Robin.io Builds Cloud-Native 5G, Edge Platform Using OpenNESS

The Robin platform automates deployment, scaling, and life cycle management for data- and network-intensive applications on Kubernetes via application topology awareness that uses OpenNESS for 5G and edge services.

Mobile network operators (MNO) are facing a major transition driven by 5G technology and increasing demand for content, new mobile network use cases, and new categories of intelligent devices. This transformation is fundamentally shifting the service delivery model and forcing MNOs to invest in modernizing infrastructure to better support increased volumes of data and rich content and add new interactive usage models.

The infrastructure transformation is driving three fundamental shifts in network scale, including an order of magnitude increase in total bandwidth available to each device, expanded capacity to accommodate the number of devices on the network at any given moment, and a new level of intelligence required from the network.

The technologies required to fulfill these shifts and accommodate the changing demand include:

1. Open radio access network (O-RAN)/virtual RAN (vRAN), which implements the RAN using an open software stack running on standard Intel® architecture servers. vRAN replaces current proprietary custom hardware and software, which does not have the right economics, scalability, and performance required for 5G deployments.

2. "Cloud-native" container-based applications are modular and provide favorable economics, scalability, and cost factors for large scale deployments. Many software providers are building cloud-native stacks for all aspects of service delivery and network management, and innovative new MNOs are building modern technology stacks that are increasingly relying on Kubernetes to build out modern technology stacks.[1]

3. Hyper automation is considered by many as a must-have to be able to manage scale, availability, and performance of a large number of endpoints as well as subscribers and content delivery systems.

MNOs need to be able to add intelligence and quickly adapt the software for different services. They also must add automation to rapidly scale the network with the most efficient utilization of the hardware. At the same time, these networks must be robust and resilient.

Robin Platform Enables Agility and Scale

The Robin platform is an application- and infrastructure-aware platform for automating the deployment, scaling, and life cycle management of data- and network-intensive applications on Kubernetes. The Robin platform abstracts the underlying server, network, and storage infrastructure so that MNOs can deliver 5G services in a cloud-native, API-driven environment with point-and-click simplicity. The Robin platform automates the provisioning and day two operations so that MNOs can deliver 5G applications in minutes instead of days.[2]

The Robin platform combines the benefits of containers and VMs, integrated into an application-aware scale-out storage stack that offers carrier-grade networking and an application-aware workflow manager. It provides a fully automated experience where complex applications can be deployed in minutes and their life cycle can be managed through radically simplified API-driven or point-and-click operations.

The Robin platform utilizes Open Network Edge Services Software (OpenNESS) to deliver networking features not available in Kubernetes and to facilitate orchestration. OpenNESS, an open source software initiative from Intel, enables orchestration of edge services across diverse network platforms and access for technologies in multi-cloud environments. It is a fully cloud-native and microservices-based architecture that is multi-access, multi-platform, and multi-cloud. It exposes a comprehensive set of APIs and services to reduce network complexity and accelerate the deployment of edge solutions.

OpenNESS is based on a suite of microservices that provide a framework for placement of any edge service, independent of the nature of that service.

The OpenNESS controller is used to deploy the edge applications on the edge node and manage the data traffic between the applications and cloud native network functions/virtual network functions (CNF/VNFs). Through the controller, appropriate traffic rules are set on the OpenNESS data plane, which then routes the device traffic to the edge application for processing.

Robin.io extends Kubernetes with intelligent, high-performance scheduling of CNFs on Intel® hardware by delivering advanced NUMA-aware placement, SR-IOV, DPDK, CPU pinning, and application topology aware storage and data management. Figure 1 illustrates the Robin platform architecture at a high level.
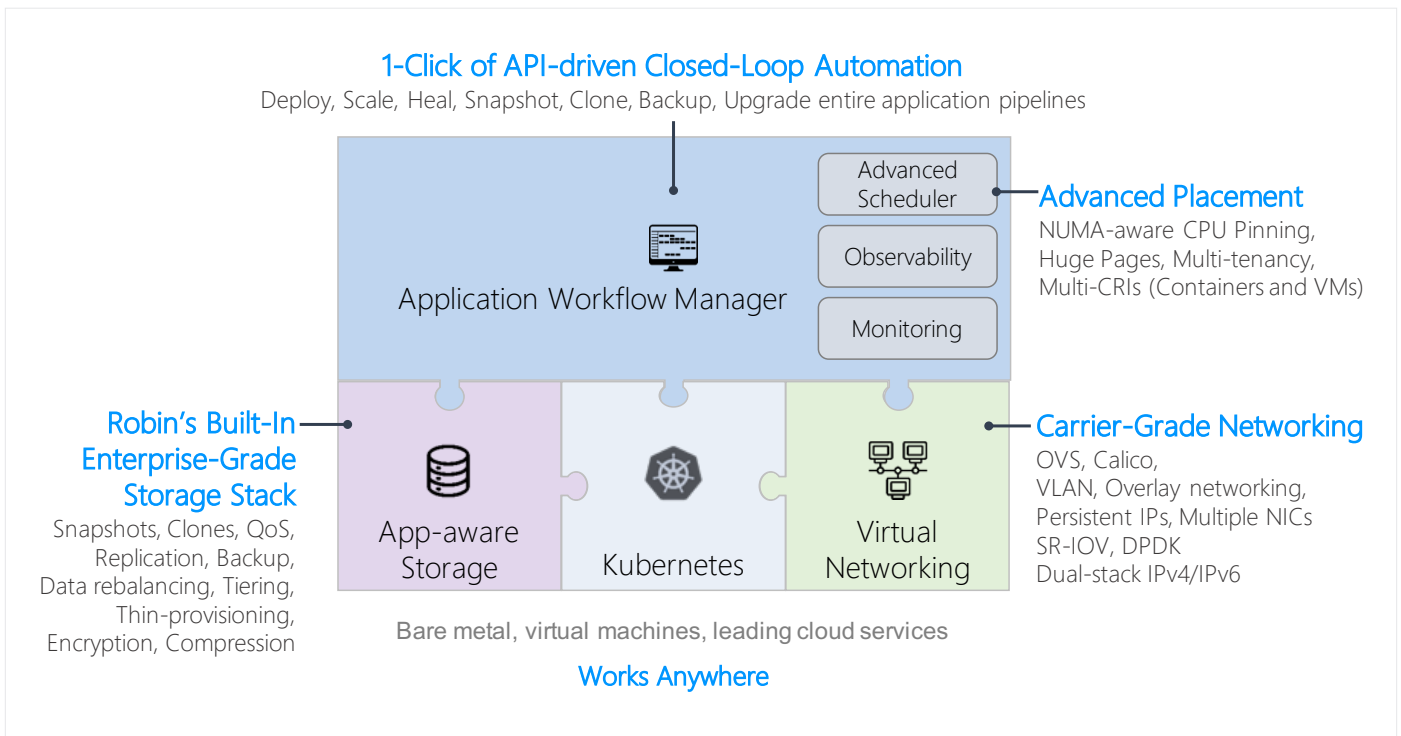
1-Click of API-driven Closed-Loop Automation
Deploy, Scale, Heal, Snapshot, Clone, Backup, Upgrade entire application pipelines

Advanced Scheduler

Advanced Placement
NUMA-aware CPU Pinning, Huge Pages, Multi-tenancy, Multi-CRIs (Containers and VMs)

Observability

Monitoring

Application Workflow Manager

Robin's Built-In Enterprise-Grade Storage Stack
Snapshots, Clones, QoS, Replication, Backup, Data rebalancing, Tiering, Thin-provisioning, Encryption, Compression

App-aware Storage

Kubernetes

Virtual Networking

Carrier-Grade Networking
OVS, Calico, VLAN, Overlay networking, Persistent IPs, Multiple NICs SR-IOV, DPDK Dual-stack IPv4/IPv6

Bare metal, virtual machines, leading cloud services

Works Anywhere

Figure 1. High-level architectural view of the Robin platform.

Robin.io and Intel® Technology Innovations for Telco

To support flexible deployment options, Robin.io specifies servers based on the Intel® Xeon® processor family, ranging from Intel Xeon Scalable processors for core network deployments to Intel Xeon D processors for uCPE servers. Intel Xeon processors fulfill diverse, mission-critical, and data-demanding workloads and are designed for real-time analytics. Intel Xeon D processors are optimized for lower power, smaller form factor designs.

To allow MNOs to further enhance the performance of their servers, the Robin platform supports the optional use of

Intel® Stratix® 10 FPGAs (field programmable gate arrays). The Intel Stratix 10 FPGAs offer the performance needed to help meet the demands of high-throughput systems with significant floating-point performance and multi-Gigabit transceiver support for chip-module, chip-to-chip, and backplane applications.

Solution Benefits and Business Impact

The Robin platform brings the agility, scale, and portability of cloud-native architecture to all 5G and mobile network applications. Table 1 lists some of the agility, cost effectiveness, and orchestration benefits of the solution.

AGILITY, DELIVER SERVICES FEATURES FAST	• Orchestration support for Open RAN • Intelligent automation of end-to-end provisioning process • Open, high-performance networking features including DPDK, SR-IOV, and MULTIS
COST-EFFECTIVE SERVICE DELIVERY	• Integration of any stateful or stateless application in a distributed development model for optimized delivery • Reduce infrastructure costs through automation that rapidly scales the network with efficient hardware utilization • Scale up dynamically by adding more memory, CPU, or storage; or scale out by adding more service components or nodes • Upgrade individual components and the entire stack in a non-disruptive, cost-effective manner without impacting operations
NETWORK AND SERVICES ORCHESTRATION	• End-to-end orchestration of microservices and legacy applications • Deployment options at network edge, data center, and telco cloud • Kubernetes-based architecture and standard Intel architecture hardware eliminates lock in and allows operators to select applications • Application-aware data protection and high-availability features for self-healing

Table 1. Solution benefits

Conclusion

MNOs are just now understanding the scale of automation they will need to grow existing networks and deploy 5G. With the Robin platform, they can build an application deployment automation infrastructure that works across their networks, one that provides both service deployment and instantiation, and ongoing life cycle management services. Utilizing OpenNESS for networking, the Robin platform offers hyper-automation for fast-growing networks.

About Robin.io

Robin.io provides an application automation platform that enables enterprises to deliver complex application pipelines as a service. Built on industry-standard Kubernetes, the Robin platform allows developers and platform engineers to rapidly deploy and easily manage data- and network-centric applications—including big data, NoSQL and 5G—independent of underlying infrastructure resources. The Robin platform is used globally by companies including BNP Paribas, Palo Alto Networks, SAP, Sabre and USAA. Robin.io is headquartered in Silicon Valley, California. More at www.robin.io and Twitter: @robin4K8S.

About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at http://networkbuilders.intel.com.