INNOVATE

MODERN APPLICATIONS EDITION

20 October, 2022

Rapidly modernize your Microsoft .NET applications on AWS

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Amazon Web Services

Agenda

- Market observation
- Porting Assistant for .NET
- AWS Microservice Extractor for .NET
- Database modernization with Babelfish for Aurora PostgreSQL

Market observation

Why now? .NET transition

.NET Full Framework

Only works on Windows

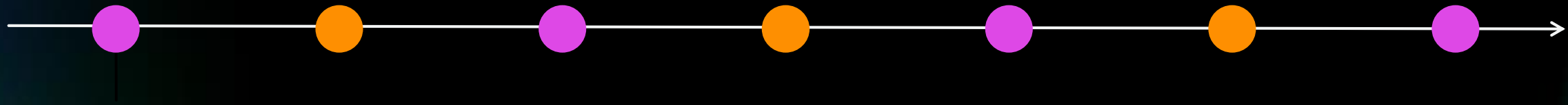
Microsoft officially announced .NET full framework 4.8 is the last version
No more new features

.NET Core

Works on both Linux and Windows

Microsoft officially announced .NET core will be the future and revealed it's roadmap

.NET Core road map



July 2019
.NET Core 3.0
RC

Sep 2019
.NET Core 3.0
GA

Nov 2019
.NET Core 3.1
LTS

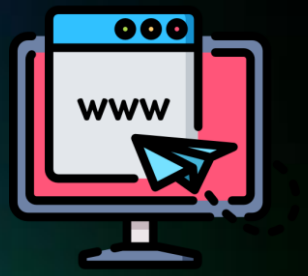
Nov 2020
.NET 5.0
GA

Nov 2021
.NET 6.0
LTS

Nov 2022
.NET 7.0
GA

Nov 2023
.NET 8.0
LTS

Real-life story



IT Operations updated the browser version

Chart components started failing

Developer

Dear Vendor, Do you have a new update for the new browser?

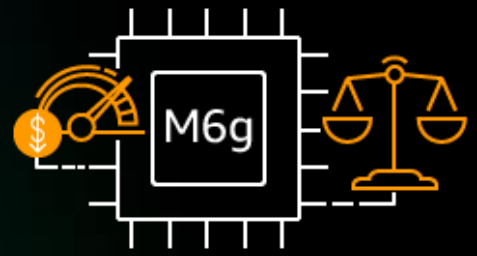
Yes, we have a fix. But it's only available on .NET core

Chart component vendor

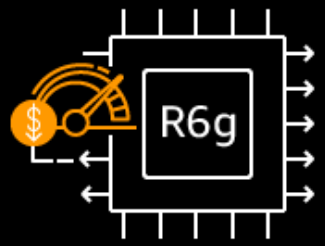
Upgraded the entire app to .NET core

.NET Core ♡ ARM processors

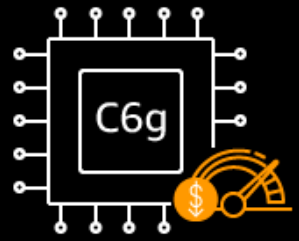
New 6th Generation Amazon EC2 instances



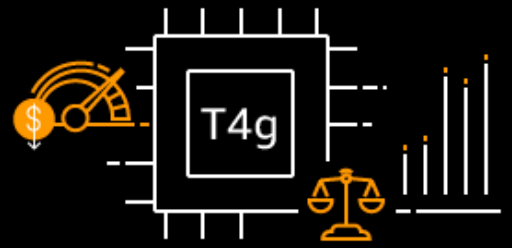
General purpose



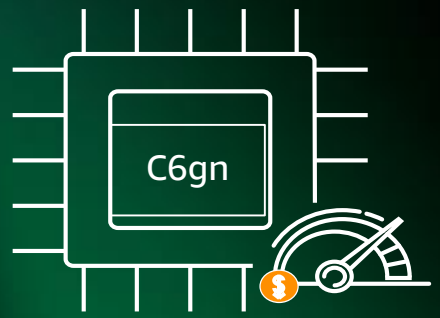
Memory optimized



Compute optimized



Burstable



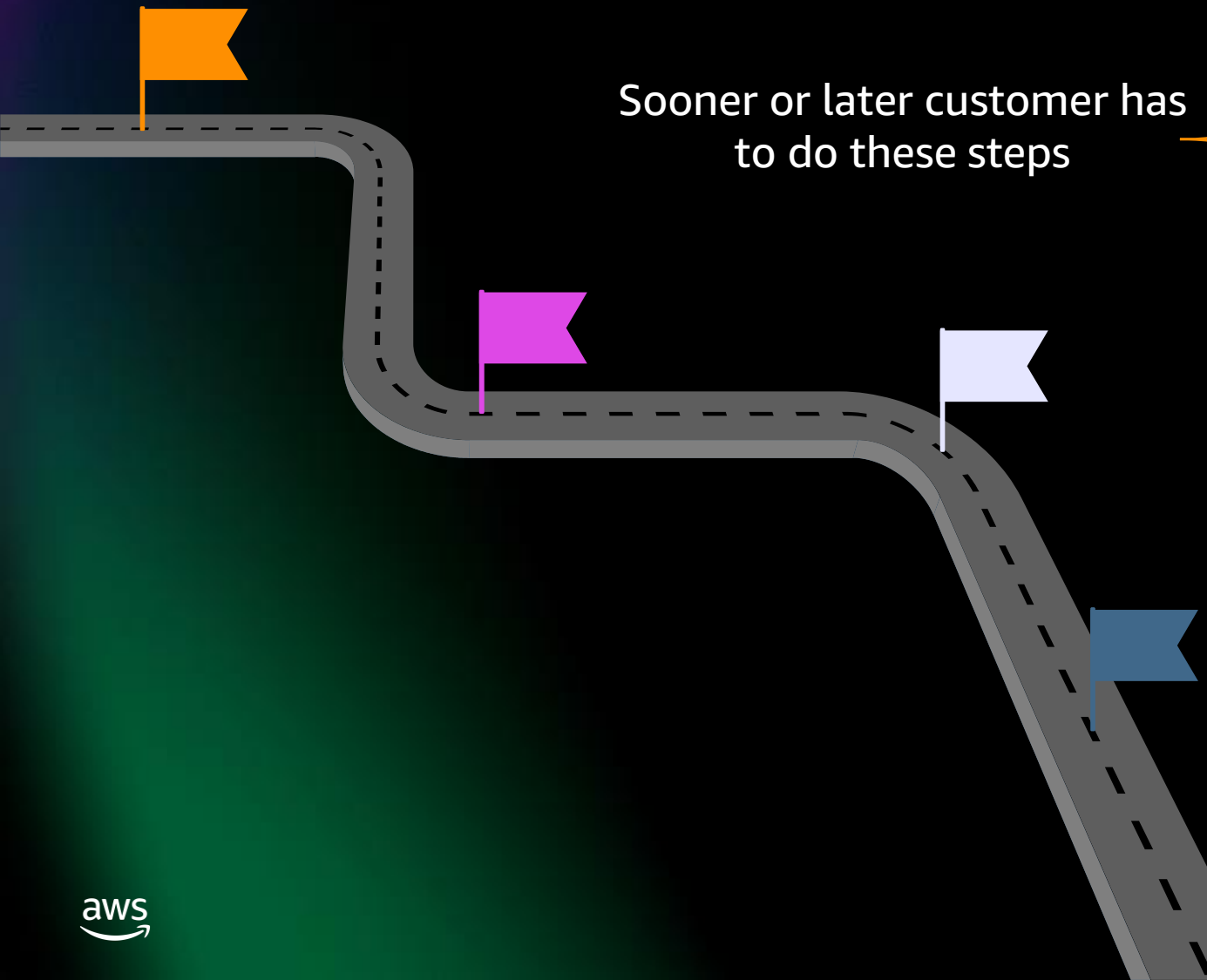
AWS Graviton2 Processors: Up to 40% better price performance over comparable current gen x86 instances

AWS Graviton3 processors: Up to 25% better compute performance, up to 2x higher floating-point performance, and up to 2x faster cryptographic workload performance compared to AWS Graviton2 processors.

ARM64 Performance in .NET 5

aws

Modernization path we typically see



Sooner or later customer has to do these steps

Upgrade .NET Framework
Upgrade legacy .NET Frameworks to .NET 4.8.
Windows OS is kept as it is. E.g.
2.0 → 4.8
3.5 → 4.8
4.5 → 4.8

Move the codebase to .NET core
Usually the OS is also upgraded to Linux containers. DevOps practices are improved. Avoid paying ~50% of instance running cost as Windows licensing fees.

Change the data store
Mix of Dynamo DB, RedShift, ElastiCache & Aurora

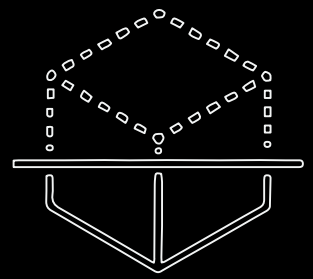
SaaSification
Change the business model

aws

Porting Assistant for .NET

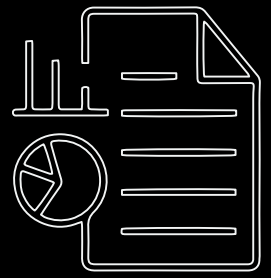
Porting Assistant for .NET

Insight and assistance for porting from .NET Framework to .NET Core



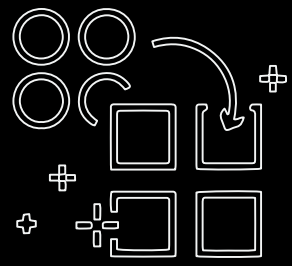
Scan

Scans .NET Framework applications to find APIs and NuGet Packages that are incompatible with .NET Core



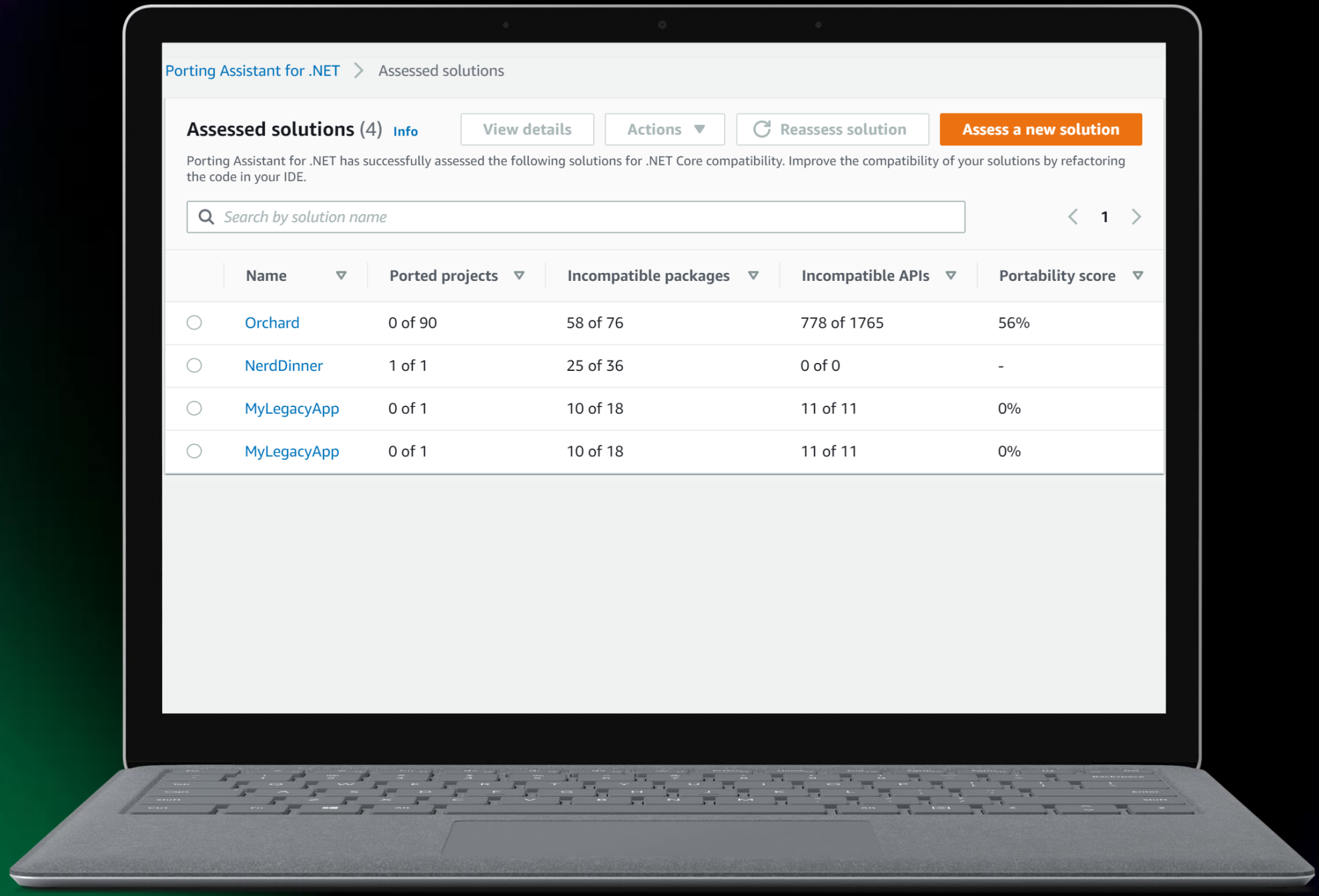
Assessment report

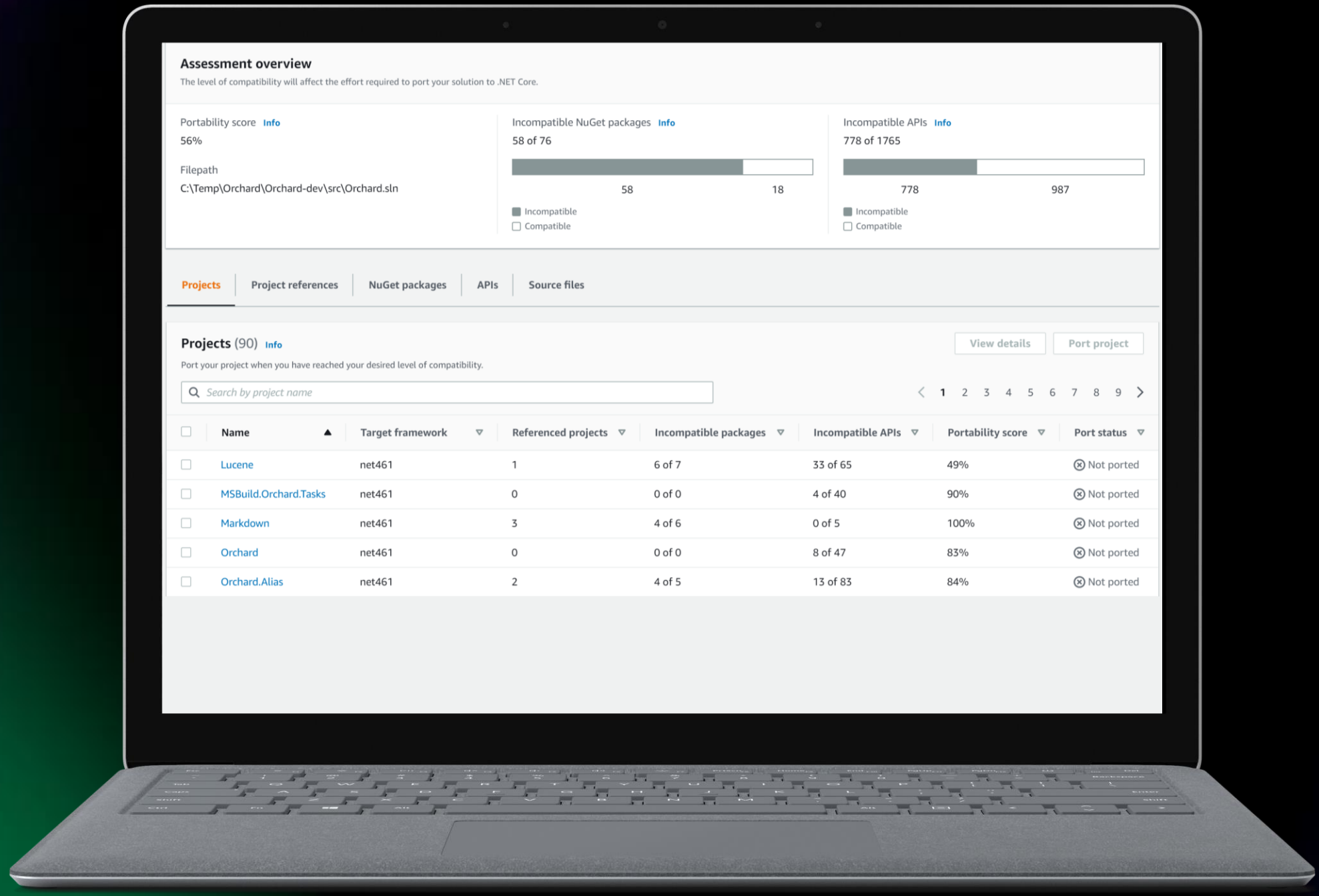
Generates compatibility assessment and suggests available replacements

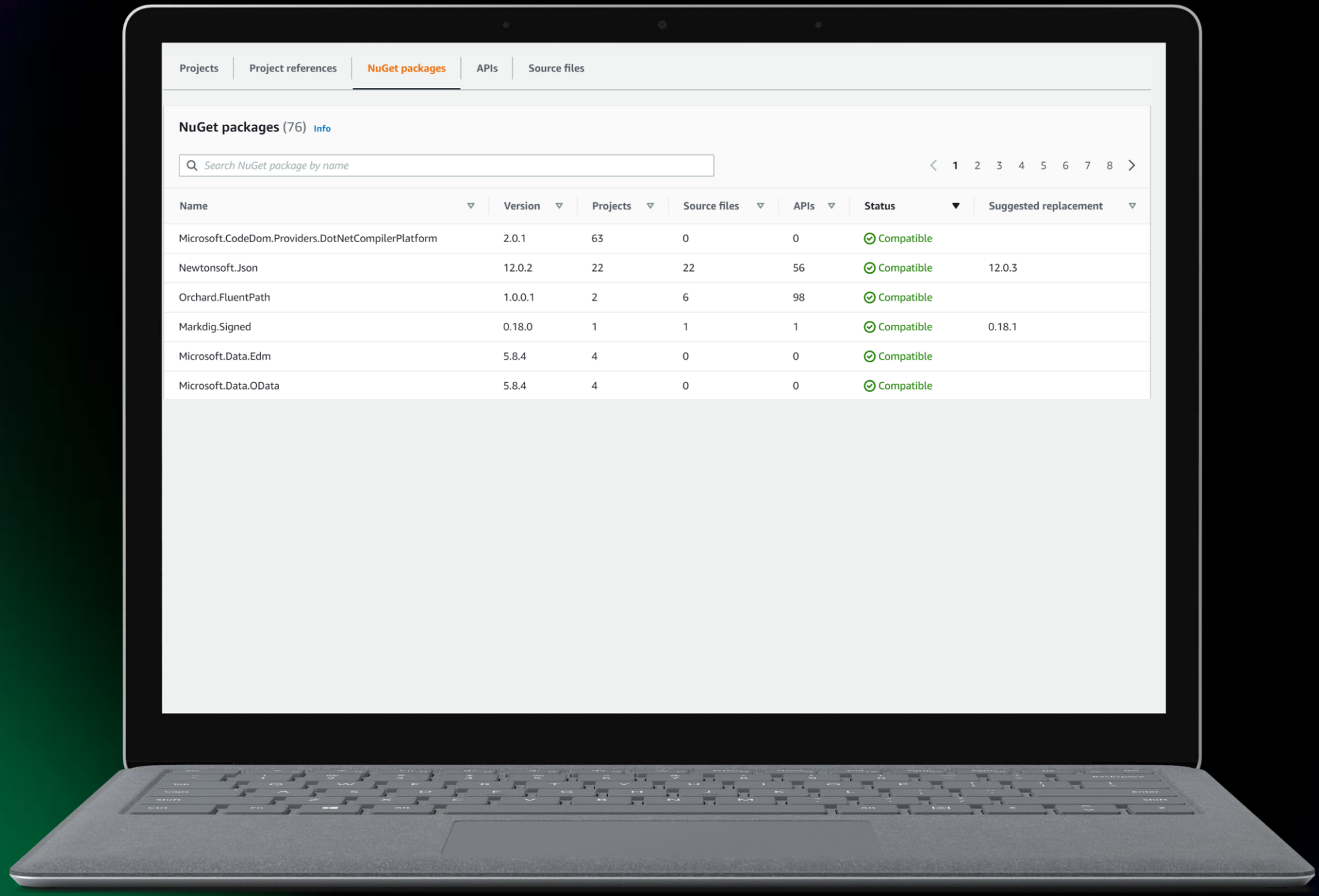


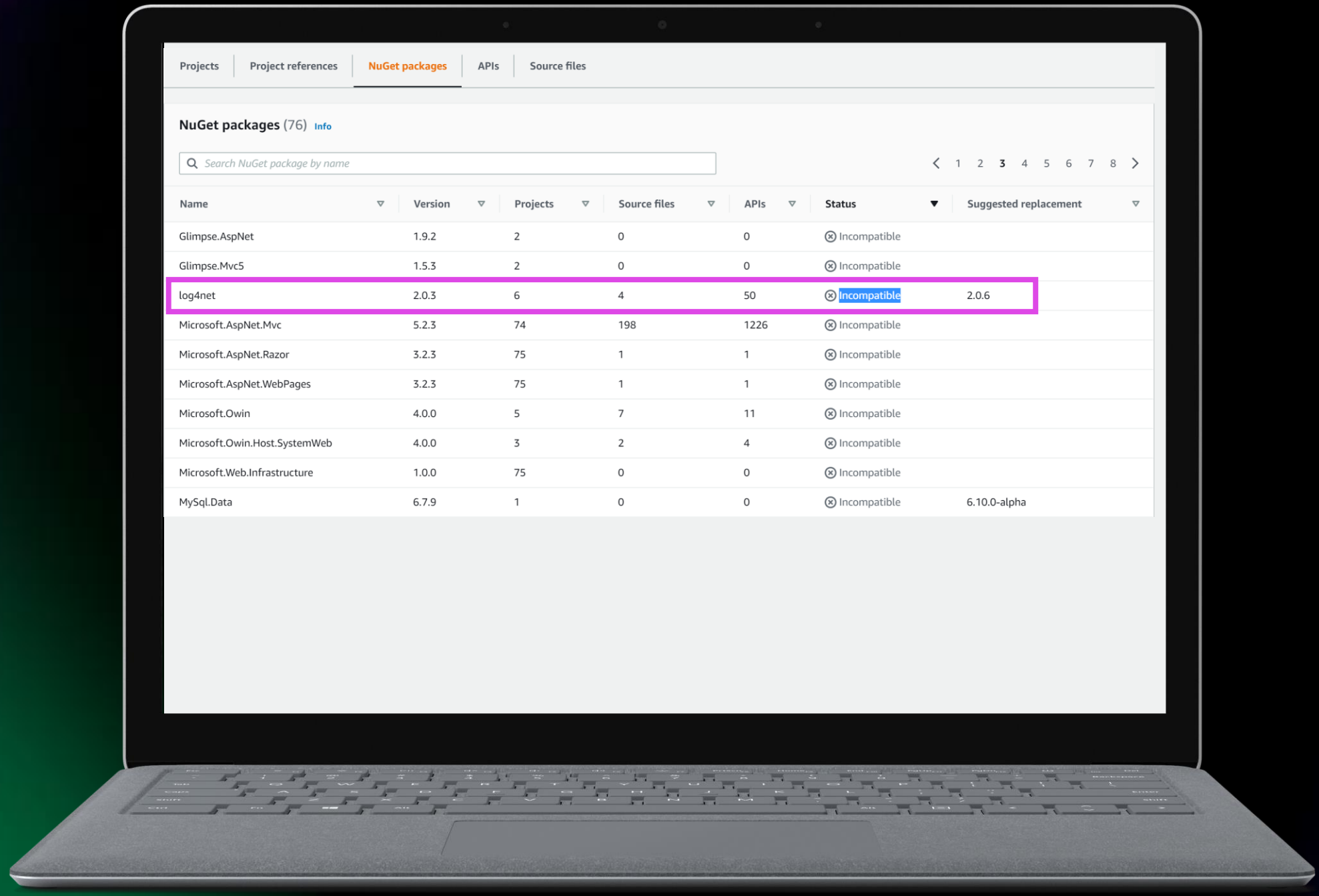
Assisted porting

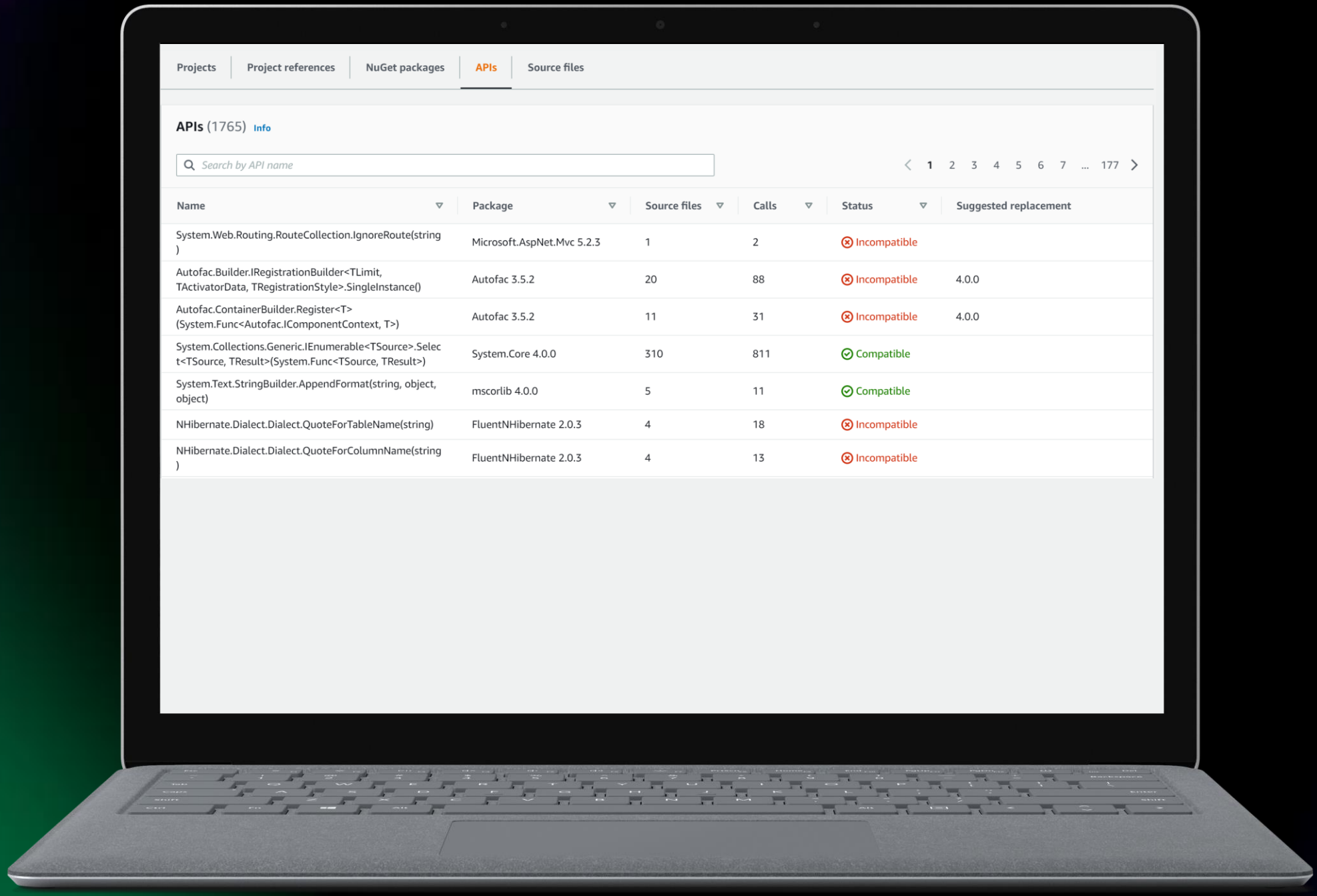
Updates packages and changes project reference files for you to start porting

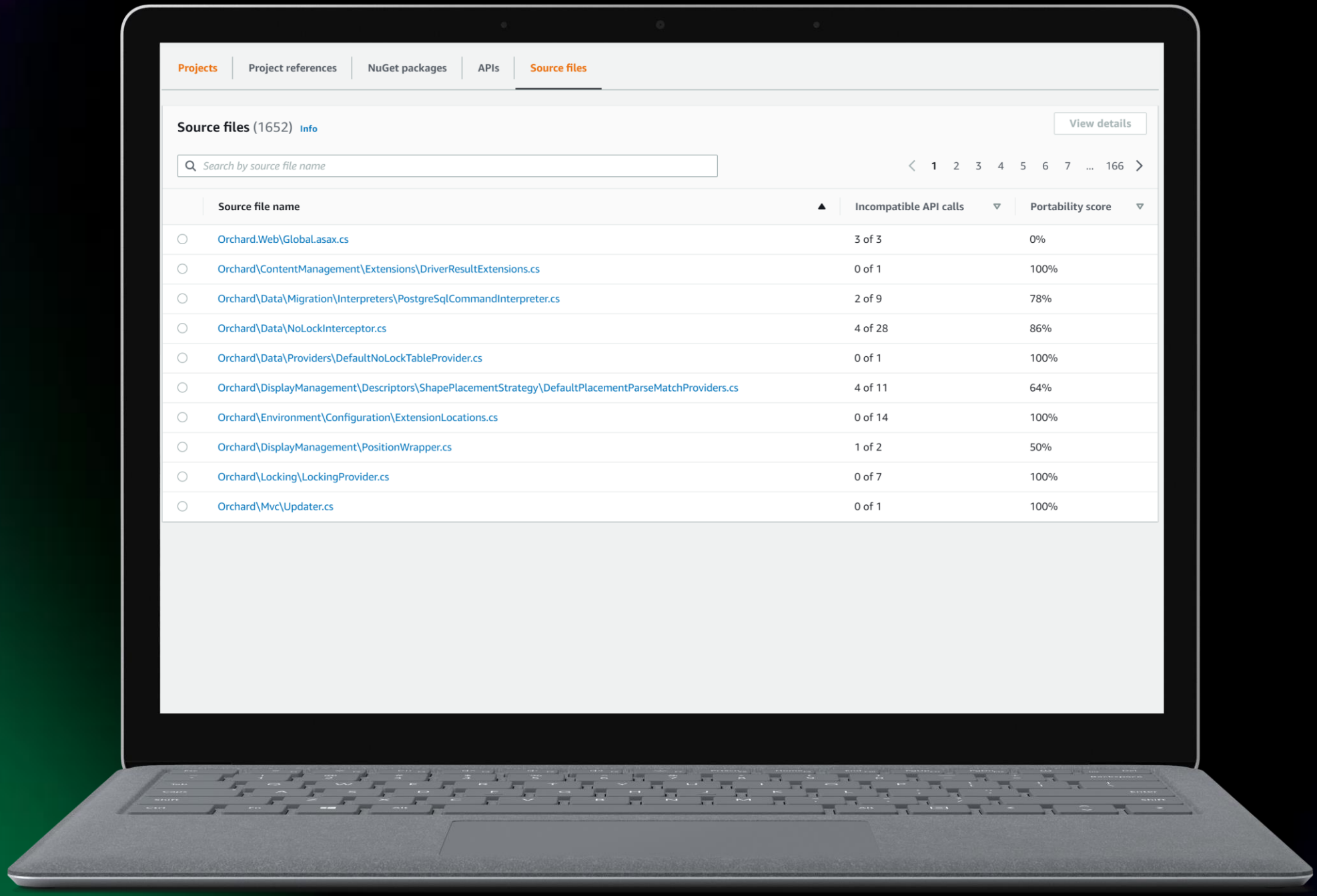


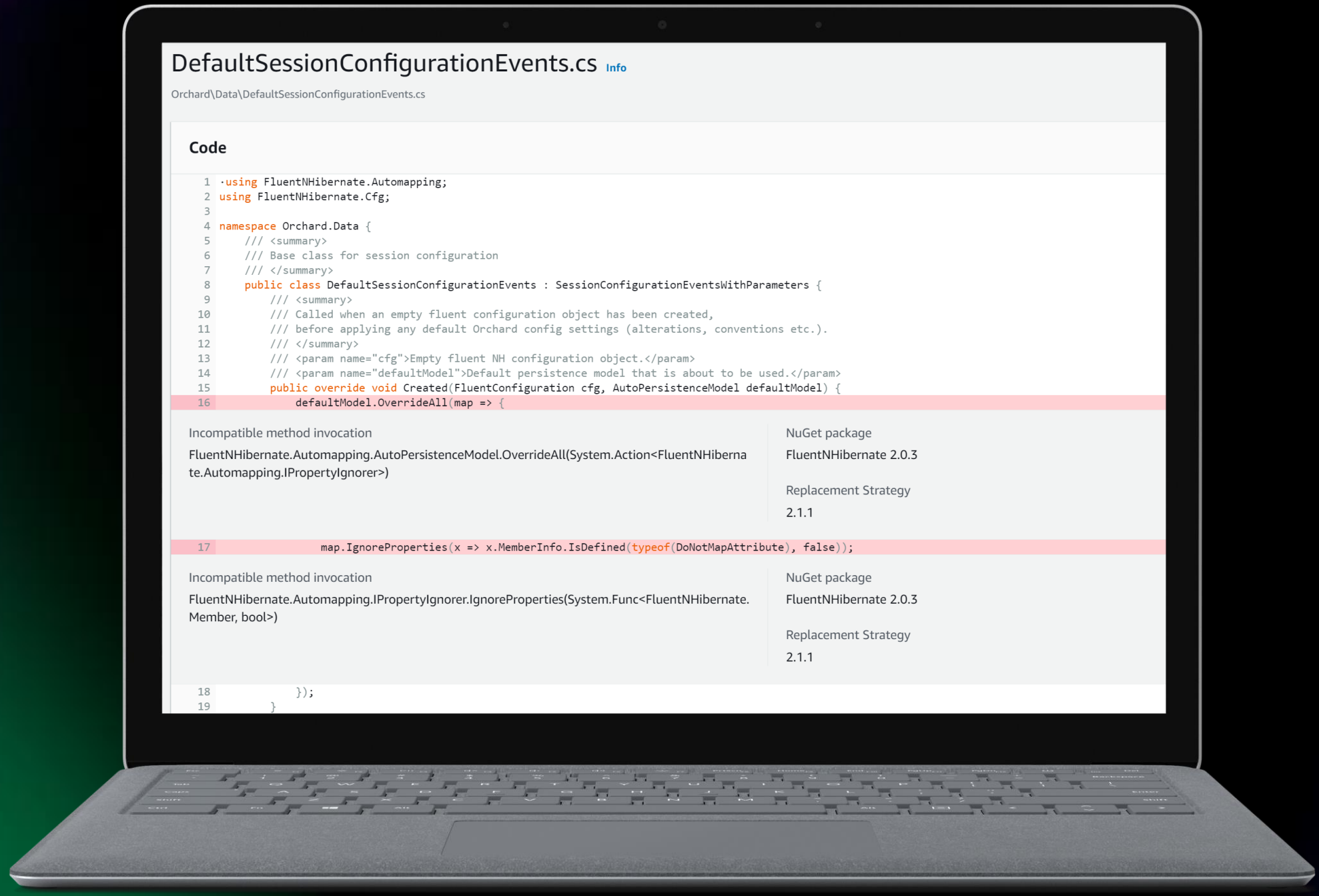


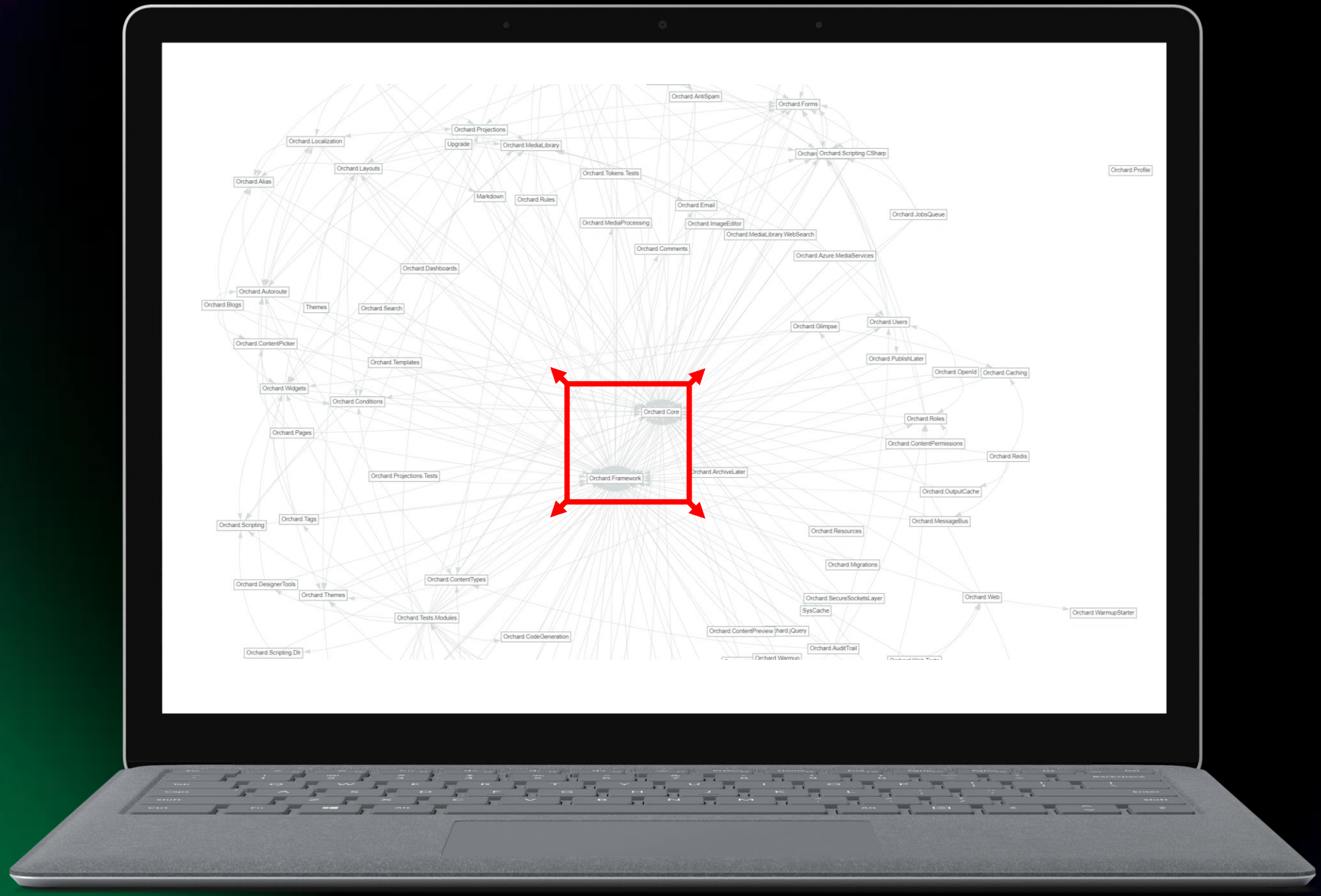












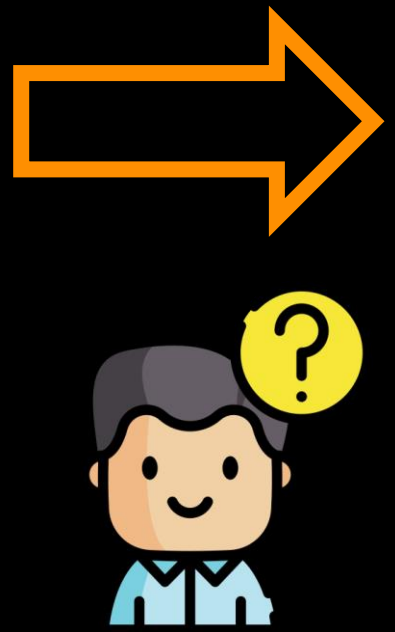
Monolithic vs Microservices Architecture

Monolithic application

Limits experimentation: feature changes require coordination among all teams involved

Impacts scalability: a spike in demand may require architectural changes to the entire app

Impacts availability: a failure in one part of the app may cause the entire app to crash



Refactored microservices

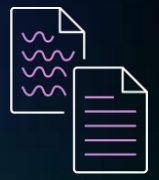
Independent teams: can build, test, and release new functionality independently

Granular scaling: without replicating the entire application

Localized failures: don't risk uptime for the whole application

aws

Challenges when moving to microservices



Difficult to identify parts of the application that need to be extracted as separate services

Difficult to group functionality based on business domains and related processes

Need to use multiple tools to co-relate source code and runtime metrics

AWS Microservice Extractor for .NET

Demo

AWS Microservice Extractor for .NET

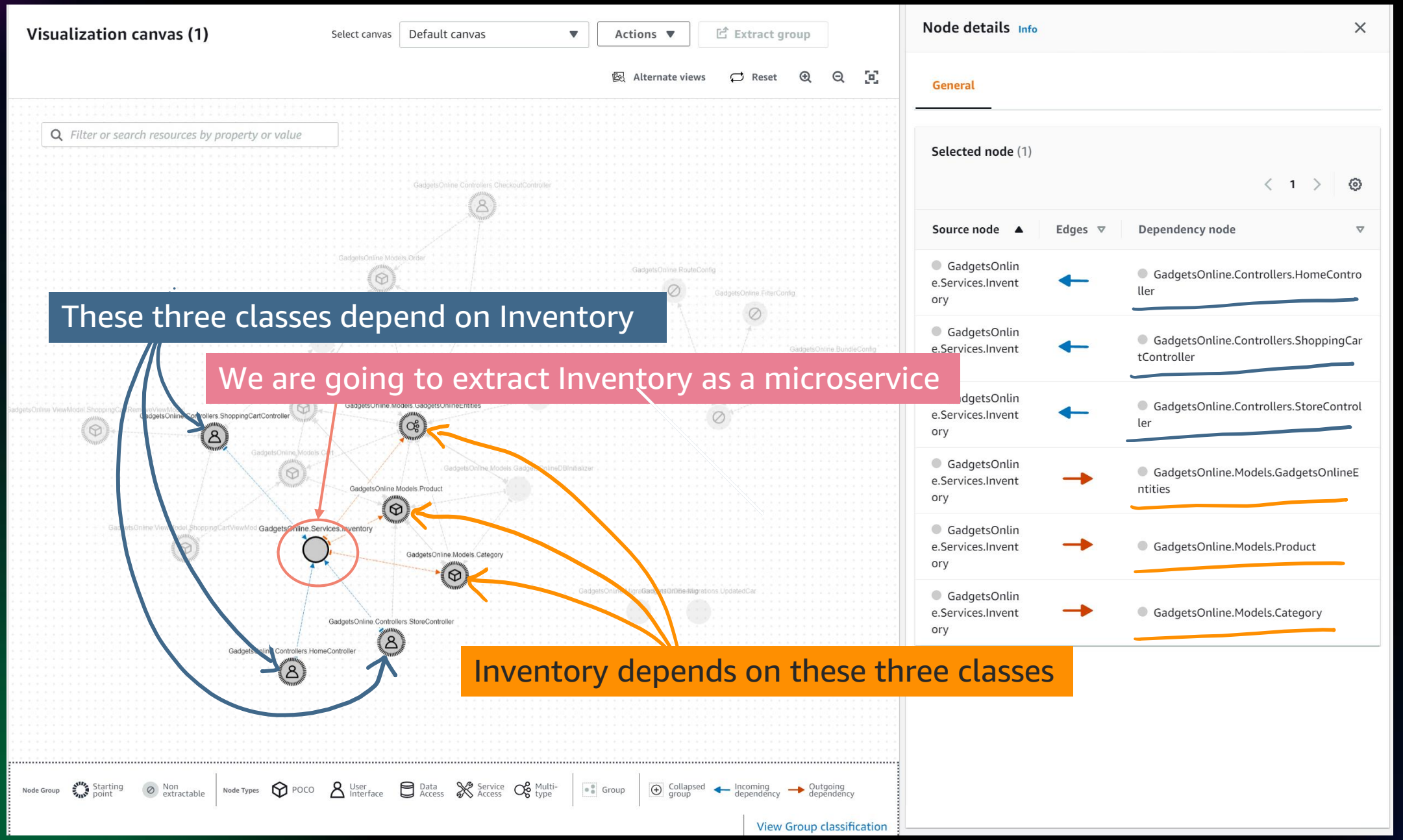
Simplify refactoring .NET applications

Get started with Microservice Extractor for .NET | Download Microservice Extractor for .NET

AWS Microservice Extractor for .NET simplifies the process of refactoring older monolithic applications into smaller code projects to build a microservices-based architecture. Modernize and transform your applications with an assistive tool that analyzes source code and runtime metrics to create a visual representation of your application and its dependencies. With Microservice Extractor providing automated recommendations, developers get guided experience to refactor legacy applications.

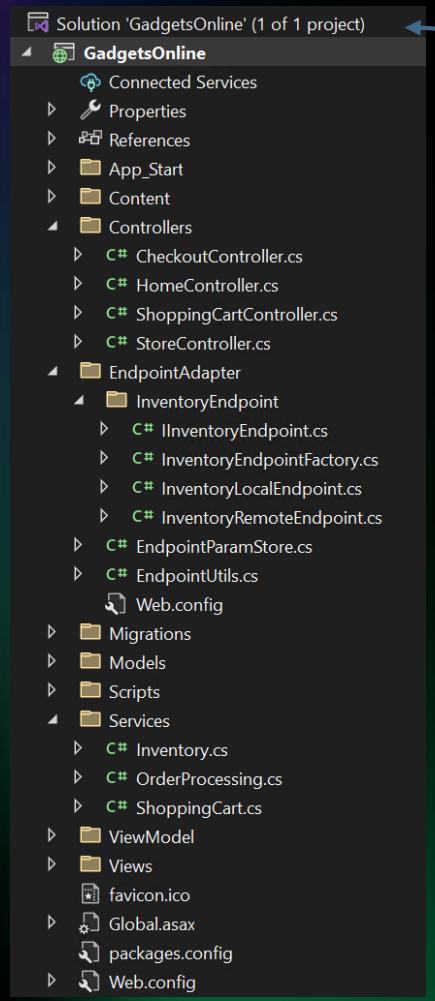
Microservice Extractor now identifies common extraction candidates using heuristics based techniques, and highlights those in visualization. These recommendations can be used as is or used as a starting point to extract microservices off of monolithic codebase. Thus, automated recommendations from Microservice Extractor helps to speed up refactoring large applications even if the developer is unfamiliar with the codebase. You can also extract the codebase into separate projects that teams can develop, build, and operate independently to improve agility, uptime, and scalability.

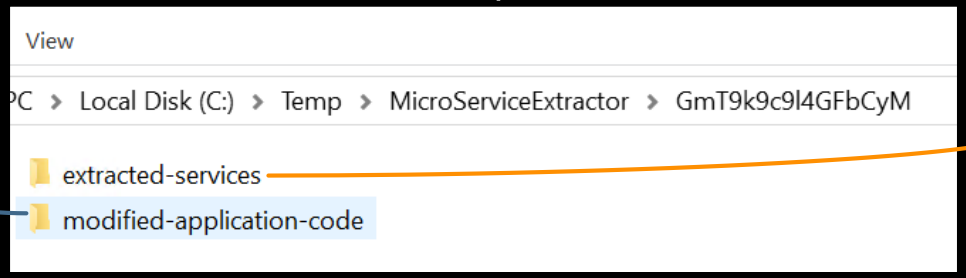
Introducing AWS Microservice Extractor for .NET | Amazon Web Services (1:01)



Service extraction

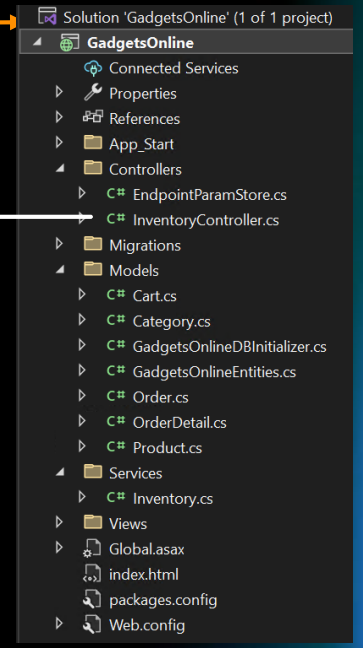
Rest of the modified application





Service API

Inventory service



Service extraction

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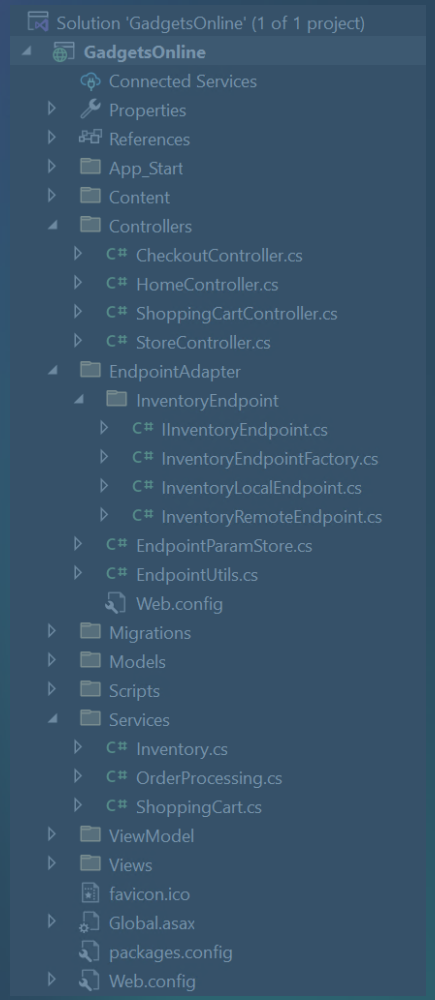
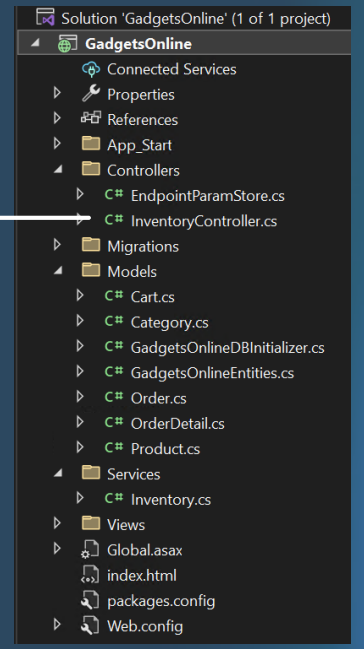



```
namespace GadgetsOnline.Controllers
{
    [RoutePrefix ( "api/Inventory" )]
    public class InventoryController : ApiController
    {
        [Route("GetBestSellers_6da88c34")]
        [ResponseType(typeof(List<Product>))]
        [HttpPost]
        public IHttpActionResult GetBestSellers_6da88c34Wrapper(dynamic endpointContainer)
        {
            try
            {
                dynamic ctorContainer = EndpointParamStore.GetConstructorContainer(endpointContainer);
                dynamic methodContainer = EndpointParamStore.GetMethodContainer(endpointContainer);
                Inventory myInstance = null;
                string ctorParamHash = EndpointParamStore.GetConstructorParamHash(ctorContainer);
                // Initialize the right constructor
                if (ctorParamHash.Equals("e3b0c442"))
                {
                    myInstance = new Inventory();
                }

                // Retrieve Method parameters
                int count = methodContainer.count;
                return Ok(myInstance.GetBestSellers(count));
            }
            catch (Exception e)
            {
                Console.WriteLine(e.ToString());
                return InternalServerError(e);
            }
        }

        [Route("GetAllCategories_e3b0c442")]
        [ResponseType(typeof(List<Category>))]
        [HttpPost]
        public IHttpActionResult GetAllCategories_e3b0c442Wrapper(dynamic endpointContainer)
        {
            try
            {
                dynamic ctorContainer = EndpointParamStore.GetConstructorContainer(endpointContainer);
                dynamic methodContainer = EndpointParamStore.GetMethodContainer(endpointContainer);
                Inventory myInstance = null;
                string ctorParamHash = EndpointParamStore.GetConstructorParamHash(ctorContainer);
                // Initialize the right constructor
                if (ctorParamHash.Equals("e3b0c442"))
                {
```

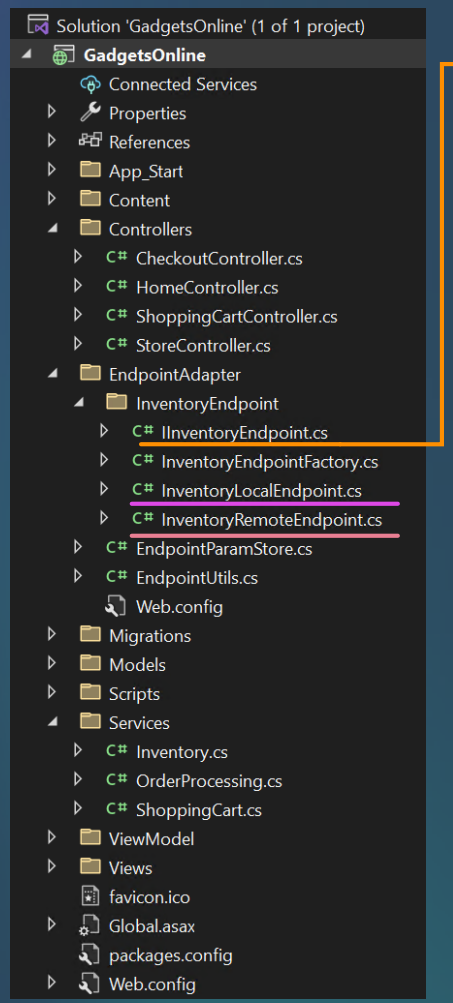
Inventory service



Service extraction

Rest of the modified application

Inventory service



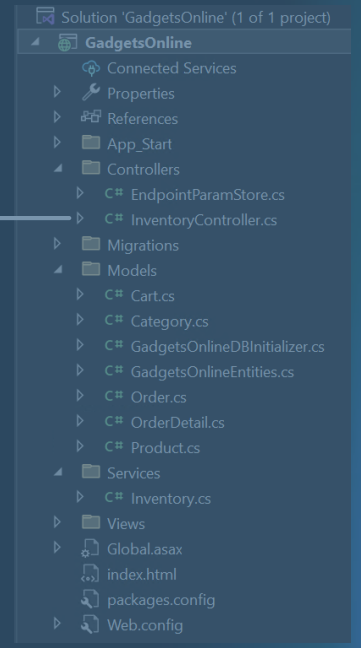

```
namespace GadgetsOnline.EndpointAdapter
{
    public interface IInventoryEndpoint
    {
        List<Product> GetBestSellers(int count);
        List<Category> GetAllCategories();
        List<Product> GetAllProductsInCategory(string category);
        Product GetProductById(int id);
        string GetProductNameById(int id);
    }
}
```

Two implementations of the same interface

```
namespace GadgetsOnline.EndpointAdapter
{
    public class InventoryLocalEndpoint : IInventoryEndpoint
    {
        private readonly Inventory originalInstance;
        public InventoryLocalEndpoint()
        {
            originalInstance = new Inventory();
        }

        public List<Product> GetBestSellers(int count)
        {
            return originalInstance.GetBestSellers(count);
        }

        public List<Category> GetAllCategories()
        {
```

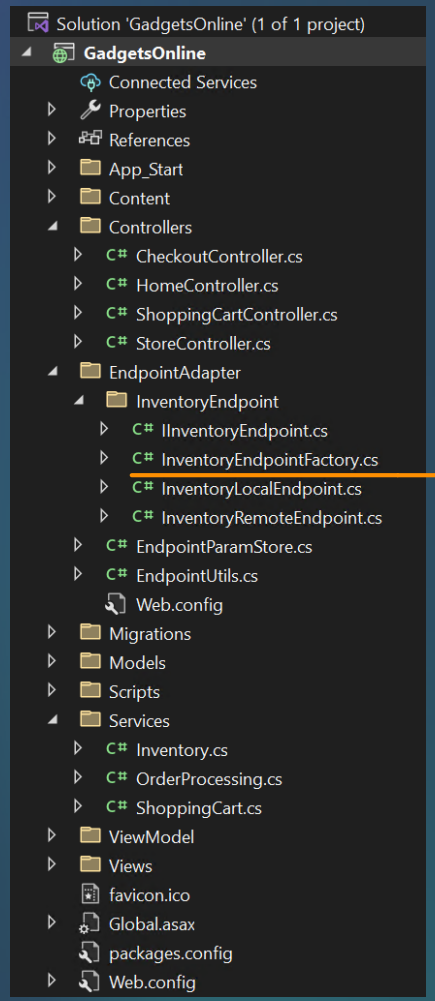
```
namespace GadgetsOnline.EndpointAdapter
{
    public class InventoryRemoteEndpoint : IInventoryEndpoint
    {
        private string endpointAddress;
        private static readonly string endpointPrefix = "api/Inventory";
        private readonly dynamic ctorParams;
        public InventoryRemoteEndpoint(string remoteEndpoint)
        {
            endpointAddress = remoteEndpoint;
            ctorParams = EndpointParamStore.NewContainer();
            EndpointParamStore.SetConstructorParamHash(ctorParams, "e3b0c442");
        }

        public List<Product> GetBestSellers(int count)
        {
            return GetBestSellersRemote("GetBestSellers_6da88c34", count);
        }

        public List<Product> GetBestSellersRemote(string endpointSuffix, int count)
        {
            try
            {
                dynamic methodParams = EndpointParamStore.NewContainer();
                methodParams.count = count;
                HttpClient client = EndpointUtils.initializeClientWithJsonMedia(endpointAddress);
                HttpResponseMessage response = EndpointUtils.PostAndGetResponse<dynamic>(client, e
                return EndpointUtils.ReadResponse<List<Product>>(response);
            }
            catch (Exception e)
            {
                throw e;
```

Service API



Service extraction

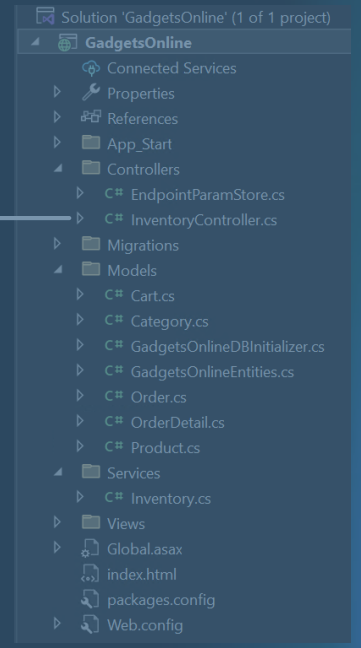
Rest of the modified application




```
namespace GadgetsOnline.EndpointAdapter
{
    public class InventoryEndpointFactory
    {
        // Knob that controls branch by abstraction (local / remote call)
        private static bool useRemoteEndpoint = false;

        // Endpoint address of remote endpoint
        private static string remoteEndpoint = "http://localhost:8080";

        private static bool initialized = false;

        // Initiate uses config file to read the value of this knob and endpoi
        public static void initEndpointFactory()
        {
            if (initialized)
            {
                return;
            }
            remoteEndpoint = EndpointUtils.getRemoteEndpoint();
            useRemoteEndpoint = EndpointUtils.isRemoteRouting();
            initialized = true;
        }


        public static IInventoryEndpoint GetEndpointAdapter()
        {
            initEndpointFactory();
            if (useRemoteEndpoint)
            {
                return new InventoryRemoteEndpoint(remoteEndpoint);
            }
            else
            {
                return new InventoryLocalEndpoint();
            }
        }


    }
```

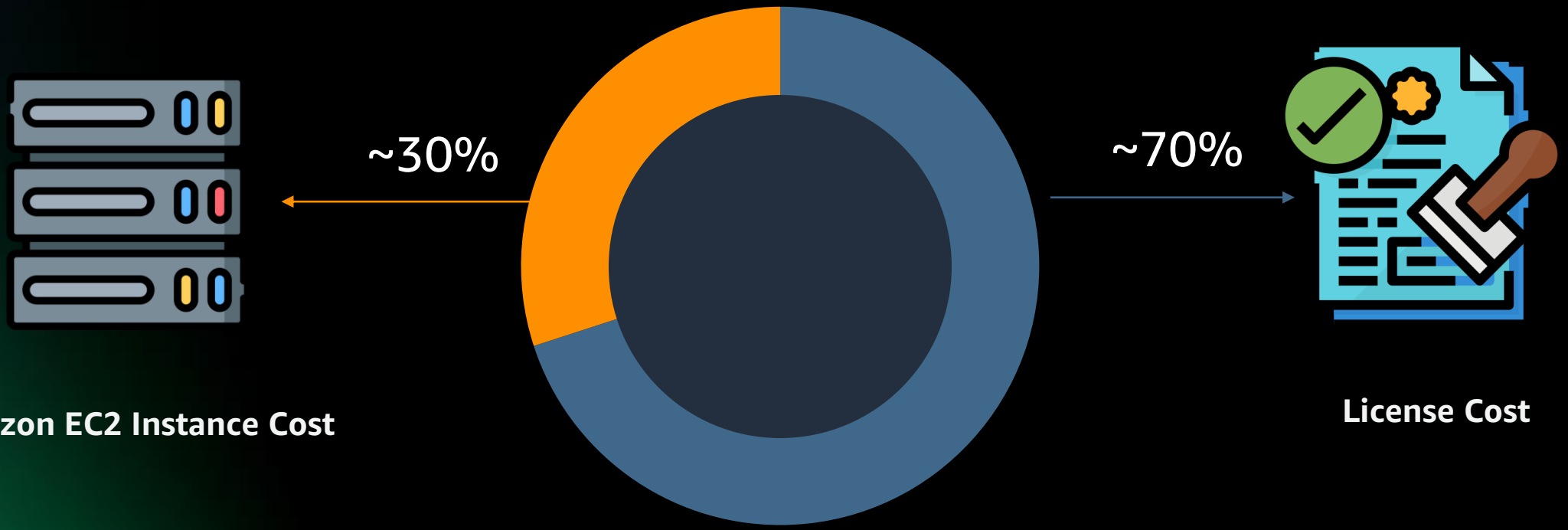
Inventory service

Service API



Microsoft SQL Server modernization

Microsoft SQL Server standard cost on Amazon EC2



R5.2xlarge instance + 100GB EBS Running on Linux + Sydney

Challenges in migrating from commercial to open source

Application

Application

Previously…
Rewrite T-SQL
Rewrite app code
Switch drivers

TDS Endpoint
T-SQL

Postgre Endpoint
PL/pgSQL

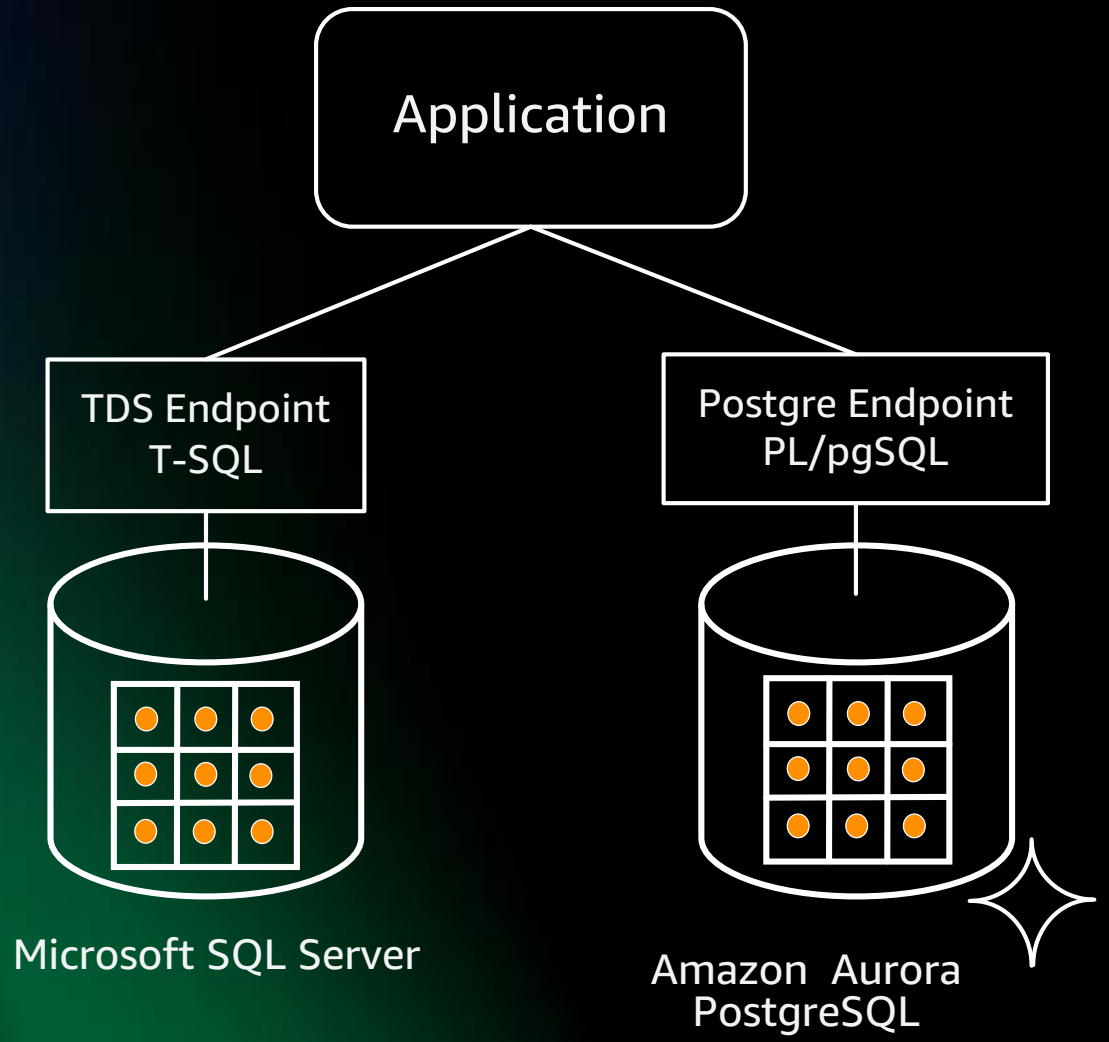
Tools

1. AWS Schema Conversion Tool
2. AWS Database Migration Service (AWS DMS)

Microsoft SQL Server

Amazon Aurora PostgreSQL

Imagine if you could . . .



- Legacy application code remains written for SQL Server
- Client drivers do not need to change
- New application code written directly to PostgreSQL

Babelfish

Run Miocrosoft SQL Server applications on PostgreSQL with little to no code changes

Keep existing queries

Translation layer enables Aurora PostgreSQL to understand Microsoft SQL Server's proprietary T-SQL

Accelerate migrations

Lower risk and complete migrations faster, saving you months to years of work

Freedom to innovate

Run T-SQL code side-by-side with new open source functionality and continue developing with familiar tools

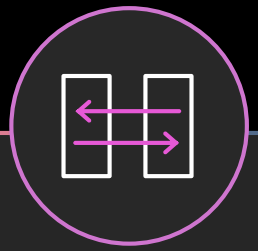
aws

Babelfish for PostgreSQL (Open-Source Project)

Customize and add new features

Contribute to help steer the direction of Babelfish

Apache 2.0 license



Use it for any purpose, innovate and distribute your modifications with confidence

Available on GitHub

Is community-driven and provides transparency into the feature roadmap

Call to action

Run the free Babelfish App Modernization Workshop

- ~3 to 4 Hours
- Self serviced & self paced
- We will provide free AWS accounts to try the labs

Run a PoC with Babelfish Compass

- ~ Takes about 15min
- Do an assessment & check the complexity

Babelfish App Modernization Workshop

Babelfish Compass reports are comprehensive and detailed

--- Table Of Contents ---

--- Assessment Summary ---

Back to Table of Contents

#applications	1
#input files	1
#SQL batches	78
#lines SQL/DDL processed	333
#lines SQL in objects	0
total #SQL features	255
Supported	145
Not Supported	12
Review Semantics	14
Ignored	84

=== SQL Features Report ===

--- SQL features 'Not Supported' in Babelfish v.1.0.0 ---

Back to Table of Contents

DDL (12/1)
ⓘ ALTER TABLE..CHECK CONSTRAINT : 12

--- SQL features 'Review Manually' in Babelfish v.1.0.0 ---

Back to Table of Contents

-no items to report-

--- SQL features 'Review Semantics' in Babelfish v.1.0.0 ---

Back to Table of Contents

DDL (14/1)
ⓘ Constraint PRIMARY KEY/UNIQUE, CLUSTERED, in CREATE TABLE : created as NONCLUS

--- SQL features 'Review Performance' in Babelfish v.1.0.0 ---

--- SQL features 'Review Semantics' in Babelfish v.1.0.0 ---

Back to Table of Contents

DDL (14/1)
ⓘ Constraint PRIMARY KEY/UNIQUE, CLUSTERED, in CREATE TABLE : created as NONCLUSTERED, no physical row

--- SQL features 'Review Performance' in Babelfish v.1.0.0 ---

Back to Table of Contents

-no items to report-

You can find where exactly the issues exist

```
-------------------------------------------------------------------------------
--- X-ref: 'Not Supported' by SQL feature -------------------------------------
-------------------------------------------------------------------------------
Back to Table of Contents

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_AliasPartIndex (DDL, 1)
    TABLE dbo.MySite_AliasPartIndex, line 277

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_AutoroutePartIndex (DDL, 1)
    TABLE dbo.MySite_AutoroutePartIndex, line 282

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_ContainedPartIndex (DDL, 1)
    TABLE dbo.MySite_ContainedPartIndex, line 287

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_ContentItemIndex (DDL, 1)
    TABLE dbo.MySite_ContentItemIndex, line 292

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_DeploymentPlanIndex (DDL, 1)
    TABLE dbo.MySite_DeploymentPlanIndex, line 297

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_LayerMetadataIndex (DDL, 1)
    TABLE dbo.MySite_LayerMetadataIndex, line 302

ALTER TABLE..CHECK CONSTRAINT: dbo.MySite_TaxonomyIndex (DDL, 1)
```

```
262  ALTER TABLE [dbo].[MySite_Document] ADD  DEFAULT ((0)) FOR [Version]
263  GO
264  ALTER TABLE [dbo].[MySite_TaxonomyIndex] ADD  DEFAULT ((1)) FOR [Published]
265  GO
266  ALTER TABLE [dbo].[MySite_TaxonomyIndex] ADD  DEFAULT ((0)) FOR [Latest]
267  GO
268  ALTER TABLE [dbo].[MySite_UserIndex] ADD  DEFAULT ((1)) FOR [IsEnabled]
269  GO
270  ALTER TABLE [dbo].[MySite_UserIndex] ADD  DEFAULT ((0)) FOR [IsLockoutEnabled]
271  GO
272  ALTER TABLE [dbo].[MySite_UserIndex] ADD  DEFAULT ((0)) FOR [AccessFailedCount]
273  GO
274  ALTER TABLE [dbo].[MySite_AliasPartIndex]  WITH CHECK ADD  CONSTRAINT [MySite_FK_AliasPartIndex] FOREIGN KEY([Doc
275  REFERENCES [dbo].[MySite_Document] ([Id])
276  GO
277  ALTER TABLE [dbo].[MySite_AliasPartIndex] CHECK CONSTRAINT [MySite_FK_AliasPartIndex]
278  GO
279  ALTER TABLE [dbo].[MySite_AutoroutePartIndex]  WITH CHECK ADD  CONSTRAINT [MySite_FK_AutoroutePartIndex] FOREIGN
280  REFERENCES [dbo].[MySite_Document] ([Id])
281  GO
282  ALTER TABLE [dbo].[MySite_AutoroutePartIndex] CHECK CONSTRAINT [MySite_FK_AutoroutePartIndex]
283  GO
284  ALTER TABLE [dbo].[MySite_ContainedPartIndex]  WITH CHECK ADD  CONSTRAINT [MySite_FK_ContainedPartIndex] FOREIGN
```

Call to action

Run the free Babelfish App Modernization Workshop

- **Self-service & self-paced**
- **We will provide free AWS accounts to try the labs**

Run a PoC with Babelfish Compass

- Generate an assessment report based on your schema
- Check the compatibility & complexity

Plug in a Partner

We have capable partners with proven experience to modernize databases

Access AWS PoC Funding

Build your business case faster

Babelfish App Modernization Workshop

How to get started with Babelfish Workshop

- Share your **use case** and let us know your interest for the Babelfish App Modernization Workshop in the **feedback form**
- We will organize a training for your team, and provide complimentary AWS accounts to try the labs
- Get a chance to receive USD$25 worth of AWS credits

Babelfish App Modernization Workshop

Dear AWS Team,

I attended Rapidly Modernize your Microsoft .NET applications on AWS session at AWS Innovate Modern Application edition.

I have an HR application running on Microsoft SQL Server. I would like to check whether Babelfish will work with that and would like to do a PoC.

Can you organize the Babelfish App Modernization Workshop for my team.

Thanks,
Bob Smith
Tech Lead – XYZ company

Recap and resources

- Market observation
- Porting Assistant for .NET
- AWS Microservice Extractor for .NET
- Database modernization with Babelfish for Aurora PostgreSQL

AWS Microservice Extractor for .NET Labs

Babelfish App Modernization Workshop

Visit the Modern Applications resource hub

Dive deeper with these resources to help you develop an effective plan for your modernization journey.

- Build modern applications on AWS
- Business value of cloud modernization
- An introduction to event-driven architectures
- Accelerate full-stack web and mobile app development
- Determining the total cost of ownership: Comparing serverless and server-based technologies
- Building event-driven architectures with AWS
- Continuous learning, continuous modernization

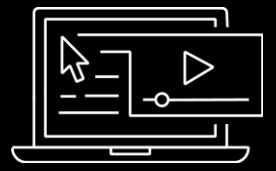
https://tinyurl.com/modern-apps-aws

Visit resource hub

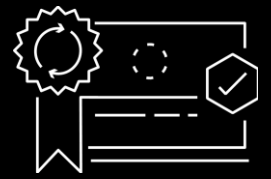
AWS Training and Certification

Get started with Free Digital Training for you and your team today

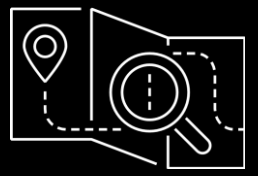
Achieve key milestones and plan your next steps with the AWS Modern Application skills training



Access 500+ free digital courses with AWS Skill Builder



Earn an industry-recognized credential:
AWS Certified Developer – Associate
AWS Certified DevOps – Professional



Create a self-paced learning roadmap
AWS ramp-up guide - Developer
AWS ramp-up guide - DevOps

aws

Thank you for attending AWS Innovate Modern Applications Edition

We hope you found it interesting! A kind reminder to **complete the survey.**
Let us know what you thought of today's event and how we can improve the event experience for you in the future.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Thank you!

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