Component 4/Unit 5-4

Iteration (Repetition, Looping, Do loops)

- Loops are used to execute statements repetitively
- Loops require a conditional test that is supposed to end the loop
- Endless loops (logic error)
- Pre-test loops
- Post-test loops

Problem Statement

Design and write a program that processes a file of debit and credit transactions and produces a report showing the transaction type (DB or CR), the transaction amount, a running count of debits, a running debit total, a running count of credits and a running credit total.

Pseudocode Solution Involving Alternation and Iteration

- SumDBandCR module
- Open File
- Output Heading
- Do pre-test Until EOF
- Input TranType, TranAmt
- If TranType = "DB"
- DebitAmt = TranAmt
- DBTotal = DBTotal + DebitAmt
- CountOfDBs = CountOfDBs + 1
- ElseIf TranType = "CR"
- CreditAmt = TranAmt
- CRTotal = CRTotal + CreditAmt
- CountOfCRs = CountOfCRs + 1
- End If
- Output TranType, TranAmt, CountOfDBs, DBTotal, CountOfCRs, CRTotal
- End pre-test
- Close File
- End module

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Example Code Showing Alternation and Iteration

```
10 Private Sub cmdSumDBandCR_Click()
11   Open ActiveDocument.Path & "/TranFile.txt" For Input As #1
12   lblReport.Caption = "Tran type   Tran amount   DB count   DB total   CR count   CR total"
13   'Repetitive execution (14, 27)
14   Do Until EOF(1)
15     Input #1, TranType, TranAmt
16     'Exclusive options (17, 21, 25)
17     If TranType = "DB" Then
18       DebitAmt = TranAmt
19       DBTotal = DBTotal + DebitAmt
20       CountOfDBs = CountOfDBs + 1
21     ElseIf TranType = "CR" Then
22       CreditAmt = TranAmt
23       CRTotal = CRTotal + CreditAmt
24       CountOfCRs = CountOfCRs + 1
25     End If
26     lblReport.Caption = lblReport.Caption & vbNewLine & _
         "    " & TranType & "         " & _
         TranAmt & "          " & _
         CountOfDBs & "            " & _
         DBTotal & "          " & _
         CountOfCRs & "            " & _
         CRTotal
27   Loop
28   Close #1
29 End Sub
```

```
1 Dim TranType As String
2 Dim TranAmt As Currency
3 Dim DebitAmt As Currency
4 Dim CreditAmt As Currency
5 Dim DBTotal As Currency
6 Dim CRTotal As Currency
7 Dim CountOfDBs As Integer
8 Dim CountOfCRs As Integer
9 Option Explicit
```

Concurrency

Concurrent programming processes (sometimes called Parallel processes) are subtasks of a larger task that are carried out independent of one another and the results are recompiled later to form a single solution. This can be done in a single processor or through a network of multiple machines/processors in what is called <u>distributed processing</u>.

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Concurrency

- Single processor concurrency
  - Standing in line to buy tickets to a show and asking the person behind you to hold your place while you stand in line to buy a hotdog down the street.
  - Driving and talking on the phone at the same time
- Multiple processor concurrency
  - Baseball team playing defense
  - Airplane pilot and copilot flying a plane

Recursion

Recursion is difficult to define. There are many jokes about recursive definitions. One is that to find the definition of recursion you need to see Recursion.

Recursive processing in programming is when a process invokes itself.

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Recursion Definition Continued

In programming a process is said to be recursive if the following two things are true.

1. A base statement is created
2. A set of statements that reduce all cases to the base statement.

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Recursion Definition Continued

Given that you know how to process a single drug prescription, to process 1000 prescriptions do the following.

1. Process the first prescription (Base statement) and remember how that was done.
2. Process the first prescription of what is left (999). This means that the base statement is executed again (process has called upon itself)

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Recursion Definition Continued

- "If at first you don't succeed, try, try again".
- Opposite mirrors generate a recursive image.
- Spell checker that checks the first word and then requires the rest of the document to be submitted for spell checking