

Fujitsu Storage ETERNUS NU200

This white paper provides an overview of the new and unique Fujitsu Storage ETERNUS NU200.

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Introduction

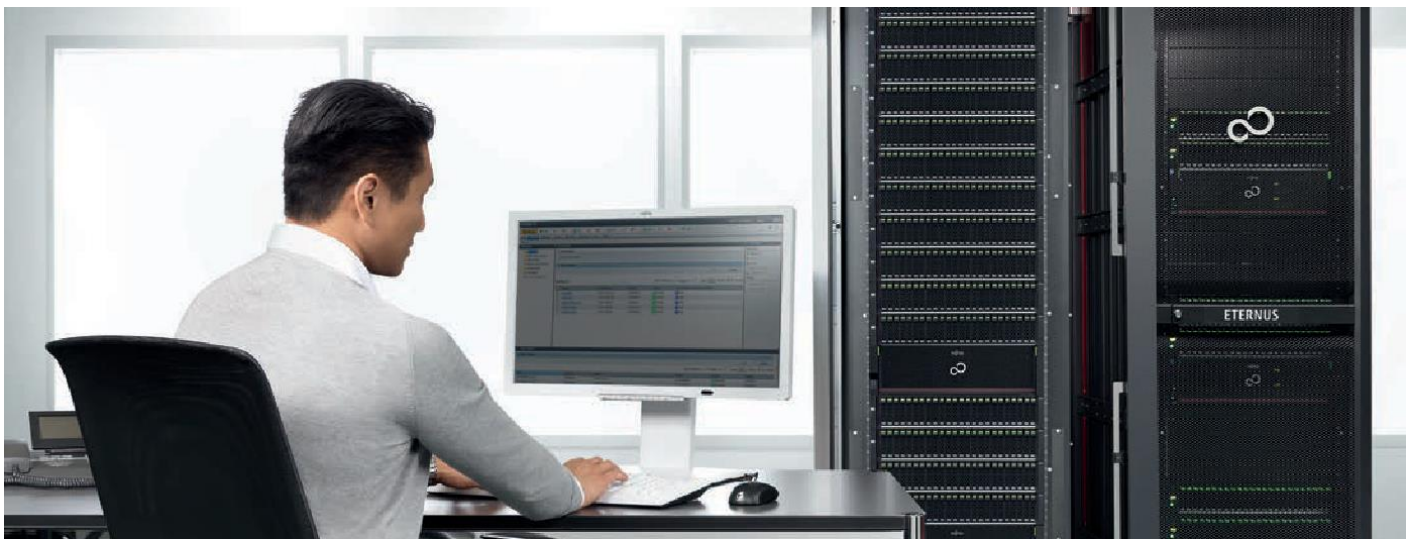
As data is the most important asset in any company, storage system plays a vital role in the IT infrastructure of every enterprise. IT administrators need to ensure that data is stored on reliable, highly available platforms that can scale efficiently in order to handle ongoing business changes.

New IT trends are also imposing new challenges on storage systems. The increasing use of business analytics and data warehousing, the hype around big data, server, and desktop virtualization, the enormous growth of unstructured data are just a few of the examples. To be successful in the data-driven business, the limits of today's infrastructures must be overcome.

Fujitsu ETERNUS NU200, the brand new service-defined platform is based on proven Fujitsu ETERNUS hardware. It features a completely redesigned storage engine with a cacheless architecture for lowest latencies and a new user interface for higher productivity in data management. ETERNUS NU200 is the one storage stack that covers Block, File, and Object – All in One.

The QoS of block, file and unstructured data can be controlled at volume level to meet individual requirements for performance, capacity, availability and protection of the data. Automatic, optimal data placement on mixed media also ensures that the fulfillment of specific SLAs goes hand in hand with maximum cost effectiveness.

Also on board is a complete set of advanced tools to meet the ever-increasing demands of data resilience. This allows to simplify backup and DR processes with ETERNUS NU200 and ensure effective protection against ransomware attacks.



Hardware Architecture

A completely new approach to storage is here – with ETERNUS NU200. Fujitsu’s brand-new product offers scalability, flexibility, and performance. The system can be a 2.5” or 3.5” form factor within 2U of space, plus expansion enclosures with the same sizes. There is a 12Gb/s SAS backend disk interface with expansion options connected through mini-SAS HD cable utilizing 4 lanes, 12Gb/s speed each – resulting in an aggregated data rate of 48Gb/s.

NU200 works in an Active/Active way with two nodes running data services all the time. When one of the nodes goes down, the other one takes over his logical resources and continues serving data without any interruption. Every hardware component within the system is redundant leaving no SPOF in the solution.



Benefits

- Supports both 2.5” and 3.5” form factors within 2U of space
- Expansion enclosures available for increased storage
- High-speed 12Gb/s SAS backend disk interface
- Active/Active operation ensures continuous data service
- Redundant HW components eliminate single points of failure

Interfaces

ETERNUS NU200 offers various network interface types and speeds. Depending on the use case customer can select either fiber channel or ethernet-based NICs. The most versatile option – ethernet interfaces can provide connectivity for block, file, or object storage whereas fiber is reserved for block storage only. Interface speeds are 10GbE and 25GbE for the ethernet or 16Gb for FC.

In addition to the above, ethernet interfaces support NVMe over Fabrics with RoCE (Remote Direct Memory Access over Converged Ethernet) or TCP as a basis.

Storage Media

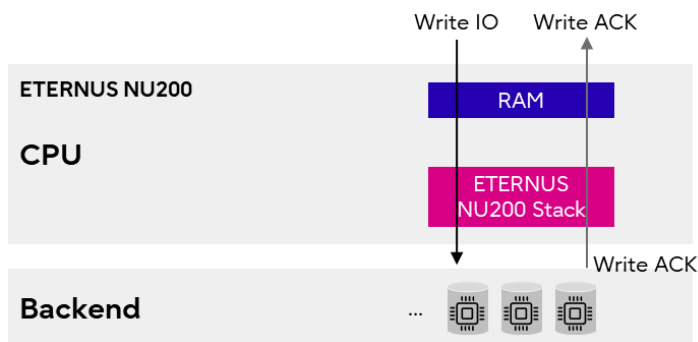
The most important element of each storage system is the media to store the data. In ETERNUS NU200 supported media types are SSDs and NL-SAS HDDs. Both are supported in two form factors – 2.5” and 3.5” to fit into base units or expansion enclosure options. Due to the characteristics of the system, NU200 supports two types of flash media – 1DWPD and 3DWPD. The first is a read-intensive SSD that can be used either by the upper tier for environments with fewer requirements for write IOs or in combination with the second type – mixed-use SSD – as a lower tier. The best performance can be achieved using mixed-use SSDs due to their specification.

The last type – NL-SAS HDD – is the best choice for cheap and high-capacity storage space for backups and archives. Storage media sizes vary starting with 1.6TB and going up to 15.36TB.

Direct Write

ETERNUS NU200 makes complete data management easy. It works in a cache-less architecture which means that there is no data written to or held by the cache. This is not only to avoid additional hardware components that increase expenses but also to simplify the architecture of the software.

In the new approach each block written from the host is sent directly to disks inside of the ETERNUS NU and write acknowledgement is sent back from there. The cache does not hold any data so there is no need to mirror it between both nodes of the system. In the event of a failure, there is no stress that some data from the cache has not been saved to the persistent storage media because everything is already on disks.



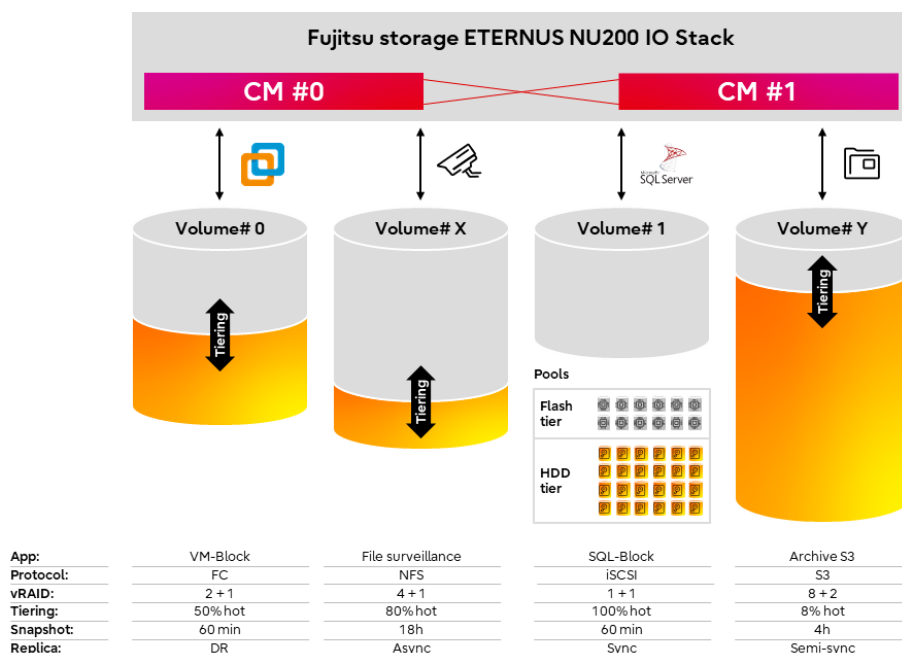
Virtual Storage Containers

Virtual Storage Container (VSC) technology provides a logical space for storage resources orchestration and configuration. By using the VSC concept it is possible to easily create namespaces for volumes, hosts, data protection policies, shares, and object stores. This namespace within the system is called an Application.

Utilizing such an approach enables IT teams to visualize better and understand the role of a particular entity created within the system. This leads to faster, easier, and more convenient administration of the system making it a perfect fit for small to mid-size environments without an IT staff specialized in storage systems administration.

The Applications can coexist next to each other supporting different workloads, host connectivity, and performance requirements with no compromise. They can be completely independent of each other or share existing storage underneath.

It is also possible to prepare templates for applications used in customers' environments and deploy namespaces that are ready to go with just one click.

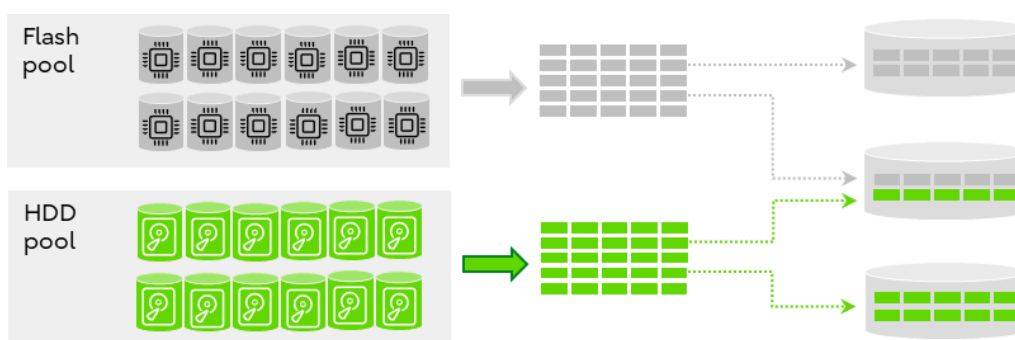


vRAID

vRAID technology is the next step in the way how the data is saved on flash or spinning disks. Unlike most traditional storage systems, ETERNUS NU200 does not use RAID but Erasure Coding. Thanks to this enhancement the system is a resilient storage platform that is protecting the real value of each organization – data, not disks.

vRAID, compared to traditional RAID offers unmatched data availability options combined with astonishingly rapid data rebuilds. From the technical side, vRAID works on a pool defined with storage media, like Flash or HDD. The pool uses the whole capacity of the disks and the more media inside the better for performance and rebuild times. Erasure coding works on data fragments that in NU200 are called “N” and “K”. The value of “N” defines how many data blocks will be used to write the data and “K” stands for parity blocks used to protect production data and ensure there are blocks to rebuild the data from in a disk failure scenario.

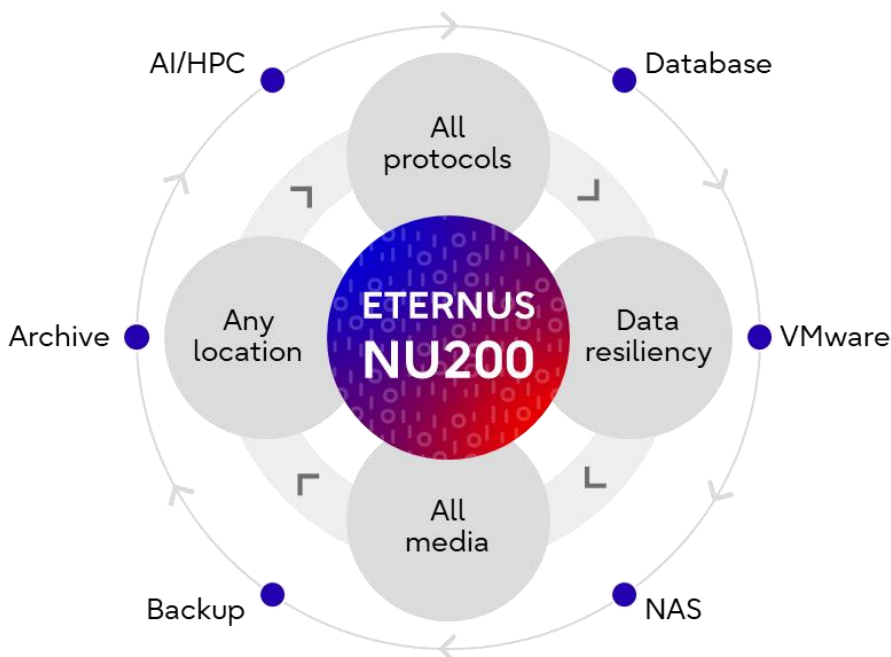
N+K settings are set on a volume level which means we can select different layouts for every volume in a pool and the data will be distributed across disks participating in a pool. vRAID layout settings have a direct influence on performance and capacity usage as they define how the data should be spread and how big the data chunks are.



Multi-protocol Approach

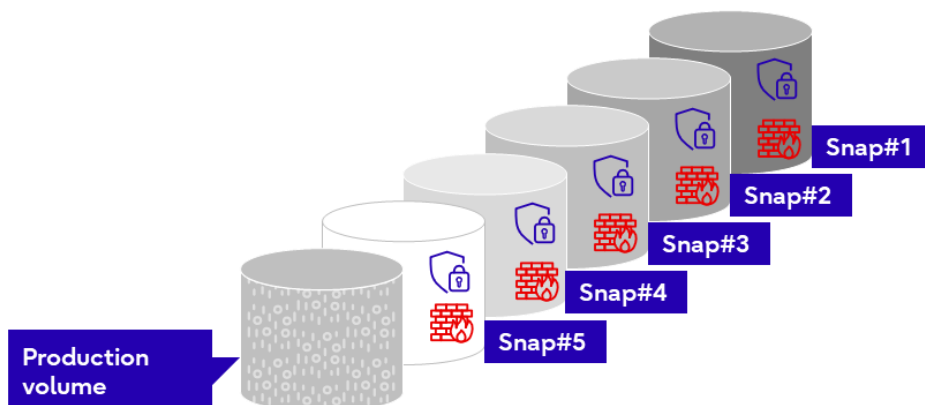
ETERNUS NU200 is an all-in-one product, offering a truly unified storage ecosystem within just 2U of the rack space. ETERNUS NU200 offers block, file, and object storage from the same box without additional gateways. All storage protocols are native without any layer of abstraction which eliminates unnecessary bottlenecks when talking about the performance. Except for the multi-protocol support, there is also a rich subset of features that all together provide a stable, fast, and secure system.

Thanks to the software architecture it is possible to simultaneously provide each storage type to business applications via different interface types or protocols. It means that it is possible to use ethernet interfaces with block, file, and object all at the same time for different or the same hosts.



Immutable Snapshots

To enhance and strengthen the data protection the ETERNUS NU200 offers immutable snapshots that are locked straight from the beginning and cannot be modified. The internal mechanism is based on the Redirect-on-Write algorithm that lowers the performance impact during snapshot existence. Because snapshots consume less space than full copies and are instant it makes them a perfect fit for development and maintenance windows. One of the features involving snapshots is recreating a specific volume state from the past to a completely new volume.



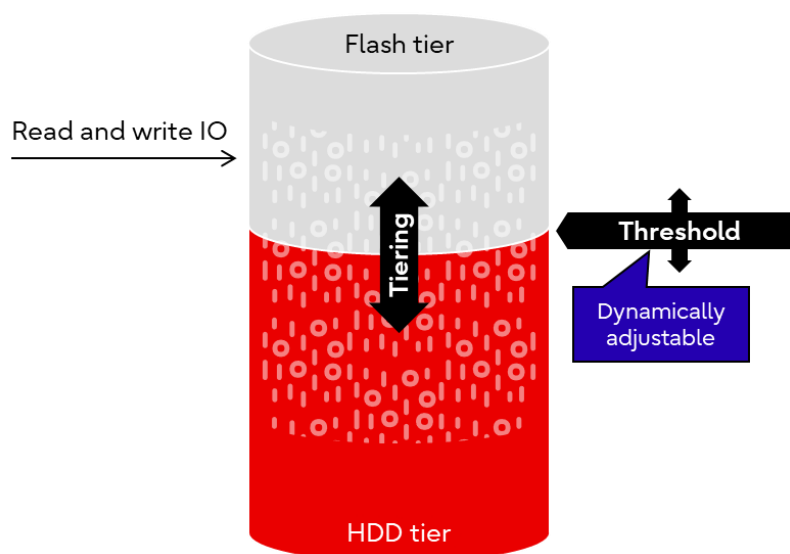
Auto Storage Tiering

Optimal data placement is a key in modern data centers; therefore, ETERNUS NU200 introduces a dynamic auto-tiering feature. Most environments frequently access only a small part of the data, so it is crucial to put it in the fastest tier consisting of flash media providing the best response time. On the other hand, after the data gets colder and is not accessed by the clients anymore it can be moved to slower media where it remains until it is required again to move to the higher tier.

Auto-tiering available in the ETERNUS NU200 meets those requirements by automatically placing the data in the right tier. In the initial phase after the write request comes from the host, the data block is placed in the upper tier. Using the Least Recently Used (LRU) algorithm the system decides if the block should stay in place or should be moved to the lower tier.

If data is moved to the lower tier and after some time read request arrives it is brought back to the flash tier and read by the host.

The data movement between tiers is based on dynamic thresholds which define when the system should start data reallocation. Two threshold values define when the system should start moving data between different media. The first "Lower threshold" describes when the system should start data reallocation and the second value "Evacuation threshold" defines the upper limit for the tier usage and when it is reached, the system aggressively evacuates the data to the lower tier.



Properly tuned volumes, movement can happen @ 4GB – 8GB/sec, 30TB/hr. or ~700TB/day

Data Security

Firmware encryption

ETERNUS NU200 supports firmware-based encryption which allows to use of advanced ciphers to encrypt end-user data. Everything is handled by the software and there is no need for additional hardware components or self-encrypting drives.

Self-encrypting drives (SED)

As an alternative to firmware encryption, NU200 also supports SEDs which can be used for data-at-rest encryption. In this approach, data is encrypted by disks using built-in chips and a special hexadecimal key that is used to unlock the data. Both, SSD and HDD disks are FIPS compliant with AES-256 encryption standard.

Multi-Factor Authentication

With ETERNUS NU200 it is now possible to authenticate users not only with username and password but also by a special token. Organizations with NU200 can benefit from an additional layer of security when managing their system by enabling MFA on specific user accounts. Storage admin can strengthen his system security with a six-digit token sent via email to his mailbox. It is an optional feature so not every account has to have it enabled but it is recommended, to avoid data compromise.

Immutability

Data immutability is enabled by default on every snapshot in the system. There is no way to modify its content but because it is treated as any other volume it can be mapped to the business server to read the data from it.

Role-based access control

There are multiple roles defined in the system that can be assigned to the new user account. It limits the risk of data compromise or unwanted and unexpected system outages that could lead to downtime and business impact.

Action policy

Another security feature offered by NU200 is policy-based action control. By defining type of the action, for example, volume deletion it is possible to select users who need to agree before the volume is deleted. Thanks to this feature organizations can avoid data loss or unwanted configuration changes as this feature is not only limited to mentioned volume deletion.

Anomaly detection

ETERNUS NU200 offers intelligent data monitoring and if there is an unusual workload detected the system notifies admins about the increased data change ratio. With this feature, admins can detect ransomware attacks in an early phase and prevent them before it is too late.

High availability, mirroring, and DR

To comply with regulations, internal policies, and availability standards ETERNUS NU200 can act as a standalone, DR, or high-availability system. ETERNUS NU200 supports three types of replication – synchronous, asynchronous, and semi-synchronous. For the most demanding use cases with the lowest RPO and RTO, there is a high-availability solution – Dual HA.

Synchronous replication

Synchronous replication ensures real-time data consistency. It synchronously mirrors data writes from a primary NU200 to a secondary one, maintaining identical copies. The write acknowledgment is always sent from the primary system to the host after the write is completed in both sites.

Asynchronous replication

Asynchronous replication involves copying data from a primary NU200 to a secondary one with a delay. Unlike synchronous replication, it doesn't require real-time consistency, allowing replication intervals. The write acknowledgment comes right after the data is written in the primary system.

Semi-synchronous replication

Semi-synchronous replication is a combination of two previous types. In a perfect world, the data link between two data centers is stable and fast. Unfortunately, this is not the case for every situation. Therefore, NU200 allows to set up the replication session where it is always a priority to synchronously mirror the data between the two sites, and whenever the link is not stable or performant enough it switches to asynchronous. After the connection between two locations recovers to the optimal state ETERNUS NU200 fails back to synchronous replication automatically.

Dual HA (future option)

High availability and continuous data access between the two systems are possible thanks to the Dual HA feature of the NU200. The core functionality underneath is a synchronous replication between two systems. In combination with a witness service that monitors the active and alive system, it is possible to set up the solution with non-stop data access. In a normal situation, the business server writes and reads from a primary NU200 however, in case of a system failure witness service detects this event and automatically switches the host workload to the neighbor in a replication pair without downtime. After the primary system is brought back to life it is possible to fail back and resume operations with zero downtime.

Management

Contemporary storage systems necessitate various management interfaces for adaptability, ease of access, and automation. Fujitsu comprehends this requirement hence, ETERNUS NU200 supports the most wanted and preferable by admins management protocols.

ETERNUS NU200 web GUI

ETERNUS NU200 web GUI provides an easy-to-understand visual management system for users who need a nice presentation and comprehensive system overview via a single pane of glass management interface. It also provides a way to manage more than just one system using the same interface. Web GUI offers some cool features such as sandbox mode where admins can have a dry run, on a given operation but what's even better, the other functionality in the GUI is the possibility to show exact CLI or Rest API syntax to perform a specific operation. With those two features in hand system admins can quickly prepare scripts without any errors or typos in their code.

ETERNUS NU200 CLI

The CLI offers enhanced control and scripting abilities that are favored by administrators. ETERNUS NU200 CLI provides advanced control over the system, allowing administrators to execute complex tasks that may not be possible through a graphical user interface. It supports scripting capabilities, enabling administrators to automate repetitive tasks, thereby increasing efficiency. It is also beneficial in environments where a graphical user interface is not available.

ETERNUS NU200 Rest API

Rest API enables seamless integration with other systems and automation tools, which is crucial in today's interconnected tech environment. This allows for programmable management of the ETERNUS NU200, enhancing scalability and efficiency. It also enables developers to manipulate and control resources programmatically, which can lead to more customized and optimized solutions. Using a REST API can help in maintaining consistent and stateless communication between client and server, which is beneficial for distributed systems.

Summary and Conclusion

ETERNUS NU200 is the one storage stack that covers all requirements: Block, File and Object. It is the best choice for applications where data organization, performance and ease of access are paramount. This new storage platform is the perfect choice for customers looking for a flexible storage solution that adapts according to their business changes. Built on powerful performance hardware architecture it ensures efficient storage consolidation while providing flexibility to respond to changing business requirements.

Benefits

- One easily scalable solution for all
- Cutting-edge architecture and highly efficient hardware
- Simple management of data protection, high availability, backup and archiving as well as disaster recovery

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