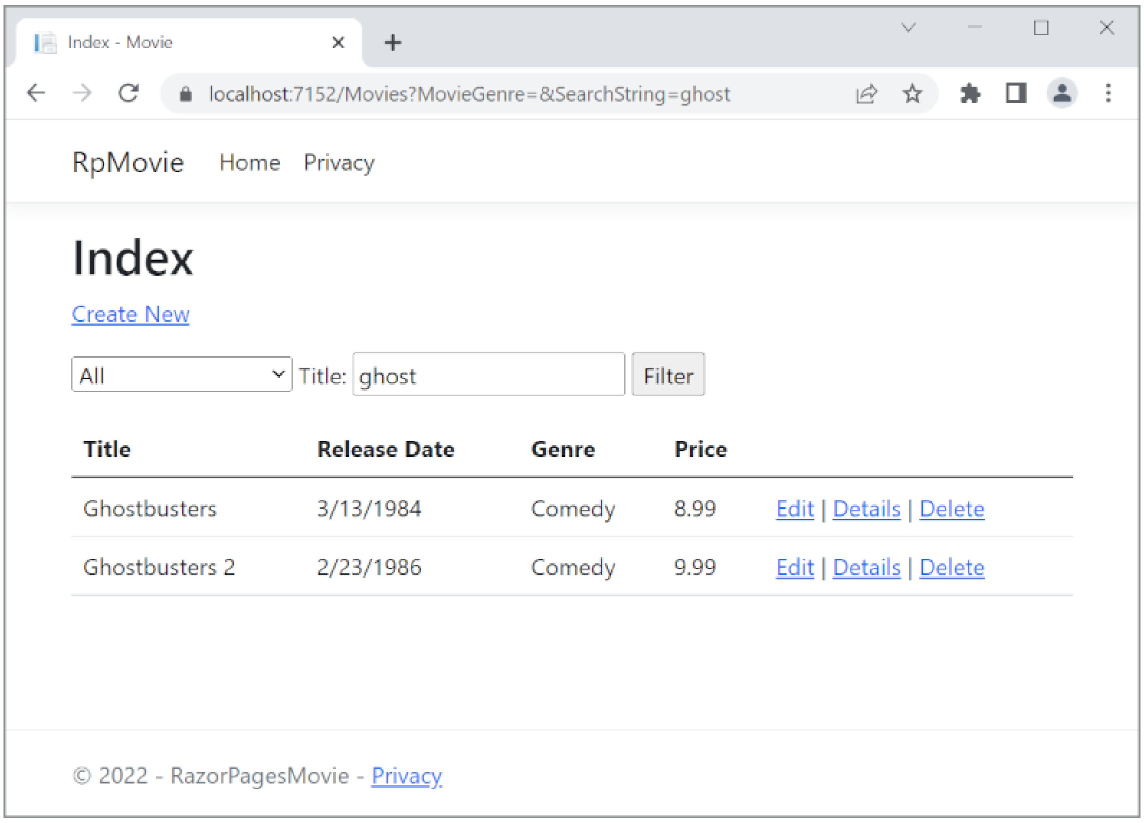
# Lab: Razor Pages web app with ASP.NET Core

This lab explains the basics of building a Razor Pages web app.

This series includes the following tutorials:

1. Create a Razor Pages web app
2. Add a model to a Razor Pages app
3. Scaffold (generate) Razor pages
4. Work with a database
5. Update Razor pages
6. Add search
7. Add a new field
8. Add validation

At the end, you'll have an app that can display and manage a database of movies.



| Title | Release Date | Genre | Price | |
|---|---|---|---|---|
| Ghostbusters | 3/13/1984 | Comedy | 8.99 | Edit \| Details \| Delete |
| Ghostbusters 2 | 2/23/1986 | Comedy | 9.99 | Edit \| Details \| Delete |

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# Exercise: Get started with Razor Pages in ASP.NET Core

## In this exercise

1. Prerequisites
2. Create a Razor Pages web app
3. Run the app
4. Examine the project files
5. Troubleshooting with the completed sample

This is the first exercise of a series that teaches the basics of building an ASP.NET Core Razor Pages web app.

At the end of this lab, you'll have a Razor Pages web app that manages a database of movies.

## Create a Razor Pages web app

1. Open the **Integrated Terminal**.
2. Change to the directory ( `cd` ) that will contain the project.
3. Run the following commands:

~~~~
```
dotnet new webapp -o RazorPagesMovie

cd RazorPagesMovie
```

The `dotnet new` command creates a new Razor Pages project in the
*RazorPagesMovie* folder.

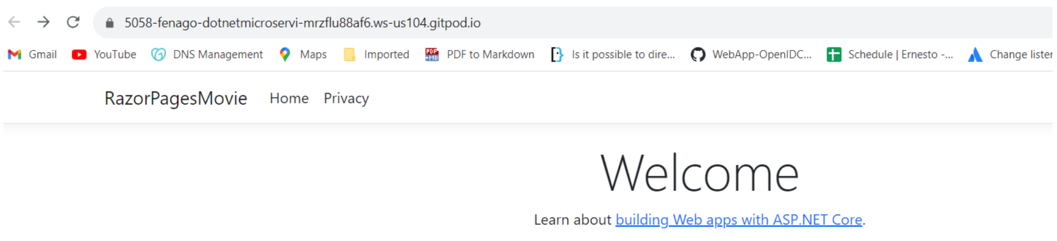
Now, open the *RazorPagesMovie* folder in the visual studio code.
~~~~

## Run the app

- Runs the app, which launches the [Kestrel server].

  ```
  dotnet run
  ```

- Launch the browser at `https://PORT-YOUR_GITPOD_URL.gitpod.io` , which displays the apps UI. `<port>` is the random port that is assigned when the app was created and is set in `Properties/launchSettings.json` .


5058-fenago-dotnetmicroservi-mrzflu88af6.ws-us104.gitpod.io

Welcome

Learn about building Web apps with ASP.NET Core.

## Examine the project files

The following sections contain an overview of the main project folders and files that you'll work with in later labs.

### Pages folder

Contains Razor pages and supporting files. Each Razor page is a pair of files:

- A `.cshtml` file that has HTML markup with C# code using Razor syntax.
- A `.cshtml.cs` file that has C# code that handles page events.

Supporting files have names that begin with an underscore. For example, the `_Layout.cshtml` file configures UI elements common to all pages. `_Layout.cshtml` sets up the navigation menu at the top of the page and the copyright notice at the bottom of the page.

**wwwroot folder**

Contains static assets, like HTML files, JavaScript files, and CSS files.

**`appsettings.json`**

Contains configuration data, like connection strings.

**Program.cs**

Contains the following code:

```
var builder = WebApplication.CreateBuilder(args);

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

var app = builder.Build();

// Configure the HTTP request pipeline.
if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    app.UseHsts();
}

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

app.UseRouting();

app.UseAuthorization();

app.MapRazorPages();

app.Run();
```

The following lines of code in this file create a `WebApplicationBuilder` with preconfigured defaults, add Razor Pages support to the [Dependency Injection (DI) container], and builds the app:

```
var builder = WebApplication.CreateBuilder(args);

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

var app = builder.Build();
```

The developer exception page is enabled by default and provides helpful information on exceptions. Production apps should not be run in development mode because the developer exception page can leak sensitive information.

The following code sets the exception endpoint to `/Error` and enables [HTTP Strict Transport Security Protocol (HSTS)] when the app is ***not*** running in development mode:

```
// Configure the HTTP request pipeline.
if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    app.UseHsts();
}
```

For example, the preceding code runs when the app is in production or test mode.

The following code enables various [Middleware]:

- `app.UseHttpsRedirection();` : Redirects HTTP requests to HTTPS.
- `app.UseStaticFiles();` : Enables static files, such as HTML, CSS, images, and JavaScript to be served.
- `app.UseRouting();` : Adds route matching to the middleware pipeline.
- `app.MapRazorPages();` : Configures endpoint routing for Razor Pages.
- `app.UseAuthorization();` : Authorizes a user to access secure resources. This app doesn't use authorization, therefore this line could be removed.
- `app.Run();` : Runs the app.

# Part 2: add a model to a Razor Pages app in ASP.NET Core

## In this exercise

1. Add a data model
2. Scaffold the movie model
3. Create the initial database schema using EF's migration feature
4. Test the app
5. Troubleshooting with the completed sample
6. Next steps

In this exercise, classes are added for managing movies in a database. The app's model classes use [Entity Framework Core (EF Core)] to work with the database. EF Core is an object-relational mapper (O/RM) that simplifies data access. You write the model classes first, and EF Core creates the database.

The model classes are known as POCO classes (from "Plain-Old CLR Objects") because they don't have a dependency on EF Core. They define the properties of the data that are stored in the database.

## Add a data model

1. Add a folder named `Models`.
2. Add a class to the `Models` folder named `Movie.cs`.

Add the following properties to the `Movie` class:

```
using System.ComponentModel.DataAnnotations;

namespace RazorPagesMovie.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; }
}
```

The `Movie` class contains:

- An `ID` field to provide a primary key for the database.
- A [[DataType]] attribute to specify the type of data in the `ReleaseDate` field. With this attribute:
    - The user is not required to enter time information in the date field.
    - Only the date is displayed, not time information.
- The question mark after `string` indicates that the property is nullable.

## Add NuGet packages and EF tools

Run the following .NET CLI commands one by one:

```
dotnet tool uninstall --global dotnet-aspnet-codegenerator
dotnet tool install --global dotnet-aspnet-codegenerator
dotnet tool uninstall --global dotnet-ef
dotnet tool install --global dotnet-ef
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
```

**Note:** Run commands one by one and ignore not found errors while running uninstall commands.

The preceding commands add:

- The command-line interface (CLI) tools for EF Core
- The aspnet-codegenerator scaffolding tool.
- Design time tools for EF Core
- The EF Core SQLite provider, which installs the EF Core package as a dependency.
- Packages needed for scaffolding: `Microsoft.VisualStudio.Web.CodeGeneration.Design` and `Microsoft.EntityFrameworkCore.SqlServer`.

Build the project to verify there are no compilation errors.

`dotnet build`

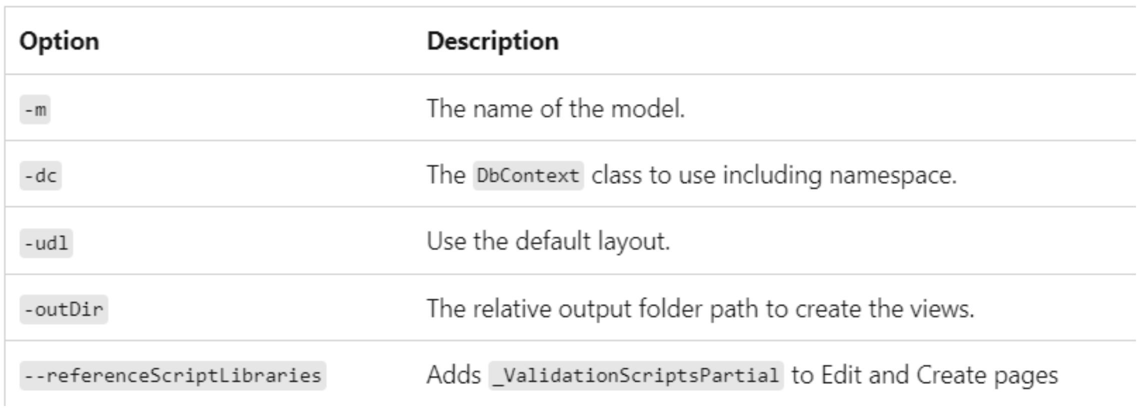
## Scaffold the movie model

In this section, the movie model is scaffolded. That is, the scaffolding tool produces pages for Create, Read, Update, and Delete (CRUD) operations for the movie model.

- Open a command shell to the project directory, which contains the `Program.cs` and `.csproj` files. Run the following command:

  ```
  dotnet aspnet-codegenerator razorpage -m Movie -dc
  RazorPagesMovie.Data.RazorPagesMovieContext -udl -outDir Pages/Movies --
  referenceScriptLibraries --databaseProvider sqlite
  ```

The following table details the ASP.NET Core code generator options.



| Option | Description |
|---|---|
| `-m` | The name of the model. |
| `-dc` | The `DbContext` class to use including namespace. |
| `-udl` | Use the default layout. |
| `-outDir` | The relative output folder path to create the views. |
| `--referenceScriptLibraries` | Adds `_ValidationScriptsPartial` to Edit and Create pages |

Use the `-h` option to get help on the `dotnet aspnet-codegenerator razorpage` command:

```
dotnet aspnet-codegenerator razorpage -h
```

### Use SQLite for development

When SQLite is selected, the template generated code is ready for development. The following code shows how to select the SQLite connection string in development and SQL Server in production.

Add following code in `program.cs`:

```
using Microsoft.EntityFrameworkCore;
using RazorPagesMovie.Data;

var builder = WebApplication.CreateBuilder(args);

builder.Services.AddRazorPages();

if (builder.Environment.IsDevelopment())
{
    builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlite(builder.Configuration.GetConnectionString("RazorPagesMovieContext")));
```

```
}
else
{
    builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlServer(builder.Configuration.GetConnectionString("ProductionMovieContext")

}

var app = builder.Build();

if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    app.UseHsts();
}

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

app.UseRouting();

app.UseAuthorization();

app.MapRazorPages();

app.Run();
```

The preceding code doesn't call `UseDeveloperExceptionPage` in development because `WebApplication` calls `UseDeveloperExceptionPage` in development mode.

### Files created and updated

The scaffold process creates the following files:

- *Pages/Movies*: Create, Delete, Details, Edit, and Index.
- `Data/RazorPagesMovieContext.cs`

The created files are explained in the next tutorial.

The scaffold process adds the following code to the `Program.cs` file:

```
using Microsoft.EntityFrameworkCore;
using RazorPagesMovie.Data;

var builder = WebApplication.CreateBuilder(args);

builder.Services.AddRazorPages();

if (builder.Environment.IsDevelopment())
{
    builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlite(builder.Configuration.GetConnectionString("RazorPagesMovieContext")));
```

```
}
else
{
    builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlServer(builder.Configuration.GetConnectionString("ProductionMovieContext")

}

var app = builder.Build();

if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    app.UseHsts();
}

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

app.UseRouting();

app.UseAuthorization();

app.MapRazorPages();

app.Run();
```

The `Program.cs` changes are explained later In this exercise.

## Create the initial database schema using EF's migration feature

- Right-click the *RazorPagesMovie.csproj* project, and then select **Open in Integrated Terminal**.

  The **Terminal** window opens with the command prompt at the project directory, which contains the Program.cs and .csproj files.

- Run the following .NET CLI commands:

```
```
dotnet ef migrations add InitialCreate
dotnet ef database update
```
```

- The `migrations` command generates code to create the initial database schema. The schema is based on the model specified in `DbContext`. The `InitialCreate` argument is used to name the migrations. Any name can be used, but by convention a name is selected that describes the migration.

- The `update` command runs the `Up` method in migrations that have not been applied. In this case, `update` runs the `Up` method in the `Migrations/<time-stamp>_InitialCreate.cs` file, which creates the database.

**Note**

For SQLite, column type for the `Price` field is set to `TEXT`. This is resolved in a later step.

The following warning is displayed, which is addressed in a later step:

> *No type was specified for the decimal column 'Price' on entity type 'Movie'. This will cause values to be silently truncated if they do not fit in the default precision and scale. Explicitly specify the SQL server column type that can accommodate all the values using 'HasColumnType()'.*

The data context `RazorPagesMovieContext`:

- Derives from [Microsoft.EntityFrameworkCore.DbContext].
- Specifies which entities are included in the data model.
- Coordinates EF Core functionality, such as Create, Read, Update and Delete, for the `Movie` model.

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

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

        public DbSet<RazorPagesMovie.Models.Movie> Movie { get; set; } = default!;
    }
}
```

The preceding code creates a [DbSet<Movie>] property for the entity set. In Entity Framework terminology, an entity set typically corresponds to a database table. An entity corresponds to a row in the table.

The name of the connection string is passed in to the context by calling a method on a [DbContextOptions] object. For local development, the [Configuration system] reads the connection string from the `appsettings.json` file.

## Test the app

1. Run the app and append `/Movies` to the URL in the browser ( `http://localhost:port/movies` ).

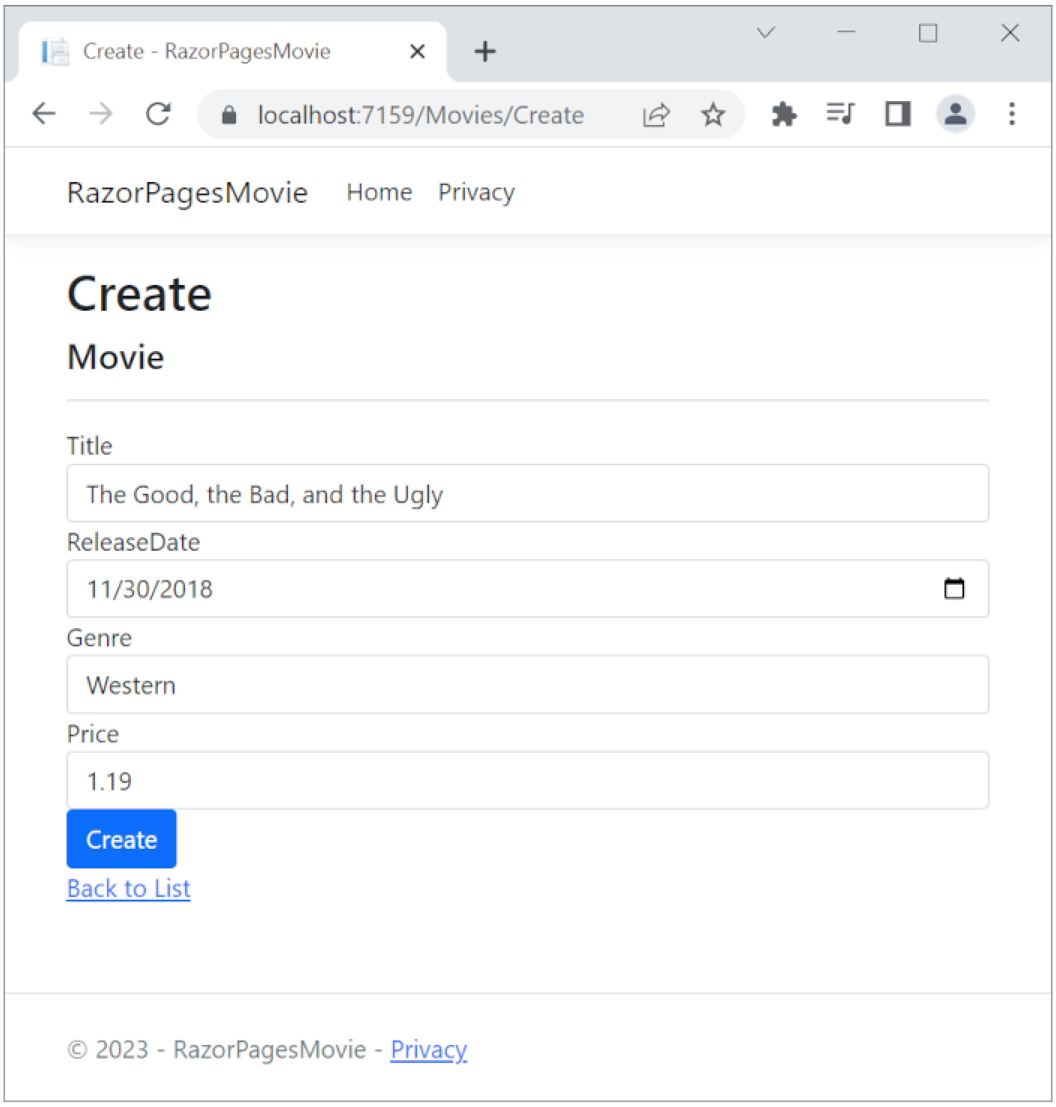
   If you receive the following error:

```
```
SqlException: Cannot open database "RazorPagesMovieContext-GUID" requested by the
login. The login failed.
Login failed for user 'User-name'.
```
```

```
```

You missed the migrations step.
```

2. Test the **Create New** link.



Create

Movie

Title: The Good, the Bad, and the Ugly
ReleaseDate: 11/30/2018
Genre: Western
Price: 1.19

3. Test the **Edit**, **Details**, and **Delete** links.

The next tutorial explains the files created by scaffolding.

### Examine the context registered with dependency injection

ASP.NET Core is built with [dependency injection]. Services, such as the EF Core database context, are registered with dependency injection during application startup. Components that require these services (such as Razor Pages) are provided via constructor parameters. The constructor code that gets a database context instance is shown later in the tutorial.

The scaffolding tool automatically created a database context and registered it with the dependency injection container. The following highlighted code is added to the `Program.cs` file by the scaffolder:
```

```
using Microsoft.EntityFrameworkCore;
using Microsoft.Extensions.DependencyInjection;
using RazorPagesMovie.Data;

var builder = WebApplication.CreateBuilder(args);

// Add services to the container.
builder.Services.AddRazorPages();
builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlite(builder.Configuration.GetConnectionString("RazorPagesMovieContext")
?? throw new InvalidOperationException("Connection string 'RazorPagesMovieContext' not
found.")));

var app = builder.Build();

// Configure the HTTP request pipeline.
if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/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.MapRazorPages();

app.Run();
```

**Part 3, scaffolded Razor Pages in ASP.NET Core**

## In this exercise

1. The Create, Delete, Details, and Edit pages
2. Next steps

This lab examines the Razor Pages created by scaffolding in the previous section.

## The Create, Delete, Details, and Edit pages

Examine the `Pages/Movies/Index.cshtml.cs` Page Model:

```
using Microsoft.AspNetCore.Mvc.RazorPages;
using Microsoft.EntityFrameworkCore;
using RazorPagesMovie.Models;
```

```
namespace RazorPagesMovie.Pages.Movies;

public class IndexModel : PageModel
{
    private readonly RazorPagesMovie.Data.RazorPagesMovieContext _context;

    public IndexModel(RazorPagesMovie.Data.RazorPagesMovieContext context)
    {
        _context = context;
    }

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

    public async Task OnGetAsync()
    {
        if (_context.Movie != null)
        {
            Movie = await _context.Movie.ToListAsync();
        }
    }
}
```

Razor Pages are derived from [PageModel]. By convention, the `PageModel` derived class is named `PageNameModel`. For example, the Index page is named `IndexModel`.

The constructor uses [dependency injection] to add the `RazorPagesMovieContext` to the page:

```
public class IndexModel : PageModel
{
    private readonly RazorPagesMovie.Data.RazorPagesMovieContext _context;

    public IndexModel(RazorPagesMovie.Data.RazorPagesMovieContext context)
    {
        _context = context;
    }
}
```

When a `GET` request is made for the page, the `OnGetAsync` method returns a list of movies to the Razor Page. On a Razor Page, `OnGetAsync` or `OnGet` is called to initialize the state of the page. In this case, `OnGetAsync` gets a list of movies and displays them.

When `OnGet` returns `void` or `OnGetAsync` returns `Task`, no return statement is used. For example, examine the Privacy Page:

```
using Microsoft.AspNetCore.Mvc;
using Microsoft.AspNetCore.Mvc.RazorPages;

namespace RazorPagesMovie.Pages
{
    public class PrivacyModel : PageModel
    {
        private readonly ILogger<PrivacyModel> _logger;

        public PrivacyModel(ILogger<PrivacyModel> logger)
        {
            _logger = logger;
        }

        public void OnGet()
        {
        }
    }
}
```

When the return type is [IActionResult] or `Task<IActionResult>`, a return statement must be provided. For example, the `Pages/Movies/Create.cshtml.cs OnPostAsync` method:

```
public async Task<IActionResult> OnPostAsync()
{
  if (!ModelState.IsValid)
    {
        return Page();
    }

    _context.Movie.Add(Movie);
    await _context.SaveChangesAsync();

    return RedirectToPage("./Index");
}
```

Examine the `Pages/Movies/Index.cshtml` Razor Page:

```
@page
@model RazorPagesMovie.Pages.Movies.IndexModel

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

<h1>Index</h1>

<p>
    <a asp-page="Create">Create New</a>
</p>
<table class="table">
    <thead>
        <tr>
            <th>
                @Html.DisplayNameFor(model => model.Movie[0].Title)
            </th>
            <th>
                @Html.DisplayNameFor(model => model.Movie[0].ReleaseDate)
            </th>
            <th>
                @Html.DisplayNameFor(model => model.Movie[0].Genre)
            </th>
            <th>
                @Html.DisplayNameFor(model => model.Movie[0].Price)
            </th>
            <th></th>
        </tr>
    </thead>
    <tbody>
@foreach (var item in Model.Movie) {
        <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-page="./Edit" asp-route-id="@item.Id">Edit</a> |
                <a asp-page="./Details" asp-route-id="@item.Id">Details</a> |
                <a asp-page="./Delete" asp-route-id="@item.Id">Delete</a>
            </td>
        </tr>
}
    </tbody>
</table>
```

Razor can transition from HTML into C# or into Razor-specific markup. When an `@` symbol is followed by a [Razor reserved keyword], it transitions into Razor-specific markup, otherwise it transitions into C#.

**The [@page] directive**

The `@page` Razor directive makes the file an MVC action, which means that it can handle requests. `@page` must be the first Razor directive on a page. `@page` and `@model` are examples of transitioning into Razor-specific markup.

**The [@model] directive**

```
@page
@model RazorPagesMovie.Pages.Movies.IndexModel
```

The `@model` directive specifies the type of the model passed to the Razor Page. In the preceding example, the `@model` line makes the `PageModel` derived class available to the Razor Page. The model is used in the `@Html.DisplayNameFor` and `@Html.DisplayFor` [HTML Helpers] on the page.

Examine the lambda expression used in the following HTML Helper:

```
@Html.DisplayNameFor(model => model.Movie[0].Title)
```

The [DisplayNameFor] HTML Helper inspects the `Title` property referenced in the lambda expression to determine the display name. The lambda expression is inspected rather than evaluated. That means there is no access violation when `model`, `model.Movie`, or `model.Movie[0]` is `null` or empty. When the lambda expression is evaluated, for example, with `@Html.DisplayFor(modelItem => item.Title)`, the model's property values are evaluated.

## The layout page

Select the menu links **RazorPagesMovie**, **Home**, and **Privacy**. Each page shows the same menu layout. The menu layout is implemented in the `Pages/Shared/_Layout.cshtml` file.

Open and examine the `Pages/Shared/_Layout.cshtml` file.

[Layout] templates allow the HTML container layout to be:

- Specified in one place.
- Applied in multiple pages in the site.

Find the `@RenderBody()` line. `RenderBody` is a placeholder where all the page-specific views show up, *wrapped* in the layout page. For example, select the **Privacy** link and the `Pages/Privacy.cshtml` view is rendered inside the `RenderBody` method.

## ViewData and layout

Consider the following markup from the `Pages/Movies/Index.cshtml` file:

```
@page
@model RazorPagesMovie.Pages.Movies.IndexModel

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

The preceding highlighted markup is an example of Razor transitioning into C#. The `{` and `}` characters enclose a block of C# code.

The `PageModel` base class contains a `ViewData` dictionary property that can be used to pass data to a View. Objects are added to the `ViewData` dictionary using a ***key value*** pattern. In the preceding sample, the `Title` property is added to the `ViewData` dictionary.

The `Title` property is used in the `Pages/Shared/_Layout.cshtml` file. The following markup shows the first few lines of the `_Layout.cshtml` file.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>@ViewData["Title"] - RazorPagesMovie</title>
    <link rel="stylesheet" href="~/lib/bootstrap/dist/css/bootstrap.min.css" />
    <link rel="stylesheet" href="~/css/site.css" asp-append-version="true" />
    <link rel="stylesheet" href="~/RazorPagesMovie.styles.css" asp-append-
version="true" />
```

The line `@*Markup removed for brevity.*@` is a Razor comment. Unlike HTML comments `<!-- -->`, Razor comments are not sent to the client.

## Update the layout

1. Change the `<title>` element in the `Pages/Shared/_Layout.cshtml` file to display **Movie** rather than **RazorPagesMovie**.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>@ViewData["Title"] - Movie</title>
```

2. Find the following anchor element in the `Pages/Shared/_Layout.cshtml` file.

```
<a class="navbar-brand" asp-area="" asp-page="/Index">RazorPagesMovie</a>
```

3. Replace the preceding element with the following markup:

```
<a class="navbar-brand" asp-page="/Movies/Index">RpMovie</a>
```

   The preceding anchor element is a [Tag Helper]. In this case, it's the [Anchor Tag Helper]. The `asp-page="/Movies/Index"` Tag Helper attribute and value creates a link to the `/Movies/Index` Razor Page. The `asp-area` attribute value is empty, so the area isn't used in the link. See [Areas] for more information.

4. Save the changes and test the app by selecting the **RpMovie** link. See the `Layout.cshtml` file if you have any problems:

```
    <!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>@ViewData["Title"] - Movie</title>
    <link rel="stylesheet" href="~/lib/bootstrap/dist/css/bootstrap.min.css" />
    <link rel="stylesheet" href="~/css/site.css" asp-append-version="true" />
    <link rel="stylesheet" href="~/RazorPagesMovie.styles.css" asp-append-
version="true" />
</head>
<body>
    <header>
        <nav class="navbar navbar-expand-sm navbar-toggleable-sm navbar-light
bg-white border-bottom box-shadow mb-3">
            <div class="container">
                <a class="navbar-brand" asp-page="/Movies/Index">RpMovie</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-
page="/Index">Home</a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
page="/Privacy">Privacy</a>
                        </li>
                    </ul>
                </div>
            </div>
        </nav>
    </header>
    <div class="container">
        <main role="main" class="pb-3">
            @RenderBody()
        </main>
    </div>

    <footer class="border-top footer text-muted">
        <div class="container">
            &copy; 2023 - RazorPagesMovie - <a asp-area="" asp-
page="/Privacy">Privacy</a>
        </div>
    </footer>

    <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>

    @await RenderSectionAsync("Scripts", required: false)
</body>
</html>
```

5. Test the **Home**, **RpMovie**, **Create**, **Edit**, and **Delete** links. Each page sets the title, which you can see in the browser tab. When you bookmark a page, the title is used for the bookmark.

The `Layout` property is set in the `Pages/_ViewStart.cshtml` file:

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

The preceding markup sets the layout file to `Pages/Shared/_Layout.cshtml` for all Razor files under the *Pages* folder.

## The Create page model

Examine the `Pages/Movies/Create.cshtml.cs` page model:

```
using Microsoft.AspNetCore.Mvc;
using Microsoft.AspNetCore.Mvc.RazorPages;
using RazorPagesMovie.Models;

namespace RazorPagesMovie.Pages.Movies
{
    public class CreateModel : PageModel
    {
        private readonly RazorPagesMovie.Data.RazorPagesMovieContext _context;

        public CreateModel(RazorPagesMovie.Data.RazorPagesMovieContext context)
        {
            _context = context;
        }

        public IActionResult OnGet()
        {
            return Page();
        }

        [BindProperty]
        public Movie Movie { get; set; } = default!;


        // To protect from overposting attacks, see https://aka.ms/RazorPagesCRUD
        public async Task<IActionResult> OnPostAsync()
        {
          if (!ModelState.IsValid || _context.Movie == null || Movie == null)
            {
                return Page();
            }

            _context.Movie.Add(Movie);
            await _context.SaveChangesAsync();

            return RedirectToPage("./Index");
        }
    }
}
```

The `OnGet` method initializes any state needed for the page. The Create page doesn't have any state to initialize, so `Page` is returned. Later in the tutorial, an example of `OnGet` initializing state is shown. The `Page` method creates a `PageResult` object that renders the `Create.cshtml` page.

The `Movie` property uses the [[BindProperty]] attribute to opt-in to [model binding]. When the Create form posts the form values, the ASP.NET Core runtime binds the posted values to the `Movie` model.

The `OnPostAsync` method is run when the page posts form data:

```
public async Task<IActionResult> OnPostAsync()
{
  if (!ModelState.IsValid)
```

```
    {
        return Page();
    }

    _context.Movie.Add(Movie);
    await _context.SaveChangesAsync();

    return RedirectToPage("./Index");
}
```

If there are any model errors, the form is redisplayed, along with any form data posted. Most model errors can be caught on the client-side before the form is posted. An example of a model error is posting a value for the date field that cannot be converted to a date. Client-side validation and model validation are discussed later in the tutorial.

If there are no model errors:

- The data is saved.
- The browser is redirected to the Index page.

### The Create Razor Page

Examine the `Pages/Movies/Create.cshtml` Razor Page file:

```
@page
@model RazorPagesMovie.Pages.Movies.CreateModel

@{
    ViewData["Title"] = "Create";
}

<h1>Create</h1>

<h4>Movie</h4>
<hr />
<div class="row">
    <div class="col-md-4">
        <form method="post">
            <div asp-validation-summary="ModelOnly" class="text-danger"></div>
            <div class="form-group">
                <label asp-for="Movie.Title" class="control-label"></label>
                <input asp-for="Movie.Title" class="form-control" />
                <span asp-validation-for="Movie.Title" class="text-danger"></span>
            </div>
            <div class="form-group">
                <label asp-for="Movie.ReleaseDate" class="control-label"></label>
                <input asp-for="Movie.ReleaseDate" class="form-control" />
                <span asp-validation-for="Movie.ReleaseDate" class="text-danger">
</span>
            </div>
            <div class="form-group">
                <label asp-for="Movie.Genre" class="control-label"></label>
                <input asp-for="Movie.Genre" class="form-control" />
                <span asp-validation-for="Movie.Genre" class="text-danger"></span>
            </div>
            <div class="form-group">
                <label asp-for="Movie.Price" class="control-label"></label>
                <input asp-for="Movie.Price" class="form-control" />
                <span asp-validation-for="Movie.Price" class="text-danger"></span>
            </div>
            <div class="form-group">
                <input type="submit" value="Create" class="btn btn-primary" />
            </div>
        </form>
    </div>
</div>

<div>
    <a asp-page="Index">Back to List</a>
</div>

@section Scripts {
    @{await Html.RenderPartialAsync("_ValidationScriptsPartial");}
}
```

The following Tag Helpers are shown in the preceding markup:

- `<form method="post">`
- `<div asp-validation-summary="ModelOnly" class="text-danger"></div>`
- `<label asp-for="Movie.Title" class="control-label"></label>`
- `<input asp-for="Movie.Title" class="form-control" />`
- `<span asp-validation-for="Movie.Title" class="text-danger"></span>`

The scaffolding engine creates Razor markup for each field in the model, except the ID, similar to the following:

```
<div asp-validation-summary="ModelOnly" class="text-danger"></div>
<div class="form-group">
    <label asp-for="Movie.Title" class="control-label"></label>
    <input asp-for="Movie.Title" class="form-control" />
    <span asp-validation-for="Movie.Title" class="text-danger"></span>
</div>
```

The [Label Tag Helper] ( `<label asp-for="Movie.Title" class="control-label"></label>` ) generates the label caption and `[for]` attribute for the `Title` property.

The [Input Tag Helper] ( `<input asp-for="Movie.Title" class="form-control">` ) uses the [DataAnnotations] attributes and produces HTML attributes needed for jQuery Validation on the client-side.

# Part 4 on Razor Pages

## In this exercise

1. LocalDB
2. Seed the database

The `RazorPagesMovieContext` object handles the task of connecting to the database and mapping `Movie` objects to database records. The database context is registered with the [Dependency Injection] container in

`Program.cs`:

```
using Microsoft.EntityFrameworkCore;
using Microsoft.Extensions.DependencyInjection;
using RazorPagesMovie.Data;
var builder = WebApplication.CreateBuilder(args);

// Add services to the container.
builder.Services.AddRazorPages();
builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlite(builder.Configuration.GetConnectionString("RazorPagesMovieContext")
?? throw new InvalidOperationException("Connection string 'RazorPagesMovieContext' not
found.")));

var app = builder.Build();
```

The ASP.NET Core [Configuration] system reads the `ConnectionString` key. For local development, configuration gets the connection string from the `appsettings.json` file.

```
{
  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft.AspNetCore": "Warning"
    }
  },
  "AllowedHosts": "*",
  "ConnectionStrings": {
    "RazorPagesMovieContext": "Data Source=FILENAME"
  }
}
```

When the app is deployed to a test or production server, an environment variable can be used to set the connection string to a test or production database server. For more information, see [Configuration].

## SQLite

> *SQLite is a self-contained, high-reliability, embedded, full-featured, public-domain, SQL database engine. SQLite is the most used database engine in the world.*

## Seed the database

Create a new class named `SeedData.cs` in the *Models* folder with the following code:

```
using Microsoft.EntityFrameworkCore;
using RazorPagesMovie.Data;

namespace RazorPagesMovie.Models;

public static class SeedData
{
    public static void Initialize(IServiceProvider serviceProvider)
    {
        using (var context = new RazorPagesMovieContext(
            serviceProvider.GetRequiredService<
                DbContextOptions<RazorPagesMovieContext>>()))
        {
            if (context == null || context.Movie == null)
            {
                throw new ArgumentNullException("Null RazorPagesMovieContext");
            }

            // Look for any movies.
            if (context.Movie.Any())
            {
                return;   // DB has been seeded
            }

            context.Movie.AddRange(
                new Movie
                {
                    Title = "When Harry Met Sally",
                    ReleaseDate = DateTime.Parse("1989-2-12"),
                    Genre = "Romantic Comedy",
                    Price = 7.99M
                },

                new Movie
                {
                    Title = "Ghostbusters ",
                    ReleaseDate = DateTime.Parse("1984-3-13"),
                    Genre = "Comedy",
                    Price = 8.99M
                },

                new Movie
                {
                    Title = "Ghostbusters 2",
                    ReleaseDate = DateTime.Parse("1986-2-23"),
                    Genre = "Comedy",
                    Price = 9.99M
                },

                new Movie
                {
                    Title = "Rio Bravo",
                    ReleaseDate = DateTime.Parse("1959-4-15"),
                    Genre = "Western",
                    Price = 3.99M
                }
            );
            context.SaveChanges();
        }
    }
}
```

If there are any movies in the database, the seed initializer returns and no movies are added.

```
if (context.Movie.Any())
{
    return;
}
```

### Add the seed initializer

Update the `Program.cs` with the following highlighted code:

```
using Microsoft.EntityFrameworkCore;
using RazorPagesMovie.Data;
using RazorPagesMovie.Models;

var builder = WebApplication.CreateBuilder(args);

builder.Services.AddRazorPages();
builder.Services.AddDbContext<RazorPagesMovieContext>(options =>

options.UseSqlite(builder.Configuration.GetConnectionString("RazorPagesMovieContext")
?? throw new InvalidOperationException("Connection string 'RazorPagesMovieContext' not
found.")));

var app = builder.Build();

using (var scope = app.Services.CreateScope())
{
    var services = scope.ServiceProvider;

    SeedData.Initialize(services);
}

if (!app.Environment.IsDevelopment())
{
    app.UseExceptionHandler("/Error");
    app.UseHsts();
}

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

app.UseRouting();

app.UseAuthorization();

app.MapRazorPages();

app.Run();
```

In the previous code, `Program.cs` has been modified to do the following:

- Get a database context instance from the dependency injection (DI) container.
- Call the `seedData.Initialize` method, passing to it the database context instance.
- Dispose the context when the seed method completes. The [using statement] ensures the context is disposed.

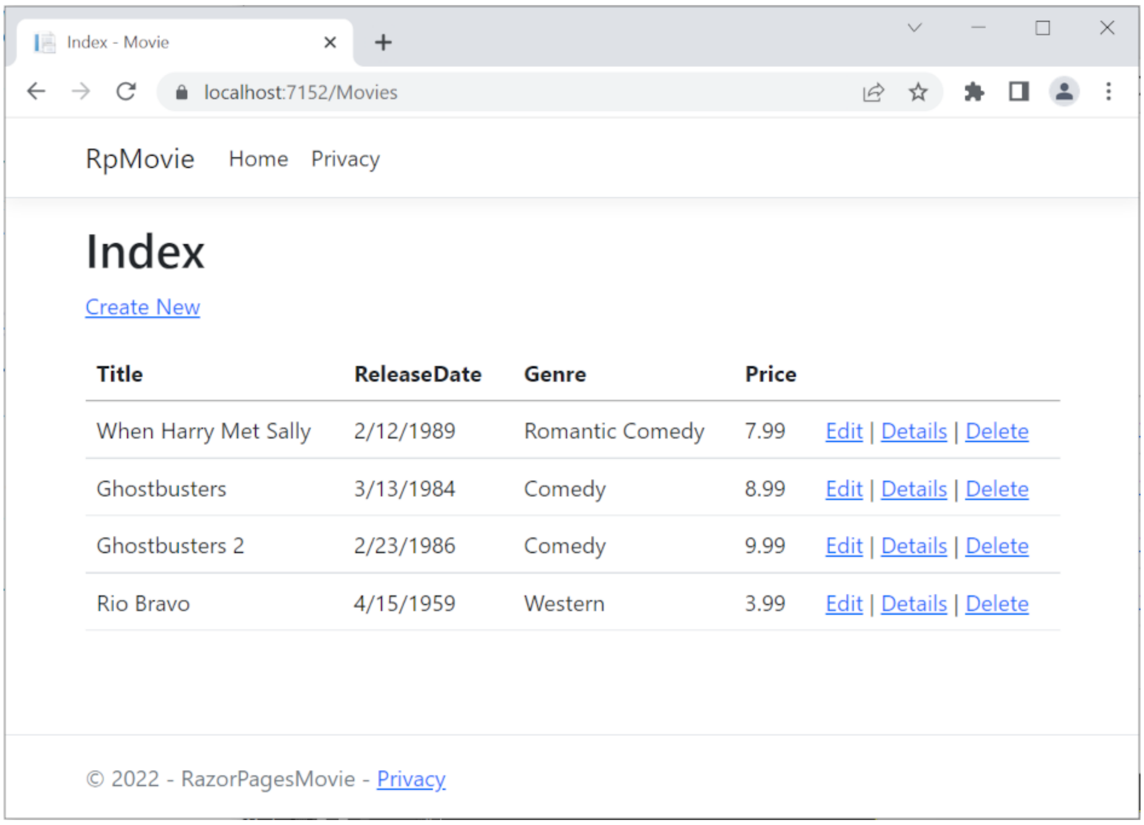
The following exception occurs when `Update-Database` has not been run:

> *`SqlException: Cannot open database "RazorPagesMovieContext-" requested by the login.`*
> *`The login failed.`* *`Login failed for user 'user name'.`*

### Test the app

Delete all the records in the database so the seed method will run. Stop and start the app to seed the database.

The app shows the seeded data:



Index

Create New

| Title | ReleaseDate | Genre | Price | |
|---|---|---|---|---|
| When Harry Met Sally | 2/12/1989 | Romantic Comedy | 7.99 | Edit \| Details \| Delete |
| Ghostbusters | 3/13/1984 | Comedy | 8.99 | Edit \| Details \| Delete |
| Ghostbusters 2 | 2/23/1986 | Comedy | 9.99 | Edit \| Details \| Delete |
| Rio Bravo | 4/15/1959 | Western | 3.99 | Edit \| Details \| Delete |

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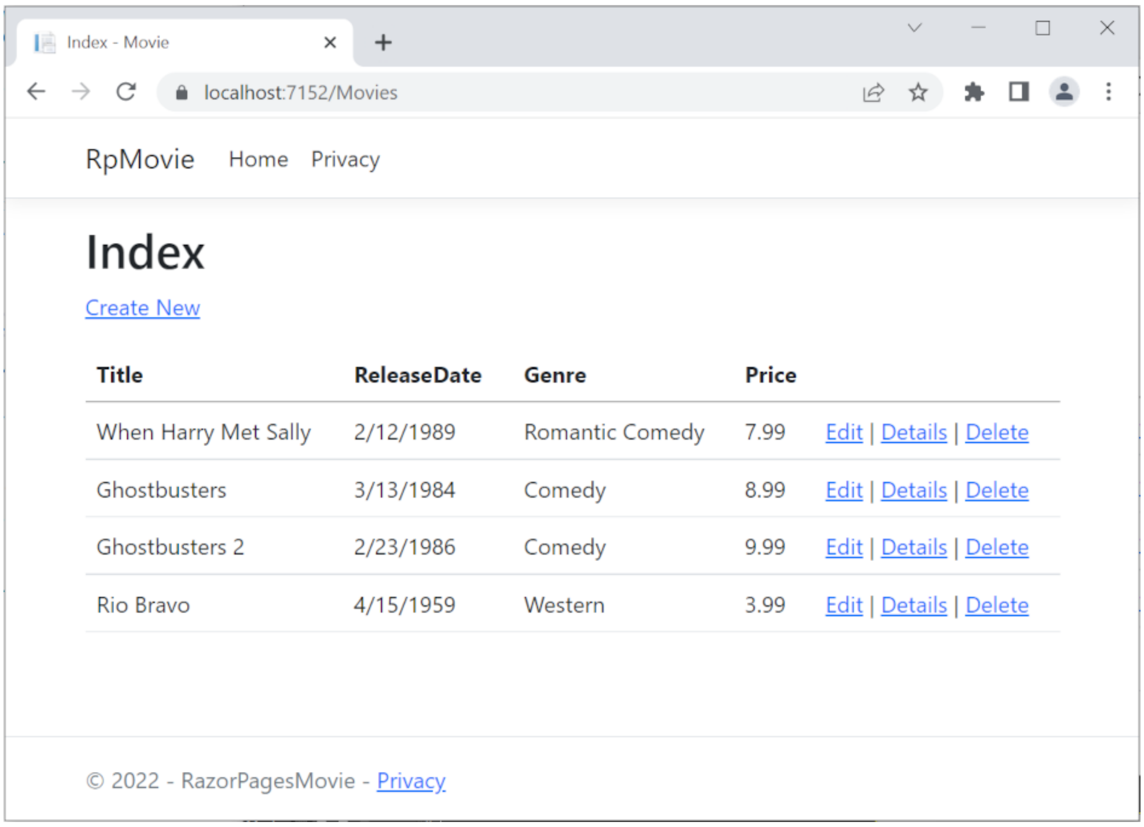
# Part 5, update the generated pages in an ASP.NET Core app

## In this exercise

1. Update the model
2. Next steps

The scaffolded movie app has a good start, but the presentation isn't ideal. **ReleaseDate** should be two words, **Release Date**.



Index

Create New

| Title | ReleaseDate | Genre | Price | |
|---|---|---|---|---|
| When Harry Met Sally | 2/12/1989 | Romantic Comedy | 7.99 | Edit \| Details \| Delete |
| Ghostbusters | 3/13/1984 | Comedy | 8.99 | Edit \| Details \| Delete |
| Ghostbusters 2 | 2/23/1986 | Comedy | 9.99 | Edit \| Details \| Delete |
| Rio Bravo | 4/15/1959 | Western | 3.99 | Edit \| Details \| Delete |

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## Update the model

Update `Models/Movie.cs` with the following highlighted code:

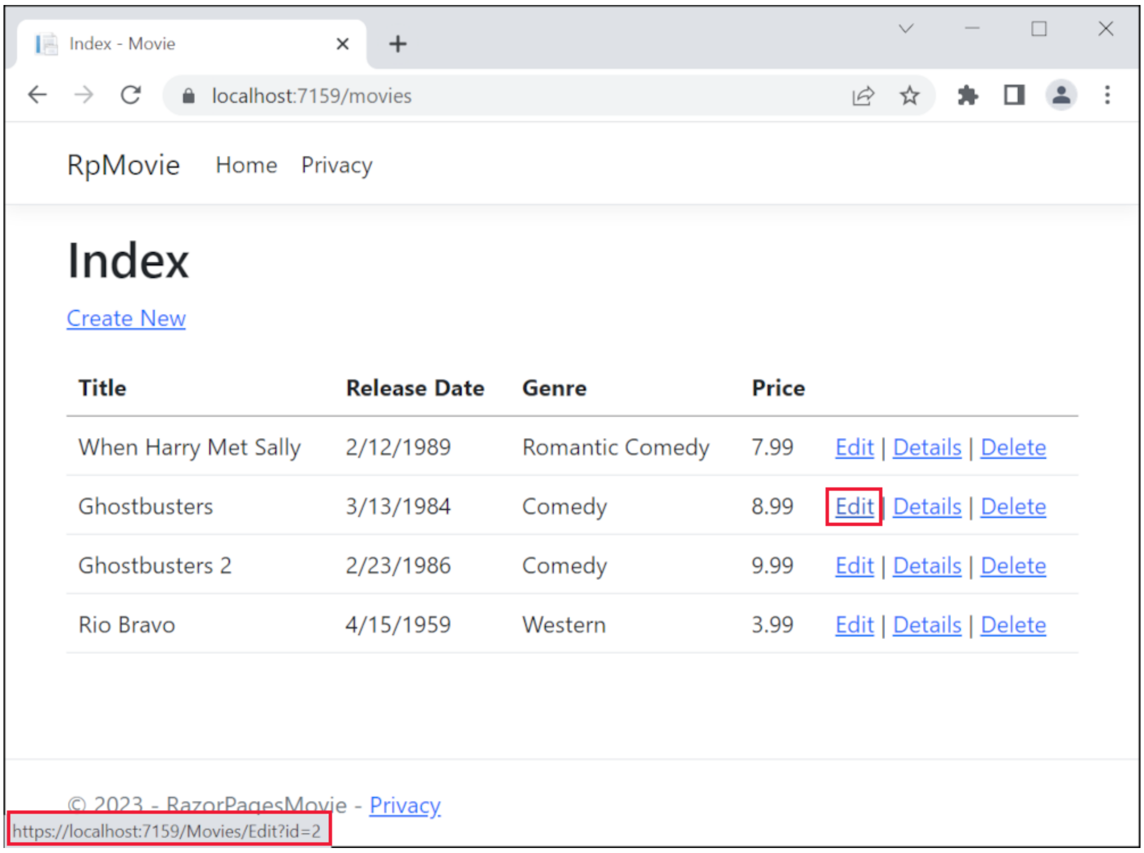
```
using System.ComponentModel.DataAnnotations;
using System.ComponentModel.DataAnnotations.Schema;

namespace RazorPagesMovie.Models;

public class Movie
{
    public int Id { get; set; }
    public string Title { get; set; } = string.Empty;

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

    [Column(TypeName = "decimal(18, 2)")]
    public decimal Price { get; set; }
}
```

In the previous code:

- The `[Column(TypeName = "decimal(18, 2)")]` data annotation enables Entity Framework Core to correctly map `Price` to currency in the database.
- The [[Display]] attribute specifies the display name of a field. In the preceding code, `Release Date` instead of `ReleaseDate`.
- The [[DataType]] attribute specifies the type of the data ( `Date` ). The time information stored in the field isn't displayed.

[DataAnnotations] is covered in the next tutorial.

Browse to *Pages/Movies* and hover over an **Edit** link to see the target URL.



# Index

Create New

| Title | Release Date | Genre | Price | |
|---|---|---|---|---|
| When Harry Met Sally | 2/12/1989 | Romantic Comedy | 7.99 | Edit \| Details \| Delete |
| Ghostbusters | 3/13/1984 | Comedy | 8.99 | Edit \| Details \| Delete |
| Ghostbusters 2 | 2/23/1986 | Comedy | 9.99 | Edit \| Details \| Delete |
| Rio Bravo | 4/15/1959 | Western | 3.99 | Edit \| Details \| Delete |

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https://localhost:7159/Movies/Edit?id=2

The **Edit**, **Details**, and **Delete** links are generated by the [Anchor Tag Helper] in the `Pages/Movies/Index.cshtml` file.

```
@foreach (var item in Model.Movie) {
        <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-page="./Edit" asp-route-id="@item.ID">Edit</a> |
                <a asp-page="./Details" asp-route-id="@item.ID">Details</a> |
                <a asp-page="./Delete" asp-route-id="@item.ID">Delete</a>
            </td>
        </tr>
}
    </tbody>
</table>
```

`Tag Helpers` enable server-side code to participate in creating and rendering HTML elements in Razor files.

In the preceding code, the [Anchor Tag Helper] dynamically generates the HTML `href` attribute value from the Razor Page (the route is relative), the `asp-page`, and the route identifier ( `asp-route-id` ).

Use **View Source / Inspect** from a browser to examine the generated markup. A portion of the generated HTML is shown below:

```
<td>
  <a href="/Movies/Edit?id=1">Edit</a> |
  <a href="/Movies/Details?id=1">Details</a> |
  <a href="/Movies/Delete?id=1">Delete</a>
</td>
```

The dynamically generated links pass the movie ID with a `query string`. For example, the `?id=1` in `https://PORT-YOUR_GITPOD_URL.gitpod.io/Movies/Details?id=1`.

In the next lab, we will look into ASP.NET Core MVC web development.