Swinburne University of Technology Sarawak

COS10009 Introduction to Programming – Semester 1 / 2018

Array (Lab 05)

Core Task 1

To Do

One-Dimensional Array

a. Declare an array of *int* type with the size of 20 to store integers in descending order starting from 20 (use a *for* loop to assign those integers into the array).

b. Display the entire array.

c. Allow user to assign a new integer into any one of the elements in the array.

d. Calculate and display the average value and the highest value in the array.

e. Display the entire array. *(Note: Repeating the codes in (b) again? In the lab next week, we will address this issue through the concept of "function")*

Core Task 2

To Do

Two-Dimensional Array

a. Declare a 5 by 5 two-dimensional array of *char* type to store five English words, where each word consists of five alphabets.

b. Prompt user to enter alphabet by alphabet for all the five words.

c. Display the entire array to the screen.

Core Task 3

To Do

Tic Tac Toe

Create a game of Tic Tac Toe, to be played on the console. The board is a 3 x 3 array of char like this

```
    |       |       |       |
    |       |       |       |
    |       |       |       |
```

and it will contain X, O or blank.

a. Declare the array of char as an array in the main() function.

b. Initialize the cells on the board, i.e. in the array, to blanks (‘ ‘), then print the whole array on the screen.

c. Prompt the user for a letter (‘X’ or ‘O’ or ‘q’ to quit) and then scans (scanf) keyboard input for this (it may also use fflush(stdin) to clear the keyboard buffer).
d. Prompt the user to for the integer numbers of the row (1-3) and column (1-3) where the letter should go
e. Repeat (c) and (d) until the user enters ‘q’.

Vital Task

To Do

Turtle Graphics

Imagine a mechanical turtle that walks around the room under the control of a C program. The turtle holds a pen and traces out shapes as it moves. In this program out will simulate the operation of the turtle and create a computerized sketchpad as well.

Select a size for your 2-D array floor, which the whole array will be initialized to zeros. User may choose to move the turtle either left, right, up or down repeatedly. Keep track of the current position of the turtle at all times, assume that the turtle always starts at the middle of the 2-D array. As the turtle moves, set the value of the location (element) that the turtle is current in to 1. After every single move made by the turtle, the array will be printed to the screen, wherever there is a 1 in the array, display an asterisk, or some other character you choose. Wherever there is a zero, display a blank.

Challenge Task

To Do

Sort Algorithms

Sort algorithms are both interesting and useful, though it can be hard to see how it they work. You will be developing a program to implement a number of sort algorithms to work with arrays.

Declare an array and prompt user to input ten integers into the array. Next, implement and demonstrate the following two sort algorithms to sort the numbers in the array:

Bubble Sort, is one of a variety of different sorting techniques. With bubble sort, each of the elements of the array is compared with its neighbour and they are swapped if they are not in the correct order. When this has been performed for all elements in the array one element will be in the correct position. It will have bubbled up to the top of the array. To sort all elements of the array requires the bubble sort to loop over all elements of the array, once for each element in the array. Have a look at:
https://www.youtube.com/watch?v=P00xJgWzz2c

Select and implement another sort algorithm of your choice: http://www.sorting-algorithms.com/

Note: You are required to print the array to the screen for every single iteration of the sort algorithm in order to show the entire sorting process.

Exploratory Task

To Do

Design and write a C program that relates to the topics covered in this lab. The program should demonstrate your ability to use what you have learnt to explore associated concepts that go beyond the scope of this unit.