Orchestration Tools Comparison

There are three major Orchestration tools available that can be used to orchestrate airavata components. Here is an exhaustive comparison of different features of these three orchestration tools and later one suggestion to orchestrate airavata.

Three Orchestration Tools :

1) Docker Swarm
2) Google Kubernetes
3) Apache Mesos

List of features on which the comparison is done :

1. Cluster Installation
2. Minimum Cluster size
3. Container Deployment
4. Maturity
5. Scalability

CLUSTER INSTALLATION

-Docker Swarm : Since most of the containers are docker based, cluster installation is really simple and native to docker.

-Kubernetes : In comparison to Docker Swarm, Kubernates's cluster installation is a bit more complicated. All the services required in the cluster are defined inside YAML(Yet Another Markup Language) files.

-Apache Mesos : For small clusters, Mesos is relatively easy to setup and install. But in case of clusters consisting of thousands and thousands of nodes, level of complexity increases exponentially

MINIMUM CLUSTER SIZE

-Docker Swarm : For test purposes, a single server can be used to carry out orchestration. But for production, multiple servers will be required for service discovery and replication

-Kubernetes : For test purposes, at least two servers are required: one for the master and one for the node/minion.

-Apache Mesos : Similar to Kubernetes, apache Mesos requires one Master and one Slave node in the testing environment. In production, there should be at least three master nodes and there can be any number of slave nodes

CONTAINER DEPLOYMENT

-Docker Swarm : Container deployment is native to docker swarm as all the containers are docker based

-Kubernetes : All container deployments in Kubernetes is carried out using YAML files

-Apache Mesos : Container Deployment in Mesos is JSON based. All dependencies are specified in a single JSON file

SCALABILITY

-Docker Swarm : Currently Docker Swarm is ideal for small to medium level setups

-Kubernetes : Since Kubernetes is backed by Google, Kubernetes can handle medium to large level of setups with applications involving many containers inside pods

-Apache Mesos : Suitable for very large applications

MATURITY

-Docker Swarm : It is mature and still evolving

-Kubernetes : Very mature as it is directly based on Google's internal BORG platform

-Apache Mesos : Very mature due to its capability of handly large to very large applications in a single cluster

References

https://www.loomsystems.com/blog/single-post/2017/06/19/kubernetes-vs-docker-swarm-vs-apache-mesos-container-orchestration-comparison
https://codefresh.io/kubernetes-guides/kubernetes-vs-docker-swarm-vs-apache-mesos/
https://www.sumologic.com/devops/kubernetes-vs-mesos-vs-swarm/
https://mesosphere.com/blog/docker-vs-kubernetes-vs-apache-mesos/