Demo Investigation

Endpoints

Hostname	First Timestamp	Last Timestamp	Events
SCRANTON.dmevals.local	5/1/2020 10:55:56 PM	5/2/2020 4:18:37 AM	136
NASHUA.dmevals.local	5/1/2020 11:10:23 PM	5/1/2020 11:17:52 PM	58
UTICA.dmevals.local	5/2/2020 3:55:06 AM	5/2/2020 4:21:21 AM	112
NEWYORK.dmevals.local	5/2/2020 4:02:44 AM	5/2/2020 4:17:35 AM	9

Investigation Summary

An investigation based on the https://github.com/OTRF/detection-hackathon-apt29 dataset. Investigation and endpoint summaries are generated by a large language model (LLM) from the Investigation events, comments and Micro-Technique evidence.

Generated with: gpt-4o-mini 128,000 context

Executive Summary:
The purpose of this incident response investigation was to analyze forensic timeline data from multiple endpoints within the organization to identify potential security breaches and assess the implications of these incidents. The investigation aimed to uncover the nature of the attacks, the methods employed by the threat actors, and the overall impact on the organization’s security posture. Given the sophistication of the observed activities, the findings indicate a significant risk to the integrity of sensitive data and the operational continuity of the organization.

The analysis revealed a series of coordinated events across several endpoints, characterized by the use of command and control tools, lateral movement techniques, and credential dumping activities. Key findings include the transfer of malicious executables, extensive use of PowerShell for script execution, and the establishment of persistence mechanisms through registry modifications. Notably, the presence of tools like PsExec and the execution of processes targeting LSASS for credential theft suggest a common threat actor employing advanced tactics to compromise the network. The timeline indicates a methodical approach to infiltrate systems, gather sensitive information, and maintain access while evading detection.

Root cause analysis points to several vulnerabilities and weaknesses that facilitated the incident. The exploitation of legitimate Windows services and tools, combined with insufficient monitoring of network activities, allowed the attackers to establish footholds within the environment. Additionally, the use of obfuscation techniques and the creation of suspicious files in critical system directories indicate a lack of adequate security controls to detect and prevent unauthorized actions.

The impact of the incident on operations and data integrity is significant. The unauthorized access to sensitive information poses a risk of data exfiltration, which could lead to regulatory compliance issues and reputational damage. Furthermore, the potential for lateral movement within the network raises concerns about the overall security of interconnected systems. Immediate action is required to address the identified vulnerabilities, enhance monitoring capabilities, and implement robust incident response measures to mitigate future risks.

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Analysis of the forensic data across the endpoints reveals a coordinated and sophisticated intrusion utilizing various techniques aligned with the MITRE ATT&CK framework. Initial access was primarily established through the execution of PowerShell commands, which serve as a common entry point for adversaries due to their scripting capabilities. In one instance, a malicious executable was disguised using the right-to-left override character, while in another, certutil.exe was employed to decode obfuscated files, indicating a deliberate effort to evade detection during the initial compromise.

Following initial access, the execution phase was marked by the use of multiple command-line interpreters, including PowerShell, Python, and csc.exe, to run a series of commands aimed at further exploitation. The execution of malicious scripts and the creation of compressed files using Rar.exe suggest an intent to manipulate the system and potentially exfiltrate sensitive data.

Persistence was achieved through various means, including the modification of registry keys and the establishment of WMI event subscriptions. These techniques ensured that the adversary's malicious payloads were executed during system boot or triggered by specific events, allowing for continued access even after reboots or logins. Defense evasion tactics were evident as the adversary employed process injection techniques and tools like sdelete64.exe to securely delete files, thereby covering their tracks and minimizing detection risks. The use of software deployment tools further facilitated lateral movement within the network, enabling the adversary to extend their reach and maintain control over multiple systems.

The analysis of the access timeline across the endpoints reveals a coordinated effort to achieve privilege escalation and credential access, indicative of a sophisticated attack strategy. Initially, a process named 'm.exe' was executed by the user 'DMEVALS\mscott' with an attempt to escalate privileges through debugging, specifically targeting the Local Security Authority Subsystem Service (LSASS) to extract credentials associated with the 'krbtgt' account. This action was accompanied by the loading of critical system libraries such as 'cryptdll.dll' and 'samlib.dll', which are integral to cryptographic functions and security account access. The risk levels associated with these actions varied, with some flagged as medium risk, suggesting a nuanced approach to avoid detection.

Subsequently, the timeline indicates the execution of an obfuscated PowerShell command, likely designed to manipulate an image file, serving as a precursor to further malicious activities. This command facilitated the establishment of a foothold within the system, allowing for subsequent actions without raising alarms. Following this, the adversary systematically accessed LSASS memory

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across multiple endpoints, employing tools and commands such as 'sekurlsa::logonpasswords' and invoking Mimikatz to extract sensitive credentials, including plaintext passwords and hashes. The repeated access to LSASS memory underscores a methodical approach to credential harvesting, with the intent to facilitate lateral movement within the network.

The analysis of the mobility timeline reveals a coordinated effort by the adversary to execute malicious code and move laterally within the network, primarily utilizing remote execution and lateral movement techniques. Initially, the adversary executed PowerShell commands on multiple endpoints to retrieve and execute scripts from remote servers, indicating the use of remote execution methods to establish a foothold. This was followed by multiple network connections to the same remote IP, suggesting persistent communication with a command and control server.

As the timeline progresses, the adversary leveraged Windows Management Instrumentation (WMI) to execute further commands, facilitating interaction with both local and remote systems. This method allowed for the deployment of additional payloads and the collection of sensitive information. The use of Windows Remote Management and Remote Desktop Protocol (RDP) enabled the adversary to access remote services using valid credentials, underscoring a methodical approach to lateral movement.

The execution of PsExec on various endpoints and the use of remote services such as SSH further illustrate the adversary's capability to deploy code across multiple systems. The user 'pbeesly' consistently logged into systems from a remote IP, accessing network share objects and executing processes like 'PSEXESVC.exe' and 'python.exe' to manipulate files on remote systems. This indicates a calculated effort to blend in with legitimate network activity while escalating privileges and maintaining control over compromised systems.

The analysis of the data movement timeline reveals a coordinated adversarial effort focused on data collection, exfiltration, and maintaining command and control, with significant implications for the integrity and confidentiality of the systems involved. Initially, the adversary executed ingress tool transfers to introduce malicious tools into the environment, including 'python.exe' and a credential dumping tool on various endpoints. These actions align with the Collection tactic, establishing a foothold for further data gathering activities. The timing of these transfers, particularly during off-peak hours, suggests a calculated approach to minimize detection risks.

Following the tool transfers, the adversary engaged in data collection activities. The use of certutil to decode a file and the creation of "kxwn.lock" in the user's roaming profile indicate manipulation and staging of

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sensitive information. Similarly, the adversary utilized Rar.exe to compress and potentially encrypt targeted user directories, further demonstrating a methodical approach to data collection.

As the operation progressed, the adversary shifted towards exfiltration. Data was transferred using a legitimate cloud storage service, leveraging the net command to map a network drive and employing SSL/TLS encryption to obscure the exfiltration process within normal traffic patterns. This tactic effectively masked their activities, complicating detection efforts. The intention to exfiltrate archived data was also evident, as the compression of files served to minimize size and conceal the nature of the data being transmitted.

Throughout these activities, the adversary likely maintained command and control channels to facilitate ongoing operations and ensure the successful transfer of collected data. The combination of these tactics underscores a sophisticated and methodical approach to data theft, highlighting the critical need for robust monitoring and response strategies to mitigate the risks posed by such coordinated attacks.

NASHUA.dmevals.local Summary

Endpoint Name: NASHUA.dmevals.local
Operating System: Windows
First Event Timestamp: 05/02/2020 02:55:24
Last Event Timestamp: 05/02/2020 08:29:22
Observed IP Addresses: 10.0.1.6
Observed Users: DMEVALS\pbeesly, pbeesly

Executive Summary:
The investigation revealed a series of coordinated actions indicative of a lateral movement attack within the network. Key events included multiple instances of remote service logins using valid credentials, specifically by the user 'pbeesly' from the domain 'DMEVALS.LOCAL'. The timeline shows the creation of suspicious files, such as 'python.exe' and 'PSEXESVC.exe', along with the execution of these files to facilitate unauthorized access and control over remote systems. The use of software deployment tools further suggests an exploitation of legitimate administrative capabilities to execute commands and scripts, highlighting a methodical approach to data collection and potential exfiltration.

The root cause of the incident appears to stem from compromised valid accounts, which allowed the adversary to leverage existing remote access protocols and administrative tools. The presence of unmonitored or poorly secured remote services, combined with the ability to execute scripts and commands without adequate oversight, created vulnerabilities that were exploited. Additionally, the lack of stringent access controls and monitoring mechanisms contributed to the adversary's ability to navigate the network undetected.

The impact of this incident on operations is significant, as it poses risks to data integrity and confidentiality. The unauthorized access and potential data exfiltration could lead to the loss of sensitive information, operational disruptions, and reputational damage. The timeline indicates attempts to archive and compress collected data, suggesting a clear intent to exfiltrate information. Immediate actions are recommended to enhance security measures, including the implementation of stricter access controls, improved monitoring of remote services, and a thorough review of user account permissions to prevent future incidents.

Combined Summary:
The timeline reveals a series of actions indicative of a potential intrusion, primarily focused on execution and lateral movement within the network. The user 'pbeesly' consistently logged into systems from a remote IP address, suggesting an attempt to navigate through the environment using valid credentials. This activity was marked by multiple instances of accessing network share objects, pointing to reconnaissance efforts and potential data

NASHUA.dmevals.local Summary

exfiltration.

The initial execution of Python scripts suggests an attempt to leverage a common scripting language for malicious purposes, favored by adversaries due to its versatility and ease of use. Following this, the use of PowerShell indicates a shift to a more powerful command-line interface, allowing for further manipulation of the system and execution of additional commands. The repeated invocation of command-line interpreters, including both Python and Windows Command Shell, highlights a methodical approach to executing various payloads.

The execution of Rar.exe to create a compressed file containing potentially sensitive data suggests an intent to exfiltrate information or prepare for further actions. This is compounded by the use of sdelete64.exe, a tool designed to securely delete files, indicating an effort to cover tracks and evade detection after executing commands. The registry modifications associated with the use of sdelete64.exe demonstrate a persistence mechanism, as the adversary likely attempted to ensure that their actions were not flagged by security measures.

The consistent use of software deployment tools for executing commands across multiple files reinforces the notion of lateral movement within the network, allowing the adversary to extend their reach and maintain access. The execution of commands that escalate privileges and facilitate further access, such as invoking 'conhost.exe' alongside the Python script, suggests a methodical approach to maintaining control over the compromised systems while potentially preparing for broader objectives, such as data manipulation or further infiltration into the network.

Overall, the sequence of events illustrates a calculated effort to exploit remote services and software deployment tools for lateral movement, emphasizing the need for vigilance in monitoring user activities and network traffic. The timeline indicates a coordinated effort by the adversary to gather and prepare data for theft, employing collection techniques to archive sensitive information and utilizing a utility to compress and potentially encrypt the data. This deliberate choice to obfuscate the contents of the files being targeted aligns with common practices in data theft, where adversaries seek to avoid detection by disguising their activities as legitimate traffic.

The potential for command and control communication is also present, as the adversary may need to establish a channel to facilitate the transfer of the collected data. This could involve mimicking normal network traffic to evade security measures, further indicating a sophisticated level of planning and execution. Overall, the timeline reflects a methodical approach to data theft,

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with clear indicators of intent to collect, package, and ultimately exfiltrate sensitive information while minimizing the risk of detection.

NEWYORK.dmevals.local Summary

Endpoint Name: NEWYORK.dmevals.local
Operating System: Windows
First Event Timestamp: 05/02/2020 02:55:25
Last Event Timestamp: 05/02/2020 08:29:21
Observed IP Addresses: 10.0.0.4
Observed Users: pbeesly, DMEVALS\mscott, dschrute, mscott, kmalone

Executive Summary:
The investigation revealed a series of significant events indicating a potential credential theft incident. The timeline shows the execution of a suspicious process, 'm.exe', which was used to perform OS credential dumping targeting the 'krbtgt' account. This action was preceded by a legitimate user logon and network connections that suggest the adversary may have gained initial access through compromised credentials. Subsequent requests for Kerberos tickets further indicate an attempt to escalate privileges and maintain persistence within the network. The use of tools commonly associated with credential dumping highlights a methodical approach to accessing sensitive information.

The root cause of the incident appears to stem from inadequate security measures surrounding credential management and monitoring. The presence of the 'm.exe' process, which executed commands to dump credentials from the LSASS memory, points to a vulnerability in the system that allowed unauthorized access to sensitive credential information. Additionally, the lack of alerts or monitoring for unusual process executions and network connections may have contributed to the adversary's ability to operate undetected.

On May 2, 2020, a series of events unfolded that indicate potential misuse of privileges and credential access on the system. The timeline begins with the execution of the 'm.exe' process by a user identified as 'DMEVALS\mscott'. This process was initiated with a command that included a debug privilege escalation attempt, specifically targeting the Local Security Authority Subsystem Service (LSASS) to dump credentials associated with the 'krbtgt' account. This action suggests an intent to gain elevated access by extracting sensitive credential information.

The execution of 'm.exe' was accompanied by multiple library loads, including critical system libraries such as 'cryptdll.dll' and 'samlib.dll', which are often associated with cryptographic functions and access to security accounts. The process also involved opening the LSASS process, a common target for credential dumping due to its storage of sensitive authentication data. The risk levels associated with these actions varied, indicating that while some activities were flagged as medium risk, others were deemed low risk, potentially downplaying the severity of the actions taken.

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The overall sequence of events points to a deliberate effort to escalate privileges and access credentials, which could facilitate further lateral movement within the network. The use of specific commands and tools designed for credential dumping highlights a calculated approach by the user, raising concerns about unauthorized access and the potential for malicious activities within the environment.

The impact of this incident on operations is significant, as the unauthorized access to credentials could lead to further lateral movement within the network, compromising additional systems and sensitive data. The integrity of user accounts and the overall security posture of the organization is at risk, potentially leading to data breaches and operational disruptions. Immediate actions are recommended to enhance monitoring, implement stricter access controls, and conduct a thorough review of credential management practices to mitigate future risks.

UTICA.dmevals.local Summary

Endpoint Name: UTICA.dmevals.local
Operating System: Windows
First Event Timestamp: 08/25/2011 18:27:29
Last Event Timestamp: 05/02/2020 08:29:23
Observed IP Addresses: 10.0.1.5
Observed Users: DMEVALS\mscott, DMEVALS\dschrute, dschrute

Executive Summary:
The investigation revealed a series of coordinated actions indicative of a sophisticated cyber attack targeting the organization. Key findings include the transfer of malicious tools, specifically a credential dumping utility, through a command and control channel, followed by the execution of PowerShell scripts to obfuscate and execute further commands. The timeline shows a pattern of lateral movement across the network, utilizing valid credentials to access remote services and execute commands on multiple systems. The use of Windows Management Instrumentation (WMI) for remote execution and the establishment of persistence mechanisms through event-triggered execution highlight the attacker's intent to maintain long-term access.

The root cause of the incident appears to stem from inadequate security measures, including the exploitation of valid user credentials and the lack of monitoring for unusual PowerShell activity. The presence of obfuscated files and the use of trusted system processes for executing malicious commands suggest a failure in detecting and responding to anomalous behavior. Additionally, the reliance on outdated security protocols may have contributed to the attackers' ability to move laterally within the network undetected.

The impact of this incident on operations is significant, with potential risks to data integrity and confidentiality. The unauthorized access to sensitive information and the ability to execute commands across multiple systems could lead to data breaches and operational disruptions. The organization must address these vulnerabilities to prevent future incidents, including enhancing monitoring capabilities, implementing stricter access controls, and conducting regular security assessments to identify and mitigate risks.

Combined Summary:
The timeline reveals a sophisticated intrusion that leverages multiple techniques across the MITRE tactics of Initial Access, Execution, Persistence, and Defense Evasion. The initial foothold appears to be established through the execution of PowerShell commands, which are commonly used for malicious purposes due to their powerful scripting capabilities. The use of certutil.exe to decode obfuscated files indicates an intent to evade detection while extracting potentially harmful payloads from hidden or encrypted locations.

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As the attack progresses, the adversary employs various command-line interpreters, particularly PowerShell and csc.exe, to execute a series of commands that suggest a methodical approach to executing malicious code. The frequent invocation of PowerShell with obfuscated commands and the use of encoded strings highlight a clear strategy aimed at avoiding detection by security mechanisms. This is further supported by the creation of WMI event subscriptions, which allow the adversary to maintain persistence by executing malicious scripts triggered by specific system events, thereby ensuring continued access even after system reboots or user logins.

The timeline also shows the use of software deployment tools, which could facilitate lateral movement within the network, allowing the adversary to exploit administrative privileges to execute commands across multiple systems. The combination of these techniques suggests a well-planned operation, likely targeting sensitive information or system control, with a focus on maintaining stealth and persistence throughout the intrusion.

The adversary's attempts to escalate privileges and gain unauthorized access to sensitive credentials within the network are evident. Initially, the use of a process named 'm.exe' suggests an effort to execute commands targeting the Local Security Authority Subsystem Service (LSASS) for credential dumping. This process was executed with elevated privileges, allowing the adversary to leverage debugging capabilities to extract login credentials, including plaintext passwords and hashes. The repeated access to LSASS memory highlights a systematic approach to credential harvesting, utilizing tools that are commonly associated with both legitimate security testing and malicious activity.

Subsequent entries show the execution of PowerShell scripts designed to invoke Mimikatz, a well-known tool for credential extraction, specifically targeting Kerberos tickets. This indicates a sophisticated level of planning and execution, as the adversary attempts to create golden tickets for unauthorized access to domain resources. The use of cached domain credentials further illustrates the adversary's strategy to maintain access even when direct communication with a domain controller is unavailable.

The timeline reveals a coordinated effort by the adversary to execute malicious code and move laterally across the network. Initially, the adversary executed a PowerShell command that retrieved and executed a script from a remote server, indicating the use of remote execution techniques to gain a foothold on the system. This action was followed by multiple network connections to the same remote IP, suggesting a persistent attempt to maintain communication with the command and control server.

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As the timeline progresses, the adversary leveraged Windows Management Instrumentation (WMI) to execute further commands, showcasing a methodical approach to lateral movement. By utilizing WMI, the adversary could interact with both local and remote systems, facilitating the execution of additional payloads and the collection of sensitive information. The use of encoded PowerShell commands to download and execute files demonstrates a focus on stealth and evasion, as these techniques can bypass traditional security measures.

The timeline also highlights the use of Remote Desktop Protocol (RDP) and Windows Remote Management (WinRM) for lateral movement. The adversary successfully logged into another system using valid credentials, further expanding their access within the network. This indicates a clear intent to explore the environment and potentially escalate privileges, as evidenced by the execution of commands designed to extract sensitive data, such as passwords.

The timeline reveals a sequence of events indicative of a potential data theft operation. Initially, the adversary employed ingress tool transfer techniques to introduce malicious tools into the compromised environment, specifically retrieving a known credential dumping tool, Mimikatz, from an external source. This action suggests an intent to gather sensitive information, likely targeting user credentials.

Following this, the adversary executed a command using certutil to decode a file, indicating further data collection efforts. The creation of a file named "kxwn.lock" in the user's roaming profile suggests that the adversary was manipulating or staging data for future exfiltration. This aligns with the collection tactic, where the adversary gathers data of interest to facilitate their objectives.

Subsequently, the timeline indicates a shift towards exfiltration, as the adversary utilized a legitimate cloud storage service to transfer data. By employing the net command to map a network drive to a cloud service, the adversary effectively masked their data theft within normal traffic patterns, leveraging existing communication pathways to avoid detection. The use of SSL/TLS encryption during this process further obscured their activities, making it challenging for security measures to identify the exfiltration.

Overall, the combination of tool transfer, data manipulation, and cloud-based exfiltration techniques paints a clear picture of a coordinated effort to steal sensitive information while minimizing the risk of detection. The adversary's actions demonstrate a methodical approach to both collecting and exfiltrating data, highlighting the need for robust monitoring and response strategies to

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counter such threats.

SCRANTON.dmevals.local Summary

Endpoint Name: SCRANTON.dmevals.local
Operating System: Windows
First Event Timestamp: 08/25/2011 18:27:29
Last Event Timestamp: 05/02/2020 08:29:16
Observed IP Addresses: 10.0.1.4
Observed Users: DMEVALS\pbeesly, pbeesly, DMEVALS\mscott, DMEVALS\kmalone, kmalone

Executive Summary:
The investigation revealed a series of significant events indicating a coordinated attack on the endpoint. Initial signs of compromise were observed with the transfer of a malicious executable file from an external source, followed by the execution of obfuscated scripts designed to evade detection. The attacker employed various techniques, including masquerading, process injection, and lateral movement through remote services, to maintain persistence and escalate privileges. The use of PowerShell for executing commands and scripts was prevalent, suggesting a sophisticated threat actor capable of leveraging legitimate tools for malicious purposes. The timeline indicates a pattern of behavior consistent with advanced persistent threats (APTs), characterized by stealthy operations and a focus on credential access and lateral movement within the network.

The root cause of the incident can be traced to vulnerabilities in endpoint security configurations and the exploitation of user privileges. The attacker gained initial access through a compromised executable, which facilitated the execution of further malicious activities. Weaknesses in monitoring and detection capabilities allowed the adversary to operate undetected for an extended period. Additionally, the use of legitimate administrative tools, such as PsExec, for lateral movement highlights a lack of stringent access controls and oversight in the network environment.

The impact of the incident on operations and data integrity was significant. The attacker successfully executed commands that could compromise sensitive data, including credential dumping and unauthorized file modifications. The presence of malware designed for persistence and lateral movement poses ongoing risks to the organization's security posture. Furthermore, the incident could lead to potential data breaches, loss of sensitive information, and disruption of business operations. Immediate remediation actions are necessary to mitigate risks, including enhancing endpoint security measures, conducting thorough audits of user privileges, and implementing robust monitoring solutions to detect and respond to future threats effectively.

Combined Summary:
The timeline reveals a sophisticated intrusion that begins with an initial

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access phase characterized by the use of masquerading techniques, specifically employing the right-to-left override character to disguise a malicious executable as a benign file. This tactic is indicative of a targeted approach, aiming to deceive users into executing malware without raising suspicion. The execution of this malware is initiated through a PowerShell command, which is a common method for adversaries to run scripts and commands that facilitate further exploitation.

Following the initial execution, the adversary establishes persistence by modifying registry keys to ensure that their malicious payload is executed during system boot or user logon. This technique allows the adversary to maintain access even after system reboots or user logouts, demonstrating a clear intent to entrench themselves within the environment. The use of PowerShell continues as a primary tool for executing commands, showcasing the adversary's reliance on scripting to manipulate the system and execute further malicious actions.

Defense evasion tactics are evident as the adversary employs process injection techniques to execute code within the context of legitimate processes, such as lsass.exe. This method not only helps to evade detection by security solutions but also potentially allows the adversary to escalate privileges and access sensitive information. The timeline also indicates the use of software deployment tools, which could facilitate lateral movement across the network, further indicating a well-planned strategy to compromise multiple systems.

The sequence of events also suggests a coordinated effort by the adversary to gather and potentially exfiltrate data from the compromised environment. The initial activity involves the transfer of a Windows executable file, identified as 'python.exe', from an external source. This transfer highlights the adversary's method of introducing tools into the victim's network, which is a common precursor to further malicious actions. The use of a Windows Portable Executable file suggests that the adversary is leveraging familiar and potentially benign tools to avoid detection while establishing a foothold within the network.

Subsequent entries show the adversary leveraging Windows Remote Management and Remote Desktop Protocol to further infiltrate the network. The use of valid accounts to access remote services highlights a methodical approach to lateral movement, allowing the adversary to pivot between systems while maintaining a low profile. The execution of PsExec, a tool commonly used for remote command execution, underscores the adversary's capability to deploy code across multiple endpoints.

The combination of executing a PowerShell script and subsequently accessing

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LSASS memory suggests a deliberate strategy to first establish a foothold and then escalate privileges by obtaining credentials. This pattern of behavior aligns with known tactics for both privilege escalation and credential access, highlighting a calculated approach to compromise the system and expand the adversary's control over the environment. The low-risk designation of the credential access event may indicate that the adversary was operating under the radar, aiming to avoid detection while executing their objectives.

Overall, the actions reflect a deliberate effort to execute code remotely and move laterally through the network, potentially to achieve broader objectives such as data exfiltration or system compromise. The implications of these actions point to a significant risk of data compromise, emphasizing the need for vigilant monitoring and response strategies within the affected environment.