

C# - Ultimate Guide - Beginner to Advanced | Master class

Section 16 - Generics

Generics

Generic class is a class, which contains one or more "type parameters".

You must pass any data type (standard data type / structure / class), while creating object for the generic class.

Generic Class - Example

```
class ClassName<T>
{
    public T FieldName;
}
```

Object of Generic Class - Example

```
ClassName<int> referenceVariable = new ClassName<int> ( );
```

- The same field may belong to different data types, w.r.t. different objects of the same class.
- You will decide the data type of the field, while creating the object, rather than while creating field in the class.
- It helps you in code reuse, performance and type-safety.
- You can create your own generic-classes, generic-methods, generic-interfaces and generic-delegates.
- You can create generic collection classes. The .NET framework class library contains many new generic collection classes in System.Collections.Generic namespace.
- The generic type parameter (T) acts as "temporary data type", which represents the actual data type, provided by the user, while creating object.
- You can have multiple "generic type parameters" in the same class (for use for different fields).
- Generics are introduced in C# 2.0.

Generic Constraints

Generic Constraints are used to specify the types allowed to be accepted in the "generic type parameter".

- where T : class
- where T : struct
- where T : ClassName
- where T : InterfaceName
- where T : new()

Generic Constraints - Example

```
class ClassName<T> where T : class
{
    public T FieldName;
}
```

Object of Generic Class - Example

```
ClassName<int> referenceVariable = new ClassName<int> ( ); //error
```

Understanding Generic Constraints

Advantage: You can restrict what type of data types (class names) allowed to be passed while creating object.

In C#, constraints are used to restrict a generics to accept only particular type or its derived types.

By using 'where' keyword, we can apply constraints on generics.

You can apply multiple constraints on generic classes or methods based on your requirements.

Eg: where T : class where T2 : class

Generic Methods

Generic Method is a method that has one or more generic parameter(s).

You can restrict what type of data types to be allowed to be passed to the parameter while calling the method.

Generic Method - Example

```
public void MethodName<T>  
{  
}
```

Calling Generic Method - Example

```
MethodName<datatype>( valueHere );
```