# Lab 4.3: Automating Adversary TTPs

## Introduction
Adversaries have been found to perform complicated TTPs in the course of an attack against a target. Emulating these TTPs can prove to be a lengthy and error-prone manual process. TTP automation is a valuable skill in making the execution of such TTPs easily repeatable and free of errors.

In this lab, we will demonstrate the automation of the initial access TTP emulated in Lab 4.2. You will follow provided samples of code to observe how automation of that TTP may be achieved using Python and Bash scripting. Deep coding or scripting knowledge is not required to follow along with this lab.

## Objectives:
1. Describe the reason for and value of automation.
2. Create and execute the APT 29 initial access TTP using automated tooling.

## Estimated Completion Time:
- 10 minutes

## Requirements
1. Kali VM – used as the attack platform to generate the payload and receive the reverse shell.
2. Windows Workstation VM – used as the victim workstation to execute the APT 29 emulated payload.

## Malware Warning
Fundamentally, this course entails executing publicly known adversary TTPs so that we can assess and improve cybersecurity. As a result, many of our tools and resources will likely be flagged as malicious by security products. We make every effort to ensure that our adversary emulation content is trusted and safe for the purpose of offensive security testing.

As a precaution, you should not perform these labs on any system that contains sensitive data. Additionally, you should never use capabilities and/or techniques taught in this course without first obtaining explicit written permission from the system/network owner(s).

# Overview

In Lab 4.2, we created an initial access payload following a TTP that APT 29 has been found to use. It was a very complex process for a single TTP, taking upwards of 30 minutes to walk through and execute. It also involved many steps, some of which required close attention to detail. With this combination of complexity and length, emulating this TTP not only becomes cumbersome, but also prone to error.

This is not an isolated case either. Adversaries continue to develop their tooling and procedures, which become increasingly sophisticated as they work to bypass defenses. Emulating those tools and procedures will also prove to be an increasingly complex and lengthy process.

To decrease both the amount of time taken to reproduce a TTP and the chances of error, we automate the TTP emulation process. Admittedly, developing the automation does take some time. However, we save time and reduce pressure during engagements where we need to reproduce the TTP.

# Walkthrough

For this TTP, the heavy lifting has already been done. Several Python and Bash scripts have been written to automate the process performed in Lab 4.2. The Python scripts perform the bulk of the work, such as creation of the base LNK object, preparation of and appending the loader scripts, and compressing the entire payload. The Bash scripts connect the pieces, performing setup, triggering the creation of the payload, and finally performing cleanup.

The custom-built scripts in Lab 4.3 are all either very easy to read or are heavily commented. They should be easy to understand on your own even without deep knowledge of coding. We'll walk through a few of the scripts here to gain familiarity with the overall processes of the automation.

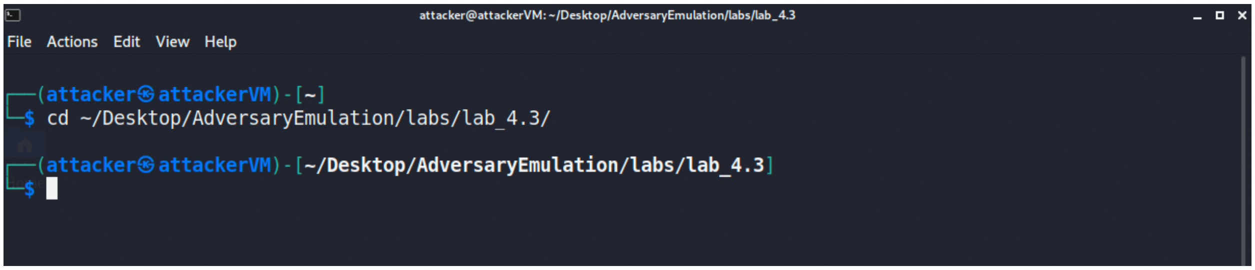
## Step 1: Access the Lab Environment

1. If you have a Cybrary Pro membership, you may access a pre-configured range environment from the Cybrary learning management system. Otherwise, you may use a self-hosted lab; for information on deploying a self-hosted lab, please see our Lab 1.2 walkthrough: https://github.com/maddev-engenuity/AdversaryEmulation/blob/main/labs/lab_1.2/Lab%201.2%20Setting%20Up%20Your%20Lab%20Environment%20v1.0.1.pdf

2. Login to the Kali attack platform using the following credentials:
    a. Username: `attacker`
    b. Password: `ATT&CK`

3. Open a terminal and navigate to the lab directory:

```
cd ~/Desktop/AdversaryEmulation/labs/lab_4.3/
```




4. Download latest lab updates, if any:

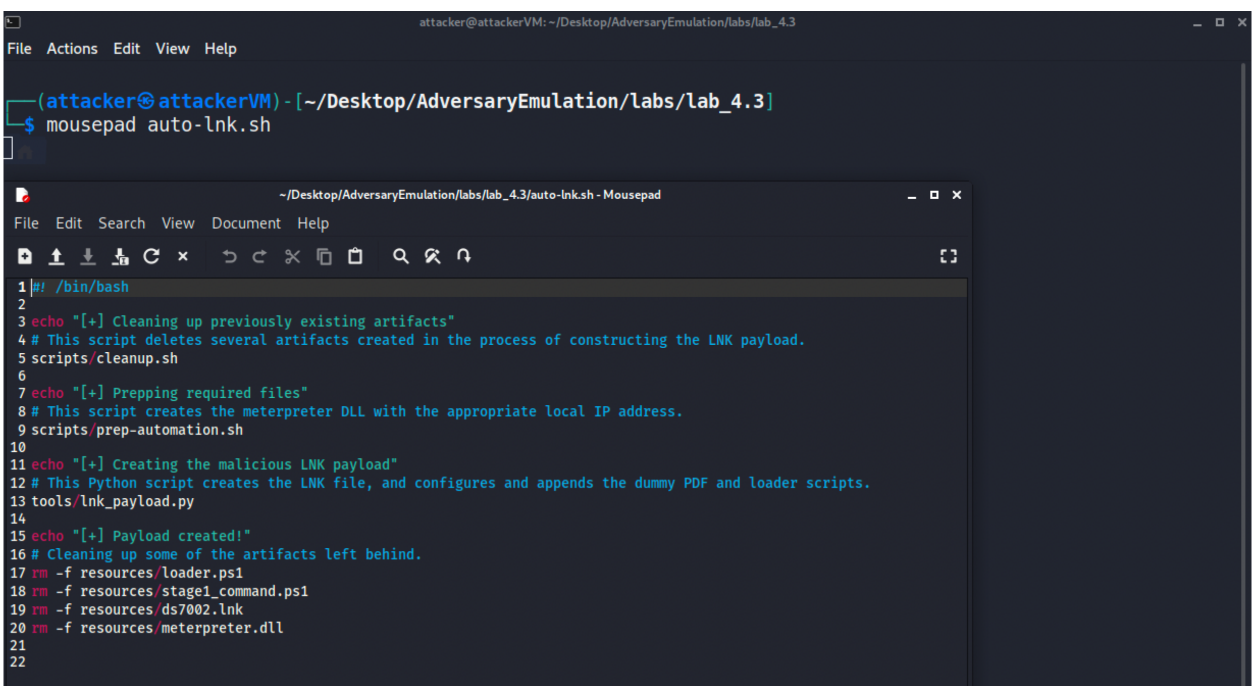
```
git pull
```

5. Lastly, ensure that Windows Security is disabled as it periodically re-enables itself. Please see Troubleshooting at the end of Lab 4.2 for instructions on how to do this.

## Step 2: Examine auto_lnk.sh

1. Let's start by taking a look at the overall automation script, `auto-lnk.sh`. Open `auto-lnk.sh`.

```
mousepad auto-lnk.sh
```



The first thing `auto-lnk.sh` does is run `cleanup.sh` (line 5), which cleans up the working directories of any files from previous attempts at building the LNK payload. It then runs `prep-automation.sh` (line 9), which calls `msfvenom` to create a `meterpreter` payload in DLL format. Next, it runs `lnk_payload.py` (line 13), which is the custom Python script that builds the LNK payload. We'll go into more detail on `lnk_payload.py` in the next section. Lastly, it cleans up artifacts left behind by `lnk_payload.py` along with the `meterpreter` DLL (lines 17-20).

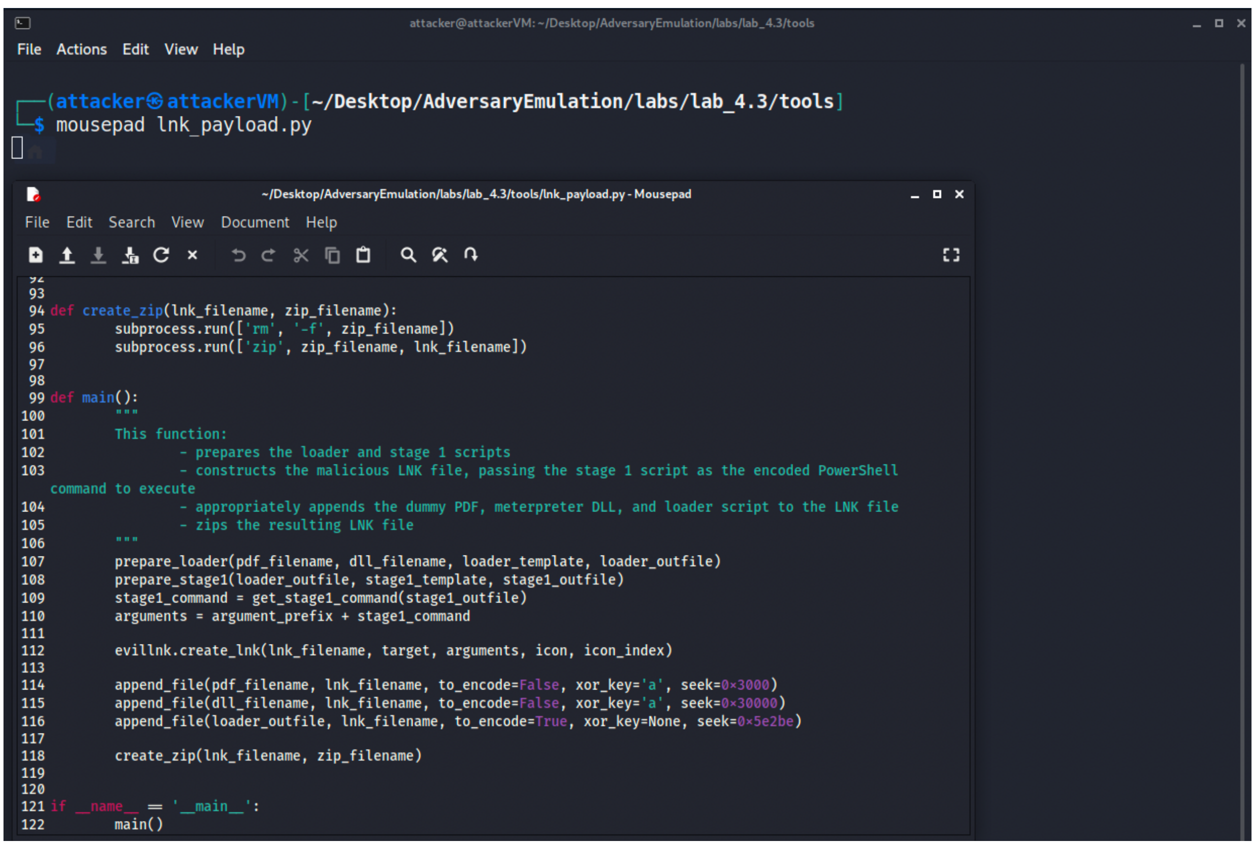
*Which directory is lnk_payload.py found in?*

a) scripts
b) tools
c) resources

## Step 3: Examine lnk_payload.py

1. Here, we'll be taking a deeper look into `lnk_payload.py` to understand the steps this script takes to automate the process of creating the LNK payload. Navigate to the `tools/` directory and open `lnk_payload.py`.

```
mousepad lnk_payload.py
```



As this is a longer script, we'll look only at the `main` function to understand the operational flow.

Note: If you are digging into the code, many variables are defined in `configs.py`.

First, the `main` function prepares the loader and Stage 1 PowerShell scripts by calling the `prepare_loader()` and `prepare_stage1()` functions (lines 108-109). These functions fill in the appropriate file sizes for the placeholders in each of the script templates and then obfuscates the resulting script using PyFuscation.

Next, `get_stage1_command()` is called (line 110), which reads the contents of the obfuscated Stage 1 script. The contents are then encoded as UTF-16LE, and then encoded into Base64.

The encoded string is inserted into a PowerShell command designed to execute the script (line 110), which is passed to `evillink.create_lnk()`(line 113). That function creates the actual LNK file with the PowerShell command to execute.

Once the LNK file is created, `main` appends the PDF and DLL to it, XOR encrypting both with 'a' (lines 115-116). It then appends the loader PowerShell script with Base64 encoding (line 117).

Finally, `main` zips up the LNK file to create our Zip payload (line 119).

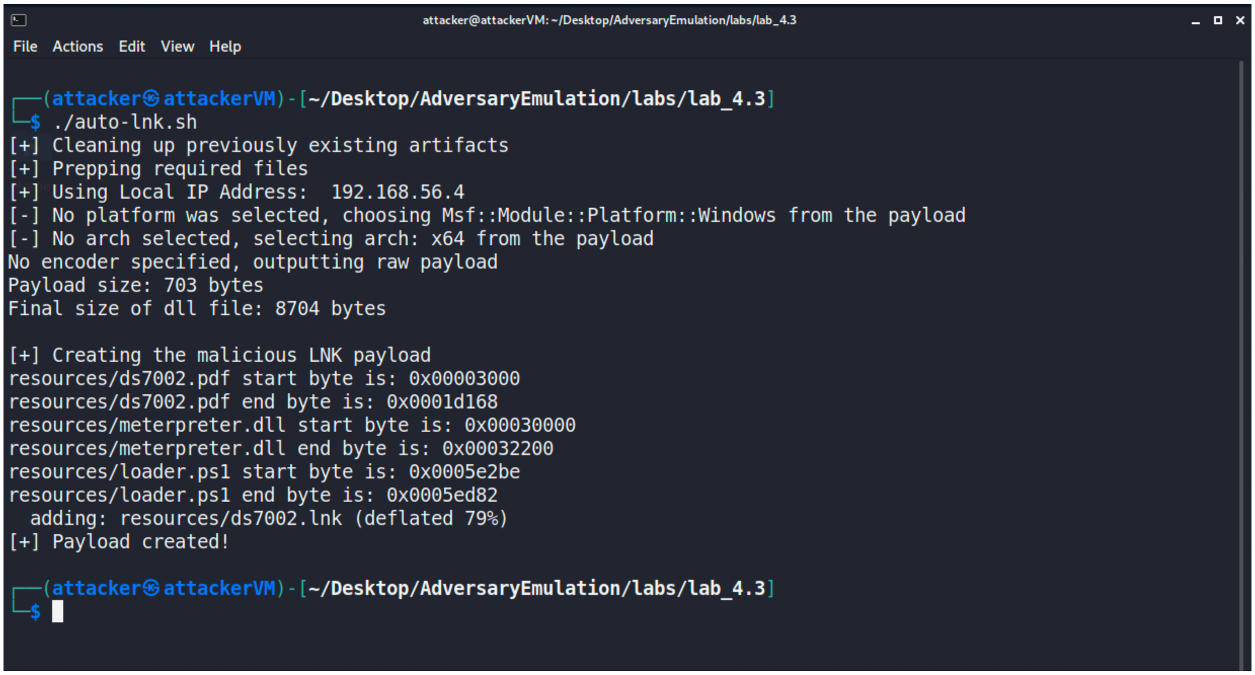
*Which function encodes the Stage 1 script?*

a) `append_file()`
b) `prepare_stage1()`
c) `get_stage1_command()`

## Step 4: Execution - Create the Payload Using Automation

Now that we've done the hard work of understanding how these scripts works, we can actually execute them without fear of being a script kiddie and see just how much automation changes everything.

1. To create our initial access payload using the automated tooling, navigate to the `lab_4.3` directory and execute `auto_lnk.sh`.




With one command, we've created and configured our entire payload, and demonstrated the value of automation!

*How easy was it to recreate the LNK payload using the provided automation compared to the manual method?*

    a) Very easy

## Step 5: Deploy the Payload

We can automate part of the process of deploying the payload as well. We've provided a script called `setup_servers.sh` that starts up both the Python3 HTTP server as well as the Metasploit Handler. Execute `setup_servers.sh`.


## Step 6: Execute the Payload

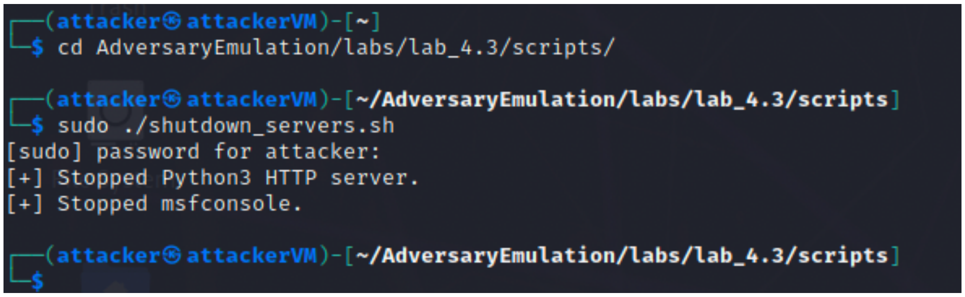
While the actual execution of the payload can be automated as well in a test scenario, the focus of this lab is only on the automation of the preparation of TTPs. As such, execution of the payload will be identical to the execution step (Step 12) in Lab 4.2.

The only difference is:

- When you open `ds7002.zip`, `ds7002.lnk` will be found in the `resources/` directory.

## Step 7: Shutdown Adversary Infrastructure

The last piece of this lab is to close the servers that were started up to deploy our payload. To do this, open up a new terminal on the `AttackerVM`, navigate to the `AdversaryEmulation/labs/lab_4.3/scripts` directory, and run `shutdown_scripts.sh` as `sudo`.




With that, we've concluded lab 4.3!

# Summary

In this lab, we used automated tooling to create the initial access payload developed in Lab 4.2. In using these scripts, we saw the value that automation can provide in repeating complex and lengthy procedures.