PMSOFT

Title of the Course:
Application Architecture Based on Docker Virtualization

Days: **4**

Code of the Course:
architecture_docker_coreos.

Target Audience:
This course is intended for project managers, devOps, architects and programmers.

Objective:
Acquire the ability to implement deployments of applications through Docker containers on CoreOS clusters.

Motivations:

The lightweight virtualization offered by the Linux kernel through cgroups allows to develop applications deployed as a group of independent virtual machines named containers. This simplifies administration tasks by allowing to run several application versions in parallel and by avoiding unnecessary uninstallations. Docker is a mature tool for handling containers, offering support throughout their whole life cycle. In order to take the full advantage of all the possibilities of containers, it is necessary to deploy them in an infrastructure supporting computational clusters. A fully automated deployment, possible to repeat on any computational clouds provider is also a key issue. Such a support is offered by the CoreOS Linux distribution.

Scope of the training:

- **Creation of Docker images**
- **Administration the Docker daemon.**
- **Deployment and back-up of the Docker registry.**
- **Deployment and administration of container instances.**
- **Creation and administration of a CoreOS cluster.**
- **Orchestration of Docker containers in the CoreOS cluster with Fleetctl.**
- **Service discovery basics with DNS.**

Technological Scope:

Linux cgroups:	https://www.kernel.org/doc/Documentation/cgroup-v1/
Docker:	https://www.docker.com/
CoreOS:	https://coreos.com/
Consul:	https://www.consul.io/.

Training specification:

Requirements: No previous knowledge required.
Type of course: 50% lectures, 50% workshops.
Materials language: english.
Training language: english or polish.

Program:

1. Overview of virtulization technology.

- Virtualization with Hipervisor.
- Virtualization with cgroup.
- Overview of cgroups technology in the Linux kernel.

2. Docker

- Creating a Dockerfile.
- Building Docker in Maven and SBT.
- DockerHub and private Docker registry.
- Administrating Docker daemons.

3. Docker instances

- Administrating local Docker images.
- Docker instance life cycle.
- Interacting with active Docker instances.

4. CoreOS

- CoreOS architecture.
- Cloud-config.
- Creating a virtual CoreOS cluster in Vagrant.
- Etcd2
- Flannel
- Fleet

5. Service deployment in CoreOS

- Creating services based on Docker images.
- Orchestration with Fleetctl.
- Service Discovery with DNS (consulDNS).
- Actualizations of application versions.
- Monitoring the state of the cluster.

6. Deployment in the cloud

- Overview of suppliers.
- Deployment in practice.