Arrays

Memory !!

acmASCIS
spreading knowledge

Agenda

- Why using arrays ?
- What arrays ?
- How we use arrays ?
- How we access elements
- Application on arrays
- Multidimensional array

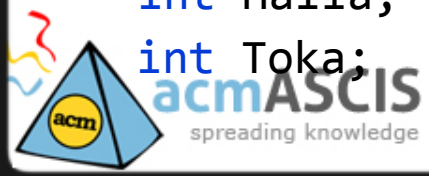
Now we can save only one value, but what if we need to save 100 value?!

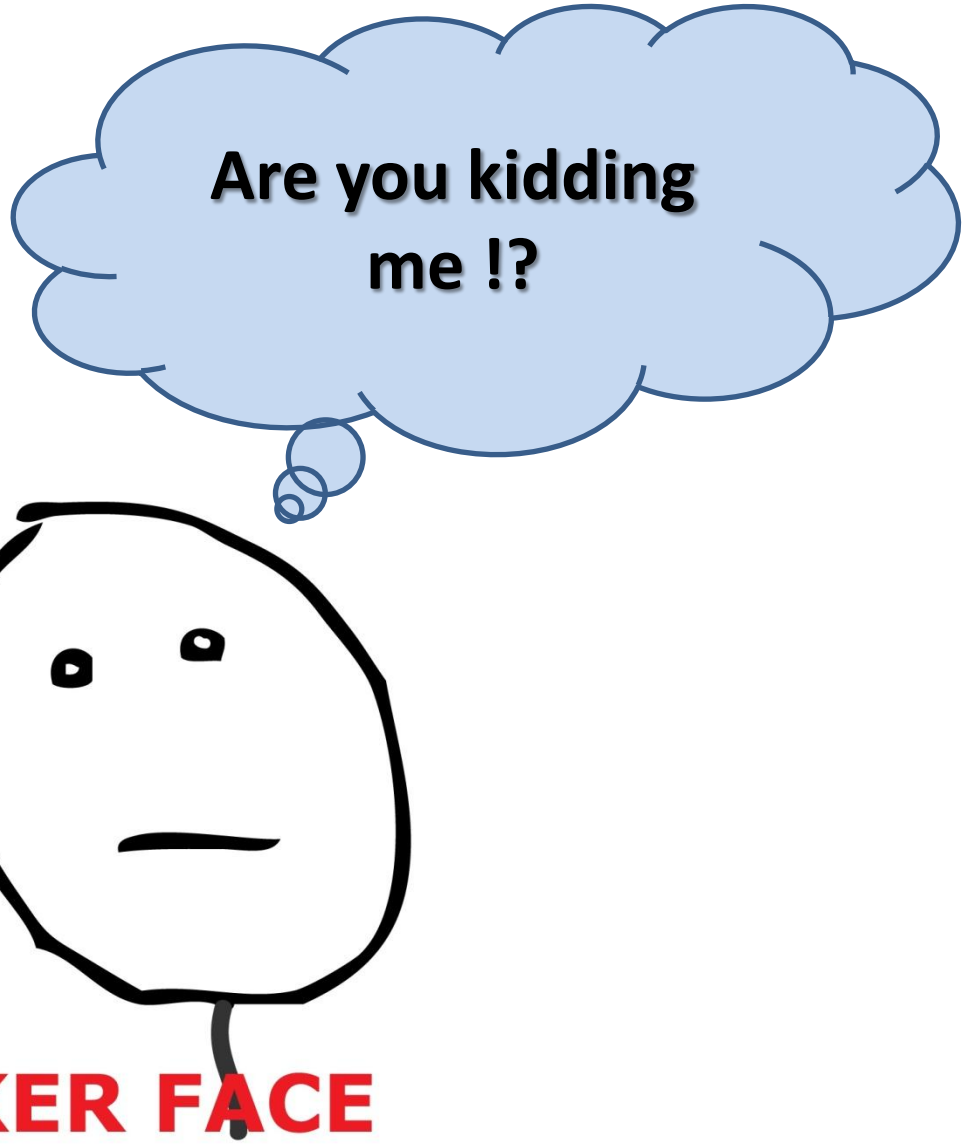
Now we can save only one value, but what if we need to save 100 value?!

Hmmm.. Well declare 100 variable :D

acmASCIS
spreading knowledge

```
int Mohammed;   int Abdullah;   int Amien;      int Mohamed;
int mina;       int Hatem;      int Bora;       int Norhan;
int menna;      int Awad;       int Mido;       int abdElwahab;
int chrisitna;  int Janna;      int nour;       int Halim;
int ahmed;      int Nahed;      int mansour;    int Hani;
int Hassan;     int Joe;        int morsy;      int Fakhry;
int joseph;     int Matt;       int sakka;      int fawzy;
int Anas;       int jasmine;    int ramzy;      int safi;
int mark;       int Sara;       int gimmy;      int Nora;
int Ismail;     int Koko;       int foo;        int Nawal;
int Boda;       int Saad;       int toot;       int Omar;
int Romy;       int Matt;       int Mounira;    int hussin;
int Mahdi;      int Hamada;     int Mounir;     int essam;
int Nagaty;     int Nada;       int Waheda;     int mahmoud;
int Ashraf;     int Jasmine;    int Wahed;      int afify;
int Abdo;       int harankash;  int Samira;     int AboMuslim;
int Ibrahim;    int sylvester;  int Samir;      int Sabry;
int Halla;      int erd;        int Hesham;     int sebrs;
int Toka;       int Somaa;      int Ali;        int tenno;
                int Basma;      int mosherf;    int AboZaid;
```





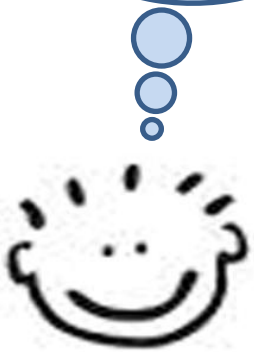
acmASCIS
spreading knowledge

Hi, I'm Genne++.

acmASCIS
spreading knowledge

Look there's something called arrays which can help you with that.

Okay ..
how do I get it ?



acmASCIS
spreading knowledge

Firstly , you should know that Array is a **block of contiguous values of the same type .**

How to declare an array?

DataType ArrayName[Size];

```
int myNumbers[3];
```

acmASCIS
spreading knowledge

Hello, I'm Array ……
Firstly , To deal with me you should know few things .

acmASCIS
spreading knowledge

1st : size must be constant


```
int Array[4];
char myName[4];
bool trueFalseQuestion[4];
long long bigNum[4];
```

Memory
??
??
??
??

2nd : initializing array

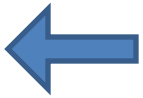

```
int arr[4] = {1,4,7,2};
int arr[] = {1,4,7,2};
```

Memory
1
4
7
2

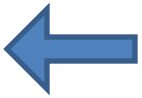
3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```



Memory
1
4
7
2

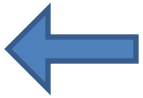


acmASCIS
spreading knowledge

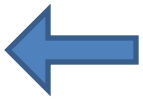
3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```



Memory
1
4
7
2



3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```

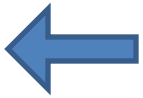
Memory
1
4
7
2

acmASCIS
spreading knowledge

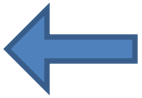
3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```



Memory
1
4
2



3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```

Memory
1
4
9
2

acmASCIS
spreading knowledge

3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```

Memory
1
4
9
2

acmASCIS
spreading knowledge

3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```

Memory
1
4
9
5

acmASCIS
spreading knowledge

3rd : index

An integer starts from zero is used to reach a specific value in the array


```
cout << arr[0];
cout << arr[1];
cin >> arr[2];
arr[3] = 5;
cout << arr[4];
```

Memory
1
4
9
5

acmASCIS
spreading knowledge

3rd : index

teger starts f zero ,

u ach

Array

Crash

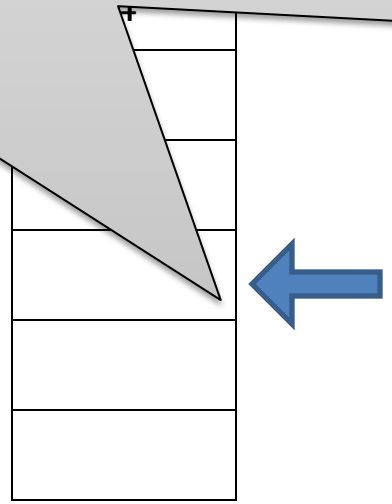
```
cout <<

cout

cin >> arr[

arr[3] = 5;

cout << arr[4];
```



acmASCIS
spreading knowledge

GHHHHHHHH
You didn’t reserve this place

acmASCIS
spreading knowledge

Common Mistakes

- Exception out of bounds.
- Constant size:

```
int Array[4];
```

```
const int size = 10;
int Array[size];
```

```
int size;
int Array[size];
```

acmASCIS
spreading knowledge

Common Mistakes

- Exception out of bounds.
- Constant size.
- Reserving a huge place:

```
int Array[100000];
```

```
int Array[1000000000];
```

Common Mistakes

- Exception out of bounds.
- Constant size.
- Reserving a huge place.
- Index VS Value.

```
int main()
{
const int SIZE = 6;
int i = 2;
char Name[SIZE] =
{'m','a','h','m','o','d'};

Name[i] = '7';

return 0 ;
}
```

Any Questions ?

Now , to the next CHALLENGE :D
we want to get the data and display them

acmASCIS
spreading knowledge

```
cin >> arr[0];
cin >> arr[1];
cin >> arr[2];
cin >> arr[3];
cin >> arr[4];
cin >> arr[5];
……

cout << arr[0];
cout << arr[1];
cout << arr[2];
cout << arr[3];
cout << arr[4];
cout << arr[5];
……
```

acmASCIS
spreading knowledge

Loops + Arrays

```
for (int i = 0; i < size; i++)
{
   cin >> arr[i];
}
```

```
for (int i = 0; i < size; i++)
{
   cout << arr[i];
}
```

Magic mirror

Problem :

given an integer N (N <= 10000) number of integers shown in the mirror , followed by the value of each integer ,
output them reversed.

input:

7
3 2 1 5 9 8 7

output:

7 8 9 5 1 2 3

Code

```
int main ()
{
    int Limit; // number Of Elements = used size
    int arr[100000];
    cin >> Limit;

    for (int i = 0; i < Limit; i++)
    {
        cin >> arr[i];
    }
    for (int i = Limit-1; i >= 0; i--)
    {
        cout << arr[i] << " ";
    }
    return 0;
}
```

acmASCIS
spreading knowledge

Let's Play

Tic-tac-toe

A better way to divide it into 3 arrays

```
int R1[3];
int R2[3];
int R3[3];
```

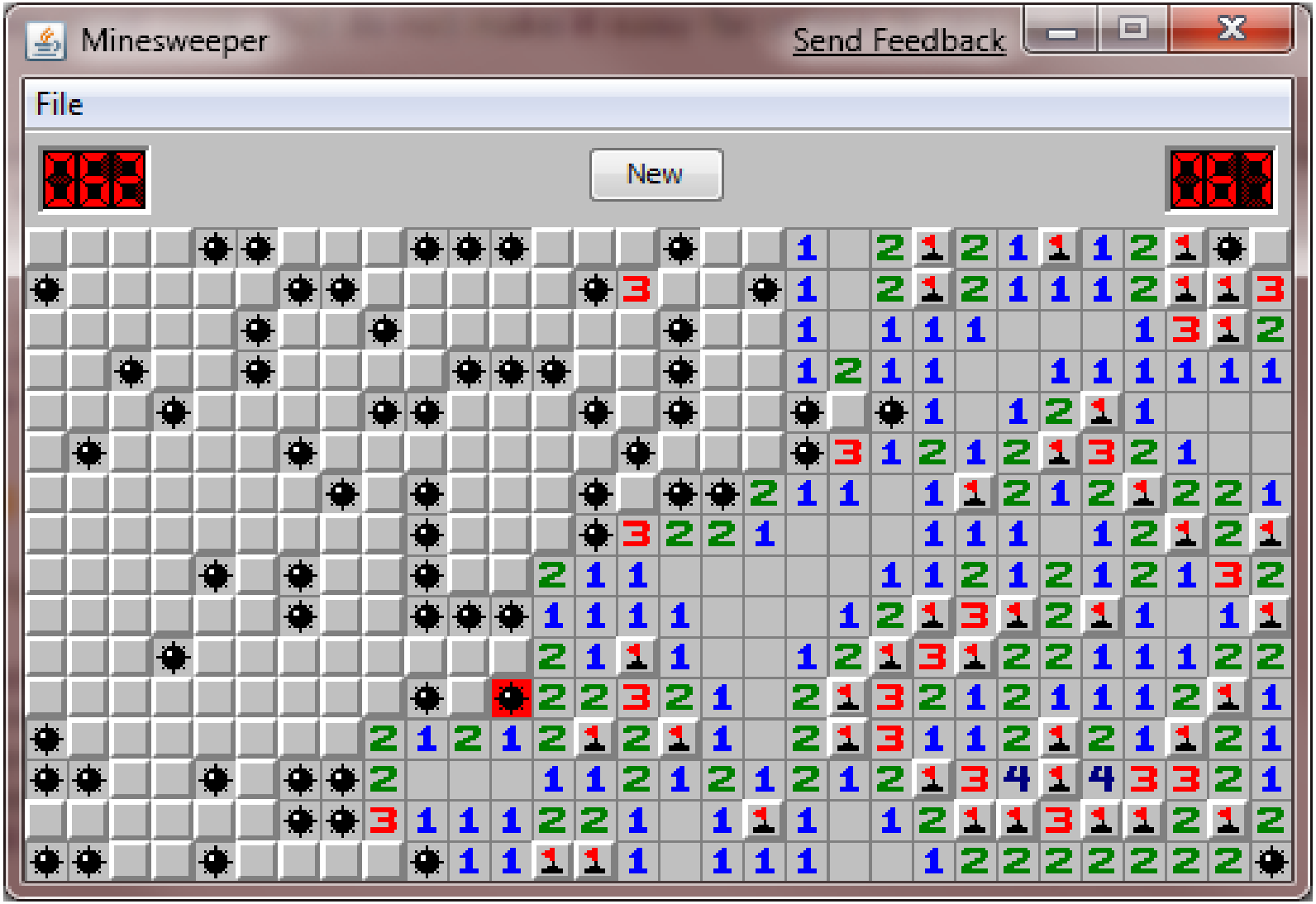
Tic-tac-toe

A better way to divide it into 3 arrays

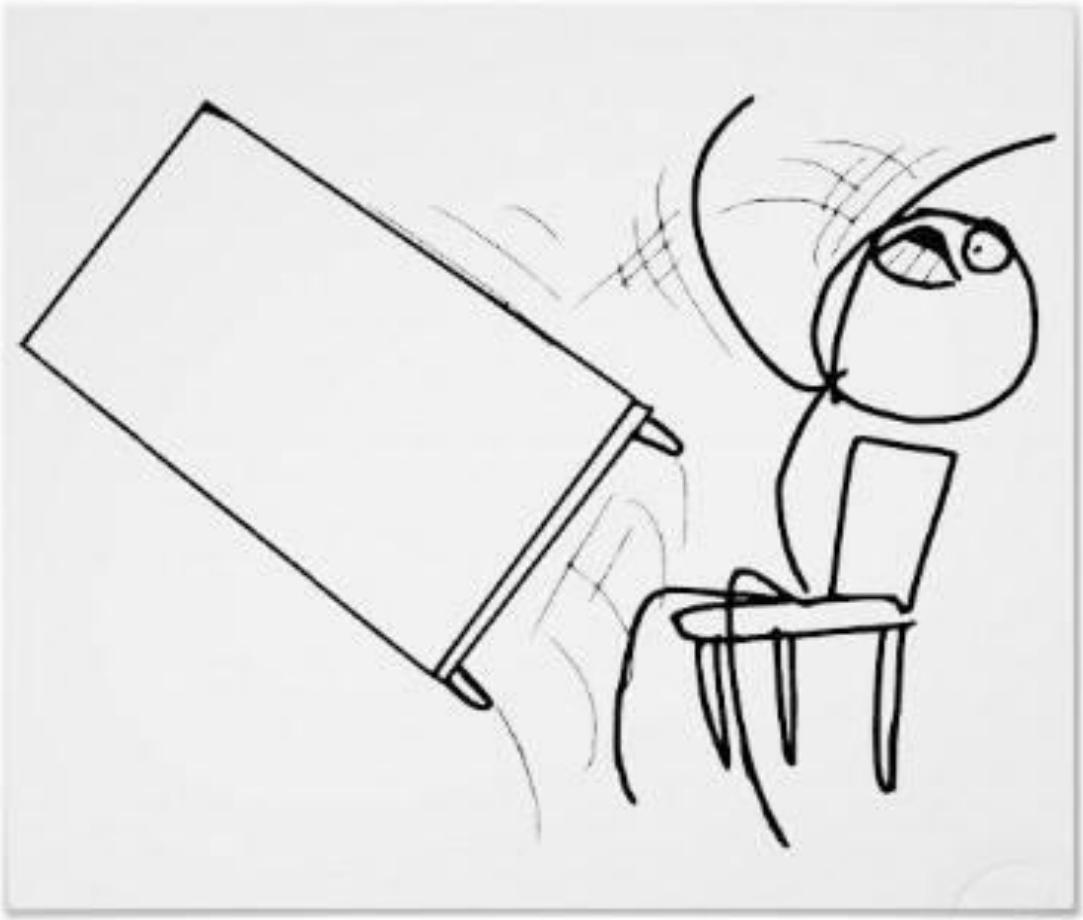
```
int R1[3];
int R2[3];
int R3[3];
```

acmASCIS
spreading knowledge

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



acmASCIS
spreading knowledge



acmASCIS
spreading knowledge

Mmmm It's you again …
Look There's something called **Multi-dimensional array.** he's specialized in these kind of problems .

Lets see what you got

acmASCIS
spreading knowledge

you can solve it easily by using 2D array

Multidimensional

acmASCIS
spreading knowledge

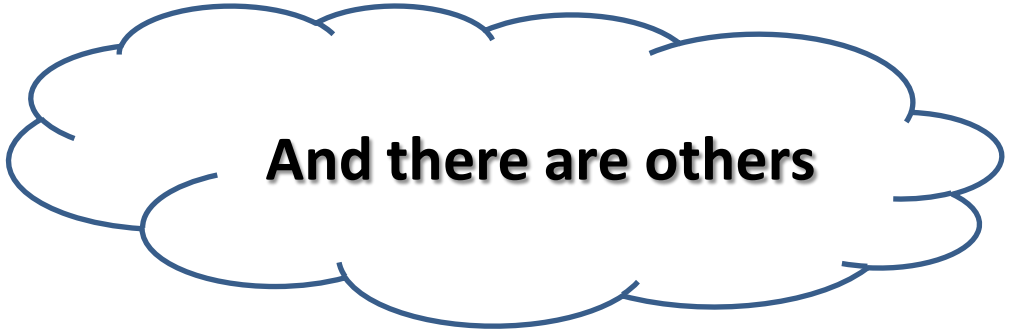
Hi, I'm like 1D Array
except you should deal with me
by 2 indices.

```
int Board [3][3];
```

	0	1	2
0	[0][0]	[0][1]	[0][2]
1	[1][0]	[1][1]	[1][2]
2	[2][0]	[2][1]	[2][2]

Applications on 2D array

acmASCIS
spreading knowledge




```
int cube [10][10][10] ;
```

```
int century[100][365][24][60][60];
```

acmASCIS
spreading knowledge

Any Questions ?

Input

	0	1	2
0	[0,0]	[0,1]	[0,2]
1	[1,0]	[1,1]	[1,2]
2	[2,0]	[2,1]	[2,2]

r : 0
c : 0
arr[0][0]

	0	1	2
0	0	??	??
1	??	??	??
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 0
c : 1
arr[0][1]

	0	1	2
0	0	1	??
1	??	??	??
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 0
c : 2
arr[0][2]

	0	1	2
0	**0**	**1**	**2**
1	??	??	??
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 1
c : 0
arr[1][0]

	0	1	2
0	0	1	2
1	3	??	??
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 1
c : 1
arr[1][1]

	0	1	2
0	0	1	2
1	3	4	??
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 1
c : 2
arr[1][2]

	0	1	2
0	0	1	2
1	3	4	5
2	??	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 2
c : 0
arr[2][0]

	0	1	2
0	0	1	2
1	3	4	5
2	6	??	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

r : 2
c : 1
arr[2][1]

	0	1	2
0	0	1	2
1	3	4	5
2	6	7	??

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

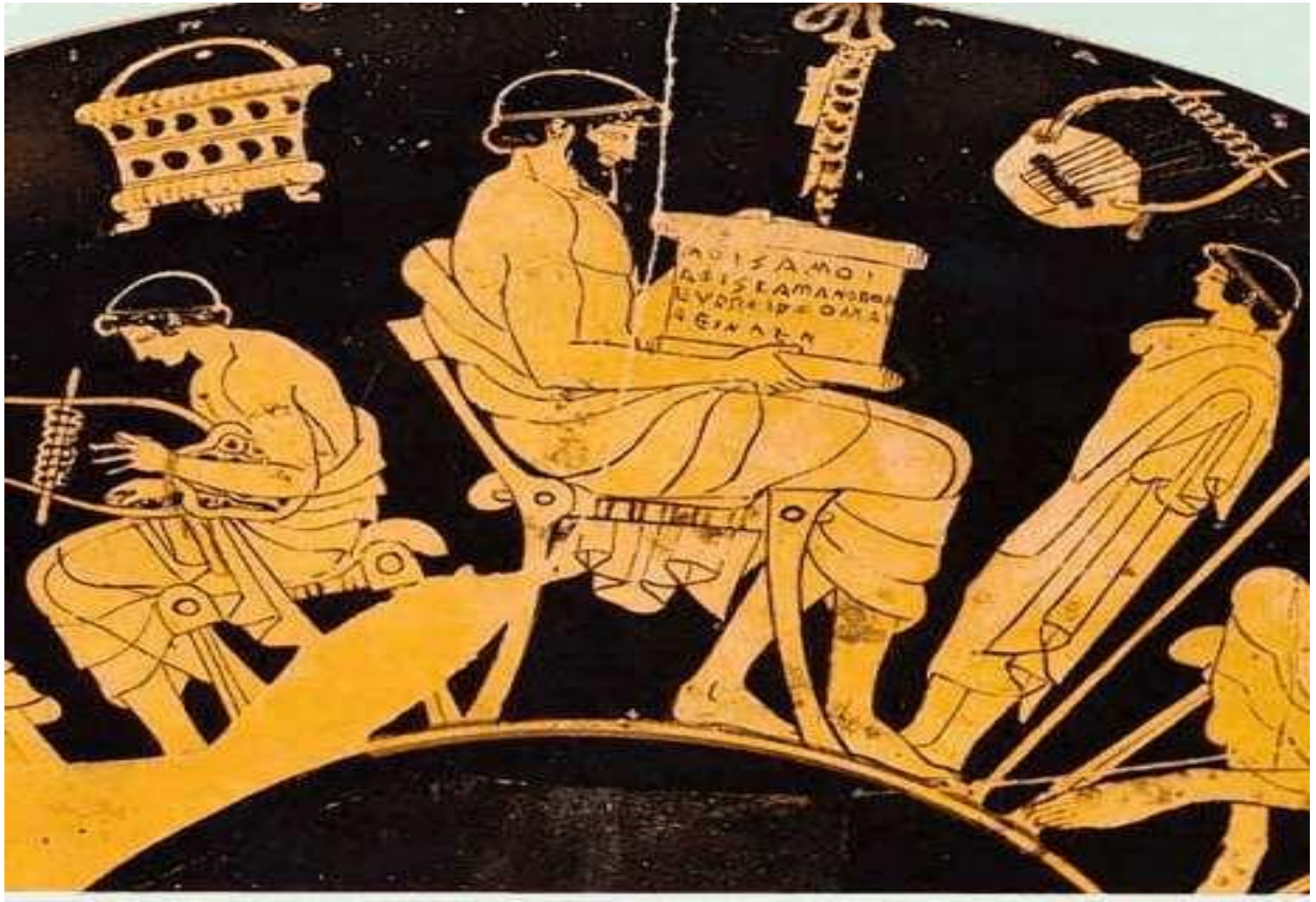
r : 2
c : 2
arr[2][2]

	0	1	2
0	0	1	2
1	3	4	5
2	6	7	8

```
for( int r=0 ; r < 3 ; r++)//Row
{
        for( int c = 0 ; c < 3 ; c++)//Column
        {
                cin >> arr[r][c] ;
        }
}
```

Any Questions ???

Genne's curse



Thank You :D

Prepared by :-
Mahmoud Hatem
Mahmoud Mohammed
Mennatullah Hesham

Software	OS	IS	CS
1 - 2 - 3	4 - 5 - 6	7 - 8 - 9	10 - 11 - 12

acmASCIS
spreading knowledge