

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“Jnana Sangama”, Belgaum -590014, Karnataka.



PROJECT WORK REPORT

On

“OOJ LAB REPORT”

Submitted by

Varsha P (1BM22CS320)

Under the Guidance

Of

SNEHA S BAGALKOT

ASSISTANT PROFESSOR

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING



B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)

BENGALURU-560019

B. M. S. College of Engineering, Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



CERTIFICATE

Department of Computer Science & Engineering (CSE)

This is to certify that the project work entitled “**OOJ LAB REPORT**” carried out out by **VarshaP(1BM22CS320)** who are bonafide students of B. M. S. College of Engineering. It is in partial fulfillment for the award of Bachelor of Engineering in Computer Science and Engineering of the Visveswaraiah Technological University, Belgaum during the year 2024. The project report has been approved as it satisfies the academic requirements in respect of **OOJ LAB REPORT** work prescribed for the said degree.

Signature of the Guide

Sneha S Bagalkot
Assistant Professor

BMSCE, Bengaluru

Signature of the HOD

Dr. Jyothy S Nayak Prof
& Head of Dept of CSE

BMSCE, Bengaluru

External Viva

Name of the Examiner

Signature with date

B.M.S. COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



DECLARATION I, **Varsha P(1BM22CS320)** of 3rd Semester, B.E, Department of Computer Science and Engineering, BMS College of Engineering, Bangalore, hereby declare that, this PROJECT entitled "**OOJ LAB REPORT**" has been carried out by me under the guidance of **Sneha S Bagalkot, Assistant Professor**, Department of CSE, BMS College of Engineering, Bangalore during the academic semester Dec 2023 - Mar 2024. We also declare that to the best of our knowledge and belief, the development reported here is not from part of any other report by any other students.

Signature

, **Varsha P(1BM22CS320)**

Program 1:

Develop a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminant b^2-4ac is negative, display a message stating that there are no real solutions.

CODE:

```
import java.util.*;
class QuadEq
{
    public static void main(String args[])
    {
        float a, b, c, d=0.0f, r1=0.0f, r2=0.0f;
        System.out.println("Enter values of a, b, c: ");
        Scanner read= new Scanner(System.in);
        a=read.nextFloat();
        b=read.nextFloat();
        c=read.nextFloat();
        if(a==0 || b==0 || c==0)
        {
            System.out.println("Invalid Input");
        }
        else
        {
            d=b*b-4*a*c;
            if(d>0)
            {
                r1=(float) (-b+Math.sqrt(d)) / (2*a);
                r2=(float) (-b-Math.sqrt(d)) / (2*a);
                System.out.println("Roots are real and distinct\nR1= "+r1+"\tR2= "+r2);
            }
            else if(d<0)
            {
                System.out.println("Roots are imaginary");
            }
            else
            {
                r1=-b / (2*a);
                r2=r1;
                System.out.println("Roots are real and equal\nR1= "+r1+"\tR2= "+r2);
            }
        }
        System.out.println("Name:Varsha P \nUSN: 1BM22CS320");
    }
}
```

Output:

```
Enter values of a, b, c:
```

```
2
```

```
3
```

```
4
```

```
Roots are imaginary
```

```
Name:Varsha P
```

```
USN: 1BM22CS320
```

Program 2:

Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

Code:

```
import java.util.Scanner;

class Subject
{
    int subjectmarks;
    int credits;
    int grade;
}

class Student
{
    Subject sub[];
    String name;
    String usn;
    double sgpa;
    Scanner scan=new Scanner(System.in);
    Student()
    {
        sub = new Subject[8];
        for(int i=0;i<8;i++)
            sub[i] = new Subject();
        scan = new Scanner(System.in);
    }
    public void getStudentDetails()
    {
        System.out.println("Enter name:");
        name=scan.nextLine();
        System.out.println("Enter USN:");
        usn=scan.nextLine();
    }
    public void getMarks()
    {
        for(int i=0;i<8;i++)
        {
            System.out.println("Enter Subject "+(i+1)+" marks:");
            sub[i].subjectmarks=scan.nextInt();
            System.out.println("Enter Subject "+(i+1)+" credits:");
            sub[i].credits=scan.nextInt();
            if(sub[i].subjectmarks==100)
                sub[i].grade=10;
            else if(sub[i].subjectmarks<40)
                sub[i].grade=0;
            else
                sub[i].grade=(sub[i].subjectmarks/10)+1;
        }
    }
}
```

```

    }
}
public void computeSGPA()
{
    int sumc=0;
    double prod=0;
    for(int i=0;i<8;i++)
    {
        sumc=sumc+sub[i].credits;
        prod=prod+(sub[i].grade*sub[i].credits);
    }
    sgpa=prod/sumc;
}
}
class Sgpa
{
    public static void main(String args[])
    {
        Student s1=new Student();
        s1.getStudentDetails();
        s1.getMarks();
        s1.computeSGPA();
        System.out.println("Name:"+s1.name);
        System.out.println("USN:"+s1.usn);
        System.out.println("S.no\tSubject Marks\tCredits\tGrade");
        for(int i=0;i<8;i++)
        {
            System.out.println((i+1)+"\t"+s1.sub[i].subjectmarks+"\t"+s1.sub[i].credits+"\t"+s1.sub[i].grade);
        }
        System.out.println("SGPA="+s1.sgpa);

        System.out.println("-----");
        System.out.println("-----");
        System.out.println("Varsha P- 1BM22CS320");
    }
}

```

Output:

```
Enter name:
varsha
Enter USN:
1bm320
Enter Subject 1 marks:
95
Enter Subject 1 credits:
4
Enter Subject 2 marks:
95
Enter Subject 2 credits:
4
Enter Subject 3 marks:
95
Enter Subject 3 credits:
4
Enter Subject 4 marks:
98
Enter Subject 4 credits:
4
Enter Subject 5 marks:
89
Enter Subject 5 credits:
3
```

```
Enter Subject 6 credits:
1
Enter Subject 7 marks:
90
Enter Subject 7 credits:
1
Enter Subject 8 marks:
87
Enter Subject 8 credits:
3
Name:varsha
USN:1bm320
S.no    Subject Marks    Credits Grade
1   95  4   10
2   95  4   10
3   95  4   10
4   98  4   10
5   89  3   9
6   90  1   10
7   90  1   10
8   87  3   9
SGPA=9.75
-----
Varsha P- 1BM22CS320
```


Program 3:

Create a class **Book** which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a `toString()` method that could display the complete details of the book. Develop a Java program to create n book objects.

CODE:

```
import java.util.Scanner;
class Books
{
    String name;
    String author;
    int price;
    int numPages;
    Books(String name,String author,int price, int numPages)
    {
        this.name=name;
        this.author=author;
        this.price=price;
        this.numPages=numPages;
    }
    public String toString()
    {
        String name,author,price,numPages;
        name="Book Name:"+this.name+"\n";
        author="Author Name:"+this.author+"\n";
        price="Price:"+this.price+"\n";
        numPages="Number of Pages:"+this.numPages+"\n";
        return name+author+price+numPages;
    }
}

class Main
{
    public static void main(String args[])
    {
        Scanner scan=new Scanner(System.in);
        int n,price,numPages;
        String name,author;
        System.out.println("Enter no.of books:\n");
        n=scan.nextInt();
        Books b[]=new Books[n];
        for(int i=0;i<n;i++)
        {
            System.out.println("Enter details of the book"+(i+1)+":");
            System.out.println("Enter name of book:");
            name=scan.next();
            System.out.println("Enter author name:");
```

```

        author=scan.next();
        System.out.println("Enter price of book:");
        price=scan.nextInt();
        System.out.println("Enter no.of pages:");
        numPages=scan.nextInt();
        b[i]=new Books(name,author,price,numPages);
    }
    System.out.println("Book Details:");
    System.out.println("Book Name\tAuthor\tPrice\tNo.of Pages");
    for(int i=0;i<n;i++)
    {
System.out.println(b[i].name+"\t"+b[i].author+"\t"+b[i].price+"\t"+b[i].numPages);
    }
    System.out.println("Varsha p - 1BM22CS320");
}
}

```

Output:

```

Enter no.of books:
1
Enter details of the book1:
Enter name of book:
over
Enter author name:
varsha
Enter price of book:
4000
Enter no.of pages:
300
Book Details:
Book Name  Author  Price  No.of Pages
over      varsha  4000   300
Varsha p - 1BM22CS320

```

Program 4:

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.

Code:

```
import java.util.Scanner;
class InputScanner
{
    Scanner scan;
    InputScanner()
    {
        scan=new Scanner(System.in);
    }
}
abstract class Shape extends InputScanner
{
    double a;
    double b;
    abstract void getInput();
    abstract void printArea();
}
class Rectangle extends Shape
{
    void getInput()
    {
        InputScanner is=new InputScanner();
        System.out.println("Enter value(rec) of a:");
        a=scan.nextDouble();
        System.out.println("Enter value(rec) of b:");
        b=scan.nextDouble();
    }
    void printArea()
    {
        double area=a*b;
        System.out.println("The area of rectangle is:"+area);
    }
}
class Triangle extends Shape
{
    void getInput()
    {
        InputScanner is=new InputScanner();
        System.out.println("Enter value of a(tri):");
        a=scan.nextDouble();
        System.out.println("Enter value of b(tri):");
        b=scan.nextDouble();
    }
}
```

```

    }
    void printArea()
    {
        double area=0.5*a*b;
        System.out.println("The area of triangle is:"+area);
    }
}
class Circle extends Shape
{
    double r;
    void getInput()
    {
        InputScanner is=new InputScanner();
        System.out.println("Enter value of radius:");
        r=scan.nextDouble();
    }
    void printArea()
    {
        double area=3.14*r*r;
        System.out.println("The area of circle is:"+area);
    }
}
class MainShape
{
    public static void main(String args[])
    {
        Rectangle r=new Rectangle();
        Triangle t=new Triangle();
        Circle c=new Circle();
        r.getInput();
        r.printArea();
        t.getInput();
        t.printArea();
        c.getInput();
        c.printArea();
        System.out.println("Varsha P-----1BM22CS320");
    }
}

```

Output:

```
Enter value(rec) of a:  
2.1  
Enter value(rec) of b:  
3.2  
The area of rectangle is:6.720000000000001  
Enter value of a(tri):  
3  
Enter value of b(tri):  
21  
The area of triangle is:31.5  
Enter value of radius:  
3  
The area of circle is:28.259999999999998  
Varsha P-----1BM22CS320
```

Program 5:

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- a) Accept deposit from customer and update the balance.
- b) Display the balance.
- c) Compute and deposit interest
- d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

Code:

```
//Account
import java.util.Scanner;
class Account
{
    String cname;
    long accno;
    String type;
    Account(String cn,long ac,String t)
    {
        cname=cn;
        accno=ac;
        type=t;
    }
}
//Account class

class MainAccount
{
    public static void main(String args[])
    {
        Scanner scan=new Scanner(System.in);
        System.out.println("Enter Name:");
        String s=scan.nextLine();
        System.out.println("Enter Account Number:");
        long ac=scan.nextLong();
        System.out.println("Enter account type:Savings/Current");
```

```

        String t=scan.next();
        System.out.println("Enter account balance:");
        double b=scan.nextDouble();

System.out.println("-----");
        System.out.println("Details:");
        System.out.println("Name:"+s);
        System.out.println("Acc No:"+ac);
        System.out.println("Acc Type:"+t);

System.out.println("-----");
        if(t.equalsIgnoreCase("Savings"))
        {
            SavAcct sv=new SavAcct(s,ac,t,b);
            sv.operations();
        }
        else if(t.equalsIgnoreCase("Current"))
        {
            CurrAct ct=new CurrAct(s,ac,t,b);
            ct.operations();
        }

System.out.println("-----");
        System.out.println("Varsha P- 1BM22CS320");
    }
}
//Savings Account Class

class SavAcct extends Account
{
    double balance;
    SavAcct(String cn,long ac,String t,double b)
    {
        super(cn,ac,t);
        balance=b;
    }
    public void operations()
    {
        Scanner scan=new Scanner(System.in);
        int c;
        do
        {
            System.out.println("Enter choice:");
            System.out.println("1.Deposit");
            System.out.println("2.Withdraw");
            System.out.println("3.Compute and Deposit interest.");
            System.out.println("4.Display Balance");
            System.out.println("5.Exit");
            c=scan.nextInt();
            switch(c)
            {
                case 1:
                    System.out.println("Enter deposit amount:");
                    double deposit=scan.nextDouble();
                    balance+=deposit;

```

```

        break;
    case 2:
        if(balance<100)
        {
            System.out.println("Less than minimum balance. Fine of Rs.5");
            balance-=5;
        }
        else
        {
            System.out.println("Enter withdrawal amount:");
            double amt=scan.nextDouble();
            balance-=amt;
            System.out.println("Withdrawal successful. Current
balance="+balance);
        }
        break;
    case 3:
        double r=6.0/100.0;
        System.out.println("Enter duration of account holding:");
        int t=scan.nextInt();
        double interest=balance*Math.pow((1+r),t)-balance;
        balance+=interest;
        System.out.println("Interest="+interest);
        System.out.println("Balance="+balance);
        break;
    case 4:
        System.out.println("Balance is:"+balance);
        break;
    case 5:
        System.out.println("Thank You.");
        break;
    default:
        System.out.println("Invalid Choice.");
    }
}while(c!=5);
}
//Current Account

class CurrAct extends Account
{
    double balance;
    CurrAct(String cn,long ac,String t,double b)
    {
        super(cn,ac,t);
        balance=b;
    }
    public void operations()
    {
        Scanner scan=new Scanner(System.in);
        int c;
        do
        {
            System.out.println("Enter choice:");
            System.out.println("1.Deposit");

```



```

System.out.println("2.Display Balance");
System.out.println("3.Withdraw");
System.out.println("4.Exit");
c=scan.nextInt();
switch(c)
{
    case 1:
        System.out.println("Enter deposit amount:");
        double deposit=scan.nextDouble();
        balance+=deposit;
        break;
    case 2:
        System.out.println("Balance is:"+balance);
        break;
    case 3:
        if(balance<100)
        {
            System.out.println("Less than minimum balance. Fine of Rs.5");
            balance-=5;
        }
        else
        {
            System.out.println("Enter withdrawal amount:");
            double amt=scan.nextDouble();
            balance-=amt;
            System.out.println("Withdrawal successful. Current
balance="+balance);
        }
        break;
    case 4:
        System.out.println("Thank You.");
        break;
    default:
        System.out.println("Invalid Choice.");
}
}while(c!=4);
}
}

```

Output:

```
Enter Name:
varsha
Enter Account Number:
23456
Enter account type:Savings/Current
savings
Enter account balance:
800
```

Details:

Name:varsha
Acc No:23456
Acc Type:savings

Enter choice:

- 1.Deposit
- 2.Withdraw
- 3.Compute and Deposit interest.
- 4.Display Balance
- 5.Exit

1
Enter deposit amount:
200

Enter deposit amount:

200

Enter choice:

- 1.Deposit
- 2.Withdraw
- 3.Compute and Deposit interest.
- 4.Display Balance
- 5.Exit

4

Balance is:1000.0

Enter choice:

- 1.Deposit
- 2.Withdraw
- 3.Compute and Deposit interest.
- 4.Display Balance
- 5.Exit

5

Thank You.

Varsha P- 1BM22CS320

Program 6:

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

Code:

```
package CIE;
import java.util.*;
public class Student{
    public String name;
    public String usn;
    public int sem;
    public void accept()
    {
        Scanner input=new Scanner(System.in);
        System.out.println("Enter name, usn and semester: ");
        name= input.nextLine();
        usn= input.nextLine();
        sem= input.nextInt();
    }
}

package CIE;
public class Internals
{
    public int int_marks[]=new int[5];
}

package SEE;
import CIE.Student;
public class External extends Student
{
    public int ext_marks[]=new int[5];
}

import java.util.*;
import CIE.*;
import SEE.*;
public class FinalMarks
{
21    public static void main(String args[])
    {
        int final_marks[]=new int[5];
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter no. of students: ");
        int n=sc.nextInt();
```

```

CIE.Internals obj[]=new CIE.Internals[n];
SEE.External obj1[]=new SEE.External[n];
for(int i=0;i<n;i++)
{
    obj[i]=new CIE.Internals();
    obj1[i]=new SEE.External();
    System.out.println("Enter details of student "+(i+1));
    obj1[i].accept();
    for(int j=0;j<5;j++)
    {
        System.out.println("Enter Internal & final marks ofsubject"+(j+1));
        obj[i].int_marks[j]=sc.nextInt();
        obj1[i].ext_marks[j]=sc.nextInt();
        final_marks[j]=obj[i].int_marks[j]+ obj1[i].ext_marks[j];
    }
    System.out.println("Final marks of "+obj1[i].name);
    for(int k=0;k<5;k++)
    {
        System.out.println("Course "+(k+1)+" : "+final_marks[k]);
    }
}
System.out.println("Name: Varsha P--- 1BM22CS320");
}
}

```

Output:

```
Enter no. of students:
1
Enter details of student 1
Enter name, usn and semester:
varsha
1BM22CS320
3
Enter Internal & final marks ofsubject1
45
47
Enter Internal & final marks ofsubject2
47
48
Enter Internal & final marks ofsubject3
43
47
Enter Internal & final marks ofsubject4
39
37
Enter Internal & final marks ofsubject5
45
40
Final marks:
Course 1: 92
Course 2: 95
Course 3: 90
Course 4: 76
Course 5: 85
```

Program 7:

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age<0. In Son class, implement a constructor that takes both father and son’s age and throws an exception if son’s age is >=father’s age.

Code:

```
import java.util.*;
class WrongAge extends Exception
{
    String message;
    public WrongAge(String msg)
    {
        this.message=msg;
        System.out.println(msg);
    }
}
class Father
{
    int f_age;
    Father(int f_age) throws WrongAge
    {
        if(f_age<0)
        {
            throw new WrongAge("Age cant be less than 0");
        }
        this.f_age=f_age;
    }
}
class Son extends Father
{
    int s_age;
    Son(int f_age,int s_age) throws WrongAge
    {
        super(f_age);
        if(f_age<=s_age)
        {
            throw new WrongAge("Father can't be younger than son");
        }
        this.s_age=s_age;
    }
}
class AgeTest
{
    public static void main(String args[])
    {
        // Test cases for the program
    }
}
```

```

{
    int f,s;
    Scanner input=new Scanner(System.in);
    System.out.println("Enter age of father and son\n");
    f=input.nextInt();
    s=input.nextInt();
    try{
        Father ob1=new Father(f);
        Son ob2=new Son(f,s);
    }
    catch(WrongAge e)
    {
        System.out.println("Caught");
    }
    System.out.println("Name: Varsha P----1BM22CS320");
}
}

```

Output:

```

60
61
Father can't be younger than son
Caught
Name: Varsha P----1BM22CS320

```

Program 8:

Write a program which creates two threads, one thread displaying “BMS College of Engineering” once every ten seconds and another displaying “CSE” once every two seconds.

Code:

```
class DisplayThread extends Thread {
    private String message;
    private int interval;

    public DisplayThread(String message, int interval) {
        this.message = message;
        this.interval = interval;
    }

    @Override
    public void run() {
        while (true) {
            System.out.println(message);
            try {
                Thread.sleep(interval * 1000);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}

class ThreadExample {
    public static void main(String[] args) {
        DisplayThread thread1 = new DisplayThread("BMS College of Engineering", 10);
        DisplayThread thread2 = new DisplayThread("CSE", 2);

        thread1.start();
        thread2.start();
    }
}
```

Output:

```
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```


Program 9:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a `NumberFormatException`. If Num2 were Zero, the program would throw an `ArithmeticException`. Display the exception in a message dialog box.

Code:

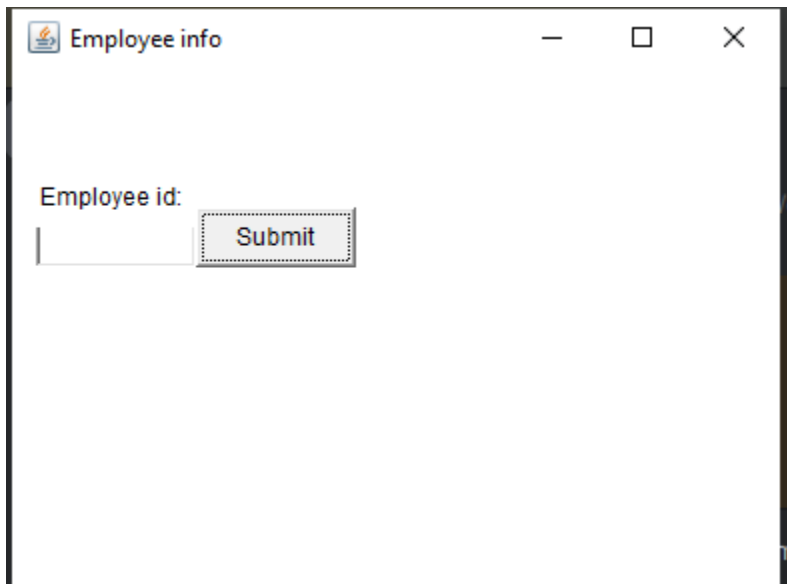
```
import java.awt.*;
import java.awt.event.*;
class AWTEExample extends WindowAdapter {
    Frame f;

    AWTEExample() {
        f = new Frame();
        f.addWindowListener(this);
        Label l = new Label("Employee id:");
        Button b = new Button("Submit");
        TextField t = new TextField();
        l.setBounds(20, 80, 80, 30);
        t.setBounds(20, 100, 80, 30);
        b.setBounds(100, 100, 80, 30);
        f.add(b);
        f.add(l);
        f.add(t);
        f.setSize(400, 300);
        f.setTitle("Employee info");
        f.setLayout(null);
        f.setVisible(true);
    }

    public void windowClosing(WindowEvent e) {
        System.exit(0);
    }

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

Output:



The screenshot shows a web browser window with the title "Employee info". Inside the window, there is a form with the label "Employee id:" followed by a text input field. To the right of the input field is a button labeled "Submit". The window has standard minimize, maximize, and close buttons in the top right corner.