

Problem 1: Implementation of Segmentation Analysis using the Suggested Methodology

a) Define and describe customer segments:

Segment Name	Description	Condition
Premium Customers	High-value clients who contribute the most to the company's ROI.	Total spending > \$2,000 .
Frequent Customers	Customers who revisit frequently to place orders, regardless of the value.	Number of orders > 1 .
Bulk Buyers	Customers who may have low frequency but buy high quantities of products.	Total units purchased > 10 .
Occasional High-Spenders	Customers who buy expensive products repeatedly or most expensive products occasionally.	Average price per item > \$500 .
New/Inactive Customers	Customers with very few records in the order table or low overall spending.	Total spending < \$500 .

c)Write SQL queries to generate segmentation data.

1. Premium Customers Logic: total spending>\$2,000

```
SELECT C.Customer_Id, C.Customer_Name,
SUM(OL.Ordered_Quantity * OL.Standard_Price) AS Total_Spent
FROM CUSTOMER_t C
JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id
JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id
GROUP BY C.Customer_Id, C.Customer_Name
HAVING SUM(OL.Ordered_Quantity * OL.Standard_Price) > 2000;
```

2. Frequent Customers Logic: (High frequency)

```
SELECT C.Customer_Id, C.Customer_Name,
COUNT(O.Order_Id) AS Order_Frequency
FROM CUSTOMER_t C
JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id
GROUP BY C.Customer_Id, C.Customer_Name
HAVING COUNT(O.Order_Id) > 1;
```

3. Bulk Buyers Logic: (Total units > 10)

```
SELECT C.Customer_Id, C.Customer_Name,
SUM(OL.Ordered_Quantity) AS Total_Units_Purchased
FROM CUSTOMER_t C
JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id
JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id
GROUP BY C.Customer_Id, C.Customer_Name
HAVING SUM(OL.Ordered_Quantity) > 10;
```

4. Occasional High-Spenders Logic: (Average price per item > \$500).

```
SELECT C.Customer_Id, C.Customer_Name,
AVG(OL.Standard_Price) AS Avg_Item_Price
FROM CUSTOMER_t C
JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id
JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id
GROUP BY C.Customer_Id, C.Customer_Name
HAVING AVG(OL.Standard_Price) > 500;
```

5. New/Inactive Customers Logic:(Low ROI)

```
SELECT C.Customer_Id,C.Customer_Name,
ISNULL(SUM(OL.Ordered_Quantity * OL.Standard_Price), 0) AS [Actual Revenue]
FROM CUSTOMER_t C
LEFT JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id
LEFT JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id
```

```
GROUP BY C.Customer_Name,C.Customer_Id
HAVING SUM(OL.Ordered_Quantity * OL.Standard_Price) < 500
OR SUM(OL.Ordered_Quantity * OL.Standard_Price) IS NULL
```

d)Develop an interface in visual studio for segmentation analysis.

SegmentationAnalysis.aspx:

```
<%@ Page Language="VB" AutoEventWireup="false"
CodeFile="SegmentationAnalysis.aspx.vb" Inherits="SegmentationAnalysis" %>

<!DOCTYPE html>
<html>
<head runat="server">
  <title>PVFC - Segmentation Analysis</title>
  <link rel="stylesheet" type="text/css" href="StyleSheet.css" />
  <style>
    .gv-container { background: white; padding: 20px; border-radius: 5px; margin-top: 20px; }
    .grid-style { width: 100%; border-collapse: collapse; background: white; }
    .grid-style th { background-color: #5a3e2b; color: white; padding: 10px; }
    .grid-style td { padding: 10px; border-bottom: 1px solid #d6c2b0; text-align: center; }
    header {background: #5a3e2b;color: white;padding: 15px;text-align: center;}
  </style>
</head>
<body>
  <form id="form1" runat="server">
    <header>
      <h1>PVFC Business Intelligence Dashboard</h1>
    </header>

    <div class="container">
      <div class="panel">
        <label style="font-weight:bold;">Select Customer Segment for Analysis:</label>

        <asp:DropDownList ID="ddlSegments" runat="server" AutoPostBack="true"
OnSelectedIndexChanged="ddlSegments_SelectedIndexChanged">
          <asp:ListItem Text="-- Click to Choose Segment --" Value="None"></asp:ListItem>
          <asp:ListItem Text="Premium Customers" Value="Premium"></asp:ListItem>
          <asp:ListItem Text="Frequent Customers" Value="Frequent"></asp:ListItem>
          <asp:ListItem Text="Bulk Buyers" Value="Bulk"></asp:ListItem>
          <asp:ListItem Text="Occasional High-Spenders"
Value="HighSpender"></asp:ListItem>
          <asp:ListItem Text="Inactive Customers" Value="Inactive"></asp:ListItem>
        </asp:DropDownList>
      </div>
    </div>
  </form>
</body>
</html>
```

```

        </asp:DropDownList>

        <asp:Label ID="lblMessage" runat="server" CssClass="group" style="display:block;
color: #8b5e3c; font-weight: bold; margin-top:10px;"></asp:Label>
    </div>

    <div class="gv-container">
        <asp:GridView ID="gvSegmentation" runat="server" CssClass="grid-style"
GridLines="None" AutoGenerateColumns="true">
            <HeaderStyle CssClass="header-row" />
            <EmptyDataTemplate>
                <p style="text-align:center; padding:20px;">No records found for the selected
segment.</p>
            </EmptyDataTemplate>
        </asp:GridView>
    </div>
</div>
</form>
</body>
</html>

```

[SegmentationAnalysis.aspx.vb:](#)

Imports System.Data

Imports System.Data.SqlClient

Imports System.Web.Configuration ' for connection from Web.config file

Partial Class SegmentationAnalysis

Inherits System.Web.UI.Page

' Connection string directly pick from web.config

Dim connStr As String =

WebConfigurationManager.ConnectionStrings("PVFCCConnection").ConnectionString

Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load

' Security Check: only Admin (1) and Employee (2) are allow

' if session RoleID is missing or it Customer (3) , redirect to login page

If Session("RoleID") Is Nothing OrElse (Session("RoleID") <> 1 And Session("RoleID") <>

2) Then

 Response.Redirect("Login_as.aspx")

End If

End Sub

Protected Sub ddlSegments_SelectedIndexChanged(sender As Object, e As EventArgs)

Dim segment As String = ddlSegments.Selected
Dim query As String = ""

' Five Segments Logic

Select Case segment

Case "Premium"

' Total spending > 2000

query = "SELECT C.Customer_Name, SUM(OL.Ordered_Quantity *
OL.Standard_Price) AS [Total Spent (\$)] " &
"FROM CUSTOMER_t C JOIN ORDER_t O ON C.Customer_Id =
O.Customer_Id " &
"JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id " &
"GROUP BY C.Customer_Name HAVING SUM(OL.Ordered_Quantity *
OL.Standard_Price) > 2000"
lblMessage.Text = "Segment: High-Value Premium Customers"

Case "Frequent"

' More than 1 order

query = "SELECT C.Customer_Name, COUNT(O.Order_Id) AS [Total Orders] " &
"FROM CUSTOMER_t C JOIN ORDER_t O ON C.Customer_Id =
O.Customer_Id " &
"GROUP BY C.Customer_Name HAVING COUNT(O.Order_Id) > 1"
lblMessage.Text = "Segment: Frequent Customers"

Case "Bulk"

' More than 10 units in total

query = "SELECT C.Customer_Name, SUM(OL.Ordered_Quantity) AS [Total Units
Purchased] " &
"FROM CUSTOMER_t C JOIN ORDER_t O ON C.Customer_Id =
O.Customer_Id " &
"JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id " &
"GROUP BY C.Customer_Name HAVING SUM(OL.Ordered_Quantity) > 10"
lblMessage.Text = "Segment: Bulk Buyers"

Case "HighSpender"

' Avg price per item > 500

query = "SELECT C.Customer_Name, AVG(OL.Standard_Price) AS [Average Item
Price] " &
"FROM CUSTOMER_t C JOIN ORDER_t O ON C.Customer_Id =
O.Customer_Id " &
"JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id " &
"GROUP BY C.Customer_Name HAVING AVG(OL.Standard_Price) > 500"
lblMessage.Text = "Segment: Occasional High-Spenders"

Case "Inactive"

' Logic: Total spending < 500

```
query = "SELECT C.Customer_Name, " &  
        "ISNULL(SUM(OL.Ordered_Quantity * OL.Standard_Price), 0) AS [Actual  
Revenue] " &  
        "FROM CUSTOMER_t C " &  
        "LEFT JOIN ORDER_t O ON C.Customer_Id = O.Customer_Id " &  
        "LEFT JOIN Order_line_t OL ON O.Order_Id = OL.Order_Id " &  
        "GROUP BY C.Customer_Name " &  
        "HAVING SUM(OL.Ordered_Quantity * OL.Standard_Price) < 500 " &  
        "OR SUM(OL.Ordered_Quantity * OL.Standard_Price) IS NULL"  
lblMessage.Text = "Analysis: New or Inactive Customers (Revenue < $500)"
```

Case Else

gvSegmentation.DataSource = Nothing

gvSegmentation.DataBind()

lblMessage.Text = ""

Return

End Select

BindGrid(query)

End Sub

Private Sub BindGrid(sqlQuery As String)

Using conn As New SqlConnection(connStr)

Dim cmd As New SqlCommand(sqlQuery, conn)

Dim da As New SqlDataAdapter(cmd)

Dim dt As New DataTable()

Try

conn.Open()

da.Fill(dt)

' if table is empty show message

If dt.Rows.Count = 0 Then

lblMessage.Text = "No customers found in this category."

End If

gvSegmentation.DataSource = dt

gvSegmentation.DataBind()

Catch ex As Exception

lblMessage.Text = "Database error: " & ex.Message

lblMessage.ForeColor = Drawing.Color.Red

End Try
End Using
End Sub
End Class

PVFC Business Intelligence Dashboard	
Select Customer Segment for Analysis: Premium Customers	
Segment: High-Value Premium Customers	
Customer Name	Total Spent (\$)
Contemporary Casuals	3900.00
Eastern Furniture	3700.00
Value Furniture	2900.00

Problem 2 : Automate targeted marketing

TargetedMarketing.aspx

```
<%@ Page Language="VB" AutoEventWireup="false" CodeFile="TargetedMarketing.aspx.vb"  
Inherits="TargetedMarketing" %>
```

```
<!DOCTYPE html>  
<html>  
<head runat="server">  
  <title>PVFC - Automated Targeted Marketing</title>  
  <link rel="stylesheet" type="text/css" href="StyleSheet.css" />  
  <style>  
    .marketing-panel { background: white; padding: 30px; border-radius: 8px; margin-top: 20px;  
box-shadow: 0 2px 5px rgba(0,0,0,0.1); }  
    .status-box { margin-top: 20px; padding: 15px; border-radius: 4px; display: none; }  
    .success { display: block; background-color: #d6c2b0; color: #155724; border: 1px solid  
#c3e6cb; }  
    header {background: #5a3e2b;color: white;padding: 15px;text-align: center;}  
  
  </style>  
</head>
```

```

<body>
  <form id="form1" runat="server">
    <header>
      <h1>Automated Targeted Marketing</h1>
    </header>

    <div class="container">
      <div class="marketing-panel">
        <h3> Select Target Segment</h3>
        <asp:DropDownList ID="ddlMarketingSegments" runat="server">
          <asp:ListItem Text="-- Select Segment to Target --" Value="None"></asp:ListItem>
          <asp:ListItem Text="Premium Customers (Send Gift & Thanks)"
Value="Premium"></asp:ListItem>
          <asp:ListItem Text="Frequent Customers (Loyalty Offer)"
Value="Frequent"></asp:ListItem>
          <asp:ListItem Text="Inactive Customers (Discount Coupon)"
Value="Inactive"></asp:ListItem>
        </asp:DropDownList>

        <br /><br />
        <h3> Trigger Automation</h3>
        <asp:Button ID="btnRunCampaign" runat="server" Text="Start Automated Campaign"
OnClick="btnRunCampaign_Click" CssClass="button" style="background:#8b5e3c; color:white;
cursor:pointer;" />

        <asp:Panel ID="pnlStatus" runat="server" CssClass="status-box">
          <asp:Label ID="lblMarketingStatus" runat="server"></asp:Label>
        </asp:Panel>
      </div>
    </div>
    <asp:Button ID="btnBack" runat="server" Text="Back" PostBackUrl="index_emp.aspx"
Width="188px" />

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

```

[TargetedMarking.aspx.vb](#)

```

Imports System.Data
Imports System.Data.SqlClient
Imports System.Web.Configuration

```

Partial Class TargetedMarketing
Inherits System.Web.UI.Page

Dim connStr As String =
WebConfigurationManager.ConnectionStrings("PVFCCConnection").ConnectionString

Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
' Security: only Admin/Employee access
If Session("RoleID") Is Nothing OrElse (Session("RoleID") <> 1 And Session("RoleID") <>
2) Then
 Response.Redirect("Login_as.aspx")
End If
End Sub

Protected Sub btnRunCampaign_Click(sender As Object, e As EventArgs)
Dim segment As String = ddlMarketingSegments.SelectedValue
If segment = "None" Then
 lblMarketingStatus.Text = "Please select a segment first!"
 pnlStatus.CssClass = "status-box"
 pnlStatus.Style("display") = "block"
 pnlStatus.Style("background-color") = "#d6c2b0"
 Return
End If

Dim query As String = ""
Dim actionMessage As String = ""

' Logic for each segment
Select Case segment
 Case "Premium"
 ' Royal Customers: Gift + Thanks Email
 query = "SELECT Customer_Name, Customer_Address FROM CUSTOMER_t
WHERE Customer_Id IN " &
 "(SELECT O.Customer_Id FROM ORDER_t O JOIN Order_line_t OL ON
O.Order_Id = OL.Order_Id " &
 "GROUP BY O.Customer_Id HAVING SUM(OL.Ordered_Quantity *
OL.Standard_Price) > 2000)"
 actionMessage = "Action: Complimentary Gift dispatched to address and 'Thank You'
email sent to: "

 Case "Frequent"
 ' Frequent: Loyalty Reward Message
 query = "SELECT Customer_Name FROM CUSTOMER_t WHERE Customer_Id IN "
&

```
"(SELECT Customer_Id FROM ORDER_t GROUP BY Customer_Id HAVING  
COUNT(Order_Id) > 1)"
```

```
actionMessage = "Action: Loyalty discount coupon sent via SMS to: "
```

```
Case "Inactive"
```

```
' Inactive: We Miss You Voucher
```

```
query = "SELECT Customer_Name FROM CUSTOMER_t WHERE Customer_Id  
NOT IN (SELECT Customer_Id FROM ORDER_t)"
```

```
actionMessage = "Action: 'We Miss You' 15% discount voucher emailed to: "
```

```
End Select
```

```
ProcessCampaign(query, actionMessage)
```

```
End Sub
```

```
Private Sub ProcessCampaign(sqlQuery As String, actionText As String)
```

```
Using conn As New SqlConnection(connStr)
```

```
Dim cmd As New SqlCommand(sqlQuery, conn)
```

```
Dim dt As New DataTable()
```

```
Try
```

```
conn.Open()
```

```
Dim da As New SqlDataAdapter(cmd)
```

```
da.Fill(dt)
```

```
If dt.Rows.Count > 0 Then
```

```
Dim customerNames As String = ""
```

```
For Each row As DataRow In dt.Rows
```

```
customerNames &= row("Customer_Name").ToString() & ", "
```

```
Next
```

```
pnlStatus.CssClass = "status-box success"
```

```
pnlStatus.Style("display") = "block"
```

```
IblMarketingStatus.Text = "<b>Automation Success!</b><br/>" & actionText &  
"<br/><i>" & customerNames.TrimEnd(", ".ToCharArray()) & "</i>"
```

```
Else
```

```
IblMarketingStatus.Text = "No customers found in this segment to target."
```

```
pnlStatus.Style("display") = "block"
```

```
End If
```

```
Catch ex As Exception
```

```
IblMarketingStatus.Text = "Automation Error: " & ex.Message
```

```
pnlStatus.Style("display") = "block"
```

```
End Try
```

```
End Using
```

End Sub
End Class

Automated Targeted Marketing

Select Target Segment

Premium Customers (Send Gift & Thanks) ▼

Trigger Automation

Start Automated Campaign

Automation Success!

Action: Complimentary Gift dispatched to address and 'Thank You' email sent to:
Value Furniture, Contemporary Casuals, Eastern Furniture

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Problem 3: Test Cases for Segmentation Analysis platform

Test case 01: Select no customer segment

PVFC Business Intelligence Dashboard

Select Customer Segment for Analysis: ... Click to Choose Segment ... ▼

No records found for the selected segment.

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Test case 02: Select the Premium Customer segment

Select Customer Segment for Analysis: Premium Customers ▼

Segment: High-Value Premium Customers

Customer_Name	Total Spent (\$)
Contemporary Casuals	3900.00
Eastern Furniture	3700.00
Value Furniture	2900.00

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Test case 03: Select the frequent Customer segment

PVFC Business Intelligence Dashboard

Select Customer Segment for Analysis:

Segment: Frequent Customers

Customer_Name	Total Orders
Contemporary Casuals	2
Eastern Furniture	2
Impressions	5
Seminole Interiors	3

Test case 04: Select the bulk buyer Customer segment

PVFC Business Intelligence Dashboard

Select Customer Segment for Analysis:

Segment: Bulk Buyers

Customer_Name	Total Units Purchased
Contemporary Casuals	15

Test case 05: Select the Occasional high splendor Customer segment

PVFC Business Intelligence Dashboard

Select Customer Segment for Analysis:

Segment: Occasional High-Spenders

Customer_Name	Average Item Price
Eastern Furniture	725.000000
Home Furnishings	650.000000
Value Furniture	591.666666

Test case 06: Select the Inactive Customer segment

PVFC Business Intelligence Dashboard

Select Customer Segment for Analysis:

Analysis: New or Inactive Customers (Revenue < \$500)

Customer Name	Actual Revenue
	0.00
Furniture Gallery	0.00
Heritage Furnishings	0.00
Kaneohe Homes	0.00
M and H Casual Furniture	0.00
Period Furniture	0.00
Seminole Interiors	0.00

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