technology overview

switchable storage

DISCREET'S NEW, HIGH-PERFORMANCE STORAGE SOLUTION WITH REAL-TIME BANDWIDTH FOR COLLABORATIVE ONLINE POST PRODUCTION

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Discreet's advanced visual effects and editing systems **inferno**®, **flame**®, **flint**®, **fire**® and **smoke**® are used throughout the world on some of the most challenging projects—jobs that require large resolution media from HDTV to film. Our applications are tuned to provide top performance at any resolution; however, when working with large imagery workflows, media management and movement is a crucial concern. It is imperative to ensure that any system can access the required media at any time. Shared storage solutions cannot provide real time performance, and standard networking can take up to 20X real time to move film data. To address these crucial workflow concerns, Discreet has designed a robust, scalable, high-performance storage environment that ensures that each creative system in your environment can instantly access media with full performance assurance. Discreet's **switchable storage** solution provides real-time media access to the creative applications, by providing full bandwidth point to point connections between systems and storage for all systems in the environment.

Our applications are tuned to provide top performance at any resolution

switchable storage also provides centralized access to metadata so that any system on the storage hub can access any project at any time. Storage is then allocated based on the project selected, software interface is provided that automatically configures the Fibre Channel switch, connecting the media directly to the suite where it will be required. Storage is "moved" between systems and suites within seconds, allowing multiple systems and suites to work on the same project and media without time-consuming media transfers.

- *Advanced storage solution for **inferno**, **flame**, **flint**, **fire** and **smoke***
- *Superior performance environment for collaborative work for SD through to film resolution*
- *Scalable storage capacity to up to 120 terabytes (200 hours HDTV (720P))*
- *Centralized metadata storage for efficient project sharing*
- *New, cost-effective 146GB disk configuration*
- *Compatible with current Fibre Channel based storage configurations*
- *Compatible with **inferno 5.3**, **flame 8.3**, **flint 8.3**, **fire 5.3**, **smoke 5.3**, **backdraft 5.3** and **stone+wire 2.2***

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FEATURES AND BENEFITS

switchable storage significantly improves the productivity and workflow of any facility by eliminating the limitations associated with moving media across a network or physically reconnecting storage between rooms. **stone**® framestores can be switched instantly between applications without ever leaving the suite. For example, once a complex series of composites have been rendered on a **flame** system, they can be switched to **smoke** without lengthy **wire**® transfers. This instant access allows for projects to be finished faster, or provides the artist with more time to focus on the creative aspects of a job.

Share media between any Discreet system
Media can be shared between any of Discreet's systems: **inferno**, **flame**, **flint**, **fire**, **smoke** or **backdraft**®.

Instant access allows for projects to be finished faster, or provides the artist with more time to focus on the creative aspects of a job

Instant transfer of media
Media is instantly connected from one Discreet system to another – without time-consuming re-digitizing or copying of files from one **stone** array to another.

Simple, yet powerful
An intuitive software interface provides fast switching of **stone** arrays between Discreet systems. Within seconds, you can switch your **flame** framestore to a **smoke** suite, or vice-versa.

Improved workflow with centralized I/O
Switchable storage combined with **backdraft** with the Video I/O option can significantly increase productivity and speed workflow. Large amounts of media can be captured by **backdraft** to **stone** storage and then switched immediately to a Discreet creative system. Conversely, media can be switched immediately to backdraft for archiving and output.

Centralized project management
The Central Clip Library allows any system instant access to all metadata for a project.

Increased storage capacity
It is possible to use a **switchable storage** configuration to access up to 15 **stone** subsystems to a single Discreet visual effects or editing system. This provides the potential of providing up to 120 terabytes of switchable disk space to a single system[1].

Superior Performance
Discreet's switchable storage solutions are designed to provide sustained high-bandwidth data pipes to multiple online suites. They are designed to assure consistent uncompressed RGB (4:4:4) playback with frame-accuracy and at all supported resolutions: 601 video, ATSC HDTV (including 1080/24p and 1080/30i) and 2K film.

[1] With the following limitation: up to 8 terabytes can be accessed at any one time—user switches between 15 8-terabyte logical volumes.

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GENERAL CONFIGURATION

switchable storage will have up to 16 available devices (host machines or **stone** arrays) and will be available on 1 Gb or 2Gb Fibre Channel systems. The system includes a fibre channel patch panel that will physically connect the storage to the system. **switchable storage** requires the services of **backdraft 5.3** and **stoneFS+wire 2.2** in addition to the latest versions of the creative applications that will be in the environment. All components are connected over a TCP/IP Network.

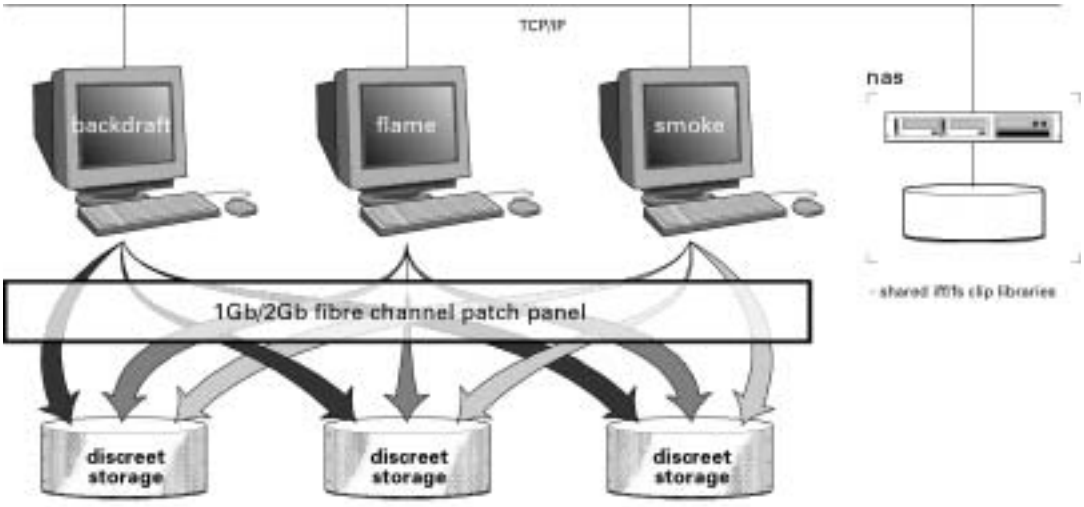

FIGURE 1 Three-system, **switchable storage** configuration. Any system can be connected to any one set of storage – storage can be switched at any time between systems.

DESCRIPTION OF COMPONENTS

Discreet's **switchable storage** solutions are built with high-quality components to provide a robust, reliable solution adapted to the demands of modern post production environments.

backdraft 5.3

backdraft is Discreet's media I/O management system, designed to boost productivity by removing tedious, time consuming tasks away from your creative: **inferno**, **flame**, **flint**, **fire** or **smoke** workstation. It can import, export, archive and restore media and projects, transfer media between systems and includes EDL capture and assemble capabilities.

backdraft 5.3 includes an intuitive graphical-user-interface to control, monitor and manage the **switchable storage** system. The new GUI provides users with a flexible, interactive means of monitoring the exact connectivity status of the 32-port Fibre Channel patch panel and its attached devices, as well as the controls to perform switched connections.

Discreet's systems are designed to meet the needs of client–supervised sessions where immediate feedback is required at any resolution whether video, HDTV or film

32-port Fibre Channel Patch Panel

A 32-port Fibre Channel patch panel allows a maximum of sixteen Discreet system units to be connected to each **switchable storage** sub-system. System units include **stone**, **inferno**, **fire**, **flame**, **smoke**, **flint** or **backdraft**.

- Manages connections between Fibre Channel devices to provide easy to use point-to-point connectivity
- Redistribute and re-route point-to-point Fibre Channel networks
- Transparent electronic switching
- Connectivity up to 300m
- Front Panel LCD Control

stoneFS**+**wire 2.2

switchable storage requires **stoneFS+wire 2.2**.

- **stoneFS** is a high performance file system providing Discreet's media applications with robust data storage that offer frame-accurate, sustained real-time playback at up to 2K film.
- **wire** is Discreet's application specific networking solution for moving media between systems.
- **stoneFS** and **wire** work together in the **switchable storage** environment to ensure that all switches happen without disrupting work in progress.

Network Attached Storage (NAS) Device

A robust, network attached storage device provides a central repository for the Discreet Clip Library. This allows any Discreet system attached to a **switchable storage** configuration to browse a single, shared project database, allowing seamless access to project metadata.

inferno, flame, flint, fire, smoke

The following versions of Discreet's advanced visual effects, editing and finishing systems support **switchable storage**: **inferno 5.3**, **flame 8.3**, **flint 8.3**, **fire 5.3** and **smoke 5.3**.

Discreet's Academy Award®[2] winning visual effects technology found in systems like **inferno**, **flame** and **flint** provide digital artists with advanced tools and superior performance for fast online experimentation and creativity. They are designed to meet the needs of client–supervised sessions where immediate feedback is required at any resolution whether video, HDTV or film.

fire and **smoke** offer editors powerful solutions for non-compressed editing and finishing projects at any resolution including digital cinema. These editing and finishing systems offer superior performance, true Multi-Master Editing™ capabilities and excellent paint, graphic design and visual effects tools.

[2] In 1999, Discreet's inferno and flame visual effects systems were each recognized with an Academy Award - Scientific and Engineering Award by the Academy of Motion Picture Arts and Sciences.

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OPERATION

switchable storage requires that all application metadata, project and user information be centralized in one location. This location is shared as an NFS mount point with all the stations that are in the **switchable storage** environment.

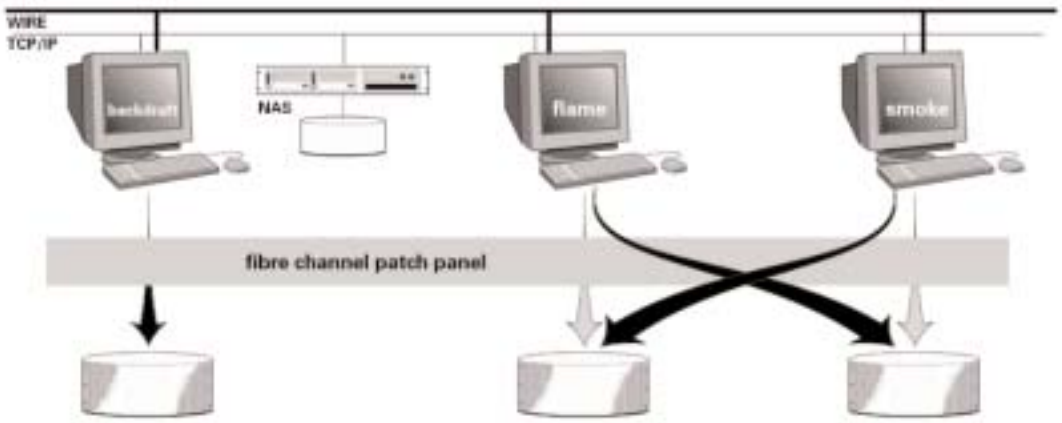

FIGURE 2 Three systems and **stone** configuration

A Network-Attached-Storage (NAS) solution is used as the central metadata repository.

Instead of having direct cable connections from host machine to **stones**, **switchable storage** requires that Discreet devices, whether host machine or storage device, be physically connected to the Patch Panel. Through the Patch Panel, a specific host is indirectly connected to the **stone**, this point-to-point connection provides guaranteed bandwidth to the creative application.

PROJECT-BASED WORKFLOW

Projects have become increasingly more complex as time progresses – this complexity is often addressed through having multiple systems assigned to a particular job. As soon as the demand for two or more systems to access the same media arises – the necessity to move media arises as well.

It is common today to have a project where there is a requirement to digitize, composite, edit and archive material. **backdraft** digitizes material from film or tape and stores the media onto its currently attached **stone**, *stone1*, in a background task. As the material is being digitized, the **flame** artist readies his/her workstation for the impending work or continues to work on other projects on its **stone**, *stone2*.

Once **backdraft** completes the material ingest, a storage switch request from **backdraft** connects *stone1* to **flame** and *stone2* to **backdraft**. Within a few seconds and without any manual reconnects or resets, the **flame** station has full and dedicated access to the **backdraft**-digitized material. The **flame** operator is able to interact, experiment and create with the newly captured material while the **backdraft** operator continues to digitize new tapes or film on *stone2*.

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When the **flame** artist completes the compositing work, he/she makes a request in **backdraft** to switch the material over to the **smoke** workstation. Again, within a few seconds, the **stones** are switched and the **smoke** machine is connected to *stone2* that contains all the finished composite work. The **smoke** editor carries on with the rest of the work and creates the complete, edited version of the project.

The process then comes full circle and the artist reconnects the **backdraft** workstation with its original **stone**, *stone1*. At this point, all of the work that has been completed in the **backdraft**-**flame**-**smoke** value-chain can be archived and stored.

Depending on your preferences and requirements, this could be a simple way to provide control over projects

EFFECTS OR EDITING BASED WORKFLOW

This configuration entails the **stone** arrays to be always attached to the type of work that is being performed, effects with effects and editing with editing. Depending on your preferences and requirements, this could be a simple way to provide control over projects.

A **flint** station may be used for lower resolution projects and preliminary compositing. As higher resolutions are needed to complete the job, a storage switch can be triggered to seamlessly patch the material to the **inferno** station within seconds — without the lengthy **wire** transfer. The **inferno** put the last touches on the project all within the same framestore. **smoke** and **fire** can be used in a similar fashion.

ARTIST-BASED WORKFLOWS

This configuration always entails each **stone** to be attached to an individual artist, providing a very clean method to control individual materials.

As the artist moves from station to station, he/she is bringing the material with him/her by performing a storage switch. The artist may start on the **flame** station since the **inferno** suite is unavailable. The material is stored on his/her **stone** (stoneArtist1). When the **inferno** frees up, the **stone** and, hence the material, moves with the artist to the **inferno** with the storage switch. This creates greater efficiencies and allows the artist to continue without losing valuable time or train of thought.

CONCLUSION

Coupled with the advent of HD and film resolutions and the increasing complexity of projects, Discreet clients are constantly searching for compelling ways to improve quality and efficiency. One simple, yet innovative way to increase efficiency and maintain quality without sacrificing creative freedom is to use Discreet **switchable storage**. It speeds up the access to large number of frames that are required for multiple passes in different applications, such as **flame** and **smoke**, while maintaining the full bandwidth required for client-facing sessions. **switchable storage** represents very good return on investment as it alleviates bottlenecks of traditional network transfers, leverages the investment over several suites and most importantly, allows money-making, creative suites to keep buzzing with interactive sessions and continue to do just that – make more money.

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