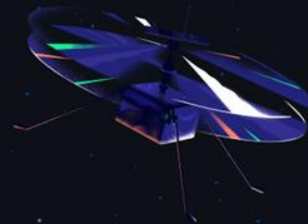# GitHub Copilot Administration & Security

Andrew Scoppa

AGENDA

GitHub Copilot - Overview

Policies and settings

Telemetry

Data privacy

Troubleshooting

Integrations

Q & A

GitHub Copilot Overview

GitHub Copilot

- An intelligent pair programmer
- Draws context from comments & code to suggest individual lines and whole functions
- Powered by OpenAI Codex
    - Copilot uses a transformative model
    - Trained on large datasets to ensure accuracy
- Available as extensions to popular IDEs
- Programming Languages and Technology available in Public code base all are supported

February 2023

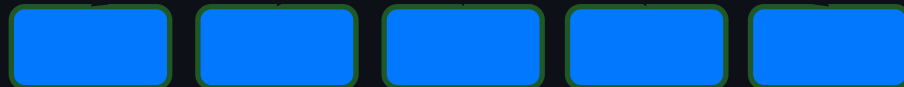TS sentiment.ts ·co write_sql.go parse_expense

```
1  #!/usr/bin/env ts-node
2
3  import { fetch } from "fetch-h2";
4
5  // Determine whether the sentiment of
6  // Use a web service
7  async function isPositive(text: string
8    const response = await fetch(`http://
9      method: "POST",
10     body: `text=${text}`,
11     headers: {
12       "Content-Type": "application/x-ww
13     },
14   });
15   const json = await response.json();
16   return json.label === "pos";
17 }
```
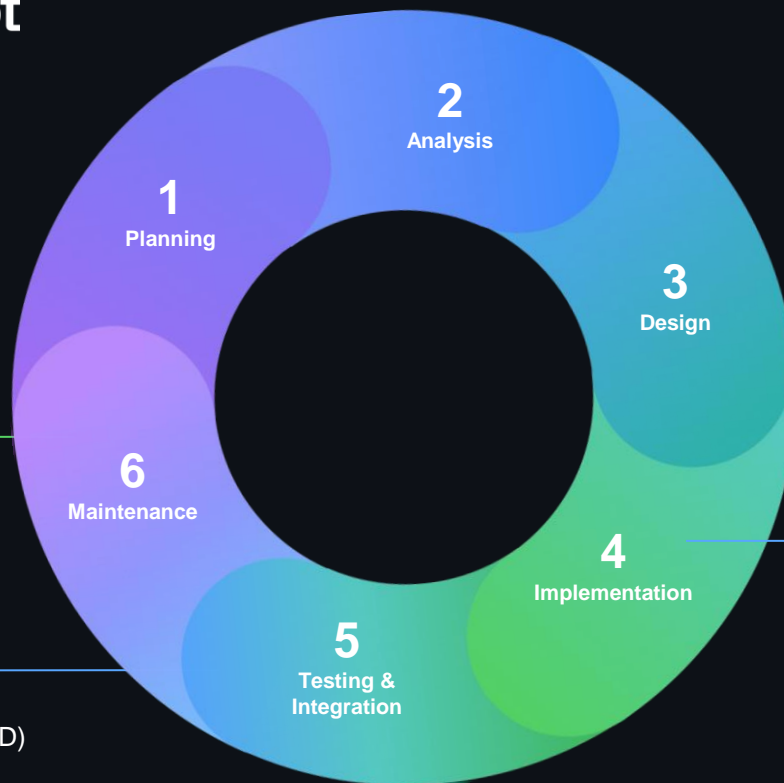
 Copilot

Design

IMPLEMENTATION

GitHub Copilot

1 Planning

2 Analysis

3 Design

4 Implementation

5 Testing & Integration

6 Maintenance

Refactoring code (code translate)
Reviewing code (code explain)
Documentation

Convert comments to code
Autofill for repetitive code
Show alternatives

Unit testing (TDD and BDD)
Finding code errors
Debugging
Code review
AI Pull Requests

February 2023

GitHub Copilot

Once enabled…

OpenAI
Codex

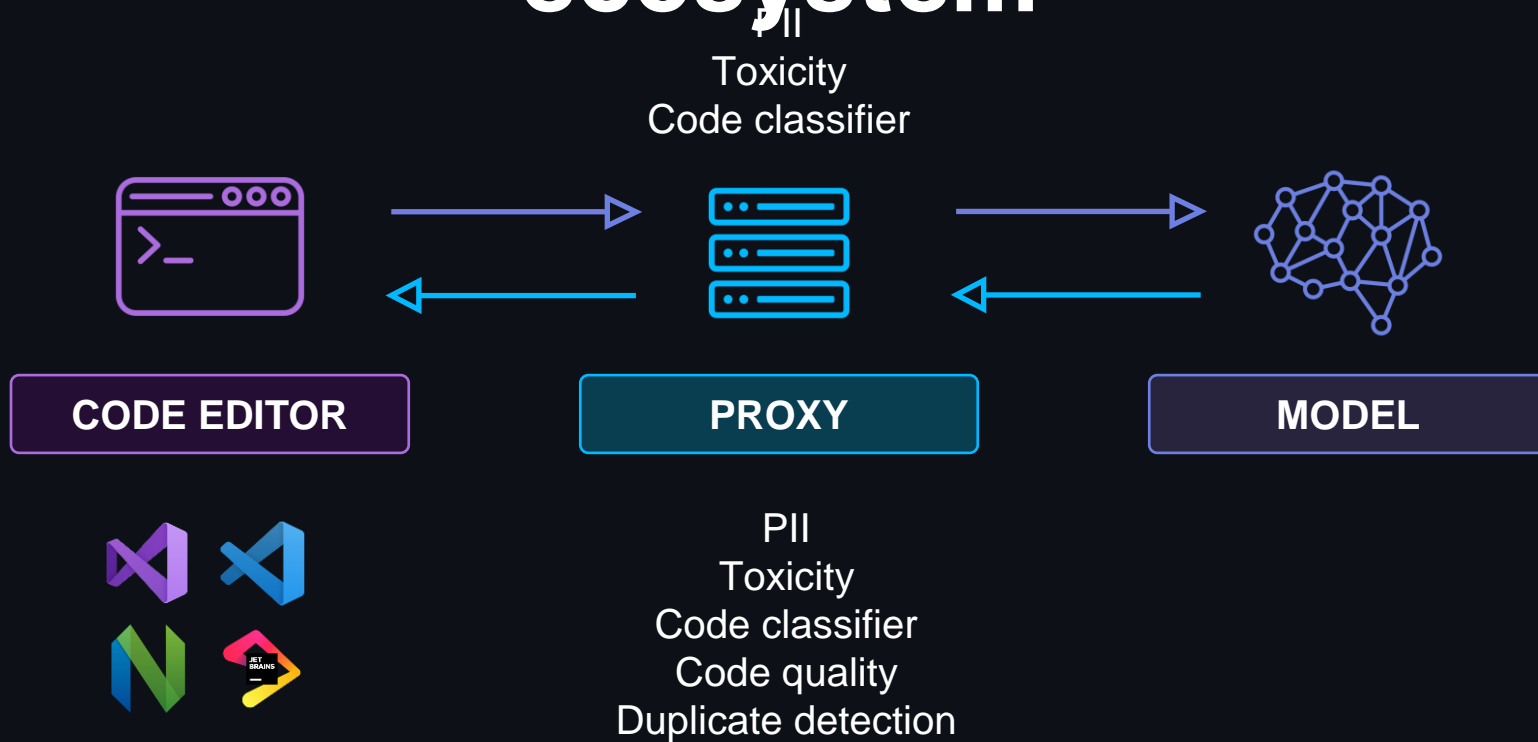Context

Suggestions

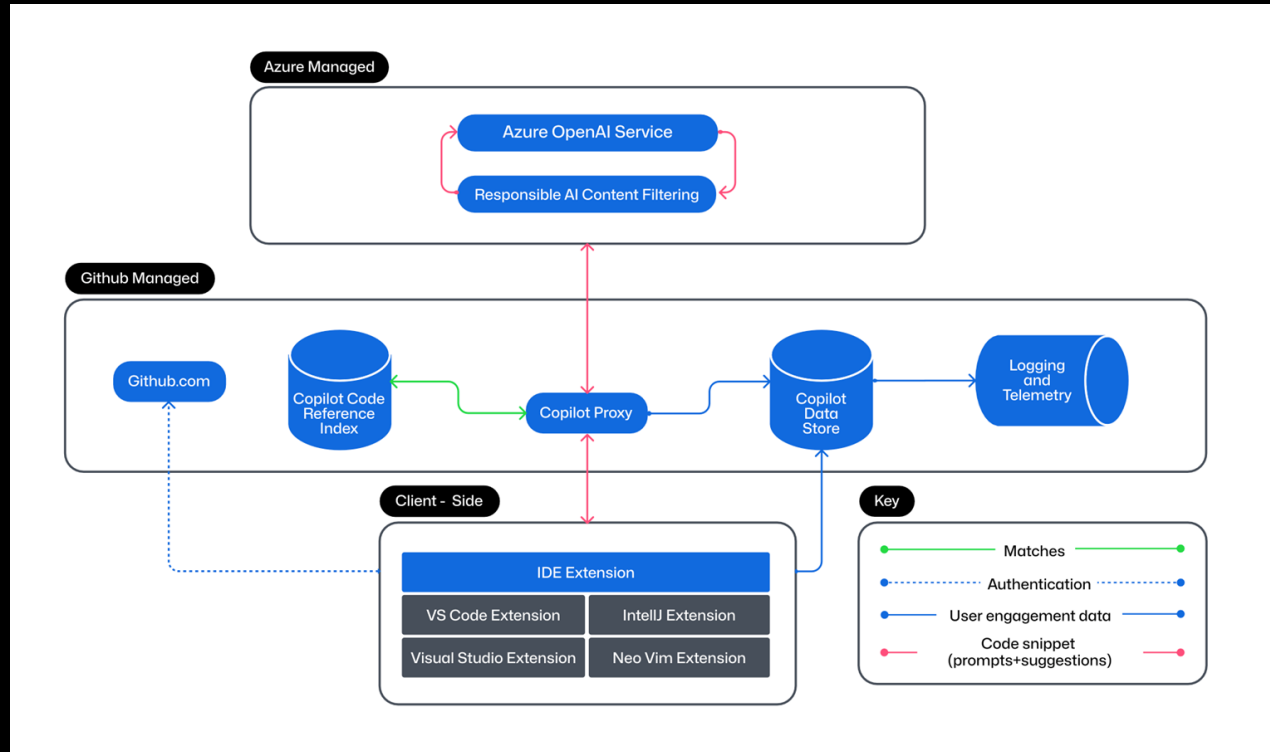| runtime.go | course.rb | time.js | IsPrimeTest.java |

```go
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
```

Visual Studio

Neovim

VS Code

JetBrains IDEs

February 2023

Data flow through the Copilot ecosystem

PII
Toxicity
Code classifier

CODE EDITOR

PROXY

MODEL

PII
Toxicity
Code classifier
Code quality
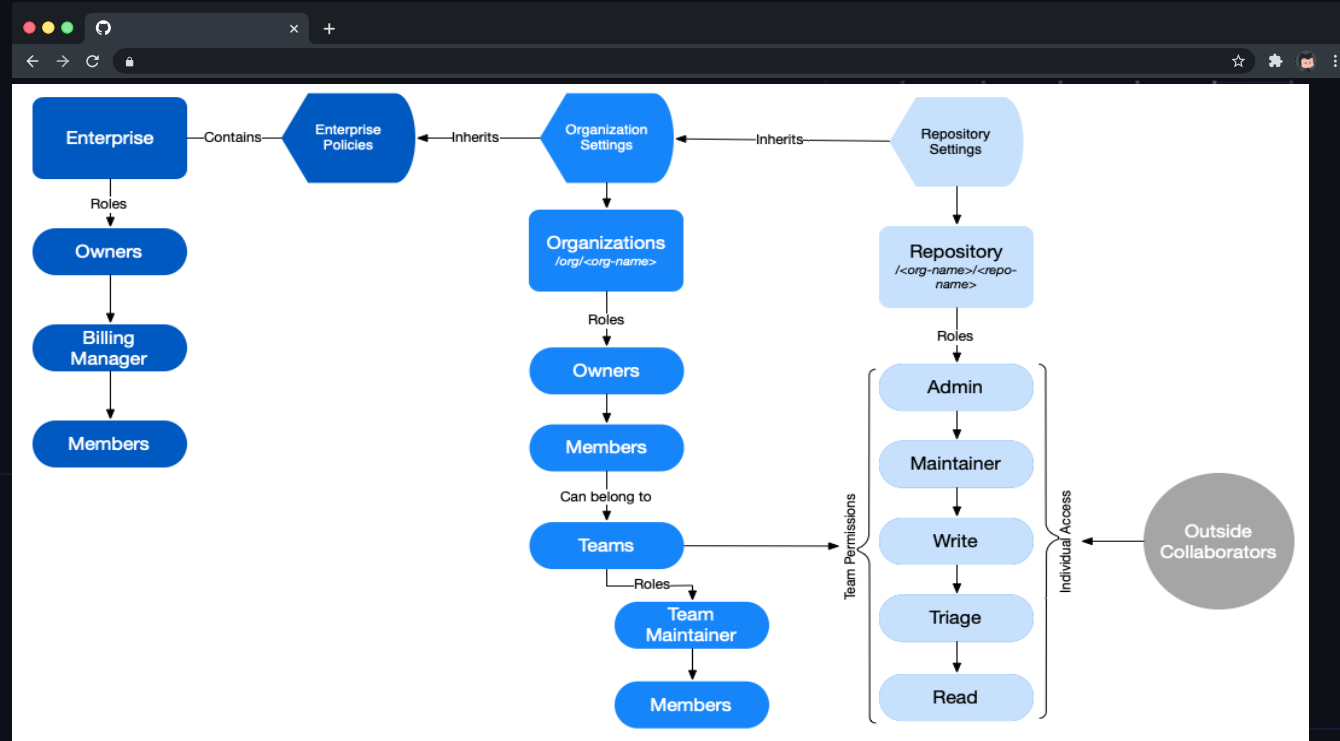Duplicate detection

Overall Copilot Architecture

Policies and settings

Govern the usage of GitHub Copilot in your Enterprise

Flow of Policies and Permissions

Copilot Policies Categories
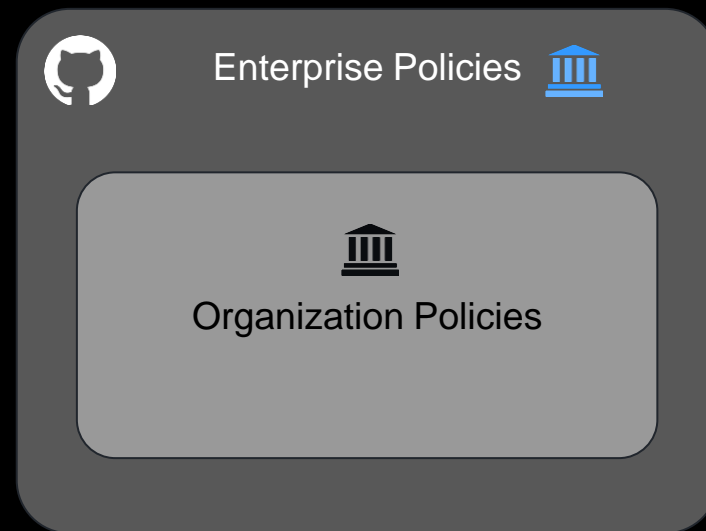
Enterprise Policies

Manage the policies for all the organizations owned by your enterprise

You cannot select a more permissive policy at the organization level

---

Organization Policies

In the absence of a defined Enterprise Policy, individual organizations within the enterprise have the flexibility to choose their own.

Enterprise Policies 🏛️

Organization Policies

Enterprise Admin Policies

Control whether **suggestions matching public code** is allowed or blocked

- Blocked
- Allow
- No Policy

Manage organization access to GitHub Copilot.

- Disabled
- Allow for all organizations
- Allow for specific organizations

Manage Copilot Chat access.

- No Policy
- Enabled
- Disabled

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Organization Settings

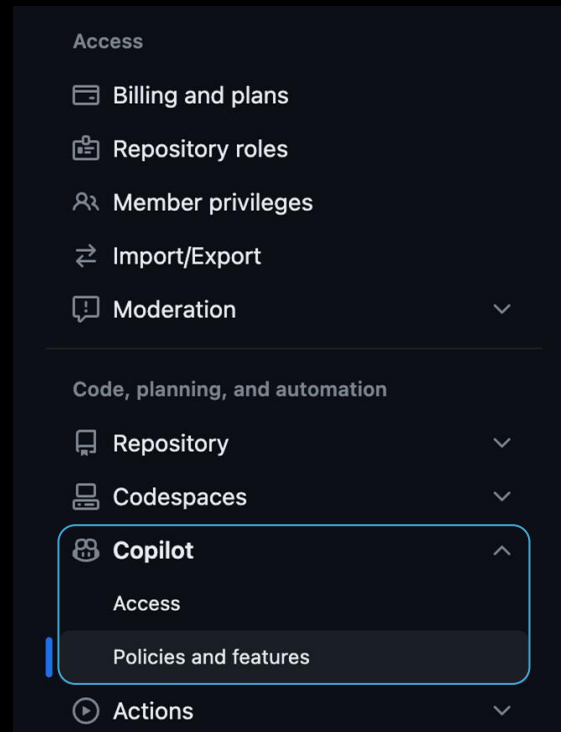Categorization of Copilot Organization settings

Access

Manage, control and audit the users Copilot interaction

Policies and features

Regulate Copilot functionality and feature enablement

Access
- Billing and plans
- Repository roles
- Member privileges
- Import/Export
- Moderation

Code, planning, and automation
- Repository
- Codespaces
- Copilot
  - Access
  - Policies and features
- Actions

Organization Settings

Manage & Control Access

Access Settings

- View Number of Copilot license utilized

- Estimated cost of Copilot Usage within the Org

- Policy to enable Copilot for all members in the org or selective members

- Extract report of Copilot activity per user

GitHub Copilot

Copilot seats

831 seats

Number of purchased seats in this organization.
Learn more on licenses.

Estimated monthly cost

$15,789.00

Each purchased seat is $19 USD/month.
Review billing details.

Copilot in your organization

Control which users or teams will have access to GitHub Copilot inside your organization. Invited users with approved access will receive an email with setup instructions. Organization settings documentation.

Enabled for: All members of the organization ▼

Access management

📄 Get report

🔍 abhi-dutta

831 members with access to Copilot

Sort ▼

@abhi-dutta   Last active 2 days ago

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Organization Settings

Access - Copilot user activity report (sample)

octodemo-seat-usage-1696435416

Login	Status	Team	Last Activity Date	Last Editor Used
Abc	Active	No team	2023-10-04	vscode/1.83.0-insider/copilot-chat/0.8.2023092902
Lakes	Active	No team	2023-09-13	vscode/1.82.0/copilot-chat/0.7.2023090101
Chaos	Active	No team	2023-10-04	vscode/1.82.1/copilot/1.111.404
Akjsda	Active	No team	2023-10-04	vscode/1.82.2/copilot-chat/0.7.1
Sbdkajs	Active	No team	2023-10-04	vscode/1.82.3/copilot-chat/0.7.1
Asa	Active	No team	2023-05-26	vscode/1.78.2/copilot/1.86.82
Baksjdb	Active	No team	2023-10-04	vscode/1.82.3/copilot-chat/0.7.2023090101
Jshbda	Active	No team	2023-10-04	/

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Organization Settings

Policies & Features

- Policies and features settings allow an org owner to define policies which will be applicable to all the users that have been onboarded to GitHub Copilot under the org

- Allows org owners to define whether "public code" matching is allowed in suggestions

- Can users use Copilot Chat (beta) feature in the supported IDE's

GitHub Copilot policies and features

Policies

Suggestions matching public code
Copilot can allow or block suggestions matching public code.

Allowed ▾

Technical preview

Enable or disable limited public beta access for members of your organization with access to GitHub Copilot. Note that users from other organizations may gain access if permitted by their administrators.

Features

GitHub Copilot Chat (Beta)
GitHub Copilot to explain a piece of code, propose bug fixes, or generate unit tests in a chat interface from your editor. If enabled, you agree to pre-release terms.

Enabled ▾

Client Side Settings

Network Settings

Proxy Settings

- GitHub Copilot supports basic HTTP proxy setups. If you need to authenticate to a proxy, GitHub Copilot supports basic authentication or Kerberos. If the proxy URL starts with `https://`, the proxy is not currently supported.

- If you don't configure a proxy directly in your editor, GitHub Copilot checks if a proxy URL is set in any of the following environment variables, from highest to lowest priority.

  - HTTPS_PROXY
  - https_proxy
  - HTTP_PROXY
  - http_proxy

Authentication Modes

- Basic Authentication
- Kerberos Authentication

[Configuring network settings](#)

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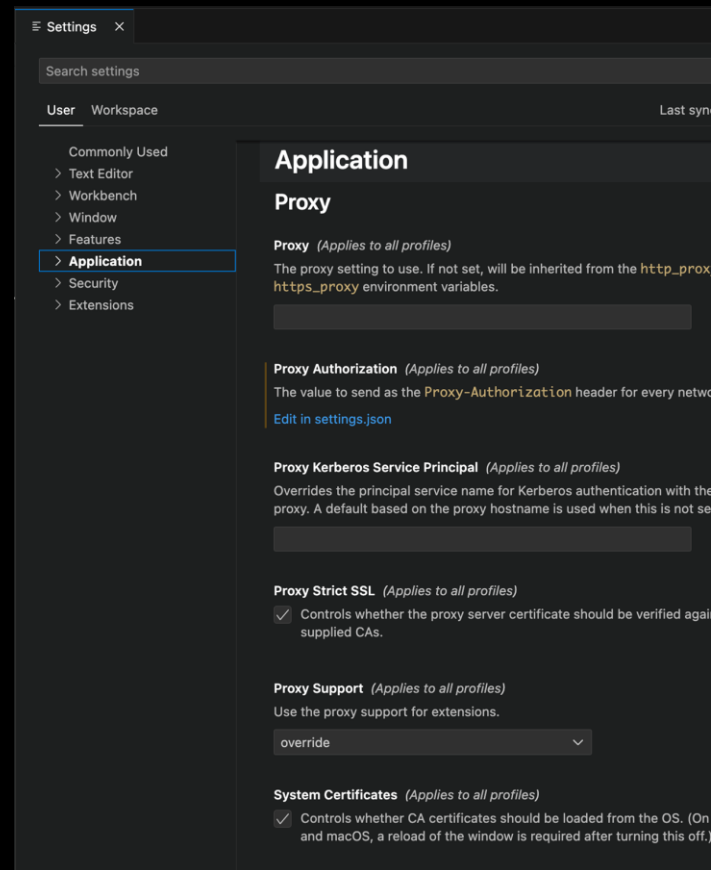
Firewall Settings

If you or your organization employs security measures like a firewall, it may be beneficial to include certain domain URLs in an "allowlist" and open specific ports and protocols.

Domain and/or URL	Purpose
`https://github.com/login/*`	Authentication
`https://api.github.com/user`	User Management
`https://api.github.com/copilot_internal/*`	User Management
`https://copilot-telemetry.githubusercontent.com/telemetry`	Telemetry
`https://default.exp-tas.com/`	Telemetry
`https://copilot-proxy.githubusercontent.com/`	API service for Copilot suggestions
`https://origin-tracker.githubusercontent.com`	API service for Copilot suggestions
`https://*.githubcopilot.com`	API service for Copilot suggestions

IDE Advanced Settings

Supported IDEs

Visual Studio

Visual Studio Code

Jet Brains

Vim/Neovim

Azure Data Studio

Configuring GitHub Copilot in your environment - GitHub Enterprise Cloud Docs

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Enable non-programming Meta Files

In settings.json, add

```
"github.copilot.enable":
{
    "*": true,
  "yaml": true,
  "plaintext": false,
  "markdown": true
}
```



```
{} settings.json ●

Users > bryantson > Library > Application Support > Code > User > {} settings.json > ...
 1   {
 2       "editor.inlineSuggest.enabled": true,
 3       "github.copilot.enable": {
 4           "*": true,
 5           "yaml": true,
 6           "plaintext": false,
 7           "markdown": true
 8       },
 9       "[python]": {
10           "editor.formatOnType": true
11       },
12       "github.copilot.advanced": {
13
14
15       },
16       "editor.inlineSuggest.showToolbar": "always",
17       "window.zoomLevel": 1,
18       "appService.connections": []
19   }
```

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User Onboarding Best Practices

Single Org vs Multi Org
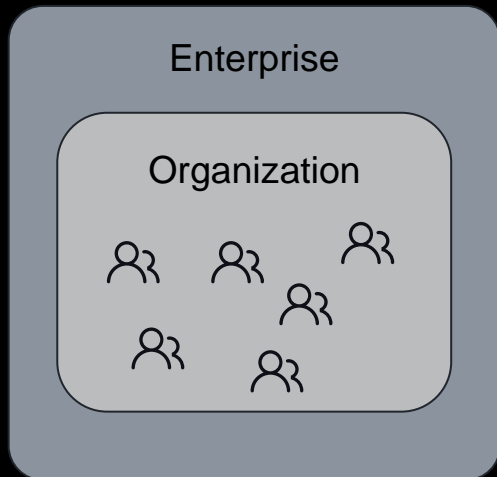
Telemetry

Insights about GitHub Copilot acceptance in your enterprise

Telemetry - GitHub REST API

Get Copilot for Business seat information and settings for an organization

Note: You must authenticate using an access token with the ***manage_billing:copilot*** scope

GET /orgs/{org}/copilot/billing

cURL

```
curl -L \
  -H "Accept: application/vnd.github+json" \
  -H "Authorization: Bearer <YOUR-TOKEN>" \
  -H "X-GitHub-Api-Version: 2022-11-28" \
  https://api.github.com/orgs/ORG/copilot/billing
```

Example response

Status: 200

```
{
  "seat_breakdown": {
    "total": 12,
    "added_this_cycle": 9,
    "pending_invitation": 0,
    "pending_cancellation": 0,
    "active_this_cycle": 12,
    "inactive_this_cycle": 11
  },
  "seat_management_setting": "assign_selected",
  "public_code_suggestions": "block"
}
```

Note: As of 5th Oct 2023 - The GitHub Copilot for Business API endpoints are in public beta and subject to change. GitHub OPEN API Schemas are available here

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Telemetry - GitHub REST API

List all Copilot for Business seat assignments for an organization

```
GET  /orgs/{org}/copilot/billing/seats
```

cURL

```
curl -L \
  -H "Accept: application/vnd.github+json" \
  -H "Authorization: Bearer <YOUR-TOKEN>" \
  -H "X-GitHub-Api-Version: 2022-11-28" \
  https://api.github.com/orgs/ORG/copilot/billing/seats
```

Response

Example response

Status: 200

```
{
  "total_seats": 2,
  "seats": [
    {
      "created_at": "2021-08-03T18:00:00-06:00",
      "updated_at": "2021-09-23T15:00:00-06:00",
      "pending_cancellation_date": null,
      "last_activity_at": "2021-10-14T00:53:32-06:00",
      "last_activity_editor": "vscode/1.77.3/copilot/1.86.82",
      "assignee": {
        "login": "octocat",
        "id": 1,
        "node_id": "MDQ6VXNlcjE=",
        "avatar_url": "https://github.com/images/error/octocat_happy.gif",
        "gravatar_id": "",
        "url": "https://api.github.com/users/octocat",
```

Note: As of 5th Oct 2023 - The GitHub Copilot for Business API endpoints are in public beta and subject to change.

Telemetry - GitHub REST API

Get Copilot for Business seat assignment details for a user

```
GET /orgs/{org}/members/{username}/copilot
```

cURL

```
curl -L \
  -H "Accept: application/vnd.github+json" \
  -H "Authorization: Bearer <YOUR-TOKEN>" \
  -H "X-GitHub-Api-Version: 2022-11-28" \
  https://api.github.com/orgs/ORG/members/USERNAME/copilot
```

Example response

Status: 200

```
{
  "created_at": "2021-08-03T18:00:00-06:00",
  "updated_at": "2021-09-23T15:00:00-06:00",
  "pending_cancellation_date": null,
  "last_activity_at": "2021-10-14T00:53:32-06:00",
  "last_activity_editor": "vscode/1.77.3/copilot/1.86.82",
  "assignee": {
    "login": "octocat",
    "id": 1,
    "node_id": "MDQ6VXNlcjE=",
    "avatar_url": "https://github.com/images/error/octocat_happy.gif",
    "gravatar_id": "",
    "url": "https://api.github.com/users/octocat",
    "html_url": "https://github.com/octocat",
    "followers_url": "https://api.github.com/users/octocat/followers",
    "following_url": "https://api.github.com/users/octocat/following",
```

Note: As of 5th Oct 2023 - The GitHub Copilot for Business API endpoints are in public beta and subject to change.

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Telemetry - GitHub Audit Logs

Copilot for Business users will now be able to review updates and changes to their Copilot settings through the audit log.

In large organizations or enterprises, tracking setting updates and purchases is crucial.
Our goal is to empower organization and enterprise admins to investigate changes to their Copilot for Business account and settings independently, eliminating the need to rely on support.

Audit Log: Copilot for Business events · Issue #822 · github/roadmap
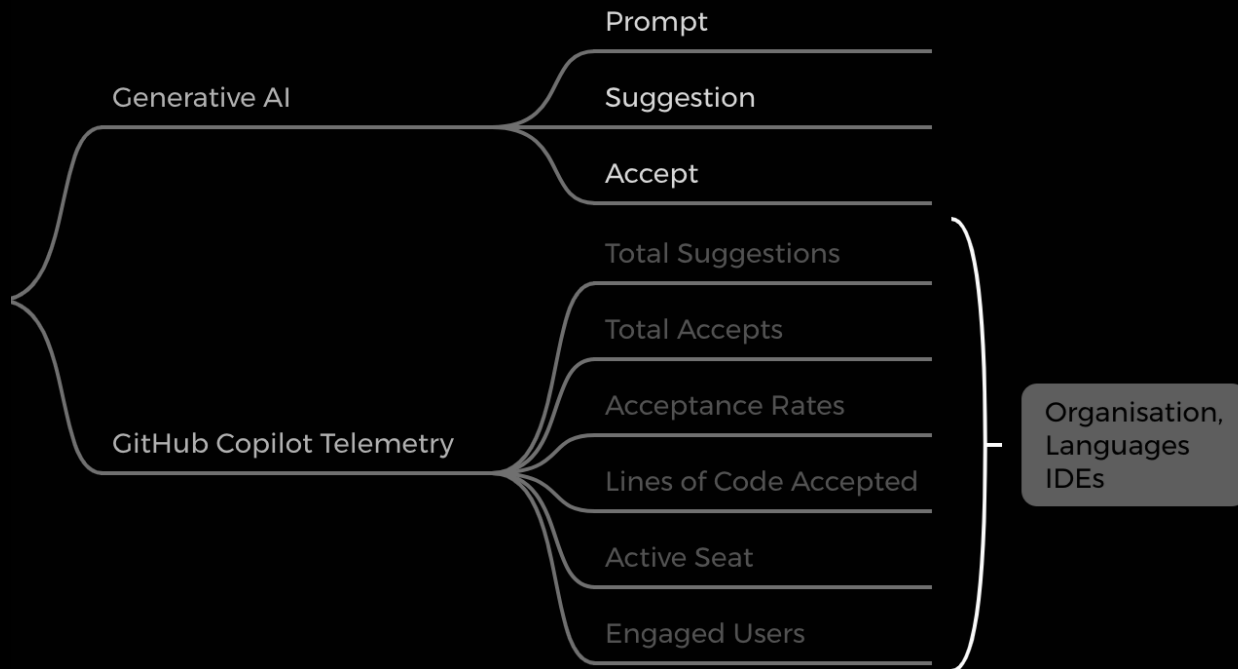

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Telemetry - Future Roadmap

Copilot for Business Telemetry from GitHub Account Team

GitHub Copilot now has a better AI model and new capabilities

Research: quantifying GitHub Copilot's impact on developer productivity and happiness

GitHub Copilot is generally available to all developers

Generative AI
- Prompt
- Suggestion
- Accept

GitHub Copilot Telemetry
- Total Suggestions
- Total Accepts
- Acceptance Rates
- Lines of Code Accepted
- Active Seat
- Engaged Users

Organisation, Languages IDEs

Data privacy

How GitHub protects your data

GitHub Copilot Trust Center

As GitHub's Chief Legal Officer, I understand the nuanced challenges of enabling company-wide AI adoption, especially in an evolving regulatory landscape. GitHub Copilot is enterprise-ready, but organizations need to clearly understand how the tool meets their compliance, security, and accessibility requirements.

Our aim is to bring you that clarity with the **GitHub Copilot Trust Center**.

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

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What Personal Data is Collected & How?

- User Engagement Data
  - Events generated with an IDE
  - Personal Data such as pseudonymous identifiers

- Prompts
  - Collection of code & contextual information to generate suggestions
  - User using a designated keyboard shortcut or pauses typing to request a suggestion

- Suggestions
  - One or more lines of proposed code and other output returned

Personal Data

- Uses the **source code** in IDE only to generate a suggestion.

- Performs several scans to identify and remove certain **information** within a prompt.

- **Prompts** are only transmitted to the AI model to generate suggestions in real-time

- Deleted once the **suggestions** are generated.

- **User engagement data** is used to improve the performance of the Copilot Service; specifically, it's used to

    a.   Evaluating GitHub Copilot

    b.   Sort algorithms

    c.   Detecting potential abuse of GitHub Copilot

o   Copilot for Business does not use your code to train the Azure OpenAI model

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Under the hood - Responding to a prompt

- Suggestions are not copied and pasted from any code database.

- Uses probabilistic reasoning to generate suggestions.

- GitHub Copilot sends a prompt to its AI model, which makes a probabilistic determination of what is likely to come next in your coding sequence and provides suggestions.

Aiding Secure Development

GitHub Copilot leverages a variety of security measures

- ○ Remove sensitive information in code

- ○ Block insecure coding patterns *

- ○ Detect vulnerable patterns in incomplete fragments of code.

* The Copilot prompt needs to be specific in it's request

FAQ

- How long the collected personal data will be retained?

  - User Engagement Data - 24 Months

  - Prompts - Discarded once a suggestion is returned

  - Suggestions - Not Retained

- Can the users control the sharing & use of their data?

  - User engagement data is required for the use of GitHub Copilot

    - General usage data

    - Pseudonymous identifiers

FAQ

- How does our collected data gets processed by GitHub?

    ○ Billing & Account Management

    ○ Produce Aggregated Reports

- How's our collected data used?

    ○ To measure the impact it has on the user

    ○ Fine Tune ranking & Sorting Algorithms and Prompt Crafting

    ○ Detect violation of Acceptable Use Policies.

    ○ Developers and their use of developer tools and services.

FAQ

- Is Telemetry available?

  - No, Telemetry is not available for Copilot for Business

- Organization-wide policy management

  - Yes, Policy settings can be implemented at an Organization level.

- Audit Logs?

  - Yes, Audit Logs are available along with Copilot specific events

- Http Proxy Support

  - Yes, HTTP proxy support via custom certificates available

Troubleshooting

Common issues and where to look

Common Issues

- GitHub's <u>Status Page</u>

- Update GitHub Copilot Extension

- Error: "GitHub Copilot could not connect to server. Extension activation failed"

- Open <u>Discussions on Copilot Community</u> with relevant files

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Viewing Logs for GitHub Copilot

Supported IDEs

Visual Studio

Visual Studio Code

Vim/Neovim

Jet Brains

Firewall settings

| Internal Network | Firewall | Attacker | Internet |

GitHub Copilot's requires connectivity to these domain URLs

- Organization employs security measures like a firewall or proxy server

- <u>Allowlist domain URLs,</u> specific ports & protocols

- Interaction with Remote Learning Model

- Trusted domain URLs

Domain and/or URL	Purpose
`https://github.com/login/*`	Authentication
`https://api.github.com/user`	User Management
`https://api.github.com/copilot_internal/*`	User Management
`https://copilot-telemetry.githubusercontent.com/telemetry`	Telemetry
`https://default.exp-tas.com/`	Telemetry
`https://copilot-proxy.githubusercontent.com/`	API service for Copilot suggestions
`https://origin-tracker.githubusercontent.com`	API service for Copilot suggestions
`https://*.githubcopilot.com`	API service for Copilot suggestions

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Network Proxy setup

- Company Equipment or Corporate Network

- Connecting to Internet via VPN or HTTP Proxy server

- Prevent connecting to GitHub' Servers
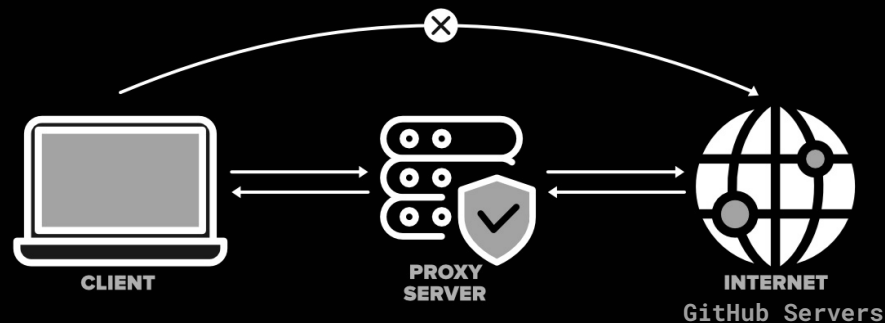
Network Proxy Errors

- Error: GitHub Copilot could not connect to server. Extension activation failed: "read ETIMEDOUT" or "read ECONNRESET"

- Configuring network settings for GitHub Copilot

- Proxy Specific errors:
  - Proxy's URL https:// currently not supported by GitHub Copilot
  - Authenticated supported basic authentication or with Kerberos
  - Custom certificates issues

Troubleshooting network errors for GitHub Copilot - GitHub Docs

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Diagnosing Network Issues

- `curl requests with --verbose`

- `curl --verbose` https://copilot-proxy.githubusercontent.com/_ping

- `curl --verbose -x http://YOUR-PROXY-URL:PORT -i -L` https://copilot-proxy.githubusercontent.com/_ping
  `--insecure` -> Certificate related issues

- diagnostic logs from editors

Diagnosing network issues

Certificate Problems

- Errors: "certificate signature failure", "custom certificate", or "unable to verify the first certificate"

- Github Copilot for Business supports Custom Certificates

- Corporate proxy configurations

- Check GitHub Copilot certificate path

- Ignore Certificate Errors in Proxy settings
  Warning: Ignoring certificate errors can cause security issues and is not recommended

Troubleshooting certificate-related errors

Issues with GitHub Copilot Chat

- Org or Enterprise owners give access to GitHub Copilot Chat beta for users

- Install GitHub Copilot Chat Prerequisites

- Authentication Issues

- Error: "Oops, your response got filtered"

GitHub Copilot Chat - GitHub Enterprise Cloud Docs

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Integrations

Use GitHub Copilot Endpoints and data with Enterprise tools

REST API - Copilot for Business

API Endpoints

- Get Copilot for Business seat information and settings for an organization

- List all Copilot for Business seat assignments for an organization

- Add teams to the Copilot for Business subscription for an organization

- Remove teams from the Copilot for Business subscription for an organization

- Add users to the Copilot for Business subscription for an organization

- Remove users from the Copilot for Business subscription for an organization

- Get Copilot for Business seat assignment details for a user

Audit Logs

Review the configuration actions taken by users at an Organisation & Enterprise level.

- Organization's Copilot settings and policies
    - Changes to the Enablement Policy
    - Org Settings changes
    - Enterprise settings changes

- Addition or removal of seats
    - Seat management changed
    - Seat assignment reused
    - Seat assignment refreshed

- Editor chat Settings

- Code Referencing Settings

Reviewing your organization or enterprise audit logs for copilot

Audit Log Events

cfb_enterprise_settings_changed	copilot.cfb_seat_cancelled
copilot.cfb_enterprise_org_enablement_changed	copilot.cfb_seat_assignment_reused
clickwrap_save_event	copilot.cfb_seat_assignment_refreshed
cfb_org_settings_changed	copilot.cfb_seat_assignment_created
copilot.cfb_seat_cancelled_by_staff	copilot.cfb_seat_assignment_unassigned
cfb_seat_management_changed	editor_chat_setting
copilot.cfb_seat_added	code_referencing_setting

Audit Logs

To review the actions taken by users at an Enterprise level.

Audit Logs

To review the actions taken by users at an Organisation level.

Events   Settings

Audit log

Filters ▾   🔍 action:copilot   ⬇ Export Git Events ▾   ⬇ Export ▾

✕ Clear current search query

Events matching search query

taylorreis_fabrikam — **copilot.cfb_seat_added**
Copilot Business seat was added for taylorreis-guest_fabrikam in the copilot-for-emus organization because they were added to the organization
United States | 136.36.██.██ | 3 weeks ago | ...
▸ View SSO details

taylorreis_fabrikam — **copilot.cfb_seat_added**
Copilot Business seat was added for taylorreis-slow_fabrikam in the copilot-for-emus organization
United States | 136.36.██.██ | 3 weeks ago | ...
▸ View SSO details

Sidebar

General
Features

Access
Billing and plans
Organization roles
Repository roles
Member privileges
Import/Export
Moderation

Code, planning, and automation
Repository
Codespaces
Copilot
Actions
Webhooks

Archive
Logs
Sponsorship log
Audit log
Deleted repositories

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Q & A

Thank you