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THE UNIX NEWSLETTER

VOLUME 2 NUMBER 7 AUGUST 1977 Page 1

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MEETINGS

As was indicated at Urbana, the Stanford Research Institute is the host for a local West Coast Meeting in September. The details appear on the following pages. As you will note on reading the minutes of the Urbana meeting, the group indicated a desire to have two meetings per year. We are trying to arrange for meetings in January and May or June 1978. Details will be published soon.

SOFTWARE DISTRIBUTION

The listing of the contents of the third distribution in last month's issue contained a large number of files in the directory "3/ug". These were all of the files on line at the Urbana Users' Group meeting. Apparently some of these files were not intended for general release. Accordingly, we have removed directory "3/ug" from the distribution. Those of you who placed material on the Urbana system with the intent of releasing the software are asked to notify us and we will include it in the fourth distribution.

The order form neglected to indicate how checks were to be made out if they were included. Any checks should be to the order of "Unix News" or the "Brooklyn College Assn.".

The TU16 driver from Harvard which appears in Distribution three seems to have one (and only one?) bug in it. If you have a TU16 drive, use the driver in Distribution two. The Harvard TU10 driver works correctly, at least on Digi-Data pseudo-TU10s. We will print the fix to the TU16 driver as soon as someone sends it to us.

NEW TORONTO RELEASE

We have been told that a new version of the Toronto Software Package was mailed to New York in mid-July. As of August 18 it has not arrived. Some tapes were shipped with the old version of the software, but as of this date we are delaying the preparation of tapes requesting the Toronto package until the new version can be shipped.

GUINNESS BOOK OF RECORDS

A tape mailed from Portland, Oregon by first class mail took five weeks to reach New York.

WORDS OF ONE SYLLABLE DEPARTMENT

From the "PDP11/60 Processor Handbook", page 11-11:

> *The design and packaging of the PDP-11/60 has placed great emphasis on RAMP. This means reduced mean time between failures (MTBF) and reduced mean time to repair (MTTR).*

Address editorial material and software submission to
Melvin Ferentz
c/o CUNY/UCC
555 West 57 Street
New York, N.Y. 10019

Subscription requests, payments and address changes should be addressed to
Armand Gazes
Physics Department
Brooklyn College
Brooklyn, N.Y. 11210

STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA 94025
(415) 326-6200

July 18, 1977

Professor Melvin Ferentz
Physics Department
Brooklyn College of CUNY
Brooklyn, New York 11210

Dear Professor Ferentz:

I am pleased to announce, as per your discussions with John Bass, that SRI International will host the UNIX West Coast Users Group Meeting on Monday and Tuesday, September 12 and 13, 1977. The Conference will be held in SRI's main building (Building 1), Conference Rooms A and B. A map is enclosed for your information.

I am also enclosing a list of local, available motels. It is suggested that San Francisco International Airport would be the most convenient airport with available limousine service and car rental facilities. A meeting agenda will follow in August.

For more information, please contact our Chairman, Dr. Oliver Whitby (ext. 2791) or Mr. John Bass (ext. 3819).

Sincerely,

David H. Brandin

David H. Brandin
Director
Information Science Laboratory

mjs

Enclosures

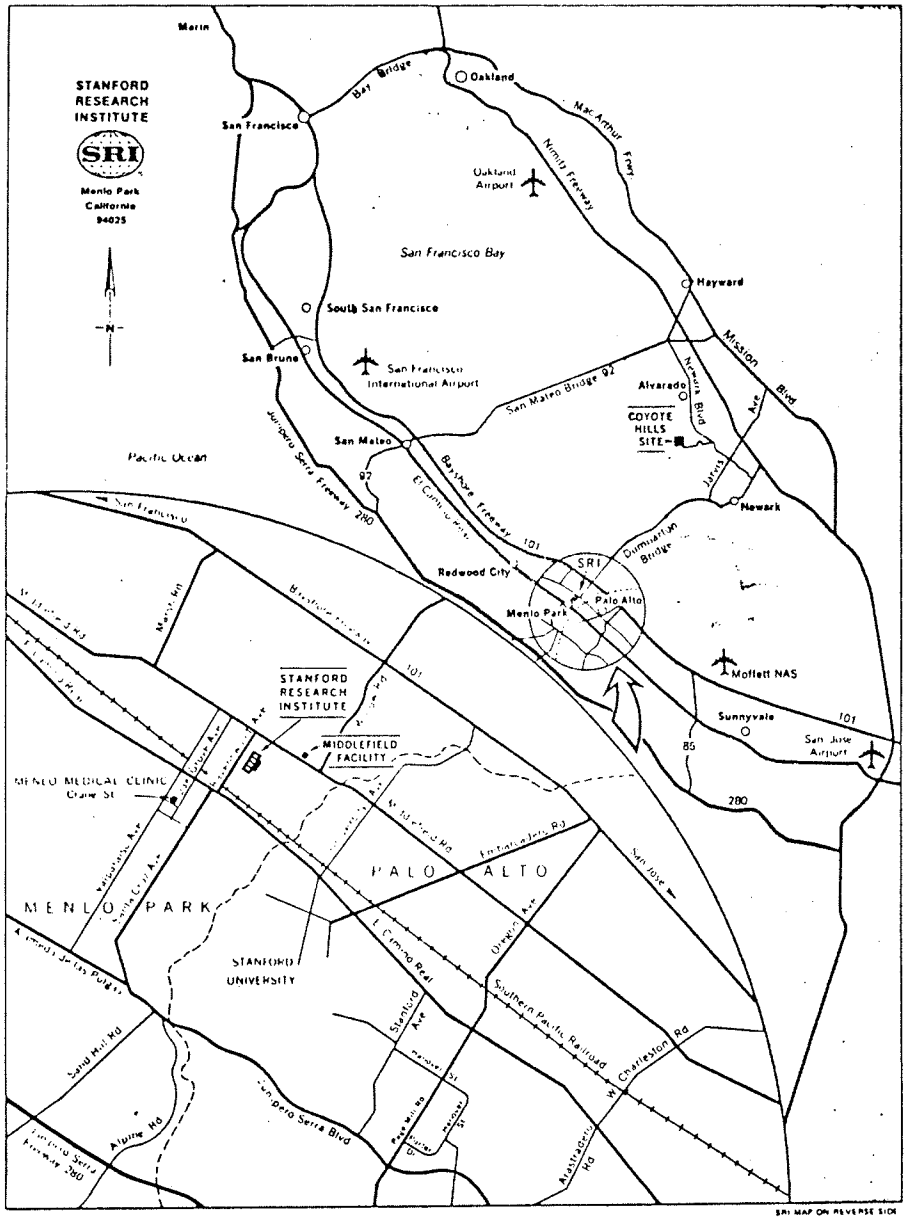
CABLE STANRES, MENLO PARK / TWX 910-373-1246

Local Hotels/Motels

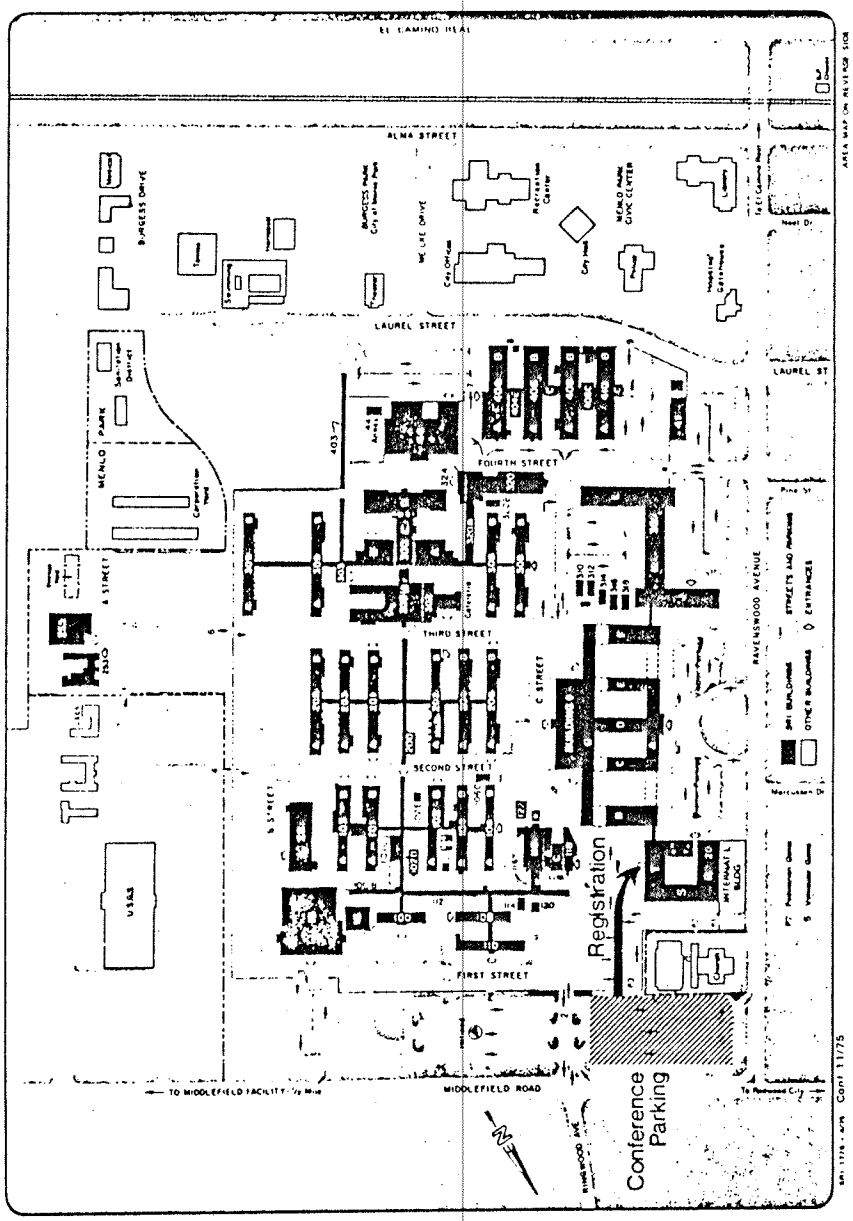
Holiday Inn-Stanford 625 El Camino Real Palo Alto, California	(415) 328-2800	Single Rates: $26.00
Mermaid Inn Motel 727 El Camino Real Menlo Park, California	(415) 323-9481	Single Rates: $16.00
Red Cottage Motel 1704 El Camino Real Menlo Park, California	(415) 326-9010	Single Rates: $17.00

Limousine Service

Airport Limousine Service	(415) 961-8800	$10.00 (SFO-SRI)



CONFERENCE PARKING
SRI HEADQUARTERS MAP



UNIVERSITY OF MINNESOTA
TWIN CITIES

Chronobiology Laboratories
Department of Laboratory Medicine and Pathology
Medical School
380 Lyon Laboratories
Minneapolis, Minnesota 55455
(612) 373-2916 or 373-2920

July 18, 1977

Professor Melvin Ferentz
Physics Department
Brooklyn College of CUNY
Brooklyn, N.Y. 11210

Dear Professor Ferentz:

We have just received a PDP 11T/34 from DEC. We are having it installed this week and are in the process of having the UNIX license agreement with Bell modified to include us. Enclosed are copies of relevant communication with them should you need the information. We were not able to obtain the serial number until now, so we were unable to get the license modified before delivery.

We should like to be added to the user's group as: Dewayne Hillman, Chronobiology Laboratories, 380 Lyon Laboratories, University of Minnesota, Minneapolis,MN 55455. Past copies of the newsletter would be appreciated as this would alleviate our having to copy them. Please advise.

Our installation will soon consist of:
1) a PDP 11T/34 package having 65KB MOS parity memory, RK05J, RK05F, Decwriter,
2) an 8-channel DZ11 RS232 compatible multiplexor,
3) two 65KB boards of compatible memory from Plessey,
4) a Printronix printer-plotter with RS232 interface to connect directly to MUX,
5) a Tektronix 4006 plotting terminal,
6) a Chatsworth Data card reader with RS232 interface for connection to the MUX or in conjunction with any RS232 terminal through telephone lines,
7) an Anderson-Jacobson letter-perfect terminal for the secretary,
8) a Research, Inc. mini-floppy disk drive designed to be used in conjunction with a terminal,
9) a Kennedy 9000 9-track tape drive at 800 BPI NRZI and 1600 BPI PE on a Western Peripherals embedded controller,
10) a home made interface to two different older Varian 620A computers so that we can, among other things, have access to older 7-track tapes,
11) a home made interface to our older Calcomp microfilm plotter, and possibly to an older 1000 cpm card reader which we hope to make look like a CR11. We are just now starting on the latter design,
12) one or more terminals to be added in the future,
13) an auto-answer modem to connect to the MUX.

My present concept of our current needs includes a DZ11 driver and a better Fortran as well as any other available software concerned with the above described system. Modifications to UNIX including memory parity checking are also of interest. Any help we can get to help us get started will be appreciated including any special considerations for the 11/34.

Sincerely,

Dewayne C Hillman

Dewayne C. Hillman

HEALTH SCIENCES

University of Illinois at Urbana-Champaign

DEPARTMENT OF COMPUTER SCIENCE
Urbana, Illinois 61801
(217) 333 4428

July 26, 1977

Professor Melvin Ferentz
Physics Department
Brooklyn College of CUNY
Brooklyn, NY 11210

Dear Mel:

Just wanted to let people know that we have created an interprocess communications facility ourselves involving non-blocking I/O and ports. We opted for the absolute minimal size increase, quite vital to us with our 11/40. Ports are consequently quite pipe-like, although much nicer. With this facility we have been able to create a networking demon that implements a rather ARPAish sort of machine-to-machine communications facility. We have also used ports for programs such as the line printer demon so that they may receive requests without having to muck around in a directory.

Those interested in copy may write and I will pass their request on to the Center for Advanced Computation which distributes things for a nominal charge (I believe about $100).

Sincerely,

Alfred D. Whaley
Senior Research Programmer

ADW:baa

VANDERBILT UNIVERSITY

NASHVILLE, TENNESSEE 37235 TELEPHONE (615) 322-7311

Box 1804 Station B *Electrical and Biomedical Engineering • Direct phone* 322-3521

June 22, 1977

Prof. Melvin Ferentz
Physics Dept.
Brooklyn College of CUNY
Brooklyn, N.Y. 11210

Dear Professor Ferentz,

We obtained recently the UNIX system and plan to run it on an 11/34 with an RK06 disk. As of now we have not heard of an existing handler for the RK06 and we would appreciate very much if you could help us. Any information will be greatly appreciated.

Sincerely yours,

Baruch Hamel

Baruch Hamel

BNSR

July 25th, 1977.

Prof. Melvin Ferentz,
Brooklyn College of CUNY,
Brooklyn, N.Y. 11210
U.S.A.

Dear Professor Ferentz:

Earlier this month I received a phone call from a Stu Overland of System Industries, California. He was selling disk storage products.

He said that he had my name on a UNIX mailing list and figured that I therefore would be in a position to buy their hardware. I asked him where he had obtained the list, and he said "somewhere". I told him that the list was proprietary as it was part of the Newsletter but he didn't seem to care and changed the subject.

I by no means object to the publishing of a mailing list in your newsletter, but I must make you aware that there is a "leak" somewhere, and that at least one copy of your newsletter is drifting around commercial circles. Perhaps other users should be warned about vendors soliciting from your list, and perhaps we should make a point of avoiding doing business with companies that have such a disrespect for propriety information.

Yours truly,

Rick Macfarlane

RM/sj

B·N Software
Research Inc.
522 University Ave.
Toronto, Ontario
M5G 1W7
(416) 598 0196

Computer Grafix Lab
New York Institute of Technology
P.O. Box 170
Old Westbury, L.I., NY
11568
August 8, 1977

Prof. Mel Ferentz
Physics Department
Brooklyn College of CUNY
Brooklyn, NY 11218

Dear Mel:

We have discovered yet another bug in setexit() and reset(). Using the most recent version published in UNIX news, the following programme slowly grows its stack until it memory faults.

```
main(){
        setexit();
        f(0, 0);
}
f(a, b){
        reset();
}
```

Here is my entry in the 'Can you write a correct version of setexit/reset' sweepstakes.

```
/ C library -- reset, setexit

/       reset(val)
/ will generate a "return" from
/ the last call to
/       setexit()
/ by restoring sp, r5
/ and doing a return.
/ 'val' is returned to the caller of setexit.
/ setexit itself returns 0.
/
/ useful for going back to the main loop
/ after a horrible error in a lowlevel
/ routine.

.globl  _setexit
.globl  _reset
.globl  csv, cret

_setexit:
        mov     r5,sr5
        mov     sp,ssp
        mov     (sp),spc
        clr     r0
        rts     pc

_reset:
        jsr     r5,csv
        mov     4(r5),r0
1:
        cmp     (r5),sr5
        beq     1f
        mov     (r5),r5
        bne     1b
/  panic -- r2-r4 lost
        br      2f
1:
        mov     -(r5),r4
        mov     -(r5),r3
        mov     -(r5),r2
2:
        mov     sr5,r5
        mov     ssp,sp
        mov     spc,(sp)
        rts     pc
.bss
sr5:    .=.+2
spc:    .=.+2
ssp:    .=.+2
```

Installed
12-APR-78
TEF

I hope this will be the last episode in the continuing saga of setexit/reset. With fingers crossed, I remain

Very truly yours,

Tom Duff

Tom Duff

July 14,1977

Dr Ferentz:

We have never met, but spoke several times last fall. As I explained at that time, I am an undergraduate student at Columbia and have worked with UNIX on a number of installations over the past three years. Last summer, myself and Jeff Rottman had an unusual opportunity to work as consultants on a UNIX installation, and as a result were able to develop a set of changes to UNIX which extend it's abilities to allow a fairly high level of real-time support without the usual sideeffect of a loss of normal system operations. When I spoke with you, you recommended that I contact Dr. J. Thomas Bigger and Dr. Lou Katz at Columbia Presbyterian. I did so, and over the past 6 months have been able to run their Version 6 UNIX with the real-time changes we developed. At this time the real-time system functions are being used on a daily basis, and the radiology group within the Hospital, which has purchased an 11/55 for use under RSX-11 in an extremely real-time application is seriously considering the possibility of running our modified UNIX despite the fact that their application is one requiring a very nearly stand-alone system. They feel that it may turn out that the availability of UNIX's very strong development support may offset the limited set of monitor requests that can be made from a real-time process. Incidently, in this connection I will probably be implementing a real-time like read ability identical to the writes now implemented.

Recently I have recived several inquiries from UNIX installations interested in the work Jeff and I have done, and have been mailing out copies of the documentaion enclosed. Lou Katz, however, felt that this documentation would make an appropriate (if somewhat long) contribution to the newsletter. Dr. Bigger has also encouraged me to send you a copy.

If the documentation I am enclosing is too long for the newsletter, I would be happy to provide a shorter, less detailed, summary of what we have done. While it would be impossible to answer the obvious questions relating to the details of the changes to UNIX in such a summary to the degree I have been able to in the enclosed document, I believe that I could provide sufficient detail to provide an overall picture of what we have done. In any case, please feel free to contact me with questions or on this matter. I can be reached at the Hospital at:

131 Black Building (the computer room)
694-3501/4019/3530/3536/4024

or care of either Dr. Bigger or Lou Katz.

Please forgive my sloppy typing. I am afraid I have been spoiled by TECO, perhaps a statement about the future of typing in general rather then a reflection on myself. Thank you very much for your time and effort.

Sincerely yours,

Ken Birman
140 Claremont Avenue, #52
New York, N.Y. 10027

Real-Time changes to UNIX

Kenneth Birman

Many computer applications, especially those involving the collection and analysis of time series data, need both real-time data aquisition facilities and a high degree of programming support suited to the implementation of sophisticated analysis techniques. Traditionally these needs have been hard to reconcile, since by and large the systems which are considered to provide adaquate real-time support are not also able to provide the sort of non-realtime data processing support which would lend itself to addressive analysis efforts. Over the past year the author has worked with Jeff Rottman (a graduate student at Berkeley) to privately develop a set of modifications of standard Version 6 UNIX which allow the system to support the realtime aquisition of data without halting or disrupting normal timeshared operations. These changes have succeeded to the point that a program previously implemented under RT11 which requires the aquisition of data at a sampling rate of at least 15kHz (DMA) with moderate data compression has been successfully transfered to an 11/70 UNIX system at Columbia University. The changes made to support this realtime activity implement previously unused hardware present in PDP 11/45's and 70's, and are not tied to any particular device or processing environment.

A process capable of satisfying the needs of a realtime application must meet several broad criteria. It must be able to control an interrupt driven device, and must therefore be capable of running at least two processor priorities, one of which must be lower than that at which the device interrupts. Entry overhead must be minimal, since very high sampling rates often require the smallest possible system overhead. Lastly, the process should be capable of recieving data from a UNIX process and of passing processed data to UNIX processes or writing it directly into a disc file.

The realtime support we have developed under UNIX attempts to satisfy each of these questions individually. Because our applications have been scientific (at Columbia we are working on cardiovascular problems involving the detection of heart rate and function abnormalities under severe time constraints), the current system is intended to work with an LPS-11 or possibly an AR-11 (which lacks DMA). Both a/d converter systems have their own clocks, and the DMA ability of the LPS-11 has been exploited at Columbia to achieve sampling rates of up to 15kHz (required by the application) with some processing of data. The main constraints we have encountered have proved to be the machine processing speed and the limits of the available mass storage device (at Columbia, 51000 blocks on an RP-04 are dedicated to the collection of data). With minimal processing of data, much higher sampling rates than those we have employed should be possible.

The realtime changes to UNIX center around the use of the machine's 'supervisor' mode to obtain a set of general pur-

pose registers and mapping registers which can be dedicated to a resident process controlled by UNIX but which has access to certain device registers. This approach is apparently similar to that used by MERT, where a special kernal program monitors operating systems which run in supervisor space controlling processes running in user space. Although the "supervisor" in our system would have to save and restore the floating point registers prior to using them, we have in this way been able to obtain a set of machine registers which need not be saved and restored except because of the internal logic of the supervisor process. On the 11/70, unused UNIBUS map registers are set up to map into the supervisor area in memory, allowing physical I/O operations to be initiated by the supervisor using 18 bit addresses in which the two high order address bits (the "xmem" bits) are both set.

In order to allow the supervisor to have access to UNIX controlled activity, EMT's have been implemented to let the supervisor request a disc write and to request that a lower priority "delayed processing" routine be entered, important because of the high interrupt priority levels common on data aquisition devices. At either priority, the supervisor is not scheduled and can use the CPU for as long as it must. Currently there are only five supervisor emt's; the other three allowing the supervisor to request that it be terminated, to signal the completion of a data transfer, and to determine its physical address for use in DMA transfers on 45's. There is no intrinsic limit, however, on the the degree of system support that could be provided in this manner. In handling the lower priority processing, and in the implementation of the supervisor disc write emt, it has been convienient to make use of the PIRQ (Programmable interrupt request) device present on the 70 and the 45. The PIRQ is also used to handle problems resulting from the asynchronous nature of a floating point interrupt which must under some circumstances be redirected at lower priority for handling later. Three out of a possible total of seven PIRQ's are currently in use.

An important consideration in designing the supervisor support was that it be possible to test supervisors and install new ones with minimal likelihood of disrupting normal activity on the 70, which is used primarily for data processing and analysis. It has proved possible to intercept most supervisor faults and errors, and to write a supervisor core dump when errors occur. Modifications to the C debugger have made the debugging of supervisor routines a fairly painless matter, in marked constrast to the usual environment in which realtime programs are developed.

A UNIX process which wishes to interact in some way with the supervisor is provided with several options. First, it can request that a supervisor be installed, which is possible

provided that no other supervisor is currently installed and sufficient memory is available. Such a supervisor is loaded at one end of memory to avoid fragmentation. It will be dormant until accessed by a UNIX process in one of two ways, both concerned with passing information to the supervisor. First, a UNIX process may "spiro" data to an installed supervisor, resulting in a transfer of a single word to a dedicated low core area within the supervisor and the activation of the supervisor at a predefined entry point. This is commonly used to pass single parameters or to request that some action be initiated. If large volumes of data are to be passed it is possible for a UNIX process to do what looks like a DMA read or write to the supervisor, whereby one page of supervisor memory is mapped to overlay the buffer being read or written by the UNIX process (which is locked in core). This shared data is accessible by both the supervisor and the UNIX process which sleeps waiting for the transfer to complete. In order to facilitate the efficient maintainance of such a raw link between the supervisor and the UNIX process, a system call has been added to lock a process running under UNIX into core. The supervisor controls the awakening of the UNIX process after the transfer through a "ready" emt. Thus a supervisor may be very tightly linked to support programs on the UNIX side, even to the point of sharing large (8k) chunks of data with it. A more conventional means of passing data to UNIX programs has also been implemented in the form of a ring buffer which can be read under UNIX through a dummy driver and involves copying data, but does not require that special precautions be taken to handle the core locking problem. This is useful when, for example, a supervisor monitors a large volume of incoming data, but produces a small volume of output.

The changes to UNIX I have described in this paper are currently running at Columbia University, with no known bugs. Sampling rates as high as 33kHz with data compression have been successfully tested, and an assembly language assist has been written to simplify the coding of supervisor processes in C. Although loosely tied to the LPS-11, it would not be especially difficult to modify the code to handle some other device. Current distribution plans would involve some sort of software agreement between the licensed UNIX installation to recieve the code, myself, and Jeff Rottman. There will be a distribution charge. All future decisions to distribute will be made by myself and Jeff Rottman. Inquiries should be directed to Kenneth Birman care of Dr. Lou Katz, Head, Cancer Research Center Computer Facility; Columbia University; College of Physicians and Surgeons; 630 West 168th Street; New York City, N.Y. 10032.

INTERACTIVE
SYSTEMS CORPORATION

22 July 1977

Professor Melvin Ferentz
CUNY Computing Center
555 W. 57th Street
New York, New York 10019

Dear Mel:

Enclosed are the minutes of the UNIX Users Group meeting. If any NEWSLETTER subscribers would like full size copies, Interactive will be glad to provide them.

Cordially,

Steve

J. Steven Zucker
Director of Systems

JSZ:jnl

Enclosure: "Minutes of the First National UNIX Users Group Meeting"

1526 CLOVERFIELD BLVD. SANTA MONICA, CA 90404 TELEPHONE (213)829-7741

MINUTES OF THE FIRST NATIONAL UNIX USERS GROUP MEETING

Steven Zucker

Interactive Systems Corporation
1526 Cloverfield Blvd
Santa Monica, California 90404

The First National Meeting of the UNIX Users Group was held at the University of Illinois, Urbana-Champaign Campus, on May 19-21, 1977. Steve Holmgren of the University's Center for Advanced Computation chaired the meeting. The enthusiasm of the more than 150 participants and the informal tone of the sessions resulted in a very stimulating atmosphere for the exchange of ideas. The meeting was divided into eight sessions:

- UNIX Site Activities
- UCLA Data Secure UNIX
- Interprocess Communication
- Graphics
- Languages
- Networking
- Data Base Management Systems
- Phototypesetting

My hope is that these notes on the sessions will be useful in directing those wishing more details to people who can provide them. I offer my apologies to those whose contributions I have inadvertently omitted and urge them to send their contributions to this Newsletter.

Many of the sessions were replete with announcements by speakers as well as members of the audience of new and/or improved drivers for one or another device, with

the Tl-16 Magnetic Tape Unit receiving the most attention. Rather than list all the drivers mentioned here, I would like to suggest that a column in the UNIX NEWSLETTER be devoted to information of this kind with installations or individuals willing to disseminate such code supplying information as to features and requirements.

UNIX SITE ACTIVITIES

This "What's happening where" session is summarized here in outline form by presenting only the speaker's name, the site he represented, and the list of the UNIX software developed or under development at the site. For further details or to determine whether and under what terms the software is available, get in touch with the speaker directly.

* * * * *

Stephen Tepper
Information Sciences Department
The Rand Corporation
1700 Main Street
Santa Monica, California 90406

- NED: A two-dimensional CRT Text Editor
- RITA: The Rule-Directed Interactive Transaction Agent, a production system language
- MS: Message System
- PORTS: A "named pipe" facility for interprocess communication
- EC: An encryption program
- VIRTUAL TERMINALS: An experimental split screen facility for making one keyboard and screen look like multiple terminals
- REMIND: Reminder and delayed (scheduled batch) execution

* * * * *

Alan Stoughton
UCLA Security Group
University of California
at Los Angeles
Los Angeles, California 90024

- NEW (nonprivileged) MOUNT command
- SYSUP and SYSDOWN procedures
- SEMAPHORES supported in the kernel
- TENEX-LIKE TTY DRIVER with interrupt time editing, user setable break characters, and CRT paging
- PASCAL SUBSET to C translator
- ENHANCEMENTS to the Illinois Network Control Program
- SYSTEM CRASH DUMP ANALYZER

* * * * *

Greg Chesson
Bell Telephone Laboratories
Murray Hill, New Jersey

- UNIX T-shirts available (I guess this is softwear, not software)
- DRAW: An interactive graphics systems for producing wirelists, proms, and for doing semiautomatic layout

* * * * *

Tucker Taft
Harvard Science Center
Harvard University
Cambridge, Massachusetts 02138

- Supports 1500 student accounts on a 192 KW 11/70 with 25 1200-baud terminal
- TENEX-LIKE TTY DRIVER; extended TTY name space
- PROCESS GROUPS ASSOCIATED WITH A TERMINAL
- PROCESS QUOTAS
- SUBMIT COMMAND FOR DELAYED BATCH EXECUTION
- INTERACTIVE STATISTICAL PACKAGE (available from Tom Ryan at Penn State)
- LOGGER FOR KERNEL PRINTFS so that system isn't delayed for nonfatal errors

* * * * *

Peter Weiner
Interactive Systems Corporation
1526 Cloverfield Blvd
Santa Monica, California 90404

Peter announced the formation of Interactive Systems Corporation. Its goal is to provide UNIX systems and services including system configuration, installation, staff training, contract programming, and UNIX-based systems.

* * * * *

Heinz Lycklama
Bell Telephone Laboratories
600 Mountain Avenue
Murray Hill, New Jersey 07974

Heinz described the several variants of UNIX that have been or are being developed at Bell Labs. In addition to the standard UNIX system which Western Electric already licenses, there are three other systems in use at Bell Labs.

LSI UNIX (LSX): LSX occupies 8K words of main memory leaving up to 20K words of user space for the single user that it supports. Minimum memory requirements for running LSX are 20K words of main memory, the extended instruction set and two floppy disks. LSX is written in C and will run the C compiler. It runs at most three processes and supports the notion of contiguous files but pipes are not supported.

LSX will run on the 11/10, 11/20, 11/34, or 11/40 as well as the LSI 11.

MINI-UNIX: Mini-UNIX supports up to four users running up to 13 concurrent processes on an 11/40, 11/34, 11/20, or 11/10. It occupies 12K words of memory leaving up to 16K words for user programs. It uses no memory mapping and, therefore, provides no memory protection. It requires an RK05 or larger disk.

MERT (Multi-Environment Real-Time System): This system runs only on an 11/70 or 11/45 as it requires the separation of kernel and supervisor spaces. MERT supports a real-time supervisor which can lock processes in memory, perform preemptive scheduling or time-out scheduling. The communication facilities (events, messages, shared memory, and process ports) were described. File system support for MERT is embodied in independent processes which communicate with other levels via messages.

* * * * *

Ken Thompson
Bell Telephone Laboratories
600 Mountain Avenue
Murray Hill, New Jersey 07974

An effort is under way at Bell Labs to convert UNIX to run on the INTERDATA 8/32. The conversion is being treated primarily as a portability exercise. As part of the portability exercise a pseudo C has been developed which enforces strict typing of variables.

A significant number of file system changes are being planned for Version 7 of UNIX. The changes would extend the allowable number of blocks in a file system from the present 2^{16} to 2^{24} blocks, thus, making it easier to use large disk files such as the RP04. The i-node size will be extended from the present 16 words to 32 words which will include space for 10 direct block pointers, one indirect block pointer, one double indirect block pointer, and one triple indirect block pointer, allowing files to be as long as 2^{32} bytes. Users IDs will be extended to 16 bits and the STAT and the FSTAT system calls will hide the physical addresses. A long SEEK system call will replace the present SEEK and a TELL system call (the inverse of SEEK will be added). The SWITCHES call will be thrown away and the SLEEP call will be replaced by PAUSE and ALARM. Significant changes are also anticipated in the STTY and GTTY system calls. It is unlikely that the new system will be available before the beginning of 1978.

* * * * *

Mike O'Brien
Department of Information Engineering
University of Illinois
Chicago Circle
P. O. Box 4348
Chicago, Illinois 60626

Mike presented a copy of the latest UNIX Distribution Center release tape and a UNIX T-shirt to Ken Thompson. There was also a certificate for Thompson and Ritchie from the Users Group honoring their work on UNIX.

* * * * *

UCLA'S DATA SECURE UNIX

Jerry Popek
Computer Science Department
3532 Boelter Hall
University of California at Los Angeles
Los Angeles, California 90210

Jerry Popek described work at UCLA in which a secure version of the UNIX operating system is being developed. The system architecture is based on a kernel architecture, with program verification methods being applied to that software.

The kernel is composed of an operating system nucleus, smaller and simpler than the UNIX kernel, which is responsible for all operational security. It provides a "capability machine" with a number of simple kernel calls. Each one provides a primitive operating system function, such as process invocation, swapping, I/O, etc. Above the kernel, running in supervisor mode, is a "UNIX interface" module, that is part of each user's process (a process has two address spaces). That module is responsible for providing an interface to user code that is identical to UNIX, and either performs the function, or prepares kernel requests to accomplish them if security relevant.

The secure UNIX system Popek described is to be capable of supporting large numbers of processes, and running virtually all non-super-user code without any change. A prototype implementation has been delivered to the government, and they are in the process of letting a contract to build a production version of secure UNIX.

Popek also described the program verification procedures necessary to show that protection is enforced by the system in an uncircumventable way.

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R. M. Walden
Western Electric
P. O. Box 20046
Greensboro, North Carolina 27420

Following the Data Secure UNIX presentation, Bob Walden announced that the Government and International Systems Division of Western Electric has established an organization to provide support for UNIX, initially to government users. The service will include consultation, installation and training, trouble shooting or problem solving assistance, improved documentation, and new feature development.

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INTERPROCESS COMMUNICATION

Alan Nemeth
Bolt Beranek & Newman
50 Moulton Street
Cambridge, Massachusetts 02138

Alan Nemeth reported on a series of meetings held to discuss interprocess communication in UNIX. The immediate goals of the meetings was to standardize on one or more interprocess communication mechanisms to be supported in UNIX systems run by the Department of Defense.

Two such mechanisms have been tentatively adopted: the port mechanism developed at The Rand Corporation and events developed at the University of Illinois. The Rand port mechanism described in Rand Report, R-2064/2, Interprocess Communication Extensions for the UNIX Operating System, provides a mechanism very much like pipes except that they can be named and opened by readers unrelated to the creator of the port. Ports also support message-oriented (as opposed to stream-oriented) I/O. While ports are intended for transfers of large amount of data between unrelated processes, the Illinois event mechanism provides a more efficient path for small one or two word messages. Each process has associated with it one event queue. Processes, using primitives provided by the kernel, can send "events" to other processes, read an event from its queue if one is there, or wait for an event to appear on its queue. At present the development of a suitable signalling mechanism to augment ports and events and provide process synchronization is a subject for further study.

Following an open discussion of ports, events, and sychronization, there were two presentations of segment sharing mechanism that have been employed in UNIX systems. Heinz Lycklama of Bell Telephone Laboratories described the MERT interprocess communication facilities. MERT provides messages which are very similar to the Illinois events except that the messages may be somewhat longer -- 10 words instead of 2. The messages are employed in MERT for communication between the file manager process and the MERT kernel. In MERT the user is given the capability of manipulating memory segments. The user may have up to 32 segments -- 6 of which may be in his active address space.

Following Heinz's presentation, Steve Holmgren described the Illinois segment sharing mechanism by which processes may send segments to or receive segments from other processes.

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GRAPHICS

A special meeting of those attendees interested in graphics under UNIX was held on the evening of May 19. Karl Kelly of the University of Illinois Center for Advanced Computation presided at the meeting. This was a very informal session at which each manufacturer of graphics hardware took its knocks. The main conclusion that could be drawn from this session was that there exists a very large and very active group doing graphics under UNIX on a tremendous variety of equipment. It is probably safe to say that there is a UNIX driver for most of the common commercially available graphics devices.

Six people volunteered to make brief presentations on work in progress at their installations. The following is a summary outline of those presentations. The often valuable and even more often humourous remarks from the floor are omitted.

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Lynn Brock
United States Navy
NPRDC
Pt. Loma, California 92152

- o Activities
  - psychological experiments and computer-aided instruction
  - has Tektronix software running under UNIX FORTRAN
  - AG-II: a set of FORTRAN callable subroutines that plots arrays of data points with grid, tick marks, and floating points labels
- o Other Packages
  - TCS, CGS, IGP, PLOT/10

Tom Duff
Computer Grafix Laboratory
New York Institute of Technology
P. O. Box 170
Old Westbury, New York 10036

- o Activities
  - Animation for Disney-style Films
- o Hardware
  - Six PDP/11's
  - Six Evans & Sutherland Frame Buffers
  - Evans & Sutherland Picture Systems 1 & 2
  - Dicomed Film Recorder with 1500 x 1500 or 3000 x 3000 resolution with 24 color bits at each point
- o Techniques in Use
  - Interpolation on line drawing
  - Patch rendering (3D) program using bicubic patches

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Mike Selander
Center for Advanced Computation
University of Illinois
Urbana, Illinois 61801

- o Activities
  - Image Processing and Robotics
- o Hardware
  - An 11/40 with a one-of-a-kind display called the "Elephant," a combination raster scan, line-drawing, and character device with 4000 x 4000 resolution and 256 gray levels

Mike described the baroque software system which uses the core image of a separate process as the refresh buffer for the Elephant.

Bill Reeves
Dynamics Graphics Project
University of Toronto
Toronto, Canada

- o Activities
  - animation: educational movies, e.g., movies illustrating sorting techniques and planetary motion
  - circuit layout and simulation
  - newspaper page layout
  - graphical input for music
  - computer art
  - cardiovascular radiology
- o Hardware

The package developed at Toronto is aimed at device independence and supports the following devices:

  - Tektronix storage tube
  - refresh displays -- the VT11 and the Graphic Wonder
  - color-video frame buffer
  - Versatec and microfilm hardcopy
  - scan converter
  - Summagraphics tablet for input

- o Real-time Response
- o High-level interface through a set of C-callable functions supporting character output, line descriptions with color filling of areas, segmented display files, and windowing
- o A standard format is used for communicating picture descriptions between modules and filters are used to produce the final pictures

- UNIX kernel modifications
  - grabcore -- reserves a buffer in low core for various displays
  - maptouser -- enables the user to set up segmentation registers to refer to buffers that have been grabbed

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Steven Zucker
Interactive Systems Corporation
1526 Cloverfield Blvd
Santa Monica, California 90404

Steve described the Rand Virtual Terminal concept and its implementation on a Genisco bit-map display system. Support for multiple windows on each of several screens, with color and vector capability as well as characters in each window, is provided in the Genisco. A new system call, "split", creates a "virtual terminal" from a rectangular region of an existing terminal (real or virtual), and gives the user another input/output port to/from UNIX.

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Gary Kaetz
Naval Postgraduate School
Code 52
Monterey, California 93940

Gary described a very powerful dual 11/50 system in which one of the 11/50s is used for ordinary UNIX

timesharing while the other is devoted to driving graphics devices. The two 11/50's communicate via shared files on three 80 megabyte disks and via direct connections through two DR11-Cs.

- Hardware Supported
  - Ramtek 645 x 240 x 4 byte map display
  - CONOGRAPHICS device
  - Vector General tablet
  - Vector General refresh display with 3D hardware windowing, rotation, and translation
  - A third processor, an 11/34, shares 32K of memory with the graphics 11/50. The 11/34 supports two Vector General displays and is downline loaded via two DR11s back to back.
- Software
  - Plot/10 converted to C
  - A distributable driver for the DR11-B

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LANGUAGES

Mike O'Brien
Department of Information Engineering
University of Illinois
Chicago Circle
P. O. Box 4348
Chicago, Illinois 60626

Mike spoke very briefly about a new C compiler which supports long variables with initialization, structures, containing variables with byte fields, conditional compilation, structure initialization, and a new printf program.

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Steve Bunch
University of Illinois
Center for Advanced Computation
5 Buena Vista
Urbana, Illinois 61801

Steve spoke about a C compiler for the Honeywell level 6 which is to be in the public domain.

At this point in the meeting there were a number of announcements made from the floor of various languages available under UNIX from various sources. In particular Commercial Union Leasing Corporation, New York City, apparently has a C to FORTRAN processor as well as FORTRAN IV PLUS running under UNIX. Reports have indicated that the Commercial Union FORTRAN IV PLUS is vastly better

than UNIX FORTRAN and it is available for a license fee from Commercial Union.

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Tucker Taft
Harvard Science Center
Harvard University
Cambridge, Massachusetts 02138

Tucker described ECL, an extensible language that is being run at Harvard. Documentation is available from the Harvard Science Center.

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Arthur Olson
Department of Chemistry, B-014
University of California
San Diego/LaJolla, California 92093

Arthur Olson announced that San Diego was running the 11/40 floating point unit under UNIX.

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Evelyn Walton
UCLA Security Group
University of California at Los Angeles
Westwood, California 90024

Evelyn Walton made a brief presention of the Pascal

to C translator being used by the UCLA security kernel project. The purpose of the translator was to enable the production of code in Pascal for which an automatic verifier exists. No attempt was made to translate all of Pascal to C. Thus the translator does not support sets or nested procedures.

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Peter Weiner
Interactive Systems Corporation
1526 Cloverfield Blvd
Santa Monica, California 90404

At this point in the meeting, Peter Weiner of Interactive Systems Corporation solicited suggestions from the floor on areas of UNIX that needed improvement or extension. Several such suggestions were forthcoming especially in the networking area.

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USERS GROUP BUSINESS

Mel Ferentz
City University of New York
Brooklyn College
Brooklyn, New York 11210

Mel announced that the UNIX Users Group will be incorporating as a nonprofit educational organization in order to obtain such benefits as favorable postage rates on its mailings. He also announced that the software distribution center will be moving from Chicago Circle to New York where the availability of greater machine resources will make it possible to speed the delivery of new distributions. The schedule for the next Users Group meeting was discussed; it will be published in the NEWSLETTER when fixed.

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NETWORKING

Jody Kravitz
Center for Advanced Computation
University of Illinois
Urbana, Illinois 61801

Steve Abraham
UCLA Security Group
University of California at Los Angeles
Westwood, California 90024

The first networking presentation was made jointly by Jody Kravitz and Steve Abraham. They announced that there will be an official release of the UNIX ARPANET NCP (Network Control Program) combining changes made at the University of Illinois, at UCLA, and at Rand. The new release will be available in mid-summer from ILL-NTS.

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Ken Thompson
Bell Laboratories
600 Mountin Avenue
Murray Hill, New Jersey 07974

Ken described an experimental UNIX networking facility he is working on at Bell Laboratories. An interesting feature of the network is a protocol which provides a "directory assistance" facility. A demon process on each host accepts calls for directory assistance and provides routing information based on the part of the network that it knows about. The call initiation protocol establishes

a path between the nodes on the network from source to destination and the messages transmitted from the source to the destination all follow the same path.

Present plans call for the use of a new DEC device, the KMC-11, a small microprocessor, to provide support for the network.

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Brian Lucas
National Bureau of Standards
Room A264 TECH
Washington, D.C. 20234

Brian Lucas discussed the ETHERNET. The ETHERNET provides a very high bandwidth yet low cost means of connecting machines that are within a single building or cluster of buildings. The network utilizes coaxial cables which support a one to two megabaud signalling rate. Adding a new host is as simple as connecting to the cable with a high impedance tap. Microprocessors between the host and the cable perform the actual signalling and detect and resolve conditions in which more than one host tries to signal simultaneously.

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DATA BASE MANAGEMENT SYSTEMS

John Hoskins
Office of Institutional Research
340 Edwards Street
New Haven, Connecticut 06520

John Hoskins described the Yale University Registration System. The system manages ten years of Yale undergraduate student records. Each student record is a separate file and the system holds approximately 15,000 records of two to three thousand bytes each. The system has been very well received in the Registrar's office where personnel are trained in only 4 hours and become expert in the use of the system in only 2 weeks. The primary components of the system are the Text Editor, a program called the "fence" (which makes available an editable copy of a student's record and prevents simultaneous update) and a number of shell files for producing grade reports, class schedules, and other reports as required. Those involved with it -- both developers and users -- speak very highly of the convenience and economy of using UNIX -- even when compared with other larger and much more expensive operating systems and machines.

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Dan Ciclan
New York Telephone
140 West Street, No. 550
New York, New York 10007

Dan Ciclan reported on the development of an enhanced,

production version of the INGRES system developed at Berkeley. The improved system is oriented towards production use rather than theoretical completeness. By vesting ownership of the data bases in the user rather than the system and by placing responsibility for avoiding the rare but potentially dangerous problem of concurrency (simultaneous update) the system is able to run ten times faster than the original Berkeley system.

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Bill Mayhew
The Children's Museum
Jamaicaway
Boston, Massachusetts 02130

Bill Mayhew described "The Information System," available for license at the above address.

The Information System is distributed as a collection of routines that perform the standard database operations: add item, delete item, add descriptor to item, remove descriptor from item, locate descriptor, retrieve next item in inverted list, delete descriptor from dictionary, plus the AND, OR, and AND NOT hitlist boolean operators. Also supplied is a user interface implementing a simple query language and providing facilities for entering, updating, and retrieving textual data items.

The Information System can be applied to a wide range of information management problems. It has been successfully used to develop interactive maintenance systems for mailing lists, membership and contribution records, and

group visit and educational program reservations, and is about to be used as the foundation for a service to match the educational resources of cultural organizations with the needs of teachers throughout the Commonwealth of Massachusetts.

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PHOTOTYPESETTING

Joe Ossana
Bell Laboratories
600 Mountain Avenue
Murray Hill, New Jersey 07974

The principal speaker at the Phototypesetting session was Joe Ossana. He announced a new phototypesetting package, typesetter V7, which is or soon will be available from Western Electric for a $3300 license fee. The new package combines NROFF and TROFF and is written in C. This results in TROFF being 50% larger and 20-30% slower than the earlier version. There have been a number of significant improvements in the package however. First TROFF font control and width calculations are now taken from files so it is relatively easy to use the package to drive other phototypesetters. Second, one can now specify artificial bolding which is performed by overstriking characters with a small offset. EQN the mathematics typesetting program now works with NROFF.

Also:

o Bell Labs is looking into other typesetters (an APS4 or APS5 typesetters, which sells for about $100,000). TROFF will easily drive it, although making use of the advanced features such as more fonts or sizes may be difficult.

o Bell Labs has a Tektronics 4014 TROFF simulator which, though slow, can show what a typeset page will look like.

o Measurements have indicated that NROFF hyphenation is correct approximately 97-1/2% of the time.

o There is a new columnar cable builder.

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Two other announcements were made at the Phototypesetting session.

Larry Smith
Texas Student Publications
P. O. Box D
University of Texas
Austin, Texas 78703

Larry announced that the University of Texas at Austin Student Publications are running two PHOTON typesetters under UNIX.

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Gerry Barksdale
Naval Postgraduate School
Computer Science Department (Code 52)
Monterey, California 93940

Gerry announced the availability of fonts which can be printed on a VERSATEK printer.

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During a break in the Phototypesetting session, two awards were presented. The first was presented by Greg Chesson to Steve Holmgren for his work in organizing and chairing the conference. Steve was pleased to receive a stuffed pheasant for his mantlepiece. The second award was presented by Ken Thompson to Dennis Mcmaugh of the Department of Defense for having the largest collection of UNIX users software in existence.

Anyone wishing to purchase an angry-looking rubber chicken should get in touch with Dennis.

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