AUUGN

Australian Unix systems User Group Newsletter

Volume 9 - Number 1

February 1988

Registered by Australia Post Publication No. NBG6524

The Australian UNIX* systems User Group Newsletter

Volume 9 Number 1

February 1988

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AUUG General Information

Memberships and Subscriptions

Membership, Change of Address, and Subscription forms can be found at the end of this issue.

All correspondence concerning membership of the AUUG should be addressed to:-

The AUUG Membership Secretary,
P.O. Box 366,
Kensington, N.S.W. 2033.
AUSTRALIA

General Correspondence

All other correspondence for the AUUG should be addressed to:-

The AUUG Secretary,
Department of Computer Science,
Melbourne University,
Parkville, Victoria 3052.
AUSTRALIA

ACSnet: *auug@munnari.oz*

AUUG Executive

President	**John Lions** - *newly elected* *johnl@cheops.eecs.unsw.oz* School of Electrical Engineering and Computer Science, University of New South Wales, New South Wales	Secretary	**Robert Elz** *kre@munnari.oz* Department of Computer Science, University of Melbourne, Victoria
Treasurer	**Chris Maltby** *chris@softway.sw.oz* Softway Pty. Ltd., New South Wales		
Committee Members	**Chris Campbell** *chris@comperex.oz* Comperex Pty. Limited, New South Wales		**Piers Lauder** *piers@basser.cs.su.oz* Basser Department of Computer Science, Sydney University, New South Wales
	Tim Roper *timr@labtam.oz* Labtam Limited, Victoria		**Peter Wischart** - *newly elected* *pjw@anucsd.oz* NEC Information Systems, Canberra

Next AUUG Meeting

The next meeting will be held in Melbourne at the Southern Cross Hotel from the 13th to the 15th of September 1988. Futher details will be provided in the next issue.

Editorial

I hope you enjoy this issue and please contribute to the next issue.

REMEMBER, if the mailing label that comes with this issue is highlighted, it is time to renew your AUUG membership.

AUUGN Correspondence

All correspondence reguarding the AUUGN should be addressed to:-

John Carey
AUUGN Editor
Computer Centre
Monash University
Clayton, Victoria 3168
AUSTRALIA

ACSnet: *auugn@monu1.oz*

Phone: +61 3 565 4754

Contributions

The Newsletter is published approximately every two months. The deadline for contributions for the next issue is Friday the 15th of April 1988.

Contributions should be sent to the Editor at the above address.

I prefer documents sent to me by via electronic mail and formatted using *troff -mm* and my footer macros, troff using any of the standard macro and preprocessor packages (-ms, -me, -mm, pic, tbl, eqn) as well TeX, and LaTeX will be accepted.

Hardcopy submissions should be on A4 with 35 mm left at the top and bottom so that the AUUGN footers can be pasted on to the page. Small page numbers printed in the footer area would help.

Advertising

Advertisements for the AUUG are welcome. They must be submitted on an A4 page. No partial page advertisements will be accepted. The current rate is AUD$ 200 dollars per page.

Mailing Lists

For the purchase of the AUUGN mailing list, please contact Chris Maltby.

Disclaimer

Opinions expressed by authors and reviewers are not necessarily those of the Australian UNIX systems User Group, its Newsletter or its editorial committee.

AUUG News Report

First, a comment on delays in getting recent issues of AUUGN out to you, the members. I want to make it clear, to all members, that these delays have not, in any way, been due to delays in the editing processes of the newsletter. The newsletter editor, John Carey, has been preparing issues by the expected dates. Recent delays have been further on in the distribution chain, getting the newsletters printed, packaged, and then mailed. From this issue, AUUG will be trying a new distribution mechanism, which we hope will alleviate these delays, and make sure that you receive your AUUGN, regularly, every two months.

Second, why am I writing this report? Usually, the President, if there's anything notable to say, supplies a short column for the newsletter. The answer, for those few of you who haven't learned elsewhere, is that Ken McDonell, our President since June 86, has departed Australia to take up a position in the USA, and has consequently resigned as president of AUUG.

In accordance with AUUG's constitution, the Management Committee, at its meeting on December the 10th, last year, unanimously elected John Lions, our foundation president, to act as President for the remainder of this year. John agreed to serve for this period.

Having done this, we became short of one general committee member, and again, in accordance with the constitution, the Management Committee appointed one of the general members of AUUG to the committee. That member is Peter Wishart, then of the Department of Computer Science at ANU, and now at NEC Information Systems (Canberra). In seeking a replacement member, we deliberately eliminated from consideration all members who reside in Melbourne or Sydney, in an attempt to increase our geographic representation, if only by a small amount. Our previous "outsider" was Tim Roper, who saw the error of his ways and moved to Melbourne...

Finally, the extraordinarily slow crawl towards incorporation is proceeding. The current obstacle, and we hope, only remaining obstacle, is our name. The Corporate Affairs office will not allow us to register a name that includes the registered trade mark **UNIX** without permission from the trade mark owner. We are currently seeing if we are able to persuade AT&T Technologies to give us that permission. Failing that, we will hold a ballot of the members, with a view to changing our (prospective) name to **AUUG Incorporated.**

Robert Elz
Honorary Secretary
AUUG

A Letter from the Acting AUUG President

Department of Computer Science,
University of New South Wales,
Kensington, NSW 2033.
[johnl@cheops.eecs.unsw.oz]
(02) 697-4071
10 March, 1988.

Dear AUUG member,

I have some good news for you, some not so good news and some really good news. You must judge for yourself which is which!

As you will read elsewhere in this issue, Ken McDonell has moved to California and has therefore resigned as President of AUUG. I have been elected to fill his shoes until the next election (not so far away). While I congratulate Ken on his new position with Pyramid, and all the challenges and rewards that it will undoubtedly bring, I am sorry that his resignation has caused a hiatus at an important stage in our development as an association.

AUUG must keep changing to survive. While I still look back with great pleasure on our initial meetings — there was a time when every body sat around in a large square, when everybody chipped in a couple of dollars on the day for coffee and biscuits, when lunch arrangements were a few reserved tables at the Pizza Hut, and when the technical discussions really were technical. Those days have gone. UNIX is no longer just fun, it has also become important business. Not necessarily worse, just different!

While UNIX has been changing, and its associated community has really changed, AUUG's membership has not changed so very much. Many of our earliest members are still active and attend meetings regularly — but we have all changed in other ways. Our average member has graduated beyond the joys of being a student and minimising the cost of attendance. At the same time it has become increasingly difficult to find volunteers to run meetings like we used to. We have perforce moved to better venues, aspired to better cuisine, and spent less time discussing the finer points of UNIX internals. Even more change in the same direction is still needed. More formality is both needed and deserved, and we will need to hire much more professional assistance in future for our main meetings.

As you will have no doubt noticed, the February meeting did not happen. This was for two reasons. First, it had been planned for Melbourne but no one was found to organise it in time. Second, your committee has concluded that we should modify our meeting pattern in future to make AUUG's winter meeting incorporate our main exhibition for the year. That seems to limit the winter meeting to Sydney and Melbourne and possibly Canberra. Since it has been almost impossible to find suitable meeting venues in Sydney this year, Melbourne was the only possibility for the winter meeting in 1988.

It will be held in September. The Call for Papers appears elsewhere in this issue, and we have a galaxy of visitors for you. The programme chairman is Tim Roper of Labtam, and he deserves your support. If you still have that draft in your bottom drawer of that paper you always intended to write, then this is the time to dust it off and to get on with it!

We still plan to have February meetings in future years in interesting locations away from the Sydney/Melbourne axis. An associated equipment exhibition is not precluded, but it's not essential. We are looking for suggestions for locations and meeting organisers. (The next Perth meeting can't be too far away now!)

For this year at least, we are suggesting that local groups should organise local meetings. This will not cause the local chapters in Adelaide and Perth any problems. Members at other centres ought to think about what they can do. The society has funds which can be used to underwrite some of the expenses of speakers invited from interstate (we haven't a firm policy yet — it will depend at least in part on what response we get — so try us!).

As you know, this being bicentennial year, we have many important visitors to our shores. But few are important enough to be invited to an AUUG meeting. We have lost one Ken, but gained another! One of the best kept secrets of the season has been Ken Thompson's arrival. (Yes, Ken *who*!) He is here with his wife, Bonnie, to spend a sabbatical year at the University of Sydney. He will be our most honoured guest at the September meeting, but you don't have to wait that long to say 'hello'. He can be contacted at Sydney University ('ken@basser.oz' should find him via ACSnet e-mail, or c/- Department of Computer Science otherwise). He is interested in visiting many parts of Australia, especially where he can fly himself. If you ever needed, a pretext to arrange a local meeting, surely you won't need to look any further now.

The remaining matter that I need to bring to your attention is the matter of the next elections for the AUUG office-bearers and committee. Being relatively modest in our aims, we don't have a very elaborate voting procedure. Perhaps it ought to be refined, though. It seems to me that over the years there hasn't been enough change in the committee. This is not to denigrate the members who have contributed mightily over the years, but now we need some new faces. This year I propose to step down, and Chris Maltby, after a very long association with the treasury, has indicated likewise. We need someone with accounting and/or financial and/or auditing experience to run for treasurer, and another to run for auditor. We need a new president ....

We need some new candidates with enthusiasm and new ideas, and with supporters who will see that they get elected. Think about who you would like to see on the committee to represent your interests, and then work towards getting him or her elected. Completed nomination forms must be in the hands of the secretary, Robert Elz, by May 1. Please do not wait until the last minute — do it now!

Start today!

Best wishes,

John Lions,
Acting President, AUUG.

Observations of the February 1988 Committee Meeting

Introduction

I have been asked as AUUGN Editor by the AUUG Management Committee to attend their meetings and pass on to the members my observations in a timely manner.

A more formal record of the proceedings has been prepared by the Secretary and will appear in a following issue after ratification by the Committee.

So here are the major items discussed at the meeting held at Scripture Union House, Surry Hills, Sydney on Monday the 29th of February 1988.

New Committee Member

Peter Wischart has been asked by the Committee to fill the vacant Committee position, created by Ken McDonell's retirement as president, and John Lions appointment as acting president, until the forthcomming elections.

AUUGN Printing and Distribution

The printing and distribution of the AUUGN has been moved to Melbourne after delays in getting the December issue to press. We hope this will increase the regularity of AUUGN delivery to members.

We also looking at imporving the handling of renewals and membership enquiries with the help of secretarial assistance.

Secretarial Assistance

Tim Roper has taken on the task of writing a job description and getting quotes from suitable people to provide secretarial assistance for the User Group.

Elections

A nomination form for the 1988 Elections can be found in this issue. The AUUG needs people who are prepared to make a contribution to the running of the group.

The position of Auditor is currently vacant and the AUUG is looking for a suitablely qualified AUUG Member to take up this position.

Also the current President and Treasurer have expressed the desire to step down from office, after both have been serving the Group long and faithfully.

Fees

The AUUG Membership fees starting from end of June 1988 were set at

member/subscriber	$65
student	$40
institution	$300

Call for Papers

Tim Roper has prepared a Call for Papers for the AUUG 88 Meeting. This appears in this issue.

I suggest that if you intend presenting a paper at the Meeting, you should start preparing now and contact Tim as soon as possible.

Incorporation

The Committee decided to proceed with a referedum held alongside the 1988 Elections, needed to make the changes necessary to the AUUG constitution to faciltate Incorporation.

Call For Papers

AUUG '88

Australian Unix systems User Group

Winter Conference and Exhibition 1988

September 13–15 1988, Melbourne, Australia

Summary

The 1988 Winter Conference and Exhibition of the Australian UNIX† systems User Group will be held on Tuesday 13th – Thursday 15th September 1988 at the Southern Cross Hotel in Melbourne, Australia.

The conference theme is *Networking – Linking the UNIX World.*

AUUG is pleased to announce that the guest speakers will include:

Ken Thompson	Bell Laboratories
Michael Lesk	Bell Communications Research
Mike Karels	University of California at Berkeley

Papers

Papers on topics related to computer networks and UNIX are now invited. Some suggested topics include but are not restricted to:

- Operating system and programming language support for networks
- Distributed file systems and their application
- Networked window systems
- ISO/OSI and UNIX
- Security aspects of computer networks
- Legal and social aspects of computer networks
- Protocol specification methods
- Harnessing new technologies
- Network applications under UNIX

Papers on other (non networking) aspects of the UNIX system are also sought.

Authors of papers presented at the conference will receive complimentary admission to the conference and the dinner. AUUG will again hold a competition for the best paper by a full time student at an Australian educational institution. The prize for this

† UNIX is a trademark of Bell Laboratories.

competition will be an expense paid return trip from within Australia to the conference to present the winning paper. A cash prize in lieu of this may be paid at the discretion of AUUG. Students should indicate with their abstract whether they wish to enter the competition. AUUG reserves the right to not award the prize if no entries of a suitable standard are forthcoming.

A special issue of the group's newsletter AUUGN containing the conference proceedings will be printed for distribution to attendees at the conference.

Acceptance of papers will be based on an extended abstract and will be subject to receipt of the final paper by the due date. Abstracts and final papers should be submitted to the programme committee chair:

Tim Roper	Phone:	International	+61 3 5871444
AUUG 88		National	03 5871444
Labtam Limited	Fax:	International	+61 3 5805581
PO Box 297		National	03 5805581
Mordialloc	Telex:	LABTAM AA33550	
Victoria 3195	ACSnet:	timr@labtam.oz	
Australia	UUCP:	uunet!munnari!labtam.oz!timr	
	ARPA:	timr%labtam.oz@uunet.uu.net	

Final papers may be sent via electronic mail and formatted using *troff* and any of the standard UNIX macro and preprocessor packages (–ms, –me, –mm, pic, tbl, eqn) or with TeX or LaTeX. Alternatively, final papers may be submitted as camera ready copy on A4 paper with 35mm margins left at the top and bottom. Intending authors unable to produce either of these forms are requested to contact the programme committee chair.

Timetable

Receipt of Extended Abstracts	Monday 13th June
Letters of Acceptance Sent	Monday 4th July
Receipt of Final Papers	Monday 8th August
Conference and Exhibition	13th–15th September

Adelaide UNIX Users Group

The Adelaide UNIX Users Group has been meeting on a formal basis for 12 months. Meetings are held on the third Wednesday of each month. To date, all meetings have been held at the University of Adelaide. However, it was recently decided to change the meeting time from noon to 6pm. This has necessitated a change of venue, and, as from April, meetings will be held at the offices of Olivetti Australia.

In addition to disseminating information about new products and network status, time is allocated at each meeting for the raising of specific UNIX related problems and for a brief (15-20 minute) presentation on an area of interest. Listed below is a sampling of recent talks.

D. Jarvis	"The UNIX Literature"
K. Maciunas	"Security"
R. Lamacraft	"UNIX on Micros"
W. Hosking	"Office Automation"
P. Cheney	"Commercial Applications of UNIX"
J. Jarvis	"troff/ditroff"

The mailing list currently numbers 34, with a healthy representation (40%) from commercial enterprises. For further information, contact Dennis Jarvis (dhj@aegir.dmt.oz) on (08) 268 0156.

Dennis Jarvis,
Secretary, AdUUG.

Dennis Jarvis, CSIRO, PO Box 4, Woodville, S.A. 5011, Australia.

PHONE: +61 8 268 0156

UUCP: {decvax,pesnta,vax135}!mulga!aegir.dmt.oz!dhj
ARPA: dhj%aegir.dmt.oz!dhj@seismo.arpa
CSNET: dhj@aegir.dmt.oz

Softway Pty Limited (Incorporated in NSW)
PO Box 305, Strawberry Hills, NSW 2012, Australia
First Floor, 120 Chalmers St, Strawberry Hills NSW
☎ (02) 698 2322 Fax (02) 699 9174

Think about it ...

- **BENCHMARKING** - choosing between a number of computers it is necessary to know whether a computer will provide adequate response under a certain type of workload. Softway will examine the implementation of the computer and its associated system software.

- **COURSES** - *"Beginner's UNIX Workshop"* a three day "hands-on" presentation aimed at first time UNIX users. *"A Fast Start to the UNIX Operating System"* two day course aimed at non-technical personnel. *"UNIX System Administration"* presented over five days, takes an in-depth look at the role of the System Administrator under UNIX.

- **SUPPORT** - second level support to existing support companies that require additional expertise.

- **DOCUMENTER'S WORKBENCH** - suite of programs which run on the UNIX† operating system, including TROFF, a document formatting program, TBL, a preprocessor for formatting tables, EQN, a preprocessor for typesetting equations and PIC, a preprocessor for producing diagrams. Softway has developed a number of "back-end" device drivers for laser printers, to be used in conjunction with Documenter's Work Bench software.

- **ACSnet** - network of unlike machines, and has a purpose and function similar to that provided by the UUCP network in wide use in most of the UNIX world.

- **BIWAY** - allows remote login interleaved with dial out operation on a single modem, significantly increasing the functionality of modems connected to the computer.

- **DIARY** - visual monthly calendar and time/event browser. Allows the user to schedule and recall events for a day or for some regular repeating series of days.

... Now call us

† UNIX is a trademark of AT&T Bell Labs.

A Map of the Australian Network

D.F. Davey[1], *Ph.D., Assoc. Prof.,*
Department of Physiology F-13,
University of Sydney,
N.S.W. 2006,
Australia

Since March 1986, information on nodes within or directly connected to the network known variously as *The Australian Computer Science Network*, *ACSnet*, or *ACS*, has been collected and distributed over the network news system in the newsgroup aus.map, and made available by file fetching from the node physiol.su.oz where the data have been maintained. Although primarily designed for use within Australia, the same information in slightly different format and supplemented with some routing information has been passed on to the UUCP project for worldwide distribution[2]. For each node in the map, the information includes: the node name and domain(s); the organisation that runs it; the operating system used; the CPU type; a contact person's name and electronic address; the postal address and telephone number; the position (latitude and longitude); and some information on the site(s) with which news is exchanged. The effort involved in maintaining the data, usually referred to as *the network map*, is not prodigious, but not trivial either, and from time to time the question arises as to whether it is worthwhile.

On an ideal network, consisting only of powerful machines with faultless hardware, and equally faultless administrators, and running faultless network software, the map would surely be unnecessary. The information would be dynamically exchanged as an integral part of the information on network links, and accessible though commands forming part of the network software package. For most of the nodes within ACSnet, running "Sydney Unix Network" software, this translates to saying the information would be available from the local *statefile* using the *acsstate* command.

Unfortunately, none of the criteria for an ideal network is met. One of most significant problems, is that some of the nodes run small address space CPU's which preclude the local statefile containing the entire network state information. This effectively prevents such machines from belonging to the top domain. Any nodes linked to them, and not also to a node in the top domain, are similarly restricted regardless of the hardware used. This point is often not appreciated by people who regularly work on, or have ready access to a machine in the top domain[3]. It means that at most such nodes an address like *john@monul* will not work, and that *acsstate -V monul* produces nothing that might tell the user how to improve the address. Imperfect software guarantees that incomplete addresses like this example do arise.

---

1. daved@physiol.su.oz
2. by Robert Elz, Computer Science, University of Melbourne (kre@munnari.oz)
3. Indeed, I suspect that if the software had been written on a machine which was not in the top domain, the situation might have been quite different!

The current version of the network software provides for a limited comment field. This means that if someone wants to find a possible route to someone else in another city, the statefile information may help. For example someone wishing to know if the Psychology Department at the University of Western Australia is on the network can execute *acsstate -V | grep -i psych* and get an indication:

```
 . . .
psych44            [su|psych]
                   "Psychology Department Research PDP 11/44"
 ->           psych (msg)
 ->         uqpsych (msg,int)
uqpsych
                   "W.A. Uni Psychlogy VAX 11/750"
 . . .
```

although the format of the output is not such that the node name is present! Note, however, that this approach will only work on a machine in the top domain. At nodes where the state information is restricted for the reasons discussed above, the question cannot be answered from the statefile information. Such nodes are likely to be outside of Computer Science departments; users at them may not have ready access to a *network guru*.

The current size limitation on the comment field means it does not contain as much information as the map data. The lack of a set format for this field also guarantees the information will be patchy; e.g. few contain a telephone number. There is no reason, in principle, why the network software could not distribute as much information as anyone wanted, and indeed the next version will probably include much more[4]. For the time being, however, much information can be obtained from the map that is lacking in the statefiles. Questions on ACS nodes like these can be answered from the map: "Who is running 4.3bsd on a Microvax?"; "Are there any Physiology Departments on ACS?"; "The link to X has been down for days. Can I telephone them?"

The existence and the maintenance of the map has some benefits most network users would be unaware of. These relate primarily to two non-ideal aspects of our network: imperfect software; and imperfect administrators. Attempting to obtain information for the map from new sites often means that messages concerning the map are amongst the first to travel to and from a new link from a site remote from it. These often fail. The reasons for the failure are varied: bad mail interfaces and improperly configured sites are the most common reasons. Occasionally real misbehaviour of the software is uncovered. Sometimes the fault is well outside the new node (incorrect intervention in statefiles being a common fault). Whatever the reason, the discovery of these faults and their rectification is important (sometimes not only for the new node if they precipitate more widespread routing problems), and the contact between an established site and a new one is valuable in doing so. Since the map information is expressed differently to that in the ACSnet commandsfile, it sometimes uncovers discrepancies between what the administrator states is wanted, and what the available state information shows has been achieved. Resolving these discrepancies is probably of some worth.

A final problem that has been drawn to my attention is that at nodes that have a fairly complete statefile, the execution time for the *acsstate* command becomes long. Thus using *acsstate* to search for information of the sort in the map data can be very time consuming.

Using the map

Having made some points regarding the potential usefulness of the map brings me to the question of how to best use it in practice.

---

4. Piers Lauder, Basser Department of Computer Science, University of Sydney (piers@basser.cs.su.oz), has shown me a sample of the comments supported by Sun IV. Most of the information now in the map is included.

First the information distributed in the aus.map (and/or the comp.mail.maps newsgroup) can be collected automatically. The maps are distributed as shell archive (shar) files. The *unshar* utility will unbundle them, and the news software can be used to trigger this. As an example, at node physiol, we collect information on the arrival of maps in the comp.mail.maps group through the following entry in our news "sys" file:

```
# record file names for automatic unsharing of uucp maps
maps:world,comp.mail.maps:F:/news/Lib/comp.maps.files
```

which cause lines like:

```
/news/news/comp/mail/maps/451
```

to be written in the record file. These can subsequently be arguments to *unshar*, run at some quiet time by *cron*. The map files contain entries which looks like:

```
#N    physiol.su.oz
#p    su
#d    su|physiol
#h    physiol.su.oz
#S    DEC Microvax II; unix 4.3bsd
#O    Dept. of Physiology, University of Sydney
#C    Dave Davey
#E    daved@physiol.su.oz
#T    (02) 692-2695
#P    F-13, NSW 2006
#L    33 53 19.8 S / 151 11 16.2 E
#R    primary node for domain physiol.su.oz
#R    image analysis
#U    basser.oz metro.oz plexus.su.oz
#W    daved@physiol.su.oz; Fri Jan 15 16:45:07 AESST 1988
```

The meanings of tags are only slightly cryptic and in any case are elaborated in a README file that accompanies the map files. Since the files are plain text they can be examined with numerous *Unix* utilities, and with specialised programs, some of which have been distributed on the network. Since the entries are multiline, they are not well suited to *grep*[5] but are perfectly suited to the inverted index system provided by *lookbib* and *pubindex* on most *Unix* systems. In our case the script that examines the map record file each night *unshar*'s the files and builds the inverted index so that a command we have called *viewmaps* can be used; it is simply a script invoking lookbib with appropriate arguments. This approach makes searching very fast (even if the entire UUCP database is used). Enquiries along the lines of those discussed above become simple. Once users become aware of the *viewmaps* command, the incidence of questions like "Can I send mail to someone at ...?" fall off dramatically.

Because the map contains positional information, cartography of nodes is possible (circles in the accompanying illustration). In the absence of complete statefile information, the physical links between nodes cannot be added. The routes over which news is exchanged (obtained from the #U fields in the map) can be added for interest (lines in the accompanying illustration). These connections, although

5. If you have access to the source for *grep*, it is a comparatively simple to add support for a –p switch (paragraph) that specifies the record separator to be a blank line rather than a newline character. *grep –p* then outputs entire map entries.

easy to plot are probably the least reliable data in the map files. The news exchange information is the most difficult to check, while being the least important.

The greatest weakness in the map relates to the dependency upon the cooperation of others in obtaining the original information. Few new nodes volunteer their map entries. Their existence has to be made known and the information requested. It is surprising how difficult it can be to solicit a new entry. No doubt this reflects badly on how useful people find the result! Nevertheless, my policy has been (with limited and temporary exceptions) to not insert entries for nodes I have not made contact with. Despite this the map now contains 266 entries. Updating of the information in the map is less of a problem than its initial acquisition. By the time a node is well established, lines of communication are generally reliable. Many staff changes are even notified.

One problem remains: how to identify nodes which have genuinely disappeared. If a node is down for some time due to a calamity (lightning strikes, floods and out-of-service air conditioning come to mind), it should not be removed from the map. But if the machine no longer exists, or the organisation no longer exists, it should be removed. Unfortunately the source of the information is no longer available! The same problem exists with ACSnet statefile, where defunct node names can persist for long periods.

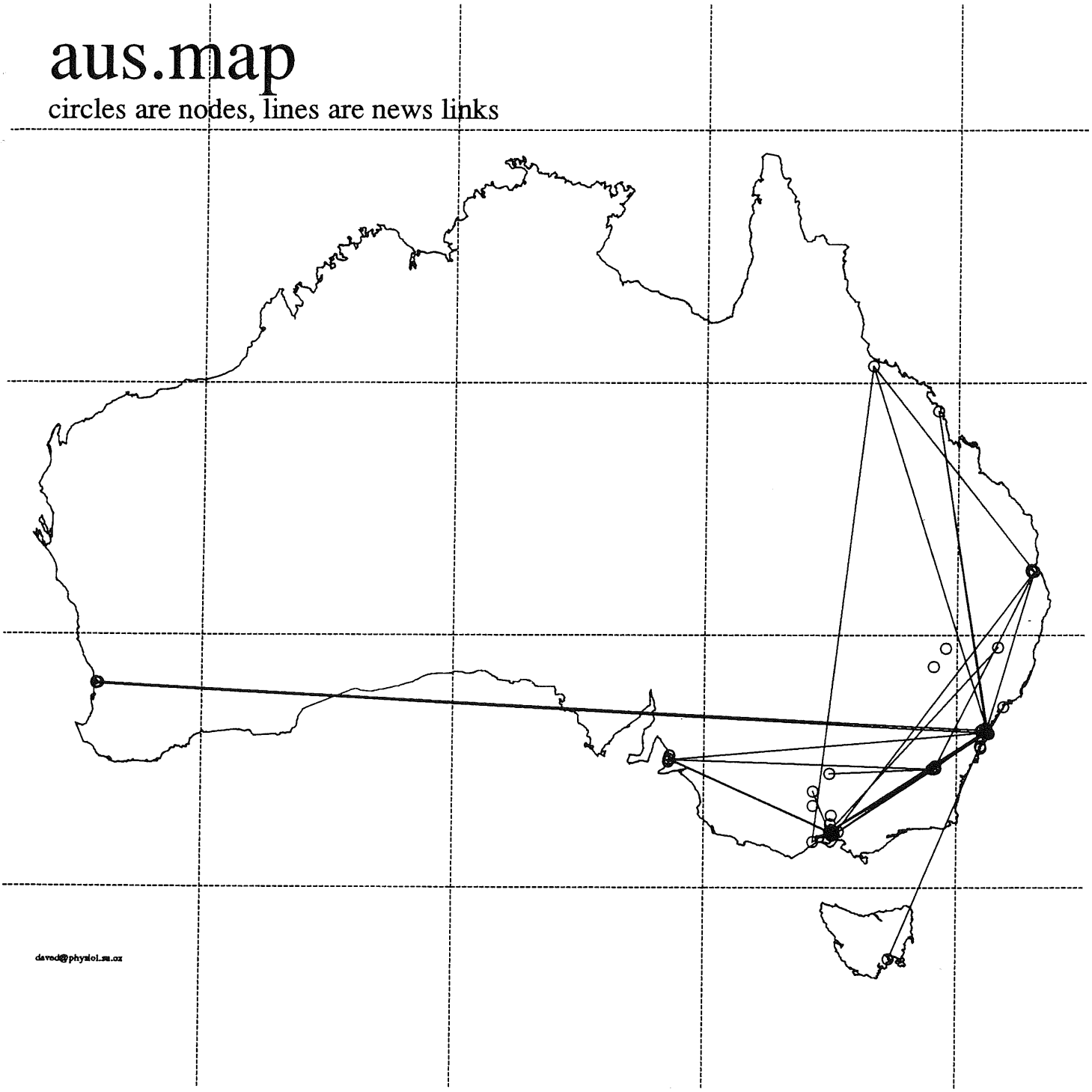
Finally, an answer to statement "we do not need a map in the ACS environment". The map has never been thought of as a replacement for the statefile information. It contains no routing information apart from domain membership. It complements statefile information, and with the right utilities is easy to search.

Summary

The network news map distributed in aus.map provides information on many of the nodes forming the Australian Computer Science network (ACSnet). The information it contains complements that available from ACSnet utilities. It is probably of greatest value at nodes remote from the network backbone, and where statefile information and network expertise is limited.

aus.map

circles are nodes, lines are news links



;login:

The USENIX Association Newsletter

Volume 13, Number 1 **January/February 1988**

CONTENTS

The closing date for submissions for the next issue of *;login:* is February 26, 1988

USENIX THE PROFESSIONAL AND TECHNICAL
UNIX® ASSOCIATION

Fifth Workshop
On
Real-Time Software and Operating Systems

May 12-13, 1988
Omni-Shoreham Hotel
Washington, DC

Sponsored by

The IEEE Computer Society

The USENIX Association

This year's workshop broadens the scope to include general real-time systems. This workshop will bring together researchers, designers, and implementers of real-time operating systems and software. There will be a substantial emphasis on practical experience, so workers from industrial organizations are encouraged to attend. Topics of specific interest include:

- Primary requirements of real-time systems
- Distributed real-time operating systems
- Application-specific operating systems
- Practical experiences and implications
- Exotic applications: medicine, music, etc.
- Architectural support for real-time
- Language, programming support, and reusability
- Types of real-time constraints
- Scheduling and resource management
- Predictability, adaptability, and maintainability
- Reliability and fault tolerance
- Instrumentation and performance measurement
- Case studies

The format of the workshop will be geared to encourage intense technical interactions and focussed discussions.

Attendance will be limited to between 75 and 100 active workers in the field. To participate in the workshop, please submit four copies of an extended abstract or position paper of up to 5 pages describing your current efforts to Lui Sha by **March 1, 1988**. The abstract should focus on insights and lessons gained from recent research and practical experience. Complete details regarding the workshop will be sent to all participants along with the acceptance letters by March 21, 1988. A digest of accepted abstracts will be made available to participants at the workshop.

General Chair
Professor John Stankovic
Department of Computer and Information Science
Graduate Research Center
University of Massachusetts
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Call for Papers
Summer 1988 USENIX Conference
San Francisco
June 20-24, 1988

Papers in all areas of UNIX-related research and development are solicited for formal review for the technical program of the 1988 Summer USENIX Conference. Accepted papers will be presented during the three days of technical sessions at the conference and published in the conference proceedings. The technical program is considered the leading forum for the presentation of new developments in work related to or based on the UNIX operating system.

Appropriate topics for technical presentations include, but are not limited to:

- Kernel enhancements
- UNIX on new hardware
- User interfaces
- UNIX system management
- The internationalization of UNIX
- Performance analysis and tuning
- Standardization efforts
- UNIX in new application environments
- Security
- Software management

All submissions should contain new and interesting work. Unlike previous technical programs for USENIX conferences, the San Francisco conference is requiring the submission of **full papers** rather than extended abstracts. Further, a tight review and production cycle will not allow time for rewrite and re-review. (Time is, however, scheduled for authors of accepted papers to perform minor revisions.) Acceptance or rejection of a paper will be based *solely* on the work as submitted.

To be considered for the conference, a paper should include an abstract of 100 to 300 words, a discussion of how the reported results relate to other work, illustrative figures, and citations to relevant literature. The paper should present sufficient detail of the work plus appropriate background or references to enable the reviewers to perform a fair comparison with other work submitted for the conference. Full papers should be 8-12 single spaced typeset pages, which corresponds to roughly 20 double spaced, unformatted, typed pages. Format requirements will be described separately from this call. All final papers must be submitted in a format suitable for camera-ready copy. For authors who do not have access to a suitable output device, facilities will be provided.

Four copies of each submitted paper should be received by **February 19, 1988**; this is an absolute deadline. Papers not received by this date will not be reviewed. Papers which clearly do not meet USENIX's standards for applicability, originality, completeness, or page length may be rejected without review. Acceptance notification will be by **April 4, 1988**, and final camera-ready papers will be due by **April 25, 1988**.

Send technical program submissions to:

Sam Leffler
SF-USENIX Technical Program
PIXAR
3240 Kerner Blvd.
San Rafael, CA 94901

(415) 258-8195
ucbvax!sfusenix

FULL PAPERS ARE DUE FEBRUARY 19, 1988

Future Workshops

In addition to the Technical Conferences in Dallas and San Francisco, the USENIX Association will sponsor four workshops during 1988. These will be

- Real-Time Operating Systems (cooperatively with IEEE) in Washington, DC, May 12-13
- UNIX Security, in Portland, OR, August 29-30
- UNIX and Supercomputing in Pittsburgh, PA, September 26-27
- Large Installation System Administration II, Monterey, CA, November 17-18

Melinda Shore of the Pittsburgh Supercomputer Center and Lori Grob of New York University are the co-Program Chairs for the Supercomputing workshop; Alix Vasilatos of MIT's Project Athena is the Program Chair of the Systems Administrator's workshop; Matt Bishop of Dartmouth College will be the Program Chair for the UNIX Security workshop.

As a result of the success of the C++ workshop in Santa Fe, NM, in November, there may be a "mini-conference" concerning C++ in October. The tentative dates are 17-20 October in Denver.

Call for Papers
UNIX Security Workshop

Matt Bishop is the chair for the UNIX Security Workshop to be held in Portland, Oregon, on Monday and Tuesday, August 29th and 30th, 1988. This workshop will bring together researchers in computer security dealing with UNIX and system administrators trying to use UNIX in environments where protection and security are of vital importance.

Some topics to be considered include: password security (password file integrity, enforcing choice of a safe password, spotting and handling crackers), network security (problems arising from logins over an unprotected Ethernet, containing a break-in to one machine in a networked environment), file system security (auditing packages, security in an NFS environment), new designs to obtain C-level (or better) certification, making existing UNIX systems more secure, and locating and fixing UNIX security problems.

Format

Each participant will submit electronically to *{ihnp4,decvax}!dartvax!bishop* a one or two page summary describing a solution to some problem. The summary should contain a description of the problem and a description of the solution detailed enough that fellow researchers and administrators can implement or use it. Also, include with your submission five (or so) topics that you'd like to hear about.

The workshop chair will collate the papers to schedule sessions for appropriate audiences. It is anticipated that some sessions will include all participants; some will be for smaller groups. Send your submissions to the chair by noon, EST July 1, 1988.

For further details on the workshop:

Matt Bishop
Dept. of Mathematics & Computer Science
Bradley Hall
Dartmouth College
Hanover, NH 03755

(603) 646-3267
{ihnp4,decvax}!dartvax!bear!bishop
bishop%bear.dartmouth.edu@relay.cs.net

For details about registration, contact the USENIX Conference Office.

Book Review

A Software Tools Sampler

by Webb Miller

Prentice-Hall Software Series, ISBN 0-13-822305-X, 344 Pages

Reviewed by Ozan Yigit

Department of Computing Services
York University
{uunet,utzoo}!yunexus!oz

Introduction

Webb Miller's new book *A Software Tools Sampler* should satisfy those appetites already whetted by earlier tools-oriented books by authors such as Kernighan and Plauger. Even more exciting, is the fact that, unlike those books, the chosen programming language for this book is C. Not surprisingly, Miller's book is based on teaching an upper-level tools course given at the University of Arizona for which Kernighan and Plauger's *Software Tools*[1] was the primary text.

A brief look at the table of contents suggests that this is an extension of the Software Tools books, with the fleshing out of several important topics that had received inadequate treatment elsewhere.

Detailed tour

The first of five chapters, "Getting Started," quickly presents a small library of utility procedures used later in the book. For completeness, it also includes a rudimentary program to change the modification time of a file (`tweak`), another to locate all occurrences of a string (`find`), a simple but effective macro processor (`macro`), and a utility for generating the most effective compile command for a set of source files, based on modification times and filename suffixes (`compile`).

[1] The University of Arizona has had its own software tools distribution ever since the release of the software described in Kernighan and Plauger's book.

The second chapter deals with a dependency-based file updating tool called `update` which is very similar to the UNIX `make`. Anyone who has read the UNIX documentation for `make` has an idea of how it works and how it may be implemented. Unfortunately, the actual implementation details are not discussed in the available UNIX literature, and some important issues such as off-line file updating (creating a command file for later execution) versus real-time file updating (immediate execution of update commands) are not even considered.

This chapter fills the gap with a thorough discussion of dependency graphs (sometimes called AOV-Networks) and various incrementally refined algorithms based on these graphs for the file update problem. The resulting program, although syntactically different, contains the basic functionality of `make`, and addresses the off-line update problem. Of course, the simple macro processor described in chapter one provides the shorthand facility for the program. Coupled with a paper published in *Software-Practice and Experience* (see additional readings at the end of this review), this chapter offers possibly the best available description of the internal workings of `make`.

The third chapter is devoted to file comparison programs that determine instructions for converting one file into another. The file comparison techniques have a variety of diverse uses. One of the earliest algorithms was invented by biologists to determine how many amino acids need to be deleted and inserted to convert one protein to another. In this chapter, two such algorithms are

discussed, where both algorithms generate the optimal sequence of instructions (edit script) to convert one file into another.

The first algorithm is originally by Walter F. Tichy, the author of a very well known revision control system (another application for file comparison techniques) for Berkeley UNIX, called `rcs`. This algorithm uses only *append* and *copy* instructions for conversion, and is presented in this chapter as a program called `bdiff`. The second algorithm, developed by Miller, uses only the *insert* and *delete* instructions. It was originally published in the November, 1985 issue of *Software-Practice and Experience.* A program that embodies the algorithm, called `fcomp`, is tested against the classic UNIX `diff` based on a different and well-known algorithm by J. W. Hunt and T. G. Szymanski. In normal circumstances, where the differences between the two files are small, it runs about four times faster than `diff`.[2] Miller demonstrates that the difference in performance is strictly due to the algorithm, and not due to a tight implementation. There is also a discussion of worst case performance for both `fcomp` and `diff`.

Chapter three concludes with a very detailed description of a programming project based on the file comparison algorithms, a Version Control System, similar to AT&T's `SCCS` (Source Code Control System) and Tichy's `rcs` (Revision Control System). Completing this project should end the suffering for those who lack such a revision control facility in their programming environment.

The fourth chapter is concerned with pattern matching, with special emphasis on *regular expressions.* The first part of the chapter deals with the `find` program introduced in chapter one, and develops a much faster (about eight times) version of the program, called `fastfind`. Improved performance is obtained by the use of an better pattern matching algorithm similar to Knuth-Morris-Pratt algorithm and a clever circular buffer for file input.

The second part of the chapter is devoted to a proper implementation of the regular expression pattern matching algorithm, based on non-deterministic finite automata.

There is an overwhelming amount of literature on regular expressions. Practically every book on compiler design dedicates a chapter to regular expressions under the discussion of lexical analysis. It is also true, however, that only a fraction of this literature goes beyond the theoretical aspects to discuss actual implementation details. The implementations included in the Software Tools books cover only the ad hoc implementation of partial regular expressions, and omit the more difficult issue of the *alternation* [or] construct. For his part, Miller apparently decided to cut no corners, hence, this chapter implements full regular expressions that follow the traditional algorithms.

Following the details for implementing a parser to generate expression trees for regular expressions, a variation is introduced to generate a non-deterministic, finite-state machine instead of the expression trees. The rest of the chapter is a thorough discussion of how to use the finite-state machine to match text lines. The efficiency of the resulting pattern matcher is further examined, and it evolves into a final program called `match`, which internally uses a *lazy evaluation* technique for improved performance.

The material presented in this chapter is sufficient to develop sophisticated applications based on full regular expressions, such as lexical analyzer generators. (See additional readings.)

The last and longest chapter of *A Software Tools Sampler* implements one of the most popular software tools, a screen-oriented interactive text editor.[3] Miller chose to model his editor, `s`, after the popular Berkeley screen editor, `vi`.

The sections in chapter five follow the logical organization of the screen editor: they cover the command processor, the buffer module and the screen module of the editor. While the sections covering the command processor and the buffer module are interesting, the most important section in this chapter

[2] This claim has been verified by the reviewer.

[3] In their books, Kernighan and Plauger show the implementation of a line editor.

deals with the development of the screen module. In most high-quality screen editors, the screen manager portion of the editor attempts to minimize the amount of data sent to the screen to update its visual contents. The screen update problem consists of both the algorithmic issues, and the low-level terminal-specific problems. Miller's important contributions in this particular problem area make this section particularly noteworthy (see additional readings). Here Miller develops an ad-hoc algorithm to generate minimal terminal control sequences to update the screen contents.[4]

The section contains a detailed design discussion of the update algorithm used in s. It also exposes the failure, in certain conditions, to generate optimal update sequences, as indicated by visually unpleasant changes to the screen. The resulting screen module is a reasonably autonomous, and may be adapted for other uses. Chapter five includes about 3000 lines of C code for the entire editor, built in a modular fashion. With the material presented here, another editor with a somewhat different interface (such as an Emacs-like editor) can be built quickly.

In general

This book is a must for programmers who take their craft seriously. Although most of the tools covered are found in UNIX and other systems, such a clean exposition of the algorithms and issues behind these tools were not so readily available before the publication of *A Software Tools Sampler*. Now, programmers are no longer restricted to an obscure or otherwise algorithmically unreasoned implementation (if they are so lucky as to obtain the source code) of these tools. Further, they should be able to utilize portions of these tools for other projects, such as a source code control system, or a lexical analyzer generator.

Miller's book does have its shortcomings, mostly in the area of typesetting. The source code listings are poorly set, without appropriate attention to language keywords (`if`, `while`, `for` etc.), or comments. These could have been highlighted to improve readability, but it appears that some publishers still think *program source* is not as important as the actual text; a big mistake in this type of a book.

The text itself could be better organized. Important references and additional readings are buried within the text, or scattered across programming assignments. An additional "Readings" section at the end of each chapter (as in the Software Tools books) would have been much more convenient for the reader. These minor issues do not undermine the fact that *A Software Tools Sampler* will make a valuable addition to to your library, close to the *Software Tools* books of Kernighan and Plauger, *The UNIX Programming Environment* of Kernighan and Pike, and *The C Programming Language* of Kernighan and Richie.

Some additional readings

Dependency-Based File Updating

Feldman, Stuart, "Make – a program for maintaining computer programs," *SP&E*, 9(4), February 1979.

Hume, Andrew, "Mk: A Successor to Make," USENIX Conference Proceedings, Summer 1987, pp. 445-457.

Miller, Webb and Eugene W. Myers, "Side-effects in automatic file updating," *SP&E*, 15(11), September 1986.

File Comparison Algorithms and Applications

Hunt, James W. and Thomas G. Szymanski, "A Fast algorithm for computing longest common subsequences," *CACM*, 20(5), May 1977.

Hunt, James W., and M. D. McIlroy, "An Algorithm for Differential File Comparison," Computing Science Technical Report #41, Bell Laboratories, Murray Hill, NJ.

Miller, Webb and Eugene W. Myers, "A file comparison program," *SP&E*, 15(11), November 1985.

Rochkind, Marc J., "The source code control system," IEEE Transactions on Software Engineering, 1(4), December 1975.

[4] In a paper by E. W. Myers and Webb Miller, this algorithm is shown to be near optimal for certain update problems.

Tichy, Walter F., "The string-to-string correction problem with block moves," ACM, Transactions on Computer Systems, 2(4), November 1985.

Tichy, Walter F., "RCS - A system for version control," *SP&E*, 15(7), July 1985.

Pattern Matching and Regular Expressions

Aho, Alfred W., Ravi Sethi and J. D. Ullman, *Compilers: Principles, Techniques and Tools,* Chapter 3, Addison Wesley, 1986.

Boyer, R. S. and J. S. Moore, "A Fast String Searching Algorithm," *CACM*, 20(10), October 1977.

Lesk, M. E. and E. Schmidt, "Lex - A lexical analyzer generator," UNIX Programmer's Manual 2, Section 20, January 1979, Bell Laboratories.

Sedgewick R., *Algorithms,*, Chapters 20-21, Addison Wesley, 1983.

Thompson, K., "Regular expression search algorithm," *CACM*, 11(6), 1968.

Screen Update Algorithms

Arnold, Kenneth C. R. C., "Screen updating and cursor movement optimization: a library package," UNIX Programmer's Manual: Supplementary Documents (4.2 BSD), University of California, Berkeley, 1984.

Gosling, James, "A re-display algorithm," Proceedings ACM, Symposium on Text Manipulation, SIGPLAN Notices, 16(6), June 1981.

Myers, Eugene W. and Webb Miller, "Row Replacement algorithms for screen editors," TR 86-19, Department of Computer Science, The University of Arizona, Tucson, Arizona.

Myers, Eugene W. and Webb Miller, "A Simple Row-Replacement Method," TR 86-28, Department of Computer Science, The University of Arizona, Tucson, Arizona.

UUNET Progress Report

There have been a number of inquiries as to the status and future of the UUNET experiment. I think it is appropriate to stop referring to UUNET as a project or experiment and to just call it UUNET.

UUNET currently has nearly 250 subscribers. The Sequent B21K has been purchased and a long-term contract has been entered into with Tymnet. UUNET also has four 800 numbers.

UUNET information is available from

{uunet, ucbvax, decvax}!usenix!uunet-request

or from Madeleine McCall at 415-528-8649.

– PHS

2.10BSD Software Release Available

The "Second Berkeley Software Distribution" (2.10BSD), produced by the Computer Systems Research Group (CSRG) of the University of California, Berkeley, is being distributed by the USENIX Association. It is available to all V7, System III, System V, and 2.9BSD licensees for a price of $200. The release consists of two 2400 foot, 1600 BPI tapes (approximately 80Mb) and approximately 100 pages of documentation If you require 800 BPI tapes, please contact USENIX for more information.

Sites wishing to run 2.10BSD should be aware that the networking is only lightly tested, and that certain hardware has yet to be ported. Contact Keith Bostic at the address below for current information as to the status of the networking. As of August 6, 1987, the complete 4.3BSD networking is in place and running, albeit with minor problems. The holdup is that only the Interlan Ethernet driver has been ported, as well as some major space constraints. Note, if we decide to go to a supervisor space networking, 2.10 networking will only run on:

11/44/53/70/73/83/84
11/45/50/55 with 18 bit addressing

If you have questions about the distribution of the release, please contact USENIX at:

2.10BSD
USENIX Association
P.O. Box 2299
Berkeley, CA 94710

+1 415 528-8649
{uunet,ucbvax}!usenix!office

If you have technical questions about the release, please contact Keith Bostic at:

{ucbvax,seismo}!keith
keith@okeeffe.berkeley.edu

+1 415 642-4948

Keith Bostic
Casey Leedom

Future Meetings

USENIX 1988 Winter Conference and UniForum – Dallas

The USENIX 1988 Winter Conference will be held on February 9-12, 1988, at the Grand Kempinski Hotel in Dallas, Texas. It will be concurrent with UniForum 1988, which will also be in Dallas.

AFUU UNIX Convention 88
Paris, March 7-10, 1988

EUUG Spring Conference
London, April 11-15, 1988

AUUG Spring Conference
Melbourne, September 13-15, 1988

EUUG Autumn Conference
Portugal, October 3-7, 1988

USENIX 1988 Summer Conference and Exhibition – San Francisco

The USENIX 1988 Summer Conference and Exhibition will be held on June 20-24, 1988, at the Hilton Hotel in San Francisco, California. There will be a conference, tutorials, and vendor exhibits.

Long-term USENIX Conference Schedule

Feb 9-12	'88 Grand Kempinski, Dallas
Jun 20-24	'88 Hilton Hotel, San Francisco
Jan 31-Feb 3	'89 Town & Country Inn, San Diego
Jun 12-16	'89 Hyatt Regency, Baltimore
Jan 22-26	'90 Washington, DC
Jun 11-15	'90 Marriott Hotel, Anaheim
Jan 22-25	'91 Dallas
Jun 10-14	'91 Opryland, Nashville

Publications Available

The following publications are available from the Association Office. Prices and overseas postage charges are per copy. California residents please add applicable sales tax. Payments **must** be enclosed with the order and **must** be in US dollars payable on a US bank.

The EUUG Newsletter, which is published four times a year, is available for $4 per copy or $16 for a full-year subscription.

The July 1983 edition of the EUUG Micros Catalog is available for $8 per copy.

Conference and Workshop Proceedings

Meeting	Location	Date	Price	Overseas Mail Air	Overseas Mail Surface
C++ Workshop	Santa Fe	November '87	$15	$25	$5
Graphics Workshop IV	Cambridge	October '87	$10	$15	$5
USENIX	Phoenix	Summer '87	$20	$25	$5
USENIX	Wash. DC	Winter '87	$20	$25	$5
Graphics Workshop III	Monterey	December '86	$10	$15	$5
USENIX	Atlanta	Summer '86	$10	$25	$5
Graphics Workshop I	Monterey	December '84	$ 3	$ 7	$5

EUUG

European UNIX® systems User Group

SPRING 1988 Conference

"UNIX® around the World"

London 11th – 15th April 1988

For further details, contact: The Secretariat **European UNIX® systems User Group**

EUUG
European UNIX® systems User Group
Owles Hall, Buntingford, Herts. SG9 9PL, UK
Tel (+44) 763 73039

PRELIMINARY ANNOUNCEMENT
and
CALL FOR PAPERS

-=-=-=-=-=-

EUUG AUTUMN '88 CONFERENCE

Lisbon, Portugal, 3-7 October 1988

-=-=-=-=-=-

NEW DIRECTIONS FOR UNIX

Preliminary Announcement

The Autumn '88 European UNIX systems User Group Technical Conference will be held in Lisbon, Portugal. Technical tutorials will be held on Monday 3rd and Tuesday 4th October followed by the three day conference, ending on Friday 7th October.

A pre-conference registration pack containing detailed information will be issued in early June 1988.

Call for Papers

The EUUG invite abstracts from those wishing to present their work. All submitted papers will be refereed. They will be judged with respect to their quality, originality and relevance.

Suggested subject areas include:

- Real time
- Security issues
- Distributed processing
- Multi processors and parallelism
- Supercomputing
- Internationalisation
- Fault tolerance
- Transaction processing
- Virtual memory
- Object oriented approaches
- Videotext applications
- Standards and conformance tests

Submissions from Students are particularly encouraged under the EUUG Student Encouragement Scheme, details of which are available from the EUUG Secretariat.

Important Dates

Abstract deadline	**30th April 1988**
Acceptance notification	**15th May 1988**
Final paper received	**1st August 1988**

Method of submission

Abstracts **must** be submitted by post to the EUUG Secretariat. All submissions will be acknowledged by return of post.

Tutorial Solicitation

Tutorials are an important part of the EUUG's biannual events providing detailed coverage of a number of topics. Past tutorials have been taught by leading experts.

Those interested in offering a tutorial should contact the EUUG Tutorial Officer as soon as possible.

Additional Information

The Programme Chair, Dr Peter Collinson, will be pleased to provide advice to potential speakers. Dr Collinson may be contacted at the address below.

If you wish receive a personal copy of any further information about this, and future EUUG events, please write, or send electronic mail, to the Secretariat.

Places in the main conference hotel are limited. In line with the suggestion made at Dublin, it will be possible to book for conferences well in advance. Therefore, there will be a special bookings desk for this conference available during the London meeting.

Useful Addresses

Secretariat	**Tutorial Officer**	**Programme Chair**
EUUG	Neil Todd	Dr Peter Collinson
Owles Hall	IST	Computing Laboratory
Owles Lane	60 Albert Court	University of Kent
BUNTINGFORD	Prince Consort Road	CANTERBURY
Herts	LONDON	Kent
SG9 9PL	SW7 2BH	CT2 7NF
UK	UK	UK
Phone: (+44) 763 73039	(+44) 1 581 8155	(+44) 227 764000 Ext 7619
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Programme committee member	**Programme committee member**
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EUROPEAN UNIX SYSTEMS USER GROUP NEWSLETTER

Volume 7
Number 4
Winter 1987

EUUG Strategy Workshop Paris 4-6 September 1987 Preliminary Notes

Helen Gibbons
euug@inset.co.uk, ...!mcvax!ukc!inset!euug

EUUG Secretariat, Owles Hall
Buntingford, England

1. *A Weekend in Paris*

This took place in the early September at the Chateau de Montvillargenne near Chantilly just north of Paris; an area well known for its horse breeding. This sounded like a nice relaxing idea, but ended up being jolly hard work. There was much discussion, some of it heated, as most people wanted their own particular ideas presented.

We shared the chateau with several wedding parties, some of whome played music very loudly under my bedroom window; I only got to sleep after the hotel manager gave me a bottle of Champagne to compensate for the noise!

Below are some rough notes that I took at the time:

The workshop dealt with the following topics: strategy, conferences and exhibitions, publications, the network, external relations, accounting and administration. Each of these will be dealt with under a separate heading.

2. *Strategy*

Drafting Committee Presenter: E Milgrom

This working party covered the role, purpose and organisation of the EUUG. It examined the role and purpose of the EUUG in respect to its members and considered whether individual group members should automatically be members of the EUUG or whether the EUUG should simply be an umbrella body with the National Groups as the members — this was preferred. So National Groups could be billed for central services and they could arrange their own special classes of membership.

Voting rights were looked at and all schemes proposed were democratic. The majority were in favour of "one country — one vote".

It was felt that the EUUG should help National Groups to improve their visibility. The EUUG should take a more important role internationally.

National Groups should retain a large amount of freedom in respect to members but it was felt that increasing institutional and corporate members was important.

At present the EUUG was seen as a forum for technical people, but it was suggested that more effort should be made to include more end users and prospective users, as the market might be too limited if restricted to technical people only. The question was raised — should the EUUG provide a platform for commercial companies? Should services include stands, exhibitions, data bases, etc?

It was felt that a distinction should be made between EUUG services and National Group services and the duration of each should be addressed periodically and financing for each service should be clearly identified.

Standards were seen as important, but enthusiasm was tempered by the amount of work needed. The majority thought that there were not adequate enough resources to fully take part in committee work, but they did want to promote standards.

Help services and duplication of efforts were looked at, and it was agreed that the EUUG should help the National Groups provide information to their members — i.e. tutorial materials, speakers, etc. and avoid conflicts of events wherever possible.

The EUUG should maintain a data base of useful information.

The EUUG should be involved in EUnet and provide support for EUnet by publicising and co-ordinating its activities. The majority agreed that it should fund studies and experiments, but *it should not run it*. The EUUG should, however, liaise with other bodies in Europe where appropriate.

Costs should be examined to see if they could be reduced without reducing services. Other means of income should be investigated.

Thought should be given to the importance of attendees at conferences, and the possibility of having other registered users within a corporation. Thought should be given as to what could be done for students.

There was a strong feeling that the Strategy Meetings were useful and should be continued, possibly every two years.

3. *Conferences and Exhibitions*

Drafting Committee Presenter: E. Janich

The current responsibilities were identified as:

Keld Simonsen	Conference officer
Helen Gibbons	Admin/Central office work
Niel Todd	Tutorials
Programme Committee	

At present the EUUG runs two conferences a year, and the other groups run from nought to two conferences per year. The profit varied from one event to the other.

The proposals of this working group were to settle on two EUUG conferences per year, one more commercial one in the Spring, and one more academic/technical one in the Autumn, but this should not be called a workshop.

The themes should be set well beforehand, and the call for papers should be distributed one year in advance. Time schedules should be set.

Tutorials should not be free. They should be more technical, and have a higher fee for non members but there should be no different levels (i.e. for profit and non profit makers).

The working group strongly recommended that there be a fixed and constant split between the host group for a conference and the EUUG, and that it be at the rate of 30/70 for all conferences and for a fixed amount of responsibilities, which should also clearly be identified.

Long term planning was also strongly recommended and it was suggested that the conferences should always be held one week after Easter (i.e. the first full week

after the Easter holiday week) and the last full week in September. This should be clear and constant and therefore should prevent collisions with group events, as it was felt to be important that EUUG conferences did not clash with local conferences. Neither should local conferences conflict with each other if they are in countries which speak the same language. Groups should talk to each other *before* fixing dates.

It was recommended that there be reduced fees for other national group members attending national conferences and this should be added to the official guidelines. The EUUG should co-ordinate invited speakers where-ever possible.

Exhibitions should be held solely for profit and should only be one per year for the EUUG.

As far as hiring professional organisers was concerned, it was felt that this should be the decision of the local group, but it should be under the control of the EUUG. Groups, however, were warned to be very careful and to keep a history of the experience, as there were unscrupulous organisers, and serious problems have been experienced in the past in using them. Care should be taken to use someone trustworthy.

It was felt that payment could be make for help when there was a heavy load a local organiser, so that local organisers could pay for jobs to be done or could offer in return free attendance at that and the next conference.

Local Groups should advertise their events and EUUG events in their local press.

It was thought that Usenix conferences had some good ideas and efforts should be made to learn from them.

Efforts should be made to advertise EUUG conferences in USENIX and also in Australia and Japan.

4. Publications

Drafting Committee Presenter: F. Kofler

The working party had examined:

Newsletter	Purpose	EUUG	Contents
National Groups	Production	Magazines	Finance
Technical Journal	Distribution	Others	Language

The working group recommended that the EUUG newsletter should not carry pure product information, but should carry a summary of what happens on the net news. It should report on surveys, reviews of books, products and public domain software. There should be more technical information at all levels, but the most technical should be placed with an outside technical journal, possibly Usenix.

The newsletter should provide cohesion and foster group feelings using pictures and jokes, but they must be of the kind understood by all. "In jokes" should be discouraged.

There should be no introductory material, but hints, pointers and lists and there should be reports of local working groups and market reports (if cheap) also legal aspects (licencing, copyrights).

It had been felt in the past that the newsletter was too English, but this was improving, and a good spread of European coverage did depend on contributions from the national groups, of which more were now being received. However, it was

agreed that all articles should appear in English. Translation services would be provided as would a service to tidy up English from non native English speakers.

It was noted from the survey that most local groups had their own newsletter, except for U.K., Ireland, the Netherlands and Iceland. Most published about 3 to 4 issues per year. Most of the work was done by the editors themselves, with the exception of Germany who paid for contributions. It was agreed the EUUG would not pay for articles and that the mailing list would not be available for sale.

The EUUG newsletter cost about £5,000, which works out at about £2 per copy*.

Funding should be from central budget at one copy per member, but extra copies should be made available to members at production plus 10%. Further copies should also be sent to the National Groups and to libraries.

Advertising should be allowed up to one third of the total. It was not possible to bind in different advertisements for different countries, but it *was* possible to provide different inserts for different countries.

It was recommended that the newsletter remained at 4 issues per year for the moment until the situation was stable, and then think of increasing to 6 per year.

The working party recommended that individual mailing be maintained as it was nice for members to have something coming direct from the EUUG, and the savings from bulk shipping would be marginal and added to that, it was not certain that all groups would be able to send out newsletters on a regular and reliable basis. The problems, however, in getting up to date labels from the groups was noted, but this was gradually improving.

National Groups should send a copy of their newsletter to each of the other groups, as well as to Owles Hall, and members could subscribe to other Groups' newsletters.

As far as other publications were concerned it was agreed to try to get a regular EUUG column in an important magazine.

Co-operation with Usenix was recommended, but the EUUG should not at present try to set up its own technical journal, nor should it try to produce its own catalogues, although a catlalogue of catalogues would be useful an could be undertaken.

5. *The Network*

Drafting Committee Presenter: S. Kenyon

Current developments are that the EUUG has been talking to EEC about the present position of EUnet and its future. EEC interest is based on intensive use of EUnet for ESPRIT projects. A study has been proposed and is underway to investigate transition to X.400 and related ISO protocols. The results of Phase A will be presented at the Dublin conference. Phase B, which is to be completed by the end of 1987 if the EEC sign the contract, will look at migration. The EUUG has stipulated that software developed for this purpose will be available at a nominal handling charge to members of the EUUG.

The working party has expressed concern at the big influence of the backbone managers on the services provided. Suggestions to solve this included having the

* Secretary's note: On examining latest figures and including editors fee this seems to be working out at nearer 10,000 UK pounds per issue.

backbone manger on the National Board, and having more than one backbone. A lot of confusion had arisen around the question of the ownership of the network. Some national groups apparently own the backbone and send out bills directly. Some countries have no control whatsoever on the backbone policies. The working group had voted 50/50 on the ownership of the network by the National Groups. A majority is in favour of the National Group co-ordinating the network activities. Membership of the local user group was voted for as a mandatory requirement for connection to EUnet.

It was noted that at present the EUUG pays £3000 to £4000 annually to support EUnet (travel, meeting costs, etc.). It was generally agreed that EUnet should be made financially independent of the EUUG by raising the rates. This requires centralised billing, a subject which was discussed, but no decision was reached. A advantage of central billing might be the avoidance of VAT charges.

The entire cost/accounting situation has not been resolved, but it was felt that it should be.

Several proposals for future plans were made to expand the services provided by EUnet. These include selective news delivery on request, distribution of news, indexes, name server, user server, increased speed/reliability/connectivity, source archive sites for public domain software.

This raised the point as to how those services should be funded (whether they should be included in the basic charge or charged extra), and about alternative software distribution media (cassettes, floppies).

It was recommended that new gateways should follow the example set by the DFN gateway in Germany and the CSNET gateway at CWI.

The question of EUnet not allowing commercial exploitation was raised. This, however, seems to conflict with the contracting of backbone duties to a commercial company, something which is considered by some countries.

An idea was presented to set up a database of publication lists, software lists, news extracts, etc. and exploit this commercially.

The need for a manual on how to set up a network connection was identified. Two aspects, organisational and technical, were identified. The EUUG might provide a master which could be localised by every national group, but no commitment to create anything in this area was made.

It was reported that a public domain version of the UUCP software is now available. Doubts about the p.d. character were raised and ACSNET was mentioned as an alternative.

It was considered unwise to advertise the network heavily before legal problems with the PTTs have been resolved. EUnet should co-operate with its users and therefore not exclude PC users provided they are EUUG members.

It was felt that the results of the ECC study should answer some of the questions raised above, and that this report should be used as input to this study, together with any conclusions later added. The question was raised as to whether the study should consult with backbones, national groups, or both.

6. *External Relations*

Drafting Committee Presenter: I. Korn

A survey of the interactions between the national groups showed that most groups worked in isolation.

The working party examined what the groups were doing in relation to contact with other groups, contact with /usr/grp and Usenix, contact with vendors and with the press.

It seemed that a lot of working groups existed within the national groups and it was felt that the boards of the various groups and the Governing Board should look at how the knowledge of what they were doing could be spread.

There were, of course, language related problems, which would mean that regions with the same language were more likely to get together.

The EUUG should help to advertise events through, for example, the calendar and a limited mailing list, but in the end it would depend on the National Groups to advertise their events.

It was recommended that the Business Managers should call all the National Groups once or twice per month to maintain contact by asking what they were doing and what was new.

It was also recommended that the Secretariat be equipped and educated in the efficient use of email and that it should always respond to email messages.

The calendar, newsletter and events should be continued with extra effort.

To promote EUUG visibility there should be support for involvement with outside bodies such as EEC and CEPT and with standard bodies and committees such as ISO and X/OPEN.

To encourage vendor awareness National Groups should always include the words "affiliated to the EUUG" in their advertising and publicity, and vice versa — the EUUG should always stress its 14 groups.

UNIX training houses should be encouraged to promote the EUUG and relevant National Groups by distributing literature and information.

7. *Accounting and Administration*

Drafting Committee presenter: N. Todd

At present Helen Gibbons is paid by the EUUG to provide a secretariat service which includes the provision of staff, equipment, premises, heating, lighting, etc. involved in the running of an office. For a fixed fee all non conference activities are funded centrally while activities related to conferences are funded from conference budgets. Principal members of the Owles Hall staff are:

1. The Business Manager who represents the Secretariat at the Governing Board and Executive Committee meetings, deals with all administration, checks out proposed conference venues and handles paperwork associated with conferences, supervises financial aspect and prepares the financial reports. She is the "public face" of the Secretariat.
2. The Accountant, who is qualified under U.K. law. She works part time and keeps all financial records, prepares reports for the treasurer and assists the external auditors
3. A small number of secretarial staff are available to handle photocopying, typing, telephones, packet preparation etc. They also deal with the franking machine, or postage stamps for shorter jobs where the benefit of the franking

machine is outweighed by the trouble of resetting the machine for different rates of small runs.

Further details of Owles Hall can be found in the September 1987 newsletter.

The existing computing facilities at Owles Hall are currently a terminal and modem to INSET in London. The modem has recently been upgraded to 2400 band to increase reliability. Other than that it should be noted that at present the Secretariat has no computing facilities, though the EUUG working party on this is still looking into the provision of a machine. Currently favoured is a 386 based system to provide the opportunity to run DOS or UNIX. The working party recommended that sponsorship be sought and suggestions, comments, contact names or offers should be submitted to the computer working party via Owles Hall.

On financial policy and cash flow, it was noted that the current policy is to cover 6 months expenditure including a conference.

In reality there is currently about one years operating held in reserve, although this does not take into account a number of extraordinary items of expenditure such as the strategy workshop, the EEC networking study, payment of a newsletter editor, 10th anniversary expenditure, and additional executive committee meetings.

The Executive Committee monitors the financial position by means of the financial overviews prepared for the Treasurer by the accountant at Owles Hall. The Governing Board receives these via the Executive Committee minutes, plus a special set usually prepared to coincide with Governing Board meetings.

A two year financial projection is prepared by the treasurer, and there was general agreement that this time scale was sufficient.

On subscriptions, points 5.2 and 5.3 of the current bye laws (which are now being revised) were re-iterated, and the working group requested that the invoices sent to the National Groups should have an explicit "pay by" date and that full bank details should be included to facilitate payments. The working group also suggested that the use of Giro bank accounts be investigated, and that there might be an advantage of looking into the possibility of the EUUG setting up "off shore" accounts.

At present a visa card had been obtained for the use of the Business Manager for official EUUG business, and Barclaycard were currently investigating the EUUG before deciding whether to allow it to take payment by credit card, but it was hoped that this would be resolved soon.

It was requested that the National Groups check the membership details sent to Owles Hall to ensure that extra names are not included by mistake.

It was noted that there have been problems in the past in trying to reclaim VAT from other countries, such as France. Care should be taken to avoid VAT problems as much as possible by using local merchandise.

Financial transactions took up a great deal of the time of the Secretariat. Members were asked to help by trying to ensure that expense claims were not submitted in multiple currencies and that the currency itself was always made clear.

Current policy required the National Groups to submit a copy of their accounts to Owles Hall for distribution to the other national groups. The working group felt that there was little to be gained by this and that a National Group's financial affairs were their own concern. Also the effort of converting the various accounts into a comparable form was too large in relation to the benefit. The working group recommended that this practice be discontinued.

It was agreed that address labels should always be requested by email and realistic reminders and deadlines should be used.

It was agreed that the Secretariat needed a higher profile on the network. Future provision should be made for the electronic update of membership lists.

EUUG/National Group co-operation and liason was seen as important and, finance permitting, it was suggested that the Business Manager should visit the committees of the National Groups. A slide presentation about the EUUG was already being considered and this could be used by any member of the committee visiting existing and start up groups.

The working group had discused the membership cards and felt that they had been a failure. It was recommended that the scheme be abandoned.

The wall chart was to be repeated for 1988 and corrections and details from the National Groups should be sent to Owles Hall by 1st November 1987.

The Business Manager invited suggestions for the updating of the bye-laws and the membership leaflet and asked that they should be sent directly to her.

Finally, it was noted that the administration was improving and that the Secretariat provided a prompt and reliable service.

General Discussion

At the end of the presentations there followed a general discussion on policy.

A special working party on fees reported their discussions. The fee to the EUUG should depend on the services provided. It was noted that it was not possible to lower fees *and* raise services, but the student question should be addressed. It was agreed that all members of national groups should be EUUG members.

The Executive Board Structure was discussed. It was thought that more work should be done on a national level. The Executive committee was responsible for ensuring that the work was done, but it did not need actually to do the work. Items to be addressed within the executive committee were: finances, publications, conferences, tutorials, software, EUnet, PR, Internationalisation User Group Relations, Administration, and co-ordination.

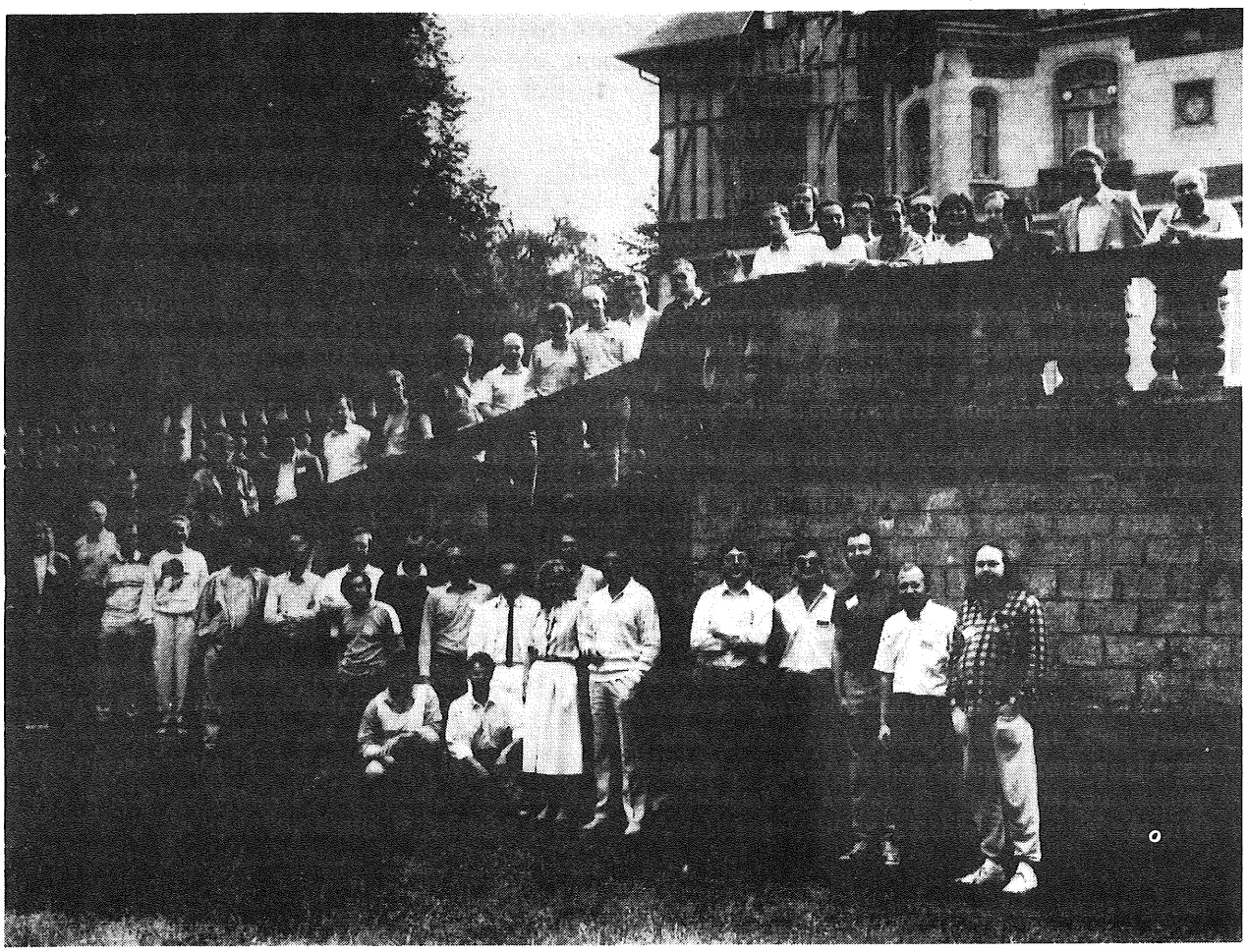
Some thought should be given to whether people should be elected to the executive committee and then placed in the jobs, or whether people should be chosen to do a specific job. It was accepted that it was difficult for the National Groups to vote as they did not know the people. It was agreed, therefore, that everyone standing for the executive committee should produce a position paper about himself/herself.

It was agreed that thought should be given to new ideas and that a shift in services should be considered towards providing less existing services and more new ones.

A suggestion was that the EUUG newsletter should become thinner while despatching information centrally to the National Groups for them to include in their newsletters.

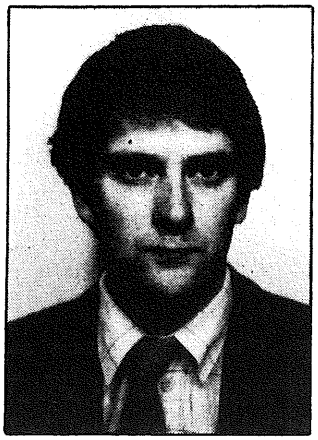
It was agreed that one Governing Board meeting each year should be separated from the conference so that more time could be given to discussions.

If you would like comment on any part of this then please send your thoughts to Owles Hall, or email to euug-exec@cwi.nl (...!mcvaxleuug-exec), or to your national group representatives.



The Morning After the Paris Strategy Meeting

A Preprocessor Extending C++ to Support Rule Based Systems via Access Orientation



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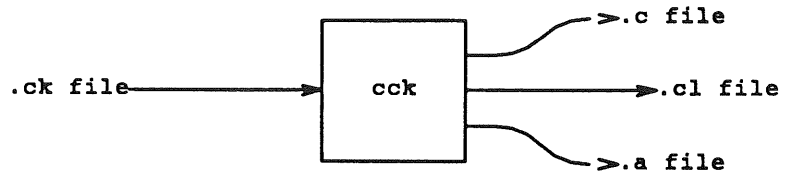
Daniel Mann is Senior Systems Analyst at UDI Ltd. Previously he has worked in both hardware and software development environments. UDI is involved in designing and manufacturing underwater sonar equipment. The work described here was used in prototyping a sonar security system. He is currently investigating the use of UNIX in real-time control applications.

Introduction

These notes describe an experimental extension to C++ developed at UDI by Daniel Mann and Graham Rowbotham. The system is dealt with in some detail and the reader is required to have an understanding of C++ and rule based systems such as OPS5. The notes are intended to give a brief description of the implementation and its potential. A detailed knowledge of the implementation is not necessary to make effective use of the the preprocessor. Some readers may prefer to study the examples given in the Appendix before reading the main text.

The `cck` preprocessor enables rule constructs to be incorporated in C++ code. The preprocessor converts the effectively extended language statements into C++ statements. Any existing C++ code is unaffected. Source files which contain rule statements have the file name postfix `.ck` rather than `.c`. File names ending in `.ck` are passed through the `.cck` preprocessor before being passed to `cfront`. When `.ck` files are compiled with the CC command three files may be produced by `cck`. There is always a `.c` file which contains regular C++ code. There may be `.a` and `.cl` files. The `.a` file contains a synopsis of the symbol objects accessed by rules. The `.cl` file contains declarations of symbol objects and rule objects defined in in the `.ck` file.



A Simple Example

The rule statements can best be described by a simple example. The rules given are derived from the "Robbie spends a day at the Zoo" example (p177, *Artificial Intelligence II*, Patrick Henry Winston). The `carnivore_1` rule has two left hand side tests (if parts). If all of the LHS test conditions are satisfied then a rule is said to be triggered, and the code in the rule right hand side, RHS, (then part) is scheduled for execution (firing).

```
#define CMP(lst, rst) !strcmp(lst, rst)

rule carnivore_1
{       ( CMP(animal.@is, "mammal") );
        ( CMP(observe.@eats, "meat") );
-->
        printf("it is a carnivore\n");
        animal.@is = "carnivore";
}
```

Rule RHS consist of any executable C++ statements. Rule LHS consist of a number of arbitrary logical expressions operating on working memory objects and other data. The logical expressions are arranged in a number of conditional tests. Each test is known as a conditional element (as in OPS5). The two conditional elements in the `carnivore_1` rule make use of the CMP macro to test if object member text pointers match with literal strings. The macro is used for convenience only. Let's review the first conditional element above.

```
( CMP(animal.@is, "mammal") );
(  <expression>  );      // in general
```

A conditional element can contain any valid C++ expression which can be evaluated to "true" or "false". The function `strcmp` is used to test if the string pointed to by object `animal` member `is` matches with literal string `"mammal"`. The only unusual feature of this expression is the `@` character. It is used in rule LHS to indicate that the rule is "monitoring" the object field. In general instances of:

```
<object>.@<member>
```

appearing in a rule LHS are identified by the `cck` preprocessor which responds by removing the `@` character before passing the remaining C++ code to the output `.c` file. Also, an entry is made in the `.a` file for the `carnivore_1` rule:

```
animal_wmo      is      carnivore_1    ce_0
observe_wmo     eats    carnivore_1    ce_1

<object class>  <member>  <rule>      <conditional element>
```

The .a file contains information required to build an attached function for the object members monitored by the rules. Attached functions contain calls to rule conditional element test functions. Member functions which appear in rule LHS must have an attached function declared in the object class definition. Consider the animal object used above:

```
class animal_wmo
{public:
        char*   is;     // member
        void    is_a(); // attached function for 'is'
}

animal_wmo      animal; // instance of animal_wmo class
```

As far as rules are concerned there is only one instance of a working memory object. The `animal` object is assumed by the rules to be of class `animal_wmo`. Rule statements are converted into rule objects of which there is only one instance. The rule objects have member functions which perform the conditional element tests and RHS statements. When the attached function `is_a()` is called for an object of class `animal_wmo` (that is the animal object) a message is sent to the appropriate rule objects causing them to evaluate the affected conditional elements. The `is_a()` function will look something like:

```
void animal::is_a()
{
        carnivore_1_rule.ce_0();
        // other rules monitoring animal.is
}
```

Rule RHS statements follow the `-->` token. Alternatively the `-fire->` token can be used. Rule RHS consist of any executable C++ statements. Normally RHS code assert new object member values. For example, the rule `carnivore_1`, when fired, updates the "`animalis`" member with the statement:

```
animal.@is = "carnivore";

<object>.@<member>      // lvalue
```

When the `@` operator is used in the rule RHS, or in executable C++ code outside rules, the preprocessor inserts a call to the attached function, thus informing rule LHS of the value change. The above assignment results in the following C++ code being inserted into the output .cfile:

```
animal.is = "carnivore"; // assert new value
animal.is_a();           // call attached function
```

The Class Definition file, .cl

Rule statements produce rule objects. These objects have functions which perform the conditional element tests and rule RHS. The member functions are output to the `.c` file. The rule class declarations are output to the `.cl` file. This enables other rules to monitor objects defined in files other than the file containing the rule statement. Each file using any particular rule must `#include` the `.cl` file associated with the `.ck` file defining the rule. Let's look at the `carnivore_1` rule:

```
rule carnivore_1
{       ( CMP(animal.@is, "mammal") );
        ( CMP(observe.@eats, "meat") );
-->
        printf("it is a carnivore\n");
        animal.@is = "carnivore";
}
```

The `.c` file shall contain the instance of the rule class and the definition of the member functions. The listing below shows part of the code output to the `.c` file:

```
carnivore_1_rule        carnivore_1(3); // rule instance

void    carnivore_1_rule::ce_0()  // conditional element
{
        int cetest = CMP(animal.is, "mammal");
        testlhs(cetest, 0);
}
```

The value `3` passed to the `carnivore_1` constructor is used to initialise the conditional element test to all-false. The state of the conditional elements is stored by a bit-field representation in the `base_rule`, known as the summary value. The listing below shows the code output to the `.cl` file. This code defines the rule object.

```
class   carnivore_1_rule : public base_rule
{public:
                carnivore_1_rule(int sum) : (sum){}
        void    ce_0();
        void    ce_1();
        void    fire();
};
```

The wmo Statement

The `wmo` statement is used to declare working memory objects which are to be known in other files. The `wmo` statement below demonstrates the syntax:

```
wmo animal
{public:
        int     @mammal;
        int     @carnivore;
        int     @ungulate;
        char*   @is;
};
```

The operation of the wmo statement is very simple. The wmo token is replaced with the class keyword. The class name is given the extension _wmo and the whole of the class statement is output to the .cl file. Any members prefixed with the @ operator have an attached member function included in the class declaration. The .cl output for the above example would be:

```
class animal_wmo
{public:
        int     mammal;         // members
        int     carnivore;
        int     ungulate;
        char*   is;
        void    mammal_a();     // attached functions
        void    carnivore_a();
        void    ungulate_a();
        void    is_a();
};
```

The wmo statement also causes a class instance to be inserted in the .c file. For the above example the .c file would contain:

```
animal_wmo      animal;
```

If the wmo has a constructor function, then initialisation values can be included in the wmo statement which will be inserted into the .c file class instance. Consider the example below:

```
wmo animal
{public:
                animal_wmo(int, char*);
        int     @mammal;
        int     @carnivore;
        int     @ungulate;
        char*   @is;
}(34, "frog");
```

Building Attached Functions

Each .ck file operated on by cck will produce a .a file if rule statements are used. The .a file contains the information needed to build the attached functions. The

attached functions are used to inform rules that objects appearing in their LHS have changed value.

When all the `.ck` files have been compiled there will be a number of `.a` files produced. These `.a` files must be operated on together to produce a single `.c` file which contains all the attached functions. Consider the two `.a` files given below.

```
animal_wmo      is      carnivore_1     ce_0 // file1.a
observe_wmo     eats    carnivore_1     ce_1

animal_wmo      is      tiger           ce_0 // file2.a
animal_wmo      is      ostrich         ce_0
```

The `abld` command is used to combine the `.a` files and build the attached function file. The following command will produce an attached function file named `afunc.c`:

```
abld  -o afunc.c  file1.a file2.a
```

The `afunc.c` file can then be compiled and linked with other C++ modules. The listing below shows the contents of the `afunc.c` file.

```
void    observe_wmo::eats_a() // attached Fn for observe.eats
{
        carnivore_1.ce_1();
}

void    animal_wme::is_a()      // attached Fn for animal.is
{
        carnivore_1.ce_0();
        tiger.ce_0();
        ostrich.ce_0();
}
```

The Base Rule

Each rule object is derived from a base rule. The base rule class is declared in the `engine.cl` file. This file along with the executable inference engine file, `engine.c`, is available for the programmer to modify. By adding additional base rule constructs it is possible to initialise the base rule members. The preprocessor passes all rule initialisation data to the rule object definition statement in the `.c` file. Consider the example rule below:

```
                        // initialised rule
rule carnivore_1(60)
{       ( CMP(animal.@is, "mammal") );
        ( CMP(observe.@eats, "meat") );
-->
        animal.@is = "carnivore";
}

        // resulting '.c' file rule object instance
carnivore_1_rule        carnivore_1(3, 60);
```

The constructor generated for rules which have initialisation uses the `base_rule_macro`. This macro is defined in `engine.cl` and must be modified to deal with the parameters passed to the base rule constructor. In the above example the value 60 is passed to a base rule member `strength`, which is used to give strength ordering to rules. The listing below illustrates the code output to the `.cl` file.

```
#define base_rule_macro (int sum, int str):(sum, str){ }

class   carnivore_1_rule : public base_rule
{public:
             carnivore_1_rule  base_rule_macro
        void    ce_0();
        void    ce_1();
        void    fire();
};
```

All information about rules is stored in the base rule. Because the base rule is entirely under programmer control there is great scope for extending the information stored in rule objects. The listing below presents a possible base rule object.

```
class   base_rule               // from engine.cl file
{                               // only meta rule can access
        friend  meta_rule;      // private part of base_rule
        base_rule* rule_fp;     // pnt to next rule in agenda
        base_rule* rule_bp;     // pnt to previous rule in agenda
        int     oldsum;
        int     summary;        // conditional element summary
        int     triggered;
        int     strength;          // rule strength
        int     priority;          // rule priority
protected:                         // protected part accessed
        float   confidence;        // by derived rule
public:
                base_rule(int sum){ summary = sum;  }
                base_rule(int sum, int str)
                        { summary = sum, strength = str;}
```

```
        void    testlhs(int ,int );
        virtual void    trig(){}
        virtual void    fire(){}
};
```

The Meta Rule

In the `engine.c` file an object known as the meta rule is defined. This object controls the firing order of the rules. When the conditional elements of a rule are all satisfied then the rule is triggered. This is done by calling `meta.trig()`. This function determines where the triggered rule object is to be inserted in an agenda of rules waiting to be fired. The function `meta.fire()` removes the top rule from the agenda and executes the rule RHS. By running `meta.fire()` until the agenda is empty, the "inference engine" applies the knowledge contained in the compiled rules to the working memory objects repeatedly, until no new object member values can be produced.

The programmer controls the rule firing order via the information stored in each rule object base part and the `meta.trig()` function. The listing below illustrates an example function:

```
// ************************************ meta_rule::trig
//      Function to insert a triggered rule in the agenda.
//      The agenda is ordered according to rule priority.
//      Only one instance of a given rule is allowed.
//
void    meta_rule::trig(base_rule* insert)
{
        base_rule* prev = 0;
        int     priority;

        // calculate rule priority-------
        priority = insert->strength * 100
                        + insert->confidence;

        // If rule is already triggered with a different
        // priority  then  remove  previous  instance of
        // rule from the agenda.
        if (insert->triggered)
        {
                if (priority == insert->priority)
                        return;
                else
                        meta.remove(insert);
        }

        // add rule to agenda--------
        while (agenda && agenda->priority > priority)
        {                           // advance along agenda
                prev = agenda;
                agenda = agenda->rule_fp;
        }
        insert->triggered = 1;   // flag rule as triggered

        ....
}
```

In the above example rules are added according to a priority value. This value is determined from the rule strength and confidence values. Rules are only triggered once for any particular LHS conditions (the refraction principle). If a rule already exists in the agenda at a priority level of the rule to be inserted, then the new rule is inserted ahead of the already waiting-to-fire rule (the recency principle). The order of rule firing is completely under the control of the programmer and need not follow the above example.

The -trig-> Statement

If the agenda ordering is dependent on the LHS values then it is necessary to examine the LHS objects before the meta rule inserts the triggered rule into the agenda. This is done with the `-trig->` statement. Any C++ code can be executed before the rule fires, at the time the rule is triggered. The example below illustrates the syntax:

```
rule carnivore_1
{       ( CMP(animal.@is, "mammal") );
        ( CMP(observe.@eats, "meat") );
-trig->
        confidence = min(animal.conf, observe.conf);
-fire->
        animal.@conf = confidence;
        animal.@is = "carnivore";
}
```

The rule `confidence` member is evaluated before `meta.trig()` is called. The `confidence` member can then be used by `meta.trig()` to order the firing.

Syntactically Attached

The attached functions are determined at compile time. This leads to some interesting effects when using pointers to modify object members. It is not possible to modify the attached function for the object member dereferenced by a pointer. However, if the dereferenced object is modified via indirection, rule LHS explicitly monitoring the object shall not receive a message informing them of the change. In such cases it is necessary to use the indirection operator in the rule LHS. Consider the working memory object given below:

```
wmo power
{       int     engine1;
        int     engine2;
public:
        int     maximum;
        int     *@value;  // points to engine member
};
```

Only the `value` member has an attached function. It is used to point to either `engine1` or `engine2`. The necessary C++ code for initialising the members is not shown. If a rule is monitoring the power object for whichever engine is currently in use it must dereference the `value` member, as does the example below.

```
rule more_speed
{       ( *(power.@value) < power.maximum );
-->
        (*power.@value)++;
}
```

The rule RHS increments the dereferenced engine member. It also calls the attached function for `power.value`. This is quite correct, but the example rule will cause a knowledge loop. As the rule RHS continually messages its own LHS until the engine value is incremented to `power.maximum` and the rule no longer triggers.

Non-Monotonic Reasoning

Non-monotonic reasoning is used to remove the effects of a rule RHS made on out-of-date LHS data. When an attached function is called, rule conditional element functions are evaluated and the result passed to the base rule function `base_rule.testlhs()`. When a rule previously fired experiences a change in a working memory object tested by the rule LHS, such that the rule no longer applies, the summary bit-field value is updated by the `testlhs()` function such as to mark the rule as not fired. The listing below presents the function. As usual the programmer can modify its operation to suit.

```
void    base_rule::testlhs(int cetest, int ceid)
{
        int     mask = 1 << ceid;
        summary = cetest ? (summary & ~mask)
                         : (summary | mask);

        if( !summary              // test if rule fired
           || meta.nonmon()       // test for truth maintenance
           && !oldsum)
        {       this->trig();     // execute rule ->trig()
                meta.trig(this); // add rule to agenda
        }
}
```

The base rule has a "non-monotonic" member which if set will cause the rule to be fired when it is marked as not fired and is currently fired. In this way the expert rules can deal with altering conclusions in response to new data. Only conclusions drawn from currently valid data are maintained. Changes in conditions may well result in previously derived conclusions being deleted in order to maintain a "true state" for the information derived by the inference engine.

The Zoo Example

The complete code for the "Robbie spends a day at the Zoo" problem is given in Appendix A. The file `animal.ck` must be compiled with the CC command along with the C++ inference engine file, `engine.c`. The `-a` option indicates that `abld` should be run on each `.a`file generated by `.ck`files. The `abld` command builds a C++ file with default name `abld.c` which is linked in with the other modules to make an executable programme, `animal`.

```
CC -v -a animal.ck engine.c -o animal
```

The CC command executes `cck` with the option to insert line control information. This enables the compiler to report errors occurring in the original source `.ck` file. Also the `cdb` debugger reports line numbers from the `.ck` file rather than the translated `.c` file. To examine the output C++ code from the preprocessor without line control information, run `cck` separately with the `-P` option.

In the zoo example, two working memory objects are used; `observe` and `animal`. Only one is necessary, but two demonstrate better the operation of the preprocessor.

In the `main()` function four `observe` members are updated. After each new value assertion, the inference engine is run to derive new information. The listing below presents the screen output. The speed of the system has been measured on an HP model 550 mini at 500 logical inferences per second.

```
-----new animal
 I can see it eating meat
 I can see it has hair
its a mammal
it is a carnivore
 I can see it has dark spots
 I can see its colour is tawny
it is a cheetah
```

Backward Chaining

A version of the well known monkey and banana problem has been coded using the preprocessor with C++. The programme is listed in Appendix B. Working memory objects are used to represent: `nothing`, `bananas`, `ladder`, `couch`, `floor`, `ceiling` and the `monkey` itself. Most of these objects are derived from a base object. The reason for the large number of objects is the extensive type checking performed by C++. The compilation command for the problem is given below:

```
CC -v -a mab.ck mab_main.ck engine.c -o mab
```

The problem is solved using backward chaining. Working memory objects are used to store information about goals. This highlights a difficulty occurring in backward chaining systems. There can be only one instance of any particular goal active at any instant in time. To solve this problem a base goal object is used which has a stacking mechanism defined. Each goal object is derived from the base goal and inherits the stacking implementation. When a particular goal is active and another goal of the same type is required, the active goal is stacked until the new goal is satisfied. Unfortunately this makes it impossible to test, in rule LHS, multiple instances of goals of the same type.

The listing below presents the screen output produced by the programme execution. The initial conditions place the monkey on the couch and the bananas on the ceiling at position 3. Because of the stacking mechanism, some goals are satisfied twice. This reduces the effective speed of the system. The speed has been measured in an HP 550 mini at 428 effective logical inferences per second.

```
initial conditions are set
set up goal to hold bananas
mb1 goal_move object ladder to 3
mb8 goal_holds object ladder       < stack hold bananas
mb5 goal_walk_to ladder
mb11 goal_on floor
mb14 jump onto the floor
```

```
mb12 walk to ladder
mb7 grab ladder
 restore stacked goal              < restore hold bananas
mb1 goal_move object ladder to 3   < stack move ladder to 3
mb9 goal_walk_to 3
mb13 walk with ladder to 3
mb10 goal_move satisfied
 restore stacked goal              < restore move to 3
mb10 goal_move satisfied
mb6 goal_holds nothing             < stack hold bananas
mb18 drop ladder
 restore stacked goal              < restore hold bananas
mb2 goal_on object ladder
mb17 climb onto ladder
mb4 grab bananas
```

Conclusion

These notes report the work carried out in developing a C++ preprocessor which supports rule based systems. Because rule knowledge is compiled, the speed of execution is fast. The syntax of the rule statements is easily understood by a C++ user. By extending C++ a number of advantages are gained: rules can be added to existing C++ code; rule based techniques can be easily mixed with the techniques supported by C++; the rule firing order is under the control of the programmer, not built into the system. The system is easily portable to different execution environments.

The disadvantages of the implementation are: there is no interpretive development option; each modification to rule knowledge requires a re-compilation; backward chaining systems are restricted due to the need to have only one instance of a working memory goal object in use at any instant.

Appendix 1

```
// @(#)animal.ck    1.3 87/06/26 15:47:41
// compile this problem with:
//       CC -v -a animal.ck engine.c -o animal
#include "engine.cl"
#include "animal.cl"
#include "stdio.h"
#include "string.h"

#define CMP(lstr,rstr) !strcmp(lstr,rstr)
#define TRUE 1

extern meta_rule meta;

// ************************************************* the symbols
wmo   observe
{public:int         @hair;
         int        @gives_milk;
         int        @feathers;
         char*      @flies;
```

```
            int       @lays_eggs;
            char*     @eats;
            int       @pointed_teeth;
            int       @claws;
            char*     @eyes;
            int       @hoofs;
            int       @chews_cud;
            int       @even_toed;
            char*     @colour;
            char*     @stripes;
            char*     @legs;
            char*     @neck;
            char*     @spots;
            int       @swims;
};

wmo animal
{public:int         @mammal;
            int       @carnivore;
            int       @ungulate;
            char*     @is;
};

// ************************************************** main loop
main()
{
          printf("-----new animal \n");
          printf(" I can see it eating meat\n");
            observe.@eats = "meat";
            while(meta.fire());
          printf(" I can see it has hair\n");
            observe.@hair = TRUE;
            while(meta.fire());
          printf(" I can see it has dark spots\n");
            observe.@spots = "dark";
            while(meta.fire());
          printf(" I can see its colour is tawny\n");
            observe.@colour = "tawny";
            while(meta.fire());

}
// ************************************************** the rules

rule mammals
{         ( observe.@hair || observe.@gives_milk);
-->
          printf("its a mammal\n");
          animal.@is = "mammal";
}

rule bird_1
{         ( observe.@feathers );
-->
          printf("its a bird\n");
```

```
            animal.@is = "bird";
}

rule bird_2
{           ( CMP( observe.@flies, "yes") );
            ( observe.@lays_eggs );
-->
            printf("its a bird\n");
            animal.@is = "bird";
}

rule carnivore_1
{           ( CMP(animal.@is, "mammal") );
            ( CMP(observe.@eats, "meat") );
-->
            printf("it is a carnivore\n");
            animal.@is = "carnivore";
}

rule carnivore_2
{           ( CMP(animal.@is, "mammal") );
            ( observe.@pointed_teeth );
            ( observe.@claws );
            ( CMP(observe.@eyes, "point_forward") );
-->
            printf("it is a carnivore\n");
            animal.@is = "carnivore";
}

rule ungulate_1
{           ( CMP(animal.@is, "mammal") );
            ( observe.@hoofs );
-->
            printf("it is an ungulate\n");
            animal.@ungulate= TRUE;
}

rule ungulate_2
{           ( CMP(animal.@is, "mammal") );
            ( observe.@chews_cud );
-->
            printf("it is an ungulate\n");
            animal.@ungulate = TRUE;
            observe.even_toed = TRUE;
}

rule cheetah
{           ( CMP(animal.@is, "carnivore") );
            ( CMP(observe.@colour, "tawny") );
            ( CMP(observe.@spots, "dark") );
-->
            printf("it is a cheetah\n");
            animal.@is = "cheetah";
}
```

```
rule tiger
{         ( CMP(animal.@is, "carnivore") );
          ( CMP(observe.@colour, "tawny") );
          ( CMP(observe.@stripes, "black") );
-->
          printf("it is a tiger\n");
          animal.@is = "tiger";
}

rule giraffe
{         ( animal.@ungulate );
          ( CMP(observe.@legs, "long") );
          ( CMP(observe.@neck, "long") );
          ( CMP(observe.@colour, "tawny") );
          ( CMP(observe.@spots, "dark") );
-->
          printf("it is a giraffe\n");
          animal.@is = "giraffe";
}

rule zebra
{         ( animal.@ungulate );
          ( CMP(observe.@colour, "white") );
          ( CMP(observe.@stripes, "black") );
-->
          printf("it is a zebra\n");
          animal.@is = "zebra";
}

rule ostrich
{         ( CMP(animal.@is, "bird") );
        ( CMP(observe.@flies, "not") );
          ( CMP(observe.@legs, "long") );
          ( CMP(observe.@neck, "long") );
          ( CMP(observe.@colour, "black_and_white") );
-->
          printf("it is an ostrich \n");
          animal.@is = "ostrich";
}

rule penguin
{         ( CMP(animal.@is, "bird") );
        ( CMP(observe.@flies, "not") );
          ( observe.@swims );
          ( CMP(observe.@colour, "black_and_white") );
-->
          printf("it is a penguin\n");
          animal.@is = "penguin";
}

rule albatross
{         ( CMP(animal.@is, "bird") );
          ( CMP(observe.@flies, "good") );
-->
```

```
            printf("it is an albatross\n");
            animal.@is = "albatross";
```

Appendix 2

```
// @(#)mab_main.ck  1.2
#include "engine.cl"
#include "mab.cl"
#include "stdio.h"

extern meta_rule meta;

enum      { light_c, heavy_c, pos_5_7_c, pos_2_2_c, pos_9_5_c};

extern    nothing_wmo          nothing;
extern    bananas_wmo          bananas;
extern    ladder_wmoladder;
extern    couch_wmo couch;
extern    floor_wmo floor;
extern    ceiling_wmo          ceiling;
extern    monkey_wmomonkey;

extern    goal_holds_wmo       goal_holds;
extern    goal_walk_to_wmo     goal_walk_to;
extern    goal_on_wmo          goal_on;
extern    goal_move_wmo        goal_move;

// ************************************************** main
main()
{
          couch.at = pos_5_7_c;
          couch.on = &floor;
          couch.weight = heavy_c;

          bananas.on = &ceiling;
          bananas.at = pos_2_2_c;

          ladder.on = &floor;
          ladder.weight = light_c;
          ladder.@at = pos_9_5_c;

          monkey.@on = &couch;
          monkey.@at = pos_5_7_c;
          monkey.@holds = &nothing;

          goal_holds.activate(&bananas);
          printf("initial conditions are set\n");
          printf("set up goal to hold bananas\n");

          while( meta.fire() );          // start inference engine
```

```
// @(#)mab.ck       1.4 87/06/26 16:28:28
// to compile this problem enter:
//        CC -v -a mab.ck mab_main.ck engine.c -o mab
#include "engine.cl"
#include "mab.cl"
#include "stdio.h"

extern meta_rule meta;

enum      { light_c, heavy_c, pos_5_7_c, pos_2_2_c, pos_9_5_c};

// ********************************************** the symbols
wmo object
{public:
          object_wmo(){ }
          object_wmo(object_wmo* ob){ on = ob; }
          char*     str;
          int       at;
          int       weight;
          object_wmo* on;
          virtual void        at_a(){ }
          virtual void        weight_a(){ }
          virtual void        on_a(){ }
};

wmo nothing : public object_wmo
{public:  nothing_wmo(object_wmo* ob) : (ob)
                              { str = "nothing object"; }
}(&nothing);

wmo bananas : public object_wmo
{public:  bananas_wmo(object_wmo* ob) : (ob)
                              { str = "bananas"; };
}(&nothing);

wmo ladder : public object_wmo
{public:  ladder_wmo(object_wmo* ob) : (ob)
                              { str = "ladder"; }
          void      at_a();
}(&nothing);

wmo couch : public object_wmo
{public:  couch_wmo(object_wmo* ob) : (ob)
                              { str = "couch"; }
}(&nothing);

wmo floor : public object_wmo
{public:  floor_wmo(object_wmo* ob) : (ob)
                              { str = "floor"; }
}(&nothing);

wmo ceiling : public object_wmo
{public:  ceiling_wmo(object_wmo* ob) : (ob)
                              { str = "ceiling"; }
```

```
}(&nothing);

wmo monkey
{public:
          int        @at;
          object_wmo* @holds;
          object_wmo* @on;
};

// ************************************************ the goals
wmo goal
{public:
          goal_wmo(){ }                  // stack constructor
          goal_wmo(object_wmo* ob){ object = ob; }

          int       active;              // members
          object_wmo* object;
          int       to;
                                         // base class functions
          void      stack(object_wmo*, int, goal_wmo*);
          void      unstack(goal_wmo*);

          virtual void        active_a(){ }       // attached functions
          virtual void        object_a(){ }
          virtual void        to_a(){ }
};

// ******************************************** goal_wmo::stack
void      goal_wmo::stack(object_wmo *obj,
                          int place, goal_wmo* st_p)
{

          if(active) // copy current goal onto stack
          {         st_p[active -1].object = object;
          }
          active++; // store new goal
          object = obj;
          to = place;
          object_a();          // call attached functions
          to_a();
          active_a();
}

// ****************************************** goal_wmo::unstack
void      goal_wmo::unstack(goal_wmo* st_p)
{
          if(--active)         // restore old goal
          {         printf(" restore stacked goal\n");
                    object = st_p[active -1].object;
                    active_a();
                    object_a();          // call attached functions
                    return;
          }
          active_a();
```

```
}

// ********************************************** derived goals
wmo goal_holds : public goal_wmo        // ***** the holds goal
{public:
                    goal_holds_wmo():(){ }
                    goal_holds_wmo(object_wmo* ob) : (ob){ }
          void      activate(object_wmo*);
          void      satisfied();
          void      active_a();
          void      object_a();
}(&nothing);
goal_holds_wmo      goal_holds_stack[10];

void      goal_holds_wmo::activate(object_wmo* obj)
{         stack(obj, 0, goal_holds_stack); }

void      goal_holds_wmo::satisfied()
{         unstack(goal_holds_stack); }

wmo goal_walk_to : public goal_wmo      // ***** the walk_to goal
{public:
                    goal_walk_to_wmo():(){ }
                    goal_walk_to_wmo(object_wmo* ob) : (ob){ }
          void      activate(object_wmo*, int);
          void      satisfied();
          void      active_a();
          void      object_a();
          void      to_a();
}(&nothing);
goal_walk_to_wmo    goal_walk_to_stack[10];

void      goal_walk_to_wmo::activate(object_wmo* obj, int place)
{         stack(obj, place, goal_walk_to_stack); }

void      goal_walk_to_wmo::satisfied()
{         unstack(goal_walk_to_stack); }

wmo goal_on : public goal_wmo // ***** the on goal
{public:
                    goal_on_wmo():(){ }
                    goal_on_wmo(object_wmo* ob) : (ob){ }
          void      activate(object_wmo*);
          void      satisfied();
          void      active_a();
          void      object_a();
}(&nothing);
goal_on_wmo         goal_on_stack[10];

void      goal_on_wmo::activate(object_wmo* obj)
{         stack(obj, 0, goal_on_stack); }

void      goal_on_wmo::satisfied()
{         unstack(goal_on_stack); }
```

```
wmo goal_move : public goal_wmo          // ***** the move goal
{public:
                    goal_move_wmo():(){ }
                    goal_move_wmo(object_wmo* ob) : (ob){ }
          void      activate(object_wmo*, int);
          void      satisfied();
          void      active_a();
          void      object_a();
          void      to_a();
}(&nothing);
goal_move_wmo       goal_move_stack[10];

void      goal_move_wmo::activate(object_wmo* obj, int place)
{         stack(obj, place, goal_move_stack); }

void      goal_move_wmo::satisfied()
{         unstack(goal_move_stack); }

// ************************************************ the rules
// if desired object on ceiling then set up goal
// to - move ladder to object position.
rule mb1
{         (goal_holds.@active);
          ((goal_holds.@object)->on == &ceiling);
-->
          printf("mb1 goal_move object %s to %d\n",
                    ladder.str, (goal_holds.object)->at);
          goal_move.activate(&ladder, (goal_holds.object)->at);
}

// if required to hold object on ceiling
// and object and ladder at same position then
// set up goal - get on the ladder
rule mb2
{         (goal_holds.@active);
          ((goal_holds.@object)->on == &ceiling);
          ((goal_holds.@object)->at == ladder.@at);
-->
          printf("mb2 goal_on object %s\n", ladder.str);
          goal_on.activate(&ladder);
}

rule mb3
{         (goal_holds.@active);
          ((goal_holds.@object)->on == &ceiling);
          ((goal_holds.@object)->at == ladder.@at);
          (monkey.@on == &ladder);
-->
          printf("mb3 goal_holds nothing\n");
          goal_holds.activate(&nothing);
}

rule mb4
{         (goal_holds.@active);
```

```
            ((goal_holds.@object)->on == &ceiling);
            ((goal_holds.@object)->at == ladder.@at);
            (monkey.@on == &ladder && monkey.@holds == &nothing);
    -->
            printf("mb4 grab %s\n", (goal_holds.object)->str);
            monkey.@holds = goal_holds.object;
            goal_holds.satisfied();
    }

    // if desired object on floor then set up goal - walk to object
    rule mb5
    {       (goal_holds.@active);
            ((goal_holds.@object)->on == &floor);
    -->
            printf("mb5 goal_walk_to %s\n",
                    (goal_holds.object)->str);
            goal_walk_to.activate(goal_holds.object, 0);
    }

    rule mb6
    {       (goal_holds.@active);
            (goal_holds.@object != monkey.@holds &&
                    monkey.@holds != &nothing);
            ((goal_holds.@object)->at == monkey.@at);
    -->
            printf("mb6 goal_holds nothing\n");
            goal_holds.activate(&nothing);
    }

    // If you want to hold object and object on floor and
    // monkey is at same position then grab it
    rule mb7
    {       (goal_holds.@active);
            ((goal_holds.@object)->on == &floor);
            ((goal_holds.@object)->at == monkey.@at &&
                    monkey.@holds == &nothing);
    -->
            printf("mb7 grab %s\n", (goal_holds.object)->str);
            monkey.@holds = goal_holds.object;
            goal_holds.satisfied();
    }

    // If object is to be moved and monkey not already
    // holding it, then - goal hold object
    rule mb8
    {       (goal_move.@active);
            (monkey.@holds != goal_move.@object);
            ((goal_move.@object)->weight == light_c);
            ((goal_move.@object)->at != goal_move.@to);
    -->
            printf("mb8 goal_holds object %s\n",
                            (goal_move.object)->str);
            goal_holds.activate(goal_move.object);
    }
```

```
// If object to be moved is light and object is not
// at desired place and monkey is holding the object
// then - goal walk to desired place
rule mb9
{         (goal_move.@active);
          ((goal_move.@object)->weight == light_c &&
                    (goal_move.@object)->at != goal_move.@to);
          (monkey.@holds == goal_move.@object);
-->
          printf("mb9 goal_walk_to %d\n", goal_move.to);
          goal_walk_to.activate(goal_move.object, goal_move.to);
}

// If the moved object has arrived at the desired place then
// the move goal is satisfied
rule mb10
{         (goal_move.@active);
          ((goal_move.@object)->at == goal_move.@to);
-->
          printf("mb10 goal_move satisfied\n");
          goal_move.satisfied();
          (monkey.@holds)->at = goal_move.to;
}

rule mb11
{         (goal_walk_to.@active);
-->
          printf("mb11 goal_on floor\n");
          goal_on.activate(&floor);
}

rule mb12
{         (goal_walk_to.@active);
          (monkey.@on == &floor &&
                    monkey.@at != (goal_walk_to.@object)->at &&
                    monkey.@holds == &nothing);
-->
          printf("mb12 walk to %s\n",
                    (goal_walk_to.object)->str);
          monkey.@at = (goal_walk_to.object)->at;
          goal_walk_to.satisfied();
}

rule mb13
{         (goal_walk_to.@active);
          (monkey.@on == &floor &&
                    monkey.@at != goal_walk_to.@to &&
                    monkey.@holds != &nothing);
-->
          printf("mb13 walk with %s to %d\n",
                    (goal_walk_to.object)->str, goal_walk_to.to);
          monkey.@at = goal_walk_to.to;
          (goal_walk_to.@object)->at = goal_walk_to.to;
          goal_move.@object = goal_walk_to.object;
```

```
            goal_walk_to.satisfied();
    }

    rule mb14
    {           (goal_on.@active);
                (goal_on.@object == &floor);
                (monkey.@on != &floor);
    -->
                printf("mb14 jump onto the floor\n");
                monkey.@on = &floor;
                goal_on.satisfied();
    }

    rule mb15
    {           (goal_holds.@active);
                ((goal_holds.@object)->on == monkey.@on);
                ((goal_holds.@object)->at == monkey.@at);
                (monkey.@holds == &nothing);
    -->
                printf("mb15 grab %s\n", (goal_holds.object)->str);
                monkey.@holds = goal_holds.@object;
                goal_holds.satisfied();
    }

    rule mb16
    {           (goal_on.@active);
                (monkey.@at == (goal_on.@object)->at);
    -->
                printf("mb11 goal_holds nothing\n");
                goal_holds.activate(&nothing);
    }

    rule mb17
    {           (goal_on.@active);
                (monkey.@at == (goal_on.@object)->at &&
                          monkey.@holds == &nothing);
    -->
                printf("mb17 climb onto %s\n",(goal_on.object)->str);
                monkey.@on = goal_on.object;
                goal_on.satisfied();
    }

    rule mb18
    {           (goal_holds.@active &&
                          goal_holds.@object == &nothing);
                (monkey.@holds != &nothing);
    -->
                printf("mb18 drop %s\n", (monkey.holds)->str);
                monkey.@holds = &nothing;
                goal_holds.satisfied();
    }
```

What NeWS?
— or —
What light through yonder window breaks?

William Roberts
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William Roberts has been programming computers since age 11. After graduating from Oxford with an Honours degree in Mathematics, he worked for two years with microcomputers of various sorts, before returning to higher education. In 1985 he was awarded an MSc with Distinction by the Department of Computer Science at Queen Mary College, London, and has remained there ever since. He is currently a systems programmer supporting the Department network of over 80 UNIX machines, and actively working on NFS and NeWS.

The Network Extensible Window System (NeWS) from Sun Microsystems is a marriage between the flexibility of the PostScript page description language and the interactive capability of a modern graphics workstation. This paper describes both PostScript and NeWS, explaining how they fit together and what the implications are for writing applications under NeWS.

1. *Introduction*

The development of PostScript and NeWS is presented here as a derivation from some initial design goals: it isn't a historical account. Like all successful software, the development of these systems undoubtedly involved thinking about all of the stages at once and reworking ideas as work progressed.

2. *PostScript*

PostScript is a page description language used by a variety of different laser printers. When it first appeared, as the control language for the Apple LaserWriter, it was a radical departure from previous graphics languages and printer languages, with a new approach both to the way graphical images are formed and the work a printer should do.

2.1 The PostScript Graphics Model

PostScript was designed to work with devices that use a *raster*, a rectangular array of pixels each with a separate colour (in the case of laser printers, just black or white). Its main design goal was to provide device-independent graphics; in particular, exactly the same PostScript file should work on a device with 300 pixels per inch and a device with 2540 pixels per inch, producing the same size output though hopefully to a higher quality.

To achieve device independence, PostScript took the bold step of abandoning pixels altogether. Freed of this restraint, the authors of PostScript designed an abstract "ideal printer" and produced software that would provide the best approximation that the actual printer can manage.

2.2 The PostScript Abstraction

The idealised PostScript printer has arbitrarily high spatial and colour resolution; it can print anything as small or as large as you like, with no loss of detail, and you can have any and every colour imaginable. The printing surface is arbitrarily large, and all marks on the printing surface are made by pouring *paint* (the colour of your choice) through a *stencil* (any arbitrary shape). New marks overwrite whatever was there before and there is no way to remove a mark once you have made it.

In order to drive such a spectacular device, the PostScript language has a number of unusual features.

- The drawing surface is two-dimensional, so all positions are specified by a pair of coordinates; to allow for the limitless drawing surface and level of detail, they are always floating point values.
- The coordinates are interpreted as a position on the paper by a coordinate transformation matrix. This matrix can be changed by applying arbitrary *linear transformations*, allowing the coordinate axes to be scaled independently, made non-perpendicular etc.
- Shapes are defined by creating a *path* on the drawing surface, made out of straight lines and Bezier curves. The coordinate transformation matrix can be changed at any point as the path is made up and the path itself leaves no mark on the paper.
- The current path can be converted into marks on the paper by converting it to a stencil and pouring colour through it. The conversions possible are *filling*, which uses the current path as the boundary, and *stroking* which constructs a stencil corresponding to a line of a given width, centred along the path. When stroking the path, the ends and corners can be handled in a number of different ways to make the sections join up properly.
- To make the transformation matrix easy to modify and easy to put right again, the complete *graphics state*, the current colour, the current path, the prevailing coordinate transformation etc., can be pushed onto a stack and later restored when necessary, eliminating any changes made in the interim. The results of any stroking or filling remain on the page and cannot be undone.

The stencil and paint model of graphics makes it easy to produce very efficient fonts for printing text: each character is described in terms of PostScript paths at some generic size, and the coordinate transformation mechanism is used to transform those paths into any desired size and orientation.

In additional to all the above "necessary" features, the designers of PostScript added an number of "extras":

- PostScript is a full programming language complete with iteration, recursion, dynamic binding and procedural abstraction. Unlike earlier printer languages where single groups of input characters produced a single effect on the output, an element of a PostScript program can be executed many times before the output is complete. This makes simple things harder, for example you need to write a PostScript program to print "plain text" rather than just sending the plain text itself, but it makes hard things much easier: to convert from some other graphics language into PostScript is normally a matter of writing PostScript routines to simulate the primitives of the other language, and then perform very simple substitutions on the other language to call the appropriate PostScript routines.
- PostScript is an interpreted language capable of self-modifying programs. It uses dynamic binding to find the meaning of names at execute time, using a stack of *dictionaries* which contain (*name*, *value*) pairs. To resolve a name, PostScript looks in the top dictionary on the stack, then the next and so on down until the name is found. This mechanism is so flexible that it is possible to implement object-oriented programming constructs such as classes and instances, complete with inheritance and message passing, all in standard PostScript.

2.3 PostScript under the Hood

The idealised PostScript printer is impossible to build, so all PostScript implementations are just approximations. How does a 300 dots per inch black-and-white raster printer produce an acceptable implementation of the ideal?

- Laser printers essentially transfer a prepared bitmap into a printing engine of some kind, so the PostScript interpreter has a *framebuffer* bitmap which represents the finished page. The default transformation matrix converts from the default PostScript coordinates (1 unit = 1/72nd of an inch, y increases up the page and the origin is in the bottom left hand corner) to the framebuffer pixel coordinates. The PostScript transformations build on the existing matrix, rather than requiring the programmer to supply a replacement matrix, so PostScript programs do not need to look at the default matrix. When a stroke or fill primitive is executed, the transformation system produces directly the framebuffer coordinates needed to change the appropriate bits in the bitmap.
- Curved portions of paths are approximated by straight lines, subject to a *flatness* threshold which limits the maximum discrepancy between the ideal curve and the straight line portion.
- Colours are represented on a monochrome system as intensities, rather like watching colour TV pictures on a black-and-white TV set. In order to produce shades of grey on a device where pixels are either black or white, a printing technique called *halftoning* is used: the page is divided up into spots, and each spot has a different size or shape according to the prevailing gray level. This is the same way the photographs are done in newspapers and relies on having a reasonable number of printer pixels per spot. On the Apple Laserwriter the spot is large enough to distinguish 64 different gray levels, and the intensity is approximated to the nearest level.
- The stencil-and-paint model is clearly quite expensive in computational terms, and would be very inefficient for printing pages of text (such as the one you are reading). To optimise this particular use of PostScript printers, the PostScript interpreter maintains a *cache* of recently used character shapes and can simply reuse a *scan-converted* character rather than recompute the bitmap when all that has happened in a simple translation. This increases the speed of printing character shapes by a factor of 1000 or more.

All of these approximations are kept hidden from the PostScript programs: a determined and nosey program can deliberately discover some of this information, but most PostScript programs operate under the assumption that their initial environment is correct and that they can just get on with their printing. This makes it fairly easy to write PostScript code that changes the initial environment and so causes subsequent code to produce a modified output: a useful example is changing things so that text formatted for an A4 page comes out reduced and rotated as two A5-sized prints per piece of A4 paper.

There is yet more to PostScript, but the above description covers most of the salient points. It has been endorsed as a standard printer page description language by such diverse companies as Apple, IBM and the phototypesetter manufacturers Linotype. The range of PostScript printers available spans from cheap(ish) 300 dot per inch printers up to the Linotronic 300 which can print on A4 width continuous rolls of paper or film, at a resolution of 2540 dots per inch. It is almost universal practice to use a 300 dot PostScript printer as an accurate page proofing device prior to printing on the expensive Linotronic; exactly the same PostScript file is used in both cases.

3. *NeWS — PostScript on the Screen*

Sun Microsystems have produced a PostScript interpreter which uses the Sun bitmapped screen as its drawing surface: all of the PostScript approximation techniques used for the laser printers apply just as well to a screen raster at a resolution of only 80 dots per inch. Not content with simply using the Sun screen as a way of previewing printer output, Sun have extended the PostScript language so that it can be used to provide all the features of a conventional window manager, and produced a *graphics server*, a process which deals with all the physical screen and input device handling, presenting a device independent interface to application programs. This server is called NeWS and can be used in place of the older Suntools window manager.

3.1 What did Sun add to PostScript?

A modern bitmapped display is normally provided with a number of libraries which provide basic graphics functions such as drawing lines and filling areas, the ability to define independent overlapping rectangular areas on the screen, on which applications can do their graphical stuff without worrying about who else is drawing what where, and lastly facilities for interactive graphics, such as notifying an application program that the mouse pointer has been moved into its window. PostScript has all the drawing primitives, but none of the others.

- NeWS generalises PostScript by providing multiple drawing surfaces rather than just the one. These *canvas* objects are arranged in a tree hierarchy with the screen framebuffer at the root. There are primitives to create a new canvas, complete with its default transformation matrix and an arbitrary shape. Each canvas has a *parent* canvas and will appear on the screen on top of its ancestors, blocking out any part of an ancestor that is behind it. The ancestors get their own back, however, by restricting the portions of their descendants that are actually visible to those pixels that are common to all ancestors (in graphics parlance, the child canvas is *clipped* to its parent when the screen image is composed). Canvasses are very efficient and can be arbitrary shapes, including disconnected regions; Sun are fond of using their logo as a canvas shape.
- The output of a PostScript printer is a completed page, so it makes no sense to work on separate parts simultaneously. On the screen however, it is often desirable to see things in progress (for example program listing scrolling in a

terminal window or some pretty piece of animation), so NeWS adds *lightweight processes* to the PostScript model. The process primtives are not unlike UNIX; a new process is created by specifying a procedure for the new procedure to execute and applying the `fork` primitive (corresponding to a combined `fork()` ... `exec()` sequent of UNIX system calls). The result of a `fork` is the creation of the new process, with a process object returned to the parent process. To collect a return value from the child, the parent can execute the `awaitprocess` primitive. The PostScript dictionary structure provides an extremely flexible form of shared memory; two processes can share any object for which they both have a name. Private memory is produced by creating a new dictionary and not telling anyone else about it!

- Interactive systems by definition require input. In NeWS, this is provided by a mechanism of *events* in which each input such as a key being pressed or the mouse moving is converted into an event object and distributed to any process that is interested. Processes can declare an interest in various classes of event and can generate their own new types of event for special purpose. This mechanism is sufficiently flexible to allow all sort of uses: timers are implemented by creating events with a "do not deliver before" timestamp that is some time in the future.

In addition to these extensions to the language, NeWS is supplied with a selection of library routines written in NeWS PostScript, covering traditional library facilities such as pop-up menus, rectangular windows with frames, terminal emulation, and *toolkit* items such as buttons, text input items, sliders etc.

The above description of NeWS is intended to give a general feel for what it involves and skips many details: a detailed Technical Overview is available from Sun and the interested reader could also look at the "comp.windows.news" USENET bulletin board. By way of rounding of this section, here is a recent piece of work of which the author is rather proud:

Using the mouse, point to a position on the screen. A white circle appears, followed by a smaller black circle on top. These are both canvasses, and the black circle is a child of the white one. Next, a PostScript process is created which expresses an interest in any movement of the mouse. When the mouse moves, this process is notified and tries to move the black circle to the current cursor position, subject to the constraint that the centre of the black circle must never go outside the white circle. Recall that the child canvas is clipped to the intersection of its ancestors, so the bits of the black circle that fall outside of the white circle are not displayed on the screen. The net result? An "eyeball" that watches the cursor as it moves around the screen, all done in PostScript and not a UNIX program in sight other than the NeWS server itself*.

4. *Programming Applications to run under NeWS*

From one viewpoint, writing an application to run under NeWS is very like writing one to run under any other system: you produce interface routines between your application code and the graphics system, each of which produces sequences of graphics primitives corresponding to the objects manipulated by the application. For fancy interactive graphics, your application program will probably take essentially

* I leave to the reader's imagination what I then did to the Mona Lisa demonstration....

the form of a central event handling loop which calls appropriate routines in response to combinations of inputs.

All of this is possible under NeWS and just as simple as with any other low-level "draw a line from x1,y1 to x2,y2" system. However to use NeWS in this way is an awful waste of a good system.

The NeWS server is **programmable**: you can send programs to it that work in parallel with your application code. The first way in which this can be used is to push the graphics interface routines into the NeWS server itself. By sending a PostScript procedure definition to the server, the application can add "customised graphics primitives" to the repetoire of the server; if your application draws lots of symbols on the screen in various places, then the PostScript routines might be "draw pine-tree-symbol at (x,y)" and so on.

The second way PostScript programs can help an application is by putting the fast interactive bits of the application entirely into the server. A classic user-interface technique is called *rubber-banding*: if a rectangular area is required, let the user define it by choosing opposite corners. After the first corner has been selected, draw on the screen the rectangle that would result if the current cursor position was used as the other corner. Because the rectangle chosen changes as the mouse moves, it looks as though the boundary is a stretchable line, hence the name rubber-band line. Using a conventional system, every time the mouse moves, the previous rectangle has to be removed and the new one drawn. By writing a PostScript procedure to do just this rubber-band rectangle task, the application is freed from having to interpret the events and do all the drawing and undrawing. Once the user has chosen the two corners, the PostScript procedure sends back the 4 coordinates and the application can carry on.

5. *Parting Thought...*[*]

The connection between the NeWS server and application programs is by a simple byte stream, such as a network connection or a serial line. Careful use of PostScript programs in the server means that only small quantities of data are sent through that connection. If someone ports NeWS to a cheap computer with good graphics, we could all run NeWS in the "terminals" on our desks but attached to the dumb terminal computers we already have.

What price a graphics console at home talking through a phone line to a number-crucher at work?

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* It would be too confusing to say "Postscript" in this context!

The X/OPEN show in Luxembourg revisited

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Having read Theo de Ridder's report on the X/OPEN demonstration event in Luxembourg (EUUGN, Vol7 No1) experienced readers may be suspicious as to what was actually demonstrated in Luxembourg.

It is with the permission of the X/OPEN group that I summarise some of the background to the demo here.

The purpose of the event was to show the installation, compilation, and execution of an application on all 11 members' systems without system specific adaptations.

The 20/20 spreadsheet from Access Technology was selected as the application for the demo because it is well known and because a spreadsheet provides a visible and lively demonstration. As was emphasised during the question and answer session on the first demo-day in Luxembourg, and as was confirmed by Paul Basson of Access Technology, every installation to date of 20/20 on a new machine had been done as a separate specific port, Each port required adaptation of the sources. This is exactly what X/OPEN is aiming to avoid.

The systems as used during the demo were all different: in hardware as well as in their UNIX implementation. All X/OPEN members are in the process of modifying their UNIX implementations in order to conform to the X/OPEN standard. Their joint commitment is to complete this by the third quarter of 1987.

ACE was given the task to create one set of sources that would compile and run identically on all 11 systems. For this reason the 20/20 sources were modified so that they would generate a 20/20 executable on each system: using the same includes, the same makefile, and the same C sources.

The preparation of the demo and the exercise of modifying and testing took a considerable amount of time. It was done using special version-control tools on top of `sccs`, specially developed "define-strip" tools, a special devised version of `cpp`, and our makefile generator `gendep`. `uucp` was used as the means for communication between the 11 systems. The reason why none of these porting and control tools were shown is simple: it was not the purpose of the demonstration. The purpose was "one set of sources, make, and run".

Much system- or machine-dependent code was re-done in a portable fashion, and care was taken to utilise only those facilities common to all 11 UNIX implementations: a subset of the X/OPEN standard.

The established changes were coded in under:

```
#ifdef XOPEN

#endif
```

a define that was then given in the (one) makefile and that was cleverly noted by Theo.

We considered it right to make the X/OPEN dependent changes visible. Theo noted the `-DXOPEN` in all compilations and perhaps he noted a couple of other defines as well; however, they were all identical on all systems. We expressly displayed the make-trace to show that exactly the same compile steps were performed using the same sources and the same defines. It is very difficult to execute different compilations by just typing "`make`" when the makefile and sources are identical, which I can assure you that they were.

We could also have flagged our changes by

```
#ifndef NOT_XOPEN

#endif
```

and then not defined `NOT_XOPEN` in the makefile. Would this not trigger suspicion?

As an introduction to the installation, the sources were read into some systems from floppy, just to demonstrate that X/OPEN bothers about source-code transfer. This may not seem important, but ACE having, much experience in the porting of software, knows that very often floppies (and other media) cannot be read on different UNIX systems. In fact source transfer has always been a major problem area when porting software to different systems.

We considered having 11 mag-tape units on stage but decided that it would look like a bad late-sixties science fiction movie. We then considered using an (Ether)network, but that was not (yet) within the X/OPEN standard, so we got stuck with the floppies as the only feasible exchange media to demonstrate. It is a sad world indeed. But the fact that X/OPEN defines formats and standards for media is a small step in the right direction anyway.

In Luxembourg the audience witnessed the effort of 11 computer manufacturers (eleven: Theo's list plus DEC) whose systems are not yet all X/OPEN conformant, demonstrating that one could achieve true portability over all systems for a medium size software product, provided the product is written according to the X/OPEN standard.

The fact that considerable effort was required to create such a portable version of the demonstrated application does not affect the X/OPEN message. It merely stresses the urgent needs: on one side, for defined and standardised interfaces, and on the other, a much better appreciation by software engineers of what portable software is.

Without these two going side-by-side, the way to go will remain long forever.

List of Interesting UNIX Publications and How to Obtain Them

Wytze van der Raay (NLUUG)
wytze@gouldnl

Gould European UNIX Support Centre
Computer Weg 4
3606 AT Maarssenbroek
The Netherlands

Wytze van der Raay is the current treasurer of the NLUUG. He is also in the process of starting up a European UNIX Support Centre for Gould. He has been active in the UNIX arena since 1980, working his way up from version 6, in both academic and commercial environments.

Here is a list of some interesting publications about UNIX, along with details on how to get them. Please send any updates or suggestions to myself at the above address.

Article Collections

1. *Bell Labs Technical Journal 1978 UNIX Issue*

   Price: 23 US $
   Via: UNIX Europe Ltd.
   27A Carlton Drive
   London SW15 2BS
   England
   + 44 (1) 7856972

2. *Bell Labs Technical Journal 1984 UNIX Issue*

   Price: 23 US $
   Via: UNIX Europe Ltd.
   27A Carlton Drive
   London SW15 2BS
   England
   + 44 (1) 7856972

3. *Proceedings of USENIX Conferences*

a.	Phoenix,	Summer 1987	20	US $	1	25	US $ shipment
b.	Washington,	Winter 1987	20	US $	1	25	US $ shipment
c.	Graphics,	December 1986	10	US $	1	15	US $ shipment
d.	Atlanta,	Summer 1986	10	US $	1	25	US $ shipment
e.	Denver,	Winter 1986	10	US $	1	25	US $ shipment
f.	Graphics,	December 1985	3	US $	1	7	US $ shipment
g.	Dallas,	Winter 1985	10	US $	1	25	US $ shipment
h.	Graphics,	December 1984	3	US $	1	7	US $ shipment
i.	Salt Lake City,	Summer 1984	10	US $	1	25	US $ shipment

Via: The Secretary, EUUG
Owles Hall
Buntingford, Herts
England SG9 9PL
+ 44 (763) 73039

4. UNIX Papers (edited by The Waite Group)

ISBN: 0 672 22578 6
Price: ~ Dfl. 75,— (US: $26.95)
Via: Your local bookshop, or:
Howard W. Sams & Company
A Division of MacMillan Inc.
4300 West 62nd Street
Indianapolis, Indiana, 46268 USA
+ 1 (317) 298 5699

Standards

1. *System V Interface Definition (SVID), Issue 2*

Volume 1, code 320-011
Volume 2, code 320-012
Price: 245 Dfl. excl. VAT
Via: Your local Olivetti representative, or:
Olivetti Nederland B.V.
OEM/VAR Division
Olivetti — AT&T Products
Verbeekstraat 19-21
2332 CA Leiden
The Netherlands
+ 31 (71) 319668

2. *X/OPEN Portability Guide*

   Second Revised and Updated Edition 1987 (in 5 volumes)

   ISBN: 0 444 70179 6
   Price: 350 Dfl excl. VAT
   265 Dfl excl. VAT via special NLUUG conference form
   Via: Your local bookshop, or directly from the publisher:
   North-Holland
   Attn: J. Dirkmaat
   P.O. Box 1991
   1000 BZ Amsterdam
   The Netherlands

3. *IEEE 1003.1 UNIX Trial Use Standard*

   Price: 19.95 $ + shipment (stock number SH10546)
   Via: IEEE Service Center
   445 Hoes Ln.
   Piscataway, NJ 08854
   + 1 (714) 821 8380

4. *1984 /usr/group Standard* (out of date)

   Price: 15 $ + 20 $ shipment
   Via: /usr/group
   4655 Old Ironsides Drive, Suite 200
   Santa Clara, CA 95054
   USA
   (Money Orders, Visa & Mastercard payments are accepted)
   + 1 (408) 986 8840

System Documentation

1. *AT&T System V Release 2.0 Documentation*

	Title	Price	Order code
a.	Basic Documentation Set	249.95 US $	307-080
b.	Supplemental Documentation Set	140.00 US $	307-082
c.	VAX Processors Version 2.0 Supplement	25.00 US $	307-220

   Via: UNIX Europe Ltd.
   27A Carlton Drive
   London SW15 2BS
   England
   + 44 (1) 7856972
   Or: AT&T Customer Information Center
   Commercial Sales Representative
   P.O. Box 19901
   Indianapolis, Indiana 46219

+ 1 (317) 352 8556

2. *Berkeley 4.3 Documentation*

a.	4.3 User's Manual Set (3 volumes)	25 US $ per volume
b.	4.3 Programmer's Manual Set (3 volumes)	25 US $ per volume
c.	4.3 System Manager's Manual (1 volume)	10 US $ per volume

Via: Howard Press
c/o USENIX Association
P.O. Box 2299
Berkeley, CA 94710
USA

- Prices are excluding shipment (very expensive!).
- Only for USENIX members.
- Order form in ";login:" (see "Magazines"). When ordering please specify your USENIX number. The form should be signed by an "Authorised Institutional Representative", and include your address and bill address.
- USENIX office phone: +1 415 528 8649
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3. *Nutshell Handbooks*

a.	Managing UUCP and USENET (Grace Todino & Tim O'Reilly)	18.00 US $
b.	Using UUCP and USENET (Grace Todino)	15.00 US $
c.	Reading and Writing Termcap Entries (John Strang)	9.00 US $
d.	Programming with Curses (John Strang)	9.00 US $
e.	Learning the Vi editor (Linda Lamb)	15.00 US $
f.	Managing Programs with Make (Steve Talbott)	9.00 US $
g.	UNIX in a Nutshell, A Desktop Quick Reference for Berkeley	19.50 US $
h.	UNIX in a Nutshell, A Desktop Quick Reference for System V	19.50 US $

Shipment: 2.50 US $ (0-4 books)
3.50 US $ (5-10 books)
4.50 US $ (11-25 books)

Via: Nutshell Handbooks
O'Reilly & Associates, Inc.
981 Chestnut Street
Newton, Massachusetts 02164
+ 1 (617) 527 4210

Product Catalogues

1. *UNIX Europe Ltd Software Catalogue*

   Price: 26 US $
   Via: UNIX Europe Ltd.
   27A Carlton Drive
   London SW15 2BS
   England
   + 44 (1) 7856972

2. *UNIX System V Software Catalogue (US)*

   Price: 26 US $
   Via: UNIX Europe Ltd.
   27A Carlton Drive
   London SW15 2BS
   England
   + 44 (1) 7856972

3. *UNIX products for Europe*

   ISBN: 90 14 03522 5
   Price: ~85 Dfl
   Publisher: Samsom
   Postbus 4
   2400 MA Alphen a/d Rijn
   Via: Your local bookshop, or from the EUUG:
   Send cheque for 15 UK £ to:
   The Secretary, EUUG
   Owles Hall
   Buntingford, Herts SG9 9PL
   England
   + 44 (763) 73039

4. *EUUG Micros Catalogue Edition 2 1985*

   Price: 7.50 UK £
   Via: EUUG
   Send cheque for 7.50 UK £ to:
   The Secretary, EUUG
   Owles Hall
   Buntingford, Herts
   England SG9 9PL
   + 44 (763) 73039

5. *UNIX Products Directory Winter 1987*
(/usr/group's Sixth Edition)

Price: 50 US $ + 20 US $ shipment
(Members of /usr/group: free, or 25 US $ + shipment)
Via: /usr/group
4655 Old Ironsides Drive, Suite 200
Santa Clara, CA 95054
USA
(Money Orders, Visa & Mastercard payments are accepted)
+ 1 (408) 986 8840

Magazines

1. *Unigram/X, the weekly newsletter for UNIX system users*

Price: 225 UK £ per year (EUUG member price)
300 UK £ per year (others)
Via: Freepost 32
Unigram Products Ltd.
London W1E 6Q2
England
+ 44 (1) 439 1632

NOTE: The member price is only applicable if you state that you are a member of the EUUG.

2. *UNIX/World*

Monthly.
Price: 18 US $ + 20 US $ shipment
Via: UNIX/World
Subscription Services
P.O. Box 1929
Marion, OH 43306
USA
+ 1 (415) 940 1500

3. *UNIX Review*

Price: 55 US $ (95 US $ for airmail)
Via: UNIX Review
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500 Howard Street
San Francisco, CA 94105
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+ 1 (415) 397 1881

4. *;login:*

Two-monthly magazine of the USENIX Association
Price: 16 US $ per year
Via: The Secretary, EUUG
Owles Hall
Buntingford, Herts
England SG9 9PL
+ 44 (763) 73039

5. *IX Magazine*

Price: 25 UK Pounds (free within the UK)
Via: IX magazine
BTB Mailing Services Ltd.,
Unit 15, The Manton Centre,
Manton Lane,
Bedford MK41 7LX
England

6. *UNIX Info*

(In Dutch language)
Price: Free (controlled circulation)
Via: Sala Communications
Den Texstraat 5a
1017 XW Amsterdam
+ 31 (20) 273198 or + 31 (2152) 63431

Tapes

Please see Frank Kuiper's article elsewhere in this issue.

Via: EUUG Distributions
c/o Frank Kuiper
Centrum voor Wiskunde en Informatica
Kruislaan 413
1098 SJ Amsterdam
The Netherlands
+ 31 (20) 5924056 or + 31 (20) 5929333
Email: euug-tapes@mcvax or frankk@cwi.nl or ...!mcvax!frankk
(see also: this EUUG Newsletter)

Hydrological Equilibrium
(The EUUG Conference at Dublin)

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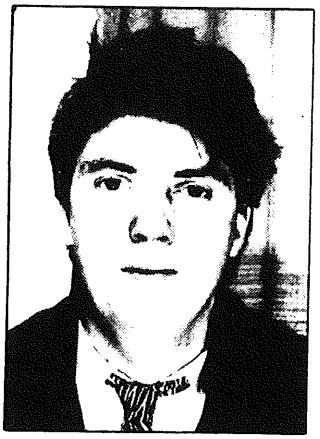

Joe Nicholson is a technical consultant with The Instruction Set involved in operating systems, networking and relational databases.

He originally studied Computer Science at University College London and has never quite recovered.

Coming from an Irish background, he is well versed in Irish culture and drinking habits. In September he spent five days sampling the black nectar and found time to attend the EUUG conference in Dublin.

Sunday

I arrived in Dublin about six p.m., with a colleague from Inset, Harnish Patel, flushed with anticipation for my very first UNIX conference. Being a virgin, so to speak, I didn't quite know what to expect apart from sandals. After a rather arduous flight from London and a brisk taxi ride into the centre of Dublin, we were confronted by hoards of green and gold clad revelers brandishing pints of the black nectar. What were they celebrating? A new licensing agreement from AT&T, 4.4 would have the `vi(2)` system call, or that David Tilbrook was staying in America *and* had just bought a drink! The truth was that Meath (a county adjacent to Dublin) had just won the All Ireland Gaelic Football Final at Croke Park. The red and white people (Cork), were later seen drowning their otherwise buoyant sorrows in the bars of Dublin.

Registration for accommodation was a surprisingly harmless affair in an exceedingly quiet Trinity College. Still not a sandal in sight! The accommodation was modest for hotel standards but rather luxurious compared with most student accommodation. A quick recce around the campus still revealed no sandals, so we had a stroll around town. An excellent repast was had at the famous Scottish restaurant chain, McDonalds. A few bars later we ended up at a very crowded side street pub, crammed with Cork supporters. This was the real start of my hydrological equilibration program, although Harnish started modestly, preferring "shorts" of Bailey's Irish Cream. Only in Ireland do you get Bailey's Irish Cream served in half pint glasses!

We retired reasonably early, because that was the time the pub shut.

Monday

I started the day with a full fried Irish breakfast, with black pudding and wholemeal scones. There were three full day tutorials on Monday, starting at 9.30; Streams, 4.3 Internals and Advanced Shell Programming. I opted for the streams, given by Bob Duncanson from UEL, and Harnish went to the 4.3 internals, given by Kirk McKusick and Mike Karels from Berkeley. The streams tutorial was a good introduction to streams programming, making the (fairly reasonable) assumption that you were a system programmer. Everyone came out with the knowledge that stream buffers were allocated from a small lined memo pad and were linked together with a linked list of staples.

Discussion in the college bar later that evening revealed that most the people who attended the 4.3 internals tutorial were well pleased. Many complained, however, of a distinct lack of mbufs, although a few pints of Guinness soon compensated for the imbalance. Later that evening, everyone was feeling a bit peckish, so we split into nice small manageable groups of about 20, to go and find somewhere to eat. About 15 of us ended up at a rather posh curry house in some dodgy looking side street. A prize for the best shoes of the conference must certainly go to the doorman of the restaurant who was in traditional Indian uniform, wearing a pair of shoes which looked like winkle pickers doing the loop the loop. After an okay meal, some of us made it back to the Buttery for a last glass of milk before bed.

Tuesday

I tried to start the day with a full fried Irish breakfast, with black pudding and wholemeal scones. I got to the desk and the man said "One pound please". I said "But I had this for free yesterday". He replied "Can't you read. There is a big notice saying what you can have for a continental breakfast outside. Can you read Sir?" Well, I suppose cereal and coffee is much better for you anyway. The seminars organised for the Tuesday were of a much lower technical content than those organised for the previous day, so I decided, like many others, to soak up some of the Dublin sunshine. Sitting, reading on a sunny day in Trinity College is certainly one of the nicer sides to life.

After the conference lunch, a largish group of pilgrims gathered in preparation for the sacred pilgrimage to the Guinness brewery. Alain Williams, the EUUG newsletter editor, was one of the brave group of worshippers who formed the advanced party. He returned with the good news that the brewery was still standing and served excellent Guinness (for free !!). He was our guide and even entered the temple for a second time. What dedication.

The Guinness brewery is unlike many breweries, which when you visit them, you have to go on a long trek round, being shown large metal casks, pipes and valves. Guinness have streamlined this operation into a 5 minute film, which you don't have to watch, and then as many halves of Guinness as you can drink, before closing time at 4 p.m.

Experience from the previous night indicated that a group of 20 was rather unmanageable for dinner. I ended up with a group of about seven others at a Lebanese restaurant with excellent Lebanese cuisine served by waitresses with thick Irish accents. A spicy meal was had by all and again some of us made it back to the Buttery for a last glass of milk.

Wednesday

The conference proper. The people who registered the night before had some idea of the bombshell which has to hit the regular EUUG delegates on Wednesday morning. The comments sounded more like the press release for some new yuppy UNIX box. "Not backward compatible with previous versions", "Very portable", "Easily fits on

a shelf". All these comments were of course referring to the newly modelled, slimline cabriolet version of the EUUG conference proceedings. This means it may look a bit stupid on your shelf, but it is a lot easier to lug round the conference for three days.

The conference was introduced by the EUUG president, Teus Hagen. His reminiscences of old EUUG letters found in a shoe box ended with announcements of the new EUUG product line, modelled by internationally famous running star, Kirk McKusick. Each item had a number on it describing its street credibility. Marks, of course, out of ten.

The unnerving responsibility of giving the first talk fell on a young French student, Solange Karsenty, who opened with a talk on the lines of the conference theme — User Interfaces. Fun and games started right from the beginning... 'Can you <crackle> me", "IS THIS TOO LOUD", "Don't stand near the podium", "Stand with one hand down your trousers", "Oh sod the microphone <clunk>". Yes it was a new audience participation game — "Opportunity Microphones".

Mike O'Dell tried to get some fur flying with his talk "What they don't tell you about window systems". Most people were more shocked with the fact that he wore a tie. He did admit that he felt "a bit isolated over the water", much to everyone's amusement.

Chris Campton came up with a new acronym to use as a chat up line at UNIX parties, during his MUSK talk. WYSIWIS — What You See Is What I See.

Each session was introduced by different representatives from the User Groups which make up the EUUG. The general idea was that the session chair would tell something about their different organisations, although some did prefer to show videos of their army training! One of the session chairs came up with the reason why you *have* to drink Guinness in Ireland. As it rains so much Ireland, you have to compensate for this external hydrological excess by consuming some internal hydrological excess in the form of the black nectar. This is backed up by extensive experimental observations: when it starts to rain, everyone goes into the pub to drink Guinness.

After lunch, the ever present Dan Klein ruined many years of detente in Europe with his UBOAT (UNIX Based On-line AIDS Tutorial). Dan admitted that "it is quite tricky to get `vi(1)` to work from a pipe". What is he doing writing an AIDS tutorial anyway?

I then skipped a couple of talks and wished I had skipped three. Fortunately, Neil Groundwater rounded off the day with a very interesting talk on a system to annotate histology slides for hospitals, accompanied with some very gory looking colour photos. The hardware description was very interesting, especially as some devices where connected to the "sexy" bus (SCSI if you have your dentures in). Whether the system is accepted by hospitals depends on the head doctors, where "the guy with the whitest hair always wins". The top ten histology CDs should be available at your local pathology lab. soon!

Software Ireland had kindly arranged a "reception" (s/r.*n/pi..up/g) for the conference delegates in the Atrium, a wonderful wooden "theatre" attached to the side of the Buttery Bar. Refreshments (s/r.*s/booze/g) were served from 8.30, time for everyone to grab a bite to eat and have a shower. A traditional Irish folk band played ... traditional Irish folk music, to a very receptive audience in one corner of the Atrium. This was despite that fact that Dan Klein had taken his shoes off! The evening really got swinging when the band moved upstairs, where they could be heard. Some of the committee members and assorted others tested

their coordination skills at group dancing, on a rather narrow balcony. The results were somewhat less than traditional.

Thursday

Thursday kicked off with a talk by Allan Milne on BNF definitions. This in itself deserves a medal as Allan did have a drop of Guinness the night before. By all accounts, it was a interesting talk. After lunch, Roger Bivand demonstrated some of the varied requirements that geographers have for user interfaces. He sited a case where a researcher had the use of a Cray to do some analysis of the correlation between a disease and location. The program churned away for a couple of days and "the result was ... that they destroyed the printer". One requirement for geographers must therefore be stronger printers!

Mike O'Dell came back for his second talk of the conference, "What they don't tell you about Hawaiian shirts before you buy them". He described HUB, a lightweight process operating system. The sort of thing "you ought to be able to write in an afternoon". It is, however, a "Scouts' Honour programming environment", like most real time executives.

The boys from Berkeley saved the day by filling in for a non-speaker, with what they didn't have time to say at the 4.3 internals tutorial — Berkeley Futures, soon trading on Wall Street. Some interesting things included:

1. Only 1 kernel allocator (instead of 14);
2. Getting rid of some of "Kirk's armpit variables";
3. Remote filesystem layer, à la vnodes;
4. Layering of device drivers, à la streams;
5. Process debugging (/proc), à la V8, and
6. Religion server, à la Allah.

Thursday finished up with a ramble through Micheal Hawley's favourite pastime — music. Who else has a utility called `ntt` — Name That Tune? The main theme was reproducing pianos and with the help of a rather natty video, everyone was able to don miners' helmets and crawl under Mike's piano. He also freely advertised a 1500-pipe organ (seems like a big boy), as long as you had a cathedral to put it in.

Thursday evening was the EUUG 10th anniversary dinner at the Royal Free Hospital, in the suburbs of Dublin. Most people didn't know what to expect, but even so, when they got there it certainly wasn't what they expected. The function was held in the cellar and consisted of little stalls serving different tastes of Irish cuisine, from smoked salmon to potato stew. Yes you guessed it, Guinness was served as well. Delegates moved from stall to stall choosing what they fancied and chatting with different groups of people. Street sellers wandered around pushing carts of fruit, singing "Cockles and Mussels". Shoe shines offered to clean your shoes, and the whole atmosphere was that of Dublin of yester year.

During the proceedings, the American representative of USENIX presented the EUUG chairman, Teus Hagen, with a poster depicting the real motivation and drinking force behind the EUUG. The poster illustrated beer around the world.

The general opinion was that this type of function was much better than a full sit-down meal where you have to make conversation with the same people for 2 hours.

Friday

The last day of a very short week. Lori Grob introduced the slide command (`slide`(1M)). The command is invoked at the end of each overhead, whereupon you shout "slide" and your assistant puts on the next slide. A trend for future EUUG conferences? Perhaps there could be a call for sliders, as well as a call for papers. Lori admitted that some of the problems with automatic exploitation of concurrency "sort of reduce to the halting problem". I wonder what her next next paper will be on.

Mr Sleaze (Bart Locaithi) revealed that people have problems with his name. "Telephone operators around the world think my name is Mark McKenzie". His talk on the implementation of the routine `bitblt()` would make most C programmers choose something simple like APL. `Do whiles` inside switch statements, jump tables, text in the data, `cpp`(1), `asm()`'s, and all from a guy who says he can't program in Assembler.

Mr. \zr (David Tilbrook) gave us "Cleaning up UNIX source", subtitled "Life without QED". Most of his talk was about the new release of Andrew. Why is he in captivity anyway? David dealt admirably with the loaded question from the front row. It appeared from his barrage that David doesn't like install scripts which tell you you are running on 4.2, when you are actually running MS-DOS.

The conference wound up with the extremely brief business meeting. The winners of the highly competitive EUUG quiz were announced and the winning solutions are listed below. A new errno was introduced by Peter Collinson: `EOLLIE` Kernel failure. The conference ended with a runner carrying the symbolic flaming EUUG travel bag leaving Dublin on route for the second half of the EUUG 10th anniversary in London.

As expected, people drifted away to catch planes home, quickly exchanging business cards they will never use. My thoughts on my first UNIX conference were clouded by the fatigue of 5 days of sitting around and socialising, but I thoughly enjoyed myself and met some very nice and interesting people. I just hope I make it to the EUUG in London.

Euro/American Relationships being furthered

EUUG Spring 1988 Conference "UNIX around the World"

The European UNIX systems User Group (EUUG) Spring 1988 Conference will be held in London, England from Wednesday 13th to Friday 15th, April. The venue is the prestigious Queen Elizabeth II Conference Centre situated opposite Westminster Abbey and the Houses of Parliament.

The Conference, entitled "UNIX around the World", is attracting the very highest quality technical papers thus affording an international forum for the presentation and exchange of current work on a wide variety of topics related to the UNIX system and C language. The global nature of the Conference stresses the importance of standards, portability, security and communications. Technical presentations concerning SVID, X/OPEN, Posix and ANSI C are of particular interest to prospective attendees as well as talks on Secure UNIX, UNIX Networking and real-time UNIX. Authors have been found in many different countries where UNIX licenses exist, for example: Australia; Canada; Israel; Japan and the USA; in addition to the many speakers from EUUGs National Groups.

The list of internationally known speakers, many of whom were original contributors to the UNIX programming environment, will include:

* Peter J Weinberger (USA), Bell Research Laboratories.

  Co-author and the W in the book "The AWK Programming Language". Peter is also known for the f77 I/O library and the network face server, `faced`. Peter's work in the 8th and 9th edition systems included an unbounded precision arithmetic package, `mp`, a fast factoring program, `afactor`, a B-tree library, `cbt`, and a new code generator for C. Above all, his v8 network file system bound a stable of machines together into a logically homogeneous system.

* M Douglas McIlroy (USA), Bell Research Laboratories.

  Author of the papers "The UNIX Success Story" and "A Research UNIX Reader", Doug exercised the right of a department head to muscle in on the original two-user PDP-7 system. Later he contributed an eclectic bag of utilities: `tmg` for compiler writing, `speak` for reading text aloud, `diff`, and `join`. He also collected dictionaries and made tools to use them: `look` (V7), `dict` (V8), and `spell` (V7).

* Maurice J Bach (Israel), IBM Scientific Centre.

  While with AT&T, Maurice wrote the much praised book "The Design of the UNIX Operating System". This unique, authoratative text documents the internal algorithms and structures which form the basis of the kernel, and analyses their relationship to the programmer interface. Much of the material was based upon courses Maurice taught at AT&T.

* Michael E Lesk (USA), Bell Communications Research.

With a prescient market instinct, Michael made text formatting accessible to the masses with the generic macros -ms, which were to `troff` what a compiler is to assembly language. He rounded out -ms with the preprocessors `tbl` for typesetting tables and `refer` for bibliographies. He also made the `lex` generator for lexical analyzers. Eager to distribute his software quickly and painlessly, Michael invented `uucp`, thereby begetting a whole global network. With Brian Kernighan, he was responsible for the UNIX computer-assisted instruction software, `learn` (V7). Without the insight of Michael Lesk and the popularising touch of Brian Kernighan, the UNIX system would not have acquired the extroverted personality that commands such widespread loyality.

* John Lions (Australia), University of New South Wales.

When John received 5th Edition UNIX it was *not* a trademark! The original license was dated 15th December, 1974 and the arrival of the tape/manuals proved to be a timely Christmas present. In 1976, John wrote "A Commentary on the UNIX Operating System" and formatted the accompanying V6 11/40 source code book. He said that `nroff` yielded some of its more enigmatic secrets so reluctantly, his gratitude was indeed mixed. However, without John's book, many of us would not remember that UNIX was once less than 10, 000 lines of code and transportable in a student's brief case. And perhaps that immortal comment on line 2238 might have escaped us:

```
/* You are not expected to understand this. */
```

* John R Mashey (USA), Mips Corporation.

Well known for his hardware, software and CPU design skills, John was a co-author of the BSTJ paper "The Programmers Workbench". During the near 10 years spent at Bell Research Laboratories, he also worked on command languages, text processing, computer-centre UNIX issues and various features of V7, followed by management of applications projects and exploratory projects with bitmapped displays and programming environments.

* Jun Murai (Japan), University of Tokyo.

Architect and designer of the Japanese UNIX Network (JUNET) which uses TCP/IP protocols over dial-up telephone lines, Jun has a hard time explaining that his name really is Jun and JUNET is not named after him!

* Sam Leffler (USA), PIXAR.

Cutting his teeth in Lucasfilm, Sam has recently been grappling to produce a public domain version of Sun's NeWs system which means he's one of those rare breeds who has a fair amount of experience with PostScript. Of course, Sam has continued his interest in user interfaces and graphics systems by working on a 3-D modelling and animation.

* David L Presotto (USA), Bell Research Laboratories.

Dave tamed networks! His upas brought some order to a Babel of mail addresses and his IPC primitives provided a common basis for communication and remote file access via Internet, Ethernet, and Datakit.

* David Turner (Great Britain), University of Kent

  Designer & architect of the functional programming language Miranda. David's research has primarily centered around functional programming languages. Currently, David is a professor in computer science at the University of Kent at Caterbury.

* Sunil K Das, the Conference Programme Chair and Chairman of The UK UNIX systems User Group (UKUUG), has borrowed freely in the above descriptions (thanks in particular go to Doug McIlroy). Any factual inaccuracies or misleading statements are unintentional but he acknowledges complete responsibility.

On Monday 11th and Tuesday 12th April, some outstanding one day tutorials will be taught by leading technical experts. From AT&T, Steve Buroff and Curt Schimel will present "Introductory" and "Advanced System V Internals" on successive days. In the final stages of planning are tutorials on "BSD Device Drivers", "C++", "Advanced System V Administration", and "Intermediate C".

A number of other tutorials are being prepared and further announcements will be made in the booking leaflet due to be distributed in December, 1987. Subjects under consideration include "Sendmail", "News", "Postscript", "X Windows", and "Software tools with Yacc and Lex".

It is intended to offer excellent discounts to those who book more than one tutorial and/or to those who book early.

An anonymous well-wisher sent a 10th anniversary cake to Owles Hall.

The EUUG secretariat appreciated it greatly, thank you.

What's up with EUUG

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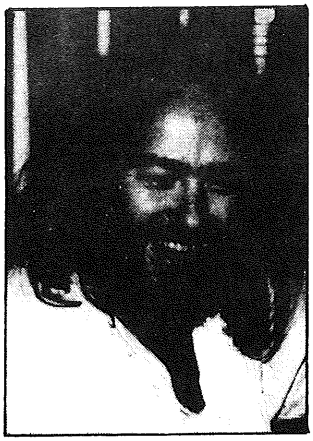


EUUG Executive Committee

What is happening to the EUUG, and what is going to happen in the near future? Quite a few things, as you will see...

1. Financial History

In 1985, the EUUG suffered its first real loss. This caused us to focus on the problem of proper financial control and planning. It became clear that the group could not rely on conference income for survival.

Due to completely new budgeting practices in both normal running and conferences, the EUUG now has a prudent reserve. The finances of the EUUG are planned to break even. Due to the policy that a conference should not make a loss, a conference normally results in a small surplus. With the level of turnover for each conference, it is not realistic to plan for break even; we will either see a profit or a loss. Naturally, the former is preferred, but every care is taken to ensure that this surplus is not excessive.

Most of the excess from conferences remains with the group as a prudent reserve. This could easily be needed in the event that a conference or other activity is not as succesful as planned. Suppliers will not accept the EUUG as a credit worthy body, and hence it is essential that sufficient cash exists at all times to fund the activities.

The group plans to retain between six months and one years operating expenditure in reserves.

This year, the Governing Board suggested that some of the reserves should be used to fund special activities:

1. A strategy workshop with all national groups	£10,000
2. A study on the EUnet network	£20,000
3. Promotion of EUUG and its 10th anniversary	£16,000

In the following paragraphs we discuss these activities further.

2. *The Paris Workshop*

The EUUG Paris workshop was held in order to improve the relations between the national groups and the EUUG executive committee, and also between the national groups themselves. Now that most national groups have grown really big, there are many of activities going on on the national level, and the groups could surely get inspiration from other groups, in many cases they share the same problems.

About 50 people from all the 14 national groups and the EUUG executive committee met in the beginning of September at a small Chateau outside Paris. We spent a weekend discussing topics such as strategy, conferences, networking, administration, newsletters and external relations.

The workshop was a forum to generate new ideas for the EUUG and the outcome is to be formalised in voting points to be put to the EUUG governing board. Already two weeks after it we had such a governing board meeting at the Dublin conference, and some important proposals from the workshop were approved there.

The governing board decided that extra copies the newsletter should now be available to institutional members at cost price plus 10%. A side remark was that the newsletter seems to have really improved under the hands of the new editor; the contents are interesting and the issues appear on time. So there is now value for the money. It is likely that this price will be of the order of £25, but the committee feel it is appropriate to collect the data from setting and mailing one more edition of the new newsletter before proposing the price.

This new price will make it possible for individuals who are employed by an organisation which is also a member of EUUG to have their own copy of the newsletter at an economic rate. As employees of an organisational member are allowed entrance to EUUG conferences at membership costs, the services obtained in this arrangement would almost be the same as being a true individual member.

This decision was initiated by a heated discussion on the student membership fee, which concluded in the above proposal, with students just fitting in like employees of an organisation (in this case their university). The many good reasons to subsidise students were mentioned, and the EUUG will also in the future have specially low conference fees for students, as the student conference grant scheme open to all students will proceed. At our last conference in Dublin about 10 students attended on grants, in contrast to almost none in the previous years.

Another decision of the governing board was that every national group should allow a member of another national group admittance to their national events on the same terms as their own members. The national events should also be better advertised to the members of the other national groups.

A lot of other good proposals were discussed in the workshop, some have already been decided on, and the EUUG executive is working on shaping the rest to make them workable proposals.

There is a fuller report on the Paris meeting elsewhere in this newsletter.

3. *EUnet and EEC.*

The EUnet study is to be done together with the EEC commission to investigate how EUnet could use standard ISO OSI protocols (including X.400 based mail) in all or parts of the network.

There is a possibility that the EEC commission will provide a big sum of money for computer equipment, communication lines etc. to implement this change. This should also apply to non-EEC countries, and the plan is to start in 1988.

The EUnet attitude to run OSI protocols is very positive when looking at the communications between the backbones, but the current cheap connections to the end machines have to stay as they are, and the operation of the network is not going to be disturbed during these changes.

It was felt by the EUUG executive committee that it was necessary for the EUUG to embark into this project in its role as a coordinator of EUnet. This work with its financial commitments would probably not have been undertaken otherwise, and a great opportunity to get proper funds for the network would have been lost.

4. EUUG 10th anniversary.

The EUUG 10th anniversary has been promoted in computer periodicals in most of the member countries. There was a splendid 10th anniversary reception and folkloristic dinner in Dublin (sponsored locally and paid by the conference, respectively), and we will go on celebrating the anniversary at the London conference in April 1988.

The London conference will also boast such interesting speakers as present or former Bell Labs people: Peter Weinberger, Mike Lesk, Dave Presotto, Doug McIlroy, Maurice Bach, and John Mashey, each of whom has made a significant contribution to the evolution of UNIX.

There will also be a tutorial programme on a high technical level held by world leading experts. The tutorial titles planned include: Advanced System V internals, BSD Device Drivers, Advanced System V Administration, C++, Intermediate C, Sendmail, News, X-Windows and Postscript. It is surely going to be an event of high quality, which you should not miss.

Future conferences will take place in

— Hanover, Germany in September 1988;

— Brussels, Belgium in April 1989; and

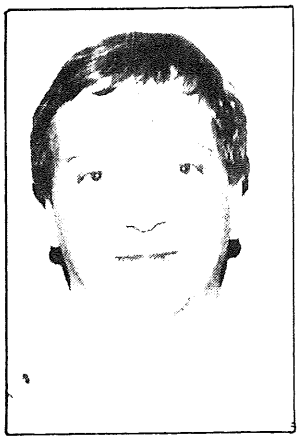
— Vienna, Austria in September 1989.

5. We need the EUUG

One general feeling on the Paris workshop was that we need the EUUG. We need the coordination role of the EUUG for the national groups. We all belong to an European UNIX community and have a lot of the same problems and attitudes.

The EUUG provides a forum where we can exchange these views, for example in the newsletter or at conferences. The EUUG can coordinate important activities like EUnet. The EUUG can provide excellent conferences and tutorials on an international level. This might be hard to do on your own as a national group, but together we can achieve it.

Fun With Spaces in TROFF



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1. The Set Space

Probably one of the most neglected `troff` requests is the `.ss`-request. To revive your memory, the form of this request is `.ss` *N*, which will set the space-character size to *N*/36 ems. The default value is (nearly always) 12/36th of an em. This request works in the current environment, and when there is no argument, the request is ignored. It is always ignored in `nroff`. The space-character size is the minimum word spacing in adjusted text. It is also the space you will always get when the text isn't adjusted. This is known in the typographical world as the **set space**. It also sets the width of the unpaddable space character "\ ". The widths of the 1/6 em narrow "\|", the 1/12 em half-narrow "\^" and, of course, the digit width space character "\0", are not affected.

The set space is dependent on the font size, so that's why it is dependent on the "em". The size of the set space might vary between the different typefaces; some typefaces require a different value, depending on the design. Obviously, a constant width font wants to have a set space the width of normal characters, so that when the text isn't justified — adjusted in troff terminology — it would appear to have been printed on a typewriter. Also, you may want to change it depending on the style of the lay-out. Apart from this use there are more reasons why you might want to play with the `.ss`-request.

1.1 Widows and Orphans

It happens all the time: you have written your article or book, keyed it into you favourite machine, formatted it with `troff`, and are not really happy with the output. After some advice from a neighbour or reading a book about typography, the mess looks somewhat more consistent, but there is still the problem with the orphans etc. The word at the top of page 24, just before the opening of section 3, should actually should belong on the bottom of page 23. Of course, one way to deal with this is to rewrite page 20 to 23, so it will fit, but then the opening of section 3 suddenly appears on the bottom of page 23, yuck! You can of course force this to page 24 by applying a `.bp`-, or better a `.ne`-request, but then you have this enormous white space left on page 23. Another way to fix this problem is to use the `.ss`-request. Around half way through the text that is is going to be page 23, you make the set space somewhat smaller than the default value, and this will be just enough to pull the offending text from page 24 onto page 23, and the difference in spacing is hardly noticable.

Of course, don't forget to reset it to its previous value so you can play the same tricks in other places.

1.2 The Late Paper Problem

A general rule is that papers will always be finished too late. But after it's finally finished, there is always another mistake to be found the moment the errand boy is around, waiting to bring it to the printer. A double word is is found on the last page. Pushing the complete 200 pages again through troff on an overloaded machine will be too time consuming. An easy fix — when the offending word doesn't take a lot of space — is to typeset just the offending line and force it to be spread over the used line length using the \p escape. If there is a word missing, the set space is first reduced, before forcing the justification. Then the output is glued on top of the offending line. If the errors are in rather big words, you probably need to typeset a couple of lines with changed set space.

Of course, be prepared to do everything again, with your luck you will find that some coffee will accidentially drop over the galleys.

1.3 A Large Number

Your nephew pops up and wants to print the largest known Mersenne prime number in his school paper. Since this number is $2^{216091}-1$, he noticed that his calculator didn't grok it. Also, he already assumed that typing in 65050 numerals on his IBM-composer would probably not go without any error, so could you please help him.

Calculating the number is not a big deal and of course you keep the answer somewhere in a file. Feeding this to troff gives a problem, "Word overflow". After grumbling "why there are always these weird arbitrary limits in UNIX programs", you will realise that troff doesn't hyphenate the number and that you don't want it to be hyphenated anyway; it wouldn't look right.

Apparently you have to break the number in smaller units and glue them together. Breaking the number can be done with your favorite editor which can handle arbitrary large files or just a little C-program, replacing each numeral for itself and a space, and inserting some newlines as well. Then you set the setspace to the smallest possible value, 1/36th of an em.

Now you notice that the last line of the block of numerals has less space then all the lines before. This is fixed by making the line length exactly to the the length of the numerals and spaces you want it to have, so the spaces are not stretched. As an alternative, you can of course set the lot not left justified. So this will get you something like:

7460 931030646613436 87339579400511489540228754084977328805113304977793662725278780664395635140955730008364494154882757427230062999220940819568775787450648115775343181409425298589715882838808681344634512372399168539091687963336
... lots of numerals omitted
44030338221036632627130427722612194544556452516799417964416162136915976643526405458724691315195450691201831185384118052177506846932786764514111877691336203815528447

If you really get carried away by this problem, you can edit the ditroff output as well to get rid of that little space. Of course, that will make your line length somewhat shorter, but who cares, it's for your nephew after all.

2. Constant spacing

The constant spacing request, `.cs` *F N M*, will set every character of the font *F* with the width of *N*/36th em. If the optional *M* is given, the em is *M*-points. The characters are centered in this space, even if this character is wider than the

available space.

This request suggests that you can use this to generate a constant width font.

```
These lines are typeset with
.cs R 16.
There is even spacing for the characters, but as you can see,
the result is an insult to the eye.
```

The result depends a bit, of course, on the variety of widths in the font. But it is much better to use a typewriter style font if you want to simulate a typewriter. Even then you might want to use the .cs-request, with the constant width set to the width of the typewriter font, in case you use a character which isn't in that font. It will then get it from the special font (S) when mounted. With some luck the result might not be too bad.

2.1 Watch that man

Although it appears that the constant width request is quite useless, it can come handy in some cases. It might happen that after an EUUG conference somebody sends you data like this.

```
0x0000,0x1FA0,0x0000,
0x0000,0x7FFC,0x0000,
0x0000,0xFEFF,0x0000,
... etc
```

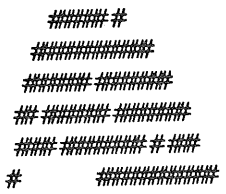
The data is actually describing a 48 by 48 pixel bitmap. Apparently a picture has been taken of you, but showing this hexidecimal stuff won't please the rest of the family. So how do you turn these numbers back into your usual self?

To put it on a line printer, you can either write a C-program or use the next sed-script.

```
# icontox

sed '
s/0x//g
s/, *//g
s/0/    /g
s/1/   #/g
s/2/  # /g
s/3/  ##/g
s/4/ #  /g
s/5/ # #/g
s/6/ ## /g
s/7/ ###/g
s/8/#   /g
s/9/#  #/g
s/[Aa]/# # /g
s/[Bb]/# ##/g
s/[Cc]/##  /g
s/[Dd]/## #/g
s/[Ee]/### /g
s/[Ff]/####/g
' $* | sed 's/ *$//'
```

Applying this script you can get lines which look more printable.



To turn this into something nice, you need to work somewhat harder. This is what I used for this paper.

```
.nf     \" nofill mode wanted
.nr y \n(.lu/2  \" get half length of line
.ps 9   \" pointsize 9
.tr #.  \" translate # to . on output
.cs R 3 \" constant spacing
.vs \w' 'u      \" make the vertical spacing equal to horzontal
.in \nyu-\w'#########################'u  \" center the face

Output of icontox comes here

\" And now restore everything to normal
.cs R
.tr ##
.ps
.vs
.in
.fi
```

After doing all this you will get something like the next picture.

As you can see, the result can be shown to the rest of your family. You might want to play with the constant spacing factor or pointsize a bit, to get the best result, since this depends on the size of the full stop for your ouput device. Also, if you want to enlarge the picture, you can just bump up the pointsize and the constant spacing factor.

2.2 *Bitmap fonts*

This technique suggests that it is easy to include screen dumps from your favourite bitmap screen in your paper. It turns out not to be that easy. A locally written screendump program family for "blit terminals" (or DMD5620) has been converted to give its output in a format to be processed by `troff`. To prevent the "Line overflow" message, `troff` had to be adapted. Apart from that, it takes considerable time for `troff` to process a bitmap created like this: about 820 CPU seconds for a blit screen.

The usual way to include screen dumps is to pass them through `troff` using the `\!` escape or the `.cf`-request (for modern versions of `troff`) and to do major surgery on the `troff` output. The problem with that is that `troff` will loose control of its output, since it doesn't know what magic is going afterwards. A more elegant way of handling this would be to have a font available on the output device which describes pixels.

Consider a character set, where each character describes 8 pixels. So the font will contain 255 different characters of the same width. For displaying the bitmap off a

1K*1K screen you only need 1024 lines of 256 characters. The input to `troff` would be something like:

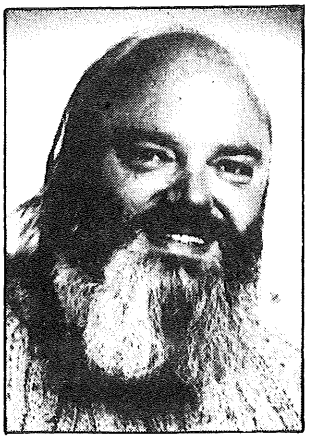
```
.nf      \" nofill mode
.ft Bm   \" select bitmap font
Ab\(es\(*A\- -   \" weird bitmap font character mapping
.fi      \" restore fill mode
.ft      \" and font
```

The moment that you want to have a dump of a colour screen, you are of course lost, but as long as there is no way to directly print colours without colour separating, it is not a real problem. Get the screen dump in black and white, get your camera out and take that picture. The print shop will do the colour separation for you as usual. If you really want to be fancy, you can have the screendump program do the colour separation.

2.3 Ackowledgements

The idea of abusing the set space request for patching up papers on the last moment comes from Bob Garufy. Rob Pike delivered the bitmaps and the icontox program. Paul Vitányi inspired the "large number problem". Jim McKie made the local screendump program family. Paul Klint suggested the idea for the need of a bitmap character font. Peter J. Weinberger permitted the use of his picture. Carol Orange assisted in turning this article into (American) English.

C++ Gossip



John Carolan
john@puschi

Glockenspiel Ltd.
Dublin, Eire

John Carolan is the current chairperson of the Irish UUG. He is also managing director of Glockenspiel Ltd. of Dublin. Glockenspiel has been using C++ since 1985, and John has presented several technical papers on C++. His present work includes the development of C++ class libraries common between OS/2 and X-Windows on UNIX.

By the time you read this, the C++ workshop in Santa Fe will be history. Anyway, I think the list of papers is interesting, just to show what various people are doing with C++:-

Steve Dewhurst, AT&T	The Architecture of a C++ Compiler
Michael Ball, TauMetric Corporation	The Oregon Software C++ Compiler
John Carolan, Glockenspiel	C++ for OS/2
Ken Friedenbach, Apple Computer	Porting C++ to the Macintosh OS
Philippe Gautron and Marc Shapiro, INRIA	Two Extensions to C++: a Dynamic Link Editor and Inner Data
Jonathan Shopiro, AT&T Bell Labs	Extending the C++ Task System for Real-Time Control
Tom Doeppner and Alan Gebele, Brown University	C++ on a Parallel Machine
Roy Campbell, University of Illinois at Urbana-Champaign	CHOICES — A Multiprocessor Object-Oriented Operating System

Oliver McBryan, New York University	C++ Environments for Parallel Computing
Dave Detlefs, Carnegie-Mellon University	Avalon: C++ Extensions for Transaction-Based Programming
Steve Mahaney and Ravi Sethi, AT&T Bell Labs	Concurrency and C++
John Rose, Thinking Machines, Inc.	C*: a C++ -like language for data-parallel computation
Kevin Kenny, University of Illinois at Urbana-Champaign	Encapsulators -- A Metaphor for Software Organization in C++
Peter Kirslis, AT&T	A Style for Writing C++ Classes
Kenneth Brown, Cardinal Information Systems	Inc., Object-Oriented Databases
Judith Grass, AT&T	Using C++ in Language Processors
James Coggins, University of North Carolina	A Summary of C++ Applications under Development at the University of North Carolina
Michael Tiemann, MCC	G++: A Free C++
Dan Schuh, University of Wisconsin	Parameterized Types for C++
Mark Rafter, Warwick University	Extending Stream I/O to include Formats
Bjarne Stroustrup, AT&T Bell Labs	What is 'Object-Oriented Programming'
Keith Gorlen, National Institutes of Health	OOPS: A C++ Object-Oriented Program Support Class Library
Ken Fuhrman, Ampex Corporation	An Object-Oriented Class Library for C++
Tsvi Bar-David, AT&T	Teaching C++
Al Conrad, University of Califormia at Santa Cruz	Modelling Graphical Data with C++
James Coggins, University of North Carolina	Integrated Class Structures for Image Pattern Recognition and Computer Graphics
Jim Waldo, Apollo Computer Inc.	Using C++ to Develop a WYSIWYG Hypertext Toolkit

Mark Linton and Paul Calder, Stanford University	The Implementation of an Object-Oriented User Interface Package
Mark Linton, Stanford University	The Design of the Allegro Programming Environment
Ragu Raghavan, Mentor Graphics	A C++ Class Browser
Tom Cargill, AT&T Bell Labs	Pi: A Case Study in Object-Oriented Programming

Only four of the speakers are actually travelling from Europe, although Olie McBryan is a native of Dublin and Bjarne Stroustrup is from Aarhus. I will include a report on the workshop in the next newsletter.

I have not had many replies to my question in the last newsletter about which colleges are teaching C++. If you are teaching it, please mail me at

mcvax!iclitc!puschi!john

and I will print a list in a future newsletter.

I heard there was a lot of interest in C++ at the recent OOPSLA conference in Florida. If anyone in EUUG was there, please can they write something for this column!

Technical tip

If you would like to make a really abstract class, i.e. one where there is no hint at all about what kind of data is being represented, you can do it like this.

In `foo.hxx`, the file which declares `Foo`:-

```
#ifdef IMP
typedef void* IPTR;
#else
typedef FooImp* IPTR;
#endif

class Foo
{
        IPTR p;
public:
        Foo();
        ...
};
```

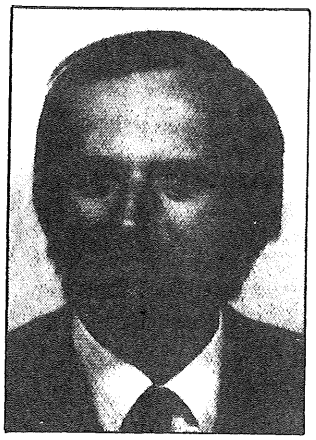
Then, in `foo.cxx`, the file which implements `Foo`:-

```
struct FooImp
{
        // anything you like
};

#define IMP
#include "foo.hxx"
```

As far as the user of `foo.hxx` is concerned, `FooImp` is invisible.

The X/OPEN Mid-Term Report



John Totman

ICL
Bracknell, England

John Totman is an electronics development engineer who has been involved in the engineering support, development and marketing of operating systems since the early 1970's.

He more recently strayed into UNIX when managing the development of commercial applications for departmental users.

A convert to the cause of standards and applications portability, John is currently a Marketing Manager for X/OPEN.

X/OPEN COMPANY LIMITED

After an engagement of nearly three years, the members of the X/OPEN Group finally "tied the knot" on the 10th of September this year. In short, X/OPEN has been incorporated as a limited company, with existing members as equal shareholders.

The Benefits of the Incorporation

This now means that X/OPEN will be managed as a truly independent company, with its own dedicated staff and offices in both the UK and the USA. The President and Chief Executive Officer for the newly formed X/OPEN Company Limited (the company has been created under UK law) is Geoff Morris who was previously the ICL X/OPEN Strategy Manager and Chairman of the X/OPEN Strategy Committee.

Other formal appointments include James R. Bell of Hewlett-Packard, as Chairman of the X/OPEN Board of Directors, with fellow strategy managers from AT&T, Bull, DEC, Ericsson, ICL, Nixdorf, Olivetti, Philips, Siemens and Unisys all becoming members of the X/OPEN Board.

Although X/OPEN has always been independent of any single vendor, incorporation has made independence much more tangible. Becoming a legal entity will enable X/OPEN to consolidate its corporate role as a focal point in drawing together the industry on the standards issue. In addition, incorporation will make it easier for non-members to participate in X/OPEN: already plans are well advanced to establish formal channels direct to users and ISVs in order to gain their contribution to the development of the X/OPEN Common Applications Environment (CAE).

X/OPEN Technical Reports

The subject of contributing to the CAE leads me to two topic areas where X/OPEN has completed major technical studies this year: On-Line Transaction Processing and a

Transport Interface Definition (XTI).

Formal reports for both these topics have been published as "White Papers" for review and comment by other standards groups and major industry organisations. In summary, these reports cover the following subject matter:

On-Line Transaction Processing — A Reference Model
This report assesses the applicability of the UNIX operating system as a vehicle for the support of a distributed Transaction Processing environment. In particular the report explores the requirements of data integrity, scheduling to ensure predictable response times, and flexible terminal support.

The concepts and terminology applicable to Transaction Processing systems are clarified as working definitions, and set out as a proposed layered functional model for a distributed Transaction Processing environment.

The good news is that the detailed development of the reference model has led to a number of well argued conclusions which support the use of UNIX as a vehicle for a Transaction Processing environment. However, there is a need for some basic functionality to be added to the UNIX kernel: guaranteed output to files and concurrent input from peripherals in particular.

The next phase for X/OPEN, following discussions with vendors, software houses and other interested parties, is to develop a complete X/OPEN TP Interface Definition for incorporation within the X/OPEN Common Applications Environment.

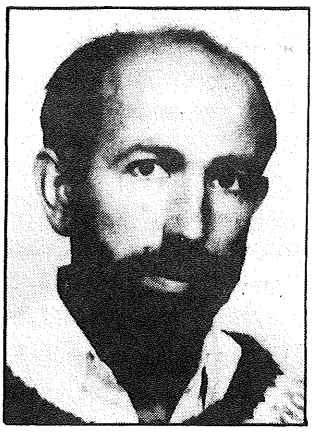
X/OPEN Transport Interface (XTI)
The XTI report defines a transport service interface which is independent of any specific transport provider. The interface is provided by way of a set of library functions for the C programming language. XTI serves three main purposes:

- XTI describes a wide set of functions and facilities together with a minimum workable subset that enables applications portability across systems incorporating XTI.
- XTI `iqqs` is concerned primarily with the ISO OSI Transport Service Definition (Connection-Oriented or Connectionless). However, it is adaptable to other types of provider. In particular XTI is extended to include TCP and UDP.
- XTI is UNIX-version-independent.
- Once again, X/OPEN is seeking to elicit comments on this draft definition from third parties for inclusion in the final definition.

A White Paper Christmas?
Future topics to be covered by X/OPEN white papers include Security and XPPC, with other subjects coming down the line as well.

A Merry Christmas from the X/OPEN Company.

EUnet



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1. Introduction

This is the third of a series of articles giving information about the European UNIX network, EUnet. The credit for the main part of this article goes entirely to Yves Devillers of INRIA, the French backbone. The end bit contains some notes on mail addressing written by yours truly. The articles supplied so far by the backbone sites are keeping this column going, so THANK YOU and please keep up the good work. However, the continuation of this column depends on articles, paragraphs, notes and ideas from anyone, not just backbone people, concerning aspects of European networking. They will all be gratefully received (please mail the above).

2. FNET — Yves Devillers (inrialdevill)

Some 90 sites (mostly educational and public research) now constitute FNET, the French EUnet sub-tree, around its backbone at INRIA (National Institute for Research in Computing and Automatics, a public research institute funded by the French Ministry for Industry). Until very recently sites were connected to the backbone (or between them, but this is out of the scope of FNET) using PAD to PAD over the public X25 network (sometimes called reverse PAD), thereby limiting access to medium and large sites (X25 fixed monthly rental is about 290 to 430 UK £. We also had a fully homologous V25 ACU (with battery saved memory and a real K7 player for outgoing excuse message!) for few dialled passive sites. Very recently low cost ACU began to be homologous, allowing access to smaller active sites.

INRIA, as a research institute, is involved in European research networks and is participating actively in "Aristote", the French X400 research network.

We have two research networks in France (three if we include FNET), the second one, "Reunir", being promoted by Ministry for National Education and by Centre National de la Recherche Scientifique, and presently based upon EARN. As well as INRIA, CEA (atomic energy research), CNES (space agency), EDF (electricity company) and CNET (PTT's research centre) are also members of Aristote. Members of Reunir are usually big computing centres (IBM 3090, Cray, Multics...) with lot of physicists and numerical modelling, whereas FNET are the classical UNIX people running on medium (VAX 780) to low size (Sun 3, SPS7) computers.

Equipment has been allocated by INRIA to run gateways between Aristote and other networks (CSNET and FNET, EARN being at early stage of negotiation). That

equipment consists of two BULL SPS7/70 (68020, 8Mb, 800Mb, ethernet and X25, System V plus Berkeley IPC, DoD suite and ISO session interface, X400 as native mailer). One computer is fully dedicated to the FNET backbone and should be in order at the end of this year (freeing the VAX 785 of all the incurred overload). Two INRIA employees are spending part of their time on FNET administration and relations with other networks and two students are working half time on network maintenance and billing. Starting next year FNET members will be asked for a yearly fixed contribution (290 UK £ for educational, 870 UK £ for commercial) to pay part of these student costs.

Last May we contributed a lot to a special issue on communication in a UNIX newspaper dedicated to SPS7. The immediate result was a good number of new small sites joining the net, with too many of them asking for news! This is our real problem in FNET with only 16 sites receiving news, and 30 asking for it. INRIA is retransmitting news to 12 sites, one of them (crcgel) retransmitting it to 3 other sites, but it seems very difficult to have a leaf node act as a redistributing site (we call them T-bone) for news, and the present 30Mb monthly volume (steadily doubling every 10 or 12 months) does not help to encourage volunteers.

AFUU, our local UUG, is pushing us to have more sites and more users on the net (and thus more AFUU members). We are convinced we cannot provide any kind of service (setting up node, debugging communication problems...) to end users as all our time is already spent running the backbone. A few users, exclusively from public research institutions, get access through minitel (French videotext) to their mailbox on a dedicated computer. This service is not yet very developed; it could be a good solution to AFUU members wishing to access the net, even though they do not have sufficient manpower to maintain a full mail node. AFUU will eventually be running such a node.

FNET people meet together very informally 4 to 6 times a year in the "AFUU-reseau" (reseau is the French word for network) working group, J.C. Petithory being the animator of it. There we enjoy talks on networking and related subjects. I should say "enjoyed" as most (all?) the meetings in the last 18 months have been dedicated to evolution within the net, switching to domain addresses, tariffs, migrations, problems at the backbone and so on. We also intend to make a tape available for FNET members, including communication stuff, configuration files and all the associated goodies. That tape should be ready for the annual AFUU meeting.

Activities in the near future, at the backbone, will be devoted to new links testing (switched numerical telephone at 64kb/s) or setting up (leased line toward Holland, IP on top of X25 through Sunlink or SPS7) and experimenting with X400 mail using mailway, a mailer channel for sendmail. Activities within FNET will include the final phase of migration toward domain based addressing, solving news problem, thinking about a possible status for the future FNET and having good talks at AFUU-reseau meetings.

3. *Addressing*

Forming addresses is always a lively problem, so I've divided this up into 3 sections: addressing where all sites are domain based; addressing where all sites are uucp based, and mixed addressing.

3.1 Domain based addressing (733)

All these examples assume an international standard format, the "Little Englander" mentality, that created UK-style addresses is handled later.

Mailing a site to which you are directly connected is simply:

user@site.sub-domain.domain

where sub-domain may be repeated zero or more times. So we at ukc might mail *user*@alvey.uk, *user*@ed.ac.uk or *user*@stl.stc.co.uk (where "alvey" shows no sub-domains, "ed" is in the "ac" sub-domain and "stl" is in the sub-domain of "stc", which is in turn in the "co" sub-domain of the "uk" domain). When explicit routing is required, then the following form of mailing can be used:

user%end-site.sub-dom.dom@rout-site.sub-dom.dom

where *end-site* is the site you want the mail to end up at, and *rout-site* is the site through which you are routing the mail. All the routing site then does is strip off the bit after the @, finds the last % in the reduced string, changes it to @ and forwards the mail on to the site after the new @. By this method multiple explicit routing is supported, hence mail to *user*%d%c%b@a would arrive at "a", who would then forward the mail to *user*%d%c@b, who in turn would forward it to *user*%d@c, who would finally send it to its end destination, that is *user*@d.

In the UK (and apparently in New Zealand), things are done differently. Hence on our academic network, JANET, site uk.ac.foo would mail site uk.ac.bar as *user*@uk.ac.bar, i.e. the domains and sub-domains are reversed. We at ukc, being an international gateway, do things properly, so we first try to make sense of things assuming a mailer has followed international standards, then we domain flip everything to see if a reversed address makes sense. This does, however, cause some amusing problems. If we mail *user*@uk.ac.rl.de, then the mail does not go to machine "de" at the Rutherford Laboratories in the "uk", but instead it goes to Germany, because we check every address before reversing it, and "de" is the registered West German domain. Basically, UK users mailing abroad through us should think internationally.

3.2 UUCP addressing

Uucp sites address each other with "bang" style addresses, (that is addresses separated by exclamation marks "!"). Hence, site "a" mails a user at site "b":

b!user

Explicit routing is easy, as routing gets added to the front, so "a" mailing "d" via "b" and "c" would mail:

b!c!d!user

Site "b" then strips off his site name and the next "!", and forwards it to site "c", and so on. In this case addressing is in the reverse order to the explicit routing for domain style addressing. It is this difference in approach that causes the "fun" when domain base sites connect to uucp sites.

3.3 Mixed Domain and UUCP style addressing

Mixed communication between domain based and uucp based sites, where explicit routing is involved is something of a minefield. There are enough difficulties in routing the mail in the first place, but the really exciting problems occur with the formation of a meaningful reply address for the recipient, who might understandably want to answer his or her mail.

Any articles detailing these problems, what caused them and ways of getting round them would be welcome, but a few examples that we at ukc have heard about, or encountered, might start the ball rolling. Examples with explanations, as with the five below (my thanks to Sean Leviseur), can be both illuminating and (hopefully) amusing for everyone.

1. Domain based mailer at "c" gets address a%b@c, removes the "@c" and tries to mail "a%b". That is an easy one, but it has happened.
2. A cc: field address of "a!" can occur, when a mailer decides to remove both the user and the site from an "a!*user*@ba" type address.
3. UUCP sites can often have fun with "a@b@c"

   I've also heard of this: "a@b!c@d", although I haven't actually seen that one.
4. Finally a specific ukc one to show how we got things wrong, before we recognised the csnet domain. We once received an address:

   user@csnet.tektronix

   so we tried to decide where to send this. Our first try is to look for a "tektronix" domain. We didn't find that, so at ukc we domain flip and see the address:

   user@tektronix.csnet

   At that time we didn't recognise csnet, so we make our next try to see if we have a site of matching name and sure enough we find tektronix.uucp, so we send the mail to:

   user@csnet.tektronix.uucp

   thereby treating csnet as part of the uucp site called tektronix. The answer in this case was to recognise the csnet domain, and everything worked.

UNIX in the Marketplace

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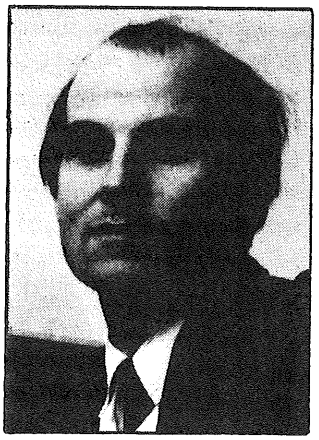

Dominic Dunlop is the Research and Developement director of Sphinx Ltd, a UK software distribution and services company he co-founded in 1983, after experience in supporting Zilog's range of super-micro computers. Sphinx centers its operations around non-proprietary operating environments, selling in a variety of third-party and self-written software products across hardware from name different vendors.

Dominic'c current rôle is that of bringing complex new products into Sphinx' offering by first understanding the technical and marketing issues involved, then working to address them in the context of the company's current capabilities and activities.

I'm Dominic. Buy me!

Hello. As Research and Development director of Sphinx, a company which sells and supports software packages for UNIX* and several other operating systems, I get to research new developments. To put it another way, I'm the person who monitors all that neat stuff that all those clever people have dreamed up, just so that I can say why it won't work. A typical killjoy critic, in other words. Consequently, your gentle editor has asked me to write a column for your newsletter, commenting on what's hot and what's not in the application software world, and whether it's all just marketing hype anyway. Provided that I don't get sued, and that I do get prodded for delivery, this should turn into a regular feature. If there's any product area that you'd like to see discussed, let me know.

And this issue's topic is...

UNIX on the 80386 — Bloodshed or Watershed?

The issue of UNIX on the Intel 80386 has been the source of a lot of smoke, punctuated by occasional flashes of light, for much of 1987. It all started back in January at the Uniforum show in Washington, when Microsoft announced that Xenix† and UNIX System V, release 3 were to merge by mid-1988, resulting in a single operating system which would be able to run both *coff* (Common Object File Format) binaries generated for System V by AT&T's compilers and linkers, and *x.out* binaries produced for Xenix by Microsoft's C-merge compiler and tools. The trouble

* *Yes, UNIX is a registered trademark of AT&T in the USA and (some) other countries*

† *Xenix, MS-DOS are registered trademarks of Microsoft Corporation*

with the initial announcement was that it was hazy about AT&T's part in the development. This turned out to be because, although AT&T had been involved all along, it were not quite ready to announce its side of the story in January. AT&T got around to putting out a press release in February. By then, the air was full of speculation and misinformation about the effects of the move on Microsoft, AT&T, Xenix outlets such as the Santa Cruz Operation and IBM, UNIX outlets such as Interactive Systems, Microport and IBM, and — oh, yes — the poor old user.

Whatever you might think of the architecture and heritage of Intel's 80386 processor, it has several important commercial and technical properties — properties which, correctly used, could get over one of the bugbears which has increased the difficulty of developing, selling and supporting software for the UNIX operating system over the past ten years. This problem is that, while you can quite easily write source code which is portable across UNIX implementations, *binary* code portability is all too rare. Consequently, software developers waste time moving their application from one implementation to another, when they could instead be improving its functionality or performance. Worse still, since porting (particularly to Intel's previous processors) is one of those jobs which is 95% crushing tedium, while still requiring 5% of inspiration, it is too often delegated to technicians who can't actually supply the necessary inspiration, and who consequently produce products which, while they work, don't work well.

How can the 80386 get software authors off this treadmill? Well, here's what it's got going for it:

MS-DOS heritage: Say what you like (or dislike) about it, MS-DOS has spawned more software more quickly (and more profitably) than any other environment. Systems which run UNIX can't afford to ignore this vast range of products, or the enormous base of users it has generated. The 80386 has a "virtual 8086" facility which can be used to run multiple MS-DOS tasks under the control of UNIX.

PC heritage: Because of the success of the IBM PC family, lots of systems designers know how to build Intel processor-based value-engineered systems which can be cranked out at the lowest possible cost. Consequently, PC-class computers give more "bangs for the buck" than almost any alternative. The 80386 at last allows an unconstrained implementation of UNIX on this class of hardware.

Xenix heritage: The 8086 and the 80286 were not pleasant targets for a port of UNIX. In fact, a conspiracy theorist once described IBM's PC-XT to me as "the most powerful system that won't run UNIX." Despite this, Microsoft and the Santa Cruz Operation made it their business to create a port of Xenix which squeezed worthwhile multi-user performance out of XT-class systems. The result was one of the most obvious success stories of the UNIX marketplace: Xenix, now running mostly on 80286-based hardware, has the largest installed system base of any single UNIX implementation, and supports a wide range of application software.

Big segments: One of the most unpleasant aspects of the 8086 and 80286 was the 64k segment limit, which meant that programmers had to play all sorts of tricks (and put up with all sorts of compiler, linker and system bugs) in order to manipulate more data than could be held in $10-worth of chips. This problem made it difficult or impossible to port big engineering, graphics or modeling applications to Intel-based hardware, so confining its utility to the low end of the

market. The 80386 still has segments, but, since they're four gigabytes long, addressability problems are a thing of the past (except for poor old MS-DOS, tied by an obsolete hardware design to just 640k of directly addressable memory).

Built-in MMU: The processor architecture which has spawned the most hardware designs for UNIX systems is that of the Motorola 68000. The sad thing about all these designs is that, although they use processors which run the same instruction set, they do not in general allow binary application portability. The main reason for this is prosaic: Motorola took its time in shipping a companion memory management unit for the CPU — and, when they did, designers didn't like it. As a result, different Motorola-based hardware designs have different memory-management schemes, and require different application base addresses, page sizes and so on. Even if operating system implementors could agree on system call identifiers and the like†, the hardware would still prevent binary portability. Recognising this weakness in its competition, Intel incorporated memory management hardware of adequate (although not superlative) performance into the CPU chips of both the 80286 and 80386. Systems designers, presented with a *fait accompli*, have little excuse to supplant this circuitry with a plethora of incompatible alternatives.

Reasonable power: The 80386 clocks in at about three MIPS. That's a reasonable amount of power to throw at the medium-sized operating systems that both the AT&T and Berkeley variants of UNIX have become. In fact, it's precisely because Xenix stayed as as a relatively small operating system, with version 7 features at its heart, that it was able to squeeze so much performance out of 8086- and 80286-based PC-class systems, and find such a ready market among those who wanted a multi-user system for the price of single-user hardware. The 80386 holds out for Intel-based systems the prospect of breaking out of this low-end ghetto.

So, in summary, the Ideal Implementation for the 80386 would have the following capabilities.

- Ability to run existing binary MS-DOS programs (including the "ill behaved" ones which operate on the (largely correct) principle that the way to get the best from MS-DOS is to pretend that it's not there)
- Support for low-cost hardware
- Ability to run existing 80286 and 80386 Xenix binaries (as well as 80286 and 80386 UNIX binaries)
- Full 32-bit addressability, allowing easy support for large programs and modern bit-mapped interfaces
- Standardised memory management scheme (including paging, as support for that's built into the 80386 CPU too)

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† *Unisoft ports to Motorola architectures have long allowed portability at the level of unlinked object modules through this type of standardisation.*

- The "big machine" features of UNIX V.3

Guess what. That's just what the merged product is going to do. What's more, at the PC (and PS) end of the market, many vendors will be competing to sell UNIX implementations which, as far as their ability to run any existing application goes, will be identical. This should result in price competition, and in product improvements as competing vendors attempt to make their particular product stand out by, for example, supporting more devices or being easier to administer. And it'll be called UNIX wherever it comes from, as AT&T has licenced use of its trademark to Microsoft. (I suspect that Microsoft and its agents had become very tired of trying to convince potentially large customers wanting to purchase *UNIX* that, even though Xenix had a different name, it was SVID-compliant and had been passed by the SVVS.)

Sounds wonderful, doesn't it? The snag is that it doesn't happen until the middle of 1988. Until then, programs developed under Xenix — even Xenix/386, the native 80386 version — will run only under Xenix, while those developed under V.3 for the 80386 will run only under V.3. For developers this means that, for the next eight months or so, either two ports must be done (and subsequently supported), or part of the potential market must be ignored. For example, although a Xenix port of a software product will satisfy many small business users, it may not impress a large organisation which has standardised on System V across a wide range of system types. Conversely, a user already running several Xenix applications is not going to be interested in a product requiring the purchase of a different and currently incompatible operating system. At least a port to either environment now should work in both after the merged product hits the streets — despite the reasons some suppliers are giving for staying with their implementation even after the merge.*

Still, I suppose having to do even two ports is a considerable improvement on the twenty or so it currently takes to address a sizable slice of the Motorola-based marketplace. In fact, the 68000 family, which had appeared to be the flavour of the decade for microprocessors running the UNIX operating system, seems to be in trouble, with many formerly loyal hardware suppliers turning either to RISC architectures to get more power, or rushing out 80386-based boxes in the hope of building sales volume.

What's my conclusion? Well, MS-DOS has shown users that binary portability on the level of "if it fits in the diskette slot, it'll run on your hardware" is achievable. To date, UNIX has not been able to deliver this sort of portability, and this has been one of a number of factors which have limited its acceptance. The 80386 and the agreement between AT&T and Microsoft fixes this deficiency, *provided that the 80386 becomes the dominant processor in the UNIX marketplace.* And it looks to me as if it will.

Footnote

It's a surprising fact that there does not appear to be an implementation of BSD-style UNIX for the 80386, even though the chip's architecture is entirely up to the challenge. Is this another indication that BSD's star is on the wane?

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* *A quick plug: Sphinx has a foot in both camps, distributing both Xenix/386 and UNIX V.3 for 80386-based PC-type systems*

News from Denmark

Keld Simonsen
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Chairman, DKUUG

So what has happened in Denmark since last time we met here? Quite a lot.

Last time I wrote about the wonderful machine that we were given to run the network. Well, actually we did not get it as our own, we just borrowed it: for one year. But that does have some advantages, because the firm is doing all the maintenance on their expense, and it is easier to shift to another machine if this machine (a SUN 2/160) gets too small.

We have not yet moved the backbone to this machine, due to many causes like too little disk space, summer holidays, lack of manpower, disk troubles and what have you. Ericsson A/S has promised us another disk, so we'll have 260 Mb in total.

And there has been other problems with the network. Nothing but trouble... The institute of computer science at University of Copenhagen (DIKU) announced in April that it would stop support for hooking up new machines to the network, and that DKUUG — the Danish EUUG branch — would have to do that work. It was our network anyway, they said, and they did not really have too much interest in contacts to all these commercial firms using the network. But, they were willing to offer continued systems support and machine power for the network. Well, it is understandable when people stop doing work for free, and DKUUG is pleased that there is still a machine and some support to run the network.

The DKUUG board then decided that the network activities were to run economically, self contained and without loss, so we had to raise the prices by about 50% to make it possible to hire someone to do the contacts to new and old net users. We only lost a couple of users by that move and more than doubled our news subscriptions, from 5 to 11 sites, with about 45 machines on mail. Half the new salary is paid by fixed subscription fees, and the rest is paid by a flat volume charge per Mb. We then cover our telephone and X.25 transmission costs (both national and international) by billing them directly to our users. The news cost from Amsterdam is split evenly on the subscribers.

Another formal thing about the network is that DKUUG is negotiating a written agreement with the Computer Science institute, thus we will know what rules are applying to this cooperative effort. It was no great pleasure to just get the message that vital parts of the net service would stop about a week ahead. Too many people are now relying on the UNIX network.

The moral I got out of this story is that is it fine if some institute or company will run the network in a country (and take all the work, troubles and financial risks with it), but you can never tell when they will stop providing those services or parts of it. As it is UNIX users using the network, from both the commercial and academic worlds, it shows up that the only organisation really interested in keeping the network running is the national UNIX user group. They will take all the responsibility if things fail fatally. So they should better be prepaired to prevent the network from failing. I am not advocating that the national UNIX group should actually run the network, but some formal arrangements with the backbones would

Letter from Germany

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This is the first "Letter from Germany" since Daniel Karrenberg left the GUUG governing board. I would like to use this letter to thank Daniel for all the work that he has done for the GUUG and the EUUG. As a tribute to him I shall continue using the same title for these articles.

Since April 1987 I have been the vice chairman of the GUUG. This position is tied to the function of the EUUG contact person. I took over this position over at a time when the GUUG had financial problems because of the EUUG subscription, which we consider to be high. At that time it looked as though the EUUG was not willing to discuss topics like fees or services and their costs, but at the governing board meeting in Helsinki the idea was born to organise a workshop on the future of the EUUG. This meeting would result in some kind of brainstorming, where all the national groups of the EUUG would try to define new (or old) goals to fullfill the actual and future needs of the EUUG and their national groups.

The EUUG now celebrates their 10th anniversary. Congratulations!!! Many things have changed in 10 years. Starting as a group with direct members in some countries, there are now 14 countries running their own groups. Maybe there are not only more UNIX users in Europe; it could be that today's profile of the UNIX user has changed. I will say no more on this topic and you should refer to the report of the Paris woods meeting.

A few weeks ago we had our 1987 GUUG conference. It took place in Karlsruhe on the 22-24th of September which was unfortunately the same date as the Dublin EUUG conference. I have to apologise for that, but it was impossible to find a different location or a different date for an event of that size. The conference had four parallel sessions, two technical in large lecture halls and two commercial sessions in smaller rooms. I do not have the exact numbers but I suppose there were more attendees than last year. There was an surprisingly high interest in the *ad hoc* working groups "network" and "user interfaces".

Finally I will give you the dates of the next events in Germany.

Berlin, March 24-25, 1988
GUUG Workshop
Working groups: "networks"; "user interfaces", and "security"
Only a limited number of attendees are allowed per working group. The groups are working in parallel.

Hanover, September 27-29, 1988
1988 GUUG annual conference.
This conference will be held in conjunction with the Autumn 1988 EUUG conference.

give some security.

Well, as it showed up in the arrangements with DIKU, they really wanted to shed the financial responsibility of the network, so DKUUG had to take on this job too. And though other sites were willing to take over the backbone role, no one was interested in taking the financial risks. So DKUUG has to take that responsibility from now on, whether we like it or not.

Enough on the network.

We have also had 3 members meetings, on 4th generation languages, UNIX introduction, and work-stations; with 80, 50 and 50 attendees respectively. We think that we are quite successful in having good themes for the meetings and aiming them at different audiences in our membership. In this way there is something for users at all level. We also find that written material with extensive abstracts is very important when we announce the meetings. This is the information the members decide upon, if they want to attend.

We have a special working group with our members who are UNIX products suppliers where we discuss exhibitions, catalogues and the like. We are planning a DKUUG stand at the Mikro Data 88 exhibition in Copenhagen, February 1988. We are also planning a list wich indexes many of the UNIX products available in Denmark, but without a wordy description of every product, only keywords will be allowed. People would then refer to the /usr/group catalogue, or just call the supplier and ask for details.

Yes, DKUUG is in the process of affiliating /usr/group, and we intend to use their services, like the catalogue, too.

Other external relations: we have meetings with the local X/OPEN consortium and we are active in the offical ISO standardisation efforts on C and UNIX (POSIX) through membership of the appropriate subcommittees in the Danish Standards Association.

A last comment: there are now (1st November 1987) about 220 members in DKUUG. This is quite far from the goal stated in our last report here, but we find it quite good compared to the size of our country.

EUUGN
Dublin abstracts

Here are brief abstracts of the papers that were presented at the Dublin conference on September 23rd — 25th.

Copies of the proceedings are available from the EUUG secretariat at Owles Hall. The cost is £20 for members of the EUUG, and £50 for non members.

A Framework for Man Machine Interfaces Design
Laboratoire de Recherche en Informatique, France
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With the increasing importance of man-machine interfaces appears the lack of tools for the construction of user interfaces. Some principles are coming out, such as the separation of the interface from the application, and allow us to start designing environments for their construction. To facilitate their construction means to design fast, to modify easily and eventually to reuse. On the user side, the interface should be dynamically adaptable to his taste and experience.

Towards such interfaces, we propose an environment built upon two tools: Graffiti and MetaGraph. The first one allows for interactive construction of the control structure of the interface, while the second one establishes a relation between the program data and the interface. This correspondence of high level abstractions will extend the functionalities of the interface by reducing graphic manipulations in the application.

What They Don't Tell You about Window Interfaces
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People communicate using languages, whether it be with other people or computers. The nature of these languages determines what can be expressed and how effectively it may be communicated. These languages may be in several forms, verbal and visual being just two of them. How should the design of a computer interface language be set about, and then how do you persuade the different systems designers to stick to one of them?

MUSK — a Multi-User Sketch Program
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In recent times we have witnessed an explosion in the use of personal workstations, but the development of interactive applications has lagged behind the capabilities of the hardware. This is particularly evident in the area of user-to-user communication.

The subject of this paper is a highly interactive sketch program that allows any number of users to participate in the sketching activity. In addition to sketching, facilities are provided for the inclusion of text and the pasting of images.

The paper starts with a brief retrospective of the user-to-user communication capabilities of UNIX and progresses to describe the design and implementation of a multi-user sketch pad.

The paper concludes that such a facility is both feasible and useful although a number of questions remain about how multi-user and media-user conversations should be managed.

UBOAT — A UNIX Based On-line Aid to Tutorials
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Designers of computer aided education (CAE) systems are presented with the dilemma that course authors are required to also be expert in the field of computers. While this is a laudable virtue, it is very often the case that a skilled educator is not necessarily a skilled programmer and, conversely, a well trained programmer is rarely a good educator. Consequently, CAE packages are either rich in information but difficult to use, or else they are wonderful examples of human-machine interfaces which convey very little real information to the student. This paper describes our work in developing UBOAT, a system designed to allow an educator with little computer expertise to develop an interactive, dynamic and effective CAE system. UBOAT allows an educator to concentrate on his or her area of expertise, without requiring a great deal of distraction in coercing the computer to interface effectively with the learner.

Early attempts at generalised CAE generators such a `learn` or `PILOT` provided an educator with simple interface to the student that allowed a predominantly top-down approach to presenting the educator's materials. Little or no attention was paid to allowing for review, question and answer, ergonomic human-machine interface, or screen oriented display. `Learn` presented all of its text in serial form, and generally required modifying the source program to add features. `Pilot` allowed for simple graphics, but required that it be done in a terminal-dependent way. Both these systems, as well as many others, had a cryptic, terse command syntax that was fairly unforgiving. The source files for the education scripts were often huge ASCII files, without any data compression or text reuse and rarely, if ever, was any debugging support or compilation facilities provided.

Developing Ada Software Using VDM in an Object-Orientated Framework*
Chris Chedgey, Seamus Kearney, Hans-Juergen Kugler
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A software development method encompassing a variant of Object-Orientated Design (OOD) and the Vienna Development Method (VDM) is described. The development is targeted at the Ada programming language. Part of the objective of the work described here is to produce a method for constructing Ada software — a method which follows sound engineering principles in order to improve software quality as well as improving productivity on the part of the developers.

Papillon — Support Tools for the Development of Graphical Software
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The Papillon project (ESPRIT 496), entitled "A configurable graphics subsystem for CIM", has produced a prototype system to help the application developer build well-structured software which is initially devoid of representation or user-interface information. Graphical representations for application data types may be subsequently described without direct coding. Calls made to the application by "driver" software such as process control or simulation programs will now be reflected in the display. A user interface may be

* *Ada is a registered trademark of the US Department of Defense (AJPO)*

automatically generated to enable a human user to "drive" such applications as production planning and scheduling. The approach has its foundations on Object-Orientated Design (OOD), the Vienna Development Method (VDM) and the programming language Ada.

Experiments With the User Interface of UNIX Mail
Peter R Innocent, Gerrit C van der Veer, Yvonne Waern
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Designing the user interface and application interface are only two aspects of the complex work that has to be done to provide users with systems that they both are able to use, and like to use. An interdisciplinary approach is necessary to define, design, and construct these interfaces. For the COST-11-ter working group "Human Factors in Telematic Systems" electronic mail was used as an example to illustrate the way to develop user interfaces. As we wanted to start from an existing situation (an application system in actual use), we chose an application that is certainly neither the best, nor the most advanced. It is, however, a standard component of UNIX which is becoming a standard operating system for a growing diversity of generally available machines.

A SunView User-Interface for Authoring and Accessing a Medical Knowledge Base
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A system named *Eidetic* has been built for the storage, retrieval, and examination of microscope slides. It is made up of two major subsystems: an authoring system, and a searching system. After an author collects images and composes a knowledge base both get transferred to Compact Disc Read Only Memory (CD-ROM). Searchers can analyse the stored data to draw conclusions and assist their diagnostic process. Eidetic supplies "power tools" to the physician or medical student.

The paper covers the overall design of the system to highlight the components which are affected by *SunView* programming techniques. To acquaint the reader with the goal of the delivered system, sections will also cover the world-view of the users, an overview of the knowledge base and its use, describe the authoring and user systems, and outline the organisation of the CD-ROM storage.

The Analysis and Manipulation of BNF Definitions
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An extended BNF notation (EBNF) is formally defined and its use described. An association software tool called LL1 provides analysis and manipulation functions for systems defined using this notation. The facilities provided by LL1 are particularly useful in the development of LL(1) definitions. This paper will also discuss the use of EBNF and LL1 in the development of language syntax and will consider some implications of using EBNF representations of Jackson structure diagrams.

UNCLE — A Case Study in Constructing Tools for the PCTE
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A set of common service interfaces has been proposed as basis for a portable common tool environment (PCTE). The PCTE favours a distributed workstation approach to software engineering environments and uses an object management system (OMS) based on an entity-relationship approach as fundamental information repository.

The PCTE defines functional interfaces allowing the creation and manipulation of complex data-models using the distributed OMS, thus facilitating the interpretation of development and

management tools. The PCTE interfaces are currently based on UNIX services and expressed in C.

UNCLE is a tool to allow the construction of command and response languages for the PCTE which are turned to the users' views of the underlying system and his or her skills. An object-orientated abstraction mechanism allows the construction of common tool interfaces.

A Distributed Design Environment for Distributed Realtime Systems
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Over the past few years the need for systematic design of real-time systems has received considerable attention due to the increasing criticality and complexity of the applications. This paper presents a distributed project support environment for the design of fault-tolerant distributed real-time systems. The innovative aspects of this environment relate to the handling of real-time from the requirements phase to the detailed implementation stage and the integration of the design tools with the evaluation tools. Data refinement, function refinement, evaluation and project management are supported by an open, coherent tool set. The uniform man-machine interface is one of the integrating factors of the whole environment.

The design environment is implemented under the UNIX operating system on a state-of-the-art graphic workstation with pointing devices. The X-window system supported the creation of the window and icon driven user interface. All the information gained and used during the design process is stored in an entity-relationship model implemented by the relational data-base DB++.

NERECO: An Environment for the Development of Distributed Software
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NERECO (NEtwork REmote COmmunications), the system here described, is constituted by a set of tools for the development and execution of distributed programs. From an architectural point of view the tools supporting such programs have been realised through the enrichment of many sequential languages (Pascal, C, CHILL) with concurrent statements and the run-time support for such statements. The integration of the concurrent part into the sequential languages has been done in order to preserve the syntactic coherence.

The co-operation model utilised is derived from CSP, with some extensions to allow asymmetrical and asynchronous communications; moreover, some statements for fault treatment have been added. The run-time support implements the synchronisation and the communication among the processes; for its implementation the IPC of UNIX 4.2 BSD, and particularly the TCP/IP protocol, has been utilised. The NERECO system has been implemented in the C language on a collection of SUN workstations connected by Ethernet.

A Knowledge Based CAD System in Architecture on UNIX
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The aim of this project is to realise an intelligent CAD system integrating part of the Architectural knowledge. It is mainly based on the assumption that this knowledge is partially included in the vocabulary of the architect and in the drawing techniques elaborated along the centuries.

In this system the symbolic representation of knowledge is based on an object-oriented language, OBJLOG, which we purposely defined as a layer above PROLOG II, and which offers some interesting processes of inheritance.

To implement the geometric model we have chosen SMALLTALK-80, an object-oriented language provided with a rich graphic programming environment, which permits us to realise a quite sophisticated user interface (pop-up menus, mouse device controls...). Communication between the model knowledge and the geometric one is carried out by UNIX in running Objlog and SmallTalk as two concurrent processes.

A User Interface for Geographers — What Can UNIX Offer ?
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Geographers have not traditionally used computers much. This paper describes the problems peculiar to this discipline, largely modeling and statistics, both on a grand scale. Emphasis is placed on picking out key features from a mass of noise. Computers are now beginning to be used to great effect, but finding the correct tools has been difficult.

The HUB: A Lightweight Object Substrate
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This paper describes the Hub system which is a machine emulator capable of operating under many different contexts in quick rotation. Tasks running in Hub pop their next instruction into a circular buffer. Creating a new task is largely a matter on popping two instructions, one of which has a different context. This is considerably more efficient than rapid context switching, which can be quite slow on some machines. Hub was initially designed to do communications processing, an area where many tasks execute and communicate concurrently.

More MIDI Software for UNIX
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The Media Lab has a Sun-3 which controls 64 channels of Midi synthesisers in real time. In addition to capturing and replaying music, work has been done on analysing it. An early example is one which will tell you which key a piece is played in. Other analyses look at note frequency and rhythmic patterns, and will eventually lead to recognition of a composer's style.

Automatic Exploitation of Concurrency in C: Is It Really So Hard?
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In this paper we consider whether it is possible to have compilers that will automatically exploit concurrency in C. We discuss the relationship between automatic exploitation of concurrency for the purposes of vectorising and multiprocessing. We review the basic techniques and transformations used and examine the necessary conditions to perform these transformations, with examples in C. Several elements of the C language and programming style, such as pointers and recursion, make it difficult to do the necessary data flow analysis. There are two possible approaches to this problem: to bypass code or blocks of code that contain "difficult" features and be unable to apply optimisations to these fragments, or to suitably restrict the language. We examine the choices made by the few available vectorising and parallelising C compilers and consider what the future may hold in the light of current research.

An Intelligent, Window Based Interface to UNIX
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Many operating systems have been developed with little thought given to the user interface. Most interfaces tend to be awkward to use and rely on simple command line interpreters. Although many experienced users have little trouble with the UNIX interface, the popularity of the system demands that a more user oriented interface will be required in the future. One aim of this interface should be to alleviate the need for naive users to learn and remember a large number of command names and cryptic command lines.

The UNIX interface can be improved by employing the facilities offered by bit-mapped graphical workstations (menus, windows, icons, etc.). To use these facilities most effectively, the interface requires intelligence. This can be provided by associating semantic information with UNIX OBJECTS. This paper describes a UNIX interface which uses a mode of interaction known as *direct manipulation*. Direct manipulation assumes an environment of objects and associated semantic information (i.e. attributes). It encompasses the ability to select objects with a pointing device, display and issue commands associated with the objects and change attributes of the objects.

This kind of interface helps a user in several ways. Displaying UNIX objects (files, directories,etc.) as icons provides a more natural interface. In addition, the association of semantic information with objects makes it easier to provide a more intelligent user interface. For example, with typing information the system can deduce exactly which commands are permissible in a given context and does not rely on commands themselves to detect errors. Consistent and helpful error messages can also be generated. Finally, the use of direct manipulation, combined with semantic information, permits a much reduced command set to be displayed in a given user context. The authors see this as an effective way of assisting the user.

Fast bitblt() with asm() and cpp
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`bitblt()` is both a fundamental building block of bitmap graphics and a demanding implementation challenge. `bitblt()`'s speed, or lack thereof, is an important factor affecting one's perception of a machine's interactive response.

This paper is about squeezing the last microsecond out of software implementations of `bitblt()`. The environment for this exercise is a bitmap display based on the Motorola 68020. Both the `asm()` capability of the compiler and the C preprocessor will figure prominently.

DES — Support for the Graphical Design of Software
Stephen Beer, Ray Welland, Ian Sommerville
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This paper describes DES (the Design Editing System) — a system which investigates how such graphical support may be provided in a *generalised* way for software engineering purposes. DES comprises of 3 tools: a shapes editor (SHAPES) for defining the shapes of a method, a language (GDL) for describing a software design method and a graphical design editor (DE) which is driven by tables generated from the first two tools. The system is implemented in C on a Sun workstation using the pixrect graphics layer and the panel user interface package.

At a very high level of abstraction a design diagram can be viewed as a number of symbols and a number of rules concerning the physical and logical constraints on those symbols. A novel feature of DES is that it is not geared towards any specific method. Rather, the tool builder defines the syntax, semantics and shapes of a design method using the high level tools SHAPES and GDL. This increases the applicability of the system since MASCOT and JSD users, for example, may utilise the same system facilities.

This paper presents each of the tools, emphasising how method-specific checks may be specified in GDL and enforced during design editing sessions.

Cleaning Up UNIX Source — or — Bringing Discipline to Anarchy
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Many people are coming to the realisation that the distribution of UNIX software is not just a matter of creating a tar tape. Approaches to software and distribution management vary from simple disciplines, conventions and procedures to full scale Integrated Programming Support Environments (IPSEs). This paper discussed some of the problems and issues involved in the management of software, concentrating primarily on the exporting of source to remote locations.

Minutes of the AUUG Management Committee Meeting
December 10, 1987

1. The meeting opened at 10:10. Present were Chris Campbell (CC), Piers Dick-Lauder (PL), Robert Elz (KRE), John Lions (JL), Ken McDonell (KENJ) in the chair, Chris Maltby (CM), and Tim Roper (TR). Also present was John Carey (JC), the AUUGN editor.

2. Moved (PL, seconded TR) **That the revised agenda be accepted.** Carried (7-0).

3. The minutes of the previous meeting (August 1987) were tabled.

4. Moved (TR, seconded PL) **That the minutes be accepted as an accurate record.** Carried (6-0, CM abstaining)

5. The president welcomed John Carey to the meeting, and thanked him for his good work in the production of AUUGN. The president explained that the editor had been invited pursuant to a motion passed at the previous meeting (item 30 in the minutes) which called for the editor to be invited to take more informal notes of the business of the meeting, and present those to the members in AUUGN in a more timely fashion than had possible for publication of the minutes.

6. Business arising from the minutes

   Item 7 **(Business arising)** It was noted that the minutes would be easier to follow if the items noted under *Business Arising* contained an indication of the subject matter of the original item.

   Item 6 **(Ivanov plaque)** The plaque was presented at the dinner, though Ivanov was unable to be present.

   Item 7 **(Singapore Meeting)** The president contacted Stephen Moore immediately after the previous meeting. The event had been cancelled by Computerworld for internal reasons.

   Item 20 **(Credit cards)** The treasurer has now completed the necessary paperwork to allow AUUG to accept VISA credit cards (as well as Bankcard and Mastercard which had previously been done).

   Item 21 **(Institutional Members Benefits)** Still deferred. CM noted that he had delivered the AUUG mailing list to an institutional member in electronic form, and suggested this as a possible benefit. Discussion was deferred until later in the meeting.

   Item 24 **(/usr/group affiliation proposal)** No further action. The secretary explained that it seemed that no further action was needed.

Item 25 **(NZUSUGI affiliation)** No further action, a letter still needs to be written.

Item 26 **(Usenix 4.3BSD manuals)** No announcement yet in AUUGN. The first batch of manuals have arrived, and are about to be distributed (some have been distributed) to those who ordered them.

Item 16 **(Meeting organiser's document)** PL explained that he was still waiting for some input from the organisers of the previous meeting (at NSWIT), and that consequently, no action had been taken. It was noted that this whole project may be made redundant by later items on the agenda for this meeting, so further discussion was deferred.

Item 20 **(Exhibitor opinion poll)** A report had been circulated.

Item 22 **(Sponsorship enquiry)** Wael Fada, of ECMS, the exhibition organiser from the NSWIT meeting in August has done this. Response seems positive.

Item 26 **(Financial statement)** This wasn't done by the end of September, but was available for this meeting.

Item 27 **(Database location)** The database, and membership records, were moved to Melbourne, for a short while. When the secretary went overseas, it was all moved back to Sydney. It was anticipated that the database would return to Melbourne in the immediate future.

Item 28 **(Redirection of mail to PO box)** Not done yet. The treasurer, who handles the current P.O. box expressed satisfaction with the way that things were working in this regard. However, the general feeling was that having the post office redirect mail from the post office box to the address of the current secretary (or secretarial service) was still the right thing to do. This is to be arranged as soon as possible.

Item 31 **(Secretarial assistance)** None sought as yet. This generated much discussion. PL pointed out that the group was accumulating income, and spending little, and that this was not a good idea. He suggested that spending most of this income on improving members services, which would be a result of a more professional secretariat would be a good idea. It was noted that we need a list of tasks that need to be performed. Given that, the president agreed to obtain details of what such assistance would be likely to cost. Further discussion was deferred until later on the agenda.

Items 33—34 **(Meeting details)** Discussion deferred to the appropriate agenda item.

Item 36 **(Tape distributions)** No action taken.

Item 38 **(Incorporation)** The forshadowed action had been completed. Discussion of current status was deferred to the appropriate agenda item.

Item 40 **(Fada negotiations wrt Melb meeting)** Done. Further discussion deferred to appropriate agenda item.

Item 41 **(Chapters, other links)** No action taken.

Item 44 **(Constitution changes)** Deferred to later agenda item

7. The president gave a brief report. He indicated that the only matters of substance were to be covered lated. He also indicated, that as forshadowed in the notice of meeting, and in the latest AUUGN, he would be relocating to the US, to take up a position there, and would consequently be resigning as president of AUUG, his resignation to take effect as of December 31, 1987. A later agenda item is to consider his replacement.

8. The secretary presented a very brief report, including copies of some correspondence.

9. The treasurer presented the balance sheets for the 1986/1987 financial year, and accounts for the first six months of the 1987/1988 year. He noted that the cheque account was holding approximately $24K at the end of the 86/86 financial year, with a further $12K on term deposit. This represented an overall increase of about $13K during the year.

   In the following six months there was a more modest rise of only approximately $1600, though this does not yet include any return from the August AUUG meeting in Sydney, nor the costs associated with the most recent AUUGN. Concern was expressed over the size of the balance of the cheque account, and the treasurer agreed to move some funds to a term deposit account as soon as possible. JL agreed to assist where necessary.

   It was also mentioned that the recent AUUGN had again just exceeded one of the post office weight limits. JC indicated that he had a formula which had been applied, but which evidently needs some tuning. It was also pointed out that postage is still only about 10% of the total cost on an issue of AUUGN.

   JL is to contact Greg Webb from NSWIT to obtain a financial statement from the Sydney AUUG meeting (August 87), transfer of the balance of the funds from that meeting, and application forms from new members who joined at the meeting.

10. CC presented a report from the ACSnet SIG established at the August 87 AGM. There have been two meetings to date. It was felt that with SPEARNET not having accomplished very much, that there was some possibility that the

universities may provide some funding for ACSnet.

PL presented an alternative proposal from Bob Kummerfeld and himself. He suggested that AUUG might emulate USENIX and establish a UUNET type organisation. This organisation could seek funding to support network hubs and a leased line backbone. $40K a year could support 2400 bps leased line links to connect all the capital cities. KENJ pointed out that the educational institutions may then face a difficult choice between Spearnet and ACSnet funding.

There was some discussion on how this might best be accomplished. CC indicated that statistics on network usage were needed, and that PL is gathering those figures from various sites. CC also indicated that the computer centre at the University of Sydney is currently operating a commercial network hub service, which is functioning quite well.

CC indicated that the next ACSnet SIG meeting would write a proposal to be presented to the next AUUG management committee meeting. The president then suggested that in light of this, all that was appropriate now was to express the opinion of the committee that this was a good idea.

11. There was some discussion on the nature of such an organisation. JL pointed out that AUUG would not be able to fund it in the way that USENIX was supporting UUNET. However, it was agreed that AUUG could provide some support to assist the formation of such an organisation.

12. Moved (TR, seconded CC) **That the secretary be authorised to obtain legal advice as to the appropriate form of company to carry on functions anticipated from the forshadowed ACSnet SIG proposal.** Carried (7-0).

13. A status report on the progress of incorporation was given.

    The secretary had completed the necessary formalities which had been pending at the previous meeting. The solicitor then resubmitted the application for incorporation to the Corporate Affairs department, who had then examined the proposed rules, and determined that the requirement of a two thirds majority for some decisions, was inconsistent with the Act, which required a three quarters majority.

    As this had been anticipated as a possible problem, and the secretary had been given a mandate by the members to change *two thirds* to *three quarters* if so required, this was done, and the modified rules were submitted.

    The solicitor then reported to the president (in the absence of the secretary) that incorporation would be completed, but not until a letter of consent to use of the registered trade mark **UNIX** was obtained. The president requested the solicitor to perform a search of the register of trade marks to determine who was the holder of the trademark. The solicitor reported that this was owned by AT&T Technologies Ltd.

14. The president remarked that we are now deeply in the shit.

15. Two possible solutions to this problem were suggested:

    a. Request permission from AT&T for use of the name.

       It was noted that AT&T's rules for use of the trademark expressly excluded its use in the name of a user group.

    b. Change the name to **AUUG Incorporated**.

       This would require a constitutional amendment, requiring a ballot of the members. The secretary was asked to contact the solicitor to determine if this would satisfy the requirements of Corporate Affairs, and in particular, if the use of *Unix* that was objectionable was only that in the name of the organisation, or those uses in the body of the rules as well.

    The secretary was also asked to request the solicitor to take steps to register the names **AUUG** and **AUUGN** for the group.

16. The meeting adjourned at 11:48 and resumed at 14:30.

17. The president reported on the feelings obtained from vendors, and the attendees of the NSWIT AUUG meeting. Generally the meeting style was felt to be quite good, but that it would not succeed more than once a year.

    There is insufficient time to organise such a meeting in Melbourne in February, and no suitable venue in Newcastle in August.

    There was also no host volunteering to host a February meeting in Melbourne, apart from Deakin University in Geelong, which was generally felt to be a little too hard to get to.

18. The president then went on to outline a proposal for a three day meeting in Melbourne in early September 1988 to be held at one of the large city hotels. A three day meeting was seen as being better for the vendors, almost doubling their potential contact time with visitors, and also in providing an extra evening for social activities for attendees. The committee had no objections to a three day meeting, provided that the programme could be filled. One suggested method of doing this, if necessary, was to schedule some time immediately after lunch each day for vendor presentations, new product announcements, etc.

19. The proposal calls for a managed conference, with a fee being charged for secretarial assistance, including preparation of a mailout brochure including a registration form to be returned to the secretariat, preparation of badges and handouts, and manning of the registration desk for the meeting. It was also noted that the costs of hiring rooms at the hotel for the meeting would likely be waived if the conference dinner, and lunches were taken at the hotel.

20. It was also proposed to set the fixed (attendee number independent) costs against the fixed income, thus plan on paying the costs of invited speakers from the

anticipated income from the exhibition. As had been agreed at the previous meeting, the dinner cost is to be an optional extra for attendees, however it was proposed that the cost be subsidised from registration fees, to make the cost less likely to dissuade attendance.

21. The committee agreed to all of these proposals.

22. A theme for the meeting is needed for publicity purposes. **Networking** was accepted as a suitable theme, with a slogan to be created later.

23. There was some discussion of possible invited speakers, and a short list was prepared. Various members of the committee were delegated to contact those potential speakers, after a final date for the meeting was determined.

24. A potential programme committee was also formed, with TR agreeing to serve as chairman. JL agreed to assist, other possible members are to be contacted.

25. It was generally agreed to abandon any attempt to hold a meeting in February 1988.

26. For future February meetings, it was suggested that regional meetings be held in each state, with AUUG subsidising travel costs for invited interstate speakers. These were anticipated to be one day meetings, with no accommodation, catering, or pre-registration, making for an administratively simple format.

27. The committee agreed to try this in February 1989, though with the possibility of reviewing this decision later in the year if no interest is shown by the local areas. A decision on what to do in February 1990 was deferred to a later meeting. It was noted that the ''February'' date was just a suggestion, local regions could hold meetings at whatever time it suited them.

28. It was agreed to go ahead with ''managed'' three day meetings in Sydney in 1989, and Melbourne in 1990, with the possibility of holding such a meeting in Brisbane at a later date.

29. The president is to continue negotiations with Wael Fada, ACMS, to finalise details of the meeting date, venue and pricing for the Sept 88 meeting, and to determine a timetable of significant events. Dates for the 1989 and 1990 meetings are also to be determined.

30. The president is also to draft a letter to members, to be published in the forthcoming AUUGN, or mailed to members, explaining this change of policy.

31. Moved (PL, seconded CM) that pursuant to clause 23(2) of the constitution, **That John Lions be appointed president of AUUG from January 1 1988.** Carried (6/0, JL abstaining).

32. A short list of possible replacements for the vacated position of general committee member pursuant to rule 23(3) was formed, and the secretary was instructed to approach, in turn, the members of the list. It was noted that the list

was expressly chosen to consist entirely of AUUG members from outside of the Melbourne and Sydney areas.

33. There was some discussion on the meeting guidelines document being prepared by PL. It was noted that with the change of meeting styles, the previous need for this document had lapsed, however guidance was still needed for the programme committee, and for organisers of the smaller, local meetings. PL was delegated to prepare two documents on these topics.

34. TR presented some proposed constitutional changes, basically intended to add the office of vice president, and an extra committee member, making the management committee size nine, and to provide that committee members must continue to be members of AUUG. He also proposed a mechanism to allow the members to remove committee members from the committee if necessary. The period of notice required for committee meetings was also to be shortened.

    The committee had no objections to these proposed changes.

35. JL suggested that the timing for elections be modified to allow more time between actions. JL and KRE were delegated to finalise a list of dates.

36. KRE suggested some additional potential changes, including the need for a procedure to allow committee members to be nominated, and elected, at the AGM if vacancies on the committee exist. The requirement that the management committee ensure that nominations for all positions was seen to be impossible to enforce, and should be changed to a requirement that the committee attempt to ensure nominations for all positions. Procedures are needed to cope with the situation which might occur if insufficient members were present to form a quorum at the AGM.

37. TR is to collect all proposed changes, and send details to committee members as soon as possible. If the solicitor advises that a name change will allow incorporation, then this should be included.

38. These was some discussion on benefits for institutional members. Usenix is publishing a new quarterly journal, the *Computer Systems Journal* which they have agreed to make available to our members at cost price. It was proposed that this journal be made available to institutional Members as part of their subscription, and for $30 a year to other members.

    Usenix has indicated that they may be able to make the first issue available to all members gratis. We will proceed with this if available.

39. The question of the provision of copies of the maining list in electronic form to institutional members who purchase copies was discussed. It was decided to hold to the status quo, no electronic distribution, at least until the question of what a secretarial service could do in this area is resolved.

40. The tasks which a secretarial service would be expected to perform, were listed as

- Mail preprocessing, including the banking of cheques, responses to membership enquiries, and handing membership applications and renewals
- Maintenance of the data base, including additions, deletions, renewals, and address changes, and including new memberships obtained at conferences.
- Mailouts, including envelope stuffing, copying where needed, and including handling mailing of the newsletter.
- Sending renewal notices to members.
- Bookkeeping, including preparation of the balance sheet.
- Handling distribution and maintenance of the mailing list.
- Phone enquiries, message taking, and provision of a FAX service.

KENJ is to discover the options available in this area, and the costs involved.

41. JL asked whether AUUGN could be printed and distributed from Melbourne, rather than from Sydney. JC agreed to obtain quotes from alternative printers, including the Monash print shop.

42. CM asked whether it was still required to obtain microfiche copies of the newsletter. He indicated that this had not been done recently, and that there had not been any enquiries for this service. It was agreed to abandon this practice.

43. There was also discussion of the possibility of providing membership cards, or badges, for members. CM agreed to determine the costs of providing badges.

44. Moved (KENJ, seconded PL) **That there be a competition to find a design for a membership badge, with the winner awarded a year's free membership of AUUG.** Carried (7/0).

45. The next management committee meeting is to be held in Sydney on Monday February 29, 1988, at a time to be decided.

46. The meeting closed at 16:46.

IDA Ireland
INDUSTRIAL DEVELOPMENT AUTHORITY

38th Level, MLC Centre
Martin Place, Sydney, NSW 2000
Australia. Tel: 233 5999
Cables: Cotra Sydney
Telex: AA 22917

MEDIA RELEASE

UNIX BASED SOFTWARE DEVELOPERS NOW HAVE THE OPPORTUNITY TO EXPORT TO LUCRATIVE EUROPEAN MARKET

The establishment of a specialist centre in Ireland dedicated to the development of application software for Unix provides an excellent vehicle for foreign companies to market their product in the lucrative European market.

The European UniCentre offers a wide range of services from application development, documentation, translation, software design to packaging a foreign product and marketing it locally in Ireland as well as the UK and Europe.

According to the European UniCentre few countries in the world can offer such tried and proven knowledge of Unix. The majority of the work of the software development laboratory is done using C and Cobol. The balance is spread across languages such as Pascal and various database and 4th generation development languages. All products are then put through a series of independently controlled quality assurance tests.

The European UniCentre concept was born out of the recognition of the emerging need for a coordinated supply of the full range of services necessary to move Unix software products in and out of Europe. The Centre provides a complete turnkey service, from software design to the delivery of fully finished products throughout Europe and the English speaking world.

The UniCentre sees itself as a practical vehicle for International trade, offering a range of crucial services and is strategically placed. The management is made up of North Americans and Europeans who chose Ireland for a number of reasons. The Government of Ireland, through the Industrial Development Authority (IDA) offers overseas organisations a package of incentives if they locate their facility in Ireland. These incentives include :

* **10% Maximum Corporation Tax**
* **AUD$20,000 Training Grant Per Irish Person Employed**
* **100% Tax Depreciation Allowances**
* **Tariff-Free Access to the EC of 350 million consumers**

Ireland has a young population 50% being under the age of 25. It has the highest level of education in Europe and Irish universities produce more computer graduates per capita than the United States.

This and the profit potential are the reasons whey IBM, DEC, ICL, Motorala, Lotus, Microsoft, Prime, Apple, Northstar, Amdahl, Gould, Wang, Ericsson and MicroPro also have development and/or manufacturing facilities in Ireland.

The United States Department of Commerce statistics have consistently shown that Ireland is the most profitable location in Europe for US business.

For the Unix developers in Australia the European UniCentre provides the opportunity to prototype their own support centre in Ireland. The Centre will assist in the start-up, recruitment, training and infra-structure, as well as advise on the many incentives the Irish economy offers to the software developer.

oooOooo

For further information, please contact:

Mr Kingsley Aikins
Director
The Industrial Development Authority of Ireland
Level 38, MLC Centre
Martin Place
Sydney NSW 2000
Tel : (02) 233 5999
Fax : (02) 221 8194

March 1988

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AUUG

Membership Categories

Once again a reminder for all ''members'' of AUUG to check that you are, in fact, a member, and that you still will be for the next two months.

There are 4 membership types, plus a newsletter subscription, any of which might be just right for you.

The membership categories are:

Institutional Member
Ordinary Member
Student Member
Honorary Life Member

Institutional memberships are primarily intended for university departments, companies, etc. This is a voting membership (one vote), which receives two copies of the newsletter. Institutional members can also delegate 2 representatives to attend AUUG meetings at members rates. AUUG is also keeping track of the licence status of institutional members. If, at some future date, we are able to offer a software tape distribution service, this would be available only to institutional members, whose relevant licences can be verified.

If your institution is not an institutional member, isn't it about time it became one?

Ordinary memberships are for individuals. This is also a voting membership (one vote), which receives a single copy of the newsletter. A primary difference from Institutional Membership is that the benefits of Ordinary Membership apply to the named member only. That is, only the member can obtain discounts on attendance at AUUG meetings, etc, sending a representative isn't permitted.

Are you an AUUG member?

Student Memberships are for full time students at recognised academic institutions. This is a non voting membership which receives a single copy of the newsletter. Otherwise the benefits are as for Ordinary Members.

Honorary Life Memberships are a category that isn't relevant yet. This membership you can't apply for, you must be elected to it. What's more, you must have been a member for at least 5 years before being elected. Since AUUG is only just approaching 3 years old, there is no-one eligible for this membership category yet.

Its also possible to subscribe to the newsletter without being an AUUG member. This saves you nothing financially, that is, the subscription price is the same as the membership dues. However, it might be appropriate for libraries, etc, which simply want copies of AUUGN to help fill their shelves, and have no actual interest in the contents, or the association.

Subscriptions are also available to members who have a need for more copies of AUUGN than their membership provides.

To find out if you are currently really an AUUG member, examine the mailing label of this AUUGN. In the lower right corner you will find information about your current membership status. The first letter is your membership type code, N for regular members, S for students, and I for institutions. Then follows your membership expiration date, in the format exp=MM/YY. The remaining information is for internal use.

Check that your membership isn't about to expire (or worse, hasn't expired already). Ask your colleagues if they received this issue of AUUGN, tell them that if not, it probably means that their membership has lapsed, or perhaps, they were never a member at all! Feel free to copy the membership forms, give one to everyone that you know.

If you want to join AUUG, or renew your membership, you will find forms in this issue of AUUGN. Send the appropriate form (with remittance) to the address indicated on it, and your membership will (re-)commence.

As a service to members, AUUG has arranged to accept payments via credit card. You can use your Bankcard (within Australia only), or your Mastercard by simply completing the authorisation on the application form.

Robert Elz

AUUG Secretary.

AUUG

Application for Ordinary, or Student, Membership Australian UNIX* systems Users' Group.

*UNIX is a registered trademark of AT&T in the USA and other countries

To apply for membership of the AUUG, complete this form, and return it with payment in Australian Dollars, or credit card authorisation, to:

AUUG Membership Secretary
P O Box 366
Kensington NSW 2033
Australia

- Please don't send purchase orders — perhaps your purchasing department will consider this form to be an invoice.
- Foreign applicants please send a bank draft drawn on an Australian bank, or credit card authorisation, and remember to select either surface or air mail.

I, ... do hereby apply for

☐ Renewal/New* Membership of the AUUG	$55.00	
☐ Renewal/New* Student Membership	$30.00	(note certification on other side)
☐ International Surface Mail	$10.00	
☐ International Air Mail	$50.00	

Total remitted AUD$_____
(cheque, money order, credit card)

* Delete one.

I agree that this membership will be subject to the rules and by-laws of the AUUG as in force from time to time, and that this membership will run for 12 consecutive months commencing on the first day of the month following that during which this application is processed.

Date: __/__/__ Signed: _____

☐ Tick this box if you wish your name & address withheld from mailing lists made available to vendors.

For our mailing database - please type or print clearly:

Name: ..... Phone: ..... (bh)

Address: .... (ah)

..... Net Address: .....

.....

..... *Write "Unchanged" if details have not*

..... *altered and this is a renewal.*

Please charge $_____ to my ☐ Bankcard ☐ Mastercard ☐ Visa.

Account number: _____ _____ _____ _____. Expiry date: __/__.

Name on card: _____ Signed: _____

Office use only:

Chq: bank _____ *bsb* ____-____ *a/c* _____ *#* _____

Date: __/__/__ *$* *CC type* ___ *V#* _____

Who: _____ *Member#* _____

Student Member Certification *(to be completed by a member of the academic staff)*

I, ... certify that

..... *(name)*

is a full time student at ..... *(institution)*

and is expected to graduate approximately ___/___/___.

Title: _____ Signature: _____

AUUG

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AUUG Membership Secretary
P O Box 366
Kensington NSW 2033
Australia

- Foreign applicants please send a bank draft drawn on an Australian bank, or credit card authorisation, and remember to select either surface or air mail.

..... does hereby apply for

☐ New/Renewal* Institutional Membership of AUUG $250.00

☐ International Surface Mail $ 20.00

☐ International Air Mail $100.00

Total remitted AUD$_____
(cheque, money order, credit card)

* Delete one.

I/We agree that this membership will be subject to the rules and by-laws of the AUUG as in force from time to time, and that this membership will run for 12 consecutive months commencing on the first day of the month following that during which this application is processed.

I/We understand that I/we will receive two copies of the AUUG newsletter, and may send two representatives to AUUG sponsored events at member rates, though I/we will have only one vote in AUUG elections, and other ballots as required.

Date: __/__/__ Signed: _____

Title: _____

☐ Tick this box if you wish your name & address withheld from mailing lists made available to vendors.

For our mailing database - please type or print clearly:

Administrative contact, and formal representative:

Name: ..... Phone: ..... (bh)

Address: .... (ah)

..... Net Address: .....

.....

..... *Write "Unchanged" if details have not*

..... *altered and this is a renewal.*

Please charge $_____ to my ☐ Bankcard ☐ Mastercard ☐ Visa.

Account number: _____ _____ _____ _____. Expiry date: __/__.

Name on card: _____ Signed: _____

Office use only: **Please complete the other side.**

Chq: bank _____ *bsb* ____-____ *a/c* _____ *#* _____

Date: __/__/__ *$* *CC type* ___ *V#* _____

Who: _____ *Member#* _____

Please send newsletters to the following addresses:

Name: ..... Phone: ..... (bh)
Address: .... (ah)
..... Net Address: .....
.....
.....
.....

Name: ..... Phone: ..... (bh)
Address: .... (ah)
..... Net Address: .....
.....
.....
.....

Write "unchanged" if this is a renewal, and details are not to be altered.

Please indicate which Unix licences you hold, and include copies of the title and signature pages of each, if these have not been sent previously.

Note: Recent licences usally revoke earlier ones, please indicate only licences which are current, and indicate any which have been revoked since your last membership form was submitted.

Note: Most binary licensees will have a System III or System V (of one variant or another) binary licence, even if the system supplied by your vendor is based upon V7 or 4BSD. There is no such thing as a BSD binary licence, and V7 binary licences were very rare, and expensive.

- ☐ System V.3 source
- ☐ System V.2 source
- ☐ System V source
- ☐ System III source
- ☐ 4.2 or 4.3 BSD source
- ☐ 4.1 BSD source
- ☐ V7 source
- ☐ Other *(Indicate which)* .....

- ☐ System V.3 binary
- ☐ System V.2 binary
- ☐ System V binary
- ☐ System III binary

AUUG

Application for Newsletter Subscription
Australian UNIX* systems Users' Group.

*UNIX is a registered trademark of AT&T in the USA and other countries

Non members who wish to apply for a subscription to the Australian UNIX systems User Group Newsletter, or members who desire additional subscriptions, should complete this form and return it to:

AUUG Membership Secretary
P O Box 366
Kensington NSW 2033
Australia

- Please don't send purchase orders — perhaps your purchasing department will consider this form to be an invoice.
- Foreign applicants please send a bank draft drawn on an Australian bank, or credit card authorisation, and remember to select either surface or air mail.
- Use multiple copies of this form if copies of AUUGN are to be dispatched to differing addresses.

Please *enter / renew* my subscription for the Australian UNIX systems User Group Newsletter, as follows:

Name: ..... Phone: ..... (bh)

Address: .... (ah)

..... Net Address: .....

.....

..... *Write "Unchanged" if address has*

..... *not altered and this is a renewal.*

For each copy requested, I enclose:

☐ Subscription to AUUGN	$ 55.00
☐ International Surface Mail	$ 10.00
☐ International Air Mail	$ 50.00

Copies requested (to above address) _____

Total remitted AUD$_____
(cheque, money order, credit card)

☐ Tick this box if you wish your name & address withheld from mailing lists made available to vendors.

Please charge $_____ to my ☐ Bankcard ☐ Mastercard ☐ Visa.

Account number: _____ _____ _____ _____. Expiry date: __/__.

Name on card: _____ Signed: _____

Office use only:

Chq: bank _____ *bsb* ____-____ *a/c* _____ *#* _____

Date: __/__/__ *$* *CC type* ___ *V#* _____

Who: _____ *Subscr#* _____

AUUG

Notification of Change of Address
Australian UNIX* systems Users' Group.

*UNIX is a registered trademark of AT&T in the USA and other countries.

If you have changed your mailing address, please complete this form, and return it to:

AUUG Membership Secretary
P O Box 366
Kensington NSW 2033
Australia

Please allow at least 4 weeks for the change of address to take effect.

Old address (or attach a mailing label)

Name: ..... Phone: ..... (bh)

Address: .... (ah)

..... Net Address: .....

.....

.....

.....

New address (leave unaltered details blank)

Name: ..... Phone: ..... (bh)

Address: .... (ah)

..... Net Address: .....

.....

.....

.....

Office use only:

Date: ___/___/___

Who: _____ *Memb#* _____

AUUG

Annual Elections
1988

The AUUG Committee Elections for 1988 are due soon, but before we can have an election we need some candidates!

Now is the time to nominate, or get yourself nominated, for one or more of the committee positions.

You will find a suitable form (though actually anything carrying the required information will do) in this issue of AUUGN.

Nominations require 3 financial members of AUUG to sign, plus the signature of the member being nominated.

One form can nominate a member for several committee positions, the elections are held in the order listed on the form, a candidate elected to a position is then ineligible to be elected to positions not yet decided.

Completed nomination forms should be returned to

The Secretary,
AUUG,
P.O. Box 366,
Kensington,
N.S.W. 2033
Australia.

to reach there no later than May 1, 1988.

Robert Elz

Honorary Secretary,
AUUG.

Australian UNIX* systems Users' Group
Annual Elections – Nomination Form

We, ...,

..... and

.....,

being current financial members of AUUG do hereby nominate

.....

for the following position(s)**

President
Secretary
Treasurer
General Committee Member (4 to be elected)
Returning Officer
Assistant Returning Officer
Auditor

Signed ..... Date .....

....

....

I, ...

do hereby consent to my nomination to the above position(s).

Signed ..... Date .....

* UNIX is a registered trademark of AT&T in the USA and other countries.

** Strike out position(s) for which nomination is **not** desired. Each person may be elected to at most one position, and the ballot for positions shall be determined in the order in which the positions are listed on this nomination form.

Nominees should use the space below (and over the page if necessary) to provide a short statement of policies, aims and/or objectives to be circulated to members of AUUG at the time of the election.