

Chapter 9. LINQ Operators

This chapter describes each of the LINQ query operators. As well as serving as a reference, two of the sections, “**Projecting**” and “**Joining**”, cover a number of conceptual areas:

- Projecting object hierarchies
- Joining with `Select`, `SelectMany`, `Join`, and `GroupJoin`
- Query expressions with multiple range variables

All of the examples in this chapter assume that a `names` array is defined as follows:

```
string[] names = { "Tom", "Dick", "Harry", "Mary", "Jay" };
```

Examples that query a database assume that a variable called `dbContext` is instantiated as

```
var dbContext = new NutshellContext();
```

where `NutshellContext` is defined as follows:

```
public class NutshellContext : DbContext
{
    public DbSet<Customer> Customers { get; set; }
    public DbSet<Purchase> Purchases { get; set; }

    protected override void OnModelCreating(ModelBuilder modelBuilder)
    {
        modelBuilder.Entity<Customer>(entity =>
        {
            entity.ToTable("Customer");
            entity.Property(e => e.Name).IsRequired(); // Column is not nullable
        });
    }
}
```

```

    });
    modelBuilder.Entity<Purchase>(entity =>
    {
        entity.ToTable("Purchase");
        entity.Property(e => e.Date).IsRequired();
        entity.Property(e => e.Description).IsRequired();
    });
}
}

public class Customer
{
    public int ID { get; set; }
    public string Name { get; set; }

    public virtual List<Purchase> Purchases { get; set; }
    = new List<Purchase>();
}

public class Purchase
{
    public int ID { get; set; }
    public int? CustomerID { get; set; }
    public DateTime Date { get; set; }
    public string Description { get; set; }
    public decimal Price { get; set; }

    public virtual Customer Customer { get; set; }
}

```

NOTE

All of the examples in this chapter are preloaded into LINQPad, along with a sample database with a matching schema. You can download LINQPad from <http://www.linqpad.net>.

Here are corresponding SQL Server table definitions:

```

CREATE TABLE Customer (
    ID int NOT NULL IDENTITY PRIMARY KEY,
    Name nvarchar(30) NOT NULL
)

```