
OpenCloud
Lessons learned:
Guidance on how to make open source development a success

OpenCloud

What you will know after 15 minutes

Top 3 Mistakes we made while developing OpenCloud.

OpenCloud

But before we begin

Who Is The Richest Fictional Character?

Scrooge McDuck

Smaug

Carlisle Cullen

Tony Stark

Charles Foster Kane

Bruce Wayne

Richie Rich

Christian Grey

Tywin Lannister

C. Montgomery Burns

Walden Schmidt

Lara Croft

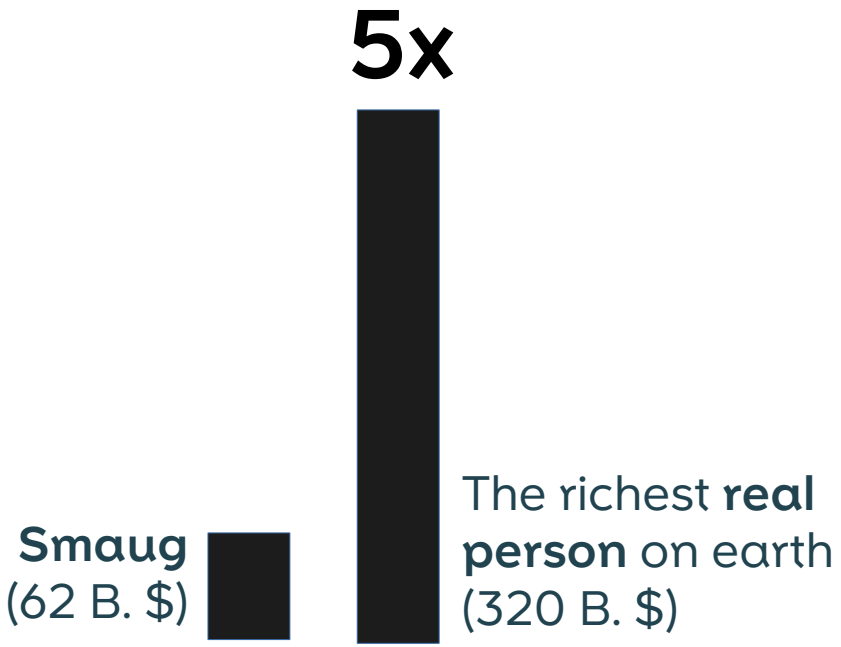
Mr. Monopoly

Lady Mary Crawley

Jay Gatsby


Smaug: 62 B $
(The Hobbit)

Centralization: Reality Surpasses Fiction



The centralization tendencies of the real world already **surpass any fiction**.

Every form of centralization threatens the free internet as we know it

Free internet

- Decentralization
- Open access
- Open formats
- Freedom of information
- Net neutrality
- Anonymity and privacy
- Collective intelligence and collaboration
- Shared Knowledge

OpenCloud is a Building Block of the Free Internet

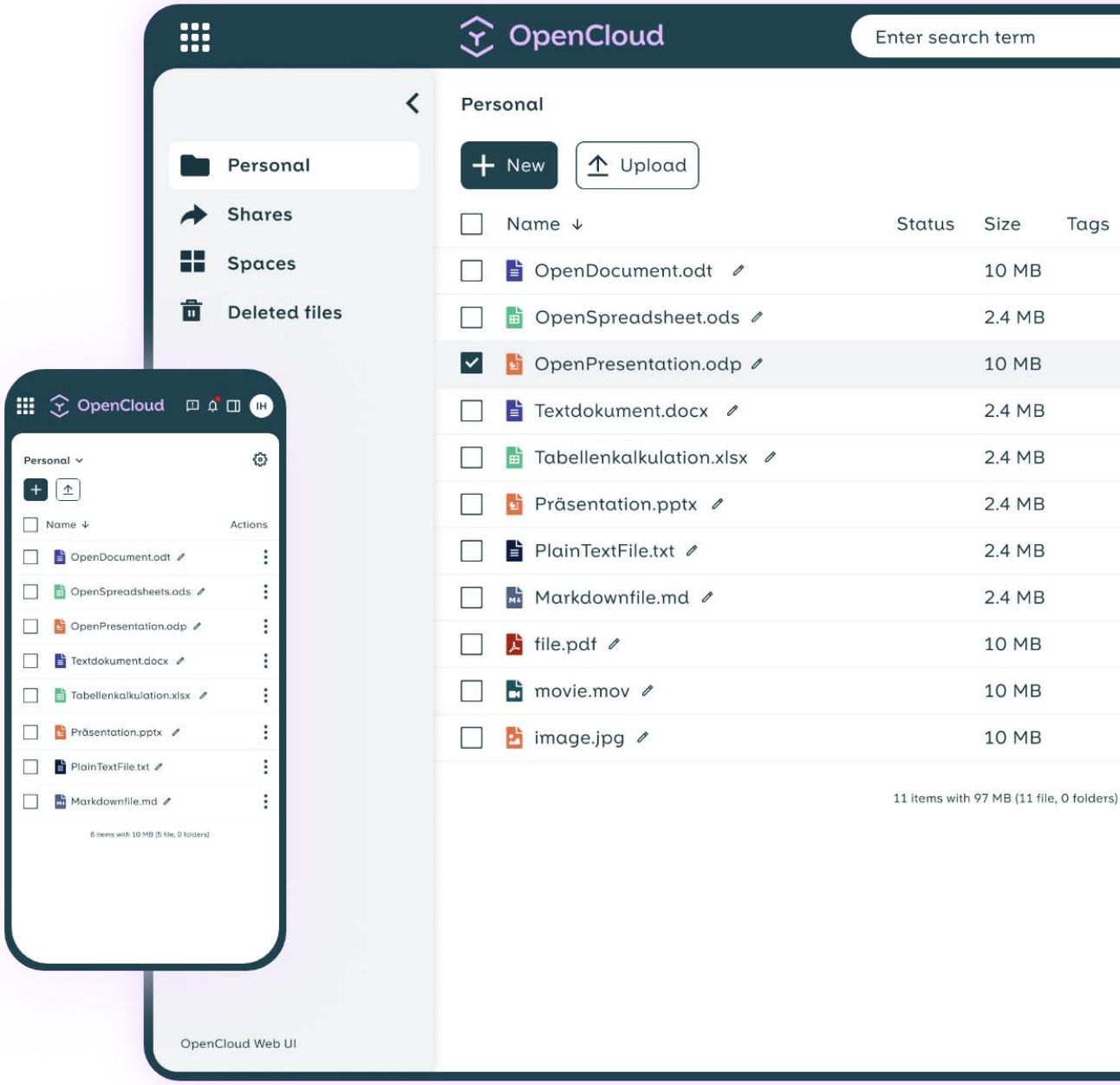
- **100% FOSS** (Apache2, AGPLv3)
- The project is driven by OpenCloud as a **for-profit company**, monetization via Support and Services
- Community usage and contributions are very welcome

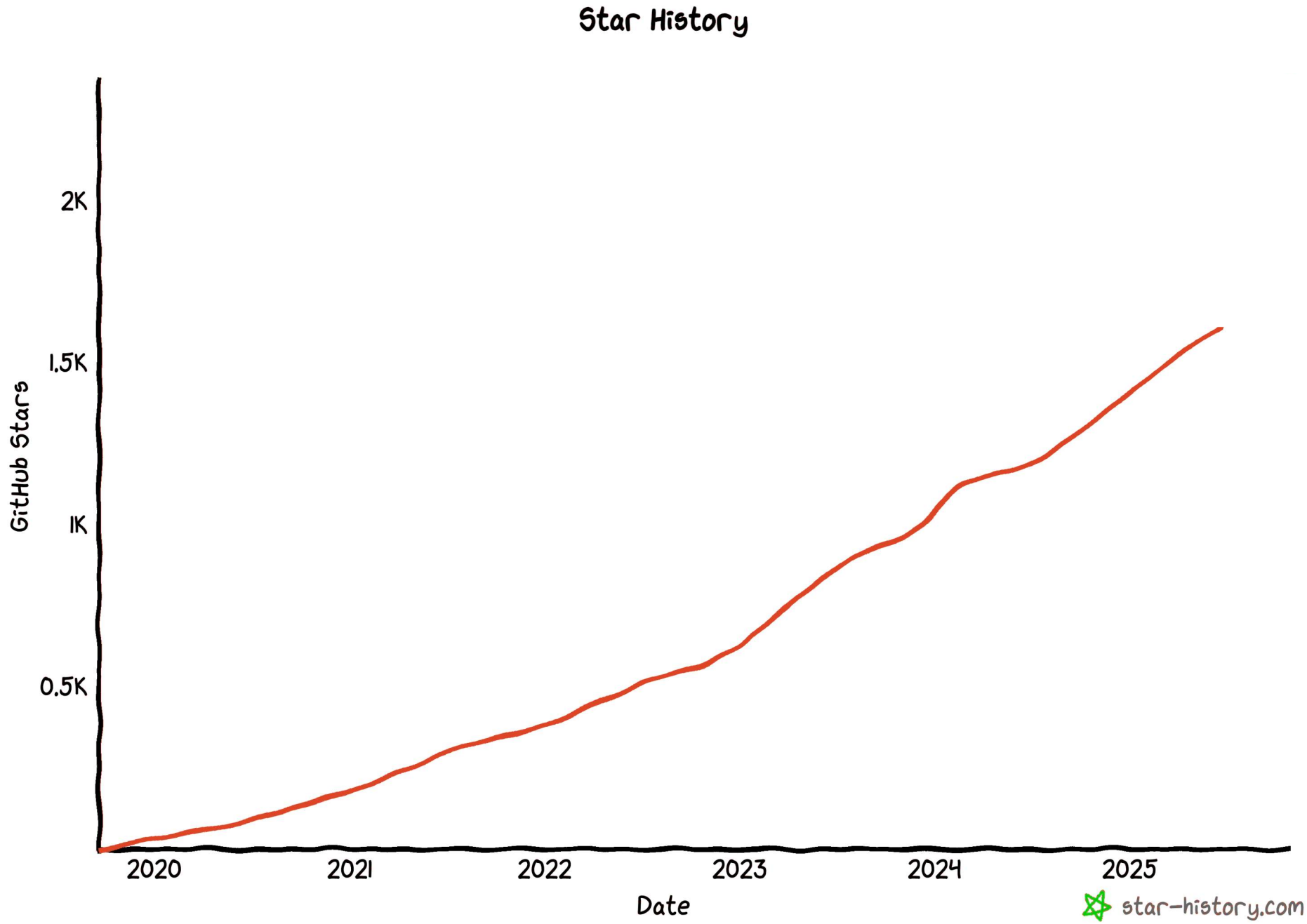
What is OpenCloud?

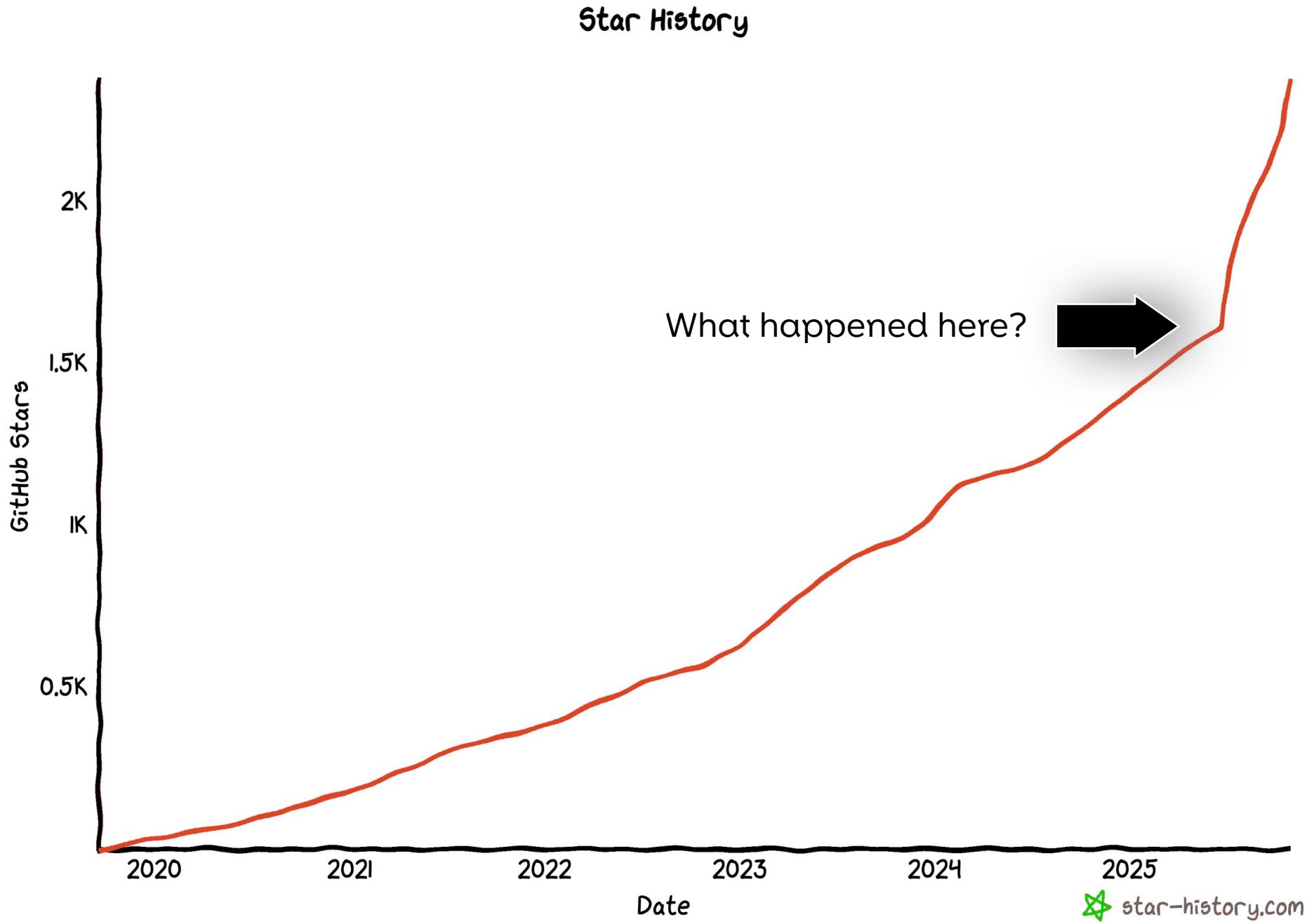
File Cloud

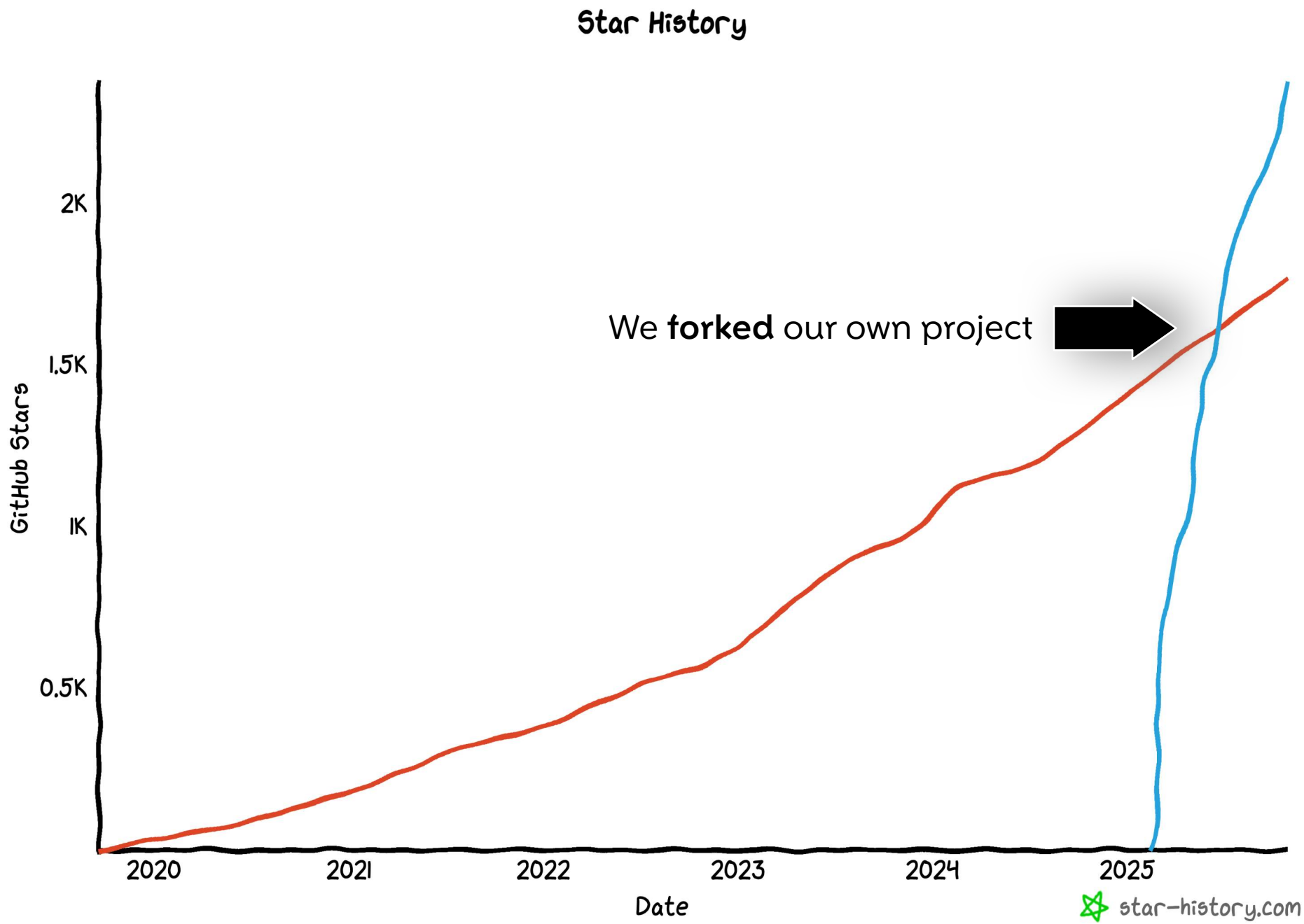
(Your files are where you are “like OneDrive”)

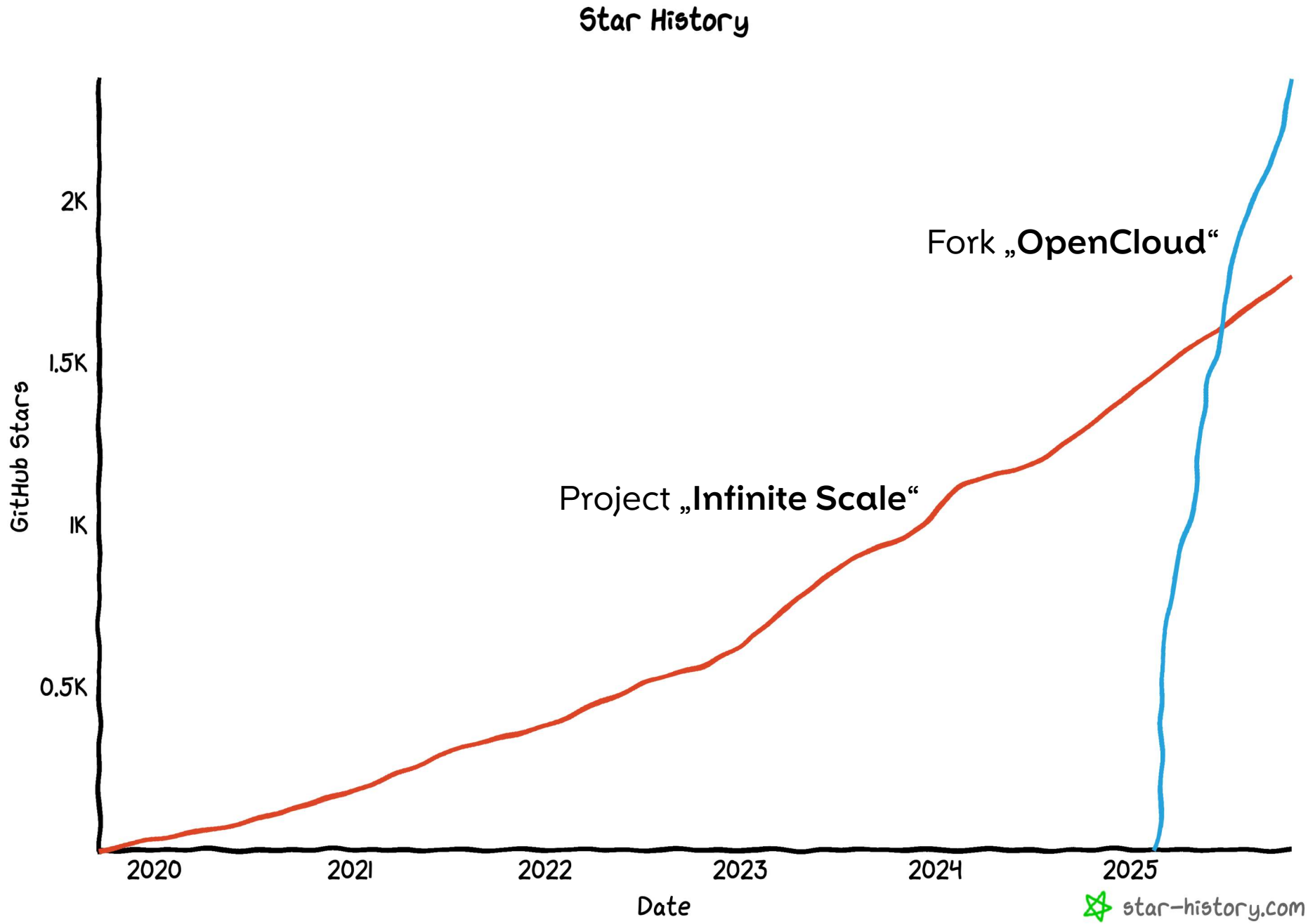
- Focus on self-hosting → privacy & sovereignty!
- 100% Open Source
- **Reliable and simple** to maintain ❤️ admins

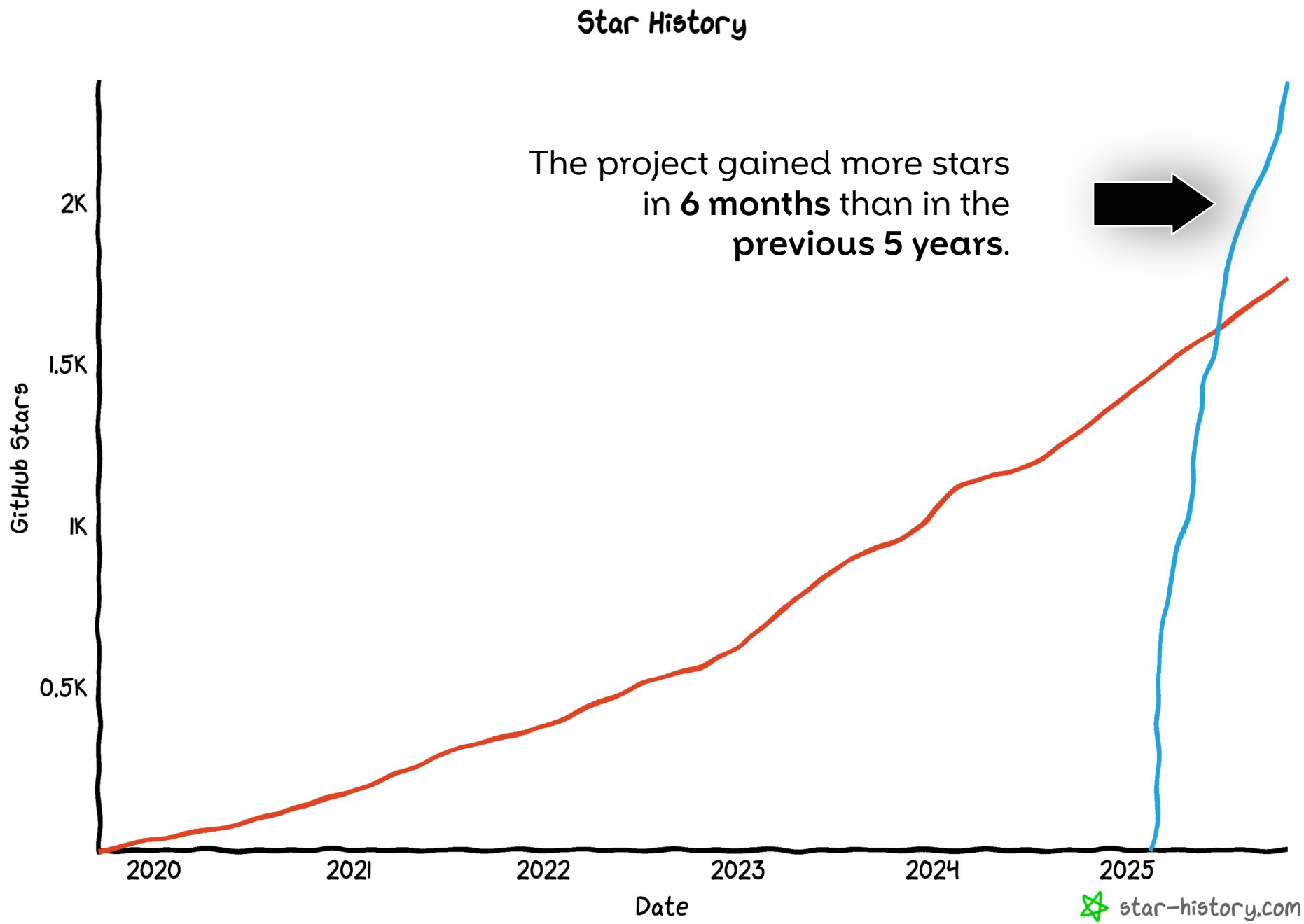


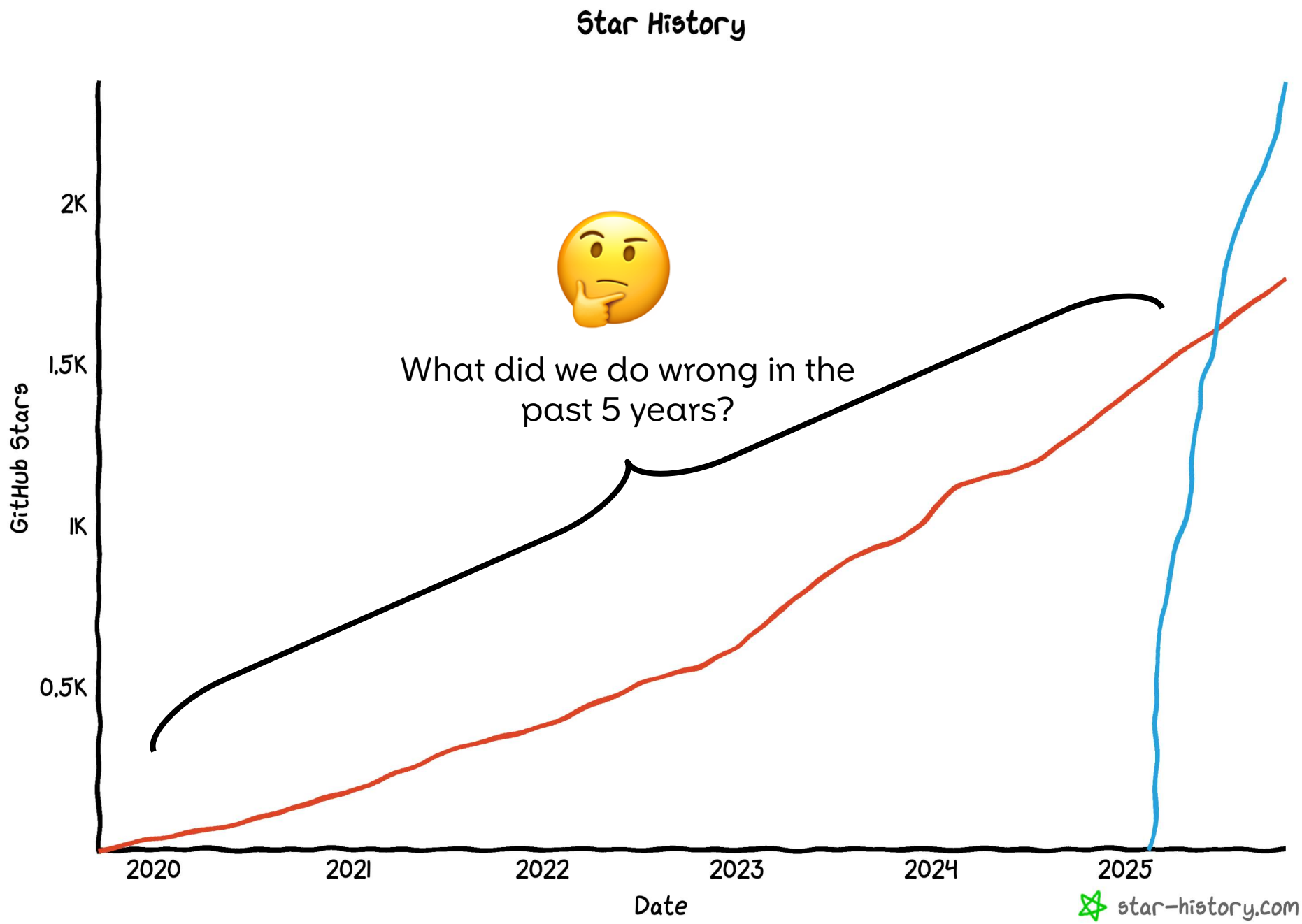

Star History
2K
1.5K
1K
0.5K
GitHub Stars
2020
2021
2022
2023
2024
2025
Date
star-history.com


Star History
2K
1.5K
1K
0.5K
GitHub Stars
What happened here?
2020
2021
2022
2023
2024
2025
Date
star-history.com


Star History
2K
1.5K
1K
0.5K
GitHub Stars
We **forked** our own project
2020
2021
2022
2023
2024
2025
Date
star-history.com


Star History
2K
1.5K
1K
0.5K
GitHub Stars
Fork „OpenCloud“
Project „Infinite Scale“
2020
2021
2022
2023
2024
2025
Date
star-history.com


Star History
The project gained more stars in **6 months** than in the **previous 5 years**.
GitHub Stars
2K
1.5K
1K
0.5K
2020
2021
2022
2023
2024
2025
Date
star-history.com


Star History
2K
1.5K
1K
0.5K
GitHub Stars
What did we do wrong in the past 5 years?
2020
2021
2022
2023
2024
2025
Date
star-history.com

OpenCloud

Learning #1

Almost nobody understands the real value of Open Source*

* as defined by the OSI: https://opensource.org/osd

Almost nobody understands the real value of Open Source Software

Question:

What is the advantage of OSS?

Bitkom: Open Source Monitor 2025: https://www.bitkom.org/sites/main/files/2025-09/Bitkom-Studienbericht-Open-Source-Monitor-2025.pdf

Almost nobody understands the real value of Open Source Software

Question:

What is the advantage of OSS?

Answer # 1:

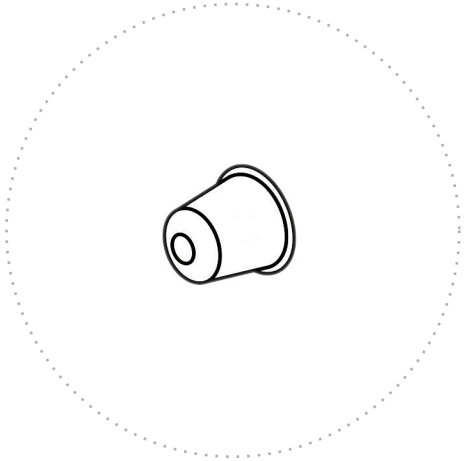
“Cost savings!“

Bitkom: Open Source Monitor 2025: https://www.bitkom.org/sites/main/files/2025-09/Bitkom-Studienbericht-Open-Source-Monitor-2025.pdf

Almost nobody understands the real value of Open Source Software

Question:

If you buy a coffee machine, would you prefer Nespresso **capsules** or **ground** coffee?



or

Almost nobody understands the real value of Open Source Software

Open Source
• **Feature** Source Code available
• **Benefit**
• **Value**

We never really communicated the value.

Almost nobody understands the real value of Open Source Software

Open Source	
• **Feature**	Source Code available 🤭
• **Benefit**	
• **Value**	

We never really communicated the value.

Almost nobody understands the real value of Open Source Software

Open Source		
• **Feature**	Source Code available	🤭
• **Benefit**	Inspect, adapt & modify	🤷‍♂️
• **Value**		

We never really communicated the value.

Almost nobody understands the real value of Open Source Software

Open Source		
• **Feature**	Source Code available	🤭
• **Benefit**	Inspect, adapt & modify	🤷‍♂️
• **Value**	Freedom, no lock-in	😍

We never really communicated the value.

OpenCloud

Learning #2

Open code is not enough

Open code is not enough

We opened the code,

but not the process.

- **Free licensed:** The code was published under proper Apache2 and AGPL licenses on GitHub
- **Closed organization:** Discussions, planning, roadmap etc. **took place in non-public Jira tickets**
- **Blackbox:** From outside, the project was a blackbox

Open code is not enough

Luckily, confluence **discontinued the Jira** on-prem licenses so we needed to find an alternative.

Open code is not enough

We moved all process related work to GitHub

By default, any ticket we open is public:

- Roadmap
- Issues
- Discussions
- Decisions (ADR)

→ **Open by default**

For customer related tickets, we still have a non-public repo, about 10% of the tickets – works perfectly for us.

OpenCloud Team Board

Insights

Bugfixing Kanban | Backlog | Sprints | Sprint Board

is:open status:Backlog 55 Discard

	Title	Story Points	Status	Labels	Parent issue	A...	Repository
	Sprint 11 1 Story Points: 0 Sep 21 - Oct 11						
1	Sprint Info		Backlog				
	Sprint 12 4 Story Points: 19 Oct 12 - Nov 01						
2	Re-vive the existing Education API #1597	8	Backlog	Priority:p2-high Type:Story	[Epic] Multi tenancy Part I #877		opencloud-eu/opencloud
3	Support Customer-Specified Tenant IDs #1598	3	Backlog	Priority:p2-high Type:Story	[Epic] Multi tenancy Part I #877		opencloud-eu/opencloud
4	User Lookup by External ID #1599	8	Backlog	Priority:p2-high Type:Story	[Epic] Multi tenancy Part I #877		opencloud-eu/opencloud
5	Sprint Info		Backlog				
	Sprint 13 1 Story Points: 0 Nov 02 - Nov 22 Current						
6	Sprint Info		Backlog				
	No Sprint 49 Story Points: 113						
7	User and Data should be deprovisioned #1287		Backlog	Priority:p2-high Type:Story			opencloud-eu/opencloud
8	Persist the Favorites Index #1196	5	Backlog	Priority:p3-medium			opencloud-eu/opencloud
9	Find a way to set quota on personal space #1487		Backlog	Priority:p2-high Status:Blocked Type	[Epic] Multi tenancy Part I #877		opencloud-eu/opencloud
10	Make Autoprovisioning work in multi-tenancy setups #1457	13	Backlog	Priority:p3-medium Type:Story			opencloud-eu/opencloud
11	Announce if running a stable or rolling version #1549		Backlog	Status:Blocked Type:Story			opencloud-eu/opencloud
12	create a buildflag for stable / rolling version #1580	5	Backlog		Announce if running a stable or rolling ver...		opencloud-eu/opencloud
13	Use Graph API "Recent" function for recent listing #1205	13	Backlog	Type:Story			opencloud-eu/opencloud
14	Make versions available via PROPFIND requests #662		Backlog	Priority:p2-high Type:Bug			opencloud-eu/opencloud

OpenCloud Team Board

Insights

Bugfixing Kanban | Backlog | Sprints | Sprint Board

-no:sprint 283 Discard

	Title	Story Po...	Status	Sprint	Assignees	Labels	Repository
	Sprint 1 24 Story Points: 81 Feb 23 - Mar 15						
1	[posix-fs] No personal space after user recreate #261		Done	Sprint 1		Priority:p2-high Type:Bug	opencloud-eu/opencloud
2	posix. 500 when restoring resources #281		Done	Sprint 1	butonic	Priority:p2-high Type:Bug	opencloud-eu/opencloud
3	Sprint Info		Done	Sprint 1			
4	PosixFS non-collaborative mode #205	8	Done	Sprint 1	aduffeck	Type:Story	opencloud-eu/opencloud
5	Metadata Storage #222	5	Done	Sprint 1	aduffeck	Type:Story	opencloud-eu/opencloud
6	Make OpenCloud useable with Multi Node Network Storage Dri... #223	13	Done	Sprint 1	rhafer	Type:Story	opencloud-eu/opencloud
7	PosixFS: Make PosixFS non-collaborative mode the new install ... #220	8	Done	Sprint 1	butonic	Type:Story	opencloud-eu/opencloud
8	PosixFS Admin Documentation #219	5	Done	Sprint 1	dragotin	Type:Story	opencloud-eu/opencloud
9	IDP IdentifierDefaultSignInPageText not configurable #376		Done	Sprint 1	butonic	Type:Bug	opencloud-eu/opencloud
10	Publish packages to public registry #209	5	Done	Sprint 1	Jamming...	Type:Story	opencloud-eu/web
11	Make web app repos public #210	8	Done	Sprint 1	Jamming...	Type:Story	opencloud-eu/web
12	Prevent Sidebar from Snapping #212	8	Done	Sprint 1	Jamming...	Type:Story	opencloud-eu/web
13	Spaces: make "Include disabled" a view setting #213	5	Done	Sprint 1	AlexAndB...	Type:Story	opencloud-eu/web
14	Make "Sort by" visually less obstrusive #214	3	Done	Sprint 1	AlexAndB...	Type:Story	opencloud-eu/web
15	embed images in md-editor-v3 #206	8	Done	Sprint 1	AlexAndB...	Type:Story	opencloud-eu/web
16	Storage Provider Benchmark #221	5	Done	Sprint 1	aduffeck	Type:Story	opencloud-eu/opencloud
17	fix(web): logo upload #235		Done	Sprint 1	kulmann	Type:Bug	opencloud-eu/opencloud
18	posix. user cannot create GDPR export #282		Done	Sprint 1	butonic	Type:Bug	opencloud-eu/opencloud
19	look up personal space for GDPR export #297		Done	Sprint 1	butonic	Type:Enhancement	opencloud-eu/opencloud

Roadmap

Insights

Living Roadmap | List | Gantt view | Feature Requests

has:available-from 22 Discard

Q1 - 2025 3

Roadmap #5
Make OpenCloud Source Code Available
Done

Roadmap #6
PosixFS
Done

Roadmap #13
Monetize: Product Service & Support Offering
Done

Q2 - 2025 5

Roadmap #10
Migration
Done

Roadmap #9
Calendar + Contacts
Done

desktop #146
Release Desktop Client (25.4.2025)
Done

Roadmap #20
Collaborative Storage
Done

Roadmap #50
iOS App
Done

Q3 - 2025 3

Roadmap #19
LTS - Long Term Support

Roadmap #16
Android App
Done

Roadmap #11
Partner Enablement

Q4 - 2025 4

Roadmap #14
Desktop: VFS - Files on Demand (Windows)

Roadmap #56
Transfer Ownership

opencloud #1419
Clean-Up File Versions

Roadmap #12
Multitenancy

Q1 - 2026 1

Roadmap #60
Guest User

Context and Problem Statement

To reduce resource usage and cost service providers want a single OpenCloud instance to host multiple tenants. Members of the same tenant should be able to only see each other when trying to share resources. A user can only be a member of a single tenant. Moving a user from one tenant to another is not supported.

OpenCloud does currently not have any concept of multi-tenancy. All users able to login to an OpenCloud instance are able to see each other and share resources with everybody. This ADR is supposed to layout a concept for a minimal multi-tenancy solution that implements the characteristics mentioned above.

To further limit the scope there are a couple of constraints:

- Tenants are rather small (sometimes just a single user, often less than 10)
- There is just a single IDP with a single "realm".
- The user-management is external to OpenCloud
- The membership of a user to a tenant is represented by a tenant id that is provided via a claim in the users' Access Token/UserInfo or by a per User Attribute in the LDAP directory.
- There is no need to support per tenant groups
- There is no need to isolate the storage of the tenants from each other
- Role Assignment happens at first login via OIDC claims

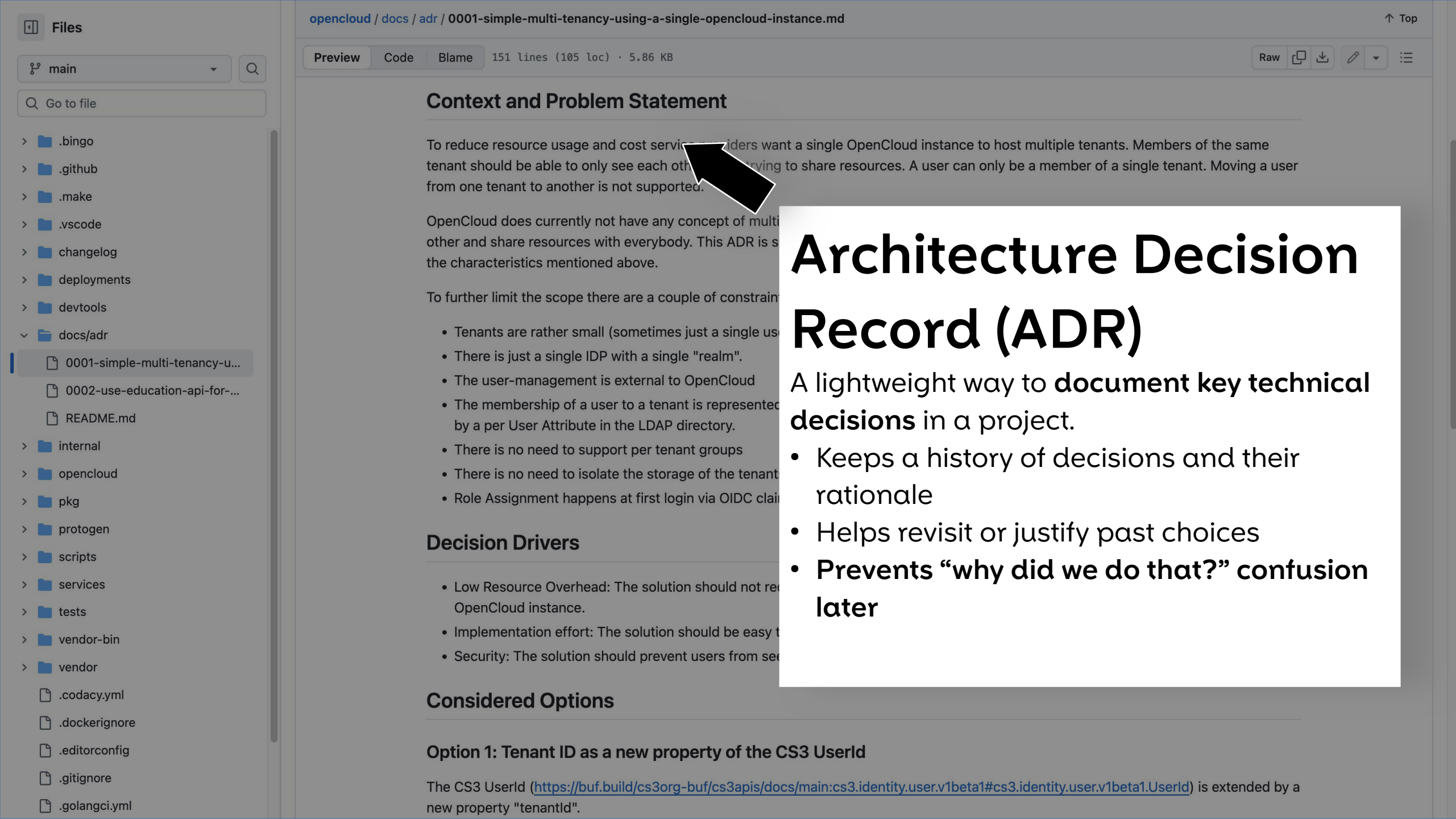
Decision Drivers

- Low Resource Overhead: The solution should not require much additional resources (CPU, Memory, Storage) per tenant on the OpenCloud instance.
- Implementation effort: The solution should be easy to implement and maintain.
- Security: The solution should prevent users from seeing or accessing anything from other tenants.

Considered Options

Option 1: Tenant ID as a new property of the CS3 UserId

The CS3 UserId (https://buf.build/cs3org-buf/cs3apis/docs/main:cs3.identity.user.v1beta1#cs3.identity.user.v1beta1.UserId) is extended by a new property "tenantId".


Files
main
Go to file
.bingo
.github
.make
.vscode
changelog
deployments
devtools
docs/adr
0001-simple-multi-tenancy-u...
0002-use-education-api-for-...
README.md
internal
opencloud
pkg
protogen
scripts
services
tests
vendor-bin
vendor
.codacy.yml
.dockerignore
.editorconfig
.gitignore
.golangci.yml
opencloud / docs / adr / 0001-simple-multi-tenancy-using-a-single-opencloud-instance.md
Top
Preview
Code
Blame
151 lines (105 loc) · 5.86 KB
Raw
Context and Problem Statement
To reduce resource usage and cost servi iders want a single OpenCloud instance to host multiple tenants. Members of the same tenant should be able to only see each oth rying to share resources. A user can only be a member of a single tenant. Moving a user from one tenant to another is not supported.
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Role Assignment happens at first login via OIDC clai
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The CS3 UserId (https://buf.build/cs3org-buf/cs3apis/docs/main:cs3.identity.user.v1beta1#cs3.identity.user.v1beta1.UserId) is extended by a new property "tenantId".
Architecture Decision Record (ADR)
A lightweight way to document key technical decisions in a project.
Keeps a history of decisions and their rationale
Helps revisit or justify past choices
Prevents “why did we do that?” confusion later

Open code is not enough

→ No more

„behind the scenes“

OpenCloud

Learning #3

KISS - Keep It Simple Stupid

OpenCloud

After 14 years of experience with PHP-based file clouds

Which component causes the most incidents?

Most incidents: The database

Split-Brain-Problem

After the upload, metadata and the file blob are stored separately.

File Metadata	
Filename	Mountains.jpg
Path	/photos/
Shared with	Alan, Mary
mtime	179430
size	30424

Most incidents: The database

Split-Brain-Problem

After the upload, metadata and the file blob are stored separately.

- **Metadata** → Database
- **Blob** → Storage

Most incidents: The database

Split-Brain-Problem

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Split-Brain-Problem: Database and storage must always be consistent, otherwise there is a risk of data loss!

Most incidents: The database

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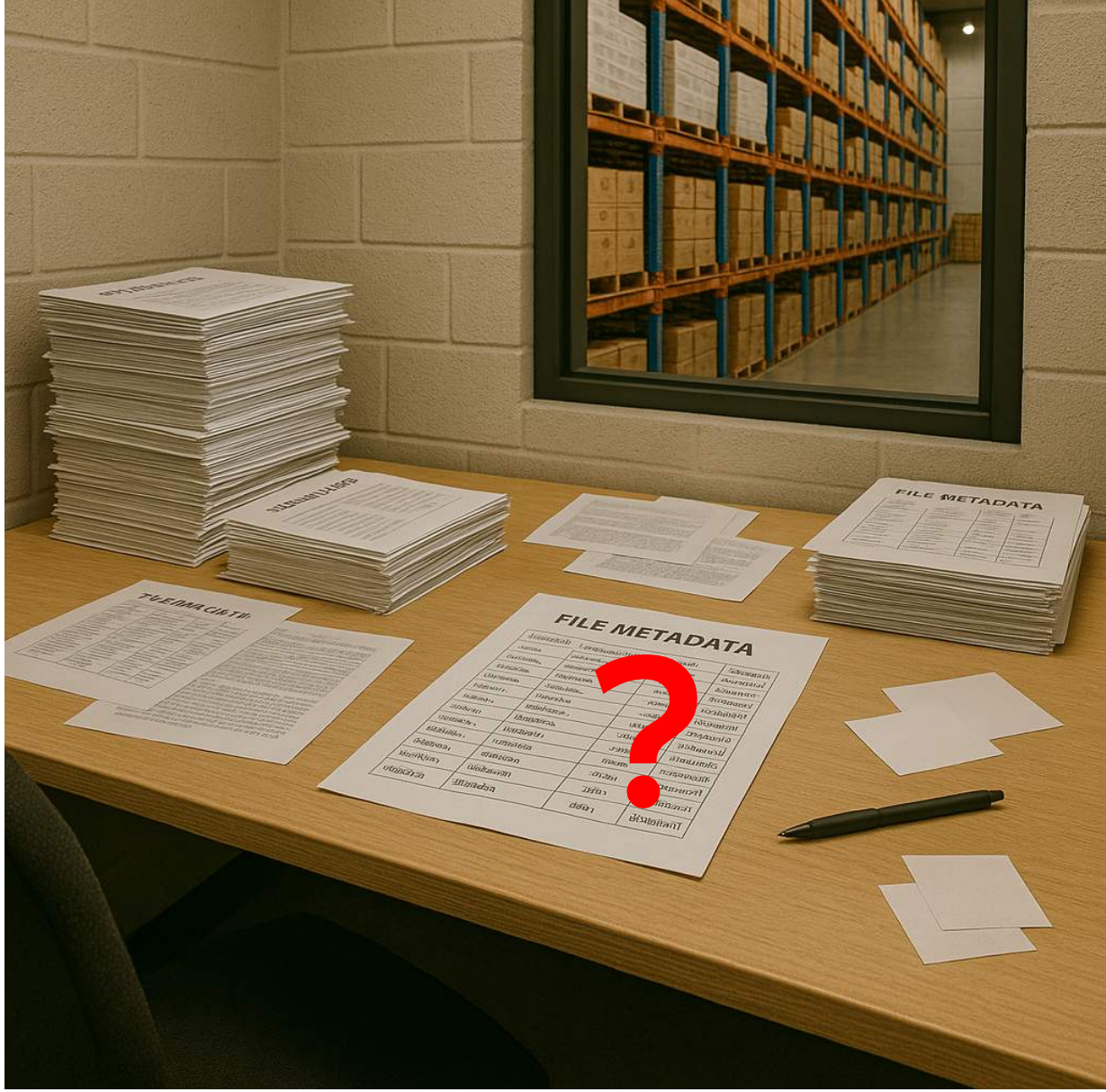

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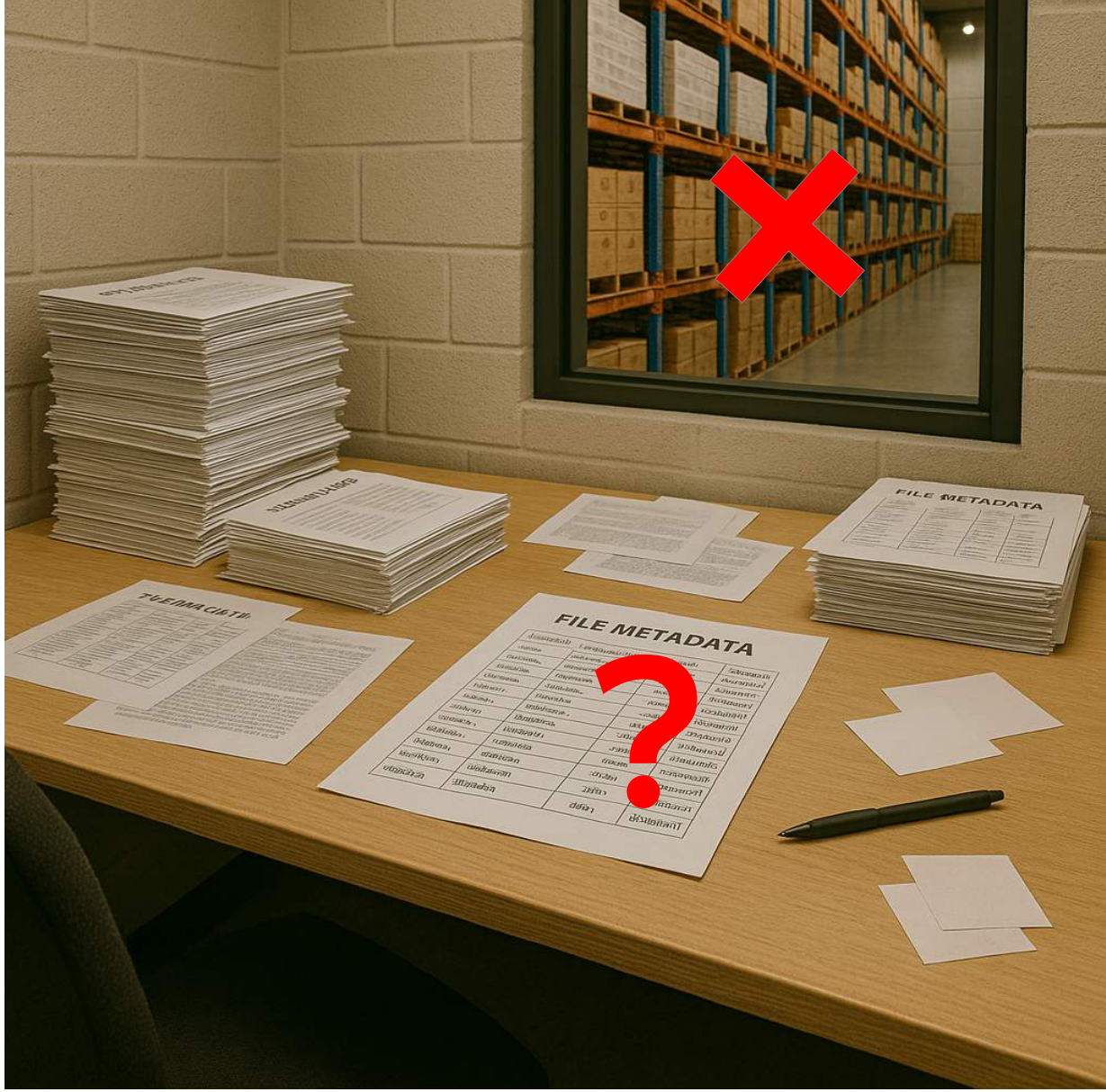

Solution:

❌ No more database

 Saving metadata on storage

Solution: Saving metadata on storage

- System gains massive **reliability**

Solution: Saving metadata on storage

- System gains massive **reliability**
- **No database knowledge** required

Solution: Saving metadata on storage

- System gains massive **reliability**
- **No database knowledge** required
- System **scales with storage**

Solution: Saving metadata on storage

- System gains massive **reliability**
- **No database knowledge** required
- System **scales with storage**
- **Single** source of truth (you can edit files eg. via command line and see changes in all clients)

→ Massive **reduction of complexity** for admins 🫶

OpenCloud

Our top 3 learnings

1) Communicate your **value** clearly

2) Open code isn't enough, **open development** is what matters

3) KISS: Keep your product simple

Thank You!

OpenCloud

Let’s stay in contact

#opencloud:matrix.org

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