

21.2.11 Lab - Encrypting and Decrypting Data using a Hacker Tool



This lab has been updated for use on NETLAB+.
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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 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. The pertinent information could be 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.

Instructions

Part 1: Create and Encrypt Files

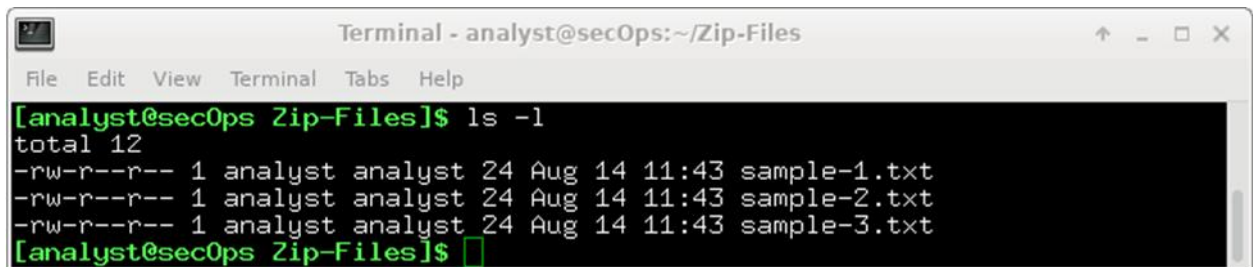
In this part, you will create a few text files that will be used to created encrypted zip files in the next step.

Step 1: Create text files.

- a. Launch the **Workstation** VM and log in with username **analyst** and password **cyberops**.

- 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 -l** command.

A terminal window titled "Terminal - analyst@secOps:~/Zip-Files" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The command prompt shows the user has entered 'ls -l', resulting in a listing of three files: sample-1.txt, sample-2.txt, and sample-3.txt, all with permissions -rw-r--r-- and owned by analyst.

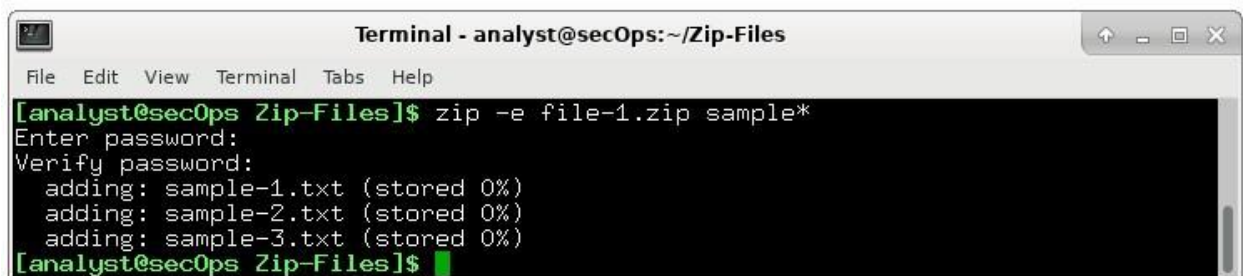
```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ ls -l
total 12
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-1.txt
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-2.txt
-rw-r--r-- 1 analyst analyst 24 Aug 14 11:43 sample-3.txt
[analyst@secOps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

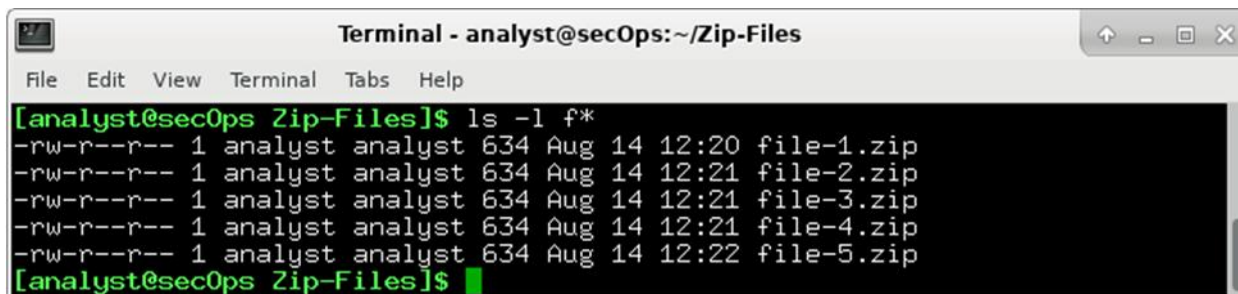
- a. Create an encrypted zip file called **file-1.zip** containing the three text files using the following command:

```
[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.

A terminal window titled "Terminal - analyst@secOps:~/Zip-Files" showing the execution of the 'zip -e file-1.zip sample*' command. It prompts for a password and verification, both of which are 'B'. It then shows the progress of adding the three sample files to the zip archive.

```
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]$
```

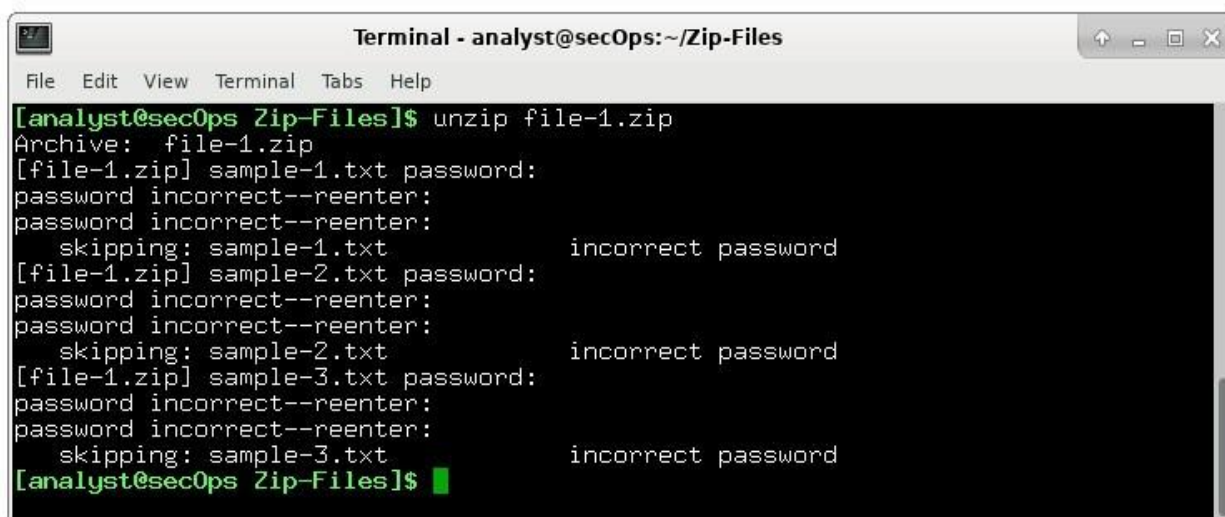
- c. Repeat the procedure to create the following 4 other files
 - **file-2.zip** using a 2-character password of your choice. In our example, we used **R2**.
 - **file-3.zip** using a 3-character password of your choice. In our example, we used **0B1**.
 - **file-4.zip** using a 4-character password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

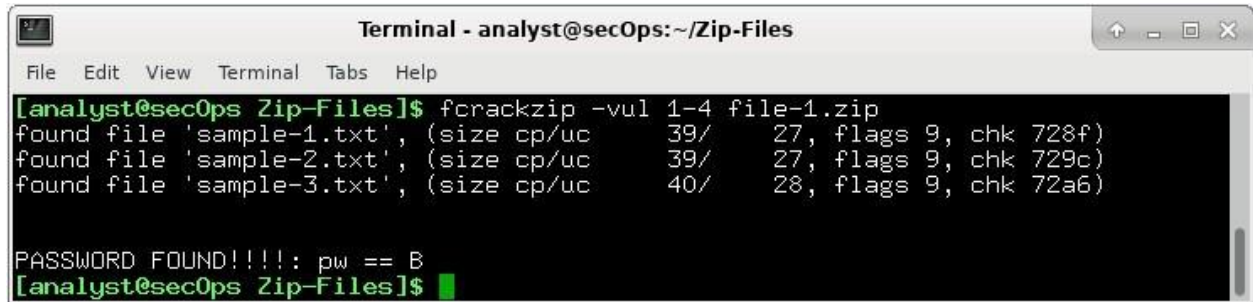
From the terminal window, enter the **fcrackzip -h** command to see the associated command options.

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

- a. 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)

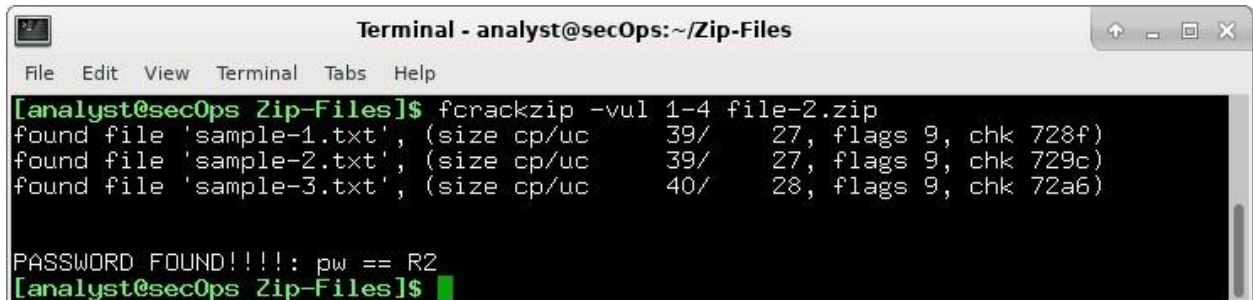
PASSWORD FOUND!!!!: pw == B
[analyst@secOps Zip-Files]$
```

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

How long does it take to discover the password?

- 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
```



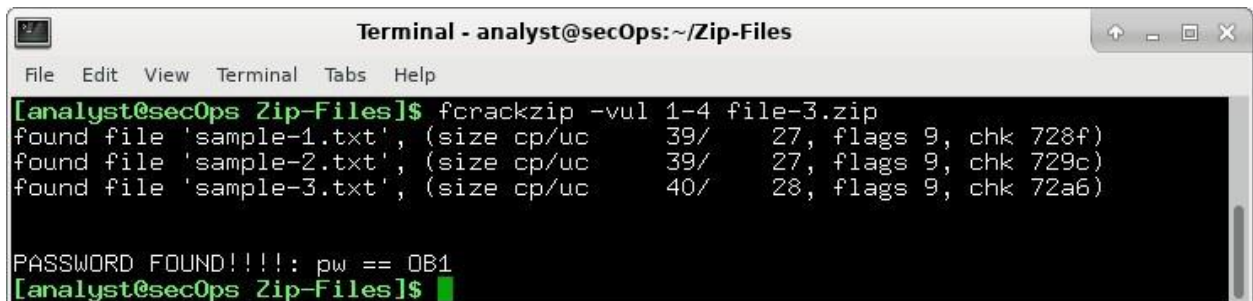
```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-2.zip
found file 'sample-1.txt', (size cp/uc 39/ 27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc 39/ 27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc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

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

How long does it take to discover the password?

- 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
```



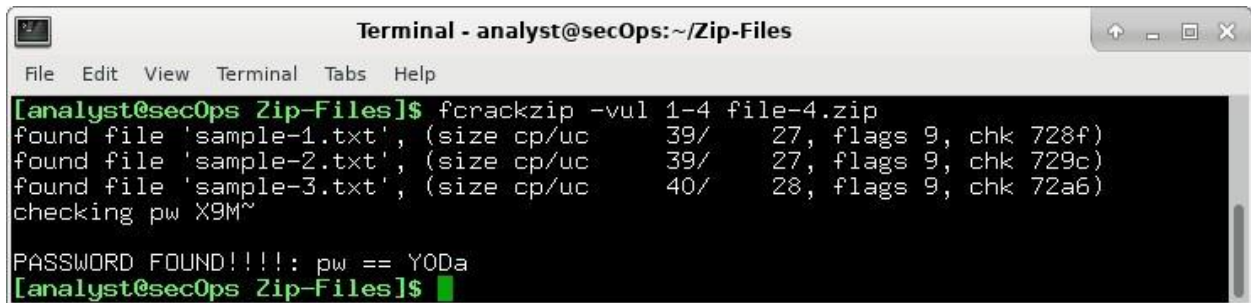
```
Terminal - analyst@secOps:~/Zip-Files
File Edit View Terminal Tabs Help
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-3.zip
found file 'sample-1.txt', (size cp/uc 39/ 27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc 39/ 27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc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

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

How long does it take to discover the password?

- 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
```

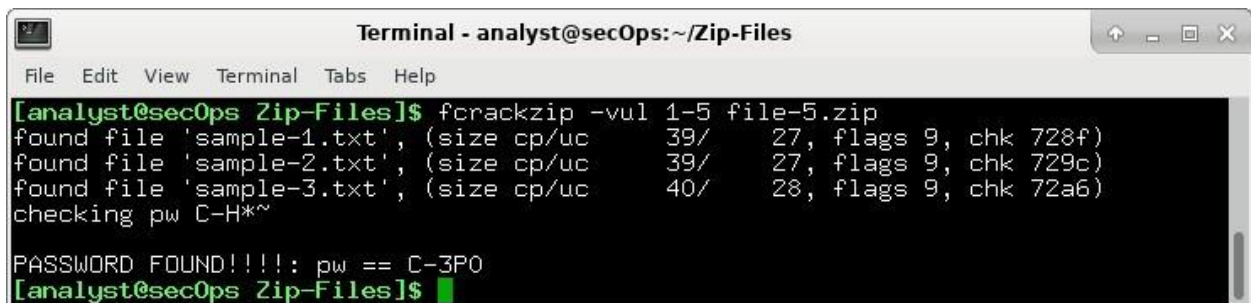


```
Terminal - analyst@secOps: ~/Zip-Files
[analyst@secOps Zip-Files]$ fcrackzip -vul 1-4 file-4.zip
found file 'sample-1.txt', (size cp/uc 39/ 27, flags 9, chk 728f)
found file 'sample-2.txt', (size cp/uc 39/ 27, flags 9, chk 729c)
found file 'sample-3.txt', (size cp/uc 40/ 28, flags 9, chk 72a6)
checking pw X9M~
PASSWORD FOUND!!!!: pw == Y0Da
[analyst@secOps Zip-Files]$
```

How long does it take to discover the password?

- 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 **-vul** 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
[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-3P0
[analyst@secOps Zip-Files]$
```

How long does it take to discover 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?

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
```

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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?
