SESSION 6 – FUNDAMENTALS OF SYS ADMIN TASKS

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- The session is expected to expose students on the need to recognize basic disk components and to understand basic disk geometry as well as the file systems.

The key topics to be covered in the session are as follows:

- Disk partitioning
- Formatting
- Disk systems
- Windows and Unix file system structure.

- Refer to the following reading material which is available on Sakai

RECOMMENDED TEXT

- Unix And Linux System Administration Handbook, 5th Edition, Linux Administration Handbook, Second Edition [Pages 243-268]
- Linux Administration Handbook, Second Edition [Pages 111-129].

Chapter Objectives

At the end of the session, students will be able to:

- Use some selected sys admin software tools
- Understand the importance of careful and systematic work habits
- Demonstrate the techniques of File Tree navigation
- Use various Unix File editors

Fundamental Sysadmin Tasks

- The daily tasks performed by a system administrator require specialized as well as common tools.
  - System administration requires a way of working that is :
    - craftsman-like,
    - strives for a working practice aimed at producing robust, secure, and reliable systems.
  - This chapter examines tools and practices common to many system administration tasks.

Fundamental Sysadmin Tasks

- System administrators are knowledgeable users of the systems they manage.
  - They need to know how to:
    - navigate the file system,
    - use basic user-level tools,
    - use the ubiquitous *vi* editor,
    - combine commands using pipes,
    - employ a variety of graphical tools.
  - It is assumed for the purposes of this chapter that the reader has a basic knowledge of the Windows and UNIX user environments.

Good Practices

- Good working practices are the threads that tie together the tasks performed by the Sysadmin.
- Good practices make tasks easier to reproduce, preserve system security/robustness, and maintain system functionality.
- System administrator involves managing details.
  - Knowing how a system is configured, what patches have been applied, what services the system needs or provides, and any number of other items is a tremendous aid in solving problems.

Good Practices

- Another part of the job is continual learning.
- Establishing a discipline of carrying out daily, weekly, and monthly tasks is necessary in maintaining systems, identifying slowly growing problems, and preparing for unexpected problems.

Good Practices

- Avoid using *root* or *administrator* as much as possible. Use a less privileged account, for which mistakes will be less drastic.
- Avoid using wildcard characters, such as the asterisk (*), when running as *root* or *administrator.*
- Make it a habit to create backup copies of files before you edit.
- Allow plenty of time to complete the tasks you need to perform.

Moving Around the File Tree

- The most basic tasks of system administration involve the manipulation of file storage.
  - Understanding file system navigation tools, and being able to use them, are basic to managing a system.
- Both UNIX and Windows organize disk storage into a tree structure.
  - UNIX unifies all file storage space, disks, remote file systems, and entries for devices and communications end points into a single tree.
  - Windows takes the approach of creating a forest of trees, one for each disk or remote file system or share, with separate named entities (e.g., *c:, lpt0*)

Moving Around the File Tree

  - Files within the file trees can be referred to by their full path names, traversing the tree from the root to the leaf and listing each directory as it is passed.
  - Although providing the full path completely specifies the location of a file, it is more common to use a relative path; one that starts in your current location.
- Commands for traversal of the file tree:
  - cd / chdir Change Directory
  - pwd Show current location
  - ls / dir List the files and directories

Moving Around the File Tree

- A less common set of commands gathers and displays file system space statistics.
  - On UNIX systems, the *df* command reveals statistics concerning individual file systems in a system's file tree, whereas the *du* command produces a list of the space consumed by directories.
  - On Windows systems this information is available using a graphical file tree viewer such as the explorer program or the web browser.

Why vi

- Despite the graphical tools available for many system administration tasks, on UNIX systems, many tasks require file editing.
  - Examples include maintenance of hosts and network files for networking, and of configuration files for daemons such as *inetd* and *init*.
- Few people really “love” *vi*. However, it is frequently the only screen-oriented text editor available for managing a system.
  - Although not as easy to use as some editors, *vi* is widely available and should be accessible on any UNIX system.

Why vi

- Many editors cause problems when editing system files. For example:
  - Pico and emacs do not (by default) place a newline at the end of a line of text.
    - This causes many problems with editing files such as /etc/passwd, and other format sensitive configuration files.
  - These editors may not have access to all of the resources that they require when the system is in single user mode.

Power Tools

- There are a number of general tools and techniques that are more frequently used by system administrators than by users.
  - These include
    - command shell features,
    - graphical desktop tools,
    - programmable filters, and
    - scripting languages.
  - Many of these are available on both UNIX and Windows in one form or another, although most have their roots in the UNIX environment.

Power Tools

- **pipes** - allow you to "pipe" the output of one command into another command as input.
- **ps** (task manager) – allows you to view the system process table.
  - The *ps* command differs a bit among UNIX variants. The two major divisions are the BSD-style and the System V-style.
- **more/less** – pagination commands that allow you to view files one page at a time.
- **grep** – Get Regular Expression – find a pattern in a file.

Power Tools

- **tar** – create a tape archive of files.
- Programmable Filters
  - Another class of tools that can be used with pipes or by themselves to massage a flow of data are programmable filters.
  - Two common examples of filters are *awk* and *sed*.
    - awk uses an interpreted command language, and treats input as though it were a textual database.
    - sed – the **s**tream **ed**itor, uses the regular expression language seen in *vi* and *grep,* and allows you to edit streams of input.

Power Tools

- **find –** locate files by name, or file characteristics, or locate strings in files.
- **perl –** a very powerful interpreted scripting language.
- **cygwin –** a UNIX shell and utilities for use on Windows systems.

Juggling Multiple Tasks

- Juggling multiple tasks is a fact of life for a system administrator:
  - Monitoring network and system performance
  - dealing with a never-ending stream of e-mail
  - searching the web for information
  - remotely accessing several systems
- Modern windowed environments help with juggling tasks by providing easily used graphical interfaces and tools for grouping related tasks.

Windowed Environments

- Both Windows and UNIX provide some form of windowed work environment.
- Although these desktop environments all appear to be different, they have several common features that are of interest to the system administrator.
  - First, note that all desktops allow for multiple windows.
    - Switching back and forth between tasks or GUI tools is performed by mouse click or keyboard shortcut.

Windowed Environments

- Second, all desktops offer terminal emulation, providing multiple command line interfaces.
  - Multiple terminal windows are often used for connections to remote systems or to edit a configuration file while using another terminal window to test the configuration.
- Third, idle tasks can be reduced to icons or entries on a task management menu for easy access.
- Fourth, UNIX desktops provide a facility for switching between multiple virtual screens. There are add-on tools for the Windows desktops that facilitate the virtual screen facility.

General-purpose GUI Tools

- *E-mail*
  - Most system administrators handle a large volume of e-mail each day. A powerful mail agent is a requirement for dealing with this flood of information.
    - A good mail agent for a system administrator should include filtering tools, for automating the task of sorting mail, and an easily navigated filing and searching system.
    - Some recent mail agents are GUI based and make it easier to fully use their filtering and navigation features.

General-purpose GUI Tools

- *Web Browsers*
  - A vast amount of useful system administration information is available on the Internet and viewable via a web browser.
  - Most UNIX and Windows platforms offer several web browsers, such as the popular Internet Explorer and Netscape Navigator.
  - For basic information, viewing and downloading of files, nearly any web browser will work. However, a browser that integrates graphics and PDF file viewing allows a wider range of information to be viewed.

General-purpose GUI Tools

- *Virtual Terminal*
  - Perhaps the most common use of a windowed environment is a setup of multiple-terminal windows, connected to multiple systems.
  - Terminal windows have several advantages over an ordinary terminal:
    - Terminal windows provide variable scroll-back capabilities that provide easy review of output.
    - Terminal windows can emulate various terminals, allowing a single workstation to act in place of one or more special-purpose terminals.
    - Terminal windows also allow for easy transfer of small bits of text and command strings by incorporating “cut and paste” capabilities.

General-purpose GUI Tools

- *Spreadsheet*
  - Spreadsheets can be used effectively to automate a number of recordkeeping tasks.
    - Typical uses of a spreadsheet are as a table of data that can be sorted and searched and as a progress checklist for larger tasks.

Summary

- The fundamental tools of system administration include:
  - careful and systematic work habits
  - a selection of basic software tools.
    - editors,
    - filters,
    - file system navigation
    - windowed environments
    - power tools

- Unix And Linux System Administration Handbook, 5th Edition By Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, Dan Mackin. Released September 2017. Publisher(s): Addison-Wesley Professional. ISBN: 9780134278308
- Practice Of System And Network Administration, The: Devops And Other Best Practices For Enterprise IT, Volume 1, By Thomas A. Limoncelli, Strata R. Chalup, Christina J. Hogan. Released November 2016. Publisher(s): Addison-Wesley Professional. ISBN: 9780133415087
- Essential System Administration, Third Edition by Æleen Frisch, Published by O'Reilly Media, Inc. (20(0-596-00343-9