Solution Set

Monash University
Faculty of Information Technology

School of Information Management and Systems

Test 1 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>
</tr>
</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>
<td></td>
</tr>
</tbody>
</table>

<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>
An application is required to read in a customer’s name, a purchase amount and a tax code 0, 1, 2 or 3. Given this information the algorithm should then calculate the tax payable. The customer’s name, purchase amount and tax payable should be displayed as output.

The tax code is one of the following:

- 0 tax exempt (0%)
- 1 state sales tax only (3%)
- 2 federal and state sales tax (5%)
- 3 special sales tax (7%)

**Answer the questions that follow:**

a) Draw a defining diagram

<table>
<thead>
<tr>
<th>Input</th>
<th>Processing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer's name</td>
<td>Determine sales tax</td>
<td>Customer's name</td>
</tr>
<tr>
<td>Purchase amount</td>
<td>Compute tax payable</td>
<td>Purchase amount</td>
</tr>
<tr>
<td>Tax code</td>
<td></td>
<td>Sales tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tax payable</td>
</tr>
</tbody>
</table>

b) Write an algorithm in pseudo code following the notation from Robertson.

**Compute TaxPayable**

Read customerName, purchaseAmount, taxCode

Case OF taxCode

0 salesTax= 0

1 salesTax= 0.03

2 salesTax= 0.05

3 salesTax= 0.07

Otherwise display “not a valid tax code”

End case
taxpayable = salesTax*purchaseAmount

Display customerName, purchaseAmount, taxPayable

End
c) Draw a TOE chart

<table>
<thead>
<tr>
<th>Task</th>
<th>Object</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read customerName, purchaseAmount, taxCode</td>
<td>txtName, txtPA, txtTaxCode</td>
<td>-</td>
</tr>
<tr>
<td>Compute TaxPayable</td>
<td>btnComputeTaxPayable</td>
<td>Click</td>
</tr>
<tr>
<td>(determines sales tax and taxpayable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display details</td>
<td>lblcustomerName, lblpurchaseAmount, lblTaxPayable</td>
<td>-</td>
</tr>
</tbody>
</table>

d) Design a user interface following the window’s standards GUI guidelines
e) Convert the algorithm into VB.NET code.

```vbnet
Sub computeTaxPayable_Click(...) Handles ...
    Dim customerName As String
    Dim purchaseAmount, salesTax, taxPayable As Single

    Select case Val(txtTaxCode.Text)
    Case 0
        salesTax = 0
    Case 1
        salesTax = 0.03
    Case 2
        salesTax = 0.05
    Case 3
        salesTax = 0.07
    Case Else
        MsgBox.Show("Invalid taxCode Enter a number between 0-3", "Error Message",
            MessageBoxButtons.OK, MessageBoxIcon.Error)
    End Select
    taxPayable = salesTax*purchaseAmount

    lblcustomerName.Text = customerName
    lbltaxPayable.Text = Convert.ToString(taxPayable)
    lblpurchaseAmount.Text = Convert.ToString(salesTax)
End Sub
```

[3+5+3+3+5 = 19 marks]
2. What is the different between a data type and a variable?

Creating a variable reserves an area of computer memory. It has an address (ie where it is physically stored, and a values of a specific data type can be stored at that address.

A data type is distinguished by the operations which can be applied and the way the information is stored in memory. Categories of data types include Integers, Strings, Boolean.

3. In the pseudocode below the word **OK** is to be printed if the `dataItem` is in the range 10 to 20 inclusive.

   ```
   If (dataItem<10 OR dataItem > 20) Then
       Print "OK"
   End If
   ```

   a) Identify the logical error in the ‘if’ statement.

   __________ dataItem should be between 10 and 20

   b) Write the corrected if statement below.

   __________ if (dataItem >= 10 AND dataItem <=20) then

   [2+2=4 marks]
4. Given the expression below identify any literal constants, symbolic constants and variables:

\[ Vol = \frac{4}{3} \times Maths.pi \times radius^3 \times height \]

**Literal Constants** 4/3, 3

**Named or Symbolic Constants** = Maths.pi

**Variables** = vol, radius, height

[5 marks]

5. a) Draw a picture of the dialogue box produced when the following lines of code are executed:

```vbnet
Dim Message As String = "Cancel this operation?"
Dim Caption As String = "No Name Specified"
Dim Result As DialogResult

Result = MessageBox.Show(Message, Caption, MessageBoxButtons.YesNo, MessageBoxIcon.Question, MessageBoxDefaultButton.Button1)
```

[5 marks]

b) What is the purpose of the Result variable?

To hold the value of the button pressed

[2 marks]
6. Use the following Visual Basic.NET code to answer the following questions:

1. \( T = 0 \)
2. \( C = 3 \)
3. Do
4. \( T = T + 2 \times C \)
5. \( C = C + 1 \)
6. Loop Until \( C > 5 \)
7. print \( T \)

a) Perform a trace of the code above.

<table>
<thead>
<tr>
<th>Line</th>
<th>T</th>
<th>C</th>
<th>Loop condition</th>
<th>print</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>4</td>
<td>false</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>5</td>
<td>false</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>6</td>
<td>true</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

b) In the above code segment, when the loop terminates, the value of \( T \) will be?

- a. 6
- b. 14
- c. 24
- d. 36

c) How many times will the loop above execute?

- a. 4
- b. 3
- c. 2
- d. Will not execute

d) The loop above is an example of:

- a. An infinite loop
- b. a pre-test loop
- c. a for loop
- d. a post-test loop

[7+1+1+1=10 marks]