UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2005/2006 – 2nd Year Examination – Semester 4

IT4302 -Rapid Application Development
PART 2 - Structured Question Paper

19th August, 2007
(ONE HOUR)

To be completed by the candidate
BIT Examination Index No:

Important Instructions:

- The duration of the paper is **1 (One) hour**.
- The medium of instruction and questions is English.
- This paper has **3 questions** and **11 pages**.
- **Answer question 1 (**50% marks**) and any one of the other questions (**50% marks**) only**.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.

Questions Answered

Indicate by a cross (✗), (e.g. ☒) the numbers of the questions answered.

To be completed by the candidate by marking a cross (✗).	1	2	3	
To be completed by the examiners:				

Based on the following case study answer question 1.
Case Study

1)
Exclusive Corporation

Exclusive Corporation is a company that manufactures household electrical appliances.
Information extracted by Systems Analyst and his team is as given below.
The sales catalogue contains 458 items of which more than half are produced by the company.

The following operations were identified.
Order Processing, Inventory Control, Production Scheduling, Manufacturing, Purchasing and Sales
Due to lack of funds, systems analyst was instructed only to conduct the analysis and design
activities for Order processing and Inventory Control operations.
The operations are described in detail below.

Order processing

Each order is accompanied by a 10% deposit. The order processing clerk is responsible for
handling the order through the following procedure.

   i.   First he determines whether the customer is new or old.
  ii.   If the customer is new, the address, contact number and 2 credit references are taken.
        Otherwise (if he is an old customer) the credit references are still taken to ensure that the
        customer is still financially sound.
 iii.   Each item number, description and price is verified with the catalogue.
 iv.   The manufactured and purchased items are grouped separately and sent to the Inventory
        Control Department.
  v.   When the order-*can be fulfilled* notice is received from Inventory control, a copy of the
        notice is sent to the Sales Department.

Inventory Control

Inventory includes all raw materials, purchased items and manufactured items. Every item
regardless of whether it is purchased or manufactured by the company itself has a maximum and
minimum quantity level.
These two quantity levels are adjusted based on the popularity of the item and is determined by the
management. Every time the inventory control clerk updates the inventory after dispatching the
consignment of items to the customer, he checks whether the remaining quantity falls below the
minimum level.

If it does fall below the minimum, the following action is taken.
   • If the item is manufactured by the company itself, it sends a product inventory notice to the
     Product Scheduling Department.
   • If it is a purchased item (including raw materials), it sends a purchase order to the Purchasing
     Department.

When a consignment of raw materials or purchased items is received, the inventory is updated. If
the quantity exceeds the maximum quantity, the following action is taken depending on the type of
item.
    • If it is a manufactured item, an overstock notice is made to management and product
      scheduling.
    • If it is a purchased item, an overstock notice is sent to purchasing.

When customer order reaches inventory control, the following procedure is carried out.

i.   The order is broken down into sub-orders for each item.

ii.   The order is classified as order *pending*

iii. Each sub-order is checked against the inventory to determine if it can be fulfilled under the current quantities in stock.

iv.   If the sub-order can be fulfilled by the inventory the following procedure is carried out.
- the inventory is adjusted by the given amount
- the sub-order is filed together with the original pending order

v.   If the sub-order cannot be fulfilled, the following action is taken.
- If the item is manufactured, the sub-order is filed in the manufacturing suspense file and a produce order is sent to the production scheduling department. After manufacturing the item, Inventory Control Department receives a notice from the Manufacturing Department. Subsequently the Inventory is updated.
- If the item is a purchased item, the sub-order is filed in the purchasing suspense file and a purchase order is sent to the purchase department. After the item is purchased, Inventory Control Department receives a notice from the Purchasing Department. Subsequently the Inventory is updated.

vi.   When all the sub-orders can be fulfilled, the order is classified as order *can be fulfilled,* and a notice is sent to the Order Processing Department indicating that the order can be fulfilled.

(a) Identify 5 classes in the Case study

(10 marks)

<u>**ANSWER IN THIS BOX**</u>

Any five from the following,

Customer, Order, Sub-Order, Item, Purchased Item, Manufactured

Item,Manufacturing suspense details, Purchasing suspense details,

Produce order, Purchase Order

(b) Constructors and Destructors are very essential in Object Oriented Programming. Describe what a Constructor and Destructor in VB.net are giving special reference to Class Hierarchy. How would one implement constructors for the above classes?

(25 marks)

<u>**ANSWER IN THIS BOX**</u>

Constructor

Whenever an instance of a class is created, the common language

runtime (CLR) attempts to execute a procedure named New, if it

exists in that object.

Continued…

New is a type of procedure called a *constructor* that is used to

initialize new objects before any other code in an object executes.

A New constructor can be used to open files, connect to databases,

initialize variables and take care of any other tasks which need to be

done before an object can be used.

Destructor:

When an object is no longer needed, the CLR calls the Finalize

method for that object before freeing its memory. The Finalize

method is called a *destructor* because it performs cleanup tasks, such

as saving state information, closing files and connections to

databases and other tasks which must be done before releasing the

object.

Class Hierarchy

When an instance of a derived class is created, the Sub New

constructor of the base class executes first, followed by constructors

in derived classes. This happens because the first line of code in a

Sub New constructor uses the syntax MyBase.New()to call the

constructor of the class immediately above itself in the class

hierarchy. The Sub New constructor is then called for each class in

the class hierarchy until the constructor for the base class is reached.

At that point, the code in the constructor for the base class executes, followed by the code in each constructor in all derived classes and the code in the most derived classes is executed last.

One should create Sub New () and Sub Finalize () procedures for

Constructors, destructors and code and be added into both

Procedures.

(c) Identify the difference between Dispose () method and Sub Finalize () method.

(20 marks)

> ### ANSWER IN THIS BOX
>
> **Sub Finalize () method is called automatically by CLR when object**
>
> **is not used. Sub Finalize () destructor cannot be called explicitly and**
>
> **can be accessed only through the specified class. Clients of Classes**
>
> **must explicitly call Dispose () methods.**

(d) Define what an abstract class is and specify how it is implemented in VB.net.

(25 marks)

> ### ANSWER IN THIS BOX
>
> **It is a class that cannot be instantiated and is frequently either**
>
> **partially implemented or not at all. One key difference**
>
> **between abstract classes and interfaces is that a class may implement an**
>
> **unlimited number of interfaces, but may inherit from only one abstract**
>
> **(or any other kind of) class. A class that is derived from an abstract class**
>
> **may still implement interfaces. Abstract classes are useful when creating components because they allow you to specify an invariant level of**
>
> **functionality in some methods, but leave the implementation of other**
>
> **methods until a specific implementation of that class is needed.**
>
> **An abstract class is denoted in Visual Basic by the keyword MustInherit.**

(e) Do a comparison between an Abstract class and an Interface placing emphasis on Visual Basic.net

(20 marks)

ANSWER IN THIS BOX

An *abstract class* is a class that cannot be instantiated, but must be inherited

from another class . An abstract class may be fully implemented, but is more

usually partially implemented or not implemented at all, thereby encapsulating

common functionality for inherited classes.

An *interface*, by contrast, is a totally abstract set of members which can be thought of as defining a contract for conduct. The implementation of an interface is left completely to the developer.

Both interfaces and abstract classes are useful for component interaction. If a method requires an interface as an argument, then any object that implements

that interface can be used in the argument.

2) (a) Unlike earlier versions of Visual Basic, Visual Basic.net is heavily dependent upon DataSet. Describe DataSet class with its members.

(20 marks)

ANSWER IN THIS BOX

Datasets store data in a disconnected cache. The structure of a

dataset is similar to that of a relational database; it exposes a

hierarchical object model of tables, rows and columns. In addition, it

contains constraints and relationships defined for the dataset.

Refer to the following scenario for part (b),(c),(d),(e)

As depicted in Figure 1, there is a form with a Datagrid. Two text boxes have been added. When Button1 is clicked data which is input into textbox1 and textbox2 are added to the Datagrid. Use the following variables for writing the code:

DataSet = myDataSet, myTable = DataTable, Columns: myColumn1,myColumn2 with names myNumber and myLastName, myRow =DataRow and DataSet name and DataTable are "CusOrders" and "Order" respectivlely.

First column takes only Integer and use Int16 data type and second column accepts string Data type.
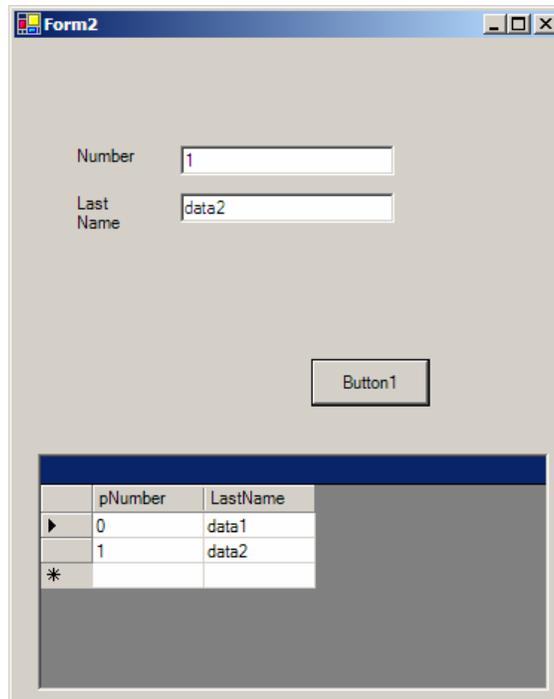

Figure-1

(b) Write down the code to create the new DataSet object and DataTable with columns.

(20 marks)

ANSWER IN THIS BOX

```
Private myDataSet As DataSet = New
DataSet("CusOrder")

Private myTable As DataTable =
myDataSet.Tables.Add("Orders")

Private myNumber As DataColumn = New DataColumn

Private myLastName As DataColumn = New DataColumn
```

Continued…

```
myNumber.DataType = System.Type.GetType("System.Int16")

myNumber.ColumnName = "pNumber"

myTable.Columns.Add(myNumber)

myLastName.DataType =

System.Type.GetType("System.String")

myLastName.ColumnName = "LastName"

myTable.Columns.Add(myLastName)
```

(c) One requires the addition of a primary key constraint to the first Column. Write the code to show how it is done.

(10 marks)

ANSWER IN THIS BOX

```
myTable.PrimaryKey = New DataColumn() {myTable.Columns(0)}
```

(d) Data Row is added to the Datagrid object when one clicks Button1. If one makes object global to form an object,
  (i) Write down the code which will be inserted into button1 click event where two boxes are assigned columns of the row.
  (ii) Write line of code which is needed to assign DataSet object as the source for DataGrid1 object.

(25 marks)

ANSWER IN THIS BOX

```
(i) Private myRow as DataRow

        myrow = myTable.NewRow

            If Me.TextBox1.Text = "" Then

                myrow(0) = 0
        Else

             myrow(0) = CType(Me.TextBox1.Text, Int16)

        End If
            myrow(1) = Me.TextBox2.Text

            myTable.Rows.Add(myrow)
```

Continued…

```
(ii) Me.DataGrid1.DataSource = myDataSet.Tables("Orders")
```

(e) Assuming that a second button has been added to the above form in Figure 1 as button2, the above data which is added to the DataSet, needs to be inserted into MS SQL Server 2000 database. Write the code segment for inserting the data in the myDataSet into myData table in the MS SQL server with matching Columns. The following variables must be used:

strConnectionString, myconnection = SqlConnection,myDataAdapter = SqlDataAdpater,myCustBuild = SqlCommandBuilder, Database = myData,User ID = sa, password = ""

(25 marks)

ANSWER IN THIS BOX

```
Dim myconnection As SqlConnection

        Dim myDataAdapter As SqlDataAdapter

        Dim myConnectionString As String

myConnectionString = "Data Source =localhost;Initial _

Catalog"& "=myTest;user ID=sa;pwd="myconnection = New _

  SqlConnection(myConnectionString)myDataAdapter = New _

  SqlDataAdapter("Select * from myData",myconnection)

        Dim mycust As SqlCommandBuilder = New _

            SqlCommandBuilder(myDataAdapter)

        myconnection.Open()

        myDataAdapter.Update(myDataSet.Tables(0))


        myconnection.Close()
```

9

3) (a) Explain the words Redim and Preserve in relation to Arrays.

(20 marks)

> **ANSWER IN THIS BOX**
>
> **Redim - Reallocates storage space for an array variable**
>
> **Preserve - is a Keyword used to preserve the data in the existing array when you**
>
> **change the size of only the last dimension**

(b) Consider the following code.
Dim myArray() As String = {"Venus", "Earth"}

Write down the statements to add "Mars" to the end of myArray without deleting the existing entries.

(20 marks)

> **ANSWER IN THIS BOX**
>
> **Redim Preserve myArray(2)**
>
> **myArray(2)="Mars"**

(c) What is meant by the Rank of an array? is there any change in the Rank of myArray after you add "Mars" in (b)?

(20 marks)

> **ANSWER IN THIS BOX**
>
> **Rank- is the Number of dimensions of an array.**
>
> **"No".**

(d) Does myArray belong to the System.Array Class?

(10 marks)

ANSWER IN THIS BOX

Yes

(e) Describe Polymorphism in Visual Basic .net. Can you create a new instance of the
System.Array class using the **New** Constructor?

Write down the statement(s) for an alternative way of creating a new instance of a
System.Array class of length 2 and of type **String.**

(30 marks)

ANSWER IN THIS BOX

"No"

Dim x As Array = Array.CreateInstance(GetType(System.String),2)

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