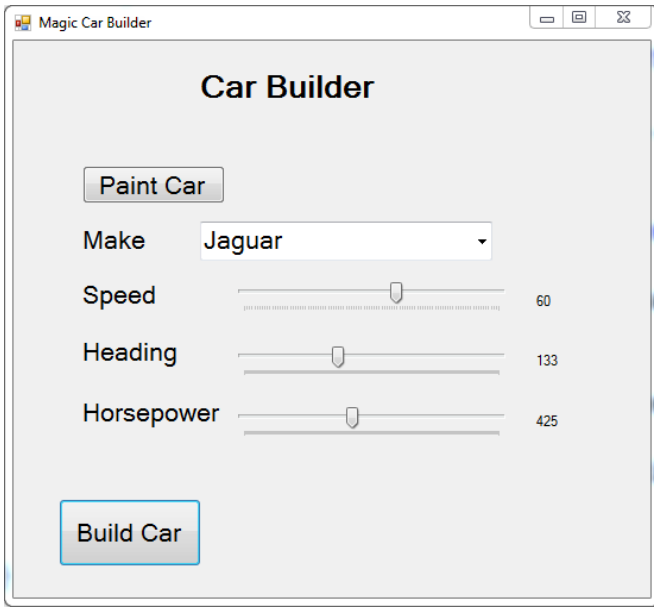
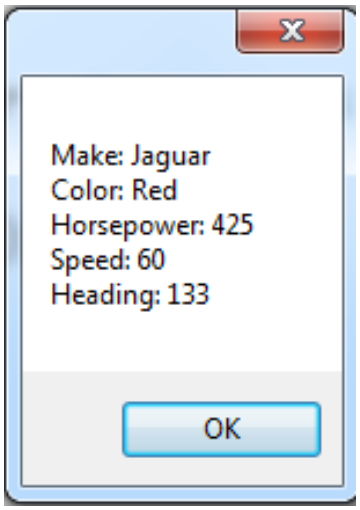
Name: **Session :**
Programming II
Lab Exercise 5/6/2024

In this lab you will create an Automobile class. When you have completed this lab, you are to submit the source code and a screen shot of your running application.

Creating and Automobile Class
In this exercise, you will create an Automobile class. You will use this class later in an Automobile Construction Factory. On your form you will have the ability to choose color, make, initial speed, and direction of travel (use compass angles).

1. Create an empty Windows Forms application





2. Add a class (Automobile) to you project. You will use this to put your class definition that is public.
3. In your class definition, define five private properties:

```
private Color myColor;
private string myMake;
private int mySpeed;
private int myHeading;
private int myHP;
```

4. In your class definition, write a constructor sub to initialize the private properties:

```
public Automobile()
{
   myColor = Color.Black;
   myMake = "";
   mySpeed = 0;
   myHeading = 0;
   myHP = 0;
}

public Automobile(Color color, string make, int s, int h, int hp)
{
   myColor = color;
   myMake = make;
   mySpeed = s;
   myHeading = h;
   myHP = hp;
}
```

5. Now write public get methods for each private member (getColor, getMake, getSpeed, getHeading, getHP).
6. Now write public set methods for each private member (setColor, setMake, setSpeed, setHeading, setHP).
7. Now add the appropriate controls to your form that allow you to select the color, make, speed, heading and HP.
8. Add a button that creates your automobile and add the following code to the btnBuild_Click event handler:

```
//Declare variables
string make, temp;
int speed, heading, hp;
string message = "";

//Get car info
make = cboMake.SelectedItem.ToString();
speed = Convert.ToInt32(trkSpeed.Value);
heading = Convert.ToInt32(trkHeading.Value);
hp = Convert.ToInt32(trkHP.Value);

//Update Automobile object
myCar.setMake(make);
myCar.setSpeed(speed);
myCar.setHeading(heading);
myCar.setHP(hp);
temp = myCar.getColor().ToString();
```

```
            //Create Automobile information object
            message += "Make: " + myCar.getMake() + Environment.NewLine;
            message += "Color: " + temp.Substring(7, temp.Length - 8) +
    Environment.NewLine;
            message += "Horsepower: " + myCar.getHP().ToString() +
    Environment.NewLine;
            message += "Speed: " + myCar.getSpeed().ToString() +
    Environment.NewLine;
            message += "Heading: " + myCar.getHeading().ToString();

            //Display Autombile object information
            MessageBox.Show(message);

            //Reset all values
            trkSpeed.Value = 0;
            trkHeading.Value = 0;
            trkHP.Value = 0;
            cboMake.Text = "";
            temp = "";
```

9. Add a button that will "paint" your car. I used a ColorDialog control to select color. Add the following code to the btnPaint_Click event handerl:

```
            //Set the color of the car using ColorDialog
            colorDialog1.ShowDialog();
            color = colorDialog1.Color;
            myCar.setColor(color);
```

10. Add the following code to the trkSpeed_Scroll event handler:

```
            //Set the speed
            lblSpeed.Text = trkSpeed.Value.ToString();
```

11. Add the following code to the trkHeading_Scroll event handler:

```
            //Set the heading
            lblHeading.Text = trkHeading.Value.ToString();
```

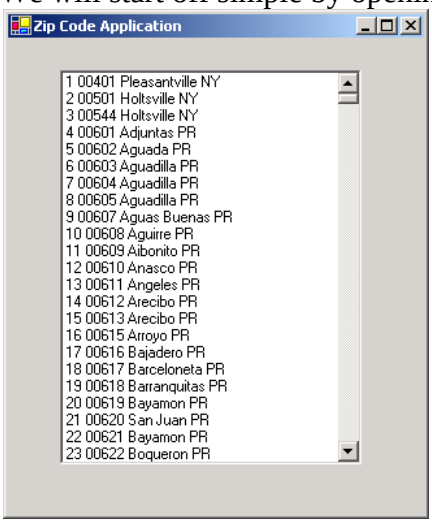
12. Add the following code to the trkHeading_Scroll event handler:

```
            //Set the horsepower
            lblHP.Text = trkHP.Value.ToString();
```

Zip Code Application

In this lab you will build a ZIP code lookup application. On the server in the //Ada/Data Files/ZipCode Database folder you will find an Access database called US-Cities.mdb which contains the Zip codes for all 42,149 cities in the United States as well as a text file called states.txt. **Do not forget to put these files in your project folder for them to be accessed properly.**

We will start off simple by opening the database and loading it into a Listbox.



This will ensure that you are getting the database into your program. To make things simpler, I created a City class to hold the fields of the database. I then created a List class object to store the cities in.

Here is the code for the City class:

```
class City
{
   private string rid;
   private string zipCode;
   private string city;
   private string state;

   public City(string id, string zc, string cty, string st)
   {
      rid = id;
      zipCode = zc;
      city = cty;
      state = st;
   }
}
```

1. Create the following variables in the Form_Load procedure

```
//Create variables
string sql, id, zip, city, state;
```

```
//Create a connection string variable
string sConnection;

//Setup  database connection
OleDbConnection dbConn = new OleDbConnection();
OleDbCommand dbCmd = new OleDbCommand();
OleDbDataReader dbReader;

//Create City object
City s;
```

2. Call the List constructor construct an List object to hold cities

```
List<City> cities = new List<City>();
```

3. Define the database connection string

```
sConnection = "Provider=Microsoft.Jet.OLEDB.4.0;Data Source = US-Cities.mdb";
```

4. Define the SQL string

```
sql = "Select * From CityStateZip Order by State Asc, City Asc;";
```

5. Create and open the database connection

```
dbConn = new OleDbConnection(sConnection);
dbConn.Open();
```

6. Create and open the database command object

```
dbCmd = new OleDbCommand();
dbCmd.CommandText = sql;
dbCmd.Connection = dbConn;
```

7. Start the database reader

```
dbReader = dbCmd.ExecuteReader();
```

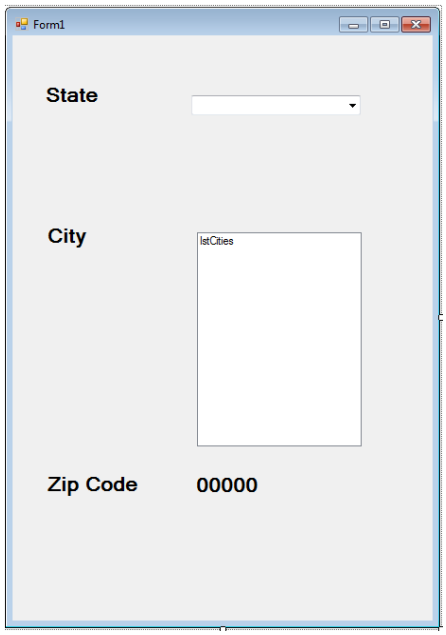
8. Read in the database records, create a city object, add the city object to the List, and add database record to the Listbox.

```
while (dbReader.Read())
{
        //Read the database fields and convert to strings
        id = System.Convert.ToString(dbReader.GetValue(0));
        zip = System.Convert.ToString(dbReader.GetValue(1));
        city = System.Convert.ToString(dbReader.GetValue(2));
        state = System.Convert.ToString(dbReader.GetValue(3));

        //Construct a City object
        s = new City(id, zip, city, state);

        //Add City object to List
        cities.Add(s);

        //Add field variables to ListBox
        lstCities.Items.Add(id + "     " + zip + "     " + city + "     " + state);
 }
```

9. Close the database reader as well as the database connection

```
dbReader.Close();
dbConn.Close();
```

Once you have successfully loaded the database, we will make an improved application to allow us to have a nicer user interface.



In the interface you would select the state and then go through the List and if the state matches, add that city to the Listbox. When you select the item from the Listbox, you would then go through the List to find the city/state match and retrieve the zip code when the match occurs. You will need to modify your code to get this to work.

1. Add three functions to your City class

```
public string getState()
{
   return state;
}

public string getCity()
{
   return city;
}

public string getZIP()
{
   return zipCode;
}
```

2. Create two Lists that are global to Form1

```
List<City> cities = new List<City>();
List<string> zips = new List<string>();
```

3. Modify the Form1_Load function as such:

```
//Create variables
string sql, id, zip, city, state;

//Create a connection string variable
string sConnection;

//Setup  database connection
OleDbConnection dbConn = new OleDbConnection();
OleDbCommand dbCmd = new OleDbCommand();
OleDbDataReader dbReader;

//Create City object variable
City s;

//Create the connection string
sConnection = "Provider=Microsoft.Jet.OLEDB.4.0;Data Source = US-Cities.mdb";
```

```
//Define the SQL query ordering by State then City ascending order
sql = "Select * From CityStateZip Order by State Asc, City Asc;";

//Connect to the database
dbConn = new OleDbConnection(sConnection);
dbConn.Open();

//Create the database command object
dbCmd = new OleDbCommand();

//Assign the SQL command to the database command object
dbCmd.CommandText = sql;

//Connect the SQL command to the database
dbCmd.Connection = dbConn;

//Start reading the database
dbReader = dbCmd.ExecuteReader();

//Start reading database records
while (dbReader.Read())
{
   //Read the database fields and convert to strings
   id = System.Convert.ToString(dbReader.GetValue(0));
   zip = System.Convert.ToString(dbReader.GetValue(1));
   city = System.Convert.ToString(dbReader.GetValue(2));
   state = System.Convert.ToString(dbReader.GetValue(3));

   //Construct a City object
   s = new City(id, zip, city, state);

   //Add City object to ArrayList
   cities.Add(s);

   //Add field variables to ListBox
   lstCities.Items.Add(id + "     " + zip + "     " + city + "     " + state);
}

//Close connection to database
dbReader.Close();
dbConn.Close();
```

```
//Read in the states to the comboBox collection
StreamReader sr = new StreamReader("states.txt");
while (sr.Peek() >= 0)
{
   cboStates.Items.Add(sr.ReadLine());
}
sr.Close();
```

Note: In order to use StreamReader you must add using System.IO;

4. Create a function for the ComboBox cboStates_SelectedIndexChanged event

```
//Create variable to hold name of state
string theState;

//Clear the cities ListBox
lstCities.Items.Clear();

//Get the state from the ComboBox
theState = cboStates.SelectedItem.ToString();

//Extract the state abbreviation
theState = theState.Substring(0, 2);

//Check each city in the cities List
for (int i = 0; i < cities.Count; i++)
{
   //if the city is in the state then add the city to lstCities
   //and add its zipcode to the zips List
   if (cities[i].getState() == theState)
   {
      lstCities.Items.Add(cities[i].getCity());
      zips.Add(cities[i].getZIP());
   }
}
```

5. Create a function for the Listbox lstCities_SelectedIndexChanged event

```
//Add the selected city zipcode to the ZIP code label
lblZip.Text = zips[lstCities.SelectedIndex].ToString();
```

6. Now test your program. When your program is working, create a screenshot of your working program showing the zipcode of some town that has an interesting name and submit it.