

CNCF ANNUAL REPORT

2020



CLOUD NATIVE
COMPUTING FOUNDATION

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WELCOME

Welcome to the 2020 Cloud Native Computing Foundation annual report.

Our themes for the year were **end user driven open source**,
diversity-powered resilience, and **a focus on education and training**.

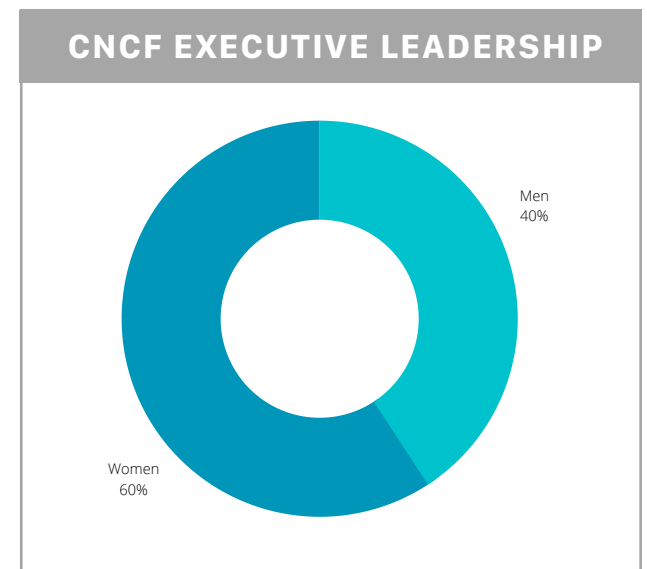
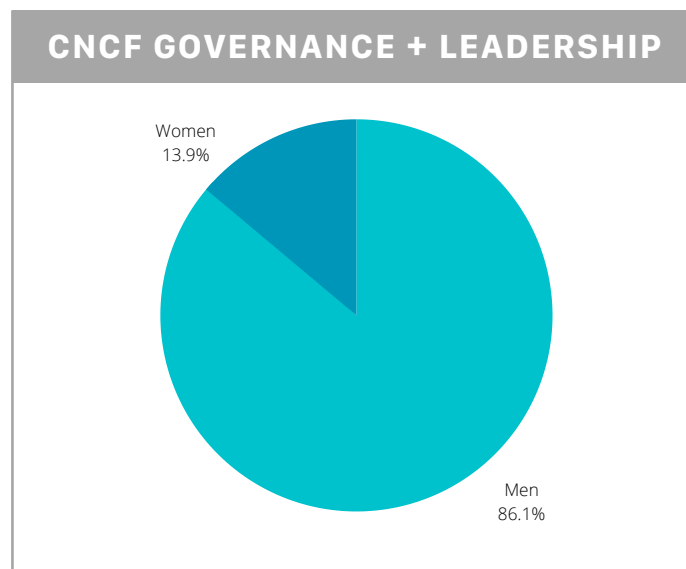
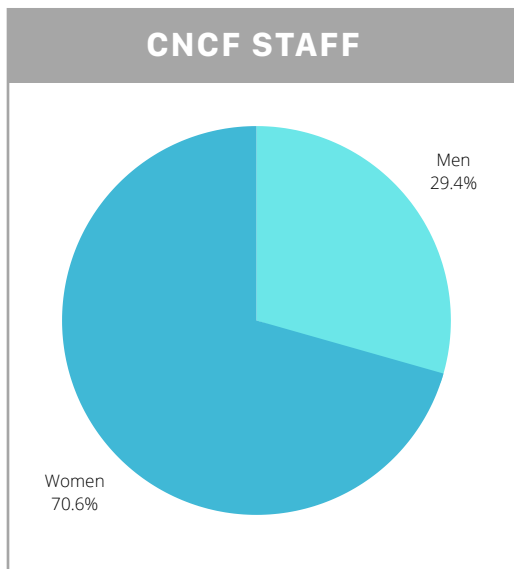
Comments and feedback are welcome at info@cncf.io.

WHO WE ARE

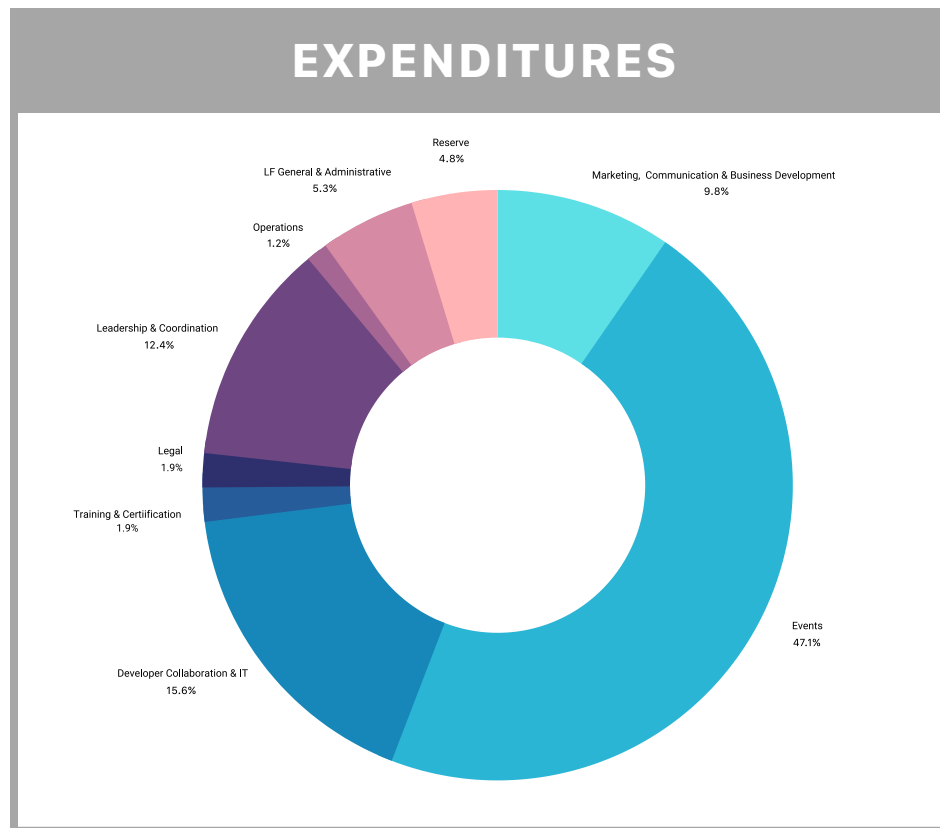
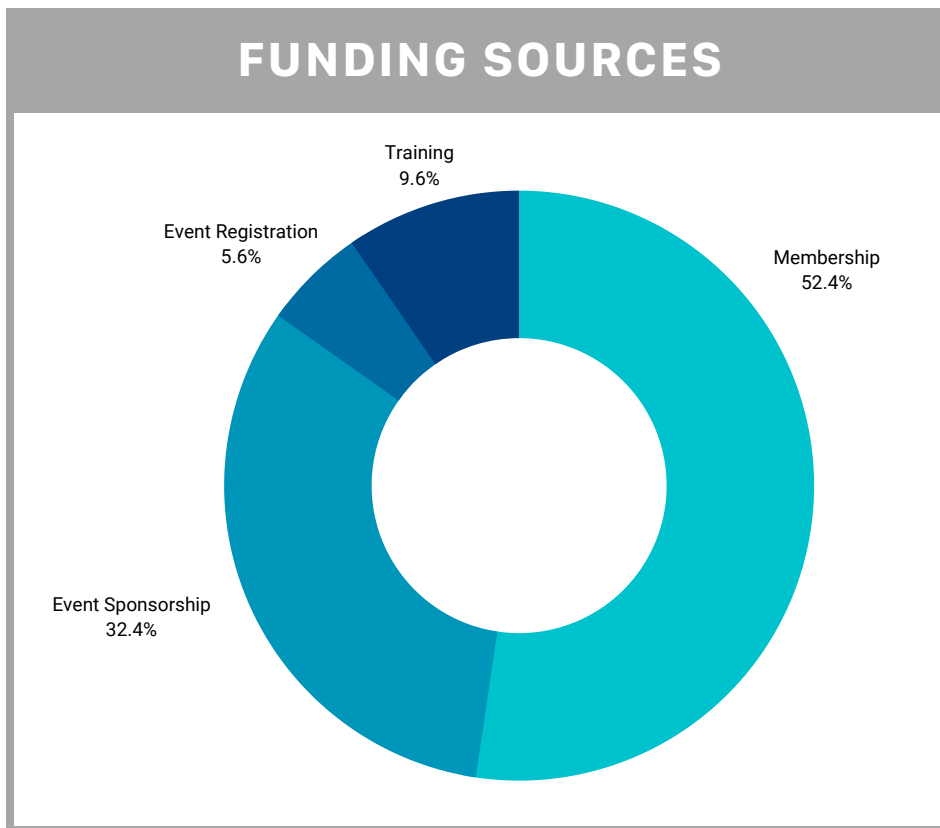
The Cloud Native Computing Foundation (CNCF) is an open source software foundation dedicated to making cloud native computing universal and sustainable. Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments across public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify the cloud native approach.

We are a community of open source projects, including Kubernetes, Prometheus, Envoy, and [many others](#). Kubernetes and other CNCF projects have quickly gained adoption and won community support, becoming some of the [highest velocity projects](#) in the history of open source.

CNCF employs [34](#) people from various backgrounds and locations; 71% are women, 29% are men. CNCF's Governance Leadership, comprising the Governing Board and Technical Oversight Committee, is 14% women and 86% men.



CNCF's revenue is derived from four primary fundraising sources, including membership, event sponsorship, event registration, and training.



A basic premise behind CNCF, our conferences (including [KubeCon + CloudNativeCon](#)), and open source, in general, is that interactions are positive-sum. There is no fixed amount of investment, mindshare, or development contribution allocated to specific projects. Just as open source development is based on the idea that, collectively, we are smarter than any one of us, open source foundations work for the betterment of the entire community. Equally important, a neutral home for a project and community fosters this type of positive-sum thinking and drives the growth and diversity that we believe are core elements of a successful open source project.

REMEMBERING DAN KOHN

CNCF and The Linux Foundation are deeply saddened at the recent passing of our longtime colleague and dear friend, Dan Kohn. Dan was one of the great open source leaders of our time, a brilliant mind – devoted to giving back to the community, and a loving husband and father who will truly be missed forever.

Dan's lifelong desire was to help others. From serving as a volunteer firefighter in college to founding [Linux Foundation Public Health](#) at the height of the pandemic to assist in the worldwide fight against COVID-19, he never stopped finding ways to make a positive and lasting impact. We are forever grateful for Dan's many contributions and accomplishments and will continue to honor his legacy of constant collaboration, sharing, and compassion in everything that we do.



MOMENTUM IN 2020

Throughout its fifth year, CNCF achieved tremendous community engagement through steady membership growth, incredible virtual event attendance, strong end user participation, and broad industry commentary. At present, CNCF hosts 80+ projects with over 110,000 contributors from nearly 1,000 organizations representing 177 countries.

Cloud native tech is not just for the cloud anymore. Built in [declared](#) that “cloud-native technology is moving to the enterprise” because “legacy tech is waking up to cloud native”. Cloud native technologies are also driving the expansion of the [“Wild West” of edge computing](#) with many firms realizing the “financial benefits to taking the cloud native path”.

As cloud native technologies continue to scale across the world, touching almost every industry, CNCF has actively embraced diversity. This diversity is at the heart of the open source movement. Together we are stronger, faster, better, and more innovative than alone and apart, and that diversity makes us more resilient to weather any challenge -- even the loss of a great leader.

Additionally, CNCF is committed to creating end user-driven open source, where everyone is encouraged to participate and get involved irrespective of their level of expertise. This expands the horizon of valuable contributions and welcomes everyone within the cloud native community to participate.

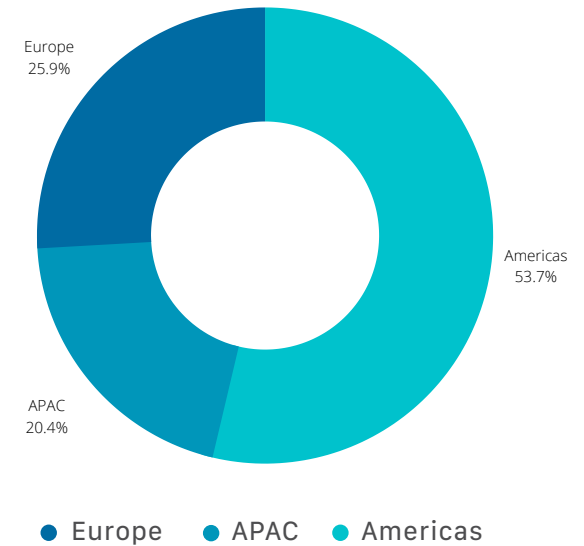
CNCF is at the forefront of these revolutionary market and technology transitions.

MEMBERSHIP

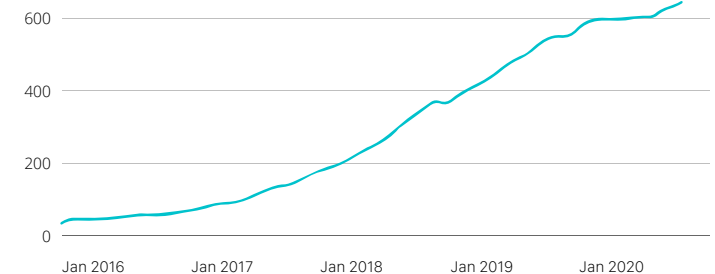
CNCF would not be what it is today without the support of our global membership community. Our members help CNCF and the Linux Foundation provide neutral governance, strong IP management, ecosystem building, training, events, developer marketing, rich tools to engage communities, and more to keep the wheels of innovation spinning for our project communities.

The CNCF ecosystem continues to grow across vendor and end user memberships, making CNCF one of the most successful open source foundations ever. Over the course of 2020, we added over 150 new members, an increase of more than 28% from 2019. Our now 20 Platinum members include some of the world’s largest public cloud and enterprise software companies and end users. Kasten by Veeam and Volcano Engine joined or upgraded to Platinum in 2020. Cox Communications, HCL Technologies, Hewlett Packard Enterprise, Intuit, SPD Bank, and T-Mobile all joined or upgraded to Gold in 2020. Investment from these leading organizations signifies a strong dedication to the advancement and sustainability of cloud native computing for years to come.

CNCF'S GLOBAL MEMBERSHIP COMMUNITY



CNCF MEMBERSHIP GROWTH



END USER COMMUNITY

CNCF prides itself on being an open source community driven by End Users. End users are defined as companies that use cloud native technologies internally but do not sell any cloud native services externally. Companies that meet this definition are eligible to join the End User Community.

Our End User Community grew to over 145 members in 2020, indicating strong, continued interest in cloud native technologies. At present, the CNCF End User Community is the largest of any open source foundation.

The End User Community meets regularly and advises the CNCF Governing Board and Technical Oversight Committee (TOC) members on key challenges, emerging use cases, and areas of opportunity and new growth

for cloud native technologies. End Users are also an important source for CNCF projects including Prometheus, Envoy, Argo, and Backstage.

A respondent of the [2020 survey](#) commented that they “enjoy hearing other organizations discuss their experience implementing different flavors of the open source projects/software products. As we begin to mature our K8s offering, those conversations are very beneficial. Continue connecting end users and advocating for knowledge sharing and collaboration.” Among respondents, 100% would recommend CNCF to other companies, and **the average satisfaction rating was 4.47 out of 5 (89%), up from 4.16 out of 5 in 2019 (83%).**

If you are using CNCF projects and meet the definition of an End User, we urge you to join our [End User Community](#) so you can participate in this influential group and provide your insights both to fellow end users and to the CNCF community as a whole. If you join, we are confident you will also learn from other end users who are deploying CNCF projects, praised as “a great way to share information between companies.”

END USER SURVEY 2020



END USERS AND TECHNICAL OVERSIGHT COMMITTEE

During 2020 the number of End User representatives on the TOC doubled from 1 to 2, with representatives from Apple, Spotify, Intuit, and American Express. Dave Zolotusky from Spotify joined as the new TOC End User Representative from Spotify. This highlights the importance of End Users to the cloud native community.

END USER DRIVEN PROJECTS

2020 has been a successful year for End User-driven projects. Envoy, Jaeger, Prometheus, TUF, and Vitess all continued to grow as graduated projects. Argo and Thanos moved from Sandbox to Incubating. [backstage.io](#) also joined CNCF at the Sandbox level.

END USERS AND KUBECON + CLOUDNATIVECON

45% of attendees and 31% of talks came from end user companies, an increase of 10% from KubeCon CloudNativeCon NA 2019! 12% of attendees came solely from the End User Community, exceeding the goal of 10%. Our keynotes featured [The Cloud Native Journey @Apple](#), an incredible landmark for how far this community has come.

AT KUBECON + CLOUDNATIVECON 2020

45%

OF ATTENDEES

31%

OF TALKS

CAME FROM END USER COMPANIES

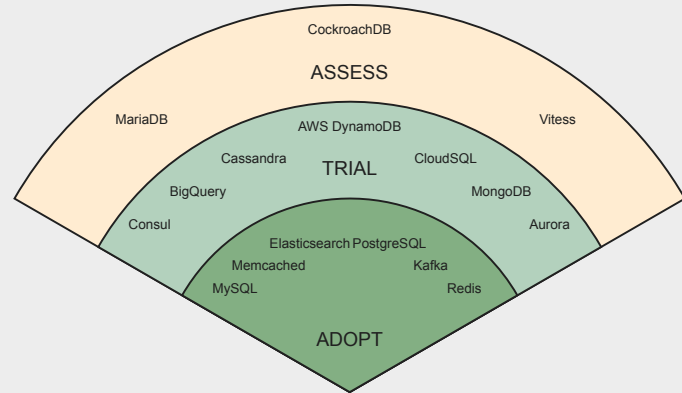
▲ +10%

FROM KUBECON + CLOUDNATIVECON 2019

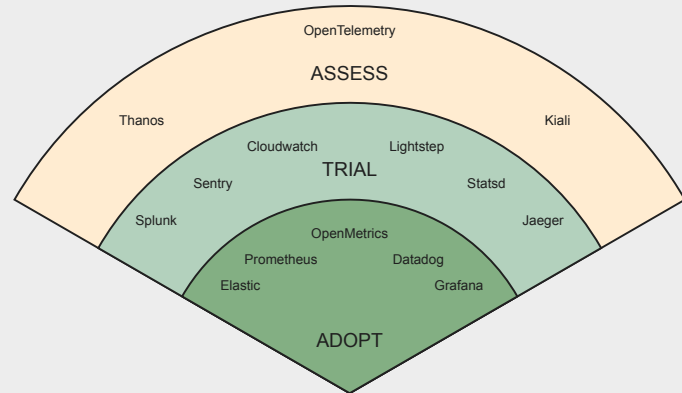
12% OF ATTENDEES

CAME FROM THE END USER COMMUNITY

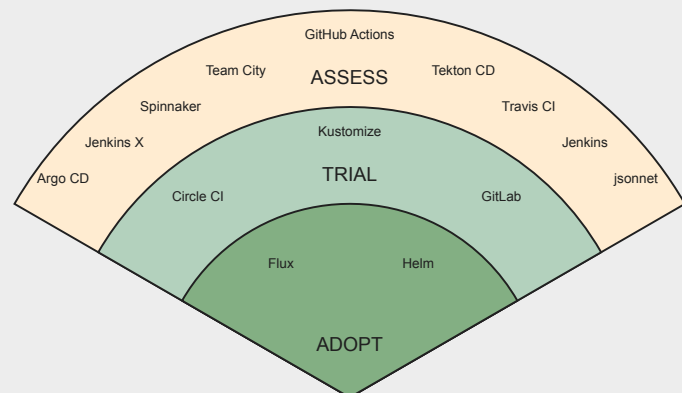
CNCF Technology Radar Database Storage, November 2020



CNCF Technology Radar Observability, September 2020



CNCF Technology Radar Continuous Delivery, June 2020



CNCF END USER TECHNOLOGY RADAR

In June 2020, CNCF launched the [End User Technology Radar](#), a quarterly report on a single topic in cloud native. It is aimed at a technical audience who want to understand what cloud native solutions end users use and recommend.

For each report CNCF surveyed the CNCF End User Community and asked them to place solutions at one of three levels:

- **Adopt:** The CNCF End User Community can clearly recommend this technology. We have used it for long periods of time in many teams, and it has proven to be stable and useful.
- **Trial:** The CNCF End User Community has used it with success, and we recommend you have a closer look at the technology.
- **Assess:** The CNCF End User Community has tried it out, and we find it promising. We recommend having a look at these items when you face a specific need for the technology in your project.

The first three End User Tech Radars explored [Continuous Delivery](#), [Observability](#), and [Database Storage](#). End users appreciated that “Tech radars provide clear data points that are easy to consume. It has worked very well in the community so far and we are happy to participate in it.”. The Tech Radars received significant press and analyst coverage including The New Stack ([here](#) and [here](#)), [InfoQ](#), [DevClass](#), [Container Journal](#), and [SiliconANGLE](#).

END USER TRAINING BENEFITS LAUNCHING IN JANUARY 2021

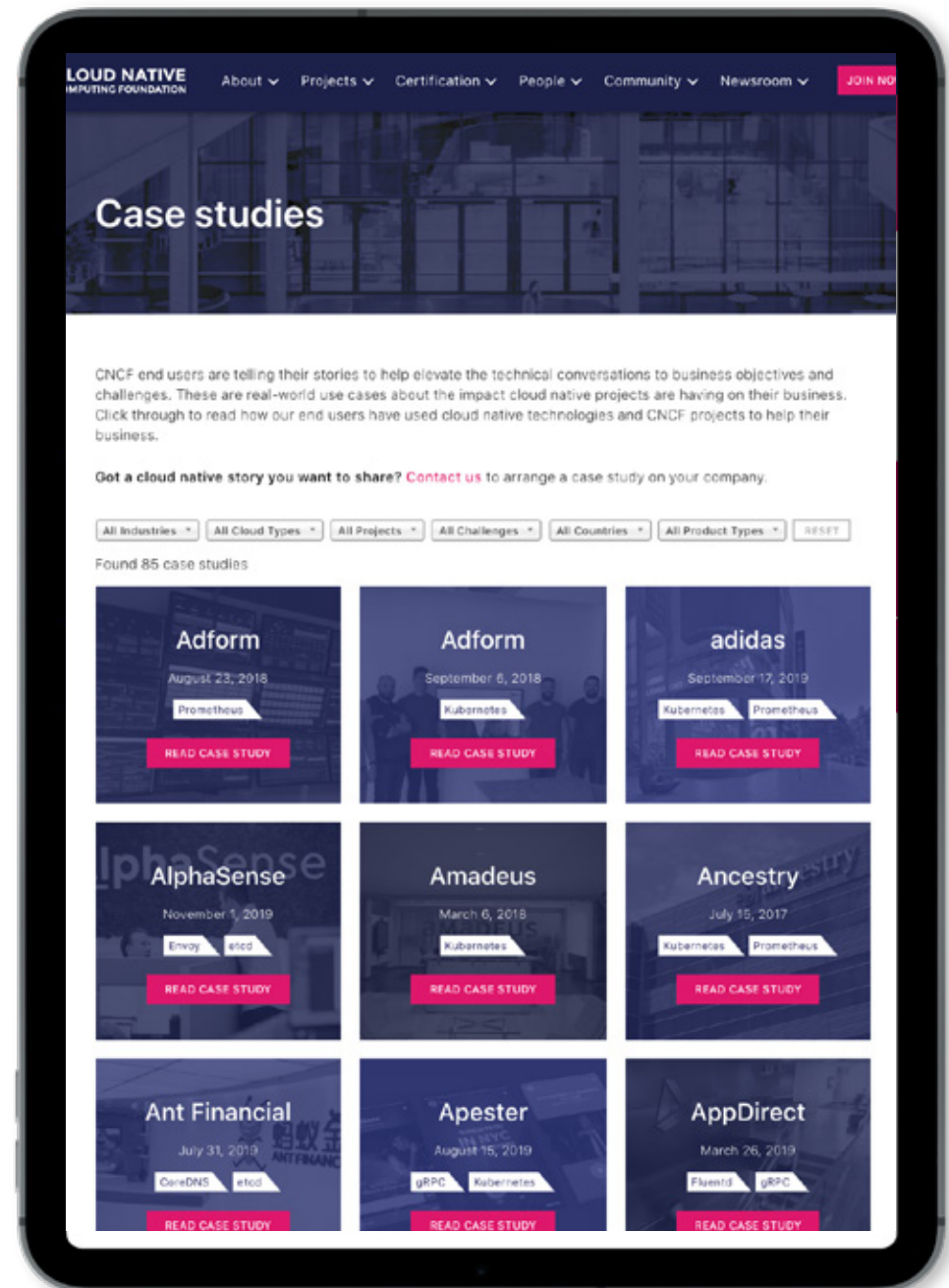
One of the biggest concerns for organizations as they transition over to new architectures is the successful adoption and implementation of cloud native technologies. According to the [CNCF's Cloud Native Survey 2020](#), 27% of respondents indicated a lack of training was one of the biggest challenges in deploying containers.

As a result, CNCF and The Linux Foundation are pleased to announce new training benefits for the CNCF End User Community.

- Our End User Supporters will receive five 100% off coupon codes – a value of up to \$2,500 – for any eLearning class, certification exam, or eLearning + Certification exam “bundle” in the Training and Certification Catalog.
- Our End User Members will receive a 15-Seat Starter Pack Subscription to eLearning and certification – a \$7,500 value. This means that 15 employees will be able to tap into unlimited access to the entire eLearning catalog and one certification exam for one year.

END USER CASE STUDIES

In 2020, we published 17 [case studies](#) about a diverse group of end users, spanning the U.S., U.K., India, China, Sweden, El Salvador, Brazil, and Japan, and in industries ranging from software (Zendesk) and telecom (Vodafone) to travel (Booking.com) and government (U.S. Department of Defense). These end users shared their learnings to benefit the community and help accelerate the adoption of cloud native technologies around the world. The majority of the published case studies involved organizations that are using multiple CNCF projects in tandem, including not only Kubernetes, but also Fluentd, Prometheus, Envoy, Helm, Jaeger, NATS, Falco, Argo, Harbor, CoreDNS, etcd, gRPC, and Open Policy Agent.

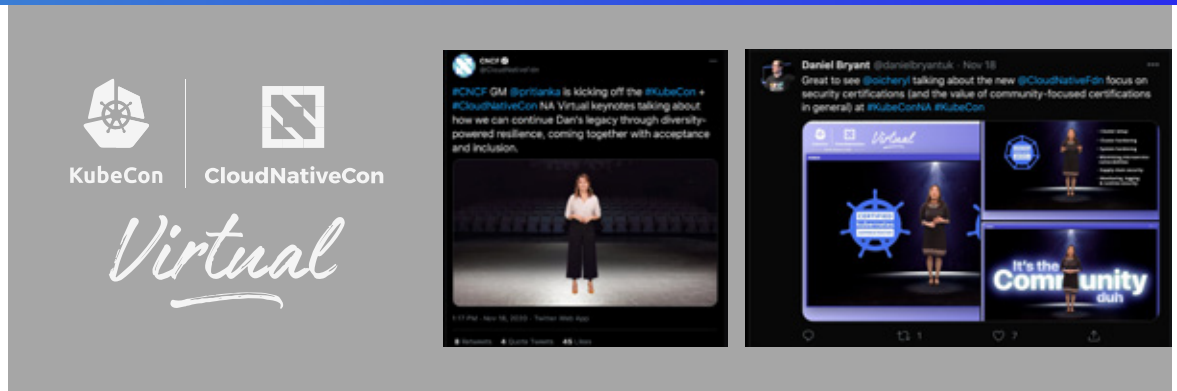


CONFERENCES AND EVENTS

CNCF put on its first virtual KubeCon + CloudNativeCon conferences in both [Europe](#) (August 17-20) and [North America](#) (November 17-20) and reached a record-breaking combined 41,000+ registrants with a 70% attendance rate each! Of this year's registrants, 72% were first-time attendees at KubeCon + CloudNativeCon Europe and 67% at North America, an indication of rising interest and healthy ecosystem growth.

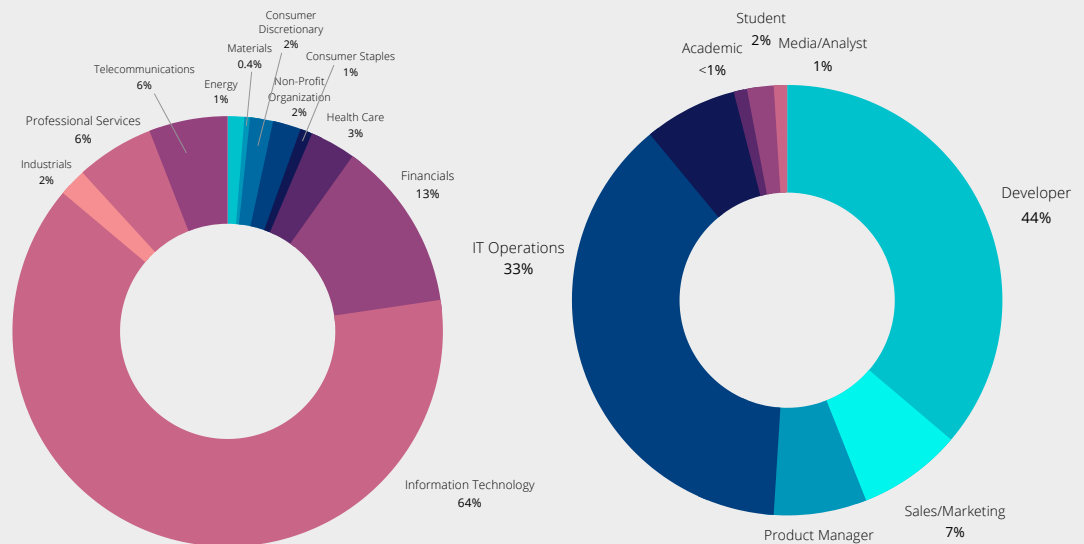
At each event, attendees had access – both live and on-demand – to over 215 sessions, including keynotes, breakout sessions, tutorials, maintainer track sessions, and the expanded 101 track sessions.

While the pandemic limited our in-person interaction, going virtual allowed CNCF to massively increase its conference reach. North America attendance increased 90% over the prior year's in-person KubeCon + CloudNativeCon North America event in San Diego. The CNCF issued a [Transparency Report](#) to recap the event; the report included detailed data covering attendee demographics, attendee and speaker diversity, and attendee sentiment on their conference experience. The [Transparency Report](#) for KubeCon + CloudNativeCon Europe is also available for 2020. The overall satisfaction scores from attendees were 87% for EU and 90% for NA.



There was significant engagement from the CNCF end user community this year with 45% of attendees for KubeCon + CloudNativeCon North America coming from end user companies. Additionally, 31% of talks were from end users.

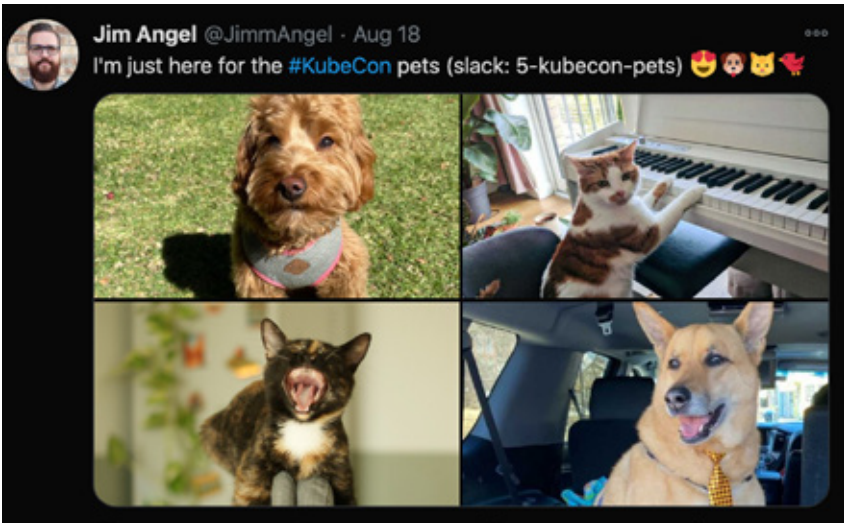
INDUSTRY AND JOB FUNCTION OF KUBECON + CLOUDNATIVECON NORTH AMERICA 2020 ATTENDEES



WELLNESS ACTIVITIES



We encouraged attendees to “Keep Cloud Native Well” at both KubeCon + CloudNativeCon Virtual events this year. While CNCF makes every effort to ensure the comfort, health, and happiness of KubeCon + CloudNativeCon attendees, there may still be some attendees who feel overwhelmed by the amount of information or from having to stay home while often being secluded from friends, family, and their usual activities.



For our 2020 events, we provided options for attendees to get active, watch some fuzzy friends, and discuss wellness.



ACTIVITIES INCLUDED:

- SESSION: STRESS & MENTAL HEALTH IN TECHNOLOGY, DR. JENNIFER AKULLIAN, FOUNDER | PSYCHOLOGIST, GROWTH COACHING INSTITUTE
- ACCESS TO OPEN SOURCING MENTAL ILLNESS (OSMI) HANDBOOK (AVAILABLE AT NA)
- ON-DEMAND DESK STRETCHING
- ON-DEMAND DESK YOGA
- ON-DEMAND DESKTOP MEDITATION
- LIVE ONLINE PUPPY + KITTY CAMS
- KEEP CLOUD NATIVE WELL SLACK CHANNEL FOR CONVERSATIONS

TRAINING + CERTIFICATION

CNCF's training and certification program continued to grow this year. In 2020, these training courses and exams received considerable interest:

- **Kubernetes Massively Open Online Course (MOOC)** hit 165,000 enrollments (65% increase from 2019).
- **Certified Kubernetes Administrator (CKA) exam** hit 37,000 enrollments (121% increase from 2019).
- **Certified Kubernetes Application Developer (CKAD)** hit 18,300 exam registrations (143% increase from 2019).
- **Kubernetes Certified Service Provider (KCSP)** program reached 179 certifications in 2020 (38% increase from 2019).
- **Kubernetes Training Partner (KTP)** program grew to 50 certified companies (42% increase from 2019).

In November 2020, CNCF launched the **Certified Kubernetes Security Specialist (CKS)** exam. This exam will provide assurance that a certificant has the skills, knowledge, and competence on a broad range of best practices for securing container-based applications and Kubernetes platforms during build, deployment, and runtime.

Other courses that CNCF funded in 2020 include:

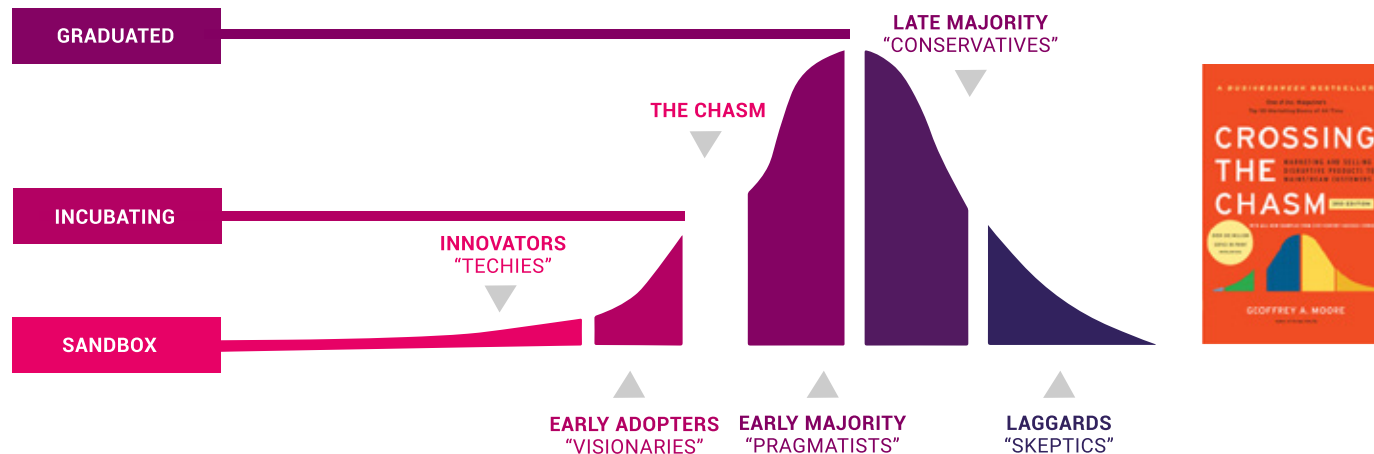
- **Service Mesh Fundamentals**
- **Managing Kubernetes Applications with Helm**
- **Cloud Native Logging with Fluentd**
- **Intro to Service Mesh with Linkerd**
- **Intro to Serverless on Kubernetes**



PROJECT UPDATES AND SATISFACTION

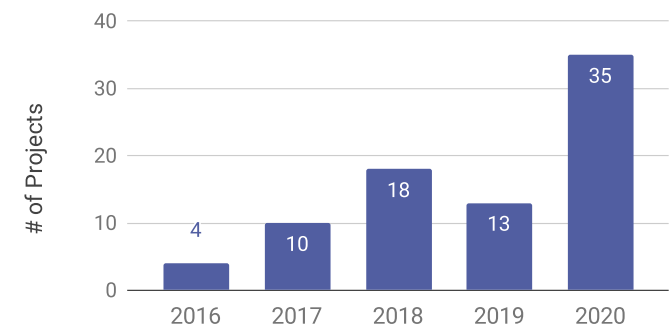
In 2020, CNCF-hosted projects Helm, Harbor, TiKV, Rook, and etcd advanced to “graduated” status, for a total of 14 projects. During 2020, Argo, Contour, and Operator Framework joined at the incubating level. Buildpacks, Cortex, Dragonfly, Falco, SPIFFE/SPIRE, and Thanos joined our 20 incubating projects from the Sandbox level.

PROJECT MATURITY LEVELS



































CNCF projects are classified by maturity level, ranging from sandbox to incubating to graduated. CNCF uses these maturity levels to indicate to enterprises the degree of project readiness for enterprise adoption. Graduated projects are suitable for the vast majority of enterprises. Incubating projects are suitable for early adopters, and sandbox projects are suitable for innovators. Projects increase their maturity level by demonstrating to the TOC that they have attained end user and vendor adoption, established a healthy rate of code commits and codebase changes, and attracted committers from multiple organizations. All projects must adopt the CNCF Code of Conduct and commit to earning the Core Infrastructure Initiative Best Practices Badge in order to become an accepted CNCF project. Full details are listed in [Graduation Criteria v1.1](#).

CNCF Projects Accepted



IN 2020 THE CNCF TOC ACCEPTED 35 NEW PROJECTS:

 <p>KEDA</p> <p>SANDBOX 3/9/20</p>	 <p>Service Mesh Interface</p> <p>SANDBOX 3/16/20</p>	 <p>argo</p> <p>SANDBOX 4/7/20</p>	 <p>VOLCANO</p> <p>SANDBOX 4/10/20</p>	 <p>ArtifactHUB</p> <p>SANDBOX 6/23/20</p>	 <p>BFE</p> <p>SANDBOX 6/23/20</p>	 <p>Cloud Custodian</p> <p>SANDBOX 6/23/20</p>
 <p>Crossplane</p> <p>SANDBOX 6/23/20</p>	 <p>dex</p> <p>SANDBOX 6/23/20</p>	 <p>keptn</p> <p>SANDBOX 6/23/20</p>	 <p>KU</p> <p>SANDBOX 6/23/20</p>	 <p>Kuma</p> <p>SANDBOX 6/23/20</p>	 <p>Litmus</p> <p>SANDBOX 6/23/20</p>	 <p>PARSEC</p> <p>SANDBOX 6/23/20</p>
<p>CNI-Genie</p> <p>SANDBOX 6/23/20</p>	 <p>CONTOUR</p> <p>INCUBATING 7/7/20</p>	 <p>OPERATOR FRAMEWORK</p> <p>INCUBATING 7/9/20</p>	 <p>SANDBOX 7/14/20</p>	 <p>Chaos Mesh</p> <p>SANDBOX 7/14/20</p>	 <p>K3S</p> <p>SANDBOX 8/19/20</p>	 <p>Backstage</p> <p>SANDBOX 9/8/20</p>
 <p>Tremor</p> <p>SANDBOX 9/8/2020</p>	 <p>Moby</p> <p>SANDBOX 9/8/2020</p>	 <p>Porter</p> <p>SANDBOX 9/8/20</p>	<p>OpenYurt</p> <p>SANDBOX 9/8/20</p>	 <p>Open Service Mesh</p> <p>SANDBOX 9/8/20</p>	 <p>Keylime</p> <p>SANDBOX 9/22/20</p>	 <p>SCHEMAHERO</p> <p>SANDBOX 11/10/20</p>
 <p>cdk8s</p> <p>SANDBOX 11/10/20</p>	 <p>CERT MANAGER</p> <p>SANDBOX 11/10/20</p>	 <p>OpenKruise</p> <p>SANDBOX 11/10/20</p>	 <p>tinkerbella</p> <p>SANDBOX 11/10/20</p>	 <p>Pravega Reliable streaming storage</p> <p>SANDBOX 11/10/20</p>	 <p>Kyverno</p> <p>SANDBOX 11/10/20</p>	

CNCF PROJECT MAINTAINER SURVEY RESULTS

CNCF conducts a [survey](#) of our project maintainers twice a year. The overall satisfaction with CNCF increased in 2020, with an improved satisfaction rating on staff responsiveness. There was a 98% maintainer project representation, and the super majority of maintainers recommended CNCF as a place to host an open source project.

83%

Maintainer Satisfaction

92%

are satisfied with CNCF response time

88%

A large majority of maintainers would recommended CNCF for other projects

PROJECT UPDATES

GRADUATIONS:



JOINED AT THE INCUBATION LEVEL OR MOVED FROM SANDBOX TO INCUBATION:



SERVICES AND ASSISTANCE FOR PROJECTS

CNCF provides a variety of [services](#) to our projects to help make them more successful and sustainable.

EVENTS

CNCF continues to invest in CNCF-hosted projects by assisting with their own specialized events. These may be in conjunction with KubeCon + CloudNativeCon or standalone conferences.

CNCF Hosted - Co-located with KubeCon + CloudNativeCon:

- [Cloud Native Security Day Europe](#) | 890 registered attendees
- [Serverless Practitioners Summit Europe](#) | 496 registered attendees
- [ServiceMeshCon Europe](#) | 891 registered attendees
- [Cloud Native Security Day North America](#) | 1,606 registered attendees
- [OpenTelemetry Community Day North America](#) | 913 registered attendees
- [Production Identity Day: SPIFFE + SPIRE North America](#) | 515 registered attendees
- [ServiceMeshCon North America](#) | 1,803 registered attendees

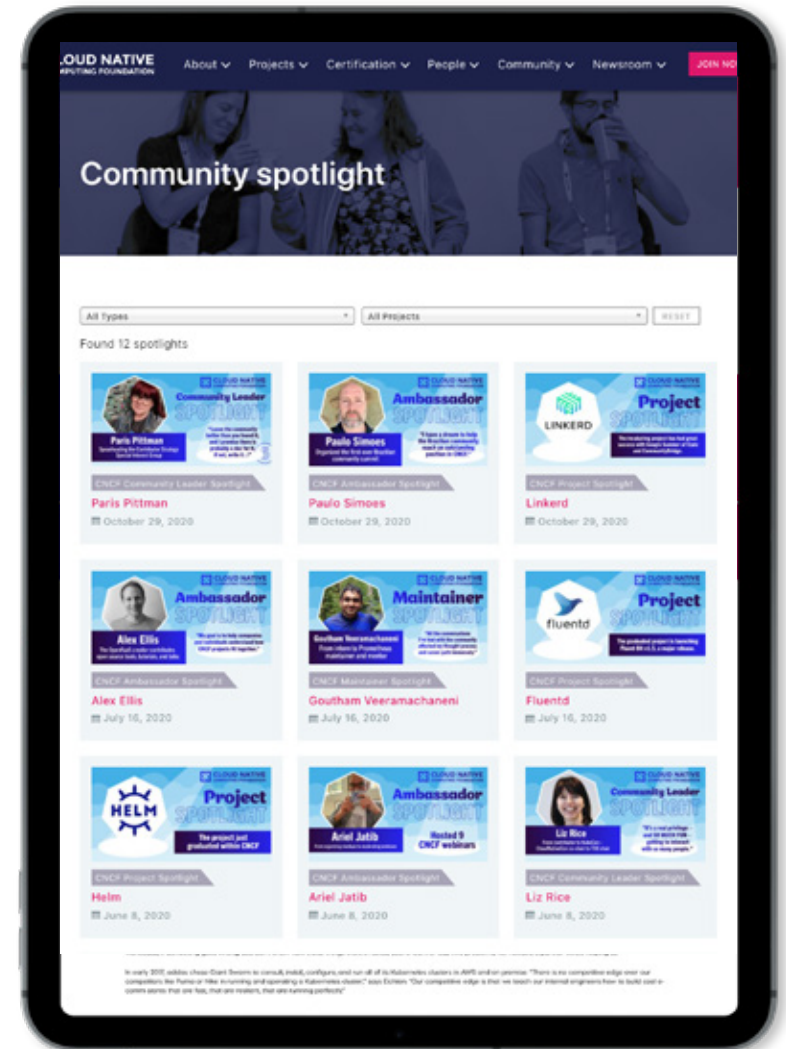
CNCF Hosted - Standalone

- [Kubernetes Forum Bengaluru](#) (in-person) | 2121 registered attendees
- [Kubernetes Forum Delhi](#) (in-person) | 985 registered attendees
- [gRPCConf](#) | 506 registered attendees
- [PromCon 2020 Virtual](#) | 744 registered attendees
- [EnvoyCon 2020 Virtual](#) | 417 registered attendees
- [Helm Workshop: v2 to v3](#) | 306 registered attendees



DOCUMENTATION, WEBSITES AND BLOGS

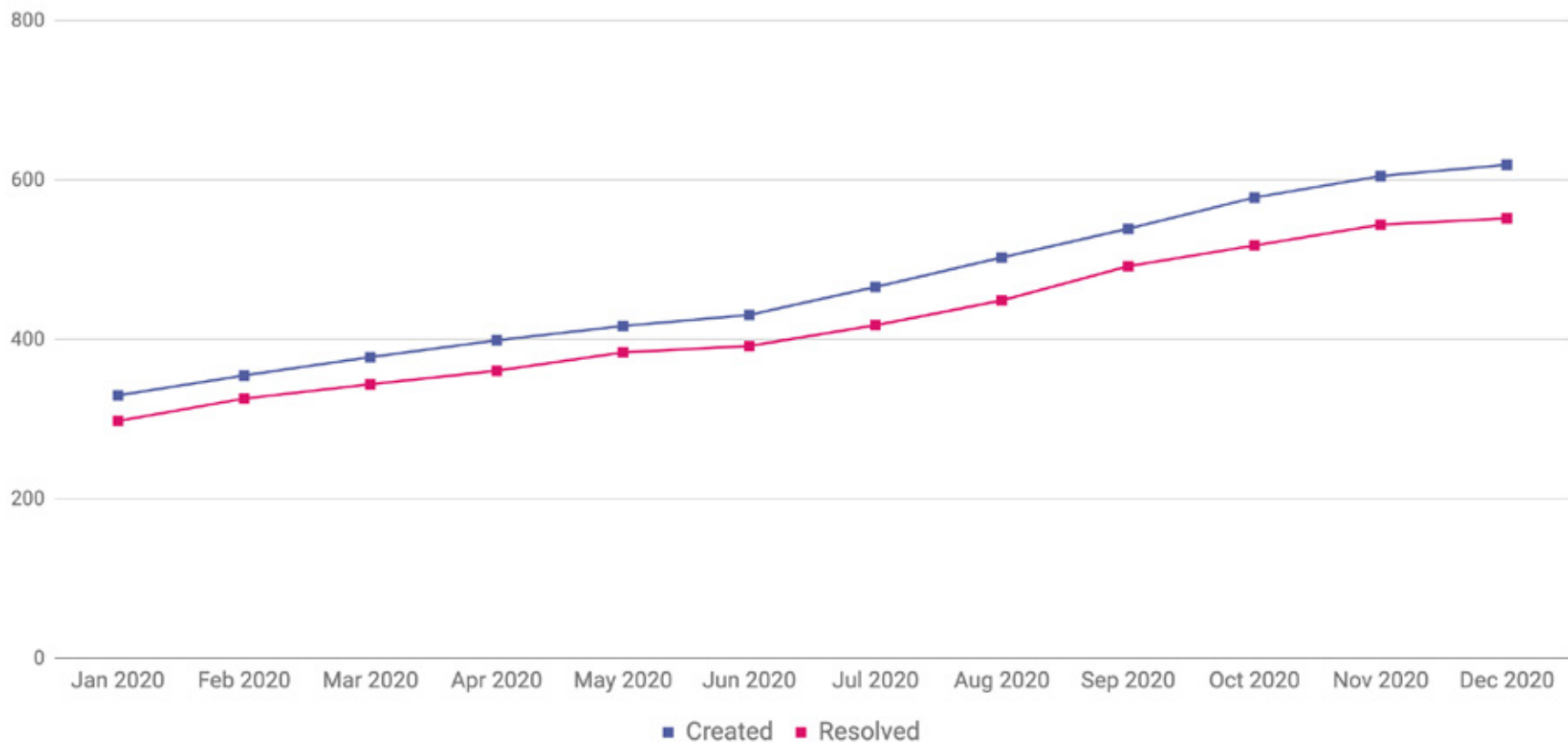
- We issued a series of project journey reports for CNCF graduated projects, including [containerd](#), [Fluentd](#), [Helm](#), [Jaeger](#), and [Vitess](#).
- 296 blog posts were published in 2020, with a blog readership of 448,493 (21% higher than 2019).
- Top blog posts for 2020:
 - [Kubernetes 1.19: The future of traffic ingress and routing](#) (eficode) (23,171 views)
 - [The difference between API Gateways and Service Mesh](#) (Kong) (15,871 views)
 - [Logging in Kubernetes: EFK vs PLG Stack](#) (MSys Technologies) (14,674 views)
 - [Building a Large-scale Distributed Storage System Based on Raft](#) (InfraCloud) (12,976 page views)
 - [9 Kubernetes security best practices everyone must follow](#) (StackRox) (11,012 page views)
- We rebuilt the CNCF website from scratch to accomplish the following goals:
 - Improve the speed of the site, both for browsing and editing content
 - Automate the administration of the site to make it easier to maintain and keep up-to-date
 - Modernize the development process and codebase to facilitate ongoing improvements
 - Improve accessibility
 - Modernize the design
- We added a [Community Spotlights](#) content type to highlight contributions from the community, including CNCF ambassadors Paolo Simoes and Queeny Jin, community leaders Paris Pittman and Liz Rice, and project maintainers Torin Sandall and Goutham Veeramachaneni
- Some projects got brand new websites courtesy of CNCF in 2020:
 - [Dex IDP](#)
 - [Longhorn](#)
 - [In-toto](#)
 - [CNI](#)
 - [Keda](#)
- Other projects got major documentation/web presence upgrades:
 - [gRPC](#)
 - [Vitess](#)
 - [Serverless Workflow](#)



CNCF SERVICE DESK

To improve access to activities and services that CNCF offers to its hosted projects, the [CNCF Service Desk](#) serves as a single access point for all CNCF services. If you're a CNCF project maintainer, all you have to do is visit <http://servicedesk.cncf.io> to request support.

CNCF SERVICE DESK REQUEST BURN UP CHART



COMMUNITY ENGAGEMENT

The CNCF community spans the world across our contributors, members, meetups, and ambassadors.

CNCF continues to support the development of this incredible cloud native community while also striving to ensure that everyone who participates feels welcome regardless of gender, gender identity, sexual orientation, disability, race, ethnicity, age, religion, or economic status. In 2020, **women and gender non-conforming speakers made up 74% of the keynotes at [KubeCon + CloudNativeCon EU Virtual](#) and 52% at [KubeCon + CloudNativeCon NA Virtual](#).**

At our KubeCon + CloudNativeCon events, there were a number of activities designed to foster the diversity of the cloud native community, including peer group mentoring and career networking, the EmpowerUs event, a Diversity &

Inclusion workshop, KubeCon + CloudNativeCon diversity and need-based scholarships and complimentary registration to CNCF hosted co-located events.

CNCF offered scholarships to 717 diversity applicants from traditionally underrepresented and/or marginalized groups and 185 need-based applicants in 2020. Scholarships and diversity programs were funded by sponsorships from Amazon Web Services, CarGurus, Cloud Native Computing Foundation, ITRenew, Legacy II Cloud, Palo Alto Networks, Two Sigma, and VMware.

Including the 2020 virtual events, CNCF has offered more than 2,300 diversity and need-based scholarships to attend KubeCon + CloudNativeCon and other CNCF hosted events over the course of its life.

727

DIVERSITY APPLICANTS
FROM TRADITIONALLY
UNDERREPRESENTED
AND/OR MARGINALIZED
GROUPS

185

NEED-BASED
SCHOLARSHIPS

FUNDED MAINLY BY:



**CLOUD NATIVE
COMPUTING FOUNDATION**

INCLUDED DONATIONS FROM



CarGurus

ITRENEW

LEGACY II CLOUD



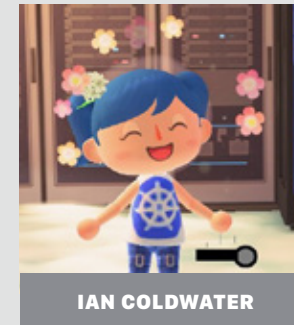
TWO SIGMA

vmware

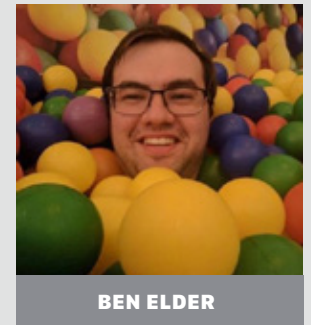
COMMUNITY AWARDS

Now in their fifth year, the [CNCF Community Awards](#) highlighted the most active ambassador and top contributor across all CNCF projects. The awards included:

- Top Cloud Native Committer – an individual with incredible technical skills and notable technical achievements in one or multiple CNCF projects. The 2020 recipient was [Ben Elder](#).
- Top Cloud Native Ambassador – an individual with incredible community-oriented skills, focused on spreading the word and sharing knowledge with the entire cloud native community or within a specific project. The 2020 recipient was [Ian Coldwater](#).



IAN COLDWATER



BEN ELDER

To recognize contributors who spend countless hours completing often mundane tasks, CNCF created the "Chop Wood and Carry Water" awards. CNCF was proud to acknowledge the amazing efforts of five individuals for their outstanding contributions in 2020: [Erin Boyd](#), [Josh Berkus](#), [Bridget Kromhout](#), [Matt Fisher](#), and [Richard Hartmann](#).



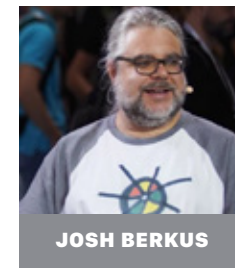
ERIN BOYD



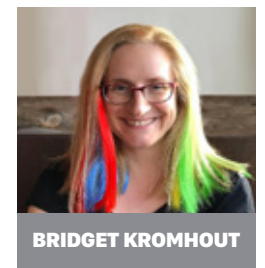
RICHARD HARTMANN



MATT FISHER



JOSH BERKUS



BRIDGET KROMHOUT



We also celebrate the contributions that end users make to our ecosystem, including providing upstream contributions to projects, creating and maintaining open source projects to expand the ecosystem, and providing significant insights into successes and failures. We were thrilled to grant our [Top End User Award to Zalando](#) in recognition of its notable contributions to the cloud native ecosystem, including chairing the CNCF Developer Experience SIG.

CNCF MEETUPS

In 2020, CNCF supported more than 194 Meetup groups in 53 countries, with greater than 158,000 members. In 2020, we experienced a nearly 10% increase in CNCF Meetup members.

194

MEETUP GROUPS

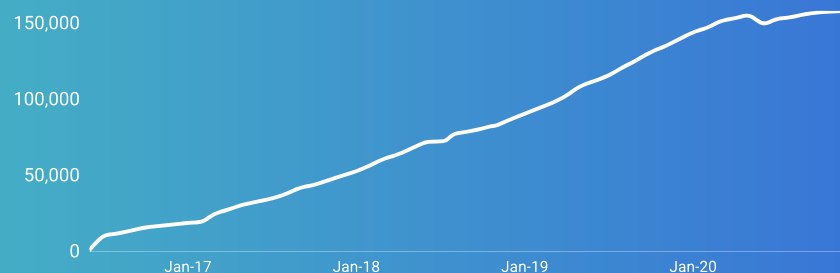
158K

MEMBERS

10%

INCREASE IN 2020

CNCF MEETUP MEMBER GROWTH



CNCF also kicked off the Cloud Native Community Groups program, which will supersede the Meetup program in the future, and will become a single hosting place for the Cloud Native community initiatives.



KUBERNETES COMMUNITY DAYS

In response to the cloud native community's evolving needs, CNCF launched the [Kubernetes Community Days \(KCD\)](#) program in 2019. KCDs are community-organized events that gather adopters and technologists from open source and cloud native communities to learn, collaborate, and network. The goal of the events is to further the adoption and improvement of Kubernetes. Unfortunately, due to the COVID-19 pandemic, the 2020 KCD events were postponed. CNCF plans to reboot the program in 2021 with the option to run virtual events. For additional information about the program, please [visit the homepage](#).



CNCF AMBASSADOR PROGRAM

Cloud Native Ambassadors (CNAs) are individuals who are passionate about Cloud Native Computing Foundation technology and projects, recognized for their expertise, and willing to help others learn about the framework and community. These individuals are bloggers, influencers, and evangelists. CNCF has 118 [CNCF Ambassadors](#) around the globe educating the world on cloud native technologies and best practices.

We accepted 22 new CNCF ambassadors and provided financial support for ambassador-run meetups in 2020. We are excited to have this worldwide group of people with diverse interests, experiences, and technical backgrounds help drive local and global cloud native communities. Please check out the [interviews](#) with several of our CNCF ambassadors from the Ambassador Spotlights section on the [CNCF homepage](#).

NEW CNCF AMBASSADORS FOR 2020



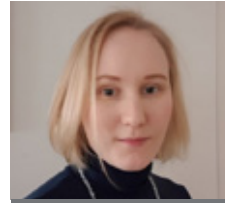
TAYLOR DOLEZAL



SAIYAM PATHAK



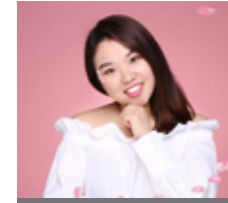
PAULO ALBERTO SIMOES



JESSICA ANDERSSON



HARRY LEE



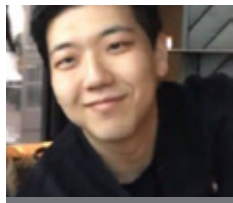
XIAOCUI LIN



FEYNMAN ZHOU



KOHEI OTA



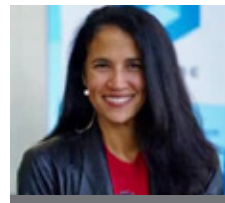
HAN SOL PARK



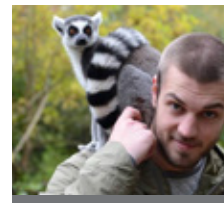
ROBY CHEN



SALIM LAKHANI



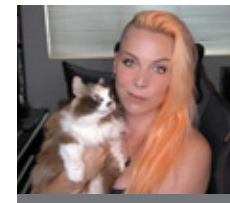
LISA-MARIE NAMPHY



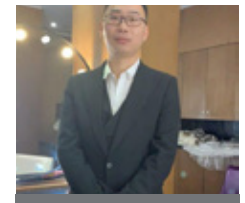
TOM KERKHOVE



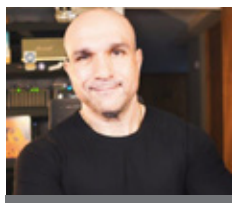
LIVIU COSTEA



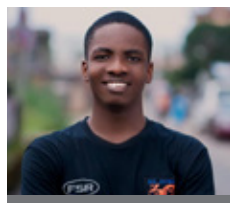
KAT COSGROVE



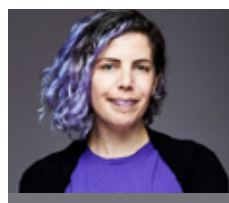
ES ZOU



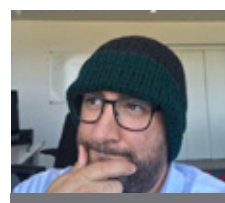
DAN PAPANDEA



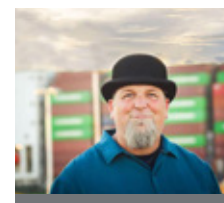
UCHECHUKWU OBASI



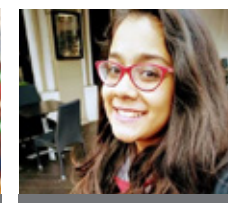
IAN COLDWATER



NUNO DO CARMO



DUFFIE COOLEY



DIVYA MOHAN

COMMUNITY MENTORING, DIVERSITY AND INTERNSHIPS

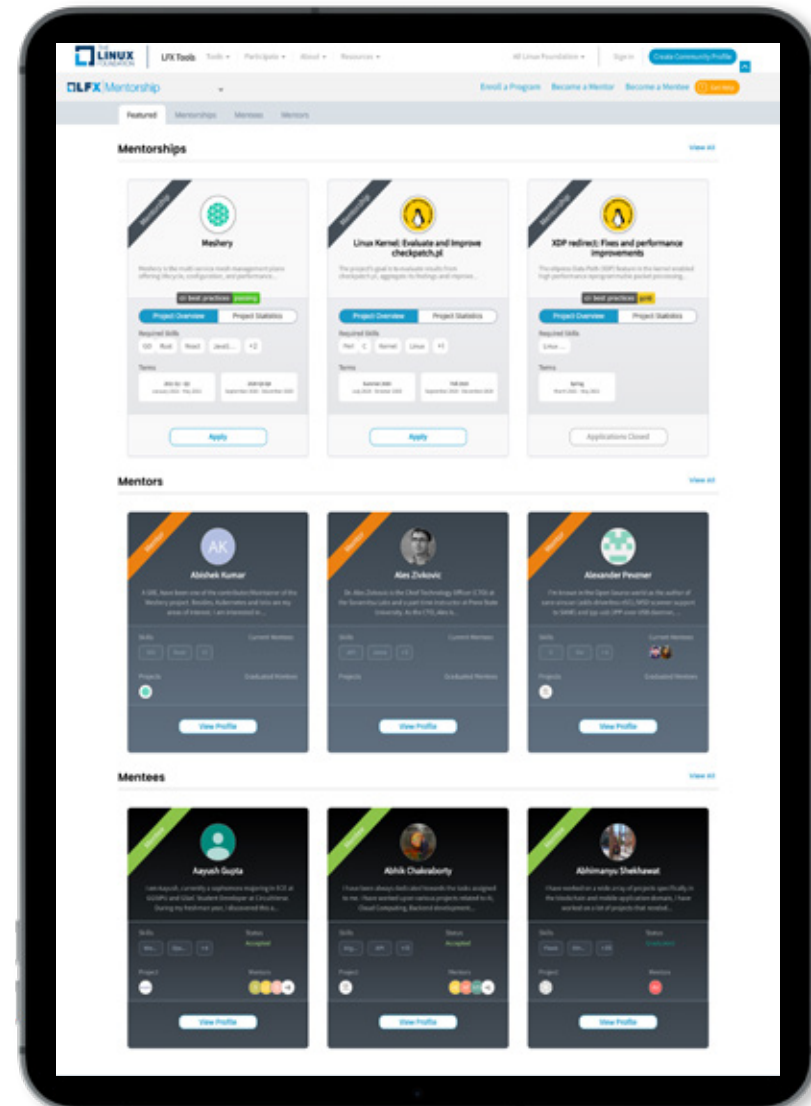
CNCF proudly supports various mentoring and internship opportunities including the [LFX](#) mentorship platform (previously known as Community Bridge), [Google Summer of Code \(GSoC\)](#), [Google Summer of Docs \(GSoD\)](#) program, and [Outreachy](#). These programs are important catalysts for internships to have an impact on future technologies that we all depend on.

Students accepted into the GSoC program have the opportunity to work with a mentor and become part of an active open source community. CNCF hosted 20 interns in 2020 (16 of them have graduated) – our largest class ever. Mentors from our community paired with interns and worked with them to help improve CNCF projects. You can find further details [here](#).

Also, 2020 was the first year that CNCF participated in the Google Season of Docs (GSoD) program. GSoD is a mentoring initiative for technical writers; this year the CNCF matched 4 writers with projects and mentors and provided administrative support.

Recently launched by The Linux Foundation, [LFX Mentorship](#) aims to sustain open source projects while providing paid opportunities for new developers to join and learn from open source communities. In 2020, CNCF sponsored 50 students during three mentoring cycles to work on 21 CNCF projects.

In November 2020, CNCF partnered with The Linux Foundation and [National Center for Women & Information Technology \(NCWIT\)](#) to [launch a new training course, Inclusive Open Source Community Orientation](#). This course is designed to provide essential background knowledge and practical skills to create an inclusive culture in the open source community.



ECOSYSTEM TOOLS

CNCF JOB BOARD

According to the [2020 Linux Foundation Open Source Jobs Report](#), cloud and containers continue to grow in popularity and importance; 69% of hiring managers are currently seeking cloud and container expertise, up from 64% in 2018. In response to this demand, CNCF launched its official job board in 2019. Since then, the job board has listed over 1,000 jobs from 2,000+ employers. More than 2,600 job seekers have applied for a job via email or on the site.

The CNCF Job Board is an excellent resource to connect with the world's top cloud native developers and hire strong candidates. The job board is a free service for both posters and applicants, and CNCF member job openings receive a featured listing. We invite you to post your job, search for candidates, or find your next employment opportunity [through the CNCF Job Board](#).

CNCF SPEAKERS BUREAU

Launched in 2018, the [CNCF Speakers Bureau](#) helps connect event organizers with speakers who have varied expertise in the cloud native ecosystem. Speakers consist of CNCF ambassadors, meetup organizers, and prominent community members who are willing to speak at events on the topics they are proficient in.

In 2020, CNCF made some [exciting updates](#) to the Speakers Bureau page, including the option for CNCF members to bulk email speakers and a powerful faceted search feature.

DEVSTATS

In 2017, CNCF developed [DevStats](#), a tool to visualize various developer and community metrics for Kubernetes and other CNCF-hosted projects, as well as non-CNCF open source projects hosted on a public GitHub repository. DevStats organizes and displays CNCF-hosted project data using [Grafana](#) dashboards. In 2020, we added DevStats API support, so others can connect to DevStats' APIs and request data programmatically.

CNCF developer Lukasz Gryglicki, the primary developer on DevStats, is responsive to suggestions and [pull requests](#) that provide additional insights into the development of CNCF's hosted projects.



CNCF LANDSCAPE AND CLOUD NATIVE TRAIL MAP

With over 5.7M pageviews in 2020, the CNCF Cloud Native [Landscape](#) has become THE place that those looking to adopt cloud native technology go to get educated on all of the cloud native options in the ecosystem. The landscape started in November 2016 as a static image of fewer than 100 projects and products. In 2020, it has grown through the power of collaborative editing to track more than 1,500 projects, products, and companies and includes a [serverless](#) landscape and the CNCF [member](#) landscape. The project has nearly 7,000 stars on GitHub.

The Cloud Native [Landscape](#) 2.0 is an interactive version that allows viewers to filter, obtain detailed information on a specific project or technology, and easily share via stateful URLs. The landscape also captures funding and financing information for companies that are fostering and building businesses around cloud native technologies. The code used to generate the interactive landscape is open source with the data stored in a [yaml](#) file. Every night, a server downloads updated GitHub data, financing information from Crunchbase, market cap data from Yahoo Finance, and CII [Best Practices Badge](#) information.

CNCF Cloud Native Landscape 2020-12-16T15:15:52Z 4455270a
 Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io
 Greyed logos are not open source



CLOUD NATIVE TRAIL MAP

The Cloud Native Landscape [Landscape](#) has a large number of options. This Cloud Native Trail Map is a recommended process for leveraging open source, cloud native technologies. At each step, you can choose a vendor supported offering or do it yourself, and everything after step 6 is optional based on your requirements.

HELP ALONG THE WAY

A. Training and Certification

Consider learning offerings from CNCF and then take the exam to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer.

B. Consulting Help

If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider.

C. Join CNCF's End User Community

For companies that don't offer cloud native services externally.

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor neutral projects. This document, state-of-the-art patterns to make these innovations accessible for everyone.



- 1. CONTAINERIZATION**
 * Mandatory step to run cloud containers
 * Any use application and dependencies below POD-11
 * Pods running on any container platform
 * Over time, you should adopt towards spinning suitable capabilities and writing Kubernetes functionality as microservices
- 2. CI/CD**
 * Setup Continuous Integration/Continuous Delivery (CI/CD) to that manages your source code automatically retest in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
 * Setup automated rollouts, roll backs and testing
- 3. ORCHESTRATION & APPLICATION DEFINITION**
 * Kubernetes (K8s) is the de facto orchestration solution
 * You should select a Certified Kubernetes Distribution, Hosted Platform or installer, not K8s
 * Helm Charts help you deploy, install, and upgrade even the most complex Kubernetes applications
- 4. OBSERVABILITY & ANALYSIS**
 * Pick solutions for monitoring, logging and tracing
 * Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
 * For tracing, look for an OpenTelemetry connector, implementation like Jaeger
- 5. SERVICE PROXY, DISCOVERY, & MESH**
 * Consider NGINX as a Fast and flexible tool that is useful for service discovery
 * Envoy and Linkerd each enables service mesh capabilities
 * Offer health checking, routing, and load balancing
- 6. NETWORKING & POLICY**
 To enable more flexible networking, use a CNCF compliant network layer like Calico, Cilium, or Weave Net. Control Plane Agent (CPA) is a general purpose policy engine with rules coming from authorization and permission granularity data. Istio, the open source cloud native service mesh project, abstracts complex application behavior and alerts on threats or abuse.
- 7. DISTRIBUTED DATABASE & STORAGE**
 When you need more resiliency and scalability than you can get from a single database, Vitess is a good option for serving MySQL, or scales through Sharding. Rook is a storage orchestrator that integrates a diverse set of storage devices into Kubernetes. Serving as the "brain" of Kubernetes, etcd provides a reliable way to store data across a cluster of machines. TKV is a high performance distributed transactional key-value store for KV data.
- 8. STREAMING & MESSAGING**
 When you need higher performance than JSON-RPC, consider messaging or MQTT. gRPC is a universal RPC framework. NATS is a multi-model messaging system that includes request-reply, publish and subscribe, queues. CloudEvents is a specification for describing event data as common ways.
- 9. CONTAINER REGISTRY & RUNTIME**
 Harbor is a registry that stores, signs, and scans content. You can also choose containerd, the most common, both of which are OCI compliant, are containerd and CRD.
- 10. SOFTWARE DISTRIBUTION**
 If you need to secure software distribution, evaluate Istio, an implementation of The Istio Framework.

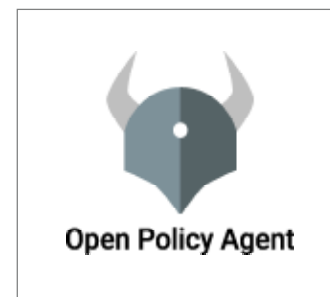
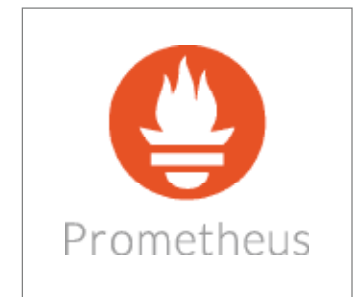
CNCF OPEN SOURCE SECURITY AUDITS

In 2018, the CNCF began performing and open sourcing [security audits](#) for its projects to improve the security of our ecosystem. The goal was to audit several projects and gather feedback from the CNCF community as to whether the pilot program was useful.

Eight CNCF-hosted projects received security audits in 2020, including [etcd](#), [TiKV](#), [linkerd \(rustls\)](#), [OPA \(gatekeeper\)](#), [Prometheus \(node_exporter\)](#), Helm, ChubaoFS, and Contour.

For the first time, CNCF also invested in exploring fuzzing work and audits to improve the security and quality of our projects, [Fluentd \(FluentBit fuzzing\)](#) participated as a pilot project. We plan on rolling out fuzzing work to more projects in 2021.

NINE CNCF-HOSTED PROJECTS RECEIVED SECURITY AUDITS IN 2020, INCLUDING:



GROWTH IN CHINA

CNCF continues to grow the cloud native community in China. CNCF's first virtual event in China, [Cloud Native + Open Source Virtual Summit China 2020](#), attracted 5,800+ attendees.

CNCF has grown from a few members in China in 2015 to over 50 in 2020. That number includes four Platinum (20% of Platinum members), six Gold (27% of Gold members), 55 Silver (nearly 8% of Silver members), and two End User Supporters (2% of End User Supporters). China now represents more than 8% of the CNCF total membership. China remains the [third-largest contributor](#) to CNCF projects (in terms of contributors and committers) after the United States and Germany.

According to the [Cloud Native Survey China 2019](#), released this year, cloud native is continuing its growth in China, especially in production. Some 49% of respondents now use containers in production, with another 32% planning to do so. This is a significant increase from November 2018 when only 20% used containers in production. Further, 72% of respondents in China use Kubernetes in production, up from 40% in November 2018. We are in the process of conducting the Chinese survey for 2020, and will release the results early next year.

Among Chinese contributors to CNCF-hosted projects, Huawei and PingCAP led the way with [66,554 and 84,816](#) contributions, respectively, and are the sixth- and eighth-largest contributors overall. CNCF also hosts five CNCF projects that were born in China: [ChaosMesh](#) (PingCAP), [Dragonfly](#) (Alibaba), [Harbor](#) (VMware China), [KubeEdge](#) (Huawei), and [TiKV](#) (PingCAP).

Our Chinese community participated in a variety of certification programs and [case studies](#) in 2020, including 17% of KCSPs, 16% of KTPs, and 24% of Certified Kubernetes Conformance companies. To help showcase best practices for this community, we published two Chinese case studies in 2020, featuring China Minsheng Bank and Platinum end user member JD.com.

CNCF, in partnership with Alibaba, continues to offer the free [Kubernetes and Cloud Native course](#) that was launched in 2019 in China.

We're excited to build on this success by hosting a KubeCon + CloudNativeCon China event in 2021.

+50 MEMBERS IN CHINA

8% OF CNCF TOTAL MEMBERSHIP

4 PLATINUM

6 GOLD

55 SILVER

3RD LARGEST NATIONAL CONTRIBUTOR TO CNCF



84,816 CONTRIBUTIONS



66,554 CONTRIBUTIONS

LOOKING FORWARD TO 2021

2020 has been a difficult year across the globe and across every industry. Despite this, the CNCF community has risen to the challenge to continue as the fastest-growing foundation in the history of open source. Today, CNCF hosts more than 80 projects with over 110,000 contributors representing 177 countries.

As we look to 2021 and beyond, the growth of distributed workforces is creating more opportunities for cloud native and open source technologies – on top of the already record-high use in production. We need innovation from everywhere, not only to deal with the pandemic but to enable our companies, governments, and entire economies to come out stronger than ever. We are well-positioned to bolster cross-company collaboration and interoperability with our neutral IP zone, rich contributor programs, and most importantly, the trust end users place in us. We will continue to foster this virtuous cycle of innovation between end users, project creators, and enhancers through our events, new end user and member initiatives, and project services.

As we honor the legacy of our longtime leader, colleague, and friend, Dan Kohn, we remain committed to taking this incredible community that he built and continuing to grow it, led by the same values and principles he started with. Diversity is at the heart of the cloud native movement – that together we are stronger, faster, better, and more innovative than alone and apart – making end users more efficient and ultimately adding value for everyone in the community. To cultivate diversity, we launched the [Inclusive Naming Initiative](#) – a cross-organizational effort to remove harmful, racist, and unclear language in software development and unify the adoption of replacement terms across the technology industry. The group will continue to focus on defining a path forward for the industry to move together to update and replace these terms without breaking dependencies.

Previously, in-person learning opportunities were offered at our flagship KubeCon + CloudNativeCon events. We are now aggressively expanding these learning opportunities through virtual and hybrid events to continue supporting community learning.

2020 was about end user driven open source, diversity-powered resilience, and a focus on education and training. In the adversity we all faced this year, there have been saplings of hope and a new direction that is more inclusive and therefore builds a stronger ecosystem. It is our hope and belief that the CNCF community will continue to evolve as more and more new people join the ecosystem and different aspects of world commerce get involved. The diversity of verticals in our world view in 2020 is one example of that. We also see signs of this in our event demographics as first-time attendees made up 69% of KubeCon + CloudNativeCon North America Virtual 2020. In 2021, we will also be launching a member referral program that will help support the growth and diversity of our community.

We also will continue to emphasize the growth of our end user community, with new initiatives such as the CNCF End User Technology Radar sharing the real experiences, feedback, and opinions of end users. We will continue our work to bring end users together to discuss best practices in the Telco, Research, and Financial Services sectors.

In summary, 2020 was an unprecedented year for both CNCF and the world. We worked tirelessly to support our community and pivot all programs to an all-virtual environment. While 2021 will bring new challenges and a new normal, we are well-positioned financially and organizationally to continue our mission to make cloud native computing ubiquitous and the de facto standard for software development and usage. We look forward to collaborating with you on this journey as we look to 2021 and beyond.

We are working diligently to iterate on our strategy for 2021. For the latest updates, please see our blog in the new year. Learn more at www.cncf.io.



CLOUD NATIVE
COMPUTING FOUNDATION

cncf.io | info@cncf.io