Visual Web Development

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10 Iterations - While ... and Do ...

Previously we looked at For Each ... Next loops and For ... Next loops. We now look at While loops and Do loops.

10.1 Earn £1

You are paid 1p on day one, 2p on day 2, 4p on day 3, 8p on day 4, 16p on day 5, ... Your pay is doubled every day. How long will it take you to earn one pound?

10.2 While ... End While

initialisation
While booleanExpression
  statementSequence
  re-initialisation
End While

For example:

```
Dim onePound As Integer = 100        1£ is 100p
Dim  dailyPay As Integer = 1
Dim daysWorked As Integer = 0
Dim  totalPay As Integer= 0          initialisation
While totalPay < onePound            loop for as long as booleanExpression is true
   totalPay = totalPay + dailyPay    re-initilaisation
   daysWorked = daysWorked + 1
   dailyPay = dailyPay * 2
End While
txtOut.Text = "After " + daysWorked + " days you will have £" + (totalPay \ 100)
```

10.3 Exercise 1

1. Dry run the While ... End While example - see the next handout.

10.4 Do ... Loop

There are four variants.

I *Do While booleanExpression*
   statementSequence
Loop

For example:

```
Dim onePound As Integer = 100        ' 1£ is 100p
Dim  dailyPay As Integer = 1
Dim daysWorked As Integer = 0
Dim  totalPay As Integer= 0                initialisation
Do While totalPay < onePound              guard - loop if true
   totalPay = totalPay + dailyPay         re-initialisation
   daysWorked = daysWorked + 1
   dailyPay = dailyPay * 2
Loop
txtOut.Text = "After " + daysWorked + " days you will have £" + (totalPay \ 100)
```


II *Do Until booleanExpression*
   statementSequence
Loop

For example:

```
Dim onePound As Integer = 100        ' 1£ is 100p
Dim  dailyPay As Integer = 1
Dim daysWorked As Integer = 0
Dim  totalPay As Integer= 0                initialisation
Do Until totalPay >= onePound             guard - loop if not true
   totalPay = totalPay + dailyPay         re-initialisation
   daysWorked = daysWorked + 1
   dailyPay = dailyPay * 2
Loop
txtOut.Text = "After " + daysWorked + " days you will have £" + (totalPay \ 100)
```

III *Do*
     statementSequence
     Loop While booleanExpression

For example:

```
Dim onePound As Integer = 100        ' 1£ is 100p
Dim  dailyPay As Integer = 1
Dim daysWorked As Integer = 0
Dim  totalPay As Integer= 0
Do
    totalPay = totalPay + dailyPay
    daysWorked = daysWorked + 1            do the loop then
    dailyPay = dailyPay * 2
Loop While totalPay < onePound        loop again if true
txtOut.Text = "After " + daysWorked + " days you will have £" + (totalPay \ 100)
```


IV *Do*
     statementSequence
     Loop Until booleanExpression

For example:

```
Dim onePound As Integer = 100        ' 1£ is 100p
Dim  dailyPay As Integer = 1
Dim daysWorked As Integer = 0
Dim  totalPay As Integer= 0
Do
    totalPay = totalPay + dailyPay
    daysWorked = daysWorked + 1            do the loop then
    dailyPay = dailyPay * 2
Loop Until totalPay >= onePound        loop again if not true
txtOut.Text = "After " + daysWorked + " days you will have £" + (totalPay \ 100)
```

10.5 Which Loop?

Which loop should you use? Any one you are comfortable with is the general answer but ...

For Each ... Next	Use with collections of any unpredictable size. But you cannot update items in the collection.
For ... Next	Use when you are confident that you know exactly the number of repetitions (iterations) you are going to make.
While ... End While	Use when the loop could execute zero, one or many times. Loved by older programmers because it is safe and it is what they were brought up on.
Do While ... Loop	Use when the loop could execute zero, one or many times.
Do ... Loop while	Use when the loop must execute at least once.
Do Until ... Loop	Use when the loop could execute zero, one or many times.
Do ... Loop Until	Use when the loop must execute at least once

10.6 Exit

You can exit from loops with:

- Exit While
- Exit Do
- Exit For

For example:


```
count = 1
While True                  loop forever
   if count > 100           exit loop if count more than 100
      Exit While
      count = count * 2
End While
```


10.7 Exercise 2

1. Design, write and test a program that will calculate how many days it will take to earn 1 million pounds if your income started with 1p on day one and then doubled each day after.

10.8 Conclusion

We looked at While and Do loops. Next we look at testing.