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| **Group Practical #1:** | Millennium Goals |
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| **Group #:** | 17 |

**Inputs**

**Outputs**

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| --- | --- |
| **Event** | **Actions** |
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|  |  |

**Interface:**

**Diagram

Description automatically generated**

**Variables:**

|  |  |
| --- | --- |
| FS | FileStream |
| Const MapMax\_X | Integer = 8 |
| Const MapMax\_Y | Integer = 12 |
| BF | BinaryFormatter |
| display | BetterGrid |
| totalSight | Double |
| Const FNAME | String = "animals.xyza" |
| Animals() | Animal |
| NumberOfAnimals | Integer = 0 |
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**Algorithm:**

Private FS As FileStream

Private Const MapMax\_X As Integer 🡨8

Private Const MapMax\_Y As Integer 🡨12

Private BF As BinaryFormatter

Private display As BetterGrid

Private totalSight As Double

Private Const FNAME As String 🡨 "animals.xyza"

Private Animals() As Animal

Private NumberOfAnimals As Integer 🡨0

Private Sub frm\_Main\_Load

display 🡨 New BetterGrid(SomeGrid)

display.EnterGrid(0, 0, "ID:")

display.EnterGrid(1, 0, "Diet:")

display.EnterGrid(2, 0, "Weight:")

display.EnterGrid(3, 0, "Sightings:")

display.EnterGrid(4, 0, "Months:")

display.EnterGrid(5, 0, "Type:")

End Sub

Private Sub SerializeFiles()

FS 🡨 New FileStream(FNAME, FileMode.OpenOrCreate, FileAccess.Write)

BF 🡨 New BinaryFormatter()

For x As Integer 🡨 0 To NumberOfAnimals - 1

Dim tempAnimal As Animal

tempAnimal 🡨 DirectCast(Animals(x), Animal)

BF.Serialize(FS, tempAnimal)

Next

FS.Close()

BF 🡨 Nothing

FS 🡨 Nothing

MessageBox.Show("Animals recorded.")

End Sub

Private Sub DeserializeFiles()

Dim tempAnimal As Animal

Dim i As Integer 🡨 0

ReDim Animals(-1)

FS 🡨 New FileStream(FNAME, FileMode.Open, FileAccess.Read)

BF 🡨 New BinaryFormatter()

While FS.Position < FS.Length

tempAnimal 🡨 DirectCast(BF.Deserialize(FS), Animal)

ReDim Preserve Animals(i)

Animals(i) 🡨 tempAnimal

End While

FS.Close()

FS 🡨 Nothing

BF 🡨 Nothing

End Sub

Private Sub btnClear\_Click

display.Clear()

display.EnterGrid(0, 0, "ID:")

display.EnterGrid(1, 0, "Diet:")

display.EnterGrid(2, 0, "Weight:")

display.EnterGrid(3, 0, "Sightings:")

display.EnterGrid(4, 0, "Months:")

display.EnterGrid(5, 0, "Type:")

End Sub

Private Sub btnLoad\_Click

Dim check As DialogResult : check 🡨 MessageBox.Show("Warning: All unsaved data will be lost.{vbNewLine}Continue?", "Warning", MessageBoxButtons.OKCancel, MessageBoxIcon.Warning)

If Not check 🡨 DialogResult.OK Then

Return

End If

DeserializeFiles()

PopGrid()

UpdateInfo()

End Sub

Private Sub btnSave\_Click

SerializeFiles()

End Sub

Private Sub btnDisplayMap\_Click

Dim newMap As New mapInt

newMap.AnimalMap 🡨 Animals

newMap.displayMap()

newMap.ShowDialog()

End Sub

Private Function CheckUnique(ID As String) As Boolean

Dim x As Integer

If ID Is Nothing Then Return False

If Animals(0) Is Nothing Then Return True

For x 🡨 0 To UBound(Animals) - 1

If ID == Animals(x).ID Then

Return False

Else

Continue For

End If

Next x

Return True

End Function

Private Sub btnAddNew\_Click

Dim localAnimal As Animal : localAnimal 🡨 Nothing

Dim localID As String : localID 🡨 Nothing

Dim rand As New Random

Dim x As Integer

If cbAnimals.Text 🡨 vbNullString Then

Return

End If

ReDim Preserve Animals(NumberOfAnimals)

While Not CheckUnique(localID)

localID 🡨 ""

For x 🡨 0 To 9

localID += CStr(rand.Next(0, 9))

Next x

End While

Select Case cbAnimals.Text

Case "Addax"

Dim localAddax As New Addax(CInt(InputBox("Enter the number of months to track the Addax for.", "Month Handler")))

Dim check As DialogResult : check 🡨 MessageBox.Show("Does the Addax have round worms?", "Worm Check", MessageBoxButtons.YesNo)

Select Case check

Case DialogResult.Yes

localAddax.HasRoundWorms 🡨 True

Case DialogResult.No

localAddax.HasRoundWorms 🡨 False

End Select

localAddax.HornLength 🡨 CDbl(InputBox("Enter the length of the Addax's horn.", "Horn Check"))

localAnimal 🡨 DirectCast(localAddax, Animal)

Case "Lion"

Dim localLion As New Lion(CInt(InputBox("Enter the number of months to track the Lion for.", "Month Handler")))

Dim check As DialogResult : check 🡨 MessageBox.Show("Is the Lion part of a pride?", "Pride Check", MessageBoxButtons.YesNo)

Select Case check

Case DialogResult.Yes

localLion.IsSolitary 🡨 False

Case DialogResult.No

localLion.IsSolitary 🡨True

End Select

localLion.TailLength 🡨CDbl(InputBox("Enter the length of the Lion's tail", "Tail Length"))

localAnimal 🡨DirectCast(localLion, Animal)

Case "Elephant"

Dim localAge As Integer : localAge 🡨CInt(InputBox("How old is the Elephant?", "Age Handler"))

Dim localBool As Boolean

Dim check As DialogResult : check **🡨**MessageBox.Show("Are the Elephant's tusks fitted with trackers?", "Tracker Handler", MessageBoxButtons.YesNo)

Select Case check

Case DialogResult.Yes

localBool 🡨True

Case DialogResult.No

localBool 🡨False

End Select

Dim localElephant As New Elephant(CInt(InputBox("Enter the number of months to track the Elephant for.", "Month handler")), localAge, localBool)

localAnimal 🡨 DirectCast(localElephant, Animal)

Case "Baboon"

Dim numBabies, numMonths As Integer

numBabies 🡨CInt(InputBox("Enter the number of babies the Baboon has (If Female):", "Baboon handler"))

numMonths 🡨CInt(InputBox("Enter the number of months to track the Baboon for.", "Baboon Handler"))

Dim localBaboon As New Baboon(numMonths, numBabies)

localAnimal 🡨DirectCast(localBaboon, Animal)

End Select

For x 🡨0 To localAnimal.monthTracks

localAnimal.Sightings(x) 🡨CInt(InputBox("Enter how many times the animal has been sighted during month {x + 1}", "Month Handler"))

Next x

Reselect:

Select Case CInt(InputBox("Enter the diet code of the animal: {vbNewLine}0: Carnivore {vbNewLine}1: Herbivore {vbNewLine}2: Omnivore", "Diet Handler"))

Case DietEnum.Carnivore

localAnimal.Diet 🡨DietEnum.Carnivore

Case DietEnum.Herbivore

localAnimal.Diet 🡨DietEnum.Herbivore

Case DietEnum.Omnivore

localAnimal.Diet 🡨DietEnum.Omnivore

Case Else

GoTo Reselect

End Select

localAnimal.Weight 🡨CDbl(InputBox("Enter the weight of the animal (KG):", "Weight Handler"))

localAnimal.X 🡨rand.Next(0, MapMax\_X)

localAnimal.Y 🡨rand.Next(0, MapMax\_Y)

localAnimal.ID 🡨localID

Animals(NumberOfAnimals) 🡨localAnimal

NumberOfAnimals += 1

PopGrid()

UpdateInfo()

End Sub

Private Sub PopGrid()

Dim x, i As Integer

Dim total As Double

i 🡨0

Dim thing As Animal

Dim localDiet As String : localDiet 🡨vbNullString

For Each thing In Animals

total 🡨0

Select Case thing.Diet

Case DietEnum.Carnivore

localDiet 🡨"Carnivore"

Case DietEnum.Herbivore

localDiet 🡨"Herbivore"

Case DietEnum.Omnivore

localDiet 🡨"Omnivore"

End Select

display.EnterGrid(0, i + 1, thing.ID)

display.EnterGrid(1, i + 1, localDiet)

display.EnterGrid(2, i + 1, thing.Weight)

For x 🡨0 To thing.monthTracks

total += thing.Sightings(x)

Next x

totalSight 🡨total

display.EnterGrid(3, i + 1, total)

display.EnterGrid(4, i + 1, thing.monthTracks + 1)

display.EnterGrid(5, i + 1, thing.GetType.Name)

i += 1

Next thing

End Sub

Public Sub UpdateInfo()

Dim animalLocal As Animal

Dim cAddax, cLion As Double

Dim localAddax As Addax

Dim avgMonths As Double

Dim localLion As Lion

Dim localElephant As Elephant

Dim cElephant As Integer

Dim localBaboon As Baboon

Dim cBaboon As Integer

Dim i As Integer : i 🡨0

tbInfo.Clear()

For Each animalLocal In Animals

avgMonths += animalLocal.monthTracks + 1

localAddax 🡨TryCast(animalLocal, Addax)

If Not localAddax Is Nothing Then

cAddax += 1

Continue For

End If

localLion 🡨TryCast(animalLocal, Lion)

If Not localLion Is Nothing Then

cLion += 1

Continue For

End If

localElephant 🡨TryCast(animalLocal, Elephant)

If Not localElephant Is Nothing Then

cElephant += 1

Continue For

End If

localBaboon 🡨TryCast(animalLocal, Baboon)

If Not localBaboon Is Nothing Then

cBaboon += 1

Continue For

End If

Next animalLocal

tbInfo.Text += $"Addax Count: {cAddax & vbNewLine}Lion Count: {cLion & vbNewLine}Baboon Count: {cBaboon & vbNewLine}Elephant Count:{cElephant & vbNewLine}"

tbInfo.Text += $"Average Sightings: {totalSight / avgMonths}"

End Sub

End Class

Public Class BetterGrid

Private \_Columns, \_Rows As Integer

Private \_SetterGrid As UJGrid.UJGrid

Private \_Header\_x, \_Header\_y As String

Public Sub New(ByRef grid As UJGrid.UJGrid)

\_Columns **🡨**grid.Cols

\_Rows **🡨**grid.Rows

\_SetterGrid **🡨**grid

End Sub

Public Sub EnterGrid(ByVal x As Integer, ByVal y As Integer, ByVal data As Object)

If x > \_SetterGrid.Cols - 1 Then

\_SetterGrid.Cols **🡨**x + 1

End If

If y > \_SetterGrid.Rows - 1 Then

\_SetterGrid.Rows **🡨**y + 1

End If

\_SetterGrid.Row **🡨**y

\_SetterGrid.Col **🡨**x

\_SetterGrid.Text **🡨**CStr(data)

End Sub

Public Sub Clear()

Dim x, y As Integer

For x **🡨**0 To \_SetterGrid.Cols - 1

For y **🡨**0 To \_SetterGrid.Rows - 1

\_SetterGrid.Row **🡨**y

\_SetterGrid.Col **🡨**x

\_SetterGrid.Text **🡨**""

Next y

Next x

End Sub

Public Property Header\_x As String

Get

Return \_Header\_x

End Get

Set(value As String)

\_Header\_x **🡨**value

EnterGrid(0, 0, value)

End Set

End Property

Public Property Header\_y As String

Get

Return \_Header\_y

End Get

Set(value As String)

\_Header\_y **🡨**value

EnterGrid(0, 1, value)

End Set

End Property

End Class

**Test data:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input:** |  |  |  |  |  |  |  |  |  |
| Animal Type | Number Of Months | Does Addax Have Worms | Enter Length Of Addax Horns | Sightings | Diet Code | Weight |  |  |  |
| Addax | 1 | Yes | 52 | 7 | 2 | 43 |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Output:** |  |  |  |  |  |  |  |  |  |
| ID: | Diet: | Weight | Sightings | Months | Type |  | Addax count | Average Sightings |  |
| 0537375003 | Omnivore | 43 | 7 | 1 | Addax |  | 1 | 7 |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input** |  |  |  |  |  |  |  |  |  |
| Animal Type | Elephant Age | Does Elephant Have a Tracker | Number Of Months Tracking | Sightings In Months 1 | Sightings In Months 2 | Diet Code | Weight |  |  |
| Elephant | 13 | No | 2 | 15 | 27 | 1 | 140 |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Output:** |  |  |  |  |  |  |  |  |
| ID: | Diet: | Weight: | Sightings: | Months: | Type: | Elephant Count | Addax count | Average Sightings |
| 0537375003 | Omnivore | 43 | 7 | 1 | Addax | 1 | 1 | 14 |
| 6871662754 | Herbivore | 140 | 42 | 2 | Elephant | 1 | 1 | 14 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Input:** |  |  |  |  |  |  |  |  |  |
| Animal Type | Number Of babies | Months Tracking | Sightings in month 1 | Sightings in month 2 | Sightings in month 3 | Diet | Weight |  |  |
| Baboon | 5 | 3 | 50 | 200 | 1 | 0 | 10 |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Output:** |  |  |  |  |  | Baboon | Elelphant | Addax | Average |
| ID: | Diet: | Weight: | Sightings: | Months: | Type: | 1 | 1 | 1 | 41.83 |
| 0537375003 | Omnivore | 43 | 7 | 1 | Addax |  |  |  |  |
| 6871662754 | Herbivore | 140 | 42 | 2 | Elephant |  |  |  |  |
| 0425626487 | Carnivore | 10 | 251 | 3 | Baboon |  |  |  |  |