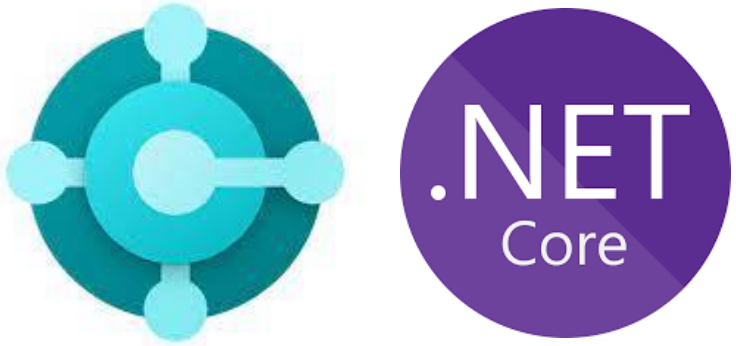
Microsoft Dynamics 365

Lessons learned from migrating to .NET Core

Wael AbuSeada
Vladislav Nagornyi



Agenda

- Why .NET Core?
- Planning the migration
- Migration techniques
- Common challenges and solutions
- Handling non-migratable components
- Results and benefits post-migration
- Q&A

Why .NET Core?

.NET Core

Modular

- small framework assemblies, faster load and less RAM use

Performance

- significant runtime performance improvements comparing to .NET Framework

Cross-platform

- not just Windows, also supports Linux and macOS

Flexible deployment

- exe can be self-contained, or use system-wide runtime

Better/simpler build tools

- powerful CLI, simplified dev experience, faster compilation

Open-source

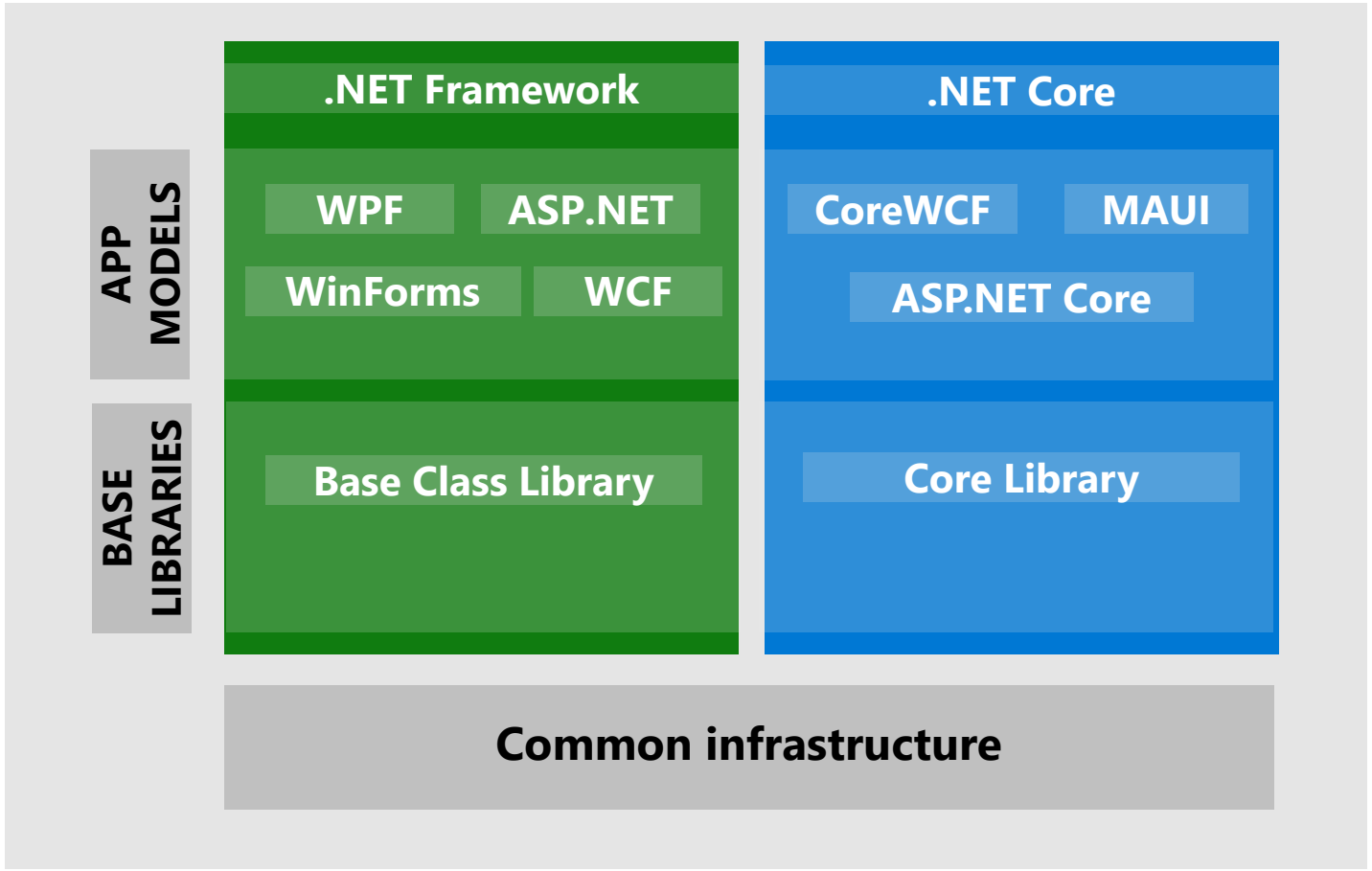
- community contributions and transparent development process

Containers

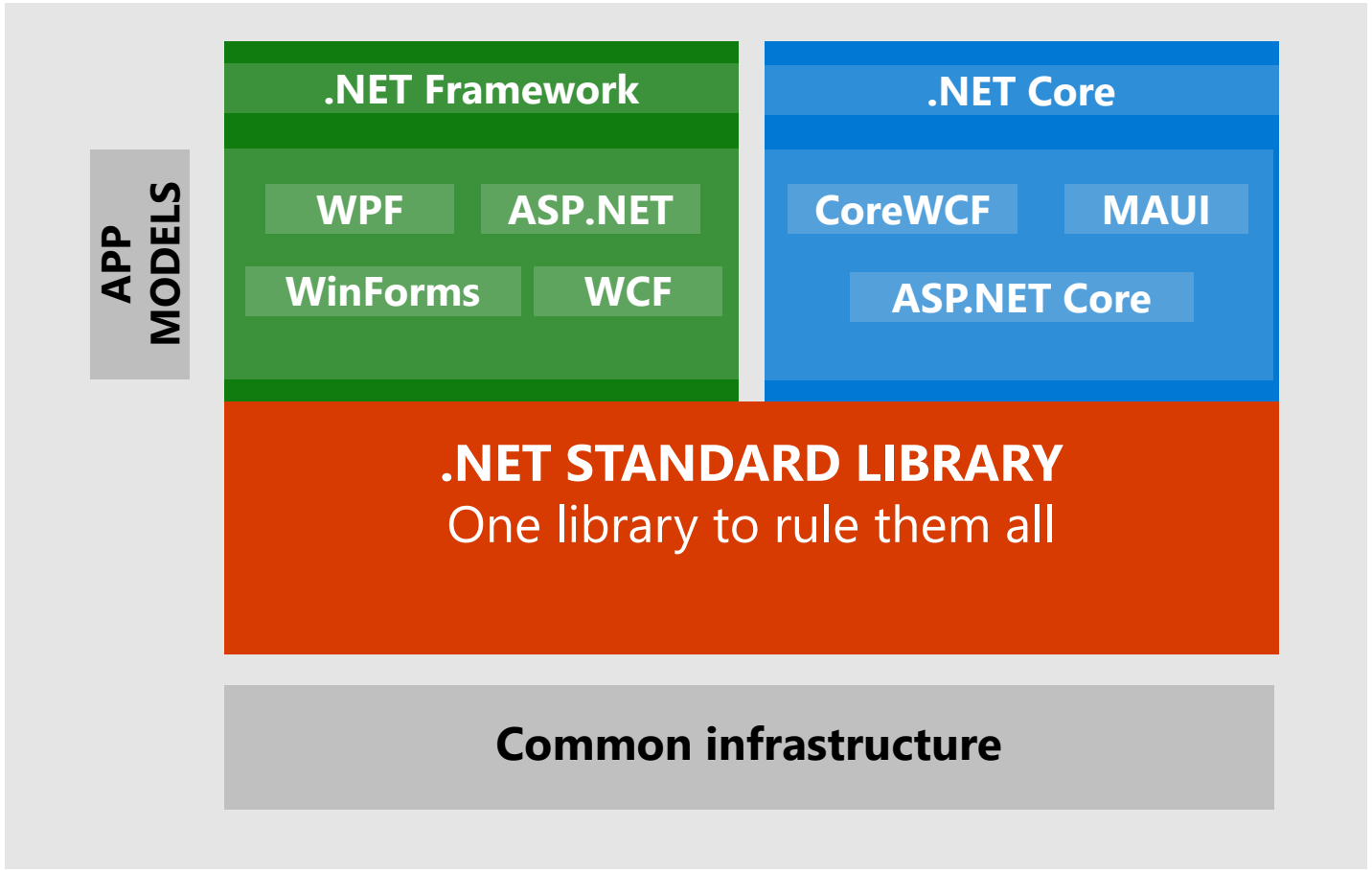
- with small footprint and support for Linux and Windows Nano Server, great match for containers and microservices

Planning the migration

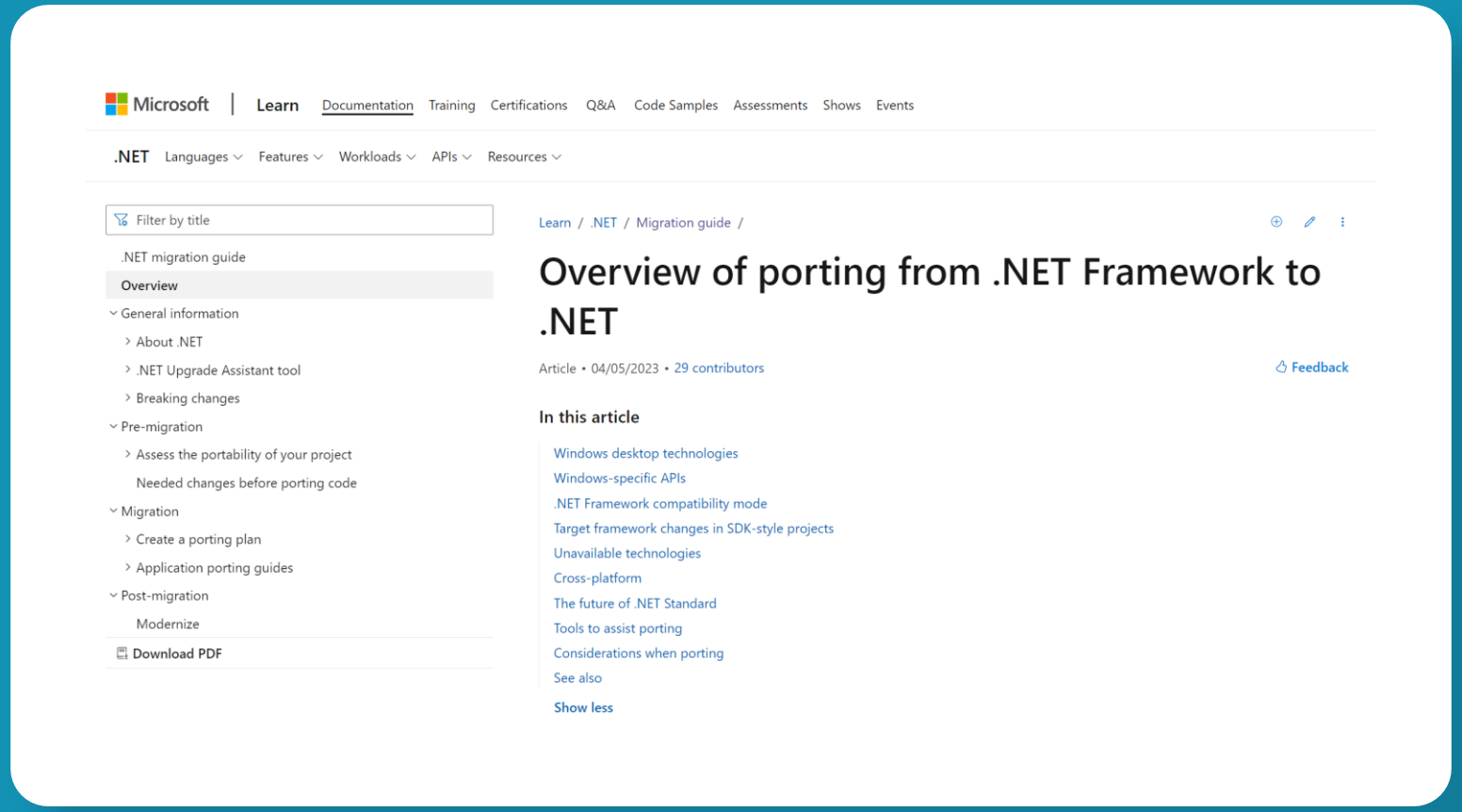
.NET Framework vs .NET Core



.NET Standard



.NET migration guide

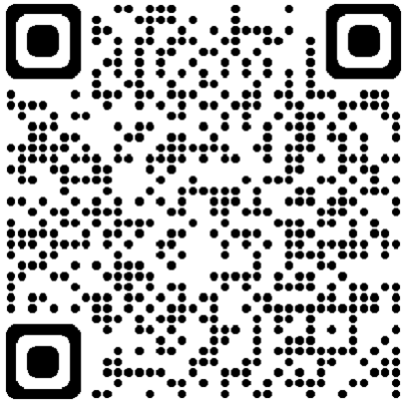


https://learn.microsoft.com/en-us/dotnet/core/porting/

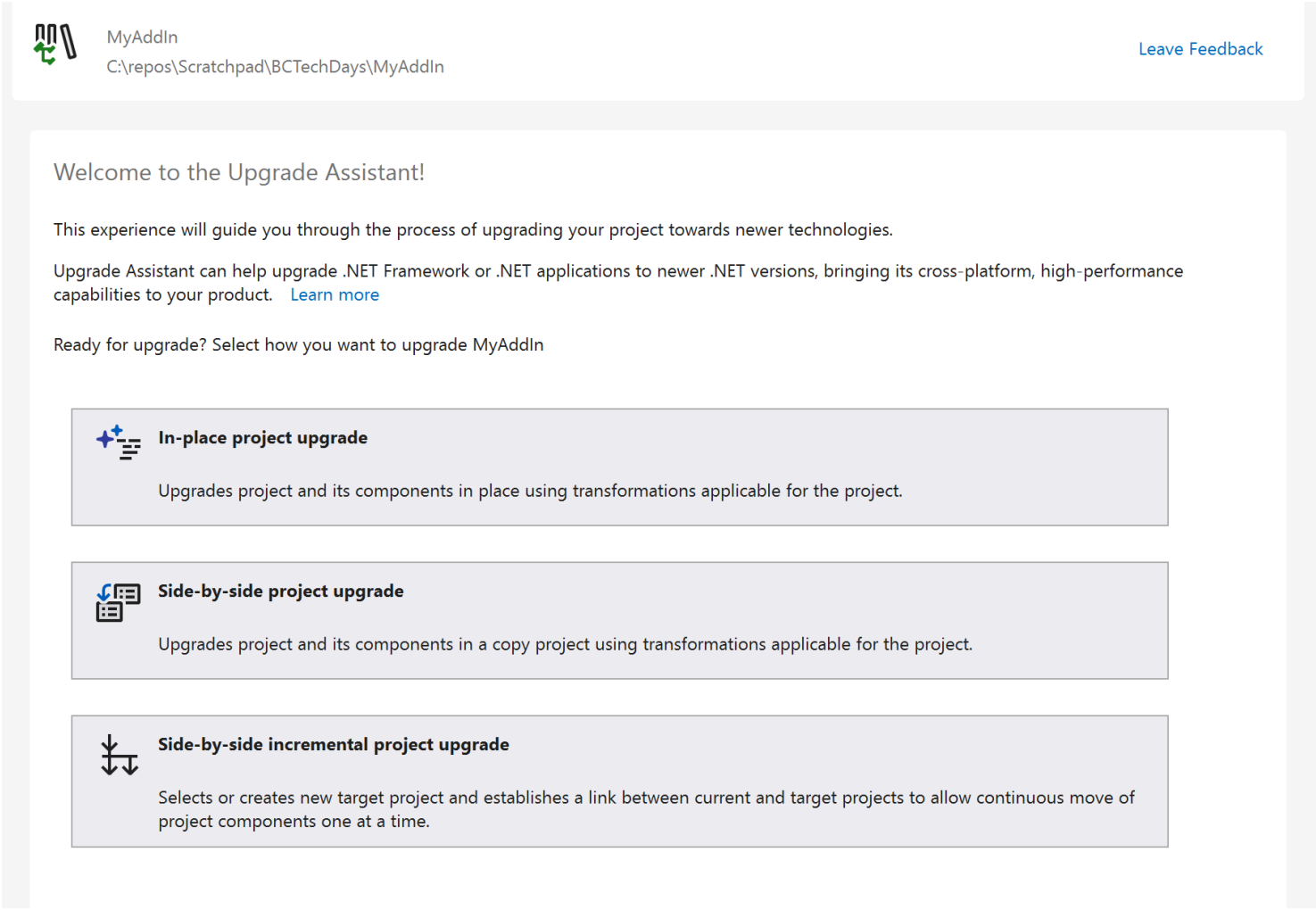
.NET Upgrade Assistant

Easiest way to start – possibly the only step needed

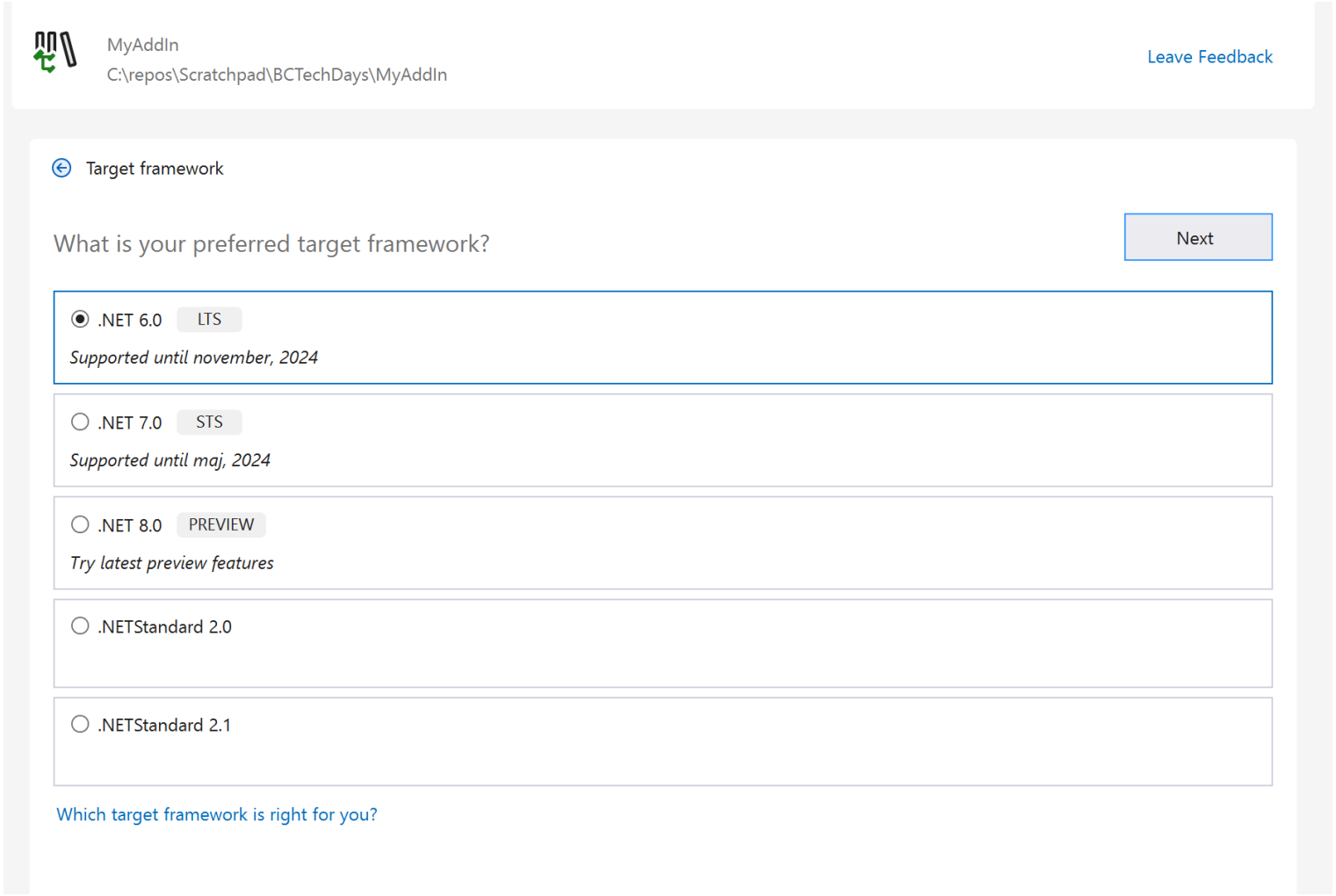
https://learn.microsoft.com/en-us/dotnet/core/porting/upgrade-assistant-overview



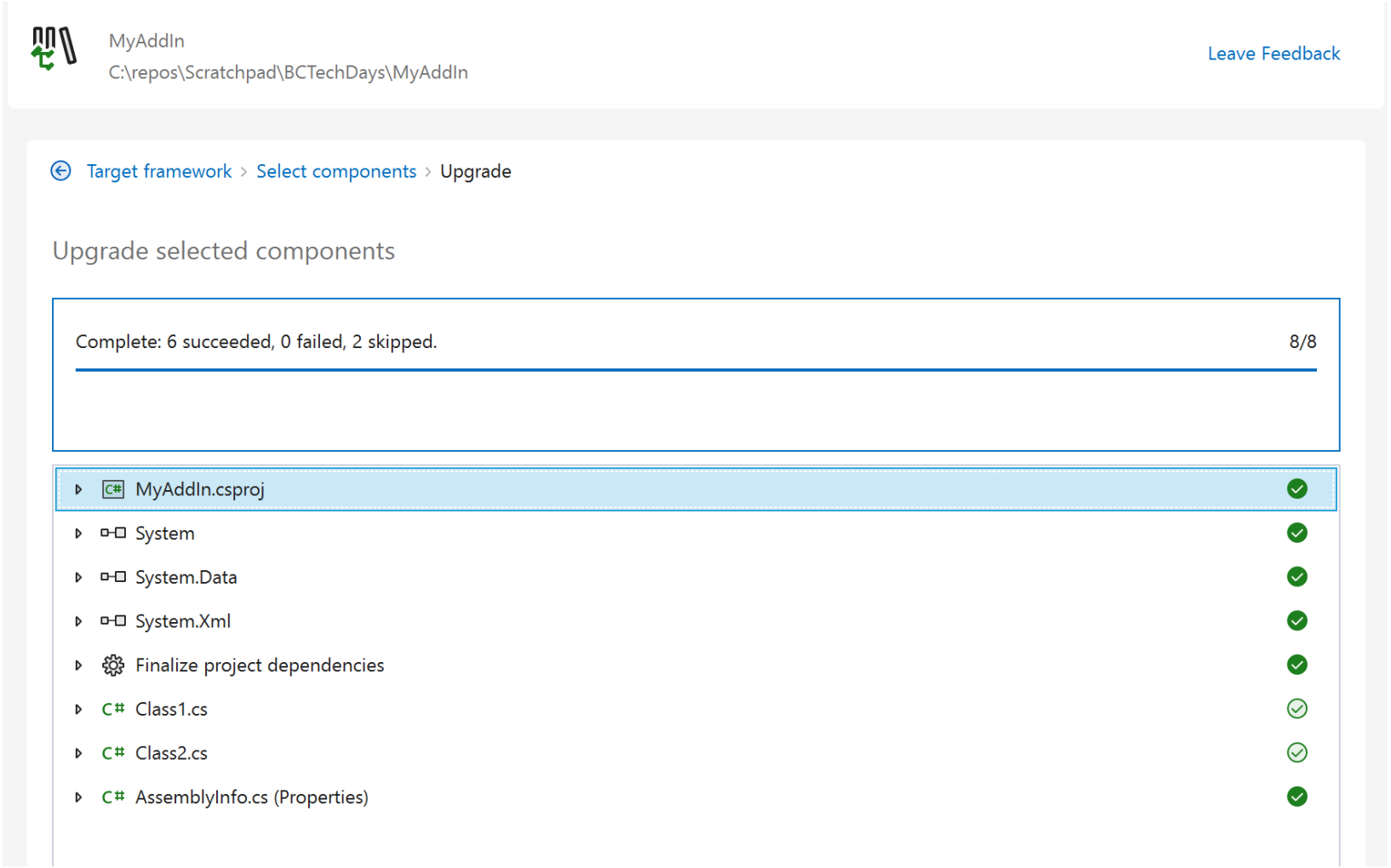
.NET Upgrade Assistant



.NET Upgrade Assistant



.NET Upgrade Assistant



Done?

Manual migration

- List incompatible functionality and components
- Establish dependencies between components
- Define migration strategy for each component
- Start executing

Migration techniques

Target technology

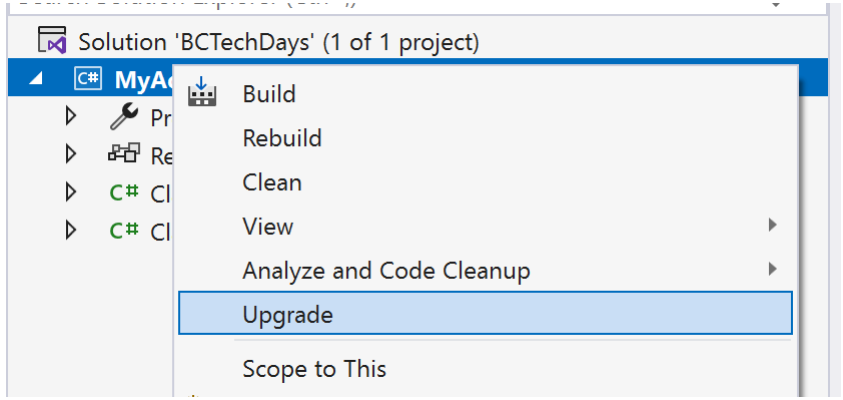
Is there an alternative functionality in .NET Core?

Is there an alternative functionality in a third-party NuGet?

Has component been planned for refactoring or deprecation?

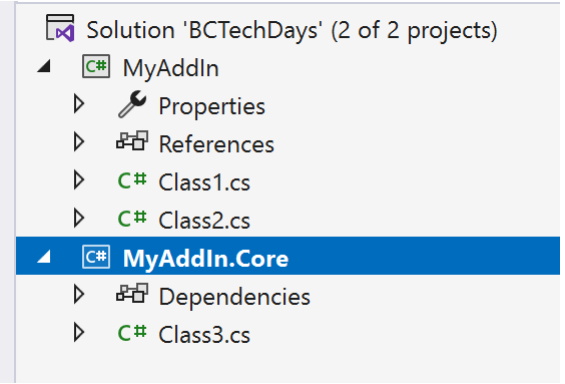
In-place vs side-by-side project migrations

- **In-place**
  - Make changes directly in the project
  - Suitable for small or relatively isolated components



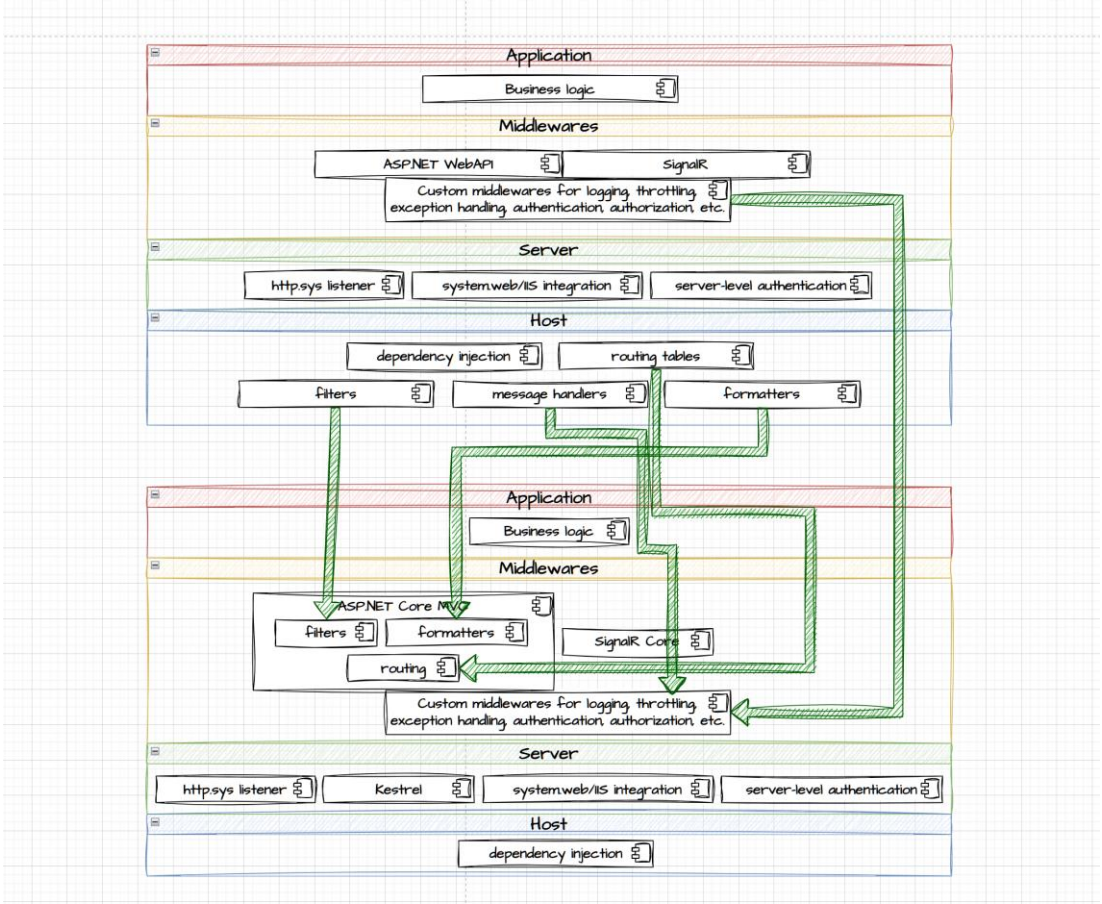
In-place vs side-by-side project migrations

- **Side-by-side**
  - Create another project
  - Move functionality gradually
  - Reduces complexity for migration of larger components,
    e.g. ASP.NET WebAPI layer



OWIN/ASP.NET

- Was one of the biggest tasks during migration – Business Central Server had 11 endpoints based on OWIN
- OWIN and ASP.NET Core are very similar, yet there's a lot of nuances
- ASP.NET Core up until 2.2 is supported by .NET Framework, helps gradual migration
- SignalR vs SignalR Core, same name but different protocols



System.Text.Json vs Newtonsoft.Json

- ASP.NET Core 3.0 uses System.Text.Json by default, Newtonsoft.Json is still available
- System.Text.Json is faster
- Keeping Newtonsoft.Json may be a better short-term solution for API compatibility

WCF

- Evaluate alternatives
- Prefer replacement based on ASP.NET Core for future-proof solution
  - CoreWCF – ASP.NET Core based middleware that partially implements WCF
  - Plain controllers
  - gRPC
  - WebSocket
  - Custom middleware

app.config/web.config vs appsettings.json

- app.config/web.config are still available via System.Configuration.ConfigurationManager
- Some settings are silently ignored
  - <gcServer enabled="true" />

App.config

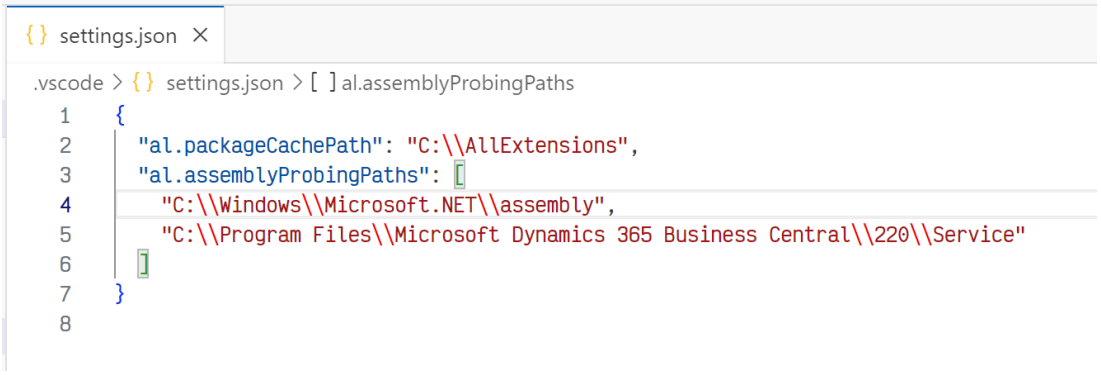
```
<?xml version="1.0" encoding="utf-8" ?>
<configuration>
  <appSettings>
    <add key="Setting1" value="Value1"/>
    <add key="Setting2" value="Value2"/>
  </appSettings>
  <connectionStrings>
    <add name="MyDatabase" connectionString="Data Source=(local);Initial Catalog=MyDB;Integrated
     Security=True" providerName="System.Data.SqlClient"/>
  </connectionStrings>
</configuration>
```

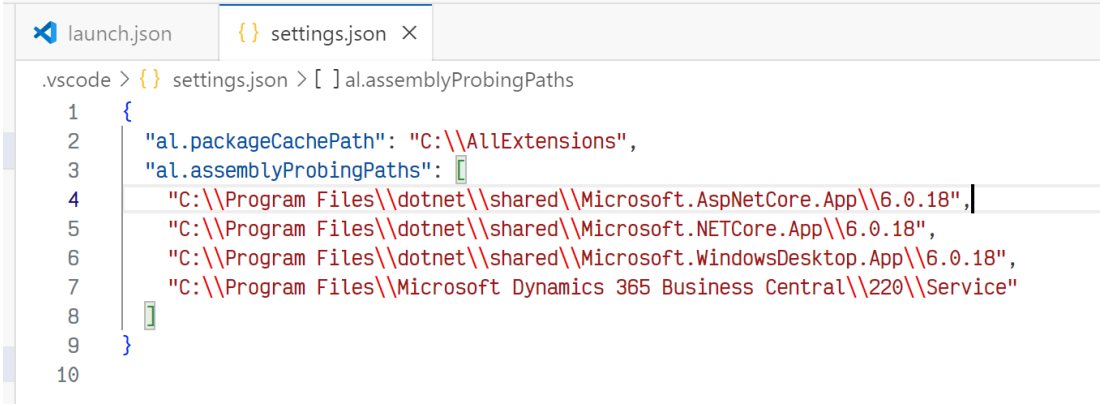
appsettings.json

Schema: https://json.schemastore.org/appsettings.json

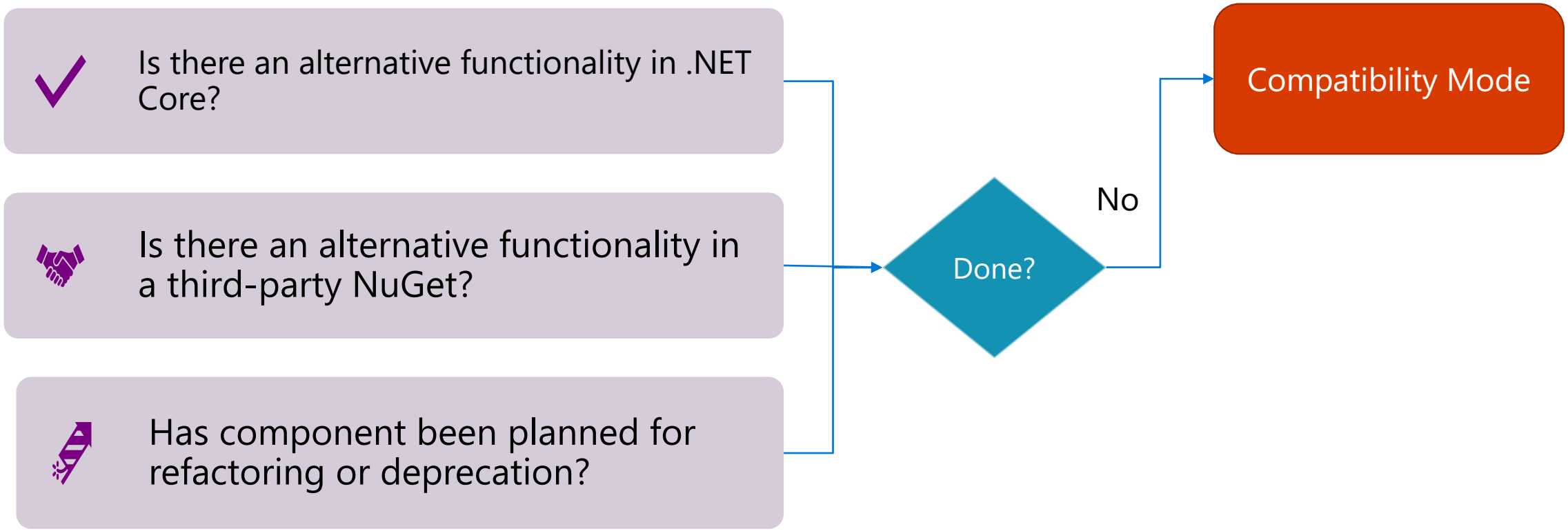
```
{
  "AppSettings": {
    "Setting1": "Value1",
    "Setting2": "Value2"
  },
  "ConnectionStrings": {
    "MyDatabase": "Data Source=(local);Initial Catalog=MyDB;Integrated Security=True"
  }
}
```

Updating AL assembly probing paths



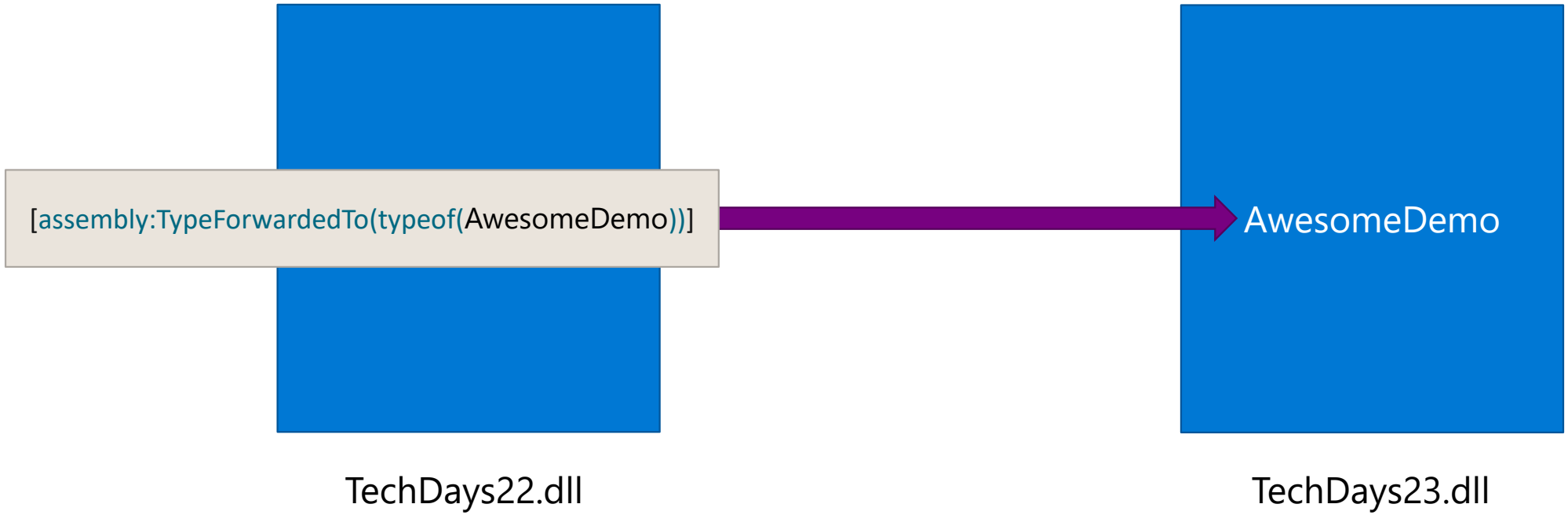


Target technology

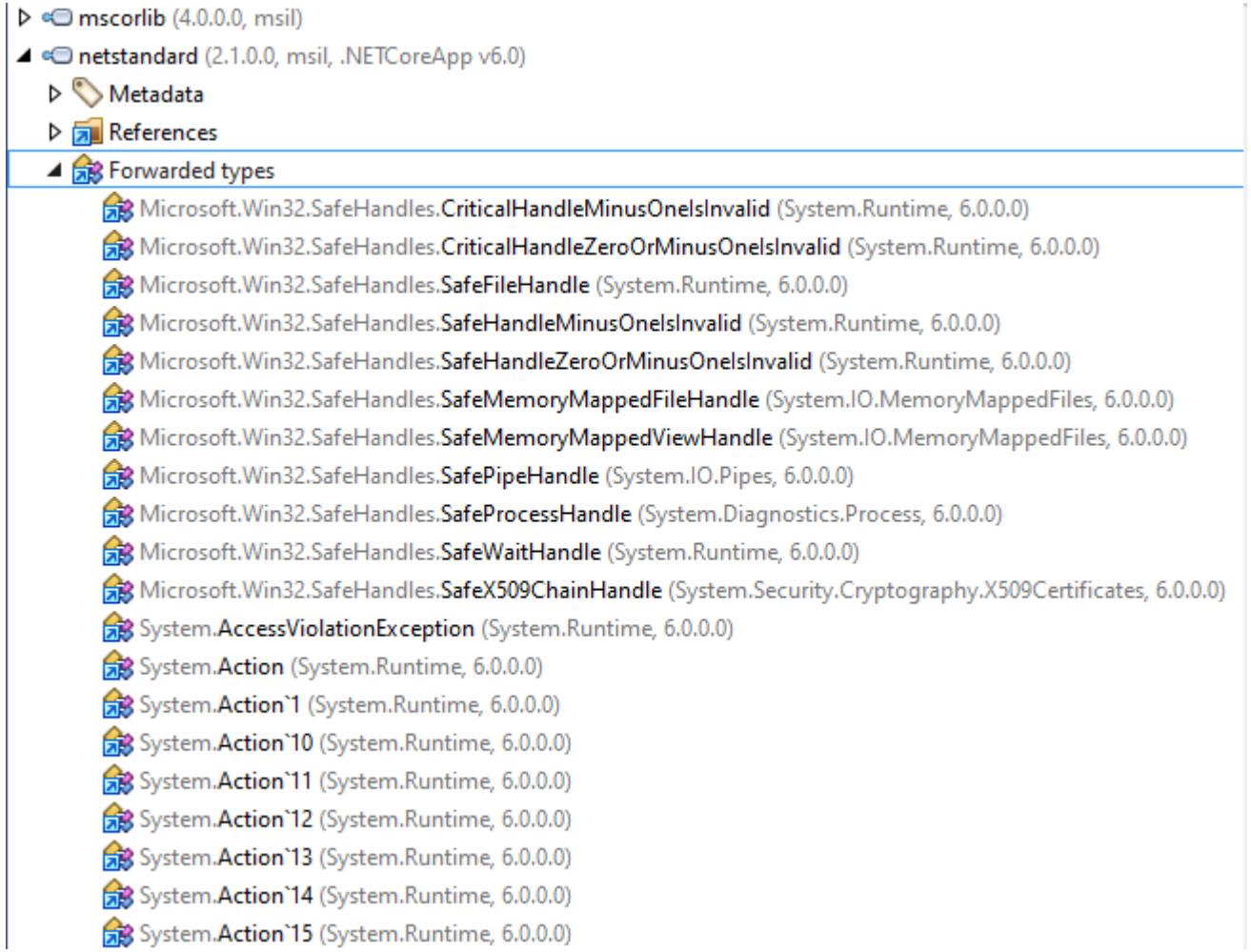


Type forwarding

Supported in AL compiler

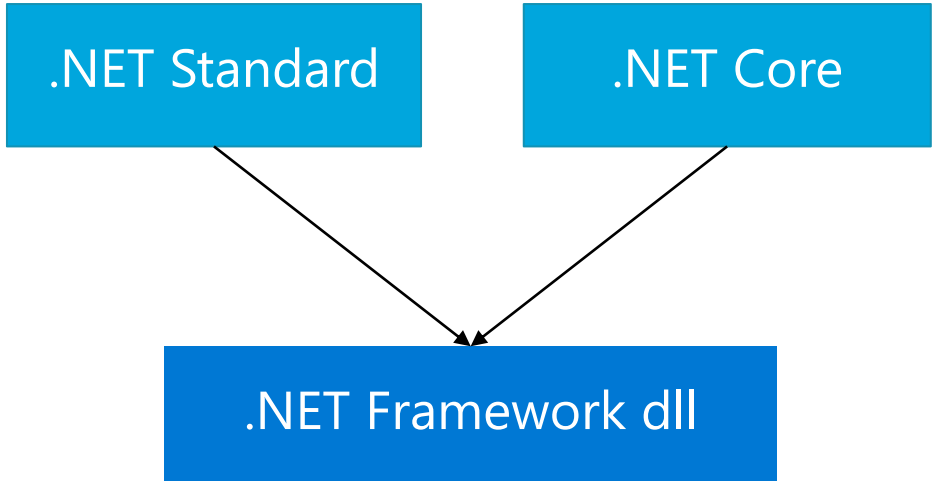


Type forwarding in net standard



.NET Framework Compatibility Mode

- It allows referencing .NET Framework libraries
- Possible thanks to type forwarding
- Why not just use compatibility mode?
  - Compile fine ☑
  - Doesn't cover all .NET Framework, but only .NET Standard subset of .NET APIs
  - Runtime error for unsupported APIs ⛔
  - This happened to our OneDrive integration
  - Your .NET framework dlls will be loaded in compatibility mode, so you might get runtime errors

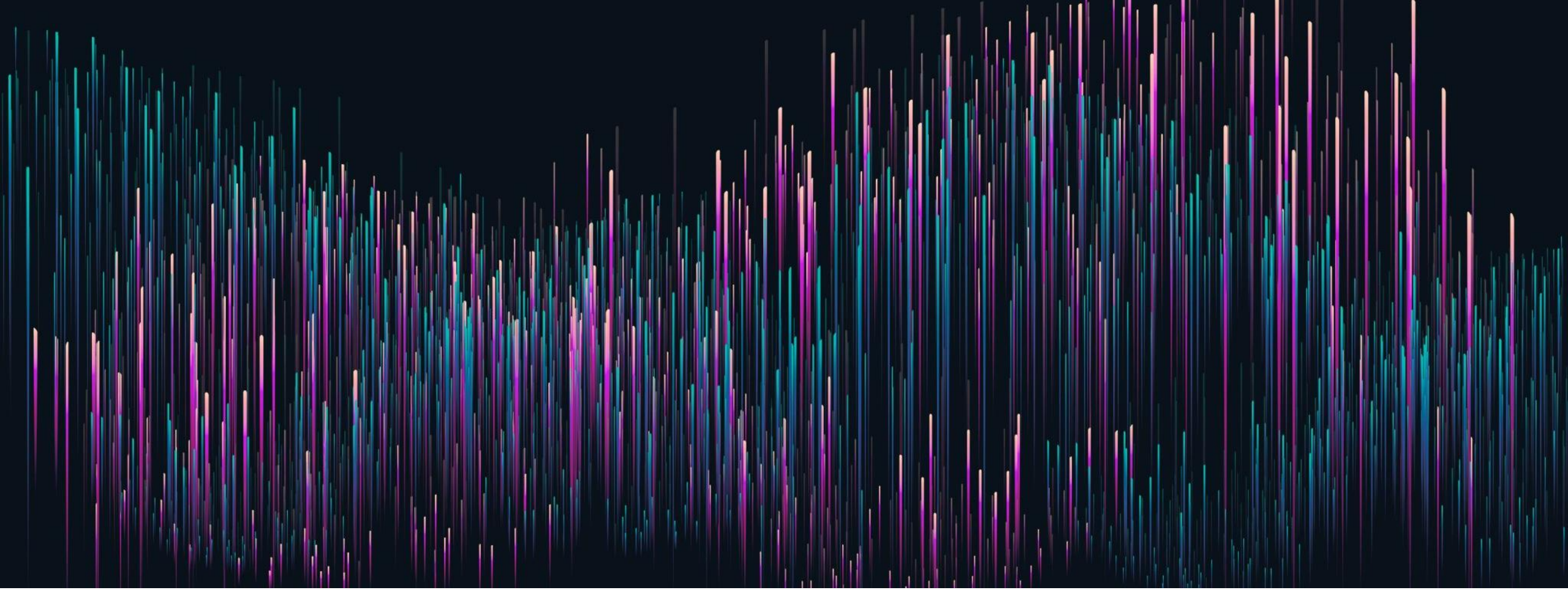


How to handle the stress of migrating huge project?

Wake up scared

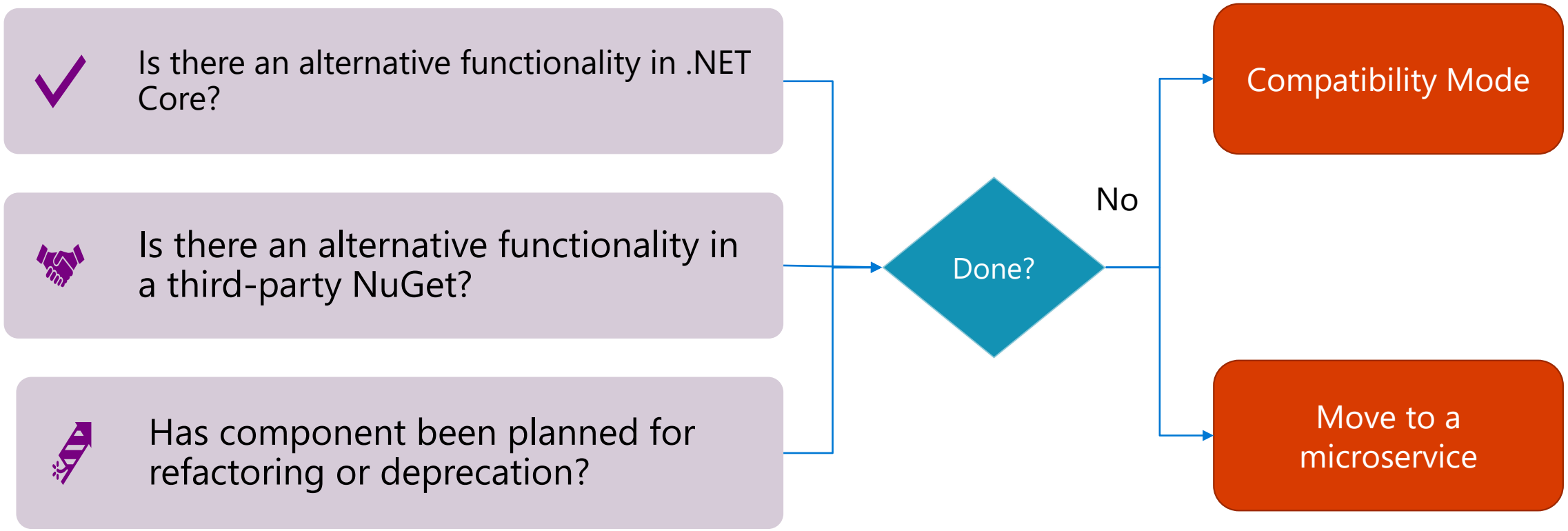
Dreaming about migration

Remember we have good test coverage on platform and application



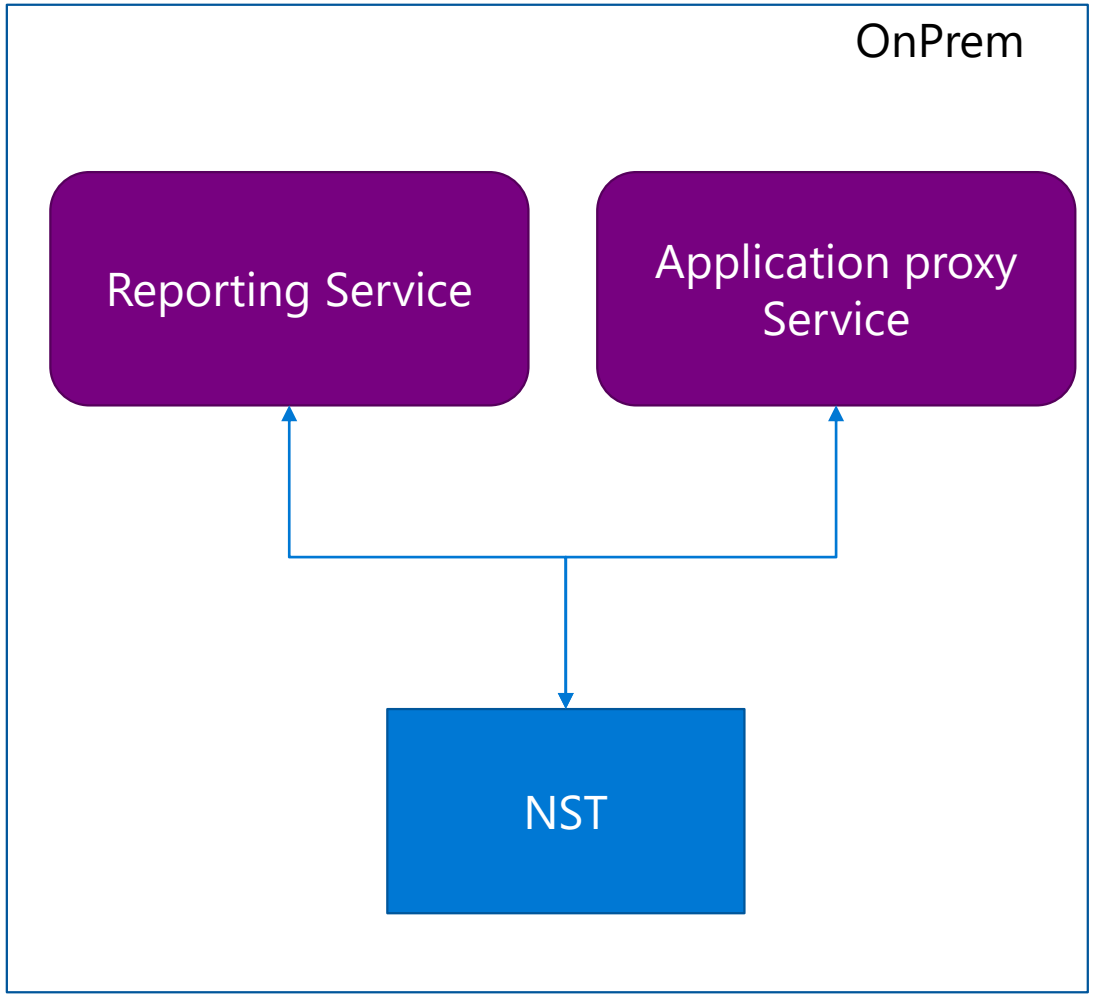
Always invest in test automation

Target technology



Moved to a microservice

- Reporting service
- Application proxy service
  - Electronic Invoicing in MX
  - Digipoort in NL
- Dataverse 9.1 integration add-in



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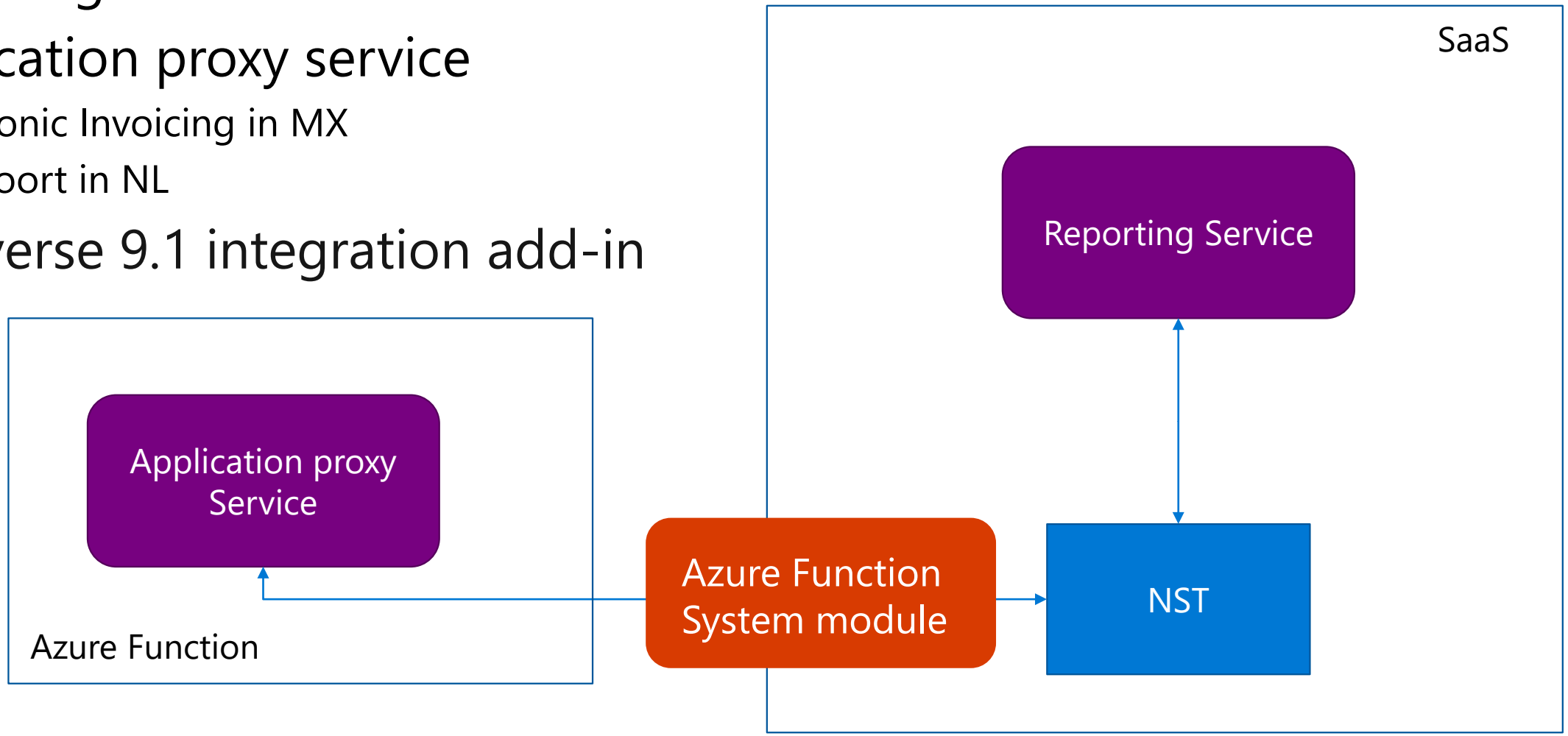


Done

Other interesting changes in .NET Core

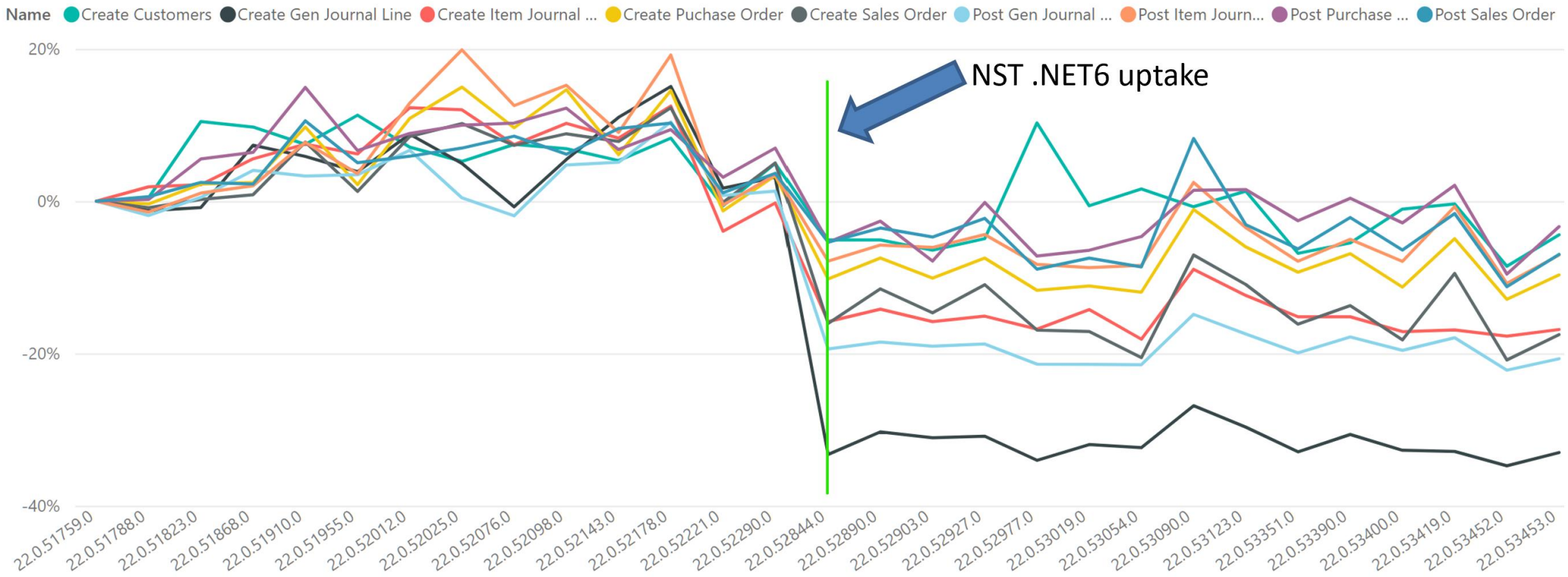
- Encoding.Default in .NET Core is always UTF8
  - In .NET Framework it was always the system's active code page
  - The documentation warns against using Encoding.Default due to the possible changes between .NET versions, from machine to machine, and within the same machine over time
- Debug.Assert in .NET Core will crash the process when assertion fails
  - In .NET Framework it would show interactive dialog, offering to ignore, to attach a debugger or to abort application execution
- Readonly fields in .NET Core cannot be modified using reflection
  - It was possible to write to a readonly field in .NET Framework using reflection

Results and benefits of migration

Performance

- In general, there are consistent computational performance improvements across all areas
- App scenarios up to 30% faster ↗
- Admin tasks (server startup, AL compilation, environment start-up, …) up to 55% faster

Performance



Performance

Scenario	Time 21.x	Time 22.x	Improvement %
Build nav binaries (cold)	11:04.0	08:31.0	-23%
Build nav binaries (warm)	05:25.0	04:01.0	-25.8%

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Q&A

Any Questions?

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Thank You!