Data Access with ADO.NET

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When to Use ADO.NET

High performance situations

You need total control over the SQL

Entity Framework builds on

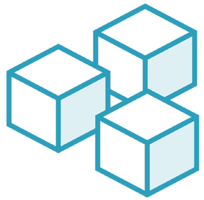
ADO.NET

Using **ADO.NET**

Access data
Use with different data sources

Support for many providers
SQL Server, SQLite, MySQL, XML, and many more

Powerful & Flexible
Gives you total control



Consistent API for accessing data
This abstraction gives you a similar way of accessing data in different data stores/sources

Requires that you know the
SQL syntax for each **database**
you are working with

Overview

- Learn about different components of ADO.NET
- How to connect to a database
- How to execute a SQL query
- Handle potential results
- Avoiding SQL injections and security considerations

Example ADO.NET **Providers**

```
# SQLite
dotnet add package Microsoft.Data.Sqlite

# SQL Server
dotnet add package Microsoft.Data.SqlClient
```

Creating a Connection

```
# SQLite
using SqliteConnection    connection = new(connectionString)

# SQL Server
using SqlConnection       connection = new(connectionString)
```

DO NOT cache the instance!

Using a **Factory** Method

```
SqlConnection CreateConnection()
{
    // Load connection string from a secure place
    return new SqlConnection(connectionString);
}

using connection = CreateConnection();
```

Creating a **Command**

Creating a **Command**

```
var command = connection.CreateCommand();
```

Creating a **Command**

```
var command = connection.CreateCommand();
```

Returns the correct type of command.

Example: SqlCommand or SqliteCommand

Creating a **Command**

```
var command = connection.CreateCommand();
command.CommandText = sqlQuery;
```

Creating a **Command**

```
var command = connection.CreateCommand();
command.CommandText = sqlQuery;

var command = new SqlCommand(sqlQuery, connection);
```

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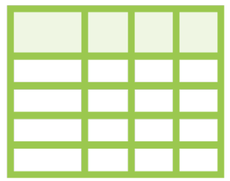
```

Retrieve All Orders and Their Customer Data

```
SELECT * FROM [Orders]
INNER JOIN [Customers] ON [Customers].Id =
[Orders].CustomerId
```

Execute the Command

Execute Non Query
Returns the number of affected rows



Execute Reader
Lets you consume the result through a data reader

Execute Scalar
Returns the first column from the first row in the result

Execute XmlReader
Requires an XML result

Forgot to dispose or close?

May occupy a connection to the database!

Next: **Inserting Data**

Command with Parameters

Requires that you know SQL

You have to know the column types

Inserting Data Using a **Parameterized Query**

```
INSERT INTO [Customers]
    (Id, Name, Address, PostalCode, Country, PhoneNumber)

VALUES
    (NEWID(), @Name, @Address, @PostalCode, @Country, @PhoneNumber)
```

Potential **SQL Injection**

```
string byeByeTable = "'); DROP TABLE [Customers] --";

string query = "INSERT INTO [Customers] (Name) VALUES ('" + byeByeTable + "')";
```

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WARNING

DO NOT DO THIS

Parameterized SQL to the Rescue!

Entity Framework and other ORMs rely on parameters

Values are treated as literals instead of a segment in the SQL query

The values in a parameter is treated as the type specified

Update and **Delete** Data

```
UPDATE [Customers] SET Name = @Name WHERE Id = @Id

DELETE FROM [Customers] WHERE Id = @Id
```

Creating and Opening a **Connection**

```
# SQLite
using SqliteConnection     connection = new(connectionString)

# SQL Server
using SqlConnection        connection = new(connectionString)


connection.Open();
```

A **consistent API** no matter what data source

Use **parameters** to **map values**
into your queries!

Use a **Parameter**

```
string name = "Filip Ekberg";

string query = "INSERT INTO [Customers] (Name) VALUES (@NameParameter)";

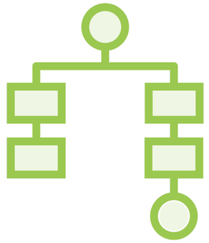
var nameParameter =
    new SqlParameter("NameParameter", System.Data.SqlDbType.NVarChar);

nameParameter.Value = name;

command.Parameters.Add(nameParameter);
```

There’s much more to discover
on your own!

Data Access in C#



You will most of the time rely on an ORM
Entity Framework Core will be what you experience for the most part

ADO.NET is great for high performance applications
You have full control and can tweak each query

You can now choose what is best suited in your application!