CTF Challenge Solution Guide

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Introduction

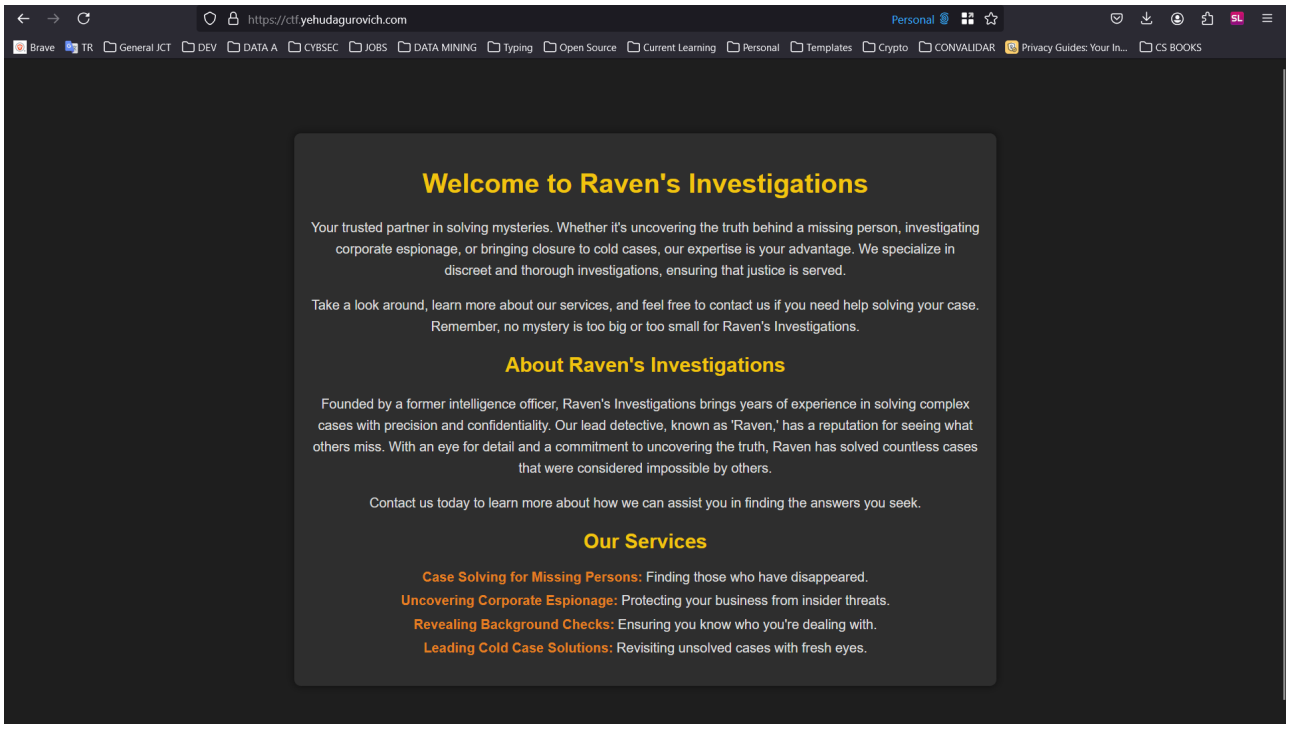
In this guide, we will walk through the solutions for each challenge in the CTF event. Each section will include a detailed explanation of the steps taken, screenshots illustrating progress, and any tools used. By following these steps, you should be able to solve the challenges and capture the flags.

Stage 1: Setup & Start

Step-by-Step Solution

1. **Go to the website**

   Start by going to ctf.yehudagurovich.com to access the initial page of the CTF.



Tools Used

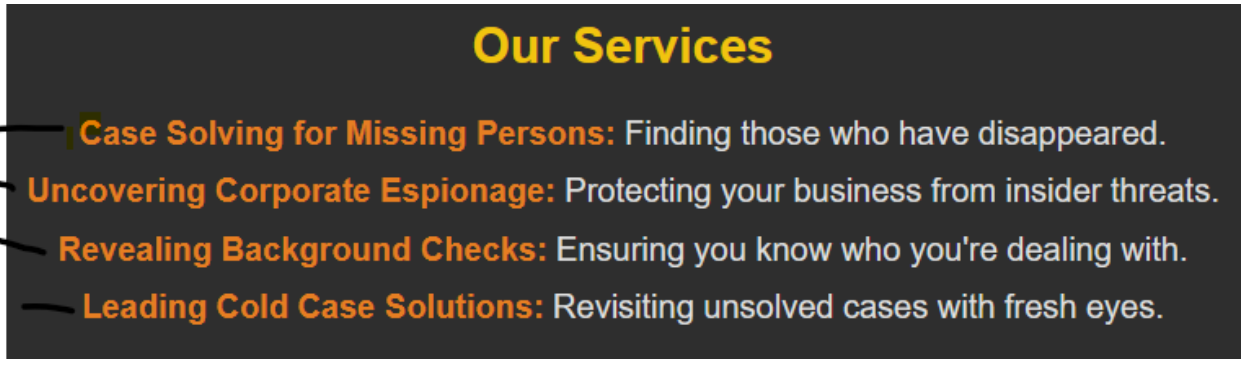
- Python
- HTTP server
- Google Cloud Platform
- Sockets
- Docker
- Self-hosted websites and domains

Stage 2: Finding the Secret Route

Step-by-Step Solution

1. **Identify the clue for CURL**

   Examine the "Our Services" section on the homepage. Note that each line starts with a capital letter. Combine these letters to form the word "CURL." As can be seen in the screenshot below, the first letter of each line spells out "CURL."



2. **Inspecting the Website using CURL**

Run the `curl` command on the website to reveal a hidden message. The command would be `curl http://ctf.yehudagurovich.com`. The message will show the following hidden message in the end:

```
If you're reading this, it means I couldn't finish what I started. But the truth is out there, waiting to be uncovered.
I need you to take this  route  even if it  is  dangerous from where I left off. There is a  secret  hidden in the shado
ws, lies that threaten everything we know. I'm begging you, don't let this end with me. You have to find the truth, no m
atter the cost. Your  mission  is critical. The future depends on it. Be careful. They're watching. Trust no one, and re
member, they will try to stop you at every turn. Stay vigilant. The truth is closer than you think.
```

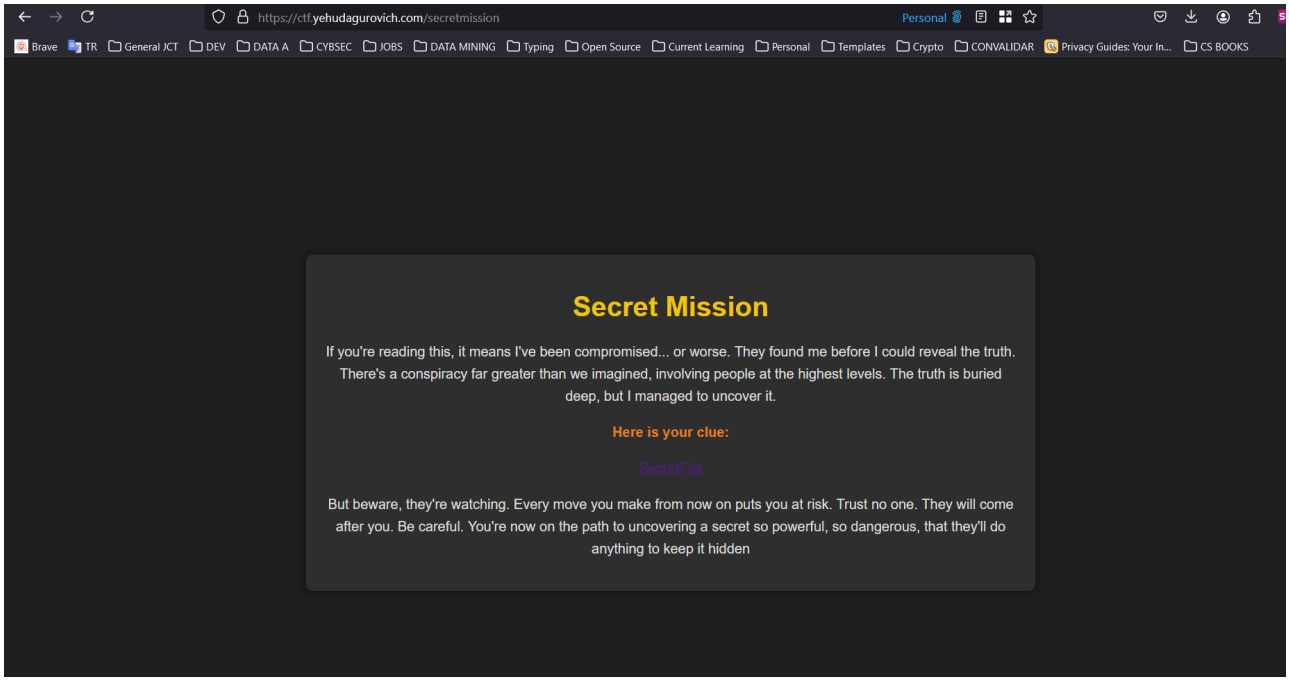
Be careful to make sure that the command is run correctly to reveal the hidden message. For example, powershell doesn't support the same curl as the command line, where the correct curl is.

3. **Finding Second Hidden Message**

   In the message we obtained, we can see that some words have 2 spaces between them. By combining these words, we get the message: "route is secret mission." This indicates the secret route: ctf.yehudagurovich.com/secretmessage.

4. **Go to secretmission route**

   Go to the secret mission route to download the necessary executable file.



Tools Used

- Curl
- Analyzing HTTP user agents and headers

Stage 3: Executing the File & MITM Attack

Step-by-Step Solution

1. **Open Wireshark on loopback mode**

   Open Wireshark and start capturing packets on the loopback interface. This will allow you to monitor the network traffic on your local machine.

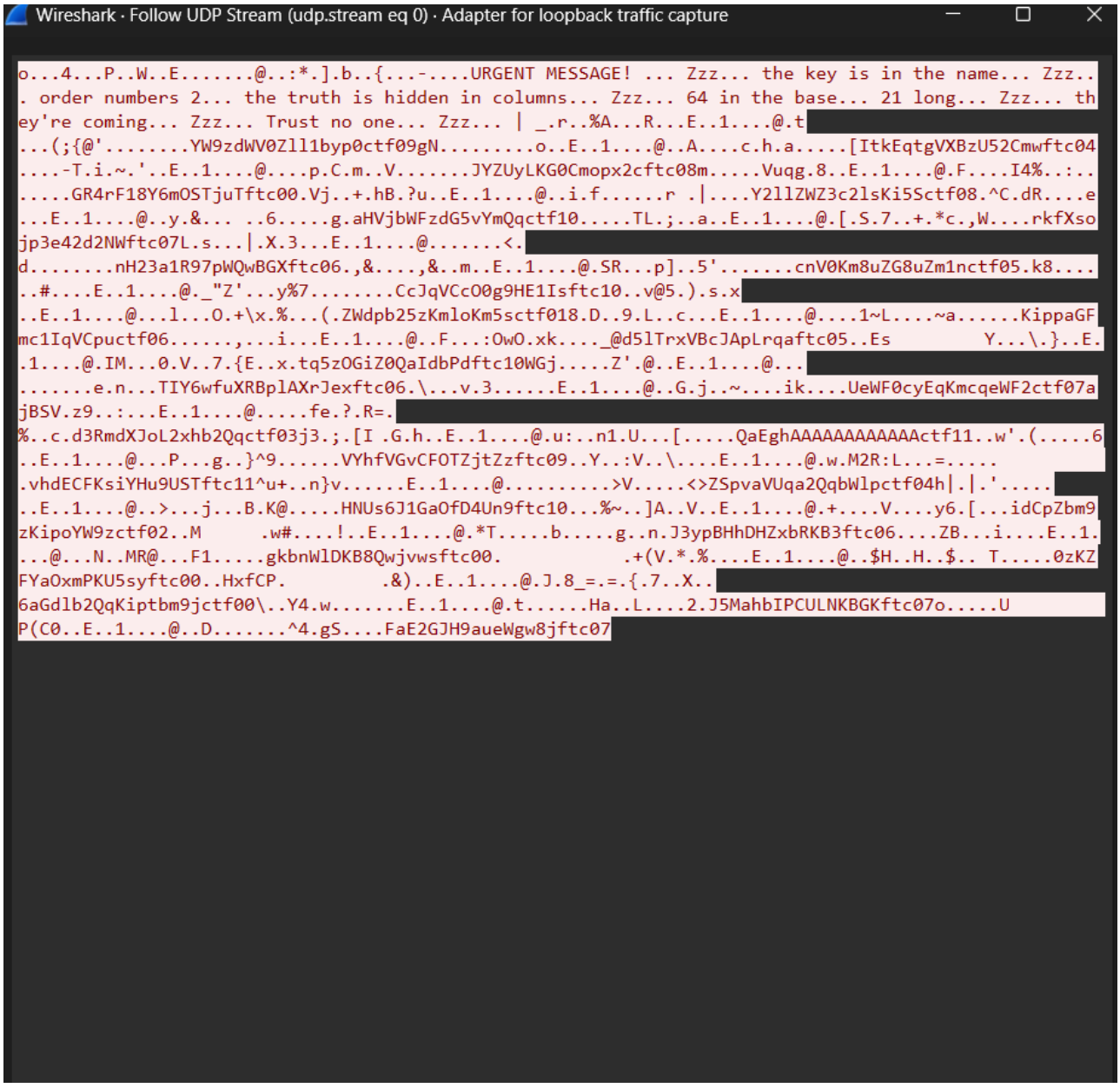
2. **Execute the `packets.exe` file**

   Execute the downloaded `packets.exe` file and monitor the network traffic to observe packet transmissions.

3. **Compile the Message**

   Following the UDP stream for the packets in Wireshark, you can extract the transmitted message. The message is encrypted and requires further analysis.

   The screenshot below shows the encrypted message extracted from the network traffic:



4. **Noticing clues and filtering useful data**

   On the first part of the message there are clues we need to set up the decryption of the message. We have *key is in the name* meaning **RAVEN**, *the truth is hidden in columns* meaning **Columnar Transposition Cipher**, *64 in the base* meaning **base64 encoding**, *order number 2* meaning the packets will be sorted by the last 2 digits of the packet message, and *21 long* meaning the message is 21 characters long.

One also has to notice that some messages have a `ctfXX` at the end, where `XX` is the order of the packet. These are the packets that need to be used to decrypt the message. and only the last 21 characters of the message are needed, to remove the header.

All this should be programmed in python, but a sample of how it would look like is here:

```
def reorganize_packets(packets: str, split_length: int) -> str:
    """
    Reorganize the packets to extract the hidden message. Make sure packets
is formatted correctly.
    """
    packets = packets.split('.')
    # Extract the packets that contain "ctf"
    packets = [re.sub(r'(ctf\d{2}).*', r'\1', packet)
            for packet in packets if 'ctf' in packet]
    # Obtain the last split_length characters of each packet
    packets = [packet[-split_length:] for packet in packets]
    # Sort the packets by the integer value of the last two characters
    packets = sorted(packets, key=lambda packet: int(packet[-2:]))
    hidden_message = ''.join(packet[:-5] for packet in packets)
    return b64decode(hidden_message).decode().rstrip('\x00')
```

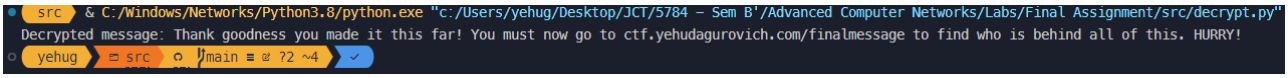
5. **Decrypting the Message**

Use Python to decrypt the message using the Columnar Transposition Cipher. The decrypted message will reveal the final message. All this should be programmed in python, but a sample of how it would look like is here:

```
def decrypt_column_cipher(key: str, encrypted_message: str) -> str:
    """
    Decrypt a message that was encrypted using the columnar cipher.
    """
    # Calculate the number of rows
    key_length = len(key)
    message_length = len(encrypted_message)
    num_rows = (message_length + key_length - 1) // key_length

    # Create sorted column indices (same as in encryption)
    column_indices = sorted(range(key_length), key=lambda k: key[k])

    # Create empty matrix
    matrix = [[''] * key_length for _ in range(num_rows)]

    # Fill the matrix column by column
    char_index = 0
    for col in column_indices:
        for row in range(num_rows):
            matrix[row][col] = encrypted_message[char_index]
            char_index += 1
```

```
        # Read the matrix row by row
        decrypted_message = ''.join(''.join(row) for row in matrix)

        # Remove padding
        return decrypted_message.rstrip('*').replace('*', ' ')
```

The final decrypted message would look like this:



Tools Used

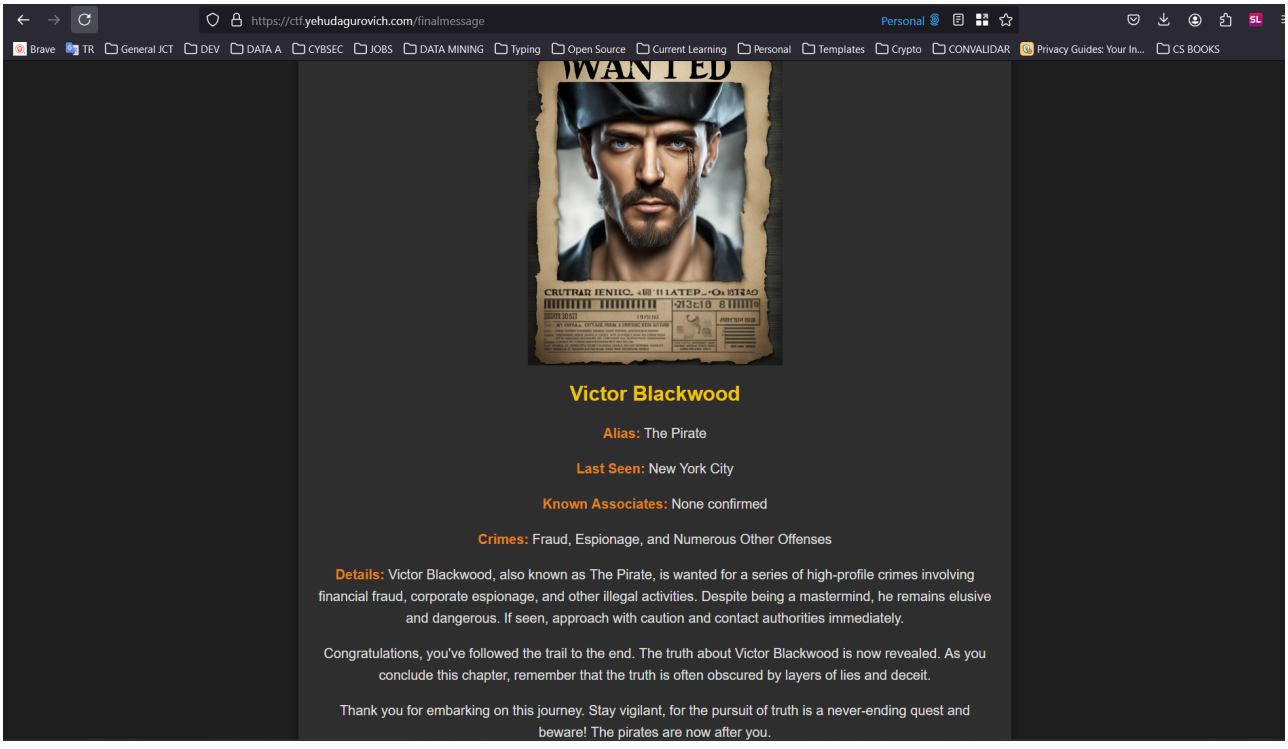
- MITM attacks
- Wireshark
- Python programming
- Cryptography
- Base64 encoding
- Executable files

Stage 4: Result

Step-by-Step Solution

1. **Go to the final website**

   Visit ctf.yehudagurovich.com/finalmessage to access the final message where you find out who is behind the conspiracy.



Conclusion

This guide provided a detailed walkthrough of the solutions for the CTF Stages. By following these steps and using the mentioned tools, you can solve the challenges and capture the flags successfully.