OpenSAF and VMware from the Perspective of High Availability

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Abstract

Cloud services are becoming one of the most popular means of delivering computational services to users who demand services with higher availability. Virtualization is one of the key enablers of the cloud infrastructure. Availability of the virtual machines along with the availability of the hosted software components are the fundamental ingredients for achieving highly available services in the cloud. There are some availability solutions introduced by virtualization vendors like VMware HA and VMware FT. At the same time the SAForum specifications and OpenSAF as a compliant implementation offer a standard based open solution for service high availability. In this paper, we investigate these solutions for availability through experiments, compare them according to metrics and based on the results propose architectures that combine them to provide highly available applications in virtualized environments.

Introduction

The term virtualization broadly describes the separation of a resource or request for a service from the underlying physical delivery of that service. Several virtualization products exist. Among these solutions VMware is one of the virtualization solution providers which has tackled the problem of availability. VMware has introduced two solutions for providing availability, VMware HA and VMware FT. Both solutions are available in VMware vSphere.

OpenSAF

The Application Interface Specification (AIS) is a set of middleware services defined by the Service Availability Forum (SAForum) to enable the development of highly available applications. OpenSAF is an open source SAForum compliant middleware implementation. The Availability Management Framework (AMF), one of the most important AIS services, plays the key role in keeping an application’s services highly available by coordinating its redundant resources, and performing recovery/repair actions in the case of a failure. AMF manages the application components and recovers their services according to the configuration provided with the application. This configuration represents the architecture of the application from the AMF perspective and describes the different entities composing it and their relations.

OpenSAF on virtual nodes

To evaluate the two solutions and their combinations from the perspective of availability, we defined a set of metrics.

Metrics

<table>
<thead>
<tr>
<th>Qualitative</th>
<th>Quantitative</th>
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<tbody>
<tr>
<td>Availability</td>
<td>Outage Time</td>
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<tr>
<td>Recovery Time</td>
<td>Failure Resolution Time</td>
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<tr>
<td>First Failure</td>
<td>Faulty and Repeated Time</td>
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Baselines architectures

For the case study we selected the VLC media player application as it has been already modified to work with OpenSAF as a SA-Aware component.

OpenSAF on physical nodes

The first baseline architecture is the deployment of OpenSAF on the physical nodes. Since our case-study is configured with the 2N redundancy model we selected two nodes to host our experiments.

VMware HA baseline architecture

We created a vSphere cluster using 2 ESXi nodes and enabled VMware HA on the cluster using VMware vCenter. We also added one VM with Ubuntu Linux and VLC installed on it. We put the VM image on an NFS shared storage so that it is accessible from all cluster nodes.

OpenSAF on virtual nodes

To take advantage of the virtualization which VMware provides and the service high availability management of OpenSAF we combined these two solutions. In this first combination we deployed the OpenSAF cluster on virtual nodes rather than on physical nodes.

Architectures

<table>
<thead>
<tr>
<th>VMware HA</th>
<th>OpenSAF on physical nodes with SA-Aware VLC component</th>
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<tbody>
<tr>
<td>OpenSAF on physical nodes with Non-SA-Aware VLC component</td>
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<td>OpenSAF on virtual nodes with Non-SA-Aware VLC component</td>
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OpenSAF on virtual nodes

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VM availability management with bare-metal hypervisor

- Intended to fix the delay in service outage.
- Two or more VMs can manage VMs added to manage the availability of the service VMs on the shared storage
- Avoiding single point of failure by having 2N redundancy for the manager VMs
- Starting and stopping the VMs with the libvirt’s “virsh” command
- Service VMs health checking done by external active monitor

Acknowledgement

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