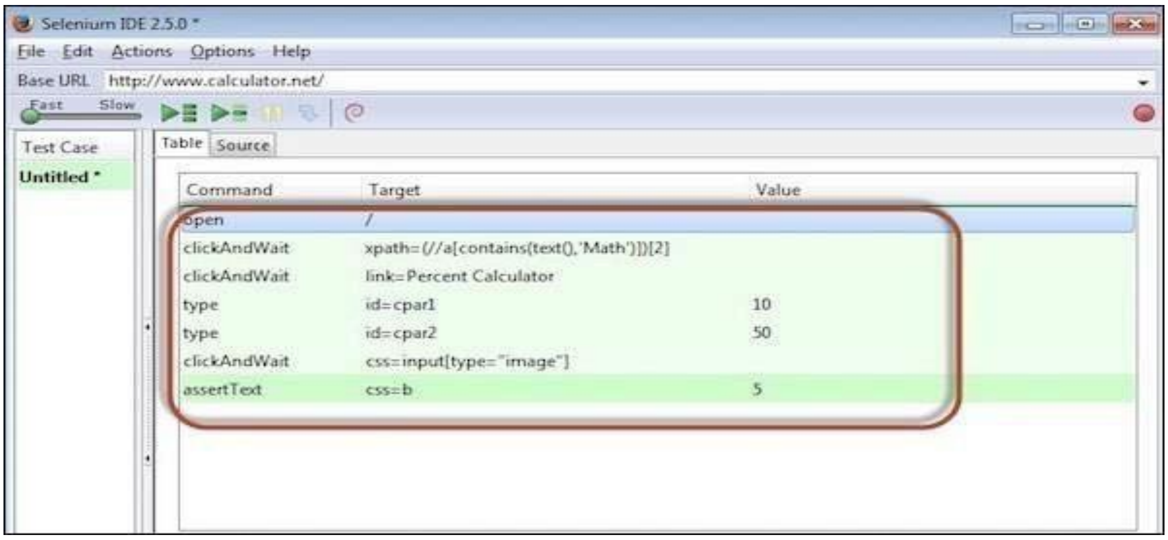
Untitled *

| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | xpath=(//a[contains(text(),'Math')])[2] | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | css=input[type="image"] | |
| assertText | css=b | 5 |

**Savingthe Recorded Test**

**Step 1** − Save the Test Case by navigating to "File" >> "Save Test" and save the file in the location of your choice. The file is saved as .HTML as default.

The test can also be saved with an extension htm, shtml, and xhtml.



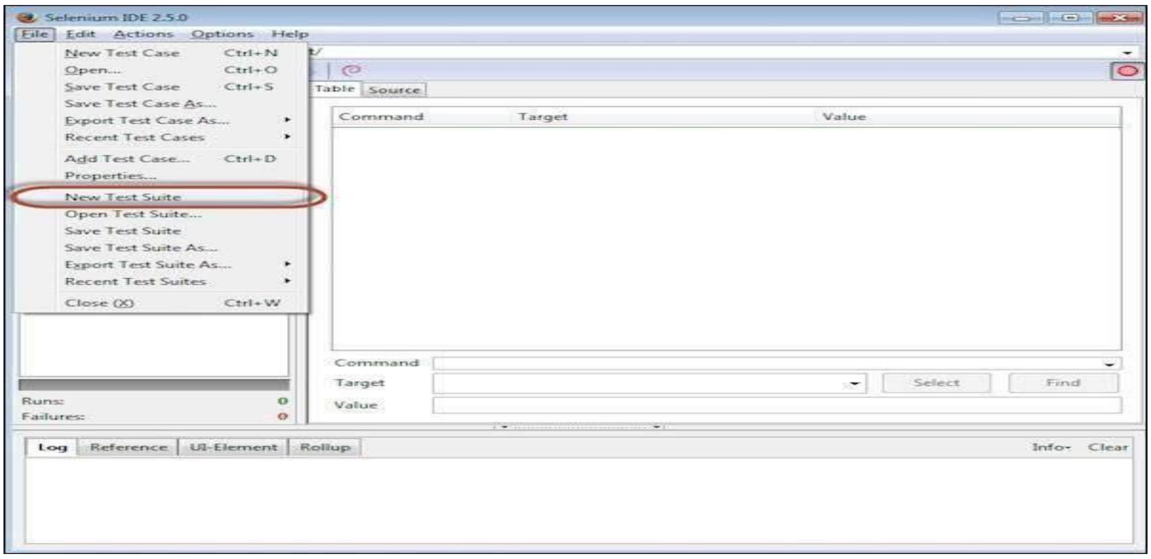
Base URL http://www.calculator.net/

| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | xpath=(//a[contains(text(),'Math')])[2] | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | css=input[type="image"] | |
| assertText | css=b | 5 |

**Savingthe Test Suite**

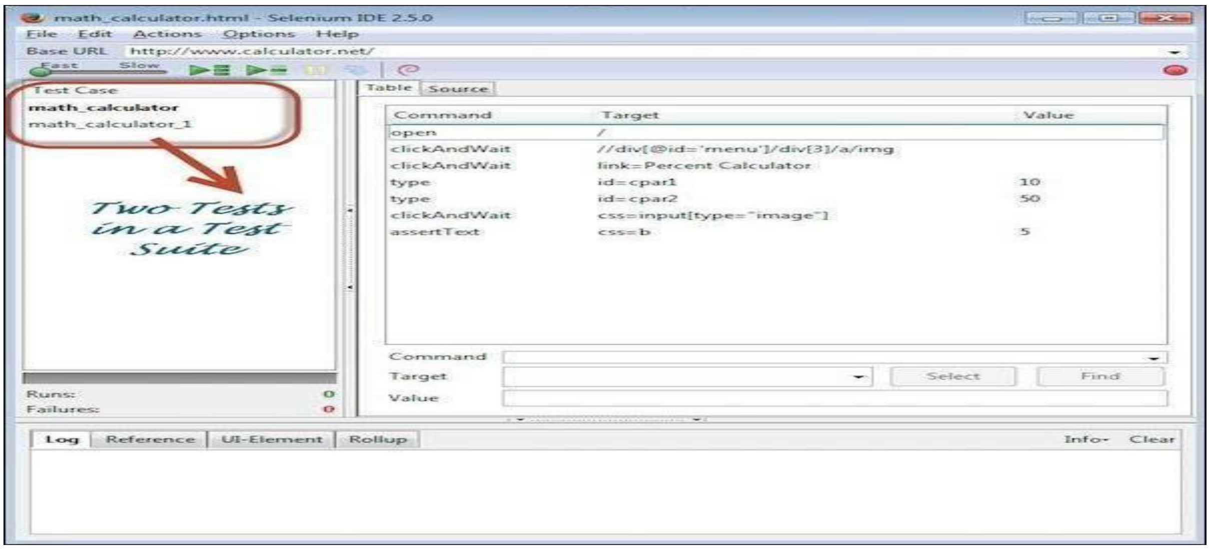
A test suite is a collection of tests that can be executed as a single entity.

**Step 1** − Create a test suite by navigating to "File" >> "New Test Suite" as shown below.



**Step 2** − The tests can be recorded one by one by choosing the option "New Test Case" from the "File" Menu.

**Step 3** − The individual tests are saved with a name along with saving a "Test Suite".


math_calculator.html - Selenium IDE 2.5.0
File Edit Actions Options Help
Base URL http://www.calculator.net/
Fast Slow
Test Case
math_calculator
math_calculator_1
Two Tests in a Test Suite
Runs: 0
Failures: 0
Table Source
Command
Target
Value
Select
Find
Log Reference UI-Element Rollup
Info▾ Clear

| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | //div[@id='menu']/div[3]/a/img | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | css=input[type="image"] | |
| assertText | css=b | 5 |

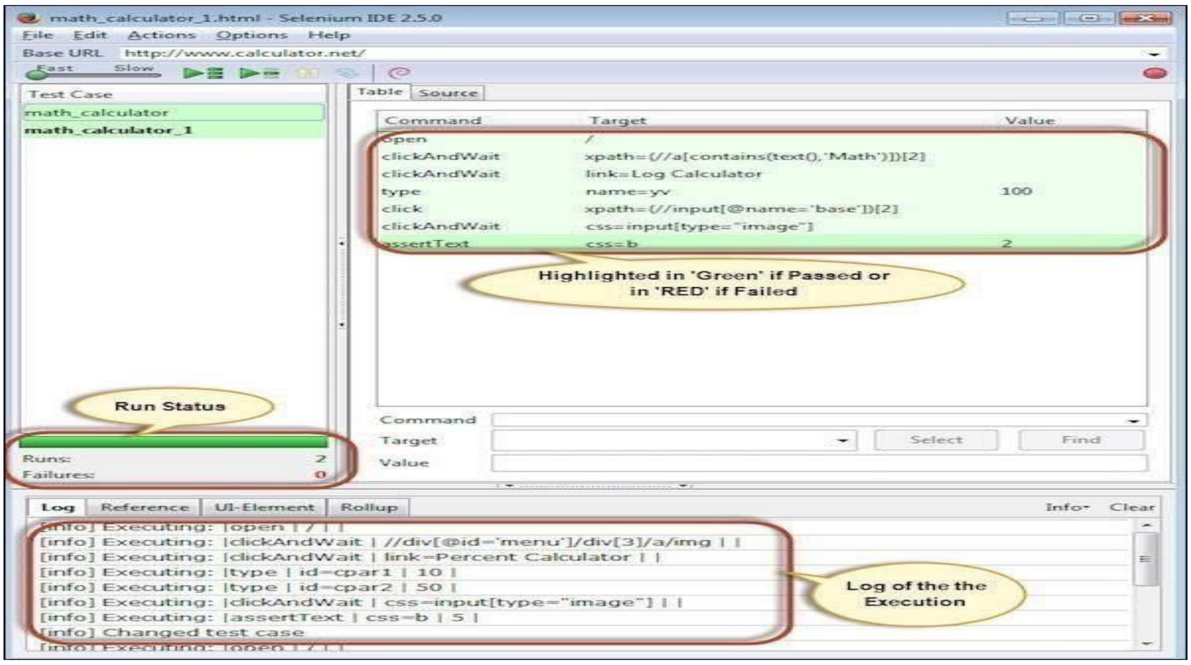
**Executingthe Recorded Test**

The recorded scripts can then be executed either by clicking "Play entire suite" or "Play current test" button in the toolbar.

**Step 1** − The Run status can be seen in the status pane that displays the number of tests passed and failed.

**Step 2** − Once a step is executed, the user can see the result in the "Log" Pane.

**Step 3** − After executing each step, the background of the test step turns "Green" if passed and "Red" if failed as shown below.


math_calculator_1.html - Selenium IDE 2.5.0
File Edit Actions Options Help
Base URL http://www.calculator.net/
Fast Slow
Test Case
math_calculator
math_calculator_1
Highlighted in 'Green' if Passed or in 'RED' if Failed
Run Status
Runs: 2
Failures: 0
Table Source
Command
Target
Value
Select
Find
Log Reference UI-Element Rollup
Info▾ Clear
Log of the the Execution

| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | xpath=(//a[contains(text(),'Math')])[2] | |
| clickAndWait | link=Log Calculator | |
| type | name=yv | 100 |
| click | xpath=(//input[@name='base'])[2] | |
| clickAndWait | css=input[type="image"] | |
| assertText | css=b | 2 |

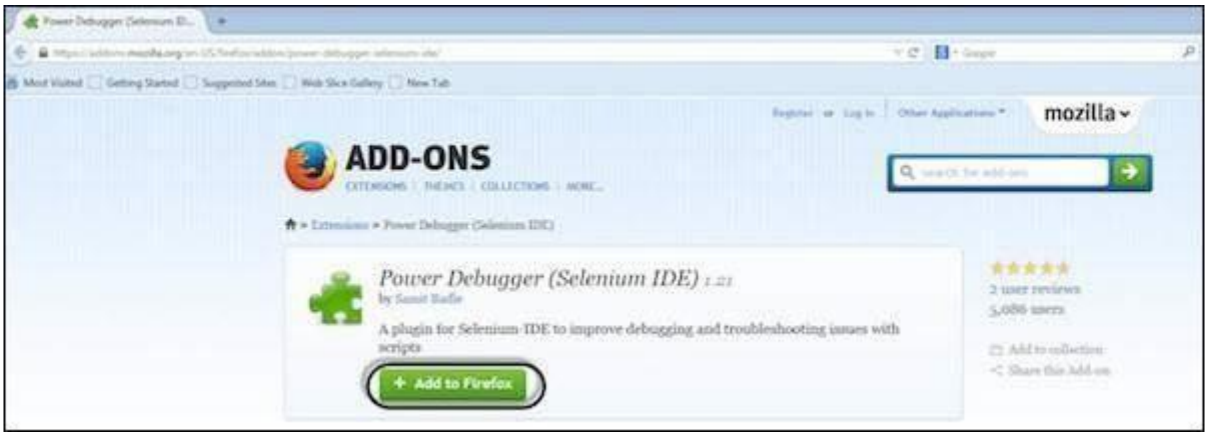
```
[info] Executing: |open | / | |
[info] Executing: |clickAndWait | //div[@id='menu']/div[3]/a/img | |
[info] Executing: |clickAndWait | link=Percent Calculator | |
[info] Executing: |type | id=cpar1 | 10 |
[info] Executing: |type | id=cpar2 | 50 |
[info] Executing: |clickAndWait | css=input[type="image"] | |
[info] Executing: |assertText | css=b | 5 |
[info] Changed test case
[info] Executing: |open | / | |
```

**Selenium IDE Script Debugging**

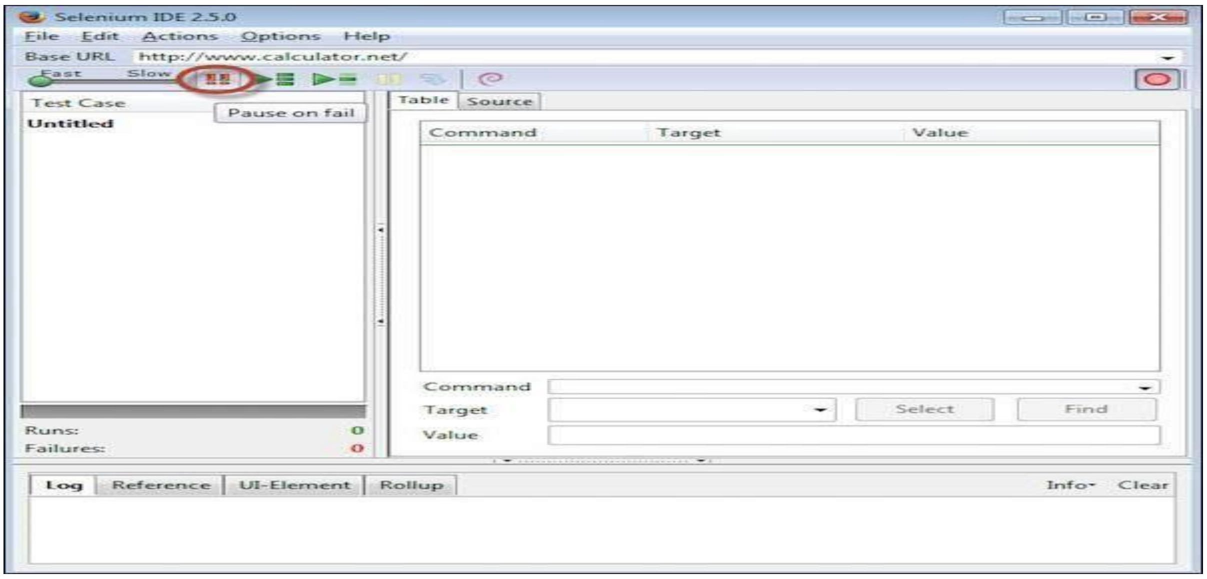
This section deals with debugging the Selenium IDE script.

Debugging is the process of finding and fixing errors in the test script. It is a common step in any script development. To make the process more robust, we can make use a plugin "Power Debugger" for Selenium IDE.

**Step 1** − To install Power Debugger for Selenium IDE, navigate to https://addons.mozilla.org/en-US/firefox/addon/power-debugger-selenium-ide/ and click "Add to Firefox" as shown below.


mozilla
ADD-ONS
EXTENSIONS | THEMES | COLLECTIONS | MORE...
Power Debugger (Selenium IDE) 1.21
by Samit Badle
A plugin for Selenium IDE to improve debugging and troubleshooting issues with scripts
+ Add to Firefox
2 user reviews
5,086 users
Add to collection
Share this Add-on

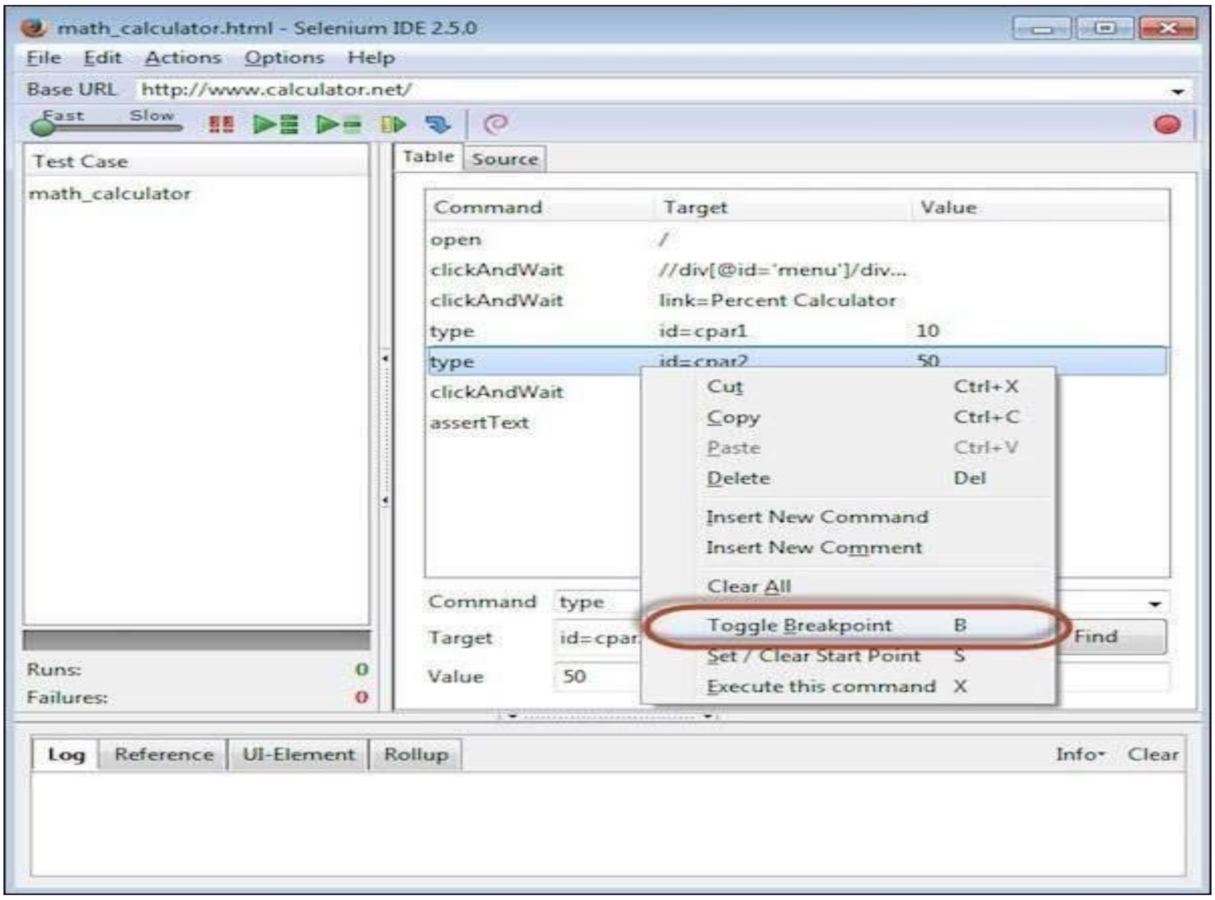
**Step 2** − Now launch 'Selenium IDE' and you will notice a new icon, "Pause on Fail" on recording toolbar as shown below. Click it to turn it ON. Upon clicking again, it would be turned "OFF".



**Step 3** − Users can turn "pause on fail" on or off any time even when the test is running.

**Step 4** − Once the test case pauses due to a failed step, you can use the resume/step buttons to continue the test execution. The execution will **NOT** be paused if the failure is on the last command of any test case.

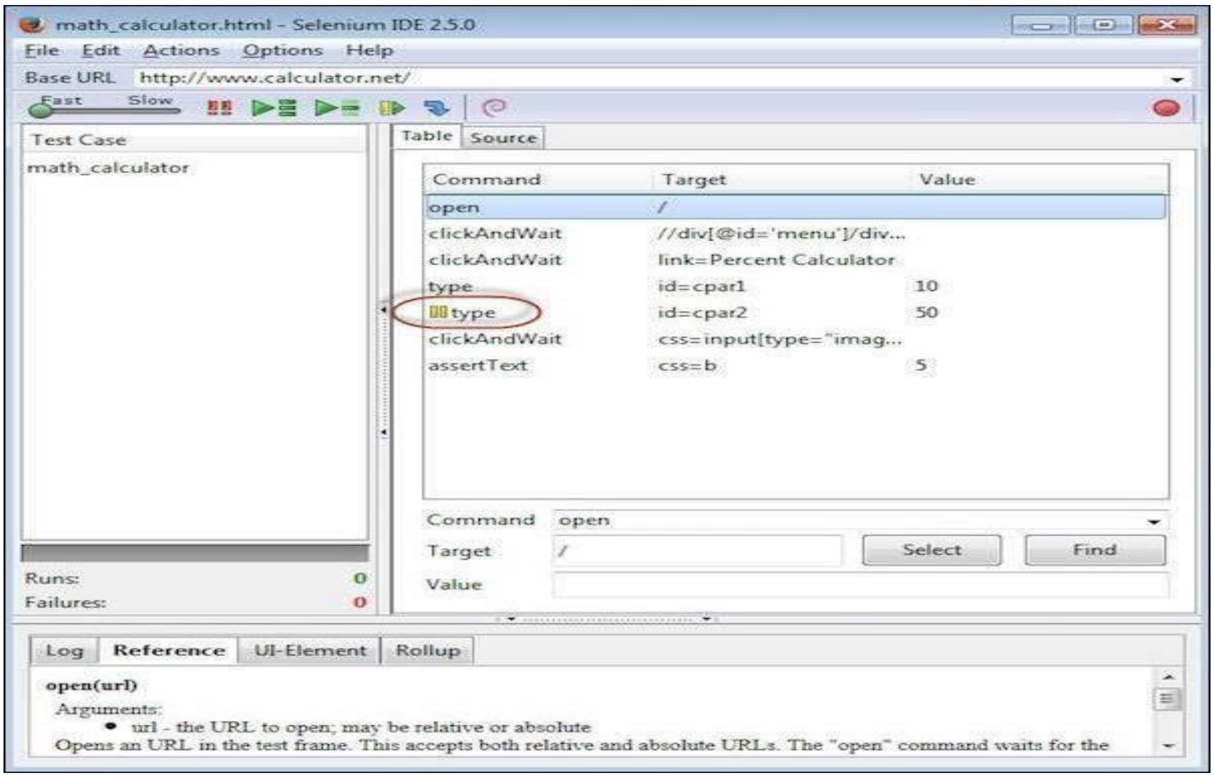
**Step 5** − We can also use breakpoints to understand what exactly happens during the step. To insert a breakpoint on a particular step, "Right Click" and select "Toggle Breakpoint" from the context-sensitive menu.



| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | //div[@id='menu']/div... | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | | |
| assertText | | |

Command: type
Target: id=cpar
Value: 50

**Step 6** − Upon inserting the breakpoint, the particular step is displayed with a pause icon as shown below.


math_calculator.html - Selenium IDE 2.5.0
File Edit Actions Options Help
Base URL http://www.calculator.net/
Fast Slow
Test Case
math_calculator
Table Source
Select
Find
Runs: 0
Failures: 0
Log Reference UI-Element Rollup

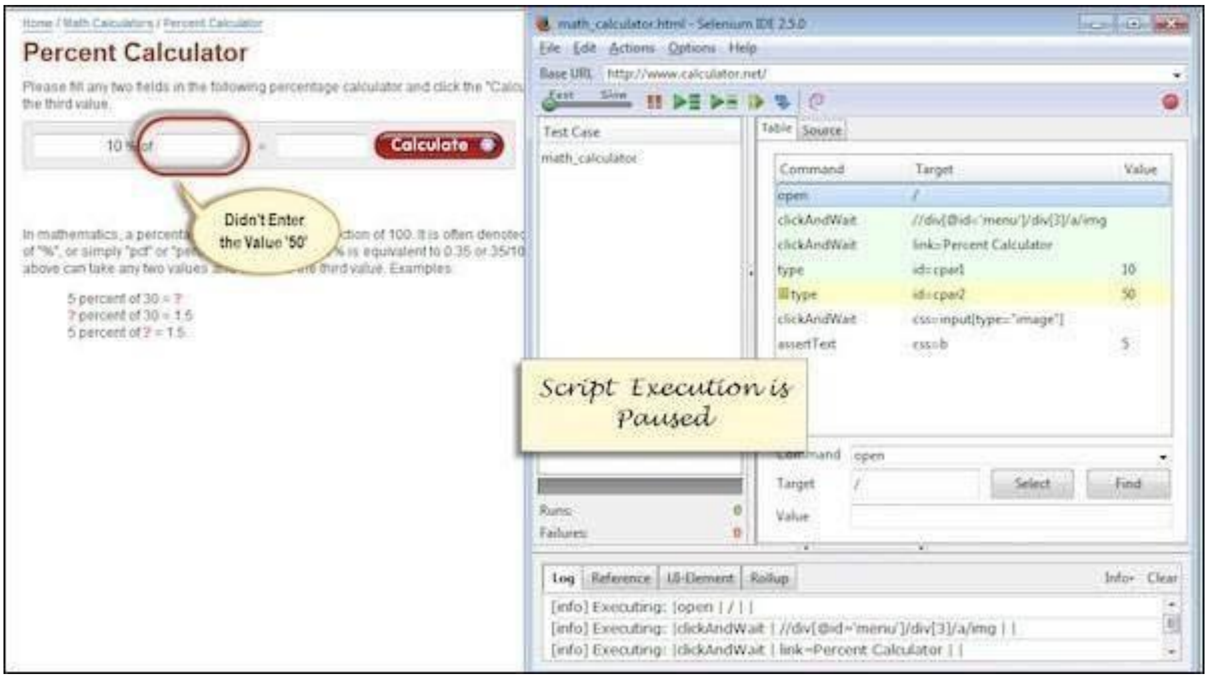
| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | //div[@id='menu']/div... | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | css=input[type="imag... | |
| assertText | css=b | 5 |

Command: open
Target: /
Value:

open(url)
Arguments:
- url - the URL to open; may be relative or absolute

Opens an URL in the test frame. This accepts both relative and absolute URLs. The "open" command waits for the

**Step 7** − When we execute the script, the script execution is paused where the breakpoint is inserted. This will help the user to evaluate the value/presence of an element when the execution is in progress.


Home / Math Calculators / Percent Calculator
Percent Calculator
Calculate
Didn't Enter the Value '50'
Script Execution is Paused
math_calculator.html - Selenium IDE 2.5.0
File Edit Actions Options Help
Base URL http://www.calculator.net/
Test Case
math_calculator
Table Source
Runs: 0
Failures: 0
Log Reference UI-Element Rollup Info▾ Clear

| Command | Target | Value |
|---|---|---|
| open | / | |
| clickAndWait | //div[@id='menu']/div[3]/a/img | |
| clickAndWait | link=Percent Calculator | |
| type | id=cpar1 | 10 |
| type | id=cpar2 | 50 |
| clickAndWait | css=input[type="image"] | |
| assertText | css=b | 5 |

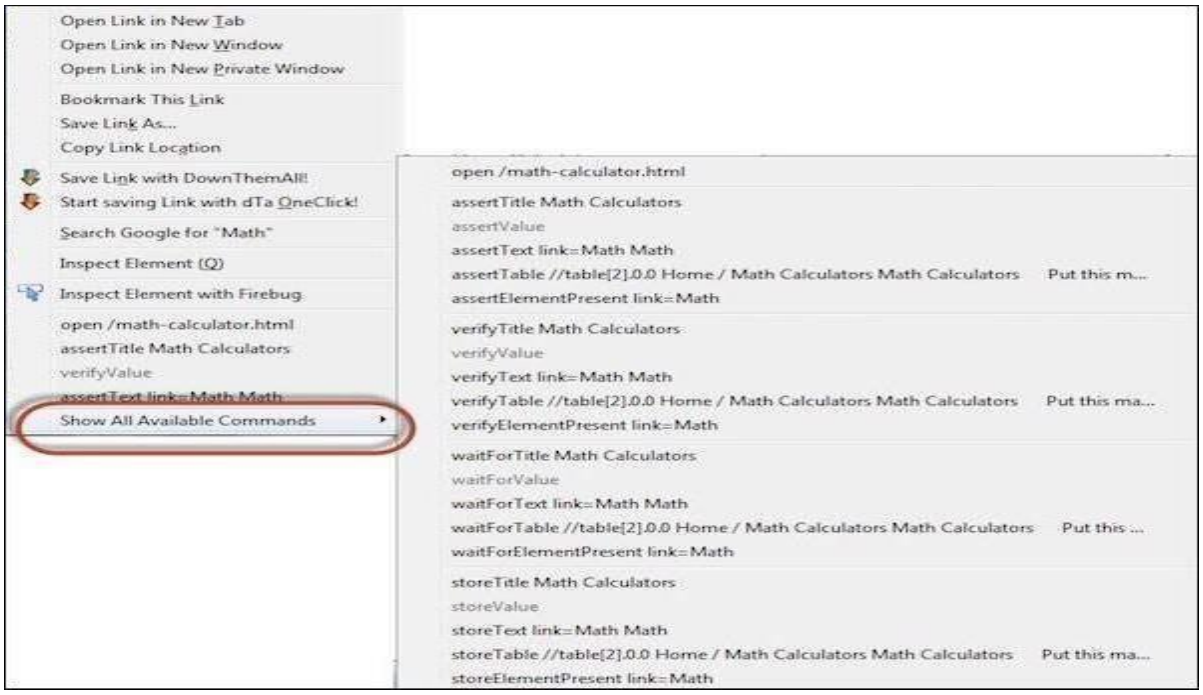
```
[info] Executing: |open | / | |
[info] Executing: |clickAndWait | //div[@id='menu']/div[3]/a/img | |
[info] Executing: |clickAndWait | link=Percent Calculator | |
```

## Inserting Verification Points

This section describes how to insert verification points in Selenium IDE.

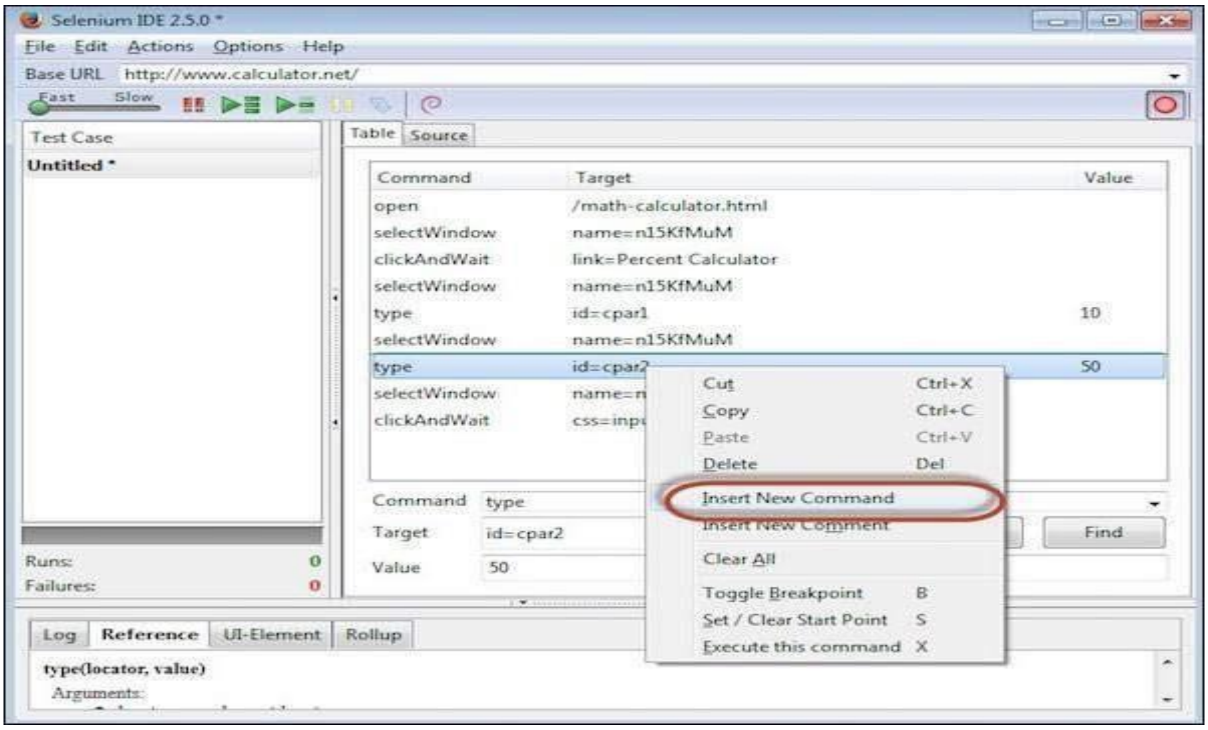
The test cases that we develop also need to check the properties of a web page. It requires assert and verify commands. There are two ways to insert verification points into the script.

To insert a verification point in recording mode, "Right click" on the element and choose "Show all Available Commands" as shown below.


Open Link in New Tab
Open Link in New Window
Open Link in New Private Window
Bookmark This Link
Save Link As...
Copy Link Location
Save Link with DownThemAll!
Start saving Link with dTa OneClick!
Search Google for "Math"
Inspect Element (Q)
Inspect Element with Firebug
open /math-calculator.html
assertTitle Math Calculators
verifyValue
assertText link=Math Math
Show All Available Commands

```
open /math-calculator.html
assertTitle Math Calculators
assertValue
assertText link=Math Math
assertTable //table[2].0.0 Home / Math Calculators Math Calculators    Put this m...
assertElementPresent link=Math
verifyTitle Math Calculators
verifyValue
verifyText link=Math Math
verifyTable //table[2].0.0 Home / Math Calculators Math Calculators    Put this ma...
verifyElementPresent link=Math
waitForTitle Math Calculators
waitForValue
waitForText link=Math Math
waitForTable //table[2].0.0 Home / Math Calculators Math Calculators    Put this ...
waitForElementPresent link=Math
storeTitle Math Calculators
storeValue
storeText link=Math Math
storeTable //table[2].0.0 Home / Math Calculators Math Calculators    Put this ma...
storeElementPresent link=Math
```

We can also insert a command by performing a "Right-Click" and choosing "Insert New Command".

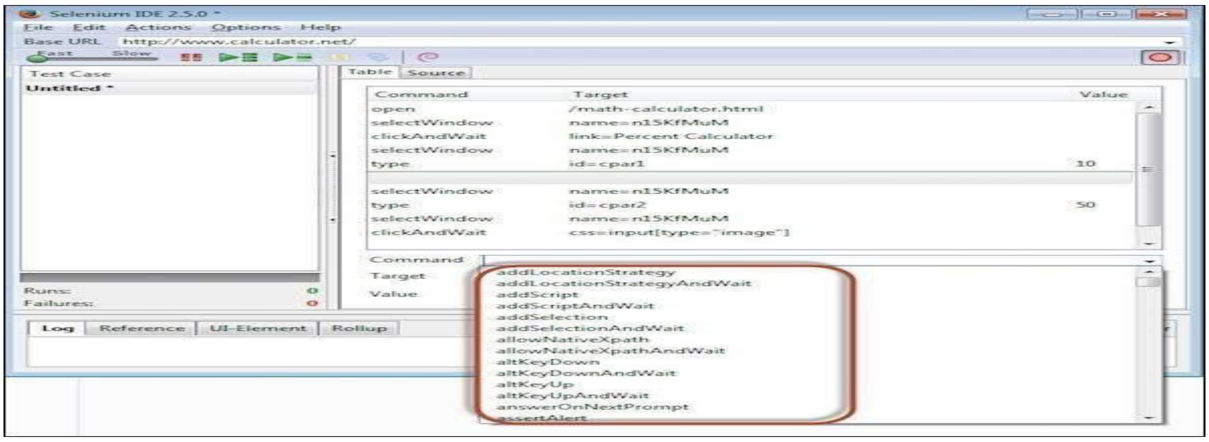


| Command | Target | Value |
|---|---|---|
| open | /math-calculator.html | |
| selectWindow | name=n15KfMuM | |
| clickAndWait | link=Percent Calculator | |
| selectWindow | name=n15KfMuM | |
| type | id=cpar1 | 10 |
| selectWindow | name=n15KfMuM | |
| type | id=cpar2 | 50 |
| selectWindow | name=n | |
| clickAndWait | css=inpu | |

Command: type
Target: id=cpar2
Value: 50

type(locator, value)
Arguments:

After inserting a new command, click 'Command' dropdown and select appropriate verification point from the available list of commands as shown below.



| Command | Target | Value |
|---|---|---|
| open | /math-calculator.html | |
| selectWindow | name=n15KfMuM | |
| clickAndWait | link=Percent Calculator | |
| selectWindow | name=n15KfMuM | |
| type | id=cpar1 | 10 |
| | | |
| selectWindow | name=n15KfMuM | |
| type | id=cpar2 | 50 |
| selectWindow | name=n15KfMuM | |
| clickAndWait | css=input[type="image"] | |

Given below are the mostly used verification commands that help us check if a particular step has passed or failed.

- verifyElementPresent
- assertElementPresent
- verifyElementNotPresent
- assertElementNotPresent
- verifyText
- assertText
- verifyAttribute
- assertAttribute
- verifyChecked
- assertChecked

- verifyAlert
- assertAlert
- verifyTitle
- assertTitle

SynchronizationPoints

During script execution, the application might respond based on server load, hence it is required for the application and script to be in sync. Given below are few a commands that we can use to ensure that the script and application are in sync.

- waitForAlertNotPresent
- waitForAlertPresent
- waitForElementPresent
- waitForElementNotPresent
- waitForTextPresent
- waitForTextNotPresent
- waitForPageToLoad
- waitForFrameToLoad

**Selenium Pattern Matching**

- This section deals with how to work with regular expressions using IDE.

Like locators, patterns are a type of parameter frequently used by Selenium. It allows users to describe patterns with the help of special characters. Many a time, the text that we would like to verify are dynamic; in that case, pattern matching is very useful.

Pattern matching is used with all the verification point commands - verifyTextPresent, verifyTitle, verifyAlert, assertConfirmation, verifyText, and verifyPrompt.

There are three ways to define a pattern −

- globbing
- regular expressions, and
- exact patterns.

Globbing

Most techies who have used file matching patterns in Linux or Windows while searching for a certain file type like *.doc or *.jpg. would be familiar with term "globbing"

Globbing in Selenium supports only three special characters: *, ?, and [ ].

- ***** − matches any number of characters.
- **?** − matches a single character.

- **[ ]** − called a character class, lets you match any single character found within the brackets. [0-9] matches any digit.

To specify a glob in a Selenium command, prefix the pattern with the keyword 'glob:'. For example, if you would like to search for the texts "tax year 2013" or "tax year 2014", then you can use the golb "tax year *" as shown below.

However the usage of "glob:" is optional while specifying a text pattern because globbing patterns are the default in Selenium.

| Command | Target | Value |
|---|---|---|
| clickAndWait | link = search | |
| verifyTextPresent | glob: tax year * | |

Exact Patterns

Patterns with the prefix 'exact:' will match the given text as it is. Let us say, the user wants an exact match with the value string, i.e., without the glob operator doing its work, one can use the 'exact' pattern as shown below. In this example the operator '*' will work as a normal character rather than a pattern-matching wildcard character.

| Command | Target | Value |
|---|---|---|
| clickAndWait | link = search | |
| verifyValue | exact: *.doc | |

Regular Expressions

Regular expressions are the most useful among the pattern matching techniques available. Selenium supports the complete set of regular expression patterns that Javascript supports. Hence the users are no longer limited by *, ? and [] globbing patterns.

To use RegEx patterns, we need to prefix with either "regexp:" or "regexpi:". The prefix "regexpi" is case-insensitive. The glob: and the exact: patterns are the subsets of the Regular Expression patterns. Everything that is done with glob: or exact: can be accomplished with the help of RegExp.

## Example

For example, the following will test if an input field with the id 'name' contains the string 'tax year', 'Tax Year', or 'tax Year'.

| Command | Target | Value |
|---|---|---|
| clickAndWait | link = search | |
| verifyValue | id = name | regexp:[Tt]ax ([Yy]ear) |

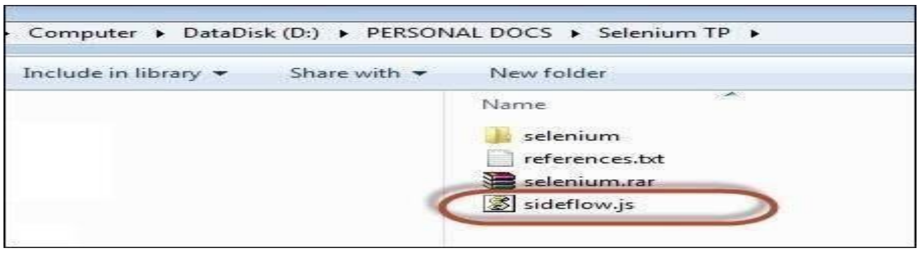
**Selenium User Extensions**

The Java script that allows users to customize or add new functionality.

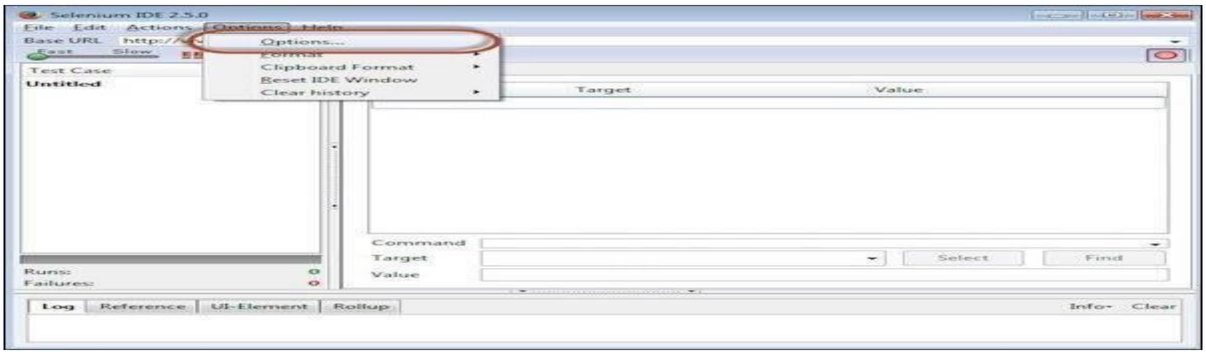
It is easy to extend Selenium IDE by adding customized actions, assertions, and locator-strategies. It is done with the help of JavaScript by adding methods to the Selenium object prototype. On startup, Selenium will automatically look through the methods on these prototypes, using name patterns to recognize which ones are actions, assertions, and locators.

Let us add a 'while' Loop in Selenium IDE with the help of JavaScript.

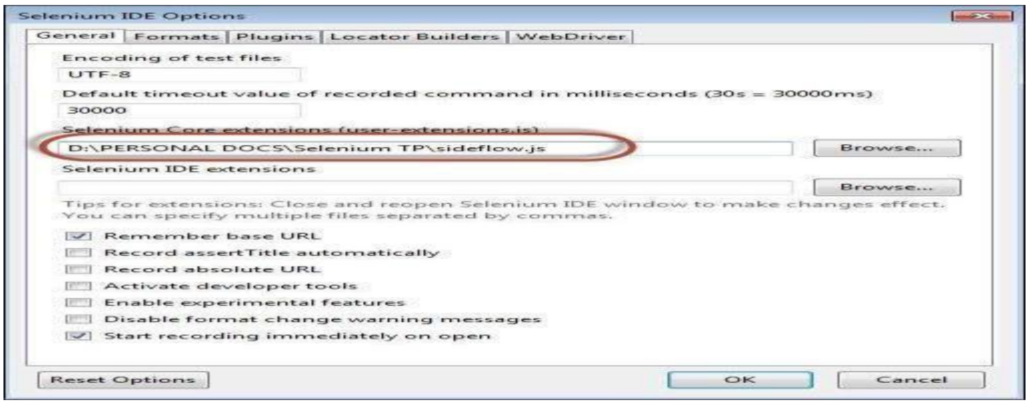
**Step 1** − To add the js file, first navigate to https://github.com/darrenderidder/sideflow/blob/master/sideflow.js and copy the script and place save it as 'sideflow.js' in your local folder as shown below.



**Step 2** − Now launch 'Selenium IDE' and navigate to "Options" >> "Options" as shown below.



**Step 3** − Click the 'Browse' button under 'Selenium Core Extensions' area and point to the js file that we have saved in Step 1.


Selenium IDE Options

General | Formats | Plugins | Locator Builders | WebDriver

Encoding of test files: UTF-8

Default timeout value of recorded command in milliseconds (30s = 30000ms): 30000

Selenium Core extensions (user-extensions.js): D:\PERSONAL DOCS\Selenium TP\sideflow.js

Selenium IDE extensions:

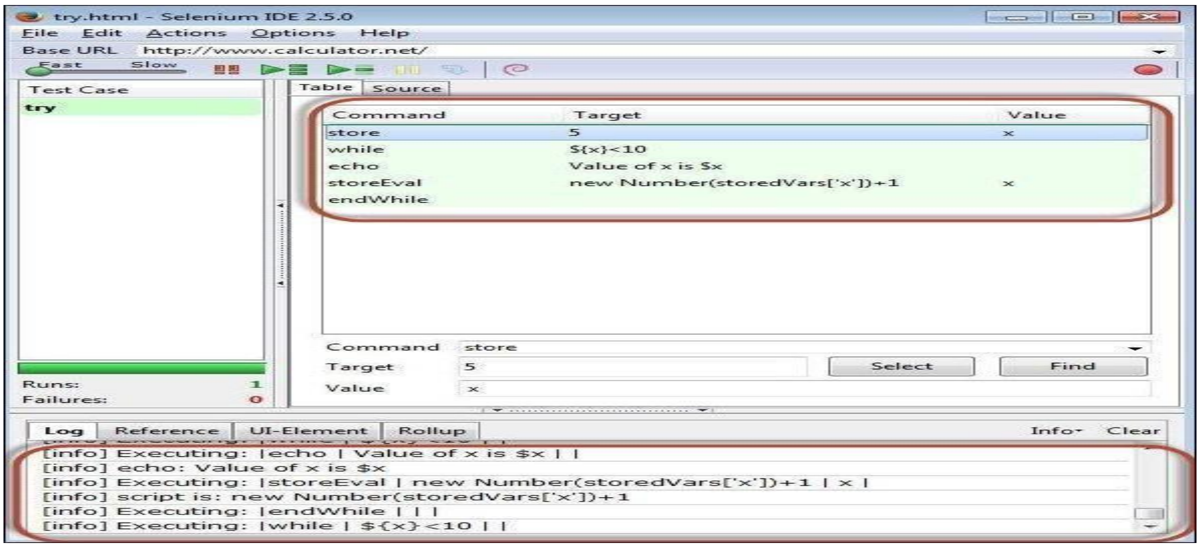
Tips for extensions: Close and reopen Selenium IDE window to make changes effect. You can specify multiple files separated by commas.

- [✓] Remember base URL
- [ ] Record assertTitle automatically
- [ ] Record absolute URL
- [ ] Activate developer tools
- [ ] Enable experimental features
- [ ] Disable format change warning messages
- [✓] Start recording immediately on open

**Step 4** – Restart Selenium IDE.

**Step 5** – Now you will have access to a few more commands such as "Label", "While" etc.

**Step 6** – Now we will be able to create a While loop within Selenium IDE and it will execute as shown below.


try.html - Selenium IDE 2.5.0

Base URL: http://www.calculator.net/

| Command | Target | Value |
|---|---|---|
| store | 5 | x |
| while | ${x}<10 | |
| echo | Value of x is $x | |
| storeEval | new Number(storedVars['x'])+1 | x |
| endWhile | | |

Command: store
Target: 5
Value: x

Runs: 1
Failures: 0

```
[info] Executing: |echo | Value of x is $x | |
[info] echo: Value of x is $x
[info] Executing: |storeEval | new Number(storedVars['x'])+1 | x |
[info] script is: new Number(storedVars['x'])+1
[info] Executing: |endWhile | | |
[info] Executing: |while | ${x}<10 | |
```

File Edit Actions Options Help
Fast Slow
Test Case
try
Table Source
Select
Find
Log Reference UI-Element Rollup
Info▾ Clear

**Viva questions:**

1. What is Selenium?
2. What are the different Selenium components?
3. What are the testing types that can be supported by Selenium?
4. What are the limitations of Selenium?
5. What is Selenese?

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## EXPERIMENT: 8

**NAME OF THE EXPERIMENT: Write a test cases for a) Gmail application b) Face book Manually .**

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES

## RECORD NOTES