Quantum

CASE STUDY

StorNext Software

Naval Surface Warfare Center Battles 1,000x Data Increase with Quantum's StorNext

When the U.S. Naval Surface Warfare Center's Carderock Division (NSWCCD) recently upgraded its underwater sensor array, it required a storage system that could keep up with the 1,000-fold increase in data generated. Quantum's StorNext data management software not only provided a scalable and reliable solution, but also significantly increased performance.

NEED FOR FAST DATA STORAGE TO KEEP SHIPS AT SEA

For more than a century, NSWCCD has conducted research, development, engineering, and testing for the U.S. Navy. This includes managing two advanced underwater sensor arrays at one of its laboratory facilities in Ketchikan, Alaska. These arrays collect the acoustic signatures of submarines operating at various speeds and depths, as well as the sounds of onboard equipment when the submarine is stationary. This information is used to assess vulnerabilities and develop quieting measures.

When NSWCCD deployed new sensor arrays, each containing hundreds of underwater microphones known as hydrophones, they vastly improved the accuracy of the testing but presented a challenge for the laboratory. The new arrays increased data collection by a factor of 1,000, with an average of 550,000 data files and up to 3TB of data per test. All of that data needed to be accurately captured and stored during the three to twenty minutes that a typical test takes. If a problem was found with the data quality, tests could be rerun, but not easily and at significant additional cost to the project.

"For us, cost savings have to do with not delaying the navy ships we are doing testing on: the longer it takes to process and store data, the more expensive it is for that ship to stay on site," says NSWCCD computer scientist Bryan Bennett. "It's about quickly getting that data through, processed, and reliably stored for later retrieval. Loss of data is catastrophic in terms of having to bring that boat back out to our facilities again."

A SAN installed in 2005, which utilized an earlier version of Quantum's StorNext® File System, initially met the organization's needs. But with massively increasing storage demands that were stressing its infrastructure, NSWCCD began looking for a high-speed, high-availability storage system that would effectively and reliably service its mixed Linux/Windows environment. It did not have to look far.

STORNEXT FEATURE SET AND MULTI-PLATFORM SUPPORT MAKE THE DIFFERENCE

The earlier SAN had been set up by a contractor, but this time around, Bennett carried out the architecting and implementation of a new SAN himself. The easiest decision, he said, was upgrading the StorNext File System software.

"Between 2005 and 2009, I kept my eyes open for other ways of accomplishing the same thing, but unlike StorNext, the other shared storage products out there struggle to support a multi-platform environment," says Bennett. "I really couldn't get the feature set that StorNext offers in anything else for a reasonable price."

The selected architecture consists of three StorNext file systems utilizing 240TB of Aberdeen XDAS RAID disks, as well as QLogic Fibre Channel cards and switches. NSWCCD uses Symantec Backup Exec to send the data from the disks to two tape libraries for backup and for shipment to other NSWCCD facilities for analysis. In this new multi-tier file system, data is passed from one tier to another as part of the project workflow. Real-time data from the hydrophones

NAVSEA

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SOLUTION OVERVIEW

- StorNext File System software
- Two tape libraries
- Aberdeen XDAS disks
- Symantec Backup Exec

KEY BENEFITS

- Ingests 1,000 times more data generated by advanced sensors
- Increases data sharing and analysis by 50%
- Avoids slowdowns in data recording in case of hardware failure
- Cuts costs of having submarines on site by increasing speed and reliability

is sent to test monitoring instruments and to the first StorNext file system, which is based on Linux servers. As soon as data is written to the first of the three file systems, a background process kicks in and copies it to a second file system.

Once verified as having been successfully copied, it is erased from the first file system so that the cleaned disk space can be reallocated for new tests. Next, analysts use Windows computers to share, process, and report data that resides in the second file system. They then store the processed data, via three Windows servers, on a third file system.

Bennett says that architecting and deploying the upgraded solution was straightforward. He referred to the owner's manual and gave Quantum a call to validate the solution architecture, which also enabled him to draw on the company's expertise regarding other aspects of the solution.

"Quantum technical support was there to help me get the high-availability metadata controller installed, tested, and working properly," he says. "They even noticed that some of our equipment had been set up incorrectly by the original vendor, and assisted me in fixing that."

GREATER PERFORMANCE AND RELIABILITY

NSWCCD is now able to process more data than before with the newly architected storage system in place. StorNext's high-speed file sharing and scalable SAN performance enable the analysis of rich, detailed information generated by the advanced sensors.

With the first file system focused on high-speed data ingest, the second file system provides consolidation and analysis of data from the first file system. In the previous system architecture, a sister site wrote everything to a single partition, which became slower and less reliable as the file system filled up. Finally, because only processed data is stored in the third file system, the raw data remains unaltered in the second file system for future analysis by the researchers. The benefits of the new architecture were evident when NSWCCD conducted its largest test ever, and the system operated flawlessly.

"We were amazed when we realized that we could take in 50 percent more data than we normally do in a day," says Bennett. "A faster ingest data rate coupled with a robust data management system enables us to run tests more quickly and get the ships back out to sea in a timely manner. The performance gains from StorNext have really impressed management."

Among other features designed for managing massive amount of data, StorNext also offers affinity groups which provide a policy-based data path for where information should reside. Bennett leverages this advanced feature within StorNext to designate which disks to write data to on the system. This is helpful in the event of a hardware failure which could slow down data recording.

"When we were rebuilding a disk that did not perform well, it slowed down throughput on the system," he says. "Now I use StorNext affinities to remove real-time writing on those boxes until the disks are rebuilt and eliminate performance delays."

Moving forward, Bennett plans to replace Linux servers and leverage the replication features in StorNext. But even with the current system, NSWCCD is getting more use out of the existing data.

"As our access levels have increased, largely due to StorNext, we are finding different ways of looking at the data and putting it to use," says Bennett. "If you have a need for shared data storage, there is no product out there that will attain what StorNext does in terms of accessibility and reliability."

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ABOUT NSWCCD

With 3200 scientists, engineers, and support staff, the Naval Surface Warfare Center's Carderock Division manages research facilities and laboratories to improve the performance of submarines and surface ships.

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