ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

Advanced Java Lab Manual BIS402

2023-24

Even Semester

Prepared By,

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Asst. Professor

IS&E Department

Lab Program List

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

Institution Vision and Mission

Vision

To develop Adichunchanagiri Institute of Technology as a center of excellence and to strive for continuous improvement of technical education and human resource advancement.

Mission

To achieve Excellence in Education, Entrepreneurship, and Innovation by producing Engineers with high Ethical Standards, Integrity, and Credibility.

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

Department Vision and Mission

Vision

To be recognized as a center of excellence in information technology and allied areas with quality learning and research environment

Mission

- Provide intellectual & professional leadership in ethical and social areas pertaining to information in contemporary society.
- Advancing the state of knowledge of information studies through research and development.
- Providing a platform to discuss cutting edge technologies.

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

Subject: Advanced Java
Subject code: BIS402
Semester: IV

Course Outcomes

At the end of the course the student will be able to:

CO1	Solve the given problem using appropriate collection class/interface
CO2	Demonstrate the concepts of String operations in Java
CO3	Demonstrate by Apply the concepts of Swings to build Java applications
CO4	Implementation web based applications using Java servlets, JSP and JDBC to build database applications

CO PO Mapping

Slight (Low) = 1 , Moderate (Medium) = 2 , Substantial (High) = 3 .

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	3	3	3		3						2
CO 2	3	2	2		3						1
CO 3	3	3	3		3				2		2
CO 4	3	3	3		3	1	1		2	1	1
CO 5	3	3	3	1	3		1				3

1. **Implement a java program to demonstrate creating an ArrayList, adding elements, removing elements, sorting elements of ArrayList. Also illustrate the use of toArray() method.**

```
import java.util.*;
public class Alist
{
	public static void main(String[] args)
	{
		ArrayList<Integer> A = new ArrayList<Integer>();
		A.add(87);
		A.add(25);
		A.add(23);
		A.add(45);
		A.add(36);
		A.add(0,10);
		System.out.println("ArrayList: " + A);

		Collections.sort(A);
		System.out.println("ArrayList: " + A);
		Integer r=A.get(2);
		A.remove(2);
		System.out.println("Removed element = "+r);
		Object[] arr = A.toArray();
		System.out.println("Elements of ArrayList as Array: ");
		System.out.println(Arrays.toString(arr));
	}
}
```

Output:

```
ArrayList: [10, 87, 25, 23, 45, 36]
Sorted ArrayList: [10, 23, 25, 36, 45, 87]
Removed element = 25
Elements of ArrayList as Array:
[10, 23, 36, 45, 87]
```

2. Develop a program to read random numbers between a given range that are multiples of 2 and 5, sort the numbers according to tens place using comparator.

```
import java.util.*;
public class CompSort
{
  public static void main(String[] args)
  {
        ArrayList<Integer> A = new ArrayList<Integer>();
        Comparator<Integer> c = new Comparator<Integer>()
        {
              @Override
              public int compare(Integer n1, Integer n2)
              {
                    int tens1 = (n1 % 100) / 10;
                    int tens2 = (n2 % 100) / 10;
                    return Integer.compare(tens1, tens2);
              }
        };
        Random r = new Random();
        Scanner s= new Scanner(System.in);

        System.out.println("Enter the range for random number generation");
        int n=s.nextInt();

        for(int i=0;i<100;i++)
        {
        int x=r.nextInt(n);
        if(x%2==0 && x%5==0)
              A.add(x);
        }
        System.out.println("ArrayList: " + A);
        Collections.sort(A, c);
        System.out.println("Sorted Elements of ArrayList : " +A);
   }
}
```

Output:

```
Enter the range for random number generation
1000
ArrayList: [940, 820, 70, 610, 850, 90, 150, 170, 590, 40, 460, 900, 410]
Sorted Elements of ArrayList : [900, 610, 410, 820, 940, 40, 850, 150, 460, 70, 170, 90, 590]
```

3. Implement a java program to illustrate storing user defined classes in collection.

```
import java.util.LinkedList;

class Address
{
        private String name;
        private String street;
        private String city;
        private String state;
        private String pincode;

        Address(String n, String s, String c, String st, String cd)
        {
                name = n;
                street = s;
                city = c;
                state = st;
                pincode = cd;
        }
        public String toString()
        {
                return name + "\n" + street + "\n" + city + " " + state + " " + pincode;
        }
}

public class Main
{
    public static void main(String args[])
    {
        LinkedList<Address> A = new LinkedList<Address>();

        A.add(new Address("AAA", "Vijayapura", "Chikmagalur", "KA", "577101"));
        A.add(new Address("BBB", "Jaynagar", "Bengaluru", "KA","560001"));
        A.add(new Address("CCC", "Jyothi Nagar", " Chikmagalur ", "KA", "577102"));

        for (Address element : A)
                System.out.println(element + "\n");

    }
}
```

Output:

AAA
Vijayapura
Chikmagalur KA 577101

BBB
Jaynagar
Bengaluru KA 560001

CCC
Jyothi Nagar
Chikmagalur KA 577102

4. **Implement a java program to illustrate the use of different types of string class constructors**.

```
import java.util.*;

public class StrCon
{
	public static void main(String[] args)
	{
		String s1=new String();
		s1="Hello Everyone";

		String s2=new String("Welcome to");

		char c1[] = { 'J', 'A', 'V', 'A' };
		String s3 = new String(c1);

		char c2[] = { 'c', 'l', 'a', 's', 's', 'e', 's' };
		String s4 = new String(c2, 0, 5);

		byte b[] = { 97, 98, 99, 100, 101, 102 };
		String s5 = new String(b);

		String s6 = new String(b, 2, 4);

		System.out.println(s1);
		System.out.println(s2+" "+s3+" "+s4);
		System.out.println("String S5="+s5);
		System.out.println("String S6="+s6);


	}
}
```

Output:

```
Hello Everyone
Welcome to JAVA class
String S5=abcdef
String S6=cdef
```

5. Implement a java program to illustrate the use of different types of character extraction, string comparison, string search and string modification methods.

```
public class StrCharExtract
{

   public static void main(String []args)
   {
      String s1 = "Hello";
      String s2 = "Hello";
      String s3 = "Hello World";
      System.out.println("Character Extraction Result");
      System.out.println("character at position 1 in s1 is "+s1.charAt(1));

      System.out.println("String Modification");
      System.out.println("characters from position 4 to 10 in s3 is "+s3.substring(4, 11));
      System.out.println("Concatenate Strings s1 and s3 "+s1.concat(s3));
      System.out.println("Replace all l with w in Strings s3 "+s3.replace('l','w'));

      char ch[]=new char[10];
      s3.getChars(3, 11, ch, 0);
      System.out.println("characters from position 2 to 10 in s3 is ");
      System.out.println(ch);
      ch=s1.toCharArray();
      System.out.println("Character array of s1 is");
      for(char c: ch)
         System.out.println(c);
      System.out.println("String Comparison");
      System.out.println("s1 and s2 is "+s1.compareTo(s2));
      System.out.println("s2 and s3 is "+s2.compareTo(s3));
      System.out.println("s3 and s2 is "+s3.compareTo(s2));
      System.out.println("String Search");
      System.out.println("First index of l in s3 is "+(int)s3.indexOf('l'));
      System.out.println("Last index of l in s3 is "+(int)s3.lastIndexOf('l'));

   }
}
```

Output:

Character Extraction Result
character at position 1 in s1 is e
String Modification
characters from position 4 to 10 in s3 is o World
Concatenate Strings s1 and s3 HelloHello World
Replace all l with w in Strings s3 Hewwo Worwd
characters from position 2 to 10 in s3 is
lo World
Character array of s1 is
H
e
l
l
o
String Comparison
s1 and s2 is 0
s2 and s3 is -6
s3 and s2 is 6
String Search
First index of l in s3 is 2
Last index of l in s3 is 9

6. Implement a java program to illustrate the use of different types of StringBuffer methods.

```
public class lab6
{

   public static void main(String []args)
   {
        StringBuffer sb = new StringBuffer("Hello");
        System.out.println("buffer initially = "+sb);
        System.out.println("buffer length = "+sb.length());
        System.out.println("buffer capacity= "+sb.capacity());

        System.out.println("\ncharAt(1) in buffer initially= "+sb.charAt(1));
        sb.setCharAt(1,'i');
        sb.setLength(2);

        System.out.println("buffer after setLength called= "+sb);
        System.out.println("charAt(1) in buffer after setCharAt called= "+sb.charAt(1));

        String s;
        int a=100;
        StringBuffer sb1= new StringBuffer(40);
        s=sb1.append("a = ").append(a).append("!").toString();
        System.out.println("\nResult of append method\n"+s);

        StringBuffer sb2= new StringBuffer("I Java!");
        sb2.insert(2, "like ");
        System.out.println("\nResult of insert method\n"+sb2);

        System.out.println("\nResult of reverse method on sb\n"+sb.reverse());

        System.out.println("\nAfter delete(2,6) on sb2\n"+ sb2.delete(2,6));
        System.out.println("\nAfter deleteCharAt(0) on sb2\n"+ sb2.deleteCharAt(0));
        System.out.println("Replace 0 to 6 in sb2\n"+ sb2.replace(0,6,"python"));
   }
}
```

Output:

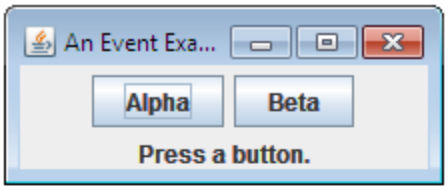
```
buffer initially = Hello
buffer length = 5
buffer capacity= 21

charAt(1) in buffer initially= e
buffer after setLength called= Hi
charAt(1) in buffer after setCharAt called= i

Result of append method
a = 100!

Result of insert method
I like Java!

Result of reverse method on sb
iH

After delete(2,6) on sb2
I  Java!

After deleteCharAt(0) on sb2
  Java!
Replace 0 to 6 in sb2
python!
```

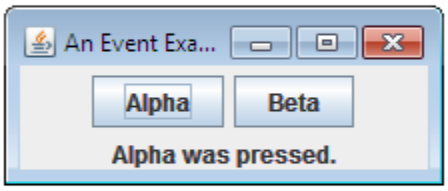
7. **Demonstrate a swing event handling application that creates 2 buttons Alpha and Beta and displays the text "Alpha pressed" when alpha button is clicked and "Beta pressed" when beta button is clicked.**

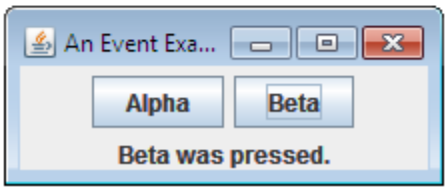
```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
class SwDemo
{
        JLabel jlab;
        SwDemo ()
        {
                JFrame jfrm = new JFrame("An Event Example");
                jfrm.setLayout(new FlowLayout());
                jfrm.setSize(220, 90);
                jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                JButton jbtnAlpha = new JButton("Alpha");
                JButton jbtnBeta = new JButton("Beta");

                jbtnAlpha.addActionListener(new ActionListener()
                {
                        public void actionPerformed(ActionEvent ae)
                        {
                                jlab.setText("Alpha was pressed.");
                        }
                });

                jbtnBeta.addActionListener(new ActionListener()
                {
                        public void actionPerformed(ActionEvent ae)
                        {
                                jlab.setText("Beta was pressed.");
                        }
                });
        .
                jfrm.add(jbtnAlpha); jfrm.add(jbtnBeta);
                jlab = new JLabel("Press a button.");
                jfrm.add(jlab);
                jfrm.setVisible(true);
        }
        public static void main(String args[])
```

```
        {
                SwingUtilities.invokeLater(new Runnable()
                {
                        public void run()
                        {
                                new  SwDemo();
                        }
                });
        }
}
```

Output on Linux System **Output on Windows System**







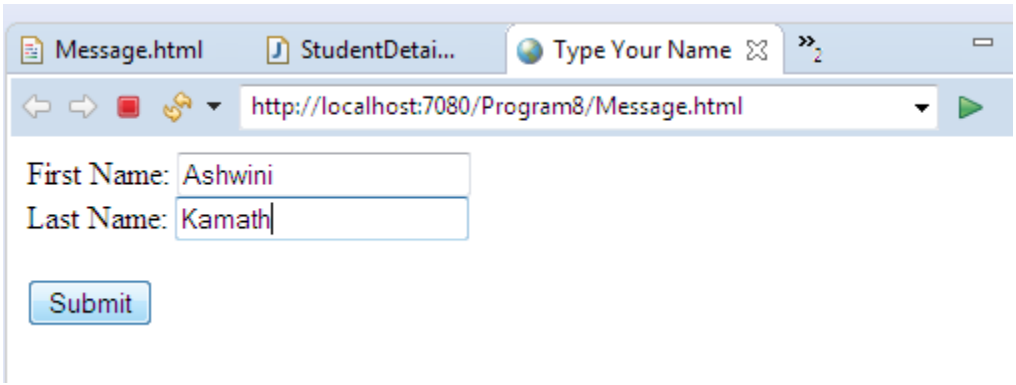
8. A program to display greeting message on the browser "Hello UserName", "How Are You?", accept username from the client using servlet.

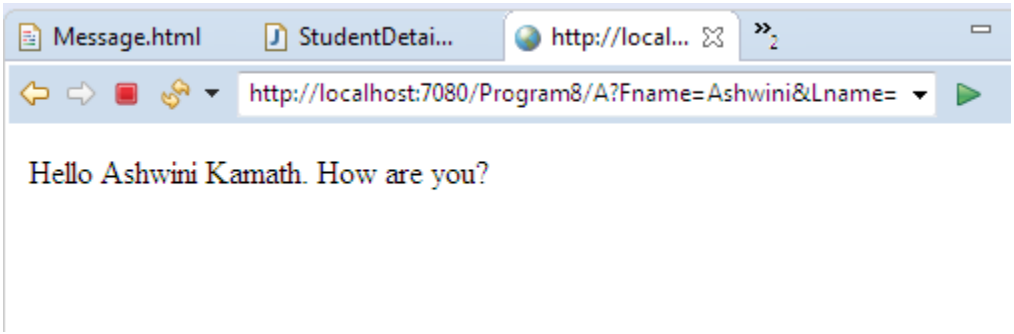
```
import java.io.*;
import javax.servlet.ServletException;
import javax.servlet.http.*;
public class A extends HttpServlet
{
        private static final long serialVersionUID = 1L;

        public void doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException,IOException
        {
                response.setContentType("text/html");
                PrintWriter out = response.getWriter();
                String Fname = request.getParameter("Fname");
                String Lname = request.getParameter("Lname");
                out.println("Hello "+Fname+ " "+Lname+". How are you?");
        }
}
```

Message.html

```
<html>
        <head>
                <title>Type Your Name</title>
        </head>
        <body>
                <form action="A" method="get">
                        First Name: <input type="text" name="Fname"><br>
                        Last Name: <input type="text" name="Lname"><br><br>
                        <input type="submit" value="Submit">

                </form>
        </body>
</html>
```

Output:


Message.html
StudentDetai...
Type Your Name
http://localhost:7080/Program8/Message.html
First Name: Ashwini
Last Name: Kamath
Submit


Message.html
StudentDetai...
http://local...
http://localhost:7080/Program8/A?Fname=Ashwini&Lname=
Hello Ashwini Kamath. How are you?

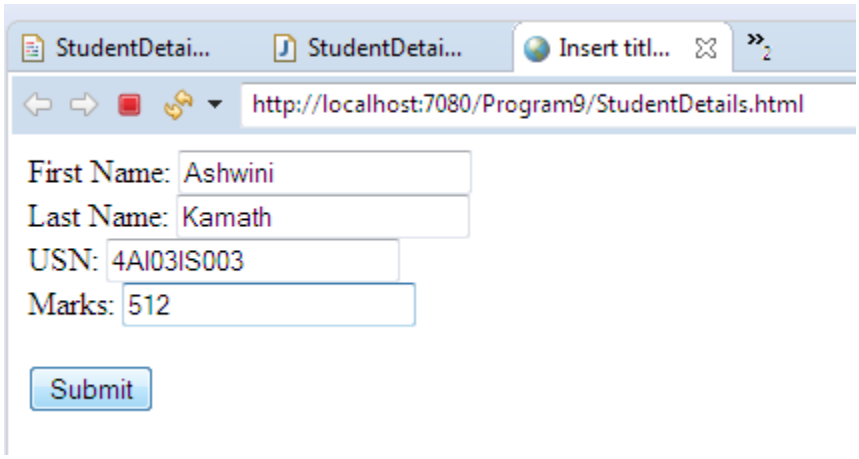
9. A servlet program to display the name, USN, and total marks by accepting student detail.

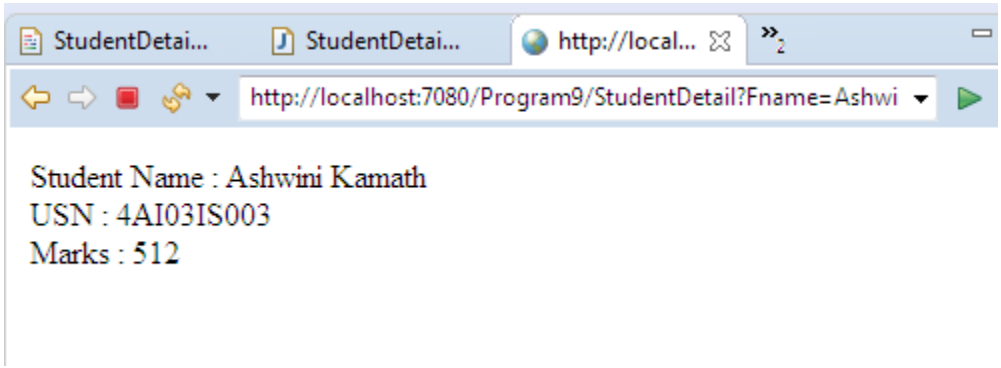
```
import java.io.*;
import javax.servlet.ServletException;
import javax.servlet.http.*;
public class StudentDetail extends HttpServlet
{
    private static final long serialVersionUID = 1L;

    public void doGet(HttpServletRequest request, HttpServletResponse response) throws
    ServletException,IOException
    {
            response.setContentType("text/html");
            PrintWriter out = response.getWriter();
            String Fname = request.getParameter("Fname");
            String Lname = request.getParameter("Lname");
            String USN = request.getParameter("USN");
            String Marks= request.getParameter("Marks");
            out.println("Student Name : "+Fname+" "+Lname);
            out.println("<br>USN : "+USN);
            out.println("<br>Marks : "+Marks);
    }
}
```

StudentDetails.html

```
<html>
        <head>
            <title>Type Your Name</title>
        </head>
        <body>
            <form action="StudentDetail" method="get">
                    First Name: <input type="text" name="Fname"> <br>
                    Last Name: <input type="text" name="Lname"> <br>
                    USN: <input type="text" name="USN"> <br>
                    Marks: <input type="text"      name="Marks"> <br> <br>
                    <input type="submit" value="Submit">

            </form>
        </body>
</html>
```

Output:

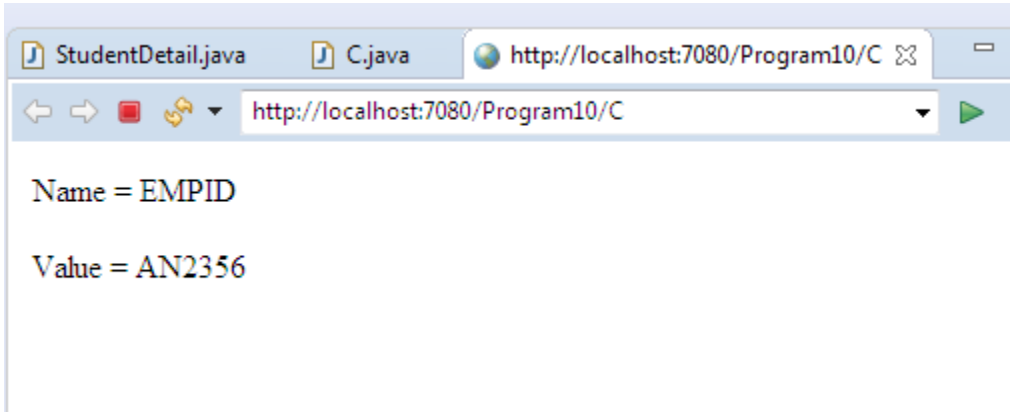

StudentDetai...
StudentDetai...
Insert titl...
http://localhost:7080/Program9/StudentDetails.html
First Name: Ashwini
Last Name: Kamath
USN: 4AI03IS003
Marks: 512
Submit


StudentDetai...
StudentDetai...
http://local...
http://localhost:7080/Program9/StudentDetail?Fname=Ashwi
Student Name : Ashwini Kamath
USN : 4AI03IS003
Marks : 512

10. A Java program to create and read the cookie for the given cookie name as "EMPID" and its value as "AN2356".

```
import java.io.*;
import jakarta.servlet.*;
import jakarta.servlet.http.*;

public class StudentDetail extends HttpServlet
{
        protected void service(HttpServletRequest req, HttpServletResponse res)
        throws ServletException, IOException
        {
                        res.setContentType("text/html");
                        PrintWriter out = res.getWriter();
                        res.addCookie(new Cookie("EMPID", "AN2356")); // create cookie

                        for (Cookie c : req.getCookies())
                        { // read cookie
                                if ("EMPID".equals(c.getName()))
                                    out.println(c.getName() + " = " + c.getValue());
                        }
        }
}
```

Output:



11. Write a JAVA Program to insert data into Student DATA BASE and retrieve info based on particular queries(For example update, delete, search etc…).

```
import java.sql.*;
import java.io.*;

public class connect
{
   public static void main(String args[])
   {

      try
       {
          Class.forName("oracle.jdbc.driver.OracleDriver");

          Connection con = DriverManager.getConnection(
           "jdbc:oracle:thin:@localhost:1521:xe", "system", "tiger");

          if (con != null)
             System.out.println("Connected");
          else
             System.out.println("Not Connected");

          BufferedReader br= new BufferedReader(new InputStreamReader(System.in));
          Statement stmt = con.createStatement();
          int x;
          System.out.println("Enter your choice:\n 1.Insert\n 2.Update\n 3.Delete\n 4.Display\n
                              5.Exit");
          while(true)
          {
              System.out.println("Enter your choice");
              int ch=Integer.parseInt(br.readLine());
              System.out.println("Enter your query");
              String q=br.readLine();
              switch(ch)
              {
                      case 1: x=stmt.executeUpdate(q);
                              if(x>0)
                                      System.out.println("Insert query Successful");
                              else
                                      System.out.println("Error Inserting data\n");
```

```
                    break;
                case 2: x=stmt.executeUpdate(q);
                    if(x>0)
                        System.out.println("Update query Successful");
                    else
                        System.out.println("Error updating data\n");
                    break;
                case 3: x=stmt.executeUpdate(q);
                    if(x>0)
                        System.out.println("Delete query Successful");
                    else
                        System.out.println("Error deleting data\n");
                    break;
                case 4: ResultSet rs= stmt.executeQuery(q);
                    while(rs.next())
                    {
                        System.out.println("USN : "+rs.getString(1));
                        System.out.println("Name : "+rs.getString(2));
                        System.out.println("Semester : "+rs.getInt(3));
                        System.out.println("Branch : "+rs.getString(4));
                    }
                    break;
                case 5: con.close(); System.exit(0);
                default: System.out.println("Invalid choice");


                }
            }

        }
        catch(Exception e)
        {
           System.out.println(e);
        }
    }
}
```

Output:

```
Connected
Enter your choice:
1.Insert
2.Update
3.Delete
4.Display
5.Exit
Enter your choice
1
Enter your query
insert into student values('4AI20IS002','AAA',5,'ISE')
Insert query Successful
Enter your choice
1
Enter your query
insert into student values('4AI20IS002','ABB',4,'ISE')
Insert query Successful
Enter your choice
1
Enter your query
insert into student values('4AI20IS003','ABC',4,'ISE')
Insert query Successful
Enter your choice
4
Enter your query
select * from student
USN : 4AI20IS001
Name : AAA
Semester : 5
Branch : ISE
USN : 4AI20IS002
Name : ABB
Semester : 4
Branch : ISE
USN : 4AI20IS003
Name : ABC
Semester : 4
Branch : ISE
Enter your choice
2
Enter your query
update student set semester=5 where usn='4AI20IS002'
```

```
Update query Successful
Enter your choice
3
Enter your query
delete from student where usn='4AI20IS001'
Delete query Successful
Enter your choice
4
Enter your query
select * from student
USN : 4AI20IS002
Name : ABB
Semester : 5
Branch : ISE
USN : 4AI20IS003
Name : ABC
Semester : 4
Branch : ISE
Enter your choice
5
Enter your query
5
```

12. A program to design the Login page and validating the USER_ID and PASSWORD using JSP and DataBase.

index.jsp file

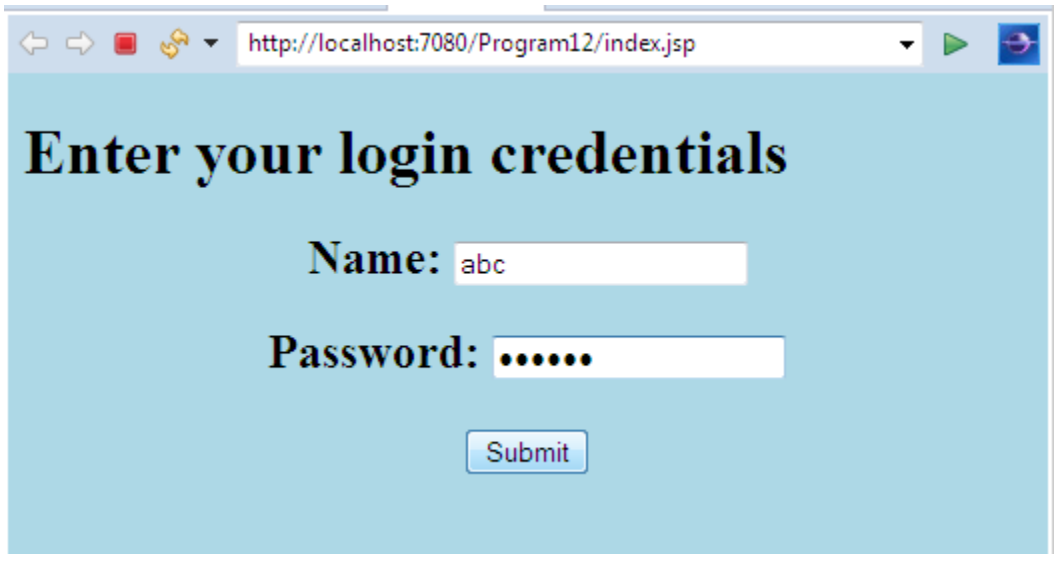
```
<html>
	<head>
		<title>Login</title>
	</head>
	<body style="background-color:lightblue;">
		<h1>Enter your login credentials </h1>
		<form action="login.jsp" method="post">

			<h2 align="center"> Name: <input type="text" name="uname">
			</h2>
			<h2 align="center"> Password: <input type="password"
								name="pswd"> </h2>
			<h2 align="center"> <input type="submit" value="Submit"></h2>

		</form>
	</body>
</html>
```

login.jsp File

```
<%@ page import="java.sql.*" %>
<%@ page import="java.io.*" %>
<%
    String username = (request.getParameter("uname")).toLowerCase();
    String password = (request.getParameter("pswd")).toLowerCase();
    try
    {
        Class.forName("oracle.jdbc.driver.OracleDriver");

        Connection con = DriverManager.getConnection(
                "jdbc:oracle:thin:@localhost:1521:xe", "system", "tiger");

        if (con == null)
            out.println("Error Connecting to database");

        Statement stmt = con.createStatement();
```

```
            String q="select * from loginCred where username="+"'"+username+"'";
            ResultSet rs= stmt.executeQuery(q);
            if(rs.next())
            {
                  out.println("<body style=\"background-color:lightgreen;\">");
                  if(rs.getString(2).equals(password))
                        out.println("<h1 align=\"center\"> You are logged in!! </h1>");
                  else
                        out.println("<h1 align=\"center\"> Try Again!! Wrong
                              Credentials</h1>");
                  out.println("</body>");

            }
      }
      catch(Exception e)
      {
                  System.out.println(e);
      }
%>
```

Output:

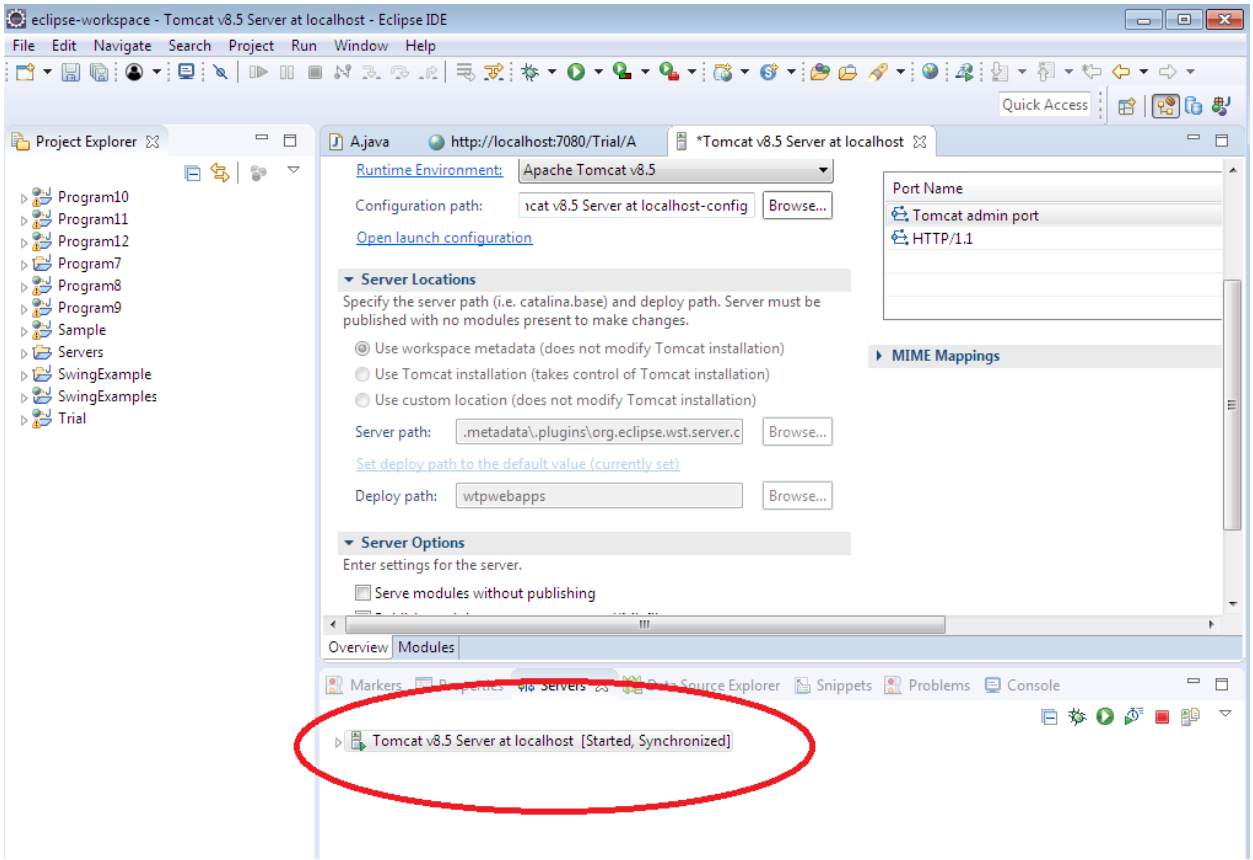



http://localhost:7080/Program12/login.jsp
You are logged in!!

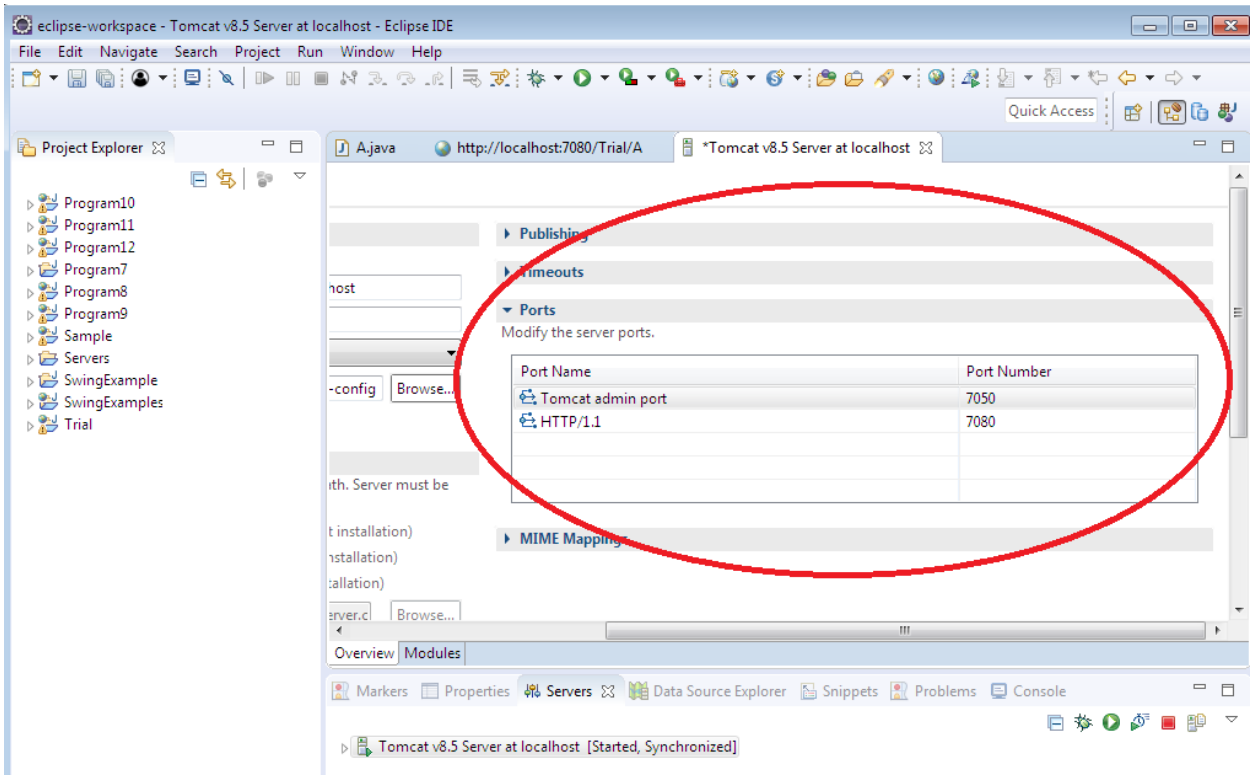

http://localhost:7080/Program12/login.jsp
Try Again!! Wrong Credentials

Instruction:

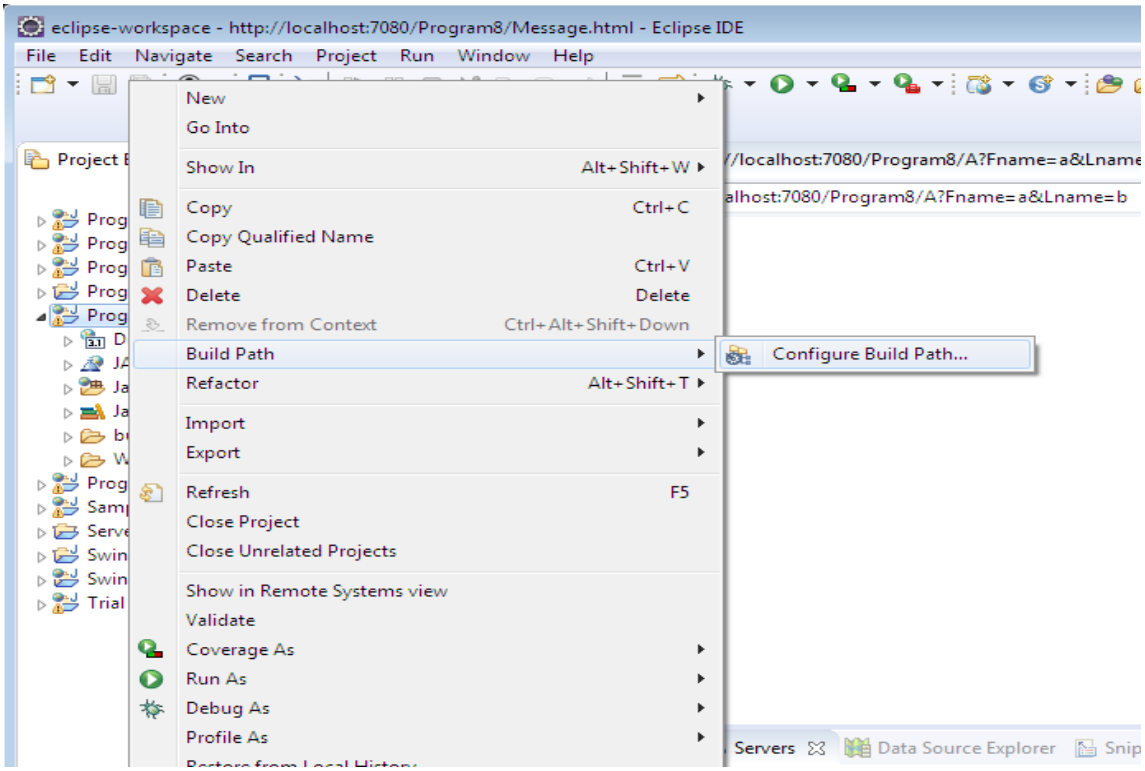
1. Solution to Tomcat server port number problem :
   Double click on the tomcat server on the eclipse, check the below image for where you can find server in eclipse environment.



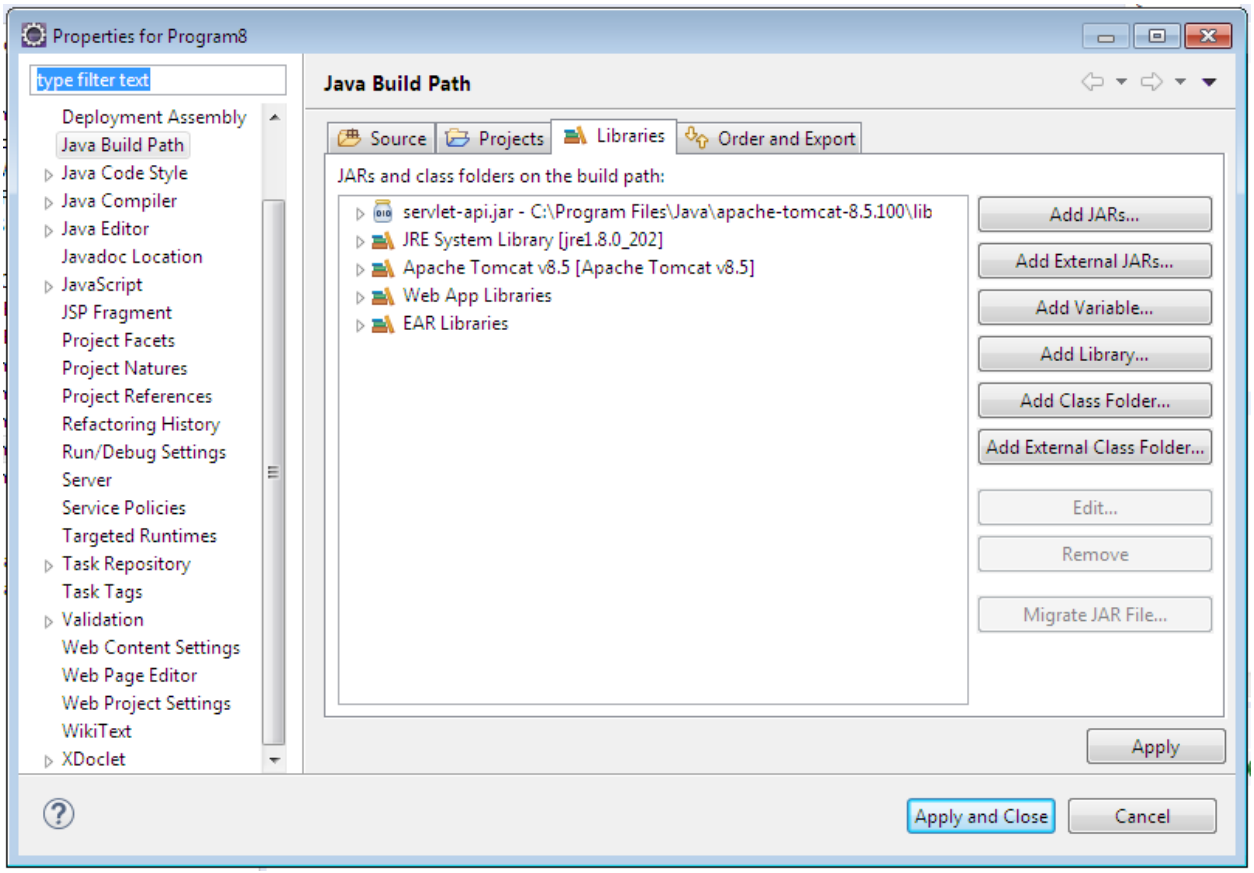
Select ports and change the value by clicking on the existing port number.

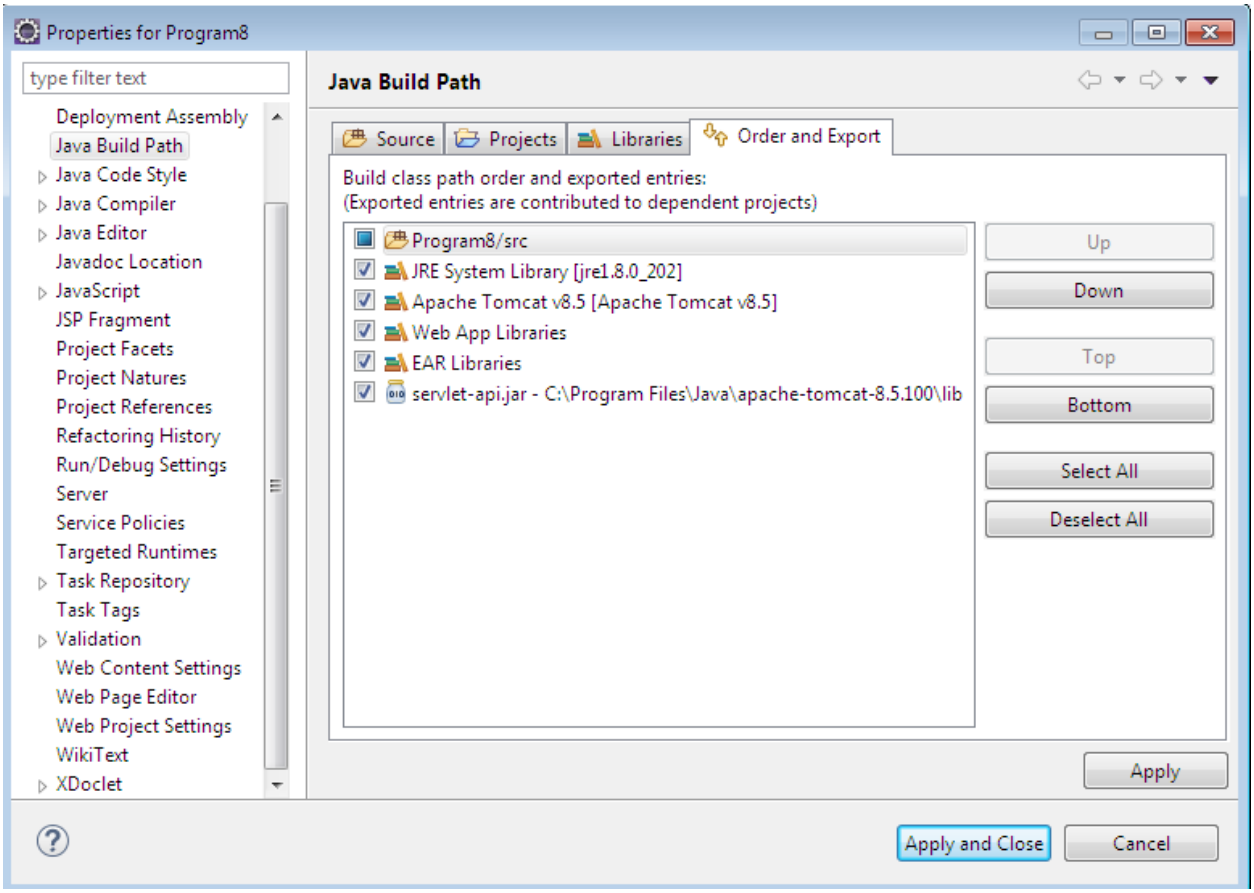


2. Solution to the problem executing servlet program: Double click on project name on the left side of eclipse and select Build path → configure build path shown in below figure



On the properties window that opens select libraries, then select Add External JARs from right side of the window and browse to the lib folder inside Apache tomcat folder and select servlet-api.jar and click on open. As shown in the following figure



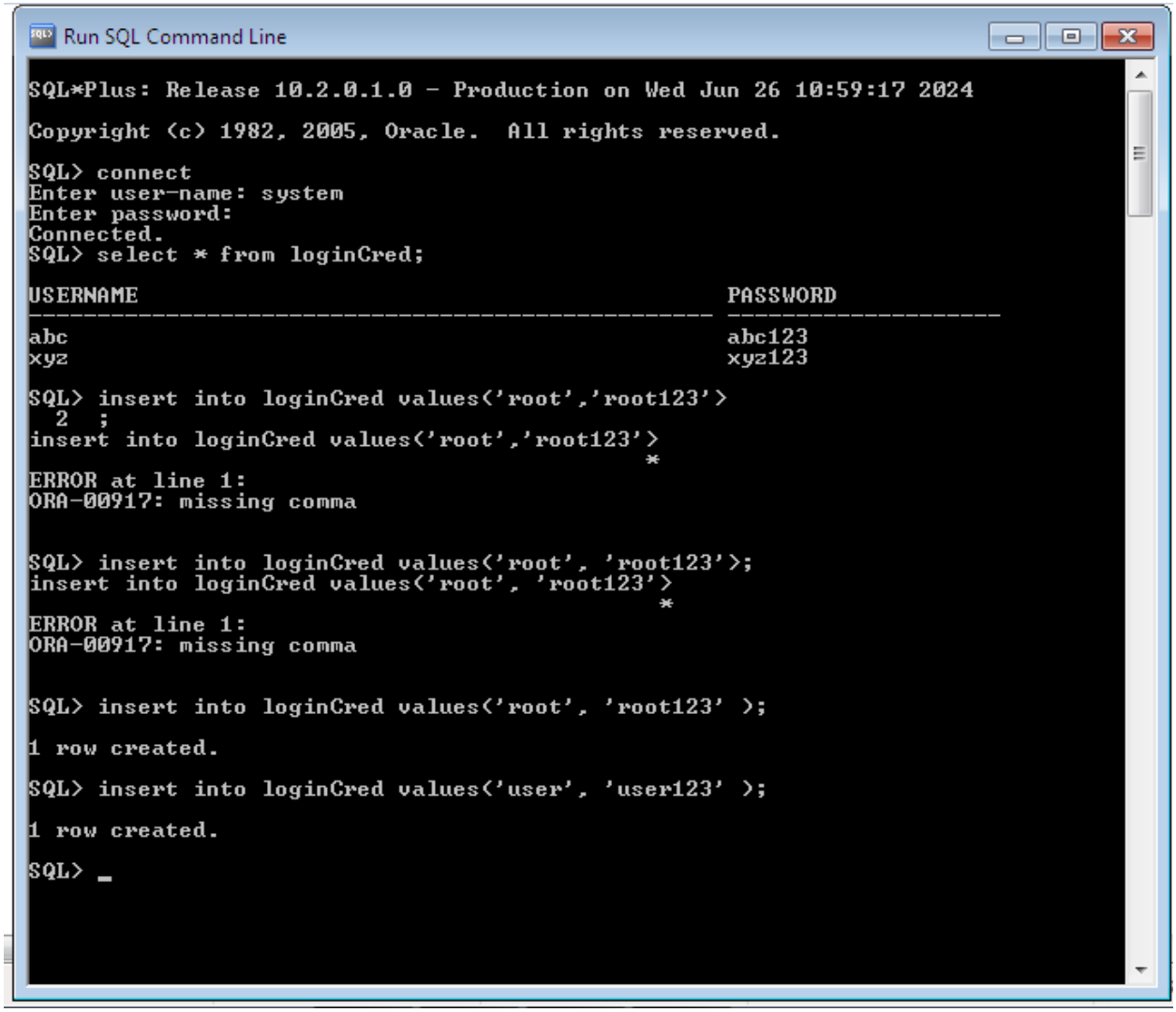


Then click on the Order and Export icon on the same window. Click on Select All from right side of the window and then click on Apply and Apply and Close from right bottom corner. It is shown in the below snapshot.

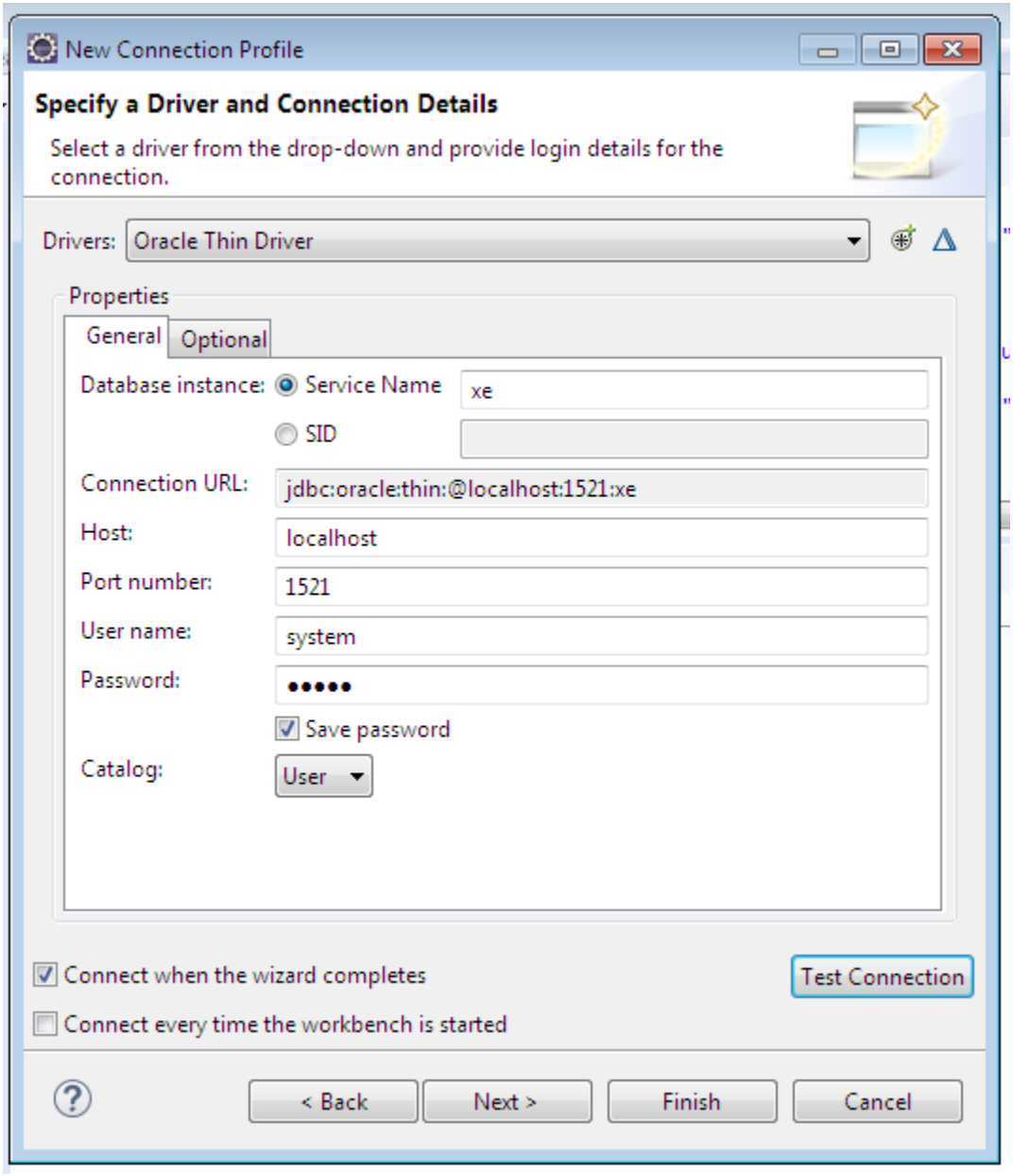
3. To insert values into database table, connect to database by giving username and password, then create the table using create table query. Then insert values as shown in the snapshot.
   Ex:

```
CREATE TABLE student (
    USN varchar(10),
    name varchar(25),
    semester int,
    branch varchar(25)
   );
insert into student values('4AI20IS001', 'aaa', 4, 'ISE' );
```

```
CREATE TABLE loginCred (
    username varchar(25),
    password varchar(25)
   );
insert into loginCred values('root', 'root123');
```



4. Connecting to the oracle database through eclipse


New Connection Profile
Specify a Driver and Connection Details
Select a driver from the drop-down and provide login details for the connection.
Drivers:
Oracle Thin Driver
Properties
General
Optional
Database instance:
Service Name
xe
SID
Connection URL:
jdbc:oracle:thin:@localhost:1521:xe
Host:
localhost
Port number:
1521
User name:
system
Password:
Save password
Catalog:
User
Connect when the wizard completes
Test Connection
Connect every time the workbench is started
< Back
Next >
Finish
Cancel