IBM

AIX 6 System Administration I: Implementation
(Course code AU14)

Student Exercises

ERC 12.0

IBM certified course material

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Contents

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Exercises description

Exercise Instructions — This section contains what it is you are to accomplish. There are no definitive details on how to perform the tasks. You are given the opportunity to work through the exercise given what you learned in the unit presentation, utilizing the unit Student Notebook, your past experience and maybe a little intuition.

Exercise Instructions With Hints — This section is an exact duplicate of the Exercise Instructions section except that in addition, specific details and/or hints are provided to help step you through the exercise. A combination of using the Instructions section along with Instructions With Hints section can make for a rewarding combination providing you with no hints when you don't want them and hints when you need them.

Optional Exercises — This section gives you additional exercises to perform relating to the unit of discussion. It is strictly optional and should be performed when you have completed the required exercises. The required exercises pertain to the most pertinent information provided in the unit. This section may help round out the hands-on experience for a related unit.

Text highlighting

The following text highlighting conventions are used throughout this book:

Bold	Identifies file names, file paths, directories, user names and principals.
Italics	Identifies links to Web sites, publication titles, and is used where the word or phrase is meant to stand out from the surrounding text.
`Monospace`	Identifies attributes, variables, file listings, SMIT menus, code examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, and messages from the system.
`Monospace bold`	Identifies commands, daemons, menu paths and what the user would enter in examples of commands and SMIT menus.
`<text>`	The text between the < and > symbols identifies information the user must supply. The text may be normal highlighting, **bold** or `monospace`, or **`monospace bold`** depending on the context.

Exercise 1. root login methods

What this exercise is about

In this exercise, you look at several ways to invoke the privileges of the **root** user.

What you should be able to do

After completing this exercise, students should be able to:

- Directly log in as **root**
- Use the `su` command to log in as **root**

Introduction

Typically the system administrator should not use **root** as their normal login account. Instead, they should use the `su` command to *become* **root** for a short period of time to do administrative tasks.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

If your lab environment uses remote System p platforms, the instructor provide you with instructions for accessing the remote environment. For example, this may involve using a Web browser to access a Web server which provides access to a virtual private network (VPN) or it may involve using a toll that extends a remote VPN to your desktop machine.

Once you have access to the remote environment you can choose a tool to connect to your assigned machine. Once again, your instructor provides you with the addressing (IP address or hostname) and instructions for accessing the remote machine. Your network utility may be a telnet client, an X-Windows server, or a VNC client. Whatever tool you are using, at various points in the labs, you may need to re-launch your remote access tool to obtain a new login prompt.

If you are using an ascii based network client, such as PuTTY, be sure to specify the telnet protocol in addition to providing the IP address of your assigned lab system. You may also want to customize the terminal emulation, such as configuring the keyboard mapping to generate <ctrl-H> when the backspace key is pressed. You might also wish to adjust the window appearance characteristics such as the font size. If you did not customize before launching the terminal emulation, you can make the changes later by right clicking on the title bar and selecting "change settings".

If you are using a VNC viewer (to access CDE environment), you need to enter (when prompted) the IP address of your assigned lab system, immediately followed by "**:#**", where # is the port number for the vncserver. For example: 192.168.22.5**:**1.

Part 1 - Direct logins to `root`

__ 1. Establish connectivity to the remote lab environment. (If you are using local non-partitioned machines, you only need to turn on the local attached terminal and skip to step 3).

__ 2. Select and launch a network utility to access your assigned lab system.

__ 3. Log in as the user **root**. The password is **ibmaix**.

__ 4. Open a terminal. (if necessary)

__ 5. Determine your current directory and your home directory.

Current directory: _____/__
Home directory: _____/__

__ 6. To verify that you do, in fact, have **root** privileges, `cat` out the file
/etc/security/passwd. This file holds the encrypted passwords for the users on your
system. Only **root** can look at this file. More details on this file are mentioned later in
the course. Did you see the contents of the file? _____

__ 7. Log out of the system.

Exercise 1. root login methods **1-3**

Part 2 - Using the `su` command

__ 8. Log into the system using the login name **team01** and the password **team01**.

__ 9. Open a terminal. (if necessary)

__ 10. Determine your current directory and your home directory.

    Current directory: _____
    Home directory: _____

__ 11. Check to see if you have the authority to view **/etc/security/passwd**.

    Did you see the contents of the file? _____

__ 12. Change to the **/tmp** directory.

__ 13. Now, switch user to **root** without using the "**-**" (dash) option.

__ 14. Determine your current directory and your home directory.

    Current directory: _____
    Home directory: _____

    Has anything changed? _____

__ 15. Do you have **root** privileges? Check **/etc/security/passwd**. _____

__ 16. Change to the **/etc** directory.

__ 17. Exit back to **team01**.

__ 18. Did the `su` and the `cd` to **/etc** (in the resulting subshell) affect the current directory after exiting the subshell? _____

__ 19. Now, try using the `su` command with the **-** (dash) option. What is your home directory? If you're not sure, check before performing the `su`. _____.

__ 20. Determine your current directory and your home directory.

Current directory: _____/_____
Home directory: _____/_____
Is there any thing different this time?

__ 21. Check /**etc**/**security**/**passwd** to make sure you have **root** privileges.

__ 22. Exit back to **team01** and log out.

End of exercise

Exercise 2. Using SMIT

What this exercise is about

AIX provides several different interfaces; ASCII (command-line), Common Desktop Environment (CDE) and X-Window (Motif). This exercise provides an opportunity to use the ASCII interface to the System Management Interface Tool (SMIT). Optionally, you can also use CDE and Motif interface to SMIT.

What you should be able to do

After completing this exercise, students should be able to:

- Log in from the ASCII interface
- Start SMIT (ASCII and optionally the graphical version)
- Add users with default settings
- Navigate through the SMIT menus
- Use SMIT function keys
- Display the SMIT history files, smit.log, and smit.script
- Start and use graphical SMIT

Introduction

This exercise is designed to give you experience working with the system management tools supplied with AIX. In most classrooms, there are two students per AIX system. In many cases, only one person is able to perform the task at a time. You need to work together with your teammate. Be sure to take turns at the keyboard.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

Note that on some terminal emulations, the function keys are not operative and you may need to substitute escape sequences. For example, instead of pressing F3, you might need to press <ESC><3> for the same function.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Using SMIT (ASCII interface)

__ 1. Log in as the user **root**. The password is **ibmaix**.

__ 2. Open a terminal. (if necessary)

__ 3. Start SMIT in ASCII mode.

__ 4. Add five users to the system. They should be named **team100** through **team104**. Take all of the defaults. Customizing the attributes is covered later in the course. Assign a password for each user that is the same as the user name. When the five users and their passwords have been entered, exit from SMIT.

__ 5. Start SMIT using the options to redirect the **smit.script** and **smit.log** files to the /**home/team100** directory. From the main SMIT menu, select **Processes & Subsystems**. Display all the current process running on your system. Examine the output.

   • Which command do you think was executed? _____.

   • How can you find out? _____

   • Return to the main menu.

__ 6. In a similar manner, select each of the main SMIT menu entries, examine the submenu, then use the `F3` key to back up to the previous menu. **Do not execute any commands that may cause changes to the system.** Because you are logged in as **root**, you must be very careful.

__ 7. Shell out **(F9)** and execute the `date` command. Return to SMIT and do the following:

1) Stop **syslogd** subsystem.

2) View the command that was executed.

3) List ALL subsystems to see that **syslogd** is inoperative.

4) Restart **syslogd**.

5) Continue to the next step. Do **not** press **F3** or exit SMIT.

__ 8. You should have the **COMMAND STATUS** screen displayed. Capture an image of this screen. Exit SMIT.

__ 9. Look at the SMIT history files using `pg` or `more`. Look for the image you captured in the previous step.

• What information is in each of these files? _____

_____

• Why should these files be monitored?

_____

__ 10. Look at the ownership of the SMIT history files of user **team100** with `ls -al.`

• Was it a good idea to create these files as **root**? _____

• What will happen if user **team100** will use SMIT?

_____

__ 11. As the system administrator, you can select the default interface that the users can use. Depending on your classroom environment, you may be able to set a different interface. Ask your instructor if you would like to change the interface. For the new interface to take effect, you need to reboot your system. Log out when you are done.

Note

If you are using VNC for remote graphics, do not change the system user interface in this step; your VNC server is configured to only work with a CDE user interface.

__ 12. If you did not change your System User Interface (and thus did not need to reboot), terminate smit and log off of your system.

Part 2 - (Optional) Using SMIT (Motif interface)

___ 13. If using CDE, log into CDE desktop as **root** and the password **ibmaix**.

If using an X-Windows environment, log in to the AIX system from the ASCII interface as **root** and the password **ibmaix**.

___ 14. If necessary, open a terminal window. If one already exists, skip to the next step.

___ 15. Add five users to the system. They should be named **team200** through **team204**. Take all the defaults. **Do not assign passwords for these users.** When the five users have been entered, exit from SMIT.

___ 16. In a similar manner, select each of the main SMIT menu entries, examine the submenu, and then use the **Cancel** button to go back to the previous menu. **Do not execute any commands that may cause changes to the system**. Because you are logged in as root, you must be very careful.

___ 17. Exit from SMIT. Look at the SMIT history files with `pg` or `more`.

   • What information is in each of these files?

   _____

   • Why should these files be monitored?

   _____

___ 18. Log out of CDE or X-Windows.

___ 19. Log out of the system.

End of exercise

Exercise 3. System startup and shutdown

What this exercise is about

This exercise familiarizes you with the system startup and shutdown process, and using the System Resource Controller (SRC).

What you should be able to do

After completing this exercise, students should be able to:

- Start a System p in multi-user

- Switch to the **root** user and shutdown the system

- Execute the `lssrc`, `stopsrc`, and `startsrc` commands

Introduction

If there are two or more students per system, you must work as a single team throughout this exercise. All instructions involve using the system unit for starting and stopping the system in various modes.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Multi-User mode

__ 1. Log in using the user name and password provided by your instructor. The login name should be a user name such as **teamxx** where **xx** is a double digit number like 01, 02, and so forth. Switch to the **root** user. Display the **alog** file for the **bootlog**. Page through the output to see what devices were configured and the other tasks that were performed.

> **Note**
>
> If this is the first time you log in using the user name, you are prompted to change your password. Keep it the same as the user name.

__ 2. Page out the /**etc/inittab** file. Take a moment to become familiar with its contents.

- What is the run level of **shdaemon**? _____
- What does it mean? _____

__ 3. Log out of this session.

Part 2 - Boot using System Management Services

__ 4. If your remote AIX system is an LPAR on a remote managed system, then you can do this SMS exercise by remotely accessing the HMC using your Web browser and starting a virtual console session with your AIX system (the Web browser must have connectivity to the HMC which may be inside a virtual private network (VPN).

__ 5. In order to boot to an SMS mode, you must first shutdown the AIX system. From the command line, request a shutdown with no delay and no reboot.

__ 6. Access your system's HMC by starting a Web browser and using the HMC's IP address as the URL. If you do not have this IP address, ask your instructor. (If you are on a stand-alone system, skip to Step 4 below for booting in SMS mode.)

__ 7. Start the Hardware Management Console application by clicking the Launch link. Log into your system HMC as **hscroot**. and password **abc1234.** Locate your machine and the logical partition which your are assigned.

__ 8. Locate the icon for your partition. The state of the partition should be **not active.** Activate the partition, specifying that you want to open a terminal window and that you want a boot mode of SMS.

__ 9. If you are using a local non-partitioned system (otherwise skip to the next step): As the **root** user, shut down and reboot the system to the System Management Services mode. As soon as you see the keyboard and hear a beep, you should press the numeric **1** key or <F1> key to access SMS.

__ 10. System Management Services (SMS) menus and contents vary from one System p machine/model to another. Take a few moments to explore the menu options which display on your system. Do not make any changes or run any tests. *Also, don't click* ***Exit*** *on the main SMS screen until you are finished exploring the other options.*

__ 11. When you are done exploring, exit the SMS program and allow the system to reboot in multi-user mode.

Part 3 - System Resource Controller (SRC)

__ 12. Log in as **root**. List the active and inoperative subsystems on your system. Display a screen at a time. Locate the `syslogd` subsystem. It should be marked as active.

__ 13. Using the appropriate SRC commands, stop the `syslogd` subsystem. Check that it is inoperative. Restart it. Check that it is active.

Part 4 - Resetting the run level (INIT)

__ 14. Shutting a system down to Single User mode removes any TCP/IP network access to the system. Due to this, you need to use the system console while doing this lab exercise.

If you are using a non-partitioned local system, then login at the attached console and skip to step 18.

If you are using a partitioned system, you need to start a virtual terminal to your partition, as you did earlier when booting to SMS mode. Do the following steps:

__ 15. Access your system's HMC by starting a Web browser and using the HMC's IP address as the URL. If you do not have this IP address, ask your instructor. (If you are on a stand-alone system, skip to Step 4 below for booting in SMS mode.)

__ 16. Start the Hardware Management Console application by clicking the Launch link. Log into your system HMC as **hscroot**. and password **abc1234.** Locate your machine and the logical partition which your are assigned.

__ 17. Start a virtual console window for your assigned partition. This acts as your system console during the exercise.

__ 18. Reset the run level to Single User Mode without rebooting the system.

__ 19. Verify that several subsystems have been stopped.

__ 20. Verify that there are few processes running on the system.

__ 21. Run **/etc/rc.net** to start the network interfaces and then reset the Run Level to Multi-User Mode.

__ 22. Ensure that all normal subsystems have been started and are working properly. If you have been using CDE, and CDE fails/hangs now, you forgot to run **/etc/rc.net** in the previous step.

__ 23. Shut down and reboot the system one more time.

End of exercise

Exercise 4. AIX software installation

What this exercise is about

In this exercise, you list the software currently installed on the AIX system. You then install two software packages.

What you should be able to do

- List the software installed on an AIX system

- Install software

- Install software fixes (optional)

- View the history of installed software (optional)

Introduction

This exercise is designed to give you experience working with the installation facilities supplied with AIX. If there is more than one student sharing a system, then only one person can actually perform these steps. All other students on that system should observe while the steps are being done.

In this exercise, you install two software packages:

- **bos.dosutil**

- **bos.games**

In this exercise, you may also install a fix to already installed software packages.

The instructions are written assuming you are using SMIT in ASCII mode. However, it is easy to interpret the instructions so that they can be used with SMIT in the AIXWindows environment. Feel free to use SMIT in either mode.

When you select an item while using the ASCII user interface, use the cursor keys on the keyboard to highlight a menu item, then press **Enter**. On a graphics display, choose (that is, click) the selected item with the left mouse button.

The fix installation and display of the fix history is optional. It requires that the lab setup for the exercises used an AIX 5L V5.3 TL6 base installation. If the image used in your lab environment has additional

maintenance already installed and committed, you may not be able to successfully complete the optional steps.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - List and install AIX software

__ 1. Access your system. If remote, we recommend an interactive ascii prompt via telnet, but CDE graphical session can also work.

__ 1. Log in to AIX as **team*xx*** and **su** to **root**.

__ 2. Use SMIT to list the software on your system.

  • What command is SMIT executing to provide this information?_____

  • Examine the output and verify that **bos.games** and **bos.dosutil** are not installed on your system.

__ 3. Now it is time to install the two software packages, **bos.dosutil** and **bos.games**:

These packages have been preloaded (but not installed) in a directory called **/usr/sys/inst.images**. The procedure to install these packages from this directory are the same as those to install software from CD or tape.

Use SMIT to install the **bos.games** and **bos.dosutil** packages. When this task has successfully completed, return to the AIX command line.

__ 4. Verify that the **bos.games** fileset installed correctly and list the games which are available.

__ 5. Use SMIT to remove the **bos.dosutil** fileset.

__ 6. If not doing the optional *Part 2 - Working with AIX Fixes*, log off the system at this point.

Part 2 - Working with AIX Fixes (Optional)

__ 7. We have already downloaded AIX 5.3 TL6 Service Pack 1 and stored the fix files in the /**usr**/**sys**/**inst.images**/**fixes** directory. Use SMIT to run a **Comparison Report** between this fix repository and what is currently installed on your system. Only report on installed software that is at a lower level than what is in the fix repository.

Briefly examine the generated report. Can you tell what problems or new capabilities are included in which fileset update? _____

__ 8. Return to the **Software Installation and Maintenance** menu and choose the menu sequence which allows you to list software that is on installation media (which could be a directory). List the APARs that are addressed by the filesets in the /**usr**/**sys**/**inst.images**/**fixes** directory. Briefly examine the output.

__ 9. Return to the **Software Installation and Maintenance** menu and follow a menu sequence that presents a dialogue panel which allows you to install a fix by specifying the related APAR number. Request to use our /usr/sys/inst.images/fixes directory as the source of the fixes.

__ 10. There is a bug in AIX 5L V5.3 TL6 where the `usrck` command can (incorrectly) lock all user accounts. You do not want that to happen. In the dialogue panel, get a listing of APARs which are available to be installed. Find the APAR which was just described. Select and install that fix. Examine the output to verify that the fix was installed. What filesets have been installed?

_____

_____

__ 11. View the history of the installed filesets using the `lslpp` command.

__ 12. Log off from the system.

End of exercise

Exercise 5. AIX 6.1 installation and configuration

What this exercise is about

In this exercise, you have the opportunity to migrate your AIX OS image from AIX V5.3 to AIX 6.1, and work with the Configuration Assistant. The Configuration Assistant is an application that can be used to configure the initial system settings.

What you should be able to do

After completing this exercise, students should be able to:

- Install an Operation System by migrating to AIX 6.1
- Use the Configuration Assistant

Introduction

The Hardware Management Console (HMC) and Configuration Assistant are graphics-based applications that assist the system administrator with various tasks. These applications are used to perform the installation of the operating system and system configuration respectively.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

The objective for the first part of this lab is to install an IBM AIX 6.1 mksysb image. The instructions to accomplish this using an eLab environment and a stand-alone system is listed. **Ask your instructor to confirm that the /spot and lppsource (bos) have been allocated for your system before starting.**

__ 1. Log in to your assigned system.

__ 2. Before you start the migration/install, you need to identify the boot disk and the adapter which has a configured interface. Use the **bootlist -o** command to identify the boot disk. Use the **netstat -in** and the lsfg commands to obtain the location of the configured interface's adapter. If the configured interface is **en4**, then the related adapter is **ent4** (the number in both names will always match). You only need the last two positions of the location code (either C#-T# or P#-T#)). You cover location codes in more detail in the Device unit later in the course.

boot disk: _____

configured interface and IP address _____

location code of the network adapter _____

__ 3. If you do not already have a working HMC window, access your system's HMC by starting a Web browser and using the HMC's IP address as the URL. If you do not have this IP address, ask your instructor.

If you are not using a HMC, log on to your stand-alone system and skip to Step 3.

__ 4. If you are not already logged into the HMC, start the Hardware Management Console application by clicking the Launch link. Log into your system HMC as **hscroot**. and password **abc1234.**

__ 5. Locate your machine and the logical partition which your are assigned.

__ 6. Shutdown your assigned lpar, This can be performed using the HMC (Operating System options only) or by using the **shutdown** command at an interactive root user prompt.

__ 7. If you currently have a virtual terminal open, close that window.

__ 8. Boot your system in SMS mode. Open a console session if you are using a lpar system and HMC configuration.

__ 9. Configure your system Remote IPL parameters. You need the correct subnet mask, plus the IP addresses of the NIM server and the gateway. These must be configured to boot off the network adapter. The instructor provides you with the NIM and gateway addresses.

NIM server IP address: _____

Gateway IP address: _____

__ 10. Assign your network adapter as the first and only boot device. Be sure the location of the adapter matches what you recorded earlier.

__ 11. Your system should be downloading an AIX network boot image at this time. The download and execution of the network boot image takes 2 to 3 minutes. When done, you see a prompt; select the terminal console and the English during installation.

__ 12. On the Main Installation and Maintenance menu, select Change/Show Setting and Install.

__ 13. Verify that the Method of Installation is set to `Migration` and the Disk to Install is the one you previously identified as the boot disk (probably `hdisk0`). When verified, enter 0 to start the installation.

__ 14. You may get prompted once or twice for other verifications. For example, it may give you the option of listing filesets and configuration files that are replaced. You may choose to examine these; the lists are not very large. Eventually respond with a 0 to continue with the migration.

When you see the "Installing Base Operation System", you can take a break (though the instructor may wish to use this time to discuss another topic).

This takes 30 to 40 minutes.

__ 15. Once the install is complete, the system automatically reboots. Once the reboot is completed, there will be a login prompt on the system console. At that point, continue to the next step.

__ 16. Log in as root user and start the Configuration Assistant.

__ 17. Ensure the date and time are set correctly.

__ 18. Familiarize yourself with some of the other options. When you've finished, exit from Configuration Assistant and select the option to **Finish now, and do not restart Configuration Assistant when restarting AIX**.

End of exercise

Exercise 6. Web-based System Manager

What this exercise is about

This exercise provides an opportunity to use the Web-based System Manager. If your classroom is networked, there is an optional part to allow you to configure your server for Web-based System Manager client access.

What you should be able to do

At the end of the lab, you should be able to:

- Use the Web-based System Manager
- Configure the Web-based System Manager for client machine access
- Use the Web-based System Manager from the client machine using the WebSM client application

Introduction

This exercise is designed to give you experience working with the Web-based System Manager in AIX. If you are sharing the machine, only one person should perform each step. You must work from a graphical interface for this exercise.

If your classroom is networked, you can configure and test the Web-based System Manager for client machine access. The client machine can be another AIX system or a PC. In both cases, the client platform must have a browser that is Java-enabled.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

If there are multiple interfaces on your system, your instructor should identify which interface to use for this exercise. If you are in an environment where the AIX system is accessed remotely, be sure to not deconfigure the interface used for that purpose.

Part 1: Use the Web-based System Manager

__ 1. For this exercise you need a graphic interface to your system.

   If you are using a partitioned system, then you need to use a remote graphics utility such as VNC or an Xwindows Server utility to access your system. You should be presented with a CDE login prompt.

   If you are using a local non-partitioned system you need to use the attached graphic console.

__ 1. Log in as **root.**

__ 2. If you logged using a locally attached graphic console on a non-partitioned system, then make sure you are in the AIX windows or CDE environment.

__ 3. If you are in a CDE environment and there is no terminal emulation window, open the **Personal Application** subpanel (arrow over the pencil and paper icon) and click on the **Terminal** icon.

   Access the Web-based System Manager.

__ 4. View system processes by both details and tree details. Viewing processes by tree detail provides a pictorial view of the parent/child relationship of the processes. Return to the view of the task icons for **Processes** when you have completed this task.

__ 5. View the Web-based System Manager window that displays the current system date and time.

__ 6. Close the Web-based System Manager Launch Pad window and log out of the
system.

Part 2 (Optional): Configure the Web-based System Manager for AIX client access

Preface

For the optional sections, you need to have a functioning network environment in lab
room. The lab teams need to pair up and work together. Each team pair select which
machine is remotely managed (Web-based System Manager server) and which
machines are the remote system administrator platform (Web-based System Manager
client).

There is no need for additional configuration to use the Web-based System Manager to
manage an AIX platform from an AIX client with the Web-based System Manager
installed. Client-server mode does not require that the server run a Web server; the
connection is made directly between the two Web-based System Manager applications.

__ 7. Log into the WebSM Client system as **root** and using the correct **root** password.

__ 8. On the WebSM Client system, make sure you are in the AIX windows or CDE
environment. If you are in a CDE environment and there is no terminal emulation
window, open the **Personal Application** subpanel (arrow over the pencil and paper
icon) and click the **Terminal** icon.

Access the Web-Based System Manager on the client platform, but specify the IP
address or hostname of the Web-based System Manager server machine.

__ 9. Do a couple things to validate that the interface is working correctly and then close
down the application.

__ 10. At the Web-based System Manager server system, disable client-server (and
remote client) access. This way you can use the Web-based System Manager
locally on a platform but not allow remote client-server access.

__ 11. At the client platform, again start the Web-based System Manager specifying the IP
address or hostname of the Web-based System Manager server machine. Did it
work? _____

__ 12. At the Web-based System Manager server platform, re-enable client-server (and remote client) access.

Part 3 (Optional): Configure the Web-based System Manager for remote client access

Preface

In order to do this optional exercise, you must have a qualified PC running a supported version of Windows or Linux, a supported desktop environment, and a Java-capable Web browser. The PC must have network connectivity to the AIX server platform.

When using a PC platform as the Web-based System Manager Remote Client, you must first install the Web-based System Manager remote client application on that platform. This is done using the Web server on the Web-based System Manager Server platform.

One a PC has the WebSM Client, it can access any AIX system which has wsmserver enabled (as in the previous exercise part). The AIX WebSM servers do not need the following configuration completed, only the server that provides for Web browser-based download of the WebSM client package.

The alternative to using a Web browser interface is to ftp download the install shield executable file to the PC. The path to that file is:

/usr/websm/pc_client/setup.exe

__ 13. While a Web page server is not needed to use the Web-based System Manager function, it is used to download the Web-based System Manager client to an remote Linux or Windows platforms you might wish to work from. The HTTP Server Web Server software (**IHS2**), which is delivered on the AIX 5L V5.3 Expansion Pack CD, should already be pre-installed on your system.

Verify that it has been installed.

__ 14. You need a graphic interface to configure the Web server support for providing the WebSM PC client. In your graphic environment start a terminal emulation window and execute **configassist** in the background.

Configure the Web server support for Web-based System Manager using the following values.

- The root document directory is: **/usr/HTTPServer/htdocs**
- The root CGI directory is: **/usr/HTTPServer/cgi-bin**
- The HTTPServer start command is: **/usr/HTTPServer/bin/apachectl restart**

__ 15. On the client PC, start the Web browser and enter a URL of:
http://<wsmservername>/remote_client.html

___ 16. Click the **InstallShield** hyperlink on the new Web page. (The **Java Web Start** method requires additional security software to be installed on both client and server platforms).

___ 17. Identify the client as either a **Linux** or **Windows** platform on the resulting Web page.

___ 18. On the **File Download** pop-up, click the **Save to Disk** button. In the **Save In:** field, navigate to store it on the **desktop** and again click the **Save** button. In the **Download complete** pop-up, click the **Open** button. This runs the **Install Shield** wizard. (*There will be a command prompt window launch to execute* `java.exe` *just before the Installer window appears; do not do anything with the command prompt window.*)

- On the Installer window, click the **Next** button.
- Use the default install Directory name and click the **Next** button.
- Note the location and size of the install and click the **Next** button.
- After the install is complete, click the **Finish** button.

___ 19. You should now see an icon on your desktop labeled: **Web Based System Manager Application**.

- Open this new icon.
- In the **Log On** window, enter the Web-based System Manager server hostname or IP address and click the **Log On** button.
- After the handshake procedure is completed, enter **root** and the **root** password and again click the **Log On** button.

___ 20. Once the Web System Manager window appears and has all the icons filled in, try a few operations to prove it is operational and then exit the application.

End of exercise

Exercise 7. Devices

What this exercise is about

This exercise familiarizes the students with listing device configuration information on the system and configuring a defined device.

What you should be able to do

At the end of the lab, you should be able to:

- List device configuration on a system using SMIT or the appropriate command

- List and change system parameters

- Configure a defined SCSI device

Introduction

This exercise is designed for you to become familiar with the methods you can use to discover what devices are on your system and how they are configured. It deals exclusively with adapters and SCSI types of devices. Future optional exercises will deal with terminals and printers.

Part 5 - Configuring a defined device, can only be done if you have an externally attached tape drive or CD-ROM. Most lab facilities do not have this.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom. If your lab environment uses remote System p/AIX platforms, the instructor will provide you with the addressing (IP address or hostname) and instructions for accessing the remote machine. For example, you might be using telnet, an X-windows server, or a VNC client. Whatever tool you are using, at various points in the labs you may need to re-launch your remote access tool to obtain a new login prompt.

Part 1 - List device configuration

__ 1. Log in as a regular user and obtain a command prompt. If using a graphical interface (ex. CDE), then start a terminal emulation window.

__ 2. **su** to the **root** user. If more than one person is using the same system you need to work as a team.

__ 3. List all the supported devices on the system.

__ 4. List the configured devices on the system. Are your SCSI devices available?

   _____

__ 5. List information about the memory you have on the system. Record the amount of memory you have.

__ 6. List the disks on your system. Record how many you have.

Part 2 - List and change system parameters

__ 7. The kernel is represented by a special logical device, **sys0**. This can be manipulated by commands or through SMIT.

List the attributes of the kernel. The only kernel attributes that can be changed are those that are marked with `True` in the last column of output.

  • Which attributes cannot be changed? _____

_____

__ 8. Which attribute in the previous listing describes the number of processes a user can run? _____

__ 9. By default, the system is configured so that each user can run no more than 128 processes at once. Change this value to 150 processes per user. The new value takes effect immediately.

Part 3 - Removing and redefining a network adapter device

Your machine must have an extra network adapter for which the corresponding interface is not configured. Otherwise, skip to *Part 5 - Changing the status of a disk drive device*.

__ 10. Identify the network interfaces that are configured (for example, available) on your system by listing the if class of devices. Look for the names of the Standard Ethernet Network Interfaces. Which of these interfaces are available and which ones are defined?

_____

_____

__ 11. For the interfaces which are only defined, select one and list the adapter which the interface is using. For example, if the interface is en4, then the corresponding network adapter device name is ent4 (the numbers always match). What is the status of the adapter?

_____

__ 12. Put the Ethernet adapter device into a `Defined` state. Be careful to specify the correct adapter and **not** the one with a configured interface. Display the adapter and verify its status.

__ 13. Remove the Ethernet adapter from the customized database.

__ 14. Rediscover and configure the Ethernet adapter. Check its status.

Part 4 - Changing the status of a disk drive device

Your machine must have a an extra disk drive to continue with this section. Otherwise, you are done with this exercise.

__ 15. Determine the logical names of your disk drives and the volume group they (if any) that they are assigned to by using the lspv command. (We will be covering PVs and VGs later in the course).

Which disks have a volume group of rootvg? _____

Which disks have a volume group of none? _____

__ 16. Generate a device listing for the disk devices. Select one disk which was not in a volume group and record the location of that disk. If it is SCSI attached, what is the SCSI ID of the disk.

_____

_____

__ 17. Using the disk selected above, put that disk device into a `Defined` state.

__ 18. Remove the disk device from the customized database.

__ 19. Rediscover and configure that same disk for use. Does the device that appears have the same location? _____

_____

Part 5 - Configure a tape device (optional)

If you have an externally attached tape drive, continue with this section. Otherwise, skip to *Part 4 - Configure a CD-ROM device*.

__ 20. Issue the `shutdown` command to bring your system down. If you have more than one user on your system, coordinate this task with the other users.

__ 21. Turn off the tape drive. Reboot the system.

__ 22. Log in and `su` to **root**. Check the status of the tape drive.

  • Is it in a state where it can be used? _____

  • Why? _____

  • Record the name of the tape drive.

__ 23. Put the tape drive into the available state so it can be used. Use the name for the tape drive that you recorded in the previous instruction.

End of exercise

Exercise 8.   LVM commands

What this exercise is about

This exercise gives you a chance to look at the file system configuration on your machine and introduce you to some LVM commands.

What you should be able to do

After completing this exercise, students should be able to:

- Display information about your file systems
- List the LVM information on your system

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

__ 1. Log in as **team01** and `su` to **root**.

__ 2. View the contents of /**etc**/**filesystems** and list the file systems on your machine.

__ 3. Execute the command: `lsfs`.

   • What does it show? _____

__ 4. Execute the command: `lsvg`.

   • What does it show? _____

__ 5. Execute the command: `lspv`.

   • What does it show? _____

__ 6. Execute the command: `lsvg -l rootvg`.

   • What does it show?

End of exercise

Exercise 9. Working with LVM

What this exercise is about

The purpose of this exercise is to give students the opportunity to work with the facility that manages physical and logical data storage, the Logical Volume Manager (LVM). The Systems Management Interface Tool (SMIT) is used extensively throughout this exercise.

What you should be able to do

After completing this exercise, students should be able to:

- Add and remove a disk from a volume group

- Create and remove a volume group

- List the characteristics of the system's volume groups, physical volumes, and logical volumes

- Add a logical volume

- Extend a logical volume

Introduction

In this exercise you work extensively with SMIT to work with the Logical Volume Manager. First, you investigate existing volume groups, physical volumes and logical volumes. Once you are comfortable with the layout of your storage, you have the opportunity to add a physical volume to a volume group and then create a logical volume. Finally, you make some changes to the logical volume characteristics. In many cases, both the SMIT screens and the command are provided in the **Exercise Instruction With Hints** section. All tasks shown can also be done using the graphical version of SMIT.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Adding and removing a disk from a volume group

__ 1. Log in as **teamxx** and switch to the **root** user account.

__ 2. Ensure you have a hard disk available to create a new volume group.

   • What is the name of the disk that is currently available? _____

__ 3. From the disk information that you determined in the step above, add a free disk into **rootvg**.

 Note

You need to substitute your free disk name when **hdiskn** is referenced.

__ 4. Check to see if the disk is now associated with **rootvg**.

__ 5. Take the same disk that you added to **rootvg**, out of **rootvg**. Make sure you remove the correct disk.

__ 6. Verify that the disk is no longer associated with **rootvg**.

Part 2 - Creating and removing a volume group

__ 7. Using the free disk, create a new volume group called **newvg**.

__ 8. Verify that the new volume group was created.

   • What are the maximum number of physical volumes that can be added to this volume group? _____

__ 9. Convert **newvg** into a big volume group.

__ 10. What is the maximum number of physical volumes that can be added to the converted **newvg**? _____

__ 11. Convert **newvg** into a scalable volume group. In order to make this change the volume group must first be varied offline. Vary it back online when the conversion is completed.

__ 12. What is the maximum number of physical volumes that can be added to the scalable format **newvg**? _____

__ 13. Remove the **newvg** volume group.

__ 14. Verify that **hdiskn** is not associated with any volume group. If it is not, repeat the steps above. You need to have this disk free for a later exercise.

Part 3 - Exploring your storage environment

__ 15. Log in as **teamxx** and **su** to **root**, if not already.

__ 16. List all of the system's volume groups. If you use SMIT, before pressing **Enter** for the output, try using the **F6** key to see the command that is being built.

__ 17. List the contents of the **rootvg** volume group. If you are using SMIT, for **List OPTION** use **status**.

Find the information that is necessary to answer the following questions about your environment:

a) How many physical volumes are there? _____

b) How many logical volumes are there? _____

c) How many total physical partitions are there for this volume group?_____

d) How many of those physical partitions are free? _____

e) How large are the physical partitions? _____

f)   What is the Logical Track Group size? _____

g) What is the maximum number of PPs per physical volume? _____

__ 18. List the contents of the **rootvg** volume group once again this time selecting **physical volumes** for the **List OPTION**. Note: the free distribution of physical partitions is shown relative to the position on disk. These positions represent outer edge, outer middle, center, inner middle, inner edge. Make a note of the free partitions and their position on disk. _____ _____ _____ _____ _____

__ 19. List all of the physical volumes on the system.

__ 20. List the contents of any physical volume on your system. If you are using SMIT, for **List OPTION** use **status**.

Find the information that is necessary to answer the following questions about your environment:

a) To which volume group does the physical volume belong? _____

b)   What is the physical partition size? _____

    c) How many total physical partitions are there? _____

    d) How many of those physical partitions are used? _____

    e) What is the maximum transfer size? _____

    Try other options for listing information about the physical volume you select.

__ 21. List all of the logical volumes in the **rootvg** volume group.

__ 22. Show the characteristics for the logical volume **hd4**. If you are using SMIT, for **List OPTION** use **status**.

Find the information that is necessary to answer the following questions about your environment:

    a) To which volume group does it belong? _____

    b) How many copies? _____

    c) How many physical partitions is it? _____

    d) How large is the logical volume in megabytes? _____

Part 4 - Adding a volume group

The completion of this section depends on having an available disk drive in your system that is not assigned to a volume group. Check for a disk drive that has not been assigned to a volume group (you can use the `lspv` command).

If all disk drives are assigned, continue with the next section *Adding a logical volume*.

> ⚠️ **Important**
>
> **Only one user per AIX system may complete this section. Please consult your teammates before continuing**.

__ 23. Only one physical volume has been defined to be a member of the **rootvg** volume group. Using an available physical volume located on your system, create a new volume group called **datavg**. Verify that the new volume group was successfully created.

Part 5 - Adding a logical volume

__ 24. Add a logical volume, which is one partition in size, to the **datavg**. (Note: If you only have one disk on your system, create the logical volume in **rootvg**.) Allocate the partitions on the outer edge of the disk. Allow the system to default the logical volume name and note the system generated name.

_____

__ 25. Rename the logical volume created above to **yylv** (where **yy** represents the initials of your first and last name) instead of the system generated one, and verify that it has been renamed.

__ 26. Extend the **yylv** logical volume by one partition and specify that the added partition be allocated on the outer edge of the disk. This logical volume is used in the next exercise.

End of exercise

Exercise 10. Working with file systems

What this exercise is about

In this exercise the students are given the opportunity to work with file systems.

What you should be able to do

After completing this exercise, students should be able to:

• Add and remove an AIX file system

• Create an AIX file system specifying the number of bytes per inode

• Create an enhanced JFS (JFS2) file system and illustrate the AIX 6.1 file system shrink capability

• Mount and unmount a file system

• Extend a file system

• Add and remove mirrors

Introduction

In this exercise, you are using SMIT extensively to work with file systems. You add a file system to the logical volume you created in the previous exercise and then mount it so users can access the storage space. You copy files into this file system and then experiment with unmounting and mounting the file system once again but in different locations. You also get an opportunity to remove a file system and create a file system. The last portion of the exercise provides exposure to creating a mirrored file system and then changing some characteristics of the mirrored file system.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Inodes and NBPI

__ 1. If you are creating a JFS file system intended to store files that are smaller than 512 bytes in size, what would you choose for the following values?

Fragment Size: _____ NBPI: _____

Regular or Large-file enabled: _____

__ 2. If you are creating a JFS file system intended to store files about 8 KB in size, what would you choose for the following values?

Fragment Size: _____ NBPI: _____

Regular or Large-file enabled: _____

__ 3. If you are creating a JFS file system intended to store files about 2 MB in size, what would you choose for the following values?

Fragment Size: _____ NBPI: _____

Regular or Large-file enabled: _____

__ 4. When should you use large file-enable file systems? _____

_____

__ 5. When should you use compressed file systems? _____

_____

Part 2 - Creating a journaled file system

__ 6. Log in to the system and **su** to **root**. In order to use the space we set aside when we created the logical volume in the previous exercise, we need to put a file system in it. Create a journaled file system on the logical volume you created in the previous exercise. Make the default mount point /**home**/**teamxx**/**dir1** where the **xx** represents your team number. (Wherever you see **yylv** substitute your initials for **yy**.) Request that the filesystem be mounts at system restart.

__ 7. At this moment, can the space be used to create an AIX file?

_____

_____

Mount the file system. Verify that it is mounted. Check the owner and group of the mount point. Change the owner and group of the mount point to **teamxx** and **staff**. Copy all files and directories that are in the /**usr**/**samples** directory to the /**home**/**teamxx**/**dir1** directory.

__ 8. Create an enhanced journaled file system in the **rootvg** and let the system create the logical volume for you. Have it mount automatically at system restart. Set its default mount point to /**home**/**teamxx**/**dir2**.   First try to create it with a size of 1 MB. If that fails, create the file system with a size of 16 MB.

__ 9. Check to see if it is mounted. It shouldn't be. Mount it. Verify that it is mounted. Change the owner and group of the mount point to **teamxx** and **staff**.

__ 10. Add several files to the /**home**/**teamxx**/**dir2** directory. (**Note:** A quick way to do this is through the use of the **touch** command.)

__ 11. List the files in the /**home**/**teamxx**/**dir1** directory. Unmount /**home**/**teamxx**/**dir1** and list the files again. (Note: If you aren't **root** then **su** to **root**)

__ 12. List the files in the /**home**/**teamxx**/**dir2** directory. It should have all the files you created in it from instruction 5. Then mount **yylv** on /**home**/**teamxx**/**dir2** and list the files in /**home**/**teamxx**/**dir2**.

- What files are there now? _____

- Where did they come from? _____

Exercise 10. Working with file systems

- What happened to the files that were originally seen in **/home/teamxx/dir2**?

_____

___ 13. Unmount **/dev/yylv**. Mount **/home/teamxx/dir1**. List the files in both **/home/teamxx/dir1** and **/home/teamxx/dir2** to be sure they are set up as originally created.

Part 3 - Changing the file system size

__ 14. Find out the names of the logical volumes on which the file systems are created. (**Hint**: Use the `Mount Point` column in the output from the logical volume listing to find the name of the logical volume.) Find the logical volumes the file systems are on and the physical partitions in each file system and write it down.

- File system: _____

  Logical volume: _____

  Size: _____

- File system: _____

  Logical volume: _____

  Size: _____

__ 15. Record the current size of the filesystem.

_____

__ 16. Extend the size of /**home**/**teamxx**/**dir1** file system by ten 512-byte blocks.

- What is the new size of the file system? _____
- How much did the file system actually get extended? _____
- Why didn't the size increase by 5,120 bytes? _____
- Did this change the size of the logical volume with which it is associated?_____

__ 17. Extend the size of the **yylv** logical volume by one physical partition.

- What is the size of the logical volume? _____
- What is the size of the file system? _____
- Did this change the size of the file system? _____
- Why not? _____

  _____

- Make it so the file system takes up all the space allocated to the logical volume.

Part 4 - Reducing the size of a file system

__ 18. Change the characteristics of the **/home**/**teamxx**/**dir1** standard file system to reduce the size down to a final size of 1 megabyte.

   • Was this successful? _____

__ 19. Change the characteristics of the **/home**/**teamxx**/**dir2** enhanced journal file system to increase the size by one 512 byte block.

   • What is the final size resulting from this? _____

__ 20. Change the characteristics of the **/home**/**teamxx**/**dir2** enhanced journal file system to reduce the size down to a final size of 16 megabytes. Was this successful?

   _____

Part 5 - Removing a file system

__ 21. Remove the **yylv** logical volume, the one with /**home**/**teamxx**/**dir1** as the mount point. (where **xx** is the number of the logical volume assigned by the system when you created the file system in Step 3.

  • Can it be done? _____

__ 22. Unmount /**home**/**teamxx**/**dir1** and remove the **yylv** logical volume.

  • Does this remove all references to the logical volume and its mount point? ____

__ 23. Ensure that all references to the **yylv** logical volume and its mount point have been removed by removing the file system.

  • Do you see any potential problems with removing a logical volume and then removing the file system? _____

  _____

Part 6 - Working with mirrors

__ 24. Normally you would mirror across multiple disks. If your system does not have two disks in a volume group, this will not be possible, and, for this lab, you should place both copies on the same disk. If your system has two disks but one of the disks is in a second volume group then you may wish to remove that volume group and extend the **rootvg** to include the available disk.

__ 25. Change the characteristics of the **fslvxx** logical volume so that mirroring is turned on to have a single mirror (two copies). Be sure to allow creating a mirror on the same disk **if** you do not have two drives in your volume group. Other than that, take all the defaults.

__ 26. Show the characteristics of the **fslvxx** logical volume.

- Can you tell that it is mirrored? _____

- What information indicates it is mirrored? _____

- What is the LV STATE? _____

- Why do you think it is marked stale? _____

- What is the scheduling policy for writes? _____

__ 27. Change the characteristics of your mirrored logical volume to do sequential writes. Synchronize the copies. Fix the problem based on the message you receive and try again. Be sure it is mounted before continuing to the next instruction.

__ 28. Show the characteristics of the **fslvxx** logical volume.

- What values have changed? _____

__ 29. Turn off mirroring on the **fslvxx** logical volume.

__ 30. Remove the, now unused, second disk from the **rootvg**.

__ 31. Define the available disk as the volume group **datavg**.

End of exercise

Exercise 11. Managing file systems

What this exercise is about

The purpose of this exercise is to give students the opportunity to understand more about managing file system space and dealing with file system problems.

What you should be able to do

After completing this exercise, students should be able to:

- Determine which directories and files are using the greatest amount of file system space

- Defragment a file system

- Verify a file system using **fsck**

- Use disk fragments to improve disk usage efficiency

- Use JFS compression

Introduction

In this exercise you perform many of the activities required of a system administrator to manage disk space. Most of these activities require use of commands on a command line. This exercise requires the successful completion of the last two exercises; *Working with LVM* and *Working with File Systems*.

Throughout this exercise you are asked to change several times from your regular user name, **teamxx**, to **root** and then back again. It is a good idea to use **exit** to return to the previous user after completion of a task by the current user instead of continually executing the **su** command.

In order to do *Part 2 - Using Fragments For Disk Usage Efficiency* and *Part 3 - Using JFS Compression*, it is assumed that you have two disk drives in your system and that you have completed *Exercise 10 - Working with LVM, Part 4 - Adding A Volume Group*.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Determining file system usage

__ 1. Check that the **/home/team01/dir2** file system is mounted. If it is not, then mount it.

__ 2. If you aren't already logged in, log in to your system and then **su** to **root**. Recursively, copy the files under /**usr**/**samples** under your /**home**/**teamxx**/**dir2 directory**. Assume you have already determined that the /**home**/**teamxx**/**dir2** file system is close to full. Try to determine which of the directories is the biggest user of the space. Then, try finding out which is the biggest file in that directory. Use the **sort** command to organize the output in order of highest to lowest use. Finally, determine who is the owner of that file.

__ 3. Let's assume that you have concluded that more space is needed (as opposed to removing files to free up space); therefore, the file system needs to be expanded. Expand the file system by the size of 1 physical partition. Verify the usage of this file system.

Part 2 - Using fragments for disk usage efficiency

__ 4. For this exercise, you create two JFS file systems, one with a fragment size of 512 bytes and the other with the default fragment size of 4096. For both file systems, use a value of 512 for NBPI. Allocate 50000 512-byte blocks for each file system and put them in the **datavg** volume group. Use **/tmp/frag512** as the mount point for the file system with a fragment size of 512 and **/tmp/frag4096** as the mount point for the one with the default fragment size. If more than one student is performing this part of the exercise separately on the same System p system, it is necessary to modify the file system names in order to make them unique. Once the file systems are created, mount them.

__ 5. Check both file systems with `df -v` and note any used space.

You test the efficiency of the two file systems you just created for storing a large number of very small files.

__ 6. First, you need a source file to use as input in the next step. Use the `/home/workshop/mkfile` script to create a file that is 512 bytes in size. This script requires the file size parameter to be passed to it and uses the suffix of **bytefile**. For example: `/home/workshop/mkfile 512` creates a file in your current directory called **512bytefile**. Run this command from the **/tmp** directory creating a 512-byte file.

__ 7. To test the number of 512-byte files that can be stored in each file system, run the shell script `/home/workshop/fragcopy`. The shell script has the usage:

> `fragcopy numfiles dir/sourcefilename dir/targetfilename`.

The `fragcopy` script creates copies of the `sourcefilename` until either the file system is full or the `numfiles` value is reached. The files are put in the directory specified in `dir/targetfilename` with the `targetfilename` as the prefix followed by a "**.**" and a number which represents the count of the file currently being created. While `fragcopy` processes, a count is displayed showing the number of files that have been successfully copied. Have `fragcopy` copy `/tmp/512bytefile` 500 times and have as the `dir/targetfilename` value: `/tmp/frag512/frag500`**.**

__ 8. Look at the contents of the **/tmp/frag512** directory. Note how many files are in this directory.

__ 9. Do the same as step 7 only this time create copies of the **512bytefile** in **/tmp/frag4096**

__ 10. Look at the contents for **/tmp/frag4096**. Note how many files are in this directory.

__ 11. Now that there are two file systems with the same number of files, see how much disk space each has utilized.

- How many 512-byte blocks have the files used in **/tmp/frag512**? _____
- How many inodes have the files used in **/tmp/frag512**? _____
- How many 512-byte blocks have the files used in **/tmp/frag4096**? _____
- How many inodes have the files used in **/tmp/frag4096**?_____
- What can you conclude from this? _____

__ 12. When you are finished reviewing the results, unmount and remove both file systems.

Part 3 - Using JFS compression

__ 13. This exercise shows how to use some simple commands to investigate the effects of JFS compression on both performance and disk space usage.

Create and mount two compressed journaled file systems, one with a fragment size of 512 and a mount point of /**tmp**/**compress512**, the other with a fragment size of 2048, and NBPI of 2048 and a mount point of /**tmp**/**compress**. Make them both 65536 512-byte blocks in size and have them mount automatically at system restart. Put them in the **datavg** volume group.

__ 14. Create a third file system (the same size as the two file systems you just created and also in the **datavg** volume group) that does not use compression, that also has a fragment size of 2048 and an NBPI of 2048, that has a mount point of /**tmp**/**uncompress**, and that is automatically mounted at system restart. This will be used for purposes of comparison.

__ 15. Check that the journaled file systems have been correctly created.

__ 16. Mount the journaled file systems.

__ 17. Next, check the performance of the compressed file system by creating a 4 MB file named **bigfile** by using the script **/home/workshop/mkfile** and then move it to /**home**/**workshop**. Then copy it to each file system, and measure the performance using **timex**. First, check that the logical volume configuration is similar. Then, record copy times.

Real time for compress512: _____

Real time for compress: _____

Real time for uncompress: _____

__ 18. Use **du** to check how much space is really used and how efficient the compression is.

Disk usage for compress512: _____

Disk usage for compress: _____

Disk usage for uncompress: _____

__ 19. Use **ls -l** to verify the normal size of each file. What is the amount of data in the bigsize file in each filesystem?

File size of bigfile in compress512: _____

File size of bigfile in compress: _____

File size of bigfile in uncompress: _____

Part 4 - Fixing file system problems

__ 20. Using the `defragfs` command, find out the current state of the file system /**tmp**/**compress512**.

__ 21. Defragment the /**tmp**/**compress512** file system.

__ 22. Perform a check on the /**home**/**teamxx**/**dir2** file system so that if it finds something wrong you are prompted as to whether or not to take any action.

   • What kind of message did you get?

   • _____ Unmount the file system and check it again. Mount the file system again after the check is complete.

Part 5 - Optional exercise

___ 23. There is a shell script provided by the system called `skulker` that periodically cleans out files on the system. Find this file and add to it a line that gets rid of **teamxx**'s **smit.log** and **smit.script** files if they haven't been used in over two days. (This could be run periodically using `cron`. You may want to refer back to this exercise after completing the unit on scheduling.)

End of exercise

Exercise 12. Paging space

What this exercise is about

This exercise is designed to give students the opportunity to work with paging space changes on an active system.

What you should be able to do

After completing this exercise, students should be able to:

- List paging space

- Add another paging space

- Change the characteristics of a paging space

- Remove paging space

Introduction

In this exercise you work with paging logical volumes, adding, deleting, and changing them. To do this exercise, you need to work in teams - one team per AIX system. Only one team member is able to do the exercise, the other team members provide support and assistance where needed.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

__ 1. If you are not already logged into your system, log in as **teamxx** and **su** to **root**. Check the current memory size on the system and then check the paging space.

__ 2. If you have two disks on your system and successfully created another volume group named **datavg** during the Working with LVM exercise, create two page spaces: first one in the rootvg volume group with a size of one partition and then the other in the **datavg** volume group with an equivalent amount of space. (Be careful, the volume groups may have different ppsize values.) Otherwise, create both page spaces in the **rootvg** volume group. If you are short of space in **rootvg**, put both paging spaces in **datavg**. Make them one partition each.
Have them become active now and at system restart.

What names did the system assign to the two new paging spaces?_____

__ 3. Check to be sure the new paging spaces are active. Create some system activity and monitor the % of paging space used.

Check the % used on the paging spaces.

• What conclusion can you come to based on these observations?

_____

If necessary, run these commands again and notice how the page space usage becomes balanced over time. Note that your system may have so much memory that this step may not use enough to trigger an noticeable increase in paging space utilization.

__ 4. Change the size of **paging00** to four partitions. Check to be sure that **paging00** has been increased.

__ 5. Reduce the size of **paging00** by one partition. Check to be sure that **paging00** has been decreased.

__ 6.   Remove **paging01**. First, deactivate it.

End of exercise

Exercise 13. Using `backup` and `restore`

What this exercise is about

The purpose of this exercise is to familiarize the students with backup and restore techniques.

What you should be able to do

After completing this unit, students should be able to:

- Backup a **non-rootvg** volume group

- Perform an incremental backup by inode

- Perform a backup by file name

- Restore a file system and an individual file

In this exercise, you back up and restore a file system as well as individual files. Some exercises may cover some options and techniques that may be in the student notes, but not necessarily covered in the instructor's presentation. Either refer to the unit notes or check the hints in the **Exercise Instructions with Hints** section.

Backup media: You do *not* use tapes or diskettes for this exercise. You create a new file system and use a file in it as your backup media. Everything in the exercise works the same whether you backup to tape or some other media.

Scenario: Existing and new file systems and files to be used for this exercise are:

- /**home**/**team***xx*/**dir2** - File system to be backed up. Created in the *Working with File Systems* exercise.

- /**home**/**bkup***xx* - New file system you create to use as the backup media.

- /**home**/**bkup***xx*/**weekly** - File used for level 0 full inode backup.

- /**home**/**bkup***xx*/**daily** - File used for level 1 incremental backup.

- /**home**/**bkup***xx*/**tardata** - File used for `tar` backups.

- /**home**/**team***xx*/**mybkup** - Directory used to demonstrate relative versus full path name backups and importance of mounting versus unmounting before restoring a backup.

Warning: There may be times in the exercise when you will be using the recursive remove command `rm -r`. Please ensure that you are in

your /**home**/**team***xx* directory and not the /**(root)** directory. Being in /**(root)** can cause some *Irrecoverable problems* that might only be fixed by reloading your system.

The **Exercise Instructions with Hints** section provides both the command line and SMIT methods. Select the one that is most appropriate for you.

Exercise Instructions

> **!** **Important**
>
> You are backing up the file system that you created in the *Working with File Systems* exercise; therefore, that exercise must have been completed successfully before continuing with this exercise. When referencing the file system you can use either the logical volume name, /**dev**/**fslv***xx* or the file system name, /**home**/**team***xx*/**dir2**.

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Use SMIT to backup a non-rootvg volume group

__ 1. Create a file system called /**home**/**savevg** in **rootvg** that holds the backup image and then mount it. Make sure the file system is in **rootvg**.

__ 2. Back up the **datavg** volume group to /**home**/**savevg**/**bkup**.

__ 3. Make sure the backup completes successfully before doing this step. Remove the **datavg** volume group. The volume group must not have any physical partitions allocated to logical volumes. In order to remove these logical volumes in the **datavg**, you must first make sure that they are all closed. In others words, the file systems must be unmounted and the paging spaces must be inactive. You need to unmount all mounted file systems in **datavg** first.

__ 4. Recover the volume group from your backup.

__ 5. Verify that the volume group is back.

__ 6. Examine the contents of the file /**tmp**/**vgdata**/**datavg**/**datavg.data**. What is the file used for?

Part 2 - Prepare file system for backup/restore

__ 7. Log in as **team*xx*** and **su** to **root**. Use **su** with out the dash so that you retain the **team*xx*** home directory.

__ 8. Create a new file system in **datavg** named /**home**/**bkup*xx***, where ***xx*** is your login team number. Make the file system one partition in size.

__ 9. Mount the new file system. Verify that it is mounted.

__ 10. Make sure the file system you created in the *Working with File Systems* exercise, /**home**/**team*xx***/**dir2** in logical volume /**dev**/**fslv*xx***, is mounted. If it isn't, mount it.

__ 11. Ensure that all files from the /**usr**/**samples** directory were copied into the /**home**/**team*xx***/**dir2** file system. You are backing up these files to the new file system, /**home**/**bkup*xx***, which you created in Step 8.

Part 3 - Backup and restore by inode (file system)

__ 12. The **bos.rte.archive** fileset contains the backup and restore utilities. Check that the **bos.rte.archive** fileset has been installed.

__ 13. You should be ready to back it up:

- Change directory to /**home**/**team***xx.*

- Unmount the /**home**/**team***xx*/**dir2** file system.

- Verify that the file system is unmounted. If you got an error unmounting the file system, it may be that you were residing in that directory. You must be out of the file system before you can unmount it. Remember, it is a good idea to unmount the file system before you back it up to ensure that there is no activity happening in the file system at the time of backup.

- Ensure that the mount point is empty. Do a listing on the directory. If it is empty, proceed to the next step. If not, ensure you are in your home directory, /**home**/**team***xx*, and delete the files in the directory /**home**/**team***xx*/**dir2**.

__ 14. Back up the entire file system in inode format. Make sure to update /**etc**/**dumpdates**. Your output media will be a file named **weekly** in the /**home**/**bkup***xx* file system.

__ 15. Display the table of contents of the /**home**/**bkup***xx*/**weekly** backup to ensure that all files in the /**home**/**team***xx*/**dir2** file system were backed up properly. How are the files listed? _____

__ 16. View /**etc**/**dumpdates** and analyze the contents.

Note

If there is more than one team on your system, you will be writing to /**etc**/**dumpdates** simultaneously. Analyze the information that relates to your logical volume name. You see the other team's logical volumes listed as well.

__ 17. Mount the /**home**/**team***xx*/**dir2** file system and simulate a daily change to the file named /**home**/**team***xx*/**dir2**/**samples**/**tcpip**/**resolv.conf**. Add your name in uppercase to the first line of the file.

___ 18. Now unmount the file system. Verify it is unmounted. Perform an incremental inode backup of **/home/team***xx***/dir2** to the file **/home/bkup***xx* **/daily**. It should backup just the changed file, **resolv.conf**. You are simulating the fact that you have a base backup in **/home/bkup***xx***/weekly** (analogous to the monthly backup explained in class) and an incremental backup in **/home/bkup***xx***/daily** (analogous to the daily backup explained in class).

___ 19. Display the table of contents of the **/home/bkup***xx***/daily** backup to ensure that just the changed file was backed up. Record the EXACT name of the file.

___ 20. View the contents of **/etc/dumpdates**. Analyze the contents.

> **Note**
>
> The next few steps show command line hints rather than SMIT screens because of the extra steps of removing files and destroying file systems, which is necessary to perform simulated recovery functions. You may continue to use the SMIT **F9** shellout feature to execute the crash procedures.

___ 21. Simulate a user accident and recover the lost file using the above backup:

Mount the file system. Change directory to **/home/team***xx***/dir2**. Remove the **samples/tcpip/resolv.conf** file. Check that it no longer exists.

___ 22. Before you start the restore, be sure you are in the directory **/home /team***xx***/dir2**. Why is this important? _____

You will see messages displayed before the restore takes place. When prompted to specify next volume #, type in **1**. When prompted to set owner/mode, type in **no**.

___ 23. Now, you perform a crash of the entire **/home/team***xx***/dir2** file system and then restore it using your backups. Ensure you are in the **/home/team***xx***/dir2** directory. Remove all files and directories in this file system. Check to see that they were all removed. Restore the file system and check to ensure all the files were restored. Which backup should you use first? _____

__ 24. The **restoresymtable** file is created or updated upon each restore when working with incremental inode backups. Do a long listing on this file to see that it exists. Remove the **restoresymtable**.

Note

The **restoresymtable** file keeps track of links and deleted files that were created between the backups. This file is only created when working with the **-r** restore option. The system does not know when you are finished restoring all your incremental inode backups, so it leaves you with the chore of cleaning up this control file. This file did not appear during the single file restore. This is because the **-r** option is not appropriate for a single file restore. The **-x** option is the option of choice when restoring a single file and the unusual problems of restoring links and deleted files correctly is not an issue.

The next three steps demonstrate the advantage of backing up by relative path name, by restoring into a directory that is different from where the files originally resided.

__ 25. Create a new directory named /**home**/**team***xx*/**mybkup**. Change and verify that you are in the new directory.

__ 26. Restore the contents of /**home**/**bkup***xx*/**weekly** into your new directory /**home**/**team***xx*/**mybkup**. Don't forget to use the verbose option so you can see what the **restore** command is doing.

__ 27. Check the directory /**home**/**team***xx*/**mybkup**. It should contain the contents of the **weekly** backup. You can see that backing up files by relative path name allows you to restore them back to ANY directory.

Part 4 - Backup and restore by name

___ 28. Make sure the /**home**/**team***xx*/**dir2** file system is mounted.

  • Why would you want to have the file system mounted in order to back it up by name? _____

___ 29. Back up the file system by name using the `backup` command. Also, use the full path name to reference the file system. Once again, you use /**home**/**bkup***xx*/**weekly** as your output media instead of a tape.

___ 30. List the table of contents to verify the backup was successful.

  • How were the files listed? _____

___ 31. Let's take a look at the difference between relative and full path backups by restoring by relative path name. First, `cd` to /**home**/**team***xx*/**mybkup** directory and delete all the files. Ensure the directory is empty.

___ 32. The goal is to restore the files from /**home**/**bkup***xx*/**weekly** into the /**home**/**team***xx*/**mybkup** directory. Restore the files and note the way the files are listed in the output of the `restore` command. Take a look at the contents of the /**home** /**team***xx*/**mybkup** directory.

  • During restore where the filenames full or relative path? _____
  • Does it contain any files? _____

___ 33. Back up the file system by name, but use a relative path name. Make sure you are in /**home**/**team***xx*/**dir2**. List the contents of **weekly**. The file names should be in a **./filename** (relative path name) format.

___ 34. Now, you should be able to restore these files into the /**home**/**team***xx*/**mybkup** directory. Change to the /**home**/**team***xx*/**mybkup** directory. Perform the restore.

___ 35. List the contents of the /**home**/**team***xx*/**mybkup** directory. All of the files should be listed.

Part 5 - (Optional)

The next eight steps are included to show what happens if you don't remember to mount a file system before performing a restore. This is a very common error that can cause a lot of headaches. Hopefully, by intentionally making this mistake in class, you can avoid it back at work or be able to identify the problem immediately and resolve it.

__ 36. The **/home/team*xx*/dir2** file system should still be mounted from the previous restore. Once again, delete all the files and directories in the file system. (If you clean out the file system now, it is much easier to see if your restore is working properly later.) Double check to make sure the files are removed.

__ 37. Unmount the file system and verify that it is unmounted.

__ 38. Change to the directory mount point and perform the restore.

__ 39. Mount the file system and look at the contents to make sure that the restore worked.

- Does the file system contain any files?_____

- Why? _____

__ 40. Unmount the file system and list the files in the mount point directory. You see that this is where your files went when you performed the restore.

__ 41. Clean up the mount point by deleting all the files in the **/home/team*xx*/dir2** directory.

__ 42. Mount the file system. Verify it was mounted.

__ 43. Now that you have the file system mounted, try the restore again. List the files after you are through with the restore.

End of exercise

Exercise 14. (Optional) Using `tar` and `cpio`

What this exercise is about

The purpose of this exercise is to familiarize the students with the UNIX commands, **tar** and **cpio**.

What you should be able to do

At the end of the lab, you should be able to:

- Use **tar** to perform a backup and a restore
- Use **cpio** to perform a backup and a restore

In this exercise you back up files and directories using **tar** and then **cpio**. The backup media is the hard drive.

The **Exercise Instructions with Hints** section provides the command line commands for this activity. SMIT does not support backups using **tar** or **cpio**. You must perform these steps from the command line.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Using `tar`

__ 1. Before getting started, perform some housekeeping. Delete all of the files in the /**home**/**team***xx*/**mybkup** directory.

__ 2. Make sure that the /**home**/**team***xx*/**dir2** file system is mounted. `tar` does not back up file systems unless they are mounted. If it is not mounted, mount it.

__ 3. Change directory to the file system and create a directory called **myjunk**. In that directory, create four zero-length files named **file1**, **file2**, **file3**, and **file4**.

__ 4. Back up the file system using the `tar` command to the file /**home**/**bkup***xx*/**tardata** using relative path names. List the contents of **tardata** to ensure all files are backed up.

__ 5. Since the backup was done using relative path names, restore them to a different directory. Use `tar` to restore the contents of the **tardata** directory to the /**home**/**teamxx**/**mybkup** directory. Verify that all files were restored.

__ 6. Change your directory to /**home**/**team***xx*/**mybkup**. Remove all the files in /**home**/**team***xx*/**mybkup**. Verify that it is empty. Use `tar` to extract only the files contained in the **myjunk** directory in **tardata** and load these files to the /**home**/**team***xx*/**mybkup** directory. List the files in the /**home**/**team***xx*/**mybkup** directory.

__ 7. You have been using relative path names up to this point with `tar`. Specify a full path name and `tar` backs it up in full path name format. Backup the contents of the file system to **tardata** directory using full path names.

___ 8. Check the contents of **tardata**. All file names should be referenced by full path name. If you restored the files, they would restore back to the same directory that you copied them from.

Part 2 - Using `cpio` (Optional)

In this section, you will back up and restore the same files again but this time using `cpio`.

___ 9. Change directory into /**home**/**team**_xx_/**dir2**/**myjunk** and make sure your files are there.

___ 10. Back up the file system using the `cpio` command to the file /**home**/**bkup**_xx_/**cpiodata** using a relative path name. List the contents of **cpiodata** to ensure all files were backed up.

___ 11. Since this backup was done using a relative path names, restore them, using `cpio`, to the directory /**home**/**team**_xx_/**mybkup**. FIRST remove all the files from the /**home**/**team**_xx_/**mkbkup** directory.

___ 12. Change your directory to /**home**/**team**_xx_/**mybkup**. Remove all the files in /**home**/**team**_xx_/**mybkup**. Verify that it is empty. Use `cpio` to extract only the files contained in the **myjunk** directory in **cpiodata** and load these files to the /**home**/**team**_xx_/**mybkup** directory. List the files in the /**home**/**team**_xx_/**mybkup** directory.

___ 13. You have been using relative path names up to this point with `cpio`. Specify a full path name with the `find` command and `cpio` backs it up with a full path name format. Back up the contents of the file system to **cpiodata** using full path names.

___ 14. Check the contents of **cpiodata**. All the file names should be referenced by full path names. If you restored the files, they would restore back to the same directory that you copied them from.

End of exercise

Exercise 15. Security files

What this exercise is about

The purpose of this exercise is to gain familiarity with security-related files.

What you should be able to do

After completing this exercise, students should be able to:

- Execute commands that identify group membership
- Identify default system groups
- Display contents of security logs
- Work with the SUID and sticky bits

Introduction

During this exercise, you are given an opportunity to look at some of the files discussed in the unit. You also have a chance to work with the SUID and sticky bits.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Security control files

1. Log in as **teamxx** and **su** to **root**. Display a listing of the system-defined groups. Take a moment to review the members of each group.

__ 2. Exit SMIT if you are in SMIT, and display the groups of which **root** is a member. Next, without logging out, display the groups of which your **teamxx** login is a member.

__ 3. Display the contents of the file that keeps track of the successful and failed **su** attempts.

   • How can you determine the failed attempts? _____

__ 4. When a user logs in successfully, the **login** program writes the associated information in the two files **/var/adm/wtmp** and **/etc/utmp**. Using the **who** command, examine the contents of these two files.

__ 5. Display in reverse chronological order, all previous logins and logouts recorded in **/var/adm/wtmp** for your login user name, **teamxx**, and **root**.

__ 6. Check to see if there were any invalid login attempts on your system due to an incorrect login name or password.

   • How can you tell? _____

Part 2 - SUID and sticky bit

___ 7. Create a listing of all SUID programs on the system in a file called **allsuids**.
Page through **allsuids** to see all the programs that are SUID programs. Look for
some of the commands that you have already learned and executed.

___ 8. As an ordinary user, you have been executing the **su** command to switch user to
root to perform privileged tasks. The **su** program has the SUID bit turned on. Do a
long listing on /**usr**/**bin**/**su** to see the SUID bit.

___ 9. Turn the SUID bit off. Verify that the bit is turned off.

___ 10. Exit back to your **teamxx** login shell and try to **su** to **root**.

   • Can you? _____

___ 11. Since you cannot **su** to **root** to turn the SUID bit back on, login over yourself as **root**
and set SUID on the program /**usr**/**bin**/**su**. Verify that the SUID bit is turned on.

___ 12. Log in over yourself as **teamxx** and **su** to **root**.

___ 13. Do a long listing on the /**tmp** directory. Locate the sticky bit that is set on the
directory.

___ 14. Exit back to your **teamxx** login shell. Ensure you are in your **teamxx** home directory.
Create a subdirectory in your home directory named **stickydir**.
Change the bits on the **stickydir** directory for full access by user, group, and others
with the sticky bit turned on. Verify that the change was made.

___ 15. Create a zero-length file in the **stickydir** directory named **sticky1**.

___ 16. Now, **su** to a **teamyy** user name that is not being used on your system.
Check with any other teams that may be sharing your system. The existing user
names should be **team01 - team05** with passwords the same as the user name.

   As this other **teamyy** user, try to first add and then remove a file named **sticky2**.

   • Can you do it? _____

-

   As this other **teamyy** user, try and remove the **teamxx** file named **sticky1**.

   - Can you do it? _____

     -

__ 17. Exit back to your **teamxx** login user name.

End of exercise

Exercise 16. User administration

What this exercise is about

This exercise introduces you to the management and administration of
users and groups.

What you should be able to do

After completing this exercise, students should be able to:

- Create a user with password restrictions

- Implement and test user login controls

- Remove a user from the system

- Create a group

- Execute `pwdadm` to change another user's password

- Invoke user communication commands

Introduction

This exercise has two parts. Be sure to do only the currently assigned
part of the exercise.

This exercise concentrates on the SMIT interface for creating and
maintaining users and groups.

The exercise instructions direct you to create users **usera, userb** and
userc. If two students are sharing an AIX system, and performing this
exercise separately, create users **useraxx, userbxx, usercxx** where
xx represents the student's initials. This will ensure unique user IDs.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1: User administration

__ 1. Log in to the system as **root**. Using SMIT, list the current users defined on your system.

__ 2. Create a new user named **usera** with the following restrictions:

  - Three-day password expiration warning
  - Two passwords before reuse
  - One week between expiration and lockout
  - Prevent other users from switching to **usera**

__ 3. List the user attributes. Exit SMIT and look at the **/etc/security/user** file. Compare the defaults in this file with the attributes listed for **usera**.

__ 4. To test the new user, log off and log in as **usera**.

  - Could you log in? _____
  - Why? _____

__ 5. Log in as **root** and page through the **/etc/passwd** file.

  - What is in the password field for **usera**? _____

  - What does this mean? _____

__ 6. Assign a password to **usera**. Display the **/etc/passwd** file.

  - What is in the password field for **usera?** _____

       • What does this mean? _____

__ 7. Do a long listing of all files including hidden files in **usera's** home directory.

       • What files were created? _____

__ 8. Test the new user ID. Log off and log in as **usera**. When prompted to change the password, type in the **same** password assigned in step 6 to test the reuse restriction set on the user ID from step 2. After you get the reuse error message, proceed to change **usera's** password to something different. After successfully logging in as **usera**, log out.

__ 9. Suppose **usera** is going on an extended vacation. Log in as **root** and using SMIT, lock **usera's** login account.

__ 10. Exit SMIT and test the account lock by attempting to log in as **usera**. You should not be able to. If you could, redo step 9 and test it again.

__ 11. Log in as **root** and try to **su** to **usera**. Change to **usera**'s environment at the same time.

       • Could you? _____

       • Why? _____

    Kill the subshell and return to **root**. Unlock **usera's** account.

__ 12. Some users may try to guess other user's passwords. To help prevent illegal logins, set the number of failed login attempts to two for **usera**. Exit SMIT and log out.

__ 13. Test the change by trying to log in as **usera** and entering an incorrect password three times. On the fourth attempt, enter the correct password. If you are in a Windows session, exit and execute this instruction from an ASCII command line.

__ 14. Log in as root and reset the failed login count for usera.

__ 15. Attempt to login at usera with the correct password. Was it successful?

__ 16. Log in as **root** and change the failed login attempts limit to **0** for **usera** to disable the failed login check.

Part 2 - Group administration

__ 17. As your company grows you may need to add additional system administrators to perform certain administrative tasks. As **root**, create a user named **helper** that assists you in user and group administration only, by being a member of the **security** group. Add **security** to **helper's** group set, not the primary group. Make the password the same as the user name.

__ 18. Exit SMIT. Page through the **/etc/group** file. Locate **security** and ensure that **helper** is listed there.

__ 19. Log out and back in as **helper**. Execute the **groups** command to ensure that you belong to two groups, **staff** and **security**. As a new system administrator, add a new group called **budget**. List all groups to verify the addition of the new group.

__ 20. Now add two new users, **userb** and **userc** making both members of **budget** as their group set.

__ 21. Exit SMIT. Assign the passwords for **userb** and **userc**. Make the password for each user the same as the user name.

__ 22. Log off and back in as **userb**. (Because this is **userb's** first login, you are prompted to change the password. Simply keep it the same. You should be familiar with what to do; therefore, the prompts are not shown). Change to the **budget** group and create a file named **report**. Add group write permission to **report**. Do a long listing on the file to verify that the group access is the **budget** group. Return to the default group.

- Other than the command you used to change groups, what other command could be used? _____

__ 23. Let's test to see if a member of the **budget** group can edit the file **report**. Log out and back in as **userc**. As in the step above, this is **userc's** first time to log in. Change the password accordingly. Edit **report** and add your name. Log out.

- Did **userc** have to issue any special command before editing the file? _____

- Why? _____

Part 3 - Customizing the default .profile file

__ 24. When a user is created, the default **.profile** file is copied into the user's home directory. As a system administrator, login, **su** to root, and edit the default **.profile** file so that all newly created users have by default the EDITOR variable automatically set up to **/usr/bin/vi** and their primary prompt string reflects the user's current directory. (Hint: remember that the PS1 variable is for the primary prompt string and the PWD variable contains the value of the current directory.)

> 📝 **Note**
>
> You may want to go back and remove the PS1 variable assignment from the **/etc/security/.profile** file so the **$** becomes the primary prompt string.

__ 25. Create a user named **userd**. Assign a password to **userd**. Log out and back in as **userd**. You should see the current directory listed as your prompt. Next display the value of the EDITOR variable. If the results are not what you expected, repeat the previous step and try again.

Part 4 - Removing users

__ 26. Log in as **root**. Before you remove **userb** from   the system, locate the stanza for **userb** in /**etc**/**security**/**passwd**.

__ 27. Remove **userb** from the system. Take the default to the option **Remove AUTHENTICATION** which is **yes**.

 • What is this doing? _____

__ 28. Page through the /**etc**/**security**/**passwd** file to ensure that the stanza for **userb** was removed.

__ 29. When a user is removed from the system, the user's home directory and files owned by the user are NOT removed. Verify that **userb's** home directory and files still exist. Remove all files and directories associated with **userb**.

Part 5 - Communicating with users

__ 30. As **root**, edit /**etc**/**motd** and add to the file in all uppercase **"TODAY IS USERA'S BIRTHDAY. SURPRISE CAKE AT 11:00."**First, check that the user access permissions on the file have write permission. If not, set write for "user."

__ 31. Display the message by logging out and back in as **usera**.

__ 32. Now create a zero-length hidden file in **usera's** home directory named **.hushlogin**. You want everyone that logs in to see the output of /**etc**/**motd** except **usera**. Log out and back in as **usera**. The /**etc**/**motd** file should not have been displayed.

__ 33. As **root**, create a file named **newsitem** in the /**var**/**news** directory. Type in a few lines. Log out and back in as **teamxx** and read the news.

__ 34. To do this step you must have more than one user on your local system. If you are the only person on your system and you have two terminals, log in on both terminals using two different **teamxx** IDs. Perform the exercise from one terminal and look for the message on the other terminal. As **root**, send a note to all users on the system that the system shuts down in 30 minutes.

Part 6 - Examine the security set up

__ 35. As **root**, examine any of the security files you have not yet seen.

Part 7 - Customizing the login herald

__ 36. If you are sharing your machine with other students, you need to work together to configure the new login prompt. ONLY ONE PERSON PER MACHINE CAN PERFORM THIS STEP.

You can customize the login prompt that appears on an individual terminal or customize it so that all terminals use the same login herald depending on what stanza you change in **/etc/security/login.cfg**. In this step, you set up a global default herald.

The herald should read:

```
.Your Company Name
 Unauthorized users will be prosecuted.
 login:
```

First, make a backup of the **/etc/security/login.cfg** file. If you corrupt this file, you are not able to log in again.

__ 37. Edit the **default** stanza in **/etc/security/login.cfg** and add the herald line.

Tip! - Do not use <**Enter**> at what looks like the end of the line. Let **vi** wrap the line. The **\r** and **\n** are escape sequences that will signal to the <**RETURN**> and <**NEW LINE**> for you. Note that for some terminal emulations, the \r <carriage return> is displayed as a literal. On those emulations, the **\n** <new line> handles both the carriage return and new line feed.

 When finished, save the file and log out.

__ 38. Check to see if the login prompt is what you expect. You must be using an ascii interface to see the effect of the change.

For students using a local console: If you are using an ASCII screen, your new herald should be displayed. If you are using CDE, you cannot see your changes unless you select the **Option** button and selection **Command Line**. If you don't see your new herald, then check your entry in **/etc/security/login.cfg**.

For student using remote access, attempt a new remote connection. For example you might use a telnet protocol either via a telnet command or via PuTTY.

End of exercise

Exercise 17. Scheduling

What this exercise is about

The purpose of this exercise is to give you the opportunity to use the scheduling facilities of `at, batch,` and `crontab.` These tools are very important for balancing a system for off-peak usage as well as scheduling periodic tasks.

What you should be able to do

After completing this exercise, students should be able to:

- Use `at` to schedule one-time-run jobs at specific times
- Use `batch` to submit jobs into a queueing facility
- Use **crontab** files to schedule repetitive jobs at specific times

Introduction

You can issue a command by entering it on the command line. It can run in the foreground or the background. A command can also be issued with `nohup` allowing you to log off and go home while the command is still running. The scheduling utilities covered in this exercise allow you to schedule commands to run after you have left for the day.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Using at

__ 1. Log in as **teamxx**. Submit a single **at** job that immediately echoes the message "Running an **at** command." and then echoes another message "**This is it!**" Check your mail. Notice the shell script name assigned to your job.

__ 2. Repeat the above instruction, but this time force your output to your screen. (Suggestion: Use the **tty** command to get your device name.)

__ 3. Experiment with the time specifications of **next week** and **next month**. After entering jobs to be executed "next week" and "next month," list the **at** jobs waiting to run and check to see whether the jobs you just submitted appear in the list.

__ 4. Let's take a look at the environment when an **at** job executes. Change directory to /**etc**. Submit an **at** job that returns the current directory to your screen and have it execute in one minute. Now change directory to /**var**/**adm** and repeat the **at** request. Change directory to the /**(root)** directory, list the **at** queued jobs, then wait for the execution of your two jobs.

   • What can you deduce from the results you obtained in this exercise step?

   _____

__ 5. You should now have several **at** jobs scheduled. **su** to **root** to give yourself proper permission for viewing these jobs. Change to the directory /**var**/**spool**/**cron**/**atjobs**. Examine some of the files in this directory and notice the additional statements that are created for the **at** job besides the ones that the user entered.

Note

pg won't work very well because lines get truncated. For one thing, you should see that the directory for the **at** job does indeed get set specifically within the **at** job itself. If the content of a file looks disjointed, it is because nulls are used as field delimiters within the file. When you have finished, return to your **teamxx** ID.

__ 6. As **teamxx**, list your **at** jobs. Use the appropriate option to cancel several of them.

Note

You need to specify the whole job name.

__ 7. Switch to **root** to gain proper permission to view the security files.

Page the **/var/adm/cron/at.deny** file. Notice that there are no entries.

• What security implications does this have? _____

For this exercise we won't modify this file, but if we were to, we would put one userid on each line to specify each user for whom we wanted to deny access. Notice, also, that there is no **at.allow** file. Exit the **root** subshell and return to **teamxx**.

Part 2 - Using batch

__ 8. As **teamxx**, submit a job to **batch** that outputs the result of the **date** command to your screen after waiting 60 seconds (**Hint**: Use the command **sleep 60**). Remember, it is submitted exactly like an **at** job but without a date and time because the time at which the job will be run is determined by system load. Unless your system is very busy, you should see the output from your **batch** job quite soon. Wait for your job to run.

Part 3 - Using crontab Files

__ 9. Switch to **root**. Switch to the /**var**/**adm**/**cron** directory. Display the contents of the **cron.deny** file. Also, look in the directory to see if a **cron.allow** file exists. The expected result is that **cron.deny** exists, but contains no user names, and that **cron.allow** does not exist.

__ 10. Return to **teamxx** and change to your home directory.

__ 11. Create a zero length file called **datefile** in the /**tmp** directory.

__ 12. In your home directory, create a file called **cron00** (which will be used as a **crontab** file) which specifies that the output of the **date** command will be appended (using the **>>** operator) to the file /**tmp**/**datefile** every minute from now on. Remember to use full path names for commands used in **crontab** files. Remember, there can be NO blank lines in the file including lines created by pressing **Enter** after the last entry.

__ 13. Place your **crontab** file in the **crontabs** directory via the **crontab** command. Then, use the appropriate option with **crontab** to look at the **crontab** entry that you created.

__ 14. Use the **-f** option of the **tail** command to check for additions to the file /**tmp**/**datefile**. If you have done the last few steps correctly, you should see an addition to the file in 1 minute, another in 2 minutes, and so on. Wait to see 3 or 4 additions to the file, then terminate the **tail -f** session.

__ 15. As **teamxx**, use the appropriate option of the **crontab** command to remove your current **crontab** file. Verify that it has been removed.

Part 4 - Optional

The remaining exercise steps are *optional*. Complete them if there is time available in this lab session and if you would like more practice working with AIX scheduling facilities.

___ 16. Continuing as **teamxx, cd** back to your home directory and create a shell script called **sizechk** to:

   ___ a. Echo the message `Active files over 2 blocks in /home`.

   ___ b. Display the date and time.

   ___ c. Display the names of all files that are larger than 2 blocks in /**home** and that have been modified within the last 2 days.

> 💡 **Hint**
>
> Use the **find** command, redirecting error messages to /**dev**/**null)**.

   ___ d. Echo `Done`.

   ___ e. Make sure all output goes to the *screen*.

   ___ f. Make the script *executable*.

___ 17. Test your script. If you don't get any output, change the blocksize to **1.**

___ 18. Run **sizechk** as an **at** job without redirecting output here (let the script do it). Make sure that your **at** job runs and that your output goes to your screen.

___ 19. Verify the system date and time. Create a file called **cron01** that causes **sizechk** to be invoked every minute for the next 5 minutes for today only. Remember to use full path names for commands used in **crontab** files. Remember, there can be NO blank lines in the file including lines created by pressing **Enter** after the last entry.

___ 20. Place your **crontab** file in the **crontabs** directory via the **crontab** command. Wait for the next 1 minute interval and check that your **sizechk** script did indeed get invoked by **cron** and that it executed successfully. While you are waiting, use the appropriate option with **crontab** to look at the **crontab** entry that you created.

__ 21. Switch user to **root**. Change directory to /**var**/**spool**/**cron**/**crontabs** and look at the files that are in this directory. Your **cron01** should be there with the name **teamxx**. Examine the contents of several of the files. They may contain statements that are commented and could be uncommented and/or modified based on specific installation requirements. They provide a starting point for the execution of some administrative commands in different areas.

__ 22. Return to **teamxx**. Edit the current **crontab** file by adding to the existing **crontab** data a line that executes the `sizechk` script on the hour, every hour of every day except Sunday. Wait a moment, and then verify that this line has been added to your **crontab**. Once you are done, remove this particular entry so it does not drive you crazy the rest of the week. Verify that it was removed.

__ 23. Switch to **root**. Examine the file /**etc**/**inittab** and notice how the `cron` daemon actually gets started.

- `cron` will respawn if it is not running. Why is this important?

  _____

  Return to your **teamxx** ID.

End of exercise

Exercise 18. Printers and queues

What this exercise is about

This exercise is designed to provide the student with the opportunity to configure and manage printers and queues using AIX Print Spooling.

What you should be able to do

After completing this exercise, students should be able to:

- Add a printer using SMIT
- Add a queue using SMIT
- Make changes to existing queues using SMIT
- Install printer support software if needed

Introduction

This exercise is designed for you to become familiar with adding a printer and a queue. In the area of printing, there are many commands that can be used to do the same thing. In many of these cases, we have provided only one command method and the other method takes you through SMIT. If you are already comfortable with certain UNIX commands for handling print activities, like submitting a print job, please feel free to use that command. Some of the functions provided by AIX can only be accessed through the command shown or through SMIT.

Printer configurations vary widely in the classrooms. Check with your instructor for specific instruction for your site.

If more than one student is sharing an AIX system, but performing this exercise separately, be sure that the queue names are unique. For example, name one of the queues *xx*draft where *xx* is the student's initials. Wherever you see **draft** in the exercise instructions, use your unique name. Wherever you see the queue name **quality**, use a queue name such as *xx*quality where the *xx* is the student's initials.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Add a local printer and a queue

__ 1. If your AIX system has printer port(s) available, then define a local printer (**this Part 1**) and then proceed to Part 3.

If your AIX system does not have printer port(s) available (possibly in a remote LPAR environment), then create a file device queue instead (**Part 2**) and then proceed to Part 3.

__ 2. Log in and **su** to **root**. Check that the AIX Print Spooling system is activated. Using SMIT, configure your printer with a local queue called **quality**.

Note

If you don't have the correct software support you will be prompted to install the software first before adding the printer and the queue. If this is the case, go to the *Part 2 - Installing Printer Support Software*.

__ 3. Using SMIT, add a second queue to the printer and name it **draft**.

__ 4. Exit SMIT and display the status of your print queues.

Part 2 - Add a file device queue

This part provides an alternative to working with a printer device in partitioned machine environments where there are no serial or parallel port that can be used for a printer definition.

__ 5. Log in and **su** to root.

__ 6. Using SMIT, configure an ASCII queue (called **quality**) with an attachment type of file and a printer type of other (generic printer). The make the requested /dev device name a value of **null**.

Any "print" jobs sent to this queue (if in a READY status) is sent to /dev/null. You disable the queues, thus simulating a printer problem. In that state you are able to practice the same print queue management procedures as would be used with any print queue.

__ 7. Using SMIT, add a second queue name it **draft**.

Use the exact same procedure as described in the previous step.

__ 8. Exit SMIT and display the status of your print queues.

__ 9. Bring down both the **quality** and **draft** queues. Check the status of your queues to be sure that both queues are down.

Part 3 - Check the queue

__ 10. Examine the /**etc**/**qconfig** file to confirm the addition of the new queue and device stanzas. Notice the location of the **quality** queue relative to the **draft** queue.

  • Which queue is listed first? _____

__ 11. Using the `qchk` command, check the status of your newly created queues. They should be marked READY.

  • Which queue is listed first? _____

  • Which queue do you think is the default queue? _____

__ 12. Using SMIT, make the **draft** queue the system default queue.

__ 13. Exit out of SMIT and check the status and order of your queues.

__ 14. Create a file that can be used as a print test file. Put the file in the /**tmp** directory and name the file **print*xx***, where ***xx*** represents your initials. Put about 10 lines of data in it.

__ 15. Test your queues and printer by sending the **print*xx*** file you created in the step above to both the **draft** queue and to the **quality** queue.

Part 4 - Change the characteristics of a queue

If you are working with a remote queue, you are not able to set default print jobs characteristics or the print queue discipline which are for local print queue management. If that is your situation, then skip the next two steps.

__ 16. If you do not have a physical printer in the lab, you are not able to see the effects of your changed job attributes, but it is still useful to know where to set these defaults.

Using SMIT, change the attributes of the **quality** queue by adjusting some printer characteristics. These may be different depending on the printer used. Try making some changes. Basically, change the look of the printed output. Here is a list of some changes you might try (depending on your printer):

- Use double spacing
- Set a top margin of 20 lines
- Specify 50 lines per page
- Use double high printing
- Provide a separator page at the head of the job

__ 17. If you have physical printers, send the **print*xx*** file to the **quality** queue to ensure that the changes were successfully made to the queue.

__ 18. Take the **draft** queue down, if not already down.

__ 19. Change the queue characteristics of the **draft** queue so that its discipline is set to **sjn**, shortest job next. Check the status of the queues to verify that the change was made successfully.

__ 20. Send the file /**etc**/**security**/**user** to the **draft** queue and check to see that it is in the queue.

Next, send the /**tmp**/**printxx** file you created in the previous exercise to the **draft** queue and again display the job queues.

- Which job is scheduled to run first after the queue is brought back up?
  _____

- Why? _____

Part 5 - Manage jobs in queues

__ 21. Bring down the **quality** queue, if not already down. Check the status of your queues to be sure that both queues are down.

__ 22. Send the files **/etc/qconfig** and **/etc/filesystems** to the **quality** queue and send the file **/etc/motd** to the **draft** queue.

__ 23. Check the order of the print jobs waiting in the two queues. They should all have the same priority value (Pri). In the **quality** queue, the **/etc/filesystems** file should be behind the **/etc/qconfig** file, because it was submitted later.

Change the print priority of the **/etc/filesystems** job to 25 so that it becomes the first print job scheduled for the **quality** queue.

__ 24. Let us assume that you really wanted the **/etc/filesystems** printed with the characteristics associated with the **draft** queue. Move the **/etc/filesystems** print job to the **draft** queue.

__ 25. You realize that you already printed **/etc/security/user** and you don't need to do it again. Cancel the job.

__ 26. You want to print all the jobs currently in your queues except for the **/etc/filesystems** job, which you want to print at a later time. Put a hold on the **/etc/filesystems** job, verify the job is being held, and then bring up your two queues.

__ 27. Check to see all jobs have printed successfully. Then, release the **/etc/filesystems** job so it too can print.

Part 6 - Add a remote print queue (optional)

__ 28. Work with another team to do remote printing. One team acts as the print server and the other will act as the print client. Record, below, the IP address of the other team's AIX system (not your own).

_____

__ 29. Each team log in and **su** to root

__ 30. On both platforms, add a name resolution entry to you local hosts file for the other team's machine if not already resolvable.

__ 31. On the server platform, using SMIT, add print access for the client system and start the print server subsystem (**lpd** daemon).

__ 32. On the client system, using SMIT, configure a remote print queue (called **remote**) with your server systems hostname as the server with and a server print queue name of **quality**. Define it with a timeout value of 1 minute.

__ 33. On the client system, send the files /**etc**/**motd** and /**etc**/**filesystems** to the **remote** queue.

__ 34. On the client system, check to see the status of the print jobs.

__ 35. On the server, see if the remote print jobs are in the **quality** queue.

__ 36. Bring up your two local queues.

End of exercise

Optional Exercise

__ 37. As the **root** user, run the script /**home**/**workshop**/**lab6**. This script creates problems with the printing subsystem. Try printing a file. Look at the error message and check the file that is being referenced. Try to fix the problem and try printing a file again. If the problem originally presented was fixed, a new error message is generated. Make sure the resource mentioned in the error message is working and then try printing a file again.

End of exercise

Exercise 19. Networking

What this exercise is about

This exercise provides an opportunity to configure and use TCP/IP.

What you should be able to do

After completing this exercise, students should be able to:

- Configure TCP/IP
- Test TCP/IP connectivity
- Use `telnet` and `ftp` to communicate on the network

Introduction

TCP/IP has been configured on your systems prior to class in order to support the NIM-based installation/migration exercise and to provide remote access to the lab systems. In this exercise, you record the existing network configuration and then you remove that configuration. At that point you only have access to the system from the system console (either a local terminal or via an HMC virtual console). From the console, you configure TCP/IP using the same values as it had before.

Exercise 19. Networking 19-1

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

If there are multiple interfaces on your system, your instructor identifies which interface to use for this exercise. If you are in an environment where the AIX system is accessed remotely, be sure to not deconfigure the interface used for that purpose.

Part 1 - Deconfigure TCP/IP

__ 1. If you are using a local non-partitioned system, login to the locally attached system console as **teamxx** and **su** to **root**. Then go to step 6.

__ 2. If you are using a remote partitioned system, access your system's HMC by starting a Web browser and using the HMC's IP address as the URL. If you do not have this IP address, ask your instructor.

__ 3. Start the Hardware Management Console application by clicking the Launch link. Log into your system HMC as **hscroot**. and password **abc1234.** Locate your machine and the logical partition which you are assigned.

__ 4. Start a virtual console window for your assigned partition. This acts as your system console during the exercise.

__ 5. Log in to your assigned partition as **teamxx** and **su** to **root**. This acts as your system console during the exercise.

__ 6. Collect the current network configuration information.

IP address: _____

IP address name resolution: _____

network mask: _____

default gateway: _____

__ 7. Identify a partner team with whom you validate network connectivity (this may have been assigned by your instructor or this could be left to you to work out with other

students). Exchange IP address and hostname information with that partner team. Record their configuration information below:

IP address: _____

IP address name resolution: _____

___ 8. `ping` your partner team's system to verify this currently works.

___ 9. Detach both the en0 and et0 interfaces.

___ 10. Remove your network interface (en0) and network adapter (ent0) from the ODM.

___ 11. Set your hostname to a null string and rename /**etc/hosts** to /**etc/hosts.bak**

___ 12. Run the configuration manager so that it rebuilds the adapter and interface you just deleted. Once this is complete, you are ready to proceed with the TCP/IP configuration.

___ 13. `ping` your partner team's system to verify that you cannot communicate.

___ 14. Display the network interfaces to show that the interface is not configured.

Part 2 - Configure TCP/IP

___ 15. Configure the network interface for your network using SMIT, TCP/IP, Minimum Configuration and Startup.

___ 16. Verify that the above action automatically set the hostname and the name resolution for your own system.

___ 17. Add an entry for your partner system in the /**etc/hosts** file. You may use SMIT or `vi`.

Part 3 - Testing the configuration

___ 18. Use the network command, `ping`, to test connectivity to your default gateway by IP address. If you can not get a response, check your en0 address and mask for correctness.

___ 19. Use the network command, `ping`, to test connectivity to your partner system. `ping` by IP address and then by host name. If you can not get a response back display the contents of your /**etc/hosts** file to ensure you have an entry for the system and it is correct. Ensure that the system you are trying to reach has completed the configuration steps.

___ 20. Execute the **host** command for the hostname of your partner system and, again, for the IP addresses of your partner system.

___ 21. Execute the **netstat -i** command to display the status of the communication adapter(s) on your system.

Part 4 - Using `telnet`

__ 22. Select a system on the network to be your partner. **telnet** to your partner's system and log in as root. Execute the `hostname` command to show that you are logged in to another system.

__ 23. While remotely logged in to your partner's system, create a file named **sys*x*file** where **x** is the number of your system. You use this file later in this exercise. List the contents of **root's** directory to verify that your file exists.

__ 24. Close the connection and verify that you are back on your local system by executing **hostname**. You should see your host name.

Part 5 - Using `ftp`

__ 25. Transfer the file, **sys*x*file**, from your partner's system to your system renaming it to **ftpdoc**. When prompted to log in, log in as **root**.

__ 26. Change to your **team*xx*'s** home directory ON YOUR system and list its contents. Pick out a small file that you can transfer to your partner system's /**home**/**team*xx*** directory. Since you are **root**, you should not have any problems with permissions. You may want to ask your partner which **team*xx*** home directory to use.

__ 27. End the file transfer session and verify that you are back on your local system.

End of exercise

Appendix A. Optional exercise: AIX 5L V5.3 installation

What this exercise is about

This exercise provides an opportunity to do an installation of the base operating system of AIX 5L V5.3. The type of installation is a complete overwrite installation with all the default settings.

What you should be able to do

At the end of the lab, you should be able to:

- Install the AIX 5L V5.3 operating system

Introduction

This exercise is designed to give you experience in installing a system as if you had just received a new machine without anything on it. You should be using the same type of distribution media you would get from IBM.

If you have more than one student sharing a system (all systems have a minimum of two terminals attached to them), then only one person can actually perform these steps. All other students on that system should observe while the steps are being done.

Requirements

- A local system capable of running AIX 5L V5.3 with a CD-ROM drive attached to it and at least 128 MB of memory and 2.2 GB of physical disk space

- Installation media (CD)

- An ASCII terminal connected to one of the built-in serial ports on the system or a graphics display station directly attached to the system that has a CD-ROM drive attached to it.

Exercise instructions

Preface

There is only one version of these instructions available; there is not a separate section "with Hints" as the other exercises have. All instructions are included.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

__ 1. If your system is already on, log in as **root**. Then, shut down the system.

- Console login: root's Password: **ibmaix**

- **# shutdown -F**

- When you see the `Halt Completed` message on the console, shutdown is complete. The system then shuts itself off.

__ 2. Turn on all attached external devices, such as terminals, CD-ROM drives, tape drives, monitors, and external disk drives. DO NOT TURN THE SYSTEM UNIT ON YET.

__ 3. Insert the installation media into the CD-ROM drive.

Place the first Installation CD in the CD-ROM drawer and push the drawer in.

__ 4. If you are using a graphics display, skip to the next step. If you are using an ASCII terminal, be sure the communications options on the terminal are set as follows:

Line Speed (baud rate) = 9600
Word Length (bits per character) = 8
Parity = no (none)
Number of Stop Bits = 1
Interface = RS-232C (or RS-422A)
Line Control = IPRTS

Be sure the keyboard and display options are set as follows:

Screen = normal
Row and Column = 24x80
Scroll = jump
Auto LF (line feed) = off
Line Warp = on
Forcing Insert = line (or both)
Tab = field

Operating Mode = echo
Turnaround Character = CR
Enter = return
Return = new line
New Line = CR
Send = page
Insert Character = space

On your IBM 3151 terminal, press the `Ctrl+Setup` keys to display the **Setup** Menu and follow the on-screen instructions to check the settings. If you need to make changes, follow the on-screen instructions for making changes.

___ 5. Turn the system unit power on. Press `F5` after you see the keyboard icon on the screen. The system will begin booting from the installation media.

___ 6. After about five minutes, a screen appears on all directly attached terminal or display devices asking you to define the system console. Notice that you are given these instructions in many different languages. Follow the instructions as they appear on the device you wish to use as the system console.

___ 7. Next, a screen is displayed that prompts you to select an installation language. Follow the directions on this screen to select the language in which the installation instructions will be displayed.

___ 8. The **Welcome to Base Operating System - Installation and Maintenance** menu will be displayed. Select item 2, **Change/Show Installation Settings and Install**.

```
                Welcome to Base Operating System
                   Installation and Maintenance


   Type the number of your choice and press Enter. Choice is indicated by >>>.


        1  Start Install now with Default Setting
   >>> 2  Change/Show Installation Settings and Install
        3  Start Maintenance Mode for System Recovery


     88 Help ?
     99 Previous Menu


     >>> Choice [1]: 2
```

__ 9. The **Installation and Settings** menu is displayed. Select item 1, **System Settings**.

```
                Installation and Settings


  Either type 0 and press Enter to install with current settings or type
  the number of the setting you want to change and press Enter.


  1 System Settings
          Method of Installation............. Preservation
          Disk Where You Want to Install......hdisk0


  2 Primary Language Environment Settings (AFTER Install)
          Cultural Convention..........     C(POSIX)
          Language....................     C(POSIX)
          Keyboard....................     C(POSIX)
          Keyboard Type ...............     Default


  3 More Options        (Desktop, Security, Kernel, Software, ...)


  0 Install AIX with the current settings listed above.
  88  Help  ?
  99  Previous Menu

  >>> Choice [0]:  1
```

__ 10. The **Change Method of Installation** menu is displayed. You are now given the opportunity to change the method of installation. Select item 1, **New and Complete Overwrite**.

```
                Change Method of Installation


   Type the number of the installation method and press Enter.


  1 New and Complete Overwrite
    Overwrites EVERYTHING on the disk selected for installation.
    Warning:  Only use this method if the disk is totally empty or if
    there is nothing on the disk you want to preserve.


  2 Preservation Install
    Preserves SOME of the existing data on the disk selected for
    installation.
    Warning:  This method overwrites the usr (/usr), variable (/var),
    temporary (/tmp), and root (/) file systems. Other product
```

```
      (application) files and configuration data will be destroyed.

   3 Migration Install
     Upgrades the Base Operating System to current release. Other product
     (application) files and configuration data are saved.

     88 Help  ?
     99 Previous Menu

   >>> Choice [2]:  1
```

__ 11. The **Change Disks Where You Want To Install** menu is displayed. You are now given the opportunity to select the disk drives where you want the system to be loaded. Select the disk drive with the greatest amount of space on it, minimum of 2.2 GB, as long as it is marked bootable. If not, select both drives or if there isn't a single drive with greater than 2.2 GB on it, select both drives.

```
               Change Disks Where You Want to Install

   Type one or more numbers for the disk(s) to be used for
   installation and press Enter. To cancel a choice, type the
   corresponding number and press Enter. At least one bootable
   disk must be selected. The current choice is indicated by >>>.

           Name        Location Code     Size (MB)    VG Status       Bootable

   >>> 1 hdisk0     04-C0-00-4,0      2063          rootvg          yes
       2 hdisk1     04-C0-00-5,0      2063          rootvg          yes

   >>> 0 Continue with choices indicated above

      55  More Disk Options
      66  Disks not known to Base Operating System Installation
      77  Display More Disk Information
      88  Help  ?
      99  Previous Menu

   >>> Choice [0]: <Enter>
```

__ 12. You are taken back to the **Installation and Settings** menu. Select item 2**, Primary Language Environment Settings (AFTER install)**.

```
              Installation and Settings

    Either type 0 and press Enter to install with current settings or type
    the number of the setting you want to change and press Enter.

    1 System Settings
            Method of Installation............. Preservation
            Disk Where You Want to Install......hdisk0


    2 Primary Language Environment Settings (AFTER Install)
            Cultural Convention..........     C(POSIX)
            Language....................     C(POSIX)
            Keyboard....................     C(POSIX)
            Keyboard Type ..............      Default


    3 More Options       (Desktop, Security, Kernel, Software, ...)


    0 Install AIX with the current settings listed above.
    88  Help  ?
    99  Previous Menu

    >>> Choice [0]:  2
```

__ 13. Change the language environment and code set for the language you wish to have
after installation. The menu that is displayed looks like this:

```
    Type the number for the Cultural Convention (such as date, time, and
    money), Language and Keyboard for this system and press Enter, or type
    106 and press Enter to create your own combination.

        Cultural Convention     Language                    Keyboard

    >>  1. C (POSIX)            C (POSIX)                   C (POSIX)
        2. Albanian             English (United States)     Albanian
        3. Arabic               Arabic (Bahrain)            Arabic (Bahrain)
            ... several screens later ...
      106. Create your own combination of Cultural Convention, Language
            and Keyboards.

      88 Help ?
      99 Previous menu
        Choice [1]:
```

__ 14. You should now be back at the **Installation and Settings** menu. If you are happy with your selections, select **0** to continue with the new and complete overwrite installation.

```
                    Installation and Settings


    Either type 0 and press Enter to install with current settings or type
    the number of the setting you want to change and press Enter.

    1 System Settings
            Method of Installation............. New and Complete Overwrite
             Disk Where You Want to Install......hdisk0


    2 Primary Language Environment Settings (AFTER Install)
            Cultural Convention.........      English (United States)
            Language....................      English (United States)
            Keyboard....................      English (United States)
            Keyboard Type ..............      Default


    3 More Options       (Desktop, Security, Kernel, Software, ...)

    0 Install AIX with the current settings listed above.
    88  Help  ?
    99  Previous Menu

    >>> Choice [0]:  0
```


__ 15. Once the installation begins, a status screen appears. Note the progress indicator at the bottom of the screen. The installation process will take approximately one hour.

Appendix B. Serial devices

What this exercise is about

This exercise gives you an opportunity to add and delete a serial device and make changes to a serial device that is attached to a RS/6000. It also gives you the opportunity to see what effect certain terminal settings have on the behavior of your terminal.

What you should be able to do

After completing this exercise, students should be able to:

- Add a terminal
- Change terminal characteristics
- Change the settings on an ibm3151 ASCII terminal
- Delete a terminal

In this exercise, you are adding a serial device, changing its characteristics both on the RS/6000 and on the device itself, and then delete the device. The serial device you use is an ibm3151 ASCII terminal. The setup screen information may differ depending on whether or not you are using a cartridge to define your language environment. The example information provided relative to setup screens is based on the ibm3151 terminal without a cartridge.

If you have another type of ASCII terminal, your instructor should provide directions on how it should be setup.

You would use many of the same steps for configuring a modem attached to a serial port. Your terminal should already be physically cabled to the first built-in serial port on your system. For this exercise you will need to work as a team with the other student who is working on your system.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom.

Part 1 - Verify a terminal

__ 1. At the console, log in as your user and **su** to **root**. Check to see if your ibm3151 ASCII terminal is currently configured. If it is, continue to the section titled ***Part 2 - Remove A Terminal***. Otherwise, if your terminal has not been configured, skip to the section titled ***Part 3 - Add a Terminal***.

Part 2 - Remove a terminal

__ 2. Using SMIT, remove the terminal you just finished setting up. Be sure to take the definition out of the database. Make sure you are logged off. Does the system let you?

_____

What is the error message it gave you? _____

__ 3. Disable the terminal.

__ 4. Return to SMIT and complete the process of removing the ASCII terminal.
After you complete this step, be sure to do the next section, *Part 2 - Add a terminal* because you will need this terminal for later exercises.

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Part 3 - Add a terminal

__ 5. Using SMIT, add a terminal on the first built-in adapter. Take all the defaults except the baud rate which you should set to 19200. Be sure your ibm3151 terminal is configured to match the communications settings on the RS/6000.

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Part 4 - Check terminal communications settings

__ 6. On the ASCII terminal keyboard, press and hold the `<ctrl>` key and press the `<Setup>` key. This puts you in setup mode. The cursor keys move you from one field to another. The space bar shows you the options for whatever field is highlighted. The `<Send>` key takes you to the next screen.

__ 7. On the Server console run the `penable` command that sends a login prompt to your ASCII terminal.

__ 8. Log in to the ASCII terminal as **root**. Try to go into SMIT.

   • What kind of message do you get? Message:

   _____
   _____

__ 9. If SMIT did not run change the terminal type so you can use SMIT and then try starting SMIT again.

Part 5 - Change terminal characteristics

__ 10. From another terminal and using SMIT, change the baud rate of your terminal to 9600. You will need to do this from your console. Be sure to disable the ibm3151 before making the changes and enable again once the changes are complete.

__ 11. Once this change is complete on the system, can you work with the terminal? __

Why not? _____

Change the settings on your terminal so it can communicate with your system.

Part 6 - Fixing a hung terminal (optional)

__ 12. DO NOT DO THIS FROM AN LFT. As **root**, from the ASCII terminal, run the shell script `/home/workshop/lab5`. This shell script causes problems with the ibm3151 terminal. Determine what the problem symptoms are, such as a hung terminal (doesn't show any character when you try to type), or strange characters displayed when you try to type something. As part of troubleshooting, check the port attributes, like the baud rate, and whether or not there are any processes running associated with the terminal. Try to fix the problem using the suggestions in the student notebook before taking the last resort of turning the terminal off then on.

__ 13. DO NOT DO THIS FROM AN LFT. As **root**, from the ASCII terminal, run the shell script `/home/workshop/lab5.1`. This shell script causes display problems with the ibm3151 terminal. Determine what the problem symptoms are, such as a hung terminal (doesn't show any character when you try to type), or strange characters displayed when you try to type something. As part of troubleshooting, check the port attributes, like the baud rate, and whether or not there are any processes running associated with the terminal. Try to fix the problem using the suggestions in the student notebook before taking the last resort of turning the terminal off then on.

End of exercise

Appendix C. Optional exercise: The System V print subsystem

What this exercise is about

This lab demonstrates configuring a printer and printing using the System V print subsystem.

What you should be able to do

At the end of the lab, you should be able to:

- Add a System V printer
- Submit jobs to the printer
- Display status of the printer and print jobs
- Remove a System V printer

Introduction

This exercise reinforces the material covered in the System V Print Subsystem appendix. It consists of questions and hands-on activities. There are two levels of information:

- Exercise Instructions
- Exercise Instructions with Hints

Use any level that facilitates your learning process. Use all available resources: team members, documentation, your instructor.

Requirements

- System running AIX 5L with connected local printer.

Exercise Instructions

Preface

Two versions of these instructions are available; one with hints and one without. You can use either version to complete this exercise. Also, please don't hesitate to ask the instructor if you have questions.

All exercises of this chapter depend on the availability of specific equipment in your classroom. If your lab environment uses remote pSeries/AIX platforms, the instructor will provide you with the addressing (IP address or hostname) and instructions for accessing the remote machine. For example, you might be using telnet, an X-windows server, or a VNC client. Whatever tool you are using, at various points in the labs you may need to re-launch your remote access tool to obtain a new login prompt.

If your classroom does not have printers, you can perform most of these exercises by printing to a file. Notes are provided in the instructions for this option.

Part 1 - Switch print subsystems

__ 1. Use `switch.prt -d` to determine which print subsystem is active.

__ 2. If the System V print subsystem is active, change to the AIX print subsystem.

What command did you use? _____

__ 3. What file is **/usr/bin/lpstat** linked to? _____

__ 4. Switch to the System V print subsystem.

What command did you use? _____

__ 5. What file is **/usr/bin/lpstat** linked to? _____

Part 2 - Add a System V printer

__ 6. Collect the following information from the instructor:

- Printer device _____

    (If you will be printing to a file, the device will be the name of the target file.)

- How the printer is connected:
  - (serial or parallel) _____,
  - which adapter _____ and
  - which port it is connected to _____.

  (If you will be printing to a file, you do not need this information.)

- If the printer is connect via a serial connection, details of the connection (baud rate, parity, bits per character, stop bits, and flow control):

  _____

  _____

  (If you will be printing to a file, you do not need this information.)

- Printer type _____

  (If you will be printing to a file, use printer type **unknown**.)

- Printer content type _____

  (If you will be printing to a file, use content type **simple**.)

- Interface script _____

  (If you will be printing to a file, use the **standard** interface script.)

__ 7. Choose a name for your printer: _____

__ 8. Log in as **root**.

__ 9. Configure the printer device:

  (If you are printing to a file, skip the steps in the table and simply create the target file using the `touch` command, for example:

  `# touch /tmp/dummy_printer`)

Step	Action
1	Use SMIT fastpath `smit pdp` to open the **Printer/Plotter Devices** menu.
2	Move the cursor to select **Add a Printer/Plotter**; press `<Enter>`.
3	Scroll through the device list and select the printer device.
4	Select the type of interface (connection).
5	Select the parent adapter.

Step	Action
6	For parallel connected printers, enter **<p>** in the **PORT number** field and press **<Enter>**.
7	For serial connected printers, enter the port number in the **PORT number** field, fill in the baud rate and so forth and press **<Enter>**.

__ 10. List the newly created printer device.

What command did you use? _____

__ 11. Use **lpadmin** to define a new System V printer using the printer device you just created. Use the information you gathered in steps 1 and 2 to configure the printer.

What command did you use? _____

__ 12. Use **lpstat** to verify queueing status.

What command did you use? _____

Is the printer accepting requests? _____

What reason is given? _____

__ 13. Use **lpstat** to verify printing status.

What command did you use? _____

Is the printer enabled? _____

__ 14. Use **lpstat** to get a long listing of your printer's characteristics.

What command did you use? _____

__ 15. Using the output from the previous step, answer these questions:

What users are allowed to access this printer? _____

What action will be taken "On fault"? (This is the default Alert action.) _____

__ 16. View the printer configuration file.

What command did you use? _____

__ 17. Navigate to the spool directory.

What command did you use? _____

__ 18. List the files in this directory: _____

Part 3 - Submit print jobs

__ 19. Attempt to print /**etc**/**motd** (the message of the day file) on your new printer.

What command did you use? _____

What happened? _____

__ 20. Enable queueing using the `accept` command. (Don't enable printing yet.)

What command did you use? _____

__ 21. Resubmit your print job.

Note the request-ID here: _____

__ 22. Use `lpstat` to list outstanding job status.

What command did you use? _____

__ 23. List the files in the spool directory: _____

__ 24. Examine the request file (`X-0`) and answer these questions:

What file will be printed? _____

What is the file's size? _____

__ 25. Submit another request to print /**etc**/**motd**, but this time, request that the print service copy the file to the spool directory.

What command did you use? _____

__ 26. List the new files in the spool directory: _____

__ 27. Examine the two new files.

• Which file is the request file? _____

• Which file is the copy of the file to be printed? _____

__ 28. Enable printing on your printer.

• What command did you use? _____

__ 29. Your print jobs should begin printing as soon as you enabled the printer.

Use `lpstat -p` while the printer is printing to show what job is being printed.

(If your jobs do not print, ask the instructor for help.)

__ 30. Examine the request log.

- What command did you use? _____

Look for request IDs in the file.

- What character at the beginning of the line indicates a new entry (new print request) in this file? _____

__ 31. Disable printing on your printer using the `disable` command.

- What command did you use? _____

__ 32. Disable queueing using the `reject` command.

- What command did you use? _____

__ 33. Use `lpadmin` to remove a System V printer.

- What command did you use? _____

Part 4 - (Optional) Configure a remote print server and client

___ 34. Use *Printing for Fun and Profit under AIX 5L* (Redbook), *Chapter 3. System V network printing* as a reference for this exercise.

___ 35. You need to work with another team.

___ 36. One team configures their system as a print server machine (see Section 3.3 in the Redbook). The other team configures their system to use the other machine's remote printer (see Section 3.1 in the Redbook).

___ 37. Test your configuration by attempting to print from the client machine to the printer on the server machine.

___ 38. Make notes below of the steps you took and your results.

End of exercise

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