UNIX SYSTEM ADMINISTRATION

Shaikh Hasibul Karim(Rana)

We can guess what a system administrator does. His/her duty is to install the system and to maintain the system. He ensures the smooth running of the system he has installed. If any portion of the system or the whole system fails it is then the job of the system administrator to repair or to reconfirm the perfect operating condition of the system. For this purpose, a system administrator should have proper backups, so that whenever he faces a problem with the system, he will be able to solve it within the least possible time. From the general point of view, we can have this sort of idea about the job description of a system administrator.

System administration has been a sore spot with UNIX from the past point of view of the Data Processing manager. UNIX provides a fair number of tools for the system manager to use, but it requires specific knowledge of them, and methodologies are not always clear. For our purposes, we can define the job description of the system administrator to have the following responsibilities:

1. Installing the system, including:
   - the basic system
   - optional software packages
   - additional disk devices
   - additional tape devices
   - additional terminal devices
2. Controlling access to the system, including:
   - user names
   - group names
   - access to specific devices
   - printer spoolers
3. Controlling access to the particular programs, such as:
   - the con facility
   - the uucp facility
4. Allocating disk space
5. Diagnosing system problems and taking appropriate action.

SCO XENIX and UNIX, although they are very similar at the low level, provide different high level mechanisms to perform these functions. We shall discuss each of these functions of the system administrator and see how they are accomplished.

Installing the Initial System

The basic method how the systems are installed is that the user is provided with a "boot disk," off which a special version of the UNIX(or XENIX) kernel can be loaded. This boot disk has a very abridged version of the overall operating system, with just a minimum of utilities and the bare minimum of utilities necessary to allow it to run. Once the boot floppy is started the initial shell script takes over and prompts the operator for what it needs to know. The procedures from on are different between SCO and UNIX, although what happens is basically the same. The steps are :

1. Partition the hard drive, and install a boot block program on the drive.
2. Do a bad track surface scan on the partition set aside for UNIX/XENIX.
3. Perform the divvy procedure, dividing up the UNIX/XENIX partition into a root file system, a swap device, and an optionally separate user file system. The user has to make some decision on the size of these disk areas.
4. Perform a mkfs command on each mountable hard disk file system, which creates the super-block, i-node table, and free list.
5. Mount the root file system and copy the basic system kernel, a few utilities, and a "stage-two" installation shell script onto it.
6. Have the user reboot the system, this time from the hard disk. At this time the "stage-two" shell script takes over.
7. Copy the rest of the UNIX base utilities from the floppy disk to hard disk.
8. Perform the optional program loading procedures, loading the software development system, the text development system, or other software packages. After these steps are done, the system is ready for the super-user to start it up and set up the user logins. The system will then be ready for use.

That's actually all there is to it. if we are ever going to install more than one system, it is a good idea to know what is going on. Sometimes if we found out too late that we made a bad choice in the size of either the swap area or the root file system, it is likely that the only way we can recover is to start the whole installation over again. However there is no need to repeat the bad track scan if this happens. New users are strongly advised to do things the "standard way," i.e. to take the defaults on most questions, until they gain some experience.

Installing Optional Software Packages

Optional software packages fall roughly into two categories:

1. Those delivered by the original software manufacturer. (SCO for XENIX and Microport for UNIX.)
2. Those provided by a third party developer.

The distribution software that is provided by the original vendors follow the standard software installation procedures for the system. Third party software might or might not use the standard procedures, so we shall have to check the document that comes with it.

The standard procedure for software installation-is different between Microport and SCO. Microport supports a simple shell script installer called installit, and SCO has the more elaborate custom program. The installit program in Microport is simpler, although completely automatic installation procedures-are possible. When the user enters the command installit, he is prompted for the first diskette of the distribution media. The installit script then reads, in cpio format, the files off the diskette. If they are named right, are treated as script files to be executed. When the script files execute, they perform any tasks necessary to the installation of

the software that needs to be done other than the actual copying of the files. On the other hand the custom program in XENIX works by maintaining a data base file of all the files in a particular package. The custom program is a very powerful system administrative tool, because it lets the user "de-install" packages if necessary, and to quickly take an inventory of which package components are installed.

Adding Hard Disk Drives

For adding a hard disk after the rest of the system has been up and running, the following needs to be done:
1. Low-level format the drive.
2. Partition the drive.
3. Divide up partition given to UNIX with the divvy program.
4. Perform a mkfs on each file system.
5. Add the file systems to the mount table and add the commands to the /etc/rc file so that file systems will be mounted automatically when the system is booted.

The nodes in the /dev directory will have already been created in the original system installation.

All of the above functions are automatically performed by the mkdev command in XENIX. For Microport, the installation instructions have a procedure for adding the second hard disk.

Adding Tape Devices

Tape drives, if required, are supported by the manufacturers of the tape drive hardware. Each has its own installation procedure, some of which are carried out automatically, others require the user to type all the necessary commands. To install a tape drive device handler on Microport, we need the "Link Kit" which is installed separately from the basic operating system.

Controlling Users and Groups

The UNIX kernel recognizes and enforces two levels of system security. The super-user, and all other users that we call "regular users". A super-user process can perform any action without regard to security checks, which is necessary to perform many system administration tasks. A regular user process may only execute those functions allowed to "non-privileged" processes and access files for which security access granted.

Access to UNIX is controlled by passwords. That means that somewhere in the system, the passwords that users type in must be stored. In order to make this system effective the passwords must be kept secret and should be well protected so that no illegal user can break the passwords. UNIX provides a program that can store the passwords in "encrypted" form.

The control of access to files is accomplished with the chmod command. Each file has associated with it an array of bits that identify which types of access by various users are

Kamal Arsalan

"To gain competative advantage Bangladeshi Companies should start using Lotus Notes" — Barnard Lim

IBM Bangladesh launched **Lotus Notes** and arranged a seminar on 9th October at a local hotel. The seminar was presented by **Barnard Lim**, Channel Manager, **LOTUS**, Singapore. During the seminar Lim informed the audience that **Lotus Notes** is a client-server software and is used in groupware applications. It helps to improve the business performance of the executives working together by reducing the time and raising the performance of everyday business activities like sales and account management, customer service and product development.

Using **Lotus Notes** developers can promptly develop cross-platform client server applications , which will immidiately increase the efficency of business processes. These "knowledge sharing" applications enable multiple users to communicate properly and manage compound documents even from remote locations.

Lotus Notes also helps the users to access, track and manage document oriented information which may come in multiple formats like text, images, Video and audio, and from various sources such as desktop applications, scanners or fax. It also provides access to the network through whichever platform (Window, Mac, OS/2, UNIX) are being used by the users, and is capable of supporting any organisation from a two user workgroup to a corporate-wide system with tens of thousands of users.

An important feature of Lotus Notes is Lotus Notes database. While discussing about this important feature Lim said that Lotus Notes data base is an object storage facility through which users can access, track, store and manage information on this network. A number of Notes Documents with different formats can be stored in each data base. The Notes Database is also Notes Application containing Views which represent browsable reports of the documents in the database. A Notes Database can be shared by the users of the same network. The documents in Notes Database can be displayed showing all or portion of the documents according to different sorting criteria such as date, priority, author, category, etc.

Another important feature of Lotus Notes is Notes Mail which helps the user to communicate quickly and efficiently with other electronic mail users. The user can send and receive mail memos from on-line messages to complex, multipage report and can forward or receive documents from any Notes Database. The Windows users can send files created with Lotus Windows products as if they were notes Mail memos. A very interesting feature of Lotus Notes is that it notifies the user with an alarm and Smart Status Bar massage whenever a new mail arrives. It also allow the user to receive other e-mail packages.

Lotus Notes provides an RSA Public-pay/Private-pay encryption scheme which ensures the highest level of security available for client server application. Notes security carries out the functions of authentication, access control, maintaining confidentiality and source verification.

Lotus Notes helps groups of personnels, customers, suppliers and business partners to have simultaneous access to the same information and to each other irrespective of their location and what computer platform they use.

Lotus Notes contains certain tools which can be used to develop applications that automates business process. Using these remarkable tools developers will be able to design features that support individual users, distribute information in documents manage time and act as agent to control the work process.

Mr. Lim told **COMPUTER JAGAT** that Lotus Nodes has changed the way business do business and provides corporate users a new way to work-together.

Lim further said that to gain competetive advantage Bangladeshi companies, specally which are involved in International trade should start using Lotus Notes as with the help of this world class client server platform 15 million users in 6000 companies around the globe are claimed to have achieved an average return on investment of nearly 200%.

It is learnt from IBM Bangladesh sources that at present Lotus Notes are being used in BTC (150 users), BOC (50 users) and in National Data bank (70 users). A number of other companies have shown keen interest for Lotus Notes and it is expected that in near future more companies will start using Lotus Notes. ●

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allowed. There are three types of access, and three types of users. The types of users are:

chmod

Type	symbol	Description
User	u	Any process with the effective User ID the same as the owner of the file.
Group	g	Any process with the effective Group ID that is in the i-node for this file.
Other	o	Any process.

The three basic types of access that may be allowed or masked on for each type of user are:

chmod/ls

symbol	Description
r	Read access.
w	Write access.' This allows the deletion of any data in the file.
x	Execute access.

Only the owner of the super-user can change the mode bits associated with a file. This is true even the file is in another user's directory. So it's possible that a user can have files in his own directory that he cannot change.

Allocating Disk Space

The UNIX system does not provide any real-time check on the usage of the hard disk space. When logged on, he can create and expand files on any file system he has write access to, until the file system has no space left in it. Obtaining larger and larger hard disk drives are no solution, because of the natural law that demand for disk space will always grow to fill the space available.

Since a UNIX system has no facility for controlling disk space usage among users, the task falls to the system administrator. What the system manager can do is monitor the disk space usage on a daily basis, and advise each user of their actual verses authorized usage.

Making Backup Tapes (Disks)

The method used for making backup of the system depends on what hardware is available and the preference of the operator who has to make the backups. Sometimes it is a requirement in an installation that the person who performs the backup is not a privileged user. All the "backup 'operator needs to be able to do is start the process, and load and unload the removable media as requested. If this is the case, one method for providing this type of access is to provide a login that automatically executes a specific shell script or program that performs the backup.

Diagnosing System Problems

The most difficult task required of the system operator is handling the condition where system problems come up. The two types of problems that might occur are either hardware or software, and it can often be difficult to tell which is which. There are amazingly few software problems within SCO XENIX or Microport UNIX, particularly after a system has been completely installed. Most of the "bugs" are known and documented, and are not of the sort that make the system unusable. As for hardware, fortunately most subsystems are designed to be able to detect problem within itself, and report them to the operating system. As far as the problems with the software are concerned, the solutions of the problems can be found in the software manuals. Sometimes it is necessary to reinstall the problematic software to get rid of the problem.

These are the basic operations that a system manager has to perform. Actually, the system administrator has to monitor the whole system time to time after the system has been installed. He/she has to perform all the trouble-shootings, problem-solving, etc., to maintain the good operating condition of the system. ●