NerdioCon
2025
PALM SPRINGS

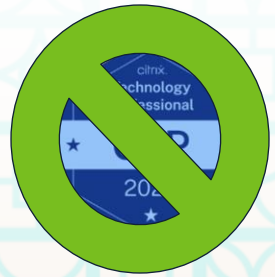
An oldie but goodie

The VDI lockdown guide:

Security truths your users don't want you to know

Who is this dude?

- 2x father, nerd, & hacker since the late ‘80s, joined the Marines, did some tours in Iraq, and now click and draw on things in the security consulting world to try and make things better.
- Passion for EUC, computer security, scouting, and racing (NASA, SCCA, Chump).
- Founding board member of the World of EUC.
- Security Nerd at VDISEC (Focus on VDI security and privacy).
- Speaker:
    - E2EVC, DerbyCon, XenAppBlog, EUC Masters Retreat, Citrix Synergy, Citrix User Groups, BSides, CUGC XL Events, VMUG Events, and VMWorld.
- Author-ish.



Presentation goal

- **Spoiler alert:** There is not one magical silver bullet, Achilles' heel, Infinity Gauntlet, Muramasa Blade, Adamantium, or Kryptonite that will make this problem go away. My goal is to get you to think about:
- Your VDI deployments differently.
- The data in your applications.
- How someone could take your data out or do things they shouldn’t be able to.
- One tip you can take back and apply to your deployment after testing to secure it. Don’t think you can “secure all the things' after the presentation, but you can make it more secure.

What is this VDI security you speak of?

VDI security self-assessment phase 1

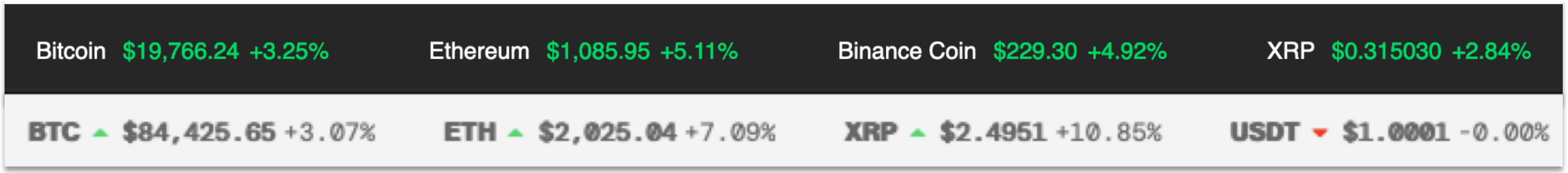
- What do you host in your deployment?
- Is it business critical?
- Is its availability revenue impacting? (back to business critical)
- What kind of data is in it? customer/client, PHI, patents, PI, PCI, banking? Who would want it?
- What can your users do in that session? What can they execute? What do they have access to?
- File shares? Are you sure they are all SMB3 and have secure permissions?

Knocking on the VDI door

- Every deployment is always under attack, all day every day. (Port scans, exploits ran, phishing emails sent, and OSINT and Recon).
- If someone wants to go in, it just takes time and pressure.

VDI cyber threats

- There are lots of people who are making lots of money **by hacking each day**. It is estimated that it's an over **one trillion dollar** industry.
- A **single attacker can make thousands of dollars a day** in cryptolocker/ransomware attacks.
- **Phishing is another revenue stream** for attackers using ransomware or credential harvesting to get credentials.
- If an attacker gets into whaling, the money goes up drastically. Think about **Google and Facebook paying over 100 million dollars to bad purchase orders** (finance and CEO fraud).
- How many passwords do you **share between accounts** on the internet and work? What is different?
- What do you **think your users do** with their passwords?



Breaches and leaks

2014-2024 (just a few of the heavy hitters)

DEHASHED
14,453,524,107 COMPROMISED ASSETS

- **Bad password habits** will hurt your business eventually.
- Most people are in **at least 5-10 breaches**.

Ebay, 233 million

Kaspersky, Source Code

USPS, 800k

Sonic, 5 million

OPM + IRS + prisoners, 21 million

LinkedIn MySpace, 176 million

BlueCross BlueShield, 10 million

Experian, 15 million

Dun & Bradstreet, 33 million

SVR Tracking, .5 million

River City Media, 1.4 billion

Anthem, 80 million

Equifax, 147.9 million

JP Morgan Chase, 77 million

E-Sports Entertainment Association (ESEA), 1.5 million

ADP: 640,000 companies (millions of employees)

Over 14.4 billion records leaked

0.0 Optimize

- Less things running, less to attack. Plus, better experience for your users and better density.

- Win, win, win.

0.0 Optimize

- To stay up to date with optimizations, follow @LoginVSI and @G0_euc.
- Turning off all the services and doing all the tweaks also will secure the image, because the only good Winder service is a dead Winder service.
- Running a couple PowerShell optimization scripts can help be the first pass to securing them.

https://www.go-euc.com

0.1: Optimization

Optimization of your image can greatly improve the security of your deployment.

Citrix Optimizer

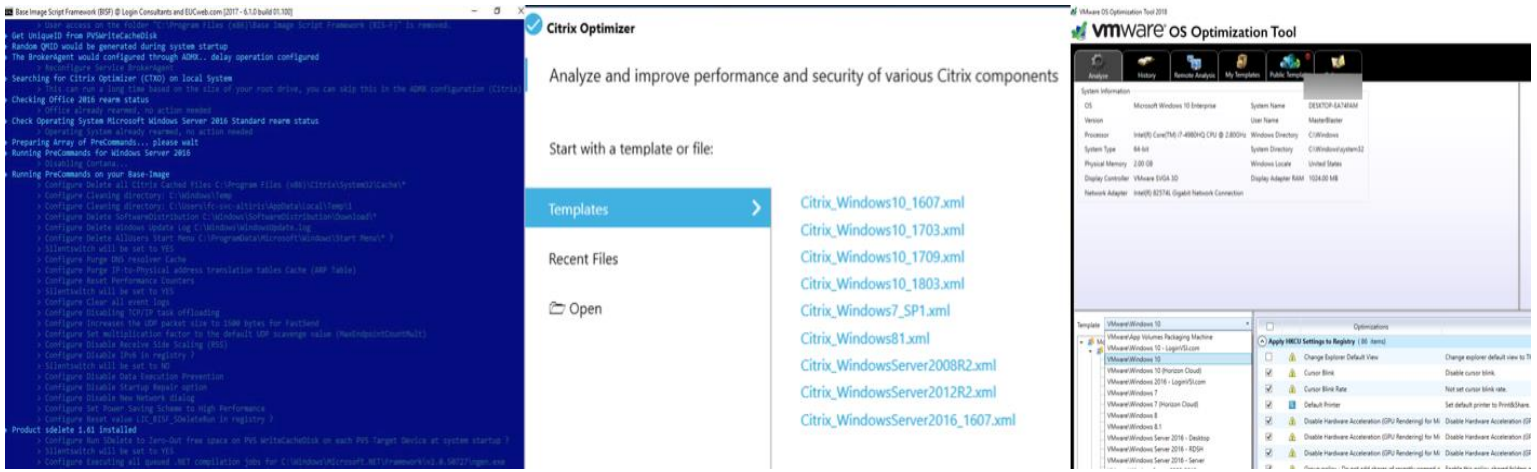
- https://support.citrix.com/article/CTX224676

BISF (Seal script too!, clean up that SCCM and AV settings. Has a GPO to run things)

- https://github.com/EUCweb/BIS-F/releases

VMware Optimizer

- https://flings.vmware.com/vmware-os-optimization-tool



1.0 Windows Policies

Secure Windows Policies are one of your best defenses from users and/or attackers from being able to do things they shouldn't.

1.0 Windows Policy Foundation: Passwords

Password policies:

- 20+ passwords remembered.
- 16+ characters (20+ for privileged) (14 recommended by CIS, Microsoft, + many others).
- Complexity turned on (if you have problems with this because of workflow, give your users a better way to log in using badges and/or biometrics).

Fine-grained password policies:

- Heard of them?

Hardening: Baselines–compliance

- Do you have the recommended settings from Microsoft?
- 311 for Windows 11
- 266 for Server 2022

Windows 11 9-19-22 Build 22621.382 - 311	
Advanced auditing	23
Computer	217
Tasks	1
Services	4
Security template	63
User	3

Server 2022 9-6-21 Build 20348.169 - 266	
User	1
Security template	62
Computer	180
Advanced auditing	23

1.1: The basics–logs

- If something is happening and you don’t know it, how will you fix it?
- Failure to configure your logs correctly can lead to a critical oversight. When it's time to apply policies, you might miss crucial errors or successes related to the changes.
- The changes within the baselines are a big deal, especially related to authentication and signing. Without the logs, you will just be enabling a policy and praying it won’t cause issues.

1.2 Recommended logs

Microsoft security baselines

1. Domain controllers
2. Servers (File, DB, App + Auth\Access Related)
3. Remaining servers
4. IT desktops
5. HR desktops
6. Finance desktops
7. Leadership desktops
8. Remaining desktops

Policy Setting Name	Member Server 2022	Domain Controller	Windows 11 22H2
Audit Account Lockout	Failure	Failure	Failure
Audit Audit Policy Change	Success	Success	Success
Audit Authentication Policy Change	Success	Success	Success
Audit Computer Account Management		Success	
Audit Credential Validation	Success and Failure	Failure	Success and Failure
Audit Detailed File Share	Failure	Failure	Failure
Audit Directory Service Access		Failure	
Audit Directory Service Changes		Success	
Audit File Share	Success and Failure	Success and Failure	Success and Failure
Audit Group Membership	Success	Success	Success
Audit Kerberos Authentication Service		Success and Failure	
Audit Kerberos Service Ticket Operations		Failure	
Audit Logon	Success and Failure	Success and Failure	Success and Failure
Audit MPSSVC Rule-Level Policy Change	Success and Failure	Success and Failure	Success and Failure
Audit Other Account Management Events		Success	
Audit Other Logon/Logoff Events	Success and Failure	Success and Failure	Failure
Audit Other Object Access Events	Success and Failure	Success and Failure	Success and Failure
Audit Other Policy Change Events	Failure	Failure	Failure
Audit Other System Events	Success and Failure	Success and Failure	Success and Failure
Audit PNP Activity	Success	Success	Success
Audit Process Creation	Success	Success	Success
Audit Removable Storage	Success and Failure	Success and Failure	Success and Failure
Audit Security Group Management	Success	Success	Success
Audit Security State Change	Success	Success	Success
Audit Security System Extension	Success	Success	Success
Audit Sensitive Privilege Use	Success and Failure	Success and Failure	Success and Failure
Audit Special Logon	Success	Success	Success
Audit System Integrity	Success and Failure	Success and Failure	Success and Failure
Audit User Account Management	Success and Failure	Success and Failure	Success and Failure

4.1: The basics–logs

1. Domain controllers
2. Servers (File, DB, App + Auth\Access Related)
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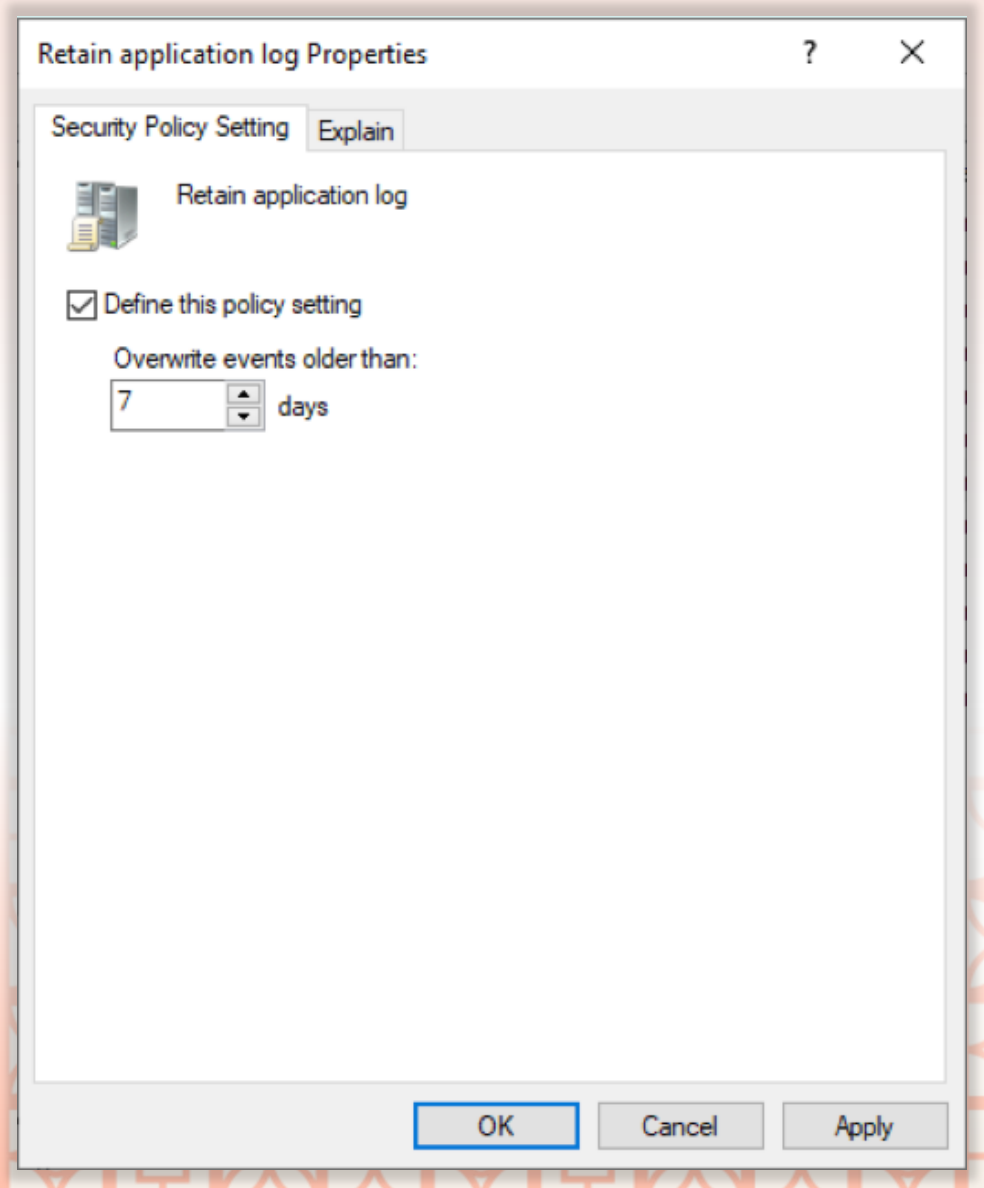
Audit Special Logon	Success	Success	Success
Audit System Integrity	Success and Failure	Success and Failure	Success and Failure
Audit User Account Management	Success and Failure	Success and Failure	Success and Failure

4.2: The basics–logs

Standards for all systems, or at least servers and desktops.
We don't have floppy drives, so crank it up.

Local event log policies matter too:

1. Prevent local guest group from accessing application log
2. Prevent local guest group from accessing security log
3. Retain application log
4. Retain security log
5. Retain system log
6. Retention method for application log
7. Retention method for security log
8. Retention method for system log

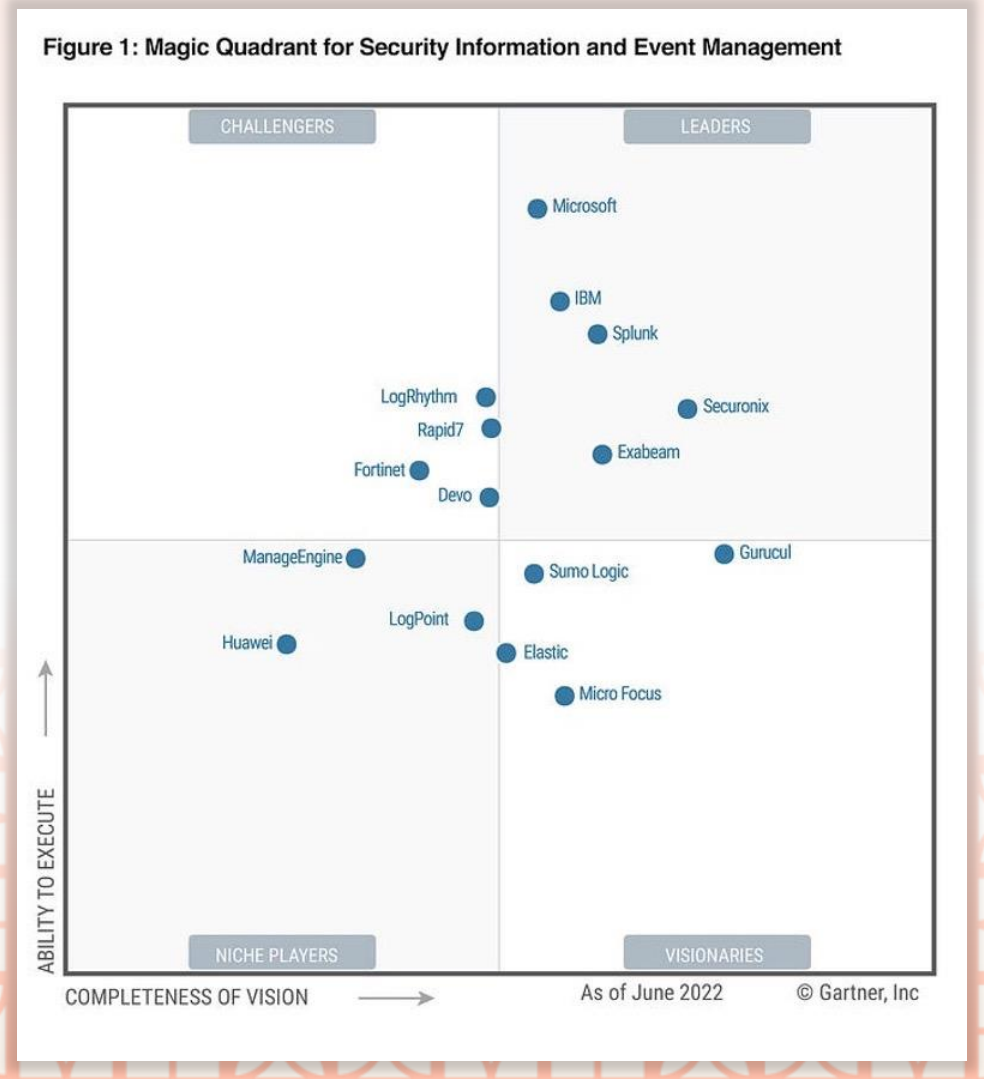


1.3: The basics–logs–what to use

1. Splunk on top of it being able to ingest almost any log known by modern nerds. It also is an SIEM for a lot of clients (security information event management). Its biggest downside is price and knowing how much you will need to do what you need to do.

2. Sentinel, LogRhythm, IBM, McAfee, ArcSight, Rapid7, Solarwinds, AlienVault, and many more.

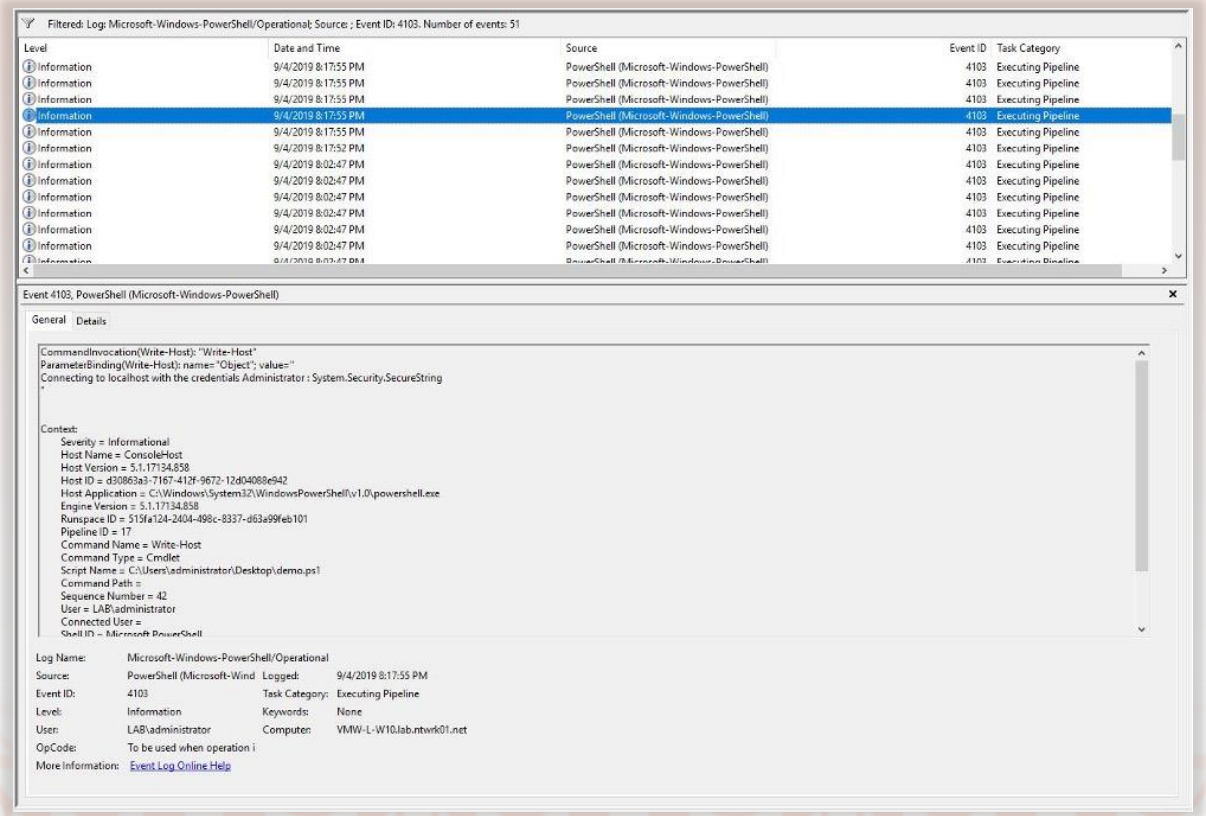
3. ELK or other variants make some servers give it lots of storage and get ready to RTFM and make all kinds of cool things.

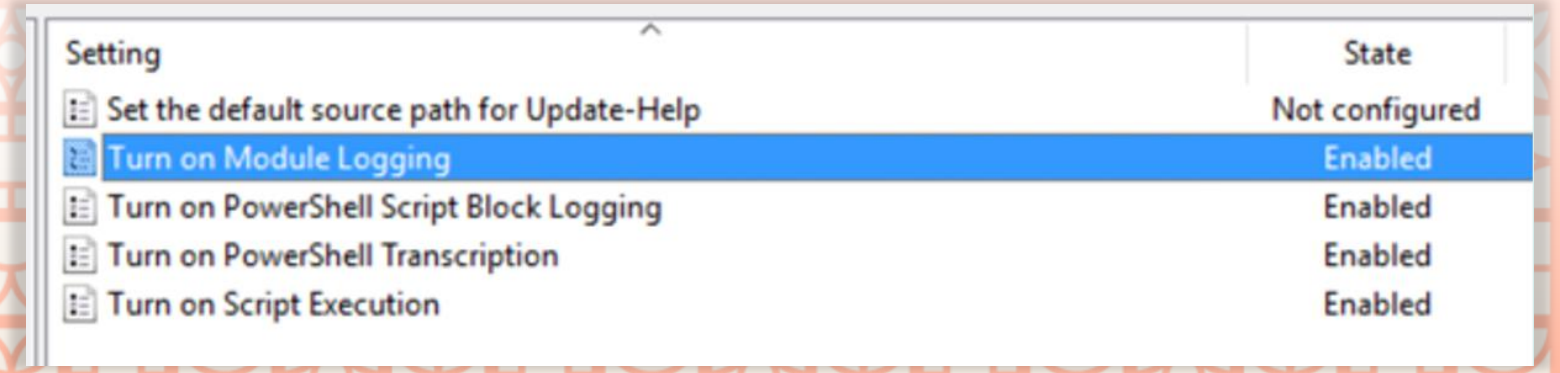


1.4: PowerShell logging

- If you allow PowerShell in your VDI deployment or just anywhere in general:
- https://www.blackhillsinfosec.com/powershell-logging-blue-team/
- https://blogs.technet.microsoft.com/ashleymcglone/2017/03/29/practical-powershell-security-enable-auditing-and-logging-with-dsc/

Event ID 4103 :)



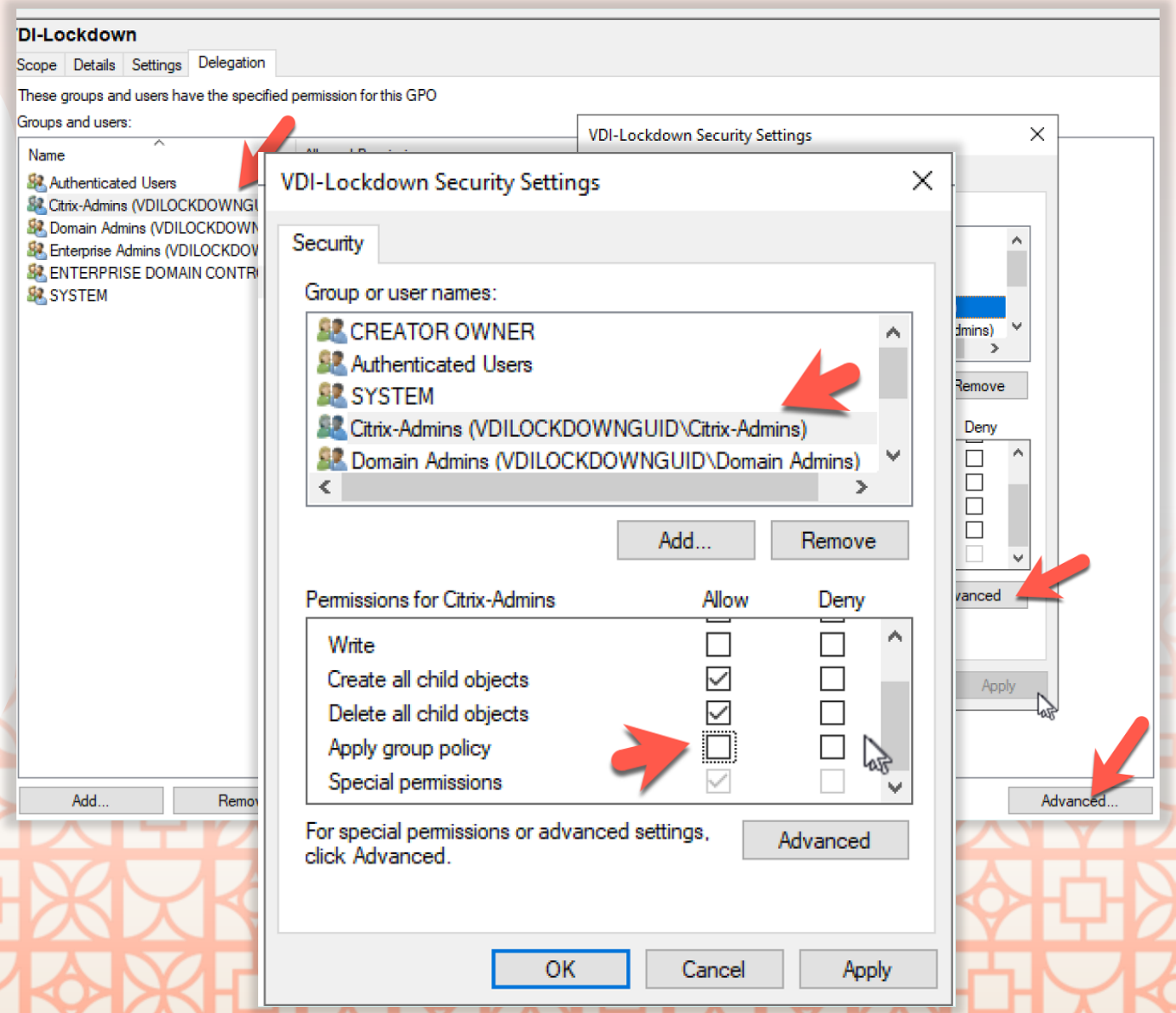


1.4: PowerShell logging

1. Remove admin application access
2. Remove common jailbreak points
3. Lock down the desktop and start menu
4. Lock down File Explorer

Windows Policy-we have to work, too

1. Make a new GPO.
2. Link it to your Test OU.
3. Change the security of the policy to “Deny” for your admin groups. You may need to apply this to your VDI admin groups and others to make sure the server can still be worked on when something isn’t functioning and to perform routine maintenance.



Windows Policy: 1. Admin applications–part 1

- Disable Run (This is the Windows noisy cricket)
  GPO: User Configuration \ Policies \ Administrative Templates \ Start Menu and Taskbar \ Remove Run

- Disable CMD
  GPO:User Configuration/Administrative Templates/System/Prevent access to the command prompt

- Disable PowerShell
  AppLocker - Powershell.exe and Powershell_ise.exe

Windows Policy: 1. Admin applications–part 1

- **Control Panel**
- GPO: User Configuration/Administrative Templates/Control Panel/Prohibit access to the Control Panel

- **System**
- GPO: User Configuration/Policies/Administrative Templates/System/Enable–Prevent access to registry editing tools

- **Restrict Admin Apps**
- Computer Configuration/Policies/Windows Settings/Security Settings/File System
    - *%AllUsersProfile%\Microsoft\Windows\Start Menu\Programs\Administrative Tools*
    - *%AllUsersProfile%\Microsoft\Windows\Start Menu\Programs\System Tools\Windows PowerShell.lnk*
    - *%AllUsersProfile%\Microsoft\Windows\Start Menu\Programs\Administrative Tools\Server Manager.lnk*
    - *And much More!*

Windows Policy: 1. Admin applications–part 2

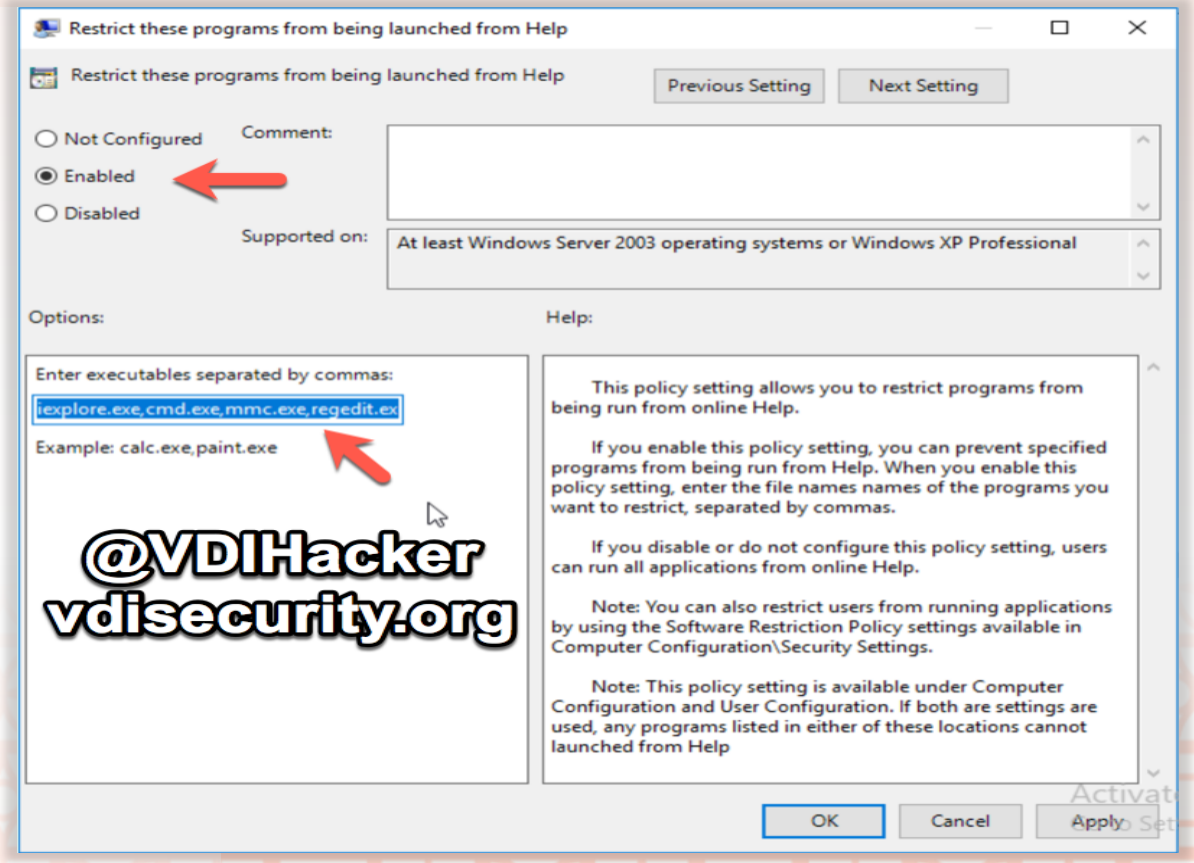
- **Windows Update**
- Computer Configuration/Policies/Administrative Templates/Windows Components/Windows Installer/
- Enable: Remove access to use all Windows Update features
- Enable: Prevent users from using Windows Installer to install updates and upgrades
- Enable always: Turn off Windows Installer
- Enable: Do not display ‘Install Updates and Shut Down' option
- Disable: Allow non-administrators to receive update notifications

- **Credentials**
- GPO: User Configuration/Policies/Administrative Templates/Windows Components/Credentials User Interface/do not display the password reveal button: Enable

Windows Policy: 2. Common jailbreaks–part 1

- GPO: User Configuration\Policies\Administrative Templates\System\Restrict these applications from being launch from Help

- cmd.exe,powershell.exe,powershell_ise.exe,notepad.exe,iexplore.exe,wordpad.exe,regedit.exe,chrome.exe



Windows Policy: 2. Common jailbreaks–part 2

Does your application use the file menu or something else?

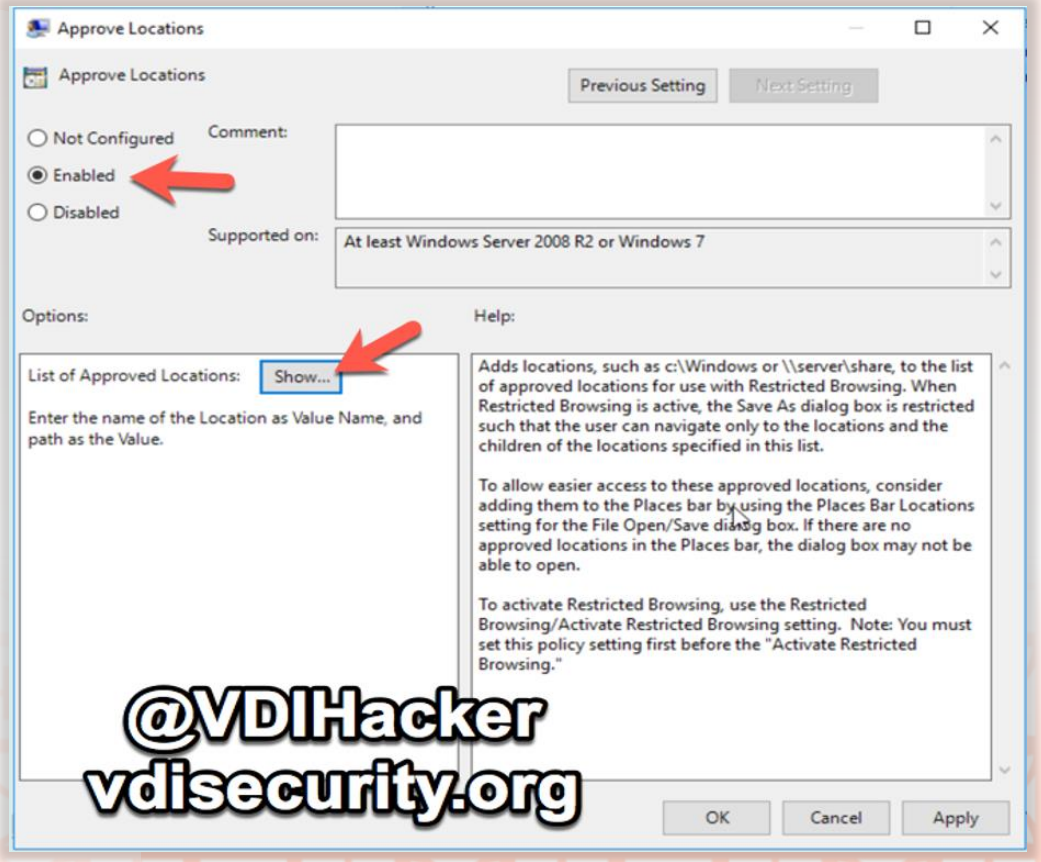
- File Open can be your enemy also, and your mitigation mileage may vary depending on the application.
- GPO: User Configuration/Administrative Templates/File Explorer/
  - Remove File Menu from File Explorer

- You may have to use other solutions to remove menus and locations from your application that are not controllable by policy. Avetco, Ivanti (Application Manager) & PolicyPak

- So many applications will have a default location inside a file directory that users have access to even with Restrict drives. Don’t send everyone to the same path, park it in the profile.

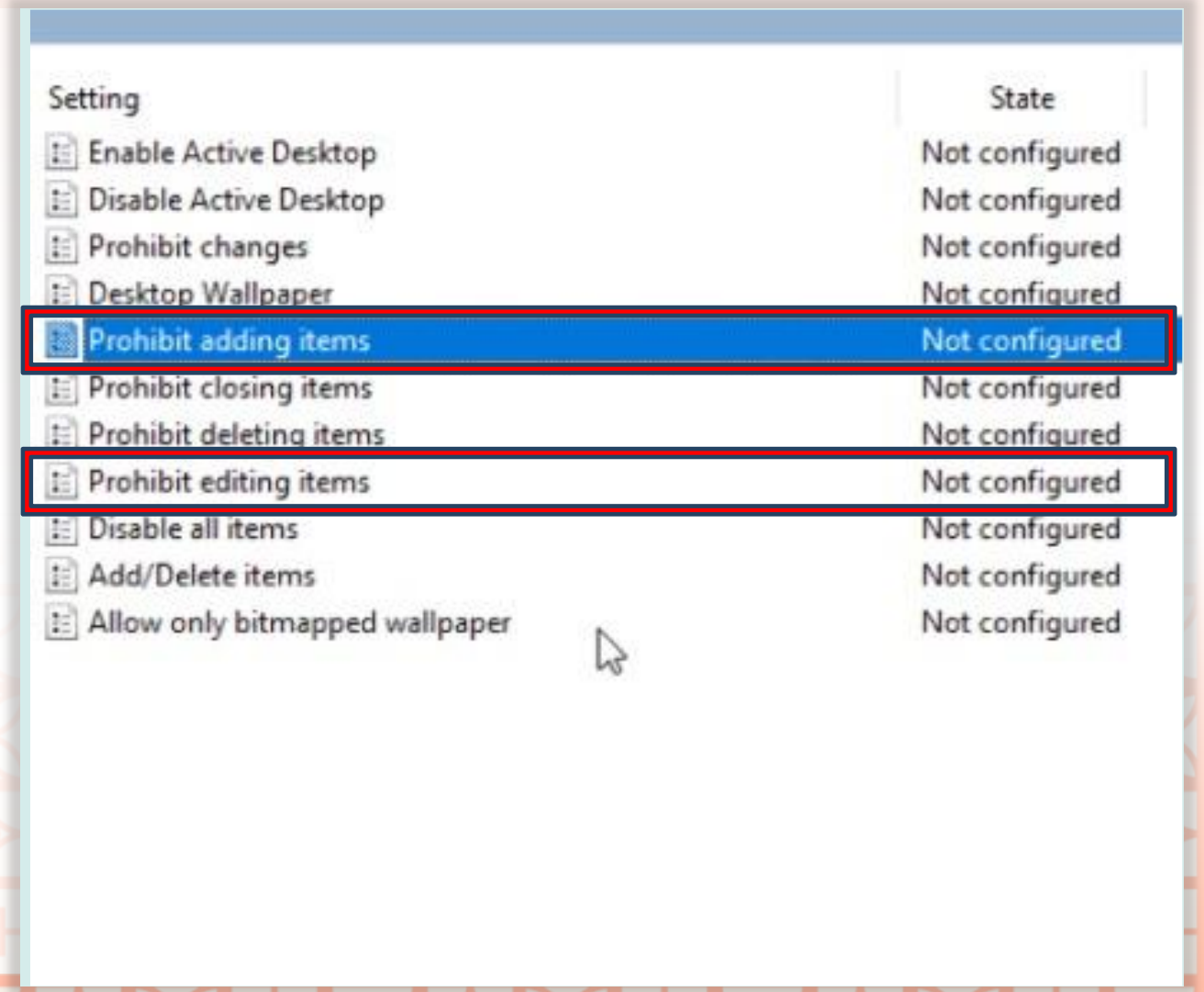
Windows Policy: 2. Common jailbreaks–part 2

- Office Products (control where they open default documents)
- Restricted browsing settings
- Default open locations per product



Windows policy: 3.1 Desktop lockdown–part 1

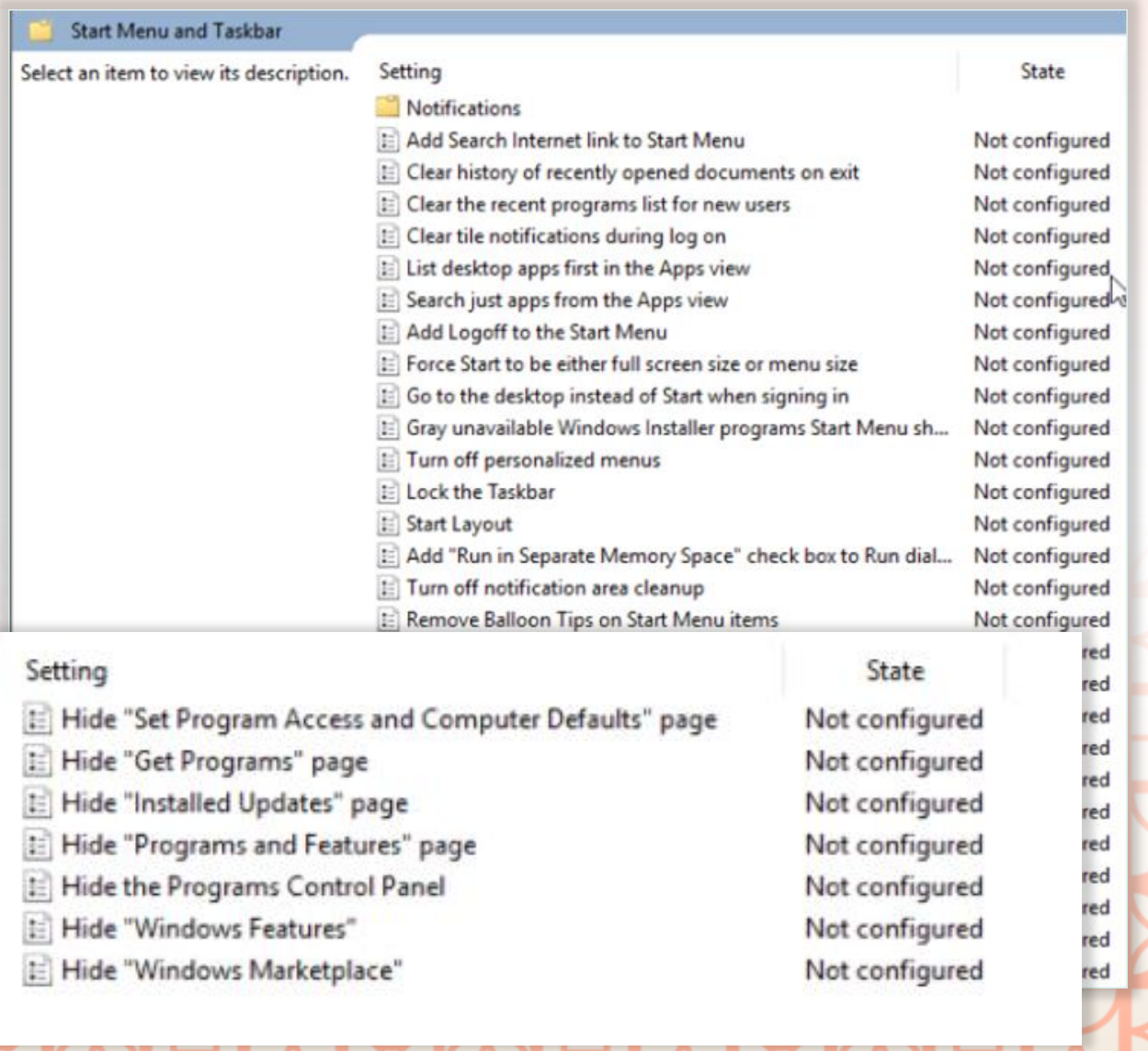
- GPO: User Configuration/Administrative Templates/Desktop/Hide network locations icon on desktop



Windows Policy: 3.2 Start Menu Lockdown–part 1

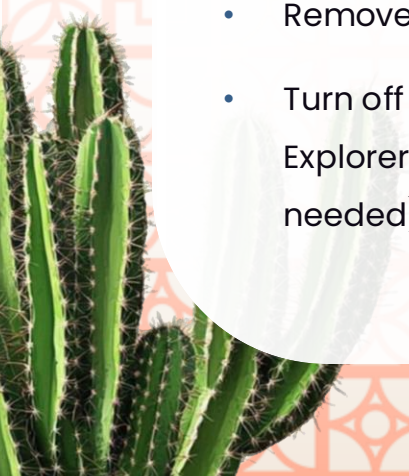
Start Menu

- GPO: User Configuration/Administrative Templates/Start menu and taskbar/Remove Network connections from Start Menu



Windows Policy: 4. Windows Explorer lockdown–part 1

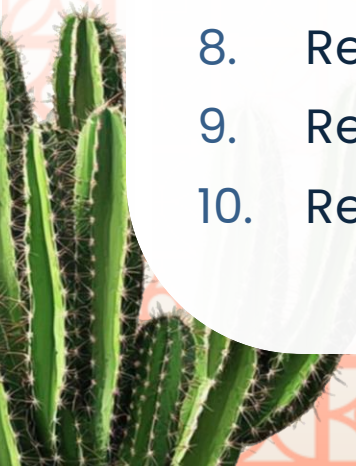
- GPO: User Configuration/Administrative Templates/File Explorer/
- **Hide these specified drives in My Computer**
- **Remove "Map Network Drive" and "Disconnect Network Drive"**
- **No Computers Near Me in Network Locations**
- **No Entire Network in Network Locations**
- Remove search button
- Turn off display of recent search entries in the File Explorer Search Box (if search disabled, not needed)



- Allow only per user or approved shell extensions
- Remove File Menu from File Explorer
- Display the Menu bar in File Explorer
- Hides the Manage Item on the File Explorer context Menu
- Remove Share Documents from My Computer
- Turn off Windows+X Hotkeys
- *Remove Security tab*
- *Remove Hardware tab*

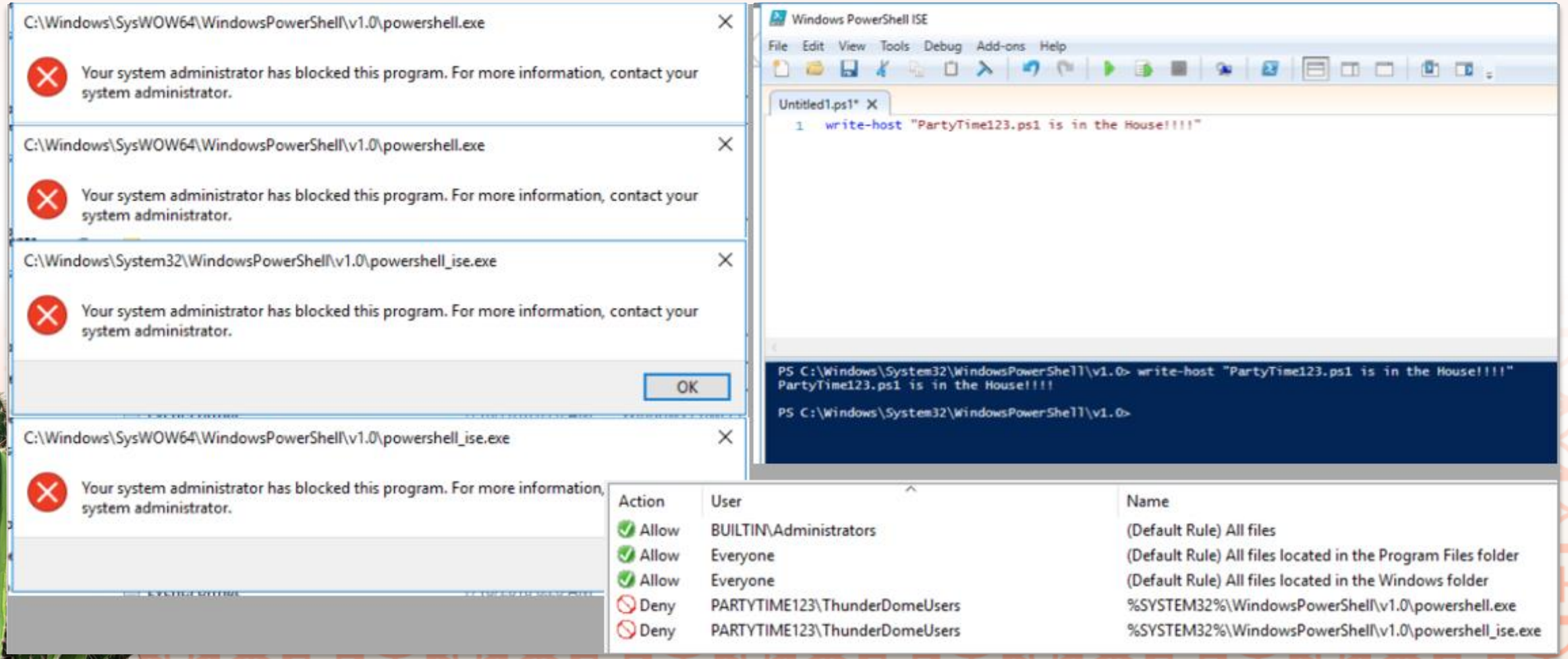
Top 10 desktop group polices for desktops and apps

1. Remove Run and CMD and PS Access
2. Restrict all drives
3. Restrict help programs
4. AppLocker all administrative applications
5. If the “Internets” isn’t needed, then block traffic with proxy or blackhole proxy
6. **Remove all unnecessary items in the Start Menu and desktop**
7. Lock down File Explorer (menu bar, file menu, network locations)
8. Remove Mapped Network Drives (Only Map drives if you have to)
9. Remove Control Panel, Remove Windows Installer Rights
10. Restrict Application Execution to only the known goods (long haul)



Don’t forget PowerShell (both flavors) and ISE (both flavors)

x86 and x64

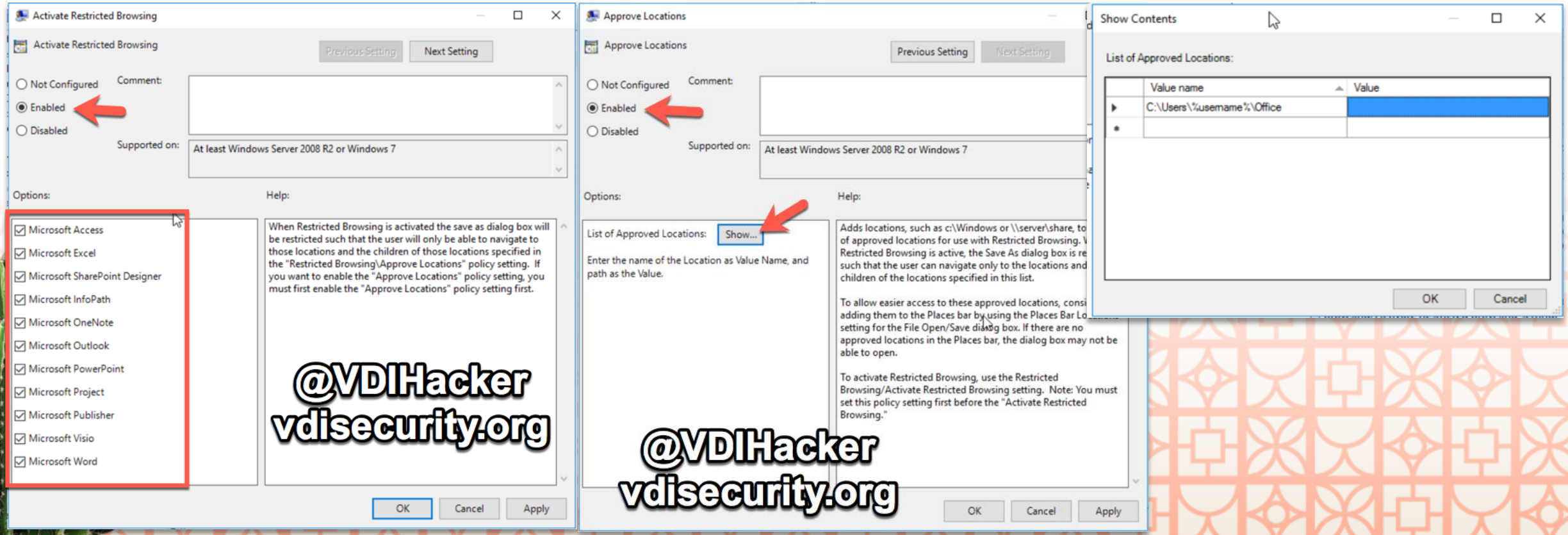


Office Products: Tons of other settings

Default open and save locations

So many applications will have a default location inside a file directory that users have access to even with Restrict drives. Don't send everyone to the same path—park it in the profile.

Restrict paths for open and saving (test, test, and test)



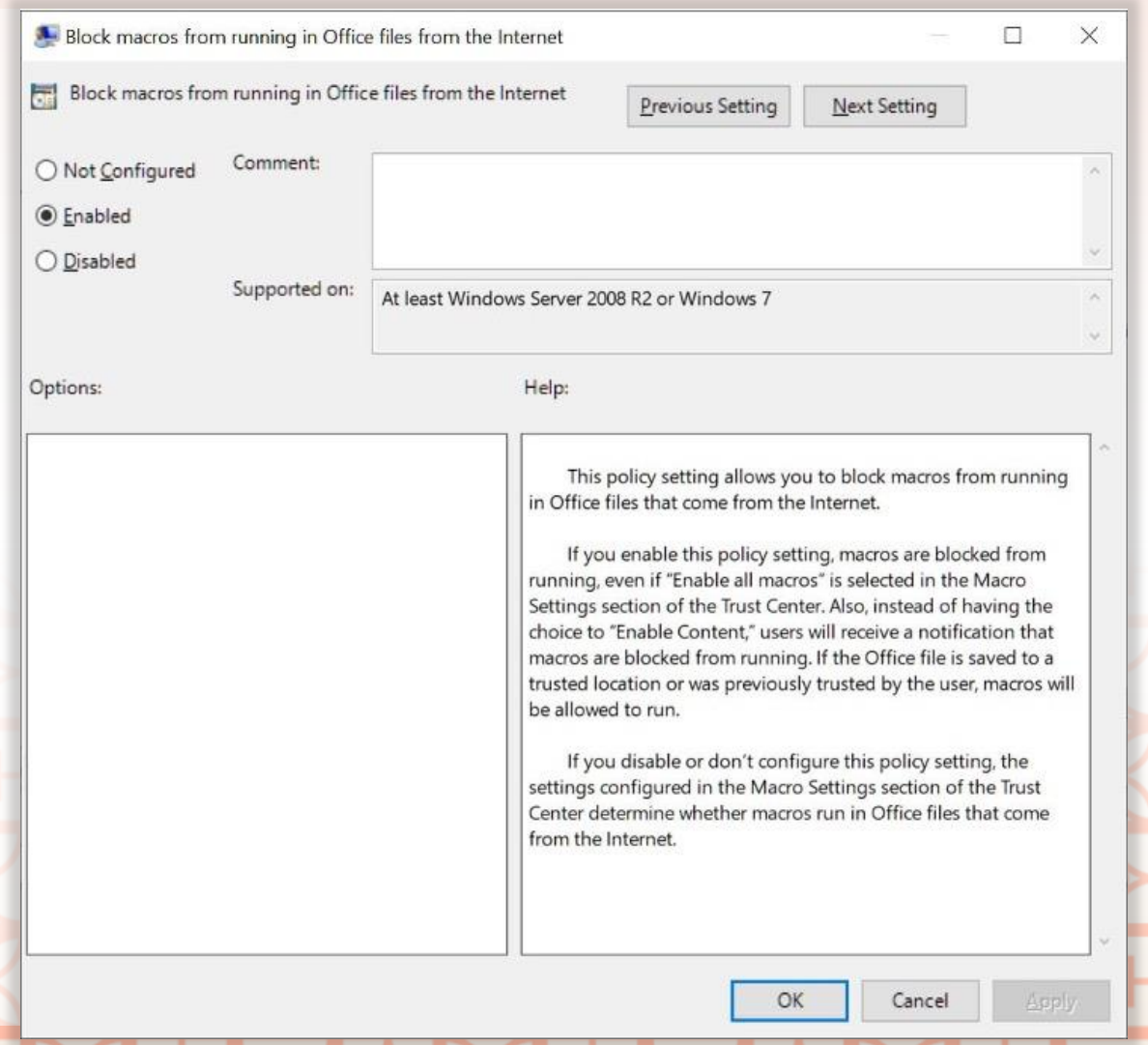
MACROS: Level 1

- Are MACROs needed in Office 2019?

  No, they are only required for about 1% of use cases. For the other 99%, we should disable them to avoid unnecessary risks.

Load the Office 2016 GPO Pack

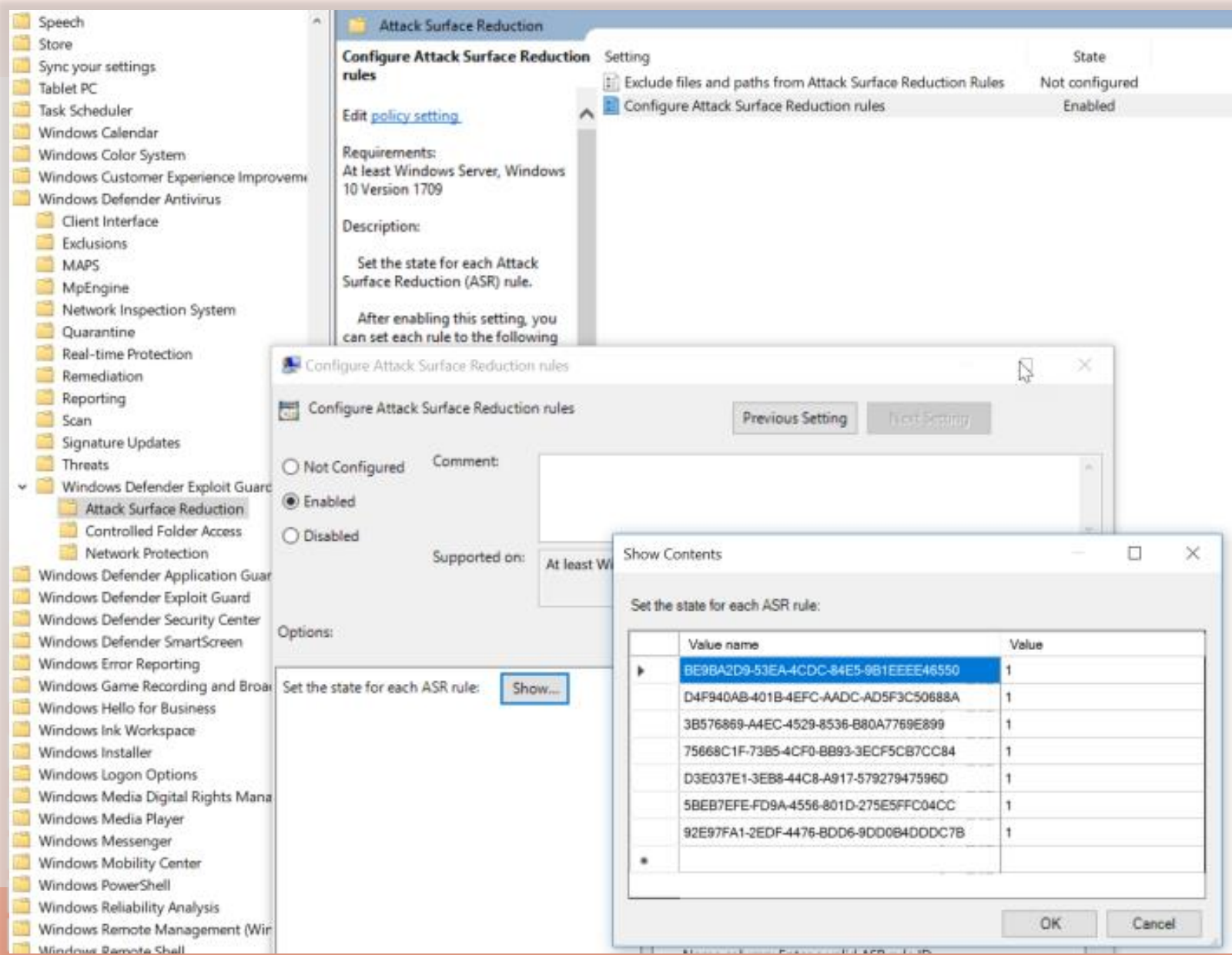
- User configuration > Administrative templates > Microsoft Word 2016 > Word options > Security > Trust Center–"Block macros from running in Office from the internet".



MACROS: Level 2

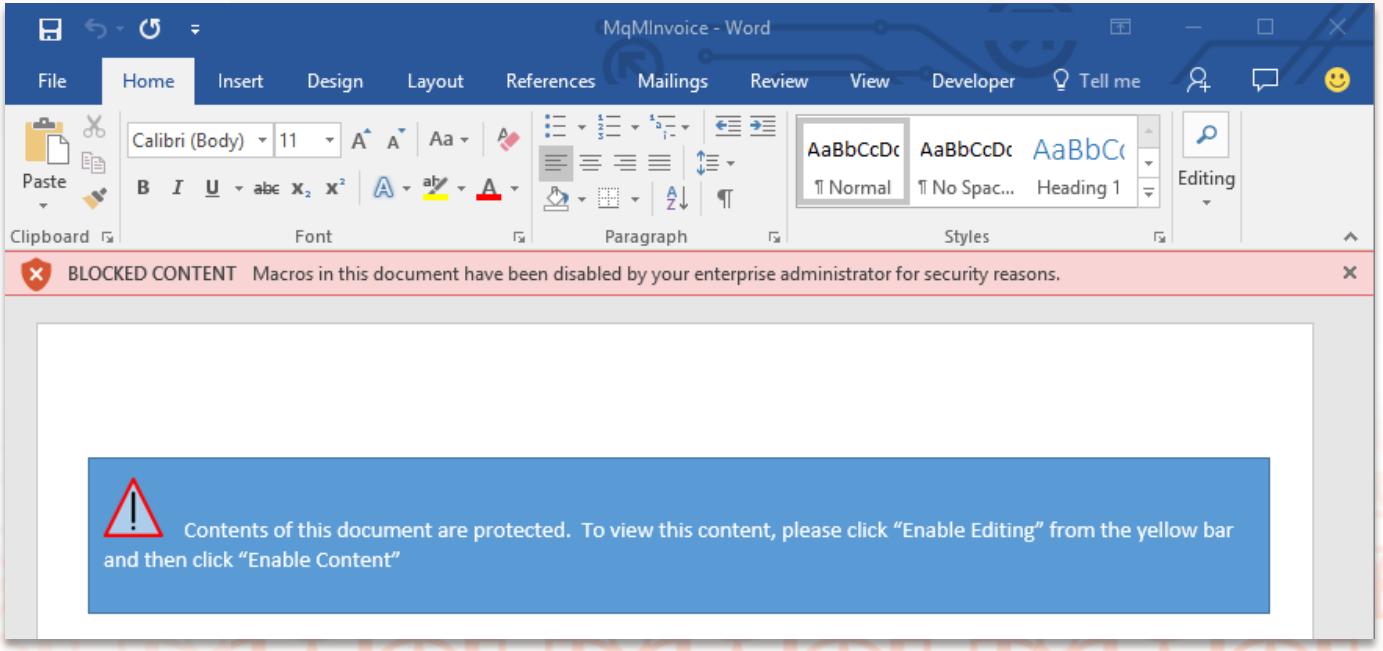
- Windows components > Windows Defender Antivirus > Windows Defender Exploit Guard >

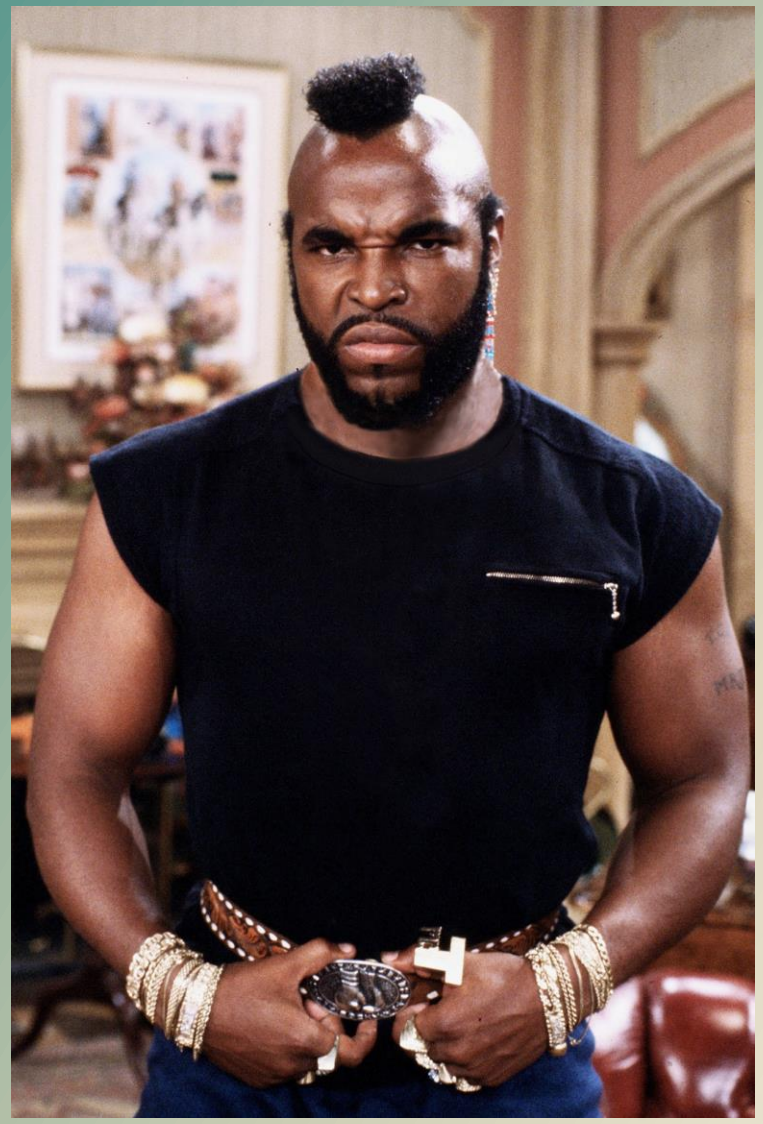
- Attack surface reduction: “Configure attack surface reduction rules”



MACROS: Level 3

1. Training, training, and training
2. Don’t click on all the things
3. There are no take backs on clicking things
4. Check the emails
5. Check twice and click once





Unpatched systems are how almost all vulnerabilities work.

2.0 Patches

2.0 Patches

In almost every scan I do, there are unpatched systems.
Number one problems in applying patches:

- No one tests the applications.
- We don’t cook it—we just serve it.
- So many admins must apply the patches and test them.
- Most of us only have the time to just smoke test, click it opens, feels right.

Got lots of apps?

Want an automated way to test them?

Rimo3

2.0 Patches

Apply all the patches?

- Sounds cool until one breaks something for thousands of users.
- So many deployments tested in prod for so many reasons.

What to do?

- Find a way to make a test deployment
- Full test deployment
- Test master image
- Test desktop pool
- Test pre-production desktop pool

2.0 Patches

Methods of mayhem

- Group Policy
- Intune
- Click Windows update
- Snapshots all day every cay

Automation is key
Keeping a schedule is a must!

Project Evergreen (Module to update common Windows apps):
https://stealthpuppy.com/evergreen/#evergreen
Automation framework (Make a golden image monthly instead of patching):
https://xenappblog.com/automation-framework-master-class/

3.0 Application control

You know what you publish, but finding out what to block can be fun.

3.0 Application control

Some apps are just bad mmkayyy

This is one of the most commonly overlooked methods to securing a VDI deployment. That is why this is before antivirus on my top 8.

VDI deployments in most cases are deployed with a known set of applications because you are publishing them. In most cases, what needs to be allowed to run is the same list of published application in the console and the add/remove programs on a known good image.

The gotchas are what do the users open after opening the application you published to them.

Major methods of doing this:

- AppLocker
- PolicyPak: Amazing other things, got Java? Least privilege manager, browser (Edge is a PDF reader?)
- UEM
- Ivanti Application Manager
- Avetco
- Most AVs can also do it, check with your vendor to find out which is better for you.

Most of these solutions will allow you to take baby steps, too.

3.1: Application control-deployment phases

Where to start?

Level 0 setup audit only default policies (Exe, installer, script, and packages)

Level 1 admin applications (PowerShell and other places)

- Make sure users are not able to launch admin tools that can cause problems.

Level 2 – LOLBins (fun times)

- Block some of the known applications and scripts that can bypass AppLocker and/or do bad things.

Level 3 – Main applications (long process)

- Step by step, we want to only allow the good and eventually get rid of the “allow any”, like a firewall, along with blocking things instead of just auditing.

LOLBins

You need application control

Oddvar Moe @api0cradle
https://lolbas-project.github.io

Good files gone wrong

LOLBins are files that are native to Windows that users will, by default, have access to and have unexpected superpowers.

- Executing code
- Passthrough of unsigned code through a signed file that is allowed
- Compiling code
- File operations
- UAC bypass
- Surveillance
- Dump process info
- Log evasion
- DLL side-loading hijacking

LOLBins

Execute

Open the target .EXE using the Program Compatibility Assistant.

```
pcalua.exe -a calc.exe
```

Usecase:Proxy execution of binary
Privileges required:User
OS:Windows vista, Windows 7, Windows 8, Windows 8.1, Windows 10
Mitre:T1218

Open the target .DLL file with the Program Compatibilty Assistant.

```
pcalua.exe -a \\server\payload.dll
```

Usecase:Proxy execution of remote dll file
Privileges required:User
OS:Windows vista, Windows 7, Windows 8, Windows 8.1, Windows 10
Mitre:T1218

Open the target .CPL file with the Program Compatibility Assistant.

```
pcalua.exe -a C:\Windows\system32\javacpl.cpl -c Java
```

Usecase:Execution of CPL files
Privileges required:User
OS:Windows vista, Windows 7, Windows 8, Windows 8.1, Windows 10
Mitre:T1218

LOLBins

Oddvar Moe @api0cradle
https://lolbas-project.github.io

AppInstaller.exe
Aspnet_Compiler.exe
At.exe
Atbroker.exe
Bash.exe
Bitsadmin.exe
CertOC.exe
CertReq.exe
Certutil.exe
Cmd.exe
Cmdkey.exe
cmdl32.exe
Cmstp.exe
ConfigSecurityPolicy.exe
Control.exe
Csc.exe
Cscript.exe
DataSvcUtil.exe
Desktopimgdownldr.exe
Dfsvc.exe
Diantz.exe
Diskshadow.exe
Dllhost.exe
Dnscmd.exe
Esentutl.exe
Eventvwr.exe
Expand.exe
Explorer.exe
Extexport.exe
Extrac32.exe
Findstr.exe
fltMC.exe
Forfiles.exe
Ftp.exe
GfxDownloadWrapper.exe
Gpscript.exe
Hh.exe
IMEWDBLD.exe
Ie4uinit.exe
Ieexec.exe
Ilasm.exe
Infdefaultinstall.exe
Installutil.exe
Jsc.exe
Makecab.exe
Mavinject.exe
Microsoft.Workflow.Compiler.exe
Mmc.exe
MpCmdRun.exe
Msbuild.exe
Msconfig.exe
Msdt.exe
Mshta.exe
Msiexec.exe
Netsh.exe
Odbcconf.exe
OfflineScannerShell.exe
OneDriveStandaloneUpdater.exe
Pcalua.exe
Pcwrun.exe
Pktmon.exe
Pnputil.exe
Presentationhost.exe
Print.exe
PrintBrm.exe
Psr.exe
Rasautou.exe
Reg.exe
Regasm.exe
Regedit.exe
Regini.exe
Register-cimprovider.exe
Regsvcs.exe
Regsvr32.exe
Replace.exe
Rpcping.exe
Rundll32.exe
Runonce.exe
Runscripthelper.exe
Sc.exe
Schtasks.exe
Scriptrunner.exe
SettingSyncHost.exe
Stordiag.exe
SyncAppvPublishingServer.exe
Ttdinject.exe
Tttracer.exe
vbc.exe

LOLBins

Oddvar Moe @api0cradle
https://lolbas-project.github.io

Verclsid.exe
Wab.exe
Wmic.exe
WorkFolders.exe
Wscript.exe
Wsreset.exe
wuauclt.exe
Xwizard.exe
Advpack.dll
Comsvcs.dll
Ieadvpack.dll
Ieaframe.dll
Mshtml.dll
Pcwutl.dll
Setupapi.dll
Shdocvw.dll
Shell32.dll
Syssetup.dll
Url.dll
Zipfldr.dll
adplus.exe
AgentExecutor.exe
Appvlp.exe
Bginfo.exe
Cdb.exe
coregen.exe
csi.exe
DefaultPack.EXE
Devtoolslauncher.exe
dnx.exe
Dotnet.exe
Dxcap.exe
Excel.exe
Fsi.exe
FsiAnyCpu.exe
Mftrace.exe
Msdeploy.exe
msxsl.exe
ntdsutil.exe
Powerpnt.exe
Procdump(64).exe
rcsi.exe
Remote.exe
Sqldumper.exe
Sqlps.exe
SQLToolsPS.exe
Squirrel.exe
te.exe
Tracker.exe
Update.exe
VSIISExeLauncher.exe
VisualUiaVerifyNative.exe
vsjitdebugger.exe
Wfc.exe
Winword.exe
Wsl.exe
CL_LoadAssembly.ps1
CL_Mutexverifiers.ps1
CL_Invocation.ps1
Manage-bde.wsf
Pubprn.vbs
Syncappvpublishingserver.vbs
UtilityFunctions.ps1
winrm.vbs
Pester.bat

AaronLocker

https://blogs.msdn.microsoft.com/aaron_margosis/tag/aaronlocker/

https://github.com/Microsoft/AaronLocker

@AaronMargosis

- Documentation is 81 pages, and it is amazing
- AaronLocker's strategy can be summed up as if a non-admin could have put a program or script onto the computer–i.e., it is in a user-writable directory–and not allow it to execute unless it has already been specifically allowed by an administrator. This will stop execution if a user is tricked into downloading malware, if an exploitable vulnerability in a program the user is running tries to put malware on the computer, or if a user intentionally tries to download and run unauthorized programs (from its documentation).

Windows Defender application control

- To get started, you need to make your golden image with all your applications installed (layering gets complicated).
- No GPO for this, image-specific (can use Intune).
- Run the discovery scripts.
- Review the findings of the applications installed and allow for all users or assign to specific users (admin applications).
- Then run the deployment scripts to only allow those applications to be ran.
- Anything the user downloads or access that isn't defined in this system will not be able to execute.
- If you install any new applications, you will need to recapture the installed applications, adjust the rules, and roll out the new one.
- https://docs.microsoft.com/en-us/windows/security/threat-protection/windows-defender-application-control/windows-defender-application-control-deployment-guide

PowerShell Copy

```
cp $MEMCMPolicy $LamnaPolicy
```

4. Give the new policy a unique ID, descriptive name, and initial version number:

PowerShell Copy

```
Set-CIPolicyIdInfo -FilePath $LamnaPolicy -PolicyName $PolicyName -ResetPolicyID
Set-CIPolicyVersion -FilePath $LamnaPolicy -Version "1.0.0.0"
```

5. Modify the copied policy to set policy rules:

PowerShell Copy

```
Set-RuleOption -FilePath $LamnaPolicy -Option 3 # Audit Mode
Set-RuleOption -FilePath $LamnaPolicy -Option 6 # Unsigned Policy
Set-RuleOption -FilePath $LamnaPolicy -Option 9 # Advanced Boot Menu
Set-RuleOption -FilePath $LamnaPolicy -Option 12 # Enforce Store Apps
Set-RuleOption -FilePath $LamnaPolicy -Option 13 # Managed Installer
Set-RuleOption -FilePath $LamnaPolicy -Option 14 # ISG
Set-RuleOption -FilePath $LamnaPolicy -Option 16 # No Reboot
Set-RuleOption -FilePath $LamnaPolicy -Option 17 # Allow Supplemental
Set-RuleOption -FilePath $LamnaPolicy -Option 19 # Dynamic Code Security
```

6. Add rules to allow windir and Program Files directories:

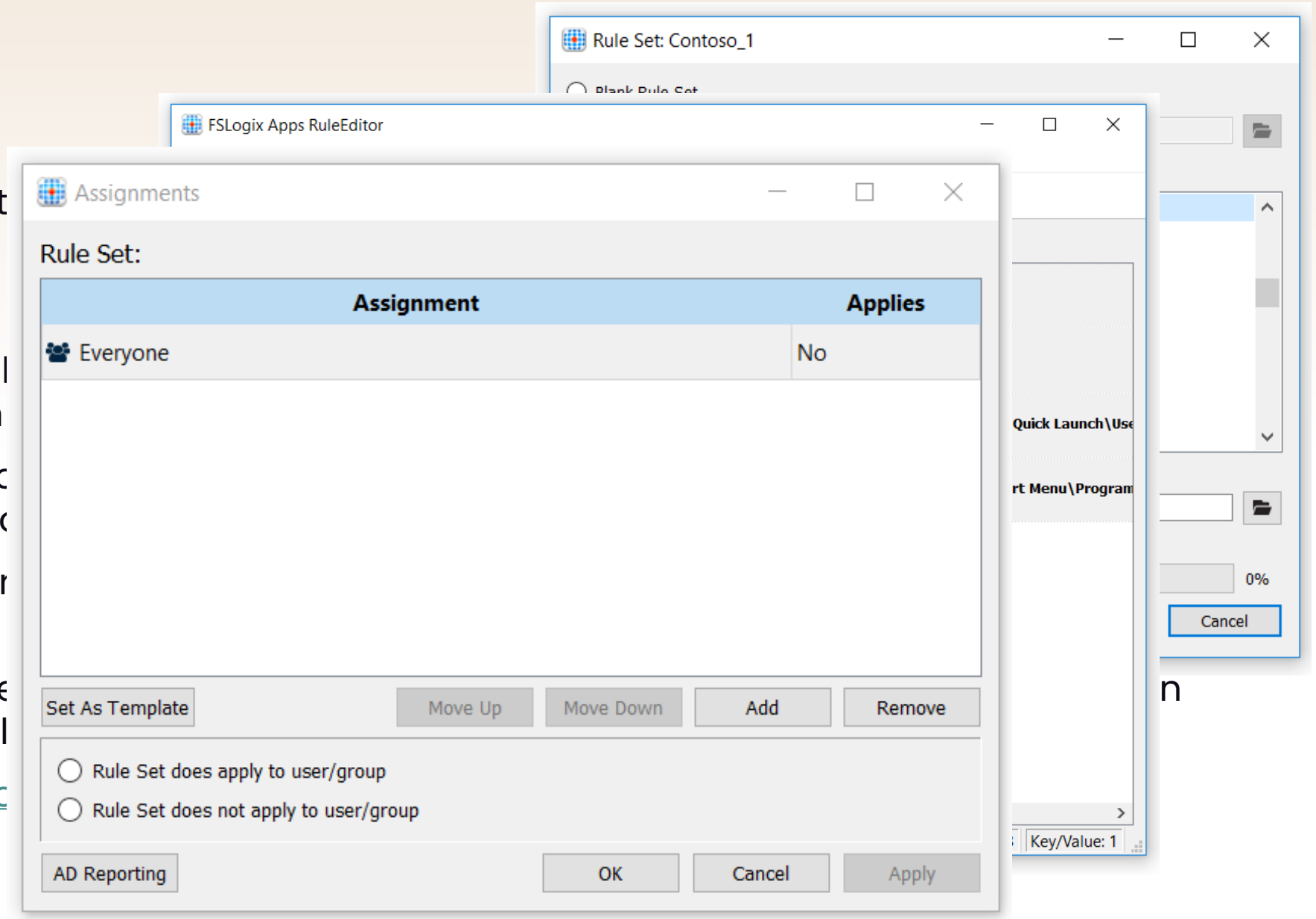
PowerShell Copy

```
$PathRules += New-CIPolicyRule -FilePathRule "%windir%\*"
$PathRules += New-CIPolicyRule -FilePathRule "%OSDrive%\Program Files\*"
```

FSLogix

Fake the funk with masking

- This is a great way to at
  an image.
- Deploy the FSLogix files
- Run the rule editor and l
  and then choose which
- This has a benefit of allo
  pools, but users based
- There are 2x files that ar
  directory, and then you
- This doesn't prevent use
  fake the funk pretty well
- https://docs.microsoft.c

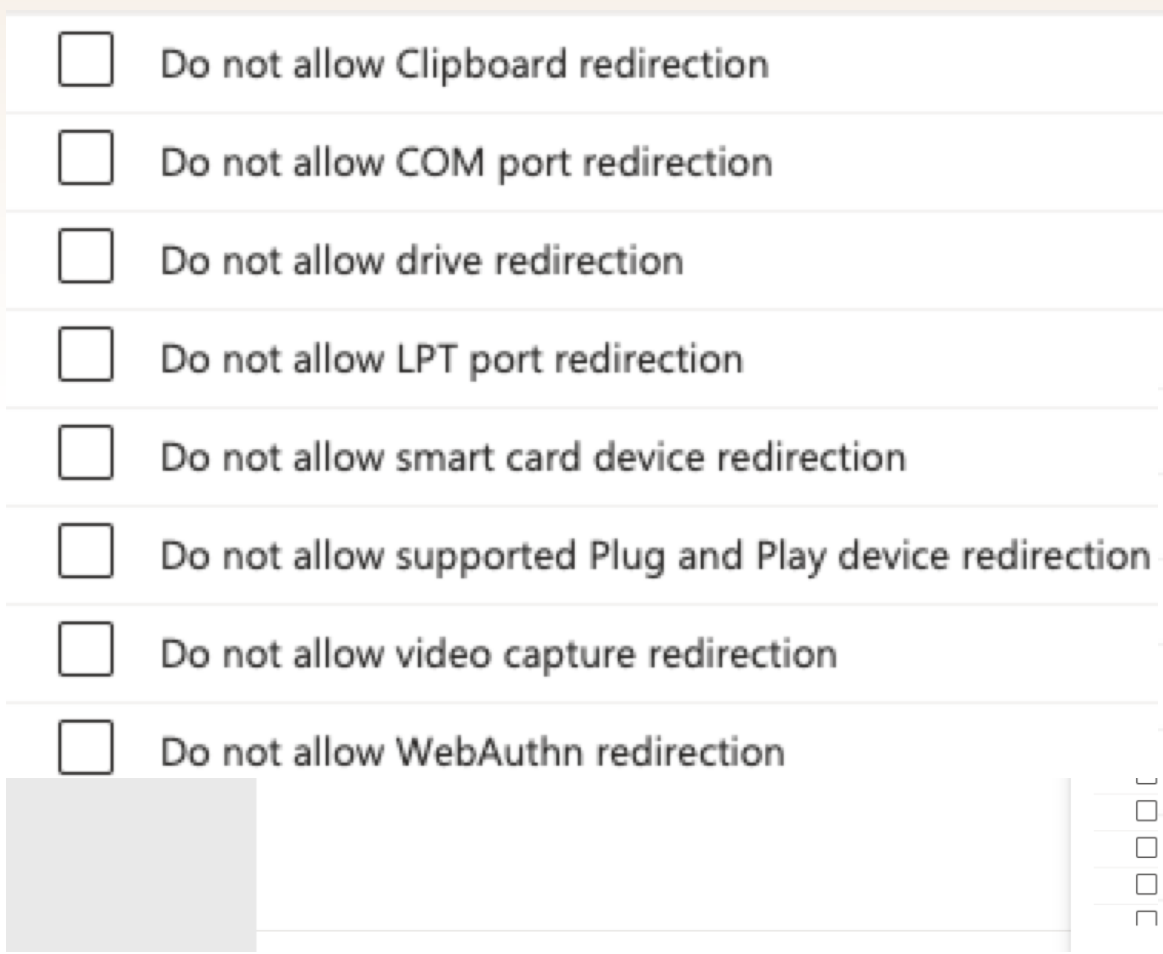


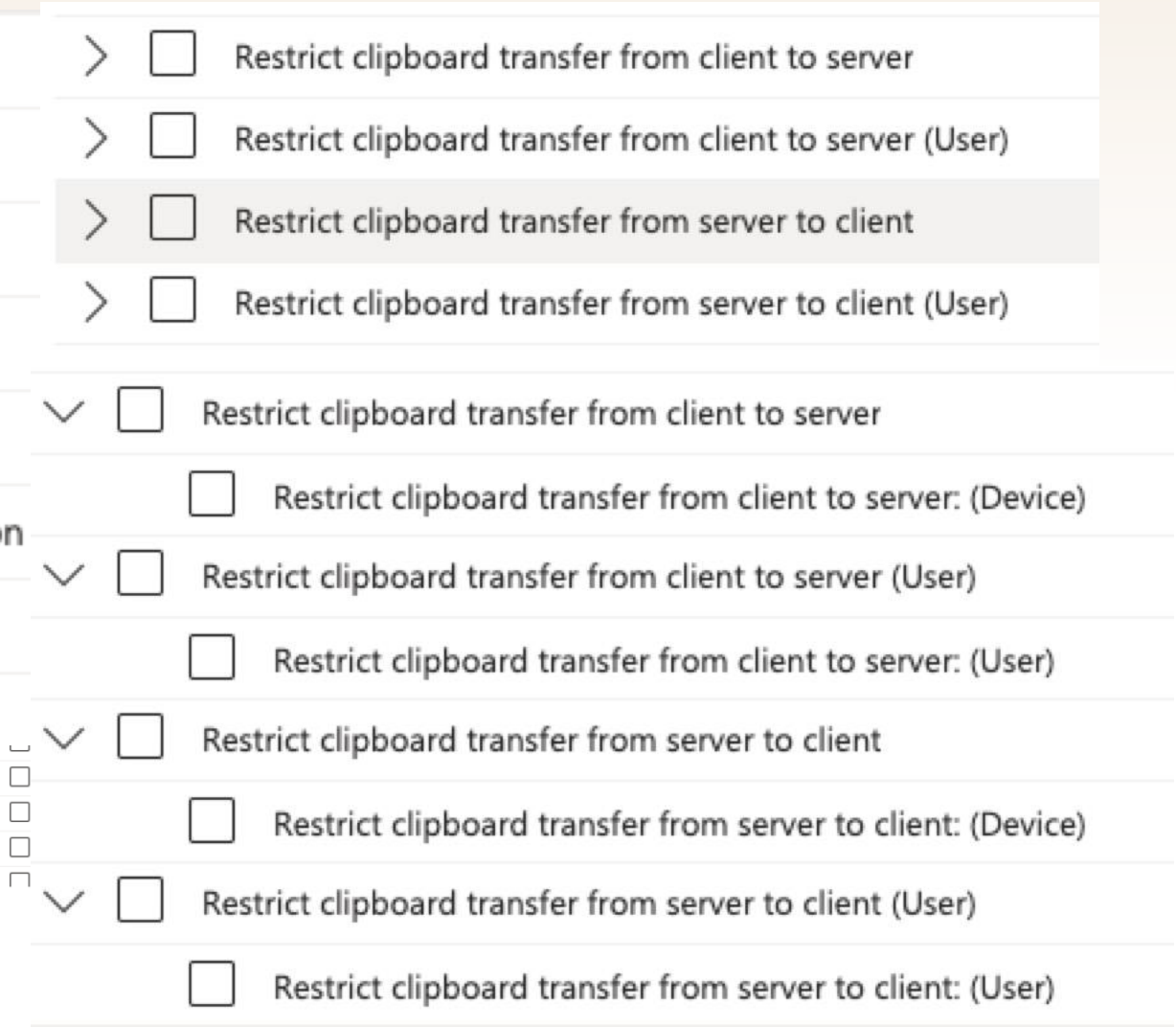
4.0 Session policies

Secure session policies are one of your best defenses from users and/or attackers being able to do things they shouldn't. Windows Policies can only go so far.

4.0 Session policies–AVD Cloud PC

Intune or GPO to the desktops

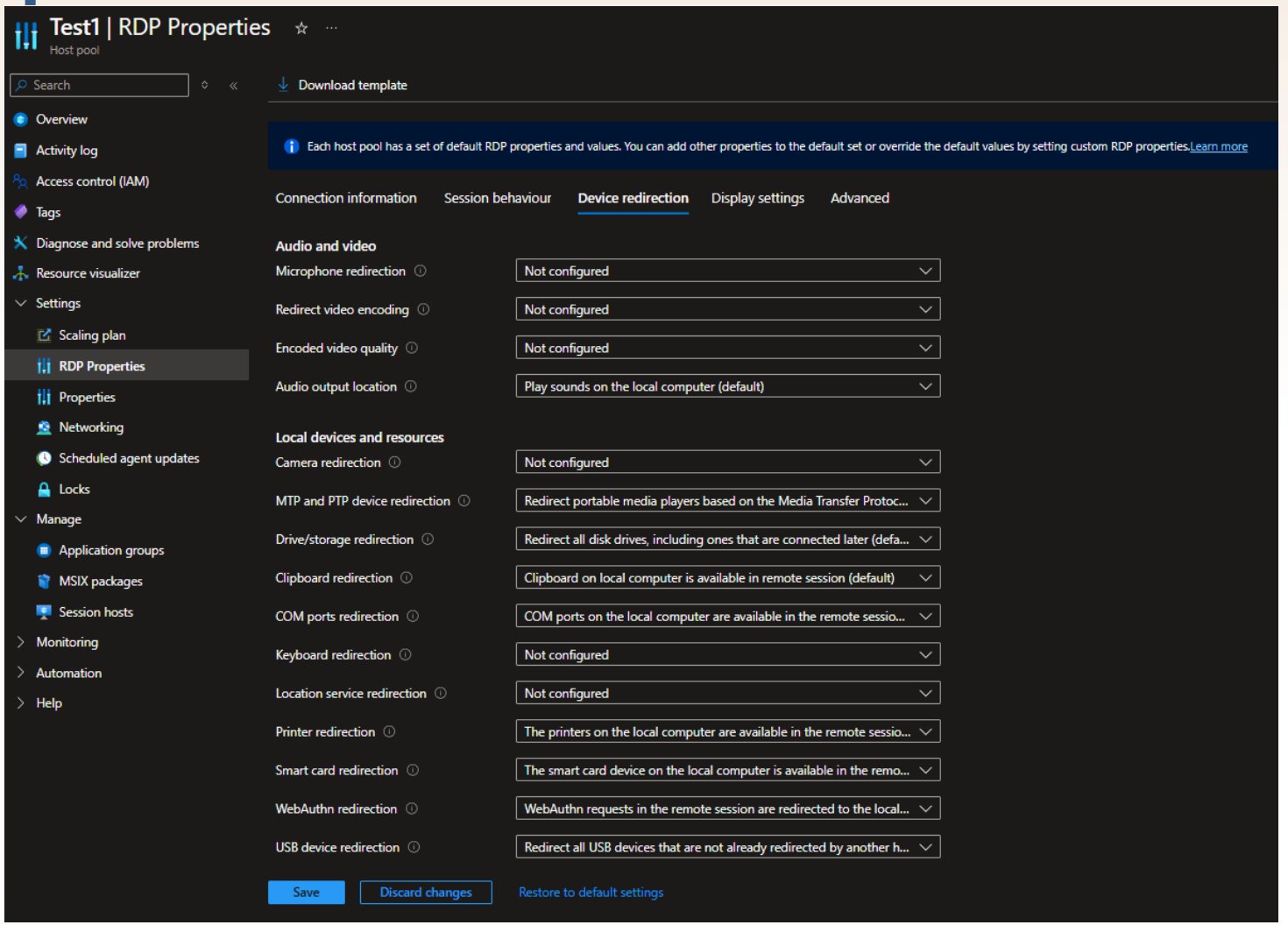




https://learn.microsoft.com/en-us/azure/virtual-desktop/clipboard-transfer-direction-data-types?tabs=intune

4.0 Session policies–AVD Cloud PC

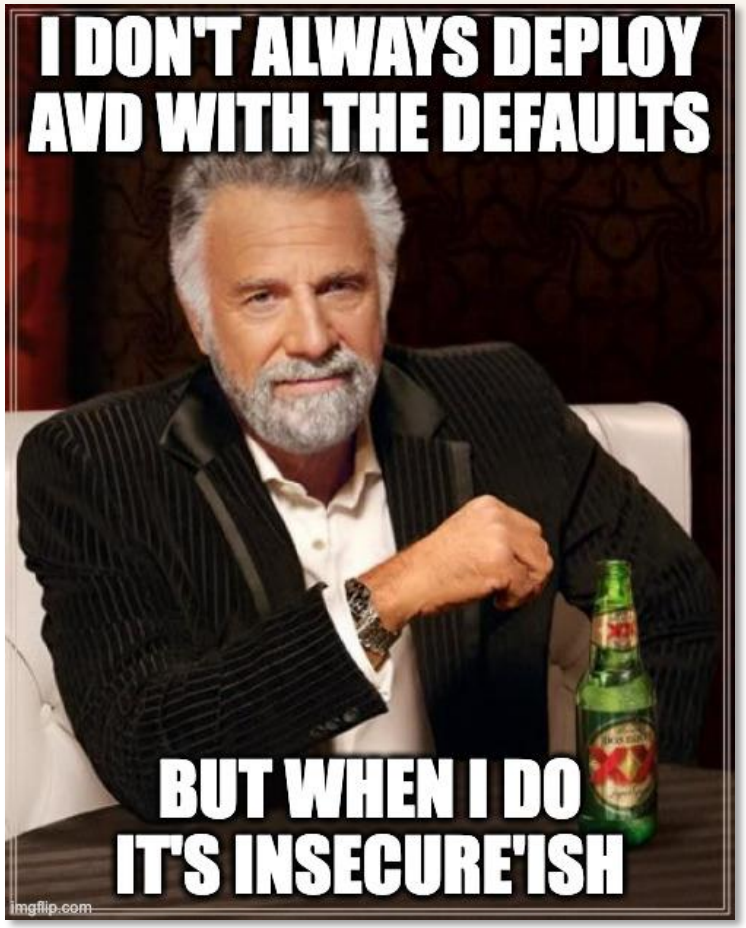
Default pools



https://learn.microsoft.com/en-us/azure/virtual-desktop/redirection-configure-drives-storage?tabs=intune&pivots=azure-virtual-desktop

4.0 Session policies–AVD Cloud PC

Cloud PC & AVD Default Session Settings		
Risk	Setting	Default setting
High	Copy\Paste	Allowed (Bi)
High	Client Fixed Drives	Allowed
High/Medium	Printer Mapping	Allowed
High/Medium	Client Webcam Mapping	Prohibited
High/Medium	Client USB Mapping	Allowed
High/Medium	Location Redirection	Prohibited
Medium/Low	COM Mapping	Allowed
Medium/Low	Audio Redirection	Allowed
Low	Microphone Mapping	Prohibited
Low	SmartCard Redirection	Allowed



5.0 Antivirus

If you have a solution of 100% application blocking, you still need something to catch the “others” and known bad things.

5.0 Antivirus

- When we first started down the XenApp world and then the VDI world, AV has been the big debate at many levels.
- Typical AV weaknesses:
  - Too much overhead, ProjectVRC went over this in 2013. You can lose 10-30% of your density.
  - Doesn't understand multi-user OS with RDS/XenApp.
  - Causes frequent updates to the image, which can add a whole lot of time to maintain the image. Requires frequent DAT updates that, in some cases, can crash some systems just keeping it up to date.
  - They all have complicated policies that don't know Citrix/VMware in general of some basic exclusions.
  - Most are not Hypervisor-aware, which means tons of agents and not using basic guest introspection that is available from XenServer, ESX and Hyper-V now.

5.0 Antivirus

- Bit9 - NextGen – detonate and deny
- BitDefender - HVI=Hypervisor Integration (XenServer, ESX and HyperV)
- **Cylance - NextGen, AI**
- **Carbon Black – NextGen**
- **CrowdStrike – NextGen + others**
- Kaspersky – classic huge solution options
- McAfee – classic huge solution options
- **Microsoft Defender – ATP classic + cloudy**
- Palo and Cisco – classic huge solution options with sprinkles of clouds
- Symantec – classic huge solution options
- TrendMicro - classic + guest introspection


CROWDSTRIKE "THE BIG ONE"
JULY 19TH, 2024
imgflip.com

6.0 Windows features

There are some new things you might like

Windows 10: Build equal but different security

- 20H2
- Windows Defender Updates for APT and AIR
- Windows Defender Application Guard for Office
- 21H1
    - Windows Defender Application Guard (WDAG) Updates
- 21H2
    - WPA3
- 22H1
    - Who knows ☺ I would guess more Defender things.

Windows 11: Building up, but starting over

- 11-21H2
  - Windows Defender updates
  - Windows Defender Application Guard + Office
  - Windows Hello Updates + TPM requirements
  - Windows Security Baseline updates
- 11-22H2
  - Credential Guard (on by default)
  - Smart app control
- 11-23H2
  - Passwordless enhancements (Passkey)
- 11-24H2
  - SMB Signing required
  - SMB NTLM Block
  - LAPs updates

Local administrator password solution (LAPS)

- **No more single admin password for all systems!**
- Management of local account passwords
  - Domain joined computers
  - Passwords stored in Active Directory
  - ACL protected
  - Randomly generated
- Managed by:
  - Group Policy
  - PowerShell
  - Agent
- **ENSURE you delegate the right permissions to the right group!**
- Find-AdmPwdExtendedrights -identity <OU name> | Format-Table (audit it)

SHA1 KEYS

TLS 1.0

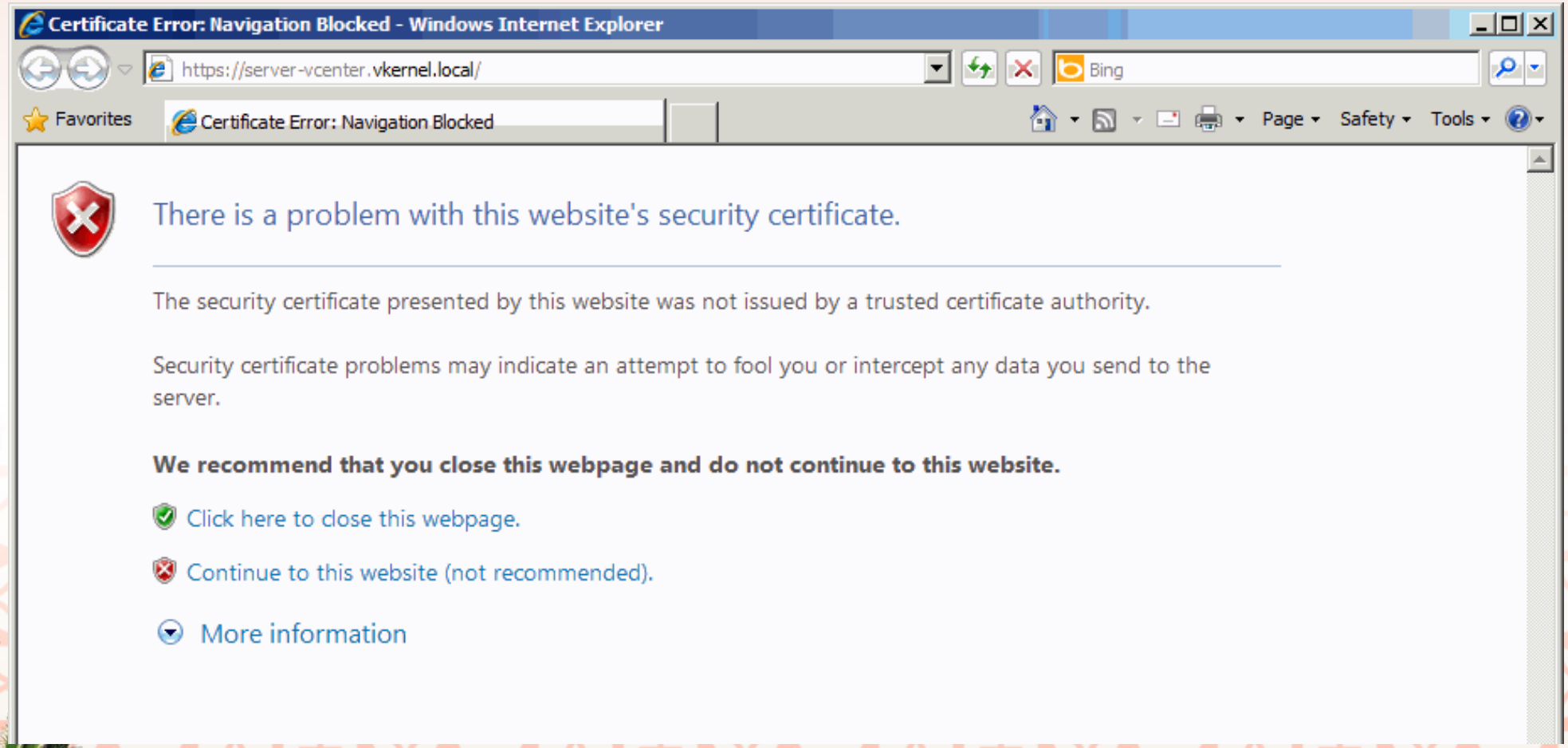
TLS 1.1
TLS 1.2

TLS 1.3

HSTS

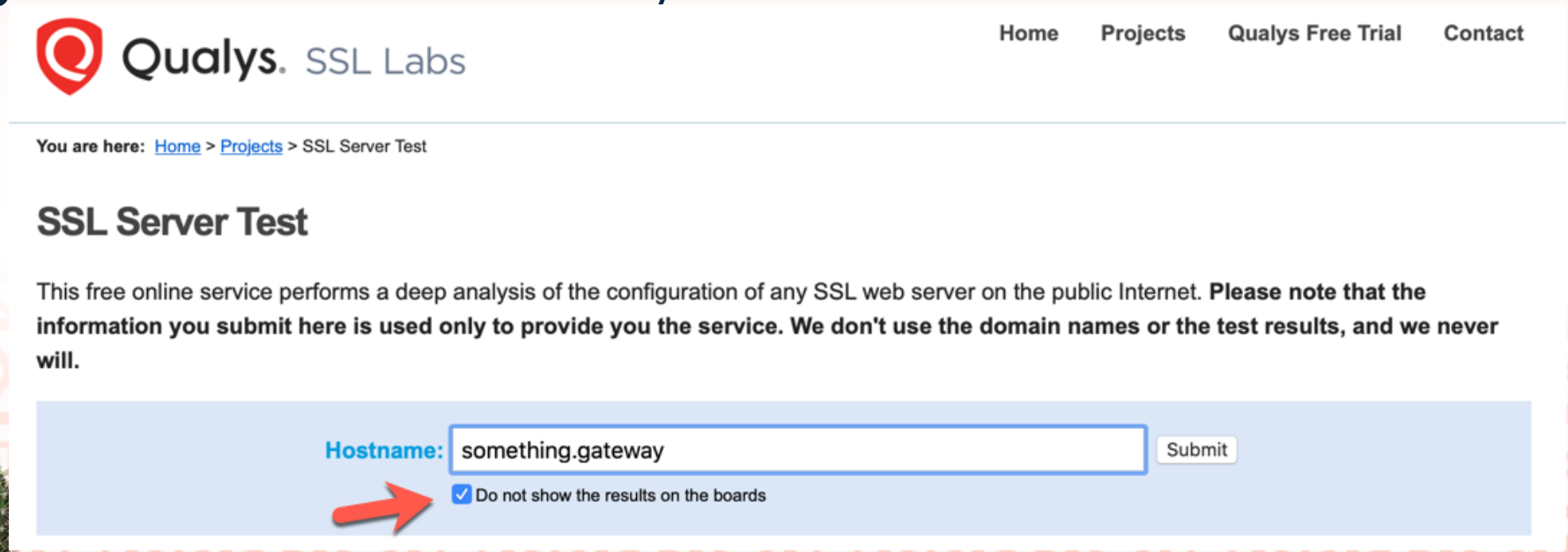
7.0 SSL

Don’t accept a man in the middle attack every day. Replace default certificates.



TLS basics for all external connections

Run your SSL Labs test (for the win!)
https://www.ssllabs.com/ssltest/analyze.html
Don't forget to check this box before you test.



http://terenceluk.blogspot.com/2018/06/scoring-a-grading-from-qualys-ssl-labs.html
https://www.vcloudinfo.com/2018/08/how-to-get-a-from-qualys-ssllabs-on.html

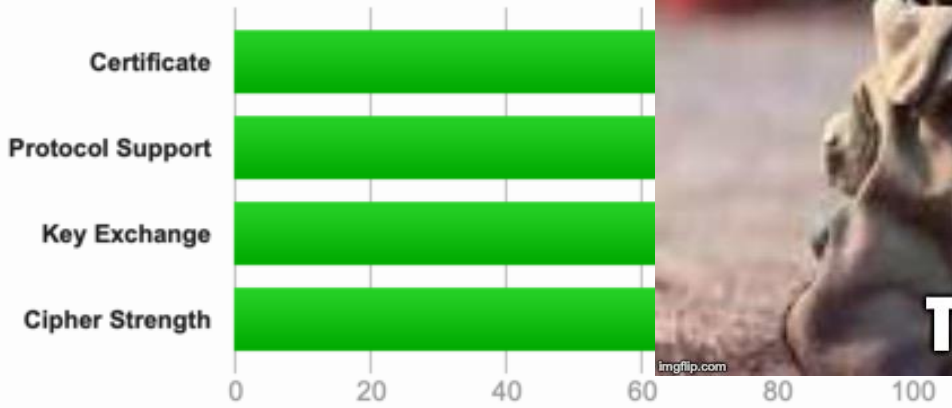
Summary

Overall Rating

Summary

Overall Rating

A+



Visit our documentation page for more information, configuration guides, and books. Known issues are documented here.

This site works only in browsers with SNI support.

Experimental: This server supports TLS 1.3 (RFC 8446).

HTTP Strict Transport Security (HSTS) with long duration deployed on this server. MORE INFO »

DNS Certification Authority Authorization (CAA) Policy found for this domain. MORE INFO »

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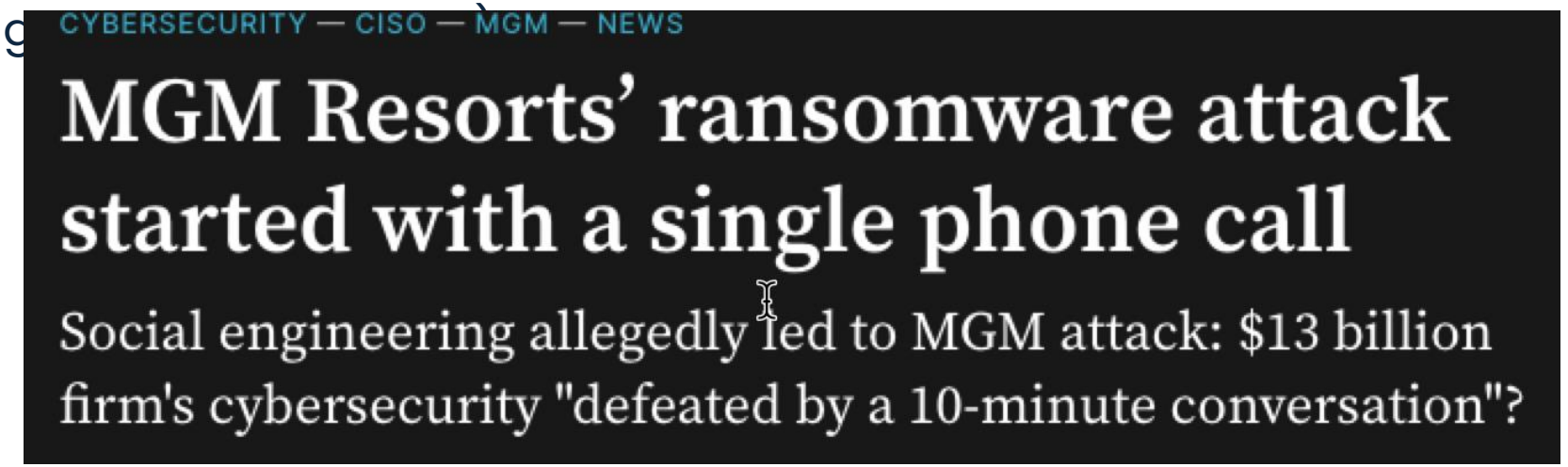
8.0 Multifactor

Requiring more than a username and password will drastically slow down or prevent the attack chain from proceeding.

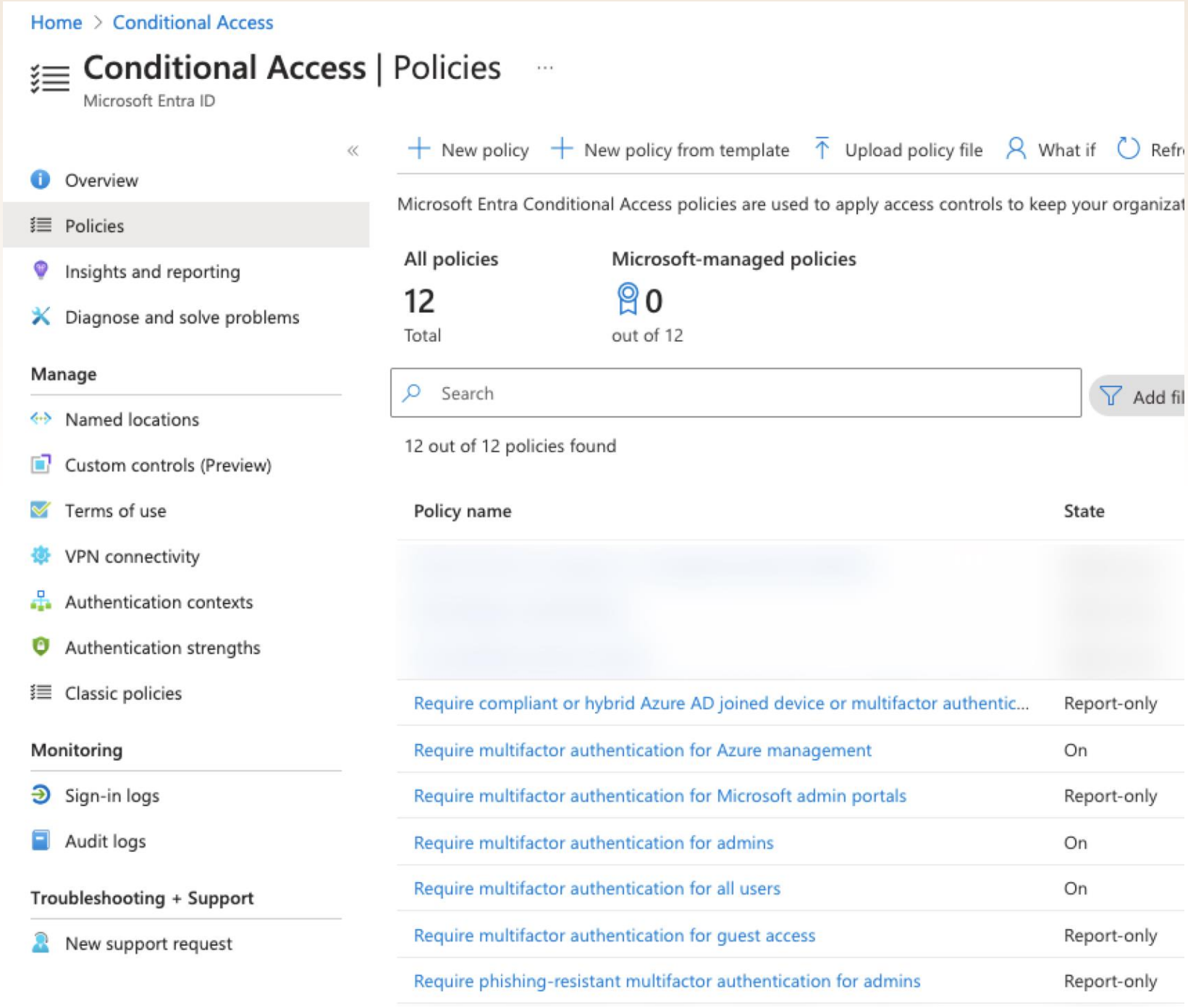
8.0 Multifactor

- This is a great defense to potential attackers.
  - If you have other entry points that do not use it, its effectiveness will go down, but that also means the attack will pivot through something that might not be yours.
- In some deployments, it may not be possible based on how it is used operationally.
- **Do or do not, there is no try** ☺
- Solutions
  - Paid
    - SAML IDP (Okta, Ping
    - DUO
    - Azure MFA
    - Proximity Badges
    - Many more



Entra ID: Conditional Access– MFA Party

Do it!



MFA vs none

MFA (4-5)

1. Physical possession of phone
2. Passcode, fingerprint, or a face
3. Locate the app
4. Open the app (may have to enter a PIN)
5. Need the UN and password

No MFA (1)

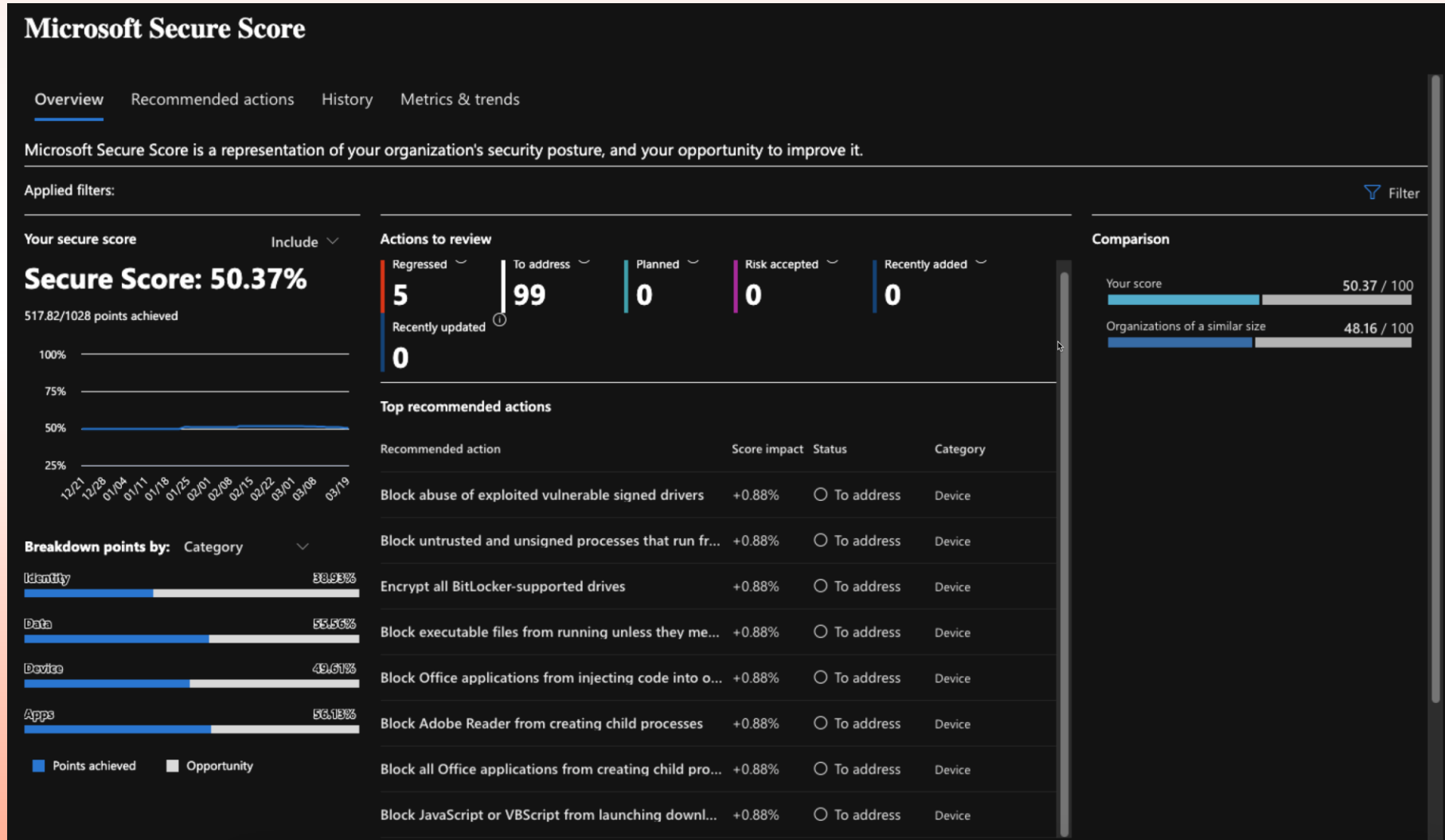
1. Need the UN and password

SMS is not ideal as if an individual is targeted, their phone number can be cloned so that MFA requests go to an attacker's phone.

Directory security

Default Entra ID or hybrid connected will have a failing school score if you don't change settings in GPO, Intune, Azure, and other locations.

If your CIO or CISO sees this GUI, your new job will be fixing these things nearly full-time.

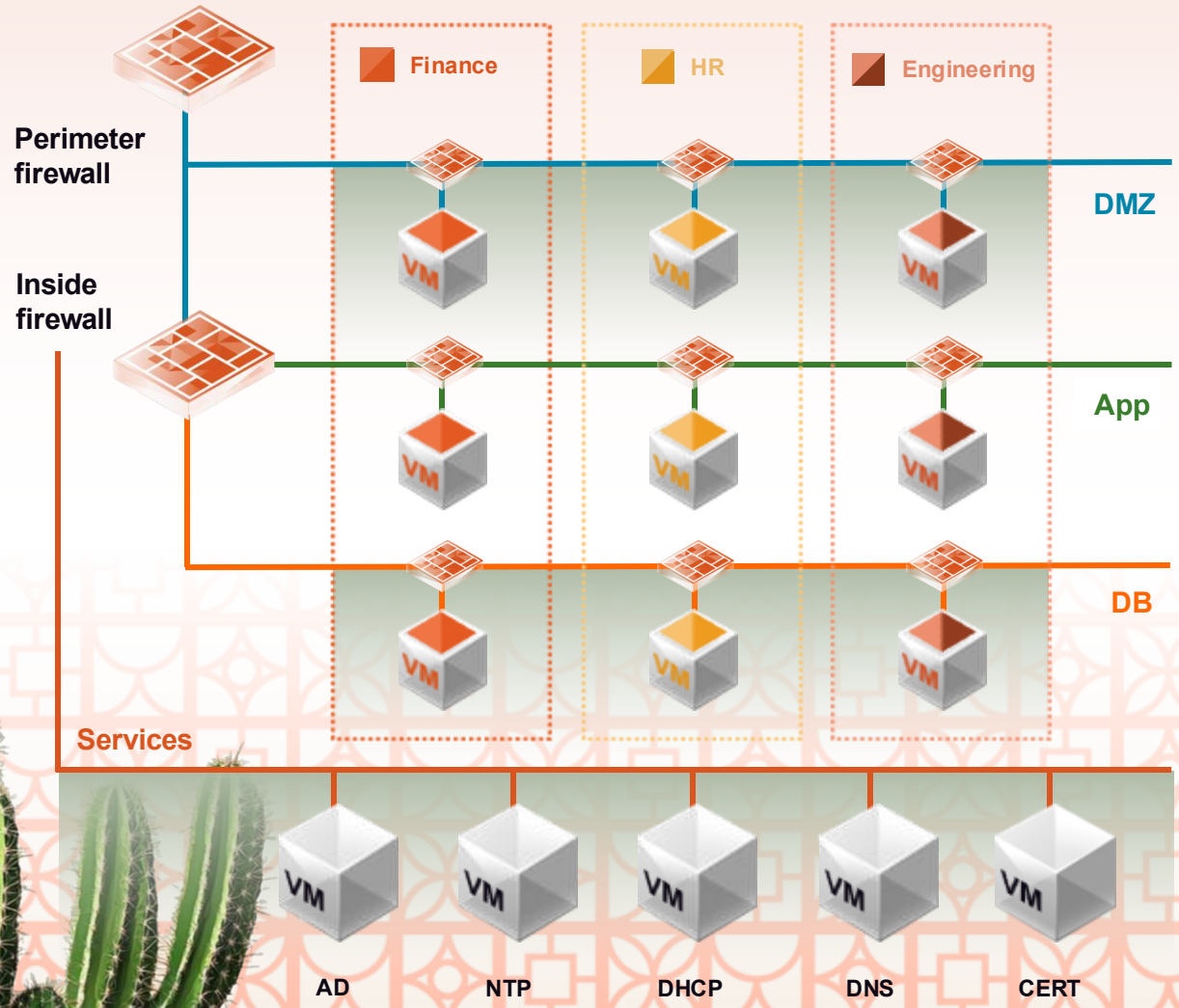


MFA pro tips

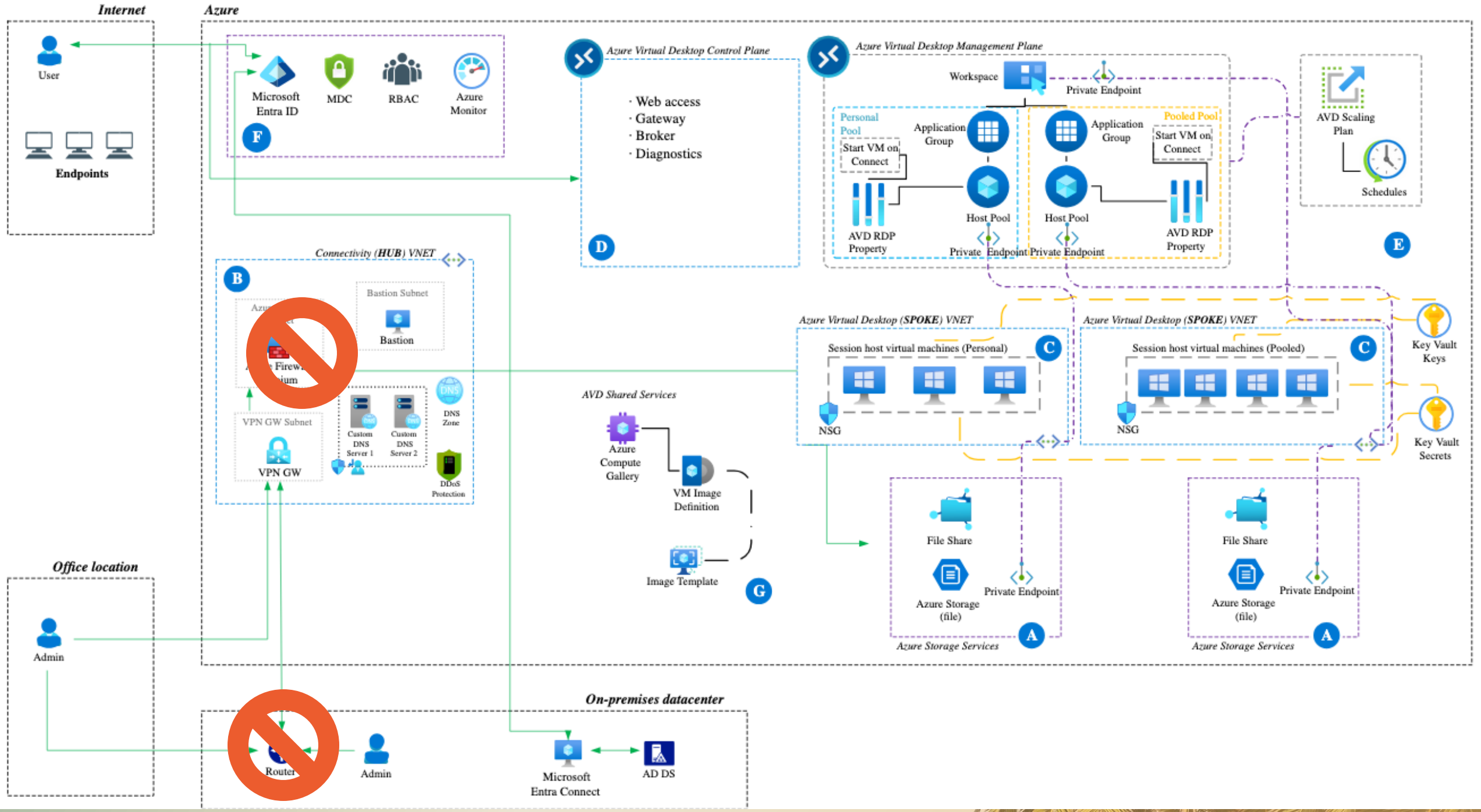
- Start with IT
- High-stakes employees (C-suite, finance)
- Leadership
- Everyone else

9.0 Micro-segmentation

Micro-segmentation



- VLANs are cool.
- No ACLs between them are not cool.
- Everything shouldn't be able to talk to everything.


Internet
Azure
User
Endpoints
Microsoft Entra ID
MDC
RBAC
Azure Monitor
F
Azure Virtual Desktop Control Plane
· Web access
· Gateway
· Broker
· Diagnostics
D
Azure Virtual Desktop Management Plane
Workspace
Private Endpoint
Personal Pool
Start VM on Connect
Application Group
Pooled Pool
Start VM on Connect
Application Group
AVD RDP Property
Host Pool
Private Endpoint
Host Pool
Private Endpoint
AVD RDP Property
AVD Scaling Plan
Schedules
E
Connectivity (HUB) VNET
B
Bastion Subnet
Bastion
Firewall
VPN GW Subnet
VPN GW
Custom DNS Server 1
Custom DNS Server 2
DNS Zone
DDoS Protection
AVD Shared Services
Azure Compute Gallery
VM Image Definition
Image Template
G
Azure Virtual Desktop (SPOKE) VNET
Session host virtual machines (Personal)
C
NSG
Azure Virtual Desktop (SPOKE) VNET
Session host virtual machines (Pooled)
C
NSG
Key Vault Keys
Key Vault Secrets
File Share
Azure Storage (file)
Private Endpoint
Azure Storage Services
A
File Share
Azure Storage (file)
Private Endpoint
Azure Storage Services
A
Office location
Admin
Router
Admin
On-premises datacenter
Microsoft Entra Connect
AD DS

VDI logging

What did we learn?

- Thanks to the Nov 24 update (auto update to server 2025).
- And a very special thanks to Crowdstrike in Jun 2024.
- Pick your Windows updates.
- Pick your upgrade groups:
  - No two of the same role should be updated at the same time.
- Europe will always have it worse because of the time zones.
- Luck is involved with so many products for when your tenant gets the update.
- Maybe run two AVs?

The final countdown

1. Apply secure group policies (don’t let users get to anything they don’t need).
2. Apply Windows patches.
3. Ensure your session policies allow users access to only what they need.
4. Use application control (users can only run what they need and everything else is blocked).
5. Run antivirus to catch the wildcards that may show up.
6. Use some of the Windows security features.
7. Make sure you SSL everything you can.
8. Use MFA.
9. Use micro-segmentation.
10. Logging (Windows event & PowerShell logs).
11. Secure endpoints.
12. Use security best practices (min domain admins, admin role groups, firewalls).

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Ramming speed=broken doors/doors left open.
Business priorities of new beat the needs of now

What's the biggest enemy to IT security?

Questions?

Patrick Coble
@VDIHacker

VDISecurity.org


SURVEY, SURVEY
Firestone
BIGFOOT
Firestone
SURVEY!!!!
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Extras (Do we have time yo?)

Special security callouts for AVD/Cloud PC

https://learn.microsoft.com/en-us/security/zero-trust/azure-infrastructure-avd

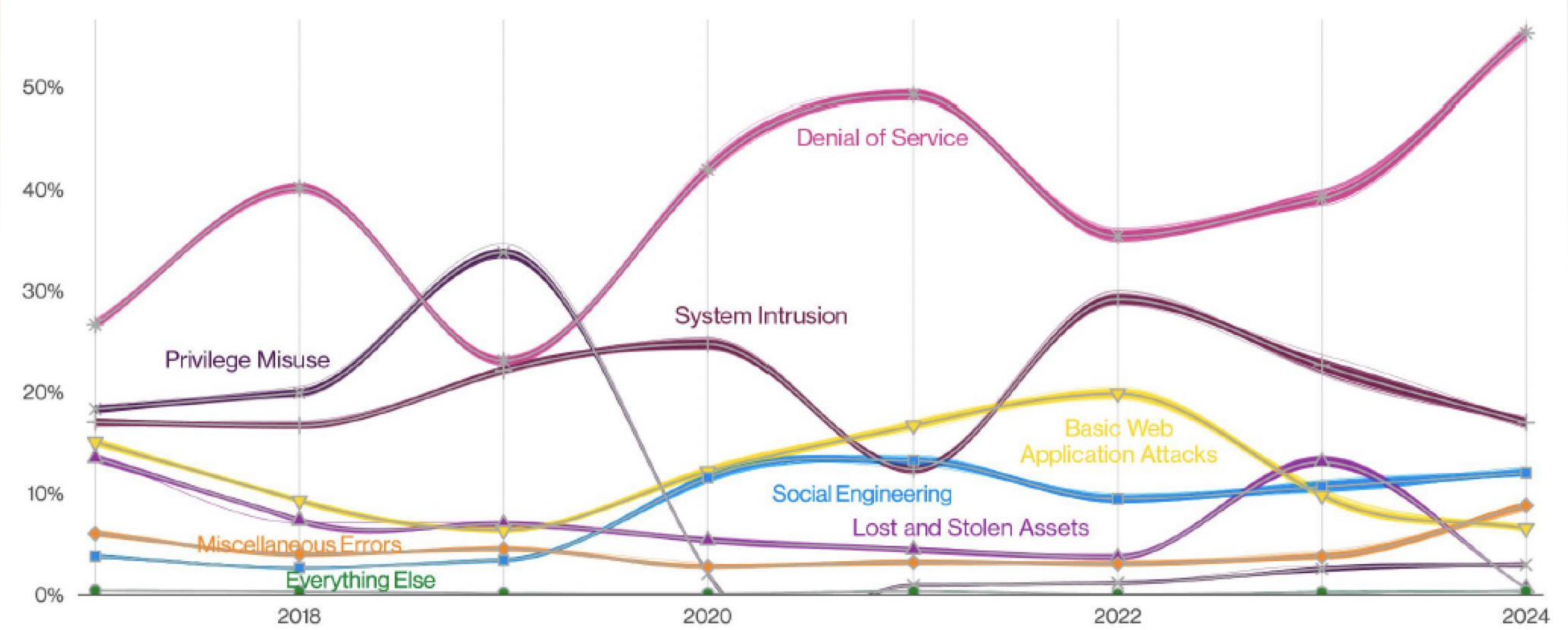
Component	Responsibility
Identity	Customer or partner
User devices (mobile and PC)	Customer or partner
App security	Customer or partner
Session host operating system	Customer or partner
Deployment configuration	Customer or partner
Network controls	Customer or partner
Virtualization control plane	Microsoft
Physical hosts	Microsoft
Physical network	Microsoft
Physical datacenter	Microsoft

https://learn.microsoft.com/en-us/azure/virtual-desktop/security-recommendations#shared-security-responsibilities

Security testing/audits

- Are you doing regular external vendor audits?
- Are you doing vulnerability assessments or security audits?
- Are you doing penetration tests?
- Are you using different companies each year?
- There are many differences in these tests, and the cost makes a significant difference in any location. You get what you pay for.

Patterns over time



Defense in depth–it's easy, they said