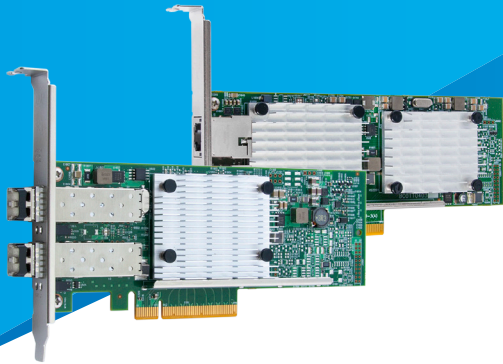


# SQL 2014 Database Backup Acceleration with Cavium FastLinQ 3400 & 8400 Series Adapters



Cavium Intelligent Ethernet Adapters and Converged Network Adapters ensure database backup completes in record time and applications continue to perform with maximum Quality of Service (QoS) thanks to Switch Independent NIC Partitioning.

## EXECUTIVE SUMMARY

The window of time to complete a backup has shrunk over time but the amount of data that must be backed up has grown exponentially. The Cavium™ FastLinQ® 3400 and 8400 Series Adapters ensure large backups complete on time while still enabling critical applications to perform optimally on the same server.

- Accelerate SQL backups and protect OLTP and application performance with the same adapter.
- Avoid over provisioning a “fat 10 GbE pipe” to applications that don’t need it.
- Ensure Quality of Service (QoS) in real-world environments.

## OVERVIEW

To make backups fit within a business’ target window, database administrators are forced to make compromises. They can only manage differential and incremental backups during most business days, which makes a system restore operation considerably longer and more complex. Bringing a failed system back online requires the latest full backup plus all the incremental backups before the failure event. If any one of those backup objects are compromised, the restore will be compromised. By applying the QoS features available with the Cavium FastLinQ 3400 and 8400 Series of 10GbE Ethernet and Converged Network Adapters, administrators won’t have to compromise.

Choosing the best connection to the cloud requires careful consideration. Cavium, with over 20 years of computer and storage networking experience, knows what it takes to ensure the customer gets the most out of their cloud.

Feature	Cavium FastLinQ 3400	Cavium FastLinQ 8400
Line Rate 10GbE Performance	✓	✓
SR-IOV	✓	✓
Energy Efficient Ethernet (IEEE 802.3az)	✓	✗
10GBASE-T Connectivity (RJ45)	✓	✗
Switch Independent NIC Partitioning (NPAR)	✓	✓
VXLAN / NVGRE Tunneling Offloads	✓	✓
PCIe Gen 3	✓	✓

Cavium offers a broad range of essential networking features from Energy Efficient Ethernet with the option for 10GBASE-T connectivity to adapters with full hardware offload of storage protocols. The Cavium FastLinQ 3400 and 8400 Series Adapters offer Switch Independent NIC Partitioning (NPAR). Cavium NPAR is a powerful, unique Quality of Service (QoS) technology that allows the server administrator to get the most efficient use out of each 10GbE port.

Cavium NPAR is a totally dynamic bandwidth guarantee solution that ensures Service Level Agreements (SLAs) can be enforced at a very fine level of granularity. As businesses grow and expand their network backup infrastructure, Cavium adapters will ensure maximum performance while also offering better QoS for mission-critical applications running on the same hardware.

### PHYSICAL CONFIGURATION

To demonstrate the advantages of Cavium FastLinQ 3400 and 8400 Series Adapters, Cavium created this reference architecture using a real-world environment similar to an e-commerce website. The infrastructure includes a virtualized server running TPC-C-like benchmarks modeled on real customer workflows. The backend database is a sophisticated Microsoft SQL Server 2014 AlwaysOn configuration database interconnected via 10GbE with two replication servers and a fourth server for dedicated backup. To stress-test the QLE3442 adapters at the maximum bandwidth possible, the configuration used an All Flash Array over a Cavium Fibre Channel connection to the database servers.

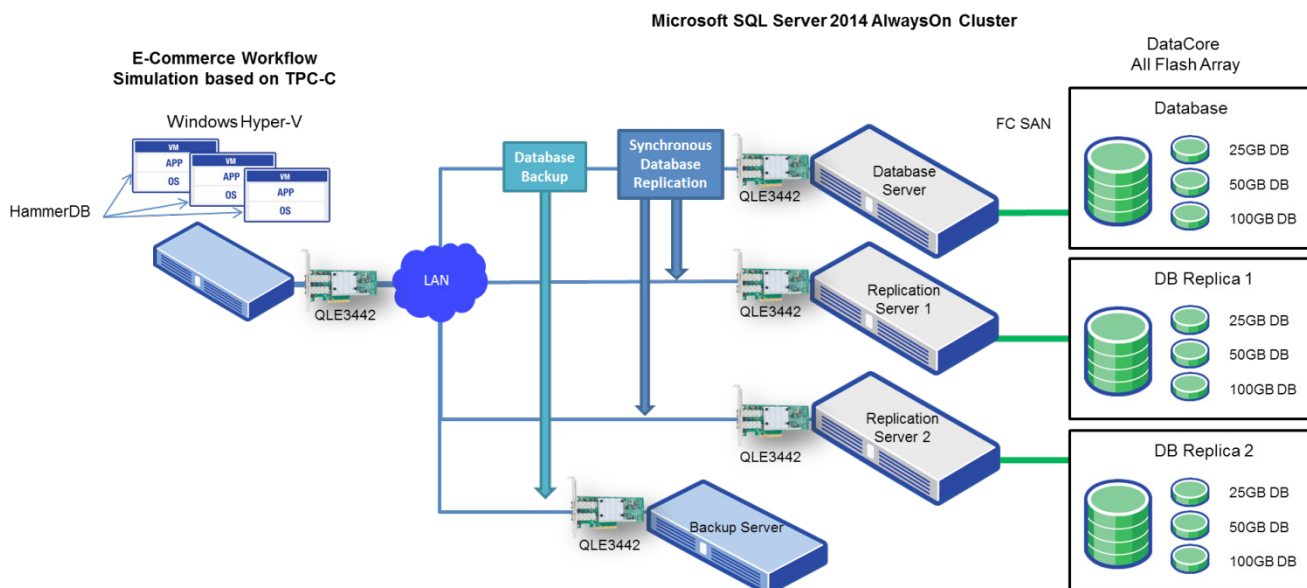


Figure 1. E-Commerce Reference Architecture with SQL Backup and Replication Servers

## SERVERS

- Intel Xeon E5-2640, 2.5GHZ, dual sockets, 12 core each, 24 total cores, 32GB memory
- On Board LOM - 1GbE
- 10GbE QLE3442-SR-CK Intelligent Ethernet Adapter
- QLE2562 8Gbps Fibre Channel Adapter

## SWITCH

- 8Gb Fibre Channel switch
- 1GbE Ethernet switch
- 10GbE Ethernet switch

## STORAGE

- DataCore All Flash Array with four 300GB SSDs, 1.2TB usable space

## DATABASE

- The databases were built with an OLTP DB performance tool using a TPC-C profile, at 25GB, 50GB, and 100GB.

## FINDINGS

Cavium performed an experiment using 1GbE and 10GbE LAN connectivity between the primary replication server and the target backup server. The results showed up to a 95% reduction in backup time.

10Gb SQL Backup over QLE3442 Bandwidth Protected NPAR – Physical Function

Database Size	Backup Over 1Gb (Minutes)	Backup Over 10Gb (Minutes)	Differential (Decrease)
25GB	9:27	0:40	92.95%
50GB	21:11	1:02	95.12%
100GB	27:28	2:15	91.81%

In addition to upgrading the infrastructure to 10GbE, the QLE3442 and QLE8442 adapters give administrators the ability to set a Quality of Service (QoS) guarantee using Cavium NIC Switch Independent Partitioning (NPAR).

Figure 2 illustrates how applying NPAR can ensure QoS for the backup, application, and SQL replication I/O using the same physical adapter. This is possible by taking a physical 10GbE port and logically dividing it into as many as four Physical Functions (PFs). The PFs look and act like any Ethernet port as far as the server BIOS and operating system are concerned. This method of partitioning an Ethernet port presents to any operating system in the same way, making it easy to use in many environments. It also makes any standards-based Ethernet switch compatible with the feature.

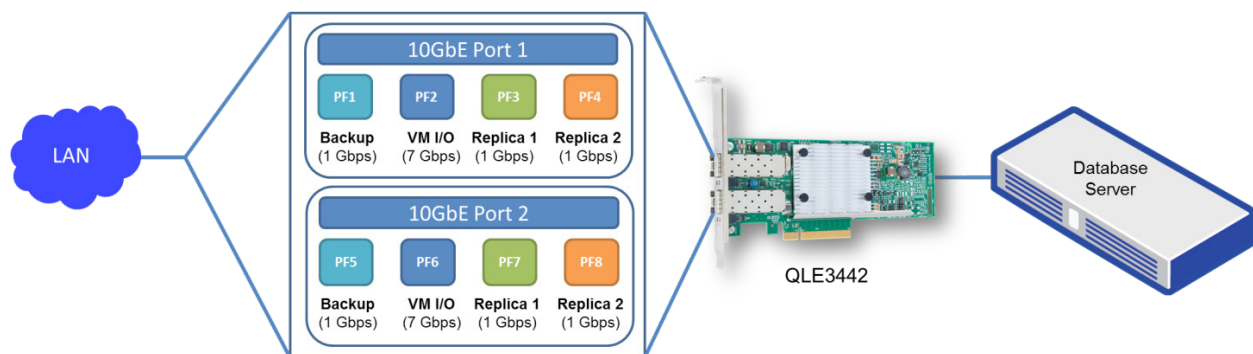


Figure 2. QLE3442 10GbE Ethernet Adapter Configured with NPAR

## CONCLUSION

Today's networks are consolidated into hyper-efficient, multi-purpose data engines. The data must continuously be backed up, replicated, and available. In addition to turbo charging your AlwaysOn environment, when combined with Cavium NPAR, networks can realize even more advantages. The SQL backup is now screaming fast and other critical applications are also getting their SLA required share of the network bandwidth—all using the same hardware. Better hardware utilization saves money and better performance saves time. This ultimately means happy system administrators and happy customers.

This performance and flexibility allows database administrators to perform full backups within every backup window. This removes a considerable amount of risk and makes backups available for completing a full restore of critical system data in the shortest amount of time. Saving time saves money.

Any database administrator who has labored through the restoration of a critical system during prime business hours understands how critical time can be. Having tight, complete, and full backup objects available at all times is a real career saver.

## ABOUT CAVIUM

Cavium, Inc. (NASDAQ: CAVM), offers a broad portfolio of infrastructure solutions for compute, security, storage, switching, connectivity and baseband processing. Cavium's highly integrated multi-core SoC products deliver software compatible solutions across low to high performance points enabling secure and intelligent functionality in Enterprise, Data Center and Service Provider Equipment. Cavium processors and solutions are supported by an extensive ecosystem of operating systems, tools, application stacks, hardware reference designs and other products. Cavium is headquartered in San Jose, CA with design centers in California, Massachusetts, India, Israel, China and Taiwan.



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