



User Services Consulting Support Tools at the NASA Numerical Aerodynamic Simulation Program

Consulting Team:

*Christopher Willard, Ph.D., Jacques Middlecoff,
Leslie Hart, Robert Eckert*

*GE Aerospace/FESD
4041 No. First St
San Jose, CA 95134*

INTRODUCTION

A variety of UNIX base software tools were developed to support the Consultant function for High Speed Processors (supercomputers) at NASA's Numerical Aerodynamic Simulation (NAS) supercomputing facility. The project maintains two Cray-2 supercomputers for general use, and several systems for evaluation and research including Convex and Alliant mini-supercomputers, and an ETA 10. The objectives of the NAS program are:

- to provide a national computational capability available to NASA, DoD, Industry, other Government agencies, and Universities, as a necessary element in ensuring continuing leadership in Computational Fluid Dynamics and related disciplines and,
- to act as a pathfinder in advanced, large-scale computer system capability through systematic incorporation of state-of-the-art improvements in computer hardware and software technologies.

NAS's first Cray-2 supercomputer was installed in October of 1984, it was then used by a small highly experienced group of users. At the current time the NAS facility supports over 300 research projects and over 700 scientific users. A second Cray-2 was added for general use in January of 1988, it is scheduled to be replaced by a Cray-YMP in the Fall of 1988. Several systems have also been acquired for evaluation and research including Convex and Alliant mini-supercomputers, and an ETA 10. The role of the NAS project as a path finder causes rapid changes in the system environment. The project often receives prerelease or Beta test versions of software. The expanding user community exhibits a great range in experience and skills in supercomputing.

As the number of projects and users increased the consulting staff grew to meet the increasing demands placed by this community. Software tools were developed to aid consultants in recording, tracking and reporting on user problems, informing users of known system problems, and to help control room staff locate consultants. These tools were developed using standard UNIX System V facilities and the C language.

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PROBLEM TRACKING SYSTEM

A Problem Tracking System provides an on-line mechanism for recording user problems, storing information on responses to the problems, accessing information on past or similar problems, and report generation. The system makes use of the UNIX directory system and tools for file manipulation and key word searching.

When a problem is reported the consultant responsible for the problem will create a User Problems File (UPF) which contains: user identification information and phone number(s), a description of the problem, any electronic mail relating to the problem (either sent or received), any notes on the progress of the problem's resolution, and a description of the problem's final resolution. UPFs are named according to the following convention:

YYMMDDuser_name

where YYMMDD = Year, month, day (always 6 digits).
user_name = the user's login name.

Each UPF contains a header line in the following format:

Log-Number, Key word problem description

The Log-Number is a reference to a Hot-line phone service problem logging system, it thus allows cross tracking between the two systems. A dummy Log-Number is entered for problems that are received directly by the consultants.

UPFs are kept in directories according to their status:

- active — problems that are currently being worked on by the consultants,
- waiting — problems that have been referred by the consultant to other resources within the NAS division and are waiting for resolution,
- fixed — resolved problems, and
- cold — cases where the user could not be found, or does not return calls, and the problem appears to be minor.

Fixed UPFs are eventually moved to archive directories.

A set of tools have been developed for such tasks as accessing directories, UPF management, and UPF searching. These tools are briefly described below.

- UPF directory access: Directories can be accessed by simply entering their names.
- Movement of UPFs into and between directories: Files can be moved to the active, waiting, fixed or cold directories with the act, fix, wt, or cld commands. For example:

act file_name

copies file_name to active and sets proper file access permissions, and

act file_name1 file_name2

copies file_name1 to active/file_name2.

If file_name already exists in the “active” directory the new file is appended to the existing file.

- Interfacing the problem tracking system with the electronic mail system: Mail files can be saved directly into UPF directories, for example, when in the mail system:

s 1 ~ a/file_name

will save message number 1 to active, with name “file_name”, and with proper file access permissions set. If file_name already exists in the “active” directory the new file is appended to the existing file.

- Locating UPFs: UPFs directories can be searched for user-name, date, or consultant with the “list” command. For example in the active directory:

list hart

would return all directory entries for consultant hart. Directory entries are printed in the standard UNIX long format:

-rw-rw-r--	1 hart	g188	96 Jul 21 17:00 880715auser
-rw-rw-r--	1 hart	g188	153 Jul 21 16:59 880719buser

Similarly “list 880715” would return all entries for July 15, 1988 and, “list jones” would return all entries for the user “jones”. Command options allow “list” to work from other directories, thus:

list -a keyword

would return all entries in the active directory containing “keyword”.

The “hdr” command performs the same searches to “list” but returns the header line from selected files, for example:

hdr hart

would return:

880715auser:	8808239 NQS question about the -rs option
880719buser:	8808414 User needs timing info.

- Searching and listing UPF headers: UPF headers can be searched for one or more key words. Header lines for selected UPFs are displayed. For example:

hd plot3d

will return header lines which contain the keyword “plot3d”, note that the search is not case sensitive,.

880708xuser:	Problem running PLOT3D on wks — Navier
880715yuser:	PLOT3D — Is there a way to decrease access time?
880729zuser:	Wants DI-3000 version of PLOT3D.

If multiple keywords are entered `hd` will return header lines which contain one or more of the keywords. The `hd` command without keywords will list the headers of all files in the directory.

- Generating reports on problems added to and moved from each directory: Reports on UPF activity are automatically generated on a weekly basis from information in the problem file directories. Figure 1. shows a section of an example report.
- General utilities: Tools are also available for counting the number of files in a directory, and for modifying a files access permissions.

Tools were developed by the consultants using C-shell command aliases and Bourne Shell scripts. As problem directories became larger some of the more complex scripts were augmented with C language programs to improve performance.

PROBLEM REPORTING SYSTEM

A problem reporting system (`fbugs`) provides the user community and the consulting staff with a list of known bugs on the Cray systems and possible work around solutions. The database is maintained by the consulting staff and currently gives the user information on five categories; the `cft-2` FORTRAN compiler, the `cft77` FORTRAN compiler, linkers and loaders, the Network Queuing System, and debuggers. Each category has a header followed by a list of problems. Each problem contains a date, a short description of the problem, and a work around solution if available. Options allow users to select only categories which have been updated since their last visit to `fbugs`, and to copy `fbugs` data to local files.

Typing `fbugs` presents a menu displaying the categories. Selecting a category displays the problems in that category ordered by date, the most recent first. The `fbugs` command is file driven, it looks in the `fbugs` directory and builds the menu from the file names it finds. Adding or deleting a file from the `fbugs` directory adds or deletes that item from the menu.

`Fbugs` was developed in response to user desire to keep abreast of problems and thus avoid known errors. `Fbugs` has been a great help not only to the users but also to the consultants for quick reference to problems.

CONSULTANT ON DUTY

A Consultant On Duty (`cod`) system aids control room staff in locating consultants to assist in user problems. The system maintains a schedule for consultants on "hot line" duty and provides their name and phone number to other user services personnel. The `cod` system has options for forwarding duty or phone information, and automatically accounts for regularly scheduled staff meetings.

There are five Unix commands plus several data tables that comprise this system. The first command is for use by the hot-line staff to inquire which consultant is on duty. This command is named "`cod`"; it takes no parameters and simply lists the name and phone number of the consultant or consultants currently on duty.

The consultants have four additional commands to help them manage the `cod` schedules and handle forwarding of duty. The most used command by the consulting staff is the "`codfwd`" command. This command allows the forwarding of duty from one consultant to another. This allows for "on the fly" changes in the regular schedule to account for special meetings as well as staff illnesses. This command takes a consultant's user code as a parameter as well as an optional duration. The duration is the amount of time that the

forwarding is to remain in effect. The consultant may cancel the forwarding manually as well with the "codunfwd" command. There is also a command to allow the consultant to temporarily modify the identification line associated with the consultant's user code. This is useful if the consultant must be in another location temporarily, such as consulting with a local user in that user's office. The consultant may also inquire as to the day's schedule with the "codsched" command.

This software is table driven and the tables are contained in several Unix files. There are seven schedule files (sched.Mon, sched.Tue, ...) that contain the consulting schedules for the seven days of the week. There are also a phone file ("phonefile") and a path file ("pathfile"). The phone file contains the usercode, full name and phone number of each consultant eligible to be the cod. This file is used for identification by the "cod" command as well as for verification by the duty forwarding command. The path file contains the usercode and home directory for each consultant. These two files contain a number of "dummy" consultants in order to allow attendance of meetings and seminars. For instance, consultants may forward their duty to the "dummy" consultant "Seminar" to indicate the attendance of a seminar in the auditorium. There are two other files of interest, both reside in the consultants home directory (found in the path file). The first is the forwarding file (".codrc"); this file contains the ending time of the forward command and the usercode of the consultant that is the target of the forward. The second is the identity file (".codid"); this contains the name and phone number of the consultant. If the file is empty or the first line is blank, the information from the phone file is used. This is used primarily for temporary changes of phone number in order to allow the consultants some mobility during their duty session.

SUMMARY

The tools developed at NAS to support the consulting function have proven to be workable and effective. The large database of ongoing and solved problems at NAS could be overwhelming without some form of management. The problem tracking system and its associated tools have allowed the consultants to track and manage these problems. This system also aids in the solution of new problems by providing access to solutions from problems worked on earlier. Perhaps its greatest value to consultants is a mechanism for handling multiple user problems simultaneously. The "consultant on duty" system works well to distribute the consulting load and provide the control room staff with a method of contacting a consultant immediately. The system bug database provides the user with an answer to some of the more common questions without having to consult the support staff.

Figure 1: High Speed Processor Consultant Activity report, section on active problems.

Cray Consultant Activity
Fri Jul 29 06:00:04 PST 1988

Active directory:

Totals: Directory: 11
 Added: 2
 Moved: 3

Added to active:

file name	description
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880728auser	8810406 Problem with incomplete code showing up in link phase
880727cuser	8808699 Program aborting with a read error

Moved elsewhere:

file name

880621auser
880719duser
880721euser
