Lab

Array and ArrayList

One Dimensional Array

0	1	2	3	4	5	6	7	8	9
0	2	4	6	8	10	12	14	16	18

Declaring One Dimensional Array

```
int[] number;
String [,] names;
Long [,,] balance;
```


Creation One Dimensional Array

- First way to create one dimensional array

```
int[] number = {3,5,7};
int [,] num = {{1,2,6},{3,4,5}};
```

Creation One Dimensional Array

- Second way to create one dimension array

```
int[] number; //one dimensional
  number = new int[50];
String [,] names; // two dimensional
  names = new string[1000,1000];
Long [,,] balance;//three dimensional
  balance = new long[500,500,500];
```


Creation One Dimensional Array

- Third way to create one dimension array

```
int[] number = new int[7];
string [,] names = new
string[1000,1000];
long [,,] balance = new
long[500,500,500];
```

Access to the Elements of an Array

- We can **iterate** through the array using a **loop** statement.

```
int[] arr = new int[5];
for (int i = 0; i < arr.Length; i++)
{
arr[i]= int.Parse(Console.ReadLine());
arr[i] = i * i;
}
```


Access to the Elements of an Array

.

```
int[] arr = new int[5];
for(int i = 0; i < arr.length; i++)
{
  Console.WriteLine arr[i]);
}
```

Example of One Dimensional Array (1)

```
//To print square number
//declaration and creation of an
Array
int total;
Console.Write("enter how many number
you want : ");
total = int.Parse(Console.ReadLine());
int[] num = new int[total];
```


Example of One Dimensional Array (2)

```
// Reading an Array from console
for(int i = 0; i < total; i++)
{
  int temp = i + 1;
Console.Write("enter num{0}:", temp);
num[i]=int.Parse(Console.ReadLine());
}
```

Example of One Dimensional Array (3)

```
// Iteration through Element of an
Array
for(int i = 0; i < total; i++)
{
  num[i] = (int)Math.Pow(num[i],2);
}
```


Example of One Dimensional Array (4)

```
Console.WriteLine("the power of array
is ");
// printing an Array to console
for (int i = 0; i < total; i++)
{
  Console.WriteLine num[i]);
}
```

Example of One Dimensional Array (5)

```
enter how many number you want : 3
enter num 1 : 3
enter num 2 : 8
enter num 3 : 6
the power of array is
9
64
36
```


Two Dimensional Array

	0	1	2	3	4
0	1	2	3	4	5
1	6	7	8	9	10
2	11	12	13	14	15
3	16	17	18	19	20
4	21	22	23	24	25

Example of Two Dimensional Array (1)

```
// Declaration and Creation the
matrix Array
int rows, cols;
Console.Write("Enter num rows:");
rows = int.Parse(Console.ReadLine());
Console.Write("Enter num columns:");
cols = int.Parse(Console.ReadLine());
int[,] matrix = new int[rows, cols];
```


Example of Two Dimensional Array (2)

```
// Reading the element from console
Console.WriteLine("Enter element:");
for (int row = 0; row < rows; row++){
for (int col = 0; col < cols; col++){
 Console.Write("matrix[{0},{1}] = ",
                  row, col);
matrix[row, col] =
int.Parse(Console.ReadLine());}}
```

Example of Two Dimensional Array (3)

```
//Iteration through Element of an Array
for (int row = 0; row <
  matrix.GetLength(0); row++){
 for (int col = 0; col <
  matrix.GetLength(1); col++){
    matrix[row, col] += 2;}
}
```


Example of Two Dimensional Array (4)

```
//Printing the element to the console
for (int row = 0; row <
  matrix.GetLength(0); row++){
  for (int col = 0; col <
  matrix.GetLength(1); col++){
    Console.Write(" " + matrix[row,
col]);}
Console.WriteLine();}
```

Example of Two Dimensional Array (6)

```
Enter num rows: 2
Enter num columns: 2
Enter element:
matrix[0,0] = 1
matrix[0,1] = 2
matrix[1,0] = 4
matrix[1,1] = 5
3 4
6 7
```


Assignment 1

- Write the following code,

  A two-dimensional array, where the user can enter the data and the print it in the form of a two-dimensional table.

ArrayList

ArryList (1)

- ArrayList and it is part of the System.Collections namespace in the .NET Framework library.
- **Add():** Adds an element to the ArrayList.
- **Insert():** Insert an element into the ArrayList at a specified index.

ArryList (2)

- **Capacity:** Stores the number of elements the ArrayList can hold.
- **Count:** Returns the number of elements currently in the ArrayList.
- **TrimToSize():** Sets the capacity of the ArrayList to the number of elements in the ArrayList.

ArryList (3)

- **Contains():** Determines if a specified item is in the ArrayList.
- **IndexOf():** Returns the index of the first occurrence of the specified item.
- **Remove():** Removes the first occurrence of the specified item.
- **RemoveAt():** Removes an element at the specified index.

ArryList (4)

- **AddRange():** Adds the elements of a collection to the end of the ArrayList.
- **InsertRange():** Inserts the elements of a collection into the ArrayList starting at the specified index.
- **GetRange():** Returns a subset of the ArrayList as an ArrayList.

ArryList (5)

- **ToArray():** Copies the elements of the ArrayList to an array.
- **CopyTo():** Copies the ArrayList or a segment of it to an array.

Full Code (1)

```
ArrayList Students = new ArrayList();
Students.Add(5);
Students.Add(3.5);
Students.Insert(1,"Aly");
Students.Insert(3, null);
Students.Add(false);
foreach (var Student in Students){
Console.Write(" " + Student);}
```


Full Code (2)

```
if (Students.Contains(false)){
Students.Remove(false);}
else{
Console.Write("\nObject not found");}
int pos;
pos = Students.IndexOf(70);
if (pos >= 0 ){
Students.RemoveAt(pos);}
else{
Console.Write("\nObject not found");}
```

Full Code (3)

```
Console.WriteLine();
ArrayList Append = new ArrayList();
Append.Add(false);
Append.Add(-10);
Append.Add('P');
ArrayList Extra = new ArrayList();
Extra.Add("khaled");
Extra.Add("-55");
```


Full Code (4)

```
Students.AddRange(Append);
Students.InsertRange(4, Extra);
Console.WriteLine();
foreach (var Student in Students){
Console.Write(" " + Student);}
```

0	1	2	3	4	5	6	7	8
5	Aly	3.5	null	khaled	-55	false	-10	p

Assignment 2

- Write the following code,

  Design and implement a class by using an ArrayList where

  1. First enter the name of student “Aly”
  2. Then enter his age 25
  3. Then enter his degree 88.3

Assignment 2

4. After that enter his best subject “Islamic” at index 2
5. Then remove his degree
6. Then search if he has total number if not append it, total = 985
7. We forget search where his name then remove it by using index
8. Enter “Ahmed” at index 0

Assignment 2

9. We want add another student in the same ArrayList whith the following data:
    9. Khaled, 27, “Quran”, “Sport”
10. Finally Remove all previous data.