LAMPIRAN A

Listing Program

- **Module ModConnection**

```vbnet
Imports MySql.Data.MySqlClient
Module ModConnection
    Public Function conString() As String
        conString = ("server=localhost;user id=root;database=db_jadwalpraktikum;pooling=false;connection
timeout=5") ' Setting string buat koneksi ke database
    End Function
    Public Function testcon() As Boolean
        Try
            Dim Conn As New MySqlConnection
            Conn.ConnectionString = conString()
            Conn.Open()
            If Conn.State = ConnectionState.Open Then
                testcon = True
                Conn.Close()
            Else
                testcon = False
                MsgBox("Tidak Terhubung", MsgBoxStyle.Critical, "Warning!!")
            End If
        Catch ex As Exception
            testcon = False
            MsgBox("Tidak Terhubung", MsgBoxStyle.Critical, "Warning!!")
        End Try
    End Function
    Public Function SQLTable(ByVal Source As String) As DataTable 'buat select data2 pada tabel
        Try
            Dim conn As New MySqlConnection
            conn.ConnectionString = ("server=localhost;user id=root;database=db_jadwalpraktikum")
            'bikin data adapter....
            Dim Adapter As New MySqlDataAdapter(Source, conn.connectionString)
            Dim DT As New DataTable

            Adapter.Fill(DT)
            SQLTable = DT
        Catch ex As MySqlException
            MsgBox(ex.Message)
            SQLTable = Nothing
        End Try
    End Function

    Public Function ExecSQL(ByVal SQLCommand As String) As Boolean 'perintah simpan, ubah, hapus
        Dim Con As New MySqlConnection
        Dim Cmd As New MySqlCommand
        Try
            Con.ConnectionString = ("server=localhost;user id=root;database=db_jadwalpraktikum")
            Con.Open()
            Cmd.CommandText = SQLCommand
            Cmd.Connection = Con
            Cmd.ExecuteNonQuery()
            Con.Close()
            ExecSQL = True
        Catch ex As MySqlException
            MsgBox(ex.Message)
            ExecSQL = False
            If Con.State = ConnectionState.Open Then Con.Close()
        End Try
    End Function
End Module
```

- *Form Main Menu*

```
Public Class frmMainMenu
    Private Sub Button1_Click(sender As System.Object, e As System.EventArgs) Handles Button1.Click
        frmMataKuliah.Show()
    End Sub

    Private Sub Button2_Click(sender As System.Object, e As System.EventArgs) Handles Button2.Click
        frmMataKuliahPeserta.Show()
    End Sub

    Private Sub Button3_Click(sender As System.Object, e As System.EventArgs) Handles Button3.Click
        frmPraktikum.Show()
    End Sub

    Private Sub Button4_Click(sender As System.Object, e As System.EventArgs) Handles Button4.Click
        frmPesertaPraktikum.Show()
    End Sub

    Private Sub Button5_Click(sender As System.Object, e As System.EventArgs) Handles Button5.Click
        frmHasilProses.Show()
    End Sub
End Class
```

- *Form* Mata Kuliah

```
Public Class frmMataKuliah
    Dim kodemk, matakuliah, kelas, hari, jammasuk, jamkeluar As String
    Dim masukkanID As Integer

    Private Sub frmMataKuliah_Load(sender As System.Object, e As System.EventArgs) Handles
MyBase.Load
        gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
    End Sub

    Private Sub btSimpan_Click(sender As System.Object, e As System.EventArgs) Handles
btSimpan.Click
        kodemk = txtKodeMataKuliah.Text
        matakuliah = txtNamaMataKuliah.Text
        hari = cmbHari.SelectedItem
        kelas = txtKelas.Text
        jammasuk = cmbJamMasuk.SelectedItem
        jamkeluar = cmbJamKeluar.SelectedItem
        Try
            If String.IsNullOrEmpty(kodemk) Then
                MsgBox("Anda Belum Mengisi Kode Mata Kuliah!!")
            Else
                ExecSQL("Insert Into `mata kuliah` Values('" & "','" & kodemk & "','" & matakuliah & "', '" &
hari & "','" & kelas & "','" & jammasuk & "','" & jamkeluar & "')")
                gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
                txtKodeMataKuliah.Text = Nothing
                txtNamaMataKuliah.Text = Nothing
                cmbHari.Text = Nothing
                txtKelas.Text = Nothing
                cmbJamMasuk.SelectedItem = Nothing
                cmbJamKeluar.SelectedItem = Nothing
            End If
        Catch ex As Exception
            MsgBox(ex.Message)
```

```vbnet
            End Try
        End Sub

    Private Sub btUbah_Click(sender As System.Object, e As System.EventArgs) Handles btUbah.Click
        If btUbah.Text = "&Ubah" Then 'Proses pemanggilan data (ubah)
            Dim i As Integer
            masukkanID = InputBox("Masukkan ID Mata Kuliah", "Ubah Data", "")
            masukkanID = masukkanID - 1 'Decrement
            txtKodeMataKuliah.Text = gridMataKuliah.Item(1, masukkanID).Value
            txtNamaMataKuliah.Text = gridMataKuliah.Item(2, masukkanID).Value
            txtKelas.Text = gridMataKuliah.Item(4, masukkanID).Value
            'loop untuk penyamaan pilihan hari, jam masuk, dan jam keluar
            For i = 0 To (cmbHari.Items.Count - 1)
                If gridMataKuliah.Item(3, masukkanID).Value = cmbHari.Items(i).ToString Then
                    cmbHari.SelectedIndex = i
                End If
            Next i

            For i = 0 To (cmbJamMasuk.Items.Count - 1)
                If (gridMataKuliah.Item(5, masukkanID).Value.ToString) = cmbJamMasuk.Items(i).ToString
Then
                    cmbJamMasuk.SelectedIndex = i
                End If
            Next i

            For i = 0 To (cmbJamKeluar.Items.Count - 1)
                If (gridMataKuliah.Item(6, masukkanID).Value.ToString) = cmbJamKeluar.Items(i).ToString
Then
                    cmbJamKeluar.SelectedIndex = i
                End If
            Next i
            btSimpan.Enabled = False
            btHapus.Enabled = False
            btUbah.Text = "Simpan"
        Else
            'proses simpan
            kodemk = txtKodeMataKuliah.Text
            matakuliah = txtNamaMataKuliah.Text
            hari = cmbHari.SelectedItem
            kelas = txtKelas.Text
            jammasuk = cmbJamMasuk.SelectedItem
            jamkeluar = cmbJamKeluar.SelectedItem
            Try
                If String.IsNullOrEmpty(kodemk) Then
                    MsgBox("Anda Belum Mengisi Kode Mata Kuliah!!")
                Else
                    ExecSQL("Update `mata kuliah` SET `Nama Mata Kuliah`= '" & matakuliah & "', `Hari`= '"
& hari & "', `Kelas`= '" & kelas _
                    & "', `Jam Masuk`= '" & jammasuk & "', `Jam Keluar`= '" & jamkeluar & "' WHERE `ID` =
'" & (masukkanID + 1) & "'")
                    gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
                    txtKodeMataKuliah.Text = Nothing
                    txtNamaMataKuliah.Text = Nothing
                    cmbHari.Text = Nothing
                    txtKelas.Text = Nothing
                    cmbJamMasuk.SelectedItem = Nothing
                    cmbJamKeluar.SelectedItem = Nothing
                    btSimpan.Enabled = True
                    btHapus.Enabled = True
                    btUbah.Text = "&Ubah"
                End If
            Catch ex As Exception
```

```
                    MsgBox(ex.Message)
            End Try
        End If
    End Sub

    Private Sub btHapus_Click(sender As System.Object, e As System.EventArgs) Handles btHapus.Click
        Try
            masukkanID = InputBox("Masukkan ID Mata Kuliah", "Hapus Data", "")
            ExecSQL("Delete FROM `mata kuliah` WHERE `ID` = '" & masukkanID & "'")
            gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
            Dim i As Integer
            For i = 0 To (gridMataKuliah.RowCount - 1)
                ExecSQL("UPDATE `mata kuliah` SET `ID` = '" & (i + 1) & "' WHERE `Kode Mata Kuliah` =
'" & (gridMataKuliah.Item(1, i).Value) & "' and `Kelas` = '" & (gridMataKuliah.Item(4, i).Value) & "'")
                gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
            Next i
            'Update Auto Increment untuk kolom ID
            ExecSQL("ALTER TABLE `mata kuliah` AUTO_INCREMENT = " &
(gridMataKuliah.RowCount))
            gridMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
        Catch ex As Exception
            MsgBox(ex.Message)
        End Try
    End Sub
End Class
```

• *Form* Mata Kuliah Peserta

```
Public Class frmMataKuliahPeserta
    Dim masukkanID, IDmk As Integer
    Dim NRP, Kode, Nama, Kelas As String
    Private Sub frmMataKuliahPeserta_Load(sender As System.Object, e As System.EventArgs) Handles
MyBase.Load
        'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
        gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata kuliah`.`Kode
Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata kuliah` ON
`mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID` ")
        gridBaca.DataSource = SQLTable("Select * FROM `mata kuliah`")
        Dim i, j As Integer
        Dim Ada As Boolean
        For i = 0 To (gridBaca.RowCount - 2)
            Kode = gridBaca.Item(1, i).Value
            'Mengecek apakah kode mata kuliah sudah ada atau belum di cmbKodeMataKuliah (jangan
sampai ada pengulangan)
            Ada = False
            For j = 0 To cmbKodeMataKuliah.Items.Count - 1
                If Kode = cmbKodeMataKuliah.Items(j).ToString Then
                    Ada = True
                End If
            Next j
            If Ada = False Then
                cmbKodeMataKuliah.Items.Add(Kode)
            End If
        Next i
    End Sub

    Private Sub cmbKodeMataKuliah_SelectedIndexChanged(sender As System.Object, e As
System.EventArgs) Handles cmbKodeMataKuliah.SelectedIndexChanged
        'untuk menampilkan kelas dan nama mata kuliah sesuai dengan Kode Mata Kuliah yang dipilih
```

```vbnet
        Dim i As Integer
        If cmbKodeMataKuliah.SelectedIndex = -1 Then
            cmbKelas.SelectedIndex = -1
            Label4.Text = "Tampilan Nama Mata Kuliah"
        Else
            cmbKelas.Items.Clear()
            For i = 0 To (gridBaca.RowCount - 2)
                Kode = gridBaca.Item(1, i).Value
                If Kode = cmbKodeMataKuliah.SelectedItem.ToString Then
                    Label4.Text = gridBaca.Item(2, i).Value 'menampilkan nama mata kuliah dari kode mata
kuliah yang dipilih
                    cmbKelas.Items.Add(gridBaca.Item(4, i).Value)
                End If
            Next i
        End If

    End Sub

    Private Sub btSimpan_Click(sender As System.Object, e As System.EventArgs) Handles
btSimpan.Click
        Dim i As Integer
        If cmbKodeMataKuliah.SelectedIndex > -1 Then 'mengecek apakah cmbkodematakuliah sudah
dipilih atau belum
            For i = 0 To (gridBaca.RowCount - 2)
                Kode = gridBaca.Item(1, i).Value
                Kelas = gridBaca.Item(4, i).Value
                If cmbKodeMataKuliah.SelectedItem.ToString = Kode And cmbKelas.SelectedItem.ToString =
Kelas Then
                    IDmk = i + 1
                End If
            Next i
            NRP = txtNRP.Text
            Try
                If String.IsNullOrEmpty(NRP) Then
                    MsgBox("Anda Belum Mengisi NRP!!")
                Else
                    ExecSQL("Insert Into `peserta_mk` Values('" & "','" & NRP & "','" & IDmk & "')")
                    'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
                    gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata
kuliah`.`Kode Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata
kuliah` ON `mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID`")
                    txtNRP.Text = Nothing
                    cmbKodeMataKuliah.SelectedIndex = -1
                    'cmbKelas.SelectedIndex = 0
                End If
            Catch ex As Exception
                MsgBox(ex.Message)
            End Try
        Else
            MsgBox("Kode Mata Kuliah Belum Terpilih")
        End If
    End Sub

    Private Sub btUbah_Click(sender As System.Object, e As System.EventArgs) Handles btUbah.Click
        If btUbah.Text = "&Ubah" Then 'Proses pemanggilan data (ubah)
            Dim i As Integer
            masukkanID = InputBox("Masukkan ID Mata Kuliah", "Ubah Data", "")
            masukkanID = masukkanID - 1 'Decrement
            txtNRP.Text = gridMataKuliahPeserta.Item(1, masukkanID).Value
            IDmk = gridMataKuliahPeserta.Item(2, masukkanID).Value
            IDmk = IDmk - 1
            Kode = gridBaca.Item(1, IDmk).Value
```

```vbnet
            Nama = gridBaca.Item(2, IDmk).Value
            Kelas = gridBaca.Item(4, IDmk).Value
            Label4.Text = Nama
            For i = 0 To (cmbKodeMataKuliah.Items.Count - 1) 'loop untuk penyamaan Kode Mata Kuliah
                If Kode = cmbKodeMataKuliah.Items(i).ToString Then
                    cmbKodeMataKuliah.SelectedIndex = i
                End If
            Next i
            For i = 0 To (cmbKelas.Items.Count - 1) 'loop untuk penyamaan Kode Mata Kuliah
                If Kelas = cmbKelas.Items(i).ToString Then
                    cmbKelas.SelectedIndex = i
                End If
            Next i
            btSimpan.Enabled = False
            btHapus.Enabled = False
            btUbah.Text = "Simpan"
        Else
            ' Proses Simpan (Update)
            For i = 0 To (gridBaca.RowCount - 2)
                Kode = gridBaca.Item(1, i).Value
                Kelas = gridBaca.Item(4, i).Value
                If cmbKodeMataKuliah.SelectedItem.ToString = Kode And cmbKelas.SelectedItem.ToString =
Kelas Then
                    IDmk = i + 1
                End If
            Next i
            NRP = txtNRP.Text
            Try
                If String.IsNullOrEmpty(NRP) Then
                    MsgBox("Anda Belum Mengisi NRP!!")
                Else
                    ExecSQL("Update `peserta_mk` SET `NRP`= '" & NRP & "', `ID_MK`= '" & IDmk & "'
WHERE `ID` = '" & (masukkanID + 1) & "'")
                    'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
                    gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata
kuliah`.`Kode Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata
kuliah` ON `mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID`")
                    txtNRP.Text = Nothing
                    cmbKodeMataKuliah.SelectedIndex = 0
                    cmbKelas.SelectedIndex = 0
                    btSimpan.Enabled = True
                    btHapus.Enabled = True
                    btUbah.Text = "&Ubah"
                End If
            Catch ex As Exception
                MsgBox(ex.Message)
            End Try
        End If
    End Sub

    Private Sub btHapus_Click(sender As System.Object, e As System.EventArgs) Handles btHapus.Click
        Try
            masukkanID = InputBox("Masukkan ID Peserta", "Hapus Data", "")
            ExecSQL("Delete FROM `peserta_mk` WHERE `ID` = '" & masukkanID & "'")
            'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
            gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata kuliah`.`Kode
Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata kuliah` ON
`mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID`")
            Dim i As Integer
            'Memperbaiki urutan ID
            For i = 0 To (gridMataKuliahPeserta.RowCount - 1)
```

```vbnet
        ExecSQL("UPDATE `peserta_mk` SET `ID` = '" & (i + 1) & "' WHERE `NRP` = '" &
(gridMataKuliahPeserta.Item(1, i).Value) & "'  and `ID_MK` = '" & (gridMataKuliahPeserta.Item(2,
i).Value) & "'")
                'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
                gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata
kuliah`.`Kode Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata
kuliah` ON `mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID`")
            Next i
            'Update Auto Increment untuk kolom ID
            ExecSQL("ALTER TABLE `peserta_mk` AUTO_INCREMENT = " &
(gridMataKuliahPeserta.RowCount))
            'gridMataKuliahPeserta.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
            gridMataKuliahPeserta.DataSource = SQLTable("SELECT `peserta_mk`.*, `mata kuliah`.`Kode
Mata Kuliah`, `mata kuliah`.`Nama Mata Kuliah` FROM `peserta_mk` INNER JOIN `mata kuliah` ON
`mata kuliah`.ID = `peserta_mk`.ID_MK ORDER BY `ID`")
        Catch ex As Exception
            MsgBox(ex.Message)
        End Try
    End Sub
End Class
```

• *Form* Praktikum

```vbnet
Public Class frmPraktikum
    Dim namaprak As String
    Dim masukkanID As Integer
    Private Sub frmPraktikum_Load(sender As System.Object, e As System.EventArgs) Handles
MyBase.Load
        gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum`")
    End Sub

    Private Sub btSimpan_Click(sender As System.Object, e As System.EventArgs) Handles
btSimpan.Click
        namaprak = txtNamaPraktikum.Text
        Try
            If String.IsNullOrEmpty(namaprak) Then
                MsgBox("Anda Belum Mengisi Nama Praktikum!!")
            Else
                ExecSQL("Insert Into `praktikum` Values('" & "','" & namaprak & "','" & "','" & "','" & "')")
                gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum`")
                txtNamaPraktikum.Text = Nothing
            End If
        Catch ex As Exception
            MsgBox(ex.Message)
        End Try
    End Sub

    Private Sub btUbah_Click(sender As System.Object, e As System.EventArgs) Handles btUbah.Click
        If btUbah.Text = "&Ubah" Then 'Proses pemanggilan data (ubah)
            masukkanID = InputBox("Masukkan ID Mata Kuliah", "Ubah Data", "")
            masukkanID = masukkanID - 1 'Decrement
            txtNamaPraktikum.Text = gridPraktikum.Item(1, masukkanID).Value
            btSimpan.Enabled = False
            btHapus.Enabled = False
            btUbah.Text = "Simpan"
        Else
            'proses simpan
```

```
            namaprak = txtNamaPraktikum.Text
         Try
            If String.IsNullOrEmpty(namaprak) Then
               MsgBox("Anda Belum Mengisi Nama Praktikum!!")
            Else
               ExecSQL("Update `praktikum` SET `Nama Praktikum`= '" & namaprak & "' WHERE `ID` =
'" & (masukkanID + 1) & "'")
               gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum`")
               txtNamaPraktikum.Text = Nothing
               btSimpan.Enabled = True
               btHapus.Enabled = True
               btUbah.Text = "&Ubah"
            End If
         Catch ex As Exception
            MsgBox(ex.Message)
         End Try
      End If
   End Sub

   Private Sub btHapus_Click(sender As System.Object, e As System.EventArgs) Handles btHapus.Click
      Try
         masukkanID = InputBox("Masukkan ID Praktikum", "Hapus Data", "")
         ExecSQL("Delete FROM `praktikum` WHERE `ID` = '" & masukkanID & "'")
         gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum`")
         Dim i As Integer
         For i = 0 To (gridPraktikum.RowCount - 1)
            ExecSQL("UPDATE `praktikum` SET `ID` = '" & (i + 1) & "' WHERE `Nama Praktikum` = '"
& (gridPraktikum.Item(1, i).Value) & "' ")
            gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum`")
         Next i
         'Update Auto Increment untuk kolom ID
         ExecSQL("ALTER TABLE `praktikum` AUTO_INCREMENT = " &
(gridPraktikum.RowCount))
         gridPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM`FROM
`praktikum`")
      Catch ex As Exception
         MsgBox(ex.Message)
      End Try
   End Sub
End Class
```

- *Form* **Peserta Praktikum**

```
Public Class frmPesertaPraktikum
   Dim masukkanID, IDPrak As Integer
   Dim NRP, Prak As String
   Dim Namaprak As String
   Private Sub frmPesertaPraktikum_Load(sender As System.Object, e As System.EventArgs) Handles
MyBase.Load
      'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
      gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*, `praktikum`.`Nama
Praktikum` FROM `peserta_prak` INNER JOIN `praktikum` ON `praktikum`.`ID` =
`peserta_prak`.`ID_Prak` ORDER BY `ID`")
      gridBaca.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM `praktikum`")
      Dim i, j As Integer
      Dim Ada As Boolean
```

```vbnet
    For i = 0 To (gridBaca.RowCount - 2)
        Namaprak = gridBaca.Item(1, i).Value
        'Mengecek apakah nama praktikum sudah ada atau belum di cmbPraktkikum (jangan sampai ada
pengulangan)
        Ada = False
        For j = 0 To (cmbPraktikum.Items.Count - 1)
            If Namaprak = cmbPraktikum.Items(j).ToString Then
                Ada = True
            End If
        Next j
        If Ada = False Then
            cmbPraktikum.Items.Add(Namaprak)
        End If
    Next i
End Sub

Private Sub btSimpan_Click(sender As System.Object, e As System.EventArgs) Handles
btSimpan.Click
    Dim i As Integer
    For i = 0 To (gridBaca.RowCount - 2)
        prak = gridBaca.Item(1, i).Value
        If cmbPraktikum.SelectedItem.ToString = prak Then
            IDPrak = i + 1
        End If
    Next i
    NRP = txtNRP.Text
    Try
        If String.IsNullOrEmpty(NRP) Then
            MsgBox("Anda Belum Mengisi NRP!!")
        Else
            ExecSQL("Insert Into `peserta_prak` Values('" & "','" & NRP & "','" & IDPrak & "')")
            'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
            gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*, `praktikum`.`Nama
Praktikum` FROM peserta_prak INNER JOIN praktikum ON praktikum.ID = peserta_prak.ID_Prak
ORDER BY `ID`")
            txtNRP.Text = Nothing
            cmbPraktikum.SelectedItem = Nothing
        End If
    Catch ex As Exception
        MsgBox(ex.Message)
    End Try
End Sub

Private Sub btUbah_Click(sender As System.Object, e As System.EventArgs) Handles btUbah.Click
    If btUbah.Text = "&Ubah" Then 'Proses pemanggilan data (ubah)
        Dim i As Integer
        masukkanID = InputBox("Masukkan ID Praktikum", "Ubah Data", "")
        masukkanID = masukkanID - 1 'Decrement
        txtNRP.Text = gridPesertaPraktikum.Item(1, masukkanID).Value
        IDPrak = gridPesertaPraktikum.Item(2, masukkanID).Value
        IDPrak = IDPrak - 1
        Namaprak = gridBaca.Item(1, IDPrak).Value
        For i = 0 To (cmbPraktikum.Items.Count - 1) 'loop untuk penyamaan nama praktikum
            If Namaprak = cmbPraktikum.Items(i).ToString Then
                cmbPraktikum.SelectedIndex = i
            End If
        Next i
        btSimpan.Enabled = False
        btHapus.Enabled = False
        btUbah.Text = "Simpan"
    Else
        'proses simpan
```

```vbnet
            For i = 0 To (gridBaca.RowCount - 2)
                Prak = gridBaca.Item(1, i).Value
                If cmbPraktikum.SelectedItem.ToString = Prak Then
                    IDPrak = i + 1
                End If
            Next i
            NRP = txtNRP.Text
            Try
                If String.IsNullOrEmpty(NRP) Then
                    MsgBox("Anda Belum Mengisi NRP!!")
                Else
                    ExecSQL("Update `peserta_prak` SET `NRP`= '" & NRP & "', `ID_Prak`= '" & IDPrak & "'
WHERE `ID` = '" & (masukkanID + 1) & "'")
                    'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
                    gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*,
`praktikum`.`Nama Praktikum` FROM peserta_prak INNER JOIN praktikum ON praktikum.ID =
peserta_prak.ID_Prak ORDER BY `ID`")
                    txtNRP.Text = Nothing
                    cmbPraktikum.SelectedItem = Nothing
                    btSimpan.Enabled = True
                    btHapus.Enabled = True
                    btUbah.Text = "&Ubah"
                End If
            Catch ex As Exception
                MsgBox(ex.Message)
            End Try
        End If
    End Sub

    Private Sub btHapus_Click(sender As System.Object, e As System.EventArgs) Handles btHapus.Click
        Try
            masukkanID = InputBox("Masukkan ID Peserta Praktikum", "Hapus Data", "")
            ExecSQL("Delete FROM `peserta_prak` WHERE `ID` = '" & masukkanID & "'")
            'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
            gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*, `praktikum`.`Nama
Praktikum` FROM `peserta_prak` INNER JOIN `praktikum` ON `praktikum`.ID =
`peserta_prak`.ID_Prak ORDER BY `ID`")
            Dim i As Integer
            ' Memperbaiki Urutan ID
            For i = 0 To (gridPesertaPraktikum.RowCount - 1)
                ExecSQL("UPDATE `peserta_prak` SET `ID` = '" & (i + 1) & "' WHERE `NRP` = '" &
(gridPesertaPraktikum.Item(1, i).Value) & "' and `ID_Prak` = '" & (gridPesertaPraktikum.Item(2,
i).Value) & "'")
                'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
                gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*, `praktikum`.`Nama
Praktikum` FROM peserta_prak INNER JOIN praktikum ON praktikum.ID = peserta_prak.ID_Prak
ORDER BY `ID`")
            Next i
            'Update Auto Increment untuk kolom ID
            ExecSQL("ALTER TABLE `peserta_prak` AUTO_INCREMENT = " &
(gridPesertaPraktikum.RowCount))
            'gridPesertaPraktikum.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
            gridPesertaPraktikum.DataSource = SQLTable("SELECT peserta_prak.*, `praktikum`.`Nama
Praktikum` FROM `peserta_prak` INNER JOIN `praktikum` ON `praktikum`.ID =
`peserta_prak`.ID_Prak ORDER BY `ID`")
        Catch ex As Exception
            MsgBox(ex.Message)
        End Try
    End Sub
End Class
```

- *Form* **Hasil Proses**

Public Class frmHasilProses

```
    Const Max_Possibility = 101
    Const Max_Child = 101
    Dim arr_bentrok(Max_Child) As Integer
    Dim arr_hari(Max_Child), arr_jammasuk(Max_Child), arr_jamkeluar(Max_Child) As String
    Dim arr_table_hari(Max_Possibility), arr_table_jammasuk(Max_Possibility),
arr_table_jamkeluar(Max_Possibility) As String
    Dim arr_open_indeks(Max_Possibility), arr_close_indeks(Max_Possibility) As Integer
    Dim tmp As Integer 'sebagai tempat penyimpanan sementara (TEMPORARY)

    Private Function CekBentrok(IDprak As String, hari_prak As String, strjammasuk_prak As String,
strjamkeluar_prak As String) As Integer

        Dim i, j, k, total_bentrok As Integer
        Dim IDCek, IDPrakCek, hari_mk, strjammasuk_mk, strjamkeluar_mk As String 'hasil pembacaan
databse
        Dim wktjammasuk_mk, wktjamkeluar_mk, wktjammasuk_prak, wktjamkeluar_prak As Date 'Hasil
Konversi ke waktu
        Dim dtkjammasuk_mk, dtkjamkeluar_mk, dtkjammasuk_prak, dtkjamkeluar_prak As Long ' sebagai
satuan detik
        Dim bentrok As Boolean
        Dim debug1, debug2 As String

        debug2 = "" 'inisialisasi
        hari_mk = ""
        strjamkeluar_mk = ""
        strjammasuk_mk = ""


        'ambil ID_Prak
        For i = 0 To gridBacaPraktikum.RowCount - 1
          If cmbNamaPraktikum.SelectedItem = gridBacaPraktikum.Item(1, i).Value Then
             IDprak = gridBacaPraktikum.Item(0, i).Value
          End If
        Next i
        'MsgBox("ID Prak adalah : " & IDprak)
        tmp = IDprak
        'proses jadwal
        gridBacaPesertaPrak.DataSource = SQLTable("SELECT * FROM `peserta_prak`")
        gridBacaPesertaMK.DataSource = SQLTable("SELECT * FROM `peserta_mk`")
        gridBacaMataKuliah.DataSource = SQLTable("SELECT * FROM `mata kuliah`")
        For i = 0 To (gridBacaPesertaPrak.RowCount - 2) ' for NRP
          If IDprak = gridBacaPesertaPrak.Item(2, i).Value Then
             bentrok = False
             'ListBox1.Items.Add(gridBacaPesertaPrak.Item(1, i).Value)
             debug1 = gridBacaPesertaPrak.Item(1, i).Value
             For j = 0 To (gridBacaPesertaMK.RowCount - 2) 'For ID_MK
               If gridBacaPesertaPrak.Item(1, i).Value = gridBacaPesertaMK.Item(1, j).Value Then
                  'ListBox2.Items.Add(gridBacaPesertaMK.Item(2, j).Value)
                  IDCek = gridBacaPesertaMK.Item(2, j).Value
                  For k = 0 To (gridBacaMataKuliah.RowCount - 2) 'For mata kuliah
                    If IDCek = gridBacaMataKuliah.Item(0, k).Value Then
                       hari_mk = gridBacaMataKuliah.Item(3, k).Value.ToString
                       strjammasuk_mk = gridBacaMataKuliah.Item(5, k).Value.ToString
                       strjamkeluar_mk = gridBacaMataKuliah.Item(6, k).Value.ToString

                       wktjammasuk_mk = CDate(strjammasuk_mk) 'mengubah dari string ke format date
                       wktjamkeluar_mk = CDate(strjamkeluar_mk)
```

```
                wktjammasuk_prak = CDate(strjammasuk_prak)
                wktjamkeluar_prak = CDate(strjamkeluar_prak)

                dtkjammasuk_mk = (Hour(wktjammasuk_mk) * 3600 + Minute(wktjammasuk_mk) *
60 + Second(wktjammasuk_mk)) 'mengubah semuanya ke detik
                dtkjamkeluar_mk = (Hour(wktjamkeluar_mk) * 3600 + Minute(wktjamkeluar_mk) *
60 + Second(wktjamkeluar_mk))
                dtkjammasuk_prak = (Hour(wktjammasuk_prak) * 3600 +
Minute(wktjammasuk_prak) * 60 + Second(wktjammasuk_prak))
                dtkjamkeluar_prak = (Hour(wktjamkeluar_prak) * 3600 +
Minute(wktjamkeluar_prak) * 60 + Second(wktjamkeluar_prak))
            End If
        Next k

        If hari_mk = hari_prak Then ' pengecekkan bentrok atau tidak pada harinya terlebih
dahulu, jika bentrok dilanjutkan pengecekkan jam masuk dan jam keluar
            If ((dtkjammasuk_mk <= dtkjammasuk_prak) And (dtkjamkeluar_mk >
dtkjammasuk_prak)) Or ((dtkjammasuk_mk > dtkjammasuk_prak) And (dtkjamkeluar_prak >
dtkjammasuk_mk)) Then
                bentrok = True
                debug2 = IDCek
            End If
        End If
    End If
Next j

'-------------------------mengecek tabel praktikum dan mana yang diambil oleh peserta (jika dia
ada 2 praktikum)-------------------------------------
    For j = 0 To gridBacaPesertaPrak.RowCount - 1
        ' Cari praktikum lainnya yang dia ambil

        If (gridBacaPesertaPrak.Item(1, j).Value = gridBacaPesertaPrak.Item(1, i).Value) And
(gridBacaPesertaPrak.Item(2, j).Value <> IDprak) Then ' NRP sama dan ID_PRAK tidak boleh sama
dengan yg diproses!
            ' Benar, ini adalah praktikum lainnya yang dia ambil
            IDPrakCek = gridBacaPesertaPrak.Item(2, j).Value

            For k = 0 To gridBacaPraktikum.RowCount - 1

                ' Ambil jadwalnya, apabila ID_PRAKnya = yg_dicek
                If gridBacaPraktikum.Item(0, k).Value = IDPrakCek Then

                    hari_mk = gridBacaPraktikum.Item(2, k).Value
                    strjammasuk_mk = gridBacaPraktikum.Item(3, k).Value
                    strjamkeluar_mk = gridBacaPraktikum.Item(4, k).Value

                    wktjammasuk_mk = CDate(strjammasuk_mk)
                    wktjamkeluar_mk = CDate(strjamkeluar_mk)
                    wktjammasuk_prak = CDate(strjammasuk_prak)
                    wktjamkeluar_prak = CDate(strjamkeluar_prak)

                    dtkjammasuk_mk = (Hour(wktjammasuk_mk) * 3600 + Minute(wktjammasuk_mk) *
60 + Second(wktjammasuk_mk))
                    dtkjamkeluar_mk = (Hour(wktjamkeluar_mk) * 3600 + Minute(wktjamkeluar_mk) *
60 + Second(wktjamkeluar_mk))
                    dtkjammasuk_prak = (Hour(wktjammasuk_prak) * 3600 +
Minute(wktjammasuk_prak) * 60 + Second(wktjammasuk_prak))
                    dtkjamkeluar_prak = (Hour(wktjamkeluar_prak) * 3600 +
Minute(wktjamkeluar_prak) * 60 + Second(wktjamkeluar_prak))

                End If
```

```vb
                Next k

                If hari_mk = hari_prak Then ' pengecekkan bentrok atau tidak pada harinya terlebih
dahulu, jika bentrok dilanjutkan pengecekkan jam masuk dan jam keluar
                    If ((dtkjammasuk_mk <= dtkjammasuk_prak) And (dtkjamkeluar_mk >
dtkjammasuk_prak)) Or ((dtkjammasuk_mk > dtkjammasuk_prak) And (dtkjamkeluar_prak >
dtkjammasuk_mk)) Then
                        bentrok = True
                        debug2 = IDPrakCek
                    End If
                End If
            End If
        Next j
        '-------------------------------------------------------------------------------------------------------------------
------------------------
        'jika NRP ini memiliki Mata Kuliah yang bentrok, maka terhitung bentrok
        If bentrok = True Then
            total_bentrok = total_bentrok + 1
            ListBox1.Items.Add(debug1 & " : " & debug2)
        End If
        End If
    Next i
    Return total_bentrok
End Function

Private Function ubahkehari(indeks As Integer) As String
    Dim hasil As String
    hasil = ""
    Select Case indeks
        Case 0
            hasil = "Senin"
        Case 1
            hasil = "Selasa"
        Case 2
            hasil = "Rabu"
        Case 3
            hasil = "Kamis"
        Case 4
            hasil = "Jumat"
        Case 5
            hasil = "Sabtu"
    End Select
    Return hasil
End Function

Private Function ubahkejam(nilai As Double) As String
    Dim jam, menit, detik As Integer
    Dim hasil As String

    hasil = ""
    jam = Int(nilai) 'pembulatan nilai
    menit = Int((nilai - jam) * 60) ' hitung sisa koma, 1 jam = 60 mnt
    detik = 0

    hasil = Format(jam, "00") & ":" & Format(menit, "00") & ":" & Format(detik, "00")

    Return hasil
End Function

Private Sub Resetarray()
    Dim i As Integer
```

```vb
    For i = 0 To Max_Possibility
        arr_table_hari(i) = ""
        arr_table_jammasuk(i) = ""
        arr_table_jamkeluar(i) = ""
    Next i

    For i = 0 To Max_Child
        arr_bentrok(1) = 0

        arr_hari(i) = ""
        arr_jammasuk(i) = ""
        arr_jamkeluar(i) = ""

        arr_open_indeks(i) = 0
        arr_close_indeks(i) = 0
    Next i
End Sub
Private Sub Isiopenlist()
    Dim i, j, indeks As Integer

    Dim offset, durasi, periode As Double

    For i = 0 To 5 'Untuk hari
        For j = 0 To 16 'Untuk jam, tiap j mewakili 1/2 jam
            indeks = (i * 17) + j
            offset = 7
            periode = (j / 2)
            durasi = 2.5

            arr_open_indeks(indeks) = indeks

            arr_table_hari(indeks) = ubahkehari(i)
            arr_table_jammasuk(indeks) = ubahkejam(offset + periode)
            arr_table_jamkeluar(indeks) = ubahkejam(offset + periode + durasi)

        Next j
    Next i
    'Clear List Box
    lbOpen.Items.Clear()
    lbClose.Items.Clear()

    'isi listbox open list
    For i = 0 To Max_Child
        lbOpen.Items.Add(i)
    Next
End Sub

Private Sub btProses_Click(sender As System.Object, e As System.EventArgs) Handles btProses.Click
    Dim i As Integer
    Dim acakindeks As Integer
    Dim Sudahada As Boolean
    Dim hariBaca As String
    Dim jammasukBaca As String
    Dim jamkeluarBaca As String
    Dim bentrok As Integer
    Dim goal As Boolean
    Dim indeksgoal As Integer 'penyimpan nilai indeks yg ditemukan goal

    Resetarray()
    Isiopenlist()
    goal = False
```

```
'--------------------------------ALGORITMA BEST FIRST SEARCH------------------------------------
    While ((lbOpen.Items.Count > 0) And (goal = False)) 'Selama OPEN masih ada peluang DAN Goal
masih false

acakkembali:
        'Bangkitkan Nilai Acak untuk memilih jadwal
        Randomize()
        acakindeks = Int(Rnd() * 102) ' 0-101

        'Check di dalam close list, apakah sudah ada?
        Sudahada = False ' asumsi awal
        For i = 0 To lbClose.Items.Count - 1
            If lbClose.Items(i) = CStr(acakindeks) Then
                Sudahada = True
            End If
        Next i

        'Jika masih ada, ulangi, acak lagi
        If Sudahada = True Then
            GoTo acakkembali
        End If

        'Tambahkan kedalam Close List
        lbClose.Items.Add(CStr(acakindeks))

        'Buang dari open list
        lbOpen.Items.Remove(acakindeks)

        'ambil hari dan jam dari tabel open kemungkinan berdasarkan indeks yg telah diacak
        hariBaca = arr_table_hari(acakindeks)
        jammasukBaca = arr_table_jammasuk(acakindeks)
        jamkeluarBaca = arr_table_jamkeluar(acakindeks)

        'Kalkulasi dan hitung nilai bentrok
        bentrok = CekBentrok(cmbIDPrak.Items(cmbNamaPraktikum.SelectedIndex).ToString, hariBaca,
jammasukBaca, jamkeluarBaca)

        'Masukkan ke dalam array asli
        'Indeks diset menggunakan lbClose.Items.Count
        arr_hari(lbClose.Items.Count - 1) = hariBaca
        arr_jammasuk(lbClose.Items.Count - 1) = jammasukBaca
        arr_jamkeluar(lbClose.Items.Count - 1) = jamkeluarBaca
        arr_bentrok(lbClose.Items.Count - 1) = bentrok

        'Tentukan GOAL
        If bentrok = 0 Then
            goal = True
            indeksgoal = lbClose.Items.Count - 1
        End If
    End While
    If goal = True Then
        'Jadwal optimal telah ditemukan
        MsgBox("Jadwal Optimal telah ditemukan", vbInformation)
        'Me.Text = arr_hari(lbClose.Items.Count - 1) & " , " & arr_jammasuk(lbClose.Items.Count - 1) &
" ~ " & arr_jamkeluar(lbClose.Items.Count - 1)
        txtHariPraktikum.Text = arr_hari(lbClose.Items.Count - 1)
        txtJamMasuk.Text = arr_jammasuk(lbClose.Items.Count - 1)
        txtJamkeluar.Text = arr_jamkeluar(lbClose.Items.Count - 1)
    Else
        'Gunakan Best First Search untuk mencari suksesor, nilai bentrok terendah
        Dim record_bentrok As Integer 'sebagai acuan
        Dim baca_bentrok As Integer
```

```vb
        Dim succesor As Integer 'sebagai penyimpan indeks
        record_bentrok = 10000

        For i = 0 To Max_Child
            baca_bentrok = arr_bentrok(i)
            If baca_bentrok < record_bentrok Then
                'update record
                record_bentrok = baca_bentrok
                'simpan indeksnya
                succesor = i
            End If
        Next i
        MsgBox("Jadwal telah ditemukan dengan nilai bentrok minimum", vbInformation)
        'Me.Text = arr_hari(succesor) & " , " & arr_jammasuk(succesor) & " ~ " &
arr_jamkeluar(succesor)
        txtHariPraktikum.Text = arr_hari(succesor)
        txtJamMasuk.Text = arr_jammasuk(succesor)
        txtJamkeluar.Text = arr_jamkeluar(succesor)
    End If
    btSimpan.Enabled = True
    btProses.Enabled = False
End Sub

Private Sub frmHasil_Load(sender As System.Object, e As System.EventArgs) Handles MyBase.Load
    Dim i As Integer
    Dim combonamapraktikum, comboidprak As String

    btSimpan.Enabled = False
    gridBacaPraktikum.DataSource = SQLTable("SELECT `ID`,`NAMA PRAKTIKUM` FROM
`praktikum` WHERE `JAM MASUK` = '00:00:00' ")
    For i = 0 To (gridBacaPraktikum.RowCount - 2)
        combonamapraktikum = gridBacaPraktikum.Item(1, i).Value
        comboidprak = gridBacaPraktikum.Item(0, i).Value
        cmbNamaPraktikum.Items.Add(combonamapraktikum)
        cmbIDPrak.Items.Add(comboidprak)
    Next i
End Sub

Private Sub btSimpan_Click(sender As System.Object, e As System.EventArgs) Handles
btSimpan.Click
    Dim hasilhari, hasiljammasuk, hasiljamkeluar As String
    hasilhari = txtHariPraktikum.Text
    hasiljammasuk = txtJamMasuk.Text
    hasiljamkeluar = txtJamkeluar.Text

    ExecSQL("Update `praktikum` SET `Hari`= '" & hasilhari & "', `Jam Masuk`= '" & hasiljammasuk
& "', `Jam Keluar`= '" & hasiljamkeluar & "' WHERE `ID` = '" & tmp & "'")
    btSimpan.Enabled = False
End Sub
End Class
```