Preliminary work

You should create a text file BOOK-FILE using a text editor

The file will consist of around 30 book files with each book title on a new line

Solution

Pseudo Code	Visual Basic (Console) Code
OpenFile "Book-File" For Append For c <- 1 to 30 Output "Enter Book Title" Input Books Book-File <- Books Next FileClose	FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Append) For c = 1 To 30 Console.Write("Enter Book Title:") books = Console.ReadLine WriteLine(1, books) Next FileClose(1)

TASK 1

A program is to be written to:

- Read the data values from the text file BOOK-FILE into a 1D array BOOK
- Output each book title from the array

TASK 1.1

Write the pseudo code for the program

TASK 1.2

Write the program code, in your language, for the pseudo code design produced in TASK 1.1

(Solution On Next Page)

Solution

Pseudo Code	Program Code

BOOK (1 to 30) As String
 	
books <- “”
 	
OpenFile “Book-File” For Append
  For c <- 1 to 30
  Output “Enter Book Title“
  Input Books
  Book-File <- Books
  Next
FileClose
 	
Count <- 1
 	
OpenFile “Book-File” For Input
Repeat
  books <- Book-File
  BOOK(count) <- books
  Count <- count + 1
Until EOF
FileClose
 	
For c <- 1 to 30
Output BOOK(c)
Next
	Sub Main()
	
	  'decleration of variables
	  Dim BOOK(0 To 30) As String
	  Dim books As String
	  Dim count As Single
	
	  'initializing of variables
	  books = ""
	  count = 1
	
	  'This part of program is to creat text file named Book-File.
	  FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Append)
	  For c = 1 To 5
	  Console.Write("Enter Book Title:")
	  books = Console.ReadLine
	  WriteLine(1, books)
	
	  Next
	  FileClose(1)
	  'This Part of program is to Read data from text file named Book-File, and store into an Array named Books
	
	  FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Input)
	
	  Do While Not EOF(1)
	
	  Input(1, books)
	
	  BOOK(count) = books
	  count = count + 1
	
	  Loop
	
	  FileClose(1)
	
	  'This part of the program is to output the contents of array Books
	  For c = 1 To 30
	  Console.WriteLine(BOOK(c))
	  Next
	  Console.ReadKey()
	  End Sub

Suggested extension task

Write program code to add a menu to the program. The options are:

1. Display the file contents
2. Search the array for the particular book
3. End the program

Write the program code for the menu option 2 as follows:

The program will:

- Prompt the user for entry of a book title
- Input the book file
- Carry out a linear search of the BOOK array to output either:
  - BOOK FOUND
  - BOOK NOT FOUND

Solution

```
Module Module1

    Dim BOOK(0 To 29) As String
    Dim books As String
    Dim count As Single
    Dim choice As Integer

    Sub Main()
        FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Append)
        For c = 0 To 5
            Console.Write("Enter Book Title:")
            books = Console.ReadLine
            WriteLine(1, books)
            BOOK(c) = books
        Next
        FileClose(1)
        choice = 0
        While choice <> 3
            Console.WriteLine("1: Display File Contents")
            Console.WriteLine("2: SEARCH the array for the particular book")
            Console.WriteLine("3: End The Program")
            choice = Console.ReadLine
            Select Case choice
                Case 1 : Command1_Click()
                Case 2 : Command2_Click()
                Case 3
                Case Else
                    Console.WriteLine("Wrong choice made... Press any key to continue.")
                    Console.ReadKey()
            End Select
        End While
    End Sub
```

```
    Private Sub Command1_Click()
        books = ""
        count = 1
        FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Input)
        Do While Not EOF(1)
            Input(1, books)
            Console.WriteLine(books)
            count = count + 1
        Loop
        FileClose(1)
    End Sub

    Private Sub Command2_Click()
        Dim thisbook As String
        Dim isfound As Boolean
        isfound = False
        Console.Write("Enter Book Title For Search")
        thisbook = Console.ReadLine()
        For c = 0 To 5
            If thisbook = BOOK(c) Then
                Console.WriteLine(" is found.")
                isfound = True
            End If
        Next
        If isfound = False Then
            Console.WriteLine("book not found...")
        End If
        Console.ReadKey()
    End Sub
End Module
```

TASK 2

A second program is to be written to search the file for a particular book.

The program will:

- Prompt the user for entry of a book title
- Input the book file
- Carry out a linear search of the file to output either:
    - BOOK FOUND
    - BOOK NOT FOUND

The pseudo code for this program is given below

The pseudo code assumes the exact number of the books in the file in not known

```
OPENFILE "BOOK-FILE" FOR READ
IsFound ← FALSE
OUTPUT "Enter book"
INPUT ThisBook

REPEAT
   READFILE "BOOK-FILE", FileBook
   IF FileBook = ThisBook
     THEN
       IsFound ← TRUE
       OUTPUT "BOOK FOUND"
   ENDIF
UNTIL IsFound = TRUE OR EOF("BOOK-FILE")

IF IsFound = FALSE
  THEN
    OUTPUT "BOOK NOT FOUND"
ENDIF
```

Write Program Code from the pseudo code design.

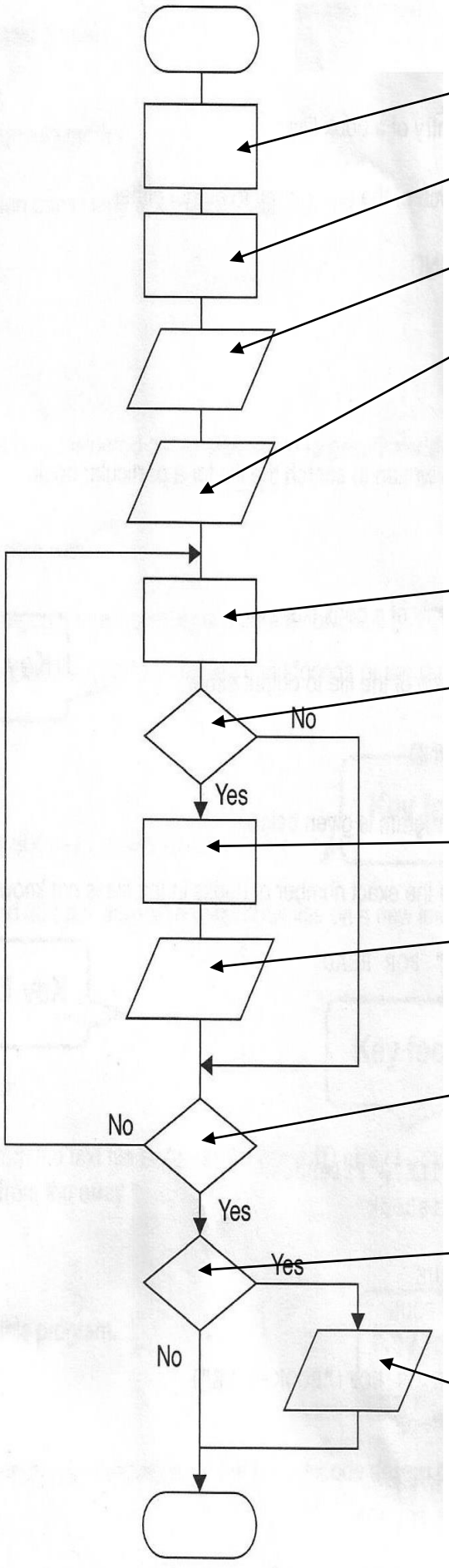
```
        Dim thisbook As String
        Dim isfound As Boolean

 FileOpen(1, My.Application.Info.DirectoryPath & "\Book-File.txt", OpenMode.Input)
        isfound = False
        Console.Write("Enter Book Title For Search")
        thisbook = Console.ReadLine()

        While Not EOF(1)
            Input(1, books)
            If thisbook = books Then
                Console.WriteLine(" BOOK FOUND.")
                isfound = True
            End If
        End While
        FileClose(1)
        If isfound = False Then
            Console.WriteLine("BOOK NOT FOUND...")
        End If
```

TASK 2.2

The program design for TASK 2.1 could bave been given as a program flowchart.

Complete the following program flowchart from the given pseudo code, by:

- Labeling the boxes
- Drawing arrows on the lines




```
OPENFILE "BOOK-FILE" FOR READ
IsFound ← FALSE
OUTPUT "Enter book"
INPUT ThisBook

REPEAT
    READFILE "BOOK-FILE", FileBook
    IF FileBook = ThisBook
      THEN
        IsFound ← TRUE
        OUTPUT "BOOK FOUND"
    ENDIF
UNTIL IsFound = TRUE OR EOF("BOOK-FILE")

IF IsFound = FALSE
  THEN
    OUTPUT "BOOK NOT FOUND"
ENDIF
```

& Operator

The & operator will be used to concatenate two strings.

For example: `"Birthday" & "Party"`
Evaluates to: `"Birthday Party"`

Built-in Functions

Any high-level programming language will have many built-in functions for the programmer to use.

It is appreciated that the three programming languages often implement these functions with very different syntax. Candidates should be familiar with the syntax used in their chosen programming language.

If a built-in function is to be used in pseudocode on the examination paper, the function will be shown and explained. Examples of this follow.

Key focus: Built-in function definitions

String handling functions (Pseudocode)

`ONECHAR(ThisString : STRING, Position : INTEGER) RETURNS CHAR`
returns the character at index position `Position` (counting from the start of the string with value 1) from the string `ThisString`.

For example: `ONECHAR("Hockey", 4)` returns `'k'`

`CHARACTERCOUNT(ThisString : STRING) RETURNS INTEGER`
returns the number of characters in string `ThisString`.

For example: `CHARACTERCOUNT("Real Madrid")` returns 11

`SUBSTR(ThisString : STRING, Value1 : INTEGER, Value2 : INTEGER) RETURNS STRING`
returns a sub-string from within `ThisString`.
`Value1` is the start index position (counting from the left, starting with 1).
`Value2` is the final index position.

For example: `SUBSTR("art nouveau", 5, 11)` returns `"nouveau"`

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Conversion between data types (Pseudocode)

`TONUM(ThisDigit : STRING) RETURNS INTEGER`
Returns the integer equivalent of the string `ThisDigit`
For example: `TONUM("8")` returns integer 8

`TOSTRING(ThisNumber : INTEGER or REAL) RETURNS STRING`
Returns characters which make up `ThisNumber` as a string
For example: `TOSTRING(83)` returns `"83"`

`TOSTRING(704.25)` returns `"704.25"`

Using ASCII character codes (Pseudocode)

`CHR(ThisInteger : INTEGER) RETURNS CHAR`
Returns the character with ASCII value `ThisInteger`
For example: `CHR(65)` returns character `'A'`

`ASC(ThisCharacter : CHAR) RETURNS INTEGER`
Returns the ASCII value for character `ThisCharacter`
For example: `ASC('A')` returns integer 65

Random Number Generator (Pseudocode)

`RANDOM(Integer1 : INTEGER, Integer2 : INTEGER) RETURNS INTEGER`
generates a random integer in the range from `Integer1` to `Integer2` inclusive.

For example: `RANDOM(10, 12)` returns either: 10, 11 or 12

TASK 3

TASK 3.1

Write a program with the following specification:

- the user enters two integers (`X` and `Y`)
- the difference between `X` and `Y` should be at least 20 and `X < Y`
- the program generates a sequence of 20 random numbers between `X` and `Y`
- the program outputs the sequence of random numbers

Suggested extension task

At present, the program might generate the same number more than once.

Modify the program design so that duplicates are not displayed.

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TASK 3

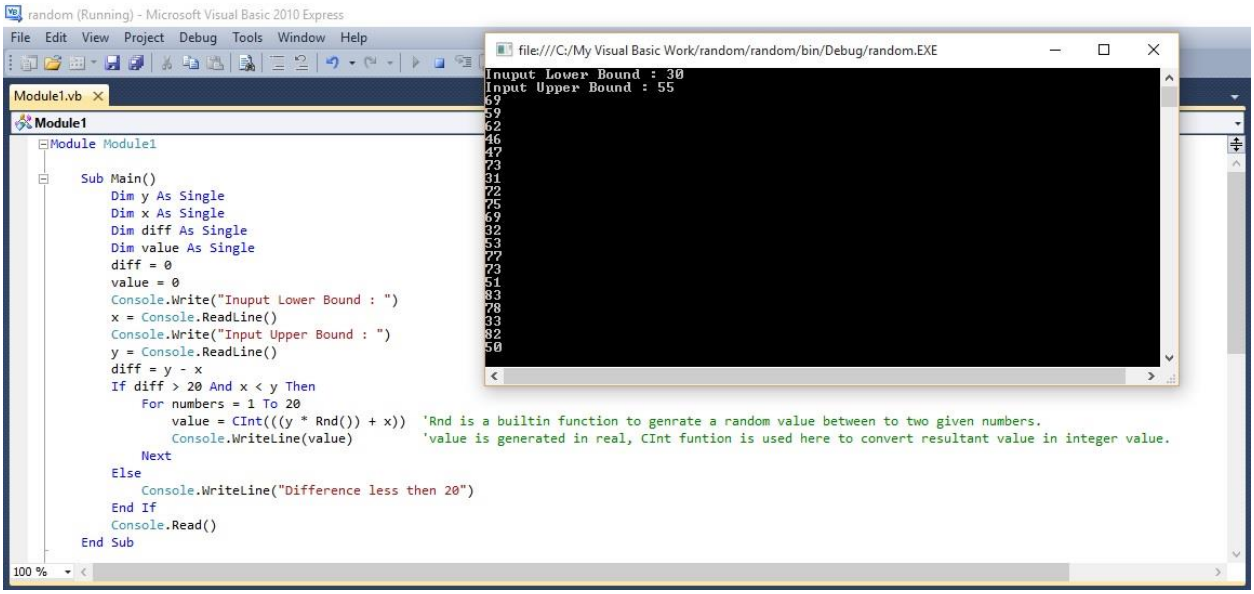
Write a program with the following specification:

- The user enters two integers (X and Y)
- The difference between X and Y should be at least 20 and X < Y
- The program generates a sequence of 20 random numbers between X and Y
- The program outputs the sequence of random numbers

Solution (Visual Basic 2010 (Console))

```
    Sub Main()
        Dim y As Single
        Dim x As Single
        Dim diff As Single
        Dim value As Single
        diff = 0
        value = 0
        Console.Write("Inuput Lower Bound : ")
        x = Console.ReadLine()
        Console.Write("Input Upper Bound : ")
        y = Console.ReadLine()
        diff = y - x
        If diff > 20 And x < y Then
            For numbers = 1 To 20
                value = CInt(((y * Rnd()) + x))  'Rnd is a builtin function to genrate a random value
between to two given numbers.
                Console.WriteLine(value)         'value is generated in real, CInt funtion is used here
to convert resultant value in integer value.
            Next
        Else
            Console.WriteLine("Difference less then 20")
        End If
        Console.Read()
    End Sub
```

OUTPUT (Visual Basic 2010 (console))



TASK 4

Use the functions given to evaluate the following expressions:

1. `ONECHAR("Tiger", 3)` g

2. `CHARACTERCOUNT("Great Pyramid of Giza")` 21

3. `TONUM("3") + TONUM("29")` 32

4.
```
p ← "The" & "Titanic"
q ← SUBSTR(p, 8, 4)
```
q itan

5. `IDE ← "Integrated Development Environment"`

   Using one or both of the `SUBSTR` and `ONECHAR` functions, write expressions to return:

   (a) `"Integrated"` SUBSTR(IDE, 1, 10)

   (b) `"Development"` SUBSTR(IDE, 12, 22)

   (c) `"IDE"` ONCHAR(IDE, 1) & ONCHAR(IDE,12) & ONCHAR(IDE, 24)

6. Use an ASCII code table to find the value for:

   (a) `(ASC('F') + 30) / 50` 2

   (b) `2 * (ASC(<Space>) + ASC('D'))` 200

7. Write the text string output by the following sequence of statements.

```
A ← "The answer is: "
B ← TOSTRING(42)
OUTPUT A & B
```
"The answer is: 42"

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