Scenario

In this lab, I will learn about several types of security controls, including preventive, detective, directive, and corrective.

As a security team member of Structureality Inc, I'm working to improve my organization's security stance. This lab focuses on configuring, using or testing the security controls to ensure we understand the nature of the various types of controls. These exercises will facilitate my recommendations on the remediations to resolve security weaknesses. First, I will work with a preventive control, then a detective control. Next, I will work with a directive control and finally, a corrective control.

will be working from a virtual machine named PC10, hosting Windows Server 2019, which serves as a client in this lab environment.

Objectives

This activity is designed to test wer understanding of and ability to apply content examples in the following CompTIA Security+ objectives:

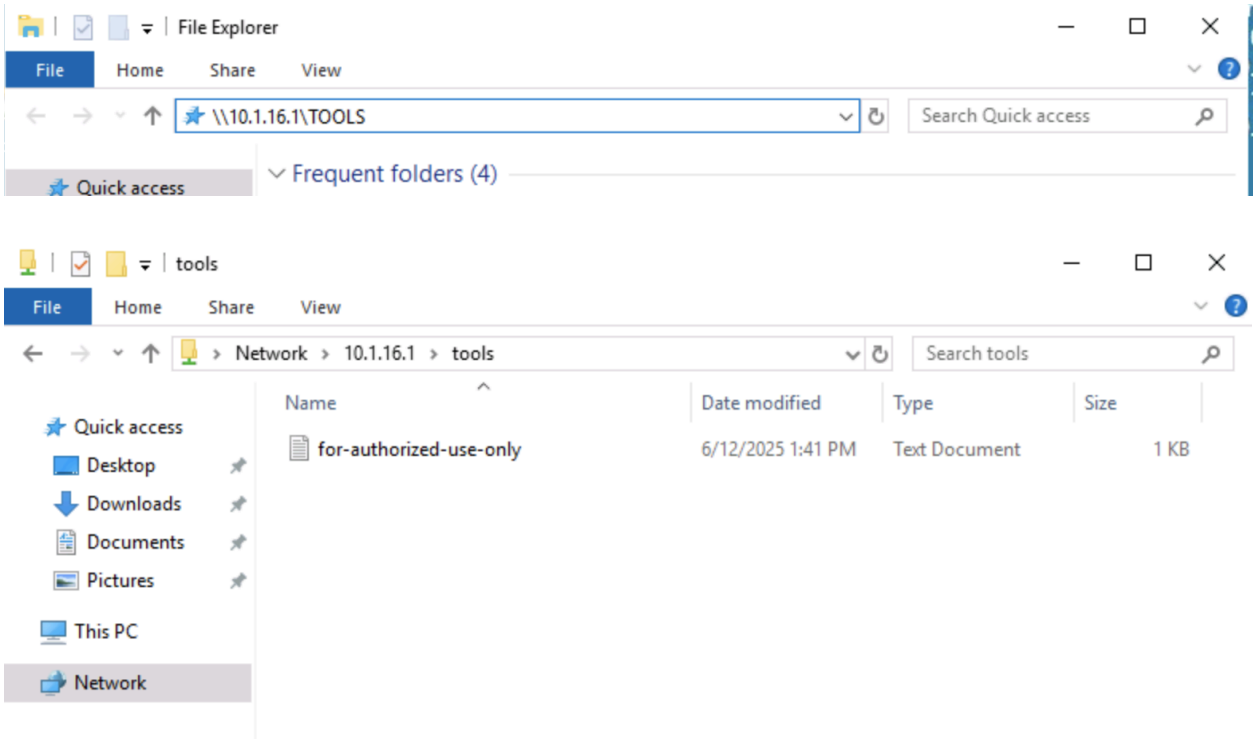
- 1.1 Compare and contrast various types of security controls.

Configure and test preventive controls

A preventive control attempts to stop an unwanted activity from taking place. In this exercise, I will first perform an undesirable activity. Next, I will implement a preventive control to block that activity. And finally, I will attempt the unwanted activity again to test the preventive control.

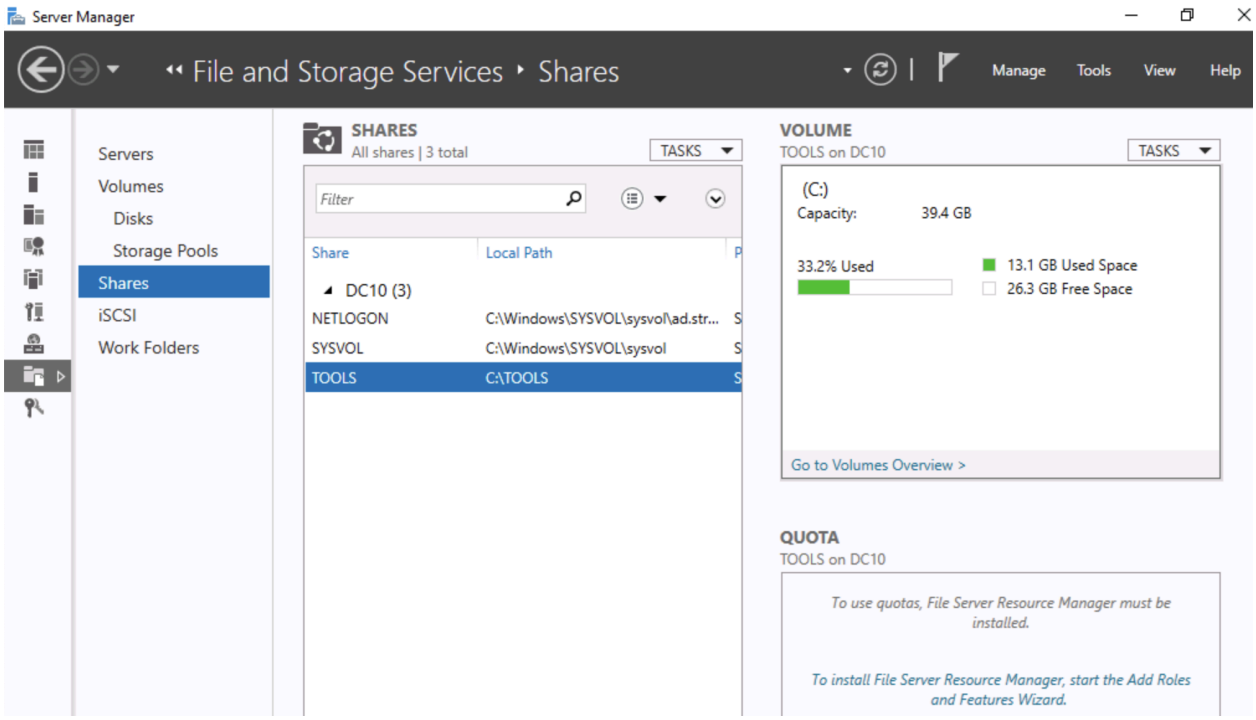
A TOOLS folder has been configured on the DC10 server. This folder is designed to hold utilities and data files that must only be accessible to domain and local administrators only. Users without an administrative rule should be prevented from viewing the share.

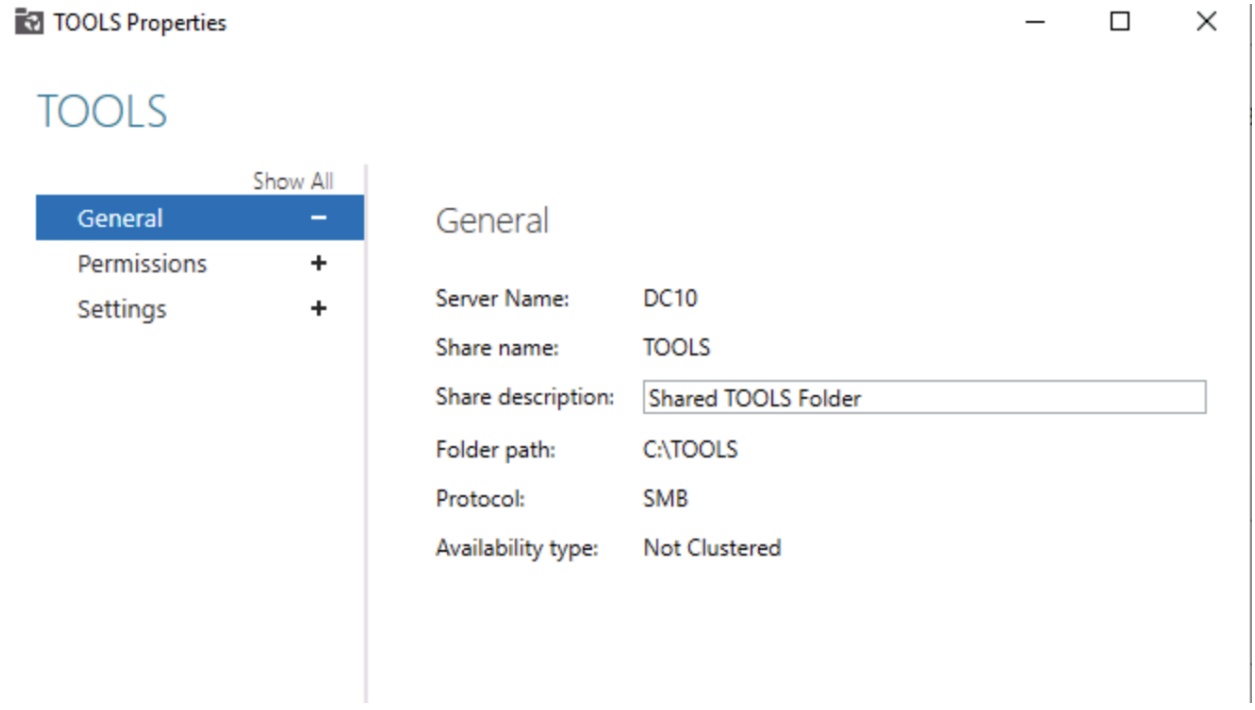
1. Now we will Verify whether the share has been configured with appropriate permissions by trying to access it using a non-administrative account.
2. select **Other user**. In the User name box, type Sam. In the Password box, type Pa$$w0rd, and press **Enter**.
3. From the taskbar, select **File Explorer and look for the file by typing \\10.1.16.1\TOOLS and hit enter.**

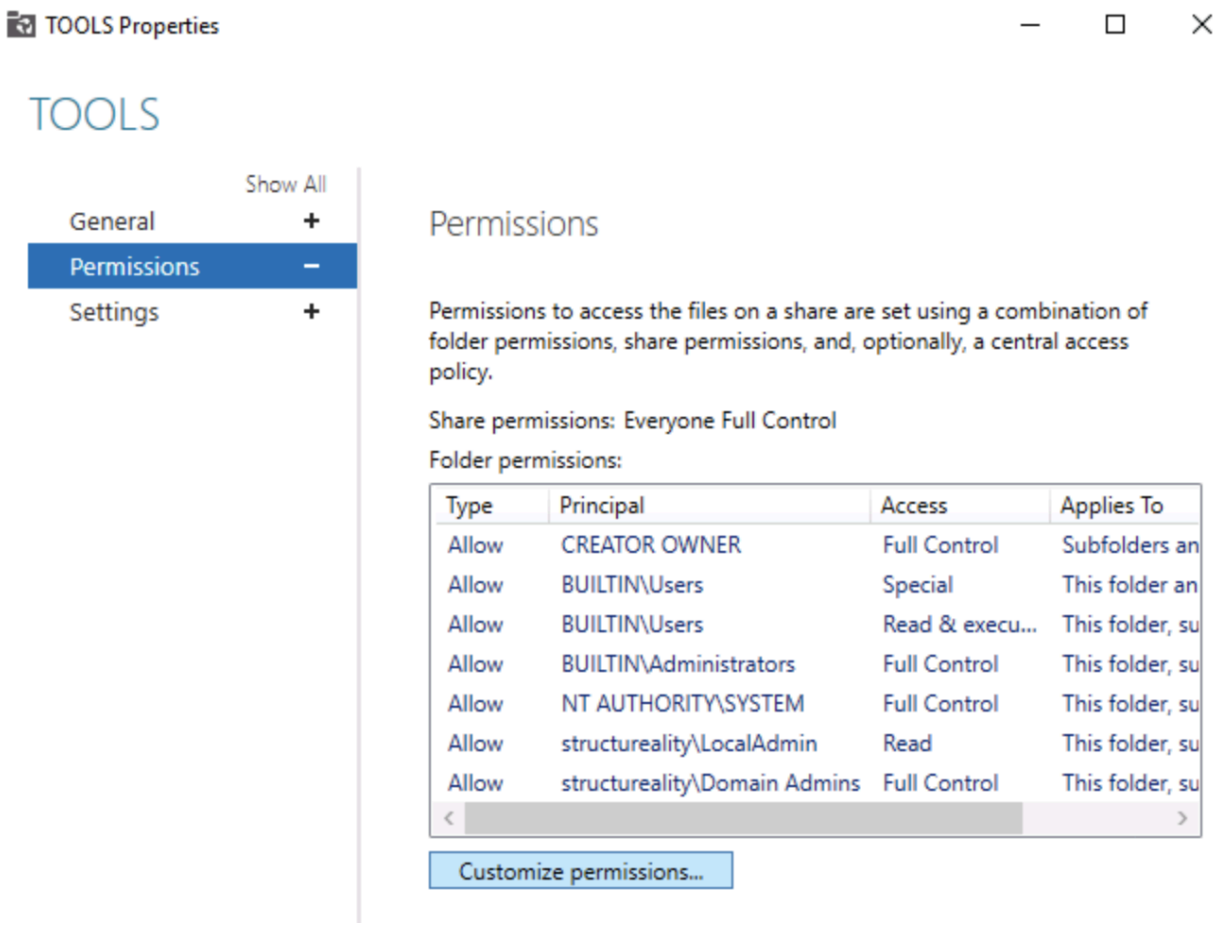


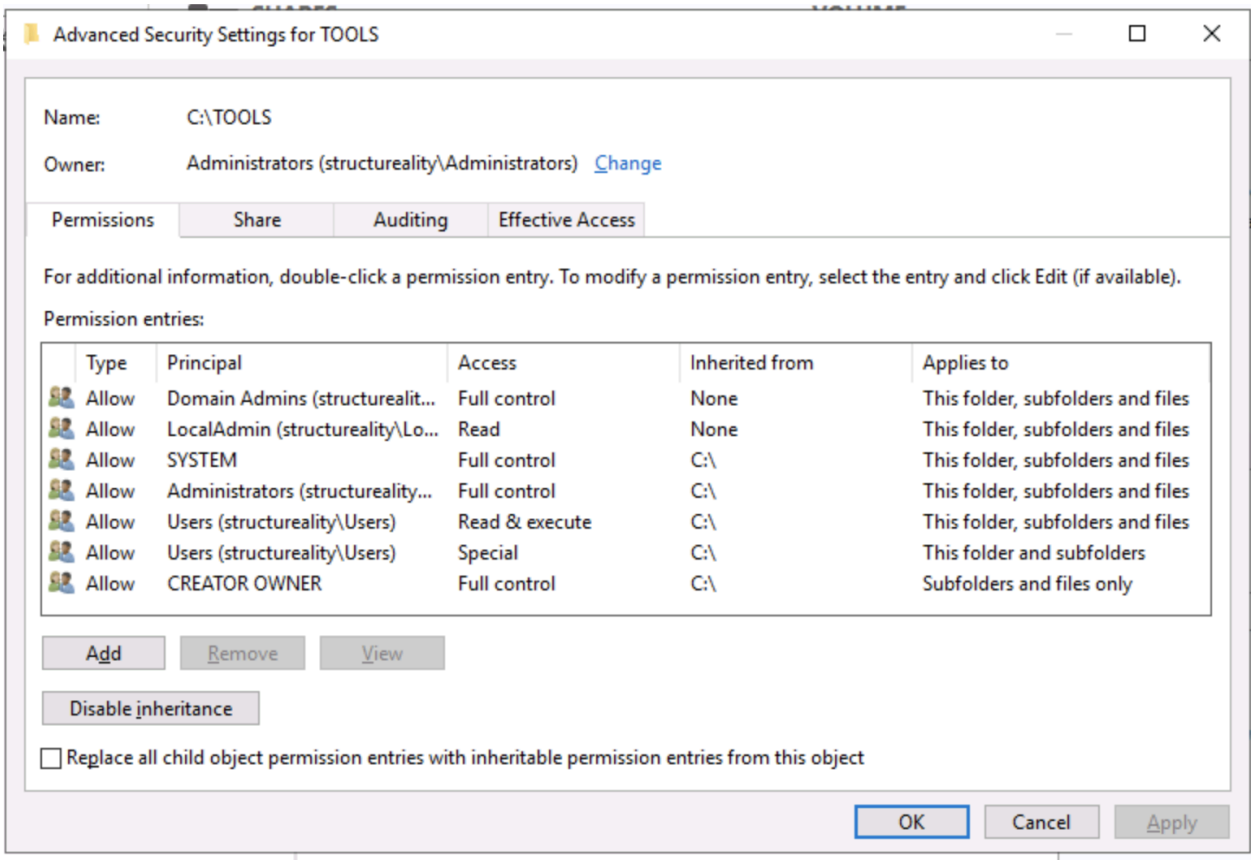
Sam is not an administrator and should not have access. I need to implement a prevention control so that Sam and other non-administrators cannot access this share.

4. Now, Select the DC10 VM, sign in as Structureality\Administrator using Pa$$w0rd as the password.
5. In **Server Manager**, select **File and Storage Services**, and then select **Shares**. Right-click the **TOOLS** share, then select **Properties**. Select the **Permissions** tab, and then click **Customize permissions**.

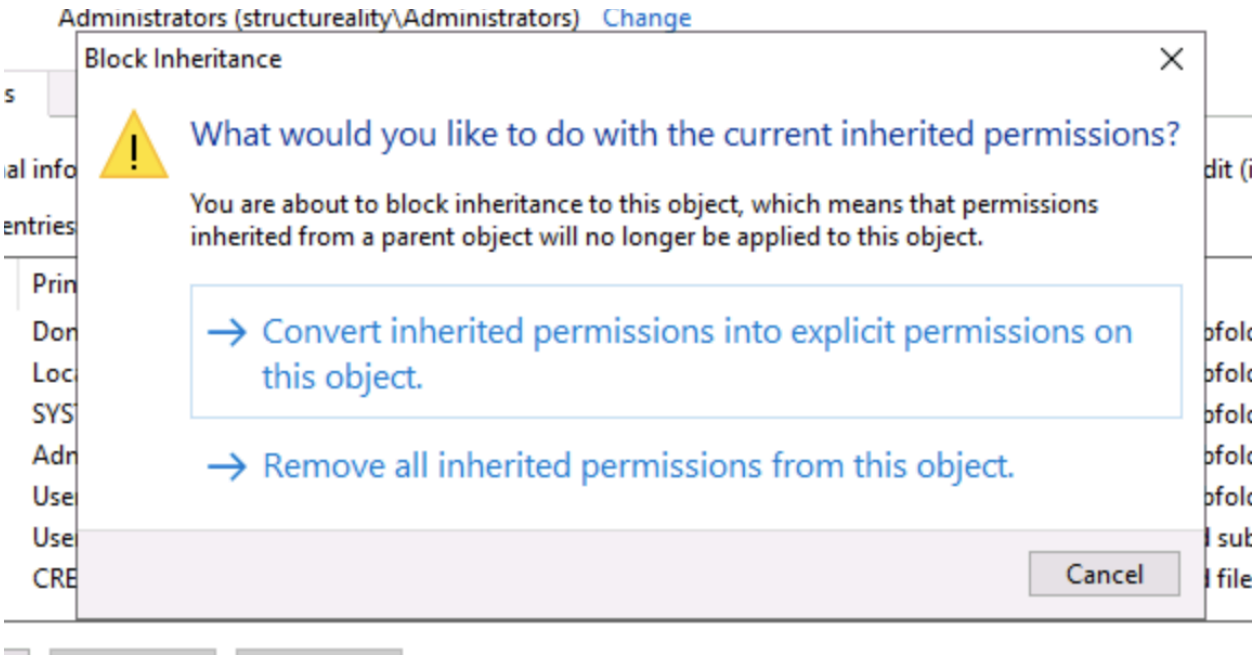

Server Manager
File and Storage Services ▸ Shares
Manage
Tools
View
Help
Servers
Volumes
Disks
Storage Pools
Shares
iSCSI
Work Folders
SHARES
All shares | 3 total
TASKS
Filter
Share
Local Path
DC10 (3)
NETLOGON
C:\Windows\SYSVOL\sysvol\ad.str...
SYSVOL
C:\Windows\SYSVOL\sysvol
TOOLS
C:\TOOLS
VOLUME
TOOLS on DC10
TASKS
(C:)
Capacity:
39.4 GB
33.2% Used
13.1 GB Used Space
26.3 GB Free Space
Go to Volumes Overview >
QUOTA
TOOLS on DC10
To use quotas, File Server Resource Manager must be installed.
To install File Server Resource Manager, start the Add Roles and Features Wizard.


TOOLS Properties
TOOLS
Show All
General
Permissions
Settings
General
Server Name:
DC10
Share name:
TOOLS
Share description:
Shared TOOLS Folder
Folder path:
C:\TOOLS
Protocol:
SMB
Availability type:
Not Clustered

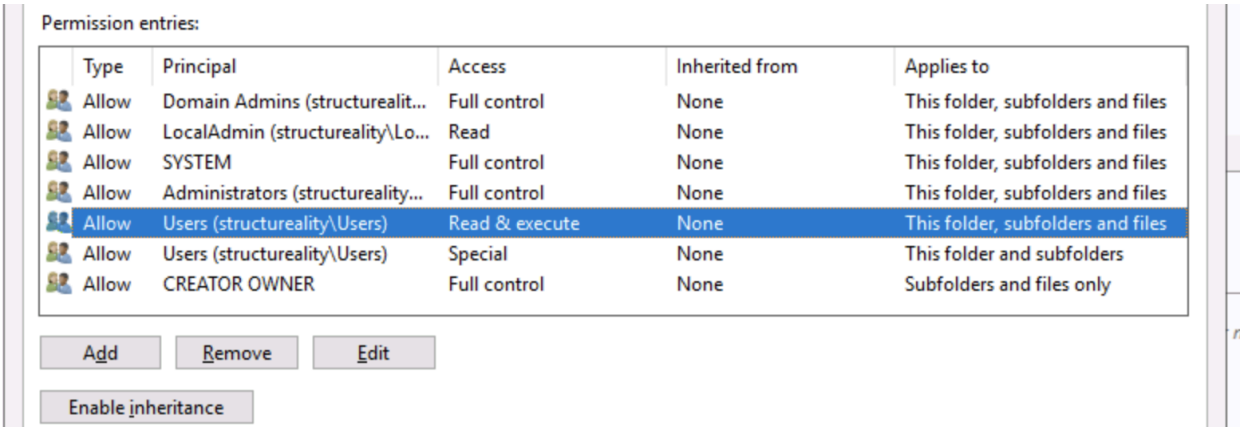

TOOLS Properties
TOOLS
Show All
General
Permissions
Settings
Permissions
Permissions to access the files on a share are set using a combination of folder permissions, share permissions, and, optionally, a central access policy.
Share permissions: Everyone Full Control
Folder permissions:
Type Principal Access Applies To
Allow CREATOR OWNER Full Control Subfolders an
Allow BUILTIN\Users Special This folder an
Allow BUILTIN\Users Read & execu... This folder, su
Allow BUILTIN\Administrators Full Control This folder, su
Allow NT AUTHORITY\SYSTEM Full Control This folder, su
Allow structureality\LocalAdmin Read This folder, su
Allow structureality\Domain Admins Full Control This folder, su
Customize permissions...



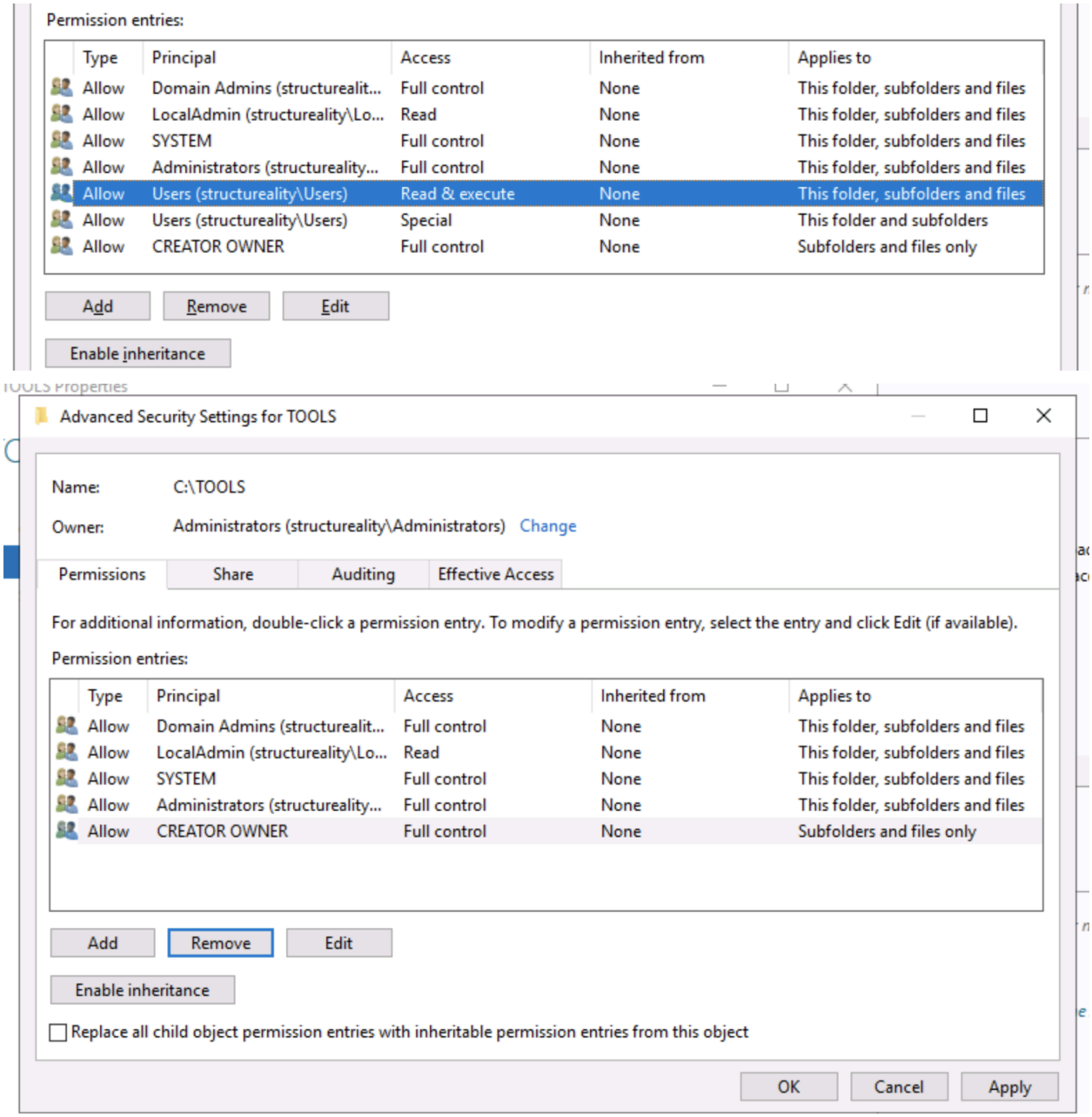
6. Which account or group object on the access control list should NOT have been assigned permissions on the share? Users
7. Observe that the Domain Admins and LocalAdmin security groups have been granted permissions on the folder. However, observe that the Domain Users group has inherited read permissions from the share's parent folder. This is the misconfiguration that allows Sam to view the share.
8. Select the **Disable inheritance** button. In the Block inheritance dialog, select **Convert inherited permissions...**



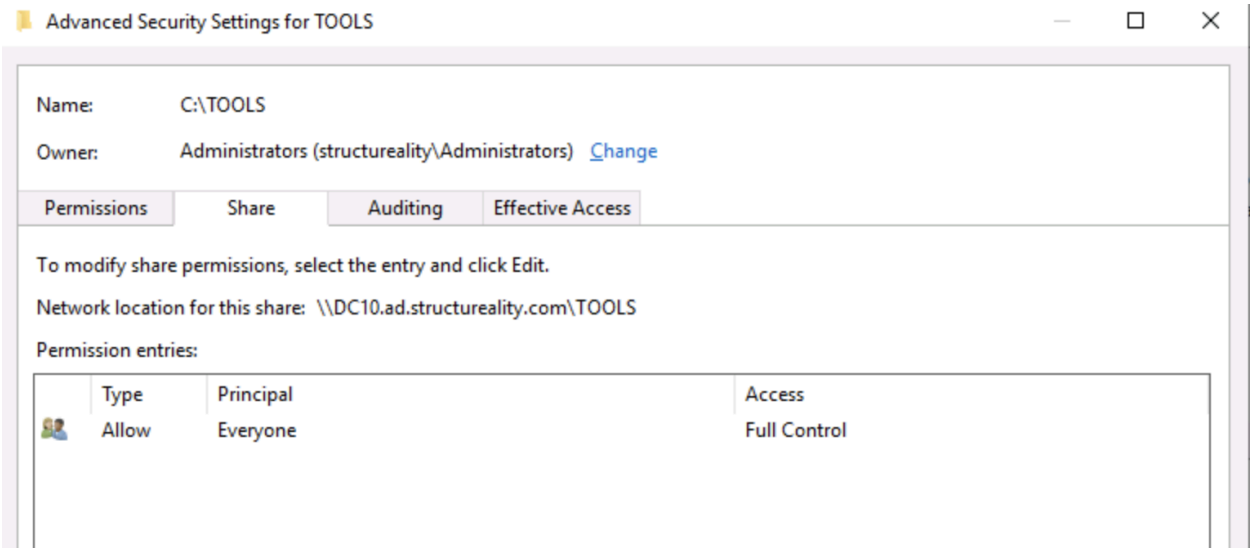
9. **From the Permission entries panel, select the first Users (structureality\Users) object, and then click the Remove button.**

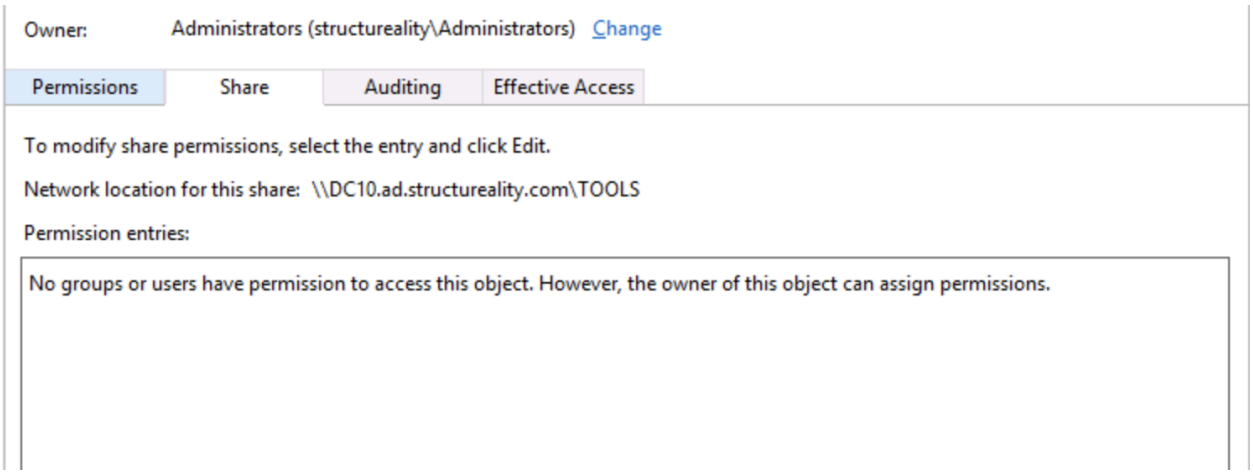


10. Remove the remaining **Users (structureality\Users)** object.



11. Select **Remove** to remove the *Everyone* group from the object's ACL entirely.

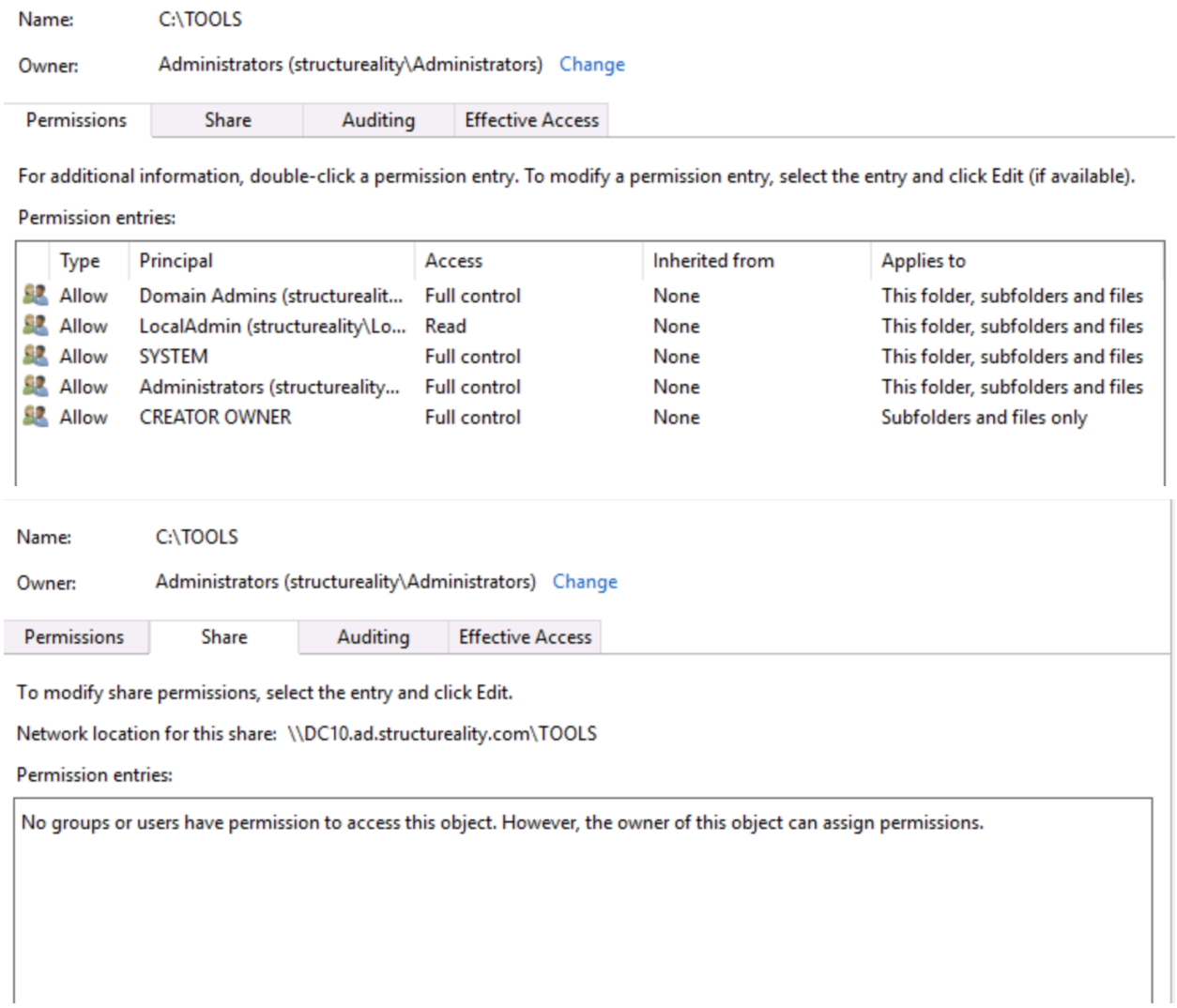




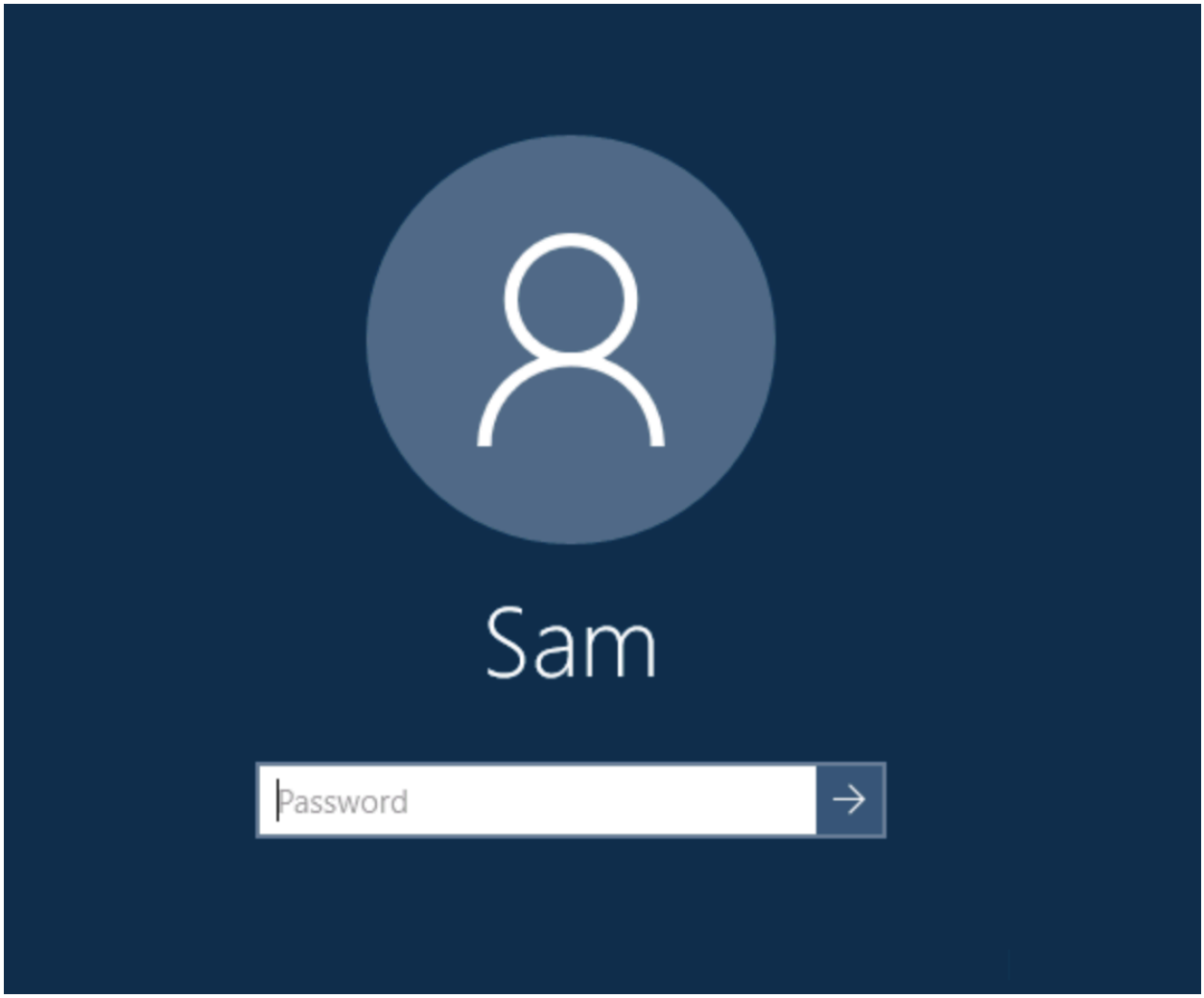
The default privilege over objects in Windows is *no access*. Thus, without an explicitly defined *allow*, users will have a default or implicit *deny*.

It is important not to implement an explicit *deny* at this juncture as it may have unintended consequences. For example, administrators are users, so they are automatically members of the Domain Users and Everyone groups. Setting *deny* for one of these groups would also deny access to the administrators who need access. In the majority of cases, explicit deny permissions will not be required.

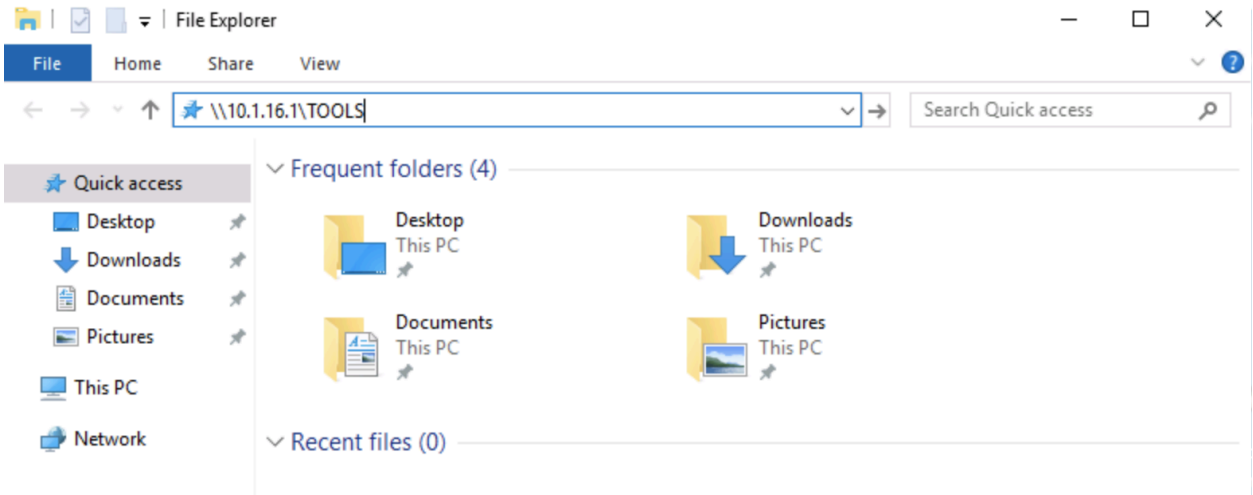
12. Select **OK** to close the dialogs.

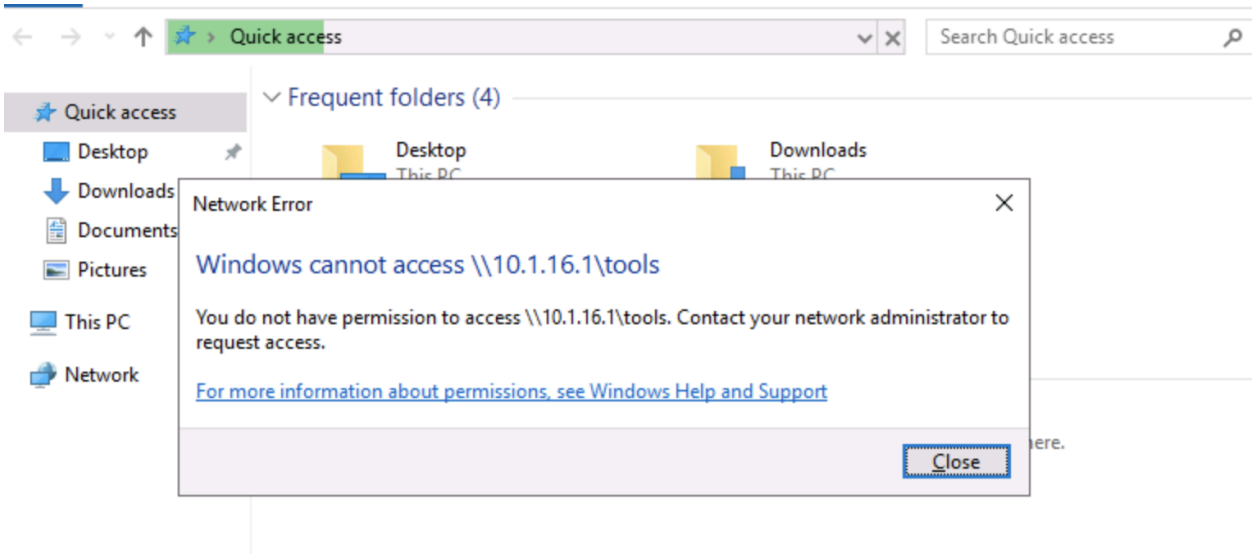


13. Switch back to the PC10 VM, sign in as Sam using Pa$$w0rd as the password.



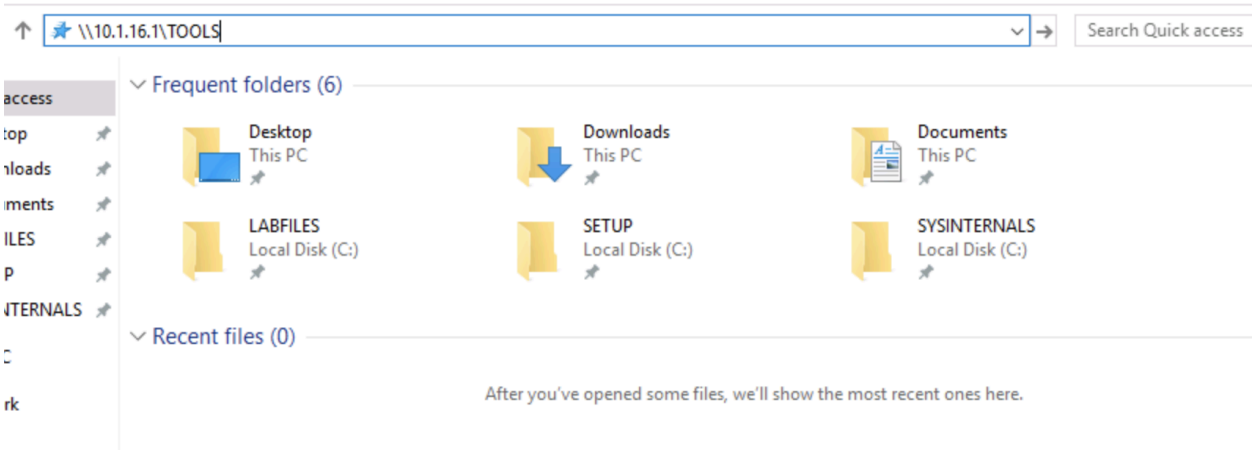
14. Open File Explorer and browse to \\10.1.16.1\TOOLS.

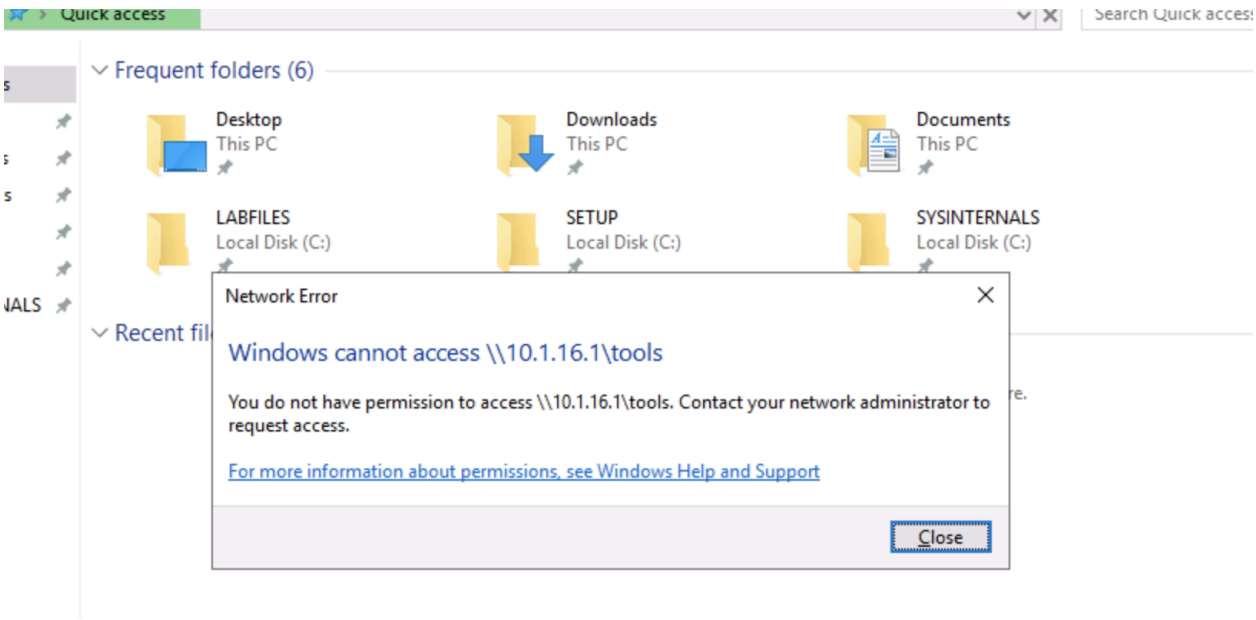




we should see a *Network Error* message indicating that we cannot access this resource.

15. Now, sign in as Jaime using Pa$$w0rd as the password.Try to Open File Explorer and browse to \\10.1.16.1\TOOLS.





The share should be accessible to Jaime's account because it is a member of the LocalAdmin security group. This group has local administrator privileges over computers joined to the domain, but does not have full Domain Admins privileges.

File access controls are classed as preventive in terms of functionality. What category of security control are file permissions? Technical

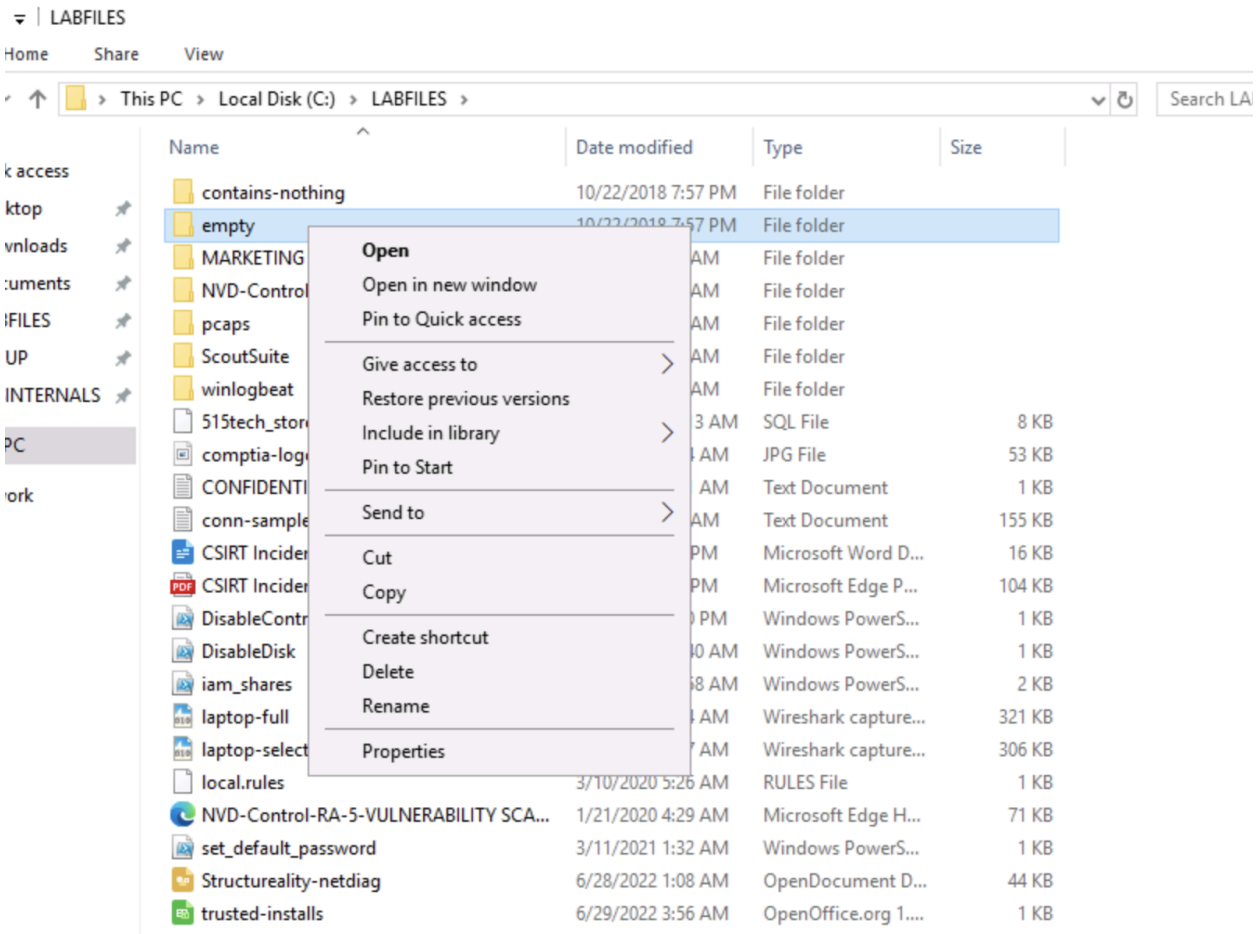
I have successfully implemented a preventive control to block nonadministrative users from accessing resources only for administrators. However, in a real-world situation, we should compare any concerning issue to company security policy and configuration baselines. If we have discovered a variant or violation, it must be reported to the security team. This report may include recommendations for remediation.

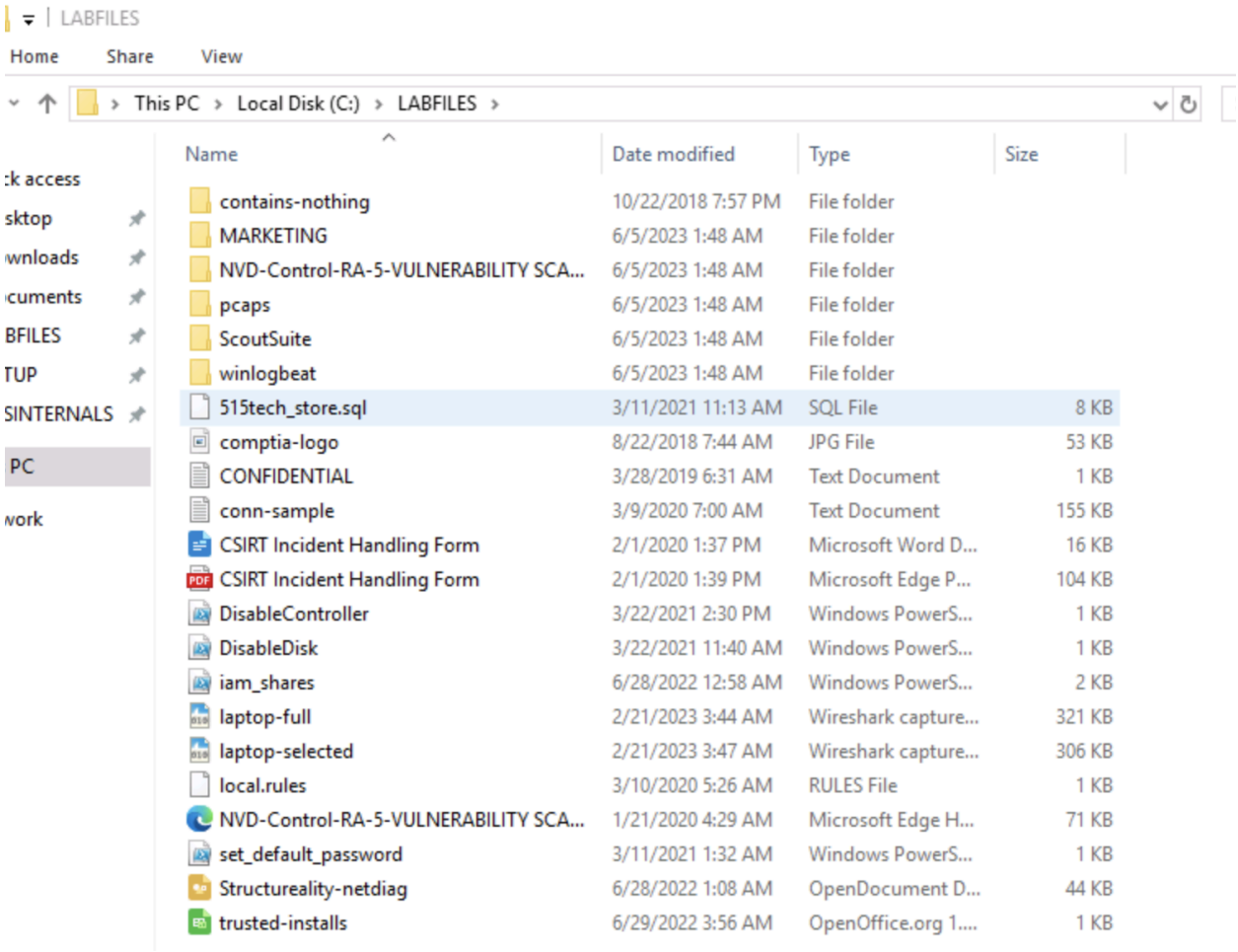
Configure and test detective controls

A detective control records a log each time an event occurs, regardless of whether that activity is benign or malicious. In this exercise, we will first perform an activity that will not be logged. Next, we will configure logging to record that activity, and then we will perform the activity again. Finally, we will review the log to confirm the record of the activity was created.

16. sign in as Jaime using Pa$$w0rd as the password. Jaime is a member of the LocalAdmin group. So, this user account is an administrator on the PC10 system.

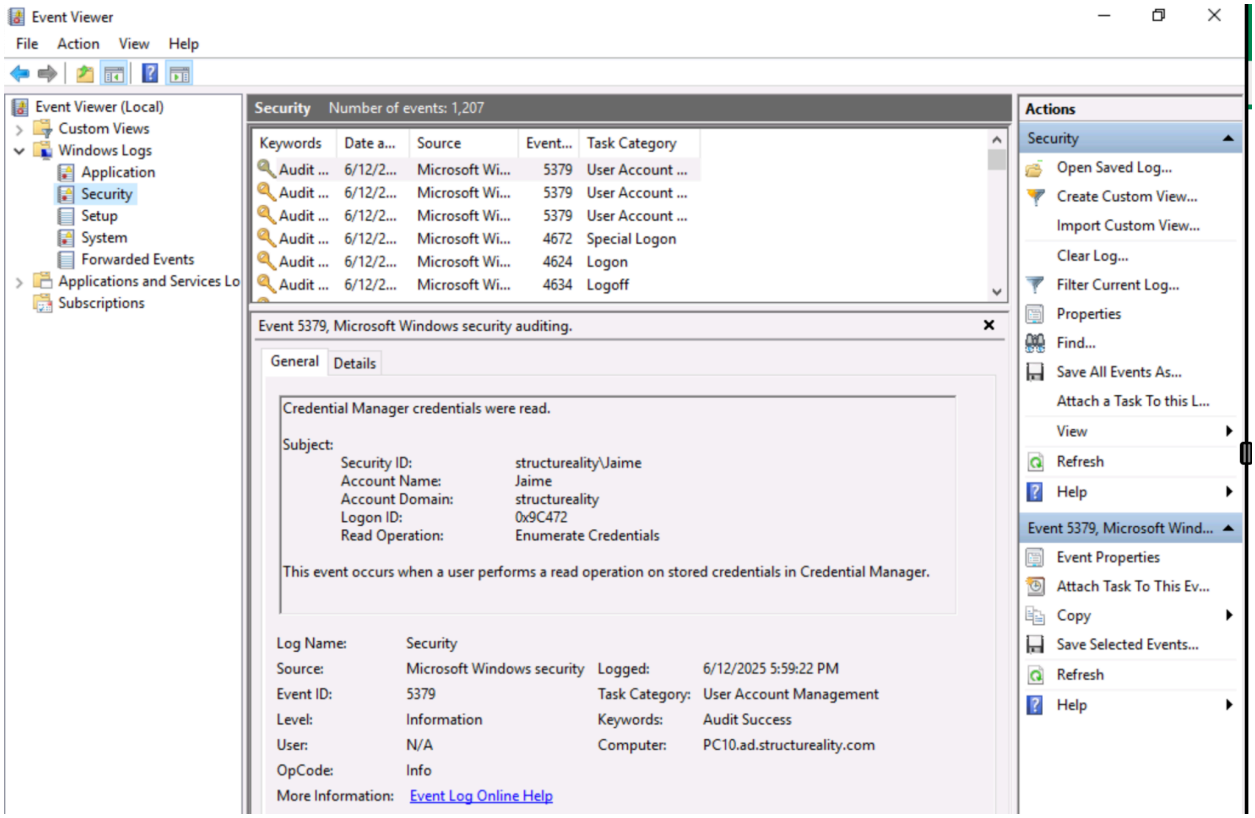
17. Open File Explorer, and from the Quick access pane, select **LABFILES**. Right-click the folder **empty** then select **Delete**.


LABFILES
Home
Share
View
This PC
Local Disk (C:)
LABFILES
Search LA
Name
Date modified
Type
Size
contains-nothing
10/22/2018 7:57 PM
File folder
empty
File folder
MARKETING
File folder
NVD-Control
File folder
pcaps
File folder
ScoutSuite
File folder
winlogbeat
File folder
SQL File
8 KB
JPG File
53 KB
Text Document
1 KB
Text Document
155 KB
Microsoft Word D...
16 KB
Microsoft Edge P...
104 KB
Windows PowerS...
1 KB
Windows PowerS...
1 KB
Windows PowerS...
2 KB
Wireshark capture...
321 KB
Wireshark capture...
306 KB
local.rules
3/10/2020 5:26 AM
RULES File
1 KB
NVD-Control-RA-5-VULNERABILITY SCA...
1/21/2020 4:29 AM
Microsoft Edge H...
71 KB
set_default_password
3/11/2021 1:32 AM
Windows PowerS...
1 KB
Structureality-netdiag
6/28/2022 1:08 AM
OpenDocument D...
44 KB
trusted-installs
6/29/2022 3:56 AM
OpenOffice.org 1....
1 KB
Open
Open in new window
Pin to Quick access
Give access to
Restore previous versions
Include in library
Pin to Start
Send to
Cut
Copy
Create shortcut
Delete
Rename
Properties

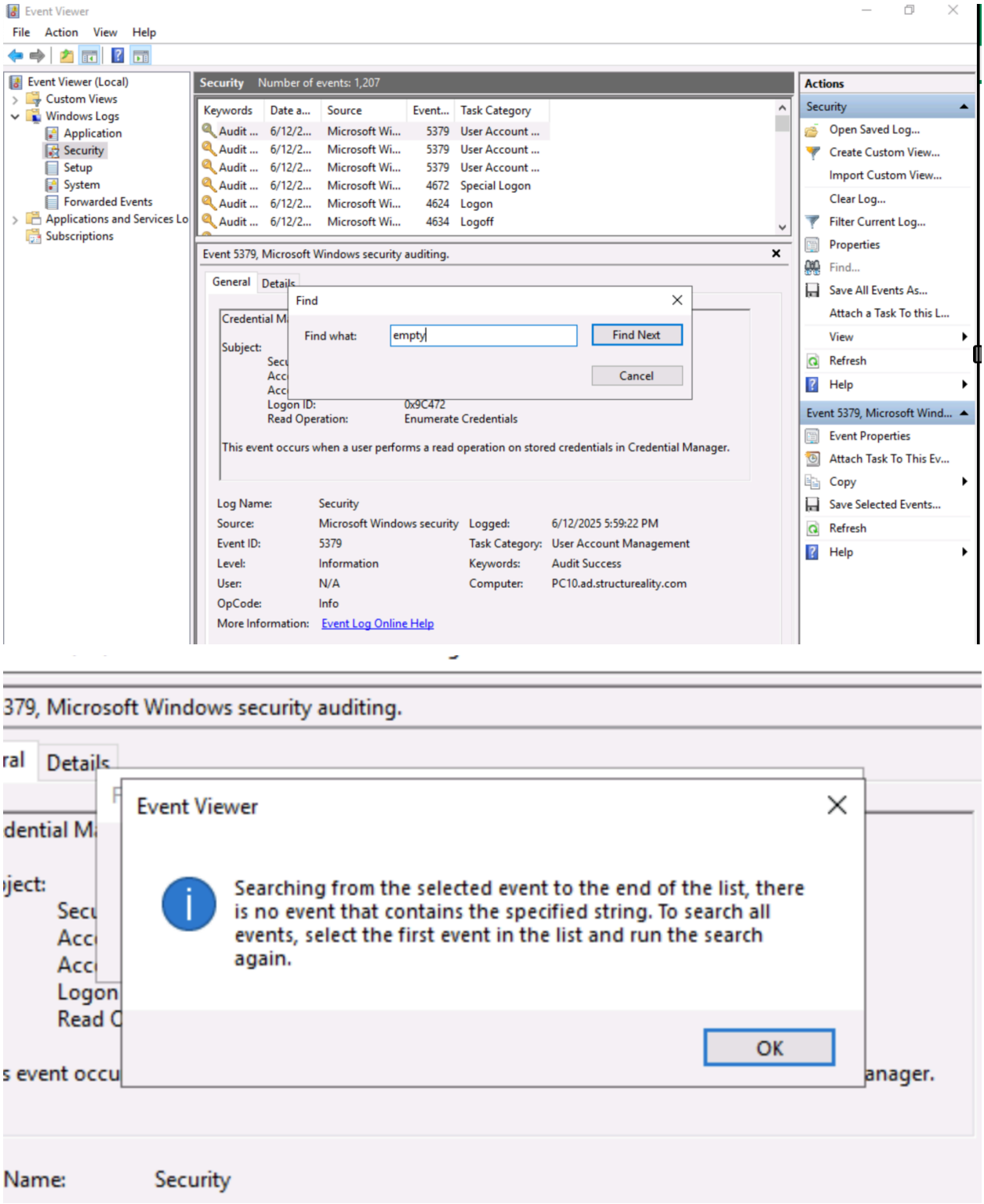


The *empty* folder should no longer be present.

18. Right-click **Start** and select **Event Viewer**. Maximize the Event Viewer window. Double-click **Windows Logs** to expand its contents. Select **Security** from in the *Windows Logs* expanded contents.

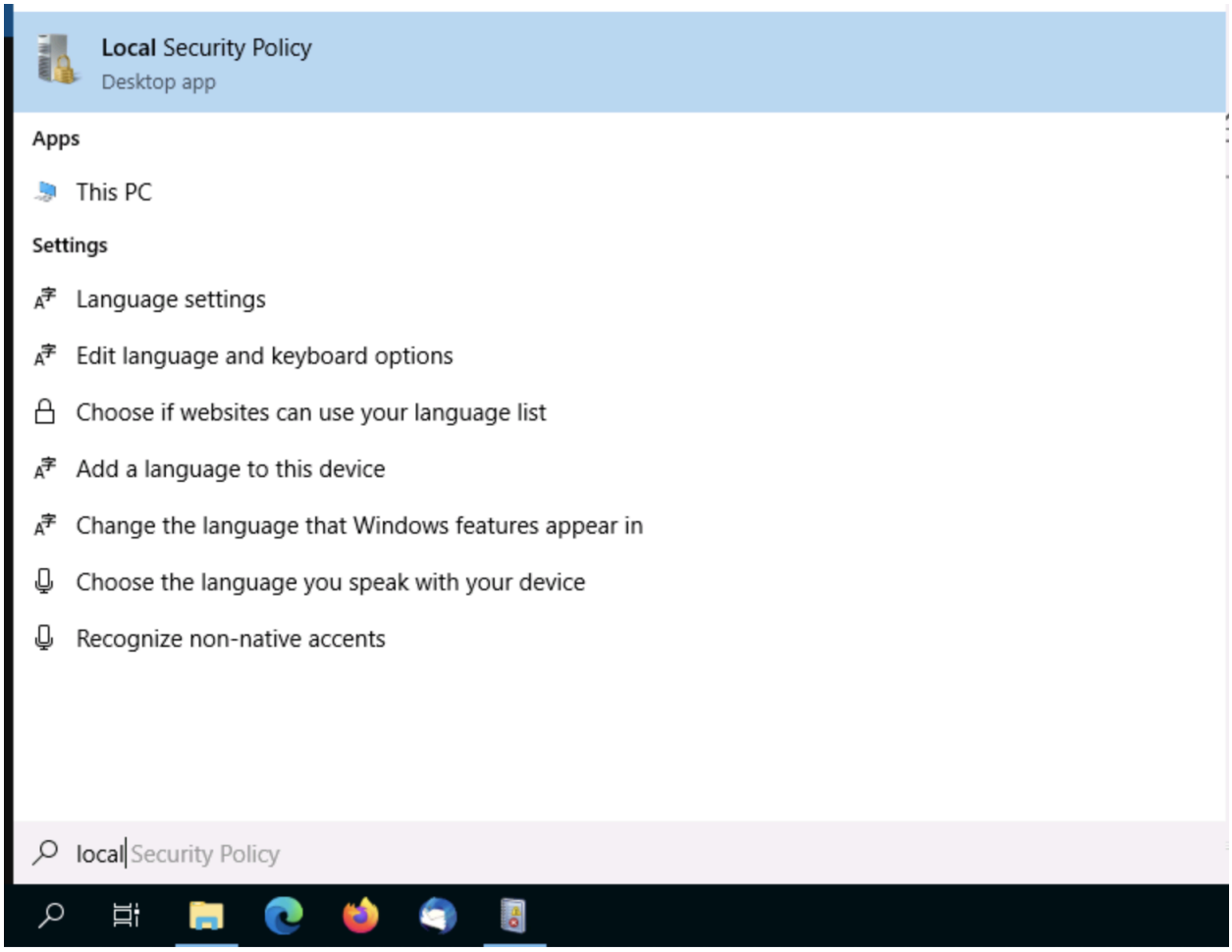


19. Select **Find...** in the right pane. Type empty in the *Find what:* filed, then select **Find Next**.Type empty in the *Find what:* filed, then select **Find Next**. After a few moments of searching, a window will appear stating the search term was not found. Select **OK**.

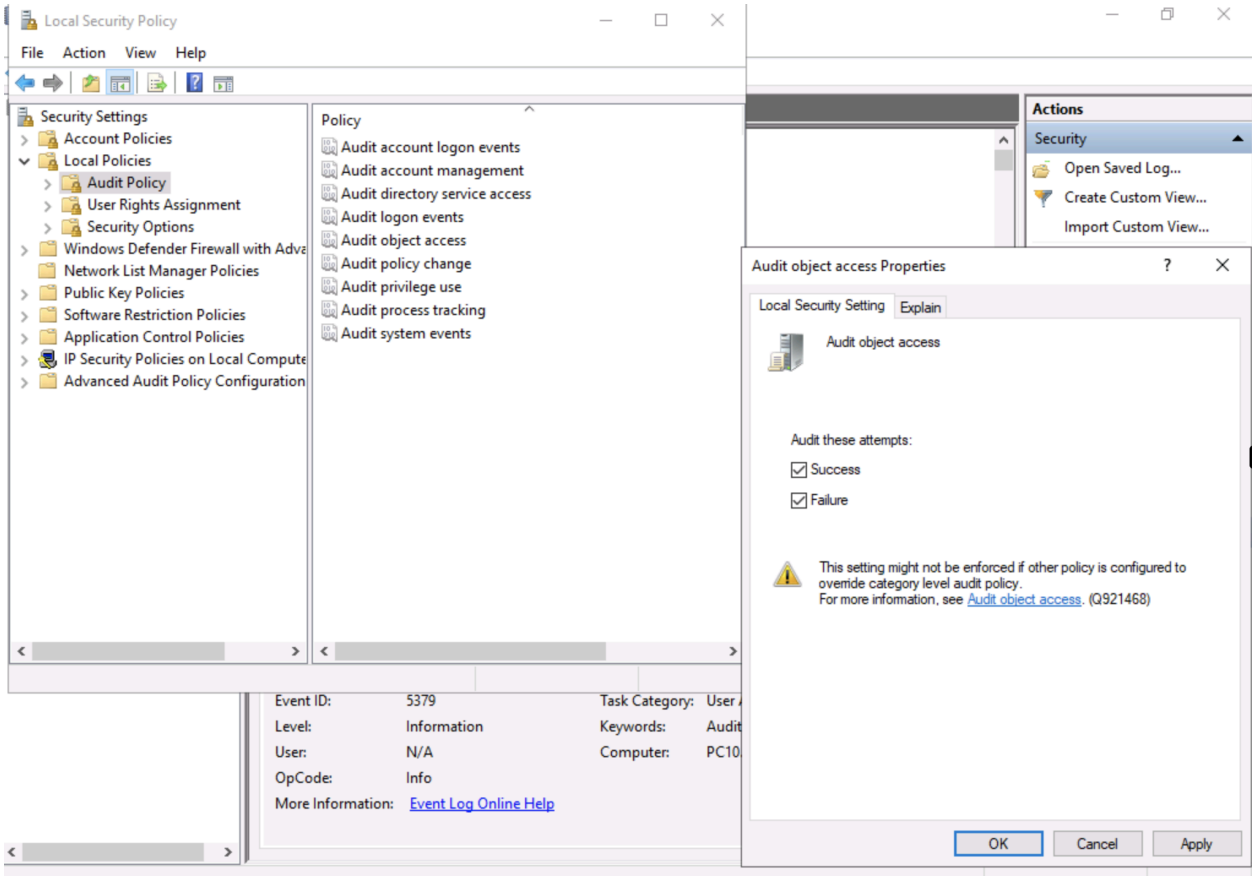


The results of the find operation indicate what? Folder deletion is not being audited

20. Select **Cancel** to close the *Find* window. Select **Type here to search** from the taskbar, type local, then select **Local Security Policy** from the results.



21. Double-click **Local Policies** to expand its contents. Select **Audit Policy** from the *Local Policies* expanded contents. Right-click **Audit object access** in the right pane, then select **Properties**. Select to mark both the **Success** and **Failure** checkboxes, then select **OK**.

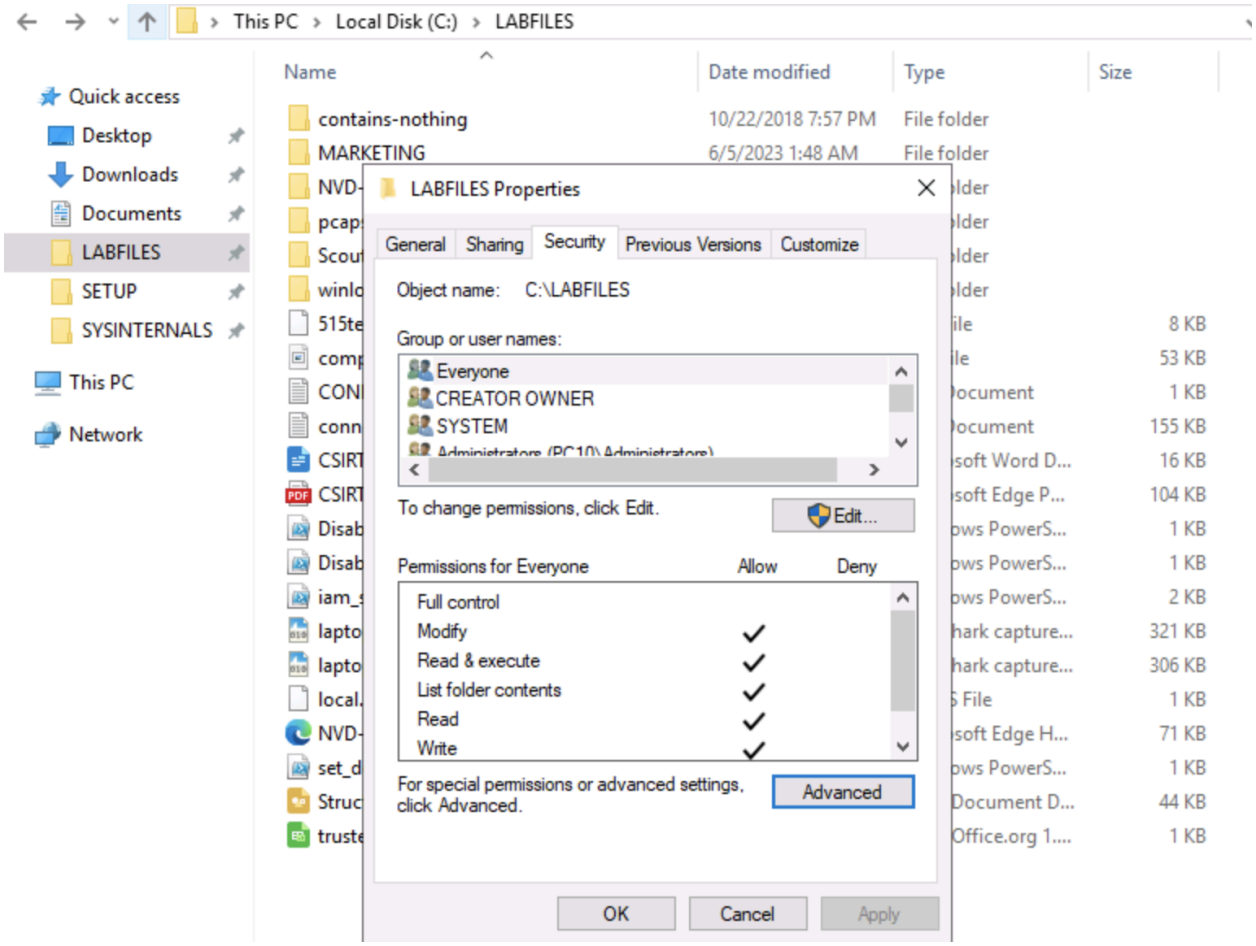


While the main switch for auditing object access activities is now on, auditing will not occur on most file objects until an on-object auditing setting is made.

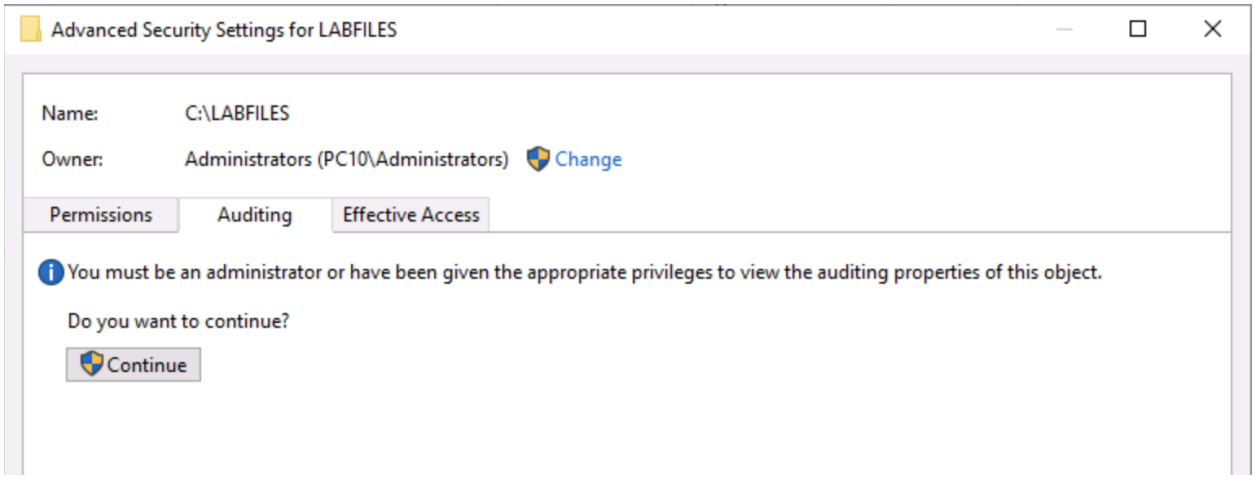
22. Close the *Local Security Policy* window.

The setting change should apply immediately. If the next steps do not result in a record of a folder deletion in the Security log accessed through the Event Viewer, restart PC10 and repeat from here, but we will then need to delete the *MARKETING* folder.

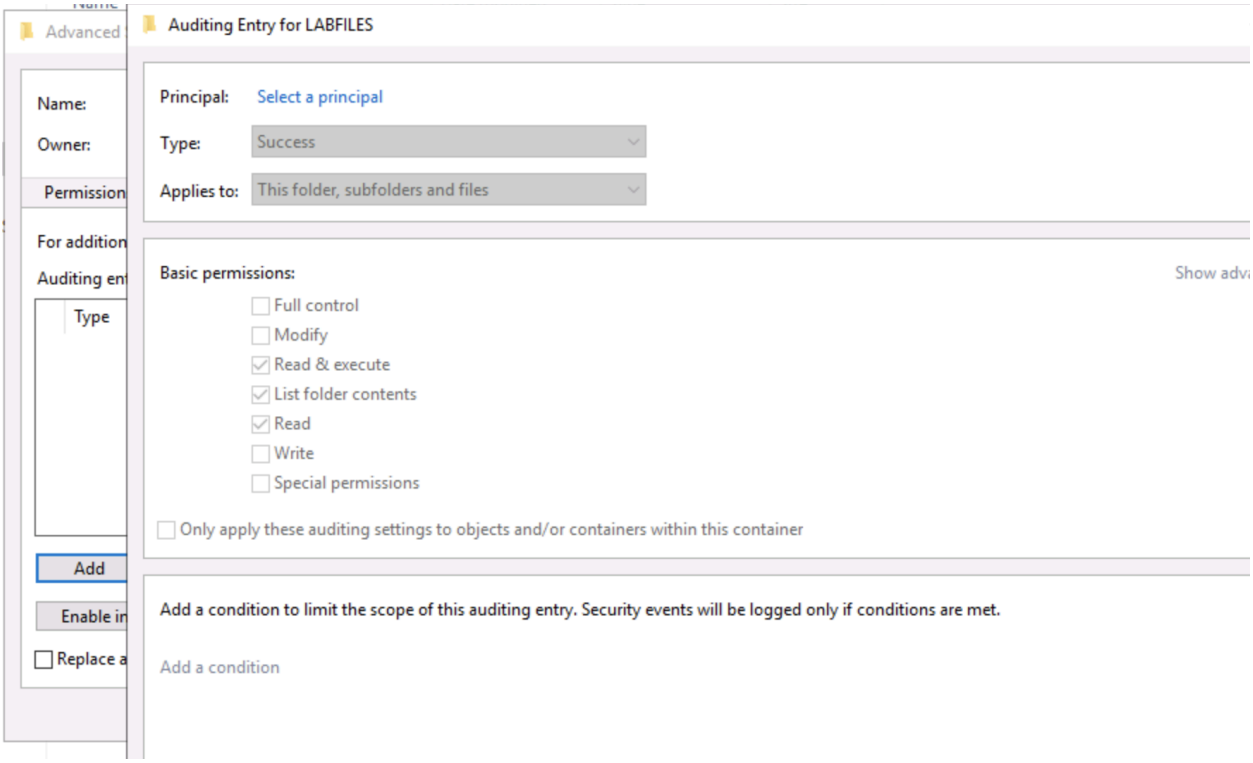
22. Return to File Explorer. Right-click **LABFILES** in the left pane, then select **Properties**. Select the **Security** tab on the *LABFILES Properties* window.

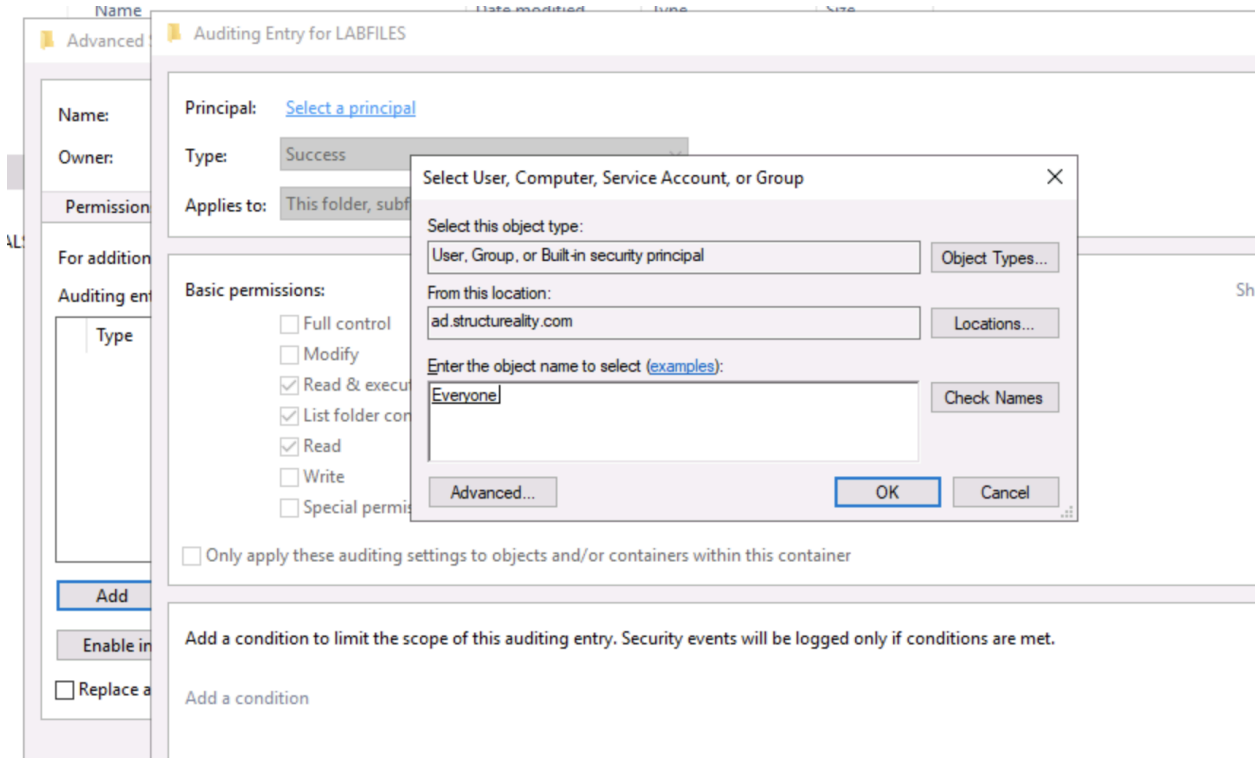


23. Select **Advanced**. Select the **Auditing** tab on the *Advanced Security Settings for LABFILES* window. Select **Continue** since we are an administrator.



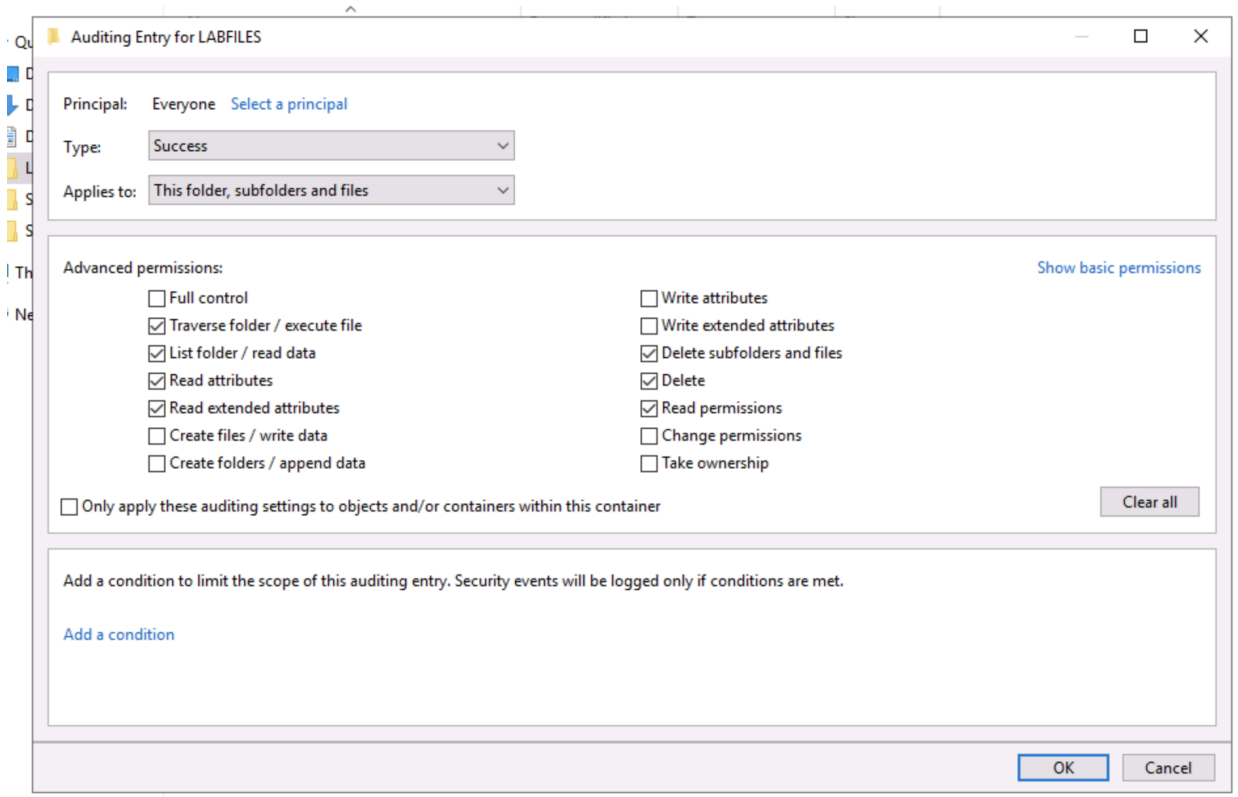
24. Select **Add**. Select **Select a principle** on the *Auditing Entry for LABFILES* window. ype everyone in the *Enter the object name to select* field, then select **Check Names**.





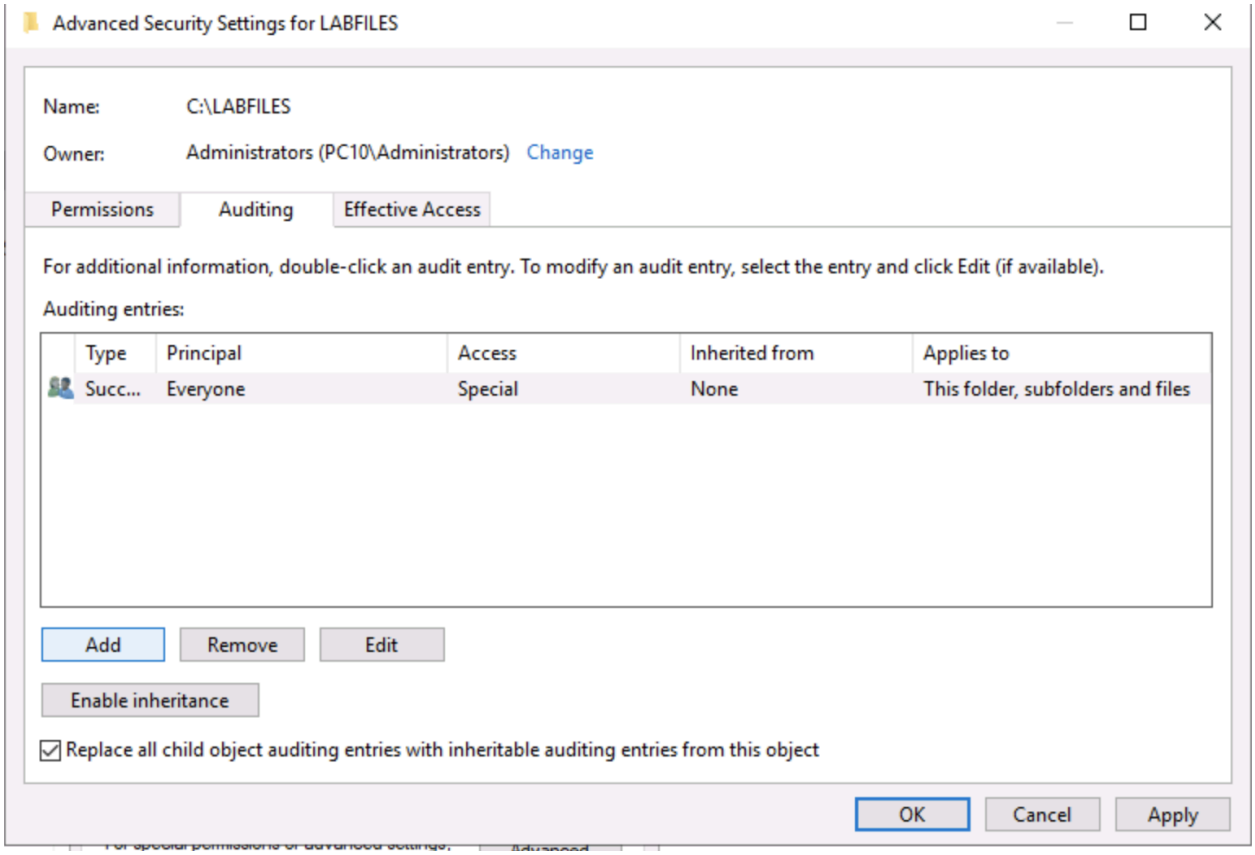
The field should now display *Everyone*..

25. Select **OK**. Select **Show advanced permissions** from the middle area of the *Auditing Entry for LABFILES* window. Select to mark the **Delete subfolders and files** and **Delete** checkboxes.

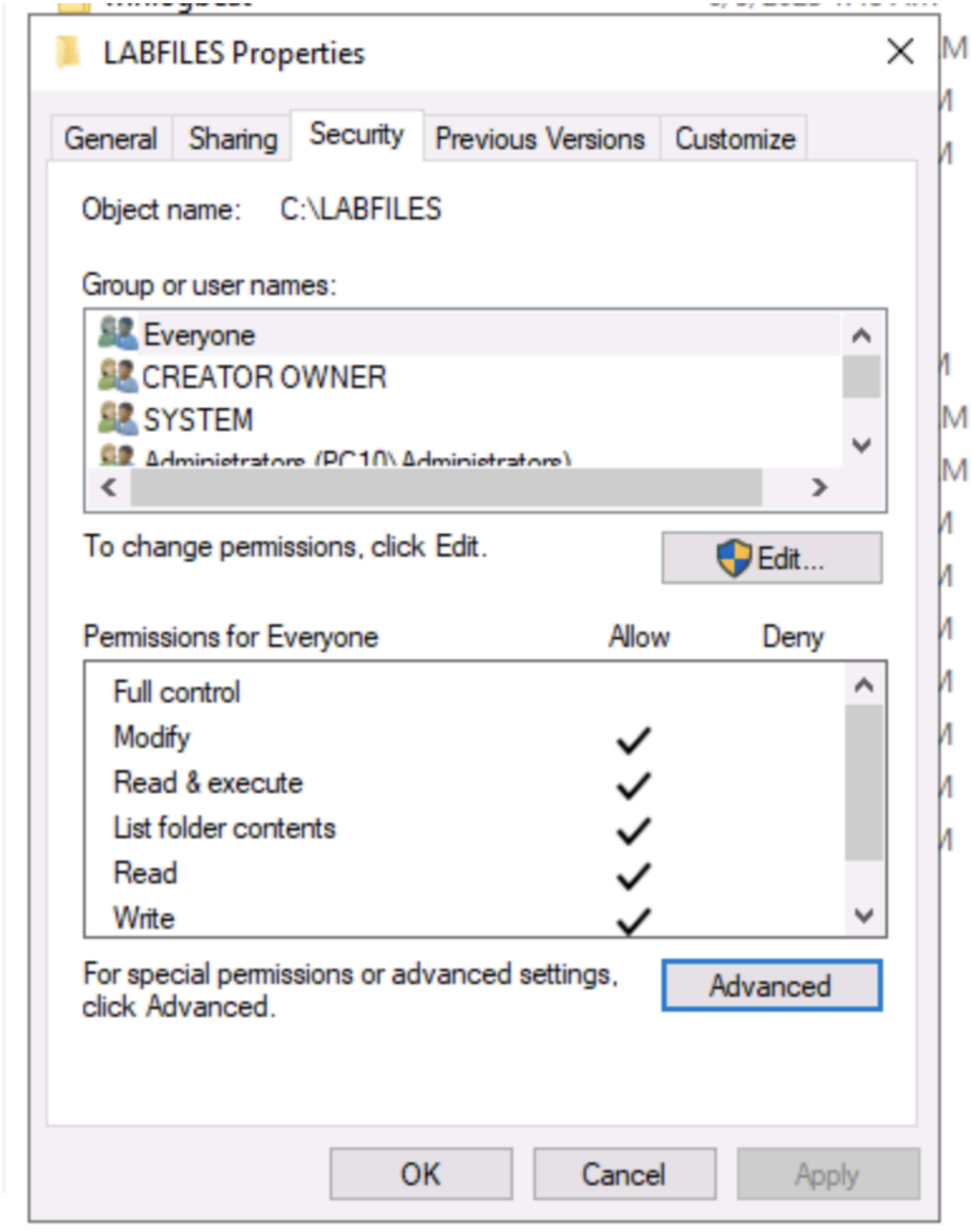


26. Select **OK** to save the settings and close the *Auditing Entry for LABFILES* window. Select **OK** to save the settings and close the *Advanced Security Settings*

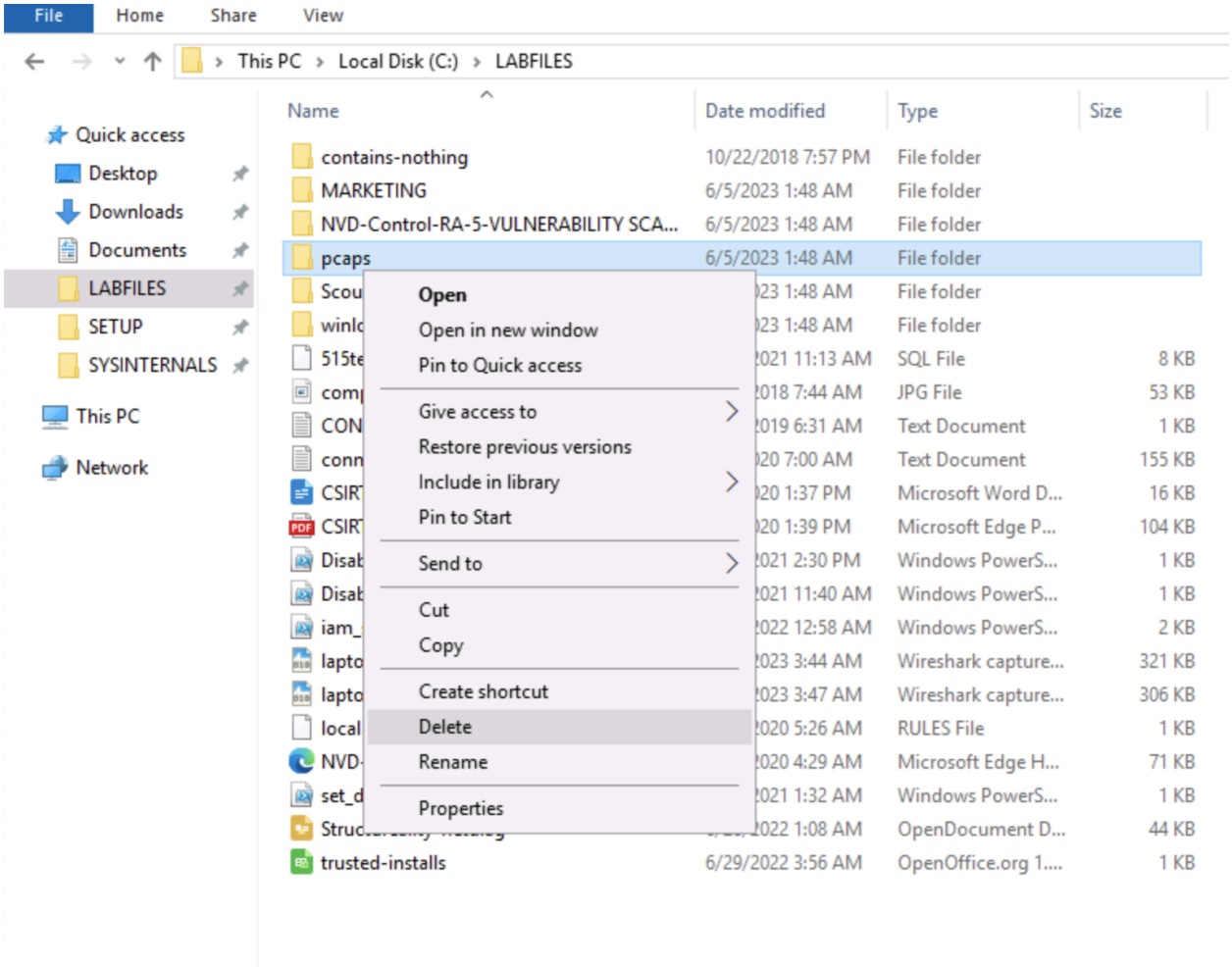
for LABFILES window.

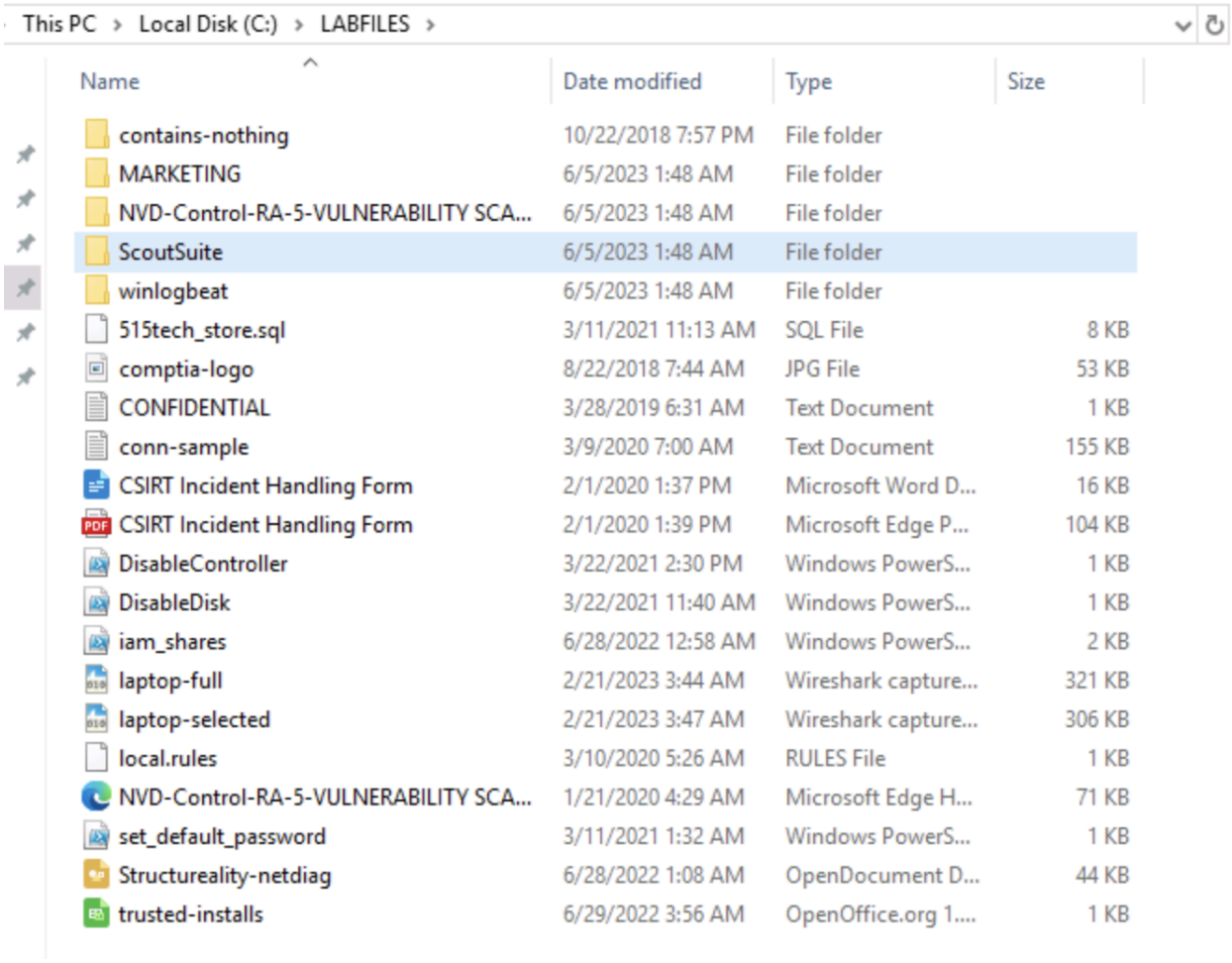


27. Select **OK** to save the settings and close the *LABFILES Properties* window.



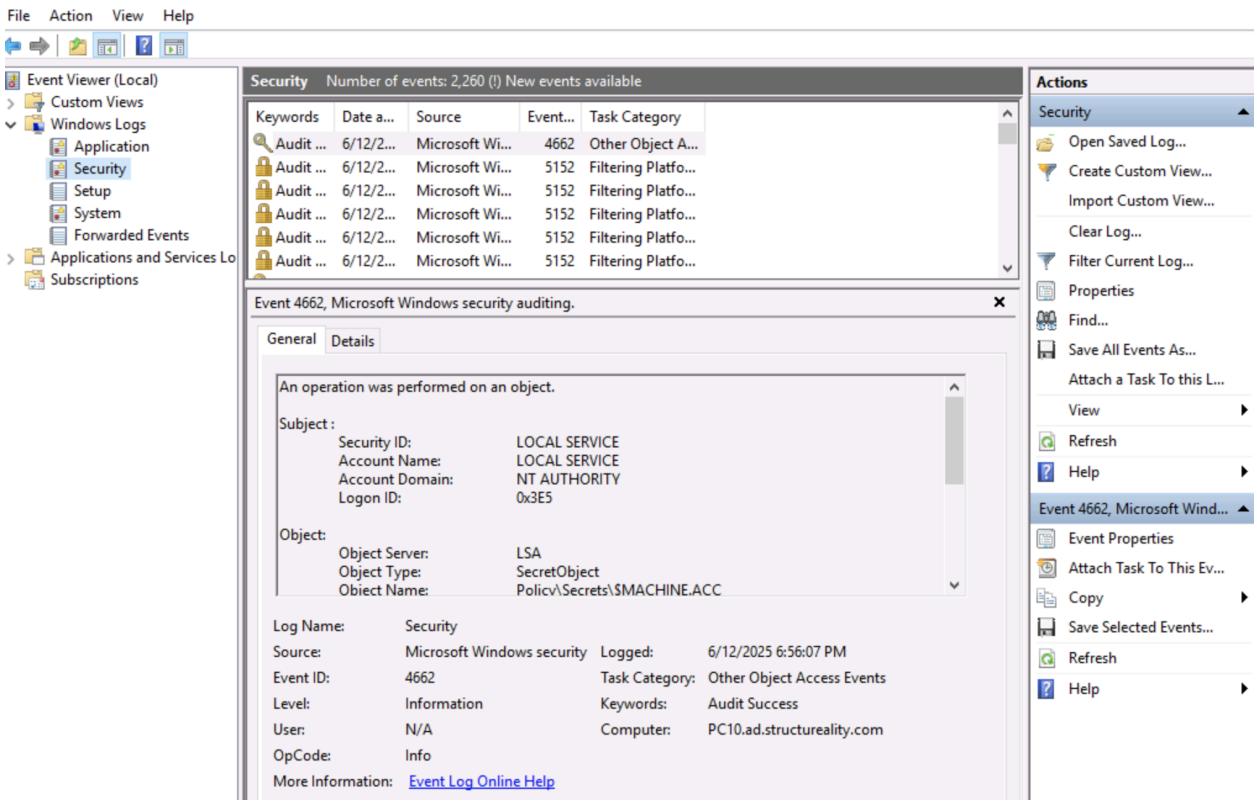
28. Return to File Explorer. Right-click the **pcaps** folder, then select **Delete**.


File
Home
Share
View
This PC
Local Disk (C:)
LABFILES
Quick access
Desktop
Downloads
Documents
LABFILES
SETUP
SYSINTERNALS
This PC
Network
Name
Date modified
Type
Size
contains-nothing
10/22/2018 7:57 PM
File folder
MARKETING
6/5/2023 1:48 AM
File folder
NVD-Control-RA-5-VULNERABILITY SCA...
6/5/2023 1:48 AM
File folder
pcaps
6/5/2023 1:48 AM
File folder
trusted-installs
6/29/2022 3:56 AM
OpenOffice.org 1....
1 KB
Open
Open in new window
Pin to Quick access
Give access to
Restore previous versions
Include in library
Pin to Start
Send to
Cut
Copy
Create shortcut
Delete
Rename
Properties

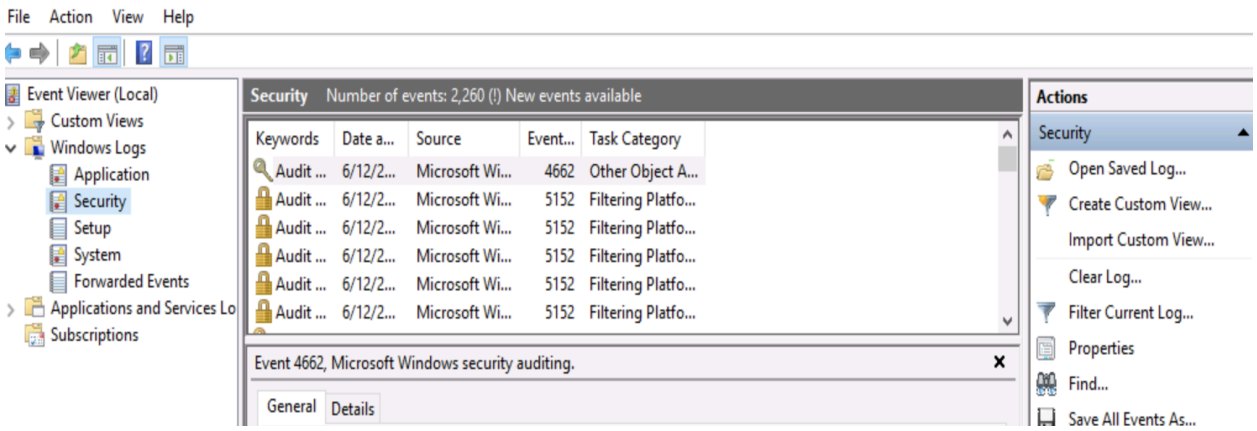


The *pcaps* folder should no longer be present.

29. Minimize File Explorer. Return to the Event Viewer. Select **Refresh** from the right pane.

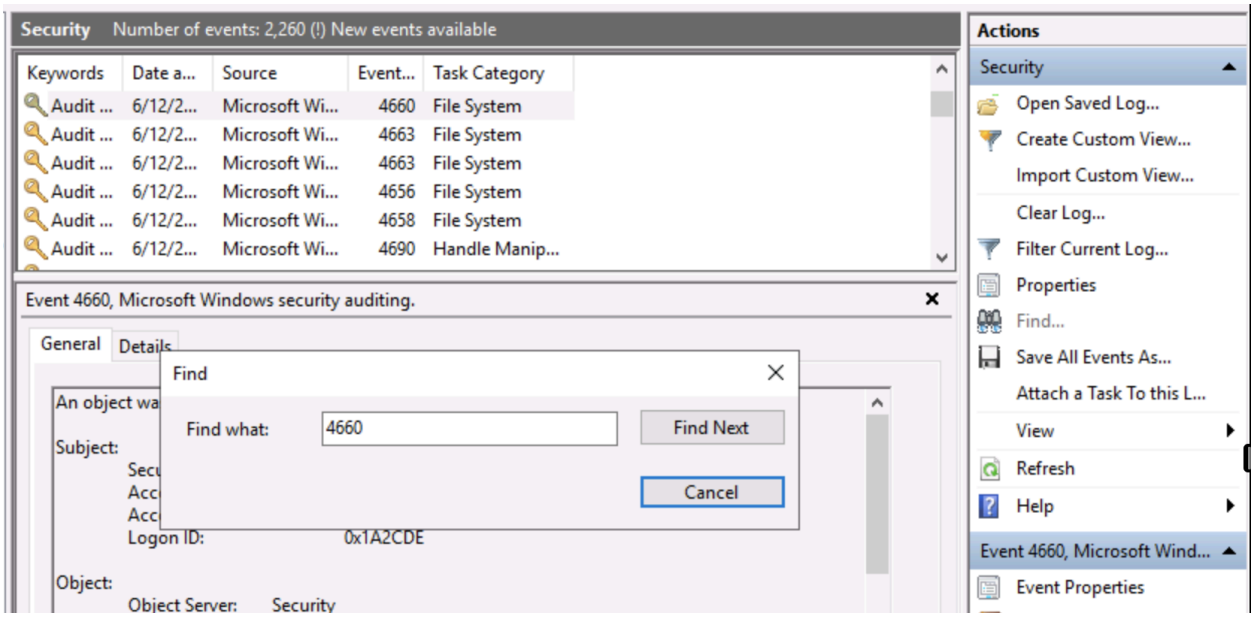


30. Select the first entry at the top of the middle pane.



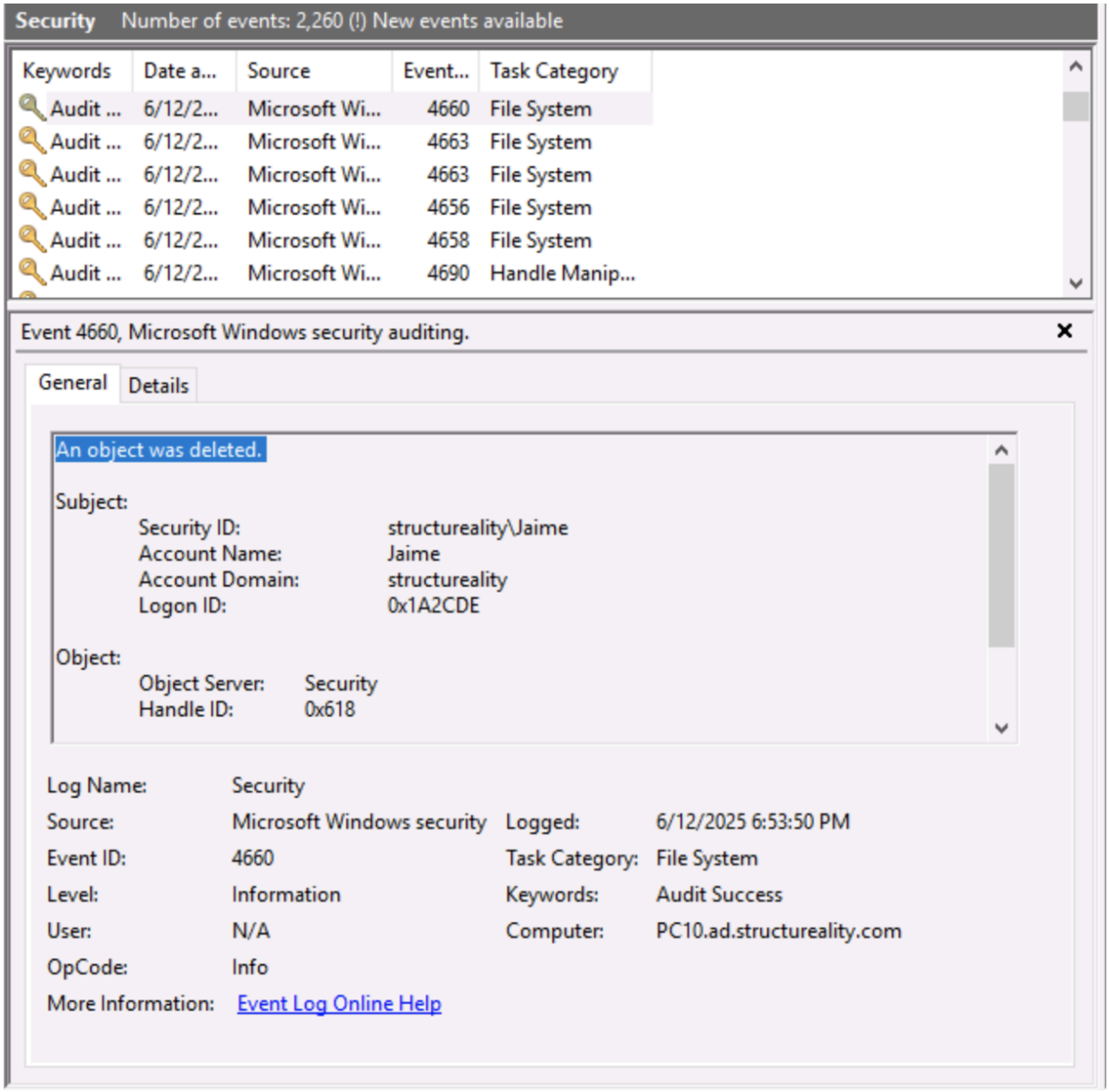
This sets the search-from point for the Find function, which only searches from the currently selected entry to earlier entries (i.e., down).

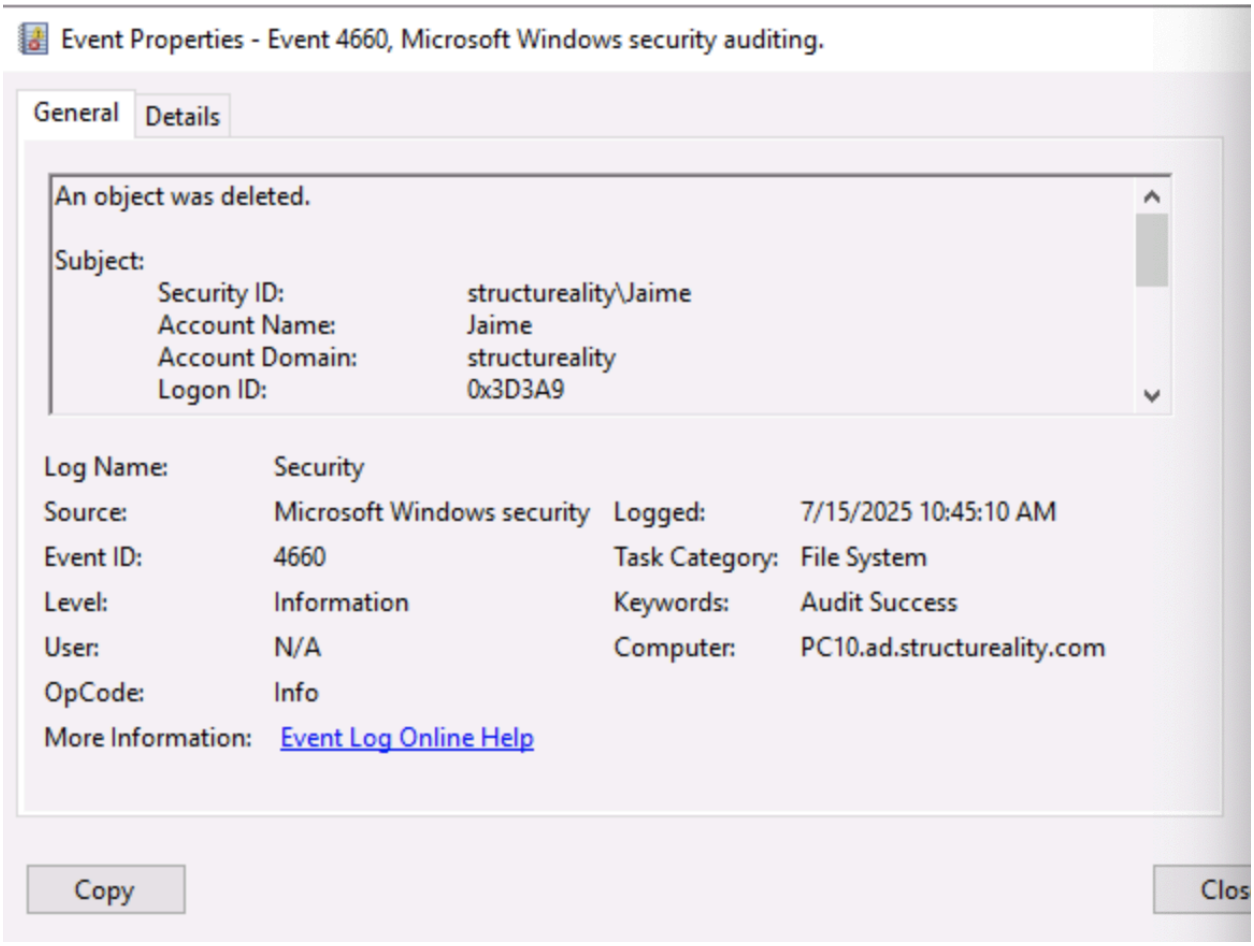
31. Select **Find...** in the right pane. Type 4660 in the *Find what:* filed, then select **Find Next**. Select **Cancel** to close the *Find* window.



4660 is the Event ID for the event type of object deletion.

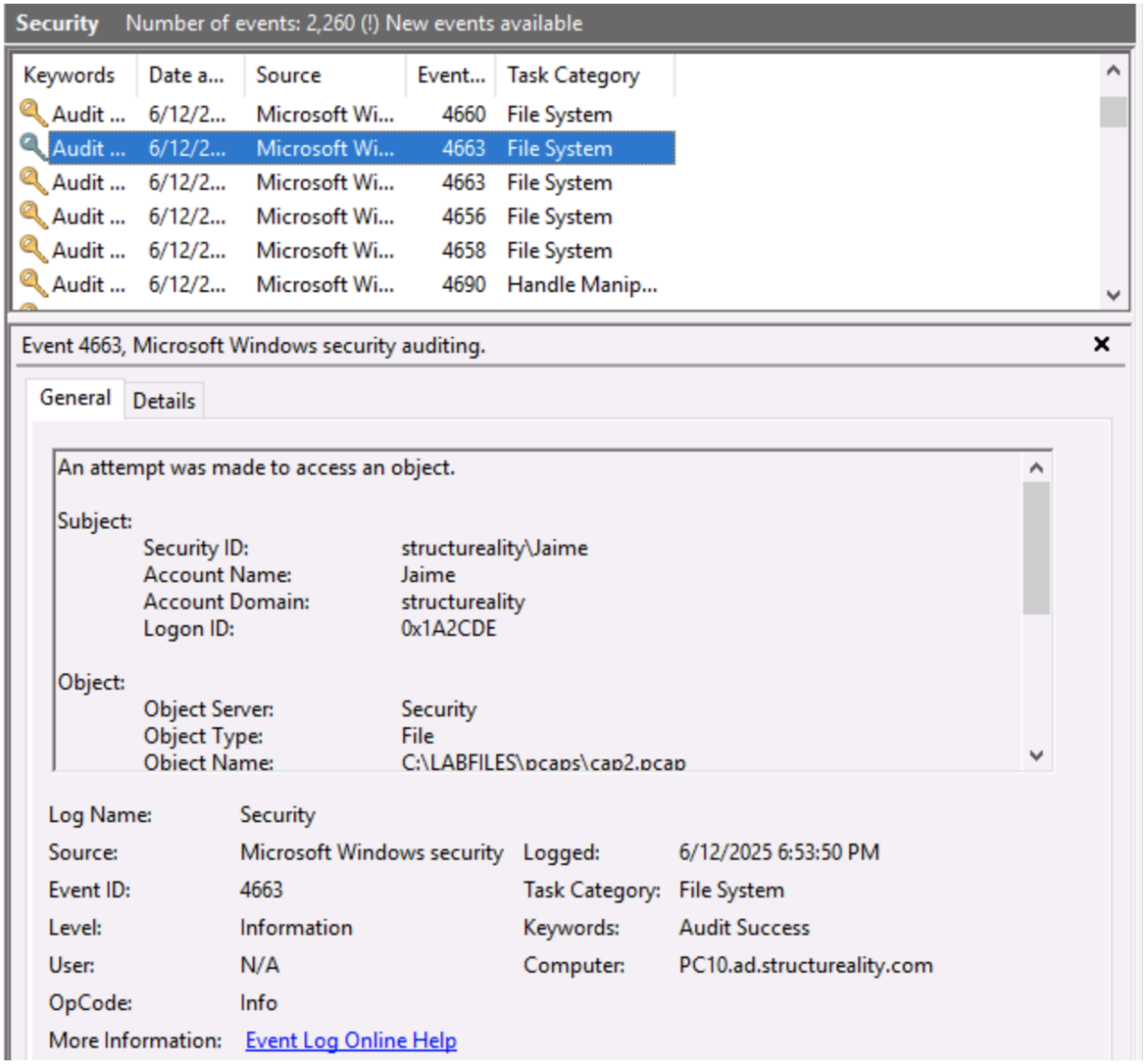
32. An audit record of Event ID: 4660 should be selected. In the bottom pane, we should see the statement "An object was deleted".


Security Number of events: 2,260 (!) New events available
Keywords Date a... Source Event... Task Category
Audit ... 6/12/2... Microsoft Wi... 4660 File System
Audit ... 6/12/2... Microsoft Wi... 4663 File System
Audit ... 6/12/2... Microsoft Wi... 4663 File System
Audit ... 6/12/2... Microsoft Wi... 4656 File System
Audit ... 6/12/2... Microsoft Wi... 4658 File System
Audit ... 6/12/2... Microsoft Wi... 4690 Handle Manip...
Event 4660, Microsoft Windows security auditing.
General Details
An object was deleted.
Subject:
Security ID: structureality\Jaime
Account Name: Jaime
Account Domain: structureality
Logon ID: 0x1A2CDE
Object:
Object Server: Security
Handle ID: 0x618
Log Name: Security
Source: Microsoft Windows security
Logged: 6/12/2025 6:53:50 PM
Event ID: 4660
Task Category: File System
Level: Information
Keywords: Audit Success
User: N/A
Computer: PC10.ad.structureality.com
OpCode: Info
More Information: Event Log Online Help

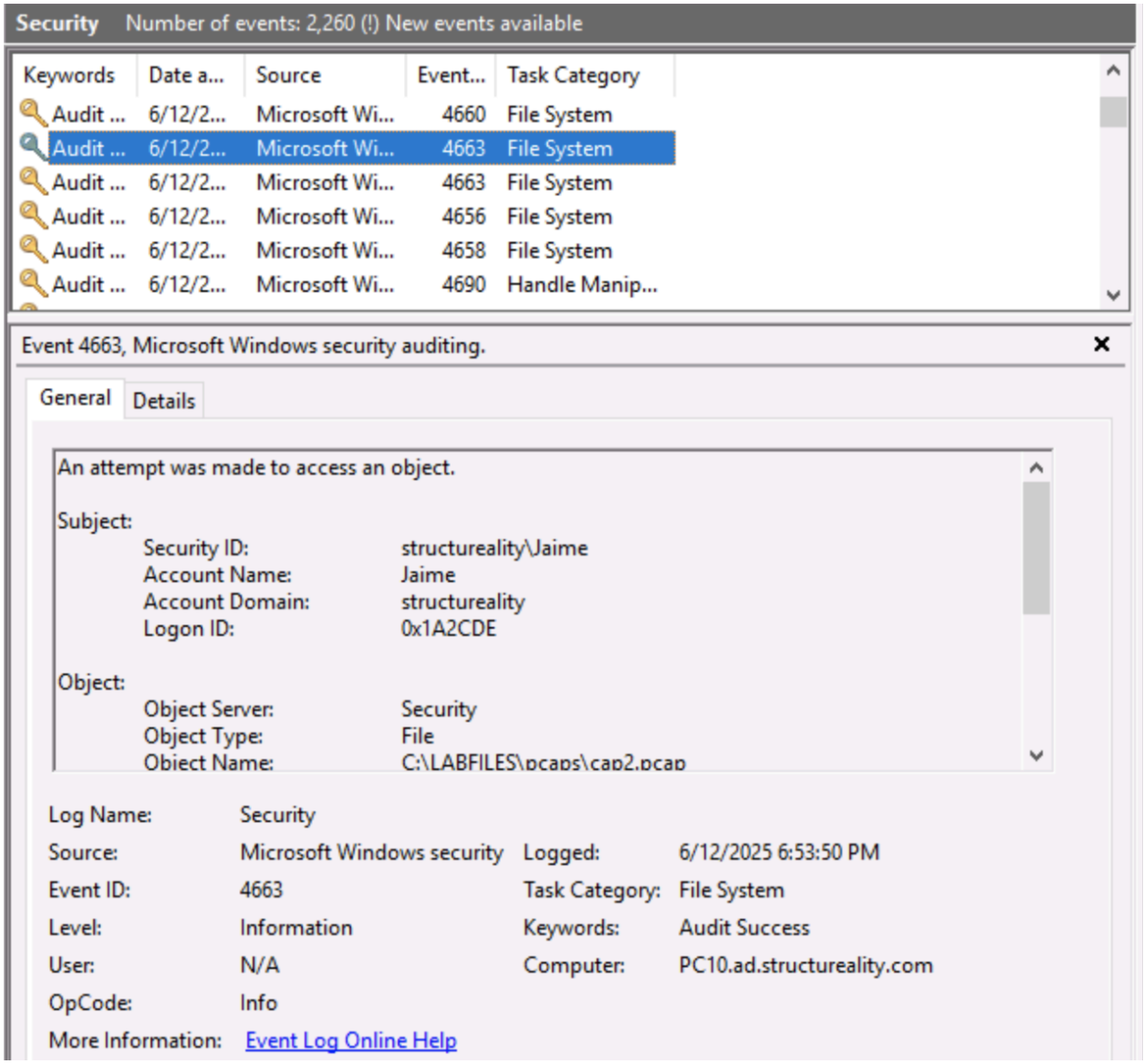


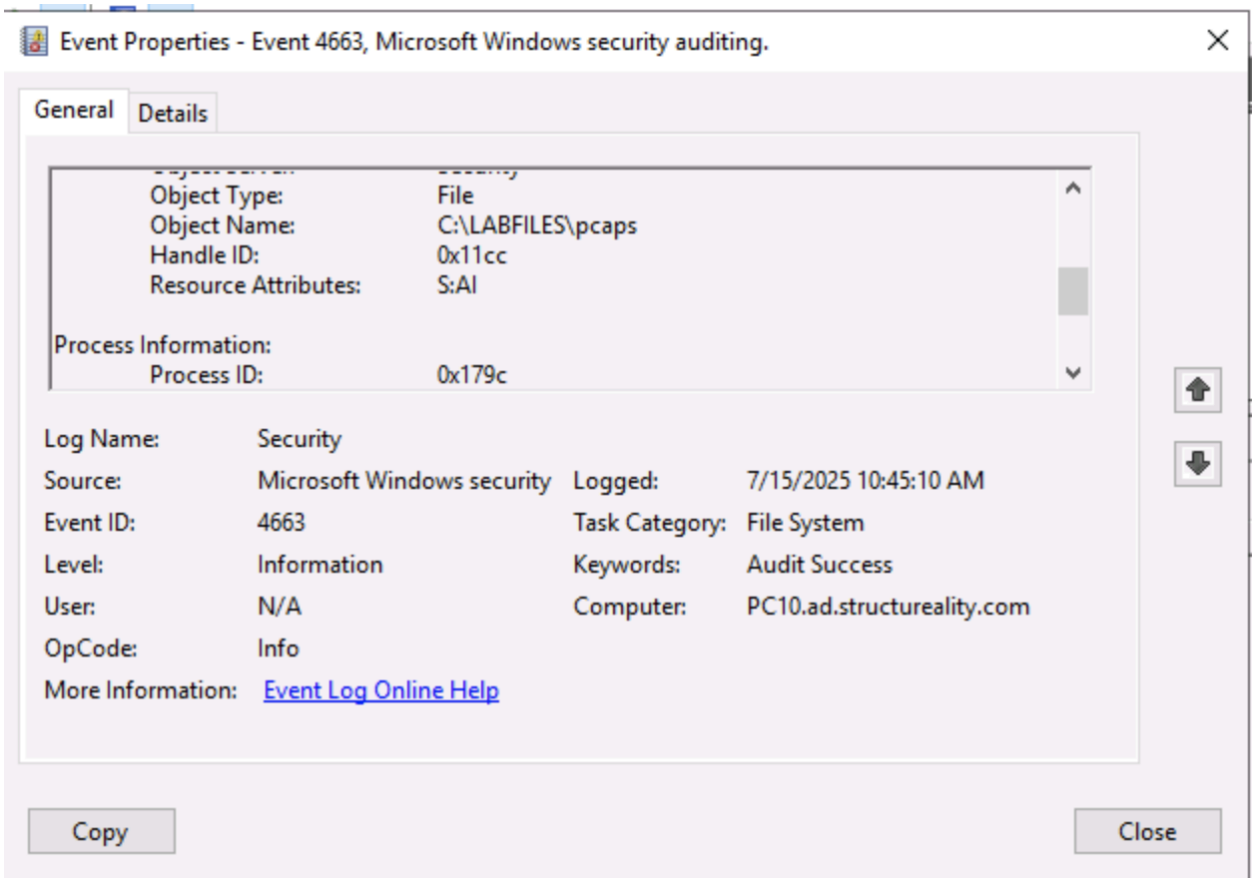
Oddly, while Event ID 4660 is the record of an object being deleted, it does not contain the actual object's name. For that, we need to find the associated Event ID 4663.

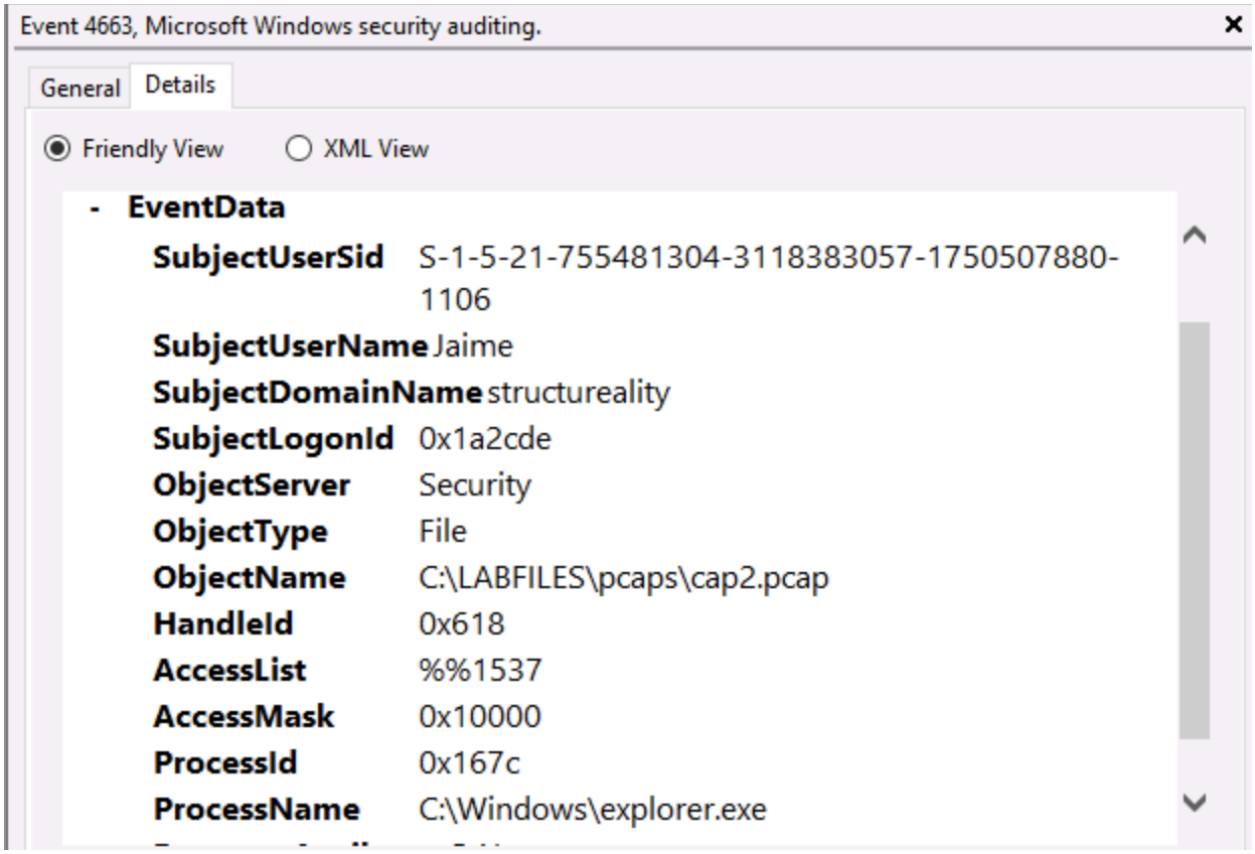
33. The Event ID 4663 for the folder deletion should be about five records above the currently selected one. Select the lowest record of **Event ID 4663** above the currently selected Event ID 4660 record.



34. Once we have selected the Event ID 4663 record, we can view the details in the bottom pane. The *General* tab has a small scrollable sub-window with details. we should see a line of "Object Name: C\LABFILES\pcaps". This Event ID 4663 record confirms that the object deleted was the C\LABFILES\pcaps folder.


Security Number of events: 2,260 (!) New events available
Keywords Date a... Source Event... Task Category
Audit ... 6/12/2... Microsoft Wi... 4660 File System
Audit ... 6/12/2... Microsoft Wi... 4663 File System
Audit ... 6/12/2... Microsoft Wi... 4663 File System
Audit ... 6/12/2... Microsoft Wi... 4656 File System
Audit ... 6/12/2... Microsoft Wi... 4658 File System
Audit ... 6/12/2... Microsoft Wi... 4690 Handle Manip...
Event 4663, Microsoft Windows security auditing.
General Details
An attempt was made to access an object.
Subject:
Security ID: structureality\Jaime
Account Name: Jaime
Account Domain: structureality
Logon ID: 0x1A2CDE
Object:
Object Server: Security
Object Type: File
Object Name: C:\LABFILES\pcaps\cap2.pcap
Log Name: Security
Source: Microsoft Windows security
Logged: 6/12/2025 6:53:50 PM
Event ID: 4663
Task Category: File System
Level: Information
Keywords: Audit Success
User: N/A
Computer: PC10.ad.structureality.com
OpCode: Info
More Information: Event Log Online Help


Event Properties - Event 4663, Microsoft Windows security auditing.
General
Details
Object Type: File
Object Name: C:\LABFILES\pcaps
Handle ID: 0x11cc
Resource Attributes: S:AI
Process Information:
Process ID: 0x179c
Log Name: Security
Source: Microsoft Windows security
Logged: 7/15/2025 10:45:10 AM
Event ID: 4663
Task Category: File System
Level: Information
Keywords: Audit Success
User: N/A
Computer: PC10.ad.structureality.com
OpCode: Info
More Information: Event Log Online Help
Copy
Close



we could also select the *Details* pane to see most of the same information.

What is the purpose of a detective control? Create a record of events and activities

Configure and test directive controls

A directive control provides instruction to direct a user towards more compliant behavior. In this exercise, we will configure a directive control in the form of a login warning banner. Finally, we will test this directive control.

35. sign in as Jaime using Pa$$w0rd as the password.

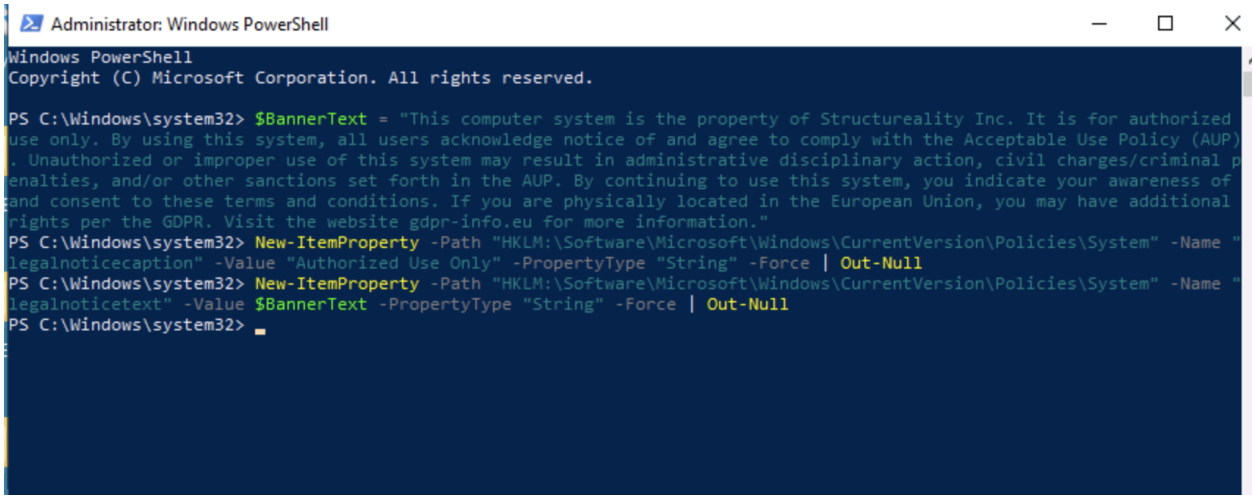
Jaime is a member of the LocalAdmin group. So, this user account is an administrator on the PC10 system.

36. Right-click **Start**, and select **Windows PowerShell (Admin)**. At the UAC prompt, select **Yes**.Enter the following code into the *Administrator: Windows PowerShell* console:

$BannerText = "This computer system is the property of Structureality Inc. It is for authorized use only. By using this system, all users acknowledge notice of and agree to comply with the Acceptable Use Policy (AUP). Unauthorized or improper use of this system may result in administrative disciplinary action, civil charges/criminal penalties, and/or other sanctions set forth in the AUP. By continuing to use this system, we indicate wer awareness of and consent to these terms and conditions. If we are physically located in the European Union, we may have additional rights per the GDPR. Visit the website gdpr-info.eu for more information." ENTER

New-ItemProperty -Path "HKLM:\Software\Microsoft\Windows\CurrentVersion\Policies\System" -Name "legalnoticecaption" -Value "Authorized Use Only" -PropertyType "String" -Force | Out-Null then hit ENTER

New-ItemProperty -Path "HKLM:\Software\Microsoft\Windows\CurrentVersion\Policies\System" -Name "legalnoticetext" -Value $BannerText -PropertyType "String" -Force | Out-Null Then Hit ENTER

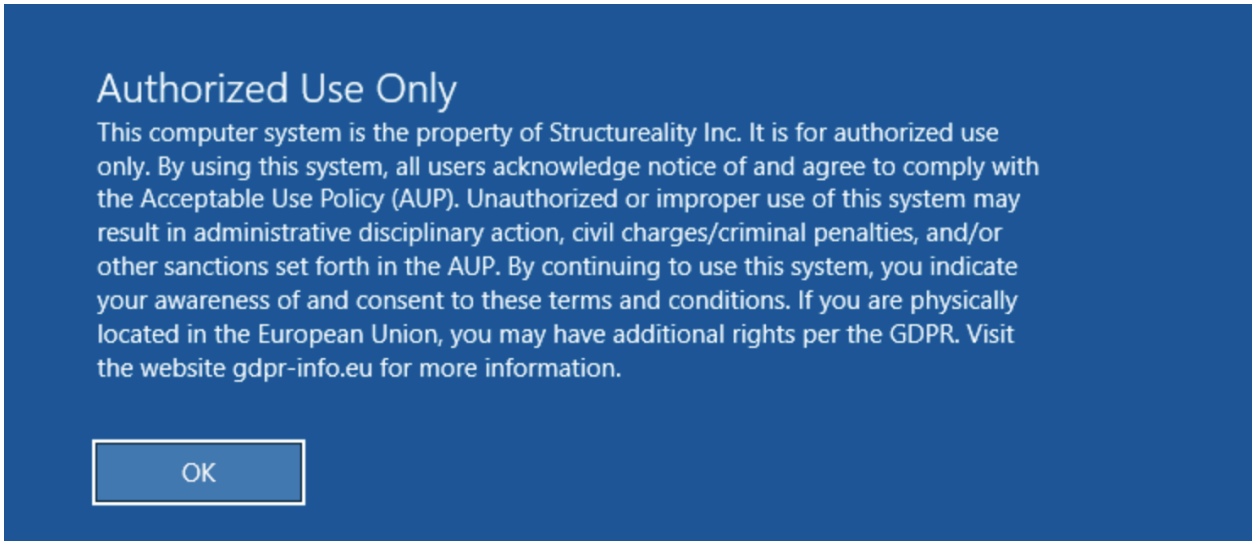


The text of the warning banner in this exercise amalgamates several banners used by various commercial and educational facilities. Be sure to consult with

wer own legal counsel before setting a warning banner to ensure it complies with laws and regulations.

37. Sign out of PC10 by selecting the **Start** menu, then selecting **Jaime** (which will be a circle at the top of the menu), then select **Sign out**. If prompted that there are open programs, select **Sign out anyway**.

38. Connect to the PC10 virtual machine, send Ctrl+Alt+Delete. we should be presented with the login warning banner that was just defined.



39. Read the warning banner, then select **OK**. sign-in process as Jaime using Pa$$w0rd as the password.

we have successfully implemented a directive control to inform personnel of the limitations and restrictions of a controlled system.

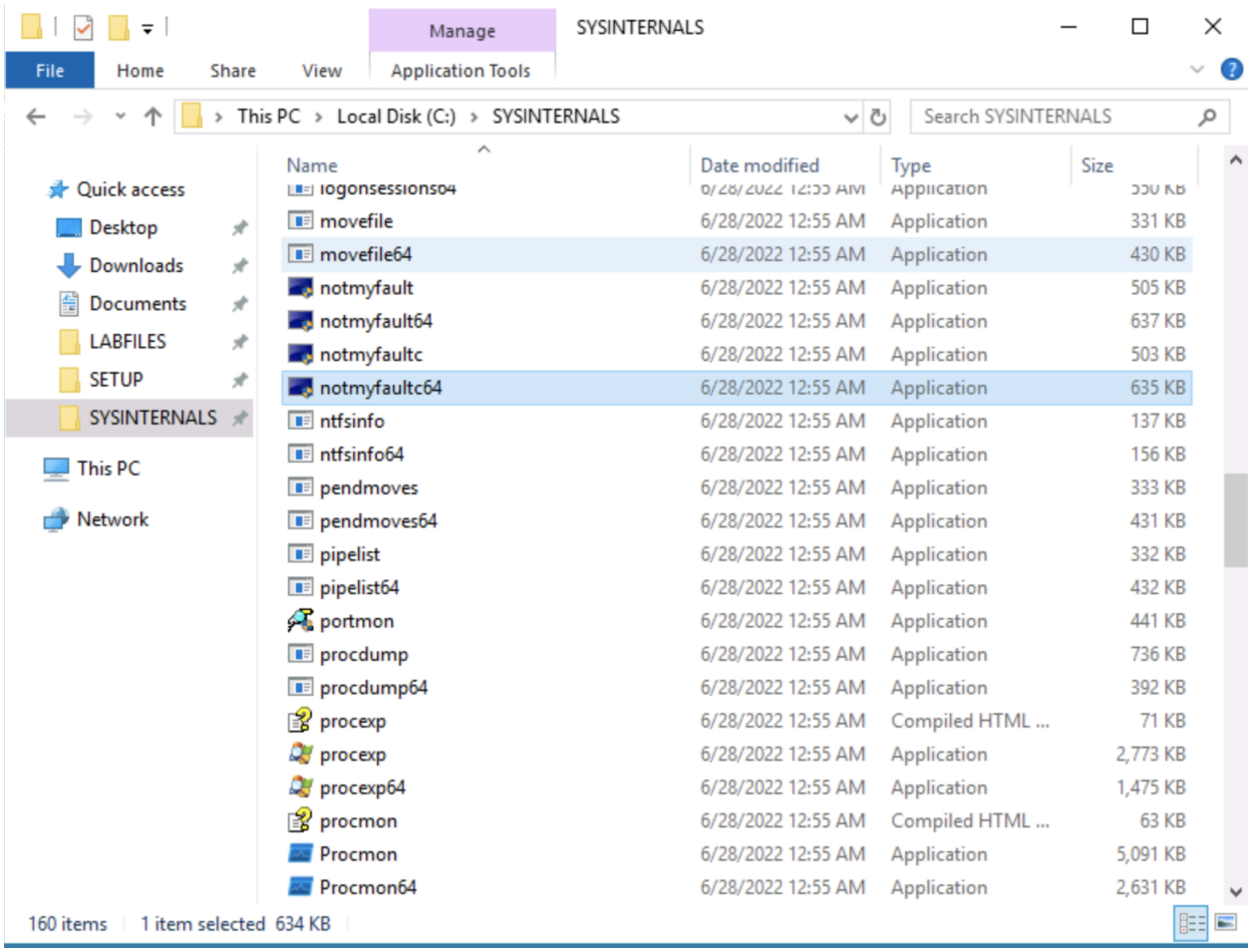
What is the goal of directive controls? Compliance

Configure and test corrective controls

A corrective control is intended to detect when something is in a less secure or less desirable state, then attempts to return to the more secure or more desirable state. In some cases, the corrective control can repair minor damage to restore a system to a more secure or desirable state.

In this exercise, we will first use a fault injection tool to trigger the existing correct control of Windows to trigger its native corrective control protection against misbehaving applications. Next, we will create and test a custom corrective control to protect the contents of a text file.

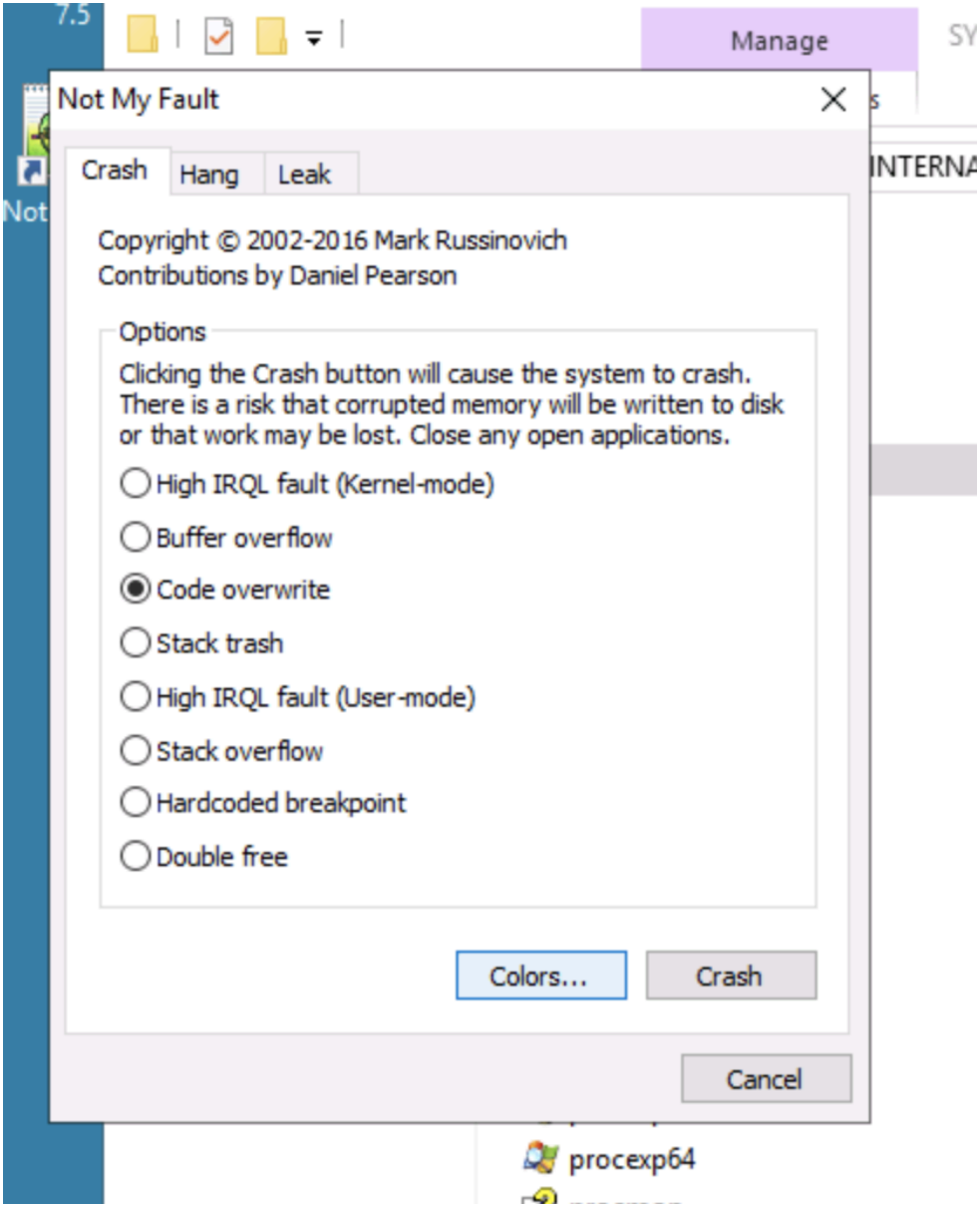
40. sign-in process as Jaime using Pa$$w0rd as the password. Open File Explorer, and from the Quick access pane, select **SYSINTERNALS**. Scroll to locate, then double-click **notmyfault64** to execute it.



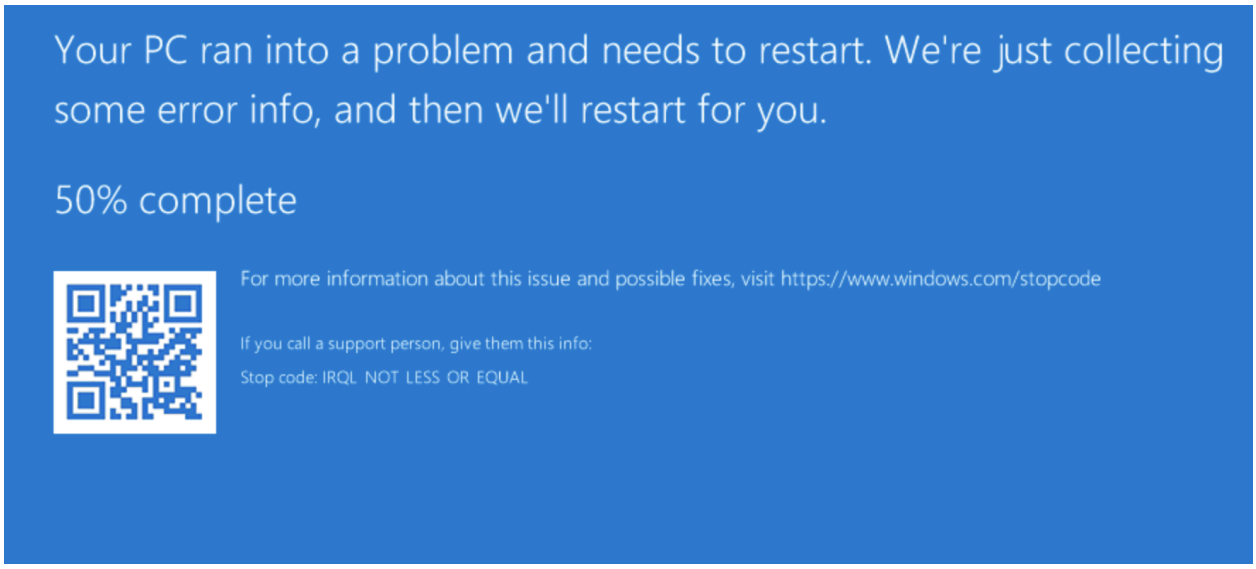
There is a CLI (command line interface) version of NotMyFault, which has a c in the file name: notmyfaultc64. If a Command Prompt window flashes open and disappears, we selected the CLI version, not the GUI version of NotMyFault64.

Windows Sysinternals is a website that offers technical resources and utilities to manage, diagnose, troubleshoot, and monitor a Microsoft Windows environment. we can experiment with the Sysinternals tools in this lab environment or go directly to sysinternals.com to learn more and download nearly 75 tools onto wer system.

41. Select **Yes** on the User Account Control window. Select the **Code overwrite** option, then select **Crash**.



42. The PC10 system should immediately experience a stop error (often called the BSOD (Blue Screen of Death)). The system will perform a partial memory dump (for potential analysis - which will not be done in this lab) and then reboot.



we have verified that the Windows corrective control to protect the execution environment from misbehaving applications is active. While we might not prefer in-memory data to be lost, the stability of the Windows execution environment is protected by immediately ceasing all execution. we can be assured that the offending application will not be running once the system reboots. This native Windows protective feature is why we should save early and often when creating new content or media.

What are the dual purposes of corrective controls?

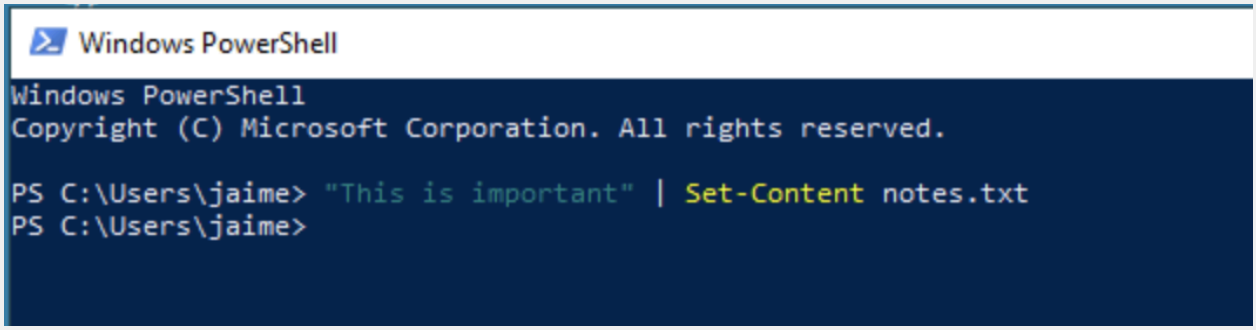
Return the system to a normal and generally secure condition

Address an unwanted or less secure state or event

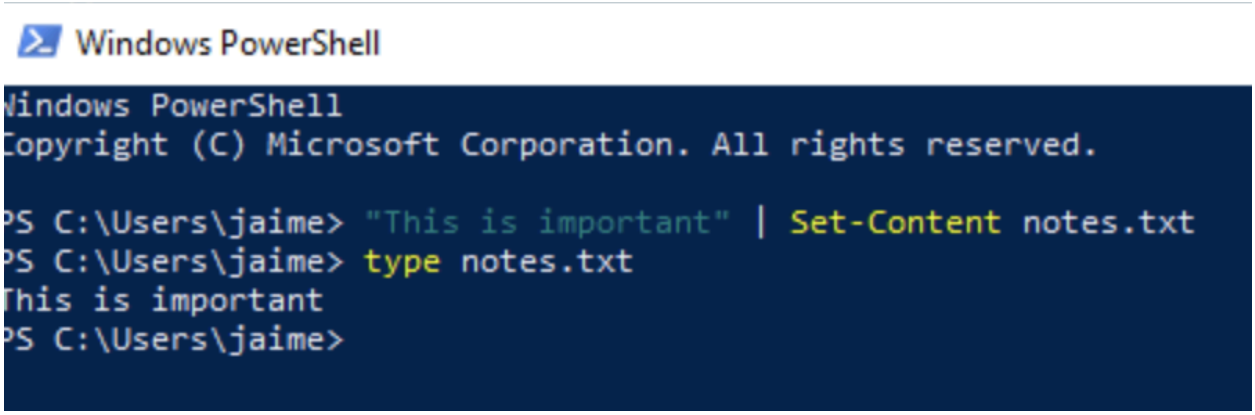
43. Next, we will create wer own corrective control to simulate the correction functions of the SigVerif utility.

44. Select **Type here to search** from the taskbar, type powershell, then select **Windows PowerShell** from the results. Enter "This is important" | Set-Content notes.txt.

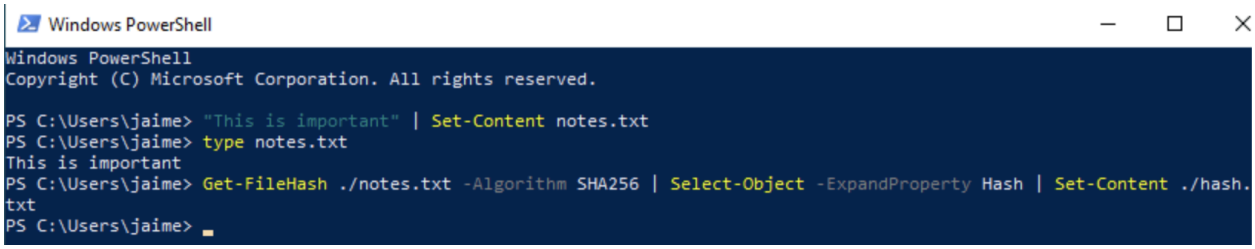
In this exercise portion, we will create a corrective control to monitor the contents of a file. If the file contents change, the control will restore the file back to its preferred content.



45. Enter type notes.txt.



46. Enter Get-FileHash ./notes.txt -Algorithm SHA256 | Select-Object -ExpandProperty Hash | Set-Content ./hash.txt.



47. Enter type hash.txt. (This command displays the contents of the hash.txt file, which is the hash calculated from the notes.txt file.) Enter echo blah >> notes.txt. (This command injects new content into notes.txt, which changes the file. Enter type notes.txt. (we should see different contents of the notes.txt file.) Enter if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -eq (Get-Content ./hash.txt)) {Write-Host "The file is correct."} else {Write-Host "The file has changed. Corrective action should be initiated."}. (This command calculates the hash of notes.txt and compares it to the

value stored in hash.txt. Since the file has changed, an error message is displayed.)

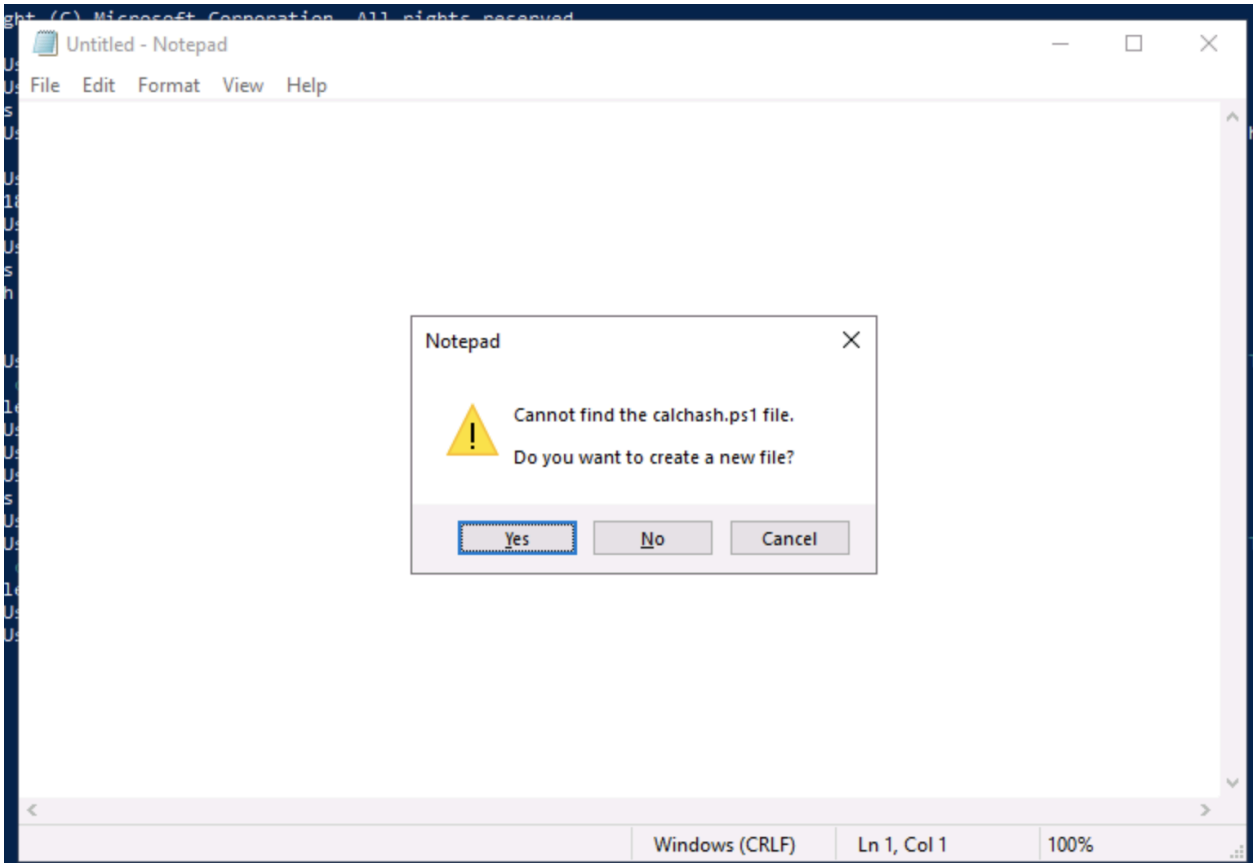
```
txt
PS C:\Users\jaime> type hash.txt
D978B81884F4998C8C00468D69196368D7A4EBE7ACB26D8FB18710363227F27D
PS C:\Users\jaime> echo blah >> notes.txt
PS C:\Users\jaime> type notes.txt
This is important
b l a h


PS C:\Users\jaime> if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -eq (Get-Content ./hash.txt)) {Write-Host "The f
ile is correct."} else {Write-Host "The file has changed. Corrective action should be initiated."}
The file has changed. Corrective action should be initiated.
PS C:\Users\jaime>
PS C:\Users\jaime>
```

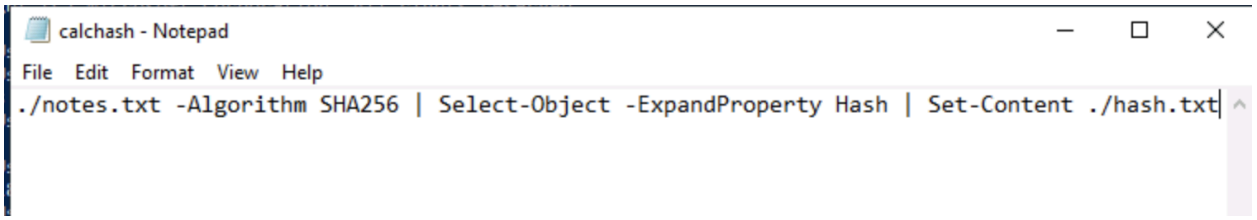
48. Enter "This is important" | Set-Content notes.txt. (This command is the corrective action to reset the contents of notes.txt back to the desired content.) Enter if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -eq (Get-Content ./hash.txt)) {Write-Host "The file is correct."} else {Write-Host "The file has changed. Corrective action should be initiated."}.(This command calculates the hash of notes.txt and compares it to the value stored in hash.txt. Since the file has been restored, a confirmation message is displayed. we have performed the corrective control manually. Now configure scripts to automate the process)

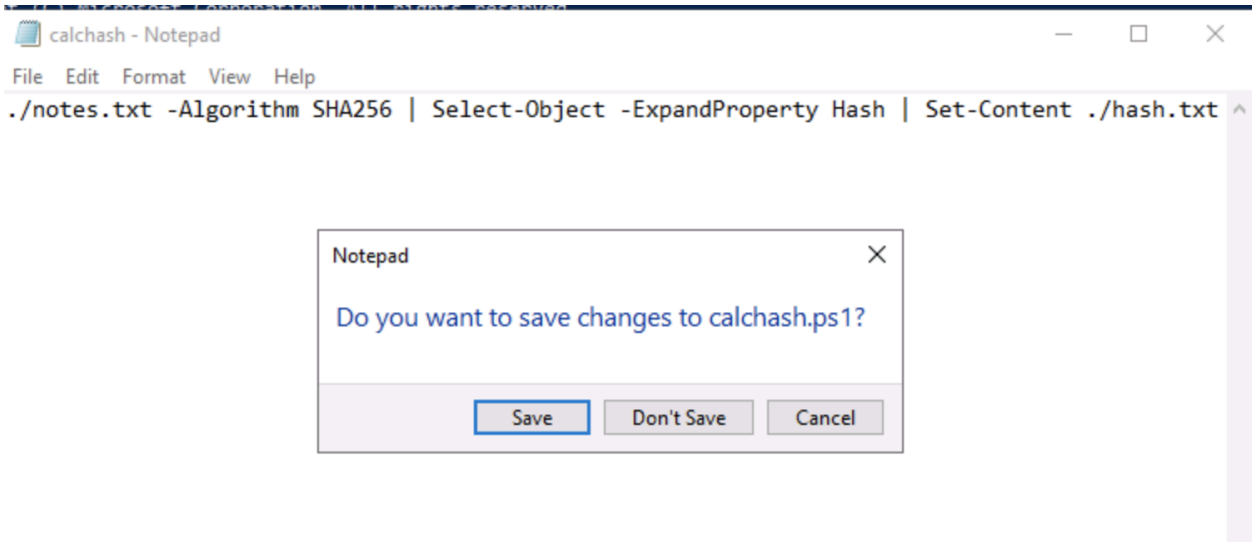
```
Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\jaime> "This is important" | Set-Content notes.txt
PS C:\Users\jaime> type notes.txt
This is important
PS C:\Users\jaime> Get-FileHash ./notes.txt -Algorithm SHA256 | Select-Object -ExpandProperty Hash | Set-Content ./hash.
txt
PS C:\Users\jaime> type hash.txt
D978B81884F4998C8C00468D69196368D7A4EBE7ACB26D8FB18710363227F27D
PS C:\Users\jaime> echo blah >> notes.txt
PS C:\Users\jaime> type notes.txt
This is important
b l a h


PS C:\Users\jaime> if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -eq (Get-Content ./hash.txt)) {Write-Host "The f
ile is correct."} else {Write-Host "The file has changed. Corrective action should be initiated."}
The file has changed. Corrective action should be initiated.
PS C:\Users\jaime>
PS C:\Users\jaime> "This is important" | Set-Content notes.txt
PS C:\Users\jaime> type notes.txt
This is important
PS C:\Users\jaime>
PS C:\Users\jaime> if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -eq (Get-Content ./hash.txt)) {Write-Host "The f
ile is correct."} else {Write-Host "The file has changed. Corrective action should be initiated."}
The file is correct.
PS C:\Users\jaime>
```

49. Enter notepad calchash.ps1. Select **Yes** on the *Notepad* window about creating a new file.Type the following into the new document: Get-FileHash ./notes.txt -Algorithm

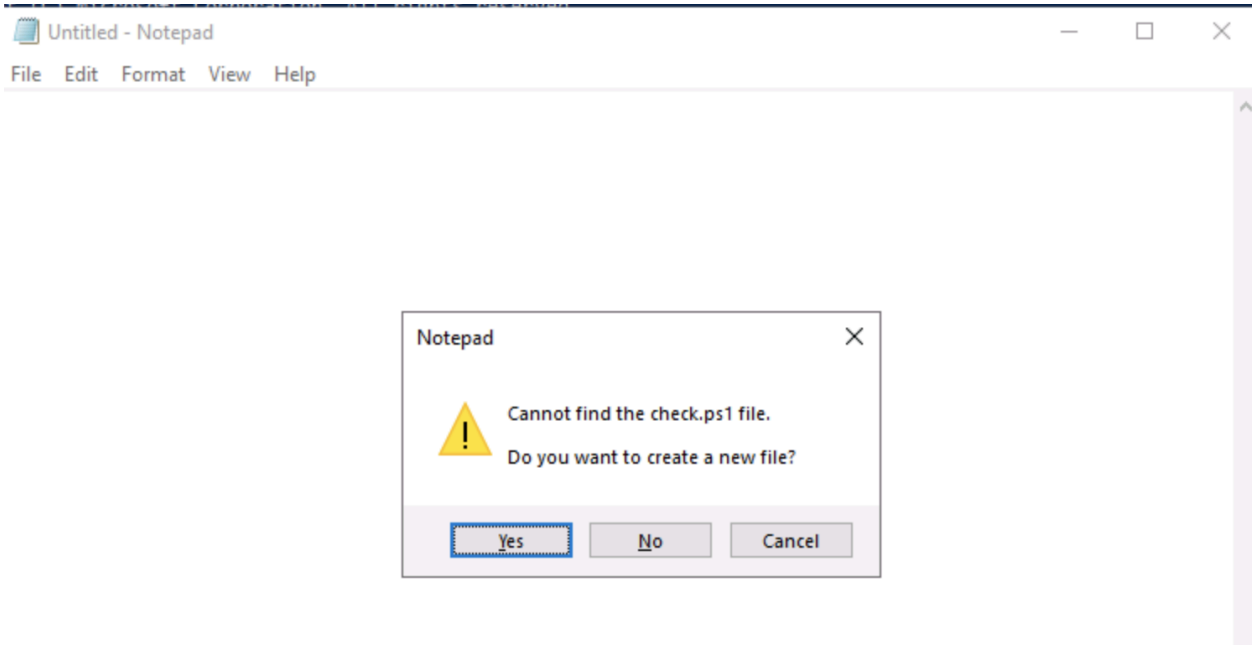
SHA256 | Select-Object -ExpandProperty Hash | Set-Content ./hash.txt. Close **Notepad**, select **Save** when prompted.







50. Enter ./calchash.ps1. (This command executes the PowerShell script of calchash.ps1, which generates a hash of the notes.txt file and saves it as hash.txt.. The "Set-Content" cmdlet performs a replacement rather than an append function when writing output into a file. The dot and slash (i.e., ./) before the script name are essential for execution. Enter type hash.txt. (This command displays the contents of hash.txt) Enter notepad check.ps1.Select **Yes** on the *Notepad* window about creating a new file.

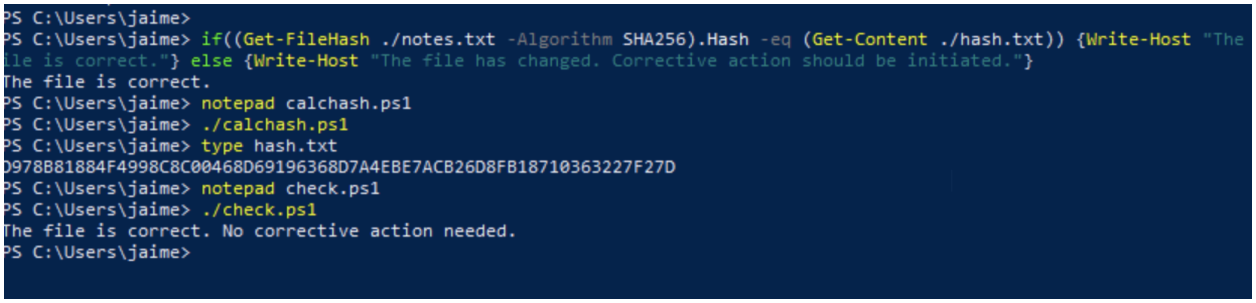


51. Select the empty area of the Notepad window, then select the below to paste the script into the VM.

```
if((Get-FileHash ./notes.txt -Algorithm SHA256).Hash -ne (Get-Content
./hash.txt))

{

  "This is important" | Set-Content ./notes.txt

  Write-Host "The file has changed. Corrective action initiated."

}

else

{

  Write-Host "The file is correct. No corrective action needed."

}
```

Close **Notepad**, select **Save** when prompted.

52. Enter ./check.ps1. (This command executes the PowerShell script of check.ps1, which calculates the hash of notes.txt and compares it to the value stored in hash.txt. If the file has not changed, a "No corrective action needed" message is displayed. If the file has changed, an "Corrective action initiated" message is displayed. The result should display the "The file is correct. No corrective action needed." message since we previously restored the notes.txt file manually.)



53. Enter type notes.txt. we should see the correct contents of the notes.txt file. Enter echo blah >> notes.txt. This command injects new content into notes.txt, which changes the file. Enter type notes.txt. we should see the modified contents of the notes.txt file. Enter ./check.ps1.This should display the "The file has changed. Corrective action initiated." message since the notes.txt file was modified. Enter type

notes.txt. we should see the corrected contents of the notes.txt file.

```
ile is correct." } else {Write-Host "The file has changed. Corrective action
The file is correct.
PS C:\Users\jaime> notepad calchash.ps1
PS C:\Users\jaime> ./calchash.ps1
PS C:\Users\jaime> type hash.txt
D978B81884F4998C8C00468D69196368D7A4EBE7ACB26D8FB18710363227F27D
PS C:\Users\jaime> notepad check.ps1
PS C:\Users\jaime> ./check.ps1
The file is correct. No corrective action needed.
PS C:\Users\jaime> type notes.txt
This is important
PS C:\Users\jaime> echo blah >> notes.txt
PS C:\Users\jaime> type notes.txt
This is important
b l a h


PS C:\Users\jaime> ./check.ps1
The file has changed. Corrective action initiated.
PS C:\Users\jaime> type notes.txt
This is important
PS C:\Users\jaime>
```

we have successfully implemented a simulation of a corrective control to repair the contents of a file should that file be modified.

This corrective action is similar to that performed by the Signature Verification (SigVerif) tool of Windows. SigVerif executes before each booting of Windows to ensure that the necessary files for a secure booting operation are present and meet a specific hash value. If any of those files are corrupted, they are removed and replaced with a valid file. The corrective actions we took manually can be automated to perform similarly. For example, we could schedule a boot task to run the check.ps1 script each time the system reboots. Also, we should run the calchash.ps1 script every time a valid change to notes.txt is performed. However, if we elect to change the contents of notes.txt, the correction action would need to be updated accordingly.

1. What is the primary purpose of preventive controls? Stop unwanted activity from succeeding
2. What is the primary purpose of detective controls? Record information about activities
3. What is the primary purpose of directive controls? Give instructions
4. What is the primary purpose of corrective controls? Restore a system back to preferred condition
5. What is the purpose of the dot and slash in front of the filenames in the PowerShell scripts and when executing PowerShell scripts? Reference the current working directory