



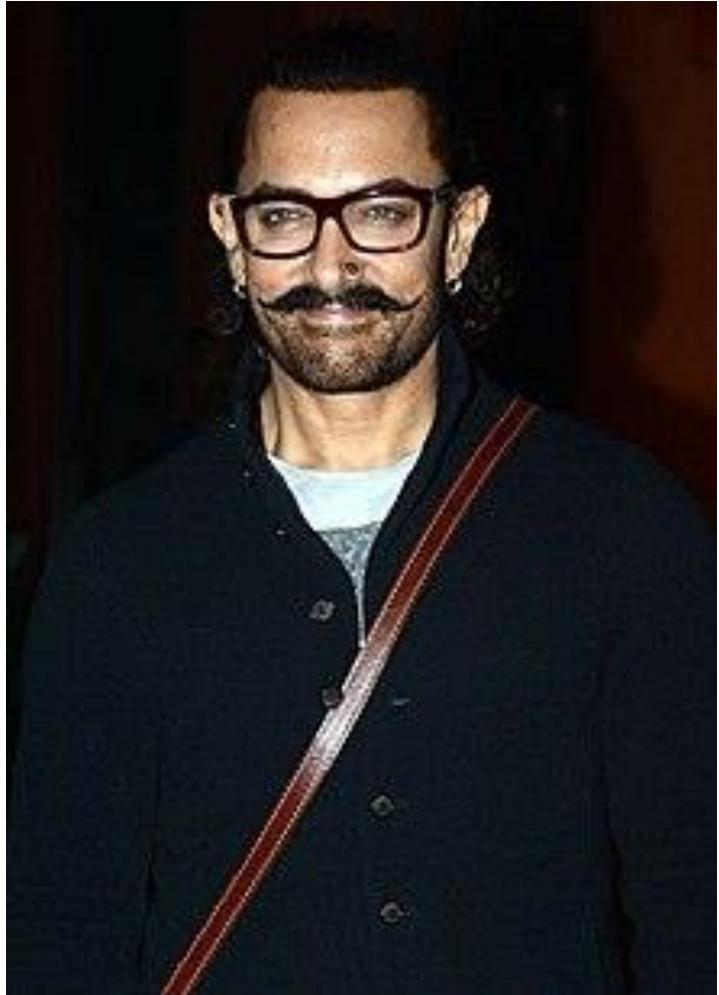
Open Source Demystified!

Exploring the real potential...



open
Source

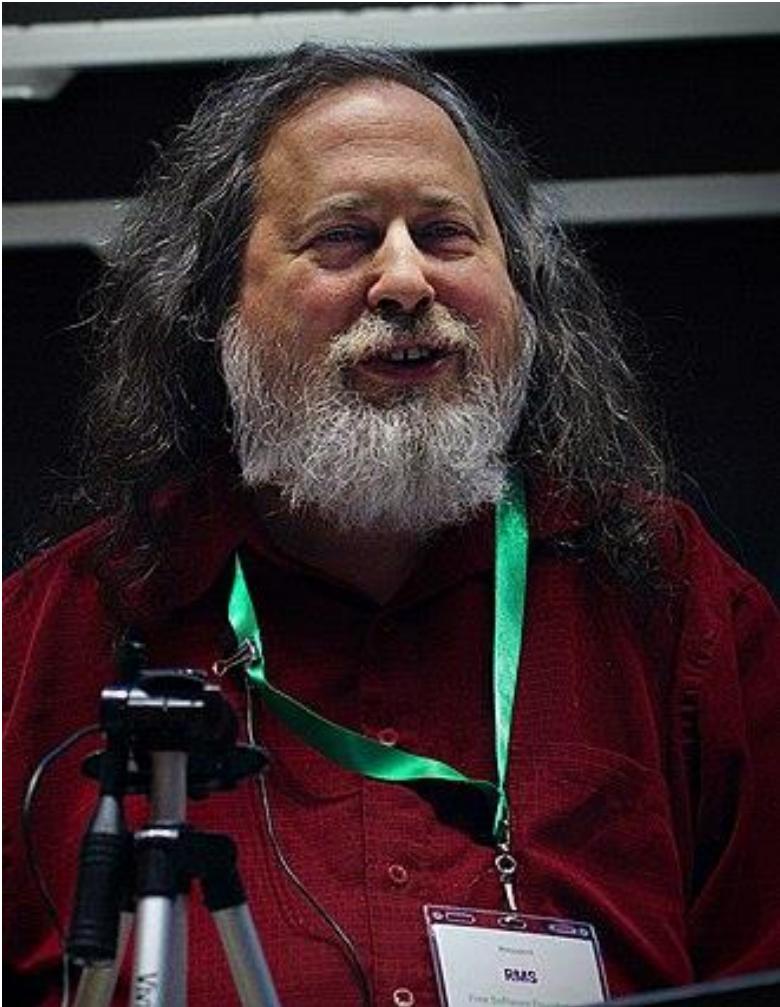
Chit-Chat



Mohammed Aamir Hussain Khan

"Mr. Perfectionist"

https://en.wikipedia.org/wiki/Aamir_Khan



Richard Matthew Stallman

Started the GNU Project

Founded of Free Software Foundation (FSF) in October 1985

Developed GNU Compiler Collection and GNU Emacs

Wrote the GNU General Public License. (GPL)

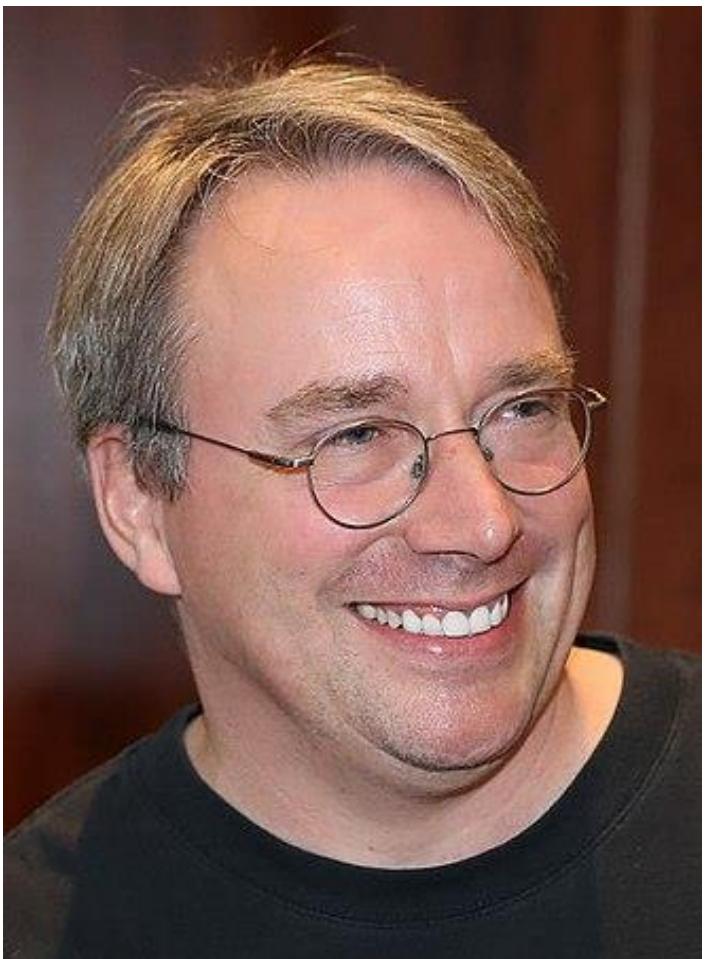
https://en.wikipedia.org/wiki/Richard_Stallman



Alia Bhatt

One of India's highest-paid actresses, she has appeared in [Forbes India's Celebrity 100](#) list since 2014 and was awarded the [TIME100 Impact Award](#) in 2022.

https://en.wikipedia.org/wiki/Alia_Bhatt



Linus Benedict Torvalds

Creator of Linux Kernel

Created the distributed version control system Git

From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds)
Newsgroups: comp.os.minix
Subject: What would you like to see most in minix?
Summary: small poll for my new operating system
Message-ID: <1991Aug25.205708.9541@klaava.Helsinki.FI>
Date: 25 Aug 91 20:57:08 GMT
Organization: University of Helsinki

Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torvalds@kruuna.helsinki.fi)

PS. Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.

https://en.wikipedia.org/wiki/Linus_Torvalds

Advancing Computing as a Science & Profession

We see a world where **computing** helps solve tomorrow's problems – where we use **our knowledge and skills** to advance the **profession** and make a **positive impact**.



ACM, the world's largest educational and scientific computing society, delivers resources that advance computing as a science and a profession. ACM provides the computing field's premier Digital Library and serves its members and the computing profession with leading-edge publications, conferences, and career resources.

Mission:

ACM is a global scientific and educational organization dedicated to advancing the art, science, engineering, and application of computing, serving both professional and public interests by fostering the open exchange of information and by promoting the highest professional and ethical standards.

Vision:

ACM will continue to be the premiere global computing society.

Core values:

- Technical excellence
- Education and technical advancement
- Ethical computing and technology for positive impact
- Diversity, Equity, and Inclusion

ACM India Council

Created by ACM to increase the level and visibility of ACM activities across India.

The ACM India Council's activities, involving academia and industry in computing, include research, organization of high-quality computing conferences, advancing Computer Science education, and awards to recognize achievement.

Get involved! In ACM activities - Publications, SIGs & Conferences, Curriculum, Chapters, Public Policy.
Join as an ACM member!



open
Source

What?



MOVIE TIME!



Video Link : <https://www.youtube.com/watch?v=SpeDK1TPbew>

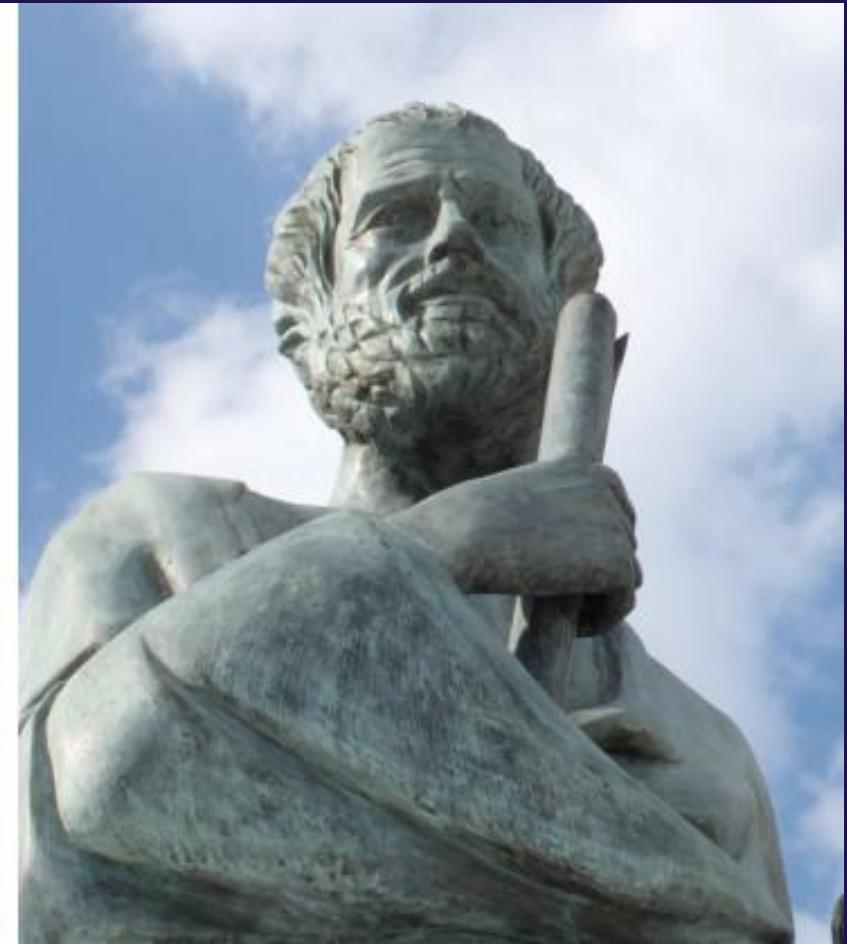
“F Prime has enabled a lot of goals we’ve had at JPL to design a truly reusable multi-mission flight architecture with the added bonus of the open-source collaboration and visibility afforded by the Mars Helicopter project,” Canham said. “It’s kind of an open-source victory, because we’re flying an open-source operating system and an open-source flight software framework, and flying commercial parts that you can buy off the shelf, if you wanted to do this yourself someday.” (The helicopter carries a combination of custom-made and off-the-shelf components – many from the world of cell phone technology – including its two cameras.)

COMMUNITY

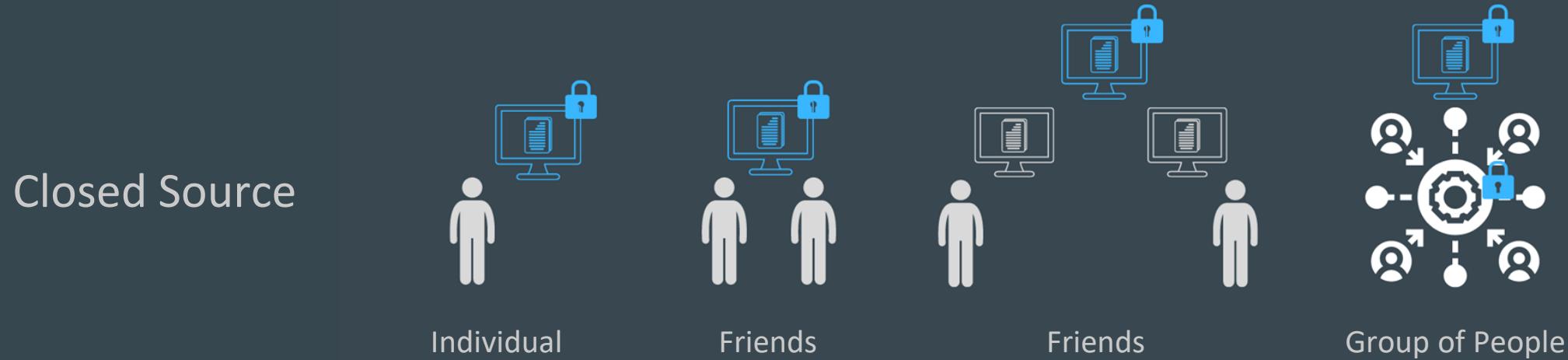


Open Source Community ~~ Society

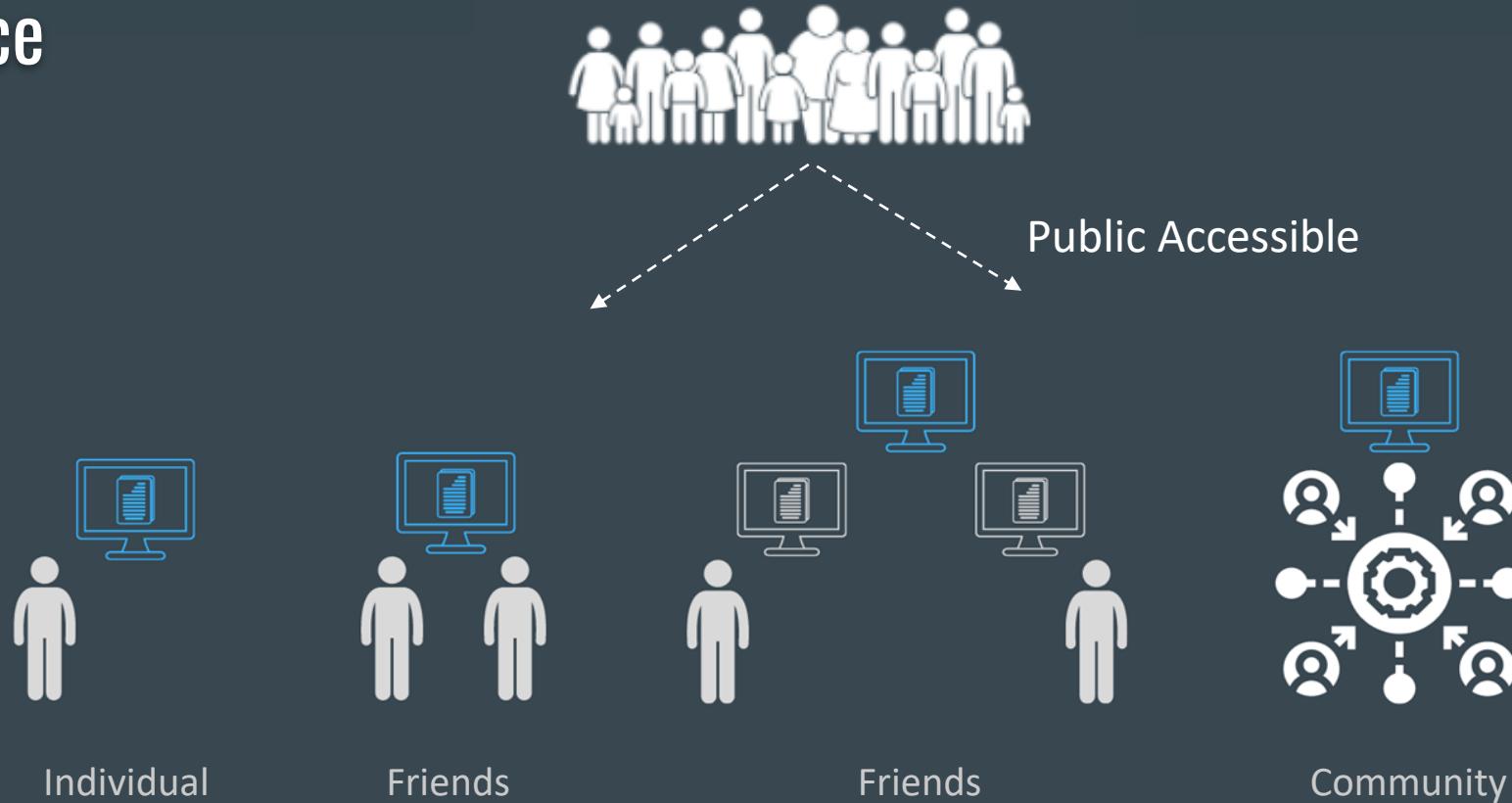
- Integrity
- Openness
- Sharing
- Collaboration
- Communication



How do we do software development ?



Open Source



Source Code is Open

Open Source



Need **NOT** be Free!

Free Software



Run, Edit, Contribute & Share

Need **NOT** be Free!

Freeware



Free to use (conditions apply!)

Mostly **NOT** Open Source!

Open Source : Essentials



Common Place for Source Code

Examples : git, github, gitee, gitlab, bitbucket, ...



Developers

Using different programming languages
(go, c, c++, java, scripts...)

Open Source : Typical Components

Governance



- Operation Structure
- Strategy & Budget
- Roadmap

Engineering



- Design and Development
- Project Management
- Source Version Control

Ecosystem



- Developers
- Vendors
- Users

..for a project to run smoothly and to be sustainable!

Project, Foundation and Sub Foundation

Projects



Foundations
(hosts sub foundations
and projects)

Sub-Foundations
(hosts projects)

Why?



open
Source

There is an open source project for **that!**

94M

developers are on
GitHub

90%+

of Fortune 100
companies use
GitHub

90%

of companies use
open source*

413M

open source
contributions in
2022

80% of organizations have increased the use of open source software over the last year.

95% of Organizations think that enterprise open source software is critical for their enterprise infrastructure.

82% of IT leaders are more likely to select a vendor who contributes to the open source community!



Open Source Collaboration makes your business more competent!

The #1 reason

organizations use open source software is to have access to **innovations and the latest technologies.**



Enterprise open source is expected to play a larger role in emerging technologies over the next two years

Top reasons why enterprise open source vendors are preferred

- 1 They are familiar with open source processes 49%
- 2 They help sustain healthy open source communities 49%
- 3 They can influence the development of features that we need 48%
- 4 They are going to be more effective if I face technical challenges 46%

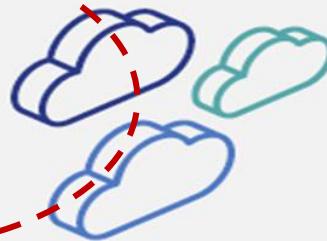
Enterprise open source solutions can help **boost 5G adoption** across industries like manufacturing, automotive, and transportation, not just telecommunications.

Top 12 trends in data and storage

In 2022, the growth in data was 3 times higher than in 2021.



56% of end users deploy open source multi-cloud management in their production environments.



43% of end users demand the freedom to leverage multiple storage vendors.



Data security is the greatest challenge facing container deployments.



Public clouds run more than 40% of end-user organization workloads.



Primary data storage, complete data protection, and disaster recovery represent the top 3 use cases for cloud storage services.



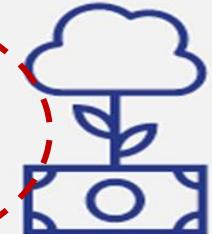
Information security and data privacy are the leading reasons to use a private cloud solution.



The biggest challenge facing multi-cloud solutions is the security and protection of data.



Cloud technologies represent the most significant area of data and storage technology investment over the next three years.



AI-driven hybrid data management is considered the most critical area for data management and analytics over the next 2-4 years.

Data quality, governance, and security are top priorities when selecting metadata management solutions.

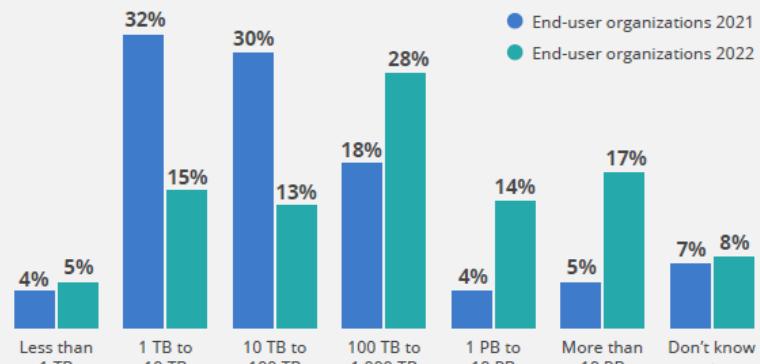


Cloud storage monitoring is the greatest challenge facing data and storage observability.



AMOUNT OF DATA GROWTH BY CATEGORY IN 2021 AND 2022

How much is the approximate data growth per year for your organization? (comparison of 2021 and 2022 results)

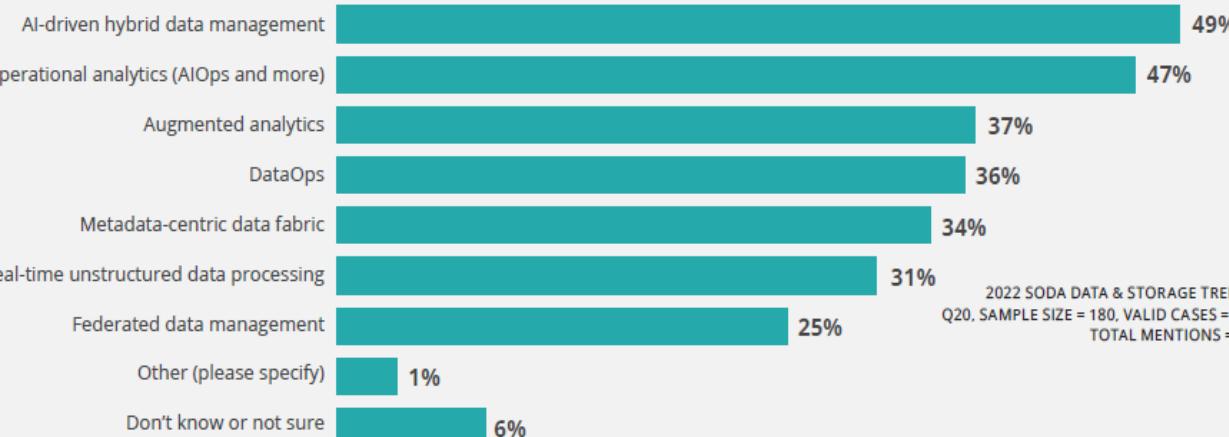


Data is growing!

Cloud Technology is the top investment area in next 3 years

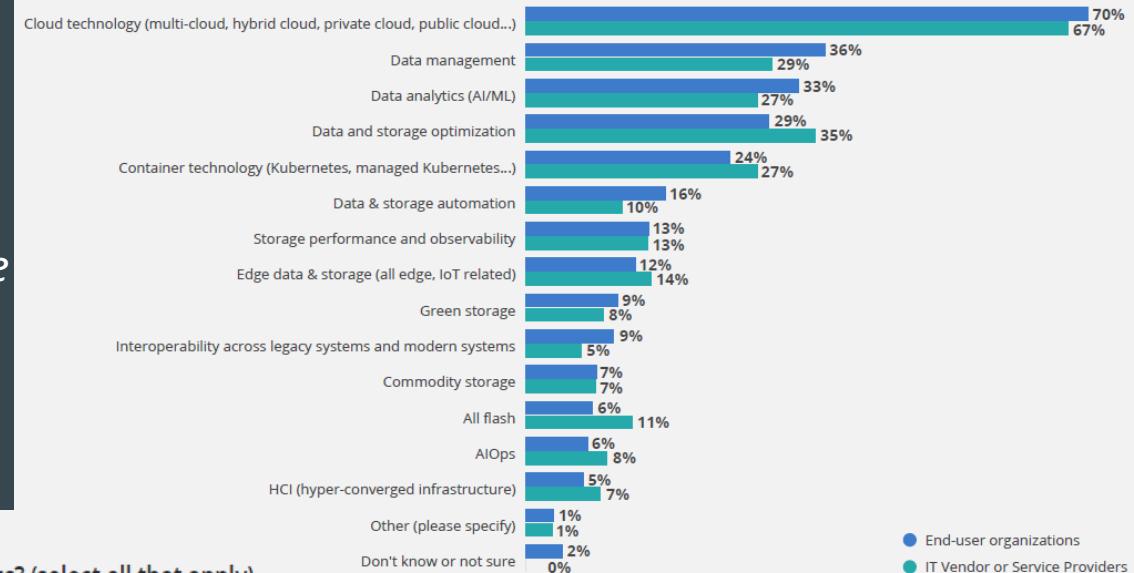
KEY DATA MANAGEMENT AND ANALYTIC AREAS OVER THE NEXT TWO TO FOUR YEARS

Which are the key capabilities you think are critical in the next 2-4 years for data management and data analytics? (select all that apply)



LEADING DATA STORAGE INVESTMENT AREAS OVER THE NEXT THREE YEARS

What are your organization's top 3 data and storage technology investment or deployment areas for the next 3 years? (segmented by end user and vendor/IT service provider)

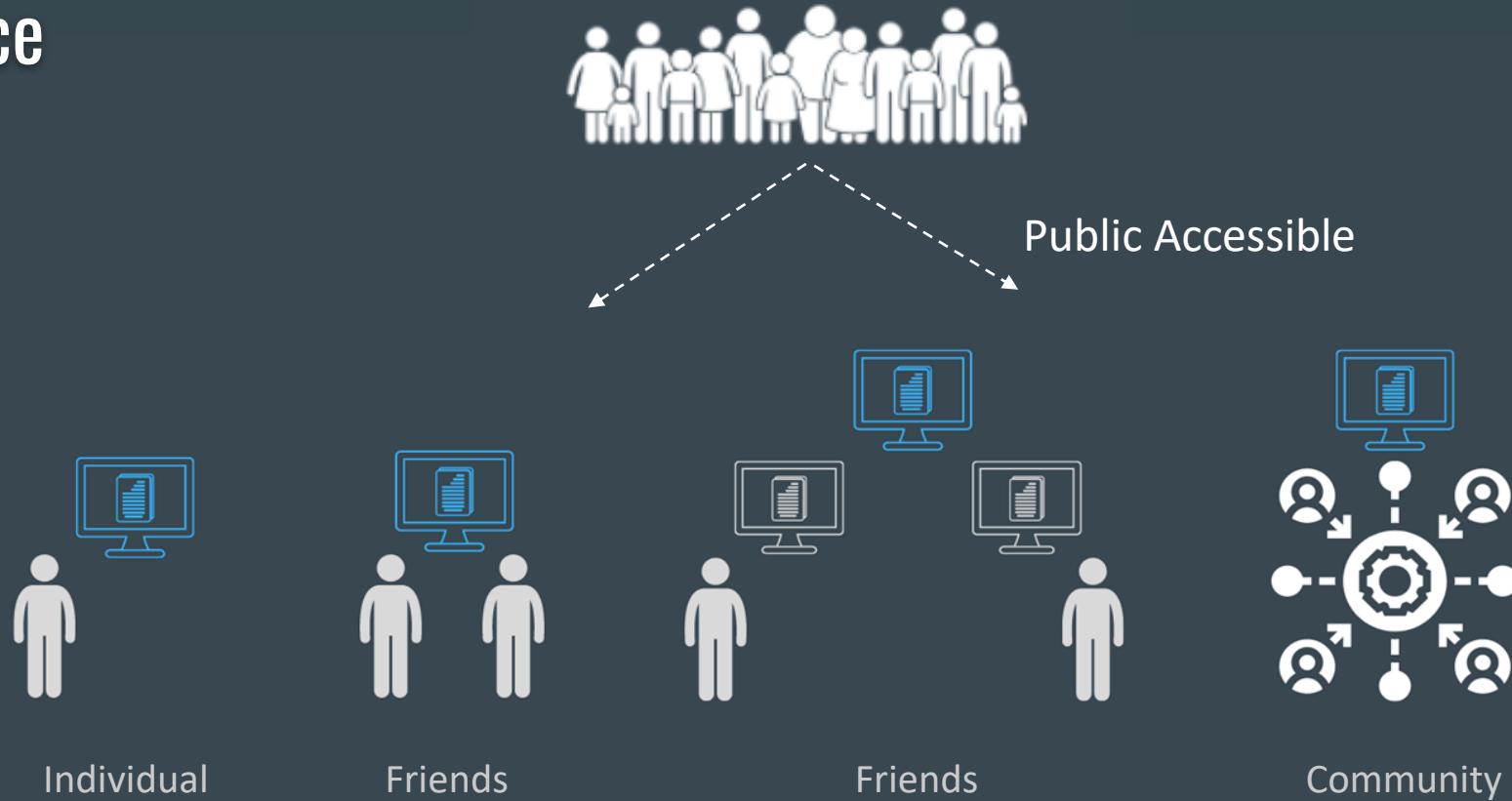


● End-user organizations
● IT Vendor or Service Providers

AI Driven Hybrid Data Management and Metadata management are the top trends for the next 2-4 years

Open Source adoption in Cloud and Kubernetes is increasing!

Open Source



Experience Power of Collaboration and Open Culture!

Collaborative & Open Culture



Collaborative Goals Setting
Collaborative Development
Collaborative Research
Collaborative Learning

Practices to ensure effective collaboration!



Open Communication

- What over Who (Community Calls, Slack, github discussions ...)

Value Development

- Why is it needed? Can't reuse? No to 'fancy pieces'! (github issue/PR handling)

Efficient Tools

- What works for us/this? Add what we use! Can we reduce 'work' (mindmap, github, gitops)

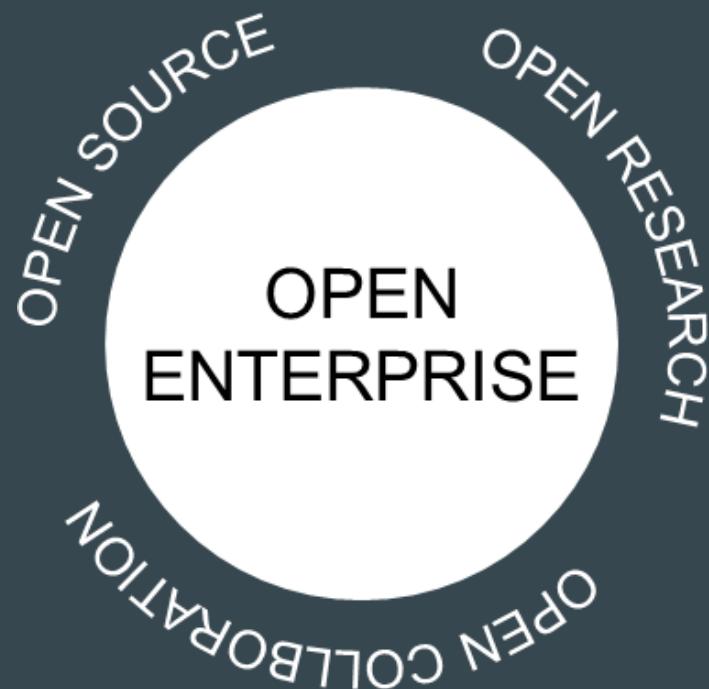
Right Process

- fit for changing community? Transparent? Inclusive? Needed? (github projects, teams, PR review...)

Self Learning

- Projects and People Self learn (project landscapes, meetups, events, outward view, technology..)

Open X !



Open Source

accelerate innovation and development with open source projects and ecosystems

Open Research

expand insights and explore ideas with open research and case studies

Open Collaboration

engage the community and build partnerships on a neutral platform

Why should I ?

Coding Skills

'Real' Projects

Technology

Communication

Confidence

Maturity

Visibility Unlimited!

Global Networking

Employability

Recognition

Leadership

Research & Innovation



**Transparent
Democratic
Value for All
Sustainable**



open
Source

How?

Open Source Ecosystem

Governance



Operation Structure
Strategy & Budget
Roadmap

Hosts and Manages the open source projects



Foundations

Host Multiple Projects and Sub Foundations | Build Governance & Operations



Sub Foundations

Host Multiple Projects | Build Governance & Operations



Independent Project Teams

Host and Manages individual projects

Engineering



Design and Development
Project Management
Source Version Control

Technology and Open Source Software Development

Developers

Design and Development of Open source software

Contributors

Contribute to non technical areas of the project

Experts

Architecture and Technology Strategy Development

Ecosystem



Collaborating Community
Brand, Awareness, Deployments
Requirements and Feedbacks

Collaboration, Productization and Deployment

Users

Use the products and solutions | Gives requirements and feedbacks | Support projects /foundations

Vendors

Build products and solutions | support the projects / foundations

Supporters

Partnering companies and individuals supporting the project community ecosystem |

How can I?

- Can Code?
- Can Test?
- Can Document?
- Can Software Design?
- Can do creative designs?
- Can evangelize?
- Can X..!

Want to
grow

Ready to
spare some
time

Ready to
spare some
time
consistently

Quick Steps

- **Join an open-source project today!**
 - Do not “PLAN”! ☺
 - Do not “THINK TOO MUCH”! ☺
- **Engage and Contribute!**
 - Identify
 - Join the community
 - Listen
 - Start small
 - Contribute
 - **Sustain → MOST IMPORTANT!**
- **Be part of a community**
 - Local Meetup Groups
 - Project Slack
 - Events

What we need?

Programming Skills
Email ID, Github Id, Slack Id ☺
Technology Competency

Time
Open mind to learn & grow!



open
Source

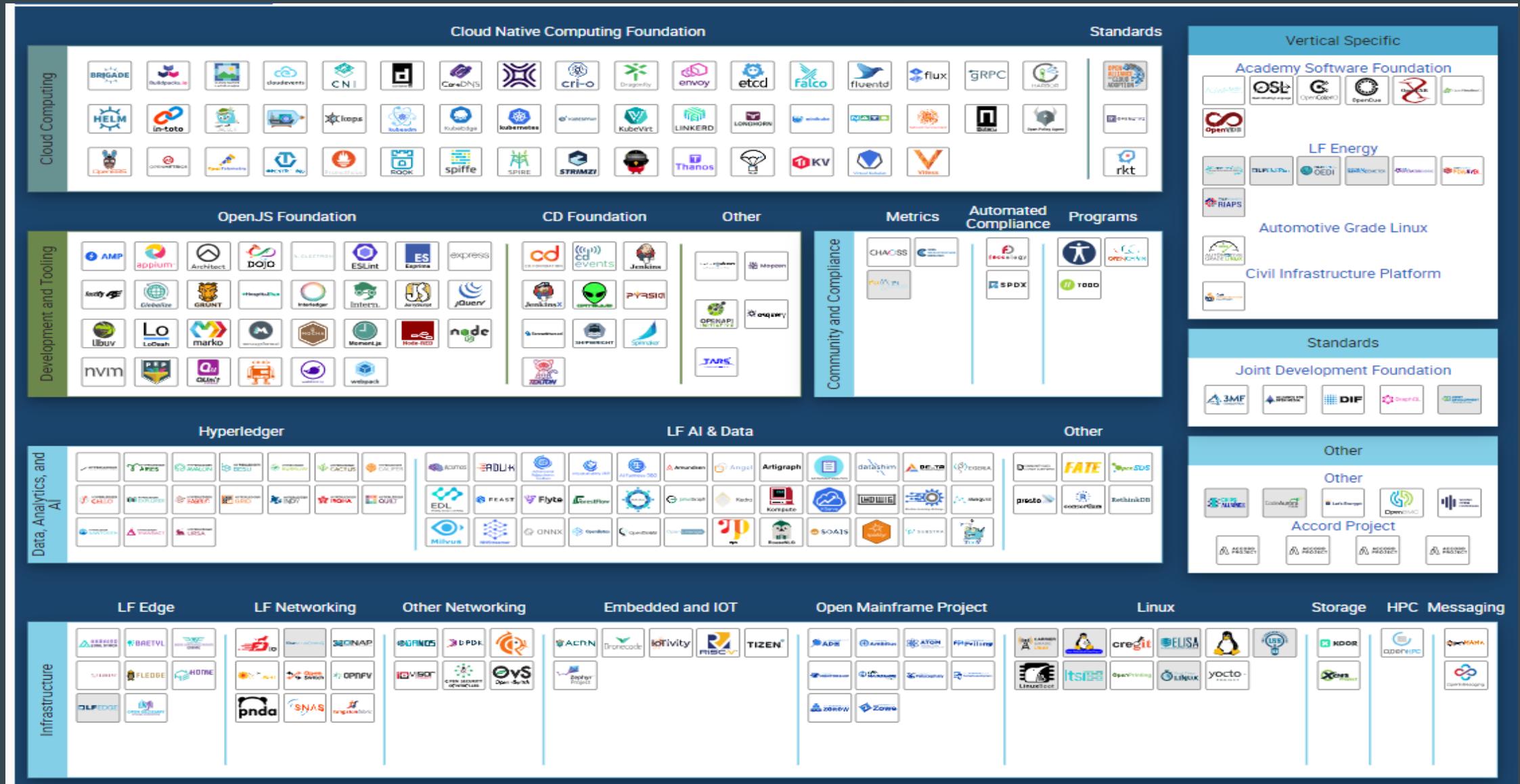
Growing Research, Growing Technology Landscapes...

More and More **domain-specific technology landscapes** of open source projects are being created.

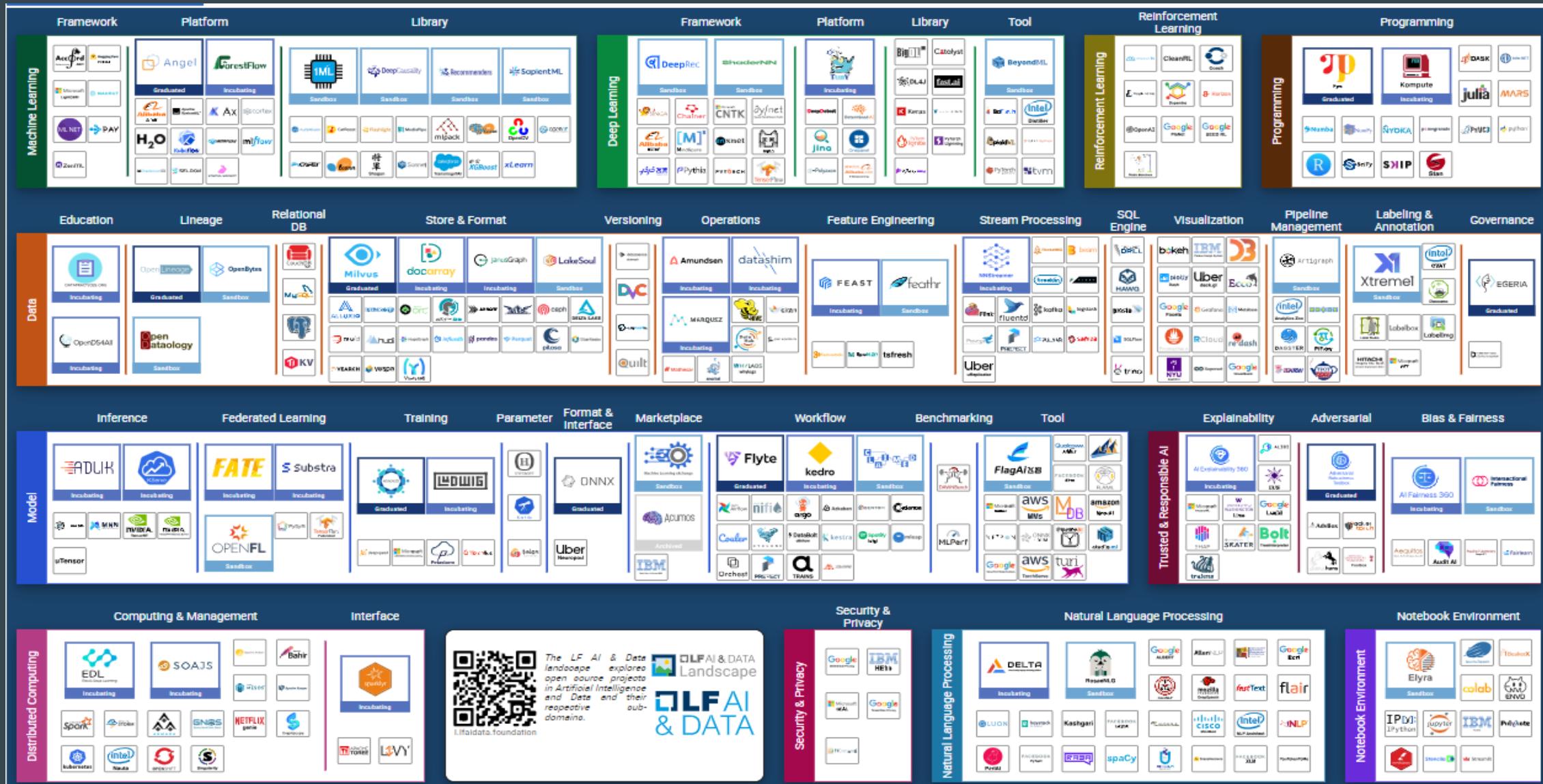
This **shows the scale** of open source project **research and development** in various technologies

More and More Open Source Projects in **Production**

LF Overall Landscape



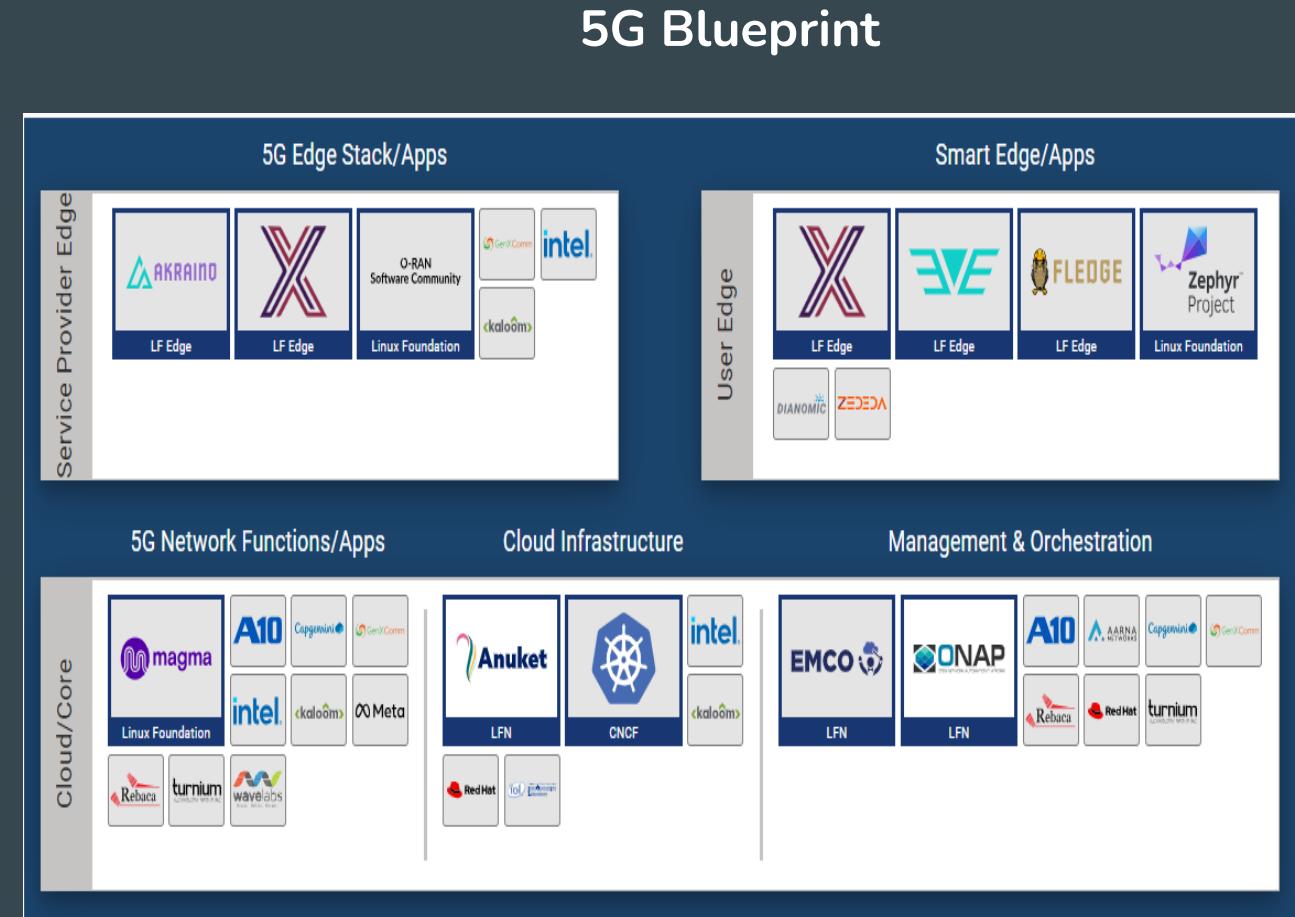
LF AI & Data Project Landscape



Gen AI is driving the AI & Data Projects growth

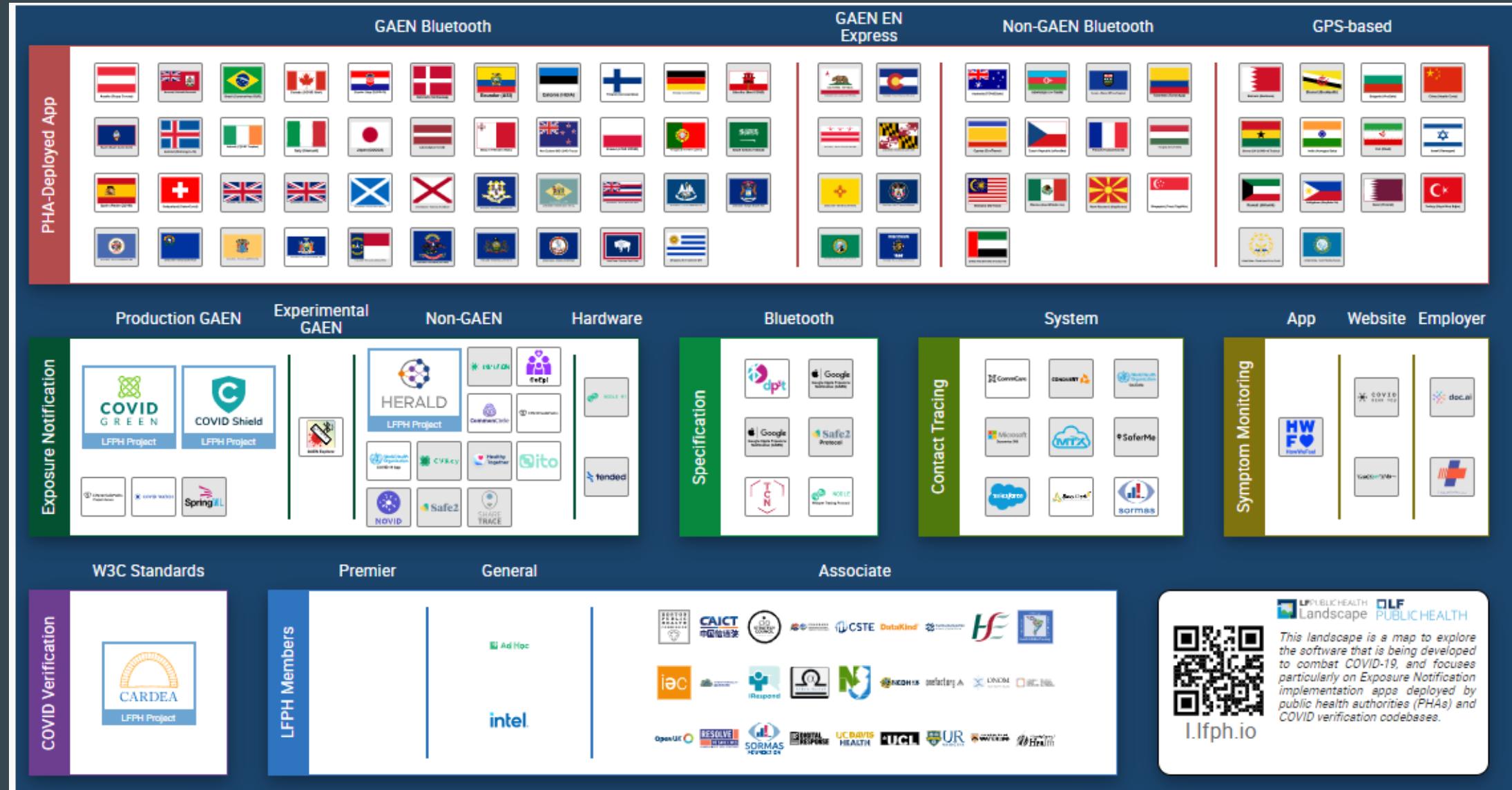
LF Networking and 5G

Networking



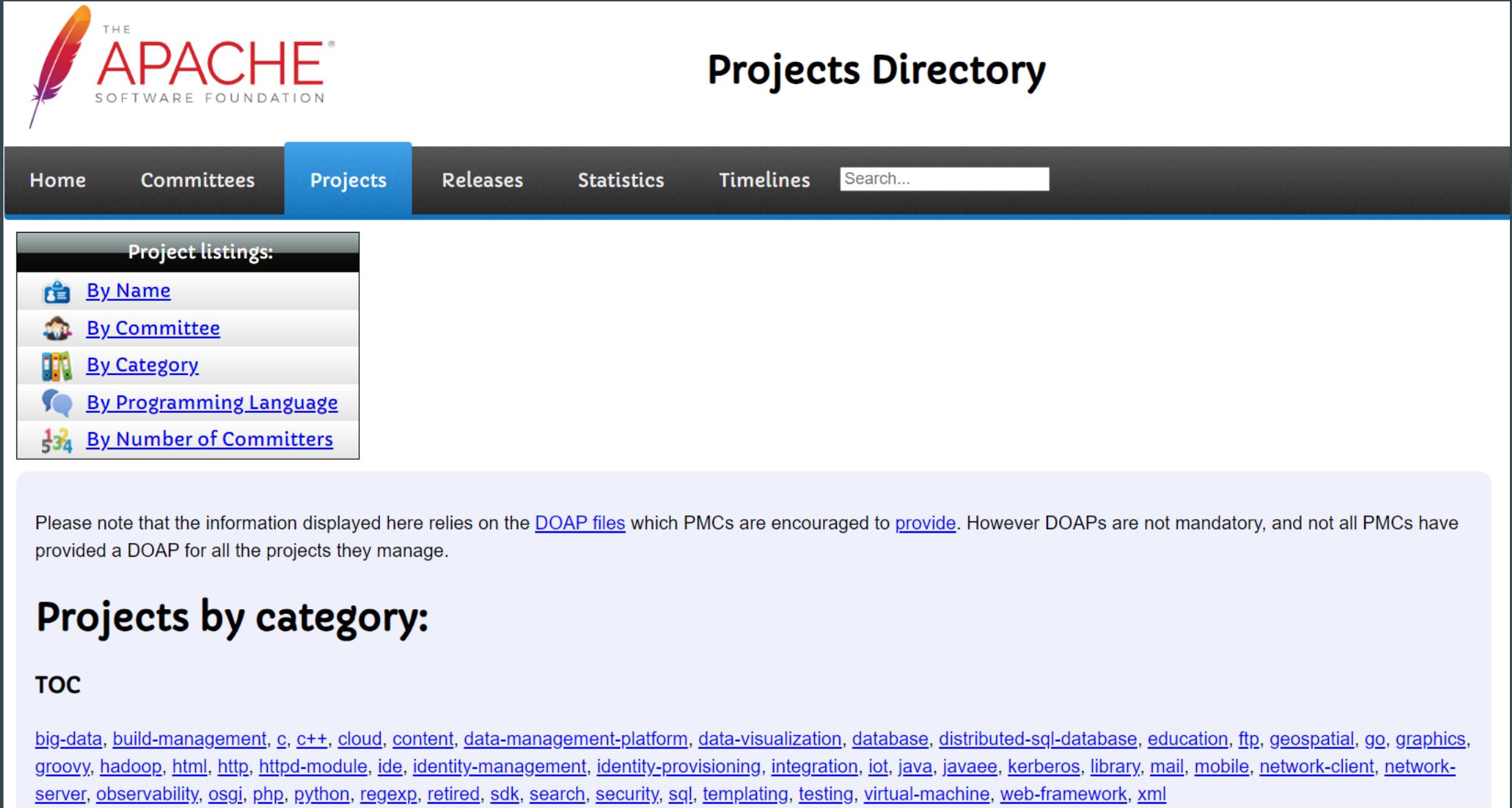
Open Source Networking and 5G open source projects are getting higher traction!

LF Public Health



LF and Industry collaboration on public health is becoming stronger...

Apache Foundation Projects across various technology domains



The screenshot shows the Apache Projects Directory page. At the top left is the Apache Software Foundation logo. To its right is the title "Projects Directory". Below the title is a navigation bar with links: Home, Committees, Projects (which is highlighted in blue), Releases, Statistics, Timelines, and a search bar labeled "Search...". On the left side, there is a sidebar titled "Project listings:" with five items: "By Name", "By Committee", "By Category", "By Programming Language", and "By Number of Committers", each with a small icon next to it. The main content area contains a note about DOAP files and a section titled "Projects by category:" with a "TOC" link below it. A long list of project names is at the bottom.

THE
APACHE[®]
SOFTWARE FOUNDATION

Projects Directory

Home Committees **Projects** Releases Statistics Timelines Search...

Project listings:

-  [By Name](#)
-  [By Committee](#)
-  [By Category](#)
-  [By Programming Language](#)
-  [By Number of Committers](#)

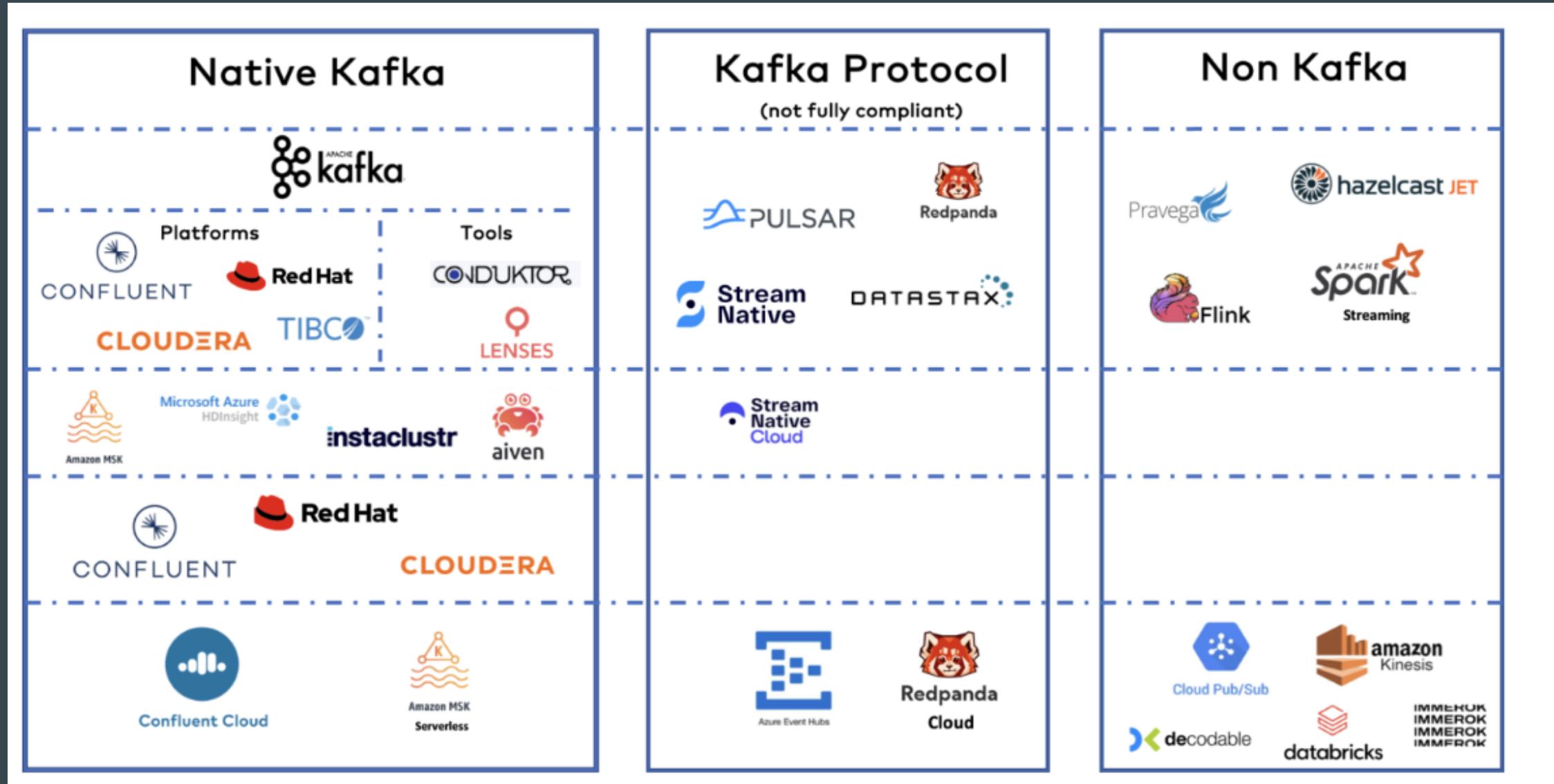
Please note that the information displayed here relies on the [DOAP files](#) which PMCs are encouraged to [provide](#). However DOAPs are not mandatory, and not all PMCs have provided a DOAP for all the projects they manage.

Projects by category:

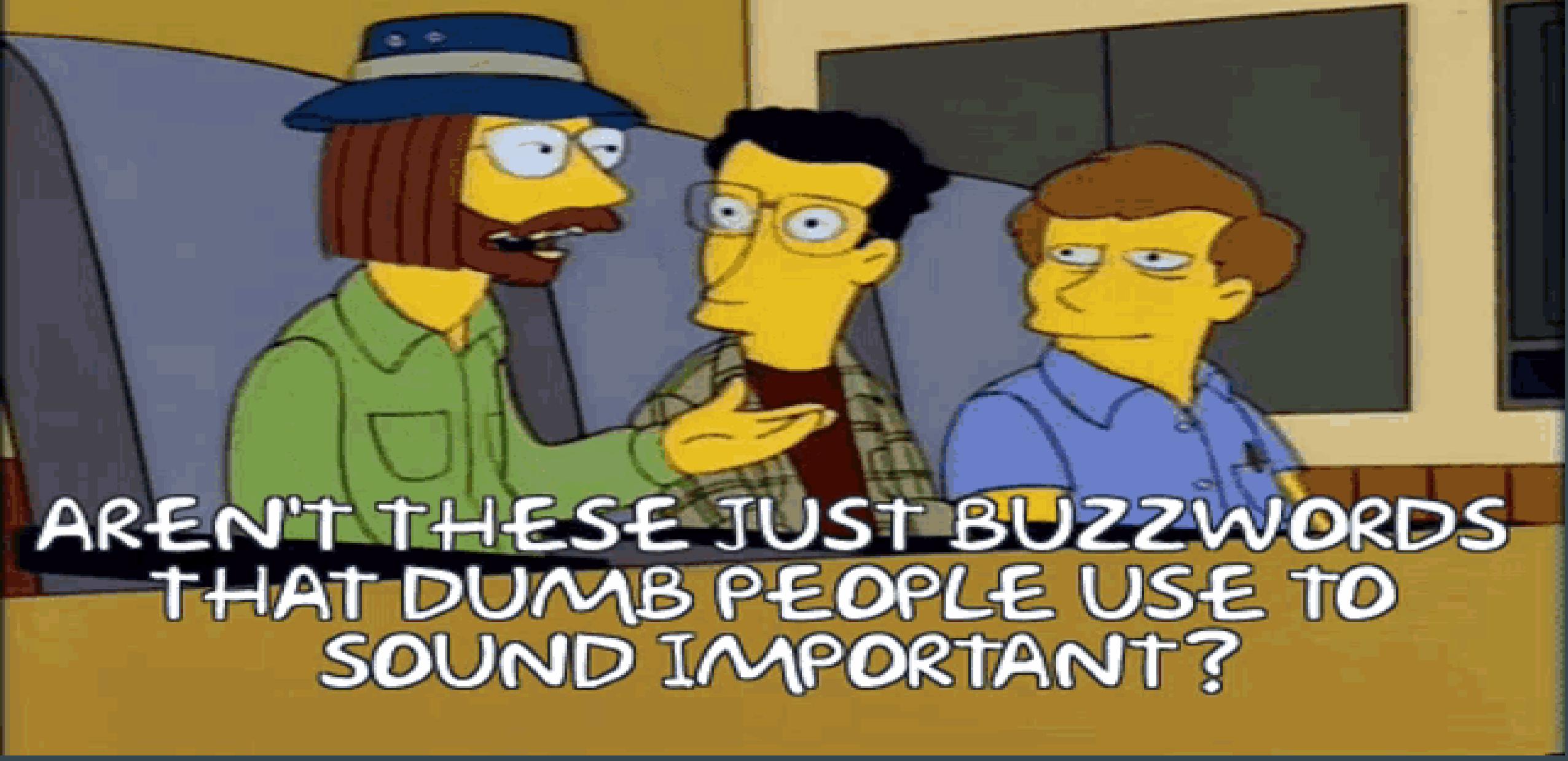
TOC

[big-data](#), [build-management](#), [c](#), [c++](#), [cloud](#), [content](#), [data-management-platform](#), [data-visualization](#), [database](#), [distributed-sql-database](#), [education](#), [ftp](#), [geospatial](#), [go](#), [graphics](#), [groovy](#), [hadoop](#), [html](#), [http](#), [httpd-module](#), [ide](#), [identity-management](#), [identity-provisioning](#), [integration](#), [iot](#), [java](#), [javaee](#), [kerberos](#), [library](#), [mail](#), [mobile](#), [network-client](#), [network-server](#), [observability](#), [osgi](#), [php](#), [python](#), [regexp](#), [retired](#), [sdk](#), [search](#), [security](#), [sql](#), [templating](#), [testing](#), [virtual-machine](#), [web-framework](#), [xml](#)

Apache Data Streaming Landscape 2023

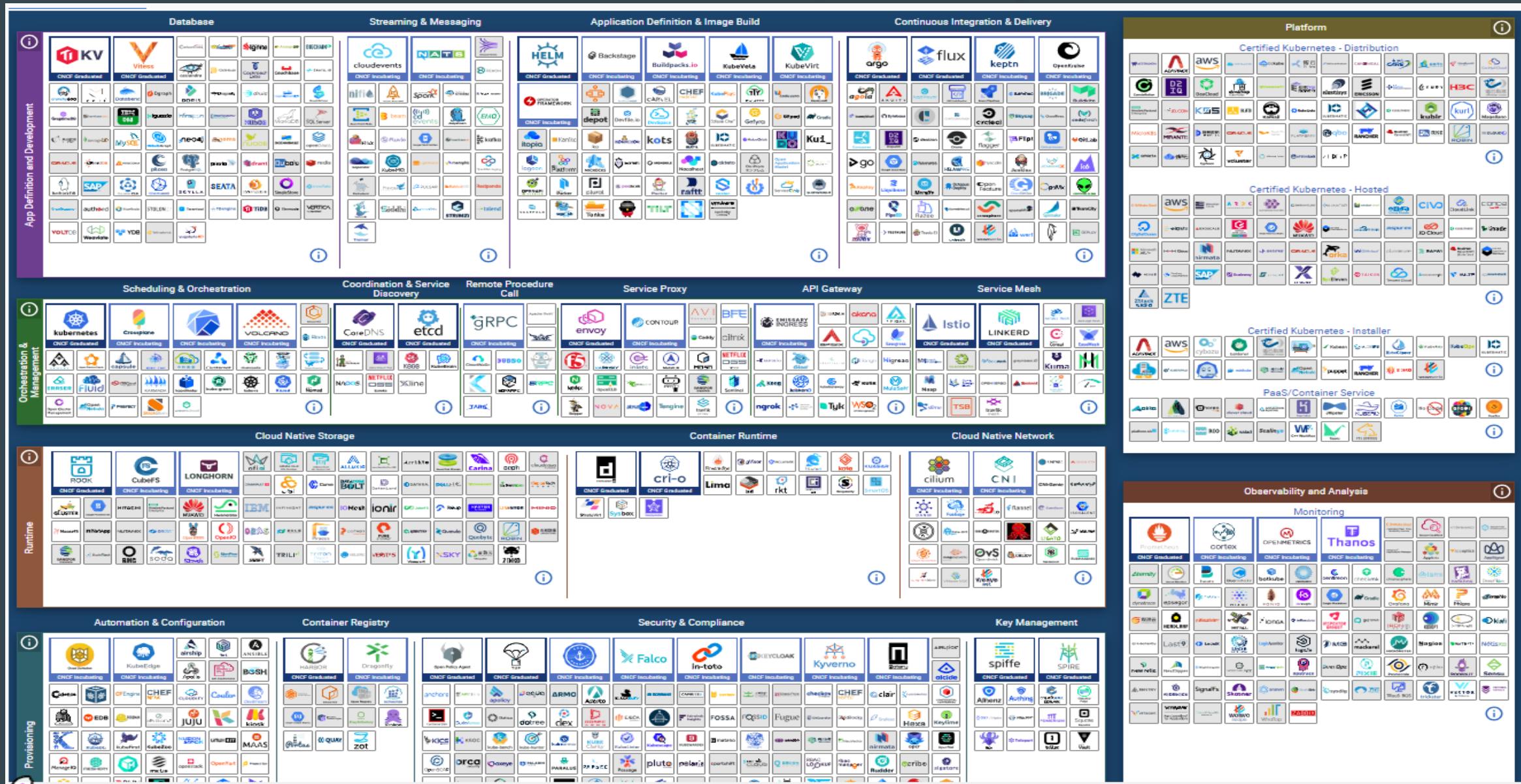


Cloud, Cloud Native, Kubernetes...



AREN'T THESE JUST BUZZWORDS
THAT DUMB PEOPLE USE TO
SOUND IMPORTANT?

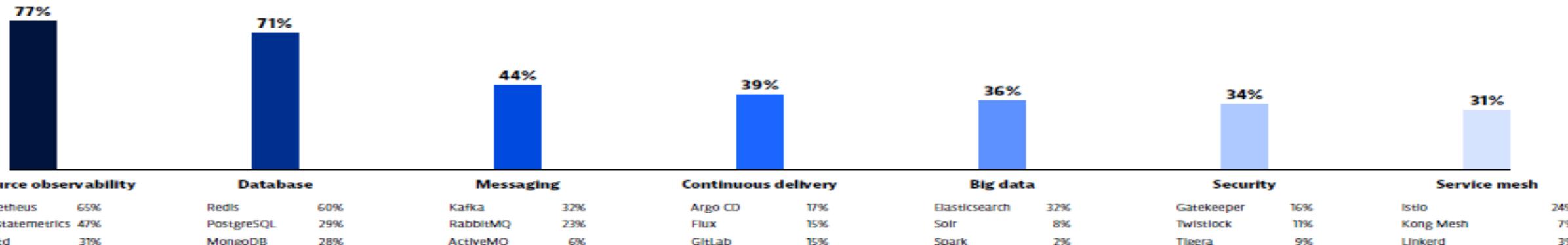
LF Cloud Native Project Landscape



Open Source project growth in Cloud Native and Kubernetes is exponential

Open source software drives a vibrant Kubernetes ecosystem

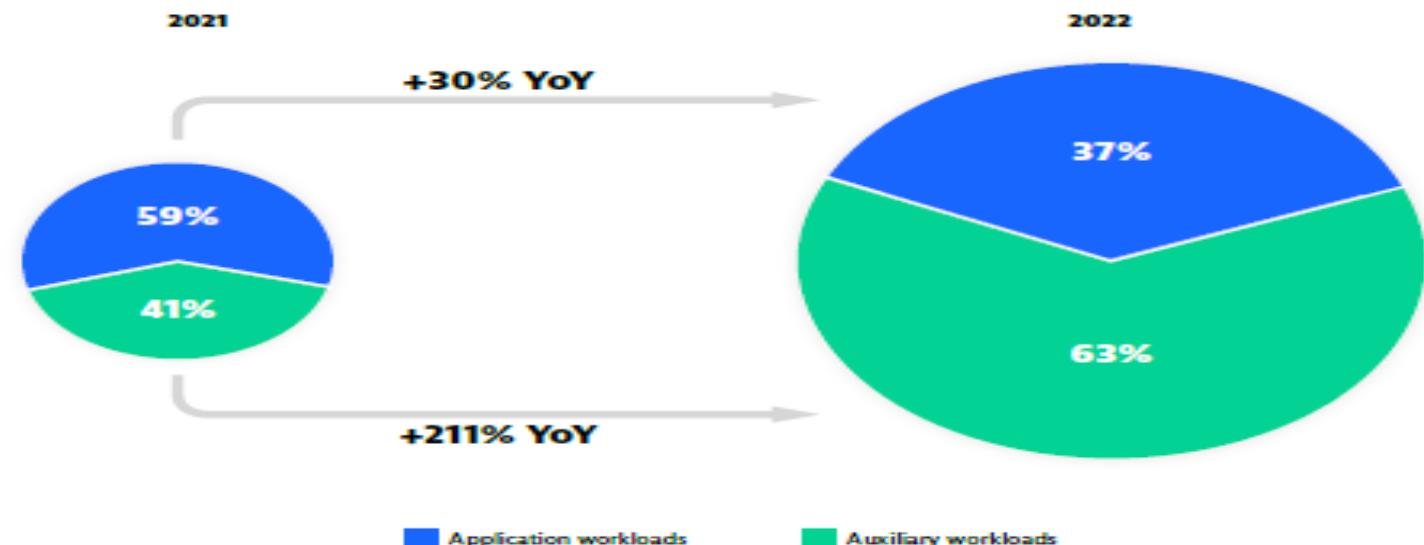
Focusing on non-application workloads, organizations use an increasing variety of technologies. These results reflect the need to enhance Kubernetes with better observability, security, and service-to-service communications. Similarly, other technologies enable specific use cases like CI/CD tools or databases. Across all categories in the Kubernetes survey, open source projects rank among the most frequently used solutions.



Kubernetes is emerging as the “operating system” of the cloud

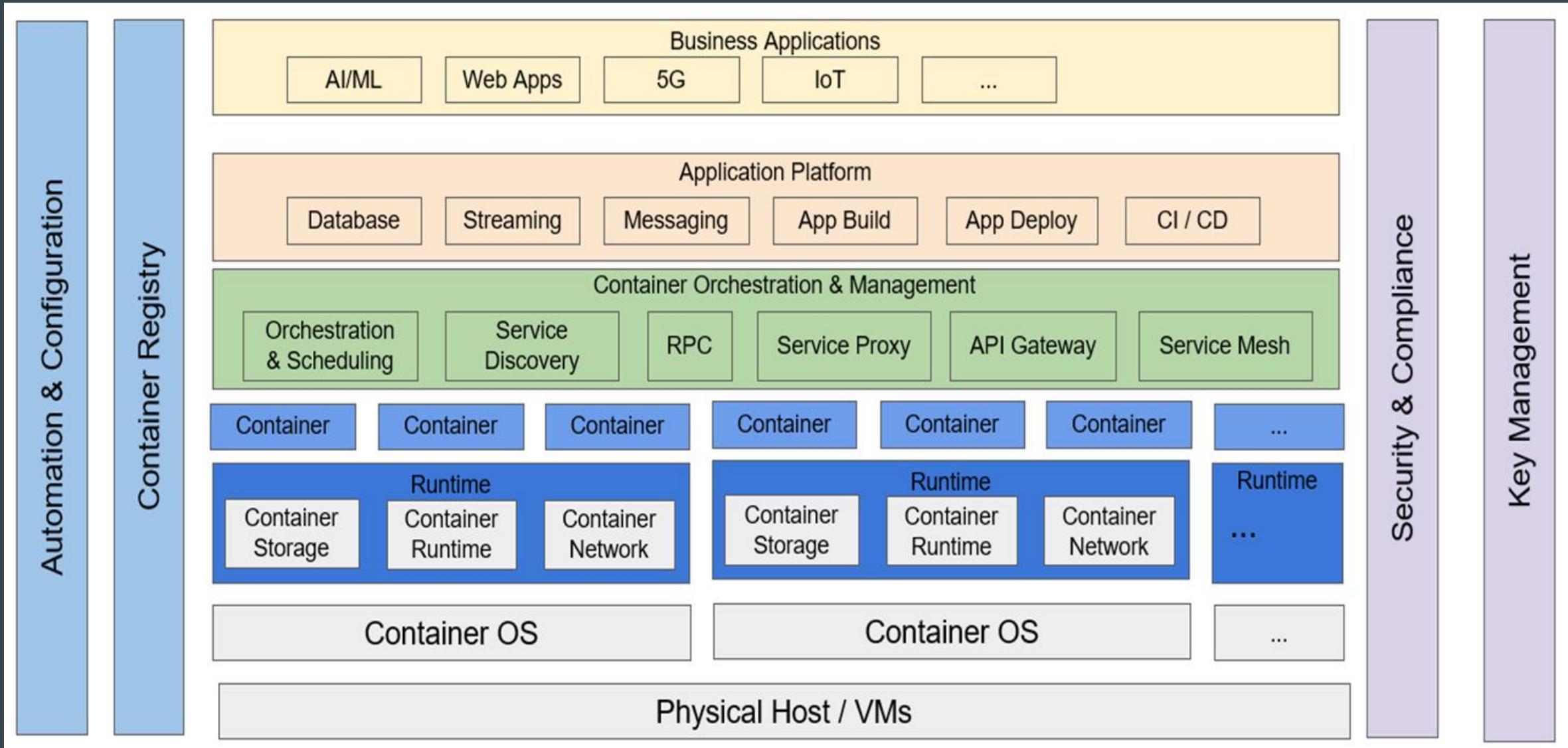
As the ideal orchestration platform for running cloud-native microservice applications, Kubernetes comes with the benefit of built-in deployment, scaling, and resiliency capabilities. In 2021, in a typical Kubernetes cluster, application workloads accounted for most of the pods (59%). By contrast, all non-application workloads, such as system and auxiliary workloads, played a relatively smaller part.

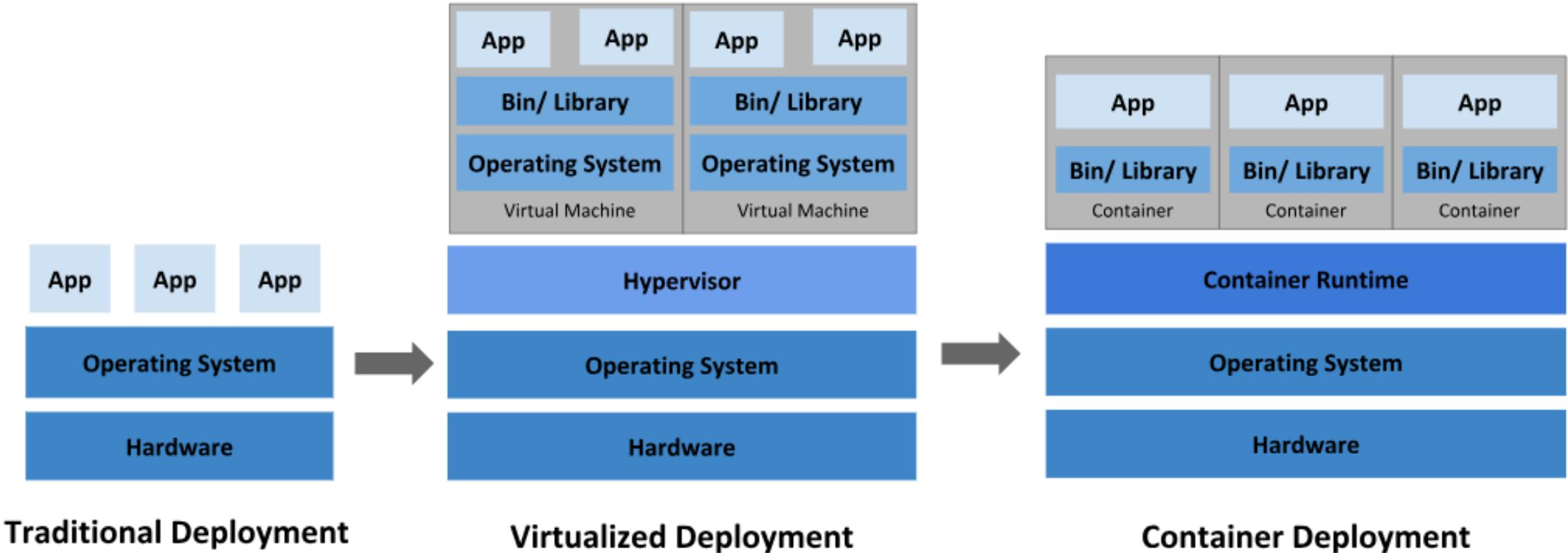
But in 2022, this picture reverses. As Kubernetes adoption has grown, auxiliary workloads now outnumber application workloads (63% vs. 37%). This switch reflects that organizations are implementing more advanced Kubernetes platform technologies such as security controls, service meshes, messaging systems, and observability tools. At the same time, organizations are using Kubernetes for a broader range of use cases, including build pipelines and scheduled utility workloads, among others. Kubernetes becomes the platform for running almost anything. As such, Kubernetes is emerging as the “operating system” of the cloud.



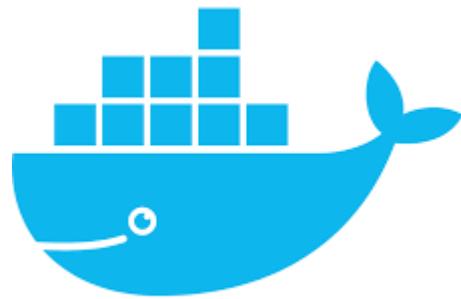
In 2021, application workloads dominated, whereas in 2022, auxiliary workloads were predominant, showing a broader range of use cases.

Cloud Native Stack

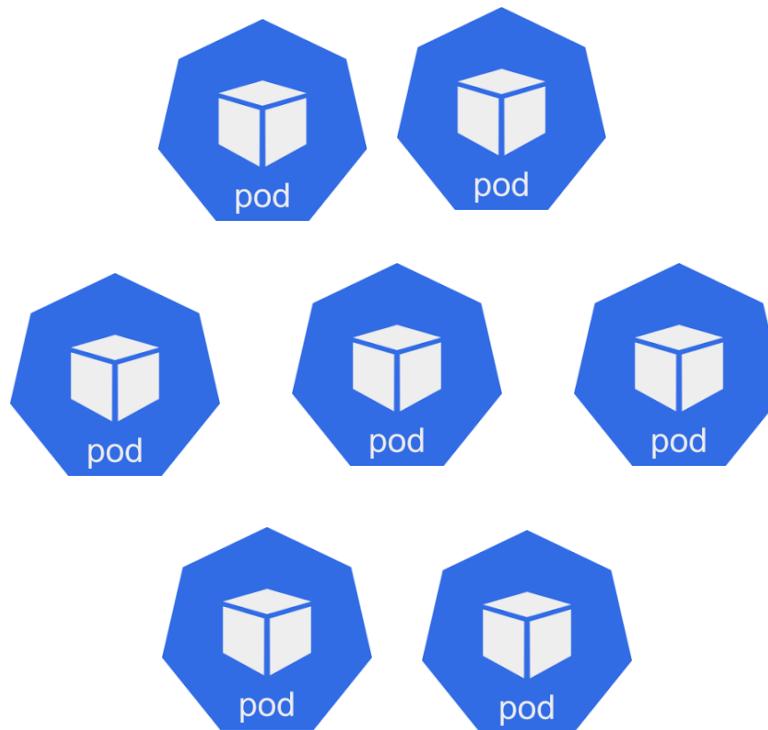




Containers



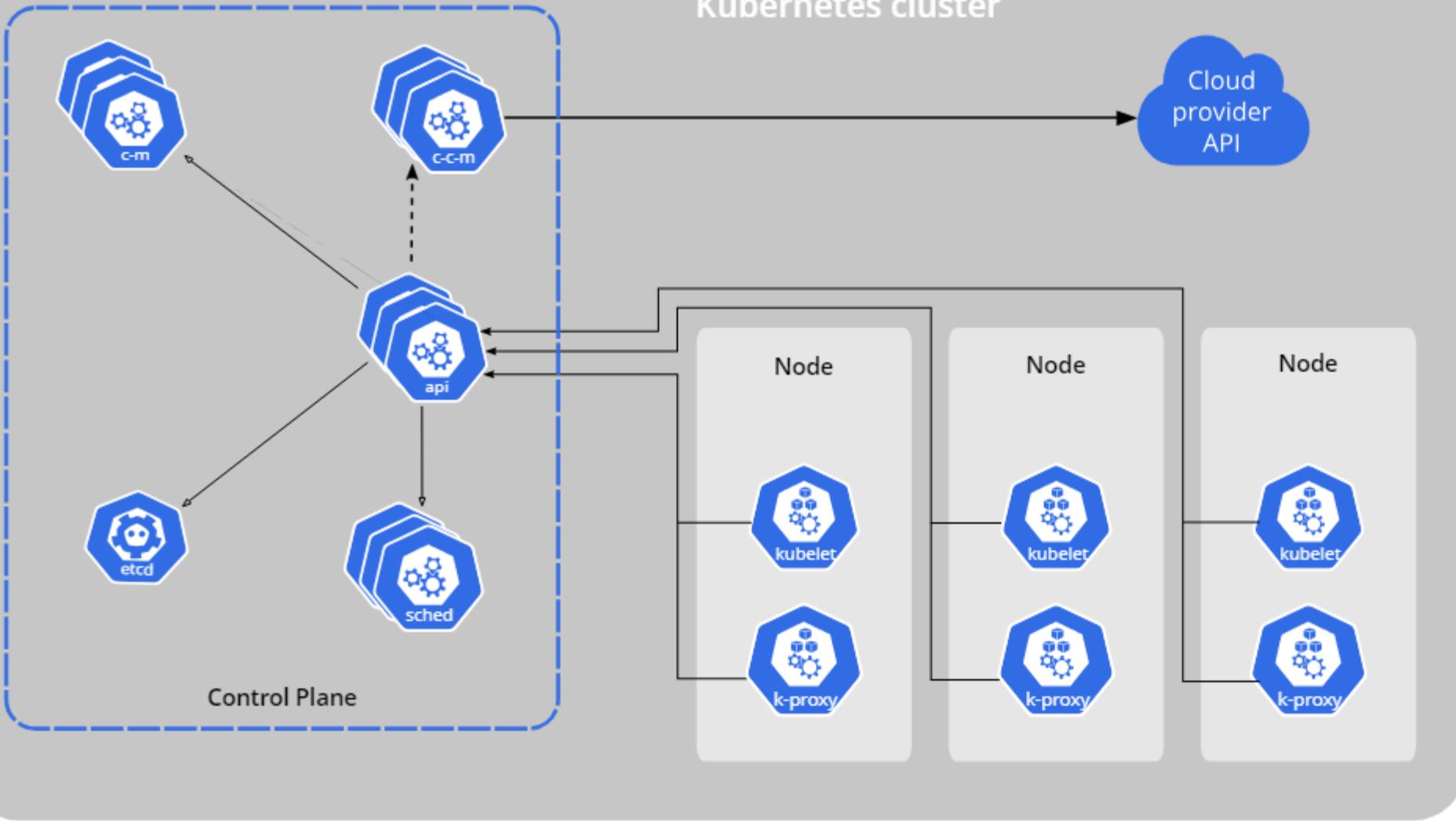
Pods



Kubernetes



Kubernetes cluster



API server

Cloud controller manager
(optional)

Controller manager

etcd
(persistence store)

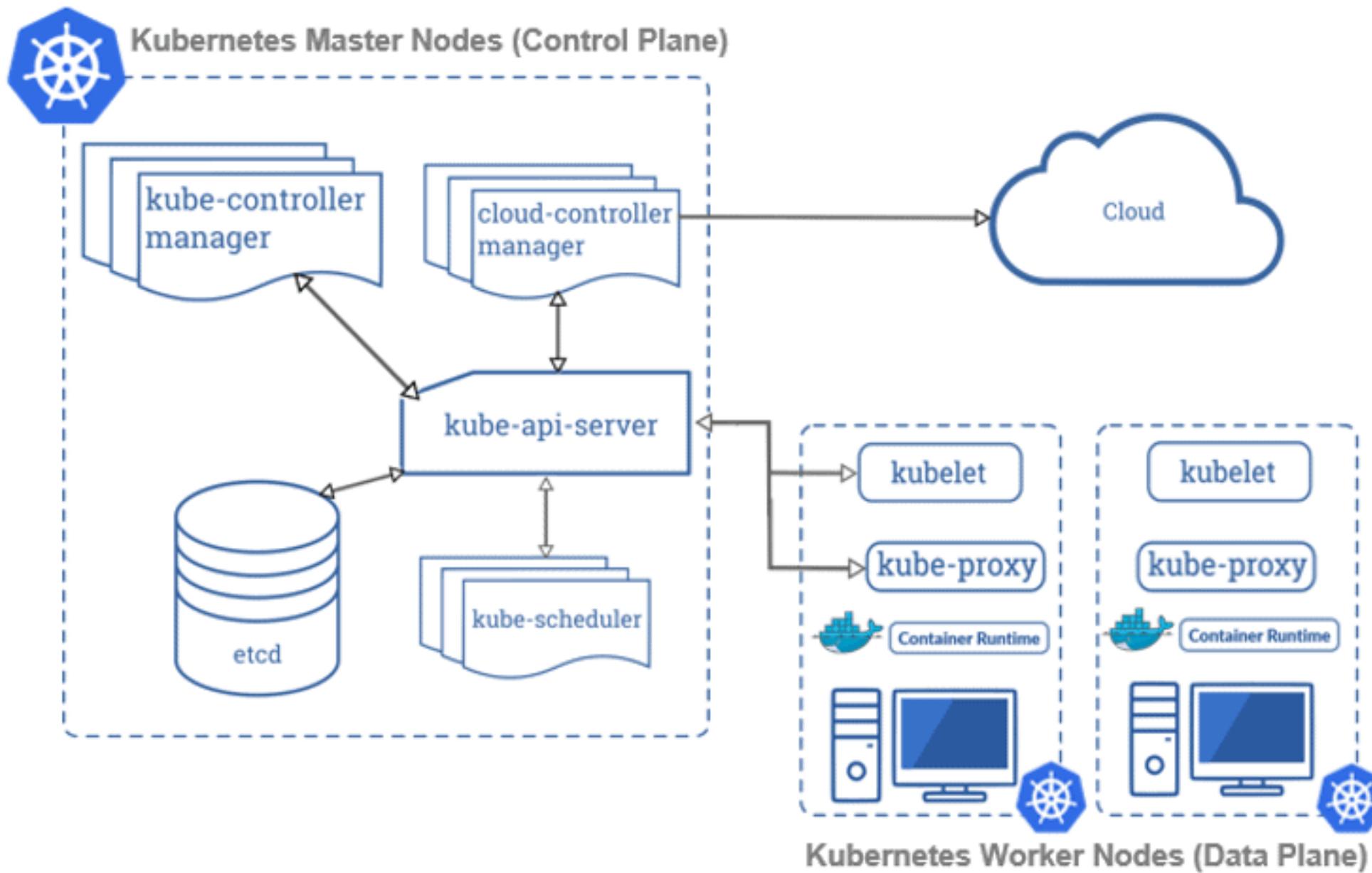
kubelet

kube-proxy

Scheduler

Control plane

Node



Opportunities - Kubernetes

Security

- Zero trust arch
- Runtime security tools
- Policy-driven security management
- Pen testing
- Assessments
- AI/ML

Observability

- Distributed Monitoring
- Async Alerts
- AI/ML
- Performance
- “Real” Observability

Data Management

- Hybrid
- Heterogenous
- Distributed
- Unstructured
- Lake / Pool / House .. ☺
- AI/ML

Knowing SODA Foundation Better!

One Open Ecosystem for Data, Infinite Possibilities

SODA Introduction



soda foundation

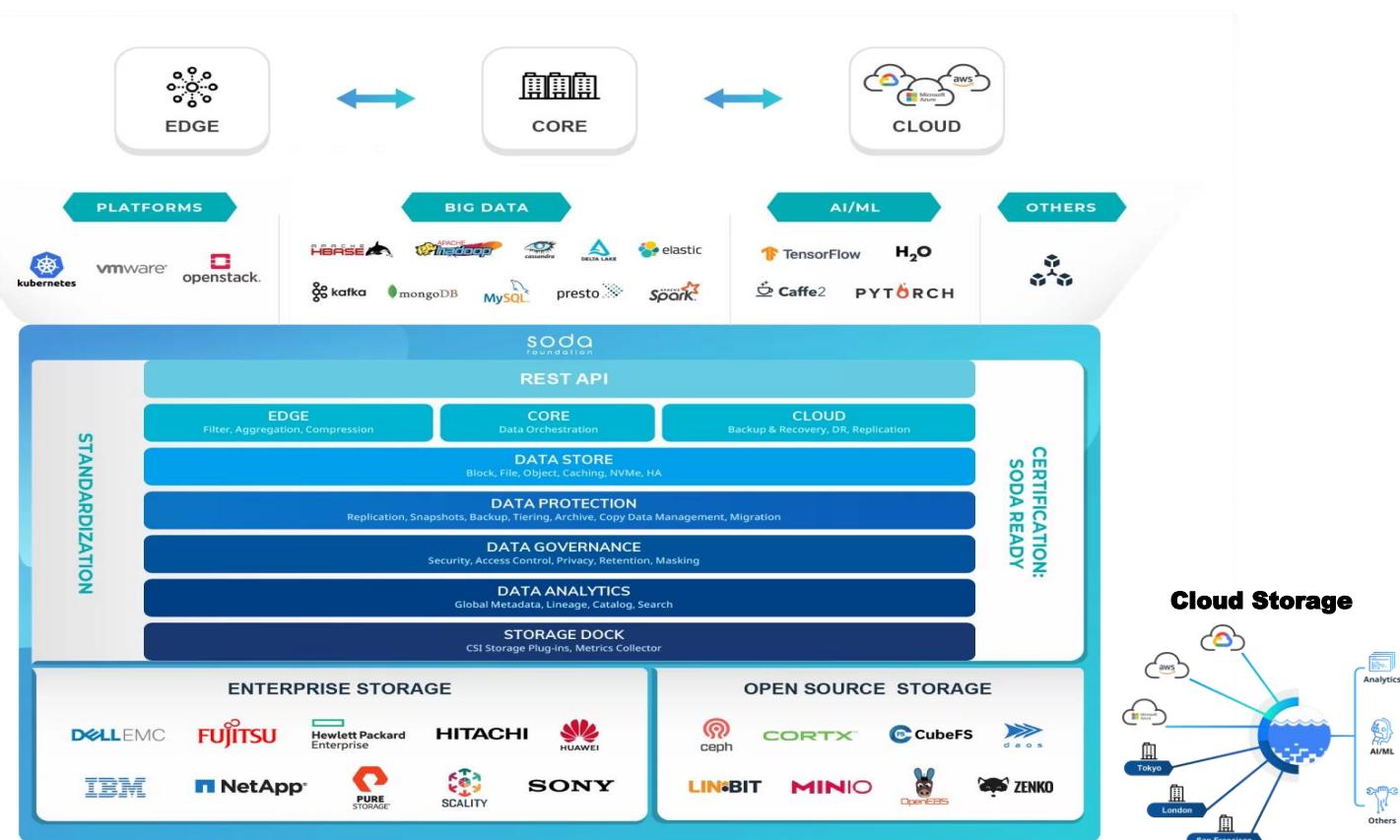


What is SODA Foundation?

Sub Foundation Chartered under Linux Foundation | Launched on June 29, 2020

aims to foster an ecosystem of open source data management and storage software for data autonomy. SODA Foundation offers a neutral forum for cross-projects collaboration and integration and provides end users quality end-to-end solutions

- Open Source Projects
- Open Research
- Open Collaboration
- Open Standards



SODA Members

Premier Members



General Members



Supporters



Associate Members



Alliance Partner



Run by Industry Organizations

SODA Help Organizations Thrive With Open Source

Open Source: accelerate innovation and development with open source projects and ecosystems

Open Collaboration: engage the community and build partnerships on a neutral platform

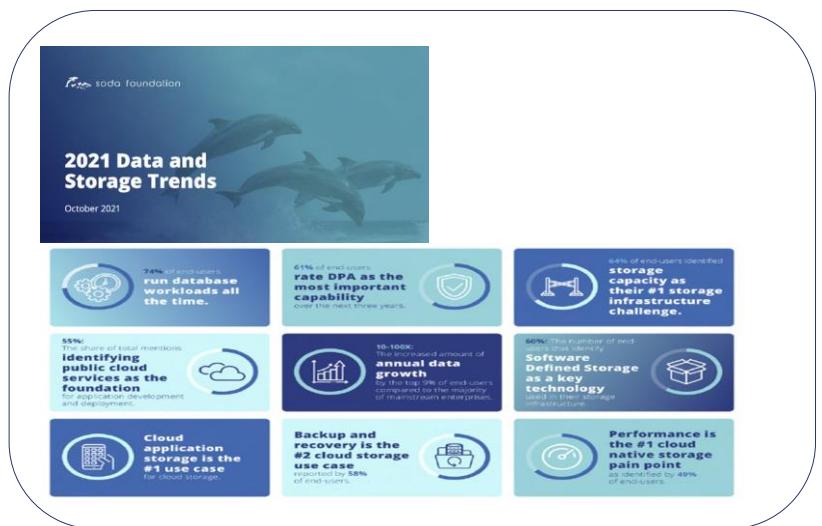
Open Research: expand insights and explore ideas with open research and case studies



Open and Neutral Governance



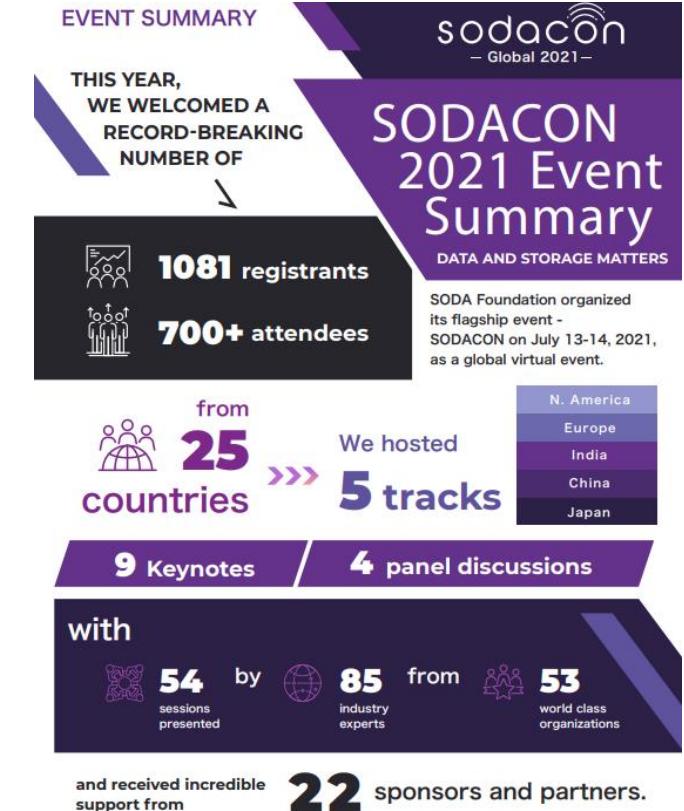
Technology Trends and Research: SODA Data & Storage Surveys



Research Collaboration and Surveys for Data & Storage
Technology Direction

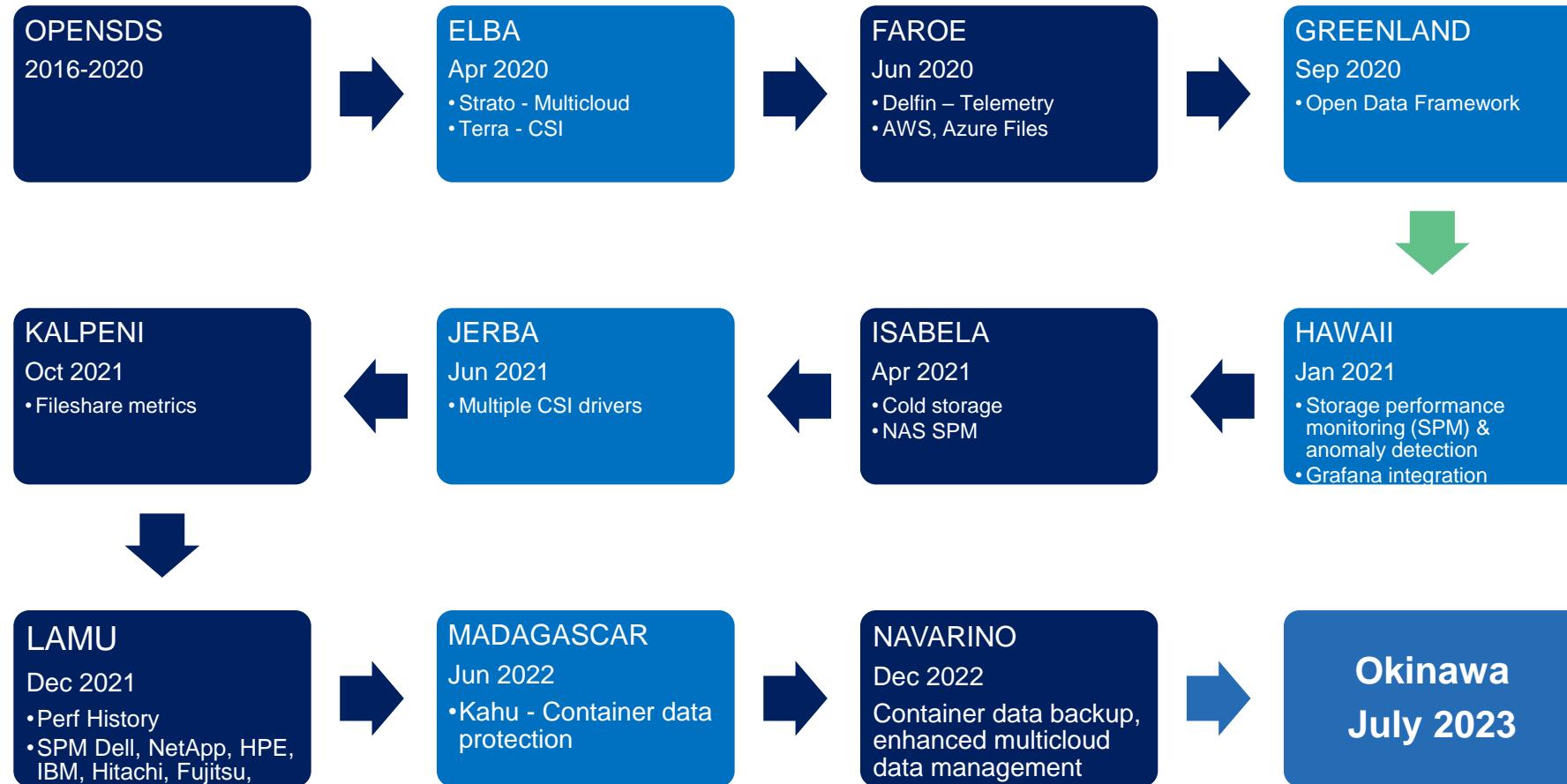


Global Events: Technology and Development Collaboration



Regular Project Releases:

For Data Framework and Solutions



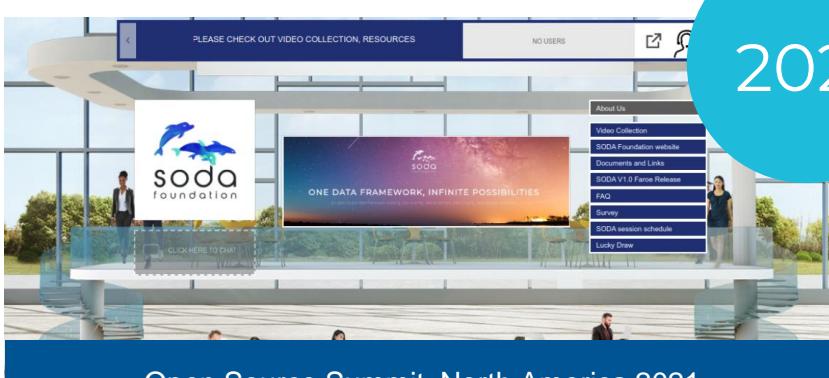
Glimpse of SODA Events

2022

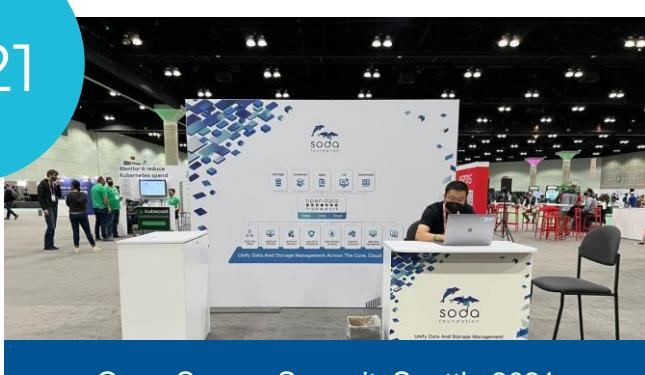


SODACON2022, Yokohama, 2022

2021



Open Source Summit, North America 2021



Open Source Summit, Seattle 2021

2020



Kubernetes Forum, Delhi 2020

2019



SODA China Community Launch, Beijing 2019



SODA Forum, Tokyo 2019

2017



Open Source India, Bengaluru 2019



Open Source Summit, Lyon 2019

2018

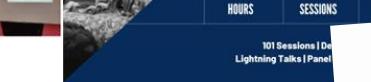


1st Japan Meetup, Tokyo 2018



OpenSDS Mini Summit, Prague 2017

2023



SODA Data Vision 2023
Bilbao, Spain
September 18, 2023

Data Vision 2023, organized by SODA Foundation in collaboration with LF OSS Europe, convened over 400 online & in person attendees in Bilbao, Spain, on September 18. The event featured a full day of 4 keynotes, 10 sessions, and 2 panel discussions, bringing together experts, architects, developers, and end-users to explore recent innovations, future trends, use cases, and challenges in data and storage. Representatives from various organizations, including Kurago, SUSE, Veeam Software, AWS, Microsoft, and more, participated in discussions. The Students Challenge recognized top achievers, with Som Shanker Pandey securing a SUSE eLearning Silver subscription, and Utkarsh Umre, Vaishali Rawat, and Kelvin Parmar winning free access to a Kubernetes for Developer Course. The event fostered collaboration and knowledge exchange within the SODA community.



COSCUP 2023 Japan



Conference for Open Source Coders, Users & Promoters



SODA China Meetup 2023
Shanghai, China
September 26, 2023

SODA China Meetup, organized by SODA Foundation and NextArch Foundation in Shanghai, China, on September 26, 2023, brought together over 400 in-person attendees for an insightful discussion on the latest developments in open source data management.



**DATA VISION
by SODA**
September 18, 2023
Bilbao, Spain + Virtual
#datavision23



SODA at Open Source India (OSI) 2023
Bengaluru, India
October 19-20, 2023

SODA Foundation participated as a Strategic Community Partner at OSI Days 2023 in Bengaluru on October 19 and 20. The event, organized by the EPF group in collaboration with India's Open Source Community and Industry, attracted over 4,700 attendees, with engagement across 100+ sessions, 100+ exhibitors, and 10+ tracks. On Day 1, Steven Tan, SODA Foundation Chair and SVP & CTO Cloud Solution at Futureus, delivered the opening keynote remotely, along with Sanil Kumar D, Founder & CEO of Caz Labs, who presented on the challenges of unstructured data management and the need for exploration journey on unstructured data trends and learned about Crystal, a SODA project for unified metadata management. Additionally, SODA hosted an onsite booth over hot days, attracting over 600 attendees for information on SODA Projects & Ecosystem, an engaging them with interactive quiz events.





Sub Foundation



CLOUD NATIVE
COMPUTING FOUNDATION

Cloud Native Projects :
Kubernetes and more!
<https://landscape.cncf.io/>

Sub Foundation



soda
foundation

Data Management Projects

What we have...

Growing Project Ecosystem

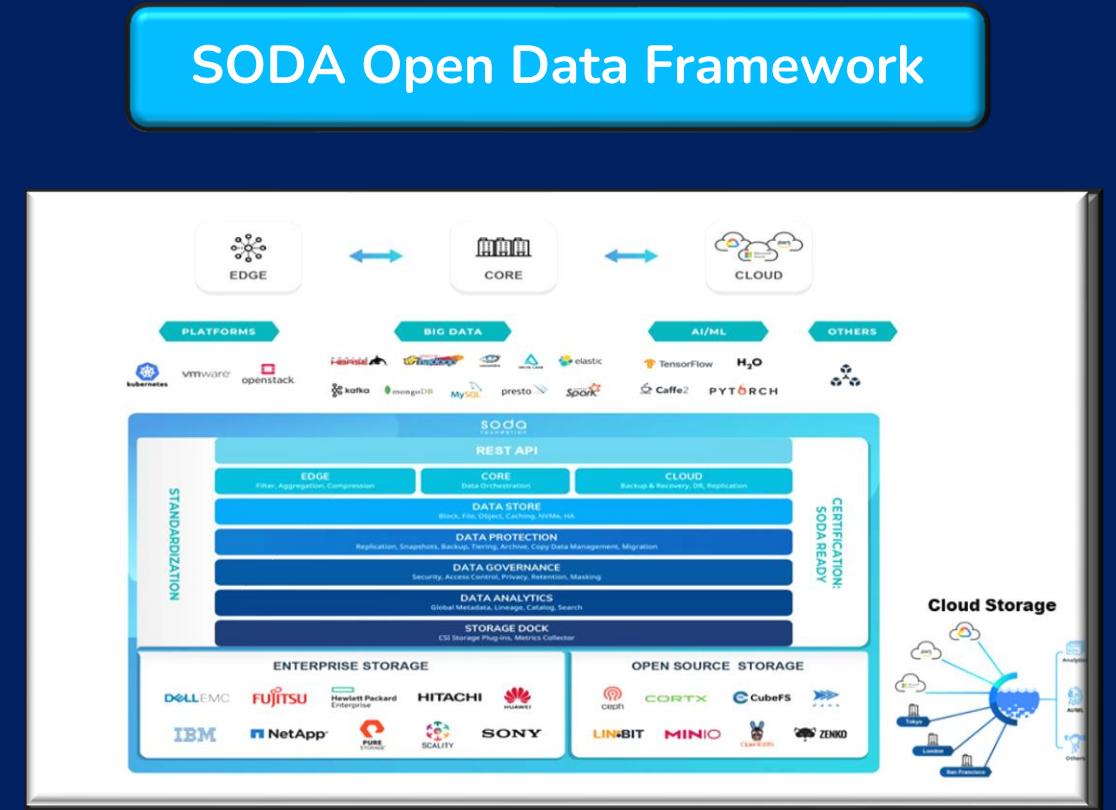
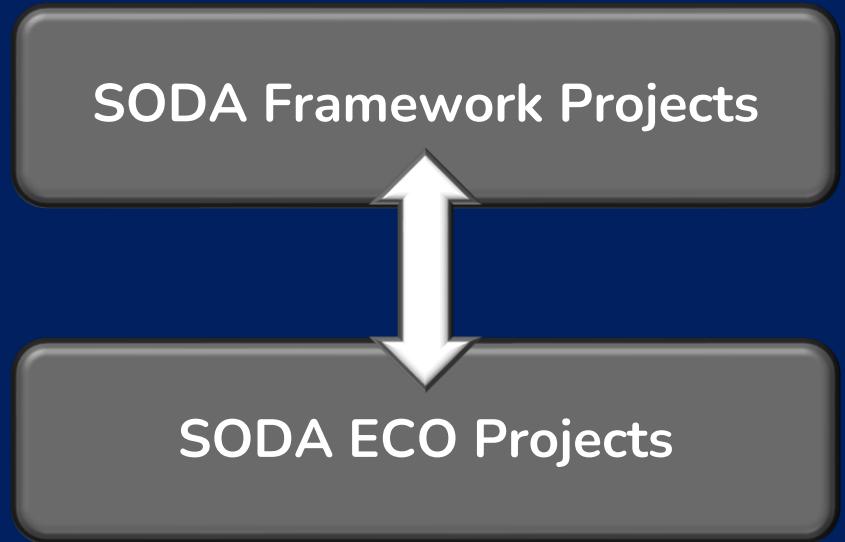


SODA Framework Projects

New SODA Framework Projects (2022)

SODA ECO Projects

Framework Projects for SDS Controller, Multicloud, Container Data Management and Data Lake |
10 External Projects in Data & Storage joined as SODA ECO Projects to build collaborative solutions.



SODA Framework Projects

SODA Framework projects focus on solving a common problem faced by end users
Managed and maintained by SODA Foundation directly



KAHU

Backup, recover and migrate K8s clusters data anywhere with no vendor lock-in

PROTECT



STRATO

Move data across multicloud environment with a common S3 compatible interface

MOVE



DELFIN

Observe, monitor and manage alerts for any storage anywhere

OBSERVE



CRYSTAL

Unified metadata for unstructured data across on-premise and cloud storage

DISCOVER

<https://github.com/sodafoundation>

SODA ECO projects are partner open source projects join SODA project landscape to **build collaborative solutions for end to end data & storage use cases**



SODA Framework Projects



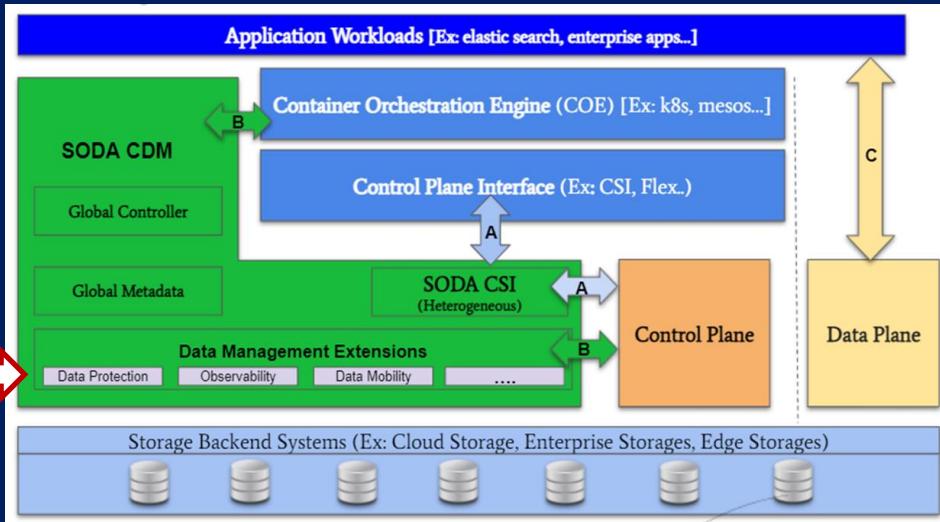
KAHU

Backup, recover and
migrate K8s clusters data
anywhere with no vendor
lock-in

PROTECT

Backup and Restore

- metadata and data
- snapshot support
- prehook / post hook support
- cross cluster backup and restore
- Backup of CSI provisioned and non CSI provisioned volumes



Container Data Management → Container Data Protection → Kahu → Backup / Restore → Kahu

Storage Provider Framework

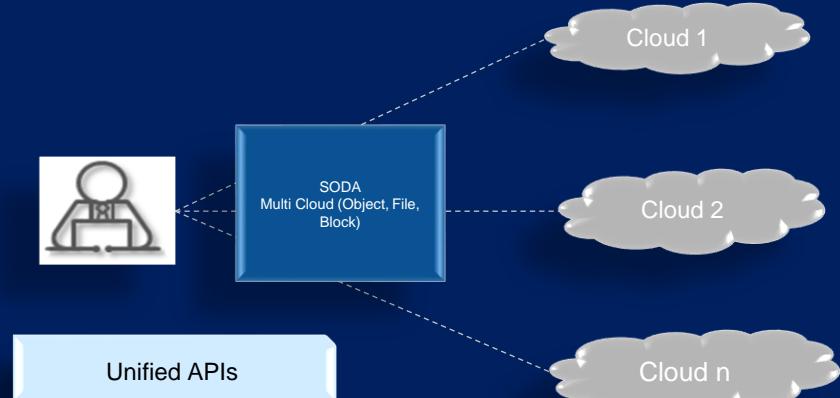
- Pluggable volume/metadata backup providers
- Runtime co-existence of multiple backup providers

Automation & Orchestration

- Scheduled backup
- Policy / Event-driven backup
- Provider-independent service plan automation

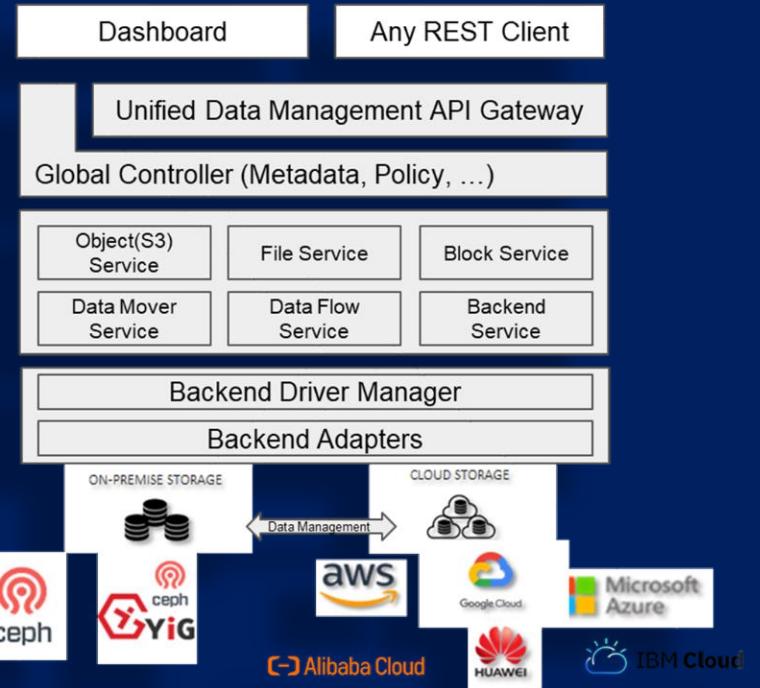
<https://github.com/soda-cdm/kahu>


STRATO
 Move data across
 multicloud environment
 with a common S3
 compatible interface



MOVE

- Unified multicloud API
- S3 compatible
- Support all major cloud vendors
- Data migration
- Data Lifecycle management
- Hybrid data management for object storage (on-prem-cloud)
- File/Block/Object
- User Level Tiering Plan – Storage Service plan
- Smart Archival





DELFIN

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OBSERVE

Resource monitoring

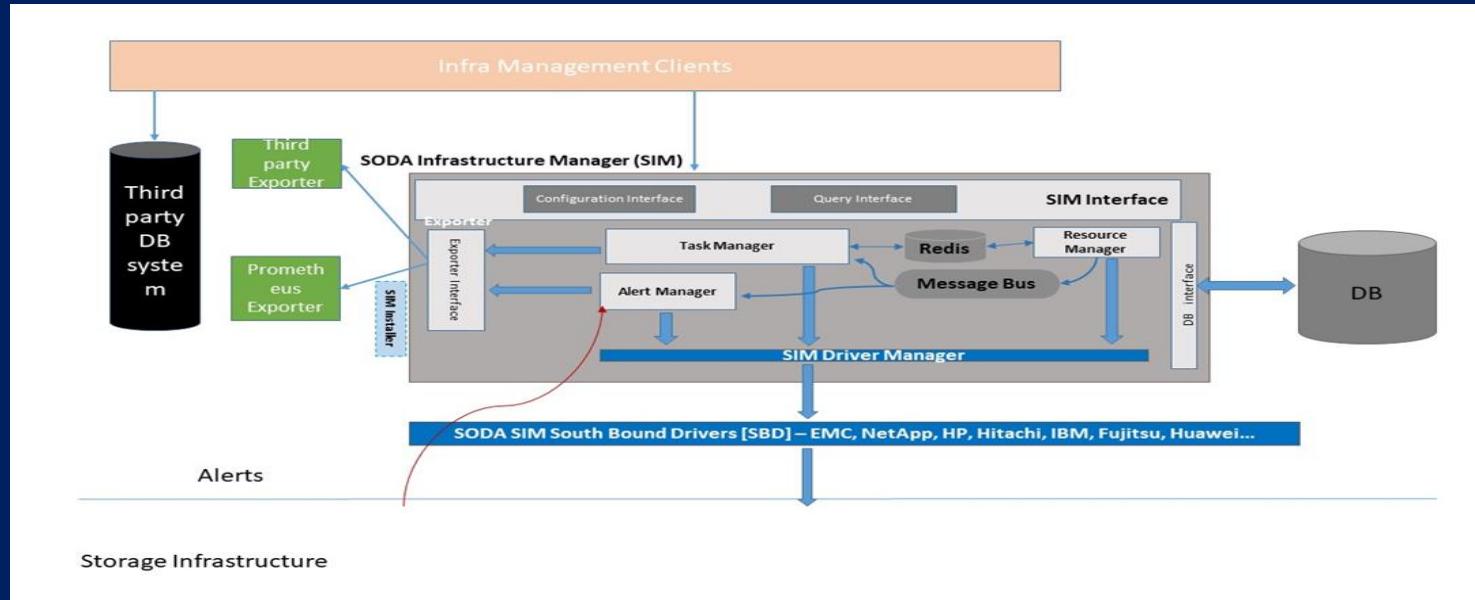
- Storage, Pool, Volume, Port, Network & Controllers
- Filesystem, Share, Quota, Qtree
- Mapping views, topology relations

Performance monitoring

- Bandwidth, Throughput, IOPS, Response time, Capacity

Alert Management

- Alert Notifications and Management



Driver Manager

- Easy support for new storage devices
- Support different vendor management platforms

Plugin Manager

- Easy support for new clients (export monitoring data to Prometheus, Grafana, Kafka or custom clients)

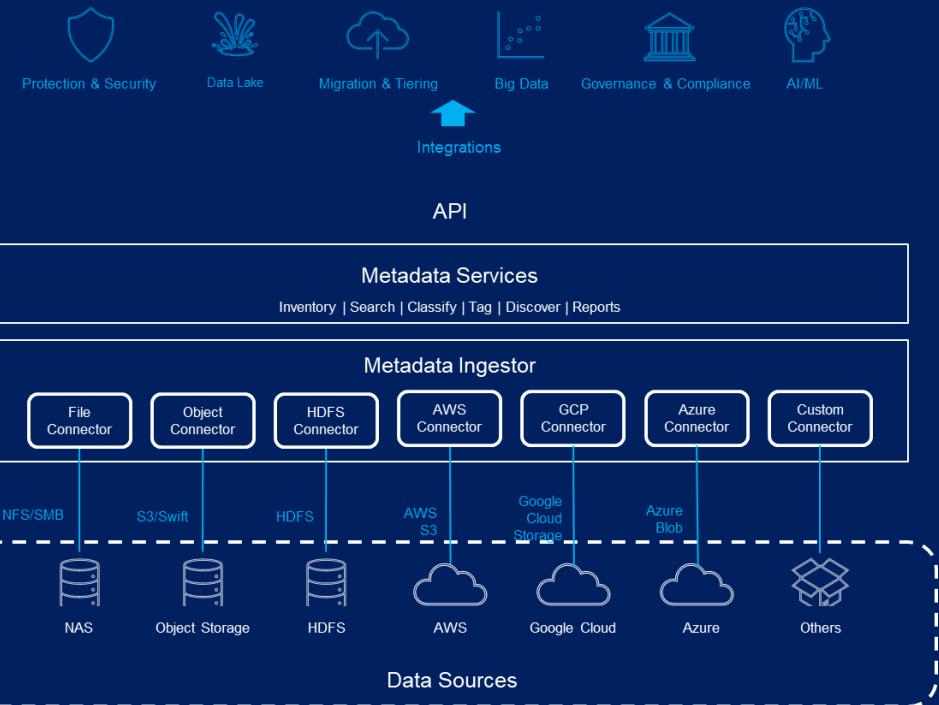
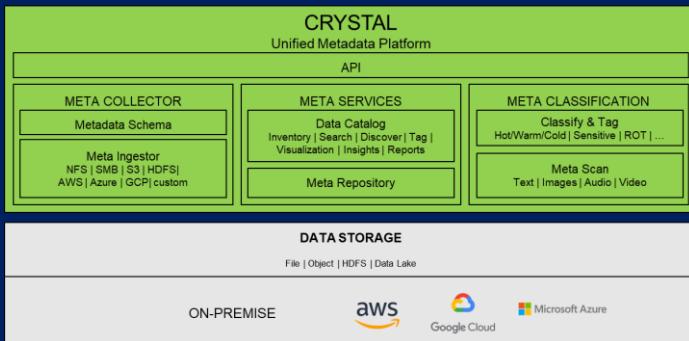


CRYSTAL

Unified metadata for
unstructured data across on-
premise and cloud storage

DISCOVER

- The project just started
- Added with some base code derived from **SODA Strato** (s3 metadata management)
- S3 metadata get, store and search
- Basic demo of apis



<https://github.com/sodafoundation/crystal>

What we plan...



KAHU

Backup, recover and migrate K8s clusters data anywhere with no vendor lock-in

PROTECT



STRATO

Move data across multicloud environment with a common S3 compatible interface

MOVE



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CRYSTAL

Unified metadata for unstructured data across on-premise and cloud storage

DISCOVER

- Replication and Failover
- Backup – Restore Performance Benchmarking

- Data Mover Performance Optimization
- Re-usable components and reorganization of the project inline with SODA Crystal

- Kubernetes Storage Monitoring
- Performance benchmarking

- Common metadata schema design
- Analysis and value positioning



soda foundation

Smart and Secure Data Management

Making Cloud Native Data Management
Smarter and Secured!

Getting Ready.....



Cloud

- Hybrid Cloud Data Orchestration & Management
- Cloud Native Observability
- Metadata management for unstructured data

AI

- AI Data exporters
- LLM-based analytics/prediction?
- LLM based assistant modules for data management
- Vector Databases
- Data Mesh

Security

- Cloud Data Security
- Cloud Native Security hardening for data
- Security assessment



<http://bit.ly/soda-starter>

<https://www.sodafoundation.io/slack/>

Let us build Next Gen Smarter Data First Solutions in Open Source!

Some more links we discussed:

<https://www.meetup.com/sodafoundationindia/> - join soda india meetup

<https://www.sodafoundation.io/slack/> - join soda slack

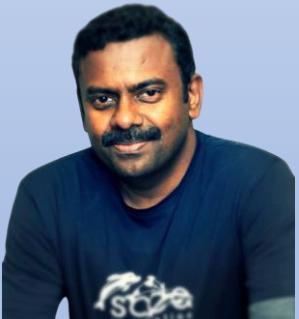
<https://github.com/> - to create your github id

<https://www.linkedin.com/company/sodafoundation> - soda foundation linkedin

So..

get best of
Let us Open Source!

Thank You!



Sanil Kumar D.

Founder CEO Caze Labs | SODA Foundation TOC Co-chair |
Industry Awarded Technologist | Patents & Research Papers | Speaker |
Founder 123Life | PhD Scholar (Open Source & Observability) | ACM Eminent Speaker

