

Lab - Encrypting and Decrypting Data using a Hacker Tool

Objectives

Part 1: Create and Encrypt Files

Part 2: Recover Encrypted Zip File Passwords

Background / Scenario

What if you work for a large corporation that had a corporate policy regarding removable media? Specifically, it states that only encrypted zipped documents can be copied to portable USB flash drives.

In this scenario, the Chief Financial Officer (CFO) is out-of-town on business and has contacted you in a panic with an emergency request for help. While out-of-town on business, he attempted to unzip important documents from an encrypted zip file on a USB drive. However, the password provided to open the zip file is invalid. The CFO contacted you to see if there was anything you could do.

Note: The provided scenario is simple and only serves as an example.

There may be some tools available to recover lost passwords. This is especially true in situations such as this where the cybersecurity analyst could acquire pertinent information from the CFO, such as the length of the password, and an idea of what it could be. Knowing pertinent information dramatically helps when attempting to recover passwords.

Examples of password recovery utilities and programs include hashcat, John the Ripper, Lophtcrack, and others. In our scenario, we will use **fcrackzip** which is a simple Linux utility to recover the passwords of encrypted zip files.

Consider that these same tools can be used by cybercriminals to discover unknown passwords. Although they would not have access to some pertinent information, with time, it is possible to discover passwords to open encrypted zip files. The amount of time required depends on the password strength and the password length. Longer and more complex passwords (mix of different types of characters) are more secure.

In this lab, you will:

- Create and encrypt sample text files.
- Decrypt the encrypted zip file.

Note: This lab should be used for instructional purposes only. The methods presented here should NOT be used to secure truly sensitive data.

Required Resources

- CyberOps Workstation Virtual Machine
- Internet access

Part 1: Create and Encrypt Files

In this part, you will create a few text files that will be used to create encrypted zip files in the next step.

Step 1: Create text files.

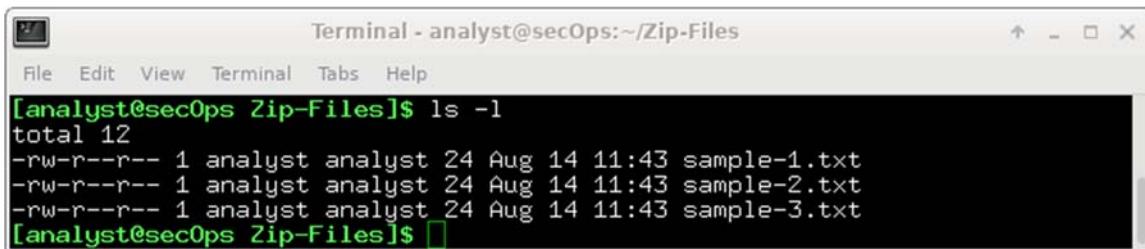
- a. Start the CyberOps Workstation VM.

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- b. Open a terminal window. Verify that you are in the analyst home directory. Otherwise, enter **cd ~** at the terminal prompt.
- c. Create a new folder called Zip-Files using the **mkdir Zip-Files** command.
- d. Move into that directory using the **cd Zip-Files** command.
- e. Enter the following to create three text files.

```
[analyst@secOps Zip-Files]$ echo This is a sample text file > sample-1.txt  
[analyst@secOps Zip-Files]$ echo This is a sample text file > sample-2.txt  
[analyst@secOps Zip-Files]$ echo This is a sample text file > sample-3.txt
```

- f. Verify that the files have been created, using the **ls** command.



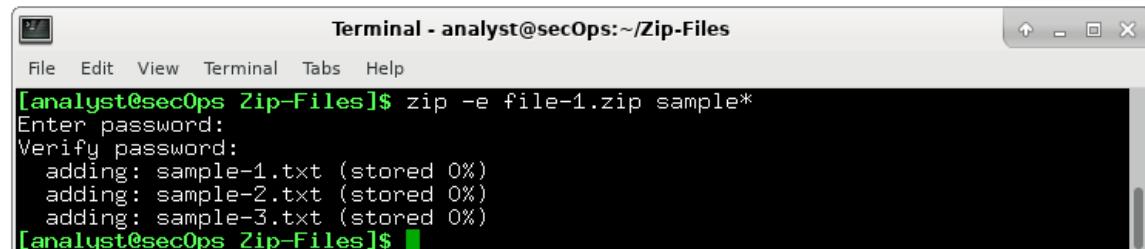
```
Terminal - analyst@secOps:~/Zip-Files  
File Edit View Terminal Tabs Help  
[analyst@secOps Zip-Files]$ ls -l  
total 12  
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-1.txt  
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-2.txt  
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-3.txt  
[analyst@secOps Zip-Files]$
```

Step 2: Zip and encrypt the text files.

Next, we will create several encrypted zipped files using varying password lengths. To do so, all three text files will be encrypted using the **zip** utility.

- a. Create an encrypted zip file called **file-1.zip** containing the three text files using the following command:

```
[analyst@secOps Zip-Files]$ zip -e file-1.zip sample*
```
- b. When prompted for a password, enter a one-character password of your choice. In the example, the letter **B** was entered. Enter the same letter when prompted to verify.

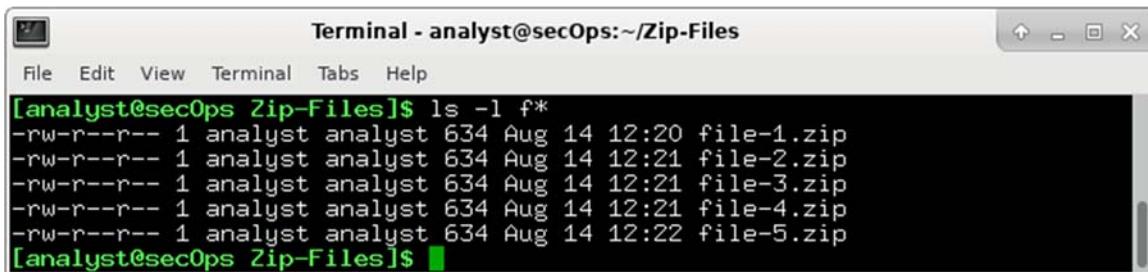


```
Terminal - analyst@secOps:~/Zip-Files  
File Edit View Terminal Tabs Help  
[analyst@secOps Zip-Files]$ zip -e file-1.zip sample*  
Enter password:  
Verify password:  
    adding: sample-1.txt (stored 0%)  
    adding: sample-2.txt (stored 0%)  
    adding: sample-3.txt (stored 0%)  
[analyst@secOps Zip-Files]$
```

- c. Repeat the procedure to create the following 4 other files
 - **file-2.zip** using a 2-character password of your choice. In our example, we used **R2**.
 - **file-3.zip** using a 3-character password of your choice. In our example, we used **0B1**.
 - **file-4.zip** using a 4-character password of your choice. In our example, we used **Y0Da**.
 - **file-5.zip** using a 5-character password of your choice. In our example, we used **C-3P0**.

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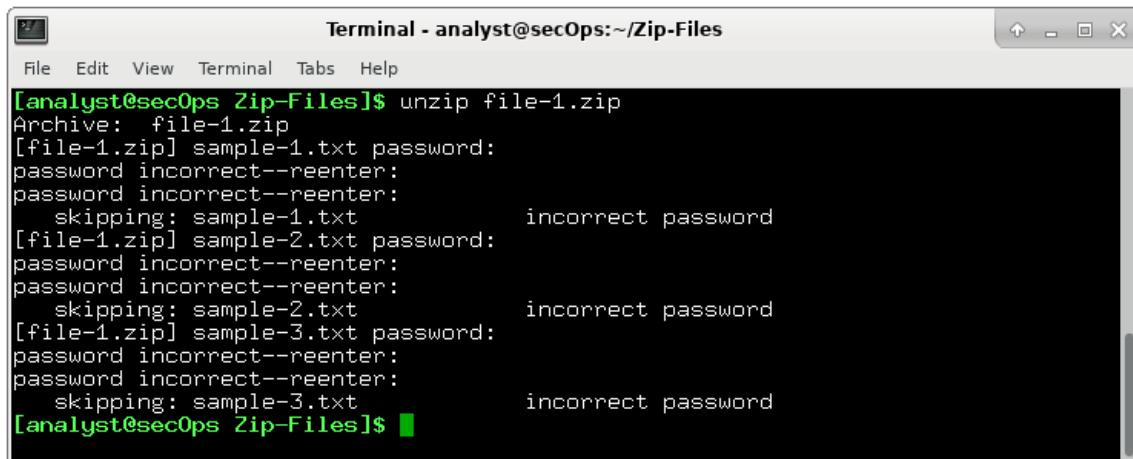
- d. Verify that all zipped files have been created using the **ls -l f*** command.



```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ ls -l f*
-rw-r--r-- 1 analyst analyst 634 Aug 14 12:20 file-1.zip
-rw-r--r-- 1 analyst analyst 634 Aug 14 12:21 file-2.zip
-rw-r--r-- 1 analyst analyst 634 Aug 14 12:21 file-3.zip
-rw-r--r-- 1 analyst analyst 634 Aug 14 12:21 file-4.zip
-rw-r--r-- 1 analyst analyst 634 Aug 14 12:22 file-5.zip
[analyst@secOps Zip-Files]$
```

- e. Attempt to open a zip using an incorrect password as shown.

```
[analyst@secOps Zip-Files]$ unzip file-1.zip
```



```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ unzip file-1.zip
Archive: file-1.zip
[file-1.zip] sample-1.txt password:
password incorrect--reenter:
password incorrect--reenter:
    skipping: sample-1.txt           incorrect password
[file-1.zip] sample-2.txt password:
password incorrect--reenter:
password incorrect--reenter:
    skipping: sample-2.txt           incorrect password
[file-1.zip] sample-3.txt password:
password incorrect--reenter:
password incorrect--reenter:
    skipping: sample-3.txt           incorrect password
[analyst@secOps Zip-Files]$
```

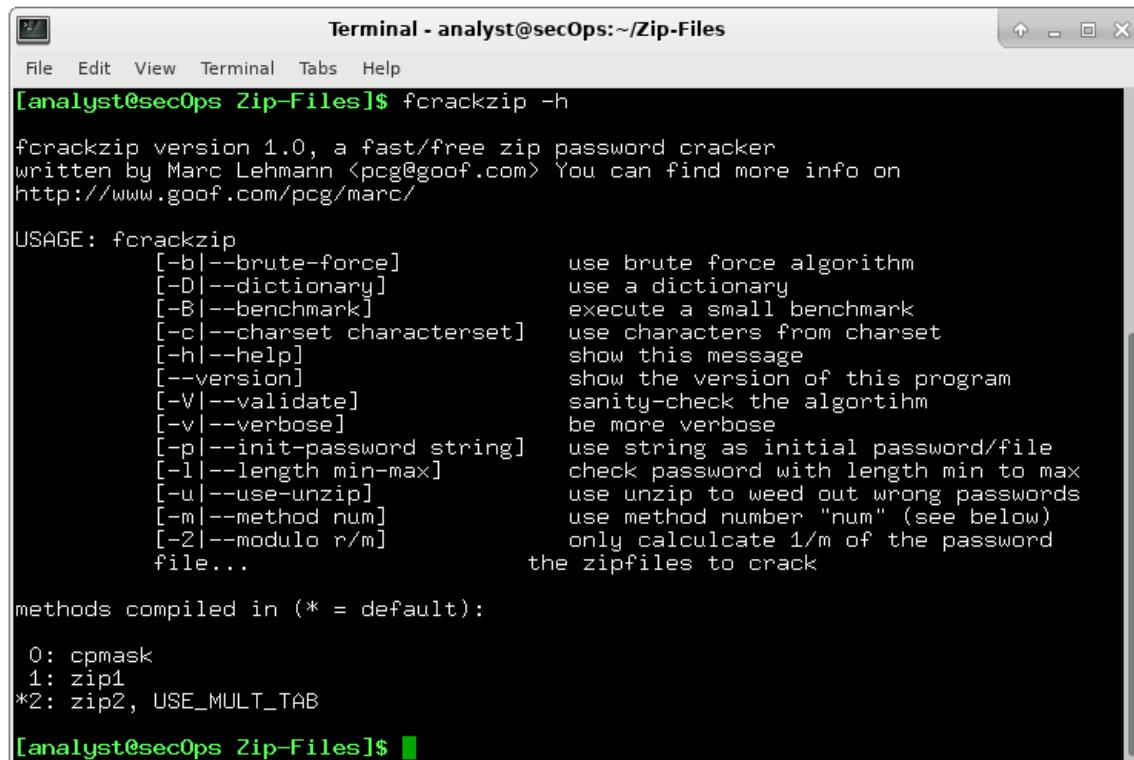
Part 2: Recover Encrypted Zip File Passwords

In this part, you will use the **fcrackzip** utility to recover lost passwords from encrypted zipped files. Fcrackzip searches each zip file given for encrypted files and tries to guess the password using brute-force methods.

The reason we created zip files with varying password lengths was to see if password length influences the time it takes to discover a password.

Step 1: Introduction to fcrackzip

- From the terminal window, enter the **fcrackzip -h** command to see the associated command options.



```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ fcrackzip -h
fcrackzip version 1.0, a fast/free zip password cracker
written by Marc Lehmann <pcg@goof.com> You can find more info on
http://www.goof.com/pcg/marc/

USAGE: fcrackzip
      [-b|--brute-force]          use brute force algorithm
      [-D|--dictionary]           use a dictionary
      [-B|--benchmark]            execute a small benchmark
      [-c|--charset charset]     use characters from charset
      [-h|--help]                  show this message
      [--version]                 show the version of this program
      [-V|--validate]              sanity-check the algorithm
      [-v|--verbose]                be more verbose
      [-p|--init-password string] use string as initial password/file
      [-l|--length min-max]       check password with length min to max
      [-u|--use-unzip]             use unzip to weed out wrong passwords
      [-m|--method num]            use method number "num" (see below)
      [-2|--modulo r/m]           only calculate 1/m of the password
      file...                      the zipfiles to crack

methods compiled in (* = default):
  0: cpmask
  1: zip1
*2: zip2, USE_MULT_TAB

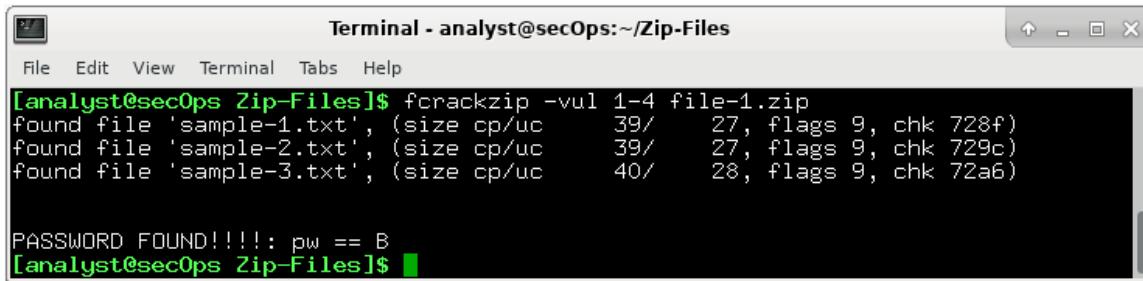
[analyst@secOps Zip-Files]$
```

In our examples, we will be using the **-v**, **-u**, and **-l** command options. The **-l** option will be listed last because it specifies the possible password length. Feel free to experiment with other options.

Step 2: Recovering Passwords using fcrackzip

- Now attempt to recover the password of the **file-1.zip** file. Recall, that a one-character password was used to encrypt the file. Therefore, use the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-1.zip
```



```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-1.zip
found file 'sample-1.txt', (size cp/uc    39/    27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc    39/    27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc    40/    28, flags 9, chk 72a6)

PASSWORD FOUND!!!!: pw == B
[analyst@secOps Zip-Files]$
```

Note: The password length could have been set to less than 1 – 4 characters.

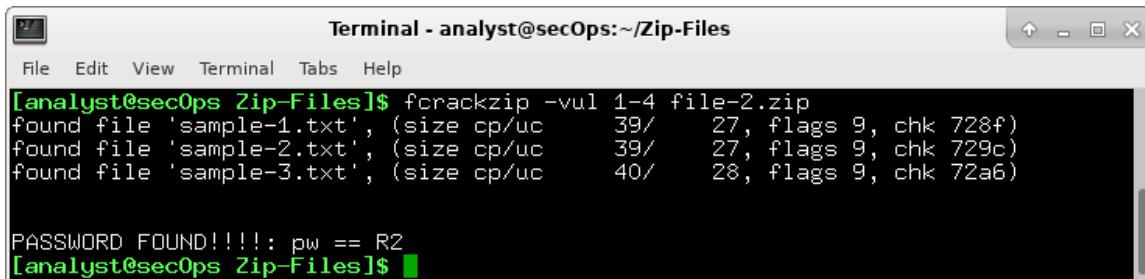
How long does it take to discover the password?

less than 1 second

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- b. Now attempt to recover the password of the **file-2.zip** file. Recall, that a two-character password was used to encrypt the file. Therefore, use the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-2.zip
```



A terminal window titled "Terminal - analyst@secOps:~/Zip-Files". The command `fcrackzip -vul 1-4 file-2.zip` is run. The output shows the program searching through a dictionary of words to find the password. It finds three files: sample-1.txt, sample-2.txt, and sample-3.txt, all with flags 9 and checksums 728f, 729c, and 72a6 respectively. Finally, it prints "PASSWORD FOUND!!!!: pw == R2".

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-2.zip
found file 'sample-1.txt', (size cp/uc      39/     27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc      39/     27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc      40/     28, flags 9, chk 72a6)

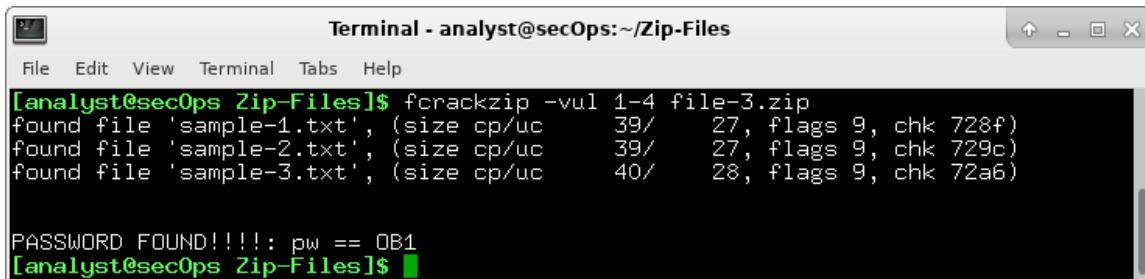
PASSWORD FOUND!!!!: pw == R2
[analyst@secOps Zip-Files]$
```

How long does it take to discover the password?

less than 1 second

- c. Repeat the procedure and recover the password of the **file-3.zip** file. Recall, that a three-character password was used to encrypt the file. Time to see how long it takes to discover a 3-letter password. Use the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-3.zip
```



A terminal window titled "Terminal - analyst@secOps:~/Zip-Files". The command `fcrackzip -vul 1-4 file-3.zip` is run. The output shows the program searching through a dictionary of words to find the password. It finds three files: sample-1.txt, sample-2.txt, and sample-3.txt, all with flags 9 and checksums 728f, 729c, and 72a6 respectively. Finally, it prints "PASSWORD FOUND!!!!: pw == OB1".

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-3.zip
found file 'sample-1.txt', (size cp/uc      39/     27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc      39/     27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc      40/     28, flags 9, chk 72a6)

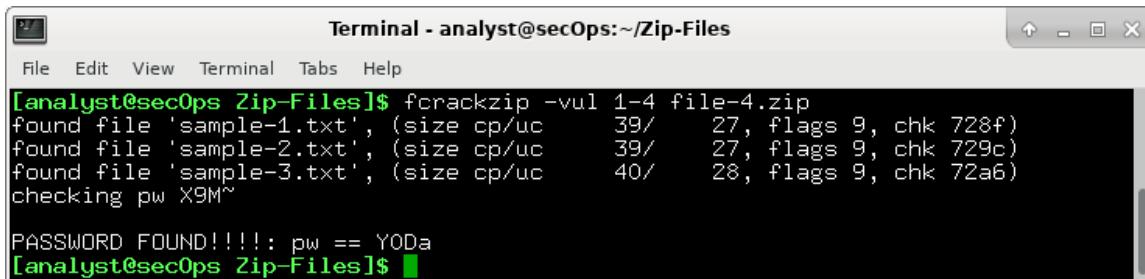
PASSWORD FOUND!!!!: pw == OB1
[analyst@secOps Zip-Files]$
```

How long does it take to discover the password?

less than 1 second

- d. How long does it take to crack a password of four characters? Repeat the procedure and recover the password of the **file-4.zip** file. Time to see how long it takes to discover the password using the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-4.zip
```



A terminal window titled "Terminal - analyst@secOps:~/Zip-Files". The command `fcrackzip -vul 1-4 file-4.zip` is run. The output shows the program searching through a dictionary of words to find the password. It finds three files: sample-1.txt, sample-2.txt, and sample-3.txt, all with flags 9 and checksums 728f, 729c, and 72a6 respectively. It then prompts for the password with "checking pw X9M~". Finally, it prints "PASSWORD FOUND!!!!: pw == YODa".

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-4.zip
found file 'sample-1.txt', (size cp/uc      39/     27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc      39/     27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc      40/     28, flags 9, chk 72a6)
checking pw X9M~

PASSWORD FOUND!!!!: pw == YODa
[analyst@secOps Zip-Files]$
```

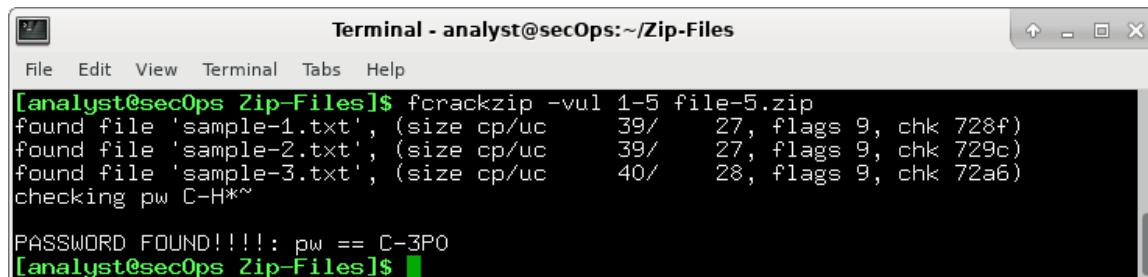
How long does it take to discover the password?

about 5 seconds

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- e. How long does it take to crack a password of five characters? Repeat the procedure and recover the password of the **file-5.zip** file. The password length is five characters, so we need to set the **-l** command option to **1-5**. Again, time to see how long it takes to discover the password using the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-5 file-5.zip
```



```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-5 file-5.zip
found file 'sample-1.txt', (size cp/uc 39/ 27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc 39/ 27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc 40/ 28, flags 9, chk 72a6)
checking pw C-H*~  
PASSWORD FOUND!!!!: pw == C-3PO
[analyst@secOps Zip-Files]$
```

How long does it take to discover the password?

It takes a long time to be able to crack the password.

- f. Recover a 6 Character Password using fcrackzip

It appears that longer passwords take more time to discover and therefore, they are more secure. However, a 6 character password would not deter a cybercriminal.

How long do you think it would take fcrackzip to discover a 6-character password?

I think it can take a lot of time to discover a 6-characters password.

To answer that question, create a file called **file-6.zip** using a 6-character password of your choice. In our example, we used **JarJar**.

```
[analyst@secOps Zip-Files]$ zip -e file-6.zip sample*
```

- g. Repeat the procedure to recover the password of the **file-6.zip** file using the following **fcrackzip** command:

```
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-6 file-6.zip
```

How long does it take fcrackzip to discover the password?

The simple truth is that longer passwords are more secure because they take longer to discover.

How long would you recommend a password needs to be for it to be secure?
