Yellow Machine and FailSafe Storage

Overview

Introduction

Storage is Storage, Right? Wrong. There are several storage media options that can be used to preserve information, but for your precious digital content, Yellow Machine offers the only complete solution with FailSafe storage and superior reliability. For more information on what options to consider when looking at storage, see our *FailSafe Storage* white paper.

Yellow Machine and FailSafe Storage

FailSafe Storage is a grade of storage above standard disk storage and regular RAID storage. FailSafe Storage is what you want to be using to store your precious digital assets to ensure your disks/data are safe when the drives fail. Whether it's your data files, photos, videos or music, Yellow Machine is the only appliance in it's category that offers FailSafe Storage which not only includes RAID 5 protection, but also Disk Scrubbing Technology and highly reliable components and design to minimize the risk of failure.

Here's why you'll want to entrust your data to a Yellow Machine:

RAID 5 Storage

Redundant Array of Independent Disks (RAID) is the ability to utilize multiple disk drives to increase performance, total capacity and increase reliability.

Parity Mode (RAID 5) is a more popular advanced storage technology that stores data across multiple disks, where the data is striped into several bytes and a parity bit. In a four drive RAID system, the data has four parts, A + B + C and Parity. With the RAID algorithm, any data can be re-generated with a minimum of three of the four parts. So if any single drive should fail, your data is still on available on the remaining disk drives. RAID 5 delivers 75% of your theoretical capacity, the best ratio of storage capacity and redundancy; which is 25% over RAID 1 or 1+0 (sometimes called 10).

Mirrored Mode (RAID 1) is another method to provide data redundancy, which essentially copies the data to two distinct drives. The net result is 50% of the total theoretical capacity. RAID 1+0 (10) adds striping, and is used typically in a four drive configuration, where you see a single volume at 50% total theoretical capacity.

RAID5 BENEFITS

Mode	Failsafe*	High Capacity	Usable Space**	Drive Letter
RAID 5	✓	✓	750GB	Y
RAID 1	✓		2 x 250GB	Y+Z
RAID 1+0	✓		500GB	Y
RAID 0		✓	1000GB	Y
No RAID		✓	4x250	W, X, Y, Z

The Yellow Machine supports all modes.

*Duplication of file in case of drive failure.
**Usable space may vary depending upon configuration and drive manufacturer specifications.

Disk Scrubbing Technology

Although most standard RAID technology can retrieve data if a drive fails, it does not repair the bad block on the disk, even though one of the four parts has gone bad. As drive usage continues, the resultant reliability of your RAID storage system decreases drastically as multiple byte errors can occur over time, thus creating a potential time bomb for data loss. RAID does not resolve drive errors, it simply recreated whatever was stored. Therefore, RAID 5 alone does not offer complete protection — this is the role of Disk Scrubbing Technology (DST).

DST looks for these potential data loss errors, and corrects them before a second block or entire drive goes bad. DST is an enterprise archival storage system technology that routinely repairs these disk errors. Disk Scrubbing runs in two modes, opportunistic and deterministic. In opportunistic mode under normal disk read, when the storage system encounters a sector error, it will repair it. Deterministic mode runs in the background and checks every sector on the disk, looking for bad sectors and repairing them.

With Masterpiece RAID DST™, Yellow Machine checks for both hard and soft sectors. When it encounters a bad sector, it utilizes RAID technology to calculate and recreate the bad sector, then re-writes the sector and verifies the write. If the sector is still bad, then it will relocate the sector, re-write and re-verify. If errors begin to occur with increased frequency, it is a likely sign of eminent disk failure. The Yellow Machine monitors and manages the disk scrubbing agent, and when the recommended threshold of repairs occur, it automatically sends an e-mail notification to the administrator and recommends a drive replacement to prevent a data loss event.

With Masterpiece RAID DST your data integrity is preserved and when coupled with RAID technology, offers unmatched reliability.

Reliable Hardware & OS

In order to maintain optimal life for your storage system, the hardware design is critical to maximize the lifetime of your storage system. Yellow Machine has a number of hardware specific designs that provides superior reliability.

Hard Disk Storage

The most common device for storage is the hard disk. Not all drives are created equal. Based on the type and use of your drive, life expectancy can vary greatly. Yellow Machine includes industrial grade disks matched to the overall system design specs in order to provide reliable operation under the heaviest of workloads. The disks then are matched to the thermal, electrical and mechanical specifications of the Yellow Machine chassis.

Other storage systems use light duty personal computer grade disks that are only specified for 10% usage cycles (i.e. the spec requires that the disk be idle 90% of the time, or reliability may be

impaired). Some other storage systems provide no disks at all, leaving it up to the user to guess which disks have appropriate electrical, mechanical, temperature and duty cycle specs for storing the user's priceless data. Don't put your most precious digital assets to the cheapest supplier – you may get what you pay for.

RAIDed OS

The Yellow Machine has a RAIDed operating system, where the operating system and system settings are stored on the RAID. This allows the OS to boot from any one of the four drives, so in the event that any one drive fails, the OS can still completely boot from any one of the other drives. Many RAID systems store the OS and settings on one disk or flash, so if that disk or flash goes bad, the system is down, without a backup, and unusable.

High-Quality Fan

Heat is the number one factor reducing disk reliability, and fans are a common failure point that cause overheating. Yellow Machine uses a premium, ball-bearing fan rated for heavy duty, long life operation. This is in contrast to the lower quality, low reliability sleeve bearing or hydro bearing fans used by competitors which also have substantially less lifetime expectation. These lower quality fans will fail, the disk will then overhead and then the disks will fail.

Each Disk has its Own Interconnect Cable

Cables and their connectors are one of the most frequent failure points in electronic systems. Some RAID systems share a single cable between two disks. If that cable fails, two disks will be lost and data recovery will be compromised. In contrast, Yellow Machine has a separate interface cable and a separate disk controller for each disk, increasing reliability and improving performance. If the cable to a single disk fails, the RAID and disk scrubbing system ensure that data can still be reliably accessed.

Uninterruptible Power Supply: UPS

All disk storage system benefit from proper power protection. The Yellow Machine has a UPS port to intelligently connect to a UPS systems, and can gracefully shutdown the Yellow Machine in the event of a power failure. Other systems add technologies such as journaling to help recover from an improper shutdown, but a connected UPS can virtually eliminate improper shutdowns from occurring in the first place. See www.YellowMachine.com/go/UPS for more information and compatible devices.

The Yellow Machine also includes a built-in surge protector and an advanced airflow design to keep the disk drives cool for longer life. With automatic temperature monitoring, the Yellow Machine will gracefully shut down to prevent overheating if it is in an excessively hot environment. An advanced mechanical drive suspension protects against shock and vibration.

Conclusion

If you are looking for long term, highly reliable storage to preserve your most precious digital content, then you need a FailSafe Storage System. FailSafe Storage includes RAID with Disk Scrubbing Technology all bundled in an affordable and highly reliable hardware design.

RAID 5 storage is ten times more reliable than a single disk (i.e external hard drive). FailSafe Storage is over 1000 times more reliable than a single disk. Large companies and data centers have trusted their data to RAID with Disk Scrubbing Technology for years. Now with the Yellow Machine, this high-end protection of enterprise grade archival storage systems is available to all of us at an affordable price.

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