knowledgeplus
PROMOTING IT

Information System - Lesson 6

8. Array Data Type

An array is a special variable that has one name, but can store multiple values. Each value is stored in an element pointed to by an index.

The first element in the array has index value 0, the second has index 1, etc

One Dimensional Arrays

A one dimensional array can be thought as a list. An array with 10 elements, called names, can store 10 names and could be visualised as this:

index	Element
0	Fred
1	James
2	Tom
3	Robert
4	Jonah
5	Chris
6	Jon
7	Matthew
8	Mikey
9	Jack

This array would be created by

```
    Dim names(9) As String
```

Elements indexed from 0 to 9

The statement:

```
        Console.WriteLine(names(1))
```

Will display James

```
        Console.WriteLine(names(7))
```

Will display Matthew

VB.Net Consol Programming

```
Sub Main()
    'Example of a 1 Dimensional array of 10 elements
    'Written by KPY
    'Date 12/2/2020

    Dim index As Integer
    Dim names(9) As String 'declaring a 10 element array of string
    Dim grades(9) As Integer ' decalaring a 10 element array of
integer

    'Entering 10 names and grades
    For index = 0 To 9
        Console.WriteLine("Enter name " & index)
        names(index) = Console.ReadLine()
        Console.WriteLine("Enter grade for " & names(index))
            grades(index) = Console.ReadLine()
    Next index

    'Displaying the 10 names and grades
    For index = 0 To 9
        Console.WriteLine(names(index) & " has grade " &
grades(index))
    Next index
End Sub
```

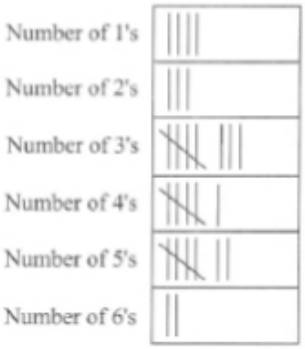
Programming Projects

Write a program that reads 6 names into an array. The program must display the names in the same order that they were entered and then in reverse order.

Make a program that fills an array with 5 elements with values entered by the user. Print out all elements in order.

Make a program that first asks the user how many values to enter. The program will then fill an array with all entered values. When all values are entered the program prints out the highest entered value and its position (and index) in the array.

We want to simulate throwing a die 30 times and record the scores. If we did this 'manually' we would end up with a tally chart:



If we use a computer to keep a count of how many times each number was thrown, we could use an integer array (index range 1..6) instead of the tally chart. In general, a die throw will give a score i, and we want to increment the count in the i th element.

```
TallyChart(i) ← TallyChart(i) + 1
```

Write a program to simulate the throwing of a die 30 times. The results of the

We wish to select six random numbers between 1 and 49 with the condition that all the numbers are different. One possible strategy, or algorithm, is.

- Initialise an array by using a for loop to store the values 1 to 49
- Repeatedly select a random element from array until a non-zero value is selected
- Display this value
- Set that element to zero
- Repeat the above three steps until six numbers have been selected.

Write a program to select six unique random numbers between 1 and 49.

Declare two arrays, Student and DoB, to store the name of Students and their dates of birth. For example if Fred is born on 22/12/84, then we could store 'Fred' in Student(1) and '22/12/84' in DoB(1). To find a particular student we can use a repeat loop:

```
Ptr ← 0
  repeat
  Ptr ← Ptr + 1
until (Student[Ptr] = WantedStudent) OR (Ptr = 5)
```

Write a program that stores 5 students' names and dates of birth and then searches for a particular student and displays that student's date of birth and current age. Display a suitable message if the student's details cannot be found.

Write a program which asks the user for the subjects done in each period for each day and then prints out the timetable with suitable headings.

Using a two-dimensional array, write a program that stores the names of ten countries in column 1 and their capitals in column 2. The program should then pick a random country and ask the user for the capital. Display an appropriate message to the user to show whether they are right or wrong.

Expand the program above to ask the user 5 questions and give a score of how many they got right out of 5.

Challenge Projects

Store in a 1-D array a set of 5 place names, and in a 2-D array the distances between the places. Ensure that the order of the places is the same in both arrays. When the names of 2 places are input, the distance between them is displayed. If they are not both in the table, a suitable message should be displayed.

A Latin Square of order n is an n x n array which contains the numbers 1, 2, 3, ..., n such that each row and column contain each number exactly once. For example the following diagram shows a Latin Square of order 4. You can see that each row can be obtained from the previous one by shifting the elements one place to the left.

1	2	3	4
2	3	4	1
3	4	1	2
4	1	2	3

Design and write a program to store such a Latin Square of a size given by the user. The program should also display the Latin Square.