

# 2018 OpenStack Foundation Annual Report

## Chairman's Note

As one looks back at the passing year, the events which often come to mind first are sometimes surprising. As I thought about 2018 while enjoying a hot cup of holiday cheer, the Dublin PTG was top of mind. As everyone who attended will recall, the event encountered the "Beast from the East." This sudden, century level storm paralyzed the country, closed the airports, street cars, trains, taxis and of most critical to us Stackers - the PTG venue. Yet what pulled all of us out of our comfort zone turned out to be a very positive demonstration of the strengths of the OpenStack open source community. It was a defining moment for me, and a revealing one for the strength of our community.

It is an event that I have oft reflected upon throughout the year as, we as a Board, have discussed the needs and future years for the OpenStack Foundation (OSF). There are many strengths to our community, but the heart is the resolve of its members to develop and build world changing technology developed within the innovative open source models and principles. That simple recognition has been the basis of thought within the board as we helped guide the 2018 growth in 4 topical areas:

1. Grow with a focus on an Open Infrastructure strategy
2. Strengthen the OpenStack project community
3. Embrace adjacent communities and technologies
4. Support OpenStack interoperability

There are more details, milestones and successes than what can be outlined here, for each of those four areas. The main point is that as we as a community have come together and built resolve. Driven by many dedicated community members, truly amazing progress has been made. Progress where, even a "Beast from the East" can't stop our resolve.

A big thank you to the technical and user leadership, the OpenStack Foundation staff, and the Board members for your dedication, motivating spirit, and resolve.

I would also like to call out the 2018 individual board members, including:

- Alan Clark
- Allison Randal
- Anni Lai
- Arkady Kanevsky
- Boris Renski
- Brian Stein
- ChangBo Guo
- Christopher Price
- Dr. Clemens Hardewig
- Egle Sigler
- Imad Sousou
- Johan Christenson
- Joseph Wang
- Kandan Kathirvel
- Kenji Kaneshige
- Kurt Garloff
- Lew Tucker
- Mark McLoughlin
- Monty Taylor
- Prakash Ramchandran
- Robert Esker
- Ruan He
- Shane Wang
- Steven Dake
- Tim Bell

Board members, thank you for your leadership and contributions.

2019 holds great promise for the OSF. It will be an amazing year of growth and technological deliveries

A salute to the New Year!

Alan Clark  
OpenStack Foundation Board Chair

Lew Tucker  
OpenStack Foundation Board Vice-Chair

## A Letter from the Executive Director

When I look back on 2018, I see the biggest year of transition for the OpenStack Foundation (OSF) since our launch in 2012. In 2017, we identified opportunities we could take on as the OpenStack project matured, our global community broadened, and the open source space became more active than ever before. In 2018, we took our first steps to act on these emerging opportunities by establishing new pilot projects and an "open infrastructure" framework to govern them,

while working hard to support our core OpenStack technology, contributor base and ecosystem.

Eight years ago, OpenStack was started with the belief that a community of equals, working together in an open collaboration, would produce better software that is more aligned to the needs of its users and more largely adopted. Now, the Four Opens—open source, open design, open development, and open community—have proved resilient, consistently managing to capture the “OpenStack Way” of doing upstream open source development. They are instrumental in the success, quality and visibility of the OpenStack software. Earlier this year, we started the Four Opens Book as a collaborative community project aiming to share these learnings and how the Four Opens were initially intended for upstream, and how they proved applicable to downstream activities such as user feedback gathering, marketing, or event management. As the OpenStack Foundation grows to advance the Open Infrastructure mission, the Four Opens will grow alongside it.

In 2018, we continued to advance the Open Infrastructure mission by establishing OSF as an effective place to collaborate for CI/CD, container infrastructure, edge computing, in addition to the traditional public and private cloud area. The Open Infrastructure approach opened a lot of doors in 2018, from the initial release of software from each pilot project, to live 5G demos, to engagement from hyperscale public cloud providers. The early returns on these investments are positive as we look forward to 2019 and beyond.

In addition to Kata Containers which launched in December 2017, we also launched 3 pilot projects in 2018—Zuul, StarlingX and Airship—that help further our goals of taking our technology into additional relevant markets. While these efforts are still new, I believe they have been extremely valuable in helping us learn how we should expand the scope of the OSF, as well as showing others the kind of approach we will take.

OpenStack remained at the core of the Foundation team’s focus, even as we invested resources to help bootstrap the pilot projects. We believe the pilot projects are helping expand the open infrastructure community and addressable markets, and already benefit the OpenStack community and ecosystem. To date, we’ve attracted dozens of new developers to the OpenStack Foundation and Open Infrastructure community through the pilot projects, which will ultimately benefit the OpenStack community and users. There is direct benefit from these contributors working upstream in OpenStack, such as through StarlingX, as well as indirect benefit from the relationships we’ve built with the Kubernetes community through the Kata Containers project. Airship is similarly bridging the gaps between the Kubernetes and OpenStack ecosystems, and show users how the technologies work together. We’re also attracting more contributions to Zuul, which provides the engine for OpenStack CI and keeps our development running smoothly.

In addition to investing in new pilot projects, we continued our extensive efforts to work with key adjacent projects in 2018, and I believe we made particularly good progress with Kubernetes. Chris Hoge, from the OSF staff, is a lead of the cloud provider SIG, and has helped the Kubernetes community standardize how Kubernetes deployments expect to run on top of various infrastructure. This has helped to clarify OpenStack’s place in the Kubernetes world, as well as led to valuable integration points like having OpenStack as part of the Kubernetes release testing process. In addition, the OpenStack Magnum project was certified as a Kubernetes installer. Through the work happening within the Kata Containers community, we have deepened these relationships into additional areas within the container ecosystem resulting in a number of new companies getting involved in our activities for the first time.

In addition to these cross-community efforts and pilot project launches, we also invested time with many of our corporate supporters. During the year, we made executive visits to a number of Platinum and Gold member companies and large users, speaking to their executive teams about our strategy and the value our community brings to the open source infrastructure world. In some cases, we also had the opportunities to present to their internal and external audiences, giving us additional reach. These meetings were extremely helpful to our team, and we plan to continue this as an activity in 2019.

### **Evolving OpenStack Foundation Events**

We knew heading into 2018 that the environment around our events was changing and we needed to respond. During the year, we held two successful PTGs in Dublin and Denver, reaching capacity for both events while also including new projects and OpenStack operators. We held Summits in Vancouver and Berlin, both experiencing attendance growth and project diversity since Sydney. Additionally, each Summit included content that represented more than 30 open source projects. Recognizing that audience shift alongside recent market research and the Foundation’s evolving strategy, we have renamed the OpenStack Summit to Open Infrastructure Summit starting in Denver, April 2019.

In 2018, we also began making a stronger investment in the China market, onboarding a China Community Manager based in Shanghai, and hosting a strategy day in Beijing with 30+ attendees from the Gold and Platinum Members in China. This effort will continue in 2019 as we host the first Summit in China: the Open Infrastructure Summit Shanghai during the first week of November.

We also spent time in 2018 working with the community to come up with a new model for events in 2019. This took a lot of coordination with multiple teams and organizations as we tried to find a way to maximize the level of participation while saving on travel and expenses for the individuals and companies who are increasingly stretched across multiple open source communities. We arrived at a plan that we will implement and iterate on in 2019 where we will co-locate PTGs as stand-alone events adjacent to our Open Infrastructure Summits.

### **Looking to 2019**

We made progress in many areas in 2018, but in some ways, the biggest progress was in establishing a framework and laying the foundation for the future of the OSF. As we head into 2019, I am excited to take what we learned in 2018 and apply it to the three forces (developers, users, commercial ecosystem) across all our projects. Our method for building communities is very effective at bringing developers together to rapidly produce real code, and that is key to having production usage and a healthy ecosystem. On the OSF front, we have more work to do to refine and adapt our business model to the environment that we are in today, which is significantly different than a few years ago. Ultimately, our value comes from the effectiveness of our communities and the software they produce. As we apply our efforts to those

fundamentals, we will be able to determine the right adaptation to ensure the long-term sustainability of the Foundation while also providing our community and sponsors with the greatest value.

Jonathan Bryce  
Executive Director  
OpenStack Foundation

## Defining Open Infrastructure

At the end of 2017, at the OpenStack Summit in Sydney, the OSF unveiled a new strategy. Realizing the variety of use cases adjacent to OpenStack, and recognizing that integration is the largest barrier to its further adoption, we shifted our focus from being solely about the production of the OpenStack software, to more broadly helping organizations use and combine open source solutions to fill their needs in terms of IT infrastructure. This strategy involves finding common use cases, collaborating across communities, supporting the creation of missing technology pieces and testing everything end to end.

The common theme here is Open Infrastructure: providing infrastructure resources to developers and users, by integrating various open source solutions. The benefits are obvious, whether that infrastructure is provided in a private or a public context: the absence of lock-in, the power of interoperability opening up new possibilities, the ability to look under the hood, fix by yourself, improve the software and contribute back your changes.

Open infrastructure has a lot of facets. The OSF traditionally addressed the public, private and hybrid cloud facet, by sustaining the production of the OpenStack software. As we explore adjacent use cases, the OSF defined several additional strategic focus areas, facets of open infrastructure that we'd like to more specifically address. Today, we are additionally focusing our efforts on container infrastructure, edge computing, CI/CD and AI/machine learning.

SFA Diagram



Over the last year, we have been taking steps to further communicate what we mean by Open Infrastructure, and explain its benefits compared to proprietary infrastructure providers. To further reflect that perspective change, starting in 2019 the OpenStack Summits will become Open Infrastructure Summits — the natural place to discuss the benefits and challenges of integrating open source solutions to provide infrastructure resources, and to discover use cases of open infrastructure.

The Foundation has also been working on a model to support open source projects beyond OpenStack. Those are the missing technology pieces as we start to address our strategic focus areas. They begin as pilot projects, a phase during which the open collaboration process is bootstrapped and the project identity is established. After that phase, the OSF board of directors is called to confirm that the project is aligned with the OSF strategy long-term. The exact criteria to be used in that confirmation process is currently being discussed, with several pilot projects on track to be confirmed in 2019.

Thierry Carrez  
VP of Engineering  
OpenStack Foundation

## Open Infrastructure Market Research

As a step in defining the Foundation's new strategy, we conducted a research study in 2018 to have a more comprehensive understanding around OpenStack brand perception, the importance of open source in the industry, and the role of open source foundations. The research was conducted by [ClearPath Strategies](#), a third party firm on behalf of

the Foundation. This study consisted of in-person focus groups, a global quantitative survey and in-depth interviews with select open source influencers across the world. In an effort to receive unbiased data, the study was conducted in a way that assured respondents did not know OpenStack Foundation commissioned the research.

Key findings from the study include:

- The OpenStack brand is strong. Qualitative research shows users know OpenStack as a powerful open source technology. Those who have direct experience with OpenStack laud its flexibility. These positive perceptions are supported in the quantitative research, as 67% of respondents rate OpenStack “favorable” or “very favorable”, on par with other tech industry leaders. Respondents in China hold an even higher opinion of OpenStack, with 82% rating OpenStack favorably. One common negative perception of OpenStack is that it can be difficult to implement and master.
- Users want open source foundations to curate and improve open source projects. The ideal role of an open source foundation is to help users navigate open source technologies by creating and managing standards and supporting integrations that improve user experience. Users do not want an open source ecosystem in which one foundation houses every project in the market. Rather, foundations should support projects that reflect the wants and needs of their respective communities.
- The OpenStack Foundation has the opportunity to define “open infrastructure”, starting with Summit. The OpenStack Summit already features projects outside the scope of the OpenStack project. By continuing to welcome communities whose projects align with the open infrastructure movement, OpenStack can broaden its reach and define open infrastructure as the thread that ties open source infrastructure projects together. We are currently exploring the name “Open Infrastructure Summit” for our global events starting at the Denver Summit in 2019.
- Open source is our guiding star. Open source technology is increasingly integral to organizations' success, offering teams access to innovative and flexible solutions. Though implementation is not without challenges, 75% say their company contributes to open source software today and 81% of respondents believe open source will become more important to their companies over the next few years.
- New projects can attract new users. In alignment with OpenStack's 2018 strategy, the Foundation has an opportunity to bring new users into the OpenStack community by supporting projects outside of OpenStack and additional strategic focus areas (e.g. CI/CD, Edge Computing, AI and Machine Learning).

Wes Wilson  
Director of Marketing  
OpenStack Foundation

## OpenStack Foundation Project Updates

### OpenStack Project Update

2018 was a productive year for the OpenStack community. A total of 1,972 contributors approved more than 65,000 changes and published two major releases of all components, code named Queens and Rocky. The component project teams completed work on themes related to integrating with other OpenStack components, other OpenStack Foundation Open Infrastructure Projects, and projects from adjacent communities. They also worked on stability, performance, and usability improvements. In addition to that component-specific work, the community continued to expand our OpenStack-wide goals process, using a few smaller topics to refine the goal selection process and understand how best to complete initiatives on such a large scale. The project teams completed work to move the RBAC policy defaults into application code to make upgrades and deployment customization easier.

The community gained three official project teams this year: The Adjutant team joined with the mission of enabling operation process automation, to improve the integration between OpenStack and operator services such as customer management. The Qinling team is building a function-as-a-service implementation for OpenStack. The PowerVMStackers team was formed to provide support for the POWER CPU architecture on the PowerVM hypervisor. Besides those additions, there were a few other changes at the team level. The Zuul project moved out of the OpenStack project to become a pilot Open Infrastructure Project within the OpenStack Foundation. The Dragonflow project was retired, and the security and stable branch maintenance project teams were converted to SIGs.



The Technical Committee (TC) membership evolved over the last year, with Paul Belanger, John Garbutt, Emilien Macchi, Colleen Murphy, Flavio Percoco, and Dean Troyer making way for first-time members Zane Bitter, Lance Bragstad, Jean-Philippe Evrard, Graham Hayes, Ghanshyam Mann, and Mohammed Naser.

The TC has undertaken several leadership initiatives during 2018. We have worked to improve the contribution experience, especially for new contributors, by encouraging reviewers to propose incremental changes to patches, rather than responding with negative reviews for minor issues. We published a “Vision for OpenStack Clouds,” to guide decisions about which new project teams to adopt, to inform the community goals process, and to frame technical decisions made by project teams. Finally, we reviewed and updated the policies for upgrades to the operating system and Python interpreter used in the testing platforms, to ensure new development happens on current and supported platforms.

The community adopted a new “extended maintenance” process to increase the period of time during which patches can be accepted into older branches. This change addresses a request from contributors who wish to collaborate on maintaining older releases, by enabling them to do so more easily and in public, rather than using private branches.

In 2018, the OpenStack User Committee (UC) restructured the criteria for becoming an Active User Contributor adding more than 700 additional community members with this designation. The increased pool of voters resulted in broader

diversity of representation on the UC, with representatives from Huawei, Salesforce, Linux Academy, Adobe, and Intel.

The primary focus of the UC has been on engagement with users and operators. Our goal is to help create a feedback loop between users/operators and Working Groups, SIGs, and Project Teams. Part of this was tagging and compiling data from the 2018 User Survey into a useful format for PTLs. This created an opportunity for projects such as Cinder to take direct feedback from the User Survey and apply it to their plans for the 2019 development cycle. Additionally, we worked with the Ops Meetup Working Group to help them host an Ops Meetup at the 2018 Denver PTG. Our hope is that continuing to put operators, users, and developers in the same room will continue to foster relationships between these communities, and ultimately improve the output of Project Teams.

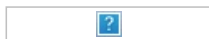
At the Denver PTG, we also took on the task of talking with each of the pilot projects to see how we could help them set up their own version of the UC, or at a minimum incorporating user feedback into their technical committee. Each pilot project was assigned a UC Member as a liaison for potential advice and collaboration.

Within the OpenStack community, there are [Working Groups, Special Interest Groups \(SIGs\), and Teams](#) around specific topics and industry verticals, that have provided updates on their 2018 accomplishments and 2019 goals.

Doug Hellmann  
OpenStack Technical Committee Chair  
Melvin Hillsman  
OpenStack User Committee Chair

## Airship Project Update

In May 2018 at the OpenStack Summit Vancouver, Airship was announced as a new OpenStack Foundation pilot project that declaratively automates cloud provisioning. Airship is a robust delivery mechanism for organizations who want to embrace containers as the new unit of infrastructure delivery at scale. Starting from raw bare metal infrastructure, Airship manages the full lifecycle of data center infrastructure to deliver a production-grade Kubernetes cluster with Helm deployed artifacts, including OpenStack-Helm. Airship allows operators to manage their infrastructure deployments and lifecycle through the declarative YAML documents that describe an Airship environment.



Since the project announcement, the Airship team has been deeply involved with the OpenStack Foundation community. They actively participated in both OpenStack Summits and in the Denver Project Teams Gathering (PTG). The team has actively embraced the four opens with source code hosted on OpenStack infrastructure, an open weekly design meeting, code reviews through OpenStack-hosted Gerrit, and active participation in a Foundation-wide forum session on establishing open governance.

Airship grew out of the infrastructure team at AT&T, but is actively encouraging participation from other organizations. In the telecom space, Ericsson and South Korea Telecom (SKT) have been participating in design, code review, and development. On the distribution side, Suse and Canonical have been evaluating and contributing to Airship.

Major accomplishments for 2018 included:

1. The introduction of the Treasure Map project, designed to give a configuration starting point for real-world data center deployments. Treasure Map is a full set of Airship YAML configuration files that are run through continuous integration, provisioning a reference platform against bare metal from the ground up. This gives deployers a starting point for their own deployments that is guaranteed to represent the latest state of the Airship project.
2. Issuing the first Airship Release Candidate (RC) at the OpenStack Summit Berlin. Airship is being used in production deployments, and this is reflected in the RC. The intent of the RC is to identify potential bugs, improve documentation, receive other feedback from the community, and express these goals in the open in advance of the 1.0 release.

2019 Goals In early 2019 Airship will deliver on two major goals. The first is a complete redesign and relaunch of the [airshipit.org](#) web site. Design work is currently underway, and after launch, major portions of the site can be updated by the community through Github code review, and later Gerrit code review (support for Gerrit is pending). The second goal is the release of Airship version 1.0. This release will build on the existing RC, already in production on some sites, with the additional features:

- OpenStack Ironic support for bare metal deployments.
- Better documentation and configuration examples with Treasure Map.
- Multi-OS support for other major Linux distributions.

In the second half of 2019, Airship will continue to grow its feature set with support for hardware and network auto-discovery and configuration.

Airship Projects

- [Armada](#) - An orchestrator for deploying and upgrading a collection of Helm charts.
- [Berth](#) - A lightweight mechanism for managing VMs on top of Kubernetes via Helm.
- [Deckhand](#) - A configuration management service with features to support managing large cluster configurations.
- [Diving Bell](#) - A lightweight solution for bare metal configuration management.
- [Drydock](#) - A declarative host provisioning system built initially to leverage MaaS for baremetal host deployment.
- [Pegleg](#) - A tool to organize configuration of multiple Airship deployments.
- [Promenade](#) - A deployment system for resilient, self-hosted Kubernetes.

- [Shipyard](#) - A cluster lifecycle orchestrator for Airship.
- [Treasure Map](#) - A complete, tested set of starter deployment artifacts.

#### Airship Channels and Meetings

- IRC: #airshipit on Freenode
- Twitter: @airshipproject
- Website: <https://airshipit.org>
- Mailing Lists (discuss and announce): <http://lists.airshipit.org/cgi-bin/mailman/listinfo>
- Developer Meetings: Tuesdays 8 AM CT in #airshipit on Freenode
- Design Meetings: Thursdays, video call alternating AM/PM (see mailing list for invitation)

Chris Hoge  
Senior Technical Program Manager  
OpenStack Foundation

### Kata Containers Project Update

In December 2017 the OpenStack Foundation launched its first pilot project, [Kata Containers](#), in the container infrastructure strategic focus area. The Kata Containers community is building a standard implementation of extremely lightweight virtual machines (VMs) that feel and perform like containers, but provide the workload isolation and security advantages of adding a VM layer. The Kata project is led by elected Architecture Committee members Eric Ernst (Intel), Jon Olson (Google), Samuel Ortiz (Intel), Xu Wang (Hyper), and Wei Zhang (Huawei).

Since launching Kata Containers in December 2017, the community has achieved several milestones including the 1.0 release in May 2018 followed by several point releases, joining the Open Container Initiative (OCI) and holding the first Architecture Committee elections.

The Kata Container 1.0 release completed the merger of Intel's Clear Containers and Hyper's runV technologies, delivering an OCI compatible runtime with seamless integration for container ecosystem technologies like Docker and Kubernetes. In Q3 and Q4 the project made rapid advancements with the 1.4.0 release which offers better logging, ipvlan/macvlan support through TC mirroring, and NEMU hypervisor support. Since its launch, Kata Containers has scaled to include support for major architectures, including AMD64, ARM and IBM p-series. At the end of 2018, the 1.5 release candidate was made available to preview. The full 1.5 release was made available on January 23, 2019, offering support for containerd v2 shim and the new Firecracker VMM.

The Kata Containers community is global, engaged and growing. In October the community hosted a meetup in China designed for large cloud providers including Alibaba, Baidu, Huawei, Tencent and more to share adoption plans and feedback for the Kata Containers roadmap. The Kata Containers community continues to work closely with the OCI and Kubernetes communities to ensure compatibility and regularly tests Kata Containers across AWS, Azure, GCP and OpenStack public cloud environments, as well as across all major Linux distributions.

Throughout 2018, the Kata Containers community presented technical updates and hosted gatherings at several global events including KubeCon + CloudNativeCon Copenhagen, OpenStack Summit Vancouver, DockerCon San Francisco, LC3 China, Open Source Summit Vancouver, Container Camp UK, DevSecCon Boston, Open Source Summit & KVM Forum Scotland, OpenStack Summit Berlin and DevOpsCon Munich. Kata Containers was also been featured at several OpenInfra Days, OpenStack Days and other container-focused meetups around the world.

Looking ahead to 2019 the Kata community plans to focus on growing and supporting it's users, leading the way for open collaboration around container security efforts and better defining its value within the greater container landscape.

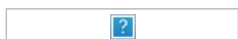
The code is hosted on Github under the Apache 2 license. Learn about the project, how to contribute and support the community at [katacontainers.io](https://katacontainers.io). Join these channels to get involved:

- GitHub: [github.com/kata-containers](https://github.com/kata-containers)
- Slack: [bit.ly/KataSlack](https://bit.ly/KataSlack)
- IRC: #kata-dev on Freenode
- Mailing list [lists.katacontainers.io](https://lists.katacontainers.io)

### StarlingX Project Update

StarlingX is one of the pilot projects governed by the OSF umbrella that was announced in May 2018. It provides an OpenStack-based cloud platform optimized for edge and IoT use cases and was originally based on Wind River's Titanium Cloud Platform.

StarlingX is an integration and development project. It integrates well-know open source components such as OpenStack projects, Ceph or Kubernetes and elevates these to a next level by integrating, enhancing, and testing them to provide a platform that fulfills the strict requirements of edge computing, like low latency, performance and security.



The community is also working on new components to provide functionality that wasn't provided by existing open source building blocks: fault, configuration, host, service and software management.

The project's first release came out in October 2018 with 1,329 commits from 84 contributors, including developers representing Wind River, Intel, 99Cloud, China UnionPay, SUSE, Fujitsu, and NEC, among others.

The community is collaborating with several group and other communities such as the [OSF Edge Computing Group](#), several OpenStack project teams, the [OPNFV Edge Cloud Project](#), [Akraino](#) and more.

While the initial code base contains enhancements to some of the OpenStack components, the community is actively working with the project teams to upstream missing functionality. The StarlingX community has decided to move to the master branch of OpenStack by the next release and handle the tasks that aren't started yet as gaps to work on as a collaborative effort with the project teams.

The community is governed by the Technical Steering Committee (TSC) which currently has eight appointed members: Curtis Collicutt (INTERdynamix), Ana Cunha (Ericsson), Shuquan Huang (99Cloud), Ian Jolliffe (Wind River), Miguel Lavalle (Huawei), Brent Rowsell (Wind River), Dean Troyer (Intel), Saul Wold (Intel).

The TSC group will be extended to nine members through an election process where the open seat and four of the current seats will be up for election in the second quarter of 2019.

The code is hosted on Github under the Apache 2 license. Learn about the project, how to contribute and support the community at [starlingx.io](#). Join these channels to get involved:

- GitHub: [git.starlingx.io/cgit](#)
- IRC: #starlingx on Freenode
- Mailing list [lists.starlingx.io](#)

Ildiko Vancsa  
Ecosystem Technical Lead  
OpenStack Foundation

## Zuul Project Update

Zuul is an open source CI/CD platform designed for test-driven open source projects and software development organizations who need to gate against multiple projects and systems before landing a single patch. Since 2012, Zuul has been proven at scale as a critical part of the OpenStack development process. As more users and use cases emerged, the team has been decoupling Zuul from OpenStack-specific systems. In early 2018, version 3.0 was released and Zuul became an independent top level pilot project hosted at the OSF. This release marks a major rewrite that includes updates to improve general reusability of Zuul outside of the OpenStack project.



With the version 3.0 release, Zuul now supports Github as a code review platform, pre merge evaluation of job configurations, handling of secrets in a formalized and secure manner, job configurations expressed as Ansible playbooks, and native multinode job support. Additional improvements and features have been added since that release including a new dashboard system, enhanced job prioritization options, and build out of standardized job roles.

One major addition added after the 3.0 release is the support for Kubernetes managed test resources. This allows Zuul to run jobs in single use pods or namespaces provisioned by your existing Kubernetes cluster(s).

The Zuul team was present at Ansiblefest where there was significant interest in the tool. Beyond that conference, we've seen adoption in a wide variety of locations including OpenStack, BMW, leboncoin, GoDaddy, OpenLab, Ansible, and Wikimedia. Many of Zuul's users are also its contributors with contributions coming from the OSF, Red Hat, BMW, GoDaddy, Huawei, and GitHub.

Looking to the future and 2019 we expect that there will be efforts to add support for Gitlab as well as Pasure and Bitbucket. OpenShift support is in the pipeline and will build on the foundation set by the Kubernetes work, along with Nodepool drivers in various states of progress for Microsoft Azure, and Amazon Elastic Compute Cloud. Operationally we have plans to remove the current single point of failure for the scheduler process and manage job and queue state with the distributed database. This will make it easier to run Zuul reliably without downtime.

Zuul is free and open source software licensed under the Apache 2 license. If you would like to get involved join us:

- On the mailing list: [zuul-discuss@zuul-ci.org](mailto:zuul-discuss@zuul-ci.org)
- On IRC: #zuul on Freenode
- Code review: <https://review.openstack.org/#/q/project:openstack-infra/zuul+OR+project:openstack-infra/zuul-jobs+OR+project:openstack-infra/nodepool>

## Press and Analyst Highlights

Analysis shows that OpenStack Foundation news coverage comprised more than 82,000 total placements in 2018 and more than 99.7% was positive or neutral. Coverage was distributed globally (57.6% North America, 35.7% APAC, 6.7% Europe, by volume), as demonstrated by the following excerpts:

- "Today, [OpenStack's] a stable system that's the de facto standard for running private clouds. There's very little hype, but now there's lots of actual usage....OpenStack users now use the system to manage well over 10 million cores of compute power." —[Frederic Lardinois, TechCrunch](#) (US)
- "In 2018, the maturity of OpenStack is no longer a concern for users and businesses: because some of the world's largest companies have begun to deploy on a large scale - from telecommunications networks to research projects and technology providers themselves....In China, I see more and more companies combining OpenStack technology and applications, and [OpenStack adoption is] beginning to expand and deepen in multiple vertical markets. The

telecom, finance, public sector, media and technology sectors are the key markets for OpenStack.” — [Sun Haofeng, CSDN](#) (China)

- “After Zuul and Kata Containers, the OpenStack Foundation has added two side projects to its OpenStack flagship project, in keeping with the Foundation’s ambition to make the open source foundation an entity no longer centered on a single project, but rather a group of projects centered on "open infrastructure." These new projects, named Starling X and Airship, symbolize the transition to the "Open Infrastructure," a new strategic course of action for the foundation.”—[Cyrille Chausson, Le Mag IT](#) (France)

The OpenStack Foundation conducted 26 private briefing sessions with analysts in 2018 in addition to hosting a half-day Analyst Briefing at the OpenStack Summit in Vancouver and a series of roundtables at the OpenStack Summit in Berlin. Analyst coverage of OpenStack Foundation projects in 2018 was widespread and predominantly positive, as illustrated by the following excerpts, and more can be found at [openstack.org/analysts](https://openstack.org/analysts):

- “The numbers speak for themselves: More than 50% of the Fortune 100 use OpenStack,... And a third of global enterprise infrastructure decision makers see expanding the use of open source as a critical or high priority.” — Forrester, "The I&O Pro’s Guide to Enterprise Open Source Cloud Adoption, Q1 2018," March 2018
- Globally, 71% of service providers are either in production or plan to be in production with OpenStack in the next 12 months. That number goes up to 80% if you include respondents who plan to implement in the next 24 months. Large service providers (\$1bn+ revenue): 63% in production with 22% in POC or planning to implement in the next 24 months. —451 Research: Voice of the Service Provider. More data available in the full report; Al Sadowski, key analyst; May 2018
- “Nearly 70% of the organizations feel that OpenStack is vital to their cloud strategy to develop their existing KPI (key performance indicator). The increase in the demand for cloud-based solutions and services are driving the OpenStack service market globally.” —OpenStack Service Market Research Report - Forecast to 2023, Market Research Future, June 2018
- “Examples of China UnionPay, China Mobile and China Railway leveraging OpenStack as a technology foundation to scale and transform their IT operations and, ultimately, achieve business outcomes have given the broader Chinese user community greater impetus to get a piece of the action.” —Enthusiasm for OpenStack gives rise to new competitive forces in China, Agatha Poon, June 2018, 451 Research
- A recent report from CCW Research and approved by the Chinese Ministry of Industry and information technology named the top 20 private cloud providers in China. 4 out of the 5 top providers are OpenStack based companies, and 14 of the top 20 providers are based on OpenStack.
- “With Open Infrastructure, the foundation has set in motion a series of actions that, while not explicitly spelled out, would ultimately deliver an integrated stack of open source technologies functionally equivalent to commercial offerings from AWS, Microsoft, Alibaba and Google.” — “Open Infrastructure is the OpenStack Foundation's next chapter,” William Fellows, Al Sadowski, November 16, 2018
- “Kata Containers is an open source project that is designed to address the security concerns associated with containers, namely the shared kernel technology and how different workloads/environments can be isolated....Ovum considers that interest in Kata Containers will accelerate as the issue of successfully being able to isolate container workloads to the same degree that VMs can be isolated will become an issue for some market segments.”—Ovum Market Radar: Container management platforms 2018/19.

## Open Infrastructure Community Highlights

### Outreachy Internship Program

Outreachy internships help people from underrepresented groups get involved by matching participants with established mentors working in open source communities. In 2018, a total of \$42,250 of funding from the OSF, Intel and Red Hat was contributed to the program, supporting seven OpenStack interns who completed the program successfully. Interns from Sri Lanka, Egypt, the United States, and Argentina worked on Ironic, Keystone, Qinling, and StoryBoard. We thank all volunteer mentors for helping Outreachy interns get involved with OpenStack!

Mahati Chamorthy  
Outreachy Program Coordinator

### Travel Support Program

The OpenStack Foundation helps key contributors who are unable to secure sponsorship to attend events by subsidizing or covering the costs for travel and accommodations. In 2018, the Foundation set aside a budget for each Summit and PTG, combined with donations from individuals from the community to fund this program.

- For the Dublin PTG in February 2018, 14 community members (11 men, 3 women) from 9 countries received travel funding. This was made possible by an investment from the Foundation of USD \$25,000 and 15 individual donations totaling USD \$650.
- For the Vancouver Summit in May 2018, 23 community members (17 men, 6 women) and 11 hotel only (7 men 4 women) from 12 countries received travel funding. This was made possible by an investment from the Foundation of USD \$60,000 and 42 individual donations totaling USD \$8,400.
- For the Denver PTG in September 2018, 10 community members (9 men, 1 woman) from 8 countries received travel funding. This was made possible by an investment from the Foundation of USD \$20,000 and 12 individual donations totaling USD \$550.
- For the Berlin Summit in November 2018, 18 community members (12 men, 6 women) from 10 countries received travel funding. This was made possible by an investment from the Foundation of USD \$30,000 and 40 individual donations totaling USD \$3,000.

Ashlee Ferguson



## Contributor Recognition & Support

Every OpenStack release, we ask our community to nominate people for recognition of their contributions to the community. The recipients of these Community Contributor Awards are celebrated at a ceremony during the Summit. In Vancouver we recognized ten contributors: Adam Spiers, Marcos Sungaila, Clay Gerrard, Stacy Veronneau, Matt Riedemann, Mark Voelker, Jay Pipes, Father Vlasie, and Veronica Acosta. After the ceremony there was discussion about how to increase the visibility of these amazing contributors. In Berlin, we brought the Stein Community Contributor Award recipients up on stage during keynotes for extra recognition. Melanie Witt, Swapnil Kulkarni, Eric Fried, Lingxian Kong, Rico Lin, Fatema Khaled, Frank Kloeker, Julia Kreger, Andreas Jaeger, and Victoria Martinez de la Cruz.

The Contributor Portal continues to evolve and change along with our community. It has expanded to include information about how to get involved, resources for communicating with the community, and who our ambassadors and community managers are. It has everything a new or experienced contributor could want to know. We are working to reorganize all the information that is there to make it a more effective tool for contributors.

The [Contributor Guide](#) has also grown substantially, becoming even more invaluable for people getting involved in the community. Since it's being actively used during the OpenStack Upstream Institute training, the Code & Documentation Contributor Guide section has been filled out and now teaches readers all the basics of contribution. We also realized there were other groups of people we could help that wouldn't be interested in the Code & Docs, Operators, or User Contributor Guide sections and so we added two new sections: the Non-Code Contributor Guide and the Contributing Organization Guide. The Non-Code section, while just getting off the ground, will enumerate all the ways to get involved in the community that don't require knowledge of Python or how to develop OpenStack documentation, i.e. Mentoring, being a SIG chair or Working Group lead. The Contributing Organisation Guide is targeted at the management and decision makers at companies wanting to have employees work upstream and what they can do to avoid common roadblocks.

Kendall Nelson  
Software Engineer  
OpenStack Foundation

## OpenStack Upstream Institute

[OpenStack Upstream Institute](#) (OUI) educated more than 125 people this year on the basics of contributing to the community. OUI was held in four new countries across four continents bringing the training to new audiences. In addition to the normal, pre-Summit trainings, and OpenStack/ OpenInfra Day events, we brought the training to a university in Rio de Janeiro with the help of Inovax.

In addition to new locations, we also tested a new format of running the training. Historically, the training has been primarily lecture based, but we continually struggled to keep students engaged and attentive. We now have expanded the Contributor Guide into a fully formed tool that we use in the trainings. The Contributor Recognition & Support section has additional details. Instructors introduce topics and then define an amount of time students have to read through the material before leading exercises to test retention of the material. This way students are more focused and can get more familiar with our documentation as the Contributor Guide holds many references that help navigating and finding information after leaving the training.

Kendall Nelson  
Software Engineer  
OpenStack Foundation  
Ildiko Vancsa  
Ecosystem Technical Lead  
OpenStack Foundation

## OpenLab

OpenLab launched in 2017 with the goal of becoming a critical piece in the open source cloud ecosystem to test and improve support for the most popular Software Development Kits (SDKs), platforms like Kubernetes, Terraform, Cloud Foundry and more on OpenStack. OpenLab has been a great success within its first year and we look forward to much more success in the coming year and beyond.

OpenLab now currently provides infrastructure, supports, or coordinates with OpenStack SDK for many popular programming languages:

- Go - gophercloud
- PHP - php-opencloud
- Java - openstack4j
- JavaScript - pkgcloud
- Python - openstacksdk
- Ruby - fog-openstack
- Rust - rust-openstack

OpenLab's infrastructure footprint started with VMs in the cloud from partners VEXXHOST and Deutsche Telekom. Both of these partners have been critical over the past year and deserve a great deal of credit for being available and responsive

to ensure OpenLab community members were free from focusing on "keeping the lights on."

In addition to VEXXHOST and Deutsche Telekom OpenLab now partners with ChameleonCloud, CloudLab, and Massachusetts Open Cloud in the academia space. CityNetwork, SWITCH, Linaro, ARM, and Packet have also decided to partner with OpenLab over the past year allowing test/use/integration requests/cases to span multiple clouds, architectures, and geographies. OneLab, Geni, and FIT IoT have also granted OpenLab usage which has opened access to thousands of federated devices across the globe for IoT, BigData, HPC, SDN, AI, and ML use cases to be created within OpenLab. We discussed working to increase the footprint of OpenLab infrastructure and we believe we have done well with the help of these partners and expect more to come.

Melvin Hillsman  
Open Source Community Manager  
Huawei

## **Event Highlights**

### **OpenStack Summit Vancouver and OpenStack Summit Berlin**

In 2018, the OpenStack Summits attracted a combined audience of more than 5,000 attendees. The Summits were held in Vancouver and Berlin where we saw attendance grow from Sydney (November 2017) to Vancouver in May and again in Berlin in November. The most notable demographic shift among Summit attendees was an increased representation of operators, architects and sys-admins compared to previous events where upstream developers and business professionals had historically been the most represented groups.

From a 5G demo from AT&T to an edge computing case from Oerlikon ManMade Fibers and even an OpenStack and containers use case from Progressive Insurance, the 2018 OpenStack Summits spotlighted users with emerging use cases in production. The Vancouver and Berlin Summits also saw a notable shift in the content that was presented off of the keynote stage. Each event had breakout sessions that represented more than 30 open source projects, which was a significant change to previous Summits where almost every session was related to OpenStack.

### **OpenDev CI/CD**

In May, the Foundation hosted the OpenDev CI/CD event that ran for two days in parallel with the the OpenStack Summit Vancouver. It was a focused event for users and developers that was structured to have an impact on future development and integration efforts. The program consisted of only a few keynotes and presentations, so the event was primarily comprised of collaborative, working sessions with technical debates, demos, shared note-taking and opportunities to carry forward the work in the spirit of open source.

The content programming was a collaborative process completed by community experts in open source CI/CD from Spinnaker, Jenkins, XCI, Mesos, Zuul, TravisCI and more. Sessions featured speakers from Google, DC/OS, Ericsson, the University of Washington and more. View the OpenDev CI/CD keynotes at [2018.opendevconf.com](http://2018.opendevconf.com). Mirantis was the headline sponsor for OpenDev CI/CD.

Claire Massey  
Senior Programs Manager  
OpenStack Foundation

### **Project Teams Gatherings (PTGs) and Forums**

The OSF organizes two types of in-person contributor events to facilitate the development of the open source projects it supports.

The first event is the Forum, which happens within the OpenStack Summit. This event helps fulfill the "open design" aspect of the Four Opens: software design should not be done behind closed doors by a separate group of developers; it should be done publicly and include as many individuals, organizations, users as possible. In the Forum, specific topics are discussed, trying to gather as much input and feedback from the widest cross-section of our extended community. Over 2018, we held Forums in Vancouver in May, and Berlin in November: a total of 164 sessions!

The second in-person event is the Project Teams Gathering (PTG). The various teams and groups in our community need in-person time to define priorities, solve complex issues, iterate quickly or build social relationships. The PTG format gives them space and time, which each team can use however they see fit, resulting in a highly productive work event. Over 2018 we organized two PTGs: one in Dublin in March (which ended up with a lot of us snowed in as Ireland got unexpected weather) where 56 teams joined, and one in Denver in September where we had 50 teams join.

One issue with running PTGs at completely different times from Summits was the difficulty to justify going to four events per year internationally to follow our projects. As a result, in 2019 a different trade-off will be tried: the PTGs will be co-located with Summits (and therefore Forums). This should reduce the number of travels required, at the expense of making a long work week. We hope to see you there!

Thierry Carrez  
VP of Engineering  
OpenStack Foundation  
Kendall Nelson  
Software Engineer  
OpenStack Foundation

## OpenStack Days / OpenInfra Days

In 2018 the community organized a total of 11 OpenStack/OpenInfra Day events in Brazil, China, Hungary, Italy, Japan, Korea, Nordics, Poland, Taiwan, Thailand and Vietnam, reaching more than 6,000 attendees. Five of the community-led events piloted OpenInfra Day branding to further encourage cross-community collaboration, content, and attendance. These regional events are organized and hosted by the local community over one or two days and typically include keynotes, breakout sessions, upstream training, and even workshops. These events continue to gather local open source developers and users to collaborate, share use cases, and discuss open infrastructure.

Denise Ridolfo  
Marketing Contractor  
OpenStack Foundation

## A Word from OSF Platinum and Gold Members

### AT&T

"AT&T continues to both grow our operation of OpenStack at scale, but also maintain our active collaboration in the community to improve and extend OpenStack. In 2018 AT&T maintained a top 10 contributor ranking in both the Rocky and Stein releases. In collaboration with SKT and Intel, we worked with the OpenStack Foundation to initiate a pilot project, Airship. At the Berlin summit, the Airship team delivered the 1st release candidate of Airship for expanded community feedback and engagement. Airship, and another AT&T initiated project, OpenStack-Helm, are serving as the foundation for AT&T's delivery of OpenStack Network Clouds, that are powering AT&T's 5G Core."

Ryan van Wyk

### Ericsson

"The OpenStack community and Foundation continue to be an important component of the information and communications technology and infrastructure ecosystem. Ericsson sees OpenStack continue to play an important role across the 5G ecosystem, in conjunction with our edge and container technologies, providing a complete end-to-end virtualization solution for next generation networks. At Ericsson, we continue to support the Foundation and community through code contribution, sponsorship and event support throughout the year."

Christopher Price

### Rackspace

"In the early days of OpenStack, our goal was simply to compile a set of working services that could boot a VM with storage and network connectivity. Less than a decade later, OpenStack is so pervasive, we find ourselves operating OpenStack for enterprise workloads and applications we couldn't have possibly envisioned in 2010. As OpenStack grows beyond itself, we couldn't be prouder of our contributions or more excited about the future of open infrastructure and Rackspace's role."

Justin Shepherd

### Red Hat

"Red Hat is proud of our continued collaboration with users, operators, and contributors as members of the OpenStack community during 2018. The platform continues to mature, and we see the value it delivers every day for our hundreds of customers that depend on OpenStack for their business-critical needs. Increasingly, we're seeing the technology, the community, and the OpenStack Foundation embracing the role of integration engine for infrastructure from the datacenter to the edge. We're looking forward to 2019 being the year of Open Infrastructure, and making yet more strides towards realizing Red Hat's vision of an Open Hybrid Cloud."

Mark McLoughlin

### SUSE

"SUSE is proud of our continuing commitment and contributions to OpenStack – the project, the community and the Foundation – and of the many things that we have accomplished together as a wider community. Members of the SUSE team collaborate, support and provide leadership through Special Interest Groups (SIGs), as Project Team Leads (PTLs), reviewing code, code contributions, as board members and more. In addition to this, we will continue to provide free OpenStack training at the Open Infrastructure Summits. SUSE continues to expand our commitment and contribution to the community through efforts to support new open infrastructure projects including StarlingX and Kata Containers, as well as more established projects such as Kubernetes and Ceph."

Alan Clark

### 99Cloud

"As the saying goes, "The man who moves a mountain begins by carrying away small stones." From 2012 through the present day, the way 99Cloud supports OpenStack growth is by taking small steps, including code commitment upstream

and projects landing in real world. Now we have become one of the top five code contributors, and our deployments covered almost half of top 100 Chinese companies. In 2018, we are very happy to see the new vision defined by Foundation to "Open Infrastructure". We engaged in the launch of StarlingX, are committed to Airship, and will implement edge projects with both of them. We believe that OpenStack will play a more and more important role in the future and show its real power to this world."

Kai Li

### **City Network**

"OpenStack is not only the key platform software for all of City Network's cloud services, it has become the true alternative for our enterprise customers in an ever more centralized cloud world. City Network continues to invest heavily in the success of OpenStack by engaging in various ways. In addition to contributing more from a technical aspect, our events such as OpenStack Days Nordics continue to grow and show a very positive momentum. We spend time both from a board level but also running working groups such as the Public Cloud Working Group. A large addition during 2018 was our online training courses for both operating as well as using OpenStack."

Johan Christenson

### **Dell EMC**

"As a leader in open infrastructure, Dell EMC has been a Foundation Gold Member from the start and participated in the community since Essex and heavily contributed both on the board and in many projects including Cinder, Manila, Ironic, Nova, TripleO, and Refstack. We plan to continue participating in the OpenStack community and running OpenStack meetups in Austin and Boston."

Arkady Kanevsky

### **EasyStack**

"In order to drive greater adoption towards OpenStack, EasyStack not only contributed to OpenStack community projects as upstream developers but also participated actively in the OpenStack Foundation programs. Since its inception, an excess of 500 enterprises and organizations have benefited through the usage of EasyStack cloud platform solutions. As part of EasyStack's long term productization roadmap centered around OpenStack and its adjacent technologies, the newly launched cloud-ready hyperconverged ECS Stack and the flagship enterprise cloud ECS products complement each other seamlessly: enhancing OpenStack's application services and solution scenarios, at the same time extending industry market growth."

Changbo Guo

### **FiberHome**

"We have continuously contributed to the OpenStack community and become Core and PTL in main projects throughout 2018. Also, we sponsored the OpenInfra Days China and took part in Berlin Summit where our engineer did a topic sharing. In the future, we are devoted to promoting OpenStack techniques and making it into practice in China."

Eileen Zhang

### **Inspur**

"Inspur is committed to providing users in China and around the world with agile, efficient, secure, and industry-specific OpenStack cloud computing solutions. It helps a lot of industry customers building cloud with OpenStack, especially for some large one with a single region of more than 1,000 nodes. Inspur actively contributes in core projects(Nova, Cinder, Neutron etc.) as well as new projects such as Kata Containers. Inspur is also extending OpenStack to support advanced virtualization capabilities, large-scale monitoring, business support management etc. In the coming year, Inspur will promote the integration of OpenStack with AI, big data infrastructures and achieve more OpenStack deployments."

Kaiyuan Qi & Zhiyuan Su

### **NetApp**

"Having been involved in the community since its inception, NetApp has had the opportunity to observe adoption cycles through both the lens of our customers and in the course of our own deployment. We've had the privilege of working with many of the largest OpenStack users globally and our own business metrics indicate continued growth in the scale and depth of their deployments. Much of that has hinged on the core projects having become significantly more deterministic, feature rich, and mature. While perhaps not well known beyond NetApp, our own Global Engineering Cloud (the dev & test environment for our flagship products) has been OpenStack based for several years. That continues as we've layered in container capabilities. We're eager to participate in the continued evolution of classic IaaS as it meshes with the Kubernetes world. Satisfying our own internal requirements as well as those of our customers increasingly demands full spectrum consideration across individual project and community boundaries. The expansion of the OpenStack Foundation to foster harmonization of all Open Infrastructure is exciting for its potential to pragmatically accomplish that."

Rob Esker

## UnitedStack

"We are continuously working with our customers and contributing to TripleO, Kolla, and Puppet to leverage the deployment and operation ability to landing mass of production OpenStack clusters in a wide of industries. In addition, we also follow those core projects like Nova, Cinder, Neutron, Ceilometer, Gnocchi and improve their stability."

Ning Yao

## OpenStack Working Group & Special Interest Group (SIG) Updates

### Meta SIG

The Meta Special Interest Group (SIG) is supporting cross-project work by encouraging SIGs to be formed and discussing SIG best practices. Over the last year, our focus was on removing artificial barriers between contributors with an operator background and contributors with a development background. To that effect, the openstack-dev, openstack-operators, and openstack-sigs mailing-lists were merged into a single openstack-discuss mailing-list where all discussions between OpenStack contributors happen. Five new SIGs were created (First Contact, K8s, Operations Docs, Resource Management, and Upgrade SIG) and two existing workgroups were turned into SIGs (Extended Maintenance, and Security). For the coming year, the Meta SIG will focus on defining best practices, in particular in how to feed back SIG output into development priorities.

### API SIG

The API-SIG is the home for discussion on all issues related to the development and use of APIs in the OpenStack ecosystem. While it has always provided guidance to developers of APIs, we are now moving toward also involving consumers of APIs, such as those who are developing SDKs to work with OpenStack. This will include not only SDK design guidance, but also helping to shape the development of SDK validation testing.

### Extended Maintenance SIG

The Extended Maintenance SIG was created after the OpenStack Summit Vancouver to bring together the efforts of the developer, operator and vendor communities for maintaining the various stable branches. Recently the Ocata release was transitioned to Extended Maintenance giving the operator and vendor communities the first opportunity to engage with the stable teams to keep Ocata viable. The single largest challenge for Extended Maintenance SIG is attracting people willing to commit their time, and their employers time, to learning what is required to keep the stable branches functional.

### Operations Docs SIG

The Operations Docs SIG was just recently formed as an owner of some documentation that no longer had an owner but was consistently brought up in the operator community as being a valuable resource. Providing an official SIG to own the content allowed the content to continue to be maintained as code, but with new owners and to continue to publish to the central website (a previous plan of just consigning the docs to an open community wiki didn't work).

This SIG has restored the content for operations-guide, ha-guide, and arch-design. They are now being updated, but are still a bit stale. The team will be working towards making updates or helping solicit updates from the community to refresh these guides and add new material.

Over the next six months we hope to raise awareness of these docs and promote involvement. We need operators and those interested in these areas to help contribute updates.

### Fog/Edge/Massively Distributed Clouds

From October 2016 through May 2018, the Fog/Edge/Massively Distributed Clouds (FEMDC) SIG provided guidelines and recommendations on how to address fog/edge computing use cases through the OpenStack ecosystem.

The FEMDC SIG advanced the topic through debate and investigation of requirements for various implementation options. The last contributions of the group have addressed:

- The characterization of expected capabilities regarding the identified use-cases
- The evaluation of AMQP Alternatives to better satisfy network specifics of edge infrastructures through a collaboration between Inria, Orange Labs, and RedHat.
- An evaluation of the Cockroach DB as a shared backend across several keystone instances in an edge context.

All these works have been presented either during the Vancouver Summit or publications. Further information available on the FEMDC wikipage. Following the new vision of the OSF as well as the creation of a larger group dedicated to edge challenges in general (across different cloud/container stacks), it has been decided to suspend the FEMDC activities until further notice.

### Security SIG

2018 was a first for the Security SIG, which had previously operated as a project that maintained a set of security-related projects (anchor/bandit/syntribos/tatu). The Security project made the transition into becoming a SIG at the very end of 2017. During 2018, the Security SIG held weekly meetings in IRC and had representation at the various PTGs and

Summits.

The software activities of the Security SIG saw a few changes during 2018:

- Bandit, the python security scanning project was migrated from under the OpenStack umbrella over to the PyCQA repository, where it is still maintained by those active in the Security SIG and has the added benefit of greater visibility from those who are highly active in the Python community
- Tatu (SSH as a Service) was introduced at the Dublin PTG and presented at the Vancouver Summit
- Anchor (Ephemeral PKI) project was retired towards the end of 2018

OpenStack security advisories are also maintained under the Security SIG, the OpenStack Security Advisories (OSSA) and the complementary OpenStack Security Notes (OSSN). These are primarily maintained by the Vulnerability Management Team (VMT). During 2018, there were two instances of reported OSSAs, both can be found [here](#). In both cases, the VMT worked closely with the affected project to triage and fix the issue in a timely manner. Another update to note is the keystonemiddleware project was added in 2018 to the list of projects that are maintained under the VMT for security vulnerabilities.

One of the Security SIGs goals for 2019 is to help with identifying security-related cross-project efforts as development priorities within the community. The Security SIG would help by promoting the effort and working alongside the involved projects to drive effort forward.

More detailed information about the Security SIG can be found on the wiki: <https://wiki.openstack.org/wiki/Security-SIG>

## First Contact SIG

The First Contact SIG has continued to grow and evolve over the past year; with two more members, a complete list of project liaisons, and regular biweekly meetings, our influence in the community has continued to expand. In the beginning we took a passive approach to helping potential contributors. We waited for questions on the mailing lists and on IRC and would respond when we saw this. Since then, we have started engaging people in more places and more actively. We've taken on monitoring parts of [ask.openstack.org](http://ask.openstack.org) for questions about how to get started contributing. We do regular reviews of patches with 'Welcome New Contributor' messages on them to ensure they are getting enough attention from us and the project teams. We have also taken to reaching out to contributors that look like they might be struggling finding a place to get involved. Anywhere we can engage with people looking for contribution help, we do.

Another larger effort we've been driving is the Contributing Organisation Guide. This guide is a collection of the bare minimums to make an effective community contributor that's targeted at the management and decision makers at companies. There are a variety of road blocks that arise internally that make contributing upstream difficult. As a SIG, we decided to collect these roadblocks and form a guide to help companies avoid the stress of finding these blockers on their own and make new contributors effective from the start.

The First Contact SIG, along with the Upstream Institute team, has also been involved in the ongoing growth and evolution of the Contributor Guide and Contributor Portal.

## OpenStack SIG-K8s

OpenStack-SIG-K8s is a cross-community SIG, with representation within the Kubernetes community as K8s-SIG-OpenStack, with the goal of promoting integrations between OpenStack and Kubernetes in three major ways:

- OpenStack as a host platform for Kubernetes
- Kubernetes as a host platform for OpenStack
- OpenStack providing a set of standalone services (storage, identity, networking) for Kubernetes.

Over the last year the SIG has had cross-community representation at every OpenStack Summit, OpenStack PTG, and KubeCon, with multiple presentations and working sessions. We've had several major accomplishments, including:

- Publishing a new whitepaper, "Leveraging Containers and OpenStack: a Comprehensive Review". <https://www.openstack.org/containers/leveraging-containers-and-openstack/>
- Including OpenStack in the CNCF CI/CD dashboard, a application for testing CNCF projects on various host-cloud platforms. <https://cncf.ci>
- Reporting conformance testing of the OpenStack cloud provider for Kubernetes to the Kubernetes community test grid. <https://testgrid.k8s.io/conformance-cloud-provider-openstack>
- Four releases of the external OpenStack cloud provider. <https://github.com/kubernetes/cloud-provider-openstack/releases>
- Qualifying OpenStack Magnum for the Certified Kubernetes conformance trademark. <https://www.cncf.io/certification/software-conformance/>
- Initial work on a provider implementation of the new Cluster API. <https://github.com/kubernetes-sigs/cluster-api-provider-openstack>

In addition to this work we have also collaborated with other Kubernetes SIGs, most notably with Chris Hoge as a co-lead in SIG-Cloud-Provider, with a focus on establishing quality and documentation standards for all Kubernetes cloud providers, as well as a plan to remove all cloud-provider code (both OpenStack and otherwise) from the main Kubernetes source tree.

Our major efforts for 2019 will include:

- Continuing development and synched releases of the OpenStack cloud provider for Kubernetes.

- Removal of the in-tree provider by end of year and coordinating transition to the external provider with projects such as Magnum.
- Coordinating talks and working sessions at OpenStack and Kubernetes events.
- Assisting the Kata Containers team in extending MiniKube (a dev-stack like sandbox for Kubernetes testing and development) in using Kata as a container runtime add-on.
- Completing development of an autoscaler driver. <https://github.com/kubernetes/autoscaler/issues/734>
- Releasing stable drivers for the Cluster API project, both for virtualization and bare metal.

That final goal is one of the most strategic for the coming year. The Cluster API project, part of K8s-SIG-Cluster-Lifecycle, is an extension to the Kubernetes API that can install and manage the lifecycle of Kubernetes on different cloud platforms using one API. It is projected to become the standard way to install and maintain Kubernetes clusters. It is important for installing Kubernetes on a traditional OpenStack virtualization cloud (Keystone-Nova-Glance-Neutron-Cinder), but is also a tremendous opportunity to position standalone Ironic as an effective project for managing bare-metal Kubernetes clusters.

We would like to thank Davanum "Dims" Srinivas for his work in coordinating development, Melvin Hillsman for setting up testing on OpenLab, and Mohammed Naser for securing test infrastructure for this work on Vexxhost.

## Resource Management SIG

The key motivation of the SIG is to align the data model across IaaS and PaaS platforms so that users could have a unified way of utilizing resources. By the end of 2018 there is a good process at Cyborg project side on refactoring DB objects, and we have also had numerous conversation throughout the year in Kubernetes community regarding heterogeneous resource management.

We have a good understanding now for the status quo and will kickstart Resource Management SIG activity starting 2019 with a new project in Kubernetes and Cyborg's Stein release, and also will look at Placement and Kube-sched for more general data model alignment possibilities.

## Scientific SIG

The Scientific SIG is dedicated to representing and advancing the use-cases and needs of research and high-performance computing (HPC) with OpenStack. It's also a great forum for cross-institutional collaboration.

The SIG Objectives include:

- HPC/HTC Infrastructure
- Research Data Infrastructure
- Application Infrastructure
- Social Infrastructure
- Identify common causes
- Create opportunities for the scientific community to engage the wider OpenStack community, i.e. industry

Activity areas in the completed cycle include:

- Gathering best practice for controlled access to sensitive data
- Federated cloud use cases and advocating specific requirements for academic federations.
- Cloud-native deployment of OpenHPC clusters on OpenStack
- Cloud-native deployment of BeeGFS
- OpenStack Ironic use cases, eg boot-to-ramdisk and boot-from-Ceph-RBD
- OpenStack advocacy at other conferences, like SuperComputing
- The social infrastructure - sharing knowledge and making connections generally!

In recent cycles new chapters have been added to the OpenStack/HPC book (<https://www.openstack.org/assets/science/CrossroadofCloudandHPC.pdf>). However, no additional content was generated in this cycle.

## Self-Healing SIG

In its first year, the Self-healing SIG has been primarily focused on bootstrapping the infrastructure and processes for collaboration, building engagement through both online and face-to-face collaboration, and sharing knowledge and experience by documenting the status quo. We have a wiki describing the SIG's mission and scope, a StoryBoard project tracking all activities, a git repository for sharing ideas, knowledge, and code, templates for use cases and technical specs, published documentation with a small but growing number of use cases, a #openstack-self-healing IRC channel with fortnightly meetings, a list of volunteers acting as liasons between the SIG and specific OpenStack projects, and a list of integration points between relevant projects.

BoF / working group sessions have been consistently well attended at each Forum and PTG, although self-healing is still a young topic within OpenStack, currently driven more by developers than by operators and end-users. Therefore one major ongoing goal is to collect feedback from operators on what they see as the major pain-points in this space.

On the technical side, some very promising technical work is proceeding. In particular, integrations with Vitrage (for root cause analysis) and with Heat (for automating self-healing workflows) are expanding to involve projects such as Monasca, Mistral, Aodh, Zaqar, and Trove. Consensus was finally reached on an initial direction for implementing health-check APIs within oslo.middleware, and coding work has consequently started. Finally, a new project Fenix has been launched to

cover rolling infrastructure maintenance, upgrade, and scaling.

Anyone with an interest in self-healing within OpenStack is warmly encouraged to participate via any of the communication channels, even if only as an observer, or a contributor of ideas / experiences. All information can be found at the SIG's homepage: [https://wiki.openstack.org/wiki/Self-healing\\_SIG](https://wiki.openstack.org/wiki/Self-healing_SIG)

## **Public Cloud Working Group**

In late 2016, representatives from public cloud providers underpinning their business on OpenStack recognized the value of collaborating and presenting requirements as a group. The working group was made official spring 2017.

Members represent public clouds from New Zealand “down under” to Sweden in northern Europe. The group meets every week on IRC and in person at Summits and PTGs to define new goals and focus areas for the upcoming cycle.

Since the group started in 2017 most focus has been put around two projects that's been created by the group. First, OpenStack Public Cloud Feature Wishlist - which focuses on visualising features, improvements or bugs critical for public clouds, as well as helping the community with good feedback. Second, Public Cloud Passport Program - a collaborative effort between a number of OpenStack based public clouds that offers cloud users a free trial globally - all based upon OpenStack.

During 2018 we grew the number of participating members in the Passport Program - now offering an even bigger footprint to cloud users eager to try out OpenStack. The Feature Wishlist has evolved - resulting in focused sessions during last years events and great interest from the community in the feedback it brings.

2019 coming up - we are looking at continuing the current projects - making the Passport Program an even better cloud user experience of OpenStack - continue the work with Feature Wishlist together with the community - all with the goal of helping OpenStack be even better.

## **Financial Services Team**

The OpenStack Financial Services Team was inaugurated at OpenStack Sydney Summit (2017). Since then, the team has regularly meet on a biweekly basis and working on a couple of projects. These includes reference architectures and gap analysis of OpenStack Cloud for the finance industry. In 2018, the team evaluated OpenStack Zun project and developed a reference architecture that integrate Big Data/Hadoop application workload in a large cluster environment, including CPU & NUMA policy with Zun container. We brought together the OpenStack developers and users to jointly participate in the blueprint and spec development. The result of such work is presented at the OpenStack Berlin Summit. The team also worked on an SDN-based multi/cross data-center network scheduling and interconnectivity proposal. The team also participated in neutron development and submitted blueprint specification to address gap in neutron firewall. We also recruited more members such as China Merchants Bank and China Life Insurance. The full list of memberships and most of the work can be found at the OpenStack Financial Team wiki. Looking forward to 2019, we plan to investigate and contribute in the areas of Big Data storage architecture as well as kubernetes/container architecture for Financial Cloud.

## **Diversity Working Group**

The Diversity Working Group released an updated version of the Diversity Survey to the Community in August and as of the last check had 88 responses. We will send out a third and final reminder after the new year and then close the survey for analysis of the data at the 6 months time frame. In addition to the survey, several initiatives were begun this year including folding the Women of OpenStack into the WG to be more inclusive and as a result changing the Networking Lunch to a Diversity Networking Lunch. We also had pronoun stickers available at Summit and are working with the Foundation to offer a non-alcohol area at events like the Mixer. In Berlin, we had an unofficial outing the night of the Pub Crawl.

The Cohort Mentoring program now falls under the WG and we are working on getting more interest in it. At Summit, there was a BoF session as well as a related panel to get feedback on how to get interest and activity.

## **Interop Working Group**

Interop program has been stable for several cycles now, not seeing a lot of frequent changes. Meetings continue on by-weekly cadence, where we address any issues that arise as well as review new and existing guidelines. Major milestoenes in 2018 was adding two add-on programs covering DNS and Orchestration, as well as starting work on NFV Vertical program. DNS and Orchestration programs have seen little uptake. NFV Vertical program currently needs more input from the community. There were also two updates to the OpenStack Powered guidelines: 2018.02 approved during the board meeting at the Dublin PTG and 2018.11, approved at the OpenStack Summit Berlin Board meeting.

### **2018 Accomplishments**

- Release of two minor guideline updates
- Release of new add-on programs covering DNS and Orchestration
- Folded RefStack into Interop WG Governance
- Collaborated with QA to add co-gating between InteropWG and Tempest

### **2019 Goals**

- Consider slowing cadence of guideline releases to 1 a year (with minor updates to add new OpenStack releases).
- Refine RefStack Server to accept subunit test results.



- Refine RefStack Client to be even easier to configure and run.
- Reconsider long-term viability of add-on program.

## **Edge Computing Group**

The Edge Computing Group is a top level working group to support edge activities in and around OpenStack. The group started to form after the OpenDev conference in 2017 covering edge computing and was launched early this year with weekly calls and more formal activities.

The purpose of the group is to explore the edge computing and IoT space to collect use cases and requirements to fulfill in the open source ecosystem. Based on the information gathered by the group it is working on defining reference architectures and missing functionality on the IaaS layer to fulfill the needs of various industries in this area.

The group targets the IaaS layer with its work and collaborating with other projects and groups both under the OpenStack Foundation umbrella as well as in the open source ecosystem in general. It also serves as a source of input for the StarlingX pilot project to support their work to provide a more robust and feature rich platform.

The group is actively represented in various industry events and the members are working on publications when it is applicable. To define the basis of the work and the scope of the activities the group published a whitepaper: *Cloud Edge Computing: Beyond the Data Center*[2] at the end of February, 2018. The whitepaper is translated to several languages to ensure a better outreach around the globe.