AI-DRIVEN SECURITY AND THREAT DETECTION USING SENTINEL

-Bhavya Agarwal

What is the problem?

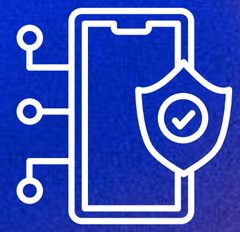
- Organizations are bombarded with cyber threats daily.
- Traditional security tools struggle to keep up with the scale and sophistication of modern attacks. They work in silos, making it hard to detect coordinated attacks.
- Organizations need an AI-powered solution that provides a holistic security view.

Microsoft Sentinel

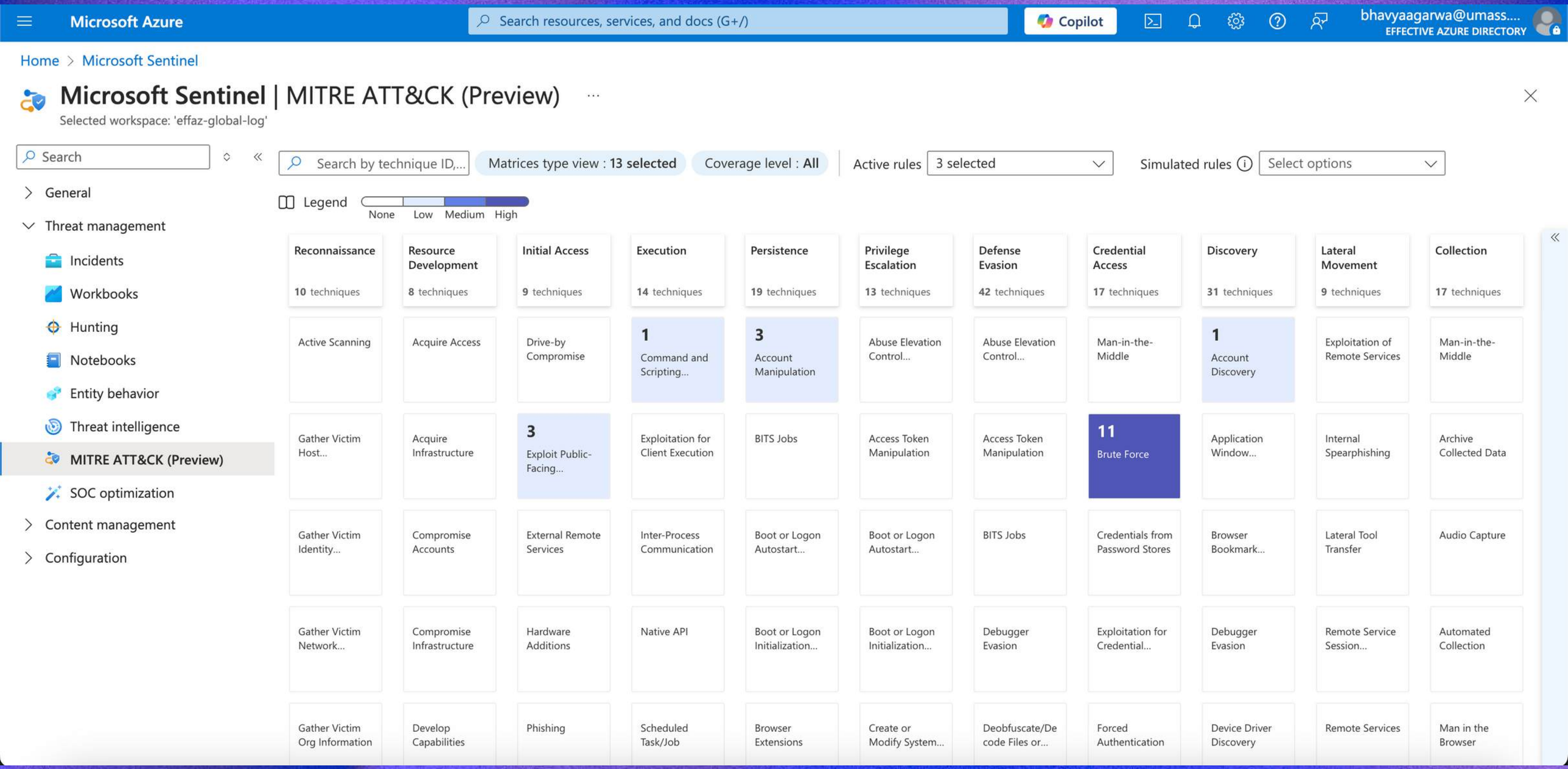
SIEM (Security Information and Event Management) & **SOAR** (Security Orchestration, Automation, and Response) solution.

One-stop security solution for all your resources: VMs, databases, cloud applications, networks, and more.

MITRE ATT&CK framework to visualize the nature and coverage of your organization's security status based on the tactics and techniques.

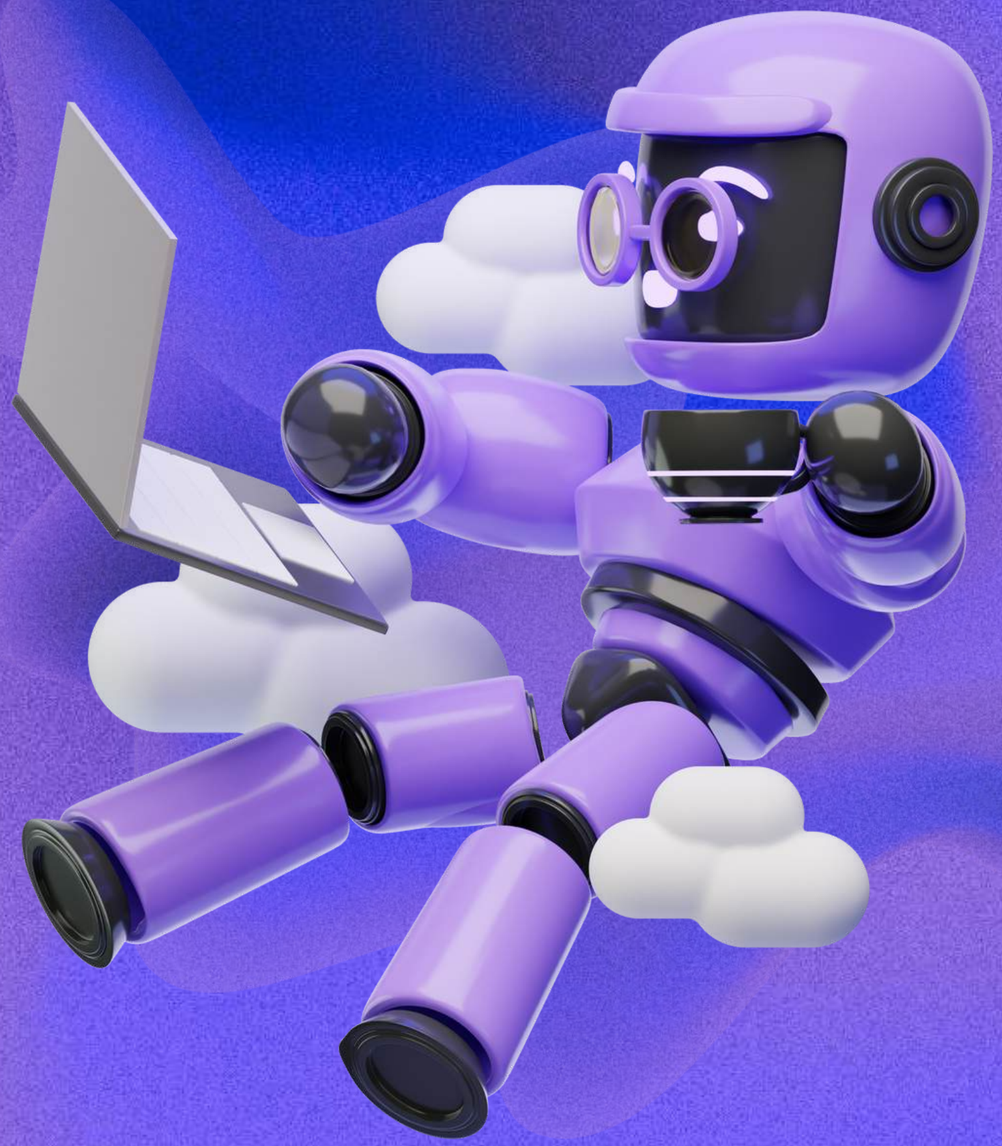


Microsoft's threat intelligence stream to detect malicious activity in your environment and provide context to security investigators for informed response decisions.


Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
bhavyaagarwa@umass....
EFFECTIVE AZURE DIRECTORY
Home > Microsoft Sentinel
Microsoft Sentinel | MITRE ATT&CK (Preview)
Selected workspace: 'effaz-global-log'
Search
General
Threat management
Incidents
Workbooks
Hunting
Notebooks
Entity behavior
Threat intelligence
MITRE ATT&CK (Preview)
SOC optimization
Content management
Configuration
Search by technique ID,...
Matrices type view : 13 selected
Coverage level : All
Active rules
3 selected
Simulated rules
Select options
Legend
None
Low
Medium
High
Reconnaissance
10 techniques
Resource Development
8 techniques
Initial Access
9 techniques
Execution
14 techniques
Persistence
19 techniques
Privilege Escalation
13 techniques
Defense Evasion
42 techniques
Credential Access
17 techniques
Discovery
31 techniques
Lateral Movement
9 techniques
Collection
17 techniques
Active Scanning
Acquire Access
Drive-by Compromise
1
Command and Scripting...
3
Account Manipulation
Abuse Elevation Control...
Abuse Elevation Control...
Man-in-the-Middle
1
Account Discovery
Exploitation of Remote Services
Man-in-the-Middle
Gather Victim Host...
Acquire Infrastructure
3
Exploit Public-Facing...
Exploitation for Client Execution
BITS Jobs
Access Token Manipulation
Access Token Manipulation
11
Brute Force
Application Window...
Internal Spearphishing
Archive Collected Data
Gather Victim Identity...
Compromise Accounts
External Remote Services
Inter-Process Communication
Boot or Logon Autostart...
Boot or Logon Autostart...
BITS Jobs
Credentials from Password Stores
Browser Bookmark...
Lateral Tool Transfer
Audio Capture
Gather Victim Network...
Compromise Infrastructure
Hardware Additions
Native API
Boot or Logon Initialization...
Boot or Logon Initialization...
Debugger Evasion
Exploitation for Credential...
Debugger Evasion
Remote Service Session...
Automated Collection
Gather Victim Org Information
Develop Capabilities
Phishing
Scheduled Task/Job
Browser Extensions
Create or Modify System...
Deobfuscate/Decode Files or...
Forced Authentication
Device Driver Discovery
Remote Services
Man in the Browser

UEBA

- **User and Entity Behavior Analytics** (UEBA) detects anomalies in user and machine behavior.
- Instead of relying on predefined rules, UEBA learns patterns over time using **machine learning** and flags suspicious activities.
- Identifies insider threats (e.g., an employee accessing sensitive data at odd hours), detects compromised accounts (e.g., a legitimate account suddenly logging in from a different country), analyzes peer behavior (e.g., comparing a user's actions to their typical patterns).



How UEBA Works in Sentinel

- Sentinel leverages UEBA to enhance security analytics by identifying anomalies that traditional rule-based systems might miss.
- It correlates activity across users, devices, and applications to detect sophisticated attack patterns.
- Provides risk-based alerts, and works alongside threat intelligence and machine learning models to improve detection accuracy and response time.
- Article- https://learn.microsoft.com/en-us/azure/sentinel/identify-threats-with-entity-behavior-analytics

Scenario #1 – Threat Simulation (TOR & Failed Login Attempt)

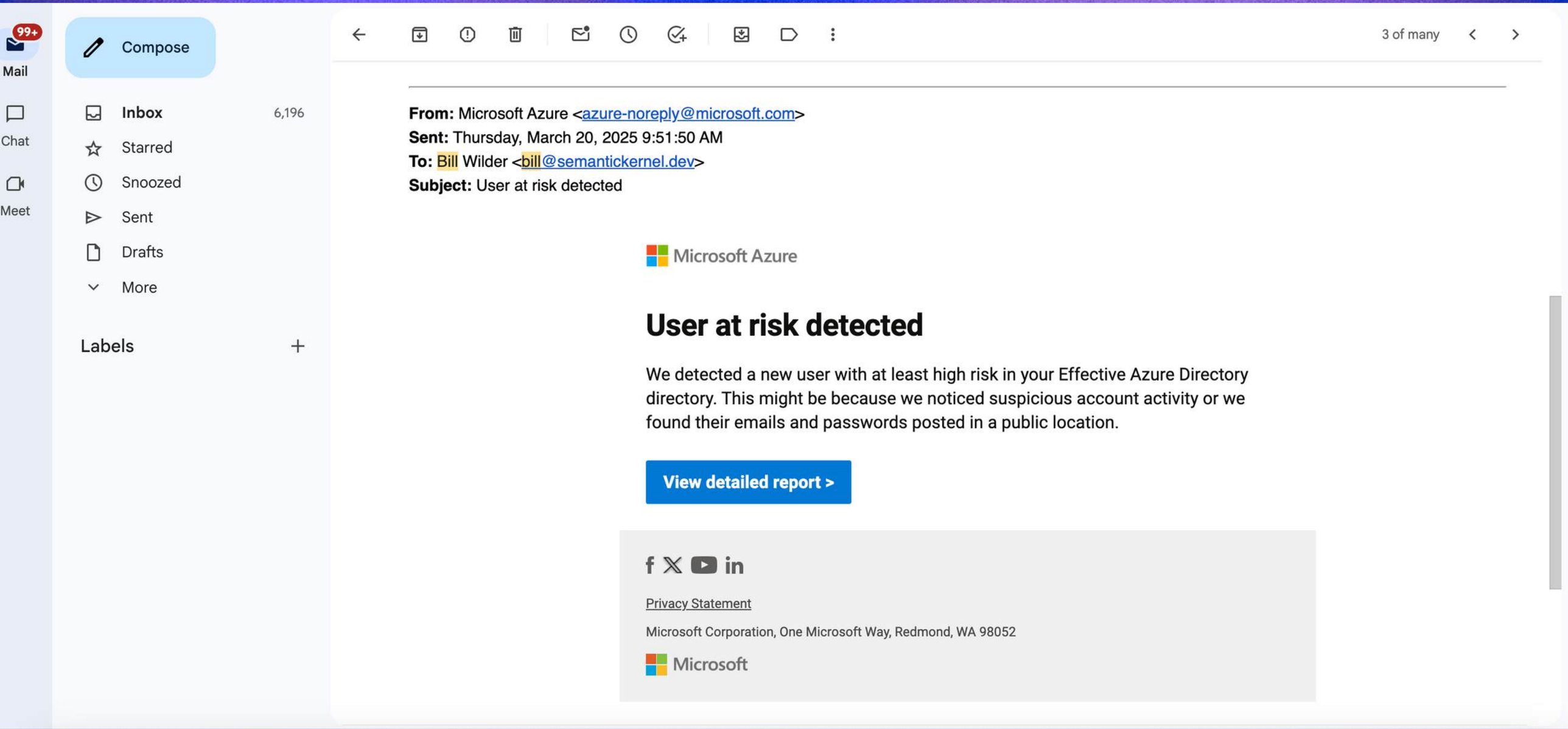
- **Scenario:** A hacker tries to brute-force their way into a VM using TOR.

- **What Happens in Sentinel?**
  - Sentinel detects multiple failed login attempts from a suspicious IP.
  - AI identifies the attacker’s behavior as anomalous.
  - Sentinel raises an alert, linking it with other attack signals.

Scenario #2 – Threat Simulation (Password Theft & Mimikatz Attack)

- **Scenario:** An attacker steals the VM password using Tor and Microsoft Key Vault and downloads Mimikatz on it.

- **What Happens in Sentinel?**
  - Detects unusual authentication activity (e.g., logging in from an unfamiliar device).
  - Flags the download of Mimikatz, a known hacking tool.
  - It classifies the risk (high risk) based on severity, confidence, and correlation with other threats.


99+
Mail
Chat
Meet
Compose
Inbox 6,196
Starred
Snoozed
Sent
Drafts
More
Labels
3 of many
From: Microsoft Azure <azure-noreply@microsoft.com>
Sent: Thursday, March 20, 2025 9:51:50 AM
To: Bill Wilder <bill@semantickernel.dev>
Subject: User at risk detected
Microsoft Azure
User at risk detected
We detected a new user with at least high risk in your Effective Azure Directory directory. This might be because we noticed suspicious account activity or we found their emails and passwords posted in a public location.
View detailed report >
Privacy Statement
Microsoft Corporation, One Microsoft Way, Redmond, WA 98052
Microsoft

Subject: Fw: Microsoft Defender for Cloud has detected suspicious activity in your environment

---

From: Microsoft Defender for Cloud <DefenderCloudnoreply@microsoft.com>
Sent: Thursday, March 20, 2025 10:14:42 PM
To: Bill Wilder <bill@semantickernel.dev>
Subject: Microsoft Defender for Cloud has detected suspicious activity in your environment

Microsoft

HIGH SEVERITY

Microsoft Defender for Cloud has detected suspicious activity in your resource

Mimikatz credential theft tool was detected (Agentless)

The Mimikatz hacktool was detected on this device. Mimikatz is a credential theft tool that can harvest plaintext passwords, password hashes, smartcard PINs, and Kerberos tickets. An attacker might be trying to harvest credentials to log into this or other devices on the network, by impersonating a valid user.

March 21, 2025 2:14 UTC

Affected Virtual Machine:
Aggie

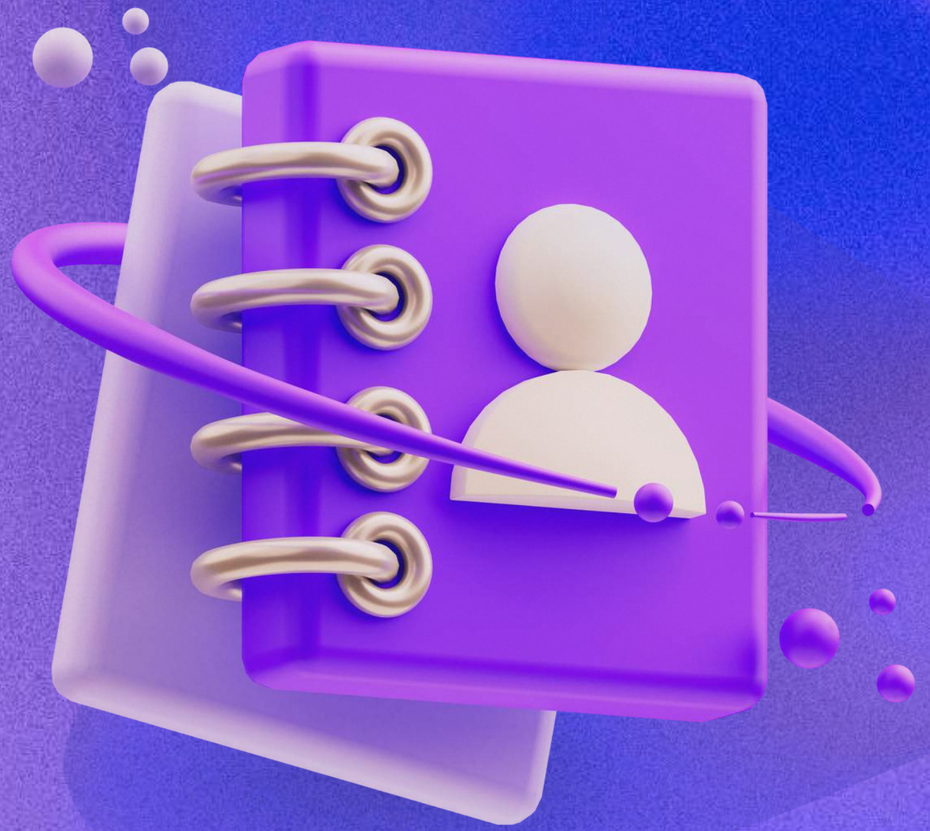
Detected by
Microsoft

View the full alert >

AI in Cybersecurity

- AI enhances cybersecurity by automating complex threat detection and reducing human workload.
- It analyzes vast amounts of security data to identify patterns that humans might miss.
- AI-driven security solutions can adapt to new attack methods without requiring manual rule updates.

Major Takeaways



- Most people think of AI as chatbots, but it’s so much more! Just because its not a chatbot does not mean it does not have any AI elements to it!
- AI-driven solutions for AI-driven problems!
- Cybersecurity is a never-ending battle, but with AI, we can stay one step ahead of attackers.

Thank You!