Containers: Challenges, Uses, and Solutions

Seminar of 3 days - 21h
Ref.: CCB - Price 2024: CHF2 890 (excl. taxes)

EDUCATIONAL OBJECTIVES

At the end of the training, the trainee will be able to:

Detail the various aspects of containerization technology and its ecosystem

See how Kubernetes works, and its internal and external components

Understand interactions with the private/public cloud and legacy system

Know the benefits and limits of micro-service architectures in both technical and organizational terms.

THE PROGRAMME

last updated: 06/2022

1) Fundamentals

- Application in 12 factors, integration, continuous deployment (CI/CD), Cloud-native applications.
- SaaS, PaaS, IaaS, object and block storage. Private, public, hybrid cloud: Problem of lock-in.
- Elastic architecture, Cattle versus Pet, Infrastructure as Code.
- Existing tools (Terraform, Ansible). Bebefit of containers versus Virtual Machines.
- CaaS in an enterprise: interoperability, Devops organization, digital transformation.
- Bimodal IT and DevOps.

Demonstration : Cloud IaaS: Digital Ocean, MS-Azure.

2) Docker

- Basic concepts: Immutability, image, layers, registry, network and storage issues.
- Automation with Dockerfile/docker-compose, integration with Github, Jenkins, DockerHub.
- Expected benefits: Reproducibility, manageability.
- Benefits in terms of elasticity, agility, upgradability.
- Impacts on development and infrastructure teams.

Demonstration : Building, modifying, and publishing Docker images.

3) Kubernetes, container orchestrator.

- Master/Workers nodes, concepts of Pods, service, different types of Ingress Controller.
- Storage: stateful, stateless, shared (NFS, GlusterFS, CEPH, rook).
- Configuration management. Using Jobs and DaemonSets.
- Internal component (etcd, kubelet, kube-dns, kube-proxy, apiserver), complementary (Helm/Tiller, envoy, side-car proxy).
- Service Discovery/Mesh (Istio), calico, cilium.

Demonstration : Building a cluster and deploying a complete stack (including Wordpress).

4) Container as a Service (CaaS)

- Standardization: OCI, CNCF, CNI, CSI, CRI.
- Cloud/Managed solutions: Amazon AWS ECS and EKS and Fargate, Google GCP, Microsoft Azure, DigitalOcean.
- Most common On-Premises solutions: Docker DataCenter, Rancher, RedHat OpenShift.
- Evolution to Serverless.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@ORSYS.fr to review your request and its feasibility.

5) Security of CaaS/Kubernetes/Docker

- Infrastructure security: partitioning, RBAC, vault/secret, logs.
- Securing containers (runtime): Seccomp, SElinux, Apparmor, Linux Capabilities, PodSecurityPolicies.
- Securing the Supply Chain: registry, notary, compliance check

Demonstration : Specific attacks, L3/L4/L7 micro-segmentation. Scanning an image's vulnerabilities, container hardening, exporting real-time logs in Splunk.

DATES

REMOTE CLASS
2025 : 01 Apr, 10 Jun, 23 Sep, 16 Dec