Swinburne University of Technology Hawthorn Campus
Department of Computing Technologies

COS30015 IT Security

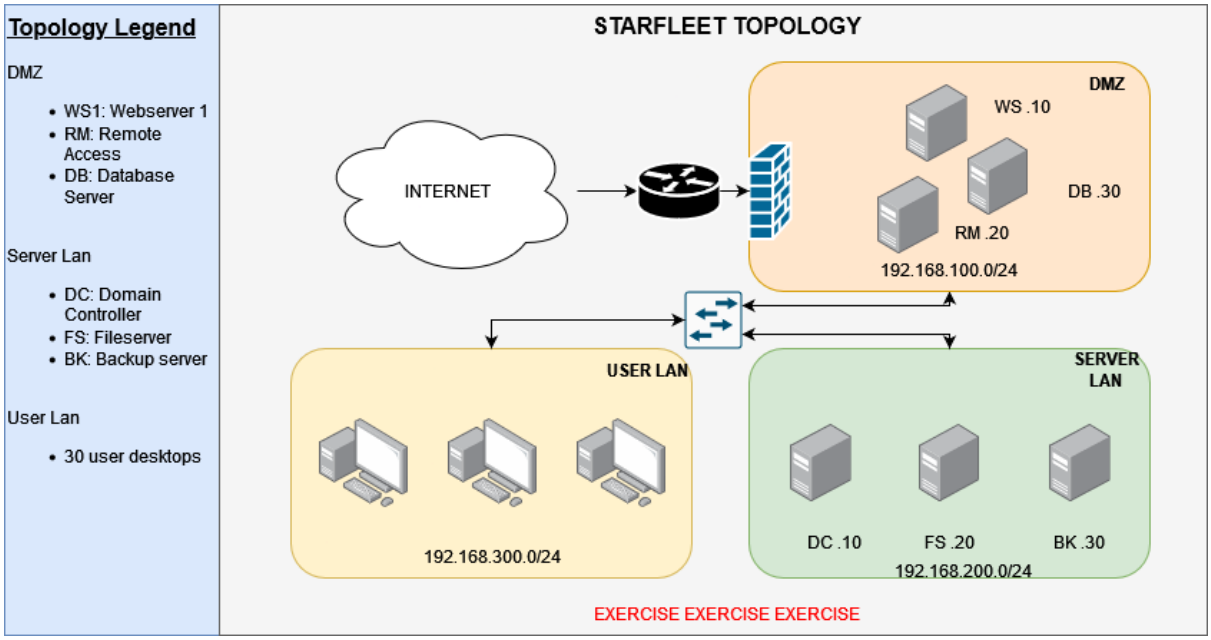
Assignment 2 - *Semester 2, 2024*

Part A Incident Forensic Analysis

Due Date: AEST 23:59 on 31/10/2024.

STARFLEET has contacted COS30015-STUDENTS to help them deal with an unfolding cyber incident. The need your help to understand what has occurred in the incident to recover. To assist, they have collected a range of artefacts across their environment.

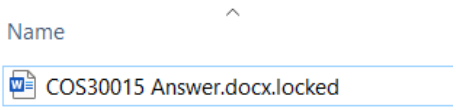
STARFLEET has provided their network topology to assist with the analysis.



Analyse the following artefacts and answer the associated questions.

1. Impact at STARFLEET

A user, Chris Pike, has reported that they are unable to open files on their computer.



Inspecting their computer, it appears that all their files has been impacted. Further investigation confirms that no files can be opened.

1. What type of threat does this appear to be?
2. What is the indicator associated with this threat type?
3. What main MITRE ATT&CK technique is associated with this incident type?

2. Unknow file identified

A file called agent.exe has been found on Chris' desktop. Chris does not recall ever downloading or running this program. The team has collected the hash for you to investigate this file.

```
d806e3e0c84b0b7208fb4ba9df5cd7b8851abce5c0bbb3ee330560aaa139f243
```

Chris' manger, Michael Burnham, has asked whether we can tell if the file was executed. The associated prefect file has been provided for agent.exe.

agent.exe-12345678.pf

```
Executable Name: agent.exe
Hash Path: 12345678
Executable Size: 12499.456 KB
Prefetch File Version: 30 (Windows 10)

Run Count: 1
Last Run Times:
  - 2024-09-10 14:35:33

Volume Information:
  - Volume Serial Number: ABCD-1234
  - Volume Creation Time: 2023-01-01 00:00:00

Referenced Files and Directories:
  - C:\Windows\System32\kernel32.dll
```

1. Is agent.exe a normal file?
2. What type of file is agent.exe?
3. Analysing the agent.exe-12345678.pf file, has agent.exe been executed before?
4. How many times has the file been executed?
5. What does this file allow an adversary to do?

3. Signs of tampering

A command has been traced to agent.exe. CMD was used to run the following command.

```
powershell -EncodedCommand
U2V0LUV4ZWN1dGlvblBvbGljeSB1bnJlc3RyaWN0ZWQ=
```

Note: line formatting makes the above command look like it is over two lines, it is one single line

1. Can you make sense of this command? What is last part decoded?
2. What does this command do?

4. What was disabled

After discussing with Michael Burnham, she's very curious how agent.exe could have been executed. She said that Defender is running on their devices.

A PowerShell script called `RunMe.PS1` was found with agent.exe. Inspecting the contents, the following was found.

```
U2V0LU1wUHJlZmVyZW5jZSAtRGlzYWJsZVJlYWx0aW1lTW9uaXRvcmluZyAkd
HJ1ZQ==
```

1. What does this script do?
2. Is the previous command and this script potentially related?
3. Could it have allowed system changes which would allow agent.exe to be ran?
4. What device was this script copied from?

5. Signs of movement

It appears the `RunMe.PS1` was copied from a device internal to STARFLEET. If true, the IT manager Mr Suru remarked that this is concerning. That means someone much has connected to Chris' computer.

1. What type of event is this?
2. Does this event confirm someone logged onto this device?
3. Where did the connection occur from?
4. What does the type/port indicate?
5. What main MITRE ATT&CK tactic is represented here?

The following Sysmon log entry was captured to help determine this.

```
Event:
  System:
    Provider Name: Microsoft-Windows-Security-Auditing
    EventID: 4624
    Version: 2
    Level: 0
    Task: 12544
    Opcode: 0
    Keywords: 0x8020000000000000
    TimeCreated SystemTime: 2024-09-10T12:01:00.000Z
    EventRecordID: 12345
    Correlation:
    Execution ProcessID: 1234 ThreadID: 5678
    Channel: Security
    Computer: UserLan-PC8
    Security:
  EventData:
    SubjectUserSid: S-1-5-18
    SubjectUserName: UserLan-PC8$
    SubjectDomainName: WORKGROUP
    SubjectLogonId: 0x3e7
    TargetUserSid: S-1-5-21-1234567890-123456789-
1234567890-1001
    TargetUserName: Chris Pike
    TargetDomainName: UserLan-PC8
    TargetLogonId: 0x12345
    LogonType: 10
    LogonProcessName: User32
    AuthenticationPackageName: Negotiate
    WorkstationName: UserLan-PC8
    LogonGuid: {00000000-0000-0000-0000-000000000000}
    TransmittedServices: -
    LmPackageName: -
    KeyLength: 0
    ProcessId: 0x44c
    ProcessName: C:\Windows\System32\svchost.exe
    IpAddress: 192.168.200.10
    IpPort: 3389
    ImpersonationLevel: %%1833
    RestrictedAdminMode: -
    TargetOutboundUserName: -
    TargetOutboundDomainName: -
    VirtualAccount: %%1843
    TargetLinkedLogonId: 0x0
    ElevatedToken: %%1842
```

6. Other indicators identified

Given the developments, Mr Suru has search across the domain for other devices with the `RunMe.PS1` file on them. Almost all devices have come back with a positive hit. Most concerning is the Domain Controller.
Sysmon logs have been provided for the Domain Controller. It appears someone has been going after a privileged account.

Analyse the DC.log.txt file.

Note: This file is a simple text file and can be viewed safely

1. What can be summarised from the events recorded in the log file?
2. Was the attack successful?
3. What account was targeted?
4. Where did the connection originate from?
5. What does the type/port indicate?
6. What main MITRE ATT&CK tactic is represented here?
7. Should a connection of this type be allowable between these two servers?

7. Impacted account

After investigating the Sysmon logs on the DC, it appears that the adversary got lucky. The team of STARFLEET have provided the output of a transportation cipher used in Roman times, along with a hash of the original password. Can you crack it?

Cipher output: `1w4tq3r62e5y`
Original password hash:
`9bf0ec5950285ac82cce6ebca7691c96520645e169a5aaef2bd5ede9036d996240762939162 70b97b39ad98a7d13ffcdf4158ba38535c8a02045663b9682731e`

1. What is the original password used to access the DC?
2. What Cipher was used obtain the original password?

8. Initial Access

Seeing that the adversary connected via the Remote Access machine in the DMZ, the team has provided you with an interesting log entry for the Remote Access machine.

```
Event:
  System:
    Provider Name: Microsoft-Windows-Security-Auditing
    EventID: 4624
    Version: 2
    Level: 0
    Task: 15534
    Opcode: 0
    Keywords: 0x8020000000000000
    TimeCreated SystemTime: 2024-09-10T10:24:01.000Z
    EventRecordID: 12360
    Correlation:
    Execution ProcessID: 1234 ThreadID: 5678
    Channel: Security
    Computer: Remote
    Security:
  EventData:
    SubjectUserSid: S-1-5-18
    SubjectUserName: Remote$
    SubjectDomainName: WORKGROUP
    SubjectLogonId: 0x3e7
    TargetUserSid: S-1-5-21-1234567890-123456789-
1234567890-1001
    TargetUserName: Chris Pike
    TargetDomainName: Remote
    TargetLogonId: 0x12345
    LogonType: 10
    LogonProcessName: User32
    AuthenticationPackageName: Negotiate
    WorkstationName: Remote
    LogonGuid: {00000000-0000-0000-0000-000000000000}
    TransmittedServices: -
    LmPackageName: -
    KeyLength: 0
    ProcessId: 0x44c
    ProcessName: C:\Windows\System32\svchost.exe
    IpAddress: 171.25.193.25
    IpPort: 3389
    ImpersonationLevel: %%1833
    RestrictedAdminMode: -
    TargetOutboundUserName: -
    TargetOutboundDomainName: -
    VirtualAccount: %%1843
    TargetLinkedLogonId: 0x0
    ElevatedToken: %%1842
```

1. It appears the adversary logged into the Remote Access machine using a STARFLEET user account. What account was used?

2. What IP address was used to access the Remote Access machine (be careful to defang this IP address)
3. What is interesting about this IP address?
4. What remote access method was used?

9. Missing Data

The team at STARFLEET is worried that some secrets went missing and were exfiltrated, and possibly made them an interesting target. Analyse the file samba_log.txt.
The structure of the log is:

- Timestamp: When the log entry was created
- Log Level: Severity or verbosity of the log message
- Process ID: ID of the process generating the log
- Thread ID: ID of the thread within the process (if applicable)
- Samba Component: The specific Samba service or module
- Message Text: The actual log message
- IP Address: IP address of the client
- User: The user performing the action
- Action: The type of action performed (upload, download, edit, view)
- File Name: Name of the file involved

1. What file was uniquely downloaded which could be a sensitive data leak?
2. What IP downloaded this file? (be careful to defang this IP address)
3. What is interesting about this IP address?
4. Who downloaded this file?

10. Incoming mail

Chris now recalls the email, the contents of which are provided below for analysis.

```
From: Kaptian Kirk <captian.kirk@starfleet.com>
To: chrispike@starfleet.com
Subject: A new offer
Date: Mon, 09 Sep 2024 08:45:12 -0700
Message-ID: <1234567890abcdef@fakeemail.com>
Reply-To: phish@fakeemail.com
X-Mailer: FakeMailer 1.0
Received: from mail.fakeemail.com (mail.fakeemail.com
[192.168.1.100])
    by smtp.example.com (Postfix) with ESMTP id 1234ABCD
    for < chrispike@example.com>; Mon, 09 Sep 2024
08:45:11 -0700 (PDT)
Received: from unknown (HELO client.fakeemail.com)
([183.81.169.238])
    by mail.fakeemail.com with SMTP; Mon, 09 Sep 2024
08:45:00 -0700
X-Spam-Status: No, score=-1.2 required=5.0
tests=ALL_TRUSTED
    autolearn=disabled version=3.4.0
X-Received: by 2002:a1c:44a0:: with SMTP id
z6mr12345678ybd.87.169.123.45
    for <chrispike@starfleet.com>; Mon, 09 Sep 2024
08:45:09 -0700 (PDT)
Content-Type: text/html; charset=UTF-8
Content-Transfer-Encoding: 7bit

<html>
<body>
<h1>Congratulations!</h1>
<p>Dear Candidate,</p>
<p>We are excited to inform you that you have been
selected for a fantastic job opportunity!</p>
<p>To view your offer letter and further details, please
click the link below:</p>
<p><a href="https://example.com/staging/
NewStarfleetoffers.docx">View Your Offer Letter</a></p>
<p>Best regards,<br>
Human Resources</p>
</body>
</html>
```

He did remark that it was odd Kirk would send him a job offer given he already worked at Starfleet, but Kirk is a bit of a character.

1. Who is the proper sender of the email? (be careful to defang this domain)
2. What was IP address of this sender? (be careful to defang this IP address)
3. What is interesting about this IP?

11. Patient zero

Investigating the Remote Access device logs in the DMZ, it appears Chris Pike's account was used to access, then then the subsequent password attack took place. It appears Chris's account has been compromised.
Chris noted that he received an email recently which seemed odd but didn't report it. It directed him to download a job offer document. The associated event was captured.

```
System:
  Provider Name: Microsoft-Windows-Sysmon
  Guid: {5770385f-c22a-43e0-bf4c-06f5698ffbd9}
  EventID: 15
  Version: 2
  Level: 4
  Task: 15
  Opcode: 0
  Keywords: 0x8000000000000000
  TimeCreated SystemTime: 2024-09-09T13:23:14.000Z
  EventRecordID: 103456
  Correlation:
  Execution ProcessID: 1234
  ThreadID: 5678
  Channel: Microsoft-Windows-Sysmon/Operational
  Computer: UserLan-PC8
  Security UserID: S-1-5-21-1234567890-123456789-
1234567890-1001

EventData:
  UtcTime: 2024-09-01 13:23:14.000
  ProcessGuid: {a23eae89-c7f3-5915-0000-001083968417}
  ProcessId: 1234
  Image: C:\Windows\System32\msedge.exe
  TargetFilename: C:\Users\ChrisPike\Downloads\
Lockheed_Martin_JobOpportunities.docx
  CreationUtcTime: 2024-09-01 05:23:14.000
  Hash: MD5=a27a9324d282d920e495832933d486ee, SHA256=
0160375e19e606d06f672be6e43f70fa70093d2a30031affd2929a5c44
6d07c1
  Contents:[ZoneTransfer] ZoneId=3
ReferrerUrl:https://example.com/staging/NewStarfleetoffers
.docx
  HostUrl= https://example.com/
```

It appears that the adversary used this file as a means to gain credentials to launch their attack campaign.

1. What is the name of the file?
2. What is the SHA256 hash of the file?
3. Is the file safe?
4. How can you verify if the file is safe?

5. What threat group did this file come from?
6. How might this file be analysed safely?

12. Easter Eggs (HD Only)

A memory capture has been obtained of Michael's device; it appears there are some HD Easter Eggs there. Analyse the memory capture.

1. Easter Egg 1:
2. How did you find Easter Egg 1?
3. Easter Egg 2 (both name and content):
4. How did you find Egg 2?