Introduction to programming
C++ Practical session

ENSIA
Academic Year (2021-2022)

Worksheet 6 « Pointers»

Exercise 1

Write a program that performs the following treatments. After each treatment and for every pointer or value , display the content of the pointer, its address, the pointed value and the address of the pointed value :

- Declare a pointer p without initialization and a pointer p initialized with Null.
- The pointer p pointes an integer value v initialized to 10.
- Using the pointer modify the integer value v " from keyboard".
- Use only the pointer p to initialize an integer value w with the value of v.
- Use only a pointer r that points to p in order to modify the integer value v " from keyboard".

Exercise 2

1) We assume that tab is an array of floats : float tab [3];
   We assume that this array is initialized.
   Write a program to calculate the sum of array elements using pointers.

2) Rewrite the program with a two dimensional array float tab2D [3][4];

Exercise 3

Write a function that takes two parameters a string and a character and returns the number of occurrences of the character in the string. We consider three prototypes :

a) int nb_occ (string s, char c);
b) int nb_occ (char s[] , char c);
c) int nb_occ (char *s, char c);

Exercise 4

Write a function that doesn't return any result and finds the maximum and minimum values in an array of integers(one dimension). We take 4 parameters : the array, its size, the maximum and the minimum, propose two solutions (parameters passed by reference, using pointers). Test the function in a small program.

Exercise 5

Write a function that returns a pointer to the maximum value of an array of double's. If the array is empty, return NULL.

```
double* maximum(double* a, int size);
```

Exercise 6

Write a program that declares an array of doubles and a pointer to its first element, then initializes the array. Display the values of the array and their addresses using the array and the pointer.

Exercise 7

Write a function that double the values of an array of doubles passed as parameter, this function must return a pointer. Apply the function to a random array and display it.

Exercise 8

We consider a singly linked list where each item is composed of an integer data and an integer key. Write a program to handle this singly linked list with functions to perform the following tasks:

1- Displaying items of the list.
2- Inserting a new node in beginning of the list.
3- Search an element in the list with a given key.
4- Deletion of the first element from the list.
5- Deletion of an item with a given key from the list .
6- Sorting elements of the list.
7- Reverse elements of the list

Exercise 9

Write a program to implement a stack of integer values using linked list. The basic functions to implement are : create, display, pop, push, display top element, empty, stack count.

The different operations are performed through the menu:

1 - Push
2 - Pop
3 - Top
4- Empty
5 - Dipslay
6 - Stack Count
7-Destroy stack
8- Exit

Exercise 10

To implement a queue of integer values with a linked list, in a data structure, we maintain two pointers, front and rear. The front points the first item of queue and rear points to last item. Write the two main functions to handle a queue:

enQueue() This operation adds a new node after rear and moves rear to the next node.
deQueue() This operation removes the front node and moves front to the next node.