

**OLLSCOIL NA hÉIREANN, GAILLIMH****National University of Ireland, Galway**

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**Summer Examinations, 2000**

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**Third Year Commerce Examination****Program Design and Development (MS 311)****Professor R. O'Callaghan****Professor S. Collins****Mr. M. A. Lang****Dr M. Madden**

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**Time Allowed: TWO hours****Answer any FOUR questions****All questions carry equal marks**

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1. (a) Visual Basic has a variety of functions for handling and manipulating strings. Describe these functions, using short examples of how they are called and what they return.

**(12 marks)**

- (b) Write a Visual Basic program to parse a sentence, by searching for key words in it. The program must ask the user for a sentence (using an InputBox), and then convert the sentence to uppercase. It must then repeat the following steps four times, using an appropriate loop structure:

- Ask the user for a word
- Convert the word to uppercase, and remove all leading and trailing spaces
- Search for the word within the sentence, and display a message box saying either that it was found or not found. Note that this message **must** include the word entered by the user (for example, "The word APPLE was not found").

**(13 marks)**

2. Salthill Global Brands needs a program to assist them with data entry. Write a Visual Basic program to do the following:

- (a) Declare an array called **products**, which can hold up to 50 names (**String**). Pass the array to a **function** named **ReadProducts** (see part (b) below), which returns the number of names actually read. Then pass the array and the number of names read to a **sub-procedure** called **WriteToFile** (see part (c) below).

(7 marks)

- (b) Write the code for the **ReadProducts** function. This function has one parameter, the name of an array. The function repeatedly asks the user to enter a product name, and stores the name entered in the array, until the user enters a blank name (""). The function returns the number of names actually read.

(9 marks)

- (c) Write the code for the **WriteToFile** sub-procedure. This sub-procedure has two parameters: the name of an array, and the number of values in it. It must open a sequential file called "PRODUCTS.TXT", write all of the names of the products into the file, and close the file.

(9 marks)

3. (a) Describe each of the following types of variables, pointing out the differences between each in terms of how they are created and accessed:

- (1) Local variables
- (2) Form-level variables
- (3) Global variables
- (4) Static variables

(12 marks)

- (b) For marketing purposes, a retail outlet wants to monitor the breakdown of sales to women, men and children. To do this, you must develop a Visual Basic program with three buttons (labelled **Woman**, **Man** and **Child**) and three corresponding text-boxes that display the total number of sales so far in each category. A sales clerk will press the appropriate button after each transaction.

Draw a sketch of the user interface, on which you must indicate the names of all controls. Then write all the code required for the program.

(13 marks)

4. First Bank of Craughwell is implementing an Electronic Banking System, which will run on dedicated computers in ATM lobbies. Your responsibility is to develop the security validation system that people will use to log on.

When the system is started up, it loads data from a central server into an array called **securityData**.

(You can assume that the start-up code has been developed separately.) This array can hold information for up to 10,000 customers. For each customer, the security data stored consists of:

**FirstName** (20 letters); **LastName** (20 letters); **Account\_No** (8 digits); **Password** (6 letters).

- (a) Write the Visual Basic code necessary to define a record structure containing a customer's security data, and to set up the global array **securityData**, that can hold a maximum of 10,000 records.

(4 marks)

- (b) Write a Visual Basic routine to ask the user for their account number, using an **InputBox**. Then search the array, using Binary Search, to find a matching record. You may assume that the array is sorted by account number, and that it is full.

(9 marks)

- (c) Extend the Visual Basic routine to check the user's password. This is done by repeating the following procedure three times: Randomly select a position in the password, ask the user for the letter at that position (e.g. "Enter the letter at Position 3 in your password"), and verify that the letter entered is correct. (Hint: use the functions **Rnd** and **Mid()**.) If all details entered are correct, display a message saying "Welcome *FirstName LastName*". Otherwise, display an error message.

Note that, to avoid giving clues to potential hackers, your program should not terminate early if incorrect information is entered. In other words, even if the user enters an unknown account number or the first letter of the password they enter is incorrect, the program should carry on asking for the other letters of the password before displaying the error message.

(12 marks)

5. (a) Explain the term **structured programming**, listing its four key features.

(4 marks)

- (b) Describe each of the key features of structured programming that you have listed above, and present examples of how each of them can be implemented in Visual Basic.

(16 marks)

- (c) Discuss the benefits of structured programming.

(5 marks)

6. Describe in detail **three** of the following terms, using Visual Basic code examples to illustrate your answer:

(1) Parameter Passing By Reference and Parameter Passing By Value

(2) Static Arrays and Dynamic Arrays

(3) Select Case Statements and Nested If Statements

(4) Sequential Files and Random Access Files

**(25 marks)**