Copilot Administration & Security

Let's build from here



Copilot Fundamentals

Copilot X

Telemetry

Data privacy

Policies and settings

Troubleshooting

Integrations

Q & A - Wrap Up

AGENDA



Copilot Fundamentals

- Artificial Intelligence (AI)
- Pair Programming
- Context comments & Code
- Suggest Individual Lines and whole functions
- Powered by OpenAl Codex
- Extensions to IDEs

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

parse expense

sentiment.ts

Give your developers a huge advantage



Increase developer productivity

And satisfaction by focusing on real problems



Accelerate innovation

Prototype & innovate more rapidly



Bridge skill gaps

Learn new languages and techniques

Offers code suggestions, contextualized to your project

Convert comments to code
Autofill for repetitive code
Show alternatives

```
1 #!/usr/bin/env ts-node
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12
     const json = await response.json();
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17
   Copilot
```

parse expense

sentiment.ts

96%

say they are faster with repetitive tasks

88%

say they are more productive

74%

focus on more satisfying work

```
1 #!/usr/bin/env ts-node
3 import { fetch } from "fetch-h2";
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         "Content-Type": "application/x-ww
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13
     const json = await response.json();
    return json.label === "pos";
   8 Copilot
```

parse expense

sentiment.ts

Developers using GitHub Copilot...

88%

have faster completion

87%

exert less mental effort on repetitive tasks

77%

spend less time searching

73%

stay more in the flow

60%

are more fulfilled with [their] job 59%

are less frustrated when coding

Duolingo Success Story

25%

..increase in developer speed

1m

..set-up time for largest repo

67%

..decrease in median code review turnaround time

70%

..increase in pull requests

"

A tool like GitHub Copilot is so impactful at large companies because suddenly engineers can make impactful changes to other developers' code with little previous exposure.

"

Engineering time is the most valuable resource at Duolingo. Making the best use of that time with the help of GitHub Copilot and Codespaces enables us to reach our goals faster.

66

With GitHub Copilot, our developers stay in the flow state and keep momentum instead of clawing through code libraries or documentation.

Source: https://github.com/customer-stories/duolingo



Features Available

- 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

- Simple license management
- Organization-wide policy management
- Industry-leading privacy

Use cases

- Code Suggestions
- Unit Test
- laC development
- Code Translation
- Dictionaries with Lookup data
- Pattern Matching using Regex

Anti-Patterns

- Non-coding tasks
- Production Data generation
- Natural language generation

GitHub Copilot Product Specific Terms - Acceptable Use

Once enabled...



OpenAI Codex









```
∞ runtime.go
             course.rb
                          Js time.js
1 package main
3 type Run struct {
      Time int // in milliseconds
      Results string
      Failed bool
7 }
```



Policies and settings

Policies in Copilot Can be Categorized Under



Enterprise Policies

An enterprise admin is able to control whether <u>suggestions matching public</u> <u>code</u> is allowed or blocked The three options are

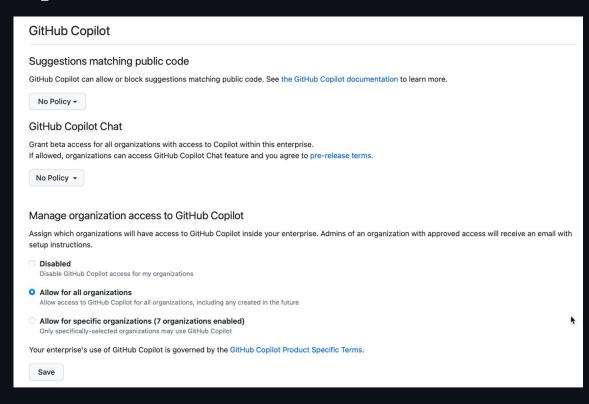
- Blocked
- Allow
- No Policy

An enterprise admin is able to <u>manage</u> <u>Copilot Chat access</u>. The three options are

- No Policy
- Enabled
- Disabled

An enterprise admin is able to <u>manage</u> <u>organizational access to Copilot</u>. The three options are

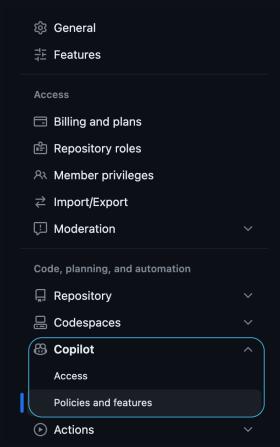
- Disabled
- Allow for all organizations
- Allow for specific organizations



Organization Settings

Organization settings of Copilot can be categorized under two headings

- Access
- Policies and features

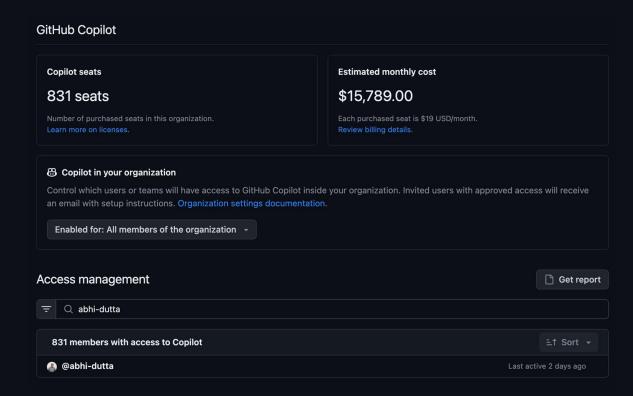


Organization Settings Contd.

Access Settings:

Allows an Org Admin or owner to

- 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



Organization Settings Contd.

Copilot user activity report sample data

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	/

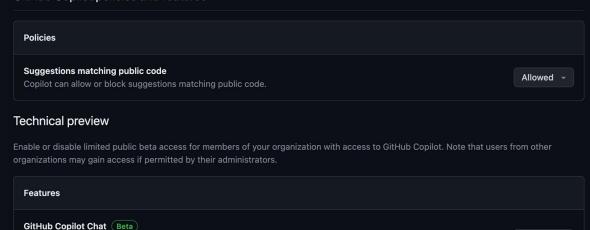
Organization Settings Contd.

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

editor. If enabled, you agree to pre-release terms.



Enabled

GitHub Copilot to explain a piece of code, propose bug fixes, or generate unit tests in a chat interface from your





Client Side Settings

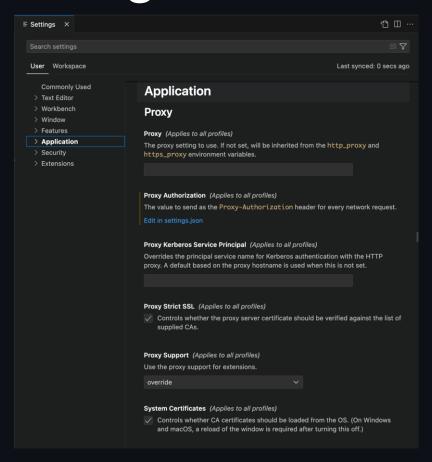
Network Settings

Proxy Settings:

- GitHub Copilot supports basic HTTP proxy setups. If you need to authenticate to a proxy, GitHub Copilot supports basic authentication or authentication with Kerberos. *If the proxy URL starts 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, listed from highest to lowest priority.
 - HTTPS_PROXYhttps_proxyHTTP_PROXYhttp_proxy

Authentication Modes:

- Basic Authentication
- Kerberos Authentication



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	<u>Purpose</u>
https://github.com/login/*	Authentication
https://api.github.com/user	User Management
<pre>https://api.github.com/copilot_internal/ *</pre>	User Management
https://copilot- telemetry.githubusercontent.com/telemetr y	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









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 > ...
           "editor.inlineSuggest.enabled": true,
            "github.copilot.enable": {
               "*": true,
                "yaml": true,
               "plaintext": false,
                "markdown": true
           "[python]": {
                "editor.formatOnTvpe": true
            "github.copilot.advanced": {
           "editor.inlineSuggest.showToolbar": "always",
           "window.zoomLevel": 1,
           "appService.connections": []
 19
```

T

User Onboarding Best Practices

Single Org vs Multi Org





Telemetry



Telemetry from GitHub REST API



Get Copilot for Business seat information and settings for an organization

```
/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.



Telemetry from GitHub REST API



List all Copilot for Business seat assignments for an

organization

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

```
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": "MD06VXNlciE=",
      "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 from GitHub REST API



Get Copilot for Business seat assignment details for a user

```
/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": "MDO6VXNlcjE=",
  "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":
```





🚳 Telemetry from GitHub Audit Logs 📳



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

With any large organization or enterprise, it's important to be able to trace settings updates and purchases. We want to empower our organization and enterprise admins to be able to investigate any changes to their Copilot for Business account and settings without having to reach out to support.

Audit	log
Events	Log streaming Settings
Filters	Q action:copilot
	current search query
Events	matching search query
4	dhruvg20 – copilot.cfb_seat_added Copilot for Business seat was added for dhruv-gupta-live in the d Unknown location Unknown IP address 2 weeks ago
•	t organization copilot.cfb_org_settings_changed Copilot Chat setting changed from unconfigured to enabled for the dataset in the company of t
42	dhruvg20 – copilot.cfb_seat_added Copilot for Business seat was added for jschanfung in the d Unknown location Unknown IP address on Sep 1
4	dhruvg20 – copilot.cfb_seat_added Copilot for Business seat was added for dhruv-gupta-live in the India 101.0.62.219 on Jun 14
	dhruvg20 – copilot.cfb_seat_added Copilot for Business seat was added for dhruvg20 in the India 101.0.62.219 on Jun 14



Telemetry - Future Roadmap

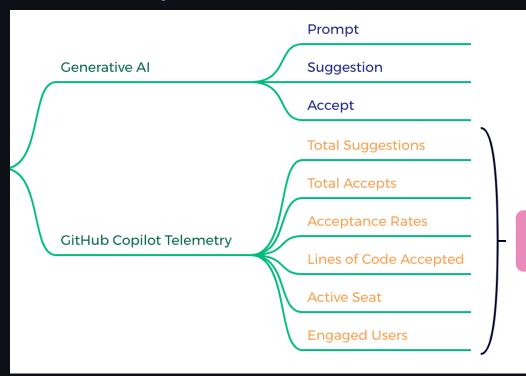


Copilot for Business Telemetry from GitHub Account Team

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



Organisation, Languages IDEs



Data privacy

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 - Cont'd

- 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 Al model to generate suggestions in realtime
- 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. Fine-tune ranking
 - b. Sort algorithms
 - c. Craft prompts

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 to

- Remove sensitive information in code
- Block insecure coding patterns
- Detect vulnerable patterns in incomplete fragments of code.

FAQ

- How long the collected personal data will be retained?
 - O User Engagement Data 24 Months
 - O Prompts Discarded once a suggestion is returned
 - O Suggestions Not Retained

- Can the users control the sharing & use of their data?
 - O Not possible & its required for the use of GitHub Copilot and will continue to be collected, processed, and shared with Microsoft when you use GitHub Copilot.

FAQ - Cont'd

- How does our collected data gets processed by GitHub?
 - O Billing & Account Management
 - O Produce Aggregated Reports

- How's our collected data used?
 - O To measure the impact it has on the user
 - O Fine Tune ranking & Sorting Algorithms and Prompt Crafting
 - O Detect violation of Acceptable Use Policies.
 - O Developers and their use of developer tools and services.

FAQ - Cont'd

- Telemetry?
 - O No, Telemetry is not available

- Organization-wide policy management,
 - O Yes, Policy settings can be implemented at an Organization level.

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

- Http Proxy Support
 - O Yes, HTTP proxy support via custom certificates available

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 enterpriseready, 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/



Troubleshooting

Common Issues

- GitHub's Status Page
- Update GitHub Copilot Extension
- Error: "GitHub Copilot could not connect to server. Extension activation failed"
- GitHub Copilot not suggesting multiple lines of code
- Open Discussions on Copilot Community with relevant files

Viewing Logs for GitHub Copilot

Supported IDEs









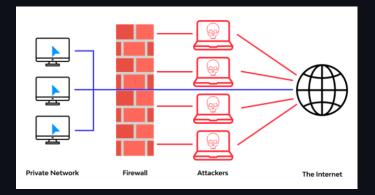
Visual Studio

Visual Studio Code Vim/Neovim

Jet Brains

Firewall settings

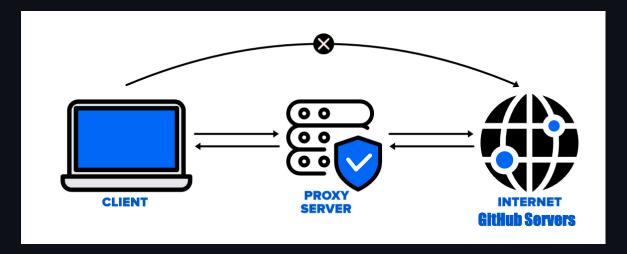
- Organization employs security measures like a firewall or proxy server
- Allowlist domain urls, specific ports & protocols
- Interaction with Remote Learning Model
- Trusted domain URLs



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

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

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

Certificate-related errors

- Errors: "certificate signature failure", "custom certificate", or "unable to verify the first certificate"
- GitHub Copilot only supports custom certificates if you use Github Copilot for Business
- Corporate proxy configure different proxy and does not intercept
- Certificates installed on machine, and GitHub Copilot find certificates
- Ignore Certificate Errors in Proxy settings
 Warning: Ignoring certificate errors can cause security issues and is not recommended

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"



Integrations

GitHub REST API for Copilot for Business

- 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 actions taken by users at an Organisation & Enterprise level.

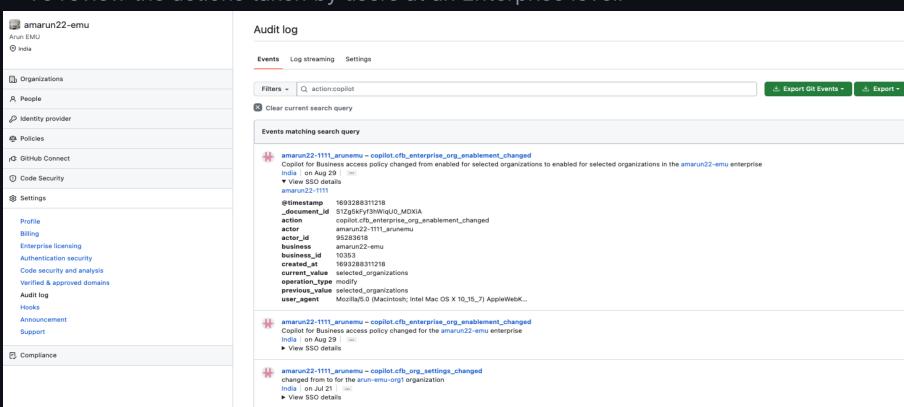
- Organization's Copilot settings and policies
 - O Changes to the Enablement Policy
 - O Org Settings changes
 - O Enterprise settings changes
- Addition or removal of seats
 - O Seat management changed
 - O Seat assignment reused
 - O Seat assignment refreshed
- Editor chat Settings
- Code Referencing Settings

Audit Log Events

cfb_enterprise_settings_changed	copilot.cfb_seat_cancelled
copilot.cfb_enterprise_org_enablement_ch anged	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

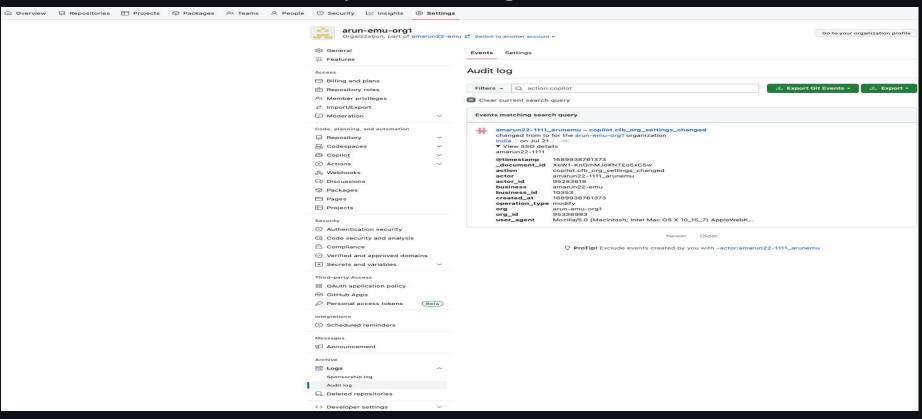
Audit Logs

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



Audit Logs

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





Thank you

Stay in Touch: eric.greene@atmosera.com

https://www.atmosera.com