

It simplifies **data access** by allowing developers to interact with databases using **.NET objects** (C# classes) instead of writing raw SQL queries.

Faster Development: EF generates SQL behind the scenes

Easier Maintenance: Models are easier to refactor than raw SQL scripts.

Code First Approach

1. You define entities (e.g., `User.cs`, `Document.cs`) as simple C# classes

2. Create `DbContext`

3. EF Core uses a class derived from `DbContext` to **track and manage** your entities.

This `DbContext` is your **bridge between C# code and the SQL database**.

4. Register `DbContext` in DI Container (in `Program.cs`)

```
builder.Services.AddDbContext<AppDbContext>(options =>
    options.UseSqlServer(
        builder.Configuration.GetConnectionString("DefaultConnection"),
        b => b.MigrationsAssembly("DigitalDocumentLockCommon")
    ));
```

Now EF Core knows how to connect to the database using your connection string from `appsettings.json`.

Commands

```
dotnet ef migrations add AddUserActivityLogTable --project ../DigitalDocumentLockCommon --
startup-project ../DigitalDocumentLockAPI
```

```
dotnet ef database update --project ../DigitalDocumentLockCommon --startup-project
../DigitalDocumentLockAPI
```

🕒 Reads your model classes and `DbContext`

🕒 Generates SQL to create the tables

🕒 Applies those scripts to the actual database

5. EF Core **automatically translates LINQ queries** into SQL and fetches data.

Project

```
|
|
|— Models/                ← All your POCO entities
|   └─ User.cs, Document.cs
|
|
|— Db/
|   └─ ApplicationDbContext    ← Maps models to database
|
|
|— Migrations/
|   └─ Migration files        ← History of schema changes
|
|
|— Repository/
|   └─ UserRepository.cs      ← Data access logic
|
|
|— appsettings.json          ← Connection string to DB
|
|
|— Program.cs                ← Registers EF Core services
```

SignIn Functionality:

1. When the user clicks **"Sign Up"** in your frontend (probably Angular/React/etc.), it makes an **HTTP POST** request like:
POST http://localhost:5138/api/Signup

Content-Type: application/json

```
{
  "firstName": "Meghana",
  "lastName": "R",
  "email": "meghana@email.com",
  "password": "Strong@123"
```

}

2. Your controller method in SignupController.cs catches the request:

- 🕒 FromBody tells ASP.NET to **deserialize** the incoming JSON to your User model.
- 🕒 The User object now contains all the properties filled from the frontend form.

It then calls:

```
var result = await _repo.SignupAsync(user);
```

This goes to the repository layer.

3. Your SignupRepository.cs performs several tasks:

Validates Input

Validates Email Format

Validates Password Strength

Checks for:

- 1 capital letter
- 1 number
- 1 special character
- Minimum 8 characters

If validation fails, returns 400.

Hashes the Password

4. **Saves to DB using EF Core**

```
await _ctx.Users.AddAsync(user);  
await _ctx.SaveChangesAsync();
```

This saves the User to the **Users** table in SQL Server.

5. **Returns Response DTO**

Returns a ResultDto like:

[Back to Controller](#)

Back in your controller:

Appropriate response is returned to the frontend.

6. Database Table Mapping

In `User.cs` you used:

```
[Table("Users")]
```

```
[Column("user_id")]
```

This ensures the class maps directly to SQL table/column names.

And your `AppDbContext.cs` declares:

```
public DbSet<User> Users { get; set; }
```

Entity Framework uses this to talk to the Users table.

Frontend Form → HTTP POST /api/Signup

↓

Controller (SignupController)

↓

Repository (SignupRepository)

↓

Validation → Hash password → Save via EF Core

↓

Database (Users table, SQL Server)

↓

Returns HTTP 200/400/409 with response message

Why bcrypt:

BCrypt Does Why It's Good

One-way hash Cannot be reversed, even if DB is stolen

Adds salt Prevents attackers from guessing common passwords

Slow to compute Prevents brute-force attacks

Verifiable You can check password match during login easily

Login Functionality:

Frontend Triggers API

- The frontend sends a **POST** request to:

POST http://localhost:<port>/api/Login/userLogin

with this JSON body: