

LINQ fundamentals





Agenda

What is LINQ ?

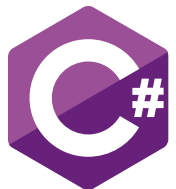
The LINQ playground project

Extension methods

Query and method syntax

Deferred execution

What is LINQ ?



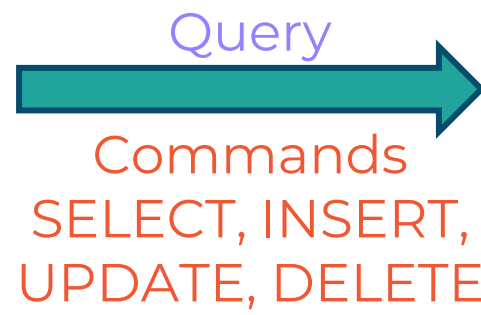
LINQ Fundamentals

SQL

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Structured Query Language

SQL



Example of SQL Query

```
/****** Script for SelectTopNRows command from SSMS *****/
SELECT TOP (1000) [Id]
      ,[TmdbId]
      ,[ReleaseDate]
      ,[Budget]
      ,[Revenue]
      ,[Runtime]
      ,[HomePageUrl]
      ,[Title]
      ,[Overview]
      ,[Popularity]
      ,[Status]
      ,[Tagline]
      ,[VoteAverage]
      ,[VoteCount]
      ,[OriginalLanguageId]
      ,[MovieImagesId]
FROM [MovieCatalog].[dbo].[Movies]
```

110 %

Results Messages

	Id	TmdbId	ReleaseDate	Budget	Revenue	Runtime	HomePageUrl	Title	Overview
1	1	3036	1994-11-04 00:00:00.0000000	45000000	112006296	123		Mary Shelley's Frankenstein	Based on Mary Shelley's novel, "Frankens
2	2	273756	2014-01-01 00:00:00.0000000	0	0	91		Asteroid vs Earth	When a shower of massive meteors threa
3	3	17244	1998-09-05 00:00:00.0000000	0	0	127		Behind the Planet of the Apes	This documentary was shown as part of t
4	4	73973	2002-09-17 00:00:00.0000000	0	0	97		The Source	Four outcast teenagers acquire mystical p
5	5	402592	2016-06-09 00:00:00.0000000	0	0	91	http://electricnostalgiafilm.com	Electric Nostalgia	A young woman is haunted by visions of a
6	6	386255	2015-12-15 00:00:00.0000000	0	0	85		The Mildew from Planet Xonader	The year is 1984. Researchers at the sec
7	7	68773	1991-11-27 00:00:00.0000000	0	0	82		Dollman	Brick Bardo is a traveller from outer space
8	8	66793	2010-01-01 00:00:00.0000000	200000	0	110		15 Till Midnight	Parallel worlds collide as a secret society p
9	9	27150	1982-04-02 00:00:00.0000000	4500000	10500000	103		Silent Rage	A mentally ill man in a small Texas town gr
10	10	21874	1981-10-30 00:00:00.0000000	0	3282232	94		Looker	Plastic surgeon Larry Roberts performs a
11	11	55949	1996-09-28 00:00:00.0000000	0	0	86		Vampirella	Dark, mysterious and sensual, Vampirella
12	12	461218	2019-04-12 00:00:00.0000000	0	0	102	https://www.william.movie	William	Two cutting-edge scientists give 'birth' to :
13	13	98547	2016-09-09 00:00:00.0000000	0	0	90		One Fall	Set in the rustic Midwestern town of One
14	14	9998	2004-01-01 00:00:00.0000000	0	0	91		Forbidden Warrior	The Gaia Za is a sacred tome that holds i

LINQ

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Language-integrated query

query

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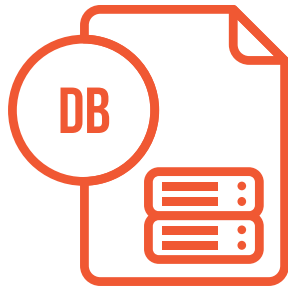
Retrieves data from data source

LINQ

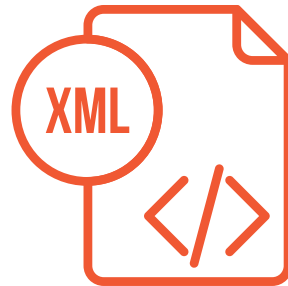
SQL like syntax in C#
Over different type of data sources

Before LINQ

System.Data



System.Xml

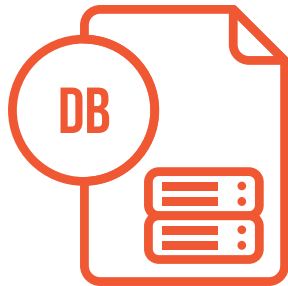


System

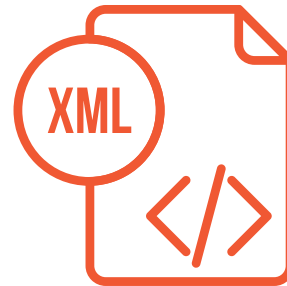


With LINQ

LINQ to
Entities



LINQ to XML



LINQ to
Objects



Why using LINQ ?

Unified query syntax for different data sources

Reduces loops over collections

Improves readability

IEnumerable<T>

Allows LINQ features

Has been extended to add LINQ support
GetEnumerator() allows to enumerate all the elements

Demo

LinqPlayground project overview

Use the IEnumerable iterator to loop over a collection

Extension methods



Extension methods

Add functionality to a class or interface

Defined outside the type

Appears like a member of the type
(Intellisense)

You can use visible members only

Declaration

To be declared in a static class
Extension methods are static methods

Declare an extension method

```
public static class StringExtension
{
    public static string Reverse(this string str)
    {
        char[] array = str.ToCharArray();
        Array.Reverse(array);
        return new string(array);
    }
}
```

Call the extension method

```
string str = "Hello world !";  
str = str.Reverse();  
Console.WriteLine(str);  
// output :    ! dlrow olleH
```

Benefits

Alternative to inheritance

Improves maintainability

You can extend a type without modifying it
(3rd party libraries)

Limit

The internal types and members are not accessible



Don't overuse extension
methods



You can't replace an
existing method with an
extension method

Good practices

Put your extension methods in separate assemblies

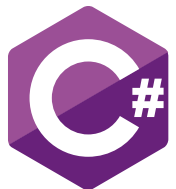
Convention : use the Extensions suffix

Avoid conflicts with existing methods

Demo

Extend the ICollection interface

Query/Method syntax



Choose your
syntax

Query expressions
Extension methods

Query syntax

SQL like syntax

Must be combined with method syntax for
advanced queries

Query syntax

```
IEnumerable<Actor> query =  
    from actor in actors  
    where actor.Popularity >= 20  
    select actor;
```

Method syntax

LINQ extension methods
Extend `IEnumerable<T>`

Method syntax

```
IEnumerable<Actor> query =  
    actors.Where(actor => actor.Popularity >= 20);
```

Demo

Write a query using the query and the method syntax

Deferred execution



Deferred execution

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The query is executed when the result is
required

When is the query executed ?

<https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/concepts/linq/classification-of-standard-query-operators-by-manner-of-execution>

When is the
query executed
?

Look for the query operators that have an immediate execution like ToList(), Count(), Any() or foreach



Performance issues with deferred execution, queries can be executed several times

Demo

Debug code with and without deferred execution

Demo

Get data from MovieData data provider service class without using LINQ



Summary

LINQ is a unified syntax to query data sources

An extension method allows to extend a type without modifying it

LINQ supports two different syntaxes : the query and the method syntaxes

LINQ operators are implemented as extension methods (method syntaxes)

Some LINQ operators execution is deferred, when the result is required