OW2 Open Source Cloudware initiative

Self-sizing and green PaaS (OSCi Domain 1)

Revision	*Date*	*Author*	*Description*
0.1	07/02/11	A. Lefebvre B. Pelletier	Creation
0.2	10/02/11	A. Lefebvre	Minor update
0.3	14/02/11	B. Pelletier	Minor update

Introduction

The self-sizing and green PaaS project was initiated by the OW2 consortium as part of the Open Source Cloud Initiative (OSCi). This project is also known as Domain 1 within OSCi. This project is a collaboration effort between open source leaders in distributed java middleware to provide an efficient Open Source cloud platform in terms of performance and energy cost.

Members & History

The first outcomes of the SelfXL collaborative project (funded by the french Agence Nationale de la Recherche) provide a bedrock to OSCi domain 1. As a use case, the Orange infrastructure is composed of large-scale data centers (+40,000 x86 servers) and typical applications use a JavaEE JOnAS middleware stack (+250 applications, +1,000 application server instances). A static server consolidation (12/1) was performed through virtualization and permitted to increase the utilization level from 20% to 75%.

The following challenges are addressed:

- Cluster growth/shrink capabilities according to workload.
- Data center multi-tenancy with limited capacities requires arbitration policies.
- Data center placement for minimizing the energy consumption.

Partners of SelfXL involved in this domain are:

- Bull, Ecole Mines Nantes, Orange.

ActiveEon joined quickly the project and has proposed a contribution around its ProActive products (intelligent scheduler and resource manager).

The first OSCi Workshop held in Paris in november 2010 has permitted to identify other synergies, in particular with OW2 partners in China (ISCAS, BUAA, PKU) to enhance the platform with others PaaS features such as provisioning or multitenancy. An OSCi workshop is scheduled in Beijing in March 2011 to identify future developments and cooperations.

UCM in Spain, leader of the OpenNebula project, is also interested to participate in Domain 1.

Others collaborative pProjects are identifiedwhich could provide input to to put results in OSCi Domain1 are: 4Ccaast (FP7), Easi-Clouds (ITEA2), CompatibleOne (FU10), Internetware (973), ...

Vision

Domain 1 envisions to deliver a full Open Source software stack for implementing a comprehensive Java PaaS solution with following capabilities and properties:

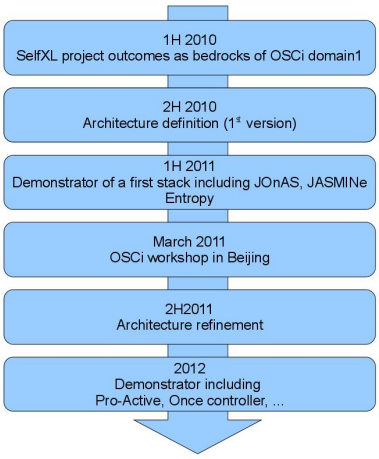
- On-demand and flexible provisioning enabling multiple deployment strategies (one application per VM on top on a dedicated AS, several applications per VM on top on a dedicated AS, several applications per VM on top on a shared AS)
- IaaS agnostic deployment and support of cluster spanning multiple IaaS. A simple use case is to deal with peak load by provisioning in a public IaaS when the private IaaS is saturated.
- support of VM placement policies (energy optimization, HA, …)
- Multitenancy and isolation
- Java EE application elasticity

Architecture

The envisaged solution relies on the following components (not exhaustive) :

- OW2 JOnAS, Java EE/Entreprise OSGi application server, hosting the end-user application,
- OW2 JASMINe, advanced management tool for SOA platform, providing the application control loop in charge of Java EE cluster growth/shrink according to the load (application elasticity),
- Pro-Active scheduler and resource manager in charge of the intelligent provisioning across various hypervisors and IaaS
- Entropy, VM placement engine, in charge of the VM packing or intelligent placement according to user policies

The OSCi Domain 1 solution envisions to support a large set of 3rd party IaaS products including Xen, KVM , OpenStack, OpenNebula, Ubuntu.



Timeline

At the date of writing this document, the picture above presents the proposed timeline of the Domain 1 project.