ArcticBlue

Modern Solution Bridges Gap Between Production Storage and Archive

Striking a balance between performance and cost

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Contents

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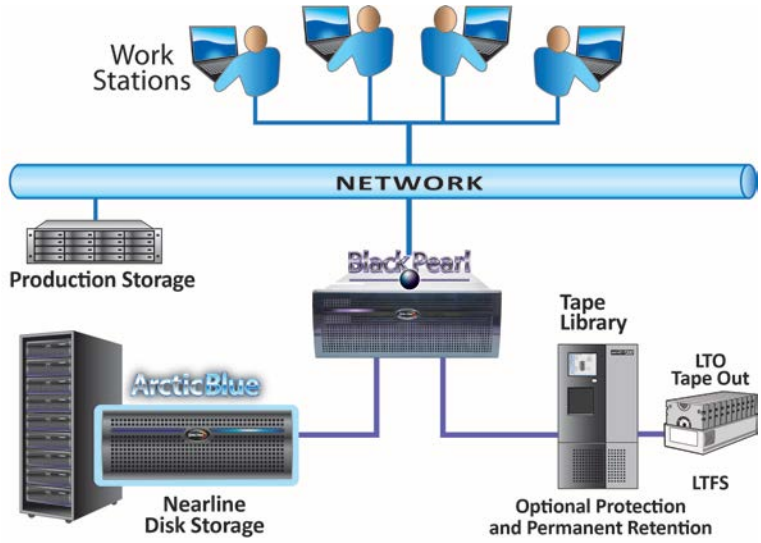
Introduction

Today's media landscape is widely effected by its transformation into a modern digital world as well as the ubiquitous use of Ethernet & IP shifting the way in which consumers consume content. Exacerbating this transformation is the number of social media companies and traditional network providers jumping into the fray to capture and/or retain customers and maintain viewership. Full immersion into this modern digital world offers companies the opportunity for greater efficiencies and the prize will go to organizations who master and use it to their full advantage. This new paradigm drives greater innovation, agility, and smarter expenditure of capital resources at all levels of business. To top the above, more content is being created than ever; higher resolution videos (4k, 8k, HDR, etc.), emergence of VR, AR, etc., all contribute to ever-increasing file sizes further driving the needs for greater storage capacities and hence, demand a large portion of "broadcast IT" capital expenditure.

Media companies and alike creating content continue to face the challenge of balancing cost against, bulging storage capacities and modernizing infrastructures, in support of expenditures for future business development. They require innovative and agile solutions to help shift their resources to their core business in this dynamic and competitive landscape. Such solutions need to be adaptive, cost-effective, fast, and allow companies to maintain control over their content, as well as keep an edge over their competition. Cloud options offer solutions to some aspects of the digital supply chain, but are limited in their speed of delivery and do not provide a cost-effective means to store frequently accessed assets. And, although, the cost of spinning disk has come down in price, it is still expensive to retain content that is not accessed on a frequent basis on primary storage.

Gaining a Return on Investment

ArcticBlue was designed with the needs of many media workflows in mind. Simply said, ArcticBlue is a mid-tier storage platform that bridges the gap between production and archival storage providing a balance between cost and the expected performance for quick concurrent access to media. ArcticBlue delivers a solid return on investment for key media organizations in **News**. ArcticBlue offers all attributes required of a storage system; such as low cost, seamless scalability and the fast response time required to store and retain breaking news, anniversaries, orbits and elections cycles, etc. for mid-term to long-term. **Creative and graphics** groups benefit from ArcticBlue for storage of their seasonal campaign or tent-pole events. These assets and projects typically sit untouched for many months or for extended periods of time. As the event nears, these assets can be accessed quickly and repurposed, then go dormant again.



Sports broadcasters and regional sports networks can leverage ArcticBlue's ability to quickly search

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and access prior season's content, B-roll, promos, teasers, social media, new media, remote and studio productions for reference or to monetize. **Video and post-production** houses, with high quality video (i.e., 4K, 8k and even 16K) resulting in file sizes growing exponentially, need to offload their primary storage and park files temporarily on a lower cost storage (i.e. ArcticBlue) – while knowing files can quickly be accessed by users when needed. Implementing a tiered storage infrastructure with ArcticBlue to augment production storage, helps reduce the overall cost of storage, while providing a highly efficient workflow and environment for production.

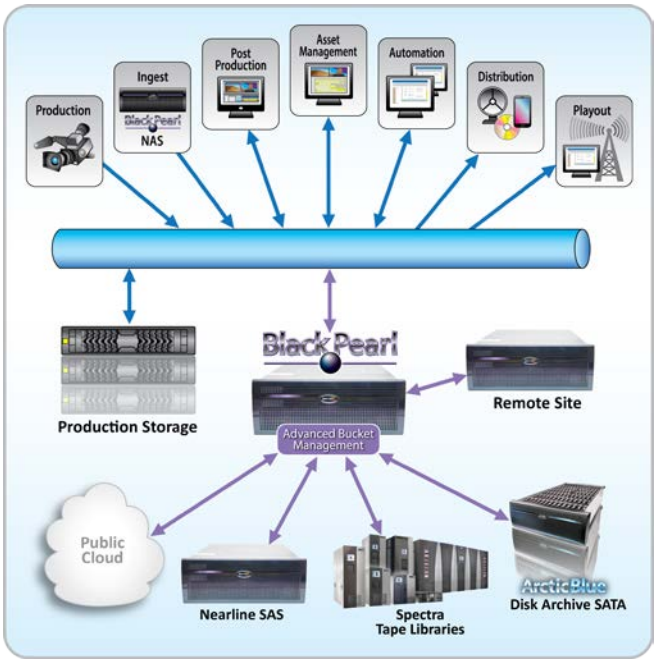
Leveraging Spectra's BlackPearl Architecture

ArcticBlue leverages the Spectra BlackPearl® gateway to creates the first power-managed disk-based object storage platform used as a nearline storage target. It delivers maximum longevity (~7 years), efficiencies and cost-effective spin-down disk, delivering the fast performance needed to access content whose value doesn't necessitate storage on premium production storage. The spin-down disk technology allows for independent bands of disk to power down when idle, which in turn, minimizes the degradation of disk - extending the life of the subsystem up to 7 years. With a cost as low as 10 cents per gigabyte, ArcticBlue provides an excellent near-line or archive storage tier, to supplement the high-cost production disk for the growing storage needs of content not frequently accessed. ArcticBlue's storage architecture provides a secondary storage tier of high-speed, large cache and disk storage that sits between production storage and tape archives, allowing for a seamless copy of content that can be accessed quickly and directly by an application (MAM, PAM, DAM).

ArcticBlue Benefits

- *No need for middleware*
- *Fast, concurrent access*
- *Performance (over GB's/sec)*
- *Longevity (~7 year disk life)*
- *Consistent Data integrity check*

To truly understand the value of ArcticBlue, one must understand the power of BlackPearl. Spectra's BlackPearl was designed to provide a single portal to multiple tiers of storage – intelligently moving and retaining media seamlessly on disk, tape and/or cloud - without the need for a middleware. BlackPearl is an agnostic storage platform that easily and seamlessly integrates with any MAM, PAM or DAM application utilizing a simple RESTful API. These integrations allow for asset management applications to transparently, ingest, manage, archive, search and retrieve all media assets seamlessly, regardless of what storage repository the media assets are stored on. Utilizing Advanced Bucket Management (ABM) - BlackPearl's intelligent data policy engine, - enable redundant copies of media on multiple storage mediums, including disk, tape, and/or public cloud, and can even automatically eject tape copies for offsite storage.



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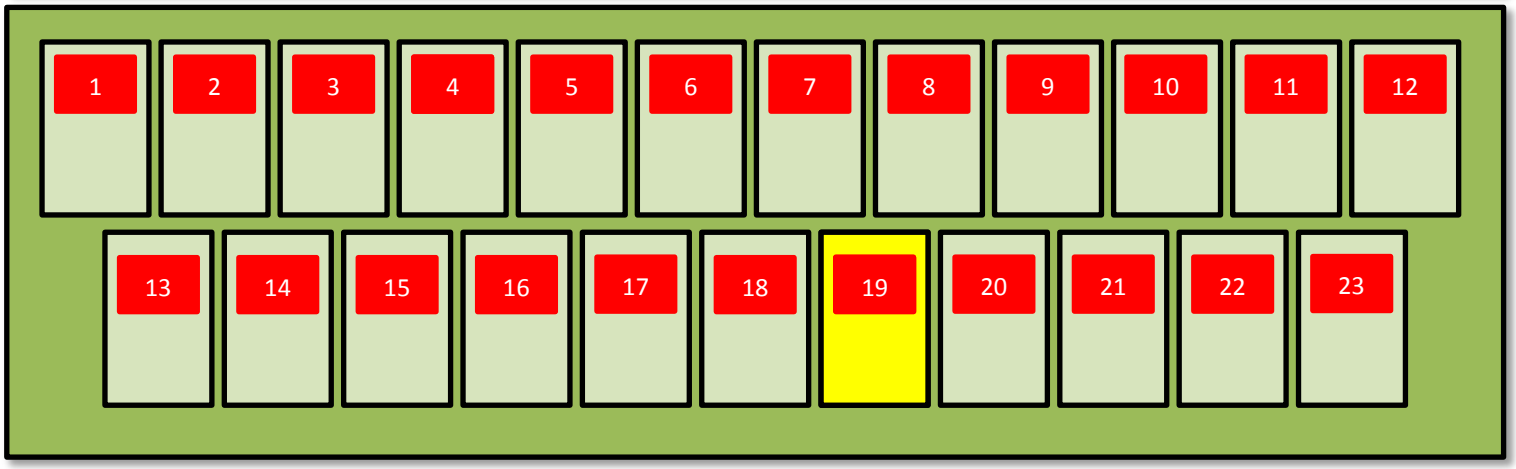
Utilizing cloud as a storage repository in media workflows is an option organizations explore as part of their digital supply chain. As more businesses look to reduce operational costs, uploading media to the cloud seems to be an attractive offering to explore for media companies - however they should not be fooled. While there are some applications and workflows that cloud services help, the cost of uploading and bringing content back is extremely cost prohibitive compared to on-premise storage, which acts as a better repository for accessed content. Additionally, the latency of bringing media back from the cloud doesn't meet the needs of many organizations who rely on media as an integral part of their business. Now, through utilizing an ArcticBlue and BlackPearl solution, media organizations can economically create a private or hybrid cloud benefiting many aspects of both approach.

Performance and Capacity: What to Expect

A unique feature of the ArcticBlue is the use of large stripes of disks (20) or Very Wide Bands [VWB]. The spread of data over large number of drives delivers greater performance (nearly 1 GB/sec) while accessing data. This data distribution coupled with optional replication delivers the best

Objects written across 23 drives with Galois Field based erasure coding
20/23 configuration protects against 3 failures



Very Wide Bands (VWB) can recover from a single block failure or the loss of entire drives. Individual block failures are recreated and saved on the original drive. Failed drives are automatically rebuilt to one of the available hot spares.

performance, protection and recovery. Other object storage systems use a 20+6 erasure coding which requires higher overhead, achieving only 20/26 of the capacity. While this method provides good data protection, it requires a greater number of drives and delivers lower useable capacity. Spectra's implementation of ZFS software uses a triple parity to maximize data integrity. "To counter the higher overhead (as is the case with erasure coded stripes), ArcticBlue uses a 20+3 or 16+2 band size, lending the system up to 83% usage (20/23) or 89% usage (16/18) of raw capacity." Compared to other object storage systems, a common 20+6 erasure coding has 77% usage, while a 3 copy redundancy has only 33% usage.

Expansion: Incremental Scaling as Business Grows

Not only is ArcticBlue reliable (up to 7 years of disk life) and economical (as low as 10 cents a gigabyte), it also easily scales to accommodate ever growing content. In order to scale the ArcticBlue system to meet evolving storage requirements, users can easily increase capacity and performance by adding additional (VWB) bands and/or expansion chassis' of ArcticBlue. Added bands are simply and automatically provisioned into available storage pool(s). Each ArcticBlue expansion chassis connects to the master node using a direct external SAS cable. BlackPearl supports up to 8 expansion chassis, scaling to 6.1PB in a single rack. Spectra Logic's storage solutions, including BlackPearl and ArcticBlue expansion nodes, are designed to easily add or swap drives, and replace components with optional spare parts stored onsite as needed. Expansions of additional bands (VWB) and nodes require zero downtime with the optional install of SAS HBAs in BlackPearl.

Cost Effectiveness: The First Disk System of Its Kind

Each band of drives is intelligently spun down when the band has been idle for a period of time (an hour). This reduces power consumption, minimizing the wear factor on the drives, thereby extending the life of the drives. Each band can be powered down individually, and quickly spun back up as needed for ingest and retrieval. Spin down capability uses up to 75% less power and can extend the disk's life span up to 7 years. The extended life span of ArcticBlue's disk drives translates into sizable cost savings. Industry norms dictate that disk subsystems usually are replaced every 3-4 years. ArcticBlue extends the time between technology upgrades by almost double. ArcticBlue also eliminates costs associated with procuring, deploying and migrating content to a new disk system every 3-4 years – which is a labor intensive and expensive process. Finally, the largest cost benefit arises from the fact that ArcticBlue lowers the expansion burden placed on primary storage further easing the need to scale out these systems.

Each full ArcticBlue node (96 drives) uses 775 watts during read/write and only 140 watts once spun down. A full rack of ArcticBlue at 6.1PB can realize power savings up to 80%. The lower power consumption results in much less heat, decreasing the demand on required cooling, further lowering the total TCO.

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Data Integrity: Keeping Content Safe

ArcticBlue systems preserve data integrity by providing multiple levels of integrity checks beyond that found in typical disk systems, resulting in a much better error recovery. First level is advanced file system checksums that protect against undetected errors. ArcticBlue features an on-demand data integrity check that scans the drives for data corruption and corrects any errors found. The integrity check runs on an individual ArcticBlue pools. In addition to checksums, the ArcticBlue pool has triple parity protection with intelligent rebuilds using a hot spare hard drive. This level of protection allows for up-to three drive failures while providing continuous access to data. Statistically, a triple parity system will only lose data once in over 2 million years for the drive type and the 23 drive band size option used in ArcticBlue.

ArcticBlue:
Each band includes one global spare
Three parity drives (20 + 3) with automatic intelligent rebuilds

Minimum Configuration:
Two bands - 384TB
Then expand one band at a time

Maximum Configuration:
6.1PB per rack
System power savings up to 80%

Performance:
Each ArcticBlue node
Throughput 1GB/second
Read/Write – 775 (W)
Idle – 140 (W) with Drive Lifecycle Management

On top of the protection, at the disk drive and file system level is the second level of protection: Object Storage checksums. The Object Storage checksum provides a file-level or part-of-file (chunk/blob) level checksum, where each file or chunk has its checksum calculated and stored with the object as metadata. An end-to-end checksum can also be used, where the host is required to provide a checksum for the file or blob before the data is sent to BlackPearl. Once sent and in the Cache, BlackPearl verifies the checksum, ensuring the integrity of data in transit to BlackPearl.

In addition to protecting the single copy of data on an ArcticBlue pool, another great way to provide more protection (while also increasing the availability of data) is to have an additional copy of data. Using BlackPearl data policies, multiple copies of data can seamlessly be made in any combination of the following: on a secondary ArcticBlue pool, on internal tape, on ejected tape, or replicated on a remote site via another BlackPearl with its own storage targets. With ArcticBlue, organizations can handle data that continues to expand at dizzying rates while remaining confident in the data's integrity.

To Recap:

- During reads and writes ArcticBlue performs continuous checks for bit rot and corrects them as needed
- As an object storage system, ArcticBlue provides the means to checksum and verify the integrity of data at the file or file-part level
- Optionally, multiple copies of assets can be created on separate ArcticBlue bands or other BlackPearls' available storage mediums - such as disk (Enterprise or ArcticBlue), tape or even the public cloud (e.g. Amazon Glacier)

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Conclusion

Competitive organizations today recognize that large repositories of assets are an invaluable and are a central and active part of their media workflows and media operations (modern archives). A modern storage platform will afford these organizations the ability to balance the cost of production storage against required fast concurrent access to their vast repositories of assets while keeping costs at bay. The BlackPearl and ArcticBlue solution lends today's media companies a modern and innovative solution that quickly adapts to shifting business needs. The intelligent and flexible combination allows organizations to protect and retain their assets with the seamless and easy addition of tape, clouds, or additional BlackPearls for multi-site requirements.

As previously mentioned the following organizations greatly benefit from the performance, efficiencies and low cost attributes of ArcticBlue:

- News Organizations
- Creative Groups
- Sports Broadcasters and Regional Sports Networks
- Post and Video Production Houses

ArcticBlue more than meets the needs of users who must frequently access archived media in a quick, efficient and affordable manner.

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Storage Experts

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