Beskar Cloud: Openstack deployment on top of Kubernetes

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Agenda

- The context of the CZ computing
- Motivation for new architecture
- OpenStack distribution overview
- Current status

Compute services at e-INFRA CZ

- Batch compute based on PBS (known as Metacentrum)
- **OpenStack IaaS cloud**
- SensitiveCloud - PaaS based on K8S
- Managed Kubernetes – PaaS based on K8S
- Karolina supercomputer

Cloud services as tool to support research

Who is using our cloud

- e-INFRA CZ is research e-infrastructure
  - 200 research/experiment oriented allocations
  - 600 users projects in "free tier" (treated as playground)
  - **50+ international projects (through EGI and ELIXIR)**
- 300 HV, 10K CPU, 200TB RAM
- Main focus on being HPC cloud
  - large flavors (up to 128 CPU), GPUs (NVIDIA A40),
    fast storage (local NVMEs) and networking
- Portion of resources/support dedicated to standard operation
  - Small VMs, databases + features like LBaaS, …

Motivation for the new architecture

- End of life of GEN1 installation from 2016
  - Custom made solution "puppet-kolla" = not supported by community
- Reach lower operation cost, target is 20%, currently around 70%
- Enable Cloud as a service (to support specialized cloud deployments, BYOC)
- Improve cloud resiliency, frequent updates
- Tune current OpenStack cloud decisions, tidy up the instance
  - assignment public networks to projects
  - quota assignments, projects governance
  - improve flavor naming and unify functionality from UI and commandline
  - Improve various parameters of cloud (MTUs, storages, GUI, …)
- Add second location in Czech Republic

Partnership with commercial partner

- Taikun Cloud, Czech Republic
- We have met at the KubeCon 2022
- Main product Taikun.cloud
- Focus on DevOps automatization tools
  - To manage OpenStack / Kubernetes clusters
- Members of Cloud native foundation
- Cooperation to create "set of scripts" to deploy OpenStack Cloud easily

OpenStack distribution as a result

- Based on open-source, popular and modern tools = supported
  - Ubuntu, MAAS, Kubespray, OpenStack-Helm
- Published on Github
  - https://github.com/beskar-cloud/
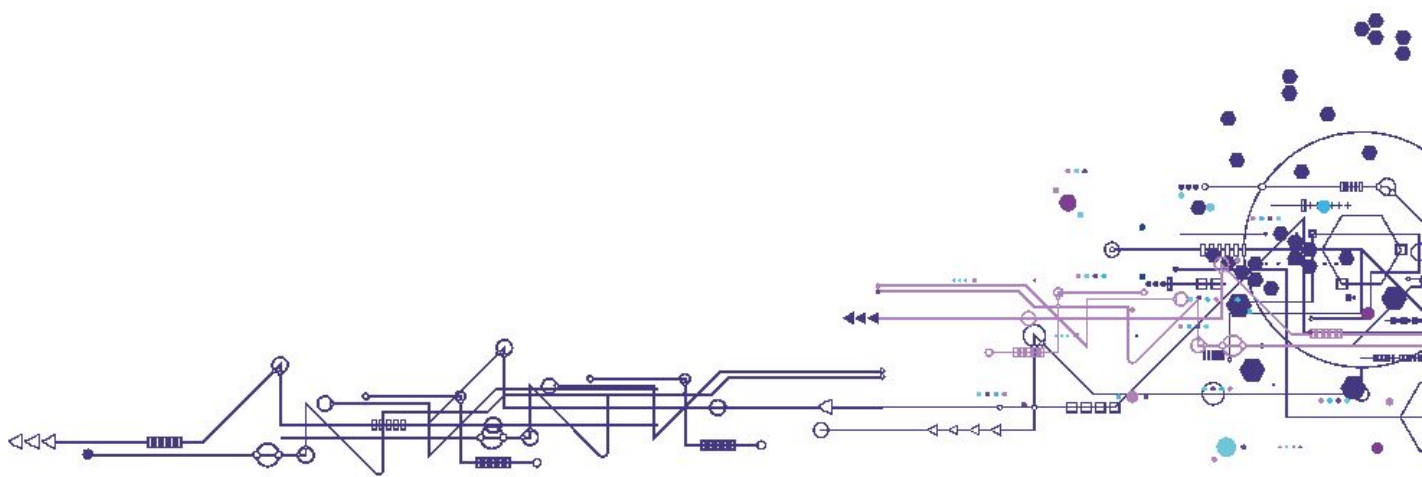- Plan to build an OpenStack community around it
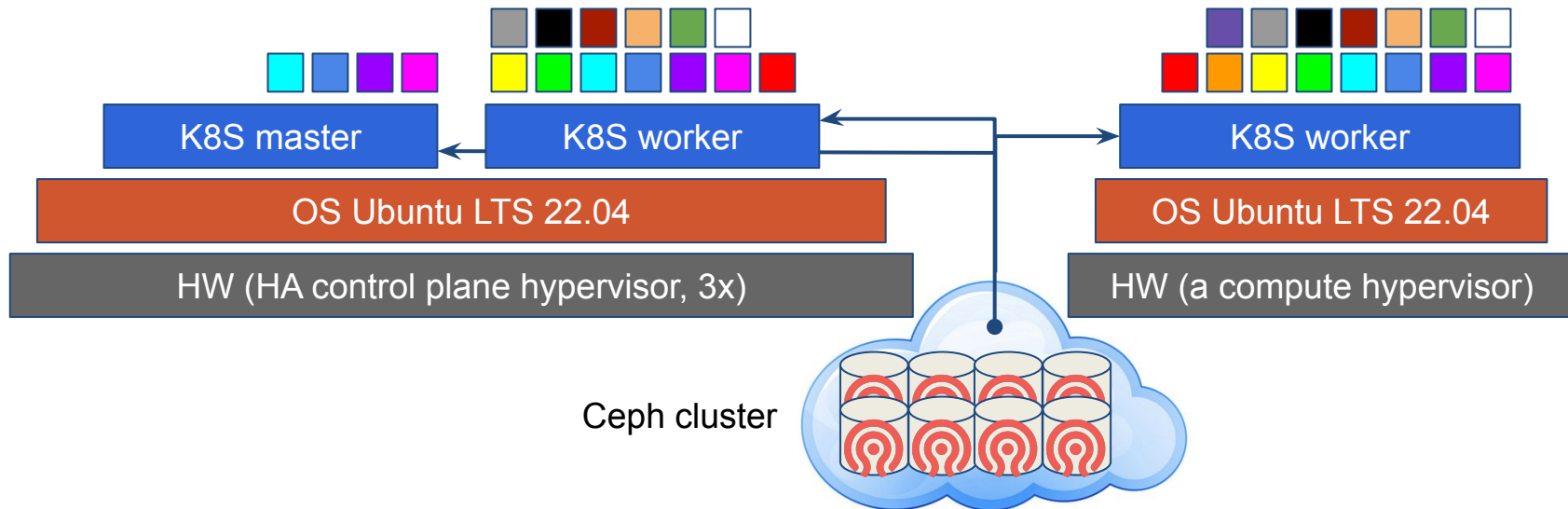
Cloud Architecture

From HW to OpenStack services

Architecture

- OpenStack
  - set of micro-services (nova, keystone, cinder, …)
  - Nowadays every component is in container
- Kubernetes
  - orchestrator and management of containers
- Infrastructure as Code and GitOps paradigm
- Therefore, decision to manage OpenStack components using Kubernetes in GitOps manner
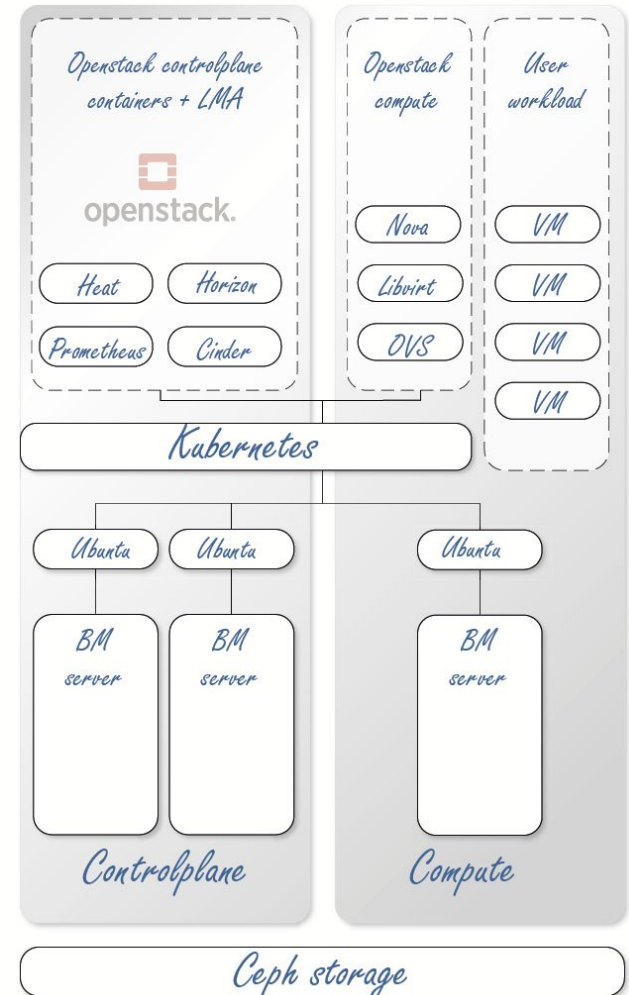
What's in the stack?

- Ubuntu MAAS
- Ansible "Infra-config"
  - playbooks for setting up the hardware operating system
- Kubespray
  - deployment production-ready Kubernetes cluster
- Openstack-helm
  - collection of Helm charts to deploy OpenStack and related services on Kubernetes
- Logging, Monitoring, Alerting (LMA)
  - Prometheus, Grafana and Loki to monitor the infrastructure
- FluxCD
  - GitOps tool for keeping K8s clusters in sync with sources of configuration in Git

Beskar is deployed

- Test deployment in second datacenter of Czech Republic (in Ostrava)
- 30 HV, part of Karolina supercomputer cluster
- Performance testing in progress - for API, DB and internal storage
  - Spawning and deleting VMs, …
- Migration of Brno site (the one with 300HV) is planned
  - as seamless as possible
  - without user interaction

This is the cloud way!

- You are welcome to join the community
- Deploy OpenStack cloud of any size using our distribution
- https://github.com/beskar-cloud/

- Related materials: our poster number 3, vote for it, discuss :)

Thank you for your attention! Questions?

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