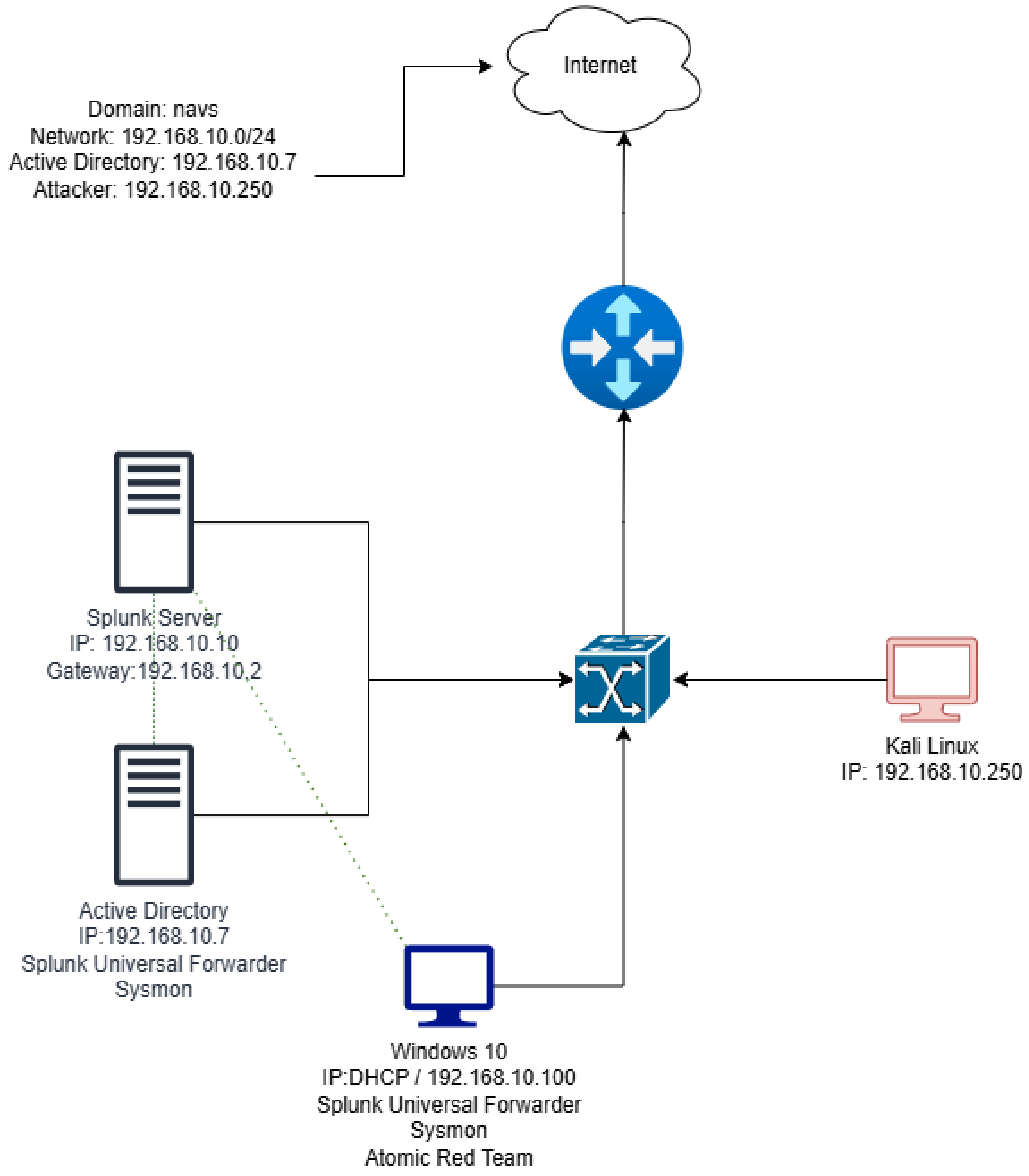
Active Directory & Attack Detection Lab

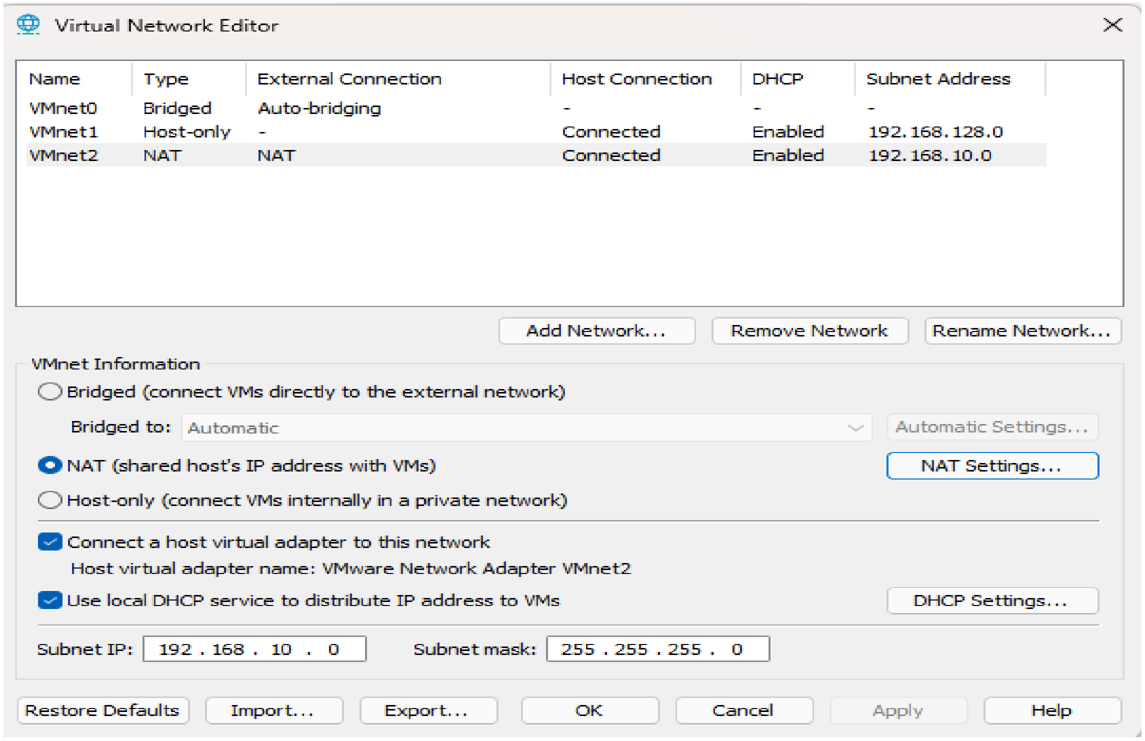
🏗️ Lab Architecture

- **SIEM:** Splunk Enterprise (Ubuntu)
- **Domain Controller:** Windows Server 2022 (Active Directory DS)
- **Target:** Windows 10 (Sysmon & Splunk Universal Forwarder)
- **Attacker:** Kali Linux (Hydra)
- **Network:** Private NAT Network



#1

Used NAT for sharing IP across 4 Virtual Machines used in this project, The Network address that was used is 192.168.10.0/24



Name	Type	External Connection	Host Connection	DHCP	Subnet Address
VMnet0	Bridged	Auto-bridging	-	-	-
VMnet1	Host-only	-	Connected	Enabled	192.168.128.0
VMnet2	NAT	NAT	Connected	Enabled	192.168.10.0

VMnet Information

○ Bridged (connect VMs directly to the external network)

Bridged to: Automatic

● NAT (shared host's IP address with VMs)

○ Host-only (connect VMs internally in a private network)

☑ Connect a host virtual adapter to this network

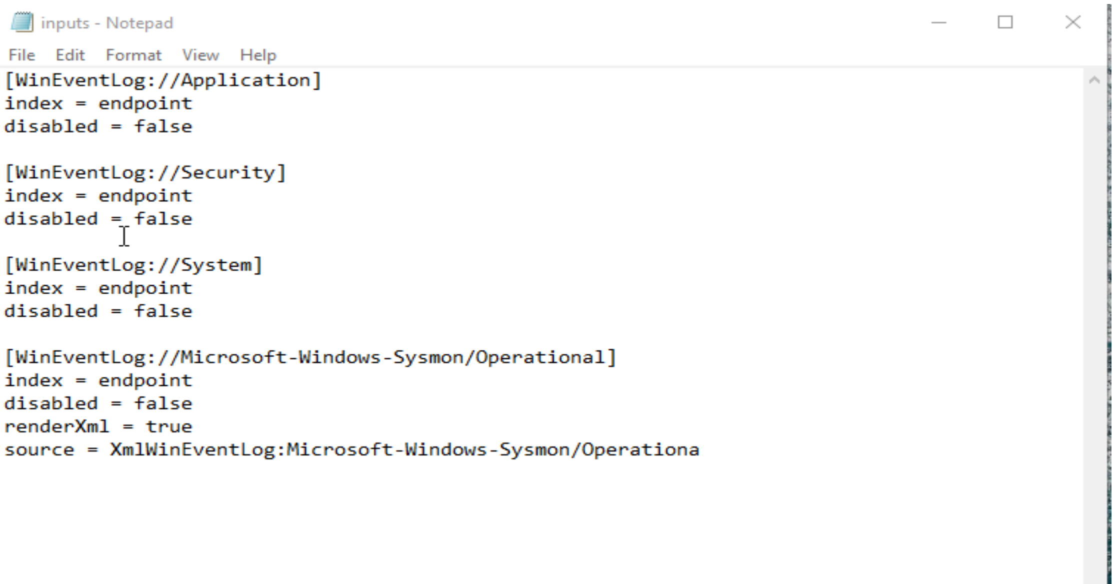
Host virtual adapter name: VMware Network Adapter VMnet2

☑ Use local DHCP service to distribute IP address to VMs

Subnet IP: 192 . 168 . 10 . 0 Subnet mask: 255 . 255 . 255 . 0

#2

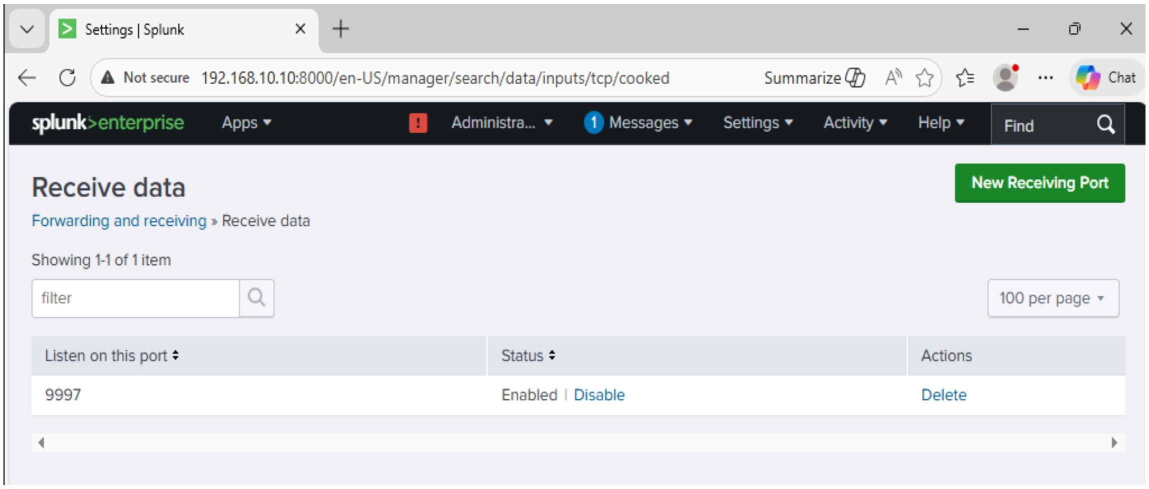
Configured Sysmon with sysmonconfig.xml through Powershell and also created a inputs.conf file for SplunkForwarder in the local folder (never configure files in the default folder) The conf file below shows what Event Logs to grab and what index to put it under, this being index=endpoint. (This process was the same for the Target-PC and Windows AD Server)



```
[WinEventLog://Application]
index = endpoint
disabled = false

[WinEventLog://Security]
index = endpoint
disabled = false

[WinEventLog://System]
index = endpoint
disabled = false

[WinEventLog://Microsoft-Windows-Sysmon/Operational]
index = endpoint
disabled = false
renderXml = true
source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa
```

#3

Splunk Enterprise IP address was changed to static (default gateway is 192.168.10.2) and receiving port 9997 was enabled via Splunk Web Interface so it can ingest data from Target-PC and Windows AD Server



Receive data

Forwarding and receiving » Receive data

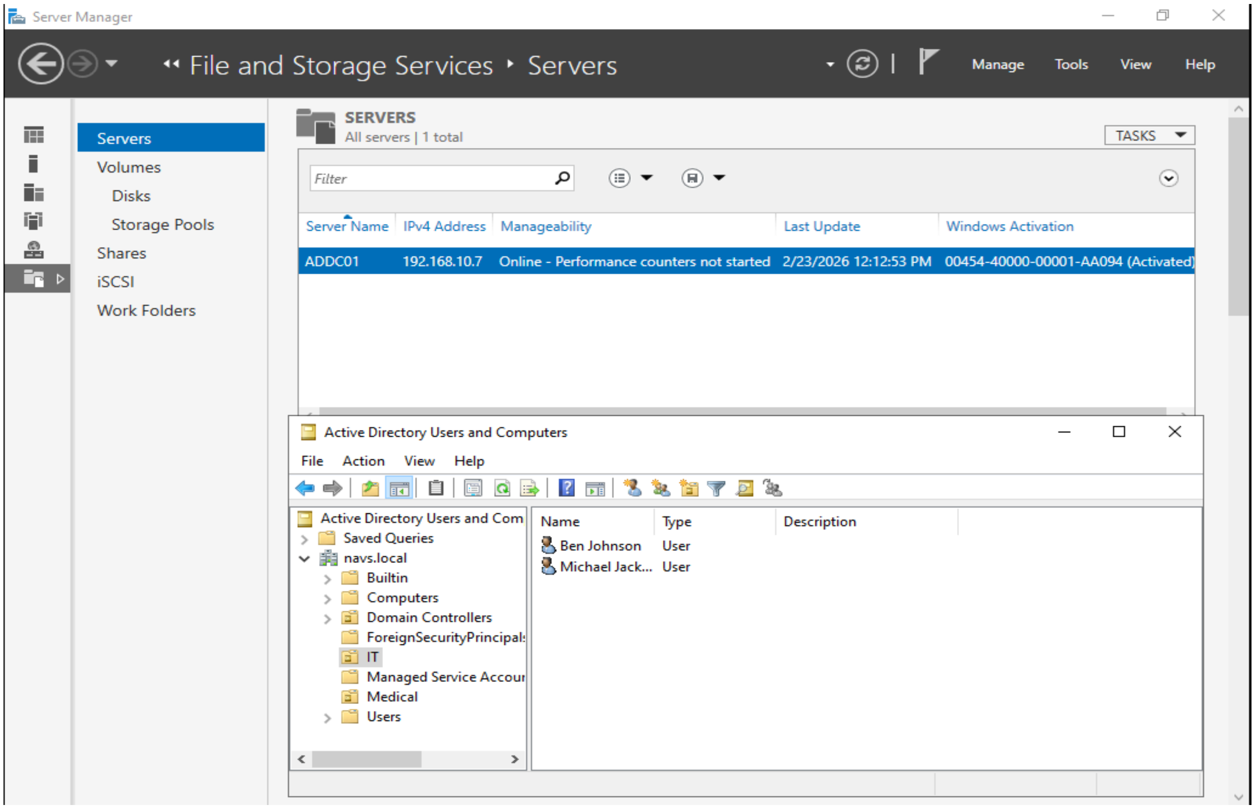
Showing 1-1 of 1 item

filter | 100 per page

Listen on this port	Status	Actions
9997	Enabled | Disable	Delete

#4

Established a navs.local domain and created test users for the brute force attack



SERVERS
All servers | 1 total

Server Name	IPv4 Address	Manageability	Last Update	Windows Activation
ADDC01	192.168.10.7	Online - Performance counters not started	2/23/2026 12:12:53 PM	00454-40000-00001-AA094 (Activated)

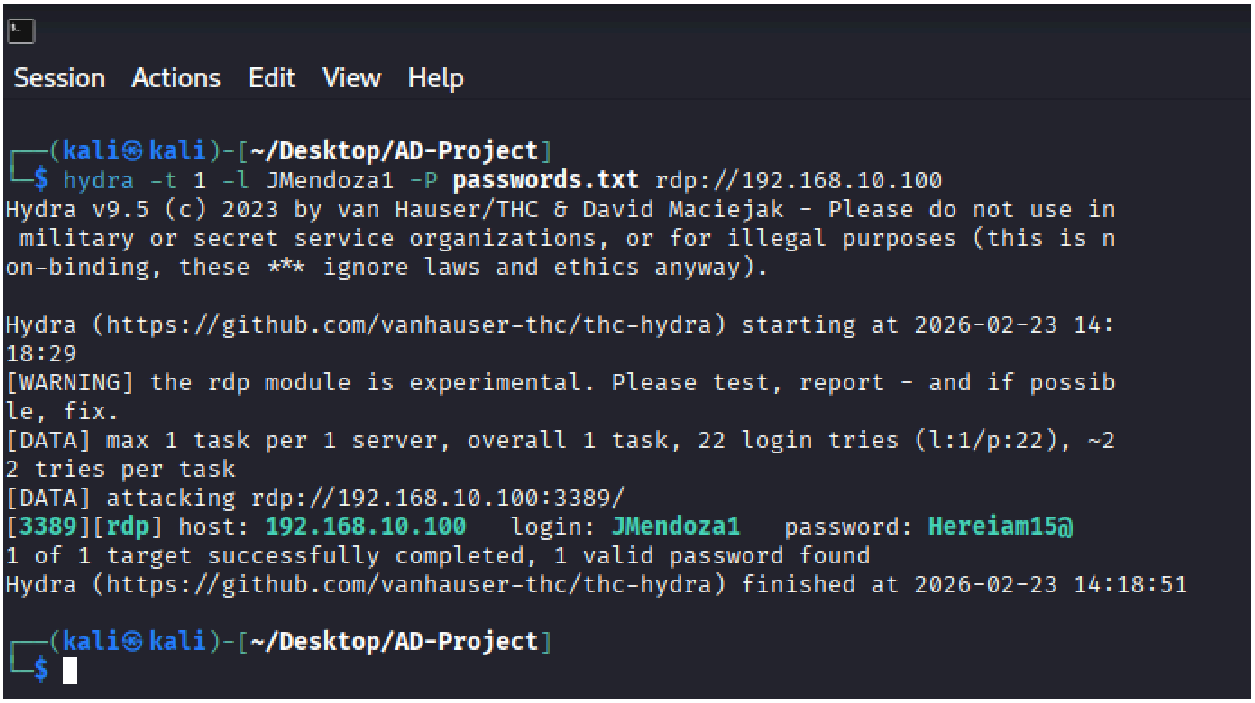
Active Directory Users and Computers

- Active Directory Users and Com
  - Saved Queries
  - navs.local
    - Builtin
    - Computers
    - Domain Controllers
    - ForeignSecurityPrincipals
    - IT
    - Managed Service Accour
    - Medical
    - Users

Name	Type	Description
Ben Johnson	User	
Michael Jack...	User	

#5

After linking the Target-PC with navs.local domain and logging into a user account, I proceeded with the Brute Force Attack using hydra on Kali Linux. After creating a password.txt file with a random generation of passwords I purposely included the password that logins to the Victims account to see what result I would get.



```
┌──(kali㉿kali)-[~/Desktop/AD-Project]
└─$ hydra -t 1 -l JMendoza1 -P passwords.txt rdp://192.168.10.100
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in
 military or secret service organizations, or for illegal purposes (this is n
on-binding, these *** ignore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2026-02-23 14:
18:29
[WARNING] the rdp module is experimental. Please test, report - and if possib
le, fix.
[DATA] max 1 task per 1 server, overall 1 task, 22 login tries (l:1/p:22), ~2
2 tries per task
[DATA] attacking rdp://192.168.10.100:3389/
[3389][rdp] host: 192.168.10.100   login: JMendoza1   password: Hereiam15@
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2026-02-23 14:18:51

┌──(kali㉿kali)-[~/Desktop/AD-Project]
└─$ 
```

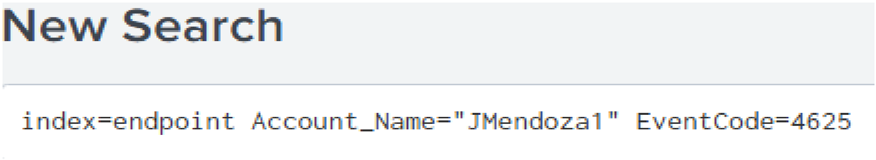
After enabling RDP for this type of attack it was able to return the correct password which would then compromise the victims account

The command used was

hydra -t 1 -l JMendoza1 -P passwords.txt rdp://192.168.10.100

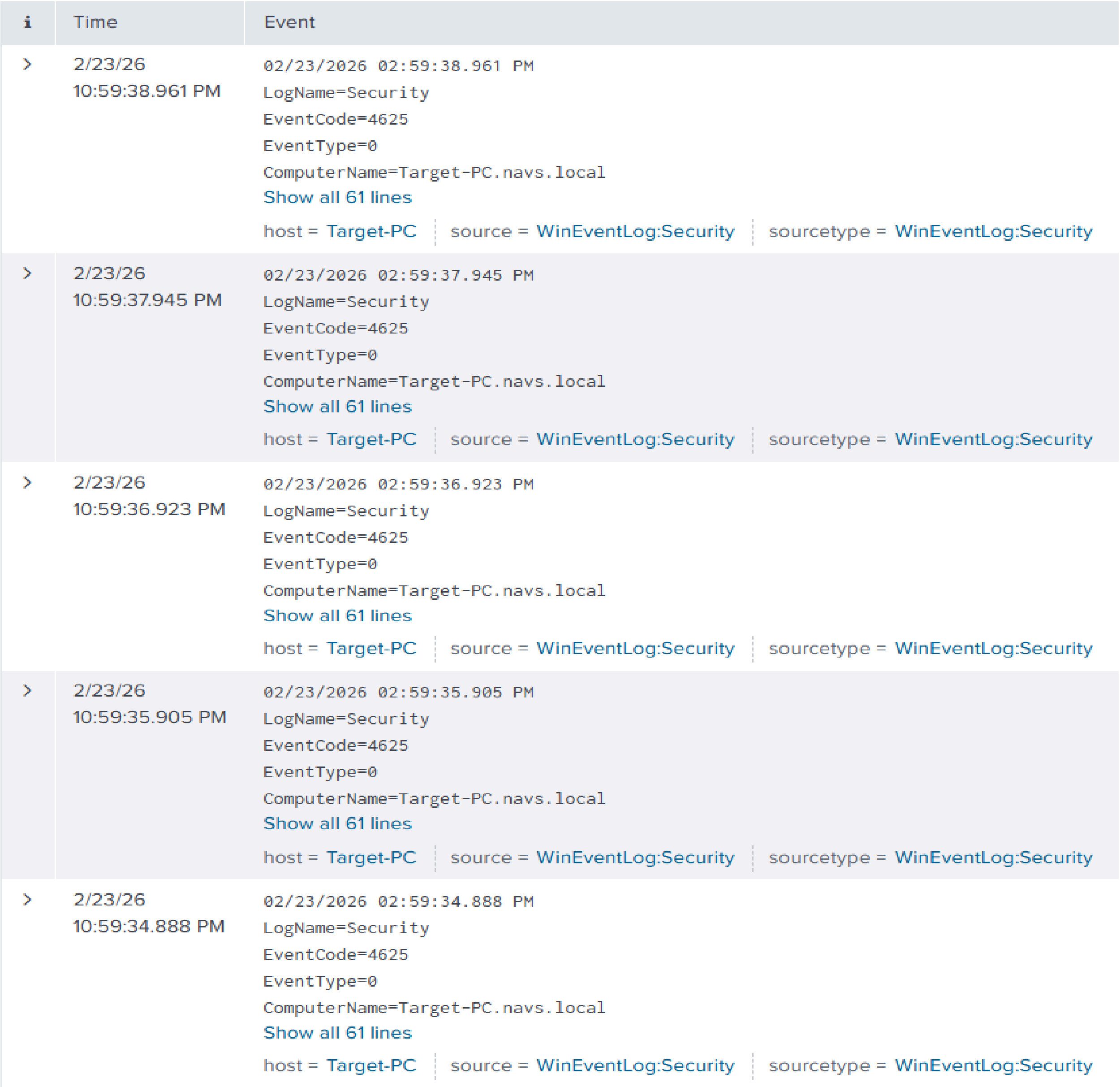
#6

Going onto the detection part of this project I will be querying for index=endpoint alongside the user who was attacked Account_Name=”JMendoza1”, I will also search for Event ID of 4625 (Failed Login) and Event ID of 4624 (Successful Login) which will show us how many times the brute force attack failed to login before successfully getting the password correct.



New Search

```
index=endpoint Account_Name="JMendoza1" EventCode=4625
```



i	Time	Event

>	2/23/26
	10:59:38.961 PM
		02/23/2026 02:59:38.961 PM
		LogName=Security
		EventCode=4625
		EventType=0
		ComputerName=Target-PC.navs.local
		Show all 61 lines
		host = Target-PC | source = WinEventLog:Security | sourcetype = WinEventLog:Security

>	2/23/26
	10:59:37.945 PM
		02/23/2026 02:59:37.945 PM
		LogName=Security
		EventCode=4625
		EventType=0
		ComputerName=Target-PC.navs.local
		Show all 61 lines
		host = Target-PC | source = WinEventLog:Security | sourcetype = WinEventLog:Security

>	2/23/26
	10:59:36.923 PM
		02/23/2026 02:59:36.923 PM
		LogName=Security
		EventCode=4625
		EventType=0
		ComputerName=Target-PC.navs.local
		Show all 61 lines
		host = Target-PC | source = WinEventLog:Security | sourcetype = WinEventLog:Security

>	2/23/26
	10:59:35.905 PM
		02/23/2026 02:59:35.905 PM
		LogName=Security
		EventCode=4625
		EventType=0
		ComputerName=Target-PC.navs.local
		Show all 61 lines
		host = Target-PC | source = WinEventLog:Security | sourcetype = WinEventLog:Security

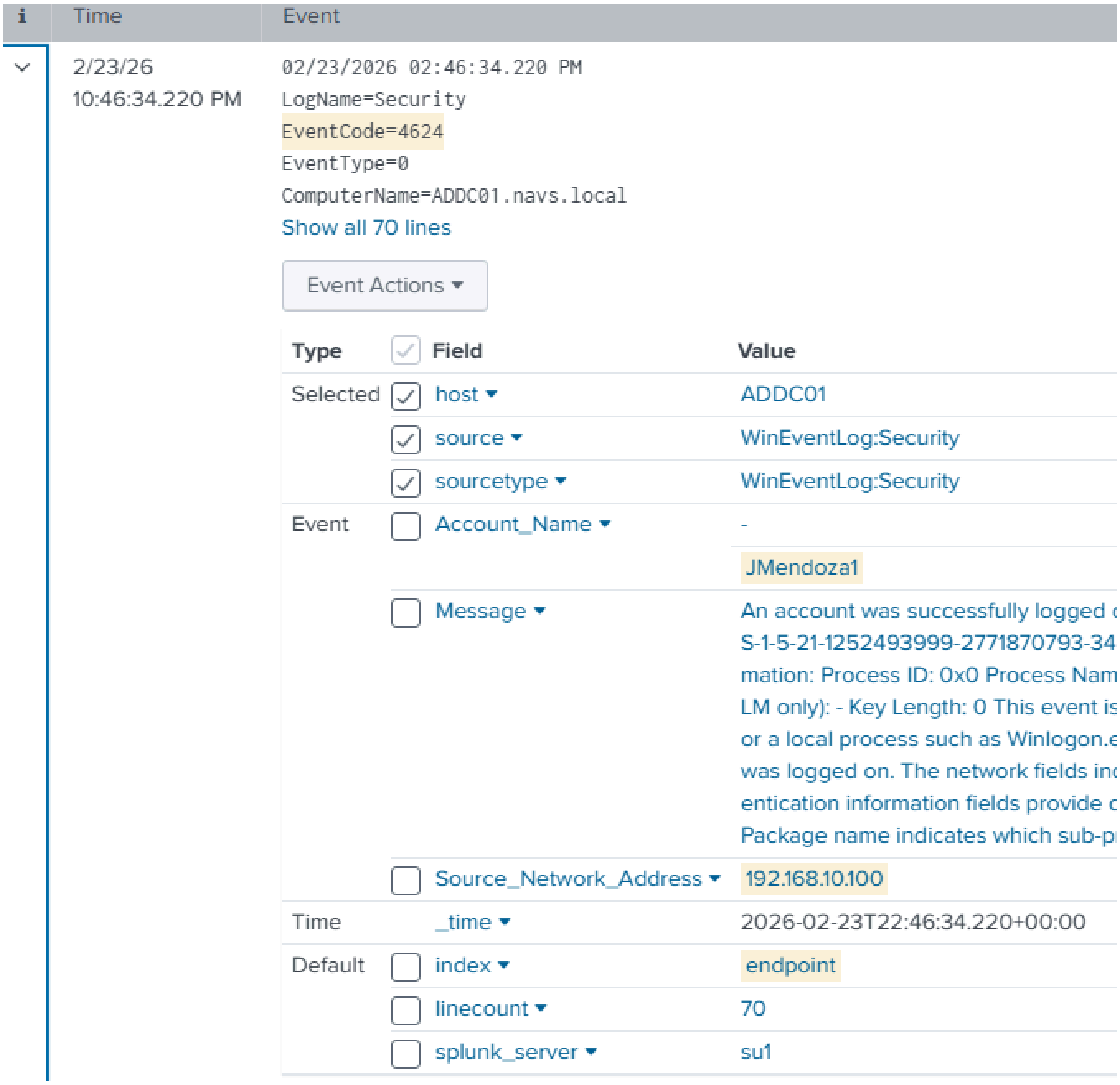
>	2/23/26
	10:59:34.888 PM
		02/23/2026 02:59:34.888 PM
		LogName=Security
		EventCode=4625
		EventType=0
		ComputerName=Target-PC.navs.local
		Show all 61 lines
		host = Target-PC | source = WinEventLog:Security | sourcetype = WinEventLog:Security

The images above show events which have a time difference of a few milliseconds, which is a key indicator of a potential brute force attack as it is trying to use multiple passwords at the same time.

#7

This shows that when searching for Event ID 4624 (Successful Login) will also show how many times it occurs along the IP address so we can see if it's coming from the attacker's IP address (192.168.10.250) or the Victims (192.168.10.100). The highlighted parts below show the victims account name and the source.

Targets Machine

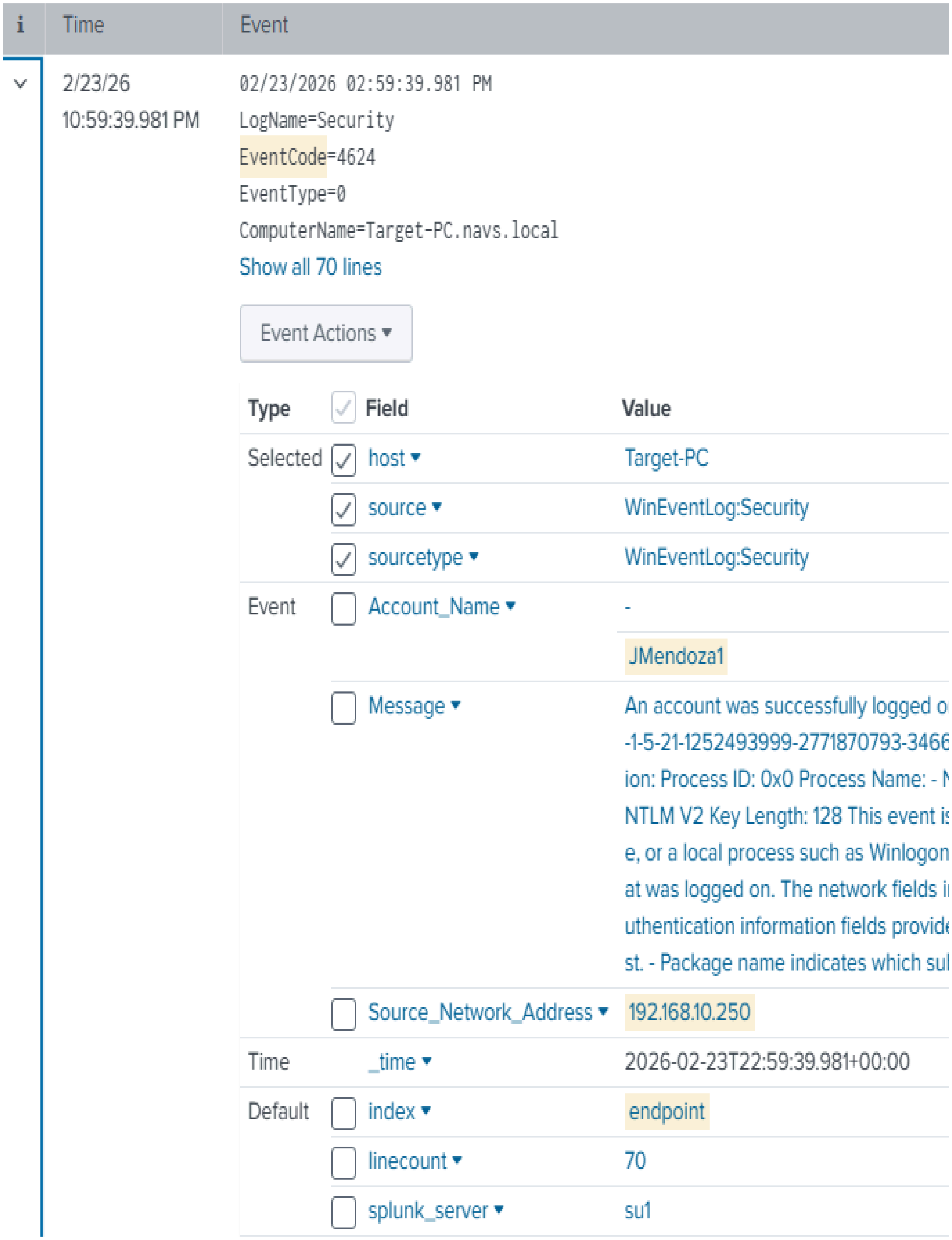


i	Time	Event

⌄	2/23/26
	10:46:34.220 PM
		02/23/2026 02:46:34.220 PM
		LogName=Security
		EventCode=4624
		EventType=0
		ComputerName=ADDC01.navs.local
		Show all 70 lines

Type	☑ Field	Value
Selected	☑ host ▾	ADDC01
	☑ source ▾	WinEventLog:Security
	☑ sourcetype ▾	WinEventLog:Security
Event	□ Account_Name ▾	- JMendoza1
	□ Message ▾	An account was successfully logged c S-1-5-21-1252493999-2771870793-34 mation: Process ID: 0x0 Process Nam LM only): - Key Length: 0 This event is or a local process such as Winlogon.e was logged on. The network fields inc entication information fields provide c Package name indicates which sub-p
	□ Source_Network_Address ▾	192.168.10.100
Time	_time ▾	2026-02-23T22:46:34.220+00:00
Default	□ index ▾	endpoint
	□ linecount ▾	70
	□ splunk_server ▾	su1

Attackers Machine



i	Time	Event
⌄	2/23/26 10:59:39.981 PM	

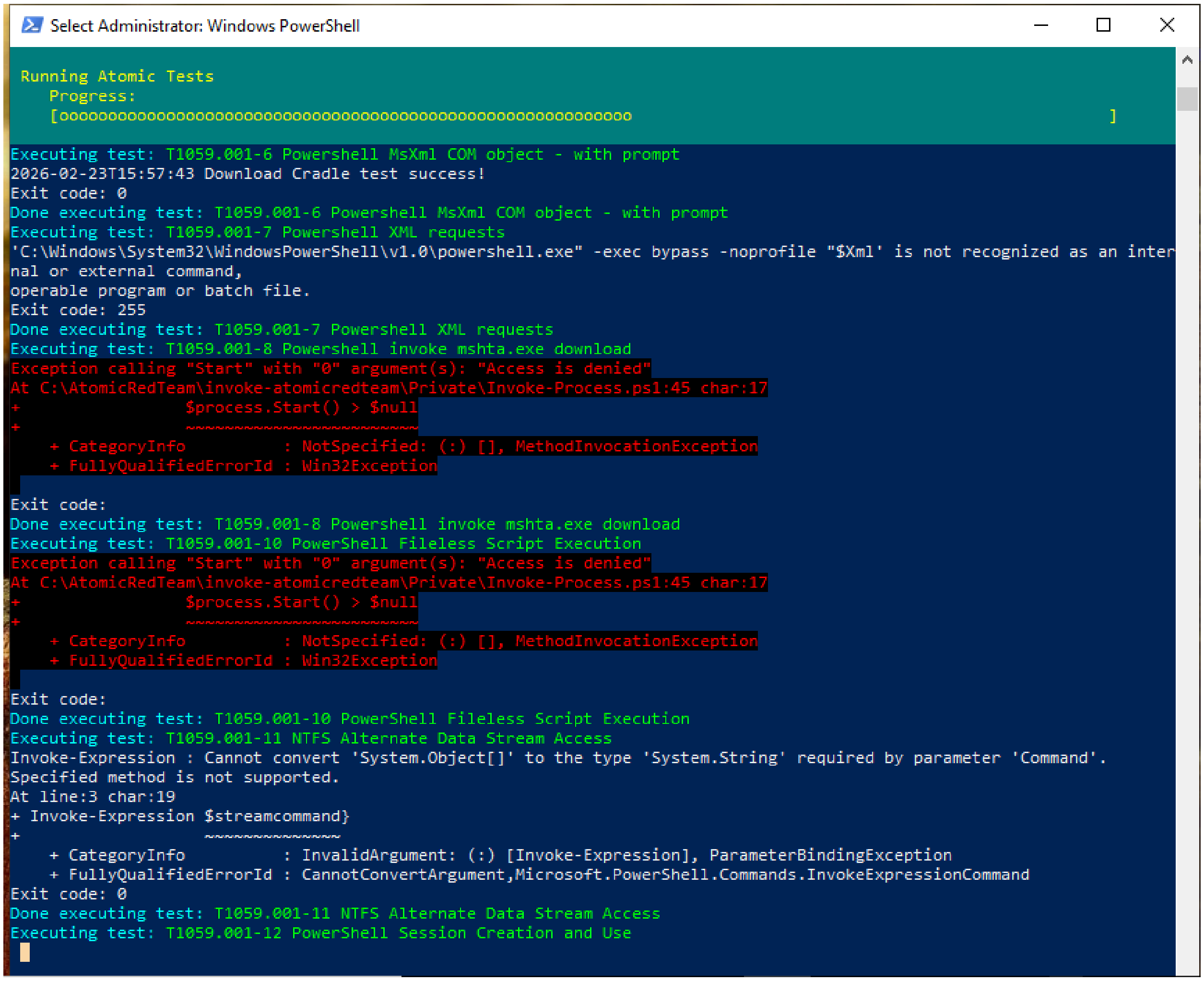
```
02/23/2026 02:59:39.981 PM
LogName=Security
EventCode=4624
EventType=0
ComputerName=Target-PC.navs.local
```

Show all 70 lines

Type	☑ Field	Value
Selected	☑ host ▾	Target-PC
	☑ source ▾	WinEventLog:Security
	☑ sourcetype ▾	WinEventLog:Security
Event	□ Account_Name ▾	- JMendoza1
	□ Message ▾	An account was successfully logged o -1-5-21-1252493999-2771870793-3466 ion: Process ID: 0x0 Process Name: - N NTLM V2 Key Length: 128 This event is e, or a local process such as Winlogon at was logged on. The network fields i uthentication information fields provide st. - Package name indicates which sul
	□ Source_Network_Address ▾	192.168.10.250
Time	_time ▾	2026-02-23T22:59:39.981+00:00
Default	□ index ▾	endpoint
	□ linecount ▾	70
	□ splunk_server ▾	su1

#8

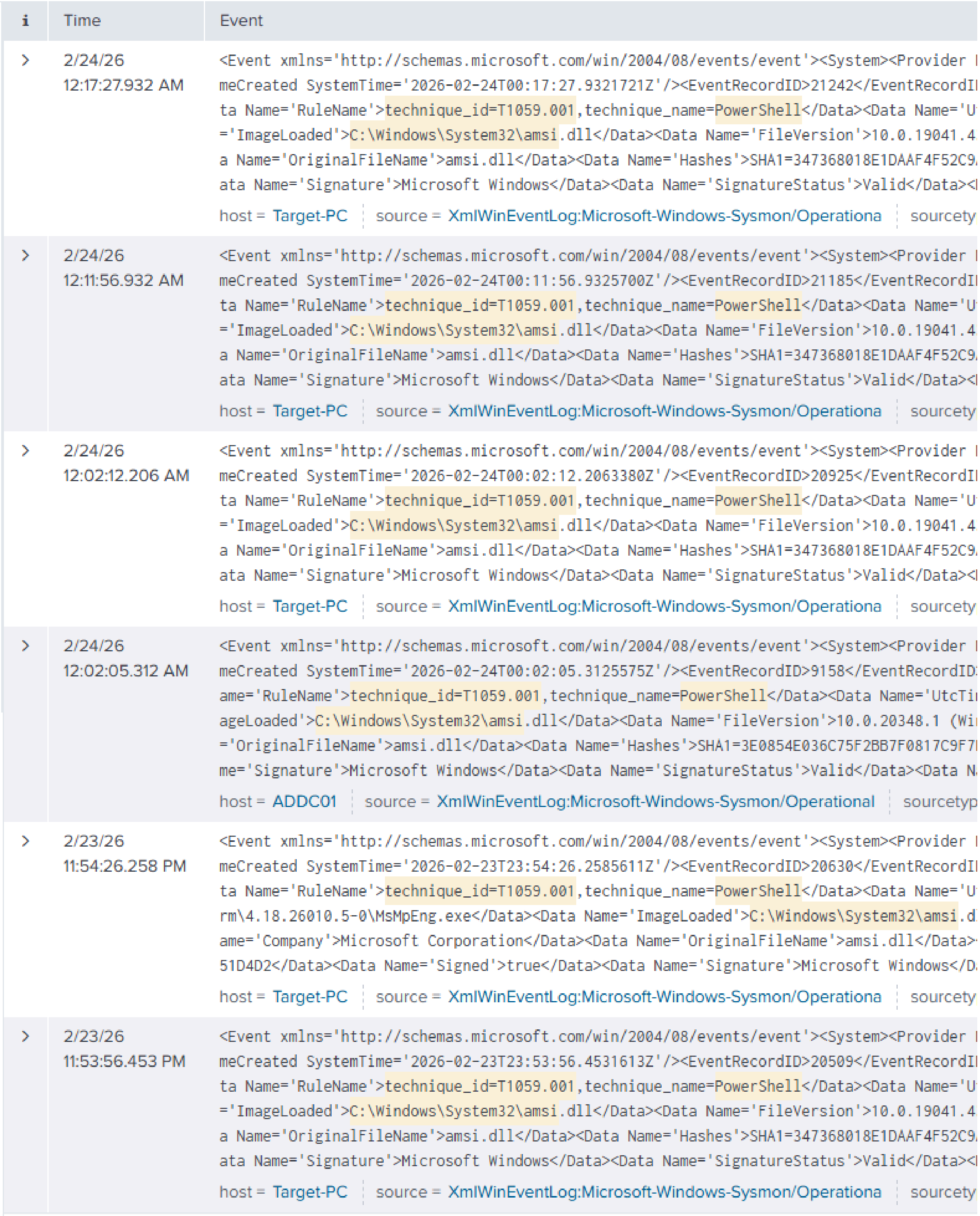
Lastly I installed AtomicRedTeam to simulate a MITRE ATT&CK T1059.001(Malicious Powershell Command Executions) and verified the telemetry within Splunk.



```
 Running Atomic Tests
    Progress:
    [ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo                                                 ]

Executing test: T1059.001-6 Powershell MsXml COM object - with prompt
2026-02-23T15:57:43 Download Cradle test success!
Exit code: 0
Done executing test: T1059.001-6 Powershell MsXml COM object - with prompt
Executing test: T1059.001-7 Powershell XML requests
'C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe" -exec bypass -noprofile "$Xml' is not recognized as an inter
nal or external command,
operable program or batch file.
Exit code: 255
Done executing test: T1059.001-7 Powershell XML requests
Executing test: T1059.001-8 Powershell invoke mshta.exe download
Exception calling "Start" with "0" argument(s): "Access is denied"
At C:\AtomicRedTeam\invoke-atomicredteam\Private\Invoke-Process.ps1:45 char:17
+                 $process.Start() > $null
+                 ~~~~~~~~~~~~~~~~~~~~~~~~
    + CategoryInfo          : NotSpecified: (:) [], MethodInvocationException
    + FullyQualifiedErrorId : Win32Exception

Exit code:
Done executing test: T1059.001-8 Powershell invoke mshta.exe download
Executing test: T1059.001-10 PowerShell Fileless Script Execution
Exception calling "Start" with "0" argument(s): "Access is denied"
At C:\AtomicRedTeam\invoke-atomicredteam\Private\Invoke-Process.ps1:45 char:17
+                 $process.Start() > $null
+                 ~~~~~~~~~~~~~~~~~~~~~~~~
    + CategoryInfo          : NotSpecified: (:) [], MethodInvocationException
    + FullyQualifiedErrorId : Win32Exception

Exit code:
Done executing test: T1059.001-10 PowerShell Fileless Script Execution
Executing test: T1059.001-11 NTFS Alternate Data Stream Access
Invoke-Expression : Cannot convert 'System.Object[]' to the type 'System.String' required by parameter 'Command'.
Specified method is not supported.
At line:3 char:19
+ Invoke-Expression $streamcommand}
+                   ~~~~~~~~~~~~~~
    + CategoryInfo          : InvalidArgument: (:) [Invoke-Expression], ParameterBindingException
    + FullyQualifiedErrorId : CannotConvertArgument,Microsoft.PowerShell.Commands.InvokeExpressionCommand
Exit code: 0
Done executing test: T1059.001-11 NTFS Alternate Data Stream Access
Executing test: T1059.001-12 PowerShell Session Creation and Use
```

#9

Splunk shows how this Telemetry test was displayed in the events section, it shows T1059.001 which is a type of abuse of powershell for malicious execution, in this instance there was nothing malicious related but it shows key things like asmi.dll which is used when bypassing security scanning to run scripts.



i	Time	Event
>	2/24/26 12:17:27.932 AM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-24T00:17:27.9321721Z'/><EventRecordID>21242</EventRecord ta Name='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='U ='ImageLoaded'>C:\Windows\System32\amsi.dll</Data><Data Name='FileVersion'>10.0.19041.4 a Name='OriginalFileName'>amsi.dll</Data><Data Name='Hashes'>SHA1=347368018E1DAAF4F52C9 ata Name='Signature'>Microsoft Windows</Data><Data Name='SignatureStatus'>Valid</Data>< host = Target-PC source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa sourcety
>	2/24/26 12:11:56.932 AM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-24T00:11:56.9325700Z'/><EventRecordID>21185</EventRecord ta Name='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='U ='ImageLoaded'>C:\Windows\System32\amsi.dll</Data><Data Name='FileVersion'>10.0.19041.4 a Name='OriginalFileName'>amsi.dll</Data><Data Name='Hashes'>SHA1=347368018E1DAAF4F52C9 ata Name='Signature'>Microsoft Windows</Data><Data Name='SignatureStatus'>Valid</Data>< host = Target-PC source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa sourcety
>	2/24/26 12:02:12.206 AM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-24T00:02:12.2063380Z'/><EventRecordID>20925</EventRecord ta Name='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='U ='ImageLoaded'>C:\Windows\System32\amsi.dll</Data><Data Name='FileVersion'>10.0.19041.4 a Name='OriginalFileName'>amsi.dll</Data><Data Name='Hashes'>SHA1=347368018E1DAAF4F52C9 ata Name='Signature'>Microsoft Windows</Data><Data Name='SignatureStatus'>Valid</Data>< host = Target-PC source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa sourcety
>	2/24/26 12:02:05.312 AM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-24T00:02:05.3125575Z'/><EventRecordID>9158</EventRecordID ame='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='UtcTi ageLoaded'>C:\Windows\System32\amsi.dll</Data><Data Name='FileVersion'>10.0.20348.1 (Wi ='OriginalFileName'>amsi.dll</Data><Data Name='Hashes'>SHA1=3E0854E036C75F2BB7F0817C9F7 me='Signature'>Microsoft Windows</Data><Data Name='SignatureStatus'>Valid</Data><Data N host = ADDC01 source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operational sourcetyp
>	2/23/26 11:54:26.258 PM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-23T23:54:26.2585611Z'/><EventRecordID>20630</EventRecord ta Name='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='U rm\4.18.26010.5-0\MsMpEng.exe</Data><Data Name='ImageLoaded'>C:\Windows\System32\amsi.d ame='Company'>Microsoft Corporation</Data><Data Name='OriginalFileName'>amsi.dll</Data> 51D4D2</Data><Data Name='Signed'>true</Data><Data Name='Signature'>Microsoft Windows</D host = Target-PC source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa sourcety
>	2/23/26 11:53:56.453 PM	<Event xmlns='http://schemas.microsoft.com/win/2004/08/events/event'><System><Provider meCreated SystemTime='2026-02-23T23:53:56.4531613Z'/><EventRecordID>20509</EventRecord ta Name='RuleName'>technique_id=T1059.001,technique_name=PowerShell</Data><Data Name='U ='ImageLoaded'>C:\Windows\System32\amsi.dll</Data><Data Name='FileVersion'>10.0.19041.4 a Name='OriginalFileName'>amsi.dll</Data><Data Name='Hashes'>SHA1=347368018E1DAAF4F52C9 ata Name='Signature'>Microsoft Windows</Data><Data Name='SignatureStatus'>Valid</Data>< host = Target-PC source = XmlWinEventLog:Microsoft-Windows-Sysmon/Operationa sourcety