University of Swaziland
Department Of Computer Science
Supplementary Examination July 2016

Title of paper   : C under Linux

Course number   : CS344

Time Allowed   : Three (3) hours

Instructions:

      • Answer ALL Questions in section A.

      • Answer any two (2) questions in section B.

This paper may not be opened until permission has been granted by the invigilator.

Section A

QUESTION 1 [25 marks]

i. Fill in the blanks in the following (Note: Just write down the missing words)   **[15]**

     a) Protecting data from access by unauthorized functions is called _____.

     b) A function name must be followed by _____.

     c) Executing the continue operator from within a loop causes control to go to _____.

     d) A A program statement that invokes a function is a function _____.

     e) The expression 99%3 evaluates to _____.

     f) A function that doesn't return anything has return type _____.

     g) All the elements in an array must be the _____ data type.

     h) A constructor is executed automatically when an object is _____.

     i) A "child" class is said to be _____ from a base class.

     j) Pointers are useful for referring to a memory address that has no _____.

     k) The lines between objects in a UML object diagram are called _____.

     l) A template argument is preceded by the keyword _____.

     m) The C++ keywords used with exceptions are _____, _____ and _____.

     n) If we're talking about dependencies, the template class is the _____ element and the instantiated class is the _____ element.

     o) The unique ( ) algorithm removes all _____ element values from a container.

ii. What is Linux? What is the basic difference between BASH and DOS?   **[2]**

iii. Explain the Linux subdirectories content of root directory.   **[3]**

iv. Write description of the following Linux commands: **[5]**

     a) shutdown - r 5

     b) mountb -t msdos /dev/hdd/mnt/ddrive

     c) chmod 7 5 5

     d) rpm –ql package

     e) cat /proc/cpuinfo

QUESTION 2 [25 marks]

i. Explain the following terms: **[10]**

    a) Constructor and destructor

    b) Call by value and call by reference

    c) Function overloading

    d) Function template

    e) Encapsulation

ii. Distinguish between the following (Note: write down with suitable example): **[15]**

    a) Base class and Derived class

    b) Private and Protected inheritance.

    c) Abstract and Concrete class

    d) A class and an object

    e) Operation polymorphism and Inclusion Polymorphism.

Section B

QUESTION 3 [25 marks]

i. Write the C++ syntax and draw the flow charts for the following statements. [12]

    a. If-else statement

    b. While statement

    c. For statement

    d. Switch statement

ii. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: [6]

$$1, 2, 3, 5, 8, 13, 21, 34, 55, 89 \ldots$$

What is recursive function? Using C++, write a recursive program of Fibonacci series.

iii. A person invests $1000.00 in a savings account yielding 5 percent interest. Assuming that all interest is left on deposit in the account. Write a program to calculate and print the amount of money in the account at the end of each year for 10 years. Use the following formula for determining these amounts: [7]

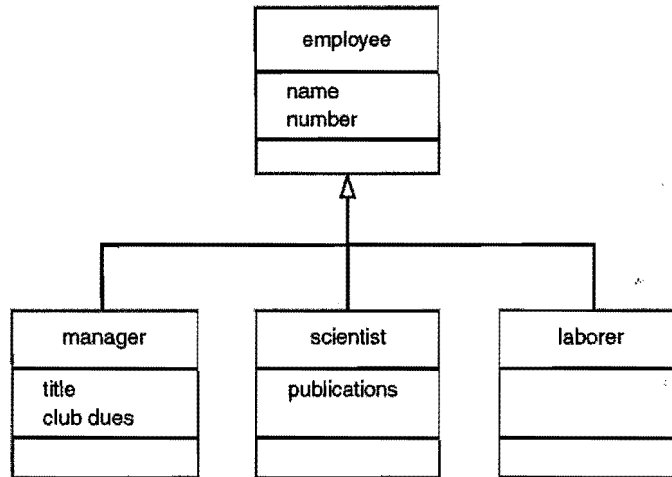$$a = p \, (1+r)^n$$

Where

    p is the original amount invested

    r is the annual interest rate

    n is the number of years and

    a is the amount on deposit at the end of the nth year

QUESTION 4 [25 marks]

i. What is stream? Write the advantage of streams. [3]

ii. Consider the following UML class hierarchy diagram for Widget Company. [12]

Using C++ notation implement the above class hierarchy. Your implementation must be as close as possible to the above design. A sample output after insert data is:

Data on manager 1:

      Name: Dlamini

      Number: 10

      Title: President

      Golf club dues: 5000

Data on Laborer 1:

      Name: Sifiso

      Number: 201

iii. Create a class called time that has separate int member data for hours, minutes, and seconds. One constructor should initialize this data to 0, and another should initialize it to fixed values. Another member function should display it, in 11:59:59 format. The final member function should add two objects of type time passed as arguments. **[10]**

A main( ) program should create two initialized time objects (should they be const?) and one that isn't initialized. Then it should add the two initialized values together, leaving the result in the third time variable. Finally it should display the value of this third variable. Make appropriate member functions const.

QUESTION 5 [25 marks]

i. What is the standard template library (STL)? **[2]**

ii. Write a C++ program demonstrating use of the pure virtual function with the use of base and derived classes. **[6]**

iii. Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In main( ), exercise the function with arrays of type int, long, double, and char. **[7]**

iv. Imagine a publishing company that markets both book and audiocassette versions of its works. Create a class publication that stores the title (a string) and price (type float) of a publication. From this class derive two classes: book, which adds a page count (type int), and tape, which adds a playing time in minutes (type float). Each of these three classes should have a getdata( ) function to get its data from the user at the keyboard, and a putdata( ) function to display its data. **[10]**

Write a main () program to test the book and tape classes by creating instances of them, asking the user to fill in data with getdata( ), and then displaying the data with putdata( ).

End of Question Paper