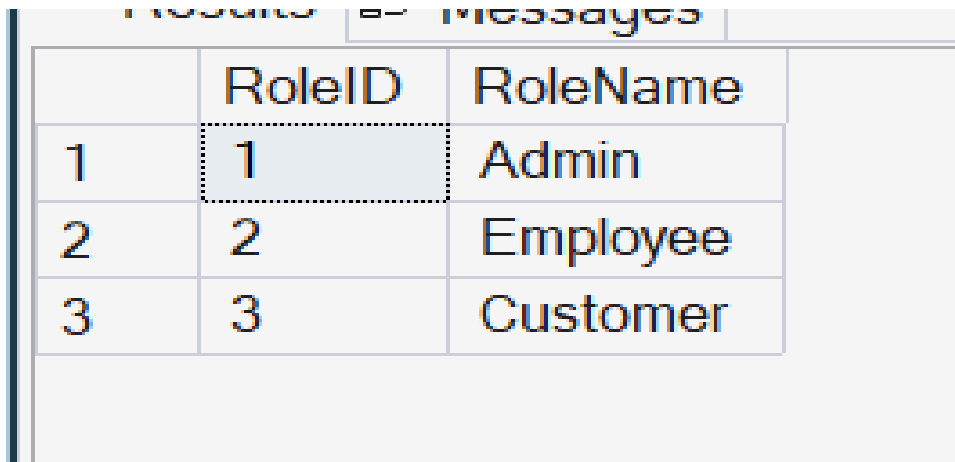


Part (a) : Role Based Access Control implemented in PVFC DB

1) Creating a Roles table:

```
CREATE TABLE PVFC_UserRoles (  
  RoleID INT PRIMARY KEY,  
  RoleName VARCHAR(20) -- Ismein hum 'Admin', 'Employee', 'Customer' likhenge  
);
```

```
INSERT INTO PVFC_UserRoles VALUES (1, 'Admin');  
INSERT INTO PVFC_UserRoles VALUES (2, 'Employee');  
INSERT INTO PVFC_UserRoles VALUES (3, 'Customer');
```



	RoleID	RoleName
1	1	Admin
2	2	Employee
3	3	Customer

2) Links with Employee and Customer Table

```
ALTER TABLE EMPLOYEE_t ADD RoleID INT;  
ALTER TABLE CUSTOMER_t ADD RoleID INT;  
  
UPDATE EMPLOYEE_t SET RoleID = 1 WHERE Employee_Id = '123-44-345';  
UPDATE EMPLOYEE_t SET RoleID = 2 WHERE RoleID IS NULL;  
UPDATE CUSTOMER_t SET RoleID = 3 WHERE RoleID IS NULL;
```

Employee_Id	Employee_Address	Employee_BirthDate	Employee_City	Employee_Date_Hired	Employee_State	Employee_Supervisor	Employee_Zip	Employee_Password	RoleID
	2134 Hilltop Rd	1900-01-01		1999-06-12	TN	454-56-768		456	1
	17834 Deerfield Ln	1900-01-01	Nashville	1999-01-01	TN			456	2

Customer_Id	Customer_Name	Customer_Address	Customer_City	Customer_State	Postal_Code	Customer_Password	RoleID
4	11111-1111111-1	Impressions	5585 Westcott Ct.	Sacramento	CA	94206-4056	123
5	12101-2345678-9	M and H Casual Furniture	3709 First Street	Clearwater	FL	34620-2314	123
6	12345-0000000-0	Home Furnishings	1900 Allard Ave.	Albany	NY	12209-1125	123
7	13101-2345678-2	Period Furniture	394 Rainbow Dr.	Seattle	WA	97954-5589	123
8	17002-1233455-0	American Euro Lifestyles	2424 Missouri Ave N.	Prospect Park	NJ	07508-5621	123
9	22222-2222222-2	Furniture Gallery	325 Flatiron Dr.	Boulder	CO	80514-4432	123
10	37101-0987654-9	Battle Creek Furniture	345 Capitol Ave. SW	Battle Creek	MI	49015-3401	123
11	42201-4356981-1	California Classics	816 Peach Rd.	Santa Clara	CA	96915-7754	123
12	45309-0987651-8	Mountain Scenes	4132 Main Street	Ogden	UT	84403-4432	123
13	56702-0986541-0	Heritage Furnishings	66789 College Ave.	Carlisle	PA	17013-8834	123
14	61101-1234567-3	Contemporary Casuals	1355 S Hines Blvd	Gainesville	FL	32601-2871	123
15	92703-1234567-0	Kanoehe Homes	112 Kiowai St.	Kanoehe	HI	96744-2537	123

Part (b) : Role Based Access Control implemented in .VB & .ASPX Files

Login_cust.aspx

```
<%@ Page Language="VB" AutoEventWireup="false" CodeFile="login_cust.aspx.vb"
Inherits="login_cust" %>
<!DOCTYPE html>
<html>
<head runat="server"><title>Customer Login</title>
<link href="style.css" rel="stylesheet" />
</head>

<body>
<form id="form1" runat="server">

<header>
<h1>Pine Valley Furnishing</h1>
</header>

<div class="form-box">
<h2>Customer Login</h2>
```

```

<asp:TextBox ID="txtCustID" runat="server" Placeholder="Enter Customer ID (CNIC)"
Width="314px"> </asp:TextBox>
<br /><br />
<asp:TextBox ID="txtPassword" runat="server" TextMode="Password" Placeholder="Enter
Password" Width="314px"></asp:TextBox>
<br /><br />
<asp:Button ID="btnLogin" runat="server" Text="Login" OnClick="btnLogin_Click" Height="55px"
Width="174px" />
<asp:Button ID="btnBack" runat="server" PostBackUrl="login_as.aspx" Text="Back"
Width="175px" />
<br /><br />
<asp:Label ID="lblMsg" runat="server" ForeColor="Red"></asp:Label>
<p>Don't have an account?
<asp:HyperLink ID="HyperLink1" runat="server" NavigateUrl="register.aspx"
CssClass="text-link">Register</asp:HyperLink>
</p>

</div>

</form>

</body>
</html>

```

login_cust.aspx.vb

```

Imports System.Data
Imports System.Data.SqlClient

```

```

Partial Class login_cust
    Inherits System.Web.UI.Page

```

```

    Dim con As New SqlConnection("Data Source=DESKTOP-42509TS\SQLEXPRESS;Initial
Catalog=PVFC;Integrated Security=True")

```

```

    Protected Sub btnLogin_Click(sender As Object, e As EventArgs) Handles btnLogin.Click

```

```

        ' Clear previous messages
        lblMsg.Text = ""

```

```

        ' Check if user provided input

```

```

    If String.IsNullOrEmpty(txtCustID.Text) Or
String.IsNullOrEmpty(txtPassword.Text) Then
        lblMsg.Text = "Please provide Customer ID and Password."
        Return ' Stop execution, page stays here
    End If

    Try
        Dim cmd As New SqlCommand("SELECT Customer_Id, RoleID FROM CUSTOMER_t
WHERE Customer_Id=@id AND Customer_Password=@pass", con)
        cmd.Parameters.AddWithValue("@id", txtCustID.Text.Trim())
        cmd.Parameters.AddWithValue("@pass", txtPassword.Text.Trim())

        con.Open()
        Dim dr As SqlDataReader = cmd.ExecuteReader()

        If dr.Read() Then
            Session.Clear()
            ' Login successful
            Session("UserID") = dr("Customer_Id")
            Session("RoleID") = dr("RoleID")
            Response.Redirect("index_cust.aspx")
        Else
            ' Invalid credentials
            lblMsg.Text = "Invalid Customer ID or Password."
        End If

        dr.Close()

        Catch ex As Exception
            lblMsg.Text = "Error connecting to database. Try again later."
        Finally
            If con.State = ConnectionState.Open Then con.Close()
        End Try

    End Sub
End Class

```

Pine Valley Furnishing

Customer Login

Don't have an account? [Register](#)

Login_emp.aspx

```
<%@ Page Language="VB" AutoEventWireup="false" CodeFile="login_emp.aspx.vb"
Inherits="login_emp" %>
<!DOCTYPE html>
<html>
<head runat="server">
  <title>Employee Login</title>
  <link href="style.css" rel="stylesheet" />
```

```
</head>

<body>
<form id="form1" runat="server">

<header>
  <h1>Pine Valley Furnishing</h1>
</header>

<div class="form-box">
  <h2>Employee Login</h2>

  <asp:TextBox ID="txtEmpID" runat="server" Placeholder="Enter Employee ID"
Width="314px"></asp:TextBox>
  <br /><br />
  <asp:TextBox ID="txtPassword" runat="server" TextMode="Password" Placeholder="Enter
Password" Width="314px"></asp:TextBox>
  <br /><br />
  <asp:Button ID="btnLogin" runat="server" Text="Login" OnClick="btnLogin_Click"
Height="55px" Width="174px" />
  <asp:Button ID="btnBack" runat="server" PostBackUrl="login_as.aspx" Text="Back"
Width="175px" />
  <br /><br />
  <asp:Label ID="lblMsg" runat="server" ForeColor="Red"></asp:Label>

</div>

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

login_emp.aspx.vb

```
Imports System.Data
Imports System.Data.SqlClient

Partial Class login_emp
  Inherits System.Web.UI.Page
```

```
Dim con As New SqlConnection("Data Source=DESKTOP-42509TS\SQLEXPRESS;Initial Catalog=PVFC;Integrated Security=True")
```

```
Protected Sub btnLogin_Click(sender As Object, e As EventArgs) Handles btnLogin.Click
```

```
    ' Clear previous message  
    lblMsg.Text = ""
```

```
    ' Check if input fields are empty  
    If String.IsNullOrEmpty(txtEmpID.Text) Or  
String.IsNullOrEmpty(txtPassword.Text) Then  
        lblMsg.Text = "Please provide Employee ID and Password."  
        Return ' Stop execution, page stays here  
    End If
```

```
    Try
```

```
        Dim cmd As New SqlCommand("SELECT Employee_Id, RoleID FROM EMPLOYEE_t  
WHERE Employee_Id=@id AND Employee_Password=@pass", con)  
        cmd.Parameters.AddWithValue("@id", txtEmpID.Text.Trim())  
        cmd.Parameters.AddWithValue("@pass", txtPassword.Text.Trim())
```

```
        con.Open()  
        Dim dr As SqlDataReader = cmd.ExecuteReader()
```

```
        If dr.Read() Then
```

```
            ' Login successful  
            Session("UserID") = dr("Employee_Id")  
            Session("RoleID") = dr("RoleID")
```

```
            ' Redirect based on role  
            Select Case Convert.ToInt32(dr("RoleID"))  
                Case 1 ' Admin  
                    Response.Redirect("index_emp.aspx")  
                Case 2 ' Employee  
                    Response.Redirect("index_emp.aspx")  
                Case Else  
                    lblMsg.Text = "Unknown role. Access denied."  
            End Select
```

```
        Else
```

```
            ' Invalid credentials  
            lblMsg.Text = "Invalid Employee ID or Password."  
        End If
```

```
        dr.Close()
```

Catch ex As Exception

 lblMsg.Text = "Error connecting to database. Try again later."

Finally

 If con.State = ConnectionState.Open Then con.Close()

End Try

End Sub

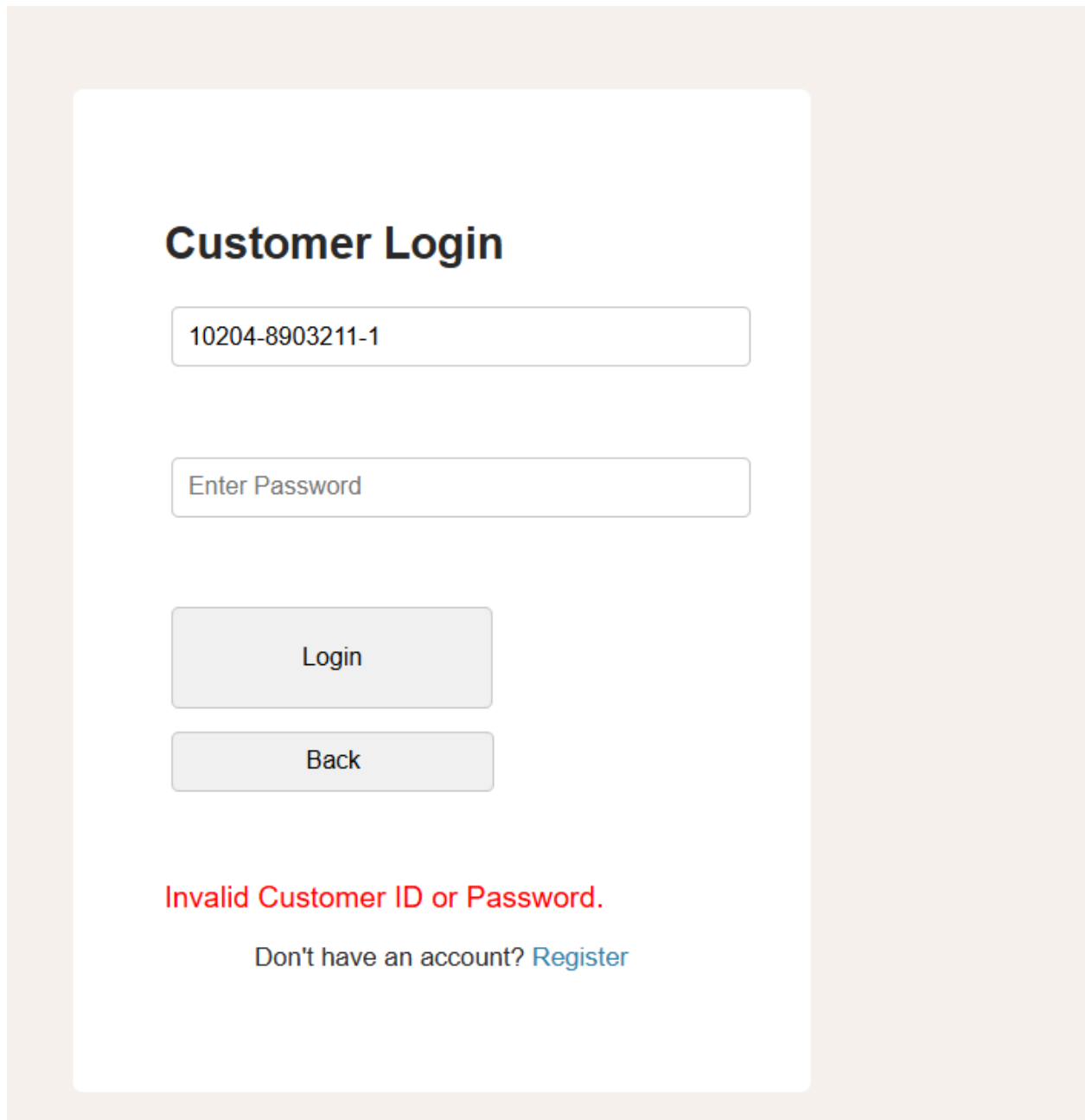
End Class

Pine Valley Furnishing

Employee Login

Part (c): Test Cases for Role Based Access Control

Test case 01: Enter Correct Customer Cnic but wrong password. Access Denied.



The screenshot shows a 'Customer Login' form with two input fields: one for the Customer ID (containing '10204-8903211-1') and one for the Password (containing the placeholder text 'Enter Password'). Below the fields are two buttons: 'Login' and 'Back'. A red error message is displayed below the buttons: 'Invalid Customer ID or Password.' At the bottom, there is a link for 'Register' with the text 'Don't have an account? Register'.

Customer Login

10204-8903211-1

Enter Password

Login

Back

Invalid Customer ID or Password.

Don't have an account? [Register](#)

Same cases observed with Employee_login.aspx

Pine Valley Furnishing

Employee Login

Invalid Employee ID or Password.

Test case 02: Enter wrong Customer Cnic but correct password.Access Denied.

The screenshot shows the 'Customer Login' page for Pine Valley Furnishing. The page has a dark brown header with the company name. Below the header is a white login form. The form contains two input fields: the first contains the customer ID '10204-89032121-0' and the second is labeled 'Enter Password'. Below the input fields are two buttons: 'Login' and 'Back'. At the bottom of the form, there is a red error message: 'Invalid Customer ID or Password.' and a link to 'Register' for users who don't have an account.

Pine Valley Furnishing

Customer Login

Login

Back

Invalid Customer ID or Password.

Don't have an account? [Register](#)

Same case observed with Employee_login.aspx

Pine Valley Furnishing

Employee Login

Invalid Employee ID or Password.

Test case 03: Enter nothing and click login button. Access Denied.

Pine Valley Furnishing

Customer Login

Enter Customer ID (CNIC)

Enter Password

Login

Back

Please provide Customer ID and Password.

Don't have an account? [Register](#)

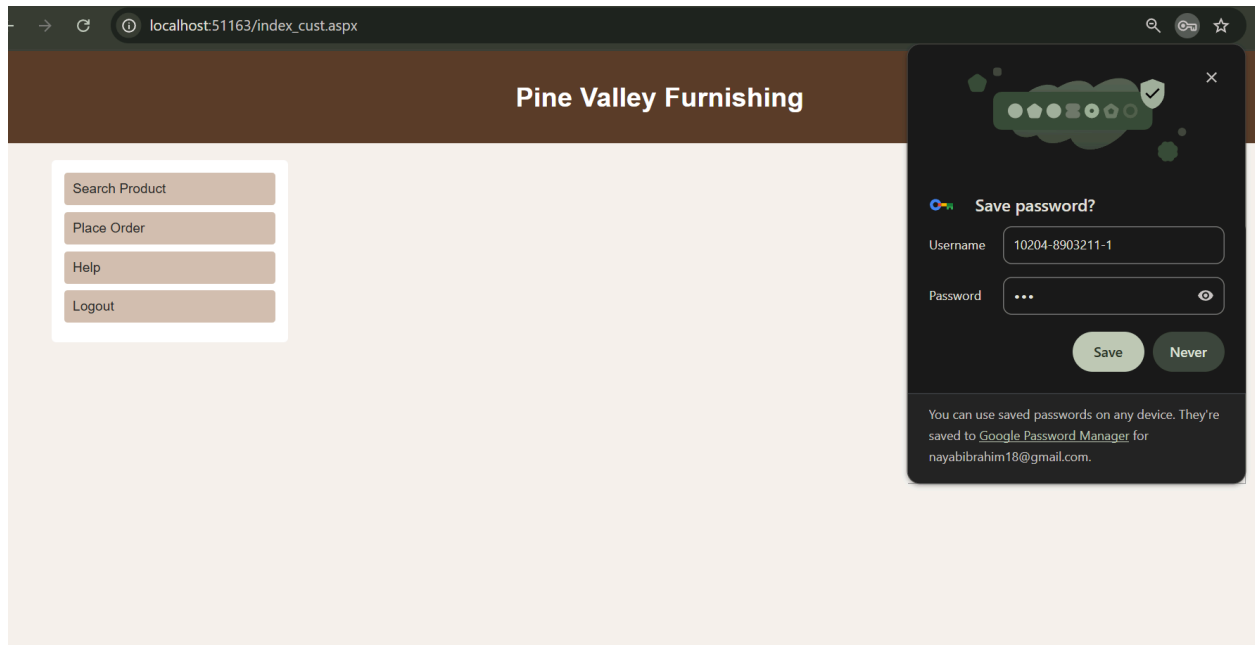
Same case observed with `Employee_login.aspx`

Pine Valley Furnishing

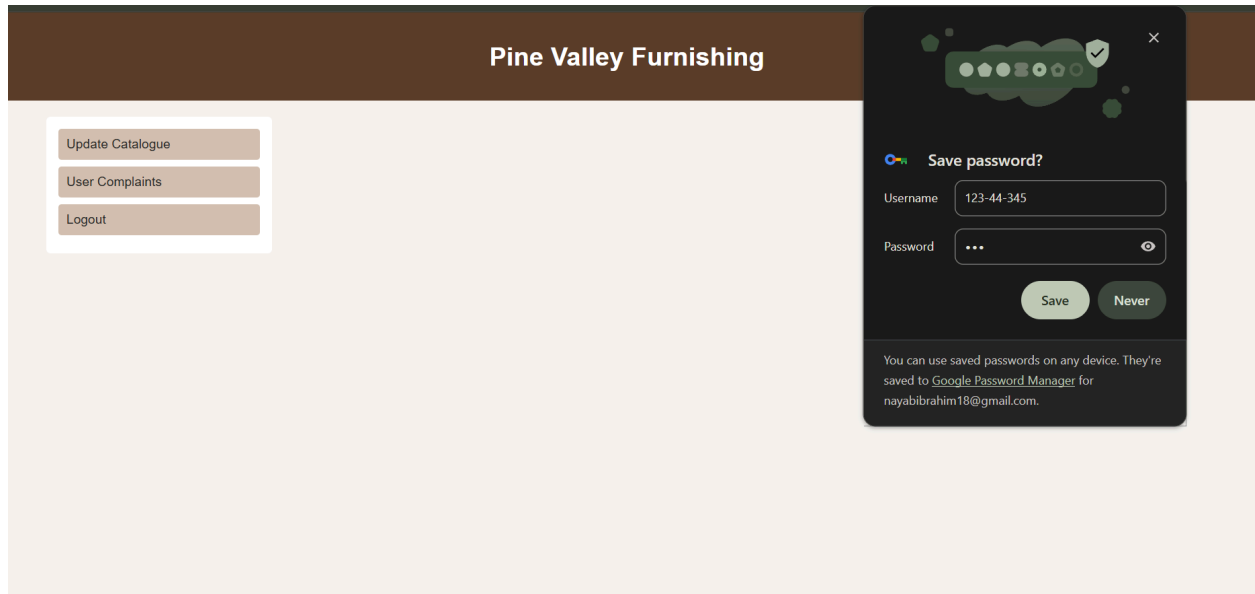
Employee Login

Please provide Employee ID and Password.

Test case 04: Enter correct login cnic and password. Access granted.



Same cases observed with Employe_login.aspx



Style Sheet code:

```
body {  
  font-family: Arial, sans-serif;  
  margin: 0;  
  background-color: #f5f3ef;  
  color: #2c2c2c;  
}
```

```
header {  
  background: #5a3e2b;  
  color: white;  
  padding: 15px;  
  text-align: center;  
}
```

```
.container {  
  width: 90%;  
  margin: auto;  
  padding: 20px;  
}
```

```
.menu {  
  width: 250px;  
  background: white;  
  padding: 15px;  
  border-radius: 5px;  
}
```

```
.menu a {  
  display: block;  
  padding: 10px;  
  margin-bottom: 8px;  
  background: #d6c2b0;  
  text-decoration: none;  
  color: #2c2c2c;  
  border-radius: 4px;  
}
```

```
.menu a:hover {  
  background: #8b5e3c;  
  color: white;  
}
```

```
}
```

```
.form-box {  
  background: white;  
  padding: 50px;  
  width: 400px;  
  margin: 50px auto;  
  border-radius: 5px;  
}
```

```
.form-box a {  
  display: block;  
  padding: 10px;  
  margin-bottom: 8px;  
  background: #d6c2b0;  
  text-decoration: none;  
  color: #2c2c2c;  
  border-radius: 4px;  
}
```

```
.form-box a:hover {  
  background: #8b5e3c;  
  color: white;  
}
```

```
.form-box p {  
  margin-top: 15px;  
  font-size: 14px;  
  text-align: center;  
}
```

```
.form-box a.text-link {  
  display: inline-block;  
  padding: 0;  
  margin: 0;  
  background: none;  
  color: #2e86ab;  
  border-radius: 0;  
}
```

```
.form-box a.text-link:hover {  
  background: none;  
  color: #2e86ab;  
  text-decoration: underline;
```

```
}
```

```
.form-box label {  
  display: block;  
  margin-bottom: 10px;  
}
```

```
}
```

```
.form-box input[type="checkbox"] {  
  width: auto;  
  margin-right: 8px;  
}
```

```
}
```

```
input, select {  
  padding: 8px;  
  margin-bottom: 12px;  
  border: 1px solid #ccc;  
  border-radius: 4px;  
  margin-left: 303px;  
}
```

```
}
```

```
button {  
  padding: 8px 15px;  
  background: #d6c2b0;  
  color: white;  
  border: none;  
  text-decoration: none;  
  color: #2c2c2c;  
  border-radius: 4px;  
  cursor: pointer;  
}
```

```
}
```

```
button:hover {  
  background: #8b5e3c;  
}
```

```
}
```

```
.products {  
  display: flex;  
  gap: 20px;  
}
```

```
}
```

```
.product-card {  
  background: white;  
  padding: 15px;  
  width: 150px;
```

```
    text-align: center;
    border-radius: 5px;
}

.group {
    margin-bottom: 15px;
}

.group label {
    display: block;
    margin-bottom: 8px;
}

.group input[type="radio"] {
    width: auto;
    margin-right: 8px;
}

.btn-group {
    margin-top: 15px;
}

.btn-group button {
    margin-right: 10px;
}

.panel {
    background: none;
    border-radius: 5px;
    max-width: 800px;
}

.panel input {
    width: 70%;
    display: inline-block;
}

.panel button {
    display: inline-block;
    margin-left: 10px;
}

.list {
    list-style: none;
```

```
padding: 0;  
}
```

```
.list li {  
background: #d6c2b0;  
margin-bottom: 8px;  
padding: 8px;  
border-radius: 4px;  
}
```