

UNIX Administration

UNIX System Administration

UNIX Administration

Chapter 1

Objectives

You will learn:

- The different UNIX variants.
- Features of the UNIX operating system.
- Running commands.
- Utilities.

UNIX Administration

UNIX System Administration

UNIX Variants

- There are several variants of the UNIX operating system.
- This current state of the UNIX derives from the fact that the source code of the early versions of UNIX was made available to a variety of computer manufacturers and third parties.
- Some UNIX variants are specific to a given hardware manufacturer; others differ in the utilities, configuration methods or user interfaces they offer.

SYS-ED/Computer Education Techniques, Inc.

1: 3

UNIX Variants

- Commonly used UNIX variants, include:
 - HP-UX Hewlett Packard
 - Solaris SunSoft
 - SVR4 AT&T
 - AIX IBM
 - BSD Berkeley Software
 - Linux Red Hat

SYS-ED/Computer Education Techniques, Inc.

1: 4

UNIX Administration

UNIX System Administration

UNIX: What is it

- UNIX is:
 - A trademark of Novell Corporation.
 - A multitasking, multiuser operating system.
 - The name given to a whole family of related operating systems and their most common application, utility, and compiler programs.
 - An extensible and open computing environment
- UNIX is a registered trademark: which means that there is intellectual property associated with UNIX that is not in the public domain.
- Some versions of UNIX require a paid license for their use.

SYS-ED/Computer Education Techniques, Inc.

1: 5

Operating Systems

- A computer system can be thought of as being composed of three primary components:
 - hardware
 - applications.
 - operating system
- The hardware includes the CPU - central processing unit, keyboard, hard drive, and printer.
 - These are physical components/entities.
- Applications provide the user specific functionality which the system can then provide:
 - Send electronic mail.
 - Edit a memo.
 - Play a game.
- The operating system is the component that both manages and controls the hardware and applications.

SYS-ED/Computer Education Techniques, Inc.

1: 6

UNIX Administration

UNIX System Administration

UNIX System

- The UNIX system is more than an operating system.
 - UNIX includes the traditional operating system components.
 - A UNIX system includes a set of libraries and a set of applications.
- Residing above the hardware are:
 - The file system and process control.
 - A set of libraries.
- At the top are the applications.
- The user has access to the libraries and the applications.
 - These two components comprise the UNIX interface.

SYS-ED/Computer Education Techniques, Inc.

1: 7

UNIX Philosophy

- Most UNIX systems have grown to be fairly large and monolithic applications are not uncommon.
- The original UNIX design philosophy resides in the core commands available on all UNIX systems.
- The featureset common to different UNIX variants are:
 - Simple, orthogonal commands.
 - Commands connected through pipes.
 - A similar option interface style; however, it would not be accurate to classify it as a common universal interface.
 - No file types.

SYS-ED/Computer Education Techniques, Inc.

1: 8

UNIX Administration

UNIX System Administration

Simple, Orthogonal Commands

- The original UNIX systems were very small, and in order to work with these constrained resources, designers had to develop concise commands.
- Each command attempted to perform a single efficient task.
- The tools could then be combined to do more complicated tasks with a:
 - Shell script
 - C program

SYS-ED/Computer Education Techniques, Inc.

1: 9

Commands Connected Through Pipes

- In order for the simple, orthogonal commands to be used as a toolset, UNIX provides the capability to utilize the output of one command as the input to another.
- This connection is called a pipe, and a series of commands connected by pipes is called a pipeline.

Example:

- In order to count the number of lines that reference MINIX in all the files, the following pipeline would be used:

```
grep MINIX * | wc
```

SYS-ED/Computer Education Techniques, Inc.

1: 10

UNIX Administration

UNIX System Administration

Common Option Interface Style

- Each command has actions that can be controlled with options, which are specified by a hyphen followed by a single letter option

Example

-l.

- Some options take option arguments, which are specified by a hyphen followed by a single letter, followed by the argument (for example, -h Header).

Example:

- In order to print with a limitation of 16 lines per page, all the lines in the file minix-info that include Tanenbaum, the following pipeline can be used:
`grep Tanenbaum minix-info | pr -l 16`

SYS-ED/Computer Education Techniques, Inc.

1: 11

No File Types

- Except when attempting to run a file as a command, UNIX will disregard the contents of a file.

Example:

- UNIX does not know the difference between a spreadsheet file and a word processor file.
- The meaning of the characters in a file is entirely supplied by the command(s) that uses the file.
 - The power of this concept is that any program can be used to operate on any file.
 - The limitation is that only a program that understands the file format can fully decode the information in the file.

SYS-ED/Computer Education Techniques, Inc.

1: 12

UNIX Administration

UNIX System Administration

Multi-user

- UNIX systems are multi-user; users must log in to the system.
 - Each user has his or her own areas for saving files, the home directory.
 - Files have modal properties which determine access.
- All running programs are associated with a user, and, similar to the way files have access control, programs can only be started or stopped by certain users.
- Unless a user can log in as the super-user, it will not be possible to access another user's files unless the owner of the file provides permission through one of several direct or indirect means.

SYS-ED/Computer Education Techniques, Inc.

1: 13

Super-user

- Only the super-user can reboot the computer using a keyboard or stopping another user's processes.
- Even if a system is rebooted, all of the security features will remain in effect.
 - Accordingly, restarting a system is not a valid means of subverting security.

SYS-ED/Computer Education Techniques, Inc.

1: 14

UNIX Administration

UNIX System Administration

Network Centricity

- Networking has become an integral part of UNIX.
- The ability to share files, support network logins, share network configuration information, and run applications across a network is included in all of the major UNIX distributions.
- It is a natural extension of the base operating system.

SYS-ED/Computer Education Techniques, Inc.

1: 15

Remote or Pseudo Terminals - telnet

- There are two mechanisms which provide these capabilities:
 - Remote or pseudo terminals.
 - Remote shells.
- Remote terminals emulate an actual terminal session.
 - This is as if the user were logged into a terminal connected to the system via a serial line.
 - The network is the line and the application is the terminal.
 - Since telnet is the most common application, remote terminals are usually referred to as telnet sessions.

SYS-ED/Computer Education Techniques, Inc.

1: 16

UNIX Administration

UNIX System Administration

Remote Shell - Different from a telnet Session

- The differences between a remote shell and a telnet session are important.
 - Telnet sessions use terminal emulation and are run as separate applications.
 - The results from a Telnet session cannot be shared with other applications unless a mechanism such as cut and paste is used.
 - Remote shells allow the results of commands to be interspersed with local commands.

SYS-ED/Computer Education Techniques, Inc.

1: 17

Network File System

- File sharing is another extension that has become an integral part of UNIX computing.
- All of the major UNIX variants support NFS - Network File System and can share files seamlessly between themselves and other UNIX versions.

SYS-ED/Computer Education Techniques, Inc.

1: 18

UNIX Administration

UNIX System Administration

Administration Tools

- UNIX vendors all offer their own GUI administrative tools which can be used for a variety of common tasks.
 - The caveat is that the tools can be somewhat limiting in non standard and unanticipated situations.
 - These tools vary widely in how they work and how they are implemented.

SYS-ED/Computer Education Techniques, Inc.

1: 19

AIX

- IBM's UNIX operating system, AIX, comes with a tool called SMIT.
 - Administrators can use SMIT to configure the system, add and remove users, upgrade software, etc.
 - SMIT is widely considered to be the most refined and best of the system administration systems, because it can be customized and run in either X-windows or a terminal session.
 - It also allows the user to view the command line equivalent of each task before it is performed.

SYS-ED/Computer Education Techniques, Inc.

1: 20

UNIX Administration

UNIX System Administration

HP-UX

- Hewlett Packard's HP/UX has a tool called SAM, which provides similar capability offered by SMIT.
 - SAM is not as powerful or sophisticated as SMIT.
 - SAM is not required to administer HP/UX.

SYS-ED/Computer Education Techniques, Inc.

1: 21

Solaris

- Sun's Solaris does not come with a tool comparable to SMIT or SAM.
 - However, Sun's individual tools for upgrading and installing software and administering NIS+ are functional and intuitive.
 - The tool supplied with Solaris for administering users, printers, and NIS/NIS+ requires X-windows.
 - It is not, however required to administer the system.

SYS-ED/Computer Education Techniques, Inc.

1: 22

UNIX Administration

UNIX System Administration

Linux

- Linux distributions vary widely when it comes to administrative tools.
- RedHat offers a desktop environment for adding software, administering users, configuring printers, and other common administrative tasks.
- Unlike the commercial tools, it's based on scripts, not binary code, and therefore can be examined and customized by administrators.

SYS-ED/Computer Education Techniques, Inc.

1: 23

System V and BSD

- UNIX has historically evolved from two primary sources:
 - AT&T's UNIX System V.
 - The University of California's BSD UNIX.
- Most of the major vendors have been moving toward a System V system; however many BSD extensions will always remain.

SYS-ED/Computer Education Techniques, Inc.

1: 24