

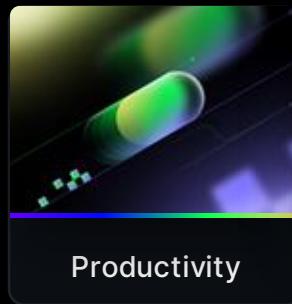
# GitHub Administration Workshop



Enterprise



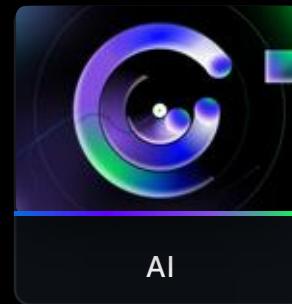
Security



Productivity



Collaboration



AI

## Objectives

- ✓ Detail differences between GitHub Enterprise products
- ✓ Decide which permissions should be applied
- ✓ Familiarity with enterprise level policies
- ✓ Explain how security access features work (SSO, SCIM, IP allow lists, etc.)
- ✓ Understand authentication methods for integration points

## Objectives

- ✓ Understand how licensing works in GitHub Enterprise
- ✓ Determine proper organization structure and settings
- ✓ Manage teams and assign permissions to protected resources
- ✓ Organize repositories in an organization and manage settings
- ✓ Ability to audit your enterprise account
- ✓ Introduction to GitHub Actions and related topics

## Agenda: Part 1

### GitHub Enterprise overview

- Platforms
- Permission flow
- Enterprise administration
- Settings walkthrough

### GitHub organizations

- Overview
- Administration and policies
- Settings walkthrough

## Agenda: Part 2

### GitHub repositories

- Overview
- Repository administration
- Branch protection and CODEOWNERS file
- Settings walkthrough

### Additional topics

- API overview and authentication methods
- GitHub Actions
- GitHub Marketplace

# GitHub Enterprise Overview



**Platforms**

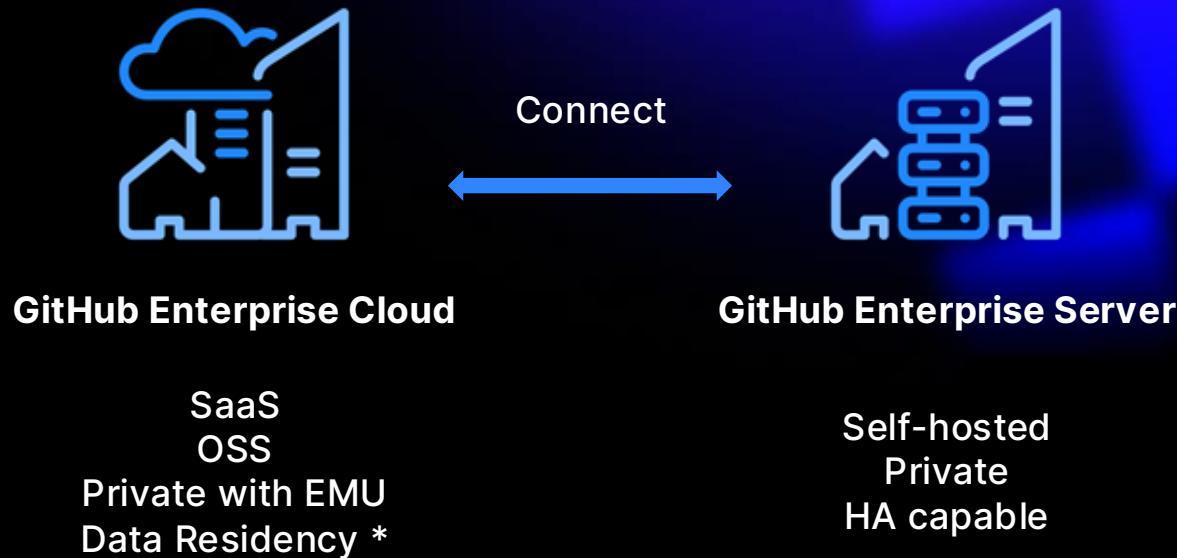


**Permissions flow**



**Enterprise administration**

# Platforms





## GitHub Enterprise Cloud

- ✓ Software as a Service (SaaS) offering
- ✓ Security and policy features
- ✓ Fast onboarding of new collaborators
- ✓ Reduced operations overhead
- ✓ Public repositories are visible
- ✓ Private repositories are not accessible
- ✓ Privacy is configured by enterprise, organization, team or individual level



## GitHub Enterprise Cloud + EMUs

- ✓ GHEC with centralized user and team management (customer IdP)
- ✓ Enterprise Managed Users (EMUs) cannot move code from a private repository
- ✓ EMU activities are recorded in the GitHub audit log



## GitHub Enterprise Server

- ✓ Self-hosted on customer's network
- ✓ Multiple hypervisor options
- ✓ Subdomain isolation to mitigate XSS attacks
- ✓ Outbound web proxy for increased security
- ✓ Isolated user accounts
- ✓ Near feature parity with GitHub Enterprise Cloud
- ✓ GitHub Connect for license sync and other features

# Billing and Plans

<b>GitHub Plans</b>	<b>Enterprise Add-ons</b>	<b>Pay per use</b>
GitHub Free (GitHub.com)	GitHub Advanced Security	GitHub Actions Cloud Runners
GitHub Teams (GitHub.com)	GitHub Copilot Business	GitHub Packages
GitHub Enterprise (Cloud or Server)	GitHub Copilot Enterprise	Codespaces Marketplace pay-per-use apps Git LFS Project sponsorship

# GitHub Enterprise Overview



**Platforms**

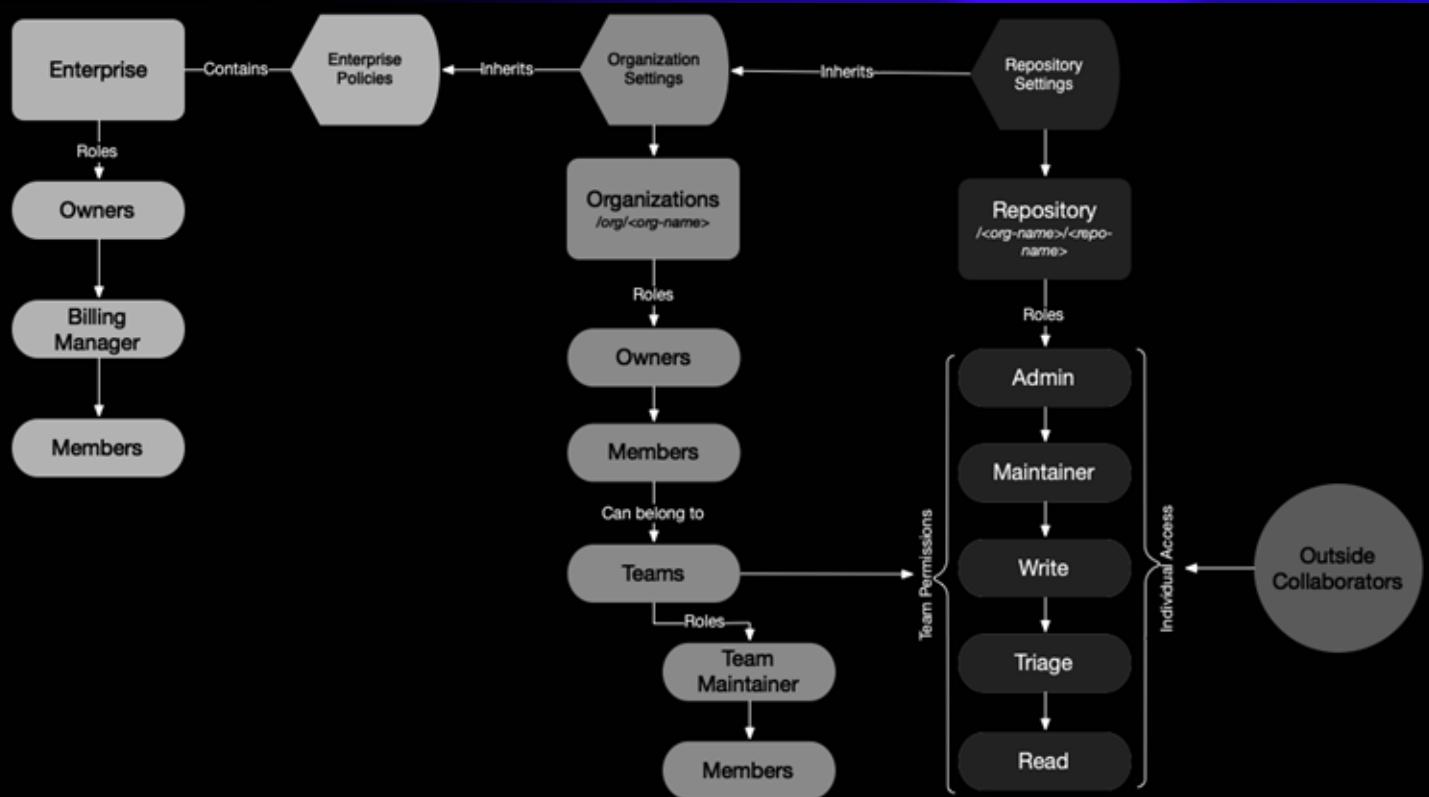


**Permissions flow**

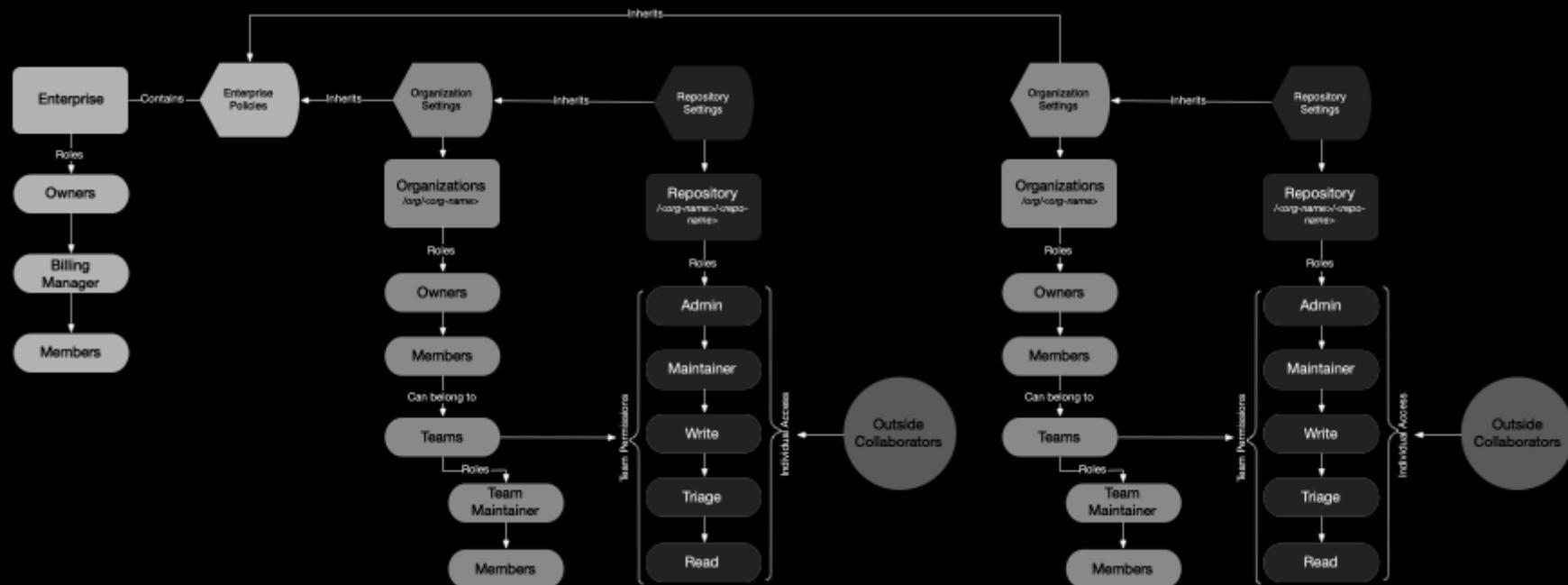


**Enterprise administration**

# Permissions Flow



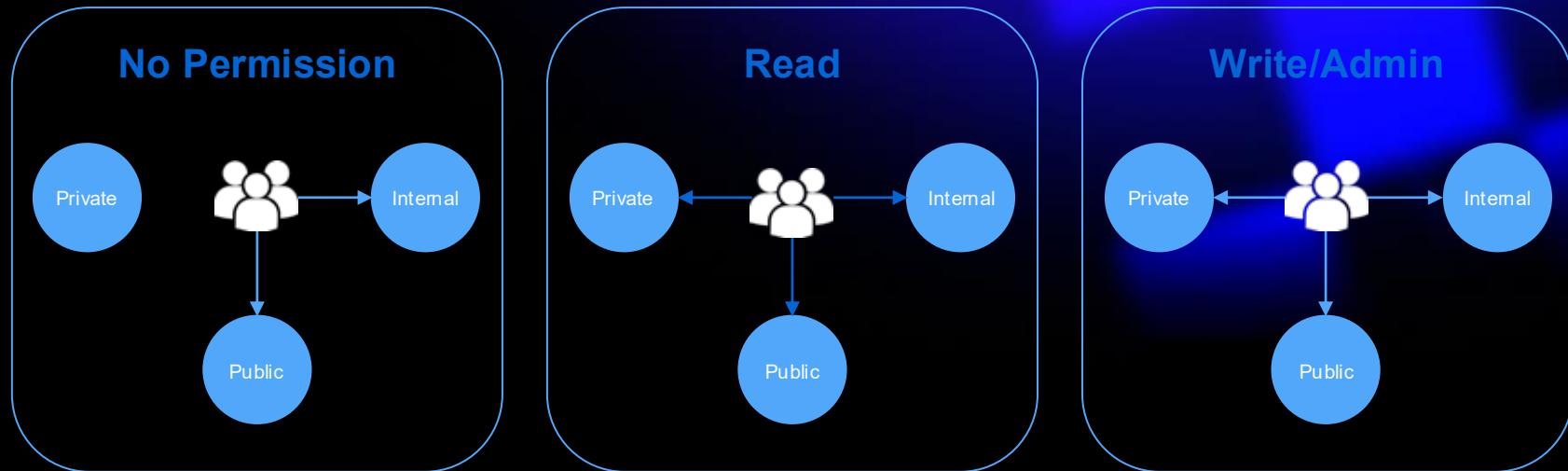
# Permissions Flow - multiple orgs



## Repository Visibility

- Public - Anyone on the internet can access (GHEC only)
- Internal - Organization members in the enterprise can access (inner-source)
- Private - Only accessible by users with explicit permission

# Repository base permissions



# Permission roles

Permission	Description
Read	Read-only access to Code and Actions. Can submit and comment on issues, pull requests, and discussions
Triage	Read-only permissions with the additional ability to manage issues, pull requests, discussions, assignments, and labels
Write	Gives write access to all parts of a repository project with the exception of the repository settings
Maintain	Ability to modify some settings of a repository including topics, enabling repository features, configuring merges and GitHub Pages, pushing to protected branches
Admin	Has full administrative access to all features, settings and configurations of the repository project

# GitHub Enterprise Overview



**Platforms**



**Permissions flow**



**Enterprise administration**

# Identity Providers

## SCIM

User lifecycle management

Dynamic provisioning  
options

## Authentication Options

Focus on top-level  
corporate divisions

Who would benefit from  
learning from others?

## Authentication Methods



SAML



OIDC

- XML-Based assertions over browser HTTP redirects
- Commonly used for Enterprise-related Login
- Widely supported

## Authentication Methods



SAML



OIDC

- Built on top of OAuth2.0
- Uses JWTs
- Supports both browser and API-based flows

# Enterprise Settings Walkthrough



**Share Screen**

# GitHub Organizations Overview



**Structure and ownership**



**Administration and settings**

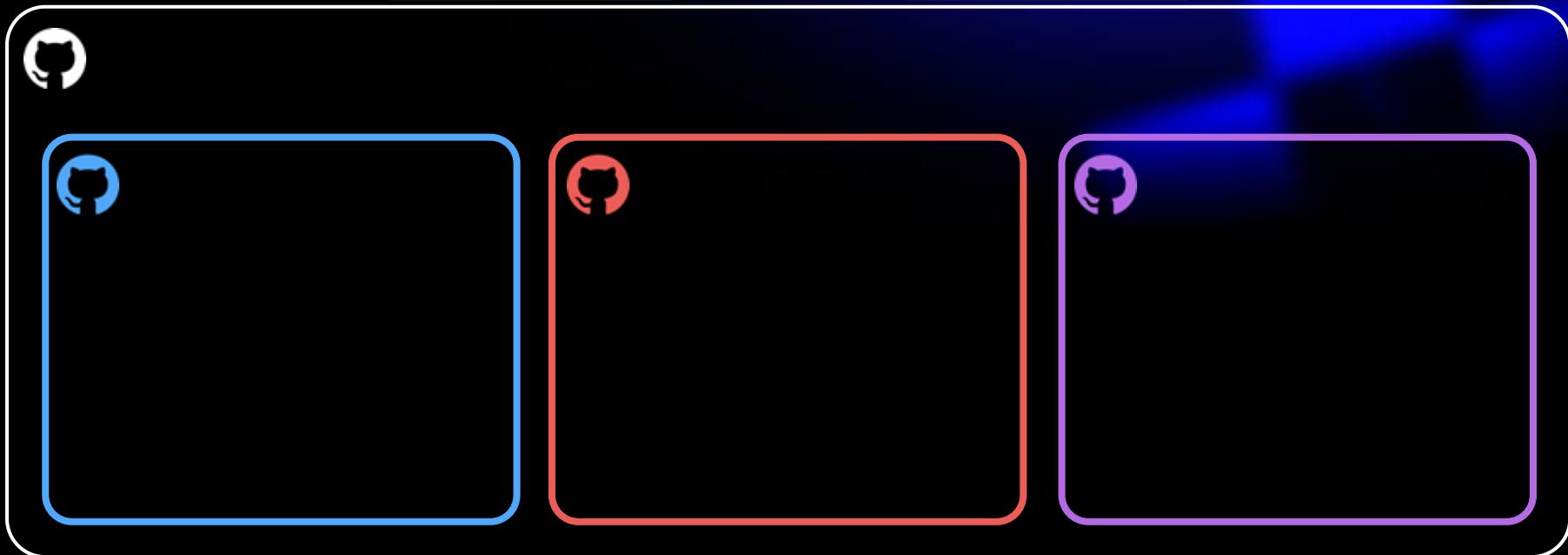
# Everything exists within GitHub (Enterprise)



# Users belong to individuals with their own namespace



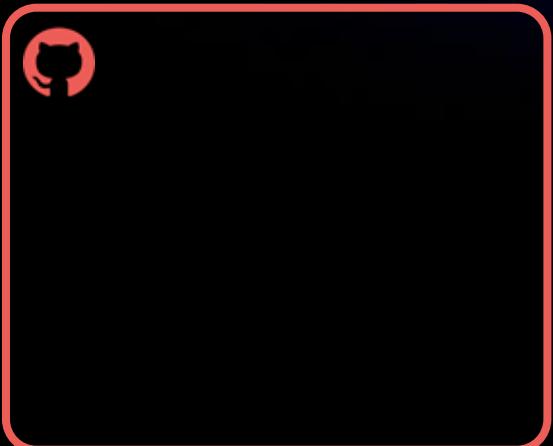
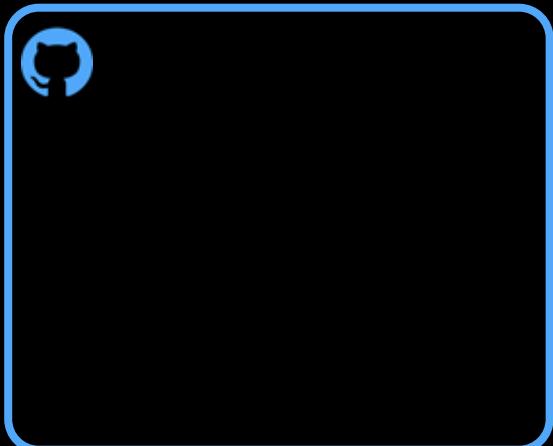
# Organizations have their own namespaces



# Organizations can own repositories



# Users can own repositories



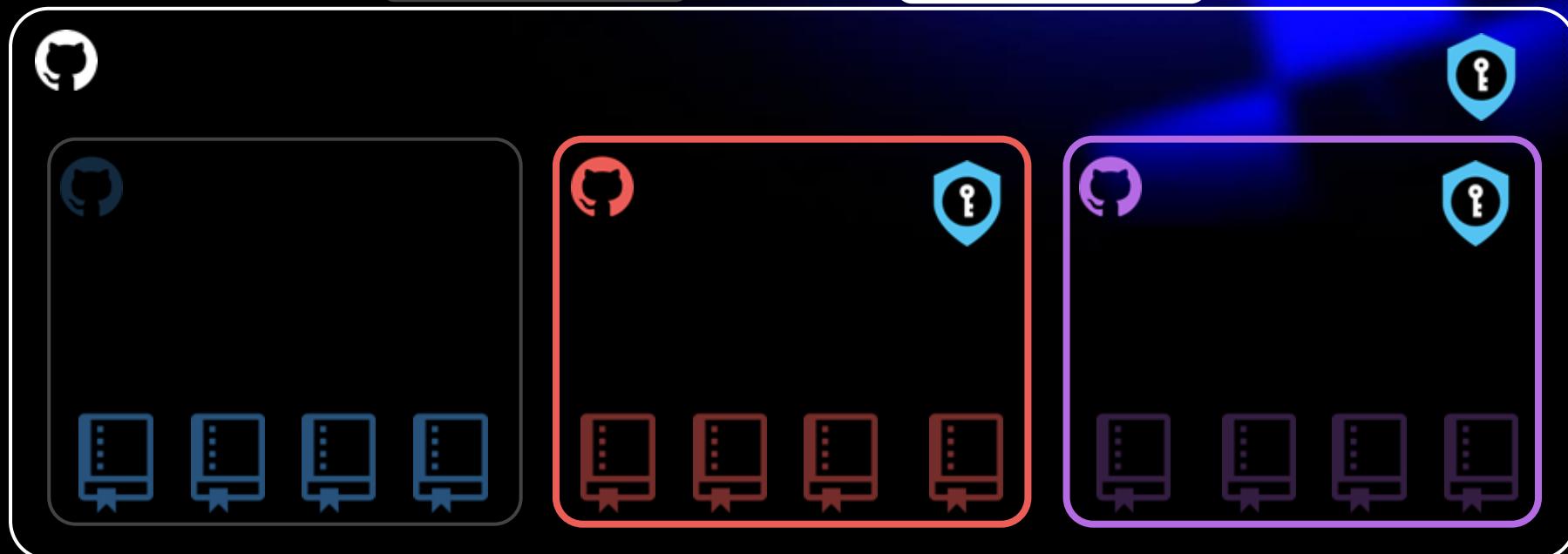
# Users can be members of organizations



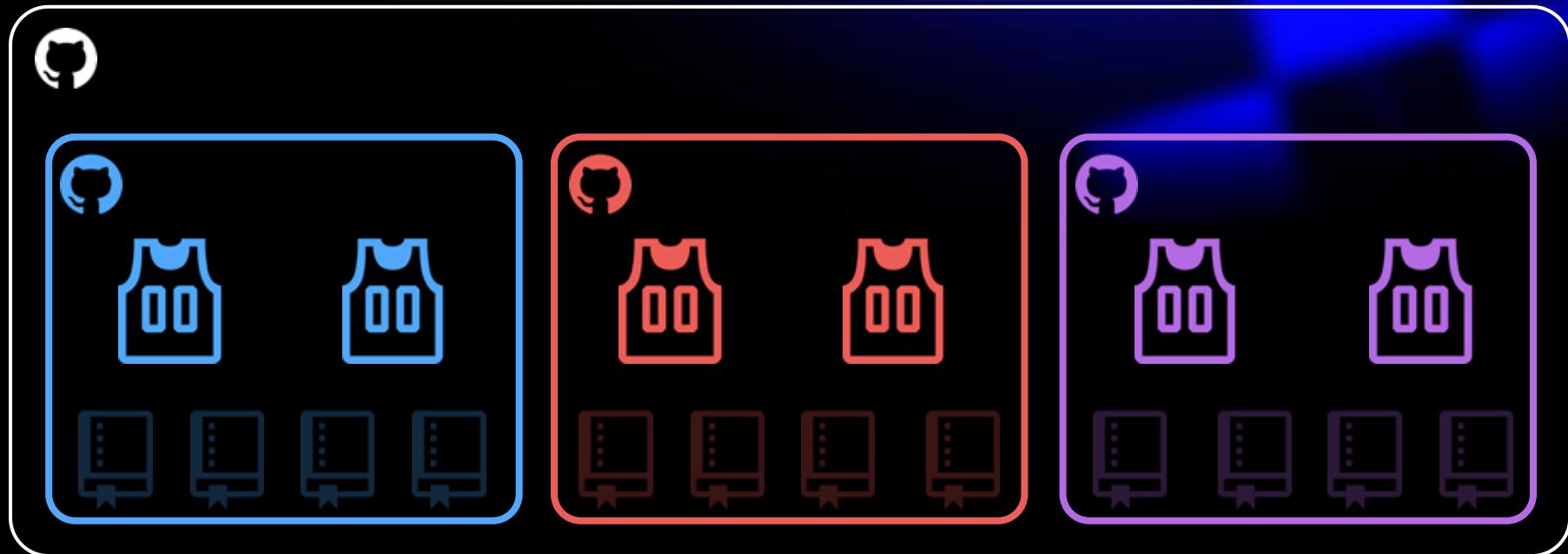
# Users can be members of organizations



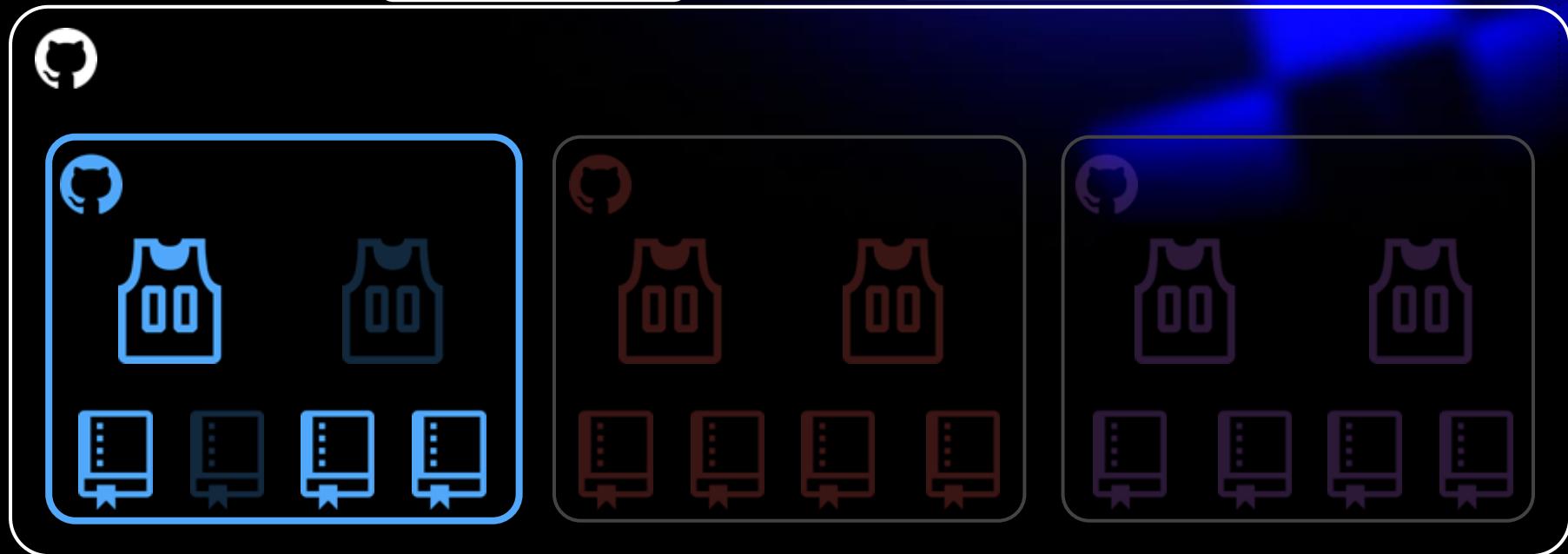
# And the org content can be protected by SSO



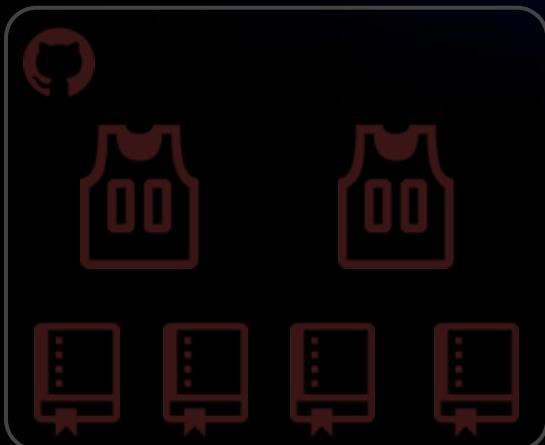
# Teams exist within organizations



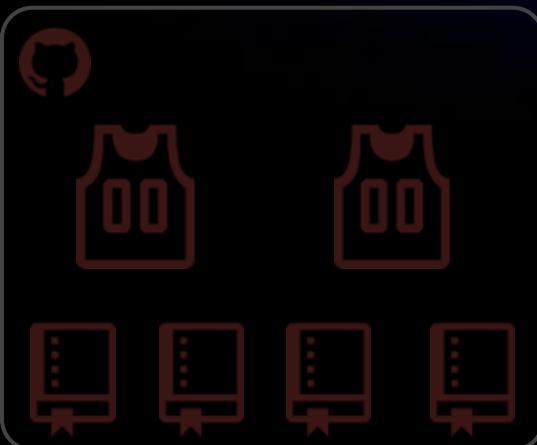
# to apply permissions and group repositories together



# and facilitate communication



# How can these users participate in Java discussions?



# Multiple Orgs Considerations

## Cost Centers

For Chargebacks Per Business Unit

Separate budgets

## Administration Units

Different Owner Teams  
Unique security postures  
Separate identity \ governance access model

## People Related

External Collaboration Boundaries  
Mid-step of acquires

# Enterprise Best Practices

## Organizations

Minimize organizations  
(ideally one) Reference

Have multiple owners

Enable SSO and 2FA

## Teams

Focus on top-level  
corporate divisions

Who would benefit from  
learning from others?

# GitHub Organizations Overview



**Structure and ownership**



**Administration and settings**

<https://github.com/alltheavo>

Repositories

alltheavo

Overview Repositories 72 Projects 2 Packages Teams 26 People 53 Security ...

Follow

alltheavo  
All the avocado.  
1 follower https://alltheavo Part of Avocado Corp.

Repositories

Find a repository... Type Language Sort New

Packages

Teams

People

Organization information

View as: Public

You are viewing the README and pinned repositories as a public user.

# Reasons to use teams



Collaboration



Inner-source



Onboarding and  
offboarding

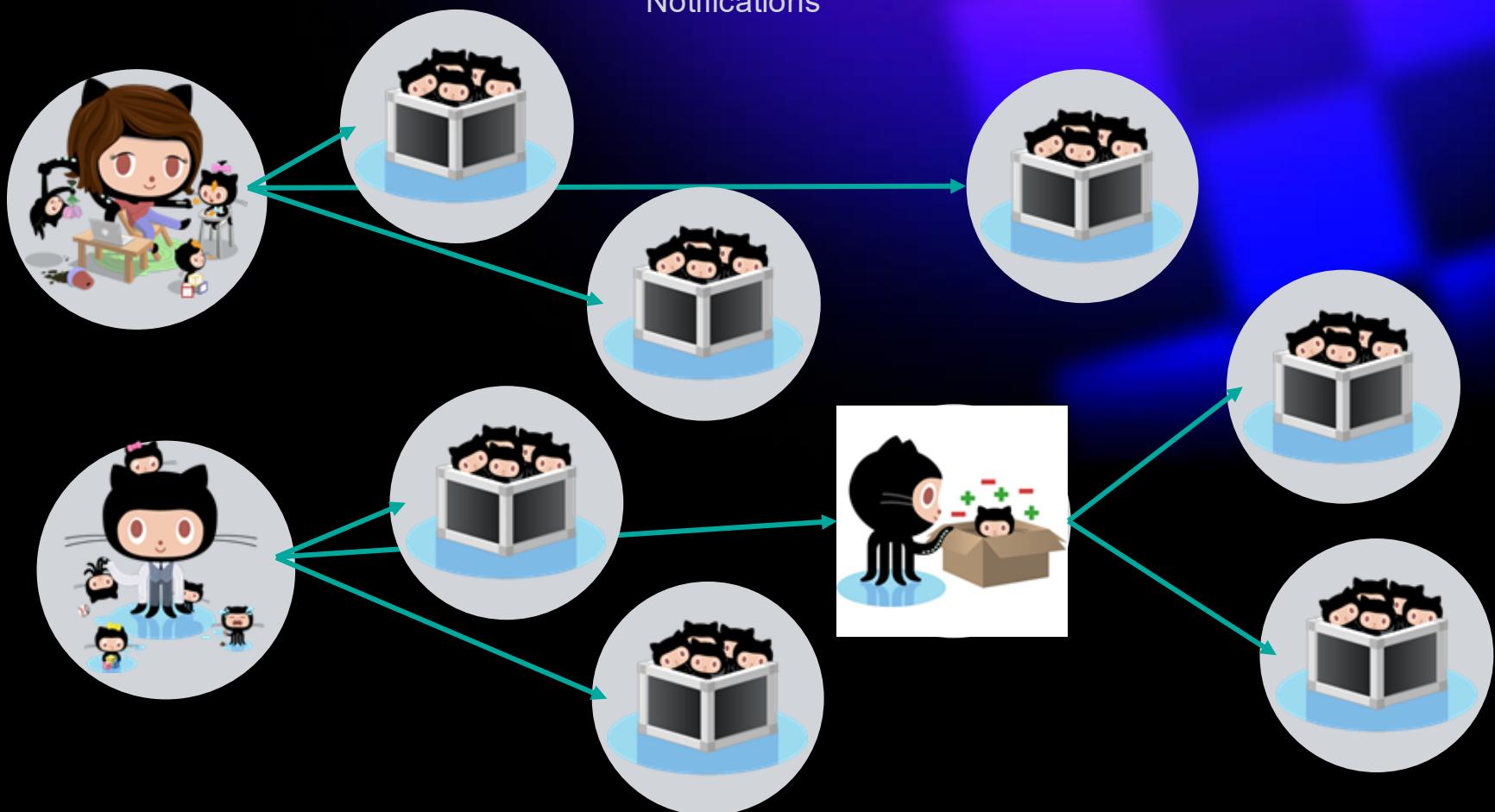


Security

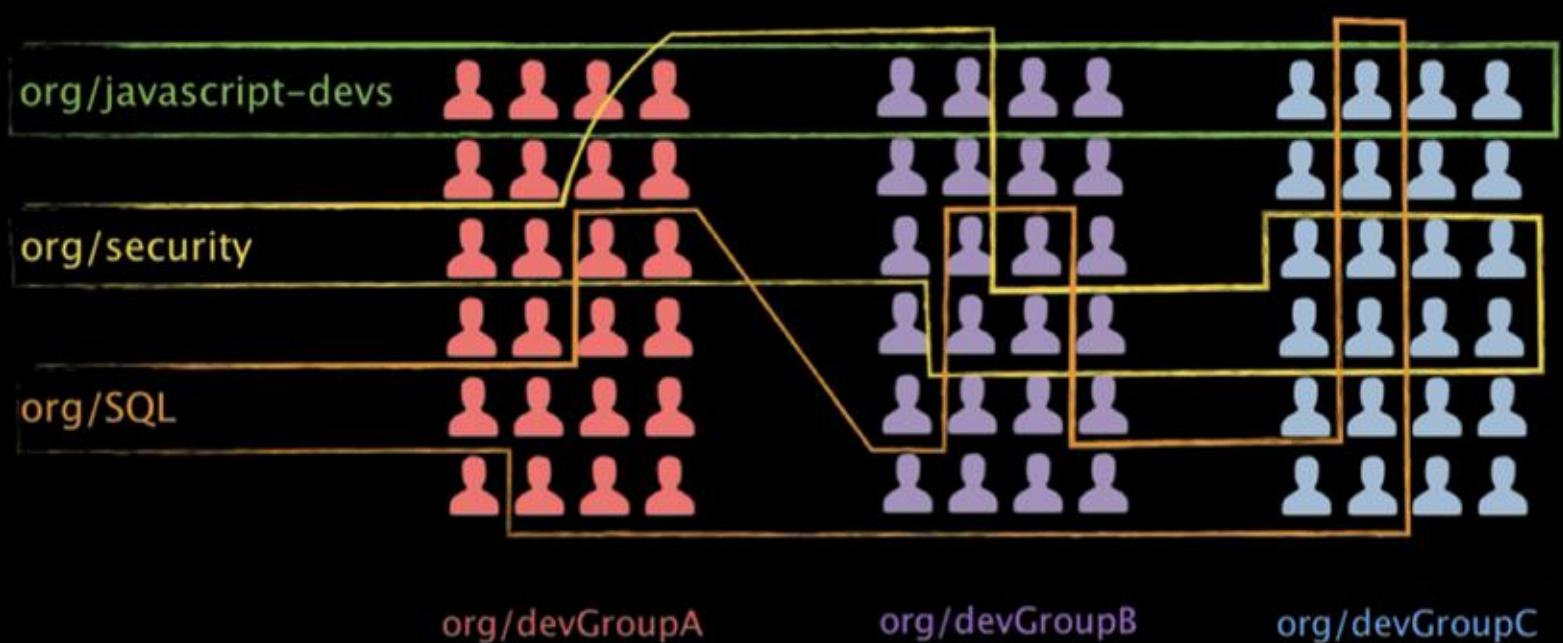
## Managing Nested Teams

- ✓ Parent teams can have multiple child teams
- ✓ Child teams inherit parent's permissions
- ✓ Child teams receive parent's notifications
- ✓ Users in a child team belong to the parent team

Permissions &  
Notifications



# Team best practices



## Configuring Teams with Team Sync

- ✓ Integrate IdP to synchronize groups to GitHub teams
- ✓ Manage rights and permissions in one place
- ✓ Can't connect to parent team if using nested teams

## Configuring Teams with GitHub

-  Manage membership within GitHub
-  Keep teams open to reduce friction

<https://github.com/alltheavo>

The screenshot shows the GitHub profile page for the organization 'alltheavo'. The top navigation bar includes links for Overview, Repositories (72), Projects (2), Packages, Teams (26), People (53), Security, Insights, and Settings. A search bar at the top right says 'Type / to search or ask Copilot'. Below the header, the organization's profile card features a circular logo with an avocado icon, the name 'alltheavo', the tagline 'All the avocado.', and stats for 1 follower, a website at <https://alltheavo>, and 'Part of Avocado Corp.'. A blue box highlights the 'Projects' link in the navigation bar. Another blue box highlights the 'Insights' link in the navigation bar. At the bottom, there are sections for 'Repositories' (with a search bar and dropdowns for Type, Language, Sort, and a 'New' button) and 'View as: Public'. A message at the bottom right states 'You are viewing the README and pinned repositories as a public user.'

## Insights - Activity Overview

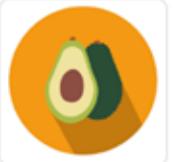
- ✓ High level insights for pull requests, issues, and contributions
- ✓ Understand contribution trends
- ✓ Use the API and dashboards (Grafana, ELK) to visualize more metrics

<https://github.com/alltheavo>

alltheavo

Type  to search or ask Copilot | > | + | ○ | ⚡ | 📁 | 🗂 | 🌐 | 🛡 | 🎨 | 🏃

Overview Repositories 72 Projects 2 Packages Teams 26 People 53 Security Insights Settings

 **alltheavo**  
All the avocado.  
1 follower <https://alltheavo> Part of Avocado Corp.

Follow

Repositories

Find a repository... Type Language Sort New

View as: Public

You are viewing the README and pinned repositories as a public user.

Security

## Manage Organizations at Scale

- ✓ Use repository policy to apply governance
- ✓ Create custom organization roles for stakeholders
- ✓ Setup Audit Logs (+ bonus for whoever needs SOC)

# Organization Settings Walkthrough



**Share Screen**

# GitHub Repositories Overview

-  **Administration**
-  **Branch protections and CODEOWNERS**
-  **Rulesets and Policies**

<https://github.com/githubuniverseworkshops/workshop-automate-your-workflow>

The screenshot shows a GitHub repository page for 'workshop-automate-your-workflow'. The page includes a navigation bar at the top with links for Code, Issues, Pull requests, Actions, Security, Insights, and Settings. Below the navigation bar is the repository title 'workshop-automate-your-workflow' and a status badge indicating it's Public and generated from 'githubuniverseworkshops/template-workshop'. The main content area displays a list of files: 'main' branch, 1 branch, 0 tags. The files listed are: Rowena Foo - Add Universe Slides (f5e795d · 4 years ago · 21 Commits), .github/workflows - Create super-linter.yml (4 years ago), CODE\_OF\_CONDUCT.md - Initial commit (4 years ago), README.md - Update README.md (4 years ago), UniversePresentation.pdf - Add Universe Slides (4 years ago), workshop\_instructions1.md - Update image of hands on activity (4 years ago), and workshop\_instructions2.md - Fix wording and spell check (4 years ago). Below the file list is a section titled 'About' containing a brief description: 'Automate your workflow using GitHub Actions and GitHub Packages.' It also lists links to 'githubuniverse.com/professional-serv...', 'github-universe-2020-workshop', 'Readme', 'Code of conduct', 'Activity', 'Custom properties', '31 stars', '3 watching', '11 forks', and a 'Report repository' button. A 'Releases' section indicates 'No releases published' and a 'Packages' section indicates 'No packages published'. At the bottom, there's a 'Contributors' section showing 3 contributors. Blue callout boxes with arrows point to the 'Nav bar', 'Files', and 'README' sections.

Nav bar

Files

README

About

Automate your workflow using GitHub Actions and GitHub Packages.

[githubuniverse.com/professional-serv...](#)

[github-universe-2020-workshop](#)

[Readme](#)

[Code of conduct](#)

[Activity](#)

[Custom properties](#)

[31 stars](#)

[3 watching](#)

[11 forks](#)

[Report repository](#)

Releases

No releases published

[Create a new release](#)

Packages

No packages published

[Publish your first package](#)

Contributors 3

githubuniverseworkshops / workshop-automate-your-workflow

Type [?](#) to search or ask Copilot

Code Issues Pull requests Actions Security Insights Settings

**Repository settings**

- General
  - Access
  - Collaborators and teams
  - Team and member roles
  - Moderation options
- Code and automation
  - Branches
  - Tags
  - Rules
  - Actions
  - Webhooks
  - Copilot
  - Environments
  - Codespaces
  - Pages
  - Custom properties
- Security
  - Code security and analysis
  - Deploy keys
  - Secrets and variables
- Integrations
  - GitHub Apps
  - Email notifications
  - Autolink references

## General

Repository name

workshop-automate-your-workflow

Rename

Template repository

Template repositories let users generate new repositories with the same directory structure and files. [Learn more about template repositories.](#)

Require contributors to sign off on web-based commits

Enabling this setting will require contributors to sign off on commits made through GitHub's web interface. Signing off is a way for contributors to affirm that their commit complies with the repository's terms, commonly the [Developer Certificate of Origin \(DCO\)](#). [Learn more about signing off on commits.](#)

## Default branch

The default branch is considered the "base" branch in your repository, against which all pull requests and code commits are automatically made, unless you specify a different branch.

main

Edit

## Social preview

Upload an image to customize your repository's social media preview.

Images should be at least 640x320px (1280x640px for best display).

[Download template](#)

Edit

## Features

Wikis

Wikis host documentation for your repository.

# Managing Repos At Scale

## Rulesets

For Chargebacks Per Business Unit

Separate budgets

## Repo Templates

Different Owner Teams  
Unique security postures  
Separate identity \ governance access model

## People Related

External Collaboration Boundaries

Mid-step of acquires

GitHub suggests to stick to single org if possible. [Reference](#)

# Managing Repos At Scale

## Rulesets

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# GitHub Repositories Overview



**Administration**



**Branch protections and CODEOWNERS**

# Repository Settings Walkthrough



**Share Screen**

# Additional Topics



**API overview**



**Authentication methods**

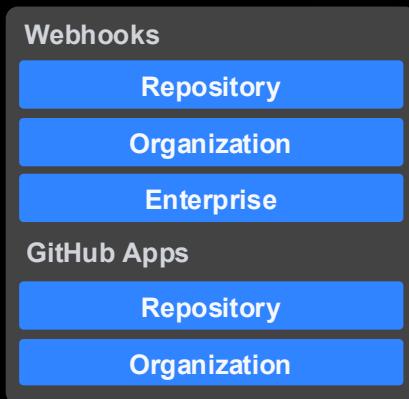


**GitHub Actions overview**



**GitHub Marketplace overview**

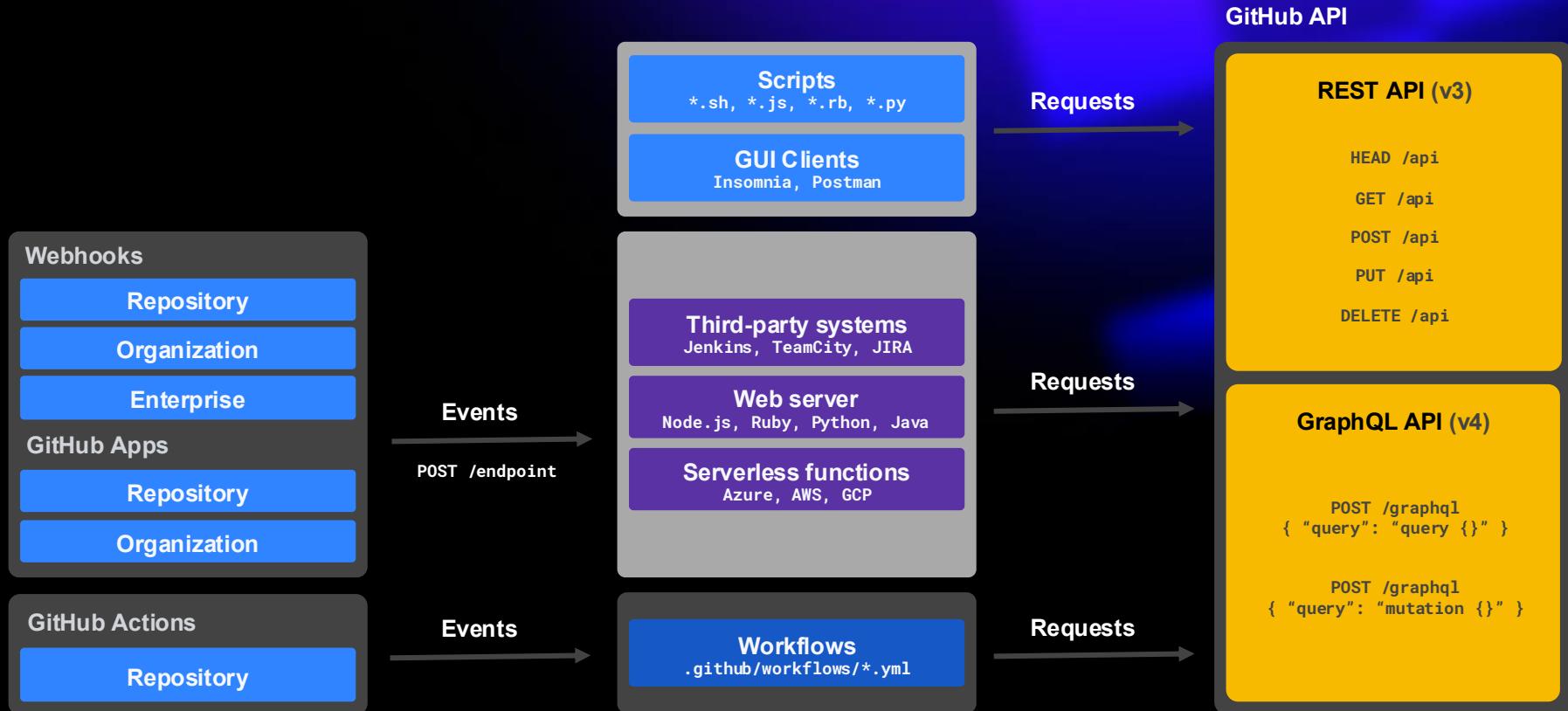
# Core Integration Loop



Integrations



# Core Loop Overview



# Additional Topics



**API overview**



**Authentication methods**

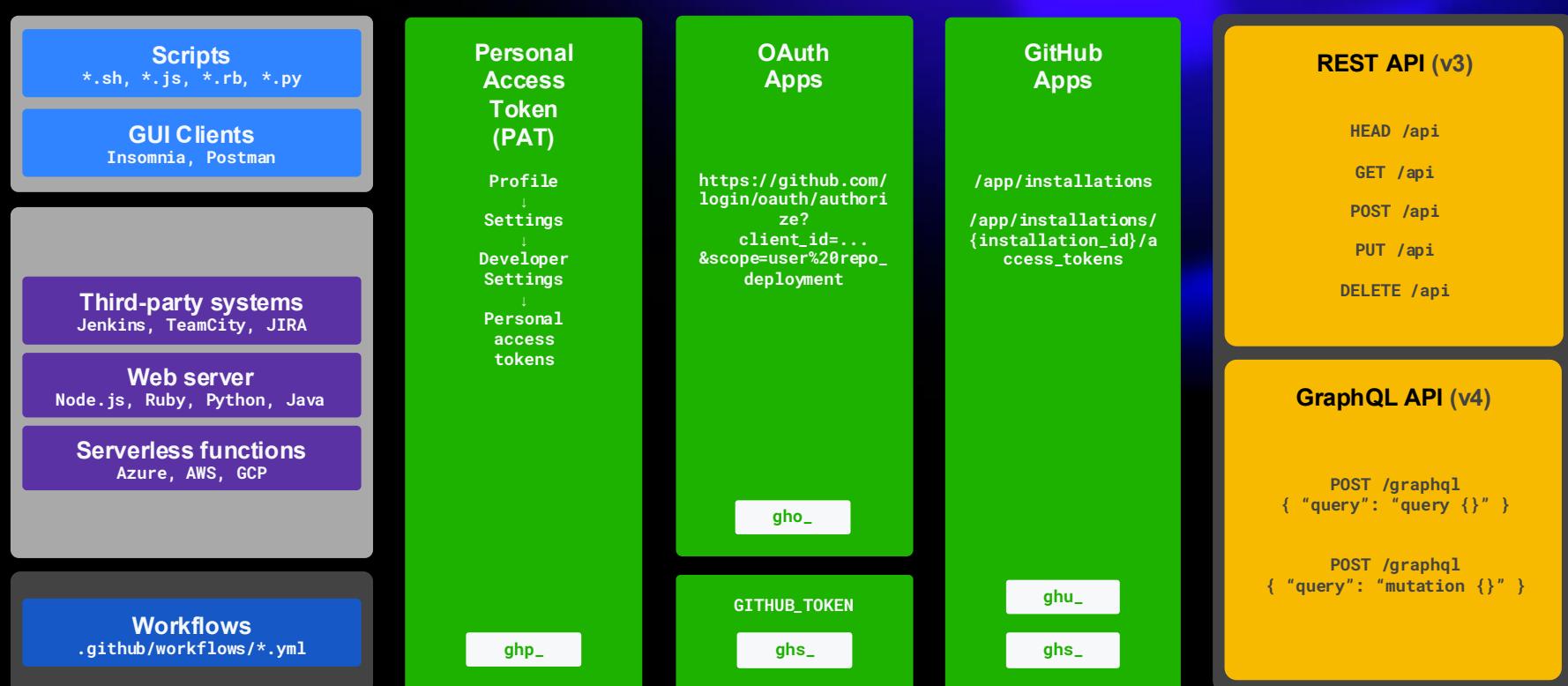


**GitHub Actions overview**



**GitHub Marketplace overview**

# API Authentication



## Authentication Methods



**GitHub Apps**



**OAuth Apps**



**Personal Access Tokens**



**Deploy Keys**



**Machine Users**

- User or organization can register up to 100 GitHub Apps
- GitHub Apps can take actions independent of a user
- GitHub Apps can be installed in a personal account or an organization
- Can act as an OAuth app on behalf of a user
- Up to 15k requests/hour (enterprise)
- Permission changes require approval by the organization where they are installed

## Authentication Methods

- GitHub Apps
  - OAuth Apps
  - Personal Access Tokens
  - Deploy Keys
  - Machine Users
- User or organization can own up to 100 OAuth Apps
  - An OAuth App acts as the authenticated user across all of GitHub
  - An OAuth App can be used as an identity provider by enabling “Login with GitHub”
  - OAuth Apps can act on all of the authenticated user’s resources
  - Up to 5k requests/hour

## Authentication Methods

- GitHub Apps
  - OAuth Apps
  - Personal Access Tokens
  - Deploy Keys
  - Machine Users
- PATs represent yourself only
  - Avoid using “no expiration” when creating a PAT
  - Useful for scripting or cURL requests
  - Do not use with a shared script or workflow
  - Up to 5k requests/hour
  - Removed automatically after one year of no usage

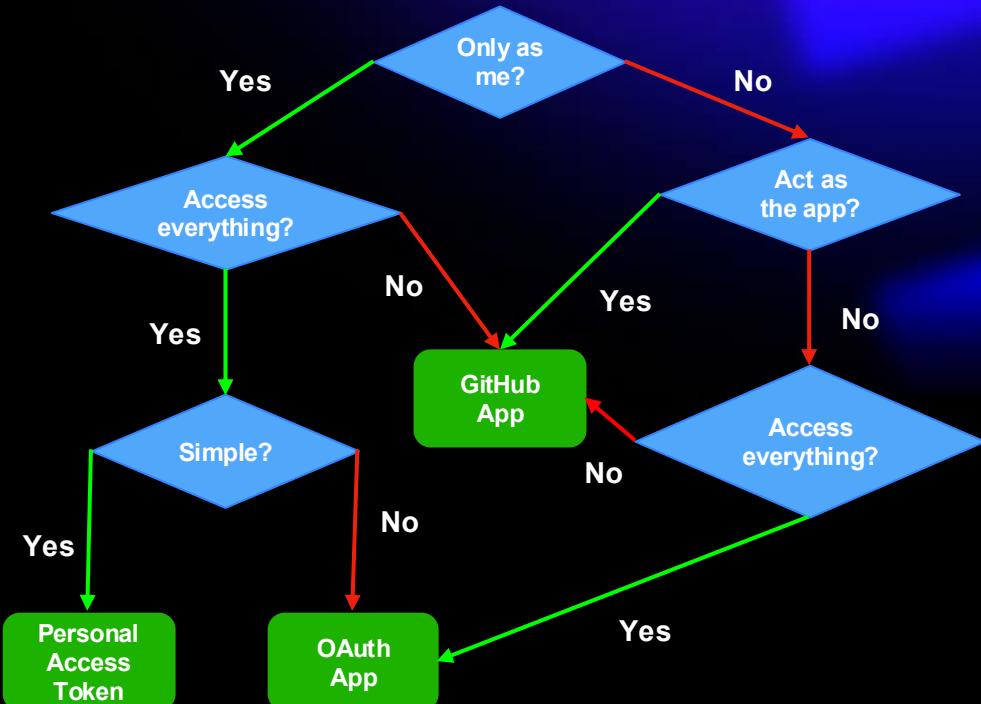
## Authentication Methods

- GitHub Apps
  - OAuth Apps
  - Personal Access Tokens
  - Deploy Keys
  - Machine Users
- Anyone with access to the repository and server can deploy the project
  - Users don't have to change their local SSH settings
  - Deploy keys are read-only by default
  - Deploy keys only grant access to a single repository
  - Deploy keys are not usually protected by a passphrase

## Authentication Methods

- GitHub Apps
- OAuth Apps
- Personal Access Tokens
- Deploy Keys
- Machine Users
  - Anyone with access to the repository and server can deploy the project
  - No (human) users need to change their local SSH settings
  - Multiple keys are not needed
  - Only organizations can restrict machine users to read-only access
  - Machine user keys, like deploy keys, are not usually protected with a passphrase

# Which access method?



# Additional Topics



**API overview**



**Authentication methods**



**GitHub Actions overview**



**GitHub Marketplace overview**

## What is GitHub Actions?



- GitHub Actions is a workflow automation tool
- Workflows stored as YAML files (.yaml)
- Triggered by GitHub webhook events
- Live logging and workflow visualization
- GitHub-hosted or self-hosted runners
- Built-in secret store for increased security

## GitHub-hosted runners



- Ephemeral
- Metered billing (50k free minutes/month)
- Static IP support (with larger runners)
- Azure vnet injection support \*

## Self-hosted runners



- Ephemeral or long-running
- No per-minute charges \*
- Customer assumes administration responsibilities
- Useful for operating systems not supported by GitHub-hosted runners

## GitHub Actions auto-scaling solutions



- Elastic Machines
- Actions Runner Controller  
(Kubernetes based)
- Automatic scale-up/scale-down as workflow demand dictates
- Offered by GitHub as-is

## GitHub Actions policies



- Configure which actions are allowed (enterprise/org/repo)
- Control repo-level runner creation
- Artifact retention period
- Default GITHUB\_TOKEN permissions

## Sharing workflows in an organization



- Create workflow templates in .github repository
- Use GitHub Packages and ghcr.io to share Docker-based actions
- Fetch internally-developed actions from private repositories with app token
- Require organization workflows with rulesets

## GitHub Actions best practices



- Use GITHUB\_TOKEN if possible, GitHub App token when necessary
- Limit token permissions to least privilege
- Use trusted actions only and limit secret access. Pin untrusted action versions
- Use environment secrets with different values per environment

## GitHub Actions best practices



- Create starter workflows for reusability
- Create meaningful README files for your custom actions
- Implement small and focused actions and make use of the Marketplace
- Use GitHub Actions for CI/CD but also for \*Ops

# Additional Topics

- API overview
- Authentication methods
- GitHub Actions overview
- GitHub Marketplace overview

Product Solutions Open Source Enterprise Pricing

Search or jump to... Sign in Sign up

## Enhance your workflow with extensions

Tools from the community and partners to simplify tasks and automate processes

Search for Copilot extensions, apps, and actions



**Featured**

- Copilot Beta
- Apps
- Actions

+ Create a new extension

### Discover apps with Copilot extensions

Your favorite tools now work with GitHub Copilot

 Copilot

**Octopus for GitHub Copilot** Beta

The Octopus extension allows a cloud hosted Octopus instance to be queried via the...

 Copilot

**LambdaTest** Beta

Design, implement and analyze test automation right where you code

 Copilot

**ReadMe API** Beta

Ask questions about the ReadMe API and get help with code, directly in VS code

 Copilot

**Product Science**

Get help with performance optimization techniques to make your code faster

 Copilot

**Pinecone AI**

Developers can leverage this app to gain crucial context or build AI applications with...

 Copilot

**Teams Toolkit**

Create, debug, and deploy Teams apps with Teams Toolkit for GitHub Copilot

# Q&A



# Thank You!

