
RECENT TECHNICAL ACTIVITIES

The Optical Disk Permanent Record

Background

Up until first quarter 1989, CFHT had been keeping its permanent record of observations on 6250 bpi 9 track magnetic tape. While this was adequate at the time it resulted in the following difficulties:

- too much manpower invested in tape handling
- the limited space in our data vault was almost exhausted
- our yearly costs for tapes were exceeding \$10,000
- our existing tapes were aged to the point where they would require yearly maintenance if they were to remain useful

After an investigation of the available devices we picked a Write Once, Read Many (WORM) Optical disk manufactured by Maxtor. This disk uses a 5 1/4 inch optical disk cartridge with a capacity of 800 Megabytes. The interface used is SCSI and the vendor of the drive, Delta μ Systems, supplied all the software required to move files on and off the media. Our reasons for choosing this drive were driven by the following considerations:

- the drive must interface to our current Unix hosts
- it must be inexpensive enough that a backup drive was affordable
- the drive chosen must be compatible with future juke-box configurations

Implementation

The drive was installed in Waimea on one of the Sun Workstations and both the drive and the workstation are on the Uninterruptible Power System. Software was created which automatically retrieves the FITS images/files from the summit in real time across the T1 leased line, compresses them using adaptive Limpel-Ziv coding, and writes them to optical disk. We have found from experience that compression factors of between 2 and 5 are typical for FITS images. This increases the effective capacity of the optical disks to at least 1.6 Gigabytes. Tests have shown that the images are removed from the summit in approximately 15 seconds.

Effects

We have made **no changes whatsoever** in the visiting observer's view of our tape handling. The observer writes data to tape at the summit and brings the tapes to Waimea for copying. In Waimea we are currently giving the observer a copy of the summit tapes and keeping the originals. We are making monthly tests comparing the original data tapes to the files on optical disk.

We expect to be able to rescind the requirement that observers make copies of their tapes in Waimea sometime

during 1990. However this will depend on the results of our comparison tests.

Results

We have found that we are filling up 1.5 optical disks per month. This will result in some 18 optical disks at \$150 each requiring storage in our data vault. The good news is that 18 optical disks take up about a cubic foot of storage space, thus increasing the longevity of our data vault.

If our comparison tests prove out, which they have to date, we will be copying all our existing 9 track tapes to optical disk.

Rick McGonegal

A Data Reduction Facility Development Computer System

Background

The CFHT network has become a very busy system with users depending on it twenty-four hours a day. This makes it difficult for the data reduction facility staff to perform software maintenance on the network and still keep the network alive. To help alleviate this problem, a small development system has been set up. Any time new software is to be added to the network or existing software needs to be upgraded, the changes are performed on the development system first. Hopefully, this strategy will minimize network downtime for software maintenance.

Implementation

The development system currently resides in Bob Link's office. It consists of a Sun 360 workstation, a Delta Microsystems 60MB cartridge tape drive, a Delta Microsystems 580MB winchester disk, and a PerfectByte 8 mm exabyte tape drive. The three storage devices are daisy-chained to the SCSI port of the Sun 3. The workstation is currently configured as a standalone computer using the winchester drive as the boot and storage device. The workstation is running Sun OS4.0 and is connected to the network so all network facilities are still available. If required, the storage devices are available to other users across the network. The development system provides another benefit to the network, there is one less machine to be served by the over-worked network file server machine. The 60MB cartridge tape is used primarily for reading in new software; these tapes are the most common medium for delivery of software. The exabyte tape is used as the primary system backup device for all disks across the network. While the exabyte is relatively slow, it has a large capacity so that a backup of the entire network can be stored on one tape. This allows the backup to be performed during the night, unattended. The

capacity of the exabyte drive is about 2 gigabytes.

Future Plans

Future plans include configuring the development system as a server and allowing it to serve one other machine. This will provide more extensive testing of software on the development system and pull off another machine from the main server. The major project for second semester 1989 is testing all software user Sun OS4.0 in order to upgrade all machines on the network to Sun OS4.0

R. Link

Updated Network News

The CFHT network has remained relatively static over the past 6 months. Rather than expanding we have been concentrating on making use of this valuable resource. Some of our uses are detailed below.

Status

Our network is currently comprised of an ethernet backbone in Waimea connected to the summit ethernet via a T1 link provided by Hawaiian Telephone. The summit network is connected via a leased line to the University of Hawaii at Manoa where we enter the three major networks.

There are currently 13 Suns, 9 HP9000's, a MicroVax, and a personal computer resident on this network. In addition, we are beginning to have 'visitor' computers show up. One of our visiting astronomers, C. Pritchett, brought his own Sun workstation with him, and we have had visiting instruments attach to the network during their observing run. We will be adding 2 HP9000's and 3 personal computers to our network in the near future.

Electronic Mail

We are currently members of the three major networks; Internet, Bitnet, and SPAN. Our addresses on these networks are:

Internet: user@cfht.hawaii.edu
Bitnet: user@UHCFT
SPAN: UHCFT::user

Our standard for CFHT personnel is to use their last name for their mailing address. If you are unsure of which address to use send the mail to 'postmaster' and we will forward it.

Network Time Protocol

All the Unix computers at CFHT use the network time protocol to synchronize their times to National Standards. Currently two of our hosts track the time at the San Diego Supercomputer Center and the remainder use these two as internal standards. The protocol is accurate enough that there is typically less than a 10 millisecond difference between our local standards and the mainland clocks.

Rick McGonegal

FTS Data Reduction on the CFHT Network

Background

The computer environment for FTS data reduction has progressed from the HP1000 to the Vax750 to the MicroVax. Since CFHT has recently embraced the Unix operating system via a network of Sun and HP Unix workstations, the FTS data reduction program has once again been ported to another computer system. This move is not only necessary, but should prove advantageous to users. For example, the FTS program is usually run under the SunWindows environment, providing the user with a sophisticated, yet easy to use, set of tools. The June 1989 FTS run will be the first use of the Sun3 version of the FTS program.

Implementation

While there have been many internal changes to the FTS program to accommodate Unix, the basic logic and user interface have been preserved. Thus, the program will 'look and feel' the same as the previous versions. The FTS program is written in the FORTRAN and C languages. The plotting routines are from the Supermongo package provided by R. Lupton and P. Mongo. Currently, the FTS package can only be run on a Sun3 or terminal.

Data Conversion

Coincident with releasing the Unix port of the FTS reduction package is the switch of the FTS data acquisition software to the HP9000 computers. One result of this switch is that all summit FTS data tapes will be in FITS format. Previously, these tapes were in native HP1000 FTS format. The FTS package now accommodates the FITS format.

As well, output of the FTS data reduction package is now in FITS format. In the past, users of the package had been taking data off-site in VMS backup format (files being in the native FTS data format). While FITS output poses no problem for CFHT, there are a number of sites using the VMS FTS package with no FITS input capability. To aid these users, CFHT has created a VMS conversion tool for transforming FITS format into the old FTS format. This conversion program is available upon request.

Future Plans

Future versions may include:

- using the IRAF image format internally instead of the native FTS format
- porting the FTS program to the Sun4 platform; it currently runs only on Sun3's
- improving the speed of hard copy plots, for example, plots of 75,000 points take up to 20 minutes for completion; the speed of hard copy plotting is currently limited by the serial link to the plotter

R. Link