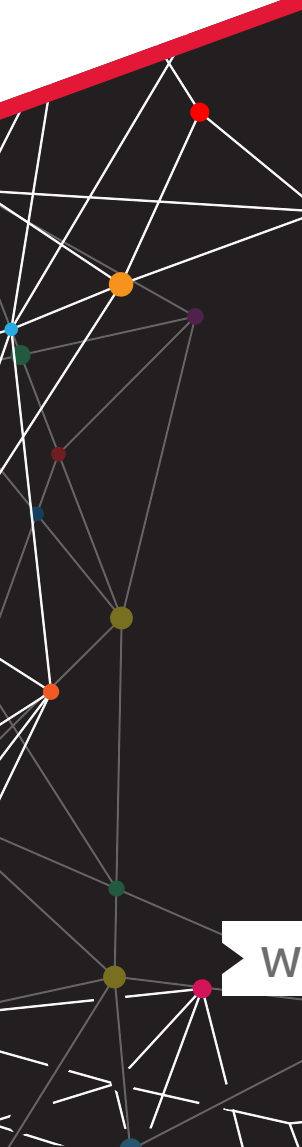


Multi-Mode Companion Cloud Automation

An Intelligent Path to Seamless Cloud
Automation for Communication Service Providers



WHITEPAPER



Abstract

In the rapidly evolving landscape of cloud computing, communication service providers (CSPs) are progressively adopting a multi-cloud approach through Red Hat's OpenShift. This is done to establish a versatile companion cloud, enhancing on-premise functionality to migrate workloads on any hyper-scaler (i.e., AWS, GCP, Azure, IBM Cloud) in an automated way. This also helps with cloud migration use cases, such as managing multi-cloud versions and their dependencies, offloading on-premises workload to multi-mode companion clouds. Red Hat OpenShift is the common CaaS layer for all of these applications, across all of the hyper-scale clouds, which allows for operational consistency and scalability.

Before the advent of multi-mode companion cloud automation, users faced challenges such as fragmented services, limited interoperability between applications, and difficulties in managing diverse digital tasks. This lack of integration often led to inefficiencies, data silos, and a less cohesive user experience. The need for manual coordination and switching between different platforms hampered productivity and hindered the seamless flow of information.

Multi-mode companion cloud fits CSPs applications, integrates with your system and platform technology using secure private, public, and hybrid clouds. This offers versatility by various services such as storage, synchronization across clouds, catering to diverse uses and needs.

As industries evolve, the demand for versatile cloud solutions has grown exponentially. The concept of a multi-mode companion cloud embraces this demand by providing a framework that adapts to different modes or scenarios, offering a holistic solution for diverse business needs.

In this whitepaper, we delve into the intricacies of multi-mode companion cloud automation, exploring how it addresses complexities associated with managing workloads seamlessly across various cloud providers.

We also cover the realm of cloud automation across various modes, i.e., zero-touch provisioning, hybrid cloud management. And how automation plays a pivotal role in enhancing efficiency, managing a myriad of applications, services, and devices seamlessly in flexible and adaptive cloud Infrastructure.

Multi-mode companion cloud automation can revolutionize the approach to cloud automation with single pane of glass management, fostering agility, scalability, and efficiency in an ever-evolving technological landscape.

Key Takeaways

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The Cloud Automation Journey

The framework, as seen in Figure 1, depicts end-to-end management multi-cloud/hybrid networks in a flexible manner which fulfills business and technical requirements.

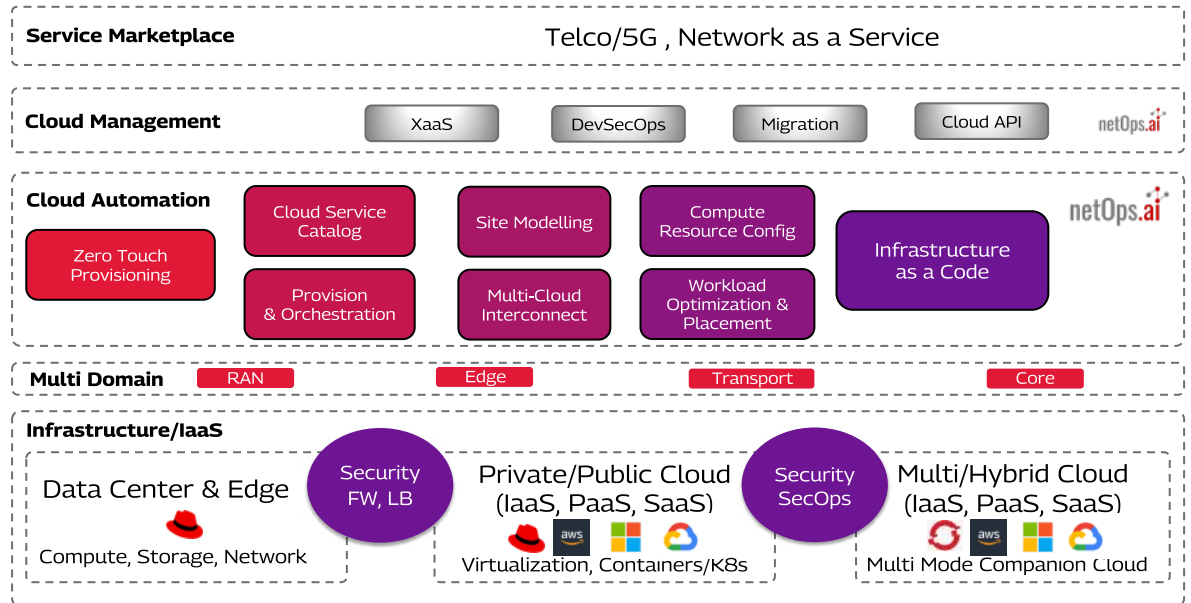


Figure 1 - Cloud Automation Journey

This modular journey provides a bird's eye view of cloud automation running on underlying infrastructure—edge data center (DC), private/public, and hybrid/multi-cloud—across multi-domain networks.

Cloud automation layer provides zero touch provisioning (ZTP) functionality with inclusion of bare metal and cloud automation with Day 0/1/2 configuration in an automated way. Overall, such cloud automations supported by an intent-based modelling approach helps CSPs to orchestrate in run-time on target clusters and optimize the performance. The infrastructure-as-a-code (IaC) functionality encompassing this layer broadens the automation scope with public/multi-hybrid cloud.

The cloud management layer provides a single-pane-of-glass management of multi-clouds and orchestrates workloads/applications seamlessly on top of them. It also helps in cloud migration of workloads with minimal downtime and dependencies. At Tech Mahindra, our automation platform, netOps.ai, and Red Hat Advanced Cluster Manager provides end-to-end cloud automation and management functionality. netOps.ai plays a vital role in this automation journey by providing the key to accelerate for 5G adoption and automates the lifecycle management of cloud application layer.

Service marketplace can be considered as a network-as-a-service offering for end customers, where users can choose any service and create service orders that further decompose and orchestrate across multi-cloud networks.

Solution Overview and Architecture

The solution architecture for a multi-mode companion cloud automation system involves a sophisticated blueprint designed to seamlessly integrate automation across diverse modes. A high-level overview has been provided in the following blueprint (Figure 2).

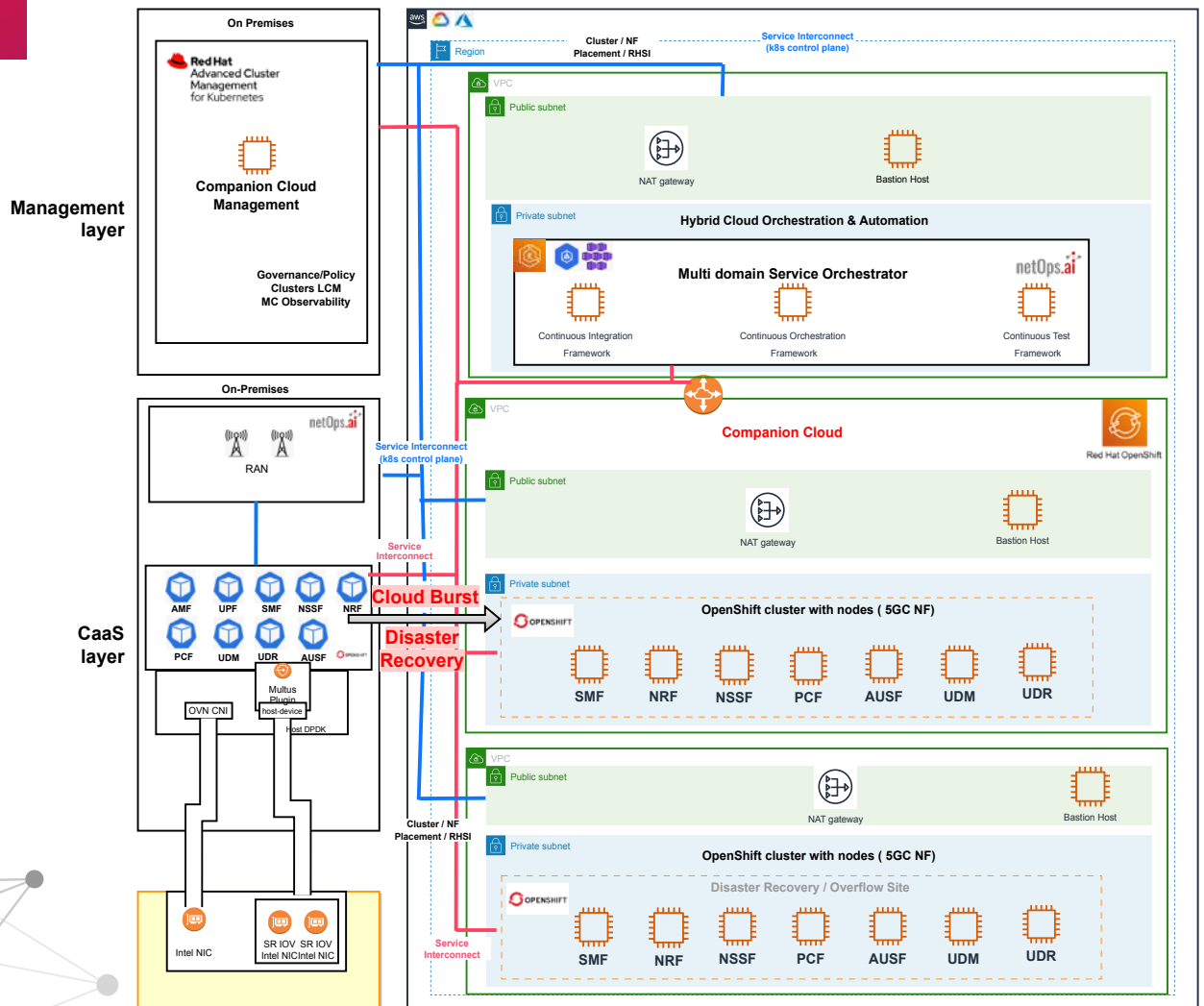


Figure 2: Solution Blueprint

This solution blueprint aims to create a robust, flexible, and secure foundation of multi-mode companion cloud automation catering to the intricacies of diverse modes.

- Ⓜ This blueprint demonstrates multi-cloud on-prem (private - Red Hat® OpenShift® Container Platform/OpenStack® Platform), public (AWS, Azure, GCP), and hybrid management with centralized orchestrator performing hybrid cloud orchestration.
- Ⓜ On-prem workloads can be migrated to multi-cloud environments with 5G control plane, subscriber data management functions residing on hybrid cloud (self-managed OpenShift), management plane on hyperscalers and 5G user plane, RAN functions on-premises. This would give a complete view of multi-cloud management.

- ▶ The multi-cloud interconnect services can be used for providing secure tunnels across clouds and seamless data migration.
- ▶ On-premises cluster management would be integrated with hybrid cloud service orchestration using a custom plugin.
- ▶ Companion cloud management would be provided by RH ACM that would handle CaaS lifecycle management.
- ▶ Tech Mahindra's netOps.ai would work as hybrid cloud orchestrator and provide multi-layer automation (infrastructure and network function automation).
- ▶ netOps.ai would also provide end-to-end multi-mode companion cloud automation integrating with RH ACM.

The Need for Automation in Multi-Mode Companion Cloud

Automation plays a vital role in multi-mode companion cloud as it streamlines repetitive tasks using customized workflow engines and increases overall efficiency. Automated cloud management tools help organize and categorize information, making it easier for users to find what they need quickly. It also brings automated resource allocation and NF placement in the target cloud and optimizes usage, ensuring that computing resources are allocated efficiently based on demand. Automated scaling processes enable the cloud infrastructure to adapt to changing workloads, ensuring optimal performance without requiring constant manual adjustments. Overall, automation brings resource management that helps control costs by optimizing resource usage, ensuring that computing resources are allocated efficiently without unnecessary expenses.

Automation in a multi-mode companion cloud is essential for creating a seamless, efficient, and user-friendly environment. It enhances productivity, improves data management, and allows users to leverage the full potential of the cloud's diverse capabilities.

Tech Mahindra netOps.ai and Red Hat Advanced Cluster Manager (RH ACM) integrated solution fulfills all these automation prerequisites where netOps.ai works as e2e master orchestrator and RH ACM provides cloud lifecycle management. Also, it provides end-to-end automation engine with automating cloud journey (Day 0/1 config), orchestrating NF workloads across multi-cloud in an automated way in a cost-efficient way using NF placement policies.

Use Cases

Multi-mode companion cloud serves a variety of use cases, enhancing user experience and addressing diverse digital needs:

- ▶ Cloud burst/cluster degradation would help in capacity expansion and infra optimization use cases in cost-efficient ways, such as:
 - Capacity expansion on existing on-premises clusters would be required.
 - Employing automation to adjust resource allocation based on demand, providing sensitive workloads with additional capacity across clouds.

- ▶ Disaster recovery across multi-clouds would provide data recovery:
 - Data migration across multi-cloud would always be a challenge.
 - Automated and scheduled seamless data migrations across clouds would help in achieving geo-redundancy (99.999%) with minimal downtime.
- ▶ Cross-platform data synchronization across multi-cloud would be used in cloud migrations:
 - Employing automation to reconcile data across platforms using 1:1 or 1:n (Active:Active) data synchronization methods.
- ▶ Cost Optimization:
 - Implementing automation to optimize resource usage and place NF workloads across clouds.

The Benefits of Multi-Mode Companion Cloud Automation

Multi-mode companion cloud automation provides multiple advantages as listed below:

- ▶ Enhanced efficiency, scalability, and flexibility:
 - Streamlines tasks and processes across diverse modes, reducing manual intervention and boosting overall operational efficiency.
 - Adapts seamlessly to changing workloads and operational requirements, scaling resources dynamically to meet demand in different modes.
- ▶ Improved resource utilization and faster response time:
 - Optimizes resource allocation by automating processes, ensuring that resources are utilized efficiently across varied applications and services.
 - Real-time automation enables rapid response to events and triggers, enhancing the system's ability to react promptly to changing conditions.
- ▶ Cost optimized and efficient security measures:
 - Reducing operational costs through intelligent resource allocation, automated scaling, and optimization strategies tailored to each mode.
 - Automates security protocols and compliance checks, adapting to the specific security requirements of different modes, enhancing overall system security.
- ▶ Streamlined application lifecycle management:
 - Facilitates the seamless deployment, configuration, and management of applications across different modes, ensuring a smooth application lifecycle.
- ▶ Agile hybrid and multi-cloud environments:
 - Enables organizations to operate seamlessly in hybrid and multi-cloud setups, with automation adapting to the nuances of different cloud providers and environments.

These benefits collectively make multi-mode companion cloud automation a strategic and impactful approach for organizations seeking to optimize their operations in dynamic and varied environments.

Future Trends in Multi-Mode Companion Cloud

Tech Mahindra and Red Hat's strong collaboration makes this solution unique -introducing smart automation across cloud lifecycle management with efficient application workloads placement. This allows users to modernize their stack with multi-cloud technologies.

Multi-cloud management can be considered a revolution in the telco world as it provides flexibility to users to place any kind of workload across clouds. We have also identified a few future trends that will leverage cutting-edge technologies to meet customer requirements.

- ▶ AI-driven automation to make systems more adaptive and intelligent across modes.
- ▶ Zero-touch automation with no manual intervention.
- ▶ Self-healing systems to create an autonomous world with recovering from faults.
- ▶ Serverless computing adoption
- ▶ Dynamic multi-cloud strategies leveraging application placement functionality.
- ▶ Human augmentation with integration of automation systems.
- ▶ Enhance DevSecOps functionality to provide E2E automation.
- ▶ Carrier-Grade CaaS layer across all public and private clouds.
- ▶ Operational effectiveness and scalability.
- ▶ Application scale due to common Carrier-Grade CaaS layer.

Multi-mode companion cloud automation emerges as an important solution, providing a holistic and adaptive approach to multiple cloud partners. As technology continues to evolve, this framework stands at the forefront, empowering organizations to navigate the complexity of diverse operational needs. This journey towards a more automated, future-ready cloud ecosystem begins with embracing the concepts mentioned in this whitepaper.

Please contact NSMarketing@TechMahindra.com to schedule a demo

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Paul Lancaster was a founding employee at one of the most well known Cloud Computing Service Providers and has been driving innovation and partnerships for Cloud Computing and Service Providers since 2008. He has managed partnerships worldwide for Red Hat for over 10 years. In his role in Telecom and Edge Business Development, he works with partners in integrating and productizing Red Hat Openshift and OpenStack with partner software for Red Hat's ecosystem of 100's of CNF and VNF applications.

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