

A Key to Data Center Efficiency:

# Driving Scale-Up and Scale-Out Workload Concurrency with HCI

WHITE PAPER

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Microsoft's SQL Server Data Warehouse application is a popular enterprise solution that facilitates strategic decision-making using massive data sets. However, that application requires substantial I/O, as do most enterprise business applications. As a result, many IT decision-makers feel a simple hyper-converged infrastructure (HCI) cluster isn't up to the job due to cost, scalability, and performance challenges. In this guide, learn how a specific HCI solution addresses those issues and offers your organization a route to HCI simplicity, enterprise-scale performance, and a drastically smaller footprint—all three rarely found in one package.

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Microsoft SQL Server 2017 was a bold step forward not only for the software giant, but also for enterprise IT leaders looking to mine and leverage the velocity and variability of data for real-time decision-making. With the native integration of SQL Data Warehouse, the application makes it easier and faster to run complex queries across vast data volumes—making it a critical component to enterprise data analytics.

Although SQL Data Warehouse offers many potential benefits to organizations, getting the most out of your application deployment requires attention to potential challenges. For instance, the dramatic expansion of enterprise data sources—more devices, applications, repositories, cloud services, and databases—brings the potential for lengthier ETL load time. And, business users' demands for more functionality and faster response times for customized reporting and dashboards create intense performance pressure.



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Now, add in the challenge that this isn't your only workload that users depend on, as well as the need for easy, cost-effective scalability within your data center. This has caused IT leaders to rethink how to deploy new infrastructure or caused them to stick with an aging infrastructure because the right solution wasn't out there.

As data velocity and variability changes, and as user requirements become more specific, it's understandable that IT decision-makers are feeling like they have to stick with the tried-and-true approach of storage-area networks and dedicated servers. The "just add a node or cluster" mentality gets unwieldy when you need a separate cluster for databases, traditional VMs, and now container workloads.

This guide will take you through what's possible with an HCI solution built for workload concurrency and driving greater efficiency in your enterprise data center. We'll focus specifically on database workloads like SQL Data Warehouse, traditional VM workloads such as VDI and file/print servers, and modern applications requiring cloud-native functionality like containers. Each presents unique performance and storage requirements that may not have always lent themselves to earlier iterations of HCI with hypervisor software layered on top of traditional small servers. But there are new HCI options built on larger, more powerful servers that can meet these unique demands—and more.

## The Problems

As data sources—applications, repositories, services, and devices—proliferate, data warehouses become more unwieldy, complex, and confusing. Not only that, even the seemingly straightforward tasks of understanding what's in the data warehouse and knowing where and how to extract it becomes a time-consuming and expensive chore.

Microsoft certainly understands this challenge and has taken steps in the latest version of SQL Data Warehouse to improve data accessibility and ETL. But the huge number and size of data volumes have put performance demands on data centers that legacy infrastructure can't meet—at least, not efficiently. Now, add to this scenario the fact that business users—the ones for whom data warehouses were created in the first place in order to solve business problems—now demand more functionality and faster response times for report and dashboard requests.

Some organizations have tried to address these problems by deploying data warehouses in the cloud, but that is becoming

increasingly challenging as extracting source data from on-premises systems to and from a cloud-based data warehouse can be maddeningly slow. This, in turn, defeats the purpose of having an enterprise data warehouse in the first place—which is to find otherwise hidden nuggets of insight quickly to support rapid-fire decision-making.

Additionally, with the increasing utilization of DevOps, containers, and micro-services, the need to scale those functions—either in the cloud or on-premises—demands a higher level of performance and flexibility than either legacy hardware or first-generation HCI have been able to deliver. What worked in earlier HCI iterations for VDI and file/print servers is not sufficient for modern enterprise applications and mission-critical workloads such as SQL Data Warehouse.

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## What an HCI Solution Should Look Like for Workload Concurrency

HCI is a great option for both legacy and modern enterprise applications, compared with a pure-cloud deployment. Most data sources are already part of an on-premises environment; users require frequent data warehouse updates and rapid response, and latency issues associated with large data warehouses can become exacerbated in the cloud-only scenario.

Whether your organization plans to utilize hyper-converged infrastructure as a purely on-premises solution in your data center or as part of a hybrid cloud solution, there are certain things you should look for in a next-generation solution for workload concurrency:

- **A hardware design that can handle the variability and velocity of legacy, standard, and modern workloads** without impacting performance profiles you may see in a traditional HCI cluster, bare-metal or SAN/server configurations. This will allow you to potentially substitute HCI for a SAN/server configuration and simplify management of storage and compute. You'll also need the flexibility to integrate card technology that can support



## HCI simplicity, enterprise-scale performance, and a drastically smaller footprint—all three rarely found in one package

specific workloads, such as graphics processing units for VDI.

- **Resiliency at several levels**, including software-defined storage and software-defined networking, in order to deliver simplified management, and decreased latency and performance bottlenecks at different software layers.
- **Seamless access to cloud capabilities** for a variety of functions, including offloading of backups and data/workload migration.
- **A reliable, experienced and workload-savvy technology partner** that can bridge the knowledge gap between hardware and software with the expertise necessary to maximize performance at all layers of the technology stack.

Clearly, earlier generations of HCI solutions were never intended to be utilized for such performance-intensive workloads like SQL Data Warehouse or other modern enterprise applications. A new approach is necessary to leverage the cost efficiency and easy deployment of HCI in a package that delivers enterprise-class performance (high IOPS and low latency), a consolidated footprint, and simplified management for mission-critical workloads.

### The Axellio HCI Solutions

Since first-generation HCI solutions typically lack the performance to overcome inevitable performance bottlenecks with enterprise workloads like data warehouses—not

to mention the need to support concurrent enterprise workloads—IT decision-makers who are looking to make a shift to HCI for its simplicity need to find new solutions specifically engineered for performance-intensive requirements. Ones with enough data storage capacity (required for these data-hungry applications) in an efficient package.

Fortunately, a breed of HCI solutions is available that is purpose-built for workload concurrency. The Axellio FabricXpress™ All-NVMe Server for hyper-converged infrastructure solutions (FX-HCI) is a great fit for applications such as the Microsoft SQL Data Warehouse because its clusters are comprised of a smaller number of robust, high-performance servers. FX-HCI provides “big iron”-class performance in a dense footprint. They are big enough, from a capacity and compute standpoint, to run a data warehouse instance that can coexist with others on the same cluster, but small enough in physical footprint to fit into environments outside a monolithic data center, such as micro or mobile solutions at the edge. They are efficient enough to help organizations save on space, power, and cooling costs.

Axellio's FabricXpress (FX) server line is built utilizing COTS technology and ties compute and storage together via a unique, highly-switched PCI bus. This architecture helps eliminate I/O bottlenecks, while its all-flash NVMe storage delivers the extremely low latency essential for enterprise business users' workload demands. FX takes HCI to a new level by supporting large Intel processors—up to 8 TB RAM and close to 2.5 PB of NVMe SSD storage in a 4-node HCI cluster. And for organizations with Microsoft software licenses,

FX offers substantially lower licensing costs for capabilities such as Storage Spaces Direct, backup and data recovery in Hyper-V hypervisors, de-duplication and compression technology in the ReFS file system, and Cluster Set for the management of multiple 16-node clusters as a single entity.

## Conclusion

Microsoft SQL Data Warehouse is an important enterprise application that many organizations are using for sophisticated data analytics and business intelligence use cases. However, that application, like most other traditional and modern enterprise applications, puts big demands for performance and scalability on organizations' data center infrastructure. IT buyers need a new approach to infrastructure that easily, efficiently, and reliably supports the larger number of data sources typically associated with SQL Data Warehouse, as well as the ability to support multiple, concurrent workloads with high I/O and low latency.

Axellio's FX-HCI solutions are optimized for these requirements; FX is engineered to deliver enterprise-grade storage for demanding workloads because the HCI solution is built upon a smaller number of very powerful servers, rather than on multitudes of smaller, underpowered boxes. FX-HCI allows organizations to avoid the time, cost, and hassle of adding nodes or clusters in order to scale with multiple, concurrent workloads—and is far easier to manage than a larger number of small HCI clusters. FabricXpress hyper-converged infrastructure solutions offer the performance, cost efficiency, availability, resiliency, and manageability required for SQL Data Warehouse and other demanding enterprise workloads.

**For more information on how Axellio's FabricXpress All-NVMe Server addresses the challenges associated with Microsoft SQL Data Warehouse and other enterprise applications, please visit <https://axellio.com/solutions/hyper-converged-infrastructure>**