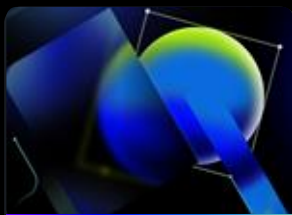


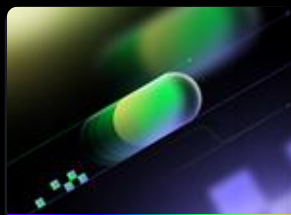
GitHub Administration Workshop



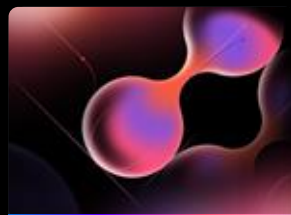
Enterprise



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



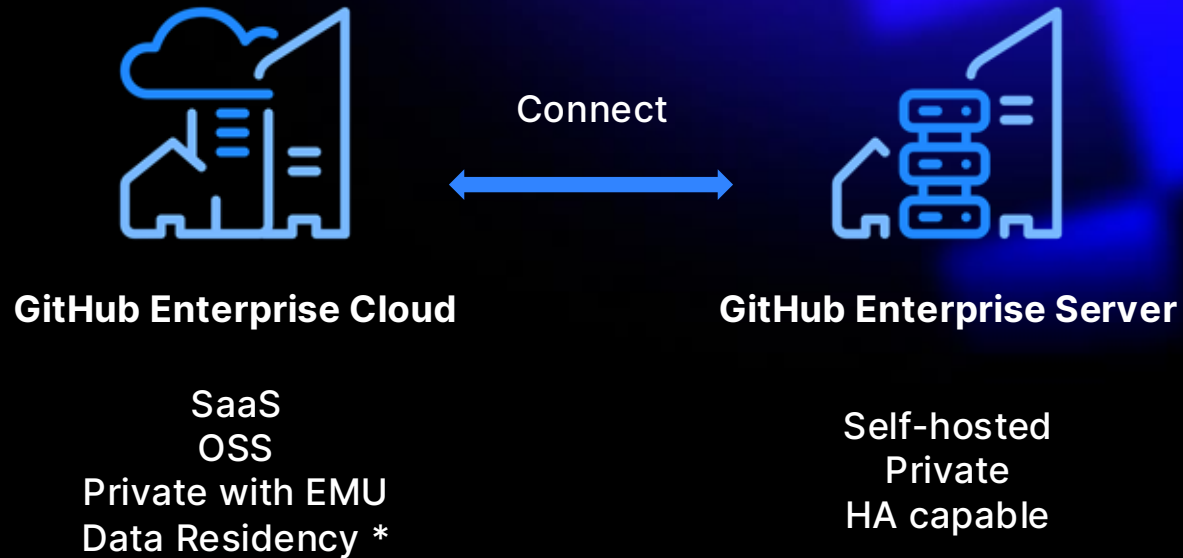
Additional topics

- 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

GitHub Plans

GitHub Free (GitHub.com)

GitHub Teams
(GitHub.com)

GitHub Enterprise (Cloud
or Server)

Enterprise Add-ons

GitHub Advanced
Security

GitHub Copilot Business

GitHub Copilot Enterprise

Pay per use

GitHub Actions Cloud
Runners

GitHub Packages

Codespaces

Marketplace pay-per-use
apps

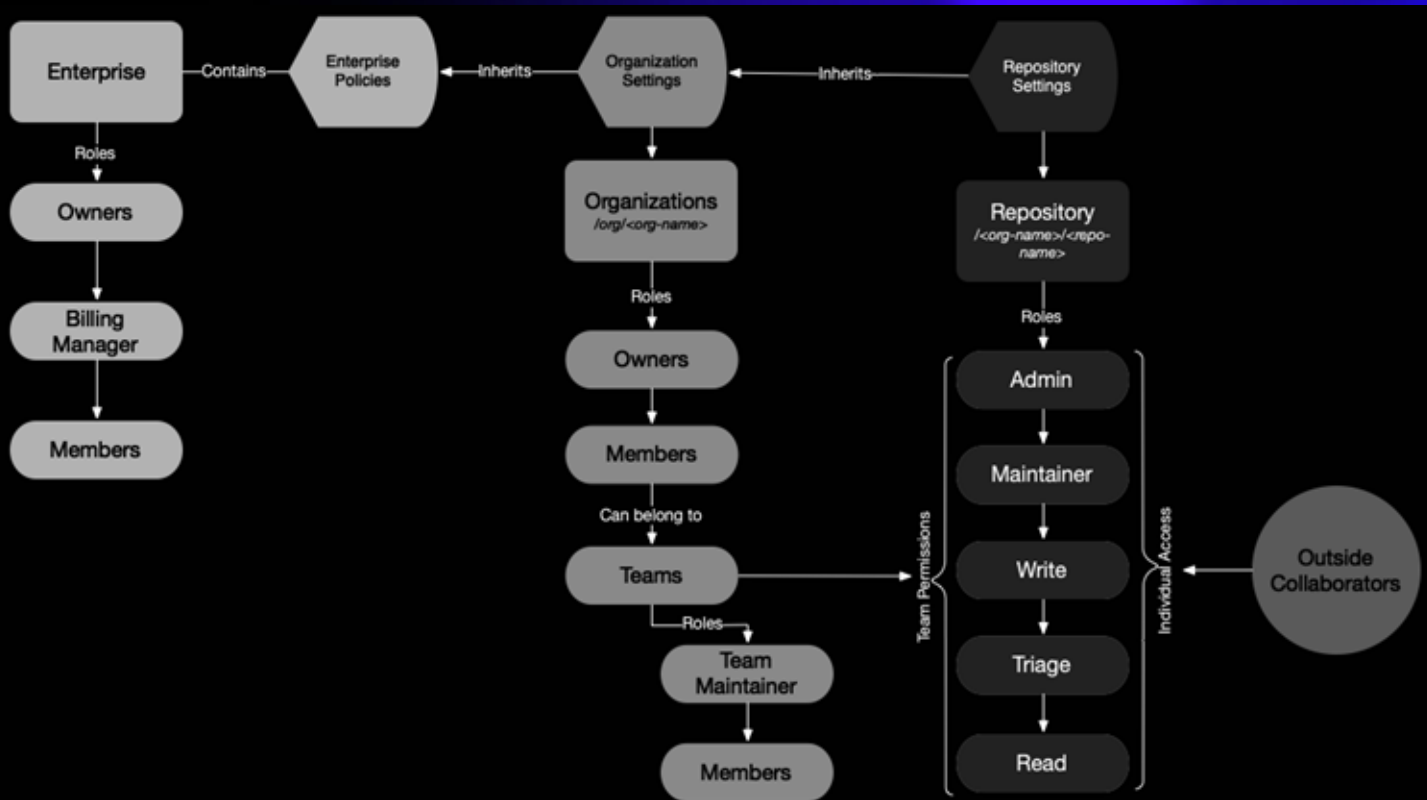
Git LFS

Project sponsorship

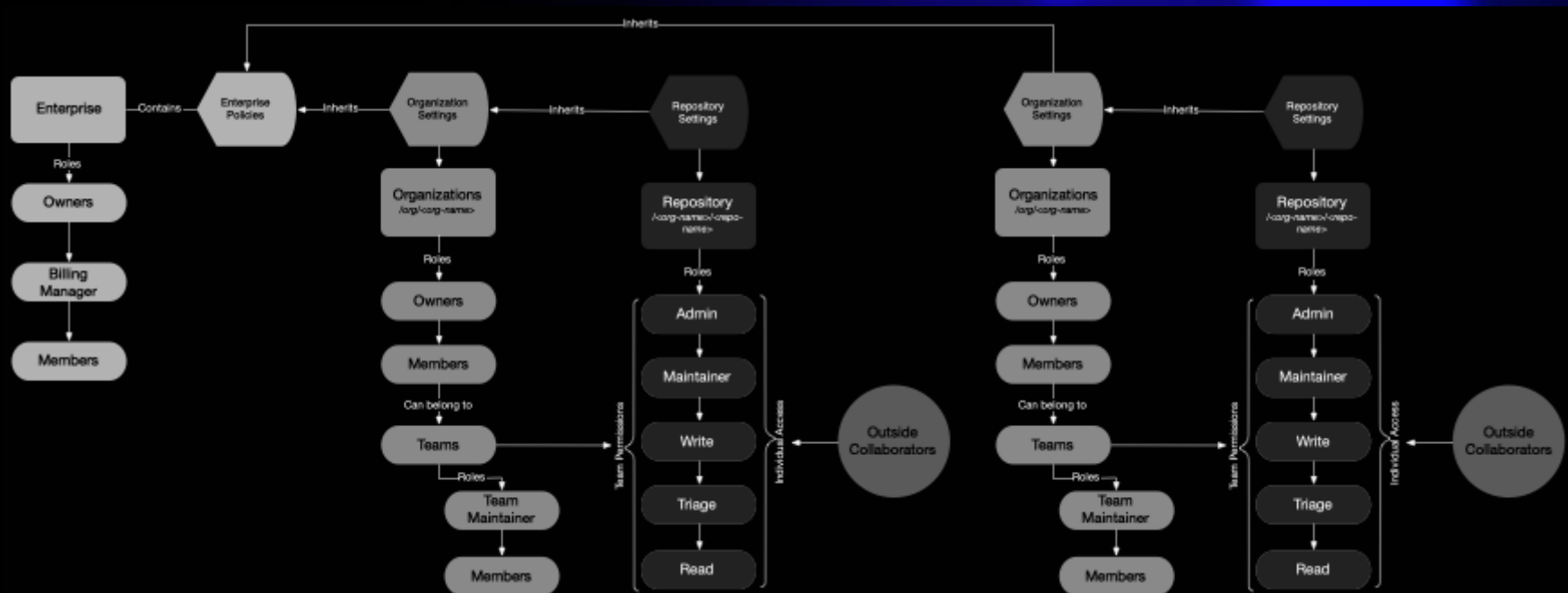
GitHub Enterprise Overview

- Platforms
- ☑ Permissions flow
- Enterprise administration

Permissions Flow



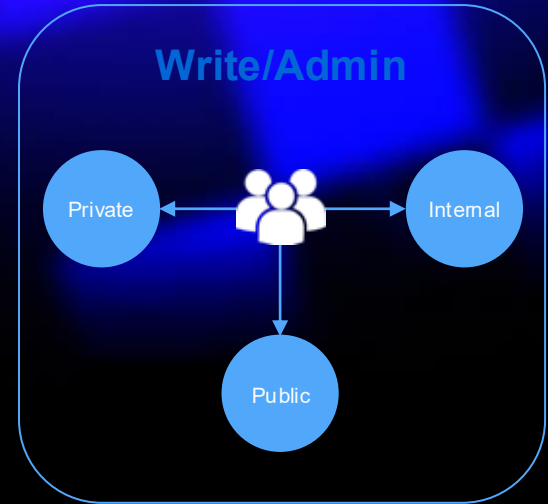
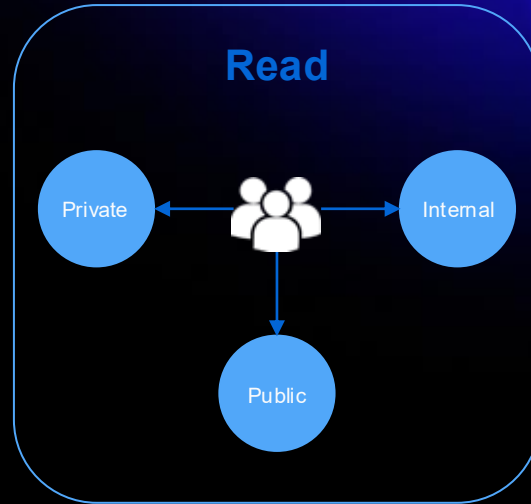
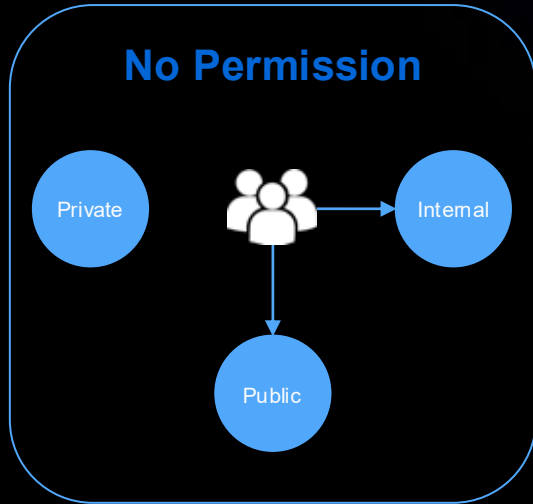
Permissions Flow - multiple orgs



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



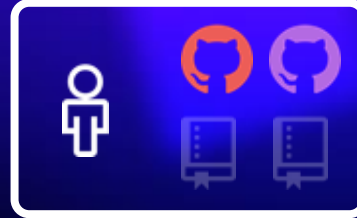
Users can be members of organizations



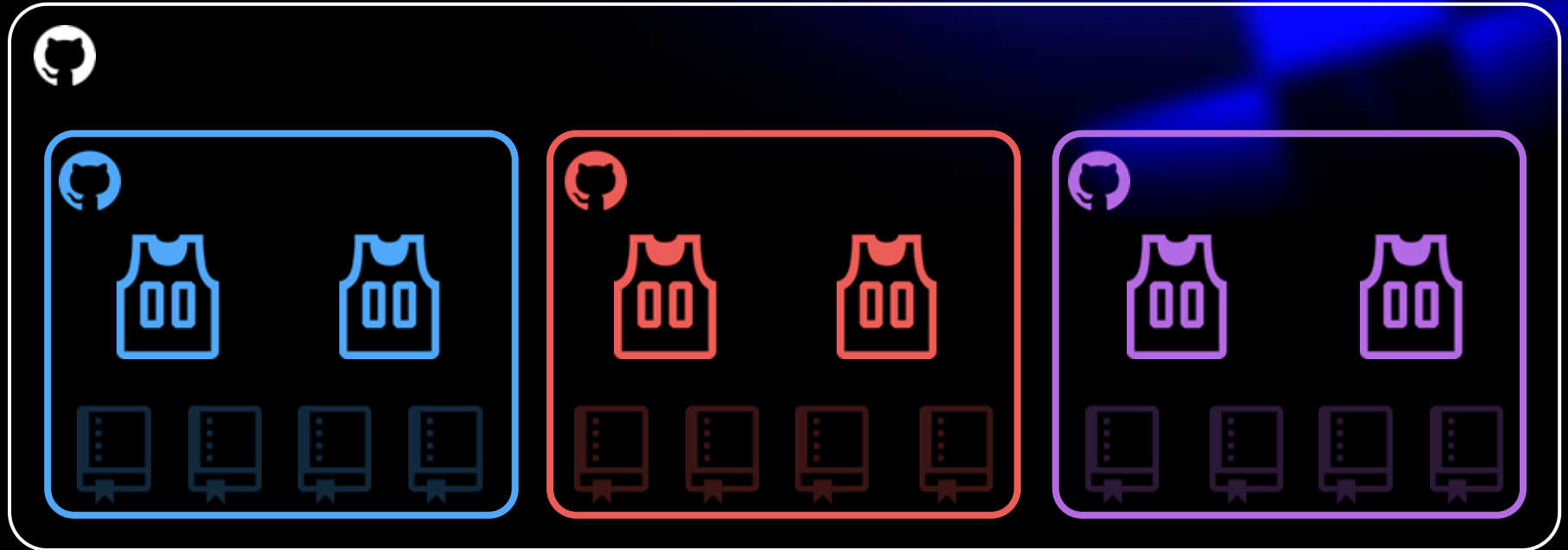
Users can be members of organizations



And the org content can be protected by SSO 



Teams exist within organizations



to apply permissions and group repositories together



and facilitate communication









@blue/java



@blue/2FA







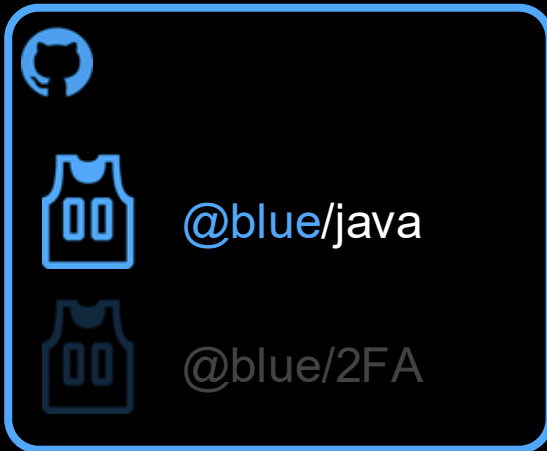


@purple/java



@purple/js

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

The screenshot shows the GitHub profile page for the organization 'alltheavo'. The header includes the GitHub logo, the organization name 'alltheavo', a search bar with the placeholder 'Type / to search or ask Copilot', and navigation icons for repository management, settings, and notifications. Below the header is a navigation bar with tabs: Overview, Repositories (72), Projects (2), Packages, Teams (26), People (53), and Security. The main profile section features the organization's avatar (an avocado), the name 'alltheavo', the tagline 'All the avocado.', '1 follower', the website 'https://allthe.avo', and the description 'Part of Avocado Corp.'. A 'Follow' button is located on the right. Below the profile information is a 'Repositories' section with a search bar 'Find a repository...', filters for 'Type', 'Language', and 'Sort', and a green 'New' button. On the right side of this section, there is a 'View as: Public' dropdown and a note: 'You are viewing the README and pinned repositories as a public user.' Callouts with blue lines point to the 'Repositories' tab, the 'Packages' tab, the 'Teams' tab, the 'People' tab, the organization's profile information, and the 'Repositories' section header.

alltheavo

Search: Type / to search or ask Copilot

Navigation: Overview, Repositories 72, Projects 2, Packages, Teams 26, People 53, Security

Profile: alltheavo, All the avocado., 1 follower, https://allthe.avo, Part of Avocado Corp., Follow

Repositories section: Find a repository..., Type, Language, Sort, New

View as: Public

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

Packages

Teams

People

Organization
information

Reasons to use teams



Collaboration



Inner-source



**Onboarding and
offboarding**

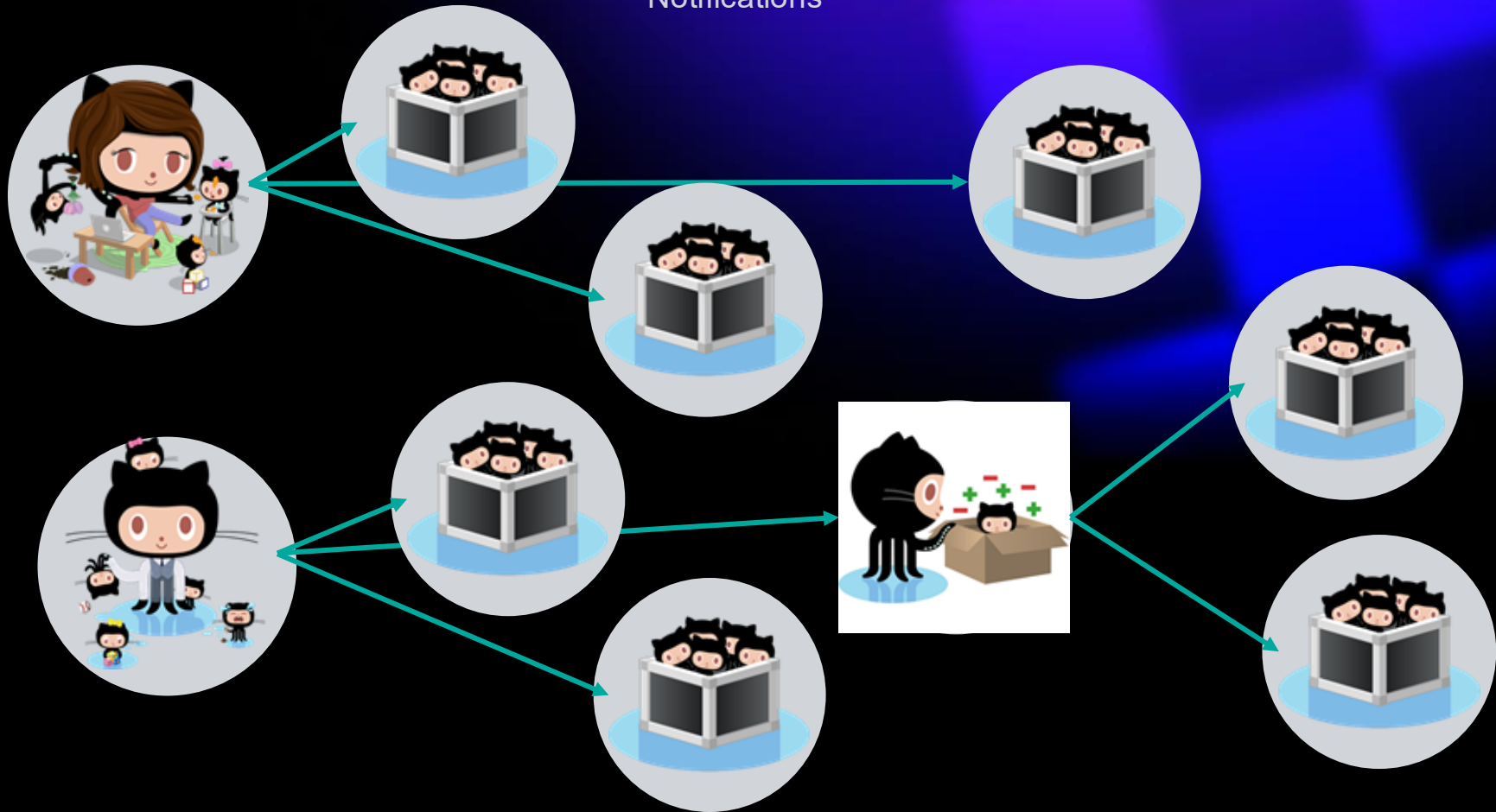


Security

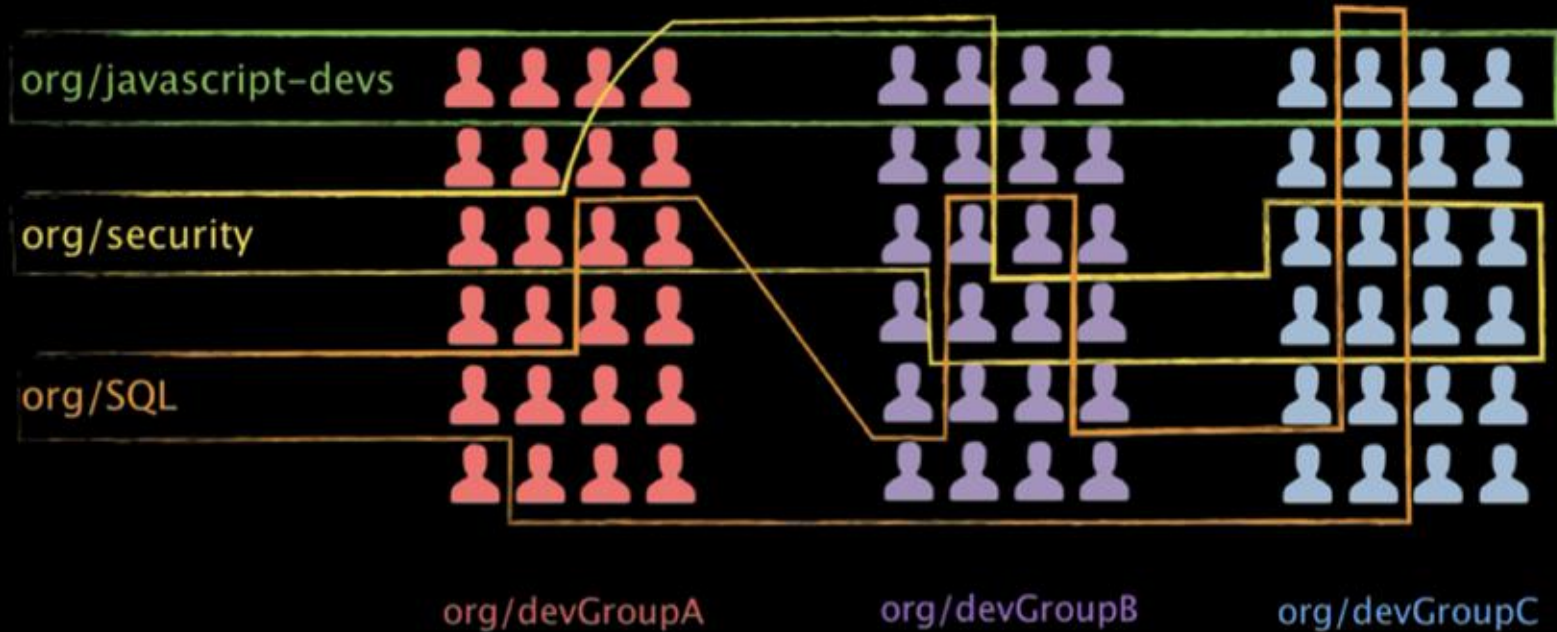
Managing Nested Teams

- ✓ 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>

 alltheavo






[Overview](#) [Repositories 72](#) [Projects 2](#) [Packages](#) [Teams 26](#) [People 53](#) [Security](#) [Insights](#) [Settings](#)



alltheavo

All the avocado.

 1 follower  <https://allthe.avo>  Part of Avocado Corp.

[Follow](#)

[Repositories](#)

[Type](#) [Language](#) [Sort](#) [New](#)



[View as: Public](#)







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




Q 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://allthe.avo>  Part of Avocado Corp.

Follow


 Repositories


Q Find a repository...

Type ▾

Language ▾

Sort ▾

 New

 View as: Public ▾
You are viewing the README and pinned repositories as a public user.

Manage Organizations at Scale

- ✓ Use repository policy to apply governance
- ✓ Create custom organization roles for stack holders
- ✓ 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 the GitHub repository page for 'workshop-automate-your-workflow'. The repository is public and was generated from 'githubuniverseworkshops/template-workshop'. It has 3 watches, 11 forks, and 31 stars. The repository is managed by 'Rowena Foo' and has 21 commits. The file list includes '.github/workflows', 'CODE_OF_CONDUCT.md', 'README.md', 'UniversePresentation.pdf', 'workshop_instructions1.md', and 'workshop_instructions2.md'. The README is titled 'Automate your workflow using GitHub Actions and GitHub Packages' and is authored by '@stebje @rwnfoo'. The right sidebar shows repository metadata, including releases, packages, and contributors.

Nav bar

Files

README

Metadata, releases, packages, contributors

- 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

Repository settings

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

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](#)

GitHub Repositories Overview

- Administration
- ☑ Branch protections and CODEOWNERS

Repository Settings Walkthrough

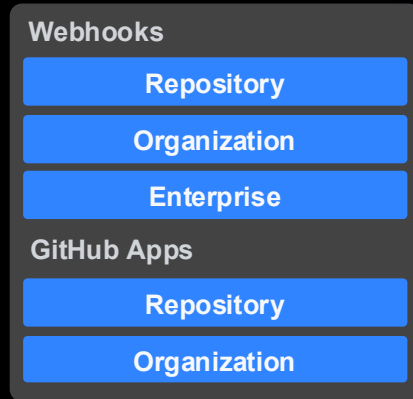


Share Screen

Additional Topics

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

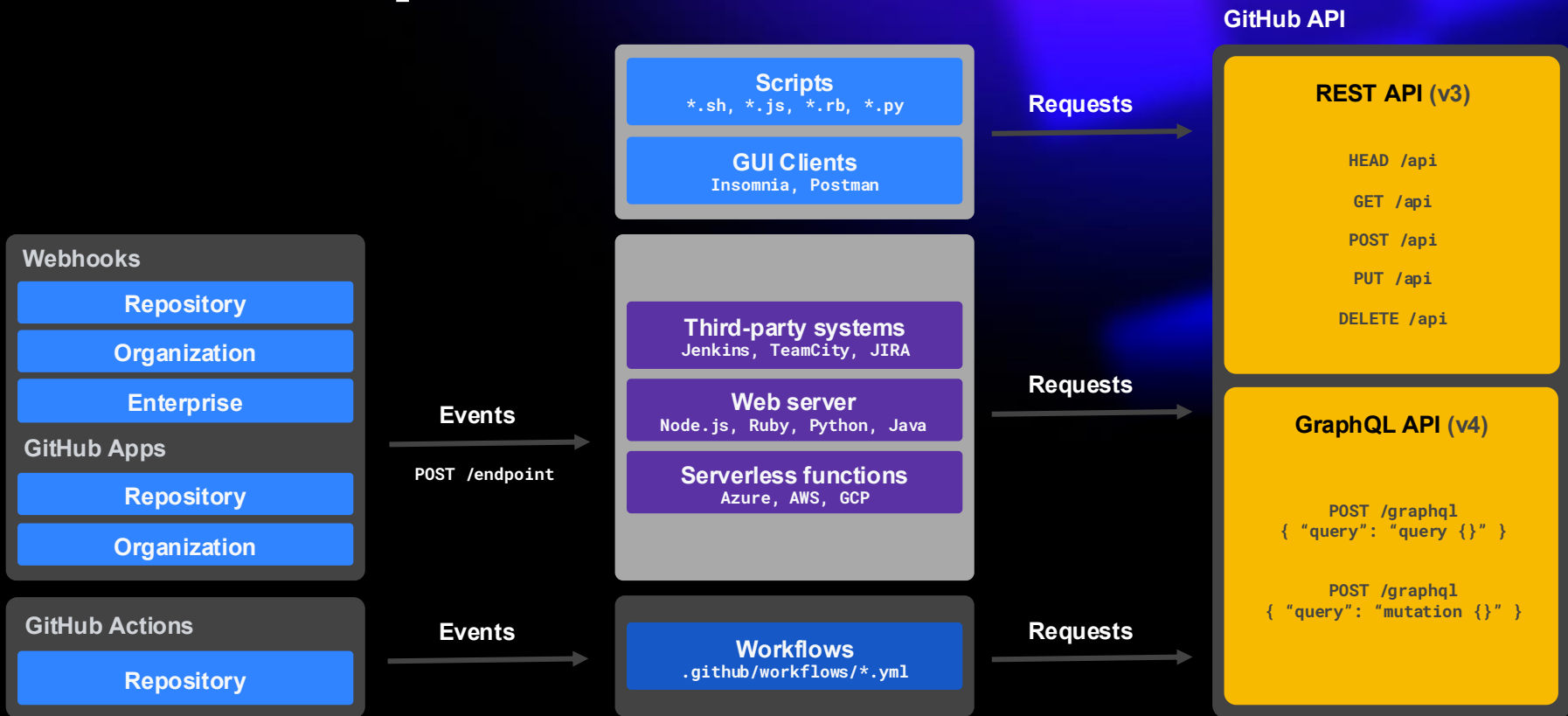
Core Integration Loop



Integrations



Core Loop Overview



Additional Topics

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

API Authentication

Scripts

*.sh, *.js, *.rb, *.py

GUI Clients

Insomnia, Postman

Third-party systems

Jenkins, TeamCity, JIRA

Web server

Node.js, Ruby, Python, Java

Serverless functions

Azure, AWS, GCP

Workflows

.github/workflows/*.yaml

Personal Access Token (PAT)

Profile
↓
Settings
↓
Developer Settings
↓
Personal access tokens

ghp_

OAuth Apps

https://github.com/login/oauth/authorize?client_id=...&scope=user%20repo_deployment

gho_

GITHUB_TOKEN

ghs_

GitHub Apps

/app/installations

/app/installations/{installation_id}/access_tokens

ghu_

ghs_

GitHub API

REST API (v3)

HEAD /api

GET /api

POST /api

PUT /api

DELETE /api

GraphQL API (v4)

```
POST /graphql
{ "query": "query {}" }
```

```
POST /graphql
{ "query": "mutation {}" }
```

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

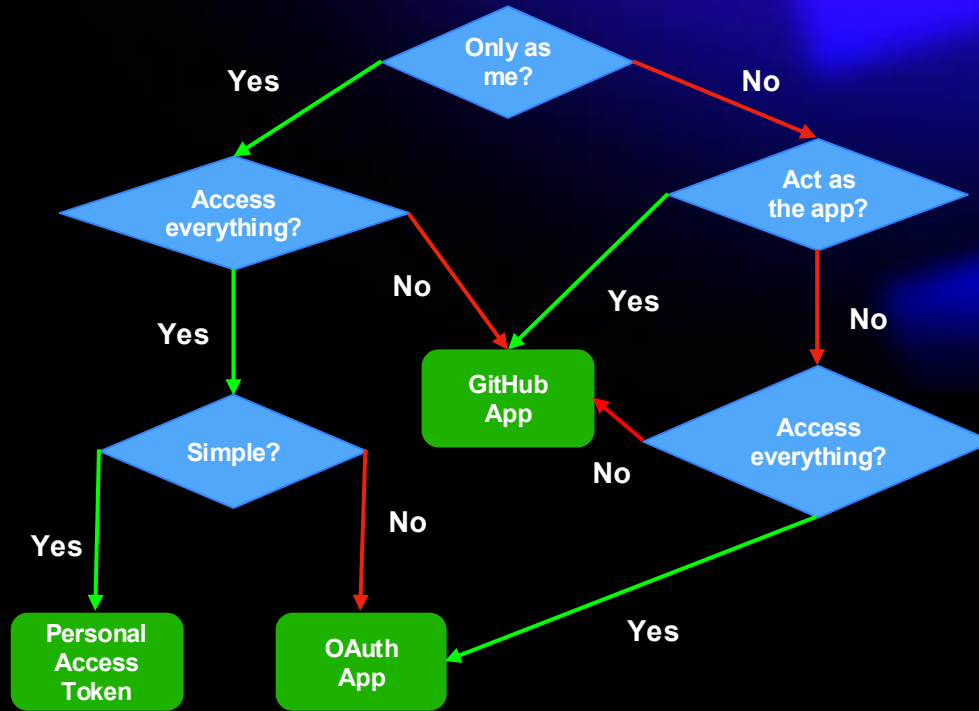
- Anyone with access to the repository and server can deploy the project
- Users don't have to change their local SSH settings
- Deploy keys are read-only by default
- Deploy keys only grant access to a single repository
- Deploy keys are not usually protected by a passphrase

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**

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

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



Copilot

LambdaTest

Design, implement and analyze test automation right where you code



Copilot

ReadMe API

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!

