

# Language Integrated Query (LINQ)

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# Introduction

- We use many different types of query
  - SQL, XQuery/XPath, DataView row filters, etc.
- Maybe we could enhance productivity by...
  - Deciding on one query expression syntax
  - Enabling compilers to check queries & results
  - Allow extensibility to target all kinds of data

# Agenda

- C#3 and VB9 Language Enhancements
  - Building to LINQ to Objects
- LINQ to XML
- LINQ to SQL
- LINQ to DataSets

# C#3 and VB9

- Ship with Visual Studio 2008
- Contain language features that enable LINQ
- Necessary for LINQ, but not sufficient...
- Also need .NET FX 3.5
  - Contains a lot of new classes that make LINQ work – we'll see some later

# demo

New Language Features – LINQ to objects



# Language Innovations

```
var contacts =  
  from c in customers  
  where c.City == "Hove"  
  select new { c.Name, c.Phone };
```

Local variable  
type inference

Query  
expressions

```
var contacts =  
  customers  
  .Where(c => c.City == "Hove")  
  .Select(c => new { c.Name, c.Phone });
```

Lambda  
expressions

Extension  
methods

Anonymous  
types

Object  
initializers

# demo

LINQ to XML



# LINQ to XML

- Creating XML
  - Constructors lend themselves to nesting
  - Can use LINQ (over anything) to build XML
- Querying
  - Use normal *axes* from XML infoset
  - Get full power of query expressions over XML
  - Select, where, group by, etc.
- Xml Namespaces

# demo

LINQ to SQL



# LINQ to SQL

- DataContext is the central class
- Use code-gen for ORM
- SQL is only submitted when needed
- Parent-child relationships are respected
  - Control of deferred loading
- Can insert/update/delete
  - Transactionally, with concurrency checks

# demo

LINQ to DataSet



# LINQ to DataSet

- Query expressions over in-memory data
- Works with untyped or typed DataSets
- If query returns some kind of DataRow: -
  - Can yield results as a DataView
  - ...and therefore databind to those results

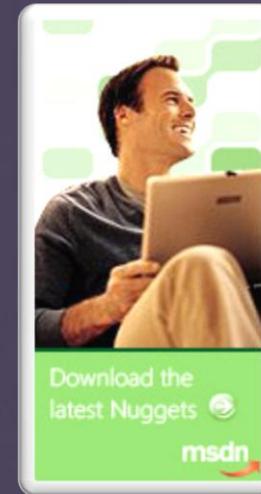
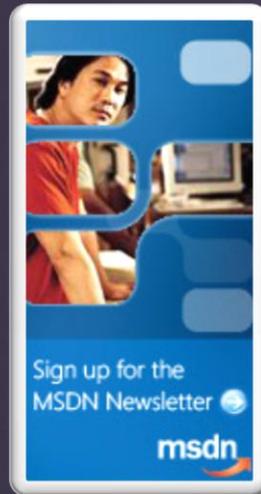
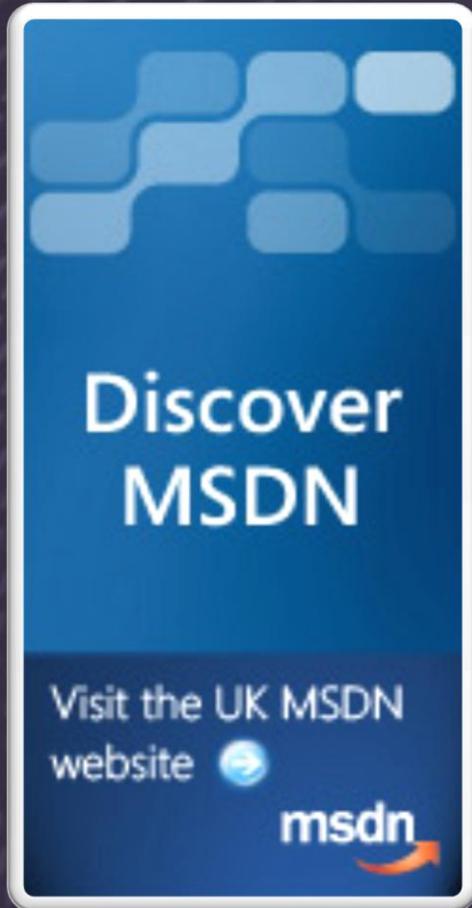
# That's LINQ

- A combination of new language features, and new fx3.5 classes (with extension methods)
- A common query expression syntax
- Freedom to implement across different kinds of data
- It's TYPED...
  - The compiler can check your queries
  - The compiler can check your results

# For more information

- Today's sample code via
  - <http://www.martinparry.com>
- MSDN Nuggets by Mike Taulty
  - <http://www.microsoft.com/uk/msdn/nuggets>

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