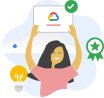
**Activity - Create hash values**

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**Lab instructions and tasks**

* + - [Activity overview](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step1)
    - [Scenario](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step2)
    - [Start your lab](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step3)
    - [Task 1. Generate hashes for files](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step4)
    - [Task 2. Compare hashes](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step5)
    - [Conclusion](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step6)
    - [End your lab](https://googlecoursera.qwiklabs.com/focuses/35930782?parent=lti_session#step7)



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**Activity overview**

As a security analyst, you’ll need to implement security controls to protect organizations against a range of threats.

That’s where hashing comes in. Previously, you learned that a hash function is an algorithm that produces a code that can’t be decrypted. Hash functions are used to uniquely identify the contents of a file so that you can check whether it has been modified. This code provides a unique identifier known as a hash value or digest.

For example, a malicious program may mimic an original program. If one code line is different from the original program, it produces a different hash value. Security teams can then identify the malicious program and work to mitigate the risk.

Many tools are available to compare hashes for various scenarios. But for a security analyst it’s important to know how to manually compare hashes.

In this lab activity, we’ll create hash values for two files and use Linux commands to manually examine the differences.

**Scenario**

In this scenario, we need to investigate whether two files are identical or different.

Here’s how you'll do this task: **First**, you’ll display the contents of two files and create hashes for each file. **Next**, you’ll examine the hashes and compare them.

Let’s hash some files!

***Note:****The lab starts with your user account, called analyst, already logged in to the Bash shell. This means you can start the tasks as soon as you click the****Start Lab****button.***Disclaimer:** For optimal performance and compatibility, it is recommended to use either **Google Chrome** or **Mozilla Firefox**browsers while accessing the labs.

**Start your lab**

Before you begin, you can review the instructions for using the Qwiklabs platform under the **Resources** tab in Coursera.

If you haven't already done so, click **Start Lab**. This brings up the terminal so that you can begin completing the tasks!

When you have completed all the tasks, refer to the **End your Lab** section that follows the tasks for information on how to end your lab.

**Task 1. Generate hashes for files**

The lab starts in your home directory, /home/analyst, as the current working directory. This directory contains two files file1.txt and file2.txt, which contain different data.

In this task, you need to display the contents of each of these files. You’ll then generate a hash value for each of these files and send the values to new files, which you’ll use to examine the differences in these values later.

* + - Use the ls command to list the contents of the directory.

Two files, file1.txt and file2.txt, are listed.

* + 1. Use the cat command to display the contents of the file1.txtfile:

cat file1.txt

Copied!

***Note:****If you enter a command incorrectly and it fails to return to the command-line prompt, you can press****CTRL+C****to stop the process and force the shell to return to the command-line prompt.*

* + 1. Use the cat command to display the contents of the file2.txtfile:

cat file2.txt

Copied!

* + 1. Review the output of the two file contents:
    2. analyst@4fb6d613b6b0:-$ cat file1.txt
    3. X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*
    4. analyst@4fb6d613b6b0:-$ cat file2.txt

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

Do the contents of the two files appear identical when you use the cat command?

checkYes

No

Although the contents of both files appear identical when you use the catcommand, you need to generate the hash for each file to determine if the files are actually different.

* + 1. Use the sha256sum command to generate the hash of the file1.txt file:

sha256sum file1.txt

Copied!

You now need to follow the same step for the file2.txt file.

* + 1. Use the sha256sum command to generate the hash of the file2.txt file:

sha256sum file2.txt

Copied!

* + 1. Review the generated hashes of the contents of the two files:
    2. analyst@4fb6d613b6b0:-$ sha256sum file1.txt
    3. 131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt
    4. analyst@4fb6d613b6b0:-$ sha256sum file2.txt

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

Do both files produce the same generated hash value?

Yes

checkNo

Click **Check my progress** to verify that you have completed this task correctly.

You have completed this task and used the sha256sum command to generate hash values for the file1.txt and file2.txt files.

Generate hashes for files

*You have completed this task and used the sha256sum command to generate hash values for the file1.txt and file2.txt files.*

**Task 2. Compare hashes**

In this task, you’ll write the hashes to two separate files and then compare them to find the difference.

* + - Use the sha256sum command to generate the hash of the file1.txt file, and send the output to a new file called file1hash:

sha256sum file1.txt >> file1hash

Copied!

You now need to complete the same step for the file2.txt file.

* + 1. Use the sha256sum command to generate the hash of the file2.txt file, and send the output to a new file called file2hash:

sha256sum file2.txt >> file2hash

Copied!

Now, you should have two hashes written to separate files. The first hash was written to the file1hash file, and the second hash was written to the file2hash file.

You can manually display and compare the differences.

* + 1. Use the cat command to display the hash values in the file1hash and file2hash files.
    2. Inspect the output and note the difference in the hash values.

***Note:****Although the content in file1.txt and file2.txt previously appeared identical, the hashes written to the file1hash and file2hash files are****completely****different.*

Now, you can use the cmp command to compare the two files byte by byte. If a difference is found, the command reports the byte and line number where the first difference is found.

* + 1. Use the cmp command to highlight the differences in the file1hash and file2hash files:

cmp file1hash file2hash

Copied!

* + 1. Review the output, which reports the first difference between the two files:

analyst@4fb6d613b6b0:-$ cmp file1hash file2hash

file1hash file2hash differ: char1, line 1

***Note:****The output of the cmp command indicates that the hashes differ at the first character in the first line.*

Based on the hash values, is file1.txt different from file2.txt?

No

checkYes

Click **Check my progress** to verify that you have completed this task correctly.

You have completed this task and used the cat and cmp commands to compare the hashes in the file1hash and file2hash files.

Compare hashes

*You have completed this task and used the cat and cmp commands to compare the hashes in the file1hash and file2hash files.*

**Conclusion**

Great work!

You practiced how to

* + - compute hashes using sha256sum,
    - display hashes using the cat command, and
    - compare hashes using the cmp command.

These are valuable tools you can use to validate data integrity as you contribute to the control of your organization’s security.

analyst@dc24cdbf71c6:~$ history

1 clear

2 history

3 ls -al

4 pwd

5 cat file\*

6 cat file2\*

7 cat file1\*

8 clear

9 sha256sum file1.txt

10 sha256sum file2.txt

11 sha256sum file1.txt >> file1hash

12 sha256sum file2.txt >> file2hash

13 ls -al

14 cat file1has

15 cat file1hash

16 cat file2hash

17 cmp file1hash file2hash

18 clear

19 history

analyst@dc24cdbf71c6:~$ !5

cat file\*

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

9sxa5Yq20R2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !6

cat file2\*

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

9sxa5Yq20R2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !7

cat file1\*

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

analyst@dc24cdbf71c6:~$ !9

sha256sum file1.txt

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

analyst@dc24cdbf71c6:~$ !10

sha256sum file2.txt

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !11

sha256sum file1.txt >> file1hash

analyst@dc24cdbf71c6:~$ !12

sha256sum file2.txt >> file2hash

analyst@dc24cdbf71c6:~$ !13

ls -al

total 44

drwxr-xr-x 2 analyst analyst 4096 May 9 02:17 .

drwxr-xr-x 1 root root 4096 May 9 01:59 ..

-rw------- 1 analyst analyst 393 May 9 02:20 .bash\_history

-rw-r--r-- 1 analyst analyst 220 Apr 18 2019 .bash\_logout

-rw-r--r-- 1 analyst analyst 3574 May 9 01:59 .bashrc

-rw-r--r-- 1 analyst analyst 3574 May 9 01:59 .profile

-rw-r--r-- 1 root root 69 May 9 01:59 file1.txt

-rw-r--r-- 1 analyst analyst 152 May 9 02:20 file1hash

-rw-r--r-- 1 root root 79 May 9 01:59 file2.txt

-rw-r--r-- 1 analyst analyst 152 May 9 02:20 file2hash

analyst@dc24cdbf71c6:~$ history

1 clear

2 history

3 ls -al

4 pwd

5 cat file\*

6 cat file2\*

7 cat file1\*

8 clear

9 sha256sum file1.txt

10 sha256sum file2.txt

11 sha256sum file1.txt >> file1hash

12 sha256sum file2.txt >> file2hash

13 ls -al

14 cat file1has

15 cat file1hash

16 cat file2hash

17 cmp file1hash file2hash

18 clear

19 history

20 cat file\*

21 cat file2\*

22 cat file1\*

23 sha256sum file1.txt

24 sha256sum file2.txt

25 sha256sum file1.txt >> file1hash

26 sha256sum file2.txt >> file2hash

27 ls -al

28 history

analyst@dc24cdbf71c6:~$ !16

cat file2hash

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !17

cmp file1hash file2hash

file1hash file2hash differ: char 1, line 1

analyst@dc24cdbf71c6:~$ !21

cat file2\*

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

9sxa5Yq20R2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !22

cat file1\*

X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-ANTIVIRUS-TEST-FILE!$H+H\*

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

analyst@dc24cdbf71c6:~$ !23

sha256sum file1.txt

131f95c51cc819465fa1797f6ccacf9d494aaaff46fa3eac73ae63ffbdfd8267 file1.txt

analyst@dc24cdbf71c6:~$ !24

sha256sum file2.txt

2558ba9a4cad1e69804ce03aa2a029526179a91a5e38cb723320e83af9ca017b file2.txt

analyst@dc24cdbf71c6:~$ !25

sha256sum file1.txt >> file1hash

analyst@dc24cdbf71c6:~$ !26

sha256sum file2.txt >> file2hash

analyst@dc24cdbf71c6:~$ ls -al

total 44

drwxr-xr-x 2 analyst analyst 4096 May 9 02:17 .

drwxr-xr-x 1 root root 4096 May 9 01:59 ..

-rw------- 1 analyst analyst 574 May 9 02:21 .bash\_history

-rw-r--r-- 1 analyst analyst 220 Apr 18 2019 .bash\_logout

-rw-r--r-- 1 analyst analyst 3574 May 9 01:59 .bashrc

-rw-r--r-- 1 analyst analyst 3574 May 9 01:59 .profile

-rw-r--r-- 1 root root 69 May 9 01:59 file1.txt

-rw-r--r-- 1 analyst analyst 228 May 9 02:21 file1hash

-rw-r--r-- 1 root root 79 May 9 01:59 file2.txt

-rw-r--r-- 1 analyst anal