VASAVI ATTENDANCE MONITORING SYSTEM

A

Report

Submitted in partial fulfilment of the

Requirements for the award of the Degree of

BACHELOR OF ENGINEERING

IN

INFORMATION TECHNOLOGY

By

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2020

BONAFIDE CERTIFICATE

This is to certify that this project entitles "**VASAVI ATTENDANCE MONITORING SYSTEM"** is a bonafide mini project work of Ms**. V AKHILA** bearing the hall ticket number **1602-18-737-063** who carried out the project under my supervision in the year **2020** certified further my best knowledge.

Signature of the examiner

B LEELAVATHY

Associate professor

Department of Information Technology

ABSTRACT:

This project is going to maintain attendance of students of Vasavi College of Engineering. It generates attendance of a student based on their daily presence (class to class). The staff/faculty will enter the attendance status of a student with respect to their subject into the database. They will be provided with login credentials for marking the attendance. Students will also be provided with login credentials with which they can access their attendance. A weekly report will be generated based on attendance. Message will be generated and sent to their respective phone numbers weekly once.

AIM:

To create a **Java GUI based Student Registration form** which takes the values like: student ID, student name, father name, email, phone number, date-of-birth, gender, course, branch, year, sem, password(for website access) from the user. These values are to be updated in the database using **JDBC connectivity .**

INTRODUCTION:

List of tables:

1.Teachers

2.Students

3.Attendance

4.Gives

5.Teaches

List of attributes with their domain types:

1. Teachers:

➢ t_id - varchar(10)

➢ t_email - varchar(20)

➢ t_pw - varchar(10)

➢ t_name - varchar(30)

➢ t_phno - number(10)

➢ subject – char(10)

2.Students:

➢ s_id - varchar(10)

➢ s_name - char(30)

➢ s_email - varchar(20)

➢ s_phno – number(10)

➢ s_pw - varchar(10)

➢ father_name - char(30)

➢ sem - number(2)

➢ course - char(5)

➢ dob - varchar(10)

➢ gender - char(5)

➢ year – varchar(2)

➢ branch – char(10)

3.Attendance:

➢ course - char(5)

➢ subject - char(10)

➢ day - date

➢ s_id - varchar(10)

➢ s_name – char(30)

➢ status - char(5)

4.Teaches:

➢ t_id - varchar(10)

➢ s_id - varchar(10)

➢ subject – char(10)

5.Student_Attendance:

➢ t_id - varchar(10)

➢ s_id - varchar(10)

➢ status - char(5)

➢ day – date

ARCHITECTURE AND TECHNOLOGY:

SOFTWARE USED:

Java Eclipse, Oracle 11g Database, Java SE version 7, SQL*Plus.

Java AWT:

Java AWT (Abstract Window Toolkit) is *an API to develop GUI or window-based applications* in java.

Java AWT components are platform-dependent i.e. components are displayed according to the view of operating system. AWT is heavyweight i.e. its components are using the resources of OS.

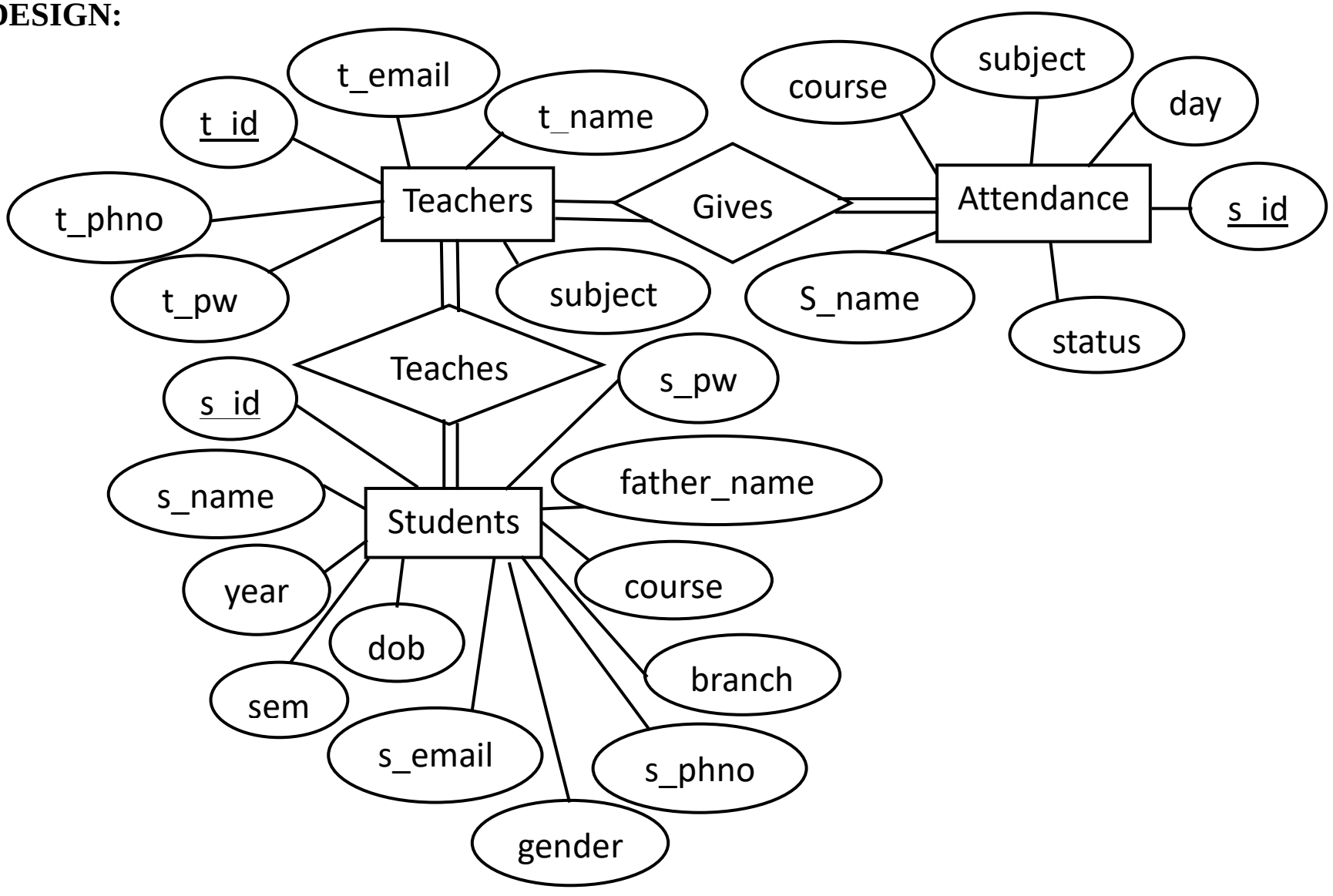
The java.awt package provides classes for AWT API such as TextField, Label, TextArea, RadioButton, CheckBox, Choice, List etc.

SQL:

Structure Query Language(SQL) is a database query language used for storing and managing data in Relational DBMS. SQL was the first commercial language introduced for E.F Codd's **Relational** model of

database. Today almost all RDBMS (MySql, Oracle, Infomix, Sybase, MS Access) use **SQL** as the standard database query language. SQL is used to perform all types of data operations in RDBMS.

DESIGN:



DDL Commands:

Create table **teachers**(t_id varchar(10), t_email varchar(20), t_password varchar(10), t_name varchar(30), t_phno number(10), subject(20));

Create table **attendance**(course char(5), subject char(10), day date, s_id varchar(10), s_name char(30), status char(5));

Create table **students**(s_id varchar(10), s_name char(30), s_email varchar(20), s_phno number(10), s_password varchar(10) unique, father_name char(30), branch char(10), sem number(2), course char(5), dob varchar(10), gender char(5), year varchar(2));

Create table **teaches**(t_id varchar(10), s_id varchar(10), subject char(20));

Create table **student_attendance**(t_id varchar(10), s_id varchar(10), status char(5), day date);

```
SQL> desc students;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 S_ID                                      NOT NULL VARCHAR2(20)
 S_NAME                                             CHAR(20)
 S_FNAME                                            CHAR(20)
 S_EMAIL                                            VARCHAR2(20)
 S_PHNO                                             NUMBER(15)
 COURSE                                             CHAR(10)
 DOB                                                VARCHAR2(10)
 GENDER                                             CHAR(10)
 YEAR                                               NUMBER(5)
 SEM                                                NUMBER(5)
 S_PW                                               VARCHAR2(10)
 BRANCH                                             CHAR(20)

SQL> select * from students;

S_ID                 S_NAME               S_FNAME
-------------------- -------------------- --------------------
S_EMAIL                  S_PHNO COURSE     DOB        GENDER           YEAR
-------------------- ---------- ---------- ---------- ---------- ----------
       SEM S_PW       BRANCH
---------- ---------- --------------------
1602-001             amrutha              varun
amrutha@gmail.com    9876543210 be         2-12-2000  female              2
         2 qqqq       it

1602-002             anjali               pavan
anjali@gmail.com     9876512340 be         24-1-2001  female              2
         2 rrrr       it
```

Java-SQL Connectivity using JDBC:

Java Database Connectivity (**JDBC**) is an application programming interface (API) for the programming language Java, which defines how a client may access a database. It is a Java-based data access technology used for Java database connectivity. It is part of the Java Standard Edition platform, from Oracle Corporation. It provides methods to query and update data in a database and is oriented towards relational databases.

The connection to the database can be performed using Java programming (JDBC API) as:

```
public void connectToDB()
```

```
    {
            try
            {
              connection =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","akhila","vasavi");
              statement = connection.createStatement();


            }
            catch (SQLException connectException)
            {
              System.out.println(connectException.getMessage());
              System.out.println(connectException.getSQLState());
              System.out.println(connectException.getErrorCode());
              System.exit(1);
            }
    }
```

Thus, the connection from Java to Oracle database is performed and therefore, can be used for updating tables in the database directly.

Table Created in SQL for above mentioned purpose is as:

Create table student(s_id varchar(10), s_name char(30), s_email varchar(20), s_phno number(10), s_password varchar(10) unique, father_name char(30), branch char(10), sem number(2), course char(5), dob varchar(10), gender char(5), year varchar(2));

Program:

Insert Students:

```
import java.awt.*;
import java.awt.event.*;
import java.sql.*;
```

```
public class InsertStudents extends Frame
{
	Button insertStudentsButton;
	TextField s_idText, s_nameText, s_fnameText, s_emailText, s_phnoText, courseText, dobText, genderText, yearText, semText, s_pwText, branchText;
	TextArea errorText;
	Connection connection;
	Statement statement;
	public InsertStudents()
	{
		try
		{
			Class.forName("oracle.jdbc.driver.OracleDriver");
		}
		catch (Exception e)
		{
			System.err.println("Unable to find and load driver");
			System.exit(1);
		}
		connectToDB();
	}

	public void connectToDB()
```

```
    {
            try
            {
              connection =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","akhila","vasavi");
              statement = connection.createStatement();


            }
            catch (SQLException connectException)
            {
              System.out.println(connectException.getMessage());
              System.out.println(connectException.getSQLState());
              System.out.println(connectException.getErrorCode());
              System.exit(1);
            }
    }
    public void buildGUI()
    {
            //Handle Insert Account Button
            insertStudentsButton = new Button("Insert Students");
            insertStudentsButton.addActionListener(new ActionListener()
            {
                    public void actionPerformed(ActionEvent e)
```

```
                {
                    try
                    {
                      //String query = "INSERT INTO sailors (SID,SNAME, RATING,
AGE) VALUES (2,'Divya',7,20)";
                      String query= "INSERT INTO students VALUES(" +
s_idText.getText() + ", " + "'" + s_nameText.getText() + "'," + s_fnameText.getText() + "," +
s_emailText.getText() +  s_phnoText.getText() + ", " + "'" + courseText.getText() + "'," +
dobText.getText() + "," + genderText.getText() + "," + yearText.getText() + ", " +
semText.getText() + "'," + s_pwText.getText() + "," + branchText.getText() + ")";
                      int i = statement.executeUpdate(query);
                      errorText.append("\nInserted " + i + " rows successfully");
                    }
                    catch (SQLException insertException)
                    {
                      displaySQLErrors(insertException);
                    }
                }
});


s_idText = new TextField(15);
s_nameText = new TextField(15);
s_fnameText = new TextField(15);
```

```
s_emailText = new TextField(15);
s_phnoText = new TextField(15);
courseText = new TextField(15);
dobText = new TextField(15);
genderText = new TextField(15);
yearText = new TextField(15);
semText = new TextField(15);
s_pwText = new TextField(15);
branchText = new TextField(15);

errorText = new TextArea(10, 40);
errorText.setEditable(false);

Panel first = new Panel();
first.setLayout(new GridLayout(4, 2));
first.add(new Label("Student ID:"));
first.add(s_idText);
first.add(new Label("Name:"));
first.add(s_nameText);
first.add(new Label("Father's Name:"));
```

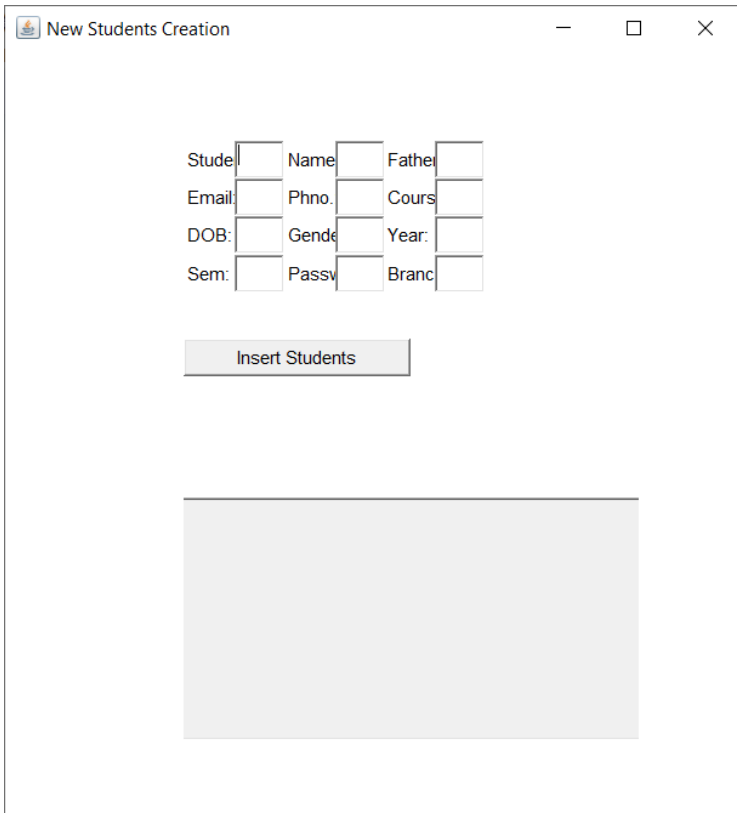
```
first.add(s_fnameText);
first.add(new Label("Email:"));
first.add(s_emailText);
first.add(new Label("Phno.:"));
first.add(s_phnoText);
first.add(new Label("Course:"));
first.add(courseText);
first.add(new Label("DOB:"));
first.add(dobText);
first.add(new Label("Gender:"));
first.add(genderText);
first.add(new Label("Year:"));
first.add(yearText);
first.add(new Label("Sem:"));
first.add(semText);
first.add(new Label("Password:"));
first.add(s_pwText);
first.add(new Label("Branch:"));
first.add(branchText);
first.setBounds(125,90,200,100);

Panel second = new Panel(new GridLayout(4, 1));
```

```
        second.add(insertStudentsButton);
second.setBounds(125,220,150,100);

        Panel third = new Panel();
        third.add(errorText);
        third.setBounds(125,320,300,200);

        setLayout(null);

        add(first);
        add(second);
        add(third);

        setTitle("New Students Creation");
        setSize(500, 600);
        setVisible(true);
}



private void displaySQLErrors(SQLException e)
{
```

```
        errorText.append("\nSQLException: " + e.getMessage() + "\n");
        errorText.append("SQLState:     " + e.getSQLState() + "\n");
        errorText.append("VendorError:  " + e.getErrorCode() + "\n");
}



public static void main(String[] args)
{
        InsertStudents s = new InsertStudents();
                s.addWindowListener(new WindowAdapter(){
                  public void windowClosing(WindowEvent e)
                  {
                        System.exit(0);
                  }
                });

                s.buildGUI();
        }
}
```

OUTPUT SCREENSHOTS:

Java GUI Screenshot:



Program:

Delete Students:

```
import java.awt.*;
import java.awt.event.*;
import java.sql.*;
public class DeleteStudents extends Frame
{
        Button deleteStudentsButton;
        List StudentsIDList;
```

```
TextField S_IDText,
S_NAMEText,
S_FNAMEText,
S_EMAILText,
S_PHNOText,
COURSEText,
DOBText,
GENDERText,
YEARText,
SEMText,
S_PWText,
BRANCHText;
TextArea errorText;
Connection connection;
Statement statement;
ResultSet rs;

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

```
            }
            catch (Exception e)
            {
                System.err.println("Unable to find and load driver");
                System.exit(1);
            }
            connectToDB();
    }

    public void connectToDB()
{
            try
            {
              connection =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","akhila","vasavi");
              statement = connection.createStatement();


            }
            catch (SQLException connectException)
            {
              System.out.println(connectException.getMessage());
              System.out.println(connectException.getSQLState());
              System.out.println(connectException.getErrorCode());
```

```
            System.exit(1);
        }
}

    private void loadStudents()
    {
        try
        {
          rs = statement.executeQuery("SELECT * FROM Students");
          while (rs.next())
          {
              StudentsIDList.add(rs.getString("S_ID"));
          }
        }
        catch (SQLException e)
        {
          displaySQLErrors(e);
        }
}

public void buildGUI()
{
```

```
StudentsIDList = new List(10);
    loadStudents();
    add(StudentsIDList);

    //When a list item is selected populate the text fields
    StudentsIDList.addItemListener(new ItemListener()
    {
            public void itemStateChanged(ItemEvent e)
            {
                    try
                    {
                    rs = statement.executeQuery("SELECT * FROM Students");
                    while (rs.next())
                    {
                            if
(rs.getString("S_ID").equals(StudentsIDList.getSelectedItem()))
                            break;
                    }
                    if (!rs.isAfterLast())
                    {
                            S_IDText.setText(rs.getString("S_ID"));
                            S_NAMEText.setText(rs.getString("S_NAME"));
                            S_FNAMEText.setText(rs.getString("S_FNAME"));
```

```
                S_EMAILText.setText(rs.getString("S_EMAIL"));
                S_PHNOText.setText(rs.getString("S_PHNO"));
                COURSEText.setText(rs.getString("COURSE"));
                DOBText.setText(rs.getString("DOB"));
                GENDERText.setText(rs.getString("GENDER"));
                YEARText.setText(rs.getString("YEAR"));
                SEMText.setText(rs.getString("SEM"));
                S_PWText.setText(rs.getString("S_PW"));
                BRANCHText.setText(rs.getString("BRANCH"));
} }
catch (SQLException selectException)
        {
                displaySQLErrors(selectException);
        }
    }
});


//Handle Delete Sailor Button
deleteStudentsButton = new Button("Delete Students");
deleteStudentsButton.addActionListener(new ActionListener()
{
```

```
                public void actionPerformed(ActionEvent e)
                {
                        try
                        {
                                Statement statement = connection.createStatement();
                                int i = statement.executeUpdate("DELETE FROM Students
WHERE S_ID = "
                                                + StudentsIDList.getSelectedItem());
                                errorText.append("\nDeleted " + i + " rows successfully");

                                S_IDText.setText(null);
                                S_NAMEText.setText(null);
                                S_FNAMEText.setText(null);
                                S_EMAILText.setText(null);
                                S_PHNOText.setText(null);
                                COURSEText.setText(null);
                                DOBText.setText(null);
                                GENDERText.setText(null);
                                YEARText.setText(null);
                                SEMText.setText(null);
                                S_PWText.setText(null);
                                BRANCHText.setText(null);
                                StudentsIDList.removeAll();
```

```
                    loadStudents();
                }
                catch (SQLException insertException)
                {
                    displaySQLErrors(insertException);
                }
            }
        });


        S_IDText = new TextField(15);
        S_NAMEText = new TextField(15);
        S_FNAMEText = new TextField(15);
        S_EMAILText = new TextField(15);
        S_PHNOText = new TextField(15);
        COURSEText  = new TextField(15);
        DOBText    = new TextField(15);
        GENDERText = new TextField(15);
        YEARText = new TextField(15);
        SEMText = new TextField(15);
        S_PWText = new TextField(15);
        BRANCHText = new TextField(15);
```

```
errorText = new TextArea(10, 40);
errorText.setEditable(false);

Panel first = new Panel();
first.setLayout(new GridLayout(4, 2));
first.add(new Label("Student ID:"));
first.add(S_IDText);
first.add(new Label("Name:"));
first.add(S_NAMEText);
first.add(new Label("Father name:"));
first.add(S_FNAMEText);
first.add(new Label("email:"));
first.add(S_EMAILText);
first.add(new Label("phno:"));
first.add(S_PHNOText);
first.add(new Label("course:"));
first.add(COURSEText);
first.add(new Label("dob:"));
first.add(DOBText);
first.add(new Label("gender:"));
first.add(GENDERText);
```

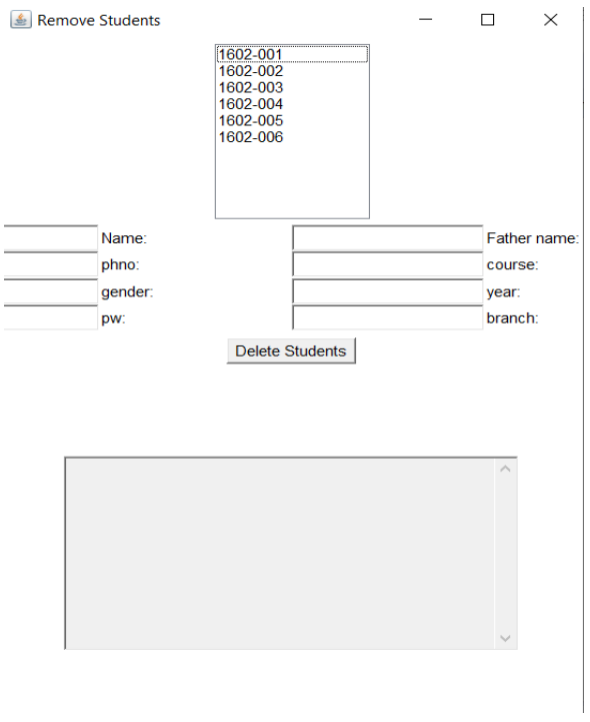
```
first.add(new Label("year:"));
first.add(YEARText);
first.add(new Label("sem:"));
first.add(SEMText);
first.add(new Label("pw:"));
first.add(S_PWText);
first.add(new Label("branch:"));
first.add(BRANCHText);

Panel second = new Panel(new GridLayout(4, 1));
second.add(deleteStudentsButton);

Panel third = new Panel();
third.add(errorText);

add(first);
add(second);
add(third);

setTitle("Remove Students");
setSize(450, 600);
setLayout(new FlowLayout());
```

```
        setVisible(true);

}




private void displaySQLErrors(SQLException e)
{
        errorText.append("\nSQLException: " + e.getMessage() + "\n");
        errorText.append("SQLState:     " + e.getSQLState() + "\n");
        errorText.append("VendorError:  " + e.getErrorCode() + "\n");
}



public static void main(String[] args)
{
        DeleteStudents dels = new DeleteStudents();
        dels.addWindowListener(new WindowAdapter(){
                public void windowClosing(WindowEvent e)
```

```
                {
                        System.exit(0);
                }
               });

                dels.buildGUI();
        }
}
```

OUTPUT SCREENSHOTS:

Java GUI Screenshot:



Program:

Update Students:

```
import java.awt.*;

import java.awt.event.*;
```

```
import java.sql.*;
public class UpdateStudents extends Frame
{
        Button updateStudentsButton;
        List StudentsIDList;
        TextField S_IDText,
        S_NAMEText,
        S_FNAMEText,
        S_EMAILText,
        S_PHNOText,
        COURSEText,
        DOBText,
        GENDERText,
        YEARText,
        SEMText,
        S_PWText,
        BRANCHText;
        TextArea errorText;
        Connection connection;
        Statement statement;
        ResultSet rs;
```

```
public UpdateStudents()
{
        try
        {
                Class.forName("oracle.jdbc.driver.OracleDriver");
        }
        catch (Exception e)
        {
                System.err.println("Unable to find and load driver");
                System.exit(1);
        }
                connectToDB();
        }

        public void connectToDB()
    {
                try
                {
                  connection =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","akhila","vasavi");
                  statement = connection.createStatement();

                }
```

```
            catch (SQLException connectException)
            {
              System.out.println(connectException.getMessage());
              System.out.println(connectException.getSQLState());
              System.out.println(connectException.getErrorCode());
              System.exit(1);
            }
}

    private void loadStudents()
    {
try
{
  rs = statement.executeQuery("SELECT S_ID FROM Students");
  while (rs.next())
  {
        StudentsIDList.add(rs.getString("S_ID"));
  }
}
catch (SQLException e)
{
  displaySQLErrors(e);
```

```
        }
}

public void buildGUI()
{
    StudentsIDList = new List(10);
        loadStudents();
        add(StudentsIDList);

        //When a list item is selected populate the text fields
        StudentsIDList.addItemListener(new ItemListener()
                {
                    public void itemStateChanged(ItemEvent e)
                    {
                        try
                        {
                            rs = statement.executeQuery("SELECT * FROM Students where
S_ID ="+StudentsIDList.getSelectedItem());
                            rs.next();
                            S_IDText.setText(rs.getString("S_ID"));
                            S_NAMEText.setText(rs.getString("S_NAME"));
                            S_FNAMEText.setText(rs.getString("S_FNAME"));
                            S_EMAILText.setText(rs.getString("S_EMAIL"));
```

```
                S_PHNOText.setText(rs.getString("S_PHNO"));
                COURSEText.setText(rs.getString("COURSE"));
                DOBText.setText(rs.getString("DOB"));
                GENDERText.setText(rs.getString("GENDER"));
                YEARText.setText(rs.getString("YEAR"));
                SEMText.setText(rs.getString("SEM"));
                S_PWText.setText(rs.getString("S_PW"));
                BRANCHText.setText(rs.getString("BRANCH"));
        }
        catch (SQLException selectException)
        {
                displaySQLErrors(selectException);
        }
    }
});


//Handle Update Sailor Button
updateStudentsButton = new Button("Update Students");
updateStudentsButton.addActionListener(new ActionListener()
{
    public void actionPerformed(ActionEvent e)
```

```
                {
                        try
                        {
                                Statement statement = connection.createStatement();
                                int i = statement.executeUpdate("UPDATE Students "
                                + "SET S_NAME='" + S_NAMEText.getText() + "', "
                                + "S_FNAME=" + S_FNAMEText.getText() + ", "
                                + "S_EMAIL ="+ S_EMAILText.getText() +" S_PHNO='" +
S_PHNOText.getText() + "', "
                                                + "COURSE=" + COURSEText.getText() + ", "
                                                + "DOB ="+ DOBText.getText() +" GENDER='" +
GENDERText.getText() + "', "
                                                                + "YEAR=" + YEARText.getText() + ", "
                                                                + "SEM ="+ SEMText.getText() + "
S_PW='" + S_PWText.getText() + "', "
                                                                                + "BRANCH=" +
BRANCHText.getText()  + " WHERE S_ID = "
                                        + StudentsIDList.getSelectedItem());
                                        errorText.append("\nUpdated " + i + " rows successfully");
                                        StudentsIDList.removeAll();
                                        loadStudents();
                                }
                                catch (SQLException insertException)
                                {
```

```
                displaySQLErrors(insertException);
            }
        }
});

S_IDText = new TextField(15);
S_IDText.setEditable(false);
S_NAMEText = new TextField(15);
S_FNAMEText = new TextField(15);
S_EMAILText = new TextField(15);
S_PHNOText = new TextField(15);
COURSEText  = new TextField(15);
DOBText    = new TextField(15);
GENDERText = new TextField(15);
YEARText = new TextField(15);
SEMText = new TextField(15);
S_PWText = new TextField(15);
BRANCHText = new TextField(15);

errorText = new TextArea(10, 40);
errorText.setEditable(false);
```

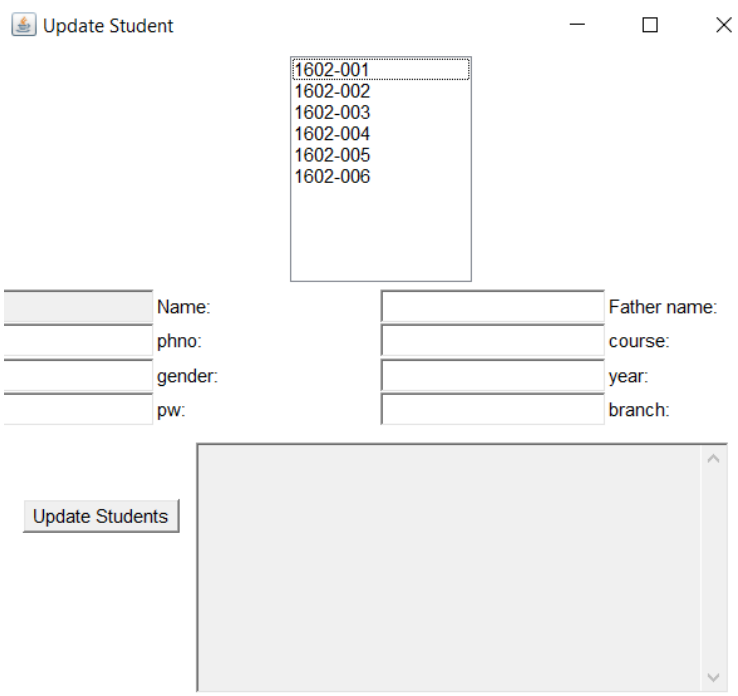
```
Panel first = new Panel();
first.setLayout(new GridLayout(4, 2));
first.add(new Label("Sailor ID:"));
first.add(S_IDText);
first.add(new Label("Name:"));
first.add(S_NAMEText);
first.add(new Label("Father name:"));
first.add(S_FNAMEText);
first.add(new Label("email:"));
first.add(S_EMAILText);
first.add(new Label("phno:"));
first.add(S_PHNOText);
first.add(new Label("course:"));
first.add(COURSEText);
first.add(new Label("dob:"));
first.add(DOBText);
first.add(new Label("gender:"));
first.add(GENDERText);
first.add(new Label("year:"));
first.add(YEARText);
first.add(new Label("sem:"));
first.add(SEMText);
```

```
first.add(new Label("pw:"));
first.add(S_PWText);
first.add(new Label("branch:"));
first.add(BRANCHText);

Panel second = new Panel(new GridLayout(4, 1));
second.add(updateStudentsButton);

Panel third = new Panel();
third.add(errorText);

        add(first);
        add(second);
        add(third);

        setTitle("Update Student");
        setSize(500, 600);
        setLayout(new FlowLayout());
        setVisible(true);

}
```

```
private void displaySQLErrors(SQLException e)
{
        errorText.append("\nSQLException: " + e.getMessage() + "\n");
        errorText.append("SQLState:     " + e.getSQLState() + "\n");
        errorText.append("VendorError:  " + e.getErrorCode() + "\n");
}

public static void main(String[] args)
{
        UpdateStudents ups = new UpdateStudents();

                ups.addWindowListener(new WindowAdapter(){
                  public void windowClosing(WindowEvent e)
                  {
                        System.exit(0);
                  }
                });

                ups.buildGUI();
        }
}
```

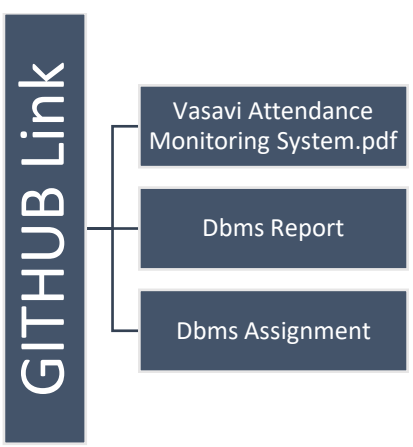
OUTPUT SCREENSHOTS:

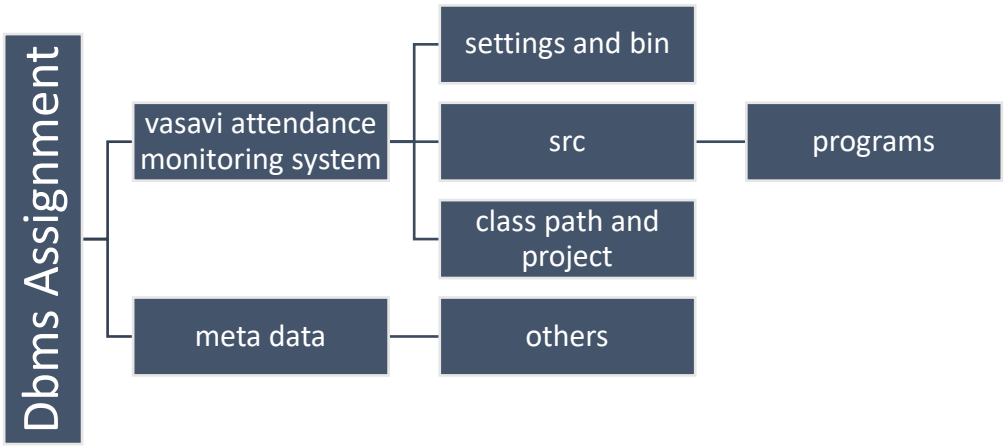
Java GUI Screenshot:



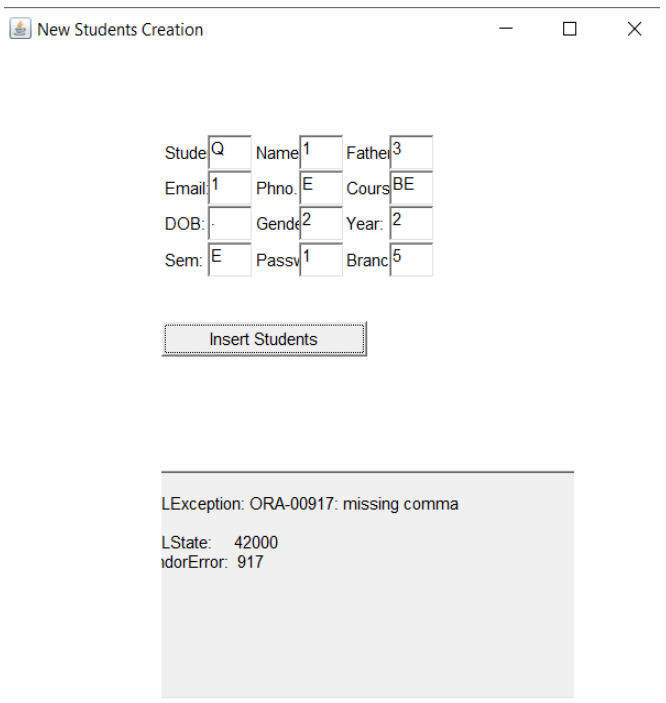
GITHUB LINK:

https://github.com/v-akhila02/akhila





TESTING:



DML Commands:

Insert into **teachers** values('&t_id','&t_email','&t_pw','&t_name',&t_phno,’&subject’);

Insert into **students** values('&s_id', '&s_name', '&s_email', &s_phno, '&s_pw', '&father_name', &sem, '&course', '&dob', '&gender', '&year',’&branch’);

Insert into **attendance** values('&s_id','&s_name','&course','&subject','&day','&status');

Insert into **student_attendance** values ('&s_id','&t_id','&status','&day',’&subject’);

Insert into **teaches** values('&t_id,'&s_id',’&subject’);

DISCUSSION & FUTURE WORK:

The application done till now is to store all the information related to the network connection of our college . Furthermore, other programming languages can also be used along with database by connecting SQL with it. This application can be extended further more to store network connections of other colleges, organizations etc

CONCLUSION:

Thus, a Java AWT based registration form is created which is connected to the Oracle 11g database. Therefore, all the entries in the form are directly updated on the register table created in the database.

REFERENCES:

https://www.oracle.com/technetwork/java/javase/documentation/index.html

https://nptel.ac.in/courses/106105175/

https://google.github.io/styleguide/javaguide.html

https://nptel.ac.in/courses/106105191/