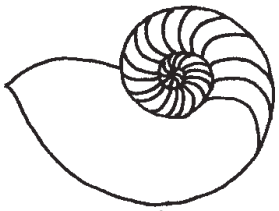
Volume 4, Number 3 January 1992 $2.50



TUUG Lines

Technical UNIX® User Group

Newsletter of the Technical UNIX® User Group

Happy New Year!

THIS MONTH'S MEETING

Meeting Location:
This month, the meeting is to be held at the theatre of the St-Boniface Hospital Research Centre, just south of the hospital itself, at 351 Taché. The meeting is set to start at the usual time – 7:30 PM, on January 14, 1992. You will likely have to sign in at the security desk at the entrance. The theatre is on the main floor; ask for directions at the security desk if you need them.

Meeting Agenda:
See last page for details.

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Let's Improve Our "Local Network"

By Gilbert Detillieux

As I struggle against yet another deadline to complete this edition of the newsletter, I count on the correct functioning of many systems on our local area network. I get some of my material as e-mail messages on one system. Sometimes, I use information from network news articles, taken from another system. I also occasionally get disks in various formats, which then have to be handled on an appropriate system. All the separate files are then collected on one of our UNIX file servers, where I can access them either from UNIX utilities (if the text needs to be massaged in some way), or from the desktop publishing system where I do the final composition and layout (currently, a Macintosh IIcx, using Aldus PageMaker 4.0).

As you can see, there are a lot of different pieces of technology that go in to the production of this newsletter, and each one is important in its own way. A good local network is critical to the operation. Likewise, a good "local network" of people is important to the success of this newsletter, and the continued growth of the group itself. No one person can do it alone, and no individual gets all the credit. We must all cooperate, and get involved, to keep things afloat.

On that note, I once again appeal to you, the members, to contribute to this newsletter. It is not only up to the editor to write up all the articles that go into each issue, or even to go "hunting" for material each month. It is up to all of us to see to it that we get the kind of newsletter we want.

You'll notice that this issue is a little thin; I hope this is only due to the busy times this holiday season, and not a sign of things to come.

I would like to thank those who have contributed material in the past, and I would particularly like to thank Roland Schneider for his article on tape formats, which you'll find in this issue.

The 1991-1992 Executive

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Vice-President:	Richard Kwiatkowski	589-4857
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Group Information

The Technical UNIX User Group meets at 7:30 PM the second Tuesday of every month, except July and August. The newsletter is mailed to all paid up members one week prior to the meeting. Membership dues are $20 annually and are due at the October meeting. Membership dues are accepted by mail and dues for new members will be pro-rated accordingly.

PRESIDENT'S CORNER

Happy New Year!

By Susan Zuk, President

Hope everyone had a very festive holiday season and you are ready for the New Year. Some TUUG members began the season's festivities at the CIPS Casino night. A great time was had by all. The event was well planned with numerous Black Jack tables, Roulette Wheels and Wheel of Fortune gambling areas. After the games of chance were completed there was a Chinese Auction and Karaoke.

Now that the partying is complete we need to look forward and see what is planned for TUUG's New Year. There will be many changes occuring within TUUG this year. The first consideration is a possible name change. The executive has been discussing the viability of either totally changing the name Technical UNIX User Group or just replacing the word Technical with either Winnipeg or Manitoba. We have found that some people consider the group to be totally technically oriented and this is because of our name. We want to encourage all types of UNIX users to join the group and to let everyone know that the focus of the group is to exchange information at all levels. This was one of the reasons we offered three optional tracks at the UNIX Symposium (Novice, Technical, and Management). If you have any new name suggestions give someone on the executive a call.

A second change is to decide if we are to become an affiliate of Uniforum Canada. I have spoken to a number of people from across Canada who are involved with this National group. Please read the insert and if you have any questions or concerns contact me at 788-7312.

Our upcoming meeting is entitled "Migrating to Open Systems". This topic was discussed at the UNIX Symposium by our Keynote Speaker, Rocky Nystrom. We have his talk taped and will be presenting it to you on Tuesday, January 14th. Our host for this meeting is Mr. Paul Hope of the St. Boniface Hospital Research Centre. You have the opportunity to listen to a very informative presentation and also to visit a very interesting building. We will be convening in the theatre and will have a large projection screen with which to view Rocky's presentation.

Our meeting co-ordinator has been keeping very busy preparing the meeting schedule for the duration of our year. If you have a particular topic which you would like to see presented give Eric Carsted a call at 949-4500. Eric will be enclosing the schedule with the next newsletter.

I guess that's all for now. We'll see you at the meeting at the St. Boniface Hospital Research Centre.

THE FORTUNE FILE

Misc.gems

Found in a UNIX fortune program.

Submitted by Kirk Marat

In Dr. Johnson's famous dictionary patriotism is defined as the last resort of the scoundrel. With all due respect to an enlightened but inferior lexicographer I beg to submit that it is the first.

— Ambrose Bierce,
"The Devil's Dictionary"

Beware of Programmers who carry screwdrivers.

— Leonard Brandwein

Here I sit, broken-hearted,
All logged in, but work unstarted.
First net.this and net.that,
And a hot buttered bun for net.fat.

The boss comes by, and I play the game,
Then I turn back to net.flame.
Is there a cure (I need your views),
For someone trapped in net.news?

I need your help, I say 'tween sobs,
'Cause I'll soon be listed in net.jobs.

Tapes and U(NIX)

The various tape formats available today can be quite confusing to understand.
This article attempts to clear up some of the confusion, and help you deal with these tape formats.

By Roland Schneider

Any of us who have ever typed the command "`rm -r *`", or seen the lights flicker and the computer system die, know the momentary feeling of panic that comes with the realization of just how transient those little magnetized spots on the system's disks really are. When you consider that each of the 10 billion bits of data on a modern hard disk occupies less than 0.00002 square millimeters, and they *all* have to be right, every time, you feel a little uneasy.

Of course, that's why we make backups and archives. Problem is, though, the bits on the tape are just as fragile as those on the disk, and since most people don't use tape commands very often, it's easy to make a mistake. A general understanding of how tape drives work helps avoid *some* of the possible mistakes, and also helps when exchanging tapes with other computer systems.

The common tape formats in use on UNIX systems are, from oldest to newest: 1/2" reels at 800, 1600, or 6250 bpi (bytes per inch), 1/4" cartridge with 4, 9, 15, or 18 tracks, 8mm videotape (Exabyte) at low or high density, and 4mm DAT. Apart from simply being grossly incompatible, each tape format has its own set of operational subtleties.

1/2", 9 track reel tapes

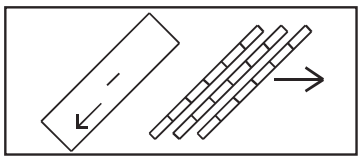
This used to be the most common type of tape drive found in larger computer installations. The tapes are bulky and the drives themselves are larger (and more expensive) than most modern computers. However, the UNIX tape utilities were written with this type of drive in mind, and many are still in use, so they bear some examination.

Data is recorded in 9 tracks simultaneously across the tape – eight data bits plus parity. During a tape write operation, the tape first passes over the erase head, which demagnetizes the tape, then across the write heads, which magnetize the tape in one of two directions, depending if a "1" or a "0" is being written, and then across the read heads, which read the data back to make sure it was successfully written.

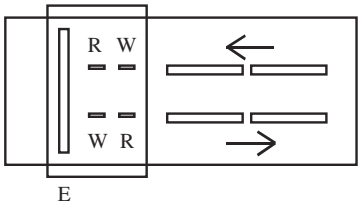
In all but the lowest performance 1/2" drives, the tape is kept under tension by running a loop from each reel into a vacuum column. Because only the mass of the tape itself has to be accelerated, the tape can start, stop, and reverse very abruptly – much more abruptly than the tape reels themselves could.

A single UNIX `write()` system call will write a single block of data (sometimes called a record, just to confuse things) onto the tape, followed by an inter-record gap. The tar "b" option sets the size of this block in 512 byte increments. The upper limit for the blocksize depends on the drive hardware, but it is frequently 10K bytes, corresponding to a tar blocksize of 20. Big blocksizes usually give a higher data transfer rate (fewer starts and stops) and allow more data to be put on a tape. (fewer inter-record gaps)

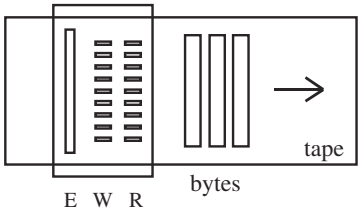
When a tape device opened for writing is closed, two *tape marks* are written. The first indicates the end of the file, the second the end of the tape. If another file is later written on the same tape, the second tape mark is erased, leaving



Format: 8mm 2.2Gb Helical Scan (Exabyte)
Tracks: 1 long track, in diagonal stripes across tape
Head: on rotating, diagonal drum



Format: QIC 150 (150Mb 1/4" cartridge)
Tracks: 18, recorded one at a time in alternating directions
Head: 2 read, 2 write (one for each direction),
head moves for other tracks, *all erased at once*



Format: 6250 BPI (150Mb 1/2" reel)
Tracks: 9, recorded simultaneously
Head: 9 read, 9 write (one for each bit + parity)

E = Erase, W = Write, R = Read

only the end-of-file indication, and two marks will be written at the end of the new file.

A single `read()` system call will read one tape block. If the size of the read exceeds the size of the block, `read()` returns a byte count indicating how many bytes were actually read. Many implementations of tar use this technique to automatically figure out the correct block size when reading a tape.

Because the erase head is just ahead of the write head, it is possible for a 1/2" tape drive to *append* to the last file on a tape by erasing both the tape marks at the end of a file and writing more blocks of data. The tar "`u`" and "`r`" options use this feature. It is actually possible to start writing *anywhere* on a tape, although this effectively destroys all existing data following the current tape position.

1/4" cartridge (QIC) tape

With advances in recording technology, particularly the quality of the tape coatings, it became possible to store more bits on less tape. The 1/4" cartridge is now one of the most popular tape formats. The storage capacity of cartridges and 1/2" reel tapes is about the same, but the cartridges are smaller and more convenient to handle, and the drives are much simpler and cheaper.

A cartridge tape drive writes data onto tape serially, one bit at a time, instead of 9 bits at a time like a 1/2" drive. As a result, the bytes are recorded lengthwise on the tape instead of across it. Why do it this way? Well, for one, it makes the tape head much simpler. Instead of having 9 read and 9 write heads crammed beside one another, 1/4" drives have only one read and one write head for each direction. This makes the drive cheaper, and allows greater information density on the tape. Incidentally, both floppy and hard disks also write data serially.

Depending on the vintage of the drive, there can be 4, 9, 15, or 18 tracks of data on the tape. (Newer drives can usually read but not write older formats) When one track has been written, the tape reverses and the tape heads are repositioned so that the next track can be written, in the opposite direction. The read and write heads are arranged so that the read head always follows the write head, allowing the data to be verified as it is written. There is only *one* erase head, and it covers the entire width of the tape, so *all* the tape tracks are erased simultaneously when track 0 is being written. Because it is impossible to selectively erase one track, it's also impossible to erase the end-of-file mark and extend a tape file. That's why the tar "u" and "r" options don't work for cartridge tapes. It also means that if you accidentally write something at the beginning of a 1/4" tape when you meant to add a new tape file at the end, you effectively destroy the whole tape, not just the data you wrote over. The *only* places you are allowed to write are at the beginning of tape or after the last file on the tape.

Quarter inch tape drives deal with tape blocks quite differently than 1/2" drives. Each tape block is 512 bytes long, and has extra error-checking and synchronization information attached to it. (That's what the QIC-?? standards specify) As a result, all `write()` system calls *must* be in multiples of 512 bytes.

There is no equivalent to the inter-record gap found on 1/2" tapes. When a 1/4" drives wants to read or write a block, it first backs up a bit so that it can get the tape up to speed before it has to start reading or writing. This is in contrast to the extremely sudden starts and stops a 1/2" tape with a vacuum column is capable of. All this starting, stopping, and backing up does two things: it wastes a *lot* of time, and it messes up the tension with which the tape is wound on the reels. The "`mt retention`" command can fix the latter.

The best solution to the start/stop problem is to feed the drive data quickly enough so that it can write continuously, without ever stopping. This is called *streaming,* and drives that work best this way are frequently called *streaming tape drives,* or simply *streamers.* If it isn't possible to stream the tape, large `write()`'s should be performed so that as much data as possible is written at once. The same applies in reverse when reading. Recommended tar block sizes are 126 or 200, although larger sizes are allowed.

8mm Helical Scan (Exabyte)

Eight millimeter tape drives have only been available for a few years, but their incredibly high information density has made them very popular with system administrators with large disks to back up. Not only is the media cheap, ($15 for 4.5 Gb) but being able to dump several entire file systems onto a single tape, unattended, is an attractive alternative to swapping tapes every twenty-five minutes for twelve hours. Even for a medium-sized system, the cost of an 8mm drive can be justified in terms of media savings alone.

An 8mm tape drive is basically an 8mm VCR where the video electronics have been replaced with a digital computer interface. As with all VCRs, the head is mounted on a rotating drum and moves diagonally across the tape. Data is recorded serially, as with a 1/4" tape, but there is only one very long track split into short diagonal bands across the tape. Sophisticated error correction coding is used to ensure reliability.

Like 1/4" drives, 8mm drives waste a lot of time if they have to start and stop, so large block sizes are usually preferable. Note, though, that the UNIX "dump" utility uses multiple processes to overlap disk reads and tape writes to keep the tape busy, so the default block size should be used for dumps onto 8mm.

In most other respects, 8mm tapes are more like 1/2" tapes than 1/4" cartridges. They can write variable-sized blocks, up to 65535 bytes, and can start writing at the beginning of the tape or after the end of any file.

Tape Head Alignment

The different tape standards specify exactly where on the tape each track is supposed to be. A track on an 18 track 1/4" cartridge tape is less than 0.35 mm wide. It is therefore essential that the tape heads are positioned in exactly the right spot for each track. Tape drives have an internal adjustment to set the alignment.

Misaligned heads usually show up as read errors when trying to load someone else's tape. However, the problem can be much more insidious than that: you will be able to read your own tapes, because the alignment was the same for both reading and writing. But what happens when your drive breaks down and is replaced or realigned? Suddenly, all the tapes written by the misaligned drive are unreadable, and valuable archived data is lost. Of course, with a lot of effort and a competent serviceman, the new drive can be misaligned like the old one and the tapes read, but this is, at best, a tricky procedure. The moral: get your tape head alignment checked if you are even a little suspicious.

Conclusions

Of course, all this only deals with the process of getting the data on and off the tape. It says nothing about attaching any meaning to that data. For transfers between UNIX systems, that isn't usually a problem, since it is just a matter of using the same utility for reading and writing. Exchanging data with other systems is more interesting, but that's a topic for a future article.

Meet This Year's Executive

Susan Zuk, President
Susan Zuk is a Senior Support Representative for UNISYS Canada, Inc. Her main areas of work include customer technical support and marketing support primarily in the UNIX environment. She started her computing career while obtaining her Commerce degree at the University of Manitoba. Ms. Zuk then went to work for IBM in Palo Alto, California where she was involved with a software development group working on a port of UNIX BSD4.2. She returned to Winnipeg to join UNISYS where she has been for the past 5 years. She is co-founder of TUUG and is currently on the executive of CIPS.

Richard Kwiatkowski, Vice-President
Richard Kwiatkowski has been the owner of his own company, R.K. Computer Services, since 1984. His major client is Trainor Laboratory, which is running a NCR Tower 650, with NCR's UNIX 3.00. Richard is a new member of the group and is new to UNIX.

Eric Carsted, Past President, Meeting Coordinator
Eric Carsted is currently the Systems Administrator at XCAN Grain Ltd. He was previously a contract consultant with Air Canada, working as the Systems Administrator for the enRoute Data Communications Project, and prior to that, a Communications Controller on the Gemini Airline Reservation Network. Mr. Carsted is also owner of Custom Micro Consulting.

Roland Schneider, Secretary
Roland Schneider is a PhD student in Electrical Engineering at the University of Manitoba. His research work has included CAD, simulation, and computer graphics. He is currently researching artificial intelligence with neural networks. Roland has been programming in C and working with UNIX since 1983. Until recently he was also the system administrator of the Department of Electrical and Computer Engineering's network of Sun workstations. His goal in life is to eradicate FORTRAN from engineering software.

Rick Horocholyn, Treasurer
Rick Horocholyn is a Senior Financial Consultant for Manitoba Hydro. He has been a TUUG member for several years, and has joined the executive this year, as treasurer. He secretly hopes to see the return of Milli Vanilli. (Sorry Rick, but I warned you I'd make something up if I didn't get your write-up by the deadline. — GED)

Gilbert Detillieux, Newsletter Editor
Gilbert Detillieux has been working with UNIX as a programmer, system administrator and trainer since 1980. He co-founded Info West Inc. in 1985, where he worked on analysis software for neuro-science labs, training sessions for novice UNIX users and programmers, and system administration functions on many flavours of UNIX. He is currently a Software Technician and network administrator for the University of Manitoba's Computer Science Department. He is also co-founder and a past president of TUUG.

Allan Moulding, Membership Secretary
Allan Moulding attended the University of Manitoba, graduating with a B.Sc. in Statistics in 1985. For the past 5 years, he's run his own consulting firm, A.B.M. Services, specialising in the CAD area. His areas of interest are graphics and programming languages.

The executive would also like to acknowledge the following people for their valuable help:
Gilles Detillieux, Mailing List
Kathy Norman, Assistant to Meeting Coordinator

TUUG Business Meeting Minutes

XCAN Grain Ltd.
TD Tower, 1200 - 201 Portage Ave.
Tuesday, November 12, 1991

Round Table: Discussion about UNIFORUM

Business Meeting: (Susan Zuk presided.)

A) President's Report:

Traditional December meeting wine and cheese will be replaced by Casino Night in conjunction with CIPS. Tickets are available from Susan Zuk.

B) Membership Secretary's Report:

Current paid-up membership is 38.

C) Newsletter Editor's Report:

The newsletter needs articles on a variety of topics. Goal is to have a technical, novice and management related article in each newsletter, as well as letters to the editor. A writeup on the symposium would be a good management article.

D) Treasurer's Report:

The year-end report was in the November newsletter. The TUUG name has been renewed for the next three years.

E) Meeting Coordinator's Report:

Next meeting is Casino Night:

Proposed January meeting presented topic: Videotape of Rocky Nystrom's symposium talk "Migrating to Open Systems"

Topics for future meetings: Presentations by SCO, Frame, Uniplex, book show and tells.

May have secondary meetings on specific topics.

F) New Business:

Moved by Gilbert Detillieux, seconded by Eric Carsted, that TUUG funds should be used to buy Al Hykaway and Susan Zuk gifts, in recognition of their work in organizing the UNIX Symposium. Carried.

Presented Topic:

Unify Database and Accell 4GL

Agenda

for
Tuesday, January 14, 1992, 7:30pm
St-Boniface Hospital Research Centre
Theatre, Main Floor, 351 Taché

1. Round Table 7:30

2. Business Meeting 8:00
   a) President's Report
   b) Membership Secretary's Report
   c) Newsletter Editor's Report
   d) Treasurer's Report
   e) Meeting Coordinator's Report
   f) New Business

3. Break 8:40

5. Presented Topic 8:50
   Migrating to Open Systems (videotaped)
   Rocky Nystrom, Information Foundation

6. Adjourn 9:30

Note: Please try to arrive at the meeting between 7:15 and 7:30 pm. Thank You.

Next Month

Meeting:
Our February meeting is scheduled for Tuesday, February 11, at 7:30 PM. The presented topic is TBA, but the meeting will likely start with our usual round table and business meeting. Location TBA.

Newsletter:
Help! Our newsletter is shrinking, and I don't have time to be a reporter, writer, *and* editor. There are currently no articles in the queue, and I would like to see something for next month's "Hands-on", "Industry" and "Technology" headings, or any other topics that would be of interest to members. Any aspiring writers out there?