GitHub

# GitHub Advanced Security Features and Demo



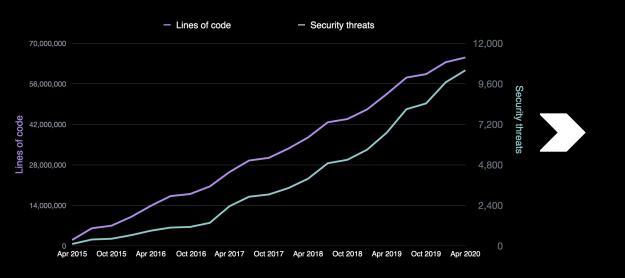
## Agenda

- What is GitHub Advanced Security (GHAS), and why?
- Demo
- Questions



# What is GitHub Advanced Security?

## More code = more technical debt & exposure



Flaws in applications are consistently the #1 attack vector for breaches

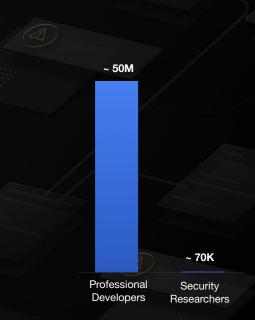
Source: GitHub Data Science Team analysis of 70 million lines of code in major OSS projects added over a 5 year period

Source: Verizon Data Breach Investigations reports 2016, 2017, 2018, 2019 and 2020.

## Solution: Shift security left, but how?



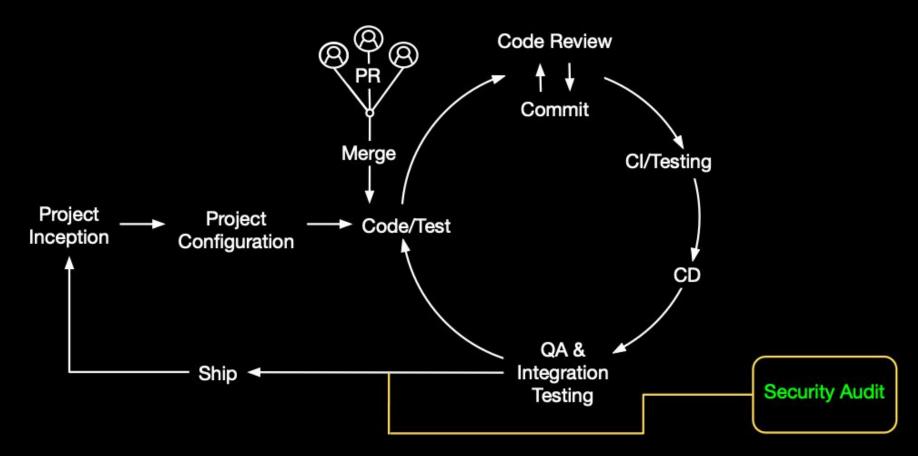
Vastly more cost effective to remediate during development



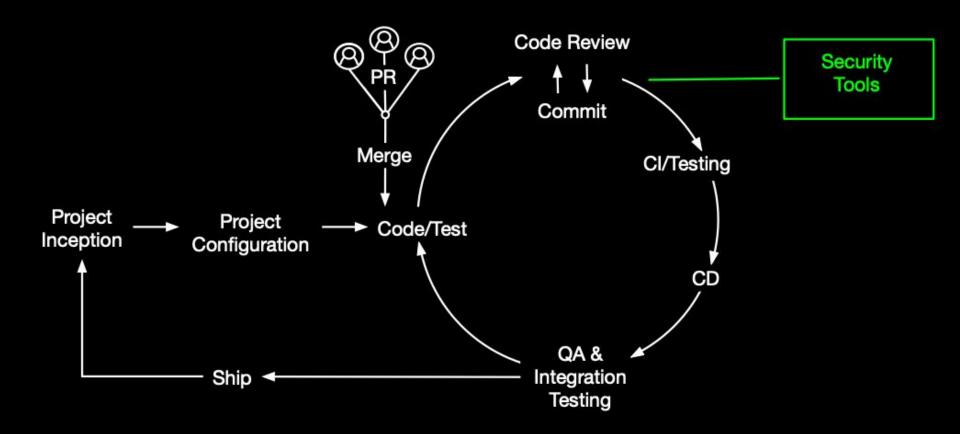
**570** more developers than security researchers



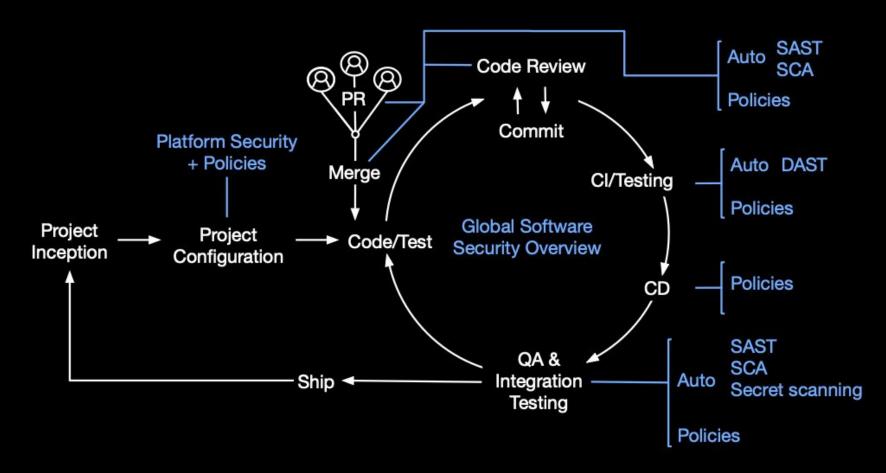
## Basic application security scenario



## Improved application security scenario



## **Application security - Targeted State**



## **GitHub** delivers complete application security

- 1. Developer-first
- 2. Native
- 3. Automated

## GitHub secures your complete software lifecycle







Code



Development Lifecycle

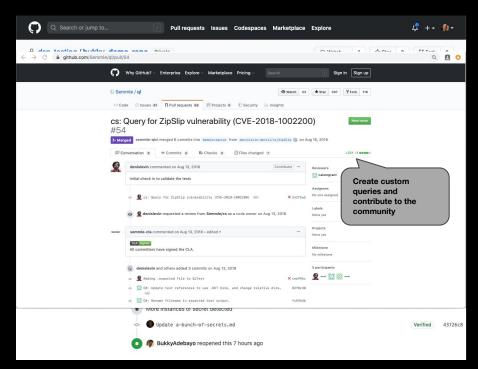
**Platform for Security Governance** 

## Secure your source code

Fail fast by finding vulnerabilities as code is developed

Find hard-coded secrets in code base

Set coding standards across your entire organisation



## 72%

Fix rate of vulnerabilities identified by CodeQL during a pull request

**15%** 



**→** 45%

Fix rate after 7 days Industry norm

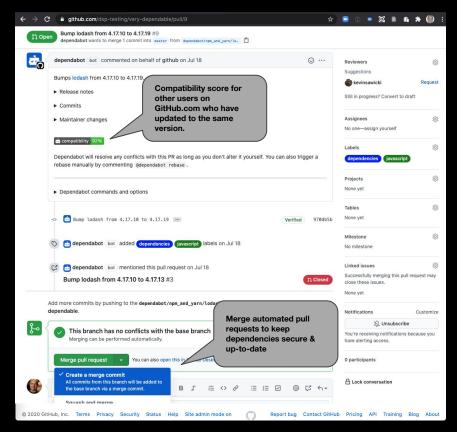
Fix rate after 90 days Industry norm

## Secure your supply chain

Know your environment

Manage your dependencies

Fix and publish vulnerability information



# 40 days

Mean time to remediate (MTTR) for repos with Dependabot security updates

## 180+ days

Mean time to remediate (MTTR)
Industry norm

## Next steps...



## Demo

## **Demo Overview**

- Configure GitHub Advanced Security
  - Difference between public repo / Enterprise
- Secret Scanning
  - Committing secrets to source
  - Managing secrets in repositories
  - Custom patterns
- Code Scanning / CodeQL
  - Alerts
  - Creating workflow and my workflow
  - Other partners (ie: laaC scans)
- Dependabot
  - Security Alerts and Updates
  - Dependency Graph
  - Version Updates
- Security Overview
- Vulnerability Database



#### **Supply Chain**

- Dependency graph
  View your dependencies
- Advisory database
   Canonical database of
   dependency vulnerabilities
- Security alerts and updates Notifications for vulnerabilities in your dependencies, and pull requests to fix them



#### Code

- Secret scanning
- Find API tokens or other secrets exposed anywhere in your git history
- Code scanning

Static analysis of every git push, integrated into the developer workflow and powered by CodeQL



Branch protection

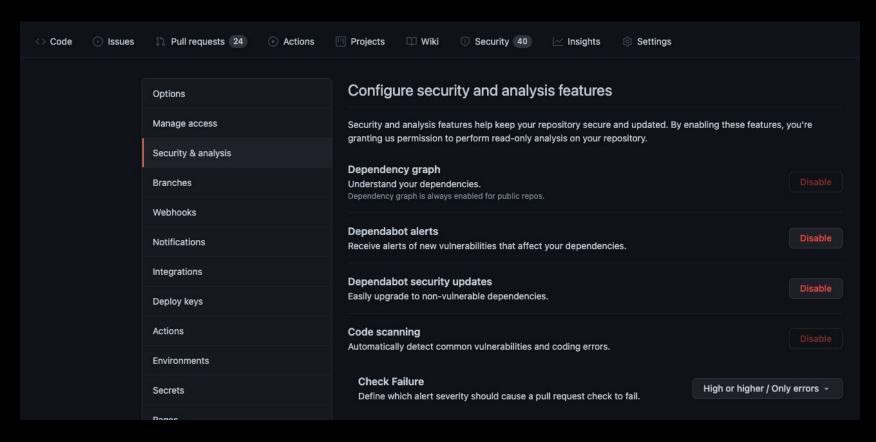
Enforce requirement for pushing to a branch or merging PRs

Commit signing

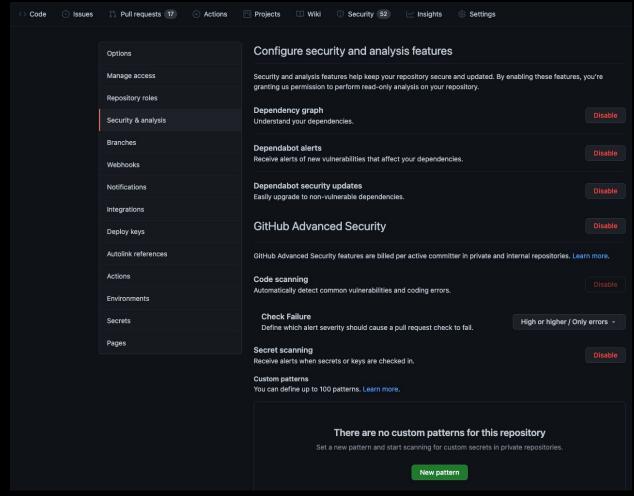
Enforce requirement that all commits are signed



## GHAS Setup - GitHub.com (public repo)



### **GHAS Setup - GitHub Enterprise Cloud**



## Secret Scanning - Partners

#### **Secret Scanning partners**





https://docs.github.com/en/code-security/secret-scanning/about-secret-scanning

### Secret Scanning - Revoked API Key Email (public .com)

Disabled Public API Key >>



noreply@mailchimpmail.com via gmail.mctxapp.net

to me \*

11:10 AM (0 minutes ago)



I wanted to reach out to you to let you know that we had to disable an active API Key in your Mailchimp account with the account name soccerjoshi07.

We were able to find your API Key posted publicly, which could give someone full access to your account. Since it's been disabled, we don't recommend re-enabling it. Instead, you'll need to generate a new API Key in your account.

Your key was found at the following URL: https://qithub.com/soccerjoshj07/qhas-demo/blob/5956292341356b5b35ce36d917a25111cb1afceb/appsettings.json

For more information on account security, refer to our Knowledge Base.

Keeping your API key secure: https://mailchimp.com/help/about-api-keys/#API key security

Thanks,

-- The Mailchimp API Team

## Secret Scanning - Revoked API Key (public .com)

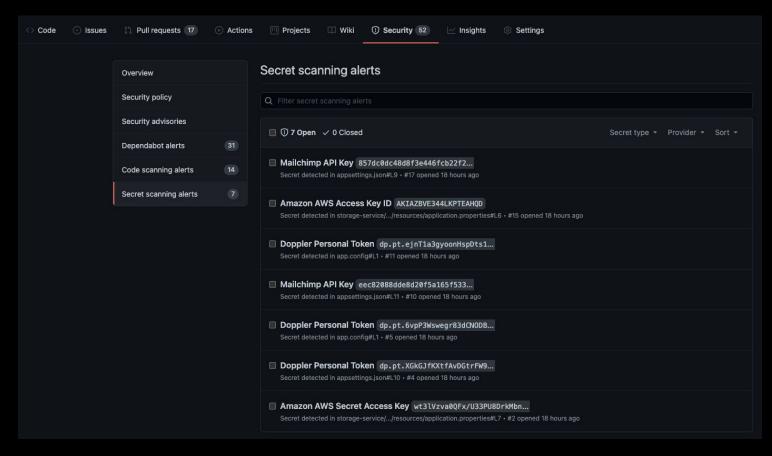
#### Your API keys

API keys provide full access to your Mailchimp account, so keep them safe. <u>Tips on</u> keeping API keys secure.

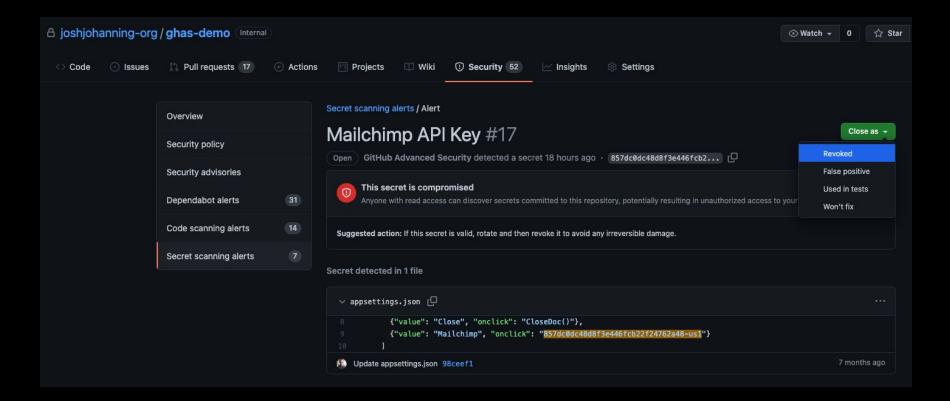
Created	User	Label	API key	QR Code	Status
May 10, 2021 12:07 pm Disabled on 05/10/2021	Joshua Johanning (owner)	Posted in public, do not enable	eee82088dde8d20f5a165f533e4c726e-us1		

Create A Key

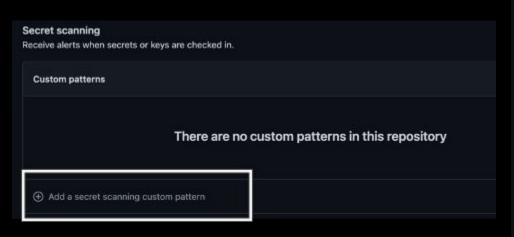
### **Secret Scanning - GitHub Enterprise Cloud**

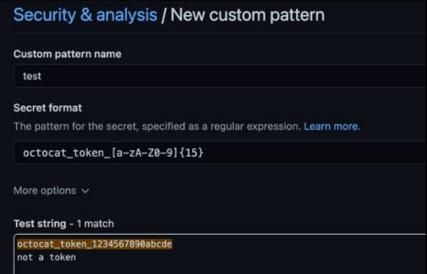


### **Secret Scanning - GitHub Enterprise Cloud**



### **Secret Scanning - GitHub Enterprise Cloud - Custom Patterns**



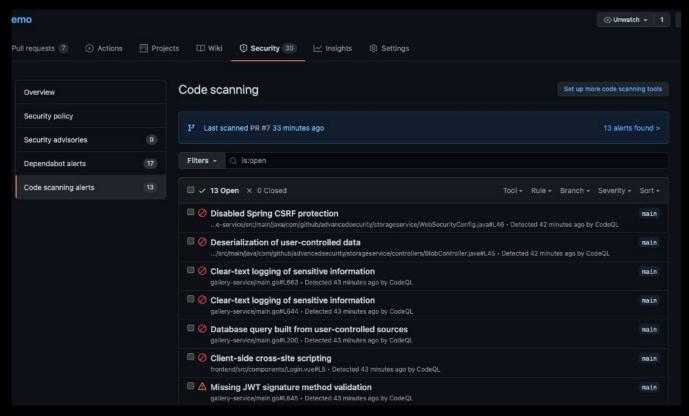


## Code Scanning - CodeQL

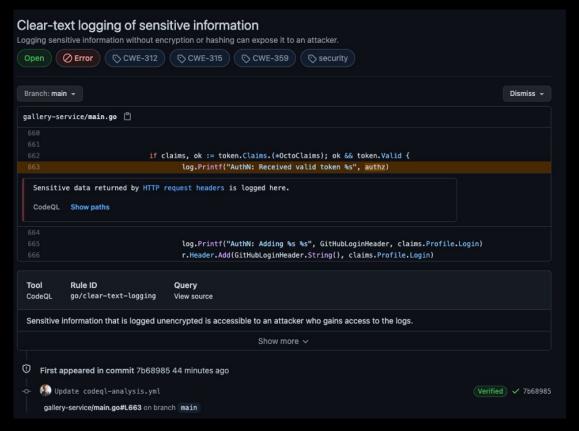
CodeQL analysis consists of three steps:

- 1) Preparing the code, by creating a CodeQL database
- 2) Running CodeQL queries against the database
- 3) Interpreting the query results

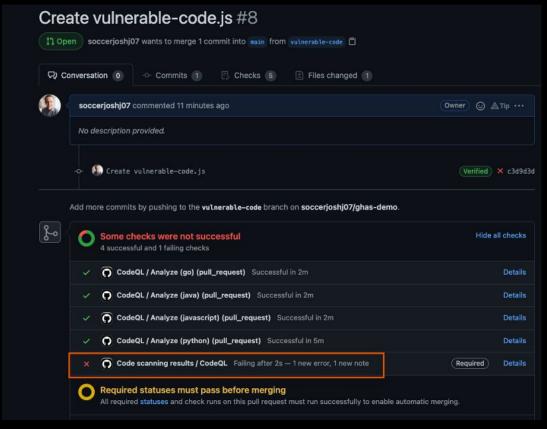
## **Code Scanning - Open Alerts**



## Code Scanning - Example Alert



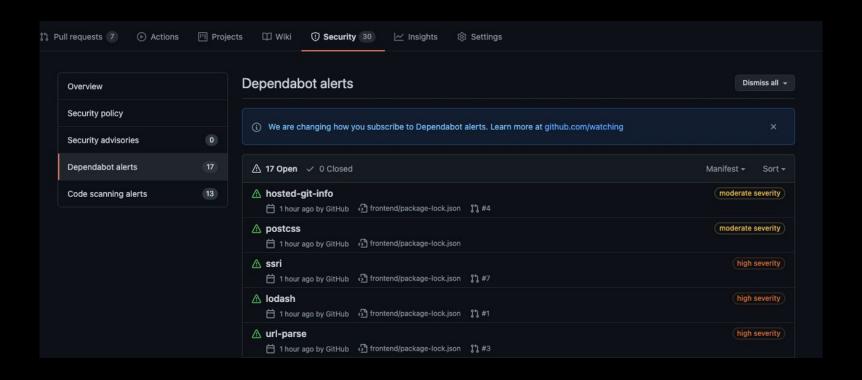
## Code Scanning - Pull Request



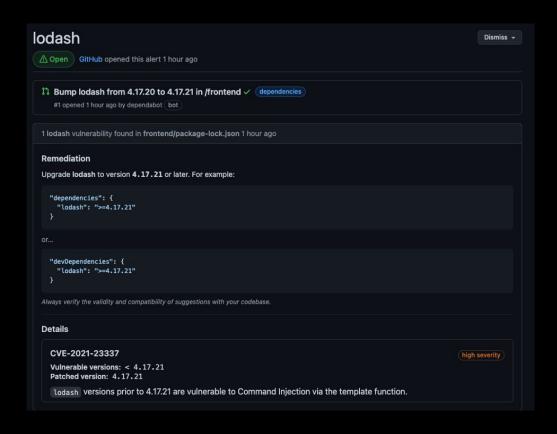
### **Dependabot - Security Alerts - Supported Package Ecosystems**

Package manager	Languages	Recommended formats	All supported formats
Composer	PHP	composer.lock	composer.json, composer.lock
dotnet CLI	.NET languages (C#, C++, F#, VB)	.csproj , .vbproj , .nuspec , .vcxproj , .fsproj	.csproj , .vbproj , .nuspec , .vcxproj , .fsproj , packages.config
Go modules	Go	go.sum	go.mod, go.sum
Maven	Java, Scala	pom.xml	pom.xml
npm	JavaScript	package—lock.json	package-lock.json, package.json
Python PIP	Python	requirements.txt, pipfile.lock	requirements.txt, pipfile, pipfile.lock, setup.py*
Python Poetry	Python	poetry.lock	poetry.lock, pyproject.toml
RubyGems	Ruby	Gemfile.lock	Gemfile.lock, Gemfile, *.gemspec
Yarn	JavaScript	yarn.lock	package.json, yarn.lock

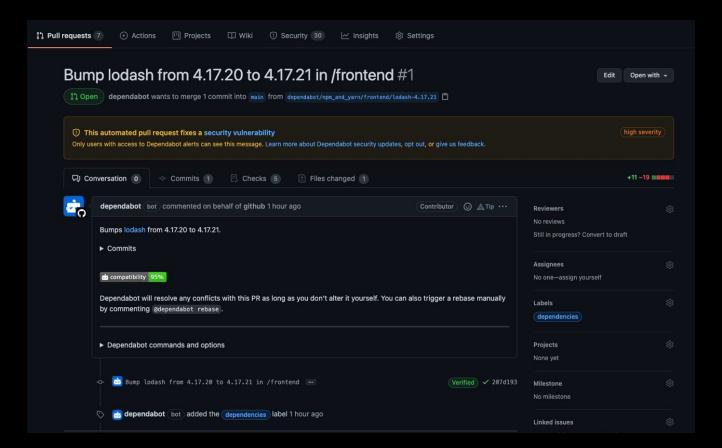
## **Dependabot - Security Alerts - Open Alerts**



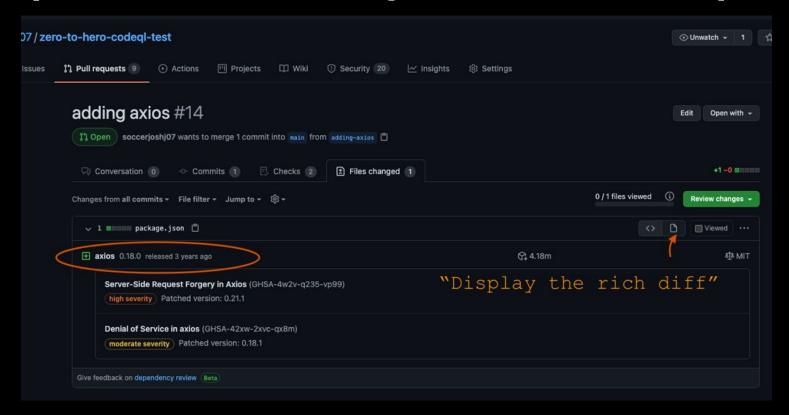
## **Dependabot - Security Alerts - Remediation**



## Dependabot - Security Alerts - Pull Request

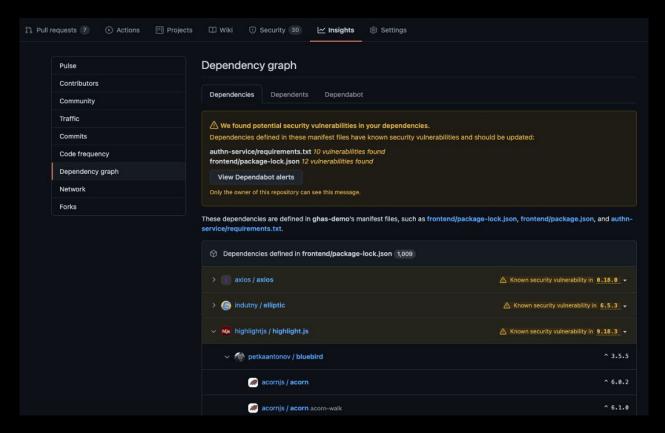


## Dependabot - Security Alerts - Pull Request



Introducing a vulnerable package that the PR catches

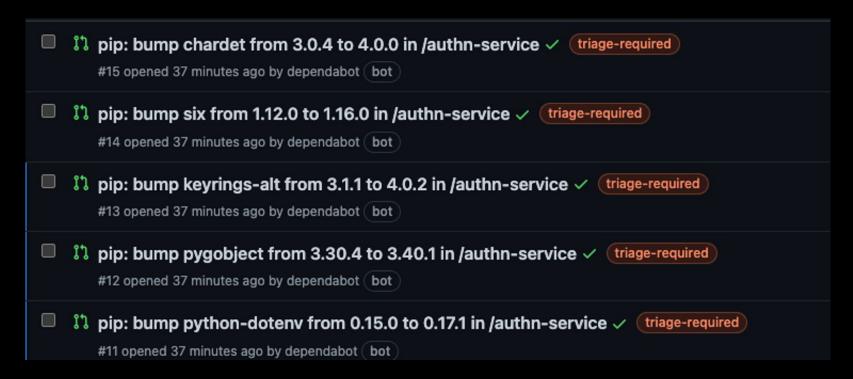
## Dependabot - Dependency Graph



### **Dependabot - Dependency Updates - Supported Manifests**

Package manager	YAML value	Supported versions	Private repositories	Private registries	Vendoring
Bundler	bundler	v1, v2		~	~
Cargo	cargo	v1	<b>~</b>	~	
Composer	composer	v1, v2	<b>~</b>	<b>~</b>	
Docker	docker	v1	<b>~</b>	~	
Hex	mix	v1		~	
elm-package	elm	v0.19	<b>~</b>	<b>~</b>	
git submodule	gitsubmodule	N/A (no version)	<b>~</b>	<b>~</b>	
GitHub Actions	github— actions	N/A (no version)	<b>~</b>	<b>~</b>	
Go modules	gomod	v1	<b>v</b>	~	~
Gradle	gradle	N/A (no version)	<b>*</b>	<b>~</b>	
Maven	maven	N/A (no version)	<b>~</b>	~	
npm	npm	v6, v7	<b>~</b>	~	
NuGet	nuget	<= 4.8 <sup>[3]</sup>	<b>~</b>	<b>~</b>	
pip	pip	v21.1.2		~	
pipenv	pip	<= 2021-05-29		<b>~</b>	
pip-compile	pip	6.1.0		<b>~</b>	
poetry	pip	v1		<b>~</b>	
Terraform	terraform	>= 0.13, <= 1.0	<b>~</b>	<b>~</b>	
yarn	npm	v1	<b>v</b>	<b>~</b>	

## **Dependabot - Dependency Updates**

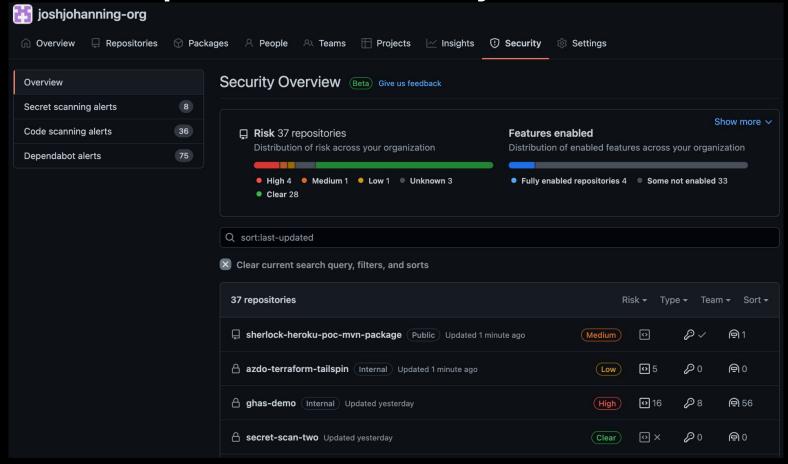


Packages that need to be updated – not necessarily security vulnerabilities

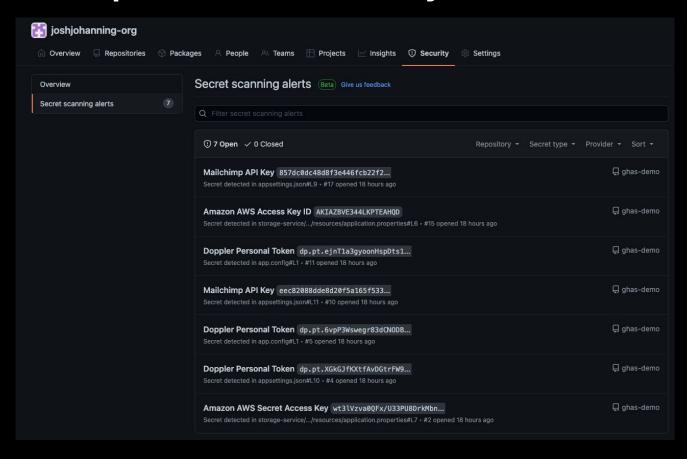
### Dependency Vulnerabilities shown in local Git output

```
joshuajohanning@10M-MAC-JJHANNING ~/Repos/AzDO/test-gh-scripts
                                                                            git push
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 12 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 275 bytes | 275.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: GitHub found 3 vulnerabilities on soccerjoshj07/test-github's default branch (3 moderate). To find out more, visit:
             https://github.com/soccerjoshj07/test-github/security/dependabot
remote:
remote:
To https://github.com/soccerjoshj07/test-github.git
   34ab7b7..19d2f98 main -> main
```

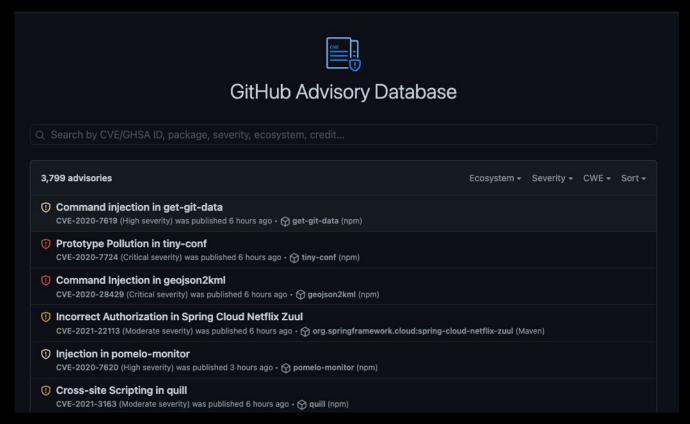
### GitHub Enterprise Cloud - Security Overview for the Org



### GitHub Enterprise Cloud - Security Overview - Secrets



### GitHub - Advisory Database



https://github.com/advisories

### **GHAS - License/Feature Comparison**

Feature	GHEC	GHEC + GHAS	Public Repos
Dependency Graph	Х	Х	Х
Dependabot Alerts for Vulnerable Dependencies	Х	X	Х
Dependabot Security Updates (PRs for vulnerabilities)	Х	X	Χ
Dependabot Version Updates (PRs for package updates)	Х	Х	Х
GitHub Security Advisories	Х	X	Χ
Security Policies	Х	Х	Х
Security Overview for the Org (Beta)		X	n/a
CodeQL Code Scanning		X	Χ
Dependency Review in Pull Request (rich diff)		X	Χ
Secret Scanning		X	X *
Secret Scanning - Custom Patterns		Х	

https://josh-ops.com/posts/github-advanced-security-feature-chart/

## Questions?

