Technical Case Study

An Adventure in Automated Warehouse Operations

How Retailer Jack Wolfskin Expanded into International Markets—Without Increasing IT Budget, IT Staffing Levels, or Carbon Footprint

For retailers, international expansion can require a massive increase in IT infrastructure and IT staffing. As a result, many companies reluctantly conclude that they can't afford it. But Jack Wolfskin succeeded by building a virtualized data center infrastructure for warehouse operations, based on NetApp® storage.

Europe's leading manufacturer of outdoor clothing, footwear, and equipment, Jack Wolfskin has approximately 750 employees at its headquarters near Idstein, Germany, and at a distribution center in Neu Wulmstorf, just outside of Hamburg. In 2013, customers purchased €324 million of merchandise through 4,000 retail outlets in Europe and China, in 870 franchise stores, and online at www.jack-wolfskin.com.

Manual Warehouse Processes Don't Scale

In 2007, the company wanted to expand from its base in German-speaking markets—Germany, Switzerland, and Austria—to China, the United Kingdom, and Russia. "But first we needed to modernize our distribution facility," says Severin Canisius, senior IT manager for Jack Wolfskin. "Our goals were to sell directly to end consumers, operate 24/7, and ship double the number of packages yearly."

To better manage the increased order volume, the company needed to make the transition from fax-based to online ordering and from manual to automated product sorting and order picking. "To provide same-day shipping, we couldn't have warehouse personnel walking up to five kilometers to fulfill one order," says Uta Mohr, Jack Wolfskin's senior manager for warehouse and distribution.

Our Solution Partner

Microsoft

The challenge was that implementing almost 100 new physical servers for the automated warehouse would be prohibitively expensive—both in terms of hardware costs and management. So much more equipment would also increase energy consumption, at odds with Jack Wolfskin's commitment to environmental sustainability.

The Right Gear for the Challenge

"The only way we could afford to expand internationally was to build a virtualized infrastructure for our warehouse applications," Canisius says. Jack Wolfskin identified three main requirements. The first was the performance needed to support demanding physical and virtual workloads such as Microsoft® Exchange Server 2010, Microsoft SQL Server® 2012, and the Klug integrated Warehouse Administration and Control System.

The second requirement was very low latency, because the automated conveyor system needs instant response from material flow control. Most companies with automated warehouses settle for physical servers with direct-attach storage because the storage used for virtual servers increases latency.

Third, Jack Wolfskin also needed zero downtime. "Downtime windows just aren't an option when you accept online orders from dealers and consumers in different time zones," Canisius says.

A First Attempt, Then Regrouping at Base Camp

Outdoor adventures can fail without the right equipment, and so can virtualization efforts. In fact, Jack Wolfskin's first attempt at virtualization did not succeed because the existing storage system could not run heavy virtualized workloads. To make the transition from physical to virtual servers, the company needed a storage solution that provides better performance with Microsoft Exchange Server and SQL Server.

"Not only does NetApp technology provide the performance needed for heavy virtualized workloads, but it also enables us to manage more than twice the storage capacity of our previous platform for a comparable price."

Severin Canisius
Senior IT Manager
Jack Wolfskin

Success, with NetApp Storage

The breakthrough came when Jack Wolfskin implemented NetApp storage and software solutions. "Not only does NetApp technology provide the performance needed for heavy virtualized workloads, but it also enables us to manage more than twice the storage capacity of our previous platform for a comparable price," says Canisius.

The virtualized infrastructure is based on NetApp storage systems, HP servers running Microsoft Windows Server® 2012 with Hyper-V®, and HP switches. Microsoft SQL Server 2012 runs on HP ProLiant DL785 servers, and other applications run on HP ProLiant 460c server blades inside of two HP BladeSystem c7000 servers. The servers connect to each other over 10 Gigabit Ethernet, and the SAN switch connects the servers to NetApp FAS3240 storage via 8Gb Fibre Channel (Figure 1).

To date, the company has virtualized more than 70% of its application environment and will soon meet its goal of 80%. Virtualized applications include Microsoft Exchange Server, Microsoft SQL Server, a Citrix-based virtual desktop infrastructure, a warehouse management server, the warehouse administration and control system, the consumer-facing website (www.JACK-WOLFSKIN.com), and the B2B website (e-Wolf.de). The IT team also consolidated its Windows® file servers, along with SharePoint® Server 2013 and SQL Server databases, using the native Server Message Block/Common Internet File System (SMB 2.0/CIFS) support in the NetApp Data ONTAP® 8 operating system.

High Availability for Round-the-Clock Retail Operations

At first, Jack Wolfskin deployed a NetApp FAS2040 with a single controller. It provided excellent performance with Windows Server 2008 with Hyper-V. A combination of NetApp deduplication, compression, and thin provisioning increased storage efficiency by 52%, immediately freeing up 20 terabytes of usable space. Power costs decreased by an estimated 50%, lowering costs while supporting the company's commitment to environmental sustainability.

Later, to increase security and reliability, Jack Wolfskin upgraded to a NetApp FAS3240 storage system with NetApp MetroCluster™ software and Windows Server 2012 with Hyper-V. "The common Data ONTAP operating system made it easy to migrate to a bigger and more scalable system," Canisius says.

Today the company has a pair of NetApp FAS3240 storage systems at headquarters and another pair at the distribution center. MetroCluster software provides high availability and disaster recovery through a combination of array-based clustering and synchronous mirroring. This means dealers can continue checking inventory and placing orders during server or storage maintenance or outages. "MetroCluster supports 24/7 operations because it's completely redundant," Canisius says. "We can take down half of it while we do software or firmware upgrades and business continues as usual."

Since implementing NetApp MetroCluster in 2009, Jack Wolfskin hasn't experienced a single second of downtime or any data loss. "Another advantage of MetroCluster software is that we manage upgrades from anywhere instead of coming in on the weekends," says Canisius. "I've even updated NetApp Data ONTAP from home and the airport." Jack Wolfskin continues to use the original NetApp FAS2040 system as a NetApp SnapVault® target for backup.

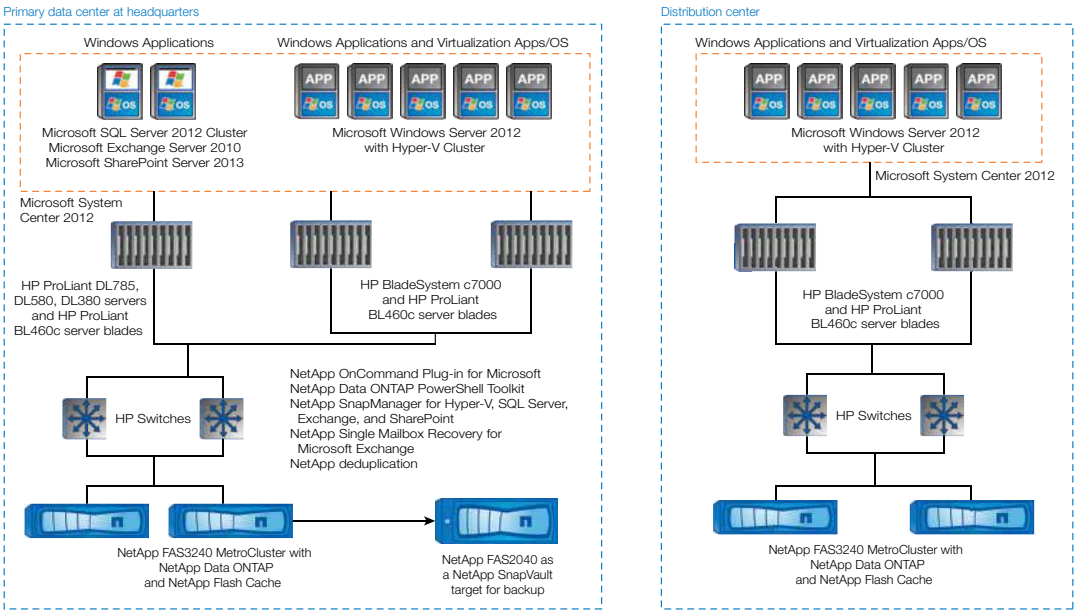


Figure 1) Virtual warehouse platform provides 73% more storage capacity at a comparable price.

Twenty Percent Year-over-Year Growth with Same-Size IT Staff

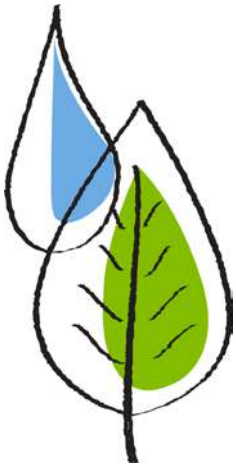
The virtual warehouse platform has helped Jack Wolfskin achieve 20% year-over-year growth without increasing IT staffing levels. From 2009 to 2012, Jack Wolfskin increased the number of packages shipped each year from 597,000 to 1.1 million, an 86% increase. The company is confident that it can ship 73% more items daily without any changes to the IT infrastructure or staffing levels. "Before, selecting every item in a 10-piece order could take more than a day," says Mohr. "Now we can fulfill that order in about 45 minutes."

One reason that the same-size IT staff can support increased volume is that adding new virtual servers doesn't increase management overhead. "When we need new server capacity, we just add another shelf to the NetApp FAS3240, at a fraction of the cost of new physical servers and storage systems," Canisius says.

The tight integration between NetApp and Microsoft System Center 2012 also simplifies management. The IT team uses Microsoft System Center Configuration Manager, Virtual Machine Manager, and Service Manager, and it is in the process of implementing Operations Manager and Protection Manager.

NetApp software saves even more time. NetApp OnCommand® Plug-in for Microsoft monitors capacity and provides alerts for Windows Server 2012 with Hyper-V virtual machines and storage. Jack Wolfskin also uses the NetApp Data ONTAP PowerShell™ Toolkit to accelerate virtual machine and storage management processes. The IT team currently uses approximately 10 PowerShell cmdlets (specialized .NET classes that execute a particular operation). One cmdlet helps to enable each new virtual hard disk that is provisioned to be correctly aligned and not consume more space than needed. Another cmdlet, called Windows Space Reclamation, keeps existing virtual hard disks as small as possible by instructing the operating system to release storage space when it's no longer needed.

Used in combination, the two cmdlets in the Data ONTAP PowerShell Toolkit increase available space by 30%. They also free up IT staff time because administrators don't have to constantly look for more space to host a new virtual system. "That's important because we invest in IT professionals not to perform repetitive administration tasks but to move the company forward," Canisius says. "NetApp integration with Microsoft System Center Operations Manager gives staff members more time to innovate. We believe this helps us hire and retain top IT talent."



Packing Light: The Impact of NetApp Storage on the Jack Wolfskin Infrastructure

- 50% reduction in data center infrastructure
- 70% reduction in storage hardware costs
- 86% more packages shipped with same-size IT staff
- 50% decrease in carbon dioxide emissions from IT infrastructure, attributable to a smaller storage footprint plus changes in the supply chain
- Zero minutes of planned and unplanned downtime in four years
- 10-fold reduction in I/O latency, enabling faster order picking

Faster Goods Intake, Faster Order Picking

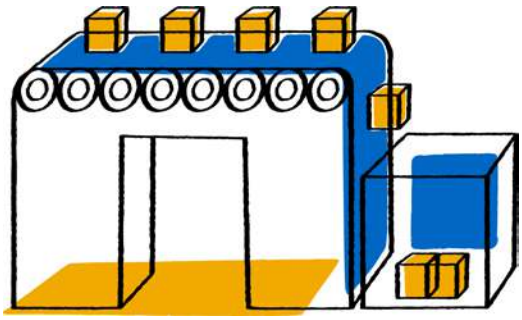
The high performance of the virtualized infrastructure enabled Jack Wolfskin to automate previously manual warehouse processes. For example, unloading a container of apparel used to take four to five hours while employees inspected cartons, labelled them, and placed them on the correct pallets. Now a virtualized application on NetApp storage automates the unloading process. “Just 45 minutes after a container arrives at the warehouse, all cartons are on the right pallet and ready for picking,” Canisius says.

Picking, too, is much faster, partly because of the very low latency in NetApp storage. Low latency is critical in warehouse operations. If the robotic vehicle that picks products off shelves receives an order even an instant after passing the exit for the product, it needs to complete the entire circuit again before picking the order. Minimizing latency is the reason that Jack Wolfskin previously ran SQL Server and the ERP system on physical servers with direct-attach storage. Now Jack Wolfskin’s warehouse applications can operate on Windows Server 2012 with Hyper-V virtual machines thanks to NetApp Flash Cache™ intelligent caching. “Our materials flow control system needs very fast response times,” Canisius says. “Flash Cache accelerates data access time from 10 milliseconds to 1 millisecond.” As a result, the company has significantly reduced the average number of circuits the robot takes to fill a day’s worth of orders. “We ship 30% of articles the same day a retailer requests them, and nearly all of the rest the next day,” says Canisius.

Dealer Access to Inventory and Ordering Systems

The new NetApp infrastructure also powers the company’s business-to-business website, called eWolf, which dealers use to check pricing and availability and to order online. “eWolf is a game-changer because it allowed us to expand to other countries without having to staff the sales office around the clock,” says Canisius. The eWolf web server operates as a virtual machine with Windows Server 2012 with Hyper-V on NetApp storage, which dealers access via web services. It processes orders that customers enter online and transmits them to the warehouse for automated fulfillment and same-day shipping.

Jack Wolfskin is also introducing new consumer applications that take advantage of the NetApp storage platform. For example, at the Frankfurt, Germany, airport store, customers can browse products and check real-time availability on a 40-inch touchscreen monitor connected to virtualized inventory servers in the company’s data center.



Simpler Backups and Restores

NetApp solutions have also simplified backups and restores. Previously, the IT team had to spend hours making tape backups. They could not accept requests to restore a single file—say, if an employee inadvertently deleted an important e-mail—because this would have required a full system restore.

"NetApp SnapManager has completely changed how we manage backups and restores," Canisius says. The IT team now takes near-instant Snapshot™ copies of all virtual machines using NetApp SnapManager® for Hyper-V. The software supports the new Windows Server 2012 with Hyper-V virtual hard disk format (VHDX), which is much faster than VHD. Jack Wolfskin configured SnapManager to store the eight most recent Snapshot copies on the production NetApp FAS3240 system. To archive the last year's worth of backups, Jack Wolfskin uses NetApp SnapVault disk-to-disk replication. It copies Snapshot data at the block level to the NetApp FAS2040 system that the company previously used for primary storage. "SnapVault lets us restore all or part of our backup data very quickly," Canisius says.

The company also takes advantage of the NetApp SnapManager suite for Microsoft applications, including SnapManager for SQL Server, SnapManager for Exchange, and SnapManager for SharePoint. The software performs application-specific backups and restores of individual files or entire server farms. For example, the IT team can recover within a few seconds any individual e-mail backed up within the last year using SnapManager Single Mailbox Recovery for Exchange. "Accepting requests to restore individual e-mail files has a big impact on employee satisfaction with IT," Canisius notes.

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The ability to clone databases with SnapManager for SQL Server makes it practical to test new applications against live data. An example is a new SQL Server application that Jack Wolfskin and its supply chain partners use to track product development from the idea to the final product. Before, Jack Wolfskin tracked the product design lifecycle for, say, a women's hiking boot, on spreadsheets. Today, the SQL Server application is integrated with the tools that designers use, such as Adobe Illustrator and the supplier portal. Suppliers can visit the portal to download product drawings and manufacturing guidelines. When the new hiking boot is complete and ready for sale, the application automatically adds a record in the ERP system, and dealers can begin ordering the product. "Keeping all product design information in one place helps our supply chain work together more efficiently," says Canisius.

When Jack Wolfskin completed its migration to Windows Server 2012, backup became even simpler. Windows Server 2012 has virtual Fibre Channel adapters, which means the IT team can now virtualize all servers, including Fibre Channel LUNs, with SnapManager. "With NetApp, we've eliminated the expense of physical servers for Windows Server 2012," Canisius says.

Future Adventures

Soon Jack Wolfskin will retire the last of its local storage drives. As the company signs on new dealers in new locations, the company expects to increase storage capacity to approximately 40TB, up from 20TB at the warehouse today.

Jack Wolfskin is also looking forward to adopting software-defined networking. This will make the location of the virtual machine completely irrelevant—the next evolution of the Jack Wolfskin private cloud.

Canisius concludes, "We could not have built a virtualized warehouse infrastructure without NetApp storage. NetApp allowed us to increase shipping capacity without higher hardware and manpower costs. This was vital as we expanded to new international markets."

NetApp

- NetApp FAS3240 and FAS2040 storage systems with NetApp Data ONTAP 8.1
- NetApp MetroCluster
- NetApp Flash Cache
- NetApp SnapVault
- NetApp deduplication
- NetApp SnapManager for Hyper-V, SQL Server, Exchange, and SharePoint
- NetApp SnapManager for Exchange Single Mailbox Recovery

Protocols

- CIFS and Fibre Channel

Third-Party Products

- Brocade front-end switches
- Microsoft Exchange Server 2010
- Microsoft SQL Server 2012
- Microsoft SharePoint Server 2013
- Microsoft Windows Server 2012 with Hyper-V
- Microsoft System Center Operations Manager 2012
- HP ProLiant and BladeSystem servers

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