

Stratoscale / Mellanox Data Center in a Rack (DCR)

Bringing the power of public clouds to a private rack

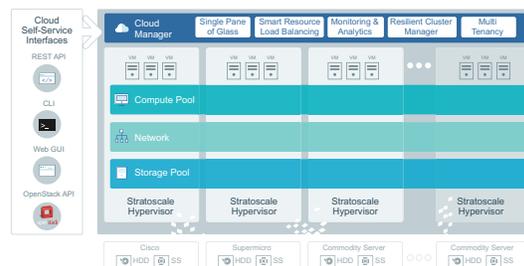


Background

There is no denying the attraction of the cloud computing paradigm, with the rapid provisioning of new workloads and the low management overhead of the compute, storage, and networking infrastructure required to support these workloads. Mellanox and Stratoscale have collaborated to create a joint solution that combines the ease of the public cloud with the security and control of on-premise equipment.

This joint Stratoscale/Mellanox private cloud solution delivers a high performance integrated rack fully populated with compute, storage, and network resources that are aggregated and managed as a single, holistic system.

Stratoscale provides many solutions addressing private clouds, big data, and rack-scale Hyper-convergence. Stratoscale's all-software solution is built around the BYOH principle. "Bring your own hardware" allows organizations to seamlessly integrate compute, storage and networking hardware systems, allowing for unprecedented operational simplicity, scalability and time to value:



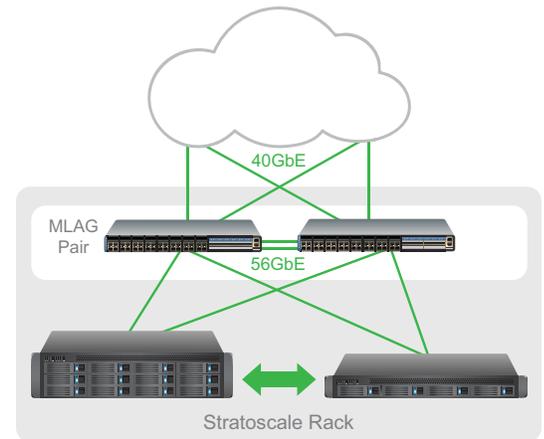
This "Data Center in a Rack" solution builds on the BYOH hardware principle, applying it to a specific set of compute, storage, and network components that were selected to maximize the amount of cloud computing capacity that can be achieved within a single 42RU data center rack.

The network that ties the compute and storage together must be scalable, reliable, and above all: high performance. Mellanox specializes in creating the best-in-class Ethernet switches with a focus on performance, with the lowest latency, highest packet rate, highest throughput, smallest form factor, and lowest power consumption switches in

the industry. All that performance would be useless if the management of it was not easily integrated into cloud orchestration tools. To that end, Mellanox created a powerful platform for managing scale-out computing networks called Mellanox NEO™.

Data Center in a Rack Solution:

This joint Stratoscale/Mellanox solution defines a high performance integrated rack that is filled to capacity with compute, storage, and network resources, with the goal of serving up the maximum level of workload scalability to fit in a single rack. Beyond combining sheer numbers of cloud computing components, Stratoscale and Mellanox have integrated this joint solution in a way that this mammoth herd of workhorse compute entities and network devices can be managed as a single, aggregated system.



Server Details:

- 47 Server Nodes
- 940 Cores (Xeon® E5-2660 v3 2.6GHz)
- 12TB RAM
- 680TB HDD
- 9 SuperMicro 6028TP-HC0R chassis
- 11 SuperMicro 6028R-E1CR12L chassis
- 40 Rack units for servers

Highly Available Network Design

- 2 Mellanox SX1410 Switches
- 40/56GbE inter-switch links
- 40GbE uplinks
- 94x 10GbE server links
- 2 Rack units for networking
- MLAG keeps all ports active

The Stratoscale private cloud solution supports maximum efficiency and ultimately the return on investment that the private cloud offers. It eliminates the separation between compute, storage, and network sub-systems. The Stratoscale hyperconverged private cloud solution provides these advantages:

1. **Fast and Easy Deployment** from zero to cloud in minutes for a single software package, including all infrastructure components, installed on any type of hardware host. Automatic hardware and network discovery keep setup time to a minimum.
2. **Self-service interface** provides full IaaS capabilities, while ensuring governance through user quotas and policies. With just a few clicks, users can create new machines on-demand using the Stratoscale GUI or through cloud management platforms.
3. **Resource pooling** large-scale IT resources can be pooled to serve multiple cloud consumers and tenants, utilizing distributed host disks for storage resource pooling. The statistical demand behavior is leveraged to squeeze the most out of the underlying infrastructure investment. In addition, the system supports multiple resource flavors and different price models, such as spot, reserved and reserved instances.
4. **Policy-based resource allocation** efficient and intelligent allocation of resources according to the defined criticality level or SLA of an application, tenant, or specific workload helps avoid resource overprovisioning.
5. **High VM density** compute storage and networking metrics are factored in VM and container placement decisions, automatically and transparently ensuring optimal resource utilization. Moreover, technologies such as memory deduplication and compression are used to enhance utilization levels of available resources.
6. **Linear scale out** web giant operational efficiency can be achieved at any scale, aligned with demand. You purchase only the required physical resources, and only when they are needed. With Stratoscale it is easy to instantly add resources. You can start small and grow based on the needs of the organization.

7. **Security** Stratoscale lets you build your cloud services, located on your premises, behind your perimeter firewall. Once deployed, you can implement your security policies by effectively defining and configuring logical networks to control traffic between machines and tenants.

8. **High availability** a fully distributed architecture ensures high availability and protection against multiple node failures. Stratoscale self-healing and self-balancing help prevent system failures and loss of data.

9. **Single-pane-of-glass** Stratoscale's centralized administration eliminates the hassle that comes with multiple device and stack management, resulting in higher operational efficiency.

10. **Lowest TCO** Stratoscale automated management eliminates the need for multiple specific system experts as well as software licenses, traditionally required for each and every individual component. In addition, the use of a single solution eliminates dependencies on expensive centralized systems, such as external storage. The result is a reduction in both upfront capital outlays and operational expenses.

Key features/benefits of the Mellanox Ethernet Switch

The Mellanox SX1410 Ethernet switch used in this configuration brings industry leading density, power efficiency, and latency. The SX1410 is the first non-blocking top of rack SDN switch providing unmatched performance advantages while lowering operating expenses.



The Mellanox SX1410 is the optimal 10G top of rack switch with 48 ports of 10GbE and 12 ports of 40/56GbE, it delivers non-blocking throughput between the compute nodes in this solution as well as line rate connectivity with the existing client network. Based on Mellanox's SwitchX®-2 silicon, this switch packs 48 SFP+ and 12 QSFP interfaces in an ultra-dense 1U form factor. The SX1410 features an industry-leading latency of 230ns and power efficiency while providing optimal performance.

The Mellanox SX1410 switch has a rich set of networking and application performance features, making this switch the perfect component for building the network fabric of this DCR solution. Whether it runs database applications, analytics, virtual desktop infrastructure, or other cloud computing applications, a high performance, lossless fabric is integral to the success of this solution.

The two Mellanox SX1410 switches in this solution will coordinate packet forwarding by operating in Multi Chassis Link Aggregation (MLAG) mode, which enables all server ports to be teamed together in an active/active mode (LACP) and all inter-switch ports to forward simultaneously in an active/active fashion with no blocked ports from Spanning Tree. Any link failure event is detected at the physical layer and recovered from in under a second. This MLAG mode is accomplished with a very simple configuration, where both switches

in this solution have functionally identical configuration files, making network provisioning simple and field replacement of switches headache free.

The network fabric for this solution is ultra-low latency, with an average node-to-node latency of well under a microsecond. This network advantage improves Application-level performance with decreases in time to completion durations and faster live migrations of Virtual Machines within the rack.

All of the switch interconnections in this solution run in 40/56GbE mode, which provides 40% more throughput than standard 40GbE links and has the further benefit of reducing the number of cables required by 29%.

The Mellanox SX1410 is the physical connection between the Stratoscale solution and the rest of the client infrastructure. The ability to interoperate with the rest of the network is an implicitly important consideration, as any incompatibility at a physical layer, like optical connectivity, or at logical layer, like a protocol stack, would limit the ability to deploy this solution. The interoperability capabilities of the SX1410 has been tested and verified by the largest server EOMs, in 3rd party labs, and in live deployments world-wide, which enables a worry free deployment of this solution into any modern data center.

To ease the management of the two switches and 120 ports utilized in the internal network, this solution includes Mellanox NEO™, which provides a single unified interface to the fabric, thus extending existing tools capabilities into monitoring and provisioning the data center network. Mellanox NEO™ uses an extensive set of REST APIs to allow access to fabric-related data and provisioning activities.



Mellanox NEO™ automates the provisioning and monitoring of the modern data center fabric, the configuration of devices, provides deep visibility into traffic and health, and enables the early detection of errors and failure events.

Conclusion

Stratoscale is redefining the data center, developing a hardware-agnostic, software platform converging compute, storage and networking across the rack or data center. This self-optimizing platform automatically distributes all physical and virtual assets and workloads in real time, delivering “rack-scale economics” to data centers of all sizes with unparalleled efficiency and operational simplicity.

Combining the control and scale of Stratoscale software with the performance of Mellanox switching hardware enables this Data Center in a Rack integrated infrastructure solution to be optimized for performance, power consumption, and ease of use.



350 Oakmead Parkway, Suite 100, Sunnyvale, CA 94085
Tel: 408-970-3400 • Fax: 408-970-3403
www.mellanox.com