

CS19003: Programming and Data Structures Laboratory

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<http://cse.iitkgp.ac.in/~aritrah/course/lab/PDS/Spring2021/>

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Arrays

Arrays are our first example of *structured data*.

Declaration

```
int A[400];  
float B[123];
```

Each of the elements $A[0], A[1], \dots, A[399]$ is a variable of type `int`

Declaration and Initialization

```
int A[5] = { 51, 29, 0, -34, 67 };  
char C[4] = { 'g', 'o', 'd', '\0' };  
char C[4] = "god";
```

```
printf("%d\n", A[5]); /*prints a garbage value*/
```

Nested loops with Arrays

One or more loops can be nested inside another loop.

Sorting

Suppose you have an array A of n elements (say, integers). They are stored in the array locations

$A[0]$, $A[1]$, . . . , $A[n-1]$

We want to rearrange these integers in such a way that after the rearrangement we have

$A[0] \leq A[1] \leq A[2] \leq \dots \leq A[n-1]$

The resultant array is **sorted**. There are many such sorting methods. One is bubble sort.

An Example: Bubble sort

Code

```
for (i=n-2; i>=0; --i)
{
    for (j=0; j<=i; ++j)
    {
        if (A[j] > A[j+1])
        {
            t = A[j];
            A[j] = A[j+1];
            A[j+1] = t;
        }
    }
}
```

$A[4]=4,3,2,1$

$i,j: A \rightarrow A'$

2,0: 4,3,2,1 \rightarrow 3,4,2,1

2,1: 3,4,2,1 \rightarrow 3,2,4,1

2,2: 3,2,4,1 \rightarrow 3,2,1,4

bubble till position

$i=4-2=2$.

1,0: 3,2,1,4 \rightarrow 2,3,1,4

1,1: 2,3,1,4 \rightarrow 2,1,3,4

bubble till position $i=1$

0,0: 2,1,3,4 \rightarrow 1,2,3,4

bubble till position $i=0$

Thank You