

Redundant Aspen Data Centers

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Intra Data Center Redundancy

The redundant Aspen Data Center addresses two aspects of modern seismic data acquisition systems in order to obtain well in excess of "2-nines" (99%) data availability:

- Continuous computational resources
- · Complete state of health (SOH) information of remote stations and communication links

Continuous computational resources are secured with two or more enterprise-class servers that share redundant-connected external disk space. The two virtual machines for data acquisition and processing can move between the servers in case of any necessary maintenance operation (manual failover) or failure within a server (automatic failover). The shared disk space is located on a RAID that is directly attached via two dual-controllers to each server, providing a failsafe connection. Moreover, employing a combination of very fast solid-state drives (SSD), fast hard disk drives, and slow large disks optimizes data access, availability of large deep storage, and cost per archived byte.

The servers communicate through two network switches providing continuous intra-server and LAN connection.

Complete SOH information is often overlooked as an essential feature for successful network operation. Without detailed SOH information of the remote stations and their communication links the seismic network operator is limited in the evaluation of the current state of the network and consequently narrows the knowledge for immediate corrective action or escalated maintenance tasks. In addition, better SOH knowledge results in more effective preventive maintenance with reduced frequency of scheduled visits. The Antelope data acquisition and processing software has multi-threaded acquisition modules that reap all available SOH information from compatible dataloggers. It calculates communication parameters like communication efficiency, data latency, data throughput, etc. All information is provided in a graphic user interface designed to display SOH information in an easy to read layout. Furthermore, the monitoring program allows for remote command-&-control of the dataloggers.



Disk space optimization

RAID6 SLOW

Complete SOH Monitoring

Antelope's data acquisition program allows acquiring data and SOH packets once and distributing it to more than one data center/user effectively reduces bandwidth and data throughput and maintains redundancy that can be used within the data center or with a backup data center.

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SOH Monitoring

Inter Data Center Redundancy

Kinemetrics' Open Systems & Services Division (OSS) developed and deployed application failover procedures that switch seismic network monitoring and alarm tasks to a backup data center if the data center loses its operational functionality includes data acquisition, processing and event review, as well as keeping an authoritative earthquake database. The latter is to maintain the timeliness and reliability of earthquake information.



Data center redundancy

New display technologies allow operators and users to access the backup data center via a web browser with full capabilities of their job tasks reduces the need to have a fully staffed remote location.

The failover procedure itself provides copious amounts of time-tagged log messages and notifications to the operators during the failover procedure enables forensic analysis of an incident in terms of error description (i.e., what was the root cause?) and process (i.e., what could be done better) leading the way for future improvements.