MUMBAI EDUCATIONAL TRUST

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Distributed System & Cloud Computing Lab

Sr No	*Title of Practical*	*Date*
1.	To develop a program for multi-client chat server using Server Socket	25.08.2023
2.	To implement Calculator using RPC (Datagram Socket)	11.09.2023
3.	To implement Date Time Server using RPC	11.09.2023
4.	To implement Hello Server using RMI	19.09.2023
5.	To implement Calculator using RMI	19.09..2023
6	To implement Date Time using RMI	19.09.2023
7.	To implement GUI Calculator using RMI	25.09.2023
8.	Using MySQL, create a Library database. Create table Book (Book_id, Book_name, Book_author) and retrieve the Book information from Library database using Remote Object Communication	16.10.2023
9.	Using MySQL create Elecrtic_Bill database. Create table Bill(consumer_no,billduedate, Billamt) and retrieve the bill information from Bill table using Remote Object Communication	16.10.2023
10.	Implementation of Shared Memory	30.10.2023
11.	Implementation of mutual exclusion using token Ring	2.11.2023
12.	To develop Application for windows using Windows Azure Platform Training Kit and Visual Studio.	6.11.2023
13.	To develop Application using Google App Engine	6.11.2023
14	To implement Identity Management in GCP	6.11.2023
15	Implement Storage as Service on Google Cloud	6.11.2023

Practical 1:

Aim: To develop a program for multi-client chat server using Server Socket

Server.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package server;

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.io.IOException;
import java.net.ServerSocket;
import java.net.Socket;
import java.util.Scanner;
import java.util.StringTokenizer;
import java.util.Vector;

/**
 *
 * @author mcamock
 */
public class Server {

    //vector to store active clients
    static Vector<ClientHandler> ar = new Vector<>();

    Server() {
        try {
            ServerSocket ss = new ServerSocket(1234);
            Socket s;
            while (true) {
                s = ss.accept();
                System.out.println("New Client request received: " + s);
                DataInputStream dis = new DataInputStream(s.getInputStream());
                DataOutputStream dos = new DataOutputStream(s.getOutputStream());
                String username = dis.readUTF();
                System.out.println("Creating a new handler for this client....");
                ClientHandler mtch = new ClientHandler(s, username, dis, dos);
                Thread t = new Thread(mtch);
                System.out.println("Adding this client to active client");
                System.out.println(username+ " has logged in");
                ar.add(mtch);
                t.start();
            }
        } catch (Exception ex) {

        }

    }

    class ClientHandler implements Runnable {

        Scanner scn = new Scanner(System.in);
        private String uname;
        final DataInputStream dis;
        final DataOutputStream dos;
        Socket s;
        boolean isloggedin;

        public ClientHandler(Socket s, String uname, DataInputStream dis, DataOutputStream dos) {
            this.dis = dis;
            this.dos = dos;
            this.uname = uname;
            this.s = s;
            this.isloggedin = true;
        }
```

```
@Override
public void run() {
    String received;
    try {
        for (ClientHandler mc : Server.ar) {
            for (ClientHandler cc : Server.ar) {
                mc.dos.writeUTF(cc.uname + " has logged in");
            }
        }
    } catch (Exception ex) {
    }
    while (true) {
        try {
            received = dis.readUTF();
            System.out.println(received);
            if (received.equals("logout")) {

                System.out.println(this.uname + " has logged out");
                this.isloggedin = false;
                this.dis.close();
                this.dos.close();
                this.s.close();
                break;
            }
            StringTokenizer st = new StringTokenizer(received, "#");
            String MsgToSend = st.nextToken();
            String recipient = st.nextToken();
            for (ClientHandler mc : Server.ar) {
                if (mc.uname.equals(recipient) && mc.isloggedin == true) {
                    mc.dos.writeUTF(this.uname + "SAYS" + MsgToSend);
                    break;
                }

            }

        } catch (Exception e) {
```

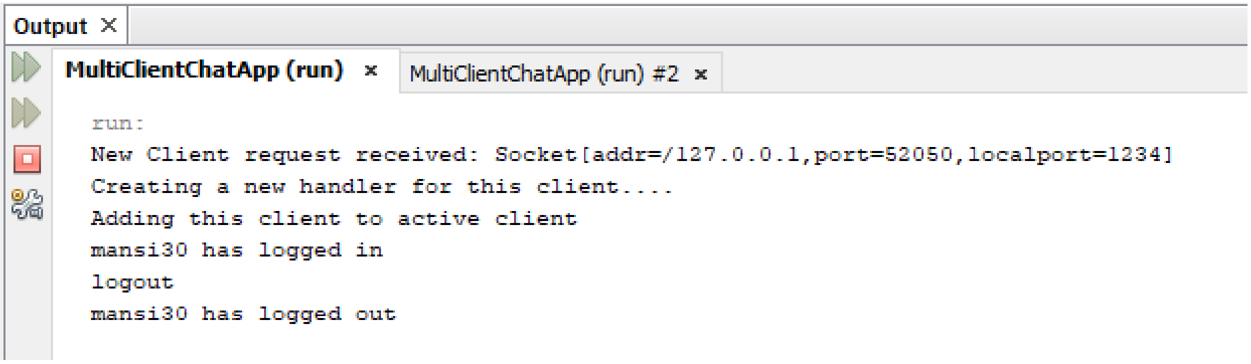
```
                    e.printStackTrace();
                }
            }
        }
    }

    public static void main(String[] args) {
        Server cs = new Server();
    }
}
```

Client.java

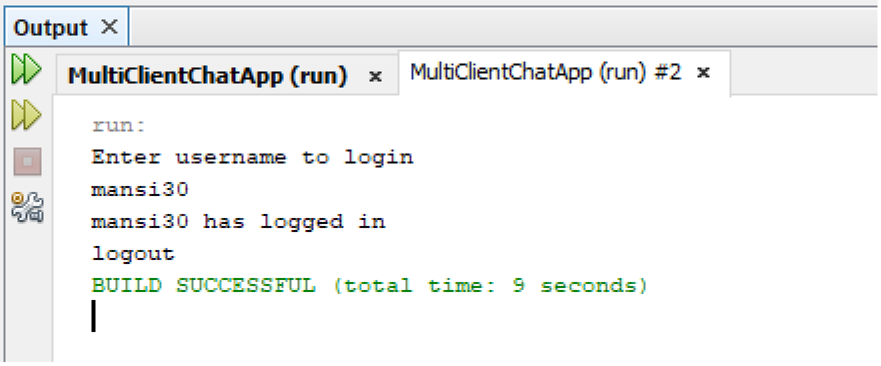
```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package client;

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.io.IOException;
import java.net.InetAddress;
import java.net.Socket;
import java.net.UnknownHostException;
import java.util.Scanner;

/**
 *
 * @author mcamock
 */
public class Client {

    final static int ServerPort = 1234;
```

```
public static void main(String[] args) throws
        UnknownHostException, IOException {
    Scanner sc = new Scanner(System.in);
    InetAddress ip = InetAddress.getByName("localhost");
    Socket s = new Socket(ip, ServerPort);
    DataInputStream dis = new DataInputStream(s.getInputStream());
    DataOutputStream dos = new DataOutputStream(s.getOutputStream());
    Thread sendMessage;
    sendMessage = new Thread(new Runnable() {
        @Override
        public void run() {
            System.out.println("Enter username to login");
            while (true) {
                String msg = sc.nextLine();
                try {
                    dos.writeUTF(msg);
                    if (msg.equals("logout")) {
                        s.close();
                        System.exit(0);
                    }

                } catch (Exception ex) {
                    ex.printStackTrace();
                }
            }
        }
    });

    Thread readMessage = new Thread(new Runnable() {
        @Override
        public void run() {
            while (true) {
                try {
                    String msg = dis.readUTF();
                    System.out.println(msg);

                } catch (IOException ex) {
                        ex.printStackTrace();
                    }
                }

            }
        });
        readMessage.start();
        sendMessage.start();

    }
}
```

Output:



```
run:
New Client request received: Socket[addr=/127.0.0.1,port=52050,localport=1234]
Creating a new handler for this client....
Adding this client to active client
mansi30 has logged in
logout
mansi30 has logged out
```



```
run:
Enter username to login
mansi30
mansi30 has logged in
logout
BUILD SUCCESSFUL (total time: 9 seconds)
```

Practical 2

Aim: To implement Calculator using RPC (Datagram Socket)

<u>Server.java</u>

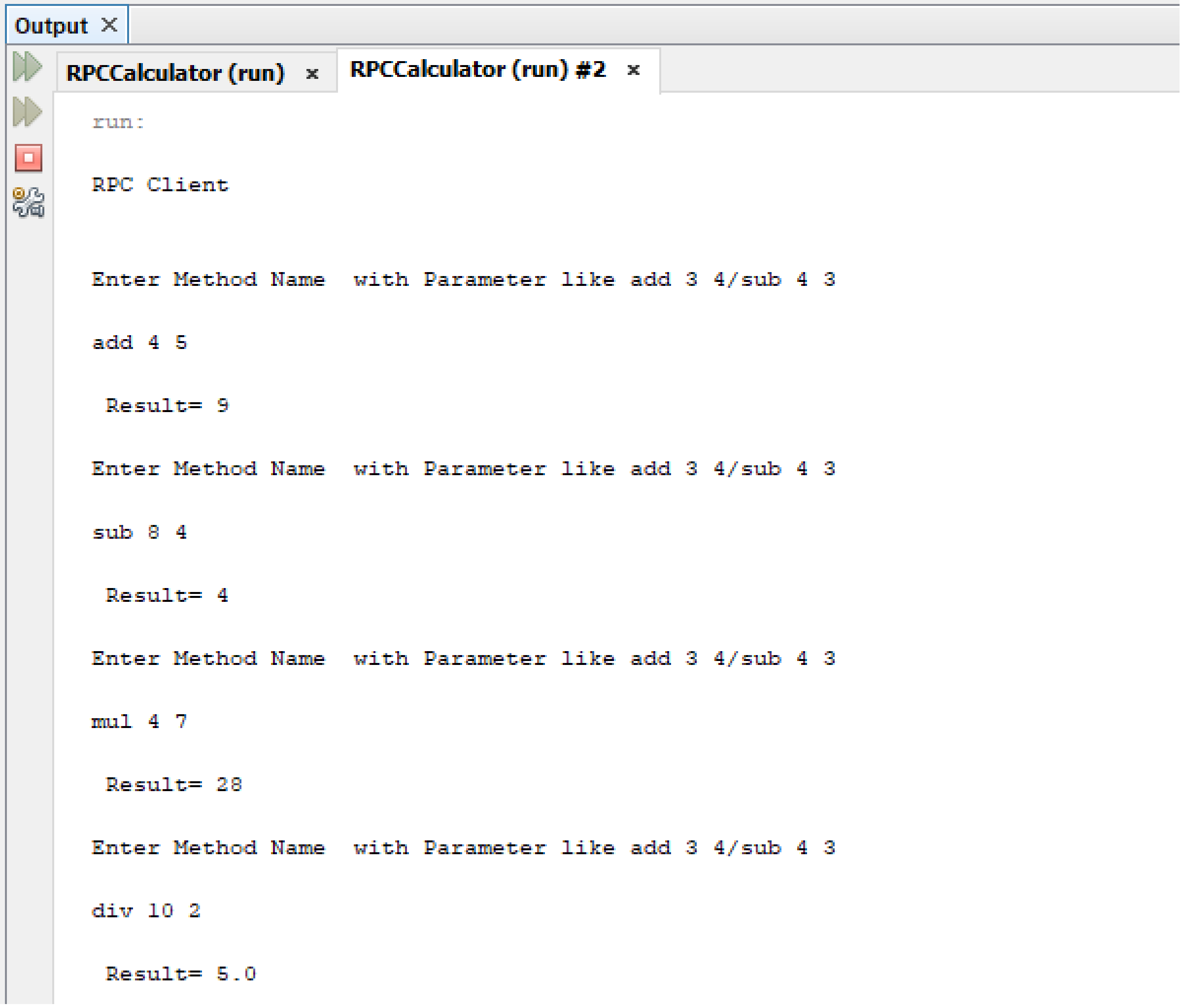
```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rpcServer;

import java.io.IOException;
import java.net.*;
import java.util.StringTokenizer;

/**
 *
 * @author mcamock
 */
public class RPCServer {
    DatagramSocket dsr;
    DatagramPacket dpr;
    String str,methodName,result;
    int val1,val2;
    RPCServer() throws SocketException, IOException{
        try{
            dsr = new DatagramSocket(1200);
            while(true){
                byte[] br = new byte[4096];
                dpr = new DatagramPacket(br,br.length);
                dsr.receive(dpr);
                str = new String(dpr.getData(),0,dpr.getLength());
                if(str.equalsIgnoreCase("exit")){
                    break;
                }
                else{
                    StringTokenizer st = new StringTokenizer(str," ");
                    while(st.hasMoreTokens())
                    {
                        methodName = st.nextToken();
                        val1 = Integer.parseInt(st.nextToken());
                        val2 = Integer.parseInt(st.nextToken());
                    }
                    System.out.println("\n Client Selected\""+str+"\"Method: ");
                    System.out.println("\nFirst Value: "+val1);
                    System.out.println("\nSecond Value: "+val2);
                    if(methodName.equalsIgnoreCase("add")){
                        result ="" +add(val1,val2);
                    }
                    else if(methodName.equalsIgnoreCase("sub")){
                        result ="" +sub(val1,val2);
                    }
                    else if(methodName.equalsIgnoreCase("mul")){
                        result ="" +mul(val1,val2);
                    }
                    else if(methodName.equalsIgnoreCase("div")){
                        result ="" +div(val1,val2);
                    }
                    byte bs[] = result.getBytes();
                    DatagramSocket dss = new DatagramSocket();
                    DatagramPacket dps = new
DatagramPacket(bs,bs.length,InetAddress.getLocalHost(),1300);
                    System.out.println("Result: "+result+"\n");
                    dss.send(dps);
                }
            }
        }
        catch(Exception ex){
            ex.printStackTrace();
        }
    }
    public int add(int val1, int val2) {
        return val1+val2;
    }
    public int sub(int val1, int val2) {
        return val1-val2;
    }
    public int mul(int val1, int val2) {
        return val1*val2;
    }
    public float div(float val1, float val2) {
        return val1/val2;
    }
    public static void main(String[] args) throws IOException{
        new RPCServer();
    }
}
```

Client.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rpcClient;

import java.io.IOException;
import java.net.*;
import java.util.Scanner;
import rpcServer.RPCServer;

/**
 *
 * @author mcamock
 */
```

```
public class RPCClient {
    RPCClient(){
        try{
            System.out.println("\nRPC Client");
            System.out.println("    \n");
            DatagramSocket dsr = new DatagramSocket(1300);
            while(true){
                System.out.println("Enter Method Name "+ " with Parameter like add 3 4/sub 4
3"+"\n");
                Scanner br = new Scanner(System.in);
                String str = br.nextLine();
                byte b[] = str.getBytes();
                DatagramSocket dss = new DatagramSocket();
                DatagramPacket dp = new
DatagramPacket(b,b.length,InetAddress.getLocalHost(),1200);
                dss.send(dp);
                if(str.equals("exit")) break;
                dp = new DatagramPacket(b,b.length);
                dsr.receive(dp);
                String s = new String(dp.getData(),0,dp.getLength());
                System.out.println("\n Result= " +s+ "\n");
            }
        }
        catch(Exception ex){
            ex.printStackTrace();
        }
    }
    public static void main(String[] args) throws IOException{
        new RPCClient();
    }
}
```

Output:



```
run:

RPC Client


Enter Method Name  with Parameter like add 3 4/sub 4 3

add 4 5

 Result= 9

Enter Method Name  with Parameter like add 3 4/sub 4 3

sub 8 4

 Result= 4

Enter Method Name  with Parameter like add 3 4/sub 4 3

mul 4 7

 Result= 28

Enter Method Name  with Parameter like add 3 4/sub 4 3

div 10 2

 Result= 5.0
```

Practical 3

Aim: To implement Date Time Server using RPC

Server.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package dateServer;

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.net.ServerSocket;
import java.net.Socket;
import java.text.SimpleDateFormat;
import java.util.Date;

/**
 *
 * @author mcamock
 */
public class DateServer {
    DateServer() throws Exception{
        ServerSocket ss = new ServerSocket(4000);
        System.out.println("Date Time Server Started");
        Socket s = ss.accept();
        DataInputStream dis = new DataInputStream(s.getInputStream());
        DataOutputStream dos = new DataOutputStream(s.getOutputStream());
        while(true){
            String str = dis.readUTF();
            if(str.equals("date"))
                dos.writeUTF("Date: "+mydate());
            else if(str.equals("time"))
```

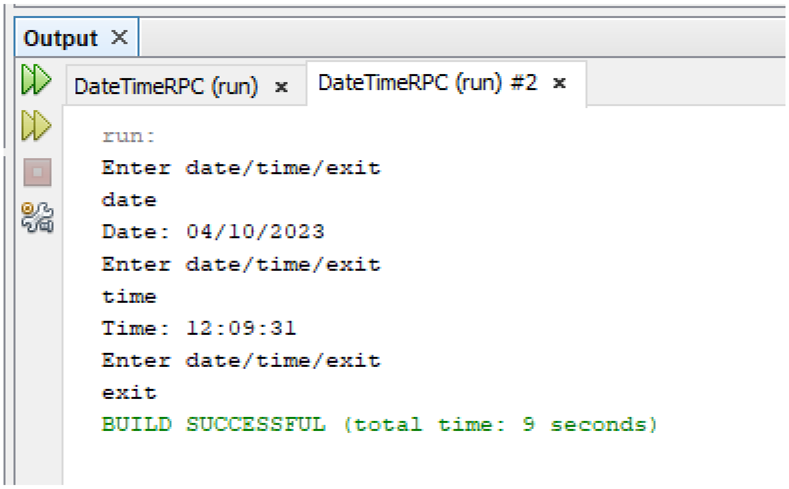
```
                dos.writeUTF("Time: "+mytime());
            else break;
        }
        s.close();
        ss.close();
    }
    public String mydate(){
        return new SimpleDateFormat("dd/MM/yyyy").format(new Date());
    }
    public String mytime(){
        return new SimpleDateFormat("hh:mm:ss").format(new Date());
    }
    public static void main(String[] args) throws Exception{
        DateServer d = new DateServer();
    }
}
```

Client.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package dateClient;

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.net.Socket;
import java.util.Scanner;

/**
 *
 * @author mcamock
 */
public class DateClient {
    public static void main(String[] args) throws Exception
```

```
  {
    Socket s = new Socket("localhost",4000);
    DataOutputStream dos = new DataOutputStream(s.getOutputStream());
    DataInputStream dis = new DataInputStream(s.getInputStream());
    Scanner sc = new Scanner(System.in);
    while(true){
      System.out.println("Enter date/time/exit");
      String str = sc.nextLine();
      if(str.equals("exit")){
        dos.writeUTF(str);
        break;
      }
      dos.writeUTF(str);
      System.out.println(dis.readUTF());
    }
    s.close();
  }
}
```

Output:



```
run:
Enter date/time/exit
date
Date: 04/10/2023
Enter date/time/exit
time
Time: 12:09:31
Enter date/time/exit
exit
BUILD SUCCESSFUL (total time: 9 seconds)
```

Practical 4

Aim: To implement Hello Server using RMI

HelloInterface.java

```
package hello;
import java.rmi.Remote;
import java.rmi.RemoteException;
public interface HelloInterface extends Remote
{
        public String say() throws RemoteException;
}
```

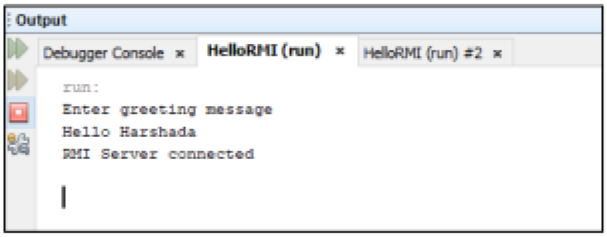
HelloClient.java

```
package hello;
import java.rmi.Naming;
public class HelloClient
{
        public static void main(String[] s) throws Exception
        {
                HelloInterface hello = (HelloInterface) Naming.lookup("//localhost/Hello");
                System.out.println(hello.say());
        }
}
```

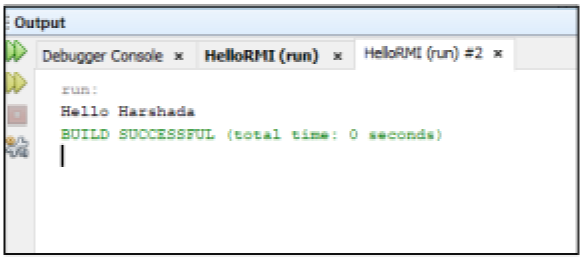
HelloServer.java

```
package hello;
import java.rmi.RemoteException;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.rmi.server.UnicastRemoteObject;
import java.util.Scanner;
public class HelloServer extends UnicastRemoteObject implements HelloInterface
{
        private String message;
        public HelloServer(String msg) throws RemoteException
        {
                message = msg;
        }
        @Override public String say() throws RemoteException
        {
                return(message);
        }
        public static void main(String[] args) throws Exception
        {
                Registry r = LocateRegistry.createRegistry(1099);
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter greeting message");
                String s = sc.nextLine();
                r.rebind("Hello", new HelloServer(s));
                System.out.println("RMI Server connected");
        }
}
```

Output:



```
run:
Enter greeting message
Hello Harshada
RMI Server connected
```



```
run:
Hello Harshada
BUILD SUCCESSFUL (total time: 0 seconds)
```

Practical 5

Aim: To implement Calculator using RMI

CalciInterface.java

```
package rmicalculator;
import java.rmi.Remote;
import java.rmi.RemoteException;

public interface CalciInterface extends Remote{
    double Add(double a, double b) throws RemoteException;
    double Sub(double a, double b) throws RemoteException;
    double Multiply(double a, double b) throws RemoteException;
    double Divide(double a, double b) throws RemoteException;
}
```

RMICalciImp.java

```
package rmicalculator;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;

public class RMICalciImp extends UnicastRemoteObject implements CalciInterface{
    RMICalciImp() throws Exception{}

    @Override
    public double Add(double a, double b) throws RemoteException {
        return a+b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body
of generated methods, choose Tools | Templates.
    }

    @Override
    public double Sub(double a, double b) throws RemoteException {
        return a-b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body
of generated methods, choose Tools | Templates.
    }

    @Override
    public double Multiply(double a, double b) throws RemoteException {
        return a*b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body
of generated methods, choose Tools | Templates.
    }

    @Override
    public double Divide(double a, double b) throws RemoteException {
        return a/b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body
of generated methods, choose Tools | Templates.
    }
}
```

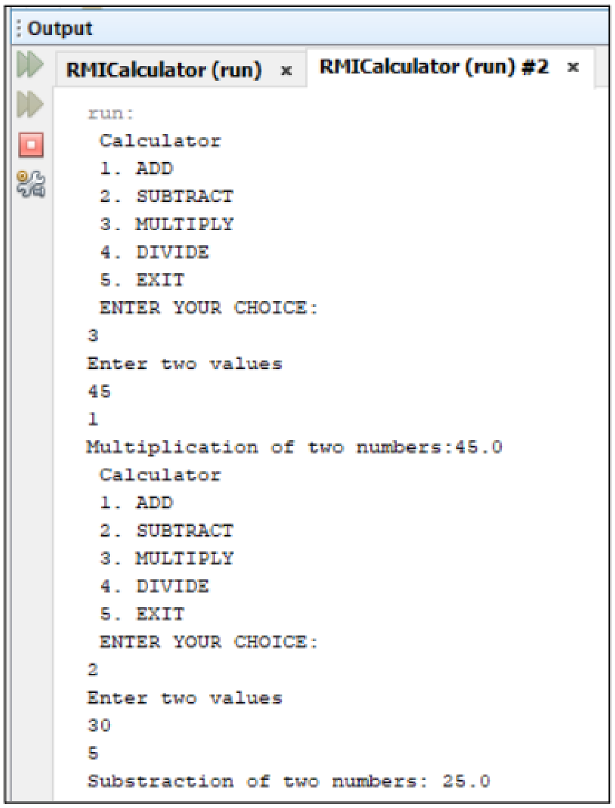
RMICalciServer.java

```
package rmicalculator;

import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class RMIServer {
    public static void main(String[] args){
        try{
            RMICalciImp rmics = new RMICalciImp();
            Registry r = LocateRegistry.createRegistry(1099);
            r.rebind("Calci", rmics);
            System.out.println("RMI server Started");
        }
        catch (Exception ex){}
    }
}
```

RMICalciClient.java

```
import java.rmi.Naming;
import java.util.Scanner;
public class RMICalciClient
{
    public static void main(String[] args)
    {
        String str; Scanner sc = new Scanner(System.in);
        try
        {
            CalciInterface cclient;
            cclient = (CalciInterface) Naming.lookup("//localhost/Calci");
            while(true)
            {
                System.out.println(" Calculator ");
                System.out.println(" 1. ADD ");
                System.out.println(" 2. SUBTRACT ");
                System.out.println(" 3. MULTIPLY ");
                System.out.println(" 4. DIVIDE ");
                System.out.println(" 5. EXIT" );
                System.out.println(" ENTER YOUR CHOICE: " );
                int ch = sc.nextInt();
                if(ch > 5)
                    System.out.println("Invalid option");
                else
                    System.out.println("Enter two values");
                    double val1 = sc.nextDouble();
                    double val2 = sc.nextDouble();
                switch(ch)
                {
                    case 1:
                        System.out.println("Addition of two numbers: " + cclient.Add(val1, val2));
                        break;
                    case 2:
                        System.out.println("Subtraction of two numbers: " + cclient.Sub(val1, val2));
                        break;
                    case 3:
                        System.out.println("Multiplication of two numbers:" + cclient.Multiply(val1, val2));
                        break;
                    case 4:
                        System.out.println("Division of two numbers:" + cclient.Divide(val1, val2));
                        break;
                    case 5:
                        System.exit(0);
                    }
                }
            }
            catch(Exception e)
            {
                e.printStackTrace();
            }
        }
    }
```

Output:



```
run:
 Calculator
 1. ADD
 2. SUBTRACT
 3. MULTIPLY
 4. DIVIDE
 5. EXIT
 ENTER YOUR CHOICE:
3
Enter two values
45
1
Multiplication of two numbers:45.0
 Calculator
 1. ADD
 2. SUBTRACT
 3. MULTIPLY
 4. DIVIDE
 5. EXIT
 ENTER YOUR CHOICE:
2
Enter two values
30
5
Substraction of two numbers: 25.0
```

Practical 6

Aim: To implement Date Time using RMI

DateTimeInterface.java

```
package datetimermi;

import java.rmi.Remote;
import java.rmi.RemoteException;

public interface DateTimeInterface extends Remote {
    String getDate() throws RemoteException;
    String getTime() throws RemoteException;
}
```

DateTimeServerImpl.java

```
package datetimermi;

import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.text.SimpleDateFormat;
import java.util.Date;

public class DateTimeServerImpl extends UnicastRemoteObject implements
DateTimeInterface {
    protected DateTimeServerImpl() throws RemoteException {
        super();
    }

    @Override
    public String getDate() throws RemoteException {
        return "Date: " + new SimpleDateFormat("dd/MM/yyyy").format(new Date());
    }

    @Override
    public String getTime() throws RemoteException {
        return "Time: " + new SimpleDateFormat("hh:mm:ss").format(new Date());
    }
}
```

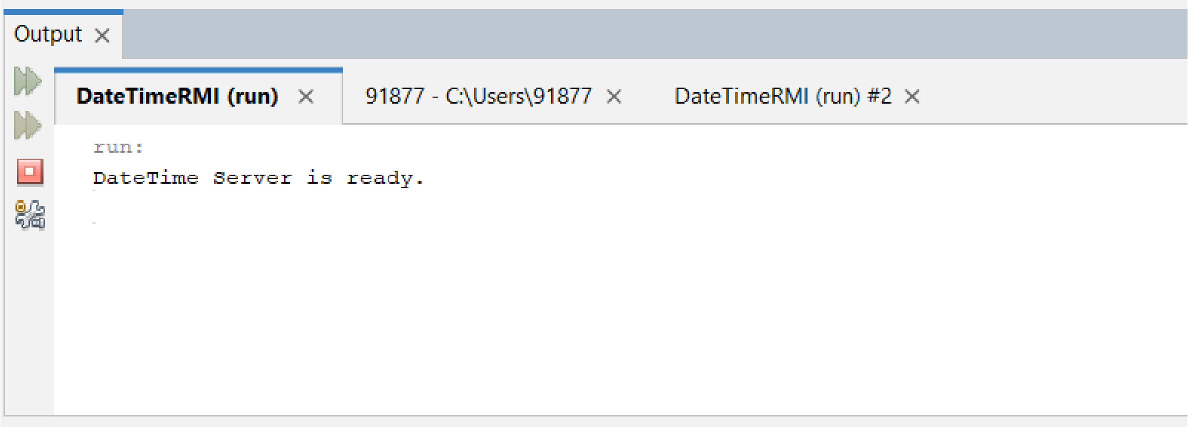
DateTimeServer.java

```
package datetimermi;

import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class DateTimeServer {
    public static void main(String[] args) {
        try {
            DateTimeInterface dateTimeObj = new DateTimeServerImpl();

            Registry registry = LocateRegistry.createRegistry(1099); // Default RMI registry port
            registry.rebind("DateTimeService", dateTimeObj);

            System.out.println("DateTime Server is ready.");
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

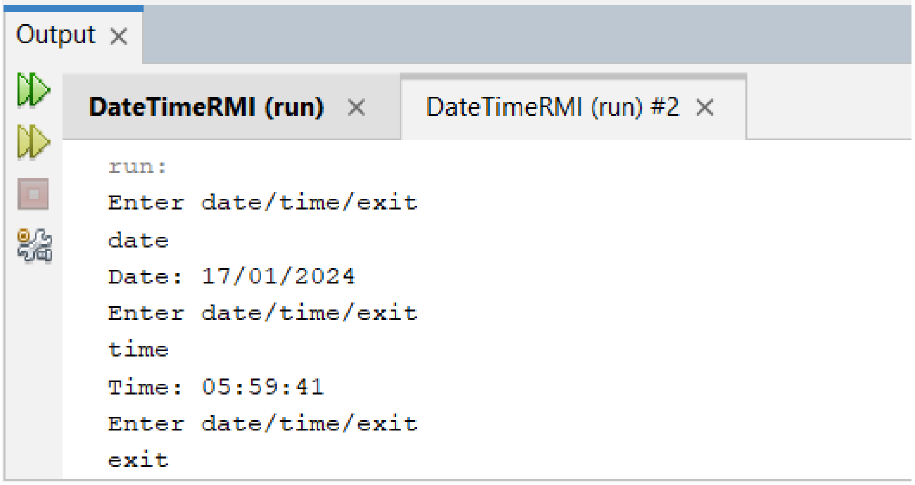
DateTimeClient.java

```
package datetimermi;

/**
 *
 * @author MansiPuthran
 */
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.util.Scanner;

public class DateTimeClient {
    public static void main(String[] args) {
        try {
            Registry registry = LocateRegistry.getRegistry("localhost", 1099);
            DateTimeInterface dateTimeObj = (DateTimeInterface) registry.lookup("DateTimeService");

            Scanner sc = new Scanner(System.in);

            while (true) {
                System.out.println("Enter date/time/exit");
                String str = sc.nextLine();

                if (str.equals("exit")) {
                    break;
                }

                if (str.equals("date")) {
                    System.out.println(dateTimeObj.getDate());
                } else if (str.equals("time")) {
                    System.out.println(dateTimeObj.getTime());
                } else {
                    System.out.println("Invalid input. Enter date/time/exit");
                }
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Output:



```
run:
DateTime Server is ready.
```



```
run:
Enter date/time/exit
date
Date: 17/01/2024
Enter date/time/exit
time
Time: 05:59:41
Enter date/time/exit
exit
```

Practical 7

Aim: To implement GUI Calculator using RMI

<u>CalciInterface.java</u>

```
package rmicalculator;
import java.rmi.Remote;
import java.rmi.RemoteException;

public interface CalciInterface extends Remote{
    double Add(double a, double b) throws RemoteException;
    double Sub(double a, double b) throws RemoteException;
    double Multiply(double a, double b) throws RemoteException;
    double Divide(double a, double b) throws RemoteException;
}
```

<u>RMICalciImp.java</u>

```
package rmicalculator;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;

public class RMICalciImp extends UnicastRemoteObject implements CalciInterface{
    RMICalciImp() throws Exception{}

    @Override
    public double Add(double a, double b) throws RemoteException {
        return a+b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body of generated methods, choose Tools | Templates.
    }

    @Override
    public double Sub(double a, double b) throws RemoteException {
        return a-b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body of generated methods, choose Tools | Templates.
    }

    @Override
    public double Multiply(double a, double b) throws RemoteException {
        return a*b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body of generated methods, choose Tools | Templates.
    }

    @Override
    public double Divide(double a, double b) throws RemoteException {
        return a/b;
        //throw new UnsupportedOperationException("Not supported yet."); //To change body of generated methods, choose Tools | Templates.
    }
}
```

RMICalciServer.java

```
package rmicalculator;

import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class RMIServer {
    public static void main(String[] args){
        try{
            RMICalciImp rmics = new RMICalciImp();
            Registry r = LocateRegistry.createRegistry(1099);
            r.rebind("Calci", rmics);
            System.out.println("RMI server Started");
        }
        catch (Exception ex){}
    }
}
```

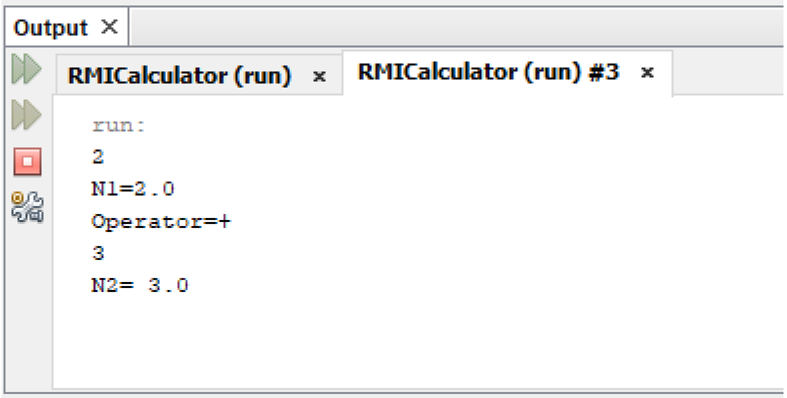
RMIGUIClient.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rmicalculator;

import java.awt.Container;
import java.awt.GridLayout;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.rmi.Naming;
import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JPanel;
import javax.swing.JTextField;

/**
 *
 * @author mcamock
 */
public class RMIGUIClient extends JFrame implements ActionListener{
    double n1 = 0.0;
    double n2 = 0.0;
    double d1;
    JButton b[] = new JButton[21];
    JTextField tf;
    Container con;
    int button,j;
    String str, num="";
    JPanel tp,bp;
    public RMIGUIClient(){
        setTitle("Calculator");
        tp = new JPanel();
        bp = new JPanel();
        tf = new JTextField(10);
        tf.setEditable(false);
        con = getContentPane();
        bp.setLayout(new GridLayout(5,4));
        tp.add(tf);
        con.add(tp,"North");
        for(int i=0; i<10;i++)
        {
            b[i] = new JButton(""+i);
        }
        b[10] = new JButton("+");
        b[11] = new JButton("-");
        b[12] = new JButton("*");
        b[13] = new JButton("/");
        b[14] = new JButton("clear");
        b[15] = new JButton(".");
        b[16] = new JButton("=");
        for(int i=0;i<17;i++){
            b[i].addActionListener(this);
            bp.add(b[i]);
        }
        con.add(bp,"Center");
        setDefaultCloseOperation(EXIT_ON_CLOSE);
    }

    @Override
    public void actionPerformed(ActionEvent ae) {
        str = ae.getActionCommand();
        for(int i=0;i<10;i++){
            if(ae.getSource()==b[i])
            {
                num = num+str;
                tf.setText(num);
                System.out.println(num);
                //System.out.println(num);
            }
        }
```

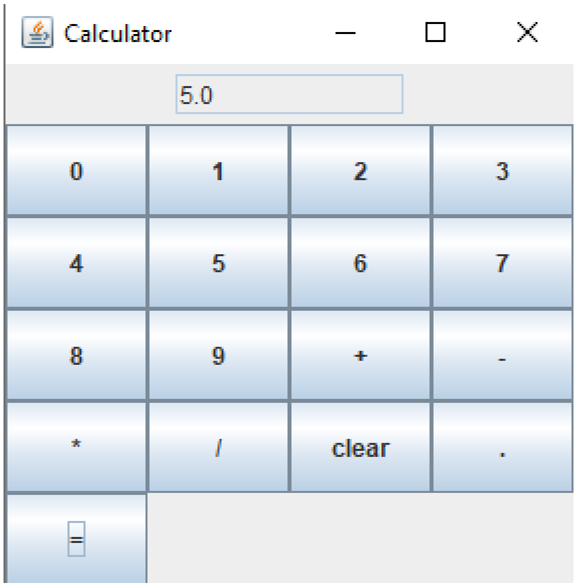
```
if(ae.getSource()==b[15])
{
    num = num+str;
    tf.setText(num);
}
for(int i =10;i<14;i++){
    if(ae.getSource()==b[i])
    {
        button = i-9;
        if(num!="")
        {
            n1 = Double.parseDouble(num);
            num="";
            System.out.println("N1="+n1);
            System.out.println("Operator="+b[i].getText());
        }
    }
}
if(ae.getSource()==b[16])
{
    n2 = Double.parseDouble(num);
    System.out.println("N2= "+n2);
    num="";
    try{
        CalciInterface cclient;
        cclient =(CalciInterface) Naming.lookup("//localhost/Calci");
        switch(button)
        {
            case 1: d1= cclient.Add(n1, n2);
            break;
            case 2: d1= cclient.Sub(n1, n2);
            break;
            case 3: d1= cclient.Multiply(n1, n2);
            break;
            case 4: d1= cclient.Divide(n1, n2);
            break;
            default: d1=0.0;
```

```
                }
                str = String.valueOf(d1);
                n1 = d1;
                tf.setText(str);
            }
            catch(Exception ex){

            }
        }
        if(ae.getSource()==b[14]){
            tf.setText("");
            num="";
            n1=0.0;
            n2=0.0;
            button=0;
        }
    }

    public static void main(String[] args){
        JFrame f = new RMIGUIClient();
        f.setSize(300, 300);
        f.setVisible(true);
    }
}
```

Output:



```
run:
2
N1=2.0
Operator=+
3
N2= 3.0
```



5.0

Practical 8

Aim: Using MySQL create Library database. Create table Book (Book_id, Book_name, Book_author) and retrieve the Book information from Library database using Remote Object Communication.

<u>LibraryInterface.java</u>

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rmilibrary;

import java.rmi.Remote;
import java.rmi.RemoteException;

/**
 *
 * @author mcamock
 */
public interface LibraryInterface extends Remote{
    public String getData() throws RemoteException;
}
```

<u>LibraryServer.java</u>

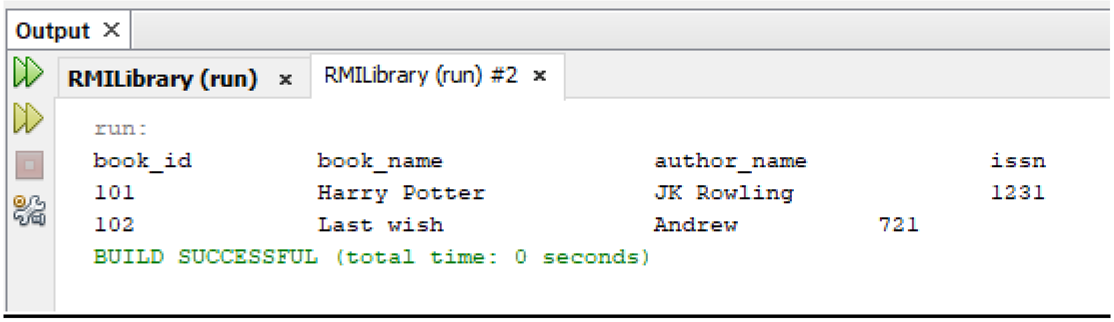
```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rmilibrary;

import java.rmi.RemoteException;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.rmi.server.UnicastRemoteObject;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.ResultSetMetaData;
import java.sql.SQLException;
import java.sql.Statement;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.naming.spi.DirStateFactory.Result;

/**
```

```
 *
 * @author mcamock
 */
public class LibraryServer extends UnicastRemoteObject implements LibraryInterface{

    int count =0, i=0;
    String str, columname;
    LibraryServer() throws RemoteException{
        super();
    }
    @Override
    public String getData() throws RemoteException {
        try{
            Class.forName("com.mysql.jdbc.Driver");
            Connection con =
DriverManager.getConnection("jdbc:mysql://localhost:3306/dscc","root","");
            Statement st = con.createStatement();
            ResultSet rs1;
            rs1 = st.executeQuery("select * from library");
            ResultSetMetaData rmd = rs1.getMetaData();
            str = "";
            columname = "";
            for(i=1;i<=rmd.getColumnCount();i++){
                columname = columname +rmd.getColumnName(i)+"\t\t";
            }
            while(rs1.next()){
                for(i=1;i<=rmd.getColumnCount();i++){
                    str = str+rs1.getString(i)+"\t\t";

                }
                str = str+"\n";
            }
            str = columname+"\n"+str;
        } catch (Exception ex) {
            ex.printStackTrace();
        }
        return str;
    }
    public static void main(String[] args){
        try{
            Registry reg = LocateRegistry.createRegistry(2099);
            LibraryServer obj = new LibraryServer();
            reg.rebind("db", obj);
            System.out.println("Database server ready");
        }
        catch(Exception e){
            System.out.println(e);
        }
    }
}
```

LibraryClient.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package rmilibrary;

import java.rmi.Naming;

/**
 *
 * @author mcamock
 */
public class LibraryClient {
    public static void main(String args[]) throws Exception{
        LibraryInterface obj = (LibraryInterface) Naming.lookup("//localhost:2099/db");
        System.out.print(obj.getData());
    }
}
```

Output:



```
run:
book_id         book_name               author_name             issn
101             Harry Potter            JK Rowling              1231
102             Last wish               Andrew          721
BUILD SUCCESSFUL (total time: 0 seconds)
```

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Practical 9

Aim: Using MySQL create Elecrtic_Bill database. Create table Bill(consumer_no,billduedate, Billamt) and retrieve the bill information from Bill table using Remote Object Communication

ElectricBillInterface.java

```
package electricbillrmi;


import java.rmi.Remote;
import java.rmi.RemoteException;

public interface ElectricBillInterface extends Remote {
    String getBillData() throws RemoteException;
}
```

ElectricBillServerImpl.java

```
 package electricbillrmi;

import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.ResultSetMetaData;
import java.sql.Statement;

public class ElectricBillServerImpl extends UnicastRemoteObject implements
ElectricBillInterface {
    public ElectricBillServerImpl() throws RemoteException {
        super();
    }

    @Override
    public String getBillData() throws RemoteException {
        String result = "";
        try {
            Class.forName("com.mysql.jdbc.Driver");
            Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/dscc",
"root", "");
            Statement st = con.createStatement();
            ResultSet rs = st.executeQuery("select * from Bill");
            ResultSetMetaData rmd = rs.getMetaData();

            // Build column names
            String columnNames = "";
            for (int i = 1; i <= rmd.getColumnCount(); i++) {
                columnNames = columnNames + rmd.getColumnName(i) + "\t\t";
            }

            // Build result string
            while (rs.next()) {
                for (int i = 1; i <= rmd.getColumnCount(); i++) {
                    result = result + rs.getString(i) + "\t\t\t";
                }
                result = result + "\n";
            }
            result = columnNames + "\n" + result;
        } catch (Exception ex) {
            ex.printStackTrace();
        }
        return result;
    }
}
```

ElectricBillServer.java

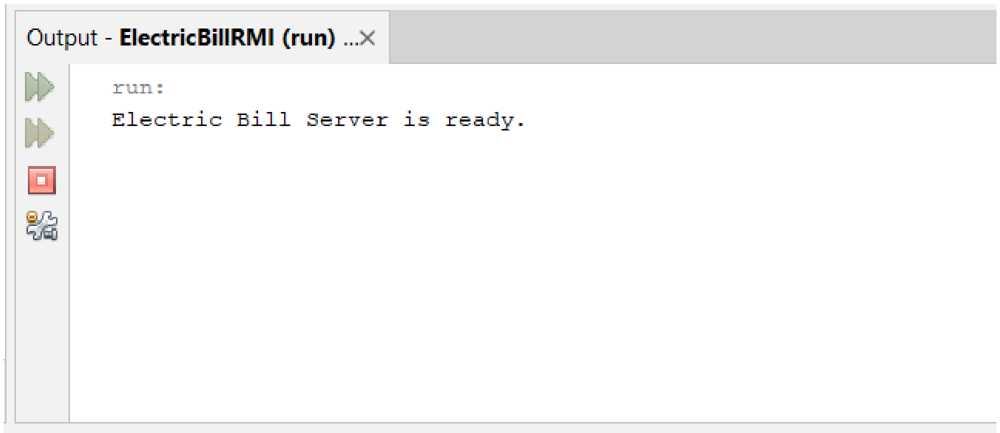
```
package electricbillrmi;

import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
```

```
public class ElectricBillServer {
    public static void main(String[] args) {
        try {
            ElectricBillInterface electricBillObj = new ElectricBillServerImpl();

            Registry registry = LocateRegistry.createRegistry(2098);
            registry.rebind("ElectricBillService", electricBillObj);

            System.out.println("Electric Bill Server is ready.");
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

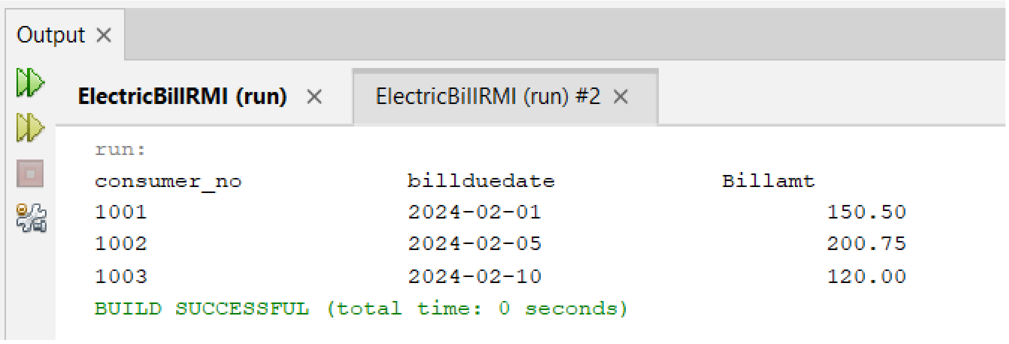
ElectricBillClient.java

```
package electricbillrmi;

import java.rmi.Naming;

public class ElectricBillClient {
    public static void main(String[] args) {
        try {
            ElectricBillInterface electricBillObj = (ElectricBillInterface) Naming.lookup("//localhost:2098/ElectricBillService");
            System.out.print(electricBillObj.getBillData());
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Output:



```
run:
Electric Bill Server is ready.
```



```
run:
consumer_no              billduedate              Billamt
1001                     2024-02-01                       150.50
1002                     2024-02-05                       200.75
1003                     2024-02-10                       120.00
BUILD SUCCESSFUL (total time: 0 seconds)
```

Practical 10

Aim: Implementation of Shared Memory

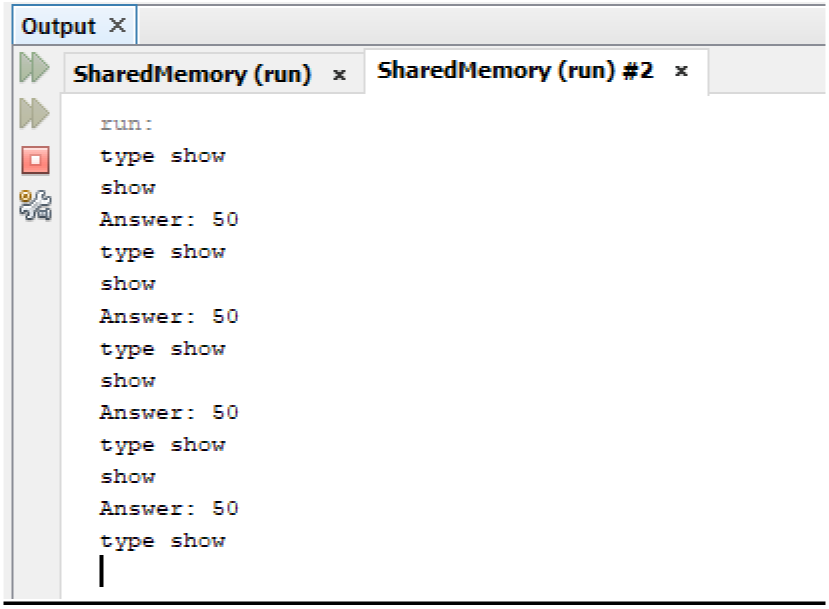
SharedMemoryServer:

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package sharedmemory;

import java.io.BufferedReader;
import java.io.InputStreamReader;
import java.io.PrintStream;
import java.net.ServerSocket;
import java.net.Socket;

/**
 *
 * @author mcamock
 */
public class SharedMemoryServer {
    static int a = 50;
    static int count = 0;
    public static int getA(PrintStream cout){
        count++;
        cout.println(a);
        return a;
    }
    public static void main(String[] args) throws Exception{
        ServerSocket ss = new ServerSocket(2000);
        Socket sk = ss.accept();
        BufferedReader cin = new BufferedReader(new InputStreamReader(sk.getInputStream()));
        PrintStream cout = new PrintStream(sk.getOutputStream());
        while(true){
            System.out.println("Client from "+sk.getInetAddress().getHostAddress()+" accepted");
            String sr = cin.readLine();
            System.out.println(sr);
            if(sr.equalsIgnoreCase("show")){
                getA(cout);
            }
            else{
                cout.println("Check Syntax");
            }
            System.out.println("Count: "+count);
        }
    }
}
```

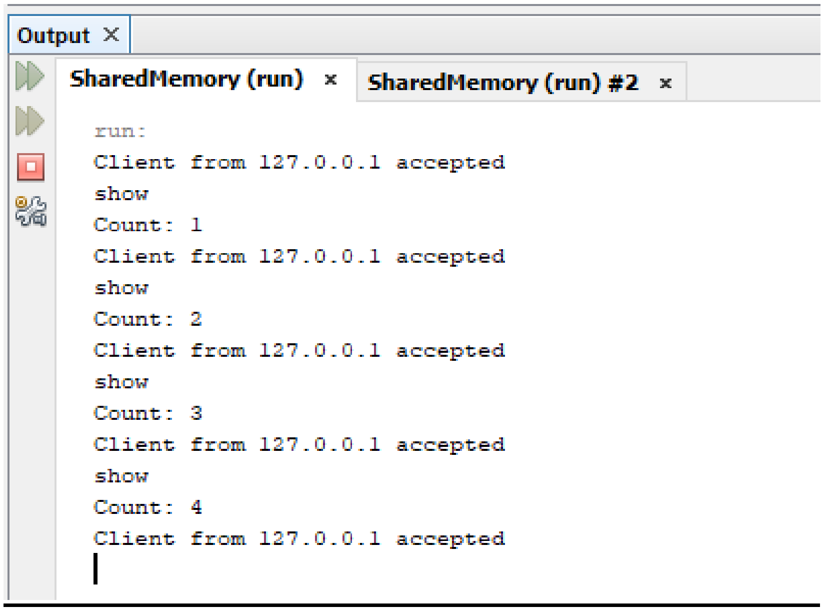
SharedMemoryClient.java:

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package sharedmemory;

import java.io.BufferedReader;
import java.io.InputStreamReader;
import java.io.PrintStream;
import java.net.ServerSocket;
import java.net.Socket;
import java.util.Scanner;

/**
 *
 * @author mcamock
 */
public class SharedMemoryClient {
    public static void main(String[] args) throws Exception{
        Socket sk = new Socket("localhost",2000);
        BufferedReader sin = new BufferedReader(new InputStreamReader(sk.getInputStream()));
        PrintStream sout = new PrintStream(sk.getOutputStream());
        Scanner stdin = new Scanner(System.in);
        String sr,sw;
        while(true){
            System.out.println("type show");
            sw = stdin.nextLine();
            sout.println(sw);
            sr = sin.readLine();
            System.out.println("Answer: "+sr);
        }
    }
}
```

Output:



```
run:
type show
show
Answer: 50
type show
show
Answer: 50
type show
show
Answer: 50
type show
show
Answer: 50
type show
```



```
run:
Client from 127.0.0.1 accepted
show
Count: 1
Client from 127.0.0.1 accepted
show
Count: 2
Client from 127.0.0.1 accepted
show
Count: 3
Client from 127.0.0.1 accepted
show
Count: 4
Client from 127.0.0.1 accepted
```

Practical 11

Aim: Implementation of mutual exclusion using token Ring

TokenRingServer.java

```
package tokenringapp;
import java.net.*; //DatagramSocket and DatagramPacket
/**
 *
 * @author MansiPuthran
 */
public class TokenRingServer {
    public static DatagramSocket ds;
    public static DatagramPacket dp;

    public static void main(String args[]) throws Exception
    {
        ds = new DatagramSocket(2000);

        while(true)
        {
            //pre-allocated space for receiving message
            byte[] buffer = new byte[1024];
            dp = new DatagramPacket(buffer, buffer.length);
            ds.receive(dp);

            String message = new String(dp.getData(), 0, dp.getLength());
            System.out.println("Message from: "+message);
        }
    }
}
```

TokenRingClient1.java

```
package tokenringapp;

import java.net.*;
import java.io.*;

/**
 *
 * @author MansiPuthran
 */
public class TokenRingClient1 {
    public static DatagramSocket ds;
    public static DatagramPacket dp;
    public static BufferedReader br;

    public static void main(String args[]) throws Exception
    {
        boolean hasToken = true;
        ds = new DatagramSocket(2001);

        while(true)
        {
            if(hasToken = true) //the current process has token
            {
                System.out.println("Do you want to enter criticalsection...(yes/no)? ");
                br = new BufferedReader(new InputStreamReader(System.in));
                String choice = br.readLine();

                //if the choice is yes, the process or client will write data to TokenRingServer
                if(choice.equalsIgnoreCase("yes"))
                {
                    System.out.println("the client or process is ready to write ");
                    System.out.println("Enter the message");
                    br = new BufferedReader(new InputStreamReader(System.in));
                    String message = "Client--> "+br.readLine();
                    dp = new DatagramPacket(message.getBytes(),message.length(), InetAddress.getLocalHost(), 2000);
                    ds.send(dp);
                    System.out.println("Message sent");
                }
                else if(choice.equalsIgnoreCase("no"))
                {
                    System.out.println("i am not ready to enter the critical section");
                    String msg1="Token";//this msg will pass to the next process
                    dp=new DatagramPacket(msg1.getBytes(),msg1.length(),InetAddress.getLocalHost(),2002);
                    ds.send(dp);
                    hasToken=false;
                }
            }
            else
            {
                System.out.println("Waiting for token");
                byte[] buffer = new byte[2048];
                dp=new DatagramPacket(buffer,buffer.length);
                ds.receive(dp);
                String prevProcessMsg=new String(dp.getData(),0,dp.getLength());
                System.out.println("PreviousProcessMsg is"+prevProcessMsg);
                if(prevProcessMsg.equals("Token"))
                {
                    hasToken=true;
                    System.out.println("I have token now");
                }
            }
        }
    }
}
```

TokenRingClient2.java

```
package tokenringapp;
import java.net.*;
import java.io.*;
/**
 *
 * @author MansiPuthran
 */
public class TokenRingClient2 {
    public static DatagramSocket ds;
    public static DatagramPacket dp;
    public static BufferedReader br;
    public static void main(String[] args)throws Exception
    {
        boolean hasToken = true;
        ds = new DatagramSocket(2002);
        while(true)
        {
            if(hasToken==true)//the current procss has token
            {
                System.out.println("do you want to enter CS..(yes/no)");
                br=new BufferedReader(new InputStreamReader(System.in));//yes or no
                String choice =br.readLine();
                //if the choice is yes, the process or client will write data to the TokenRingServer
                if(choice.equalsIgnoreCase("yes"))
                {
                    System.out.println("the client or process is ready to write");
                    System.out.println("enter the message");
                    br=new BufferedReader(new InputStreamReader(System.in));
                    String msg = "Client2-->"+br.readLine();
                    dp=new
DatagramPacket(msg.getBytes(),msg.length(),InetAddress.getLocalHost(),2000);
                    ds.send(dp);
                    System.out.println("message sent");
                }
                else if(choice.equalsIgnoreCase("no"))
                {
                    System.out.println("i am not ready to enter the critical section");
                    String msg1="Token";//this msg will pass to the next process
                    dp=new
DatagramPacket(msg1.getBytes(),msg1.length(),InetAddress.getLocalHost(),2003);
                    ds.send(dp);
                    hasToken=false;
                }
            }
            else
            {
                System.out.println("Waiting for token");
                byte[] buffer = new byte[2048];
                dp=new DatagramPacket(buffer,buffer.length);
                ds.receive(dp);
                String prevProcessMsg=new String(dp.getData(),0,dp.getLength());
```

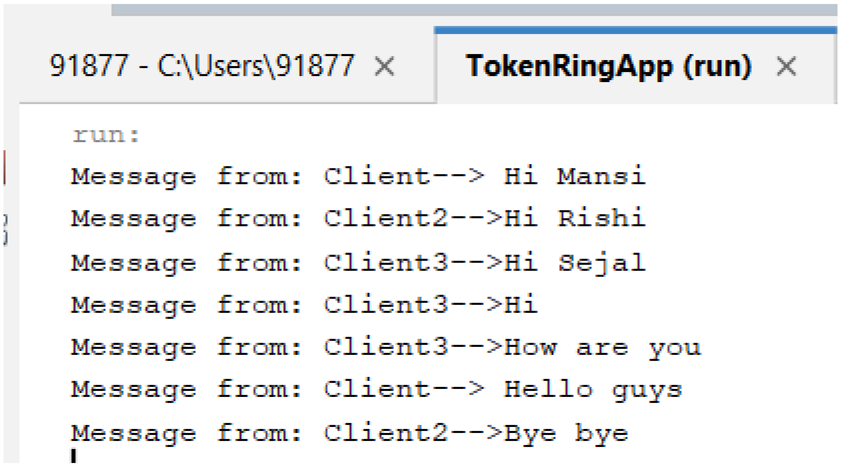
```
                System.out.println("PreviousProcessMsg is"+prevProcessMsg);
                if(prevProcessMsg.equals("Token"))
                {
                    hasToken=true;
                    System.out.println("I have token now");
                }
            }
        }
    }
}
```

TokenRingClient3.java

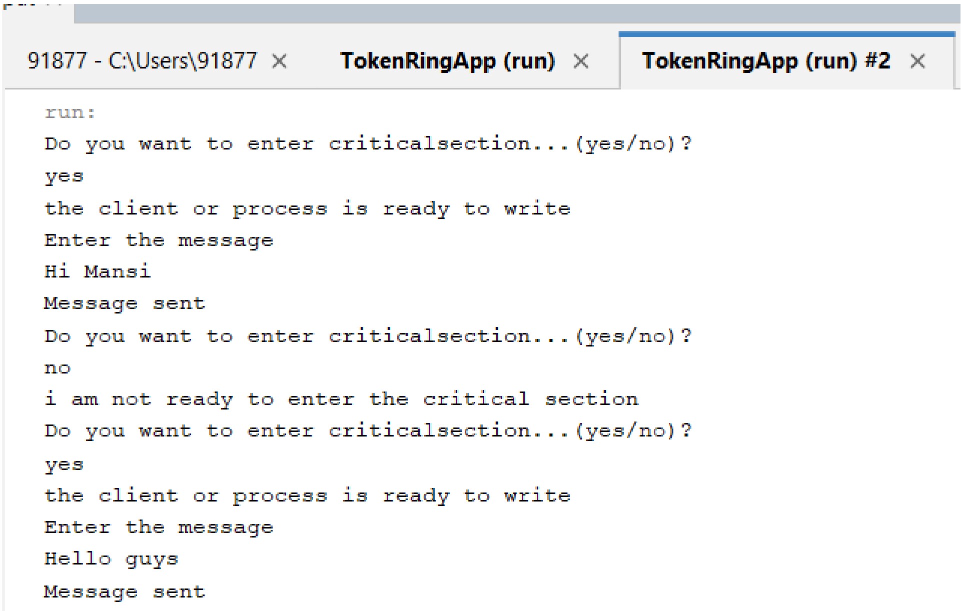
```
package tokenringapp;

//if the process doesn't want to the enter to the critical section
//it will pass the token to the next process
import java.net.*;
import java.io.*;

/**
 *
 * @author MansiPuthran
 */
public class TokenRingClient3 {

    public static DatagramSocket ds;
    public static DatagramPacket dp;
    public static BufferedReader br;
    public static void main(String[] args) throws Exception {
        boolean hasToken = true;
        ds = new DatagramSocket(2003);
        while (true) {
            if (hasToken == true)//the current procss has token
            {
                System.out.println("do you want to enter CS..(yes/no)");
                br = new BufferedReader(new InputStreamReader(System.in));
                String choice = br.readLine();
                //if the choice is yes, the process or client will write data to the TokenRingServer

                if (choice.equalsIgnoreCase("yes")) {
                    System.out.println("the client or process is ready to write");

                    System.out.println("enter the message");
                    br = new BufferedReader(new InputStreamReader(System.in));

                    String msg = "Client3-->" + br.readLine();

                    dp = new DatagramPacket(msg.getBytes(), msg.length(), 
InetAddress.getLocalHost(), 2000);

                    ds.send(dp);
                    System.out.println("message sent");
                }
                else if (choice.equalsIgnoreCase("no"))
                {
                    System.out.println("i am not ready to enter the critical section");
                    String msg1 = "Token";//this msg will pass to the next process
                    dp = new DatagramPacket(msg1.getBytes(), msg1.length(), 
InetAddress.getLocalHost(), 2001);
```

```
                    ds.send(dp);
                    hasToken = false;
                }
            } else {
                System.out.println("Waiting for token");
                byte[] buffer = new byte[2048];
                dp = new DatagramPacket(buffer, buffer.length);
                ds.receive(dp);
                String prevProcessMsg = new String(dp.getData(), 0, dp.getLength());

                System.out.println("PreviousProcessMsg is" + prevProcessMsg);
                if (prevProcessMsg.equals("Token")) {
                    hasToken = true;
                    System.out.println("I have token now");
                }
            }

        }
    }
}
```

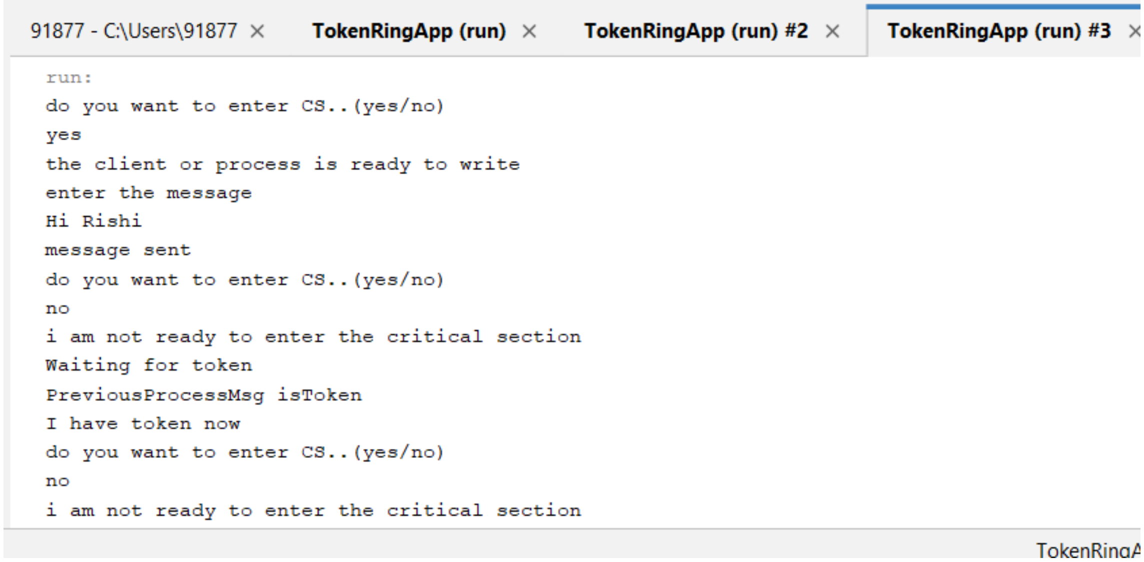
Output:



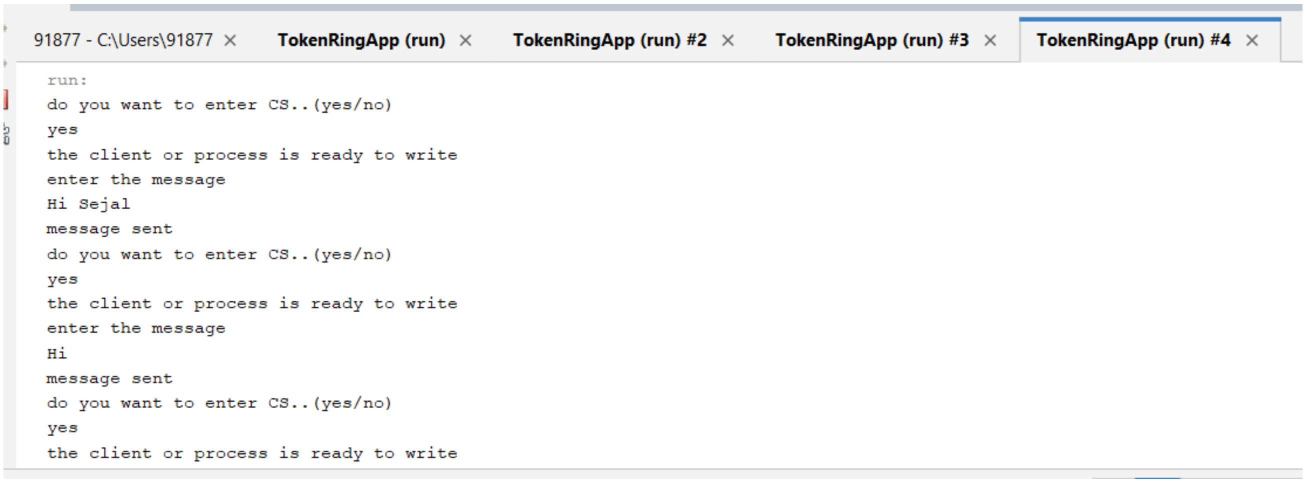
```
run:
Message from: Client--> Hi Mansi
Message from: Client2-->Hi Rishi
Message from: Client3-->Hi Sejal
Message from: Client3-->Hi
Message from: Client3-->How are you
Message from: Client--> Hello guys
Message from: Client2-->Bye bye
```



```
run:
Do you want to enter criticalsection...(yes/no)?
yes
the client or process is ready to write
Enter the message
Hi Mansi
Message sent
Do you want to enter criticalsection...(yes/no)?
no
i am not ready to enter the critical section
Do you want to enter criticalsection...(yes/no)?
yes
the client or process is ready to write
Enter the message
Hello guys
Message sent
```



```
run:
do you want to enter CS..(yes/no)
yes
the client or process is ready to write
enter the message
Hi Rishi
message sent
do you want to enter CS..(yes/no)
no
i am not ready to enter the critical section
Waiting for token
PreviousProcessMsg isToken
I have token now
do you want to enter CS..(yes/no)
no
i am not ready to enter the critical section
```



```
run:
do you want to enter CS..(yes/no)
yes
the client or process is ready to write
enter the message
Hi Sejal
message sent
do you want to enter CS..(yes/no)
yes
the client or process is ready to write
enter the message
Hi
message sent
do you want to enter CS..(yes/no)
yes
the client or process is ready to write
```

Practical 12

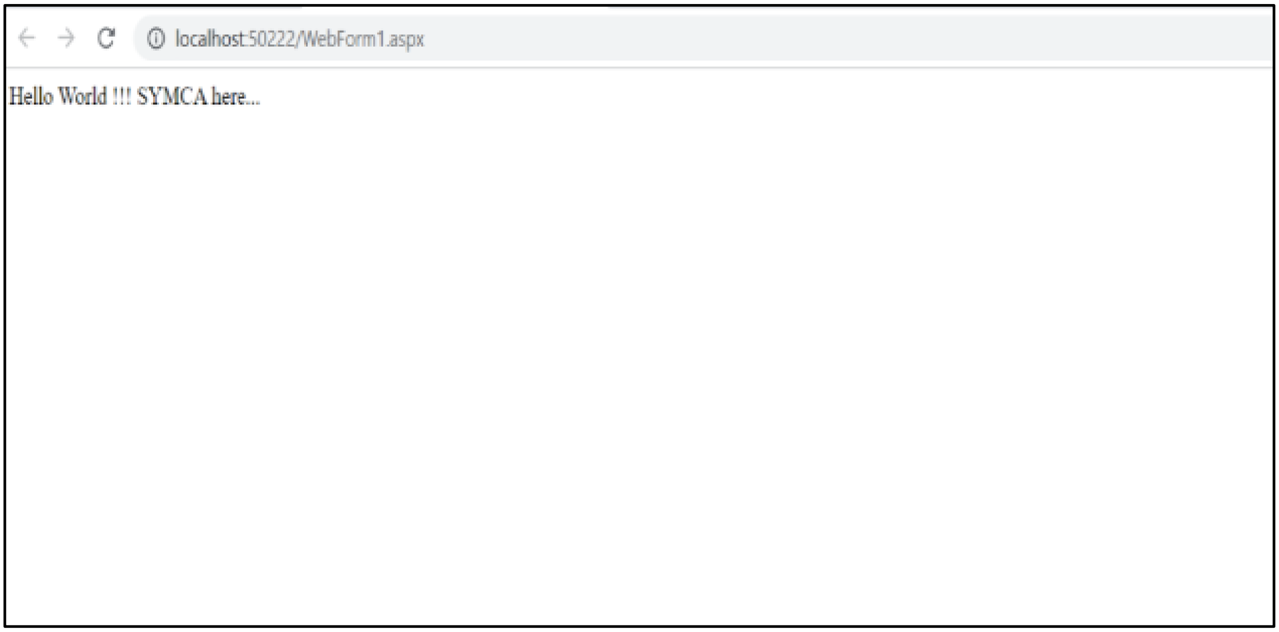
Aim: To develop Application for windows using Windows Azure Platform Training Kit and Visual Studio.

Code:

WebForm1.aspx

```
<!DOCTYPE html>
<html xmlns=”http://www.w3.org/1000/xhtml”>
<head runat=”server”>
        <title></title>
</head>
<body>
        <form id=”form1” runat=”server”>
                <div>
                        Hello World !! This is SYMCA
                </div>
        </form>
</body>
</html>
```

Output:



Hello World !!! SYMCA here...

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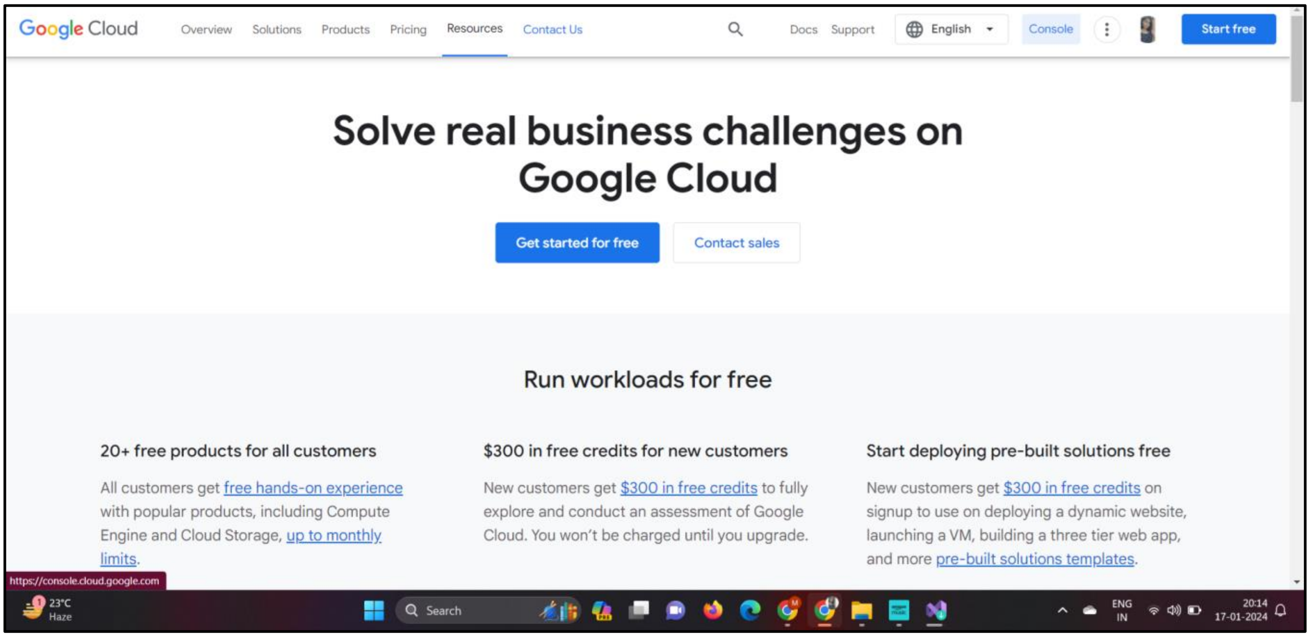
Practical 13

Aim: To develop Application using Google App Engine

Click on Console on top right



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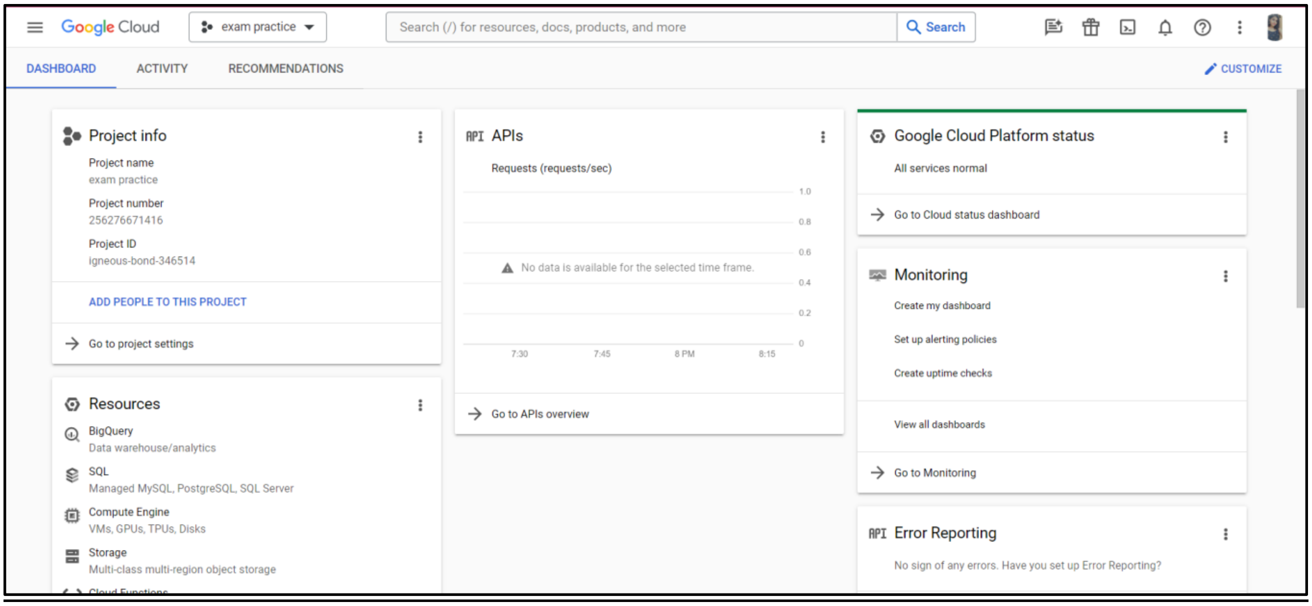
New customers get $300 in free credits on signup to use on deploying a dynamic website, launching a VM, building a three tier web app, and more pre-built solutions templates.

https://console.cloud.google.com

Click over current project next to GCP



Google Cloud · exam practice · Search (/) for resources, docs, products, and more · Search

DASHBOARD · ACTIVITY · RECOMMENDATIONS · CUSTOMIZE

Project info

Project name
exam practice

Project number
256276671416

Project ID
igneous-bond-346514

ADD PEOPLE TO THIS PROJECT

Go to project settings

Resources

BigQuery
Data warehouse/analytics

SQL
Managed MySQL, PostgreSQL, SQL Server

Compute Engine
VMs, GPUs, TPUs, Disks

Storage
Multi-class multi-region object storage

Cloud Functions

APIs

Requests (requests/sec)

No data is available for the selected time frame.

Go to APIs overview

Google Cloud Platform status

All services normal

Go to Cloud status dashboard

Monitoring

Create my dashboard

Set up alerting policies

Create uptime checks

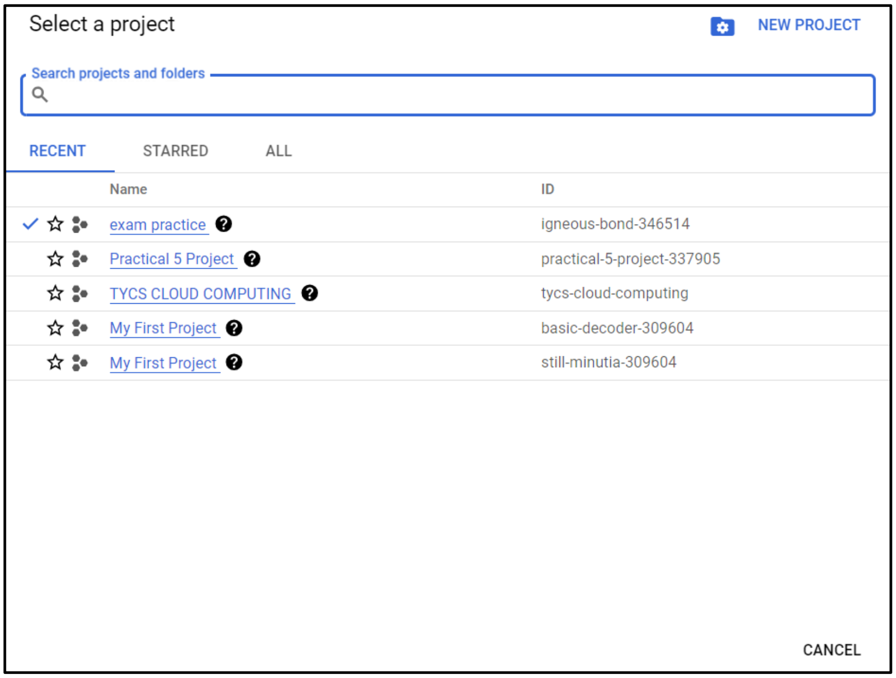
View all dashboards

Go to Monitoring

Error Reporting

No sign of any errors. Have you set up Error Reporting?

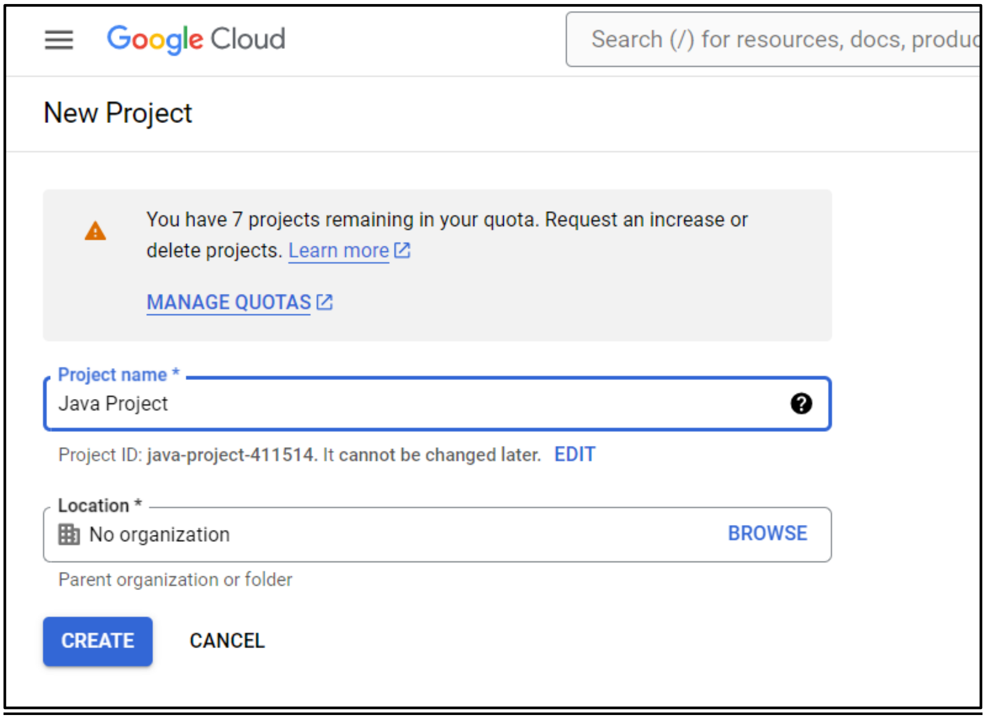
Click on New Project



Select a project

Name	ID
exam practice	igneous-bond-346514
Practical 5 Project	practical-5-project-337905
TYCS CLOUD COMPUTING	tycs-cloud-computing
My First Project	basic-decoder-309604
My First Project	still-minutia-309604

Give some useful name for project and click on create



Google Cloud

Search (/) for resources, docs, produc

New Project

You have 7 projects remaining in your quota. Request an increase or delete projects. Learn more

MANAGE QUOTAS

Project name *

Java Project

Project ID: java-project-411514. It cannot be changed later. EDIT

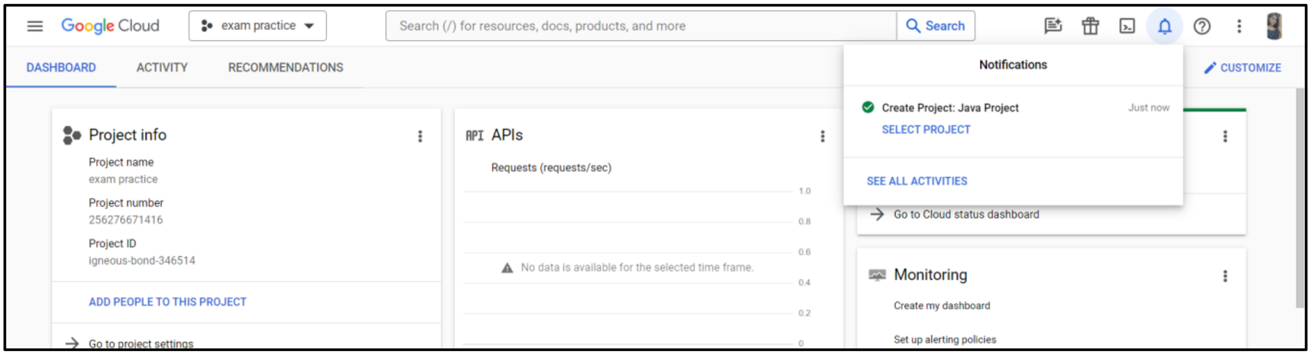
Location *

No organization BROWSE

Parent organization or folder

CREATE CANCEL

Now the project is created but still we've the old project selected so click on current project next to GCP and select the newly created project



Google Cloud exam practice Search (/) for resources, docs, products, and more Search

DASHBOARD ACTIVITY RECOMMENDATIONS CUSTOMIZE

Project info

Project name
exam practice

Project number
256276671416

Project ID
igneous-bond-346514

ADD PEOPLE TO THIS PROJECT

Go to project settings

APIs

Requests (requests/sec)

No data is available for the selected time frame.

Notifications

Create Project: Java Project Just now

SELECT PROJECT

SEE ALL ACTIVITIES

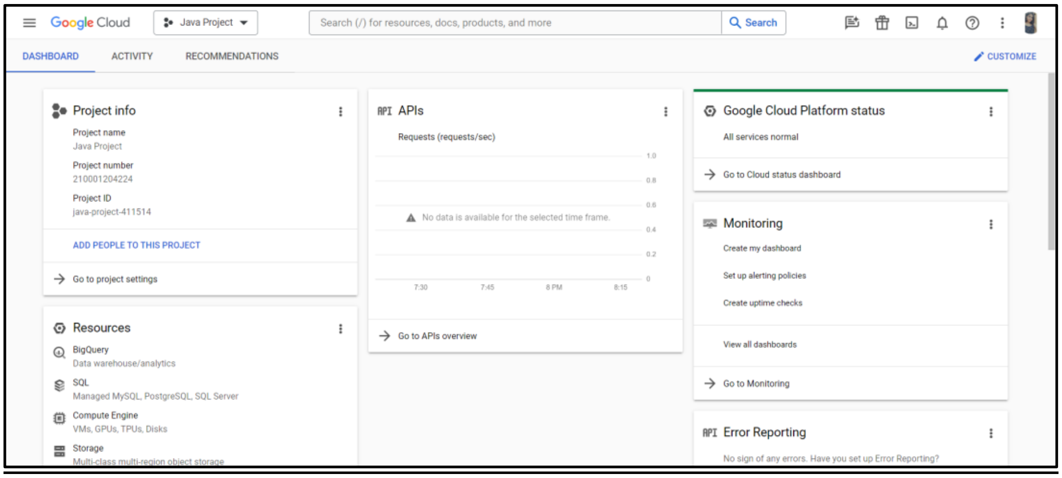
Go to Cloud status dashboard

Monitoring

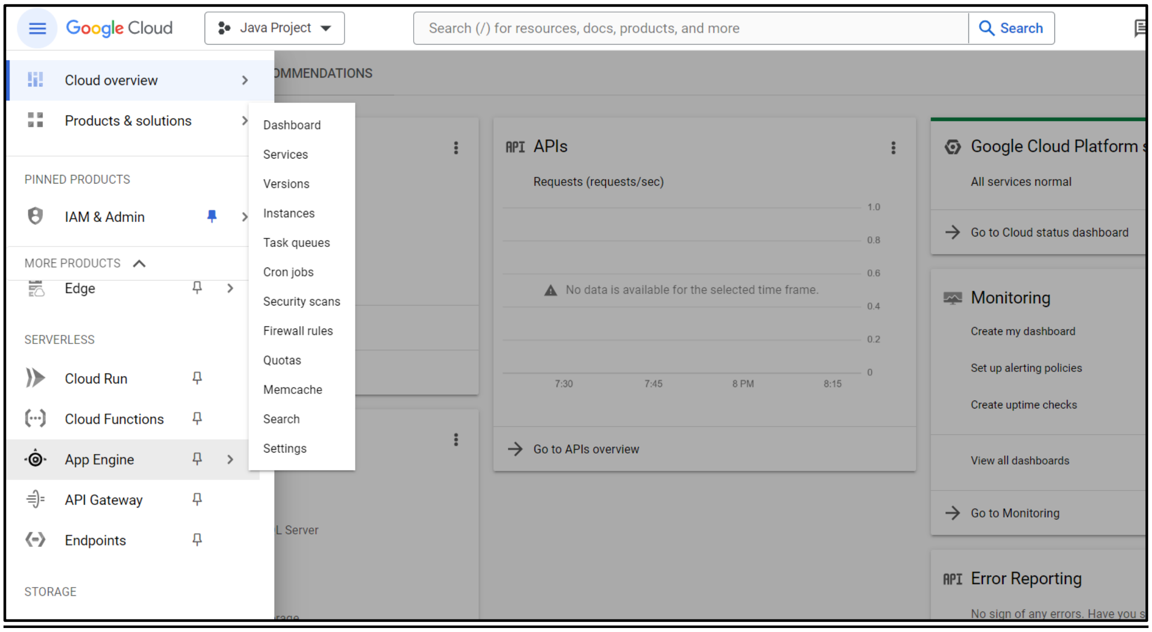
Create my dashboard

Set up alerting policies

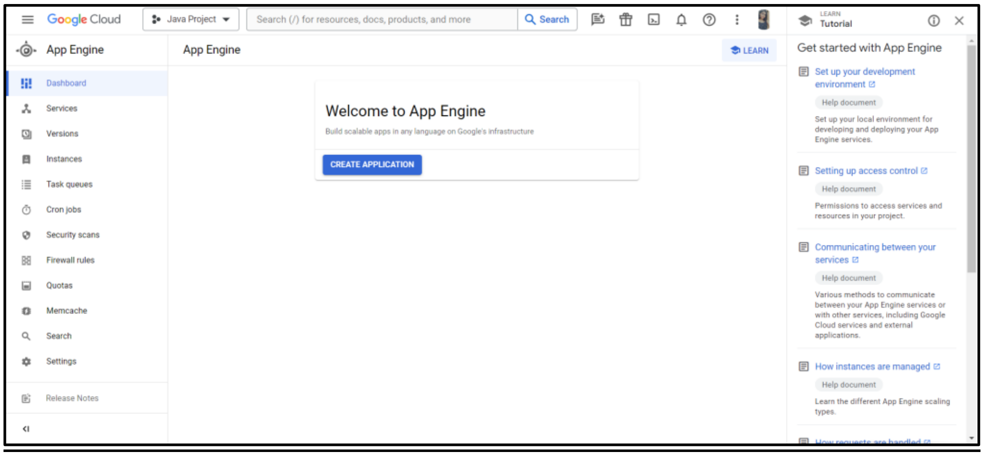
Now the project is selected, the interface will look like as below



Select App engine from left panel



The interface after clicking on App engine will look like below



App Engine

Welcome to App Engine

Build scalable apps in any language on Google's infrastructure

Get started with App Engine

Set up your development environment

Set up your local environment for developing and deploying your App Engine services.

Setting up access control

Permissions to access services and resources in your project.

Communicating between your services

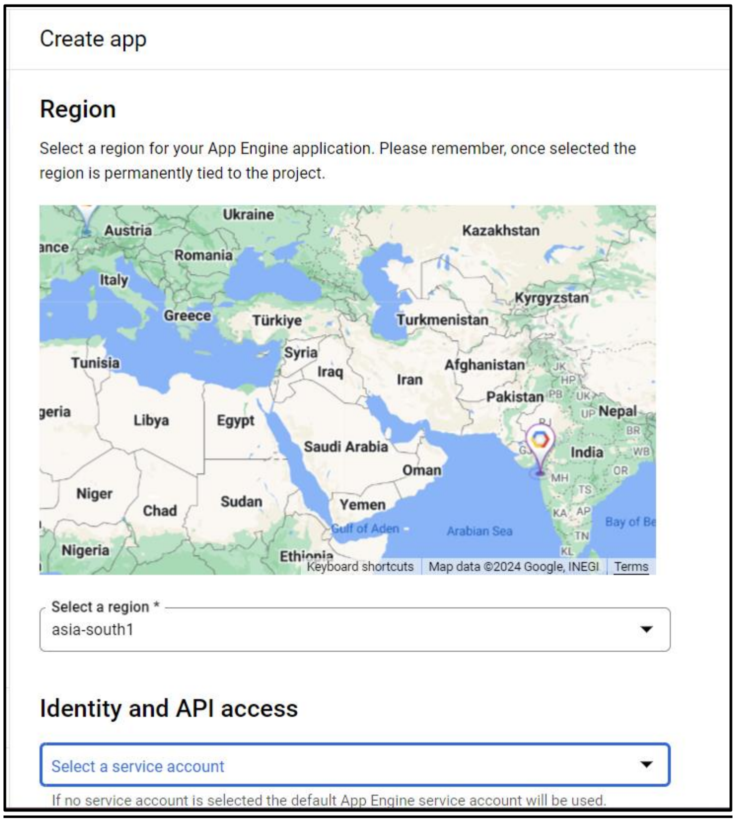
Various methods to communicate between your App Engine services or with other services, including Google Cloud services and external applications.

How instances are managed

Learn the different App Engine scaling types.

How requests are handled

Click on Create Application then select the region in next slide and click Next



Create app

Region

Select a region for your App Engine application. Please remember, once selected the region is permanently tied to the project.

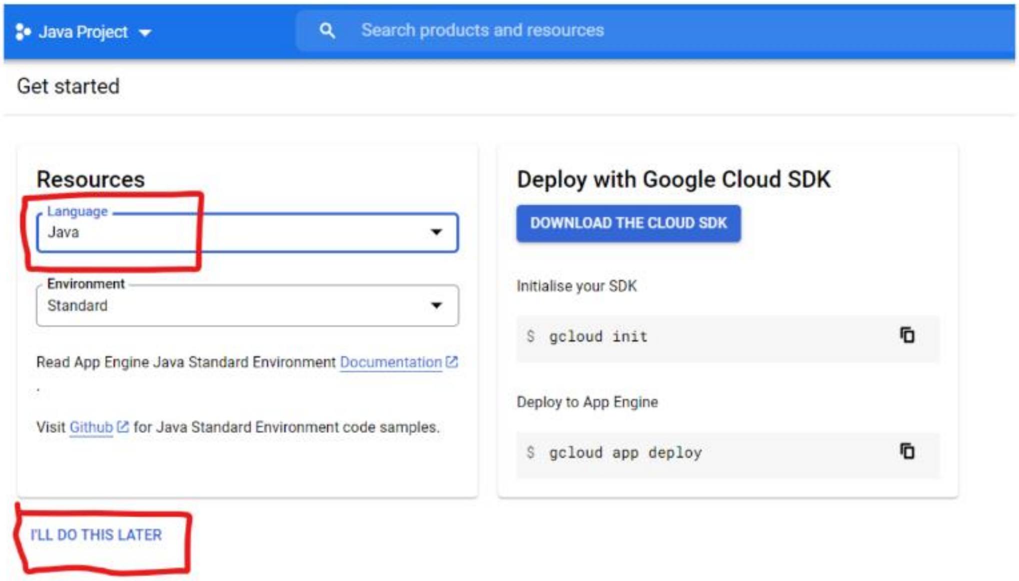
Select a region *
asia-south1

Identity and API access

Select a service account

If no service account is selected the default App Engine service account will be used.

Now select the language and click I’ll do this later



Resources

Language: Java

Environment: Standard

Read App Engine Java Standard Environment Documentation.

Visit Github for Java Standard Environment code samples.

Deploy with Google Cloud SDK

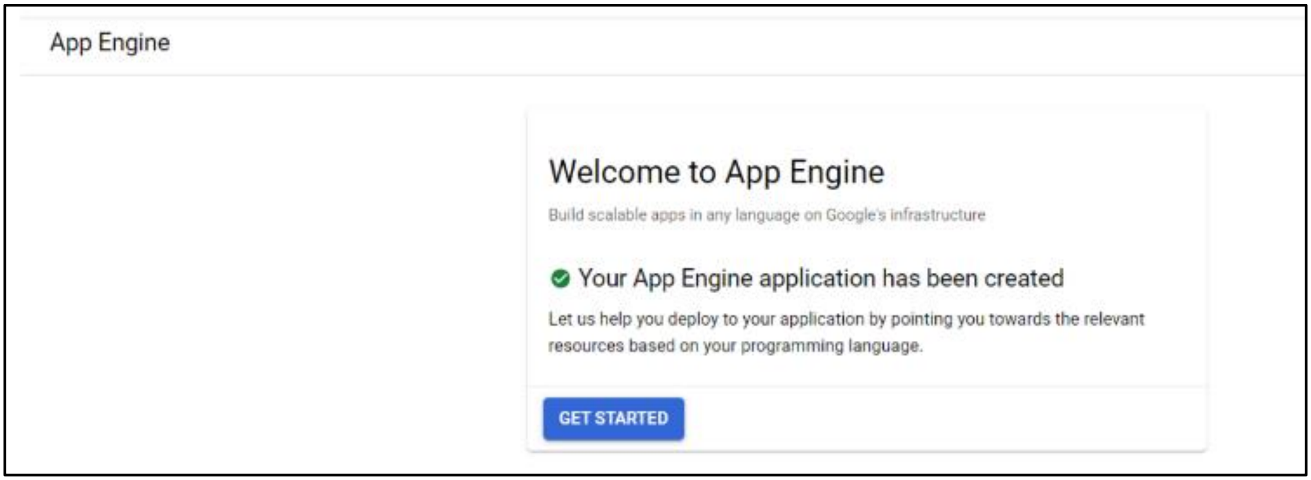
Initialise your SDK

```
$ gcloud init
```

Deploy to App Engine

```
$ gcloud app deploy
```

Now the App Engine Application has been created



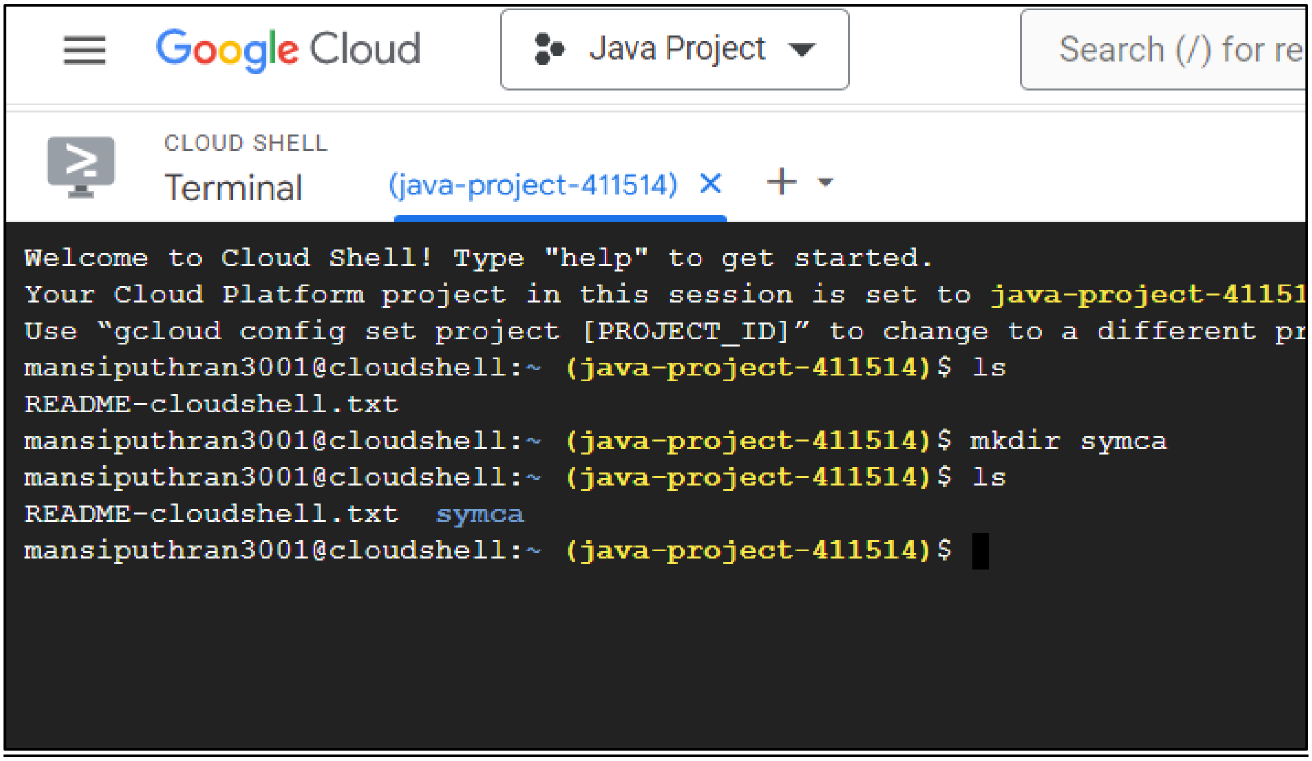
Welcome to App Engine

Build scalable apps in any language on Google's infrastructure

✓ Your App Engine application has been created

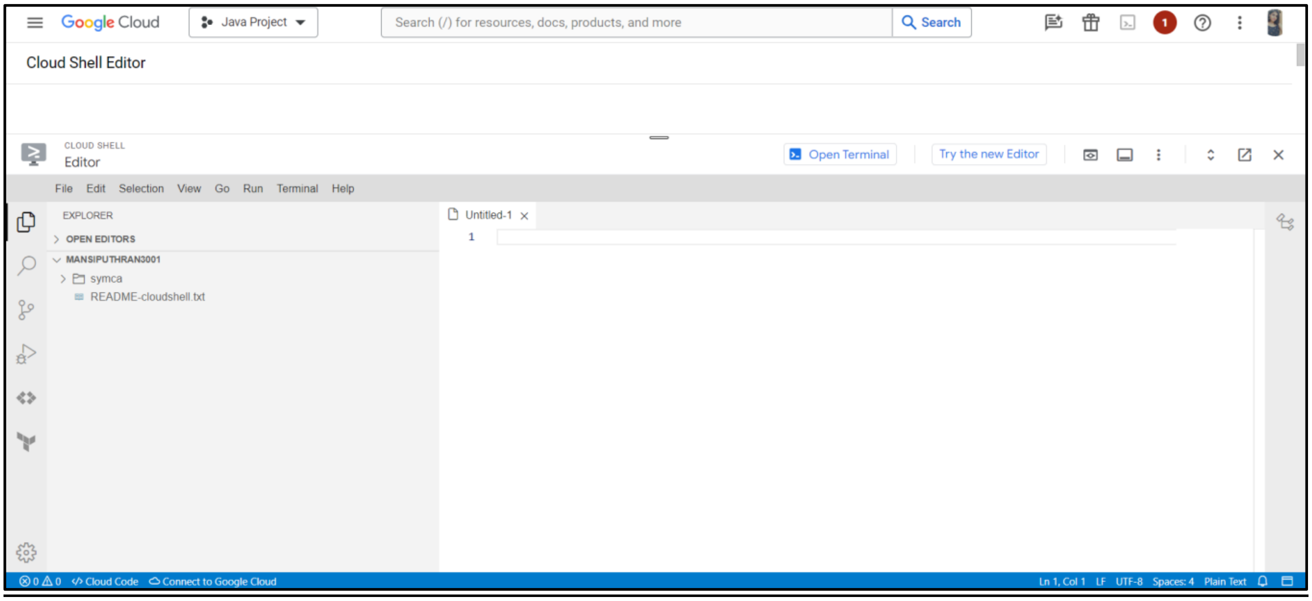
Let us help you deploy to your application by pointing you towards the relevant resources based on your programming language.

Search Cloud shell and click on Open terminal it will open the command shell to work

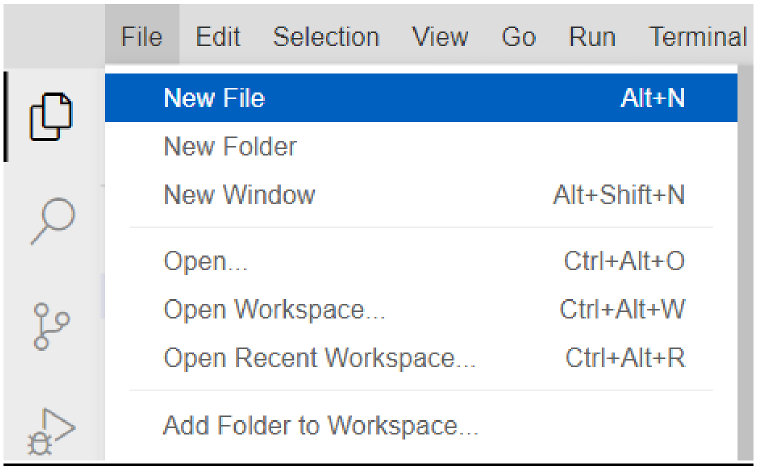


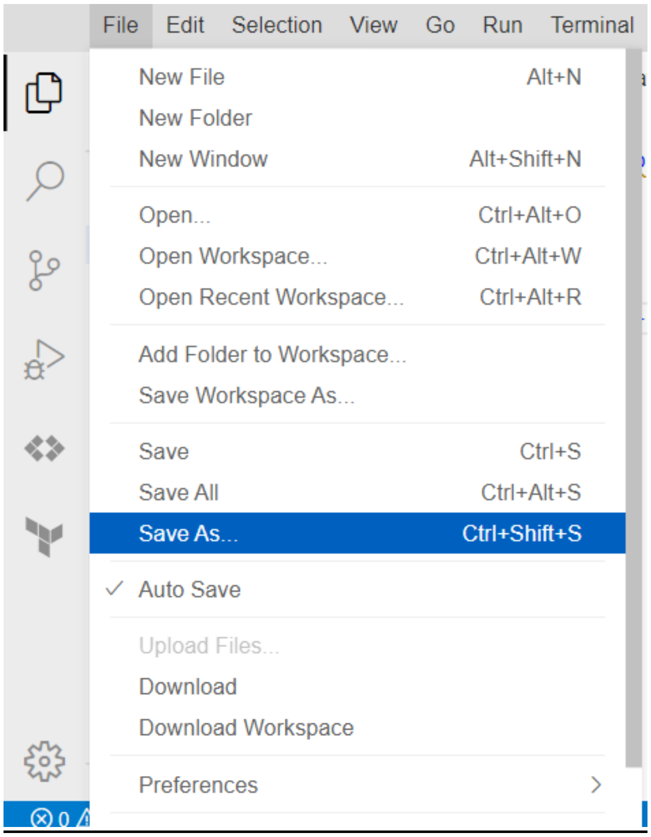
```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to java-project-41151
Use “gcloud config set project [PROJECT_ID]” to change to a different pr
mansiputhran3001@cloudshell:~ (java-project-411514)$ ls
README-cloudshell.txt
mansiputhran3001@cloudshell:~ (java-project-411514)$ mkdir symca
mansiputhran3001@cloudshell:~ (java-project-411514)$ ls
README-cloudshell.txt  symca
mansiputhran3001@cloudshell:~ (java-project-411514)$
```

Click on open editor and then click on Legacy Editor

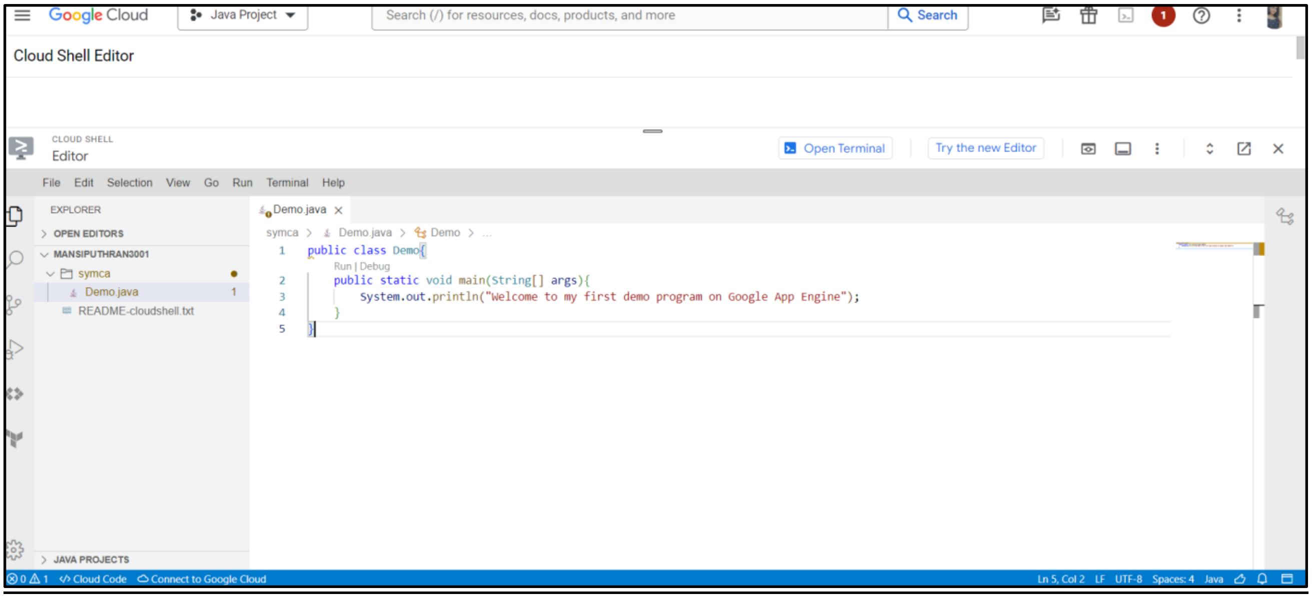


Create Demo.java



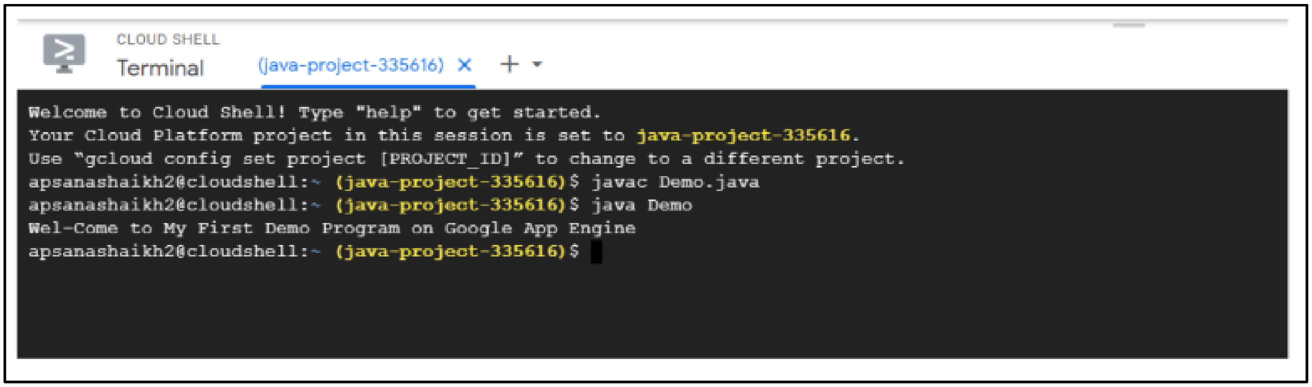


Now write the Demo.java program


Google Cloud
Java Project
Search (/) for resources, docs, products, and more
Search
Cloud Shell Editor
CLOUD SHELL
Editor
Open Terminal
Try the new Editor
File Edit Selection View Go Run Terminal Help
EXPLORER
OPEN EDITORS
MANSIPUTHRAN3001
symca
Demo.java
README-cloudshell.txt
JAVA PROJECTS
Demo.java
symca > Demo.java > Demo > ...
Run | Debug
0 ⚠ 1 Cloud Code Connect to Google Cloud
Ln 5, Col 2 LF UTF-8 Spaces: 4 Java

```java
public class Demo{
    public static void main(String[] args){
        System.out.println("Welcome to my first demo program on Google App Engine");
    }
}
```

Open the terminal and run the program and see the output



```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to java-project-335616.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
apsanashaikh2@cloudshell:~ (java-project-335616)$ javac Demo.java
apsanashaikh2@cloudshell:~ (java-project-335616)$ java Demo
Wel-Come to My First Demo Program on Google App Engine
apsanashaikh2@cloudshell:~ (java-project-335616)$
```

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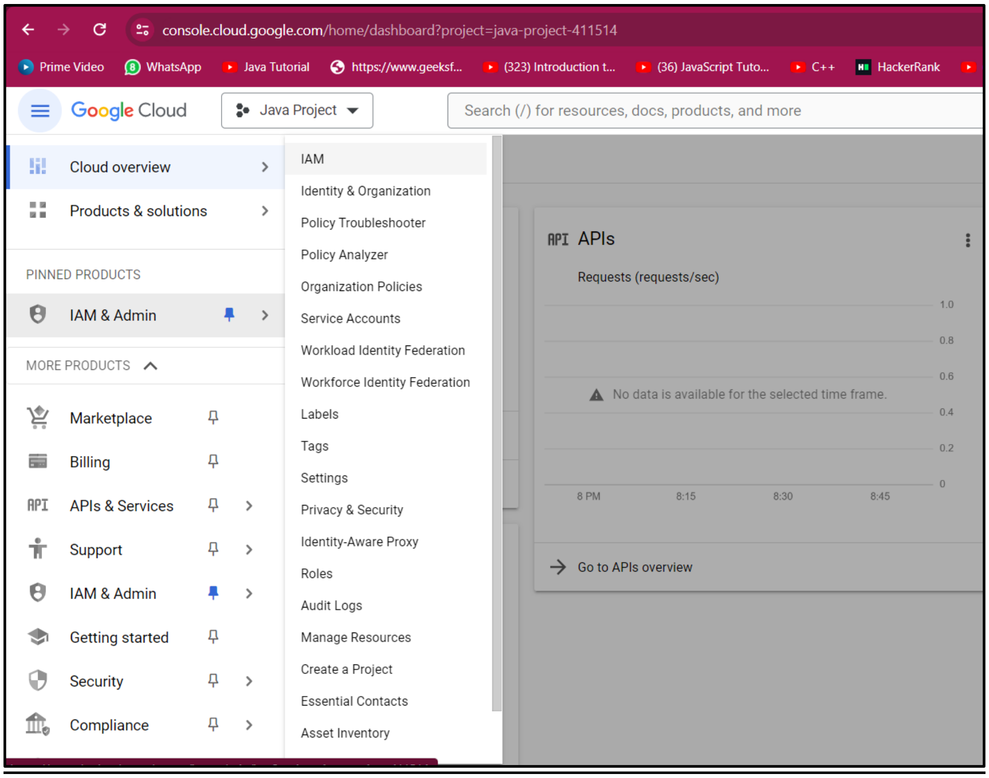
Practical 14

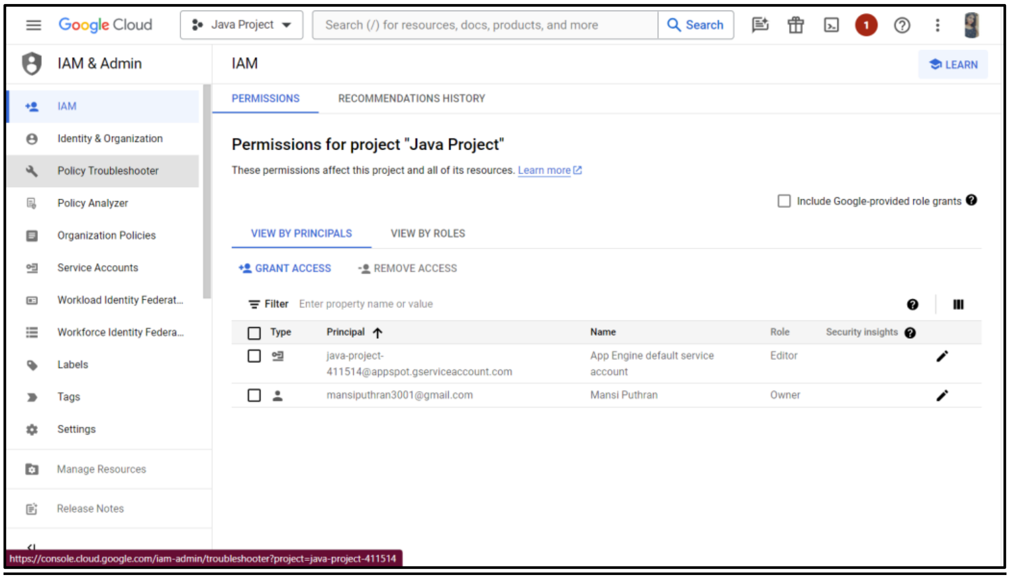
Aim: To implement Identity Management in GCP

Select a project and select IAM



No data is available for the selected time frame.

Click on Grant access for you project

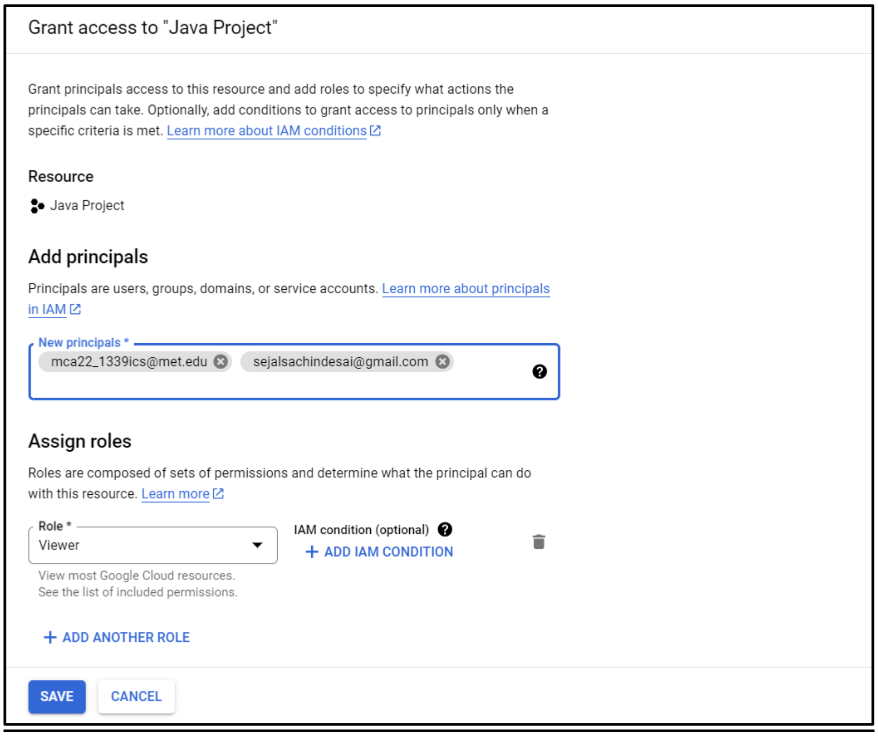


Permissions for project "Java Project"

These permissions affect this project and all of its resources. Learn more

□	Type	Principal ↑	Name	Role	Security insights
□		java-project-411514@appspot.gserviceaccount.com	App Engine default service account	Editor	
□		mansiputhran3001@gmail.com	Mansi Puthran	Owner	

Add new principals and assign roles



Grant access to "Java Project"

Grant principals access to this resource and add roles to specify what actions the principals can take. Optionally, add conditions to grant access to principals only when a specific criteria is met. Learn more about IAM conditions

Resource

Java Project

Add principals

Principals are users, groups, domains, or service accounts. Learn more about principals in IAM

New principals *: mca22_1339ics@met.edu, sejalsachindesai@gmail.com

Assign roles

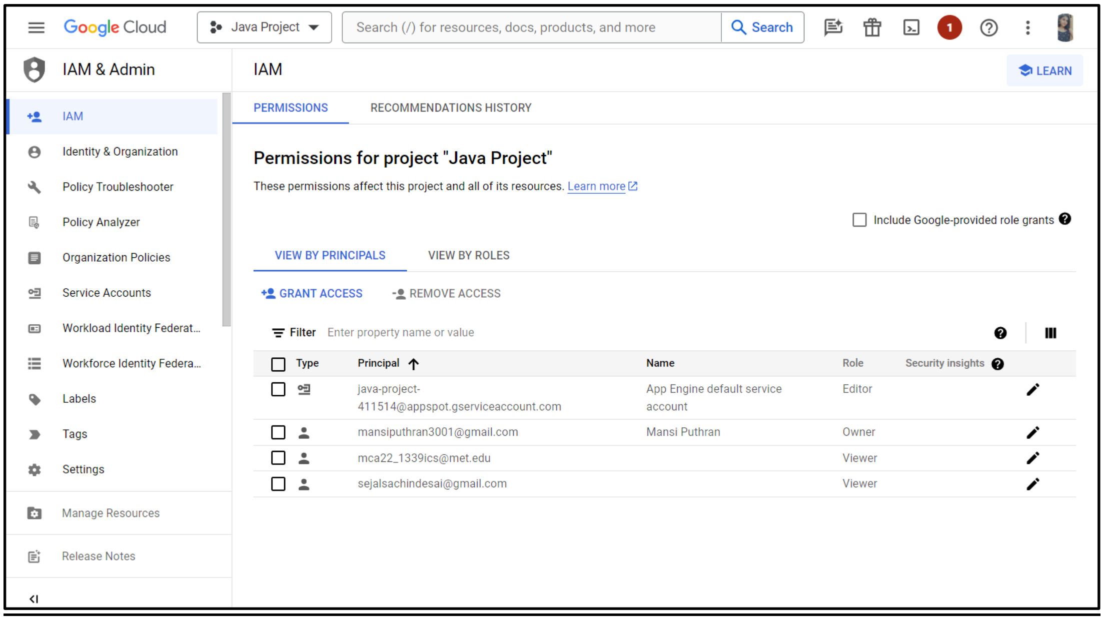
Roles are composed of sets of permissions and determine what the principal can do with this resource. Learn more

Role *: Viewer

View most Google Cloud resources. See the list of included permissions.

IAM condition (optional)

It will look like this



Permissions for project "Java Project"

These permissions affect this project and all of its resources. Learn more

□ Include Google-provided role grants

□ Type	Principal ↑	Name	Role	Security insights
□	java-project-411514@appspot.gserviceaccount.com	App Engine default service account	Editor	
□	mansiputhran3001@gmail.com	Mansi Puthran	Owner	
□	mca22_1339ics@met.edu		Viewer	
□	sejalsachindesai@gmail.com		Viewer	

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Practical 15

Aim: Implement Storage as Service on Google Cloud

Getting started

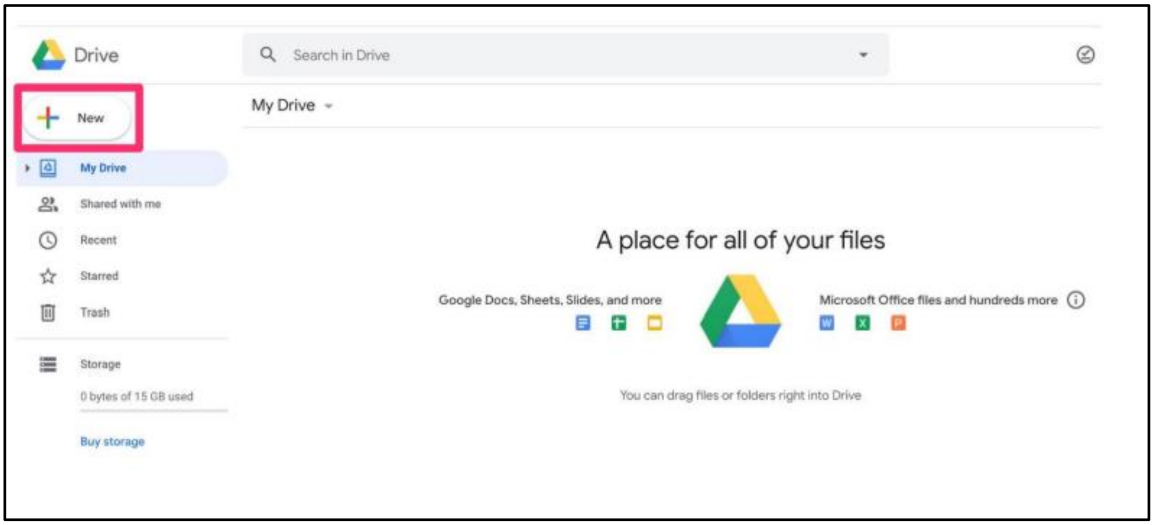
To get started with Google Drive, you'll need to make a Google account, if you don't already have one.

Creating a Google account is free, and gives you access to Google Drive, as well as other Google Services, such as Gmail, Google Calendar, and Google Photos.

Once you've signed up for an account (or signed into an existing account), you can access Google Drive in your browser by going to drive.google.com. This will bring you to Drive's web interface, which is fairly intuitive and easy to navigate.

As you begin to familiarize yourself with all the things you can do with Google Drive, you'll most likely want to first learn how to upload, create, manage and share files.

Uploading and creating files



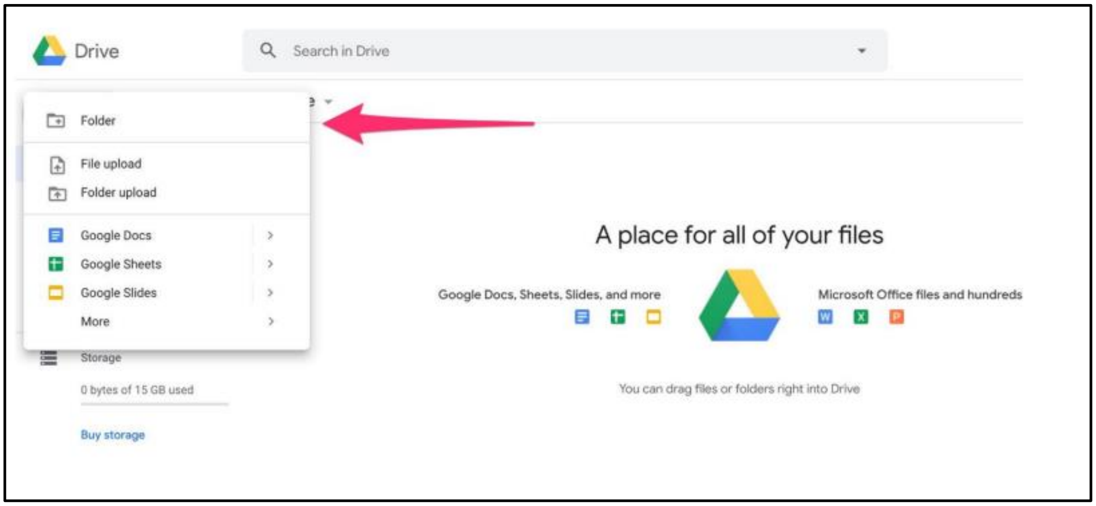
A place for all of your files

Google Docs, Sheets, Slides, and more

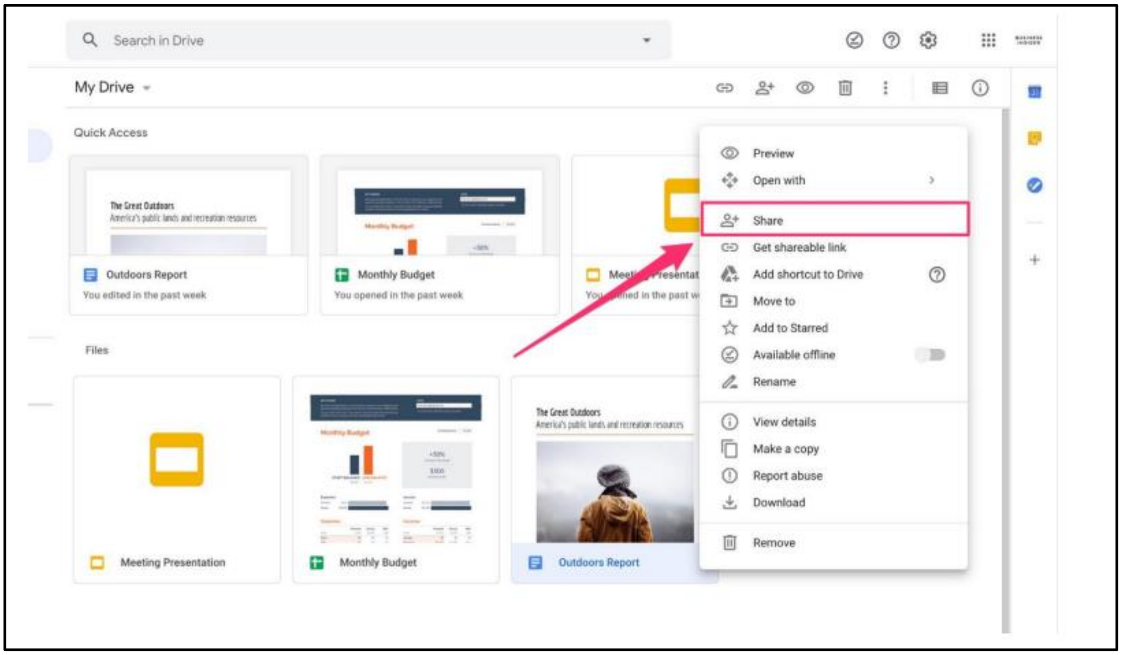
Microsoft Office files and hundreds more

You can drag files or folders right into Drive

Managing and organizing files and folders


Drive
Search in Drive
Folder
File upload
Folder upload
Google Docs
Google Sheets
Google Slides
More
Storage
0 bytes of 15 GB used
Buy storage
A place for all of your files
Google Docs, Sheets, Slides, and more
Microsoft Office files and hundreds
You can drag files or folders right into Drive

Sharing files and folders



The biggest draw of Google Drive is the ability to share files and folders with others. From sharing videos to entire Drive folders, Drive makes sharing simple.

To share a Google Drive file or folder, right-click on it to bring up the context menu, then click "Share." From there, you'll be able to add collaborators using their email address, and decide whether people can edit, comment on, or simply just view the file.

Any files created in Drive have the option to be edited by multiple people at once, meaning you'll be able to collaborate with others in real-time.