Solution Set + Marking Guide

Monash University
Faculty of Information Technology
School of Information Management and Systems

Test 2  2005
IMS1906 Business Programming Fundamentals

Reading Time:  5 minutes
Writing Time:  50 minutes

Instructions to candidates:

- Candidates are reminded that they should have no books, notes, papers or other material in their possession unless their use is specifically permitted below.
- Calculators are NOT allowed
- ANSWER ALL QUESTIONS IN THE SPACE PROVIDED.
- This test counts towards 10% of your exam mark.

<table>
<thead>
<tr>
<th>Student Identification</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Student’s Surname</td>
<td></td>
</tr>
<tr>
<td>Student’s First name</td>
<td></td>
</tr>
<tr>
<td>Tutor’s Name</td>
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<table>
<thead>
<tr>
<th>Instructors Use Only</th>
<th>Marks /Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Marks</td>
<td>/50</td>
</tr>
</tbody>
</table>
Q1
Consider the following extract of code, which contains 3 errors:

```vbnet
Dim sngDeposits As Single, sngWithdrawals As Single
Dim sngBalance As Single, intMonth As Integer
Dim srInputFile As IO.StreamReader

srInputFile = IO.File.OpenText("account.txt")
intMonth = 1
sngBalance = 0

Do While (intMonth < 12)     ' Read 12 months worth of data
    sngDeposits = Convert.ToSingle(srInputFile.ReadLine())
    sngWithdrawals = Convert.ToSingle(srInputFile.ReadLine())
    sngBalance = sngBalance + sngDeposits - sngWithdrawals
    lstResultList.Items.Add( "Balance for month " & Month & " is " & sngBalance.ToString("C")
    intMonth = intMonth + 1
Loop
lblFinalBalance.Text = sngBalance
```

i. State the three types of errors that can occur in programming

ii. Explain how these errors might be detected if you were the programmer

Line 9 (or 6): The comment refers to 12 months of data, which can be reasonably expected to be correct, but the loop will only occur 11 times, due to either the initialization of intMonth to 1 (line 6), or due to the use of < 12 rather than <= 12 or < 13 (line 9). Only one of the lines needs to be identified; and only 1 line can be accepted for marks. This is a logic error. It would be detected either by performing a deskcheck, or running the program and observing that the output stops prematurely.

Line 14: There is a syntax error: Month should be intMonth. This would be detected by the editor underlining the offending word; or at compile time, through an error message. (Some students may say it is a runtime error; shown by a ‘Month 0’ always being displayed. This is valid, given that there is no ‘option explicit on’ statement. You can only accept it if their explanation for iii is correct, otherwise no mark for i or ii)

Line 17 (10): This will lead to a run-time error. The file is closed inside the loop; and therefore on the second iteration when the code is at line 10 and tries to read from the file, a runtime error will occur. Either line 17 or 10 should be identified by the student - and it can only be counted towards marks once (in case they list it as separate errors). The solution is to swap lines 17 and 18.

It would be detected at runtime by using a file with more than 1 month-worth of data.

1x 3 marks for stating the type of error
1(syntax) + 2(logical + 2(runtime) marks for explanations of how it would be detected/discovered.

[3 + 5 = 8 marks]
Q2

a) Explain the difference between a user-defined subroutine and user-defined function

User-defined subroutine
- use keyword sub
- can return more than one value by passing parameters ByRef

User defined function
- use keyword function
- can return ONLY one value

b) Given the following snippet of VB.NET code

Private Sub calcPay( ByVal hours As Single, ByRef earnings As Single)
    earnings = hours * 24.38
End Sub

What does it mean to pass a parameter ByVal and ByRef, in the context of the example above.

The parameter *hours* is passed by Value this means that this parameter is used in the subroutine without altering the value (one-way communication)
The parameter *earnings* is passed in to the subroutine and returned back to the calling sub procedure. (two way communication)
c) Write a VB.NET independent Sub Procedure named *swapNames* which accepts two names, and will swap the values stored in the variables passed as arguments to the procedure.

A possible solution is:

```vbnet
Public Sub swapNames(ByRef first As String, ByRef second As String)
    Dim temp As String
    temp = first
    first = second
    second = temp
End Sub
```

**MARKING:**
- Sensible start to declaration (Public or Private, Sub, suitable-name) + End Sub +1 mark
- Two String parameters in declaration (names not an issue) +1 mark
- Parameters are passed by reference (ByRef and NOT ByVal) +1 mark
- Temporary variable is declared of type String (name not an issue) +1 mark
- Correct swapping logic +1 mark

[5 marks ]

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c) Write a VB.NET Function named *isEven* which accepts an integer and returns TRUE if the number is even and FALSE is the number is odd. Use the following Function header:

```vbnet
Private Function isEven(ByVal intNumber As Integer) As Boolean
    Dim isNumberEven As Boolean
    If (intNumber mod 2 = 0) Then
        isNumberEven = True
    Else
        isNumberEven = False
    End If
    Return isNumberEven
End Function
```

**MARKING:**
- Correct use of If Then Else +1 mark
- Declaration of Boolean variable isNumberEven +1 mark
- Use of Mod +1 mark
- Return variable correctly +1 mark
- Function header + footer +1 mark

[5 marks ]
Q3
An array of names needs to be searched for the name “Greg” and its position in the array needs to be returned. Illustrate how would perform the search. You do not have to write any VB.NET code. Use may use pseudo code, diagrams, anything to illustrate how you would perform the search.

<table>
<thead>
<tr>
<th></th>
<th>Mick</th>
<th>Wei</th>
<th>Andy</th>
<th>Greg</th>
<th>Doris</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Solution Algorithm

FindPositionOfNameInArray

currPos = 0
posNLF = -1
Do While (currPos < numElements)
    If names(currPos) = nameLookingFor Then
        posNLF = currPos
    End If
    currPos = currPos+1
End Do
Return posNLF    ‘Note if -1 is returned the name is not found in the array (+1) [10 marks]
Q4
Write a Sub Procedure named `LoadFile` that opens a file named “myFriends.txt” and reads the data, then adds each to a listbox. The data file “myFriends.txt” contains the following friends names, eg:

  Angela
  Alysha
  Taylor
  Charlotte
  Bridie

Include **Exception Handling code** to cope with the case when the data file is corrupt or missing. (If an exception does occur, simply abort the loading of the file.)

```vbnet
Private Sub LoadFile()
    Dim sre As IO.StreamReader
    Dim strName As String
    Try
        sre = IO.File.OpenText("myFriends.dat") 'Open File for reading  
        'While not at eof display name in listbox)
        Do While (Not sreStreamReader.Peek() = -1)
            strName = sreStreamReader.ReadLine  
            lstFriends.Items.Add(strName)
        Loop
        sre.Close() 'Close File
    Catch exFile As IO.FileNotFoundException
        MessageBox.Show("The file cannot be found", 
        "Error", MessageBoxButtons.OK, MessageBoxIcon.Information)
    Catch exOther As Exception
        MessageBox.Show("An error occurred whilst loading the file", 
        "Error", MessageBoxButtons.OK, MessageBoxIcon.Information)
    End Try
End Sub
```

* Procedure declaration line (first line) is (syntactically and semantically) correct 1 mark
* An IO.StreamReader variable is declared (`sre`) 1 marks
* All other variables used in procedure that are not global are declared (with appropriate types) 1 marks
* The file is opened correctly, using `IO.File.OpenText("myFriends.dat")` 1 mark
* The data is read from the file using `sre.ReadLine()` statements 1 mark
* The student has used a loop to process the entire file’s data (or can use the Peek method). 3 mark
* Name added to listbox correctly 2 mark
* The file is closed correctly 1 mark
* There is a Try-Catch-End Try wrapped around the file IO statements (correct syntax) 1 marks
* There is a special Catch block for the file not found exception. 1 marks
* Inside the Catch block(s), an error message is displayed using MessageBox.Show, explaining that an error occurred for at least the simple case that some exception has occurred (the As Exception case) 1 marks

[14 marks]