

THE State of Affairs

The Office of the CIO with the State of Nebraska improved data-handling issues with smarter and faster data-storage tools

BY JIM UTSLER

Data is an organization's most prized possession. It offers insight into operations and allows decision makers to quickly respond to current and upcoming opportunities. As the influx of data grows at an almost exponential rate, IT departments are sometimes flummoxed when it comes to properly safeguarding and efficiently storing data. These two points can quickly become issues when—no matter how cleverly—older storage technology is used.

For the State of Nebraska's Office of the CIO (OCIO), this meant overly long backup processes, production-processing delays, expensive storage-media hosting, wasted people hours and inefficient disaster-recovery plans. Dealing with a limited budget, the organization found a way to address these issues and keep costs down.

Working closely with MSI Systems Integrators, which provided the hardware solutions, and OpenTech Systems, which offered some essential software tools, the OCIO has more streamlined backup procedures and an efficient disaster-recovery plan. The new data-storage

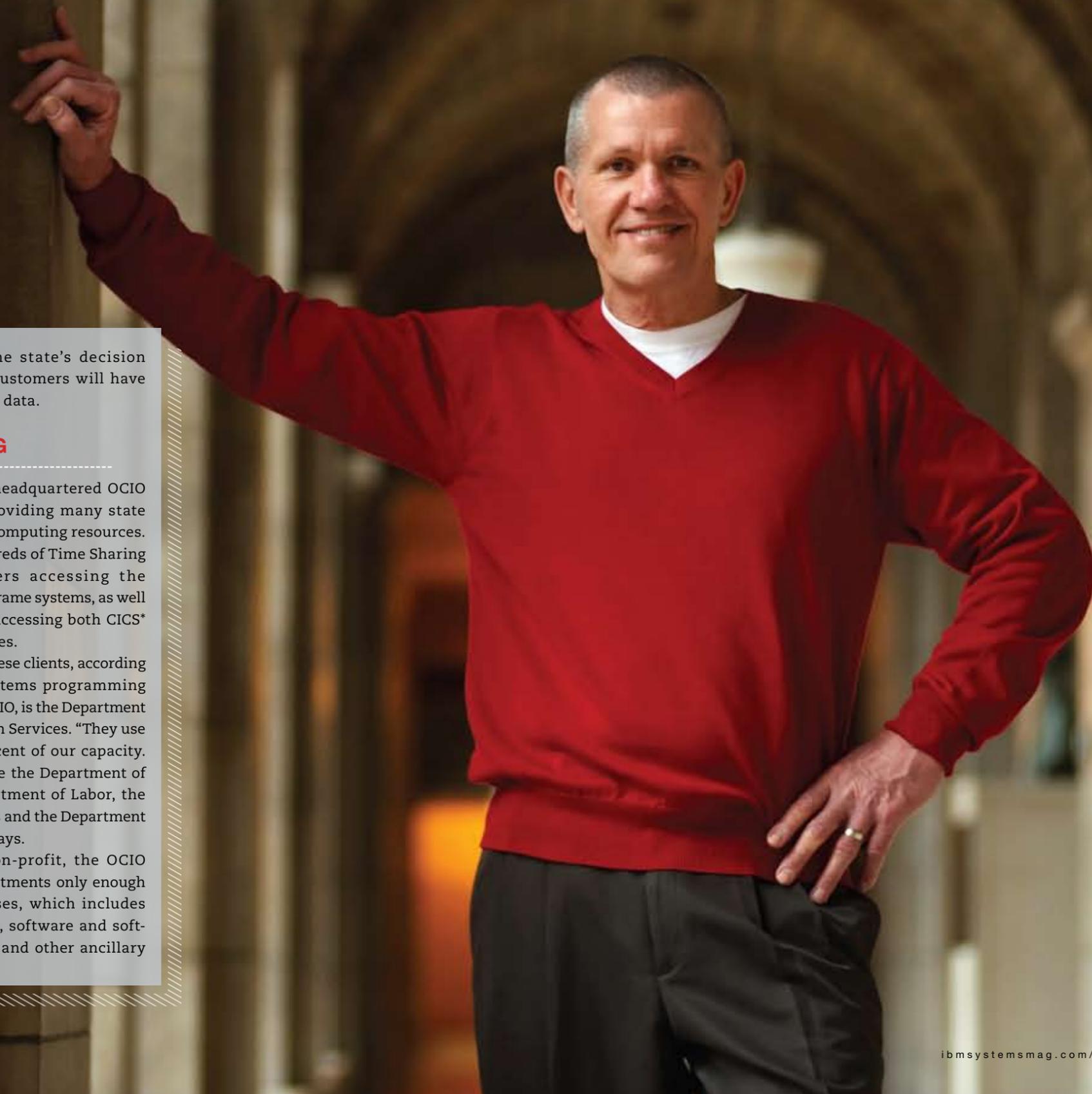
systems assure the state's decision makers and their customers will have access to necessary data.

HEAVY LIFTING

The Lincoln, Neb.-headquartered OCIO is charged with providing many state departments with computing resources. These include hundreds of Time Sharing Option (TSO) users accessing the organization's mainframe systems, as well as hundreds more accessing both CICS* and database services.

The largest of these clients, according to Fred Lupher, systems programming manager with the OCIO, is the Department of Health and Human Services. "They use in excess of 50 percent of our capacity. Other clients include the Department of Revenue, the Department of Labor, the Department of Roads and the Department of Corrections," he says.

Acting as a non-profit, the OCIO charges these departments only enough to cover its expenses, which includes rates for CPU usage, software and software development, and other ancillary



Fred Lupher, systems programming manager with the OCIO, says the State of Nebraska used System z and System Storage solutions to improve data-backup procedures.

resources, including data storage, tape backups and disaster-recovery services. Core to this are the two System z9* Enterprise Class (EC) machines operating in a Parallel Sysplex* environment. It also has a Capacity BackUp processor (CBU) in the form of an IBM System z10* Business Class (BC) server located at an off-site facility.



UP CLOSE

Proactive thinking helped the OCIO when it was facing an upward-spiraling increase in data. Prior to adopting new tape-related storage processes, the organization had an almost literal mountain of tape to deal with. For example, its “DASD farm,” as Lupher puts it, was backed up to tape every weekend, accounting for some 1,800 tape mounts. Lupher adds, “Being a DFSMSHsm [Data Facility Storage Management Subsystem Hierarchical Storage Management] shop, we had another 900 Migration Level 2 (ML2) tapes to copy every week. All of these cartridges, about 2,700 in total, had to be packaged in large containers and manually transported off-site for safekeeping.” The process for gathering

Customer: State of Nebraska

Headquarters: Lincoln, Neb.

Business: Services provider for government agencies

Challenge: Improving its data-backup procedures

Solution: Installing several new IBM System Storage devices and using VDR Tape/Copy from OpenTech Systems

Hardware: Two IBM System z9 Enterprise Class and a shared IBM System z10 Business Class, as well as an IBM System Storage 3584-L23 Automated Tape Library and 12 IBM System Storage TS1120 tape drives

Software: A variety of homegrown and vendor-supplied applications and VDR Tape/Copy from OpenTech

Why use Parallel Sysplex technology? “Running in this mode enables us to share resources, but it’s mainly for availability,” remarks Lupher. “Every two months on a Sunday night, we apply all of our software changes, including to the operating system and any vendor-supplied applications—and we IPL one processor at a time, ensuring critical applications remain up and running. This allows us to give our clients around-the-clock availability.”

On occasion, the OCIO shifts workloads when one processor reaches peak workload capacity and the other hasn’t. As of now, when the workload is balanced between the processors, each runs at around 90- to 95-percent capacity.

and loading these cartridges began on every Sunday and ran through mid-Monday. “It was just crazy,” Lupher recalls.

Perhaps even crazier were the amount of tape mounts—around

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10,000—the organization had to deal with in one week. This large volume led to bottlenecks in processing, beginning when a job called for a tape, after which an operator would have to locate and retrieve the tape and then mount it. In some cases, drives weren’t available. This was especially true after hours, during batch and backup processing.

The large number of tape mounts also impacted the OCIO’s clients. At the time, they were being charged \$1.40 per mount (but nothing for storage).

Wanting to reduce the number of tape mounts, the OCIO used IBM’s Volume Mount Analyzer to identify small tape-date sets. It then utilized another IBM product, Tape Mount Management, to intercept those small data sets and reroute them to a large DASD pool. After that occurred, Hierarchical Storage Management (HSM) would, based on predetermined thresholds, offload the DASD pool—containing the small, multiple data sets—onto tape. “We realized improvements but also recognized this was a stopgap measure at best,” Lupher notes.

As an added point of concern, the tapes weren’t encrypted. Rather, the containers the cartridges were loaded into were banded to prove they hadn’t been tampered with during transit.

A LIGHTER LOAD

With all of those issues in mind the OCIO considered alternative technologies, including tape type and tape

drives, and at the same time looking for ways to improve disaster-recovery methodologies, which consisted mainly of daily tape backups.

To that end, it put out a request for proposal. Three vendors came in as serious contenders, but one, MSI, came out on top. Its solution consisted of an IBM System Storage* TS7740 Virtual Tape Server (VTS) with 256 virtual drives, an IBM System Storage 3584-L23 Automated Tape Server and 12 IBM System Storage TS1120 tape drives. It also included using 3592s as the new storage media.

As part of its bid, MSI recommended an OpenTech Systems' product to provide a disaster-recovery tool, which, in this case, was VDR Tape/Copy, in lieu of mirroring to a second VTS. To ensure the OCIO could use VDR to the fullest extent, OpenTech dispatched a technician to bring Lupher's staff up to speed. Initially, the organization began small, using test data sets, and then moved to its development and quality-assurance environments, migrating data from the old cartridges to the VTS.

After letting the dust settle for a few weeks, which allowed the OCIO to ensure that, according to Lupher, "the hardware was stable, the performance was up to our expectations, and the data was consistently available," the organization began copying all of its production data. Within a month it had migrated 40,000 cartridges down to a much more manageable 300. With that finished, the organization hired a contractor to shred much of its old 3490 media.

One of the most obvious benefits to using 3592 media was transportability. Initially, the DASD backups and the HSM ML2 copies were placed in a small container, referred to as a turtle case. The case, holding up to 20 cartridges, was all that was needed to move all the DASD backups and the copied HSM ML2 data off-site. The OCIO also eliminated security concerns in the transporting of

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cartridges. All tapes are now encrypted at the TS1120 device level as the data is written to tape. Because this processing takes place on the drives rather than on the mainframes, the organization experienced no degradations in core-system performance.

The new technology has proven to be so successful analysts are using it for data they would have previously targeted for DASD, realizing the drawbacks associated with the old 3490 media were eliminated. In addition, there are no longer tape-mount delays, because there are always virtual drives available.

OpenTech's VDR also plays a large role in data safeguards and disaster recovery. For example, this tool identifies all tape data sets that have been written to the VTS within the previous 24 hours and creates a job stream that copies them to tape. This has allowed the OCIO to transport a single 3592 cartridge—containing between 2,000 and 4,000 data sets—on a daily basis.

"This really cut down on the amount of data-set copying analysts had been doing to get their critical data off-site," Lupher remarks. "In addition, we're also now making copies of all tape data sets, which has helped us eliminate both the many copy steps as well as the risk of an analyst inadvertently overlooking or omitting critical data sets."

VDR has also positioned the organization to better recover from an unplanned system outage. Should one occur, the off-site data could be processed using the z10 BC CBU mainframe located

at the remote site. Along with the z10 BC, OCIO has mirrored DASD, as well as TS1120 tape drives, at the remote site. The VDR process was recently modified to write the daily backup copies directly to the recovery site, placing the data where necessary should a disaster occur. "It's good to know the functionality is there, but we hope we never have to use it," Lupher adds.

The near elimination of physical tape handling has allowed tape library employees who had been charged with that task to be trained and moved into other roles within the organization. The OCIO's customers have also realized other benefits. Rather than being charged on a per-tape-mount basis, everyone is being charged for storage at an across-the-board rate of \$2.25 per GB per month.

ESSENTIAL SERVICES

As the State of Nebraska's OCIO has discovered, data is likely its most important asset. Without it, work would grind to a halt and essential services wouldn't be delivered to the state's residents. Thanks to its updated storage infrastructure, including its new tape-handling devices, higher-density storage media and software such as OpenTech's VDR, it can rest a little easier on several accounts. Contracted storage requirements have been dramatically cut, processing time has significantly decreased, staffing required for tape mounts and tape handling has been virtually eliminated, and a sound disaster-recovery plan has been put into place.

"Really," Lupher says, "we couldn't have asked for more." 



Jim Utsler, IBM Systems Magazine senior writer, has been covering technology for nearly 20 years.