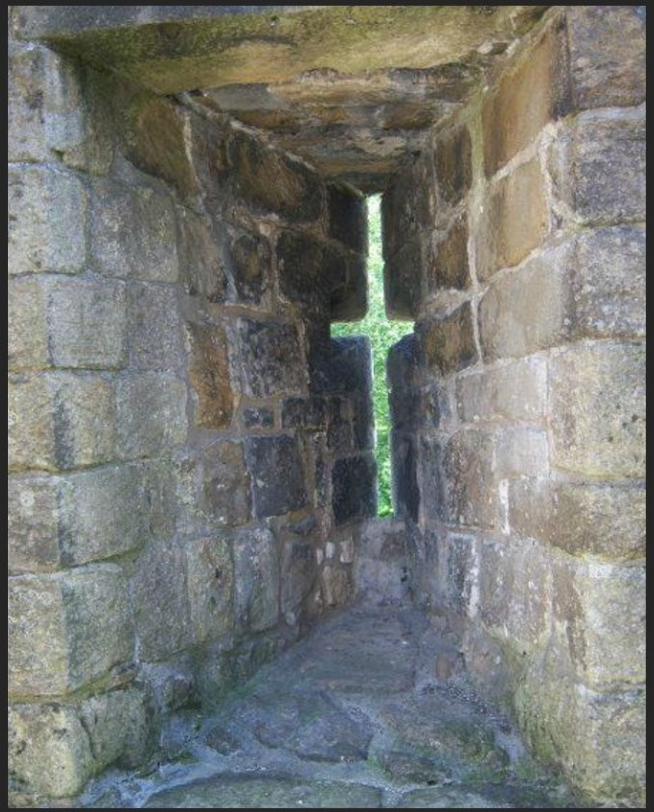
A Series Of Unfortunate Windows Events

Matthew Gracie
Information Security Engineer
@InfosecGoon

So Why Do We Want To Centralize Our Logs, Anyway?

Attackers view



Defenders view

So How Do We Do It?

In The Beginning

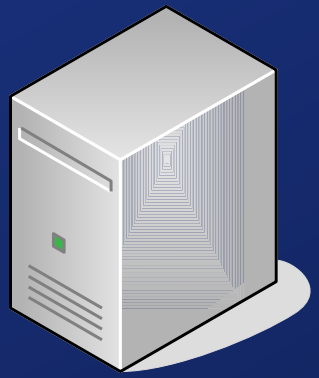
- In the beginning there was syslog, and syslog was good.
- It was a simple, efficient, easy standard that every *nix box and every piece of network gear spoke natively.
- Naturally, Windows didn’t support it.

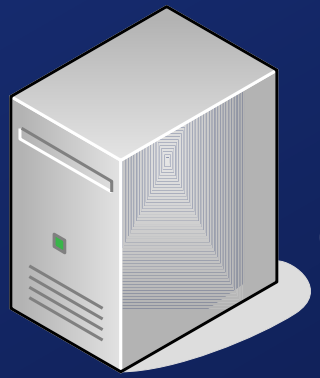
Windows Event Logs

- Windows writes events to “Event Logs”, including the classics: Application, Setup, System, and Security.
- Windows 2000 introduced per-application log files.
- Windows Vista rewrote everything with an XML event definition standard.


Event Properties - Event 4802, Microsoft Windows security auditi...
General
Details
The screen saver was invoked.
Subject:
Security ID: CONTOSO\dadmin
Account Name: dadmin
Account Domain: CONTOSO
Logon ID: 0x759A9
Session ID: 3
Log Name: Security
Source: Microsoft Windows se
Logged: 9/10/2015 5:16:32 PI
Event ID: 4802
Task Category: Other Logon/Logoff
Level: Information
Keywords: Audit Success
User: N/A
Computer: DC01.contoso.local
OpCode: Info
More Information: Event Log Online
Copy
Close

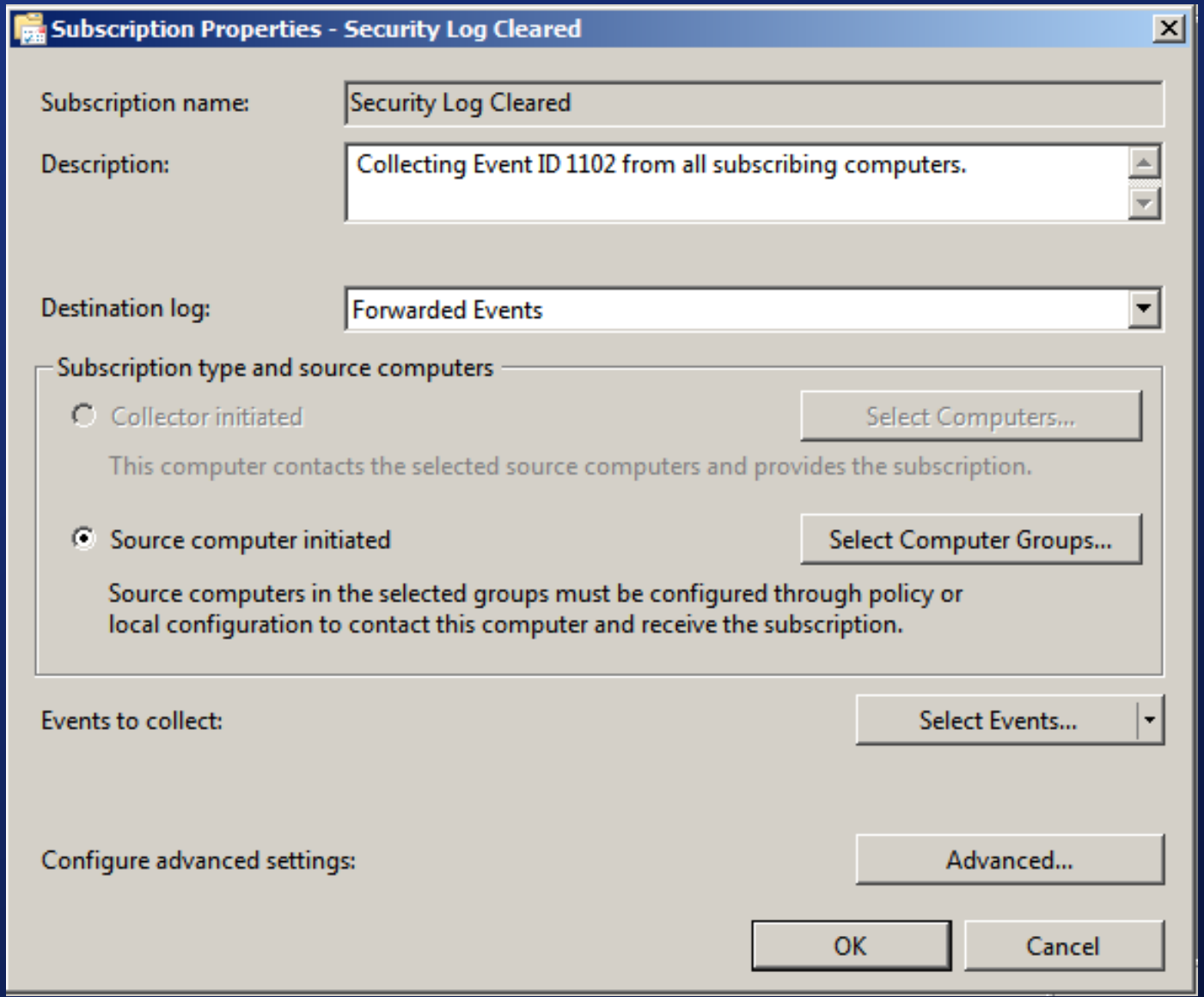
Subscription Server

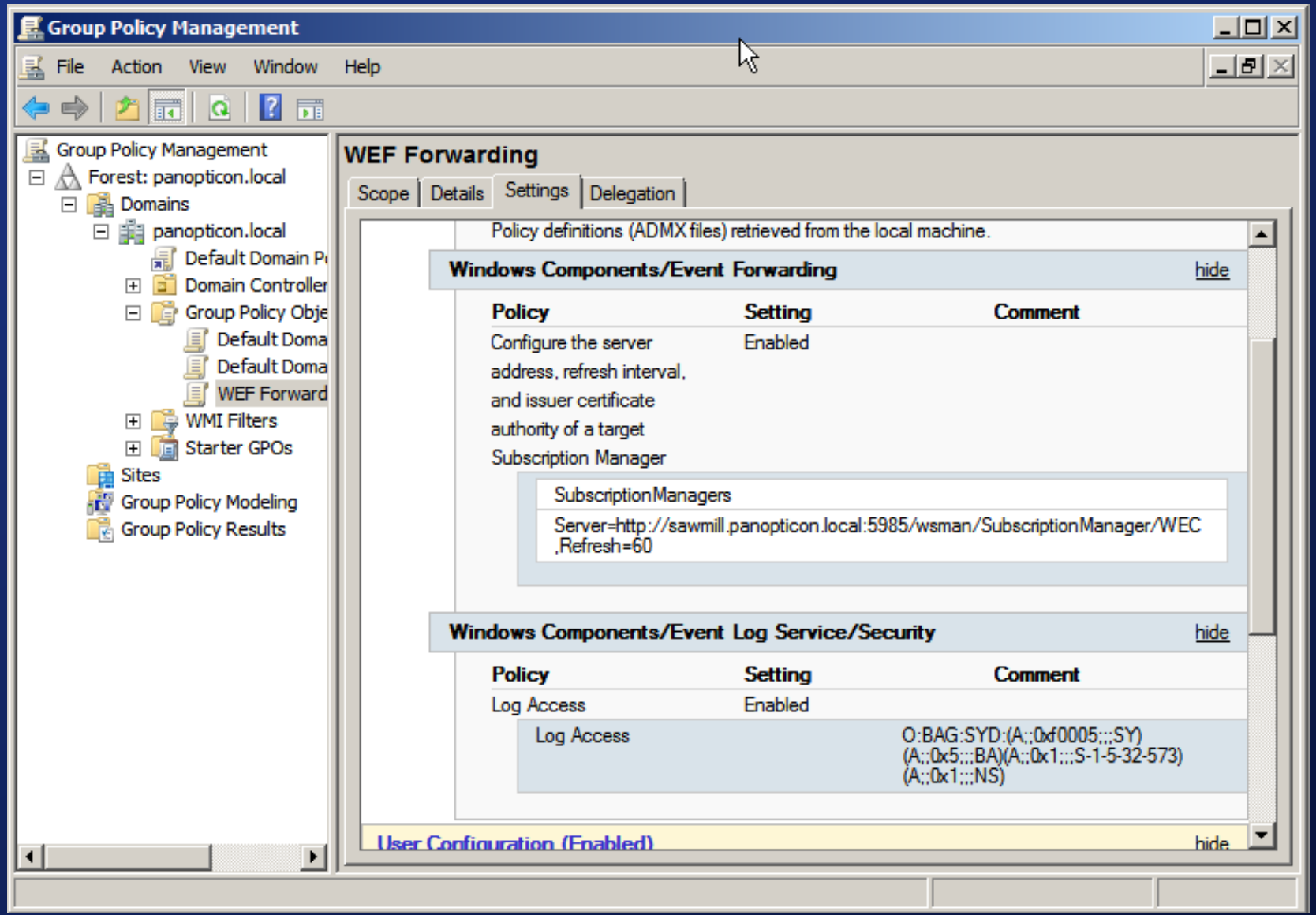


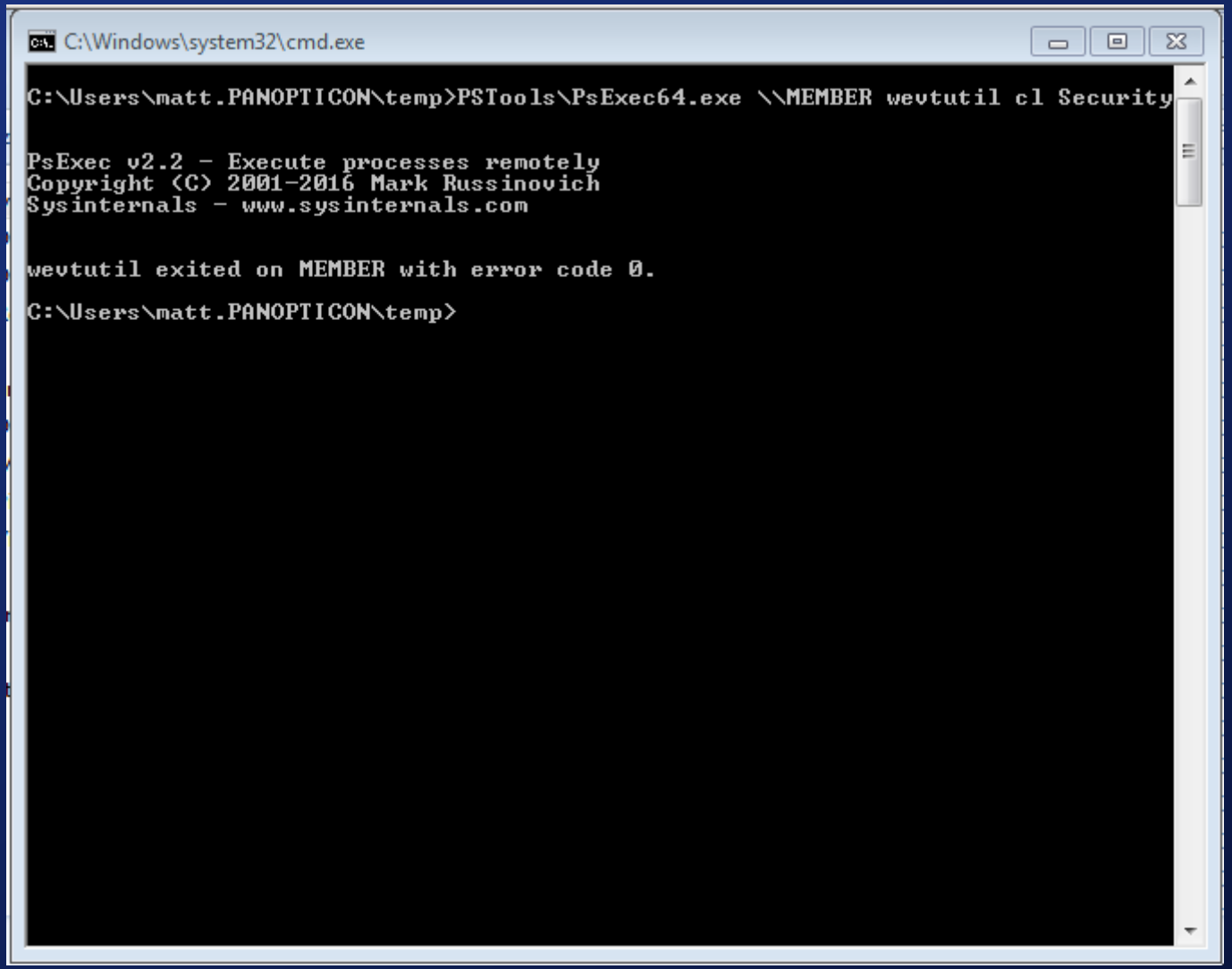


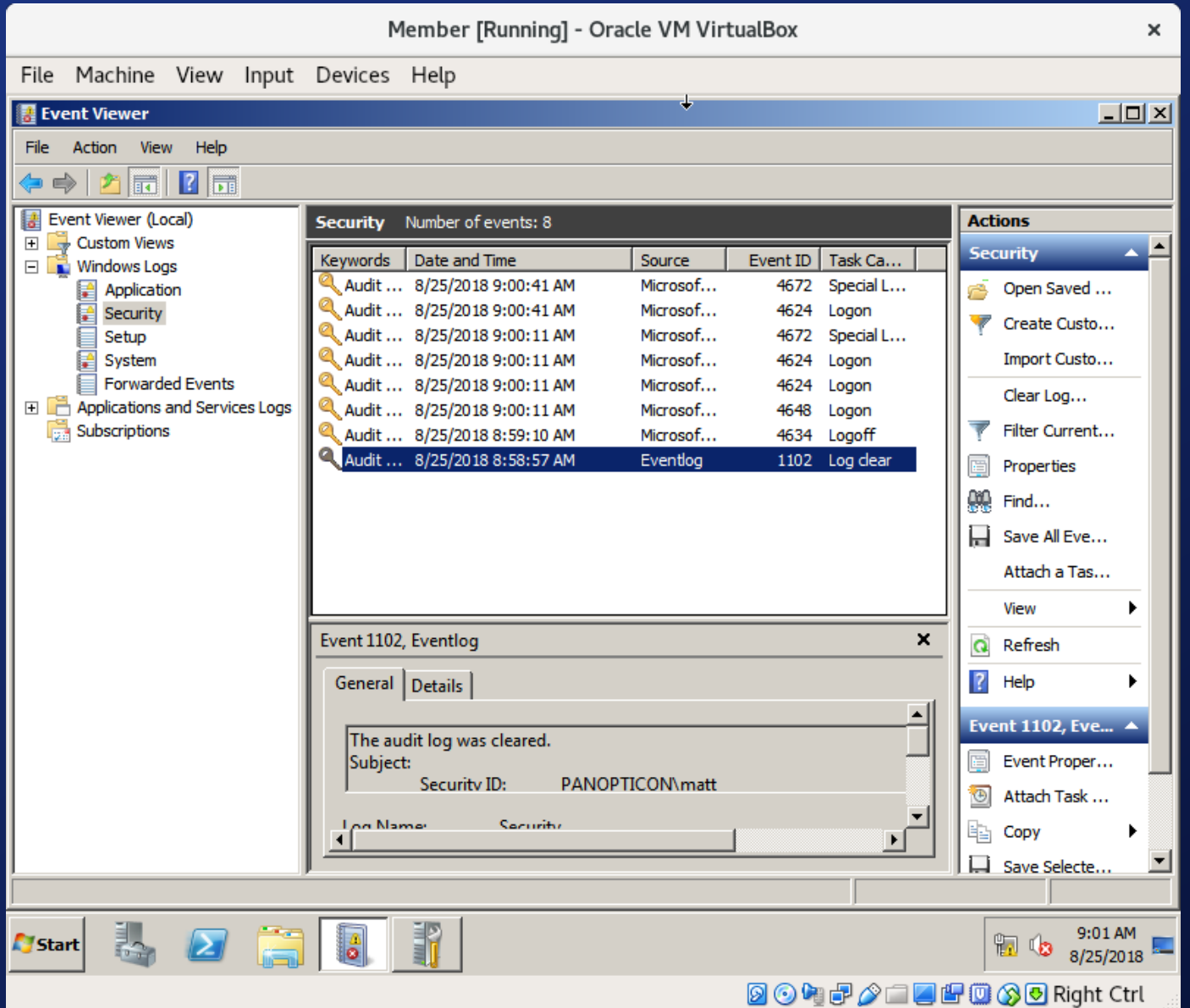
Domain Controller

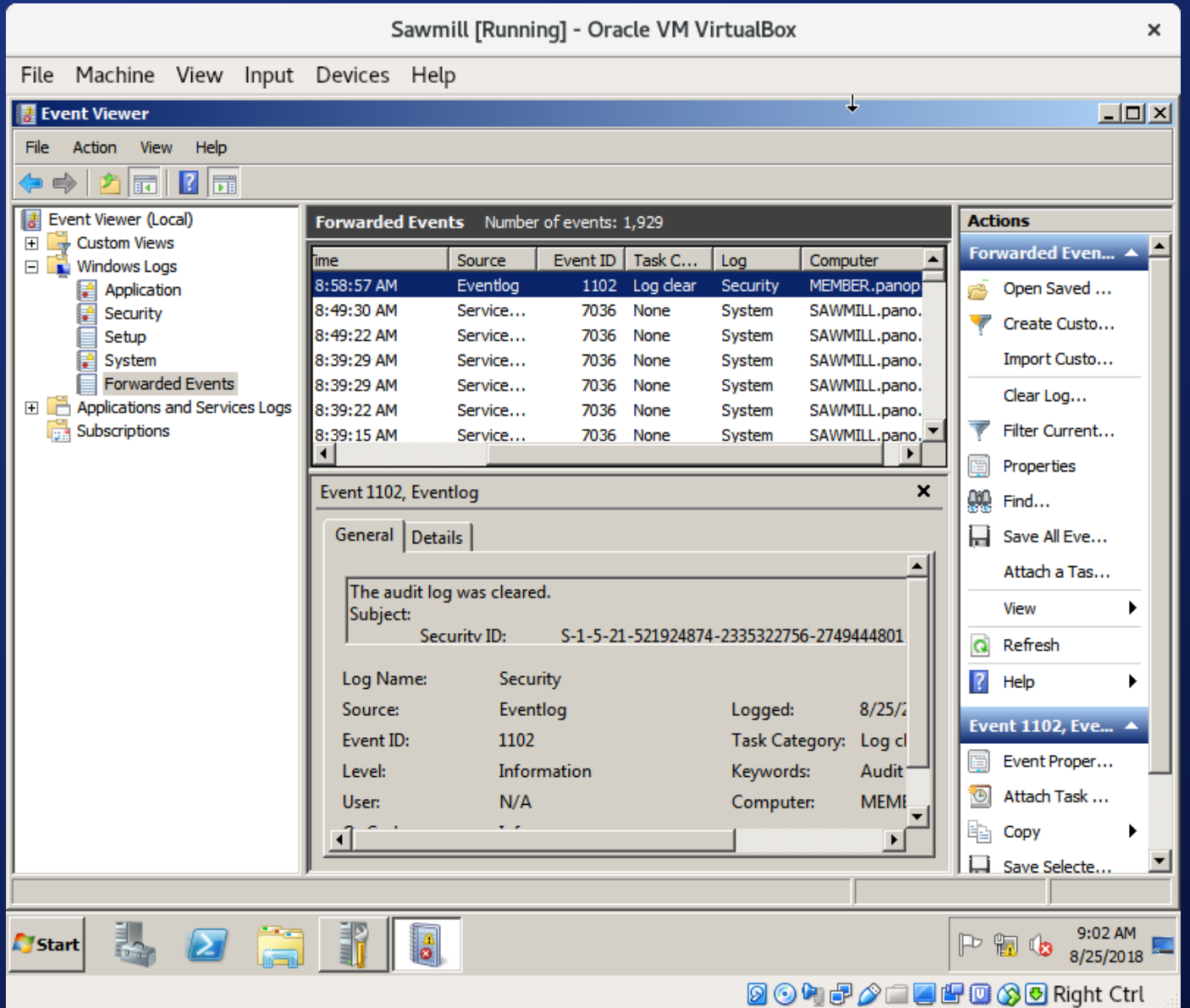
Client Computer


Subscription Properties - Security Log Cleared
Subscription name:
Security Log Cleared
Description:
Collecting Event ID 1102 from all subscribing computers.
Destination log:
Forwarded Events
Subscription type and source computers
Collector initiated
Select Computers...
This computer contacts the selected source computers and provides the subscription.
Source computer initiated
Select Computer Groups...
Source computers in the selected groups must be configured through policy or local configuration to contact this computer and receive the subscription.
Events to collect:
Select Events...
Configure advanced settings:
Advanced...
OK
Cancel


Group Policy Management
File Action View Window Help
Group Policy Management
Forest: panopticon.local
Domains
panopticon.local
Default Domain P
Domain Controller
Group Policy Obje
Default Doma
Default Doma
WEF Forward
WMI Filters
Starter GPOs
Sites
Group Policy Modeling
Group Policy Results
WEF Forwarding
Scope Details Settings Delegation
Policy definitions (ADMX files) retrieved from the local machine.
Windows Components/Event Forwarding hide
Policy Setting Comment
Configure the server address, refresh interval, and issuer certificate authority of a target Subscription Manager
Enabled
SubscriptionManagers
Server=http://sawmill.panopticon.local:5985/wsman/SubscriptionManager/WEC,Refresh=60
Windows Components/Event Log Service/Security hide
Policy Setting Comment
Log Access
Enabled
Log Access
O:BAG:SYD:(A;;0xf0005;;;SY)(A;;0x5;;;BA)(A;;0x1;;;S-1-5-32-573)(A;;0x1;;;NS)
User Configuration (Enabled) hide


C:\Windows\system32\cmd.exe
C:\Users\matt.PANOPTICON\temp>PSTools\PsExec64.exe \\MEMBER wevtutil cl Security
PsExec v2.2 - Execute processes remotely
Copyright (C) 2001-2016 Mark Russinovich
Sysinternals - www.sysinternals.com
wevtutil exited on MEMBER with error code 0.
C:\Users\matt.PANOPTICON\temp>


Member [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Event Viewer
File Action View Help
Event Viewer (Local)
Custom Views
Windows Logs
Application
Security
Setup
System
Forwarded Events
Applications and Services Logs
Subscriptions
Security Number of events: 8
Keywords Date and Time Source Event ID Task Ca...
Audit ... 8/25/2018 9:00:41 AM Microsof... 4672 Special L...
Audit ... 8/25/2018 9:00:41 AM Microsof... 4624 Logon
Audit ... 8/25/2018 9:00:11 AM Microsof... 4672 Special L...
Audit ... 8/25/2018 9:00:11 AM Microsof... 4624 Logon
Audit ... 8/25/2018 9:00:11 AM Microsof... 4624 Logon
Audit ... 8/25/2018 9:00:11 AM Microsof... 4648 Logon
Audit ... 8/25/2018 8:59:10 AM Microsof... 4634 Logoff
Audit ... 8/25/2018 8:58:57 AM Eventlog 1102 Log clear
Event 1102, Eventlog
General Details
The audit log was cleared.
Subject:
Security ID: PANOPTICON\matt
Actions
Security
Open Saved ...
Create Custo...
Import Custo...
Clear Log...
Filter Current...
Properties
Find...
Save All Eve...
Attach a Tas...
View
Refresh
Help
Event 1102, Eve...
Event Proper...
Attach Task ...
Copy
Save Selecte...
Start
9:01 AM
8/25/2018
Right Ctrl


Sawmill [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Event Viewer
File Action View Help
Event Viewer (Local)
Custom Views
Windows Logs
Application
Security
Setup
System
Forwarded Events
Applications and Services Logs
Subscriptions
Forwarded Events Number of events: 1,929
Time Source Event ID Task C... Log Computer
8:58:57 AM Eventlog 1102 Log clear Security MEMBER.panop
8:49:30 AM Service... 7036 None System SAWMILL.pano.
8:49:22 AM Service... 7036 None System SAWMILL.pano.
8:39:29 AM Service... 7036 None System SAWMILL.pano.
8:39:29 AM Service... 7036 None System SAWMILL.pano.
8:39:22 AM Service... 7036 None System SAWMILL.pano.
8:39:15 AM Service... 7036 None System SAWMILL.pano.
Event 1102, Eventlog
General Details
The audit log was cleared.
Subject:
Security ID: S-1-5-21-521924874-2335322756-2749444801
Log Name: Security
Source: Eventlog
Logged: 8/25/2
Event ID: 1102
Task Category: Log cl
Level: Information
Keywords: Audit
User: N/A
Computer: MEMB
Actions
Forwarded Even...
Open Saved ...
Create Custo...
Import Custo...
Clear Log...
Filter Current...
Properties
Find...
Save All Eve...
Attach a Tas...
View
Refresh
Help
Event 1102, Eve...
Event Proper...
Attach Task ...
Copy
Save Selecte...
Start
9:02 AM
8/25/2018
Right Ctrl

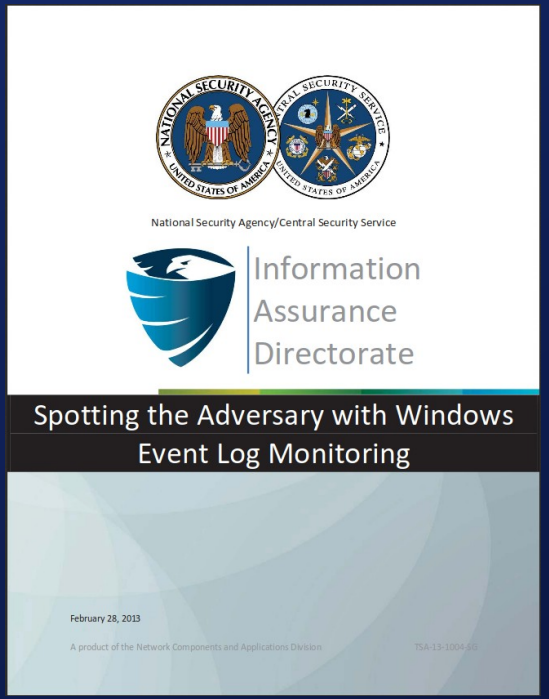
What Events to Monitor?

- Security Event Logs being cleared.
- High value groups like Domain Admins being changed.
- Local administrator groups being changed.
- Local users being created or deleted on member systems.
- New Services being installed, particularly on Domain Controllers (as this is often an indicator of malware or lateral movement behavior).

Jessica Payne
“Monitoring What Matters”

Any Other Suggestions?

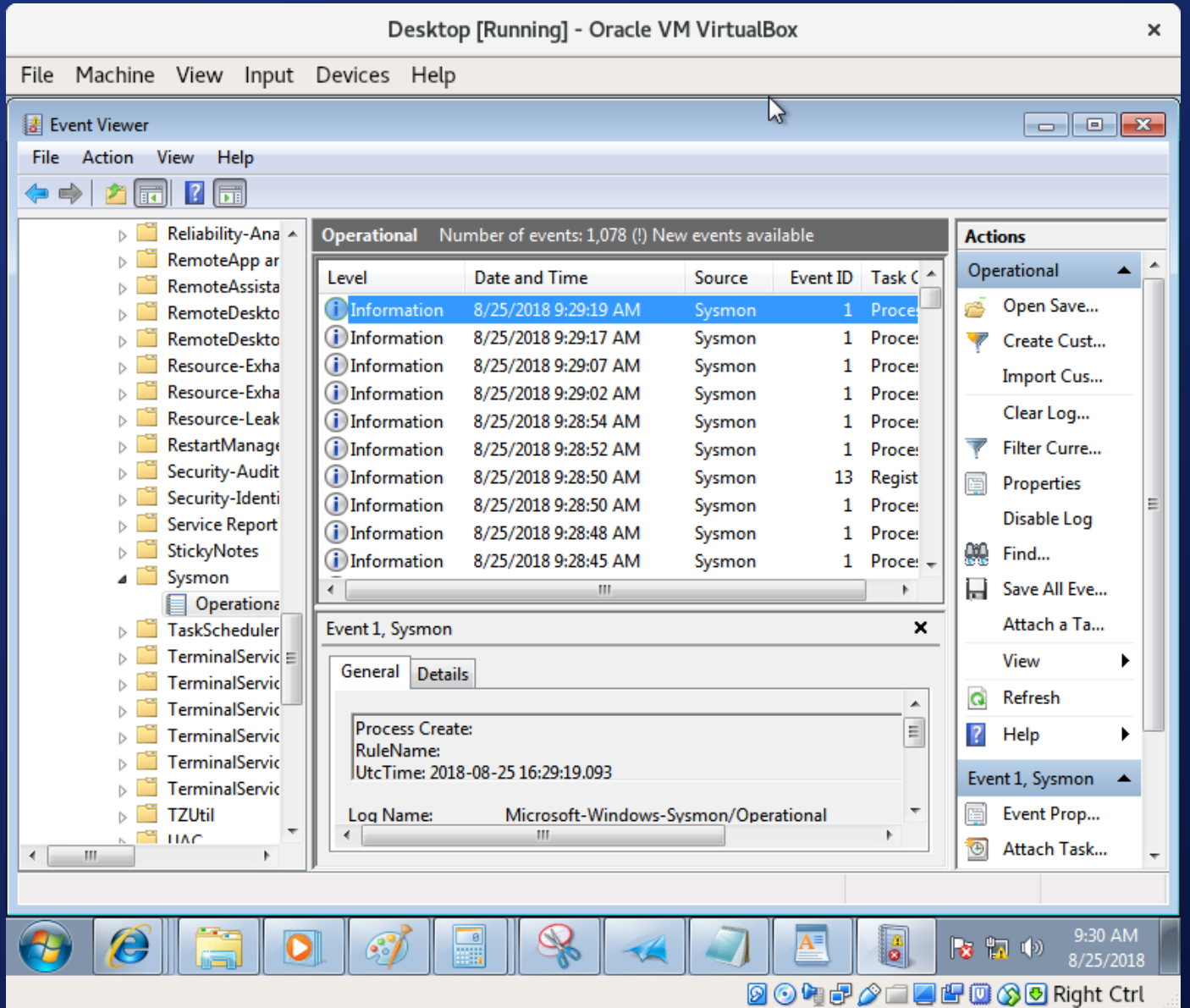
- Changes to Scheduled Tasks.
- Password resets.
- Software installations.
- Account creation / enabling.
- Honeytokens.
- Legacy accounts.
- RDP logins.

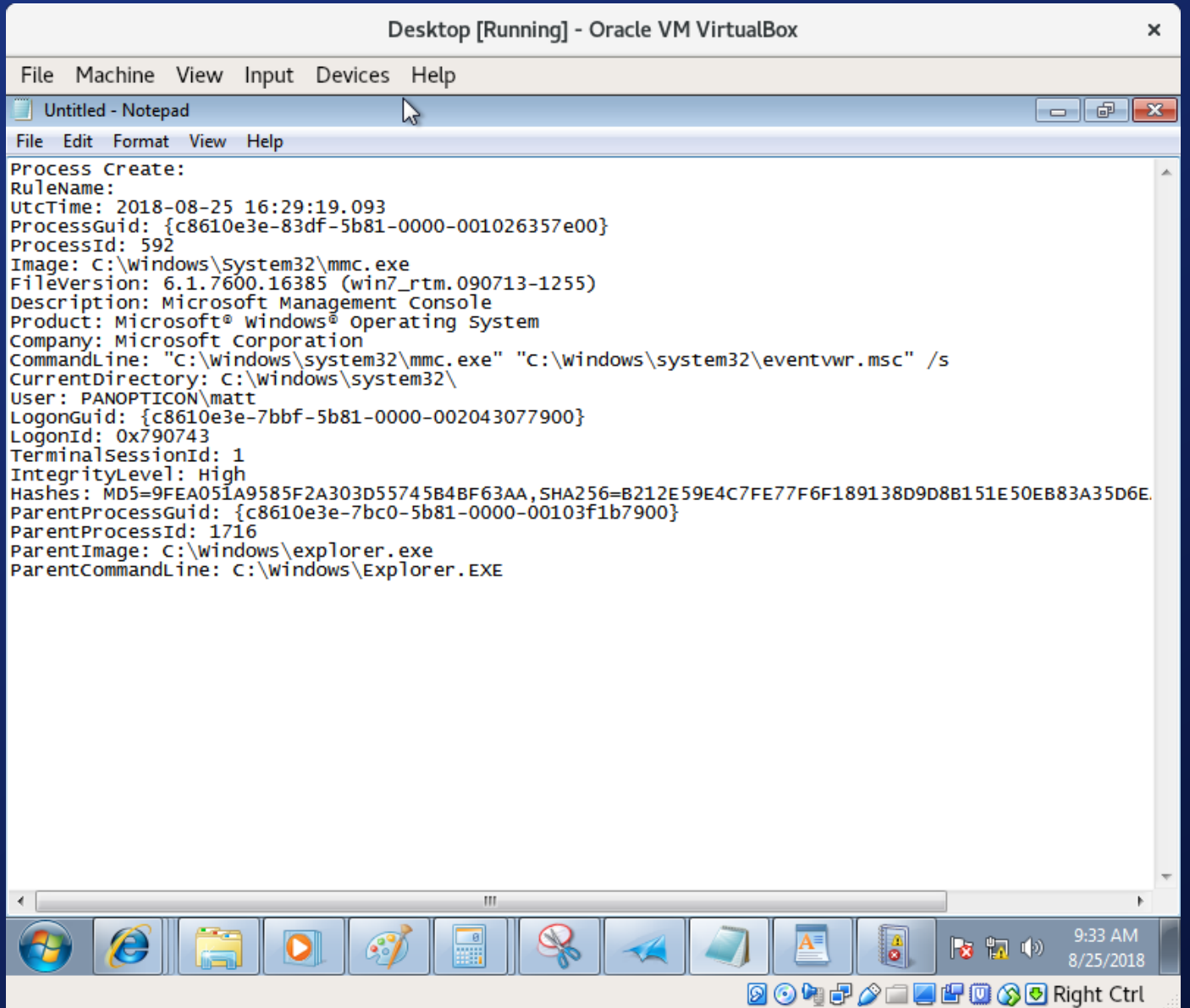


Sysmon

“System Monitor (Sysmon) is a Windows system service and device driver that, once installed on a system, remains resident across system reboots to monitor and log system activity to the Windows event log. It provides detailed information about process creations, network connections, and changes to file creation time. By collecting the events it generates using Windows Event Collection or SIEM agents and subsequently analyzing them, you can identify malicious or anomalous activity and understand how intruders and malware operate on your network.”

Sysmon Download Page


Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Event Viewer
File Action View Help
Reliability-Ana
RemoteApp ar
RemoteAssista
RemoteDeskto
RemoteDeskto
Resource-Exha
Resource-Exha
Resource-Leak
RestartManage
Security-Audit
Security-Identi
Service Report
StickyNotes
Sysmon
Operationa
TaskScheduler
TerminalServic
TerminalServic
TerminalServic
TerminalServic
TerminalServic
TerminalServic
TZUtil
Operational Number of events: 1,078 (!) New events available
Level Date and Time Source Event ID Task C
Information 8/25/2018 9:29:19 AM Sysmon 1 Proce
Information 8/25/2018 9:29:17 AM Sysmon 1 Proce
Information 8/25/2018 9:29:07 AM Sysmon 1 Proce
Information 8/25/2018 9:29:02 AM Sysmon 1 Proce
Information 8/25/2018 9:28:54 AM Sysmon 1 Proce
Information 8/25/2018 9:28:52 AM Sysmon 1 Proce
Information 8/25/2018 9:28:50 AM Sysmon 13 Regist
Information 8/25/2018 9:28:50 AM Sysmon 1 Proce
Information 8/25/2018 9:28:48 AM Sysmon 1 Proce
Information 8/25/2018 9:28:45 AM Sysmon 1 Proce
Event 1, Sysmon
General Details
Process Create:
RuleName:
UtcTime: 2018-08-25 16:29:19.093
Log Name: Microsoft-Windows-Sysmon/Operational
Actions
Operational
Open Save...
Create Cust...
Import Cus...
Clear Log...
Filter Curre...
Properties
Disable Log
Find...
Save All Eve...
Attach a Ta...
View
Refresh
Help
Event 1, Sysmon
Event Prop...
Attach Task...
9:30 AM
8/25/2018
Right Ctrl


Desktop [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Untitled - Notepad
File Edit Format View Help
Process Create:
RuleName:
UtcTime: 2018-08-25 16:29:19.093
ProcessGuid: {c8610e3e-83df-5b81-0000-001026357e00}
ProcessId: 592
Image: C:\Windows\System32\mmc.exe
FileVersion: 6.1.7600.16385 (win7_rtm.090713-1255)
Description: Microsoft Management Console
Product: Microsoft® Windows® Operating System
Company: Microsoft Corporation
CommandLine: "C:\Windows\system32\mmc.exe" "C:\Windows\system32\eventvwr.msc" /s
CurrentDirectory: C:\Windows\system32\
User: PANOPTICON\matt
LogonGuid: {c8610e3e-7bbf-5b81-0000-002043077900}
LogonId: 0x790743
TerminalSessionId: 1
IntegrityLevel: High
Hashes: MD5=9FEA051A9585F2A303D55745B4BF63AA,SHA256=B212E59E4C7FE77F6F189138D9D8B151E50EB83A35D6E
ParentProcessGuid: {c8610e3e-7bc0-5b81-0000-00103f1b7900}
ParentProcessId: 1716
ParentImage: C:\Windows\explorer.exe
ParentCommandLine: C:\Windows\Explorer.EXE
9:33 AM
8/25/2018
Right Ctrl

Sysmon

There are several freely available Sysmon configurations available on the Internet. One of the best is from @SwiftOnSecurity.

Windows-Native Analysis Tools

With all the logs in one place, there are some freely available Windows tools for analysis.

- Event Viewer
- Log Parser (Studio)
- PowerBI Desktop

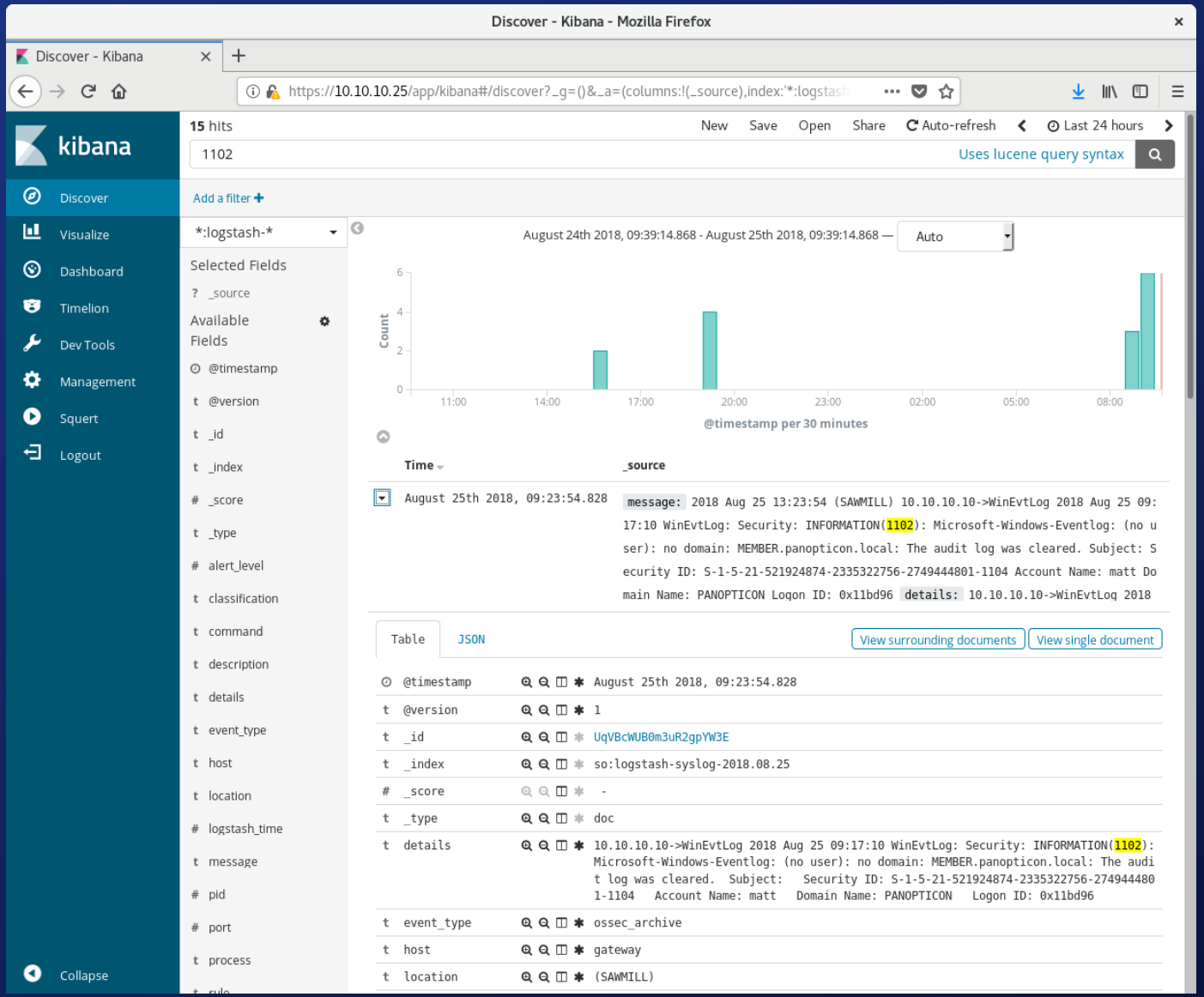
Log Shipping Mechanisms

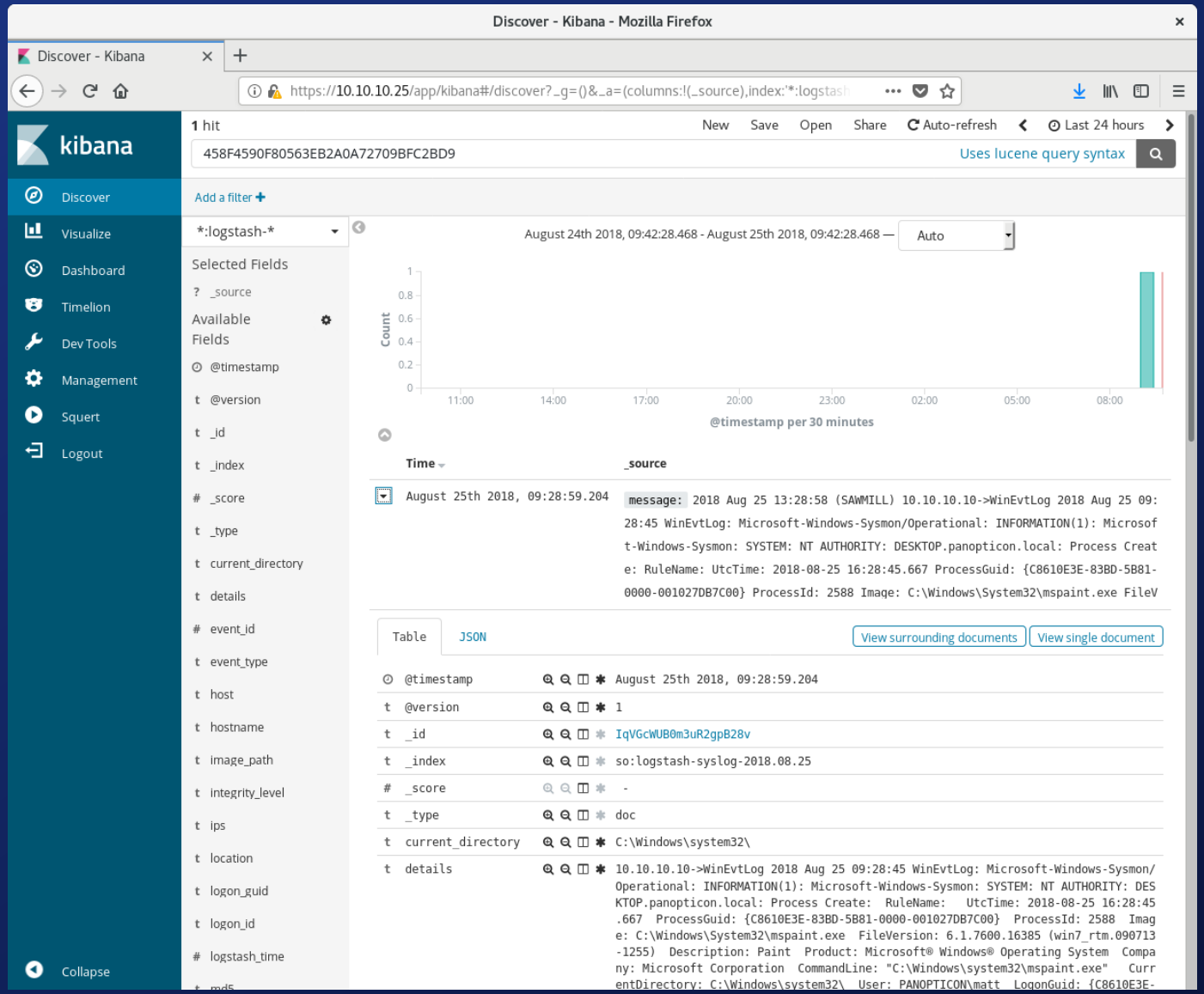
If you prefer, there are a lot of options for moving them into another analysis platform.

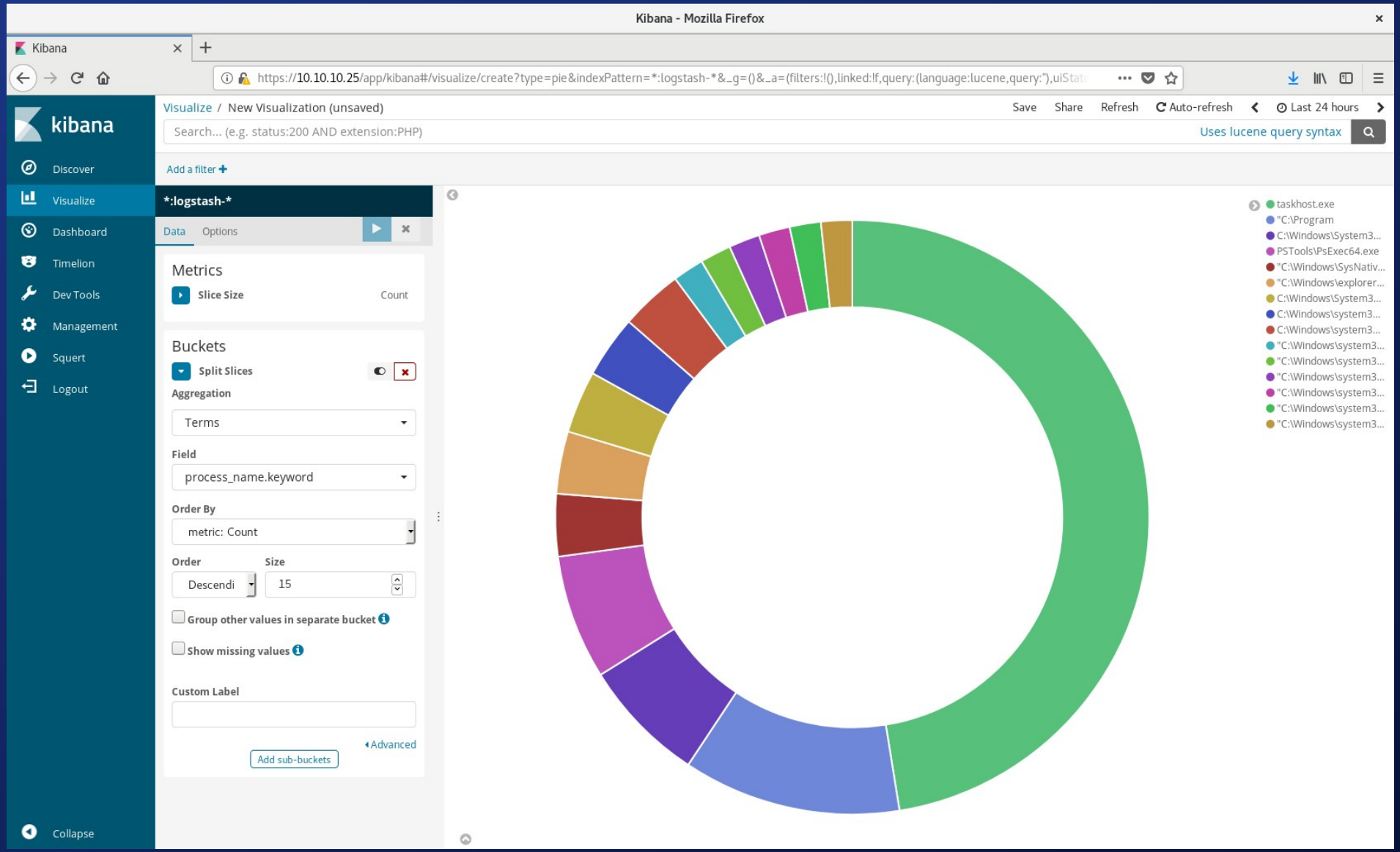
- NXLog
- OSSEC
- Winlogbeat

Security Onion

- Project by Doug Burks (@dougburks)
- Prebuilt Dockerized stack of open source NSM tools
- Available as an appliance ISO
- Can be installed on top of vanilla Ubuntu and RHEL/CentOS
- Commercial support and training available
- Built around the Elastic Stack.
- Includes Elastalert for writing alarm rules.


Discover - Kibana - Mozilla Firefox
Discover - Kibana
https://10.10.10.25/app/kibana#/discover?_g=()&_a=(columns:!(_source),index:'*:logstash
kibana
15 hits
New
Save
Open
Share
Auto-refresh
Last 24 hours
1102
Uses lucene query syntax
Add a filter
Discover
Visualize
Dashboard
Timelion
Dev Tools
Management
Squert
Logout
Collapse
:logstash-
Selected Fields
? _source
Available Fields
@timestamp
t @version
t _id
t _index
_score
t _type
alert_level
t classification
t command
t description
t details
t event_type
t host
t location
logstash_time
t message
pid
port
t process
August 24th 2018, 09:39:14.868 - August 25th 2018, 09:39:14.868 —
Auto
Count
@timestamp per 30 minutes
Time
_source
August 25th 2018, 09:23:54.828
message: 2018 Aug 25 13:23:54 (SAWMILL) 10.10.10.10->WinEvtLog 2018 Aug 25 09:17:10 WinEvtLog: Security: INFORMATION(1102): Microsoft-Windows-Eventlog: (no user): no domain: MEMBER.panopticon.local: The audit log was cleared. Subject: Security ID: S-1-5-21-521924874-2335322756-2749444801-1104 Account Name: matt Domain Name: PANOPTICON Logon ID: 0x11bd96 details: 10.10.10.10->WinEvtLog 2018
Table
JSON
View surrounding documents
View single document
@timestamp August 25th 2018, 09:23:54.828
@version 1
_id UqVBcWUB0m3uR2gpYW3E
_index so:logstash-syslog-2018.08.25
_score -
_type doc
details 10.10.10.10->WinEvtLog 2018 Aug 25 09:17:10 WinEvtLog: Security: INFORMATION(1102): Microsoft-Windows-Eventlog: (no user): no domain: MEMBER.panopticon.local: The audit log was cleared. Subject: Security ID: S-1-5-21-521924874-2335322756-2749444801-1104 Account Name: matt Domain Name: PANOPTICON Logon ID: 0x11bd96
event_type ossec_archive
host gateway
location (SAWMILL)


Discover - Kibana - Mozilla Firefox
Discover - Kibana
https://10.10.10.25/app/kibana#/discover?_g=()&_a=(columns:!(_source),index:'*:logstash
kibana
Discover
Visualize
Dashboard
Timelion
Dev Tools
Management
Squert
Logout
Collapse
1 hit
New
Save
Open
Share
Auto-refresh
Last 24 hours
458F4590F80563EB2A0A72709BFC2BD9
Uses lucene query syntax
Add a filter
:logstash-
Selected Fields
? _source
Available Fields
@timestamp
t @version
t _id
t _index
_score
t _type
t current_directory
t details
event_id
t event_type
t host
t hostname
t image_path
t integrity_level
t ips
t location
t logon_guid
t logon_id
logstash_time
August 24th 2018, 09:42:28.468 - August 25th 2018, 09:42:28.468 —
Auto
Count
1
0.8
0.6
0.4
0.2
0
11:00
14:00
17:00
20:00
23:00
02:00
05:00
08:00
@timestamp per 30 minutes
Time
_source
August 25th 2018, 09:28:59.204
message: 2018 Aug 25 13:28:58 (SAWMILL) 10.10.10.10->WinEvtLog 2018 Aug 25 09:28:45 WinEvtLog: Microsoft-Windows-Sysmon/Operational: INFORMATION(1): Microsoft-Windows-Sysmon: SYSTEM: NT AUTHORITY: DESKTOP.panopticon.local: Process Create: RuleName: UtcTime: 2018-08-25 16:28:45.667 ProcessGuid: {C8610E3E-83BD-5B81-0000-001027DB7C00} ProcessId: 2588 Image: C:\Windows\System32\mspaint.exe FileV
Table
JSON
View surrounding documents
View single document
@timestamp August 25th 2018, 09:28:59.204
t @version 1
t _id IqVGcWUB0m3uR2gpB28v
t _index so:logstash-syslog-2018.08.25
_score -
t _type doc
t current_directory C:\Windows\system32\
t details 10.10.10.10->WinEvtLog 2018 Aug 25 09:28:45 WinEvtLog: Microsoft-Windows-Sysmon/Operational: INFORMATION(1): Microsoft-Windows-Sysmon: SYSTEM: NT AUTHORITY: DESKTOP.panopticon.local: Process Create: RuleName: UtcTime: 2018-08-25 16:28:45.667 ProcessGuid: {C8610E3E-83BD-5B81-0000-001027DB7C00} ProcessId: 2588 Image: C:\Windows\System32\mspaint.exe FileVersion: 6.1.7600.16385 (win7_rtm.090713-1255) Description: Paint Product: Microsoft® Windows® Operating System Company: Microsoft Corporation CommandLine: "C:\Windows\system32\mspaint.exe" CurrentDirectory: C:\Windows\system32\ User: PANOPTICON\matt LogonGuid: {C8610E3E-


Kibana - Mozilla Firefox
Kibana
https://10.10.10.25/app/kibana#/visualize/create?type=pie&indexPattern=*:logstash-*&_g=()&_a=(filters:!(),linked:!f,query:(language:lucene,query:''),uiState
kibana
Discover
Visualize
Dashboard
Timelion
Dev Tools
Management
Squert
Logout
Collapse
Visualize / New Visualization (unsaved)
Save
Share
Refresh
Auto-refresh
Last 24 hours
Search... (e.g. status:200 AND extension:PHP)
Uses lucene query syntax
Add a filter
:logstash-
Data
Options
Metrics
Slice Size
Count
Buckets
Split Slices
Aggregation
Terms
Field
process_name.keyword
Order By
metric: Count
Order
Descendi
Size
15
Group other values in separate bucket
Show missing values
Custom Label
Advanced
Add sub-buckets
taskhost.exe
"C:\Program
C:\Windows\System3...
PSTools\PsExec64.exe
"C:\Windows\SysNativ...
"C:\Windows\explorer...
C:\Windows\System3...
C:\Windows\system3...
C:\Windows\system3...
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"C:\Windows\system3...
"C:\Windows\system3...
"C:\Windows\system3...
"C:\Windows\system3...
"C:\Windows\system3...

Summary

- Windows Event Forwarding (WEF) is available in every supported version of Windows.
- It requires one subscription server and one GPO.
- It can pull any event from the endpoints on your network with amazing granularity.

Questions?