

# Hydot Backend Tutorial



Master 5 Popular Backend Frameworks Step By Step

- (1) Dotnet mvc and Api
- (2) Laravel mvc and Api
- (3) Spring boot mvc and Api
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# DOTNET MVC

## [Start]

From the terminal run this command **dotnet new mvc -o ProjectName**

Open the solution in VSCode **code ProjectName**

When Visual Studio Code requests that you add assets to build and debug the project, select **Yes**. If Visual Studio Code doesn't offer to add build and debug assets, select **View > Command Palette** and type ".NET" into the search box. From the list of commands, select the .NET: Generate Assets for Build and Debug command.

Visual Studio Code adds a .vscode folder with generated launch.json and tasks.json file

Trust the HTTPS development certificate by running the following command:

**dotnet dev-certs https --trust**

In vscode, press ctrl + f5 to run the app without debugging

## [Application]

The typical flow of the application is Model View Controller(MVC) and each of them play a critical role

Model: It defines the data schema that will be used to write data into the database.

View: It defines the UI of the application

Controller: It correlate the Model and View Activity. It stores the application logic and process the users request, it then response to the user request with a view.

Ui logic belongs to the View, Input logic belongs to the Controller and the business logic belongs to the model

Create a new file name it HelloWorld.cs and paste this content into it

```
using Microsoft.AspNetCore.Mvc;
using System.Text.Encodings.Web;

namespace MvcMovie.Controllers;

public class HelloWorldController: Controller{

    public string Index(){

        return "Hello World";
    }

    public string Welcome(){
        return "Welcome";
    }

}
```

Every public method is a Http endpoint.

The url is <https://localhost:7111/HelloWorld>

https => The protocol used

localhost:7111 => The server and port running the application

HelloWorld => The controller Name, [HelloWorldController], inside this controller, we have the Index() method. This index method will be the initial method which will be executed when the user access the HelloWorld controller

The Index() is the base url.

<https://localhost:7111/HelloWorld/Welcome>

Now for this example, we are moving into the welcome method Welcome() to execute the code there. The controller name is HelloWorld and the specific method name is Welcome

/[Controller]/[ActionName]/[Parameters]

In the program.cs, the default route is

```
app.MapControllerRoute(
    name: "default",
    pattern: "{controller=Home}/{action=Index}/{id?}"
);
```

We can modify it so that the default route will be HelloWorldController

```
app.MapControllerRoute(
    name: "default",
    pattern: "{controller=HelloWorld}/{action=Index}/{id?}"
);
```

Parameters

From the welcome method in the HelloWorld controller add this

```
public string Welcome(string name, int numTimes = 1)
{
    return HtmlEncoder.Default.Encode($"Hello {name}, NumTimes is: {numTimes}");
}
```

In your browser do this <https://localhost:7111/HelloWorld/Welcome?name=Rick&numtimes=4>

## **Add A View**

In the View folder, create a folder called HelloWorld. Note that the folder name in the View folder should match with the controller name.

If the controller name is MoneyController, the folder name should be Money and so on

In the HelloWorld folder, create an Index.cshtml which is a razor view file,

The code should be this

```
@{
    ViewData["Title"] = "Index";
}
```

```
<h2>This is the index file</h2>
```

```
<p>Hello from the view template!</p>
```

Now in the HelloWorldController, update the Index()

```
public IActionResult Index(){
```

```
    return View();  
}
```

Now this code will do this, It will move into the View Folder > HelloWorld Folder > Index.cshtml

## **Layout**

In the shared folder, there is a \_Layout.cshtml file that will act as the root of the application. Now in this file, the section is divided into 3 main section

```
<header> </header>
```

```
<main> </main>
```

```
<footer> </footer>
```

The header contains the normal header of the application, it can be modified

```
<header>  
<nav class="navbar navbar-expand-sm navbar-toggleable-sm navbar-light bg-white  
border-bottom box-shadow mb-3">  
<div class="container-fluid">  
<a class="navbar-brand" asp-area="" asp-controller="Home" asp-  
action="Index">MvcMovie</a>  
<button class="navbar-toggler" type="button" data-bs-toggle="collapse" data-bs-  
target=".navbar-collapse" aria-controls="navbarSupportedContent"  
aria-expanded="false" aria-label="Toggle navigation">  
<span class="navbar-toggler-icon"></span>  
</button>  
<div class="navbar-collapse collapse d-sm-inline-flex justify-content-between">  
<ul class="navbar-nav flex-grow-1">  
<li class="nav-item">  
<a class="nav-link text-dark" asp-area="" asp-controller="Home" asp-  
action="Index">Home</a>  
</li>  
<li class="nav-item">  
<a class="nav-link text-dark" asp-area="" asp-controller="Home" asp-  
action="Privacy">Privacy</a>  
</li>  
</ul>  
</div>  
</div>  
</nav>
```

```
</header>
```

The main section will display all the route i will enter

```
<div class="container">
<main role="main" class="pb-3">
@RenderBody()
</main>
</div>
```

@RenderBody() => RenderBody is a placeholder where all the view-specific pages you create show up, *wrapped* in the layout page. For example, if you select the Privacy link, the *Views/HelloWorld/Index.cshtml* view is rendered inside the RenderBody method.

The Footer section will contain the normal footer.

```
<footer class="border-top footer text-muted">
<div class="container">
&copy; 2024 - MvcMovie - <a asp-area="" asp-controller="Home" asp-
action="Privacy">Privacy</a>
</div>
</footer>
```

Good, now the scripts resides in the wwwroot folder. The [~] sign means wwwroot folder

```
<script src="~/lib/jquery/dist/jquery.min.js"></script>
<script src="~/lib/bootstrap/dist/js/bootstrap.bundle.min.js"></script>
<script src="~/js/site.js" asp-append-version="true"></script>
```

Okay, the Views/\_ViewStart.cshtml contain this code

```
@{
Layout = "_Layout";
}
```

To display the title of the page, modify the Index.cshtml

```
@{
ViewData["Title"] = "Movie List";
}
```

```
<title>@ViewData["Title"]-Movie App</title>
```

```
<h2>This is the index file</h2>
```

```
<p>Hello from the view template!</p>
```

## Passing Data from controller to view

Modify the Welcome() in the HelloWorld.cshtml controller

```
public IActionResult Welcome(string name, int numTimes)
{
    ViewData["Message"] = "Hello, " + name;
    ViewData["NumTimes"] = numTimes;

    return View();
}
```

Now in the Views folder, create Welcome.cshtml and add this code

```
@{
    ViewData["Title"] = "Welcome";
}

<title>@ViewData["Title"]</title>

<ul>
    @for (int i = 0; i < (int)ViewData["NumTimes"]!; i++)
    {
        <li>@ViewData["Message"]</li>
    }
</ul>
```

Now Visit this url <https://localhost:7111/HelloWorld/Welcome?name=Rick&numtimes=4>  
It will print Rick 4 times

Data is taken from the URL and passed to the controller using the MVC model binder. The controller packages the data into a ViewData dictionary and passes that object to the view. The view then renders the data as HTML to the browser.

## Add Models

We need to define poco (Plain old clr objects) class

```
using System.ComponentModel.DataAnnotations;
namespace MvcMovie.Models;

public class Movie{
    public int Id { get; set; }
    public string? Title { get; set; }
    [DataType(DataType.Date)]
    public DateTime ReleaseDate { get; set; }
    public string? Genre { get; set; }
    public decimal Price { get; set; }
```

```
}
```

Install the necessary nugget packages,

```
dotnet tool install --global dotnet-aspnet-codegenerator
dotnet add package Microsoft.EntityFrameworkCore.Design
dotnet add package Microsoft.EntityFrameworkCore.Sqlite
dotnet add package Microsoft.VisualStudio.Web.CodeGeneration.Design
dotnet add package Microsoft.EntityFrameworkCore.SqlServer
dotnet add package Microsoft.EntityFrameworkCore.Tools
```

Create a database

```
mssql -u sa -p Password
```

Create a data folder and add the datacontext file

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text.RegularExpressions;
using System.Threading.Tasks;
using MvcMovie.Models;
using Microsoft.EntityFrameworkCore;
```

```
namespace MvcMovie.Data
```

```
{
```

```
public class DataContext:DbContext
```

```
{
```

```
//Empty constructor
```

```
public DataContext(): base(){
```

```
}
```

```
//Database Connection String
```

```
protected override void OnConfiguring(DbContextOptionsBuilder optionsBuilder)
```

```
{
```

```
base.OnConfiguring(optionsBuilder);
```

```
optionsBuilder.UseSqlServer("Server=localhost,1433;Database=learnDOTNETMvc;User=sa  
;Password=HydotTech;TrustServerCertificate=true;");
```

```
}
```

```
//Data Set, where Project and User are models in the Model folder
```

```
//public DbSet<Attitude> Attitudes {get; set;}
```

```
}
```

```
}
```



Import it into the Program.cs

```
using Microsoft.EntityFrameworkCore;
using MvcMovie.Data;

var builder = WebApplication.CreateBuilder(args);

builder.Services.AddDbContext<DataContext>();

// Add services to the container.
builder.Services.AddControllersWithViews();

var app = builder.Build();

// Configure the HTTP request pipeline.
if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Home/Error");
    // The default HSTS value is 30 days. You may want to change this for production
    // scenarios, see https://aka.ms/aspnetcore-hsts.
    app.UseHsts();
}

app.UseHttpsRedirection();
app.UseStaticFiles();

app.UseRouting();

app.UseAuthorization();

app.MapControllerRoute(
    name: "default",
    pattern: "{controller=Home}/{action=Index}/{id?}"
);

app.Run();
```

Run this to scaffold the project

```
dotnet aspnet-codegenerator controller -name MovieController -m Movie -dc
LearnDotnetMVC.Data.MyDatabase --relativeFolderPath Controllers --useDefaultLayout --
referenceScriptLibraries -sqlite
```

-m => The name of the model.

-dc => The Data context

--relativeFolderPath => The relative output folder path to create the files.

--useDefaultLayout => The default layout should be used for the views.

--referenceScriptLibraries => Adds \_ValidationScriptsPartial to Edit and Create pages.

-sqlite => Flag to specify if DbContext should use SQLite instead of SQL Server.



In the program.cs, add this configuration

```
builder.Services.AddDbContext<LearnDotnetMVContext>(options =>
options.UseSqlServer(builder.Configuration.GetConnectionString("MyDatabase")));
```

In the appsetting.json, add the following configuration to connect to your database

```
{
  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft.AspNetCore": "Warning"
    }
  },
  "AllowedHosts": "*",
  "ConnectionStrings": {
    "MyDatabase":
    "Server=localhost,1433;Database=learnDOTNETMvc;User=sa;Password=HydotTech;TrustServerCertificate=true;"
  }
}
```

From Visual Studio, install the following nugget packages

Microsoft.VisualStudio.Web.CodeGeneration.Design

Microsoft.EntityFrameworkCore.SqlServer

Microsoft.EntityFrameworkCore.Design

Microsoft.EntityFrameworkCore.Tools

Microsoft.EntityFrameworkCore.SQLite

To migrate the table, run  
dotnet ef migrations add InitialCreate  
dotnet ef database update

### **Datacontext File**

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using Microsoft.EntityFrameworkCore;
using LearnDotnetMVC.Models;
```

```

namespace LearnDotnetMVC.Data
{
    public class LearnDotnetMVCcontext : DbContext
    {
        public LearnDotnetMVCcontext (DbContextOptions<LearnDotnetMVCcontext> options)
        : base(options)
        {
        }
    }

    public DbSet<Movie> Movie { get; set; } = default!;
}

```

The DbSet is used to define the table name to be connected to the database and their respective model

## **MovieController**

Inside the MovieController, the datacontext is injected into the constructor

```

private readonly LearnDotnetMVCcontext _context;

public MovieController(LearnDotnetMVCcontext context)
{
    _context = context;
}

```

Inside the Details method

```

// GET: Movie/Details/5
public async Task<IActionResult> Details(int? id)
{
    if (id == null)
    {
        return NotFound();
    }

    var movie = await _context.Movie
        .FirstOrDefaultAsync(m => m.Id == id);
    if (movie == null)
    {
        return NotFound();
    }

    return View(movie);
}

```

The var movie will query the database through `_context.Movie`.`FirstOrDefaultAsync(m => m.Id == id)`; It will query the Movie table and search for a movie whose id is in the parameter `Details(int? id)`, If there is no such movie id, it will return null, else it will return a view with the movie in a json format

The movie generated will then be passed into Details.cshtml in the /Views/Movie folder

```
@model LearnDotnetMVC.Models.Movie
```

```
@{  
    ViewData["Title"] = "Delete";  
}
```

```
<h1>Delete</h1>
```

```
<h3>Are you sure you want to delete this?</h3>
```

```
<div>
```

```
<h4>Movie</h4>
```

```
<hr />
```

```
<dl class="row">
```

```
<dt class = "col-sm-2">
```

```
@Html.DisplayNameFor(model => model.Title)
```

```
</dt>
```

```
<dd class = "col-sm-10">
```

```
@Html.DisplayFor(model => model.Title)
```

```
</dd>
```

```
<dt class = "col-sm-2">
```

```
@Html.DisplayNameFor(model => model.ReleaseDate)
```

```
</dt>
```

```
<dd class = "col-sm-10">
```

```
@Html.DisplayFor(model => model.ReleaseDate)
```

```
</dd>
```

```
<dt class = "col-sm-2">
```

```
@Html.DisplayNameFor(model => model.Genre)
```

```
</dt>
```

```
<dd class = "col-sm-10">
```

```
@Html.DisplayFor(model => model.Genre)
```

```
</dd>
```

```
<dt class = "col-sm-2">
```

```
@Html.DisplayNameFor(model => model.Price)
```

```
</dt>
```

```
<dd class = "col-sm-10">
```

```
@Html.DisplayFor(model => model.Price)
```

```
</dd>
```

```
</dl>
```

```
<form asp-action="Delete">
```

```
<input type="hidden" asp-for="Id" />
```

```
<input type="submit" value="Delete" class="btn btn-danger" /> |
```

```
<a asp-action="Index">Back to List</a>
```

```
</form>
```

```
</div>
```

The @model statement at the top of the view file specifies the type of object that the view expects.

Simply put, the @model is coming from the controller and it has a type of LearnDotnetMVC.Models.Movie

The Index() method in the controller

```
public async Task<IActionResult> Index()
{
    return View(await _context.Movie.ToListAsync());
}
```

It will generate a list and feed the index.cshtml

@model IEnumerable<LearnDotnetMVC.Models.Movie>

```
@{
    ViewData["Title"] = "Index";
}
```

```
<h1>Index</h1>
```

```
<p>
<a asp-action="Create">Create New</a>
</p>
<table class="table">
<thead>
<tr>
<th>
@Html.DisplayNameFor(model => model.Title)
</th>
<th>
@Html.DisplayNameFor(model => model.ReleaseDate)
</th>
<th>
@Html.DisplayNameFor(model => model.Genre)
</th>
<th>
@Html.DisplayNameFor(model => model.Price)
</th>
<th></th>
</tr>
</thead>
<tbody>
@foreach (var item in Model) {
<tr>
<td>
@Html.DisplayFor(modelItem => item.Title)
</td>
<td>
@Html.DisplayFor(modelItem => item.ReleaseDate)
</td>
<td>
@Html.DisplayFor(modelItem => item.Genre)
```

```

</td>
<td>
@Html.DisplayFor(modelItem => item.Price)
</td>
<td>
<a asp-action="Edit" asp-route-id="@item.Id">Edit</a> |
<a asp-action="Details" asp-route-id="@item.Id">Details</a> |
<a asp-action="Delete" asp-route-id="@item.Id">Delete</a>
</td>
</tr>
}
</tbody>
</table>

```

@Html.DisplayNameFor(model => model.Title), It will display the field name as a label and an input field

@Html.DisplayFor(modelItem => item.Title), it will display only the content

## The Rest

```

using System;
using System.Collections.Generic;
using System.Linq;
using System.Threading.Tasks;
using Microsoft.AspNetCore.Mvc;
using Microsoft.AspNetCore.Mvc.Rendering;
using Microsoft.EntityFrameworkCore;
using LearnDotnetMVC.Data;
using LearnDotnetMVC.Models;

namespace LearnDotnetMVC.Controllers
{
    public class MovieController : Controller
    {
        private readonly LearnDotnetMVCcontext _context;

        public MovieController(LearnDotnetMVCcontext context)
        {
            _context = context;
        }

        // GET: Movie
        public async Task<IActionResult> Index()
        {
            return View(await _context.Movie.ToListAsync());
        }

        // GET: Movie/Details/5
        public async Task<IActionResult> Details(int? id)
        {

```

```

if (id == null)
{
    return NotFound();
}

var movie = await _context.Movie
    .FirstOrDefaultAsync(m => m.Id == id);
if (movie == null)
{
    return NotFound();
}

return View(movie);
}

// GET: Movie/Create
public IActionResult Create()
{
    return View();
}

// POST: Movie/Create
// To protect from overposting attacks, enable the specific properties you want to
// bind to.
// For more details, see http://go.microsoft.com/fwlink/?LinkId=317598.
[HttpPost]
[ValidateAntiForgeryToken]
public async Task<IActionResult> Create([Bind("Id,Title,ReleaseDate,Genre,Price")]
    Movie movie)
{
    if (ModelState.IsValid)
    {
        _context.Add(movie);
        await _context.SaveChangesAsync();
        return RedirectToAction(nameof(Index));
    }
    return View(movie);
}

// GET: Movie/Edit/5
public async Task<IActionResult> Edit(int? id)
{
    if (id == null)
    {
        return NotFound();
    }

    var movie = await _context.Movie.FindAsync(id);
    if (movie == null)
    {

```

```

return NotFound();
}
return View(movie);
}

// POST: Movie/Edit/5
// To protect from overposting attacks, enable the specific properties you want to
bind to.
// For more details, see http://go.microsoft.com/fwlink/?LinkId=317598.
[HttpPost]
[ValidateAntiForgeryToken]
public async Task<IActionResult> Edit(int id,
[Bind("Id,Title,ReleaseDate,Genre,Price")] Movie movie)
{
    if (id != movie.Id)
    {
        return NotFound();
    }

    if (ModelState.IsValid)
    {
        try
        {
            _context.Update(movie);
            await _context.SaveChangesAsync();
        }
        catch (DbUpdateConcurrencyException)
        {
            if (!MovieExists(movie.Id))
            {
                return NotFound();
            }
            else
            {
                throw;
            }
        }
        return RedirectToAction(nameof(Index));
    }
    return View(movie);
}

// GET: Movie/Delete/5
public async Task<IActionResult> Delete(int? id)
{
    if (id == null)
    {
        return NotFound();
    }
}

```



```

var movie = await _context.Movie
.FirstOrDefaultAsync(m => m.Id == id);
if (movie == null)
{
    return NotFound();
}

return View(movie);
}

// POST: Movie/Delete/5
[HttpPost, ActionName("Delete")]
[ValidateAntiForgeryToken]
public async Task<IActionResult> DeleteConfirmed(int id)
{
    var movie = await _context.Movie.FindAsync(id);
    if (movie != null)
    {
        _context.Movie.Remove(movie);
    }

    await _context.SaveChangesAsync();
    return RedirectToAction(nameof(Index));
}

private bool MovieExists(int id)
{
    return _context.Movie.Any(e => e.Id == id);
}
}
}

```

The actions for each is defined

```

<a asp-action="Edit" asp-route-id="@item.Id">Edit</a> |
<a asp-action="Details" asp-route-id="@item.Id">Details</a>
| <a asp-action="Delete" asp-route-id="@item.Id">Delete</a>

```

**I will throw more light on subsequent Lectures from scratch**

### Search

```

public async Task<IActionResult> Index(string searchString)
{
    if (_context.Movie == null)
    {
        return Problem("Entity set 'MvcMovieContext.Movie' is null.");
    }

    var movies = from m in _context.Movie
        select m;

    if (!String.IsNullOrEmpty(searchString))

```

```

    {
        movies = movies.Where(s => s.Title!.Contains(searchString));
    }

    return View(await movies.ToListAsync());
}

```

Add this to the frontend

```

<form asp-controller="Movie" asp-action="Index">

    <p>
    Title: <input type="text" name="SearchString" />
    <input type="submit" value="Filter" />
    </p>

</form>

```

The code will go into the Movie controller and execute the Index method. The index method accept a searchString parameter, it will query the database comparing the title with the search string if there is some match, if yes it will return some data

```

public async Task<IActionResult> Index(string searchString)
{
    if (_context.Movie == null)
    {
        return Problem("Entity set 'MvcMovieContext.Movie' is null.");
    }

    var movies = from m in _context.Movie
    select m;

    if (!String.IsNullOrEmpty(searchString))
    {
        movies = movies.Where(s => s.Title!.Contains(searchString));
    }

    return View(await movies.ToListAsync());
}

```

The movie list will then be pushed into the view to be looped and to be displayed

```

@foreach (var item in Model) {
    <tr>
    <td>
    @Html.DisplayFor(modelItem => item.Title)
    </td>
    <td>
    @Html.DisplayFor(modelItem => item.ReleaseDate)
    </td>
    <td>
    @Html.DisplayFor(modelItem => item.Genre)

```

```

</td>
<td>
@Html.DisplayFor(modelItem => item.Price)
</td>
<td>
<a asp-action="Edit" asp-route-id="@item.Id">Edit</a> |
<a asp-action="Details" asp-route-id="@item.Id">Details</a> |
<a asp-action="Delete" asp-route-id="@item.Id">Delete</a>
</td>
</tr>
}

```

## Validation

In the poco table, we can add some input validation like this using System;

```

using System.ComponentModel.DataAnnotations;
using System.ComponentModel.DataAnnotations.Schema;

```

```

namespace MvcMovie.Models;

```

```

public class Movie
{
    public int Id { get; set; }

    [StringLength(60, MinimumLength = 3)]
    [Required]
    public string? Title { get; set; }

    [Display(Name = "Release Date")]
    [DataType(DataType.Date)]
    public DateTime ReleaseDate { get; set; }

    [Range(1, 100)]
    [DataType(DataType.Currency)]
    [Column(TypeName = "decimal(18, 2)")]
    public decimal Price { get; set; }

    [RegularExpression(@"^[A-Z]+[a-zA-Z\s]*$")]
    [Required]
    [StringLength(30)]
    public string? Genre { get; set; }

    [RegularExpression(@"^[A-Z]+[a-zA-Z0-9""'\s-]*$")]
    [StringLength(5)]
    [Required]
    public string? Rating { get; set; }
}

```

For GET, there is no need to define a HTTP method name, but you need to do that for post

```

// GET: Movies/Delete/5

```

```

public async Task<IActionResult> Delete(int? id)
{
    if (id == null)
    {
        return NotFound();
    }

    var movie = await _context.Movie
        .FirstOrDefaultAsync(m => m.Id == id);
    if (movie == null)
    {
        return NotFound();
    }

    return View(movie);
}

// POST: Movies/Delete/5
[HttpPost, ActionName("Delete")]
[ValidateAntiForgeryToken]
public async Task<IActionResult> DeleteConfirmed(int id)
{
    var movie = await _context.Movie.FindAsync(id);
    if (movie != null)
    {
        _context.Movie.Remove(movie);
    }

    await _context.SaveChangesAsync();
    return RedirectToAction(nameof(Index));
}

```

**Project Work Link**  
**Not Yet**

Spring Boot