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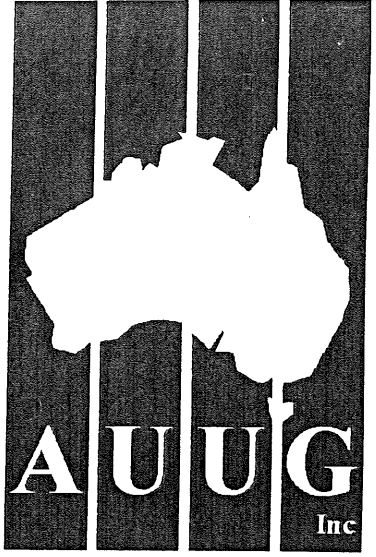

AUUGN

AUUG Inc. Newsletter

Volume 15, Number 6

December 1994

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The AUUG Incorporated Newsletter

Volume 15 Number 6

December 1994

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

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AUUG General Information

Next AUUG Meeting

The AUUG'95 Conference and Exhibition (*The Internet Means Business*) will be held from the 19th to 21st September, 1995, at the Sydney Convention and Exhibition Centre, Darling Harbour, Sydney.

Advertising

Advertisements to be included in AUUGN are welcome. They should conform to the standards of other contributions (see page 5). Advertising rates are $120 for a quarter page, $180 for half a page, $300 for the first A4 page, $250 for a second page, $500 for the inside cover and $750 for the back cover. There is a 20% discount for bulk ordering (ie, when you pay for three issues or more in advance). Contact the business manager for details.

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Back Issues

Various back issues of the AUUGN are available. For availability and prices please contact the AUUG secretariat or write to:

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AUSTRALIA

Conference Proceedings

A limited number of the Conference Proceedings from previous AUUG Conferences are still available, at $50 for members and $60 for non-members. Contact the AUUG secretariat.

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AUUG Newsletter

Editorial

Welcome to AUUGN Volume 15 Number 6, the last one for 1994 and the last that I will be editing. This issue should be received by members early in the new year. I hope that everyone had a Merry Christmas and wish you all a prosperous New Year.

At the time of writing this, the new editor had not been formally notified, and as such I will not mention the name here. I will be forwarding any correspondence, and e_mail to auugn@munnari.oz.au should be delivered correctly. Also note that I have published deadlines for submission of articles for issues of AUUGN in 1995. These deadlines may change slightly in the future to better reflect the new editors schedule.

I would like to take this opportunity to thank all those people that have been contribution to AUUGN, since I took over as an editor. In particular, I would like to thank Janet Jackson and Frank Crawford, who have always had something for AUUGN, be it regular features, or an article or paper when things were a bit quiet. I'd also like to thank the members of the Management Committee, the Business Managers (past and present), local chapter representatives and the membership who have always been willing to contribute towards your newsletter (and remember it always is your newsletter and needs your regular contributions).

Unfortunately, the pressures of my full-time job have been increasing over the years, and have now reached the stage where I can't devote sufficient time to do AUUGN properly. I'll certainly be lending a hand during the change over, and still be involved with AUUG in some way.

Finally, in this edition, we have a lot of information about upcoming events, with CFP's for AUUG95, many of the Summer Conferences, for Uniforum NZ and for a number of USENIX functions, articles by Adrian Booth and Frank Crawford, some reprints from USENIX's login and the regular features.

Jagoda Crawford

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AUUGN Book Reviews

The AUUGN book review editor is Frank Crawford. Anyone interested in reviewing books or with book reviews to submit for publishing in AUUGN please contact Frank. His address can be found on page two of this issue. Remember, that any books you review, you keep.

Contributions

The Newsletter is published approximately every two months. The deadlines for contributions for the next issues of AUUGN are:

Volume 16 No 1	Friday 27th January
Volume 16 No 2	Friday 24th March
Volume 16 No 3	Friday 26th May
Volume 16 No 4	Friday 28th July
Volume 16 No 5	Friday 29th September
Volume 16 No 6	Friday 24th November

Contributions should be sent to the Editor at the above address. Electronic submissions are preferred, and details can be obtained from the Editor.

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AUUG President's Page

What does "Information Technology" really mean these days?

Recently I attended a National Scholarly Communications Forum in Canberra, the topic of which was Public Access to Networked Information. It was an interesting event, held over two days in the "Martian Embassy" (to quote the taxi driver), more officially known as the Academy of Science Building.

The event was a real eye opener to me, as I thought I was fairly well up on Internet type happenings. But there is a lot happening out there in the non-computing community, which actually is where it should be happening anyway, since computing infrastructure (including communications) is really a means to an end - and not an end in itself! Sometimes those of us who spend our entire professional lives buried in computers tend to forget this...

Which leads me to ask what the term "Information Technology" really means these days. The term "computing" itself is an interesting one, as it is clearly a legacy from the early days of computing when computers were used exclusively as number crunchers, solving equations. Very few computers are used for number crunching these days - possibly only supercomputers, and the odd spreadsheet calculation. Most contemporary "computers" are really text manipulators.

Most Computer Science Departments in Universities are offshoots of either Mathematics Departments, or Electrical Engineering. When computers started to become used regularly in the commercial (ie non scientific) world, commerce departments in Universities began to set up computer courses, naming them as "Information Systems". Many of you would be familiar with the skirmishes that have taken place between University Commerce Departments and Computer Science Departments...

I'm not sure where the term "Information Technology" was born, but it is a less emotive term that Information Systems, as the addition of Technology makes it more acceptable to the technical community.

With the well publicised convergence of computing and communications, the term "Information Technology and Telecommunications" (IT&T) has become commonplace, particularly in Federal Government circles. There is a great deal of overlap between a Network Operating System such as Netware, and a general purpose operating system such as Unix. Bridges, routers, and even modems are really computers that handle comms traffic.

Getting back to the Canberra conference, what struck me was the fact that librarians, amongst others, are now very much part of the IT&T "space". And that makes sense when you think of it. Before computers were invented, librarians were the custodians of the world's data bases: the data just happened to be contained in rows of dusty books in a library, rather than bytes on a disc or tape.

Probably half the attendees at the conference were librarians of one form or another, and it was interesting to hear presentations on how the public libraries are starting to re-instate themselves as oracles of knowledge in the community, by beginning to provide internet connectivity.

The most cogent example was provided by Mal Bryce of Ipswich City Council in Queensland. Ipswich has relied on traditional industries such as mining and heavy industry for years, but has suffered the malaise of many cities throughout the western world whose economies have been driven by coal mining and heavy industry. However, the city council, encouraged by the vision of an IT literate mayor, has started a program to stimulate local industry by providing internet connectivity to schools, homes, libraries, and other public access places, in the belief that "the net" is enabling technology, and will soon become as indispensable to business as telephones and fax machines. The libraries are for the hub of this new infrastructure. The irrepressible Mal Bryce, a one time politician, was lured from Western Australia to head up this initiative.

But there was more. Ian Crellin from the Department of Primary Industry and Energy (DPIE) gave a

presentation on how the DPIE is starting to set up Telecentres in vacant shops in country towns for the same reason. These centres will have internet connectivity, PCs, laser printers, etc, with affordable communication costs. Since the DPIE's usual agenda is more in the line of propping up wheat subsidies and the like, I really became excited at their sense of vision.

So what is Information Technology these days? It's more than the convergence of computers and communications: it's about accessing public databases through the net; it's about providing an infrastructure upon which new value added industries can grow; it's all about ensuring our country has a future.

Phil McCrea

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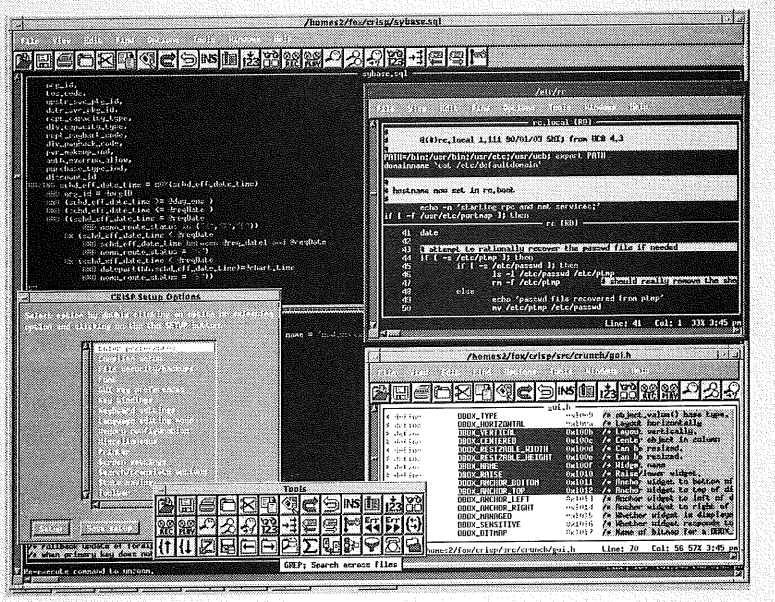

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A Summary of Linus Torvalds' Presentation at WAUG

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I thought I might post a brief summary of Linus's presentation at WAUG.

I'd never attended a WAUG meeting before. I wasn't really sure about what they did and what happened in their meetings. So I didn't know what to expect.

I got there about 15 minutes early. After obtaining a brochure on WAUG and AUUG I was pleasantly surprised to see free copies of the September issue of the *Linux Journal*. I believe that LJ sent over 200 copies of the issue to WAUG at very short notice — well done LJ. I didn't take a copy (I've already got the issue at home) but I think many people were quite interested in its contents — it was a real eye-opener for some.

The meeting started at about 6pm and Linus stepped up after a short introduction and began his presentation. His presentation gave an introduction to Linux, to some of Linux's main features, a few of its internals, current developments, and future developments and the benefits of free software. I don't think there were quite as many questions as the SLUG meeting but there were nevertheless some significant questions asked.

Two highlights during the presentation: a) someone asked if Linus could compare Linux and BSD4.4. This brought a huge response from the rest of us — I think we've all witnessed the massive flame wars that erupt whenever someone asks this question on Usenet. Linus diplomatically declined to comment claiming a certain degree of bias :)

b) Linus was commenting upon how he still hasn't earned his bachelor (of computer science?) from the university yet. Its an interesting procedure though because Linus is allowed to teach a few courses at the university even though he hasn't formally studied the units at the university. However by teaching them he gets credits for those units towards his degree. I guess there's just no substitute for "on the job experience".

After the meeting people chatted outside and helped themselves to the beef and bread carvery. There was a lot of people waiting to meet and talk with Linus and I'm glad I took the opportunity to do so. Linus is a very personable fellow and I certainly agree with Jamie Honan's sentiments when he stated that "you couldn't meet a nicer bloke".

Linus now has a few days to enjoy WA's hospitality and I believe he's heading up to Monkey Mia on Thursday. He'll be giving a tutorial on Linux kernel internals on Saturday morning and then departs Australia on the Sunday for a week in Singapore. And then will end another leg of the Linus Torvalds World Tour. I would've volunteered to show Linus around our fair city in his remaining days here but I believe he already has a number of tour guides to do that :)

In closing and on behalf of many many people, I would like to thank WAUG and AUUG for bringing Linus to Australia and for allowing us non-WAUG members the opportunity of attending Linus's presentation. Their generosity is very greatly appreciated. And I'm sure that everyone who obtained a copy of the Linux Journal feels doubly appreciative. I know of quite a few people who will subsequently be sending in applications to AUUG and this is perhaps the highest compliment I can give.

And hopefully it won't be so long before we see Linus in Australia again. :)

Patrick D'Cruze <pdcruze@orac.iinet.com.au>

Linus Does Perth

Some months back Adrian* mentioned the up-coming conferences and the fact that maybe, just MAYBE we'd get a visit by Linus Torvalds. It was at that stage we all knew he was coming, because at least four of us would have killed Adrian had he been lying. :) So a couple of meetings later it's confirmed. Book the Orchard Hotel guys, otherwise the word will leak out anyway and we'll have 200 people trying to fit at the Bluenote Hotel, and wouldn't THAT be fun!

On the big day I got there early, over half an hour before the rest of the crowd turned up, to see all the AUUG propaganda laid out neatly, stickers (which didn't stick too well folks) and a box of Linux Journals. Slowly the regular chapter members trickled in, together with the occasional non-member, and then the influx of new faces to flesh the crowd out to what appeared (to me at least) around the 300 mark.

While waiting for the meeting to start, most of us flicked through our free copies of the Linux Journal. At the fashionably late time of about 6:15pm (do these things ever start on time?) the crowd settled and who should get up but Adrian. Urgh, what a tiresome megalomaniac he can be at times. "Blah blah blah.. here's Linus" would just about sum it up.

There were no suprises when Linus steps up (we'd all seen the article with his picture, you see) and started by saying that he's not very good at public speaking. The general consensus seemed to be that he should have gotten over it by now, followed by "look at all the neat free stuff he's getting!". I mean, I had to PAY for my T-shirt!. ;)

We had a show of hands as to who had not heard of Linux, and surprisingly for a bunch like us some people did raise their hands. Of those who had ever heard of Linux, a significant proportion had used it. It was also pointed out (or at least it should have been) that at least one business there was using it - one of them being a local internet provider (Hi Michael!)

Linus talked about various aspects of Linux - for starters the humble origins as a terminal emulation program which sort of moved onto something more suitable than minix, and the point where everyone jumped on the bandwagon to help write the ultimate OS! Linus also mentioned that he was only responsible for half the code (and presumably therefore only half the bugs), the benefits of copylefted software, and more particularly, GNU.

The audience listened attentively, and Linus was apparently expecting to be interrupted frequently. But boy did we have a surprise for him! Most of those who were quiet probably just couldn't wait for the food. About half an hour into it they started loosening up and asking a few questions. Thinking back to those who talk too much, I did note that most of the questions were asked by the regular WA chapter interrogaters.

Expertise seemed to vary greatly. Most of the questions seemed to be along the lines of asking why certain methods were used and not others, and asking about its rather unique paging system which aims to use as much memory as possible as a file cache (darn good idea that!). As I recall my only question was probing Linus as to whether his T-shirt was free. The answer was yes, but we had to check since that wasn't mentioned on his list of things he picked up at the Melbourne conference, and he was of course wearing it.

And so inevitably came the discussion of what Linus actually does at the University of Helsinki. Not much, as it seems. It's evident that most of Linus' exploits with computers are self taught. Some of his course accreditations have come from tutoring others on subjects he hasn't yet started, let alone completed. One particular question addressed what Linus would like as a dream machine, the answer primarily being something with at least 16Mb of RAM, as Linux is intended to operate best on a machine with oodles of memory. What ever happened to the Linus Torvalds dream machine funding?

---

* Adrian Booth

And one question that everyone can surely understand was why after all the work that's been put into Linux that Linus continues to nurture it. The answer is fan mail. People congratulating and thanking him for the endless hours of effort and devotion he'd put in. Even constructive criticism is welcome, even if the idea is deleted due to personal beliefs in what should and shouldn't go.

After somewhat over an hour, the talk inevitably came to an end. After a hefty round of applause (Western Australians are such a friendly lot) Adrian stood up and announced a Linux internals tutorial that was hastily organised for the UWA on the coming Saturday. I couldn't attend, but am reliably informed that the turnout to this was about 20 - not bad considering the short notice! A carvery was put on in the outdoors function area, the rolls being as usual, delicious, as well as various snacks as are usually supplied to the starving masses after a technical talk. Many of us went back for thirds and fourths of roast beef rolls, while others sought out someone to sign them up to the local chapter.

Slowly the crowd started to dissipate, but although there were still quite a few people there, nobody else seemed to notice Jayne Torville being escorted out through the back exit. All there was was animated conversation between groups of egg-heads, the largest one of course being centred around Linus.

Then the numbers continued to decrease until a group of what would otherwise be termed stragglers, took Linus out for a coffee, or beer or something - I won't speculate which because I wasn't there. :(Since then there have been a number of new faces at local chapter meetings, so Linus certainly did the WA chapter of AUUG a favour by showing his face.

I'm sure all those who attended the meeting appreciated the worth of this short blonde guy with glasses, a pointy nose that twitches a lot, and slight accent. We're all awaiting the next net.personality to tour the country. Now, where's my "Linus Does Oz" T-shirt?

- Mitchell Brandsma (meetch@perth.dialix.oz.au :)

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Internet: enquiries@sw.oz.au

Call for Articles for the Australian

The Australian newspaper runs an AUUG column every Tuesday, in its computer section. The aim of these articles is to inform the public and raise the profile of open systems within this country. Having one's views published in a respected national paper also carries kudos and recognition for authors.

AUUG would like to ensure that all members of the open system community have access to this voice, and we are actively seeking a diverse spectrum of people and opinions.

If you are interested in being part of this process, please provide me with the following information:

* your name
* contact details
* a copy of your article

Your article should be between 600 and 800 words in length, and can address any issue that may be of interest within the open systems community. If you can't decide on an appropriate topic, please provide me with some professional details and I'll try and give you some ideas tailored to your expertise. Some typical subjects are listed at the end of this article.

If you have access to email, this is the preferred form of submission. Please format your article as a plain text file, with lines no longer than 79 characters, and with a blank line separating paragraphs. If you don't have email, please provide a hardcopy in a similar format (there's not much point doing any fancy typesetting).

All submissions are accepted on the understanding that they may or may not be used and that the material may be edited. AUUG will only submit your work to the Australian newspaper, although unless you advise us otherwise we will reserve the right to add your articles to a public FTP archive at some time in the future, and reprint them in AUUG's newsletter, AUUGN. The copyright on the material remains yours, your act of submitting material only gives us licence for the abovementioned purposes.

In practice, I submit your work to the Australian unedited and leave the decision of what to print up to them (I'm not in the business of being a thought police!). Usually a period of 2 to 4 weeks will then pass before you'll see your article in print; I maintain a pipeline of material to buffer me against the inevitable fluctuations in supply.

Please email or phone me if you have any further queries.

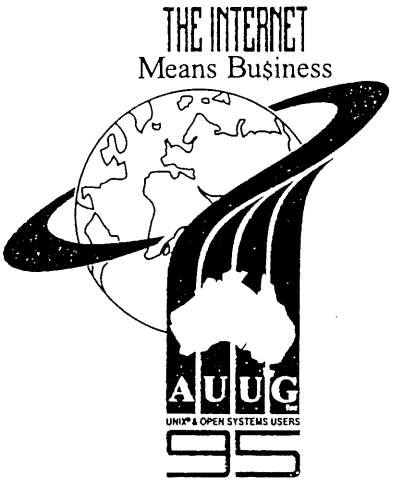
Lucy Chubb
lucyc@sw.oz.au
(02) 698 2322

NOTE: Lucy has taken over this role from Michael Paddon.

Some topical areas to get you started :-

Standards: POSIX, X/Open, System V.
The sudden demise of COSE;
just another consortium?
The history of Unix.
The future of Unix.
If NT is so popular,
how come no one is using it?
Competition for the desktop:
Unix, Windows/NT and OS/2.
Managing security.
Computer viruses.
System administration.
Network administration.
Networking technologies.
Distributed computing.
What happened to OSI?
Managing multiple network protocols.
Living with the Internet.
Unix on PC's.
Linux - the people's Unix?
Would you run Unix at home?
The graphics revolution.
Virtual reality.
CASE tools.
Is Unix really that hard to use?
Now that Unix has grown up,
where have the hackers gone?
The costs of open systems.
Analyse a market trend.
Run a straw poll on a topical subject.
New technologies.

AUUG '95 Conference & Exhibition
Sydney Convention and Exhibition Centre
Darling Harbour, Sydney, Australia
19-21 September 1995



CALL FOR PAPERS

Australian UNIX and Open Systems Users Group
Annual Conference, September 19-21, 1995
Sydney, Australia

"The Internet Means Bu$iness"

Every 30 seconds another network is connected to the world wide Internet. What was a research experiment of the 80's is now part of every production level communications service inventory in the 90's. It is quickly becoming the only viable method of servicing hundreds and thousands of people in Australia and millions world wide, from corporate and government users to academics and researchers as well as the private individual. Despite it's size, the Internet resists inertia and continues to grow, assuming dynamic new roles at each stage in its evolution.

AUUG '95 solicits papers on all aspects of the Internet phenomenon, in particular, it's relevance to business use and applications combining Unix and Open Systems technologies with the Internet's open communications services.

Events:

AUUG '95 will be a four day conference, commencing September 18, 1995. The first day will be devoted to tutorial presentations, followed by three days of papers, work-in-progress and product update sessions, and BOFs.

Tutorials:

Provisions for two full-day tutorials and up to eight half-day tutorials have been made. These sessions, typically in a lecture format, are targeted to educate the audience and arm them with innovative "how to" lessons. Please submit tutorial abstracts, along with preference for a half- or full-day slot to address below.

Papers:

AUUG '95 provides dual Technical and Management tracks for the presentations. To share your innovative implementations, applications, and similar areas submit your abstract for the technical track. We are also interested in your experiences, case studies, strategic issues, and the like. If your topic better fits these areas submit your abstract for the Management track. This should not, of course, discourage papers which are appropriate for both audiences at once.

Vendor product announcements will be automatically rejected unless specifically submitted for the product update stream.

Prize for the Best Student Paper:

A cash prize of $500 will be awarded for the best paper submitted by a full-time student at an accredited tertiary education institution.

Work-in-Progress (WIP) and Product Update (PUD) Sessions:

A great success in '94, these brief 15 minute sessions are designed to report on current work with fundamental aspects highlighted, and to allow the chance for vendors to 'advertise' products. Product specification sheets should be submitted with your abstract.

Birds-of-a-Feather Sessions (BOFs):

Are you interested in discussing particular problem areas, sharing arcana on favourite programs, using the internet, or other controversial topics? During the lunch hour and at the end of each presentation day, time slots for BOFs will be available. We distinguish two types of BOF; general interest and vendor sponsored. Please contact the Committee if you would like to organise a Birds-of-a-Feather Session. There may be some facilities charge to vendor sponsored events.

Speaker Incentives:

Presenters of papers are afforded free conference registration.

Product Update, Work-in-Progress and panelist presenters get single day registration and can 'top up' to get full attendance.

Tutorial presenters may choose 25% of the profit for their session OR full conference registration.

Form of Submissions:

Please indicate whether your submission is relevant to the technical or management audiences, or both. In either case, submissions are required to be in the form of an abstract and an outline. Please provide sufficient detail to allow the committee to make a reasoned decision about the final paper; of course a full paper is also perfectly acceptable. A submission should be from 2-5 pages and include:

1. Author name(s), postal addresses, telephone numbers, FAX and e-mail addresses.

2. A biographical sketch not to exceed 100 words.

3. Abstract: not to exceed 100 words

4. Outline: 1-4 pages giving details of the approach or algorithms pursued. Shorter outlines will not give the programme committee enough information to judge your work fairly, and, in most cases, this means your paper will be rejected.

Longer outlines and full papers simply cannot be read by the committee in the time available. However, you may append a full paper to your outline; this is sometimes useful during evaluation.

5. References to any relevant literature

6. Audio-visual requirements: 35 mm slides are preferred, however, overheads will be accepted. Hand written or typewriter generated overheads will not be accepted.

Acceptance:

Authors whose submissions are accepted will receive instructions on the preparation of final papers for inclusion in the conference proceedings, and the format requirements for slides.

All participants in WIP, PUD and BOF sessions will receive written confirmation once accepted.

Programme Committee:

Geoff Huston - AARNet (chair)
Ian Hoyle - BHP Research
Hugh Irvine - connect.com.au
Phil McCrea - Consultant
Frank Crawford - ANSTO
Andy Linton - AARNet

Relevant Dates:

Abstract and outlines due: March 6, 1995
Notifications to authors: April 3, 1995
Final Papers due: August 4, 1995

Addresses:

Please submit one hard copy and one electronic copy (if possible) to the addresses below:

AUUG '95 Programme
P O Box 468
Paddington, NSW 2021
AUSTRALIA

e-mail: auug95.papers@munnari.oz.au

Phone: +61 2 959-3656
Fax: +61 2 923-1036

Tutorial abstracts to: auug95.tutorials@munnari.oz.au

TECHNICAL PROGRAM ANNOUNCED FOR THE

USENIX ASSOCIATION 1995 TECHNICAL CONFERENCE

BERKELEY, CA (October 28, 1994)- The USENIX Association and the Program Chair, Peter Honeyman, CITI, University of Michigan, have just released the tutorial and technical program of the USENIX Association 1995 Technical Conference to be held January 16-20, 1995 in New Orleans, Louisiana.

USENIX conferences are well known as platforms where state-of- the-art developments are unveiled. The USENIX Association is the original, established in 1975, not-for-profit organization for individuals and institutions interested in UNIX-like operating systems and advanced open systems computing technology. Its members are responsible for many of the high tech breakthroughs that are changing the way we live and work today, including the creation of UNIX, networking technology and the Internet.

As Michael Short of the University of California, Berkeley, Computer Science Division explains, "If you can only attend one conference, the USENIX conference should be it. The tutorial quality and instructors are unsurpassed. And you get to meet your peers from around the world."

The 1995 Technical Conference begins January 16-17 with a tutorial program offering 20 in-depth courses essential to professional development. Taught by the experts in these topics, the tutorials are: Essential UNIX Programming; Advanced UNIX Security; Intro to UNIX Kernel Internals; IP Network Administration; DCE Remote Procedure Call System (RPC); WIN32: Porting X/Motif Applications to Windows NT; Advanced Tools of Networking; Sendmail - Version 8; Writing New Motif Widgets; Perl Programming Essentials; Achieving Security in an Internet Environment; Publishing on the World Wide Web; Concurrent Object-Oriented Programming; The Kerberos Approach to Network Security; Intro to Tcl and Tk; Multiprocessing; Topics in System Administration; UNIX Network Programming; Microsoft's OLE and the Common Object Model (COM); The Law and the Internet

The technical sessions program for Wednesday-Friday, January 18-20, begins with "Ubiquitous Computing," the Keynote Address by Mark Weiser of the Xerox Palo Alto Research Center. Innovations from the Palo Alto research community are an important feature of this conference. Never-before-presented research by academic and industry researchers and developers is the fruit of the refereed presentations. These presentations, refereed by the program committee, examine essential developments in the areas of BSD, Mass Storage, Security, Objects Technology, Libraries, File Systems, and Architecture. In addition, leading experts have been invited to share their in- depth analysis of current issues in the areas of Very High Level Languages, Systems Administration, Cryptography, Operating System Measurement, Inter-Language Unification, High-Speed Networking,and Operating Systems Design and Implementation. The Internet is a topic of great interest with talks on Internet Information Commerce, Cash on the Internet, Economics of the Internet, and the Internet at the Turn of the Millennium.

A Vendor Display on January 18 and 19 rounds out the conference. Software, hardware, and networking products vendors.will be ready with in-depth answers for the serious questions asked by the sophisticated if informal USENIX conference attendees.

The New Orleans Marriott is the site of all conference activities. The Marriott is offering special discounts to conference attendees.

Press passes are available for free admission to all conference events.

For more information, please contact: Judy DesHarnais, Telephone: 714 588 8649, Internet: conference@usenix.org

To receive the complete program electronically:
On the World Wide Web access the URL at http://www.usenix.org
Access the USENIX automatic mailserver, finger info@usenix.org

ANNOUNCEMENT & CALL FOR PARTICIPATION

9th USENIX SYSTEMS ADMINISTRATION CONFERENCE (LISA IX)

September 18-22, 1995

Marriott Hotel, Monterey, California

Co-sponsored by
USENIX, the UNIX and Advanced Computing Systems Professional and Technical Association, and SAGE, the System Administrators Guild

IMPORTANT DATES
Refereed paper submissions:
Extended abstracts due: May 1, 1995
Notification to authors: June 5, 1995
Final papers due: August 1, 1995

Registration materials available: July, 1995

The USENIX Systems Administration (LISA) Conference is widely recognized as the leading technical conference for system administrators. Historically, LISA stood for "Large Installation Systems Administration," back in the days when having a large installation meant having over 100 users, over 100 systems, or over one gigabyte of disk storage. Today, the scope of the LISA conference includes topics of interest to system administrators from sites of all sizes and kinds. What the conference attendees have in common is an interest in solving problems that cannot be dealt with simply by scaling up well-understood solutions appropriate to a single machine or a small number of workstations on a LAN.

The theme for this year's conference is "New Challenges," which includes such emerging issues as integration of non-UNIX and proprietary systems and networking technologies, distributed information services, network voice and video teleconferencing, and managing very complex networks. We are particularly interested in technical papers that reflect hands-on experience, describe fully implemented and freely distributable solutions, and advance the state of the art of system administration as an engineering discipline.

TUTORIAL PROGRAM
Monday and Tuesday, September 18-19, 1995
The two-day tutorial program at the conference offers up to five tracks of full- and half-day tutorials. Tutorials offer expert instruction in areas of interest to system administrators of all levels, from novice through senior. Topics are expected to include networking, advanced system administration tools, Solaris and BSD administration, Perl programming, firewalls, NIS, DNS, Sendmail, and more.

To provide the best possible tutorial offerings, USENIX continually solicits proposals for new tutorials. If you are interested in presenting a tutorial at this or other USENIX conferences, please contact the tutorial coordinator:

Daniel V. Klein
+1 412 421 0285
FAX: +1 412 421 2332
E-mail: dvk@usenix.org

TECHNICAL SESSIONS
Wednesday through Friday, September 20-22, 1995
The three days of technical sessions consist of two parallel tracks. The first track is dedicated to presentations of refereed technical papers. The second track is intended to accommodate invited talks, panels and Works-in-Progress (WIP) sessions.

CONFERENCE TOPICS
Papers addressing the following topics are particularly timely; papers addressing other technical areas of general interest are equally welcome.

— Dealing with differences in UNIX implementations -- migration and interoperability among BSD, SVR4, OSF and others

— Integration of UNIX-based with non-UNIX-based and proprietary systems and networking technologies (Mac, NT and DOS PCs)

— Application of emerging technologies (Mbone, Mosaic) to system administration

— Administration and security of distributed information services (WAIS, gopher, WWW) and network voice and video teleconferencing (Mbone)

— Experience supporting mobile and location-independent computing

— Experience with large (1000+ machine) networks, especially networks of SVR4-based systems

— Real-world experience with implementations of proposed system administration standards

— Unusual applications of commercial system administration software packages

— Application of operational planning techniques to system administration including measurements and metrics, continuous process improvement, automation, and increasing productivity

— File migration, archival storage and backup systems in extremely large environments

— Innovative tools and techniques that have worked for you

— Managing high-demand and high-availability environments

— Migrating to new hardware and software technologies

— Administration of remote sites that have no technical experts

— Supporting MIS organizations on UNIX

— Real-world experiences with emerging procedural/ethical issues--e.g., developing site policies, tracking abusers, and implementing solutions to security problems

— Networking non-traditional sites (libraries, museums, K-12)

REFEREED PAPER SUBMISSIONS

An extended abstract is required for the paper selection process. Full papers are not acceptable at this stage; if you send a full paper, you must also include an extended abstract. "Extended" means 2-5 pages.

Include references to establish that you are familiar with related work, and, where possible, provide detailed performance data to establish that you have a working implementation or measurement tool.

Submissions will be judged on the quality of the written submission, and whether or not the work advances the state of the art of system administration. For more detailed author instructions and a sample extended abstract, send email to lisa9authors@usenix.org. or call USENIX at +1 510 528 8649.

Note that the USENIX organization, like most conferences and journals, requires that papers not be submitted simultaneously to more than one conference or publication and that submitted papers not be previously or subsequently published elsewhere. Papers accompanied by "non-disclosure agreement" forms are not acceptable and will be returned unread. All submissions are held in the highest confidence prior to publication in the conference proceedings, both as a matter of policy and as protected by the U.S. Copyright Act of 1976.

Authors of an accepted paper must provide a final paper for publication in the conference proceedings. At least one author of each accepted paper presents the paper at the conference. Final papers are limited to 20 pages, including diagrams, figures and appendixes, and must be in troff, ASCII, or LaTeX format. We will supply you with instructions. Papers should include a brief description of the site, where appropriate.

Conference proceedings, containing all refereed papers and materials from the invited talks, will be distributed to attendees and will also be available from the USENIX following the conference.

WHERE TO SEND SUBMISSIONS
Please submit extended abstracts for the refereed paper track by TWO of the following methods:

% E-mail to: lisa9papers@usenix.org
% FAX to: +1 510 548 5738
% Mail to:

LISA 9 Conference
USENIX Association
2560 Ninth Street, Suite 215,
Berkeley, CA USA 94710

To discuss potential submissions, and for inquiries regarding the content of the conference program, contact the program co- chairs at lisa9chair@usenix.org or at:

Tina M. Darmohray
Lawrence Livermore National Laboratory
PO Box 808 L-510
Livermore, CA USA 94550
+1 510 423 5999
FAX: +1 510 422 7869
E-mail: tmd@usenix.org

Paul Evans
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700 East Middlefield Road
Mountain View, CA USA 94043
+1 415 694 1855
FAX: +1 415 965 8637
E-mail: ple@usenix.org

INVITED TALK TRACK
If you have a topic of general interest to system administrators, but that is not suited for a traditional technical paper submission, please submit a proposal for a second track presentation to the invited talk (IT) coordinators:

Laura de Leon, Hewlett-Packard
+1 415 857 5605
FAX: +1 415 857 5686
E-mail: deleon@hpl.hp.com

Peg Schafer, BBN
+1 617 873-2626
FAX: +1 617 873 4265
E-mail: peg@bbn.com

PROGRAM COMMITTEE
Program Co-chair: Tina Darmohray, Lawrence Livermore National Laboratory
Program Co-chair: Paul Evans, Synopsys, Inc.
Paul Anderson, University of Edinburgh
Kim Carney, Massachusetts Institute of Technology
Rob Kolstad, Berkeley Software Design, Inc.
Bryan McDonald, SRI International
Marcus Ranum, Trusted Information Systems, Inc.

John Schimmel, Silicon Graphics, Inc.

VENDOR DISPLAY
Wednesday, September 20, 1995
Well-informed vendor representatives will demonstrate products and services at the informal table-top display. If your company would like to participate, please contact:

Zanna Knight
+1 510 528 8649
FAX: +1 510 548 5738
E-mail: display@usenix.org

BIRDS-OF-A-FEATHER SESSIONS
Birds-of-a-Feather sessions (BoFs) are very informal gatherings of attendees interested in a particular topic. BoFs are held Tuesday, Wednesday, and Thursday evenings of the conference. BoFs may be scheduled in advance by telephoning the USENIX Conference Office at +1 714 588 8649 or via e-mail to conference@usenix.org. They may also be scheduled at the conference.

FOR REGISTRATION INFORMATION
All details of the conference program, conference registration fees and forms, and hotel discount and reservation information will be available in July, 1995. If you wish to receive registration materials, please contact:

USENIX Conference Office
22672 Lambert Street, Suite 613
Lake Forest, CA USA 92630
+1 714 588 8649
FAX: +1 714 588 9706
E-mail: conference@usenix.org

ANNOUNCEMENT and PRELIMINARY CALL FOR PAPERS

5th USENIX UNIX Security Symposium

June 5-7, 1995

Salt Lake City Marriott Hotel

Salt Lake City, Utah

Sponsored by
the USENIX Association, the UNIX and Advanced Computing Systems Professional and Technical Association

In cooperation with:
The Computer Emergency Response Team (CERT), IFIP WG 11.4, and Uniforum (pending)

IMPORTANT DATES

DATES FOR REFEREED PAPER SUBMISSIONS

Extended abstracts due:	Feb 13, 1995
Program Committee decisions made:	Mar 8, 1995
Camera-ready final papers due:	May 1, 1995

Registration Materials Available: March 1995

PROGRAM COMMITTEE
Program Chair: Fred Avolio, Trusted Information Systems, Inc.

Steve Bellovin, AT&T Bell Laboratories
Bill Cheswick, AT&T Bell Laboratories
Ed DeHart, CERT
Ed Gould, Digital Equipment Corporation
Marcus Ranum, Trusted Information Systems, Inc.
Jeff Schiller, MIT
Gene Spafford, COAST Laboratory, Purdue University

OVERVIEW
The goal of this symposium is to bring together security practitioners, researchers, system administrators, systems programmers, and others with an interest in computer security as it relates to networks and the UNIX operating system.

This will be a 3 day, single-track symposium. The symposium will consist of tutorials, refereed and invited technical presentations, and panel sessions. The first day will be devoted to tutorial presentations. Two days of technical sessions will follow the tutorials.

TUTORIALS
[June 5]
This one-day tutorial program is designed to address the needs of both technical and management attendees. The tutorials will supply overviews of various security mechanisms and policies. Each will provide specifics to the system and site administrator for implementing numerous local and network security precautions, firewalls, and monitoring systems.

KEYNOTE AND TECHNICAL SESSIONS

[June 6-7]

The keynote address by Stephen T. Walker, Founder and President of Trusted Information Systems, will begin the technical sessions program. Mr. Walker will speak on information security and privacy in computing. Mr. Walker is an electronics engineer and computer systems analyst with over 25 years of experience in system design and program management; particularly exten- sive is his experience with the design and implementation of large scale computer networks and information systems. He is recognized for his pioneering work on the DoD Computer Security Initiative, the establishment of the National Computer Security Center, and the formation of the Defense Data Network. He is a member of the Computer System Security and Privacy Advisory Board, established by the Computer Security Act of 1987.

The technical sessions program, in addition to presentations of refereed papers, will include invited talks, and possibly panel sessions. There will also be two evenings available for Birds-of-a-Feather sessions (BoFs) and Works-in-Progress Reports (WiPs). The program committee invites you to submit proposals, ideas, or suggestions for these presentations; your suggestions may be submitted to the program chair via email to: security@usenix.org or by post to the address given below.

Papers that have been formally reviewed and accepted will be presented during the symposium and published in the symposium proceedings. Proceedings of the symposium will be published by USENIX and will be provided free to technical session attendees; additional copies will be available for purchase from USENIX.

SYMPOSIUM TOPICS

Presentations are being solicited in areas including but not limited to:

- User/system authentication
- File system security
- Network security
- Security and system management
- Security-enhanced versions of the UNIX operating system
- Security tools
- security incident investigation and response
- computer misuse and anomaly detection
- security in heterogeneous environments
- configuration management to support security
- security-related testing methods
- case studies

REFEREED PAPER SUBMISSIONS

Submissions must be received by Feb 13, 1995. Full papers should be 10 to 15 pages. Instead of a full paper, authors may submit an extended abstract which discusses key ideas. Extended abstracts should be 5-7 pages long (about 2500-3500 words), not counting references and figures. The body of the extended abstract should be in complete paragraphs. The object of an extended abstract is to convince the reviewers that a good paper and presentation will result.

All submissions will be judged on originality, relevance, and correctness. Each accepted submission will be assigned a member of the program committee to act as its shepherd through the preparation of the final paper. The assigned member will act as a conduit for feedback from the committee to the authors. Camera-ready final papers are due May 1, 1995.

Please accompany each submission by a cover letter stating the paper title and authors along with the name of the person who will act as the contact to the program committee. Please include a surface mail address, daytime and evening phone number, and, if available, an email address and fax number for the contact person.

If you would like to receive detailed guidelines for submission and examples of extended abstracts, you may send email to:

securityauthors@usenix.org

or telephone the USENIX Association office at +1 510 528 8649.

The UNIX Security Symposium, like most conferences and journals, requires that papers not be submitted simultaneously to another conference or publication and that submitted papers not be previously or subsequently published elsewhere. Papers accompanied by "non-disclosure agreement" forms are not acceptable and will be returned to the author(s) unread. All submissions are held in the highest confidentiality prior to publication in the Proceedings, both as a matter of policy and in accord with the U.S. Copyright Act of 1976.

WHERE TO SUBMIT

Please send one copy of a full paper or an extended abstract to the program committee via two of the following methods. All submissions will be acknowledged.

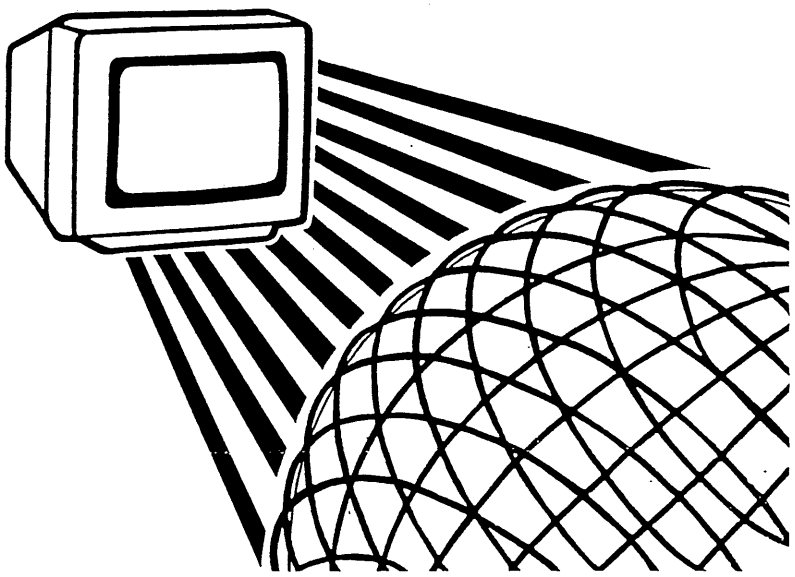
- Preferred Method: email (Postscript or ASCII) to:
  securitypapers@usenix.org
- Alternate Methods:
- Postal delivery to:
  Fred Avolio
  Trusted Information Systems
  3060 Washington Road
  Glenwood, MD 21738
  Phone: +1 301 854 6889
- Fax to: +1 301 854 5363

REGISTRATION MATERIALS

Materials containing all details of the technical and tutorial programs, registration fees and forms, and hotel information will be available beginning in March 1995. If you wish to receive the registration materials, please contact USENIX at:

USENIX Conference Office
22672 Lambert Street, Suite 613
Lake Forest, CA USA 92630
+1 714 588 8649; Fax: +1 714 588 9706
email: conference@usenix.org

UniForum NZ '95



THE CONFERENCE

Combine Business with Pleasure

UniForum NZ '95

The Conference

17-20 May 1995
Masterton, New Zealand

Featuring:

Technology Convergence	Hypermedia
The Internet	Security
Open Networking	User Tools

Registration forms available mid-March 1995.
Contact: Julie Jones, UniForum New Zealand

P.O. Box 27-149	email: jj@integral.co.nz
Mt Roskill, Auckland	Ph: 64-25-958-245
New Zealand	Fax: 64-9-629-2015

Open System Publications

As a service to members, AUUG will source Open System Publications from around the world. This includes various proceeding and other publications from such organisations as

AUUG, UniForum, USENIX, EurOpen, Sinix, *etc.*

For example:

EurOpen Proceedings		USENIX Proceedings	
Dublin	Autumn'83	C++ Conference	Apr'91
Munich	Spring'90	UNIX and Supercomputers Workshop	Sept'88
Trosmo	Spring'90	Graphics Workshop IV	Oct'87

AUUG will provide these publications at cost (including freight), but with no handling charge. Delivery times will depend on method of freight which is at the discretion of AUUG and will be based on both freight times and cost.

To take advantage of this offer send, in writing, to the AUUG Secretariat, a list of the publications, making sure that you specify the organisation, an indication of the priority and the delivery address as well as the billing address (if different).

AUUG Inc.
Open System Publication Order
PO Box 366
Kensington, NSW, 2033
AUSTRALIA
Fax: (02) 332 4066

UNIX Societies in the Pacific Region

UniForum Singapore (SINIX) Association
190 Clemenceau Avenue
#05-33-34 Singapore Shopping Centre
Singapore, 0923

Tel: +65 334 3512
Fax: +65 334 0855

Malaysian UNIX User (MALNIX)
c/o MIMOS, 7th Floor
Exchange Square
Off Jalan Semantan
Damansara Heights
50490 Kuala Lumpur, Malaysia

Tel: +60 3 255 2700
Fax: +60 3 255 2755

UNIX Users Club of the Philippines (UUCP)
2/F 9697 Kamagong St
Makati, M.M.
Philippines

Tel: +63 2 812 1847
Fax: +63 2 818 4816

USRNIX HK
c/o Unisys (Hong Kong) Ltd
36/F Sun Hung Kai Centre
30 Harbour Road, Wanchai
Hong Kong

Tel: +852 879 3800
Fax: +852 827 5304

Korean Unix User Group (KUUG)
c/o Electronics & Telecomms
Research Institute
P O Box 8, Daeduk Science Town
Daejeon, 305 606
Seoul, Korea

Tel: +82 42 820 6894
Fax: +82 42 861 1033

Chinese Open Systems Assoc.
4F, 337 Fu-Hsing North Road
Taipei
Taiwan

Tel: +886 2 545 1348
Fax: +886 2 545 1369

China UNIX User Group Society
12 Zhongguancun Nan Lu
P O Box 8718 100080
Beijing
China

Tel: +86 1 256 5681/256 1090
Fax: +86 1 256 2533

The Indonesia UNIX User (Indonix)
Jl. Musi 41
Jakarta 10150
Indonesia

Tel: +62 21 384 6234/384 6749
Fax: +62 21 560 3672/372 605

UniForum India (IndUNIX)
c/o Integra Micro Systems Pvt. Ltd
G5, Swiss Complex
33 Racecourse Road
Bangalore, 560 001
India

Tel: +91 812 260 073
Fax: +91 812 261 468

UniForum NZ
44 Seabrook Ave
Auckland 7
New Zealand

Tel: +64 9 827 1679
Fax: As above

Japan UNIX Society
Marusyo Bldg
5F 3-12 Yotsuya
Shinjuku-ku
Tokyo 160
Japan

Tel: +81 3 3356 0156
Fax: +81 3 3356 1094

This was mailed to the Editor recently. We can guarantee that AUUGN isn't printed on a Pentium.

Q&A: THE PENTIUM FDIV BUG

Q: How many Pentium designers does it take to screw in a light bulb?
A: 1.99904274017, but that's close enough for non-technical people.

Q: What do you get when you cross a Pentium PC with a research grant?
A: A mad scientist.

Q: What's another name for the "Intel Inside" sticker they put on Pentiums?
A: The warning label.

Q: What do you call a series of FDIV instructions on a Pentium?
A: Successive approximations.

Q: Complete the following word analogy: Add is to Subtract as Multiply is to:
1. Divide
2. ROUND
3. RANDOM
4. On a Pentium, all of the above

A: Number 4.

Q: Why didn't Intel call the Pentium the 586?
A: Because they added 486 and 100 on the first Pentium and got 585.999983605.

Q: According to Intel, the Pentium conforms to the IEEE standards 754 and 854 for floating point arithmetic. If you fly in aircraft designed using a Pentium, what is the correct pronunciation of "IEEE"?
A: Aaaaaaaiiiiiiiiieeeeeeeeeeee!

AUUG Regional Contacts
1994 - 1995

Location	Contact	Tel/Fax
Adelaide	Michael Wagner mhw@syserv.com.au	Tel: (08) 212-2800 Fax: (08) 231-0321
Brisbane	David Hughes bambi@Bond.edu.au	Tel: (075) 95-1450 Fax: (075) 95-1456
Canberra	John Barlow john.barlow@anu.edu.au	Tel: (06) 249-2930 Fax: (06) 249-0747
Darwin	Phil Maker pjm@cs.ntu.edu.au	Tel: (089) 466-666 Fax: (089) 270-612
Hobart	Steven Bittinger steven.bittinger@its.utas.edu.au	Tel: (002) 207-406 Fax: (002) 207-488
Melbourne	David Taylor davet@vaxc.cc.monash.edu.au	Tel: (03) 857-5660
Perth	Adrian Booth abcc@dialix.oz.au	Tel: (09) 354-4936 Fax: (09) 354-4936
Sydney	Julian Dryden julian@dwt.csiro.au	Tel: (02) 809-9345 Fax: (02) 809-9476

6th Annual Canberra Conference and Workshops

Call For Presentations and Workshops

AUUG in Canberra is holding its 6th annual conference and workshops on the 14th and 15th of February 1995. As well as a selection of international and national speakers, we are looking for presentations from local individuals and organi- sations in any area of UNIX or Open Systems. Presenters for half or full day workshops on any subject are also welcome (workshop presenters receive a modest stipend).

The 1994 conference and workshops were attended by over 100 people from throughout the Canberra region. We look forward to seeing you at the 1995 conference and workshops.

The INTERNET Project

If you are an AUUG member in the Canberra Chapter you can get email and news access to the Internet for no additional charge (just the membership cost). This is provided by a dialup service which has been due for some serious fixes for quite some time and is now getting them.

AUUG Inc Canberra and the PC Users Group (ACT) are proud to announce "The INTERNET Project". By pooling our resources, we can additionally offer members full access to the Internet at a fraction of the cost of commercial services. Currently one years access (365 hours of "connect" time) costs $120. If you are interested in this service, please contact John Barlow (work: 2492930) to have a brochure posted out to you.

Meetings Organiser, Canberra Chapter of AUUG Inc.
Mr Peter Davie, 2480430 (work) 2480468 (fax)
peter@canb.auug.org.au (email).

Combine Business with Pleasure

UniForum NZ '95

The Conference

17-20 May 1995
Masterton, New Zealand

Featuring:

Technology Convergence	Hypermedia
The Internet	Security
Open Networking	User Tools

Registration forms available mid-March 1995.
Contact: Julie Jones, UniForum New Zealand
P.O. Box 27-149 email: jj@integral.co.nz
Mt Roskill, Auckland Ph: 64-25-958-245
New Zealand Fax: 64-9-629-2015

CALL FOR PAPERS FOR NSW CHAPTER OF AUUG

SUMMER TECHNICAL CONFERENCE

Wednesday, March 1st - Friday March 3rd, 1995

The NSW Chapter of AUUG 1995 Summer Technical Conference will tentatively be held on March 1-3, 1995.

Speakers and workshop/tutorial presenters are invited to speak on issues related to UNIX and Open systems, including, but not limited to system and network administration, software engineering, operating system research, works in progress and implementation on any combination of Open systems including Plan 9, NT, Novell, Banyan Vines etc.

Prospective speakers and workshop/tutorial presenters are invited to submit abstracts to the NSW conference organiser, Brenda Parsons, whose contact details appear below. Please indicate the length of the time slot required for your talk in increments of 15 minutes.

Selected non-Sydney-siders (>100 kms) speakers and tutorial presenters will have their travel and accommodation subsidised by the NSW Chapter of AUUG,

All such speakers and tutorial presenters will also receive complimentary conference registration.

Speakers and Tutorial/Workshop Presenters at Summer Conferences around Australia may be invited by AUUG Inc. to deliver their paper or workshop at the AUUG 1995 Winter Conference in Sydney.

Speakers should NOTE that the provision of a full paper and/or a set of slides for inclusion in the proceedings will be MANDATORY this year. Papers will be accepted in most electronic formats, but must be camera ready if not in electronic format.

Prospective workshop/tutorial presenters are to submit an outline and an indication as to the duration of the workshop/tutorial (half day increments) to the conference organiser.

A non-exhaustive list of possible Tutorial/Workshop Topics Include (some of these could also be papers):

* Perl and/or tkperl
* Tcl/Tk
* Sh/ksh programming for the masses
* Introduction to UNIX
* Introduction to Sys Admin
* Configuration Management / Source Control Schemes
* Firewall Workshop
* Network Management Workshop / SNMP
* The Information Superhighway
* Welcome to the M-Bone
* Introduction to Networks
* Sendmail Configuration
* Internet News Management (B/C News, nntp etc)

* Public Domain software that every site can't live without - getting, maintaining, ftp, patch etc.
* Headaches of a Hetrogeneous environment - coping with the macs, pc's, nt's, novell's etc.
* Why Novell 4.0 looks more like unix then it does Netware 3.11?
* Cisco Router configuration and access lists.
* Performance Tuning for OS's and Databases

IMPORTANT DATES:

Closing date for abstracts:	November 19, 1994
Speaker Notifications:	December 3, 1994
Tutorial/Workshop Notes due:	February 1, 1995
Finished papers due:	February 1, 1995
Early Bird Registration:	February 15, 1995
Conference date:	March 1-3, 1995

Abstracts and tutorial/workshop outlines may be either emailed or Australia posted in any suitable format to:

Post: Brenda Parsons
Osmosys Consulting
PO Box 43
Darlinghurst 2010

Email: bdp@sydney.dialix.oz.au

Phone: 018 647 259

Brenda Parsons.

AUUG Inc. - Victorian Chapter

(formerly SESSPOOLE)

AUUG-Vic is the official Victorian chapter of AUUG Inc. It was the first Chapter of the AUUG to be formed, then known as SESSPOOLE, and its members have been involved in the staging of the Victorian AUUG Summer Technical Meetings every year since 1990. AUUG-Vic currently meets approximately every six weeks to hold alternate social and technical meetings. It is open to all members of AUUG Inc., and visitors who are interested in promoting further knowledge and understanding of UNIX and Open Systems within Victoria.

The purpose of the social meetings is to discuss UNIX and open systems, drinking wines and ales (or fruit juices if alcohol is not their thing), and generally relaxing and socialising over dinner. Whilst the technical meetings provide one or two "stand-up" talks relating to technical or commercial issues, or works in progress of open systems.

The programme committee invites interested parties wishing to present their work, to submit informal proposals, ideas, or suggestions on any topics relating to Open Systems. We are interested in talks from both the commercial and research communities.

Social meetings are currently held in the Bistro of *The Grosvenor Tavern, 2A Equitable Place, Melbourne,,* starting at about 6:30pm. Venues for the technical meetings are varied and are announced prior to the event. The dates for the next few meetings are:

Wed, 1 February '95	Technical
Tue, 14 March '95	Social
Wed, 19 April '95	Technical

Hope to see you there!

To find out more about AUUG-Vic and its activities, contact the committee or look for announcements in the newsgroup **aus.org.auug**, or on the mailing list **auugvic@clcs.com.au**. The committee may be reached more directly on **auugvic-exec@clcs.co.au**.

AUUG-Vic committee:

President:	Enno Davids	Metva	(03) 882 2333	enno@metva.technix.oz.au
Secretary:	David Taylor	Monash University	(03) 857 5660	davet@vaxc.cc.monash.edu.au
Treasurer:	Neil Murray	Webster Computer	(03) 561 9999	neil@wcc.oz.au
Programme Chair	Michael Paddon	Kodak	(03) 353 2382	mwp@munnari.oz.au
Committee:	Arnold Pears	La Trobe University	(03) 479 1144	pears@latcs1.lat.oz.au
Committee:	Peter Lazarus	Legent Australia	(03) 286 5200	plazarus@auspacific.legent.com

AUUG-Vic Email addresses:

General Membership	auugvic@clcs.com.au
Committee:	auugvic-exec@clcs.com.au
Mailing list administration:	auugvic-request@clcs.com.au

AUUGWet 95

Northern Territory Chapter of AUUG

18-21 April 95

The NT Chapter of the Australian UNIX users group (AUUG) will be holding a Wet season conference (summer conference for southerners) during April 95. The theme for this conference is:

"Security and the Internet"

Presentations on any area of interest to the open systems community are sought.

AUUGWet has been running for 4 years now and provides a good opportunity to visit the Top End. We normally get about 70 people at the conference.

But why should you come to Darwin? Well:

- To visit the Top End.
- Free food and drink.
- Access to the School of Information Technology kit:

  1 x Piper Cherokee 6 (aeroplane).
  1 x GPS.
  1 x slightly soiled Toyota 4x4.

- Free air tickets.
  We hope to able to bring in a few speakers from outside Darwin. We would of course provide you with the air tickets.
- Free accommodation.
  We can probably find somewhere for you to stay in Darwin free of charge.

Contact:

Phil Maker pjm@cs.ntu.edu.au
Euan Pryde edp@it.ntu.edu.au (089-466546)

ANNOUNCEMENT AND CALL FOR PAPERS

PERTH SUMMER TECHNICAL CONFERENCE

Wednesday, February 22, 1995 †

The Perth AUUG 1995 Summer Technical Conference will be held on February 22, 1995†. Speakers are invited to speak on technical issues related to Unix and Unix-like systems, including but not limited to system and network administration, software engineering, and operating system research and implementation.

Prospective speakers are invited to submit abstracts to the Perth conference organiser, Adrian Booth, whose contact details appear below. Selected interstate speakers will have their travel and accommodation paid for by AUUG Inc. All speakers will receive complimentary conference registration.

Speakers at Summer Conferences around Australia may be invited by AUUG Inc. to deliver their paper at the AUUG 1995 Winter Conference in Sydney.

Speakers should *note* that the provision of a full paper and/or a set of slides for inclusion in the proceedings will be **mandatory** this year. If this is inappropriate for your talk, please contact the organiser.

It is currently planned to host a series of workshops and/or tutorials on one or more days around the conference date. Prospective workshop/tutorial presenters are also sought, and are invited to submit a brief overview and an estimate of the duration of the workshop/tutorial to the conference organiser.

IMPORTANT DATES:

Closing date for abstracts:	December 15, 1994
Finished papers due:	February 1, 1995
Conference date:	February 22, 1995 †

Adrian Booth
abcc@perth.dialix.oz.au
Arena Technology
7 Glenrowan Place
Willetton WA 6155 Oz
Phone (09) 354 4936
Fax (09) 354 4115

† The conference date is tentative depending upon the availability of our interstate speaker, however it should be in the last two weeks of February, 1995.

From the Western Front

My secret writing technique

People regularly tell me they wish they could write. Then they'd be able to write reviews for AUUGN, letters to their mothers, and manuals for their software.

These are usually the same people who produce great volumes of email and news every day.

Does this suggest something?

My secret writing technique is simple. I just pretend I'm sending email. So this column is a message to *readers@auugn.auug.org.au* (don't try that address — it's fictitious). You don't have to assume a more formal style when writing stuff that's going to be printed — so just put your brain in email-mode and go for it. Using the same text editor you use for email strengthens the illusion. (If you don't yet use email, pretend you're talking on the phone instead.)

At the end of this column I suggest an application of this no-longer-secret technique.

-oOo-

WAUG's meeting venue is currently the Blue Note Tavern in Colin Street, West Perth, but there are plans to move to the more salubrious Freeway Hotel, just off the freeway in Mill Point Road, South Perth. This is where we're going to have the 1995 Summer Conference. The WAUG committee recently held a meeting at the Freeway and checked out the meeting rooms, the courtyard (complete with swimming pool) and of course the food.

Recent meetings have been well-attended. The room was packed in November for Adrian Booth's firewall case study (see Don Griffiths' review elsewhere in this issue). In October, Tim Hoffman from the local Sun office presented his usual frustrating strip show — removing only his jacket, albeit stylishly — and an overview of Solaris 2.4, which is also frustrating because you can get it for Intel processors but not yet for Sun's own SPARC architecture. Solaris 2.4 has lots of bug fixes and a number of new features, and hopefully NIS+ will actually work properly. And apparently Sun are going to introduce mice with balls. This seemed to please most of the largely male audience.

As you can see, we need more people to summarise and review our meetings. Reviews encourage speakers, and are appreciated by those members who can't be there. So if you can manage to write half a page or so about one of our meetings, those members and I will be eternally grateful. (If you can't email, fax it to me and I'll type it in.) Don't assume someone else will do it. Make yourself that someone. My email account and fax machine are awaiting your input.

-oOo-

WAUG meets at 6pm on the 3rd Tuesday of each month. Our excellent meeting organiser is Mark Baker, <waug-meetings@uniwa.uwa.edu.au>, (09) 491 6081.

Janet Jackson <janet@dialix.oz.au> (WA Chapter Sub-editor), phone/fax (09) 272 5061
From WAUG, the WA Chapter of AUUG

WAUG Meeting Review

November
Internet Firewalls

Adrian Booth, Arena Technology

Popular journalism has painted the Internet in sparkling rainbow hues, with a pot of gold at the end of every link. Unfortunately for the unwary, the showers that produced the rainbow may develop into a raging tempest. To enjoy the benefits without getting soaked, we need a weir to hold back the deluge, or to mix the metaphor, a firewall.

The subject of the case study Adrian presented was well obscured, preventing identification. However, by presenting the design constraints of the exercise, the presentation was meaningful and avoided excessive abstraction.

To be successful the design had to achieve two primary goals: 1) Allow access by a vendor to provide application support; 2) Consolidate Internet access that had previously been ad-hoc via a number of channels. (A single point of access is an essential feature of a firewall design.) These goals needed to avoid compromising the security of the organisation, to the extent that upon detection of any penetration attempt the network link would be shut down.

In this case, the firewall solution was a combination of a screening router and a "bastion" host [Cheswick & Bellovin]. The router was configured to reject all packets other than those for specific ports or from specific IP addresses. The only route installed is a static route to the bastion host. Many potentially insecure TCP/IP options are disabled (source routing, ICMP redirect, RIP, etc).

The host itself is a minimally configured UNIX box with one interface to the router and one to the internal network. For each permitted protocol, the bastion runs a custom packet filter program that allows external connection via standard ports. The filter then relays packets to the internal network. In particular, *sendmail* needs to be sanitised to prevent use of the well-documented security holes.

External access is authenticated by the use of a one-time pad, delivered via non-Internet means. A policy of "three strikes and out" is enforced, disabling the account until the firewall administrator restores it from the console.

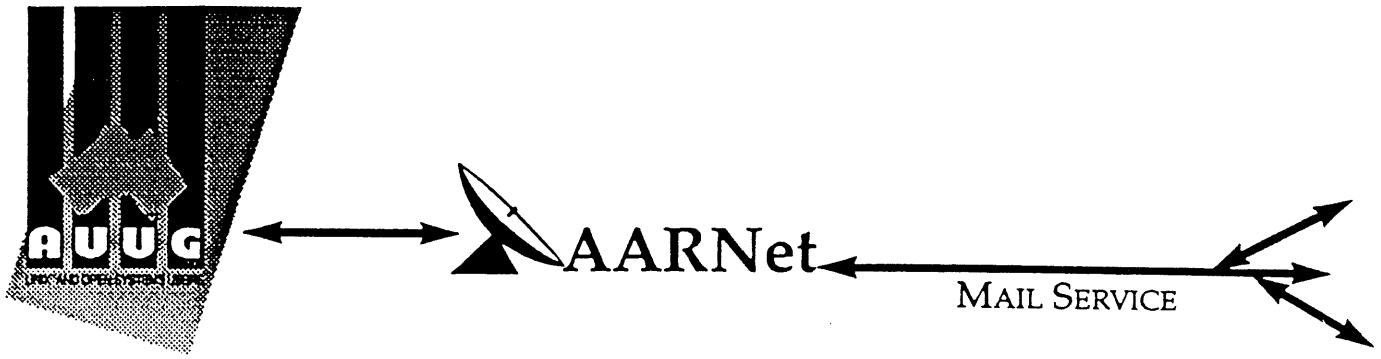
The important issue of maintenance was raised. A firewall is not a one-time expense. Reviews of the router logs and regular audits of the system are required to ensure continued confidence in the system.

Finally, a reflection on how secure the system is. Adrian pointed out that if the NSA wanted to break in, they could probably do so. However, the casual vandal will be kept out and the site contains little of interest to the dedicated system browser.

Adrian's talk was highly informative and provided entertaining hooks for audience participation. It was neither too techie nor was it predigested management fodder. The numbers attending this meeting were well above average, reflecting the current high levels on interest in Internet topics. Adrian also scores well for limiting the plug for Arena Technology, his consulting company, to drawing our attention to the cool fold-up pencil holders he had placed at the rear of the room. A certain well known ex-president of WAUG later put these to good use, scooping up munchies during the after talk supper.

Reference: Cheswick & Bellovin, *Firewalls & Internet Security.* Addison-Wesley, Reading, Massachusetts, 1994.

Don Griffiths <griffith@cs.curtin.edu.au>
From WAUG, the WA Chapter of AUUG



Dear Site Administrator,

As you may be aware, the arrangements for mailing to addresses outside Australia (and also to AARNet sites) changed in May 1991. Since then, the University of Melbourne are no longer managing the administrative details associated with maintaining this service. The AARNet (Australian Academic and Research Network) management has taken over administering the service, and are requiring all ACSnet and similar sites to register with AARNet and pay a fee for continued access to Internet mail services. AARNet have set this fee as $1000 per annum for most sites, with larger sites paying more (you know who you are).

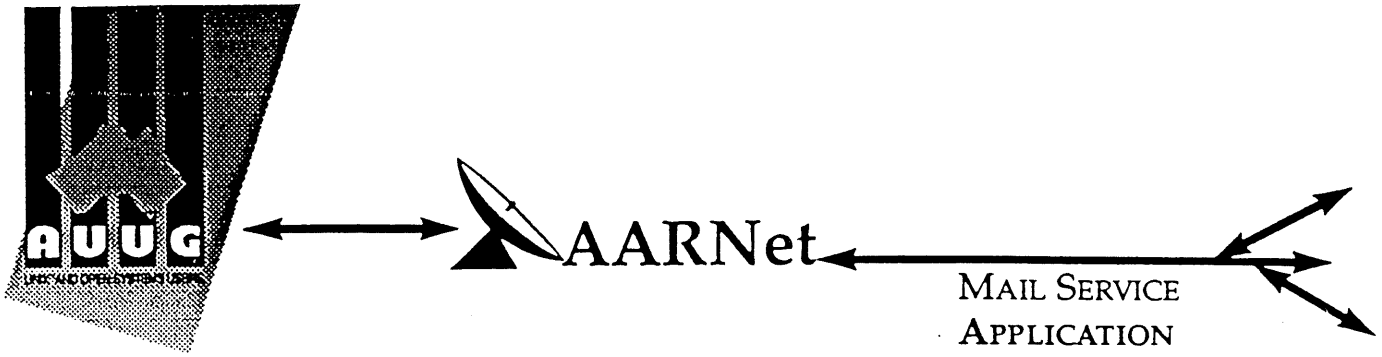
The fee is intended to cover use of AARNet bandwidth for your network traffic. Registration with AARNet, however, provides ONLY the registration of your address in worldwide address tables - your site will be unreachable without this registration. The fee does NOT cover the costs involved in obtaining a connection to AARNet or ACSnet NOR does it include a guarantee that you can be connected or even to help you find a connection point. See Note B for some information about connection services.

AUUG as a service to its members has negotiated with AARNet to achieve a lower price for this basic address registration service. The lower price is based on the reduction in paperwork for the AARNet management authorities. The AUUG/AARNet fee is dependent on the membership status of the owner of the machine(s)/domain involved, and is currently $250 for members and $600 for non-members. As such it is a substantial discount on the AARNet fee, but only applies to sites in the AARNet $1000 category. Larger sites will need to negotiate directly with AARNet.

The address registration is for one AUUG membership year. Membership years start on the 1st January or July, whichever is nearest to receipt of your application. Sites which do not renew their AUUG/AARNet registration annually with their AUUG membership each year will be removed from the Internet tables and will no longer be able to communicate with international and AARNet hosts. Reminders/invoices will be sent along with your membership renewal.

The required initial registration form is attached below. It should be completed and forwarded to AUUG's (postal) mailing address at the bottom of the form or faxed to (02) 332 4066. If you have any queries on the AUUG/AARNet arrangements please direct them to Catrina Dwyer at the AUUG office on (02) 959 3656 (catrina@swift.sw.oz.au) or myself (frank@atom.ansto.gov.au).

Regards,
Frank Crawford
AUUG-AARNET Administrator
AUUG Inc.



On behalf of the organisation listed below I wish to apply to be a Mail Service Affiliate Member of AARNet, and accordingly request that AUUG Incorporated arrange for the Australian Vice-Chancellors' Committee (AVCC) to maintain on my behalf an electronic mail delivery record in the Australian Academic and Research Network (AARNet) to allow my organisation to send and receive electronic mail carried across AARNet.

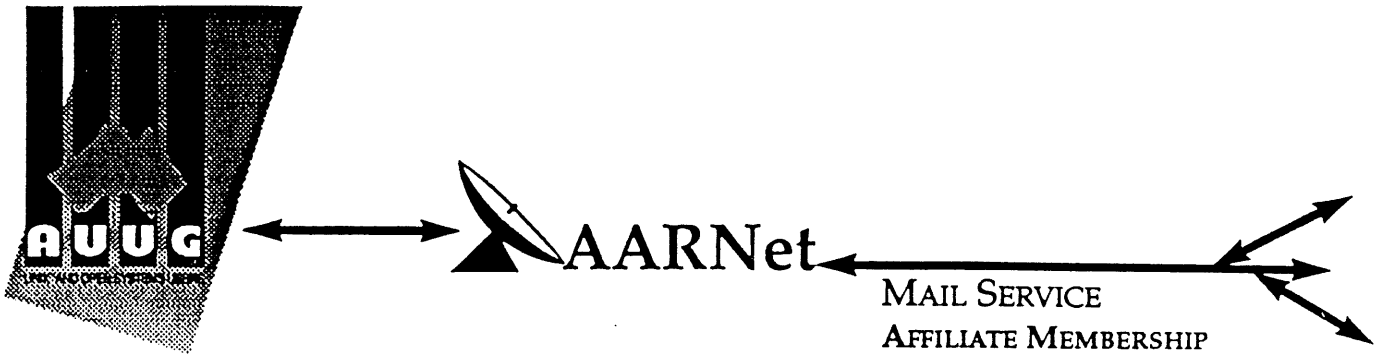
I understand that the AVCC may consult the recorded logs of my organisation's usage of AARNet facilities for 1990, and determine that I am ineligible for registration under the terms of the agreement between AVCC and AUUG Inc. I understand that AUUG Inc will invoice my organisation for this service for the calendar year 1991 and for subsequent years unless it receives my organisation's written advice to terminate the Affiliate Membership of AARNet.

I understand that the AVCC and AUUG Inc maintain the right to vary the Mail Service Affiliate Membership charges from year to year, and maintains the right to cease offering this service to my organisation at the start of any year, at their discretion. I understand that in the event of any variation of the Mail Service Affiliate Membership of AARNet, my organisation will be advised in writing by the AVCC or AUUG Inc to the address below.

I understand that in consideration of the AARNet Mail Service Affiliate Membership charge, AARNet will undertake to maintain a mail directory entry which will direct incoming electronic mail to the AARNet gateway system(s) which I have nominated below. Furthermore I accept that there is no other undertaking made by AARNet in terms of reliability of mail delivery or any other form of undertaking by AARNet or the AVCC in consideration of the payment to AARNet for the maintenance of the mail directory entry on AARNet.

I undertake that my organisation's use of the mail delivery services over AARNet will not be used as a common commercial carrier service between my organisation and other organisations receiving similar services from AARNet, nor will it be used as a commercial carrier service between branches of my organisation. Furthermore my organisation undertakes to use AARNet facilities within the terms and conditions stated in the AARNet Acceptable Use Policy. I accept the right of the AVCC or AUUG Inc to immediately terminate this service at their discretion if these undertakings are abused by my organisation (where the AVCC retains the right to determine what constitutes such abuse).

I understand that a fee is payable with this application: of $250 if the host/hosts covered are owned by a member of AUUG Incorporated, or $600 if the host/hosts covered are not owned by an AUUG member. Corporation host owners may only claim the member price if the corporation is an Institutional member of AUUG Inc. My cheque payment of either $250 or $600 as appropriate is enclosed with this application.



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APPLICATION FORM

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_____

Signed:_____AUUG Membership No (if known):_____

Name:_____Position:_____

on behalf of the organisation named above.

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_____

_____

_____Postcode:_____

Administrative Contact:_____ Title:_____

E-Mail:_____ Phone: (___)_____

Fax: (___)_____

Technical Contact:_____ Title:_____

E-Mail:_____ Phone: (___)_____

Fax: (___)_____

Mail Delivery Information to be entered in AARNet (see Note A next page)

Domain Names Requested: _____

_____

Gateway Addresses:_____

_____

_____

Expected Link Protocol: UUCP SL/IP MHSnet Other:_____

* * * *

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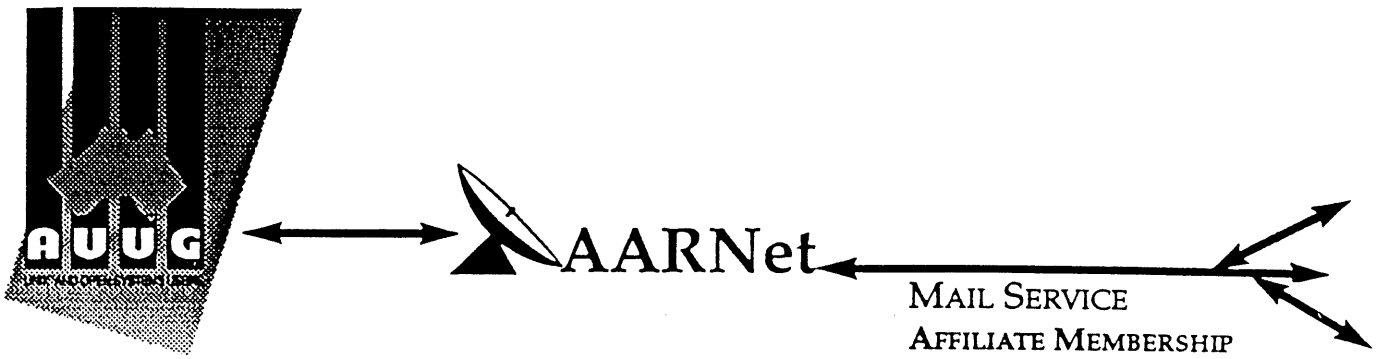

MAIL SERVICE
AFFILIATE MEMBERSHIP
APPLICATION FORM cont'd.

Note A. Mail Delivery Information

Two items of information are required: firstly the preferred name of your mail host (or the domain name(s) of a group of hosts) in Internet domain name system format, and secondly the name (or names) or AARNet gateway systems who will accept electronic mail over AARNet (and connected overseas networks) on your behalf and forward it to you. The primary requirement for an AARNet gateway is its ability to recognise your host/domain addresses and perform the necessary mail header rewriting reliably.

Please check with the postmaster at your preferred AARNet gateway host site before citing them as a gateway for AARNet mail delivery. For ACSnet addresses (*.oz.au), the host "munnari.oz.au" (Melbourne University) is a recommended gateway. Other possible sites include "metro.ucc.su.oz.au" (Sydney University), sirius.ucs.adelaide.edu.au (University of Adelaide), uniwa.uwa.oz.au (University of WA) and bunyip.cc.uq.oz.au (University of Qld). Note that all gateway addresses must be fully domain qualified.

Example Mail Directory Information request:

Mail addresses required:	acme.oz.au, *.acme.oz.au
Mail Gateways (primary)	gw.somewhere.edu.au
(secondary)	munnari.oz.au
(secondary)	unnet.uu.net

The addressability of your site and the willingness of your nominated gateways to act in that capacity will be determined before registration proceeds. Processing will be made faster if you contact the postmaster at your nominated gateways in advance to inform them of your intentions. Your nominated technical contact will be notified by email when registration is complete.

Note B. Getting Connected

New sites will need to find an existing AARNet or ACSnet site who will accept their site as a connection, and also select a protocol for transferring data over their mutual link. Although the UUCP package is a standard inclusion with UNIX, it is little used in Australia due to its relatively poor performance. Other possible choices for your link protocol include SLIP (TCP/IP) and MHSnet.

Among a number of organisations who provide connection services, Message Handling Systems Pty Ltd have announced a special offer on both their link software and connect time for AUUG members. For more details on this offer, contact Message Handling Systems on (02) 550 4448 or elaine.mhs.oz.au.

Book Reviews

Well, here we are, at the end of another year, but not quite at the end of books for review. Certainly, these books are not the high profile authors we have seen recently, but they are useful to a wide audience, from new Internet users, to those starting with X11 and on to developers and academics.

On to administrative matters, last time I didn't have too many books, suddenly, I received lots, which went in quick time, and I'm looking forward to getting more early next year. All this means that we will have lots of books for review. The current practice is to post a note to the newsgroup *aus.org.auug* when we have new books available. Unfortunately, this disadvantages members without network connections, or on the end of a low speed link. For people in such a position, either mail, via the AUUG PO Box, or fax me on (02) 717 9273, with your contact details and preferences.

Frank Crawford

The Elements of E-mail Style

by David Angell and Brent Heslop
Addison Wesley
1993, 157 pages
ISBN 0-201-62709-4

Reviewed by
Dave Horsfall
<dave@esi.com.au>

Readers of the classic "Elements of Style" by Strunk and White will feel right at home with this publication. The authors recognise the need for strong written communications in an e-mail environment, yet the formality required in a business letter would be out of place in a world where a letter can arrive within seconds of it being sent, and a quick reply is expected.

Much of the book is USA-centric, but this is to be expected. To their credit the authors point out that other cultures (Europe, Japan etc) are accustomed to a much more formal style than is the norm in USA.

It follows the same patter as Strunk and White, while adapting it for the e-mail environment, so we find admonishments against "flames" (and techniques for dealing with same), and practical suggestions for how to highlight parts of your message while staying with 7-bit ASCII. The examples chosen are often quite witty, and illustrate the point being made very well.

A large section of the book is devoted to basic grammar -- something that seems to have been overlooked in schools these days -- and the rules therein can equally be applied to formal correspondence. A glossary deals with English and jargon from an e-mail point of view (e.g an imperative statement could be "Send me the file.") and an appendix deals with conventions on the USENET.

Only a few things spoiled the tome: the insistence that the term "chairman" is sexist (it has nothing to do with "man"); the usual conversion of imperial units to metric in which precision has been gained ("1 fluid ounce" becomes "29.6 milliliters"), and a rather amusing typo in an e-mail address (the author's own, no less).

Recommended if you need to write formal e-mail (as is becoming the norm in net-aware businesses), or if you would like a simplified version of the rules of English grammar.

Solaris Porting Guide

by SunSoft ISV Engineering,
Michele Ann Goodman, Manoj Goyal
and Robert A. Massoudi
SunSoft Press, Prentice Hall
1993, 864 pages, soft cover, includes diskette
ISBN 0-13-030396-8

Reviewed by
David Purdue
Knowledge Distributed Systems Pty Ltd
<davidp@knowledge.com.au>

The Solaris Porting Guide attempts to tell you everything you need to know to port software to the Solaris 2.x (System V Release 4) environment. Absolutely everything. A goal that many may regard as ambitious.

The intended audience of this book is developers who are producing software for the Solaris

environment, whether on SPARC or Intel platforms. The main emphasis is Solaris 2.x, but there is also a lot of information relevant to Solaris 1.x (SunOS 4.1.x), as this is seen as a step on the migration path to Solaris 2.x. The Porting Guide assumes a good deal of prior knowledge of UNIX, C Programming, and GUI programming knowledge in its audience.

Chapter 1 describes dynamic linking, an important concept because of its relevance to the Application Binary Interface (ABI). It describes how to create programs that use dynamic linking, and to create shared libraries, and gives some tips for improving shared library performance.

Chapter 2 describes the differences between K&R C and ANSI C.

Chapter 3 gives an overview of the SVR4 software packaging format. It gives a brief description of how to create, install and check a software package. Personally, I wish more software vendors would take note of this standard way of packaging software.

Chapter 4 covers Open Windows, which includes the Open Look Window Manager, OLIT (the Open Look Interface Toolkit) and DevGuide (a graphical interface builder), and X11 and Display PostScript servers. The chapter wanders around various topics, including Internationalisation, Localisation and new features of various widgets introduced in the Solaris 2.x version of Open Windows.

Chapter 5 is titled "Graphics" and describes a wide variety of Application Programmer Interfaces to the Sun graphics hardware.

Chapter 6, Application Interoperability, discusses various ways that applications running on an Open Windows display can exchange information, including ICCCM conventions, drag and drop, and the Tool Talk service.

Chapter 7 covers approaches to internationalising programs. It highlights features of Solaris that can help, and concludes with a list of Do's and Don'ts.

Chapter 8 discusses Solaris' compliance with SVID3, the System V Interface Definition. It references a lengthy diagram in Appendix D that shows the difference in the interfaces (commands, system calls and functions) from Solaris 1.x to Solaris 2.x.

Chapter 9 gives a broad overview of device driver development for Solaris 2.x.

Chapter 10 describes the multithreading and multiprocessing capabilities of Solaris 2.x, with emphasis on how user programs can access multithreading to improve performance.

Chapter 11 describes the realtime processing facilities.

Chapter 12 covers the networking facilities, including the ONC+ suite of protocols.

Chapter 13 describes interprocess communication, from pipes to the SYSV semaphore, message queue and shared memory facilities.

Chapter 14 describes the differences between the SPARC and x86 implementations of Solaris 2.x.

Chapter 15 lists the various IEEE, ANSI, ISO and even RFC standards that Solaris 2.x conforms to.

Finally, Chapter 16 discusses Project DOE, the future direction that Sunsoft wishes to take Solaris.

As noted above, the aim of this book is quite ambitious. At over 800 pages it is quite a weighty volume, but it tries to cover so much ground that it cannot be considered a complete reference on any topic. There are slight inconsistencies, in that, as a book written by committee, there was not a consistent view on how each section should be written, and so the depth of coverage varies. Some sections have quite detailed examples in the text, others do not.

Overall, the most useful aspect of this book is that is does look at all these topics in at least some detail, and is then able to refer you to the definitive reference. In addition, the chapter of standards compliance has proved very useful to a colleague who is responsible for preparing responses to tenders.

Getting Started with UNIX and X

by Torbjorn Andreasson and Jan Skansholm
Addison-Wesley
1993, 284 pages, $48.95
ISBN 0-201-63170-9

Reviewed by
Lawrie Brown
<Lawrie.Brown@adfa.oz.au>

We all started using UNIX once, and for many there is a challenge in understanding the concepts and commands. This book is intended for inexperienced users, with many examples of how commands are used, and discussion of concepts such as the file system. It is particularly intended for those using X-terminals as their interface to a UNIX system.

The book is in three sections. There is an elementary introduction to information essential to making effective use of UNIX in chapters 1 to 3, and part of 4. This covers logging in and out, including on X-terminals, a description of the file system, and an introduction to the basic commands and the shell. Both Motif and Openlook window managers are discussed, as well as the Bourne, Korn, C and TC shells, with some care being taken to flag the distinctive features of each. The approach is very prescriptive: do this, and this should happen. Whilst good for getting started, it does not provide overall command summaries.

The next intermediate section covers chapters 4 to 6. It discusses more advanced uses of the shell including processes and job control, shell variables, editing and history mechanisms, and startup files. Then follows a discussion of communications utilities such as ftp, telnet, rcp, rsh and others; followed by chapters on mail and news. Finally the use of various text editors both for X and ascii terminals.

Finally there is an advanced section in chapters 7 to 9, which describes how to write shell scripts; a brief description of program development, and a final chapter on some basic system administration tools.

So, for a UNIX novice does this book succeed? It certainly attempts to cover a large amount of material, and for that reason, unfortunately, I believe it fails. For a book this size, and for the intended audience, there is far far too many topics touched upon. In particular I fail to see why the chapter on systems administration is there, it does not belong in an introductory text. There are also a number of places where the book gets bogged down in unnecessary details on some commands and on the finer niceties of shell programming, whilst at other times it skims over important issues (such as the interaction of directory permissions on mv or cp, or the dangers of wildcards in rm!). Because so many commands are described, the book belts through them all in a manner that I feel would be overwhelming for a novice. The chapter on editing could probably do with being earlier.

On the positive side, the introductory material in the first couple of chapters is clear and informative, as is the description of the file system. The command summaries at the end of each chapter are good, but in a teaching environment would probably need to be supplemented by additional exercises. Material on some commands is scattered in several places, making it hard for more experienced users to locate information.

Having read the book myself, I then loaned it to one of my first-year students, who has been using a UNIX-X environment for about 6 months for his comments. He felt that the introductory UNIX material was clear, but that the description of X was clumsy and confusing. The coverage of the various commands he felt was too terse, and commented that several topics would not have been clear, had he not already had some familiarity with them. In summary he felt the book was not useful enough for him to want a copy.

My own conclusion is similar. Whilst the goal of this book is good, I'm afraid it misses the mark. Despite some quite good introductory material, the bulk of the book comprises too rapid and prescriptive a description of a very large number of commands and topics for a novice user, whilst not being detailed and indexed well enough for an experienced user.

Programming under Mach

by Joseph Boykin, David Kirschen,
Alan Langerman and Susan Loverso
Addison-Wesley
1993, 490 pages
ISBN 0-201-52739-1

Reviewed by
Peter Chubb
Softway Pty Ltd
<peterc@sw.oz.au>

Mach is a microkernel operating system now available commercially with a UNIX interface as OSF/1 and on the Next. If you want to program to the Mach interface directly, making use of the threads, IPC and VM manipulation that Mach allows, this book will probably help.

Chapters in the book give worked examples for simple multithreaded programs, for IPC, for using the Mach Interface Generator (MIG) and for memory management, culminating in a complete program for external memory management (i.e., a user-level pager). This extensive example code (if carefully examined) can be used as boilerplate to build more complex applications.

One useful feature of the book is that it tells you what bugs (features?) are present in the various versions of the Mach kernel, and how to get around them. There are some race conditions in the external memory manager interface, for example, that can be quite tricky to avoid.

It is unclear as to what level of expertise the book is aimed at. The introduction says that readers should already be experienced UNIX and C programmers. There doesn't really seem to be enough information for a complete beginner at multi-threaded programming to make a shot at using the information here. On the other hand, what instruction does appear seems to be at a fairly basic level — I think that maybe it is merely to provide a common vocabulary. The best descriptions in the book of how and why to use multithreading do not appear until chapter 11.

Moreover, there are subtle bugs in some of the example programs. For example, the stdio package that C provides is not thread safe, so a mutex is used to serialise access to the various FILE structures. All well and good — but this is only done for some of the files, not all. Consequently there is opportunity for stderr (for example) to become corrupt if the example program is used.

The discussion on ports (a port is a communications endpoint) in chapter 2 is confusing. On the one hand, the text says 'Every Mach thread has a set of Mach IPC ports' (section 2.6.2) but on the other hand ports are global to a task (which may contain many threads). There is also some more confusion in my mind at least after reading that every task has exactly three ports set up for it (an exception port, a notify port and a bootstrap port) but is named by a control port. It is not until chapter 7.2 (in a footnote) that it is made clear that the control port is not attached to the task, but is actually a port owned by the Mach kernel.

There are other confusions in the book, at a similar kind of level.

Despite these confusions, if you already know how to do multithreaded or multiprocess programming and wish to know how to do it under Mach, this book will be useful.

UNIX Systems for Modern Architectures: Symmetric Multiprocessing and Caching for Kernel Programmers

by Curt Schimmel
Addison Wesley
1994, 396 pages, $59.95
ISBN 0-201-63338-8

Reviewed by
Peter Chubb
Softway Pty Ltd
<peterc@sw.oz.au>

This is the book that I wish that I'd had ten years ago. In one volume, it draws together all the things that 'everyone knows' about caching and locking, and applies it all to modern Unix kernels. If you're doing research into multiprocessor operating systems, the comprehensive reference lists are just the thing. If you've just been put into the position of having to work on a multi-processor kernel (or indeed, a single processor kernel on an architecture with caches), the book forms a gentle introduction to the problems (and solutions!) posed by such architectures.

The contents fall into three parts:

- Cache Memory Systems,
- Multiprocessor Systems, and
- Multiprocessor Systems with Caches.

The first part discusses cache architectures. It first discusses the basic configurations (physical and virtual caches, various kinds of tagging, etc), then points out the problems that those architectures give when UNIX (or any modern operatings system for that matter) is running on that architecture. Solutions to the problems are also given, and performance and other trade-offs discussed.

The second part discusses adapting UNIX to run on a tightly coupled shared memory multiprocessor. It falls into two parts: the first gives a general overview of mutual exclusion mechanisms, the second shows how to modify UNIX.

As UNIX usually runs as a monolithic monitor, it has to be modified to take advantage of such an architecture. There are basically two ways: nominating one processor as a 'Master', and performing all kernel operations on it, or providing some form of lock for all kernel operations. In the latter case, how much to lock at a time is a key design decision that will have massive performance implications. The section discusses the trade-offs for the different locking granularities.

The third part draws together the first two, and shows how the presence of a cache makes the locking techniques described in part two fail. It then gives solutions (both hardware and software) to make locking work properly when a cache is present.

In each part, the basic architecture is explained at the highest level of abstraction that still allows the key problems to be seen. (Sometimes that means quite a low level: for example in the third part, where the Sparc's non-sequential memory model and its write-behind buffer are discussed, or in the second part, where SVr4.2MP's synchronisation and locking primitives are described.) This makes the book suitable for people with no hardware background.

Doing the easy exercises at the end of each chapter can help to test one's understanding. Some of the questions have answers at the back of the book.

The title is somewhat of a misnomer: only caching, locking, the interaction of caching and locking, and modifications to UNIX to cope with caching and the need for locking are discussed. However, *UNIX Systems for Modern Architectures* covers these four areas thoroughly, and gives a good set of references for further reading.

This was mailed to the Editor recently.

TOP TEN NEW INTEL SLOGANS FOR THE PENTIUM

9.9999973251	It's a FLAW, Dammit, not a Bug
8.9999163362	It's Close Enough, We Say So
7.9999414610	Nearly 300 Correct Opcodes
6.9999831538	You Don't Need to Know What's Inside
5.9999835137	Redefining the PC -- and Mathematics As Well
4.9999999021	We Fixed It, Really
3.9998245917	Division Considered Harmful - No Life-Maintenance Devices Should Be Used With This Processor
2.9991523619	Why Do You Think They Call It *Floating* Point?
1.9999103517	We're Looking for a Few Good Flaws

And the 0.9999999998th Slogan Is...

The Errata Inside

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ISBN: 0130303968, Book & Disk, 1993, $59.95*

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Berny Goodheart, TANDEM Computers

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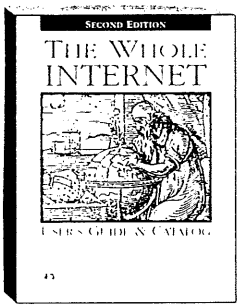
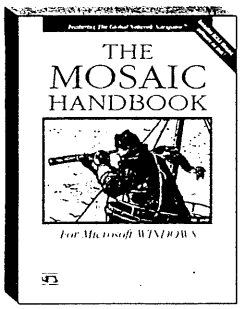


THE WHOLE INTERNET USER'S GUIDE AND CATALOGUE 2\e
Author: Ed Krol Price: $49.95 ISBN: 1-56592-063-5
The best book about the Internet just got better! This is the second edition of O'Reilly's bestselling introduction to the Internet, a resource of almost unimaginable wealth.



from O'Reilly,

THE MOSAIC HANDBOOK for MICROSOFT WINDOWS (Bk/Dsk)
Author: Richard Koman Price: $59.95 ISBN: 1-56592-094-5
Using Mosaic, a user can move from document to document, viewing text, graphics, video, audio - without having to worry about where the information is located.

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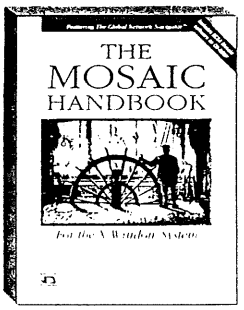
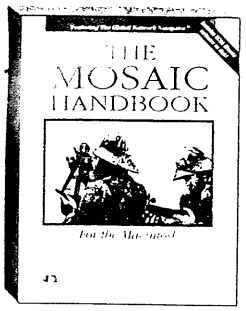


THE MOSAIC HANDBOOK for the X WINDOW SYSTEM (Bk/CD)
This book comes with the public domain version of NCSA Mosaic on CD. The disk also contains the Mosaic Handbook Home Page, with links to all of the servers mentioned in the book.
Author: Koman & Ferguson Price: $59.95 ISBN: 1-56592-095-3



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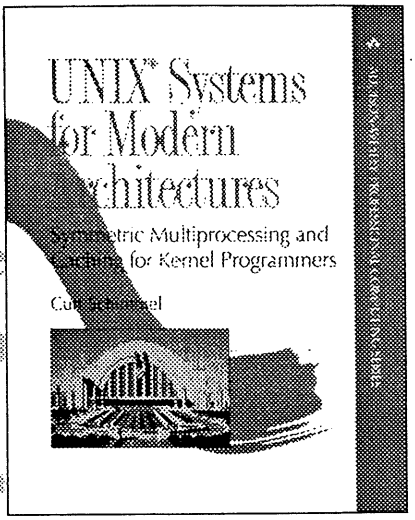

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UNIX Systems for Modern Architectures

Curt Schimmel

Written for the UNIX kernel developer, this book provides a complete yet comprehensible explanation of the operation of caches and symmetric multiprocessors, how they work together, and the issues operating systems must address in order to run on the machines that incorporate them.

After a review of UNIX kernel internals, Schimmel launches into a detailed description of cache memory systems, including several kinds of virtual and physical caches, as well as a chapter on efficient cache management. For each type of cache, the book covers the impact on the software and the operating system changes necessary for these systems. The next section details the operation of the tightly-coupled, shared memory, symmetric multiprocessor. It examines the problems these multiprocessors present to the operating system, such as race conditions, deadlocks, and the ordering of memory operations, and looks at how the UNIX kernel can be adapted to run on such systems. Finally, the book looks at the interaction between cache memory systems and multiprocessors and the new problems that this interaction presents to the kernel. Techniques for solving thse problems are then explained.

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University of Melbourne

DEPARTMENT OF COMPUTER SCIENCE

Parkville, Victoria 3052
19th September, 1980.

W.N. Joy,
Department of Electrical Engineering and Computer Science,
University of California at Berkeley,
Berkeley,
CALIFORNIA.

Dear Bill,

I thought I would let you know what I have been doing to VMUNIX since you gave me the tape with your latest system at the end of June.

Needless to say, the system ran without any difficulty, though one strange thing was that the file /usr/include/wait.h wasn't in the /usr/include directory (nor in /usr/src/sys/h). This was no problem, but it would be nice to see a copy of your file so I can make ours the same (ie. to get the 'correct' values for the option flags, so the systems remain binary compatible).

I have made the following changes, many of which were in our version of the original VMUNIX release. These are (more or less) in order, some mods depend on earlier ones.

1) Buffers are allocated at boot, rather than at ld time. There is also a fix for the bug that caused bss to fail to be cleared properly at startup (a stray sign bit not being reset in an address). Some dead code in mba.c was also removed (it would have been wrong if ever executed after this change).

2) Two new system calls have been added. Tlimit(n) sets a CPU time limit of n seconds (for student f77 programmers). Uname (& utsname) is from Bell's later versions (3.0 or 4.0 or something). Incidentally, I don't really know what the release and version fields should contain, do you? I guess the sysname should be "VM/UNIX", and the nodename is easy.

3) Function uprintf() was added to prf.c. It is just the same as printf(), but prints on the controlling tty for the current process, and guarantees not to block (though there is no need for that at the minute). This function is called to warn users who encounter no space/inodes on device conditions. The system also delays (uninterruptibly) for 5 seconds any process that causes an 'out of space' message (so the system doesn't bog down with printf()'s to the console).

4) Disc quotas (without change to the way I described them) were implemented. These are still raw.

5) Hp.c has been fixed (finally). ECC correction is modelled (very closely) upon that in up.c, but handles RM03's correctly. Struct mbaregs now includes mba_map, so the hideous #defines for the map addresses can be removed.

6) Device error logging has been added (in hp.c & machdep.c (for mem) anyway). This is just the same as is on the Delaware tape.

7) Bugs in closef() and umount() have been fixed (I think). Block device close routines get called at the correct times (via closef() only if not mounted, and via umount only if not open). In core blocks associated with a closed block device are invalidated (though this is not well done yet, the code needs to be rewritten). Also, the close routine for a special file is not called if the device is open via an alias inode (i.e. non-link that refers to the same device).

8) A structure, and an instance of it, containing pointers to the ends of the system tables, and their sizes, has been added. References of the form &proc[NPROC] have been altered to v.ve_proc. (I think this originated in Bell Unix). Of itself this is of no benefit (it should even make the code run slightly slower) but it forms the basis of a later mod, and of future mods to come.

9) The bfreelist scheme has been extensively modified. There are now 4 freelists, brelse chooses which to add a buffer to depending on how quickly we want it reused (as indicated by b_flags). It would be easy to add more queues if some hierarchy of re-use times were developed. In this case, buf structs should probably include a b_queue field to indicate which queue the buffer belongs on (replacing B_AGE and a couple of new flags I have added). The 4 queues are: (a) Never to be re-used, (b) Delay re-use as long as possible, (c) Re-use if necessary, and (d) Re-use as soon as desired. The criteria for placing a block on the queues are:

(a) None (this queue isn't used yet - it will be in the next mod)

(b) None of B_AGE, B_ERROR, and B_INVAL is set.

(c) B_AGE is set.

(d) B_INVAL or B_ERROR is set.

B_INVAL is a new flag set by geteblk() to indicate that the buffer doesn't contain valid data (it is easier to test than b_dev == NODEV). It is also used to mark a block invalid after its device is closed (in which case b_dev != NODEV anyway). Naturally getblk() and geteblk() make sensible choices when a buffer is needed. All 4 queues are FIFO, there appears to be no reason (other than expediency) for having any LIFO 'queues' as there used to be.

10) Mount(), umount(), and update() all avoid the bcopy() of the super block. This is done by arranging that the super block go on bfreelist queue (a) so it can not be re-used (this would seem to be the reason for getting an extra block and not brelse'ing it). This also permits I/O directly to the super block (without any disc I/O for input). Df runs faster (without -l anyway), and fsck/icheck can re-build the super block of the root without requiring a re-boot.

11) A dynamic upper limit of used slots in the proc table is maintained. This makes searching it quicker in all those searches which are still linear. The same ought to be done for files, and possibly texts (though a direct pointer from the inode would stop most text searches anyway). Inodes should have some form of LRU scheme (which means that they are always all in use (like bufs)). I haven't re-installed this as I am not sure how it relates to your hashing scheme, also I believe I have a better method than the way it was originally done at Toronto under V6).

12) The fcntl(fd, cmd, arg) sys call (from Bell Unix) has been added. Open() has been modified to implement all the fancy flags (O_APPEND, O_CREAT, O_TRUNC) except O_NDELAY which I dont know how to do. I don't even really know what it means. (Does it imply non blocking I/O for all I/O requests, only special files, or only some special files? Does the I/O proceed anyway, in parallel with the process? Or is it just that if data is not ready the sys call returns? Do you know?) I have added O_WRTFULL however. It causes the size of the inode to be restored if a write fails for any reason. Its purpose is to stop /usr/adm/wtmp from becoming corrupted whenever /usr runs out of space half way through writing a record (it is better for all the data to be lost than half of it). I have added (or more correctly Sydney Univ. has) fcntl commands to lock and unlock files (deadlock is prevented by only permitting one locked file per process). The implementation is weak if a locked file is subject to dup()'s or fork()'s, but survives the simple, usual cases. There is also a new file type IFLOK which locks automatically on open, but is identical to IFREG in all other respects (that is untested so far, I haven't modified mknod.c nor fsck.c yet).

So much for what I have done, what I want to do in the future (which will begin sometime in November when the students go away) is:

1) I want the system tables (or most of them) to be allocated at boot. This is useless by itself, but ...

2) Then NPROC, NBUF, ... should become variables, so they can be altered via adb on a /VMUNIX file (there are already no &proc[NPROC] references to become inefficient by this change). Again no great saving (1 or 2 less re-compilations a year), but ...

3) Finally, do dynamic allocation/deallocation of tables as required. This will be easy on the VAX, but is probably not doable on pdp 11's or Interdatas. (The limited address space of a pdp 11 would probably make it useless anyway).

4) I want to add a F_TRUNC cmd to fcntl, so files can be truncated without knowing their names. It would be ideal if it were possible to delete only the last section of a file (i.e. shorten it) but the arg to fcntl is only an int, and this is just not good enough. I don't think it worth a new sys call.

5) I still have to remove the limitation to 64K of buffers.

6) Now that there exists the means to lock a block in core, I intend to use the sticky bit on a directory inode to cause the blocks of the directory to be locked in core once read, then apply it to '/', '/usr', '/bin', '/usr/bin', and '/usr/ucb' - 9 blocks total on our system. However this really needs more than the 60 buffers we currently allocate (i.e. the previous mod), especially since 10 of those could be in use by our 5 printers. I am also unsure what sort of limit to apply to blocks retained this way. An absolute limit would be easy, but not really what is wanted, a limit per directory wouldn't be so easy, but is closer to being satisfactory. Possibly the system should just reset the sticky bit whenever a new block is added to a directory, and leave it to some SU to decide?

One strange thing that has occurred lately, is that the system has been executing the printf("issig") in sig.c, which is supposed to be impossible. Does this occur on your system, or is it something I have done? I haven't looked for the cause yet (it doesn't seem to do any harm, so there is no urgency).

Another bug that I have fixed (and forgot above) is that two lines in exit() were in the wrong order. The code used to be

```
noproc=1;
p->p_stat=SZOMB;
```

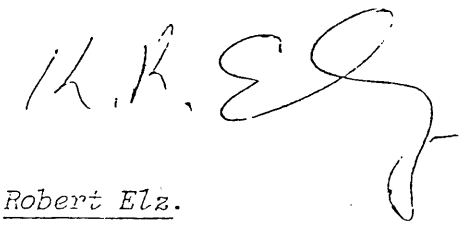
If a clock interrupt occurs between the two lines, clock() may try to alter the priority of the exiting process, causing "panic: remrq" when it can't find the process on its assigned queue. Reversing the lines should cure it.

I would appreciate hearing of any recent changes you have made. Did you get any explanation from anyone at Bell for the strange way disksort() behaved? If so I would love to know it. If you want a tape with any or all of these mods on it, just let me know and I will send it (I still have the tape you gave me, which must be returned sometime). You should be able to get a short message to me by mail to ianj (hope you don't mind Ian) containing a request that he forward it to me via Sydney, but it probably won't be much quicker than the ordinary postal service, (I don't log on to Sydney often). I also intend to send a copy of this letter to the local UNIX newsletter (AUUGN) so the rest of the country can learn what I am doing. If you reply, and don't object, I will send a copy of your reply too.

Finally, you may recall that I asked you about 'scald' when I visited you, but whoever was responsible for it wasn't around. Could you pass on the following request to that person (I don't think that you mentioned a name).

We would like to obtain a copy of 'scald'. Can we get it from you, or do we have to approach the original authors? (Stanford)? If the latter, can we get a 'pi' running version from you if we get the other first? If you can give us a copy, do you want me to send a tape, or would you prefer us to send the value of a tape and let you supply one. Naturally we will pay any postage/handling charges. Thanks,

Yours sincerely,



cc: Peter Ivanov, AVVON Editor

Robert Elz.

Comment from Dave Horsfall

The following is a comment from Dave Horsfall, regarding the letter reprinted in the !AUUGN section of the last issue of AUUGN (AUUGN Volume 15 No 5, pp 75-76)

That was certainly a blast from the past! For what it's worth, I still stand by what I said, unless a better explanation is offered...

Dave Horsfall
dave@esi.com.au

The Internet - How to Connect in Australia: Service Provider Choices and Costs

Frank Crawford

Australian Nuclear Science and Technology Organisation
<Frank.Crawford@ansto.gov.au>

1. Introduction

With the huge growth in the number of people wanting connections to the Internet, there has been an equal growth in the number of groups offering connections to the Internet. Not all of these groups are offering the same types of service, or even the same pricing structure. Even for experienced Internet users it can be confusing trying to sort between the different offers.

In reality, there are a number of different types of connections to the Internet, and there are a number of different ways to obtain one. In many cases, you may have two or three different services available to you, one from your employer, one from your home and a third as a fallback. Obviously, this would only be the case if a connection to the Internet was crucial to you.

To understand the types of connections available, it is necessary to have some knowledge of Internet facilities. There are basically two different connection mechanisms: direct IP connection, and message connections. The choice between these two is very much based on the type of traffic that can be forwarded over the connection.

2. Types of Connection

A direct IP connection, is a full network connection. It allows the use of all Internet protocols now and in the future, and involves the passage of network traffic at the lowest level. It may (and usually does) involve a connection through a router, *i.e.* a device that routes IP packets from one network to another. Often this is a dedicated hardware device, but it can also be a general purpose computer. The physical connection to the Internet is generally over a Telecom service (at least in Australia) such as a leased line or an ISDN connection. While the local network is usually based on an Ethernet or Token Ring network technology (although, again, this is changing as new technologies are developed).

A message based connection, on the other hand, only allows certain message types to be passed from the Internet to a different network via a gateway. The local network protocol can be based on such protocols as UUCP or ACSnet/MHSnet, although various other PC connections are also common. The types of traffic that can be passed is generally limited, and commonly only consists of *email* and *news*, although mechanisms often exist to allow the use of *ftp* (via *ftpmail*) and similar facilities. In particular, most of the messages are generally *store-and-forward*, *i.e.* can be held on the gateway before being passed on.

There is one final type of Internet connection, that is, having an account on a host with an IP connection. The primary reason for mentioning this, is that, while all Internet facilities may be available, you may not be able to use some, as your *terminal* may not support them (*e.g.* X based applications with a terminal emulator). This is especially important when choosing how to connect to a Service Provider.

3. Getting a Connection

As an individual, there are three ways to get an Internet connection:

- enrol in a university course which involves having an account,
- be employed by a company with a network connection, or
- obtain an account on a public access machine.

For an organisation, obtaining a network connection is also limited to three options:

- be part of a multi-national, which has an overseas connection,
- connect directly to AARNet (usually limited to big companies), or
- connect via an Internet Service Provider.

The bulk of this paper will be devoted to the different options in obtaining a network connection. Much of this is based on the *Network Access in Australia FAQ* (Frequently Asked Questions) by Zik Saleeba. This FAQ is updated approximately monthly, and posted to the newsgroup *aus.net.access* (among others). It can also be obtained by FTP, from any site which archives FAQ's (e.g. *archie.au*) and by World Wide Web at:

http://www.cs.monash.edu.au/~zik/netfaq.htl

or

ftp://archie.au/usenet/FAQs/alt.internet.access.wanted/Network_Access_in_Australia_FAQ

If you don't have access to a connection in order to obtain a copy, then contact either one of the providers listed here, or contact the AUUG secretariat and ask if they can send you a copy.

3.1 Public Access Systems

For those who only need or want access to a machine providing Internet services, there is a wide variety of choices, in location, cost, level of support and type of connection.

In terms of national organisations there are quite a number, who offer a common service throughout Australia, these include:

Organisation	Email Phone	Charges[2] Comments	Full IP
Interconnect Australia Pty Ltd	info@interconnect.com.au 008 818 262	$95.00+$20/month+15c/minute	Yes
DIALix Services	justin@dialix.oz.au	1c/min, 1c/1000 bytes email/ftp	Yes
OzEmail Pty Ltd	support@ozemail.com.au 008 805 874	$25+$10/hr ($5/hr after 9pm) Specialise in PC connections	Yes
APANA	info@apana.org.au	varies Group of independent operator	some
Pegasus Networks Communications Pty Ltd	support@peg.pegasus.oz.au 1 800 812 812	$95+$20/month+time charges Access through AUSTPAC	Yes
ACS	info@acs.org.au (02) 211 5855	$50+excess charge For ACS Members	Yes
AUSNet Services Pty Ltd	tomk@kakadu.com.au (089) 48 3555	? New organisation	Yes

Aside from the national organisations, there are a large number of organisations covering a single "local" area (*e.g.* a metropolitan region). This is probably the most volatile area, at present, and it would be best to obtain the latest FAQ to find who can provide such a service locally. For the computer hobbyiest, a local connection is often a good choice, as you can develop contacts with the operator, and often the rates are a bit lower.

3.2 Internet Connection Service Providers

At the other end of the scale, there are many providers who provide a full IP connection to your host or network. The best description of these comes from the *Network Access in Australia FAQ*, part of which is reproduced here:

2. These rates are from the *Network Access in Australia FAQ*, Version: 2.10, Last modified: 1994/11/15.

>From: OzNetFAQ Section 7
Subject: Section 7: What network organisations are there in Australia?

(Paragraphs in quotes come from the organisations themselves, unquoted paragraphs are my own guesses[3])

---------- AARNet ----------

AARNet is the Australian Academic and Research Network. It's currently the major Australian Internet-connected computer network, and all the other organisations mentioned in this FAQ get their network connections from it. You must have a "compatible interest with" the education, academic or research interests to be an affiliate member of AARNet. It does not provide public access or commercial networking services except through the other organisations mentioned here.

"AARNet is the Australian Academic and Research Network. AARNet is a private telecommunications network service operated by the Australian Vice Chancellors' Committee (AVCC) as a service to the participating member institutions of the AVCC and the Commonwealth Scientific and Industrial Organisation (CSIRO). Its objective is the provision of dedicated telecommunications services in support of members' research, academic and service activities. In addition, AARNet provides telecommunications services to other organisations under this general brief."

Organisations interested in a connection to AARNet should contact the Customer Services Manager for the latest information or fetch a copy of the document "Connecting to AARNet" available from:

ftp://aarnet.edu.au/pub/doc/affiliate.*

Contact --->	Brenda Aynsley, Customer Services Manager
Email ----->	<Brenda.Aynsley@aarnet.edu.au> or <admin@aarnet.edu.au>
Fax ------->	(06) 249-1369
Voice ----->	(06) 249-4968
Snail ----->	GPO Box 1142, Canberra ACT 2601, Australia

---------- ADAM ----------

"ADAM has steadily built up in size over the years to become the largest BBS in Australia. It has the infrastructure required to cope with the increasing demand for dial-up information services. ADAM imports 2000 new files per week, not counting duplicates, and creates its own CD-ROMs. It also sells V32bis/V42bis modems at cost price. ADAM has two IP links - a 28.8k link for Mail and News, and a 14.4k link for live IP. These links are full bandwidth, not shared, as is common on other systems. The speed is further increased by the majority of files already being on the system."

Area ------>	Adelaide
Contact --->	Greg Hicks
Email ----->	Stephen White <steve@adam.com.au>
Voice ----->	(018) 824 648

3. *i.e.* Zik Saleeba's guesses.

---------- Australian Computer Society ----------

The Australian Computer Society is providing Internet access for members of the society only. Mail and news are free, but full IP access costs $200 per year.

---------- Apana ----------

APANA operates an Australia-wide network with over three hundred machines (belonging to individual members of APANA) connected to it. All members (as far as we can tell!) have set up their link and their machine(s) so that they can send/receive e-mail and news. Commercial use is not allowed.

In addition, over 100 of these machines have full connectivity (in most cases, permanently) to The Internet via the APANA IP Network, so that their users can use ftp, telnet, talk, IRC to each other and the rest of The Internet, and access archie, gopher and WWW servers around the world. Internauts can access APANA servers.

The other two hundred or so use dialup UUCP to transfer news/mail in batches, typically once or twice a day. In a number of cases, remoteness from major cities such as Adelaide, Brisbane, Canberra, Melbourne or Sydney precludes permanently connected phone lines (which is only economically feasible within the same area code). In other cases, people prefer the simplicity and cheapness of UUCP.

Over ten APANA members (individuals) supply accounts for public access, as listed elsewhere. Most of these also have direct IP access.

APANA's fee scale for full membership in 1994 is as follows:

Joining fee (once only)	$20
Annual membership	$50

Affiliate membership (for use of the APANA Network via a full member's machine) involves no fees to APANA, but will normally involve a charge of $50-100/year to the owner of the machine.

E-mail <info@apana.org.au> for an automatic response giving more details about APANA.

Area ------>	Adelaide
Contact --->	Mark Newton
Email ----->	<adelaide@apana.org.au>
Voice ----->	(08) 373-5575 (h)

Area ------>	Brisbane
Contact --->	Phil Homewood
Email ----->	<brisbane@apana.org.au>
Voice ----->	(07) 355-4162 (h)
Pager ----->	016-070 #671-8727

Area ------>	Cairns
Contact --->	Dave Freeman
Email ----->	<cairns@apana.org.au>
Voice ----->	(070) 51-4110

Area ------>	Canberra
Contact --->	Craig Gibson

Email -----> <canberra@apana.org.au>
Voice -----> (06) 292-5366 (voice/fax)

Area ------> Geelong
Contact ---> Mark Gregson
Email -----> <geelong@apana.org.au>
Voice -----> (052) 21-3450

Area ------> Hobart
Contact ---> John Lamp
Email -----> <hobart@apana.org.au>
Voice -----> (002) 23-1366 (w), (002) 34-3913 (h)

Area ------> Melbourne
Contact ---> Warwick Hockley
Email -----> <melbourne@apana.org.au>
Voice -----> (03) 571-0484

Area ------> Sydney
Contact ---> Matt Perkins
Email -----> <sydney@apana.org.au>
Voice -----> (02) 689-3469

Area ------> Wollongong
Contact ---> Russell Noble
Email -----> <wollongong@apana.org.au>
Voice -----> (042) 96-5015 (h)

---------- Australia OnLine ----------

Australia online provide both interactive SL/IP access to the internet and UUCP feeds. They also provide access to CompuServe U.S. (though CompuServe in itself is quite expensive). They provide full support to customers, which may be very useful to less experienced network users. Pricing is $7.80 per hour on-line, with an extra $1.80 per Mb of data transferred. One megabyte per hour is covered by the on-line costs. The minimum on-line charge per month is $15.60. Registration is $95 for SL/IP and $10 for CompuServe only.

"We are committed to ensuring that our modem pool always has sufficient spare capacity to ensure that our customers can successfully connect whenever they choose.

ISDN bandwidth is dedicated to *interactive* users so as to ensure that our interactive users aren't suffocated by heavy corporate batch transfers."

Area ------> Melbourne
Contact ---> Michael Bethune
Email -----> info@ozonline.com.au
Voice -----> (03) 888-2622

---------- AUUG ----------

The Australian Unix User Group has long been a popular club for UNIX gurus. The Canberra chapter of the group offers a volunteer-supported dialin system for its members. A dial-on-demand UUCP system is used to connect to the net.

"The Canberra Chapter of AUUG Inc. (UNIX and Open Systems Users in Australia - see group aus.auug) runs a dialup service for members. The services is based around a Sun 3/160 workstation and provides logins to UNIX for e-mail and news connectivity and for general UNIX shell access. We also provide UUCP feeds for news and mail. News and mail user agents for MSDOS and Windows are also available. The service is available free to all AUUG Canberra chapter members. AUUG membership is around $90 per year for an individual and includes journals and access to other national and local chapter services."

Area ------> Canberra
Contact ---> John Barlow
Email -----> <john.barlow@anu.edu.au>
Voice -----> (06) 249-2930 (w)

Area ------> Canberra
Contact ---> Peter Wishart
Email -----> <pjw@canb.auug.org.au>
Voice -----> (06) 261-2900 (w), (06) 247-2996 (h)

---------- Brisnet ----------

Brisnet is another non-profit networking organisation. They operate in the Brisbane area currently, and claim to have a large and mature network. As with most hobbyist organisations commercial use is not allowed.

"BrisNet is a non-profit association which aims to provide cheap(ish) access to electronic mail and USENET news in the Brisbane and South-East Queensland area. We provide a dial-in USENET environment, UUCP feeds, dial-in IP, and permanent IP connections. Locally developed software is available to help improve access."

Area ------> Brisbane
Contact ---> Rhys Weatherley
Email -----> <rhys@brisnet.org.au>
Voice -----> (015) 576-698 (w)

Area ------> Brisbane
Contact ---> John Lemon
Email -----> <john@ozspace.brisnet.org.au>
Voice -----> (07) 372-5296 (h)

---------- CSTPL ----------

Commerical Software Training Pty Ltd is an international networking setup which offers IP feeds and UUCP feeds on a commercial basis. One area of interest is in providing network feeds to developing countries and outback areas.

"CST Pty Ltd is now a fully commercial operation, and an AARNet Value Added Reseller, and is thus able to connect others to the network. This includes full domain registration assistance and MX record handling. cstpl.com.au is extending its operations and research into Queensland as well as seeking to provide network feeds to developing countries. The special area of interest is Asia, with on going research in China, and connections to Pakistan. The Queensland project is enabling Cairns, Mt Isa, Townsville, Mackay and Rockhampton to be connected to the Brisbane server via ISDN, providing internet access for users, with servers in all cities. All options will be available to users as a local call. The time frame for completion of all links is early 1995."

Contact ---> Robert Chalmers
Email -----> <robert@cstpl.com.au>
Snail -----> 22 Minster Street, 4740

---------- Compuserve Pacific ----------

Compuserve provide a pay-by-volume commercial email service. Compuserve were one of the original email systems in the USA and are still one of the largest. Compuserve Pacific is linked to the US Compuserve, and from there to the internet through a gateway. They have dialins in Melbourne, Sydney, Adelaide and some other cities. People on Compuserve can be contacted using an address of the form: nnnn.nnnn@compuserve.com, where nnnn.nnnn is the person's Compuserve user id.

Voice -----> (008) 025-240

---------- connect.com.au ----------

Connect.com.au now operate in most capitals. They offer feeds to other and support all the major protocols. Interactive accounts are not available. Charging for ninety minutes of connect time per day would total around $2000 per year.

"Connect.com.au now has hubs in Melbourne, Sydney, Canberra, Perth, Adelaide, and Brisbane. All access to connect.com.au is protocol based; we do not offer interactive access. We currently support the protocols: uucp, SL/IP, and PPP. Access is via intermittent or permanent modem or ISDN connections. We are happy to carry interstate traffic over our network as alternative to installing point-to-point links around the country. We also offer full access to the Internet and are willing to act as a mail and news gateway."

Email -----> <connect@connect.com.au>
Fax -------> (03) 528 5887
Voice -----> (1 800) 818-262, (03) 528 2239
Snail -----> 29 Fitzgibbon Crescent, Caulfield Victoria 3161

---------- Corinthian Engineering ----------

Corinthian Engineering P/L offers a network hub service Australiawide. Like connect.com.au they do not offer login accounts, instead they are aimed at providing permanent network feeds. While not forthcoming with pricing information they are "primarily aimed at the commercial or higher volume user requiring a premium service, full technical support, 24 hour 7 day availability with known costs". They offer a number of extra services including name server management and packet filtering at no extra cost.

Contact ---> Richard Perini or Dave Dodd
Email -----> <rpp@ci.com.au> or <dave@ci.com.au>
Fax -------> (02) 906 1556
Voice -----> (02) 906 4333

---------- Dialcom ----------

Dialcom is a computer network service provided by OTC. I have no details on it apart from the name.

---------- DIALix ----------

"DIALix Services is a Network Affiliate Member of AARNet and runs public access sites in Perth, Sydney, Melbourne, Adelaide, Brisbane and Canberra. Internet access is available for both business and personal users from $10 with most services available at 1 cent per minute of connect time.

"Users connect to DIALix through multiple dial up lines to use e-mail, usenet news, ftp, telnet, talk, finger, irc, gopher, rlogin and so on. Currently only Unix shell and UUCP are offered; SLIP and PPP should be available by the end of the year.

"Log in on any DIALix system as visitor for further information or on-line registration."

Area ------>	Perth, Sydney, Adelaide, Melbourne, Brisbane, Canberra
Contact --->	Justin Sullivan
Email ----->	<justin@sydney.DIALix.oz.au>
Voice ----->	(02) 948-6995, (09) 244-2433, (1800) 64-2433, (0411) 114-388, (018) 491-642, (0414) 747-574
Snail ----->	PO Box 7, Fairlight NSW 2094 or P.O. Box 153, Doubleview WA 6018
Web ------->	http://www.dialix.com/

---------- Fidonet ----------

Fidonet is a world-wide network of bulletin-boards (BBSes). Network topology is highly variable due to the hobbyist nature of the nodes. It runs on a different network protocol from Usenet, but provides a similar style of electronic mail and news service. While FIDOnet <-> Usenet gateways do exist crossover between Usenet and FIDOnet is not particularly high. In general FIDOnet is somewhat less reliable and slower, although this is not universally the case. FIDONet BBSes also offer many other services like large file areas, online games, and chat. There are hundreds of FIDOnet sites around the country so I won't attempt to cover them all here. For more information check the state hub contacts that are listed every month in Australian Personal Computer magazine.

---------- Geko ----------

Geko provides network access in the Sydney area, both UNIX shell-style accounts and SL/IP access. Their prices are very low for a commercial service with a shell account costing only $15 per month after the setup cost of $20. Dialin SL/IP is a little more expensive at $40 per month plus $80 setup fee, but still quite cheap compared to other providers. Permanent SL/IP and high-speed connections are also available. A very good ratio of five users per modem is maintained.

Area ------>	Sydney
Contact --->	Dez Blanchfield
Email ----->	<info@geko.com.au>, <sales@geko.com.au>
Voice ----->	(02) 968 4333, (018) 412 666
Fax ------->	(02) 968 4334

---------- Hedland College ----------

Hedland College are offering on-line mail and news access, with a local ftp area.

"This service will be free until mid-January 1994 during stabilisation of the service. Currently a single modem is on line, but more are being added soon. One line will provide a slip connection and a mail/news Pop server is being added in December for off-line reading and replying. A full Internet service (telnet, ftp etc) is planned for 1994.

"Once the service has been stabilised, there will be a charge for this service. Details of probable charges are not yet available but will be made available in late December or early January."

Area ------>	Western Australia
Contact --->	Robert Hart

Email -----> <hartr@hedland.edu.au>
Voice -----> (091) 721-681
Snail -----> South Hedland WA 6722

---------- Hilink Communications ----------

"HiLink Communications is a full Internet access provider operating in Melbourne. We provide full internet access via SLIP/CSLIP/PPP connections for individuals and businesses, using high speed modems or ISDN. Online charges are kept to a minimum, to allow users to browse the Internet at leisure, rather than always being mindful of the clock ticking up dollars. A WWW caching proxy server on our site reduces the cost of WWW usage to our customers, by keeping local copies of recently requested documents.

"HiLink Communications does not provide Unix shell access, but does provide an installation kit of software to run on Mac or MS-Windows computers. The kit contains all that is needed to use E-mail, Usenet News, World Wide Web, Archie, IRC, FTP and Telnet."

Area ------> Melbourne
Contact ---> Daniel O'Callaghan
Web -------> http://www.hilink.com.au/
Email -----> <info@hilink.com.au>
Voice -----> (03) 528-2018, (015) 854-852
Snail -----> 6/1 Maysbury Ave, Elsternwick, Victoria, 3185

---------- Hunter Networking Association ----------

The Hunter Network Association is a cost-recovering, cooperative operation of Amateur computer networking enthusiasts, who are interested in realising a non-profit Internetwork in the Newcastle/ Lake Macquarie/Hunter Valley region. A sizeable portion of the membership are also in APANA.

Area ------> Newcastle
Contact ---> Michael Brown
Email -----> <mbrown@scorch.hna.com.au>
Voice -----> (049) 62 1783
Snail -----> PO Box 49, Broadmeadow NSW 2292

---------- iiNET Technologies ----------

iiNet provides commercial accounts, but also not-for-profit services to schools. It also provides many feeds to hobbyists.

"iiNet Technologies is a small, Perth based firm whose goal is to network companies, individuals, schools and organisations in Western Australia. We operate as an Internet Service Provider, offering dial up shell, SL/IP and PPP accounts, and we also operate as a carrier, offering permanent live connections or UUCP at affordable prices."

iiNet are apparently offering accounts for a fee of $25 per month, plus volume at $2.00 per megabyte internationally and $1.50 for domestic traffic.

Area ------> Western Australia
Contact ---> Michael Malone
Email -----> <iinet@iinet.com.au>
Fax -------> (09) 307-8414
Voice -----> (09) 307-1183

Snail -----> PO Box 811 Hillarys 6025, WA

---------- ILB Computing ----------

"ILB Computing has a dialup site in Wollongong. Phone Numbers are (042) 25-8099 2 lines. Using MHSnet software running news/mail. 1.2G of news online (i think its about 3 weeks)."

Area ------> Wollongong
Contact ---> Kevin Withnall
Email -----> <kevin@ilb.com.au>
Fax -------> (042) 26-4986
Voice Msg -> (016) 28-5942
Voice -----> (042) 26-1305

---------- Informed Technology ----------

"We are a mail affiliate to AARNet and maintain a constant MHSnet connection to uniwa.uwa.edu.au. We take the full newsfeed and offer interactive UNIX logins as well as SLIP, PPP, UUCP and MHSnet connections. We have full time SLIP connections to Perth BBSes including Omen and CD-ROM Support."

For more information email info@it.com.au

Area ------> Perth
Contact ---> Stephen Darragh
Email -----> <srd@it.com.au>
Voice -----> (09) 245-2279
Snail -----> P.O. Box 688, Claremont, WA 6010

---------- Internet Access Australia Pty Ltd ----------

Internet Access Australia was seen to be doing a good trade at the Victorian PC show. They offer mainly dialin SL/IP and PPP access, and sell a basic internet pack for $99 including Trumpet/Winsock and 6 hours connect time. After that the charge is $7.50 per hour. They have a never full modem policy.

Contact ---- Anthony Bodin
Email ------> <iaccess@iaccess.com.au>
Fax -------> (03) 563 7854
Voice -----> (03) 576 4222
Snail -----> 1st Floor 769 Centre Road, Benleigh East, Victoria 3165

---------- InterConnect Australia ----------

InterConnect provides public access dialin machines in most major cities and is closely linked to the network service provider connect.com.au. Their charging system includes $95 registration, $20 per month, and $9 per hour on-line, with two hours per month and 1Mb of storage supplied from the monthly fee. They also have a rather surprising $1 per megabyte FTP charge. Possibly this presages the coming AARNet charges.

"InterConnect Australia is now providing dialup interactive access to the Internet as a local call in Melbourne, Sydney, Brisbane, Canberra, Adelaide and Perth. We are the first service provider to deliver national access to the Internet at local call telecom rates. A 1-900 number will be available soon to provide economical access from anywhere in Australia outside of the major cities."

Email -----> <info@interconnect.com.au>
Voice -----> (1-800) 818 262 (toll free), (03) 528-2239.
Snail -----> 29 Fitzgibbon Crescent, Caulfield, Victoria.

---------- Keylink ----------

Keylink is Telecom's answer to public computer network access. One happy user reports that Keylink are very helpful, another comments "They seem to want money for *everything* they do". Their dialin is a 008 number, and they are accessible through Austpac. You can get to them via the internet by using one of the gateways, eg. "telnet austpac.aarnet.edu.au", nui 131400. Charges are apparently around the $20 per hour mark. Since keylink is x.400 based, it does not provide telnet, ftp, rlogin etc.

Email -----> </G=CUSTOMER/S=SERVICE/O=CUST.SERVICE/@telememo.au>
Voice -----> (008) 807-324

---------- Kralizec ----------

Kralizec is a commercial public access site which is interested mainly in providing a service to end users, rather than feeding other sites. The operator places a high importance on high quality service and personal response. It features a large software library, including a lot of Linux software and a 6-platter CD-ROM changer. Each new member receives a 26-page Kralizec Users Guide.

"Kralizec is expanding and expects to obtain a direct Internet link soon"

Area ------> Sydney
Contact ---> Nick Andrew
Email -----> <nick@kralizec.zeta.org.au>

---------- Magnadata Public Access Internet Services ----------

Magnadata provides a commercial internet service based around SLIP/PPP. They claim that flexibility is their prime aim, and offer various networking services in addition to standard user services.

"Our charging is radically different from most of the large service providers, in that we don't have any charge for time spent on-line. It is because of these sort of charges that networks like Compuserve are a sort of electronic wasteland, where everyone works offline, and then uploads - there are no _people_ around, and people is one of the most important things about the Internet. At Magnadata, there are no charges for time spent on-line."

Area ------> Sydney
Email -----> <info@magna.com.au> URL - http://magna.com.au
Fax -------> (02) 264 7308
Voice -----> (02) 264 7326
Snail -----> P.O. Box A770, Sydney, 2000

---------- Message Handling Systems (TMX) ----------

The Message Exchange is the name under which the better-known Message Handling Systems is providing networking services to the public. Message Handling Systems is one of the original network providers in Australia. They have taken over maintenance of the SUN-III software which was the fundamental basis for Australian networking (good ol' ACSnet and the .oz domain!) until AARNet came along.

TMX now market the descendant of this software as MHSnet. They also provide network feeds for the

ACSnet network under the TMX name. TMX provides MHSnet and UUCP connections and imports "Clarinet" news. Charging is based on connect time only. Gateways are available for ftp and internet access as well as full or partial newsfeeds and email. TMX don't offer interactive accounts but do offer cheap single user accounts using offline readers.

For further information mail enquiry@mhs.oz.au.

Contact ---> Elaine Pensabene
Email -----> <elaine@mhs.oz.au>
Voice -----> (008) 806-962, (02) 550-4448

---------- Microplex ----------

Microplex offers interactive login accounts and UUCP network feeds to the public. Shell accounts have access to all Internet services at a cost of $25 setup fee plus $23.50 per month. There is also a discount rate of $234 per year. They have a high bandwidth link to AARNet, and their prices compare quite favourably to other commercial services with comparable features. Their dialin capacity is very impressive - meaning there should be less problem with getting engaged signals.

UUCP feeds cost $45 for setup plus $25 to $90 a month depending on connect time, and do a special deal for a UUCP feed plus a shell account. Contact them for further details.

Area ------> Sydney
Email -----> <info@jolt.mpx.com.au>
Fax -------> (02) 888-2328
Voice -----> (02) 888-3685
Snail -----> P.O. Box 627 Marsfield NSW 2122

---------- OzEmail ----------

OzEmail is a company offering a complete client interface to the internet via their easy-to-use Windows client software which they sell for $80. They provide internet mail access, Usenet news, access to AAP, "Newsbytes", and their own message base. Online charges are to be $2 an hour for mail and $10 an hour for interactive use. Local access is available in most capitals. They also offer ISDN network feeds to companies.

Email -----> <support@ozemail.com.au>

---------- Pegasus ----------

Pegasus is a "subscriber supported" setup. Pegasus sell public access to their own networks, as well as UUCP access to the Internet. They are members of the Association for Progressive Communications, and hence have a bent towards environmental and other issues. They have full Internet access. Cheaper access is available through the use of their "Messenger" offline reader. The charging system starts at around $25 per month, time charging at 10 cents per minute. A 1-800 support hotline and user manuals are available.

A unique form of access they provide is through AUSTPAC, allowing subscribers to connect via 2400 baud modem from anywhere in the country.

"Pegasus Networks provides an online communication and information service to subscribers across Australia. The network was established in 1989, offering services specifically to those with interests in the environment, development, education, media, health, and human rights. It has a rapidly growing user base of individuals and organizations (non-government, government, and private) involved in

community, development, education, aid, research, media, management and policy. Pegasus is a founding member of the international Association for Progressive Communications (APC)."

Email -----> <support@peg.apc.org>
Voice -----> 1 800 812-812, (07) 257-1111
Snail -----> PO Box 284, Broadway Q 4006

---------- PPIT Pty Ltd ----------

PPIT is a commercial setup which offers only non-interactive network services but at low rates. Online services such as telnet, ftp, irc, gopher and World Wide Web are not available. On the other hand at $100 per annum for a 30 minute per day mail/news account they are one of the cheaper commercial providers.

"AccServ is a commercial operation of PPIT Pty. Ltd. which aims to provide affordable access to the InterNet for individuals who may not have the expertise, desire, or funding to maintain their own InterNet connection. AccServ is connected to the InterNet through TMX (The Message eXchange) and ultimately the AARNet (Australian Academic and Research Network).

"AccServ provides a simple menu-based interface to: Electronic Mail (e-mail) allowing you to send to (or receive from) almost anywhere in the world; Usenet News; "Archie" file searches; and NetFTP (anonymous file fetches from public access InterNet file servers). No knowledge of Unix or network complexities is required."

Area ------> Melbourne
Contact ---> Paul Pavlinovich
Email -----> <sales@accserv.ppit.com.au>
Voice -----> (03) 747 9823

---------- Pro-Net ----------

Pro-Net are a commercial setup with a slightly unusual approach. They, like Pegasus, are using a toll-free dialin number to allow calls from anywhere in Australia to be charged at the local rate. They have an interesting menu interface to their system and claim to have extensive, up-to-date archives. An on-line chat system with conference areas is also provided, as well as storage for databases. They are also importing the "Newsbytes" independent computer industry news service; possibly the only network in Australia to do so.

"Charges are now on application. Various tariffing policies. Now offering X.400 mail and Novell Network interconnection. People owning Novell Network Fileservers can now interconnect their local LAN to Pro-Net. Now offering EDI services Nationally. Educational tariffs now available. Beta Testing Multimedia mail services with customised Front-End software for DOS and WINDOWS."

Fax -------> (03) 349-1257
Voice -----> (03) 349-2266
Snail -----> P.O Box 186, North Carlton, Vic, 3054

---------- Winthrop Technology ----------

"Winthrop Technology offer general bureau services on an Ultrix system. Since we are on AARNet, accounts on this system provide full AARNet access.

"Accounts are available on one of two charging systems: a) You can pay a flat fee of $50 per month b) Casual, pre-paid access. This is charged at $2.50 per connect hour.

"In addition to accounts on our bureau system, Winthrop Technology also offer Mail Affiliate links to AARNet. Users with their own Unix system can get mail and news feeds. The connection can use UUCP, MHSnet, or local SLIP. This does not offer full SLIP to AARNet. Mail Affiliates are charges $150 per month for their connection and mail/news feed; in addition, AARNet charge $1000 per annum for the service."

Area ------>	Perth
Email ----->	<kaye@uniwa.uwa.edu.au>
Fax ------->	(09) 382-1688
Voice ----->	(09) 380-3698
Snail ----->	University of W.A., Nedlands W.A. 6009

3.3 Specialised Services

It is worth noting that with the growth of the Internet in Australia there are a number of specialised service providers springing up. Some of these are listed above, however, it is worth giving them special mention. These include:

- ACS-link, specialises in connections for ACS members. In fact, this service is provided as part of the Pegasus Network.
- schoolsNET, specialises in connections for schools. They can be contacted by email as <info@schnet.edu.au> or telephone on (03) 214 0125.
- Pegasus Networks Communications, a founding member of the Association for Progressive Communications, and are interested in offering links to community groups.
- Australia OnLine, who specialise in providing connections for business and are investigating such commercial projects as funds transfer over the Internet and electronic publication.
- APANA, an organisation of computer enthusiasts, who have established a network throughout Australia. Many have full IP connectivity and some offer public access to the Internet through their machines. They often provide connectivity to locations that would not be available otherwise.

3.4 Connecting Directly to AARNet

Finally, large organisations often need to connect directly to AARNet, and while AARNet are not directly in the business of general Internet connections, they will do so. Obviously, this is only sensible for organisation who have internal technical expertise, as AARNet will not offer support for such organisations (they are stretched enough, just managing the AARNet network).

In general a connection to AARNet is either directly into the regional hub, or through one of the local universities, for outlying regions. AARNet have two different charging schemes, one, a flat rate depending on your network bandwidth (show below), and the second a usage based rate, mainly designed for Value Added Resellers (VARs). Further details can be found from the AARNet Customer Services Manager (see AARNet in the section above on Internet Connection Service Providers).

TABLE 1. AARNet Annual Access Fees as at 1st June 1994

Fee $'000	Access speed	Fee $'000	Access speed
5	dial in ≤ 9.6Kbps	35	256Kbps
8	9.6Kbps	40	512Kbps
15	19.2Kbps	45	1Mbps
20	32Kbps	50	2Mbps
25	48Kbps & 64Kbps	60	10Mbps
30	128Kbps		

4. Conclusion

Connecting to the Internet is getting much more complicated, with the breakup into various specialised groups, a wide range of charges and support options and a variety of connection options. This is then exacerbated by the rate of change of the vendors, many of whom are just starting now, and many of whom may not be around in a few years.

If you are planning to connect to the Internet, you need to look at the following issues and then select a vendor who can meet your requirements:

- type of connection: dialup, ISDN, leased line,
- type of access: email and news or full IP,
- level of internal support: how much can you do yourself,
- level of external support: how much will the provider do,
- how much are you willing to pay: you get what you pay for.

While this may seem complicated, it is no different to selecting any other service for your business, for example, the current campaign between Telecom and Optus.

No matter what you decide, once you get reliable access to the Internet, you will find it a tremendously valuable tool for your organisation, be it as a means of contacting your clients, through email, or as a way to find new and useful information, through various online services.

5. References

[1] Zik Saleeba, 1994/11/15, *Network Access in Australia FAQ (Version: 2.10)*, http://www.cs.monash.edu.au/~zik/netfaq.html.

Securing an Internet Connection

Adrian Booth

Arena Technology

ABSTRACT

These is a summary of the talk I gave at WAUG's November meeting. It discusses an Internet connection established by a large organisation, with particular emphasis on the security aspects of the connection.

N.B.: I am not at liberty to say whose Internet connection this is. For simplicity, I refer to the organisation as WidgetCo throughout this article.

1. Why did WidgetCo want a connection?

WidgetCo had committed to buying an important turnkey system from an international vendor. The vendor of the system wanted remote access to the system in order to perform bug fixes, product updates, and quality assurance in the field.

Although these requirements could have been met by a dialup modem, several issues were raised:

- The security risks inherent with dialup access;
- The cost and overheads associated with a dialback solution;
- The difficulty of budgeting for (international) telephone calls;
- The fact that a dialup system only solved the *project* connectivity problem, instead of providing WidgetCo with a general connectivity solution.

This led to WidgetCo exploring the possibility of an Internet connection.

2. But the Internet is dangerous!

Security was identified early as the overriding consideration. An Internet connection had to be demonstratably at least as secure as a dialback solution (but with similar or greater functionality) to be considered. Also, at any further stage of the project, any decisions that were taken were to err on the side of security.

WidgetCo recognised that it did not have the inhouse expertise to evaluate, let alone construct a secure Internet connection. Several third parties were queried about their ability to supply a "sufficiently secure" connection.

Of these third parties, only Uniq Professional Services could both supply a secure connection, and immediately meet WidgetCo's requirement for X Windows access across the connection. For these reasons Uniq were selected to install it.†

3. Solution: Build a Firewall

An Internet *firewall* is a single point of contact between one network and the Internet. It typically screens out unwanted and/or unauthorised traffic, and is made as secure and reliable as possible.

A quote from Mark Twain sums up the philosophy nicely:

> *Keep all your eggs in one basket - and watch it carefully!*

† No, I don't get anything from Uniq for saying this.

4. What type of firewall?

WidgetCo's basic options were:

4.1. A router (a "choke")

A router would form the endpoint of WidgetCo's physical connection to it's Internet provider. This router would be configured with access rules that would only allow nominated traffic: for example, telnet traffic from the vendor of the turnkey system.

A router tends to be less flexible, difficult to administer, very good at filtering packets, and provide poor logging.

4.2. A Bastion Host (a "dual-homed gateway")

A computer system (often Unix-based) that would run a suite of gateway applications, controlling access through access rules.

A bastion host tends to be poor at filtering packets, but flexible, easier to administer, and provide very good logging.

WidgetCo chose to use a combination of a router and a bastion host. The router discards unauthorised traffic, while the bastion host performs further authorisation checks on incoming traffic.

5. The Router

The router is configured to allow only nominated types of traffic, and to allow traffic only to the firewall. There are several important configuration steps. Most of these consist of turning off several "on by default" features, such as IP source routing, ICMP Redirects, and the ability to telnet to the router.

6. The Bastion Host

The bastion host is a Unix workstation with many security patches applied. It has two network interfaces: one to WidgetCo's internal network, and one on a private network shared only by it and the router. It is a stripped-down, minimal system: there is no C compiler, no NFS, no NIS, no printing, no man pages, etc., and it does not advertise routes to the internal network. The kernel does not automatically forward packets between its interfaces; all packets that pass through the bastion host are explicitly copied by gateway programs.

All unused ports and services on the bastion host are disabled (although they are already not available due to the router's configuration). Ports that are enabled run a gateway application that authorises users via a one-key password scheme before allowing them access to the internal network.

7. Sendmail

The vendor's sendmail was discarded - something everyone should do! IDA sendmail was installed on the bastion host†. A chroot, non-privileged proxy sits on the SMTP port listening for mail. It collects the mail and writes it to its current directory. A related process scans the spool directory and passes mail to sendmail for delivery. A small amount of `sendmail.cf` tinkering was required: this was actually quite simple thanks to a sendmail tutorial Frank Crawford presented around the time that the firewall was being installed.

8. Issues

- The 9600 baud leased line was quickly swamped; X Windows via the Internet was abandoned very early.
- Several WidgetCo dialin modems were retired, with external parties encouraged to use the secure Internet connection instead.
- Access rules on the bastion host use IP addresses, not fully qualified domain names, to avoid DNS spoofing.

† IDA sendmail was a personal preference of the installer; sendmail 8.6.9 is probably equally suitable.

- Regularly monitor router and bastion host logs.
- The router and bastion host are physically secure, and can only be used via serial consoles.
- There is some occasional ongoing administration associated with an Internet connection: a firewall is not "set and forget".
- Performing a regular audit of your firewall is essential: it turns up historical access that has not been disabled, as well as things done for testing that were never turned off when the testing was complete.
- In WidgetCo's case, an important issue was allowing external staff to roam around their internal network: how much do you trust external third parties on your internal network?

9. Conclusion

WidgetCo has experienced very few apparent breakin attempts, probably because the router is an effective filter, but doesn't keep track of packets it rejects!

WidgetCo commissioned a breakin attempt from a third party who were highly motivated to succeed: the breakin attempt failed, but it was detected and logged.

A "secure" Internet connection is possible!

But that isn't The End!

The term *bastion* comes from castles, where it is a protruding, well-defended area. Just as the availability of gunpowder made castles obsolete overnight, a security hole might be found tomorrow that makes all existing firewalls useless. It is *essential* that someone have the responsibility of keeping up to date with security holes.

Some sources of information are:

FTP sites
: CERT, SERT, COAST, `gatekeeper.dec.com`, `research.att.com`

Newsgroups
: `comp.security.unix`

Mailing
: *bugtraq*, *firewalls*, vendor-specific if appropriate (such as *sunad mins*)

Books
: *Firewalls and Internet Security* (Addison-Wesley)
: *Practical Unix Security* (O'Reilly)

Most importantly of all: if you can afford it, get an expert in to do it. In any organisation of any size, an Internet firewall cannot be approached simply as an "interesting exercise": it has to be right from day one of enabling your connection.

SAGE, the System Administrators Guild, is dedicated to the advancement of system administration as a profession. In just two years, SAGE's membership continues to increase steadily, and there is growing recognition of SAGE as a representative in system administration issues. SAGE brings together system and network administrators for:

- professional and technical development,
- sharing of problems and solutions,
- communicating with users, management, and vendors on system administration topics.

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  <paw@usenix.org>

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sage-ethics	Ed Gould
sage-jobs	Tina Darmohray
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sage-pubs	Bryan McDonald
sage-security	Arnold & Laura de Leon
sage-stds	Janet Frazier
sage-vendors	Dave England

You can contact these groups via email at *<their name@usenix.org>* for example, *<sage-certify@usenix.org>*.

SAGE DISCUSSION GROUPS
sage-managers
sage-outreach
sage-pt

SAGE ONLINE SERVICES
Email server:
majordomo@usenix.org

FTP server:
ftp.sage.usenix.org

WWW URL:
http://www.sage.usenix.org

SAGE SUPPORTING MEMBER
Enterprise Systems Management Corp.

SAGE THE SYSTEM ADMINISTRATORS GUILD NEWS

On Professionalism †

by Tom Limoncelli
<tal@plts.org>

Elizabeth Zwicky *<zwicky@corp.sgi.com>* writes about the value of going to a LISA conference:

> If you've never had the experience of being in the same space with dozens, hundreds, or thousands of other system administrators, you owe it to yourself to try it; even if the tutorials and the talks don't help you, the discussion at coffee breaks is an education in itself.

This is an excellent lead-in to something I've been wanting to bring up for a while.

What is the difference between an amateur and a professional? I'm not talking about whether or not you are paid, but whether or not you act amateurish or professionally and whether you are treated with the appropriate amount of respect by the people around you, the people you work for, and society.

At a recent retreat, a friend brought up the fact that in her field (psychiatry) extra schooling is required to become professionalized. What she discovered was that 70% of her professionalization was the result of being with other people going through the same "professionalization" process. Growing together, maturing together, watching their teachers, they all learned how to walk, talk, dress, act like a "professional." By the time their schooling was done, the psychiatrists were "professionals" (the social definition, at least).

Hearing that really got me to thinking. One of the goals of SAGE is to get more respect for system administration as a profession.

Yet, we have no schools that let us interact with others for years before we hit the "real world." In fact, it is quite the opposite. I think the term "on the job training" must have been created to describe system administrators.

System administrators usually work in isolation. There may be one per department, one per area, etc. If you are the system administrator for a bunch of chemists at a medical research company, there is no one you can turn to and ask for technical opinions or even talk about better ways to manage your time, do major overhauls, etc. The nearest thing you have is Usenet, which many system administrators don't have access to. Even if you do, it can be difficult to explain an entire 10-net, 100-machine network so that you can ask, "What's the best way to configure automounter in this situation?" If you do, you're likely to get 50 replies saying, "Ugh, I hate automounter. It sucks, dude!" Other technical questions might be difficult to ask because you are skirting exposing proprietary information.

So, what do we system administrators have instead?

We have LISA/SAGE/SANS/USENIX conferences. They are our universities where we interact with others, learn from scholars and get sage advice.

These conferences go a long way to reaching the goals of SAGE. However, they are only a couple of times a year, not everyone can attend, they are expensive and require absence from work for long periods of time.

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 5

$GROUPNAME is an organization in New Jersey (the birthplace of UNIX) which is like SAGE-AU or SAGE-UK. (*$groupname is not like SAGE-AU or SAGE-UK; it's a local group, like BayLISA and BackBAy LISA – Ed.)* We host "cluster groups" every other month. We pick restaurants around the state, (one in the south, one in the center, etc.) and we hold social gatherings simultaneously. Sometimes we pick a theme and report back what each group did with the theme. For example, once we had each group come up with a list of what was their most used publicly-available software. We all learned from each other at that meeting. It was interesting to compare what the groups listed in common. [1]

The cluster groups provide a social space for system administrators. Some people model good behavior while others learn. Sometimes it's like "Usenet-live" with ten people talking at once about how they switched configured automounter, or the talk gravitates to meta-topics like how to manage time, users, managers, etc.

How difficult is it to form a cluster group? Not very. We gain members by posting to the appropriate mailing lists and newsgroups. We do all the arrangements via email. The most important thing is to have consistent locations (so people only get lost their first time) and consistent time/date (so people can plan for it). Best of all, there can't be any turf wars. The hope is to have cluster groups going on in each part of the state. If a turf war starts, start an additional cluster!

What about the future?

Well, I don't think that cluster groups and conferences alone will change our industry. The SAGE Job Descriptions Booklet, salary surveys, and other tools are also needed. Maybe someday it will be expected that system administrators will have some kind of advanced degree. Then again, the most accurate way to predict the future is to be the one that creates it.

If you are interested in starting a local group, the friendly people on the sage-locals mailing list would love to help you get started! If you are in New Jersey, you can get more information about $GROUPNAME by writing to *groupname-info@plts.org*.

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1 To see the results of these discussions:
echo get groupname 94-04-21-central-jersey-\ cluster-report | mail majordomo@plts.org
echo get groupname 94-04-21-south-jersey-\cluster-report | mail majordomo@plts.org

Surviving Solaris 2.x †

by Hal Pomeranz
<pomeranz@netcom.com>

We Have Met the Enemy

If it hasn't happened to you by now, it will soon: somebody is going to hand you a SPARC machine and ask you to install Solaris 2.x on it. I'm part of a team of folks at my company who are rolling out a new computing infrastructure which is based on Solaris 2.3 (and NIS+, just to complete my happiness). Let me tell you now, there is no point in arguing: Sun is committed, the people who pay your salary are committed, and failing to jump on the technology early is going to be one of those career limiting decisions that you will regret in about two years.

Sure the paradigm shift is painful. And sure, I will admit to being a closet System V admin: I spent my formative system administration years at Bell Labs (but I was primarily a SunOS admin, and probably the only `csh` user, so I wasn't entirely brainwashed). There are, however, several things that you can do to make your transition less painful.

Patch! Patch! Patch!

While the stability of the operating system has increased rapidly with each successive point release, Solaris 2.3 right off the operating system media is pretty shaky. Get hold of your Sun rep and get Sun to provide you with a list of the "recommended" patches and install them. If this means paying for a support contract, then do it, even for just a year. Compare the price of the contract against the downtime you will experience without the patches and you will be way ahead.

Sun has also released a "Maintenance Supplement" CD. Volume 1 contains about five dozen patches that have all been QA'd together. Most of the patches have been superseded by newer versions, but it is a fine place to start and hopefully Sun will produce a second volume with newer patches. Sun's part number for the CD is SMSP-230-CDB-MS1.

Avoid at all costs patch 101318-50 which will leave your system in an unbootable state. I have heard, but not confirmed, reports of problems with other revs of the 101318 patch above -50. I am currently using 101318-45 without problems.

Third-Party Tools

You may have heard that you can eat anything if you just put enough ketchup on it. Well, you can survive any new operating system as long as you can get your favorite editor, mail agent, news reader, and windowing system all working.

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Well the good news is that almost all of the "major" free software has been ported to Solaris 2.x. The GNU stuff is trivial; Perl works; there is a patch for X11R5 on ftp.x.org, and the list goes on. If you get stuck, send me email – it feels like I have ported every software package available on the Internet at this point (except building C-news or INN – our news server is a SunOS box – so you are on your own there).

And, by the way, I am tired of people whining about Sun unbundling the compiler: the war is over and we lost. You can ftp the Solaris gcc binaries from any GNU archive (and then do yourself a favor and use the compiler to build the latest rev of gcc from source). Actually, it is probably worthwhile to buy one license of the Sun unbundled compiler just to have it.

The first hint when compiling anything under Solaris 2.3 is to avoid the Berkeley compatibility libraries at all costs. The following macros should solve 90% of all of your problems in this area:

```
#ifdef SYSV
#define index          strchr
#define rindex         strnchr

#define bcopy(s,d,l)   memmove(d,s,l)
#define bzero(s,l)     memset(s,0,l)
#define bcmp           memcmp
#endif /* SYSV */
```

If it ends up that you simply must compile something `-lucb` (be sure to send me email for help first), be sure to also link it -Bstatic so your users do not have to add /usr/ucblib to their LD_LIBRARY_PATH variable.

Programs which use socket calls (almost anything vaguely distributed or network related) will need to be linked with "`-lsocket -lnsl`". Remember that this is a System V system, so there is no ranlib . Your best bet is to define a RANLIB variable at the top of your Makefile which you can set to "/bin/true" on System V machines and to "ranlib" on BSD boxes. Software which does not have a predefined configuration for Solaris 2.x will usually have a SVR4 or Systen V configuration predefined – use SVR4 if you can.

Just Do It

Learning a new operating system is just like learning a new language: total immersion is the best way to learn it. Make sure the display on your desktop is connected to a Solaris box. It will be painful at first and you will be tempted to switch back, but give it an honest try for at least a month after you have got your favorite tools ported. If you are still unable to deal with Solaris after a month, at least you will have some ammunition to fire at the enemy camp.

Do not try to turn on all of the whiz-bang features of Solaris at once. Wait until you have got the basics of System V system administration down before you start turning on things like cachefs and NIS+. In fact, wait for NIS+ to get a lot more "cooked" before you turn it on at all, or at least only enable it on a small workgroup at first so you can get the hang of it. You must apply the appropriate patches before enabling NIS+.

One caution: do not try to run Solaris 2.x on anything less than a SPARC Classic with 24MB of RAM – it is just too slow on weaker machines.

Why Ask Why?

There are plenty of reasons why you would want to go to Solaris 2.x, but everybody's reasons are different and I refuse to start a religious war on the issue. Sun is already shipping hardware that only supports Solaris 2.x, and somebody high up in your company is already planning on buying some of it. You can expend some effort now and dive into this stuff, or you can explain to your management later why nobody is getting any work done on their new $250,000 server.

Your Voice †

by Win Bent
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In previous issues of *;login:*, Elizabeth Zwicky has written about several "tools" she uses, and other aspects of system administration. Some of these have been extremely useful – her description of the trials of locating the power switch on a large variety of machines was perfect, except that apparently she was not confronted by an equal number of UPS boxes beeping at her.

However, I get a sense of the curmudgeon about her, especially after reading her two contributions to the June issue. She is correct that an improved understanding of the job of SAs will help all around, but when I read, "the real cost of work often doesn't get explained adequately to users who then believe that you are refusing to do something that is going to take three weeks to set up and three weeks a year to maintain because you're too lazy to spend five minutes to make them happy," I hear "everybody's picking on me." Her other column describes ways to hide from the users.

She poses, and answers, three questions concerning system administration:

- How much work is it really? More than the users think.
- How much work can the system administrator do? Less than the users think.
- Does the system administrator have motivation for doing new or difficult things? Usually not.

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She mentions that the first is a communications problem, and the second is a problem of both communications and management. She doesn't say, but it's safe to assume that the third is a management problem. Nowhere do I see suggestions for solutions, and in particular her discussion of question three contains a fair amount of doom and gloom.

My favorite tool for system administration is my voice. If I am handed a project by someone who thinks it's merely a five-minute job, I make sure to let them know my view of it, either right away or in a follow-up call or e-mail. I let the users know where it stands in my priority list, and find out how high a priority it is for them. Yes, sometimes I am taken by surprise – an easy software installation turns out to be a major headache. Or vice versa! KEEP THE USERS INFORMED! They will have a better understanding of what you do and why it takes the time it does IF YOU TELL THEM ABOUT IT. "I had hoped to install the latest release of SpiffyMail by the end of today, but it turns out that the vendor sent us the wrong release on a sandpapered CD-ROM. It looks as though fixing this will take at least two weeks."

Similarly, you can create a level of motivation, or at least interest, in your management for new or difficult things. Tell them what a neat idea it is, how it'll be challenging, and how wonderful things will be when it's done. If they know what you're doing, and why you're doing it, they're much more likely to encourage you, and to recognize the achievement when the job is done.

A larger question is: what really is your job? Perhaps a very real part of your job is to pound non-stop on "five-minute" jobs. Perhaps you really are expected to say "No" to (almost) all requests, and perhaps you're even expected to do so without ever saying "Leave me alone!" Now's the time to use your voice: sit down with your manager and make sure you both understand what you're expected to do, and make sure you both understand how closely that matches the current reality.

Ann Landers often says, "nobody can take advantage of you without your permission." I believe this is true, if we allow for a wide interpretation of "permission." If you have become overworked and under-appreciated, it is up to you to change your situation. Talk to your users. Talk to your management. When everyone understands what you do and what you are expected to do, you and they will have come that much closer to being a team, not adversaries.

System Administration Models †

by Elizabeth Zwicky
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The most popular system administration model is none whatsoever. You have computers, some of which have system administrators. Which ones have system administrators is determined entirely at the whim of whoever purchases the computer. This model has the advantage of extreme simplicity, requiring no thought and no agreement to implement. On the other hand, it has severe disadvantages. It maximizes the extent to which decisions about computing are made on an ad-hoc basis to meet short-term needs. People buy computers that they can't use because there's nobody to help them set them up; people buy computers without buying backup systems or using them, and important projects are lost; resources are duplicated unnecessarily. This constitutes a major drain on corporate resources – most obviously, money, but most importantly the time and energy of people who are fighting computers instead of using them.

It is therefore in the corporate interest to actually ensure that there are system administrators and that those system administrators are effective. To that end, there should be some vision as to how those system administrators are distributed.

For some reason, the model that leaps to people's mind first is a purely centralized model based on the datacenters that became common in the days when IBM was still revising their estimate of the total number of computers the world needed from 6 to a few thousand. This inspires fear and loathing, and well it should; centralized datacenters were a neccessary evil, not a desireable solution, even when they were standard. In a world of workstations and personal computers, they are not merely inadvisable as a complete solution, they're impossible. If you attempt to centralize control of all the company's computing resources, issues of resource contention and local customizations will drive people to go back to buying their own unsupported computers, leaving you somewhat worse off than if you had just let them do it in the first place, since the new computers will be actively hidden. Nobody creates new purely centralized facilities, and the old ones discovered this problem with a vengeance when personal computers first became popular. This is therefore a straw-man argument, frequently mentioned, but only to be discredited.

In reality, a reasonable model will balance out a number of conflicting needs. You need to achieve economies of scale, by putting resources as high up in the organization as practical. You also want to standardize across groups in order to maximize your ability to move information and people

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within the company. You need to custom fit the computers to their users as much as possible – one-size-fits-all works no better for computers than for clothes. You need to provide effective assistance to people, which means both having people who know what their particular circumstances and needs are and having people who are always available. You need system administrators who are responsible to the people they support, but those system administrators also need specialized management and support.

The end result is going to be some combination of centralized and local support. The centralized support is going to specialize in consistency, availability, and deep understanding of system administration issues, including explaining managers to system administrators and vice versa. The local support is going to specialize in local adaptation, user support, and representing the special needs of their community to the centralized support. Within this basic theme, there are many possible variations, mostly representing different solutions to two main problems: who is the line manager for the local system administrators, and what organizational level do they work for?

The local system administrators can either work for the central organization and be assigned to areas, or they can work for the local groups and be advised by the central organization. I admit that theoretically they could work for both simultaneously, resulting in an organizational directed graph rather than an organizational tree, but I sincerely hope that most businesses will reject this solution on the grounds that it is widely known to be a quick route to managerial disasters.

Having the local system administrators work for the central organization adds flexibility, helps to ensure consistency in both technical and managerial procedures, and ensures a support structure for the system administrators. On the other hand, it loosens the connection between the system administrators and the people they support, by making the system administrators into effectively internal contractors. (This is a special problem in companies that don't already have people in this sort of position.) In a company that is currently relatively strongly centralized, it may serve to increase local control; in a company that is currently very distributed, it will increase central control, which is likely to be a political and social problem. Whatever the organizational chart says, it will also give the system administrators a strong sense of having two managers, since they are trying to please both their manager, and the people in the local area they support. Again, this problem is likely to be most acute in companies where this sort of situation is rare.

Having the local system administrators work for the groups that they support avoids many managerial and political problems, at the expense of putting hiring and managerial decisions for system administrators in the hands of people who may not have the expertise in the are that the central group has. This tends to lead to inconsistent management, and encourages inconsistent technical decisions as well, by loosening the connections between the local groups. It also will leave most system administrators in very small groups (often consisting of lone system administrators). Some things cannot be managed at that level – networks, for instance – and must be provided as central services. Some things, like backups and security, are so crucial to the company that they must be monitored by a central group. Some things, like news and electronic mail, only provide cost-effective and user-friendly service if there is some centralized service available for them. Users need coverage when their system administrators are ill or otherwise absent; they need a reliable and easy-to-remember way to contact the correct people when something doesn't work, which almost certainly means a central dispatching service which can provide answers to routine queries, route problems to the appropriate person, and cover more hours than the local system administrators. Small system administration groups cannot be reasonably expected to be expert in everything and will need technical support in some areas.

All of this means that there will be a large number of problems and processes that involve both central system administrators and local system administrators, often in multiple parts of the central group and multiple local groups. These situations are extremely failure-prone, because of the number of people and hand-offs involved, and very hard to resolve when they fail, because there is rarely a single person at fault and a single place to fix things. This is by no means unique to the situation where local system administrators work for the local group, but it is significantly worsened there, because it increases the number of handoffs between different management trees. Handing a process off to someone with a different set of priorities and a different manager involves more risk of failure that handing it off within the same organization.

It is not unusual for companies to choose to combine these methods by leaving local system administrators managed by local groups where there are existing pools of administrators and expertise, and putting system administrators with central managers into the remaining groups. This is an effective solution for places that either want central control, or have groups that don't want to put the effort into hiring their own system administrators. Moving system administrators that are currently in local groups where they are well-integrated and effective is spectacularly difficult and unpopular. The opposite case – where the company wants to put in local system administrators but not everybody wants them — is less frequent and usually easier to fix. It usually results from a group that doesn't really want any system administrators at all, and the issues surrounding that will have to be dealt

with under either method. Mixing the two methods gives both sets of advantages, but it also provides both sets of disadvantages, and while each local group gets one set of advantages or the other, the central group gets to deal with both sets of disadvantages simultaneously.

All of this discussion has conveniently ignored the question of exactly what a local group is and exactly where the central group is. A local group needs to be a set of people with a strong common goal and culture, that already works as a reasonably cohesive unit. It needs to be large enough to support at least one system administrator, which leads inexorably into discussions of how many users a single system administrator should support. Most companies will want the largest possible number of people covered per administrator, which is partly a technical issue and partly a social issue. The technical issue can be roughly summed up by saying that the number of administrators you need rises with the complexity of the site and with the amount of support the users need. It is a mistake to assume that technically oriented users like engineers automatically need less support than non-technical users like secretaries; it is more accurate to say that they need different sorts of support. The social issue involves familiarity. The point of putting system administrators in local groups is to make them a working part of the group. This is not going to work unless the people who're being supported all know the system administrator. As a generalization, a local group should be no larger than a building, to encourage this sort of familiarity.

Picking local group sizes is extremely dependent on the corporate culture, and usually on the internal structure of individual pieces of the company. It's rarely possible to pick a single level of the organizational chart and declare it to be the right place to put the system administrators; not only does this usually leave local groups of extremely uneven size, it also leaves everybody above that level unsupported. This process should be regarded as an art, not a science, and left to fall out of the natural way the company works to the maximum extent possible.

The central group will generally be at the corporate level (although there is nothing stopping an individual part of the company from adopting this sort of model internally, when the company as a whole has no model at all, in which case the "central" group will be at the top level available). This is appropriate because issues of security, backups, and consistent electronic interface to the outside world should be corporate priorities, and because it leads to the maximum possible economies of scale. On the other hand, it may turn out to be reasonable to have sub-centers in smaller pieces of the company (at the risk of increasing all the communications problems). In particular, it's important to arrange financial matters so that purchases can be made where they are sensible. For instance, it may be reasonable for a number of local groups to share a file server that is not large enough for the whole company to share, and there should in that case be a mechanism for buying and supporting that machine. A programming division will probably have multiple local groups that share a need for the same compilers and tools, making it reasonable to buy and support those at the division level. It is in the best interest of the company to make it as easy as possible for groups to band together for site licenses of software and support; many companies either overpurchase software because this isn't possible, or end up wasting most of their savings in paying employees to argue about the financials. Ideally, these sub-groups can be handled in the center, but if that is not effective, putting in small amounts of intermediate organization may well be worth the effort.

All of this falls short of suggesting a particular solution for everybody's company. This is because there is no one right answer for the general case, although there may be a right answer for some specific cases. Almost any answer is better than ignoring the issue altogether, however; a traditional company large enough to have more than one building is going to need both local and central administrators, and they are going to need to work closely together.

Upcoming in *Computing Systems (Volume 7:4)*

ELK:
The Extension Language Kit
Carsten Bormann and Oliver Laumann

Secure Timeliness: On the Cost of Non-Synchronized Clocks
Raphael Yahalom

Reliable Real-Time Garbage Collection in C++
Kelvin Nilsen

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FEATURE

Understanding UNIX Workstation Performance †

by Scott Hazen Mueller
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Introduction

UNIX performance and analysis and tuning is rather like the weather: Lots of people talk about it, but few do anything about it. Traditionally, it is the exclusive realm of people dealing in high-performance computing, either in corporate data centers or in scientific supercomputing environments. If you use a UNIX workstation, the usual response to a real or perceived performance problem is to run out and buy the latest and greatest fast box.

Why worry about performance?

I care about workstation performance for one of two reasons:

1) I can't buy a faster machine.

2) I don't think I should spend the money on a faster machine.

For either case, I try to measure the system performance and either verify or deny the statement, "This system's basic CPU performance and architecture is adequate to the task."

If I can verify this statement, then I try to identify changes I can make to the system that will allow it to perform up to capacity. If I deny it, I have to replace the machine.

Basics of system performance analysis

System performance analysis is really about the identification of bottlenecks, factors that prevent the system from performing the task(s) required of it. There are two kinds of bottlenecks:

1) Those that can be corrected.

2) Those that cannot be corrected without replacing the system.

Bottlenecks that cannot be corrected are those that are intrinsic to the design of the machine: the CPU type and speed (usually), the memory architecture, the I/O and I/O bus architecture, and operating system limitations. The only way to alleviate these bottlenecks is to replace the system, and sometimes to go to an entirely different platform. If, for example, your job mix requires that you run multiple parallel processing-intensive jobs, you may not be able to use any single-processor system. For that job mix, you probably have to use a Symmetric Multiprocessing (SMP) system.

Bottlenecks that can be corrected are generally resource bottlenecks: physical memory, disk I/O rates, and (sometimes) total CPU cycles. You can usually add memory to a system, for example, if you determine that you don't have enough. Disk loads can sometimes be split, balanced or striped across multiple disks. If you already are running an SMP-capable system, you can add more CPUs if you are running compute-intensive jobs.

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Measuring system performance

In this section I'll talk entirely about the BSD-style tools, not because it's not possible to measure system performance on a System V system, but because I don't have access to a System V box to review the tools available there. Also, the discussion and analysis here is generic; it may not apply in a given situation because of special considerations. I hope to illuminate this topic, I don't claim to be able to solve everyone's performance problems.

My first tool is usually `ps(1)`. On a BSD (SunOS 4 also) system, "`ps -aux`" yields information on the memory and CPU utilization of currently-running processes. For example, from the output in Figure 1 I can determine that the system being used is largely idle, since "`ps`" itself is the process with the highest %CPU. The "SZ" column tells me the virtual (real + swap) size of the each process, and the "RSS" (Resident Set Size) information tells me how much real memory each process is consuming.

"`ps`" is also the best source of memory utilization information in most environments, and especially so on SunOS 4 systems. It breaks out the memory usage for each process, and the values can be summed to determine how much memory is being used by processes on the system. It does not tell how much memory is used by the kernel or for file system buffers. That information is actually fairly hard to obtain, and the method is highly system-dependent.

Use `vmstat(1)` for a broader overview of system performance. Do be aware that `vmstat` does not provide good numbers for systems with large numbers of disks, and that `vmstat` on SunOS 4 systems does not give good numbers for "avm" (Active Virtual Memory).

The output from `vmstat` (see Figure 2) at first glance appears to be quite cryptic, but it just takes a little time to become accustomed to the headers and to learn to decode it. The default display gives information on five areas: the process queue, memory utilization, paging activity, fault rates (interrupts and context switches) and CPU activity.

The process queue information is the information that underlies the (in)famous "load average" figure. If you have ever wondered how load average is computed, `vmstat` can give you the raw numbers. Basically, load average is the average number of jobs each second that are ready to run and waiting for the CPU. The "r" column under "procs" is the number of jobs this last second that are ready to run. Thus, for the example output, the load average would be about 1. The "b" column is the count of processes blocked waiting for I/O to complete, and the "w" column is the tem. A large count of processes ready to run may indicate that the CPU cycles available are not sufficient. Likewise, a large number of blocked processes could well mean that the system is waiting on I/O activity, and a large number of processes swapped out means the system probably doesn't have enough physical memory.

The memory information gives the "avm" (Active Virtual Memory), how much virtual memory is currently in use, and the size of the Free List ("fre"), basically how much physical memory is not in use. This information displays in a nutshell whether the system's physical memory is fully used or not.

The paging activity information gets quite detailed. Generally the "re" (Reclaim), "at" (Attach), "fr" (Pages Freed) and "de" (Deficit) figures are fairly meaningless unless you are actually debugging the virtual memory code in the kernel. The key indicators are the "pi" (Page In), "po" (Page Out) and "sr" (Scan Rate) numbers. The paging rates indicate, of course, whether the system is busy reading and writing pages to and from disk rather than doing real work. Even more important is the scan rate; BSD UNIX systems use a `clock' algorithm to search for memory pages to free, and the scan rate is the rate at which the system is performing free page searches. All BSD systems, as far as I know, are configured with a maximum value for the scan rate, two or three hundred on the ones I am familiar with. If the scan rate is significant, over one hundred, the system can be characterized as "thrashing", spending too much time on memory management. A system with a high scan rate needs more physical memory; this is one of the few calls I feel comfortable making without actually seeing the specific system.

Figure 1:

```
USER     PID  %CPU %MEM SZ   RSS  TT   STAT TIME   COMMAND
scott   2545  7.7  4.7  220  180  co   R    0:00   ps aux
root     143  0.0  17.4 716  696  ?    I    55:56  /usr/lib/news/trn/mthreads -s
```

Figure 2:

```
 procs  memory          page          faults       cpu
r b w  avm  fre  reatpipofrdesrd0d1d2d3insycsussyid
1 0 0  400  1908 0  0  0  0  0  0  0  0  0  0  0  4  6  1  0  1  99
```

The fault rate information gives an overview of disk activity, as well as the interrupt, system call and context switch rates. The disk activity information is critical in identifying disk I/O bottlenecks. Many systems will run disk I/O up to 30 I/Os per second (I am starting to see much higher numbers on newer systems with fast SCSI drives), so I/O rates in the 20 to 30 range are frequently indicative of a disk being driven flat-out. Since information is given for up to 4 disks, it is also possible to determine if the I/O load is well-balanced on a smaller system. A multiple-disk system should not have 30+ I/Os/second on one or two drives and <10 I/Os/second on the remainder.

The interrupt rate will be higher on systems with interrupt-driven I/O such as serial lines. The best advice I can give with regard to these figures is to generate some output under normal load conditions and then save it aside for comparison when looking at or for performance problems.

The CPU activity column is quite important. For one, if the "id" (Idle Time) figure is large, then it's almost a sure guarantee that your system can handle the workload and that CPU speed is not your performance problem. A low idle time, however, does not mean that the CPU is not adequate. It's entirely possible for a system that is thrashing to consume most of the CPU without performing any productive work. The CPU columns are displayed last if you read left-to-right, and it's a good idea to look at them last. Look for performance problems in other areas first, and use the CPU activity to verify or deny that your system has adequate performance.

There are other tools for delving in more detail into system performance; iostat, for example can give you all kinds of I/O activity information, and can be used to examine activity on specific disks. I believe that some systems provide a "`dkstat`" command, which provides information specifically on disk activity. The "`pstat`" command dumps various system tables, and can be used to examine the allocation of your swap space.

Improving system performance

You improve system performance by examining in turn each of the bottlenecks that you can alleviate, and for each that is a problem area you take the necessary corrective action. Always keep in mind the principle that correcting one bottleneck means that something else becomes the new bottleneck. If none of the correctable bottlenecks are causing your performance problem, you then have the option of either living with the problem, or replacing the system. I cannot give you good advice on how to choose a new system, except that you should study the design carefully and be sure that you understand the new bottlenecks.

Some key indicators that you might look for are:

- Lack of physical memory – high page out rates, high scan rates, high CPU idle time and/or high CPU system time, low free memory, large number of swapped processes.
- Disk overloaded – high disk I/O rates, high CPU idle time, sometimes high paging rates.
- CPU overloaded – no apparent memory or disk problems, low CPU idle time.

Frequently, the most reliable way to improve system performance is to add more physical memory. Adding memory can even improve performance on a system that is suffering apparent disk overload problems. If the system is indicating high disk I/O rates combined with high paging rates and/or a large number of swapped processes, the system is actually more short on memory than it is lacking disk I/O capacity. Adding more memory will lower the paging and swapping activity, all of which hits the disk(s), and will free up the disks for actual file I/O activity. Furthermore, on many systems adding memory will increase the size of the file system buffer cache, allowing more disk blocks to reside in memory, and decreasing the disk activity still more.

If you have no memory problems and disk activity is quite high, you can usually buy more performance in one of two ways. First, on a small system, you can move your data files to a spindle separate from the operating system itself, so that your data accesses don't have to contend for disk I/O bandwidth with OS activity. Secondly, on moderate-sized to large systems, you can use a virtual disk facility (for example OnLine DiskSuite from Sun) to aggregate disks into large partitions. "Stripe" disks together for better performance. Do make sure that you don't stripe disks together that are on the same controller.

Finally, if you have adequate memory and you don't have disk I/O problems, and your CPU is always busy, you may be able to improve performance by upgrading the CPU or adding another one. There are CPU upgrades available for some systems that are quite reasonably priced, simple to install, and that nearly double the raw CPU performance

Conclusion

It can often pay off quite handsomely to analyze the performance of a slow system before making the decision to replace it. Frequently, slow real performance is caused by a lack of resources rather than native lack of performance. Furthermore, taking the time to understand the performance of a system can let you take short-term measures to improve it in a "crunch" situation.

An Update on Standards Relevant to USENIX Members †

by Nick Stoughton
USENIX Standards Report Editor
<nick@usenix.org>

The following reports are published in this column:

- POSIX.0: Guide to POSIX OSE
- POSIX Conformance Testing
- POSIX Interpretations
- SPEC 1170: A Developer's Reply

Our Standards Report Editor, **Nick Stoughton**, welcomes dialogue between this column and you, the readers. Please send your comments to *<nick@usenix.org>*.

Report on POSIX.0: Guide to POSIX OSE

Kevin Lewis <klewis@gucci.enet.dec.com> reports on the July 11-15, 1994 meeting in Nashua, NH.:

Hello to you who have been following with great vigor the progress of the POSIX.0 work. I was absent from the April POSIX meeting, helping my wife have our fifth baby. It was a girl, and she is a party animal so the July meeting afforded me some rest.

First, let me bring you up to date on the status of the group's work. At the conclusion of the July meeting, the voting status on the guide document (draft 16) was at 89% affirmative. [NOTE: some of you may have seen a draft 16.1 floating around. This is a draft that was created just after the draft 16 recirculation in IEEE started, in order to address some concerns at the international level, i.e., JTC1/SC22/WG15]. This percentage is based on 45 affirmative votes which were received at the close of the recirculation ballot and 10 affirmative votes which had initially been negative but were converted to affirmative during the ballot resolution process. Seven votes remain negative. It is highly possible that with the probability of some last minute resolutions that will be taking place with the weeks following the July meeting, the affirmative vote could reach 91%.

Draft 16.1 was submitted to WG15 for an SC22 letter ballot which will conclude on August 5. The comments arising from this letter ballot will be reviewed and dispositions created by the POSIX.0 technical reviewers. The resulting document changes will be folded into the recirculation resolutions for production of draft 17. This version will be submitted in late August/early September for another 30-day recirculation starting October 1. Parallel to this, the working group will prepare draft 17 for submission to the IEEE Review Committee (RevCom) and also submit it for subsequent SC22 DTR ballot.

I anticipate that at the conclusion of this recirculation, the document will be ready for submission to the IEEE Standards Board for approval.

There are approximately 19 unresolved objections remaining. These fall into the following areas: Layered APIs, External Environment Interfaces within the Reference Model, and the inclusion of Public Specifications.

I do believe that we are now reaching the end of the road on this work. For those who are interested, we are planning to discuss RevCom preparation along with reviewing any comments that have come in from the second recirculation. It very well may be that the October meeting will be our last meeting, unless some new work comes our way. But please don't ask me about that right now. I only want to get this done so I can save some trees.

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 5

Report on POSIX Conformance Testing

Kathy Liburdy <kliburdy@eng.clemson.edu> reports on the July 11-15, 1994 meeting in Nashua, NH:

Conformance testing in the IEEE Portable Applications Standards Committee (PASC) standardization effort is a composite of several bodies each of which contributes to the overall goal of enhancing the quality of the POSIX standards environment. This report summarizes the state of conformance testing at the time of the POSIX meeting in July, 1994.

The Steering Committee on Conformance and Testing (SCCT) discussed issues related to keeping test methods and the corresponding base standard in synchronization. Five cases were identified which could result in discrepancies between the test methods and base standard. If there is a discrepancy because there is an error in the approved test method standard, because existing base standards specifications are changed, or because an official interpretation of the base standard results in the identification of a problem in the TM standard, then the proposed solution is to initiate an amendment for the TM standard. It is less clear what action should be recommended if the base standard must be revised, either due to identification of an error in the approved base standard or due to an interpretation of the base standard which requires modifying the base standard.

The issue which emerges from these latter two cases is one of timing: Should the TM reflect the existing base standard even though modifications are imminent, or should the TM reflect the changes which are assumed to be applied to the base standard at some time in the future? While acknowledging that there is no clear answer to this question, the SCCT recommended that PASC adopt the policy of requiring the test methods for an approved standard to reflect the existing text of the base standard at the time of adoption of the TM standard.

Due to the resignation of Dave Hollenbeck from the SCCT, Barry Hedquist was nominated to serve the remainder of Dave's unexpired term. His nomination was approved.

Jerry Powell, a member of the SCCT and Lead Rapporteur of the WG15 Rapporteur Group on Conformance Testing (RGCT) reported that the RGCT met May 9-10 in Tokyo, Japan. Roger Martin convened the meeting as Jerry was not able to attend. The activity highlights of this meeting included the forwarding of the US contributed Harmonization Conformance Testing Terminology report to SC22/WG15. The purpose of this report is to explain the unique definitions used in the PASC Test Method standards in relation to similar terms used in the ISO/IEC testing standards. The next meeting of the RGCT is scheduled for October 24-25, 1994 at Whistler Convention Center in Whistler, British Columbia, Canada.

The PASC Test Methods working group discussed the appointment of a new chair due to the appointment of the current chair, Lowell Johnson, as PASC chair. Members discussed the possibility of a merger of the SCCT and 2003, with Roger Martin being a likely candidate for the chair of the new SCCT/2003 group.

The 2003 working group continued to work toward the final draft of the standard Rules and Guidelines for Test Method Specification for Measuring Conformance to POSIX. This standard is a revision of the existing standard for test methods development (1003.3-1991). Unresolved topics include the use of charts to explain test result codes and the introduction of a construct to permit formal test specifications in support of automated testing. A request has been issued for a ballot slot, and a consensus on these topics is expected to be achieved by the time the ballot slot becomes available.

Progress reports from groups developing test methods for base standards were given in the 2003 working group meeting. Ongoing efforts include 2003.2 (Shell and Utilities), 2003.4 (Real Time), and 2003.5 (Ada Language Binding).

The Automated Testing BOF met Wednesday afternoon, July 13. A brief report was given on the Invitational Workshop on Automated Testing hosted by NIST in cooperation with Clemson University. The goals of this workshop included reviewing existing and emerging technologies for automated specification and development of test methods, exploring the relationship between automated testing and standards development, and establishing a forum for the continuing exchange of information between experts working in this area. An overview of the workshop is scheduled to appear in the September issue of IEEE Software.

I gave an overview of the development of test methods for the Ada binding to POSIX. This work is applying the Clemson Automated Testing System (CATS) to assist in the development of test methods. The development process includes the identification of requirements in the base standard which must be tested, the development of a strategy for testing one or more requirements, and a formal specification of the test. This formal specification can be automatically translated into a test and executed on an implementation under test, thereby providing rapid feedback to the test developer which can be used to improve the quality of the test methods.

Shane McCarron reported on the progress of the Assertion Definition Language (ADL) Project. Two prototype test suites are being developed with ADL to assist in the evaluation of the ADL technology. Mt. Bonnell will be developing a test suite for TET 1.10, and Applied Testing and Technology will develop a test suite for OMG's Common Object Request Broker Architecture version 1.2. Because these efforts are part of the research project supported by X/Open, MITI and Sun

Microsystems Labs, the resulting test suites will be made available under the same copyright and grant of rights as the ADL project itself. For more information on this project, contact Shane McCarron at *ahby@naps.com.*

The July issues of the newsletter *Automated Testing in Open Systems (OATS)* was distributed at the POSIX meeting. This issue includes articles about the ADL classroom experiment, PHIGS Validation Tests developed by NIST, and the NIST Advanced Technology Program's initiative in Software Technology. Copies may be requested by contacting me, Kathy Liburdy at *kliburdy@eng.clemson.edu.*

Report on POSIX Interpretations

Andrew Josey <a.josey@novell.co.uk> reports on the July 11-15, 1994 meeting in Nashua, NH.:

I attended the IEEE PASC meeting in Nashua, NH on July 12th and July 13th in my role as Portable Applications Standards Committee (PASC) Vice-Chair for Interpretations (VC/Int).

This role involves coordinating interpretation requests and responses for all PASC standards, notably, although not confined to, POSIX.1 (System Interfaces) and POSIX.2 (Shell & Utilities).

I seem to have gotten this job because I complained last summer that several of my interpretations had not been processed after 18 months. In the last 9 months, we have gotten the process back on track and since January, have finalized nearly 100 requests and published four interpretation documents.

I attended two sessions, POSIX.1 on Tuesday, which spent the time reviewing interpretation requests – approximately 20 requests were covered (8 of these for 2003.1, the test methods for POSIX.1) – and POSIX.2 on Wednesday which covered nearly 30 interpretation requests.

Many of the interpretation requests against POSIX.2 highlight defects in which the standard has changed historical practice. A large number of potential corrections are being identified this way.

Interpretation requests are accepted for approved standards only. This means one of the following:

Approved IEEE PASC Standards:

System Interface Standard	IEEE Std 1003.1-1990 (ISO 9945-1:1990)
Real Time Extensions	IEEE Std 1003.1b-1993
Shell and Utilities	IEEE Std 1003.2-1992 (ISO/IEC 9945-2:1993)
Ada Bindings for POSIX	IEEE Std 1003.5-1992
Fortran 77 Bindings	IEEE Std 1003.9-1992
Test Methods (Concepts)	IEEE Std 1003.3-1991
Test Methods for 1003.1	IEEE Std 2003.1-1993
OSI API Standards	IEEE Std 1224-1993, IEEE Std 1224.1-1993 (X.400), IEEE Std 1224.2-1993 (X.500) 1326/27/28 are related language bindings & Test methods

The most active to-date interpretation groups are 1003.1-1990 (System Interface) with 69 requests and 1003.2-1992 (Shell & Utilities) with 68 requests. The next most active is 2003.1 with 19 requests.

Most active of the last quarter is 1003.2, with 11 requests (however many of these are multi-parted including, for example, a 60-part request on vi!). POSIX.2 is the largest standard produced to-date by PASC, and now that folks are trying to achieve conformance, we do expect to see a large number of requests. In my view this is an immature standard which needs to have test methods and systems implemented before we truly get to a usable standard. It has to go through the same life cycle as POSIX.1 (i.e. the first revision will be a better product than the original).

I tend to take advantage of the working groups meeting at the PASC quarterly meetings to make them act as specialist subgroups. Actual interpretation responses can only be approved by the interpretations group mailing list (this allows full participation by all interested parties). However, in most cases the mailing list approves what the specialist group comes up with.

What can be done through the interpretation process?

Interpretation can explain and clarify the intent of the standard: it cannot make an alteration to the original standard or supply consulting information.

Changes to the standard can be made only through revision or supplement to the standard, which then go through the normal balloting process.

The PASC has guidelines for the interpretation groups which give sample pro forma responses that should be used in answering a request; for example:

- The unambiguous situation: "The standard clearly states . . . and conforming implementations must conform to this."
- The "defect" situation: "The standard states . . . and conforming implementations must conform to this. However, concerns have been raised which are being referred to the sponsor."

All in all, there are eleven pro forma responses for various situations.

A major result of the interpretation process is to highlight defects and/or ambiguities in the standards, and pass these on to the working group for the next revision. In particular, with the revision to 1003.2 (1003.2b) the work group is actively making corrections based on these interpretations. Should the next ballot fail, they intend to make further changes based on interpretation discussions at this meeting. (It's likely that the sections on `vi` will need rewriting, since 60 interpretation comments were processed).

The POSIX.1a working group is also actively monitoring POSIX.1 interpretations.

In the last quarter, PASC introduced an electronic process for submitting Interpretation requests. The latest procedure for requesting an interpretation is outlined below:

Requests for interpretations should be addressed to Secretary, IEEE Standards Board IEEE Standards Department 445 Hoes Lane P.O. Box 1331 Piscataway, NJ 08855-1331 Email: *stds.pasc-interp-request@ieee.org*.

Electronic mail is the preferred medium and flat ASCII format text, the preferred format to allow committee circulation.

Requests for interpretations should include:

- The specific designation of the standard, including the year of publication.
- The specific subsection being questioned.
- The applicable conditions for the case in question.
- A suggested correction, if applicable.

Submissions by electronic mail are processed as follows:

- The Interpretations requester sends the request to *stds.pasc-interp-request@ieee.org*.
- The IEEE acknowledges receipt of the request to the requester, with a copy of this acknowledgment to the PASC Vice Chair of Interpretations.
- When the PASC VC/Int has assigned a number to the interpretation, he or she informs the IEEE and the requester of the assigned reference number.
- After consideration by the interpretations committee, which may involve many exchanges of correspondence, the inquirer will be notified by the PASC VC/Int of the decision of the subgroup. The PASC VC/Int includes a note to the requester asking for their acknowledgment of receipt.
- Decisions will be published from time to time in cumulative form and may be ordered from the IEEE.

The IEEE PASC VC/Interpretations can be reached electronically on *stds.pasc-vc-interp@ieee.org.*

Last, but not least, I received a copy of the new POSIX 1003.1b-1993 standard at the meeting (it has a blue cover and includes POSIX.1-1990). PASC obviously knew something that I did not, since the very next day in came the first interpretation request against that standard!

SPEC 1170 – A Developer's Reply

Nicholas M. Stoughton
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Following my editorial in the previous issue of this newsletter, I would like to take the opportunity of allowing one of the X/Open 1170 consortium members an opportunity for a personal reply. The following is excerpted from a note to me from Mark Brown of IBM in Austin. I should point out that this is a personal reply, and not a statement from IBM!

I was a little disturbed when I read your editorial on SPEC 1170; while it is certainly one angle from which one can view the X/Open consortium, I think that I'd like to present another one.

I can tell you straight out that while this may seem to be a bonus to the author, to an applications developer it means that they are Less Than Totally Useful. I have stopped trying to count the times that my customers have asked me, after I've spent 30 minutes or so evangelizing for POSIX (I work on the POSIX.2b committee myself): "so, how portable will my code be if I am using X" where X is Shared Memory or Sockets or whatever. All those missing pieces mean that the Standards don't really deliver the goods to the people who need them the most.

1170 was started due to *customer demand.* ISVs couldn't use POSIX or XPG to get the portability they needed, due to those "missing pieces."

The end of systems programming in UNIX? Bwa-ha-ha-ha! Hardly. Did the SVID cause this? Certainly POSIX hasn't. Neither will 1170. It simply plugs a lot of holes. Heck, there were a lot of things that the group *wanted* to put in but didn't. For example, where are all the floating point interfaces?

It is really easy to put a sinister face on 1170; the truth is simply that it is a market response to a perceived gap in the published standards.

Perl Practicum: A Plea for Clarity †

by Hal Pomeranz
<pomeranz@netcom.com>

After a brief hiatus, welcome back to the second year of "Perl Practicum." This month, Rob asked me to write a little piece about writing readable Perl. I started out with every intention of doing just that, but the article evolved instead into a piece on writing maintainable Perl. This dismayed me for a bit, until I realized that maintainability was the primary driving force for clarity. If, having been written, one's code never had to be looked at again, the motivation for writing clear code would be greatly reduced (note: not eradicated). That bit of philosophy done with, let us proceed with what amounts to little more than a collection of useful tips I have collected through the years.

A Little About Loops

The first rule is "say what you mean." Compare the following two mechanisms for doing the same thing:

```
grep($array{$_}++, @list);      # BAD!

for (@list) {                   # OK
 $array{$_} = 1;
}
```

I claim the second form is to be preferred since it makes clear what is going on: we are iterating over @list and setting values in %array to be non-zero (the assignment, as opposed to the auto-increment operator, is significant). There are several other, more verbose, ways to rewrite the above "for" loop: decide which form you are most comfortable with, but avoid `grep()` as a loop operator. I generally prefer to optimize for readability over performance.

As another example, consider the following two infinite loop constructs:

```
while (1) {                     # BAD!
  ...
}

for ( ;; ){                     # OK
  ...
}
```

The second form tends to be more visually arresting, it alerts the reader that something important is happening.

As long as we are on the subject of loops, let us examine another rule for clear communication, "say it succinctly." The `goto` statement and multi-level break commands are both to be abhorred because they hamper the reader's ability to conceptualize the program flow at a glance. I went looking for some "before and after" examples of these constructs and did not find any that would easily fit the space boundaries imposed upon this series. Enough said, I think.

Conditional Expressions

Along the lines of "saying what you mean" remember that you can always use `until` instead of `while` and `unless` instead of `if`:

```
&usage() unless (@ARGV);
until ($value > $LIMIT) {
    ...
}
```

Avoiding extra negation in conditional expressions can be a great aid to clarity. Perl can read like clear prose if you are careful and use informative symbolic names.

With the postfix conditional operators, be careful to put the most important part of the statement up front. This is why we write:

```
open(...) || die ... ;    # recommended
```

rather than

```
die ... unless open(...);# EVIL!
```

The purpose of the statement is to associate a file handle with a file or process. The `die()` operation is merely a case of exception handling.

Similarly, avoid overloading conditional expressions with operations which actually manipulate program data or have other side effects. Evaluate an expression to take a logical branch in the program flow and then perform your operations.

Parentheses, Functions, and Others

Always err on the side of extra parentheses, though of course too many can cause problems as well. In conditional expressions, "extra" parentheses will help the reader parse the expression. They also help protect the application from maintenance by programmers with a poorer grasp of operator precedence than the author.

Perl is of course extremely forgiving as far as parenthesizing function argument lists. *Always* parenthesize function arguments. The classic example of the importance of this rule is taken directly from the Camel book:

```
print (1+2)*3, "\n";      # INCORRECT!
```

This prints the value expression in parentheses, i.e., the number three without a newline. The statement is syntactically correct (points to you if you figure out exactly what happens in the rest of the line) and the Perl interpreter will not complain, but the output is wildly different from:

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 6

```
print((1+2)*3, "\n");# CORRECT
```

which is probably what the author of the code intended.

If you only need a few scattered values out of a list value returned by a function, please avoid assignment to dummy variables. In other words, do:

```
($login, $name, $home) =
  (getpwent)[0,6,7];        # GOOD
```

rather than:

```
($login, $dummy, $dummy $dummy,
  $dummy, $dummy, $name, $home) =
  getpwent;                 # BAD
```

Aside from wasted typing, the second form obscures precisely which information you are interested in manipulating.

Odds and Ends

It is a good general principle when writing clear code never to rely on default behaviors. Explicitly `undef` your variables or assign them zero values before using them for the first time. This helps to avoid errors introduced through later modifications.

Function defaults are a trickier issue. You can pretty well assume that any Perl function will operate on $_ or @_ when given no arguments. This is a nice feature and I use it all the time (too convenient to give up, I suppose). It does, however, make Perl code less than clear to the uninitiated reader, and I have had occasions where something unexpected has cropped up because $_ did not contain what I thought it did. On a more trivial issue, I would like to make a plea for explicitly using the "<" character when opening a file for reading, even though this is the default behavior for open().

Never hard-code pathnames or other constants into your program. Assign these values to variables AT THE TOP of your program. For example, here are the first few lines of an application I wrote to manipulate a remote optical jukebox:

```
#!/usr/bin/perl

$jukehost = 'gator';
$nfsjukedir = '/rd/juke';
$realjukedir = '/export/jb/jb0';
$localjukedir = '/jukebox';
$remotecmd = '/usr/local/etc/jbadm';
```

When the code is written in this fashion, maintenance becomes a breeze.

Always explicitly close file and directory handles as soon as you finish processing the data. You avoid potential shortage problems, protect your code from interesting side effects caused by later modification, and make your code clearer to the hypothetical external viewer.

Issues of Convention

The careful reader will note that I have been discussing issues of clarity related to program syntax. Equally important are issues which are not dictated by the language definition, such as your indentation scheme, variable naming conventions, and commenting scheme. These are also the areas where you run into the most religious warfare.

To avoid this morass (for example, everybody I know hates my bracing style), I suggest only one simple rule. Pick a site standard that everybody can live with and stick to it. Even a bad standard is better than no standard at all. If you are forced to maintain code that is developed and used externally to your organization, then maintain whatever conventions pertain to the code as you received it.

For a good starting point, there is a document available on the Internet entitled *Recommended C Style and Coding Standards* (originally from a document prepared by committee at Bell Labs, but modified by Henry Spencer, David Keppel, and Mark Brader). Obtain */pub/cstyle.tar.Z* from *ftp.cs.washington.edu*.

Further Study

Please note that everything said above applies pretty well to any language you choose to program in. Certain constructs may or may not be available to you, but clarity should be syntax-independent. For a more in depth treatment of this material, start with a good C style guide and then follow up through any bibliographic information provided in it.

Point/Counterpoint †

Putting Up With Putting Up

by George Spellvin

In *;login:* 19.5, Hal Pomeranz <*pomeranz@netcom.com*> gives some good suggestions on how to cope with Solaris 2.x. While solving the immediate problem of 'how to make it work' is useful, we need to deal with the problems at the source. Why should everyone duplicate effort in after-market workarounds?

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 6

Like all OS's, Solaris is far from perfect. It is far from usable for a lot of people. Finding workarounds for some of the problems is a laudable (and indeed, necessary) project. However, we still need to keep the pressure on Sun to fix and improve their products. Vendors must be made accountable for what they produce.

- Enough people beating up on IBM could have saved us from SMIT, but we all shrugged and found workarounds. Now we're stuck with it.

- Enough people beating up on Sun has finally produced an NIS that approaches a reasonable level of usability for large sites.

- Enough people beating up on HP might just get real disk partitioning in HP-UX. (I know, they've been promising it for years.)

If no one tries to change things, the vendors won't have any reason to do it right. They will just put out product, and we'll keep finding clever hacks to get around the more obstructive design decisions. Rather than fighting the operating system, wouldn't you rather use your clever hacks to improve life for your users and yourself?

Call your Sun sales rep. Tell him or her what you don't like about Solaris. Tell them about the bugs you've found. Keep up the pressure until they fix it. Don't forget though, it isn't just Sun, do the same for IBM & AIX, HP & HP-UX, DEC & OSF/1, etc.

I'd also like to draw your attention to the standards bodies. How many of you have bothered to get a copy of the POSIX sysadmin standards draft? How many of you have contacted COSE and told them what you want to see in an OS? How many of you care how hard or easy your job will be in five years? I've seen the proposed POSIX standard and it scares me silly. Forget distributed admin if that ever passes.

I'm writing this under a pseudonym. Why? Because a group I was active with, a group that was trying to get Sun to fix Solaris, caused enough commotion that Sun asked my management to intercede on their behalf. If we could get that much attention in only six months, think what kind of a difference all of us working together can make.

We're all busy, but if we don't get active now, we'll have only ourselves to blame later. Don't put up; get involved. Don't hack around it; file a bug report and make the vendor fix it. Don't sit back and let the standards bodies decide for us how we'll do our jobs; join up and make yourself heard.

A Response to Mr. Spellvin and Others

by Hal Pomeranz
<pomeranz@TFS.COM>

My Solaris article provoked more comment from more people than any other article that I have written for *;login:*. I would like to try to reply to some points raised by all, but to George Spellvin's points in particular.

I believe that George and I actually have more common ground under our feet than may actually be apparent at first glance. I strongly advocate agitating the vendor community to get them to fix some of the system management tragedies that have been foisted upon our professional community in recent years (and those, like POSIX, which are catastrophes waiting to happen). My original article attempted to be extremely strong on the issue of patching your Solaris machine before attempting to get any work done. Those patches would not be available without the efforts of Mr. Spellvin and others who have brought problems to the vendor's attention.

George is also correct that somebody has to stand up and try to change things. Unfortunately, I think I have hit my quixotic limit. I hate the fact that most commercial UNIX systems no longer are shipped with a bundled C compiler. I do not think that Solaris should try and pretend to have BSD compatibility libraries. The list of things I would like to see changed goes on. I would be extremely happy if somebody else did my dirty work in this regard, but I cannot complain if they do not. In the meantime, I do what I have to do to keep myself and my business going.

Actually, we shouldn't even be having to fight with the vendors about all this mess. It has been noted by others that the wrong people, depending upon your perspective, are setting the priorities for the next generation of computing devices. Your company wants more cycles and neato new features. Nobody who makes real purchasing decisions in your organization ever says, "Hey, hold on there just a bit fellas! Why don't you clean up all those outstanding bugs and security holes, make your systems easier to manage, and retune them so I don't have to buy new hardware to support your new OS, and then we'll talk about buying your new FUBAR devices?"

To end on a more specific note, one comment I consistently heard was in response to my assertion, "do not try to run Solaris 2.x on anything less than a Sparc Classic with 24MB of RAM – it is just too slow on weaker machines." Many people told me, "Well I run it on my Sparc [1[+]IIPCIIPX] with X MB of RAM, and it's just fine." I disagree, and, yes, I have run Solaris on those platforms. Your mileage may vary.

Wherever You Go, There You Are †

by Elizabeth D. Zwicky
<zwicky@corp.sgi.com>

Recently I spent six weeks in Cortaillod, Switzerland, working at SGI's European manufacturing center. People's reactions to this were rather predictable. For one thing, they all wanted to know exactly where Cortaillod was; if you're Swiss, the applicable answer is "About 10 minutes outside of Neuchatel." If you're European, it will probably help to know that Neuchatel is between Lausanne and Basel. If you're American, Neuchatel is about an hour and a half from Geneva. If you didn't know that Geneva was in Switzerland, then about all you need to know is that we're talking about Central Europe here.

Everybody also assumed that I would write a column about the stunning differences between American system administration and Swiss system administration. It's true that I can go on for pages about the differences between Switzerland and America (the iced tea rant alone takes up several screens, and many people of my acquaintance are waiting with bated breath for the moment when I stop saying things like "you don't get much Mexican guitar music in Switzerland, but there are a surprising number of Andean pipe players") but the fact is that system administration is much the same there as it is here. Certainly there are language issues (there's nothing like setting out to read the fine manual only to discover that you have the German version in which only the illustrations make any sense to you), and being in a time zone nine hours away from the center of your industry adds interest to technical support, but, basically, system administration is system administration.

This should not actually come as a surprise to anybody who has held many system administration jobs. I have been slowly moving away from academia into industry, starting from a job in a university, moving to one in a research institute, and finally holding one in a genuine for-profit company. At every stage, people kindly warned me that I was moving into a higher-stress world with a lower standard of intelligence. This is not true. Anybody who thinks the academic world is low-stress has never encountered a graduate student in the final throes of getting a PhD, and anybody who thinks the world of contract research is calm has never truly experienced the full impact of the words "soft money." Your only requirement is to refinance your job every month or so, but it's not stressful, not really, unless you have some neurotic need to know that you're going to have a job next month and maybe some inkling of what it will be.

As for relative intelligence, it may be true that your average university student is more intelligent than your average company employee, although I wouldn't make any large bets, but in any case it does not follow that your average university student has more common sense, a greater ability to use a computer, or more patience and graciousness when dealing with system administrators. Your average university student tends to be younger, to be more emotional, and to have more spare time. This does not imply more tolerance for delay, however, merely an apparently infinite supply of time in which to think up ways to use computers for purposes other than those for which their purchasers intended them. In moments of crisis, employees tell you they have children at home waiting for them, while students tell you they have homework due, giving you a choice of whether to blight the future of the present generation or the next.

Similarly, the laid-back Californians are not any happier having to wait for their computers to work than the time-conscious Swiss, although admittedly they swear about it in fewer languages. You do get more language misunderstandings in Switzerland (although even in America the computer industry is not completely inhabited by native speakers of American English, particularly in California). Unintuitively, the worst of these misunderstandings occur between the Americans and the British. On one occasion I had the humiliating experience of trying to fix a machine I believed was named Bonnie because of the existence of a nearby Clyde. Eventually its owner enlightened me by pointing out that the machine was named after the large purple dinosaur. After that I asked everyone to write down everything for me.

But in general, people vastly overestimate the differences. For instance, people tend to assume that when I talk about my colleagues leaving work because the weather is too good and they want to wind-surf, I'm referring to Californians. As it happens these were Swiss wind-surfing Lake Neuchatel, where the wind is less reliable but you don't need to worry about the tide. (The only Californians I've worked with who were lured away by the weather were going to play golf.) The local wine tastings were also in Switzerland, as was the show where we did the live intercity ATM demo in conjunction with the phone company.

Admittedly, the language situation made setting up the demo more interesting. Especially during an initial problem in which the videoconference application was not connecting all participants to each other, and was connecting different ones for the audio, the video, and the whiteboard.

Imagine, if you will, somebody who speaks only English, who can hear a German speaker with minimal English and a bilingual German and English speaker, who can see but not hear each other and hear but not see him. Now imagine that they are trying to debug multicast routing over ATM. Forty-five minutes passed in the attempt to determine who could see whom and who could hear whom, and success was not achieved until several telephone calls were added in. Unfor-

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 6

tunately, there was a magic moment when one of my colleagues could both see and hear the person who he was trying to reach on the telephone - in fact, he could hear the phone ringing on the far end over the videoconference audio – but the person he was trying to call wasn't answering the phone because he was busy with the videoconference problem. By waving the phone at the video camera, and pleading into the microphone, the caller was able to communicate that he wanted a phone answered to most of the conference participants, but not to the one he was calling. In short order, 5 people in 3 cities were devoted to the problem of getting the phone answered (often one could watch irrelevant people answering their phones), and the caller was clutching his microphone in his teeth in order to type with one hand and hold the telephone with the other. This handily prevented him from swearing at his local audience, which was both steadily growing and laughing hysterically.

In other words, it was just like working here; exciting, maddening, and full of unintentional humor.

System Administration Tools Your Vendor Never Told You About: The Toy†

by Elizabeth D. Zwicky
<zwicky@corp.sgi.com>

System administrators need toys for some of the same reasons that doctors need them in their waiting rooms; they keep cranky unhappy people occupied while they wait. It's true that most doctors only keep toys for children, and stick the rest of us with mere unamusing elderly magazines, but then doctors don't have to sit in their own waiting rooms, either, and their patients are generally sick and therefore subdued.

The ideal toy for a system administrator is both amusing and calming for visitors, and serves as stress release for the system administrator. Avoid fragile objects, and anything that makes a noise you're going to object to while frantically debugging things, and anything that shoots water or produces magnetic fields. Legos and their ilk are good, although people tend to rapidly become attached to their creations and become unhappy when you want to take them apart so other people can play. Some people swear by puzzles, but others complain that they either make people more frustrated, or make them refuse to leave until they're done. I have gotten one emphatic vote for a toy called a "Jibba Jabber," which is designed to be throttled.

System Administration Tools Your Vendor Never Told You About: Painkiller †

by Hal Pomeranz
<pomeranz@netcom.com>

At the risk of sounding like an Excedrin commercial, I had a headache today. System Administration is a high stress job and I, like many other sufferers, react to stress by developing tension headaches. System Administration is also a customer service job, but I have a hard time being nice and smiling at people when my shoulder, neck, and forehead muscles are tied up in knots. It's at times like this when the 1,000 count bottle of generic pain reliever is a godsend.

Whatever poison you choose (I'm an ibuprofin man myself), buy in bulk and keep it where everybody in the your System Admin group can get at it. Think of it as a group harmony preserving agent. At some places where I've worked, a medical services company provides handy little wall racks that contain boxes of single dose packets. There are two problems with this scheme: (1) personally, it takes several "single dose" packets to satisfy my habit, and (2) you're at the whim of some outside agency as far as restocking goes (somehow their restocking schedules were never built with System Administrators in mind).

Of course, you should strive to develop a chemical free lifestyle. Eat right, get plenty of rest and exercise, get out and do things with your non-work friends, and all of those other things you read in stress reduction pamphlets from your doctor's office. But keep that industrial size bottle of aspirin handy, just in case.

† This is a reprint from ;login, the USENIX Association Newsletter, Volume 19 Number 6

An Update on Standards Relevant to USENIX Members †

by Nick Stoughton
USENIX *Standards Report Editor*
<nick@hoskyns.co.uk>

The following reports are published in this column:

- POSIX.5: Ada Bindings
- ISO SC22
- SRASS: Services for Reliable, Available, Serviceable Systems

Our Standards Report Editor, **Nick Stoughton**, welcomes dialogue between this column and you, the readers. Please send your comments to *<nick@usenix.org>*.

You know how you get "tuned in" to certain words or phrases because they are relevant to things you do? Well, I tend to notice the word "standard" whenever I see it, which has led me to ponder the various meanings of the word; usually it is being used with a different meaning than International Standards.

Standards can be an accepted or an approved example of something against which another is measured (the Collins dictionary). It also means, in Britain at least, a size that is smaller than *large* and larger than *medium*! (I believe that you Americans use "regular" instead of "standard" for this). Clearly, by this measure, POSIX.2 is not *standard*!

A standard is also a principle of propriety, honesty, and integrity, as in "setting high standards." Is this POSIX?

An editorial in a British trade weekly recently caught my eye, since it had the word "standards" in the title. For a change, it was really about the sort of standards we are talking about here. So, with permission from the author, John Lamb, and from *Computer Weekly*, I reproduce some parts:

> Mention Standards to most users and you conjure up a mental image of grey committee members arguing over some obscure communications protocol. Packed with suppliers' representatives, users can be forgiven for regarding many of these committees as cynical efforts to ensure that standards are drawn so widely as to be meaningless.
> Remember the ill-fated ACE consortium? Whatever happened to that gathering? Even when the standards body does shuffle together some recommendations, such as the POSIX interface for UNIX, loose specifications render them worse than useless.
> All too often the work of standards bodies is undermined by suppliers who refuse to join in. IBM and Microsoft have both played this game with the Object Management Group, although they both finally played ball.
> Against this background it is not surprising that users are now taking things into their own hands.
> [Recently] London hosted a powerful gathering of top names from the oil industry. They want to standardize the software they use for key applications. With the expenditure of billions of [dollars], the oilmen have the clout to tame their suppliers.
> But Barclays Bank [one of the largest High Street banking companies in the U.K.] has also shown that individual users can build IT strategies around standards. They have taken the bold move of insisting that suppliers adhere to the Open Software Foundation's DCE specification.
> And in the U.S. the network Applications Consortium, a user group with total revenues of $200 billion, is trying to standardise interoperability between software operating systems and network services.
> Agreeing on standards is no easy matter: technical complexities, resistance from end-users who have their own pet solutions, and vested commercial interests all conspire against the would-be standards setter.
> But the end result in terms of cheaper costs and streamlined systems is worth the effort by the users, if only more would get involved.

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Although I do not agree with all of what John has to say, it is encouraging to see someone else recognizing some of the problems we face. It is also interesting to see the "mental image" of us standards geeks as being grey individuals arguing about obscure communications protocols; he clearly has never been to a POSIX meeting!

POSIX may be regarded by some as a loose specification that is worse than useless, but it does have a significant user representation. That's what I do after all. It is loose in the base specifications, but uses profiles (few of which are yet published) to tighten up for specific uses, such as the POSIX.18 UNIX profile.

It is with considerable regret that we see Jeff Haemer standing down as the USENIX Institutional Representative to POSIX. Jeff has been undertaking this role for the last three years, and has done much to forward the work of POSIX in the interests of the end users. For various, personal, reasons, Jeff feels that he can no longer commit the time needed to this work.

It was Jeff who introduced me to the world of standards, and took me on as Snitch Editor. I owe him a major debt of gratitude, and hope that you will all join me in wishing him well. Jeff has been responsible for keeping POSIX on a sensible course, fighting invention, and ably representing the interests of the majority of UNIX users in the U.S.

Stephe Walli, my predecessor as Snitch Editor, will be rejoining the battle as the USENIX I.R. from January. If you want to contact him, send e-mail to *<stephe@usenix.org>*. Stephe, you have a hard act to follow, but I know you'll do it well!

Report on POSIX.5: Ada Bindings

Robbie Robbins <robbie@lfs.loral.com> reports on the July 11-15, 1994 meeting in Nashua, NH:

The primary charter of the POSIX.5 group is to produce Ada language bindings to POSIX standards. The standard for Ada language bindings to 1003.1-1990 was published in 1992 as 1003.5-1992. The working group is now working on three projects:

- P1003.5a – A few problem fixes to the 1003.5-1992 Standard
- P1003.5b, comprising the documents formerly named P1003.20 (the Ada binding to POSIX.1b, the real-time extensions of POSIX) and Mutexes and Condition Variables and Thread I.D.s from P1003.20a (the Ada binding to POSIX.1c, the real-time threads extensions of POSIX.)
- P2003.5, the test assertions document for 1003.5-1992.

In addition, a MOTIF/Ada study group met to consider producing an Ada Binding standard to 1295-1993, the IEEE MOTIF standard.

P1003.5a

There were no meetings on P1003.5a in Nashua. The plan for P1003.5a is to fix the known errors in 1003.5-1992 and rewrite Chapter 6 (Read/Write).

P1003.5b

P1003.5b is the Ada binding to POSIX.1b (the real-time extensions of POSIX) and Mutexes and Condition Variables and Thread I.D.s from P1003.1c (the real-time threads extensions of POSIX).

The first formal ballot on what was then named P1003.20 was conducted on a "thin" binding version: that is, P1003.20 did not repeat the underlying semantics of the POSIX Real-time Extensions draft, which is a C-language interface. The ballot showed that the balloting group favored a self- contained, "thick" binding version instead, which would not require references to the C version. By January, the underlying semantics were imported into the draft. This thickening process in turn exposed problems in the bindings draft. We worked on these problems, and at the July meeting the group reviewed the document and made further changes, and the document was edited for consistency.

Most of the July meeting consisted of issues presentations and fine tuning to 1003.5b. The object was to have a new draft ready by August 1 for ballot, scheduled for the month of September.

The POSIX.5 working group, together with the POSIX.4 working group, is still working to resolve the seven objections to P1003.1c that the POSIX.5 working group submitted in July as a coordination ballot. Five of the objections are considered resolved. The remaining two objections are currently under negotiation between the chairmen of the two working groups, and these negotiations continued during the July meeting. The first objection involves situations where the code of a signal handler needs to ensure that a mutex is locked. The other involves the change brought on by P1003.1c from per-process signal masking to per-task signal masking.

This is still a major issue between the two working groups, and we hope to have it resolved by October.

P2003.5

Kathy Liburdy of Clemson University gave a report on the status of test methods. Sections 3 and 4 are complete in rough draft form and need review. A complete draft of P2003.5 will be ready by the time of the October PASC meetings.

MOTIF/Ada

IEEE PASC approved a Study Group to consider an Ada Binding to the recently approved IEEE Motif Standard (IEEE 1295). This group met in Nashua to discuss what could be standardized. There are several commercial products that provide a MOTIF/Ada binding, thus there is substantial existing practice. However, these products all use Ada83, and the new version of Ada (Ada94) is nearing approval within ISO. Ada94 provides several Object Oriented Programming features that would be very useful in describing a MOTIF interface. As a result, the group decided that standardizing an Ada83 binding would not be very useful. Conversely, there is insufficient commercial practice with Ada94 MOTIF bindings to justify standardization at this time, but it was reasonable to expect Ada94 products "real soon now". In the interim, there are some useful activities that the group could do to prepare for a MOTIF/Ada standard. In particular, the IEEE 1295 document requires some services defined in Xt and Xlib. The C bindings are "standardized" by the X Consortium, but no equivalent document exists for Ada. The group wants to identify the minimum set of Xt/Xlib features needed for MOTIF, so that this set can be included in the MOTIF/Ada binding. The group has asked PASC for permission to continue to meet through Jan 95, with the expectation that there would be sufficient practice to start standardization by the end of 1995.

Report on ISO SC22

John Hill <jhill@bb.unisys.com> reports on the September 19-23, 1994 meeting in The Hague, The Netherlands:

Many of you are aware that there is an international standards development committee whose scope includes computer programming languages and their environments. That committee's formal name is ISO/IEC JTC 1 SC22. Or, SC22 for short. This brief article concerns the outcomes of the most recent meeting of SC22. They met in The Hague, The Netherlands 19-23 September 1994. NNI, the Netherlands national standards body, (analogous to ANSI for the USA) hosted the meeting.

Thirteen delegations participated in the following. They came from Austria, Canada, Denmark, ECMA, Finland, France, Germany, Japan, Netherlands, New Zealand, Switzerland, UK and the US. It happens that the Austrian delegation carried the proxies of both New Zealand and Switzerland.

Eleven working group conveners attended, three other working groups were represented by members of national body delegations. The working group conveners who attended were from WG2-Pascal, WG3-APL, WG4-COBOL, WG5-Fortran, WG9-Ada, WG11-Bindings, WG14-C, WG17-Prolog, WG19-FDTs, WG20-Internationalization, and WG21-C++.

The working groups whose conveners did not attend were WG8-BASIC, WG15-POSIX and WG18-FIMS.

The outcome of these big political meetings is always a set of resolutions. Just so you get an idea of what sort of thing goes on, I reproduce here those resolutions.

SC22 approved 28 resolutions covering a broad range of activities. The following summarizes the key resolutions:

- Divisions of work item were approved for POSIX, APL and Internationalization. This allows for what were previously large, single-document projects to deliver their work in smaller packages.
- Five (5) project editors, all from the US, were approved.
- Eight (8) WG conveners were reappointed. Three from the US received conditional reappointments pending final US nomination approval pending some paperwork.
- SC22 formed a new WG, WG22, for Portable Common Tools Environment (PCTE). France provided a convener, Regis Minot. The UK provided a project editor, John Dawes. SC22 expects Switzerland to propose the European Computer Manufacturers Association (ECMA) as Secretariat.
- SC22 disbanded three WGs: WG2-Pascal, WG8-BASIC, WG18-FIMS. The work on Pascal and BASIC is complete, except for maintenance. The US will provide a project editor for each. The work on FIMS was disbanded due to insufficient participation. SC22 invited the US to submit its FIMS standards for fast-track approval. A likely candidate for this is the COBOL binding.
- SC22 reviewed the JTC1 Chairman's proposals for use of information technology and approved a contribution for the Geneva JTC1 meeting. The text of this contribution is in an attachment at the end of this report.

Please be aware that the document is a response to a proposal that would automate all of JTC1. Consequently, this is a single input of many that JTC1 will take into consideration at its next meeting.

- SC22 requested its chairman to raise, at the SC chairman's forum, issues concerning publications delays (in ITTF). Essentially, SC22 observed a number of delays in having its standards published. This resolution will deliver some ordinance on the target.

- Canada announced its intent to retain the SC22 secretariat and named Mr. Ed Borkovsky to that position.

This SC22 meeting dealt with a large number of touchy administrative issues, and a few tricky technical matters. As has been typical in the past, the atmosphere was intense but under control. All the national body delegations made effective contributions making for a lively set of debates.

Draft Contribution from ISO/IEC JTC 1 SC22 to JTC 1 on JTC 1's Strategy for Implementation of Information Technology: SC22 welcomes the initiative to move progressively towards electronic working and appreciates the work involved in producing document JTC1 N3034. It wishes to cooperate in achieving the aggressive time scale proposed. During its discussions to this end, some suggestions were made on which SC22 would welcome further consideration.

SC22 suggests that further consideration be given to the use of electronic mail and FTP in addition to diskettes, and to the use of SGML as a target standard. SC22 would welcome information on the availability and cost of appropriate SGML environments.

SC22 Comments and Suggestions on Document JTC1 N3034. The document discusses the use of electronic formats for document registers and ballot/comment due date list, including distribution by diskette. However, Recommendations #1 and #2 encourage the use of electronic mail. Electronic mail seems reasonable for use of document registers and ballot/comment due date lists in preference to mail distribution of diskettes. (We note parenthetically that customs delays are occasionally encountered in the shipment of diskettes.) The character code set ISO 8859-1 (Latin-1) includes characters for Western European alphabets and cannot be displayed on many existing display screens.

The code set ISO 646 IRV (ASCII+) is a seven-bit code which can be transmitted through existing electronic mail facilities, but some characters will display differently on different display screens in different countries. For example, a document entitled "Problems with '\' character" would display on many Japanese screens as "Problems with '¥' character".

The most restrictive code set, ISO Invariant 646, contains only the 26 (English) lower case letters, the 26 upper case letters, the ten digits, and the punctuation characters !+%&+()*+,-./:;<=>?_ and space.

SC22 recommended replacing "ISO 8859-1" by "either ISO 646: IRV or invariant ISO 646." The advantage of restricting administrative documents to Invariant ISO 646 is that such documents can be assured to display the same on (almost) any existing screen or printer and to transmit unchanged via electronic mail.
SC22 also recommended modifying another recommendation so it reads:

> "For work in progress where possible and all future work, Project Editors be required to submit their text (WD, CD, DIS, etc.) in electronic form. When technically possible, Project Editors shall provide also a plain text (ASCII) version for review by National Body experts."

It should be noted that it is not possible in all cases for Project Editors of work in progress to provide their texts in electronic form so that printed form can be reproduced. For example, printing of the paper copy may involve manual intervention or use of proprietary software, or may be dependent on a specific computer environment.

The ability of working groups to accept and convert electronic documents irrespective of format requires an extensive range of system and software resources. Few, if any, SC22 working groups have such a range of resources available to them. It is not practical to expect working group conveners to make such an extensive investment.

Therefore, the SC22 secretariat is unable to commit to implementation of all of the recommendations by 1995/03/01. A period of investigation and system development is required in order for the secretariat to implement any procedure for electronic distribution of draft standards. It is probably necessary to limit the number of formats that will be accepted and converted.

Report on SRASS: Services for Reliable, Available, Serviceable Systems

Arun Chandra <achandra@vnet.ibm.com> reports on the July 11-15, 1994 meeting in Nashua, NH:

The POSIX Services for Reliable, Available, and Serviceable Systems (SRASS) study group was finally approved to become a working group at the July 1994 meeting held at Nashua, NH. This study group was formed in October 1993 following two BOF sessions.

The group, originally called the Fault Management Study group, is interested in issues of fault tolerance, high avail-

ability, reliability, serviceability, and maintainability. Vendors in the group include Tandem, Sequoia, Unisys, Texas Instruments, Stratus, and IBM. Users in the group include the Naval Surface Warfare Center, the Naval Air Warfare Center, Jet Propulsion Laboratory, and the Johns Hopkins University Applied Physics Laboratory.

The purpose of the group's project is to specify a set of interfaces to allow portable access to underlying fault management services by application programs. These underlying services may support detection, logging, and notification of abnormal conditions during system operation; classification and analysis of abnormal conditions for fault diagnosis; and corrective actions for system reconfiguration, reinitialization and recovery.

The SRASS group's Project Authorization Request (PAR) includes two major areas: Fault Tolerance and Serviceability. IBM's AIX documentation has been identified as the base document for serviceability issues while documentation from Tandem, Sequoia, and Stratus will serve as the documentation for fault tolerance issues. Also, a number of other existing documents are being used as reference documents.

The SRASS group's initial scope within POSIX is to define standard APIs which will address fault management (fault tolerance, serviceability). Liaison with other groups will ensure that the APIs standardized by this group will not violate existing standards. Checkpoint/Recovery is an example of the above. The initial list of fault management extensions to the POSIX specifications will comprise APIs for fault detection, fault localization, reconfiguration, fault recovery, error logging, notification, tracing, and dumps. The scope of this effort will be limited only to those APIs which support functionality existing in common practice.

For more information on the group please contact the group Chair, Helmut Roth, *<hroth@relay.nswc.navy.mil>*, or the group Vice Chair, Arun Chandra, *<achandra@vnet.ibm.com>*.

Unix Tricks & Traps

The Perils of `pico` (or, why you should use `vi`!)

As many of us are aware, and, as Unix hacks, sometimes freely admit, many Unix text editors are pretty unfriendly for the novice user. These new users want an editor that's "friendly", and "menu driven", and all those horrible things spurned by purists brought up on `ed`.

Along comes an editor such as `pico` (part of `pine`, another "friendly" mailer, ugh!). Our hero[ine], the sysadmin, at the request of the users, installs said mailer, and editor that comes with it.

Now, normally, this would be fine. The novice user now has one of these bells-and-whistles editors, that does everything they've ever wanted, and holds their hand while they do it. Everybody's happy.

Until....

Generic user reads/asks/learns/experiments/(horror of horror)RTFMs, and wants to change their setup. Create an alias, change an environment variable...whatever...maybe just take a look at these files with dots in front of their names?

This is good! The users are keen to learn, and explore, and all those Good Things that make the sysadmin's life easier, and the user more confident and productive.

But the user edits their `.cshrc`, `.profile`, or whatever with `pico`, because it's so easy to use! `pico`, being designed for an email system, does a few nifty things for you. One of them is to (if set to, and by default on some versions, it is) automatically insert linefeeds to keep generic user from breaching netiquette and posting long lines. This is good for email for novices.

This is *really* bad for editing system files!

So our intrepid user edits their `.cshrc` file. It's been set up badly, and has a long line in the path setting (substitute `.login` if you prefer to set your paths there). `pico`, being nice, adds some line breaks. Generic didn't ask for them, Generic probably didn't even notice them...

Generic is stuffed! Can't log in...weird messages! Of course, Generic doesn't find this out until the next time they log in, and then, they can't remember what they did anyway! (How many times have we heard, and even said ourselves, somewhat sheepishly, "I didn't change anything!") Chances are, they didn't even alter the file themselves, but `pico` merrily went on its happy, friendly way, and trashed the file. So our local sysadmin gets the phonecall, manages to work out what the problem is, but doesn't think of the editor as doing it for the user, abuses the user, and throws bricks at them! Not good!

It doesn't need to be said, that you should *never* use these editors on really important files (`pico /etc/passwd`?!, hide your head in shame if you've even considered it).

So what to do about this? (`pico` is just an example, other editors can also be set up to do these nice things, of course, with the same dangers.)

The obvious, and the hardest, is educating your users, *teach* them `vi`! Teach them that funny operating-system-disguised-as-an-editor `emacs` (hey, it's only CPU and memory anyway!), write nice guides to these editors (it can be done!). (Teach 'em `sed` and `nroff`?!)

Get users who refuse to learn a decent editor a Mac or a PC, and run something glorious like Eudora on it for them (you won't regret it, Eudora is a perfect example of client-server done properly)

RTFM for everything you install, especially editors (yeah, it's a drag, but you might stumble onto the option to auto-insert, and you might be able to turn it off globally, depends on your editor, of course, I'm using `pico` as an example). Or hack the source to these editors, remove auto-indent.

Laugh, set fire to everyone and steal an APC and drive it to the local police station... If only!!!!

Carl Brewer <carl@oversteer.library.uwa.edu.au>

Please send your contributions for this column to the Tricks & Traps / User Support Mailbox Sub-editor, Janet Jackson <*janet@dialix.oz.au*>, phone/fax (09) 272 5061. Suggestions for topics are also welcome.

AUUG EXECUTIVE COMMITTEE
SUMMARY OF MINUTES OF MEETING 21 October 1994

Present: Phil McCrea, Glen Huxtable, Frank Crawford, Chris Maltby
Rick Stevenson, Stephen Boucher

Apologies: Michael Paddon, Lucy Chubb, Peter Wishart

Guests: Catrina Dwyer, Wael Foda - ACMS (Morning only), Lachie Hill &
Don Weatherman (Media Solutions), Alistair Gordon (Strategic Publishing).

1. ACMS Report on AUUG '94

A full report was distributed by Wael Foda to the committee members present. In summary, AUUG'94 provided the best ever attendance figures for Melbourne. An evaluation form was sent out to the exhibitors for feedback about the exhibition and any points to note for 1995. The general response was good.

It was noted that the prices for participation in the exhibition have remained the same since 1990. A price increase was proposed for 1995.

Some sponsorship for AUUG'95 were signed up prior to the close of AUUG'94. At AUUG'95, AT&T will be sponsoring the conference dinner and Hewlett Packard will be sponsoring the cocktail party.

ACMS have officially been appointed conference organiser for '95 by letter from PMC.

1.2 Financial Statement

AUUG '94 is projected to break even or make a small profit. The financial position is not clear at this stage as outstanding debts have not been collected.

ACMS suggested that the AUUG Conference Committee review the advertising budget for 1995, taking into account how effective advertising is at promoting the conference versus promoting AUUG in general.

The Committee gave a formal vote of thanks to ACMS for 1994.

2. Treasurer's report

Overall financial position is healthy. It was proposed that a finance sub-committee be established to handle the 94/95 budget in addition to other financial issues. Cttee members are: SB, FC CD. Accounting software (e.g. MYOB) is to be purchased in an effort to simplify AUUG's accounting process.

FC and SB met with the auditors, Nichol & Nichol, to discuss the annual Audit Report. There are some small areas for concern which should be resolved with the purchase of the above mentioned accounting software. Nichol & Nichol have agreed to undertake overseeing AUUG's lodgement of a Group Tax Employer application. Some information on non-member income is required by the auditors. SB to liase with Secretariat. In addition, they have agreed to act as AUUG's accountants in specific cases. A proposal is due from them.

3.0 Media Solutions

3.1 AUUG '94 Wrap Up

Lachie was very pleased with the coverage AUUG '94 received - best to date. MS compiled a press cuttings book. A copy is held by the Business Manager. Journalists now know AUUG and are happy to cover conference in depth. This was not the case a few years ago. The mechanics of the PR campaign worked well with one exception: soliciting PR articles from general sessions speakers was very difficult. Speakers not receptive to the PR effort. Must improve this for '95. Vendors who sponsored speakers for AUUG'94 were very co-operative and helpful. In general, the exhibition generated a reasonable amount of coverage.

International coverage: Unigram.X in the UK did 1 page report on AUUG written by a Melbourne based journalist. First time for this to happen and provides good basis for repeat coverage in '95.

Motion: To appoint Media Solutions on an ad hoc basis for selected projects. AUUG '95 PR to be reviewed separately. Moved: SB/CM. Carried.

4.0 Alistair Gordon, Strategic Publishing

Alistair put forward a proposal that AUUG'95 become part of an umbrella IT educational event with in conjunction the ACS, organised by Strategic Publishing in 1995. The aim is to attract MIS Managers and increase attendance at AUUG '95 through a more general programme. The event would be sold on a ticket basis with a 65% / 35% split between the participating body and the organiser. Concerns were voiced about the broad focus of such an event. AUUG is a specialised conference concerned with Unix and Open Systems and not computing in general.

5.0 Other Business

5.1 95 Conference Committee

Geoff Huston has formally accepted position as 95 Programme Chair. The Call For Papers will be issued by GH shortly and a Programme Committee elected. The 95 Conference Cttee members have been selected: President, Treasurer, Asst. Treasurer, Business Manager & Conference Organiser.

5.2 Australian and OSR articles

Concern over erratic appearance of AUUG column. PMC to talk to the editor about any problems he may have with the column.

AUUG has been approached by Open Systems Review to write a page for the magazine. PMC has determined that there would be no conflict of interest with the Australian as the focus will be more technical. AUUG could use the diary page in both publications to detail chapter activity. A coordinator for the OSR articles & diary page is to be appointed. CD to approach the NSW Chapter to find a coordinator.

5.3 AUUGN Editor

To date, 2 candidates have come forward to take over from Jagoda. Jagoda has replied to both applications and is evaluating their suitability for the post.

5.4 Spafford/Linus Tours

CD reported on feedback from Linus' tour. Very well received, particularly in WA, VIC and Singapore. CD to approach WAUG to do article on Linus' tour for AUUGN. Spafford's tour generally went well. GH to contact Spaf for feedback.

5.5 Speaker Tours for 95

Brent Chapman is willing to do an update on the SAGE tutorial on firewalls. His costs could be an issue for AUUG. If his costs are not too expensive AUUG will tour him circa April 95 for approx 3 weeks. Chapters are to be approached to determine level of interest. GH to approach Brent to clarify his fees and determine interest in the tour.

5.6 Summer Conference Series

NSW & WA have posted CFP and booked dates. Promotion will be done nationally by AUUG but locally by Chapters. Sub - Cttee formed to handle workshop tours either during or after summer conferences. Members are: GH, CM, RS and CD. Potential speakers for tours include: John Ousterhuit, Rich Stevens. CD to chase other chapters for conference dates.

5.7 Chapter Council meeting and Finances

Chapters would like to use Australian and OSR Diary pages to promote local events. If meeting is to be held during winter conference in 95 it must be scheduled properly. Problems this year in time/room availability. Some chapters have significant amounts of money in bank accounts. There must be justification for keeping such amounts in local bank a/c instead of nationally. SB to liase with Chapters.

5.8 Business Manager

A list of software required by CD was drawn up. Motion: That AUUG purchase the necessary software for Business Manager. Moved: SB/CM. Carried. CM to source discounted software for CD's Mac and purchase required software.

5.9 Other

Asia/Pacific Unix Groups. CD to contact groups to obtain a list of contacts for AUUGN.

Committee to examine the possibility of: AIR Registration and Webb page - FC to talk to Geoff Huston or Hugh Irvine.

NEXT MEETING: 15 DECEMBER

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 an 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 Membership is not a membership you can 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.

It's also possible to subscribe to the newsletter without being an AUUG member. This saves you nothing financially, that is, the subscription price is greater than 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 your membership type, examine your membership card or the mailing label of this AUUGN. Both of these contain information about your current membership status. The first letter is your membership type code, M for regular members, S for students, and I for institutions, or R for newsletter subscription. Membership falls due in January or July, as appropriate. You will be invoiced prior to the expiry of your membership.

Check that your membership isn't about to expire and always keep your address up-to-date. 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 Visa or Mastercard by simply completing the authorisation on the application form.

MEMBERSHIP APPLICATION
INSTITUTIONAL

AUUG Inc
UNIX® AND OPEN SYSTEMS USERS

To apply for AUUG membership, complete this form and return it with payment in Australian Dollars to:

REPLY PAID 66, AUUG MEMBERSHIP SECRETARY,
P.O. BOX 366, KENSINGTON, NSW 2033, AUSTRALIA
Tel: +61 2 361-5994 or 1 800 625 655 • Fax: +61 2 332-4066

Tick this box if you wish your name withheld from mailing lists made available to vendors. ☐

NOTE: Please do not 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.

We, _____
(Company Name)

do hereby apply for:

Renewal/New* Inst. membership of AUUG ☐ $350.00
International air mail ☐ $120.00

TOTAL REMITTED AUD$_____
(Cheque, money order, or credit card)

I/We agree that this membership will be subject to the rules and by-laws of AUUG as in force from time to time, and that this membership will run from time of joining/renewal until the end of the calendar or financial year.

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.

Signed_____ Date _____

Title _____

INSTITUTIONAL MEMBER DETAILS:
To be completed by institutional members only.

Following are our specified contacts. The primary contact holds the full member voting rights. The two designated reps will also be given membership rates to AUUG activities including chapter activities. By default a regional chapter will be selected for you. If you would rather nominate a chapter, please specify in space provided (indicate NONE for no chapter). *(Please print clearly or type)*

Primary Contact_____
Position/Title _____
Address _____
_____ Postcode_____
Bus. Tel: _____ Bus. Fax:_____
e-mail address _____
Local Chapter Pref. _____

1st Rep._____
Position/Title _____
Address _____
_____
Bus. Tel: _____ Bus. Fax:_____
e-mail Address _____
Local Chapter Pref. _____

2nd Rep._____
Position/Title _____
Address _____
_____
Bus. Tel: _____ Bus. Fax:_____
e-mail address _____
Local Chapter Pref. _____

Please charge $_____ to my
☐ Bankcard, ☐ Visa, ☐ Mastercard
Account number:_____
Expiry date:_____
Name on card:_____
Signature:_____

AUUG Secretariat Use

*Chq: bank*_____ *bsb* _____
*a/c*_____ *#* _____
*Date:*_____ *$* _____
*Initial:*_____
Date processed: _____
Membership # _____

AUUG Inc. as a user group, exists to provide UNIX® and open systems users with relevant and practical information, services, and education through cooperation among users.

MEMBERSHIP APPLICATION
INDIVIDUAL

UNIX® AND OPEN SYSTEMS USERS

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Tick this box if you wish your name withheld from mailing lists made available to vendors. ☐

NOTE: Please do not 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.

INDIVIDUAL OR STUDENT MEMBERSHIP:

I, _____ do hereby apply for:

Renewal/New membership of AUUG	☐ $ 90.00
Renewal/New Student membership	☐ $ 25.00 (please complete certification portion)
International air mail	☐ $ 60.00

TOTAL REMITTED: AUD$_____ (Cheque, or money order, or credit card)

I agree that this membership will be subject to the rules and by-laws of AUUG as in force from time to time, and that this membership will run from time of joining/renewal until the end of the calendar or financial year.

_____
Signature

_____
Date

LOCAL CHAPTER DESIGNATE:

You can participate in the activities of a local AUUG Chapter. Part of your fee will be given to the chapter to support those activities. By default a regional chapter will be selected for you. If you would rather nominate a chapter, please specify here _____ (indicate NONE for no chapter).

TO BETTER SERVE YOU, PLEASE PRINT YOUR CONTACT INFORMATION:

Name/Contact: _____
Position/Title: _____
Company: _____
Address: _____
_____ Postcode_____
Tel: BH_____ AH _____
Fax: BH_____ AH _____
email address:_____

Over for Institutional Membership

STUDENT MEMBER CERTIFICATION: *(to be completed by a member of the academic staff)*

I, _____ certify that
(administrator)
_____ is a full time student at
(name)
_____ and is expected to
(institution)
graduate approximately _____.
(date)

_____
Signature

_____ _____
Title *Date*

Please charge $_____ to my
☐ Bankcard, ☐ Visa, ☐ Mastercard
Account number:_____
Expiry date:_____
Name on card:_____
Signature:_____

AUUG Secretariat Use

*Chq: bank*_____ *bsb* _____
a/c _____ *#* _____
Date: _____ *$* _____
Initial: _____
Date processed: _____
Membership # _____

AUUG Inc. as a user group, exists to provide UNIX® and open systems users with relevant and practical information, services, and education through cooperation among users.

Notification of Change

UNIX® AND OPEN SYSTEMS USERS

You can help us! If you have changed your mailing address, phone, title, or any other contact information, please keep us updated. Complete the following information and either fax it to the AUUG Membership Secretary on (02) 332-4066 or post 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..)

❒ The following changes are for my personal details, member #:_____

❒ The following changes are for our Institutional Member, primary contact.

❒ The following changes are for our Institutional Member, representative 1.

❒ The following changes are for our Institutional Member, representative 2.

PLEASE PRINT YOUR OLD CONTACT INFORMATION (OR ATTACH A MAILING LABEL):

Name/Contact: _____
Position/Title: _____
Company: _____
Address: _____
_____ Postcode_____
Tel: BH _____ AH _____
Fax: BH _____ AH _____
email address:_____

PLEASE PRINT YOUR NEW CONTACT INFORMATION:

Name/Contact: _____
Position/Title: _____
Company: _____
Address: _____
_____ Postcode_____
Tel: BH _____ AH _____
Fax: BH _____ AH _____
email address:_____

AUUG Secretariat Use

Date: _____
Initial: _____
Date processed: _____
Membership # _____

AUUG Incorporated
Application for Newsletter Subscription
AUUG Inc.

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.

This form is valid only until 31st May, 1995

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	$ 150.00**
☐ International Surface Mail	$ 20.00
☐ International Air Mail	$ 60.00

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.
** This includes a copy of the proceedings of the AUUG Winter Conference.

Please charge $_____ to my ☐ Bankcard ☐ Visa ☐ Mastercard.

Account number: _____ _____ _____ _____. Expiry date: __/__.

Name on card: _____ Signed: _____

Office use only:

Chq: bank _____ *bsb* ____-____ *a/c* _____ # _____

Date: __/__/__ *$* *CC type* ___ *V#* _____

Who: _____ *Subscr#* _____