Experimental NO:-1

Experimental Name:- Write a Java program to load and display multiple images into a swing container.

Theory: Java swing is a powerful toolkit for creating user interface in Java applications. It provides various components for building GUI applications, including containers to hold other components, such as image. In this experiment, we aim to create a Java program that loads and displays multiple image into swing container.

Here Java swing library provides a number of classes for working with image including

- Image: The base class for all image type in Java
- BufferedImage: A class that represents an image that is stored in memory
- ImageIcon: A class that wraps an image and provides methods for displaying in a GUI

To load an image from a file, you can use the ImageIO.read() method. This method takes a file object as its argument and returns as Image object.

To display an image in a swing container you can use the JLabel class. The JLabel class has a constructor that takes an ImageIcon object as its argument. this will create a label that displays the images

You can also use a JScrollPane to display multiple ~~image~~ images in a single container The JScrollPane class has a method called setViewportView() that takes a component object as its argument. This will case the scroll pane to display the component.

Apparatus:

1. Java Development kit (JDK)
2. Eclipse
3. Image files (.jpg, .png, .gif) for demonstration

Experimental no:- 2

Experimental Name:- Suppose a restaurant sells Pizza for $100, Burgers for $30 and Tea for $10. Write a java program for generating restaurant bills after ordering from a customer

Theory: In this experimental, we aim to create a Java program that generates restaurant bill for customers based on their orders. The restaurant offers three items on its menu: Pizza, Burgers, and Tea, with corresponding prices of $100, $30, $10 respectively. To achieve this, we will use Java programming concepts such as variables, user input, and calculations to compute the total bill for a customer's order. Here we

① Define the prices of the menu items

② Initialize variable to store the quantities of each item ordered by the customer

③ Prompt the user to enter the quantities of each item they have ordered

④ calculate the total cost for each item by multiplying its price with the quantity ordered

⑤ calculating the total bill by summing up the costs of all items.

⑥ Display the order details and the total bill the user

Apparatus:

① JDK (Java Development kit)

② Eclipse IDE

Source Code:

```
Package OmarFaruk;
import Javax.swing;
import Javat.awt.swing;
public class BillGeneration extends JFrame
    implement ActionListener {
  Jlabel l;
  JCheckBox cb1, cb2, cb3;
  JButton b;
  BillGeneration () {
  l = new Jlabel ("Food ordering system);
  l.setBounds (50, 50, 300, 20);
  cb1 = new JCheckBox ("Pizza @100");
  cb2 = new JCheckBox ("Burger @30");
  cb3 = new JCheckBox ("Tea @ 10");

  b = new JButton ("Order");
  b.setBounds (100, 250, 80, 30);
  b.addActionListener (this);
  add (b);
  vetVisible (true);
  }
public void action performed (ActionEvent e) {
float amount = 0;
String msg = "Selected items : \n");
```

Experimental No:- 3

Experimental Name:- Write a Java Program to create a student registration form for ICE department including the fields "Name", "Roll", and "Department" in GUI.

Theory:- This experiment will demonstrate how to write a Java program to create a student registration form for the ICE department. The program will use a graphical user interface (GUI) to allow the user to enter the student's name, roll number and department. The program will then store the information in a file and display a confirmation message. Here we discuss problem step by step

1. Create a new Java project in your text editor
2. create a new class.
3. Import Javax.swing library
4. create JFrame object. This will

main window of the form

⑤ Add a JLabel object to the JFrame object for each of the three fields name, roll and department

⑥ Add a JTextField, JButton.

The program will create ~~with~~ a window the three text fields and a submit button. The user can enter their name, roll number, and department into the text field.

Apparatus:

① JDK (Java Development)

② Eclipse

③ Java swing library for GUI components

Experiment No: 4

Experiment Name: Write a java program in GUI to develop a simple calculator that can calculate addition, substract, division and multiplication operations.

Theory: Graphical User Interface (GUI) programming allows developers to create interactive applications with user-friendly interfaces. In this experiment, we aim to develop a simple calculator using Java GUI that can perform basic arithmetic operations such as addition, substraction, division and multiplication

- Graphical User Interface (GUI)

→ GUI programming involves creating graphical elements like buttons, labels, and text field that user can interact with. In Java, GUI applications are often developed using libraries like swing or Javafx.

- Swing library:

→ Swing is a Java GUI toolkit that

provides a rich set of components for creating graphical user interface. It includes classes for buttons, labels, text fields and other UI elements. Swing components are customizable and can be arranged in various layouts to create visually appealing interface

⊙ Creating the GUI components

⊙ Create a new Java project and add necessary swing libraries to the project

⊙ Add buttons for digits (0-9), arithmetic operation (+, -, *, /) equal (=) and a text field to display input and output

~~Logical~~

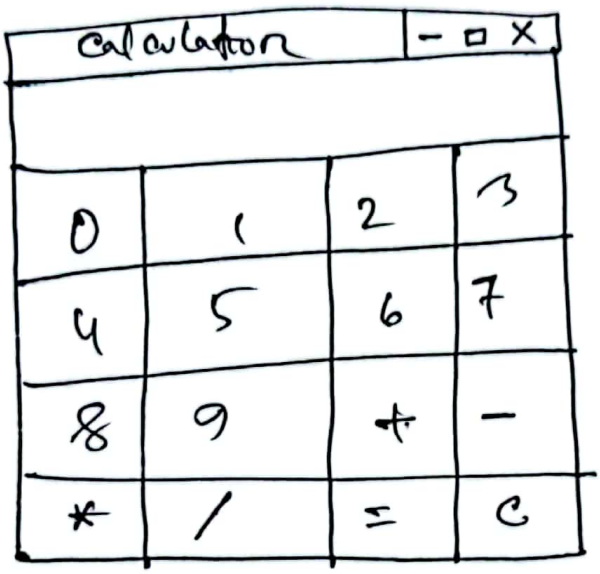
~~Logic~~

Apparatus:

① JDK (Java Development kit)

② Use an Integrated Development Environment (IDE) like Eclipse or IntelliJ IDEA for coding convenience

Output:



Experiment NO:- 05

Experiment Name:- Suppose multiple threads try to access the same resources and finally produce erroneous and unforeseen results. Write a java program to slove this problem using object or method synchronization

Theory: A thread is similar to a program that has a single flow of control or independent process that can be run simultaneously.

Multithreading refers to multiple thread of control within it. Threads are implemented in the form of object that contain a method called run(). The run method is the heart and soul of any thread

Java contains two slightly different ways of implementing a thread -

- Implementing the runnable interface
- Extending the thread @class

Synchronization control the access the multiple threads to a shared resources. It is the process of allowing thread to execute

one after one.

Without synchronization of threads, one thread can modify a shared variable while another thread can update the same shared variable which leads to significant errors.

This is the general form of the synchronized statement:

```
synchronized (object)
{
    // statements to be synchronized
}
```

Here, object is a reference to the object being synchronized. A synchronized block ensures that a call to a method that is a member of object occurs only after the current thread has successfully entered object's monitor

Apparatus:

1. Eclipse IDE
2. JDK

Experimental NO:- 6

Experimental Name:- Write a client-server TCP socket program in java that the server listens for connection requests and whatever message the client sends, the server converts it to UPPERcase and sends it back.

Theory :- In networking, the client-server ~~server~~ - server-side program ~~runs~~ must agree on a port on number before they can communicate with each other. A client is a user program that connects to a server to access a service. And a server is a sample of software or hardware that serves a specific service to its clients.

There are 4 types of communication layers in network. They are application layer, transport layer, internet layer and network layer. The transport layer is two types

1. Transmission control (TCP)
2. User Datagram Protocal (UDP)

A socket is one end-point of a two-way communication link between two program running on the network.

Java socket programming is used for communication between the applications running on different JRE. A socket implementation gives us the ability to read from it and write to it as if it is a file

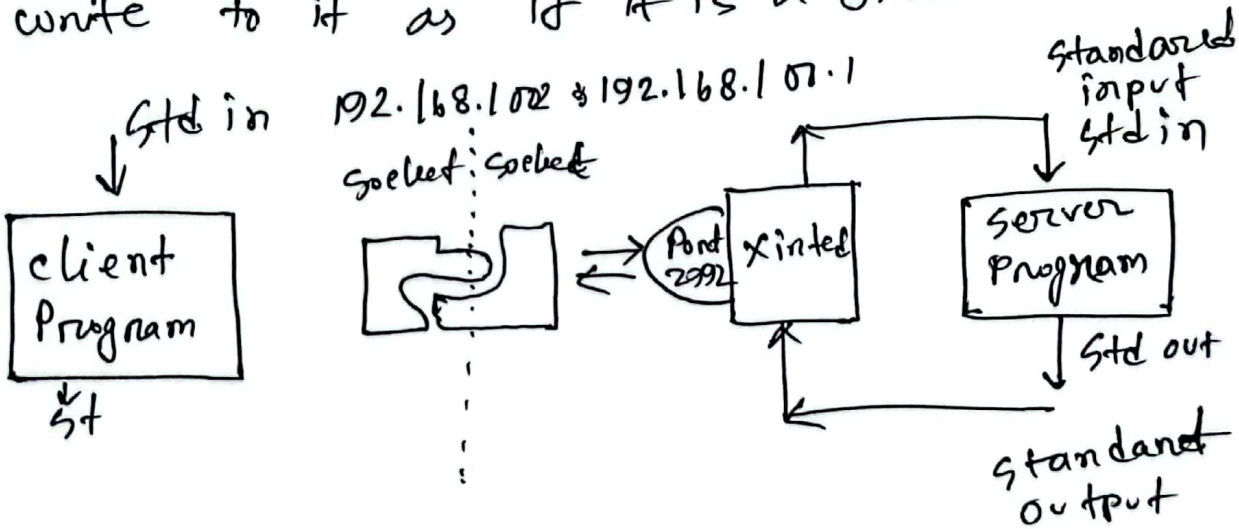


figure-1 Socket programming between client and server

So sockets are the most widely used programming interfaces for the transport layer protocols. TCP is a connection-oriented protocol that provides a reliable flow of data between two computers such as HTTP, FTP and Telnet.

The two key classes from the java.net package used in creation of server and client program are

- Server socket
- Socket

In the case of a connection request the program creates a new socket through which it will exchange data with the client using input and output streams. Transmission control protocol (TCP) guarantees the delivery of packet and preserves their order at destination

Apparatus:

- Eclipse IDE
- JDK (Java Development Kit)

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Apparatus:

- Eclipse IDE
- JDK (Java Development kit)

Experimental no – 7

Experimental Name:- write a client-server UDP socket program in java that the server listens for connection requests, and whatever message within 1024 bytes the client sends, the server converts it to uppercase and sends it back after 6 ms.

Theory: sometimes Transmission control protocal (TCP) which guarantees the delivery of packet and preserves their order on destination, these features are not required and since they do not come without performance costs, it would be better to use a lighter transport protocol. This kind of service is accomplished by the UDP protocol which conveys datagram packets.

Datagram packets are used to implement a connectionless packet delivery service supported by the UDP protocol. Each message is transferred from source machine to destination based on information contain within that packet.

That means, each packet needs to have destination address and each packet might be routed differently, and might arrive in any order. Packet delivery is not guaranted.

Java supports datagram communication through the following classes

- Datagram Packet
  - The class Datagram Packet contains several constructors that can be used for creating packet object
  - Datagram Packet (byte [] buf, int length, netAddress, address, int port);

- Datagram Socket:-
  - The class Datagram Socket supports various methods that can be used for transmitting or receiving data a datagram over the network
  - void send (DatagramPacket P)
    - » sends a datagram packet from this socket
    - » Receiving a datagram packet from this socket

Apparatus:

- Eclipse IDE
- Java Development kit (JDk)

Experimental No:- 8

Experimental Name:- Suppose we have an ms Access database named IEE-PUST which has a table named by student with field (Name, Email, and phone). using this database answer the following questions

(a) Write down a java program to insert data into the student table of the IEE-PUST database

(b) Create a java program to print all student records from the student table of the IEE-PUST database

Theory: JDBC (Java DataBase connectivity) is the standard interface for communication between a Java application and a SQL database It allow a java program to issue SQL statements and process the results. JDBC Provides methods for querying and updating the data in Relational Database management system such as SQL, oracle etc. Java database connectivity is similar to

ODBC which is used for accessing and managing database

However, the difference is that JDBC is designed speifically for Java programs, where as ODBC is not depend upon any language JDBC architecture is shown on figure-2

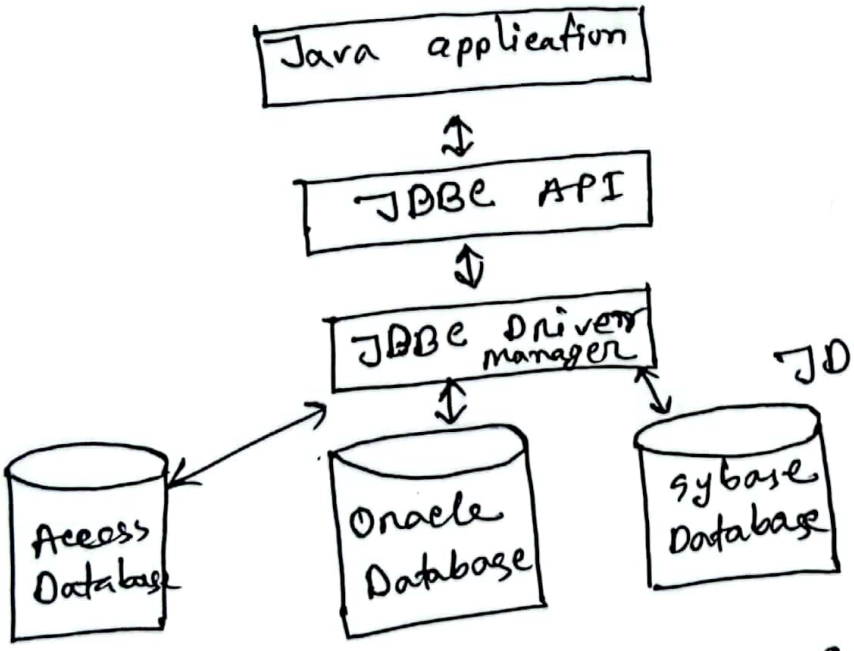

figure-2 JDBC architecture

All JDBC programs do the following

Step-1: load the JDBC driver

Step-2: Specify the name and location of the database being used

Step3: connect to the database with a connection object

Step-4: Execute a SQL query using a Statement object

Steps: Get the results in a Resultset object

Step 6: Finish by closing the result set, Statement and connection objects

The java.sql package makes a connection with a database with the help of Driver Manager class. It sends SQL parameters to a database. It also updates and retires the results of a query.

Making a ~~Coneo~~ Connection with Driver Manage class:

Driver Manager class

→ It helps to make a connection with the driver

→ It attempts to set up a logging stream through the DriverManager class

→ It provides a permission whe the code is running within a security Manager, such as an applet

Driver interface:-

→ This interface is mainly used by the Driver Manager class for registering and connecting drivers based on JDBC technology

DriverPropertyInfo class

→ This class is generally not used by the general user.

Sending SQL Parameters to a database:-

- Statement interface
  - Used to send basic SQL statements
- Prepared Statement interface
  - Used to send prepared statement or derived SQL statements from the statement object
- Callable Statement interface
  - Used to call database stored procedures
- Connection interface
  - provides methods for creating statements and managing their connections and properties
- Save point
  - helps to make the save points in a transaction

SQL Insert statement:-

- This statement allows insertion of a single or multiple records into the database
- It can also be specified by users about the name of the column in which the user want to insert the data

⇒ Syntax:
- insert into table-name, values(value1, value2, ...)

- The Insert statement has mainly three classes
  - » Insert
    - It specifies which table column has to be inserted in the table
  - » Into
    - It tells in which the data will be stored
  - » values
    - In this we insert the values we have to insert

Showing records from table of a database

For showing records we have to use result set.getString() method under string object

Apparatus:

1. Eclipse IDE
2. JDK
3. Ms Access

Experimental No:- 9

Experimental Name: Consider an ms access database name lab-18 which has a table name by teacher with field (Name, Email, and phone).

Using this database give the answer of the following questions:

(a) Write down a java program to create a GUI registration from according to the Teacher table

(b) Create a java program to insert data into the Teacher table of the Lab-18 database from the GUI registration from which you have already created.

Theory:- For creating a registration form according to a table of a database the programmer have to create first registration from using JTextfield, JLabel, JButton, Connection, ResultSet, Statement classes

To add the object of the JButton the programmer have to use addActionListener() method.

For connection, the Driver class is used. The DriverManager.getConnection() method is used to access the database

Finally insert data into the table of the database from the graphical user interface registration form

Apparatus:

- Eclipse IDE
- JDK
- MS Access.