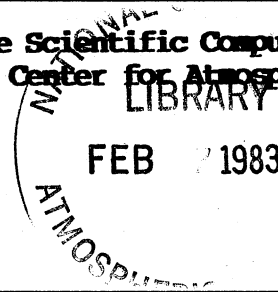# The Record

a newsletter of the Scientific Computing Division,
National Center for Atmospheric Research

FEB 1983

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SERVICES DIRECTORY
(303) 494-5151 - FTS prefix 322-5

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CONSULTING OFFICE

The Consulting Office will be closed every Wednesday from 13:30-14:30 for staff meetings. When the special Consulting Office is closed, a recorder will be attached to 313 and messages may be left. When you leave a message, please indicate the nature of your question.

	Regular Consulting Office		Special Consulting Office
	Extension 579 08:30-12:30	Extension 579 13:00-17:00	Extension 313 10:30-12:30
MONDAY	Erich Thanhardt	Harsh Passi	Barb Horner
TUESDAY	Ann Cowley	Dan Anderson	Ken Hansen
WEDNESDAY	Ken Hansen	Dave Kennison	Harsh Passi
THURSDAY	Barb Horner	Dan Anderson	Dave Kennison
FRIDAY	Ken Hansen	Dave Kennison	Dan Anderson

SCHEDULE OF MACHINE UNAVAILABILITY

All machines may be down from 07:00 until 08:30 daily for Systems Checkout. In addition, some machines will be down for Preventive Maintenance as follows: 7600, 06:00-07:00 (M T W Th F); CRAY-1, 06:00-07:00 (M Th), 06:00-07:30 (T), 06:00-06:30 (F); TMS-4, 06:00-07:00 (daily); MODCOMP, 08:00-12:00 (1st Monday of month).

Software and Libraries
Group, left to right--
Harsh Anand Passi, Ben
Domenico (seated), Richard
Valent, and Raul Lopez.
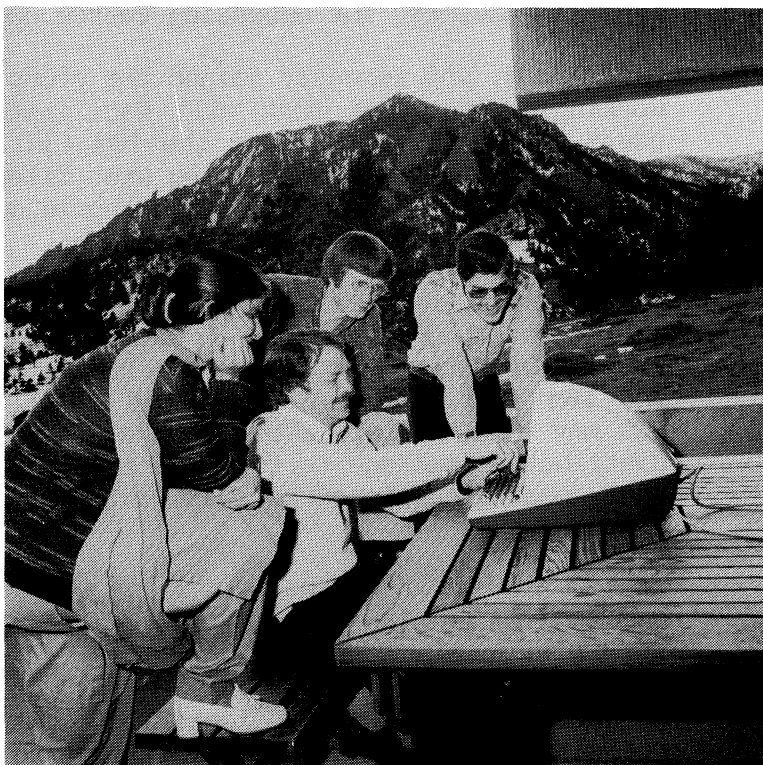
The Software and Libraries Group

The long-term goal of the Software and Libraries Group (SLG), headed by Ben Domenico, is to provide users with convenient access to the software needed to make the best use of SCD computers in their scientific research. The software falls into three main categories: mathematical, graphics, and program development tools. The work of the graphics project will be covered in more detail in the next issue of The Record.

Richard Valent is responsible for maintaining the supported public software packages, which now number in the thousands in twenty separate libraries with well over a million lines of source code. Although much of the software has commercial origins, he has also worked with users to incorporate their software into NCAR public libraries. Continuing Russ Rew's effort to automate the maintenance procedures, Richard has himself developed a considerable collection of programs for such tasks as implementing, testing, auditing, and restoring the library software on both the CDC 7600 and the CRAY-1. Anticipating the CDC 7600's departure, he has isolated SLG's CDC 7600-specific software, and has worked with the NCAR Consulting Office to publicize this software and its recommended replacements.

Harsh Anand Passi, who only works half time in SLG, is responsible for acquiring and implementing NCAR's large store of mathematical software. She is the main User Services mathematical and statistical consultant and acts as a liaison with the Advanced Methods Section. Harsh is also the SLG expert on CRAY-1 procedures for accessing source code and library documentation.

Raul Lopez, who recently joined the group as a part time student assistant, is working on programs that will facilitate the transfer of information among users on the PDP 11/70s and the IBM 4341. His utilities will provide a uniform interface for transferring user files and mail among the various machines on the NCAR local network. This should make it easier to identify and correct problems with the public software.

Ben Domenico is working on providing a uniform set of program development utilities on all SCD machines. So far the focus of this effort has been the Virtual Operating System (VOS) Software Tools package, which is now running on the IBM 4341, the CRAY-1 and the PDP 11/70 UNIX systems. Non-NCAR users of SCD may also be interested in the fact that SLG is converting its software distribution package to run on the CRAY-1, so that SLG can continue to distribute locally-developed software to other sites.

CDC 7600 to be Disconnected

On January 7, 1983 the Scientific Computing Division gave Control Data Corporation the 90-day notification required by contract to cancel maintenance on the CDC 7600.

The effect of this action is that CDC engineers will no longer maintain the CDC 7600 after April 7, 1983. SCD will disconnect the power to the CDC 7600 on April 8, 1983. Users should note that the CDC 7600 card reader will no longer be available after this date.

Please note that as we get closer to April 7, the workload will increase while users get their last minute work done. To have the best chance of completing any conversions and final CDC 7600 processing, please submit them as quickly as possible.

by Gary Jensen

Modifications for the Second CRAY-1

SCD has received a favorable response to its request for bids on electrical and mechanical modifications to the computing center required to bring the second CRAY-1 online.

The contractor has been selected and the proposed contract forwarded to the National Science Foundation for approval at the time of this writing. The

NCAR Facilities Group has placed orders for most of the known "long lead time" items.

SCD chose a contractor that proposed the lowest price for a 45-day completion program. There will be severe liquidated damages for delays not due to NCAR. The contractor also has agreed to notify SCD 48 hours prior to any computing center shutdowns.

Ground rules for computing center shutdowns are limited to three occasions, four days maximum each occasion, for a total shutdown time of ten days over the length of the 45-day contract.

Experience tells us that contractors and their employees are not perfect and that we can expect to have some unscheduled shutdowns. This is inevitable.

The Operations Group will post online notices for all planned power shutdowns, as well as operate a "Hot-Line" at (303) 494-5151 ext. 536 (FTS 322-5536) during this 45-day period. Someone will be available at all times to provide information regarding schedules, problems and current plans.

This will be a time when we will all need to practice patience and understanding. We appreciate your help in getting through this period of aggravation. The reward of additional CRAY-1 computing power will make this worthwhile.

by Gary Jensen

SCD Announces New Allocation Policy

On January 6, 1983 the UCAR trustees authorized NCAR's director, Wilmot Hess, to initiate a new allocation policy of SCD's computer resources. The new policy calls for the following distribution of computer time:

    40% University use.
    40% NCAR use.
    20% Joint use.

This policy will go into effect when the CDC 7600 is replaced by the new CRAY-1. Please note that the resources of both of the CRAY-1 machines are considered to be combined for the purposes of distribution.

by Walter Macintyre

Special Consulting Office Open

A special Consulting Office is now set up to aid users in removing CDC 7600 dependencies from their codes and procedures. The office is in room 11c of the SCD Input/Output area, and may be reached at (303) 494-5151, extension

313. The calls will be answered automatically by the recording device when the office is closed. Please leave your name, location (city and state) and phone number and someone will return your call. Be sure to indicate that your question concerns CDC 7600 conversion since this recording device also accepts messages for the regular Consulting Office.

The hours of operation are 10:30-12:30 daily. Please take all of your CDC 7600 conversion questions to the special Consulting Office. As demand increases, the hours of operation will be expanded. Demand will be evaluated by the number of messages left on extension 313 and by in-office visits. As a matter of policy, telephone calls will take precedence over people walking into the office.

by Barb Horner

SCD Announces Conversion Seminars and Site Visits

In anticipation of the removal of the CDC 7600, SCD is planning to hold a series of seminars to assist users in moving smoothly off of the CDC 7600 computer. In addition to these seminars, which will be held at NCAR on the Mesa Lab, a series of site visits are being planned to carry essential conversion information to our remote users. Questionnaires are being sent out at this writing to ascertain which remote sites desire a visit from SCD personnel.

The seminars are scheduled for the second and third weeks of February 1983, approximately one month before the site visits and about two months before the CDC 7600 is physically removed from NCAR. The schedule for the conversion seminars is printed below. Anyone interested in attending these seminars should contact Greg McArthur, SCD Training Project Coordinator at (303) 494-5151, ext 532.

Title of Seminar	Date	Time
Elementary CRAY JCL	2/7/83	9-11:00
Using PSTORE: A Tutorial Introduction	2/9/83	9-10:30
Using Magnetic Tape -TAPECY,TAPEIO,DSEG,MCONV	2/11/83	9-10:00
Using ED and SEDIT on the CRAY-1 and IBM 4341	2/14/83	9-10:00
Using UPDATE on the CRAY-1	2/15/83	9-11:00
Using EDITOR on the CRAY-1	2/16/83	9-11:00
CRAY JCL Procedures	2/22/83	9-11:00
The NCAR Local Network	2/24/83	9-11:30

Online Ski Report Available to SCD Users

Those of us fortunate enough to live in Colorado are naturally interested in the ski conditions at various locations around the state. In the interest of maintaining a healthy relationship with our remote users, we have initiated a special ski report file which is located on the IBM 4341 computer. You may access this file by logging onto the IBM 4341 and entering SKIRPT. The file is similar to the NEWS DAILYB file. You may peruse the ski report file in the BROWSE facility. Access to the IBM 4341 has been simplified with the installation of our UNINET packet switching service (see Volume 3, Number 11 of The Record). Using UNINET, you can access and read the ski report file.

We hope you will make use of this new feature on our IBM system, particularly if you are planning a visit to NCAR this winter. Check the ski report file first and come prepared to enjoy our mountains and snow.

by Walter Macintyre

PSTORE Available

Version 01 of PSTORE, a permanent file storage replacement for PLIB, has been released as of today, February 1. PSTORE (for Permanent STORagE) files reside on the TBM and are accessible from the CRAY-1. Future versions of PSTORE will allow access from the IBM 4341 (via the NCAR Local Network), and other satellite computers. The TBM volumes which implement PSTORE escape the quarterly purge, just as PLIB volumes do now.

A description of PSTORE is available in Chapter 2 of the Conversion Handbook; documentation exists online on the IBM 4341 and in hard copy from the Consulting Office.

Software "News" from CRAY Research, Inc.

Why We Did What We Did to Boolean

CFT 1.09 would accept Boolean constants and expressions as arguments to intrinsic functions. Except for a few special functions, CFT 1.10 will not. The major reason for the change was the introduction of generic functions. This requires CFT to inspect the argument types before deciding how to evaluate the function. It wasn't that 1.09 allowed Boolean arguments; it just didn't prevent them.

The 1.09 treatment was reasonably consistent (although the type conversion routines worked in a counter intuitive way), but it was not extensible to 1.10 with both generic and specific function names. It would probably be possible to make CFT 1.10 accept Boolean arguments for old specific functions, but this would introduce strong inconsistencies.

Consider the following Boolean expressions:

        (I .OR. 400014000000000000000B)
        (X .AND. 7B)
        (SHIFT (525252525252525252252B,N)

The first is obviously a way to make a real number out of an integer; the
second clearly produces, as an integer, the right hand 3 bits of X; the third
is really Boolean. Suppose that these were each used as the argument to the
ABS function. Under 1.09, ABS was only the specific name of the real ABS
functions. In effect it would clear the sign bit of the real argument. In
1.10, ABS is also the generic name for the class of absolute value functions:
ABS, IABS, DABS and CABS. If the argument type is real it clears the sign
bit, if the argument type is integer it selects either arg or -arg, etc.
Which ABS should be used for each of the above arguments? It isn't really
determinable by the compiler. There probably aren't any old codes out there
which use arguments of type 2 or 3 for ABS, but this does give you some idea
of the kind of problem generics present for the compiler. As generic func-
tions become understood they are likely to become widely used. Surely MAX is
much easier to use than trying to remember whether MAX1, MAX0, AMAX1 or AMAX0
is appropriate. The ad hoc 1.09 rules (for example: Boolean acts as real in
ABS and as integer in MOD) are not easily explainable and are difficult to
remember.

In the long run we feel that consistent rules for the use of Boolean arguments
will be best. We regret that in the short run you may be asked to make incon-
venient and time-consuming changes to your code.

24-bit Integer Variables in CFT

CFT has supported both the INT24 compiler directive and INTEGER *2 as declara-
tives for 24-bit variables. The intent was to provide access to fast multiply
and divide instructions for values known to be small, particularly subscripts.
As CFT has matured, it has done a better job of automatically moving subscript
calculations into A registers. We now recommend that users not use INT24,
although we will continue to support it.

As implemented, 24-bit variables are always stored in memory as full 64-bit
quantities with sign extension. Most scalar operations will load values into
A registers, perform the operation, transfer the result to an S register with
sign extension and store. If the operation must be performed in S registers,
the values will be transferred and operated on, the result will be truncated
by moving it back to an A register, and then it will be sign extended and
stored from an S register. Most vector operations directly load V registers,
operate and store with no truncation or sign extension. Overflow into the
24th or higher bit is never detected. When used as an argument to a function,
the variable is loaded into an A register and moved to the S register with
sign extension and the function is evaluated in S registers.

Note that constants are 64-bit quantities and that 64-bit mode is a higher
type than 24-bit mode. An expression such as 3*INT24 is evaluated in 64-bit
mode and produces a 64-bit result.

The initial 1.10 release of CFT did not allow 24-bit integers as arguments to intrinsic functions (other than specific type conversion routines). A critical mod will be released which will cause CFT 1.10 to accept 24-bit integer arguments for any functions which accepts 64-bit integers.

Documentation Update

The purpose of this column is to announce revisions, updates and new documents of interest to the user of SCD's computers.

Included at various times will be documents issued by SCD, by NCAR but outside SCD, by IBM, and by CRAY Research, Inc. Directions for obtaining the documents are included.

SCD Documents

The Conversion Handbook is now available to aid users with the transition from the CDC 7600 to the CRAY-1. The Handbook includes chapters on PLIB replacements, editing on the CRAY-1, ULIB/XLIB conversion, converting from FRED to IFTRAN, using magnetic tapes, input/output routines, data communications, and NCAR RSCS tutorials for UT200 users, HASP users, and IBM 2780/3780 users. Also included are numerous examples.

SCD documents are available from Sal Farfan, room 17G, ext. 346. If you are at the Mesa Lab, you may pick up manuals in the Computing Library (room 9C).

CRAY Documents

The CRAY Operating System (COS) 1.11 is now the default operating system. CRAY 1.11 documents are being mailed at this time.

CFT 1.09 remains the default FORTRAN compiler. However, CFT 1.10 can be accessed by including the following control statement in the user's JCL:

```
CFT110.
CFT,XXXXXX   (As always)
```

by Linda Besen

Zot - The Next Quarterly Purge of VSNs

The next quarterly purge of VSNs from the TBM will occur on March 26, 1983 (a few days earlier than usual so as not to conflict with the Easter weekend), and will affect VSNs not accessed since January 8, 1983.

Users must access needed VSNs during the current quarter to prevent them from being purged.   VSNs on Dedicated and Archival reels and PLIB (P04xxx or P05xxx) VSNs are not purged.

A new utility called UPKEEP, for TBM volume maintenance, was announced in the January 1, 1983 issue of The Record (Volume 4, Number 1). This program can be very helpful to users who wish to update valuable volumes, and to delete unneeded volumes. A full explanation of UPKEEP may be found on pages 8-10 of that issue. Questions to Mary Trembour (ext. 450).

Summary of Daily Bulletin Items

Below is a summary of some items which have appeared in the Daily Bulletin (the NEWS file for remote entry users). These items concerned systems changes, operations procedures, and other news of general interest. They may still be of interest to users and are listed below by topic and date.

CRAY-1:

December 15, 1982
The CRAY-1 BRANIO utility described in November's special edition of The Record will be added to source library CRAYLIB and binary library $NCARLB today.

December 27, 1982
The CRAY-1 has two changes this morning—a new network package with dynamic buffering and a new TBM processor with various changes. The TBM processor delay time when no jobs are active in the TBM queue has been changed from 20 seconds to 60 seconds.

IBM 4341:

January 6, 1983
Beginning Monday, January 10, print files from job classes A-D and M which exceed 25,000 lines will be sent to the DICOMED and be put onto microfiche. See the January 1 issue of The Record for details.

Summary of NCAR Computer Use for December 1982

7600 COMPUTER

	DECEMBER		FISCAL YTD	
	Total	Day Avg	Total	Day Avg
Clock Hours in the Month	744.00	24.000	2208.00	24.000
less Scheduled PM	20.15	.650	61.72	.671
less Hardware Downtime	14.23	.459	40.05	.435
less Software Downtime	.03	.001	.30	.003
less Environmental Downtime	0.00	0.000	10.19	.111
less Operations Use	9.67	.312	31.73	.345
less Other Causes	8.27	.267	19.15	.208
Clock Hours Up	691.65	22.311	2044.86	22.227
less Systems Checkout	0.00	0.000	.18	.002
Clock Hours Avail. to Users	691.65	22.311	2044.68	22.225
less Idle Time	97.76	3.154	282.43	3.070
Clock Hours in Use	593.89	19.158	1762.25	19.155
% Available Hours Used	85.87 %		86.19 %	

CRAY-1 COMPUTER

	DECEMBER		FISCAL YTD	
	Total	Day Avg	Total	Day Avg
Clock Hours in the Month	744.00	24.000	2208.00	24.000
less Scheduled PM	15.89	.513	45.12	.490
less Hardware Downtime	10.63	.343	19.68	.214
less Software Downtime	1.35	.044	5.10	.055
less Environmental Downtime	0.00	0.000	9.25	.101
less Operations Use	0.00	0.000	1.22	.013
less Other Causes	1.95	.063	14.03	.152
Clock Hours Up	714.18	23.038	2113.60	22.974
less Systems Checkout	2.45	.079	13.78	.150
Clock Hours Avail. to Users	711.73	22.959	2099.82	22.824
less Idle Time	1.60	.052	13.18	.143
Clock Hours in Use	710.13	22.907	2086.64	22.681
% Available Hours Used	99.78 %		99.37 %	

Computer Resources Allocated in December 1982

SCIENTIST	PROJECT TITLE	CCU		KCRU	
		Request	Alloc.	Request	Alloc.
David Hummer Univ. of Colo.	Frequency redistribution effects in multiplets	0.0	0.0	1.5	1.5
Philip Saffman CALTECH	Interaction between a turbulent wind and finite amplitude	1.0	1.0	1.0	1.0
Douglas B. Boudra Univ. of Miami	Investigation of ocean heat transport using a density coordinate model	5.0	5.0	0.0	0.0
R. C. Srivastava Univ. of Chicago	Doppler radar study of convective clouds	0.0	0.0	22.5	22.5
Karl Gustafson Univ. of Colo.	Divergence-free numerical methods for hydrodynamics	5.0	5.0	0.0	0.0
G. V. Rao St. Louis Univ.	Flux computation	3.0	3.0	0.0	0.0
Donald R. Mock Univ. of Wash.	FGGE-Tropical/extra-tropical interactions	5.0	5.0	0.0	0.0
Sharon Nicholson Clark Univ.	Rainfall fluctuations in southern Africa	0.0	0.0	3.5	3.5
Wilton Sturges III Florida State U.	Interaction between rings and a boundary current	5.0	5.0	0.0	0.0
Lesley T. Julian Univ. of Colo.	Statistical study and analysis 500mb blocking flow	0.0	0.0	20.25	20.25

| SCIENTIST	PROJECT TITLE	CCU		KCRU	
		Request	Alloc.	Request	Alloc.
David G. Abbott Univ. of Colo.	Radiative transfer and hydrodynamics of OB star winds	0.0	0.0	5.0	5.0
Wen-yih Sun Purdue Univ.	Mesoscale convection over warm water	4.0	4.0	4.0	4.0
Elmar R. Reiter/ Donna Tucker Colo. State Univ.	Causes and effects of atmospheric interannual variability	6.0	5.0	4.0	4.0
James H. Curry Univ. of Colo.	Transition to disorder in Rayleigh-Benard convection	4.0	4.0	4.5	4.5

Note: Resources requested and granted may differ for several reasons.

1. During the processing of a request for computer time, the applicant may decide to switch from one machine to the other.

2. The applicant may not have requested the resources on the CDC 7600 necessary for access to the CRAY-1.

3. A request may be supported at a lower level than requested because:

   a. It exceeds the 5-hour limit above which Panel review is required; or

   b. Reviewers consider the amount of time requested to be excessive.
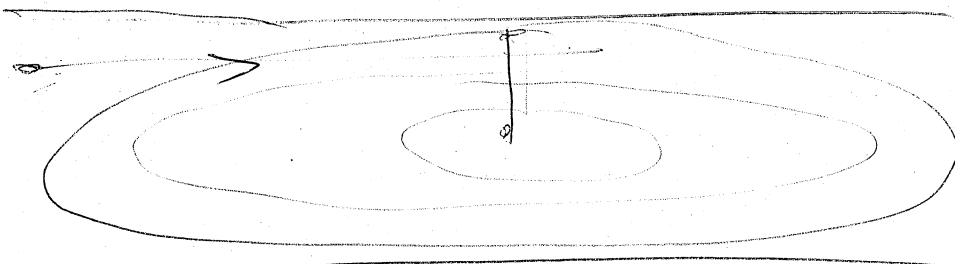
The Record

Issued by the
National Center for Atmospheric Research
Scientific Computing Division
P.O. Box 3000
Boulder, Colorado 80307

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