

*Technical UNIX<sup>®</sup>User Group*

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newsletter of the  
**Technical UNIX<sup>®</sup>**  
**User Group**

**This month ...**

UNIX Symposium in Winnipeg  
UNIX for Beginners  
The Challenge of OLTP  
1991 - 92 Executive Nominations  
October 8th Agenda

Late Breaking News...  
Next Meeting to be held at  
IBM Canada Ltd.  
See ANNOUNCEMENT for details

# Thoughts From The Editor

By Susan Zuk

October has arrived quickly and it is amazing that the UNIX Symposium is less than a month away. Final preparations are being made in readiness for the event. When you look over the enclosed brochure you will find that there are a wide variety of topics, speakers and companies being represented. Complete the registration form and send it to us before the October 21st deadline. If you require more registration forms give us a call and if you know of anyone who would be interested in attending the symposium pass on the information.

Along with the symposium we are also preparing for our new season. Executive elections will be held at our meeting. If you are interested in becoming involved with the organization, let us know. The group is growing very quickly and we can always use your help for the projects in the upcoming months.

A membership form has been included with this package. Please complete this form no matter if you are a new member or if you are renewing your membership.

Barry Finch of IBM Canada Ltd. will be hosting this month's meeting and he will also be speaking on the topic of NFS. NFS is the acronym for Network File System and it means that a user on one machine can have transparent access to remote files. With NFS your UNIX System can access other UNIX Systems, running NFS, as though they were local.

This is my last newsletter as I am stepping down as Newsletter Editor. I hope you have found the newsletter valuable and enjoyable. Thanks to those of you who have contributed information. I hope you continue to do so in the future. See you soon and don't forget to fill out your UNIX Symposium registration form. Remember, early registration ends on October 21st!!

## 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 1 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.

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## The Executive

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	(or) Susan Zuk	(W) 788-7312

## ANNOUNCEMENT...

### Meeting Location:

The October meeting location will be provided by IBM Canada, Inc. IBM is located in the TD Tower at 9th Floor - 201 Portage Avenue. Please enter at the front door. Please sign in at the security desk and use the company name of TUUG. See you at the meeting.

Technical UNIX User Group  
P.O. Box 130  
Saint-Boniface, Manitoba  
R2H 3B4

# Winnipeg's 1991 UNIX Symposium

## November 4 & 5, 1991

### Winnipeg Convention Center

CIPS (Canadian Information Processing Society), in conjunction with TUUG (Winnipeg's Technical UNIX User Group), will be hosting the city's first UNIX Symposium on November 4 & 5, 1991 at the Winnipeg Convention Centre. The theme of this symposium will be "The Role of UNIX in the Open Systems Environment".

This event will feature hour-long tutorial seminars and a product exhibition. The seminars will cover three tracks of interest:

- a novice UNIX track,
- a technical UNIX track, and
- a management track.

Some of the topics covered by the seminars are Migrating to Open Systems, Office Automation and Imaging, Case Tools, Writing Software for Portability, UNIX System Security and Basic UNIX Concepts. If you would like to know more about this symposium or would like to be involved, call Al at (204)986-2143 or Susan at (204)788-7312.

The market for UNIX has become the fastest growing segment in the computer industry. More and more companies and governmental agencies are discovering the key role UNIX can play in an open systems environment. This symposium is an opportunity to discover for yourself what UNIX can do for you.

#### Keynote Speaker for Symposium

Rocky Nystrom, founder of Information Foundation (a Denver, Colorado based UNIX consulting and training company), will be delivering the keynote address at the CIPS/TUUG 1991 UNIX Symposium. His address is entitled "The Benefits of the UNIX Environment".

Mr. Nystrom will discuss the history and evolution of UNIX, the benefits of vendor independence and technology independence, and the role of standards organizations.

He will also be presenting a management-oriented tutorial session entitled "Migrating to Open Systems".

Mr. Nystrom has been working in the UNIX industry since 1980, first as a programmer, then as a trainer. He founded Information Foundation in 1984, and has since authored several UNIX marketing presentations and training courses. He has delivered training, in the United States and Canada, to such organizations as AT&T, the United States Army, Canadian Department of National Defense, the Canadian National Railway and other railroads and airlines. His company also develops software applications in the open systems environment.

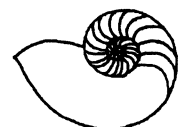
#### Participating Companies

Amdahl Canada Ltd.  
Data General (Canada) Inc.  
Digital Equipment of Canada, Ltd.  
Electro Systems Group, Ltd.  
Hewlett-Packard (Canada) Ltd.  
IBM Canada Ltd.  
Information Foundation  
M & L Data Services Ltd. (NCR)

Microstructure Inc.  
Network Computing Devices (Canada) Inc.  
SCO Canada, Inc.  
Sun Microsystems of Canada, Inc.  
Systemhouse Inc.  
Uniform Canada  
UNISYS Canada, Inc.  
Wang Canada Ltd.



Canadian Information  
Processing Society



Technical UNIX User Group

# UNIX for Beginners

## Practical Advice on Getting Started

By Glenn K. Schulke

Reprinted with permission from the August 1991 issue of *CommUNIXations*, published by Uniform

### The .mailrc File

Because users' communications needs and preferences differ, the UNIX electronic mail system allows each user to create a handy file, `.mailrc`, in which to customize their own electronic mail environment. Although the system administrator may have configured a global startup file, `.mailrc` allows individual users to add additional features that may not have been implemented for everyone.

The "hidden" `.mailrc` file, like `.profile`, resides in each user's home directory, such as `/usr/glenn` or the shell environment variable `$HOME`. Both files are executed upon logging into UNIX.

When you enter the e-mail system, two environment variables are taken from the execution environment set globally by `/etc/profile` or individually in a user's `.profile` file. These variables cannot be altered within the mail system. The `$HOME=directory` is the user's base of operations. `MAILRC=filename` is the name of the e-mail startup file. By default this is the `$HOME/.mailrc`.

There are about 40 variables available in standard releases of UNIX System V.3 by which the UNIX electronic mail system can be altered for individual requirements. They can be set to include such things as changing the escape character (tilde) while creating a message; creating a special folder for saving incoming messages; setting the number of lines in a screenful of headers or the number of lines to display on the terminal screen; specifying an editor; or prompting the user for a subject for the message.

There are three basic commands to use with `.mailrc` to customize an e-mail system. They are `set`, `unset` and `alias`. The `set` command, obviously, sets a variable for use, as when you wish to add a feature to your e-mail that was not implemented by your system administrator. Conversely, `unset` disables e-mail variables that were set for all users on the system. To initiate either command in the `.mailrc` file, type `set` or `unset`, a space or tab and then the variable you wish to enable or disable, as shown in "Popular `.mailrc` set Variables."

### CUSTOMIZATION

Most experienced UNIX users will decide gradually what custom features they want in their personal e-mail. Only the printed documentation readily provides a list of all the available additions and those that the administrator has set globally reveal themselves in use.

The `.mailrc` files does not exist in your home directory until you create it. Therefore, the first step in customizing your e-mail system is to use the `cat` (concatenate) command. Type

```
$ cat > $HOME/.mailrc
```

and press `<return>`. Now you're ready to add to or subtract from the default setup of the mail system.

For example, you might like to be prompted to describe the subject of any message before you create and send it, so the recipient quickly gets an idea of what the message contains before reading it. Add the `set` command and the appropriate instruction, with a carriage return after each line:

```
$ cat > $HOME/.mailrc
set asksub
```

To complete the action, simply press the key combination `<control-d>`. This returns you to the `$` prompt. The next time you log in to the system or into your e-mail, `.mailrc` with the subject prompt will be in effect.

You can easily append more features to this file. If you want to be able to "pipe" messages to a laser printer for hard copies, add an extra right angle bracket ("greater than") to `cat`, type the command and name of the printer and press `<return>`, as in this example:

```
$ cat >> $HOME/.mailrc
set cmd=lp -dlaser <return>
```

Note that doing this will override an instruction set previously, such as an order by the administrator to send print jobs to a different printer. In addition, it is possible to erase the current contents of your `.mailrc` file and at the same time replace them with

others, which you do in the same way as above, using *cat*, one bracket and *set*.

Similarly, to get rid of a feature installed in the overall e-mail system, use *unset*. If, for instance, the carbon copy feature is implemented and you prefer not to be prompted after composing a message for a list of other users to receive a copy of it, type:

```
$ cat > $HOME/.mailrc
unset askcc <return>
```

Aliases can make the job of sending e-mail easier by saving keystrokes and typing errors. If, for instance, you regularly send mail to all people in your department, you can create an alias by which to send a message to everybody without having to enter all their names. Similarly, to send mail to a distant associate whom you must reach through a number of different systems, a brief alias can shorten the string to a manageable length. To set these in your *.mailrc*, you would type:

```
alias sales jim john joe sam mike pat
```

```
alias ghenry galaxy!solar!saturn!harpo!attmail!ghenry
and <return> after each.
```

Finally, imagine that you want to modify one of these features you've created - for example, Sam has left your company and doesn't belong in your department alias. Just use your favorite editor (such as *vi* or *emacs*) and add, delete or change lines as you would in any other text document; in this case, delete Sam's name from the alias string. Then log out and log back in (or leave and return to the mail system) and the changes will be in effect.

There are many other environmental variables that can be implemented when configuring and personalizing your electronic mail system. The accompanying list includes the most commonly used *set* variables, along with a brief explanation. If you should find that you have them and don't want them, merely substitute *unset*.

**Glenn K. Schulke** is vice president of Unizone, a value-added distributor of UNIX products in Tempe, AZ.

## Popular .mailrc set Variables

- set askcc** Prompts for a carbon copy list after entering each message.
- set asksub(ject)** Prompts for a subject when entering each message. Some systems use the variable *asksub*; others use *asksubject*.
- set autoprint** Enables automatic printing after a message has been deleted or undeleted.
- set bang** Enables the special case treatment of exclamation points. For example, you might use *!* a shell escape in the *vi* editor.
- set cmd="cat|tab|lp -dlaser"** Sets the default command for the *pi* or "pipe" command in the mail system. This example concatenates the message to a shell script called "tab," which adds a left margin to the e-mail message, then sends the message to the printer called "laser" in the UNIX print spooler.
- set crt="23"** Pipes messages having more than 23 lines, in this case through the command specified by the variable for the *PAGER* command in *.mailrc*.
- set dot** Specifies a period on a line by itself during input as being the end of message and the instruction to send the message.
- set EDITOR=/usr/bin/wp** Specifies the editor to be used when wither the *e* or *~e* command is used. This specifies a word processor.
- set ignore** Tells the mail system to ignore interrupts while entering messages. This is handy if you work over a modem or dial-up lines.
- set header** Enables printing of the header summary when entering the mail system.
- set keep** Truncates the mailbox to zero length rather than removing it.
- set mchron** Causes message headers to be listed in numerical order (most recent first) but displayed chronologically.
- set PAGER=/usr/bin/pg** Tells the mail system to use the pager */usr/bin/pg* to paginate the messages.
- set prompt=" "** Sets the command-mode prompt to *\_* rather than the default *?*.
- set screen=23** Sets the number of lines in a screen full of headers, in this case 23.
- set VISUAL=/usr/bin/wp** Sets the preferred screen editor to be a word processor rather than the default, *vi*.

# THE CHALLENGE OF OLTP

*On-line transaction processing is a high-end application on which many millions of dollars ride daily. Most users haven't seen UNIX as an option but now there are signs of change.*

By Peggy King

*Reprinted with permission from the September 1991 issue of CommUNIXations, published by Uniforum*

Transactions are at the heart of service businesses. To a bank transactions are deposits and withdrawals; to an insurance company they are claims and payments; to the travel industry they are reservations and tickets. To telecommunications companies, the electronic switching transactions themselves are services provided on a per-use basis or for flat fees. These and other businesses depend on the flow of transactions to produce a steady stream of revenue. For service businesses, especially ones that are too large and too decentralized to rely on manual records to back up their electronic systems, on-line transaction processing (OLTP) is their most critical computer function.

OLTP makes far more demands on computing power than other applications that use large databases, such as decision support. For example, using an automated teller machine (ATM) to inquire about your bank account balance involves a decision support. It becomes transaction processing when you decide to transfer cash from your savings to your checking account. If the ATM is at a branch bank, this transaction requires distributed database access, since the changes you initiate at the remote site get recorded in a centralized (mainframe) database at the bank's data processing headquarters.

The funds transfer is a two-phase transaction that results in a credit to the checking account and a debit to savings. To guarantee the integrity of such a transaction, an OLTP system requires a two-phase commit, which assures that both parts are complete before recording the changes. If for some reason the funds transferred out of savings don't reach your checking account, the database would roll back to the information it had before the first transaction occurred. Such a system protects the database from containing erroneous information -- in this case, recording a deduction in savings without making the corresponding addition to checking.

## STARTING LITE

Mission-critical OLTP applications of the sort found in banking, reservations, retail catalog sales and claims processing require "industrial-strength" configurations

that have become available only recently on UNIX systems. Some companies need fault-tolerant systems and many more require highly available systems with features such as redundant processors and disks. Governments agencies and currency traders, among others, expect higher levels of security than previously were available under UNIX.

Then throughput demands of an OLTP system, especially during peak hours, exceed the capacity of midrange servers, which have been the largest commercial UNIX systems. These large systems need transaction processing monitors. In addition, as graphical user interfaces become common, end users on terminals or workstations expect point-and-click displays to simplify data entry.

Given such requirements, only a handful of companies have implemented "bet the business" applications on UNIX platforms. There are more examples of the kind of applications informally known as "OLTP Lite": database applications that run on midrange servers without transaction processing monitors. Typically, OLTP Lite applications manage transactions involving completed inventory, parts or customer service rather than money itself.

Midwest Dental, a dental equipment manufacturer in Des Plaines, IL, had been running OLTP Lite applications under materials requirements planning (MRP) manufacturing software from Minx Software of San Jose, CA, on Hewlett-Packard UNIX-based servers for four years when it was acquired in 1990 by Gendex, also of Des Plaines. Previously, Gendex had used a proprietary system from Xerox; now the merged company uses UNIX-based HP 9000 Series 800 servers.

Jim Kettner, a Gendex vice president, says that the main advantage of the UNIX environment is its flexibility for testing how transactions alter files in a manufacturing environment. For example, Minx MRP software is complex and changes from one release to the next. In its newest version, Minx neglected to document a minor change in the method of calculating order variances.

Because user programmers have access to the application files, they were able to look at the file structure and figure out for themselves what had changed.

In another instance, the UNIX system helped programmers who needed to know the results of back-flushing work orders (creating a work order and allocating materials to it later). They were able to create a dummy database and test the result by seeing the actual work files. Under Gendex's previous system, MRP ran in batch jobs and programmers had no file access.

## **ADDING INDUSTRIAL STRENGTH**

Despite the benefits that customers have realized from putting small-scale TP applications on-line, UNIX still has growing pains when it comes to mission-critical OLTP. "Customers are studying open OLTP but not many have jumped in," says Dave Zwicker, transaction processing systems marketing manager for DEC in Marlboro, MA. "UNIX is immature in the commercial environment, which forces application developers to build transaction processing features into their code."

Nevertheless, efforts are under way to give UNIX the features it needs to compete against proprietary commercial computing environments. AT&T subsidiary UNIX System Laboratories (USL) is working on joint development efforts with hardware vendors including Bull HN Information Systems, Pyramid Technology, Sequent Computer Systems and Unisys. Each of these vendors has enhanced its version of UNIX for this purpose. Some of these enhancements will be incorporated in the enhanced security (ES) and multi-processing (MP) versions of System V.4 that USL has scheduled for release next year. Similarly, Sequoia Systems, Stratus Computer and Tandem Computers have modified versions of UNIX for their fault-tolerant systems.

The standard UNIX file system is the largest barrier to implementing industrial-strength OLTP. UNIX message passing schemes can't handle the volume of processes that OLTP systems spawn at peak load times. Additionally, in standard versions the operating system queues "writes" in buffers instead of processing them right away. In the event of a hardware failure when data is in the buffers, the queued data will be lost. Transaction

processing systems work around this problem by writing data directly to disks.

Attaining full POSIX compliance can solve some problems with using UNIX for TP, says Gary Wilkerson, a transaction processing consultant with Migration Software of Bellevue, WA. For example, TP systems in mission-critical environments need a way to prioritize the order in which transactions get processed. Standard UNIX provides for preemptive multitasking but has no method for prioritizing the preempts. POSIX dictates a method for prioritizing tasks. Other POSIX standards that will benefit UNIX are better dispatching and scheduling, and security schemes that include encrypting and decoding on a per-transaction basis.

## **CENTRALIZED OR NOT**

The typical proprietary OLTP configuration is mainframe on which a database resides. Users access the database via terminals. Now that Amdahl, Tandem and Stratus all sell mainframe-class hardware running UNIX, it's possible to have a centralized UNIX OLTP system. On the other hand, many companies that take an interest in UNIX OLTP are doing so because they want a decentralized configuration. Some decentralized systems involve no more than file sharing across a LAN while others are designed as true client/server implementations. Customers with investments in existing mainframes are looking for ways to expand their transaction processing capabilities without rewriting applications or retraining employees, and they are daunted by the prospect of migration to a totally new TP environment.

Companies installing their first OLTP system or starting over from scratch may want a client/server environment and distributed databases because of the cost savings and scalability. In addition, servers can handle more intelligent clients than dumb terminals because the user interface processing can be downloaded to workstations. On the downside, two-phase commit and recovery protocols are more difficult to implement when no single machine is the central database repository. Furthermore, most relational database products currently are tuned for centralized environments rather than distributed processing. "A fully reliable implementation of a distributed database system on a client/server architecture doesn't exist yet," says John Rymer, vice president of Seybold Office Computing in Boston.

## PROPRIETARY STILL SELLS

All major vendors offer hardware that can be used in UNIX transaction processing applications, but their eagerness to offer an open OLTP solution relates inversely to how many customers they have for proprietary OLTP. Although IBM and DEC, two major players, say they will offer OLTP on UNIX platforms, neither has announced a timetable for releasing products.

Though its substantial market share in TP gives IBM no reason to rush into open systems, the company is hedging its bets by pursuing open strategies for both centralized and decentralized TP. IBM's centralized TP development efforts are devoted to porting its Customer Information and Control System (CICS) monitor to AIX for mainframes. Since 1975 this development has centered in Hursley Park in Winchester, UK. IBM has invited Boole and Babbage of Sunnyvale, CA, to work with the Hursley Park lab to port CICS performance tools to AIX. For decentralized configurations, IBM will offer a monitor based on technology now being developed by Transarc of Pittsburgh, PA.

DEC's development efforts for ULTRIX-based TP began this year at its OLTP West facility in Mountain View, CA. With development efforts still at an early stage, it looks as if DEC customers may have a long wait for open OLTP under ULTRIX. In June, DEC announced its intention to offer Applications Control and Management System (ACMS), its strategic transaction processing monitor, on ULTRIX systems (it is already on Macintosh, Microsoft Windows and MS-DOS clients). "VMS is our robust commercial environment," says Zwicker.

Similarly, Stratus and Tandem seem in no hurry to sell UNIX-based OLTP to customers who will buy their proprietary solutions. Neither has named customers who have begun to implement their UNIX-based fault-tolerant systems.

## UNIX GAINS MOMENTUM

Bull, ICL and Unisys also have long histories in the transaction processing business, but many of their current customers consider their proprietary systems from these vendors to be past their prime. To avoid having these customers pull the plug, the vendors offer growth paths that make new UNIX hardware interoperable with their existing system. Unisys has a range of Intel-based U6000 servers, Bull has the Mips R3000-based DPX 300 and ICL the Sparc-based DRS 6000. These companies have worked with USL to provide implementations of Tuxedo /T for their database servers and have networking

products that provide IBM customers the same type of peer-to-peer mainframe connectivity.

Jim Johnson, chairman of Standish Group, a market researcher in Hyannis, MA, estimates that Unisys is at least a year ahead of other vendors in providing enhancements to Tuxedo /T for high throughput and secure transaction processing on UNIX systems. Because of Unisys' development work with USL, its U6000 servers are the only multiprocessor systems that now run System V.4 (even though Sequent manufactures two of its high-end models.) ICL and Bull have released their implementations of Tuxedo /T very recently.

Amdahl, NCR and Hewlett-Packard are positioning themselves to win new business from customers whose previous vendors have yet to commit to UNIX OLTP. Until IBM moves into the market, Amdahl has a window of opportunity to sell its 5990 with the multi-domain feature subsystem, which can run the large-scale operating systems MVS and UTS (Amdahl's version of UNIX) concurrently. This option is attractive to IBM customers who want to migrate to UNIX but do not want to switch from their existing CICS/MVS environments.

NCR still sells its I Series, E Series and older UNIX Tower systems to existing customers. Nevertheless, the company's new strategy is to help TP customers switch to client/server OLTP environments that use NCR's Top End TP monitor. Now that AT&T/NCR has chosen Top End as the strategic transaction processing product for the merged company, NCR's expertise in migration-path engineering makes the System 3000 a potentially attractive choice to customers who want to use application programming interfaces to their proprietary TP monitors while planning an eventual switch to open systems. Meanwhile, NCR and Unicorn Systems of Glendale, CA, have developed an interface between Top End and CICS for IBM customers who want to migrate to the System 3000.

Hewlett-Packard promotes its proprietary MPE operating system for transaction processing but also has made a major development effort to enhance its HP-UX for OLTP. The first company to provide Transaction Processing Council benchmarks for its commercial UNIX systems, HP positions its HP 9000 Series 800 servers for first-time customers and for HP 3000 users migrating to UNIX.

Pyramid, Sequent and Sequoia sell no other operating system than UNIX. All offer implementations of Tuxedo /T and are actively promoting their systems as OLTP platforms. If AT&T's System 7000 servers, which



Pyramid manufacturers, are included, Pyramid has installed UNIX OLTP applications at more sites than any other vendor. Independence Technologies, Inc. (ITI), of Fremont, CA, ported a version of Tuxedo /T to Pyramid about two years ago and USL has recently completed a port of the latest version 4.1.

Sequent, which worked with USL to port 4.1, has an OLTP implementation in beta test at the Lebanon, NH, headquarters of retailer Burlington Coat Factory. CICS-based TP monitors from Unicorn and VISystems of Dallas connect Sequent servers to IBM mainframes.

Sequoia's recently introduced Series 400 is based on the Motorola 68040. Now that ITI has completed a port of Tuxedo /T, Sequoia joins the list of vendors offering a complete UNIX-based OLTP solution.

### CHANGES AHEAD

For good reasons, MIS directors view UNIX-based OLTP as untried technology. Compounding the problem, they may have trouble finding technical professionals who are at liberty to share what they have learned in migrating from proprietary implementations. Outside of telecommunications, only a few commercial-strength OLTP systems (including distributed relational

databases and transaction processing monitors) currently are in full operation. Even fewer are willing to discuss their implementations because they view the performance and scalability of their systems as a competitive advantage.

In the United States, vendors have at least a year to sell proprietary OLTP as the only safe choice. In Europe, where the push for open systems is in full swing, proprietary systems are a harder sell than commercial UNIX. Unisys recently closed a deal with a major brokerage house in London, which insists on remaining anonymous. And months before the European Disneyland opens near Paris, a Pyramid system running transaction processing software from Anasazi, Inc., of Phoenix is on-line and taking reservations.

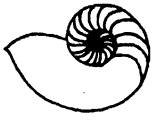
Among the many areas of commercial computing into which UNIX systems are heading, OLTP is perhaps the most ambitious. If the operating system can prove itself in this demanding application, all types of commercial UNIX may earn wide acceptance.

*Peggy King is the Senior Editor of CommUNIXations.*

## Candidates for the 1991 - 92 Executive

The following is a list of candidates for the 1991 - 92 Executive. Anyone wishing to nominate a member or themselves notify Gilles Detillieux at 788-6766 before the October 8th meeting. The following are names of candidates as of the first week in October.

President	Susan Zuk
Vice President	Richard Kwiatkowski
Treasurer	Rick Horocholyn
Secretary	
Newsletter Editor	Gilbert Detillieux
Membership Secretary	Paul Hope
Meeting Coordinator	Roland Schneider Al Molding Eric Carsted



Technical UNIX® User Group

**Agenda**  
for  
**Tuesday, October 8, 1991**  
**7:30pm**  
**IBM Canada Ltd.**  
**TD Tower**  
**9th Floor - 201 Portage Avenue**  
**(See Page 2 - Announcements for Details)**

- |                                  |      |
|----------------------------------|------|
| 1. Round Table                   | 7:30 |
| 2. Business Meeting              | 8:00 |
| a) End of a Season               |      |
| b) Membership Secretary's Report |      |
| c) Newsletter Report             |      |
| d) Treasurer's Report            |      |
| e) Meeting Coordinator's Report  |      |
| f) Elections                     |      |
| 4. Break                         | 8:40 |
| 5. Presented Topic               | 8:50 |
| NFS - Network File System        |      |
| Barry Finch, IBM Canada, Inc.    |      |
| 6. Adjourn                       | 9:30 |

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

**Community Service Announcement!!!**

Greg Moeller is looking for a version of MINIX. If you have a version or know of a way he can obtain one, call him at 941-6080.