

Inventory Management System

Project 2 – Programming Techniques (CA-PRTQS) title: "Inventory Management System" description: "C# Programming Fundamentals Project by Marc Cavada" author: "Marc Cavada"

Introduction

This project is a **prototype Inventory Management System** developed in **C# using .NET 9 and Visual Studio Code**.

It captures and manages inventory items using **EF Core and SQLite**, exposing a **RESTful API** with Swagger/OpenAPI support.

InventoryAPI – Code Files

1. Program.cs

```
using Microsoft.EntityFrameworkCore;
using InventoryAPI;

var builder = WebApplication.CreateBuilder(args);

builder.Services.AddDbContext<InventoryDbContext>(options =>
    options.UseSqlite("Data Source=inventory.db"));

builder.Services.AddEndpointsApiExplorer();
builder.Services.AddSwaggerGen();

var app = builder.Build();

if (app.Environment.IsDevelopment())
{
    app.UseSwagger();
    app.UseSwaggerUI();
}

app.UseHttpsRedirection();

app.MapGet("/", () => "Inventory API is running.");
app.MapGet("/items", async (InventoryDbContext db) => await db.Items.ToListAsync());
app.MapGet("/items/{id}", async (int id, InventoryDbContext db) =>
{
    var item = await db.Items.FindAsync(id);
    return item != null ? Results.Ok(item) : Results.NotFound();
});
app.MapPost("/items", async (Item newItem, InventoryDbContext db) =>
{
    db.Items.Add(newItem);
    await db.SaveChangesAsync();
    return Results.Created($"/items/{newItem.Id}", newItem);
});
```

```
});  
  
app.Run();
```

2. InventoryDbContext.cs

```
using Microsoft.EntityFrameworkCore;  
  
namespace InventoryAPI  
{  
    public class InventoryDbContext: DbContext  
    {  
        public InventoryDbContext(DbContextOptions<InventoryDbContext> options) :  
base(options) { }  
        public DbSet<Item> Items { get; set; }  
    }  
}
```

3. Item.cs

```
namespace InventoryAPI  
{  
    public record Item(int Id, string FirstName, string LastName, double Price);  
}
```

4. InventoryAPI.csproj

```
<Project Sdk="Microsoft.NET.Sdk.Web">  
  <PropertyGroup>  
    <TargetFramework>net9.0</TargetFramework>  
    <Nullable>enable</Nullable>  
    <ImplicitUsings>enable</ImplicitUsings>  
  </PropertyGroup>  
  <ItemGroup>  
    <PackageReference Include="Microsoft.EntityFrameworkCore.Sqlite" Version="8.0.7"  
/>  
    <PackageReference Include="Microsoft.EntityFrameworkCore.Tools" Version="8.0.7">  
      <PrivateAssets>all</PrivateAssets>  
      <IncludeAssets>runtime; build; native; contentfiles; analyzers;  
buildtransitive</IncludeAssets>  
    </PackageReference>  
    <PackageReference Include="Swashbuckle.AspNetCore" Version="6.7.0" />  
  </ItemGroup>  
</Project>
```

5. InventoryAPI.http

```
GET https://localhost:7255/items
GET https://localhost:7255/items/1
POST https://localhost:7255/items
Content-Type: application/json
```

```
{
  "id": 101,
  "firstName": "Apple",
  "lastName": "Box",
  "price": 499.99
}
```

Setup Instructions

Prerequisites • .NET 9 SDK • Visual Studio Code or Visual Studio • SQLite CLI (optional)

Build & Run

```
cd InventoryAPI dotnet restore dotnet build dotnet run
```

API will run on: • HTTPS: <https://localhost:7255> • HTTP: <http://localhost:5091>

Database Migrations

```
dotnet ef migrations add InitialCreate --project InventoryAPI dotnet ef database update --project InventoryAPI
```

Database Model

Item.cs

```
public class Item
{
    public int Id { get; set; }
    public string FirstName { get; set; }
    public string LastName { get; set; }
    public double Price { get; set; }
}
```

InventoryDbContext.cs

```
using Microsoft.EntityFrameworkCore;

public class InventoryDbContext: DbContext
{
    public InventoryDbContext(DbContextOptions<InventoryDbContext> options) :
base(options) { }
    public DbSet<Item> Items { get; set; }
}
```

API Endpoints

Endpoint Method Description / GET Health check / Root message /items GET Fetch all items /items/{id} GET Fetch a single item by ID /items POST Add a new item

Swagger UI: <https://localhost:7255/swagger>


Program Flow (Diagram)

```
flowchart TD
    A[Start API] --> B[Swagger / Root Endpoint]
    B --> C{Select Endpoint}

    C -->|"GET /items"| D[Fetch all items from DB]
    D --> E[Return JSON list]

    C -->|"GET /items/:id"| F[Fetch item by ID]
    F --> G{Item Exists?}
    G -->|Yes| H[Return Item JSON]
    G -->|No| I[Return 404 Not Found]

    C -->|"POST /items"| J[Receive Item JSON]
    J --> K{Validate Input}
    K -->|Valid| L[Insert into DB]
    K -->|Invalid| M[Return 400 Bad Request]
    L --> N[Return Created Response]
```

 Development Highlights • Minimal API with ASP.NET Core • EF Core SQLite integration • Input validation for IDs and prices • Async/await for database operations • Swagger/OpenAPI for endpoint testing

Folder Structure

```
InventoryAPI/ ├── Program.cs ├── Item.cs ├── InventoryDbContext.cs ├── appsettings.json ├──
appsettings.Development.json ├── Properties/ ├── bin/ ├── obj/ └── InventoryAPI.csproj
```

Author

Marc Cavada Programming Fundamentals – CDI College Project: CA_PRFND – Inventory Management System

✅ This version is **GitHub-ready**:

All C#, XML, and HTTP blocks are fenced separately.

Mermaid diagram is standalone.

Folder structure uses its own code block.

Text and headings are outside code blocks, so everything renders correctly.