Managing Penetration Testing Data with Kvasir

Toorcon 15 (San Diego)

@grutz

cisco

BACKGROUND

$ whois grutz

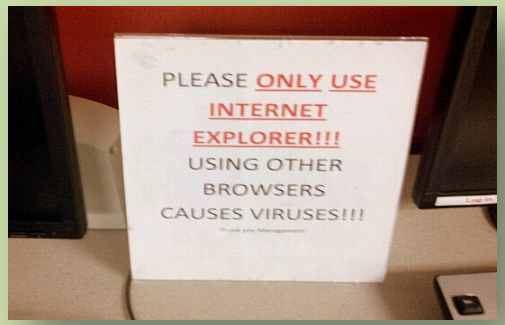
Corporate penetration tester for ~15 years

~10 years internal with Federal Reserve and Pacific Gas & Electric

5 years consulting to customers for cisco

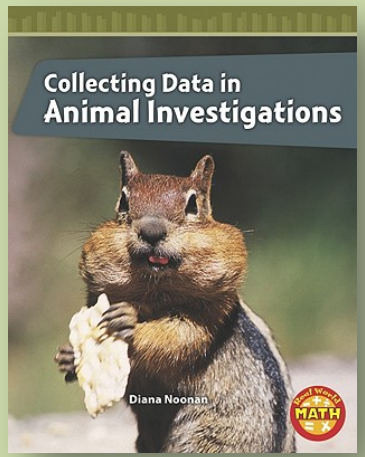
Developed Squirtle, the NTLM Attack tool

Smashed up some Huawei/H3C/HP gear



DEFINING THE PROBLEM

Testing is all about collecting data…



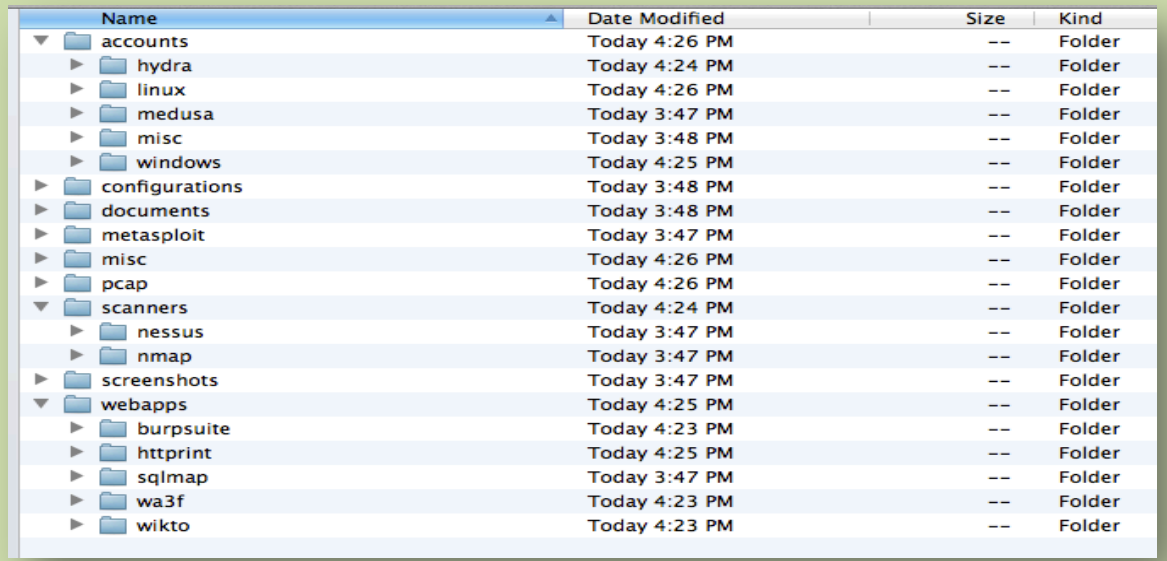
There is a reason movies never portray hacking realistically.


16. Typical hacker at work

As pentesters we collect a TON of data…

So you sort them into directories…

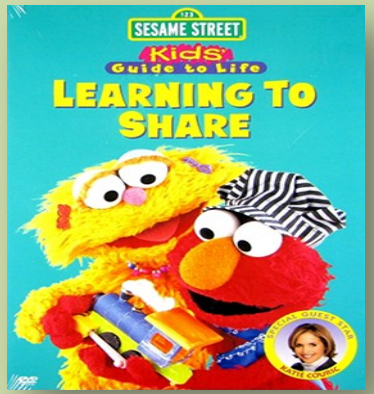
…which can be difficult to manage…



Name	Date Modified	Size	Kind
accounts	Today 4:26 PM	--	Folder
hydra	Today 4:24 PM	--	Folder
linux	Today 4:26 PM	--	Folder
medusa	Today 3:47 PM	--	Folder
misc	Today 3:48 PM	--	Folder
windows	Today 4:25 PM	--	Folder
configurations	Today 3:48 PM	--	Folder
documents	Today 3:48 PM	--	Folder
metasploit	Today 3:47 PM	--	Folder
misc	Today 4:26 PM	--	Folder
pcap	Today 4:26 PM	--	Folder
scanners	Today 4:24 PM	--	Folder
nessus	Today 3:47 PM	--	Folder
nmap	Today 3:47 PM	--	Folder
screenshots	Today 3:47 PM	--	Folder
webapps	Today 4:25 PM	--	Folder
burpsuite	Today 4:23 PM	--	Folder
httprint	Today 4:25 PM	--	Folder
sqlmap	Today 3:47 PM	--	Folder
wa3f	Today 4:23 PM	--	Folder
wikto	Today 4:23 PM	--	Folder

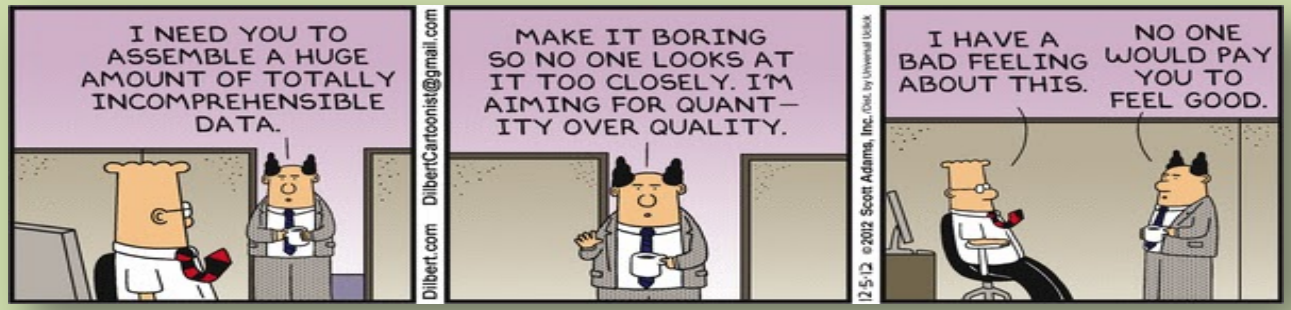
Sharing data across your team

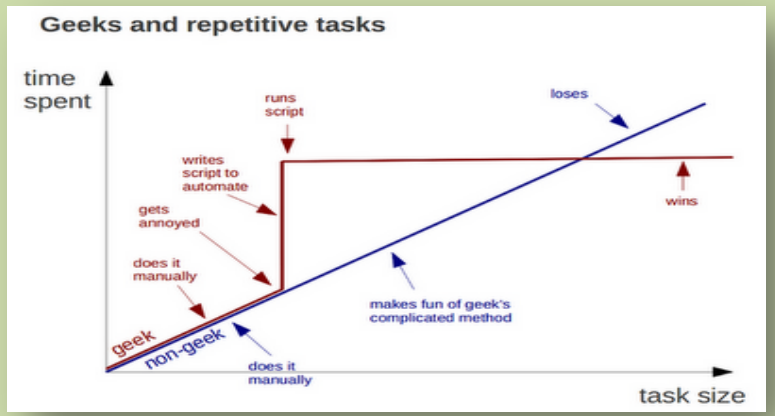
…can have its challenges



Did you get everything you need?

Great! Now write a report, monkey!





CURRENT OPTIONS?

Currently…

- Metasploit Pro, Cobalt Strike, STRATEGIC, CORE, etc
- Nexpose, Nessus, QualysGuard, Saint, Fortigate, etc
- ThreadFix, Archer, RiskIO, Secunia VIM, etc
- Issue / Bug tracking tools (and their wikis)
  - TRAC, Redmine, Bugzilla, etc
- Wikis!
- Spreadsheets!
- Roll your own!

Issues with these tools

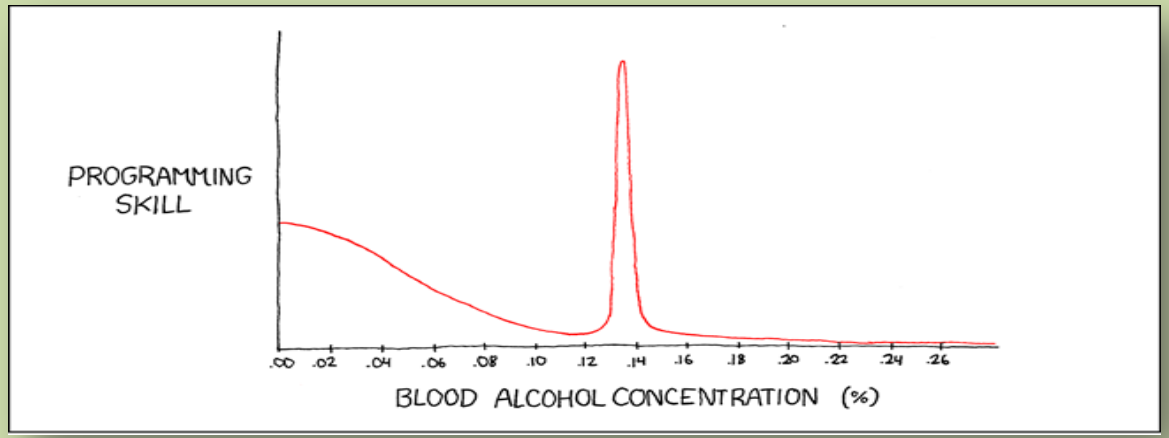
- Not designed to manage PT data
  - You have to conform your data to the tool
  - *Vulnerability Management != Penetration Test Data!*
- Requires enhancements / add-ons
  - Develop your own add-ons
  - Maintain support and training
- Changes are difficult to implement
  - No access to source code for when things break
  - High complexity, vendor demands, delays
- “In the cloud” or “vendor hosted” solutions
- Spreadsheets??? Really?!?!

ENTER KVASIR

0118 999 881 999 119 725 3

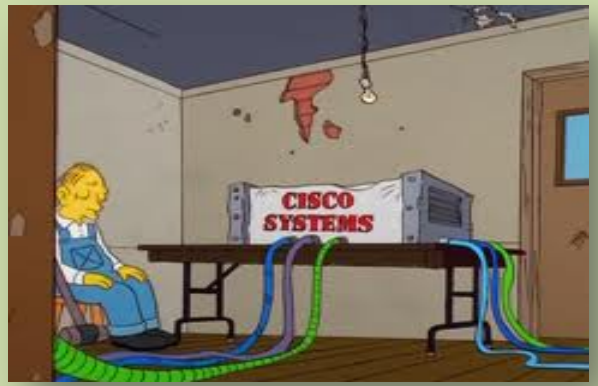
ACHTUNG!

I am an ADHD coder. Large bits of Kvasir were thought of after working at a customer's site and developed with little sleep and lots of caffeine and/or alcohol. I am also not a really good UI coder.



Kvasir's Cisco Pedigree

- Recognized long ago that managing disparate data is essential to effective testing results
- Began from our acquisition of "The Wheel Group" back in 1999
- Multiple iterations:
  - AttackAll, AutoSPA, Halo/Banshee, AutoSPAng
- Close source / proprietary



Design Philosophy

- Take disparate data and cram it into a (mostly) consistent relational database format.
- Focus on PENETRATION TEST tools and data
- Be quick
- Be adaptable
- Try not to get in the way of the hacking
- No cross-contamination of customer data

Benefits to using Kvasir

- Alcohol infused coding practices
- Designed by and for Penetration Testers

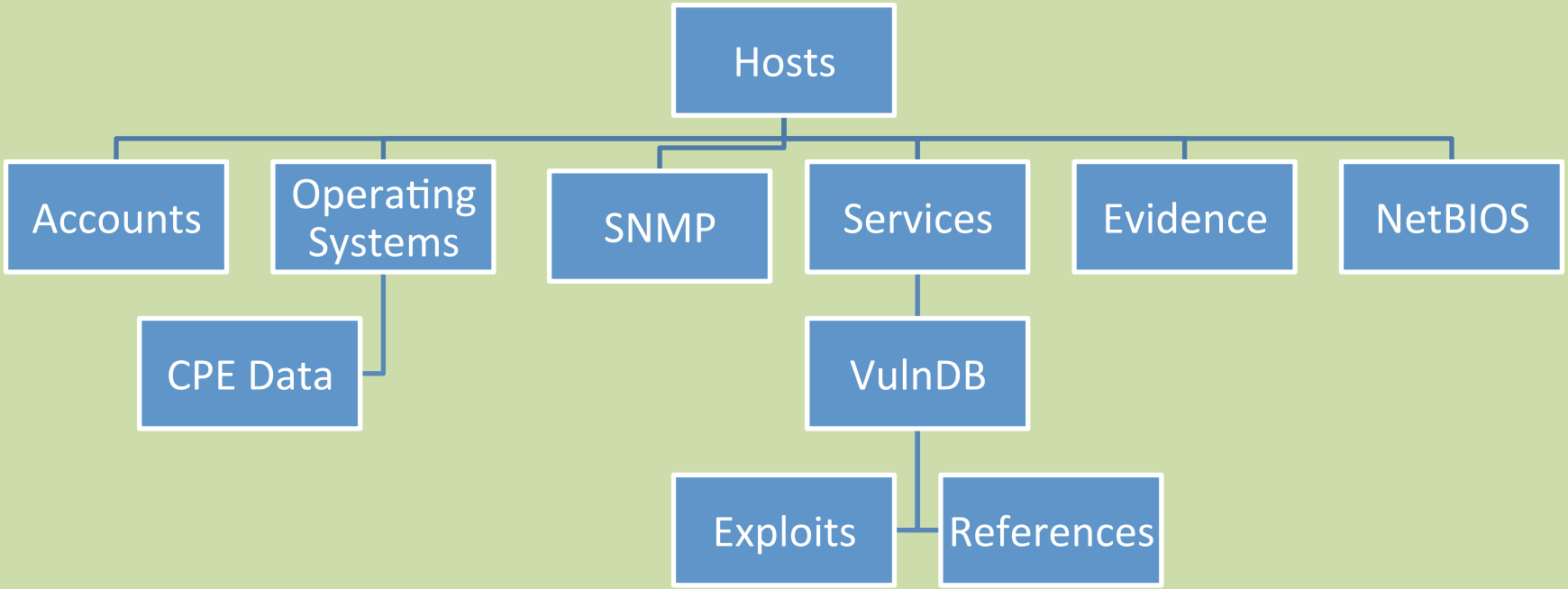
  OPEN SOURCE! FREE!!!
- Data access through web2py shell == awesome!

```
In [34]: fh.seek(0)

In [35]: for z in fh.readlines():
    (ip, port) = z.split(':')
    port = int(port)
    host_rec = db.t_hosts.insert(f_ipv4=ip, f_engineer=1, f_asset_group='vnc')
    db.commit()
    svc_rec = db.t_services.insert(f_hosts_id=host_rec, f_proto='tcp', f_number=port, f_name='vnc')
    db.commit()
   ....:
```

http://web2py.com/books/default/chapter/29/06/the-database-abstraction-layer

High-level Database Design

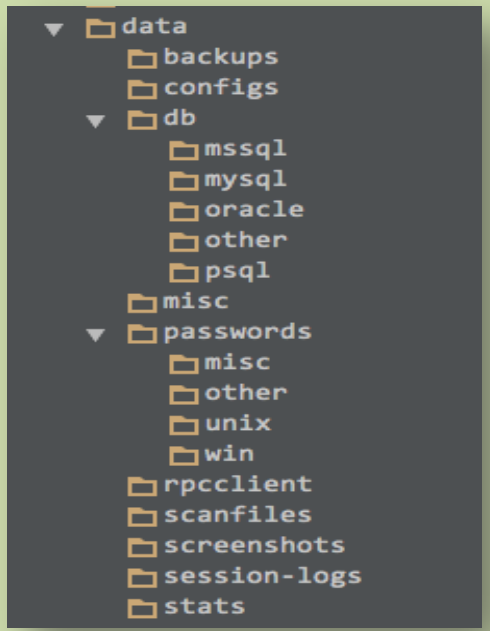


Data Directory Structure

All script output is stored under “data”

Local to the web server

Session-logs/ contain ‘script’ file output from launched terminals



Supported Host/Vulnerability Scanners

Right Now

Nexpose

Nmap

Nessus

Metasploit (hosts only)

ShodanHQ

Horizon

QualysGuard

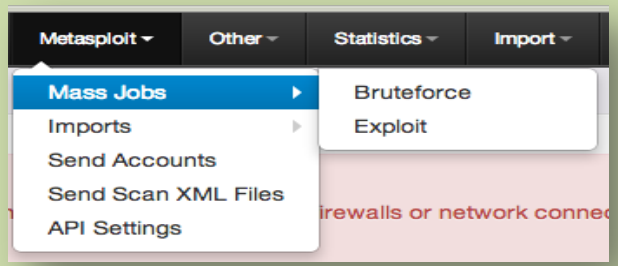
Metasploit Pro (Webscan)

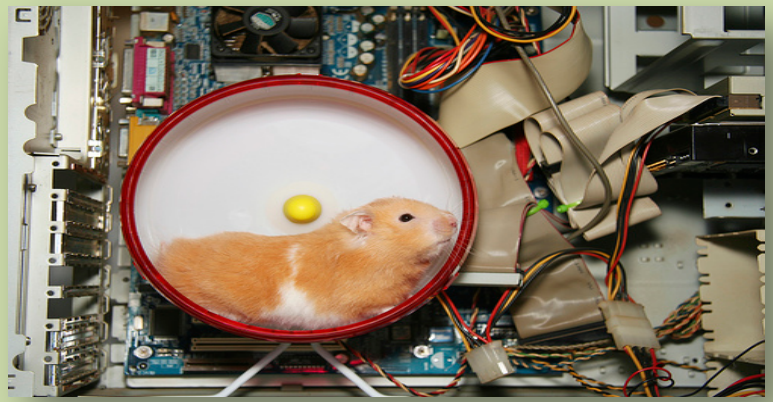
BurpSuite Pro (Report XML)

Others?

Metasploit Pro API Integration

- Kvasir utilizes some MSF Pro-only API functions:
  - Bruteforce / Exploit
  - Import XML, PWDUMP, Screenshots
  - Sending Accounts / Scan data results
- TODO:
  - Sending exploits to Framework API
  - Direct MSF DB access (who uses ‘pass’ as a field name? MSF!)





THE KVASIR WORKFLOW

Installation and setup

https://github.com/KvasirSecurity/Kvasir/wiki/Installation

- Kvasir begins life as a completely blank slate
  - You must add users, CPE, Vulndata, Exploits, etc
  - Mostly automated through parts of the UI
- For multiple team members on a test:
  - One central person runs the SQL database
  - All team members have their own Kvasir instance and point to the SQL DB in settings.database_uri

Importing Support Data

- Vulnerability data can be:
  - Imported prior to engagement start
  - Imported as part of a Vulnerability Scan results
- Exploits XML data imported:
  - Nexpose's exploits.xml file
  - ImmunitySec CANVAS download / file
- CPE OS Data
  - Downloaded and parsed from MITRE

Populating Engagement Data

- Vulnerability Scanner Imports
  - Import direct from scanners or files
- Nmap Scanning Imports
  - Import XML output file (-oX)
  - Kick-off a scan and import the results
- Bruteforce/Account Tools
  - THC Hydra
  - Medusa
  - Metasploit creds.csv output
  - PW recovery tool output (John POT, user:password, etc)

Valkyries

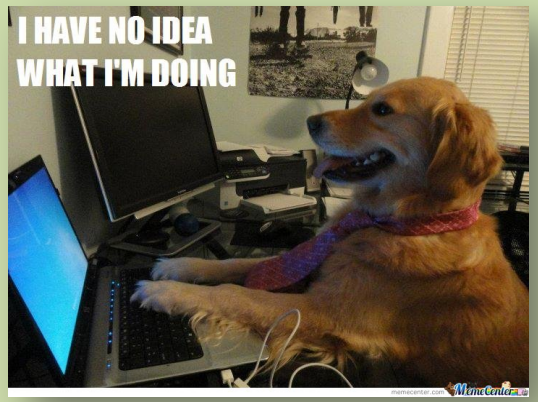
Tasks who results feed back to Kvasir

Not designed to replace Metasploit / CANVAS / CORE, etc.

WebShot: Grab images of HTTP instance using phantomjs

VNCShot: Grab images of open VNC Servers using vncdotool

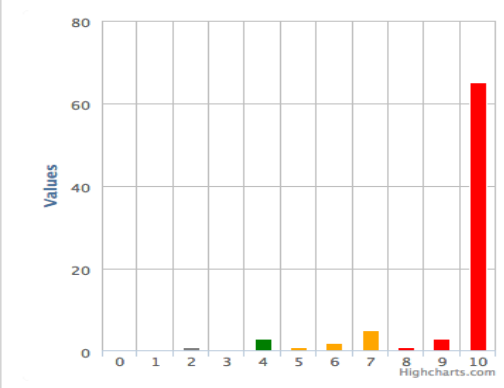
Others planned, just not completed



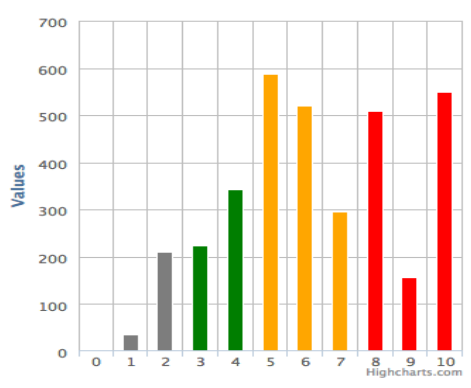
SCREENSHOTS!

Main Index

Top Host Severities



Vulnerabilities by Severity



Top Vulnerabilities (8+)

Show All

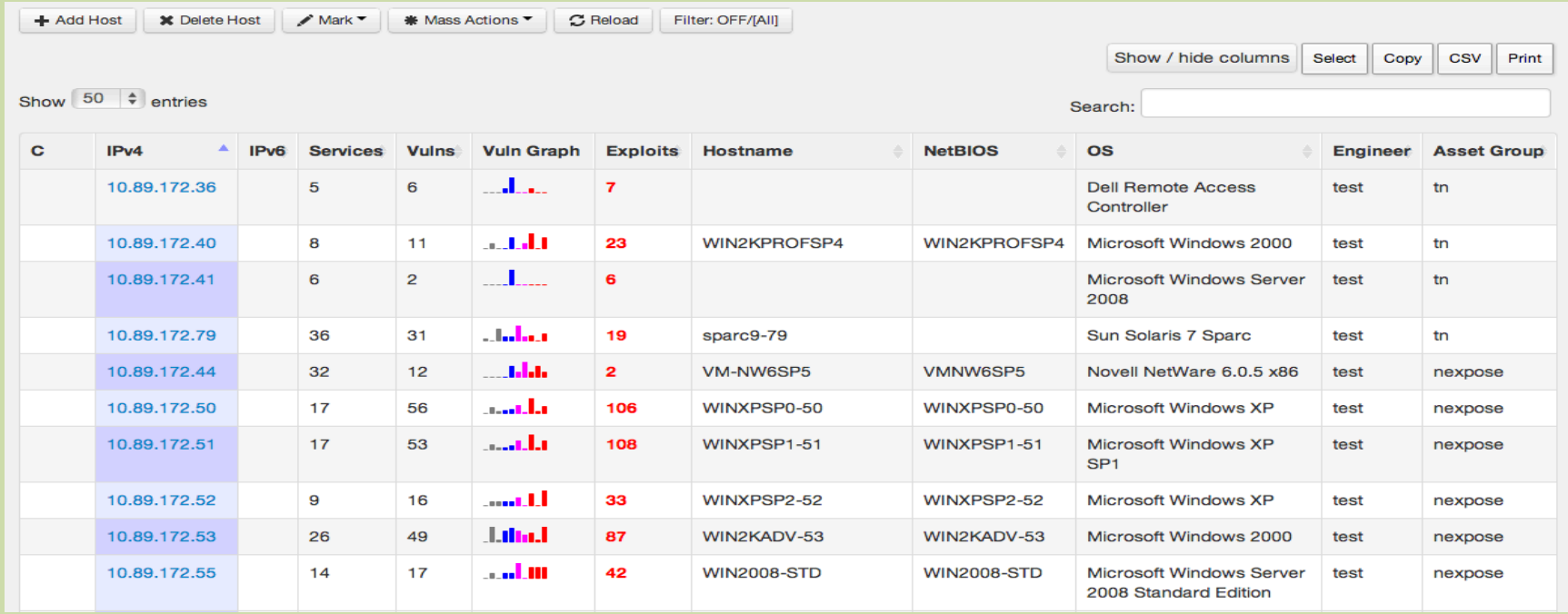
cisco-ios-ftp-multiple-vulns cisco-ios-nhrp-bof cisco-ios-obsolete-version cisco-system-timers-bof dns-bind-obsolete http-cisco-0002 http-openssl-dtls-heap-bof ipsec-weak-encryption-settings oracle-cpu-january-2010-olap oracle-missing-apr-2009-cpu oracle-missing-july-2009-cpu oracle-obsolete-version rpc-cmsd-file-overwrite sunpatch-119810 windows-hotfix-ms08-001 windows-hotfix-ms08-062 windows-hotfix-ms09-032 windows-hotfix-ms09-041 windows-hotfix-ms09-053 windows-hotfix-ms09-055

Summary

Total Hosts	82
Confirmed Hosts	0
Unconfirmed Hosts	82
Accessed Hosts	0
Services/Vulnerabilities	
Total Services	1678
Total Vulnerabilities	3425
Hosts w/ Vulns	81 (98.78%)
Hosts w/ High Vulns (=> 8)	69 (84.15%)
Services w/ Vulns	723
Services w/ High Vulns (=> 8)	1213
Total Accounts	387
Compromised Accounts	37
Passwords	37
Joe Accounts	17

Domains Discovered	SPALAB SANDBOX SCO_DOMAIN TARGETS MYGROUP

Host List



+ Add Host | ✖ Delete Host | Mark | Mass Actions | Reload | Filter: OFF/[All]

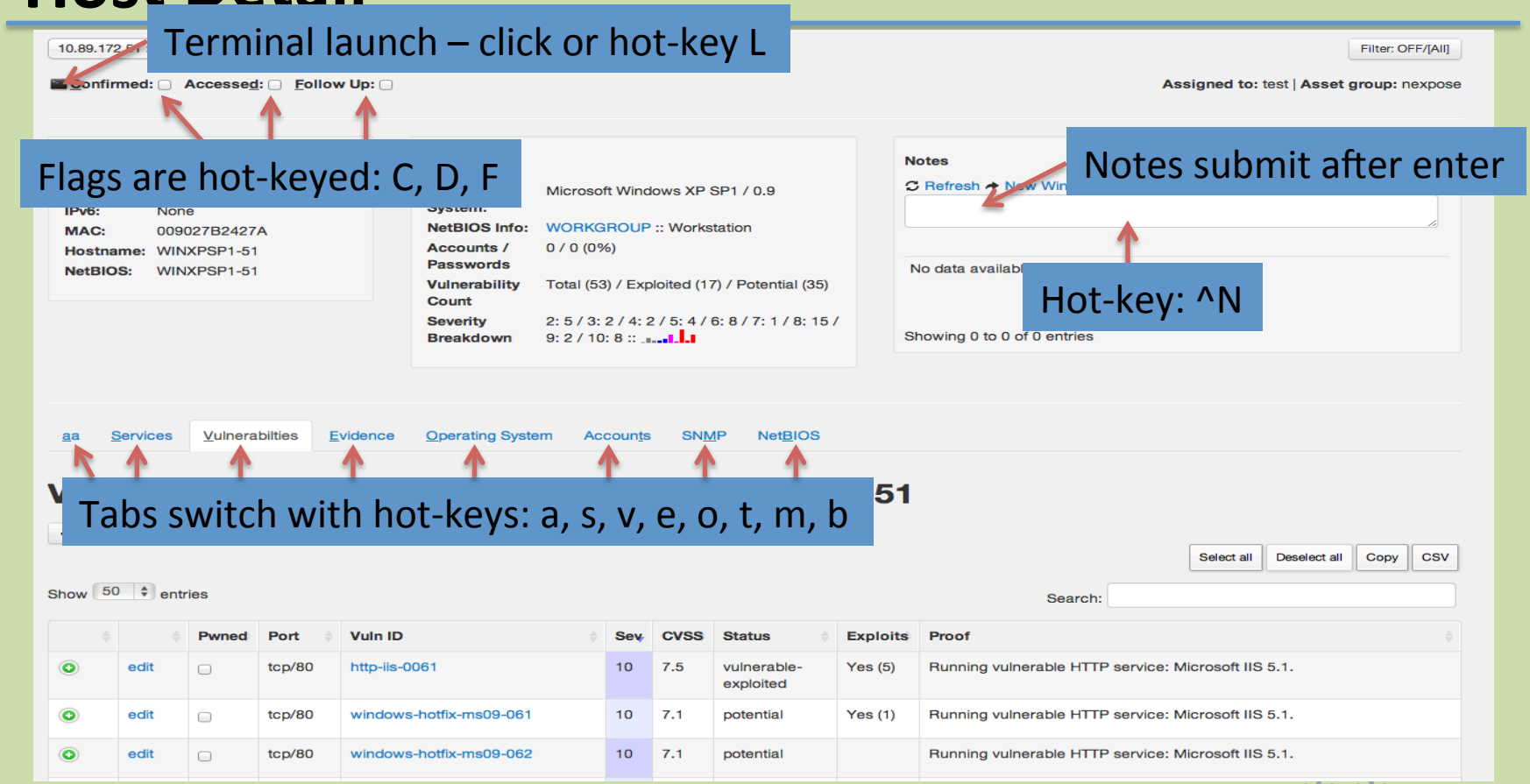
Show / hide columns | Select | Copy | CSV | Print

Show 50 entries

Search:

C	IPv4	IPv6	Services	Vulns	Vuln Graph	Exploits	Hostname	NetBIOS	OS	Engineer	Asset Group
	10.89.172.36		5	6		7			Dell Remote Access Controller	test	tn
	10.89.172.40		8	11		23	WIN2KPROFSP4	WIN2KPROFSP4	Microsoft Windows 2000	test	tn
	10.89.172.41		6	2		6			Microsoft Windows Server 2008	test	tn
	10.89.172.79		36	31		19	sparc9-79		Sun Solaris 7 Sparc	test	tn
	10.89.172.44		32	12		2	VM-NW6SP5	VMNW6SP5	Novell NetWare 6.0.5 x86	test	nexpose
	10.89.172.50		17	56		106	WINXPSP0-50	WINXPSP0-50	Microsoft Windows XP	test	nexpose
	10.89.172.51		17	53		108	WINXPSP1-51	WINXPSP1-51	Microsoft Windows XP SP1	test	nexpose
	10.89.172.52		9	16		33	WINXPSP2-52	WINXPSP2-52	Microsoft Windows XP	test	nexpose
	10.89.172.53		26	49		87	WIN2KADV-53	WIN2KADV-53	Microsoft Windows 2000	test	nexpose
	10.89.172.55		14	17		42	WIN2008-STD	WIN2008-STD	Microsoft Windows Server 2008 Standard Edition	test	nexpose

Host Detail


Terminal launch – click or hot-key L
Flags are hot-keyed: C, D, F
Notes submit after enter
Hot-key: ^N
Tabs switch with hot-keys: a, s, v, e, o, t, m, b
Confirmed:
Accessed:
Follow Up:
Filter: OFF/[All]
Assigned to: test | Asset group: nexpose
IPv6: None
MAC: 009027B2427A
Hostname: WINXPSP1-51
NetBIOS: WINXPSP1-51
Microsoft Windows XP SP1 / 0.9
NetBIOS Info: WORKGROUP :: Workstation
Accounts / Passwords 0 / 0 (0%)
Vulnerability Count Total (53) / Exploited (17) / Potential (35)
Severity Breakdown 2: 5 / 3: 2 / 4: 2 / 5: 4 / 6: 8 / 7: 1 / 8: 15 / 9: 2 / 10: 8 ::
Notes
Refresh
No data availabl
Showing 0 to 0 of 0 entries
aa
Services
Vulnerabilities
Evidence
Operating System
Accounts
SNMP
NetBIOS
Select all
Deselect all
Copy
CSV
Show 50 entries
Search:
Pwned
Port
Vuln ID
Sev
CVSS
Status
Exploits
Proof
edit tcp/80 http-iis-0061 10 7.5 vulnerable-exploited Yes (5) Running vulnerable HTTP service: Microsoft IIS 5.1.
edit tcp/80 windows-hotfix-ms09-061 10 7.1 potential Yes (1) Running vulnerable HTTP service: Microsoft IIS 5.1.
edit tcp/80 windows-hotfix-ms09-062 10 7.1 potential Running vulnerable HTTP service: Microsoft IIS 5.1.

Services

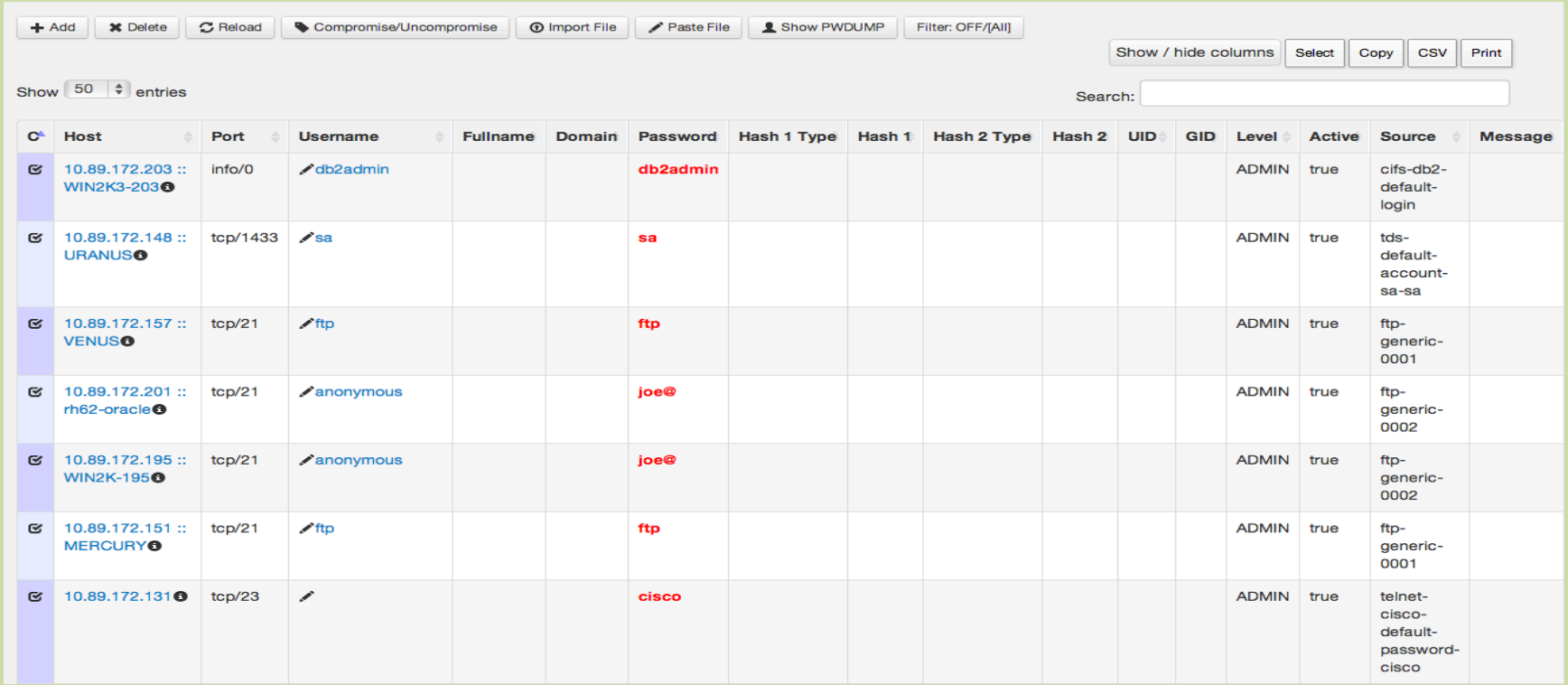
	edit	10.89.172.36	tcp	80	open	0		HTTP	RAC_ONE_HTTP 1.0
	edit	10.89.172.36	tcp	443	open	4	Yes (1)	HTTPS	RMC Webserver 2.0
	edit	10.89.172.36	tcp	554	open	0		RTSP	
	edit	10.89.172.40 :: WIN2KPROFSP4	info	0	info	8	Yes (19)		

Exploits:

Name	Title	Source	Rank
MS Windows CanonicalizePathName() Remote Exploit (MS06-040)	2223	exploitdb	Expert
MS Windows NetpIsRemote() Remote Overflow Exploit (MS06-040)	2162	exploitdb	Expert
MS Windows NetpIsRemote() Remote Overflow Exploit (MS06-040) (2k3)	2355	exploitdb	Expert
Microsoft Server Service NetpwPathCanonicalize Overflow	16367	exploitdb	Expert
Microsoft Server Service NetpwPathCanonicalize Overflow	exploit/windows/smb/ms06_040_netapi	metasploit	Intermediate
MS Windows Server Service Code Execution Exploit (MS08-067)	7104	exploitdb	Expert
MS Windows Server Service Code Execution Exploit (MS08-067) (2k/2k3)	7132	exploitdb	Expert
MS Windows Server Service Code Execution PoC (MS08-067)	6824	exploitdb	Expert
Microsoft Server Service Relative Path Stack Corruption	16362	exploitdb	Expert
Microsoft Server Service Relative Path Stack Corruption	exploit/windows/smb/ms08_067_netapi	metasploit	Novice
Windows Server Service Underflow (MS08-067)	ms08_067	canvas	Unknown
MS Windows Mailslot Ring0 Memory Corruption Exploit (MS06-035)	2057	exploitdb	Expert
Microsoft SRV.SYS Mailslot Write Corruption	auxiliary/dos/windows/smb/ms06_035_mailslot	metasploit	Intermediate
MS Windows 2K/XP TCP Connection Reset Remote Attack Tool	276	exploitdb	Expert
Multiple Vendor TCP Sequence Number Approximation Vulnerability (1)	24030	exploitdb	Expert
Multiple Vendor TCP Sequence Number Approximation Vulnerability (2)	24031	exploitdb	Expert
Multiple Vendor TCP Sequence Number Approximation Vulnerability (3)	24032	exploitdb	Expert
Multiple Vendor TCP Sequence Number Approximation Vulnerability (4)	24033	exploitdb	Expert
TCP Connection Reset Remote Exploit	291	exploitdb	Expert

Vulnerabilities: dcerpc-ms-netapi-netpathcanonicalize-dos :: windows-hotfix-ms08-067 :: cifs-nt-0002 :: windows-hotfix-ms06-035 :: cifs-acct-password-never-expires :: cifs-acct-password-never-expires :: tcp-seq-num-approximation :: cifs-nt-0001

Accounts



+ Add | ✖ Delete | Reload | Compromise/Uncompromise | Import File | Paste File | Show PWDUMP | Filter: OFF/[All]

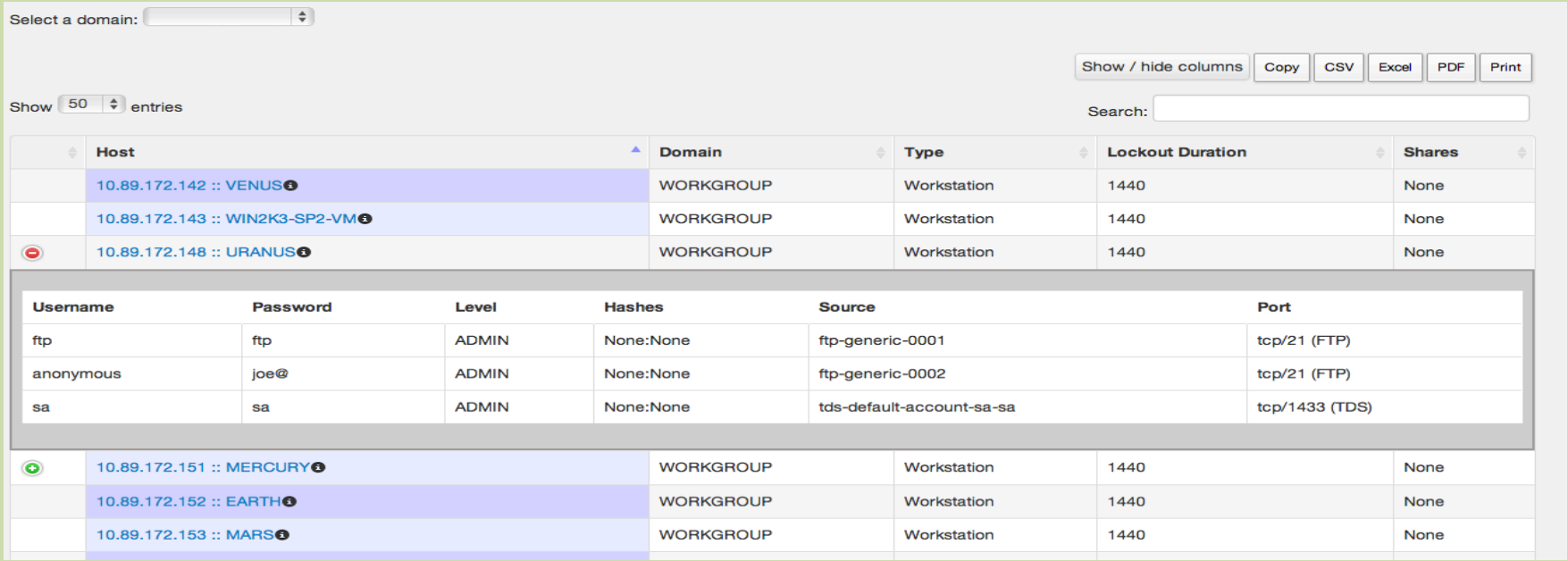
Show / hide columns | Select | Copy | CSV | Print

Show 50 entries

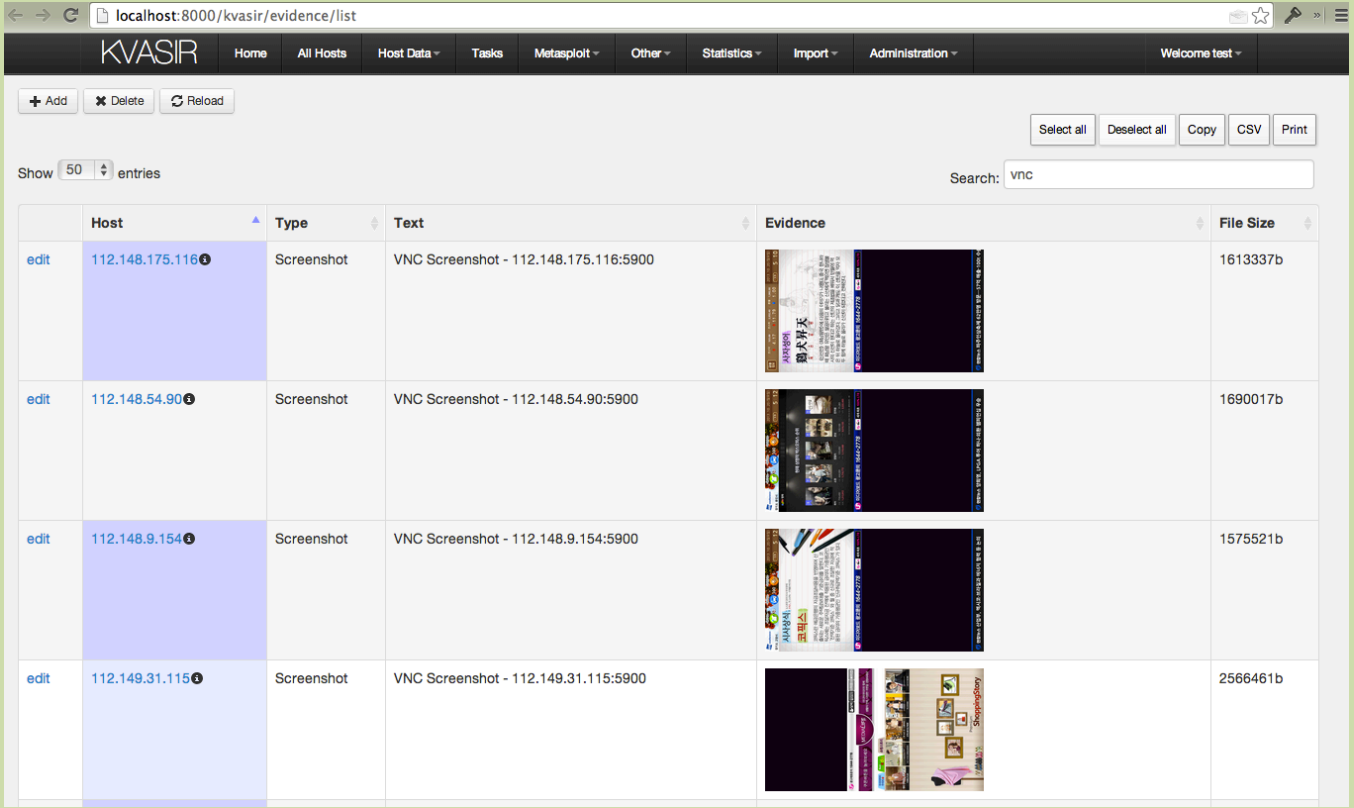
Search:

Host	Port	Username	Fullname	Domain	Password	Hash 1 Type	Hash 1	Hash 2 Type	Hash 2	UID	GID	Level	Active	Source	Message
10.89.172.203 :: WIN2K3-203	info/0	db2admin			db2admin							ADMIN	true	cifs-db2-default-login	
10.89.172.148 :: URANUS	tcp/1433	sa			sa							ADMIN	true	tds-default-account-sa-sa	
10.89.172.157 :: VENUS	tcp/21	ftp			ftp							ADMIN	true	ftp-generic-0001	
10.89.172.201 :: rh62-oracle	tcp/21	anonymous			joe@							ADMIN	true	ftp-generic-0002	
10.89.172.195 :: WIN2K-195	tcp/21	anonymous			joe@							ADMIN	true	ftp-generic-0002	
10.89.172.151 :: MERCURY	tcp/21	ftp			ftp							ADMIN	true	ftp-generic-0001	
10.89.172.131	tcp/23				cisco							ADMIN	true	telnet-cisco-default-password-cisco	

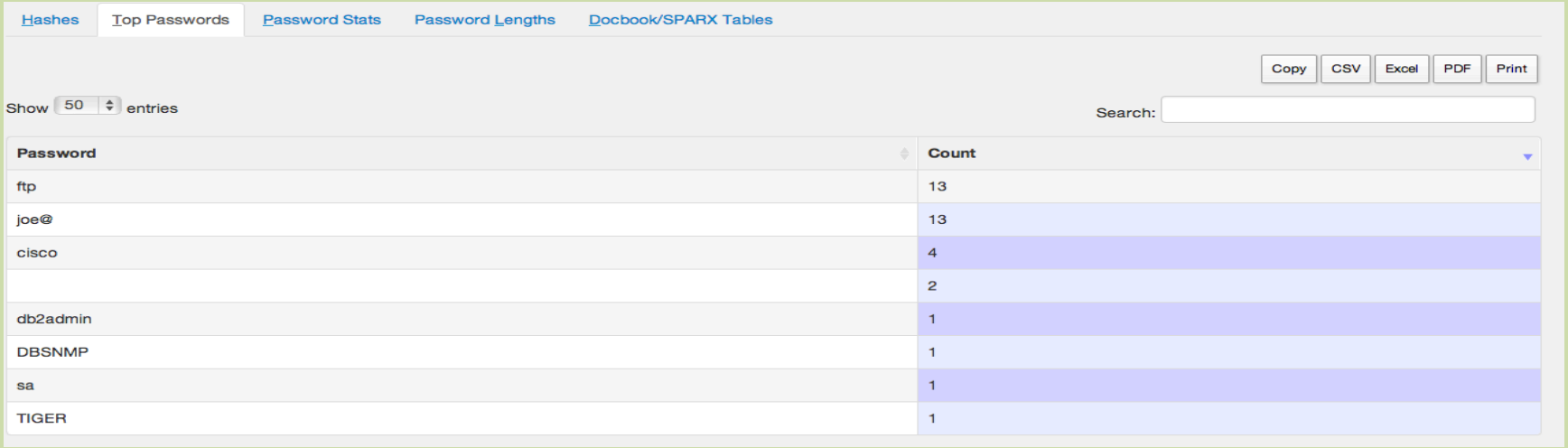
Windows Domain Memberships



Evidence (Screenshots, Docs, etc)



Password Statistics



Vulnerability Statistics

Filter: OFF/[All]

Select all | Deselect all | Copy | CSV | Print

Show 50 entries

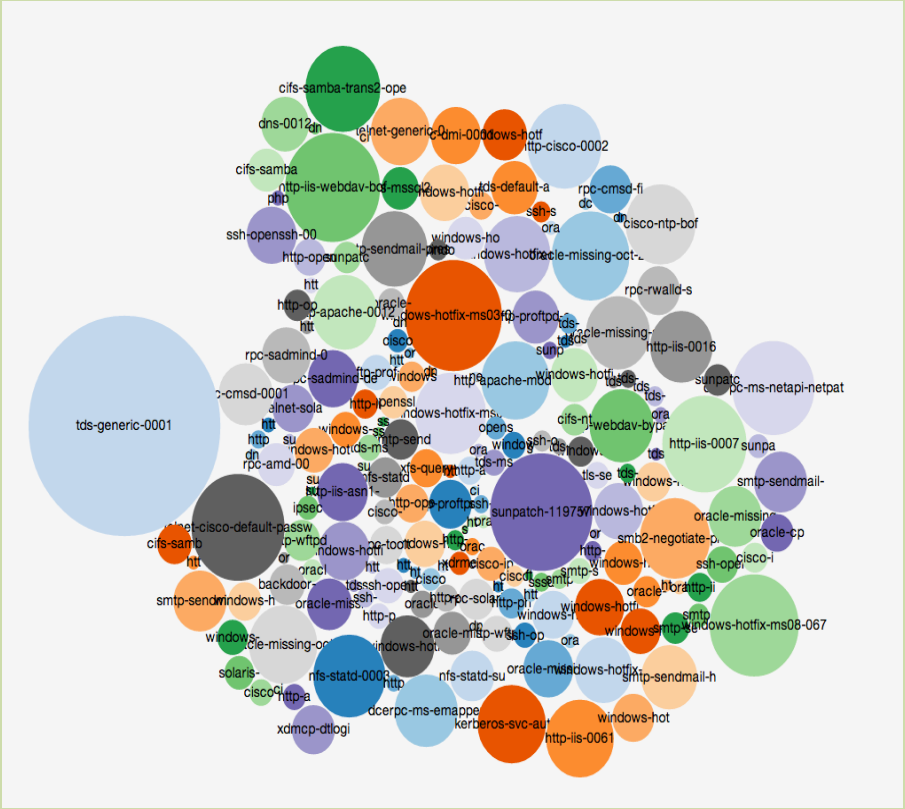
Search:

Vulnerability ID	Status	Count	Severity	CVSS Score
windows-hotfix-ms08-067	potential	53	10	10.0
kerberos-svc-auth-gss-buffer-overflow	potential	43	10	10.0
windows-hotfix-ms09-048	potential	28	10	7.1
telnet-generic-0006	vulnerable-exploited	22	10	10.0
rpc-rwalld-syslog-format-string-bof	potential	21	10	7.5
rpc-cmsd-0001	potential	21	10	10.0
smtp-sendmail-signal-memory-corruption	potential	21	10	7.6
smtp-sendmail-header-parsing-bof	vulnerable-version	20	10	10.0
smtp-sendmail-header-parsing-bof2	vulnerable-version	20	10	10.0
nfs-statd-suse-string-parsing-vuln	potential	18	10	10.0
rpc-cmsd-file-overwrite	potential	18	10	9.3
nfs-statd-0003	potential	18	10	10.0
xdmcp-dtlogin-double-free	potential	17	10	10.0
windows-hotfix-ms09-061	potential	15	10	7.1
windows-hotfix-ms09-062	potential	15	10	7.1

Vulnerability Circles

"In progress"

Diameter calculated by service counts, CVSS details, accounts, severity, etc



ON THE HORIZON

Lots to still do…

- Consistent vulnerability database (VulnDB?) that maps to vendor tags (QID, NessusID, Nexpose ID)
- Additional vulnerability scanner support
- Metasploit to release their new MDM structure
- Integration with customer/on-site management tools (Archer, ThreadFix, etc)
- Probably an overhaul of the user interface
- Whatever is in TODO.md that I thought of while sleepless on a 10hr flight back home

http://github.com/KvasirSecurity/Kvasir

THANK YOU!