

# Better together: OpenStack and Kubernetes

## Open Infrastructure for Cloud-Native Frameworks

OpenStack is composable, open infrastructure that provides API-driven access to compute, storage and networking resources. The flexible platform allows you to deploy bare metal, virtual machines and container resources—all on a single network.

OpenStack supports the largest number of enterprise storage and networking systems today, and running Kubernetes with OpenStack allows you to seamlessly integrate containers into your environment.

While OpenStack is widely known as a private cloud platform, you can access the same open infrastructure immediately from dozens of public cloud providers around the world. Whether you want to run containerized applications on bare metal or VMs, OpenStack lets you run containers the best way for your business.

### Run Kubernetes on OpenStack

- Use the OpenStack cloud provider for Kubernetes.
- Use Magnum, an OpenStack project that allows self-service provisioning of container orchestration engines like Kubernetes, Docker Swarm and Mesos on top of VMs or bare metal.
- Explore the architectures and benefits from case studies from OpenStack users like CERN, eBay, LivePerson and Yahoo! Japan.

### Run OpenStack on Kubernetes

- Use OpenStack-Helm which uses Helm to install OpenStack on Kubernetes. It is a full lifecycle management solution that lets users easily deploy and manage individual OpenStack components or a full stack.
- Use OpenStack LOCI which builds OCI-compatible containers that are independent of any particular deployment or orchestration technology. It can be dropped into heavy-weight deployment tools like OpenStack-Helm, or used individually to deliver standalone services like Cinder block storage.

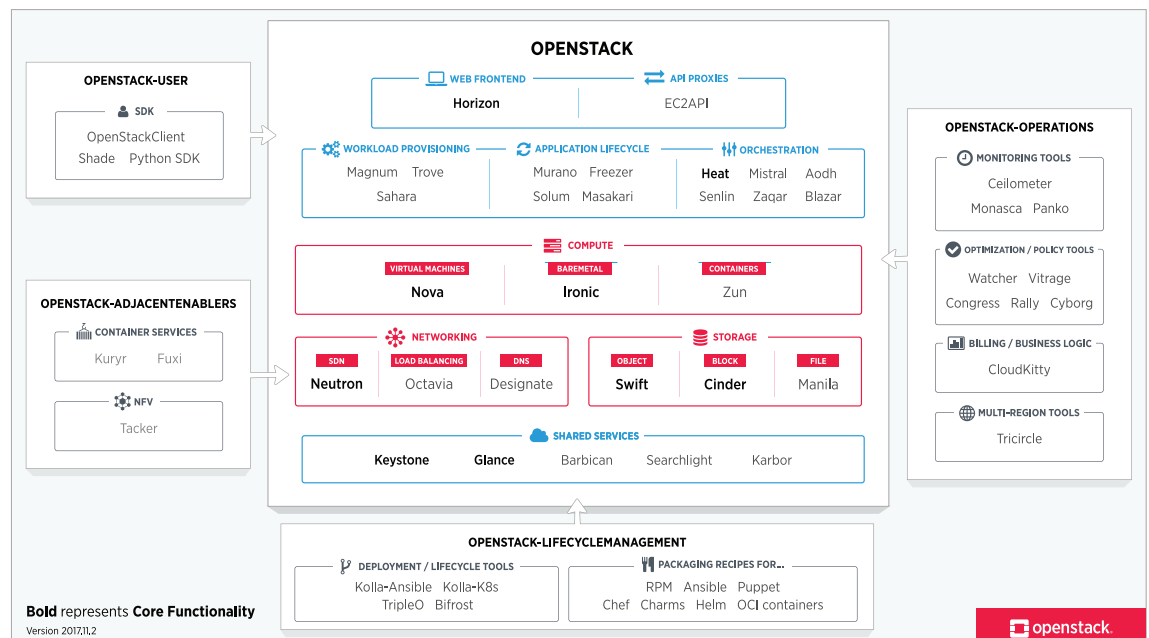
### Run Independent OpenStack Services with Kubernetes

- Use Cinder (block storage) as a standalone service to manage all of your cloud storage with one API. The Kuryr project bridges container networking and storage models to OpenStack networking and storage abstractions. This lets users run OpenStack VMs and Kubernetes on the same network.
- Build Kubernetes golden images with Docker Image Builder and deploy those images with standalone Ironic (bare metal service). Or use Ironic as a Nova (compute) driver, getting the cloud provisioning of Nova with bare metal performance.

## OpenStack Landscape

OpenStack is a set of composable infrastructure services orchestrating compute, storage and networking resources. The core services represented in bold are run by the majority of OpenStack-powered clouds, but you can decide which additional services to run based on your use case.

Learn more about OpenStack projects at [openstack.org/software/project-navigator](https://openstack.org/software/project-navigator)



# LivePerson Case Study: Kubernetes and Hybrid Cloud

If you've ever engaged with a sales or support rep through a chat window on a website, there's a good chance you were using the LivePerson real-time messaging platform. To support its software developers, boost time to deployment, better leverage public cloud, and increase hardware utilization, LivePerson chose Kubernetes to orchestrate Docker containers on its OpenStack private cloud. LivePerson wanted to orchestrate containerized apps while relying on its existing OpenStack powered infrastructure. With a sizeable OpenStack footprint orchestrating VMs across multiple datacenters, its team recognized the opportunity behind combining OpenStack and containers.

LivePerson has successfully built multiple Kubernetes clusters running on Openstack VMs, distributed on seven global data centers and runs many of its critical services in production on them.

LivePerson is an early OpenStack adopter, in production in 2012, and has grown its footprint to over 70,000 virtual cores. Several years ago, it migrated from a single monolithic service, running mainly on VMware, combined with physical servers running Sun Solaris and Microsoft Windows, to over 200 microservices running on Linux within OpenStack.

## RUN KUBERNETES ON OPENSTACK

OpenStack gave LivePerson the perfect framework for exploring and implementing containers within its enterprise. Docker and Kubernetes fit seamlessly with OpenStack, giving them the perfect opportunity to drive a shift toward better business value.

Leveraging their OpenStack powered infrastructure, LivePerson deployed Kubernetes clusters, using Puppet, on large VMs, and the team is migrating its microservices to the new clusters. Some services are already in production, and over the next few quarters, LivePerson intends to have all its containerized services in production.

So far, LivePerson has had great results with Docker and Kubernetes on OpenStack:

1. Focusing on the continuous integration and delivery pipeline, its team has seen significant advantages in time to deployment, giving its developers a fast and smooth pipeline to production. Implementing a new service went from taking a few days to a few minutes. To upgrade existing services, it went from a few hours to a few seconds.
2. Kubernetes made all the difference in its ability to grow toward hybrid cloud. With Kubernetes, its team can have the same pipeline and technology, using private and public cloud without added complexity. Orchestrating the services, making them mobile across different infrastructures, is exactly what LivePerson needed. Eventually, many microservices will run in containers on its private cloud and multiple public clouds.
3. A big win LivePerson achieved recently is a self service deployment tool they developed which under the hood works with the Kubernetes API and allow developers to easily roll forward or backward as needed in any environment from QA to production.

To explore the possibilities of OpenStack and containers, visit [www.openstack.org/containers](http://www.openstack.org/containers).




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*“Having OpenStack-powered infrastructure makes the most sense for use and has given us the fastest path to production to deploy Kubernetes clusters using Puppet on OpenStack VMs. It's kind of like having a one stop shop for all of our use cases - bare metal, instances and containers.”*

**Koby Holzer,**

Cloud Engineering Director, LivePerson

## More OpenStack and containers case studies

-  Workday built OpenStack on Kubernetes for zero downtime in production
-  eBay uses OpenStack to manage Kubernetes at scale
-  How CERN uses Magnum to run Kubernetes on OpenStack



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