Control Statements

Controlling Program Flow

- Control Statements that can be used are:
- Conditional Statements
  - if ….else
  - switch/case
  - Trinary operator ?:
- Loop Statements
  - for
  - while
  - do…while

if and if ... else

- Used for check certain value or range of values

```
if (condition)
{
  do something;
}
```

```
if (condition)
{
  do something;
}
else
{
  do something else;
}
```

```
int grade;
Console.WriteLine("Enter grade");
string s = Console.ReadLine();
grade = int.Parse(s);
if (grade >= 60)
 {
  Console.WriteLine("Pass");
 }
else
 {
  Console.WriteLine("Fail");
 }
```

switch … case

- Used for multiple certain values
  - Ex: check for value 1 ,2, other values

```
switch (expression)
{
  case value1:
     statements
    break;
  case value2:
     statements
    break;
  default :
     statements
}
```

```
switch (grade)
 {
   case 1:
     Console.WriteLine("One");
   break;
   case 2:
     Console.WriteLine("two");
   break;
   default:
     Console.WriteLine("other value");
   break;
 }
```

Ternary operator ? :

```
condition ? consequent : alternative
```

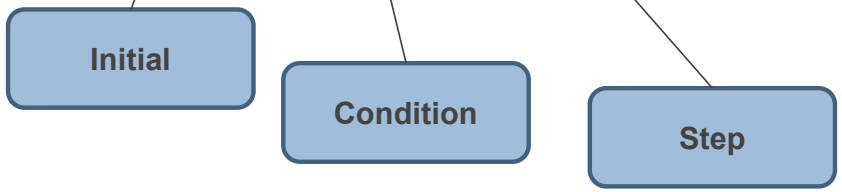
```
int x = 10;
string v;
if (x==10)
{
    v = "10";
}
else
{
    v = "Other Number";
}
```

```
v = (x == 10) ? "10" : "Other Number";
```

for

- Used for known number of loops

```
int i;
for(  i=0 ; i<3 ; i++ )
{
        …
}
```




```
for (int i = 0; i < 3; i++)
 {
   Console.WriteLine("{0}", i);
 }
```

```
for (int i = 2; i >=0; i--)
 {
   Console.WriteLine("{0}", i);
 }
```

while

- Used when number of loops is unknown but depends on certain condition

```
while(x<5)
{
        …
}
```

```
int y = 10;
while (y < 20)
 {
   Console.WriteLine("{0}", y);
   y++;
 }
```

do... while

- Same as while but loops at least one time

```
do
{
        …
} while (x < 6);
```

loops flow control

- ***break*** statement :
  - The break statement will terminate looping and continue executing the code that follows after the loop (if any).
- ***continue*** statement:
  - The continue statement will terminate the current loop and continue with the next loop.

```
for (int i = 2; i >= 0; i--)
{
  …
  if (x == 10)
   break;
  Console.WriteLine("{0}", i);
 }
```

```
for (int i = 2; i >= 0; i--)
 {
       …
   if (x == 10)
     continue;
   Console.WriteLine("{0}", i);
 }
```

Assignment

- Take two integer from user and get max of them
- Create simple menu and get user selection from it
  - To calculate sum or get max or get min
- Simple calculator
- ***Optional Assignment***:
  - Magic Box

Assignment

- ***Magic Box***
  - Row - - Column - -
  - Row++

6	1	8
7	5	3
2	9	4

Arrays

Arrays

- Array is reference type data type
- Used to store collection of homogenous elements (same data type)
- Number of elements in array could be dynamically allocated but once the array is allocated its size could not be changed directly

Single Dimension Array

- Declare a reference to single dimension array

```
int[] arr;
```

```
char[] arr;
```

Single Dimension Array

- Initialization of array reference
  - ***Explicitly***
    - Array elements auto initialized with default values(0, false, null)
    - Statically

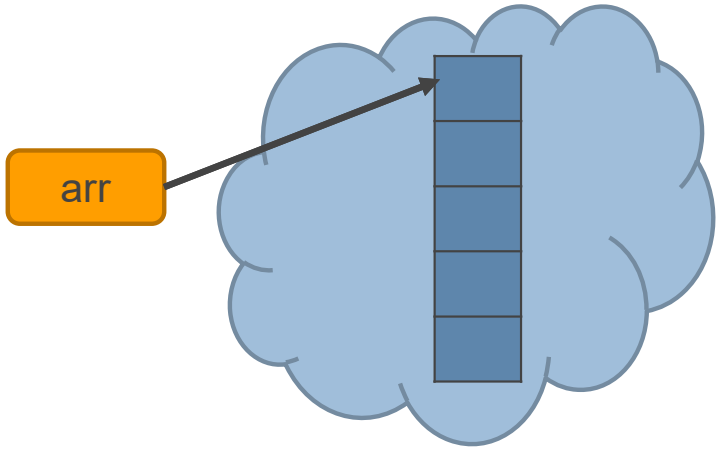
```
int[] arr = new int[5];
```

Array size

    - Dynamically

```
arr = new int[size];
```

Array size
(variable)

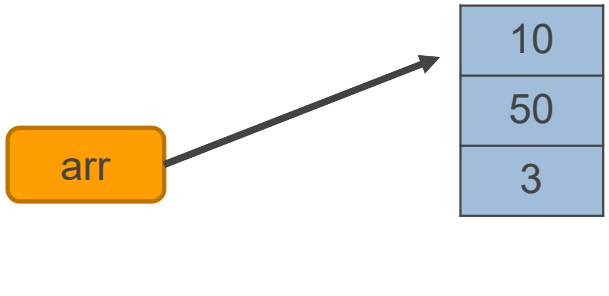


Heap Memory

Single Dimension Array

- Initialization of array reference
  - ***Implicitly*** (Array initializer)

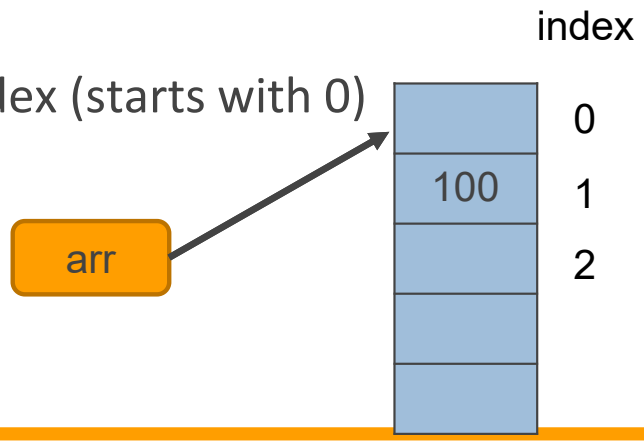
```
int[] arr = new int[] { 10, 50, 3 };
int[] arr = { 10, 50, 3 };
```



- Array elements automatically initialized with their default values
  - 0,null, false
- Accessing array elements
  - Array elements could be accessed through index (starts with 0)

```
arr[1]=100;
```

index



Single Dimension Array

- Using for loop with single dimension array
  - *for* Loop

```
for (int i = 0; i < 3; i++)
{
 Console.WriteLine("{0}", arr[i]);
}
```

  - *foreach* loop
    - Used for read only

```
foreach (int x in arr)
{
 Console.WriteLine("{0}", x );
}
```

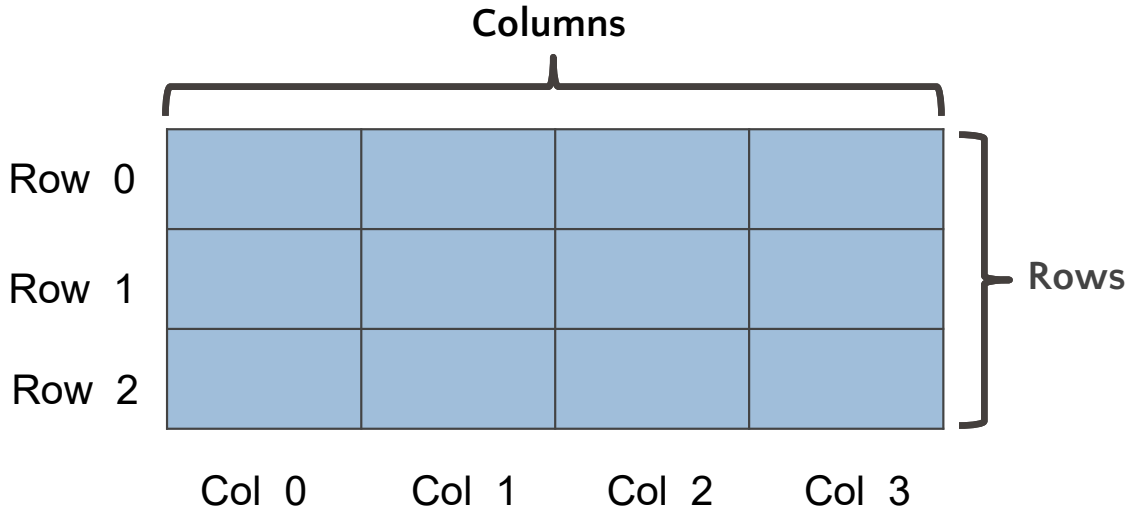
Assignment

- Get sum, average ,max ,min of integers given by the user
  - Let the user determine number of integers
- Calculate the result of one operation Equation
  - Ex: user Input 5*3 ➔ result 15
  - Method used (string)
    - Contains
    - Split

```
5+3
8
6*5
30
```

Multi Dimensional Array

- 2-dimension array



Multi Dimensional Array

- Declare reference to multi-dimensional array

```
int[,] arr;
```

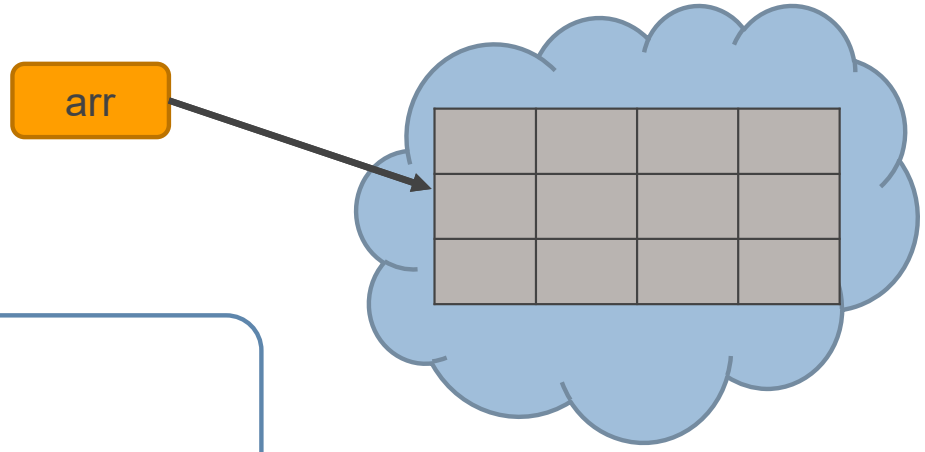
```
int[,,] arr;
```

- Initialization reference
  - *Explicitly*

```
arr = new int[3, 4];
// 3 rows,4 columns
```

  - *implicitly*

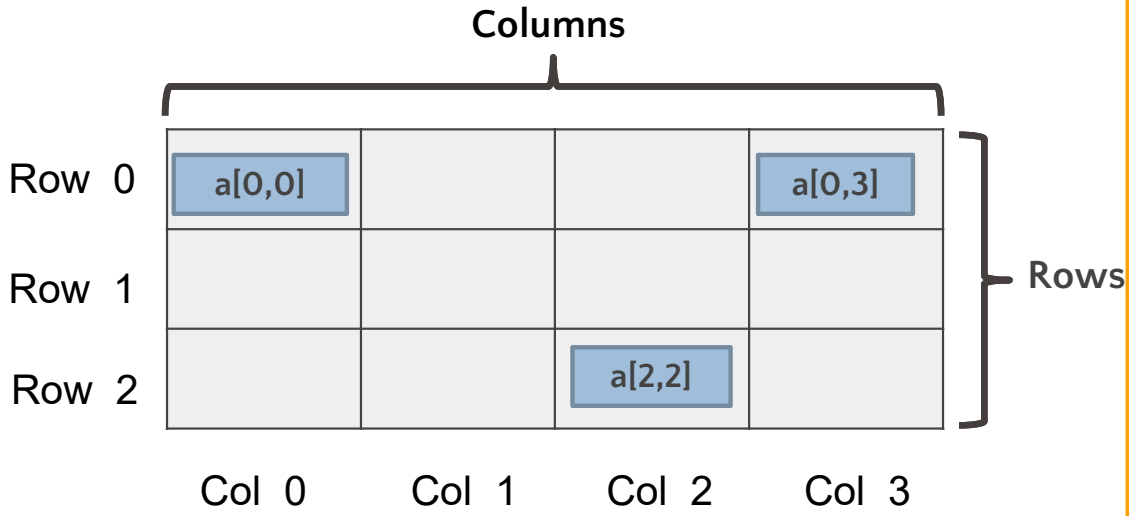
```
int[,] arr = new int[,] {
                {1,2,3},
                {3,4,5}
                }; // 2 rows, 3 columns
```



Multi Dimensional Array

- Access array elements
  - Through 2 indices

```
arr[0,3]=10;
```



Multi Dimensional Array

- Looping through 2-D Arrays
  - Using 2 nested for loop

```
for(int j=0 ; j<3 ; j++)
{
  for(int i=0 ; i<4 ; i++)
  {
  Console.WriteLine (arr[ j ,i]);
  }

}
```

0,0	0,1	0,2	0,3
1,0	1,1	1,2	1,3
2,0	2,1	2,2	2,3

Multi Dimensional Array

- Array properties
  - Length → number of the array element
- Array Methods
  - Static Methods
    - Sort
    - BinarySearch
    - Reverse

```
arr = new int[]{5,7,2};
Array.Sort(arr); // Static Method
```

  - instance method
    - GetLength(int dimension)
      - Gets number of elements in certain dimension

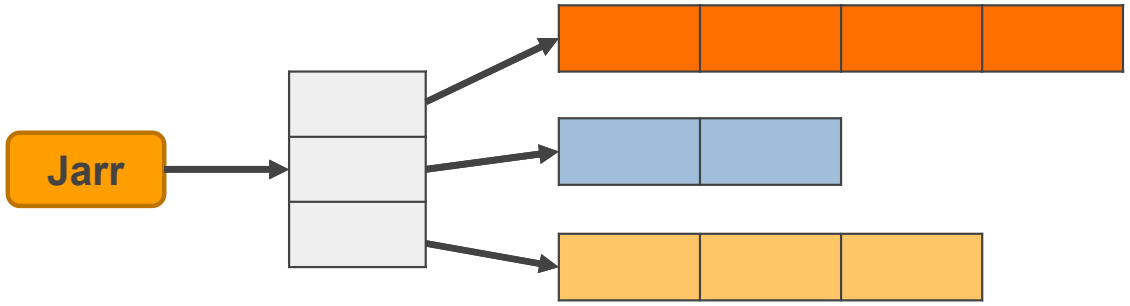
```
int[,] arr = new int[,] { {1,2,3}, {3,4,5} };
arr. GetLength (0); // 2
arr. GetLength (1); // 3
```

Assignment

- Design a program to Get the degree of 3 student with 4 subject from user input then calculate
  - The sum of marks for each student
  - The average for each subject

Multi Dimensional Array

- Jagged Array (Array of Arrays)



- Declare Jagged Array Reference

```
int[][]Jarr ;
```

Multi Dimensional Array

- Initialization reference

```
int[][] jarr = new int[3][];
jarr[0] = new int[4] { 1, 2, 3 ,4 };
jarr[1] = new int[2] { 4, 5};
jarr[2] = new int[3] { 10, 15, 20};
```

  - Using array initializer

```
int[][] jArray = new int[][] {
          new int[] { 1, 2, 3 ,4 },
          new int[] { 4, 5},
          new int[] { 10, 15, 20}
            };
```

Assignment

- Design a program that get from user input
  - Number of class room
  - Number of student in each class
  - Mark for each student
- Then calculate the
  - Average mark for each class room