

+ 22

GitHub Features Every C++ Developer Should Know

MICHAEL PRICE



20
22



Welcome to CppCon 2022!

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<https://aka.ms/cppcon/discord>

- Meet the Microsoft C++ team
- Ask any questions
- Discuss the latest announcements

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Our sessions

Monday 12th

- **The Imperatives Must Go** – Victor Ciura
- **What's New in C++ 23** – Sy Brand
- **C++ Dependencies Don't Have to Be Painful** – Augustin Popa
- **How Microsoft Uses C++ to Deliver Office** – Zachary Henkel

Tuesday 13th

- **High-performance Load-time Implementation Selection** – Joe Bialek, Pranav Kant
- **C++ MythBusters** – Victor Ciura

Wednesday 14th

- **-memory-safe C++** – Jim Radigan

Thursday 15th

- **What's New for You in Visual Studio Code** – Marian Luparu, Sinem Akinci
- **Overcoming Embedded Development Tooling Challenges** – Marc Goodner
- **Reproducible Developer Environments** – Michael Price

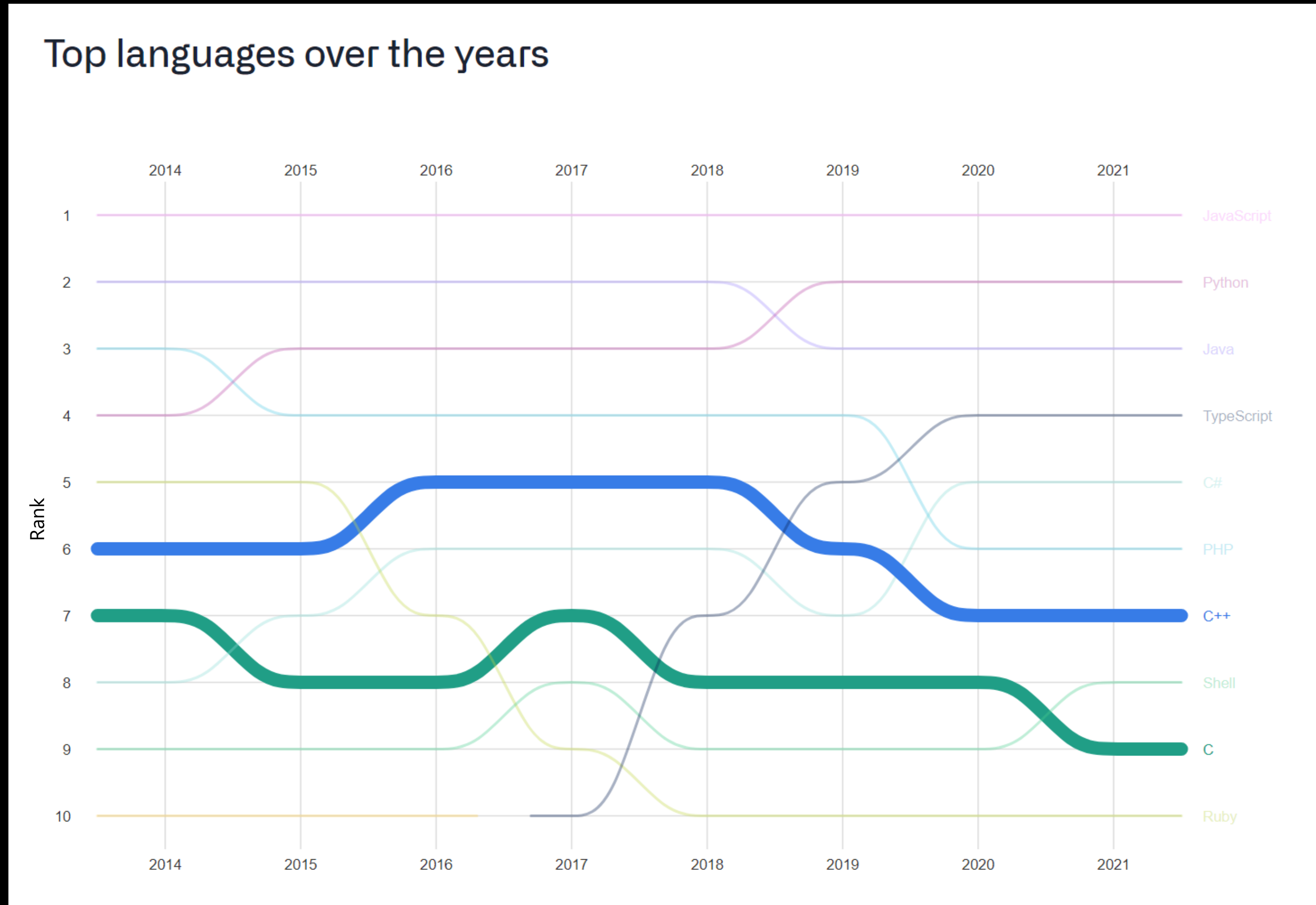
Friday 16th

- **GitHub Features Every C++ Developer Should Know** – Michael Price
- **What's New in Visual Studio 2022** – Marian Luparu, Sy Brand
- **C++ Complexity (Keynote)** – Herb Sutter

C++ Users

GitHub and Microsoft Observations

The 2021 State of the Octoverse



By The Numbers

ISO C++ 2022 Survey Results

What's New in Visual Studio 2022

Marian Luparu, Sy Brand

What's New for You in Visual Studio Code

Marian Luparu, Sinem Akinci

57%

of C++ users using Visual Studio or Visual Studio Code as primary editor

C++ Dependencies Don't Have to Be Painful

Augustin Popa

83%

of C++ users say managing library dependencies is a pain point

This Talk (and)

Reproducible Developer Environments

Michael Price

71%

of C++ users say making a new dev environment is a pain point

This Talk

75%

of C++ users say setting up CI from scratch is a pain point

47%

of C++ users using cloud CI/CD

40%

of C++ users **not** using cloud at all

Automation

Automate all the things!

GitHub Actions components



Workflows

- Process that runs one or more *jobs*
- Defined by YAML files in repository
- Triggered manually, on schedule, or by an *event*
- Limited reuse
- Starter *workflows* available



Events

- Triggers a *workflow* run
- *Events* for...
- Branches
- Pull Requests
- Issues
- Discussions
- Projects
- Releases
- Forks
- Watches/Stars



Jobs

- Set of ordered *steps* to execute on a *runner*
- Can be dependent on other *jobs* (by default executed in parallel)



Actions

- Reusable *step* component
- Three Kinds...
- Docker
- JavaScript (or TS)
- Composite
- Publish in GitHub Marketplace



Runners

- Execution environment for a *job*
- GitHub-hosted VMs
- Ubuntu Linux
- Microsoft Windows
- Apple macOS
- Self-hosted
- Additional variants of Linux, Windows, and macOS

GitHub Actions Runners

Spend less time managing your infrastructure and more time writing code

Standard GitHub-hosted runners

Linux	2-core	7 GB RAM	14 GB	x 1	\$0.008 USD per min
Windows	2-core	7 GB RAM	14 GB	x 2	\$0.016 USD per min
macOS	3-core	14 GB RAM	14 GB	x 10	\$0.08 USD per min
Storage					\$0.008 USD per GB per day

Included storage and minutes each month

Free	500 MB	2,000 min
Pro	1 GB	3,000 min
Team	2 GB	3,000 min
Enterprise Cloud	50 GB	50,000 min

Self-hosted runners

Linux	ARM32, ARM64, x64	RHEL 7+, CentOS 7+, Oracle Linux 7, Fedora 29+, Debian 9+, Ubuntu 16.04+, Linux Mint 18+, openSUSE 15+, SLES 12 SP2+
Windows	x64	Windows 7, Windows 8.1, Windows 10, Windows Server 2012 R2, Windows Server 2019
macOS	x64	macOS 10.13+

Larger GitHub-hosted runners (beta for Team and Enterprise Cloud plans)

Linux	4-core	16 GB RAM	150 GB	x 2	\$0.016 USD per min
Linux	8-core	32 GB RAM	300 GB	x 4	\$0.032 USD per min
Linux	16-core	64 GB RAM	600 GB	x 8	\$0.064 USD per min
Linux	32-core	128 GB RAM	1200 GB	x 16	\$0.128 USD per min
Linux	64-core	256 GB RAM	2040 GB	x 32	\$0.256 USD per min
Windows	8-core	32 GB RAM	300 GB	x 8	\$0.064 USD per min
Windows	16-core	64 GB RAM	600 GB	x 16	\$0.128 USD per min
Windows	32-core	128 GB RAM	1200 GB	x 32	\$0.256 USD per min
Windows	64-core	256 GB RAM	2040 GB	x 64	\$0.512 USD per min

- Number of runner instances can scale with demand
- Enterprise Cloud plans can elect to have static IP addresses for runners

Developer Environments

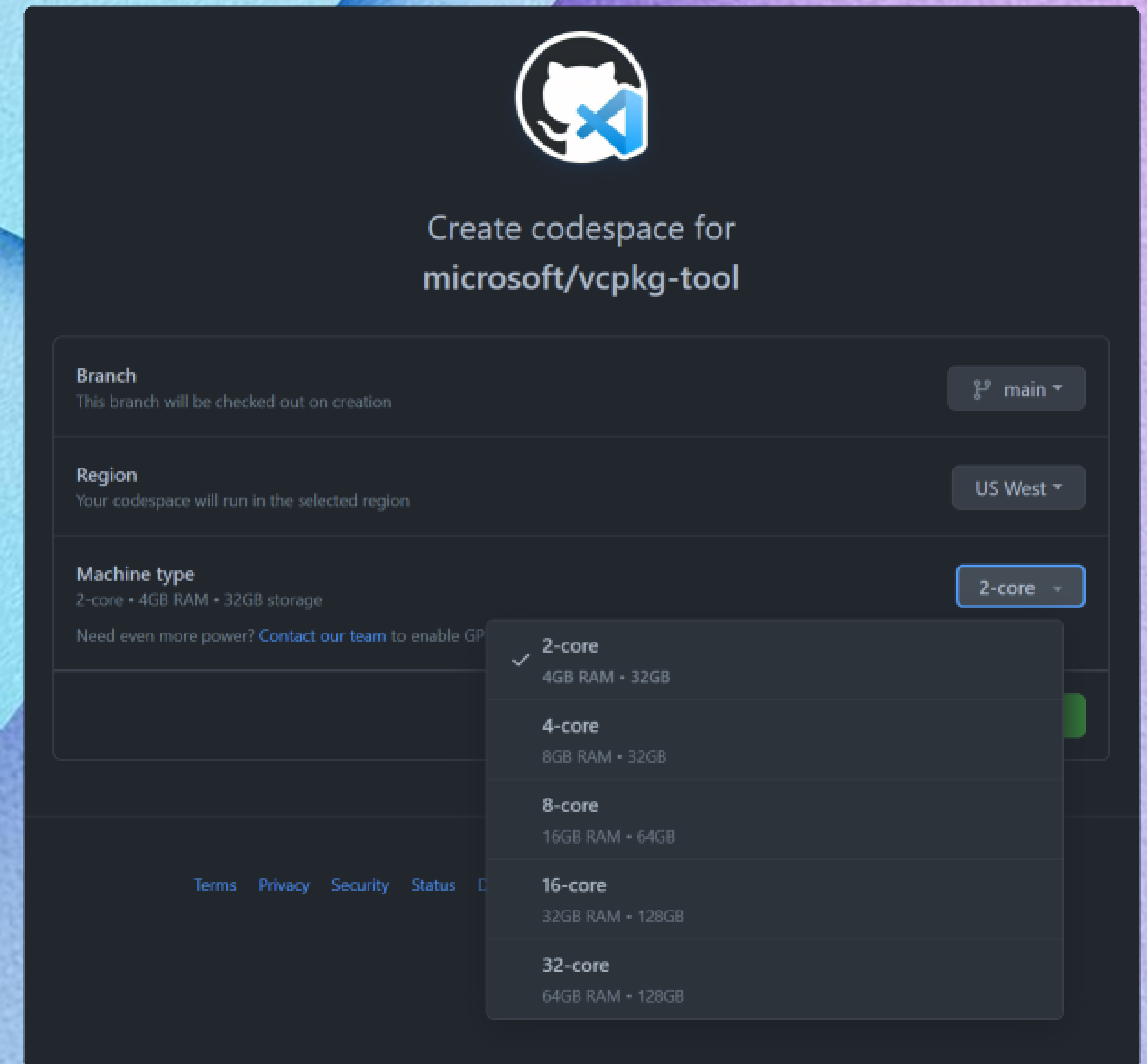
Fast starts and resiliency with cloud-hosted developer environments

Visual Studio Code in Any Browser

	vscode.dev	github.dev
How to access?	<a href="https://vscode.dev/<optional-route-or-repo>">https://vscode.dev/<optional-route-or-repo>	github.com → github.dev OR press '.' on repository page
Can connect to GitHub repositories?	✔ Yes ^{1 2}	✔ Always ²
Can connect to Azure Repos?	✔ Yes ¹	✘ No
Can connect to files on local system?	✔ Yes ¹	✘ No
Is always the latest release?	✔ Yes	✔ Yes
Can use Insiders release of Visual Studio Code?	✔ Yes ³	✔ Yes
Can transition to instance with compute?	✔ Yes ⁴	✔ Yes ⁴

GitHub Codespaces

- On-demand, container-based, cloud development environments
- Persistent state across work sessions
- Limited portability between different VM SKUs
- Customizable environments with dev containers
- Can be prebuilt from GitHub Actions



Collaboration

Collaborate effectively, regardless of team size and location

GitHub ◀ Git ◀ Linux ◀ Unix + C

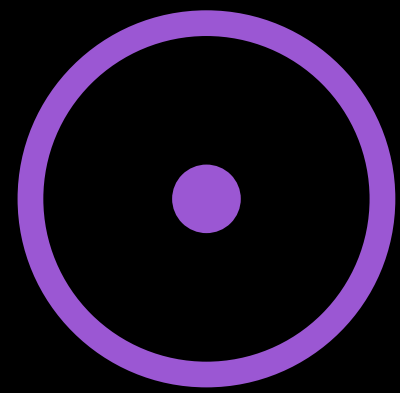
A Brief History Detour



... [git] was obviously designed for [the Linux development] workflow... So git was basically designed and written for my requirements, and it shows.

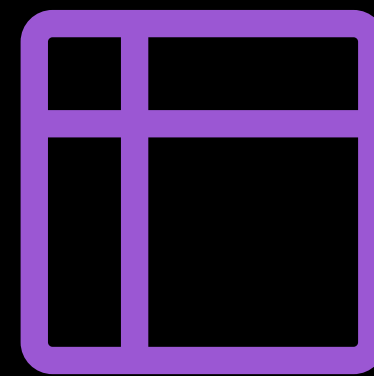
Linus Torvalds | Creator of the Linux kernel

GitHub Issues, Projects, and Pull Requests



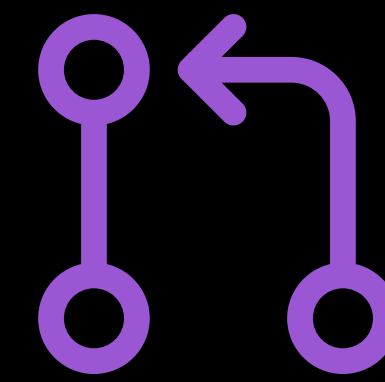
Issues

- Easy to file
- Decomposable
- Labels for organization
- Automatable



Projects

- Long-term planning
- Flexibility



Pull Requests

- Code Review
- Gated merges
- Access control
- Automatable

GitHub Pull Requests and Issues
extension for Visual Studio Code

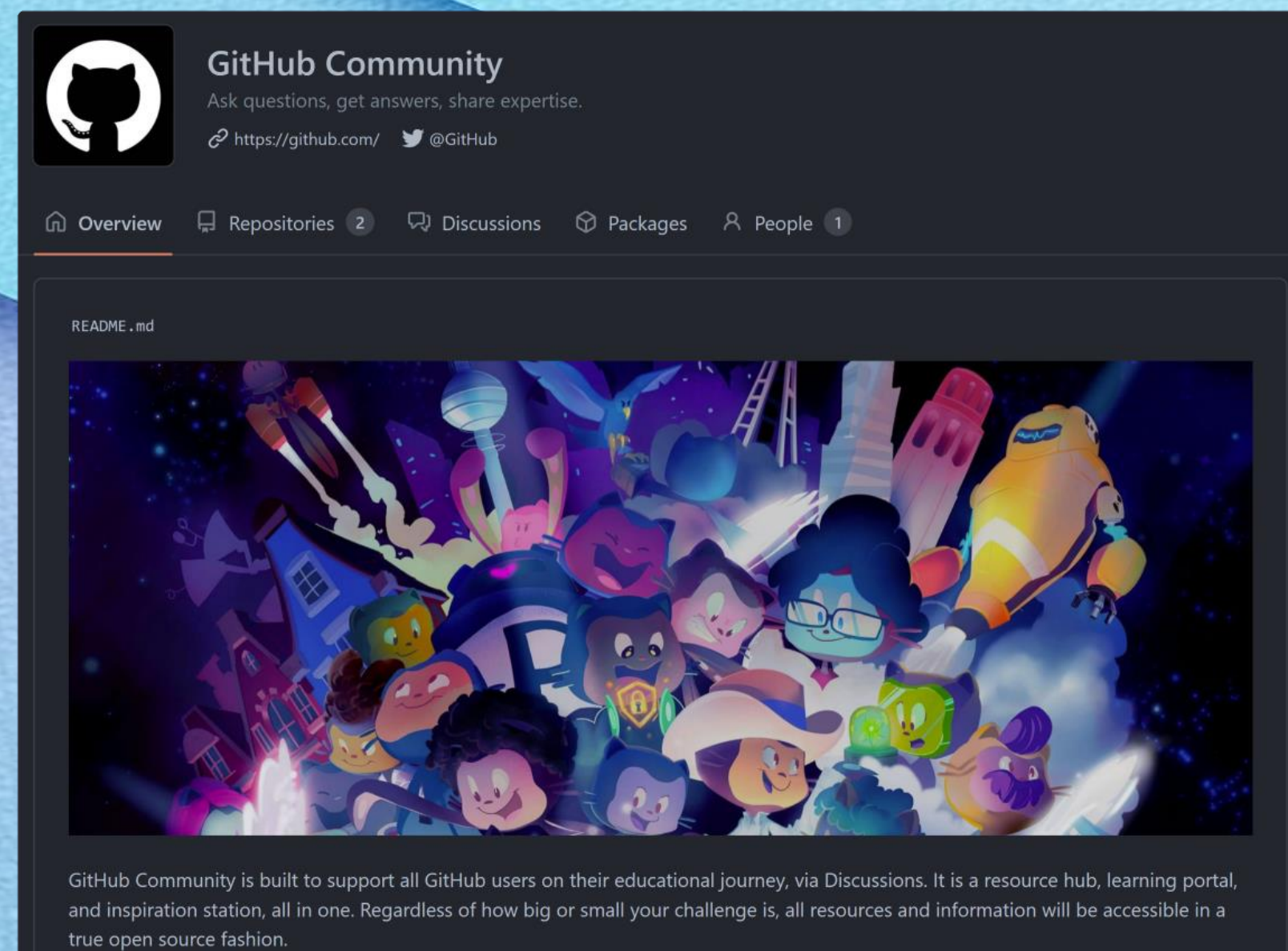
Demonstration

Adding continuous integration and fixing bugs in a cross-platform C++ project without cloning the repository locally

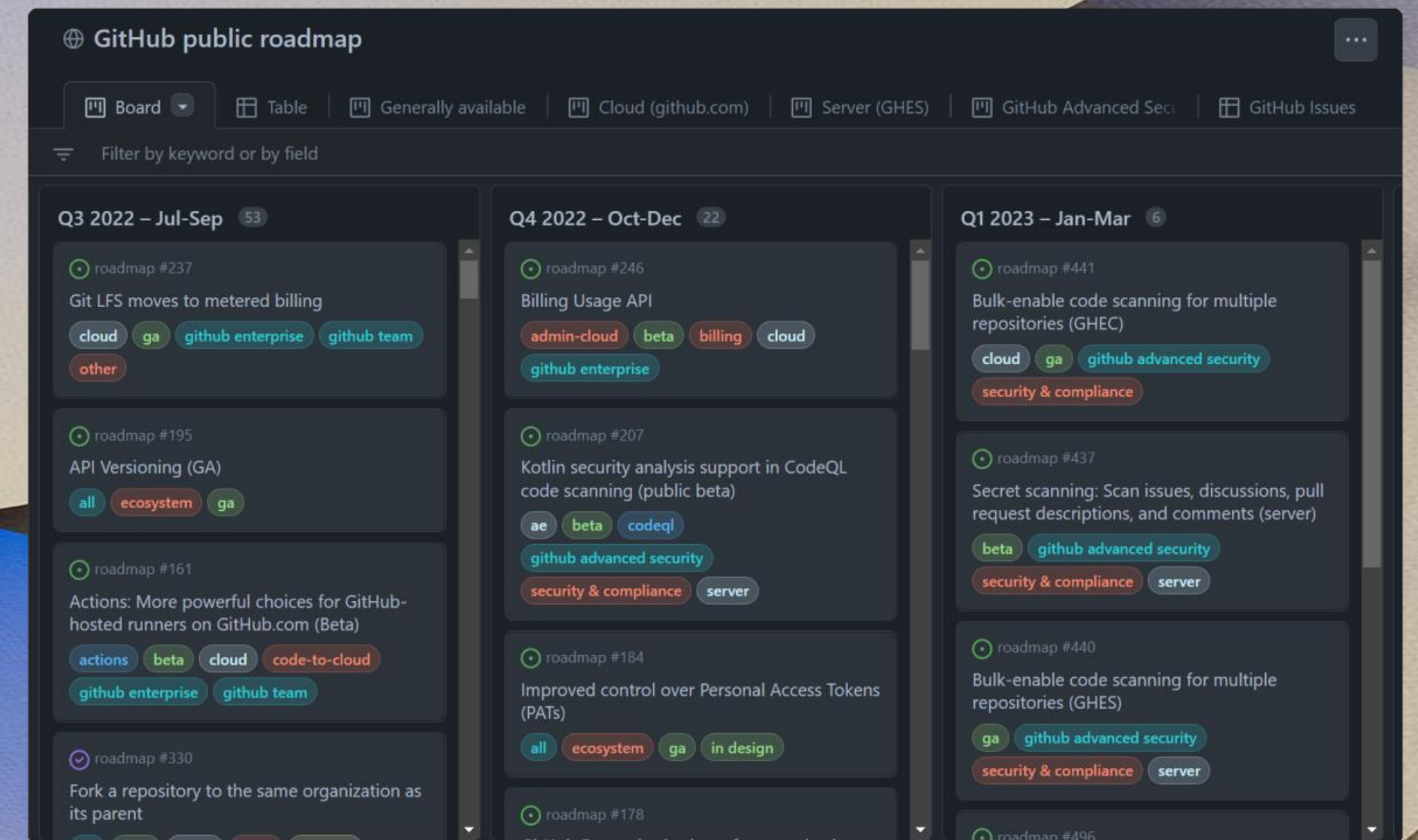
Visibility and Openness

Working in the open

GitHub Community and the GitHub Roadmap



<https://github.com/orgs/community>



<https://github.com/orgs/github/projects/4247>

Enjoy the rest of the conference!

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Questions & Answers