Fits Storage System

System Description Document

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# Introduction

The Fits Storage System comprises the hardware and software systems developed in late 2009 and early 2010 to improve the facilities at Gemini for the storage of our FITS data files. It essentially replaces and enhances the functionality of the wikiwiki (GN) and petrohue (GS) dataflow directories. Previously, FITS data was stored on filesystems that were NFS exported directly from the Netapp filers and NFS mounted on any other system requiring access. ISG carried out backups of these systems, but such backups were purely intended for disaster recovery and did not include a long term archive component. Several issues were present in this direct NFS system mainly due to issues with the native NetApp filesystem where putting a large number of files in a directory would lead to the filesystem claiming to be full. These filesystems did not appear to behave as advertised in this manner and this led to operations not being able to use the full capacity of these filesystems resulted in significant overhead for science operations in that data was stored locally for less time than ideal and that effort was required to monitor filecounts and delete files as needed.

The Fits Storage System addresses all these concerns, and provides various useful extra functionality to science and other operations that deal with locally stored FITS files.

# Deployment

The current intent is to deploy a FITS Storage System at each Gemini Site where FITS data are stored, this would be both summit sites and both base facility sites. Each system can operate independently of the others, though various utilities are provides to compare and synchronize data between the various systems.

# System Overview

Each Fits Storage system comprises a computer running RHEL5 Linux with a large amount of disk storage space. In the current implementation, the computers are Virtual Machines (VMs) running as part of the ISG VM cluster at each site. The storage is also provided as part of the VM and is actually stored on the ISG Netapp storage systems at the same site as the VM is located.

The VM implementation is such that to Linux Operating System (OS) running on the VM, the storage appears to be a local SCSI device. The Linux OS builds and maintains an ext3 filesystem on this device, thus avoiding any uncertainties in the behavior of the NetApp filer’s native filesystem.

The Linux system NFS exports the filesystem to hosts on the Gemini network, such that it can be accessed in exactly the same manner as the previous NetApp NFS exported filesystems. As NFS was the only means that the previous systems could be accessed, this ensures complete backwards compatibility. All that is required is that hosts mount the new filesystem appropriately and that any hard-wired paths to this filesystem are updated as appropriate.

There is an additional software component to the system, which also runs on the Linux computer. Essentially, the software maintains a database containing various details of the files on the storage system. The database is a PostgreSQL system running on the same Linux host. The database stores various housekeeping details of the files (size, last modification timestamp, Cyclic Redundancy Checksum (CRC)) etc, and various FITS header values from the file in order to present summary data. When a file is modified, the database creates new records for it and does not delete the old ones. Thus, a summary of the history of any given datafile is also recorded.