STRATUS® CLOUD SOLUTIONS FOR COMMUNICATIONS SERVICE PROVIDERS

Software-based fault-tolerant cloud solution

The Stratus software-based fault-tolerant Cloud Solutions enable Communications Service Providers (CSPs), cloud providers and application providers to easily offer and deploy any Virtualized Network Function (VNF) or other cloud application as a highly available (HA) or stateful fault-tolerant (FT) network function, with geographic redundancy—without changes to application code.

Transparent Service Continuity

Stratus' Software Defined Availability (SDA) moves fault management and automatic failover from the applications to an automated virtualized resilience layer that provides fully automated, selectable levels of resilience to cloud workloads for Network Function Virtualization (NFV) and SDN. Complete fault management—including fault detection, localization, isolation, recovery and repair—is automatically done by the software infrastructure without application awareness.

This solution enables CSPs to apply successful IT technologies —such as commercial off-the-shelf (COTS) hardware and the mass virtualization and cloud deployment of applications—to the carrier network, without the complexity and time consuming efforts required to modify and test every application.

Key Benefits

Seamless protection and fault-tolerance

- Save time and reduce complexity in deploying any virtualized and cloud application for transparent and instantaneous service continuity, without code changes

Fault management and selectable levels of resilience for all VNFs

- Deploy a variety of functions such as control and forwarding elements with selectable levels of resilience for each, including high availability and fault-tolerance, with geo-redundancy

Efficiency of redundancy

- Unlike traditional fault-tolerant approaches, which limit utilization to sub-50%, the Stratus Cloud Solutions dramatically increase efficiency of redundancy with over 80% utilization—for lower CAPEX and OPEX

This Stratus solution enables CSPs to apply successful IT technologies to the carrier network, without the complexity and time consuming efforts required to modify and test every application.

Selectable Levels of Resiliency, Including High Availability and Stateful Fault-Tolerance

While some applications such as MME (Mobility Management Entity) and HSS (High Speed Switch) may need stateful FT so that all session states are protected, other applications such as DDoS (Distributed Denial of Service) and firewall may only require instant HA—which means when there is a major fault, the application may be immediately restarted on another server (and traffic automatically redirected) without the loss of service accessibility and service continuity.

With SDA, any application with any availability requirement can be run in the cloud with application transparency and without the complexity and performance overhead associated with application-based approaches. For example, a control element VNF-C can be tagged and deployed in FT mode, while its componentized forwarding element VNF-C with SR-IOV enabled can be run in instant HA for high-performance and low-latency processing—all without application code changes and awareness.

This private and hybrid OpenStack/KVM based cloud solution provides multiple availability levels that transparently, intelligently and dynamically match selected application availability levels with infrastructure resources; using only the resources you need when you need it, so you can maximize utilization, efficiency and ROI with one cloud solution for all applications.

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Investment Protection Using Commodity Hardware

Deployed on commodity servers with no special skills required, the modular and flexible architecture preserves existing VNFs and other application investments and enables you to expand your cloud-based service offerings. This means you can deploy any KVM and OpenStack based application using our automated resilience management layer which interfaces to an orchestrator or OSS of your choice through our open API—this saves time, money and reduces new deployments from months to days or minutes.

Statepointing of VMs

Unlike application-based HA solutions which require application code changes, this solution automatically creates VM pairs between hosts in an anti-affinity mode so that the state of a VM (and all its applications) are captured regularly and asynchronously, based on a highly sophisticated algorithm that ensures globally consistent state for all applications deployed in a stateful FT option. If a fault occurs on the primary server, the secondary server takes over automatically from the most recent statepoint without data loss.

Efficiency of Redundancy

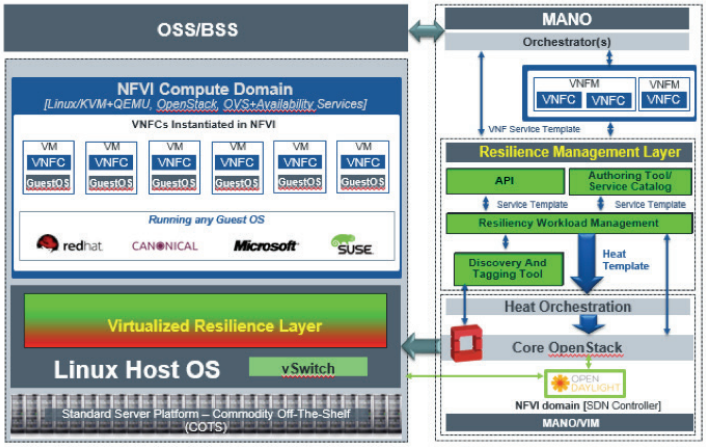
Each primary server VMs (with their applications) are backed up on separate secondary servers. However the secondary shadow VMs are getting state updates (if state protection FT is requested) rather than doing the same amount of work as the VMs on the primary. Each secondary VM is only using about 6%-10% of the CPU resources used by its corresponding primary VM. This means, unlike the traditional 1+1 or n+n approach which require twice the amount of resources, this solution requires much less secondary capacity. Therefore n number of servers will only need k number of additional servers for HA or FT, where k is much less than n. Also, each physical server will run a combination of primary VMs (whose secondary VMs are backed up on separate servers) and also smaller secondary VMs whose primary VMs are doing the complete workload in other physical servers. This n+k de-clustered redundancy significantly increases utilization and the efficiency of resiliency—which translates to significant decrease in CAPEX and OPEX.

Availability Services and Workload Services

Stratus' Cloud Solutions consist of two technologies; Availability Services and Workload Services.

Availability Services enable you to achieve stateful service accessibility and service continuity for mission critical workloads, as well as other availability level options for less critical workloads.

Workload Services provide resilience management and interfaces to existing OSS systems or orchestrators to enable fast, easy and efficient deployments and management for all workload types in OpenStack based clouds.



Stratus Software-Based Fault-Tolerant Cloud Solution Includes Virtualized Resilience Layer and Resilience Management Layer for Automation

Key Features

Availability Services

- Achieve SLAs with no downtime, data loss or business interruptions with stateful service accessibility and service continuity, without code changes
- Optimize ROI with one solution for all applications with multiple availability levels, on any commodity hardware server
- Increase efficiencies with higher resource utilization using n+k de-clustered redundancy

Workload Services

- Reduce complexity, cost and human errors with Resource Tagging
- Gain efficiencies and standardization with Template Authoring
- Speed up deployments from days to minutes with the Service Catalog
- Interface and integrate with other OSS and orchestrators through an open API

About Stratus

Stratus Technologies is the leading provider of infrastructure-based solutions that keep applications running continuously in today's always-on world. Stratus enables rapid deployment of always-on infrastructures—from enterprise servers to clouds—without any changes to applications. Stratus' flexible solutions—software, platform and services—prevent downtime before it occurs and ensure uninterrupted performance of essential business operations.

To learn more, visit **stratus.com**

Stratus Technologies

www.stratus.com