

## Introduction

This past year the Controls group within the Collider Accelerator Department at Brookhaven National Laboratory replaced the Network Attached Storage (NAS) device that is used to store software and data critical to the operation of the accelerators. The NAS also serves as the original repository for all logged data. This purchase was used as an opportunity to categorize the data we store, and to review and evaluate our storage strategies.

This was done in the context of an existing policy that places:

- No explicit limits on the amount of data users can log.
- No limits on amount of time that the data is retained at its original resolution.
- Requires that all data be available in real-time.

## Categorization

Data was categorized into three distinct tiers:

1. Critical operational data.
2. Auxiliary operational data.
3. Historical/Temporary data.

Each tier was then assigned a desired level of reliability.

## Tier 1 – Critical Operational Data

Data that is needed to run the accelerators.

Consists of:

- Program executables.
- Configuration information.
- Front End Computer boot areas.
- Archives of recent settings.
- Critical home directories.

Reliability:

- High availability primary storage system required.
- Equivalent high availability disaster recovery system required.
- Data replicated to disaster recovery system as often as possible.
- Switch to disaster recovery system as fast as possible (less than 4 hours).

## Tier 2 - Auxiliary Operational Data

Data that is important for some operational tasks, but not critically needed for basic machine operation.

Consists of:

- Logged data from current run.
- Archived settings from previous runs.

Reliability:

- High availability solution desired.
- Disk based disaster recovery system required.
- Data replicated to alternate disk based system, where data is no more than a few days old.
- Switch to alternate system in less than 4 hours.

## Tier 3 – Historical/Temporary Data

Data not critical or important for current run.

Consists of:

- Logged data from past runs.
- Data to be stored for short periods.

Reliability:

- Some high availability features desired.
- Disaster recovery system not required.
- Disk based hot backup not necessary.
- Restoration from tape may take a few days.

## Storage Strategy

Tier 1:

- Use a high availability NAS device.
- Use a second NAS for disaster recovery.
- Replicate data to disaster recovery system as often as possible.

Tier 2:

- Leverage NAS system used for tier 1 to also store tier 2.
- Copy data to low cost auxiliary storage servers within days.
- Copy data from auxiliary storage servers to tape.
- Remove tier 2 data from NAS within 1 month.

Tier 3:

- Tier 2 data becomes tier 3 data as it ages. It is retained on auxiliary storage indefinitely for real-time access.