

# Brocade and Basho Solutions

## HIGHLIGHTS

- Provides a scale-out network for scale-out distributed databases, enabling predictable high performance and operational simplicity
- Leverages Basho Riak and Brocade VCS Fabric technology to deliver a highly available, fault-tolerant, predictable, and easy-to-use distributed system
- Provides the assurance of a jointly validated solution designed for optimal performance and efficiency

## Distributed Systems and the Network

In response to the explosive growth in unstructured and semi-structured data, distributed systems technology has undergone a rapid evolution. New business requirements—such as the need to store large repositories of movies, virtual machines, or other large objects—demand more cost-effective and scalable technologies than traditional scale-up storage and database solutions provide. This has driven the development of linear, scale-out distributed database technology, which can leverage the cost and scaling benefits of commodity servers. For this technology to be most effective, it must run on a linear, scale-out network to assure optimal performance and ease of use.

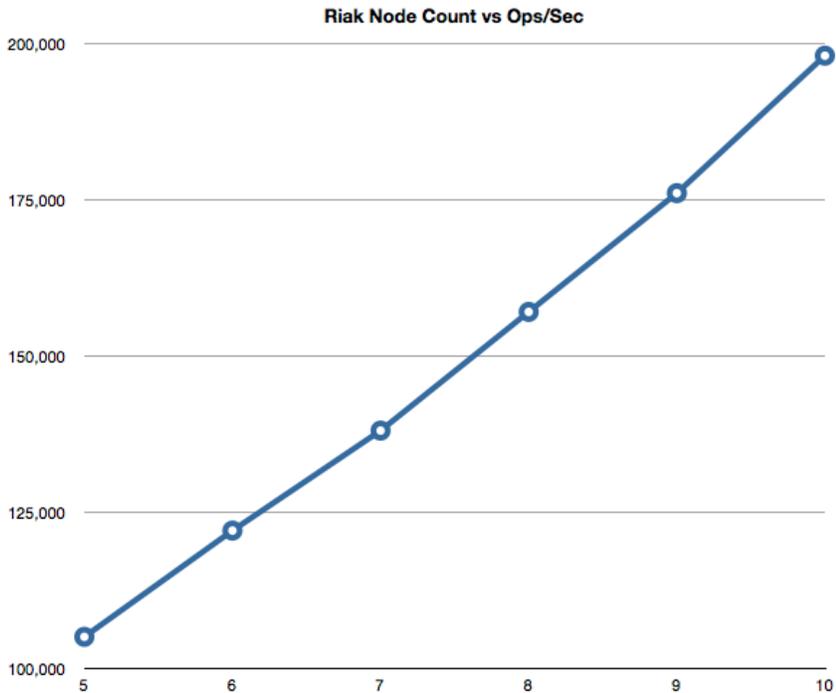
## The Brocade and Basho Solution

Basho Technologies is the creator and developer of Riak, a distributed NoSQL database that provides high availability, fault-tolerance, and operational simplicity; and Riak CS, a cloud-based object storage system that sits on top of Riak. Basho's distributed software system can be deployed on commodity servers with Direct Attached Storage (DAS). This creates a linearly scalable system whose high availability and fault-tolerance are assured by the software itself, not requiring expensive or proprietary high-availability mechanisms in the server hardware.

For a distributed system like this to work optimally, the network that interconnects the servers must be highly efficient and deliver predictable low latency. The performance of the distributed database cluster can be severely degraded if the underlying network suffers from packet loss, congestion, high latency, or high jitter. Such network problems result in server nodes going into TCP slow-start, a protection mechanism built into TCP that protects applications from packet loss but greatly decreases performance and throughput.

The ideal network for a distributed database technology such as Riak should be inherently scale-out, have deep





**Figure 1:** A series of 30-minute benchmark tests measured the performance of a Riak cluster of varying size running on Brocade VDX 6740 Switches.

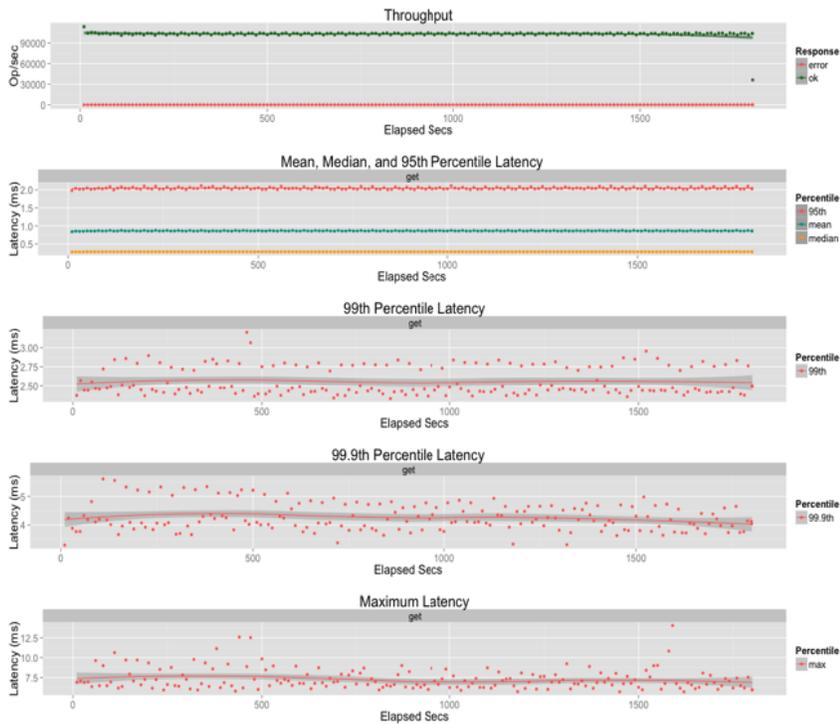
buffering to absorb server microbursts, and provide consistently high throughput and low latency. It should also be able to scale-out non-disruptively so that as more servers are added to the database cluster, more switches can be added without reconfiguring existing switches.

Brocade® VDX® switches provide the advanced feature set that data centers require and deliver the high performance and low latency these environments demand. Together with Brocade VCS® Fabric technology, these switches can simplify network design and operations for a more automated and efficient network, offer the flexibility needed to easily scale networks, deliver the predictable low latency required, and offer deep buffering to absorb any bursty traffic.

### Joint Validation, Proven Performance

Basho and Brocade, recognizing the importance of matching the performance and scale-out properties of distributed database technology to the corresponding scale-out network underlay, set out to test the performance of Brocade VDX switches in a Basho Riak deployment.

Tests measured the performance of a Riak cluster of varying size running on Brocade VDX 6740 10 Gigabit Ethernet (GbE) switches. The basho\_bench load generation tool was run against the nodes as the test team increased the cluster node count and then graphed the results. The test team ran 30-minute benchmarks of reads and read/writes against the cluster as the cluster size was increased from 5 to 10 nodes (see Figure 1).



**Figure 2:** Riak validation test results showed highly efficient and predictable performance from the underlying Brocade network.

The IOPS and associated network performance results for the 5-node test (see Figure 2) demonstrated consistently high network throughput and consistently low latency, including very low variance (no more than 3 to 1) from the 99th and 99.9th percentiles. This is indicative of highly efficient and predictable performance from the underlying network.

### Summary

Brocade and Basho are delivering industry-leading solutions for distributed systems, distributed networks, and object storage repositories. When deploying such modern systems, it is important that all applications, the underlying database, the object store, and the network work together seamlessly in order to reap the full benefit of these amazing new tools.

### Learn More

Brocade partners with companies of all sizes to deliver innovative solutions that help organizations maximize the value of their most critical information. To learn more, visit [www.brocade.com](http://www.brocade.com).

### About Brocade

Brocade networking solutions help organizations achieve their critical business initiatives as they transition to a world where applications and information reside anywhere. Today, Brocade is extending its proven data center expertise across the entire network with open, virtual, and efficient solutions built for consolidation, virtualization, and cloud computing. Learn more at [www.brocade.com](http://www.brocade.com).

### About Basho

Basho is a distributed systems company dedicated to making software that is highly available, fault-tolerant and easy-to-operate at scale. Basho's distributed database, Riak, and Basho's cloud storage software, Riak CS, are used by fast growing online businesses and by over 30 percent of the Fortune 50 to power their critical Web, mobile and social applications and their public and private cloud platforms.

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