Data Acquisition Networking

This article will narrow our networking perspective to just what happens in the data acquisition area.

1. Why We Care

Our claim is that the decision making process can be improved by having an accurate mental model of our computing environment. In particular, instrumentation hardware and observing programs should both take networking into account.

The key to the proper mental model is that we have not just added new features but that we have undergone a phase change. The very nature of computing in a properly structured network is different. This phase change from many computers, each with its own services, to one seamless computing environment, was precipitated by:

- Summit network. There is a complete network setup and operating at the summit.
- Waimea link. Tying our two local area nets into one wide area net is a major increase in connectivity.
- Current industry standards. Even though we are a multi-vendor house (DEC, HP and SUN) we have not compatibility problems.
- Previous CFHT investments. Our investments are not all new. Our Waimea SUNs, VMS net, cabling, terminal servers are all integrated in.
- Advent of new computers. This particular project was timed well to allow us the advantages of this technology.

2. Implications

Even the most basic implications of the phase change are many and each is quite important to our ability to perform better science more efficiently. All CFHT computing resources are technically accessible all of the time. Sophisticated observing programs that would require the Waimea SUN-4 or a VMS application as part of the observing loop can now be considered.

Data can be acquired to and from anywhere easily and quickly. Our system design can now consider such questions as "should data be directly acquired onto the Waimea disc drives?" An automated archiving system is also possible.

Instruments (CFHT and visitors) can be direct network devices. We have in fact tested the network to both coudés and the cassegrain environment. Also, we have just completed a successful CIRCUS run in which the French-built CIRCUS control computer was a network device and data was acquired directly across the net.

Remote acquisition and development is now possible. Much engineering at the summit from Waimea has already occurred. We are also planning to use our world wide network connection to benefit instrument development. Our Canadian link will be used to test the MOSIS control electronics before delivery to CFHT.

We are also striving to become a tapeless society. Tape handling errors (especially at 14,000 ft.) and tape processing time are major factors in our current operation. It is not uncommon when processing imaging data to discover that much more time is spent getting data on and off tapes than is actually spent processing it. It is also true that error checking for correct data transfer on the network is more robust than for tapes.

3. Constraints

We have some real and some self-imposed constraints:

- No system level modification for special run accommodation. This is a bad idea anytime but especially in a multi-tasking networked computing environment.
- Our own CFHT data acquisition software will run primarily on one machine. This will simplify software version control and equipment backup/damage-control strategies.
- Tape drives must still exist as backup equipment and as recognition that some astronomers wouldn't be comfortable without them.
- Much corporate policy has yet to be worked out. Note that we have not discussed remote observing either from Waimea or outside Hawaii.

4. Summary

When designing new equipment or planning a novel scientific program, one really should give the network some thought. Networking is already making a big difference to our nighttime possibilities.

Jon Brewster

An Integrated Observing Environment

1. Previous Situation

In the observatory's design, and in the original implementation, the telescope operator and observer were together in the control room. Unfortunately, it was not feasible to accommodate large visitor instruments and instruments which required CAMAC or instrumentation cabling. The solution was to move the observer to the nearest large, open area, which became the observing room. This has been the situation for the last seven years.That the arrangement did work cannot be argued. That it had significant problems is also a fact. The isolation kept the telescope operator and observer from working as a real team. It left the observer alone with a lot of complicated equipment which had to be operated correctly to achieve good observations. Although the problem was recognized, and frequently discussed, it was not easily possible to alter the observatory layout. Thus, the situation persisted for many years.

2. Planning

With the continuing computerization of instruments and the emergence of CCD's as the preeminent detectors, the observing situation was reconsidered. A working group was formed to study the possibility of again combining the functions of T.O. and observer in one room. The group determined that the amount of equipment required to support CCD imaging and spectroscopy was compatible with a control room redesign. However, at the same time it decided that most other observing, including visitor instruments, would have to remain in the present observing room for a