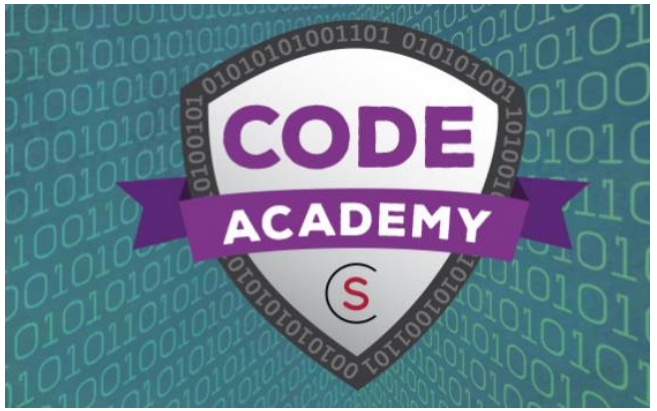

Day 10: Databases and C#

CODE BOOTCAMP VAASA 2021

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Databases and C#

Databases in the .NET environment

- Typical business applications almost always require a database, often a SQL database
- In .NET programming, many SQL databases are directly supported under a technology named ADO.NET
  - ActiveX Data Objects = ADO, Microsoft's prior database access technology for Windows
  - Compare this to ASP and ASP.NET
- In .NET, databases can be accessed from all application types
  - Console applications, desktop applications
  - Web applications, Web APIs, etc.
  - Cloud applications
- Remember that in web applications, the front-end application cannot directly access databases

ADO.NET architecture

- Your own code
- The ADO.NET class library
- Provider classes, aka the ”drivers”
- Database’s own data access technology
- The database

Basics of Entity Framework

- Entity Framework (EF) is Microsoft's open source ORM framework (Object-Relational Mapper)
- Entity Framework has been designed to work with SQL databases, but the latest version also supports other database types and storage methods
- Entity Framework's main task is to allow databases to be accessed as classes, instead of using SQL to work with the database data
- Entity Framework will keep all data and changes to the in memory until the data is saved
- ORM tools like Entity Framework will make database programming much easier
  - …however, the developer must understand how ORMs work, especially related to performance and memory consumption

Creating an entity model

- Using Entity Framework requires so-called entity classes to be generated in C#; these classes mirror the database's structure
- These classes can be generated manually, but it is more efficient to use tools
- There are two tools
  - ”Scaffold-DbContext” inside Visual Studio
  - The command-line command ”dotnet ef” for use with Visual Studio Code
- Which databases does Entity Framework support?
  - Microsoft SQL Server, MySQL, SQLite, PostgreSQL, Azure Cosmos DB, In-Memory, …
  - For details: https://docs.microsoft.com/en-us/ef/core/providers/index

Language Integrated Query

- Language Integrated Query or LINQ for short
- LINQ is a way to manipulate various data formats inside C# applications
- Supported
  - Built-in objects (the class library)
  - Self-implemented classes and data types
  - XML files
  - DataSet storage objects
  - SQL databases and Entity Framework
- When working with databases, LINQ is commonly used with SQL databases thru Entity Framework

Summary and exercises

C# coding

1. Test LINQ queries with various data source
   - An array of numbers
   - A list of strings
   - A list which stores classes that you have created
2. Create an Entity Framework model to the Northwind database
   - Then write a LINQ query that fetches the Finnish customers
3. Create a simple ASP.NET MVC application that lists Northwind database data on the screen
   - For example, all customers
   - How can you limit the data (rows, columns) that are shown?
   - How can you use the Razor technology to support this?

Developing the web demo further

- Let’s add SQL database support to our web demo application!
- The required classes
  - The model classes for the database data to be processed
  - Usually, these model classes match the database table structure
  - The entity model *context* ties the models with the database
- For more information
  - Razor Pages with Entity Framework Core in ASP.NET Core
  - https://docs.microsoft.com/en-us/aspnet/core/data/ef-rp/intro