Agile Storage Foundation

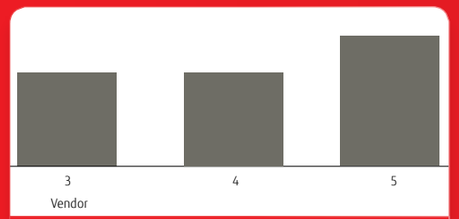
This interactive eBook brings together all the resources you need. Save it to your desktop as a quick reference tool.

Agile Storage Foundation Overview

With Fujitsu Agile Storage Foundation you get one product family, one platform platform management layer, one licence agreement. And no nasty surprises.

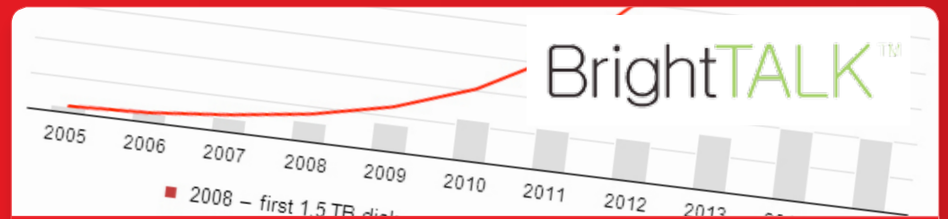
Videos

We're blowing the whistle on other storage solutions. Watch our exposé videos.



Comparison Charts

See how other storage solutions compare.



Webinar

Is your storage a maze, a mess or a minefield? Watch our recent webinar.

10 Great Things

10 Great Things about Fujitsu Agile Storage Foundation.

3 Steps

along the pathway to Storage First.

View Product Datasheets and White Papers

Case Studies

Agile Storage Foundation in action.

Press Reviews

Read what the press have to say.

White Paper

IDC Reshaping the datacentre.

Reshaping ICT, Reshaping Business

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We're blowing the whistle on other storage solutions

Agile Storage Foundation

For many organisations, the decision to acquire storage infrastructure comes after the choice of servers and applications is made.
This project-based approach can mean that organisations are forced into implementing multiple storage platforms to match different server and application requirements.

Multiple platforms mean multiple issues

As needs change and storage technology develops over time, this multi-platform strategy can lead to islands of disparate storage, with different protocols, different disk types and, more importantly, different management standards.

The consequences are considerable:

1. **Your capital outlay is multiplied**
Acquiring a range of different storage platforms and then to duplicating them to provide the resilience and replication you need to secure your data becomes prohibitively expensive. When you look at the cost of securing your data in terms of replication and base security your capital expenditure soon spirals.

2. **You are forced to purchase more licences**
With multiple storage platforms you will need different licences for different activities – from encryption to thin provisioning and drive spin-down - adding to the ongoing costs of your platforms.

3. **Your operating costs are higher and risks are much greater**
The more platforms you have, the more people, time and money you have to spend to operate multiple platform management systems. At the same time, the risks of human error are greater as your staff are required to work across different management platforms and in different ways.

4. **You discover hidden charges**
As additional storage technology is bolted on to your system, it can take longer to perform day-to-day tasks. It is unlikely your vendor will have told you that multiple hardware and software stacks require ongoing maintenance and that staff will need to be trained on every new system – all of which will need to come from your budget.

5. **Your only option is to rip-and-replace**
When data volumes increase, technology improves or you outgrow your existing storage the only way to upgrade your storage infrastructure is to start again with new platforms.

A new direction

At Fujitsu, all of this led us to believe there needs to be a shift in the way organisations approach storage. Instead of designing the application tier, then the server and network tier and then thinking about the storage tier, wouldn't it be better if you could lay down a flexible, scalable and agile tier of storage first?

Previously, there was no single storage solution available that would encompass all the different workload profiles that organisations required. For example, differences in terms of connection protocol (iSCSI/FC/NAS) or disk types (SAS/SATA/FC/SSD).

With Fujitsu Agile Storage Foundation all this has changed.

Putting storage first

For organisations large or small, with Fujitsu Agile Storage Foundation the emphasis is on the development of storage architecture at the start. With this new approach, we can help you build a flexible, scalable foundation for your servers and applications that will match your demands, now and into the future.

Our Agile Storage Foundation concept is easy to scale, meaning there is now:

- No need to duplicate capital expenditure, with pay-as-you-grow infrastructure instead.
- No need for multiple software licences, with all functionality included in the base price.
- No more escalation in management or maintenance charges, with a single platform interface.
- No more upgrade nightmares, with the ability to scale the platform as you grow.

To put it simply, with **Fujitsu Agile Storage Foundation** you get one product family, one platform management system, one licence agreement and no surprises.

For more information, contact:

Chris Bone, Head Of Sales Consultancy, Fujitsu Technology Product Group
Email: chris.bone@uk.fujitsu.com Telephone: +44 (0) 7867 834407

Videos

Here are a selection of videos. Watch the 4 exposé videos – things your storage provider probably didn't tell you.

Exposé 1
What they probably didn't tell you about upgrades.

Exposé 2
What they probably didn't tell you about licences.

Exposé 3
What they probably didn't tell you about platform management.

Exposé 4
What they probably didn't tell you about fees.

Eternus DX
Learn more about the Fujitsu ETERNUS DX range.

Manufacturing in Europe
Take a tour of our world-class European facility.

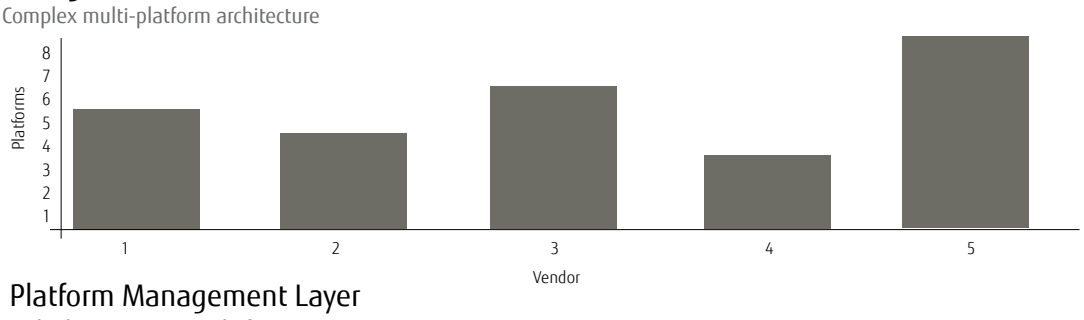
We're blowing the whistle on other storage solutions

Upgrade nightmares, impossible to scale, multiple licences and platforms, escalating management fees and spiralling maintenance costs.

The Fujitsu difference is clear to see.

Storage Platforms

Complex multi-platform architecture

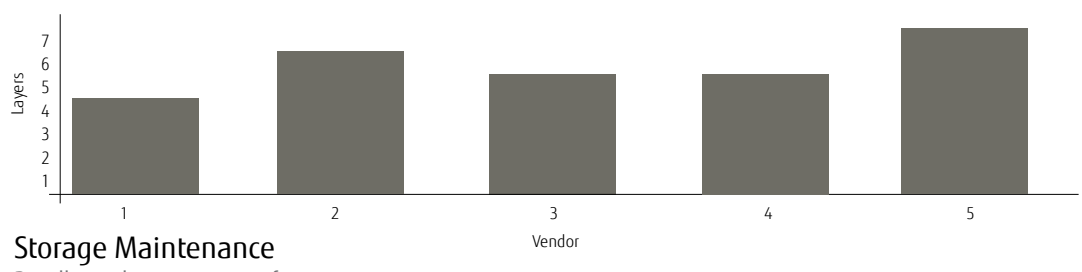


One platform

Fujitsu

Platform Management Layer

Multiple management platforms

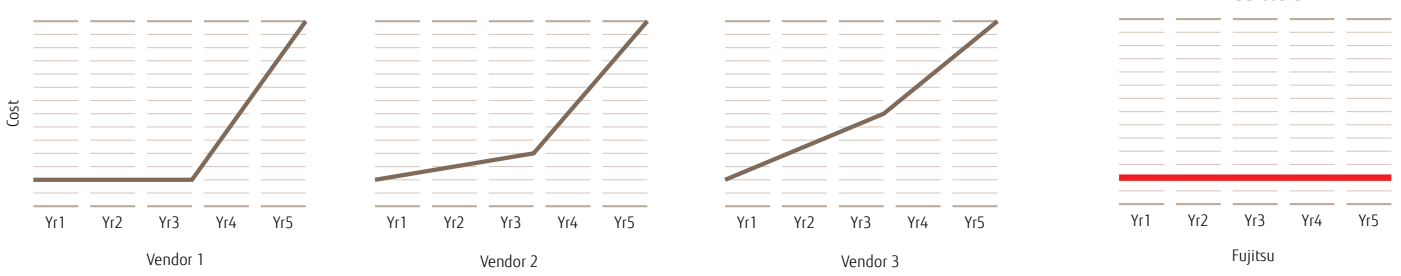


One layer

Fujitsu

Storage Maintenance

Rapidly escalating costs out of warranty



With Fujitsu Agile Storage Foundation, there's one product family.

One platform management layer. One licence agreement.

And no nasty surprises.

Reshaping ICT, Reshaping Business

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We're blowing the whistle on other storage solutions

Is your storage a maze, a mess or a minefield?

View our recent webcast in association with BrightTALK.

Click here to create a BrightTALK login

You will need internet access.

We're blowing the whistle on other storage solutions

Storage First:
10 Great things about Fujitsu storage

1

Virtualisation is it still relevant?

Virtualisation still plays an enormous role in your application requirements. Choosing the right storage platform with close integration VMware, will ensure that you get the benefits of moving to a virtualised infrastructure as well as a solid storage foundation to give you investment protection in all future IT solutions. ETERNUS provides that integration into VMware's software stack.

2

Over 40% of customers are looking at ease of scalability as a choice of a storage vendor (source – IDC)

With data growth at over 40% per year, the right storage platform and the scalability it provides is vital. The ETERNUS single product family allows you to scale from the smallest initial requirement through to the largest of enterprise customers.

3

Are you looking for integrated back up and DR solutions with your storage vendor?

The ease of backing up data and ensuring that it is on the right platform is becoming more and more critical as data continues to grow. Choose the wrong option and you will not be able to hit your SLAs and find yourselves with data on the wrong storage platform. The ETERNUS CS range provides back up, archiving and data de-duplication in one appliance, providing investment protection due to its scalability.

4

Costly migration from one platform to another

The cost of migration and upgrades to a business is increasing and providing an easy path to do this is becoming more and more prevalent. The Fujitsu ETERNUS range can provide 'data in place' upgrades, stopping the need for downtime windows as the customers storage requirements grow.

5

Agile Storage provides a foundation for change

One poor decision in the procurement cycle, can lead to years of pain for your business.
When making the decision on your storage platform you're normally faced with the stark reality of choosing one type of network connectivity and potentially disk type, Fujitsu provides you with all the choices available.

We're blowing the whistle on other storage solutions

6 **Storage Management, is it important?**

With every different vendor that you choose, you add another storage management platform into your environment. This is an additional operating expense that you cannot stretch your budget to. The Fujitsu answer is provide a single management interface for all its storage portfolio, this eliminates additional operating expense, for both training and product.

7 **Availability - does it drive the storage decision?**

System availability and access to data are what you base your business around, you cannot afford for access to data to be interrupted, this stops business critical decisions being made. The Fujitsu architecture provides a no single point of failure ensuring that one component failure doesn't mean cause loss of trade.

8 **Data Encryption and the drivers**

Ensuring that customer data is kept safe should be the cornerstone of your data storage strategy. The Fujitsu answer is to provide storage controller data encryption rather than a separate stand alone software product, to protect the most valuable asset that a company has.

9 **Operational Efficiency**

Multiple storage platforms mean multiple technical skills and resources. This squeezes your operational expenditure even further in tough economic times. The Fujitsu answer is to provide investment protection by one product family that works on the same commands across the whole range from the low end to the high end.

10 **Price and Performance**

The current economic climate drives you to make decisions that provide the most initial financial benefit, sometimes without considering the impact on the business. Fujitsu's ETERNUS platform gives you the best of both worlds, a fast storage solution at a financially competitive price.

We're blowing the whistle on other storage solutions

Upgrade nightmares, impossible to scale, multiple licences and platforms, escalating management fees and spiralling maintenance costs.

With Fujitsu Storage First, there's one product family, one platform management layer, one licence agreement and no surprises.

This is your pathway to Fujitsu Storage First...

Step 1

A 20 minute Fujitsu consultation

– to establish the current Storage solution challenges you are experiencing and your plans for the next 12 months and beyond.

Step 2

A complimentary Storage Assessment*

– to uncover your true storage infrastructure where you will find out what storage you really have, what you don't have, where it is, what it's doing (or not doing), efficiency levels, areas of risk or potential failure.

Step 3

A personalised Storage Whistle Blowers report

– based on the Storage Assessment findings, Fujitsu presents the truth about your current storage environment and a recommendations report that includes associated changes, improvements, benefits/costs, ROI and timeline.

*Optional - based on the Fujitsu Light Storage Assessment service (3 days)

Case Studies

European Southern Observatory

Lechwerke AG (LEW)

The municipality of Markaryd

Nassauische Heimstätte / Wohnstadt

PAALGROUP

Case study
European Southern Observatory (ESO)

»A space telescope places extremely high demands on a storage system. After the comparison of different systems, the unrivalled performance and cost-benefit ratio of the ETERNUS DX models made the scales tip in favor of Fujitsu.«

Alessio Checcucci, ALMA Archive, European Southern Observatory

The customer

The European Southern Observatory (ESO) is the pre-eminent European science and technology organization in astronomy and operates the scientifically most productive observatory in the world. **www.eso.org**

The challenge

To create a safe harbor for valuable research data captured, for instance, by the ALMA network of radio telescopes in the Chilean Atacama desert. The site produces one Terabyte per day requiring fast replication.

The solution

Disk storage systems from the Fujitsu ETERNUS DX400 S2 series.

The Cosmos in focus

With its world-class observing facilities the European Southern Observatory plays a leading role in cutting-edge astronomical research. ESO is an intergovernmental organization with 15 member states: Austria, Belgium, Brazil, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland and Great Britain. ESO is headquartered in Garching near Munich where it harbors the most important scientific and technical departments including the organization's administration. The annual contributions of the ESO member states amount to approximately 140 million euros. Presently the organization has about 700 employees. The design, construction and operation of pioneering astronomical facilities and instruments places high demands on the organization's scientists, technicians and engineers and, at the same time, opens up unique opportunities to cooperate with the industry and promote technology transfer.

Powerful storage systems for space information

In Garching the space data captured by ESO's telescope networks runs together. On the Paranal site in Chile, for, instance, ESO operates the sophisticated Very Large Telescope (VLT), based on latest technologies. It is an array of four unit telescopes, each with a main mirror of 8.2 meters in diameter and four additional 1.8-meter movable auxiliary telescopes with the option to use it as a giant optical interferometer. In this mode the telescope can snap images with an angle resolution within the range of thousandths of an arc second. To put it another way, images of such powerful resolution theoretically make it possible to capture a car on the moon and distinguish its two headlights from our planet. It is obvious that the telescopes generate immense and very valuable data volumes night after night. To make the space images and technical data accessible to its members the ESO operates various Sybase databases. "Astronomers from the member states and all over the world regularly retrieve observation data from our scientific archive," explains Dieter Suchar, Head of the Operations Technical Support Department at ESO. "In order to deliver data reliably we use fast-access storage solutions."

Reliable storage systems for data from distant galaxies

© ESO/José Francisco Salgado (josefrancisco.org)

Outstanding performance and easy administration

"To meet the different requirements we distribute our data on high, middle and low performance storage," explains Dieter Suchar. "In the middle performance segment we had already gained positive experience with the Fujitsu ETERNUS DX90 series. However, when it came to high performance storage, we decided to have a completely new look at the cutting-edge technologies on the storage market – and opted for Fujitsu once again." After a trial installation of several months the scales clearly tipped in favor of the ETERNUS DX440 S2 series, Fujitsu's second generation of ETERNUS DX disk storage systems. Its redundant components and RAID protection make this storage system a true data safe. Owing to its superior scalability the ETERNUS DX440 S2 scales flexibly to 960 2.5-inch disk drives enabling the organization to keep pace with intensive data growth. ESO deploys the system with a storage capacity of 50 TB. "We are highly satisfied with the outstanding performance of our ETERNUS DX440 S2," Dieter Suchar is pleased to note. "And also the ETERNUS SF Storage Management Suite goes down extremely well with our system administrators. It ensures maximum configuration flexibility and flawless administration."

Shared storage for ESO science users

In addition to the images the telescopes capture it is also necessary to store the Meta data. "When it comes to the analysis of our data it is important to determine under which circumstances the images were

»We are highly satisfied with the outstanding performance of our ETERNUS DX440 S2. And also the ETERNUS SF Storage Management Suite goes down extremely well with our system administrators. It ensures maximum configuration flexibility and flawless administration.«

Dieter Suchar, Head of the Operations Technical Support Department, European Southern Observatory

grabbed," Dieter Suchar explains. "This includes factors such as wind speed and temperature at the telescope sites. Since the data is collected and stored throughout the night, it is clear that every single one of our observatories has to be able to keep pace with the massive data growth." The Fujitsu storage system mastered the field trials at the Garching-based ESO headquarters brilliantly:

"The data flow is run through the ETERNUS DX440 storage system which is connected to our Sybase database server at a speed of 2,500 Mbit per second. The performance of the ETERNUS DX440 as shared storage is extremely high. When other applications access the system at the same time we are still able to offer our science users 1,400 Mbit per second."

World's biggest network of radio telescopes opens its eye on the Universe

ALMA is one of the most recent and largest astronomy projects the European organization ESO has embarked on with North America, Eastern Asia and Chile. ALMA, the Atacama Large Millimeter Array, is the most complex ground-based astronomy observatory on Earth. By 2013, i.e. after the completion of the largest expansion phase, ALMA will be comprised of a giant array of linked 12-meter and 7-meter antennas. The new network of telescopes will capture light in the Cold Universe at submillimeter wavelengths and hunt its hidden secrets between the threshold levels for infrared and radio radiation. However, when passing through the earth atmosphere the waves are markedly weakened through the water vapor in the atmosphere. Since a high and dry site is crucial to millimeter wavelength operations the array is being constructed on the Chajnantor plateau in the Chilean Atacama desert at 5,000 meters altitude. The world's highest observation position is thus located 750 meters above the Mauna Kea observatories (Hawai) and 2,400 meters above ESO's Very Large Telescope (VLT) on the Paranal (Chile). ALMA's 66 individual precision antennas will form a single revolutionary network of telescopes – with a resolution that tops the capacity of the Hubble Space Telescope tenfold. With ALMA astronomers will be able to explore the composition of stars, planetary systems, galaxies and even the basic building blocks of life more closely.

Data storage at 2,900 meters altitude

ALMA's first scientific observations were initiated already in 2011. "Our operations generate a continuous data stream," explains Alessio Checcucci, who is in charge of the ALMA Archive at ESO. "The observatory produces approximately one Terabyte research data per day." Alessio Checcucci, who also works at the ESO headquarters in Garching, was involved in situ at the ALMA site in Chile for about 6 months. "The data we accumulate at an altitude of 5,000 meters is transferred 40 kilometers downhill via four fiberglass lines." Day after day the raw data that is captured by the telescopes runs together at the control center that is situated at an altitude of approximately 2,900 meters. "For this purpose we need a storage system that meets the highest demands," says Alessio Checcucci. "And that is why, after the comparison of various systems, we opted for Fujitsu."

While EOS in Garching deploys an ETERNUS DX440, the slightly smaller version ETERNUS DX410 that scales flexibly to 480 2.5-inch disk drives and provides a rich set of connectivity and interoperability choices from FC and FCoE to iSCSI host interfaces best suits the needs of ALMA. "The unrivalled performance and cost-benefit ratio of the ETERNUS DX models made the scales tip in favor of Fujitsu," Alessio Checcucci is pleased to report.

The benefit

- Reliable and safe storage of valuable research data
- Non-stop data availability
- Non-disruptive capacity upgrades
- Superior scalability
- Fast access times

Products and services

Storage systems:
- 1 x ETERNUS DX410 S2 with a storage capacity of 10 TB
- 1 x ETERNUS DX440 S2 with a storage capacity of 50 TB

Optimal support in Chile

"To start with, we put the system to the proof in Garching. After successful testing Fujitsu got the go-ahead for Chile," Alessio Checcucci continues. "The Fujitsu experts gave us excellent support and assisted us greatly with the installation on site." The ETERNUS DX410 S2 deployed at the ALMA site in Chile is provided with a total capacity of ten TB. The system is connected to a cluster with four Fujitsu PRIMERGY servers. From here the data is transferred to the main data center in Santiago de Chile and replicated in the regional centers of the ALMA partners in Germany, the United States and Japan. Remote replication to offsite locations is a key component of the ETERNUS DX systems – and truly indispensable for maximum data protection.

Non-disruptive upgrades

Whether in Garching or in the Chilean Atacama desert, the ESO IT managers have the possibility to upgrade their respective ETERNUS DX systems with different 2.5-inch, 3.5-inch, SAS, Nearline SAS and SSD hard drive types, even in mixed configurations. Non-disruptive capacity upgrades are supported just by adding the hard drives with zero downtime. After all, the telescopes never take a break either – they observe the Cosmos all year round and require storage systems that do not take the back seat when it comes to staying power and reliability.

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(14 cents/min via German landline,
max. 42 cents/min via German mobile network)

Case Study

For online storage, Lechwerke relies on Fujitsu's ETERNUS DX systems

»We are very positively surprised by the high performance of the ETERNUS DX440 S2 storage systems. Thanks to Fujitsu's Storage Integration Services, the switch to running operations was extremely quick and absolutely smooth«

Werner Gruber, Systems Management, LEW Service & Consulting GmbH

The customer

Lechwerke AG (LEW) is a regional utility company responsible for around 500,000 customers in Bavaria and parts of Baden-Württemberg. LEW is part of the RWE Group.
www.lew.de

The challenge

To increase the storage performance – especially in the SAP environment – while simultaneously reducing administrative time and expense.

The solution

ETERNUS DX440 S2 from Fujitsu as storage systems plus ETERNUS SF Storage Cruiser for optimal management in conjunction with Fujitsu's Storage Integration Services.

Effective Storage Strategies for Utility Companies

If you need to securely store and evaluate the user data for half a million customers, your options inevitably point to a high-end storage system. And to achieve the highest possible level of storage performance, comprehensive consulting is also advisable. In both of these cases, Lechwerke AG (LEW) turned to Fujitsu – and is now enjoying a considerable increase in performance through using the ETERNUS DX440 S2 storage systems including Storage Integration Services.

Lechwerke - Energy for the Local Area

Lechwerke AG provides both electricity and gas products along with services in the fields of network and plant construction, energy generation and telecommunications. Via the electricity network, Lechwerke supplies more than one million people in Bavaria and parts of Baden-Württemberg with energy. The Bayern Electricity Works (BEW) is also part of the LEW Group. Between them, they have complete responsibility for operating a total of 35 hydroelectric power plants. The BEW is one of Bavaria's leading hydroelectric power plant operators. The power plants that the BEW operates in Donau, Iller, Günz, Lech and Wertach produce an average of one billion kilowatt hours of environmentally-friendly electricity every year from renewable water power.

Refreshing and Mirroring the Storage Network

Within the LEW Group, LEW Service & Consulting counts IT operations among its areas of responsibility. This is where Datacenter Manager Werner Gruber and his team guard the data from around half a million customers. To ensure that these customers can depend on the highest possible level of security, two mirrored storage systems were recently installed in two separate LEW datacenters in Augsburg. The two ETERNUS DX440 S2 systems are connected via a rapid Storage Area Network (SAN). "The performance of our old EMC systems was no longer up to the challenge," says Werner Gruber, explaining the reasons for the new purchases. "They couldn't provide the capabilities we needed any longer. The system had reached its efficiency ceiling and we couldn't expand it any further."

ETERNUS DX – The flexible Data Safe

Faster Operation in Critical Phases

It didn't take long for positive feedback to arrive from the LEW staff members. "Our SAP users definitely noticed the faster access times," says Werner Gruber, the Head of Systems Management.

"For a utility company like LEW, the annual consumption billing is of course a very critical phase with intensive use of both computer resources and data. Compared with the previous year, the response and running times of our dialogue and batch processes have improved by around 30 per cent. And that is largely due to our new ETERNUS DX440 S2 Systems from Fujitsu."

Secure Storage

Depending on the application, LEW's performance increase is between 20 per cent and – in exceptional cases – even as much as 100 per cent. One noticeable "turbo" for this is the ETERNUS DX440 S2's large cache, which has been expanded to 96 Gigabytes. "This cache forms an additional rapid main memory which is used for interim buffering," says Gruber. "That's where the majority of the currently-used data is located. So the first read request is operated directly from the cache – even before the hard drives are accessed. And that happens very rapidly."

»We are more than surprised by the high performance of Fujitsu's ETERNUS DX440 S2. Even the start-up process was completely straightforward and ran without interruptions – that's something I have never experienced«

Werner Gruber, Systems Management, LEW Service & Consulting GmbH

What's more, the ETERNUS DX440 S2 System maintains the data stored in the RAID Controller Cache with an extremely high level of security. In the case of a power cut, the data are automatically written into a Flash storage module and securely preserved there until the power is restored. Naturally, there are also security mechanisms that come into effect to protect the data stored on the hard drives and which significantly reduce the risk of data loss. For example, ETERNUS DX Systems have internal system control authorities, which warn in advance about breakdowns or damage, plus RAID mirroring etc. In the case of LEW, there is the additional factor of the data mirroring on twin systems. Should one system suffer a breakdown, the affected data can be very easily and quickly restored.

Optimal Scalability

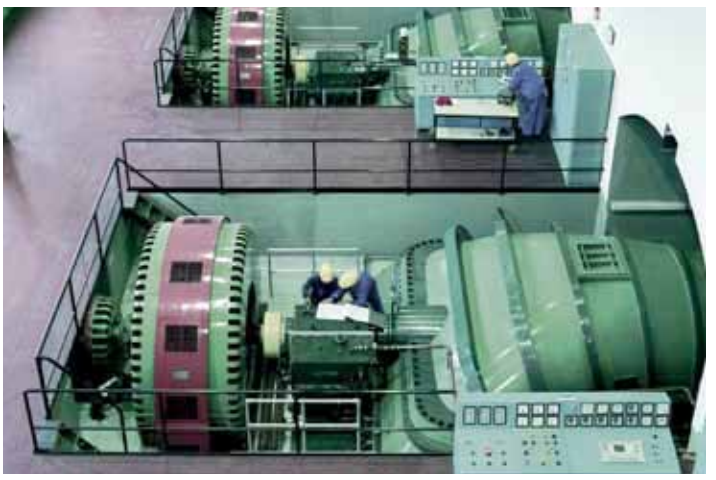
For LEW, there was another important aspect to consider alongside the security factor. "Our annual data growth is around 15 to 20 per cent," is Werner Gruber's estimate. "At the moment, we're operating our ETERNUS DX440 S2 systems with 25 Terabytes respectively, distributed between 60 drives. Thanks to the excellent scalability, we still have some room to expand." That is something of an understatement considering that Lechwerke AG would be able to store around 50 times as much data on their ETERNUS DX440 S2 systems. The systems can be expanded to a capacity of up to 1,440 Terabytes (which corresponds to a placement of 240 3.5" or 480 2.5" HDDs).

Comprehensive Monitoring via ETERNUS SF

To provide absolutely comprehensive storage management, Fujitsu supplies the ETERNUS SF software as standard. LEW opted for a considerably more complex version (at extra cost), the ETERNUS SF Storage Cruiser. Marc Harnisch, Senior Systems Engineer at Fujitsu, installed the software: "The Storage Cruiser doesn't just take into consideration the ETERNUS DX storage systems in the datacenter, but looks at the complete SAN, the servers and all associated components." This solution, therefore, provides all-round monitoring including performance and correlation management. As Harnisch puts it: "This allows the administrator to detect the typical bottlenecks in the network."

The Storage Cruiser: A Graphical Overview

Werner Gruber agrees that this investment makes financial sense for LEW: "With the Storage Cruiser, we can precisely determine the degree of capacity utilization for the storage controller CPUs and the hard drives. We can see exactly how much performance margin we still have left." Gruber particularly appreciates the overview that the software provides him with: "We now have an extremely good graphical evaluation that makes it possible to view the connection from the server to the smallest logistical unit in the storage system. The path that the data takes can now be traced at a glance, the SAN port and fibre channel connection that the data uses. This is an extremely helpful resource. "In the past, we had to create a lot of sketches on pieces of paper to collect this information for an overview." If the data flow becomes slower, it is now easier for Gruber's team to locate the bottleneck that is causing the reduction in speed. "The Storage Cruiser makes it much simpler for us to provide a diagnosis about why some aspect is not performing optimally," Gruber explains. As a result, the time and cost of administration have been reduced.



The benefit

- Reliable and safe storage of critical business data
- Continuous access to data
- Rapid expansion of the storage capacity
- Optimal scalability
- Fast access times
- High energy efficiency

Products and services

- Storage systems: 2 x ETERNUS DX440 S2 with a disk storage capacity of 25 Terabytes respectively
- Storage management software: ETERNUS SF Storage Cruiser
- Storage Integration Services from Fujitsu

Storage Integration Services

Marc Harnisch also assisted LEW with the implementation of the two ETERNUS DX440 S2 systems. These "Storage Integration Services" provided by Fujitsu offer advantages to customers beyond simply the amount of time saved. "The main installation was completed within a day, then we needed an additional day to install the Storage Cruisers," Harnisch says. "The alternative would have been four weeks of training for the IT team." This training took place anyway, but due to the precise knowledge of the client environment and following a detailed consultation regarding the courses that were absolutely necessary, the training time was reduced to two weeks.
An additional advantage is the in-depth customization of the storage systems. "We know how to get the best possible performance from such a system," Harnisch explains. "In our consultation, we were able to support Werner Gruber and his team with all the necessary calibrations. And at the same time, warning messages were logged in the SAN via the Storage Cruiser. So we were able to correct these in time, before any critical errors arose."

Professional Planning and Implementation

So it took just over a week until Lechwerke AG were able to transfer the system to running operations. Werner Gruber is very satisfied with the results:

"Fujitsu's planning to prepare the server systems for operation was extremely professional from powering on the hardware to the distribution of the RAID groups. The actual switching of both systems into running operations during a brief downtime was something our users hardly even noticed."

Green IT

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max. 42 cents/min via German mobile network)

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Case Study
The municipality of Markaryd

»Now we have a future-proof storage solution that does not lead to unforeseen costs and with professional support from Fujitsu.«

Ludvig Nagy, IT Coordinator at the municipality of Markaryd

Ludvig Nagy, IT coordinator och Kristian Blåsol, Systems engineer

The customer

The municipality of Markaryd

The challenge

The municipality was outgrowing its storage solution and needed new, future-proof storage. In addition, the municipality was not content with the previous vendor's support, and with a licensing model that incurred additional costs and made the storage difficult to forecast.

The solution

The ETERNUS DX410 storage system from Fujitsu, equipped with 30 hard drives, plus two Brocade 300 SAN switches. The installation was undertaken by technicians from Fujitsu. The agreement includes five years support and equipment that enables the Fujitsu technicians to remotely diagnose and manage the system.

No more unforeseen costs

During the spring of 2011 the municipality of Markaryd started specifying the requirements for a new storage solution.

"We had outgrown our current SAN storage. In addition, we were not satisfied with the support from our vendor", says IT coordinator Ludvig Nagy, who is responsible for the daily operation of the various IT systems the municipality utilize and for the planning and development of the IT platform.

Ludvig Nagy calls the support "crazy".

"On several occasions when we called the vendor, we were told that we didn't have a valid support agreement and that we must send in a copy of an invoice to prove otherwise. We had to endure that every time we needed help. It was terrible."

Another problem with the previous storage solution was the licensing agreement that caused unforeseen costs when new functionality was added.

"The base solution was competitively priced, but new costs kept occurring. When we wanted to connect our virtual servers to the storage we had to buy a new license. To open a port in the SAN switch was additional cost and so on. It was untenable with all the additional costs."

"Everything must be included"

Therefore, Ludvig Nagy and his colleagues at the IT department produced a very detailed specification of the new storage solution.

"Everything must be included, ports and other things must be opened and there must not be any additional license costs. We don't want to pay any extra in the future. Moreover, we wanted huge amounts of disk space."

The municipality chose a solution from Fujitsu and their partner kHuset, an IT solution provider with nearly 30 years experience from the business. Ludvig Nagy describes the reason behind the choice as a mix of security, price and performance.

"If you only look at the base price, the other vendors had fairly attractive solutions, but everything wasn't included like we wanted. In addition, Fujitsu offered a lot more disk than the others."

The solution the municipality chose is based on the ETERNUS DX410 disk storage system from Fujitsu, equipped with thirty 600 gigabyte hard drives, plus two Brocade 300 SAN switches.

"The difference in performance between this solution and the previous is fantastic."

One reason for the increase in performance is that the ETERNUS DX410 supports 8 Gbit/s Fibre Channel while the previous storage solution only supported 2 Gbit/s.

The municipality strives to utilize its IT resources as effectively as possible. The IT environment is virtualized and nowadays the municipality only has four servers that run almost 50 virtual servers.

All data is stored in the SAN network

All servers have their storage in the SAN network. Among the virtual servers are file servers, web servers, business systems, the system used by the switch board, billing systems and lots of data bases.

"When I say that everything is stored in the SAN, I really mean everything. That's why it is so very important to have a robust and scalable storage solution like the one we now have."

Technicians from Fujitsu installed the new storage solution while the municipality migrated the data from the old to the new storage.

"There are several advantages with our new solution, besides the increase in performance. Fujitsu's management tools are so much easier to use and understand than in our previous solution."

Fujitsu in collaboration with

KHUSET

The municipality chose a solution from Fujitsu and their partner kHuset, an IT solution provider with nearly 30 years experience from the business.
www.khuset.se

First class support from Fujitsu

Ludvig Nagy continues:

"We also got very good documentation from Fujitsu that describes the system management. The documentation was written in consultation with us, by the technicians from Fujitsu that were here and did the actual installation. It is very seldom a vendor supplies documentation, and even rarer good documentation. Sometimes when we contact Fujitsu's support, we not only get an answer to our question but also a small remark saying 'by the way, that's already in your documentation'."

Included in the Fujitsu storage solution are two servers that monitor the SAN network and enables Fujitsu's technicians to remotely diagnose and fix possible problems. Five years support is included in the agreement.

"Now we have the storage solution that we wanted, a solution with high performance and plenty of room for growth and with fast and reliable support from Fujitsu. The demand for more disk space increases all the time. Before our support agreement ends we probably will have to expand with more disks, but there's nothing to it, it's just to connect another disk rack.

Technical details

- The solution is based on the ETERNUS DX410 disk storage system from Fujitsu
- Currently 30 hard drives are used with a capacity of 600 gigabyte each, for a total storage capacity of 18 terabyte
- Two Brocade 300 SAN switches connects the storage to the servers
- Technicians from Fujitsu did the installation
- Five years support is included in the agreement. Technicians from Fujitsu can remote connect to the storage system to diagnose and fix possible problems

FUJITSU

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Case Study
Nassauische Heimstätte / Wohnstadt

»With the deployment of ETERNUS CS800 Data Protection Appliance we have been able to increase our backup speed significantly – we now manage with half as much time. In addition, the deduplication technology has made it possible to shrink our data volume drastically.«

Mario Friedrich, Information Systems and Services Division, Nassauische Heimstätte / Wohnstadt Group, Germany

The customer

For over 80 years the Nassauische Heimstätte / Wohnstadt Group has offered services for living, building and development. **www.naheimst.de**

The challenge

To face the challenge of quickly growing data, the Nassauische Heimstätte / Wohnstadt Group was searching for a new solution for its second headquarters in Kassel that would minimize backup time.

The solution

With the integration of the Fujitsu ETERNUS CS800 Data Protection Appliance combined with CA ARCserve® Backup, the Group has been able to shrink their data volume dramatically and cut backup times by half.

Hesse's biggest accommodation provider

The core activity of the Nassauische Heimstätte / Wohnstadt Group is renting out around 65,000 of its own apartments at over 150 locations throughout the Federal German State of Hesse. Besides the associated tasks of administration, modernization and portfolio maintenance, building high-quality apartments is one of the key concerns of the Group. Other focal points relate to the sectors of urban planning, redevelopment agency work, municipal building construction and implementing private property measures. The Group came into being in 2005 as the result of a merger of the predecessor companies Nassauische Heimstätte GmbH with its headquarters in Frankfurt am Main, Germany, and Wohnstadt GmbH in Kassel, Germany. Both companies avail of eight decades of experience in real-estate management and in all areas of planning and building in the Federal States of Hesse and Thuringia and in numerous countries of the European Union.

Optimizing backup windows with ETERNUS CS

It was necessary to modernize the backup system for the second headquarters of the Group in Kassel, Germany. It was also necessary to rethink the backup concept. As Mario Friedrich, Server, Storage and Communication Systems Administrator at the Nassauische Heimstätte / Wohnstadt Group sums up: "Our main question was: How do we get to grips with backup times – and, of course, how do we get to grips with data capacity? On the one hand, data quantities are on the increase all the time and, at the same time, there is less time available for data backup." It quickly became certain that network storage with deduplication would be the best way to reduce the data quantity and optimize the backup window. After comparing the competing solutions, the Group opted for the ETERNUS CS800 Data Protection Appliance from Fujitsu, because both the performance features and the price-performance ratio were convincing.

The benefit

- High data availability due to accelerated backup and recovery
- Radically minimized backup volume thanks to deduplication
- High disk performance and reliability
- Easy on-site scalability
- Easy configuration via an intuitive web-user interface

Products and services

- Storage system: 1 x ETERNUS CS800
- Backup software: CA ARCserve® Backup
- Maintenance & Support

Two terabytes of backup data

The computing center of the Nassauische Heimstätte / Wohnstadt Group in Kassel, Germany, has over 40 servers, and three further branch offices are also linked up to it. Mario Friedrich estimates that the quantity of data to be backed up has now grown to around two terabytes. It comprises conventional office correspondence, the ERP system and CAD data and extensive redevelopment plans – because the day-to-day tasks of the Group also cover urban redevelopment and building new apartments. The fact that the Nassauische Heimstätte / Wohnstadt Group opted for a Fujitsu backup solution was also attributable to positive experiences in the past: As Mario Friedrich says: "The quality of the Fujitsu servers is just what we need. Furthermore, the quality of service when implementing systems or if there is a problem is irreproachable. We have firm maintenance contracts and everything runs great."

The deduplication factor of success

The obvious step was to take a closer look at ETERNUS CS800 S2. As Mario Friedrich explains, "We wanted to simplify our backup procedure and reduce the quantity of tapes. We would have needed bigger and bigger tape drives and more vault space to store the tapes. So the concept of putting our backup on network storage was an important step for us. The deduplication technology of the ETERNUS system is optimal for reducing data volume." In order to do this, space-saving reference pointers are set and these take the place of the redundant data blocks within the backup files. This means that ETERNUS CS800 S2 is able to spot redundant data and eliminate it – so only the data added or changed between the backup phases is saved. This is why ETERNUS CS800 provides the ideal basis for making full backups in a space-saving way. In case of disaster, the Group can thus quickly jump back to the last status and does not need to take recourse to individually restoring incremental backups plus the last full backup, which would take more time and would be more error-prone.

Greater data reduction than expected

The Nassauische Heimstätte / Wohnstadt Group uses the "NAS Basic" version of ETERNUS CS800 S2, i.e. the Network Attached Storage System version that is supplied as standard with 16 terabytes of disk storage. The Group also ordered an expander unit, so that the overall capacity is now 32 terabytes. The system could be scaled still further to 160 terabytes. The advantages of the system soon became clear to Mario Friedrich:

"Already after the first few weeks, using ETERNUS CS800 S2 led to a greater data reduction than Fujitsu led us to believe. Fujitsu said we could assume that the data volume would be cut in the ratio 10:1 – but we actually achieve a factor of 11:1. This is an outstanding result."

Accelerated backup speed

This new margin now means greater data integrity and security. As Mario Friedrich adds, "It allows us to keep more data available, without having to overwrite it. So our backup now covers a longer period – and therefore is of higher quality." An additional factor which must not be underestimated is the time advantage. "Our backup times are now around half what they were. That has really speeded things up," Mario Friedrich judges. The same applies to the restore times because, after all, access to data on hard disks is far faster than would be permitted by tape media. But Mario Friedrich still doesn't want to do without tapes entirely. The weekend full backups are written to ETERNUS CS800 and also backed up on tapes. "But we can confidently remove the tapes from the system and put them in a vault," Mario Friedrich sums up.

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max. 42 cents/min via German mobile network)

Case study
PAALGROUP relies on PRIMERGY servers and ETERNUS storage systems

»We enjoy double benefits with Fujitsu server and storage systems because they are both efficient and powerful. With the heavy demands on our IT infrastructure this goes easy on our budget and makes our virtualization project extremely efficient.«

Ralph Ober, Authorized Representative and Commercial Director, PAAL GmbH (PAALGROUP)

The customer

PAALGROUP is Europe's leading manufacturer of high-performance balers for the waste disposing and recycling industry. **www.paalgroup.com**

The challenge

In order to satisfy the highest security requirements with regard to fail-safety and data security, PAALGROUP was searching for a powerful IT environment for its branch in Germany that would be suitable for data center mirroring.

The solution

Through the combined solution of Fujitsu servers and storage systems along with VMware virtualization software PAALGROUP attains the highest possible redundancy and fail-safety.

Global player in the recycling industry

PAAL GmbH started business in 1854 as a publishing house in Osnabruck, Germany. However, only a few decades later entrepreneurial foresight and pioneering spirit geared the company towards waste paper management. Already around 1900 PAAL manufactured balers that could compress mountains of paper into stackable squares; and back then nobody could have predicted how important bale compressing technology would become for the recycling industry one day. In 2002 PAAL's merger with FAES (Spain), DICOM (Great Britain) and COMDEC (France) turns the now multinational group of companies into a global player who concentrates on the design and manufacture of waste recycling machinery. The high performance balers, for instance, are designed to achieve maximum availability while keeping operating costs to a minimum. Today PAALGROUP is Europe's leading manufacturer in this market segment. In the course of their joint history the PAALGROUP companies have delivered more than 30,000 machines to customers from Scandinavia all the way down to South Africa. In Germany PAAL GmbH employs 116 people who generate an annual turnover of approximately 25 million euros. In the meantime the headquarters have been moved to Georgsmarienhütte near Osnabruck.

Mirrored data center for enhanced security

The central data center of PAAL GmbH stores not only data from customers worldwide, but also construction drawings that provide valuable design and engineering details – hence the company's extremely high data security requirements. PAAL GmbH thus decided to approach Fujitsu's SELECT Partner OSMO-Anlagenbau GmbH & Co. KG, also based in Georgsmarienhütte. From this cooperation resulted a sophisticated concept designed to modernize the company's data center and, for security reasons, to supplement it by a duplicate data center. "The mirror site is located on the PAAL GmbH premises, however, in a separate fire compartment about 200 meters away from the original data center," explains Oliver Bergmann, Consultant at OSMO-Anlagenbau. "Storage synchronization between the two data centers is performed on the basis of ETERNUS storage systems by Fujitsu – this guarantees the highest possible data security."

The benefit

- Fail-safety due to data center mirroring
- More flexibility and higher productivity through virtualization
- Lower energy costs due to efficient server and storage systems

Products and services

- Servers: 5 x PRIMERGY RX300 S6
- Storage systems: 2 x ETERNUS DX90 with a total of 10.8 TB
- Backup: 1 x ETERNUS LT40
- Network: 4 x Brocade 300 FC-Switch 8 Gb/s
- Virtualization software: VMware vSphere 4 Advanced
- Management software: Fujitsu ServerView Suite
- Backup software: Symantec Backup Exec

All-round efficienc

To help ensure PAAL's specific requirements OSMO has recommended the deployment of the ETERNUS DX90 storage system. "Especially in a fibre channel environment Fujitsu storage systems prove to be highly efficient and failsafe," Oliver Bergmann clarifies. "With the controller-based mirroring of two ETERNUS DX90 systems our customer is provided with the perfect approach to implementing a cost-efficient high-availability solution in two fire compartments." Also in terms of energy savings ETERNUS DX90 is trailblazing, as certain services that are not required during the night "can be switched into the stand-by mode or shut down completely – and that saves a great deal of energy," Bergmann praises the overall functionality.

Remote maintenance lowers service costs

The Fujitsu PRIMERGY RX300 S6 servers range among the most efficient systems in their power class and thus serve as a stable and reliable basis for PAAL's recently virtualized IT environment. "Thanks to these extremely energy-efficient systems PAAL GmbH is able to cut its energy expenditure by as much as 40 %," Bergmann, who previously carried out a comprehensive TCO analysis with his customer, is pleased to state. "We appreciate the confidence of PAAL GmbH as their full service provider. For one thing PAAL has entrusted us with consulting and financing. And due to the sophisticated server management solution provided by Fujitsu ServerView we are also able to offer the company cost-effective servicing via remote maintenance. This software enables us to react proactively in the event of potential failures, as ServerView issues early warnings in case of suspicious incidents in the data center."

High-availability environment

On the part of PAAL GmbH Ralph Ober, Authorized Signatory and Commercial Director, has been responsible for the implementation of this major project: "Now that our IT environment is virtualized via VMware we achieve true added value," Ralph Ober explains. "The positive consolidation effect is plain to see: We manage efficiently with only half as many productive servers as before. Thus the step towards a mirrored data center wasn't that big after all." And, as Ralph Ober is pleased to note, the new IT environment fully satisfies the company's expectations regarding fail-safety:

"We are genuinely satisfied with the powerful Fujitsu PRIMERGY servers. These systems function smoothly in our redundant IT environment. However, we wanted to test what happens in case of a system failure: When the servers in a data center fail to react, the mirrored data center assumes its tasks within a matter of seconds."

A storage solution that grows along with demand

In terms of data storage PAAL has made sufficient provisions. Each of the two ETERNUS DX90 systems housed in the two data centers is provided with twelve disks with 450 GB each, i.e. with 4.5 TB per system. "However, our storage solution is scalable up to 120 disk drives with a capacity of 2 TB per disk, and the two ETERNUS DX90 systems are designed to grow along with the needs of our business for quite a while," says Ralph Ober. Regarding its backup solution PAAL relies on Fujitsu as well. And this is where the ETERNUS LT40 tape library system with Symantec Backup Exec software comes in. With the ETERNUS LT40 that features cutting-edge LTO technology PAAL has opted for another flexible solution scaled to its needs. Presently PAAL has licensed this system for the base configuration with one tape drive including 12 slots. Based on the growth of the company's data volume the storage capacity of the tape library is easily upgradable by activating an additional tape drive and slots via a software license.

For further information about ETERNUS products by Fujitsu please refer to:
ts.fujitsu.com/ETERNUS

Green IT BROCADE Symantec.

Partner

OSMO

www.osmo-kommunikation.de

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(14 cents/min via German landline,
max. 42 cents/min via German mobile network)

Storage First:
Coverage recap of ETERNUS and PRIMERGY reviews

October 2011 – June 2012

ETERNUS

IT Pro - Fujitsu ETERNUS DX90 S2 review

25 October 2011

Fujitsu's new DX90 S2 storage array claims to be much faster and more expandable than previous Eternus models. In this exclusive review, Dave Mitchell finds out just how fast it really is and whether it's good value or not.

Read full review

PR Pro - Fujitsu ETERNUS CS800 S3 Entry review

6 June 2012

Fujitsu moved into the data deduplication space a few years ago, and it now wants to make this hot technology affordable for SMBs. In this review, we test the Eternus CS800 S3 Entry model, which combines big reductions in storage usage with good value and ease of use.

Read full review

IT Pro - Fujitsu ETERNUS CS800 S3 Entry review

21 June 2012

An affordable data deduplication unit for SMBs. Our testing showed the Eternus CS800 S3 can help make businesses make big storage savings. Fujitsu's Eternus CS800 S3 Entry appliance aims to open up the world of de-duplication to cash strapped SMBs.

Read full review

We're blowing the whistle on other storage solutions

PRIMERGY

IT Pro - Fujitsu PRIMERGY TX120 S3 review

3 November 2011

Fujitsu's new Primergy TX120 S3 is an entry-level server with a difference. It may look like a standard PC, but Dave Mitchell thinks it's anything but. Read this exclusive review to find out why.

Read full review

IT Pro - Fujitsu PRIMERGY TX140 S1 review

8 November 2011

The Primergy TX140 S1 is one of Fujitsu's first Xeon E3 tower servers and packs plenty of features into its large chassis. Dave Mitchell delves deeper to see if it's a better choice than the latest entry-level servers from Dell and HP.

Read full review

PC Pro - Fujitsu PRIMERGY RX100 S7 review

23 November 2011

The Primergy RX100 S7 is Fujitsu's first low-profile rack server to support Xeon E3 processors, and aims to be the model of versatility. It's designed as a scalable system for SMBs needing a workhorse for web, file and print services, but also as a low-cost virtualisation platform for data centres.

Read full review

PC Pro - Fujitsu PRIMERGY TX120 S3 review

13 December 2011

In a world of bland black cubes, Fujitsu's Primergy TX120 S3 stands out. This entry-level server is the size of a small desktop PC and runs almost silently, yet it's packed with plenty of server-specific features.

Read full review

ZDNet UK - Fujitsu PRIMERGY RX100 S7 Review

20 January 2012

Hot on the heels of HP and Dell, Fujitsu has introduced a new server to its rack-mount lineup, the 1U Primergy RX100 S7, capable of accommodating Intel's latest Xeon E3-1200 (Sandy Bridge) processor technology. Unlike the competition, however, Fujitsu is opting to position the RX100 S7 as an entry-level virtualisation host rather than purely a standalone application platform.

Read full review

PC Pro - Fujitsu PRIMERGY RX100 S7 Review

1 February 2012

Fujitsu's first low-profile rock server to support Xeon E3 processors is a compact and quiet unit with excellent expansion potential, good redundancy and quality remote management.

Full review in print edition

IT Pro - Fujitsu PRIMERGY RX600 S6 review

1 February 2012

Fujitsu's new Primergy RX600 S6 is a highly scalable enterprise server designed for running critical applications and virtualisation. In this exclusive review, Dave Mitchell takes a closer look at this mighty Xeon E7 system and its 40 processor cores.

Read full review

V3 - Fujitsu PRIMERGY TX120 S3 review

21 February 2012

Don't be fooled by the tiny case, the Primergy TX120 S3 Fujitsu has space for the latest Xeon E3-1200 multi-core processor plus supporting memory, storage and other options to deliver an affordable yet compelling solution for small businesses and others where space is at a premium.

Read full review

PC Pro - Fujitsu PRIMERGY TX120 S3 review

1 March 2012

In a world of bland black cubes, Fujitsu's Primergy TX120 S3 stands out.This entry-level server is the size of a small desktop PC and runs almost silently, yet it's packed with plenty of server-specific features.

Full review in print edition

IT Pro - Fujitsu PRIMERGY RX350 S7 review

13 March 2012

Fujitsu's new RX350 S7 neatly fills a gap in its Primergy server range and showcases Intel's latest Xeon E5-2600 processors. In this exclusive review, Dave Mitchell looks at this highly expandable system and its modular features.

Read full review

PC Pro - Fujitsu PRIMERGY RX300 S7 review

3 April 2012

Fujitsu has always claimed its Primergy RX300 rack server is a virtualisation powerhouse, and in this exclusive review we bring you the first look at its latest seventh-generation model. Along with support for Intel's new Xeon E5-2600 family of processors, it has a huge memory capacity and adds interesting storage permutations.

Read full review

ZDNet UK - Fujitsu PRIMERGY RX300 S7

30 April 2012

You wait for ages for a Xeon E5 server to be released, and then two come along together: the first example we reviewed was the Dell PowerEdge R720. Now it's the turn of the Fujitsu Primergy RX300 S7 which, as you'll see below, proved pretty impressive when put through its paces.

Read full review

BCW - REVIEW: Fujitsu PRIMERGY RX300 S7

9 May 2012

Intel's new Xeon E5-2600 (Sandy Bridge-EP) processors have been quickly adopted by all of the big server vendors to power a new generation of faster, more capable, products. As usual, Dell and HP are leading the charge but there are others, such as Fujitsu, who has used the new chips to upgrade a number of servers–not least the popular Primergy RX300, now in its seventh (S7) incarnation.

Read full review

Product Datasheets and White Papers

Fujitsu ETERNUS CS
High End Data Protection

Fujitsu ETERNUS CS800
Data Protection Appliance

Fujitsu ETERNUS DX60 Entry
Level Disk Storage System

Fujitsu ETERNUS DX80 Mid
Range Disk Storage System

Fujitsu ETERNUS DX90 Mid
Range Disk Storage System

Fujitsu ETERNUS DX400 Mid
Range Disk Storage Systems

Fujitsu ETERNUS DX8700 High
End Disk Storage System

Fujitsu ETERNUS LT20
Tape System

Fujitsu ETERNUS LT40
Tape System

Fujitsu ETERNUS LT60
Tape System

The NetApp Agile Data
Infrastructure

NetApp: Agile Infrastructure
for Big Data

Reshaping ICT, Reshaping Business

NetApp Global System Partner | FUJITSU

DATASHEET ETERNUS CS HIGH END

DATA PROTECTION APPLIANCE V5

INTELLIGENT DATA PROTECTION FOR DYNAMIC INFRASTRUCTURES

ETERNUS CS HIGH END

ETERNUS CS High End provides intelligent data protection for dynamic infrastructures and makes backup and archiving fit for ILM (Information Lifecycle Management). This multiple tier storage solution exploits the best of disk and tape in a seamless manner with superior connectivity for True Tape Virtualization and File Archiving.

ETERNUS CS High End lowers total cost of storage through efficient use of the most cost effective storage and Deduplication technologies. The powerful Grid Architecture features unmatched scalability, automatic failover and cascaded long distance connections such leveraging unmatched disaster resiliency for protection against site outages.

FEATURES AND BENEFITS

MAIN FEATURES	BENEFITS
MAKES DATA PROTECTION FIT FOR ILM (INFORMATION LIFECYCLE MANAGEMENT)	■ Enables flexible Service Levels (SLA) for backup and archiving ■ Multiple tier storage with data on disk, tape, tapeless and offsite locations ■ Efficient data compression, Deduplication, encryption and WORM technologies
TRUE TAPE VIRTUALIZATION AND FILE ARCHIVING	■ Superior VTL and NAS connectivity for dynamic infrastructures ■ Workload adaptive provisioning of storage resources ■ Outstanding TCO reductions with consolidation of cost effective storage tiers
GRID ARCHITECTURE	■ Unmatched node scalability over clustered sites ■ VTL and NAS functionality on one system ■ Unmatched disaster resilience with integrated automatic failover, data mirroring, data replication and cascaded long distance connections ■ Live monitoring, health check and non-disruptive upgrades

TECHNICAL DETAILS

MODELS AT A GLANCE	SINGLE PROC. APPLIANCE	DISK LIBRARY EDITIONS	FULL SCALABLE APPLIANCES
Model	CS50	CS500 DL (VTL only) CS1500 DL	CS500 / CS1000 (VTL only), CS1500, CS2000, CS3000, CS4000, CS5000
VTL Frontend Ports	2 to 4 (FC 8Gb)	4 to 8 (FC/FICON 8Gb)	4 to 32 (FC/FICON 8Gb)
Virtual Tape Drives	16 to 32	32 to 256	32 to1024 (FC), up to 512 (FICON)
NAS Frontend Ports	No	CS500DL(No), CS1500DL (max. 4 x 10 GbE or 4 x 1 GbE per node, max 4 nodes)	(max. 4 x 10 GbE or 4 x 1 GbE per node, max 4 nodes)
NAS Backup Ports	No	CS500DL(No), CS1500DL (Option)	2 FC ports, 2 FC ports in standby, (1 active node per system , 1 node in standby, NFS and/or CIFS mount point)
Backend Ports	2	Option	4 to 24 (FC)
Physical Tape Drives supported	1 to 2	Option	2 to 112
Physical Tape Libraries supported	2	Option	10
VOLUME CACHES VTD/FILES			
Capacity (uncompressed)	2.4 TB	16 TB to 1568 TB (RAID 6)	5,4 TB to 1339,2 TB (RAID 5)
Sustained Performance (preliminary)	Max. 1.4 TB/h	Max. 9 TB/h	Max. 37 TB/h
Number of Files	None	None	Max. 500 Million
Virtual Tape Volumes	20,000	300,000	Max. 1,500,000
Physical Tape Volumes	500	Option	Max. 50,000
DEDUPLICATION STORE OPTION			
Capacity	None	None	32 TB to 160 TB (per backend node)
INSTALLATION SPECIFICATION			
Dimension (H x W x D)	90 x 484 x 770 mm (Proc.) (3.54 x 19.05 x 30.31 inches)	2,003 x 700 x 1,050 mm (per Rack) (78.86 x 27.56 x 41.33 inches)	
Height (Standards)	2 U	42 U	
Weight (kg / lbs)	20 / 44	280 to 4059 / 617 to 8,948	280 to 4,132 / 617 to 9109
Power consumption (kW)	0.33	1.35 to 46,4	1.35 to 46,8
Heat emission (BTU/h)	1,127	4,600 to 158,464	4,600 to 160,515
Sound pressure (dB(A))	< 60 **dB(A)**		
Rated Voltage	EU: 2 or 3 phases of 230 V	US: 2 supplies of 208 V (phase to phase)	
Fuse protection	16 A per phase (fuses not coupled)	Min. 20 A per phase	
Connection type	CEE connectors, 1 or 3 phases selectable (2 to 6 Connectors per Rack)	L6-30 connector (not for 115V) (2 to 6 Connectors per Rack)	
	All installation data will be without Deduplication hardware installed		
ENVIRONMENTAL			
Room air conditioned	Yes		
Bottom supply air	No		
Temperature Operating	15°C to 35°C (59 to 95°F) at 30 to 70% relative humidity, non-condensing		
Temperature Operating recommended	Long Term at 20°C (68°F), max 2 hours at minimum 15°C or maximum of 35°C (59 to 95 °F)		
Humidity Operating, recommended	Long Term at appr. 50% RH, Tolerances at 30 to 70% RH (relative humidity, non-condensing)		
Operating environment	FTS 04230 – Guideline for Data Center (installation locations)		
Operating environment Link	http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe		
SUPPORT			
Standard warranty	2 years / 5 x 9 / On-site service		
Recommended support services	Solution Contract: ts.fujitsu.com/supportservice		
COMPLIANCE WITH STANDARDS			
Product safety	CE, UL/CSA , (others)		
Radiation, EMI	CE, C-tick, FCC, VCCI (others)		
EMI Class	Class B		
INFORMATION RESSOURCES			
	Web-Store: http://docs.ts.fujitsu.com/dl.aspx?id=02c0faa4-9961-49e0-a099-cfd01100482d		
	For the detailed information of operating systems and applications please contact your Fujitsu sales representative		

VTL=Virtual Tape Library, NAS=Nearline Attached Storage

FUJITSU PLATFORM SOLUTIONS

In addition to FUJITSU ETERNUS CS DATA PROTECTION APPLIANCES, FUJITSU provides a range of platform solutions. They combine reliable FUJITSU products with the best in services, know-how and worldwide partnerships.

Dynamic Infrastructures

With the Fujitsu Dynamic Infrastructures approach, Fujitsu offers a full portfolio of IT products, solutions and services, ranging from clients to datacenter solutions, Managed Infrastructure and Infrastructure-as-a-Service. How much you benefit from Fujitsu technologies and services depends on the level of cooperation you choose. This takes IT flexibility and efficiency to the next level.

Computing Products

www.fujitsu.com/global/services/computing/

- PRIMERGY: Industrial standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system

Software

www.fujitsu.com/software/

- Interstage: Application infrastructure software
- Systemwalker: System management software

MORE INFORMATION

Learn more about Fujitsu ETERNUS CS, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus/

FUJITSU GREEN POLICY INNOVATION

Fujitsu Green Policy Innovation is our worldwide project for reducing burdens on the environment. Using our global know-how, we aim to resolve issues of environmental energy efficiency through IT. Please find further information at:
www.fujitsu.com/global/about/environment/

Green Policy Innovation

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2012-02-14 WW EN

Datasheet
Fujitsu ETERNUS CS800 S3 Storage

Data Protection Appliance: Backup to Disk with Deduplication

ETERNUS CS Data Protection Appliance

The ETERNUS CS data protection appliances offer outstanding data protection for dynamic infrastructures. ETERNUS CS minimizes backup times and fulfills the recovery time objectives for all business critical environments.

By aligning tape, disk and advanced deduplication technology into a controllable Information Lifecycle Management (ILM) strategy, enterprise data protection can be flexibly aligned to different SLAs.

ETERNUS CS is suited for every backup infrastructure environment and all market leading backup software. It enables the consolidation of storage devices, to simplify your company's data protection administration. It saves energy, lowers total cost of storage, and makes efficient use of the most cost-effective technologies.

ETERNUS CS800 S3

Fujitsu ETERNUS CS800 S3 is a data protection appliance optimized for back-up to disk. It radically reduces costs, through savings in required storage capacity of up to 95%, using leading deduplication technology. It also protects data against disaster through replication.

As an integrated and optimized appliance ETERNUS CS800 S3 is far more easy to use, more efficient to operate and displays better results in deduplication - compared with pure software solutions in combination with standard disk systems.

Features and benefits

Main features	Benefits
■ High capacity and performance while reducing costs	■ Maximum disk performance for better data protection ■ Highest scalability from entry up to 160 TB ■ Data deduplication technology reduces disk requirements
■ Improved and automated disaster recovery protection	■ Remote encrypted replication with reduced network bandwidth ■ Reduced media handling and easy administration ■ Supports Symantec OpenStorage (OST) and Path-to-Tape
■ Integration into dynamic infrastructures	■ Turnkey solution for easy and economical deployment ■ Standard NAS or VTL interface for easy implementation and operation

Technical details

MODEL OPTION	NAS Entry	NAS Basic	NAS Performance	VTL
Capacity	4 or 8 TB	16 – 160 TB	32 – 160 TB	32 – 160 TB
Host Ethernet and Replication Interface	5 x 1GbE	7 x 1GbE	5 x 1GbE 2 x 10GbE	5 x 1GbE
Fibre Channel Interface (max.)	-	2 X 8GbFC	2 X 8GbFC	4 x 8GbFC
Path-to-Tape	-	Symantec OST support of direct tape creation Application specific		
Path-to-Tape Interface (preconfigured)	-	1 x 8GbFC (option)	1 x 8GbFC	2 x 8GbFC
NAS Backup Target	NFS and/or CIFS mount point			
Shares (max)t	128	128	128	128
Partitions (max.)	-	64	64	64
Virtual Tape Dives (max.)	-	80	80	256
Virtual Cartridges per VTL partition (max.)	-	9000	9000	9000
Tape Drive Emulations	-	DLT7000, SDLT 320, SDLT 600, SLT-S4, LTO-1, LTO-2, LTO-3, LTO-4, LTO-5		
Libraries Emulations	-	ADIC Scalar 24, Scalar 100, Scalar i500, Scalar i2000, Scalar i6000		

GENERAL SPECIFICATION	
Performance (in-line-operation)	Up to 6.3 TB/h
Standard software included	Deduplication, Replication, Path-to-Tape
Supported application	For the detailed support matrix of operating systems and applications please contact your Fujitsu sales representative

INSTALLATION SPECIFICATION	
Dimension (W x D x H) - standard	484 x 770 x 90 up to 982 mm (19.05 x 30.31 x 3.54 up to 38.66 inches)
Height	2U up to 38U (1U = 44,45mm / 1.75 inches)
Weight	30 up to 375 kg (66 up to 825 lbs)
Power voltage (V)	AC 100 - 120 / 200 – 240
Power frequency (Hz)	50 / 60
Power consumption (W)	Min 600 / max 5900
Power phases	Dual

ENVIRONMENTAL	
Heat emission (BTU/h)	Min 2050 / max 20500
Heat emission (kj/h)	Min 2100 / max 21600
Temperature (Operating)	15 - 35°C (59 - 95°F)
Humidity (Operating)	20 - 80 % (relative humidity, non-condensing)
Sound pressure (dB(A))	49 – 53
Operating environment	FTS 04230 – Guideline for Data Center (installation locations)
Operating environment Link	http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe

Maintenance and Support Services

The perfect extension to product specific base warranty - for optimized operation.
Recommended Service: 24 x 7 Fujitsu support for enterprise class services.
Please check your specific service level with your FUJITSU sales organization or partner.

Standards Compliance	
Product safety	UL60950-1, CSA60950-1, EN60950-1, IEC60950-1, GOST
Electromagnetic Compatibility	FCC Part-15 Class A, ICES-003 Class A, EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A, CNS13438(C6357) Class A, C-Tick, BSMI
Electromagnetic Immunity	EN 55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC, Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances), WEEE-compliant (Waste electrical and electronically equipment)
Compliance notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.
Compliance link	Compliance Link: https://sp.ts.fujitsu.com/sites/certificates/default.aspx

More information

Fujitsu OPTIMIZATION Services

In addition to Fujitsu ETERNUS, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

Dynamic Infrastructures
With the Fujitsu Dynamic Infrastructures approach, Fujitsu offers a full portfolio of IT products, solutions and services, ranging from clients to datacenter solutions, Managed Infrastructure and Infrastructure as a Service. How much you benefit from Fujitsu technologies and services depends on the level of cooperation you choose. This takes IT flexibility and efficiency to the next level.

Computing products
www.fujitsu.com/global/services/computing/
- PRIMERGY: Industrial standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system
- BS2000 mainframes

Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus

Fujitsu green policy innovation

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www.fujitsu.com/global/about/environment/

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Website: www.fujitsu.com/ts/eternus
2012-04-24 EM EN

Datasheet
Fujitsu ETERNUS DX60 S2 Disk Storage System

The Economy Storage

ETERNUS DX S2 DISK STORAGE SYSTEMS

Fujitsu's second generation of ETERNUS DX disk storage systems, ETERNUS DX S2, are The Flexible Data Safe for Dynamic Infrastructures. Enterprise-proven capabilities protect data assets across all types of IT infrastructure. Redundant components, RAID protection and build-in data protection provide the highest system reliability to ensure business continuity is maintained.

ETERNUS DX S2 models are comprehensive disk storage platforms with superior scalability to address the demands of intensive data growth and highest performance. Free choice of modular disk storage and state-of-the-art connectivity across the entire model range delivers maximum configuration flexibility allowing choice in performance and TCO.

The unified ETERNUS SF storage management software enables single point administration, easy data protection and efficient operation across the entire ETERNUS DX range. In virtualized IT environments in particular, ETERNUS SF perfectly integrates the powerful ETERNUS DX disk storage with minimal administration effort.

ETERNUS DX60 S2

Delivering reliable operation at an affordable price makes ETERNUS DX60 S2 an ideal disk storage system for small and medium-sized IT environments.

Management software, included at no extra cost, reduces administration effort and provides functionality to ensure data protection. Flexible support for different network connections and disk types enables choice in cost and performance optimization.

Designed for smaller environments it provides remarkable scalability in storage capacity of up to 72 TB offering good headroom for future growth. The perfect storage solution for consolidation of distributed data and for smaller server virtualization projects.

Green IT

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Green Product

This product cleared our company's original evaluation standard which followed global environmental measures.

Reshaping ICT, Reshaping Business

NetApp Global System Partner

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Features and benefits

Main features	Benefits
Reliable operation at an affordable price	**Combines affordable price-level with** ■ High performance ■ Rich data safety functionality ■ Enterprise proven capabilities already in entry-level storage
Ideal for small and medium-sized IT environments	■ Easy to install, configure, operate and maintain **Fits perfectly to** ■ Storage consolidation starters & virtualization newcomers ■ Medium capacity requirements with moderate growth rates
Free of charge ETERNUS SF Express Storage Management	■ Comes with a richly featured management suite at no extra costs ■ Single point administration ■ Easy and efficient operation

Technical details

General Specification			2.5" Base Model		3.5" Base Model	
			Single Controller	Dual Controller	Single Controller	Dual Controller
RAID Levels			0, 1, 1+0, 5, 5+0, 6			
Host Interfaces			Fibre Channel (4/2/1 Gbit/s) iSCSI (1 Gbit/s / 100Mbit/s) SAS (3 Gbit/s)			
Number of controllers			1	2	1	2
Number of host interfaces			2	4	2	4
Number of hosts		Fibre Channel	Max. 32	Max. 64	Max. 32	Max. 64
		iSCSI	Max. 32	Max. 64	Max. 32	Max. 64
		SAS	Max. 2	Max. 4	Max. 2	Max. 4
Cache memory capacity			1 GB	2 GB	1 GB	2 GB
Number of drive enclosures			—		Max. 1	
Number of drives			Max. 24 (2.5"CE)		Max. 24 (3.5"CE +3.5"DE)	
Storage capacity		Physical capacity	Max. 21.6 TB		Max. 72.0 TB	
		Logical capacity	Max. 16.0 TB		Max. 53.4 TB	
Drives	3.5-inch	SAS disk drives	600 GB/450 GB/300 GB (15,000 rpm)			
		Nearline SAS disk drives	3 TB/2 TB/1 TB (7,200 rpm)			
- Notes			3.5" drives are available only for 3.5" drive enclosures.			
	2.5-inch	SAS disk drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm)			
- Notes			2.5" drives are available only for 2.5" drive enclosures.			
Drive interface			Serial Attached SCSI (3 Gbit/s)			
Redundancies		RAID Controller	No	Yes	No	Yes
		Fan	Yes	Yes	Yes	Yes
		Power Supply	Yes	Yes	Yes	Yes
Number of LUN			Max. 512			
LUN capacity			Max. 32 TB			
Number of Snapshots		Standard (built-in)	8			
		Maximum (option)	512			
- Note			Local Copy License must be purchased to maximize the number of Snapshots			
Number of copy generations			8			
Remote Copy feature			No			

Installation Specification		2.5" Base Model	3.5" Base Model
Dimensions (W x D x H)	Standard	483 x 650 x 88mm (2U)	
		19 x 25.5 x 3.5 inch [2U]	
	Maximum	483 × 650 × 88 mm (2U)	483 × 650 ×176 mm (4U)
		19 × 25.5 × 3.5 inch [2U]	19 × 25.5 × 7 inch [4U]
Service Area	Front	800 mm (31.5 inch) or more	
	Rear	800 mm (31.5 inch) or more	
Maximum Weight		35 kg (35 kg per single enclosure)	70 kg (35 kg per single enclosure)
		77.2 lb (772. lb per single enclosure)	154.4 lb (772. lb per single enclosure)
Power	Voltage	AC 100 – 120 V / AC 200 – 240 V	
	Phase	Single	
	Frequency	50 Hz / 60 Hz	

Installation Specification (Continued)			2.5" Base Model	3.5" Base Model
Maximum Power Consumption	**AC 100 - 120V**	**CE**	510 W (520 VA)	440 W (450 VA)
		DE	—	370 W (380 VA)
		Max	—	810 W (820 VA)
	AC 200 - 240V	**CE**	500 W (510 VA)	430 W (440 VA)
		DE	—	370 W (380 VA)
		Max	—	800 W (820 VA)
Maximum Heat Generation	**AC 100 - 120V**		1,840 kJ/h (1,740 BTU/h)	2,920 kJ/h (2,760 BTU/h)
	AC 200 - 240V		1,800 kJ/h (1,700 BTU/h)	2,880 kJ/h (2,720 BTU/h)
Environmental Conditions	**Temperature**		10 – 40°C (Operating)	
			50 – 104°F (Operating)	
	Humidity		20 – 80% RH (Operating)	
Altitude			3,000 m (10,000 ft.)	
Operating environment			FTS 04230 Guideline for Data Center (installation locations)	
Operating environment link			http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe	

Supported RAID Levels	
RAID 0	Data striping on several disk drives, not recommended
RAID 1	Mirrored disk drives
RAID 1+0	Data mirroring, then striping of the data over several disk drives
RAID 5	Striping with distributed parity
RAID 5+0	RAID 5 arrays, striped again over several drives
RAID 6	Striping with distributed double parity

Management	
Interfaces	Ethernet (1000 Base-T / 100 Base-TX / 10 Base-T)
Supported protocols	SNMP (version1, 2C, 3), SMI-S 1.4
Administration	Web-Environment, CLI (Command Line Interface), ETERNUS SF Express

Supported OS For ETERNUS SF Express	
Operation Management Server	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit) including R2
Operation Management Client	Microsoft® Windows® 7 Home Premium
	Microsoft® Windows® 7 Professional
	Microsoft® Windows® 7 Ultimate
	Windows Vista® Home Basic
	Windows Vista® Home Premium
	Windows Vista® Business
	Windows Vista® Enterprise
	Windows Vista® Ultimate
	Windows® XP Home Edition
	Windows® XP Professional
	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit)

Options	
License	ETERNUS SF Local Copy License

Noise Emission	2.5" Base Model	3.5" Base Model
Sound Power Level (LWAd)	5.9 B	6.0 B
Sound Pressure Level (LpAm)	42.0 dB(A)	43.5 dB(A)
- Notes	measured with single enclosure according to ISO7779 and declared according to ISO9296	

Warranty	
Global Factory Warranty	3 years

Maintenance and Support Services

The perfect extension of the product specific base warranty for optimized operation.
Please check your specific service level with your FUJITSU sales organization or partner.

Supported configurations

A wide range of host operating systems, servers as well as applications is supported.
For a detailed support matrix
check: http://www.fujitsu.com/global/services/computing/storage/eternus/products/diskstorage/dx-entry/supported-device/

Compliance With Standards	
Product safety	UL60950-1, CSA-C22.2 No. 60950-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	CNS13438(C6357) Class A, FCC CFR47 part 15 Class A, ICES-003 Class A,
	EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A
Electromagnetic Immunity	EN55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC
	Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances)
	WEEE-compliant (Waste electrical and electronic equipment)
- Notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.

More information

Fujitsu platform solutions

In addition to Fujitsu ETERNUS DX, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

Dynamic Infrastructures
With the Fujitsu Dynamic Infrastructures approach, Fujitsu offers a full portfolio of IT products, solutions and services, ranging from clients to datacenter solutions, Managed Infrastructure and Infrastructure-as-a-Service. How much you benefit from Fujitsu technologies and services depends on the level of cooperation you choose. This takes IT flexibility and efficiency to the next level.

Computing products
www.fujitsu.com/global/services/computing/
- PRIMERGY: Industry standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system

Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS DX60 S2, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus/

Fujitsu green policy innovation

Fujitsu Green Policy Innovation is our worldwide project for reducing burdens on the environment. Using our global know-how, we aim to resolve issues of environmental energy efficiency through IT. Please find further information at:
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Website: www.fujitsu.com/eternus/
2012-01-17 WW-EN

Datasheet
Fujitsu ETERNUS DX80 S2 Disk Storage System

The Flexible Data Safe for Dynamic Infrastructures.

ETERNUS DX S2 DISK STORAGE SYSTEMS

Fujitsu's second generation of ETERNUS DX disk storage systems, ETERNUS DX S2, are The Flexible Data Safe for Dynamic Infrastructures. Enterprise-proven capabilities protect data assets across all types of IT infrastructure. Redundant components, RAID protection and build-in data protection provide the highest system reliability to ensure business continuity is maintained.

ETERNUS DX S2 models are comprehensive disk storage platforms with superior scalability to address the demands of intensive data growth and highest performance. Free choice of modular disk storage and state-of-the-art connectivity across the entire model range delivers maximum configuration flexibility allowing choice in performance and TCO. Data-in-place upgrade options are also available throughout the system's lifecycle to ensure maximum investment protection.

The unified ETERNUS SF storage management software enables single point administration, easy data protection and efficient operation across the entire ETERNUS DX range. In virtualized IT environments in particular, ETERNUS SF perfectly integrates the powerful ETERNUS DX disk storage with minimal administration effort.

ETERNUS DX80 S2

The ETERNUS DX80 S2 with Intel® Xeon® processors is a reliable and flexible disk storage system for medium-sized IT environments. It offers an outstanding price/performance ratio and is easy to manage, thus reducing operational effort. It provides remarkable scalability with storage capacity of up to 360 TB, thus offering enough headroom for future growth. The flexible support for different network connectivity and disk types (SAS, Nearline SAS and SSD) provides a choice between cost and performance optimization. The ETERNUS DX80 offers Thin Provisioning allowing a more cost-efficient use of storage capacity right from the start. Data-in-place upgrades lead seamlessly to the next higher ETERNUS DX system, thus ensuring flexibility and investment protection. The enclosed ETERNUS SF Express software reduces administration work and provides data safety functionality.

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This product cleared our company's original evaluation standard which followed global environmental measures.

Features and benefits

Main features	Benefits
Data center functionality already in the Entry class	■ Flexible configuration of drives and connectivity; enables flexible balancing of performance, capacity and costs ■ Ensures data safety and high availability through comprehensive features like encryption, redundancy, copy functions and snapshots ■ Efficient operations through technologies such as Tiering, Thin Provisioning and Eco-mode
Richly featured management suite at no extra costs	■ Free of charge ETERNUS SF Express Storage Management ■ Snapshot functionality already included ■ Easy and efficient operation
Unique and consistent family concept	■ Seamless and fully compatible product family of disk storage systems with uniform system components and unified management software ■ Family concept reduces operations, maintenance, migration and training efforts as well as costs ■ Migration path to the next bigger model

Technical details

General Specification			2.5" Base Model		3.5" Base Model	
			Single Controller	Dual Controller	Single Controller	Dual Controller
Supported RAID Levels			0, 1, 1+0, 5, 5+0, 6			
Host Interfaces			Fibre Channel (8/4/2 Gbit/s) FCoE (10 Gbit/s) iSCSI (10 Gbit/s) or iSCSI (1 Gbit/s) SAS (6/3 Gbit/s)			
Number of controllers			1	2	1	2
Number of host interfaces			2/4 ports	4/8 ports	2/4 ports	4/8 ports
- Notes			Mixed configurations are possible.			
Number of hosts			Max. 1,024			
Cache memory capacity			2 GB	4 GB	2 GB	4 GB
Number of drive enclosures			Max. 4 (2.5") / Max. 9 (3.5")			
Number of drives			Max. 120			
Storage capacity		Physical capacity	Max. 360.0 TB			
		Logical capacity	Max. 267.0 TB			
Drives	3.5-inch	SAS disk drives	600 GB/450 GB/300 GB (15,000 rpm)			
		Nearline SAS disk drives	3 TB/2 TB/1 TB (7,200 rpm)			
		SSD (Solid State Drives)	400 GB/200 GB/100 GB			
- Notes			3.5" drives are available only for 3.5" drive enclosures.			
	2.5-inch	SAS Non-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm), 300GB (15,000 rpm)			
		SAS Self-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm)			
		Nearline SAS disk drives	1 TB (7,200 rpm)			
		SSD (Solid State Drives)	400 GB/200 GB/100 GB			
- Notes			2.5" drives are available only for 2.5" drive enclosures.			
Drive interface			Serial Attached SCSI (6 Gbit/s)			
Back-End Disk Connectivity			1 pair of four-lane x 6 Gbit/s Serial Attached SCSI buses (SAS 2.0 wide)			
Redundancies		RAID Controller	No	Yes	No	Yes
		Fan	Yes	Yes	Yes	Yes
		Power Supply	Yes	Yes	Yes	Yes
Number of LUN			Max. 2,048			
LUN capacity			Max. 128 TB			
Number of Snapshots		Standard (built-in)	8			
		Maximum (option)	1,024			
- Note			Local Copy License must be purchased to maximize the number of Snapshots			
Number of copy generations			256			
Remote Copy feature			No			

Installation Specification		2.5" Base Model	3.5" Base Model
Dimensions (Standard)	Controller enclosure (CE)	CE: 482 × 645 × 88 mm (2U)	CE: 482 × 670 × 88 mm (2U)
(W x D x H)		CE: 19 × 25.4 × 3.5 inch (2U)	CE: 19 × 26.4 ×3.5 inch (2U)
	Drive enclosure (DE)	DE: 482 × 540 × 88 mm (2U)	DE: 482 × 555 × 88 mm (2U)
		DE: 19 × 21.3 × 3.5 inch(2U)	DE: 19 × 21.9x 3.5 inch (2U)
Service Area	Front	800 mm (31.5 inch) or more	
	Rear	800 mm (31.5 inch) or more	
Maximum Weight		175 kg (35 kg per single enclosure)	350 kg (35 kg per single enclosure)
		385 lb (77 lb per single enclosure)	770 lb (77 lb per single enclosure)

Installation Specification (Continued)			2.5" Base Model	3.5" Base Model
Power	Voltage		AC 100 – 120 V / AC 200 – 240 V	
	Phase		Single	
	Frequency		50 Hz / 60 Hz	
Maximum Power Consumption	AC 100 - 120V	CE	630 W (640 VA)	620 W (630 VA)
		DE	570 W (580 VA)	550 W (560 VA)
		Max	2,910 W (CE+2.5"DEx4)	5,570 W (CE+3.5"DEx9)
			2,960 VA (CE+2.5"DEx4)	5,670 VA (CE+3.5"DEx9)
	AC 200 - 240V	CE	630 W (640 VA)	610 W (620 VA)
		DE	570 W (580 VA)	550 W (560 VA)
		Max	2,910 W (CE+2.5"DEx4)	5,560 W (CE+3.5"DEx9)
			2,960 VA (CE+2.5"DEx4)	5,660 VA (CE+3.5"DEx9)
Maximum Heat Generation	AC 100 - 120V		10,700 kJ/h (10,200 BTU/h)	20,300 kJ/h (19,300 BTU/h)
	AC 200 - 240V		10,700 kJ/h (10,200 BTU/h)	20,200 kJ/h (19,200 BTU/h)
Environmental Conditions	Temperature		10 – 40°C (Operating)	
			50 – 104°F (Operating)	
	Humidity		20 – 80% RH (Operating)	
Altitude			3,000 m (10,000 ft.)	
Operating environment			FTS 04230 Guideline for Data Center (installation locations)	
Operating environment link			http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe	

Management	
Interfaces	Ethernet (1000 Base-T / 100 Base-TX / 10 Base-T)
Supported protocols	SNMP (version1, 2C, 3), SMI-S 1.4
Administration	Web-Environment, CLI (Command Line Interface), ETERNUS SF Express

Supported OS For ETERNUS SF Express	
Operation Management Server	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit) including R2
Operation Management Client	Microsoft® Windows® 7 Home Premium
	Microsoft® Windows® 7 Professional
	Microsoft® Windows® 7 Ultimate
	Windows Vista® Home Basic
	Windows Vista® Home Premium
	Windows Vista® Business
	Windows Vista® Enterprise
	Windows Vista® Ultimate
	Windows® XP Home Edition
	Windows® XP Professional
	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit)

Options	
License	ETERNUS SF Local Copy License

Noise Emission	2.5" Base Model	3.5" Base Model
Sound Power Level (LWAd)	6.6 B	
Sound Pressure Level (LpAm)	49 dB(A)	
- Notes	measured with single enclosure according to ISO7779 and declared according to ISO9296	

Warranty	
Global Base Warranty	3 years

Maintenance and Support Services

The perfect extension of the product specific base warranty for optimized operation.
Recommended Service: 24 x 7 Fujitsu support for enterprise class services.
Please check your specific service level with your FUJITSU sales organization or partner.

Supported configurations

A wide range of host operating systems, servers as well as applications is supported.
For a detailed support matrix
check: http://www.fujitsu.com/global/services/computing/storage/eternus/products/diskstorage/dx-entry/supported-device/

Compliance With Standards	
Product safety	UL60950-1, CSA-C22.2 No. 60950-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	CNS13438(C6357) Class A, FCC CFR47 part 15 Class A, ICES-003 Class A,
	EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A
Electromagnetic Immunity	EN55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC
	Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances)
	WEEE-compliant (Waste electrical and electronic equipment)
- Notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.

More information

Fujitsu platform solutions

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Dynamic Infrastructures
With the Fujitsu Dynamic Infrastructures approach, Fujitsu offers a full portfolio of IT products, solutions and services, ranging from clients to datacenter solutions, Managed Infrastructure and Infrastructure-as-a-Service. How much you benefit from Fujitsu technologies and services depends on the level of cooperation you choose. This takes IT flexibility and efficiency to the next level.

Computing products
www.fujitsu.com/global/services/computing/
- PRIMERGY: Industry standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system

Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS DX80 S2, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus/

Fujitsu green policy innovation

Fujitsu Green Policy Innovation is our worldwide project for reducing burdens on the environment. Using our global know-how, we aim to resolve issues of environmental energy efficiency through IT. Please find further information at:
www.fujitsu.com/global/about/environment/

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Website: www.fujitsu.com/eternus/
2012-05-14 WW-EN

Datasheet
Fujitsu ETERNUS DX90 S2 Disk Storage System

The Flexible Data Safe for Dynamic Infrastructures.

ETERNUS DX S2 DISK STORAGE SYSTEMS

Fujitsu's second generation of ETERNUS DX disk storage systems, ETERNUS DX S2, are The Flexible Data Safe for Dynamic Infrastructures. Enterprise-proven capabilities protect data assets across all types of IT infrastructure. Redundant components, RAID protection and build-in data protection provide the highest system reliability to ensure business continuity is maintained.

ETERNUS DX S2 models are comprehensive disk storage platforms with superior scalability to address the demands of intensive data growth and highest performance. Free choice of modular disk storage and state-of-the-art connectivity across the entire model range delivers maximum configuration flexibility allowing choice in performance and TCO. Data-in-place upgrade options are also available throughout the system's lifecycle to ensure maximum investment protection.

The unified ETERNUS SF storage management software enables single point administration, easy data protection and efficient operation across the entire ETERNUS DX range. In virtualized IT environments in particular, ETERNUS SF perfectly integrates the powerful ETERNUS DX disk storage with minimal administration effort.

ETERNUS DX90 S2

The ETERNUS DX90 S2 with Intel® Xeon® processors is a reliable and flexible disk storage system for small and medium-sized IT environments. It provides an outstanding price/performance ratio and is easy to manage. In order to cope with enormous data growth yet maintain flexibility, it offers remarkable scalability with storage capacity of up to 360 TB, thus offering enough headroom for future growth. The flexible support of different network connectivity and disk types (SAS, Nearline SAS and SSD) provides a choice between cost and performance optimization. The ETERNUS DX90 offers Thin Provisioning as a standard feature enabling a more cost-efficient use of storage capacity right from the start. Data-in-place upgrades lead seamlessly to the next higher ETERNUS DX system, thus ensuring flexibility and investment protection. The enclosed ETERNUS SF Express software reduces administration work and provides data safety functionality. The excellent ETERNUS DX90 data center functionality is based on storage-based replication which protects valuable data assets against site outages.

Green IT

Green Policy Innovation | Green Product
This product cleared our company's original evaluation standard which followed global environmental measures.

Features and benefits

Main features	Benefits
Data center functionality already in the Entry class	■ Flexible configuration of drives and connectivity; enables flexible balancing of performance, capacity and costs ■ Ensures data safety and high availability through comprehensive features like encryption, redundancy, copy functions and snapshots ■ Efficient operations through technologies such as Tiering, Thin Provisioning and Eco-mode
Comprehensive disaster recovery functionality	■ Supports flexible disaster recovery concepts between remote locations at any distance
Unique and consistent family concept	■ Seamless and fully compatible product family of disk storage systems with uniform system components and unified management software ■ Family concept reduces operations, maintenance, migration and training efforts as well as costs ■ Migration path to the next bigger model

Technical details

General Specification		2.5" Base Model		3.5" Base Model	
		Single Controller	Dual Controller	Single Controller	Dual Controller
Supported RAID Levels		0, 1, 1+0, 5, 5+0, 6			
Host Interfaces		Fibre Channel (8/4/2 Gbit/s) FCoE (10 Gbit/s) iSCSI (10 Gbit/s) or iSCSI (1 Gbit/s) SAS (6/3 Gbit/s)			
Number of controllers		1	2	1	2
Number of host interfaces		2/4 ports	4/8 ports	2/4 ports	4/8 ports
- Notes		Mixed configurations are possible.			
Number of hosts		Max. 1,024			
Cache memory capacity		4 GB	8 GB	4 GB	8 GB
Number of drive enclosures		Max. 9			
Number of drives		Max. 240		Max. 120	
Storage capacity	Physical capacity	Max. 360.0 TB			
	Logical capacity	Max. 267.0 TB			
Drives 3.5-inch	SAS disk drives	600 GB/450 GB/300 GB (15,000 rpm)			
	Nearline SAS disk drives	3 TB/2 TB/1 TB (7,200 rpm)			
	SSD (Solid State Drives)	400 GB/200 GB/100 GB			
- Notes		3.5" drives are available only for 3.5" drive enclosures.			
2.5-inch	SAS Non-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm), 300GB (15,000 rpm)			
	SAS Self-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm)			
	Nearline SAS disk drives	1 TB (7,200 rpm)			
	SSD (Solid State Drives)	400 GB/200 GB/100 GB			
- Notes		2.5" drives are available only for 2.5" drive enclosures.			
Drive interface		Serial Attached SCSI (6 Gbit/s)			
Back-End Disk Connectivity		1 pair of four-lane x 6 Gbit/s Serial Attached SCSI buses (SAS 2.0 wide)			
Redundancies	RAID Controller	No	Yes	No	Yes
	Fan	Yes	Yes	Yes	Yes
	Power Supply	Yes	Yes	Yes	Yes
Number of LUN		Max. 4,096			
LUN capacity		Max. 128 TB			
Number of Snapshots	Standard (built-in)	8			
	Maximum (option)	2,048			
- Note		Local Copy License must be purchased to maximize the number of Snapshots			
Number of copy generations		256			
Remote Copy feature		Yes			
- Note		Remote Copy Licenses must be purchased for each system			

Installation Specification		2.5" Base Model	3.5" Base Model
Dimensions (Standard)	Controller enclosure (CE)	CE: 482 × 645 × 88 mm (2U)	CE: 482 × 670 × 88 mm (2U)
(W x D x H)		CE: 19 × 25.4 × 3.5 inch (2U)	CE: 19 × 26.4 ×3.5 inch (2U)
	Drive enclosure (DE)	DE: 482 × 540 × 88 mm (2U)	DE: 482 × 555 × 88 mm (2U)
		DE: 19 × 21.3 × 3.5 inch(2U)	DE: 19 × 21.9x 3.5 inch (2U)
Service Area	Front	800 mm (31.5inch) or more	
	Rear	800 mm (31.5inch) or more	
Maximum Weight		350 kg (35 kg per single enclosure)	
		770 lb (77 lb per single enclosure)	

Installation Specification (Continued)			2.5" Base Model	3.5" Base Model
Power	Voltage		AC 100 – 120 V / AC 200 – 240 V	
	Phase		Single	
	Frequency		50 Hz / 60 Hz	
Maximum Power Consumption	AC 100 - 120V	CE	630 W (640 VA)	620 W (630 VA)
		DE	570 W (580 VA)	550 W (560 VA)
		Max	5,760 W (CE+2.5"DEx9)	5,570 W (CE+3.5"DEx9)
			5,860 VA (CE+2.5"DEx9)	5,670 VA (CE+3.5"DEx9)
	AC 200 - 240V	CE	630 W (640 VA)	610 W (620 VA)
		DE	570 W (580 VA)	550 W (560 VA)
		Max	5,760 W (CE+2.5"DEx9)	5,560 W (CE+3.5"DEx9)
			5,860 VA (CE+2.5"DEx9)	5,660 VA (CE+3.5"DEx9)
Maximum Heat Generation	AC 100 - 120V		21,200 kJ/h (20,200 BTU/h)	20,300 kJ/h (19,300 BTU/h)
	AC 200 - 240V		21,200 kJ/h (20,200 BTU/h)	20,200 kJ/h (19,200 BTU/h)
Environmental Conditions	Temperature		10 – 40°C (Operating)	
			50 – 104°F (Operating)	
	Humidity		20 – 80% RH (Operating)	
Altitude			3,000 m (10,000 ft.)	
Operating environment			FTS 04230 Guideline for Data Center (installation locations)	
Operating environment link			http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe	

Management	
Interfaces	Ethernet (1000 Base-T / 100 Base-TX / 10 Base-T)
Supported protocols	SNMP (version1, 2C, 3), SMI-S 1.4
Administration	Web-Environment, CLI (Command Line Interface), ETERNUS SF Express

Supported OS For ETERNUS SF Express	
Operation Management Server	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit) including R2
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit) including R2
Operation Management Client	Microsoft® Windows® 7 Home Premium
	Microsoft® Windows® 7 Professional
	Microsoft® Windows® 7 Ultimate
	Windows Vista® Home Basic
	Windows Vista® Home Premium
	Windows Vista® Business
	Windows Vista® Enterprise
	Windows Vista® Ultimate
	Windows® XP Home Edition
	Windows® XP Professional
	Microsoft® Windows Server®2008 Standard (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Enterprise (32-bit) (64-bit)
	Microsoft® Windows Server® 2008 Datacenter (32-bit) (64-bit)

Options	
License	ETERNUS SF Local Copy License

Noise Emission	2.5" Base Model	3.5" Base Model
Sound Power Level (LWAd)	6.6 B	
Sound Pressure Level (LpAm)	49 dB(A)	
- Notes	measured with single enclosure according to ISO7779 and declared according to ISO9296	

Warranty	
Global Base Warranty	3 years

Maintenance and Support Services

The perfect extension of the product specific base warranty for optimized operation.
Recommended Service: 24 x 7 Fujitsu support for enterprise class services.
Please check your specific service level with your FUJITSU sales organization or partner.

Supported configurations

A wide range of host operating systems, servers as well as applications is supported.
For a detailed support matrix
check: http://www.fujitsu.com/global/services/computing/storage/eternus/products/diskstorage/dx-entry/supported-device/

Compliance With Standards	
Product safety	UL60950-1, CSA-C22.2 No. 60950-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	CNS13438(C6357) Class A, FCC CFR47 part 15 Class A, ICES-003 Class A,
	EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A
Electromagnetic Immunity	EN55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC
	Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances)
	WEEE-compliant (Waste electrical and electronic equipment)
- Notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.

More information

Fujitsu platform solutions

In addition to Fujitsu ETERNUS DX, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

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- ETERNUS: Storage system

Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS DX90 S2, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus/

Fujitsu green policy innovation

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Datasheet
Fujitsu ETERNUS DX400 S2 series Disk Storage Systems

The Flexible Data Safe for Dynamic Infrastructures.

ETERNUS DX S2 DISK STORAGE SYSTEMS

Fujitsu's second generation of ETERNUS DX disk storage systems, ETERNUS DX S2, are The Flexible Data Safe for Dynamic Infrastructures. Enterprise-proven capabilities protect data assets across all types of IT infrastructure. Redundant components, RAID protection and build-in data protection provide the highest system reliability to ensure business continuity is maintained.

ETERNUS DX S2 models are comprehensive disk storage platforms with superior scalability to address the demands of intensive data growth and highest performance. Free choice of modular disk storage and state-of-the-art connectivity across the entire model range delivers maximum configuration flexibility allowing choice in performance and TCO. Data-in-place upgrade options are also available throughout the system's lifecycle to ensure maximum investment protection.

The unified ETERNUS SF storage management software enables single point administration, easy data protection and efficient operation across the entire ETERNUS DX range. In virtualized IT environments in particular, ETERNUS SF perfectly integrates the powerful ETERNUS DX disk storage with minimal administration effort.

ETERNUS DX400 S2 series

The ETERNUS DX400 S2 series with Intel® Xeon® processors is purpose-built for data centers and virtualized environments. Its leading performance architecture featuring innovative powerful technologies delivers excellent performance for all levels of business.

The ETERNUS DX400 S2 series offers outstanding scalability from 2 to 960 disk drives in order to serve capacity-intensive environments with tremendous storage density. Non-disruptive capacity upgrades, by simply adding disks or complete enclosures with the latest 2.5 inch, 3.5 inch, SAS, Nearline SAS, SED (Self Encrypting Drives) and SSD drive types, is supported even in mixed configurations, thus enabling an efficient tiered storage environment. Data-in-Place upgrades from ETERNUS DX90 S2 to the ETERNUS DX410 S2 model and further to the ETERNUS DX440 S2 model as well as field-replaceable FC, FCoE or iSCSI host interface cards provide convincing flexibility throughout the lifecycle of enterprise data. Internal redundant components and local or remote data copy options ensure maximum resiliency and protects valuable data assets against site outages. Together with an easy-to-use ETERNUS SF storage management software suite with a wide range of features, the architecture of the ETERNUS DX400 S2 series is ideally designed for the requirements of mid-range and large enterprises.

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This product has the top-level environmental factor in the comparison with our previous product or product in market.

Features and benefits

Main features	Benefits
Versatile midrange storage system	■ Flexible configuration of disk types and connectivity enables flexible balancing of performance, capacity and costs ■ Ensures data safety through comprehensive features like encryption, redundancy, rich copy functionality and snapshots ■ Efficient operations through technologies such as Tiering, Thin Provisioning and Eco-mode
High scalability regarding capacity, performance and availability	■ Leading performance architecture delivers support, high data growth and virtualization ■ Supports high capacity growth bridging midrange and large data center requirements. Comprehensive high availability and disaster recovery functionality ensure high quality of service
Unique and consistent family concept	■ Seamless and fully compatible product family of disk storage systems with uniform system components and unified management software ■ Family concept reduces operations, maintenance, migration and training efforts as well as costs ■ Migration path to the next bigger model

Technical details

General Specification		DX410 S2	DX440 S2
Supported RAID Levels		0, 1, 1+0, 5, 5+0, 6	
Host Interfaces		Fibre Channel (8/4/2 Gbit/s) FCoE (10 Gbit/s) iSCSI (10 Gbit/s) or iSCSI (1 Gbit/s)	
Number of controllers		2	
Number of host interfaces		4 – 16 ports	4 – 32 ports
- Notes		Mixed configurations are possible.	
Number of hosts		Max. 1024	
Cache memory capacity		8 GB / 16 GB	24 GB / 48 GB / 72 GB / 96 GB
Number of drive enclosures		Max. 20 (3.5", 2.5")	Max. 40 (3.5", 2.5")
Number of drives		Max. 480 (2.5") / Max. 240 (3.5")	Max. 960 (2.5") / Max. 480 (3.5")
Storage capacity	Physical capacity	Max. 720.0 TB	Max. 1440.0 TB
	Logical capacity	Max. 512.6 TB	Max. 1,025.3 TB
Drives 3.5-inch	SAS disk drives	600 GB/450 GB/300 GB (15,000 rpm)	
	Nearline SAS disk drives	3 TB/2 TB/1 TB (7,200 rpm)	
	SSD (Solid State Drives)	400 GB/200 GB/100 GB	
2.5-inch	SAS Non-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm), 300GB (15,000 rpm)	
	SAS Self-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm)	
	Nearline SAS disk drives	1 TB (7,200 rpm)	
	SSD (Solid State Drives)	400 GB/200 GB/100 GB	
Drive interface		Serial Attached SCSI (6 Gbit/s)	
Back-End Disk Connectivity		2 pairs of four-lane x 6 Gbit/s SAS buses (SAS 2.0 Wide)	4 pairs of four-lane x 6 Gbit/s SAS buses (SAS 2.0 Wide)
Redundancies		RAID Controller, Fan, Power Supply	
Number of LUN		Max. 16,384	
LUN capacity		Max. 128 TB	
Number of Snapshots		8,192	
Number of copy generations		256	
Remote Copy feature		Yes	
- Notes		Remote Copy Licenses must be purchased for each system	

Installation Specification		
Dimensions (W x D x H)	Controller enclosure (CE)	482 × 700 × 132 mm (19 x 27.6 x 5.2 inch) (3U)
	2.5" Drive enclosure (DE)	482 × 540 × 88 mm (19 x 21.3 x 3.5 inch) (2U)
	3.5" Drive enclosure (DE)	482 × 555 × 88 mm (19 x 21.9 x 3.5 inch) (2U)
Service Area	Front	800 mm (31.5 inch) or more
	Rear	800 mm (31.5 inch) or more
Maximum Weight	Controller enclosure	54 kg (118.8 lb)
	2.5" Drive enclosure	35 kg (77 lb)
	3.5" Drive enclosure	35 kg (77 lb)
Power	Voltage	AC 100 – 120 V / AC 200 – 240 V
	Phase	Single
	Frequency	50 Hz / 60 Hz

Installation Specification (Continued)			DX410 S2	DX440 S2
Maximum Power Consumption	AC 100 - 120V	CE	470 W (480 VA)	610 W (620 VA)
		DE	570 W (580 VA)	
		Max	11,870 W (12,080 VA) (CE+DEx20)	23,410 W (23,820 VA) (CE+DEx40)
	AC 200 - 240V	CE	470 W (480 VA)	720 W (730 VA)
		DE	570 W (580 VA)	
		Max	11,870 W (12,080 VA) (CE+DEx20)	23,520 W (23,930 VA) (CE+DEx40)
Maximum Heat Generation	AC 100 - 120V		43,700 kJ/h (41,600 BTU/h)	86,200 kJ/h (82,100 BTU/h)
	AC 200 - 240V		43,700 kJ/h (41,600 BTU/h)	86,600 kJ/h (82,100 BTU/h)
Environmental Conditions	Temperature		10 – 40°C (Operating)	
			50 – 104°F (Operating)	
	Humidity		20 – 80% RH (Operating)	
Altitude			3,000 m (10,000 ft.)	
Operating environment			FTS 04230 Guideline for Data Center (installation locations)	
Operating environment link			http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe	

Management	
Interfaces	Ethernet (1000 Base-T / 100 Base-TX / 10 Base-T)
Supported protocols	SNMP (version1, 2C, 3), SMI-S 1.4
Administration	Web-Environment, CLI (Command Line Interface)

Noise Emission	DX410 S2	DX440 S2
Sound Power Level (LWAd)	7.0 B	
Sound Pressure Level (LpAm)	53 dB(A)	
- Notes	measured with single enclosure according to ISO7779 and declared according to ISO9296	

Warranty	
Global Base Warranty	3 years

Maintenance and Support Services

The perfect extension of the product specific base warranty for optimized operation.
Recommended Service: 24 x 7 Fujitsu support for enterprise class services.
Please check your specific service level with your FUJITSU sales organization or partner.

Supported configurations

A wide range of host operating systems, servers as well as applications is supported.
For a detailed support matrix check:
http://www.fujitsu.com/global/services/computing/storage/eternus/products/diskstorage/dx-mid/supported-device/

Compliance With Standards	
Product safety	UL60950-1, CSA-C22.2 No. 60950-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	CNS13438(C6357) Class A, FCC CFR47 part 15 Class A, ICES-003 Class A,
	EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A
Electromagnetic Immunity	EN55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC
	Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances)
	WEEE-compliant (Waste electrical and electronic equipment)
- Notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.

More information

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- ETERNUS: Storage system

Software
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- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS DX400 S2, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
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Fujitsu green policy innovation

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Datasheet
Fujitsu ETERNUS DX8700 S2 Disk Storage System

The Flexible Data Safe for Dynamic Infrastructures.

ETERNUS DX S2 DISK STORAGE SYSTEMS

Fujitsu's second generation of ETERNUS DX disk storage systems, ETERNUS DX S2, are 'The Flexible Data Safe' for Dynamic Infrastructures. Enterprise-proven capabilities protect data assets across all types of IT infrastructure. Redundant components, RAID protection and build-in data protection provide the highest system reliability to ensure business continuity is maintained.

ETERNUS DX S2 models are comprehensive disk storage platforms with superior scalability to address the demands of intensive data growth and highest performance. Free choice of modular disk storage and state-of-the-art connectivity across the entire model range delivers maximum configuration flexibility allowing choice in performance and TCO.

The unified ETERNUS SF storage management software enables single point administration, easy data protection and efficient operation across the entire ETERNUS DX range. In virtualized IT environments in particular, ETERNUS SF perfectly integrates the powerful ETERNUS DX disk storage with minimal administration effort.

ETERNUS DX8700 S2

The ETERNUS DX8700 S2 enterprise disk storage system, with Intel® Xeon® processors is purpose-built for large enterprises. Enterprises are no longer forced to anticipate future capacity demand levels and to select a specific high-end model with limited data-capacity range. The unique modular architecture offers flexibly scaling according to business needs. With minimum initial costs customers can start with a two controller module system and four drive enclosures. Maximum performance with up to 128 front-end host ports can be obtained by scaling up to eight controller modules. FC, FCoE and iSCSI host interfaces can operate in mixed configurations.

Software license pricing is based on the number of controllers used only. This transparent licensing model allows gradual capacity upgrading to the maximum drive count without resulting in capacity based price increases. Fujitsu's Flexible Data Management concept enables a higher level of automation for storage tiering, including support for SAS, Nearline SAS and SSD drives that ensure optimum service levels while reducing the overall total cost of storage.

System robustness based on redundant components and local data copy options ensure high availability for today's non-stop business. Multiple remote replication options protect all valuable data assets against site outages.

Green Policy Innovation

SUPER Green Product
This product has the top-level environmental factor in the comparison with our previous product or product in market.

Features and benefits

Main features	Benefits
High end storage for large data centers	■ Fail-safe system design reduces downtime to a minimum ■ Multi-dimensional scalability in terms of speed, capacity and availability provides the headroom for huge data growth ■ High level of automation optimizes operational efficiency
Supports flexible growth without high pre-investments	■ Unique modular architecture that can be flexibly expanded ■ Start with minimum initial costs an grow flexibly with minimum fix-stepped costs ■ No hidden software costs through simple, fixed-price license scheme
Unique and consistent family concept	■ Seamless and fully compatible product family of disk storage systems with uniform system components and unified management software ■ Family concept reduces operations, maintenance, migration and training efforts as well as costs

Technical details

GENERAL SPECIFICATION			DX8700 S2
Supported RAID Levels			0, 1, 1+0, 5, 5+0, 6
Host Interfaces			Fibre Channel (8/4/2Gbit/s) FCoE (10Gbit/s) iSCSI (10/1Gbit/s)
Number of controllers			2 - 8
Number of host interfaces			4 – 128 ports
- Notes			Mixed configurations are possible.
Number of hosts			Max. 8,192
Cache memory capacity			Max. 768 GB
Number of drive enclosures			Max. 128 (3.5", 2.5")
Number of drives			Max. 3,072 (2.5") / Max. 1,536 (3.5")
Storage capacity		Physical capacity	Max. 4,608.0 TB
		Logical capacity	Max. 3,588.7 TB
Drives	3.5-inch	SAS disk drives	600 GB/450 GB/300 GB (15,000 rpm)
		Nearline SAS disk drives	3 TB/2 TB/1 TB (7,200 rpm)
		SSD (Solid State Drives)	400 GB/200 GB/100 GB
	2.5-inch	SAS Non-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm), 300GB (15,000 rpm)
		SAS Self-Encrypting drives	900 GB/600 GB/450 GB/300 GB (10,000 rpm)
		Nearline SAS disk drives	1 TB (7,200 rpm)
		SSD (Solid State Drives)	400 GB/200 GB/100 GB
Drive interface			Serial Attached SCSI (6Gbit/s)
Back-End Disk Connectivity			32 pairs of four-lane x 6 Gbit/s SAS buses (SAS 2.0 Wide)
Redundancies			RAID Controller, Fan, Power Supply
Number of LUN			Max. 65,535
LUN capacity			Max. 128TB
Number of Snapshots			Max. 32,768
Number of copy generations			256
Remote Copy feature			Yes

Installation Specification		
Dimensions (W x D x H)	Controller enclosure (CE)	482 × 940 × 840 mm (19 x 37.0x 33.1 inch) (19U)
	2.5" Drive enclosure (DE)	482 × 540 × 88 mm (19 x 21.3 x 3.5 inch) (2U)
	3.5" Drive enclosure (DE)	482 × 555 × 88 mm (19 x 21.9 x 3.5 inch) (2U)
Service Area	Front	850 mm (31.5 inch) or more
	Rear	850 mm (31.5 inch) or more
Maximum Weight	Controller enclosure	225 kg
	2.5" Drive enclosure	35 kg (77 lb)
	3.5" Drive enclosure	35 kg (77 lb)
Power	Voltage	AC 200 – 240 V
	Phase	Single
	Frequency	50 Hz / 60 Hz
Maximum Power Consumption	Max configuration	76,450 W (78,030 VA)
Maximum Heat Generation		281,350 kJ/h (267,850 BTU/h)
Environmental Conditions	Temperature	10 – 35°C (Operating)
		50 – 95°F (Operating)

Humidity	20 – 80% RH (Operating)
Altitude	3,000 m (10,000 ft.)

Installation Specification (Continued)

Operating environment	FTS 04230 Guideline for Data Center (installation locations)
Operating environment link	http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe

Management

Interfaces	Ethernet (1000 Base-T / 100 Base-TX / 10 Base-T)
Supported protocols	SNMP (version1, 2C, 3), SMI-S 1.4
Administration	Web-Environment, CLI (Command Line Interface)

Warranty

Global Base Warranty	3 years

Maintenance and Support Services

The perfect extension of the product specific base warranty for optimized operation.
Recommended Service: 24 x 7 Fujitsu support for enterprise class services.
Please check your specific service level with your FUJITSU sales organization or partner.

Supported configurations

A wide range of host operating systems, servers as well as applications is supported.
For a detailed support matrix
check: http://www.fujitsu.com/global/services/computing/storage/eternus/products/diskstorage/dx8000/supported-device/

Compliance With Standards

Product safety	UL60950-1, CSA-C22.2 No. 60950-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	FCC CFR47 part 15 Class A, ICES-003 Class A, EN55022 Class A, VCCI Class A, AS/NZS CISPR22 Class A
Electromagnetic Immunity	EN55024
CE certification	Electromagnetic Compatibility Directive 2004/108/EC Low Voltage Directive 2006/95/EC
Environmental compliance	RoHS-compliant (Restriction of hazardous substances) WEEE-compliant (Waste electrical and electronical equipment)
- Notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.

More information

Fujitsu platform solutions

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Computing products
www.fujitsu.com/global/services/computing/
- PRIMERGY: Industry standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system

Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

More information

Learn more about Fujitsu ETERNUS DX8700 S2, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/eternus/

Fujitsu green policy innovation

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2012-05-14 WW-EN

Data Sheet
Fujitsu ETERNUS LT20 S2

Economy System Ideal for Small Businesses and Branch Offices

ETERNUS LT TAPE LIBRARY SYSTEM

The affordable ETERNUS LT tape systems offer impressive scalability and reliability. The ultimate backup solution which meets a wide range of demanding data storage requirements including long-term archiving, disaster recovery and unattended backup for small to medium businesses, workgroups or branch office IT. It is all about the close integration and smooth interaction of servers and storage systems – either Fujitsu solutions or in heterogeneous environments. ETERNUS LT systems are certified for market-leading backup and archiving software. Highly automated, simple and remote operation enables usage without any demand for local expert skills. The pay-as-you-grow concept means that customers avoid unnecessary initial investment and remain flexible.
ETERNUS LT features standardized LTO technology synonymous with high capacity, high speed and low media costs. The systems are equipped with LTO-3 / 4 / 5 technologies and are connected to the server via the SAS (Serial Attached SCSI) or FC interface. Starting from LTO-4 ETERNUS the LT systems are enabled for encryption offering enhanced security and compliance.

ETERNUS LT20 S2

The ETERNUS LT20 S2 is ideal for small businesses and branch offices. It combines exceptional storage density and up to 24 TB of compressed capacity in a compact 1U form factor, giving room for unpredictable data growth. The system is equipped with standardized LTO technology providing high speed and low media costs.

Features and Benefits

Main Features	Benefits
Latest technology	
■ Ultra-compact product with up to 8 slots and one LTO drive in a single height unit	■ Up to 24 TB (compressed LTO-5) in 1U
■ LTO-3 / LTO-4 / LTO-5 HH SAS technology	■ SAS interface meets both enterprise and midrange/nearline storage requirements at relatively low costs, providing users and integrators with flexible storage architectures
■ LTO-4 / LTO-5 HH drive with optional Fibre Channel interface	■ High data throughput of up to 8 Gb/s ■ Smaller backup window is needed
Many extras at no additional cost	
■ Mail slot	■ Easy input and output of a single cartridge
■ Barcode reader	■ Short initialization time thanks to slot barcodes, also with unoccupied data slots
■ Remote management utility and user friendly operator panel	■ Automatism help to decrease the error rate of backup processes

Technical details

Possible basic configurations	Number of tape drives	Number of slots
LTO-3, half height, SAS	1	8
LTO-4, half height, SAS	1	8
LTO-4, half height, Fibre Channel	1	8
LTO-5, half height, SAS	1	8
LTO-5, half height, Fibre Channel	1	8

General system information			
Type	LTO-3 Half height	LTO-4 Half height	LTO-5 Half height
Total capacity native	3.2 - 3.2 TB	6.4 - 6.4 TB	12 - 12 TB
Total capacity compressed	6.4 - 6.4 TB	12.8 - 12.8 TB	24 - 24 TB
Write/read speed at write/ read head	60 / 120 MB/s	80 / 160 MB/s	140 / 280 MB/s
Variable speed recording uncompressed	27 - 60 MB/s	33 - 80 MB/s	44 - 140 MB/s
Buffer size	64 MB	128 MB	256 MB
Recording format	Multiple Track linear		
Maximum data rate	3 Gibt/s	3 Gibt/s / 4 Gbit/s	6 Gbit/s / 8 Gbit/s
Backwards compatible	Read/write compatibility with LTO2 Read compatible with LTO1	Read/write compatibility with LTO3 Read compatible with LTO2	Read/write compatibility with LTO4 Read compatible with LTO3
Data cassette	LTO 2,3 LTO 3 WORM	LTO 2,3,4 LTO 3,4 WORM	LTO 3,4,5 LTO 3,4,5 WORM
Capacity	400 GB (uncompressed) / 800 GB (compressed)	800 GB (uncompressed) / 1600 GB (compressed)	1500 GB (uncompressed) / 3000 GB (compressed)
Bandwidth	1/2 inch	1/2 inch	1/2 inch
Hardware encryption	-	possible	possible

Installation specification	
Dimension (W x D x H) - standard	447.5 x 805 x 43.75 mm
Height Unit Standard	1 U
Weight	14 kg
Power voltage	85 V - 264 V (+/- 5%) /
Power frequency	50 Hz / 60 Hz (+/- 5%)
Switched OFF mode	3.5 W
Unit ready (no tape loaded into 1st drive)	32 W
Unit ready (no tape loaded into 2nd drive)	48 W
Write/read data no robotic moves	55 W
Write/read data with robotic moves	59 W (HH)
Notes	Typical power consumption: One HH drive increase the AC power consumption by 12W for unit ready no tape loaded / by 29W for write/read no robotic moves

Environmental	
Temperature (Operating)	10 - 35°C
Humidity (Operating)	20 - 80 % (relative humidity)

Installation specification	
Operating environment Link	http://docs.ts.fujitsu.com/dl.aspx?id=d4ebd846-aa0c-478b-8f58-4cfbf3230473
Air quality	The library should be placed in an area with minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. Excessive dust and debris can damage tapes and drive.
Compliance	
Product safety	UL60950-1, CSA6090-1, EN60950-1, EN61000-3-2, EN61000-3-3, IEC60950-1, GOST-R
Electromagnetic Compatibility	AS/NZS CISPR 22 Class A, CNS13438(C6357) Class A, EN55022 Class A, FCC Part-15 Class A, ICES-003 Class A, VCCI Class A
Electromagnetic Immunity	EN 55024
CE certification	2004/108/EC, 2006/95/EC
Environmental compliance	RoHS compliant, WEEE compliant
Compliance notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.
Warranty	
Standard Warranty	1 year
Service level	On-site Service (depending on country)
Maintenance and Support Services - the perfect extension	
Recommended Service	7x24, Onsite Response Time: 4h - For locations outside of EMEA please contact your local Fujitsu partner.
Service Weblink	http://ts.fujitsu.com/Supportservice

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More information

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ts.fujitsu.com/eternus_lt

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Website: ts.fujitsu.com/
2012-03-30 WW-EN

Data Sheet
Fujitsu ETERNUS LT40 S2

Flexible Entry System with Ample Scalability

ETERNUS LT TAPE LIBRARY SYSTEM

The affordable ETERNUS LT tape systems offer impressive scalability and reliability. The ultimate backup solution which meets a wide range of demanding data storage requirements including long-term archiving, disaster recovery and unattended backup for small to medium businesses, workgroups or branch office IT. It is all about the close integration and smooth interaction of servers and storage systems either Fujitsu solutions or in heterogeneous environments. ETERNUS LT systems are certified for market-leading backup and archiving software. Highly automated, simple and remote operation enables usage without any demand for local expert skills. The pay-as-you-grow concept means that customers avoid unnecessary initial investment and remain flexible.
ETERNUS LT features standardized LTO technology synonymous with high capacity, high speed and low media costs. The systems are equipped with LTO-3 / 4 / 5 technologies and are connected to the server via the SAS (Serial Attached SCSI) or FC interface. Starting from LTO-4 ETERNUS the LT systems are enabled for encryption offering enhanced security and compliance.

ETERNUS LT40 S2

The ETERNUS LT40 S2 combines exceptional storage density and up to 72 TB of compressed capacity in a compact 2U form factor, giving room for unpredictable data growth.
The system comes with standardized LTO technology providing high speed and low media costs. The ETERNUS LT40 offers high flexibility as it has up to two drives for redundancy and partitioning. ETERNUS LT40 can be split into two virtual libraries serving different application environments in parallel. This provides maximum efficiency and cost-effectiveness. The slot upgrade option gives customers a start of 12 slots and upgrades to 24 slots.

Features and Benefits

Main Features	Benefits
Latest technology	
■ Upgradeability from 12 to 24 slots via software license	■ Easy upgrade to the needed storage capacity ■ High investment protection
■ LTO-3/LTO-4/LTO-5 HH or LTO-4/LTO-5 FH SAS technology	■ SAS interface meets both enterprise and midrange/nearline storage requirements at relatively low costs, providing users and integrators with flexible storage architectures
■ LTO-4/LTO-5 HH or LTO-4/LTO-5 FH drive with optional Fibre Channel interface	■ High data throughput of up to 8 Gb/s ■ Smaller backup window is needed
■ Partitioning via license key	■ Makes it easier to separate different LTO generations, avoids undesired incompatible media loads ■ Build up two independent libraries out of one system
Many extras at no additional cost	
■ Mail slot	■ Easy input and output of up to three cartridges
■ Barcode reader	■ Short initialization time thanks to slot barcodes, also with unoccupied data slots
■ Remote management utility and user friendly operator panel	■ Easy administration, enables configuration and diagnostic ■ Automatism help to decrease the error rate of backup processes

Technical details

Possible basic configurations	Number of MTC drives	Tape system interface
LTO 3, half height, SAS	1 – 2	SAS
LTO 4, half height, SAS	1 – 2	SAS
LTO 4, half height, Fibre channel	1 – 2	Fibre Channel
LTO-5, half height, SAS	1 – 2	SAS
LTO 5, half height, Fibre channel	1 – 2	Fibre Channel
LTO 4, full height, SAS	1	SAS
LTO 4, full height, Fibre channel	1	Fibre Channel
LTO 5, full height, SAS	1	SAS
LTO 5, full height, Fibre channel	1	Fibre Channel

General system information					
Type	LTO-3 Half height	LTO-4 Half height	LTO-5 Half height	LTO-4 Full height	LTO-5 Full height
Total capacity native	4.8 - 9.6 TB	9.6 - 19.2 TB	18 - 36 TB	9.6 - 19.2 TB	18 - 36 TB
Total capacity compressed	9.6 - 19.2 TB	19.2 - 38.4 TB	36 - 72 TB	19.2 - 38.4 TB	36 - 72 TB
Write/read speed at write/ read head	60 / 120 MB/s	80 / 160 MB/s	140 / 280 MB/s	120 / 240 MB/s	140 / 280 MB/s
Variable speed recording uncompressed	27 - 60 MB/s	33 - 80 MB/s	44 - 140 MB/s	33 - 120 MB/s	44 - 120 MB/s
Buffer size	64 MB	128 MB	256 MB	128 MB	256 MB
Recording format	Multiple Track linear				
Maximum data rate	3 Gibt/s	3 Gibt/s / 4 Gbit/s	6 Gbit/s / 8 Gbit/s	3 Gibt/s / 4 Gbit/s	6 Gbit/s / 8 Gbit/s
Backwards compatible	Read/write compatibility with LTO2 Read compatible with LTO1	Read/write compatibility with LTO3 Read compatible with LTO2	Read/write compatibility with LTO4 Read compatible with LTO3	Read/write compatibility with LTO3 Read compatible with LTO2	Read/write compatibility with LTO4 Read compatible with LTO3
Data cassette	LTO 2,3 LTO 3 WORM	LTO 2,3,4 LTO 3,4 WORM	LTO 3,4,5 LTO 3,4,5 WORM	LTO 2,3,4 LTO 3,4 WORM	LTO 3,4,5 LTO 3,4,5 WORM
Capacity	400 GB (uncompressed) / 800 GB (compressed)	800 GB (uncompressed) / 1600 GB (compressed)	1500 GB (uncompressed) / 3000 GB (compressed)	800 GB (uncompressed) / 1600 GB (compressed)	1500 GB (uncompressed) / 3000 GB (compressed)
Bandwidth	1/2 inch	1/2 inch	1/2 inch	1/2 inch	1/2 inch
Hardware encryption	-	possible	possible	possible	possible

Installation specification	
Dimension (W x D x H) - standard	447.5 x 810 x 87.6 mm
Height Unit Standard	2 U
Weight	16.5 kg (HH) / 15.5 (FH)
Power voltage	85 V - 264 V (+/- 5%) /
Power frequency	50 Hz / 60 Hz (+/- 5%)
Switched OFF mode	1.5 W
Unit ready (no tape loaded into 1st drive)	34 W (HH) / 39 W (FH)
Unit ready (no tape loaded into 2nd drive)	46 W (HH) / 56 W (FH)
Write/read data no robotic moves	51 W (HH) / 61 (FH)
Write/read data with robotic moves	59 W (HH) / 69 (FH)

Installation specification	
Notes	Typical power consumption: One HH drive increase the AC power consumption by 12W for unit ready no tape loaded / by 29W for write/read no robotic moves
Environmental	
Temperature (Operating)	10 - 35°C
Humidity (Operating)	20 - 80 % (relative humidity)
Operating environment Link	http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe
Air quality	The library should be placed in an area with minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. Excessive dust and debris can damage tapes and drive.
Compliance	
Product safety	UL60950-1, CSA6090-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	AS/NZS CISPR 22 Class A, CNS13438(C6357) Class A, EN55022 Class A, EN6100-3-2, EN61000-3-3, FCC Part-15 Class A, ICES-003 Class A, VCCI Class A
Electromagnetic Immunity	EN 55024
CE certification	2004/108/EC, 2006/95/EC
Environmental compliance	RoHS compliant, WEEE compliant
Compliance notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.
Warranty	
Standard Warranty	1 year
Service level	On-site Service (depending on country)
Maintenance and Support Services - the perfect extension	
Recommended Service	7x24, Onsite Response Time: 4h - For locations outside of EMEA please contact your local Fujitsu partner.
Service Weblink	http://ts.fujitsu.com/Supportservice

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2011-12-29 WW-EN

Data Sheet
Fujitsu ETERNUS LT60 S2

Scalable Mid-range System for High Capacity Requirements

ETERNUS LT TAPE LIBRARY SYSTEM

The affordable ETERNUS LT tape systems offer impressive scalability and reliability. The ultimate backup solution which meets a wide range of demanding data storage requirements including long-term archiving, disaster recovery and unattended backup for small to medium businesses, workgroups or branch office IT. It is all about the close integration and smooth interaction of servers and storage systems either Fujitsu solutions or in heterogeneous environments. ETERNUS LT systems are certified for market-leading backup and archiving software. Highly automated, simple and remote operation enables usage without any demand for local expert skills. The pay-as-you-grow concept means that customers avoid unnecessary initial investment and remain flexible.
ETERNUS LT features standardized LTO technology synonymous with high capacity, high speed and low media costs. The systems are equipped with LTO-3 / 4 / 5 technologies and are connected to the server via the SAS (Serial Attached SCSI) or FC interface. Starting from LTO-4 ETERNUS the LT systems are enabled for encryption offering enhanced security and compliance.

ETERNUS LT60 S2

The ETERNUS LT60 S2 addresses customers with high capacity requirements. It combines exceptional storage density and up to 144 TB of compressed capacity in a compact 4U form factor, giving room for unpredictable data growth. The system comes with standardized LTO technology providing high speed and low media costs. The ETERNUS LT60 offers comprehensive flexibility as it has up to four drives for redundancy and partitioning. ETERNUS LT60 can be split into two virtual libraries serving different application environments in parallel. This provides maximum efficiency and cost-effectiveness.

The slot upgrade option gives customers a start with 12 slots and upgrades to 48 slots. The slot upgrade option means that customers can pay as they grow and remain flexible as they can even mix different LTO generations withinto one system. One advanced feature available with the ETERNUS LT60 is the redundant power supply that ensures uninterrupted operation should there be a power failure.

Features and Benefits

Main Features	Benefits
Latest technology	
■ Upgradeability from 24 to 36 or 48 slots via software license	■ Easy upgrade to the needed storage capacity ■ High investment protection
■ LTO-3/LTO-4/LTO-5 HH or LTO-4/LTO-5 FH SAS technology	■ SAS interface meets both enterprise and midrange/nearline storage requirements at relatively low costs, providing users and integrators with flexible storage architectures
■ LTO-4/LTO-5 HH or LTO-4/LTO-5 FH drive with optional Fibre Channel interface	■ High data throughput of up to 8 Gb/s ■ Smaller backup window is needed
■ Partitioning via license key	■ Makes it easier to separate different LTO generations, avoids undesired incompatible media loads ■ Build up two independent libraries out of one system
Many extras at no additional cost	
■ Mail slot	■ Easy input and output of up to three cartridges
■ Barcode reader	■ Simplified media management ■ Short initialization time thanks to slot barcodes, also with unoccupied data slots
■ Remote management utility and user friendly operator panel	■ Easy administration, enables configuration and diagnostic ■ Automatism help to decrease the error rate of backup processes ■ Ethernet network for Firmware upgrades, statistics

Technical details

Possible basic configurations	Number of MTC drives	Tape system interface
LTO 3, half height, SAS	1 – 4	SAS
LTO 4, half height, SAS	1 – 4	SAS
LTO 4, half height, Fibre Channel	1 – 4	Fibre Channel
LTO-5, Half height, SAS	1 – 4	SAS
LTO-5, Half height, Fibre Channel	1 – 4	Fibre Channel
LTO 4, full height, SAS	1 – 2	SAS
LTO 4, full height, Fibre channel	1 – 2	Fibre Channel
LTO 5, full height, SAS	1 – 2	SAS
LTO 5, full height, Fibre Channel	1 – 2	Fibre Channel

General system information					
Type	LTO-3 Half height	LTO-4 Half height	LTO-5 Half height	LTO-4 Full height	LTO-5 Full height
Total capacity native	9.6 - 19.2 TB	19.2 - 38.4 TB	36 - 72 TB	19.2 - 38.4 TB	36 - 72 TB
Total capacity compressed	19.2 - 38.4 TB	38.4 - 76.8 TB	72 - 144 TB	38.4 - 76.8 TB	72 - 144 TB
Write/read speed at write/ read head	60 / 120 MB/s	80 / 160 MB/s	140 / 280 MB/s	120 / 240 MB/s	140 / 280 MB/s
Variable speed recording uncompressed	27 - 60 MB/s	33 - 80 MB/s	44 - 140 MB/s	33 - 120 MB/s	44 - 120 MB/s
Buffer size	64 MB	128 MB	256 MB	128 MB	256 MB
Recording format	Multiple Track linear				
Maximum data rate	3 Gibt/s	3 Gibt/s / 4 Gbit/s	6 Gbit/s / 8 Gbit/s	3 Gibt/s / 4 Gbit/s	6 Gbit/s / 8 Gbit/s
Backwards compatible	Read/write compatibility with LTO2 Read compatible with LTO1	Read/write compatibility with LTO3 Read compatible with LTO2	Read/write compatibility with LTO4 Read compatible with LTO3	Read/write compatibility with LTO3 Read compatible with LTO2	Read/write compatibility with LTO4 Read compatible with LTO3
Data cassette	LTO 2,3 LTO 3 WORM	LTO 2,3,4 LTO 3,4 WORM	LTO 3,4,5 LTO 3,4,5 WORM	LTO 2,3,4 LTO 3,4 WORM	LTO 3,4,5 LTO 3,4,5 WORM
Capacity	400 GB (uncompressed) / 800 GB (compressed)	800 GB (uncompressed) / 1600 GB (compressed)	1500 GB (uncompressed) / 3000 GB (compressed)	800 GB (uncompressed) / 1600 GB (compressed)	1500 GB (uncompressed) / 3000 GB (compressed)
Bandwidth	1/2 inch	1/2 inch	1/2 inch	1/2 inch	1/2 inch
Hardware encryption	-	possible	possible	possible	possible

Installation specification	
Dimension (W x D x H) - standard	447.5 x 810 x 175.2 mm
Height Unit Standard	4 U
Weight	27 kg (HH) / 26 (FH)
Power voltage	85 V - 264 V (+/- 5%)
Power frequency	50 Hz / 60 Hz (+/- 5%)
Switched OFF mode	1.5 W
Unit ready (no tape loaded into 1st drive)	34 W (HH) / 39 W (FH)
Unit ready (no tape loaded into 2nd drive)	46 W (HH) / 56 W (FH)
Write/read data no robotic moves	51 W (HH) / 61 (FH)
Write/read data with robotic moves	59 W (HH) / 69 (FH)

Installation specification	
Notes	Typical power consumption: One HH drive increase the AC power consumption by 12W for unit ready no tape loaded / by 29W for write/read no robotic moves
Environmental	
Temperature (Operating)	10 - 35°C
Humidity (Operating)	20 - 80 % (relative humidity)
Operating environment Link	http://docs.ts.fujitsu.com/dl.aspx?id=e4813edf-4a27-461a-8184-983092c12dbe
Air quality	The library should be placed in an area with minimal sources of particulate contamination. Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. Excessive dust and debris can damage tapes and drive.
Compliance	
Product safety	UL60950-1, CSA6090-1, EN60950-1, IEC60950-1, GOST-R
Electromagnetic Compatibility	AS/NZS CISPR 22 Class A, CNS13438(C6357) Class A, EN55022 Class A, EN6100-3-2, EN61000-3-3, FCC Part-15 Class A, ICES-003 Class A, VCCI Class A
Electromagnetic Immunity	EN 55024
CE certification	2004/108/EC, 2006/95/EC
Environmental compliance	RoHS-compliant, WEEE-compliant
Compliance notes	There is general compliance with the safety requirements of all European countries and North America. National approvals required in order to satisfy statutory regulations or for other reasons can be applied for on request.
Warranty	
Standard Warranty	1 year
Service level	On-site Service (depending on country)
Maintenance and Support Services - the perfect extension	
Recommended Service	7x24, Onsite Response Time: 4h - For locations outside of EMEA please contact your local Fujitsu partner.
Service Weblink	http://ts.fujitsu.com/Supportservice

Fujitsu platform solutions

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More information

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ts.fujitsu.com/eternus_lt

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2011-12-29 WW-EN

White Paper

The NetApp Agile Data Infrastructure

Larry Freeman, Senior Technologist, NetApp
June 2012 | WP-7162

Abstract

Monumental data growth brings new opportunities to users and companies but taxes the resources of IT organizations. A new infrastructure is needed, one that brings forward the concepts of intelligent, immortal, and infinite data management. NetApp's agile data infrastructure is designed to simplify IT complexity in today's data-driven world.

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1 Overview

A Data-Driven Society

Today's world is composed of a vast network of data producers and data consumers. Data producers generate data about their health, the economy, the weather, current traffic conditions, and virtually every other aspect of their lives, including the brand of toothpaste they use.

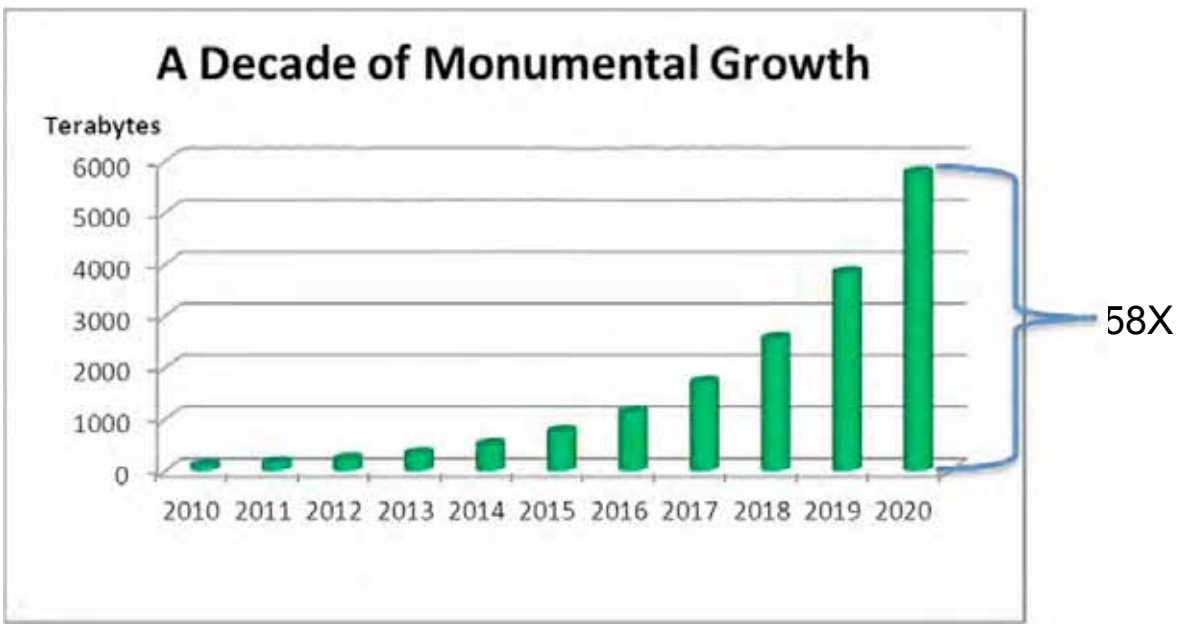
Data consumers absorb this data and use it to form opinions or create some sort of actionable event. In healthcare, data takes the form of a diagnosis based on a pattern of patient symptoms and lab reports. In finance, data can be an analysis of buying trends that influence the purchase and delivery of goods. In areas such as climatology and traffic density, access to detailed data in its greatest form can save lives by predicting natural disasters or at the very least reduce your commute by rerouting you to less-traveled roads.

Our thirst for information is driven by the benefits provided, and that thirst in turn fuels the desire for more data, which provides more benefit, creating a rapid cycle of data proliferation.

How Much Data?

Industry experts estimate that enterprise server-based data will continue to grow at the rate of 50% annually. Put into context, this means that enterprise data center operators will be asked to manage 58 times more data at the end of this decade than they were at the start of the decade.

Figure 1) Data growth projection assuming 50% annual growth.



A question many of you might ask: "Is my IT infrastructure prepared to handle this magnitude of growth?" For most, the answer is a resounding "no!" It is often said that recognizing you have a problem is the first step in identifying a solution. In that spirit, if you believe your IT infrastructure is sufficiently robust to maintain 50% annual data growth for the remainder of the decade and that you can meet the needs of your users in spite of this growth, read no further. However, if you are concerned with your organization's capability, the following sections should prove useful.

The remainder of this paper will examine how a data-driven world will affect IT organizations and how an agile data infrastructure anticipates and responds to these needs. Sections include:

- A Data-Centric View of IT
- The Role of Infrastructures in IT
- Accelerating Velocity with Agility
- Inside the Agile Data Infrastructure
- Summary

2 A Data-Centric View of IT

For the past 50 years, IT has been the driver of innovation in business. Office productivity, desktop publishing, and e-mail communications are common examples of how IT has changed our daily work lives because of new business applications that became available and implemented through IT. Today, however, the tables are turning. Recognizing that data converted into information provides new opportunities; businesses are now driving innovation within IT. The scope of data within an organization and finding new ways to harvest this data are propelling businesses and placing increasing stress on IT resources.

As an example, in the past, businesses would identify a specific application: for example an accounting application running on an Oracle® database. The business unit would consult with IT and scope out the architecture and resources required. IT would build the app and after months of testing roll it out to the business unit.

Today, the role of IT is much different. The business unit might come to IT with a request like this: “We know we have customer service records, and we also have customer sales records. We’d like to combine the two together and somehow create a system that predicts when customers will start to see issues because of outdated equipment. In addition, we’d like to have a system that automatically notifies these customers and have an automatic escalation procedure for customers that don’t respond to our notifications.”

In this case, there is no off-the-shelf product to provide this capability. IT must innovate to create a solution that might include a combination of commercial, open source, and proprietary software coding.

Examples such as the preceding are causing IT to reexamine its role and become more of a partner in innovation instead of a manager of IT assets. Recent patterns have caused observers to note that IT appears to be in the process of untethering its equipment from the data that it manages. Bring your own device (BYOD) is one example of this, and public cloud deployments are another. Is IT is becoming a manager of data instead of a manager of racks of servers, network switches, and storage arrays? It appears so.

During this transition, two key expressions are emerging in IT: infrastructure and agility. In the next sections we’ll examine both.

3 The Role of Infrastructures In IT

One way to think of an infrastructure is as an entity that is managed by a few for the benefit of many. Examples of common infrastructure types are transportation, energy, and law enforcement. In IT, the most commonly thought of infrastructure is a network infrastructure. If we think about a typical IT network, it consists of a series of network interface cards (NICs), host bus adapters (HBAs), switches, routers, and assorted cabling. Once the network infrastructure is put in place, it becomes self-running, auto tuning, and infinitely scalable. Over time, as newer and faster networking equipment becomes available,

necessary upgrades take place without disruption to users. The network infrastructure is the nervous system of IT, and any disruption would be unthinkable.

The trend toward server virtualization has brought forth a second infrastructure within IT: the server infrastructure. No longer are physical servers tethered to dedicated applications. Virtualization has allowed applications to dart between physical servers without disruption to users. Upgrades, load balancing, and nondisruptive replacement of servers are now possible using this new server infrastructure.

The third and final infrastructure of IT is the storage, or data, infrastructure. Up until recently, technology limitations have made it impossible to create a data infrastructure that allowed automated management, nondisruptive operation, and seamless growth of data. A new generation of data storage hardware and software, however, is changing the landscape. It is now possible to imagine an agile data infrastructure within IT that is Intelligent, Immortal, and Infinite.

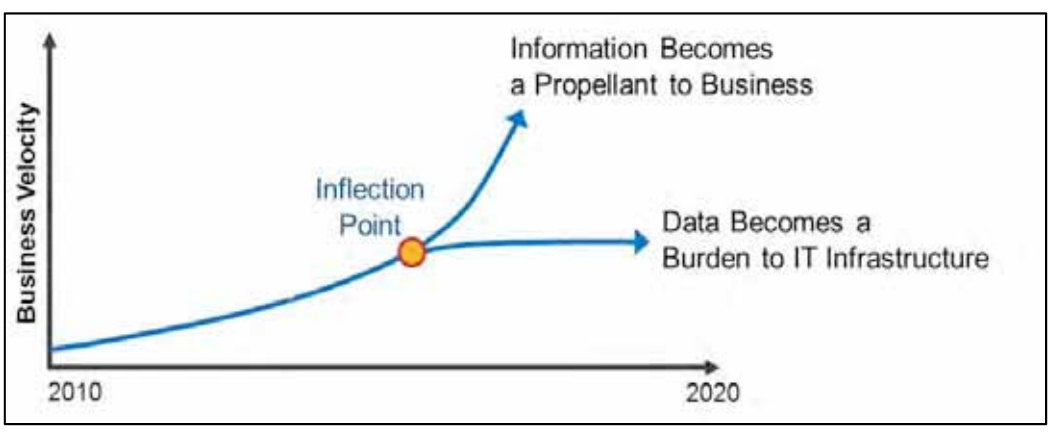
4 Accelerating Velocity With Agility

Recall a question was posed earlier in this paper: “Is my IT infrastructure prepared to handle this magnitude of growth?” A follow-up question could also be asked: “What happens if it’s not?”

A business inflection point is defined as an event that results in a significant change in the progress of a company, industry, or sector. An inflection point can be considered a turning point after which a dramatic change, with either positive or negative results, is expected to result. Andy Grove, Intel's cofounder, described an inflection point as "an event that changes the way we think and act.”

Monumental data growth can eventually lead to an inflection point for your business. If you are struggling today to keep up with data growth and cannot provide the data services that your company needs, you might in fact have already passed your inflection point.

Figure 2) Data growth inflection point.



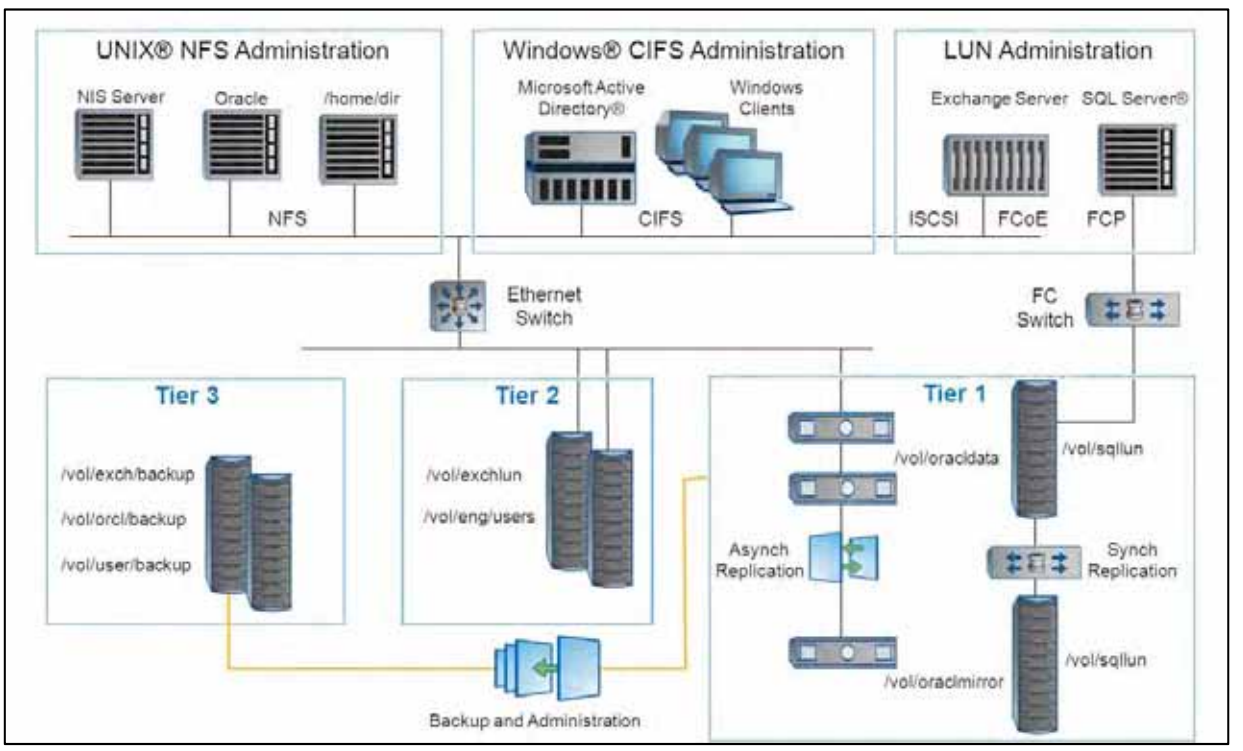
However, if you have put in place an agile data infrastructure that provides Intelligent, Immortal, and Infinite attributes, then you are in a position to help your organization use its data as a propellant to success.

In the next section, we’ll describe the attributes that compose an agile data infrastructure.

5 Inside the Agile Data Infrastructure

For decades, storage has been deployed in silos—one silo for financial apps, one for engineering, one for e-mail—each one based on different storage technologies and the capabilities needed to support the requirements of that silo. Over time, we improved the capabilities within the silo, starting with SAN and NAS, and then unified, shared storage, but as shown in Figure 3, data was still locked within its tier, or silo.

Figure 3) Traditional storage architecture: tiered storage in silos.



Although the model in Figure 3 used the best technologies available at the time, it did not always provide for the optimal placement of data or the optimal cost of storing this data. Management also proved to be troublesome as data and applications scaled. Do *all* my databases belong in tier 1? Are the tier 2 user files growing beyond the limits of my storage containers? Can I use some of my extra tier 3 capacity to host a new application but still maintain required service levels? All these questions point to the need for a new way of thinking about storage and data. This leads us back to the discussion of infrastructures and agility.

As mentioned, an agile data infrastructure is centered on three pillars: it is Intelligent, Immortal, and Infinite. Within these pillars are nine specific technologies that together form the basis of an infrastructure that easily adapts to both IT and the organization's needs. In the remainder of this section, we'll discuss each of the three pillars in more detail and the nine technologies that support them.

Intelligent Data Management

The first pillar, and perhaps the cornerstone, of an agile data infrastructure is **intelligent data management**. Without the ability to automatically deploy, adjust, and control data storage attributes, an infrastructure is not truly agile. Human intervention must be kept at a minimum, and policy enforcement must be made paramount.

In an era of monumental growth and complexity, intelligence is not an option but a requirement. Routine operations such as creating a LUN, establishing a replication pair, and monitoring performance bottlenecks become increasingly frustrating when multiplied by hundreds or thousands of instances.

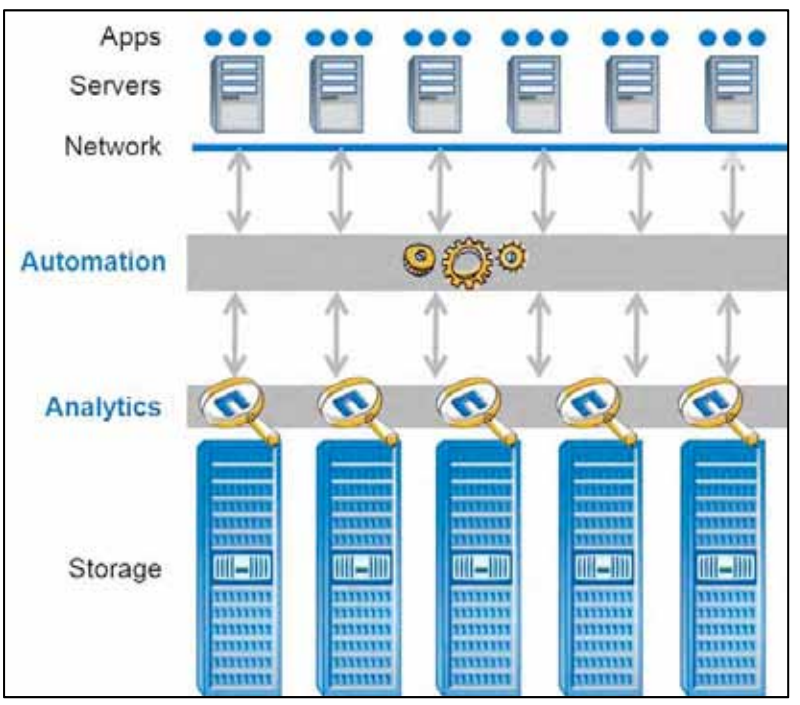
NetApp simplifies this complexity with policy-based management. When a small number of policies that match the data characteristics are defined, applications can be assigned to a policy you've created. There is no need for any manual intervention unless an out-of-policy condition exists. By eliminating routine tasks and only managing the things that require management, IT can shift its focus from operations to innovation.

The following sections describe the three NetApp® technologies that support intelligent data management: service automation and analytics, storage efficiency, and virtual storage pooling.

Service Automation and Analytics

As IT departments move from supporting terabytes to petabytes, automation becomes more and more critical. You need to reduce the time it takes to perform routine administrative tasks—even as your infrastructure grows—and you need to manage more terabytes per full-time employee. Improved processes and solutions enable IT to manage it all with the push of a button.

Figure 4) Service automation and analytics



NetApp OnCommand® management software is a family of products designed to make NetApp storage the best solution for physical, virtual, and cloud environments.

Specifically, OnCommand Unified Manager integrates the functions of Provisioning Manager, Protection Manager, and Operations Manager into a single user interface. The OnCommand Unified Manager interface enables you to define storage service levels and policy-based workflows to automate provisioning and protection of your agile data infrastructure.

Another important component is OnCommand Insight, which includes modules that offer visibility into your end-to-end infrastructure to help you optimize your data infrastructure. With OnCommand Insight, you can optimize performance, plan your capacity requirements, and be sure that you are delivering to your service levels.

OnCommand stands out from other solutions and is recognized as a leading solution by industry experts based on the combined strength of the following capabilities:

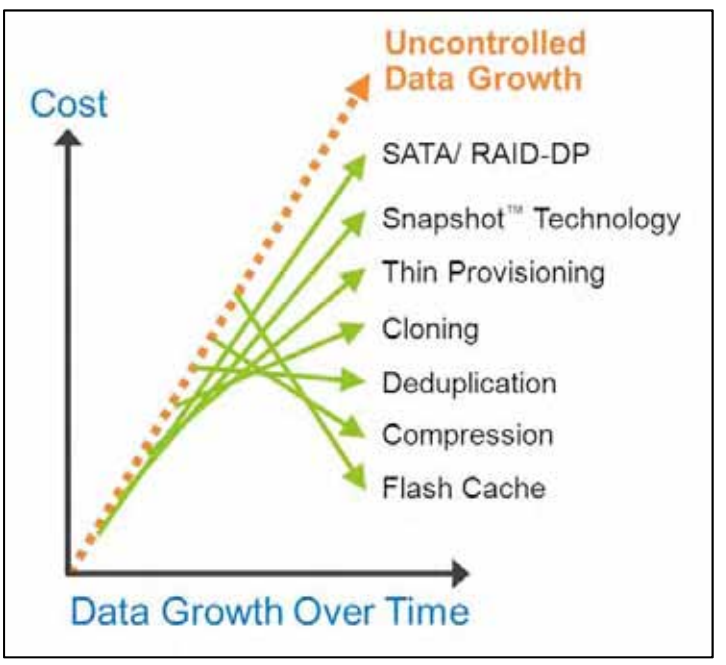
- Capacity planning and capacity management with flexible, enterprise-level reporting
- Cost awareness reporting, enabling chargeback

- Continual resource discovery and service path validation to maximize resource utilization: for example, reclamation
- Integration with IT Service Management (ITSM), and a Configuration Management Database (CMDB) to conform with IT Infrastructure Library (ITIL) requirements
- End-to-end visibility of multivendor and multiprotocol environments

Storage Efficiency

Storage efficiency is something that many people debate, so let's take a moment to discuss what's different about NetApp's approach. To us, storage efficiency is not a feature; it's a way of life. It's a commitment to a long-term technology design approach in which we exploit every possible opportunity to drive the cost per gigabyte down.

Figure 5) Storage efficiency



For instance, we design our storage systems to take advantage of low-cost SATA drives, and we provide both performance acceleration and a reliability profile to those drives. This is very different from what other storage systems can do.

We also employ a variety of data reduction techniques, including primary-level deduplication, compression, and more. The variety of data reduction techniques reduces the amount of data on the disk and traveling over the network.

Finally, you can make fewer copies. One of the biggest cost drivers in the data infrastructure is the fact that every time a primary copy of data is created, roughly 20 to 25 copies of that data are also created: test and development copies, backup copies, and disaster recovery copies. These are full copies of data, and they all require raw storage. If you can eliminate any of those copies by providing them to the applications as "virtual" copies, you'll reduce the cost of storage.

Storage efficiency is a way of thinking and is extremely important in the agile data infrastructure. Storage capacity growth should not deplete IT budgets. We seek every single way in which we can drive the dollar per effective gigabyte down.

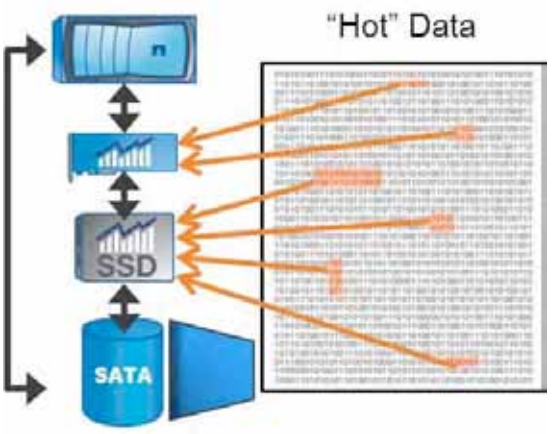
Virtual Storage Tiering

Once data is created, its value can change drastically over time. The dilemma faced by every storage administrator is trying to determine when to place data on the proper storage medium so that costs are

minimized but needed performance is not sacrificed. Over the history of computing, many attempts have been made to address this issue. Hierarchical storage management (HSM) and information lifecycle management (ILM) are examples of two such attempts that failed to achieve broad adoption.

Virtual storage tiering solves the problems of these past attempts by “serving data when it’s hot.” This means that frequently accessed data is identified instantly and promoted to the highest performance media in a timely manner. Other forms of tiering depend on a delayed migration that can reduce the value of storage tiering if the data is no longer in demand by the time it reaches a higher performance tier, expending unnecessary energy within the infrastructure.

Figure 6) Virtual storage tiering



In contrast, virtual storage tiering promotes hot data to performance storage without moving the data. This process is not data migration; the hot block remains on hard disk media whenever a copy of the data block is made. This approach to data promotion means that additional disk I/O operations, required in other approaches to simply move data between tiers, are not needed. When the activity of the hot data on Flash trends down and the data blocks become cold, the inactive data blocks are simply overwritten with new hot data blocks. Again, no data movement.

This non–data migration approach is highly efficient, eliminates wasteful disk I/O operations, and does not obviate storage efficiency features such as data deduplication and thin provisioning.

Immortal Data Operations

The second of the three pillars is **immortal data operations**. Not much data is being deleted these days. There are some valid reasons for this. First, many applications require long-term trending analysis, and depending on your industry—healthcare, for instance—there are mandates requiring long-term retention of data. Second, over time it’s been proven that it’s more cost effective to keep all data stored rather than spending the time to analyze what should be deleted. This might actually turn out to be a blessing, as new algorithms are developed to mine internal data and look for proverbial needles in the data haystack.

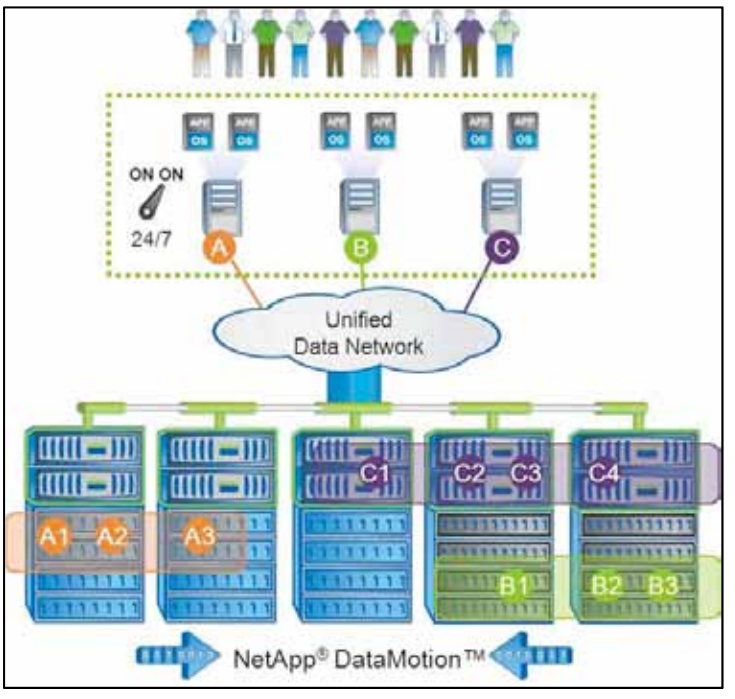
What these trends mean is that the majority of your data will eventually outlive your equipment several times over. Typically, a technology refresh of storage arrays requires a lengthy migration of the data, a testing period, and resynchronization, and then finally the application goes live on the new hardware. This is a very inefficient, time-consuming, and expensive event. An agile data infrastructure must recognize that if data is immortal, then the infrastructure should be too. Upgrades and replacements should not require downtime or complicated migration and test scenarios.

Let’s look at the NetApp technologies that support immortal data operations.

Nondisruptive Operations

An agile infrastructure means that multiple business-critical applications share the underlying infrastructure resources. As a result, the ability to schedule data outages for routine maintenance is a thing of the past.

Figure 7) Nondisruptive operations



NetApp DataMotion™ offers true data mobility to the infrastructure without affecting the availability of client applications. This is critically important for lifecycle management tasks such as system maintenance, technology refresh, and software upgrades because these activities have traditionally required planned outages and have affected the ability to provide continuous access to data.

Because data can be accessed while it's being moved, operations such as workload balancing, technology refreshes, and adding capacity can all be done without scheduling a system outage and business disruption.

Embedded Data Security

Your organization and your data sit in the middle of a perfect storm where technology, business needs, and regulations all come together. Your users want unfettered up-to-the-minute information and don't mind taking shortcuts to get to it. With today's always-on business environment, employees might even have company data on their personal smartphones and other mobile devices. NetApp embedded data security will help you meet regulatory requirements to protect stored data.

Figure 8) Embedded data security

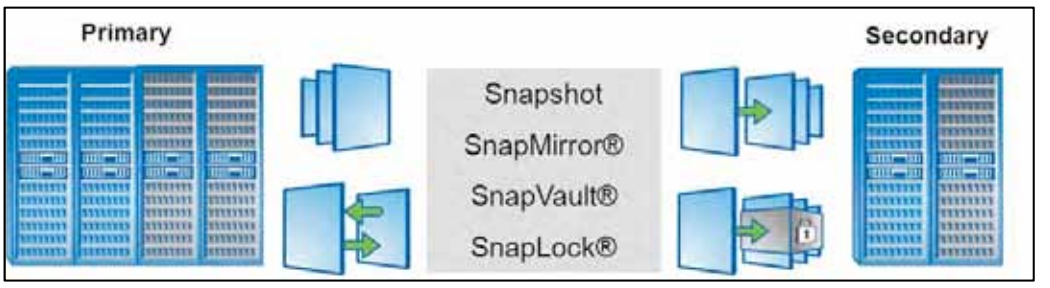
First, we help protect unauthorized access to the storage array, using role-based access control (RBAC). Second, we provide onboard antivirus protection using either Sophos or McAfee anti-virus engines. Finally, through the use of granular encryption, you can keep job functions within the same company from accessing data that is out of their area. For example, marketing can be kept out of accounting's files.

Integrated Data Protection

Operational efficiency requires you to automate everything you can so that it doesn't require a storage administration task.

Integrated data protection is an aspect of that. Data protection needs to become as "set it and forget it" as possible. It should not require ongoing adjustments to architecture, storage systems, and protection policies in order to meet service-level agreements. You will be able to set and forget at a level where once that set of policies and protection is set at an infrastructure level, you don't have to manage protection as your environment keeps changing.

Figure 9) Integrated data protection



This principle holds whether it is application integration to provide local availability, whether it is providing network-efficient and storage-efficient disk for backup and disaster recovery, or whether it is using exactly the same formats to be able to do long-term retention. The ability to automate at this level is becoming more and more critical in order to deal with storage environments that need to constantly grow and change in order to meet business needs.

Infinite Data Scaling

Our final pillar is the third "I": **infinite data scaling.** To us, infinite means that we can scale to meet the needs of even our largest customers. Of course, hard limits exist on things such as the number of terabytes in a volume or the number of nodes in a cluster, but those limits exceed the requirements of the vast majority our customers. For those customers that are approaching our limits, we are committed to continual expansion of those limits in order to always stay ahead of our customers.

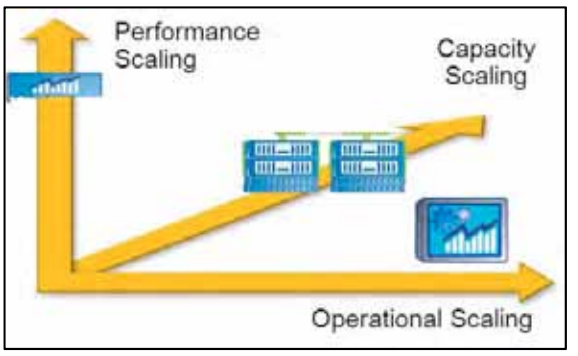
Following are the technologies that support infinite data scaling.

Seamless Scaling

An agile infrastructure must scale in the multiple dimensions of performance, capacity, and operations: that is, it must have the ability to scale efficiently, without the need to scale the number of people managing the environment and without sacrificing performance.

NetApp has always offered the ability to efficiently scale up in modular increments, whereas our competitors typically require a forklift upgrade whenever a workload outgrows the architecture of their specialized (and non-unified) storage systems.

Figure 10) Seamless scaling



With the introduction of Data ONTAP® 8, we now offer the ultimate in seamless scaling: the ability to scale out performance and capacity for both NAS and SAN environments, for both technical and enterprise applications.

One example of seamless scaling is NetApp Infinite Volumes. Infinite Volumes support organizations that need to store dozens of petabytes and billions of files in a single, scalable repository, With Infinite Volumes, customers no longer need to compromise on full enterprise functionality, including storage efficiency, integrated data protection, multi-tenancy, application integration, and scale-out storage. Data ONTAP delivers both scalability and enterprise functionality, enabling customers to start small and grow incrementally in a single Data ONTAP cluster.

Unified Architecture

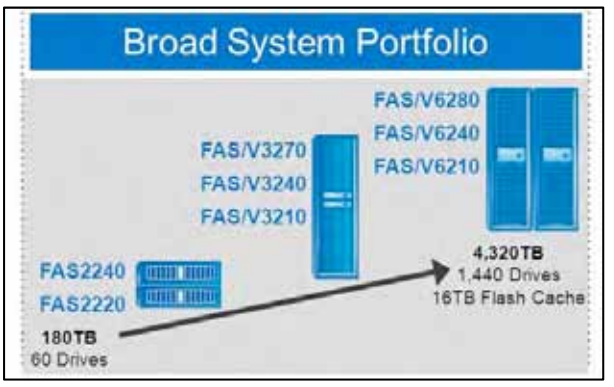
NetApp pioneered multiprotocol storage systems, and every one of our FAS or V-Series systems supports Fibre Channel (FC), Fibre Channel over Ethernet (FCoE), iSCSI, Network File System (NFS), and Common Internet File System protocol (CIFS). More than 98% of our customers have purchased licenses to run more than one protocol, and most of them do just that.

Multiprotocol was once synonymous with unified architecture, and the ability to support multiple protocols is now table stakes for any modern storage system. However, NetApp has consistently raised the bar for a unified architecture since we began offering multiprotocol support more than 10 years ago.

The real benefits of unified storage are at the architecture level, not at the box level.

A unified architecture means that you don't need to take a rip-and-replace approach when you need more I/O or a mix of I/O and cost profiles for different applications and storage needs.

Figure 11) Unified architecture



You can increase storage utilization by using a single architecture rather than a multiarray approach that requires you to break it up into smaller pieces.

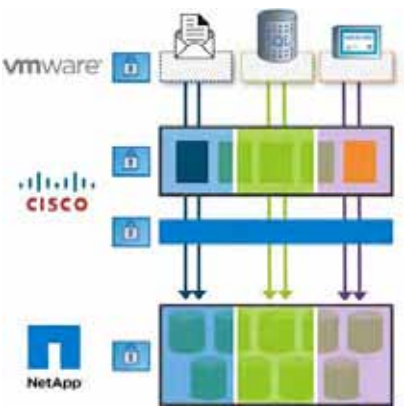
The ability to handle multiple workloads and deploy multiple technology options across a single architecture gives you the flexibility to deal with change, because whatever storage requirements you might have today, they will change again in the next 12 to 18 months.

The combination of compelling functionality with massive scale is unprecedented in the industry and enables NetApp to offer optimal solutions for the widest range of workloads with a common set of tools, processes, and compatible hardware.

Secure Multi-Tenancy

Secure multi-tenancy (SMT) takes virtualization to the next level, providing a bridge to cloud computing. SMT offers secure isolation for tenants in a virtualized environment to allow the broad sharing of resources across various applications and tiers of a typical IT infrastructure. It also works very well in a service provider model for the separation of customers in a virtualized, shared infrastructure.

Figure 12) Secure multi-tenancy



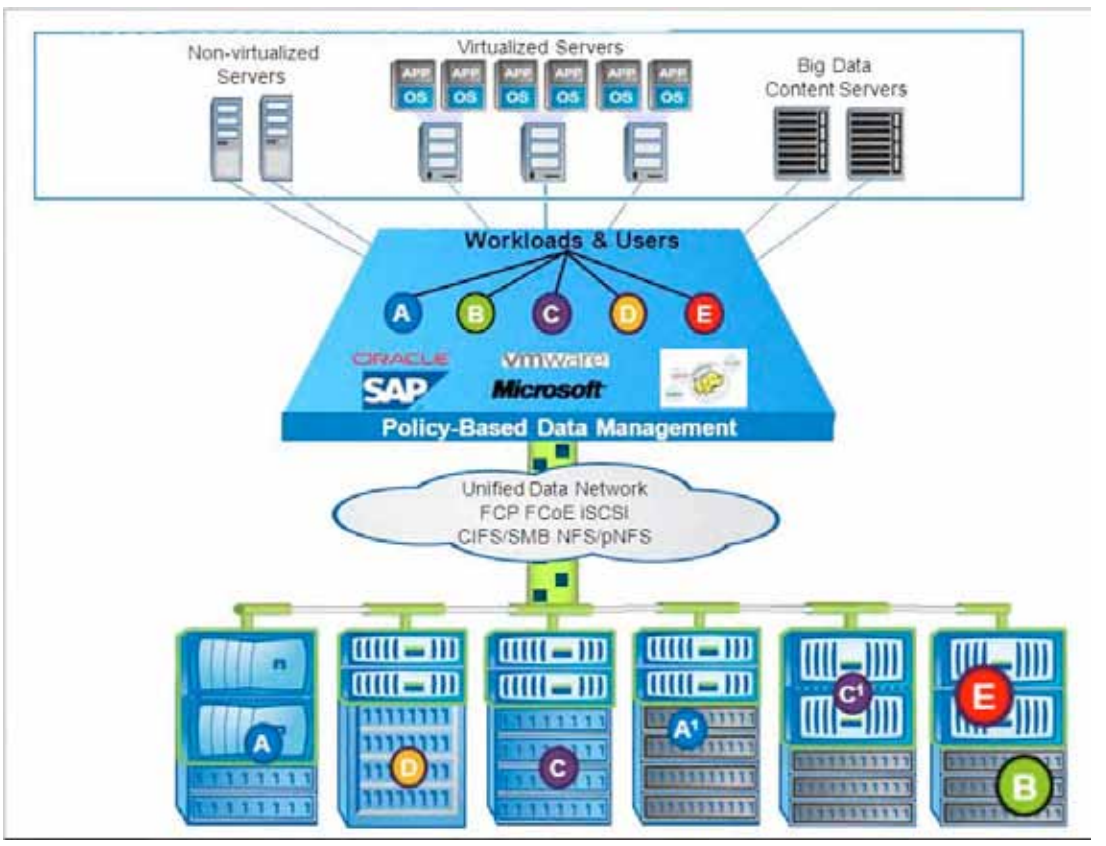
SMT creates isolated zones, or virtual silos, for each of the three sample applications (tenants) shown in figure 12. Cisco, NetApp, and VMware each offer unique capabilities, enabling secure isolation and service levels at each layer and for each tenant. Only Cisco, NetApp, and VMware can provide SMT from end to end, from servers to storage.

SMT enables secure separation in a shared infrastructure so that users can share more—and save more. SMT increases agility through quality of service (QoS) and mobility. Server, storage, and network resources can be moved from one tenant to another rapidly and nondisruptively. Resources for apps, business units, or customers can be scaled up or down, enabling dynamic service for each tenant. Being able to rapidly respond to business needs enables organizations to transform IT from an expense into a strategic asset.

6 Summary

As shown in Figure 13, the NetApp agile data infrastructure acts as a bridge between IT application servers and data that these servers create and consume. Agility is apparent in the management layer, where data is provisioned and protected through policy-based enforcement. Agility is also present in the storage layer, where a fleet of storage systems maintains continuous access to data in spite of the need for performance balancing, capacity expansion, system upgrades, and even entire system replacement.

Figure 13) Agile data infrastructure



Data travels from the management layer to the storage layer, through a unified data network supporting all common block and file protocols. This allows a diverse set of storage arrays to act as a singular pool of storage in which all data resides. The result is a self-managing data infrastructure that quickly adapts to dynamic requirements and new workloads, enabling IT to become a key contributor to the success of their organization.

We welcome your feedback regarding this document. Please contact us at xdl-agile-data-feedback@netapp.com to share your comments or questions.

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in this document.

Go further, faster®

White Paper

NetApp Big Content Solutions: Agile Infrastructure for Big Data

Ingo Fuchs, NetApp
April 2012 | WP-7161

Executive Summary

Enterprises are entering a new era of scale, in which the amount of data processed and stored is breaking down every architectural construct in the storage industry. NetApp delivers solutions that address the challenges of big data scale through the “big data ABCs”—analytics, bandwidth, and content—enabling customers to gain insight into massive datasets, move data quickly, and store important content for long periods of time without increasing operational complexity.

This white paper will focus on NetApp® solutions for big content, including secure, boundless infrastructure for file services, enterprise content repositories, and distributed content repositories. These three NetApp solutions will enable enterprises to obtain the most value from dramatically larger datasets.

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1 Entering a New Era of Big Scale

In the 1990s, IT teams were focused on obtaining optimal performance from the key applications and infrastructure of their enterprises. These siloed “systems of record” did a good job of keeping track of vital information, but they were very expensive, the data couldn’t be shared between groups, and they did not offer sufficient drill-down insight into the data to drive business advantage. In the 2000s, IT focus shifted to efficiency: how to do more with less. Technologies such as virtualization, sharing, and consolidation of the enterprise’s existing infrastructure became the key drivers for IT.

We are now entering a new era of big scale, in which the amount of data processed and stored by enterprises is breaking down every architectural construct in the storage industry today. As a result, IT teams are trying to convert these existing systems of record built back in the 1990s and 2000s into “systems of engagement”: ones that can efficiently deliver the necessary information to the right people, in real time, to enable them to perform more sophisticated analyses and make better business decisions.

Evolving from Systems of Record to Systems of Engagement

Data by itself has no value. Value comes from using the data to drive business results, offer services to customers, and increase revenue. The challenge for scalable storage is to enable these business outcomes from dramatically larger datasets.

In short, the amount of data is increasing, and the data objects themselves are getting bigger. All of these forces together are putting an enormous amount of scale pressure on existing infrastructures, especially the storage platform. This is what NetApp refers to as the big data challenge: how to obtain the most value for the enterprise from this immense digital universe of information.

2 Infrastructure Breaking Points

Today’s enterprises are finding it difficult to manage the exponential growth in big data. Traditional approaches can’t scale to the level needed to be able to ingest all of the data, analyze it at the speed at which it arrives, and store the relevant datasets efficiently for extended periods of time. The industry as a whole has started to get a handle on how to manage the increased infrastructure complexity in a virtual world, but handling infrastructure in a scalable world is presenting some very serious challenges.

From Where Is Big Data Coming?

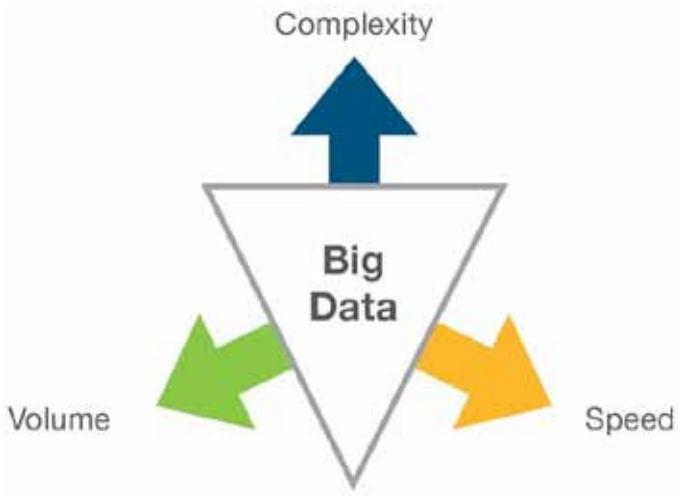
Although human-generated data, such as Facebook pictures and Tweets, is getting the most attention in the media, the biggest data growth is coming from machine-generated datasets, including consumer behavior-tracking applications and financial market analyses.

Big data is breaking today’s storage infrastructure along three major axes, as illustrated in Figure 1.

- **Complexity.** Data is no longer just about text and numbers; it's about real-time events and shared infrastructure. The information is now linked, it is high fidelity, and it consists of multiple data types. Applying normal algorithms for search, storage, and categorization is becoming much more complex and inefficient.
- **Speed.** How fast is the data coming in? High-definition video, streaming media over the Internet to player devices, and slow-motion video for surveillance all have very high ingestion rates. Businesses have to keep up with the data flow to make the information useful. They also have to keep pace with ingestion rates to drive faster business outcomes—or in the military to save lives.
- **Volume.** All collected data must be stored in a location that is secure and always available. With such high volumes of data, IT teams have to make decisions about what is “too much data.” For example,

they might flush all data each week and start over the following week. But for many applications this is not an option, so more data must be stored longer without increasing operational complexity. This can cause the infrastructure to quickly break on the axis of volume.

Figure 1) Where is your infrastructure breaking?

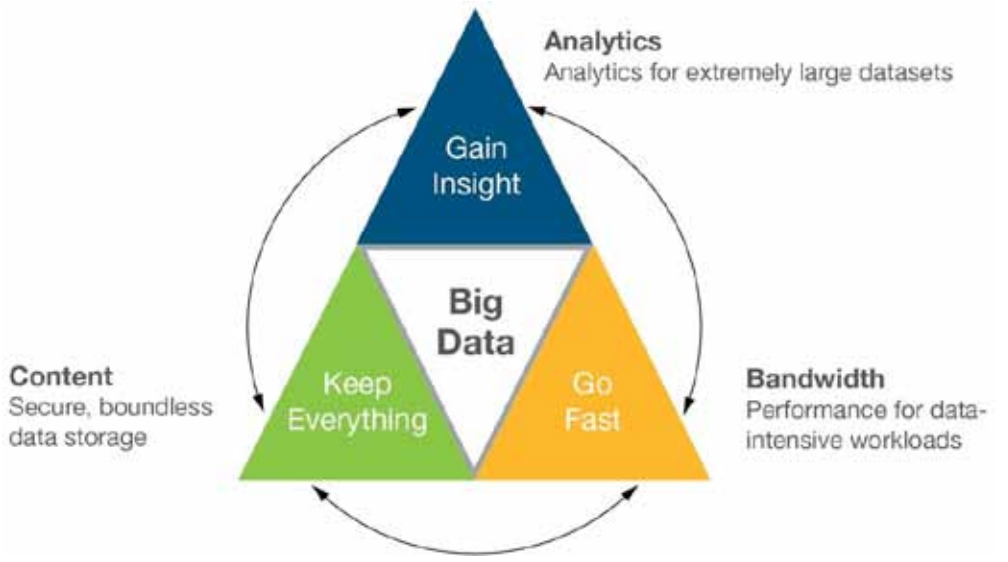


NetApp defines the solutions for managing data at scale within a framework that is called the “big data ABCs”: specifically analytics, bandwidth, and content. As shown in Figure 2, each solution area has its own challenges and unique infrastructure requirements:

- **Analytics.** Providing efficient analytics for extremely large datasets.
- **Bandwidth.** Obtaining better performance for very fast workloads.
- **Content.** Delivering boundless, secure, scalable data storage.

All three of these solution sets can work alone, or they can be combined together to solve the enterprise’s big data challenges.

Figure 2) NetApp big data ABCs: analytics, bandwidth, and content.



3 Big Content Challenges

The following section will focus on the “C” of the NetApp ABCs: the challenges of managing big content. Big content needs an underlying infrastructure that accommodates storing, managing, and retrieving large datasets. Key business challenges for enterprises addressing big content include:

- **Effectively addressing long-term retention policies.** As the amount of stored data grows, the retention of that data becomes more complex, not only in terms of volume, but also in terms of implementing corporate policies around how long to store data, when to delete it, and where to store it. Increasingly, organizations are challenged to store data for decades or forever, with the need to make sure data is not compromised as the storage infrastructure evolves during that time.
- **Quickly finding and retrieving content from long-term repositories.** After addressing the enterprise’s retention policies, the next challenge is to be able to quickly find and retrieve relevant content from that long-term repository. If a company needs to retrieve all contracts for a specific account, or a healthcare organization needs to access all medical images for a patient, quick and easy retrieval becomes critical, especially as the amount of data and the complexity of the storage infrastructure increase.
- **Leveraging historical data for new business opportunities.** Increasingly, organizations are leveraging the tremendous value in their historical data, whether it is evaluating customer purchasing behavior, quickly identifying retail trends, or understanding the impact of regional weather patterns to determine insurance pricing. With this historical data easily managed and accessible, new business opportunities arise, including better positioning of products in online Web sites and offering customized products to targeted customer segments.

4 Big Content Solution Environments

There are three primary solution environments for storing, managing, and retrieving big content:

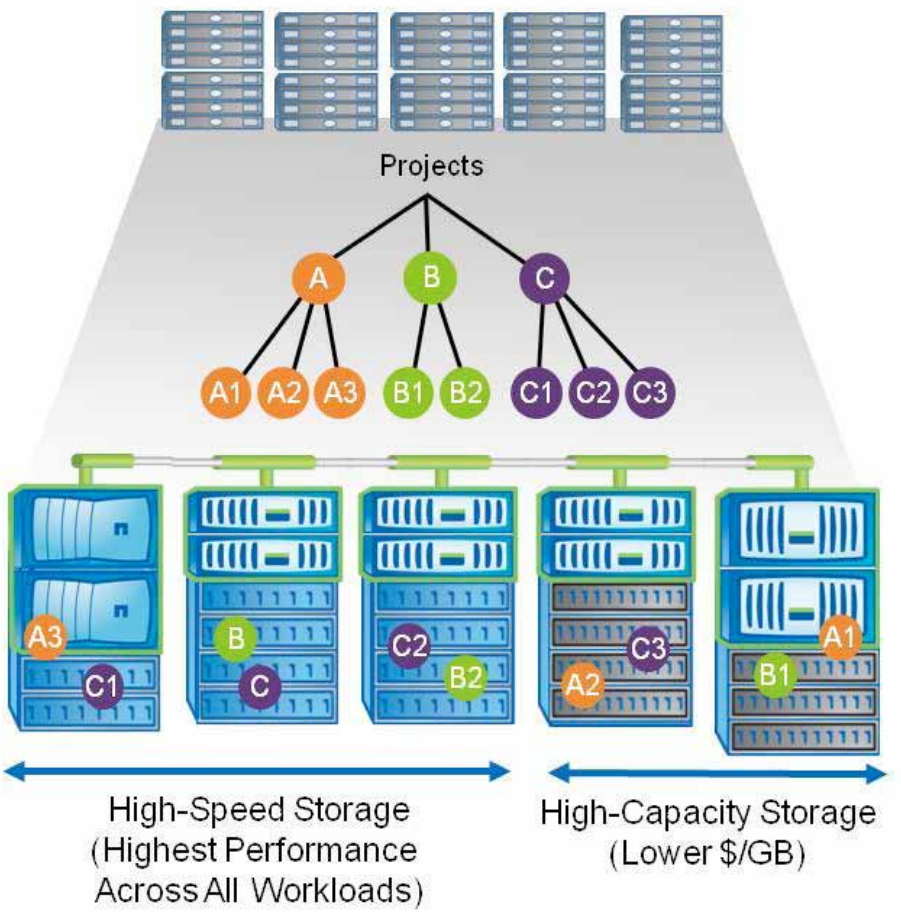
- **File services.** File services are probably the most familiar big content environment to customers today. The NetApp solution for file services addresses the needs for traditional enterprise use cases (such as file shares and home directories) and fast-growing use cases, such as virtualization and applications such as Microsoft® SharePoint® or Oracle® databases. NetApp has decades of experience in providing data infrastructure solutions in this area. These use cases are now expanding into larger data sets with advancements in protocols and technology, namely, NFSv4.x and SMB2.
- **Enterprise content repositories.** Enterprise content repositories address new use cases for active archives as datasets grow beyond traditional architectures. Enterprise content repositories can solve the challenges of storing enterprise data at multipetabyte scale, for long periods of time, without losing enterprise-class functionality such as deduplication, compression, data protection, and application integration.
- **Distributed content repositories.** Distributed content repositories scale beyond the traditional setup of a limited number of data centers (often a primary data center plus a disaster recovery site) to accommodate environments where organizations have dozens or even hundreds of sites, all storing different subsets of data with varying retention and data protection policies.

4.1 NetApp Solution for File Services

NetApp Data ONTAP® 8 delivers superior capabilities for file services, ranging from file shares in enterprises and engineering organizations to virtual infrastructures and business-critical applications,

such as Oracle and SAP® (see Figure 3). With Data ONTAP 8, organizations can consolidate file services workloads and business applications onto a dynamic storage cluster by adding nodes, disk technology, and caching as needed for a flexible, scalable file services infrastructure. NetApp has innovated in this space for decades, most recently adding capabilities around NFSv4.x and SMB2 to increase security and performance in parallelized storage deployments.

Figure 3) NetApp solution for file services.



File services based on Data ONTAP 8 address three key storage requirements:

- **Always on.** With Data ONTAP 8, customers can run their file services infrastructure 24x7x365 and eliminate data outages through nonstop operations, regardless of hardware failures or management operations.
- **On-demand flexibility.** By supporting a wide range of protocols and applications and the ability to quickly adjust to changing workloads, Data ONTAP enables customers to get ahead of market changes and dynamically adjust to changes in their business requirements.
- **Operational efficiency.** With deduplication, compression, efficient data protection, and unified data access, NetApp Data ONTAP 8 dramatically improves operational efficiency, enabling customers to scale their infrastructure with existing IT resources.

4.2 NetApp Solution for Enterprise Content Repositories

For organizations that need to store dozens of petabytes and billions of files in a single, scalable repository, Data ONTAP 8 adds Infinite Volume. With Infinite Volume, customers no longer need to compromise on full enterprise functionality, including storage efficiency, integrated data protection, multi-tenancy, application integration, and scale-out storage. Data ONTAP 8 delivers both scalability and

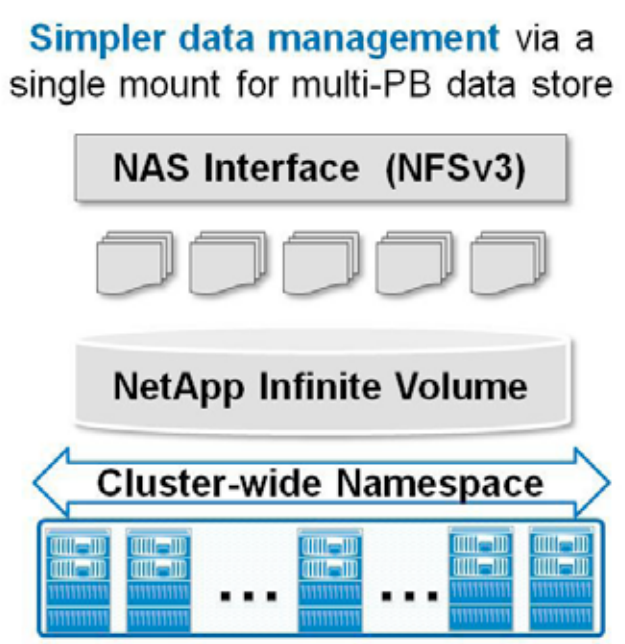
enterprise functionality, enabling customers to start small and grow incrementally in a single Data ONTAP cluster.

NetApp Data ONTAP 8 and the Infinite Volume feature provide three key benefits for enterprise content repositories:

- **Reducing operational complexity and increasing agility.** NetApp Data ONTAP 8 provides the ability to scale to billions of files and petabytes of capacity in a single volume, eliminating the need for many volumes. In addition, storage efficiency features reduce the amount of physical disk storage needed, and secure multi-tenancy enables private cloud implementations in shared environments.
- **Making sure of continuous availability.** Built-in high availability features in Data ONTAP 8 protect against hardware and disk failures, as well as operational downtime due to system upgrades or routine management tasks.
- **Providing integrated data protection.** Data ONTAP 8 provides integrated data protection—including Snapshot™ copies, SnapMirror® replication, and integration with data protection software partners—making sure that data is protected, even across multiple data centers.

The NetApp enterprise content repository solution (shown in Figure 4) is based on Data ONTAP 8 operating in Cluster-Mode Infinite Volume, part of Data ONTAP 8 NetApp FAS data storage systems.

Figure 4) NetApp enterprise content repository solution.



Enterprise content repositories are typically used for active archive use cases, where the focus is on storing and managing large amounts of data, while retaining the ability to quickly retrieve content back when needed.

One example of a large content repository would be an enterprise IT department that is storing hard drive images for all supported, standardized IT systems (specifically laptop and desktop images), including multiple versions for different departments and various operating system versions. Another example would be a customer ingesting large image data that needs to be retained for a long period of time, such as satellite images, medical images including MRIs, or scanned financial documents such as loan documents.

PNI Digital Media is a NetApp customer that is generating millions of consumer-ordered digital content transactions each year for major retailers and their thousands of locations worldwide. PNI relies on the

Data ONTAP 8 operating system's centralized management and easy provisioning and performance monitoring to host 950 million images and 3PB of data at production data centers in Vancouver, British Columbia, and Toronto, Ontario.

4.3 NetApp Solution for Distributed Content Repositories

The NetApp distributed content repository solution addresses the needs of organizations requiring large, distributed, multisite content repositories. The solution consists of NetApp StorageGRID® software running on virtualized server infrastructure and uses NetApp E-Series storage systems for storing data. Additionally, NetApp offers comprehensive planning, implementation, and support services.

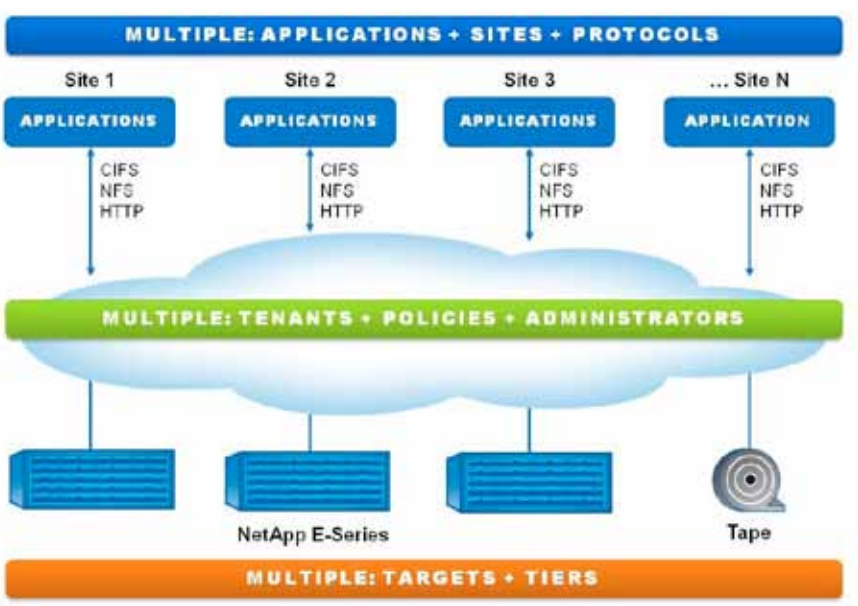
The NetApp solution for distributed content repositories provides customers with the ability to store petabytes of data and billions of files or objects across hundreds of sites in a single, location-independent namespace. StorageGRID uses object-level or file-level policies to manage where and how long data should reside and accommodates the need for data infrastructure that enables secure, boundless retention policies of "forever": typically years or decades.

NetApp delivers the following three key capabilities for distributed content repositories:

- **A single, large repository for unstructured data.** NetApp StorageGRID can store billions of datasets, such as files or objects, and petabytes of capacity in a single, multisite namespace.
- **Create, manage, and consume data globally.** Using a sophisticated global policy engine, data can be created, managed, or consumed at any location, while making sure that data resides where it should, as long as it should, and on the optimal storage tier.
- **Intelligent data classification and access.** Using metadata that describes the data stored in the repository, policies can be executed in a highly granular, yet efficient way. In addition, data can be managed and retrieved simply by using metadata, such as account numbers or the name of a customer, regardless of where the data is physically stored.

NetApp StorageGRID makes it possible for complex storage networks involving multiple applications using multiple protocols spread across multiple sites to all be seamlessly managed as a single entity. (See Figure 5.) StorageGRID can provide secure public or private cloud storage services to multiple tenants, each with their own policies and administrators. It also allows for storage to be organized into arbitrary storage pools that can overlap and be grouped by tier.

Figure 5) NetApp distributed content repository solution.



Distributed content repositories are typically used in organizations that store data in a number of sites, exceeding the traditional setup of a primary data center and a secondary (or disaster recovery) data center. NetApp supports hundreds of sites, which can be located on multiple continents. WAN optimization strategies and location-aware storage policies make sure that these sites are managed in an easy and automated way.

As an example, Adventist Health System, a not-for-profit healthcare organization based in Altamonte Springs, Florida, uses NetApp's distributed content repository solution based on StorageGRID to accommodate rapid growth across 43 campuses in 10 states, managing 7,700 licensed beds and providing care for over four million patients each year. The NetApp StorageGRID solution, which currently stores 268TB of data, includes primary storage in the Lake Mary data center in central Florida and disk-to-disk replication to a disaster recovery site in Carlstadt, New Jersey.

5 Summary

Enterprise datasets are growing rapidly, now reaching multiple terabytes of data or even billions of files for many organizations. In order to manage these ever-increasing datasets and meet key business objectives, an underlying infrastructure must be in place that facilitates the storing, managing, and retrieving of big content.

NetApp provides a secure, boundless storage infrastructure that addresses the many challenges of big content, including effectively addressing long-term retention policies, quickly finding and retrieving content from long-term repositories, and leveraging historical data to identify and support new business opportunities.

The universe of data can be an information gold mine. Let NetApp help your find the value of your data and turn it into real business advantage.

Big Content Innovation Is Based on NetApp
NetApp big content offerings provide a foundation to spark innovation, make better decisions, and drive successful business outcomes—at the speed of today's business.

Go further, faster®

WHITE PAPER

Reshaping the Datacentre: What Do You Need To Do?

Sponsored by: Fujitsu

Thomas Meyer
Giorgio Nebuloni
Chris Ingle

October 2011

IDC OPINION

Being an aggregate of technology and human elements, datacenters have constantly been in evolution, welcoming new types of hardware, supporting changing business models, and becoming an increasingly relevant asset for private and public organizations. Over the past three years, elements of disruption have been mounting up, ranging from faster swings in market conditions, to booming computing density and storage volumes, to the challenges presented by aging datacenter facilities, unable to support current power requirements.

- IDC believes that datacenters are built around four main pillars: infrastructure hardware; infrastructure software, including virtualization and management tools; applications and workloads (SAP, databases, etc.); and facility and energy components. Using the correct set of best practices around each of those is key to improving overall datacenter performance.

- Organizations rank achievement of IT budget plans as the key priority, with 67% of the organizations interviewed classifying it as a KPI, followed by metrics related to quality and delivery of IT services such as user satisfaction with IT (56%) and achievement of service level agreements (SLAs, 53%). Only a small portion of IT departments succeed on the full KPI stack and effectively deliver added value to their companies, while the rest still too often act as a cost center.

- Among the key steps needed to boost datacenter performance are: focus on a smaller number of projects; tighter connection between virtualization and system vendor management tools; provisioning of flexible platforms for different workloads; deep attention to storage issues, as those tend to spill out, impacting other areas.

- Virtualization has become the glue of datacenter infrastructure, as over 20% of the physical x86 servers shipped in 2011 are bound to host a virtualized environment. Most organizations, however, are not making the most of it, as they stop at physical consolidation, without gunning for time savings and staff reallocation, where the real benefits are. As a rule of thumb, and in order to achieve management improvements, the administrator-to-VM-ratio should be at least 1:30. Successful service providers are hovering at 1:50 to 1:100, and infrastructure-as-a-service (IaaS) providers have ratios in the four-digit range.

This whitepaper presents datacenter management best practices and highlights key intervention areas for organizations that want to increase their success rate in reaching key performance indicators (KPIs) such as cost, time-to-market, and user satisfaction.

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METHODOLOGY

This IDC White Paper is based on a number of primary and secondary sources. These include IDC's EMEA Server and Server Virtualization Trackers, IDC qualitative research, and results from a number of independent end-user surveys conducted by IDC over recent months.

The main surveys used for the current research are the *2011 Datacenter Optimization Survey*, conducted in August 2011 and involving 150 IT managers responsible for administrating and purchasing datacenter hardware in organizations with at least 25 servers in three European countries and the *2011 Datacenter Facility, Power and Cooling Survey*, involving 50 IT and facility managers of companies with at least one datacenter facility in four European geographies. This latter survey was conducted in CY3Q11.

In addition to these, other research has also been used, including IDC EMEA Virtualization surveys, the *IDC Managed System Survey, 2010* (300 respondents in Western European countries), the *Blade User Buying Behaviour Survey* (300 respondents in Western European countries, April 2011) and the *European Storage Survey* (more than 500 respondents in Western Europe, March 2011).

IN THIS WHITE PAPER

This IDC White Paper focuses on datacenter management practices among IT organizations, including key intervention areas such as facility administration, backend hardware purchase and refresh, virtualization and infrastructure software, IT staff, and applications or workloads. Against this backdrop, organizations are classified in four subsets depending on their success in reaching key performance indicators (KPIs), and the concrete best practices of the most successful organizations are presented in the paper. Finally, advice is given to companies that look to perform better and move on up in the maturity model.

SITUATION OVERVIEW

Being an aggregate of technology and human elements, datacenters have constantly been in evolution, welcoming new types of hardware, supporting changing business models, and becoming an increasingly relevant asset for private and public organizations. Over the past three years, however, elements of disruption have been escalating on both the technology and business sides:

- IT backend infrastructures need to support businesses in a highly uncertain macroeconomic environment, with more frequent and more extreme swings in market conditions. IT needs to be more flexible in supporting fast operational turnarounds.
- Budget allocation becomes increasingly linked to a required return on investment (ROI) on new assets and staff that is measurable in quarters, if not months.
- Sourcing models are now more complex than before, as companies make use of variable combinations of in-house services, traditional outsourcing and now cloud services. Management of such hybrid environments is and will be a key challenge in terms of data integrity, SLAs, and accountability.

- Computing density has continued to boom, boosted by centralization and increasingly dense form factors (blades, hyperscale rack systems). As a consequence, average power density reached new heights in the past few months — and at the same time an increasing number of mission-critical workloads sit in ever shrinking floor space, drawing significantly on delivered energy.

- Datacenter storage volumes did not stop growing over the past five years, more than quadrupling between 2006 and 2010, and thus increasing information management and data capacity demands on datacenter space and staff resources. IDC foresees enterprise storage volumes growing 50% in 2011 over 2010, and we expect a similar compound annual growth rate (CAGR) to continue through 2015.

- Datacenter facilities that have typically had a lifespan of 10–15 years are often unable to support current requirements, and are literally several generations behind top-class, highly-efficient environments set up by the largest public cloud service providers.

- Workloads and operating environments continue to evolve, with server virtualization now covering almost 22% of the new x86 shipments in EMEA. This has often turned the headache of managing a sprawling number of physical machines into that of managing a booming volume of virtualized environments as well as the physical estate.

During the course of this paper, IDC will analyze how the most successful companies deal with these and other challenges in datacenters, as well as highlighting the practices and key initiatives that differentiate over-performers from their worse performing peers.

KEY CHALLENGES

In order to understand how an IT organization can optimize its datacenter practices, it is paramount to quickly review what the goal of a datacenter is, and how the different components contribute to its overall performance.

According to IDC, a datacenter is a computing infrastructure with the main goal of providing end users with applications, IT services, and data at the best cost-to-service ratio. Datacenters are an aggregate of disparate elements, ranging from staff to hardware elements, from software licenses to contracts with external providers, and so on. All of these elements can be clustered around four main building pillars or domains, each of which requires the adoption of the correct set of practices:

- **Infrastructure hardware**, including server, storage, networking elements

- **Infrastructure software**, including server and storage virtualization platforms, operating systems, system management software tools and governance tools

- **Applications and workloads** running on top of the operating systems, including standard off-the-shelf software products as well as in-house software, and extending to relative licensing and support costs and business processes

- **Facility components**, such as building, cooling/power systems, and datacenter connectivity

In addition, key parts of the overall datacenter aggregate are internal staff and external contracts with outsourcers or cloud service providers. Depending on the choices IT organizations make around each of those pillars, a datacenter will be more or less effective in delivering on its goals. Examples of parameters defining approaches around each pillar include:

- In the hardware area, the frequency of server refreshes or the choices around network infrastructure
- In the software areas, the type of operating systems used, the ability of IT staff to write customized software, or sophistication in the use of automation tools
- In the workload area, the ability to make software environments more flexible, or the elimination of structural complexity in SAP installations
- In the facility area, the best practices used to cool infrastructure (e.g., raised floor, use of modular datacenters).

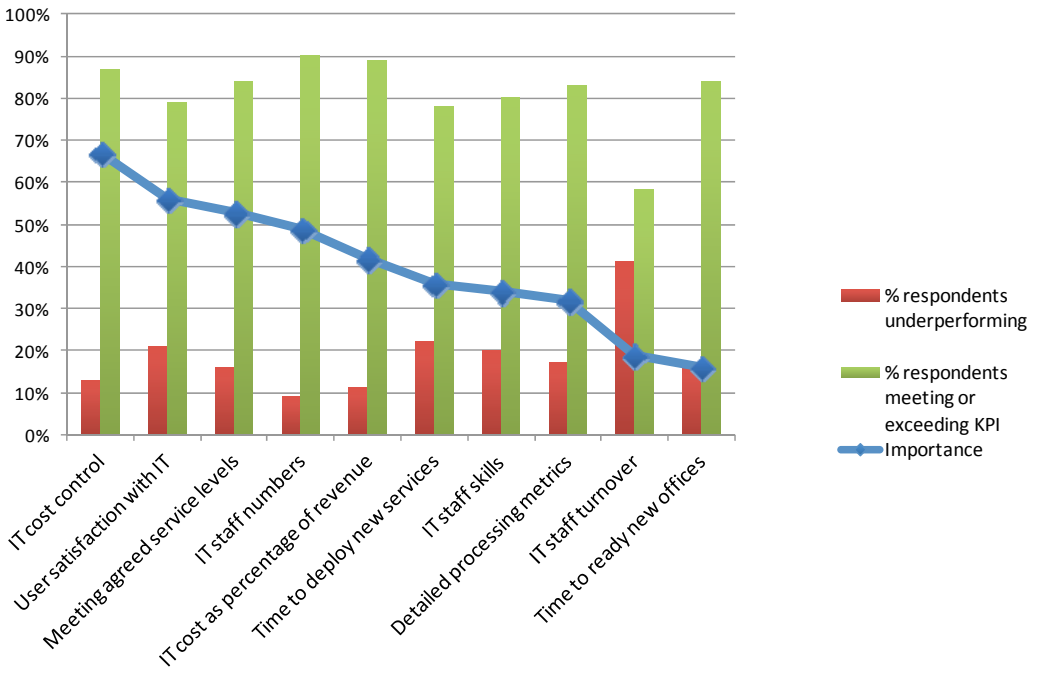
Ways to Measure Success

IDC research shows that IT departments measure themselves against a number of key performance indicators (KPIs). Such metrics are formally or informally chosen by IT management and the CxO as a way to benchmark their IT organizations as regards to the achievement of the datacenter goals described above. Figure 1shows the most common KPIs in use in EMEA organizations, as reported by respondents in the Datacenter Optimization survey.

FIGURE 1

Key Performance Indicators for EMEA Datacenters

Q: I would like to now look at some key metrics for your business and IT organization. Can you let me know the metrics that you focus on?



Source: IDC, 2011; n = 151

As clearly shown in Figure 1, the achievement of IT budget plans is widely seen as the key priority, with 67% of the organizations interviewed classifying it as a KPI. Cost control is followed by KPIs related to quality and delivery of IT services such as user satisfaction with IT (56%) and achievement of service level agreements (SLAs, 53%). Other budget items (IT staff numbers [49%] and IT cost as % of revenue [42%]) make the top 5. KPIs related to time-to-market items and staff management rank lower in the mind of the IT managers interviewed.

A vast majority (81%) of organizations report to meet or exceed their KPIs. Interestingly, KPIs related to budget and cost control are on average met by a higher percentage of respondents (90%) compared to those linked to time-to-market, staff management, and service levels/user satisfaction, which are in the 80% range. IDC believes this to be confirmation of a wider trend that sees IT organizations tend to put budget control above other elements as the main (and often only) metric for success. In many cases this leads IT organizations to err on the side of underinvestment, which subsequently hampers the ability to deliver solid service to internal customers.

IDC maintains that only organizations with a balanced approach to budget and service delivery are able to fulfill their mission wholly. However, the optimization of practices in all of the four pillars previously described is needed if the dilemma between cost containment and investments is to be solved.

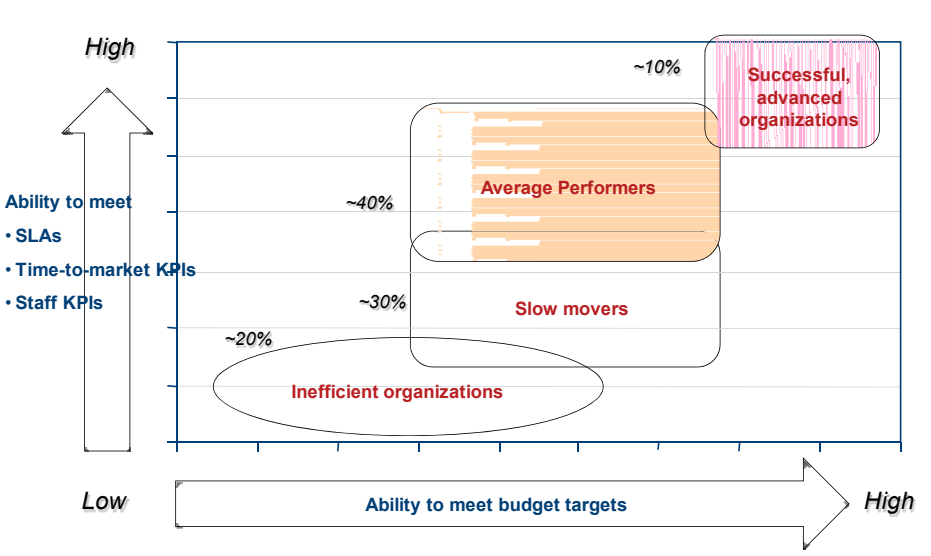
In the following sections, IT organizations have been segmented depending on their success in meeting or exceeding KPIs. IDC describes what successful organizations do differently, focusing on concrete best practices in the pillars and how they contribute to overall performance.

MATURITY MODEL

By using the results of the Datacenter Optimization Survey, as well as other IDC research, organizations can be classified in four broad groups, depending on the degree to which they fulfill budget or cost KPIs versus SLAs, customer satisfaction, time-to-market, and staff retention and turnover.

FIGURE 2

Datacenter Success Maturity Model



Source: IDC, 2011

The four groups can be described as follows:

- **Successful organizations** — Defined as exceeding most of their KPIs and meeting the rest, they represent a minority, and they are able to hit a good balance between investments and budget protection. Innovation, high satisfaction of internal customers and high levels of staff retention are characteristics of this group.

- **Average performers** — These are able to achieve or exceed budget-related KPIs, and achieve most of the other KPIs, although IT service levels are not always optimal. These firms are typically followers on new technology adoption and still tend to see IT as a separate identity, measuring IT success without correlating it with business improvements. They are the largest group, and they usually have difficulties in retaining IT talent.

- **Slow movers** — This group is usually able to achieve most budget targets thanks to tight cost control, but do so by underspending and sacrificing service quality and time-to-market and eventually widely missing out on potential savings of new technologies such as virtualization.

- **Inefficient organizations** — This segment represents roughly 20% of the sample, and it tends to perform inconsistently on budget targets, and even more erratically on other KPIs. It is characterized by very slow time to market and software skills that are well below average.

Common Traits Among Successful Organizations

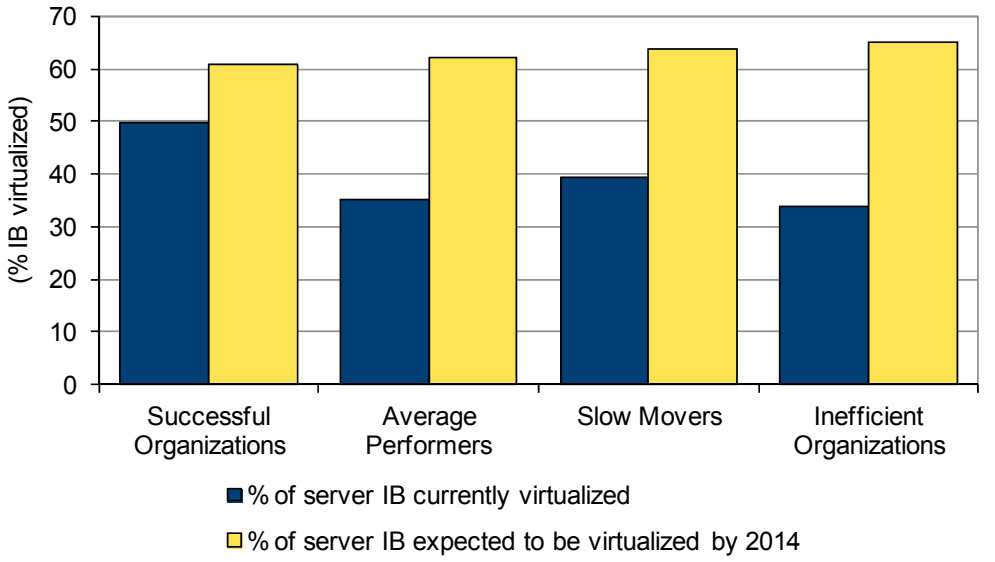
What makes successful organizations stand out from underachievers? All four groups are strikingly similar in terms of demographics, when looking at company size and datacenter size. In all groups, roughly 70% to 80% of the sample has more than 1,500 employees, 5% to 12% has between 1,000 and 1,499 employees and the rest are equally divided between 200–499 and 500–999. Similarly, across all four maturity groups, 35% of the sample have more than 500 servers, and an average of 35% had 100–499 servers and 30% had 25–99 servers. Infrastructure age also remained very homogeneous, with around 25% of the installed base (IB) being less than one year old, 45% of it being one to three years old, and roughly 30% four years old or more.

Advanced Approach to Hardware and Infrastructure Software (Pillars 1 and 2)

Similarities extend beyond demographics, though leading to some counterintuitive discoveries. Figure 3 shows the percentage of server installed base virtualized by maturity group. Adoption of partitioning or virtualization technology is equal in all groups in terms of the percentage of companies using it (average 70% of all respondents). Similarly, companies in all groups believe the virtualization penetration on server installed base (IB) will be at around 60% in three years. Excelling organizations stand out, however, in terms of current penetration of installed base, with 50% of the IB virtualized, compared to 30%–40% in the other groups.

FIGURE 3

% of Installed Base Virtualized by Maturity Group



Source: IDC, n= 16, 56, 47, 32

This first set of results proves that using virtualization per se does not ensure success in reaching KPIs. Virtualization needs to be managed and optimized to produce positive results. Successful organizations tend to use more often tools from the storage and server supplier to manage virtualized environments (20% of the sample, versus an average of 5% in the other groups) and advanced management suites (30% versus 15% in the other groups). Continuing to develop higher levels automation in virtualization environments also helped successful organizations to reduce downtime by up to 30%.

Also of interest are the following findings:

- Successful companies, and average performers, tend to give more weight to ease of use (25% of them mention it as a top three criteria, versus 14% in slow and inefficient performers) and ease of installations (18% versus <10% for slow and inefficient organizations) when picking their management software. The presence of monitoring tools (25% mention as top three criteria) and brand of management software (30%) are also important to successful companies, but not much valued elsewhere

- Successful organizations are on average more inclined to use unified system management software to administrate storage and server elements (55% of respondents, versus 43% in slow movers and inefficient organizations). They are also keener to see automation as a top investment priority (56% versus less than 50% in slow movers and inefficient organizations).

- Successful organizations have staff that is more skilled, both generally and specifically in the area of system management. More than 50% of the underperformers pointed to lack of in-house skills as one of the top three hurdles in expanding use of management technologies. This compares to only 25% in the best performers. Also, successful companies seem to understand the value of management software better. Only 13% of them rank the initial purchase cost

of management software as a top three hurdle, versus 36% in average performers, 40% in slow movers, and 50% in inefficient IT departments.

As a result of better management practices, hardware is better optimized, with positive effects on overall storage volumes and above all a more solid environment. As an example, and despite having a higher percentage of virtualized servers (see Figure 3), only 20% of the successful companies have storage capacity problems due to virtualized environments, versus 34% of average performers and 40% of the underperforming organizations.

Software and Other Elements (Pillars 3 and 4)

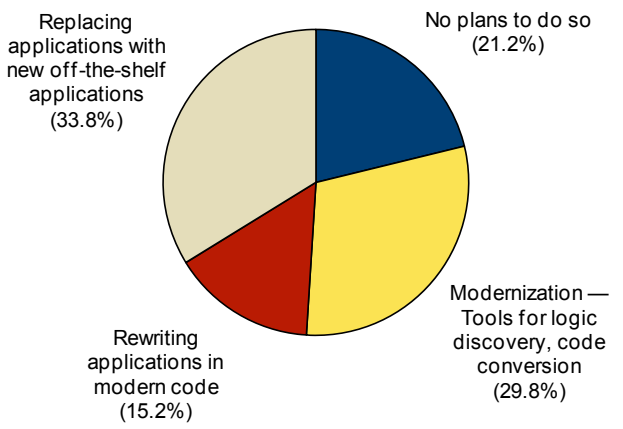
Along with an advanced approach in the lower part of the stack, what really differentiates successful companies from the rest of the pack are the skills on the software side. Workloads and applications appear very homogeneous in their weight across all groups in the maturity model, with IT infrastructure tasks monopolizing an average of 33% of servers, business applications and CRM covering roughly 20% of the machines, and the rest being equally split between email and collaboration (11%); analytics (10%); application developments (12%); and Web (13%).

However, different IT organizations go about tasks in this area with different attitudes. IDC surveys show that organizations that are able to exceed KPIs present typically higher software capabilities compared to their peers. This appears clearly when analyzing the approach to legacy applications. Of the 150 companies interviewed in the Datacenter Optimization survey, only 15% claimed that rewriting applications in modern code would be their preferred way of upgrading current software stacks, versus 30% of the organizations that exceeded KPIs (Figure 4). On the contrary, replacing custom applications with standard off-the-shelf offerings is the path chosen by more than a half of organizations classified as slow movers or inefficient, versus 25% in average and excellent organizations.

FIGURE 4

Attitude Towards Legacy Applications

Q: What is your approach to updating your legacy applications?



Source: IDC, n= 151

SAP, one of the key software pillars of businesses, is often deployed among best performers (50% of them use SAP, versus around 45% in the rest of the groups). With complexity being mentioned by all respondents as the primary challenge for SAP environments (27 points in average, versus 15 for upgrade challenges and 15 for costs), datacenter teams that have more solid coding skills and overall a better prepared staff can once again stand out from the crowd.

It is noteworthy that complexity in SAP environments makes it in turn extremely difficult to orchestrate applications in accordance with other elements of IT infrastructure, ending up with silos such as the ones displayed in Figure 5. A way to overcome this challenge is set up an end-to-end framework to manage hardware, infrastructure software, and SAP software modules as a whole.

A Service-led Datacenter Model

As a summary, we can say that the datacenters that are most likely to exceed a balance scorecard for KPIs are the ones that:

- Have not only deployed, but also fine-tuned server virtualization and set up a correct management framework. The primary business benefit for users of virtualization is faster deployment of applications: on average, organizations that had implemented an advanced virtualization program using automation found they could deploy applications 40% faster than before.

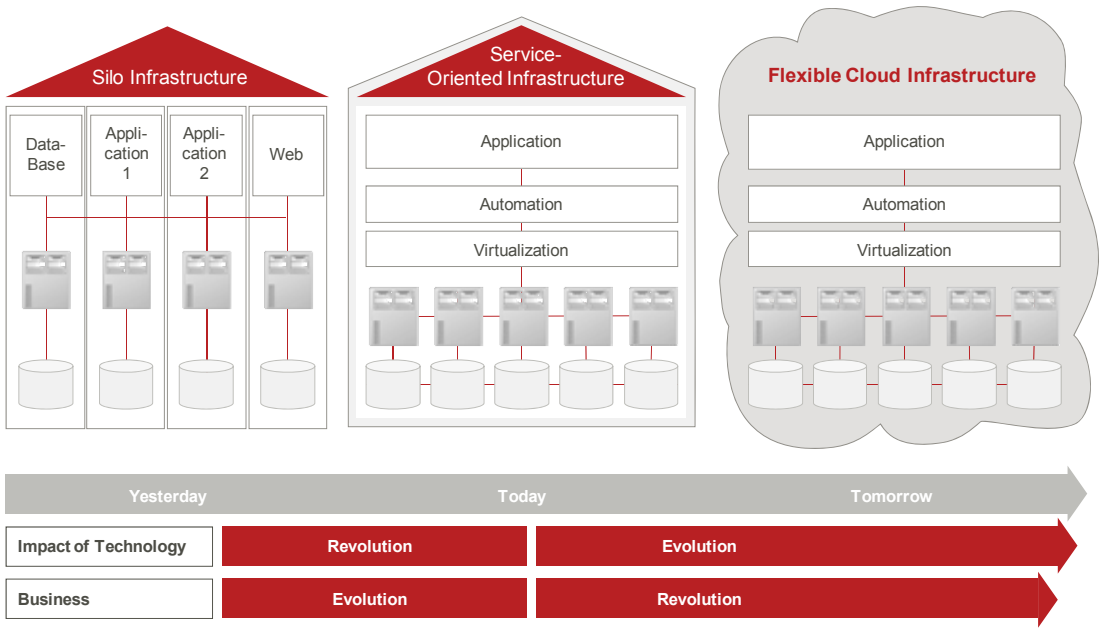
- Maintain a rich software ecosystem within the enterprise, with strong skills in coding new software, ability to support a multitude of environments, and awareness of software licensing cost dynamics.

- Consider automation a top investment priority but are able to pick the right automation software.

Having built more solid foundations for their datacenter infrastructure, the best performer will be able to react better to future evolutions in the way IT is delivered to the business. IDC believes that successful IT organizations have completed initial stages of hardware consolidation and are already moving from service-oriented infrastructures towards dynamic, on-demand environments, where business requirements are quickly reflected in IT service (Figure 5). At this stage, server, storage, and network resources are orchestrated and automated, unifying all different sourcing areas (in-house, outsourced, in public clouds) under the same umbrella.

FIGURE 5

Evolution of Datacenter Pillars



Source: Fujitsu/IDC, 2011

DATACENTER BEST PRACTICES

A first set of general recommendations can be made after comparing practices among the most efficient datacenter organizations and other groups:

- **Focus on a smaller number of projects** — Companies exceeding targets have considerably fewer projects running compared to companies performing at average levels or missing their KPI targets. On average, IT departments running datacenters with more than 25 servers have almost 60 concurring projects, counting both those currently executed and those in planning phase. The best performing companies interviewed averaged slightly more than 30.

- **Virtualization alone doesn't make the difference, management does** — Virtualization ratios don't change much between low and top performers, but what impacts overall performance are the goals of virtualization and the approach to management.

- IDC advices organizations to step up their efforts by concentrating on reducing man hours spent managing infrastructure. The reduction of hardware capital expense should be seen as a nice by-product, but not as the goal of virtualization projects. Hardware CapEx accounts for 15% of overall datacenter costs, versus 30% related to the most precious resource, IT staff.

- A clear link has been discovered between the use of management tools provided by storage and system suppliers and the overall success in virtualization management.

- **Double your attention on storage** — As the amount and complexity of enterprise data continues to grow, investing in knowledge and new technologies in the storage area makes a difference. Storage links and capacity typically come up as some of the principal inhibitors for effective virtualized environments, but considerably less so for successful datacenter teams. Also, data lifecycle management, back-up and archiving need to be re-architected around virtualized pools. Regardless of their specific remit area, IT administrators in the best performing organizations show higher awareness around storage issues. 30% of inefficient companies were unsure whether their IT backend had a unified storage strategy in place; i.e., the ability to access storage through file and block protocols. This compares with 20% in the average performers and 15% among best performing companies.

Figure 6 summarizes the main best practices for each of the four pillars available in 2011 as well as in future years.

FIGURE 6

Datacenter Best Practices Short and Mid-term

Pillars	Best Practices in 2011	Best Practices in 2012–2014
Hardware **(server, storage, networking)**	•Constant refresh in installed base •Leverage suppliers to obtain better prices on converged network/server solutions • Use tiered storage solutions • Increase percentage of shared storage to allow virtualization, VDI • Optimize storage for backup and high availability on virtualization environments	•Use bespoke and/or workload-optimized server solutions • Gradually migrate workloads to standard x86 architectures, whenever reliability requirements are satisfied • Increase usage of NAND Flash for both internal and external storage blocks • Modular integrated stacks for quicker deployments
Infrastructure Software **(OS, virtualization, management/automation software)**	•Use system vendor provided hardware management tools • Couple system vendor mgmt tools with virtualization tools • For DC with 200+ servers, make sure of integration of system mgmt with governance tools • Keep skills in legacy (UNIX, mainframe) alive	• Invest in SaaS system management tools • Benchmark mgmt tools on number of VMs / full time admin day • Enable full automation for hardware resources • Consolidate number of management suites
Applications and Workloads	•Nurture internal software skills • Work to reduce impact of infrastructure workloads on datacenter productivity • Evaluate SaaS offerings in non-core workloads • Invest in reducing complexity of SAP installations • Set roadmap for upgrade of enterprise apps – cloud, off-the shelf or in-house?	• Deeper use of SaaS offerings coupled with data integration tools • Standardize large SAP installations on a single CPU platform • Use of upcoming in-memory and NoSQL database technologies for high performance tasks
Facility and Power management	•Reduce number of datacenters • Share energy responsibility between facility/IT managers • Use ultra-dense server solutions for the right workloads (HPC) to save energy • Retrofit current facility to enable high power density aisles, raised floor/lowered ceiling	•Green field datacenters should target PUE of <1.5 • Evaluate modular builds for greenfield datacenters • Evaluate free air cooling facilities and increase DC temperature • Reduce percentage of non-IT space in your datacenter

Source: IDC, 2011

Ways To Improve – What Should You Do?

In the previous paragraphs, IDC outlined the general path that successful teams have followed to get where they are. Those companies tend to be strong in virtualization implementations and in storage backend:

- According to IDC, companies using virtualization were able to save between 10% and 25% on staff costs per server compared to organizations that did not implement it, with better ratios obtained by those companies with more complete management solutions. Savings on overall annual software licensing are also considerable, and IDC estimates those to be as high as 15% compared to what companies that don't use virtualization have. Overall, IDC estimates that total cost of ownership (TCO) (including staff, hardware purchase and maintenance and software) can be reduced by up to 10% through a combined usage of virtualization and integrated system software management tools. In larger datacenters, TCO can be reduced by up to 15%, as proven in previous IDC research (*Understanding Datacenter Cost and How to Reduce It*, IDC #GE52S, March 2010).

- Survey data shows that storage modernization (setup of tiered storage environments, unified storage tools, automated backup, etc.) can help to improve time to market considerably. IDC estimates that a modern storage backend can reduce waiting times by up to 20%, depending on the application. I/O-intensive data warehouse workloads can see improvements in the 30% range.

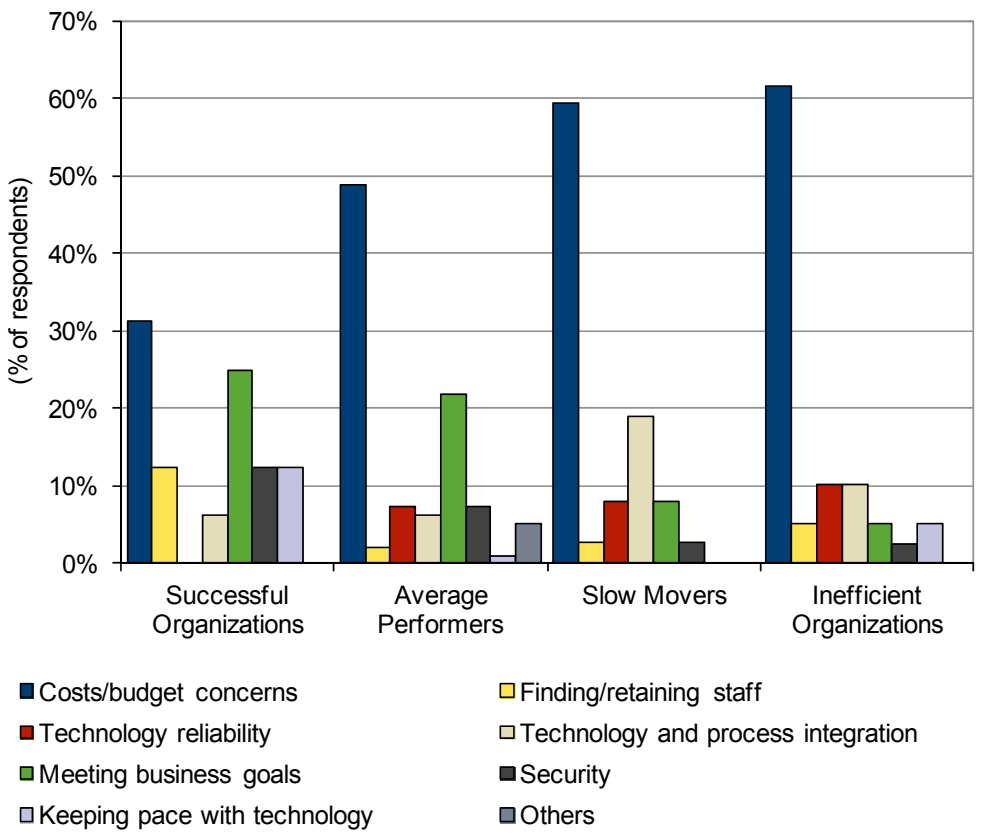
In the following paragraphs, IDC presents concrete priorities and action points for organizations that want to step up in the maturity model, depending on where they are currently positioned.

Inefficient Organizations

Datacenters that fall under this category have to focus on basic priorities in order to make sure they hit their cost KPIs first. More than 60% of the underperformers mention budget concerns as one of the most important issues in managing infrastructure in the coming months, versus 50% among average operators and 30% in the excellent cases (see Figure 7).

FIGURE 7

Most Important Future Issues in Managing Infrastructure, by Maturity Group



Source: IDC, n= 16, 56, 47, 32

Five key points of advice for organizations in this group are:

- **Refocus, reduce number of IT projects** — Survey data shows that the first set of KPIs missed when the number of projects gets out of control relates to cost issues. In certain cases, a paradox situation comes to be where IT staff numbers are carefully monitored to keep budget in line, but the projects they work on aren't, leading to spiking costs on software and low service levels for internal customers. Selectively eliminating projects that have been long standing and non-core to the business will help refocus resources in key areas.

- **Assess hardware installed base for aged assets** — Around 30% of the server installed base in EMEA, for example, is four years old or older, and hardware maintenance accounts for 15% of overall datacenter running costs. Targeted refreshes on standard x86 servers should be a first step to reducing costs, but in the mid-term (12 months), a clear strategy for legacy systems must be developed.

- **Execute on server centralization** — Maintenance costs and remote support for distributed computing environments in branch offices increase man hours quickly. With networks and WAN now capable of handling large datasets, it is recommended that organizations shift physical and virtual environments into a smaller number of locations wherever possible.

- **Improve virtualization management with basic usage —** Although organizations in this group have likely dipped their toes in virtualization, this has seldom brought about benefits others than some marginal reductions in server installed base, often offset by higher costs in management. IDC advises companies to make sure all out-of-the-box tools (hardware monitoring, device management, asset repository, performance monitoring…) entailed in hypervisor vendors or system vendor software are enabled and that staff can use them properly.

- **Invest in basic shared storage environment** — Whether to support virtualized pools or SAP, some form of shared storage is a must-have in all datacenters with at least 50 serves. Low cost solutions based on iSCSI are now widely available, and can help reap quick benefits in many areas.

Slow Movers

Organizations in this subset tend to hit most of their budget targets, usually at the cost of under-investing and overlooking user satisfaction. Signs that a company falls into the slow mover category are IT spending below 1.5% of annual revenue, extremely conservative expectations in spending growth for future years, and inability to perform technology and process integration (see Figure 7). In order to accelerate datacenter operations, IDC suggests the following steps:

- **Make your storage backend safer with data protection tools** — Virtualization makes data on shared storage environments even more critical, as disruption in that part of the infrastructure would mean downtime on the server side too. Companies are advised to evaluate and use backup tools that are fully compatible with their virtualization platforms, and should integrate them with storage management tools as well.

- **Standardize your management tools** — Organizations in this subset are not apt to experiment with a variety of management tools for various domains. IDC advises freeing up resources and eliminating redundant software by using mono-brand server and storage management tools. A tight management environment is the cornerstone to building dynamic IT infrastructures that will deliver resources in an as-a-service mode in the future.

- **Reassess savings from virtualization** — Physical consolidation is a first step, but time savings and staff reallocation are the real goal. Make sure all server administrators are fully trained on virtualization consoles. As a rule of thumb, and in order to achieve management improvements, the administrator-to-VM ratio should be at least 1:30. Successful service providers are hovering at 1:50 to 1:100, and mega-datacenters such as Amazon have ratios in the four-digit range.

- **Commit to a roadmap in workload upgrade** — If all workloads are taken into account, the majority of organizations across all groups expect to execute upgrades and refreshes only starting from 2013 or beyond. Infrastructure workloads (file and print, networks, security) are poised to get a refresh sooner (55% expect to do that before end of 2012), while analytics will be lagging behind (only 30% expect refresh before end of 2012). IDC believes that in many cases, a clear roadmap for upgrade has not even been established. Setting short-term (12 months) targets in terms of evaluation of new applications is a key part of improving service delivery and time to market.

- **Evaluate options in datacenter facilities** — The chances are that organizations with a conservative approach have older-than-average buildings and cooling systems. IDC research shows that buildings constructed more than 10 years ago typically have power usage efficiency (PUE) values above 2 (i.e., the total energy needed is more than double the energy needed to power IT gear). Simple best practices such as the use of contained cold/hot aisles and raised floors can go a long way to improving this. Choices around power-efficient hardware can help maximize these efforts.

Average Performers

Companies in this subset run moderately efficient datacenters, are on the lookout for potential technology or process disruptions, and overall deliver acceptable services for their internal customers. What separates them from excellence, and could disrupt their processes in the era of cloud services, is the ability to adapt quickly to new environments, however. In order to achieve that, the following steps are recommended:

- **Work to retain/increase IT staff skills** — Staff skills are mentioned as a top KPI by only 30% of average performers, versus 45% in top performers. Retaining the best people and training them further is a simple task, yet often overlooked as a way of boosting productivity.

- **Expand internal skills on software** — As datacenter hardware becomes more standardized on x86 platforms and common storage interfaces, IT departments need to work on their software and development skills to stand out. To get there, organizations need to rely less on off-the-shelf software in the core-business areas (vertical-specific software, analysis software), while freeing up developers from scripting tasks around non-differentiating areas, such as system management tools, infrastructure, email, and collaboration.

- **Link automation to business goals** — With a continuous focus on budgets, companies look to use automation as a means to reduce operating costs. On average, the cost-reduction impact from this activity was seen to be in the region of 5%–10%. However, automation software must also help the company get closer to its business objectives. 23% of average performers and best performers list business goals as one of the key priorities in managing infrastructure, versus 7% among slow movers and inefficient datacenters. IDC recommends defining clear metrics in terms of service delivery when setting up automation software for virtualization and delivery of IaaS internally.

- **Increase spending where competitive advantage follows** — Best performers are not always those spending less. Across all spending areas (staff, outsourcing contracts, software licenses, hardware maintenance and purchase, facilities), average performers expect yearly spending growth of 5% in 2012 and 2013. This is roughly two points higher than slow performers and only one point less than best performers. Areas of relevance where well-placed spending will result in competitive advantage in the next two years, will be analytics (Big Data), purchase of workload specific high-performance hardware and software for integrating cloud services with on-premises applications.

- **Reassess datacenter facility, particularly with regards to cooling** — Cooling is emerging as the key priority among IT and facility managers, with 46% mentioning it as one of the top priorities in the datacenter facility for the

next year (followed by reliability at 38% and systems management at 26%). IDC is observing an ever-increasing pressure on datacenters to deliver high cooling density, with kW/m^2 (kilowatt per square meter) values growing from below 0.5 kW/m^2 to more than 1 kW/m^2 in a few years. Several advanced solutions are available today for customers that need to reach very high density, ranging from modular datacenters to containers, to new best practices on greenfield facilities. Those can then be used to house hyper-scale or blade servers to achieve maximum efficiency and density.

CHALLENGES

Transforming a complex environment such as a datacenter is not an easy task. Challenges may arise not only from technology issues, but also from internal IT stakeholders. Virtualization and cloud delivery models (Figure 4) change the role of the IT administrator. This leads to increasing overlap in the areas of competence of infrastructure administrators, responsible for storage, servers, and networks, who are now forced to cooperate more closely to set up and manage virtualized pools. It also coincides with changes in the status quo and readjustments in overall staff balances. CIOs should proactively work with group leaders to define and prioritize the key action items presented above, and making sure all internal stakeholders are equally involved in the reshaping project.

If change entails a visible risk factor, maintaining the status quo also presents challenges, and above all extreme conservativeness in investing and improving processes can quickly lead to slower time to market and revenue generation.

Another formidable disruptive factor for organizations trying to enhance their datacenter operations lies in the booming interest in cloud services delivered by external providers. These can present both a distraction and an argument for less illuminated CFOs to demand a drastic reduction in budget, as effectively some external providers compete with internal IT to deliver services to the business — often at lower prices. IDC believes that a quick dismissal of the potential of cloud services does not serve anyone well.

IDC research (European Storage Survey) shows that around 40% of companies with more than 50 employees were making use of at least one public cloud service as of March 2011, with interest equally divided between SaaS, IaaS, and PaaS. At the same time, only 7% of companies believed public cloud services to be of strategic importance in 2011, with 27% believing that they will become strategically important by 2013.

The reality is that the most successful teams have already started looking into what cloud service providers (CSPs) can deliver, and how they can reap benefits from it, be it for quick on the fly server capacity for peak demand or for non-mission–critical workloads delivered in a software-as-a-service model. In the *Datacenter Optimization Survey*, 26% of the best performers had already started either evaluation or actual usage of cloud services, versus 14% among inefficient companies.

When looking at the primary benefits that cloud has enabled, there are three key areas: faster deployment of applications (at least 2x faster), reduced cost (average of 20%), and reduced downtime (10%–80%).

IDC believes that a moderate and above all regimented use of cloud services can help improve overall datacenter performance, particularly as far as time to market is

concerned. Operating costs can also be positively impacted, as companies with more experience in cloud environments stated that they saw a reduction in operating costs of around 20% on average, with some stating they saved even more. While CSPs won't be able to deliver on mission-critical workloads for some time, being aware of their best practices and considering the impact they might have on future strategy choices is indeed a very savvy thing to do.

Alongside evaluation processes, IDC recommends that organizations classify their workloads and link them to clearly stated service levels agreements before planning what to do with them. Key among SLAs will be the definition of security levels — depending on such a matrix, CSPs can be benchmarked more easily and decisions can be taken regarding cloud deployment timeframes.

CONCLUSION

Over recent years, marked by economic uncertainty, elements of disruption have forced CIOs and datacenter managers to transform their backend infrastructures to support businesses through the extreme swings in market conditions that we have experienced.

IDC believes that, in order to step up to the task, IT departments need to evolve their practices and move toward flexible datacenter environments.

In the course of this research, IDC identified four maturity stages for datacenter management practices. By comparing the most successful datacenter teams with their peers, it is apparent that one of the main issues organizations run into is conservativeness and the decision to stick to rigid budgets, even if this comes at a cost of missed KPIs in areas such as user satisfaction and time to market. IDC believes that only the small portion of IT departments succeeding on the full KPI stack is effectively delivering added value to companies, while the rest too often act as a cost centre.

Key lessons learnt are:

- IT services can be delivered in a number of ways, including on-premises datacenter deployments, outsourcing contracts, and off-premises cloud usage. In order to build a more dynamic infrastructure, companies need to orchestrate various technology pieces to make them work as a whole.

- Virtualization is a cornerstone of datacenters today, and can help companies save between 10% and 25% on staff costs per server. However, both a solid storage foundation and robust administration tools are needed to reach these targets.

- Orchestration is necessary for virtualization to produce benefits. Successful organizations combining virtualization with hardware management and automation solutions were able to reach higher virtualization rates (up to 50% versus an average of 30%) and subsequently improve their application deployment time by 40%.

- Storage skills and modern storage practices (setup of tiered storage environments, unified storage tools, automated backup, etc.) can help to considerably improve time to market, as well as minimize issues in virtualized environments. IDC discovered a strong link between overall datacenter

performance and awareness around storage issues. IDC estimates that a modern storage backend can reduce waiting times by up to 20% depending on the application. I/O-intensive data warehouse workloads can see improvements in the 30% range.

IDC advises companies to assess their datacenter maturity level and take clear actions to address each issue in the correct order of priority for their business. This will lay a solid foundation for building cloud-like datacenter environments that deliver substantial TCO reduction and free up resources for innovation.