

**KAVIYATRI BAHINABAI CHAUDHARI,  
NORTH MAHARASHTRA UNIVERSITY, JALGAON**

**NES's**

**GANGAMAI COLLEGE OF ENGINEERING  
ISO 9001:2008**



**DEPARTMENT OF COMPUTER ENGINEERING**

**Laboratory Manual**

**Class: B.E. Computer**

**Semester: VII**

**Subject: ATL - I**

**Academic Year: 2023-24**



**Nagaon Education Society's  
GANGAMAI COLLEGE OF ENGINEERING,  
NAGAON, DHULE-05  
Computer Department**

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## **Institute Vision**

- Empowering first generation engineers to excel in technical education based on human values

## **Institute Mission**

- To impart affordable and quality education in order to meet needs of industry and to achieve excellence in teaching learning process.
- To achieve excellence in application oriented research in selected area of Technology to contribute to the development of the region.
- To collaborate with industries to promote innovation capabilities of budding engineers.
- To develop responsible citizens to awareness and acceptance of ethical values.
- To build a support system of all stakeholders to develop the institute.



**Nagaon Education Society's  
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NAGAON, DHULE-05  
Computer Department**

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## **DEPARTMENT OF COMPUTER ENGINEERING**

### **Vision**

Enriching computer students through quality & value education, developing globally competent computer engineers.

### **Mission**

- To create globally competent students having ability to design, develop and test the software's in coordination with latest technology.
- To facilitate continuous teaching, learning process and collaborate local province state, national and international education for research.
- To interact industry expertise for academic & research.
- To impart ethical and social values among students.
- To develop skills set of our graduates so that they can be competent with software industry.

# A Laboratory Manual

For

## **Advanced Technology – Lab**

For the Bachelor of Engineering in the Computer Engineering

BE Computer

Semester – VII

2023-2024

Name: .....

Roll No:.....Batch:.....

PRN NO:.....



Nagaon Education Society's  
**GANGAMAI COLLEGE OF ENGINEERING,**  
**NAGAON, DHULE-05**  
**Computer Department**

## CERTIFICATE

This is to certify that

Mr./Mr. \_\_\_\_\_

Having Roll No. \_\_\_\_

Of VII Semester for the course Bachelor of Computer Engineering

Of the institute **Gangamai College of Engineering, Nagaon, Dhule**, has

completed the term work satisfactorily of the subject

**Engineering Advanced Technology- Lab**

for the academic year 2023 – 2024

as prescribed in the curriculum

Date: \_\_\_\_\_

PRN No: \_\_\_\_\_

Place: Nagaon, Dhule

Exam Seat No: \_\_\_\_\_

**Subject Teacher**

**HOD**

**Principal**

**Seal of the Institute**

## **PRACTICAL-COURSE OUTCOMES**

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### **COURSE OUTCOMES(CO<sub>s</sub>)**

1. Break down real world problems / application.
2. Demonstrate Full Stack development.
3. Design Full Stack based applications.
4. Decide tools for Full Stack development.
5. Develop Full Stack based applications.

<b>Expt No.</b>	<b>Name of Experiment</b>	<b>Page No.</b>	<b>Starting Date</b>	<b>Ending Date</b>	<b>Remark</b>
1.	Implementation of PHP Application with MYSQL as back-end .				
2.	Implementation of ASP.NET application with SQL server as back end.				
3.	Study and perform data analytics and data visualization using numpy, pandas, and matplotlib.				
4.	Implementation of web application using R.				

# **DEPARTMENT OF COMPUTER ENGINEERING**

## **Objectives**

To enhance competency by undertaking laboratory assignments using Full Stack.

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Nagaon, Dist- 05.  
Dept of Computer

Name: .....

Year: .....Branch/Course:.....

Roll No:.....Expt No:.....

Experiment:.....

Date of Performance.....Date of Completion.....

### Experiment No. 1

**Aim: Implementation of PHP Application with MYSQL as back-end .**

**1. Objective:** Development and deployment of PHP Application software.

#### **2. Background:**

**PHP** is a general-purpose scripting language especially suited to web development. It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1994. The PHP reference implementation is now produced by The PHP Group. PHP originally stood for *Personal Home Page*, but it now stands for the recursive initialism *PHP: Hypertext Preprocessor*.

PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any type of data, such as generated HTML or binary image data – would form the whole or part of an HTTP response. Various web template systems, web content management systems, and web frameworks exist which can be employed to orchestrate or facilitate the generation of that response. Additionally, PHP can be used for many programming tasks outside of the web context, such as standalone applications and robotic drone control. Arbitrary PHP code can also be interpreted and executed via command-line interface (CLI).

The standard PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on almost every operating system and platform,



free of charge.

The PHP language evolved without a written formal specification or standard until 2014, with the original implementation acting as the *de facto* standard which other implementations aimed to follow. Since 2014, work has gone on to create a formal PHP specification.

### **PHP and MySQL**

PHP and MySQL are like two different sides of the same coin. Just like MySQL has built in functions for data manipulations, so does PHP has built in functions for connecting to MySQL server and manipulating the data in the database. Let's now look at some of PHP functions that allow us to manipulate MySQL databases

#### *MySQL connect*

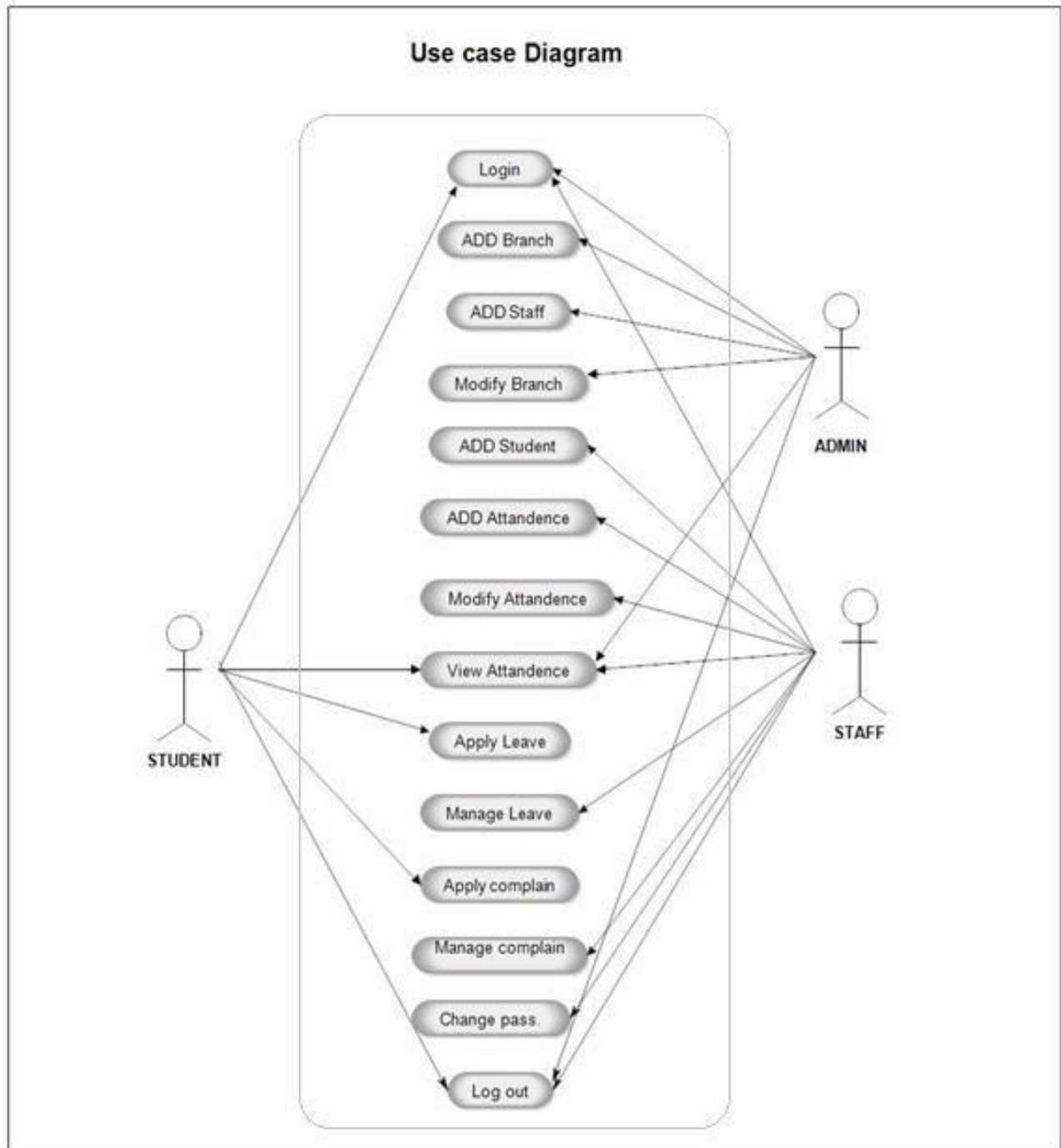
```
$dh = mysql_connect(servername,username,password);
```

#### **HERE**

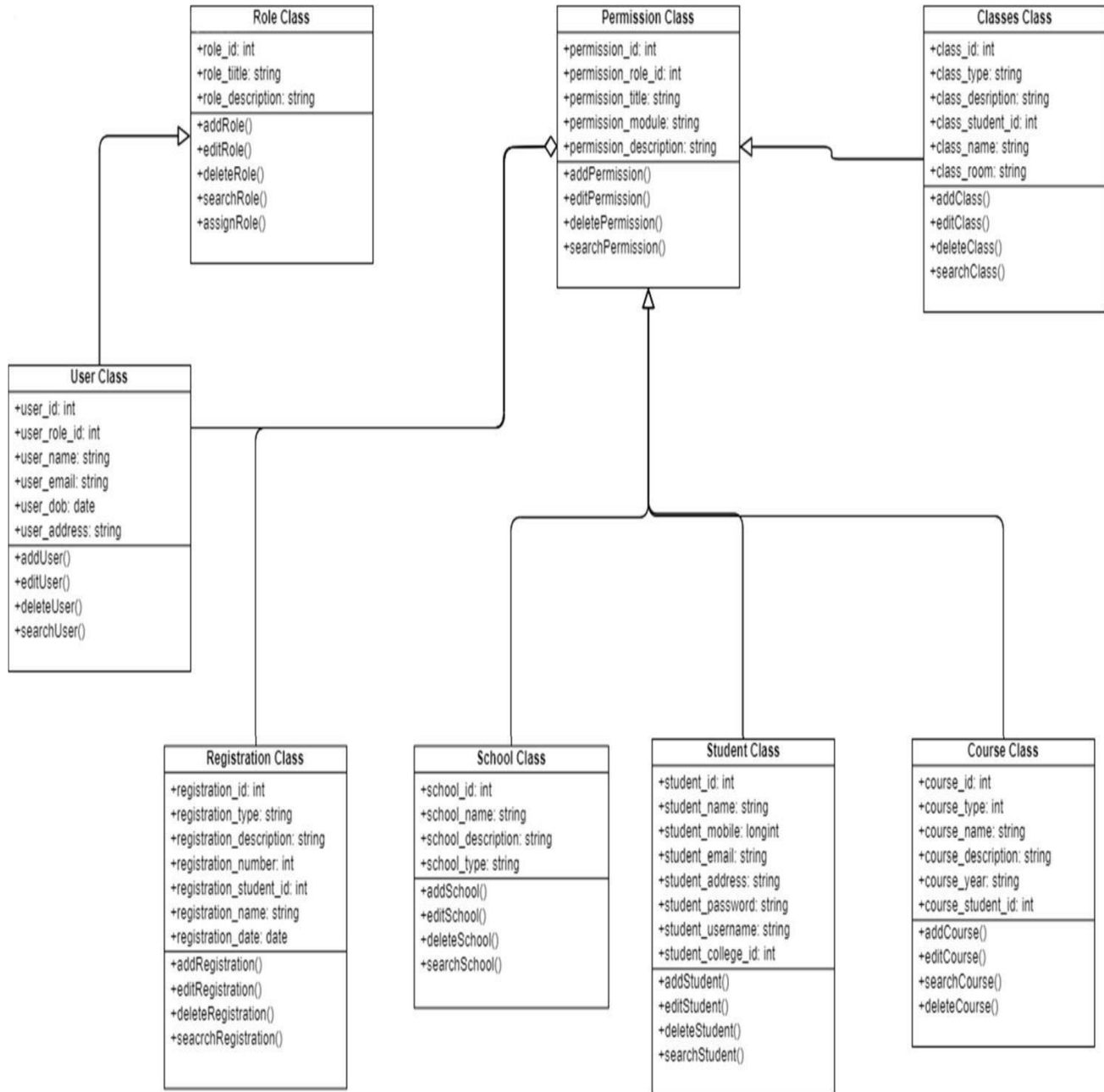
- "mysql\_connect" is the PHP built in function for connecting to MySQL database
- "servername" is the name of the server running MySQL server.
- "username" is the name of the user that we will use to authenticate ourselves when connecting to the server.
- "password" is the password that we will use to authenticate ourselves when connecting to the server.

### 3. Pre-lab Task:

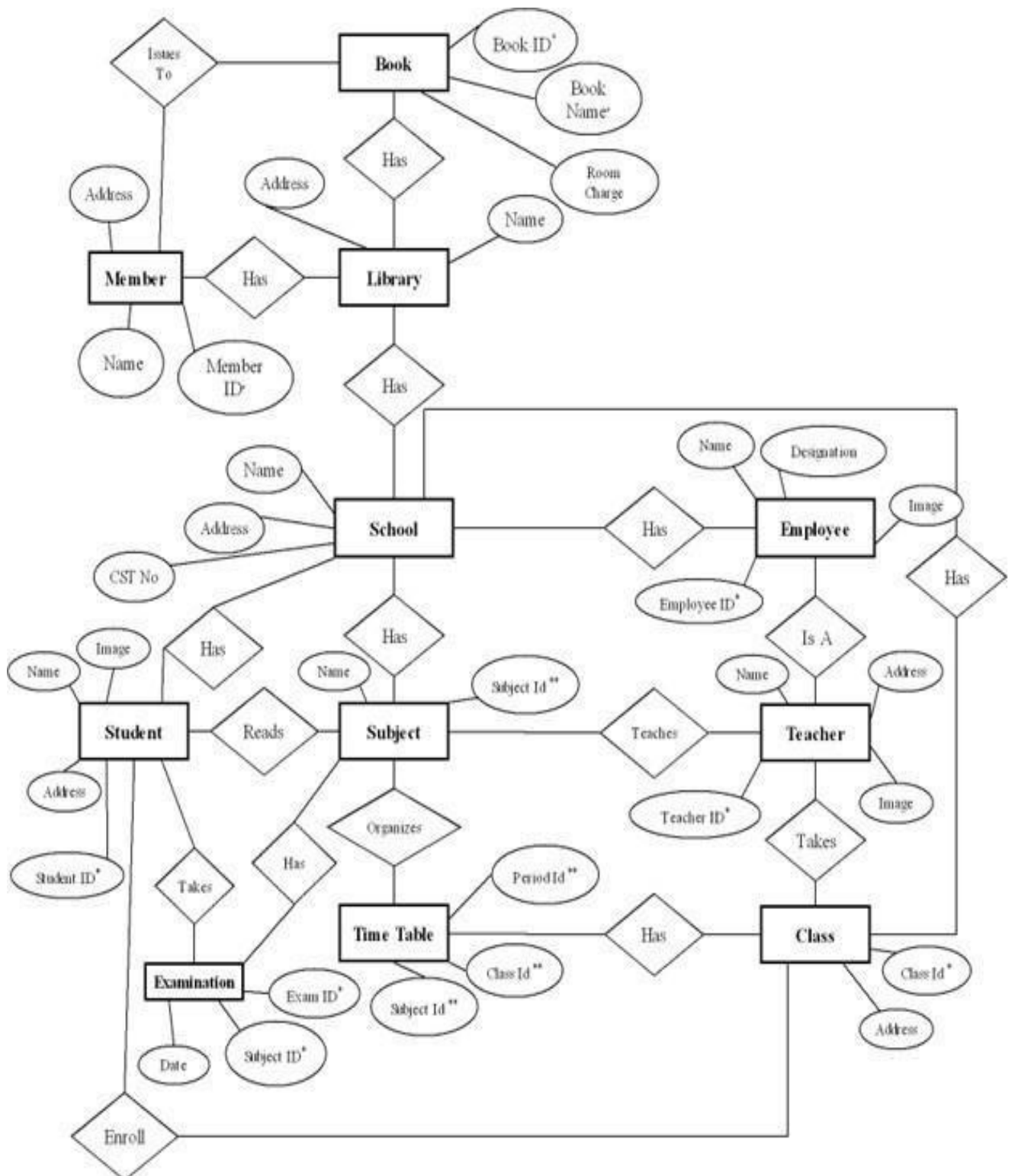
#### 1. Use case diagram for school management system



## 2. Class Diagram for school management system:



### 3.E-R diagram for school management system



#### 4. In-lab Task:

##### Login form

```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body { font-family: Arial, Helvetica, sans-serif;}
form { border: 3px solid #f1f1f1;}

input[type=text], input[type=password] {
  width: 100%;
  padding: 12px 20px;
  margin: 8px 0;
  display: inline-block;
  border: 1px solid #ccc;
  box-sizing: border-box;
}

button {
  background-color: #04AA6D;
  color: white;
  padding: 14px 20px;
  margin: 8px 0;
  border: none;
  cursor: pointer;
  width: 100%;
}

button:hover {
  opacity: 0.8;
}

.cancelbtn {
  width: auto;
  padding: 10px 18px;
  background-color: #f44336;
}

.imgcontainer {
  text-align: center;
```

```

    margin: 24px 0 12px 0;
}

img.avatar {
    width: 100%;
    border-radius: 50%;
}

.container {
    padding: 16px;
}

span.psw {
    float: right;
    padding-top: 16px;
}
/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
    span.psw {
        display: block;
        float: none;
    }
    .cancelbtn {
        width: 100%;
    }
}
</style>
</head>
<body>

<h2>Login Form</h2>

<form action="/action_page.php" method="post">
  <div class="imgcontainer">
    
  </div>

  <div class="container">
    <label for="uname"><b>Username</b></label>
    <input type="text" placeholder="Enter Username" name="uname" required>

    <label for="psw"><b>Password</b></label>
    <input type="password" placeholder="Enter Password" name="psw" required>

```

```

<button type="submit"><a href="thank.html">Login</a></button>
<label>
  <input type="checkbox" checked="checked" name="remember"> Remember me
</label>
</div>


<div class="container" style="background-color:"#f1f1f1">
  <button type="button" class="cancelbtn">Cancel</button>
  <span class="psw">Forgot <a href="#">password?</a></span>
</div>
</form>

</body>
</html>

```

## Output

**Login Form**



**Username**

**Password**

[Login](#)

☒ Remember me

[Cancel](#) [Forgot password?](#)

## Student Information Form

```
<html>
<head>
<script type="text/javascript" src="validate.js"></script>
</head>
<body style="bgcolor:"#00FFFF">
<form action="#" name="StudentRegistration" onsubmit="return(validate());"
style="padding:30px">

<table cellpadding="10" width="50%" bgcolor="#F0F8FF" align="center"
cellspacing="10" style="padding:"50%">

<tr>
<td colspan=6>
<center><font size=4><b>Student Registration Form</b></font></center>
</td>
</tr>

<tr>
<td>Name</td>
<td><input type=text name=textnames id="textname" size="30"></td>
</tr>

<tr>
<td>Father Name</td>
<td><input type="text" name="fathername" id="fathername" size="30"></td>
</tr>

<tr>
<td>Postal Address</td>
<td><input type="text" name="paddress" id="paddress" size="30"></td>
</tr>

<tr>
<td>Personal Address</td>
<td><input type="text" name="personaladdress" id="personaladdress" size="30"></td>
</tr>

<tr>
<td>Sex</td>
<td><input type="radio" name="sex" value="male" size="10">Male
<input type="radio" name="sex" value="Female" size="10">Female</td>
```



</tr>

<tr>

<td>City</td>

<td><select name="City">

<option value="-1" selected>select..</option>

<option value="Chalisgaon">CHALISGAON</option>

<option value="Mumbai">MUMBAI</option>

<option value="Jalgaon">JALGAON</option>

<option value="Nashik">NASHIK</option>

<option value="Shirpur">SHIRPUR</option>

<option value="Dondaicha">DONDAICHA</option>

<option value="Pune">PUNE</option>

<option value="Mumbai">MUMBAI</option>

<option value="Parola">PAROLA</option>

<option value="Patna">PATNA</option>

</select></td>

</tr>

<tr>

<td>Course</td>

<td><select name="Course">

<option value="-1" selected>select..</option>

<option value="B.Tech">B.TECH</option>

<option value="M.TECH">M.TECH</option>

<option value="MBA">MBA</option>

<option value="BCA">BCA</option>

</select></td>

</tr>

<tr>

<td>District</td>

<td><select name="District">

<option value="-1" selected>select..</option>

<option value="Dhule">DHULE</option>

<option value="Jalgaon">JALGAON</option>

<option value="Shindkheda">SHINDKHEDA</option>

<option value="Dondaicha">DONDAICHA</option>

</select></td>

</tr>

```

<tr>
<td>State</td>
<td><select Name="State">
<option value="-1" selected>select..</option>
<option value="Maharashtra"></option>
<option value="Rajasthan">MUMBAI</option>
<option value="Goa">GOA</option>
<option value="Bihar">BIHAR</option>
</select></td>
</tr>
<tr>
<td>Pin Code</td>
<td><input type="text" name="pincode" id="pincode" size="30"></td>

</tr>
<tr>
<td>Email Id</td>
<td><input type="text" name="emailid" id="emailid" size="30"></td>
</tr>

<tr>
<td>DOB</td>
<td><input type="text" name="dob" id="dob" size="30"></td>
</tr>

<tr>
<td>Mobile No</td>
<td><input type="text" name="mobilenno" id="mobilenno" size="30"></td>
</tr>
<tr>
<td><input type="reset"></td>
<td colspan="2"><input type="submit" value="Submit Form" /></td>
</tr>
</table>
</form>
</body>
</html>

```

## Output:

The screenshot shows a web browser window with two tabs: 'prgm1.html' and 'reg.html'. The address bar shows the file path 'C:/Yogeshwari/ATL%20programs/reg.html'. The main content area displays a 'Student Registration Form' with the following fields and controls:

- Name:
- Father Name:
- Postal Address:
- Personal Address:
- Sex: ☐ Male ☐ Female
- City:
- Course:
- District:
- State:
- Pin Code:
- Email Id:
- DOB:
- Mobile No:
- Reset:
- Submit Form:

Below the browser window, a taskbar shows several open applications: 'Usecase-1.png', 'use case.svg', and a 'Show all' button. The system tray on the right indicates the time as 4:42 PM on 11/4/2022.

## Database Schema:

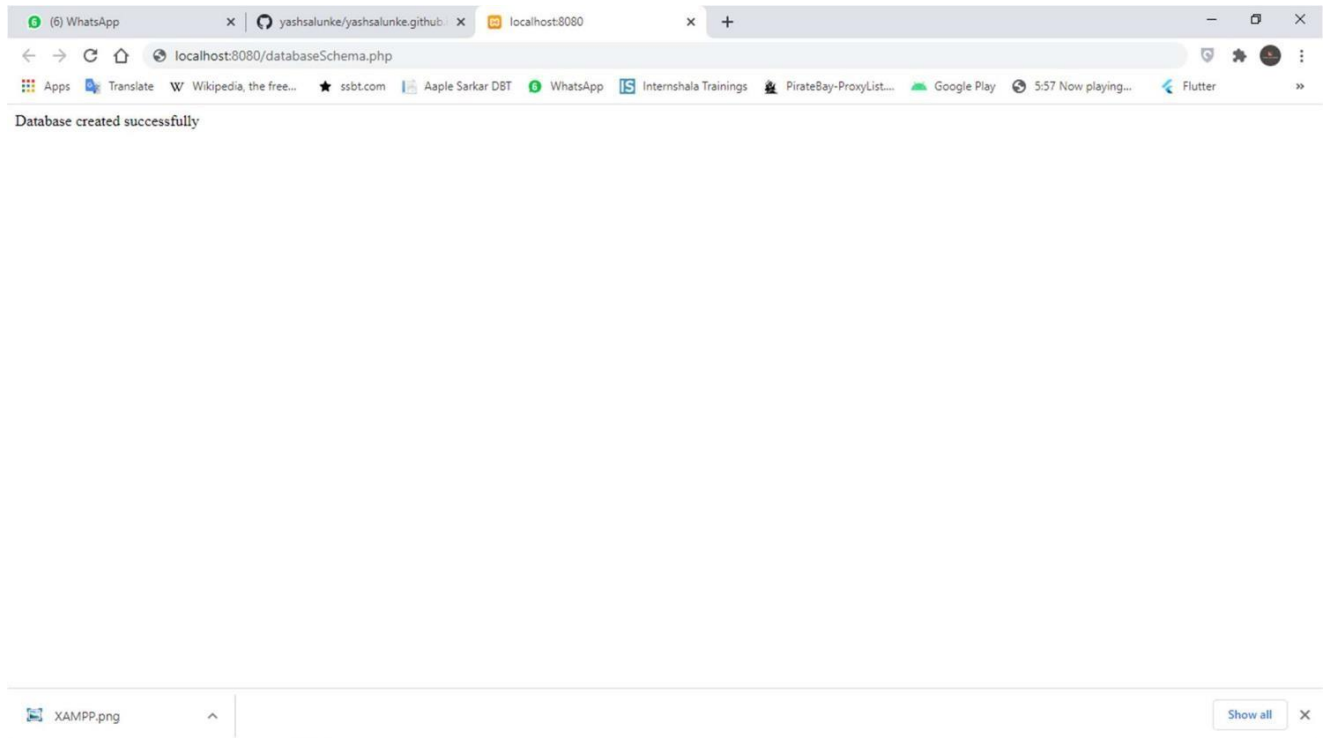
```
<?php
$servername = "localhost";
$username = "username";
$password = "password";

// Create connection
$conn = new mysqli($servername, $username, $password);
// Check connection
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}

// Create database
$sql = "CREATE DATABASE myDB";
if ($conn->query($sql) ===
    TRUE) { echo "Database
    created successfully";
} else {
    echo "Error creating database: " . $conn->error;
}

$conn->close();
?>
```

## Output:



## 5. Post-lab Task:

### Outcomes:

- **PHP** scripts to handle HTML forms.
- Created **PHP** programs that use various **PHP** library functions, and that manipulate database.

### Questions:

1. What is PEAR in PHP
2. What is the difference between static and dynamic websites.
3. What is MYSQL.
4. How to execute a php script from the common line
5. Write the common use of PHP.

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Roll No:.....Expt No:.....

Experiment:.....

Date of Performance.....Date of Completion.....

### Experiment No. 2

**Aim: Implementation of ASP.net Application with Sql Server as back-end .**

**1. Objective:** Development and deployment of ASP.net Application software.

**2. Background:**

**ASP.NET** is an open-source,<sup>[2]</sup> server-side web-application framework designed for web development to produce dynamic web pages. It was developed by Microsoft to allow programmers to build dynamic web sites, applications and services.

It was first released in January 2002 with version 1.0 of the .NET Framework and is the successor to Microsoft's Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language. The ASP.NET SOAP extension framework allows ASP.NET components to process SOAP messages.

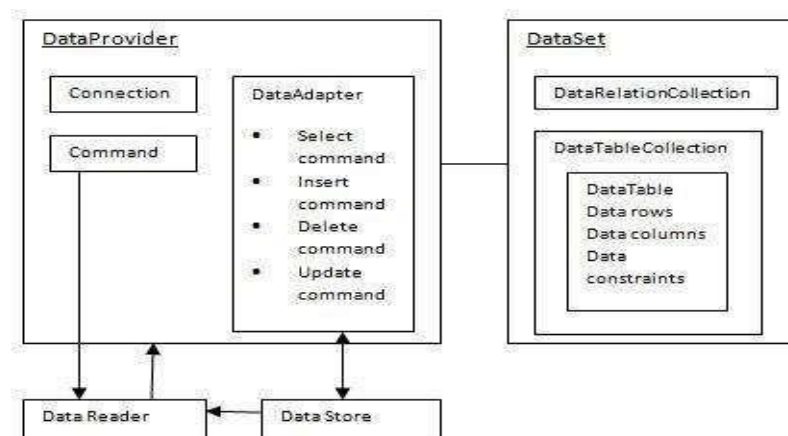
ASP.NET's successor is ASP.NET Core. It is a re-implementation of ASP.NET as a modular web framework, together with other frameworks like Entity Framework. The new framework uses the new open-source .NET Compiler Platform (codename "Roslyn") and is cross platform. ASP.NET MVC, ASP.NET

Web API, and ASP.NET Web Pages (a platform using only Razor pages) have merged into a unified MVC

### ASP.net and SqlServer (ADO.net)

ADO.NET provides a bridge between the front end controls and the back end database. The ADO.NET objects encapsulate all the data access operations and the controls interact with these objects to display data, thus hiding the details of movement of data.

The following figure shows the ADO.NET objects at a glance



**Fig :ADO.NET Objects**

### The DataSet Class

The dataset represents a subset of the database. It does not have a continuous connection to the database. To update the database a reconnection is required. The **DataSet** contains **DataTable** objects and **DataRelation** objects. The **DataRelation** objects represent the relationship between two tables.

Following table shows some important properties of the **DataSet** class:

<b>Properties</b>	<b>Description</b>
CaseSensitive	Indicates whether string comparisons within the data tables are case- sensitive.
Container	Gets the container for the component.
DataSetName	Gets or sets the name of the current data set.
DefaultViewManager	Returns a view of data in the data set.
DesignMode	Indicates whether the component is currently in design mode.
EnforceConstraints	Indicates whether constraint rules are followed when attempting any update operation.
Events	Gets the list of event handlers that are attached to this component.
ExtendedProperties	Gets the collection of customized user information associated with the DataSet.
HasErrors	Indicates if there are any errors.
IsInitialized	Indicates whether the DataSet is initialized.

Locale	Gets or sets the locale information used to compare strings within the table.
Namespace	Gets or sets the namespace of the DataSet.
Prefix	Gets or sets an XML prefix that aliases the namespace of the DataSet.
Relations	Returns the collection of DataRelation objects.
Tables	Returns the collection of DataTable objects.



The following table shows some important methods of the DataSet class:

Methods	Description
AcceptChanges	Accepts all changes made since the DataSet was loaded or this method was called.
BeginInit	Begins the initialization of the DataSet. The initialization occurs at run time.
Clear	Clears data.
Clone	Copies the structure of the DataSet, including all DataTable schemas, relations, and constraints. Does not copy any data.
Copy	Copies both structure and data.
CreateDataReader()	Returns a DataTableReader with one result set per DataTable, in the same sequence as the tables appear in the Tables collection.
CreateDataReader(DataTable[])	Returns a DataTableReader with one result set per DataTable.

EndInit	Ends the initialization of the data set.
Equals(Object)	Determines whether the specified Object is equal to the current Object.
Finalize	Free resources and perform other cleanups.
GetChanges	Returns a copy of the DataSet with all changes made since it was loaded or the AcceptChanges method was called.
GetChanges(DataRowState)	Gets a copy of DataSet with all changes made since it was loaded or the AcceptChanges method was called, filtered by DataRowState.
GetDataSetSchema	Gets a copy of XmlSchemaSet for the DataSet.
GetObjectData	Populates a serialization information object with the data needed to serialize the DataSet.
GetType	Gets the type of the current instance.
GetXML	Returns the XML representation of the data.
GetXMLSchema	Returns the XSD schema for the XML representation of the data.
HasChanges()	Gets a value indicating whether the DataSet has changes, including new, deleted, or modified rows.
HasChanges(DataRowState)	Gets a value indicating whether the DataSet has changes, including new, deleted, or modified rows, filtered by DataRowState.

IsBinarySerialized	Inspects the format of the serialized representation of the DataSet.
Load(IDataReader, LoadOption, DataTable[])	Fills a DataSet with values from a data source using the supplied IDataReader, using an array of DataTable instances to supply the schema and namespace information.
Load(IDataReader, LoadOption, String[])	Fills a DataSet with values from a data source using the supplied IDataReader, using an array of strings to supply the names for the tables within the DataSet.
Merge()	Merges the data with data from another DataSet. This method has different overloaded forms.
ReadXML()	Reads an XML schema and data into the DataSet. This method has different overloaded forms.
ReadXMLSchema()	Reads an XML schema into the DataSet. This method has different overloaded forms.
RejectChanges	Rolls back all changes made since the last call to AcceptChanges.
WriteXML()	Writes an XML schema and data from the DataSet. This method has different overloaded forms.
WriteXMLSchema()	Writes the structure of the DataSet as an XML schema. This method has different overloaded forms.

## The DataTable Class

The DataTable class represents the tables in the database. It has the following important properties; most of these properties are read only properties except the PrimaryKey property:

Properties	Description
ChildRelations	Returns the collection of child relationship.
Columns	Returns the Columns collection.
Constraints	Returns the Constraints collection.
DataSet	Returns the parent DataSet.
DefaultView	Returns a view of the table.
ParentRelations	Returns the ParentRelations collection.
PrimaryKey	Gets or sets an array of columns as the primary key for the table.
Rows	Returns the Rows collection.

The following table shows some important methods of the DataTable class:

Methods	Description
AcceptChanges	Commits all changes since the last AcceptChanges.
Clear	Clears all data from the table.
GetChanges	Returns a copy of the DataTable with all changes made since the AcceptChanges method was called.

GetErrors	Returns an array of rows with errors.
ImportRows	Copies a new row into the table.
LoadDataRow	Finds and updates a specific row, or creates a new one, if not found any.
Merge	Merges the table with another DataTable.
NewRow	Creates a new DataRow.
RejectChanges	Rolls back all changes made since the last call to AcceptChanges.
Reset	Resets the table to its original state.
Select	Returns an array of DataRow objects.

### The DataRow Class

The DataRow object represents a row in a table. It has the following important properties:

Properties	Description
HasErrors	Indicates if there are any errors.
Items	Gets or sets the data stored in a specific column.
ItemArrays	Gets or sets all the values for the row.
Table	Returns the parent table.

The following table shows some important methods of the DataRow class:

Methods	Description
---------	-------------

AcceptChanges	Accepts all changes made since this method was called.
BeginEdit	Begins edit operation.
CancelEdit	Cancels edit operation.
Delete	Deletes the DataRow.
EndEdit	Ends the edit operation.
GetChildRows	Gets the child rows of this row.
GetParentRow	Gets the parent row.
GetParentRows	Gets parent rows of DataRow object.
RejectChanges	Rolls back all changes made since the last call to AcceptChanges.

### **The DataAdapter Object**

The DataAdapter object acts as a mediator between the DataSet object and the database. This helps the Dataset to contain data from multiple databases or other data source.

### **The DataReader Object**

The DataReader object is an alternative to the DataSet and DataAdapter combination. This object provides a connection oriented access to the data records in the database. These objects are suitable for read-only access, such as populating a list and then breaking the connection.

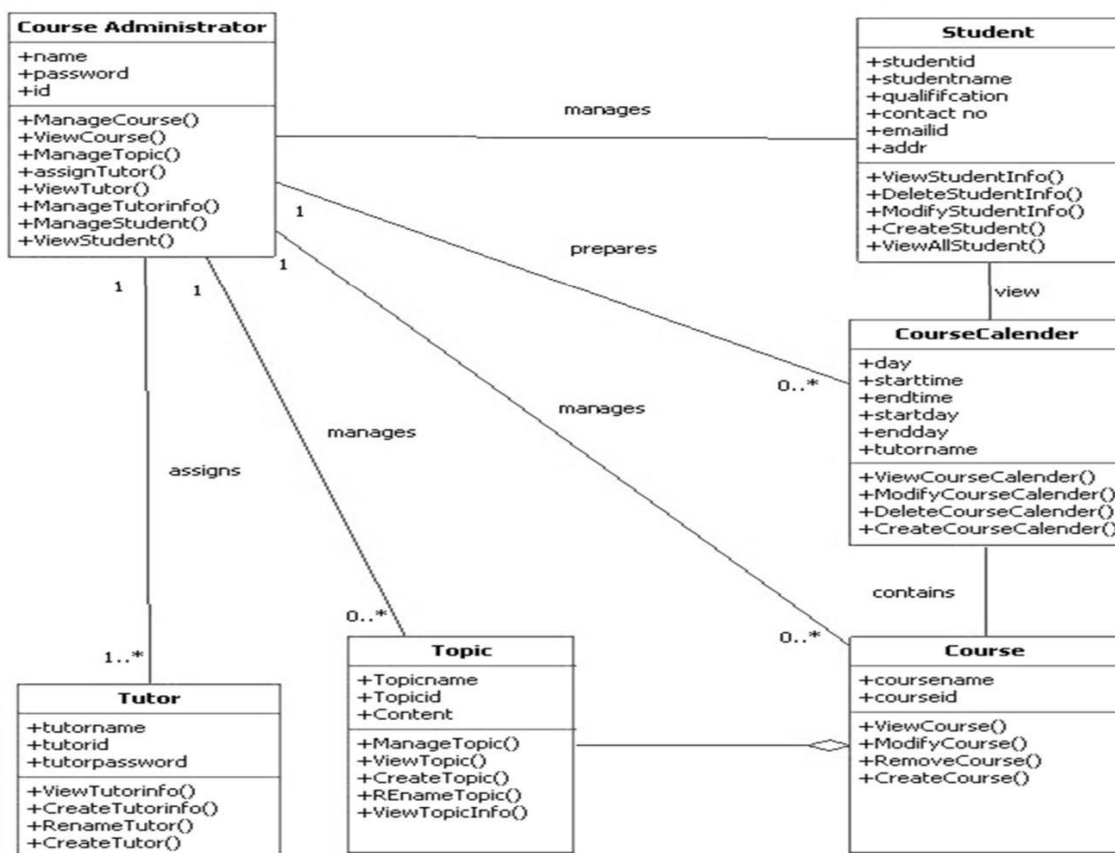
### **DbCommand and DbConnection Objects**

The DbConnection object represents a connection to the data source. The connection could be shared among different command objects.

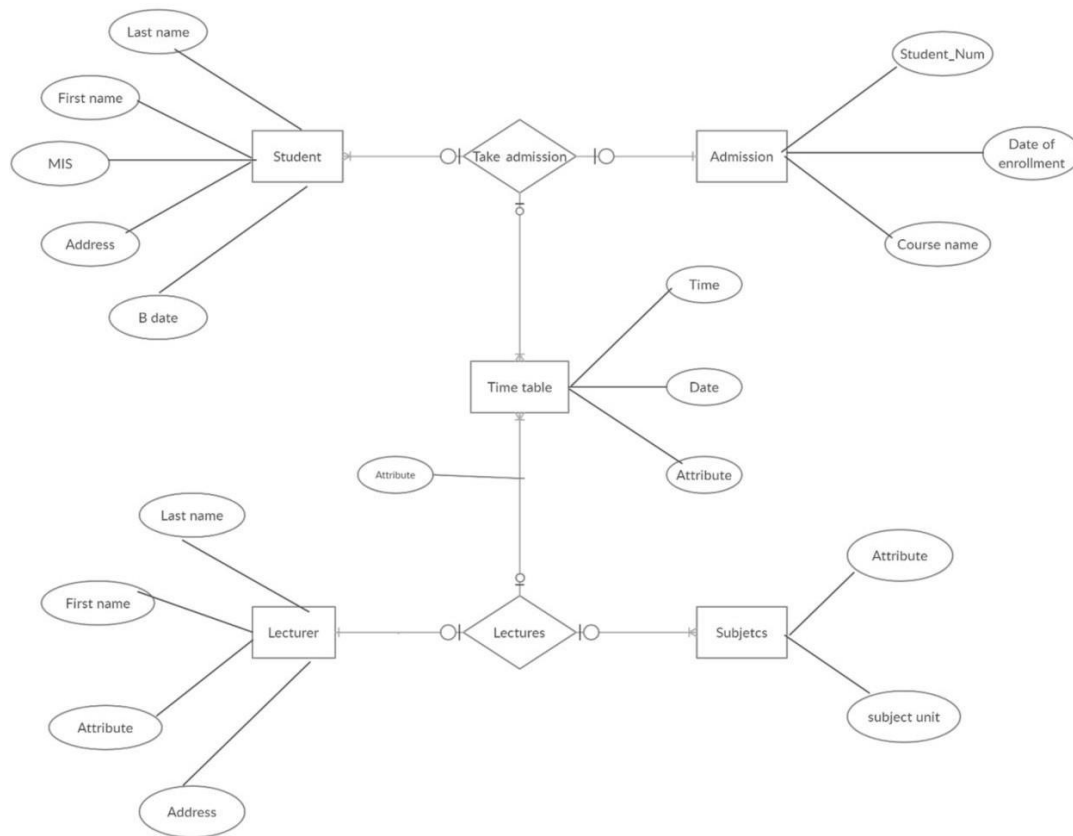
The DbCommand object represents the command or a stored procedure sent to the database from retrieving or manipulating data.

### 3. Pre-lab Task

#### 1 Use case diagram for college management system.



## 1.E-R diagram for College management system





## 2. Post Lab Task

### Login Form

```
<@ Page Title="" Language="C#" MasterPageFile="~/Site.Master"
AutoEventWireup="true" CodeBehind="Login.aspx.cs"
Inherits="WebApplication2.WebForm2"% >
<asp:Content ID="Content1" ContentPlaceHolderID="HeadContent"
runat="server">
    <style type="text/css">
        .style1
        {
            width: 74%;
            border-
collapse:
collapse;
border: 1px
solid
#808000;
margin-left:
0px;
background-
color:
#C0C0C0;
        }
        .style2
        {
            width:
174px;
color:
#800000;
font-family: "Times New
Roman", Times, serif;
font-size: x-large;
```

```

.style3
{
    width: 7px;
    text-align: center;
}
.style4
{
    width: 375px;
}
.style5
{
    width:
    174px;
    color:
    #CC0000
    ; font-
    size:
    small;
}
.style6
{
    width:
    174px;
    color:
    #FF0000;
    height:
    28px;
}
.style7
{
    width: 7px;
    text-
    align:
    center;
    height:
    28px;
}
.style8
{
    .style10

}

```

```

        width: 375px; height: 28px;
width:
174px;
color:
#CC0000
; font-
size:
large;
    text-align: right;
}
.style11
{
    width:
    174px;
    color:
    #FF0000;
    font-family: "Times New
    Roman", Times, serif;
    font-size: x-large;
    text-align: right;
}
</style>
</asp:Content>
<asp:Content ID="Content2" ContentPlaceHolderID="MainContent"
runat="server">
    <table align="center" class="style1">
        <tr>
            <td
                class=
                "style
                5">
                &nbsp;
            </td>
            <td
                class=
                "style
                3">
                &nbsp;
            </td>
            <td class="style4">
                <asp:Label ID="lbl" runat="server"
                    style="color: #FF0000; font-size: x-large; font-
weight: 700" Text="Label"></asp:Label>

```

```

        </td>
    </tr>
    <tr>
        <td class="style10">

            <strong>User Name</strong></td>
        <td class="style3">
            :</td>
        <td class="style4">
            <asp:TextBox ID="txtUserName"
            runat="server"></asp:TextBox>
            <asp:RequiredFieldValidator
            ID="RequiredFieldValidator1" runat="server"
            ErrorMessage="Enter User Name"
            ControlToValidate="txtUserName"></asp:RequiredFieldValidator>
        </td>
    </tr>
    <tr>
        <td class="style11">
            <strong>Password</strong></td>
        <td class="style3">
            :</td>
        <td class="style4">
            <asp:TextBox ID="txtPassword" runat="server"
            TextMode="Password"></asp:TextBox>
            <asp:RequiredFieldValidator
            ID="RequiredFieldValidator2" runat="server"
            ErrorMessage="Enter Passwrđ"
            ControlToValidate="txtUserName"></asp:RequiredFieldValidator>
        </td>
    </tr>
    <tr>
        <td class="style6">
        </td>
        <td class="style7">
        </td>
        <td class="style8">
            <asp:Button ID="btnSubmit" runat="server"
            Text="Submit" onclick="btnSubmit_Click" />
            <asp:ValidationSummary ID="ValidationSummary1"
            runat="server" ShowMessageBox="True" />
        </td>
    </tr>

```

```
</table>
</asp:Content>
```

### Login Form Asp.net Code:

```
using System;
using
System.Collections
.Generic; using
System.Linq;
using
System.Web;
using
System.Web.
UI;
using
System.Web.UI.WebC
ontrols; using
System.Data;
using System.Data.SqlClient;

namespace WebApplication2
{
    public partial class WebForm2 : System.Web.UI.Page
    {
        SqlConnection con = new SqlConnection("Data
Source=.\SQLExpress;Initial Catalog=sinup;User
ID=sa;Password=ssbt");
        protected void Page_Load(object sender, EventArgs e)
        {
            lbl.Visible = false;
        }
        public void show()
        {
            try
            {
```

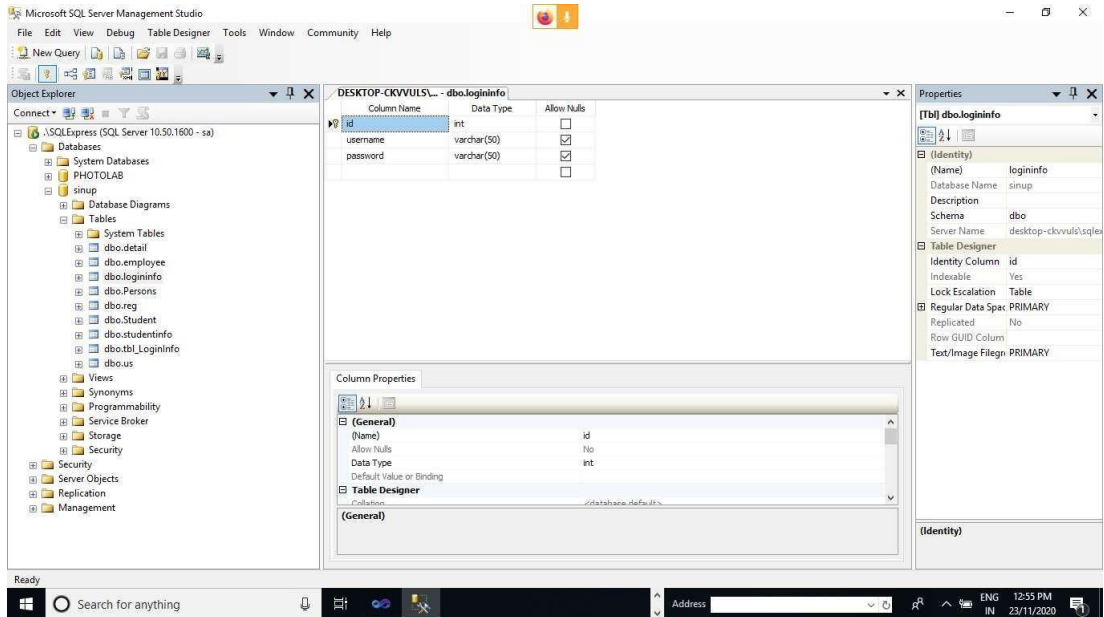
```

        SqlCommand sqlcmd = new SqlCommand("insert into
logininfo values('" + txtUserName.Text + "','"+
txtPassword.Text + "')", con);
        con.Open();
        sqlcmd.ExecuteNonQuery();
        con.Close();
    }
    catch (Exception ex)
    {
        lbl.Text = ex.Message;
    }
    finally
    {
        con.Close();
        con.Dispose();
    }
}

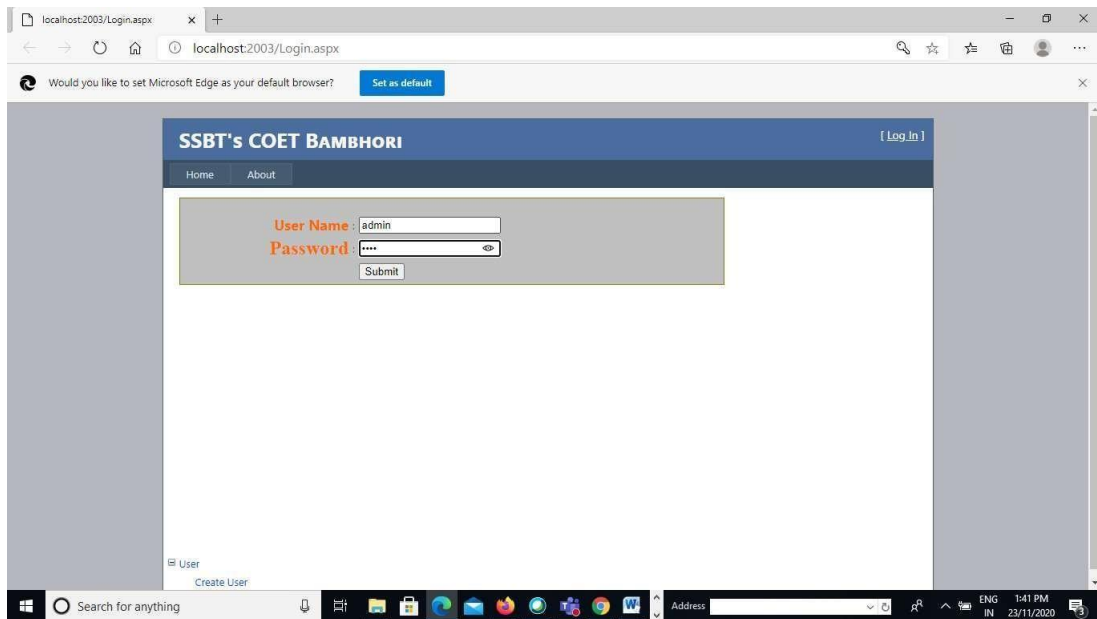
protected void btnSubmit_Click(object sender, EventArgs e)
{
    show();
}
}

```

# Database



## Output:



Information Form Design:

```
<w@ Page Title="" Language="C#" MasterPageFile="~/Site.Master"
AutoEventWireup="true" CodeBehind="info.aspx.cs"
Inherits="WebApplication2.WebForm4" %>
<asp:Content ID="Content1" ContentPlaceHolderID="HeadContent"
runat="server">
    <style type="text/css">
        .style1
        {
            width: 100%;
        }
        .style2
        {
            width: 41px;
            text-align: center;
        }
        .style3
        {
            width: 232px;
        }
        .style4
        {
            font-family:
            "Times New
            Roman"; font-
            weight: bold;
            color:
            #00FF00;
            font-
            size: x-
            large;
            background-color: #CC0000;
        }
        .style5
        {
            background-color: #CC3300;
        }
        .style6
```



[illegible]

```

        <td
            class="style3
            " width="30">
            &nbsp;</td>
        <td
            class=
            "style
            2">
            &nbsp;</td>
        <td>
            &nbsp;</td>
    </tr>
</table>
</asp:Content>

```

Information Form Asp.net Code:

```

using System;
using
System.Collections
.Generic; using
System.Linq;
using
System.Web;
using
System.Web.
UI;
using
System.Web.UI.WebC
ontrols; using
System.Data;
using System.Data.SqlClient;

namespace WebApplication2
{
    public partial class WebForm4 : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {
            lbl.Visible = false;

        }
    }
}

```

```

protected void btnSave_Click(object sender, EventArgs
e)
{
    SqlConnection con = new SqlConnection("Data
Source=.\SQLExpress;Initial Catalog=sinup;User
ID=sa;Password=ssbt");
    SqlCommand sqlcom = new
    SqlCommand("SP_Insert_Studentinfo", con);
    con.Open();
    sqlcom.CommandType = CommandType.StoredProcedure;
    sqlcom.Parameters.AddWithValue("@rollno",
    txtRoll.Text.ToString());
    sqlcom.Parameters.AddWithValue("@sname",
    txtStudentName.Text.ToString());
    sqlcom.Parameters.AddWithValue("@fname",txtFatherName.Te
xt.ToString());
    sqlcom.Parameters.AddWithValue("@city",txtCity.Text.ToS
tring()); sqlcom.ExecuteNonQuery();
    con.Close();
    lbl.Text = "Record
Inserted Successfully";
    lbl.Visible = true;
    clearcontrol();

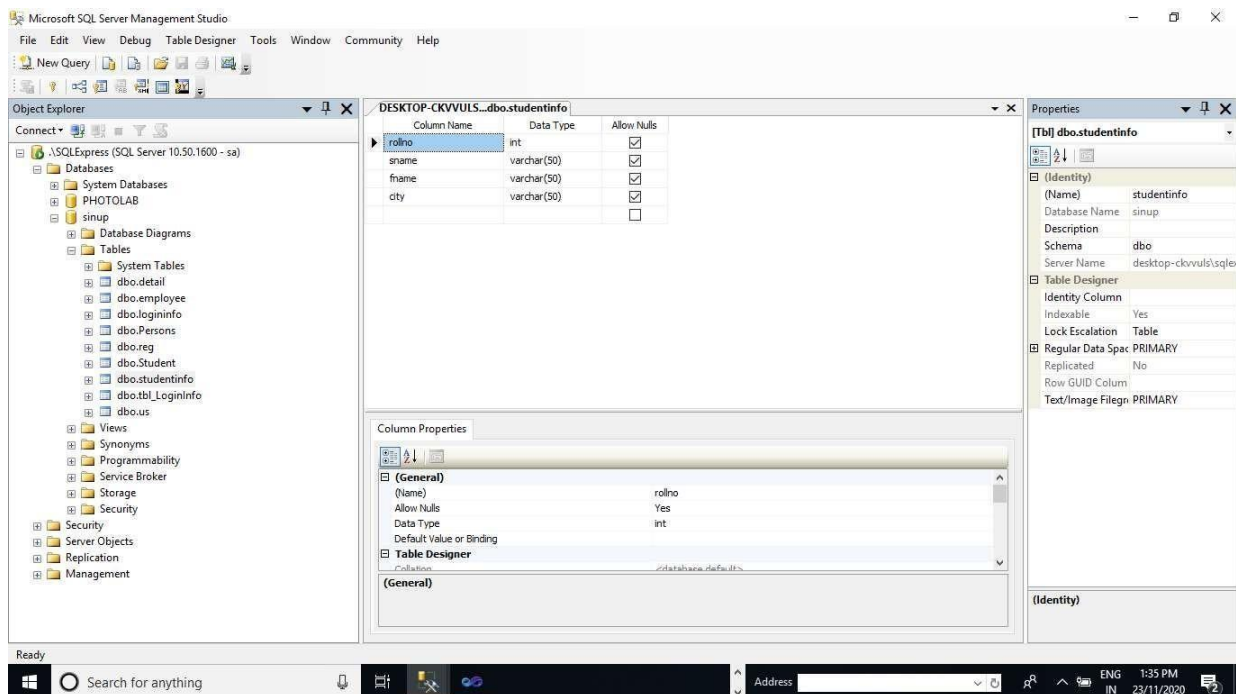
}
public void clearcontrol()
{
    txtCity.Text
    = "";
    txtFatherName
    .Text = "";
    txtRoll.Text
    = "";
    txtStudentNam
    e.Text = "";
}

}
}

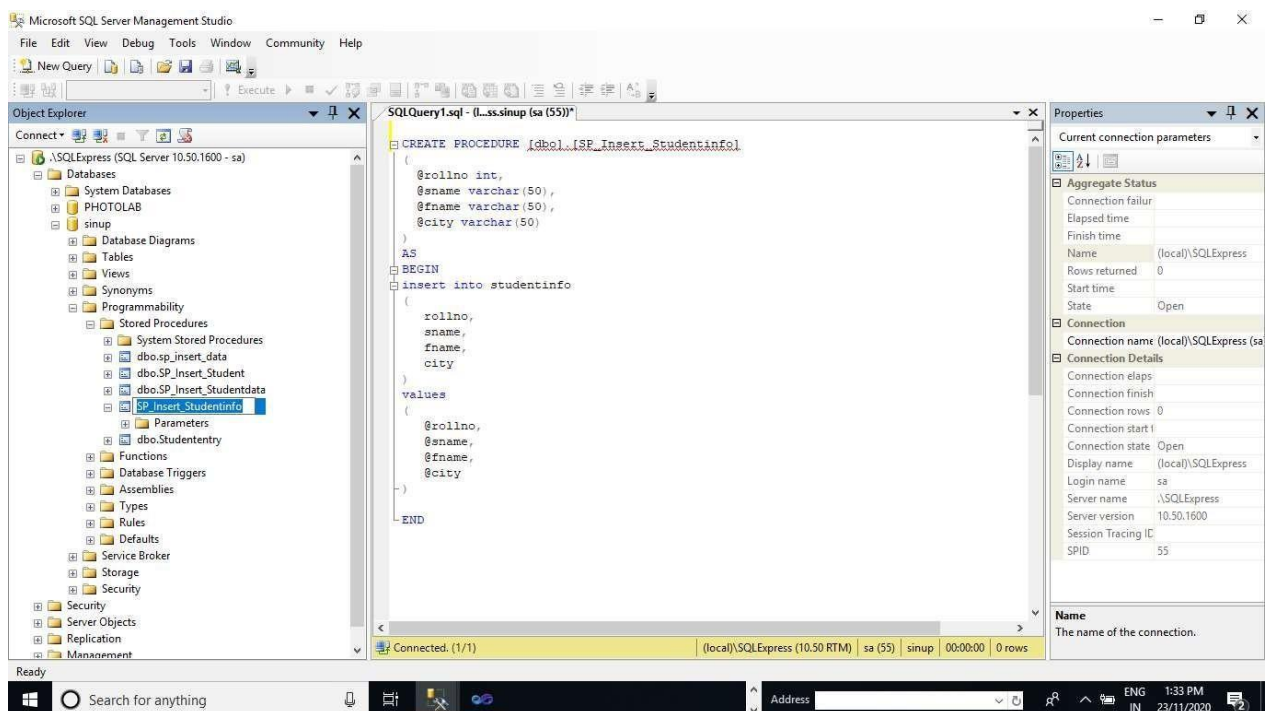
```

# Information Form Database:

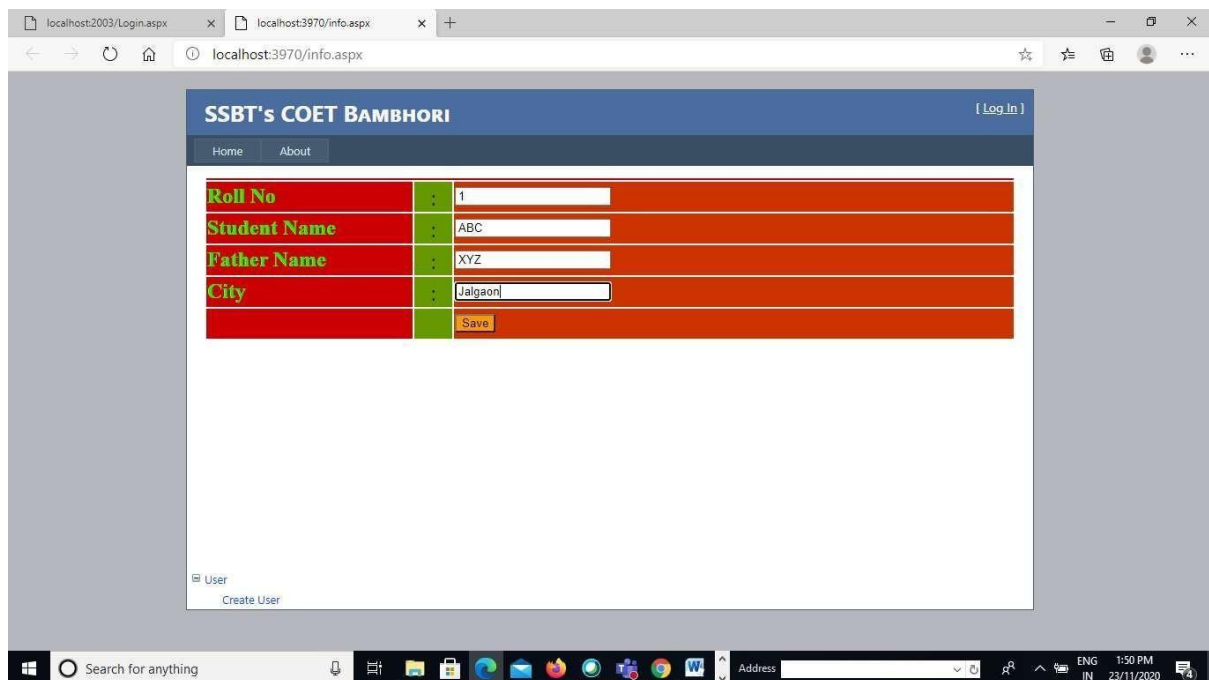
## Create Table:



## Stored Procedure



## Output



## Report Design:

```
<@ Page Language="C#" AutoEventWireup="true"
CodeBehind="WebForm3.aspx.cs"
Inherits="WebApplication1.WebForm3"% >
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD
XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml
11-transitional.dtd">
```

```
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
```

```
        <asp:GridView ID="gvData" runat="server"
            AllowPaging="True" AutoGenerateColumns="False"
            CellPadding="4" ForeColor="#333333"
```

```

GridLines="None"
onpageindexchanging="gvData_PageIndexChanging"
PageSize="2">
<AlternatingRowStyle BackColor="White"
ForeColor="#284775" />
<Columns>
    <asp:BoundField DataField="PersonID"
        HeaderText="PersonID" />
    <asp:BoundField DataField="LastName" HeaderText="Last
        Name" />
    <asp:BoundField DataField="FirstName"
        HeaderText="First Name" />
    <asp:BoundField DataField="Address"
        HeaderText="Address" />
    <asp:BoundField DataField="City" HeaderText="City"
        />
    <asp:CommandField ShowEditButton="true" />
    <asp:CommandField ShowDeleteButton="true" />
</Columns>
<EditRowStyle BackColor="#999999" />
<FooterStyle BackColor="#5D7B9D" Font-Bold="True"
    ForeColor="White" />
<HeaderStyle BackColor="#5D7B9D" Font-Bold="True"
    ForeColor="White" />
<PagerStyle BackColor="#284775" ForeColor="White"
    HorizontalAlign="Center" />
<RowStyle BackColor="#F7F6F3" ForeColor="#333333" />
<SelectedRowStyle BackColor="#E2DED6" Font-Bold="True"
    ForeColor="#333333" />
<SortedAscendingCellStyle BackColor="#E9E7E2" />
<SortedAscendingHeaderStyle BackColor="#506C8C" />

    <SortedDescendingCellStyle BackColor="#FFFDF8" />
    <SortedDescendingHeaderStyle BackColor="#6F8DAE" />
</asp:GridView>

</div>
</form>
</body>
</html>

```

## Report Asp.net Code

```
using System;
using
System.Collections
.Generic; using
System.Linq;
using
System.Web;
using
System.Web.
UI;
using
System.Web.UI.WebC
ontrols; using
System.Data;
using
System.Data.Sql
Client;
namespace
WebApplication
1
{
    public partial class WebForm3 : System.Web.UI.Page
    {
        SqlConnection con = new SqlConnection("Data
Source=.\SQLExpress;Initial Catalog=sinup;User
ID=sa;Password=ssbt");
        protected void Page_Load(object sender, EventArgs e)
        {
            con.Open();
            show();
        }
        private void show()
        {
            SqlCommand cmd = new SqlCommand("select *
from Persons", con); SqlDataAdapter da =
new SqlDataAdapter(cmd);
            DataSet ds =
new DataSet();
            da.Fill(ds);
            gvData.DataSource
ce = ds;
            gvData.DataBind

```

```

        d();

    }

    protected void gvData_PageIndexChanging(object sender,
GridViewPageEventArgs e)
    {
        gvData.PageIndex =
        e.NewPageIndex;
        show();

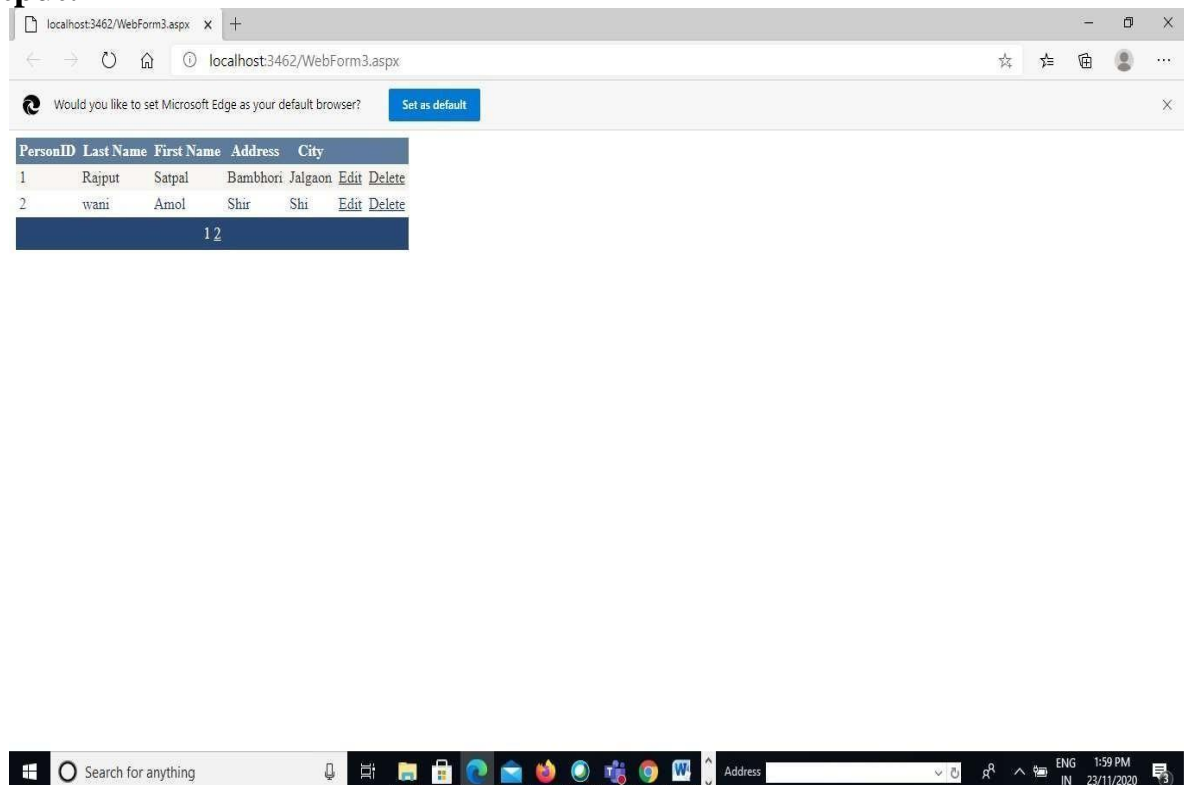
    }

}

}

```

## Output:





**Outcomes:**

1. Creates ASP.net Web Forms
2. Created ADO.net programs that use various library functions, and that manipulate database.

**Questions:**

1. What is ADO.NET?
2. What is the ADO.NET components?
3. How can you define data structure in ADO.NET?
4. What is connection pooling in ADO.NET?
5. What is the difference between data reader and data set?

Nagaon Education Society's  
GANGAMAI COLLEGE OF ENGINEERING ( DHULE )  
Nagaon, Dist- 05.  
Dept of Computer

Name: .....

Year: .....Branch/Course:.....

Roll No:.....Expt No:.....

Experiment:.....

Date of Performance.....Date of Completion.....

### Experiment No. 3

**Aim: Study and perform Data Analytics and Data Visualization using Numpy, Pandas and Matplotlib**

**1.Objective:** To perform data analysis and visualization on a sample dataset .

#### **2. Background:**

##### **NumPy**

It is a Python package. It stands for 'Numerical Python'. It is a library consisting of multidimensional array objects and a collection of routines for processing of array.

**Numeric**, the ancestor of NumPy, was developed by Jim Hugunin. Another package Numarray was also developed, having some additional functionality. In 2005, Travis Oliphant created NumPy package by incorporating the features of Numarray into Numeric package. There are many contributors to this open source project.

#### **Operations using NumPy**

Using NumPy, a developer can perform the following operations –

- Mathematical and logical operations on arrays.
- Fourier transforms and routines for shape manipulation.
- Operations related to linear algebra. NumPy has in-built functions for linear algebra and random number generation.

## **NumPy – A Replacement for MatLab**

NumPy is often used along with packages like **SciPy** (Scientific Python) and **Matplotlib** (plotting library). This combination is widely used as a replacement for MatLab, a popular platform for technical computing. However, Python alternative to MatLab is now seen as a more modern and complete programming language. It is open source, which is an added advantage of NumPy.

### **Pandas**

Pandas is an open-source Python Library used for high-performance data manipulation and data analysis using its powerful data structures. Python with pandas is in use in a variety of academic and commercial domains, including Finance, Economics, Statistics, Advertising, Web Analytics, and more. Using Pandas, we can accomplish five typical steps in the processing and analysis of data, regardless of the origin of data — load, organize, manipulate, model, and analyse the data.

Below are the some of the important features of Pandas which is used specifically for Data processing and Data analysis work.

### **Key Features of Pandas**

- Fast and efficient DataFrame object with default and customized indexing.
- Tools for loading data into in-memory data objects from different file formats.
- Data alignment and integrated handling of missing data.
- Reshaping and pivoting of date sets.
- Label-based slicing, indexing and subsetting of large data sets.
- Columns from a data structure can be deleted or inserted.
- Group by data for aggregation and transformations.
- High performance merging and joining of data.
- Time Series functionality.
- Pandas deals with the following three data structures –
  - **Series**
  - **DataFrame**
  - These data structures are built on top of Numpy array, making them fast and efficient.

	<b>Data Structure</b>	<b>Dimensions</b>	<b>Description</b>
	Series	1	1D labeled homogeneous array, size-immutable.
	Data Frames	2	General 2D labeled, size-mutable tabular structure with potentially heterogeneously typed columns.

DataFrame is widely used and it is the most important data structures.

### **Series**

Series is a one-dimensional array like structure with homogeneous data. For example, the following series is a collection of integers 10, 23, 56, ...

### **Key Points of Series**

- Homogeneous data
- Size Immutable
- Values of Data Mutable

### **DataFrame**

DataFrame is a two-dimensional array with heterogeneous data. For example,

<b>Name</b>	<b>Age</b>	<b>Gender</b>	<b>Rating</b>
Steve	32	Male	3.45
Lia	28	Female	4.6
Vin	45	Male	3.9
Katie	38	Female	2.78

The table represents the data of a sales team of an organization with their overall performance rating. The data is represented in rows and columns. Each column represents an attribute and each row represents a person.

### Key Points of Data Frame

- Heterogeneous data
- Size Mutable
- Data Mutable

### **Matplotlib**

Matplotlib is one of the most popular Python packages used for data visualization. It is a cross-platform library for making 2D plots from data in arrays. Matplotlib is written in Python and makes use of NumPy, the numerical mathematics extension of Python. It provides an object-oriented API that helps in embedding plots in applications using Python GUI toolkits such as PyQt, WxPython or Tkinter. It can be used in Python and IPython shells, Jupyter notebook and web application servers also.

Matplotlib has a procedural interface named the Pylab, which is designed to resemble MATLAB, a proprietary programming language developed by MathWorks. Matplotlib along with NumPy can be considered as the open source equivalent of MATLAB.

Matplotlib was originally written by John D. Hunter in 2003. The current stable version is 2.2.0 released in January 2018.

### **3. Pre-lab Task:**

1. Installation of Ubuntu 18.04
2. Installation of Anaconda 3 with Jupyter Notebook
3. Installation of Numpy Package
4. Installation of Pandas Package
5. Installation of Matplotlib Package

### **4. In Lab Tasks**

Perform the following data analysis and visualization on the given dataset.

**Write a Python program to display first 5 rows from COVID-19 dataset. Also print the dataset information and check the missing**

**Solution :**

```
import pandas as pd
covid_data=
pd.read_csv('covid_19_data.csv')
print("\nDataset First Five Rows:")
print(covid_data.head(5))
print("\nDataset Information :")
print(covid_data.info())

print("\nMissing data
information:")
print(covid_data.isna().sum())
```

**Output :**

**Dataset First Five Rows:**

Sr.No	Observation Date	Province Date	Country /Region	Last Update
1	01/22/2020	Anhui	Mainland China	17:00
2	01/22/2020	Beijing	Mainland China	17:00
3	01/22/2020	Chongqing	Mainland China	17:00
4	01/22/2020	Fujian	Mainland China	17:00
5	01/22/2020	Gansu	Mainland China	17:00

**Confirmed Deaths Recovered:**

0	1.0	0.0
1	14.0	0.0
2	6.0	0.0
3	1.0	0.0
4	0.0	0.0

Dataset Information :

<class 'pandas.core.frame.DataFrame'> RangeIndex: 156292 entries, 0 to 156291 Data columns (total 8 columns):

```
# Column Non-Null Count  Dtype
---  -
0 SNo      156292 non-null int64
1 ObservationDate 156292 non-null object
2 Province/State 111979 non-null object
3 Country/Region 156292 non-null object
4 Last Update 156292 non-null object
5 Confirmed 156292 non-null float64
6 Deaths 156292 non-null float64
7 Recovered 156292
non-null float64 dtypes:
float64(3), int64(1),
object(4) memory usage:
9.5+ MB
None
```

Missing data information:

SNo	0
ObservationDate	0
Province/State	44313
Country/Region	0
Last Update	0
Confirmed	0
Deaths	0
Recovered	0
dtype: int64	

**Write a Python program to get the latest number of confirmed, deaths, recovered and active cases of Novel Coronavirus (COVID-19) Country wise.**

**Solution:**

```
import pandas as pd
covid_data= pd.read_csv('covid_19_data.csv')
covid_data['Active'] = covid_data['Confirmed'] - covid_data['Deaths'] -
covid_data['Recovered']

result = covid_data.groupby('Country/Region')[['Confirmed', 'Deaths',
'Recovered', 'Active']].sum().reset_index()
print(result)
```

### Output:

Sr.No	Country/Region	Confirmed	Deaths	Recovered	Active
0	Azerbaijan	1.0	0.0	0.0	1.0
1	(“St.Martin”)	2.0	0.0	0.0	2.0
2	Afghanistan	6289387.0	208903.0	4251819.0	1828665.0
3	Albania	1685359.0	45778.0	4251819.0	701856.0
4	Algeria	6560551.0	262137.0	4499006.0	17994.8.0
221	Western Sahara	2011.0	174.0	1536.0	3.0.0
222	Yamen	286662.0	81116.0	157104.0	48442.0
223	Zambia	1592737.0	36186.0	1431407.0	125144.0
224	Zimbabwe	829416.0	22839.0	628780.0	177797.0
225	Occupied Palestinian territory	25.0	0.0	0.0	25.0



[226 rows x 5 columns]

---

**Write a Python program to get the latest number of confirmed deaths and recovered people of Novel Coronavirus (COVID-19) cases Country/Region - Province/State wise.**

**Solution:**

```
import pandas as pd
covid_data= pd.read_csv('covid_19_data.csv')
data = covid_data.groupby(['Country/Region', 'Province/State'])[['Confirmed',
'Deaths', 'Recovered']].max()
pd.set_option('display.max_rows', None) print(data)
```

**Output:**

Country/Region	Confirmed \
Province/State	
Australia	Australian Capital Territory 114.0
	Diamond Princess cruise ship 0.0
	External territories 0.0
	From Diamond Princess 8.0

**Write a Python program to get the Chinese province wise cases of confirmed, deaths and recovered cases of Novel Coronavirus (COVID-19).**

**Solution:**

```
import pandas as pd
```

	Jervis Bay Territory	0.0
	New South Wales	4498.0
	Northern Territory	46.0
	Queensland	1185.0
	South Australia	544.0
	Tasmania	231.0
	Victoria	20347.0
	Western Australia	787.0
Australia	None	2.0

```
covid_data= pd.read_csv('covid_19_data.csv')
c_data =
covid_data[covid_data['Country/Region']=='Mainland
China'] c_data = c_data[['Province/State', 'Confirmed',
'Deaths', 'Recovered']] result =
c_data.sort_values(by='Confirmed', ascending=False)
result =
result.reset_index(drop=True)
print(result)
```

### **Output:**

```
Province/State Confirmed Deaths Recovered
0    Hubei    68148.0  63627
1    Hubei    4512.0    .0
2    Hubei    68148.0  63627
3    Hubei    4512.0    .0
4    Hubei    68147.0  63627
...    ei    4512.0    .0
926    Gansu    0.0  0.0  0.0
2
926    Jilin    0.0  0.0  0.0
3
926    Heilongjiang    0.0  0.0  0.0
4
926    Inner Mongolia    0.0  0.0
5
926    Xinjiang    0.0  0.0  0.0
6
```

[9267 rows x 4 columns]

**Write a Python program to list countries with no cases of Novel Coronavirus (COVID-19) recovered.**

**Solution:**

```
import pandas as pd
covid_data= pd.read_csv('covid_19_data.csv')
data = covid_data.groupby('Country/Region')[['Confirmed', 'Deaths',
'Recovered']].sum().reset_index() result =
data[data['Recovered']==0][['Country/Region', 'Confirmed', 'Deaths',
'Recovered']] print(result)
```

**Output:**

```
Country/Region Confirmed Deaths Recovered

0      Azerbaijan 1.0  0.0  0.0
1      ('St. Martin',) 0.0  0.0  0.0
10     Aruba 19.0  0.0  0.0
15  Bahamas, The 10.0  0.0  0.0
37     Cape Verde 1.0  0.0  0.0
38     Cayman Islands 3.0  0.0  0.0
41     Channel Islands 1.0  0.0  0.0
50     Curacao 2.0  0.0  0.0
58     East Timor 1.0  0.0  0.0
67     Faroe Islands 10.0  0.0  0.0
74     Gambia, The 4.0  0.0  0.0
80     Greenland 3.0  0.0  0.0
82     Guadeloupe 187.0  0.0  0.0
83     Guam 6.0  0.0  0.0
85     Guernsey 3.0  0.0  0.0
105    Jersey 6.0  0.0  0.0
```

121	MS Zaandam	0.
	2069.0	0
	458.0	
131	Martinique	0.
	172.0 6.0	0

134	Mayotte	21.0	0.0	0.0
149	North Ireland	1.0	0.0	0.0
155	Palestine	86.0	0.0	0.0
163	Puerto Rico	3.0	0.0	0.0
165	Republic of Ireland	21.0	0.0	0.0
166	Republic of the Congo	1.0	0.0	0.0
167	Reunion	137.0	0.0	0.0
171	Saint Barthelemy	17.0	0.0	0.0
192	St. Martin	2.0	0.0	0.0
202	The Bahamas	3.0	0.0	0.0
203	The Gambia	1.0	0.0	0.0
216	Vanuatu	6.0	0.0	0.0
217	Vatican City	4.0	0.0	0.0
225	occupied Palestinian territory	25.0	0.0	0.0

**Write a Python program to get the top 10 countries data (Last Update, Country/Region, Confirmed, Deaths, Recovered) of Novel Coronavirus (COVID-19).**

**Solution:**

```
import pandas as pd
covid_data= pd.read_csv('covid_19_data.csv', usecols = ['Last Update',
'Country/Region', 'Confirmed', 'Deaths', 'Recovered'])
result = covid_data.groupby('Country/Region').max().sort_values(by='Confirmed',
ascending=False)[:10]
pd.set_option('display.max_column',
None) print(result)
```

**Output:**

	Last Update	Confirmed	Deaths	Recovered	Country/Region
France	4/6/20 9:37	1867721.0	42215.0	113017.0	
India	4/6/20 9:37	1747242.0	45974.0	1615379.0	
Argentina	4/6/20 9:37	1310491.0	35436.0	1129102.0	
UK	4/6/20 9:37	1174979.0	45592.0	816.0	
Brazil	4/6/20 9:37	1168640.0	40564.0	1051778.0	
US	4/6/20 9:37	1059753.0	34032.0	4174884.0	
Iran	4/6/20 9:37	762068.0	41493.0	558818.0	
South Africa	4/6/20 9:37	751024.0	20241.0	693467.0	
Poland	4/6/20 9:37	712972.0	10348.0	294783.0	
Iraq	4/6/20 9:37	519152.0	11670.0	447039.0	

---

**Write a Python program to create a plot (lines) of total deaths, confirmed, recovered and active cases Country wise where deaths greater than 150.**

**Solution:**

```
import pandas as pd
import matplotlib.pyplot as plt
covid_data= pd.read_csv('covid_19_data.csv', usecols = ['Last Update',
'Country/Region', 'Confirmed', 'Deaths', 'Recovered'])
covid_data['Active'] = covid_data['Confirmed'] - covid_data['Deaths'] -
covid_data['Recovered']

r_data = covid_data.groupby(["Country/Region"])[["Deaths", "Confirmed",
"Recovered", "Active"]].sum().reset_index()
```

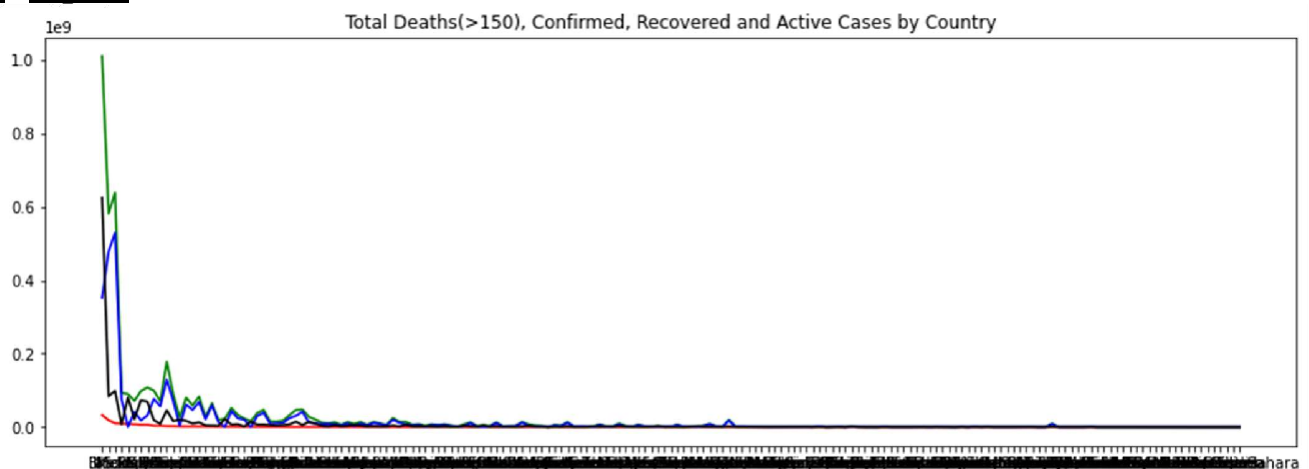
```

r_data = r_data.sort_values(by='Deaths',
ascending=False) r_data =
r_data[r_data['Deaths']>50]
plt.figure(figsize=(15, 5))
plt.plot(r_data['Country/Region'],
r_data['Deaths'],color='red')
plt.plot(r_data['Country/Region'],
r_data['Confirmed'],color='green')
plt.plot(r_data['Country/Region'], r_data['Recovered'],
color='blue') plt.plot(r_data['Country/Region'],
r_data['Active'], color='black')

plt.title('Total Deaths(>150), Confirmed, Recovered and Active
Cases by Country') plt.show()

```

### **Output:**



**Write a Python program to visualize the state/province wise combine number of confirmed, deaths, recovered, active Novel Coronavirus (COVID-19) cases in USA.**

### **Solution:**

```

import pandas as
pd import
plotly.express as
px
covid_data= pd.read_csv('covid_19_data.csv')
covid_data['Active'] = covid_data['Confirmed'] - covid_data['Deaths'] -
covid_data['Recovered'] combine_us_data =
covid_data[covid_data['Country/Region']=='US'].drop(['Country/Region'], axis=1)
combine_us_data = combine_us_data[combine_us_data.sum(axis = 1) > 0]
combine_us_data = combine_us_data.groupby(['Province/State'])[['Confirmed',

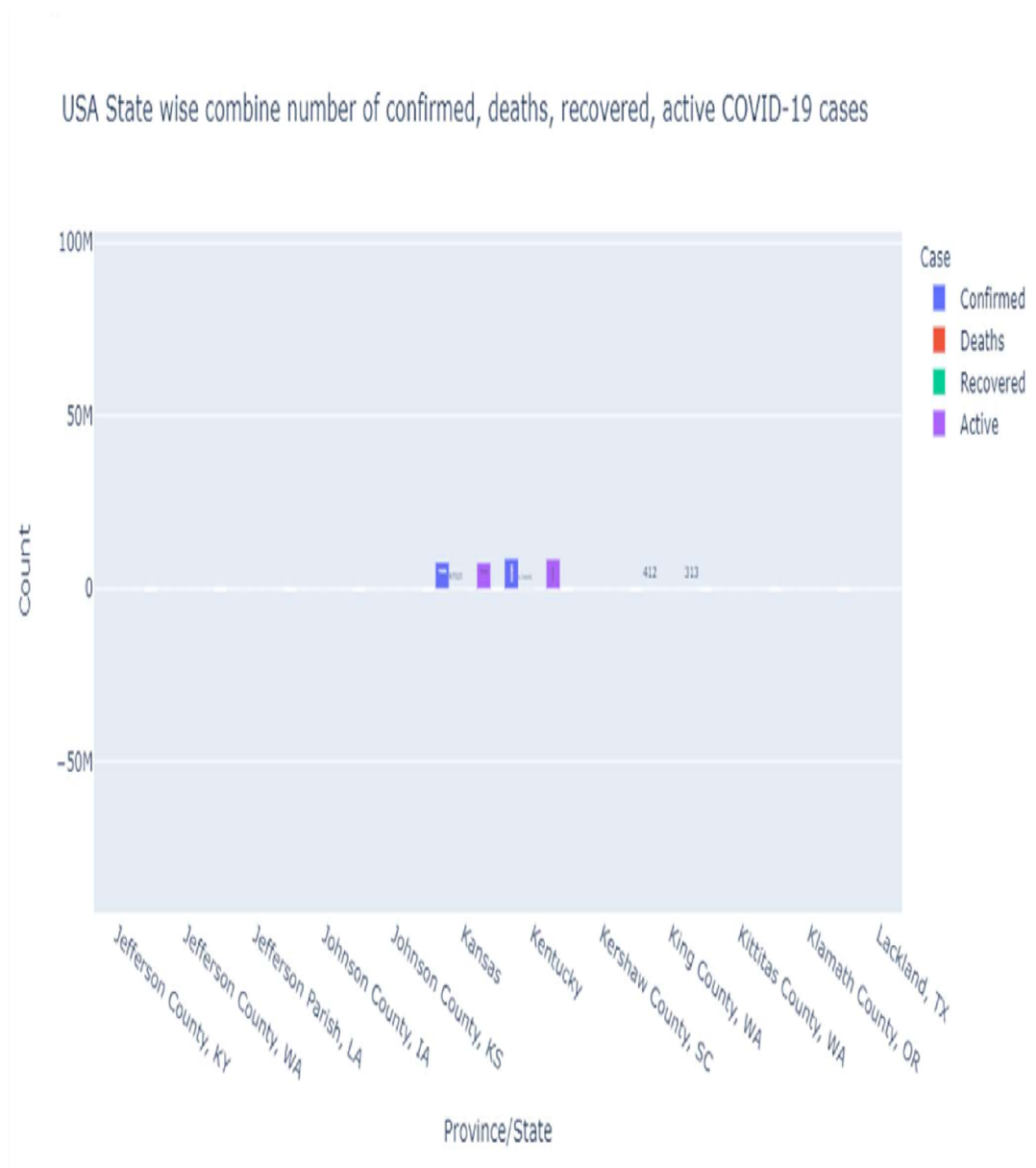
```

```

'Deaths', 'Recovered', 'Active']]).sum().reset_index()
combine_us_data = pd.melt(combine_us_data, id_vars='Province/State',
value_vars=['Confirmed', 'Deaths', 'Recovered', 'Active'], value_name='Count',
var_name='Case')
fig = px.bar(combine_us_data, x='Province/State', y='Count', text='Count',
barmode='group', color='Case', title='USA State wise combine number of
confirmed, deaths, recovered, active COVID-19 cases')
fig.show()

```

### Output:



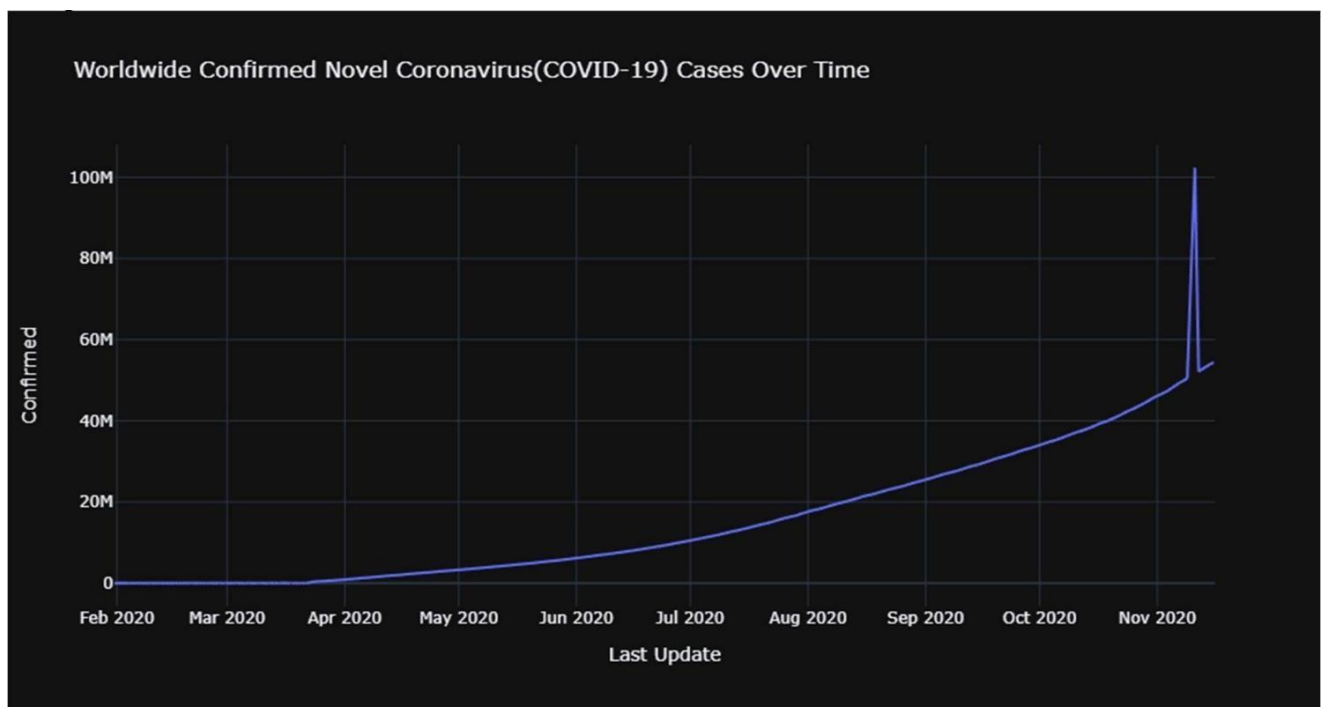
**Write a Python program to visualize Worldwide Confirmed Novel Coronavirus (COVID-19) cases over time.**

**Solution:**

```
import pandas as
pd import
plotly.express as
px import plotly.io
as pio
pio.templates.default = "plotly_dark"

covid_data= pd.read_csv('covid_19_data.csv')
grouped = covid_data.groupby('Last Update')[['Last Update', 'Confirmed',
'Deaths']].sum().reset_index()
fig = px.line(grouped, x="Last Update", y="Confirmed",
              title="Worldwide Confirmed Novel Coronavirus(COVID-19) Cases
Over Time") fig.show()
```

**Output :**



**4. Post Lab Tasks**

Performed data analysis and visualization on the sample dataset using Numpy, Pandas and Matplotlib



### Questions:

1. List and describe key features of Namy?
2. Enlist and describe key features of pandas?
3. Enlist and describe key features of matplotlib?
4. Describe two important data structure of pandas?
5. Describe how pandas is more powerful as compare to other standard data type in python?

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Dept of Computer

Name: .....

Year: .....Branch/Course:.....

Roll No:.....Expt No:.....

Experiment:.....

Date of Performance.....Date of Completion.....

### Experiment No. 4

**Aim:** Implementation of web Application using R.

**1. Objective:** Development of web Application using R.

**2. Background:**

**R:** It is a programming language and software environment for statistical analysis, graphics representation and reporting. R was created by Ross Ihaka and Robert Gentleman at the University of Auckland, New Zealand, and is currently developed by the R Development Core Team. The core of R is an interpreted computer language which allows branching and looping as well as modular programming using functions. R allows integration with the procedures written in the C, C++, .Net, Python or FORTRAN languages for efficiency. R is freely available under the GNU General Public License, and pre-compiled binary versions are provided for various operating systems like Linux, Windows and Mac. R is free software distributed under a GNU-style copy left, and an official part of the GNU project called GNU S. As stated earlier, R is a programming language and software environment for statistical analysis, graphics representation and reporting.

### **The following are the important features of R:**

- ▮ R is a well-developed, simple and effective programming language which includes conditionals, loops, user defined recursive functions and input and output facilities.
- ▮ It has an effective data handling and storage facility,
- ▮ It provides a suite of operators for calculations on arrays, lists, vectors and matrices.
- ▮ It provides a large, coherent and integrated collection of tools for data analysis.
- ▮ It provides graphical facilities for data analysis and display directly on the computer.

R is world's most widely used statistics programming language. It's the first choice of data scientists and supported by a vibrant and talented community of contributors. R is taught in universities and deployed in mission critical business applications.

### **Why use R Programming?**

There are several tools available in the market to perform data analysis. Learning new languages is time taken. The data scientist can use two excellent tools, i.e., R and Python. We may not have time to learn them both at the time when we get started to learn data science. Learning statistical modeling and algorithm is more important than to learn a programming language. A programming language is used to compute and communicate our discovery.

The important task in data science is the way we deal with the data: clean, feature engineering, feature selection, and import. It should be our primary focus. Data scientist job is to understand the data, manipulate it, and expose the best approach. For machine learning, the best algorithms can be implemented with R. Keras and TensorFlow allow us to create high-end machine learning techniques. R has a package to perform Xgboost. Xgboost is one of the best algorithms for Kaggle competition.

R communicate with the other languages and possibly calls Python, Java, C++. The big data world is also accessible to R. We can connect R with different databases like **Spark** or **Hadoop**. In brief, R is a great tool to investigate and explore the data. The elaborate analysis such as clustering, correlation, and data reduction are done with R. There are several-applications available in real-time. Some of the popular applications are: Facebook, Google, Twitter, HRDAG, Sunlight Foundation, RealClimate, NDAA,etc.

### **3. Pre-lab Task:**

#### **Installation of R-base for windows**

1. Goto link <http://cran.r-project.org>
2. Select “Download for Windows” & Click on “Base”
3. Select“Download R 3.3.2 for Windows(62 megabytes, 32/64 bit)”
4. Click on “Save file”
5. After downloading double click on “R 3.3.2-win.exe” file
6. Click 'next'...'Finish'.

#### **Installation of R-studio for windows**

1. Go to RStudio website (<https://www.rstudio.com/products/rstudio/download/>),
2. Select Platform “Rstudio 1.0.136-windows vista/7/8/10”
3. Double click on “Rstudio 1.0.136-windows vista/7/8/10”
4. Click next to continue when the install wizard opens.
5. Click next to accept the default install location.
6. Click Install to accept the default start menu folder and install RStudio!  
Click Finish to close the wizard.

#### **Installation of R-base for Ubuntu**

1. sudo apt-get install r-base
2. if require- sudo apt-get update

### Through Ubuntu Software Center:

1. Open Ubuntu Software Center.
2. Search for r-base & click Install.
3. Then run R by executing R in the Terminal.

### Installation of R-studio for Ubuntu

1. Go to RStudio website choose and download the Rstudio Desktop version for your system ([www.rstudio.com/products/rstudio/download/](http://www.rstudio.com/products/rstudio/download/))
2. Open this file in Ubuntu Software Center
3. Click install and you're done

### **Installation** Open source R package (i.e. R-shiny)

Run the following command from an R console:

```
install.packages("shiny")
```

### **Data Types and R-Objects**

In R programming language the variables are not declared as some data type. The variables are assigned with R-Objects. The data type of the R-object becomes the data type of the variable. There are many types of R-objects. Following are some of the Data types and R-Objects.

Table: Data types and R-Objects

	Data types	R- Objects
1.	Logical	Vectors
2.	Numeric	Lists
3.	Integer	Matrices
4.	Character	Arrays

5.	Comple x	Data Frames
----	-------------	----------------

#### 4.In-lab Task:

Create a simple app that displays text within the title panel, sidebar panel and main panel, where the sidebar panel is located on the right

##### Step 1: Install package & build framework

```
>install.packages("shiny")

>library(shiny)
>ui <- fluidPage()
>server <- function (input, output) { }
>shinyApp (ui =ui , server = server)
```

##### Step 2: Building the UI framework

```
>install.packages("shiny")
>library(shiny)
>ui <- fluidPage(
  titlePanel(title = "First
app....."),
  sidebarLayout(
    sidebarPanel ("Sidebar
panel, ....."),
    mainPanel("Main panel,
....."))
  ))
>server <- function (input, output) { }
>shinyApp (ui =ui , server = server)
```

##### Step 3: Adjusting the UI framework

```
>install.packages("shiny")
```

```

>library(shiny)
>ui □ fluidPage(
  titlePanel(title = “First
  app.....”),
  sidebarLayout( position
  = “right”, sidebarPanel
  (“Sidebar panel, .....”),
  mainPanel(“Main panel,
  .....”))
  ))
>server □ function (input, output) { }

>shinyApp (ui =ui , server = server)

```

## 5. Post-

### lab

#### Task:

#### Outcome

#### s:

Student should able

3. To execute R script.
4. To implement web app using R

#### Web Resources:

1. <https://www.dezyre.com/projects/data-science-projects/data-science-projects-in-r>
2. <https://data-flair.training/blogs/data-science-projects code/>
3. <https://machinelearningmastery.com/machine-learning-in-r-step-by-step/>

**Questions:**

1. what is R?
2. Write some of the functions of R?
3. What are the data structure in R that is used to perform statistical analysis and create graph?
4. Describe data types in R?
5. State various applications of R?



