Using OpenSAF for carrier grade High Availability

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What is OpenSAF

- Formed 2007
- Base platform middleware developed by OpenSAF Project
- Provides availability, manageability, utility and platform services needed to develop highly available distributed applications
- Implements SA Forums AIS Specification
- Supported by OpenSAF Foundation
OpenSAF and Availability Spectrum

Enterprise Applications

Telco

Military

OpenSAF

Availability

99% 99.9% 99.99% 99.999% 99.9999%

Some of the Application Domain segments

OpenSAF

Other MW (Proprietary, Commercial, Open-source), Typically domain driven

Integration support

Characteristics

MW X

MW Z

MW Y
OpenSAF 4.7 Services

Management Systems

CM, FM

SNMP / Netconf / SOAP / HTTP / RPC / ...

Management Daemons

Optional, Modular, Pluggable

AMF
IMM
IMM "CLI"
NTF
LOG

OpenSAF Infrastructure Services

RDE, FM
MDS
MBC
Logtrace

OpenSAF Core

OpenSAF Optional Services

Python Bindings
SMF
CKPT
MSG
LCK

Java Bindings
PLM
EVT

• LCK – Lock Service
• LOG – Log Service
• MSG – Message Service
• PLM – Platform Management Service
• SMF – Software Management Framework
• AMF – Availability Management Framework
• CKPT – Checkpoint Service
• CLM – Cluster Membership Service
• EVT – Event Service
• IMM – Information Model Management Service
OpenSAF – Potential Use Cases for NFV

- HA for VNFs (Current Focus of OpenSAF)
  - VNF Local
- HA As a Service
  - Offer AIS APIs to VNF Vendors to use (HealthCheck, Isolation, Messaging, Notification, CheckPoint/State …)
OpenSAF in VNF Space – Local to the VNF

- MANO Layer
  - Converged Infrastructure Management - PIM

- NFVI Layer
  - Compute Virtualization (KVM)
    - Servers
  - Network Virtualization
    - Storage
    - Networking

- VNF Layer
  - VNF
    - OpenSAF

- OSS Layer
HA as a Service
Centralized Controllers offers APIs (Healthcheck, isolation, checkpoint, notification, messaging...)

OSS Layer

VNF Layer
VNF VNF VNF
Check Point Health Check MSG NTF
HA API

NFVI Layer
Compute Virtualization (KVM)
Network Virtualization
Servers Storage Networking

MANO Layer
MANO
Converged Infrastructure Management - PIM

OpenSAF Ctrl 1 OpenSAF Ctrl 2
Check Point Health Check MSG NTF
The High Availability DNA

- Application HA Redundancy configuration and State Model
- Application dependencies, lifecycle timeouts (scripts, callback timeout)
- Application monitoring (healthchecks, pid, external, via 3rd party LSB/OCF resource agents)
- Application fault management – recovery and repair policies
- Manageability (admin, logging, notification interfaces) and in-service upgradeability
- Cluster wide Availability orchestration and management
HA Integration with OpenSAF

Application - Distributed application deployed redundantly
- Legacy Application
- OpenSAF Library - APIs in C/JNI/Python-CTypes
A/S - Active | Standby – Application processes linked with OpenSAF libraries running as Active and Standbys
P - Proxy – Interacts with OpenSAF on behalf of legacy App
PR - Proxied – Legacy application modelled as Proxied (Proprietary communication between Proxy and Proxied)
PM - Passive Monitoring (like pid monitoring)
AM - Active Monitoring (like sending SNMP requests)
RA - Resource agents. LSB/OCF resource agents!

- Persistent cluster configuration
Includes system description, availability information model, OpenSAF services’ configuration (and application configuration)

Lifecycle, Healthcheck, Workload – commands/callbacks
Proprietary Communication between Proxy and Proxied.
Achieving 5-6 Nines is a lot of Work

For millisecond fail-overs:

• Create SA_AWARE application (code intrusive, application needs to understand the framework and different availability roles)
• Choose Redundancy model (2N, N+M, N-Way, N-Way Active…)
• Use AMF for health checks (HC)
  – Register with AMF
  – Implement logic for HC callbacks and different roles (active, standby, quiescing..)
• Use Check Point for state if needed
  – Implement logic to write check points when active and receive when stand-by
• Use Notification Service to tell the world
• Use Message Service for cluster backed messaging
• Use SMF for in-service upgrade campaigns
Thank You!