

Obfuscation & Deobfuscation

Overview

Room URL: <https://tryhackme.com/room/obfuscation-aoc2025-e5r8t2y6u9>

Difficulty: Medium

Category: Obfuscation

Date Completed: 12/18/2025

Objectives

- Learn about obfuscation, why and where it is used.
 - Learn the difference between encoding, encryption, and obfuscation.
 - Learn about obfuscation and the common techniques.
 - Use CyberChef to recover plaintext safely.
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Introduction

This challenge puts defenders in the shoes of McSkidy, a security analyst investigating a suspicious phishing email. The narrative centers around a malicious PowerShell script (`SantaStealer.ps1`) extracted from a PDF attachment. The objective is twofold: first, deobfuscate hidden content within the script to understand its malicious intent, and second, demonstrate offensive obfuscation techniques by encoding sensitive data (an API key) to evade detection. This two-part challenge

serves as an excellent introduction to common obfuscation methods used by threat actors, including Base64 encoding and XOR encryption, while emphasizing the importance of CyberChef as a Swiss Army knife for cryptographic operations.

Tools & Techniques

- **CyberChef:** The primary tool for both deobfuscation (Part 1) and obfuscation (Part 2). Its intuitive drag-and-drop interface and real-time output made it ideal for rapid experimentation.
 - **Visual Studio Code (VS Code):** Used as the execution environment for the PowerShell script. A critical step was **trusting the workspace** in VS Code to allow script execution without security warnings.
 - **PowerShell Terminal:** Executed the modified script to retrieve flags after completing each obfuscation/deobfuscation task.
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Walk Through

Part 1: Deobfuscation (Obtaining Flag 1)

1. **Script Analysis:** Opened `SantaStealer.ps1` in Visual Studio Code and navigated to the "Start here" section as instructed by the in-code comments.
2. **Pattern Recognition:** Identified a Base64-encoded string within the script—characterized by a long sequence of alphanumeric characters with `=` padding.
3. **Deobfuscation with CyberChef:**
 - Opened [CyberChef](#)
 - Pasted the Base64 string into the **Input** pane
 - Dragged the **From Base64** operation into the **Recipe** section
 - Clicked **BAKE!** to decode the string into plaintext
4. **Script Modification:** Replaced the obfuscated string in the PowerShell script with the decoded plaintext as per the challenge instructions.
5. **Execution:** Saved the modified script, opened PowerShell, navigated to the Desktop directory (`cd .\Desktop\`), and executed the script (`.\SantaStealer.ps1`) without debugging. **Flag 1 retrieved successfully.**

```
File Edit Selection View Go Run Terminal Help
C:\Users\Administrator\Desktop> .\SantaDeobfusc1.ps1 X
C:\Users\Administrator\Desktop> .\SantaDeobfusc1.ps1 ...
# Start Here
# Part 1: Deobfuscation
# =====
# TODO (Step 1): Deobfuscate the string present in the $C2B64 variable and place the URL in the $C2 variable,
# then run this script to get the flag.
# =====
$C2B64 = "aHR8cHh0L99JH1Sub30aH8v8dJsdGhTL2V4Zmls"
$C2 = "https://c2.northpole.thm/exfil"
# =====
# Part 2: Obfuscation
# =====
# TODO (Step 2): Obfuscate the API key using XOR single-byte key 0x37 and convert to hexadecimal,
# then add the hex string to the $ObfAPIKey variable.
# Then run this script again to receive Flag #2 from the validator.
$APIKey = "CANDY-CANE-API-KEY"
$ObfAPIKey = Invoke-XorDecode -Hex "HEX_HERE" -Key 0x37
# =====
# reference
function Decode-B64 {
    param([Parameter(Mandatory=$true)][string]$S)
    try { [System.Text.Encoding]::UTF8.GetString([Convert]::FromBase64String($S)) } catch { "" }
}
# reference
function Invoke-XorDecode {
    [CmdletBinding()]
    param(
        [AllowEmptyString()][string]$Hex,
        [int]$Key
    )
    if ([string]::IsNullOrWhiteSpace($Hex)) {
        return ""
    }
}
PS C:\Users\Administrator> PS C:\Users\Administrator>
[+] Recon: collecting host and user context
[+] Stealing Santas presents list
[+] Preparing payload
[+] Contacting C2 endpoint
[+] Exfiltration attempted (no response)
[+] Establishing foothold
[+] Downloading payload...
THM(C2_Deobfuscation_29838)
PS C:\Users\Administrator> PS C:\Users\Administrator>
```

6. **Objective Understanding:** The second challenge required *encoding* the malicious actor's API key using **XOR encryption** with a specific key (`0x37` in hexadecimal) to simulate how attackers hide sensitive credentials.

7. Obfuscation with CyberChef:

- Entered the plaintext API key (found in the script) into CyberChef's **Input** pane
- Dragged the **XOR** operation into the **Recipe** section
- Configured the XOR key as `37` and set the dropdown to **Hex** (ensuring the key was interpreted as hexadecimal `0x37`, not ASCII)
- The **Output** pane displayed the XOR-encrypted result in hexadecimal format

8. **Script Update:** Replaced the plaintext API key in the PowerShell script with the newly obfuscated hexadecimal string as instructed by the "Part 2" comments.

9. **Final Execution:** Saved and re-ran the script in PowerShell. **Flag 2 retrieved successfully.**

```
File Edit Selection View Go Run Terminal Help
SantaStealerp1 3 X
C:\Users\Administrator\Desktop> .\SantaStealerp1 > ...
0 #ErrorActionPreference - $SilentlyContinue
1
2 #-----
3 # Start here
4 # Part 1: Deobfuscation
5 #-----
6 # TODO (Step 1): Deobfuscate the string present in the $C2B64 variable and place the URL in the $C2 variable,
7 # then run this script to get the flag.
8
9 $C2B64 = "aHR0cHMwYjY5MjUzOTQ0aWVkb3VudGhtL2V4Zmls"
10 $C2 = "https://c2.northpole.thw/xf11"
11 #-----
12 # Part 2: Obfuscation
13 #-----
14 # TODO (Step 2): Obfuscate the API key using XOR single-byte key 0x37 and convert to hexadecimal,
15 # then add the hex string to the $ObfAPIKey variable.
16 # Then run this script again to receive Flag #2 from the validator.
17 $ApiKey = "CANDY-SAME-API-KEY"
18 $ObfAPIKey = Invoke-XorDecode -Hex "74 76 79 73 6e 1a 74 76 79 72 1a 76 67 7e 1a 7c 72 6e" -Key 0x37
19 #-----
20 # Reference
21
22 function Decode-Base64 {
23     param([Parameter(Mandatory=$true)][string]$S)
24     try { [System.Text.Encoding]::UTF8.GetString([Convert]::FromBase64String($S)) } catch { "" }
25 }
26
27 # Reference
28
29 function Invoke-XorDecode {
30     cmdletBinding()
31     param(
32         [AllowEmptyString()][string]$Hex,
33         [int]$Key
34     )
35     if ([string]::IsNullOrEmpty($Hex)) {
36         return ""
37     }
38 }
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