



AZURE OPENAI SERVICES

Codex – GitHub Copilot



The DevEx difference.

Faster Time to Revenue

Grow revenue by improving DevEx.

- Shorter time to market
- Increased profitability

Improved Operational Efficiency

Drive business performance through increased:

- Productivity
- Efficiency
- Product quality

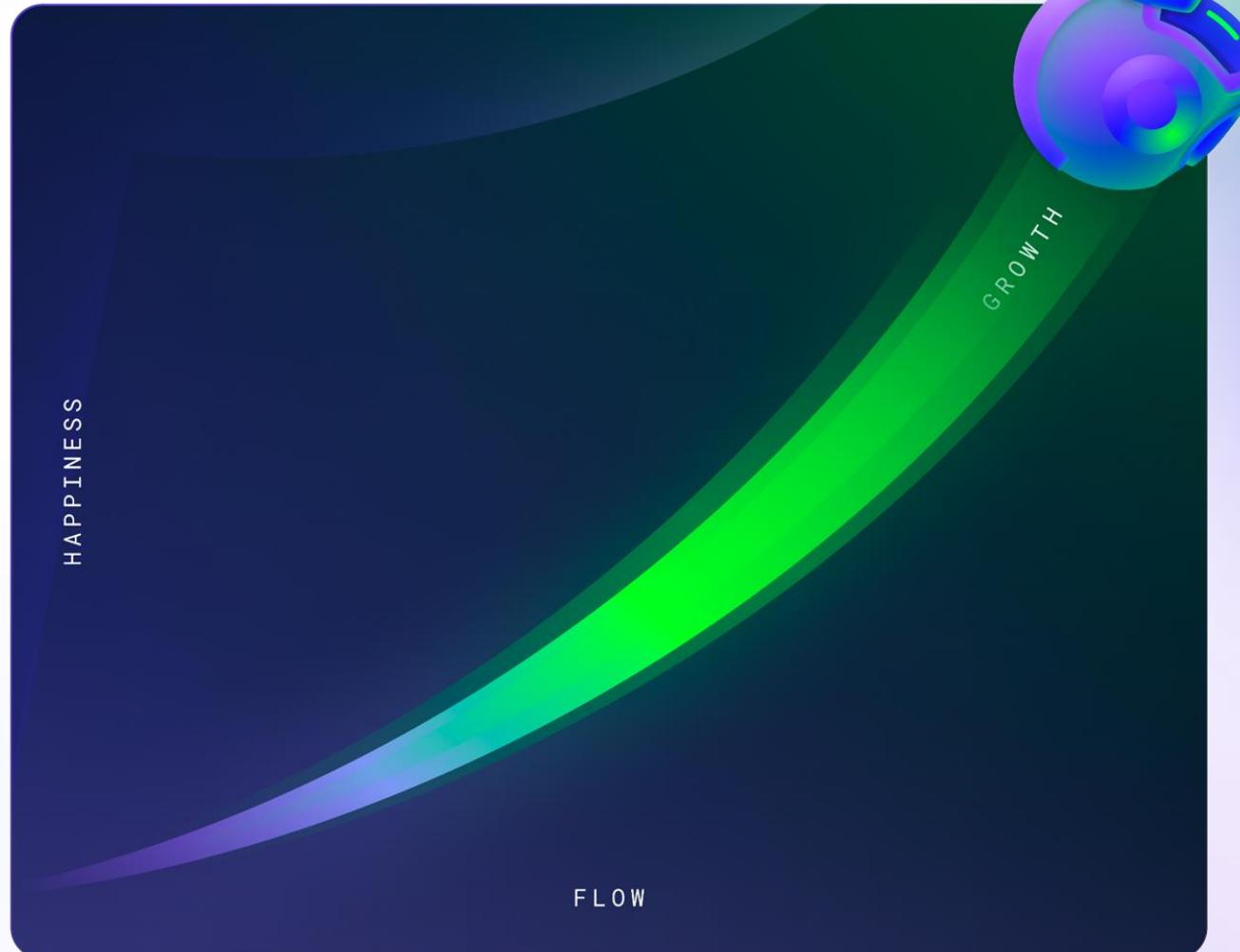
Higher Talent Retention

Attract and retain top engineering talent.

- High team morale
- Motivating and rewarding work

AI is the next frontier in DevEx.

A McKinsey study found that equipping developers to be their most productive also significantly improves the developer experience, and developers using generative AI-based tools were more than twice as likely to report overall happiness, fulfillment, and a state of flow.





The Copilot effect.

The world's most widely adopted AI developer tool.

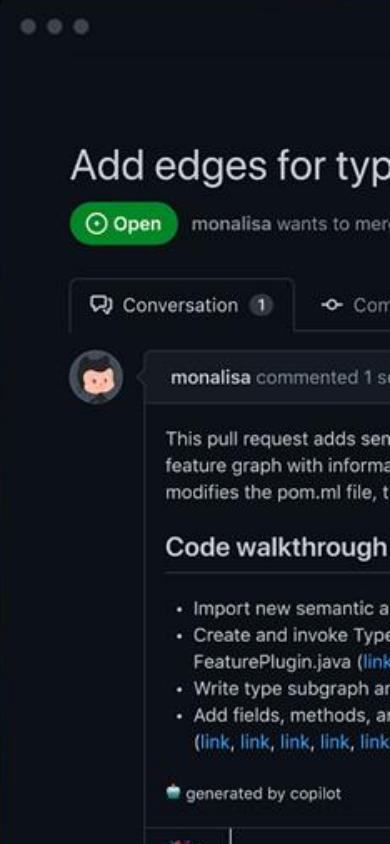
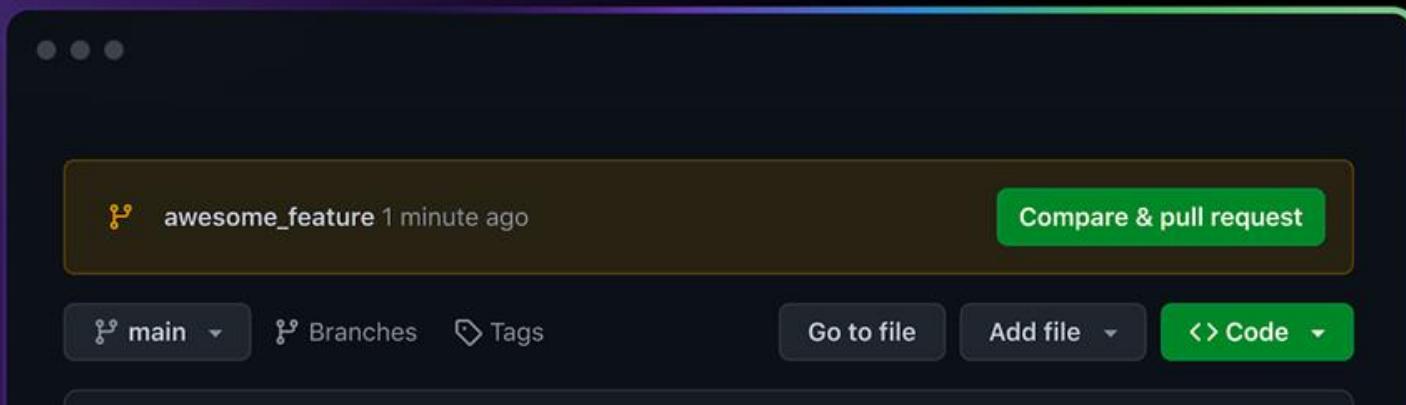
Maximize developer happiness

Increase developer productivity

Accelerate software development

Proven AI that accelerates
workflows and your software
development agility.

 .eslintignore	improve getting started docs	6 days ago
 .gitignore	improve getting started docs	6 days ago
 .npmrc	improve getting started docs	6 days ago
 jest.config.js	improve getting started docs	6 days ago
 package.json	update nodegit	3 days ago



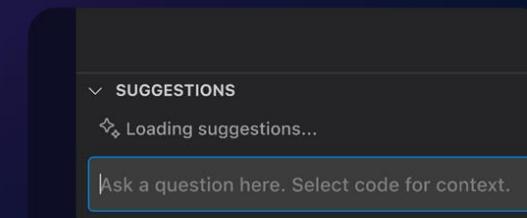
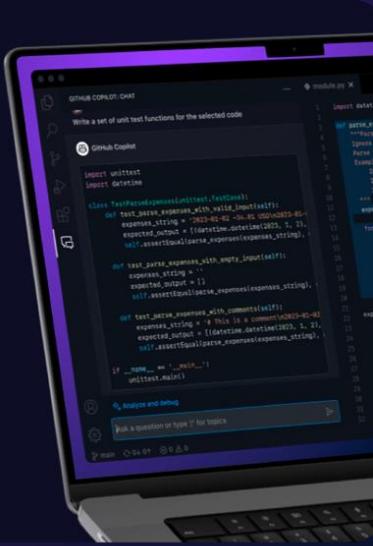
1st overall pick among developers.



75% of
developers want
to try it next
year

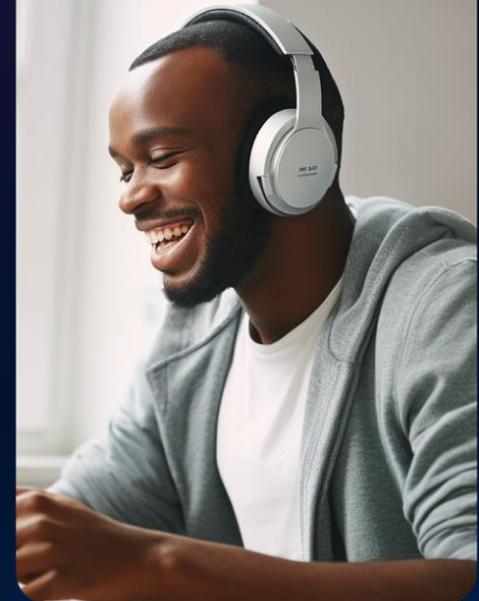


55% of developers
using AI coding
tools choose
GitHub Copilot



Copilot enables
faster coding
by 55%

75% of
developers are
more fulfilled



More than
1.5M developers

Pioneer in enterprise adoption of AI.

Over 1 in 5 Fortune 500 companies use Copilot
(<1 yr since launch)



37,000+ businesses building software with Copilot

A screenshot of a code editor interface. The code shown is a Python script with several test cases for a function named 'parse_expenses'. The code includes comments, assertions, and a main function call. The interface includes standard code editor elements like line numbers, a status bar at the bottom, and a search bar.

Software is hard



Technical debt

Burden imposed to manage application code continues to accumulate



Knowledge management gaps

Existing codebases not as well understood



App and data silos

Complex system integrations that are difficult to dissect



Benefits of AI in software development



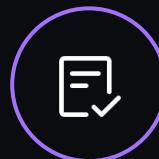
Reduce monotonous tasks

Project scaffolding, unit testing, code duplication



Employ idiomatic techniques

Write idiomatic code from the outset



Understand existing code

Gain a better understanding of existing codebases and documentation



What value does it represent?

Proof Points

More than 2,000 developers surveyed

We recruited
 **95**
developers, and split them randomly into two groups.

We gave them the task of writing a web server in JavaScript

 **45 Used**

GitHub Copilot

 **78%**

finished

 **1 hour, 11 minutes**

average to complete the task



 **50 Did not use**

GitHub Copilot

 **70%**

finished

 **2 hours, 41 minutes**

average to complete the task



Results are statistically significant ($P=.0017$) and the 95% confidence interval is [21%, 89%]



Developer productivity with Copilot goes beyond speed.

87%

74%

73%

less mental effort on repetitive tasks

focus on more satisfying work

say they are more in the flow



Developer productivity with Copilot means developers focus on what matters most.



More time on

Designing

Brainstorming

Collaborating

Iterating

Planning



Less time on

Writing Tests, Repetitive Code, & Boilerplate

Debugging

Searching Documentation

Finding Vulnerabilities

Deciphering Existing Code

Correcting Syntax

Summarizing Changes and Comments

Learning Git Commands

DEVELOPER PRODUCTIVITY WITH COPILOT BENEFITS ENTERPRISES.



Release
cycle agility

55%

Faster completion



Developer
onboarding

57%

More upskilling



Developer
retention

41%

Less burnout

Developers are finding joy with Copilot

More in the flow

Less frustrated when coding

More fulfilled with my job

Focus on more satisfying work

Less mental effort on repetitive tasks

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

GitHub Copilot

John Skoubourdis
@scoubourdis

GitHub Copilot is like giving a programmer a super power 🤖

11:41 PM · Jun 2, 2022

1,579 Retweets 137 Quote Tweets 22.6K Likes

Alex MacCaw ✅
@maccaw

One of the best uses of GitHub CoPilot is autocompleting your tests.

At this point it's writing the majority of my tests.

5:55 PM · Oct 29, 2022

20 Retweets 3 Quote Tweets 307 Likes

swyx ✨
@swyx

By far the greatest benefit of using @Github Copilot so far is I now don't have to be forced to document my code.

I actively *want* to write great comments, because when I do, I get the dopamine hit of a good Copilot suggestion.

7:51 PM · Oct 12, 2022 from Puerto Vallarta, Jalisco

21 Retweets 3 Quote Tweets 338 Likes

@willman@xoxo.zone
@willmanduffy

You win this round Copilot

updateMyselfMutationVari
ame: 'Bob',
ame: 'Builder',

5:01 PM · Jun 14, 2022

50 Retweets 3 Quote Tweets 780 Likes

Danny Postma
@dannypostmaa

AI is doing 80% of my coding – the future looks brighter than ever! 😊

```
90 methods: () =>
91   async fetch () =>
92     // ...
93
94
95   this.test = await this.$axios.$get('/admin/analytics', {
96     params: {
97       startDate: this.date.start,
98       endDate: this.date.end
99     }
100   })
101   this.isLoading = false
102 }
```

0:17 493.5K views

4:37 PM · Dec 1, 2022

1,161 Retweets 187 Quote Tweets 9,969 Likes

JD Ross ✅
@justindross

Some of our engineers just told me they'd estimate 40% of the lines of code they produce are now written by the GitHub CoPilot AI

6:13 PM · Oct 19, 2022

386 Retweets 159 Quote Tweets 5,220 Likes



GitHub Enterprise

Mercado Libre frees developers' minds to focus on their mission with GitHub.

~50%

reduction in time
spent writing code
with GitHub Copilot

9,000+

developers using
Copilot

100,000

pull requests
merged per day



GitHub Enterprise

Itaú delivers software faster with GitHub Enterprise.

93%

speed increase in
time to commit code
with GitHub Actions

68%

increase in
deployment
speed

75%

increase in code
reuse

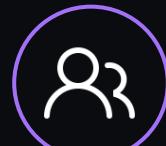
GitHub Copilot For Business

Business controls



Policy controls

At the Enterprise and Organization Level
No code snippets are used to train the model



Easy to assign users

Migration support built-in



Filtering public code matches

Allow or block suggestions for your business



GitHub Copilot

Your AI pair programmer

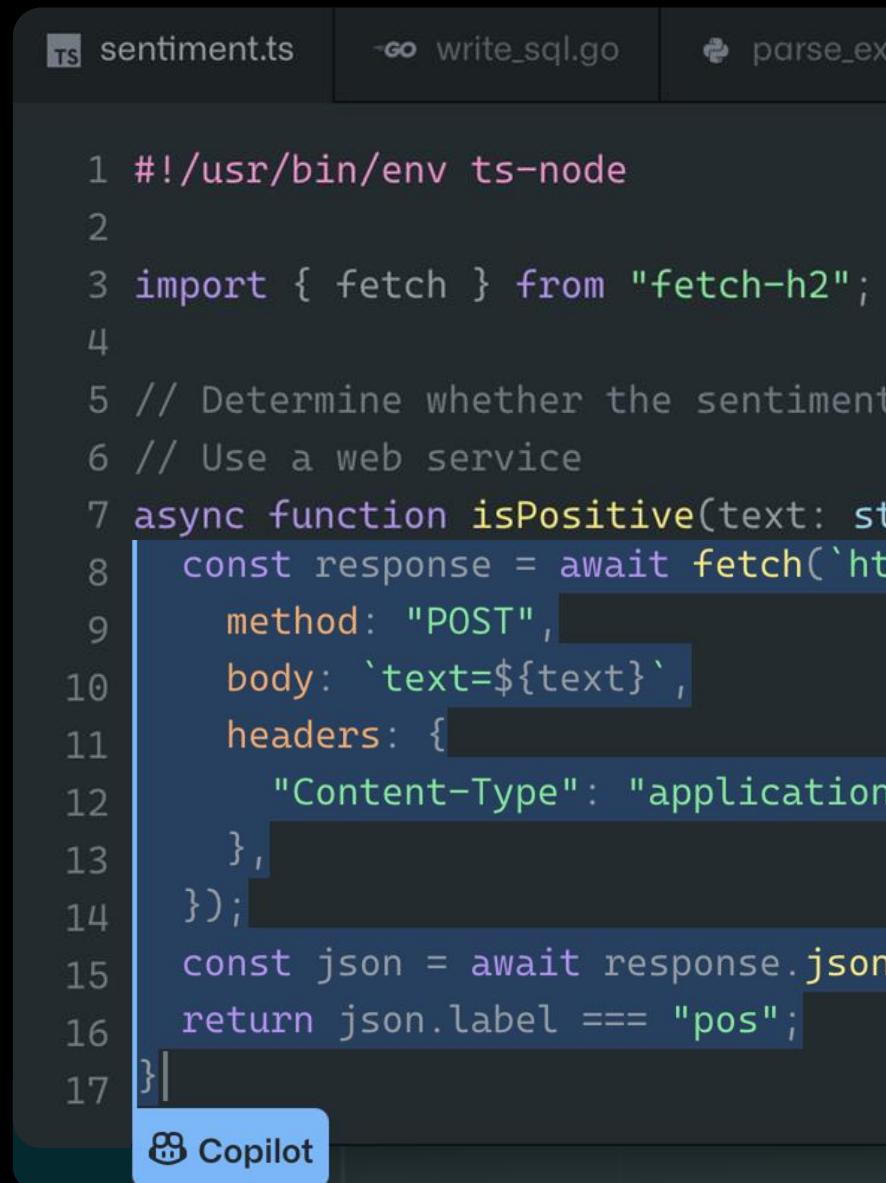
**Uses the context you've provided
and synthesizes code to match**

Convert comments to code

Autofill for repetitive code

Autosuggest tests

Show alternatives



A screenshot of a code editor interface showing GitHub Copilot in action. The editor has tabs for 'sentiment.ts' (selected), 'write_sql.go', and 'parse_ex...'. The code in 'sentiment.ts' is:

```
1 #!/usr/bin/env ts-node
2
3 import { fetch } from "fetch-h2";
4
5 // Determine whether the sentiment
6 // Use a web service
7 async function isPositive(text: string): boolean {
8     const response = await fetch(`https://api.sentiment.com/v1/sentiment?text=${text}`);
9     const json = await response.json();
10    return json.label === "pos";
11}
12
13
14
15
16
17}
```

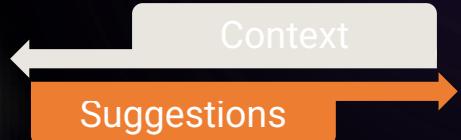
The cursor is at the end of the line 'return json.label === "pos";'. A blue callout bubble labeled 'Copilot' is positioned at the bottom right of the code area.



Once enabled...



OpenAI GPT-3.5
Turbo
Derivative



A screenshot of a code editor interface. At the top, there are tabs for "runtime.go", "course.rb", "time.js", and "IsPrimeTest.java". The main area displays the following Go code:

```
1 package main
2
3 type Run struct {
4     Time int // in milliseconds
5     Results string
6     Failed bool
7 }
```

The code editor interface includes line numbers on the left side of the code area.



Visual Studio



Neovim



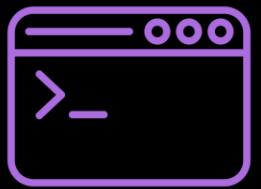
VS Code



JetBrains IDEs



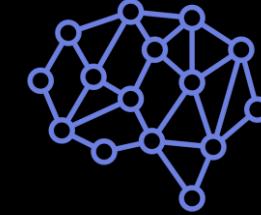
Toxicity
Code classifier



CODE EDITOR



PROXY



MODEL

PII
Toxicity
Code classifier
Code quality
Duplicate detection



Pillars for the vision

Ubiquitous across every tool developers use and integrated into every task that developers perform. Offering suggestions wherever you write and providing insights wherever you read. All with a radically-usable experience.

Conversational by default, so natural language can be used to achieve anything. Offering an informal and iterative interface that empowers developers to create more fluidly by thinking out loud and then reacting to emergent insights.

Personalized to the context and knowledge of the individual, project, team, organization, and community. Offering a "second brain" to developers, which understands your intent, history, and helps translate information into meaning (code, docs, etc.)

Safe, Trustworthy, and Reliable so our customers can take a bet not only on the technology and product but on GitHub as a partner and a contributor to responsible AI practices and goals.

GITHUB COPILOT CHAT

Chat experience in the IDE

ChatGPT-like experience in editor

- Generic questions
- Generate unit tests
- Explain the code
- Propose a fix for bug
- Make code robust / secure

Support VS Code and Visual Studio

Voice-to-code with GitHub Copilot Voice

The screenshot shows the GitHub Copilot interface integrated into a code editor. On the left, there's a sidebar titled "GITHUB COPILOT" with various icons. The main area is a code editor with a Python file named "add_elements.py". The code defines a function "parse_expenses" that takes a string of expenses and returns a list of triples. A cursor is placed in the middle of the function body. Below the code editor, the "TERMINAL" tab is active, showing a command-line session where the code is run and a "ValueError" is caught. The status bar at the bottom provides details like the file path, line number, and character position.

```
def parse_expenses(expenses_string):  
    """Parse the list of expenses and return the list of triples  
    (date, value, currency).  
    Ignore lines starting with #.  
    Parse the date using datetime.  
    Example expenses_string:  
        2023-01-02 -34.01 USD  
        2023-01-03 2.59 DKK  
        2023-01-03 -2.72 EUR  
    """  
    expenses = []  
    for line in expenses_string.splitlines():  
        if line.startswith("#"):  
            continue  
        date, value, currency = line.split("#")  
        expenses.append((float(value),  
                        currency,  
                        datetime.datetime.strptime(date,  
                            "%Y-%m-%d")))  
    return expenses  
  
expenses_data = '''2023-01-02 -34.01 USD  
2023-01-03 2.59 DKK'''
```

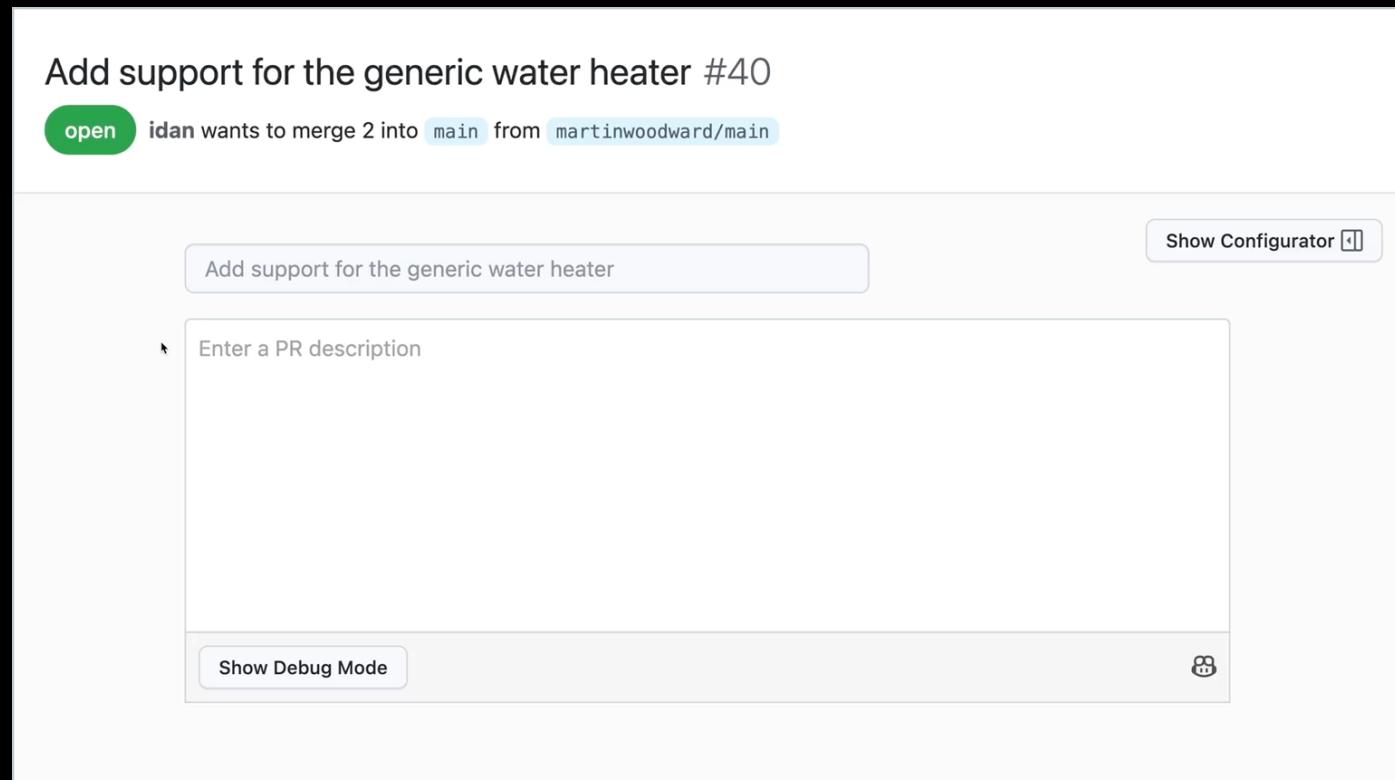
GITHUB COPILOT FOR PULL REQUESTS

the future of AI-powered software development

AI powered tags in Pull Requests

Automatically suggest sentences and paragraphs as developers type based on PR code changes

Automatically warn and suggest tests where needed



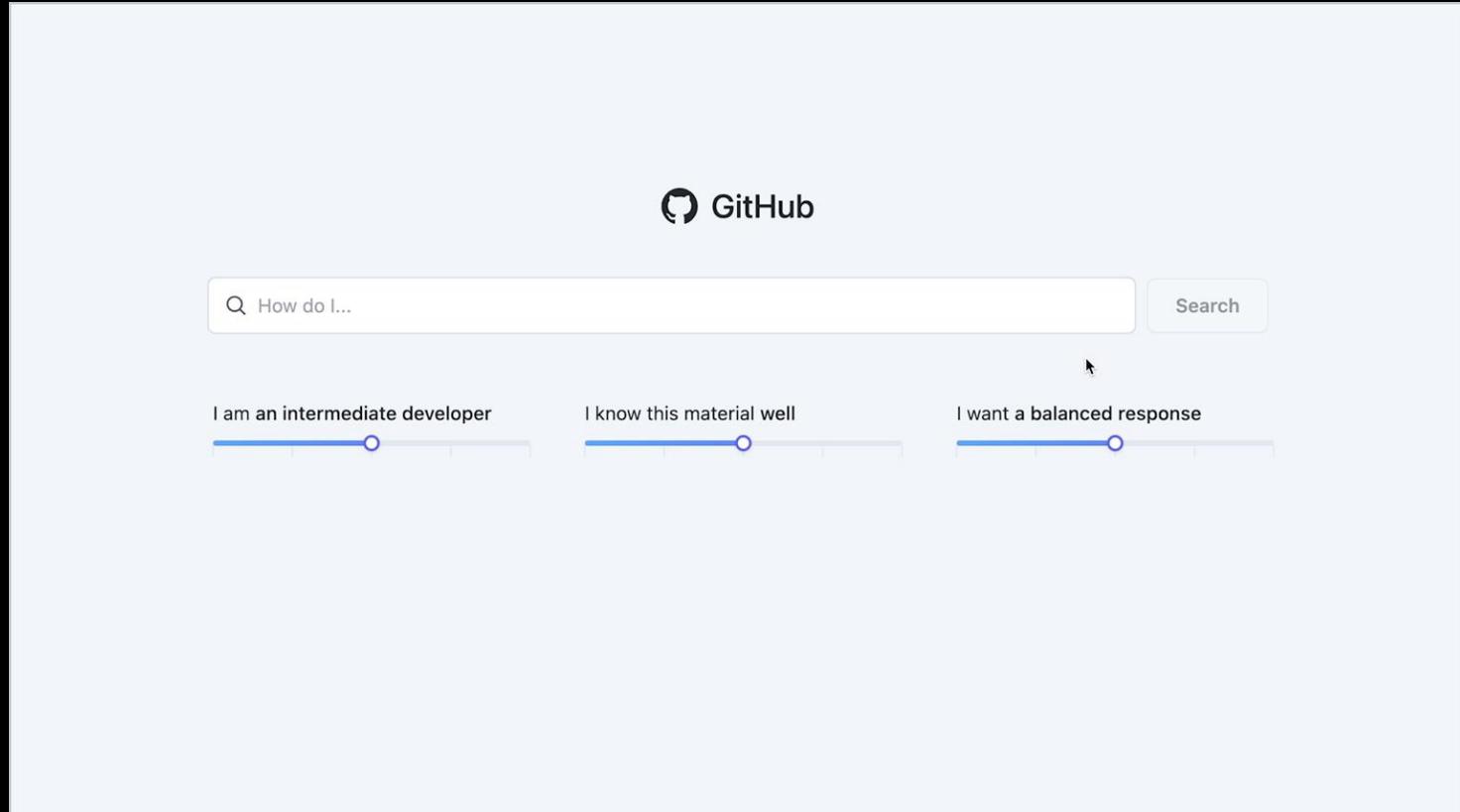
GITHUB COPILOT FOR DOCS

the future of AI-powered software development

AI-generated responses to questions
based on documentation

Starting with docs for:

- GitHub
- React
- Azure
- MDN
- In future, your in-house docs and codebases



GITHUB COPILOT FOR THE CLI

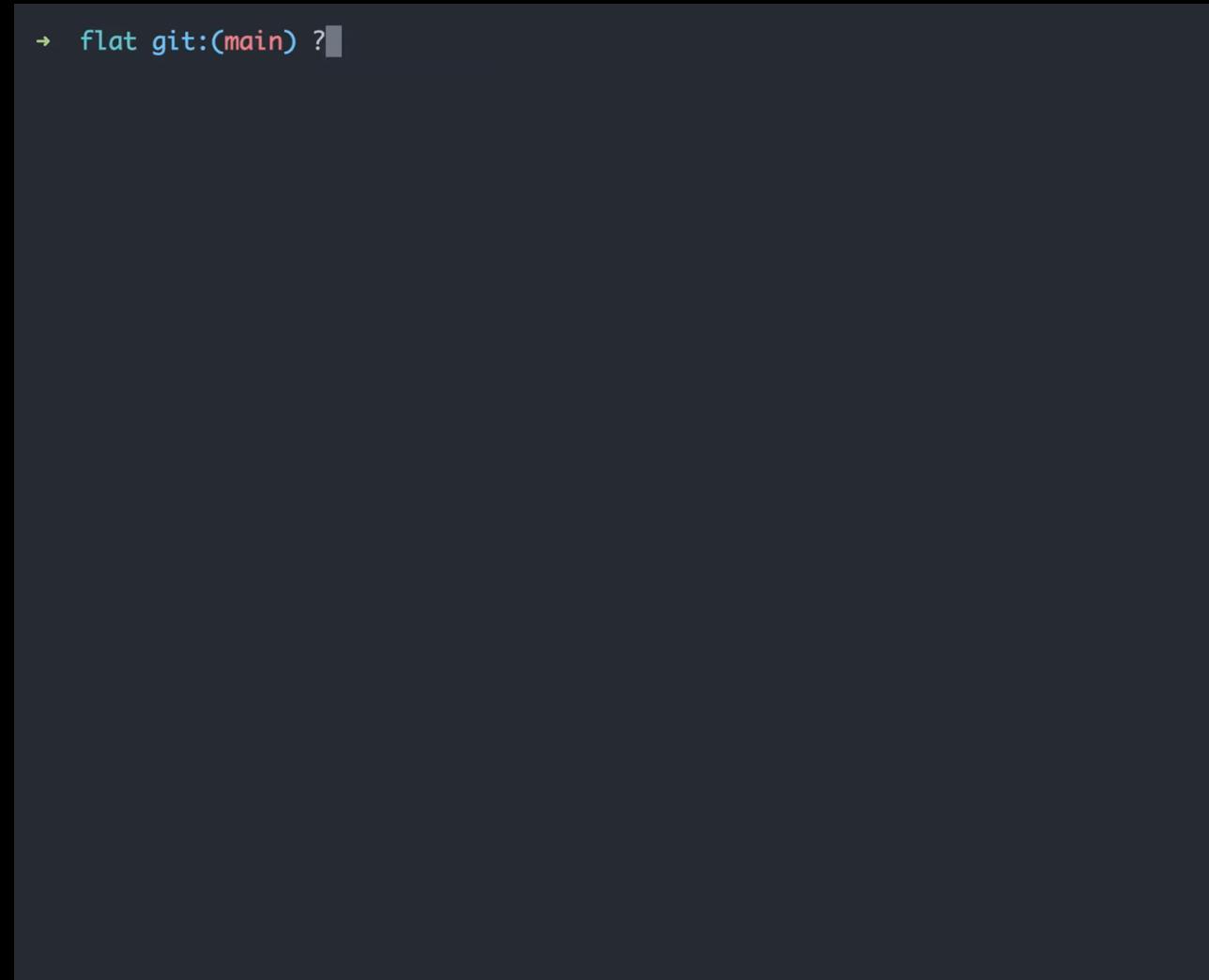
the power of Copilot in the terminal

Suggest CLI commands in the terminal window

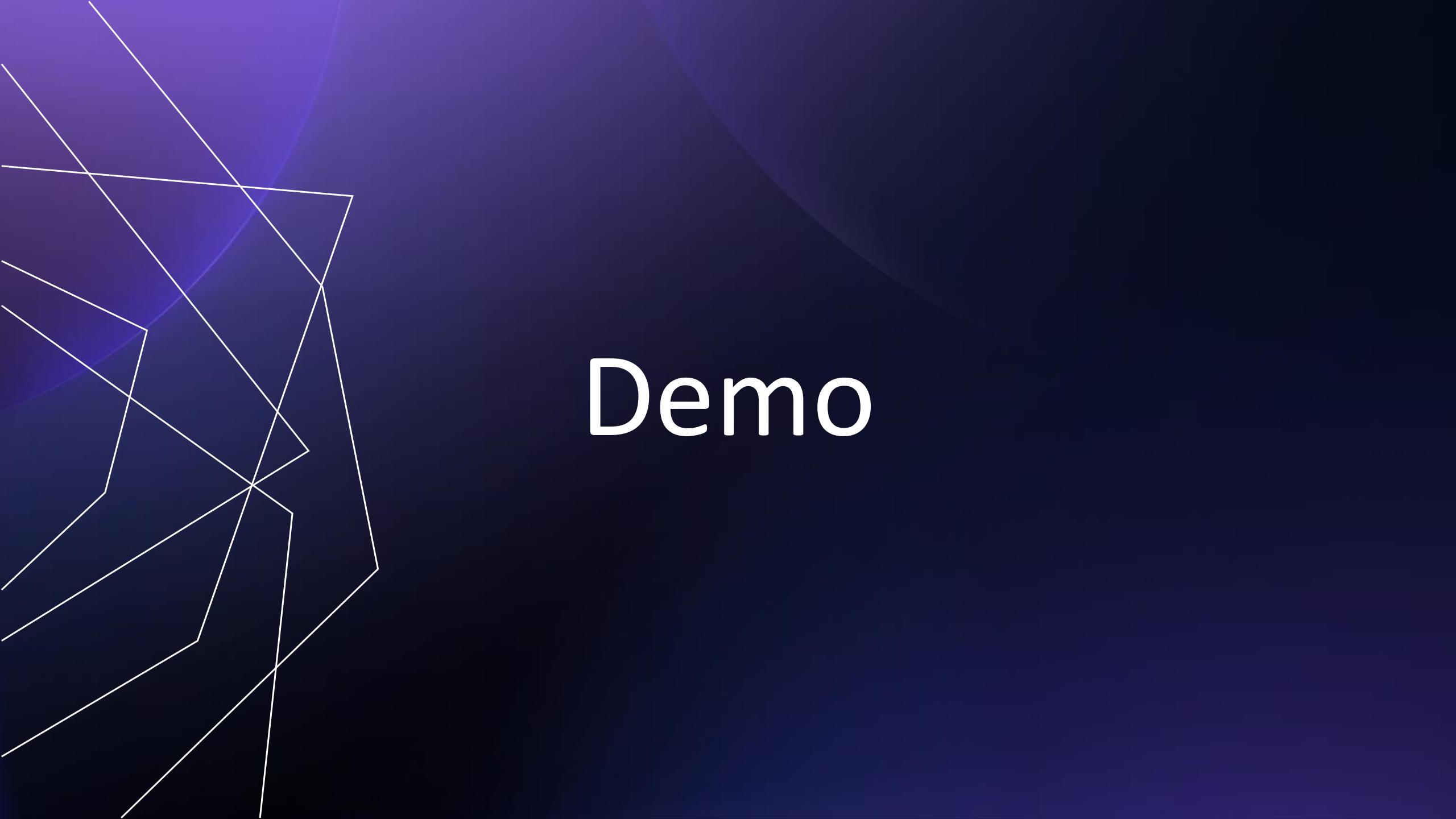
Three shell commands:

- ?? – General CLI
- git? – git specific CLI
- gh? – GitHub specific CLI

Revise & Execute



A screenshot of a terminal window with a dark background. The text "flat git:(main) ?" is displayed at the top, followed by a large, semi-transparent watermark-like image of the same text.



Demo



Get the
advantages of
AI today



Increase developer productivity

And satisfaction by focusing on real problems



Accelerate innovation

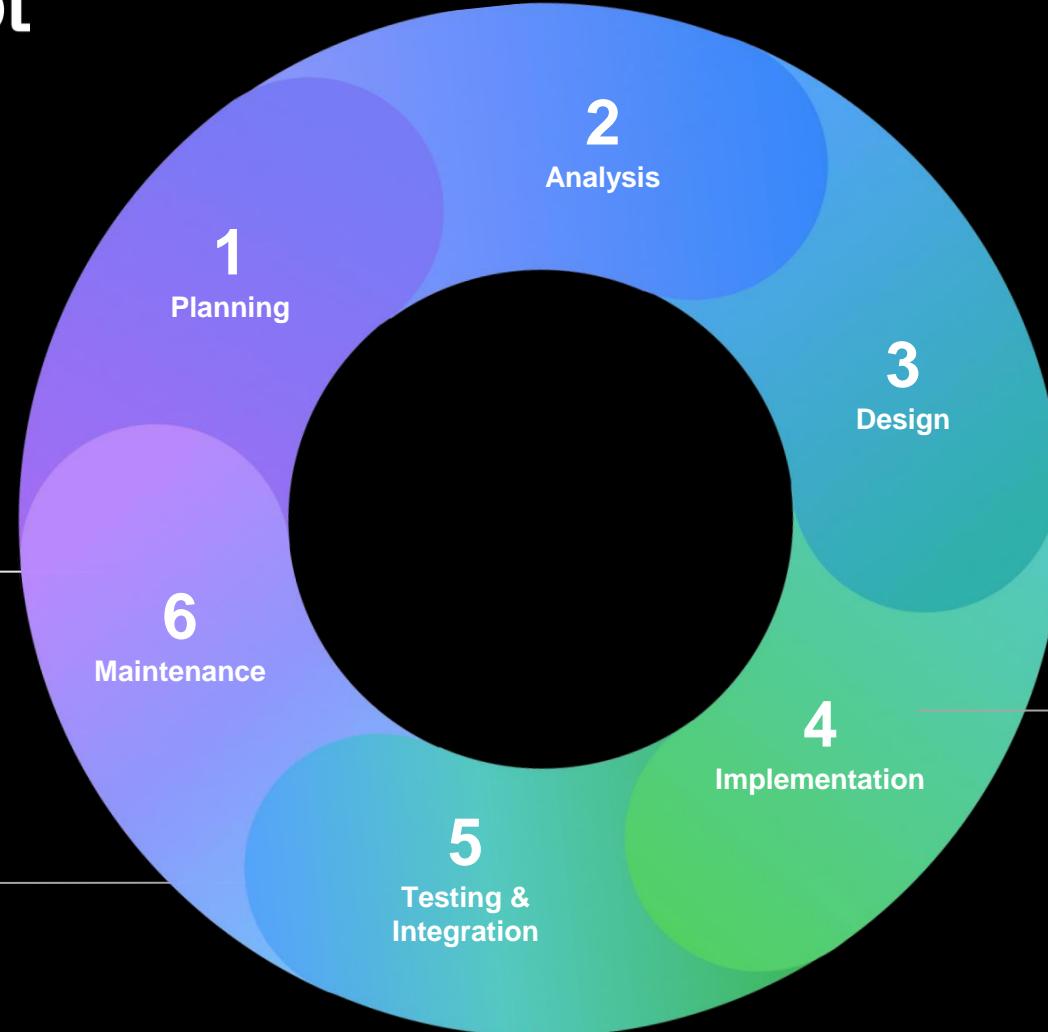
Prototype & innovate more rapidly



Bridge skill gaps

Learn new languages and techniques



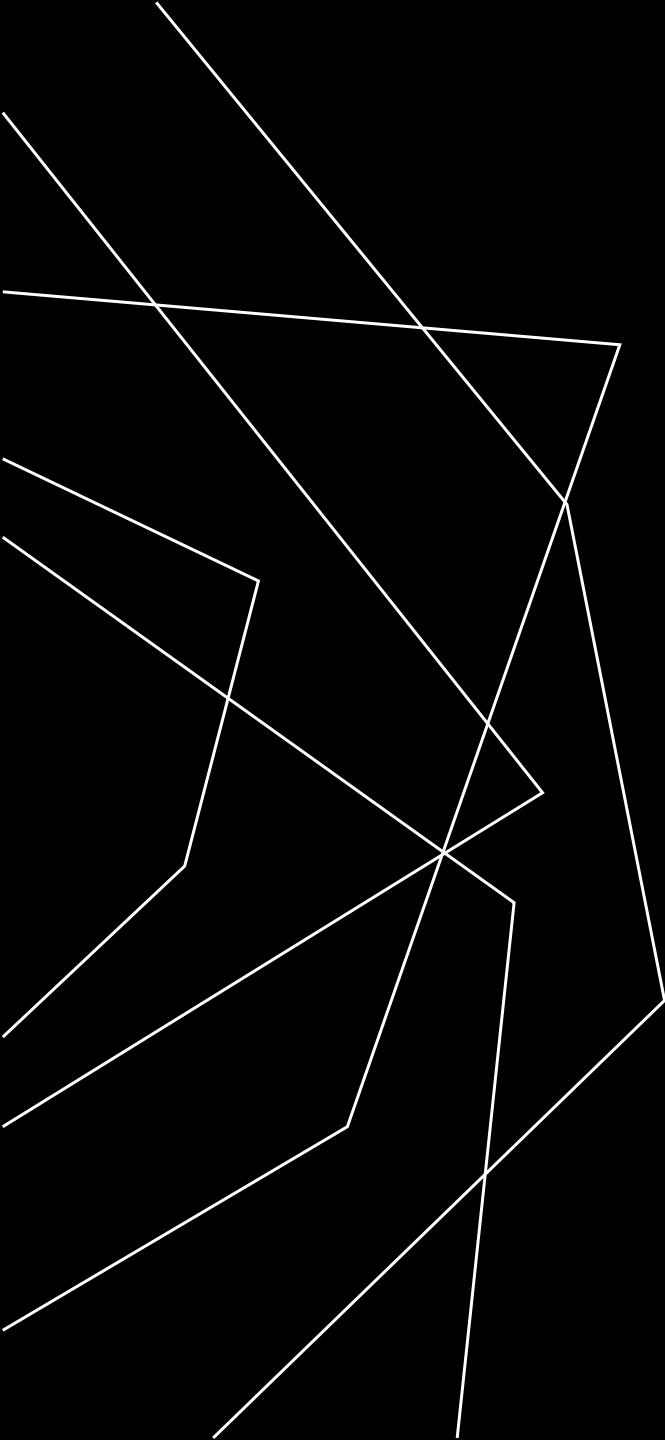


GitHub Copilot tomorrow
AI for Pull Request
Copilot for your Docs
Copilot Security

GitHub Copilot today
Convert comments to code
Autofill for repetitive code
Show alternatives

GitHub Copilot Chat
Unit testing
Finding code errors
Debugging
Code review
Refactoring code (code translate)
Reviewing code (code explain)
Documentation



An abstract geometric pattern is positioned on the left side of the image. It consists of several white lines forming a complex, overlapping shape. The lines create various angles and intersections, some forming small triangles or rectangles. The overall effect is a minimalist, modern graphic.

THANK YOU