Programming with C and C++

CSC-101 (Lecture 15)

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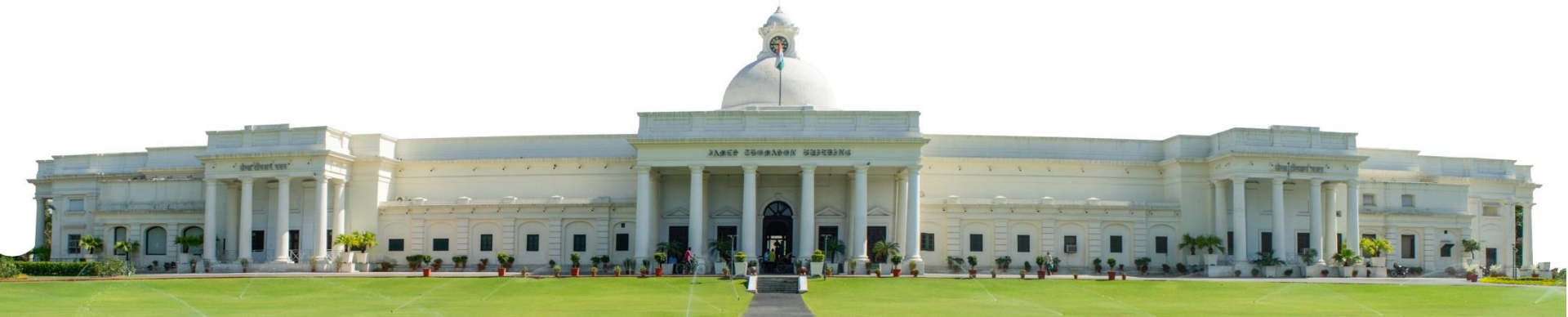


Reading and Writing Character Array

```c
#include <stdio.h>

int main() {
    char input[100]; // Declare a character array to store input
    int i = 0;
    char c;

    printf("Enter a string (up to 100 characters): ");

    // Use a loop to read characters until the array is full
    // or Enter (newline) is pressed
    while (i < sizeof(input) - 1 && (c = getchar()) != '\n') {
        input[i] = c; // Store the character in the array
        i++;
    }

```

https://ideone.com/VrREiG

```
17      // Null-terminate the character array to make it a valid C string
18      input[i] = '\0';
19
20      printf("You entered: %s\n", input); // Print the input
21
22      return 0;
23  }
24
```

stdin

```
Welcome to IIT Roorkee
```

stdout

```
Enter a string (up to 100 characters): You entered: Welcome to IIT Roorkee
```

Printing Character Array

```c
#include<stdio.h>
int main()
{
    char str[10]="Hello IITR";
    //printf("Enter a String: ");
    //scanf("%s", &str);

    for (int i=0; i<10; i++)
    printf("%c", str[i]);
}
```

input Output

Success #stdin #stdout 0s 5516KB

```
Hello IITR
```

https://ideone.com/NZkTUu

Arrays - Example 1

</> source code

https://ideone.com/U8V9mi

```
1  #include <stdio.h>
2
3  int main(void) {
4      int a[8]={20,30,40};
5      for (int i=0; i<8; i++)
6      printf("%d ",a[ i ]);
7      return 0;
8  }
9
```

input Output

Success #stdin #stdout 0s 5392KB

```
20 30 40 0 0 0 0 0
```

Example 2

</> source code

https://ideone.com/K9vvrU

```c
#include <stdio.h>

int main(void) {
    int a[4]={10,20,30,40};
    for (int i=0; i<8; i++)
    printf("%d ",a[ i ]);
    return 0;
}

```

stdout

```
10 20 30 40 1378877920 22025 -91800064 -1841019489
```

Example 3

</> source code

https://ideone.com/kcbBIT

```c
#include <stdio.h>

int main(void) {
    int a[4]={10,20,30};
    for (int i=0; i<8; i++)
    printf("%d ",a[ i ]);
    return 0;
}
```

stdout

```
10 20 30 0 -1573006880 22002 2033631232 2068984768
```

Example 4

</> source code

https://ideone.com/Rkd9pu

```
1   #include <stdio.h>
2
3   int main(void) {
4       int a[]={10,20,30};
5       for (int i=0; i<8; i++)
6       printf("%d ",a[ i ]);
7       return 0;
8   }
9
10
```

stdout

```
10 20 30 -551353856 -234756495 0 0 2134995424
```

Some Famous Problems

- Write a program to find the kth largest element in an unsorted array.
- Suppose you have an array in ascending order. Write a program to sort it in descending order using the fewest possible steps.
- Binary Array sorting problem
- Implement Tricolor Flag Sorting Problem.
- Write a program to find the majority element in an array (an element that appears more than n/2 times, where n is the size of the array).

- Write a program to check if two strings are anagrams of each other in C.
  - "listen" and "silent",
  - "cinema" and "iceman“
  - "debit card" and "bad credit" are anagrams

- Take an input n where n is an integer. Write a program to print the prime numbers less than n (Famous **Sieve of Eratosthenes algorithm** takes $n \log\log(n)$ steps and **Sieve of Atkin** takes $n/\log\log(n)$ steps).

Binary Search Algo'

```c
#include <stdio.h>

int main() {
    int arr[] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    int size = sizeof(arr) / sizeof(arr[0]);
    int target = 6;

    int left = 0;
    int right = size - 1;
    int found = -1; // Initialize a variable to track if the element is found

    while (left <= right) {
        int mid = (left + right) / 2;

        if (arr[mid] == target) {
            found = mid; // Element found, store its index
            left = right + 1; // Set left > right to exit the loop
        } else if (arr[mid] < target) {
            left = mid + 1; // Search the right half
        } else {
            right = mid - 1; // Search the left half
        }
    }

```

```
25      if (found != -1) {
26          printf("Element found at index %d\n", found);
27      } else {
28          printf("Element not found in the array\n");
29      }
30
31      return 0;
32  }
33
```

https://ideone.com/XjhcDe

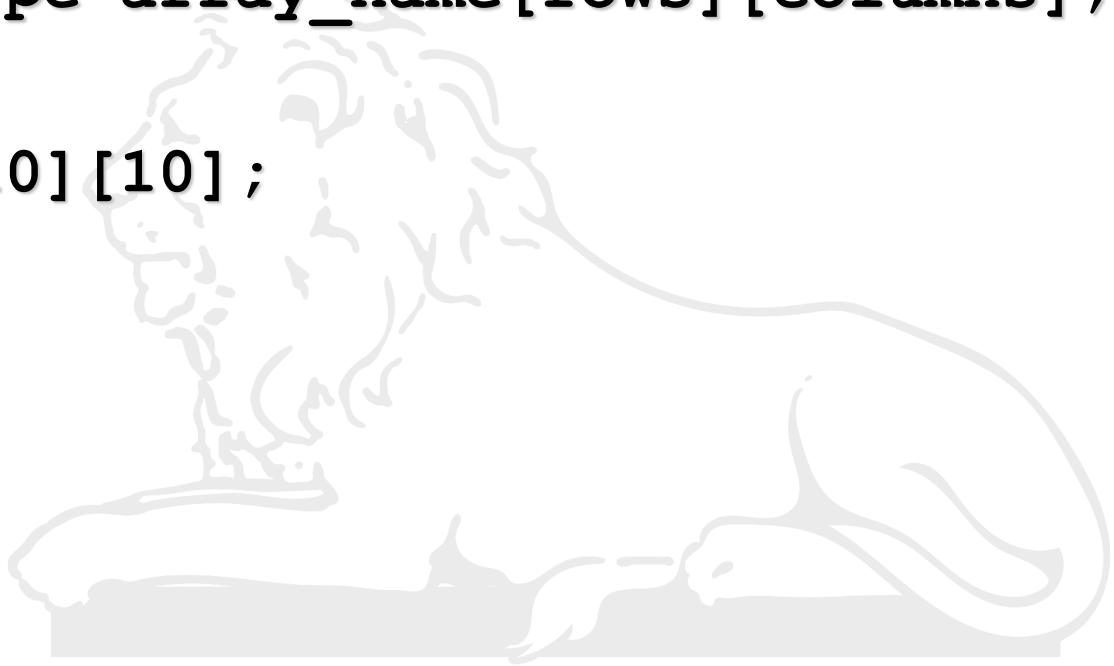
input Output

Success #stdin #stdout 0s 5472KB

```
Element found at index 5
```

Two Dimensional Array in C

- Declaration of two dimensional Array in C
- `data_type array_name[rows][columns];`
- `int a[10][10];`



</> source code

```c
#include <stdio.h>
void main ()
{
    int arr[3][3],i,j;
    for (i=0;i<3;i++)
    {
        for (j=0;j<3;j++)
        {
            printf("Enter a[%d][%d]: ",i,j);
            scanf("%d",&arr[i][j]);
        }
    }
```

```
13      printf("\n printing the elements ....\n");
14      for(i=0;i<3;i++)
15      {
16          printf("\n");
17          for (j=0;j<3;j++)
18          {
19              printf("%d\t",arr[i][j]);
20          }
21      }
22  }
```

https://ideone.com/dL9sjF

Success #stdin #stdout 0.01s 5536KB

comments (0)

stdin

copy

```
1 2 3 4 5 6 7 8 9
```

stdout

copy

```
Enter a[0][0]: Enter a[0][1]: Enter a[0][2]: Enter a[1][0]: Enter a[1][1]: Enter a[1]
[2]: Enter a[2][0]: Enter a[2][1]: Enter a[2][2]:
 printing the elements ....

1   2   3
4   5   6
7   8   9
```

Thank You!