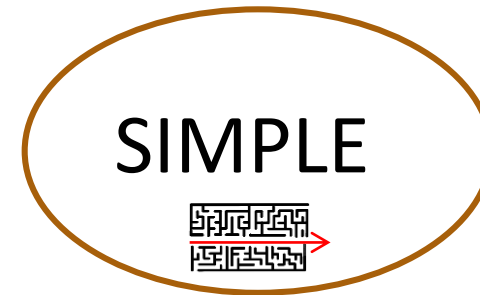


Kubernetes cluster for SIMPLE Grid Framework (Lightweight WLCG Sites)



kubernetes

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What is Kubernetes?

Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

Features:

- Run Anywhere
- Automatic binpacking
- Self-healing
- Horizontal scaling
- Service discovery and load balancing
- Automated rollouts and rollbacks
- Secret and configuration management
- Storage orchestration



Kubernetes vs Docker Swarm

Kubernetes:

- Pros**
- is an open source and modular tool that works with any OS
 - has an impressively huge community among container orchestration tools. Over 50,000 commits and 1200 contributors
 - provides easy service organization with pods

- Cons**
- it is required to have a separate set of tools for management, including kubectl CLI
 - installation can be quite complex



kubernetes

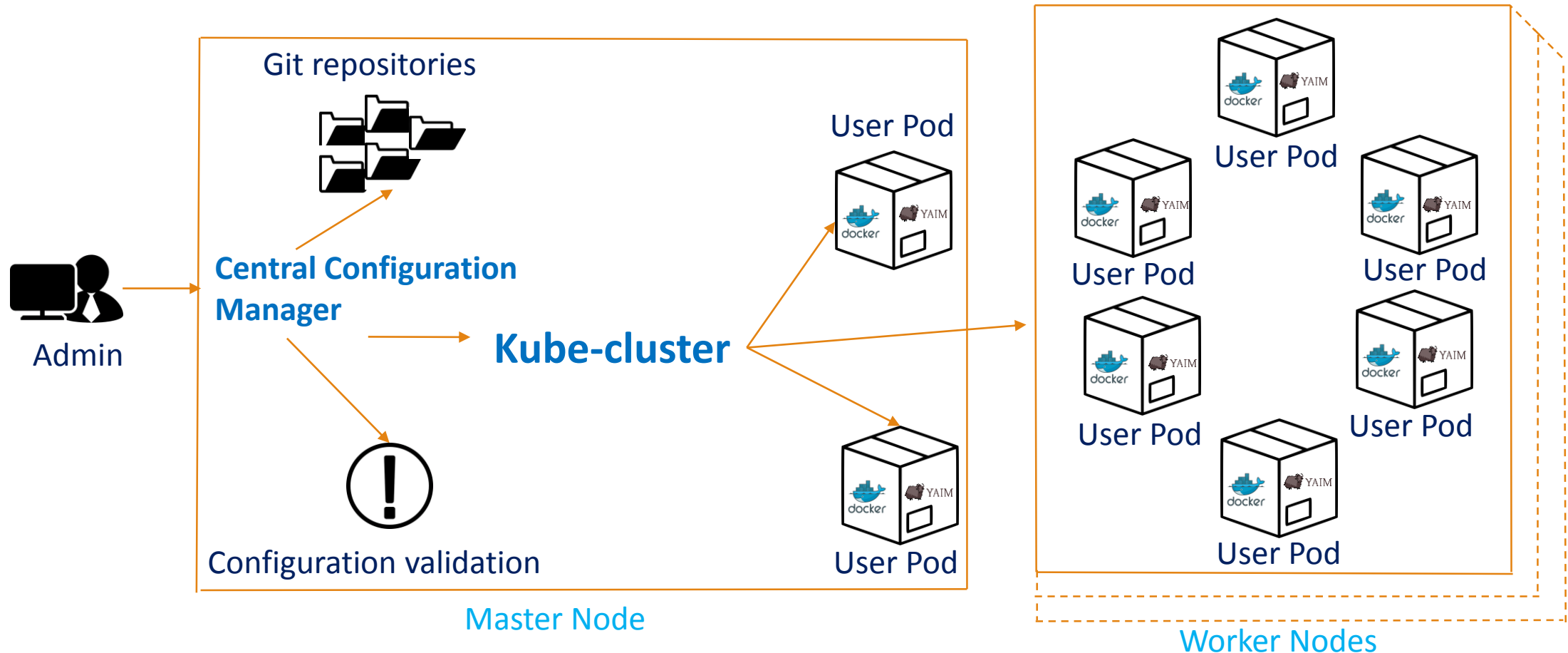
Docker Swarm:

- Pros**
- is easy to install with a fast setup
 - is simpler to deploy and Swarm mode is included in the Docker engine
 - smoothly integrates with Docker Compose and Docker CLI

- Cons**
- provides limited functionality
 - have smaller community and project
 - services can be scaled manually

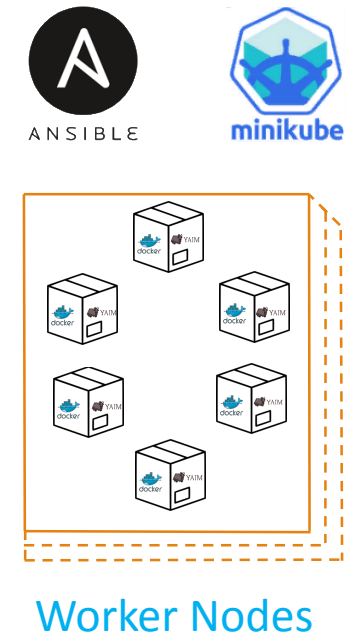


Kubernetes in the SIMPLE project



Making the kube-cluster

- ✓ Step 1. Figuring out what do we need, setting up minimum use case or development environment.
- ✓ Step 2. Considering ways to make kube-cluster: by using Minikube or writing Ansible playbooks (preferred because Minikube can only run a single-node Kubernetes cluster inside a VM while we needed multiple-nodes cluster).
- ✓ Step 3. Establishing ansible playbooks where roles were set.



Making the kube-cluster

- ✓ Step 4. Optimizing the process by creating high master playbook that will run 3 playbooks: add-user, port6443 and master.
- ✓ Step 5. Checking worker node container.
- ✓ Step 6. Deploying worker node container with kube-cluster.
- ✓ Step 7. Establishing ansible playbooks to create deployment and pod and run the container.

Summary: now we have ansible playbook which creates deployment and pod, copies repository from GitHub and run the worker node container.

Future options for using Kubernetes in the SIMPLE Grid project

Deploying compute element container with kube-cluster.

- Deal with host configuration
- Set permissions
- Figuring out firewalls settings
- Check connection between containers

Create Ansible Role to receive information from Level-1 configurations and set up the kube- cluster appropriately

Having exact number of containers and information about each container, which will be provided by variables from Level-1

Conclusions

- Set up the kube-cluster and create pods for worker nodes and compute element containers (GitHub Repository: https://github.com/WLCG-Lightweight-Sites/simple_grid_kube_cluster)
- Next step: resolve pod to pod networking and create Ansible roles

The Community

Project Homepage

<http://cern.ch/go/9lHd>

GitHub Repositories

<http://cern.ch/go/kr7p>

Simple Grid Specification

<http://cern.ch/go/8JLH>

Technical Discussion List (E-Groups)

Name: WLCG-Lightweight-Sites-Dev

Link: <http://cern.ch/go/l9wZ>

Open Source Community

Name: WLCG Lightweight Sites

Link: <http://cern.ch/go/Hz7S>

Mattermost (IM):

Team: WLCG

Name: WLCG-Lightweight-Sites

Link: <http://cern.ch/go/8HWP>