# Homework 1 Arrays, tuples and records

# 1. Trace through the following pseudocode and complete the trace table below.

# 

# maxAge = 0

# array ageList[4]

# for index = 0 to 3

# ageList[index] = input ()

# if ageList[index] > maxAge then

# maxAge = ageList[index]

# position = index

# endif

# next index

# print (AgeList[position], position)

# Test Data 12, 16, 17, 11

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **ageList** | | | |  |  |  |
| **index** | **0** | **1** | **2** | **3** | **maxAge** | **position** | **Output** |
| - | - | - | - | - | 0 | - | - |
| 0 | 12 | - | - | - | 12 | 0 | - |
| 1 | 12 | 16 | - | - | 16 | 1 | - |
| 2 | 12 | 16 | 17 | - | 17 | 2 | - |
| 3 | 12 | 16 | 17 | 11 | 17 | 2 | 17, 2 |
|  |  |  |  |  |  |  |  |

[4]

2. A teacher uses a program to store an array of 20 pupils pupil[0:19] she would like to sort them into two groups for a group activity. Write a pseudocode algorithm that will read the 20 names and then output lists consisting of every other pupil.

Example: GROUP 1

pupil1

pupil3

pupil5

GROUP 2

pupil2

pupil4

pupil6 [5]

group1 = []

group2 = []

array pupils[0:19]

for i = 0 to 19

    nameOfPupil = input("enter pupil name")

    pupils.append(nameOfPupil)

endfor

for x = 0 to 19

    if x % 2 == 0 then

        group1.append(pupils[x])

    else

        group2.append(pupils[x])

    endif

endfor

print(“group 1: “, group1)

print(“group 2: “, group2)

3. (a) The results of an Athletics event involving several schools are recorded. An array **school[0:3]** holds the names of the 4 schools participating. A second array **medal[0:3]** holds the number of medals that each school has won. This array is updated each time a new result is announced.

For test purposes, the names of the schools are recorded as AAAA, BBBB, CCCC, DDDD. The medal array is pre-loaded with results [4,7,1,3], meaning that school AAAA has 4 medals, BBBB has 7 medals, etc.

Each time a new result comes in, the user enters the result. They are prompted to enter the school number (1 for AAAA, 2 for BBBB etc.) and the medal array is updated.

When the user enters -1 for the school number, the results are printed in the form

**School number nn School name XXXX Number of medals nn**

Complete the pseudocode for this program. Include validation to ensure that a valid school number is entered. [8]

array school[0:3]= ["AAAA", "BBBB","CCCC","DDDD"]

array medal[0:3] = [4,7,1,3]

while schoolNumber != -1 do

    schoolNumber = int(input("enter school number 1 to 4, -1 to end"))

    if schoolNumber < 0 or schoolNumber > 4 then

        print("invalid input")

        continue

    newResult = int(input("enter the new result"))

    if newResult < 0 then

        print("invalid input")

        continue

    if 4 > schoolNumber > 0 then

        medal[schoolNumber-1] = newResult

for i in range(0, 4):

    print("school number", i + 1, "school name", school[i], "medals:", medal[i])

(b) It is possible to have an n-dimensional array holding a set of elements of the same type. Give an example of a program where it might be useful to use a multi-dimensional array. How many dimensions would this array need?

If you wanted to for example, make an array that holds the scores of different classes, you could use a 2d array, which is an array containing arrays, each array being the array of scores on a test for each class and each value in each sub array being the test scores of individual pupils.

[2]

(c) Give **one** difference between the data structures **array** and **tuple**. [1]

Array only stores one type of data, whereas tuple can store multiple types of data, like int and str at the same time, while array’s items’ data types are the same, like all str for example.

[Total 20 Marks]