Lean NFV Operations

Overview

The Alcatel-Lucent Lean Network Functions Virtualization (NFV) Ops demonstration is an interactive showcase of a fully virtualized end-to-end solution for operations management, which is running over a hundred virtual machines. This is a High Availability (HA) system subjected to a comprehensive set of lifecycle operations.

First unveiled at Mobile World Congress 2015, this live demonstration presents a virtualization catalog structured around an application store and launchpad coupled with rapid service instantiation. A holistic approach to Life Cycle Management (LCM) and Reliability, Availability, Serviceability (RAS) tests are demonstrated along with advanced Service Function Chaining (SFC).

The demonstration is designed as a cloud system executing some of the most sophisticated Virtual Network Functions (VNF). It integrates an Operations Support System (OSS), Management and Orchestration platform (MANO) and Software Defined Networking (SDN) in a modular and scalable structure based on Alcatel-Lucent solutions available in 2015 and is fully aligned with the European Telecommunications Standards Institute (ETSI) NFV Industry Specification Group (ISG) framework. The Alcatel-Lucent products demonstrated are:

- **VNF:** Virtual Evolved Packet Core (vEPC) and Virtual IP Multimedia Subsystem (vIMS)
- **MANO:** CloudBand Management System (CBMS)
- **SDN:** Nuage Networks Virtualized Services Platform (VSP)
- **OSS:** Motive Dynamic Operations (MDO)
- **NFVI (Network Functions Virtualization Infrastructure):** CloudBand Nodes

The Lean NFV Ops experience includes deployments executed from the ground up, augmented with new components and reconfigured while enduring maintenance with no downtime. Self-service Ops (S2O) empower the Communication Service Providers' (CSPs) own enterprise customers and Mobile Network Operators (MVNOs) to manage the services they consume by leveraging the same tools.

This demonstration presents CloudBand Ecosystem examples from third party members and innovations from Bell Labs Research on analytics and autonomics (machine learning) for NFV. It represents the capabilities of the Alcatel-Lucent Cloud Innovation Center (CIC), which is the hub for the Alcatel-Lucent CloudBand Ecosystem program.

Background

Three years ago, the telecommunications industry reached a turning point when it embarked on the NFV journey. ETSI hosted the NFV Working Group with members from leading network operators. A foundational paper was presented at SDN & OpenFlow World Congress in October of 2012. Today's most visible outcomes are baseline NFV requirements, an evolving reference architecture and specific use cases.

From day one, Alcatel-Lucent has been an active contributor and strong supporter of this initiative. The Lean NFV Ops demonstration focuses on ETSI NFV's Use Case #5, which calls for the Virtualization of Mobile Core Network and IMS. Our approach to lean operations reflects two guiding directives:

- **The end user experience is paramount.** This can be seen in a 4G video call that leverages Alcatel-Lucent's award winning Voice over Long Term Evolution (VoLTE) solution. The end user's quality of Experience (QoE) enjoys service continuity while the demonstration stimulates unplanned, pent-up demand, performs maintenance operations, and causes failures prompting dynamic system changes, all of which are successfully concealed from the running video session and completely transparent to the overall end user experience.
- **Mitigate complexity with elegant sophistication and manageability.** NFV's Future Mode of Operations (FMO) is DevOps friendly and is based on a software centric model driven by visibility, abstractions, analytics, ease of programmability and flexible automation, which are key to enabling and driving dynamic operations. By contrast, today's Present Mode of Operation (PMO) as seen in legacy and conventional architectures suffers from rigid frameworks, subpar utilization levels, costlier and lengthier lead times, which determine a conservative development culture, hamper innovation and negate necessary agility in today's fast shifting market.

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Lean NFV principles

NFV is a paradigm shift that embraces concepts and emerging technologies that will disrupt prevailing network design principles, operations, procurement and market practice. Adhering to lean principles means prioritizing value over self-defeating overhead and elevating purposeful quality under continuous improvement. Understanding cloud economics is of the essence: NFV's success is measured in significant operational effectiveness, cost efficiencies and value created by innovating with speed. To support these objectives, the Alcatel-Lucent Lean NFV Ops demonstration platform is based on ten design principles:

1. **Nimble environments:** Shift from tightly coupled, integrated stacks and dedicated hardware to software-defined systems and data center environments populated by widely available and more adaptable commercial off-the-shelf (COTS) servers and existing Information Technology (IT) solutions.
2. **Stack deconstruction:** Embrace openness and frictionless interoperability, decouple the logic and data planes and implement service decomposition, application modeling and easy to work programmable interfaces (API) to streamline and modularize service architectures.
3. **Intelligent allocation and distribution:** Work with smart load placement factoring cost, application requirements and service levels defining performance, capacity, security and high availability, which take the sheer scale and scope of the carriers' Wide Area Networks (WAN) into account.
4. **Dynamic and secure control:** Enable flexible automation that meets application lifecycle needs with timely orchestration of the underlying infrastructure through smart workload placement, policies, predictive analytics, autonomics and self-optimizing systems engineered to meet demand curves and operate with agility, full visibility and in control.
5. **Common resource pool:** Evolve from compartmental sprawl to application multi-tenancy options where services tap into shared assets exposed by common and scalable platforms, that rationalize and right-size resources on demand.
6. **Contextual operations center:** Realize the positive impact of asset consolidation with centralized management and an aggregated sky view that transcends conventional silos to render a context-aware and operations-friendly tactical single-pane-of-glass.
7. **Software house:** Adopt models enabled by network softwarization, which help raise infrastructure utilization levels and subsequent return on assets (ROA) followed by faster time to market (TTM), new value creation, and accelerated return on investment (ROI).
8. **Best-of-breed ecosystem:** Evolve beyond just settling for today's feature and performance parity to foster new value chains with multi-vendor environments that advance unique capabilities, some of which couldn't be achieved otherwise.
9. **Communities:** Use, be involved and contribute to open source initiatives and standards promoting industry wide benefits in everyone's best interest.
10. **Collaborative workstyles:** Devise roles and responsibilities that embrace co-creation with lead users, customers and partners; embrace experimentation, agile project management and DevOps to enable collaborative development and operations required to deliver Lean NFV.

About CIC

The Alcatel-Lucent Cloud Innovation Center (CIC) is part of the IP Platforms CTO organization. It delivers the following four programs:

- **NFV Lab**, which facilitates application onboarding projects and is the hub of the CloudBand Ecosystem.
- **NFV Experience**, which develops demonstrations and hands-on workshops, and participates in events and meetings with customers, industry analysts and third party partners.
- **Forward Lab**, which experiments and tests emerging techs, and works on forward-looking projects.
- **Community Cloud**, which provides a sandbox available to Alcatel-Lucent's in-house community and promotes flying our own jets (FOOJ) programs.

Contact […] to schedule a CIC demonstration or workshop.

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