open-e

Case Study Open-E NAS

Klinikum Oldenburg gGmbH

Open-E NAS modules at the Klinikum Oldenburg (Oldenburg Hospital, Germany) provide a cost-efficient and future-proof solution to handling the problem of mass storage created by electronic patient records. The modules reliably put the hospital's 800 gigabyte dataset and 20 gigabytes of new data created each month online.

Replacing Three Miles of Paper…

Until 2000, patient administration at the Klinikum Oldenburg was run the same way as anywhere else. All the patient data - be it findings (with or without images), treatment and meeting protocols or surgery reports - landed between the covers of traditional patient files. The hospital thus amassed three miles of cardboard and paper over the years, all of which had to be stored and indexed in an air-conditioned central archive - an undertaking that took up a lot of space and money.

The main problem - besides costs - lay in the inadequate availability of paper-based patient information, as a paper record can only ever be in one place at a time. As long as the attending doctor needed the record on his or her rounds, administration had no access to it. And if the record was in the gastroenterological or cardiology department, this meant the radiology department could not add any findings to the file - and consequently could not produce any.

As a consequence, the task of transporting patient files from department to department slowly grew into a logistical nightmare. And because it has its own cardiology center, the Oldenburg health center is anything but small! With 740 beds and 32.000 inpatient cases annually, its capacity rivals that of most university hospitals in Germany.

It fits into the primary IDE port and replaces the operating system and NAS server: the NAS module from Open-E.

... The Electronic Patient Record Online

When it comes to data management, however, the Klinikum Oldenburg is way ahead of many a university hospital in terms of its modernity and efficiency. The reason for this is that the hospital administration decided to bring the constantly growing mountain of paper under control by commissioning the computer center, shortly before the turn of the millennium, to set up an online information system. The center - still affectionately known by the somewhat archaic title "*EDP*" - was asked to provide a system that would manage without creating paper files in the long run and help to gradually reduce the high-maintenance stock of patient records.

As a result, Ralf Cordoni, Head of IT Systems Maintenance, designed an online information system intended to combat the existing paper mountains, avoid creating new ones and also offer the certainty that it could satisfy any legal requirements placed on electronic patient records at any time. The latter point is important because the clinical world is in agreement that such requirements will come. After all, legislators have to find some way of curbing the costs of health care. And as is the case for taxation, the electronic capture, processing and storage of patient data is deemed to be an appropriate means to do this. *"We are too far removed from politics to be able to say with any certainty when electronic patient records will become a requirement,"* says Cordoni with a smile, as he is convinced there is no way round this change. *"But we are unperturbed, because we are already using electronic records - quickly, cheaply and reliably."*

Ralf Cordoni in front of the heart of the IT department at the Oldenburg Municipal Clinics, where two Open-E NAS modules hold all the patient records online.

Open-E NAS: Wise Alternatives

Under Cordoni's direction, the IT department at the Klinikum Oldenburg converted to an information system, which provides access to patient data online, on January 1, 2004. Patient data is captured and delivered using medico//s, a hospital information system (HIS) developed by Siemens Medical Solutions. This solution is a professional Oracle database application, which gives attending doctors online access to electronic patient data at the touch of button or click of the mouse. The data itself comes from an NAS (Network Attached Storage) system - a fixed-disk storage system coupled to the database computer via a network. A version 2.0 Open-E NAS module economically and reliably manages and controls the mass storage system, which consists of a Redundant Array of Inexpensive Disks (RAID).

The Oldenburg staff had Hamburg-based IT service provider IOS gradually digitalize all the paper-based records in the inventory dating from January 1, 2000, transfer the data to DVD and shred the paper. This is an ongoing task because non-digital data is still produced in day-to-day business, be it cardiograms from a plotter, ultrasounds of unborn babies or patient record sheets from the mobile services.

Using one Open-E NAS 2.0, the NAS01 storage array in the middle of the 19-inch rack makes all the patient records available to the hospital information system online via Gigabit Ethernet.

Four DVDs with a total data volume of 15 GB held in 18.000 files are created month in, month out. And if we add the 5 GB from the online system, this means the storage system has to digest an additional 20 GBs every month.

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- To find a cost-effective solution for storing these data quantities, the IT department at the Klinikum Oldenburg had been on the look out from an early stage for an external storage system that could be networked with the HIS. And this is how they came across Open-E, rather by chance, whose Open-E NAS solution exactly matched acting IT Manager Cordoni's requirements on paper: *"We were already involved in the final beta phase, when the product was still called Ancom."*

- The cooperation with Open-E from this early stage was so positive that the computer center purchased two version 2.0 Open-E NAS modules in 2003 in order to construct two, mutually redundant storage subsystems for the HIS.

- A 19-inch chassis serves as the platform for each of the storage arrays together with, what Cordoni describes as, *"slightly better power supplies,"* a modern motherboard for an Intel Celeron processor with 2.0 GHz, equipped with 256 MB RAM, Gigabit Ethernet network connection and an 8000 series RAID 5 controller from 3Ware.

- Six 300 GB (Maxtor 5A300J0) hard disks are connected to this RAID controller, one of which is available as a hot spare in case one of the five drives in the RAID farm should fail. There is no need for system disk drives - such as CD-ROM or floppy drives - as the operating system is contained on the Open-E NAS module. Even the DVD drive for setting up the operation of the NAS is obsolete; the Klinikum Oldenburg only uses it for transferring digitalized patient files.

The Klinikum Oldenburg saves the data from the NAS01 storage array online onto the second storage array, which also controls an Open-E NAS 2.0, using Gigabit Ethernet.

1.5 Terabytes of Data Storage for Just € 2.500

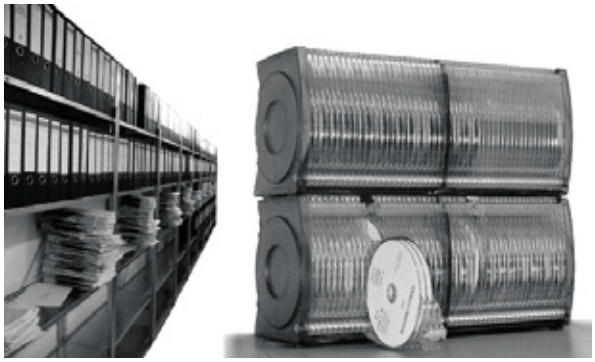
In just a few steps, Open-E turns a storage array into a powerful, easy-to-maintain NAS appliance that does not need any system drives: The flash module holds the NAS server and operating system.

- *"Compared to the Open-E solution, complete NAS systems are umpteen times more expensive,"* offers Cordoni for consideration. He says the costs of a Microsoft server operating system alone, and be that "only" the Storage Server 2003, and the necessary system hard disks this requires, considerably exceed the price it costs to buy the Open-E NAS module. And for reasons of security and availability, Cordoni says he would always include two mutually redundant data stores in his systems, which means even more costs.

- Cordoni also sees further potential for savings in the data delivery. *"An Open-E is ready for operation as soon as the module is connected, and configuration via Web browser takes less than 15 minutes,"* praises the acting head of IT at the Oldenburg Klinikum. *"During operation, 600 workstations (800 users) access the NAS data via the HIS - and these people see and feel no difference to data stored locally on the respective PC."* The Open-E file servers are coupled to the hospital information system via Gigabit Ethernet using copper cable. After the archive data on the DVDs was copied onto the system and after eighteen months of continuous operation, a good half of the storage capacity is now full. *"Our NAS holds the handsome amount of 804 gigabytes of data stored in 1.2 million files or 183.000 directories,"* explains Cordoni, who, not without reason, is proud of his acquisition, which not only satisfies him in terms of the low costs, but also in terms of availability.

"The issue of data security has increased enormously," explains Cordoni. *"There are five layers of protection for all of the patient data. Two servers are currently located in different places in the building, and they mirror each other and thus always hold the same dataset."*

The Open-E NAS's snapshot capability is of benefit here, and this feature has been part of version 2.0 since the update on December 3, 2004. *"Should the system ever crash, the second server would ensure continued availability."* What Cordoni is referring to is the two NAS servers that Open-E NAS modules make available in the network.



Putting files onto data carriers - the DVD archive (shown right) contains all of the data from four years, which would have once filled dozens of shelves in its paper form.

"Even if both systems failed, the digital archive can be copied back onto the system from the backup tapes in 48 hours," says Cordoni when explaining "plan B." *"We also hold duplicate copies of the DVDs as well."* And just in case the entire building should fail to be secure enough, the hospital *"creates film versions of the data in addition to digitalizing it"* (in other words, the hospital produces microfilm copies due to issues of legal certainty).

However, the Klinikum Oldenburg has never had to use the additional backup systems since the installation of the Open-E NAS systems. *"During the course of 432 days of uptime over the 18 months since setup, we have not had a single system failure in our NAS,"* says Cordoni, confirming the reliability of the NAS solution from Open-E.

Conclusion: Open-E Delivers the Ideal NAS Solution to Satisfy Small- and Medium-Sized Enterprises' Ever Increasing Demands for Storage

After one and a half years of operation under load in what is not only a business-critical, but also a trend-setting application, Cordoni is very positive about the results. *"From my point of view, I can wholeheartedly recommend Open-E NAS for small- and medium-sized enterprises. The system is reliable, good value in terms of setup and running costs, difficult, if not impossible, to hack, and I am also pleased with the support from the manufacturer,"* praises Cordoni. *"If need be, you have a direct line to a support team, and the sales staff is professional and knows what I'm talking about."*

And should the Klinikum Oldenburg's storage requirements increase more drastically than planned, then that's no problem either: The NAS modules from Open-E can address more than one RAID controller…

With its NAS modules, Open-E delivers an ideal solution for small- and medium-sized enterprises with large storage requirements.

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