

# AMEREN MIGRATES STORAGE WITHOUT BUSINESS INTERRUPTION

Ameren  
migrates 10TB  
of storage to  
new volumes  
without  
interruption to  
workload  
processing

By Denny Yost

**A**meren Corp. is a utility holding company headquartered in St. Louis, MO. Through its subsidiaries, Ameren provides electricity in Illinois and Missouri to approximately 2.4 million electric customers and nearly 1 million natural gas customers across 64,000 square miles. The company's approximately 9,300 employees support 16,500 megawatts of electrical power generation, 7,400 circuit miles of high-voltage transmission lines, and more than 78,000 miles of distribution—making Ameren one of the larger power companies in Illinois and Missouri.

Like most large companies, Ameren can't afford to have its mainframe down for extended periods. Power companies must maintain high-availability of electricity and gas to their customers, while also performing normal business functions such as providing online access to accounts, creating monthly bills, and collecting payments. Employees and managers also need access to business information to properly run the company and serve customers. The Information Technology (IT) department and the services it provides are as important and integral to the business as the electricity and gas the company delivers to customers.

Maintaining the high-availability required of Ameren's IT department sometimes poses significant challenges. Recently, a difficult challenge arose when business requirements dictated a storage device migration to newer equipment. >

“Our goal was to implement a tiered storage environment to reduce electricity consumption, lower our overall storage cost, and enhance our disaster recovery environment,” says Jimmy Hu, Ameren’s infrastructure specialist. “To accomplish our goal, we needed to make a non-disruptive move of 10TB of data, encompassing more than 2,000 volumes of storage, while maintaining existing replications of data. In addition, Ameren had to maintain the existing Recovery Point Objective [RPO] of three hours during the migration process, which further complicated the effort.”

The difficult, time-consuming task of locating and testing solutions to help perform the migration task soon began.

“We knew that the standard system and storage vendor utilities could not meet our somewhat complex requirements,” says Hu. “So, we had to look for innovative solutions that did meet our requirements. The first product we initially reviewed looked like it could perform the tasks we needed. However, upon testing the product, we found it to be too limiting. Ameren has been an FDR, ABR, and FDRINSTANT customer for decades. So, we decided to bring FDRPAS in for a trial.”

FDRPAS, from Innovation Data Processing, was introduced in 2001 to ease data migration from older to newer disks. The product can move individual disk volumes or an entire disk controller to new storage devices without disrupting workload processing. Furthermore, FDRPAS can simultaneously swap shared disks on all sharing systems. When the FDRPAS swap of a volume is complete, the volume resides completely on the new device, and the original device is no longer required. If all the volumes on an old disk subsystem are moved to new locations with FDRPAS, the old DASD subsystem can be erased, powered off, and disconnected. To date, more than 1,400 installations have used FDRPAS.

Migration of data from old to new disk hardware can be costly and time-consuming. Without the use of FDRPAS, implementation of new disk subsystems might require that many applications, or perhaps an entire system, be shut down while volumes are backed up and restored to new locations. The conversion process may take many hours, even days, and often needs to be done during evenings or weekends; the conversion often gets delayed since the business requirement at most companies is for non-stop availability.

Ameren’s testing of FDRPAS soon began.

“The ability to create a point-in-time backup was important to us in case we needed to fall back to the source volumes, or if there was a problem with the target volumes, which impacted the replicated copies,” says Hu. “FDRPAS has a SWAPDUMP feature that makes it possible to create a point-in-time backup, but we needed to know if we had the resources to support this feature. Innovation analyzed the systems requirements and determined we had more than adequate resources to support the SWAPDUMP.”

When FDRPAS is used to create a point-in-time backup (the SWAPDUMP statement), the operation is similar to that of a normal SWAP except the volumes won’t be swapped at the end of the operation. By using SWAPDUMP

with the CONFIRMSPLIT=YES and COPYVOLID=YES parameters, the source volumes will form a consistent point-in-time backup as of the time of the cutover to the new disk array.

Once Ameren completed its testing, the company decided to use FDRPAS for the migration. Diagnostic testing began immediately to identify any issues with the disk volumes before the migration.

“We ran the Innovation products FASTCPK and FDREPORT on all the volumes as a health check to identify and resolve any issues,” says Hu. “Additionally, we saw volumes with two VSAM VVDS [VSAM Volume Datasets] and volumes with size discrepancies. Innovation also gave us a workaround for those issues.”

Storage migration was originally planned for only one week, but actually lasted two weeks.

“Our plan was to do a migration over a one-week period, then make the switch,” says Hu. “However, to support a business requirement, the migration was delayed an additional week.”

This delay required Ameren to run FDRPAS an additional week, thus consuming more resources than originally planned. This created several unexpected issues for Ameren and Innovation. The first issue was that the FDRPAS monitors, running to ensure the source devices are online and the target devices are offline while intercepting all I/O operations, timed-out. Innovation fixed this issue by automatically adding time to the monitoring jobs.

Innovation worked with IBM and Ameren to resolve issues with CPU, SWAPDUMP storage, and DB2 I/O errors. According to Hu, “We needed a change to significantly reduce the number of fixed pages used by the FDRPAS monitor job to avoid pageable storage shortage. Due to the number of volumes in the SWAPDUMP process over an unanticipated extended period of time, CPU consumption had caused some concern. Innovation quickly provided a change to reduce the CPU consumption without disrupting the SWAPDUMP process. Finally, we also ran into a problem that caused I/O errors in DB2. The problem turned out to be a bug in DASD error recovery. IBM created APAR OA35902 to describe this problem and issued PTFs [Program Temporary Fixes] to fix it.”

### **Mission Accomplished**

Normal preparation and use of FDRPAS is straightforward. Most installations prepare for a migration, test for a day or two, and are ready to perform the migration. Ameren was a little different.

“Due to a special user requirement, the migration effort was spread over multiple weeks,” says Hu. “The actual data migration itself only took about 30 hours. We then issued the CONFIRMSPLIT command, IPLed with the new disk array, and everything came up with no issues. FDRPAS had done its job, and Innovation’s dedication and timely support were excellent!” **ME**

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