.NET Conf China 2025

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更简单的 C# dotnet app.cs

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What is it

```
[pipeline@weihanli-asia-01 file-apps]$ echo 'Console.WriteLine("Hello World!");' > hello.cs
[pipeline@weihanli-asia-01 file-apps]$ cat hello.cs
Console.WriteLine("Hello World!");
[pipeline@weihanli-asia-01 file-apps]$ dotnet hello.cs
Hello World!
[pipeline@weihanli-asia-01 file-apps]$
```

- **No Project File**
- run file
- file-based programs/apps

简化 C# -
初学者友好 -
原型验证(PoC) -
教学、脚本、自动化 -
可以一键成长为项目 -

The Evolution of C# Simplicity

.NET Framework/C# 1

- Main Method
- Classic Project file

.NET Core/C# 7

- Simplified SDK-based Project File
- Default Items

.NET 6/C# 10

- Top-level statements
- Implicit Usings (global using)

.NET 10/C# 14

- File-based Apps (no project file)
- Ignored Directives

How it works

```
Done Building Project "/home/pipeline/file-apps/hello.csproj" (Clean target(s)).

Build succeeded.
    0 Warning(s)
    0 Error(s)

Time Elapsed 00:00:00.68
  Determining projects to restore...
  All projects are up-to-date for restore.
  hello -> /home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.dll
```

In-Memory Virtual Project 基于内存的虚拟项目

```
[pipeline@weihanli-asia-01 file-apps]$ export MSBUILDTERMINALLOGGER=off && dotnet clean hello.cs && dotnet build hello.cs
Build started 11/19/2025 5:24:17 PM.
Project "/home/pipeline/file-apps/hello.csproj" on node 1 (Clean target(s)).
CoreClean:
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/build-start.cache".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/build-success.cache".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.deps.json
".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.runtimeco
nfig.json".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.dll".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.pdb".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.Generated
MSBuildEditorConfig.editorconfig".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.AssemblyI
nfoInputs.cache".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.AssemblyI
nfo.cs".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.csproj.Co
reCompileInputs.cache".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.dll".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/refint/hello.dl
l".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.pdb".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/hello.genruntim
econfig.cache".
  Deleting file "/home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/obj/debug/ref/hello.dll".
Done Building Project "/home/pipeline/file-apps/hello.csproj" (Clean target(s)).

Build succeeded.
    0 Warning(s)
    0 Error(s)

Time Elapsed 00:00:00.64
  Determining projects to restore...
  Restored /home/pipeline/file-apps/hello.csproj (in 300 ms).
  hello -> /home/pipeline/.local/share/dotnet/runfile/hello-ebbd7300e0ca3875539186936114e0fe0b40b45c604a9ef591261f872b7e6baf/bin/debug/hello.dll
[pipeline@weihanli-asia-01 file-apps]$
```

How to use it

```
#!/usr/bin/env dotnet
Console.WriteLine("Hello .NET 10!");
```

```
[pipeline@weihanli-asia-01 file-apps]$ chmod +x hello.cs
[pipeline@weihanli-asia-01 file-apps]$ ls -l hello.cs
-rwxrwxr-x 1 pipeline pipeline 59 Nov 20 14:08 hello.cs
[pipeline@weihanli-asia-01 file-apps]$ ./hello.cs
Hello .NET 10!
```

How to use it

```
#:project ../Net10Samples
#:property PublishAot=false

Net10Samples.JsonSamples.JsonIgnoreWhenReadWriteSample();
```

```
#:sdk Microsoft.Net.Sdk.Web
#:property ManagePackageVersionsCentrally=false
#:property PublishAot=false
#:package WeihanLi.Web.Extensions@2.1.0
using WeihanLi.Web.Extensions;

var app = WebApplication.Create(args);
app.MapGet("/", () => "Hello World!");
app.MapRuntimeInfo().ShortCircuit();
app.Run();
```

How to use it

```
#:sdk Microsoft.Net.Sdk.Web

using System.Runtime.CompilerServices;

var builder = WebApplication.CreateBuilder(args);
var app = builder.Build();

app.MapGet("/sse", (CancellationToken cancellationToken, int duration = 10) =>
{
    async IAsyncEnumerable<string> GetLines(
        [EnumeratorCancellation] CancellationToken cancellationToken)
    {
        while (!cancellationToken.IsCancellationRequested)
        {
            var rand = Random.Shared.Next(60, 100);
            yield return $"date: {DateTime.Now:yyyy-MM-dd HH:mm:ss}, rand: {rand}";
            await Task.Delay(1000, cancellationToken);
        }
    }

    return TypedResults.ServerSentEvents(GetLines(cancellationToken));
});
```

How to use it

Common Build files

- Directory.Build.props
- Directory.Build.targets
- Directory.Packages.props

```xml
<Project>
  <PropertyGroup>
    <ArtifactsPath>$(MSBuildThisFileDirectory)artifacts</ArtifactsPath>
  </PropertyGroup>
</Project>
```

```
 pwsh  file-programs  main ≡ ?5 ~2  75ms                    10.0.100
>> dotnet build .\hello-csharp14.cs
Build succeeded in 3.2s
 pwsh  file-programs  main ≡ ?5 ~2  3s 438ms                 10.0.100
>> dotnet restore .\hello-csharp14.cs
Restore complete (0.3s)

Build succeeded in 0.5s
 pwsh  file-programs  main ≡ ?5 ~2  728ms                    10.0.100
>> dotnet build .\hello-csharp14.cs
Restore complete (0.3s)
  hello-csharp14 net10.0 succeeded (0.2s) → artifacts\bin\debug\hello-csharp14.dll

Build succeeded in 0.9s
```

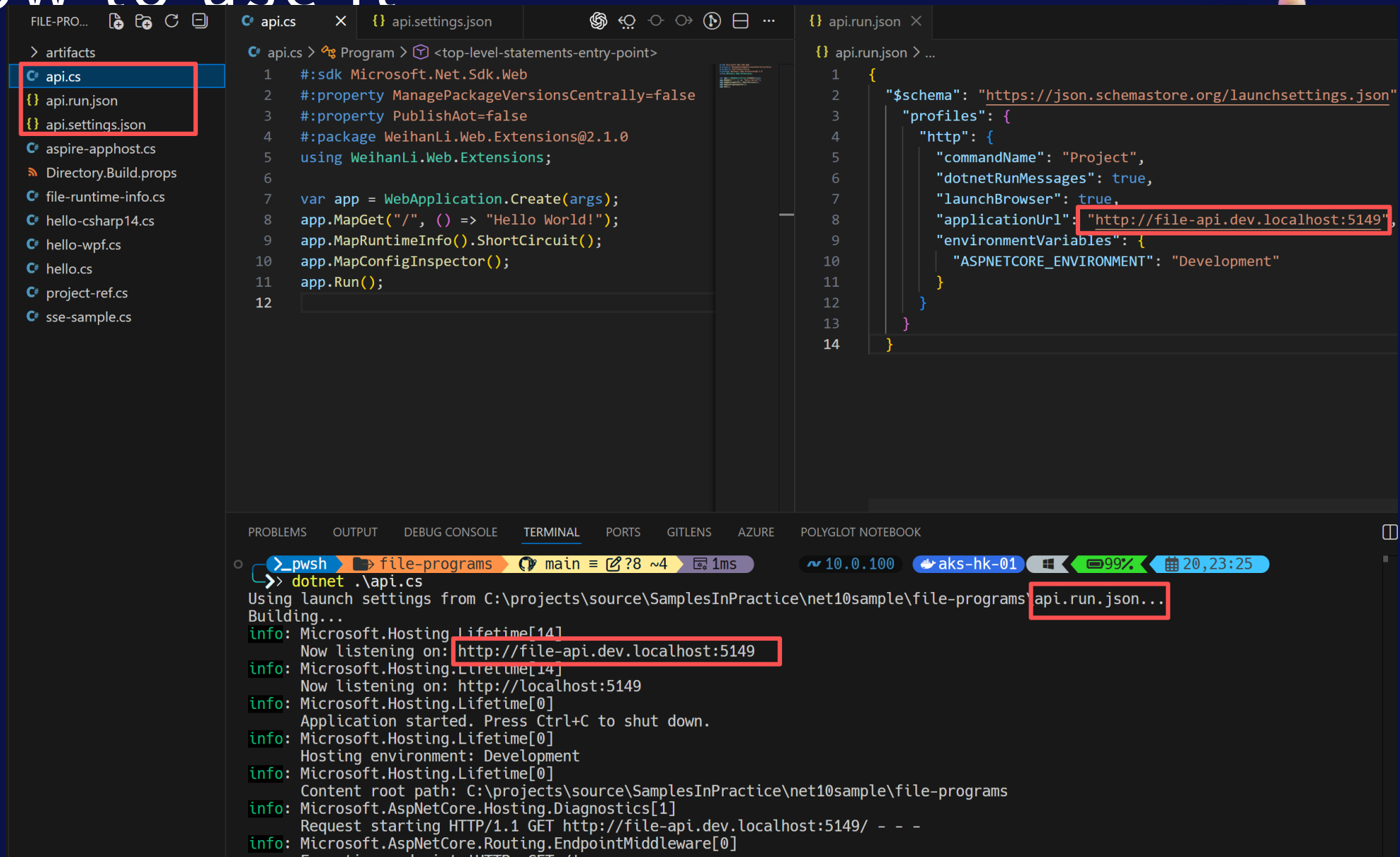
How to use it

```
 >_pwsh  file-programs  main ≡ ?5 ~2  151ms                    10.0.100
❯ dotnet clean .\hello-csharp14.cs

Build succeeded in 0.4s
 >_pwsh  file-programs  main ≡ ?5 ~2  616ms                    10.0.100
❯ dotnet publish .\hello-csharp14.cs
Restore complete (14.1s)
  hello-csharp14 net10.0 win-x64 succeeded (5.1s) → artifacts\hello-csharp14\
❯ ls .\artifacts\hello-csharp14\

    Directory: C:\projects\source\SamplesInPractice\net10sample\file-programs\artifacts\hello-csharp14

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          11/20/2025    22:17        1112064 hello-csharp14.exe
-a---          11/20/2025    22:17        6516736 hello-csharp14.pdb

 >_pwsh  file-programs  main ≡ ?3 ~3  23ms
 10.0.100  aks-hk-01  98%  25,21:24
❯ .\artifacts\hello-csharp14\hello-csharp14.exe
Hello, C# 14!
❯ dotnet format .\hello-csharp14.cs
Unhandled exception: System.IO.FileNotFoundException: The file 'hello-csharp14.cs' does not appear to be a valid project or solution
 file.
   at Microsoft.CodeAnalysis.Tools.Workspaces.MSBuildWorkspaceFinder.FindFile(String workspacePath)
   at Microsoft.CodeAnalysis.Tools.Workspaces.MSBuildWorkspaceFinder.FindWorkspace(String searchDirectory, String workspacePath)
   at Microsoft.CodeAnalysis.Tools.FormatCommandCommon.ParseWorkspaceOptions(ParseResult parseResult, FormatOptions formatOptions)
   at Microsoft.CodeAnalysis.Tools.Commands.RootFormatCommand.FormatCommandDefaultHandler.InvokeAsync(ParseResult parseResult, Cance
llationToken cancellationToken)
```

How to use it

```
[pipeline@weihanli-asia-01 file-apps]$ ls
hello.cs
[pipeline@weihanli-asia-01 file-apps]$ dotnet project convert hello.cs
Specify the output directory (hello):
[pipeline@weihanli-asia-01 file-apps]$ ls
hello  hello.cs
[pipeline@weihanli-asia-01 file-apps]$ ls hello/
hello.cs  hello.csproj
[pipeline@weihanli-asia-01 file-apps]$ cat hello/hello.cs
 Console.WriteLine("Hello .NET 10!");
[pipeline@weihanli-asia-01 file-apps]$ cat hello/hello.csproj
 <Project Sdk="Microsoft.NET.Sdk">

  <PropertyGroup>
    <OutputType>Exe</OutputType>
    <TargetFramework>net10.0</TargetFramework>
    <ImplicitUsings>enable</ImplicitUsings>
    <Nullable>enable</Nullable>
    <PublishAot>true</PublishAot>
    <PackAsTool>true</PackAsTool>
    <UserSecretsId>hello-d234fa9ac13f947d91ef4f32d90bead7ad72fded843debcc87e10a66cf8fb075</UserSecretsId>
  </PropertyGroup>

</Project>
[pipeline@weihanli-asia-01 file-apps]$ dotnet run --project ./hello/hello.csproj
Hello .NET 10!
```

How to use it


FILE-PRO...
artifacts
api.cs
api.run.json
api.settings.json
aspire-apphost.cs
Directory.Build.props
file-runtime-info.cs
hello-csharp14.cs
hello-wpf.cs
hello.cs
project-ref.cs
sse-sample.cs
api.cs
api.settings.json
api.cs > Program > <top-level-statements-entry-point>
#:sdk Microsoft.Net.Sdk.Web
#:property ManagePackageVersionsCentrally=false
#:property PublishAot=false
#:package WeihanLi.Web.Extensions@2.1.0
using WeihanLi.Web.Extensions;
var app = WebApplication.Create(args);
app.MapGet("/", () => "Hello World!");
app.MapRuntimeInfo().ShortCircuit();
app.MapConfigInspector();
app.Run();
api.run.json
api.run.json > ...
{
"$schema": "https://json.schemastore.org/launchsettings.json"
"profiles": {
"http": {
"commandName": "Project",
"dotnetRunMessages": true,
"launchBrowser": true,
"applicationUrl": "http://file-api.dev.localhost:5149",
"environmentVariables": {
"ASPNETCORE_ENVIRONMENT": "Development"
}
}
}
}
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
GITLENS
AZURE
POLYGLOT NOTEBOOK
pwsh
file-programs
main ≡ ?8 ~4
1ms
10.0.100
aks-hk-01
99%
20,23:25
dotnet .\api.cs
Using launch settings from C:\projects\source\SamplesInPractice\net10sample\file-programs\api.run.json...
Building...
info: Microsoft.Hosting.Lifetime[14]
Now listening on: http://file-api.dev.localhost:5149
info: Microsoft.Hosting.Lifetime[14]
Now listening on: http://localhost:5149
info: Microsoft.Hosting.Lifetime[0]
Application started. Press Ctrl+C to shut down.
info: Microsoft.Hosting.Lifetime[0]
Hosting environment: Development
info: Microsoft.Hosting.Lifetime[0]
Content root path: C:\projects\source\SamplesInPractice\net10sample\file-programs
info: Microsoft.AspNetCore.Hosting.Diagnostics[1]
Request starting HTTP/1.1 GET http://file-api.dev.localhost:5149/ - - -
info: Microsoft.AspNetCore.Routing.EndpointMiddleware[0]

How to use it

api.cs

```
#:sdk Microsoft.Net.Sdk.Web
#:property ManagePackageVersionsCentrally=false
#:property PublishAot=false
#:package WeihanLi.Web.Extensions@2.1.0
using WeihanLi.Web.Extensions;

var app = WebApplication.Create(args);
app.MapGet("/", () => "Hello World!");
app.MapRuntimeInfo().ShortCircuit();
app.MapConfigInspector();
app.Run();
```

api.settings.json

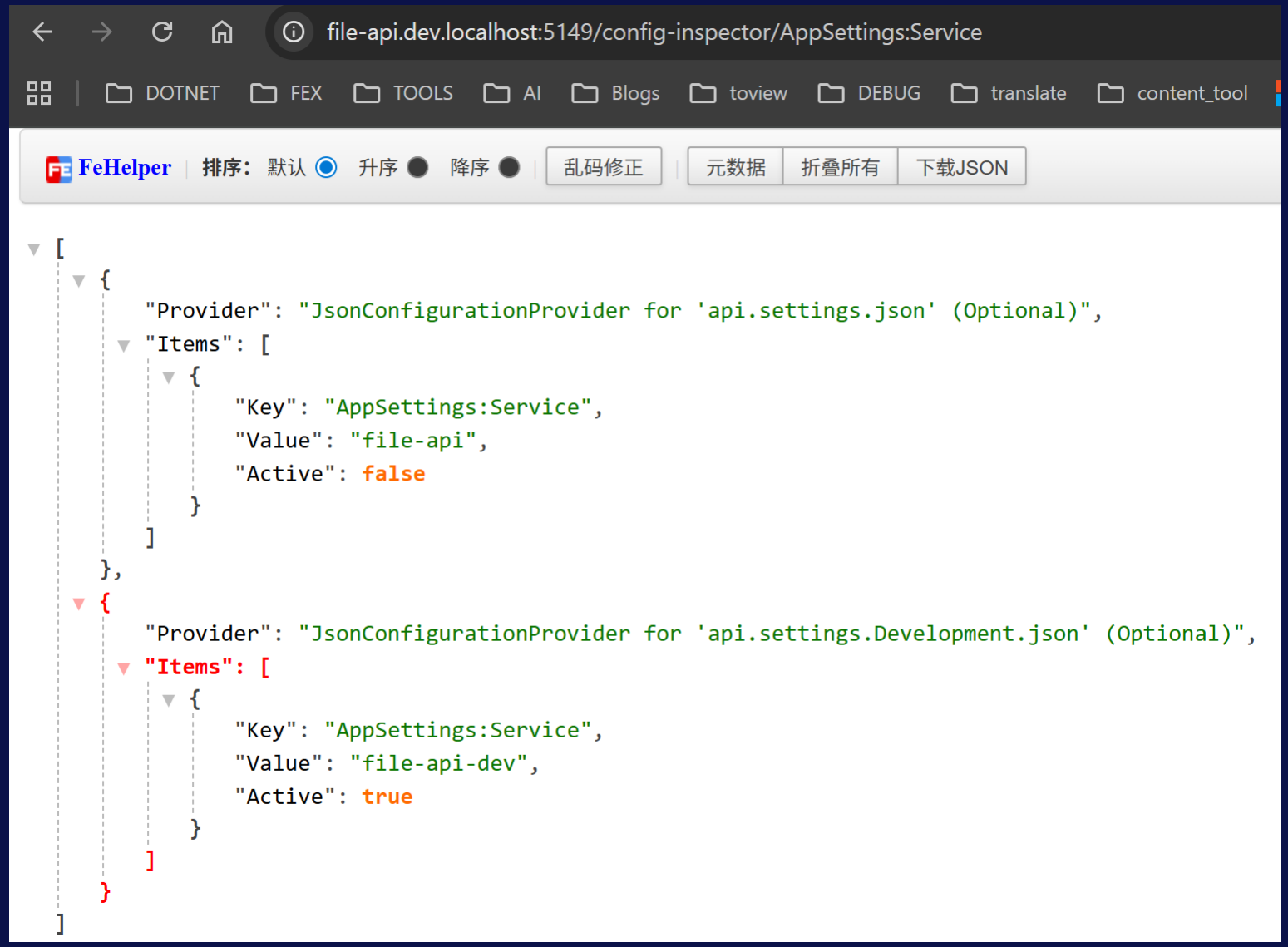
```
{
  "AppSettings": {
    "Service": "file-api"
  }
}
```

file-api.dev.localhost:5149/config-inspector/AppSettings:Service

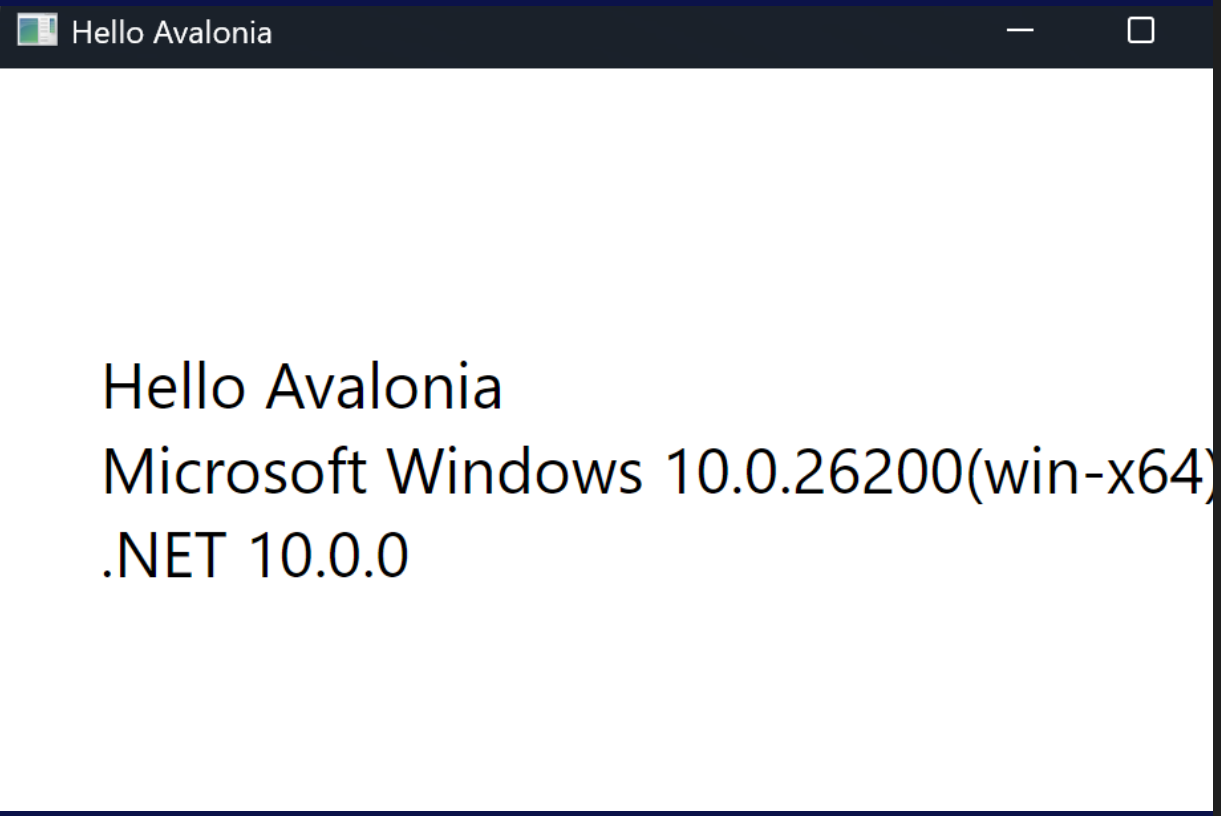
FeHelper 排序: 默认 升序 降序 乱码修正 元数据 折叠所有 下载JSON

```
[
  {
    "provider": "JsonConfigurationProvider for 'api.settings.json' (Optional)",
    "items": [
      {
        "key": "AppSettings:Service",
        "value": "file-api",
        "active": true
      }
    ]
  }
]
```

How to use it


file-api.dev.localhost:5149/config-inspector/AppSettings:Service
DOTNET
FEX
TOOLS
AI
Blogs
toview
DEBUG
translate
content_tool
FeHelper
排序: 默认 升序 降序
乱码修正
元数据
折叠所有
下载JSON
[
{
"Provider": "JsonConfigurationProvider for 'api.settings.json' (Optional)",
"Items": [
{
"Key": "AppSettings:Service",
"Value": "file-api",
"Active": false
}
]
},
{
"Provider": "JsonConfigurationProvider for 'api.settings.Development.json' (Optional)",
"Items": [
{
"Key": "AppSettings:Service",
"Value": "file-api-dev",
"Active": true
}
]
}
]

How to use it




```
#!/usr/bin/env dotnet
#: package Avalonia@11.3.7
#: package Avalonia.Desktop@11.3.7
using Avalonia;
using Avalonia.Controls;
using Avalonia.Controls.ApplicationLifetimes;
using System.Runtime.InteropServices;
AppBuilder.Configure<App>().UsePlatformDetect().StartWithClassicDesktopLifetime(args);

class App : Application
{
    public override void OnFrameworkInitializationCompleted()
    {
        if (ApplicationLifetime is IClassicDesktopStyleApplicationLifetime desktop)
            desktop.MainWindow = new MainWindow();

        base.OnFrameworkInitializationCompleted();
    }
}
class MainWindow : Window
{
    public MainWindow()
    {
        Title = "Hello Avalonia";
        Width = 500;
        Height = 300;
        Content = new TextBlock
        {
            Text = $"""
                    Hello Avalonia
                    {RuntimeInformation.OSDescription}({RuntimeInformation.RuntimeIdentifier})
                    {RuntimeInformation.FrameworkDescription}
                    """,
            HorizontalAlignment = Avalonia.Layout.HorizontalAlignment.Center,
            VerticalAlignment = Avalonia.Layout.VerticalAlignment.Center,
            FontSize = 24
        };
    }
}
```

How to use it

TestHelper.cs

```cs
namespace Test;

public static class TestHelper
{
    public static void PrintMessage
        (string message)
    {
        Console.WriteLine(message);
    }
}

```

multi-file-test.cs

```cs
#:property Imports=TestHelper.cs

using static Test.TestHelper;

PrintMessage(
    "Hello from multi-file test!"
);

```

Directory.Build.targets

```xml
<Project>
  <ItemGroup Condition="'$(Imports)' != ''">
    <_ImportedFiles Include="$(Imports.Split(';'))" />
    <Compile Include="@(_ImportedFiles)" />
  </ItemGroup>
</Project>
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS AZURE POLYGLOT NOTEBOOK

pwsh

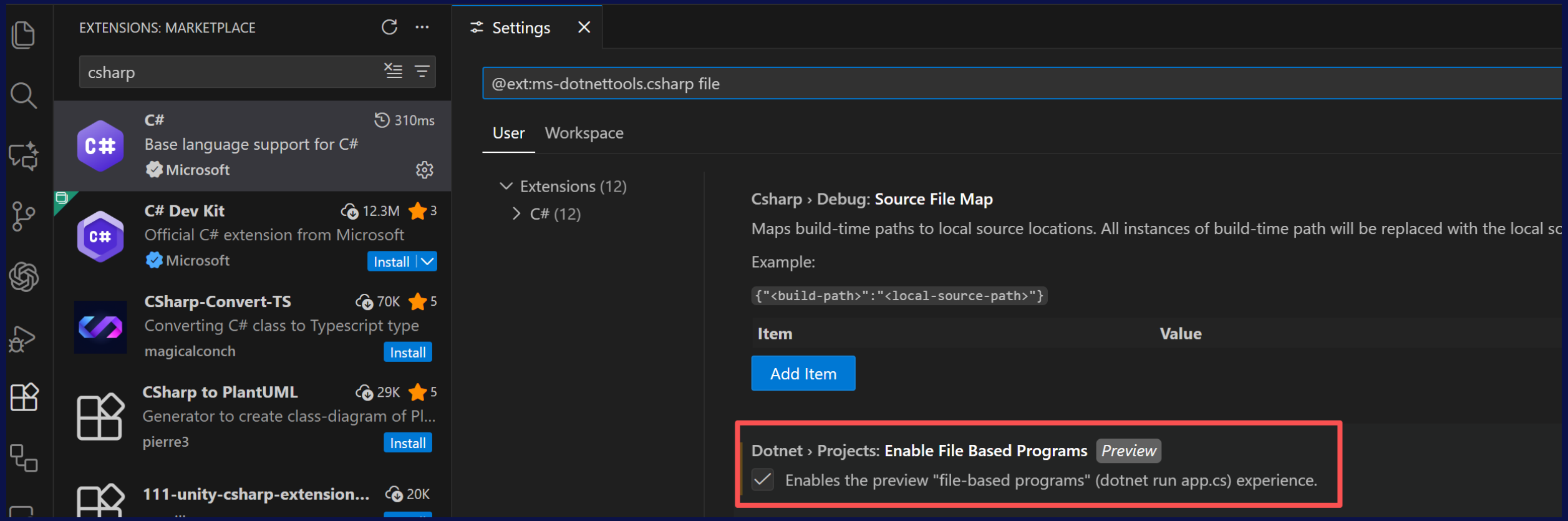
```
>_pwsh  file-programs  main ≡ ?3 ~1  167ms
~ 10.0.100  aks-hk-01  100%  24,00:20
> dotnet .\multi-file-test.cs
Hello from multi-file test!
```

How to use it

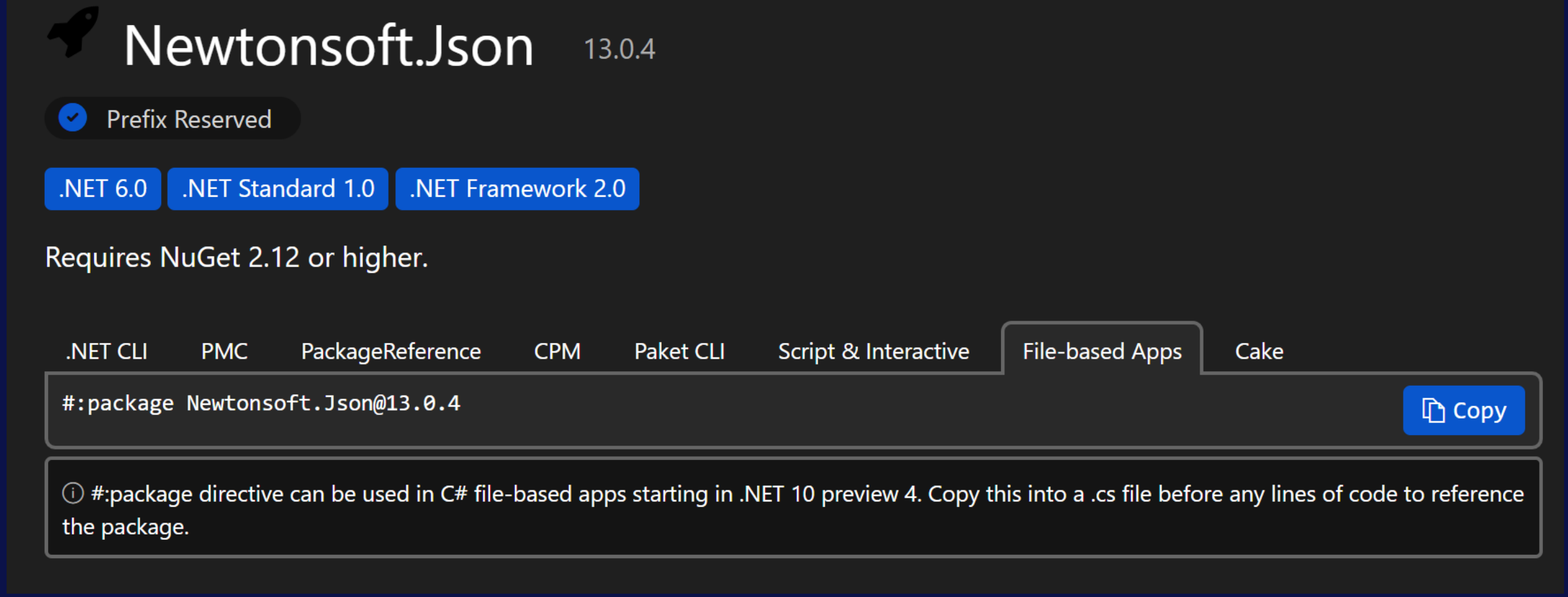
```
#:project ./src/WeihanLi.Common/WeihanLi.Common.csproj
#:property PublishAot=false

using WeihanLi.Common;
using WeihanLi.Common.Helpers;
using WeihanLi.Extensions;

var solutionPath = "./WeihanLi.Common.slnx";
string[] srcProjects = [
    "./src/WeihanLi.Common/WeihanLi.Common.csproj",
    "./src/WeihanLi.Common.Logging.Serilog/WeihanLi.Common.Logging.Serilog.csproj",
    "./src/WeihanLi.Extensions.Hosting/WeihanLi.Extensions.Hosting.csproj",
];
string[] testProjects = [ "./test/WeihanLi.Common.Test/WeihanLi.Common.Test.csproj" ];

await DotNetPackageBuildProcess
    .Create(options =>
    {
        options.SolutionPath = solutionPath;
        options.SrcProjects = srcProjects;
        options.TestProjects = testProjects;
    })
    .ExecuteAsync(args);
```

```yaml
name: default

on:
  push:
    branches:
      - "main"
      - "master"
      - "dev"
  pull_request:
    # The branches below must be a subset of the branches above
    branches:
      - "main"
      - "master"
      - "dev"

jobs:
  build:
    name: Running tests on ${{ matrix.os }}
    runs-on: ${{ matrix.os }}
    strategy:
      # max-parallel: 1
      matrix:
        os: [ubuntu-latest, macOS-latest, windows-latest]
    steps:
    - uses: actions/checkout@v4
    - name: Setup .NET SDK
      uses: actions/setup-dotnet@v4
      with:
        dotnet-version: |
          8.0.x
          9.0.x
          10.0.x
    - name: dotnet info
      run: dotnet --info
    - name: build
      run: dotnet build.cs
```

How to use it


EXTENSIONS: MARKETPLACE
csharp
C#
310ms
Base language support for C#
Microsoft
C# Dev Kit
12.3M
3
Official C# extension from Microsoft
Microsoft
Install
CSharp-Convert-TS
70K
5
Converting C# class to Typescript type
magicalconch
Install
CSharp to PlantUML
29K
5
Generator to create class-diagram of Pl...
pierre3
Install
111-unity-csharp-extension...
20K
Settings
@ext:ms-dotnettools.csharp file
User
Workspace
Extensions (12)
C# (12)
Csharp › Debug: Source File Map
Maps build-time paths to local source locations. All instances of build-time path will be replaced with the local sc
Example:
{"<build-path>":"<local-source-path>"}
Item
Value
Add Item
Dotnet › Projects: Enable File Based Programs
Preview
Enables the preview "file-based programs" (dotnet run app.cs) experience.

How to use it


Newtonsoft.Json
13.0.4
Prefix Reserved
.NET 6.0
.NET Standard 1.0
.NET Framework 2.0
Requires NuGet 2.12 or higher.
.NET CLI
PMC
PackageReference
CPM
Paket CLI
Script & Interactive
File-based Apps
Cake
#:package Newtonsoft.Json@13.0.4
Copy
#:package directive can be used in C# file-based apps starting in .NET 10 preview 4. Copy this into a .cs file before any lines of code to reference the package.

Next

- Multiple Files
- Multiple Targets
- dotnet format
- Performance Enhancements
- Debug Support
- More…

References

- https://github.com/dotnet/sdk/blob/main/documentation/general/dotnet-run-file.md
- https://github.com/dotnet/roslyn/blob/main/docs/features/file-based-programs-vscode.md
- https://github.com/dotnet/sdk/pulls?q=is%3Apr+label%3AArea-run-file
- https://github.com/dotnet/sdk/issues?q=is%3Aissue+label%3AArea-run-file
- https://github.com/WeihanLi/SamplesInPractice/tree/main/net10sample/file-programs
- https://github.com/WeihanLi/SamplesInPractice/tree/main/AvaloniaSamples/file-scripts
- https://learn.microsoft.com/en-us/dotnet/core/whats-new/dotnet-10/sdk?WT.mc_id=DT-MVP-5004222
- https://devblogs.microsoft.com/dotnet/announcing-dotnet-run-app/
- https://learn.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/overview#file-based-programs
- https://learn.microsoft.com/en-us/dotnet/csharp/fundamentals/program-structure/#building-and-running-c-programs
- https://github.com/DamianEdwards/runfile

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Thank You

 https://github.com/WeihanLi