





Abdallah Karakra

Computer Science Department

Comp 230

Tuesday, January 05, 2016

Uploaded By: anonymous

Arrays

Array is a collection of data items of the same type.

Array element is a data item that is part of an array.



BIRZEIT UNIV

Teesday, January 05, 2016m

Arrays

		L	
	•	c[0]	-45
•	Array	c[1]	6
	 Group of consecutive memory locations 	c[2]	0
	Same name and type	c[3]	72
	- Same name and type	c[4]	1543
•	To refer to an element, specify	c[5]	-89
	– Arrav name	c[6]	0
		c[7]	62
	 Position number 	c[8]	-3
•	Format:	c[9]	1
	arraynama[position number]	c[10]	6453
		c[11]	78
	 First element at position 0 	Î	
	– n element array named c:	Position number of	
	• c[0], c[1]c[n - 1]		

array c

of

Tuesday, January 95, 2016 m

Declaring Arrays

• When declaring arrays, specify

arrayType arrayName[numberOfElements]; e.g. int c[10]; float myArray[100];

Declaring multiple arrays of same type

 Format similar to regular variables
 e.g. int b[100], x[27];





Arrays

Array elements are like normal variables
 c[0] = 3;
 printf("%d", c[0]);
 c[1]= c[0]+c[2]
 c[3]= c[2]+5

Perform operations in subscript (index).

c[5 - 2] == c[3] == c[x]

Tuesday, January 95, 2016m

Examples Using Arrays

Initializers

int n[5] = { 1, 2, 3, 4, 5 }; char alphabet[5] = { `A', 'B', 'C', 'D', 'E' };

• All elements 0

int n[5] = { 0 }

- If size omitted, initializers determine it
 int n[] = { 1, 2, 3, 4, 5 };
 - 5 initializers, therefore 5 element array



Examples Using Arrays

Output:

Output:

5 31

31 5

BIRZEIT UNIVE

Uploat

20

9

```
int a [5] = {5,2,9,10,31};
int result = a[3%2] + a[2]+a[4/2];
printf("%d\n",result);
printf("%d",a[5%3]);
```

```
int a [5] = {5,2,9,10,31};
int temp;
printf("%d %d",a[0], a[4]);
temp=a[0];
a[0]=a[4];
a[4]=temp;
printf("\n%d %d",a[0], a[4]);
```

Tuesday, January 05, 2016m

Example: Fill and Print Array

#include <stdio.h></stdio.h>	Output:
int main ()	Element[0] = 1
	Element[1] = 2
<pre>int n[10]; // n is an array of 10 integers int i,j;</pre>	Element[2] = 3
initialize elements of array n (Fill Array)	Element[3] = 4
<pre>for (i = 0; i < 10; i++) </pre>	Element[4] = 5
<pre>n[i] = i + 1; /* set element at location i to i + 1 */</pre>	Element[5] = 6
}	Element[6] = 7
// output each array element's value (Print Array) for $(i = 0; i < 10; i+1)$	Element[7] = 8
{	Element[8] = 9
<pre>printf("Element[%d] = %d\n", j, n[j]); }</pre>	Element[9] = 10

return 0;

Example: Fill and Print Array

```
#include <stdio.h>
#define size 5 // array size= 5
int main ()
   int n[ size ]; // n is an array of 5 integers
   int i, j;
   // initialize elements of array n (Fill Array)
   for ( i = 0; i < size; i++ )</pre>
      scanf ("%d", &n[ i ]);
   // output each array element's value (Print Array)
   for (j = 0; j < size; j++ )</pre>
      printf("Element[%d] = %d\n", j, n[j]);
   return 0;
```

Input: 1 2 3 4 5

Output:		
Element[0]	=	1
Element[1]	=	2
Element[2]	=	3
Element[3]	=	4
Element[4]	=	5





Examples

Example 1 (Fill and print array using function) Example 2 (Inverse Array using function) Example 3 (sum two arrays) Example 4 (sort array)



Example: Finding the Maximum

#include <stdio.h>
#define size 5
int main()

int i,max; int list[size]; //initialize the array for (i=0;i<size;i++) scanf("%d",&list[i]); //find maximum value max=list[0]; for (i=1;i<size;i++) if (max<list[i]) max=list[i]; printf("Maximum value:%d",max); return 0;



Example: sorting it in descending order

BIRZEIT UNI

```
void Sort(int array[])
£
     int i,j;
     int temp;
     for(i=0;i<Size-1;i++)</pre>
     £
           for (j=i+1; j<Size; j++)</pre>
           £
              if (array[i]<array[j])</pre>
              ł
                  temp=array[j];
                  array[j]=array[i];
                  array[i]=temp;
                                                                Code
              }
           }
                                     Enter array of integers with size 3
     }
                                     345
                                     array after sorted :5 4 3
                                Abdallah Karakra
Tuesday, January 05, 2016 m
```



Linear Search

Problem:

Given a list of N values, determine whether a given value X occurs in the list.

For example, consider the problem of determining whether the value 55 occurs in:



Solution:

start at one end of the list,

if the current element doesn't equal the search target, move to the next element, stopping when a match is found or the opposite end of the list is reached.





Example

Write a program that takes 7 integers as input and prints the number with the smallest sum of digits and its location in the array.

Code



Tuesday, January 95, 2016m

Creating a 2D Array

Create array elements by telling how many ROWS and COLUMNS

Example:

int grades[5][3];

grades is a two-dimensional array, with 5 rows and 3 columns. One row for each student. One column for each test.





Example

int a[2][4];

a[1][0]=9;



a[0][3]=5;

a[0][1]=a[0][3]+ a[1][0];



Declare & Initialize

Example:

int grades [5][3] =

- { { 78, 83, 82 },
 - $\{90, 88, 94\},\$
 - $\{71, 73, 78\},\$
 - { 97, 96, 95 },
 - { 89, 93, 90 } };

A Two-D Array is an array of arrays. Each row is itself a One-D array.



Row, Column Indices

	U	I	<u> </u>
0	78	83	82
1	90	88	94
2	71	73	78
<u>3</u>	97	96	<u>95</u>
4	89	93	90

1

Give both the ROW and COLUMN indices to pick out an individual element.

The fourth student's third test score is at ROW 3, COLUMN 2



Tuesday, January 95, 2016m

Example : Fill Array

What are the elements of the array table?

```
int table[3][4];
int x = 1;
for (row = 0; row < 3; row++)
    for (col = 0; col < 4; col++)
    {
       table[row][col] = x;
       x++;
    } //for col</pre>
```



Example



Write a program that adds up two 2x2 arrays and stores the sum in third array.

Code



Tuesday, January 95, 2016 m



"Success is the sum of small efforts, repeated day in and day out." Robert Collier

Teesday, January-05, 2016m







References:

Problem Solving & Program Design in C (main reference)

