Programming with C and C++

CSC-101 (Lecture 13)

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Printing the address

addresscheck.c

```c
#include<stdio.h>
int main()
{
    int num1, num2, num3, sum;
    printf("Enter any number to store in \"num1\" variable: ");
    scanf("%d", &num1);
    printf("Enter any number to store in \"num2\" variable: ");
    scanf("%d", &num2);
    printf("Enter any number to store in \"num3\" variable: ");
    scanf("%d", &num3);
    printf("\nValue of num1 = %d", num1);
    printf("\nAddress of num1 = %u", &num1);
    printf("\nValue of num2 = %d", num2);
    printf("\nAddress of num2 = %u", &num2);
    printf("\nValue of num3 = %d", num3);
    printf("\nAddress of num3 = %u", &num3);
    sum = num1+num2+num3;
    printf("\n\nValue of sum = %d", sum);
    printf("\nAddress of sum = %u", &sum);
    //getch();
    return 0;
}
```

https://ideone.com/leNhCJ

Printing the address

```
~$ ./a.out
Enter any number to store in "num1" variable: 10
Enter any number to store in "num2" variable: 20
Enter any number to store in "num3" variable: 30

Value of num1 = 10
Address of num1 = 1306826088
Value of num2 = 20
Address of num2 = 1306826092
Value of num3 = 30
Address of num3 = 1306826096

Value of sum = 60
Address of sum = 1306826100~$
```

Printing the address

addcheck2.c

```c
#include <stdio.h>

int main(void) {
	// your code goes here
	int a;
	printf("\nAddress of a = %d", &a);
	printf("\nAddress of a = %u", &a);
	printf("\nAddress of a = %o", &a);
	printf("\nAddress of a = %x", &a);
	printf("\nAddress of a = %X\n", &a);
	return 0;
}
```

```
~$ ./a.out

Address of a = 1118898020
Address of a = 1118898020
Address of a = 10254203544
Address of a = 42b10764
Address of a = 42B10764
~$
```

https://ideone.com/n8iAhK

Doubt on Unary operators

unaryex.c

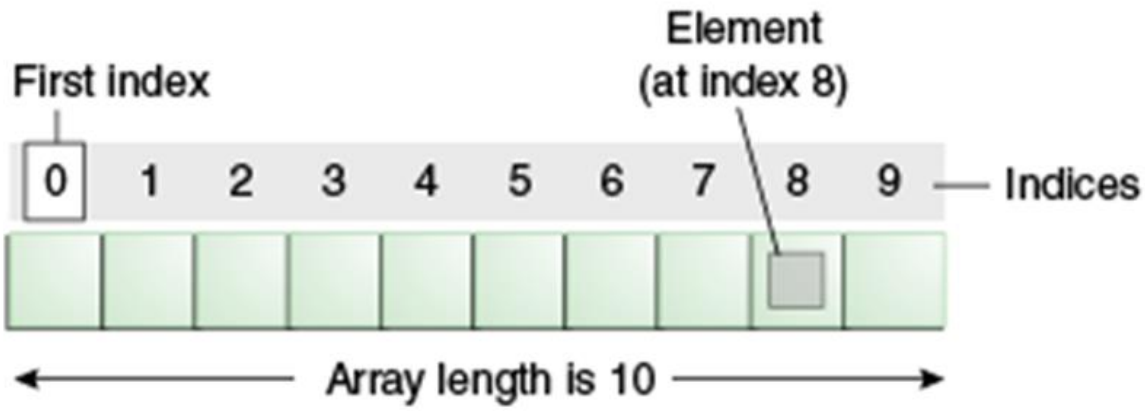
```c
#include <stdio.h>

int main ()
{
  int a = 5; // positive value of a.
  int b = -a; // use unary minus operator to change the value
  int c = +b; //// use unary plus operator to change the value

  int n1 = 20;
  int n2 = -30;

  printf (" The value of a: %d \n", a);
  printf (" The value of b: %d \n", b);
  printf (" The value of c: %d \n", c);

  printf (" The value of -n1: %d \n", -n1);
  printf (" The value of -n2: %d \n", -n2);

  return 0;
}
```

```
~$ gcc unaryex.c
~$ ./a.out
 The value of a: 5
 The value of b: -5
 The value of c: -5
 The value of -n1: -20
 The value of -n2: 30
~$
```

https://ideone.com/SKKxOu

Arrays in C

- Each element of an array is of same data type and carries the same size, i.e., int = 4 bytes.
- Elements of the array are stored at contiguous memory locations where the first element is stored at the smallest memory location.
- Elements of the array can be randomly accessed since we can calculate the address of each element of the array with the given base address and the size of the data element.



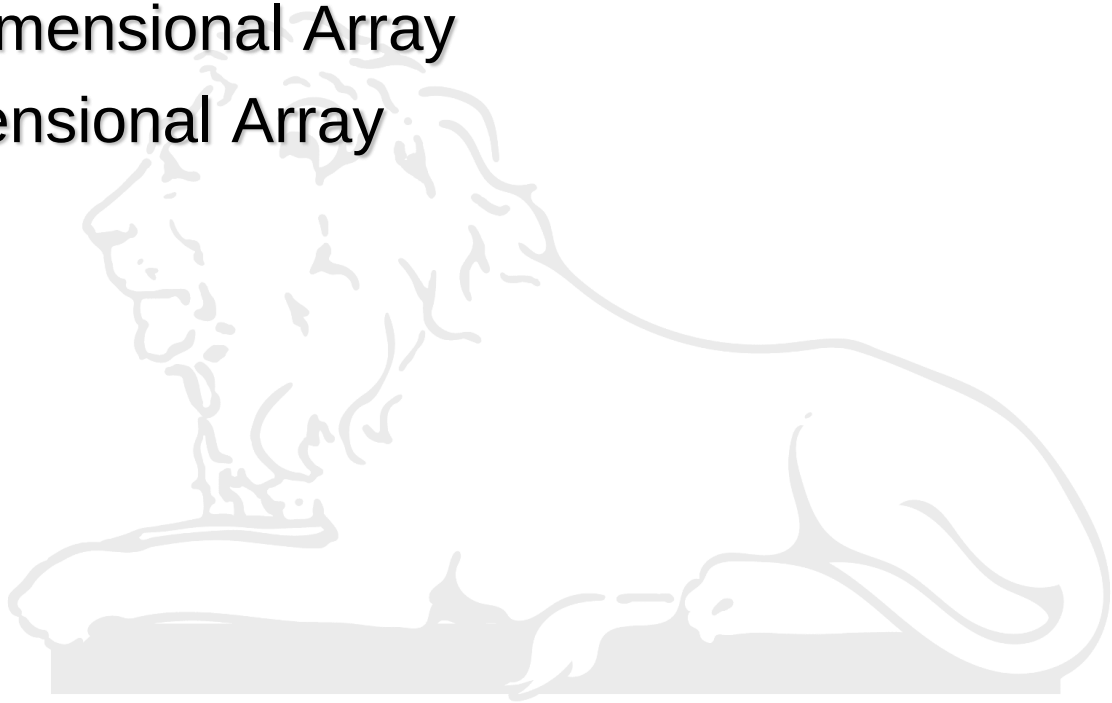
Advantages

- **Code Optimization**: Less code to the access the data.
- **Ease of traversing**: By using the for loop, we can retrieve the elements of an array easily.
- **Ease of sorting**: To sort the elements of the array, we need a few lines of code only.
- **Random Access**: We can access any element randomly using the array.

Types of Array in java

There are two types of array.

- Single Dimensional Array
- Multidimensional Array



1-D Array

- Declaration

```
data_type array_name[array_size];
```

- Example

```
int marks[5];
```

Array example

</> source code

```
1  #include<stdio.h>
2  int main(){
3  int i=0;
4  int marks[5];//declaration of array
5  marks[0]=90;//initialization of array
6  marks[1]=70;
7  marks[2]=80;
8  marks[3]=95;
9  marks[4]=85;
10 //traversal of array
11 for(i=0;i<5;i++){
12 printf("%d \n",marks[i]);
13 }//end of for loop
14 return 0;
15 }
```

stdout

```
90
70
80
95
85
```

https://ideone.com/jWSAH4

Arrays

arrcheck.c

```c
#include<stdio.h>
int main(){
int i=0;
int marks[5];//declaration of array
marks[0]=90;//initialization of array
marks[1]=70;
marks[2]=80;
marks[3]=95;
marks[4]=85;
//traversal of array
for(i=0;i<6;i++){
printf("%d \n",marks[i]);
}//end of for loop
printf("%d \n",marks[-5]);
return 0;
}
```

```
~$ gcc arrcheck.c
~$ ./a.out
90
70
80
95
85
0
21995
~$
```

https://ideone.com/mnHXbZ

Random number generation

randgenv1.c

```c
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int i;

    printf(" Random Numbers are: \n");
    for (i = 0; i <5; i++)
    {
        printf(" %d", rand());
     }
     return 0;
}
```

```
~$ gcc randgenv1.c
~$ ./a.out
 Random Numbers are:
 1804289383 846930886 1681692777 1714636915 1957747793~$
~$ gcc randgenv1.c
~$ ./a.out
 Random Numbers are:
 1804289383 846930886 1681692777 1714636915 1957747793~$
```

https://ideone.com/T0i7CE

Random number generation

randgenv2.c

https://ideone.com/f9c4zE

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h> // use time.h header file to use time

int main()
{
    int i;
     time_t t1; // declare time variable

    /* define the random number generator */
    srand ( (unsigned) time (&t1)); // pass the srand() parameter

    printf("\n"); // print the space

    printf(" Random Numbers are: \n");
    for (i = 0; i <5; i++)
    {
        printf(" %d", rand());
     }
     return 0;
}
```

```
~$ gcc randgenv2.c
~$ ./a.out

 Random Numbers are:
 1234350048 1249823084 1066441092 862534721 547687479~$
~$ gcc randgenv2.c
~$ ./a.out

 Random Numbers are:
 92749736 176211546 1797971892 748572358 1465097017~$
```

WAP to find minimum of 5 numbers using an array

arrayapp1.c

```c
#include <stdio.h>

int main() {
    int numbers[5];

    printf("Enter five numbers: ");
    for (int i = 0; i < 5; i++) {
        scanf("%d", &numbers[i]);
    }

    int min = numbers[0]; // Assume the first number is the minimum
```

https://ideone.com/7EB5VQ

```
12
13      // Compare with the remaining numbers in the array
14      for (int i = 1; i < 5; i++) {
15          if (numbers[i] < min) {
16              min = numbers[i];
17          }
18      }
19
20      printf("The minimum number is: %d\n", min);
21
22      return 0;
23  }
```

```
~$ gcc arrayapp1.c
~$ ./a.out
Enter five numbers: 10 30 100 2 10
The minimum number is: 2
~$
```

arrayapp2.c

```c
#include <stdio.h>
#include <stdlib.h>

int main() {
    int numbers[5];

    printf("Randomely generated five numbers are: ");
    for (int i = 0; i < 5; i++) {
        numbers[i]=rand()%1000;
        printf("%d ", numbers[i]);
    }

    int min = numbers[0]; // Assume the first number is the minimum
```

```
14
15      // Compare with the remaining numbers in the array
16      for (int i = 1; i < 5; i++) {
17          if (numbers[i] < min) {
18              min = numbers[i];
19          }
20      }
21
22      printf("\nThe minimum number is: %d\n", min);
23
24      return 0;
25  }
26
```

https://ideone.com/e5Sihp

```
~$ gcc arrayapp2.c
~$ ./a.out
Randomely generated five numbers are: 383 886 777 915 793
The minimum number is: 383
~$
```

Printing base address of an array

addressarray1.c

```c
#include <stdio.h>
#include <stdlib.h>

int main() {
    int a[5];

    printf("%d \n", a);
    printf("%u \n", a);
    printf("%X \n", a);

    return 0;
}
```

```
~$ ./a.out
-553055648
3741911648
DF090A60
~$
```

https://ideone.com/UdDQxE

Thank You!