

## CentricStor at the Oberfinanzdirektion Magdeburg

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Pages 3

### Virtual Tape Technology for all System Worlds

When the Oberfinanzdirektion (higher financial directorate) of the city of Magdeburg opted for the virtual tape technology of Fujitsu Siemens Computers in 1999, it was taking a leap into the unknown simply because the prototype of today's CentricStor had just been unveiled at the CeBIT trade fair in the spring of that year. But that's way back in the past. Since then, the CentricStor storage solution has established itself as the centerpiece of backup operations at the Magdeburg fiscal authority and now brings together the tape processing activities of different operating system worlds. In addition to storing the data of z/OS and BS2000/OSD mainframes and of PRIMEPOWER servers (running Solaris), Tivoli Storage Manager is also responsible for backing up the remote, open system worlds of several of the state authorities and ministries in Sachsen-Anhalt using the Virtual Tape Appliance.

"The looming bottlenecks were already plain to see", says Peter Cordes, Systems Programming Team Leader (Mainframe Division) at the Oberfinanzdirektion (OFD) in Magdeburg. "When we extended and enhanced our procedures, the amount of data involved increased to such an extent that our existing AML/E tape library and the seven 3490 tape drives were no longer able to cope with our needs". That was in 1998.

#### Limited space prevent extension of tape storage

Simply adding to the existing 6000 cartridge slots would not have done the trick. Due to the limited space in the security cell, there was no room for further automated tape libraries. And there was also another problem. The OFD deployed two different mainframe operating systems. An IBM mainframe running z/OS was responsible for handling payrolls for state employees whereas the core taxation applications ran on two BS2000/OSD servers with a total of 12 virtual systems.

Senior management of the financial computer center was therefore forced to consider a thorough reorganization of tape processing operations. However, certain conditions had to be satisfied. The

new storage solution had to be capable of backing up the data of both mainframe worlds and also had to support different tape and robotics technologies. Thinking back, Peter Cordes notes that "solution approaches were discussed with the two manufacturers, IBM and Fujitsu Siemens Computers". The outcome of these discussions was that no IBM/VTS solution could be promised for BS2000/OSD and, at the time, there was no virtual tape system that could be attached to the existing tape library.

#### Virtual tape solution meets backup requirements

"At CeBIT 1999, Fujitsu Siemens Computers exhibited its virtual tape technology for the first time, and we saw that that was exactly what we needed", remembers Cordes. However, the system on display – the precursor of today's CentricStor – was just a prototype. In the words of the IT expert, "the concept met our technical requirements but there was no reference installation". Nevertheless, this solution was chosen. The prime reasons behind the decision were not only the unique technical concept and the performance capability of the solution but also the trust in the solution provider. "We had already

worked with Fujitsu Siemens Computers for many years and knew that they would do what they promised. We were therefore sure that the company would again deliver on their promise".

Fujitsu Siemens Computers pledged to install a production solution in Magdeburg, the state capital of Sachsen-Anhalt, by the end of 1999. "Time was running short as we had little free tape capacity". Nevertheless, the financial computer center was prepared to wait until the end of the year, even at the price of having to install an interim solution

#### Oberfinanzdirektion Magdeburg



SACHSEN-ANHALT

The higher financial directorate is subordinate for the Federal Ministry of Finance and the treasury of Saxony-Anhalt as a middle authority.



to supply the missing capacity. In fact, data had to be moved out of the tape library and stored externally to enable work to continue.

### **Oberfinanzdirektion as German pilot customer**

"It took courage to go for a completely new solution which wasn't even available as a finished system and for which no reference installation existed", says Jürgen Seewald as he looks back. He was a senior consultant at Fujitsu Siemens Computers and worked on the project from the very beginning. "The OFD Magdeburg was the first German pilot customer for our Virtual Tape Appliance. That was its name at the time; only later was it renamed to CentricStor".

The management at the financial computer center was proved right. At the end of 1999, the "front-end" was installed to establish the logical connection between the mainframes and the virtual tape drives and internal disk cache of CentricStor. "What did surprise me was that the IBM mainframe world was integrated into the overarching storage concept with no difficulty at all", states Cordes.

In February 2000, the "back-end" to connect the tape robots to CentricStor was also available – and the first CentricStor customer system in the world finally went live without further testing. "The switch to CentricStor was made over a single weekend", says Cordes. "Members of staff from the various departments of the financial computer center were joined by Fujitsu Siemens Computers

technicians on site, and developers from Munich were also at the ready to provide immediate help on technical issues". Following migration, CentricStor had to make about 15% of the data immediately available. The remaining data on the 6000 cartridges of the old system was placed in a manual archive. During migration, the tape drives and media were replaced with Magstar 3590-E equipment. This is where the open concept of CentricStor came into its own. "We were totally free to configure the tape libraries and drives as we pleased", explains Cordes. "According to our forecast, we needed only about 1000 new cartridges instead of the previous 6000; this eliminated any storage capacity bottlenecks".

The reasons for the substantial reduction in the number of tapes lie in the fact that CentricStor compresses the data to be stored and that "volume stacking" ensures that tape capacity is fully exploited. Data media with a higher capacity can be put to effective use by stringing together several logical volumes on a physical medium. CentricStor boosts tape capacity utilization from an earlier figure of often around 20 percent to above 90 percent.

### **The second generation of the virtual library system**

A second, more powerful system with new cache technology and higher capacity was installed when CentricStor Version 2.0 was introduced in September 2001. The first system was then migrated to Version 2.0. This performance

enhancement was accompanied by a doubling of the number of virtual drives. The new version update also supported interfacing to the open system world. "The state budgetary procedure runs as a cluster solution under Solaris on PRIMEPOWER machines. In the past, this data was backed up manually using local DLT jukeboxes. Now, all production data and long-term archiving data is also backed up using CentricStor and NetWorker. Automated operation of the attached ADIC AML/2 tape library with Magstar drives and 18,000 slots is not only faster but, above all, more reliable", says Cordes.

Today, CentricStor is the center point of operations at the Oberfinanzdirektion Magdeburg. Without it, consolidated tape processing would be inconceivable. As demands on the system grow, so does the solution itself. For example, the manual transfer of data to external storage was automated in 2004; a remote Scalar 100 library with LTO drives is now in use.

### **Flexible backup for all departments**

In total, the virtual tape system holds the data generated by about 10,000 users. At the heart of remote data backup is IBM's Tivoli Storage Manager (TSM). The TSM server is installed on the IBM mainframe at the Oberfinanzdirektion Magdeburg and the TSM clients run on the systems of all attached departments. The clients can be configured locally. "Each person with local responsibility decides which data is to be backed up centrally and at which intervals. This gives the departments the freedom to define how much data is backed up and when", explains Cordes. "At the same time, we offer all departments a central tape processing service".

The combination of TSM and CentricStor delivers the flexibility needed to manage the heterogeneous IT landscape spread across the state. TSM clients are available for almost all common operating systems and can be configured to support full or incremental backup. "TSM, in conjunction with CentricStor, also enables us to back up system worlds that we do not even have in-house", enthuses Cordes. A separate logical tape pool is available for TSM backup, and this pool is stored on CentricStor via the z/OS mainframe. Computer center



customers can therefore apply their own tape storage methods without having to worry about which physical tape medium is used. Data backup no longer relies on individual departmental employees – usually without IT training – to regularly and reliably operate local tape drives and tape libraries.

Although it was not the original task of the fiscal authority, thanks to CentricStor the Oberfinanzdirektion has gradually taken on the role of service provider to the state's public administration. The Kultusministerium (ministry of culture), the Landesbetrieb Bau (state enterprise for construction) and others are also served in addition to the OFD in Sachsen-Anhalt. The fiscal authority is cooperating with a further public administration service provider to set up the tape libraries. In a separate computer center not far from the fiscal authority and linked via a network, the OFD has installed an automated tape library under the control of CentricStor. "At the

moment, copies of long-term archives and important data are kept there. These are needed to restart our computer center in the event of a total failure", says Cordes.

**Planned: Move to CentricStor Version 3.1**

This cooperation is set to intensify when the scheduled move to CentricStor Version 3.1 takes place in 2007. The two IT service providers intend to duplicate complete backups in each other's computer centers by means of cache mirroring and dual save. The fact that data is backed up in two separate locations will greatly increase security. It is fortunate that the two computer centers have already been working with CentricStor for the last few years.

"Our intention is not only to save money", says Cordes. "We also attach importance to consolidating and unifying tape processing for different system worlds". Storing data centrally reduces administrative

overhead. "Staffing levels in government agencies have always been a chronic bottleneck and CentricStor enables us to meet growing demands with the same staff". Only a very small number of employees is needed to manage the whole of our storage facilities. "And they are very committed, highly specialized experts – otherwise, we couldn't cope", says Cordes in praise of his staff.

Short, flexible backup times, better utilization of tape library systems and storage capacity, no dependence on a particular operating system, simple and centralized administration with lower staffing costs, greater flexibility and reduced space requirements for the tape libraries, plus cost savings – the management of the financial computer center is not reluctant to hail the benefits of the CentricStor solution. "In the future as in the past, we will be able to respond quickly and flexibly to changing demands".



**About CentricStor**

Due to their high storage capacity and comparatively low cost, tapes are still the medium of choice for data backup and long-term archiving. However, classical mainframe applications often write only small data records to tape and rarely make full use of available tape capacity. By contrast, CentricStor utilizes virtual tape drives to first store records in an internal tape volume cache before writing several logical volumes successively to a physical medium by means of volume stacking. This ensures that the storage capacity of tape cartridges is exploited to the full, thus substantially reducing costs and space requirements. At the same time, the disk-to-disk-to-tape solution (D2D2T) is faster and more reliable. Given the benefits of hard disk speed, the time window required for data backup is shortened. Optimal operation of the attached tape drives in streaming mode also enhances data integrity. What's more, CentricStor assumes responsibility for the automatic duplication and reorganization of data media; this prevents data loss if physical tape errors should occur.