

GitHub — 101

Copilot

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



71 minutes | that's 55% less time!



50 Did not use

GitHub Copilot



70%

finished



2 hours, 41 minutes

average to complete the task



161 minutes



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

GitHub Copilot

Your AI pair programmer

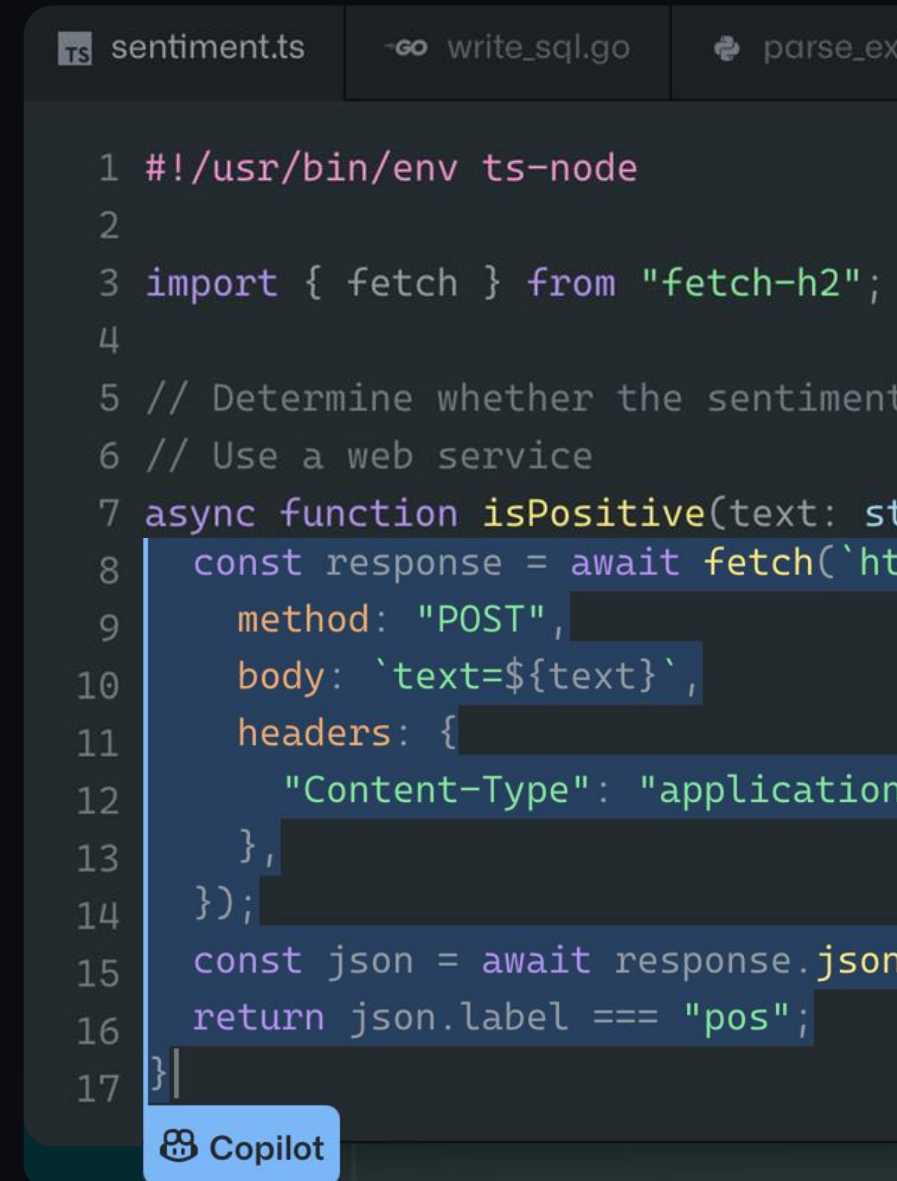
**Uses the context you've provided
and synthesizes code to match**

Convert comments to code

Autofill for repetitive code

Autosuggest tests

Show alternatives



```
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: st
8     const response = await fetch(`ht
9         method: "POST",
10        body: `text=${text}`,
11        headers: {
12            "Content-Type": "application
13        },
14    });
15    const json = await response.json
16    return json.label === "pos";
17 }
```



GitHub Copilot

Once enabled...



OpenAI GPT-3.5
Turbo
Derivative



Context

Suggestions



Visual Studio



Neovim



VS Code



JetBrains IDEs

runtime.go course.rb time.js IsPrimeTest.java

```
1 package main
2
3 type Run struct {
4     Time int // in milliseconds
5     Results string
6     Failed bool
7 }
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
```

The AI-Powered Developer Experience

@hubber



A limit does in fact exist

- Training data impacts suggestions
- GitHub Copilot != Compiler
- The AI can't read your mind



Prompt Engineering

- One thing at a time – **Single** responsibility

- The prompt is **specific**

- Expect **short** answers back





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

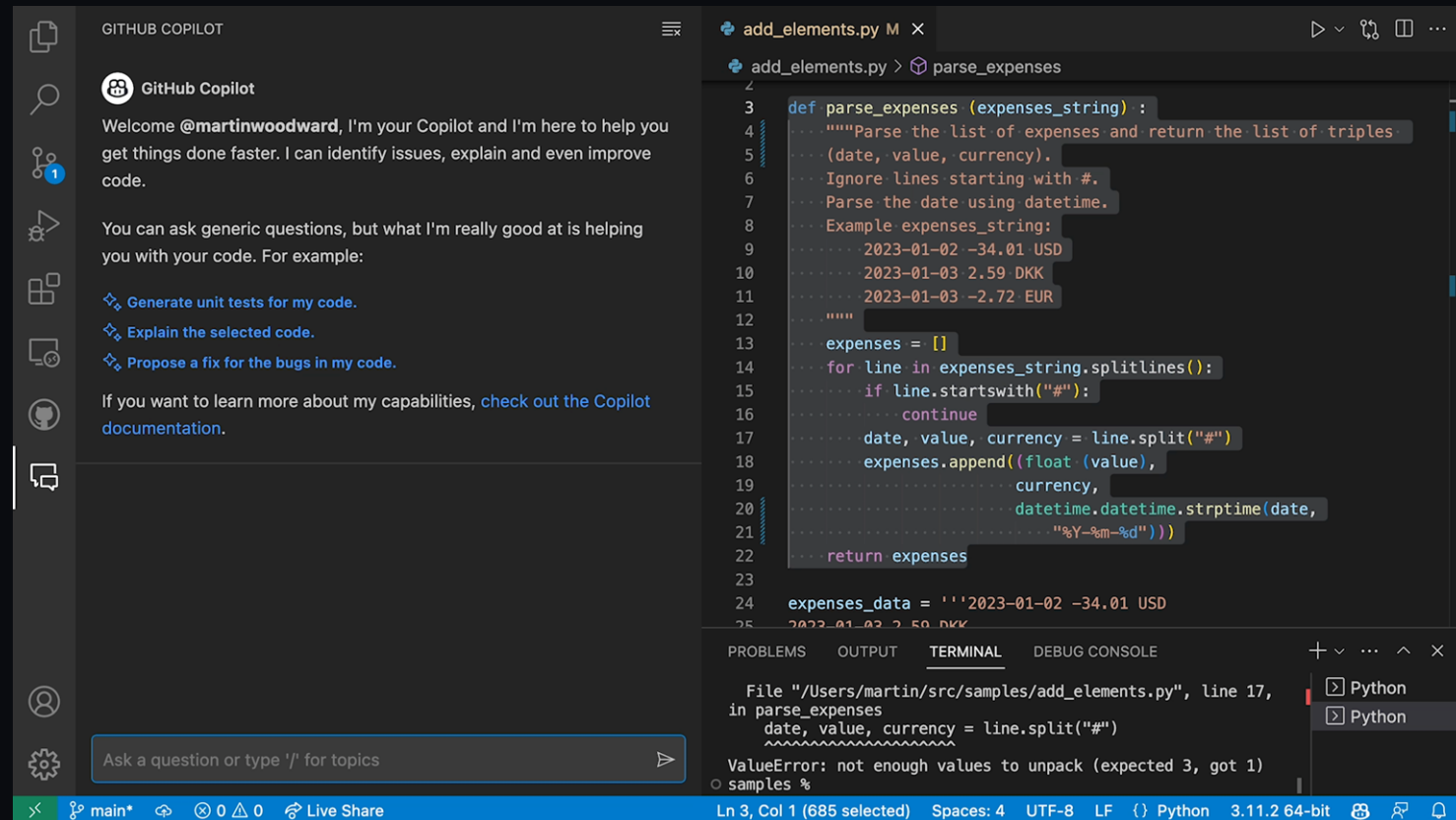
Chat experience in the IDE

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



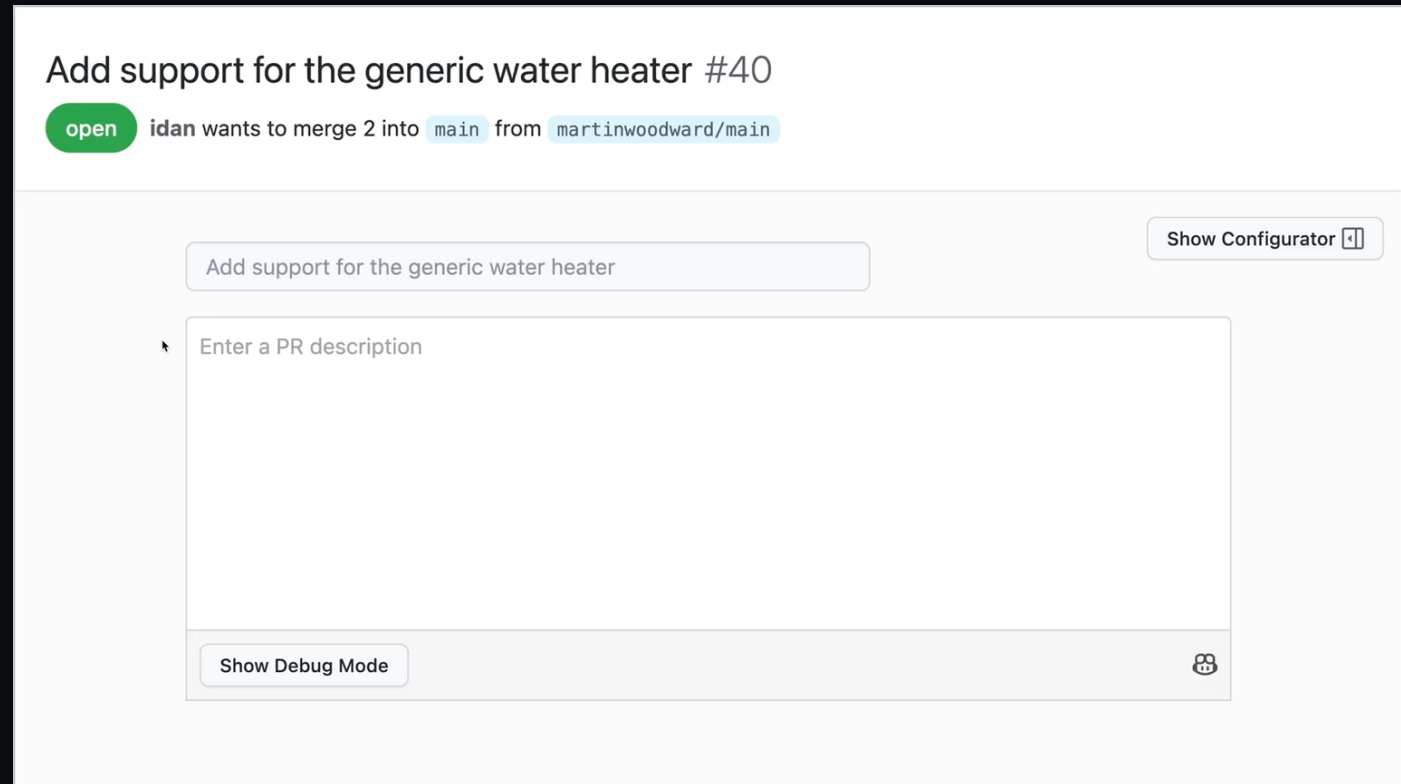
GitHub Copilot for Pull Requests

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



The screenshot shows the GitHub Copilot interface for a Pull Request. At the top, the title "Add support for the generic water heater #40" is displayed. Below the title, a green "open" button is followed by the text "idan wants to merge 2 into main from martinwoodward/main". The main area contains a text input field with the placeholder "Enter a PR description". Above this field is a button labeled "Add support for the generic water heater". To the right of the input field is a button labeled "Show Configurator" with a small icon. At the bottom left of the input field is a button labeled "Show Debug Mode". At the bottom right of the input field is a small icon of two people.

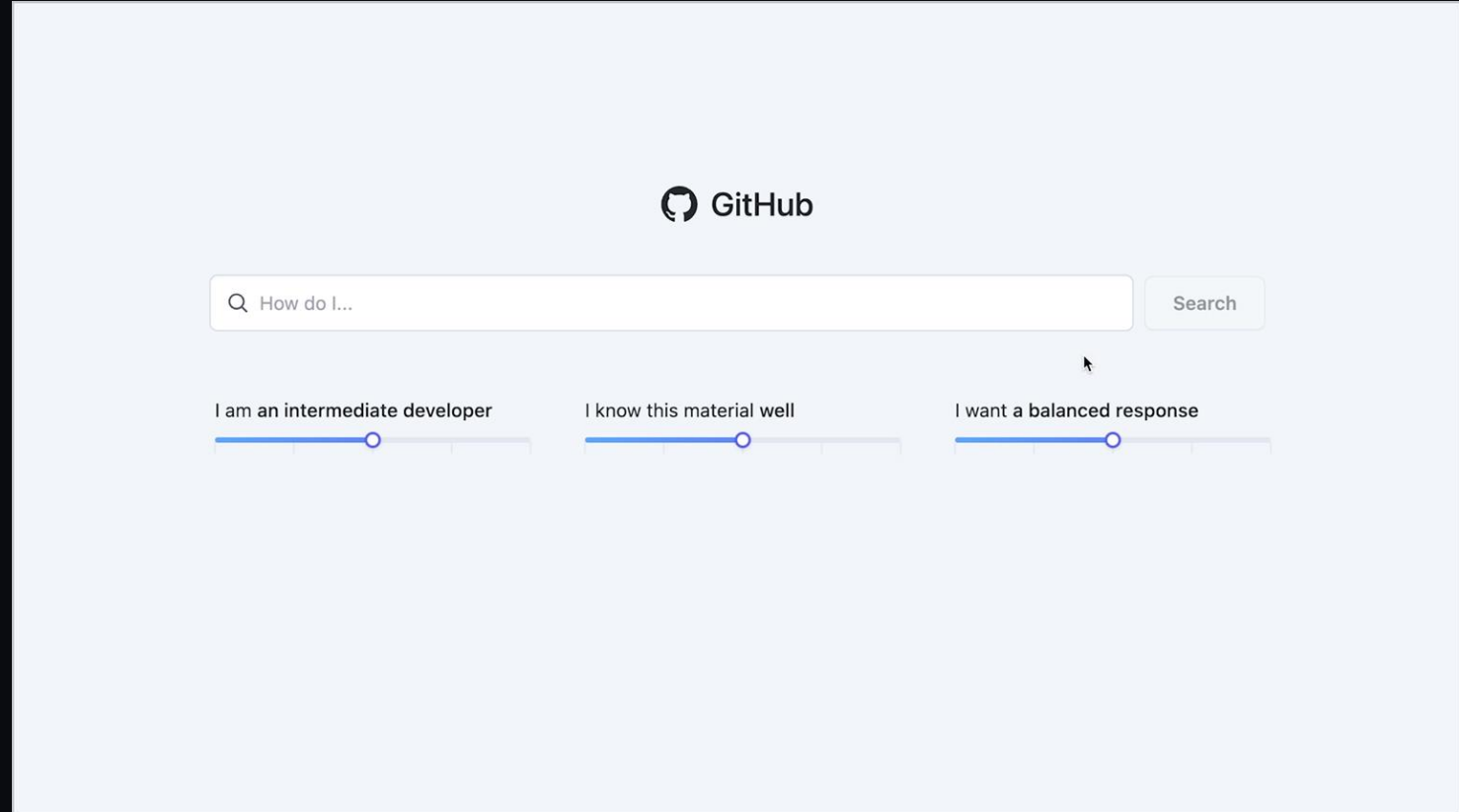
GitHub Copilot for Docs

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



The screenshot displays the GitHub Copilot for Docs interface. At the top center is the GitHub logo. Below it is a search bar with the placeholder text "Q. How do I..." and a "Search" button to its right. Underneath the search bar are three sliders for customizing the response:

- I am an intermediate developer**: A slider with a blue line and a white circle marker positioned at the 3rd tick mark out of 5.
- I know this material well**: A slider with a blue line and a white circle marker positioned at the 3rd tick mark out of 5.
- I want a balanced response**: A slider with a blue line and a white circle marker positioned at the 3rd tick mark out of 5.

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

```
→ flat git:(main) ?
```

