SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 23ITT101- PROBLEM SOLVING AND C PROGRAMMING

I YEAR /I SEMESTER

Unit 3- Arrays and Strings

Topic 1: Arrays

Brain Storming

1. How to allocate continuous memory location?

- Hint: int a=5;
- Single storage location is alloted for 5 in a variable “a”.
- How to allocate more than one memory location?

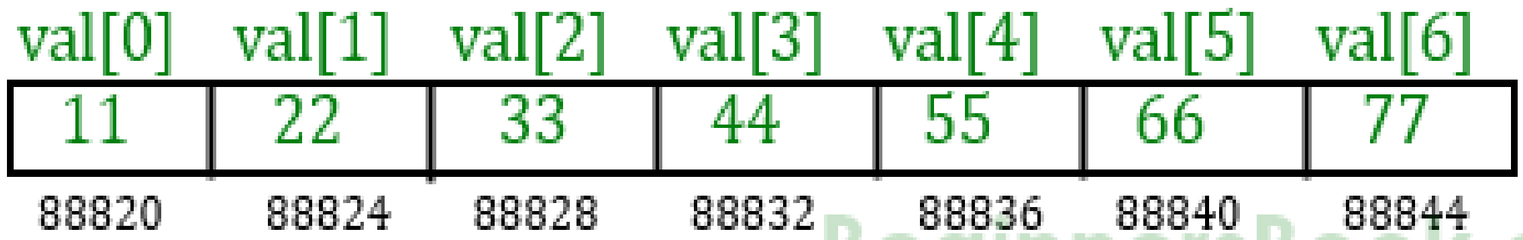
Characteristics of arrays:

- ✓ An array is always stored in consecutive memory location.
- ✓ It can store multiple value of similar type, which can be referred with single name.
- ✓ The pointer points to the first location of memory block, which is allocated to the array name.
- ✓ An array can either be an integer, character, or float data type that can be initialized only during the declaration.
- ✓ The particular element of an array can be modified separately without changing the other elements.
- ✓ All elements of an array can be distinguishing with the help of index number.

The operations of an array include −

- ✓ Searching − It is used to find whether particular element is present or not.
- ✓ Sorting − Helps in arranging the elements in an array either in an ascending or descending order.
- ✓ Traversing − Processing every element in an array, sequentially.
- ✓ Inserting − Helps in inserting elements in an array.
- ✓ Deleting − helps in deleting the element in an array.

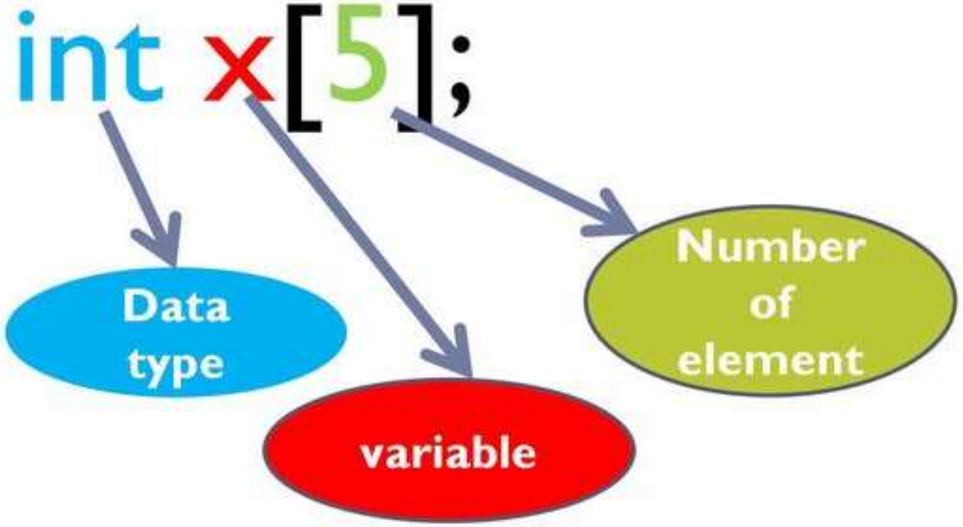
Memory Representation



All the array elements occupy contigious space in memory. There is a difference of 4 among the addresses of subsequent neighbours, this is because this array is of integer types and an integer holds 4 bytes of memory.

Memory representation of array

Array Representation




```
x[0] = 100;
x[1] = 200;
x[2] = 300;
x[3] = 400;
x[4] = 500;
```

- Contoh:

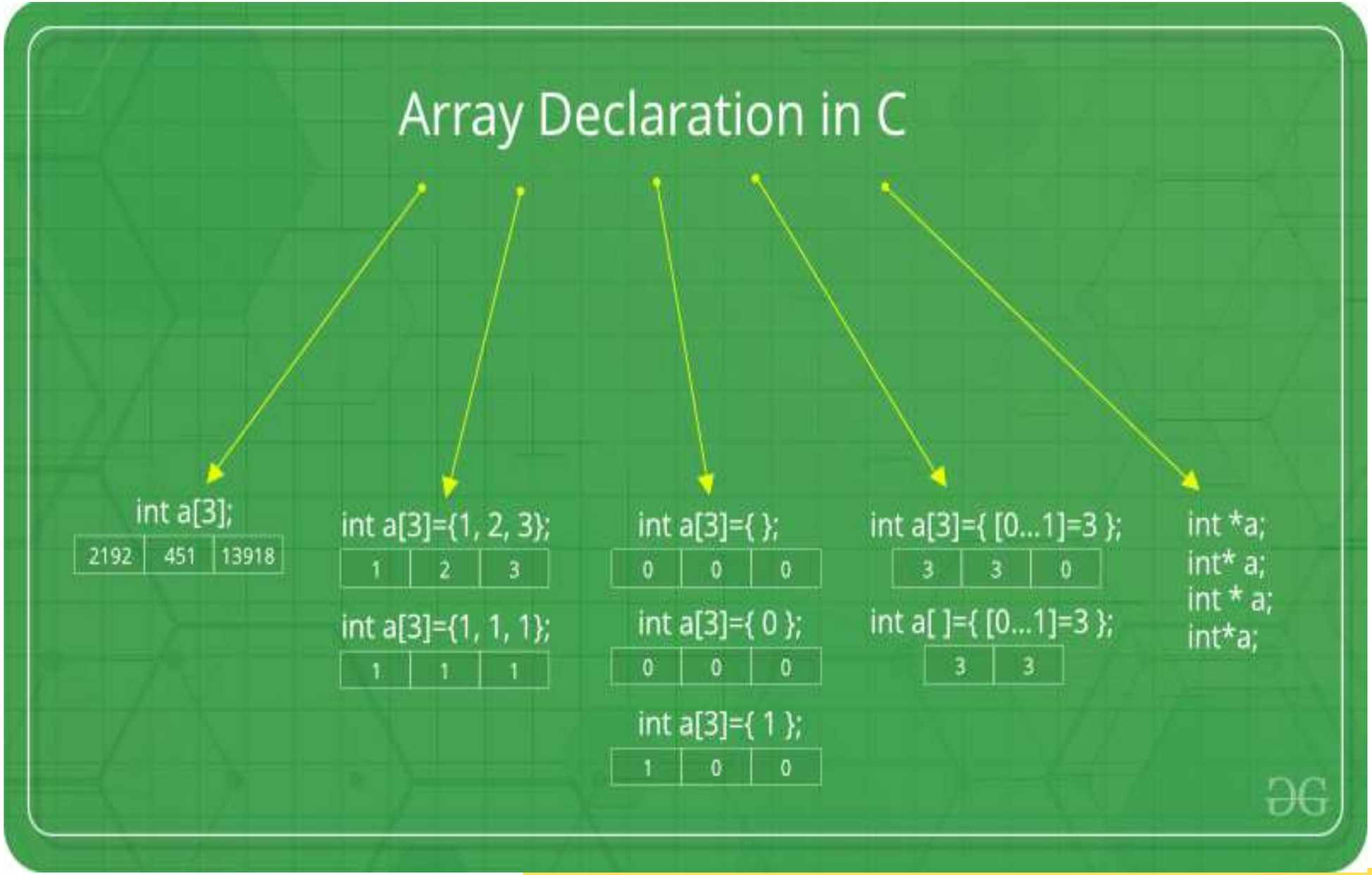
index	0	1	2	3	4
value	100	200	300	400	500

Array Declaration and Initialization

```
int students[93];

float cost[10];
// declare an array by specifying size in [].

int my_array1[20];

char my_array2[5];

// declare an array by specifying user defined size.

int size = 20;

int my_array3[size];
```

Array Initialization

```
char name1[ ] = { 'J', 'a', 'n' };
 char name2[ ] = { "Jan" };
 char name3[4] = "Jan";
int number[3] = { 5, 7, 2 };
int number1[3] = { 5, 7 };
int number[3] = { [0] = 5, [2] = 7 };

int num[3] = {1, 100, 200};
printf("%d", num[1]);  // Outputs: 100
```


Array Declaration in C
int a[3];
2192 451 13918
int a[3]={1, 2, 3};
1 2 3
int a[3]={1, 1, 1};
1 1 1
int a[3]={ };
0 0 0
int a[3]={ 0 };
0 0 0
int a[3]={ 1 };
1 0 0
int a[3]={ [0...1]=3 };
3 3 0
int a[ ]={ [0...1]=3 };
3 3
int *a;
int* a;
int * a;
int*a;

```
#include <stdio.h>

  void main()
   {
      // Declare and initialize an array arr with the elements
      int arr[10] = {54, 27, 15, 6, 47, 134, 69, 153, 3, 51};

      // We use a for loop to print all the elements one by one
      for (int i = 0; i < 10; i++)
          printf("%d ", arr[i]);

          }
```

Output

54 27 15 6 47 134 69 153 3 51

```
// Program to take 5 values from the user and store them in an array
// Print the elements stored in the array

#include <stdio.h>

void main() {

  int values[5];

  printf("Enter 5 integers: ");

  // taking input and storing it in an array
  for(int i = 0; i < 5; ++i) {
     scanf("%d", &values[i]);
  }

  printf("Displaying integers: ");

  // printing elements of the array
  for(int i = 0; i < 5; ++i) {
     printf("%d\n", values[i]);
  }
}
```

Output:

```
Enter 5 integers: 1
-3
34
0
3
Displaying integers: 1
-3
34
0
3
```

```
// Program to find the average of n numbers using arrays

#include <stdio.h>

void main() {

  int marks[10], i, n, sum = 0;
  double average;

  printf("Enter number of elements: ");
  scanf("%d", &n);

  for(i=0; i < n; ++i) {
    printf("Enter number%d: ",i+1);
    scanf("%d", &marks[i]);

    // adding integers entered by the user to the sum variable
    sum += marks[i];
  }

  // explicitly convert the sum to double
  // then calculate average
  average = (double) sum / n;

  printf("Average = %.2lf", average);

}
```

Output:

```
Enter number of elements: 5
Enter number1: 45
Enter number2: 35
Enter number3: 38
Enter number4: 31
Enter number5: 49
Average = 39.60
```

```
#include <stdio.h>
void main()
{
    int num[10];  // Declare an array of size 10 to store
         integer values
    int i;
// Prompt the user to input 10 elements into the array
    printf("Input 10 elements in the array :\n");
    for(i=0; i<10; i++)
    {
            printf("element - %d : ",i);  // Prompt the user to
         input the i-th element
        scanf("%d", &num[i]);  // Read the input and store it
                                        in      the array
    }
    // Display the elements in the array
    printf("\nElements in array are: ");
    for(i=0; i<10; i++)
    {
        printf("%d  ", num[i]);  // Print each element
    }
    printf("\n");
}
```

Output:

```
Input 10 elements in the array :
element - 0 : 1
element - 1 : 1
element - 2 : 2
element - 3 : 3
element - 4 : 4
element - 5 : 5
element - 6 : 6
element - 7 : 7
element - 8 : 8
element - 9 : 9

Elements in array are:
1  1  2  3  4  5  6  7  8  9
```

```
#include <stdio.h>
 void main ()
{
 int mark[ 10 ];    /* mark is an array of 10 integers */
 int i,j;
for ( i = 0; i < 10; i++ )
     {
         mark[ i ] = i + 100; /* set element at location i to i + 100 */
      }
/* output each array element's value */
for (j = 0; j < 10; j++ )
     {
printf("Element[%d] = %d\n", j, mark[j] );
      }

 }
```

OUTPUT:

```
Element[0] = 100
Element[1] = 101
 Element[2] = 102
 Element[3] = 103
 Element[4] = 104
 Element[5] = 105
 Element[6] = 106
 Element[7] = 107
 Element[8] = 108
 Element[9] = 109
```

References

TEXT BOOKS

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3.Reema Thareja, “Programming in C”, 2nd Edition, Oxford University Press,(2015). (UNIT –I,II, III, IV, V)

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1.Byron Gottfried, “Programming with C”, 2nd Edition, (Indian Adapted Edition), TMH Publications, (2006). (Unit II, III, IV)

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Thank You