

Technical Documentation

Developing Software System II:
Human Capital Management Web Application

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Contents

Introduction	2
Overall Description.....	3
Pre-Requirements	4
Business Requirements	4
Project Dependencies	5
Software Design and Implementation Constraints	6
Application Overview	8
HCM API Page	8
Login Page	9
Login as an Administrator.....	9
Employee Page: List (Login Redirect)	9
Employee Page: Create.....	10
Employee Page: Edit	10
Employee Page: Delete	11
Assignment Page: Create.....	11
Assignment Page: Edit	12
Assignment Page: Delete	12
Department Page: List.....	13
Department Page: Create.....	13
Department Page: Edit	14
Department Page: Delete	14
Administrator Page: List.....	15
Administrator Page: Edit.....	15
Administrator Page: Delete.....	16
Login as an Employee.....	16
Information Details (Login Redirect)	16
References.....	17

Introduction

This document provides the final detailed technical (infrastructure) specifications and design for Human Capital Management (HCM) web application (Web App). The purpose of HCM Web App is to provide small companies to manage their employees within their assignment's details.

The web app has multiple user categories i.e., back-office and employees. The application also has a login/logout functionality, authentication, authorization, and restriction for a specific user to a specific page.

Back-office or administrator user will be able to add new employees in departments with all descriptions, salaries and other suitable data. They also will be responsible for managing the departments, employee assignments, and positions that employee can be in.

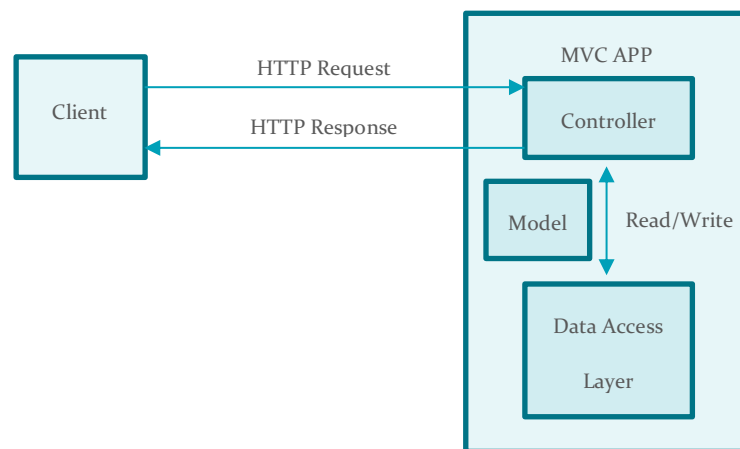
Employee user will have ability to update a specific portion of their record like name, address, email, and phone.

Overall Description

.NET is a developer platform made up of tools, programming languages, and libraries for building many different types of applications. The base platform provides components that apply to all different types of apps such as ASP.NET.

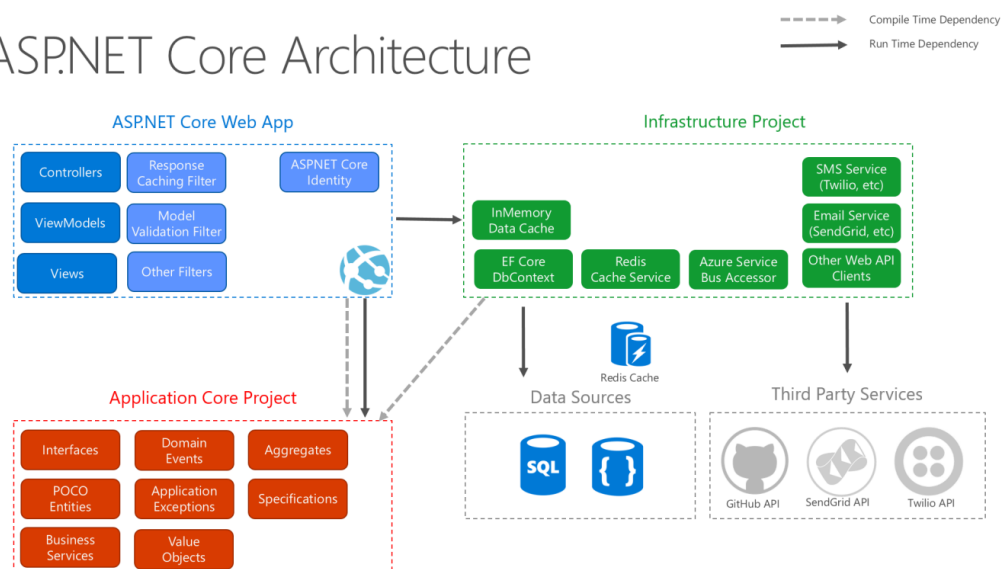
This web application is built using C#, ASP.Net Core framework, SQLite, and dependencies such as Auto Mapper, Swagger, and Entity Framework.

The following diagrams shows the simple logic design for web API app,



The following diagrams shows the details for ASP.NET Core Architecture that we used,

ASP.NET Core Architecture



PRE-REQUIREMENTS

The following list are the pre-requirements for HCM Web App:

- .NET CORE 3.1 SDK or higher
- Visual Studio / Visual Studio Code
- GitHub Account
- Git

BUSINESS REQUIREMENTS

The following list are the business requirements for HCM Web App:

- Employees can have multiple assignments in a given department if they don't overlap.
- Assignment can have multiple salaries but the only valid salary is the last one.
- Departments should be unique based on "Name".
- Employees can have at most 10 assignments across all departments.
- Employee email and phone are unique and mandatory.
- Employee should have only one link to User.
- Assignment start date is required.
- Assignment end date should be greater than the start date.
- Salary amount should be positive and greater than 0.01 units.
- Username, phone, email should be unique per role.
- Password should be at least 8 chars including at least 1 upper letter, 1 digit, and 1 special symbol.

PROJECT DEPENDENCIES

The following list are the project dependencies for HCM Web App:

HCM.Api

```
AutoMapper (10.1.1) ↑
AutoMapper.Extensions.Microsoft.DependencyInjection (8.1.1) ↑
Microsoft.AspNetCore.Authentication.JwtBearer (3.1.21) ↑
Microsoft.AspNetCore.Mvc.Newtonsoft.Json (3.1.21) ↑
Microsoft.EntityFrameworkCore.Design (3.1.19) ↑
Newtonsoft.Json (13.0.1)
Swashbuckle.AspNetCore (5.5.0) ↑
Swashbuckle.AspNetCore.Swagger (5.5.0) ↑
Swashbuckle.AspNetCore.SwaggerGen (5.5.0) ↑
Swashbuckle.AspNetCore.SwaggerUI (5.5.0) ↑
System.IdentityModel.Tokens.Jwt (6.14.1) ↑
```

HCM.Api.Client

```
Microsoft.AspNetCore.Mvc.Newtonsoft.Json (3.1.21) ↑
NSwag.MSBuild (13.11.1) ↑
```

HCM.Core

```
Microsoft.AspNetCore.Mvc.Newtonsoft.Json (3.1.21) ↑
NSwag.MSBuild (13.11.1) ↑
```

HCM.Database

```
Microsoft.AspNetCore.Http.Abstractions (2.2.0)
Microsoft.EntityFrameworkCore (3.1.19) ↑
Microsoft.EntityFrameworkCore.Design (3.1.19) ↑
Microsoft.EntityFrameworkCore.Sqlite (3.1.19) ↑
SQLite (3.13.0)
```

HCM.Web

```
Microsoft.AspNetCore.Authentication.JwtBearer (3.1.21) ↑
Microsoft.AspNetCore.Mvc.Razor.RuntimeCompilation (3.1.21) ↑
Microsoft.EntityFrameworkCore.Sqlite (3.1.21) ↑
Microsoft.EntityFrameworkCore.SqlServer (3.1.21) ↑
Microsoft.EntityFrameworkCore.Tools (3.1.21) ↑
Microsoft.VisualStudio.Web.CodeGeneration.Design (3.1.5) ↑
```

SOFTWARE DESIGN AND IMPLEMENTATION CONSTRAINTS

The software should have capabilities for:

- Login (Authorization via JWT token and cookies)
- Logout
- Access control
- * Employee
- * Administrator

What the administrators can do:

- Create/Update/Delete/View Employees
- Create/Update/Delete/View Departments
- Create/Update/Delete/View Salaries
- Create/Update/Delete/View Employee Assignments

What employees can do:

- Update their record
- * Personal information
- View their record
- * Assignments
- * Salary

The project will have two components:

- Backend (API) will take care of all the business logic regarding the above
- Frontend (UI) will consume the backend API via HTTP requests

Controllers:

- Employee
- Create (Administrator)
- Update (Administrator)
- Update (Employee)
- Delete (Administrator)
- Get (Administrator, Employee)
- Department
- Create (Administrator)
- Update (Administrator)
- Delete (Administrator)
- Get (Administrator, Employee)
- Assignment
- Create (Administrator)
- Update (Administrator)
- Delete (Administrator)
- Get (Administrator, Employee)
- Salary
- Create (Administrator)
- Update (Administrator)
- Delete (Administrator)
- Get (Administrator, Employee)

Pages Administrators:

- Login
- Home
- Employees
- * Employee Details
- * Assignments
- ** Assignment Details
- ** Salary Details
- Departments

Pages Employees:

- Login
- Home
- * Personal
- * Assignments
- ** Assignment Details
- ** Salary Details

Application Overview

The project source code is available on GitHub, https://github.com/arioanindito/ario_hcm

HCM API PAGE

The screenshot displays the Swagger UI for the HCM API. The interface includes a top navigation bar with the Swagger logo and a dropdown menu to select a definition (currently set to 'Hcm.Api'). Below the header, the API is organized into sections: Assignment, Department, Employee, Token, and User. Each section lists its endpoints with corresponding HTTP methods (GET, POST, PUT, DELETE) and status icons. Two callouts are present: one pointing to the 'Authorize' button in the top right corner, labeled 'Authorization', and another pointing to the 'POST /api/Token' endpoint, labeled 'Token Generator'.

Section	Method	Endpoint	Status
Assignment	GET	/api/Assignment/{employeeId}/all	Locked
	GET	/api/Assignment/{assignmentId}	Locked
	PUT	/api/Assignment/{assignmentId}	Locked
	DELETE	/api/Assignment/{assignmentId}	Locked
	POST	/api/Assignment/{employeeId}/{departmentId}	Locked
Department	GET	/api/Department	Locked
	POST	/api/Department	Locked
	GET	/api/Department/{departmentId}	Locked
	PUT	/api/Department/{departmentId}	Locked
	DELETE	/api/Department/{departmentId}	Locked
Employee	GET	/api/Employee	Locked
	POST	/api/Employee	Locked
	GET	/api/Employee/{employeeId}	Locked
	PUT	/api/Employee/{employeeId}	Locked
	DELETE	/api/Employee/{employeeId}	Locked
Token	POST	/api/Token	Locked
User	GET	/api/User	Locked
	POST	/api/User	Locked
	GET	/api/User/{userId}	Locked
	PUT	/api/User/{userId}	Locked
	DELETE	/api/User/{userId}	Locked
	PUT	/api/User/password/change/{userId}	Locked

The HCM API page is an API web page. In order to access and execute, the user should generate token and proceed bearer authentication.

LOGIN PAGE

myHCM

Username

Password

Please select

Login

myHCM

administrator@hcm.com

.....

✓ Please select
Administrator
Employee

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The first page that user will see is the login page. This page contains login functionality for 2 users which is administrator and employee.

LOGIN AS AN ADMINISTRATOR

Employee Page: List (Login Redirect)

Hcm Employees Departments Administrators Logout

Employees

Id	Names	Email	Country
762567e702ec484d9d74b943be5cf701	Paul Pogba	paul@hcm.com	Bulgaria
4361874584ac46deba2684ec8e09fa2f	Raphael Varane	raphael@hcm.com	Bulgaria

Edit Delete

Edit Delete

+ Create

Navigation Bar

Create button

List of employees with edit & delete function

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When the user is logged-in as an administrator, they will be directed to employee list page. It shows the list of all employee and options to create, edit, or delete particular user. This page is accessible only by administrator.

Employee Page: Create

The screenshot shows a web application interface for creating a new employee. At the top, there is a navigation bar with links: 'Hcm', 'Employees', 'Departments', 'Administrators', and a 'Logout' button. The main content area is titled 'Create a new Employee'. It contains a form with the following fields: 'First Name' and 'Family Name' (both empty text boxes), 'Phone' and 'Email' (both empty text boxes), 'Country', 'City', and 'Post Code' (all empty text boxes), and 'Address Line' (an empty text box). At the bottom right of the form are two buttons: 'Cancel' and 'Create'. The footer of the page reads '© 2021 - Hcm.Web - Privacy'.

When the user (administrator) clicks the create button, it will redirect to employee create page. The picture above shows the form information for new employee.

Employee Page: Edit

The screenshot shows the 'Edit Employee' page for 'Paul Pogba'. The page has the same navigation bar as the create page. The main content area is titled 'Paul Pogba'. It contains a form with the following fields: 'First Name' (filled with 'Paul'), 'Family Name' (filled with 'Pogba'), 'Phone' (filled with '+3598123456'), 'Email' (filled with 'paul@hcm.com'), 'Country' (filled with 'Bulgaria'), 'City' (filled with 'Varna'), 'Post Code' (filled with '9000'), and 'Address Line' (filled with 'Address Home Paul'). At the bottom right of the form are two buttons: 'Cancel' and 'Save'. Below the form is a section titled 'Assignments' with a blue '+' button to its right. This section contains a table with the following data:

Department	Position	Start Date	End Date	Amount	Currency	
Quality Assurance	Lead QA	04/01/2022 05:43:00	10/01/2022 05:43:00	7000.00	EUR	Edit Delete
Information Technology	Manager	01/01/2022 00:48:00	03/31/2022 00:48:00	3000.00	EUR	Edit Delete

Annotations on the right side of the page point to specific elements: 'Employee details' points to the form fields, 'Create button' points to the 'Save' button, and 'Assignment list' points to the table.

The edit employee page consists of employee details information and their assignments. With this page, the user could edit the employee information as well as their assignments.

Employee Page: Delete

Hcm Employees Departments Administrators Logout

Are you sure you want to delete this?

Id	762567e702ec484d9d74b943be5cf701
First Name	Paul
Family Name	Pogba
Phone	+3598123456
Email	paul@hcm.com
Country	Bulgaria
Address Line	Address Home Paul
Post Code	9000
City	Varna

[Delete](#) [Back to List](#)

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The delete employee page shows the record for chosen employee that will be deleted.

Assignment Page: Create

Hcm Employees Departments Administrators Logout

Assignment:

Position	Department Id
<input type="text"/>	Information Technology
Start Date	End Date
<input type="text" value="dd/mm/yyyy --:--"/>	<input type="text" value="dd/mm/yyyy --:--"/>
Amount	Currency
<input type="text" value="0.00"/>	EUR

[Cancel](#) [Create](#)

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When the user (administrator) clicks the create assignment button, it will redirect to assignment create page. The picture above shows the form information for new assignment.

Assignment Page: Edit

Hcm Employees Departments Administrators Logout

Assignment: Quality Assurance

Position	Lead QA	Department	Quality Assurance
Start Date	01/04/2022 05.43	End Date	01/10/2022 05.43
Amount	7000.00	Currency	EUR

Cancel Save

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The edit assignment page shows the record for chosen assignment that will be edited.

Assignment Page: Delete

Hcm Employees Departments Administrators Logout

Are you sure you want to delete this?

Position	Lead QA
Department	Quality Assurance
Start Date	04/01/2022 05:43:00
End Date	10/01/2022 05:43:00
Amount	7000.00
Currency	EUR

Delete Back to List

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The delete assignment page shows the record for chosen assignment that will be deleted.

Department Page: List

The screenshot shows the 'Departments' list page. The header includes 'Hcm Employees Departments Administrators' and a 'Logout' link. The main content area displays a table of departments with columns for Name, Country, and City. Each row has 'Edit' and 'Delete' buttons. A blue '+' button is in the top right corner of the table. Two callout boxes with arrows point to these elements: 'Create button' points to the '+' button, and 'Department list' points to the table.

Name	Country	City	
Information Technology	Bulgaria	Varna	Edit Delete
Human Resources	Bulgaria	Sofia	Edit Delete
Quality Assurance	Bulgaria	Varna	Edit Delete
Marketing	Bulgaria	Sofia	Edit Delete

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Department list page shows all the department in the company. The administrator could create, edit, and delete specific department.

Department Page: Create

The screenshot shows the 'Create a new Department' form. The header includes 'Hcm Employees Departments Administrators' and a 'Logout' link. The form has three input fields: 'Name', 'Country', and 'City'. At the bottom right of the form are 'Back' and 'Create' buttons. The footer contains '© 2021 - Hcm.Web - Privacy'.

Create a new Department

Name

Country

City

[Back](#) [Create](#)

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When the user (administrator) clicks the create department button, it will redirect to department create page. The picture above shows the form information for new department.

Department Page: Edit

The screenshot shows the 'Edit Department' page. At the top, there is a navigation bar with 'Hcm', 'Employees', 'Departments', and 'Administrators' on the left, and 'Logout' on the right. The main content area features a form titled 'Information Technology'. The form has three input fields: 'Name' (containing 'Information Technology'), 'Country' (containing 'Bulgaria'), and 'City' (containing 'Varna'). Below these fields are two buttons: 'Back' and 'Save'. At the bottom of the page, there is a footer with the text '© 2021 - Hcm.Web - Privacy'.

The edit department page shows the record for chosen department that will be edited.

Department Page: Delete

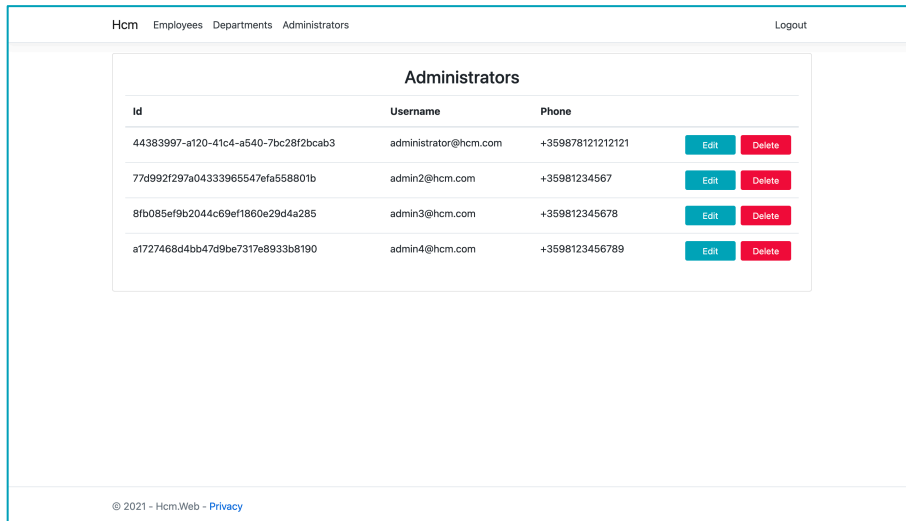
The screenshot shows the 'Delete Department' page. At the top, there is a navigation bar with 'Hcm', 'Employees', 'Departments', and 'Administrators' on the left, and 'Logout' on the right. The main content area features a confirmation message: 'Are you sure you want to delete this?'. Below this message is a table with the following data:

Name	Information Technology
Country	Bulgaria
City	Varna

Below the table are two buttons: 'Delete' (in red) and 'Back to List' (in blue). At the bottom of the page, there is a footer with the text '© 2021 - Hcm.Web - Privacy'.

The delete department page shows the record for chosen department that will be deleted.

Administrator Page: List

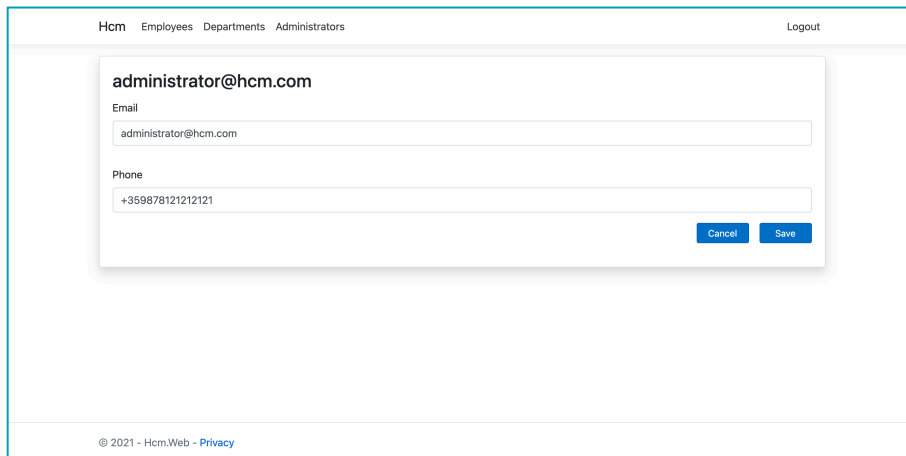


The screenshot shows the 'Administrators' page in a web application. At the top, there is a navigation bar with links for 'Hcm', 'Employees', 'Departments', and 'Administrators', and a 'Logout' button on the right. The main content area is titled 'Administrators' and contains a table with four columns: 'Id', 'Username', 'Phone', and two action buttons ('Edit' and 'Delete'). The table lists four administrators. At the bottom of the page, there is a footer with the text '© 2021 - Hcm.Web - Privacy'.

Administrators				
Id	Username	Phone	Edit	Delete
44383997-a120-41c4-a540-7bc28f2bcab3	administrator@hcm.com	+3598781212121	Edit	Delete
77d992f297a04333965547efa558801b	admin2@hcm.com	+35981234567	Edit	Delete
8fb085ef9b2044c69ef1860e29d4a285	admin3@hcm.com	+359812345678	Edit	Delete
a1727468d4bb47d9be7317e8933b8190	admin4@hcm.com	+3598123456789	Edit	Delete

Administrator list page shows all the administrator in the company. The administrator could edit, and delete specific administrator. Furthermore, in order to create new administrator, the user should create it within API page.

Administrator Page: Edit



The screenshot shows the 'Administrator Edit' page in a web application. At the top, there is a navigation bar with links for 'Hcm', 'Employees', 'Departments', and 'Administrators', and a 'Logout' button on the right. The main content area is a form titled 'administrator@hcm.com'. It contains two input fields: 'Email' with the value 'administrator@hcm.com' and 'Phone' with the value '+3598781212121'. At the bottom right of the form, there are two buttons: 'Cancel' and 'Save'. At the bottom of the page, there is a footer with the text '© 2021 - Hcm.Web - Privacy'.

The edit administrator page shows the record for chosen administrator that will be edited.

Administrator Page: Delete

[Hcm](#) [Employees](#) [Departments](#) [Administrators](#) [Logout](#)

Are you sure you want to delete this?
Id 44383997-a120-41c4-a540-7bc28f2bcab3
Username administrator@hcm.com
Phone +359878121212121
[Delete](#) [Back to List](#)

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The delete administrator page shows the record for chosen administrator that will be deleted.

LOGIN AS AN EMPLOYEE

Information Details (Login Redirect)

[Hcm](#) [Logout](#)

My Information Details
First Name **Family Name**
Phone **Email**
Country **City** **Post Code**
Address Line
[Save](#)

Department	Position	Start Date	End Date	Amount	Currency
Quality Assurance	Lead QA	04/01/2022 05:43:00	10/01/2022 05:43:00	7000.00	EUR
Information Technology	Manager	01/01/2022 00:48:00	03/31/2022 00:48:00	3000.00	EUR

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When the user is logged-in as an employee, they will be directed to employee information details. It shows their personal information and assignments. This page is accessible only by the employee hence only shows their information.

References

<https://dotnet.microsoft.com/en-us/learn/aspnet/what-is-aspnet>

<https://docs.microsoft.com/en-us/aspnet/core/tutorials/first-web-api?view=aspnetcore-6.0&tabs=visual-studio>

<https://docs.microsoft.com/en-us/aspnet/core/?view=aspnetcore-6.0>