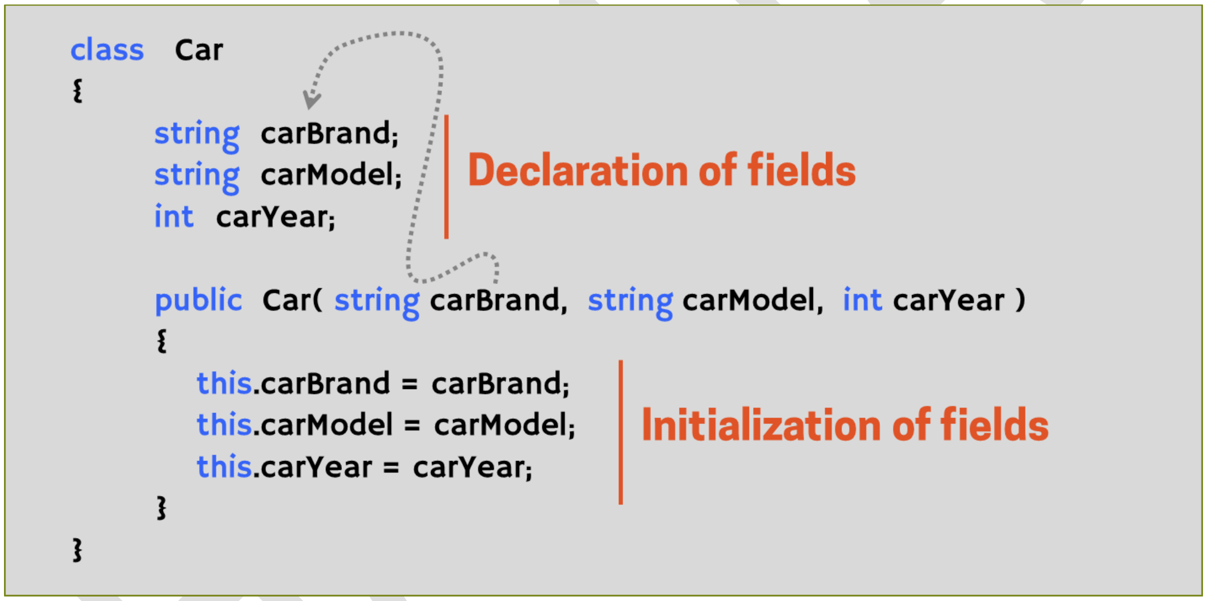
12

Constructors

Introducing Constructors

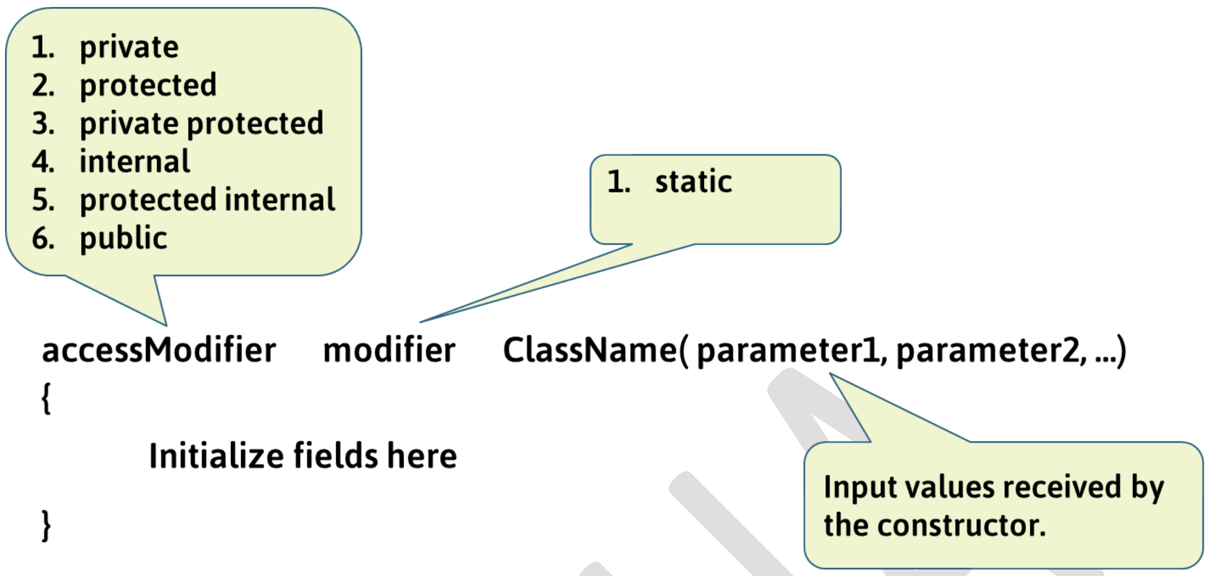
- Special method of class, which contains initialization logic of fields.
- Constructor initializes the fields and also contains the additional initialization logic (if any).



```
class  Car
{
        string  carBrand;
        string  carModel;
        int  carYear;

        public  Car( string carBrand,  string carModel,  int carYear )
        {
            this.carBrand = carBrand;
            this.carModel = carModel;
            this.carYear = carYear;
        }
}
```

Syntax of Constructor

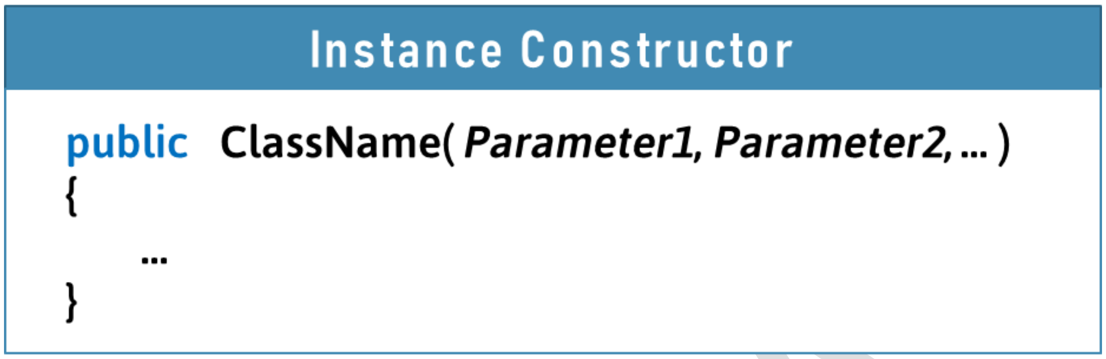


```
accessModifier    modifier    ClassName( parameter1, parameter2, …)
{
        Initialize fields here
}
```

Rules of Constructors

- Constructor's name should be same as class name.
- Constructor is recommended to be "public" member or "internal" member;
  - if it is a "private member", it can be called within the same class only; so you can create object of a class only inside the same class; but not outside the class.
- Constructor can have one or more parameters.
- Constructor can't return any value; so no return type.
- A class can have one or more constructors; but all the constructors of the class must have different types of parameters.

Instance Constructor (vs) Static Constructor



Instance Constructor

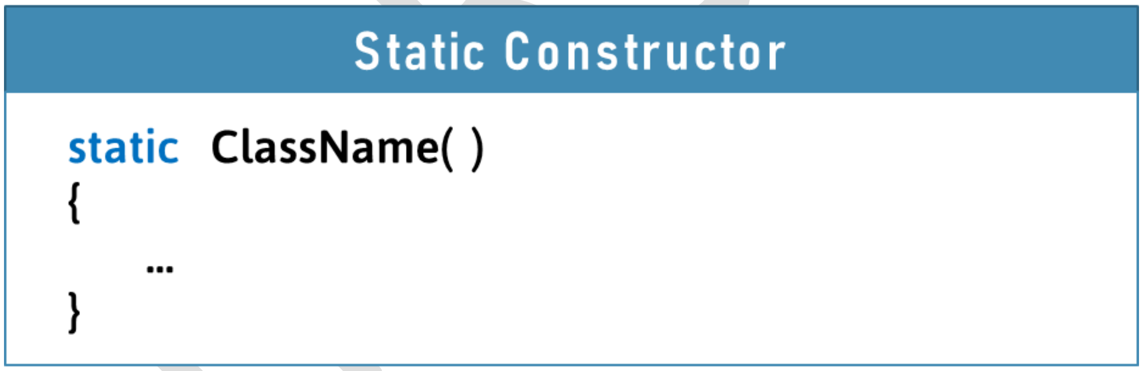
```
public  ClassName( Parameter1, Parameter2, ... )
{
     ...
}
```

› Initializes instance fields.

› Executes automatically every time when a new object is created for the class.

› "private" by default; We can use any of access modifiers.

› Can contain any initialization logic, that should be executed every time when a new object is created for the class.



Static Constructor

```
static  ClassName( )
{
     ...
}
```

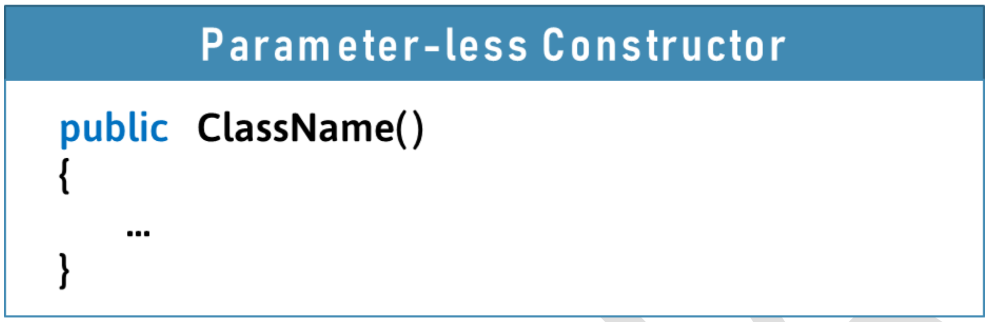
› Initializes static fields.

› Executes only once, i.e. when first object is created for the class or when the class is accessed for the first time during the execution of Main method.

› "public" by default; Access modifier can't be changed.

› Can contain any initialization logic, that should be executed only once i.e. when a new object is created for the class.

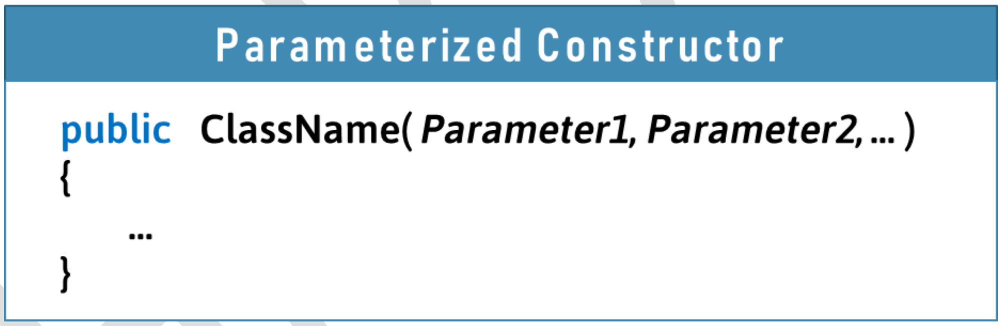
Parameter-less (vs) Parameterized Constructor



Parameter-less Constructor

```
public  ClassName()
{
        ...
}
```

- Constructor without parameters.
- It generally initializes fields with some literal values (or) contains some general-initialization logic of object.



Parameterized Constructor

```
public  ClassName( Parameter1, Parameter2, ... )
{
        ...
}
```

- Constructor with one or more parameters.
- It generally initializes fields by assigning values of parameters into fields.

Implicit Constructor (vs) Explicit Constructor

Implicit Constructor (after compilation)

```
public  ClassName()
{
}
```

- If there is a class without constructor, then the constructor automatically provides an empty constructor, while compilation, which initializes nothing. It is called as "Implicit Constructor" or "Default Constructor".
- It is just to satisfy the rule "Class should have a constructor".

Explicit Constructor (While coding)

```
public  ClassName( with or without parameters )
{
      ...
}
```

- The constructor (parameter-less or parameterized) while is created by the developer is called as "Explicit Constructor".
- In this case, the C# compiler doesn't provide any implicit constructor.

Constructor Overloading

- Write multiple constructors with same name in the class, with different set of parameters (just like 'method overloading').
- It is recommended to write a parameter-less constructor in the class, in case of constructor overloading.

Constructor Overloading (multiple constructors in the same class)

```
public  ClassName()
{
}

public  ClassName( parameter1, parameter2, … )
{
     …
}
```

Object Initializer

- Special syntax to initialize fields / properties of class, along with creating the object.
- Executes after the constructor.
- It is only for initialization of fields / properties, after creating object; it can't have any initialization logic.

Execution Sequence:

$$\begin{tikzcd}\text{new Class( )} \arrow[r] & \text{Constructor} \arrow[r] & \text{Object Initializer}\end{tikzcd}$$

Object Initializer

```
new  ClassName()  { field1 = value, field2 = value, … }
```

- Use 'object initializer' when-
  - there is no constructor present in the class; but you want to initialize fields / properties.
  - (or) there is a constructor; but it is meant for initializing other set of fields, other than the fields that you want to initialize.

Points to Remember

- 'Instance constructor' initializes 'instance fields'; but also can access 'static fields'.
- 'Static constructor' initializes 'static fields'; can't access 'instance fields'.
- Default (empty constructor) is provided automatically by C# compiler, if the developer creates a class without any constructor.
- It is always recommended to write a parameter-less constructor first, if you are creating parameterized constructor.
- Use 'object initializer', if you want to initialize desired fields of an object, as soon as a new object is created.