University Medical Center Hamburg-Eppendorf (UKE)

MORE FLEXIBILITY AND IT BUDGET THANKS TO SOFTWARE-DEFINED INTELLIGENCE

REPLACEMENT OF PROPRIETARY ARCHIVE ENSURES COST REDUCTIONS AND FUTURE SECURITY

„With iTernity iCAS and the Ceph cluster, we were able to cut our storage and archive costs in half. Today, we can shape the development of the hospital much more flexibly."

Erich Noll | Head of Data Center at the University Medical Center Hamburg-Eppendorf

UNIVERSITY MEDICAL CENTER HAMBURG-EPPENDORF (UKE)

Industry:
Healthcare

Background:
Due to the discontinuation (end-of-life) of the existing proprietary archiving system, the UKE was looking for a new solution. At the same time, the storage infrastructure was to be optimized in terms of costs and flexibility.

Challenge:

- End-of-life of the archive system in use
- Connection of applications/systems not always possible due to proprietary API
- High storage costs and limited flexibility
- Future-proofing and efficiency of the overall solution

Solutions:
iTernity iCAS
Ceph cluster

Image page 1: Campus Research of the UKE. Image page 2: Main building of the UKE (Source: University Medical Center Hamburg-Eppendorf, UKE)

The UKE is considered a European pioneer in the digitalization and introduction of electronic patient files. The hospital has been working paperless since 2011 and is consistently optimizing its IT infrastructure.

THE SUCCESS AT A GLANCE

- Move toward a software-based infrastructure for more flexibility in storage selection and connectivity of clinical applications
- Reduction of archive and storage costs by half compared to the replaced proprietary archive system
- Audit-proof archive with WORM storage, retention management, and self-healing for long-term protection of availability and data integrity
- Future-proof, universal storage and archive solution without hardware dependency or proprietary APIs

DIGITAL PIONEER

Is digital the new normal in clinics and hospitals? In Germany, the picture of digitalization in the health-care sector is rather mixed. The University Medical Center Hamburg-Eppendorf (UKE) is certainly one of the pioneers. This is due not least to the early and consistent implementation of the digital patient file and the hospital's networked approach.

The UKE's motto „Knowledge - Research - Healing through Networked Competence" is also driven by the hospital's IT department. More than 170 IT employees ensure smooth IT operations for half a million patients annually and for the various departments such as neurosciences, cardiovascular research, health services research, and oncology.

A central factor and success driver for this is the hospital's storage infrastructure. In the area „Data Center" the requirements of the departments, the applications used, and long-term demand planning all come together. The aim is to cope with rapid data growth, reduce storage costs, meet a wide range of user requirements, and store data securely for the long term. In order to master these diverse challenges in the future, the UKE has opted for a software-based solution approach and launched a project to replace the proprietary archive and storage system.

Image page 3: Doctors in the operating room of the university hospital (Source: University Medical Center Hamburg-Eppendorf, UKE)

END-OF-LIFE AND RESTART

Proprietary storage and archiving systems present IT departments with various challenges. They create dependencies on hardware and interfaces, regularly lead to time consuming data migrations, and thus cause high effort and costs in the long term.

The UKE also relied on a proprietary system for long-term archiving. However, the end-of-life of this system was approaching, which means that the solution is no longer produced or supported by the manufacturer and must be replaced. The UKE used this situation as a starting point for making the IT infrastructure and the archiving solution more flexible, as Erich Noll, Head of Data Center at the UKE, recalls:

> *„Our archive system had to be replaced because further development was discontinued. However, this gave us the opportunity to look for a more flexible and cost-effective solution and to optimize the infrastructure in the same step."*

THE INITIAL SITUATION

The University Medical Center Hamburg-Eppendorf (UKE) tackled digitalization at an early stage and thus occupied a pioneering role in Europe. Since 2008, the hospital has been using a PACS (Picture Archiving and Communication System) to process and store images from imaging procedures, such as radiology and nuclear medicine.

This was followed in 2011 by the introduction of the digital patient record for a paperless daily clinical practice. The UKE was the first European hospital to achieve the highest level of the EMRAM model (Electronic Medical Record Adoption Model) defined by the non-profit organization HIMSS, making it the first certified, fully-digitalized hospital in Europe.

The PACS for radiology and the digital patient file were thus established components at the start of the project; they were supplemented by other applications, such as a solution for image and findings documentation in gynecology. The focus of the optimization was primarily on the IT infrastructure and archive intelligence, as Erich Noll summarizes:

> *„Our objective for replacing the existing archive system included four building blocks: meeting regulatory requirements, implementing all requirements from the business departments, reducing storage costs, and finally making the storage infrastructure more flexible."*

THE REQUIREMENTS

How can these goals be implemented in an optimal and future-proof way? This question was at the center of the selection process and discussions with various manufacturers and partners. As Erich Noll explains, the IT department at the UKE quickly decided on the solution it wanted:

> *„After extensive research, we publicly tendered the joint solution of iTernity iCAS and a Ceph cluster. iCAS as flexible software for audit-proof archiving and the Ceph cluster as software-defined storage for efficient and scalable data storage."*

In detail, the storage and archiving solution should cover the following requirements and fulfill them in the long term:

INFRASTRUCTURE REQUIREMENTS

- Addition of cost-effective object storage to the existing storage classes (SAN, file server)
- Linux operating system
- Easy scalability and expandability
- Redundant data storage

REQUIREMENTS FOR THE ARCHIVE SYSTEM

- Audit-proof storage of patient data to meet regulatory requirements
- Flexible connection of various applications, such as PACS, document management system, and other systems in the future
- Flexible connection of cost-effective storage solutions
- Independence from proprietary interfaces and from storage hardware

The decision to use iTernity iCAS in conjunction with a Ceph cluster was also based on the fact that both solutions are software based. The advantage of a software-defined approach (software-defined storage/archive) is flexibility and the associated efficiency. With software-based solutions, the intelligence for data storage and archiving is separated from the physical hardware. No proprietary hardware components are required, so standard hardware and open interfaces can be used. Erich Noll emphasizes:

> *„Due to the proprietary API of the existing archive system, connecting individual applications was problematic and we had to use expensive special hardware. For the future, we were looking for a universal solution, which is more open, flexible, and cheaper in the long run.“*

THE SOLUTION

How does the overall solution of long-term archive and cost-effective storage infrastructure fit together, and what changes does this result in for the university hospital?

The Ceph cluster provides the backend for the archive system: a highly scalable object storage cluster based on standard hardware on which all data is stored redundantly.

OBJECT STORAGE

Object Storage can be compared to a parking service. The customer hands in their vehicle and receives a receipt. They do not know where their car is parked and how often it is moved.

Objects are stored in a single location and assigned a unique identifier rather than organized in a hierarchy.

iCAS sits on top of the storage infrastructure as a software layer and provides the archive intelligence with various functionalities: WORM storage (Write Once Read Many), retention management, encryption, and automatic data integrity checks form the core of the middleware. The iCAS server is operated virtually, with data stored on Tier 1 (local storage) and Tier 2 (object storage via S3 interface).

The applications, such as the PACS, are connected via CIFS/SMB, NFS, or S3 and can be flexibly expanded. This openness enables easy integration of existing and future applications. iCAS is also multi-client capable, meaning that several repositories can be set up, which are logically separated from one another within an installation, for example by department or application.

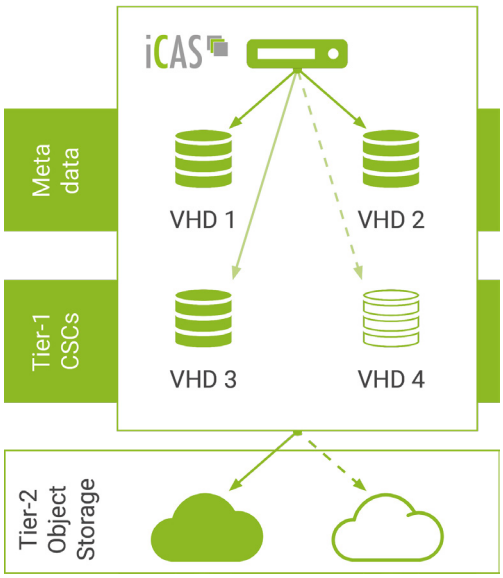


Figure: Object Storage Architecture with iCAS (Source: iTernity)

The data is written from the applications to the local Tier 1 of iCAS and then via S3 interface to Tier 2. iCAS combines the metadata, such as the retention period and the hash ID, with the archived objects in so-called content storage containers (CSCs). The CSCs are self-supporting archive objects that can be easily migrated to future storage infrastructures without loss.

Since the data is mirrored on the Ceph cluster, the data can be deleted from Tier 1 after a defined time to free up the capacities of the local storage. Thanks to Tier 2 write failover, it is also possible to archive data if access to one of the configured Tier 2 targets is not possible.

After writing, the archive data can no longer be changed, manipulated, or deleted, but only read (WORM storage). For reading, the files are loaded from the object storage into the cache, which increases the access performance.

The UKE also relies on the proven self-healing functionality of iCAS. In this process, the archive data is replicated and its integrity is continuously checked. Damaged objects are automatically identified and exchanged with the „healthy objects“ from the replicated storage.

The introduction and commissioning of iCAS went quickly and smoothly, as Erich Noll recalls:

> *„We were able to meet all our requirements with iCAS and our CEPH cluster right away. The solution runs absolutely smoothly and gives us a tremendous amount of flexibility and security.“*

RESULT AND OUTLOOK

> *„With iTernity iCAS and the Ceph cluster, we were able to cut our storage and archive costs in half. Today, we can shape the development of the hospital much more flexibly."*

The impact of the project goes beyond the continuation of an audit-proof archive and the fulfillment of regulatory requirements. The following results were achieved through the use of iTernity iCAS and the Ceph cluster:

- Significant increase in archive and storage efficiency
- Flexibility thanks to the software-defined approach and the breaking of dependencies on hardware and proprietary interfaces
- Universal connection of any type of storage to the archive
- Simple integration of existing and future applications thanks to open interfaces

Erich Noll, Head of Data Center at UKE, adds:

> *„We have gained significant security for the future and can implement IT requirements much more easily with iCAS and the Ceph cluster."*

The IT managers at the UKE are well aware that requirements are tending to become larger and more complex - increasing data volumes, the connection of new applications, the rapid technological progress of storage solutions, and stricter specifications for data storage are just a few examples. Another focus for the next few years will be the reorganization of the scientific area, where large volumes of research and raw data are generated that need to be stored efficiently. However, the UKE believes it is prepared for these trends and developments:

> *„We have the latest equipment and technology in place today and are very well positioned for the future. New requirements can be flexibly implemented with our IT infrastructure. "*

DATA ARCHIVING MADE SIMPLE

iCAS is a flexible middleware for retention management & WORM storage. The solution integrates perfectly into existing infrastructure landscapes. While you take care of your core business, iCAS reliably protects the integrity and availability of your data in the background.

HARDWARE INDEPENDENT

The archive intelligence is tied to the software-layer, not to the hardware

COMPLIANT

iCAS assures regulatory and compliance requirements

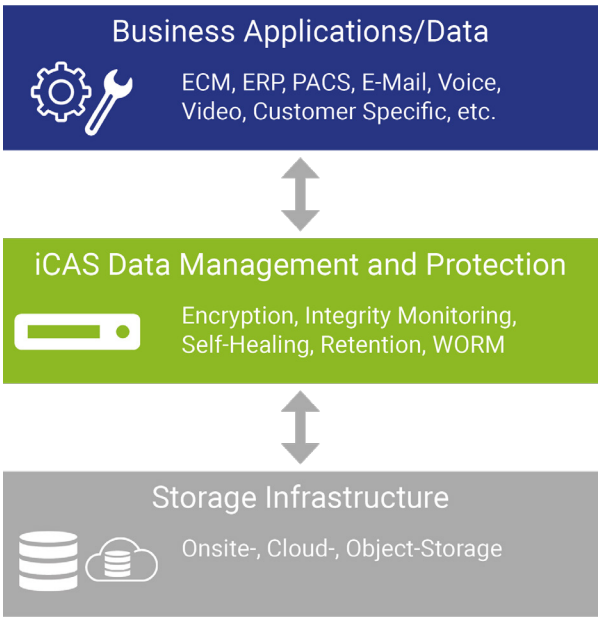
FLEXIBLE

Middleware between your business application and the storage infrastructure

TAMPER-PROOF

iCAS provides WORM storage, encryption and retention management

THE CENTRAL PLATFORM FOR YOUR DATA MANAGEMENT



iCAS protects data integrity and availability, even if the underlying storage technology and hardware changes in the future. As a software-defined solution, iCAS lays the foundation for audit-proof data archiving and protects your investments in hardware, software and services.

iCAS adapts to your IT infrastructure and adds compliance, data integrity protection and WORM storage (Write Once Read Many) to your existing systems.

iTernity

WE TAKE YOUR DATA SECURELY INTO THE FUTURE

We protect your business-critical data. The trust you place in us is our motivation and an investment in the future. The result: more security, less effort, no worries.

Our DNA is archiving, our mission the long-term availability and integrity of all types of corporate data. Our focus is on your challenges, whether data protection, cost pressure, data growth, cyber attacks, lack of time, or complexity –
we take your data securely into the future.

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