**Filter content in Linux**

In this reading, you’ll continue exploring Linux commands, which can help you filter for the information you need. You’ll learn a new Linux command, **find**, which can help you search files and directories for specific information.

**Filtering for information**

You previously explored how filtering for information is an important skill for security analysts. **Filtering** is selecting data that match a certain condition. For example, if you had a virus in your system that only affected the **.txt** files, you could use filtering to find these files quickly. Filtering allows you to search based on specific criteria, such as file extension or a string of text.

**grep**

The **grep** command searches a specified file and returns all lines in the file containing a specified string or text. The **grep** command commonly takes two arguments: a specific string to search for and a specific file to search through.

For example, entering **grep** **OS** **updates**.**txt** returns all lines containing **OS** in the **updates**.**txt** file. In this example, **OS** is the specific string to search for, and **updates.txt** is the specific file to search through.

Let’s look at another example: **grep error time\_logs.txt**. Here grep is used to search for the text pattern. **error** is the term you are looking for in the **time\_logs.txt** file. When you run this command, grep will scan the time\_logs.txt file and print only the lines containing the word **error**.

**Piping**

The pipe command is accessed using the pipe character (**|**). **Piping** sends the standard output of one command as standard input to another command for further processing. As a reminder, **standard output** is information returned by the OS through the shell, and **standard input** is information received by the OS via the command line.

The pipe character (**|**) is located in various places on a keyboard. On many keyboards, it’s located on the same key as the backslash character (**\**). On some keyboards, the **|** can look different and have a small space through the middle of the line. If you can’t find the **|**, search online for its location on your particular keyboard.

When used with **grep**, the pipe can help you find directories and files containing a specific word in their names. For example, **ls /home/analyst/reports | grep users** returns the file and directory names in the **reports** directory that contain **users**. Before the pipe, **ls** indicates to list the names of the files and directories in **reports**. Then, it sends this output to the command after the pipe. In this case, **grep users** returns all of the file or directory names containing **users** from the input it received.

**Note:** Piping is a general form of redirection in Linux and can be used for multiple tasks other than filtering. You can think of piping as a general tool that you can use whenever you want the output of one command to become the input of another command.

**find**

The **find** command searches for directories and files that meet specified criteria. There’s a wide range of criteria that can be specified with **find**. For example, you can search for files and directories that

* Contain a specific string in the name,
* Are a certain file size, or
* Were last modified within a certain time frame.

When using **find**, the first argument after **find** indicates where to start searching. For example, entering **find /home/analyst/projects** searches for everything starting at the **projects** directory.

After this first argument, you need to indicate your criteria for the search. If you don’t include a specific search criteria with your second argument, your search will likely return a lot of directories and files.

Specifying criteria involves options. **Options** modify the behavior of a command and commonly begin with a hyphen (**-**).

**-name and -iname**

One key criteria analysts might use with **find** is to find file or directory names that contain a specific string. The specific string you’re searching for must be entered in quotes after the **-name** or **-iname** options. The difference between these two options is that **-name** is case-sensitive, and **-iname** is not.

For example, you might want to find all files in the **projects** directory that contain the word “log” in the file name. To do this, you’d enter **find /home/analyst/projects -name "\*log\*"**. You could also enter **find /home/analyst/projects -iname "\*log\*"**.

In these examples, the output would be all files in the **projects** directory that contain **log** surrounded by zero or more characters. The **"\*log\*"** portion of the command is the search criteria that indicates to search for the string “log”. When **-name** is the option, files with names that include **Log** or **LOG**, for example, wouldn’t be returned because this option is case-sensitive. However, they would be returned when **-iname** is the option.

**Note**: An asterisk (**\***) is used as a wildcard to represent zero or more unknown characters.

**-mtime**

Security analysts might also use **find** to find files or directories last modified within a certain time frame. The **-mtime** option can be used for this search. For example, entering **find /home/analyst/projects -mtime -3** returns all files and directories in the **projects** directory that have been modified within the past three days.

The **-mtime** option search is based on days, so entering **-mtime +1** indicates all files or directories last modified more than one day ago, and entering **-mtime -1** indicates all files or directories last modified less than one day ago.

**Note:** The option **-mmin** can be used instead of **-mtime** if you want to base the search on minutes rather than days.

**Key takeaways**

Filtering for information using Linux commands is an important skill for security analysts so that they can customize data to fit their needs. Three key Linux commands for this are **grep**, piping (**|**), and **find**. These commands can be used to navigate and filter for information in the file system.