



## **Final Project**

### **CA-CYESN**

Instructions:

1. Read all instructions.
2. Prepare needed files.
3. Write your program code.

Total \_\_\_\_\_/60

## Objective

The purpose of this project is to implement file hashes, compare file hashes, describe the usage and importance of file hashing, and define file integrity.

## Required Material

- Customer-supplied desktop/laptop hardware system
- Windows 10 Professional installed
- MD5deep installed
- MD5deep may be obtained from <https://sourceforge.net/projects/md5deep/files/md5deep/md5deep-4.3/md5deep-4.3.zip/download>, or
- Download, extract, and move the MD5deep folder to your desktop.

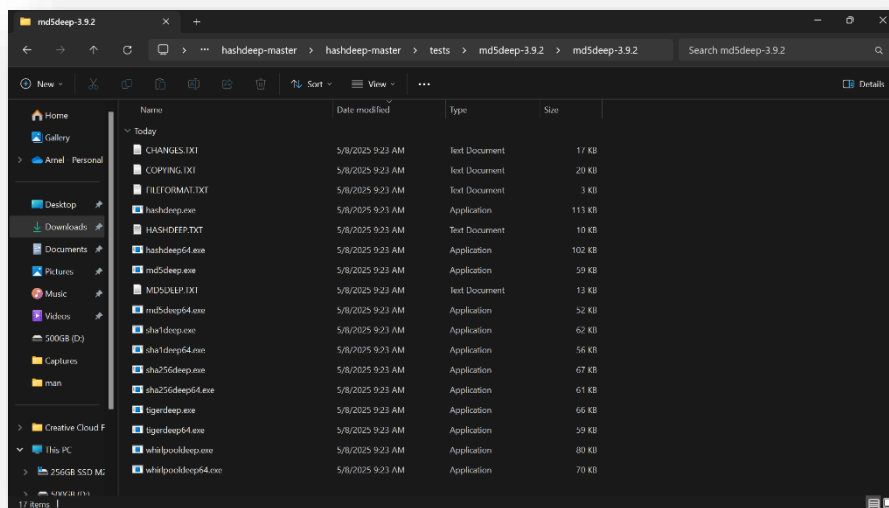
## PROJECTS SPECIFICATIONS

### Instructions

In this procedure, you will create and compare hashes. You will also tamper with the file to witness the differences in hashing, so you will better understand what ensuring file integrity really means.

#### Part1 1:

1. Power on your machine.
2. Log on to your computer using your administrative account.
3. Double-click the md5deep-4.3 folder, located on the desktop.
4. To help navigate which files are which, you will change the view option to show the file extensions of each file.
5. Click the View tab near the top left of the window and place a check in the box next to File Name Extensions; this will add the extensions to each file to help you navigate which files are which. **(Screenshot Required)**



6. Locate md5deep.exe, sha1deep.exe, and whirlpooldeep.exe. These will be the hash algorithms

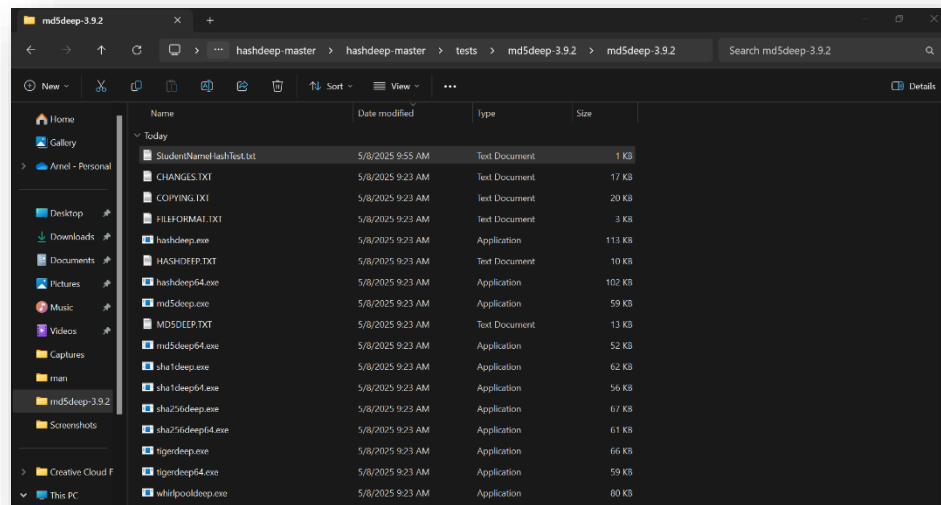
you will test.

## Part 2:

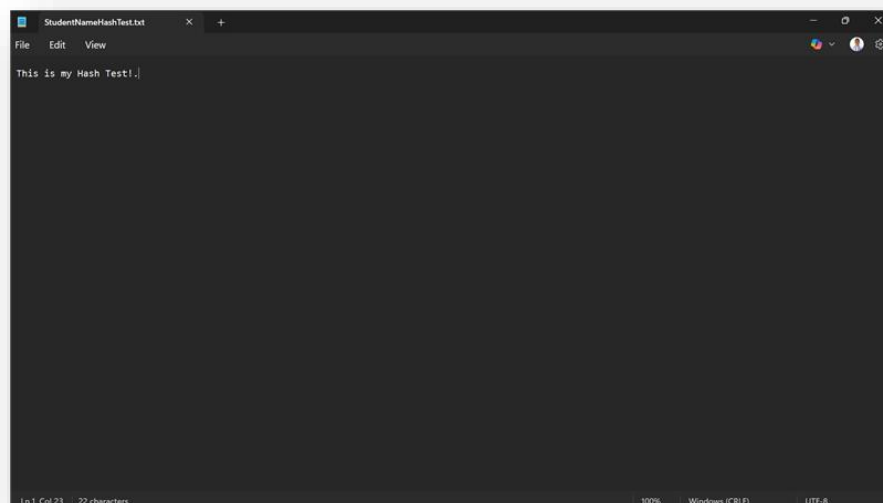
### Creating a Test File

Create a test file in the same folder as the hash algorithms. Using the command line can be difficult if you are not familiar with it, so keeping the file in the same folder will create an easier environment to navigate.

1. Right-click any empty white space in the right pane.
2. Navigate to and select New ➤ Text Document.
3. You will be prompted to create a name for the new text document. Type **StudentNameHashTest** as the name. Notice the file is given a .txt extension. Press Enter to confirm. **(Screenshot Required)**



4. Double-click the **StudentNameHashTest.txt** file to open it in Notepad.
5. Type **This is my Hash Test!.** **(Screenshot Required)**



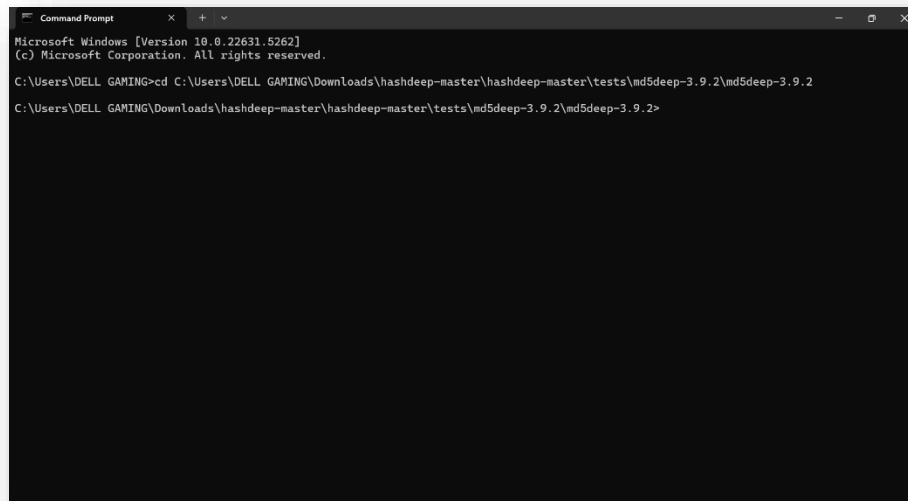
- Click File, and then select Save to save the contents. Exit Notepad by clicking on the red X in the top-right corner of the window.

### Part 3:

#### Creating Multiple Hashes

A hash is similar to a digital fingerprint. It is considered secure if it includes a fixed size, is unique, and cannot be reversed to reveal the original plaintext.

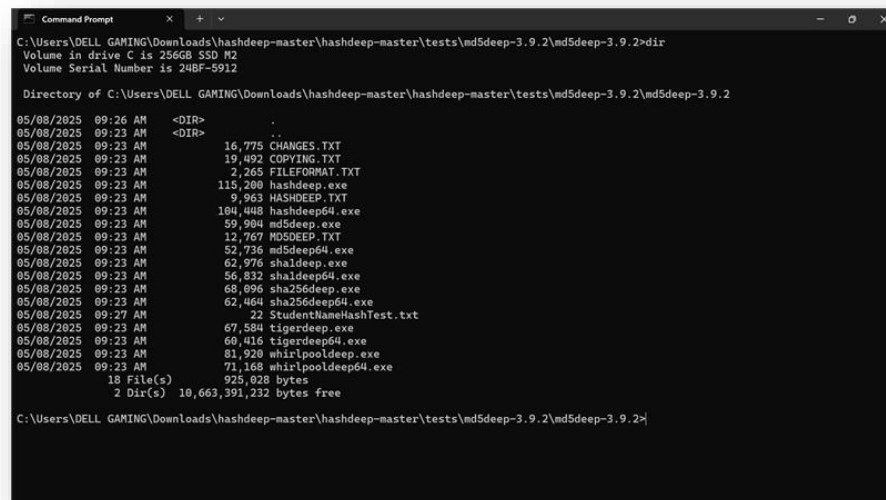
- Leave the md5deep-4.3 folder open.
- To locate the command prompt, type cmd in the embedded search bar and press Enter. The Command Prompt window will be launched.
- You will need to change directories to be inside the md5deep-4.3 folder. Type `cd C:\users\your account name\desktop\md5deep-4.3` and press Enter. You will be redirected to the folder **(Screenshot Required)**



```
Microsoft Windows [Version 10.0.22631.5262]
(c) Microsoft Corporation. All rights reserved.

C:\Users\DELL GAMING>cd C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

- Now that the command prompt is located in the folder, you can view the contents by typing `dir` and pressing Enter. The contents of the folder will be displayed **(ScreenShot Required)**



```
Microsoft Windows [Version 10.0.22631.5262]
(c) Microsoft Corporation. All rights reserved.

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>dir
Volume in drive C is 256GB SSD M2
Volume Serial Number is 24BF-5912

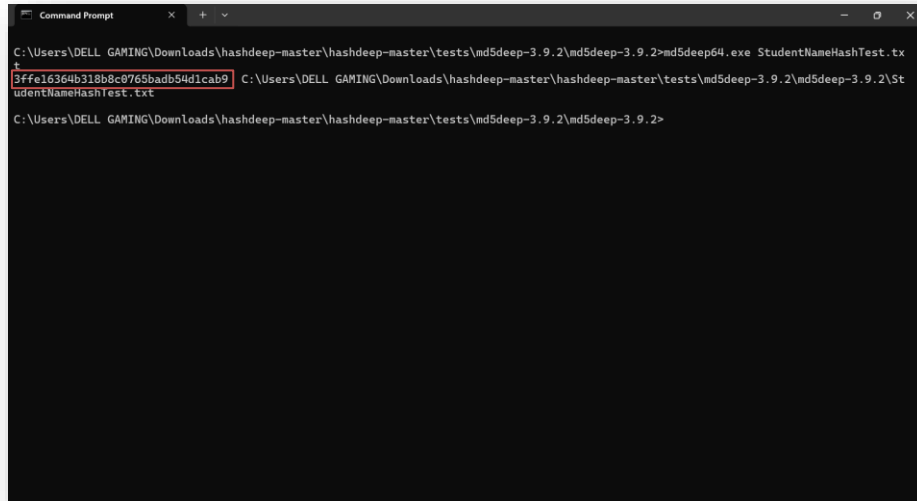
Directory of C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2

05/08/2025 09:26 AM <DIR>          .
05/08/2025 09:23 AM <DIR>          ..
05/08/2025 09:23 AM             16,775 CHANGES.TXT
05/08/2025 09:23 AM             19,492 COPYING.TXT
05/08/2025 09:23 AM              2,265 FILEFORMAT.TXT
05/08/2025 09:23 AM             115,200 hashdeep.exe
05/08/2025 09:23 AM              9,963 HASHDEEP.TXT
05/08/2025 09:23 AM             104,448 hashdeep64.exe
05/08/2025 09:23 AM             59,904 md5deep.exe
05/08/2025 09:23 AM             12,767 MD5DEEP.TXT
05/08/2025 09:23 AM             52,736 md5deep64.exe
05/08/2025 09:23 AM             62,976 sha1deep.exe
05/08/2025 09:23 AM             56,832 sha1deep64.exe
05/08/2025 09:23 AM             68,096 sha256deep.exe
05/08/2025 09:23 AM             62,464 sha256deep64.exe
05/08/2025 09:27 AM              22 StudentNameHashTest.txt
05/08/2025 09:23 AM             67,584 tigerdeep.exe
05/08/2025 09:23 AM             60,416 tigerdeep64.exe
05/08/2025 09:23 AM             81,920 whirlpooldeep.exe
05/08/2025 09:23 AM             71,168 whirlpooldeep64.exe
                18 File(s)          925,028 bytes
                2 Dir(s) 10,663,391,232 bytes free

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

Here you can see the same contents as within the Windows Explorer. Locate the hash algorithms you will be using, along with the StudentNameHashTest.txt file. Understand that to use these command-line tools you will need to type the entire filename with its associated extension.

5. To create your first hash, type `md5deep.exe StudentNameHashTest.txt`. This tells the computer to use MD5 to create a hash of StudentNameHashTest.txt. Press Enter to create the hash. **(Screenshot Required)**

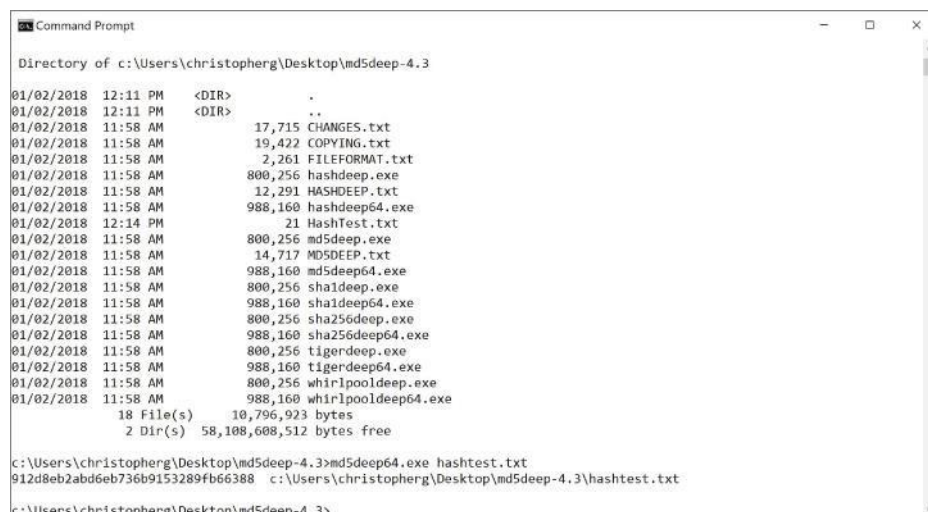


```
Command Prompt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2>md5deep64.exe StudentNameHashTest.txt
3ffe16364b318b8c9765badb54d1cab9 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\StudentNameHashTest.txt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2>
```

You should see a string of characters, as illustrated in the figure. This represents your file with the MD5 hash algorithm applied to it.

#### NOTE

You will receive an error if you attempt to use `md5deep.exe` on a 64-bit system. If you are currently using a 64-bit system, use `md5deep64.exe`. The same will be true for the following hash algorithms as well. Proper Hash output for 64-bit version is shown in Figure Below



```
Command Prompt
Directory of c:\Users\christopherg\Desktop\md5deep-4.3
01/02/2018 12:11 PM <DIR> .
01/02/2018 12:11 PM <DIR> ..
01/02/2018 11:58 AM      17,715 CHANGES.txt
01/02/2018 11:58 AM      19,422 COPYING.txt
01/02/2018 11:58 AM       2,261 FILEFORMAT.txt
01/02/2018 11:58 AM      800,256 hashdeep.exe
01/02/2018 11:58 AM      12,291 HASHDEEP.txt
01/02/2018 11:58 AM      988,160 hashdeep64.exe
01/02/2018 12:14 PM          21 HashTest.txt
01/02/2018 11:58 AM      800,256 md5deep.exe
01/02/2018 11:58 AM      14,717 MD5DEEP.txt
01/02/2018 11:58 AM      988,160 md5deep64.exe
01/02/2018 11:58 AM      800,256 sha1deep.exe
01/02/2018 11:58 AM      988,160 sha1deep64.exe
01/02/2018 11:58 AM      800,256 sha256deep.exe
01/02/2018 11:58 AM      988,160 sha256deep64.exe
01/02/2018 11:58 AM      800,256 tigerdeep.exe
01/02/2018 11:58 AM      988,160 tigerdeep64.exe
01/02/2018 11:58 AM      800,256 whirlpooldeep.exe
01/02/2018 11:58 AM      988,160 whirlpooldeep64.exe
18 File(s)      10,796,923 bytes
2 Dir(s)      58,108,608,512 bytes free

c:\Users\christopherg\Desktop\md5deep-4.3>md5deep64.exe hashtest.txt
912d8eb2abd6eb736b9153289fb66388 c:\Users\christopherg\Desktop\md5deep-4.3\hashtest.txt
c:\Users\christopherg\Desktop\md5deep-4.3>
```

6. Now type `sha1deep.exe StudentNameHashTest.txt` and press Enter, The string of numbers and letters represents your file with the Sha-1 hash algorithm applied to it. **(Screenshot Required)**

```
Command Prompt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>md5deep64.exe StudentNameHashTest.txt
3ffe16364b318b8c0765badb54d1cab9 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>sha1deep64.exe StudentNameHashTest.txt
e2450d49b26e0c7f96e7bf31ec4216cf58aa2124 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

*Notice that the hash output has more characters than the MD5 hash. The MD5 hash output is 128 bits, while the Sha-1 hash output is 160 bits. SHA (secure hash algorithm) is considered more secure.*

7. Finally, type whirlpooldeep.exe StudentNameHashTest.txt and press Enter. This will use the Whirlpool hash algorithm on the text file. **(Screenshot Required)**

```
Command Prompt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>whirlpooldeep64.exe StudentNameHashTest.txt
072f51b0702f9b9c38c4a6e4aeb7eeafa9254f4e18d0c1bdc43774832eeacbb650b916f0720511b02f27d61b1b88b66d1aac30e52b38c90c057b032bed6aa47d C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

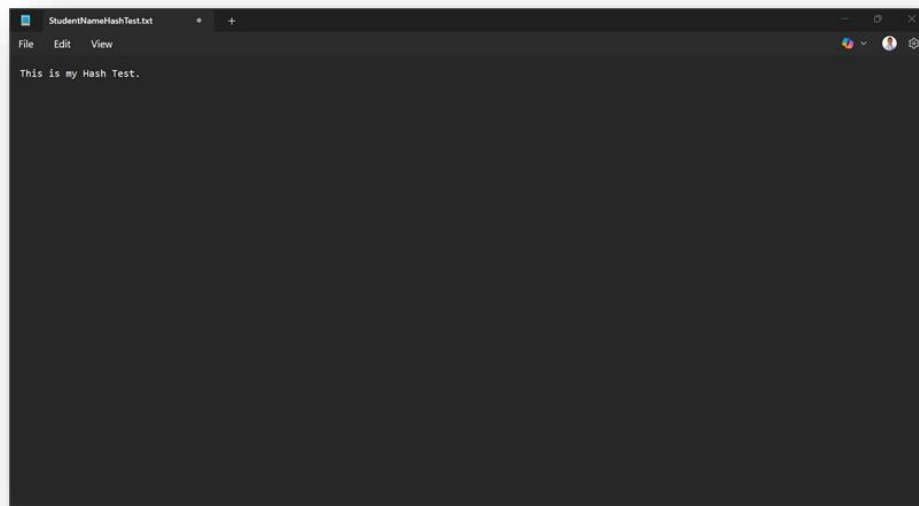
The Whirlpool hash algorithm employs an astounding 512-bit digest to the file, much larger than the previous two hashing algorithms.

## Part 4:

### Tampering with a File

The purpose of the hash is verifying file integrity. Now let's tamper with the file in a minimal way so you can later attempt to discern the subtle difference.

1. Leave the Command Prompt window open and return to the Windows Explorer window with the md5deep-4.3 folder open.
2. Double-click the HashTest.txt file to open it. Notepad will launch.
3. Delete the exclamation point and insert a period. The contents should now read, This is my Hash Test., **(Screenshot Required)**



4. Click File and select Save to save the file. Exit Notepad by clicking on the red X in the top-right corner of the window.
5. Exit the Windows Explorer window by clicking on the red X in the top-right corner of the window.

## Part 5:

### Comparing Hash Values

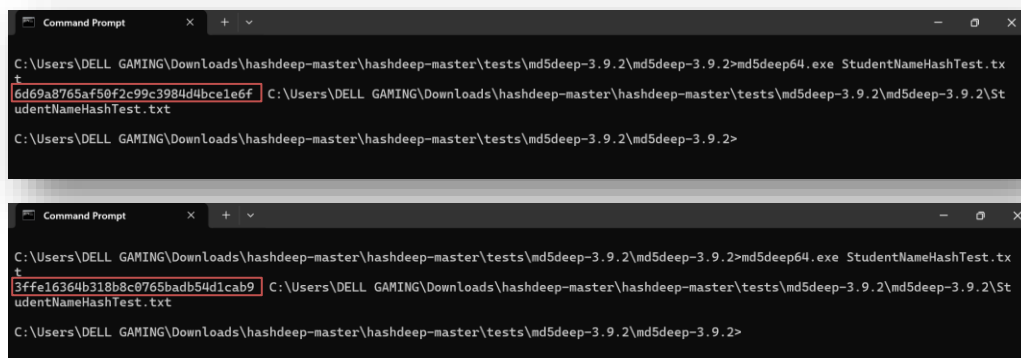
You might think with such a subtle change to the contents of the file that a hash output might be similar. You will now discover the importance of hash output by comparing the before and after of the file hashes.

1. Return to the command prompt. You should be able to view the three previous hashes.
2. At the prompt, type `md5deep.exe StudentNameHashTest.txt`. This will create a hash of the newly tampered with HashTest file. Press Enter.

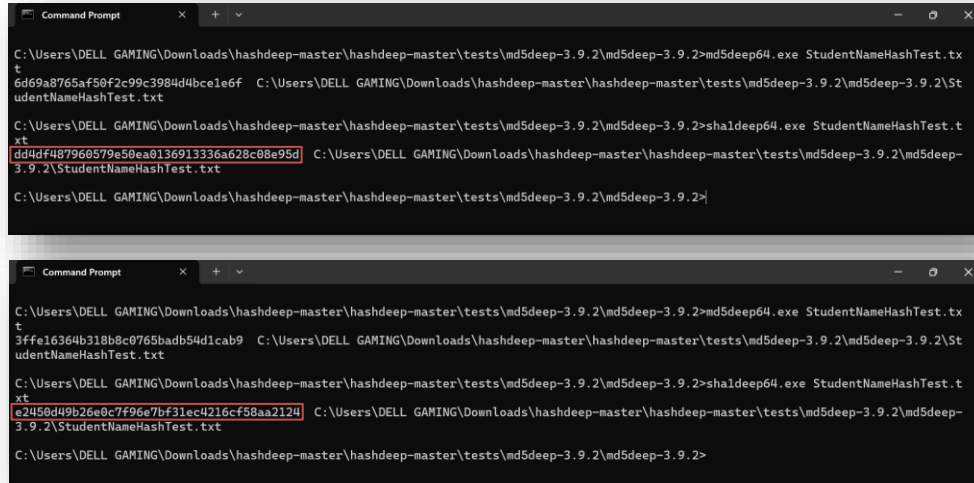
**Is there a difference between your new hash and your previous hash?**

Ans \_\_\_\_\_ Yes

As comparing this hash to the first hash reveals a completely different set of characters. This verifies the file's integrity. (**Screenshot Required**)



3. Type sha1deep.exe HashTest.txt and press Enter. The resulting hash will be displayed and should be different from the earlier hash (**Screenshot Required**)



```
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>md5deep64.exe StudentNameHashTest.txt
6d69a8765af50f2c99c3984d4bce1e6f C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>sha1deep64.exe StudentNameHashTest.txt
dd4df487960579e58ea0136913336a628c08e95d C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>md5deep64.exe StudentNameHashTest.txt
3ffe16364b318b8c0765badb54d1cab9 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

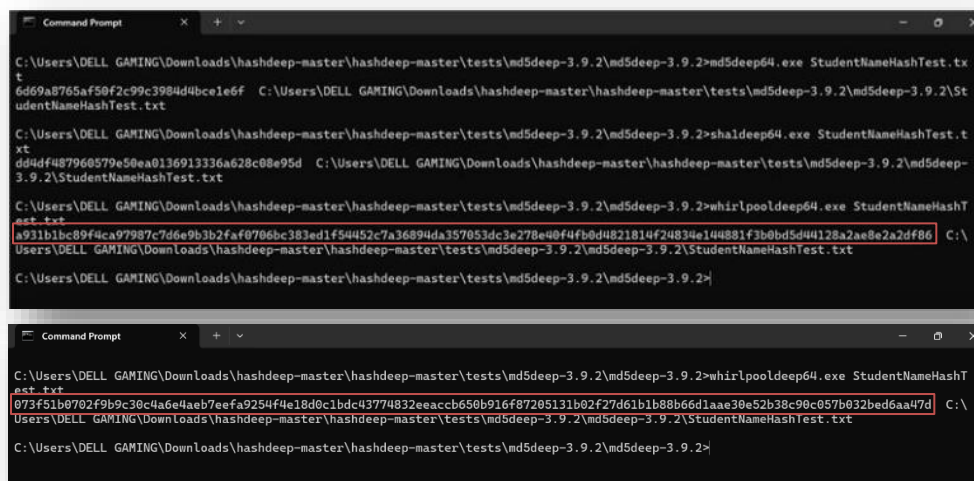
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>sha1deep64.exe StudentNameHashTest.txt
e2450d49b26e0c7f96e7bf31ec4216cf58aa2124 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

When you compare your Sha-1 outputs, is there a difference?

Ans: \_\_\_\_\_ Yes

4. Finally, type whirlpooldeep.exe HashTest.txt and press Enter. There should be a difference between the previous hash and the new hash. (**Screenshot Required**)



```
C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>md5deep64.exe StudentNameHashTest.txt
6d69a8765af50f2c99c3984d4bce1e6f C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>sha1deep64.exe StudentNameHashTest.txt
dd4df487960579e58ea0136913336a628c08e95d C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>whirlpooldeep64.exe StudentNameHashTest.txt
a9311b1bc89f4ca97987c7d6e9b3b2faf0706bc383ed1f54452c7a36894da357053dc3e278e40f4fbdd4821814f24834e144881f3b0bd5d44128a2ae8e2a2df86 C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>whirlpooldeep64.exe StudentNameHashTest.txt
873f51b0702f9b9c30c4a64aeb7eeafa9254f4e18d0c1bdc43774832eeac6b50b916f87205131b02f27d61b1b88b66d1aa30e52b38c90c057b032bed6aa47d C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2\StudentNameHashTest.txt

C:\Users\DELL GAMING\Downloads\hashdeep-master\hashdeep-master\tests\md5deep-3.9.2\md5deep-3.9.2>
```

Is there a difference between your hashes?

Ans: \_\_\_\_\_ Yes

5. Exit the command prompt by typing exit and pressing Enter.
6. Shut down the computer.



## MARKING SCHEME

You will be graded on:

Project component	Points
Part 2	20
Part 3	20
Part 4	20
Part 5	20
The total number of possible points is :	100%