Training: Component Soft
KBS-615 Kubernetes Networking deep dive and Troubleshooting

TRAINING GOALS:

Kubernetes is the de-facto system for container orchestration, e.g. automating the deployment, scaling and management of microservices-based, containerized applications. And as Kubernetes is becoming the most widely used platform for deploying applications, it is of paramount importance to know how to address problems that may occur in these systems.

This course will present from the generic methodologies applicable in the troubleshooting to the domain specific instructions that will address the various aspects of Kubernetes and the deployed applications.

This training builds on the knowledge gained by students on one of our Kubernetes administration trainings and teaches advanced topics about Kubernetes networking and troubleshooting practices for them.

The first part of the training deals with the different types of networking resources that facilitates the connectivity for containers, the Container Network Interface (CNI) as well as CNI plugins.

In the second part of this training participants learn about a wide range of IT troubleshooting concepts and technics starting with the generic methodologies applicable in troubleshooting to the domain specific instructions that will address the various aspects of Kubernetes clusters and applications deployed in them.

Besides in-depth theoretical coverage, students also do hands-on exercises in their own Kubernetes lab system throughout the training.

Course parts: 2 days Kubernetes networking deep dive + 3 days Kubernetes Troubleshooting, 5 days altogether

Structure: 50% theory 50% hands on lab exercises

Target audience: System administrators, developers and devops who participated on one of our Kubernetes administration trainings or have a Certified Kubernetes Administrator (CKA) certification and want to learn more about Kubernetes networking as well as general IT systems troubleshooting technics and their implementation at Kubernetes clusters.

CONSPECT:

- PART I. Container and Kubernetes networking deep dive, 2 days
  - Module 1: Network connectivity for containers

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- Isolating network resources
- Connecting network namespaces - veth pairs
- Connecting network namespaces - linux bridge
- Connecting network namespaces - Open vSwitch
- Connecting network namespaces - routing
- Iptables introduction
- IPVS introduction
- Connecting network namespaces - macvlan
- Connecting network namespaces - ipvlan
- Connecting network namespaces - SR-IOV
- Lab 1

- Module 2: CNI - Container network interface
  - CNI Specification - Concepts
  - CNI - Network configuration format
  - CNI - Execution protocol
  - CNI - Operations
  - CNI - Plugin delegation
  - CNI - Conventions
  - Lab 2
- Module 3: CNI plugins
  - CNI - Reference Plugins
  - Third Party Plugins - Calico
  - Third Party Plugins - Multus CNI
  - Third Party Plugins - Whereabouts
  - Third Party Plugins - sriov-cni
  - Third Party Plugins - ovs-cni
  - Lab 3
- Module 4: Services deep dive
  - Kubernetes service implementation with iptables
  - Kubernetes service implementation with ipvs
  - Dual stack services

- PART II. Kubernetes Troubleshooting
  - Module 1: Troubleshooting methodology and tools
    - Fault analysis methodology
    - Diagnosis methodology
    - Diagnosis tools

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        - System
        - Container
        - Kubernetes
    - Module 2: Kubernetes architecture
        - Control plane components, configuration, logging
        - Worker components, configurations, logging
        - Request processing
        - RBAC
        - Troubleshooting node issues
    - Module 3: Handling workload errors
        - Troubleshooting pod errors.
        - Troubleshooting Deployments
        - Troubleshooting StatefulSets
    - Module 4: Troubleshooting the Networking
        - Network architecture
        - CNI
        - Troubleshooting services
        - Troubleshooting network policies
    - Module 5: Storage issues
        - Storage in Kubernetes
        - CSI
        - Troubleshooting storage issues

REQUIREMENTS:

Linux container (e.g. Docker) and Kubernetes admin. skills, for instance by participating on our Docker and Kubernetes administration courses.

Difficulty level



CERTIFICATE:

The participants will obtain certificates signed by Component Soft (course completion).

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TRAINER:

Certified Component Soft Trainer.

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