OpenSAF in the Cloud. Why an HA Middleware is still needed

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Agenda

• The OpenSAF Project
• High Availability and Service Availability
• Why Application HA is necessary in the cloud
• OpenSAF HA capabilities
• Proposal to leverage OpenSAF HA with existing cloud solutions for unified availability management
• OpenSAF roadmap
OpenSAF High Availability and the Cloud

We have 99.99% uptime. We are good.

Should we consider the telcos?

They have 5 Nines.

What is OpenSAF? They have APIs?

What is SA? Deployments will anyway have standbys.

The cloud people are here.

Cloud

SAF/OpenSAF
The OpenSAF project

- Most comprehensive Service Availability middleware providing availability, manageability and platform services for developing HA available applications
- Interface APIs in C with support for Java and Python bindings
- LGPL v2.1 license
- Implements SA Forum AIS specification
- Supported by the OpenSAF foundation
High Availability and Service Availability

- The probability that a service is available to its users at a random point in time

- In telecom, 99.999% availability (five nines) is often required

- HA and SA are essentially the same, but SA enables more – for example planned updates of hardware and software
Two Opinions about Application HA in the Cloud

You don't need to worry about HA – the cloud will take care of that for you.

The cloud doesn't change anything regarding HA – it is the same as outside the cloud.
High Availability and Service Availability

**WALTER’S MOMENTS**
by S.A. Forum

“THERE’S NO UPSIDE TO DOWN TIME.”

“We delivered almost all of the luggage, so only a few bags are missing. If that’s not good enough, you should have picked Availability Air.”
Hardware Faults

• The cloud infrastructure can handle hardware faults for you – all the application sees is a node reboot
• With a hot standby VM, even a reboot may be avoided
• Problem with co-located VMs – we don't want to have active and standby app on the same physical node
Software Faults

• Applications currently have no or limited HA support from cloud infrastructure

• Using HA middleware, we can also get shorter fail-over time in the event of a hardware fault
The Cloud Gives You More Faults

- Hypervisor and cloud infrastructure are also subject to faults

- Hardware used in cloud may be less reliable (not carrier grade)

- Geographic distribution may decrease the risk of total outage, at the cost of network latency and increased risk for split-brain
The cloud way – pets vs. cattle

• Pets: few powerful nodes, scale-up
• Cattle: many cheap nodes, scale-out
• “architecting for failure” vs “architecting for scale”
The cloud way – Standardized Service Level Agreement

Provide service throughout the year

Your problem was triggered by some other vendor/service inside the cloud
OpenSAF based HA

- OpenSAF based HA solutions are applicable across the availability spectrum:
  - Enterprise
  - Telecom and aerospace/defense
  - Millisecond failover
OpenSAF based HA

- Supports all redundancy configurations (Including no redundancy)
- Express Dependencies between distributed/stand alone software
- Fault Management policies (Recovery and Repair)
- Code intrusive or Not?
- Lifecycle scripts and timeouts configuration, workload management
- Monitoring and Healthcheck
- Orchestration of rolling upgrade of the cluster nodes. Standardized manageability
OpenSAF based HA - Fault Management

- Detection - Component Health Checks, Active/Passive Monitoring, api based error reporting, resource agents

- Isolation - Node Power off or Resource isolation

- Recovery - Failover of role assignments to standby/spare resources

- Repair - Automatic restart of failed resource

- Notifications – Standardized state change notifications (and logging)
OpenSAF HA – Key Advantages

• Provide for Availability as a service in the cloud
• Centralized/Streamlined orchestration of workload management (maintaining affinity)
• Enable cloud software to be more carrier grade
• Ease of Integration – With Both API based and scripts based entities (software, vm, agents, etc)
OpenSAF HA – Key Advantages

- Enables reliability for stateful applications
- Application level failure detection and recovery. Enables fault mitigation and milli second failover
- Support for automated rolling upgrades across the cluster involving application and cluster expansion/shrinking
- Pythonic interface for provisioning, status and management of HA entities. (Java mappings also supported)
Leveraging existing cloud solutions with OpenSAF
OpenSAF and Vmware (A study)

- Outage time measured with/without adding OpenSAF capabilities to existing VMware solutions (FT and HA)

- Outage time measurement by running OpenSAF within and outside the VMs and other combinations

- OpenSAF can detect Hardware, OS and Application failures

- The study concluded that outage time significantly reduced when combining OpenSAF with existing Vmware capabilities

Leveraging openstack and OpenSAF

• OpenSAF can provide HighAvailability as a service in openstack – Uniform, centralized, automated availability management across openstack
• Openstack's flexible deployment architectures enables easy integration with OpenSAF for all redundancy configurations for any of the OpenStack infrastructure software (distributed and standalone)
• Monitoring (Intrusive and Non-Intrusive) a basic requirement
  - With/Without Resource agents.
• Provide for a perspective of TRY_AGAIN /TIME_OUT semantics
OpenSAF provides for a Unified HA

Integrated HA architecture for compute, network, storage, dashboard

Application HA

VM HA

Unified HA from OpenSAF

Unified view and/of Availability Management

Provides for openstack 'availability architecture, hierarchy' and 'standardized management' (admin, log, notification, upgrade) interface
OpenSAF Roadmap

- Enhanced cluster management (quorum/consensus based membership)
- Scaling out even further
- Feature rich CLI
- Container - contained