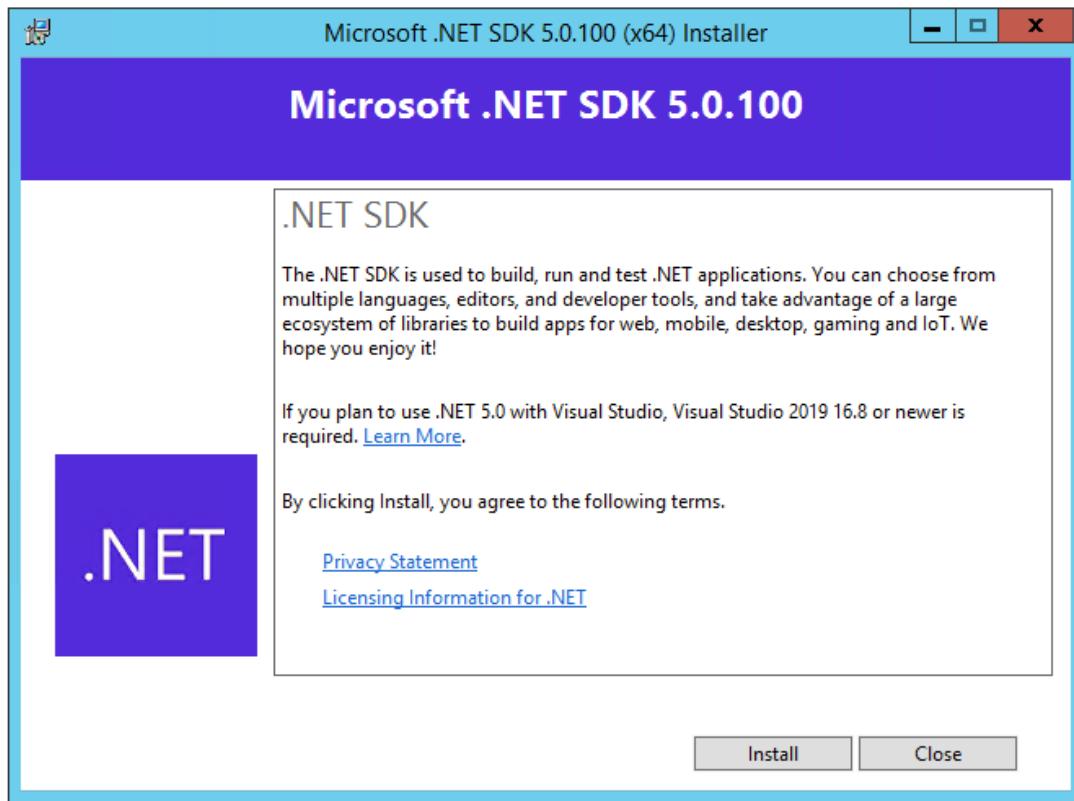


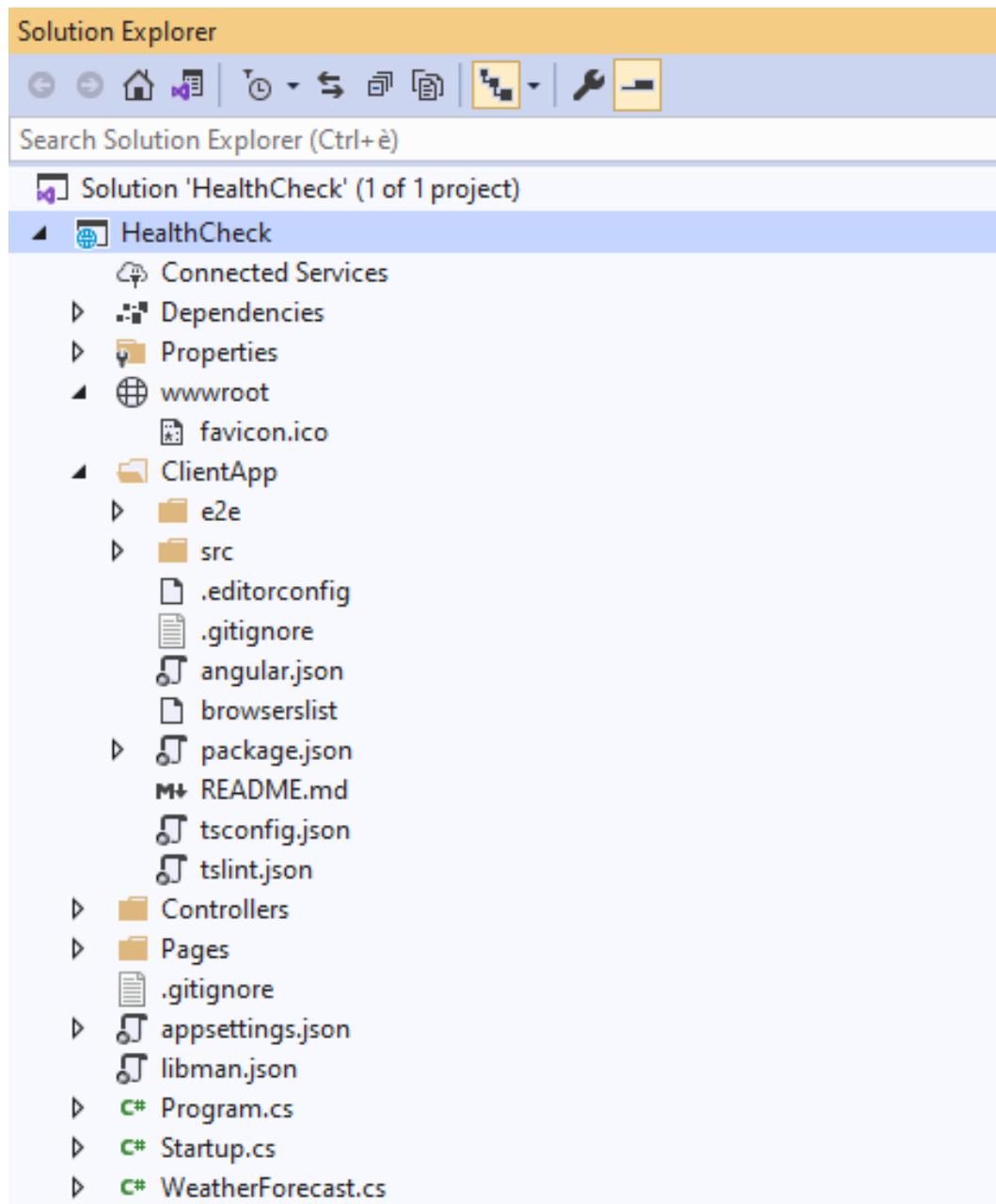
# Chapter 1: Getting Ready

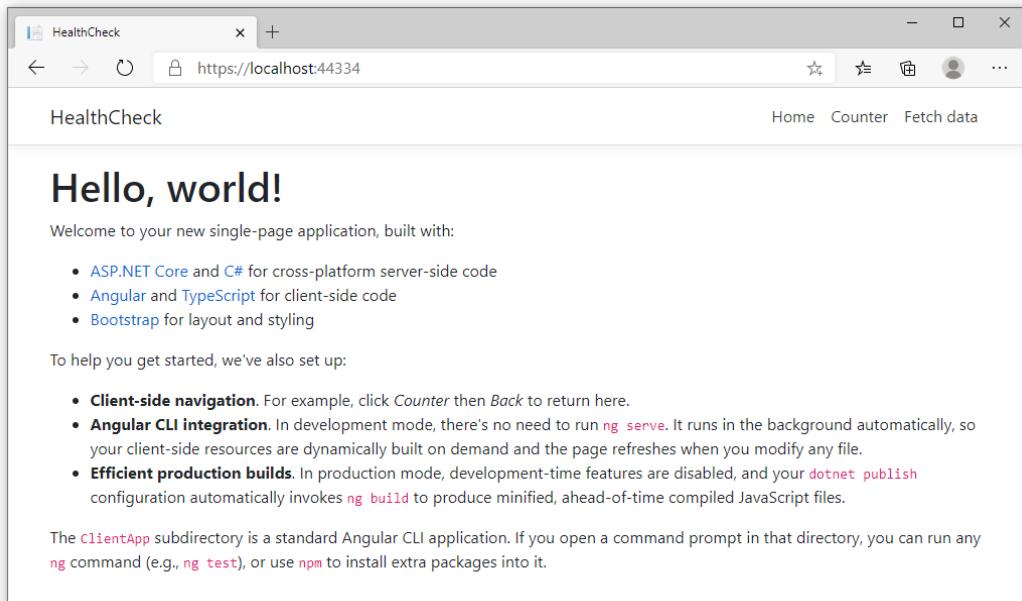
## .NET Schedule



- .NET Core 3.0 release in September
- .NET Core 3.1 = Long Term Support (LTS)
- .NET 5.0 release in November 2020
- Major releases every year, LTS for even-numbered releases
- Predictable schedule, minor releases if needed







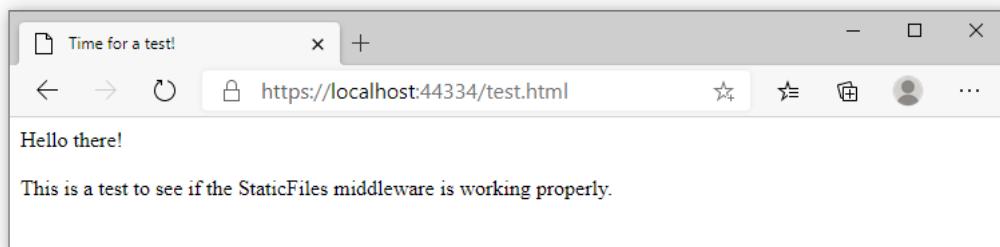
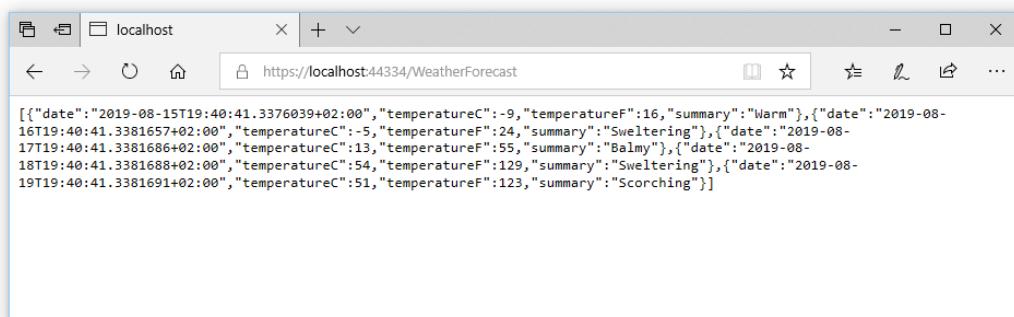
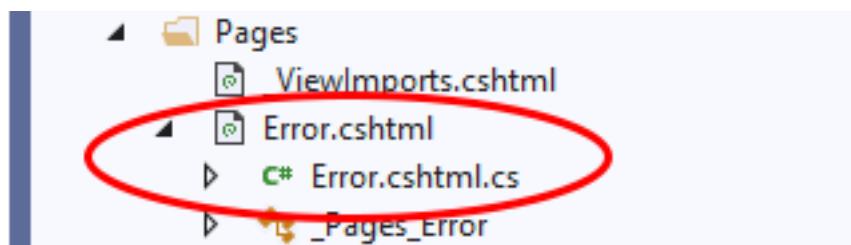
# Hello, world!

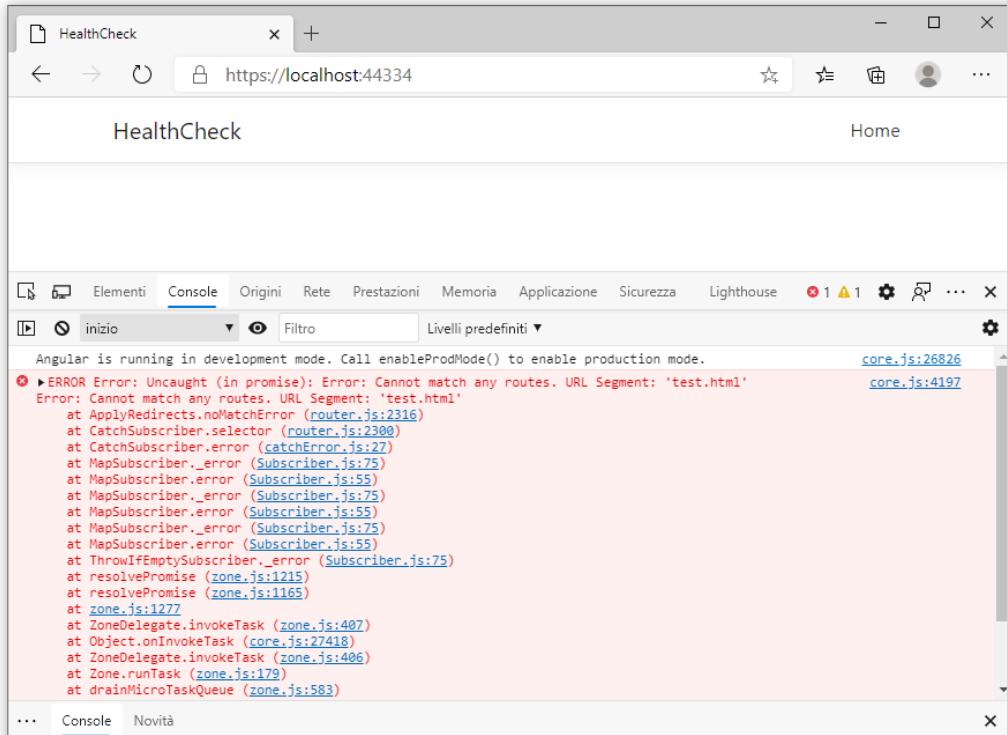
Welcome to your new single-page application, built with:

- [ASP.NET Core](#) and [C#](#) for cross-platform server-side code
  - [Angular](#) and [TypeScript](#) for client-side code
  - [Bootstrap](#) for layout and styling
- To help you get started, we've also set up:
- **Client-side navigation.** For example, click [Counter](#) then [Back](#) to return here.
  - **Angular CLI integration.** In development mode, there's no need to run `ng serve`. It runs in the background automatically, so your client-side resources are dynamically built on demand and the page refreshes when you modify any file.
  - **Efficient production builds.** In production mode, development-time features are disabled, and your `dotnet publish` configuration automatically invokes `ng build` to produce minified, ahead-of-time compiled JavaScript files.

The `ClientApp` subdirectory is a standard Angular CLI application. If you open a command prompt in that directory, you can run any `ng` command (e.g., `ng test`), or use `npm` to install extra packages into it.

## Chapter 2: Looking Around





The screenshot shows the Visual Studio Code editor with the file `app.server.module.ts` open. The code defines an Angular server module:

```

import { NgModule } from '@angular/core';
import { ServerModule } from '@angular/platform-server';
import { ModuleMapLoaderModule } from '@nguniversal/module-map-ngfactory-loader'; (app.server.module.ts)
import { AppComponent } from './app.component';
import { AppModule } from './app.module';

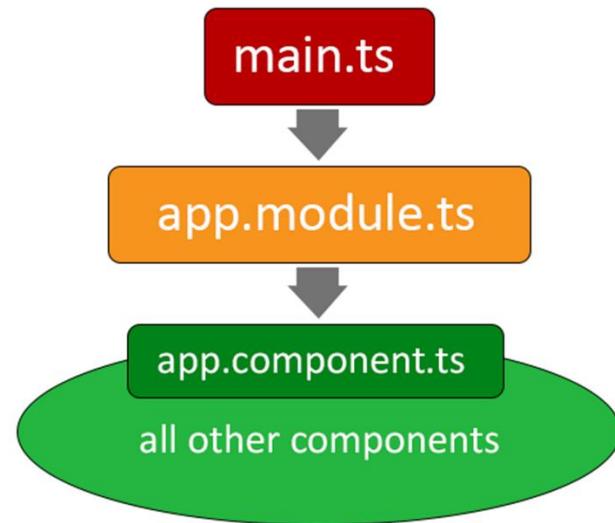
@NgModule({
  imports: [AppModule, ServerModule, ModuleMapLoaderModule],
  bootstrap: [AppComponent]
})
export class AppServerModule { }

```

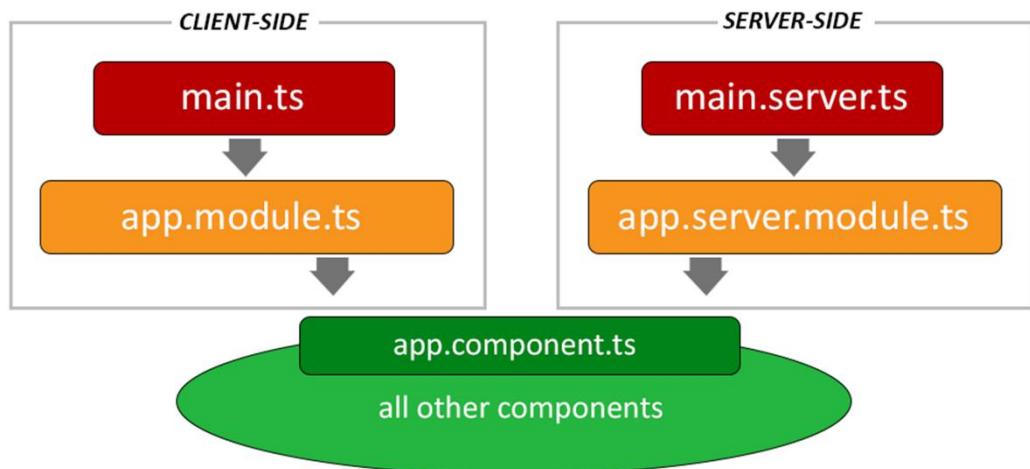
The line `(app.server.module.ts)` is highlighted in red, indicating a TypeScript compilation error. The error list at the bottom shows two errors:

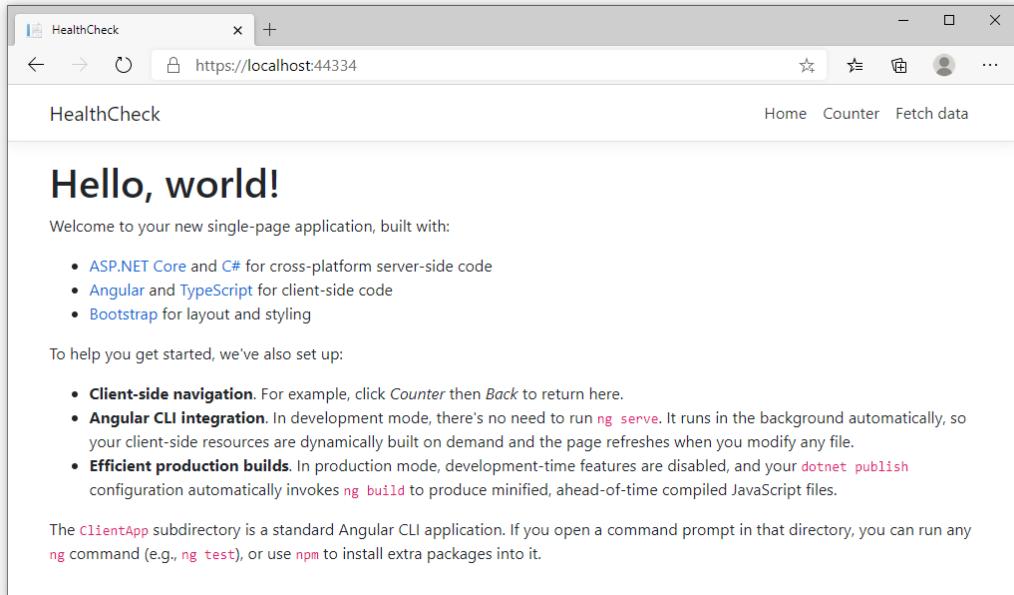
- TS2307 (TS) Cannot find module '@nguniversal/module-map-ngfactory-loader' or its corresponding type declarations. C:\Projects\Net5... app.server.module.ts
- TS2304 (TS) Cannot find name 'app'. C:\Projects\Net5... app.server.module.ts

## Angular Initialization Cycle

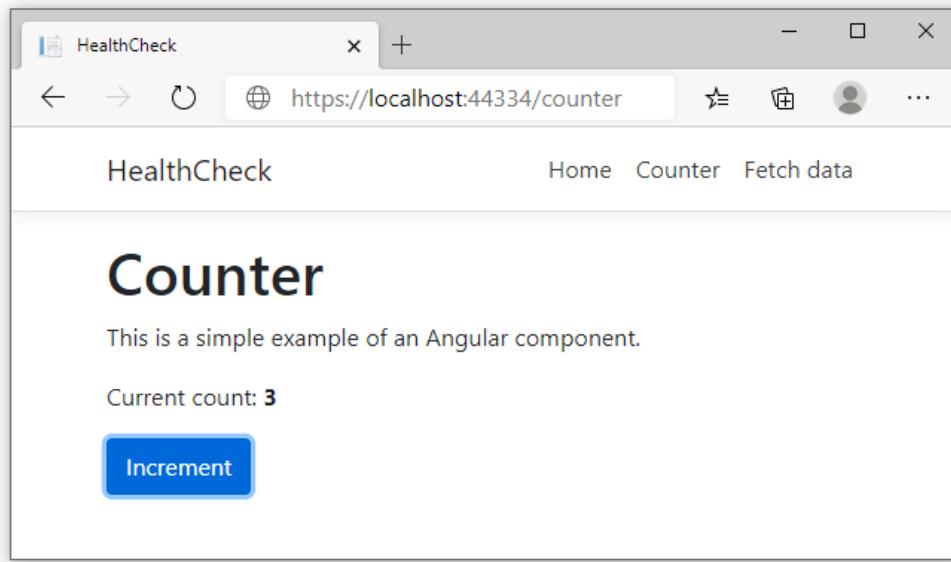


## Angular Universal Initialization Cycle

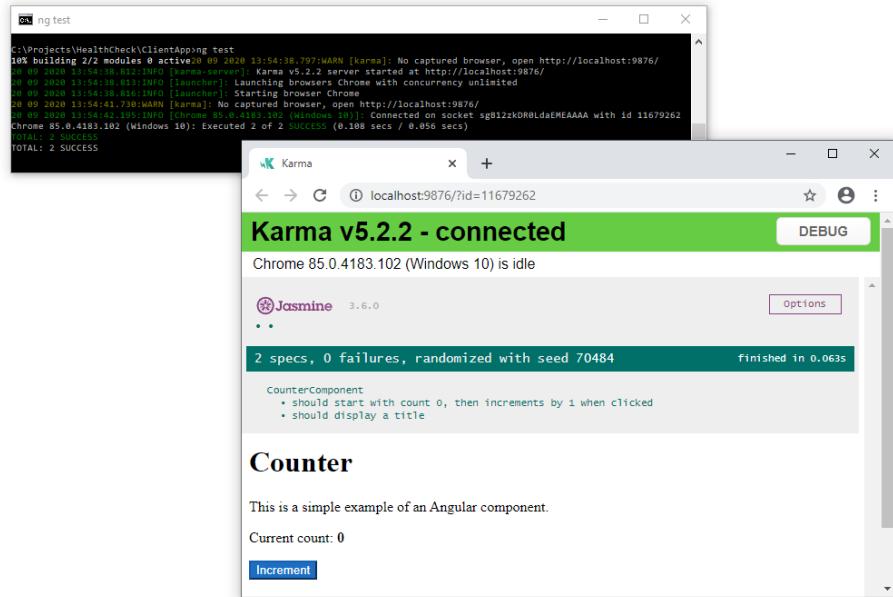




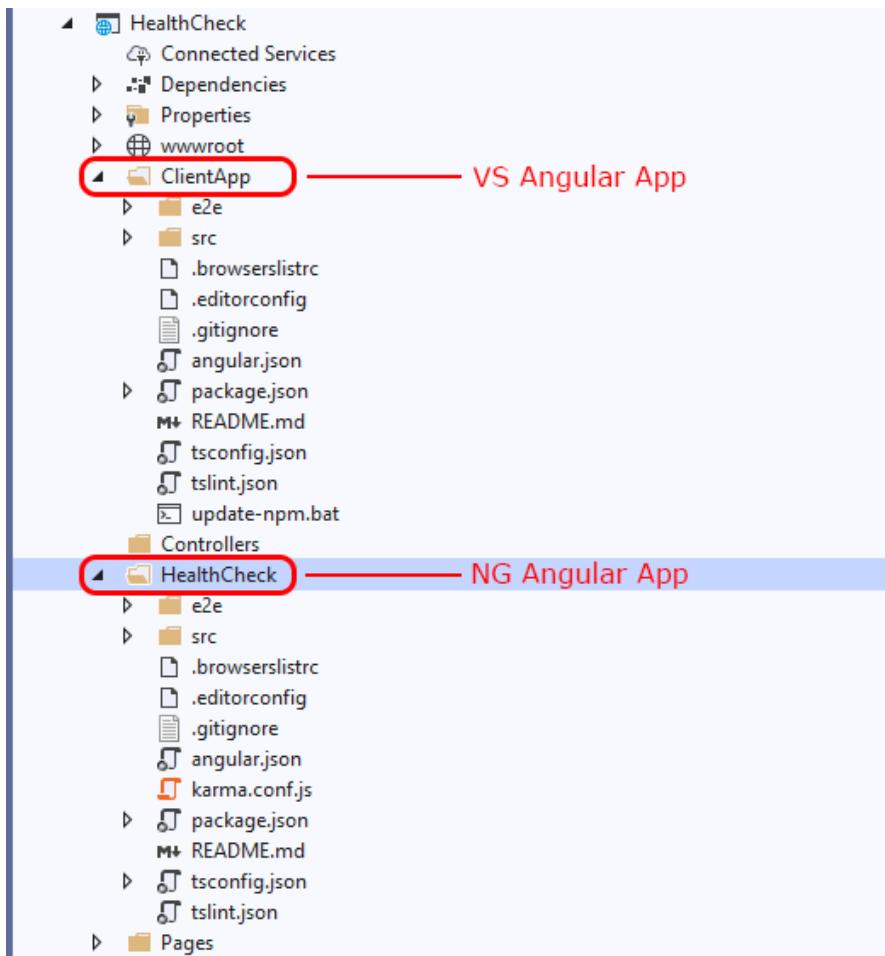
HealthCheck      Home    Counter    Fetch data

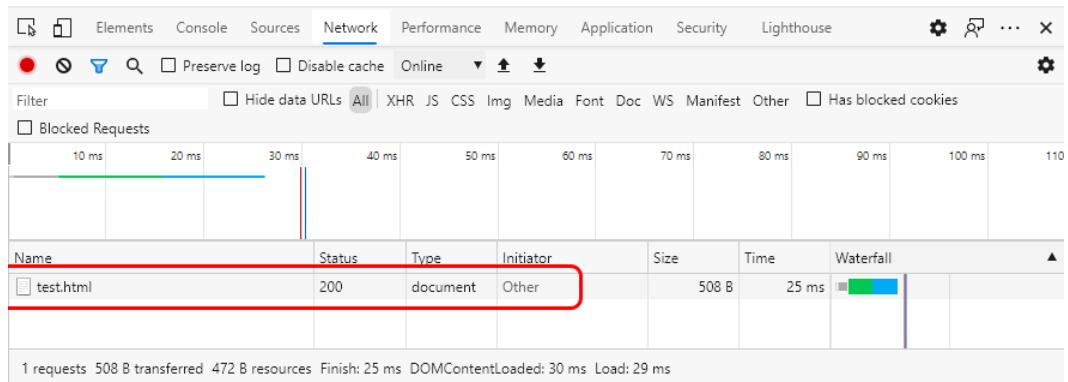
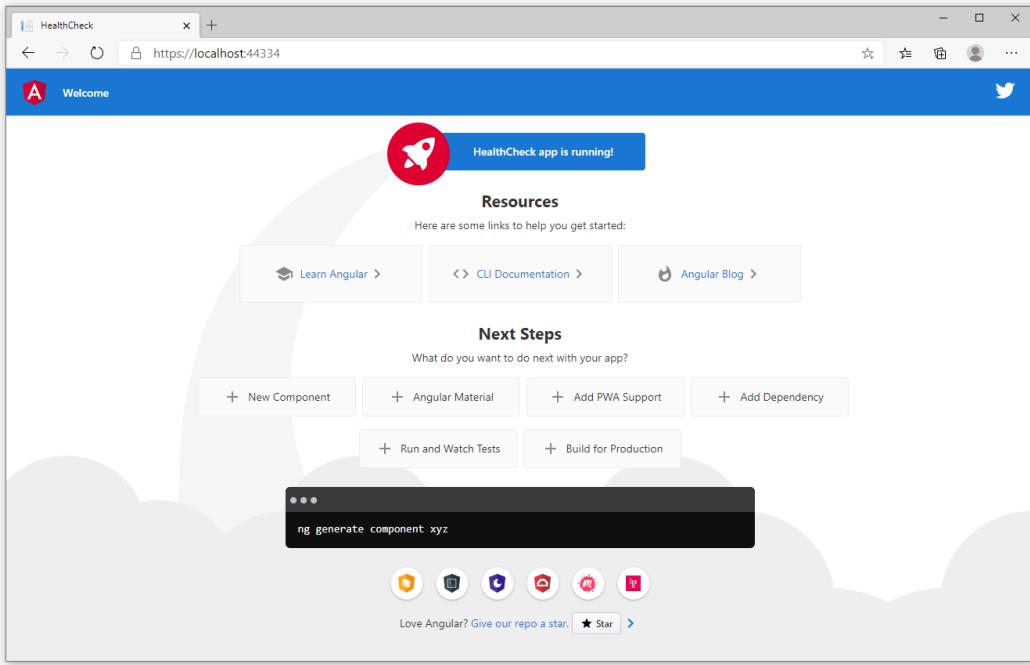


Date	Temp. (C)	Temp. (F)	Summary
2020-09-21T05:04:55.7535005+02:00	43	109	Balmy
2020-09-22T05:04:55.753781+02:00	29	84	Chilly
2020-09-23T05:04:55.7537835+02:00	10	49	Hot
2020-09-24T05:04:55.7537839+02:00	-2	29	Cool
2020-09-25T05:04:55.7537846+02:00	29	84	Chilly



```
CREATE HealthCheck/.editorconfig (274 bytes)
CREATE HealthCheck/.gitignore (631 bytes)
CREATE HealthCheck/.browserslistrc (703 bytes)
CREATE HealthCheck/karma.conf.js (1015 bytes)
CREATE HealthCheck/tsconfig.app.json (287 bytes)
CREATE HealthCheck/tsconfig.spec.json (333 bytes)
CREATE HealthCheck/src/favicon.ico (948 bytes)
CREATE HealthCheck/src/index.html (297 bytes)
CREATE HealthCheck/src/main.ts (372 bytes)
CREATE HealthCheck/src/polyfills.ts (2826 bytes)
CREATE HealthCheck/src/styles.scss (80 bytes)
CREATE HealthCheck/src/test.ts (753 bytes)
CREATE HealthCheck/src/assets/.gitkeep (0 bytes)
CREATE HealthCheck/src/environments/environment.prod.ts (51 bytes)
CREATE HealthCheck/src/environments/environment.ts (662 bytes)
CREATE HealthCheck/src/app/app-routing.module.ts (245 bytes)
CREATE HealthCheck/src/app/app.module.ts (393 bytes)
CREATE HealthCheck/src/app/app.component.html (25757 bytes)
CREATE HealthCheck/src/app/app.component.spec.ts (1072 bytes)
CREATE HealthCheck/src/app/app.component.ts (216 bytes)
CREATE HealthCheck/src/app/app.component.scss (0 bytes)
CREATE HealthCheck/e2e/protractor.conf.js (904 bytes)
CREATE HealthCheck/e2e/tsconfig.json (274 bytes)
CREATE HealthCheck/e2e/src/app.e2e-spec.ts (662 bytes)
CREATE HealthCheck/e2e/src/app.po.ts (274 bytes)
- Installing packages (npm)...
```





Network

Name: test.html

Headers

Remote Address: [::1]:44334

Referer Policy: strict-origin-when-cross-origin

Response Headers

accept-ranges: bytes
content-encoding: gzip
content-type: text/html
date: Mon, 26 Oct 2020 06:44:52 GMT
etag: "1d68f6174e87658"
last-modified: Sun, 20 Sep 2020 15:19:39 GMT
server: Microsoft-IIS/10.0
status: 200
vary: Accept-Encoding
x-powered-by: ASP.NET

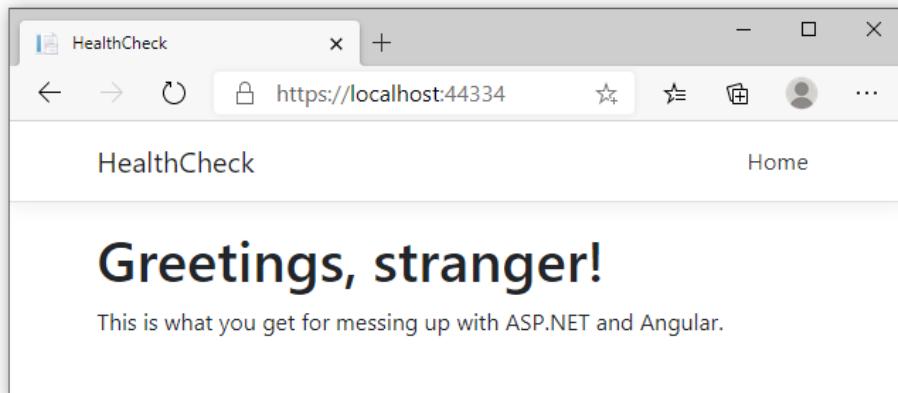
Network

Filter: All

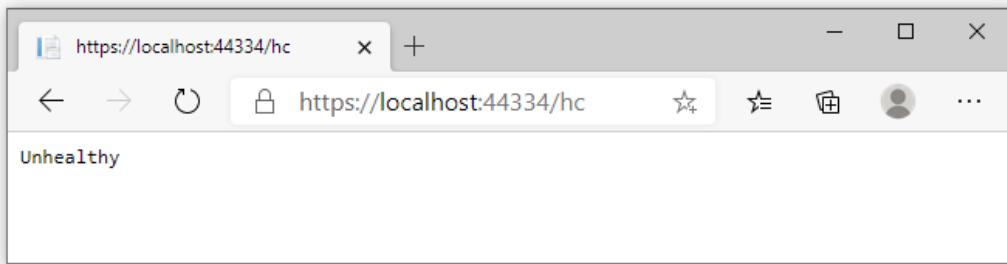
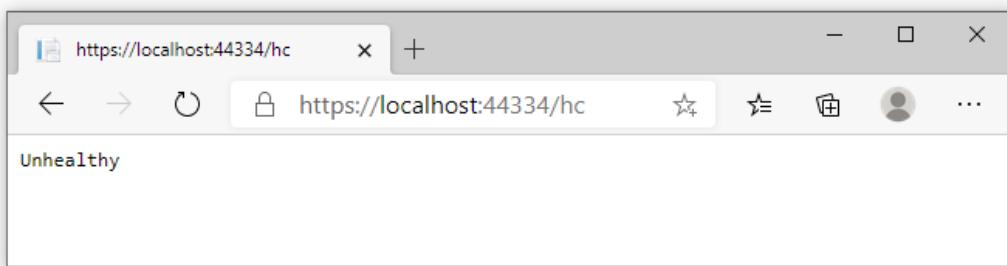
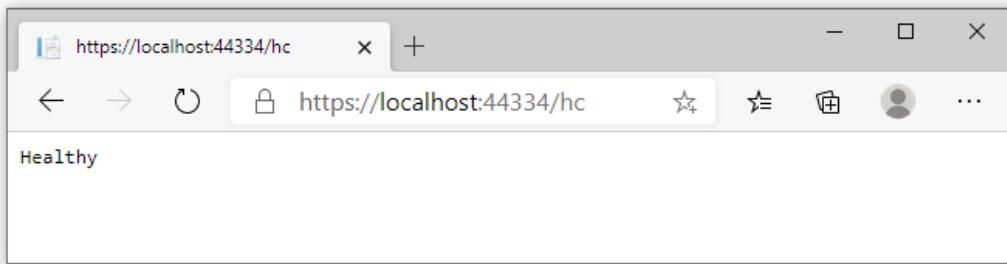
Name	Status	Type	Initiator	Size	Time	Waterfall
test.html	304	document	Other	49 B	53 ms	

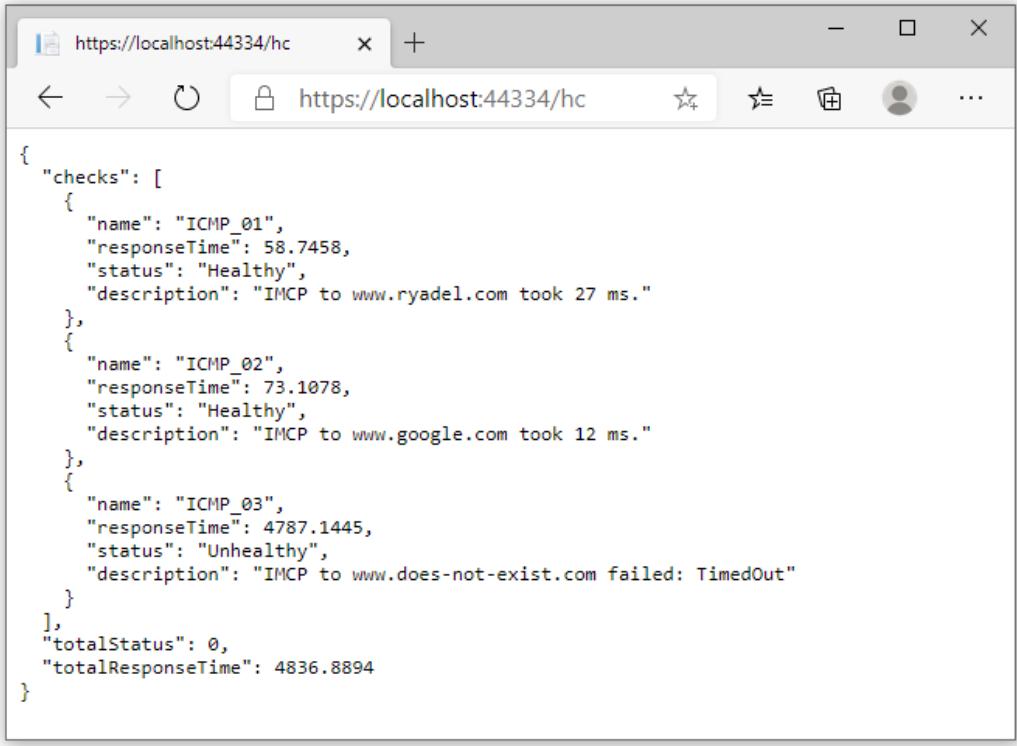
1 requests 49 B transferred 472 B resources Finish: 53 ms DOMContentLoaded: 64 ms Load: 64 ms

```
1 import { BrowserModule } from '@angular/platform-browser';
2 import { NgModule } from '@angular/core';
3 import { FormsModule } from '@angular/forms';
4 import { HttpClientModule, HTTP_INTERCEPTORS } from '@angular/common/http';
5 import { RouterModule } from '@angular/router';
6
7 import { AppComponent } from './app.component';
8 import { NavMenuComponent } from './nav-menu/nav-menu.component';
9 import { HomeComponent } from './home/home.component';
10 import { CounterComponent } from './counter/counter.component';
11 import { FetchDataComponent } from './fetch-data/fetch-data.component';
12
13 @NgModule({
14   declarations: [
15     AppComponent,
16     NavMenuComponent,
17     HomeComponent,
18     CounterComponent,
19     FetchDataComponent
20   ],
21   imports: [
22     BrowserModule.withServerTransition({ appId: 'ng-cli-universal' }),
23     HttpClientModule,
24     FormsModule,
25     RouterModule.forRoot([
26       { path: '', component: HomeComponent, pathMatch: 'full' },
27       { path: 'counter', component: CounterComponent },
28       { path: 'fetch-data', component: FetchDataComponent },
29     ])
30   ],
31   providers: [],
32   bootstrap: [AppComponent]
33 })
34 export class AppModule { }
```



## Chapter 3: Front-End and Back-End Interactions





A screenshot of a Microsoft Edge browser window displaying a JSON response at the URL `https://localhost:44334/hc`. The JSON object contains an array of three check results and summary statistics.

```
{  
  "checks": [  
    {  
      "name": "ICMP_01",  
      "responseTime": 58.7458,  
      "status": "Healthy",  
      "description": "IMCP to www.ryadel.com took 27 ms."  
    },  
    {  
      "name": "ICMP_02",  
      "responseTime": 73.1078,  
      "status": "Healthy",  
      "description": "IMCP to www.google.com took 12 ms."  
    },  
    {  
      "name": "ICMP_03",  
      "responseTime": 4787.1445,  
      "status": "Unhealthy",  
      "description": "IMCP to www.does-not-exist.com failed: TimedOut"  
    }  
  "totalStatus": 0,  
  "totalResponseTime": 4836.8894  
}
```

```

1 import { BrowserModule } from '@angular/platform-browser';
2 import { NgModule } from '@angular/core';
3 import { FormsModule } from '@angular/forms';
4 import { HttpClientModule, HTTP_INTERCEPTORS } from '@angular/common/http';
5 import { RouterModule } from '@angular/router';
6
7 import { AppComponent } from './app.component';
8 import { NavMenuComponent } from './nav-menu/nav-menu.component';
9 import { HomeComponent } from './home/home.component';
10 import { HealthCheckComponent } from './health-check/health-check.component';
11
12 @NgModule({
13   declarations: [
14     AppComponent,
15     NavMenuComponent,
16     HomeComponent,
17     HealthCheckComponent
18   ],
19   imports: [
20     BrowserModule.withServerTransition({ appId: 'ng-cli-universal' }),
21     HttpClientModule,
22     FormsModule,
23     RouterModule.forRoot([
24       { path: '', component: HomeComponent, pathMatch: 'full' },
25       { path: 'health-check', component: HealthCheckComponent }
26     ])
27   ],
28   providers: [],
29   bootstrap: [AppComponent]
30 })
31 export class AppModule { }

```

## JAVASCRIPT MODULE SYSTEM

import {...}

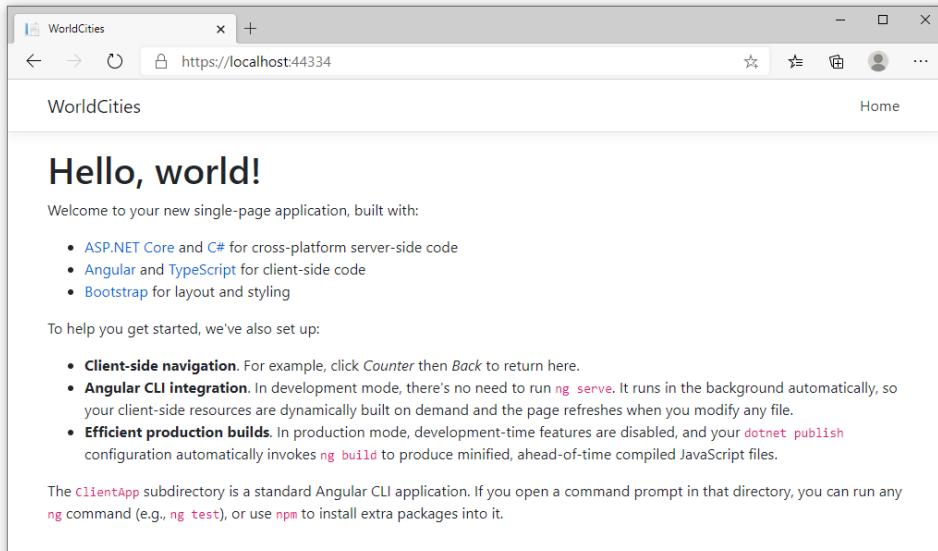
## ANGULAR MODULE SYSTEM

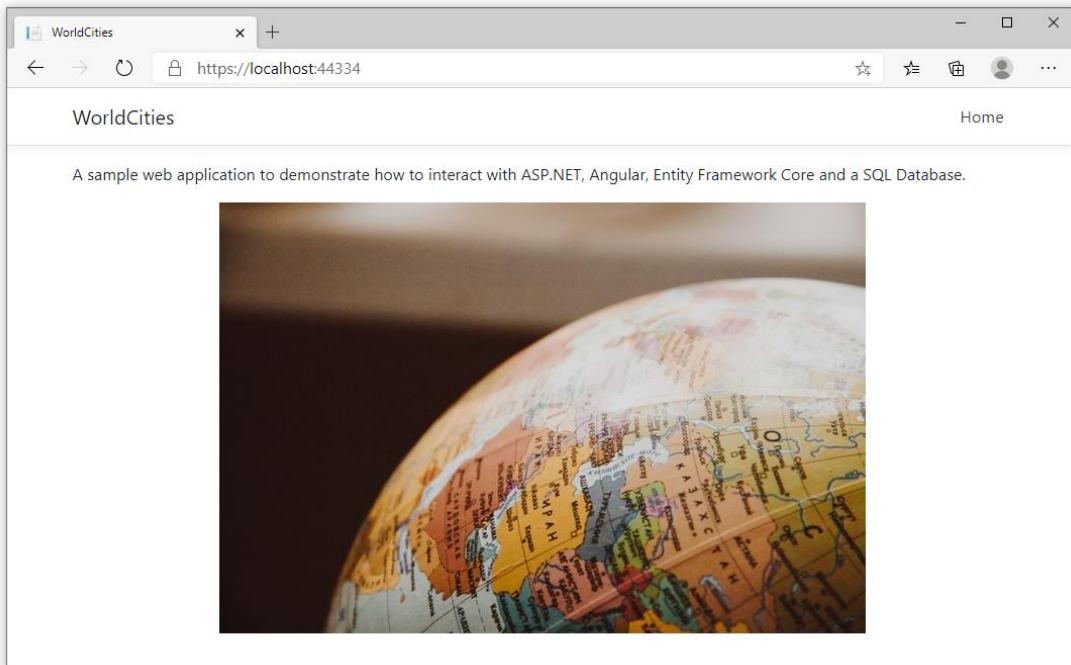
@NgModule({...});

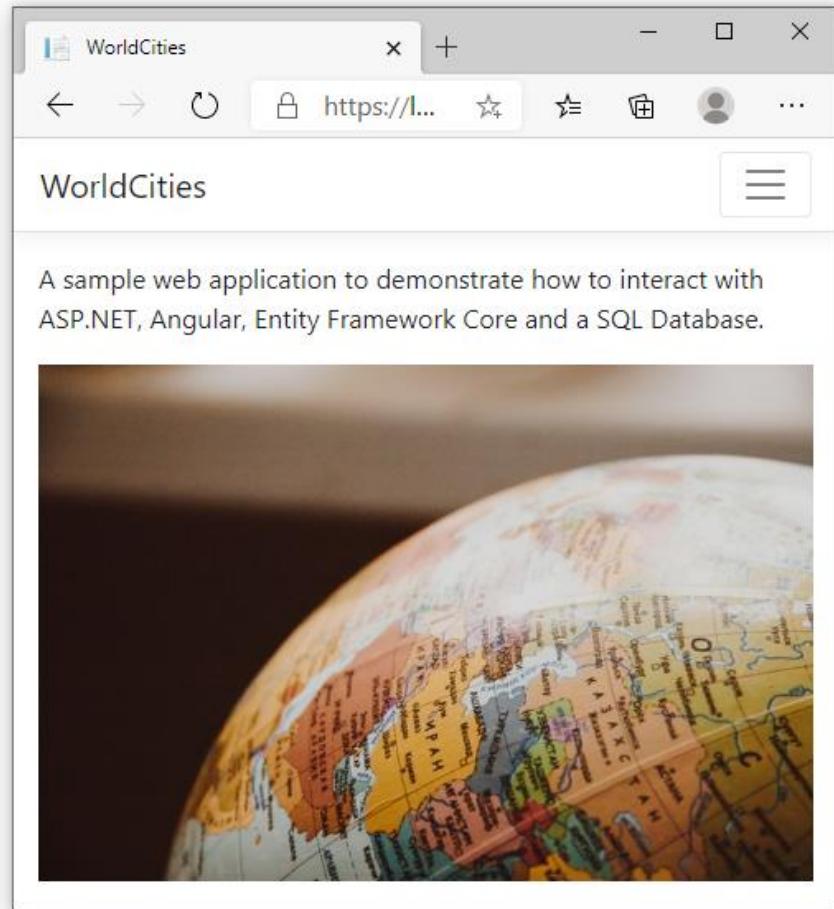
A screenshot of a Microsoft Edge browser window titled "HealthCheck". The address bar shows the URL <https://localhost:44334/health-check>. The main content area displays a "Health Check" section with the heading "Health Check". Below it, a message says "Here are the results of our health check:". A table follows, showing three rows of data:

Name	Response Time	Status	Description
ICMP_01	46.344	Healthy	IMCP to www.ryadel.com took 26 ms.
ICMP_02	25.8048	Healthy	IMCP to www.google.com took 12 ms.
ICMP_03	4641.141	Unhealthy	IMCP to www.does-not-exist.com failed: TimedOut

# Chapter 4: Data Model with Entity Framework Core







World Cities Database | +

<https://simplemaps.com/data/world-cities>

 **simplemaps**  
Geographic Data Products

US Zips US Cities World Cities Updates Contact [Products](#) ▾

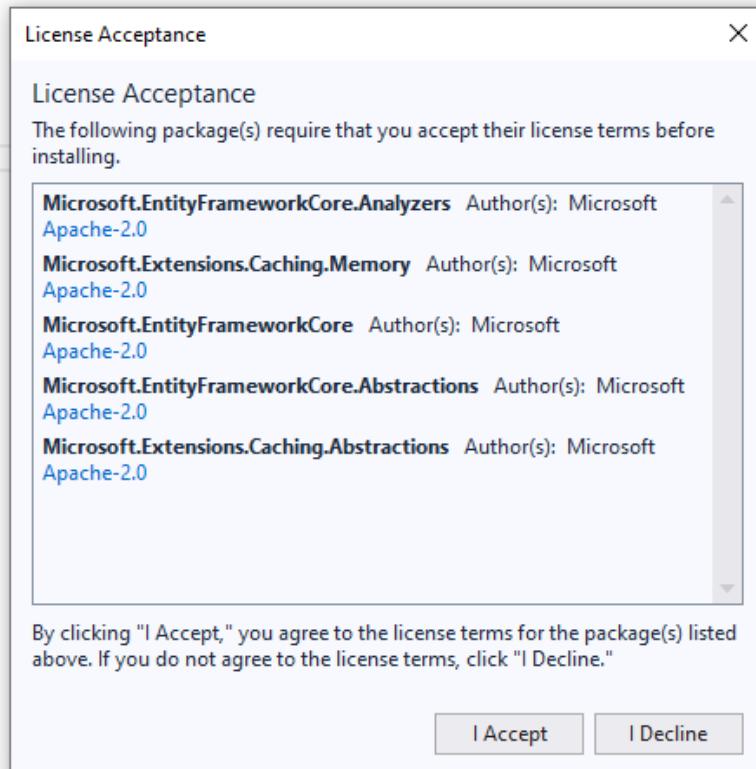
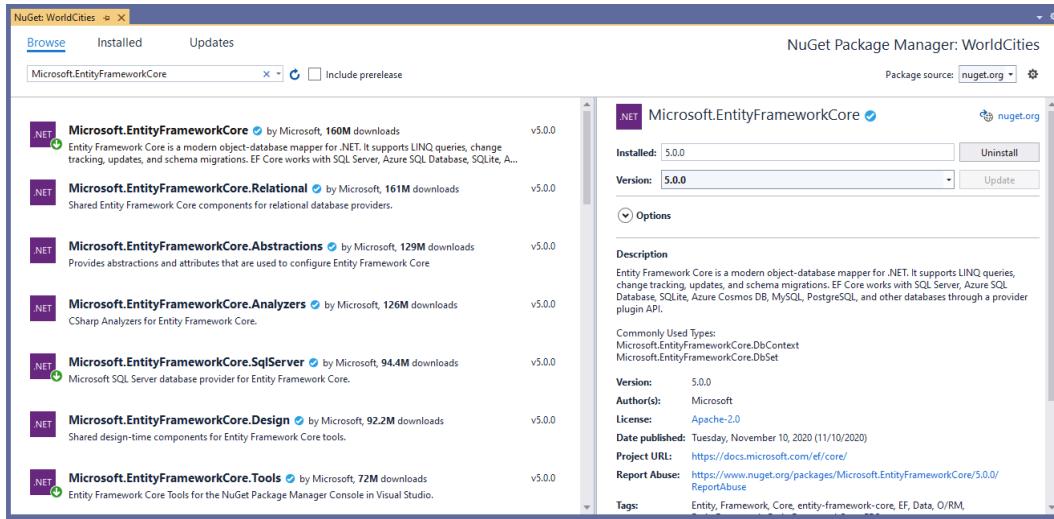
## World Cities Database

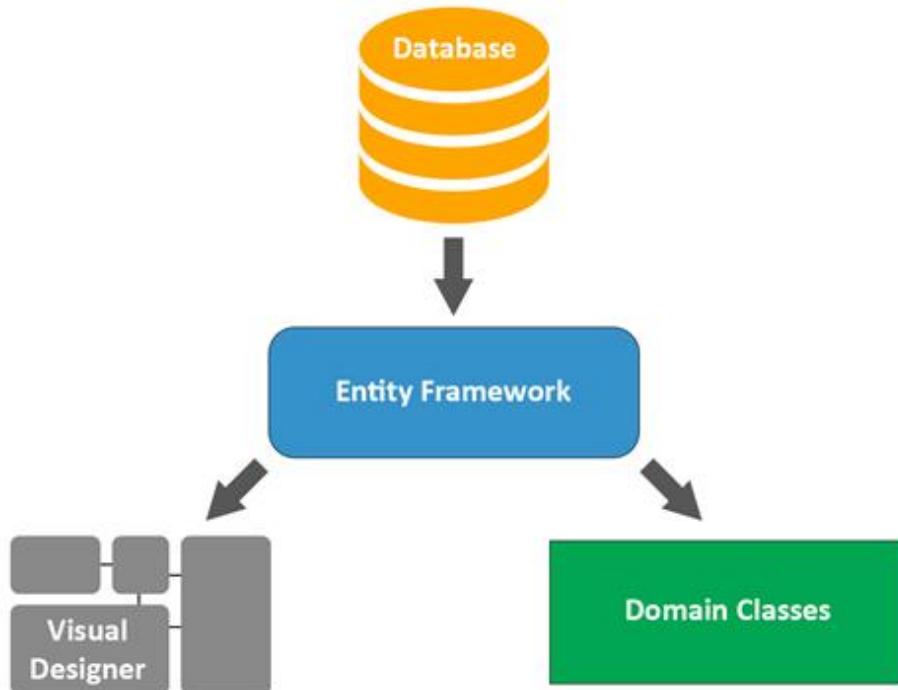
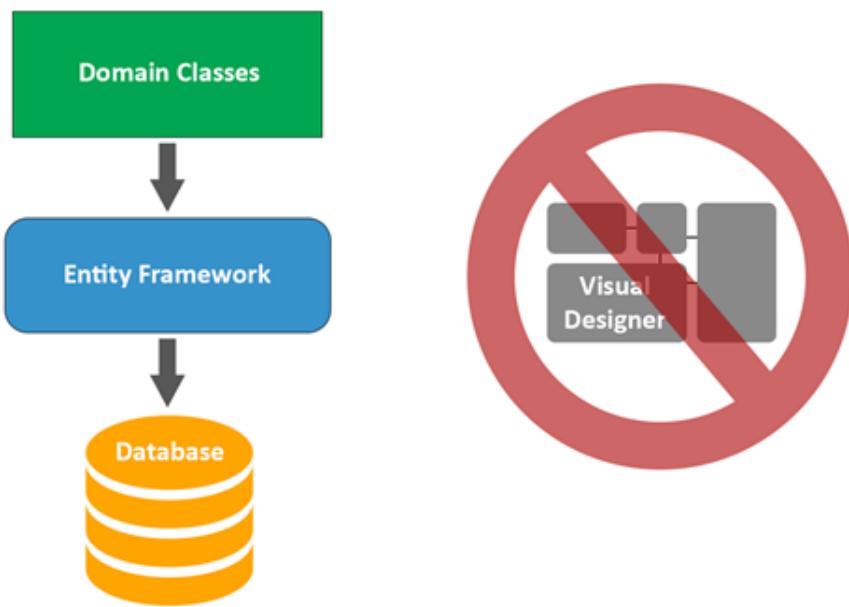
We're proud to offer a simple, accurate and up-to-date database of the world's cities and towns. We've built it from the ground up using authoritative sources such as the NGIA, US Geological Survey, US Census Bureau, and NASA.

Our database is:

- Up-to-date:** It was last refreshed in April of 2019.
- Comprehensive:** Over 4 million unique cities and towns from every country in the world.
- Accurate:** Cleaned and aggregated from official sources. Includes latitude and longitude coordinates.
- Simple:** A single CSV file, concise field names, only one entry per city.

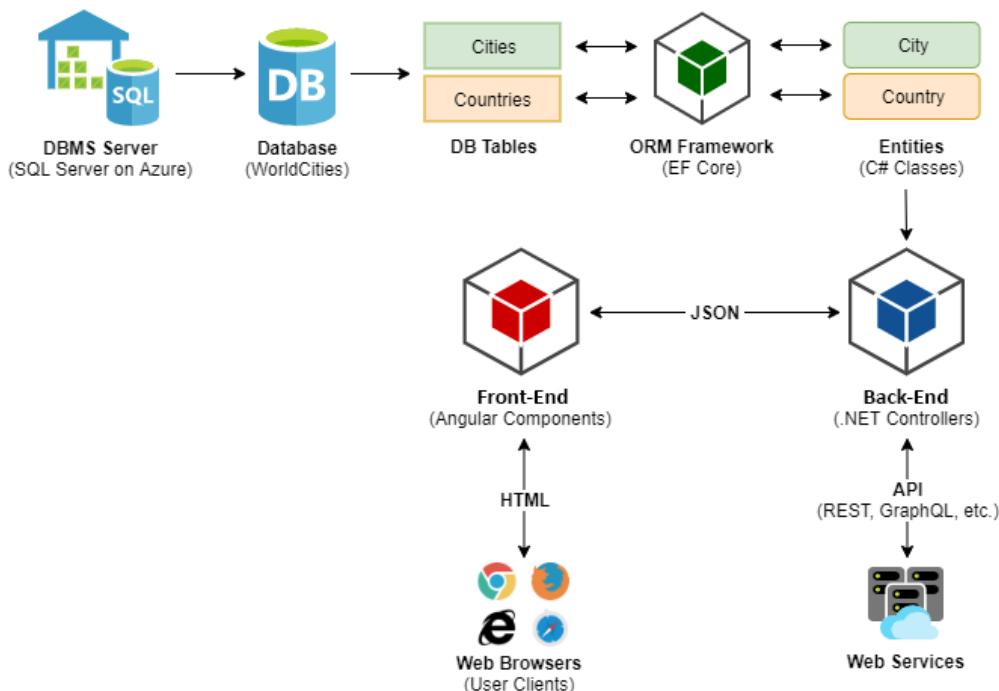
Databases	Basic	Pro	Comprehensive
Commercial use	Allowed	Allowed	Allowed
File format	CSV, Excel	CSV, SQL (too large for Excel)	CSV or SQL (too large for Excel)
Type of cities	Prominent cities (large, capitals etc.)	Most cities and towns	All populated places
Number of entries	About 13 thousand	About 1.6 million	About 4 million
Future updates	Not guaranteed	Included for 12 months	Included for 24 months
Data last updated	2019	2019	2019
Attribution	Required	Not required	Not required
License	Creative Commons Attribution 4.0	Permissive, no redistribution	Permissive, no redistribution
Refund policy	N/A	30-day guarantee	30-day guarantee
One-time fee	Free	\$199	\$499
	<a href="#">Download</a>	<a href="#">Buy Now!</a>	<a href="#">Buy Now!</a>



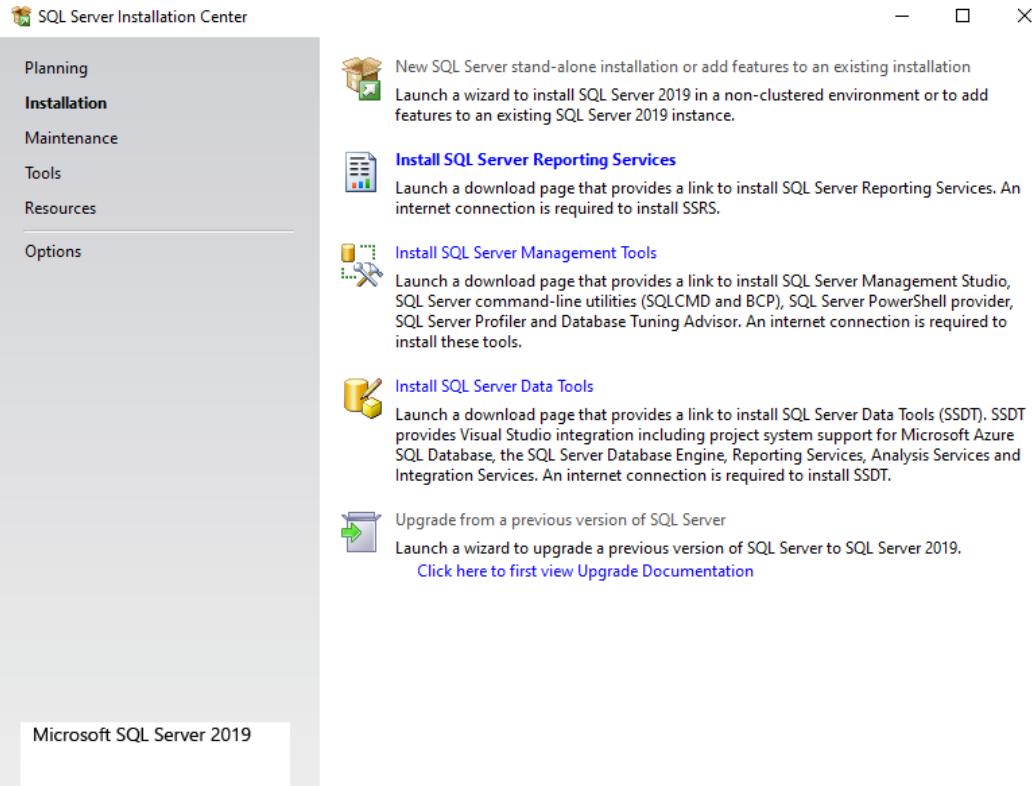


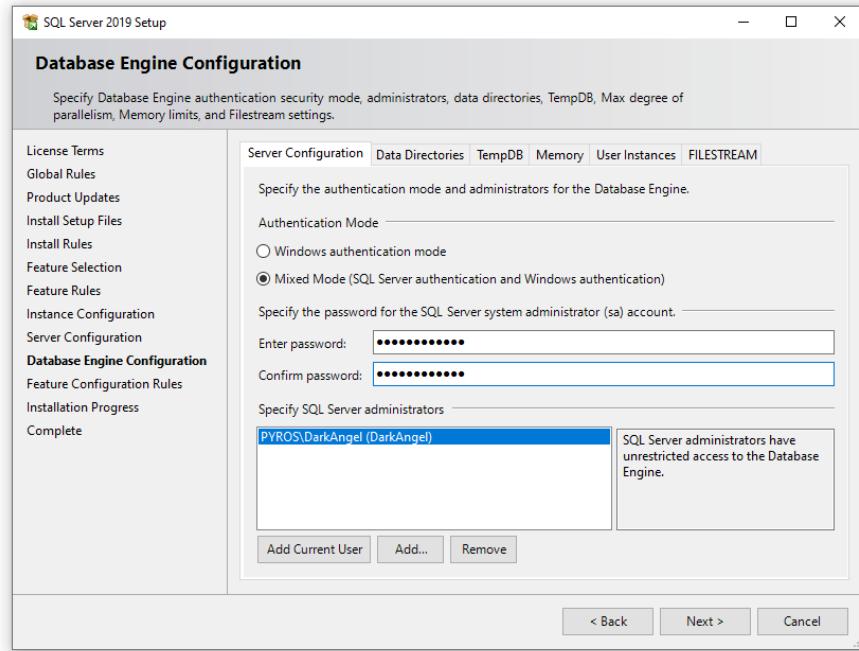
## DBMS Data Lifecycle

From Database to Front-End



	A	B	C	D	E	F	G	H	I	J	K
1	city	city_ascii	lat	lng	country	iso2	iso3	admin_name	capital	population	id
2	Malishëvë	Malisheve	42.4822	20.7458	Kosovo	XX	XKS	Malishevë	admin		1901597212
3	Prizren	Prizren	42.2139	20.7397	Kosovo	XX	XKS	Prizren	admin		1901360309
4	Zubin Potok	Zubin Potok	42.9144	20.6897	Kosovo	XX	XKS	Zubin Potok	admin		1901608808
5	Kamenicë	Kamenice	42.5781	21.5803	Kosovo	XX	XKS	Kamenicë	admin		1901851592
6	Viti	Viti	42.3214	21.3583	Kosovo	XX	XKS	Viti	admin		1901328795
7	Shtërpçë	Shterpe	42.2394	21.0272	Kosovo	XX	XKS	Shtërpçë	admin		1901828239
8	Shtime	Shtime	42.4331	21.0397	Kosovo	XX	XKS	Shtime	admin		1901598505
9	Vushtrri	Vushtrri	42.8231	20.9675	Kosovo	XX	XKS	Vushtrri	admin		1901107642
10	Dragash	Dragash	42.0265	20.6533	Kosovo	XX	XKS	Dragash	admin		1901112530
11	Podujevë	Podujeve	42.9111	21.1899	Kosovo	XX	XKS	Podujevë	admin		1901550082
12	Fushë Kosovë	Fushe Kosove	42.6639	21.0961	Kosovo	XX	XKS	Fushë Kosovë	admin		1901134407
13	Kaçanik	Kacanik	42.2319	21.2594	Kosovo	XX	XKS	Kaçanik	admin		1901200321
14	Klinë	Kline	42.6217	20.5778	Kosovo	XX	XKS	Klinë	admin		1901230162
15	Leposaviq	Leposaviq	43.1039	20.8028	Kosovo	XX	XKS	Leposaviq	admin		1901974597
16	Pejë	Peje	42.66	20.2922	Kosovo	XX	XKS	Pejë	admin		1901339694
17	Rahovec	Rahovec	42.3994	20.6547	Kosovo	XX	XKS	Rahovec	admin		1901336358
18	Gjilan	Gjilan	42.4689	21.4633	Kosovo	XX	XKS	Gjilan	admin		1901235642
19	Ulpjan	Ulpjan	42.5217	21.1258	Kosovo	XX	XKS	Ulpjan	admin		1901682048
20	Obilliq	Obilliq	42.6869	21.0703	Kosovo	XX	XKS	Obilliq	admin		1901102771
21	Gjakovë	Gjakove	42.3803	20.4308	Kosovo	XX	XKS	Gjakovë	admin		1901089874
22	Pristina	Pristina	42.6666	21.1724	Kosovo	XX	XKS	Prishtine	primary		1901760068





The screenshot shows the Microsoft Azure portal with a banner for creating a managed cloud database with a free account. Below it, the Azure Marketplace search bar is used to find 'SQL Database'. The search results show various options like 'SQL Database (Quickstart tutorial)', 'SQL Data Warehouse', 'SQL Elastic database pool', 'Azure Database for MySQL (preview)', 'Azure Database for PostgreSQL (preview)', and 'SQL Server 2017 Enterprise Windows Server 2016'. A 'Start free >' button is visible.

The screenshot shows the Microsoft Azure sign-in page. At the top right, there is a "Sign out" link. Below it, session information is displayed: SessionID: 338c7c74-3a36-4b59-9acc-82c54728b84f and TimeStampUTC: 11/18/2019 10:57:16 PM. The main message in the center says "Looks like you already have an Azure account".

The Azure free account is only available to new users and is limited to one per customer

[Sign up for a Pay-As-You-Go subscription](#)

[Use an existing subscription in your account](#)

The screenshot shows the Microsoft Azure portal homepage. At the top, there is a search bar labeled "Search resources, services, and docs (G+/-)". To the right of the search bar are several icons: a user profile, a gear, a question mark, and a smiley face. Below the search bar, there is a section titled "Azure services" with various service icons: Create a resource, CDN profiles, Subscriptions, RevAPM CDN, Virtual machines, App Services, Storage accounts, SQL databases, Azure Database for PostgreSQL, and a "More services" button. Below this, there is a "Navigate" section with links to Subscriptions, Resource groups, All resources, and Dashboard. Further down, there is a "Tools" section with links to Microsoft Learn, Azure Monitor, Security Center, and Cost Management. At the bottom, there is a "Useful links" section with links to Technical Documentation, Azure Migration Tools, Azure Services, Recent Azure Updates, and Quickstart Center. On the far right, there is a "Azure mobile app" section with links to the App Store and Google Play.

Microsoft Azure

Home > Select SQL deployment option

Select SQL deployment option

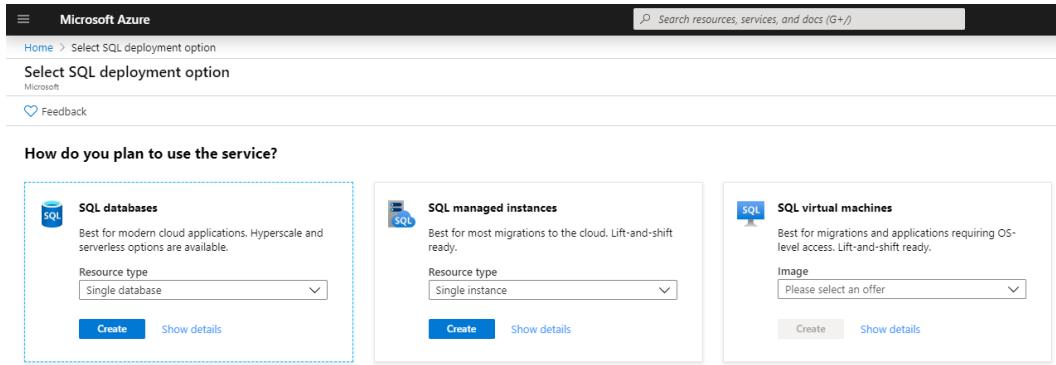
Feedback

How do you plan to use the service?

**SQL databases**  
Best for modern cloud applications. Hyperscale and serverless options are available.  
Resource type: Single database  
[Create](#) [Show details](#)

**SQL managed instances**  
Best for most migrations to the cloud. Lift-and-shift ready.  
Resource type: Single instance  
[Create](#) [Show details](#)

**SQL virtual machines**  
Best for migrations and applications requiring OS-level access. Lift-and-shift ready.  
Image: Please select an offer  
[Create](#) [Show details](#)



Microsoft Azure

All services > New > Marketplace > Azure SQL > Select SQL deployment option > Create SQL Database

Create SQL Database

Basics Networking Additional settings Tags Review + create

Create a SQL database with your preferred configurations. Complete the Basics tab then go to Review + Create to provision with smart defaults, or visit each tab to customize. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \* Pay-As-You-Go

Resource group \* (New) PacktPub [Create new](#)

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name \* WorldCities

Server \* Select a server [Create new](#)

The value must not be empty.

[Review + create](#) [Next : Networking >](#)

New server

Server name \* netcore3-angular8 .database.windows.net

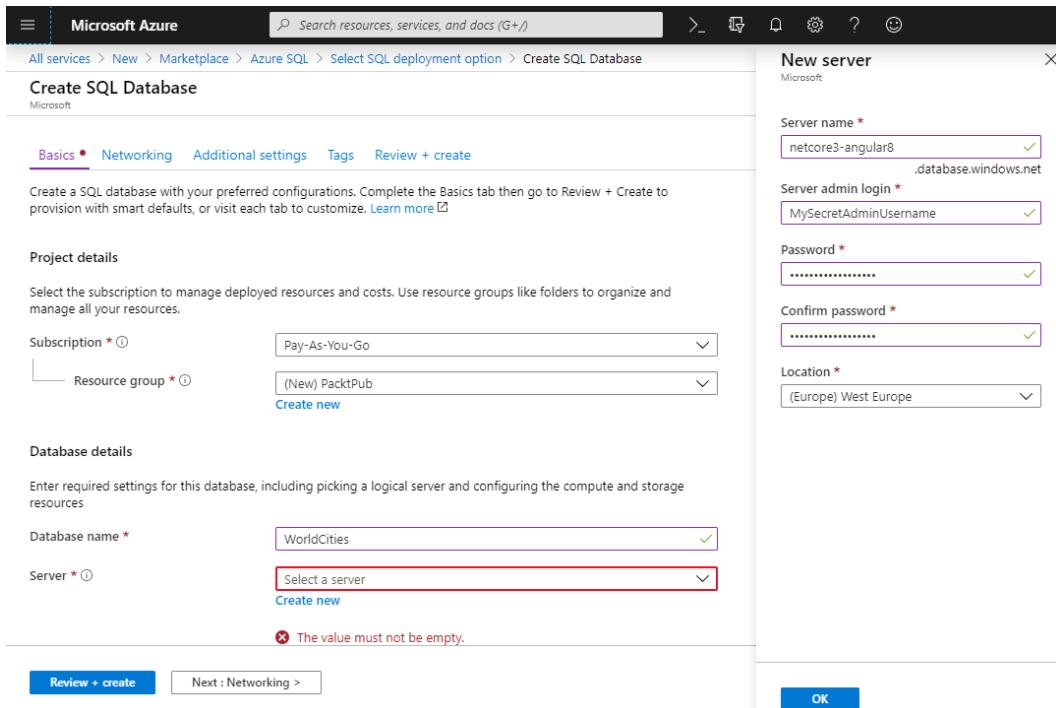
Server admin login \* MySecretAdminUsername

Password \* \*\*\*\*\*

Confirm password \* \*\*\*\*\*

Location \* (Europe) West Europe

[OK](#)



All services > New > Marketplace > Azure SQL > Select SQL deployment option > Create SQL Database > [Configure](#)

### Configure

[Feedback](#)

<b>Basic</b> For less demanding workloads	<b>Standard</b> For workloads with typical performance requirements	<b>Premium</b> For IO-intensive workloads.	<b>vCore-based purchasing options</b> Click here to customize your performance using vCores >
--	--	---	--

DTUs [What is a DTU?](#)

**5 (Basic)**

Data max size

100 MB  2 GB



Cost summary

Cost per DTU (in EUR)	0.84
DTUs selected	x 5
ESTIMATED COST / MONTH	
4.21 EUR	

[Apply](#)

#### Basics

Subscription	Pay-As-You-Go
Resource group	PacktPub
Region	(Europe) West Europe
Database name	WorldCities
Server	(new) netcore3-angular8
Compute + storage	Basic: 2 GB storage

#### Networking

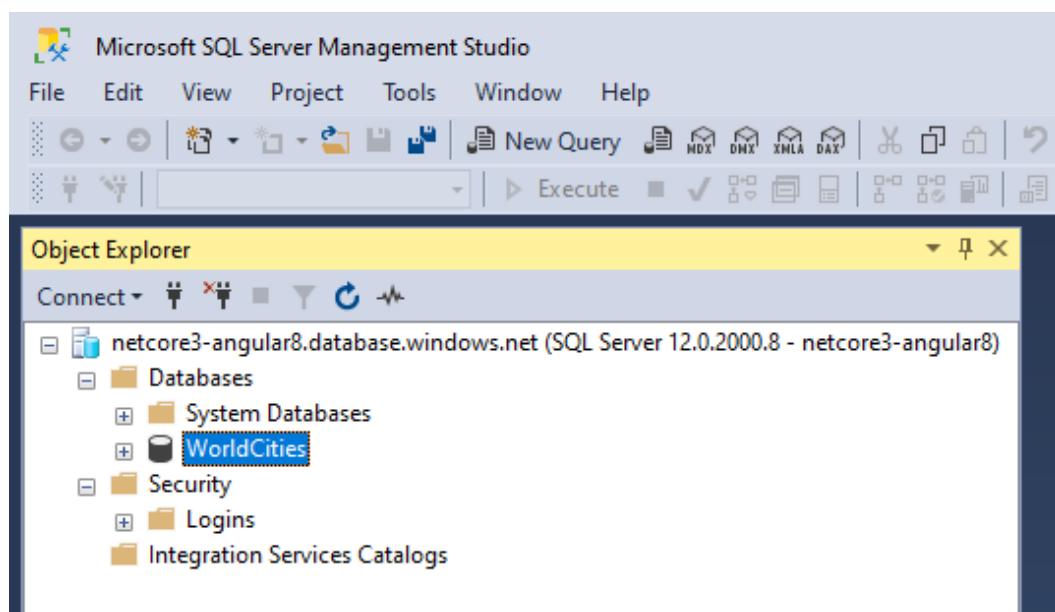
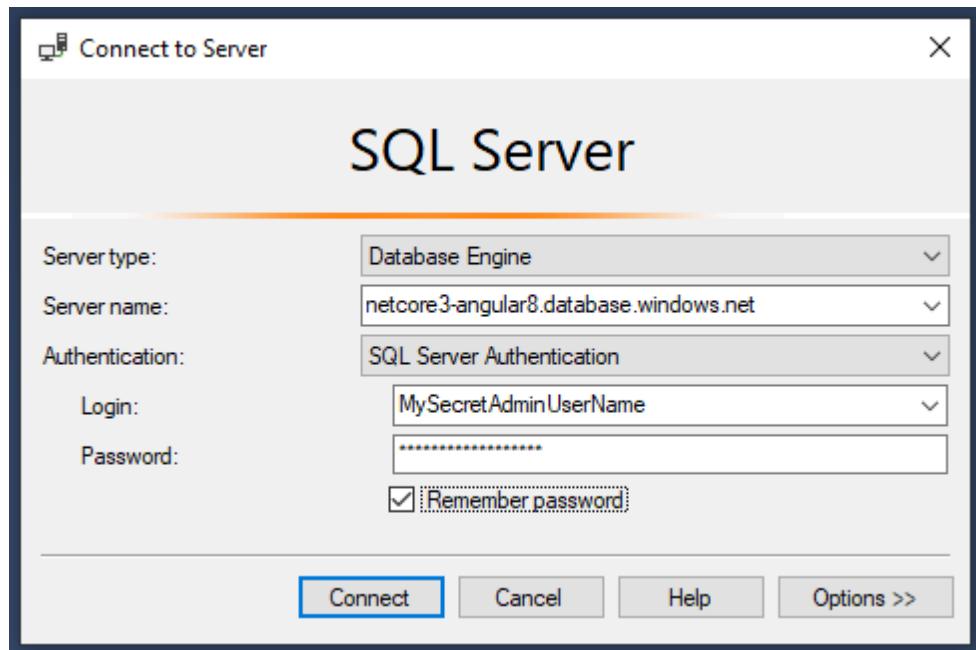
Allow Azure services and resources to access this server	Yes
Add current client IP address	Yes
Private endpoint (preview)	None

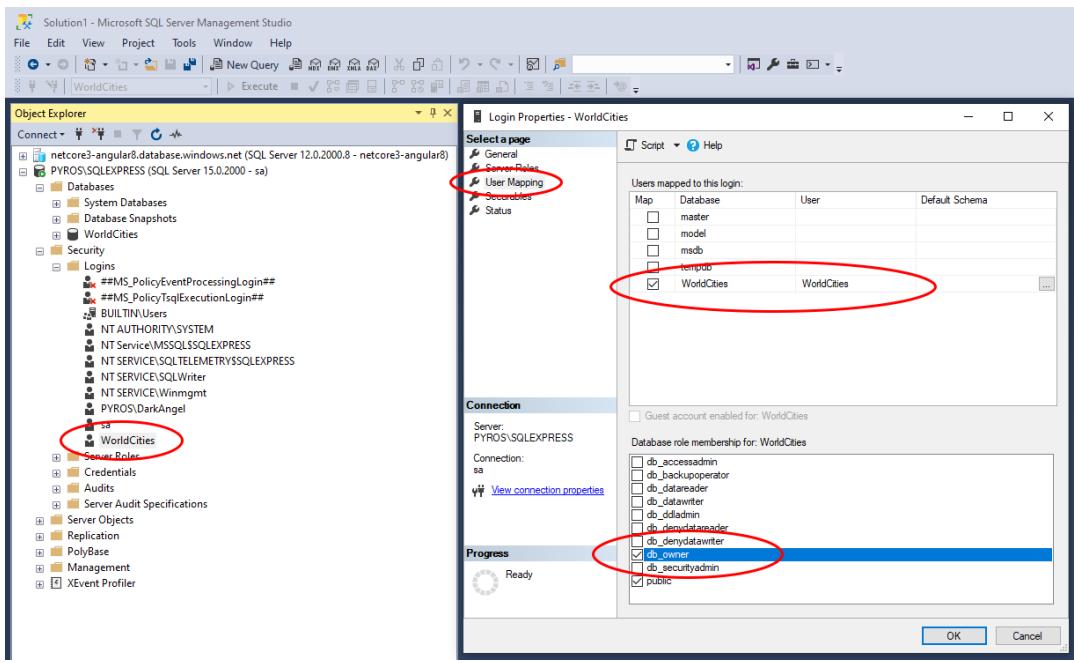
#### Additional settings

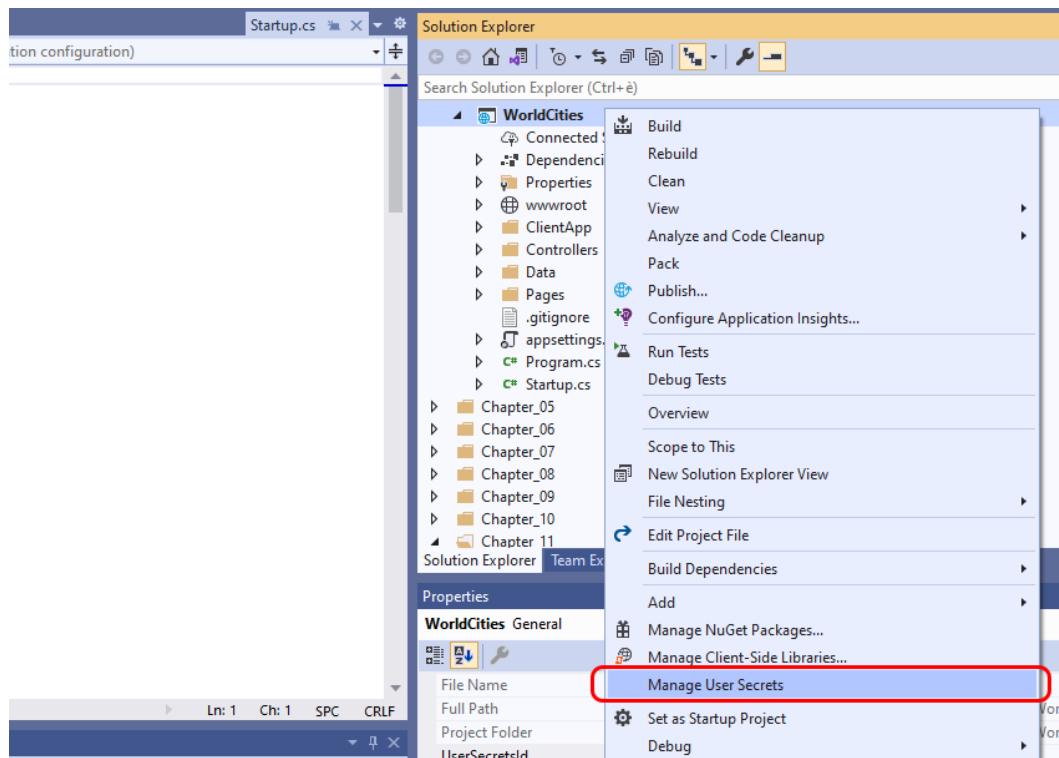
Use existing data	Blank
Collation	SQL_Latin1_General_CI_AS
Advanced data security	Not now

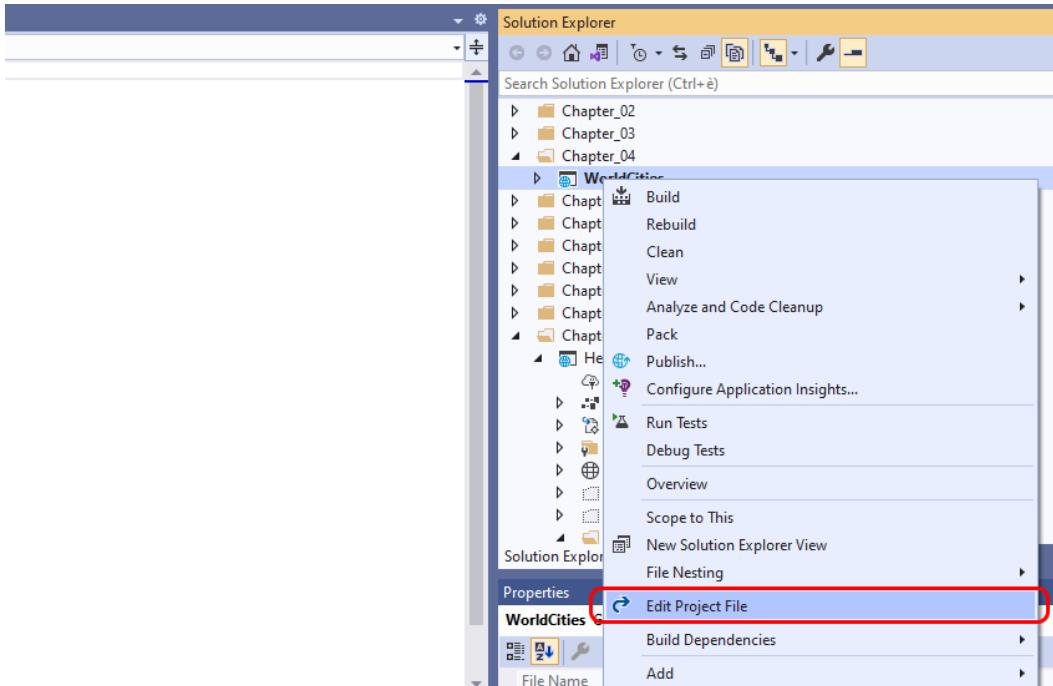
#### Tags

[Create](#) [< Previous](#) [Download a template for automation](#)









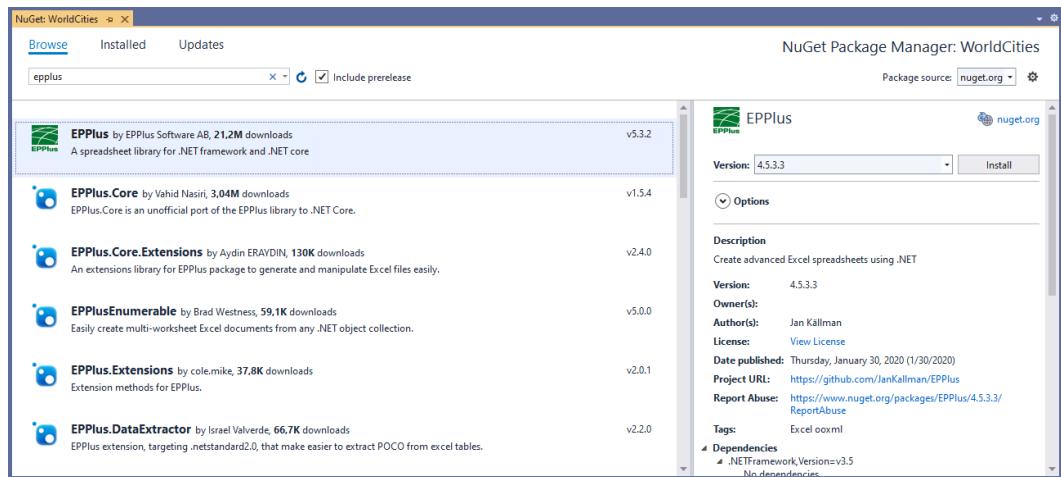
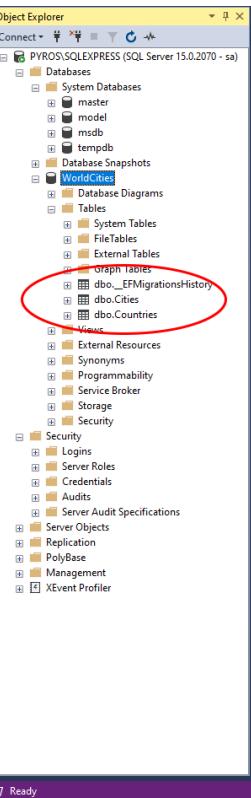
```
C:\Projects\Book3\Chapter_04\WorldCities>dotnet ef migrations add "Initial" -o "Data\Migrations"
warn: Microsoft.EntityFrameworkCore.Model.Validation[30000]
      No type was specified for the decimal column 'lat' on entity type 'City'. This will cause values to be silently truncated if they do not fit in the default precision and scale. Explicitly specify the SQL server column type that can accommodate all the values using 'HasColumnType('').
warn: Microsoft.EntityFrameworkCore.Model.Validation[30000]
      No type was specified for the decimal column 'lon' on entity type 'City'. 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('').
Info: Microsoft.EntityFrameworkCore.Infrastructure[10403]
      Entity Framework Core 3.0.0 initialized 'ApplicationDbContext' using provider 'Microsoft.EntityFrameworkCore.SqlServer' with options: None
Done. To undo this action, use 'ef migrations remove'

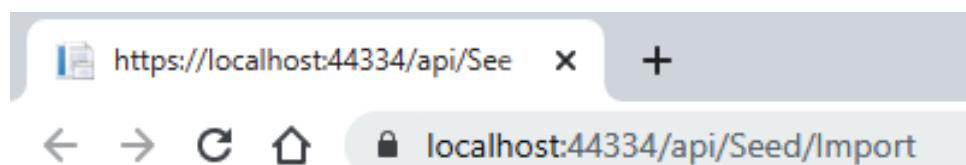
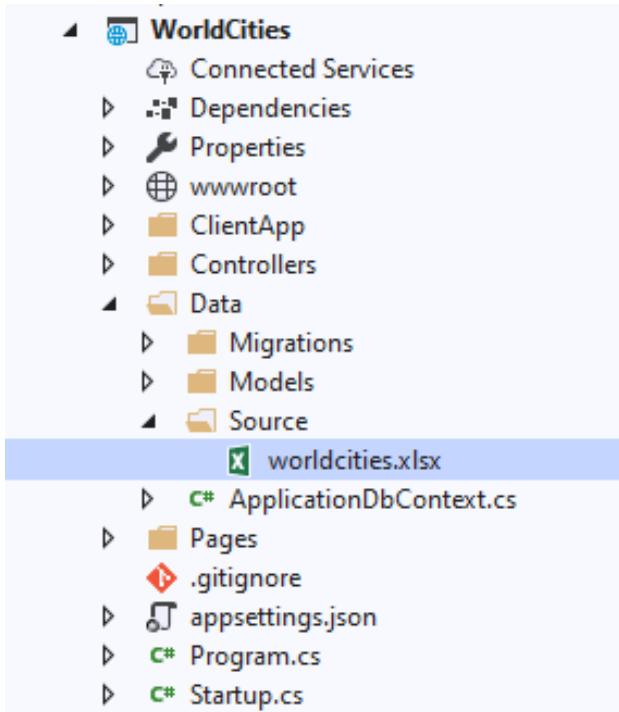
C:\Projects\Book3\Chapter_04\WorldCities>
```

```
C:\Projects\Book3\Chapter_04\WorldCities>dotnet ef migrations add "Initial" -o "Data\Migrations"
info: Microsoft.EntityFrameworkCore.Infrastructure[10403]
      Entity Framework Core 3.0.0 initialized 'ApplicationDbContext' using provider 'Microsoft.EntityFrameworkCore.SqlServer' with options: None
Done. To undo this action, use 'ef migrations remove'

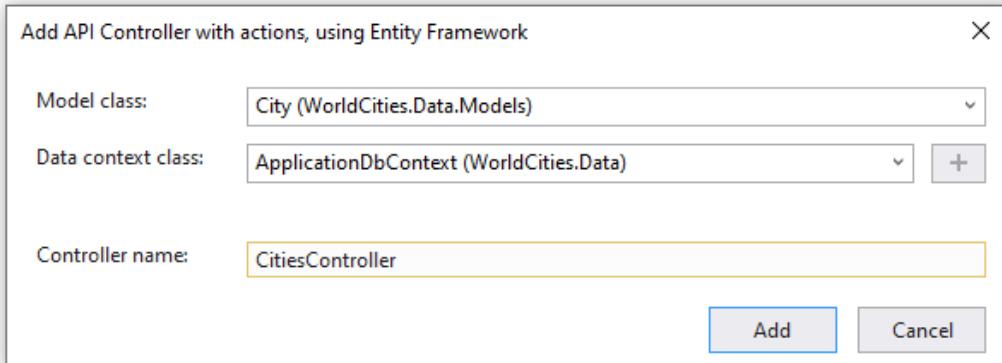
C:\Projects\Book3\Chapter_04\WorldCities>
```

```
[c:\Projects\Book1\Chapter 4\WorldCities] ef database update
[Info]: Microsoft.EntityFrameworkCore.Infrastructure[10403]
      Entity Framework Core 3.0.0 initialized 'ApplicationDbContext' using provider 'Microsoft.EntityFrameworkCore.SqlServer' with options: None
[Info]: Microsoft.EntityFrameworkCore.Database.Command[20100]
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      SELECT OBJECT_ID('[_EFMigrationsHistory]')
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      EXEC sp_executesql N'ALTER TABLE [_EFMigrationsHistory] ADD CONSTRAINT [PK__EFMigrationsHistory] PRIMARY KEY ([MigrationId])'
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      EXEC sp_executesql N'DROP TABLE [_EFMigrationsHistory]'
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      SELECT OBJECT_ID('[_EFMigrationsHistory]')
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      EXEC sp_executesql N'CREATE TABLE [_EFMigrationsHistory] ([MigrationId] int NOT NULL, [ProductVersion] nvarchar(max) NULL, [EfMigrationsHistory] nvarchar(max) NULL, CONSTRAINT [PK__EFMigrationsHistory] PRIMARY KEY ([MigrationId]))'
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      SELECT [MigrationId], [ProductVersion]
      FROM [_EFMigrationsHistory]
      ORDER BY [MigrationId]
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='20100']
      EXEC sp_executesql N'ALTER TABLE [_EFMigrationsHistory] ADD CONSTRAINT [PK__EFMigrationsHistory] PRIMARY KEY ([MigrationId])'
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      SELECT [MigrationId], [ProductVersion]
      FROM [_EFMigrationsHistory]
      ORDER BY [MigrationId]
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      EXEC sp_executesql N'DROP TABLE [_EFMigrationsHistory]'
      Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
      CREATE TABLE [Countries] (
      [Id] int NOT NULL IDENTITY,
      [Name] nvarchar(max) NULL,
      [ISO2] nvarchar(max) NULL,
      [ISO3] nvarchar(max) NULL,
      [CONSTRAINT [PK__Countries] PRIMARY KEY ([Id])]
  );
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='20100']
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  CREATE TABLE [CountryId] (
      [Id] int NOT NULL IDENTITY,
      [Name] nvarchar(max) NULL,
      [ISO2] nvarchar(max) NULL,
      [ISO3] nvarchar(max) NULL,
      [CONSTRAINT [PK__CountryId] PRIMARY KEY ([Id])]
  );
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  CREATE TABLE [Cities] (
      [Id] int NOT NULL IDENTITY,
      [Name] nvarchar(max) NULL,
      [Name_ASCII] nvarchar(max) NULL,
      [Lat] decimal(9,4) NOT NULL,
      [Long] decimal(9,4) NOT NULL,
      [CountryId] int NOT NULL,
      [CONSTRAINT [PK__Cities] PRIMARY KEY ([Id]),
      CONSTRAINT [FK__Cities_Countries_CountryId] FOREIGN KEY ([CountryId]) REFERENCES [Countries] ([Id]) ON DELETE CASCADE
  );
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='20100']
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  CREATE TABLE [CountryId] (
      [Id] int NOT NULL IDENTITY,
      [Name] nvarchar(max) NULL,
      [Name_ASCII] nvarchar(max) NULL,
      [Lat] decimal(9,4) NOT NULL,
      [Long] decimal(9,4) NOT NULL,
      [CountryId] int NOT NULL,
      [CONSTRAINT [PK__CountryId] PRIMARY KEY ([Id]),
      CONSTRAINT [FK__CountryId_Countries_CountryId] FOREIGN KEY ([CountryId]) REFERENCES [Countries] ([Id]) ON DELETE CASCADE
  );
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  CREATE INDEX [IX_Cities_CountryId] ON [Cities] ([CountryId]);
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='20100']
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  CREATE TABLE [MigrationsHistory] (
      [MigrationId] int NOT NULL IDENTITY,
      [ProductVersion] nvarchar(max) NULL
  );
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  INSERT INTO [EFMigrationsHistory] ([MigrationId], [ProductVersion])
  VALUES ('20191128030140_Initial');
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='20100']
  Executing DbCommand [Parameters[], CommandType='Text', CommandTimeout='30']
  INSERT INTO [EFMigrationsHistory] ([MigrationId], [ProductVersion])
  VALUES ('N 20191128030404_Initial', 'N 3.0.0');
```





```
{"cities":12959,"countries":235}
```



```
https://localhost:44334/api/Cities
```

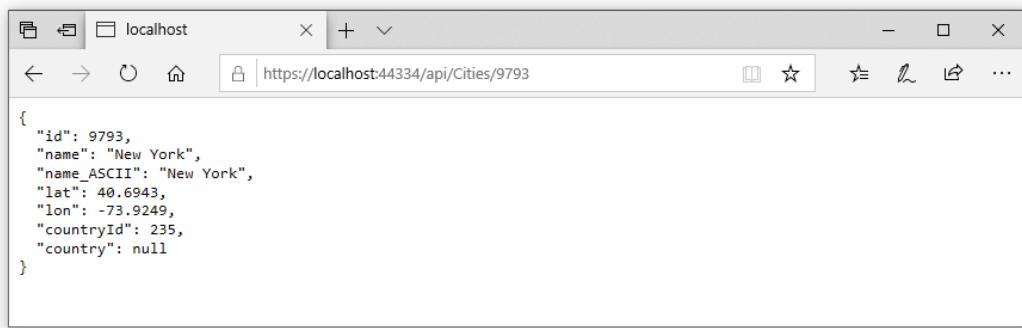
[[{"id":1,"name":"Malishev\u0107","name\_ASCII":"Malisheve","lat":42.4822,"lon":20.7458,"countryId":1,"country":null}, {"id":2,"name":"P\u0107rizen","name\_ASCII":"Prizren","lat":42.2139,"lon":20.7397,"countryId":1,"country":null},{ "id":3,"name":"Zubin Potok","name\_ASCII":"Zubin Potok","lat":42.9144,"lon":20.6897,"countryId":1,"country":null}, {"id":4,"name":"Kamenice\u0107","name\_ASCII":"Kamenice","lat":42.5781,"lon":21.5803,"countryId":1,"country":null}, {"id":5,"name":"Viti\u0107","name\_ASCII":"Viti","lat":42.3214,"lon":21.3583,"countryId":1,"country":null}, {"id":6,"name":"Sht\u0107rpca\u0107","name\_ASCII":"Shterpc\u0107","lat":42.2394,"lon":21.0272,"countryId":1,"country":null}, {"id":7,"name":"Shtime\u0107","name\_ASCII":"Shtime","lat":42.4331,"lon":21.0397,"countryId":1,"country":null}, {"id":8,"name":"Vushtrri\u0107","name\_ASCII":"Vushtrri","lat":42.8231,"lon":20.9675,"countryId":1,"country":null}, {"id":9,"name":"Dragash\u0107","name\_ASCII":"Dragash","lat":42.0265,"lon":20.6533,"countryId":1,"country":null}, {"id":10,"name":"Podujeve\u0107","name\_ASCII":"Podujeve","lat":42.9111,"lon":21.1899,"countryId":1,"country":null}, {"id":11,"name":"Fush\u0107 Kosove\u0107","name\_ASCII":"Fush\u0107 Kosove","lat":42.6639,"lon":21.0961,"countryId":1,"country":null}, {"id":12,"name":"Ka\u0107anik\u0107","name\_ASCII":"Ka\u0107anik","lat":42.2319,"lon":21.2594,"countryId":1,"country":null}, {"id":13,"name":"Kline\u0107","name\_ASCII":"Kline","lat":42.6217,"lon":20.5778,"countryId":1,"country":null}, {"id":14,"name":"Leposaviq\u0107","name\_ASCII":"Leposaviq","lat":43.1039,"lon":20.8028,"countryId":1,"country":null}, {"id":15,"name":"Peja\u0107","name\_ASCII":"Peje","lat":42.6600,"lon":20.2922,"countryId":1,"country":null}, {"id":16,"name":"Rahovec\u0107","name\_ASCII":"Rahovc\u0107","lat":42.3994,"lon":20.6547,"countryId":1,"country":null}, {"id":17,"name":"Gjilan\u0107","name\_ASCII":"Gjilan","lat":42.4689,"lon":21.4633,"countryId":1,"country":null}, {"id":18,"name":"Lipjan\u0107","name\_ASCII":"Lipjan","lat":42.5217,"lon":21.1258,"countryId":1,"country":null}, {"id":19,"name":"Obiliq\u0107","name\_ASCII":"Obiliq","lat":42.6869,"lon":21.0703,"countryId":1,"country":null}, {"id":20,"name":"Gjakove\u0107","name\_ASCII":"Gjakove","lat":42.3803,"lon":20.4308,"countryId":1,"country":null}, {"id":21,"name":"Pristina\u0107","name\_ASCII":"Pristina","lat":42.6666,"lon":21.1724,"countryId":1,"country":null}, {"id":22,"name":"Decan\u0107","name\_ASCII":"Decan","lat":42.5378,"lon":20.2911,"countryId":1,"country":null}, {"id":23,"name":"Istog\u0107","name\_ASCII":"Istog\u0107","lat":42.7808,"lon":20.4875,"countryId":1,"country":null}, {"id":24,"name":"Hani i Elezit\u0107","name\_ASCII":"Hani i Elezit","lat":42.1500,"lon":21.2967,"countryId":1,"country":null}, {"id":25,"name":"Junik\u0107","name\_ASCII":"Junik\u0107","lat":42.4758,"lon":20.2772,"countryId":1,"country":null}, {"id":26,"name":"Kilokot\u0107","name\_ASCII":"Kilokot\u0107","lat":42.3714,"lon":21.3744,"countryId":1,"country":null}, {"id":27,"name":"Mamushe\u0107","name\_ASCII":"Mamushe\u0107","lat":42.3308,"lon":20.7269,"countryId":1,"country":null}, {"id":28,"name":"Partesh\u0107","name\_ASCII":"Partesh\u0107","lat":42.4019,"lon":21.4336,"countryId":1,"country":null}, {"id":29,"name":"Ranillug\u0107","name\_ASCII":"Ranillug\u0107","lat":42.4922,"lon":21.5989,"countryId":1,"country":null}, {"id":30,"name":"Rushnica\u0107","name\_ASCII":"Rushnica\u0107","lat":42.3750,"lon":21.3750,"countryId":1,"country":null}]]

```
https://localhost:44334/api/Countries
```

```
[{"id":1,"name":"Kosovo","is02":"XK","is03":"XKS","cities":null}, {"id":2,"name":"Svalbard","is02":"XR","is03":"XSV","cities":null}, {"id":3,"name":"West Bank","is02":"XW","is03":"XWB","cities":null}, {"id":4,"name":"Yemen","is02":"YE","is03":"YEM","cities":null}, {"id":5,"name":"Mayotte","is02":"YT","is03":"MYT","cities":null}, {"id":6,"name":"South Africa","is02":"ZA","is03":"ZAF","cities":null}, {"id":7,"name":"Zambia","is02":"ZM","is03":"ZMB","cities":null}, {"id":8,"name":"Zimbabwe","is02":"ZW","is03":"ZWE","cities":null}, {"id":9,"name":"Kazakhstan","is02":"KZ","is03":"KAZ","cities":null}, {"id":10,"name":"Laos","is02":"LA","is03":"LAO","cities":null}, {"id":11,"name":"Lebanon","is02":"LB","is03":"LBN","cities":null}, {"id":12,"name":"Saint Lucia","is02":"LC","is03":"LCA","cities":null}, {"id":13,"name":"Liechtenstein","is02":"LI","is03":"LIE","cities":null}, {"id":14,"name":"Sri Lanka","is02":"LK","is03":"LKA","cities":null}, {"id":15,"name":"Liberia","is02":"LR","is03":"LBR","cities":null}, {"id":16,"name":"Lesotho","is02":"LS","is03":"LSO","cities":null}, {"id":17,"name":"Lithuania","is02":"LT","is03":"LTU","cities":null}, {"id":18,"name":"Luxembourg","is02":"LU","is03":"LUX","cities":null}, {"id":19,"name":"Latvia","is02":"LV","is03":"LVA","cities":null}, {"id":20,"name":"Libya","is02":"LY","is03":"LBY","cities":null}, {"id":21,"name":"Morocco","is02":"MA","is03":"MAR","cities":null}, {"id":22,"name":"Monaco","is02":"MC","is03":"MCO","cities":null}, {"id":23,"name":"Moldova","is02":"MD","is03":"MDA","cities":null}, {"id":24,"name":"Montenegro","is02":"ME","is03":"MNE","cities":null}, {"id":25,"name":"Saint Martin","is02":"MF","is03":"MAF","cities":null}, {"id":26,"name":"Madagascar","is02":"MG","is03":"MDG","cities":null}, {"id":27,"name":"Marshall Islands","is02":"MH","is03":"MHL","cities":null}, {"id":28,"name":"Macedonia","is02":"MK","is03":"MKD","cities":null}, {"id":29,"name":"Mali","is02":"ML","is03":"MLI","cities":null}, {"id":30,"name":"Burma","is02":"MM","is03":"MMR","cities":null}, {"id":31,"name":"Mongolia","is02":"MN","is03":"MNG","cities":null}, {"id":32,"name":"Macau","is02":"MO","is03":"MAC","cities":null}, {"id":33,"name":"Martinique","is02":"MQ","is03":"MTQ","cities":null}, {"id":34,"name":"Mauritania","is02":"MR","is03":"MRT","cities":null}, {"id":35,"name":"Montserrat","is02":"MS","is03":MSR,"cities":null}, {"id":36,"name":"Malta","is02":"MT","is03":MLT,"cities":null}, {"id":37,"name":"Mauritius","is02":MU,"is03":MUS,"cities":null}, {"id":38,"name":"Maldives","is02":MV,"is03":MDV,"cities":null}, {"id":39,"name":"Malawi","is02":MW,"is03":MWI,"cities":null}, {"id":40,"name":"Mexico","is02":MX,"is03":MEX,"cities":null}, {"id":41,"name":"Malaysia","is02":MY,"is03":MYS,"cities":null}, {"id":42,"name":"Mozambique","is02":MZ,"is03":MOZ,"cities":null}, {"id":43,"name":"Namibia","is02":NA,"is03":NAM,"cities":null}, {"id":44,"name":"New Caledonia","is02":NC,"is03":NCL,"cities":null}, {"id":45,"name":"Niger","is02":NE,"is03":NER,"cities":null}]
```

## Chapter 5: Fetching and Displaying Data

```
{"id":9793,"name":"New York","name_ASCII":"New York","lat":40.6943,"lon":-73.9249,"countryId":235,"country":null}
```



A screenshot of a Microsoft Edge browser window. The address bar shows the URL `https://localhost:44334/api/Cities/9793`. The main content area displays a JSON object:

```
{  
  "id": 9793,  
  "name": "New York",  
  "name_ASCII": "New York",  
  "lat": 40.6943,  
  "lon": -73.9249,  
  "countryId": 235,  
  "country": null  
}
```

WorldCities

WorldCities

Cities

Here's a list of cities: feel free to play with it.

ID	Name	Lat	Lon
1	Malishevë	42.4822	20.7458
2	Prizren	42.2139	20.7397
3	Zubin Potok	42.9144	20.6897
4	Kamenicë	42.5781	21.5803
5	Viti	42.3214	21.3583
6	Shtërpcë	42.2394	21.0272
7	Shtime	42.4331	21.0397
8	Vushtri	42.8231	20.9675

```
C:\Projects\Net5-Angular10\Chapter_05\WorldCities\ClientApp>ng add @angular/material
Installing packages for tooling via npm.
Installed packages for tooling via npm.
? Choose a prebuilt theme name, or "custom" for a custom theme: Indigo/Pink      [ Preview: https://material.angular.io?theme=indigo-pink ]
? Set up global Angular Material typography styles? Yes
? Set up browser animations for Angular Material? Yes
UPDATE package.json (1657 bytes)
UPDATE src/app/app.module.ts (1366 bytes)
UPDATE src/index.html (547 bytes)

C:\Projects\Net5-Angular10\Chapter_05\WorldCities\ClientApp>
```

The screenshot shows a Microsoft Edge browser window titled "WorldCities". The address bar displays the URL "https://localhost:44334/cities". The main content area has a header "WorldCities" and navigation links "Home" and "Cities". Below this, a section titled "Cities" contains the text "Here's a list of cities: feel free to play with it." followed by a table listing 11 cities with their IDs, names, latitudes, and longitudes.

ID	Name	Latitude	Longitude
1	Malishevë	42.4822	20.7458
2	Prizren	42.2139	20.7397
3	Zubin Potok	42.9144	20.6897
4	Kamenicë	42.5781	21.5803
5	Viti	42.3214	21.3583
6	Shtërpçë	42.2394	21.0272
7	Shtime	42.4331	21.0397
8	Vushtri	42.8231	20.9675
9	Dragash	42.0265	20.6533
10	Podujevë	42.9111	21.1899
11	Fushë Kosovë	42.6639	21.0961

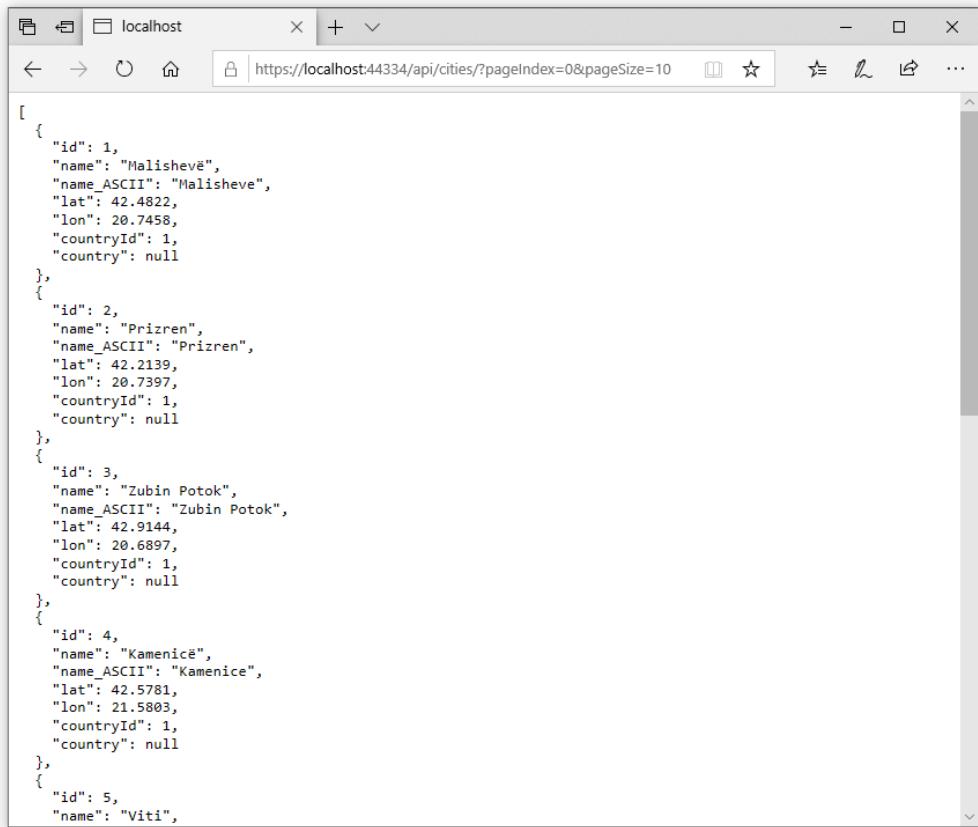
The screenshot shows a web browser window titled "WorldCities" with the URL "https://localhost:44334/cities". The page displays a table of city data and a navigation bar.

**Table Data:**

ID	Name	Latitude	Longitude
1	Malishevë	42.4822	20.7458
2	Prizren	42.2139	20.7397
3	Zubin Potok	42.9144	20.6897
4	Kamenicë	42.5781	21.5803
5	Viti	42.3214	21.3583
6	Shtërpcë	42.2394	21.0272
7	Shtime	42.4331	21.0397
8	Vushtrri	42.8231	20.9675
9	Dragash	42.0265	20.6533
10	Podujevë	42.9111	21.1899

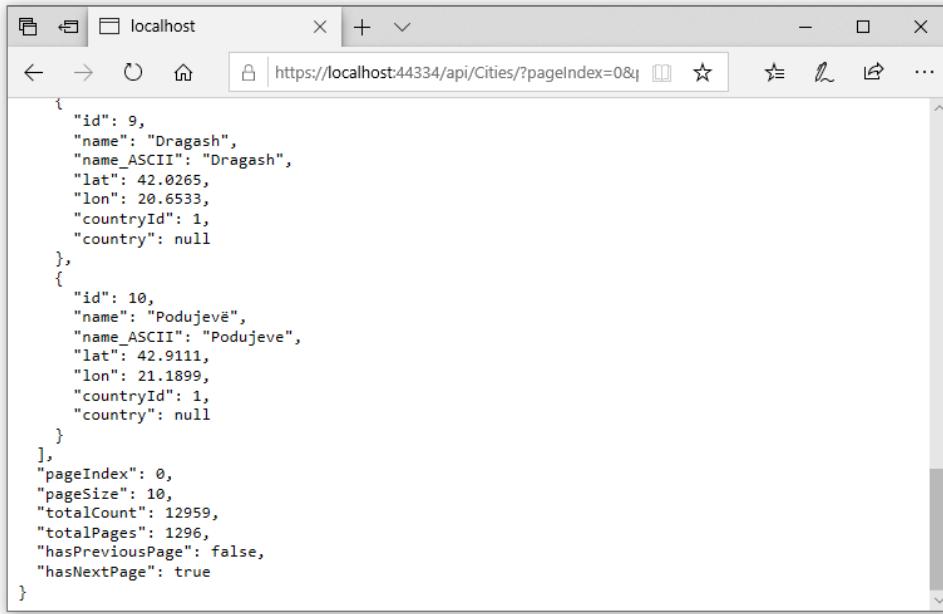
**Page Navigation:**

Items per page:  1 – 10 of 12959 |< < > >|



A screenshot of a Microsoft Edge browser window. The address bar shows the URL: `https://localhost:44334/api/cities/?pageIndex=0&pageSize=10`. The page content displays a JSON array of city objects:

```
[{"id": 1, "name": "Malishevë", "name_ASCII": "Malisheve", "lat": 42.4822, "lon": 20.7458, "countryId": 1, "country": null}, {"id": 2, "name": "Prizren", "name_ASCII": "Prizren", "lat": 42.2139, "lon": 20.7397, "countryId": 1, "country": null}, {"id": 3, "name": "Zubin Potok", "name_ASCII": "Zubin Potok", "lat": 42.9144, "lon": 20.6897, "countryId": 1, "country": null}, {"id": 4, "name": "Kamenicë", "name_ASCII": "Kamenice", "lat": 42.5781, "lon": 21.5803, "countryId": 1, "country": null}, {"id": 5, "name": "Viti", "name_ASCII": "Viti", "lat": 42.5781, "lon": 21.5803, "countryId": 1, "country": null}]
```



A screenshot of a Microsoft Edge browser window. The address bar shows the URL <https://localhost:44334/api/Cities/?pageIndex=0&pageSize=10>. The main content area displays a JSON object representing a paginated list of cities. The object includes an array of city objects, each with properties like id, name, name\_ASCII, lat, lon, countryId, and country. It also includes pageIndex, pageSize, totalCount, totalPages, hasPreviousPage, and hasNextPage properties.

```
{
  "id": 9,
  "name": "Dragash",
  "name_ASCII": "Dragash",
  "lat": 42.0265,
  "lon": 20.6533,
  "countryId": 1,
  "country": null
},
{
  "id": 10,
  "name": "Podujevë",
  "name_ASCII": "Podujeve",
  "lat": 42.9111,
  "lon": 21.1899,
  "countryId": 1,
  "country": null
},
],
"pageIndex": 0,
"pageSize": 10,
"totalCount": 12959,
"totalPages": 1296,
"hasPreviousPage": false,
"hasNextPage": true
}
```

## Cities

Here's a list of cities: feel free to play with it.

ID	Name	Latitude	Longitude
1	Malishevë	42.4822	20.7458
2	Prizren	42.2139	20.7397
3	Zubin Potok	42.9144	20.6897
4	Kamenicë	42.5781	21.5803
5	Viti	42.3214	21.3583
6	Shtërpcë	42.2394	21.0272
7	Shtime	42.4331	21.0397
8	Vushtrri	42.8231	20.9675
9	Dragash	42.0265	20.6533
10	Podujevë	42.9111	21.1899

Items per page:  1 - 10 of 12959 | < < > >|

## Cities

Here's a list of cities: feel free to play with it.

ID	Name ↑	Latitude	Longitude
7835	'Ajlūn	32.3333	35.7528
3954	'Ajmān	25.4056	55.4618
51	'Amrān	15.6594	43.9439
4172	25 de Mayo	-37.8	-67.6833
4092	28 de Noviembre	-51.65	-72.3
6377	Aalborg	57.0337	9.9166
5579	Aarau	47.3896	8.0524
5607	Aarau	47.39	8.034
7096	Aasiaat	68.7167	-52.8667
1378	Aba	5.1004	7.35

Items per page: 10 ▾

1 – 10 of 12959

| < < > > |

## Cities

Here's a list of cities: feel free to play with it.

Filter by name (or part of it)...

ID	Name ↑	Latitude	Longitude
7835	'Ajlūn	32.3333	35.7528
3954	'Ajmān	25.4056	55.4618
51	'Amrān	15.6594	43.9439
4172	25 de Mayo	-37.8	-67.6833
4092	28 de Noviembre	-51.65	-72.3
6377	Aalborg	57.0337	9.9166
5579	Aarau	47.3896	8.0524
5607	Aarau	47.39	8.034
7096	Aasiaat	68.7167	-52.8667
1378	Aba	5.1004	7.35

Items per page:  | < < > > |

## Cities

Here's a list of cities: feel free to play with it.

Filter by name (or part of it)...

New York

ID	Name ↑	Latitude	Longitude
9793	New York	40.6943	-73.9249
8771	West New York	40.7856	-74.0093

Items per page:  | < < > > |

A screenshot of a Microsoft Edge browser window. The address bar shows the URL `https://localhost:44334/api/Countries/?pageIndex=0&pageSize=2`. The page content displays a JSON object representing a paginated list of countries. The object has properties: `items` (an array of two country objects), `pageIndex`, `pageSize`, `totalCount`, `totalPages`, `hasPreviousPage`, `hasNextPage`, `sortColumn`, `sortOrder`, `filterColumn`, and `filterQuery`.

```
{
  "items": [
    {
      "id": 1,
      "name": "Kosovo",
      "iso2": "XK",
      "iso3": "XKS",
      "cities": null
    },
    {
      "id": 2,
      "name": "Svalbard",
      "iso2": "XR",
      "iso3": "XSV",
      "cities": null
    }
  ],
  "pageIndex": 0,
  "pageSize": 2,
  "totalCount": 235,
  "totalPages": 118,
  "hasPreviousPage": false,
  "hasNextPage": true,
  "sortColumn": null,
  "sortOrder": null,
  "filterColumn": null,
  "filterQuery": null
}
```

A screenshot of a Microsoft Edge browser window, identical to the one above, displaying the same JSON response from the REST API endpoint `https://localhost:44334/api/Countries/?pageIndex=0&pageSize=2`. The JSON object represents a paginated list of countries, specifically Kosovo and Svalbard.

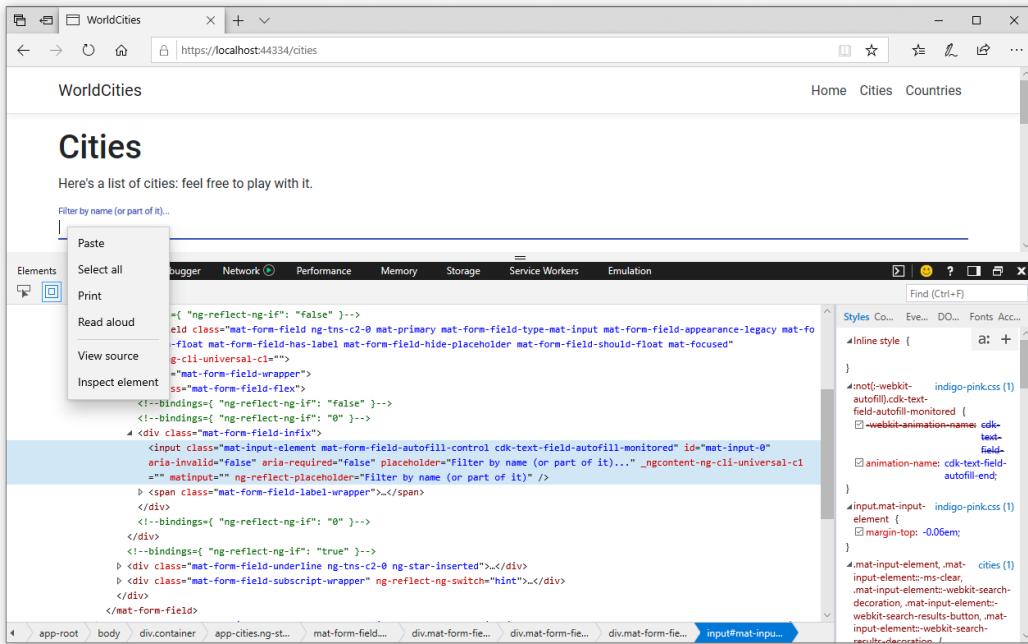
```
{
  "items": [
    {
      "id": 1,
      "name": "Kosovo",
      "iso2": "XK",
      "iso3": "XKS",
      "cities": null
    },
    {
      "id": 2,
      "name": "Svalbard",
      "iso2": "XR",
      "iso3": "XSV",
      "cities": null
    }
  ],
  "pageIndex": 0,
  "pageSize": 2,
  "totalCount": 235,
  "totalPages": 118,
  "hasPreviousPage": false,
  "hasNextPage": true,
  "sortColumn": null,
  "sortOrder": null,
  "filterColumn": null,
  "filterQuery": null
}
```

The screenshot shows a web browser window with the title "WorldCities" and the URL "https://localhost:44334/countries". The page displays a list of countries with columns for ID, Name, Latitude, and Longitude. A search bar at the top allows filtering by country name. The table includes entries for Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua And Barbuda, Argentina, and Armenia. At the bottom, there are pagination controls for items per page (set to 10) and a range of 1-10 of 235.

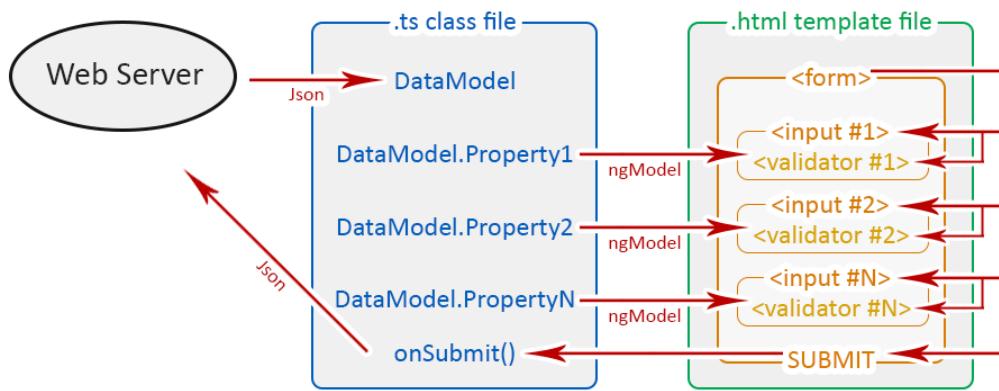
ID	Name ↑	Latitude	Longitude
120	Afghanistan	AF	AFG
123	Albania	AL	ALB
173	Algeria	DZ	DZA
232	American Samoa	AS	ASM
118	Andorra	AD	AND
125	Angola	AO	AGO
122	Anguilla	AI	AIA
121	Antigua And Barbuda	AG	ATG
126	Argentina	AR	ARG
124	Armenia	AM	ARM

Items per page: 10 | < < > >| 1 – 10 of 235

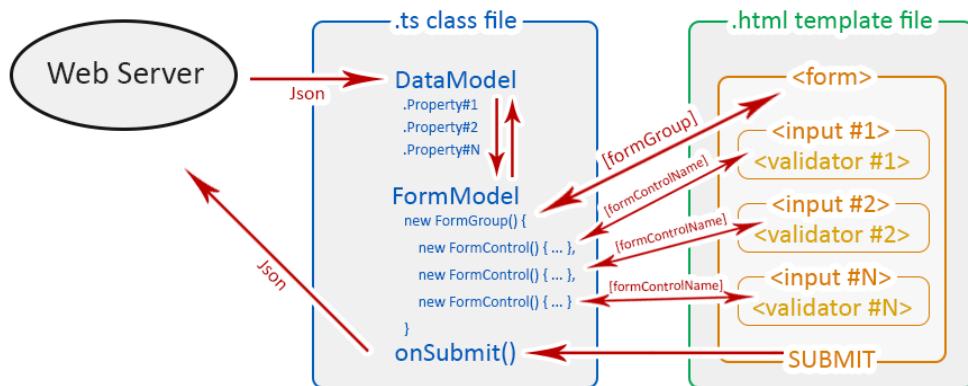
# Chapter 6: Forms and Data Validation



## Template-Driven Forms



## Model-Driven Forms



## Master

ID	Name	Lat	Lon
1	Rome	10	10
2	Paris	20	20
3	Berlin	15	18
4	Oslo	12	16
5	Helsinki	12	16
6	Madrid	12	16
7	Prague	12	16

## Detail

Edit City

Name	<input type="text" value="Paris"/>
Lat	<input type="text" value="20"/>
Lon	<input type="text" value="20"/>
<input type="button" value="Save"/>	<input type="button" value="Cancel"/>



The screenshot shows a web browser window titled "WorldCities" with the URL "https://localhost:44334/cities". The page displays a list of cities with columns for ID, Name, Latitude, and Longitude. A search bar at the top allows filtering by name. The table includes entries for Ajlun, Ajman, Amran, 25 de Mayo, 28 de Noviembre, Aalborg, Aarau, Aarau, Asiaat, and Aba. At the bottom, there are pagination controls for items per page (set to 10) and a range of 1-10 of 12959.

ID	Name ↑	Latitude	Longitude
7835	'Ajlūn	32.3333	35.7528
3954	'Ajmān	25.4056	55.4618
51	'Amrān	15.6594	43.9439
4172	25 de Mayo	-37.8	-67.6833
4092	28 de Noviembre	-51.65	-72.3
6377	Aalborg	57.0337	9.9166
5579	Aarau	47.3896	8.0524
5607	Aarau	47.39	8.034
7096	Aasiaat	68.7167	-52.8667
1378	Aba	5.1004	7.35

Items per page: 10 | < < > >|

WorldCities

WorldCities

Home Cities Countries

## Edit - Paris

City name:

City latitude:

City longitude:

**Apply Changes** **Cancel**

City longitude:

**Create** **Cancel**

Console

Default levels ▾

POST https://localhost:44334/api/cities 500 zone-evergreen.js:2952

```
city-edit.component.ts:101
error: "Microsoft.EntityFrameworkCore.DbUpdateException: An error occurred while updating the entries. See the inner exception for details.
--> Microsoft.Data.SqlClient.SqlException (0x80131904): The INSERT statement conflicted with the FOREIGN KEY constraint "FK_Cities_Cou
The statement has been terminated.
at Microsoft.Data.SqlClient.SqlCommand.<>c.<ExecuteDbDataReaderAsync>b__164_0(Task`1 result)
at System.Threading.Tasks.ContinuationResultTaskFromResultTask`2.InnerInvoke()
at System.Threading.ExecutionContext.RunInternal(ExecutionContext executionContext, ContextCallback callback, Object state)
--- End of stack trace from previous location where exception was thrown ---
at System.Threading.Tasks.Task.ExecuteWithThreadLocal(Task& currentTaskSlot, Thread threadPoolThread)
--- End of stack trace from previous location where exception was thrown ---
at Microsoft.EntityFrameworkCore.Storage.RelationalCommand.ExecuteReaderAsync(RelationalCommandParameterObject parameterObject, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Storage.RelationalCommand.ExecuteReaderAsync(RelationalCommandParameterObject parameterObject, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Storage.RelationalCommand.ExecuteReaderAsync(RelationalCommandParameterObject parameterObject, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Update.ReaderModificationCommandBatch.ExecuteNonQuery(IRelationalConnection connection, CancellationToken cancellationToken)
ClientConnectionId:e04412e5-acf7-45b8-8787-66d13994ce1c
Error Number:547,State:0,Class:16
--- End of inner exception stack trace ---
at Microsoft.EntityFrameworkCore.Update.ReaderModificationCommandBatch.ExecuteNonQuery(IRelationalConnection connection, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Update.Internal.BatchExecutor.ExecuteAsync(DbContext _, ValueTuple`2 parameters, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Update.Internal.BatchExecutor.ExecuteAsync(DbContext _, ValueTuple`2 parameters, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.Storage.Internal.SqlServerExecutionStrategy.ExecuteNonQuery[TState,TResult](TState state, Func`2 execute, CancellationToken cancellationToken)
at Microsoft.EntityFrameworkCore.ChangeTracking.Internal.StateManager.SaveChangesAsync(IList`1 entriesToSave, CancellationToken cancellationToken)
```

## Create a new City

City name:

City latitude:

City longitude:

Country:

CreateCancel

## Create a new City

City name:

City latitude:

City longitude:

Country:

CreateCancel

# Cities

Here's a list of cities: feel free to play with it.

[Add a new City](#)

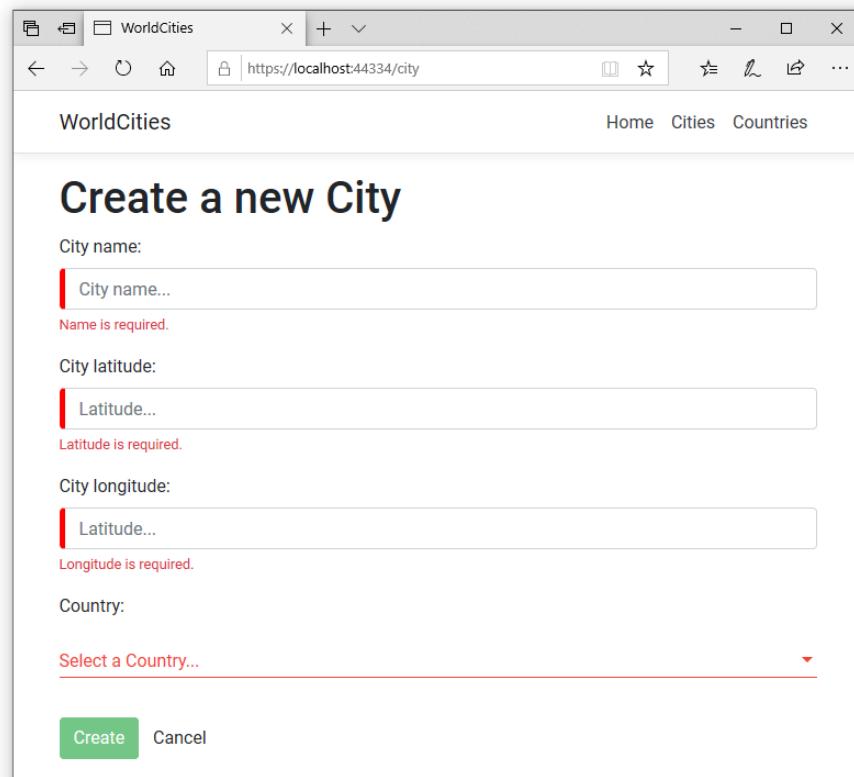
Filter by name (or part of it)...

New Tokyo

---

ID	Name ↑	Latitude	Longitude
12960	New Tokyo	35.685	139.7514

Items per page: 10 ▼    1 – 1 of 1    |< < > >|



The screenshot shows a browser window titled "WorldCities" with the URL "https://localhost:44334/city". The page has a header with "WorldCities" and navigation links for "Home", "Cities", and "Countries". Below the header, the main content area is titled "Create a new City". It contains four input fields with validation messages:

- City name:** A text input field with a red border and placeholder "City name...". Below it is a red error message: "Name is required."
- City latitude:** A text input field with a red border and placeholder "Latitude...". Below it is a red error message: "Latitude is required."
- City longitude:** A text input field with a red border and placeholder "Latitude...". Below it is a red error message: "Longitude is required."
- Country:** A dropdown menu with a red border and placeholder "Select a Country...".

At the bottom of the form are two buttons: a green "Create" button and a "Cancel" button.

# Cities

Here's a list of cities: feel free to play with it.

[Add a new City](#)

Filter by name (or part of it)...

paris

ID	Name ↑	Latitude	Longitude
6736	Paris	48.8667	2.3333
9270	Paris	33.6689	-95.5462
9625	Paris	36.2934	-88.3065
11089	Paris	39.6148	-87.6904
12817	Paris	38.2015	-84.2717

Items per page: 10 ▾ 1 – 5 of 5 | &lt; &lt; &gt; &gt;|

## Create a new City

**ERROR:** A city with the same *name, lat, lon* and *country* already exists.

City name:

New Tokyo

City latitude:

35.685

City longitude:

139.7514

Country:

Select a Country...

Japan ▾

[Create](#) Cancel

# Countries

Here's a list of countries: feel free to play with it.

[Add a new Country](#)

Filter by name (or part of it)...

ID	Name ↑	ISO 2	ISO 3
120	<a href="#">Afghanistan</a>	AF	AFG
123	<a href="#">Albania</a>	AL	ALB
173	<a href="#">Algeria</a>	DZ	DZA
232	<a href="#">American Samoa</a>	AS	ASM
118	<a href="#">Andorra</a>	AD	AND
125	<a href="#">Angola</a>	AO	AGO
122	<a href="#">Anguilla</a>	AI	AIA
121	<a href="#">Antigua And Barbuda</a>	AG	ATG
126	<a href="#">Argentina</a>	AR	ARG
124	<a href="#">Armenia</a>	AM	ARM

Items per page:  ▾

1 – 10 of 236

| < < > > |

## Edit - Denmark

Country name:

ISO 3166-1 ALPHA-2 Country Code (2 letters)

ISO 3166-1 ALPHA-3 Country Code (3 letters)

[Save](#) [Cancel](#)

## Edit - Denmark

Country name:

Name already exists: please choose another.

ISO 3166-1 ALPHA-2 Country Code (2 letters)

This ISO 3166-1 ALPHA-2 country code already exists: please choose another.

ISO 3166-1 ALPHA-3 Country Code (3 letters)

[Save](#) [Cancel](#)

## Create a new Country

Country name:

ISO 3166-1 ALPHA-2 Country Code (2 letters)

This ISO 3166-1 ALPHA-2 country code already exists: please choose another.

ISO 3166-1 ALPHA-3 Country Code (3 letters)

ISO 3166-1 ALPHA-3 country code requires 3 letters.

CreateCancel

## Countries

Here's a list of countries: feel free to play with it.

Add a new Country

Filter by name (or part of it)...

New Japan

ID	Name ↑	ISO 2	ISO 3
236	New Japan	NJ	NJP

Items per page: 10 ▾

1 – 1 of 1

|< < > >|

## Chapter 7: Code Tweaks and Data Services

The screenshot shows a web browser window titled "WorldCities" with the URL "https://localhost:44334/city/6625". The page displays an "Edit - Madrid" form. The "City name:" field contains "Madrid". The "City latitude:" field contains "WRONG!", with a red error message below it stating "Latitude requires a positive or negative number with 0-4 decimal values.". The "City longitude:" field contains "ALSO WRONG!", with a red error message below it stating "Longitude requires a positive or negative number with 0-4 decimal values.". The "Country:" dropdown menu is set to "Spain". At the bottom of the form are "Save" and "Cancel" buttons.

WorldCities

https://localhost:44334/city/6625

WorldCities

Home Cities Countries

### Edit - Madrid

City name:

Madrid

City latitude:

WRONG!

Latitude requires a positive or negative number with 0-4 decimal values.

City longitude:

ALSO WRONG!

Longitude requires a positive or negative number with 0-4 decimal values.

Country:

Select a Country...

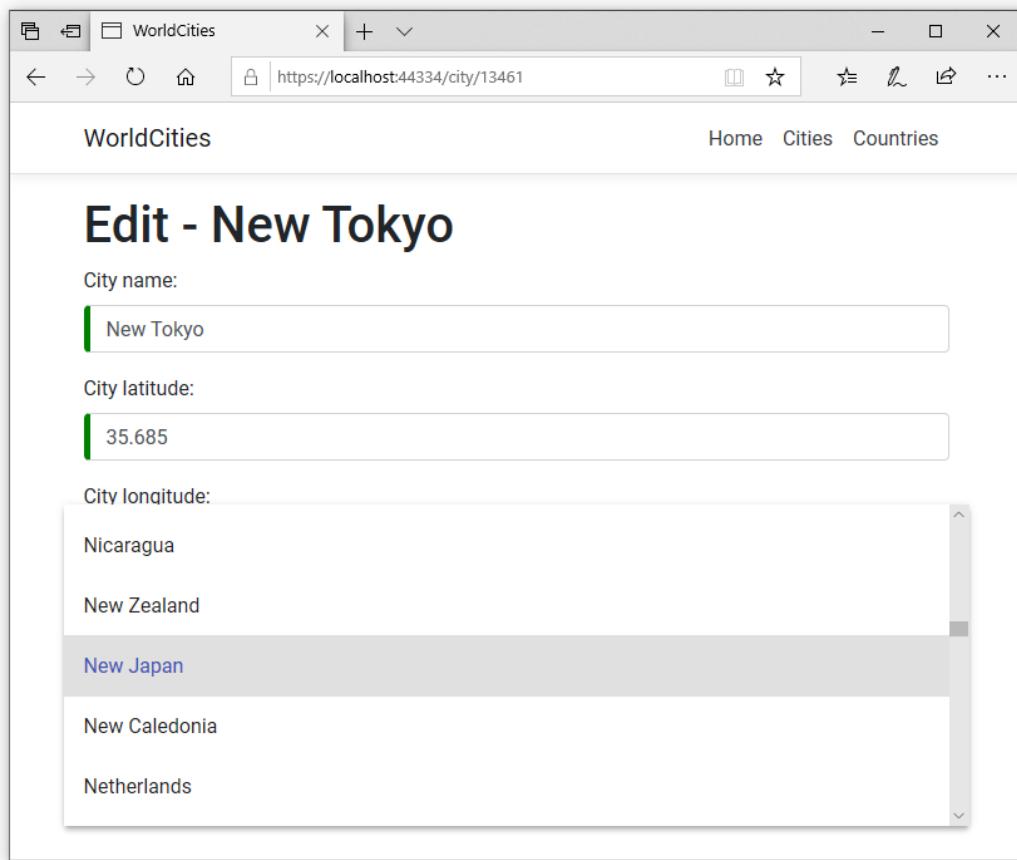
Spain

Save Cancel

The screenshot shows a web browser window titled "WorldCities" with the URL "https://localhost:44334/countries". The page has a header with "WorldCities" and navigation links for "Home", "Cities", and "Countries". Below the header is a large heading "Countries" and a subtext "Here's a list of countries: feel free to play with it.". A green button labeled "Add a new Country" is visible. A search bar with the placeholder "Filter by name (or part of it)..." is present. A table lists 10 countries with columns: ID, Name, ISO 2, ISO 3, and Tot. Cities. The table includes rows for Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua And Barbuda, Argentina, and Armenia. At the bottom, there is a pagination control with "Items per page: 10" and navigation icons for page 1 of 236.

ID	Name	ISO 2	ISO 3	Tot. Cities
120	<a href="#">Afghanistan</a>	AF	AFG	41
123	<a href="#">Albania</a>	AL	ALB	26
173	<a href="#">Algeria</a>	DZ	DZA	60
232	<a href="#">American Samoa</a>	AS	ASM	1
118	<a href="#">Andorra</a>	AD	AND	7
125	<a href="#">Angola</a>	AO	AGO	49
122	<a href="#">Anguilla</a>	AI	AIA	1
121	<a href="#">Antigua And Barbuda</a>	AG	ATG	1
126	<a href="#">Argentina</a>	AR	ARG	155
124	<a href="#">Armenia</a>	AM	ARM	12

Items per page: 10 | < < > >| 1 – 10 of 236



The screenshot shows a web browser window titled "WorldCities". The address bar displays the URL "https://localhost:44334/countries". The main content area is titled "Countries" and contains the following text: "Here's a list of countries: feel free to play with it." Below this, there is a search bar with the placeholder "Filter by name (or part of it...)". A green button labeled "Add a new Country" is visible. A table lists one country entry:

ID	Name ↑	ISO 2	ISO 3	Tot. Cities
236	New Japan	NJ	NJP	1

At the bottom of the page, there is a pagination control with the text "Items per page: 10" and a dropdown arrow, followed by "1 - 1 of 1" and navigation icons.

The screenshot shows a web browser window titled "WorldCities" with the URL "https://localhost:44334/cities". The page has a header with "WorldCities" and navigation links for "Home", "Cities", and "Countries". Below the header is a large heading "Cities" and a subtext "Here's a list of cities: feel free to play with it.". A green button labeled "Add a new City" is visible. A search bar with the placeholder "Filter by name (or part of it)...". A table lists 10 cities from a larger dataset:

ID	Name ↑	Latitude	Longitude	Country
7835	'Ajlūn	32.3333	35.7528	Jordan
3954	'Ajmān	25.4056	55.4618	United Arab Emirates
51	'Amrān	15.6594	43.9439	Yemen
4172	25 de Mayo	-37.8	-67.6833	Argentina
4092	28 de Noviembre	-51.65	-72.3	Argentina
6377	Aalborg	57.0337	9.9166	Denmark
5579	Aarau	47.3896	8.0524	Switzerland
5607	Aarau	47.39	8.034	Switzerland
7096	Aasiaat	68.7167	-52.8667	Greenland
1378	Aba	5.1004	7.35	Nigeria

At the bottom, there are pagination controls: "Items per page: 10" with a dropdown arrow, "1 – 10 of 12960", and navigation icons for first, previous, next, and last pages.

The screenshot shows a web browser window titled "WorldCities". The address bar displays the URL "https://localhost:44334/country/220". The main content area is a form titled "Edit - Jordan". The form has three input fields: "Country name" containing "Jordan", "ISO 3166-1 ALPHA-2 Country Code (2 letters)" containing "JO", and "ISO 3166-1 ALPHA-3 Country Code (3 letters)" containing "JOR". Below the form are two buttons: "Save" (highlighted in green) and "Cancel". At the top right of the browser window, there are navigation links: "Home", "Cities", and "Countries".

WorldCities

Home Cities Countries

## Edit - Jordan

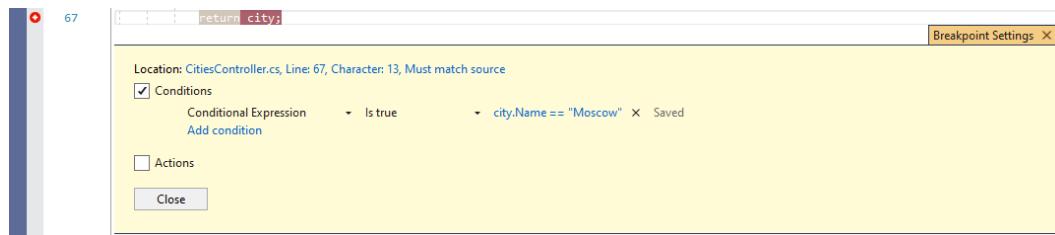
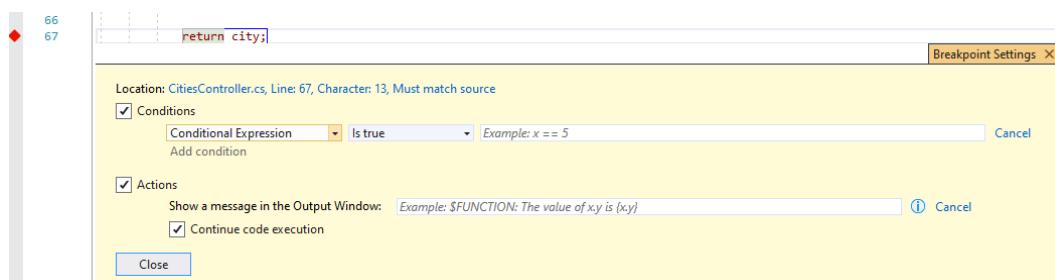
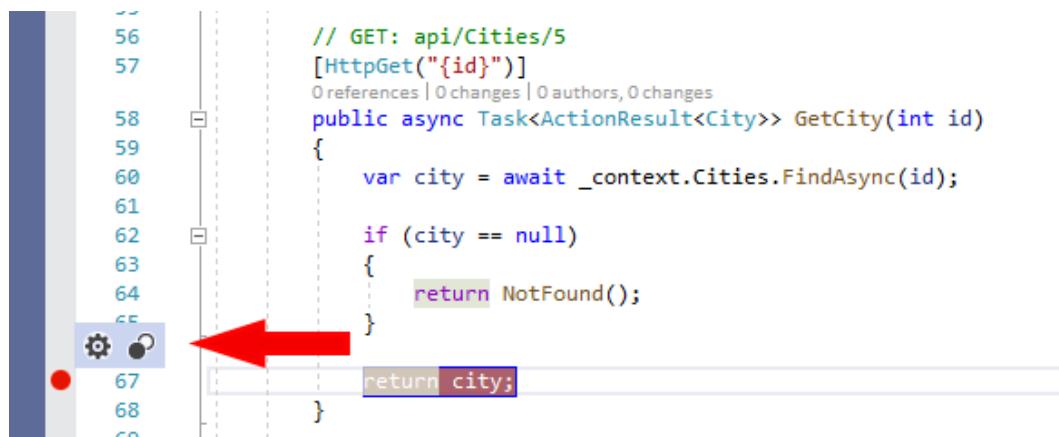
Country name:

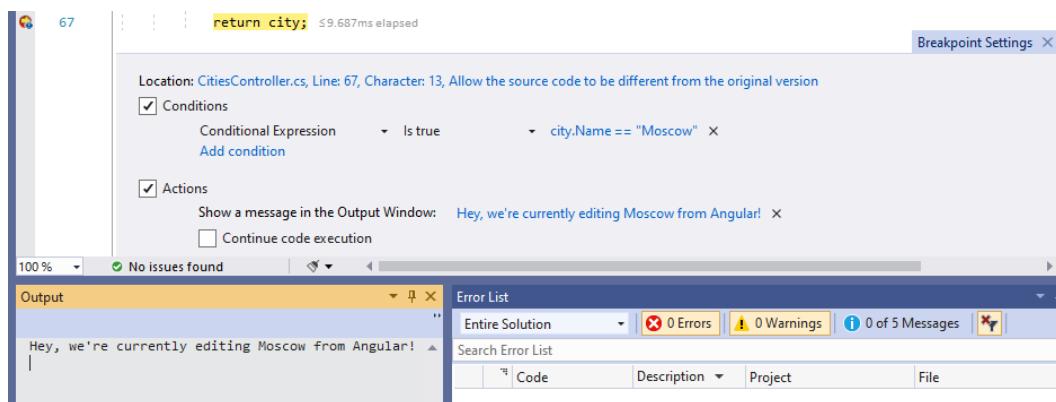
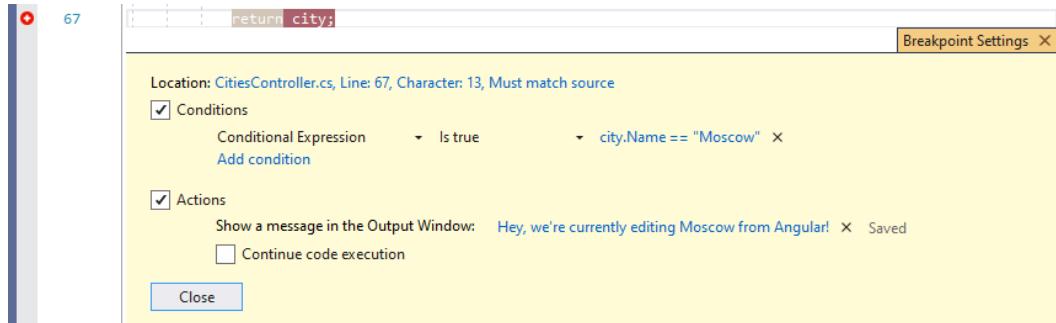
ISO 3166-1 ALPHA-2 Country Code (2 letters)

ISO 3166-1 ALPHA-3 Country Code (3 letters)

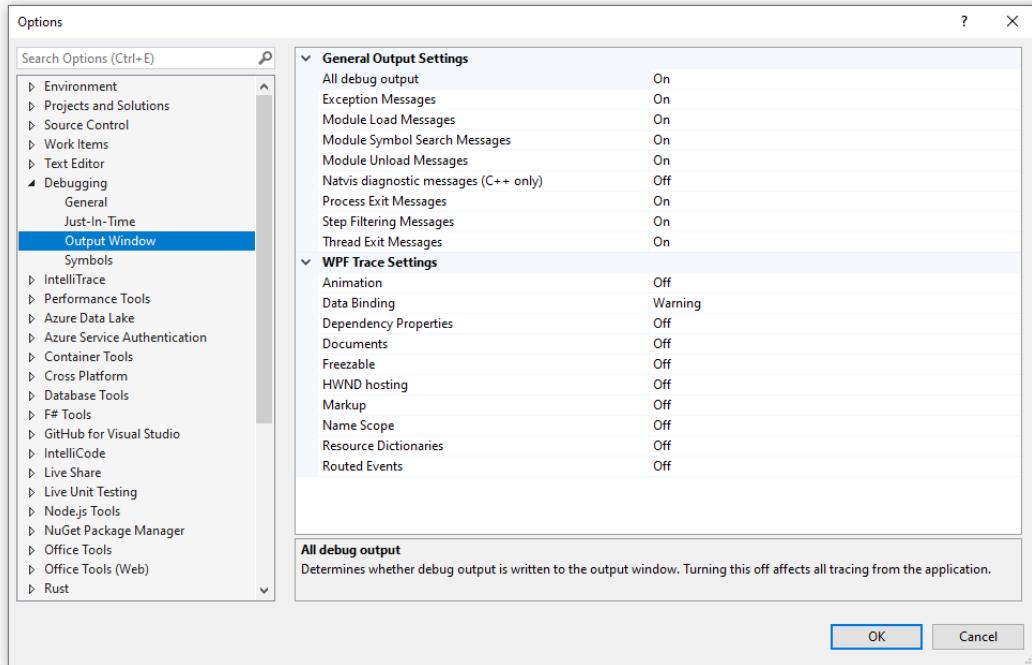
**Save** Cancel

## Chapter 8: Backend and Frontend Debugging





```
Output
Show output from: Debug
END
Microsoft.AspNetCore.Hosting.Diagnostics: Information: Request starting HTTP/2.0 POST https://localhost:44334/
Microsoft.AspNetCore.Routing.EndpointMiddleware: Information: Executing endpoint 'WorldCities.Controllers.Citi
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Executed action method WorldCiti
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Route matched with {action = "Is}
Microsoft.AspNetCore.Mvc.Infrastructure.ObjectResultExecutor: Information: Executing ObjectResult, writing val
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Executed action WorldCities.Cont
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Executing action method WorldCiti
Microsoft.AspNetCore.Routing.EndpointMiddleware: Information: Executed endpoint 'WorldCities.Controllers.Citi
Microsoft.EntityFrameworkCore.Infrastructure: Information: Entity Framework Core 3.0.0 initialized 'Applicatio
Microsoft.AspNetCore.Hosting.Diagnostics: Information: Request finished in 64.9188ms 200 application/json; cha
Microsoft.EntityFrameworkCore.Database.Command: Information: Executing DbCommand [Parameters=@__city_Name_0='
SELECT CASE
    WHEN EXISTS (
        SELECT 1
        FROM [Cities] AS [c]
        WHERE (((((c).[Name] = @__city_Name_0) AND ([c].[Name] IS NOT NULL AND @__city_Name_0 IS NOT NULL)) )
    ELSE CAST(0 AS bit)
END
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Executed action method WorldCiti
Microsoft.AspNetCore.Mvc.Infrastructure.ObjectResultExecutor: Information: Executing ObjectResult, writing val
Microsoft.AspNetCore.Mvc.Infrastructure.ControllerActionInvoker: Information: Executed action WorldCities.Cont
Microsoft.AspNetCore.Routing.EndpointMiddleware: Information: Executed endpoint 'WorldCities.Controllers.Citi
Microsoft.AspNetCore.Hosting.Diagnostics: Information: Request finished in 66.8664ms 200 application/json; cha
```



The screenshot shows a code editor and a 'Text Visualizer' window. The code editor displays a C# file with several lines of code. Lines 81 through 116 are visible, including a query that retrieves data from a database using LINQ and then converts it to SQL. The 'Text Visualizer' window is open, showing the generated SQL query. The SQL query is as follows:

```

SELECT [c0].[id], [c0].[Name], [c0].[ISO2], [c0].[ISO3], (
    SELECT COUNT(*)
    FROM [Cities] AS [c]
    WHERE [c0].[id] = [c].[CountryId]) AS [TotCities]
FROM [Countries] AS [c0]
ORDER BY [c0].[Name]
OFFSET @_p_0 ROWS FETCH NEXT @_p_1 ROWS ONLY
  
```

The 'Text Visualizer' window also includes buttons for 'Close' and 'Help'.

```
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
```

var filterColumn = (this.filterQuery)  
? this.defaultFilterColumn  
: null;  
  
var filterQuery = (this.filterQuery)  
? this.filterQuery  
: null;  
  
this.countryService.getData<ApiResult<Country>>(  
event.pageIndex,  
event.pageSize,  
sortColumn,  
sortOrder,  
filterColumn,  
filterQuery)  
.subscribe(result => {  
 this.paginator.length = result.totalCount;  
 this.paginator.pageIndex = result.pageIndex;  
 this.paginator.pageSize = result.pageSize;  
 this.countries = new MatTableDataSource<Country>(result.data);  
, error => console.error(error));  
}

JavaScript debugging warning  
You just set a breakpoint in JavaScript code, but JavaScript debugging is disabled. Visual Studio will not be able to stop at this breakpoint unless you enable JavaScript debugging.  
→ Enable JavaScript Debugging  
→ Continue Debugging  
→ Continue Debugging (Don't Ask Again)

```
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
```

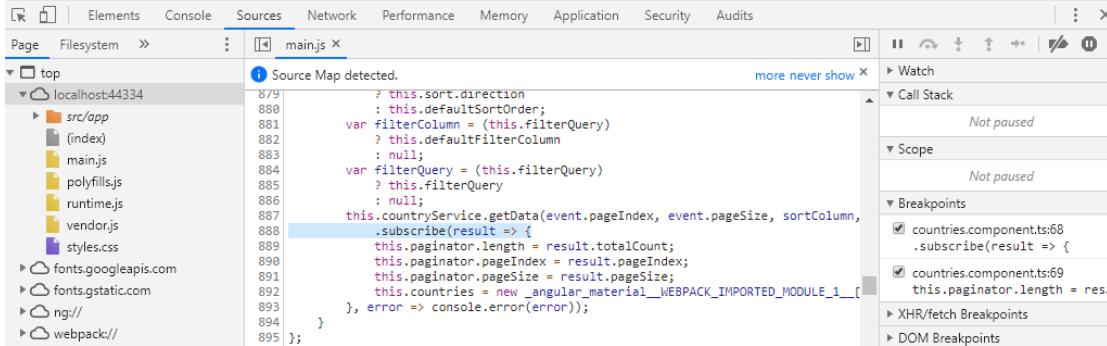
this.countryService.getData<ApiResult<Country>>(  
event.pageIndex,  
event.pageSize,  
sortColumn,  
sortOrder,  
filterColumn,  
filterQuery)  
.subscribe(result => {  
 this.paginator.length = result.totalCount;  
 this.paginator.pageIndex = result.pageIndex;  
 this.paginator.pageSize = result.pageSize;  
 this.countries = new MatTableDataSource<Country>(result.data);  
, error => console.error(error));  
}

result Object {data: Array(10), pageIndex: 0, pageSize: 10, ...} ↴  
 ↴ data Array(10) [Object, Object, Object, ...]  
 ↴ length 10  
 ↴ 0 Object {id: 120, name: "Afghanistan", iso2: "AF", ...}  
 ↴ 1 Object {id: 123, name: "Albania", iso2: "AL", ...}  
 ↴ 2 Object {id: 173, name: "Algeria", iso2: "DZ", ...}  
 ↴ 3 Object {id: 232, name: "American Samoa", iso2: "AS", ...}  
 ↴ 4 Object {id: 118, name: "Andorra", iso2: "AD", ...}  
 ↴ 5 Object {id: 125, name: "Angola", iso2: "AO", ...}  
 ↴ 6 Object {id: 122, name: "Anguilla", iso2: "AI", ...}  
 ↴ 7 Object {id: 121, name: "Antigua And Barbuda", iso2: "AG", ...}  
 ↴ 8 Object {id: 126, name: "Argentina", iso2: "AR", ...}  
 ↴ 9 Object {id: 124, name: "Armenia", iso2: "AM", ...}  
 ↴ \_\_proto\_\_ Array(0) [ ... ]

Add a new Country

Filter by name (or part of it)...

ID	Name ↑	ISO 2	ISO 3	Tot. Cities
120	Afghanistan	AF	AFG	41
123	Albania	AL	ALB	26
173	Algeria	DZ	DZA	60
232	American Samoa	AS	ASM	1

The screenshot shows the Chrome DevTools Sources tab for the file main.js. A breakpoint is set at line 895. The code snippet is as follows:

```
    // this.sort.direction
    // this.defaultSortOrder;
    var filterColumn = (this.filterQuery)
    ? this.defaultFilterColumn
    : null;
    var filterQuery = (this.filterQuery)
    ? this.filterQuery
    : null;
    this.countryService.getData(event.pageIndex, event.pageSize, sortColumn,
    .subscribe(result => {
        this.paginator.length = result.totalCount;
        this.paginator.pageIndex = result.pageIndex;
        this.paginator.pageSize = result.pageSize;
        this.countries = new _angular_material_IMPORTED_MODULE_1_[
            ], error => console.error(error));
    }
);
```

The Breakpoints sidebar on the right shows two checked breakpoints in countries.component.ts:68 and countries.component.ts:69.

# Countries

Here's a list of countries: feel free to play with it.

Add a new Country

Filter by name (or part of it)...

ID	Name ↑	ISO 2	ISO 3	Tot. Cities
120	Afghanistan	AF	AFG	41

Elements Console Sources Network Performance Memory Application Security Audits

Page Filesystem >> main.js countries.component.ts x

```
53 var filterColumn = (this.filterQuery)
54   ? this.defaultFilterColumn
55   : null;
56
57 var filterQuery = (this.filterQuery)
58   ? this.filterQuery
59   : null;
60
61 this.countryService.getData<ApiResponse<Country>>(
62   event.pageIndex,
63   event.pageSize,
64   sortColumn,
65   sortOrder,
66   filterColumn,
67   filterQuery)
68 .subscribe(result => {
69   this.paginator.length = result.totalCount;
70   this.paginator.pageIndex = result.pageIndex;
71   this.paginator.pageSize = result.pageSize;
72   this.countries = new MatTableDataSource<Country>(result.data);
73 }, error => console.error(error));
74 }
75 }
```

Watch Call Stack Scope Not paused Breakpoints XHR/fetch Breakpoints DOM Breakpoints Global Listeners Event Listener Breakpoints

# Countries

Here's a list of countries: feel free to play with it.

Loading...

Elements Console Sources Network Performance Memory Application Security Audits

Page Filesystem >> main.js x

Source Map detected. more never show

```
878 var sortOrder = (this.sort)
879   ? this.sort.direction
880   : this.defaultSortOrder;
881 var filterColumn = (this.filterQuery)
882   ? this.defaultFilterColumn
883   : null;
884 var filterQuery = (this.filterQuery)
885   ? this.filterQuery
886   : null;
887 this.countryService.getData(event.pageIndex, event.pageSize, sortColumn,
888   .subscribe(result => { result = {data: Array(10), pageIndex: 0, pageSize: 10};
889   this.paginator.length = result.totalCount;
890   this.paginator.pageIndex = result.pageIndex;
891   this.paginator.pageSize = result.pageSize;
892   this.countries = new _angular_material__WEBPACK_IMPORTED_MODULE_1__[0].MatTableDataSource<Country>(result.data);
893 }, error => console.error(error));
894 }
895 }
```

Paused on breakpoint Watch Call Stack (anonymous) main.js:889 \_\_tryOrUnsub vendor.js:168020 next vendor.js:168141 \_next vendor.js:168091 next vendor.js:168068 \_next vendor.js:172561 next vendor.js:168068 \_next vendor.js:172074 next vendor.js:168068

The screenshot shows a web browser window titled "WorldCities" at the URL <https://localhost:44334/city/6294>. The page displays an "Edit - Prague" form. The form fields are as follows:

- City name:** Prague
- City latitude:** 50.0833
- City longitude:** 14.466
- Country:** Czechia (selected from a dropdown menu)

Below the form are two buttons: **Save** (green) and **Cancel**.

A **Form Debug Info** section contains the following information:

- Form value:**

```
{ "name": "Prague", "lat": 50.0833, "lon": 14.466, "countryId": 167 }
```
- Form status:** "VALID"

## Edit - Prague

City name:

 ×

City latitude:

City longitude:

Country:

Select a Country...

Czechia

Save

Cancel

### Form Debug Info

**Form value:**

```
{ "name": "Prague", "lat": 50.0833, "lon": 14.466, "countryId": 167 }
```

**Form status:**

"VALID"

### Form Activity Log

[26/10/2020, 03:40:36] Form Model has been loaded.

[26/10/2020, 03:40:49] Form was updated by the user.

[26/10/2020, 03:40:49] Form was updated by the user.

## Form Activity Log

[26/10/2020, 03:51:10] Name has been loaded with initial values.  
[26/10/2020, 03:51:10] Form Model has been loaded.  
[26/10/2020, 03:53:09] Name was updated by the user.  
[26/10/2020, 03:53:09] Form was updated by the user.

```
69      // react to changes in the form.name control
70      this.form.get("name")!.valueChanges
71      .subscribe(val => {
72          if (!this.form.dirty) {
73              this.log("Name has been loaded with initial values.");
74          }
75          else {
76              this.log("Name was updated by the user.");
77          }
78      });
●
```

SQLQuery1.sql - PYROS\SQLEXPRESS.WorldCities (sa (53)) - Microsoft SQL Server Management Studio

File Edit View Query Project Tools Window Help

WorldCities Execute

Object Explorer

Connect

PYROS\SQLEXPRESS (SQL Server 15.0.2070 - sa)

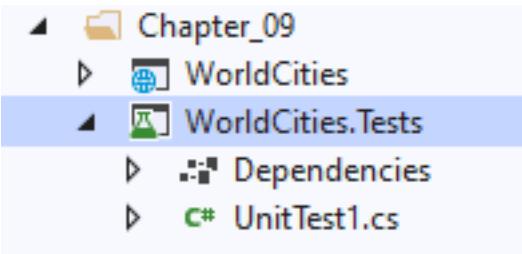
- Databases
  - System Databases
  - Database Snapshots
- WorldCities
  - Database Diagrams
  - Tables
    - System Tables
    - FileTables
    - External Tables
    - Graph Tables
    - dbo.\_EFMigrationsHistory
    - dbo.Cities
    - dbo.Countries
    - dbo.LogEvents
  - Columns
  - Keys
  - Constraints
  - Triggers
  - Indexes
  - Statistics

SQLQuery1.sql - PYROS\WorldCities (sa (53))

Results Messages

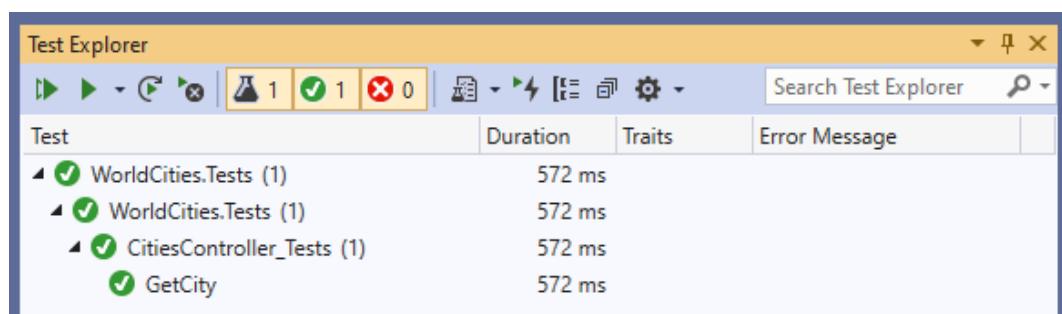
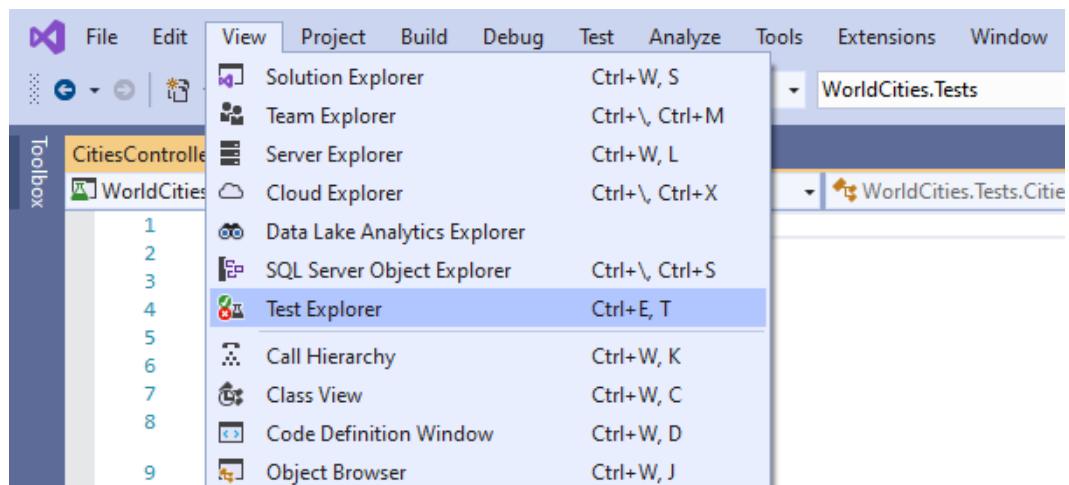
ID	Message	MessageTemplate
1	User profile is available. Using "C:\Us...	User profile is available. Using '{FullName}' as key r...
2	Starting @angular/cli on port 54996...	Starting @angular/cli on port 54996...
3	Application started. Press Ctrl+C to shu...	Application started. Press Ctrl+C to shut down.
4	Hosting environment: "Development"	Hosting environment: {envName}
5	Content root path: "C:\Projects\Net5...	Content root path: {contentRoot}
6	Request starting HTTP/2 GET https://...	{HostingRequestStartingLog}
7	> worldcities@0.0.0 start C:\Projects\...	> worldcities@0.0.0 start C:\Projects\Net5-Angular...
8	> ng serve "--port" "54996"	> ng serve "--port" "54996"
9	(node:80732) ExperimentalWarning: C...	(node:80732) ExperimentalWarning: Conditional ex...
10	<> [webpack.Progress] 0% compiling	<> [webpack.Progress] 10% compiling
11	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 0/0 modules ...
12	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 0/1 modules ...
13	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 1/1 modules ...
14	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 1/1 modules ...
15	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 1/2 modules ...
16	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 2/2 modules ...
17	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 2/2 modules ...
18	<> [webpack.Progress] 10% building ...	<> [webpack.Progress] 10% building 2/3 modules ...

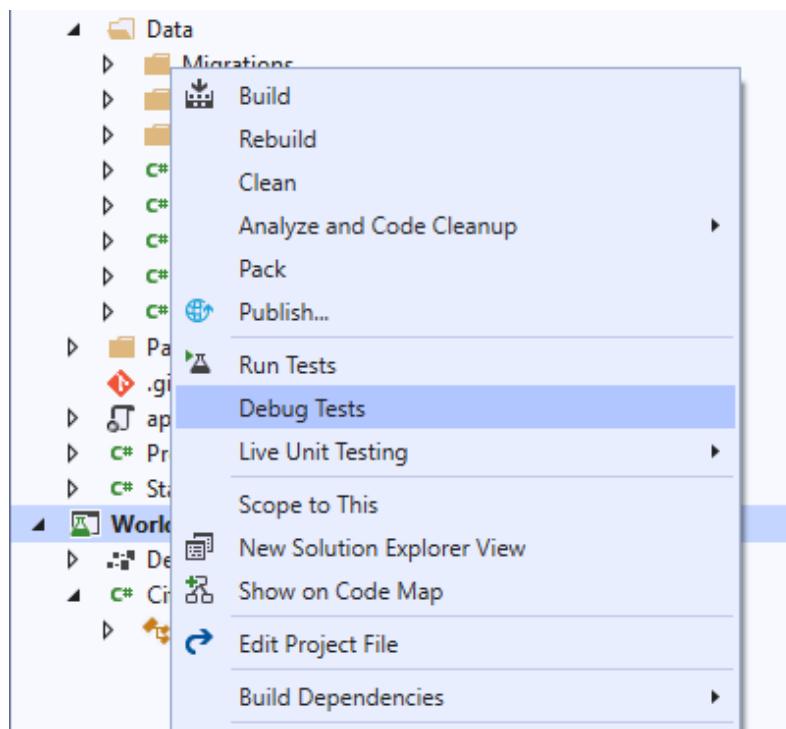
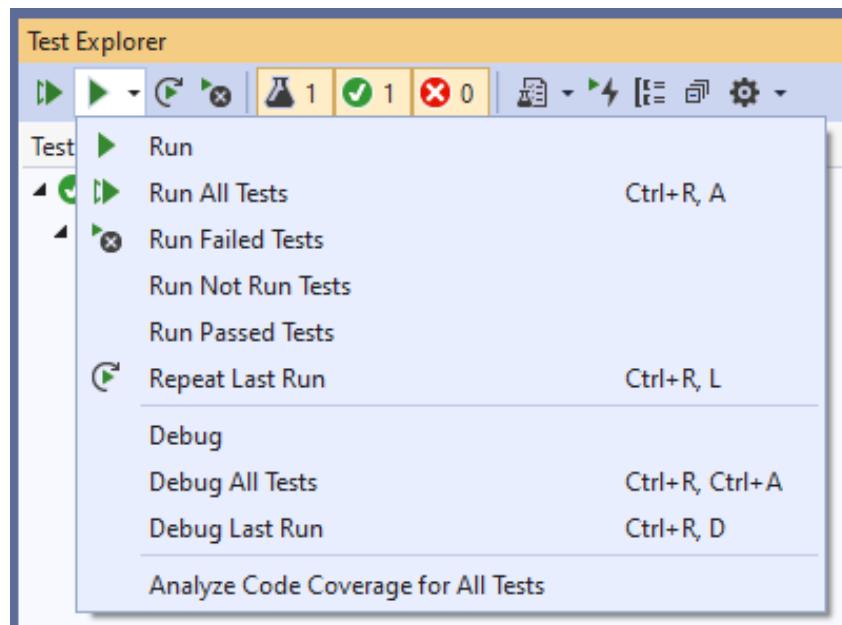
# Chapter 9: ASP.NET Core and Angular Unit Testing



The screenshot shows the Visual Studio Solution Explorer with the following structure:

- Chapter\_09 (solution root)
  - WorldCities (ASP.NET Core project)
  - WorldCities.Tests (Unit testing project)
    - Dependencies
    - UnitTest1.cs



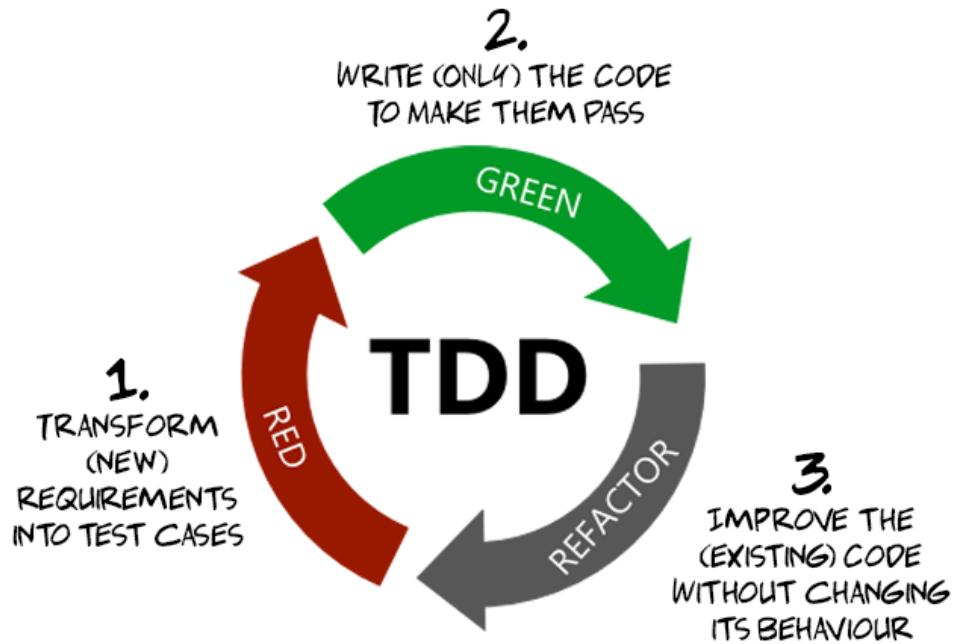


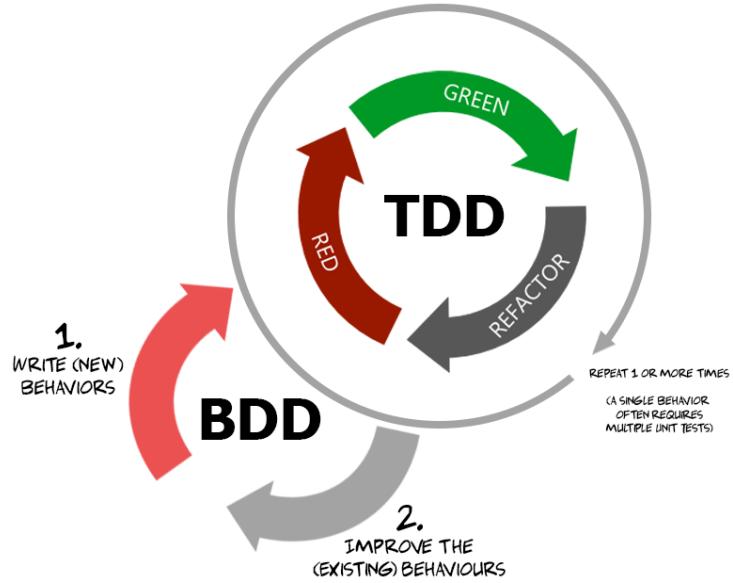
A screenshot of a code editor in Visual Studio. The code being typed is:

```
46     #region Assert
47     Assert.NotNull(city_existing);
48     Assert.Null(city_notExisting);
49     #endregion
50 }
51 }
52 }
53 }
```

The cursor is at line 47, position 10, under the word "Assert". A tooltip shows the properties of the "city\_existing" variable:

city_existing	{WorldCities.Data.Models.City}
Country	null
CountryId	1
Id	1
Lat	1
Lon	1
Name	"TestCity1"
Name_ASCII	null





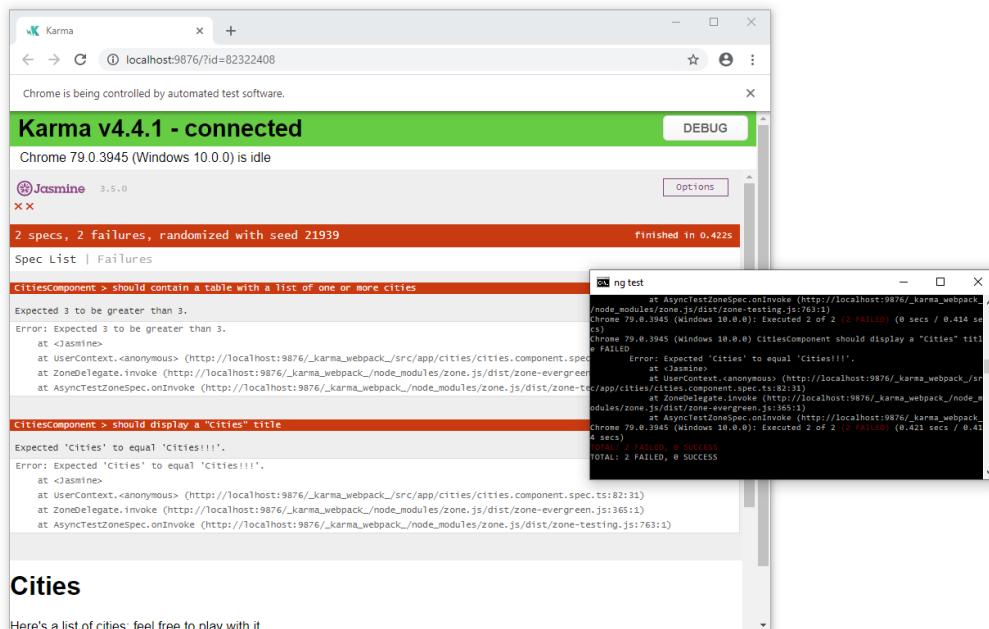
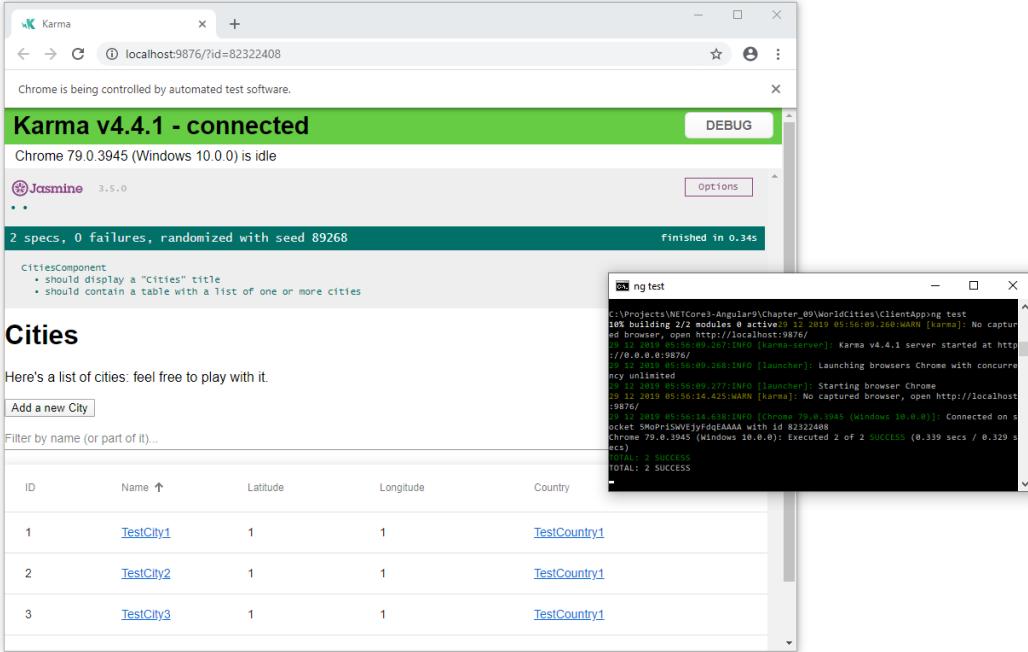
ID	Name ↑	Latitude	Longitude	Country
7835	'Ajlūn	32.3333	35.7528	Jordan
51	'Amrān	15.6594	43.9439	Yemen
4172	25 de Mayo	-37.8	-67.6833	Argentina

The screenshot shows a table in a browser's developer tools Elements tab. The table has columns for ID, Name, Latitude, Longitude, and Country. The rows are styled with alternating colors. The third row ('Amrān') is highlighted with a blue background. The fourth row (25 de Mayo) is highlighted with a light blue background. The fifth row (Argentina) is highlighted with a light orange background. The 'Name' column is sorted in ascending order, indicated by an upward arrow icon.

```

<table _ngcontent-ng-cli-universal-c129 mat-table mat-sort class="mat-elevation-z8 cdk-table mat-table mat-sort" role="grid" ng-reflect-active="name" ng-reflect-direction="asc" ng-reflect-data-source="[object Object]">
  <thead role="rowgroup">
    <tr _ngcontent-ng-cli-universal-c129 mat-header-row role="row" class="cdk-header-row mat-header-row ng-star-inserted">...</tr>
    <!--ng-container-->
  </thead>
  <tbody role="rowgroup">
    <tr _ngcontent-ng-cli-universal-c129 mat-row role="row" class="cdk-row mat-row ng-star-inserted" role="row">...</tr>
    <tr _ngcontent-ng-cli-universal-c129 mat-row class="cdk-row mat-row ng-star-inserted" role="row">...</tr>
    <!--ng-container-->
  </tbody>

```



# Chapter 10: Authentication and Authorization

The screenshot shows a Visual Studio interface. In the top half, a code editor displays a C# test file named `CitiesController_Tests.cs`. The code is testing the `GetCity()` method of the `CitiesController`. It uses `Arrange-Act-Assert` style tests with `[Fact]` attributes. A yellow vertical bar highlights the code between lines 25 and 36. In the bottom half, a Package Manager Console window is open, showing one error: CS7036, which states there is no argument given that corresponds to the required formal parameter 'operationalStoreOptions'.

```
10  namespace WorldCities.Tests
11  {
12      public class CitiesController_Tests
13      {
14          /// <summary>
15          /// Test the GetCity() method
16          /// </summary>
17          [Fact]
18          public async void GetCity()
19          {
20              #region Arrange
21              var options = new DbContextOptionsBuilder<ApplicationDbContext>()
22                  .UseInMemoryDatabase(databaseName: "WorldCities")
23                  .Options;
24
25              using (var context = new ApplicationDbContext(options))
26              {
27                  context.Add(new City()
28                  {
29                      Id = 1,
30                      CountryId = 1,
31                      Lat = 1,
32                      Lon = 1,
33                      Name = "TestCity1"
34                  });
35                  context.SaveChanges();
36              }
37          }
38      }
39  }
```

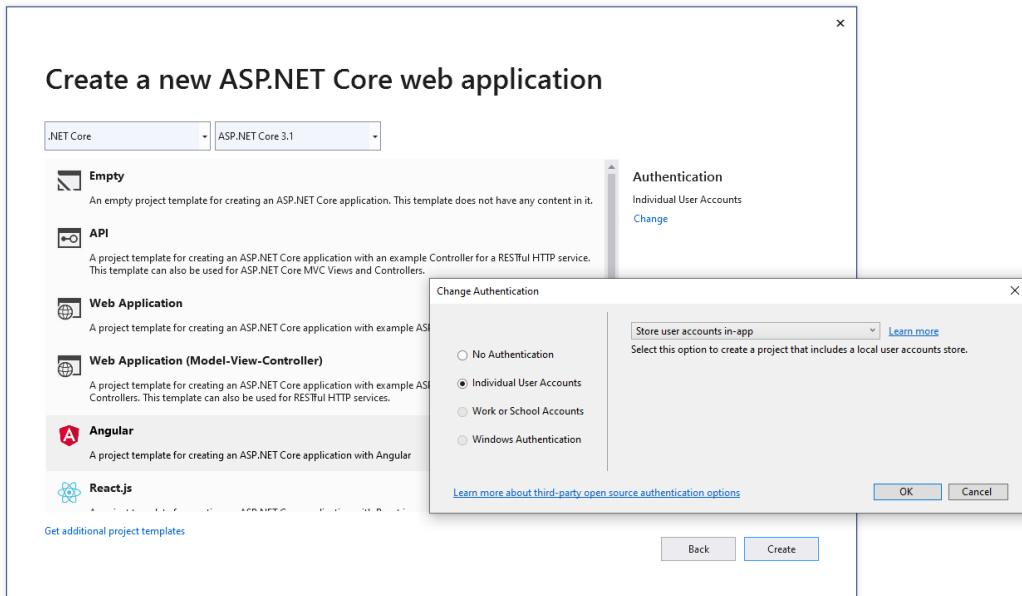
Package Manager Console

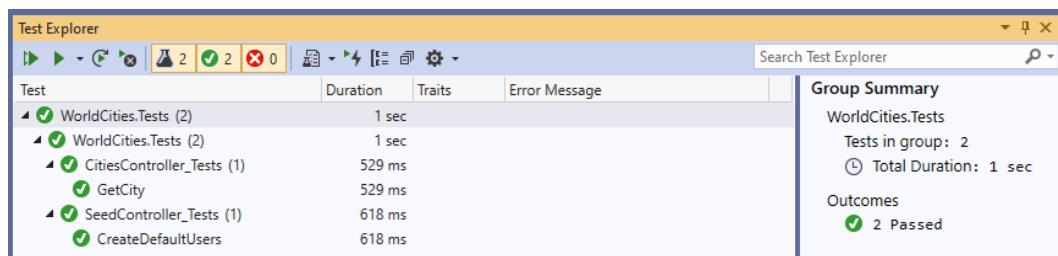
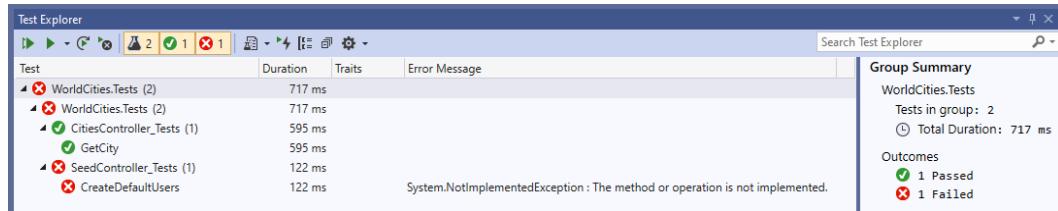
Task List ... Error List ... Output Command Window Find '{ static: true }'

Entire Solution 1 Error 0 Warnings 0 of 5 Messages Build + IntelliSense

Code Description Project File

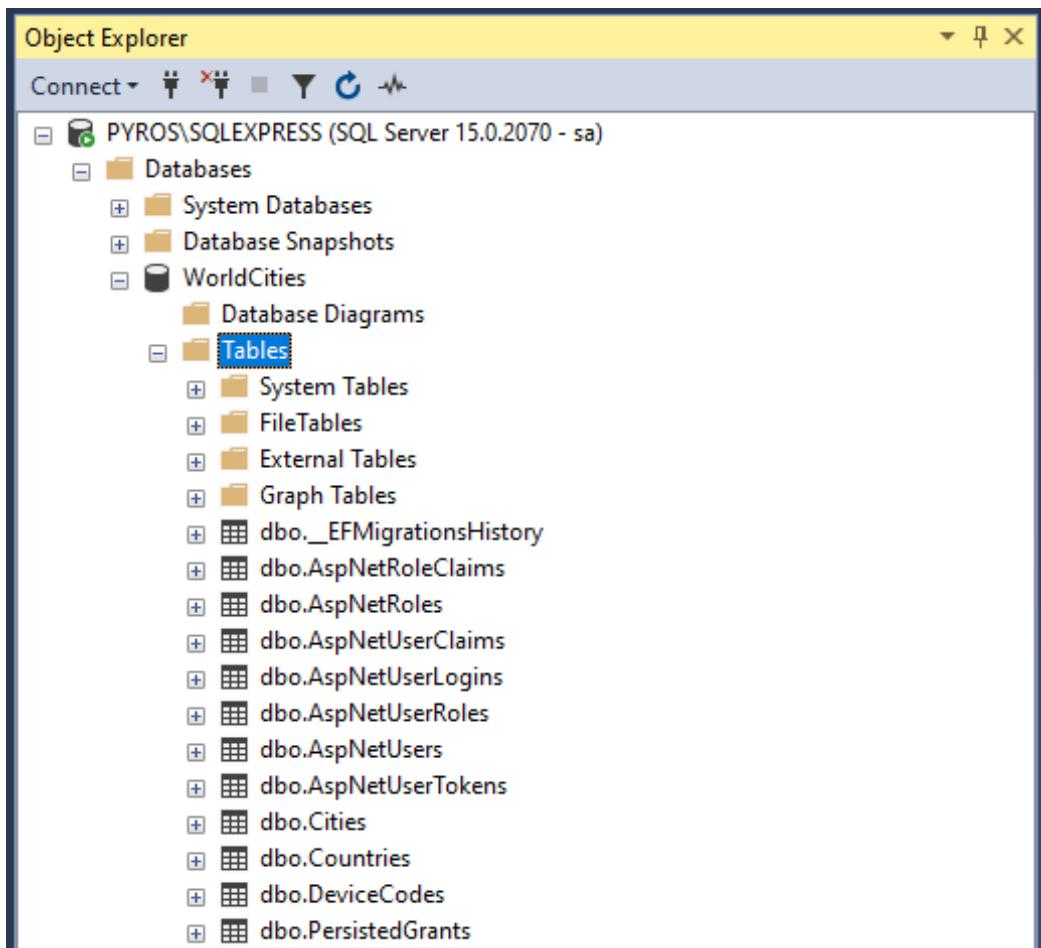
CS7036 There is no argument given that corresponds to the required formal parameter 'operationalStoreOptions' of 'ApplicationDbContext.ApplicationDbContext(DbContextOptions<IOptionalStoreOptions>)'

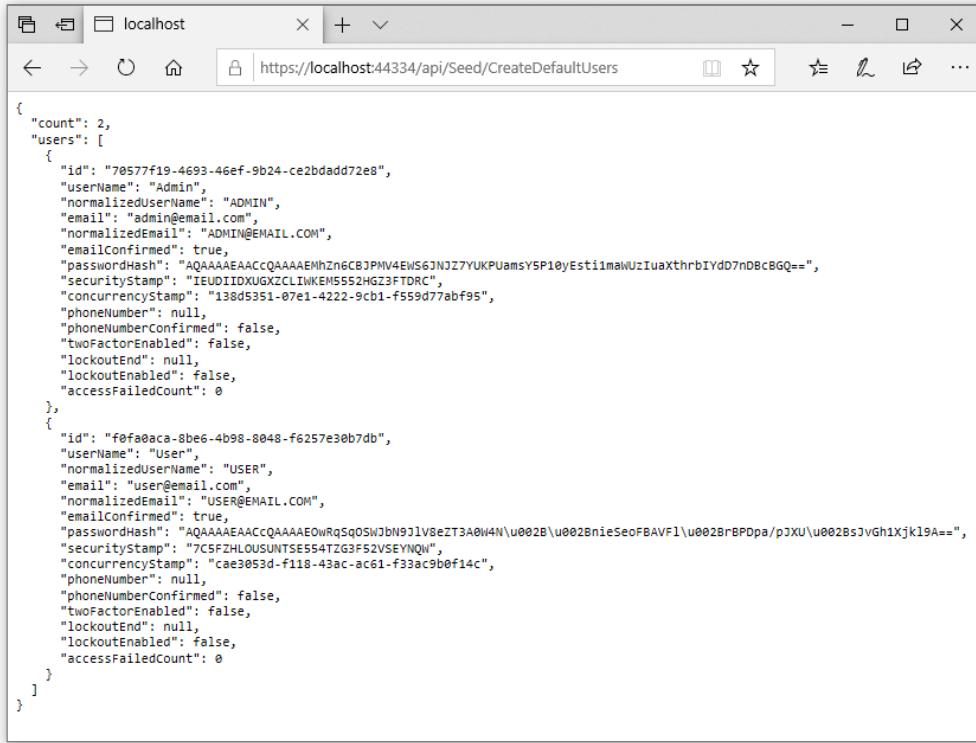




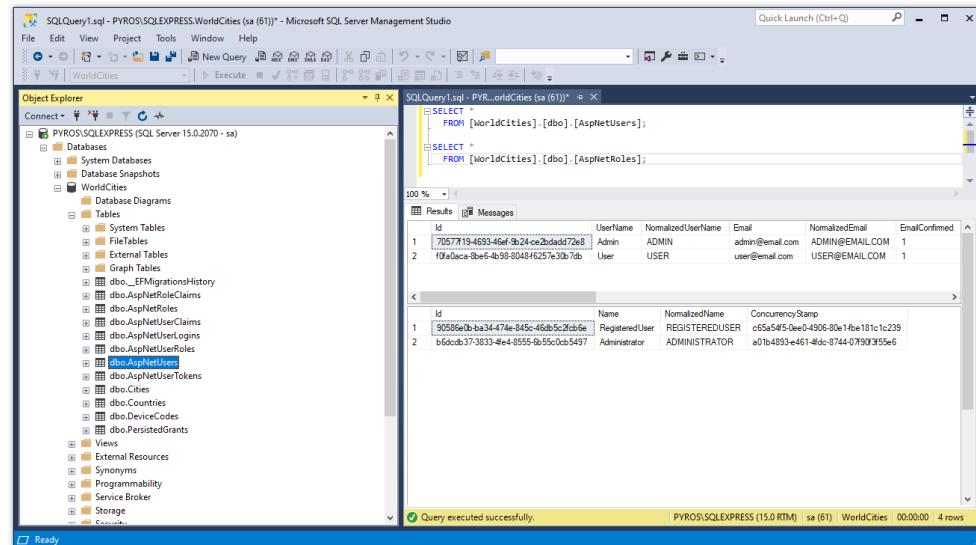
```
C:\Projects\Net5-Angular11\Chapter_10\WorldCities>dotnet ef migrations add "Identity" -o "Data\Migrations"
Build started...
Build succeeded.
Info: Microsoft.EntityFrameworkCore.Infrastructure[10403]
      Entity Framework Core 5.0.0 initialized 'ApplicationDbContext' using provider 'Microsoft.EntityFrameworkCore.SqlServer' with options: None
Done. To undo this action, use 'ef migrations remove'
C:\Projects\Net5-Angular11\Chapter_10\WorldCities>
```

```
ca Command Prompt
C:\Projects\Net5-Angular11\Chapter_10\WorldCities>dotnet ef database update
Build started...
Build succeeded.
info: Microsoft.EntityFrameworkCore.Infrastructure[10403]
      Entity Framework Core 5.0.0 initialized 'ApplicationDbContext' using provider 'Microsoft.EntityFrameworkCore.SqlServer' with options: None
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (14ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      SELECT 1
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (13ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      SELECT OBJECT_ID(N'[__EFMigrationsHistory]');
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (1ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      SELECT 1
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (0ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      SELECT OBJECT_ID(N'[__EFMigrationsHistory]');
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (2ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      SELECT [MigrationId], [ProductVersion]
      FROM [__EFMigrationsHistory]
      ORDER BY [MigrationId];
info: Microsoft.EntityFrameworkCore.Migrations[20402]
      Applying migration '20201112034035_Identity'.
Applying migration '20201112034035_Identity'.
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (4ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      CREATE TABLE [AspNetRoles] (
          [Id] nvarchar(450) NOT NULL,
          [Name] nvarchar(256) NULL,
          [Normalized Name] nvarchar(256) NULL,
          [ConcurrencyStamp] nvarchar(max) NULL,
          CONSTRAINT [PK_AspNetRoles] PRIMARY KEY ([Id])
      );
info: Microsoft.EntityFrameworkCore.Database.Command[20101]
      Executed DbCommand (1ms) [Parameters=[], CommandType='Text', CommandTimeout='30']
      CREATE TABLE [AspNetUsers] (
          [Id] nvarchar(450) NOT NULL,
          [UserName] nvarchar(256) NULL,
          [NormalizedUserName] nvarchar(256) NULL,
          [Email] nvarchar(256) NULL,
          [NormalizedEmail] nvarchar(256) NULL,
```





```
{
  "count": 2,
  "users": [
    {
      "id": "70577f19-4693-46ef-9b24-ce2bdadd72e8",
      "userName": "Admin",
      "normalizedUserName": "ADMIN",
      "email": "admin@email.com",
      "normalizedEmail": "ADMIN@EMAIL.COM",
      "emailConfirmed": true,
      "passwordHash": "AQAAAAEAACQAAAEWn6CBJPMV4EWS6JNJZ7YUKPUamsY5P10yEsti1maNUzIuaXthrbIYdD7nDBcBGQ==",
      "securityStamp": "IEUDIDIOUGXZLNIKEM552HGZ3FTDRC",
      "concurrencyStamp": "138d5351-07e1-4222-9cb1-f559d77abf95",
      "phoneNumber": null,
      "phoneNumberConfirmed": false,
      "twoFactorEnabled": false,
      "lockoutEnd": null,
      "lockoutEnabled": false,
      "accessFailedCount": 0
    },
    {
      "id": "f0faeaca-8be6-4b98-8048-f6257e30b7db",
      "userName": "User",
      "normalizedUserName": "USER",
      "email": "user@email.com",
      "normalizedEmail": "USER@EMAIL.COM",
      "emailConfirmed": true,
      "passwordHash": "AQAAAAEAACQAAAEWn6CBJPMV4EWS6JNJZ7YUKPUamsY5P10yEsti1maNUzIuaXthrbIYdD7nDBcBGQ==",
      "securityStamp": "7CSFZHLousUNTS554TZG3F52SEYNQW",
      "concurrencyStamp": "cae3053d-f118-43ac-ac61-f33ac9b0f14c",
      "phoneNumber": null,
      "phoneNumberConfirmed": false,
      "twoFactorEnabled": false,
      "lockoutEnd": null,
      "lockoutEnabled": false,
      "accessFailedCount": 0
    }
  ]
}
```



The screenshot shows the Object Explorer on the left and a query results grid on the right.

**Object Explorer:**

- Connected to PYROS\SQLEXPRESS (SQL Server 15.0.2070 - sa (61))
- Databases: System Databases, Database Snapshots, WorldCities
- WorldCities:
  - Tables: AspNetUsers, AspNetRoles
  - Views: AspNetRoleClaims, AspNetRoles, AspNetUserClaims, AspNetUserLogins, AspNetUserRoles, AspNetUserTokens, Cities, Countries, DeviceCodes, PersistedGrants, Views
  - External Resources, Synonyms, Programmability, Service Broker, Storage

**SQL Query Grid:**

```

SELECT *
FROM [WorldCities].[dbo].[AspNetUsers];
SELECT *
FROM [WorldCities].[dbo].[AspNetRoles];

```

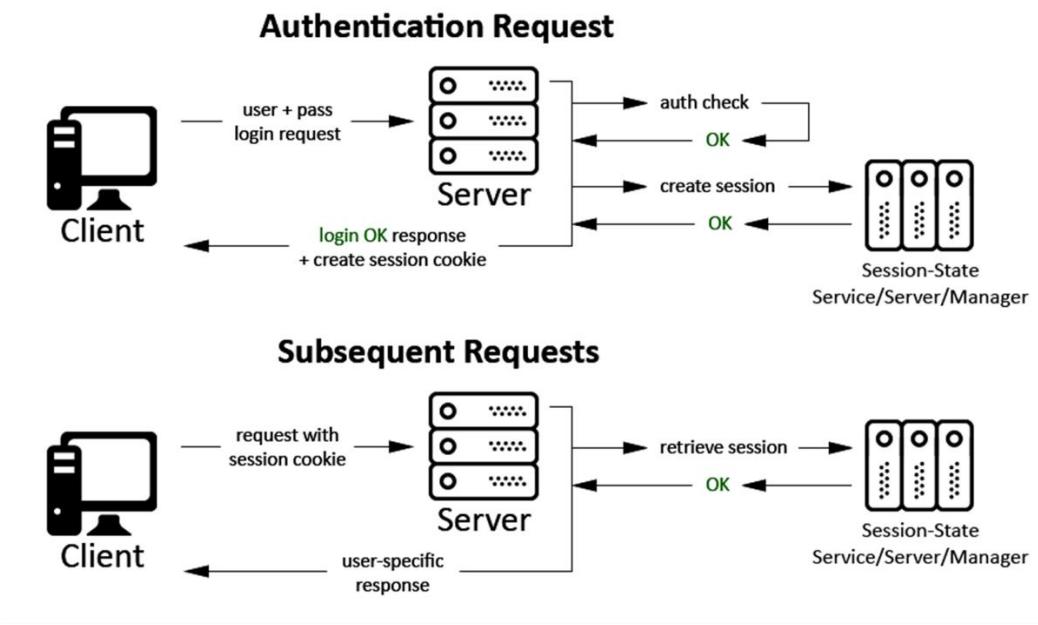
	Id	UserName	NormalizedUserName	Email	NormalizedEmail	EmailConfirmed
1	70577f19-4693-46ef-9b24-ce2bdadd72e8	Admin	ADMIN	admin@email.com	ADMIN@EMAIL.COM	1
2	f0faeaca-8be6-4b98-8048-f6257e30b7db	User	USER	user@email.com	USER@EMAIL.COM	1

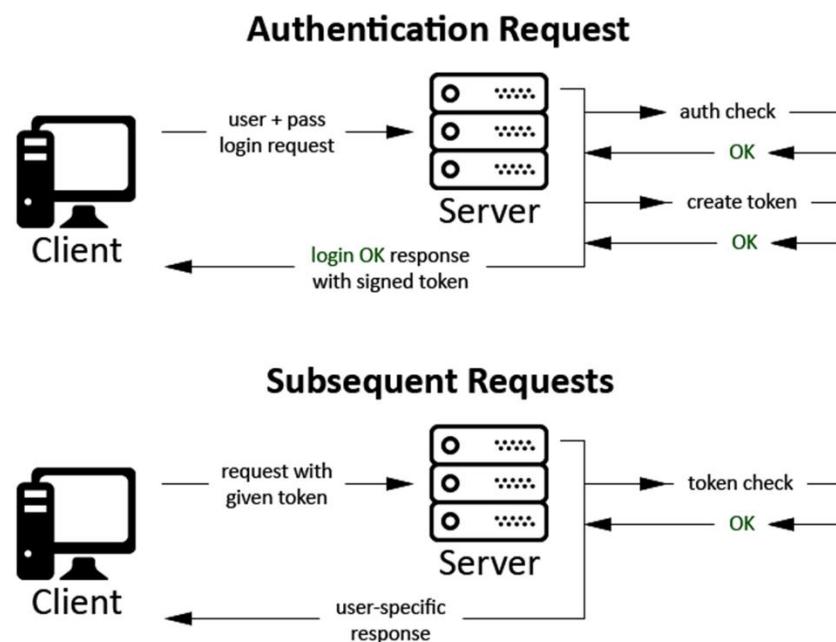
	Id	Name	NormalizedName	ConcurrencyStamp
1	90586e0b-a34-474e-845c-46b85c2cb6e	RegisteredUser	REGISTEREDUSER	c65a545-0ee-4906-80e1-be181c1c239
2	b6dcdb37-3833-4e-8555-055c0cb5497	Administrator	ADMINISTRATOR	a0b4893+461-4dc-8744-0790'955e6

Query executed successfully.

# Session-Based Authentication Flow



# Token-Based Authentication Flow



AuthSample

Home Counter Fetch data Hello user@email.com Logout

## Hello, world!

Welcome to your new single-page application, built with:

- [ASP.NET Core](#) and [C#](#) for cross-platform server-side code
- [Angular](#) and [TypeScript](#) for client-side code
- [Bootstrap](#) for layout and styling

To help you get started, we've also set up:

- **Client-side navigation.** For example, click *Counter* then *Back* to return here.
- **Angular CLI integration.** In development mode, there's no need to run `ng serve`. It runs in the background automatically, so your client-side resources are dynamically built on demand and the page refreshes when you modify any file.
- **Efficient production builds.** In production mode, development-time features are disabled, and your `dotnet publish` configuration automatically invokes `ng build` to produce minified, ahead-of-time compiled JavaScript files.

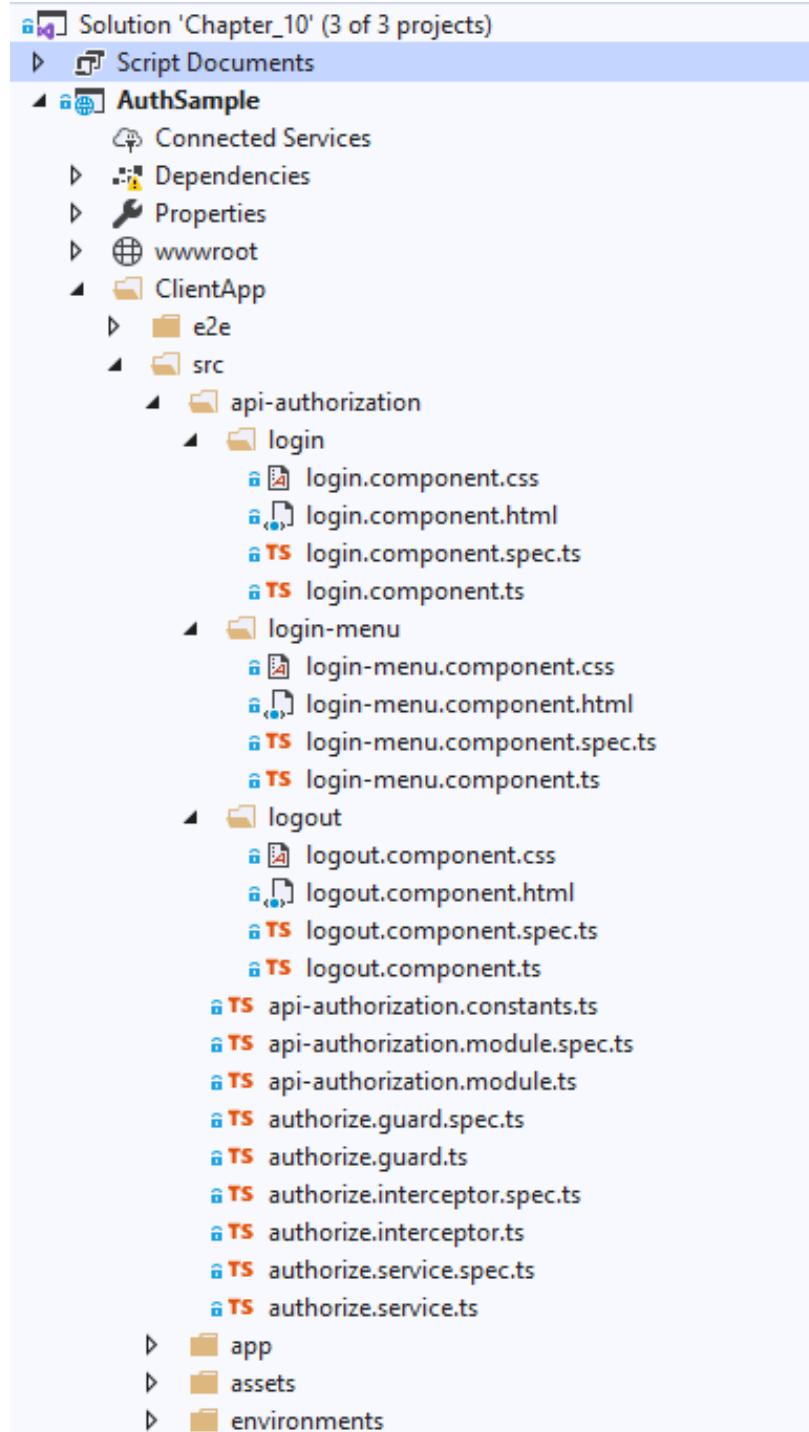
The `ClientApp` subdirectory is a standard Angular CLI application. If you open a command prompt in that directory, you can run any `ng` command (e.g., `ng test`), or use `npm` to install extra packages into it.

Command Prompt

```
C:\Projects\NETCore3-Angular9\Chapter_10\AuthSample\ClientApp>npm install
npm WARN deprecated core-js@2.6.11: core-js@<3 is no longer maintained and not recommended for usage due to the number of issues. Please, upgrade your dependencies to the actual version of core-js@3.
npm WARN sass-loader@8.0.0 requires a peer of fibers@>= 3.1.0 but none is installed. You must install peer dependencies yourself.
npm WARN webpack-subresource-integrity@1.3.4 requires a peer of html-webpack-plugin@^2.21.0 || ~3 || >=4.0.0-alpha.2 <5 but none is installed. You must install peer dependencies yourself.
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.11 (node_modules\webpack-dev-server\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.11: wanted {"os":"darwin","arch":"any"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.11 (node_modules\watchpack\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.11: wanted {"os":"darwin","arch":"any"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.1 (node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.1: wanted {"os":"darwin","arch":"any"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@1.2.11 (node_modules\@angular\compiler-cli\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@1.2.11: wanted {"os":"darwin","arch":"any"} (current: {"os":"win32","arch":"x64"})
npm WARN optional SKIPPING OPTIONAL DEPENDENCY: fsevents@2.1.2 (node_modules\chokidar\node_modules\fsevents):
npm WARN notsup SKIPPING OPTIONAL DEPENDENCY: Unsupported platform for fsevents@2.1.2: wanted {"os":"darwin","arch":"any"} (current: {"os":"win32","arch":"x64"})

audited 17125 packages in 20.052s
found 8 vulnerabilities

C:\Projects\NETCore3-Angular9\Chapter_10\AuthSample\ClientApp>
```



## Log in

Use a local account to log in.

Email

Password

Remember me?

[Log in](#)

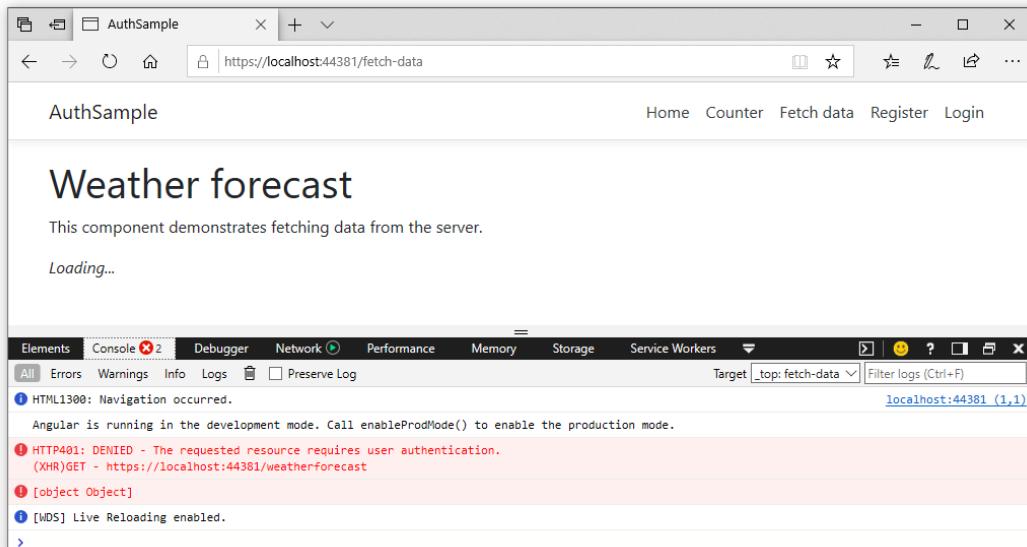
[Forgot your password?](#)

[Register as a new user](#)

Use another service to log in.

There are no external authentication services configured. See [this article](#) for details on setting up this ASP.NET application to support logging in via external services.

© 2019 - AuthSample



The screenshot shows a web browser window titled "AuthSample" with the URL "https://localhost:44381/fetch-data". The page content is titled "Weather forecast" and includes a subtitle: "This component demonstrates fetching data from the server." Below this is a table displaying five rows of weather data:

Date	Temp. (C)	Temp. (F)	Summary
2020-01-01T00:48:44.8869247+01:00	-20	-3	Chilly
2020-01-02T00:48:44.8869586+01:00	16	60	Cool
2020-01-03T00:48:44.8869765+01:00	24	75	Sweltering
2020-01-04T00:48:44.8869958+01:00	53	127	Hot
2020-01-05T00:48:44.8870115+01:00	29	84	Freezing

## Log in

Use a local account to log in.

Email

Password

Remember me?

[Log in](#)

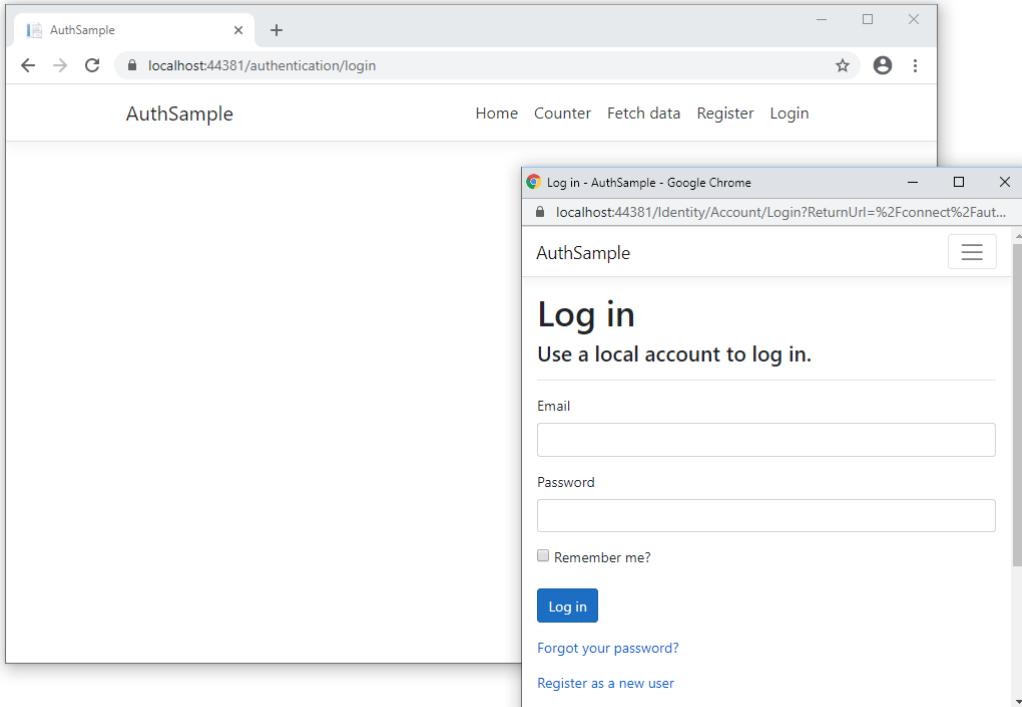
[Forgot your password?](#)

[Register as a new user](#)

[Resend email confirmation](#)

Use another service to log in.

There are no external authentication services configured. See  
[this article about setting up this ASP.NET application to support  
logging in via external services.](#)



AuthSample Register Login

## Register confirmation

This app does not currently have a real email sender registered, see [these docs](#) for how to configure a real email sender. Normally this would be emailed: [Click here to confirm your account](#)

---

© 2020 - AuthSample

# Hello, world!

Welcome to your new single-page application, built with:

- [ASP.NET Core](#) and [C#](#) for cross-platform server-side code
- [Angular](#) and [TypeScript](#) for client-side code
- [Bootstrap](#) for layout and styling

To help you get started, we've also set up:

- **Client-side navigation.** For example, click [Counter](#) then [Back](#) to return here.
- **Angular CLI integration.** In development mode, there's no need to run `ng serve`. It runs in the background automatically, so your client-side resources are dynamically built on demand and the page refreshes when you modify any file.
- **Efficient production builds.** In production mode, development-time features are disabled, and your `dotnet publish` configuration automatically invokes `ng build` to produce minified, ahead-of-time compiled JavaScript files.

The `ClientApp` subdirectory is a standard Angular CLI application. If you open a command prompt in that directory, you can run any `ng` command (e.g., `ng test`), or use `npm` to install extra packages into it.

A sample web application to demonstrate how to interact with ASP.NET, Angular, Entity Framework Core and a SQL Database.

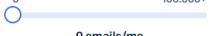


A sample web application to demonstrate how to interact with ASP.NET, Angular, Entity Framework Core and a SQL Database.

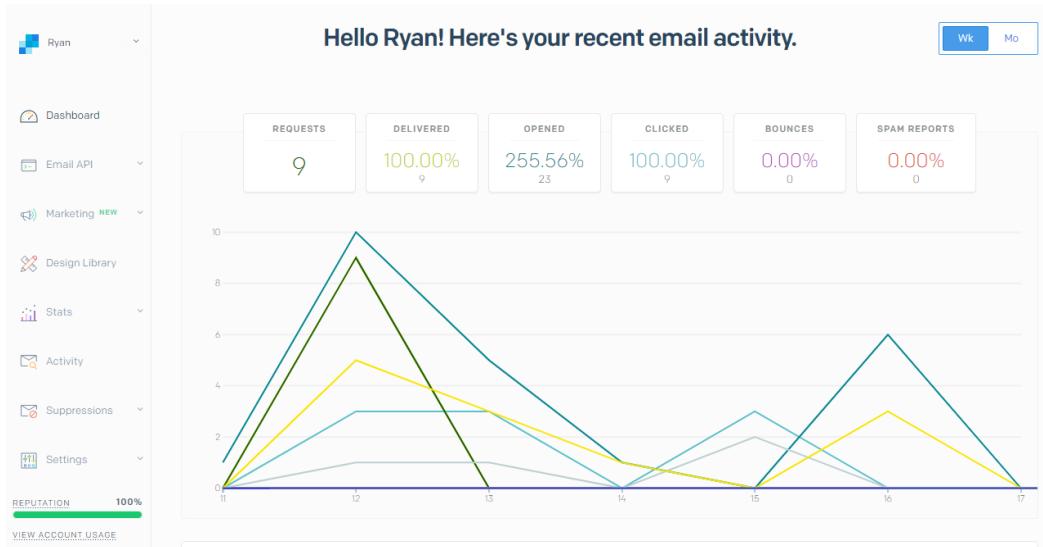


**SendGrid** Products Why SendGrid Resources Developers Pricing Contact Us Sign In Start for free

---

Free	Essentials	Pro	Premier
Try it out! Integrate fast and explore features with 100 emails/day forever. <b>\$0/mo</b>  <a href="#">Start for free</a>  <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> APIs, SMTP Relay, and Webhooks</li><li><input checked="" type="checkbox"/> Delivery Optimization Tools</li><li><input checked="" type="checkbox"/> Dynamic Template Editor</li><li><input checked="" type="checkbox"/> Insightful Analytics</li><li><input checked="" type="checkbox"/> Ticket Support</li><li><input type="checkbox"/> No Access to Email Validation</li></ul>	Empower your business with foundational email features. <b>Starts at \$14.95/mo*</b>  0 emails/mo to 100,000+ <a href="#">Start for free</a>  <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> APIs, SMTP Relay, and Webhooks</li><li><input checked="" type="checkbox"/> Delivery Optimization Tools</li><li><input checked="" type="checkbox"/> Dynamic Template Editor</li><li><input checked="" type="checkbox"/> Insightful Analytics</li><li><input checked="" type="checkbox"/> Ticket &amp; Chat Support</li><li><input type="checkbox"/> No Access to Email Validation</li></ul>	<b>POPULAR</b> Take ownership of your sending to maximize your email delivery. <b>Starts at \$89.95/mo*</b>  0 emails/mo to 1.5 million+ <a href="#">Start for free</a>  <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> APIs, SMTP Relay, and Webhooks</li><li><input checked="" type="checkbox"/> Delivery Optimization Tools</li><li><input checked="" type="checkbox"/> Dynamic Templates + Testing</li><li><input checked="" type="checkbox"/> Insightful Analytics</li><li><input checked="" type="checkbox"/> Ticket, Chat, &amp; Phone Support</li><li><input type="checkbox"/> 2,500 Email Validations</li></ul>	Amplify your email program with extra support from our team. <b>Custom Pricing</b>  <a href="#">Talk to an Expert</a>  <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> APIs, SMTP Relay, and Webhooks</li><li><input checked="" type="checkbox"/> Delivery Optimization Tools</li><li><input checked="" type="checkbox"/> Dynamic Templates + Testing</li><li><input checked="" type="checkbox"/> Insightful Analytics</li><li><input checked="" type="checkbox"/> Prioritized Support</li><li><input type="checkbox"/> 5,000 Email Validations</li></ul>

\* Taxes and overages may apply.



Setup Guide / Integrate

## Integrate using our Web API or SMTP Relay

① Overview  
② Integrate  
③ Verify

**Choose a setup method**

**RECOMMENDED**

**Web API**

The fastest, most flexible way to send email using languages like Node.js, Ruby, C#, and more.

**Choose**

**SMTP Relay**

The easiest way to send email. It only requires modifying your application's SMTP configuration.

**Choose**

## Integrate using our Web API or SMTP Relay

Overview

Integrate

Verify

How to send email using C#

- 1 Make sure you have the **prerequisites**  
Our library requires .NET version 4.5.2.
- 2 **Create an API key**  
This allows your application to authenticate to our API and send mail. You can enable or disable additional permissions on the [API keys page](#).  
My First API Key Name • [Create Key](#)
- 3 **Create an environment variable**  
Update the development environment (user space) with your SENDGRID\_API\_KEY. For example, in Windows 10, please review [this thread](#).
- 4 **Install the package**  
The recommended installation uses the NuGet package manager. Run the following:  
1 PM> Install-Package SendGrid  
Alternatively, you can download the SendGrid C# .NET library directly from our [Github repository](#).

## Add a Sender

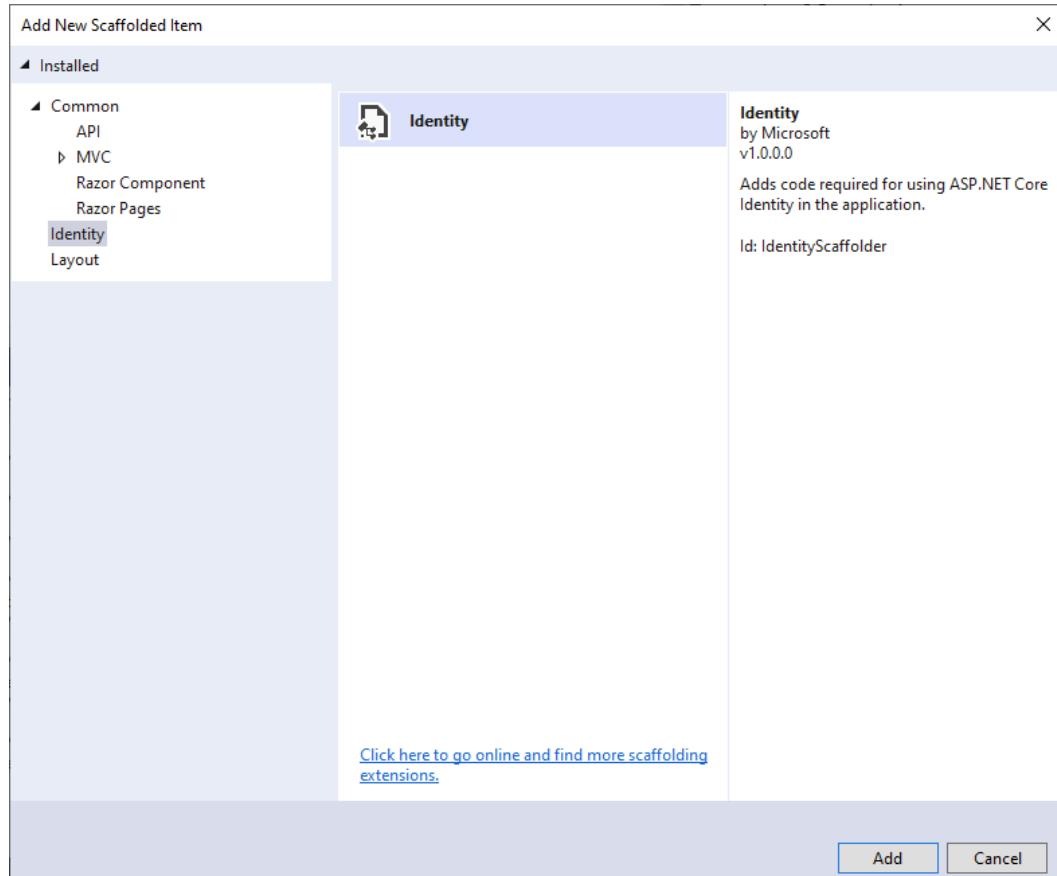
You're required to include your contact information, including a physical mailing address, inside every promotional email you send in order to comply with anti-spam laws such as [CAN-SPAM](#) and [CASL](#). You'll find replacement tags for this information in the footer of all the email designs SendGrid provides.

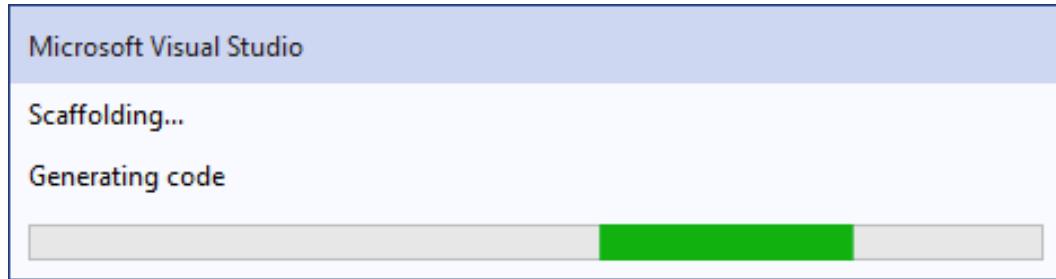
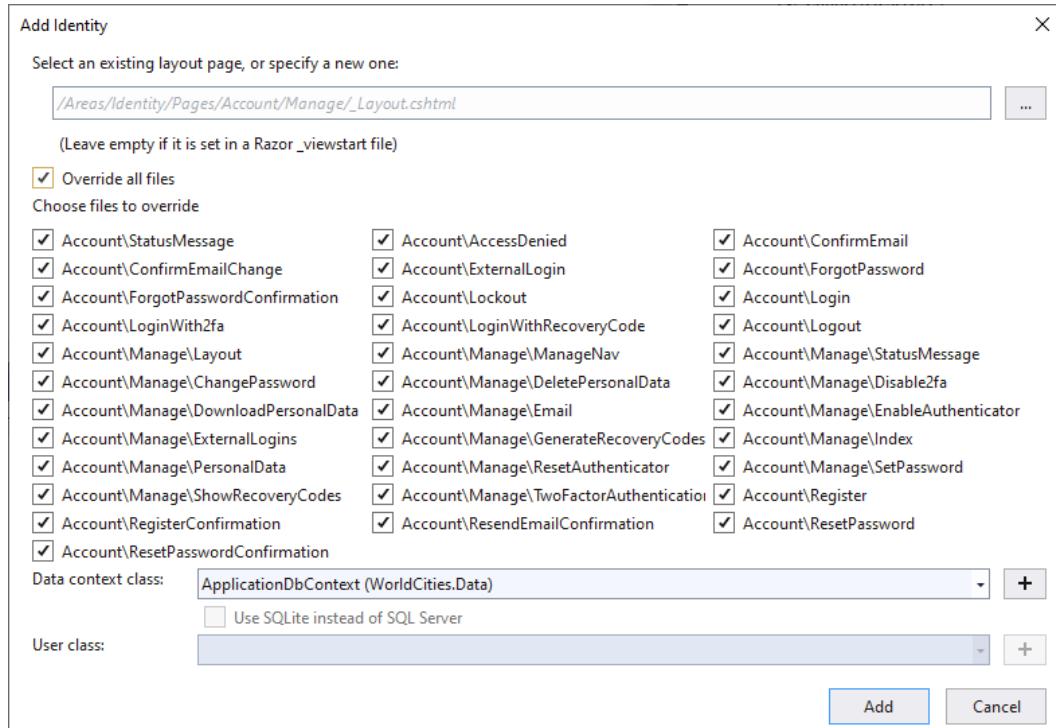
[Learn more »](#)

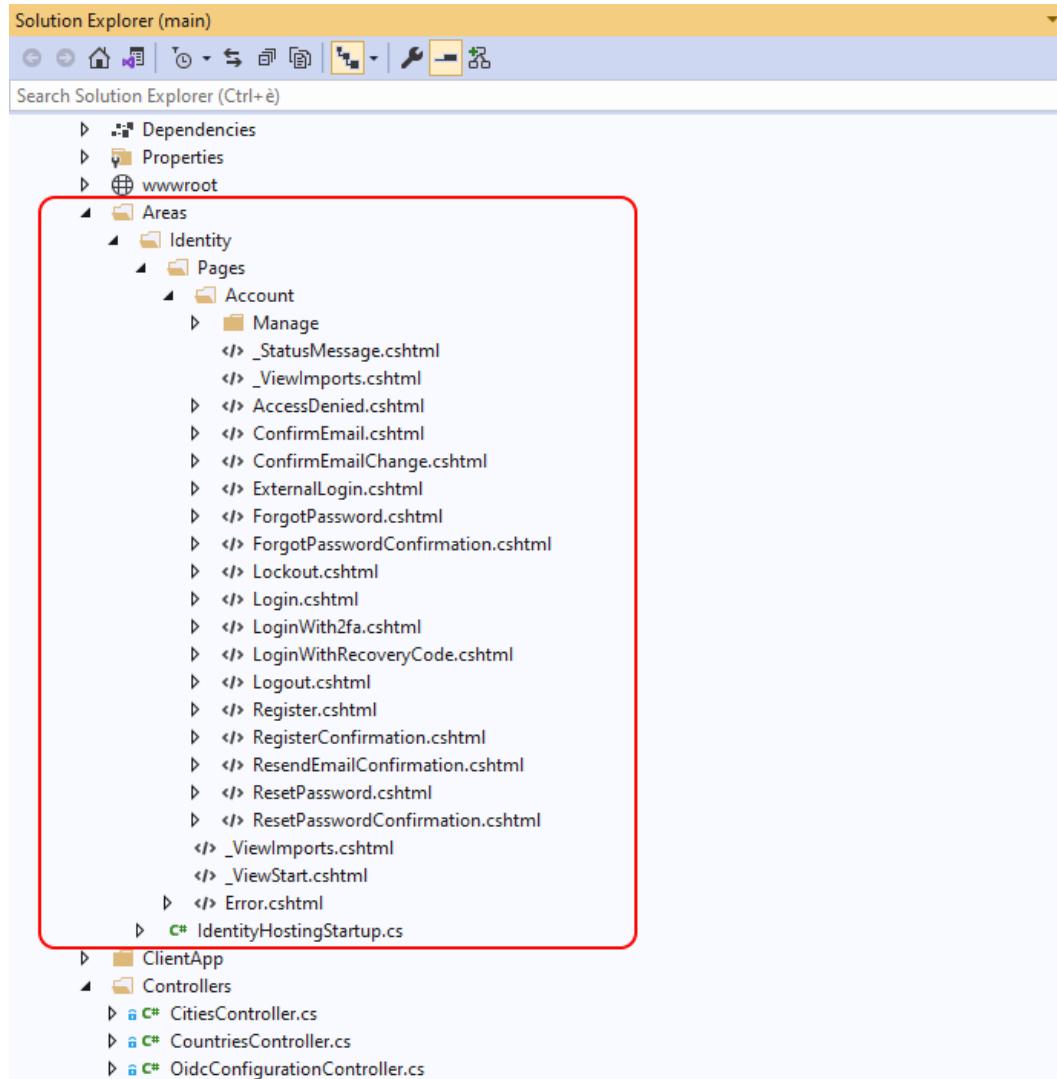
From Name •

From Email Address • [i](#)

If your email domain doesn't match one of your [authenticated domains](#), you'll need to verify this email address before using this sender. We'll send this email address a verification email after you save this sender.







```
Register.cshtml.cs
WorldCities
WorldCities.Areas.Identity.Pages.Account.RegisterModel
OnPostAsync(string returnUrl)

0 references | 0 changes | 0 authors, 0 changes
public async Task<IActionResult> OnPostAsync(string returnUrl = null)
{
    returnUrl ??= Url.Content("~/");
    ExternalLogins = await _signInManager.GetExternalAuthenticationSchemesAsync().ToList();
    if (ModelState.IsValid)
    {
        var user = new ApplicationUser { UserName = Input.Email, Email = Input.Email };
        var result = await _userManager.CreateAsync(user, Input.Password);
        if (result.Succeeded)
        {
            _logger.LogInformation("User created a new account with password.");
            var code = await _userManager.GenerateEmailConfirmationTokenAsync(user);
            code = WebEncoders.Base64UrlEncode(Encoding.UTF8.GetBytes(code));
            var callbackUrl = Url.Page(
                "/Account/ConfirmEmail",
                pageHandler: null,
                values: new { area = "Identity", userId = user.Id, code = code, returnUrl = returnUrl },
                protocol: Request.Scheme);

            await _emailSender.SendEmailAsync(Input.Email, "Confirm your email",
                $"Please confirm your account by <a href='{HtmlEncoder.Default.Encode(callbackUrl)}>clicking here</a>.");
        }
        if (_userManager.Options.SignIn.RequireConfirmedAccount)
        {
            return RedirectToPage("RegisterConfirmation", new { email = Input.Email, returnUrl = returnUrl });
        }
    }
}
```

await \_emailSender.SendEmailAsync(Input.Email, "Confirm your email", \$2.709,123ms elapsed  
\$"Please confirm your account by <a href='{HtmlEncoder.Default.Encode(callbackUrl)}>clicking here</a>.");

The screenshot shows a code editor with two tabs: "SendGridEmailSender.cs" and "Register.cshtml.cs". The "SendGridEmailSender.cs" tab is active, displaying C# code for a service class. The code includes methods for sending emails using SendGrid. A tooltip is visible over the line of code "var client = new SendGridClient(apiKey);". The tooltip contains the text "1 reference | darkseal, 16 hours ago | 1 author, 1 change" and "var client = new SendGridClient(apiKey);". The "Register.cshtml.cs" tab is also visible in the background.

```
0 references | darkseal, 16 hours ago | 1 author, 1 change
public async Task SendEmailAsync(
    string email,
    string subject,
    string message)
{
    var result = await Execute(Options.ApiKey, subject, message, email);
}

1 reference | darkseal, 16 hours ago | 1 author, 1 change
private async Task<Response> Execute(
    string apiKey,
    string subject,
    string message,
    string email)
{
    var client = new SendGridClient(apiKey); ⏎ 1ms elapsed
    var msg = new SendGridMessage()
    {
        From = new EmailAddress(Options.Sender_Email, Options.Sender_Name),
        Subject = subject,
        PlainTextContent = message,
        HtmlContent = message
    };
    msg.AddTo(new EmailAddress(email));
}
```

## Register confirmation

Please check your email to confirm your account.

# Chapter 11: Progressive Web Apps



Screenshot of the 'web-app-manifest generator' application interface.

The interface shows the following configuration:

- App Name:** HealthCheck
- Short Name:** HealthCheck
- Theme Color:** #2196f3
- Background Color:** #2196f3
- Display Mode:** Standalone
- Orientation:** Any
- Application Scope:** /
- Start Url:** /

The manifest.json code generated is:

```
{  
  "name": "HealthCheck",  
  "short_name": "Healthcheck",  
  "theme_color": "#2196f3",  
  "background_color": "#2196f3",  
  "display": "standalone",  
  "scope": "/",  
  "start_url": "/"  
}
```

**Generate Icons**  
The Web App Manifest allows for specifying icons of varying sizes. Upload a 512x512 image for the icon and we'll generate the remaining sizes.

**Upload via Graphql**  
 fff.png

**Upload via Express**

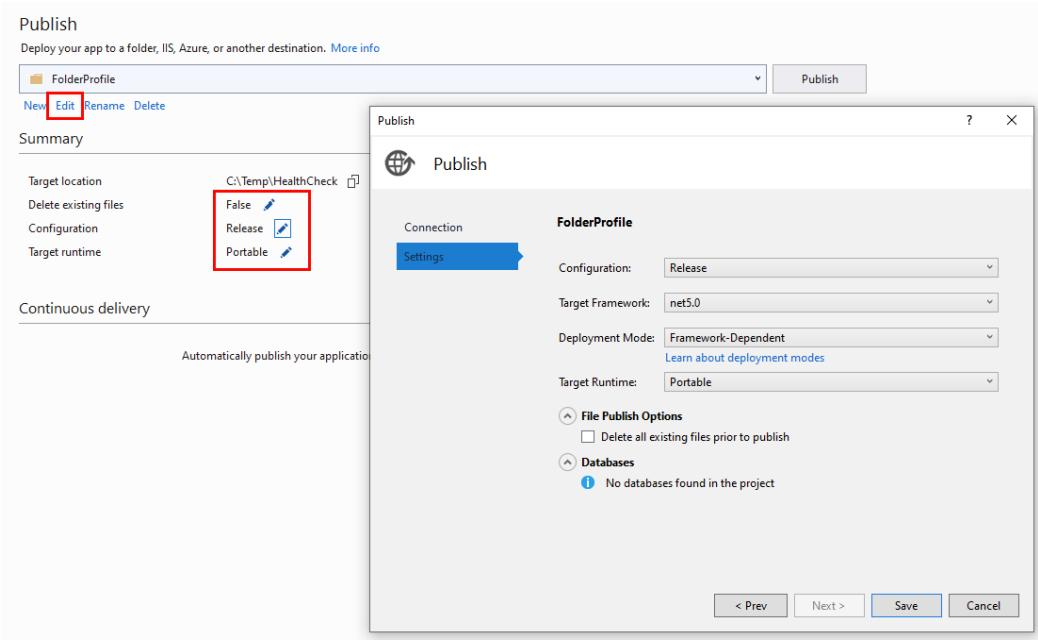
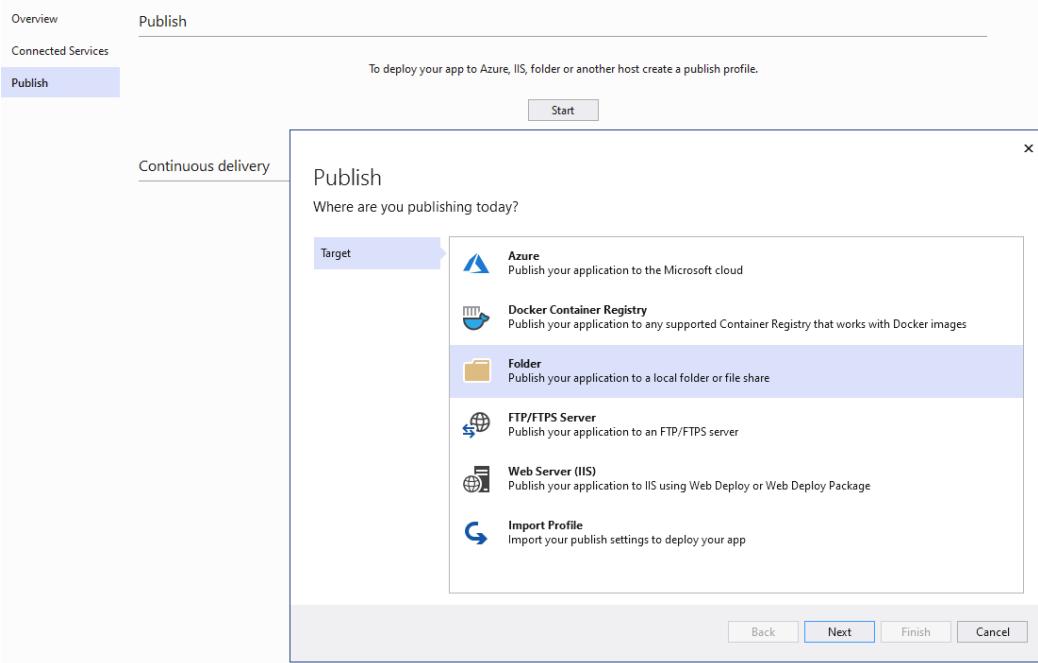
[CLICK TO FORK ON GITHUB](#)



```
C:\ Command Prompt
C:\Projects\Net5-Angular11\Chapter_11\WorldCities\ClientApp>ng add @angular/pwa
Skipping installation: Package already installed
CREATE ngsw-config.json (624 bytes)
CREATE src/manifest.webmanifest (1346 bytes)
CREATE src/assets/icons/icon-128x128.png (1253 bytes)
CREATE src/assets/icons/icon-144x144.png (1394 bytes)
CREATE src/assets/icons/icon-152x152.png (1427 bytes)
CREATE src/assets/icons/icon-192x192.png (1790 bytes)
CREATE src/assets/icons/icon-384x384.png (3557 bytes)
CREATE src/assets/icons/icon-512x512.png (5008 bytes)
CREATE src/assets/icons/icon-72x72.png (792 bytes)
CREATE src/assets/icons/icon-96x96.png (958 bytes)
UPDATE angular.json (4882 bytes)
UPDATE package.json (1762 bytes)
UPDATE src/app/app.module.ts (2125 bytes)
UPDATE src/index.html (833 bytes)
✓ Packages installed successfully.

C:\Projects\Net5-Angular11\Chapter_11\WorldCities\ClientApp>
```





# Hello, world!

Welcome to your new single-page application, built with:

- **ASP.NET Core** and **C#** for cross-platform server-side code
- **Angular and TypeScript** for client-side code
- **Bootstrap** for layout and styling

To help you get started, we've also set up:

- **Client-side navigation.** For example, click *Counter* then *Back* to return here.
- **Angular CLI integration.** In development mode, there's no need to run `ng serve`. It runs in the background automatically, so your client-side resources are dynamically built on demand and the page refreshes when you modify any file.
- **Efficient production builds.** In production mode, development-time features are disabled, and your `dotnet publish` configuration automatically invokes `ng build` to produce minified, ahead-of-time compiled JavaScript files.

The `clientApp` subdirectory is a standard Angular CLI application. If you open a command prompt in that directory, you can run any `ng` command (e.g., `ng test`), or use `npm` to install extra packages into it.

The screenshot shows the Chrome DevTools Application tab selected. On the left, a sidebar lists various storage and service worker-related items. The main panel is titled "App Manifest" and displays the contents of `manifest.webmanifest`. The manifest includes the following fields:

- Identity:**
  - Name: HealthCheck
  - Short name: HealthCheck
- Presentation:**
  - Start URL: [/](#)
  - Theme color: #2196f3
  - Background color: #2196f3
  - Orientation: (no value)
  - Display: standalone

The screenshot shows the Chrome DevTools Application tab selected. On the left, a sidebar lists various storage and service worker-related items. The main panel is titled "Service Workers" and shows information for the service worker at `https://localhost:44334/`.

The service worker details are as follows:

- Source:** `ngsw-worker.js`
- Status:** #1201 activated and is running `stop`
- Clients:** `https://localhost:44334/ focus`
- Push:** `Test push message from DevTools.` (button labeled "Push")
- Sync:** `test-tag-from-devtools` (button labeled "Sync")

At the bottom, a note states: "▶ Service workers from other origins".

**WARNING:** the app is currently *offline*: some features that rely upon the back-end might not work as expected.  
This message will automatically disappear as soon as the internet connection becomes available again.

HealthCheck

Home Health Check

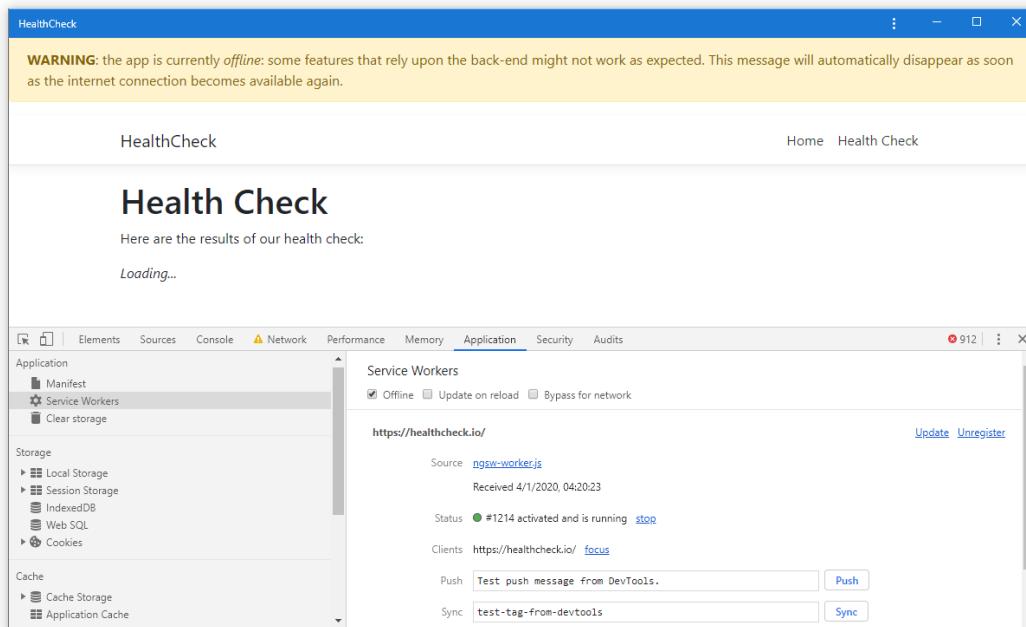
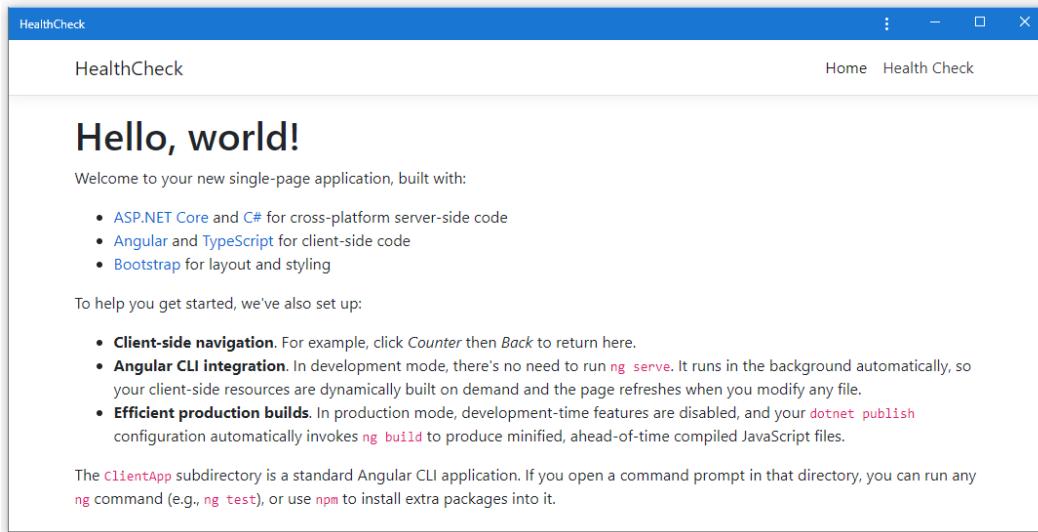
# Hello, world!

Welcome to your new single-page application, built with:

- [ASP.NET Core](#) and [C#](#) for cross-platform server-side code
- [Angular](#) and [TypeScript](#) for client-side code
- [Bootstrap](#) for layout and styling

The screenshot shows the Chrome DevTools Application tab open. In the left sidebar, 'Service Workers' is selected and highlighted with a red box around the checkbox labeled 'Offline'. Below the sidebar, the URL <https://localhost:44334/> is shown. On the right, details about a service worker are displayed: Source [ngsw-worker.js](#), Received 3/1/2020, 00:11:22, Status #1201 activated and is running [stop](#), and Clients <https://localhost:44334/> [focus](#).

The screenshot shows a browser window titled 'HealthCheck' with the address bar showing [localhost:44334](https://localhost:44334). The page content is 'Hello, world!' and the browser's address bar has a red box around the refresh icon.



```
http-server
```

```
C:\>npx http-server -p 8080 -c-1 C:\Temp\HealthCheck\ClientApp\dist\  
npx: installed 27 in 3.25s  
Starting up http-server, serving C:\Temp\HealthCheck\ClientApp\dist\  
Available on:  
  http://169.254.251.188:8080  
  http://192.168.1.101:8080  
  http://192.168.112.1:8080  
  http://192.168.159.1:8080  
  http://127.0.0.1:8080  
Hit CTRL-C to stop the server  
> -
```

## Chapter 12: Windows, Linux, and Azure Deployment

Output

Show output from: Debug

```
'iisexpress.exe' (CoreCLR: clrhost): Loaded 'C:\Program Files\dotnet\shared\Microsoft.AspNetCore.DataProtection.KeyManagement.XmlKeyManager: Information:  
'iisexpress.exe' (CoreCLR: clrhost): Loaded 'C:\Program Files\dotnet\shared\Microsoft.AspNetCore.Hosting.Diagnostics: Information: Request starting HTTP/2  
'iisexpress.exe' (CoreCLR: clrhost): Loaded 'C:\Program Files\dotnet\shared\Microsoft.AspNetCore.SpaServices: Information: > healthcheck@0.0.0 start C:\Pr  
ng serve "--port" "53567"
```

Output

Show output from: Build

```
audited 17038 packages in 9.425s  
found 2 high severity vulnerabilities  
  run `npm audit fix` to fix them, or `npm audit` for details  
npm run build -- --prod  
  
> healthcheck@0.0.0 build C:\Projects\NETCore3-Angular9\Chapter_11\HealthCheck\ClientApp  
> ng build "--prod"
```

### Azure services

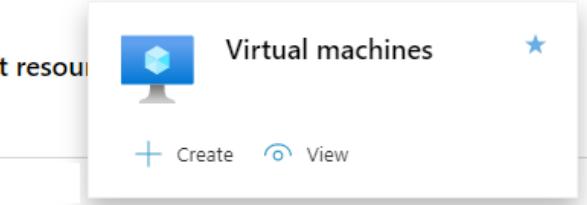
Create a resource

Virtual machines Subscriptions Managed databases

Recent resources

Virtual machines

Name  Create View



Microsoft Azure

All services > Virtual machines > Create a virtual machine

## Create a virtual machine

Basics Disks Networking Management Advanced Tags Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image.

Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization.

Looking for classic VMs? [Create VM from Azure Marketplace](#)

**Project details**

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \* ⓘ Pay-As-You-Go

Resource group \* ⓘ PacktPub [Create new](#)

**Instance details**

Virtual machine name \* ⓘ HealthCheck

Region \* ⓘ (Europe) West Europe

Availability options ⓘ No infrastructure redundancy required

Image \* ⓘ Windows Server 2019 Datacenter [Browse all public and private images](#)

Azure Spot instance ⓘ  Yes  No

Size \* ⓘ **Standard B1ms**  
1 vcpu, 2 GiB memory (17.38 €/month)  
[Change size](#)

All services > CreateVm-MicrosoftWindowsServer.WindowsServer-201-20200104031129 - Overview

## CreateVm-MicrosoftWindowsServer.WindowsServer-201-20200104031129 - Overview

Deployment

Search (Ctrl+ /) Delete Cancel Redeploy Refresh

Overview Inputs Outputs Template

Your deployment is complete

Deployment name: CreateVm-MicrosoftWindowsServer.WindowsS... Start time: 1/4/2020, 3:17:25 AM  
Subscription: Pay-As-You-Go Correlation ID: e244a166-707d-4cab-94d4-e0cb03d8b973  
Resource group: PacktPub

Deployment details (Download)

Next steps

Setup auto-shutdown Recommended  
Monitor VM health, performance and network dependencies Recommended  
Run a script inside the virtual machine Recommended

Go to resource

Microsoft Azure Search resources, services, and docs (G+/)

Home > WEB-01 Virtual machine

Search (Ctrl+ /) Connect Start Restart Stop Capture Delete Refresh Open in mobile

## WEB-01

Virtual machine

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Networking Connect

Advisors (1 of 7): Log Analytics agent should be installed on your virtual machine →

Essentials

Resource group (change) : ThePaac	Operating system :
Status : Running	Size : Standard D52 v2 (2 vcpus, 7 GiB memory)
Location : West Europe	Public IP address :
Subscription (change) : Microsoft MVP	Virtual network/subnet : vnet/default
Subscription ID :	DNS name : Configure
Tags (change) : Click here to add tags	

 Add inbound security rule X

HealthCheck-nsg

 Basic

Source \* ⓘ

Source IP addresses/CIDR ranges \* ⓘ  
  
✖ The value must not be empty.

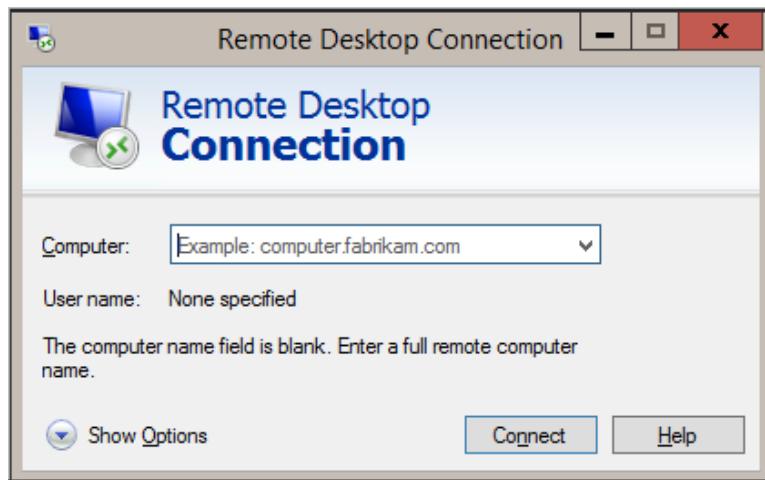
Source port ranges \* ⓘ

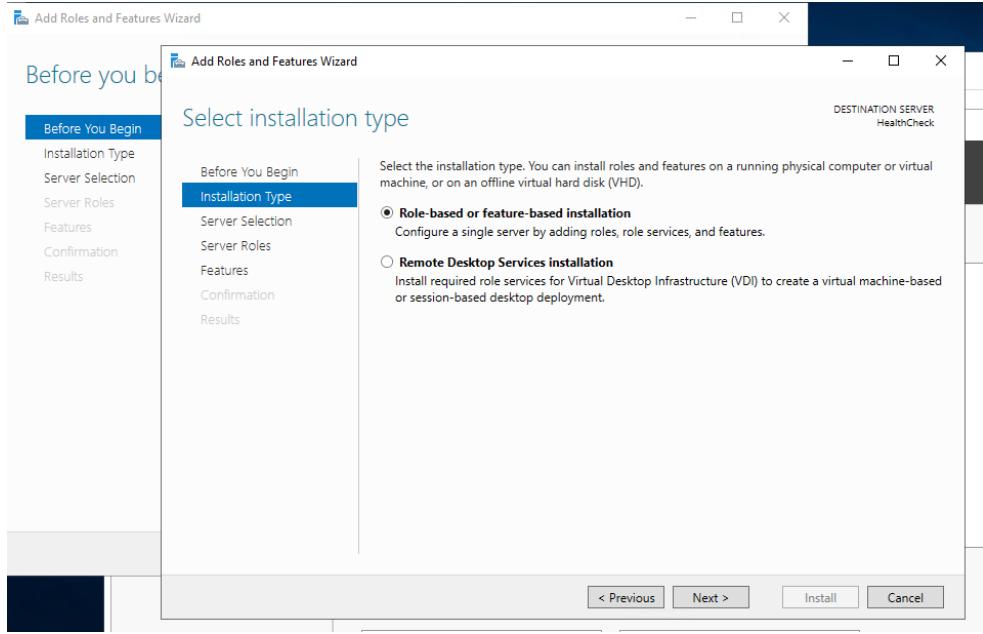
Destination \* ⓘ

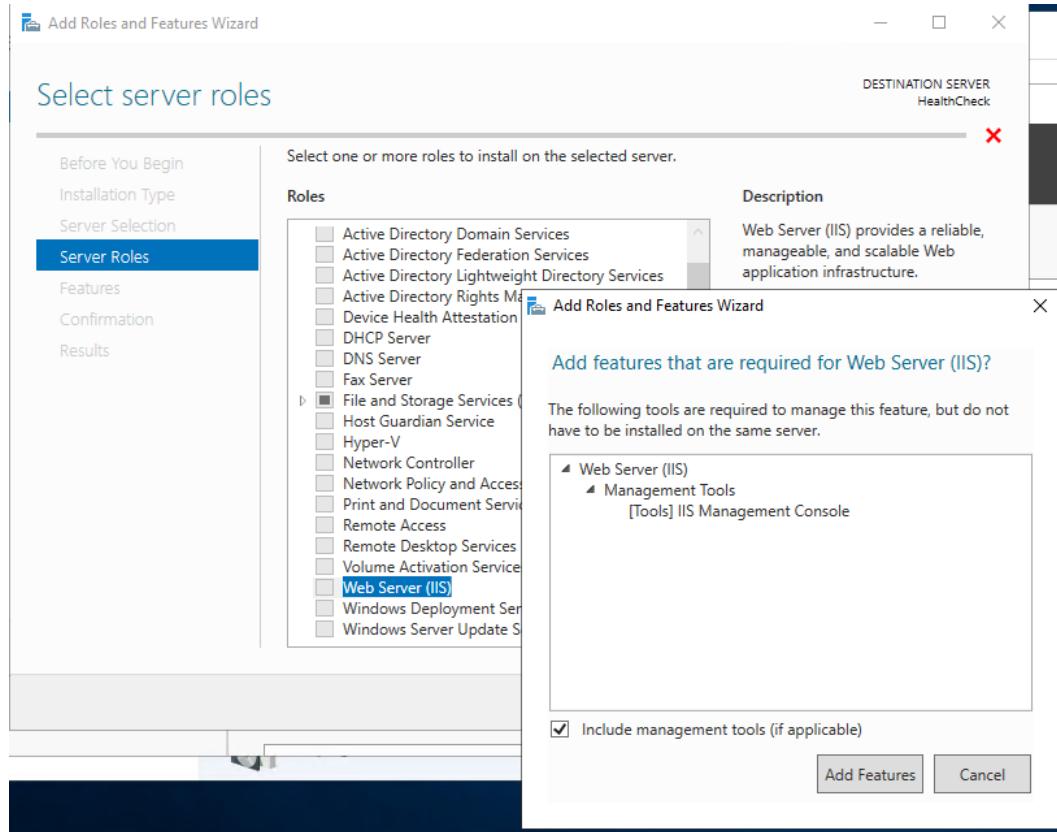
Destination port ranges \* ⓘ  
 ✓

Protocol \*  
 Any  TCP  UDP  ICMP

Action \*  
 Allow  Deny







## Run apps - Runtime ⓘ

### ASP.NET Core Runtime 5.0.0

The ASP.NET Core Runtime enables you to run existing web/server applications. **On Windows, we recommended installing the Hosting Bundle, which includes the .NET Runtime and IIS support.**

#### IIS runtime support (ASP.NET Core Module v2)

15.0.20300.0

OS	Installers	Binaries
Linux	<a href="#">Package manager instructions</a>	<a href="#">Arm32</a>   <a href="#">Arm64</a>   <a href="#">Arm64 Alpine</a>   <a href="#">x64</a>   <a href="#">x64 Alpine</a>
macOS		<a href="#">x64</a>
Windows	<a href="#">Hosting Bundle</a> <a href="#">x64</a>   <a href="#">x86</a>	<a href="#">Arm64</a>   <a href="#">x64</a>   <a href="#">x86</a>

**Publish**

Select existing Azure Virtual Machine

Ryadel

Subscription: Microsoft MVP

View: Resource group

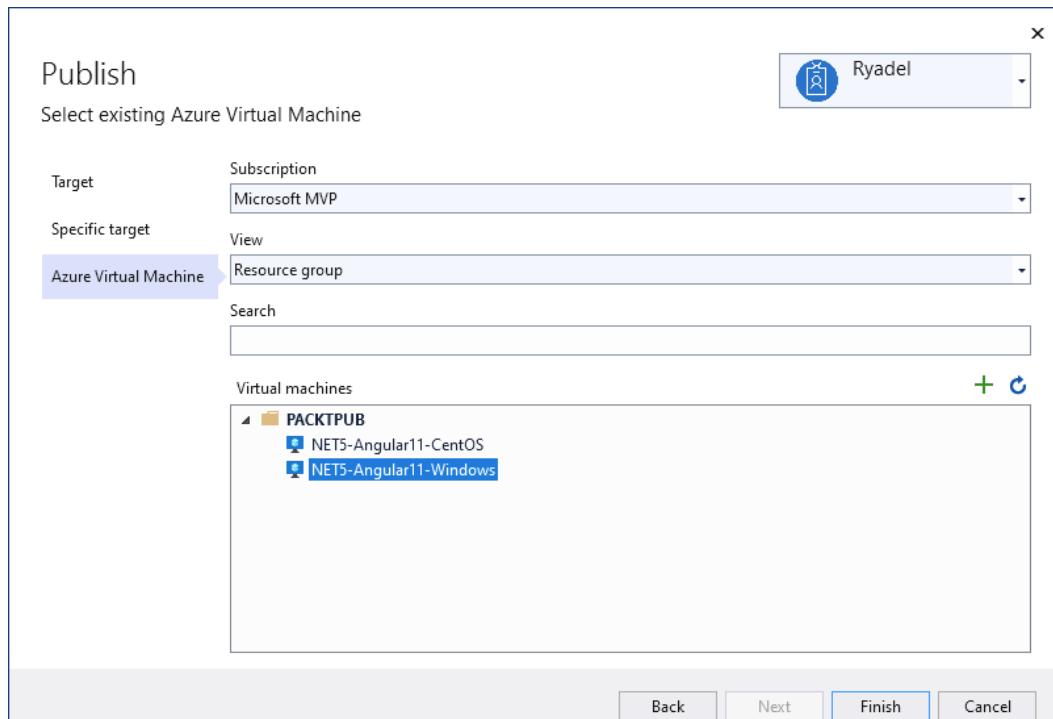
Search:

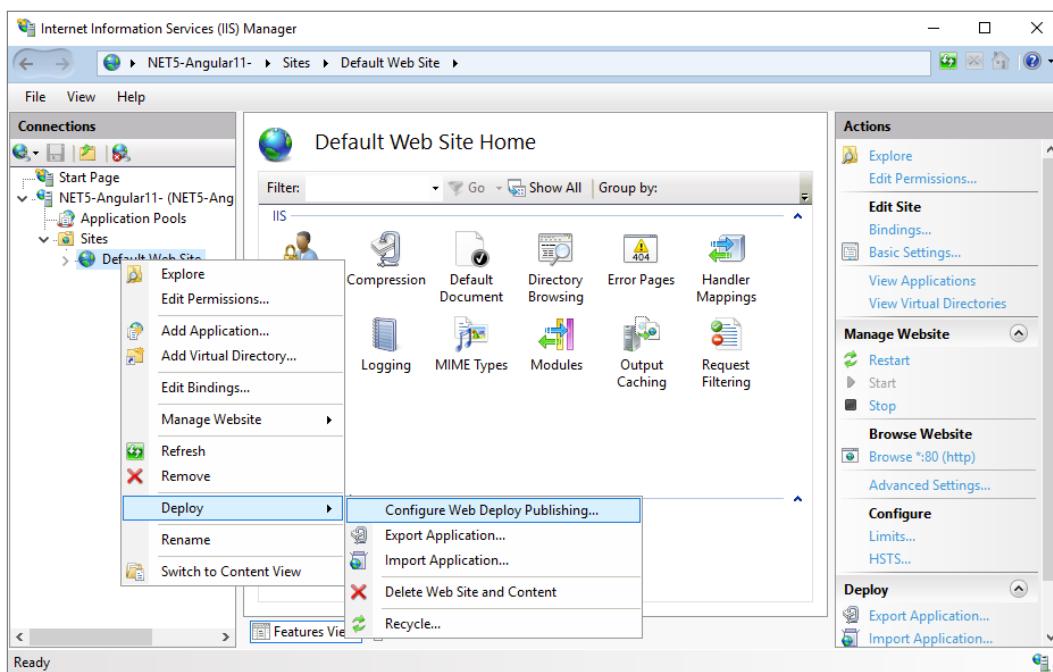
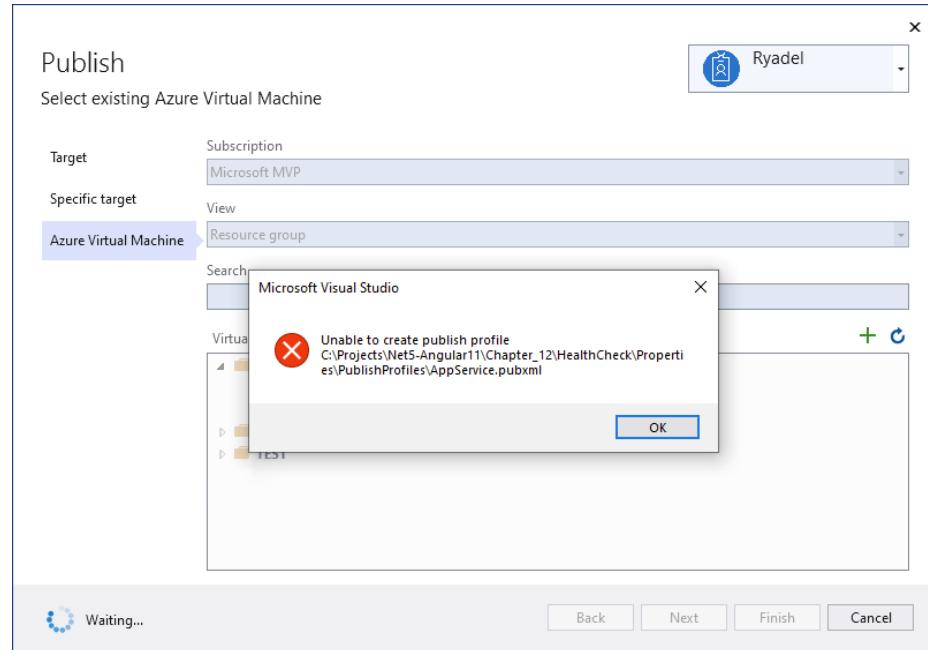
Azure Virtual Machine

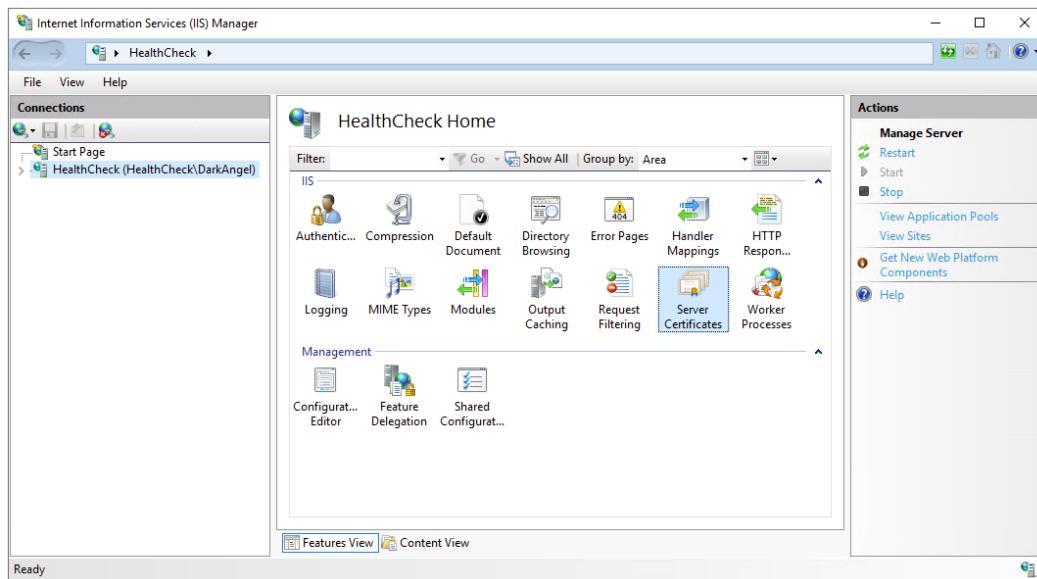
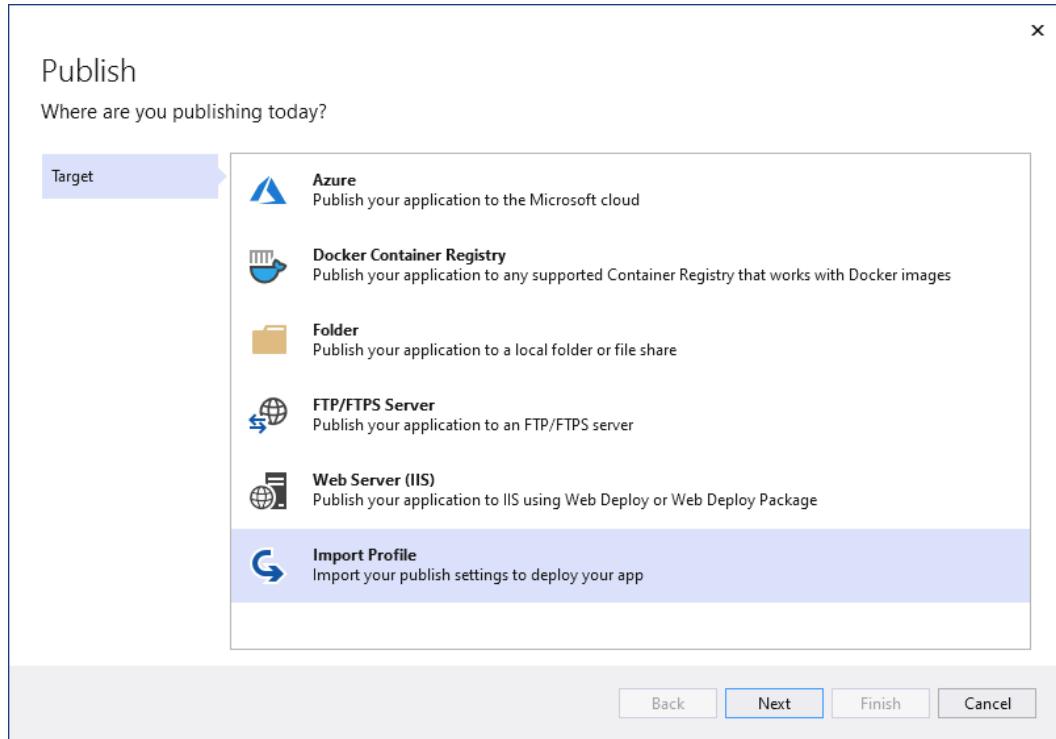
Virtual machines:

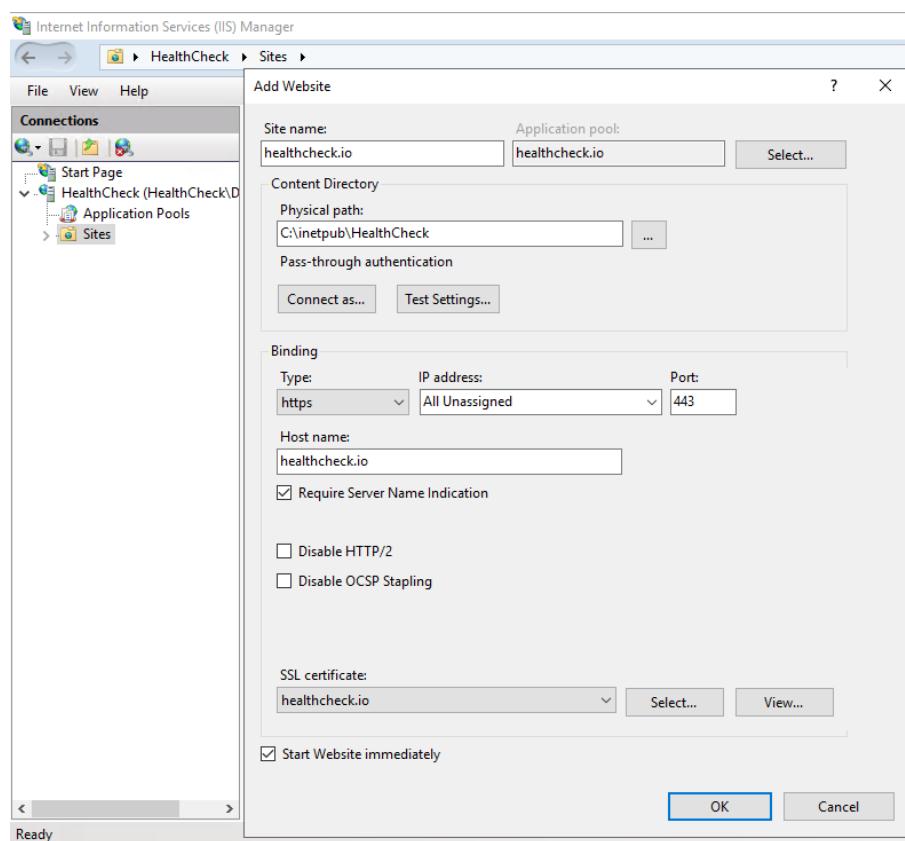
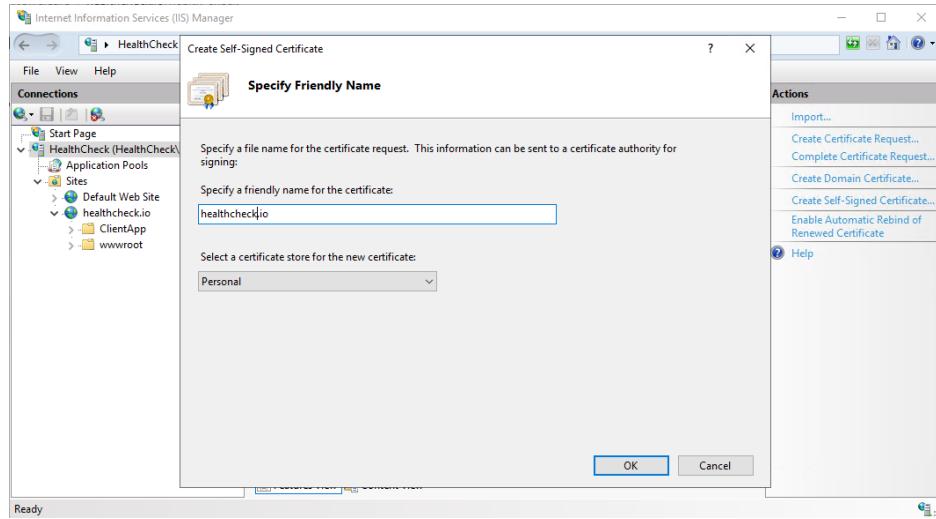
- PACKTPUB
  - NET5-Angular11-CentOS
  - NET5-Angular11-Windows

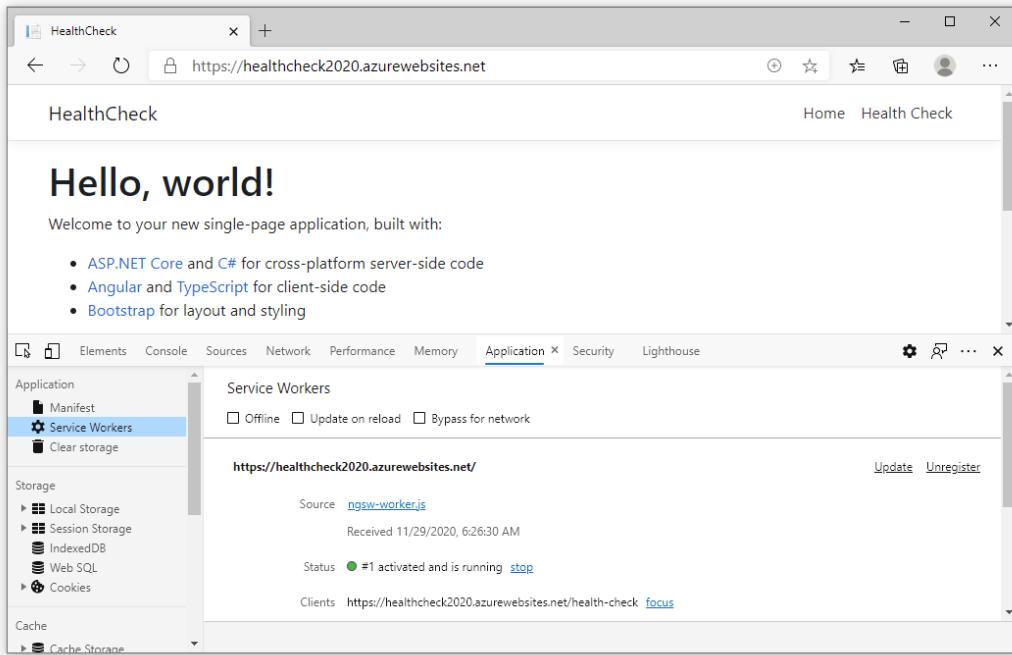
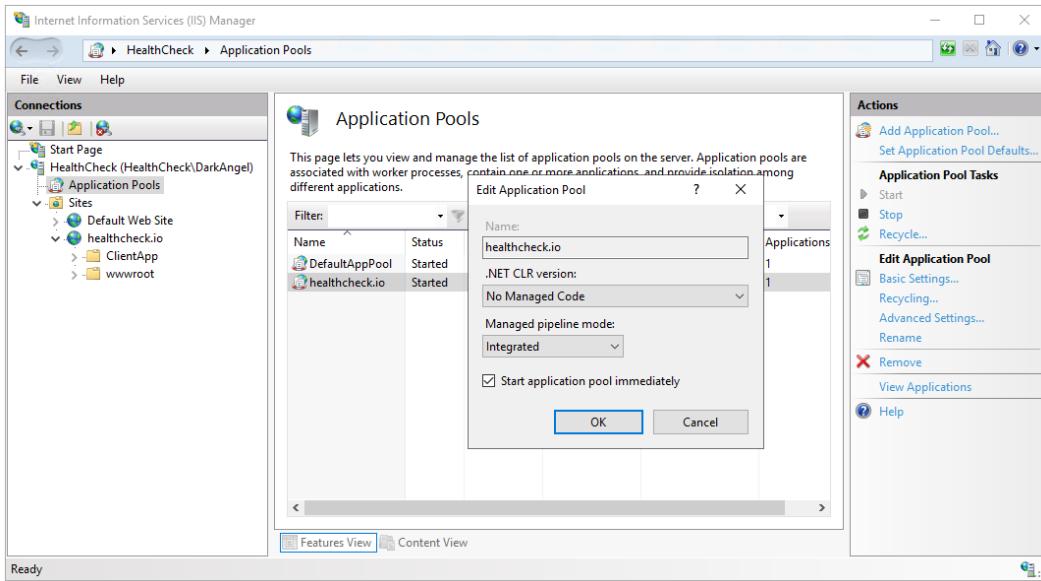
Back Next Finish Cancel

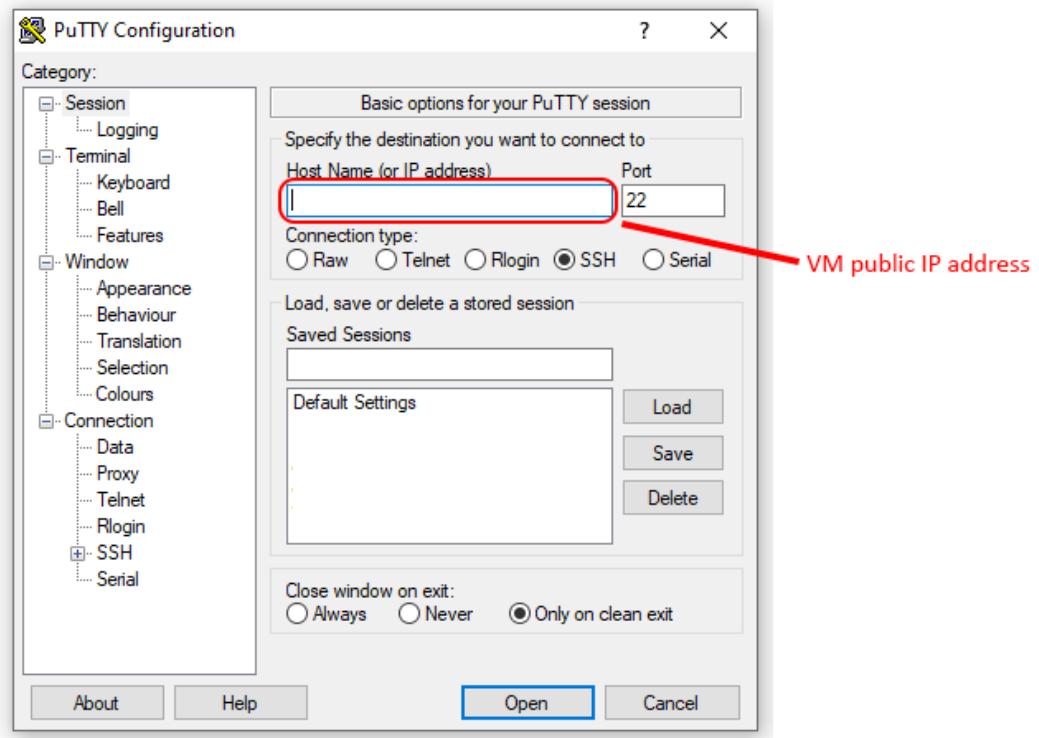






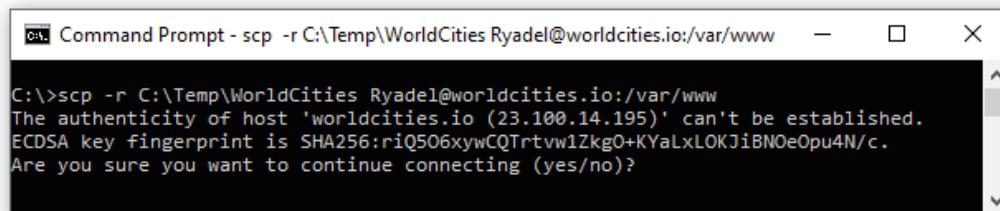
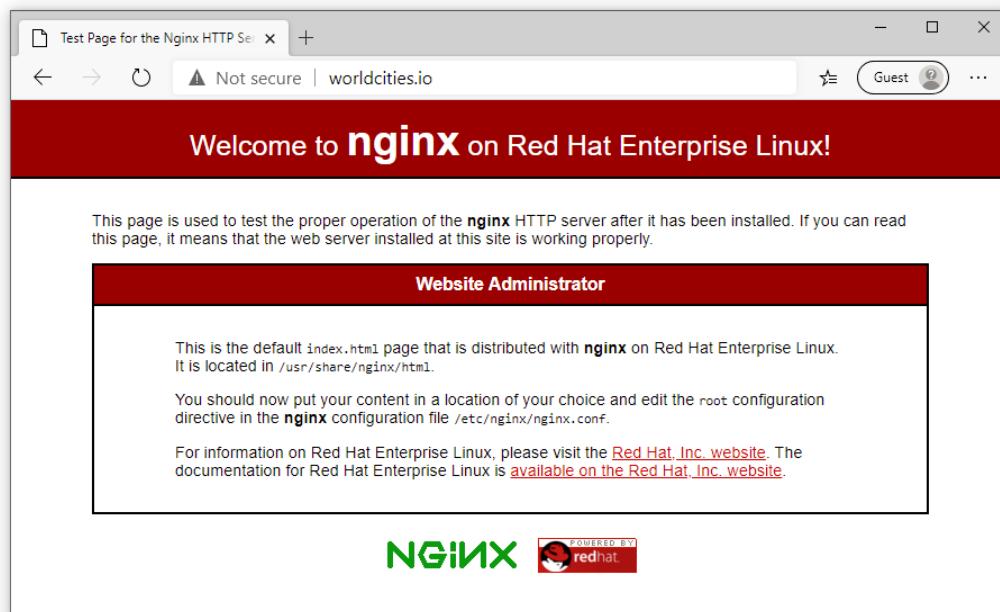




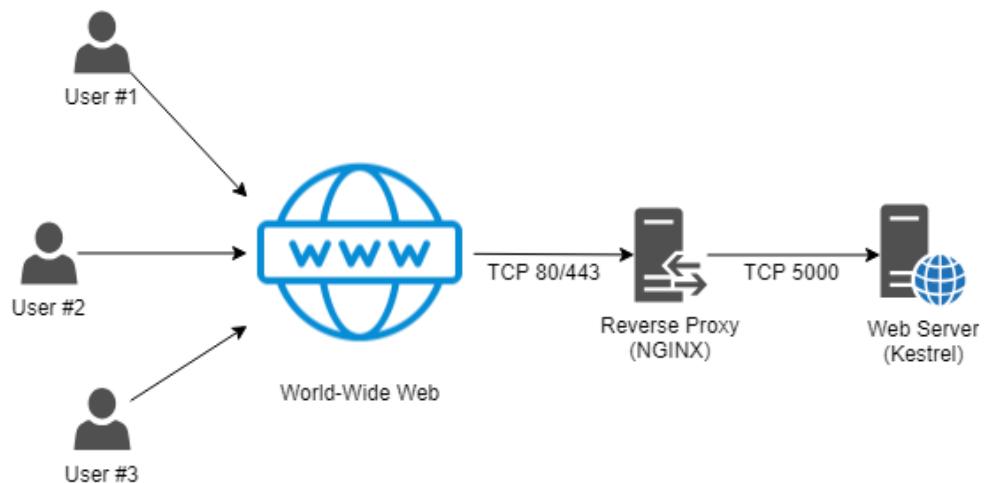


```
Ryadel@NET5-Angular11-CentOS:~  
└─ login as: Ryadel  
└─ Ryadel@23.100.14.195's password:  
Activate the web console with: systemctl enable --now cockpit.socket  
[Ryadel@NET5-Angular11-CentOS ~]$
```

A terminal window titled "Ryadel@NET5-Angular11-CentOS:~" is shown. It displays an SSH login process. The user "Ryadel" logs in from IP "23.100.14.195". A password prompt follows, and then a message about enabling the cockpit web console. The command "[Ryadel@NET5-Angular11-CentOS ~]\$" is visible at the bottom.



```
Command Prompt - scp -r C:\Temp\WorldCities Ryadel@worldcities.io:/var/www
3rdpartylicenses.txt          100%   32KB  938.2KB/s  0:00
icon-128x128.png             100% 1253   32.8KB/s  0:00
icon-144x144.png             100% 1394   43.3KB/s  0:00
icon-152x152.png             100% 1427   35.7KB/s  0:00
icon-192x192.png             100% 1790   54.5KB/s  0:00
icon-384x384.png             100% 3557   97.0KB/s  0:00
icon-512x512.png             100% 5008  137.6KB/s  0:00
icon-72x72.png               100% 792   26.2KB/s  0:00
icon-96x96.png               100% 958   31.9KB/s  0:00
index.html                   100% 8276  235.5KB/s  0:00
main-es2015.1a6056fcc51260fce9e2.js 100% 949KB  8.6MB/s  0:00
main-es5.1a6056fcc51260fce9e2.js    100% 1047KB  6.2MB/s  0:00
manifest.webmanifest           100% 1346   33.4KB/s  0:00
ngsw-worker.js                100% 141KB   3.3MB/s  0:00
ngsw.json                     100% 3084   95.0KB/s  0:00
polyfills-es2015.b19e7a4a0f1df1cc1a17.js 100% 36KB   1.1MB/s  0:00
polyfills-es5.b1f18f2baea8092014d0.js    100% 129KB  3.0MB/s  0:00
runtime-es2015.681bd8a4edb177c86959.js 100% 1485   48.3KB/s  0:00
runtime-es5.681bd8a4edb177c86959.js    100% 1485   23.1KB/s  0:00
safety-worker.js              100% 519   15.9KB/s  0:00
styles.143aac3caa82f80e18f.css        100% 210KB  4.4MB/s  0:00
worker-basic.min.js            100% 519   17.3KB/s  0:00
Microsoft.CodeAnalysis.CSharp.resources.dll 100% 322KB  5.6MB/s  0:00
Microsoft.CodeAnalysis.CSharp.Workspaces.resource 100% 16KB  528.5KB/s  0:00
Microsoft.CodeAnalysis.resources.dll       100% 37KB   1.1MB/s  0:00
Microsoft.CodeAnalysis.Workspaces.resources.dll 100% 39KB   1.2MB/s  0:00
Microsoft.CodeAnalysis.CSharp.resources.dll 100% 342KB  5.3MB/s  0:00
Microsoft.CodeAnalysis.CSharp.Workspaces.resource 100% 17KB  546.4KB/s  0:00
Microsoft.CodeAnalysis.resources.dll       100% 38KB   1.1MB/s  0:00
Microsoft.CodeAnalysis.Workspaces.resources.dll 100% 40KB   1.2MB/s  0:00
```



```
Ryadel@NET5-Angular11-CentOS:/
[Ryadel@NET5-Angular11-CentOS /]$ sudo systemctl status kestrel-worldcities.service
● kestrel-worldcities.service - WorldCities
    Loaded: loaded (/etc/systemd/system/kestrel-worldcities.service; enabled; vendor preset: disabled)
      Active: active (running) since Sun 2020-11-29 02:48:00 UTC; 11s ago
        Main PID: 33259 (dotnet)
           Tasks: 12 (limit: 12104)
         Memory: 14.5M
            CGroup: /system.slice/kestrel-worldcities.service
                      └─33259 /usr/bin/dotnet /var/www/WorldCities/WorldCities.dll

Nov 29 02:48:00 NET5-Angular11-CentOS systemd[1]: Started WorldCities.
[Ryadel@NET5-Angular11-CentOS /]$
```

[←](#) [→](#) [⟳](#) [HomeAs](#) [🔒 worldcities.io](#)

WorldCities [Home](#) [Cities](#) [Countries](#) [Register](#) [Login](#)

A sample web application to demonstrate how to interact with ASP.NET, Angular, Entity Framework Core and a SQL Database.



Elements Sources Console Network Performance Memory Application Security Audits

Application

- Manifest
- Service Workers**
- Clear storage

Service Workers

- Offline
- Update on reload
- Bypass for network

<https://worldcities.io/> [Update](#) [Unregister](#)

Source [ngsw-worker.js](#)  
Received 29/11/2020, 04:44:48  
Status **● #1260 activated and is running** [stop](#)  
Clients <https://worldcities.io/> [focus](#)

# Error.

An error occurred while processing your request.

Request ID: | 3123e876-4f723ee9d56ef4e5.

## Development Mode

Swapping to the **Development** environment displays detailed information about the error that occurred.

The **Development** environment shouldn't be enabled for deployed applications. It can result in displaying sensitive information from exceptions to end users. For local debugging, enable the **Development** environment by setting the **ASPNETCORE\_ENVIRONMENT** environment variable to **Development** and restarting the app.

Instance Details

Name \*  .azurewebsites.net

Publish \*  Code  Docker Container

Runtime stack \*

Operating System \*  Linux  Windows

Region \*  Not finding your App Service Plan? Try a different region.

App Service Plan

App Service plan pricing tier determines the location, features, cost and compute resources associated with your app.  
[Learn more](#)

Windows Plan (West Europe) \*  Create new

Sku and size \*  Shared infrastructure, 1 GB memory

Delete Cancel Redeploy Refresh

We'd love your feedback! →

**Your deployment is complete**

Deployment name: Microsoft.Web-WebApp-Portal-d23607c3-a3dd Start time: 29/11/2020, 05:55:52  
 Subscription: Microsoft MVP Correlation ID: cb726ccc-f4a5-4633-a73b-499cd8df67b2  
 Resource group: PacktPub

Deployment details (Download)

Resource	Type	Status	Operation details
HealthCheck2020	Microsoft.Web/sites	OK	<a href="#">Operation details</a>

Next steps

[Go to resource](#)

Microsoft Azure Search resources, services, and docs (G+/-)

Home > **HealthCheck2020**

App Service

Search (Ctrl+/Overview)

Browse Stop Swap Restart Delete | Refresh Get publish profile Reset publish profile ...

Click here to access our Quickstart guide for deploying code to your app →

**Essentials**

Resource group ([change](#))  
 PackPub  
 Status  
 Running  
 Location  
 West Europe  
 Subscription ([change](#))  
 Microsoft MVP  
 Subscription ID  
 1fc269a2-a008-4d28-a388-c30af77244a0  
 Tags ([change](#))  
 Click here to add tags

**URL**  
<https://healthcheck2020.azurewebsites.net>

App Service Plan  
 Azure2020AppPlan (F1: Free)  
 FTP/deployment username  
 No FTP/deployment user set  
 FTP hostname  
 ftp://waws-prod-am2-309.ftp.azurewebsites.windows.net/site  
 FTPS hostname  
 https://waws-prod-am2-309.ftp.azurewebsites.windows.net/site

Diagnose and solve problems  
 Our self-service diagnostic and troubleshooting experience helps you identify and resolve issues with your web app.

App Service Advisor  
 App Service Advisor provides insights for improving app experience on the App Service platform. Recommendations are sorted by freshness, priority and impact to your app.

## Publish

Which Azure service would you like to use to host your application?

Target

Specific target

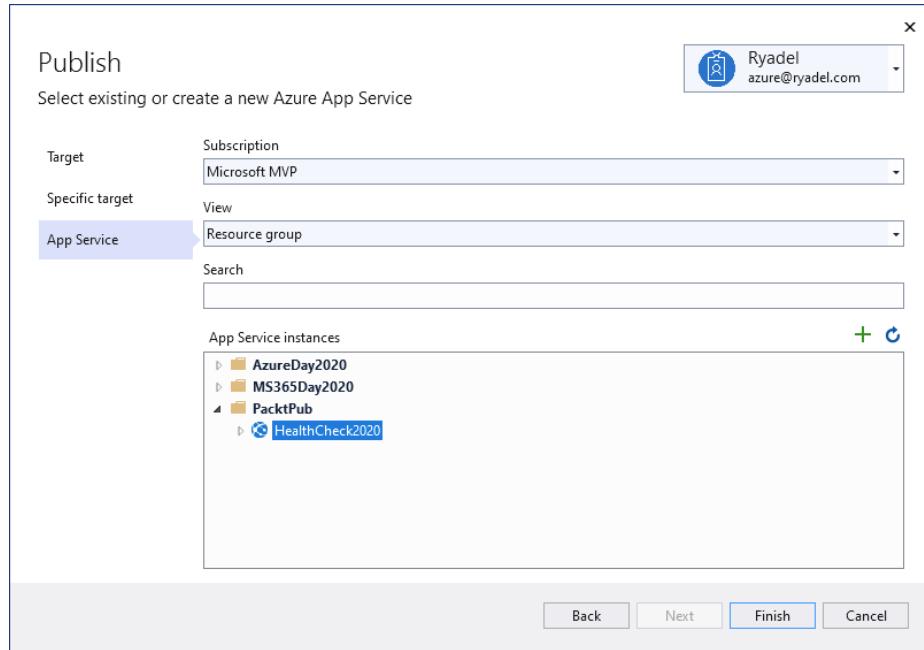
- Azure App Service (Windows)**  
Publish your application code to a managed infrastructure that is easy to scale
- Azure App Service (Linux)**  
Publish your application code to a managed infrastructure that is easy to scale
- Azure App Service Container**  
Publish your application as a Docker image to Azure Container Registry and run it on Azure App Service
- Azure Container Registry**  
Publish your application as a Docker image to Azure Container Registry
- Azure Virtual Machine**  
Manage your own infrastructure

Back

Next

Finish

Cancel



The screenshot shows the Microsoft Edge DevTools interface. The address bar displays the URL <https://healthcheck2020.azurewebsites.net>. The main content area shows the application's landing page with the heading 'Hello, world!' and a welcome message about the technology stack used. Below the content, the DevTools Network tab is active, showing a service worker registration for 'ngsw-worker.js' at the URL <https://healthcheck2020.azurewebsites.net/>. The status bar indicates the worker is activated and running. On the left side, the Storage panel is open, showing sections for Application (Manifest, Service Workers, Clear storage), Storage (Local Storage, Session Storage, IndexedDB, Web SQL, Cookies), and Cache (Cache Storage).