EF Core Essentials

Key Optimizing Strategies for Better Performance

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#csharp-db

Table of Contents

Features in EF Core

Overview

Recap of EF Core Basics

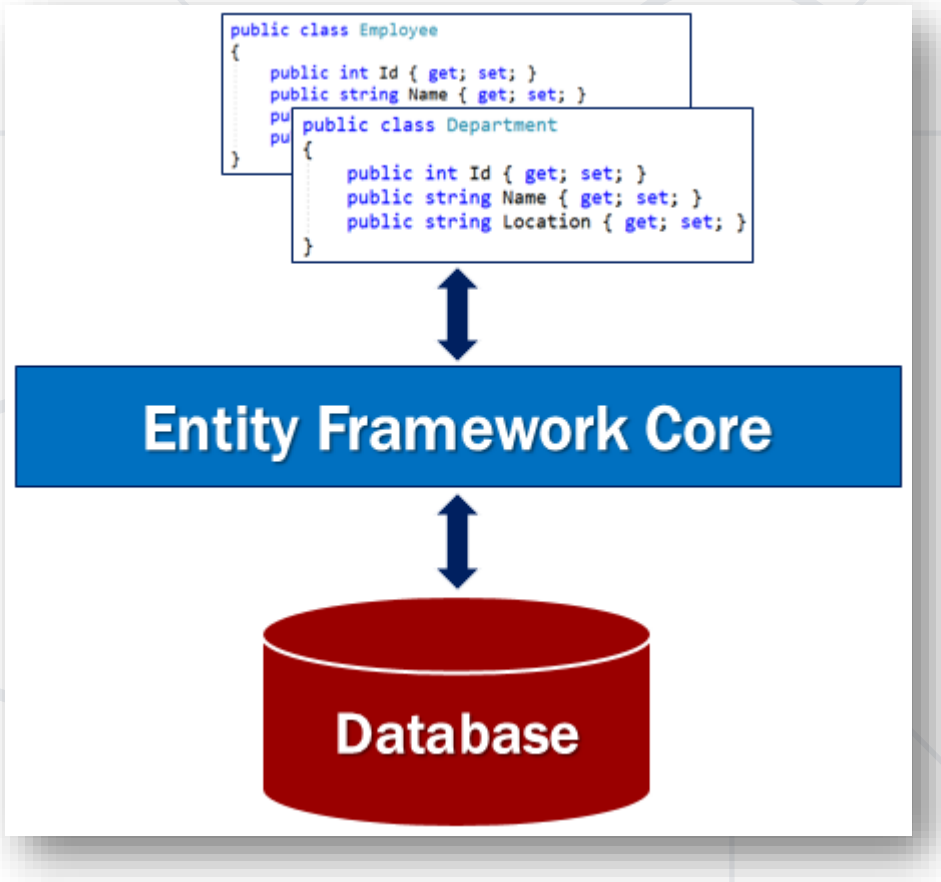
- Entity Framework Core is a lightweight, extensible, **cross-platform**
- ORM (**Object Relational Mapping**) framework for **.NET** applications
- Provides a **high-level abstraction** for managing relational databases with minimal code
- Supports **many database engines**

The Model

- With EF Core, **data access** is performed **using a model**
- A model is made up of **entity classes** and a **context object** that represents a **session with the database**
- The context object allows **querying** and **saving data**

Model Development Approaches

- Generate a model from an **existing database**
- Hand **code a model** to **match the database**
- Once a model is created, use **EF Migrations** to create a database from the model
- Migrations allow **evolving the database** as the model changes



Querying

- **Instances** of entity classes are **retrieved from the database** using **Language Integrated Query** (**LINQ**)
- LINQ allows you to use C# to write **strongly typed queries**
- It **uses your derived context** and entity classes to reference database objects

Querying

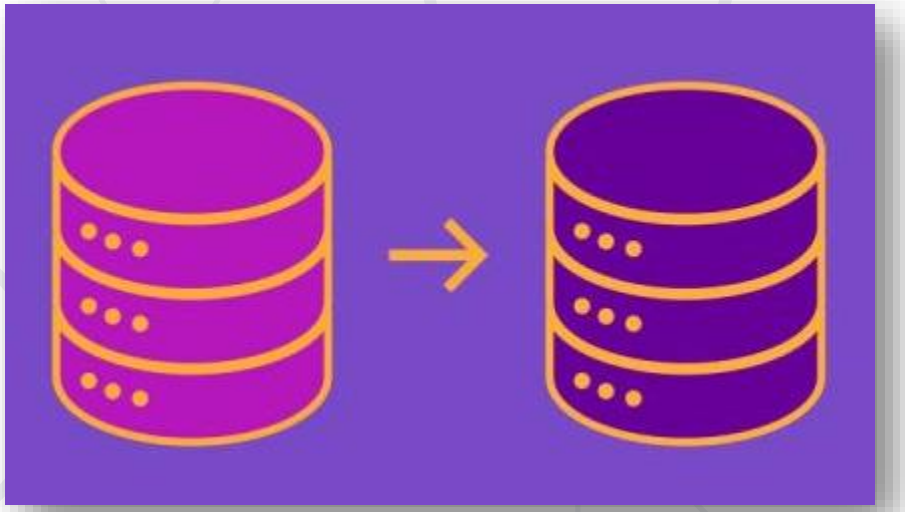
- EF Core **passes a representation of the LINQ query** to the **database provider**
- Database providers in turn **translate it** to **database-specific query language**
- Queries are **always executed against the database** even if the entities returned in the result already exist in the context
- Querying allows you to **read data from the database**

Saving Data

- Data is **created**, **deleted**, and **modified** in the database using instances of your entity classes
- Saving data means **adding new entities to the database**, **removing entities**, or **modifying** the properties of existing entities in some way

Saving Data Approaches

- Entity Framework Core (EF Core) supports **two fundamental approaches** for saving data to the database:
  - **Change tracking** and **SaveChanges**
  - **ExecuteUpdate** and **ExecuteDelete** ("bulk update")



Local Generic Repository

Repository Pattern

Repository Pattern

- Without Repository **direct access to DbContext**
- The **Repository Pattern** is a fundamental **design pattern** in software development
  - Provides an **abstraction layer** between the application's data access logic and the underlying data source
  - It promotes **separation of concerns** and enhances code **maintainability**, **testability**, and **scalability**

Generic Repository Pattern

- The **Generic** Repository pattern in C# is a design pattern that abstracts the application's data layer, making it easier to manage data access logic across **different data sources**
- It aims to **reduce redundancy** by implementing **common data operations** in a single, **generic repository** rather than having separate repositories for each entity type

Key Concepts

- **Generic Interface**
  - A generic repository typically starts with a generic interface defining common operations like **Add**, **Delete**, **Find**, and **Update**
  - These operations are **defined in a generic way**, **applicable to any entity type**
- **Implementation**
  - The generic interface is then implemented in a concrete class
  - This class handles the data source interactions, such as querying a database using an ORM (like Entity Framework)
- **Entity Framework Context**
  - The implementation will often utilize an Entity Framework context to interact with the database

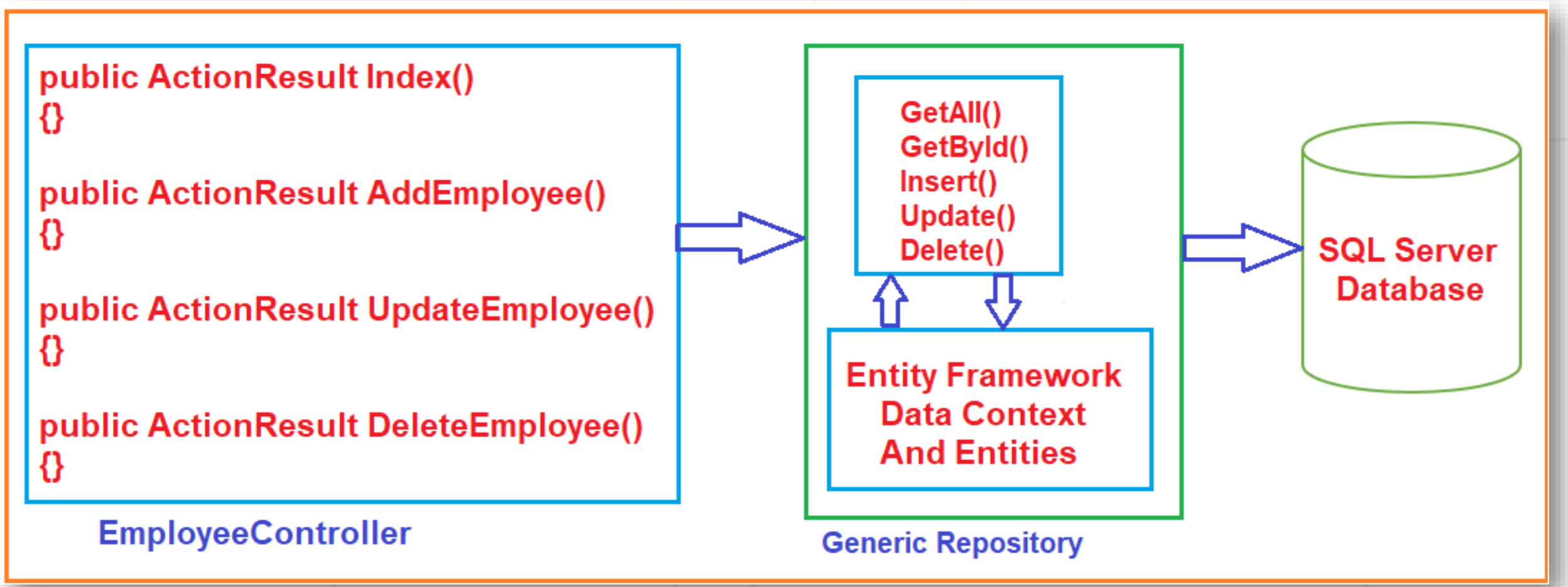
Why Do We Need Generic Repository DP

- In a **Basic Repository** or **Non-Generic Repository**, we need to create **separate repositories for every entity** in our application
- For example, **if we have three entities**:
  - *Employee*, *Product*, and *Customer*
  - We **need to create three repositories**: *EmployeeRepository*, *ProductRepository*, and *CustomerRepository*

DRY Principle

- Creating separate repositories is boring and **repetitive work**
  - Especially **if** all the repositories will **do** the **same kind of work**
  - Typically database **CRUD** operations
- This is against the **DRY** (**Don't Repeat Yourself**) principle
- To solve the above problem, the **Generic Repository Design Pattern** comes into the picture

Example


public ActionResult Index()
{}
public ActionResult AddEmployee()
{}
public ActionResult UpdateEmployee()
{}
public ActionResult DeleteEmployee()
{}
EmployeeController
GetAll()
GetById()
Insert()
Update()
Delete()
Entity Framework
Data Context
And Entities
Generic Repository
SQL Server
Database

Inversion of Control Design Principle

- The **IoC Design Principle** suggests the inversion of various types of controls in **object-oriented design** to achieve **loose coupling** between the application classes
- The **Main class** should **NOT** have a **concrete implementation** of an aggregated class
- It should **depend on the abstraction** of that class
- Here, control means any **extra responsibilities** a class has **other than its main** or fundamental responsibility

What is Dependency Injection?

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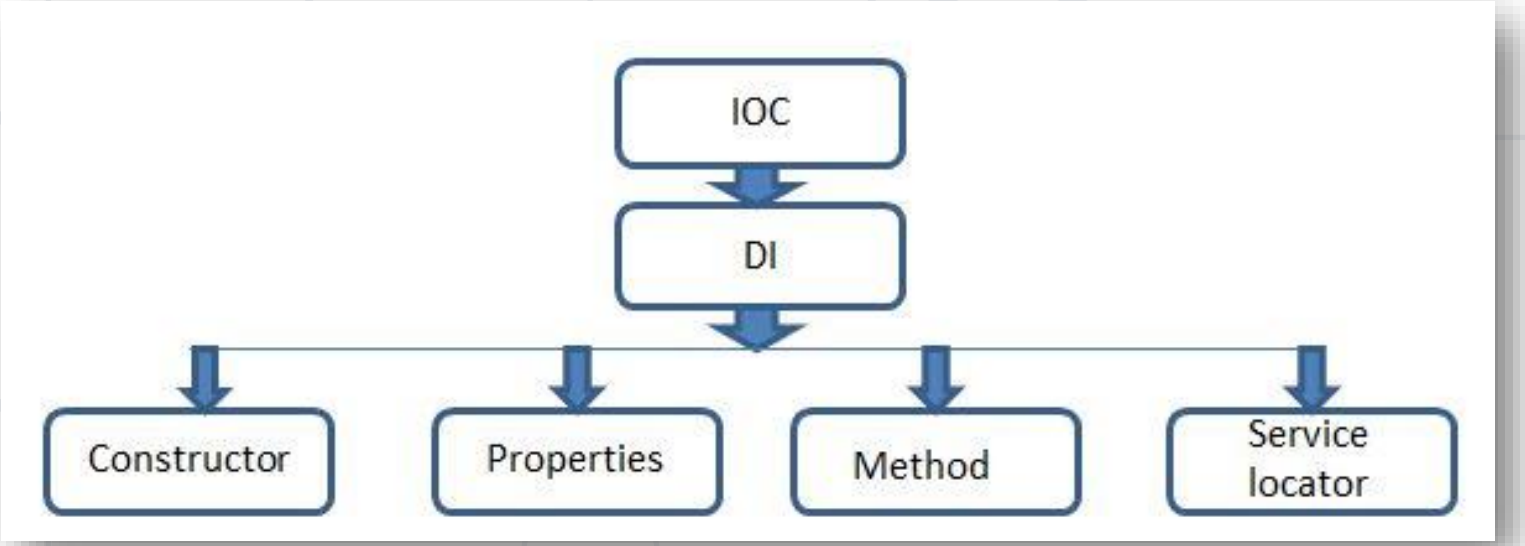
- **IoC** can be done **using Dependency Injection** (DI)
- How to **inject concrete implementation** into a class using abstraction (**an interface inside**)
- The main idea of **dependency injection** is to **reduce the coupling between classes** and **move the binding of abstraction** and concrete implementation **out of the dependent class**
- **DI** is **how one object knows about another** abstracted dependent object

Ways to Achieve DI

- Injection via **Constructor**
- Injection via **Property**
- Injection via **Method**
- Injection via **Service Locator**



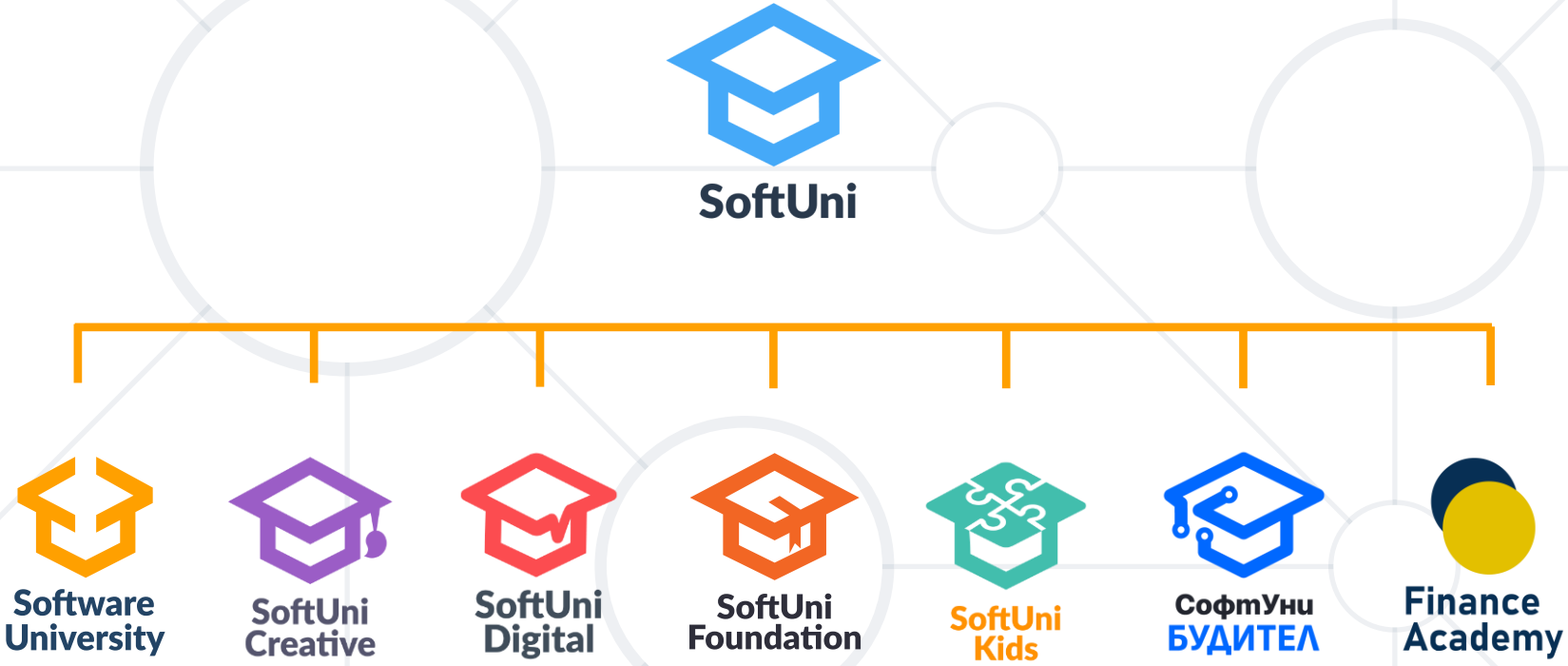
Live Demo

Cinema Hub

Summary

- EF Core main features Overview
- Generic Repository Design Pattern
- IoC and DI
- Service Collection

Questions?



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