

# Introduction to Computer Security

## Monitoring -Phase 4

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**Memo:-** Monitoring the Ransomware Detection using Watchdog.

**Objective:** - In this Phase we will be exploring the possible ransomware activity monitoring by using a python library called as watchdog. The logs are recorded in a text file to check for any possible intrusions. We will be monitoring the previously used critical folder where any changes like modifications or accessing them will be recorded.

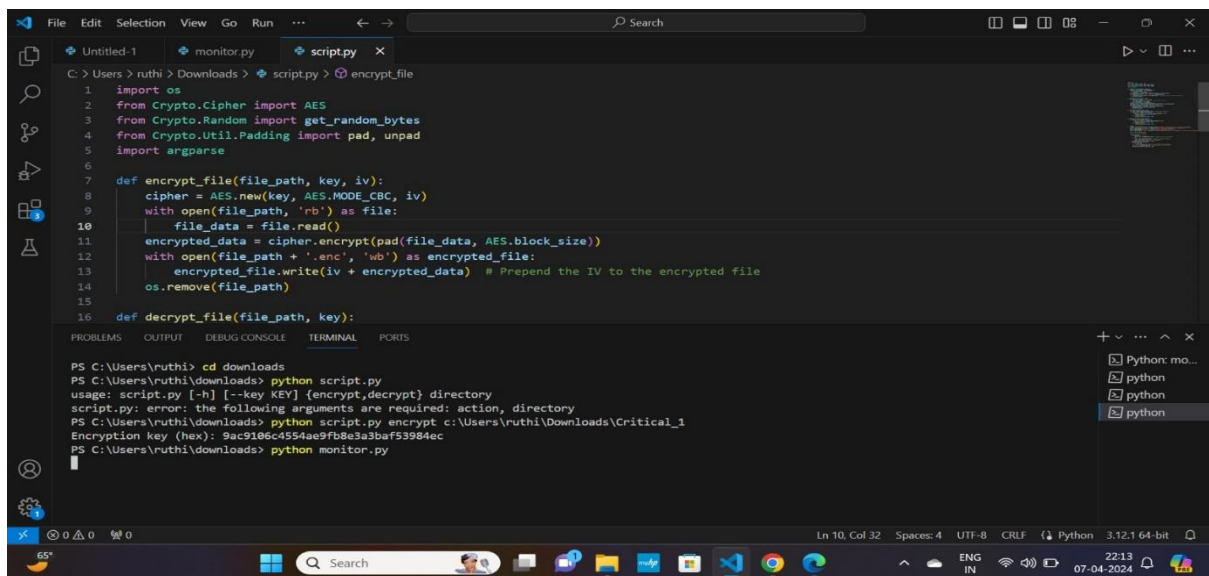
**Implementation:** - Importing the Necessary libraries such as Watchdog which is one of the python libraries used to monitor files or folders in any given path.

- Once we run the monitor.py file, it starts monitoring for any changes or modifications in the given path.
- Now, the logs are detected and saved in a text file named "file\_changes.log".
- I have encrypted the files by using the same encryption algorithm used in the previous phase and observed the changes to the logs.
- By this way we can monitor any changes if we would like to see intrusions in any organizations by honey trapping or catching the hackers by checking their path in which they have entered the organization.

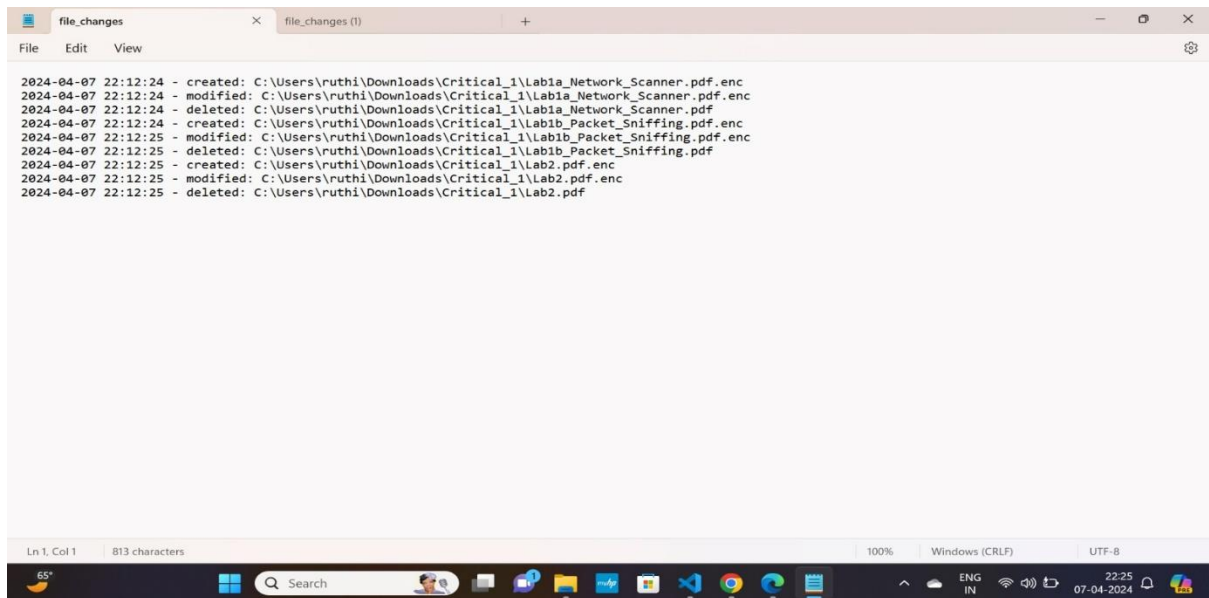
**Dependencies:** - Python 3.6 or later.

- Watchdog for file monitoring.

The below is the AES encryption code used in previous phase:-



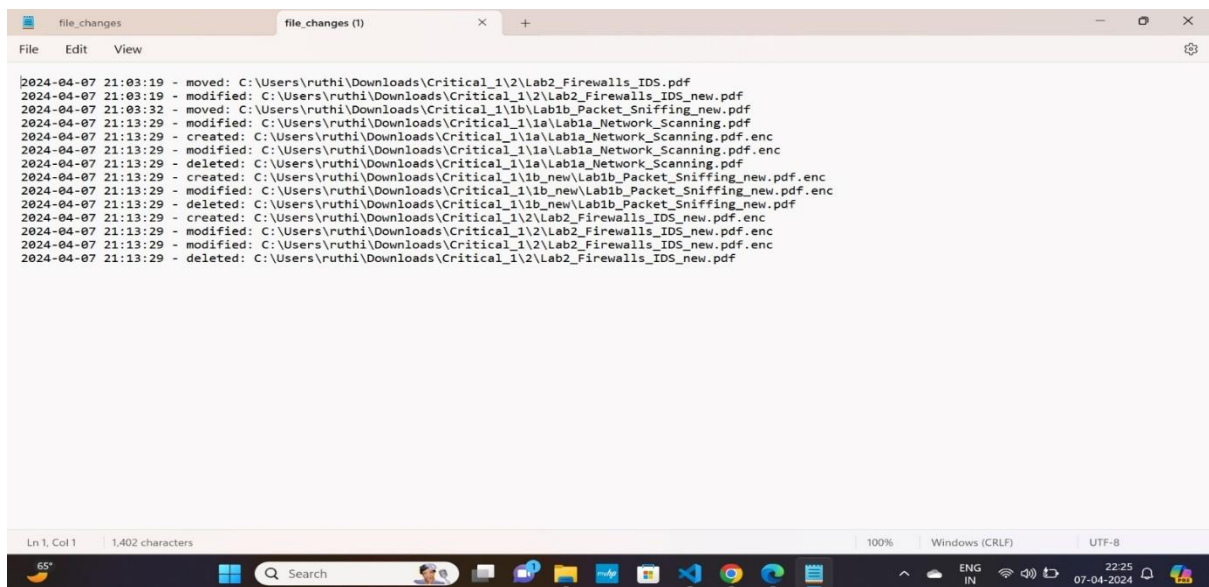
```
File Edit Selection View Go Run ... Search
C:\Users\ruthi> Downloads > script.py > encrypt_file
1 import os
2 from Crypto.Cipher import AES
3 from Crypto.Random import get_random_bytes
4 from Crypto.Util.Padding import pad, unpad
5 import argparse
6
7
8 def encrypt_file(file_path, key, iv):
9     cipher = AES.new(key, AES.MODE_CBC, iv)
10    with open(file_path, 'rb') as file:
11        file_data = file.read()
12    encrypted_data = cipher.encrypt(pad(file_data, AES.block_size))
13    with open(file_path + '.enc', 'wb') as encrypted_file:
14        encrypted_file.write(iv + encrypted_data) # Prepend the IV to the encrypted file
15    os.remove(file_path)
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17 def decrypt_file(file_path, key):
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A screenshot of a Notepad++ window titled 'file\_changes' with a single tab 'file\_changes (1)'. The window displays a list of file operations in a log format. The operations include creating, modifying, and deleting files in the path 'C:\Users\ruthi\Downloads\Critical\_1\Lab1a\_Network\_Scanner.pdf.enc' and 'C:\Users\ruthi\Downloads\Critical\_1\Lab1b\_Packet\_Sniffing.pdf.enc'. The status bar at the bottom indicates 'Ln 1, Col 1' and '813 characters'.

```
2024-04-07 22:12:24 - created: C:\Users\ruthi\Downloads\Critical_1\Lab1a_Network_Scanner.pdf.enc
2024-04-07 22:12:24 - modified: C:\Users\ruthi\Downloads\Critical_1\Lab1a_Network_Scanner.pdf.enc
2024-04-07 22:12:24 - deleted: C:\Users\ruthi\Downloads\Critical_1\Lab1a_Network_Scanner.pdf
2024-04-07 22:12:24 - created: C:\Users\ruthi\Downloads\Critical_1\Lab1b_Packet_Sniffing.pdf.enc
2024-04-07 22:12:25 - modified: C:\Users\ruthi\Downloads\Critical_1\Lab1b_Packet_Sniffing.pdf.enc
2024-04-07 22:12:25 - deleted: C:\Users\ruthi\Downloads\Critical_1\Lab1b_Packet_Sniffing.pdf
2024-04-07 22:12:25 - created: C:\Users\ruthi\Downloads\Critical_1\Lab2.pdf.enc
2024-04-07 22:12:25 - modified: C:\Users\ruthi\Downloads\Critical_1\Lab2.pdf.enc
2024-04-07 22:12:25 - deleted: C:\Users\ruthi\Downloads\Critical_1\Lab2.pdf
```

I tried checking it multiple times to make sure I am able to fetch the logs.



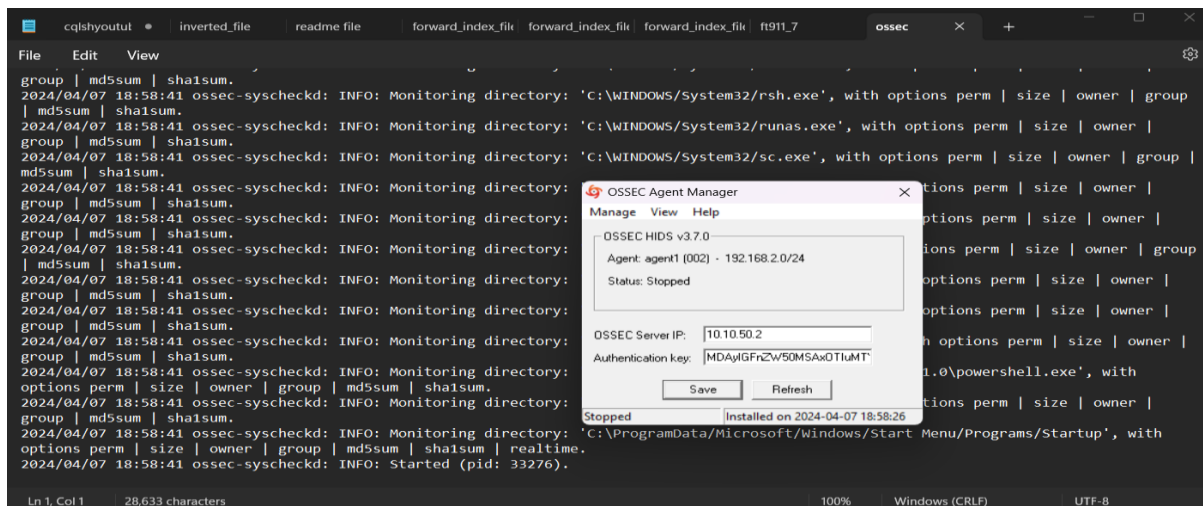
A screenshot of a Notepad++ window titled 'file\_changes' with a single tab 'file\_changes (1)'. The window displays a list of file operations in a log format. The operations include moving, modifying, and deleting files in the path 'C:\Users\ruthi\Downloads\Critical\_1\2\Lab2\_Firewalls\_IDS.pdf' and 'C:\Users\ruthi\Downloads\Critical\_1\1a\Lab1a\_Network\_Scanning.pdf'. The status bar at the bottom indicates 'Ln 1, Col 1' and '1,402 characters'.

```
2024-04-07 21:03:19 - moved: C:\Users\ruthi\Downloads\Critical_1\2\Lab2_Firewalls_IDS.pdf
2024-04-07 21:03:19 - modified: C:\Users\ruthi\Downloads\Critical_1\2\Lab2_Firewalls_IDS_new.pdf
2024-04-07 21:03:32 - moved: C:\Users\ruthi\Downloads\Critical_1\1b\Lab1b_Packet_Sniffing_new.pdf
2024-04-07 21:13:29 - modified: C:\Users\ruthi\Downloads\Critical_1\1a\Lab1a_Network_Scanning.pdf
2024-04-07 21:13:29 - created: C:\Users\ruthi\Downloads\Critical_1\1a\Lab1a_Network_Scanning.pdf.enc
2024-04-07 21:13:29 - modified: C:\Users\ruthi\Downloads\Critical_1\1a\Lab1a_Network_Scanning.pdf
2024-04-07 21:13:29 - deleted: C:\Users\ruthi\Downloads\Critical_1\1b_new\Lab1b_Packet_Sniffing_new.pdf
2024-04-07 21:13:29 - created: C:\Users\ruthi\Downloads\Critical_1\1b_new\Lab1b_Packet_Sniffing_new.pdf
2024-04-07 21:13:29 - modified: C:\Users\ruthi\Downloads\Critical_1\1b_new\Lab1b_Packet_Sniffing_new.pdf
2024-04-07 21:13:29 - deleted: C:\Users\ruthi\Downloads\Critical_1\1b_new\Lab1b_Packet_Sniffing_new.pdf
2024-04-07 21:13:29 - created: C:\Users\ruthi\Downloads\Critical_1\2\Lab2_Firewalls_IDS_new.pdf
2024-04-07 21:13:29 - modified: C:\Users\ruthi\Downloads\Critical_1\2\Lab2_Firewalls_IDS_new.pdf
2024-04-07 21:13:29 - deleted: C:\Users\ruthi\Downloads\Critical_1\2\Lab2_Firewalls_IDS_new.pdf
```

We can even use an application called OSSEC and monitor the logs just by specifying the path where we want to monitor.

- 1) We will need to specify the Server IP along with the authentication key.

- 2) From the screenshot you can see all the logs as they are selected by default.
- 3) If you need a specific folder or path then we will need to just select that particular path and delete the rest of the paths from the <syscheck> file in the program files.



**Conclusion:-** Our team has successfully developed code to monitor the changes in the file system which is possible to prevent ransomware attacks. We have found couple of ways such as watchdog and OSSEC to monitor and watch the logs of that particular folder or files. So, we can identify any intruders who are trying to access our files and make changes in our files.

The below are the screenshots which has the files created named "file changes" and the encrypted files in the critical folder once we have encrypted the critical folder.

