

Fundamentals of UNIX
Lab 12.4.1 – Command Line Archive Tools
(Estimated time: 45 min.)

Objectives:

- Develop an understanding of backup and compression utilities
- Review **tar** archiving options
- Back up selected files with **tar**
- Back up a directory with **tar**
- Compress files
- Uncompress files
- Back up and compress your home directory
- Restore your home directory
- Use **jar** to archive and compress

Background:

In this lab, you will work with the built-in UNIX utilities to back up, compress and restore data. Backing up data for safekeeping is also known as archiving. This is one of the most important aspects of network security and support. Backups are a key component in a comprehensive security plan. To back up or transfer files via ftp or another method, you need to be able to package and restore the files easily. In this lab, you will work with the Tape Archive (**tar**) and Java Archive (**jar**) utilities to perform backups of data as well as restoring data from backups. We will cover the UNIX file compression utility and you will use **tar** and **compress** to back up and restore your home directory.

Tools / Preparation:

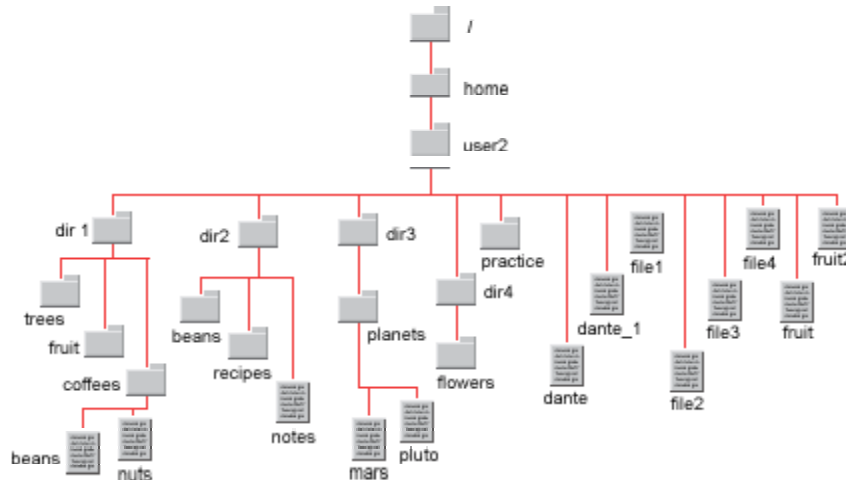
- a) Before starting this lab, review Chapter 12, Section 3 – Backing Up, Compressing and Restoring Files, and Section 4 – Combining Backup and Compression
- b) You will need the following:
 1. A login user ID (e.g. user2) and password assigned by your instructor.
 2. A computer running the UNIX operating system.
 3. Networked computers in a classroom with the class file system installed.

Notes:

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Use the diagram of the sample Class File System directory tree to assist with this lab.

Class File Tree Structure



Step 1. Log in to CDE

Login with the user name and password assigned to you by your instructor in the CDE entry box.

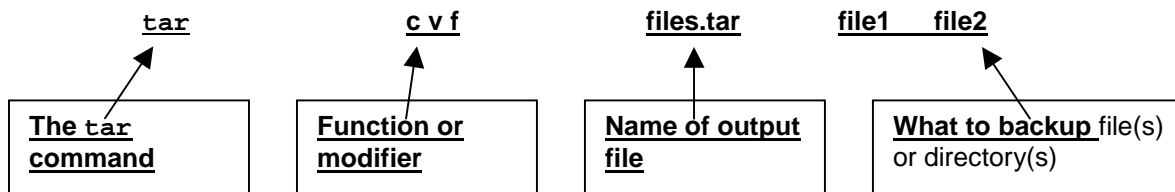
Step 2. Access the Command Line

Right click on the **workspace** backdrop and click on **Tools**. Select **Terminal** from the menu to open a terminal window.

Step 3. Review tar Archiving Options

The UNIX operating system has several integrated utilities that allow multiple files to be backed up and compressed. The **tar** (tape archive) command enables you to back up single or multiple files in a directory hierarchy. The **tar** command is standard with all versions of the UNIX operating system. Although it was originally developed for use with tape drives, **tar** can copy files to other locations on the hard disk or to a floppy disk and other removable media. The **tar** command can create an archive from a single file, but it is primarily used to combine multiple files, such as the contents of a directory, into a single file and then extract them later if they are needed. By itself, it does not compress the files as it bundles them. The command syntax is shown below.

Command Format: *tar function [modifier] [output file] filename(s) / directory(s)*



The most frequently used options available with the **tar** command are **c**, **t**, and **x** (all lower case). It is not necessary (but accepted) to precede these with a dash (-) as with other UNIX command options.

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Tar Command Function Options

Function	Meaning	Function Performed
c	Create (combine)	Create a new tar file
t	Table of Contents	List the table of contents of the tar file
x	Extract files	Extract the specified files from the tar file

Tar Command Function Modifiers

Modifier	Meaning	Function Modified
f	File name	Specify the tar file to be created as either a file on the hard disk (/tmp/file.tar), or a device file for an output device (/dev/xxx) like a floppy disk, optical drive or tape drive
v	Verbose	Execute in verbose mode

- What option would you use to archive one or more files? _____
- What modifier would you use to specify the name of a new **tar** file as the archive? _____
- What modifier would you use to see the results of the **tar** command? _____

Step 4. Back up Selected Files with tar

To back up a group of files using the **tar** command and create a single **tar** file, use the syntax shown below. The **cvf** option is used to **create (c)** in **verbose (v)** mode a **file (f)**. In this case, the files to be archived (tree1 and tree2) are on the hard drive in the current directory. The **tar** file to be created (trees.tar), will also be placed on the hard drive in the current directory, since no other directory or device is specified. You can specify several files or the name of a directory to archive all of the files in the directory.

tar cvf trees.tar tree1 tree2

- Change to your **home** directory. What command did you use? _____
- Create a new directory called **tardir** to put your **tar** backup archives in. What command did you use? _____
- Backup the **dante** files (dante and dante_1) and create an archive **tar** file called **dantefiles.tar** in the **tardir** directory using a relative pathname. Use verbose mode. What command did you use? _____
- What was the response? _____
- Compare the original size of the dante files with the size of the **dantefiles.tar** file you created. What command did you use to compare the sizes of the files? _____ Were the files compressed? _____
- Backup all files that start with the letters **file** (file1, file2 etc.) and create an archive **tar** file called **files.tar** in the **tardir** directory using a relative pathname. Use the asterisk (*) wildcard to specify the names of the files to be archived. Use verbose mode. What command did you use?

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- g. Use the table of contents option (t) with verbose (v) and file (f) modifiers to see the list of files you backed up in the **files.tar** archive. What command did you use? _____ How many files were combined to make the **files.tar** file? _____

Step 5. Back up a Directory with tar

You can also use the **tar** command to backup an entire directory including all the files and subdirectories contained within the directory.

- a. From your **home** directory, backup the contents of the **dir2** directory using **tar** to create a new **tar** file archive called **dir2.tar** in the **tardir** directory using a relative pathname. Use verbose mode. What command did you use? _____
- b. What was the response? _____
- c. Change to the **tardir** subdirectory. What command did you use? _____
- d. Use the **tar** command with the table of contents (t) option, verbose (v) and file (f) modifiers to see the contents of the **dir2.tar** file. What command did you use? _____
- e. How many directories and files were archived in the **dir2.tar** file? _____

Step 6. Compress Files

It is frequently useful to archive files that have not been used for a while and then compress them so they take up less disk space. Any file, including those archives created with **tar**, can be compressed. Compression is a valuable tool since it reduces the amount of disk space files occupy, while still keeping them readily available. The **compress** command is used to compress files and is included with all versions of the UNIX operating system.

When files are compressed with the **compress** command, the original file is replaced using the same name but with a **.Z** suffix appended to the end of the file name. Note that this is an uppercase letter Z. When the **compress** command is used with the verbose (-v) option, it will show the name of the input (file.lst) and output file (file.lst.Z) and the amount of compression achieved. Use the **ls -l** (list long) command before compressing a file to see its original size, in bytes, and then again afterward to see the compressed size. Multiple files can be compressed simultaneously and wildcard metacharacters are supported. The example below will compress all files beginning with file and display the result in verbose mode.

Command Format: **compress option file1 file2**

Example: **compress -v file***

- a. Change to your **home** directory and create a new subdirectory called **compressdir**. What command did you use? _____
- b. Display a long listing of the files in the **coffees** subdirectory in order to see their current size. What command did you use? _____
- c. What is **current** the size of the **beans** file? _____

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- d. Change to the **coffees** subdirectory using a relative pathname. What command did you use?

- e. What command could you use to find out what **type** of file beans was? _____
What is **type** of file is the **beans** file? _____
- f. Copy the **beans** file from the **current** directory (coffees) to the **compressdir** subdirectory you created earlier using the tilde (~) to represent your home directory path. What command did you use? _____
- g. Change to the **compressdir** subdirectory using a relative pathname. What command did you use? _____
- h. Compress the beans file using the verbose (-v) option. What command did you use?

- i. What was the result of the compress command? _____
- j. Display a long listing of the files in your current directory (compressdir) in order to see their current size. What is the size of the **beans.Z** file now? _____ Does the original **beans** file still exist? _____
- k. Change to your **home** directory and copy the **files.tar** file from the **tardir** directory to the **compressdir** directory. What command did you use? _____
- l. Check the size of the **files.tar** file and then compress it. How much was it compressed? _____
What is its name after it has been compressed? _____

Step 7. Uncompress Files

The corresponding command used to reverse the effects of the **compress** command is **uncompress**. Files cannot be used in their compressed form so it is necessary to use the **uncompress** command to restore them to their original size.

Command Format: ***uncompress option file1 file2***

Example: ***uncompress -v file***

Note: It is not necessary to specify the .Z extension with the **uncompress** command. This command can uncompress multiple files and supports the use of wildcard metacharacters such as ? and *.

- a. Change to the **compressdir** subdirectory. What command did you use? _____
- b. Display a long listing of the files in your current directory (compressdir) in order to see their current size. What is the size of the **beans.Z** file now? _____
- c. Uncompress the beans file using the verbose (-v) option. What command did you use?

- d. What was the result of the compress command? _____

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- e. Display a long listing of the files in your current directory (compressdir) in order to see their current size. What is the size of the **beans** file now? _____ Does the compressed **beans.Z** file still exist? _____

Step 8. Back Up and Compress Your Home Directory

It is good practice to perform a regular nightly backup of your home directory. This section describes the process used to archive your home directory to a **tar** file and then compress it.

- a. Change to your **home** directory and create a new subdirectory called **backup**. What command did you use? _____
- b. From your **home** directory (/home/userX) change to the parent directory **/home**. What command did you use? _____
- c. Backup the entire **userX** directory using the **tar** command to create an archive file called **home.tar** in the **backup** directory. What command did you use?

- d. From the **/home** parent directory, change to the **backup** directory. What command did you use?

- e. Display a long listing and verify that the **home.tar** file is present. What is the size of the file?

- f. Compress the **home.tar** file using the verbose (-v) option. What command did you use?
compress -v home.tar
- g. What was the result of the compress command?

- h. Display a long listing and verify that **home.tar** is there. What is the size of the file now?

Step 9. Restore Your Home Directory

In this section, you will restore the compressed **tar** file of your home directory that was previously created. Just as **tar** can combine files to a single archive file, it can also be used to restore them. After you uncompress the **tar** file and extract the original files, you can move them to your real home directory as needed.

- a. Change to your **home** directory and create a new subdirectory called **hometemp**. This will create a separate directory to temporarily hold the restored archived file in. What command did you use? _____
- b. Copy **home.tar.Z** from the **backup** directory to your current directory (hometemp). What command did you use? _____
- c. Change to the hometemp directory and uncompress the **home.tar.Z** file using the verbose mode. What command did you use? _____
- d. Extract the **tar** files to the current **hometemp** directory using the Extract (x) option with verbose (v) and file (f) modifiers. What command did you use? _____

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- e. After the files were extracted, does the original **home.tar** file still exist? _____

Step 10. Use `jar` to Archive and Compress

The **jar** (java archive) command is similar to the **tar** command, but compresses the resulting file in the same step. It is a Java™ application that combines multiple files into a single **jar** (Java archive) file. It is also a general purpose archiving and compression tool, based on ZIP and the ZLIB compression format. The **jar** command is standard with the Solaris operating system, but is available on any system that has Java virtual machine (JVM) installed. The syntax and options for the **jar** tool are almost identical to the **tar** command. The following is an example of **jar**:

jar cvf trees.tar tree1 tree2

- a. Change to your home directory and use the **jar** command to create a compressed archive file called **fruit.jar** using the two fruit files (fruit and fruit2). What command did you use?

- b. What was the result of the **jar** command?

- c. Copy the **fruit.jar** file to the **backup** directory.
- d. Display a long listing of the **backup** directory. Is the **jar** archive file listed? _____
- e. What is the size of the **fruit.jar** file? _____ Were the files compressed as they were archived? _____
- f. Are the original fruit files still in your home directory? _____
- g. Change to the backup directory and use the **jar** command with the Extract (x) option and the verbose (v) and file (f) modifiers to extract the **fruit.jar** file into the backup directory. What command did you use? _____
- h. What was the result from the **jar** extract? _____

Step 11 – Remove Files and Directories Created in this Lab

Remove all files and directories created in your home directory during this lab.

Step 12. Close the Terminal Window and Logout

Double click on the dash button in the upper left corner of the screen, then click the **EXIT** icon on the front panel.