

# GitHub Copilot &

# Microsoft 365 Copilot Extensibility

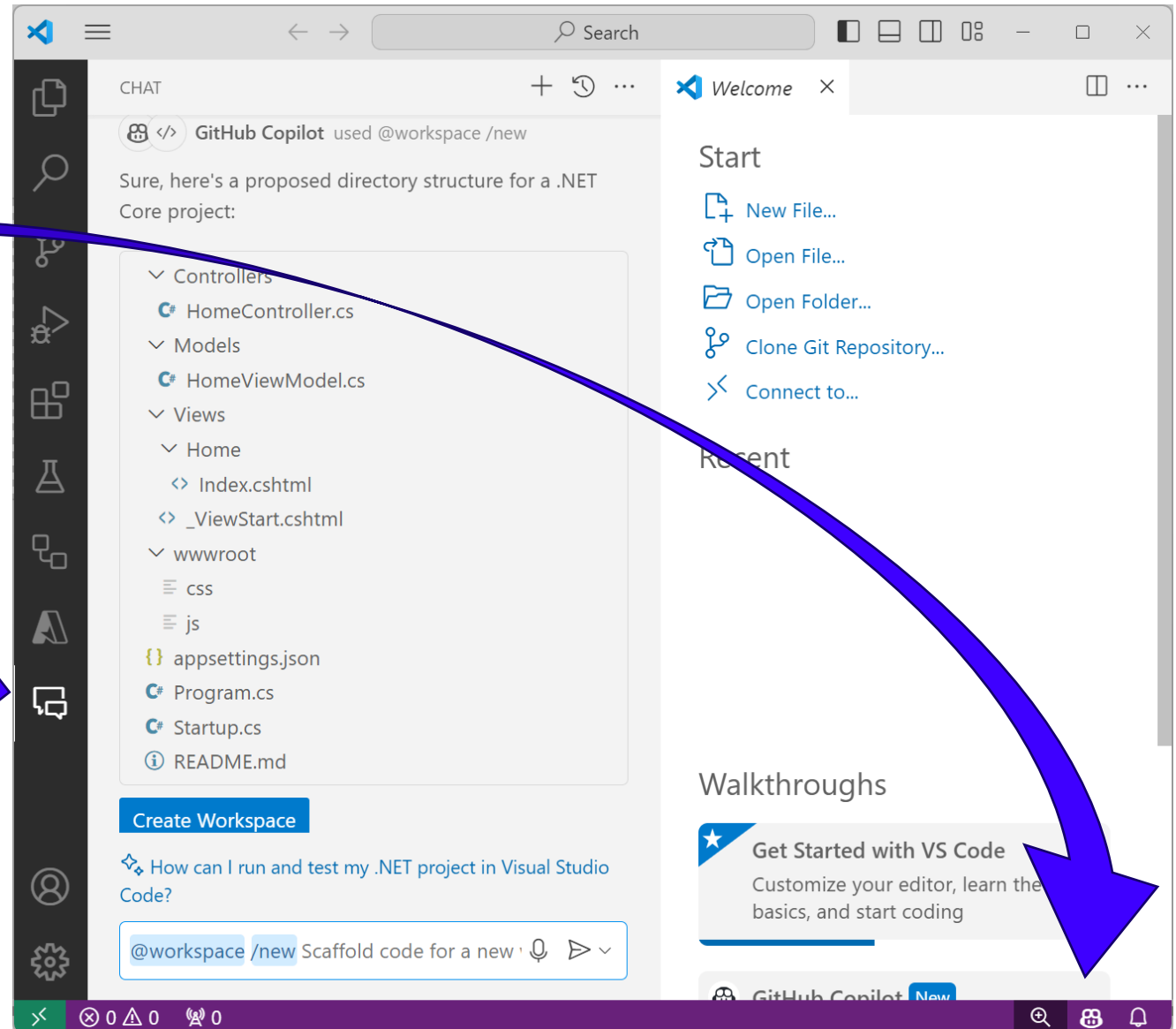
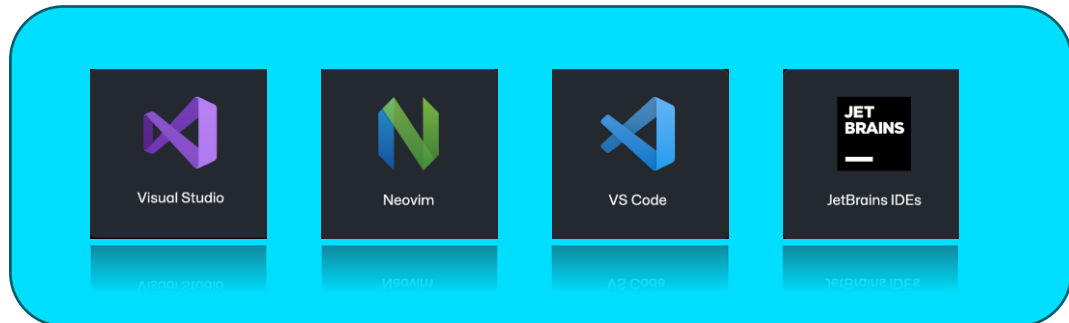
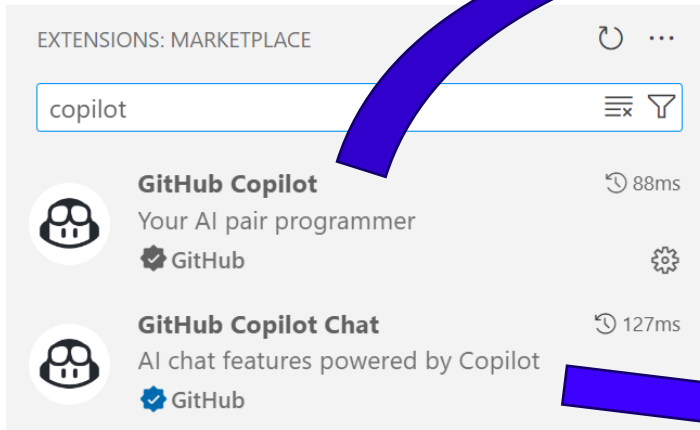
Lorenzo Barbieri  
Principal Consultant



[lorenzo.barbieri@softwareone.com](mailto:lorenzo.barbieri@softwareone.com)



# Copilot in Your IDE



# When to use Copilot vs Copilot Chat

## Copilot

Direct Code Writing

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Seamless IDE Integration

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Solo Development

## Copilot Chat

In-Depth Assistance

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Learning & Teaching






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Collaborative Scenarios

# How to Start with Copilot


## Visual Studio Code Editing evolved


### Start


-  New File...
-  Open File...
-  Open Folder...
-  Clone Git Repository...
-  Connect to...

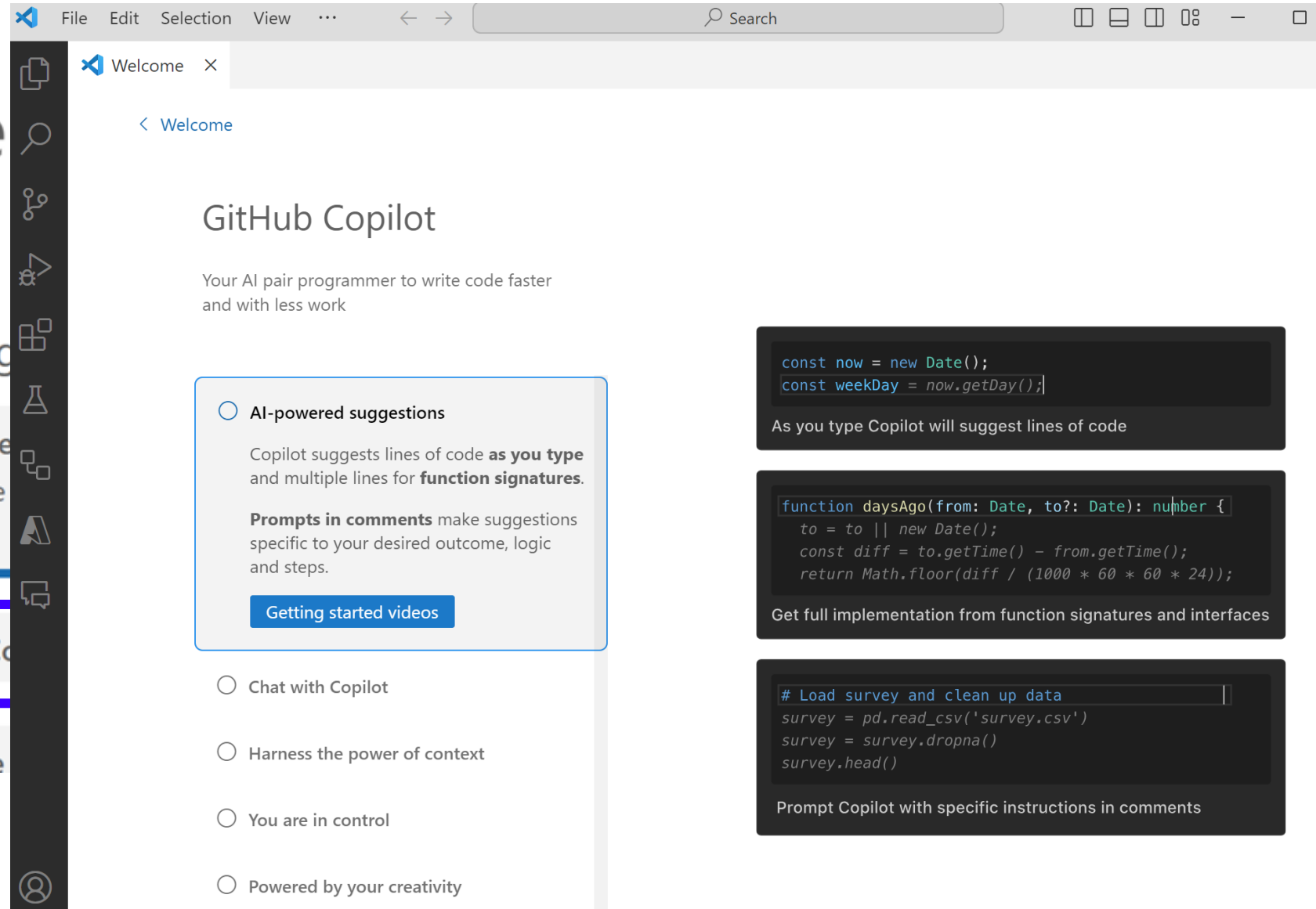
### Recent

### Walkthrough

 **Get Started**  
Customize  
coding

 **GitHub Copilot**

 **Learn the**



File Edit Selection View ... Search

Welcome X

< Welcome

## GitHub Copilot

Your AI pair programmer to write code faster and with less work

- ☐ **AI-powered suggestions**  
Copilot suggests lines of code **as you type** and multiple lines for **function signatures**.  
**Prompts in comments** make suggestions specific to your desired outcome, logic and steps.  
[Getting started videos](#)
- ☐ Chat with Copilot
- ☐ Harness the power of context
- ☐ You are in control
- ☐ Powered by your creativity

```
const now = new Date();
const weekday = now.getDay();
```

As you type Copilot will suggest lines of code

```
function daysAgo(from: Date, to?: Date): number {
  to = to || new Date();
  const diff = to.getTime() - from.getTime();
  return Math.floor(diff / (1000 * 60 * 60 * 24));
}
```

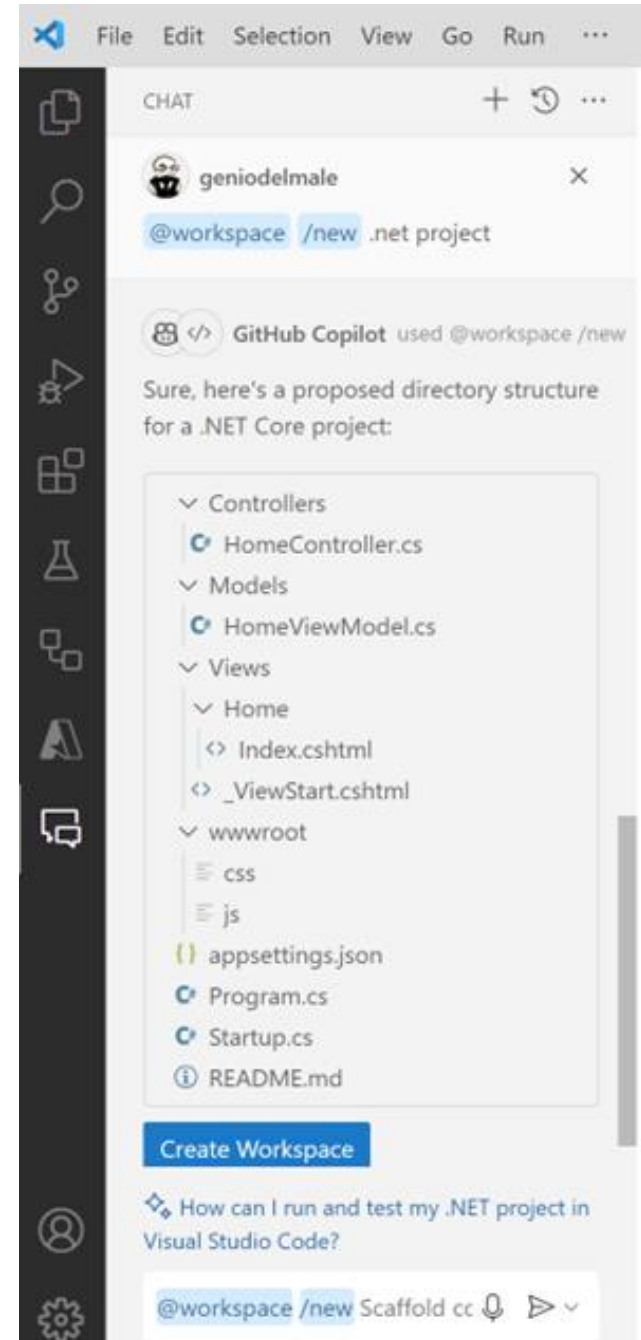
Get full implementation from function signatures and interfaces

```
# Load survey and clean up data
survey = pd.read_csv('survey.csv')
survey = survey.dropna()
survey.head()
```

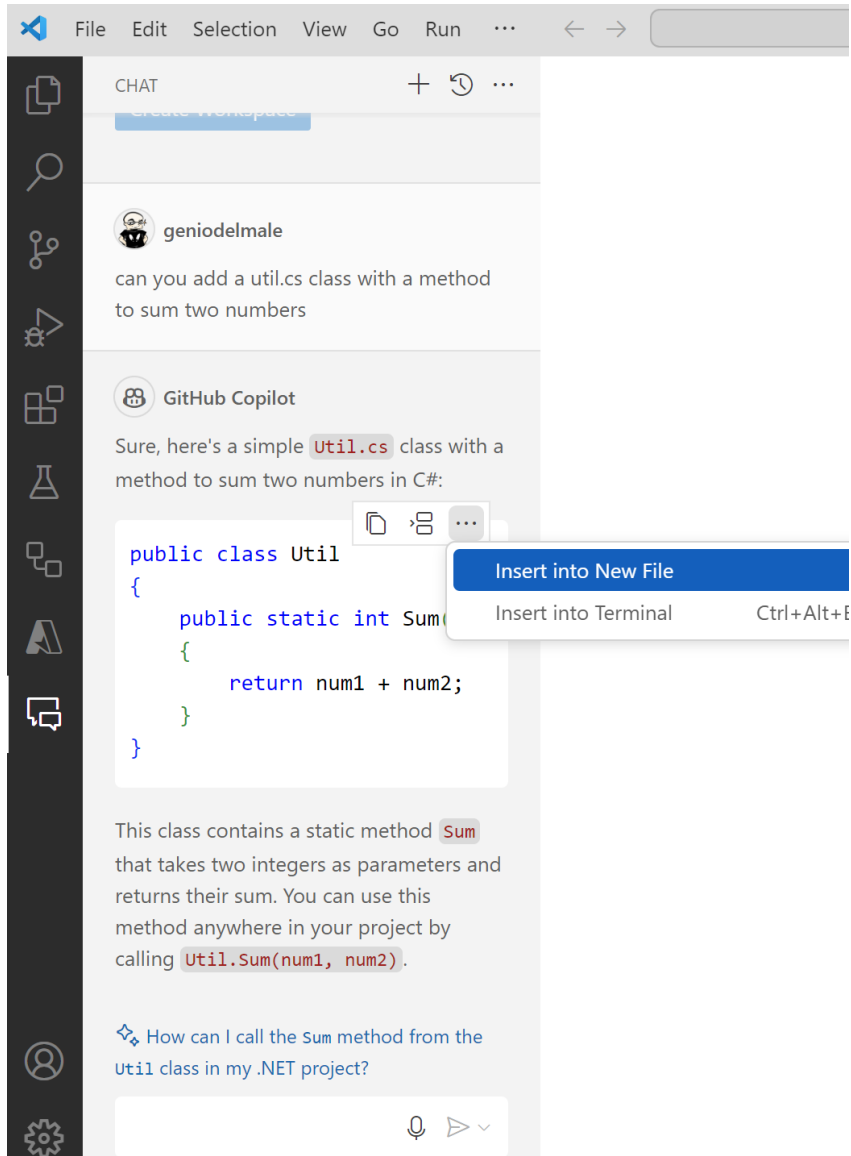
Prompt Copilot with specific instructions in comments

# Working in a project level

Type `/` command in GitHub Copilot Chat to start with a new project



# Writing Code...



CHAT

geniodelmale

can you add a util.cs class with a method to sum two numbers

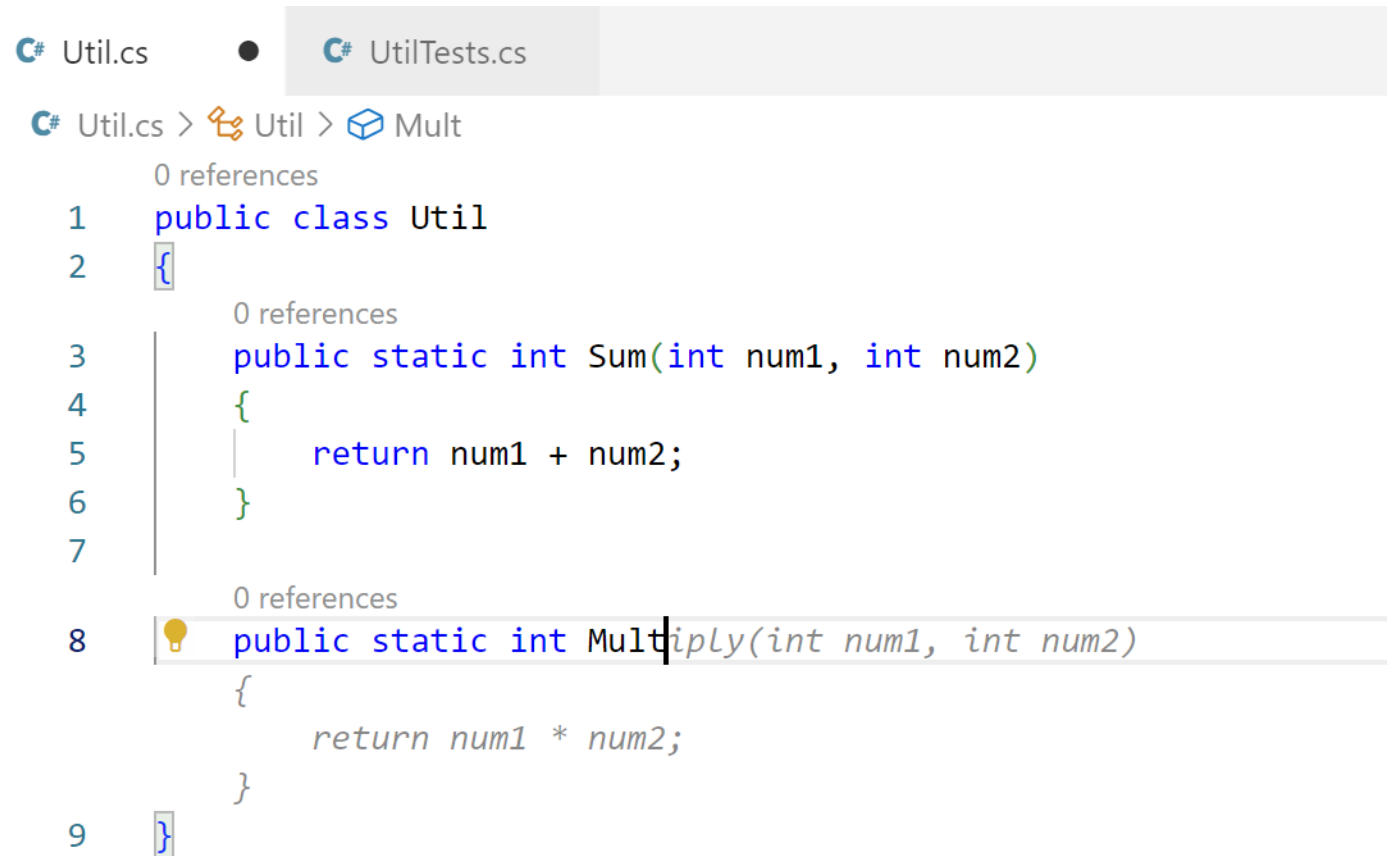
GitHub Copilot

Sure, here's a simple `Util.cs` class with a method to sum two numbers in C#:

```
public class Util
{
    public static int Sum(int num1, int num2)
    {
        return num1 + num2;
    }
}
```

This class contains a static method `Sum` that takes two integers as parameters and returns their sum. You can use this method anywhere in your project by calling `Util.Sum(num1, num2)`.

How can I call the `Sum` method from the `Util` class in my .NET project?



```
Util.cs • UtilTests.cs
```

```
Util.cs > Util > Mult
```

0 references

```
1 public class Util
2 {
3     0 references
4     public static int Sum(int num1, int num2)
5     {
6         return num1 + num2;
7     }
8     0 references
9     public static int Multiply(int num1, int num2)
10    {
11        return num1 * num2;
12    }
13 }
```

# ...Tests, and more...

The screenshot shows the Visual Studio IDE with a C# project named 'my-dotnet-app'. The main editor displays the file 'UtilTests.cs' with the following code:

```
1 using NUnit.Framework;
2
3 [TestFixture]
4 public class UtilTests
5 {
6     [Test]
7     public void Sum_TwoPositiveNumbers_ReturnsCorrectSum()
8     {
9         int result = Util.Sum(5, 7);
10        Assert.AreEqual(12, result);
11    }
12
13    [Test]
14    public void Sum_NegativeAndPositiveNumber_ReturnsCorrectSum()
15    {
16        int result = Util.Sum(-3, 7);
17        Assert.AreEqual(4, result);
18    }
19
20    [Test]
21    public void Sum_TwoNegativeNumbers_ReturnsCorrectSum()
22    {
23        int result = Util.Sum(-3, -7);
24        Assert.AreEqual(-10, result);
25    }
26 }
```

On the left, a chat window is open with the user 'geniodelmale' asking: 'can you create some test methods for Sum?'. The GitHub Copilot response is visible, showing a simple unit test class for the 'Sum' method in the 'Util' class using NUnit:

```
using NUnit.Framework;

[TestFixture]
public class UtilTests
{
    [Test]
    public void Sum_TwoPositiveNumbers_ReturnsCorrectSum()
    {
        int result = Util.Sum(5, 7);
        Assert.AreEqual(12, result);
    }

    [Test]
    public void Sum_NegativeAndPositiveNumber_ReturnsCorrectSum()
    {
        int result = Util.Sum(-3, 7);
        Assert.AreEqual(4, result);
    }

    [Test]
    public void Sum_TwoNegativeNumbers_ReturnsCorrectSum()
    {
        int result = Util.Sum(-3, -7);
        Assert.AreEqual(-10, result);
    }
}
```

At the bottom of the chat window, a suggestion is visible: 'How can I run the unit tests for my .NET'.

The chat window shows the user 'geniodelmale' asking: 'please explain me the code'. The GitHub Copilot response is as follows:


Used 1 reference >

Sure, this is a simple C# class named `Util` with two static methods: `Sum` and `Multiply`.


1. `public class Util`: This line declares a public class named `Util`. Classes in C# are blueprints for creating objects. A class can contain fields, methods, constants, constructors, properties, indexers, operators, events, and nested types.
2. `public static int Sum(int num1, int num2)`: This line declares a public static method named `Sum`. This

# ...Refactoring...

CHAT + ↺ ...

 genio del male

please refactor the code removing static members

 GitHub Copilot

Used 1 reference >

Sure, here's your refactored `Util` class with non-static methods:

```
public class Util
{
    public int Sum(int num1, int num2)
    {
        return num1 + num2;
    }
}
```

```
public int Multiply(int num1, int num2)
{
    return num1 * num2;
}
```

Now, to use these methods, you'll need to create an instance of the `Util` class:


```
Util util = new Util();
int sum = util.Sum(3, 4);
int product = util.Multiply(3, 4);
```




# ...and Comments!

CHAT

correspond to real locations or phone numbers.

 geniodelmale  
can you add comments?

 GitHub Copilot  
Used 1 reference >  
Sure, here's your `Util` class with added comments:

```
public class Util
{
    // This method takes two integers as parameters and returns their sum.
    public static int Sum(int num1, int num2)
    {
        return num1 + num2;
    }

    // This method takes two integers as parameters and returns their product.
    public static int Multiply(int num1, int num2)
    {
        return num1 * num2;
    }
}
```

# Util.cs • {} Untitled-1 • UtilTests.cs


# Util.cs > Util


0 references

```
1 public class Util
2 {
3     // This method takes two integers as parameters and returns their sum.
4     // 0 references
5     public static int Sum(int num1, int num2)
6     {
7         return num1 + num2;
8     }
9     // This method takes two integers as parameters and returns their product.
10    // 0 references
11    public static int Multiply(int num1, int num2)
12    {
13        return num1 * num2;
14    }
}
```

# Creating Sample Data


CHAT + ⌚ ... Util.cs {} Untitled-1 UtilTests.cs


 geniodelmale  
can you create a sample json file with 10 records with Italian person names, surnames, phone numbers and addresses?

 GitHub Copilot  
Used 1 reference >  
Sure, here's a sample JSON file with 10 records of Italian person names, surnames, phone numbers, and addresses:

```
[
  {
    "name": "Giovanni",
    "surname": "Rossi",
    "phone": "+39 0123 456789",
    "address": "Via Roma, 10, 00100 Roma, Italy"
  },
  {
    "name": "Maria",
    "surname": "Bianchi",
    "phone": "+39 0123 456788",
    "address": "Via Milano, 20, 20100 Milano, Italy"
  },
  {
    "name": "Luca",
    "surname": "Verdi",
    "phone": "+39 0123 456787",
    "address": "Via Napoli, 30, 80100 Napoli, Italy"
  },
  {
    "name": "Anna",
    "surname": "Russo",
    "phone": "+39 0123 456786",
    "address": "Via Torino, 40, 10100 Torino, Italy"
  },
  {
    "name": "Marco",
    "surname": "Bianchi",
    "phone": "+39 0123 456785",
    "address": "Via Roma, 50, 00100 Roma, Italy"
  },
  {
    "name": "Giulia",
    "surname": "Rossi",
    "phone": "+39 0123 456784",
    "address": "Via Milano, 10, 20100 Milano, Italy"
  },
  {
    "name": "Alessandro",
    "surname": "Verdi",
    "phone": "+39 0123 456783",
    "address": "Via Napoli, 20, 80100 Napoli, Italy"
  },
  {
    "name": "Francesca",
    "surname": "Bianchi",
    "phone": "+39 0123 456782",
    "address": "Via Torino, 30, 10100 Torino, Italy"
  },
  {
    "name": "Roberto",
    "surname": "Russo",
    "phone": "+39 0123 456781",
    "address": "Via Roma, 40, 00100 Roma, Italy"
  },
  {
    "name": "Elena",
    "surname": "Bianchi",
    "phone": "+39 0123 456780",
    "address": "Via Milano, 30, 20100 Milano, Italy"
  }
]
```

CHAT + ⌚ ...  
complet...

 geniodelmale  
can you create a sample json file with 10 records with Greek person names, surnames, phone numbers and addresses?

 GitHub Copilot  
Used 1 reference >  
Sure, here's a sample JSON file with 10 records of Greek person names, surnames, phone numbers, and addresses:

```
[
  {
    "name": "Γιάννης",
    "surname": "Παπαδόπουλος",
    "phone": "+30 210 1234567",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Μαρία",
    "surname": "Μητρούσιου",
    "phone": "+30 210 1234568",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Αλέξανδρος",
    "surname": "Παπαδόπουλος",
    "phone": "+30 210 1234569",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Ελένη",
    "surname": "Μητρούσιου",
    "phone": "+30 210 1234570",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Νικόλαος",
    "surname": "Παπαδόπουλος",
    "phone": "+30 210 1234571",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Σοφία",
    "surname": "Μητρούσιου",
    "phone": "+30 210 1234572",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Χρήστος",
    "surname": "Παπαδόπουλος",
    "phone": "+30 210 1234573",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Αννα",
    "surname": "Μητρούσιου",
    "phone": "+30 210 1234574",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Γεώργιος",
    "surname": "Παπαδόπουλος",
    "phone": "+30 210 1234575",
    "address": "Λεωφόρος Σι..."
  },
  {
    "name": "Κατερίνα",
    "surname": "Μητρούσιου",
    "phone": "+30 210 1234576",
    "address": "Λεωφόρος Σι..."
  }
]
```

The screenshot shows the GitHub Copilot interface within a code editor. At the top, a tab is labeled 'GitHub Copilot Suggestions for Util.cs' with a close button. Below the tab, the heading 'GitHub Copilot Suggestions' is displayed, followed by '5 Suggestions'. The first suggestion, 'Suggestion 1', is highlighted. It contains a code block with a closing brace '}', a descriptive paragraph about the 'Util' class and its methods, a paragraph about the 'UtilTests' class, and another paragraph about test methods. Below the code block is a button labeled 'Accept suggestion 1'. The second suggestion, 'Suggestion 2', is partially visible at the bottom, showing a closing brace and a comment '// Path: Program.cs'.

# GitHub Copilot CLI

```
$ gh copilot --help
Your AI command line copilot.

Usage:
  copilot [command]

Examples:

$ gh copilot suggest "Install git"
$ gh copilot explain "traceroute github.com"

Available Commands:
  alias      Generate shell-specific aliases for convenience
  config     Configure options
  explain    Explain a command
  suggest    Suggest a command

Flags:
  -h, --help      help for copilot
  -v, --version   version for copilot

Use "copilot [command] --help" for more information about a command.
```

<https://github.com/github/gh-copilot>

# “Luckily” also Copilot has its limits, for now...

Training data impacts suggestions

GitHub Copilot != Compiler, tester,  
security scanner, etc.

The AI can't read your mind, yet.

[arxiv.org/pdf/2211.06956.pdf](https://arxiv.org/pdf/2211.06956.pdf)





Copilot Business  
can improve  
productivity and  
code quality.

55%

faster **coding**

46%

**of code** written by  
AI

15%

**higher** code quality

**Focus on the code that only **YOU** can write!**



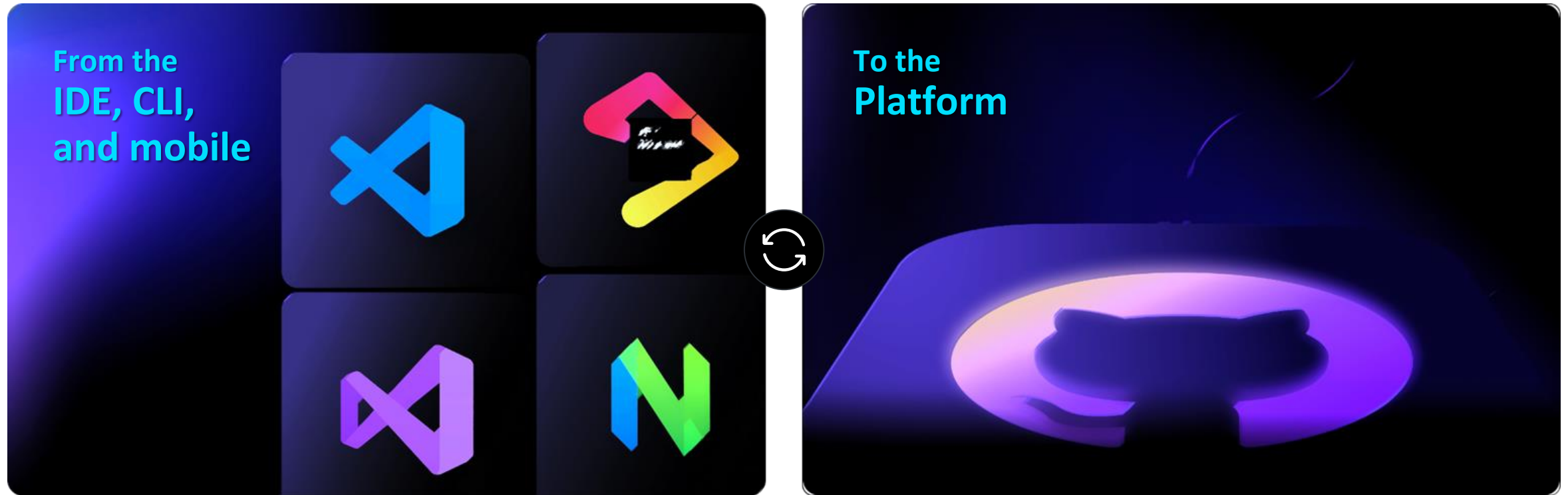
Copilot Business has the same features of Copilot Individual, but with more control on users and IP.

### Management and policies

- ✓ Public code filter
- ✓ User management
- ✓ Data excluded from training by default
- ✓ IP indemnity
- ✓ Content exclusions
- ✓ SAML SSO authentication<sup>2</sup>

<https://resources.github.com/copilot-trust-center/>

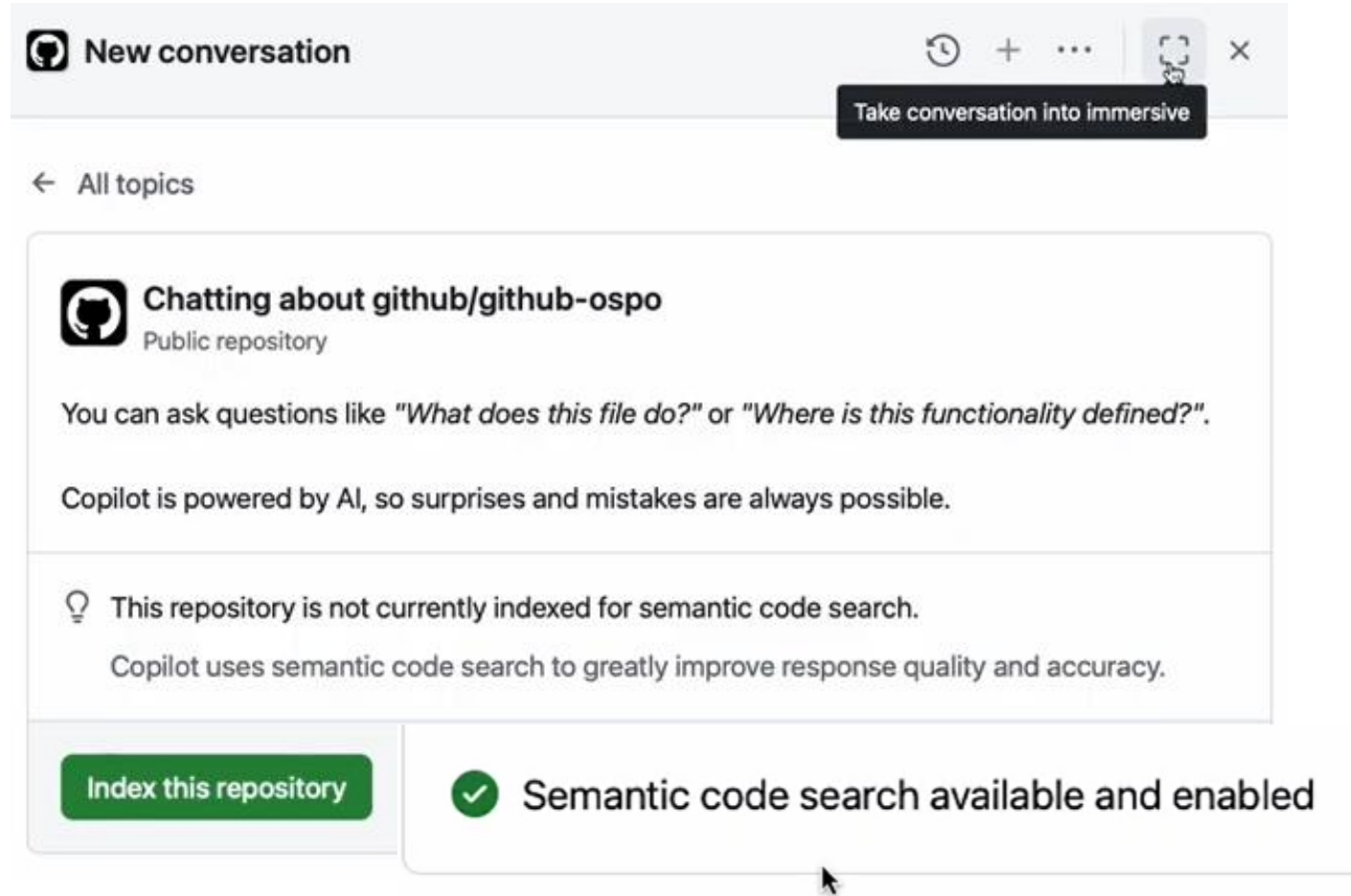
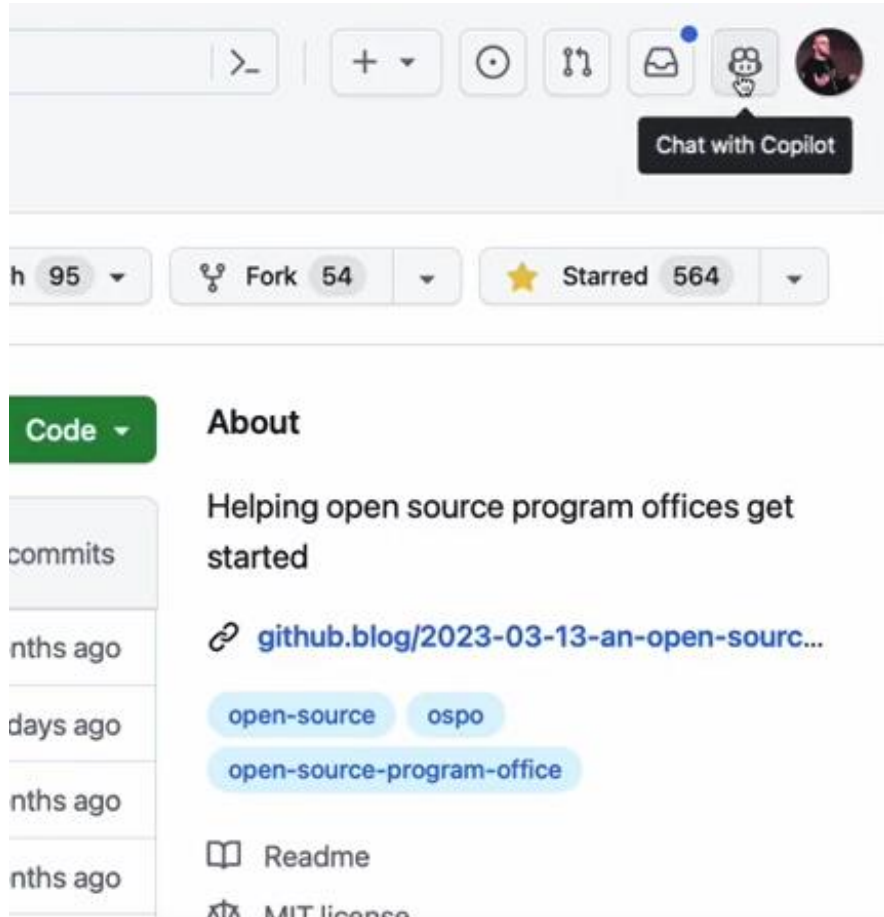
# Copilot Enterprise\* for an AI-powered software development lifecycle.



\*Requires GitHub Enterprise Cloud



# Chat with Copilot directly in github.com





## Chat with Copilot

Copilot indexes and understands your code so you can get answers to questions, learn about new codebases, or improve legacy code.

Select a docset or repository to chat about

🔍 Search topics

### Docsets

-  GitHub Advanced Security →
-  GitHub Engineering →
-  GitHub Public →
-  GitHub TheHub →
-  Primer →
-  GitHub A11y Docs →
-  TypeScript →

### Repositories

-  github/enterprise-advocates →
-  github/customer-engagement-programs →

What is a geometric filter?



**Copilot** Generating...

- **Geometric Filter definition (in [geometric\\_filter.rs](#)):**
  - The Geometric Filter is a probabilistic set size estimator, distinct from related filters like HyperLogLog, MinHash, and others.
  - It supports operations such as insertion and deletion, which are expressed by simply toggling the bit associated with the hash of the original item.
  - The symmetric difference between two sets is denoted by a simple XOR operation of the associated Geometric Filters, however, it doesn't support the union operation.
  - Unlike other set estimators, the estimated size of the symmetric difference between two sets is relative to the estimate size and not relative to the union of the original two sets.
  - The Geometric Filter retains bits necessary to find potentially single item differences with

# Create PR Summaries

The screenshot shows a GitHub Pull Request (PR) interface. At the top, the repository is 'octodemo / geektrainer-demo-conference'. The PR title is 'Add Django messages to submit and edit flows #12'. The PR is open and shows that it wants to merge 1 commit into the 'main' branch from the 'add-success-messages' branch. The PR has 0 conversations, 1 commit, 0 checks, and 2 files changed. A comment from 'GeekTrainer' is visible, stating 'Resolves issue'. The PR is currently in progress, and there are no reviews or assignees. The PR is created by '0fb4de0'.

octodemo / geektrainer-demo-conference

Type to search

<> Code Issues 1 Pull requests 1 Discussions Actions Projects Wiki Security Insights

## Add Django messages to submit and edit flows #12

Edit <> Code

Open GeekTrainer wants to merge 1 commit into main from add-success-messages

Conversation 0 Commits 1 Checks 0 Files changed 2 +11 -2

GeekTrainer commented 7 hours ago • edited

Resolves issue

0fb4de0 Add Django messages to submit and edit flows

Add more commits by pushing to the add-success-messages branch on octodemo/geektrainer-demo-conference.

Reviewers

No reviews

Still in progress? [Convert to draft](#)

Assignees

No one—[assign yourself](#)

Labels

None yet

# Copilot can understand your organization's repositories and knowledge base.

## Discover

Does code already exist for this?

Help! I need step-by-step instructions.

## Explain

What does this code do?

Why is this important?

## Analyze

What needs my attention?

Does anything here use anti-patterns?

# Github Copilot for Azure



**1.In-Chat Azure Expertise:** Simply type “@azure” in Copilot Chat and get real-time insights and answers without leaving your code.



**2.Personal Resource Management:** Need to list your storage accounts or find the URL for your Azure container app? GitHub Copilot for Azure has your back.



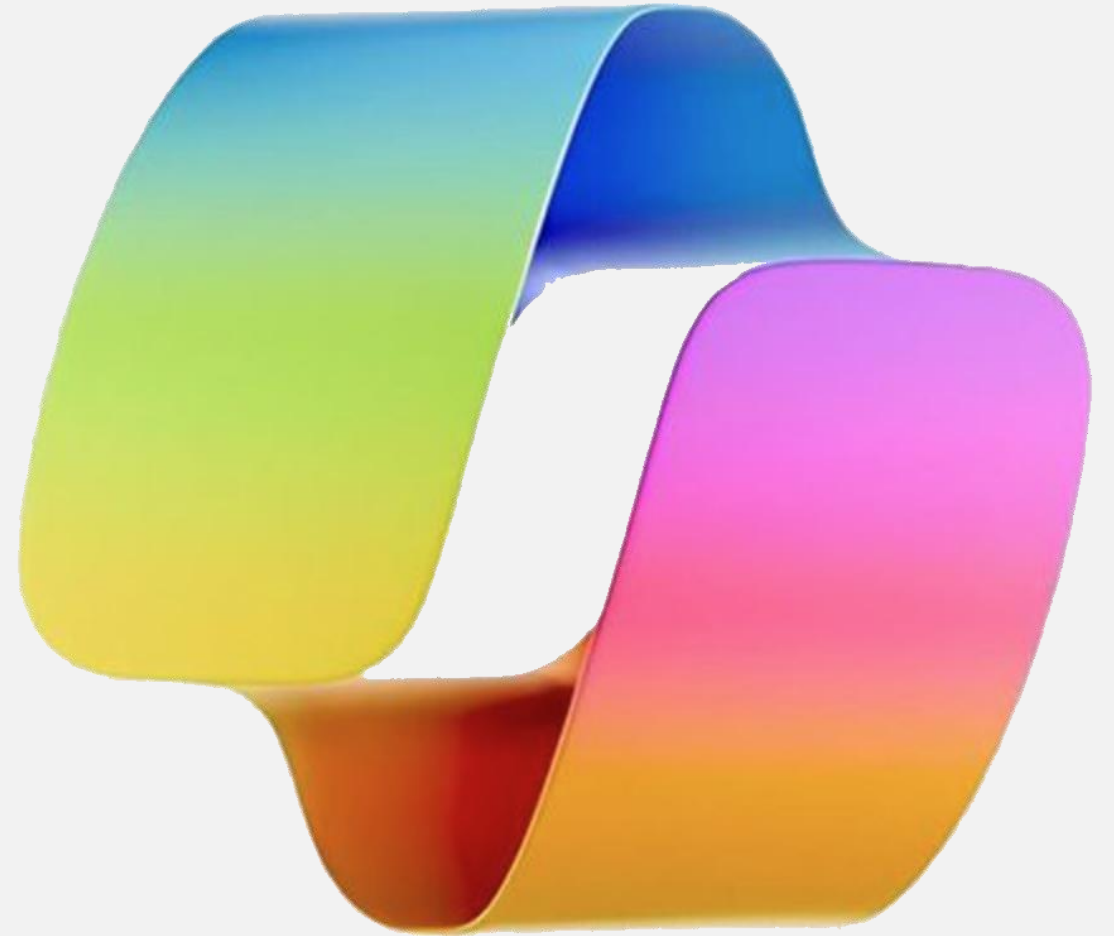
**3.Deployment Guidance:** Need help understanding how to deploy an application on Azure? GitHub Copilot can provide guidance and help along the way.



**4.Troubleshooting:** GitHub Copilot for Azure can help you navigate Log Analytics to diagnose your problems.

[https://microsoft.qualtrics.com/jfe/form/SV\\_4OCHtDpnNfB1Meq](https://microsoft.qualtrics.com/jfe/form/SV_4OCHtDpnNfB1Meq)

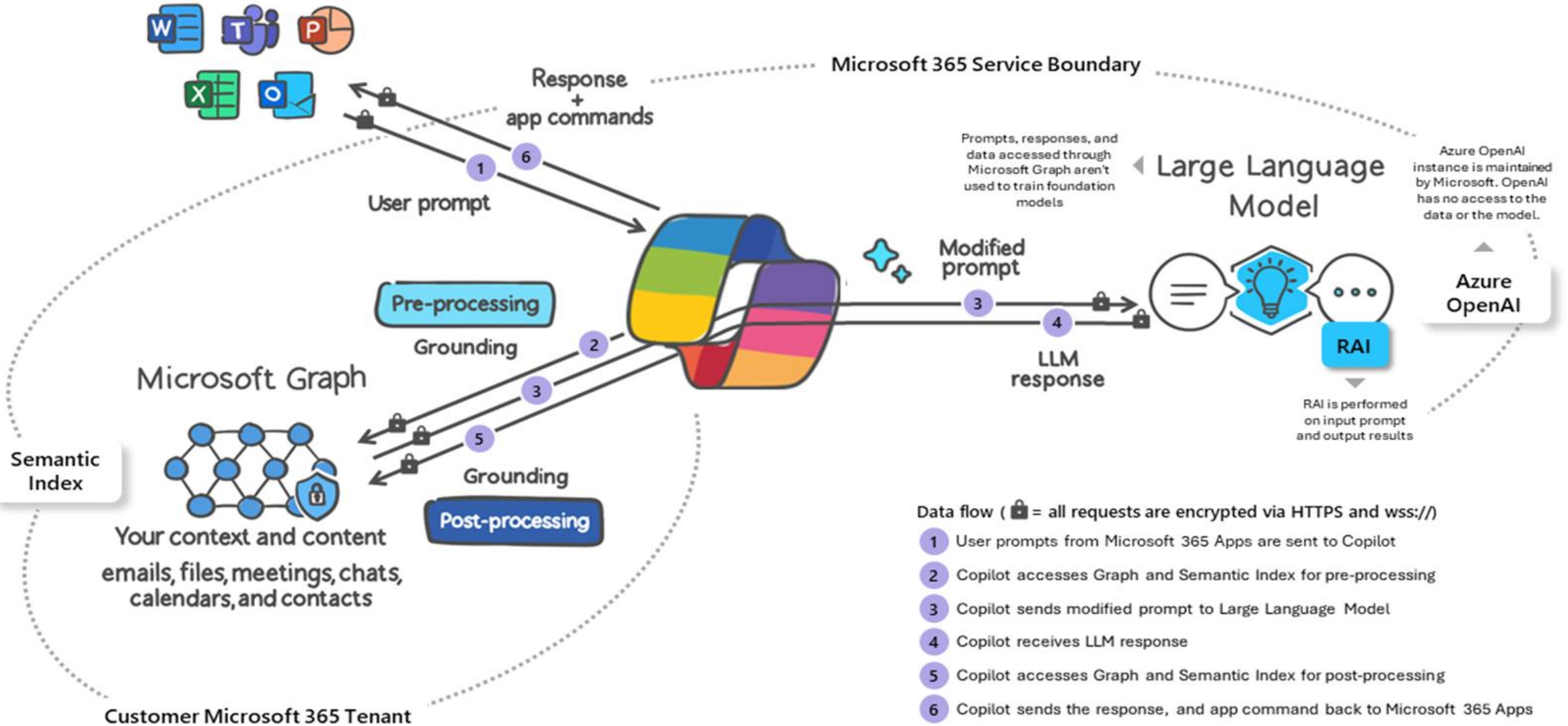
# Microsoft 365 Copilot Extensibility





Microsoft 365 Apps

# Microsoft 365 Copilot



Data flow (🔒 = all requests are encrypted via HTTPS and wss://)

- 1 User prompts from Microsoft 365 Apps are sent to Copilot
- 2 Copilot accesses Graph and Semantic Index for pre-processing
- 3 Copilot sends modified prompt to Large Language Model
- 4 Copilot receives LLM response
- 5 Copilot accesses Graph and Semantic Index for post-processing
- 6 Copilot sends the response, and app command back to Microsoft 365 Apps



# Extensibility





Microsoft  
365 Apps

**Skills**



Large  
Language  
Models

# Copilot for Microsoft 365

**Knowledge**

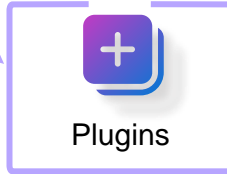


Microsoft Graph - Your Data -



The Internet

Real time interactions, including ChatGPT plugins

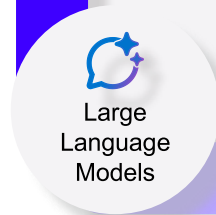


+



Microsoft 365 Apps

**Skills**



Copilot for Microsoft 365 Extensibility

Copilot for Microsoft 365

**Knowledge**



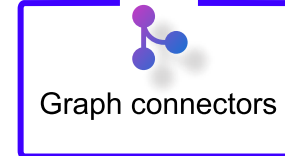
Microsoft Graph - Your Data -

+



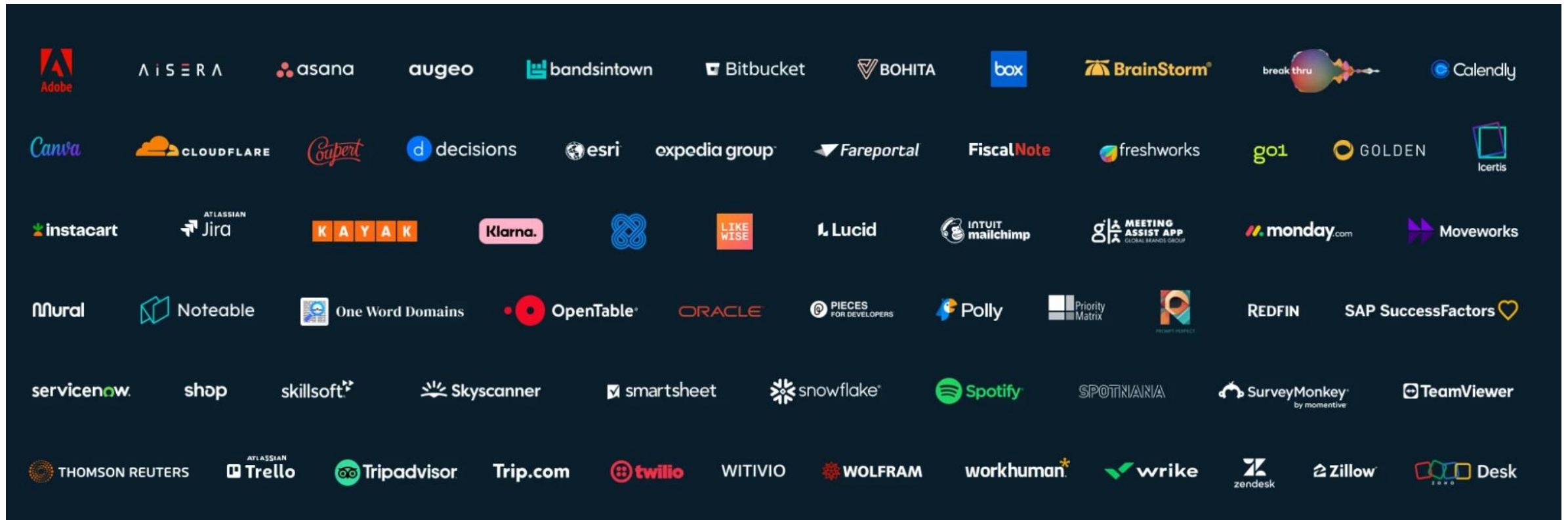
The Internet

+



Static Data Import

# Many plugins already available



# Unlimited possibilities!

Extend Microsoft Copilot



**Copilot**

Build your own copilot



Your copilot

Comprehensive developer toolchain

Microsoft Copilot  
Studio

Teams Toolkit  
for Visual Studio Code

Teams AI library

Azure AI  
Studio

# Thank You!

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## Q&A



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# softwareone