Kubernetes II - Installation, Configuration and Administration

Course code: KUBERNETES_ADMIN

The course is intended for administrators who want to get acquainted in detail with the installation, configuration and operation of Kubernetes clusters. We will use a real multi-node cluster in the course, which we will configure ourselves during the exercise. We will deal with all the details that are needed to manage a stable production cluster. Last but not least, this course can be considered as preparation for the Certified Kubernetes Administrator (CKA) certification.

Required input knowledge

- Basics of knowledge of infrastructure technologies (networking, data storage)
- Basic knowledge of Docker or another container runtime
- Linux command line operation

Teaching methods

- Expert explanation with practical examples, exercises on computers.
- During the course we will use a real K8s cluster, installed in on-premise mode

Studying materials

- Printed presentations of the subject matter.

Course syllabus

Kubernetes - Basic information

- Principles and philosophy
- CRI, CNI, CSI standards
- Cluster structure and roles of individual components
- Orientation in the cluster API

Cluster installation

- Control plane initialization
- Initialization of worker nodes
- High availability and redundancy control plane
- Work with tokens and certificates
- Virtual clusters (namespaces)

Cluster node administration

- Node operations (add, remove, cordon / uncordon, drain)
- Working with static control plane (enable / disable / modify)
- Configuration service etcd (data backup, high availability, time snapshots)
- Taints and labels at the node level

Networking in Kubernetes

- CNI network plugins
- Plugin configuration and selection of a suitable plugin
- Overview of the most used plugins, features, advantages / disadvantages

Data storage in Kubernetes

- Overview of options
- Objects PV, PVC, SC and others
- Practical examples of deployment (database databases)

Safety

- Security aspects of the cluster
- PKI in Kubernetes (certificates, authorities, certificate renewal, ...)
- Control user access to cluster environments, RBAC
- Configuration files for kubectl and work with them

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Application operation

- Pod and its structure
- Multipod deployment and when to use it (advantages / disadvantages)
- Higher level controllers (ReplicaSet, Deployment, StatefulSet, DaemonSet)
- Service objects
- Ensuring high application availability
- Zero-downtime upgrade / downgrade applications
- Application scaling
- Scheduling pod in a cluster
- Floor monitoring (readiness / startup / liveness functionality tests)

Best practices

- Kubernetes native application
- Cluster application requirements
- Load balancing

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