

APEX connect

by DOAG

GitHub Copilot: Erfahrungen aus einem Jahr AI-gestützter Software-Entwicklung

Mittwoch 03.05.2023 | 11:00 - 11:45 | Music Hall 3



Robert Marz
DATABEE
Die IT-Architekten



Robert Marz – Independent Consultant

Primary Role

Senior Technical Architect
with database centric view of the world

DOAG (German Oracle User Group)

Active Member of Database Community
Responsible for Cloud Topics



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GitHub Copilot: Intro



GitHub Copilot: Whats that?

GitHub Copilot

- is a cloud-based artificial intelligence tool developed by GitHub and OpenAI to assist users [...]by autocompleting code. [[Wikipedia](#)]

Your AI pair programmer

- GitHub Copilot uses the OpenAI Codex to suggest code and entire functions in real-time, right from your editor. [[GitHub](#)]





GitHub Copilot: History

June 29, 2021

- GitHub Copilot technical preview VS Code development environment.

October 29, 2021

- GitHub Copilot was released as a [plugin](#) on the JetBrains marketplace on.

May 27, 2022

- [@RobbieDabee](#) was accepted for technical trial

October 27, 2021

- GitHub released the GitHub Copilot Neovim plugin as a public repository.

March 29, 2022

- GitHub announced Copilot's availability for the Visual Studio 2022 IDE on.

June 21, 2022

- GitHub announced that Copilot was out of "technical preview", and is available as a subscription-based service for individual developers.



GitHub Copilot: Installation & Prerequisites

Supported Editors / IDEs:

- VS Code
- NeoVim
- Visual Studio
- JetBrains IDEs

Installation:

- Download the Plugin from the Marketplace

Prerequisite:

- IDE needs internet connection
- Github Copilot Hosts must be whitelisted on firewall
- GitHub Account
- GitHub Copilot Subscription





GitHub Copilot: Invocation

How to invoke

Just type - works like normal autocomplete

Press Ctrl-<Enter>

Use Context Menu

Invoke Copilot Labs





GitHub Copilot: Demo



GitHub Copilot: Usecases





Usecase: Auto Complete

Copilot continuously reads your Input

suggestions:

next line

Algorithms /
Functions
(from comments)





Usecase: Learn a new Language

Suggestions

- are syntactically correct

Code snippets

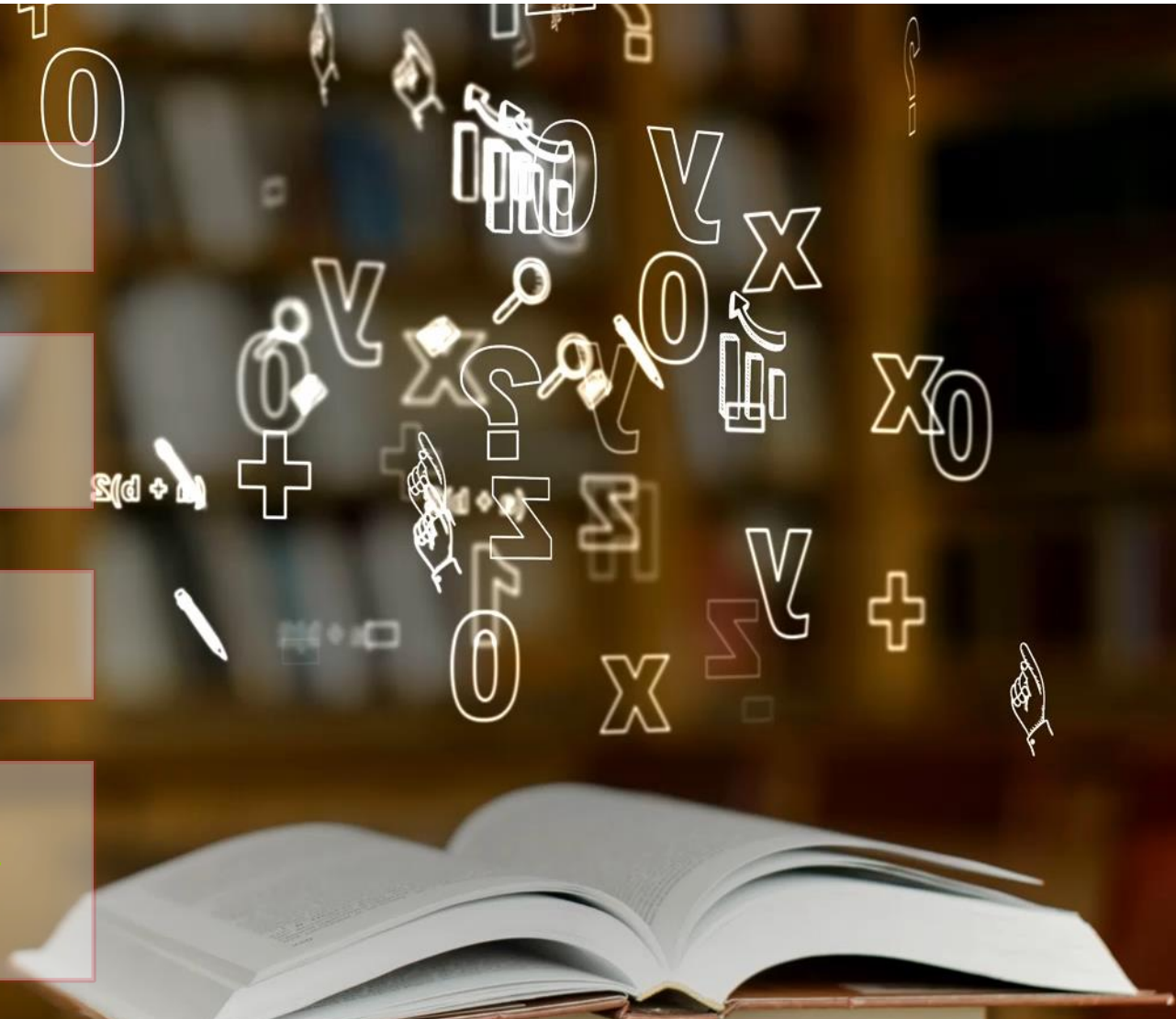
- are in style
- e.g., „Pythonic“

Examples

- Explains how code works

Copilot 4 Docs

- <https://githubnext.com/projects/copilot-for-docs/>
- Preview with waitlist





Usecase: Write Unittests

```
27
28
29 def test_get_co
30
60
61 ...
62 | I
63 ...
```



Usecase: Write Unittests (Preview in Copilot Labs)

GITHUB COPILOT LABS: TEST GENERATION

```
function plural(word, num) {
  var i
  , rule

  if (num !== 1 || num === undefined) {
    for (i = 0; i < rules.length; i++) {
      rule = rules[i]

      if (type(rule[0]) === 'RegExp' && rule[0].test(word)) {
        return type(rule[1]) === 'Function' ? rule[1](word, num) : rule[1]
      }
      if (type(rule[0]) === 'String' && rule[0] === word) {
        return type(rule[1]) === 'Function' ? rule[1](word, num) : rule[1]
      }
    }
  }
}
```

Suggest a new test

```
describe('test plural', function() {
  it('test plural.plural', function(done) {
    assert.equal(plural('zebra', 1), 'zebra');
    assert.equal(plural('zebra', 2), 'zebras');
    assert.equal(plural('zebra'), 'zebras');
    assert.equal(plural('stop'), 'stoppes');
  });
});
```

JS index.js

```
JS index.js > plural
71
72 function plural(word, num)
73   var i
74   , rule
75
76   if (num !== 1 || num ===
77     for (i = 0; i < rules.l
78     rule = rules[i]
79
80     if (type(rule[0]) ===
81     return type(rule[1]
82   }
83   if (type(rule[0]) ===
84   return type(rule[1]
85   }
86
87 }
88
89 return word + 's'
```

Test Pilot

0egerikuss-MacBook-Pro:plural
oegerikus\$

Ln 72, Col 1 Spaces: 2 UTF-8 LF {} JavaScript



Usecase: Explain Code (Preview in Copilot Labs)

The screenshot shows a code editor with a TypeScript function and the Copilot Labs interface. The code is as follows:

```
TS function buildInvertedIndex(s: string): Untitled-1 •  
1 function buildInvertedIndex(s: string): { [key: string]:  
2   const words = s.split(/\W/);  
3   const index: { [key: string]: number[] } = {};  
4   for (let i = 0; i < words.length; i++) {  
5     const word = words[i];  
6     if (word) {  
7       if (index[word]) {  
8         index[word].push(i);  
9       } else {  
10        index[word] = [i];  
11      }  
12    }  
13  }  
14  return index;  
15 }  
16
```

The Copilot Labs panel on the right is titled "GITHUB COPILOT LABS" and has a sub-header "EXPLAIN". It features a dropdown menu with the text "Code does following (English)" and a button labeled "Ask Copilot". At the bottom of the panel, there is a section for "LANGUAGE TRANSLATION". The status bar at the bottom of the editor shows "Ln 16, Col 1", "Spaces: 2", "UTF-8", "LF", "TypeScript", "Insert", and "Prettier".



Usecase: Do my Job



Copilot knows nothing

- about your goals
- the environment
- the ecosystem
- the company rules
- the business rules

It's your code

→ your responsibility

You need to understand and review

- every generated line of code

Copilot generates

- Code
- Bugs
- Security Issues



GitHub Copilot: Demo

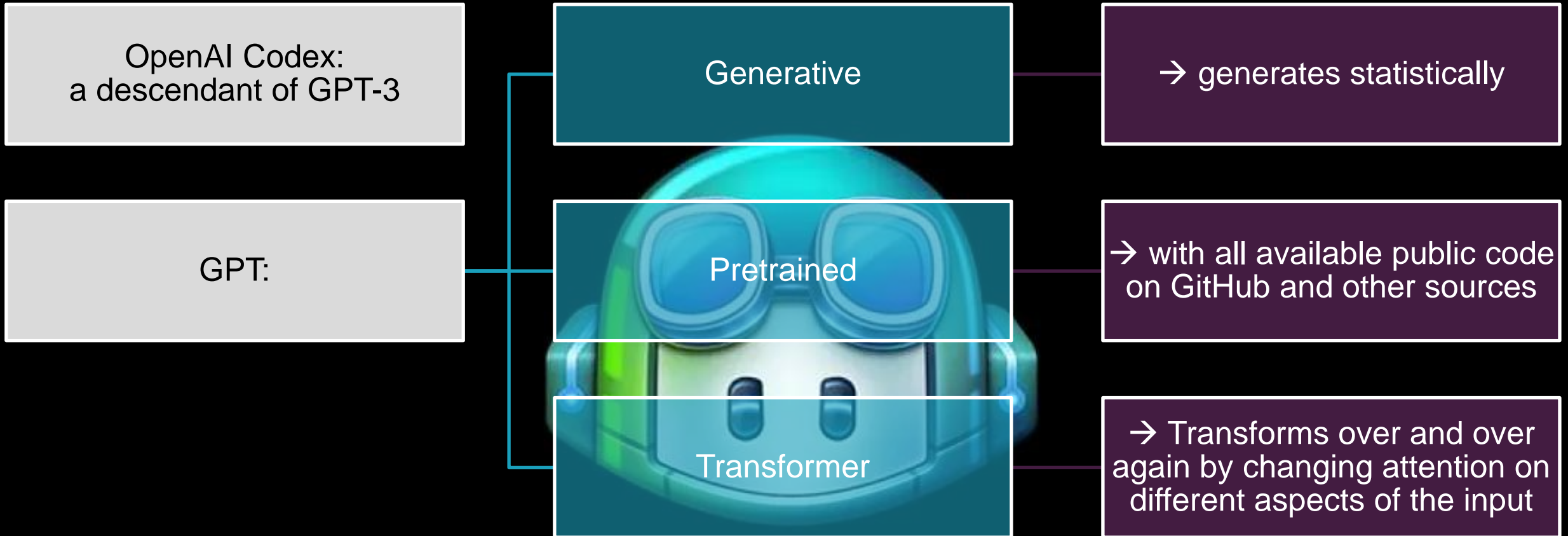




GitHub Copilot: How it works



GitHub Copilot – How it works I



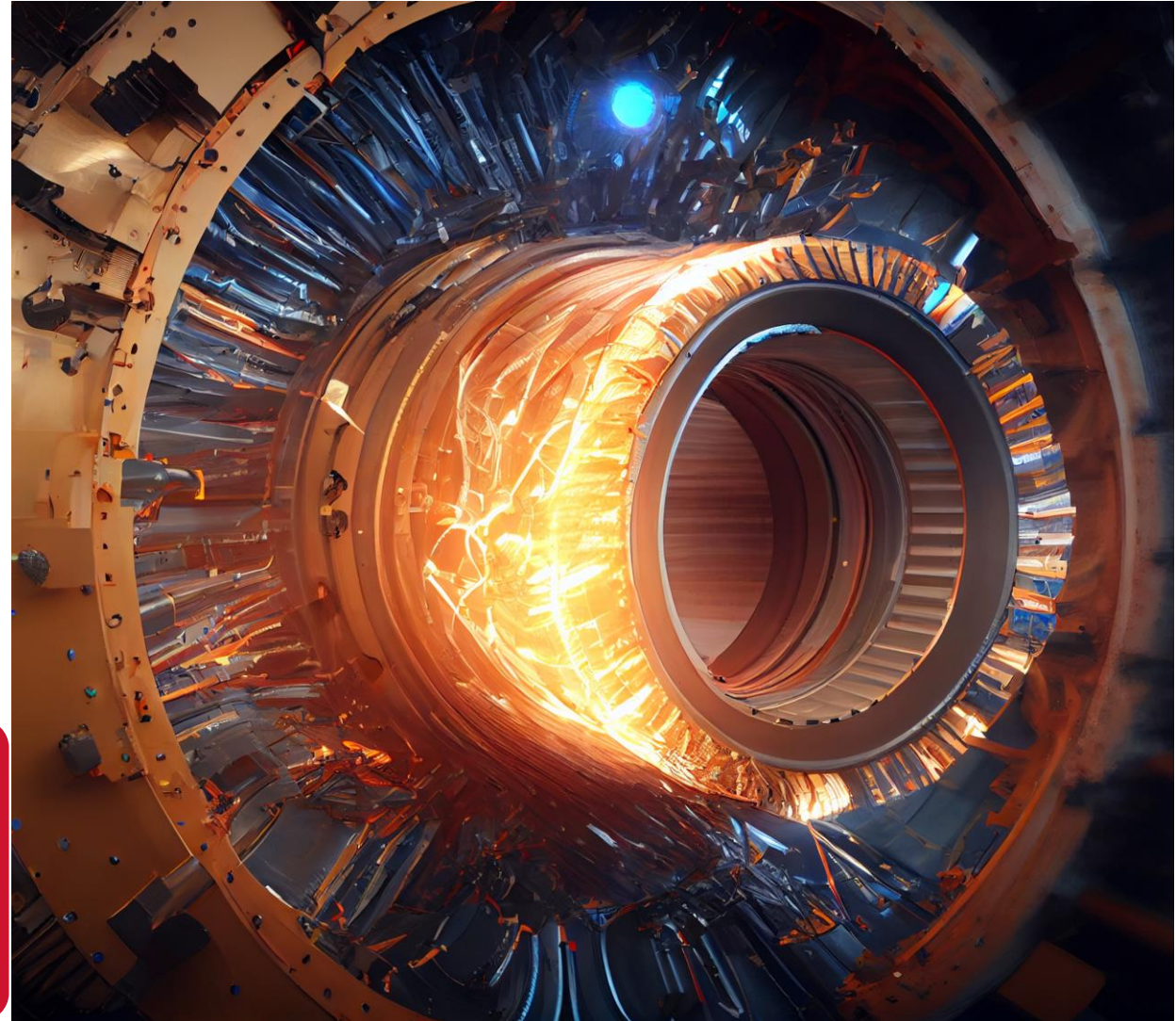


GitHub Copilot – How it works II

Copilot uploads
your prompt to
the cloud.

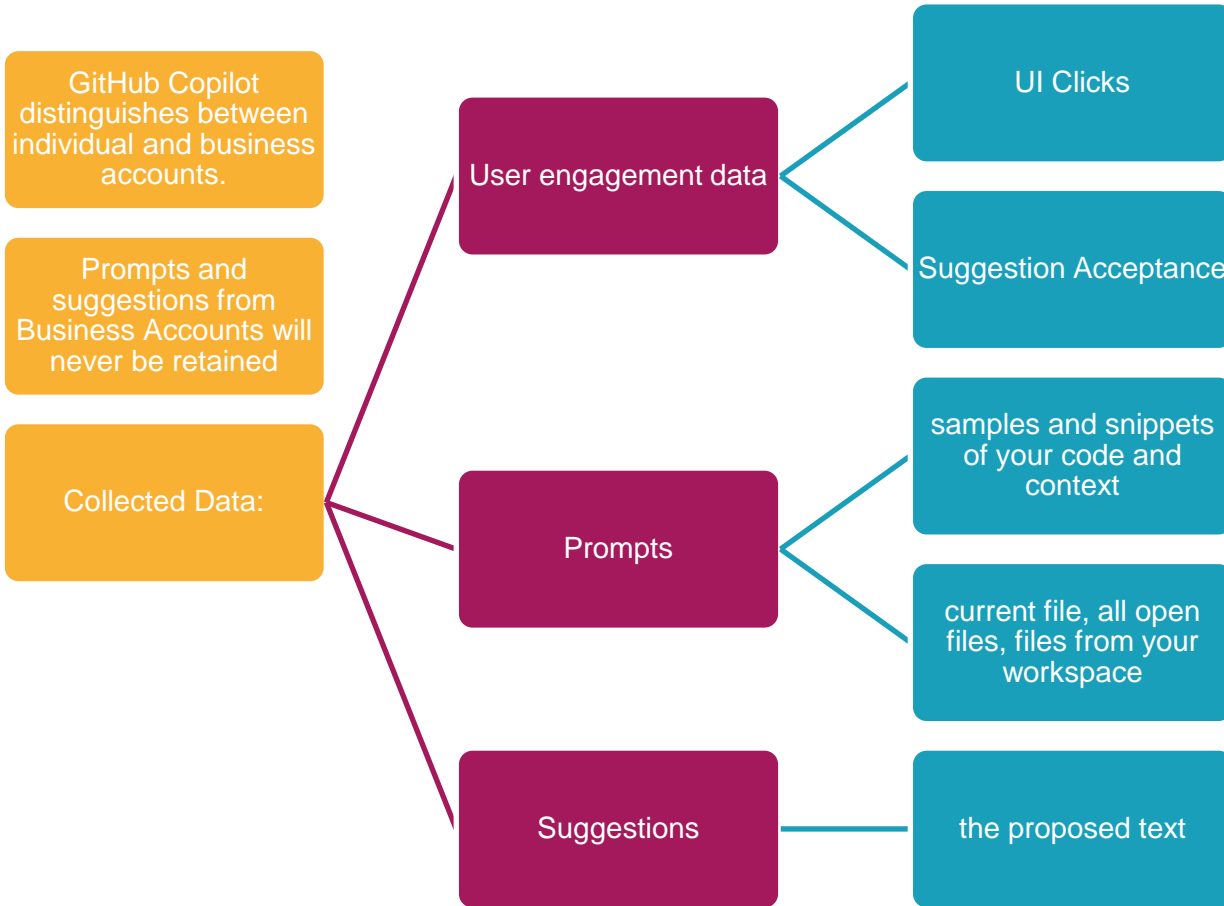
openAI Codex
does ist magic

Results are
displayed in your
editor





GitHub Copilot: Data privacy – collected data





GitHub Copilot: Copyright & License Issues



Copilot is trained with code available in public repos regardless of their license.



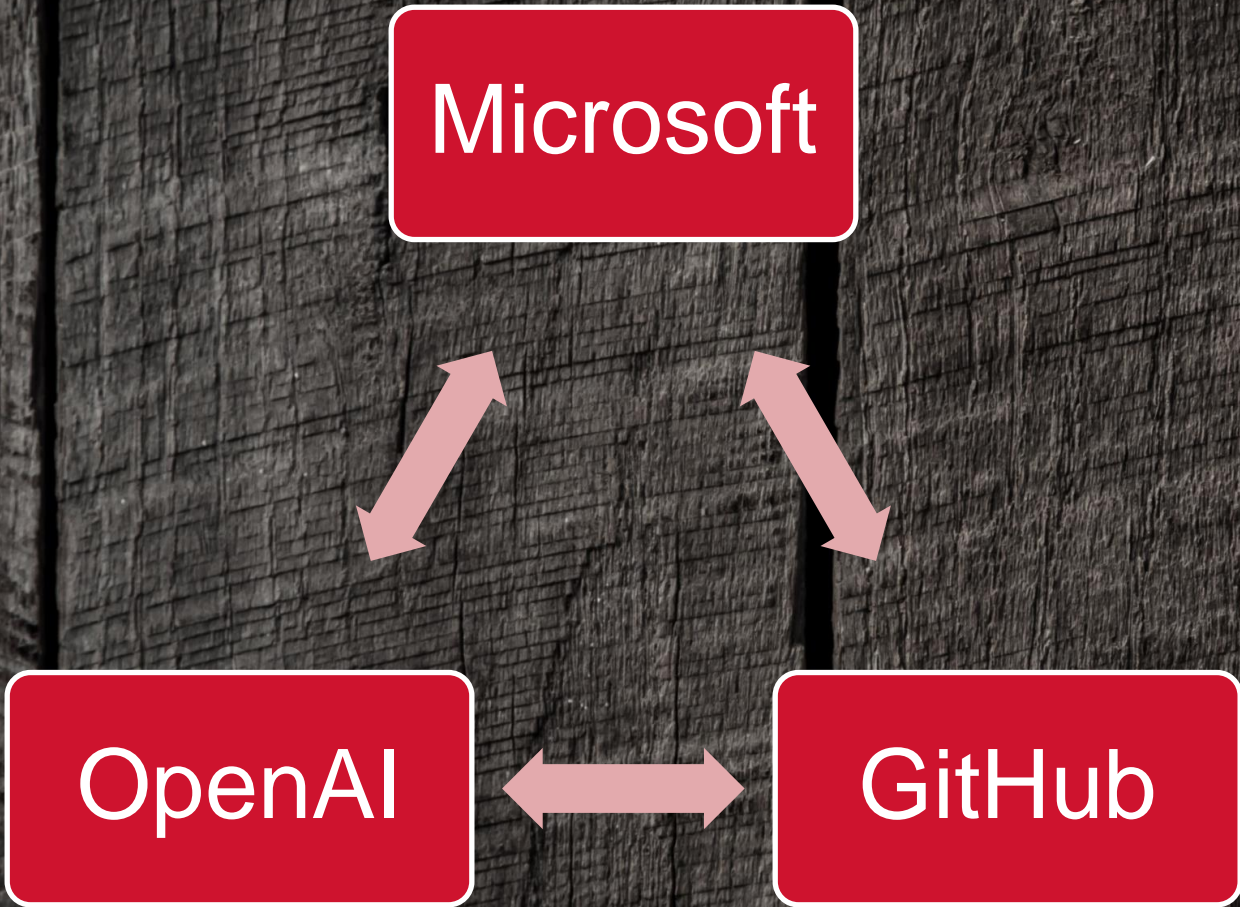
Copilot generates every answer based on the prompt – it is unlikely, that it reproduces copyrighted code.



Let's leave those disputes to the lawyers



GitHub Copilot – Companies involved





GitHub Copilot: Costs

Copilot for Individuals

\$ **10** per month /
\$100 per year

- ✓ Plugs right into your editor
- ✓ Turns natural language prompts into code
- ✓ Offers multi-line function suggestions
- ✓ Speeds up test generation
- ✓ Blocks suggestions matching public code

[Start a free trial >](#)

Copilot for Business new

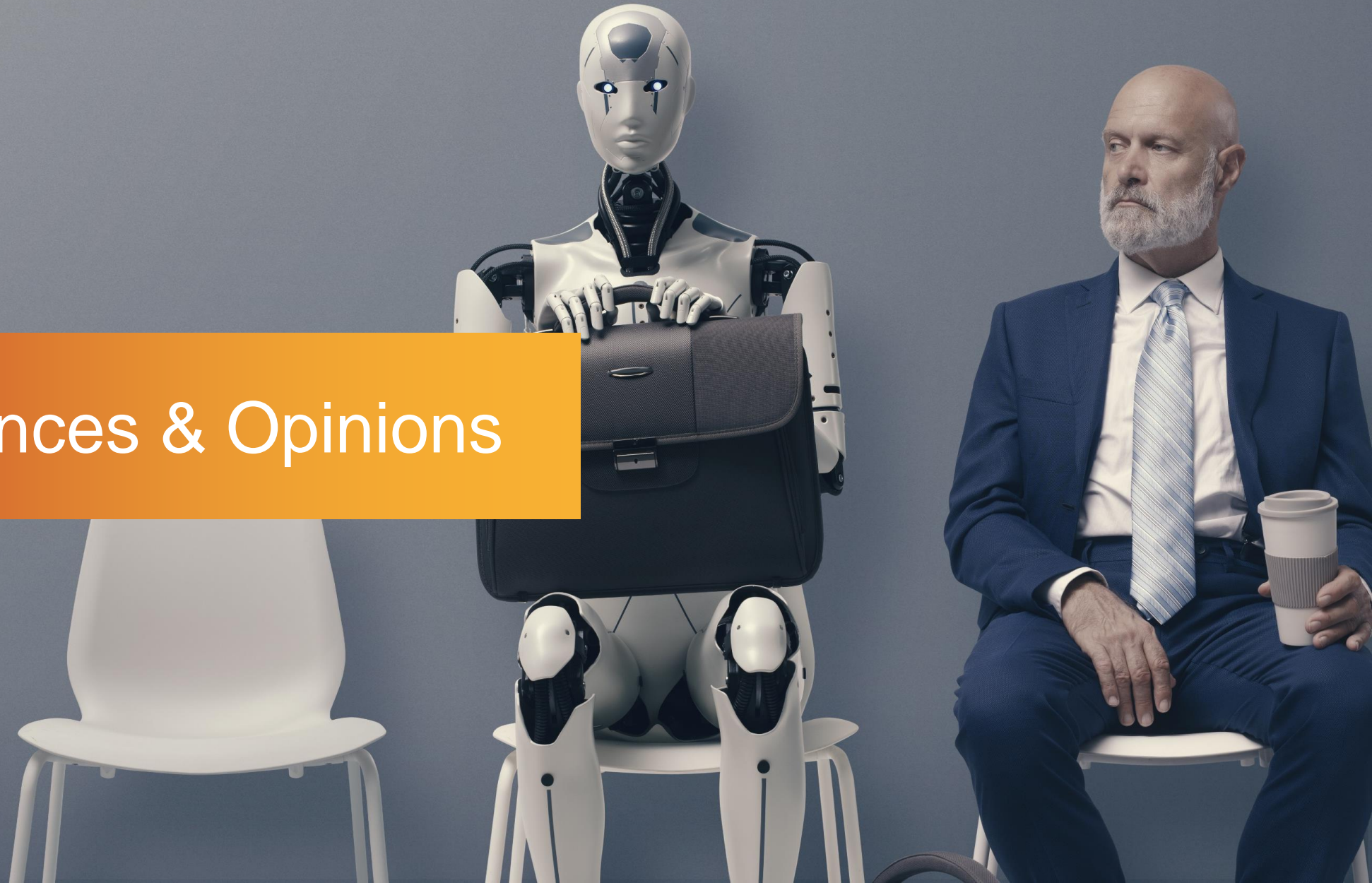
\$ **19** per user
per month

- ← Everything included in Copilot for Individuals, plus...
- ✓ Simple license management
- ✓ Organization-wide policy management
- ✓ Industry-leading privacy
- ✓ Corporate proxy support

[Buy Now >](#)

[Contact Sales >](#)

My Experiences & Opinions





How Do I use GitHub Copilot?



My usage

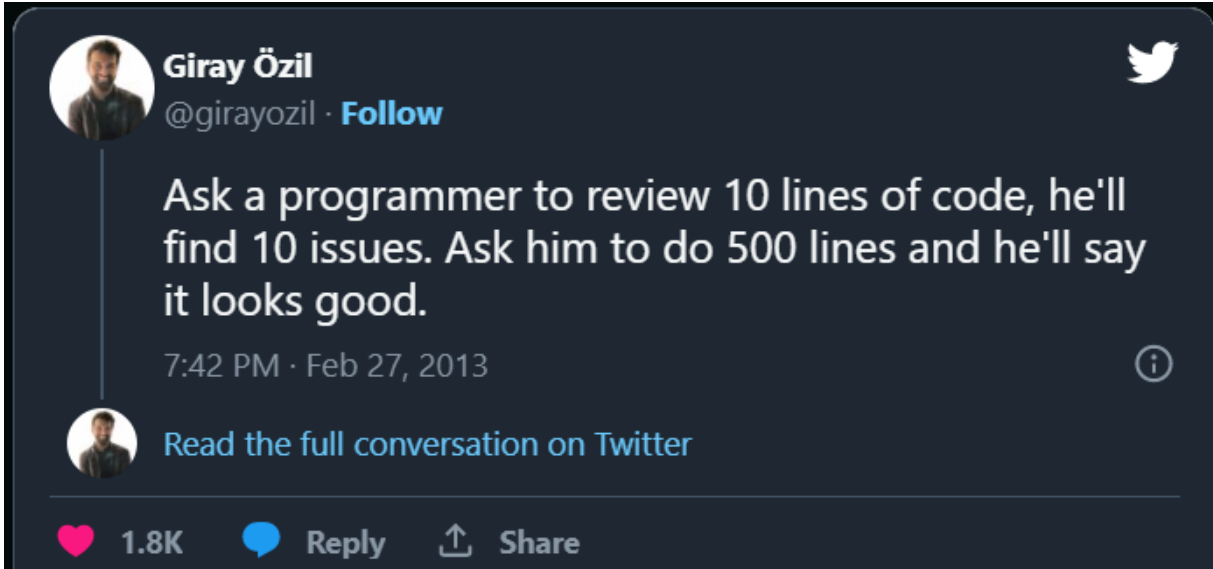
I keep typing and enjoy the autogenerated suggestions.

Rarely, I write a comment and get inspired by generated functions. I almost never accept functions as a whole

I use the explain feature a lot, when writing documentation



How Do I get the best results?



Best results by

accepting only little amounts of code

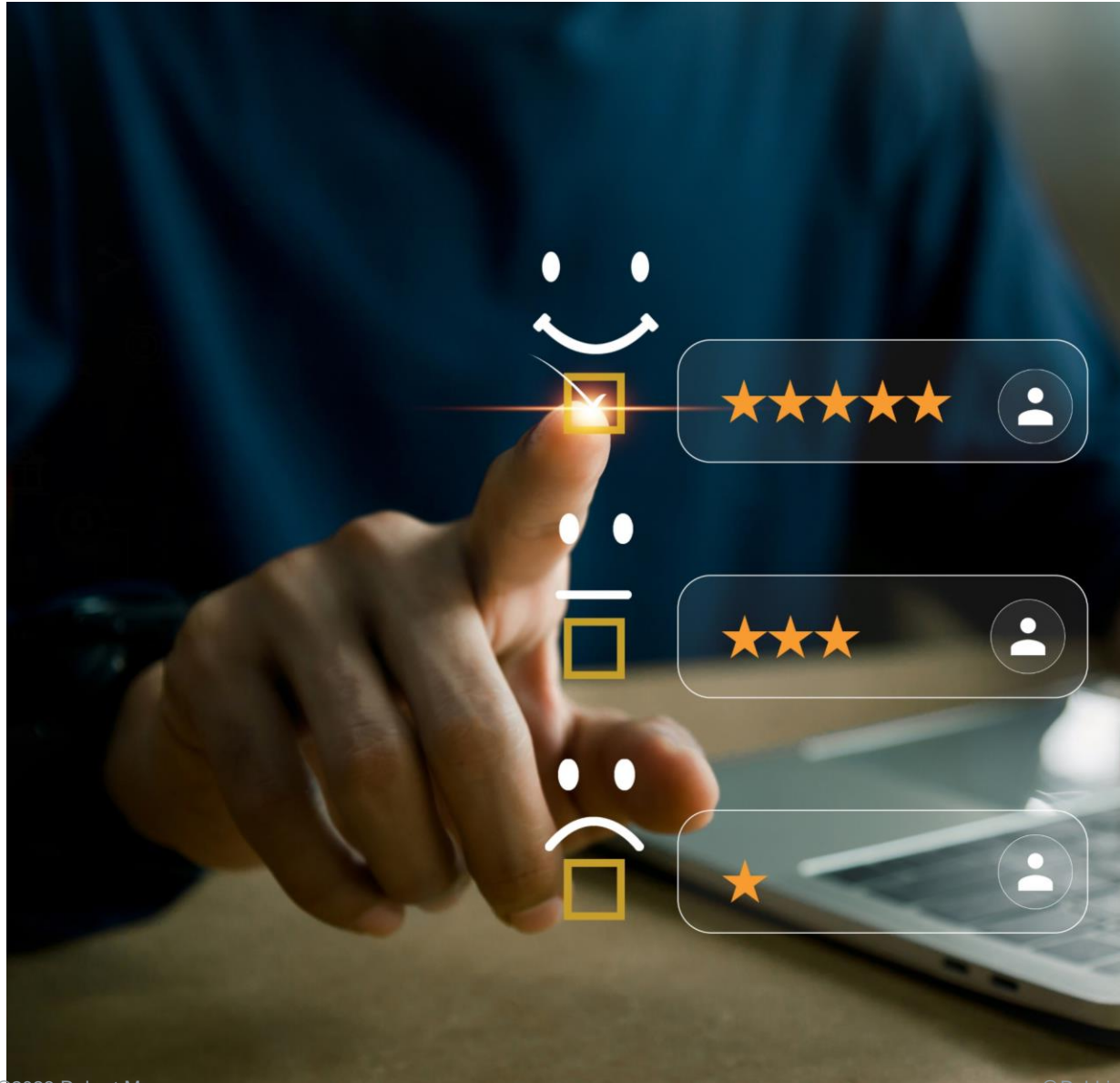
carefully checking, what's suggested

never accept code, I don't understand

divide code in small functions with meaningful names and parameters



What languages work best?



GitHub Copilot works

- with most computer languages.

Results are better

- when more training data (aka Repositories) is available.

Best Results come for

- JavaScript
- TypeScript
- Python
- Ruby
- Go
- C#
- C++



Copilot & Oracle SQL

```
SELECT  
FROM  
WHERE  
Employee-  
Employees  
HireDate BETWEEN  
SELECT  
WHERE  
City IN ('Seattle', 'Tacoma')  
EmployeeID, FirstName, Last  
EmployeeID, FirstNa  
HireDate NOT BETT
```

GitHub Copilot works well with SQL

Mixes SQL dialects

- e.g. mySQL & pgSQL

In most cases easy to adapt



Copilot & Oracle PL/SQL

ORACLE®

DATABASE



PL/SQL

Only little amount
of PL/SQL
Trainingdata

Wrong suggestions
quite common

Copilot can't distinguish
between Oracle PL/SQL
and PL/pgSQL

Easy to adapt

→ create more PL/SQL
repositories on GitHub!



GitHub Copilot: Pitfalls & Caveats

Copilot generates „B***Sh***“

(technical term)
generated code looks good, but isn't understood by Copilot

Check

- every line
- every variable name
- every function call

Copilot doesn't generate the best code

- rather the average of all repos in GitHub
- with bugs and security issues

It's your code. You are in charge

- There won't be a label
- „Generated by an AI“



Is it worth the money?



It worth the money?

Definitely!

It spares multiple hours a week googeling for exampes

Types the boring repetitions

Sometimes it even helps, when I'm stuck.

I'll keep my rubber ducky, though.

Conclusion



Boosts your Coding Speed

Types the boring repetitions for you

Really helpful when you're stuck

Won't take your job

PLEASE

**DO
TRY THIS
AT HOME**