Five Summer Weeks in Seattle

<u>Synopsis</u>: For five long weeks in the summer of 2005, the King County Superior Court Clerk was unable to support desktop access to its ECR (Electronic Court Records) system due to significant hardware failures. Despite inconvenience, court case records were available, for the most part, as needed by the Court and others; no documents were lost or damaged. An extensive official report has identified many valuable technical and operational lessons learned.

A Major System Failure

On Friday, June 24, 2005, at the close of the business day, ECR had a major system failure. On Tuesday June 28, the ECR "failover" system was activated, for it was clear recovery would take time. The Department of Judicial Administration (DJA, also known as the Clerk's Office) technology staff worked all week to repair the system, which was brought back to operation the following Saturday, July 2. Later that afternoon, during which catch-up scanning and indexing was initiated by DJA staff, the ECR system failed again, even more severely.

Replacement of the failed hardware was ordered. In the meantime, the Clerk and Court took many creative steps to maintain essential service levels and prepare for the inevitable catch-up work ahead. After four weeks of hardware replacement, system and data repair, and data synchronization, ECR was fully restored to all users by August 1.

For 24 business days, if someone wanted to see a court case record, it was necessary to do it the old-fashioned way: request the file or document from the Clerk's Office and then go through the Clerk to get access to it. (Typically, documents needed in courtrooms were hand-delivered there by Clerk's Office staff.)

Background

DJA is the official keeper of the record of Superior Court case files. The average daily filing volume now exceeds 8,000 documents per day. For cases filed prior to 2000, paper documents are held in folders on shelves at the Clerk's three locations. Superior court case files must be kept indefinitely, either on microfilm or electronically. Before ECR, archived case files were microfilmed at an annual cost of about $250,000. Since 1997, all archived cases have been scanned ("imaged").

When ECR went into effect in 2000, the Clerk started routinely scanning all documents in new cases, whatever the case type. After scanning, each imaged document is linked with the case number to which it belongs and assigned to an electronic workflow queue. Docketing clerks locate documents in workflow queues and enter key data into the state-wide

database that is the official case index. With a few exceptions, the paper documents are destroyed after their corresponding imaged versions have been confirmed added to the ECR system. Files are viewable electronically on computers in the public areas of the Clerk's Office or using a browser on a computer that is part of the county's Wide Area Network (which includes all court and county staff computers).

In 2005, Electronic Filing (E-Filing) was added to ECR. Documents can be submitted to the Clerk electronically, in PDF for TIF format. After receipt, they are processed and stored in the same document management system as the scanned images. They are first viewed by the clerk who verifies they are linked correctly to their cases and assigns them to their workflow queues. E-Filed documents represent savings in that they do not have to be processed through the scanning steps.

ECR now holds more than 65 million images. More than 50,000 images are added each business day. On an average day, more than 100,000 images are retrieved for viewing. In June of 2003, the Clerk purchased a backup system, referred to as the "failover" system. It contains a copy of the entire image repository and is updated continuously as new images are added to ECR. The "failover" system is located at the court's Kent facility, some 20 miles from the downtown courthouse.

The Technical Composition of ECR

The ECR system environment includes: six application servers, FileNet document image scanning and repository software, multiple large-scale transactional databases, custom-developed server software, middleware, Windows client applications, Web browser interfaces, high-speed document scanners, approximately five terabytes of data storage capacity, and a dedicated high-speed tape backup system. It supports an average of 300 concurrent users during business hours, serving several thousand user sessions during a typical business day.

What Happened?

Technology: On Friday, June 24, 2005 at 4:15 p.m., the ECR system experienced a system shut-down when a storage array failed. The Duratec Storage Array failure corrupted data necessary for the operation of Windows 2000, so the operating system could not be booted. The SQL Server master database necessary for the database management system to function was also damaged, as were the databases necessary for operation of ECR. This also caused the loss of the FileNet (document repository system) and SQL Server executable binary files; those programs could not be started.

Immediately notified that ECR had suffered a major failure, the Deputy Director assigned Technology staff to work on it throughout the weekend. Accordingly, they tested existing data

backups, verified the functionality and status of backup FileNet systems, and configured ECR Web viewers to provide read-only access to the document repository that resided on the backup FileNet system. Staff found that the failover database system required modification to work properly with the newly released Web viewer, which had been modified to accommodate PDF format. A programming work around was implemented. Technology staff told management the failover system could not support the demand load of typical full production usage.

As judges, staff, and others arrived Monday, they learned about the system problems in e-mail messages and through notices placed on various home pages for high-use departments and divisions.

As the work week began, work continued, with vendor participation, on hardware (storage array) and software issues (FileNet document management system). Staff recovered the operating system and with remote support from the vendor restored the storage array to functionality. They replaced necessary SQL server binaries and recovered the master database, plus the ECR and FileNet databases from backups. A FileNet technician was brought on site to assist with the FileNet restoration and testing. The following describes the notable events of the downtime period:

Operations: On Monday, June 27, since the ECR system was down, staff were directed to perform tasks not requiring the ECR system, such as processing documents, filing papers, and file folders in pre-ECR cases. Customers were helped as much as possible with copies from hard copy files and those whose requests could not be filled were asked to leave names and phone numbers so DJA could contact them when ECR was again functioning. The ECR failover system became available late in the afternoon.

On Tuesday, June 28, access to the ECR failover system was given to the highest priority case file users: the Superior Court Commissioners, the Criminal Presiding Departments (two sites), for Clerks' staff assisting customers, and staff working on quick turnaround calendars. Other staff whose usual work involved ECR took on other needed Clerk's Office tasks, such as unclaimed property research, processing hard copy documents, prepping and staging incoming documents for scanning, preparing vital statistic forms for transmittal to the State, delivering copies of ECR documents to individual courts as requested, and serving the public with printouts from the failover system.

Since it appeared that the system would be available for light testing on Friday and for production work on Saturday, a schedule was created for staff to work Saturday and Sunday to begin to get caught up on document processing. On Saturday, 30 staff reported to work and began catching up on the backlog. All ECR related activities were extremely slow. By 4:00 p.m. all processing staff were dismissed, because a second system failure had happened.

Technology: At 3:45 p.m., the storage array again failed. Damage this time was more extensive. It was soon evident that another restoration effort would likely have the same result. Accordingly, work began immediately to develop specifications for replacement equipment for the affected system servers and storage devices, working with vendors who had the needed equipment and who could offer fast delivery. It was clear that ECR would be down for as long as it took to effect these replacements.

Operations: DJA built a plan to use paper versions of the case files for public and court file access. Original filed documents received during down time would be staged for scanning; photocopies would be made from them to meet the needs of the court and public for access to the documents. By Tuesday, it was clear that important document index information had to be input into the State-wide database, "SCOMIS," the official index to the case files and the only functional resource available to display what documents were actually being filed while the ECR system was down. The decision was made to process filings from the copies made of the submitted documents. The submitted documents would still be staged for scanning, which would start as soon as ECR was operational. Staff and the court continued to rely on the failover system to access documents filed before the system failure. Once the copies of current filings were processed, they were sorted by case number so they could be located and made available to the court or other users on request. Taking advantage of the scanner down time, staff arranged for routine maintenance to be done in preparation for long extended use during the catch-up period ahead. This mode of operation continued for documents filed between June 22 and July 21. Documents docketed in SCOMIS would later be subject to a careful review and reconciliation process, to ensure that information in SCOMIS and ECR were exactly matched. Approximately 216,000 documents would be filed with the Clerk's Office during the ECR down time period. Documents received after July 21 were not docketed into SCOMIS; they were held as the first batches of backlog work to be cleared up after ECR was back on line.

Technology: A FileNet technician was needed to reinstall the FileNet system, a process requiring skills within FileNet normally scheduled well in advance. This was coordinated closely with FileNet to occur soon after new equipment would be ready for it. When new equipment arrived, it was unpacked, inventoried, and assembled; hardware burn-in testing ran overnight. The new equipment was installed, cabled, and tested. The operating system was installed and configured, as were SQL Server, ECR, and FileNet. SQL databases were rebuilt. The old system was brought back online for transfer of recoverable data. Additional configurations, tests, patching, and installation of utility software was done. The FileNet technician helped us re-install the FileNet system, discovering some data corruption had taken place. A data recovery specialist from FileNet was brought in to assist with the recovery process, using portable storage devices obtained to speed the transfer of backup image repository data from failover system. By July 23, FileNet was restored to functionality

and the process of data recovery began, to be followed by system auditing and testing. Further data transfers at tests completed the process.

Operations: Since documents filed between June 22 and July 21 had already been entered into SCOMIS and the clerk's actions had been completed, the reconciliation process to get the information from SCOMIS into the restored ECR system was the focus of this work. (For most users, desktop access to imaged documents had been restored in the last couple of weeks of July.) Documents filed since July 21 had not been docketed into SCOMIS and no clerk's actions had been taken. This was backlogged work that needed to be completed, along with working with the ongoing daily addition of about 8000 new filings daily. There was a substantial catch-up project ahead. Staff sorted and processed documents out of order due to their priority throughout the backup period. A three-week push involving extensive overtime, staff reassignment, and reprioritization of duties helped the clerk catch up on the remaining 136,000 documents by September 24.

Lessons Learned

There were many lessons to be learned through the down time and recovery process. The following lists are considered a start; other lessons will, we hope, emerge as our analysis of what went wrong (and right) continues.

- **Openly Analyze Problems:** Despite our intention not to have such a problem, the King County Superior Court, Clerk's Office, and all who use court files had to live through and recover from the five-week down time for a critical application. Only an open, no-holds-barred analysis of what went wrong (and right) will provide the knowledge, tools, and experience needed to move forward.

- **Business Process Flexibility:** The Clerk's Office implemented many business "work-arounds" on-the-fly in response to problems that arose during the down time event. These adjustments were critical to keeping the court operational during the downtime event. Business flexibility is as important as technology system failover abilities.

- **Scope—Enterprise vs. Department:** The ECR system is heavily used by many King County agencies and the public, in addition to the heavy reliance placed on it by the Court and by DJA. The ECR application has been completely supported by DJA staff, treated as a high priority departmental application. It may be better supported and gain in reliability when defined as an enterprise-class application.

- **Failover Planning and Testing:** The failover system could view all of the ECR documents, but some documents were not available at the beginning. When the failover system was built, testing should have been done to ensure all documents would be properly

displayed. Performing early tests would have avoided the highly time-consuming work that had to be done when this problem was discovered.

♦ **Backlogging:** The failover system could handle limited document viewing, but it could not support document scanning, so newly filed documents could not be added to the system during the down time period. The resulting backlog created many business problems that required later catch-up work, some of it quite substantial.

♦ **Ongoing Tests:** Over the period of operation of the ECR system it should have had stress-testing and other operational tests to demonstrate how it would function in various scenarios, along with the failover system.

♦ **Growth in Usage:** Use of the ECR system and what is demanded of it is extremely high. A successful system that is widely used may inevitably be called on to do more for its users. Increasing the amount of dedicated resources to the support and maintenance of the system would seem wise, given the system's ever-increasing workload.

♦ **Unusual Usage Levels:** Court document management systems differ from other industries using document scanning/imaging. All industries add images to their systems, but courts must support a *high volume* access demand. Substantially higher viewing of imaged court records may mean it is necessary to support each function separately. Viewing documents should not slow down intake and processing capacity, and vice versa.

♦ **Open Communication:** Communicating fully with Court leaders, judges, other regular file users, and staff is critical. Communicate clearly with county officials, for any system failure and recovery incident impacts them. Communicate with the press, answering the hard questions and making the facts clear. Without direct, knowledgeable, frequent, and straightforward communication, rumors take hold.

♦ **Focus on Data Recovery:** We stressed the importance of data recovery when designing failover and back-up systems. Data recovery was, in fact, successful—there was no loss of images (court documents) during this crisis.

♦ **Displaying Images on Paper:** The failover system was not robust enough to deploy to all users' desktops. The Clerk's Office could use it to print out pages needed by users. Printing from the failover system helped keep the business of the court going. It showed, in fact, that the documents in ECR could be displayed on paper as well as on computer screens.

♦ **Set Priorities:** The failover system could restore electronic access to a limited number of places. These were prioritized to ensure electronic access for the high volume calendar courts (commissioner calendars, chief criminal, and chief civil courts).

♦ **Habits, Old and New:** Some staff had never docketed filings directly into SCOMIS, a practice that the Clerk's Office had observed for twenty-one years prior to ECR. Some file users had never been to the Clerk's Office until this crisis made them to go there to get printouts.

Conclusions, Actions Taken, and Future Plans

Technology systems break—this must be anticipated with contingency plans for both technical and business operations. DJA and the Court conducted their business and recovered from a major system down time event. For a comparable catastrophe with an all-hard-copy record, recovery would have been much more difficult, if not impossible. With ECR, the record was protected and preserved because it was centralized, backed up, and never accessed directly (only through electronic copying to a user's computer or to a printer that would replicate the document on paper). The crisis impaired the usual mode of customer access—through the computer at a person's desk. With electronic documents, there could be backups, a failover system, and other safeguards not available for those whose records are entirely based in paper.

DJA's first steps were to avoid such a long down time event again and to be better prepared to weather a similar event, whatever its cause.

The new equipment is more robust and of better quality. Stand-by replacement equipment has been set up to help avoid similar failure in the future. System design has been modified and improved.

Work is now under way with the county's Office of Information Resource Management (OIRM), leader of the overall county business continuity strategy, to ensure against future failure of ECR as a primary county system.

A document management system (DMS) replacement has already been funded through a 2005 technology capital improvement project process. DJA technology staff will work on reducing the demand on ECR's primary image repository before beginning that project. It is likely that the project will look at separating the read-only activity (viewing) from the image input activity (scanning) in ECR.

DJA will engage a consultant to review the event, response, recovery activities, and plans made to date, seeking independent feedback and advice, similar to a performance audit. DJA will ask users and other interested parties to review the consultant's report, adding their

feedback to that independent review. The review should help us formulate and justify future technology resource requests needed to ensure the ongoing reliable operation of ECR.

It is clear that King County justice system workers and leaders rely on ECR to help them accomplish their work related to court case records. They likely used the Clerk's Office before to access case records, but the ease with which ECR allows access may have increased their use of case file resources. Getting files without leaving one's desk makes court files more attractive sources of information.

DJA has been asked to speak and write about the ECR event and the recovery by a variety of groups and publications. There seems to be more interest in the fact that we got through and recovered from a major technical problem than in just having shown a complex system is vulnerable to such problems.

DJA hopes to maintain two ongoing lines of inquiry: Continue to learn from user groups about what might have helped them more during the downtime period. This will help us find better business process work-arounds in the future. DJA will continue to respond to requests from other courts, associations, publications, and interested parties about what happened with the ECR system downtime and recovery. This may help encourage others to explore and invest in similar technology. DJA believes courts should continue to learn from one another's experience with electronic document management and filing technology.

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