Intro Forensics

Presented by Pranav, challenges & slides borrowed from friends @ UW (Batman’s Kitchen)

sigpwny{next_time_i_wont_forget_the_flags}

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Things we'll cover

concepts:

- file formats
- network protocols
- steganography

tools:

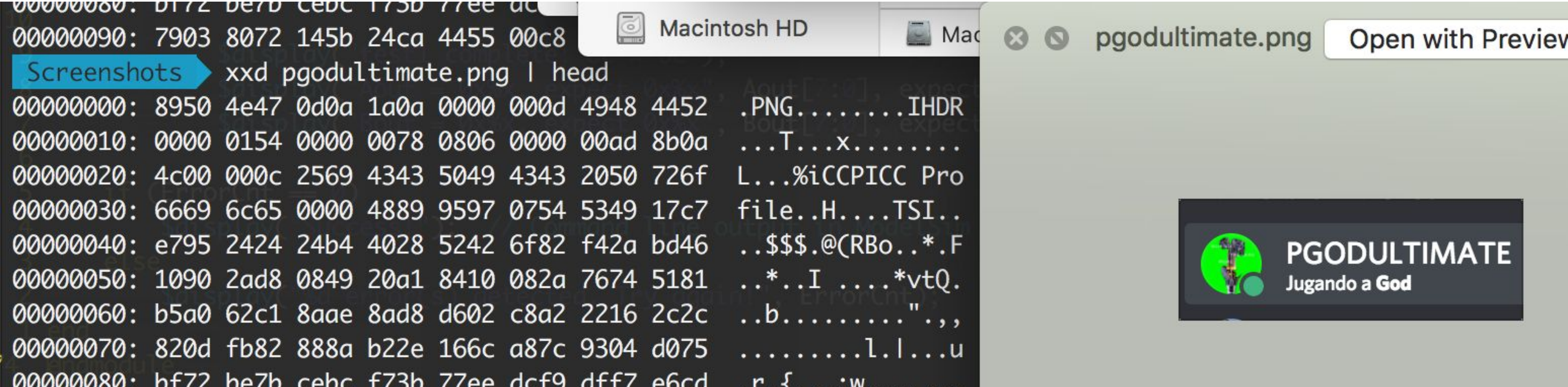
- foremost
- wireshark
- stegsolve

Jobs in this field that use forensics skills

- Incident Response - looking at things post-hack
- Malware Analysis - obfuscated exfiltration methods
- These skills are general and make you better at using a computer (but that’s true about pretty much anything you learn so…)
- I don’t really know! Feel free to DM me / throw out suggestions.

Magic Number

- File formats usually start with a sequence of bytes
- how does the **file** utility work? usu. by checking magic #s
- you can check with: **xxd filename | head**
- This is useful for identifying files!



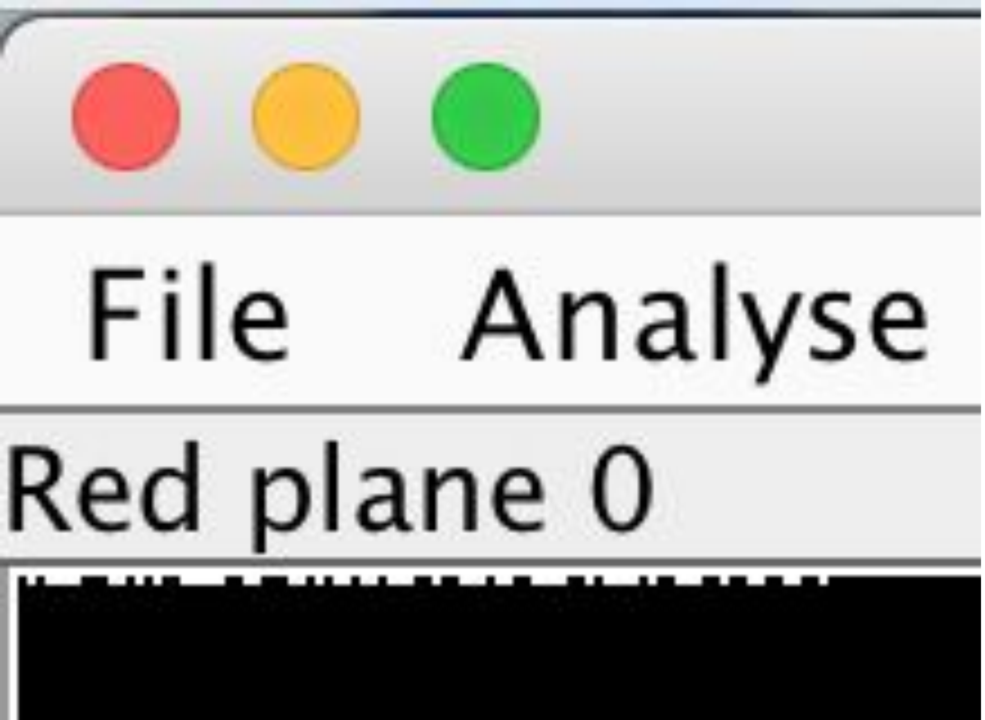
```
00000080: bf72 be7b cebc f73b 77ee ac
00000090: 7903 8072 145b 24ca 4455 00c8
 Screenshots  xxd pgodultimate.png | head
00000000: 8950 4e47 0d0a 1a0a 0000 000d 4948 4452  .PNG........IHDR
00000010: 0000 0154 0000 0078 0806 0000 00ad 8b0a  ...T...x........
00000020: 4c00 000c 2569 4343 5049 4343 2050 726f  L...%iCCPICC Pro
00000030: 6669 6c65 0000 4889 9597 0754 5349 17c7  file..H....TSI..
00000040: e795 2424 24b4 4028 5242 6f82 f42a bd46  ..$$$.@(RBo..*.F
00000050: 1090 2ad8 0849 20a1 8410 082a 7674 5181  ..*..I ....*vtQ.
00000060: b5a0 62c1 8aae 8ad8 d602 c8a2 2216 2c2c  ..b.........".,,
00000070: 820d fb82 888a b22e 166c a87c 9304 d075  .........l.|...u
00000080: bf72 be7b cebc f73b 77ee dcf9 dff7 e6cd  .r.{....:w......
```

Foremost quick usage:

- It is a “file carver” — used for recovering files from disk images
- looks for headers (magic numbers, footers, data structures)
- **apt-get install foremost** or **pip install foremost**
- foremost -i input_file # will create output/ with results, if any

Try: animals.dd challenge

Steganography: hiding things in files



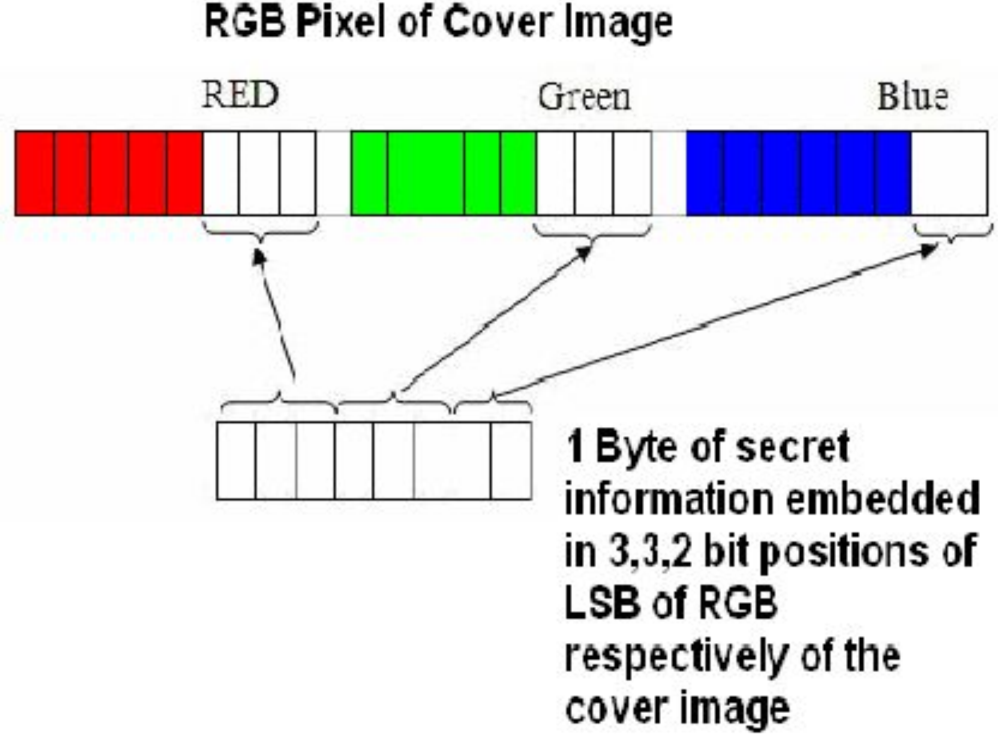
File Analyse

Red plane 0

- RGB: LSB of an image
- sometimes you have to hunt for the right tool, sometimes you have to write your own

< stegsolve

Steganography: hiding things in files



RGB Pixel of Cover Image

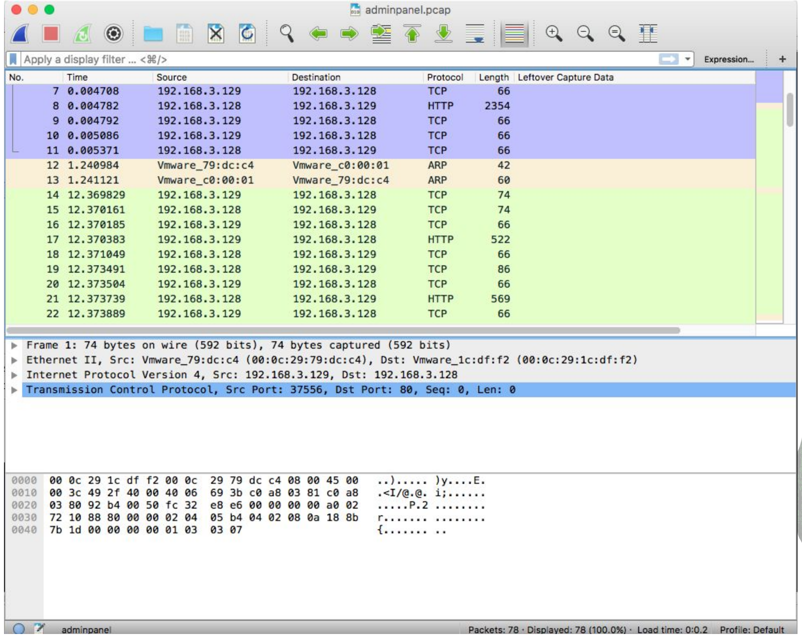
1 Byte of secret information embedded in 3,3,2 bit positions of LSB of RGB respectively of the cover image

Wireshark

- tool for analyzing network protocols
- very useful for day-to-day
- fun with wireshark: finding 0days @ DEF CON CTF

Adminpanel.pcap challenge!

Step 1: open wireshark with data



No.	Time	Source	Destination	Protocol	Length	Leftover Capture Data
7	0.004708	192.168.3.129	192.168.3.128	TCP	66	
8	0.004782	192.168.3.128	192.168.3.129	HTTP	2354	
9	0.004792	192.168.3.129	192.168.3.128	TCP	66	
10	0.005086	192.168.3.129	192.168.3.128	TCP	66	
11	0.005371	192.168.3.128	192.168.3.129	TCP	66	
12	1.240984	Vmware_79:dc:c4	Vmware_c0:00:01	ARP	42	
13	1.241121	Vmware_c0:00:01	Vmware_79:dc:c4	ARP	60	
14	12.369829	192.168.3.129	192.168.3.128	TCP	74	
15	12.370161	192.168.3.128	192.168.3.129	TCP	74	
16	12.370185	192.168.3.129	192.168.3.128	TCP	66	
17	12.370383	192.168.3.129	192.168.3.128	HTTP	522	
18	12.371049	192.168.3.128	192.168.3.129	TCP	66	
19	12.373491	192.168.3.128	192.168.3.129	TCP	86	
20	12.373504	192.168.3.129	192.168.3.128	TCP	66	
21	12.373739	192.168.3.128	192.168.3.129	HTTP	569	
22	12.373889	192.168.3.129	192.168.3.128	TCP	66	

```
▶ Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
▶ Ethernet II, Src: Vmware_79:dc:c4 (00:0c:29:79:dc:c4), Dst: Vmware_1c:df:f2 (00:0c:29:1c:df:f2)
▶ Internet Protocol Version 4, Src: 192.168.3.129, Dst: 192.168.3.128
▶ Transmission Control Protocol, Src Port: 37556, Dst Port: 80, Seq: 0, Len: 0
```

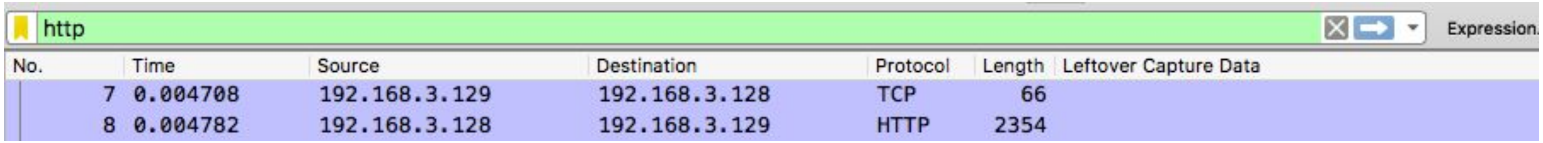
```
0000  00 0c 29 1c df f2 00 0c  29 79 dc c4 08 00 45 00   ..)..... )y....E.
0010  00 3c 49 2f 40 00 40 06  69 3b c0 a8 03 81 c0 a8   .<I/@.@. i;......
0020  03 80 92 b4 00 50 fc 32  e8 e6 00 00 00 00 a0 02   .....P.2 ........
0030  72 10 88 80 00 00 02 04  05 b4 04 02 08 0a 18 8b   r....... ........
0040  7b 1d 00 00 00 00 01 03  03 07                     {....... ..
```

adminpanel

Packets: 78 · Displayed: 78 (100.0%) · Load time: 0:0.2   Profile: Default

Adminpanel.pcap challenge!

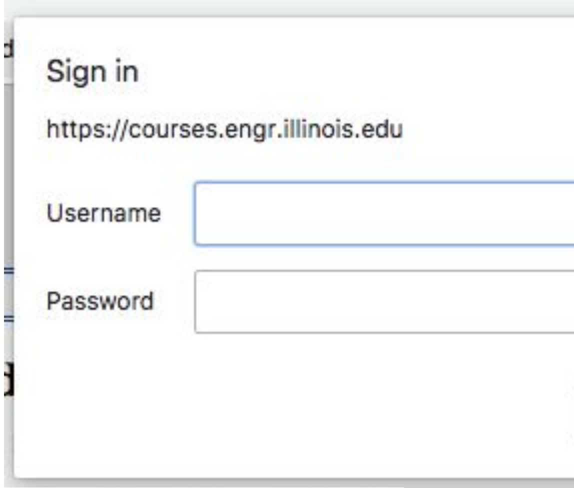
Step 2: Filter relevant data



http

No.	Time	Source	Destination	Protocol	Length	Leftover Capture Data
7	0.004708	192.168.3.129	192.168.3.128	TCP	66	
8	0.004782	192.168.3.128	192.168.3.129	HTTP	2354	

Adminpanel.pcap challenge!



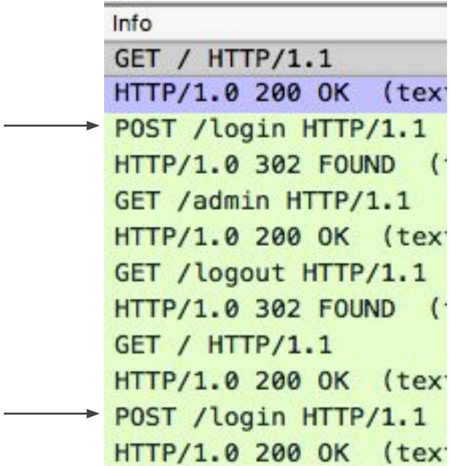
Sign in

https://courses.engr.illinois.edu

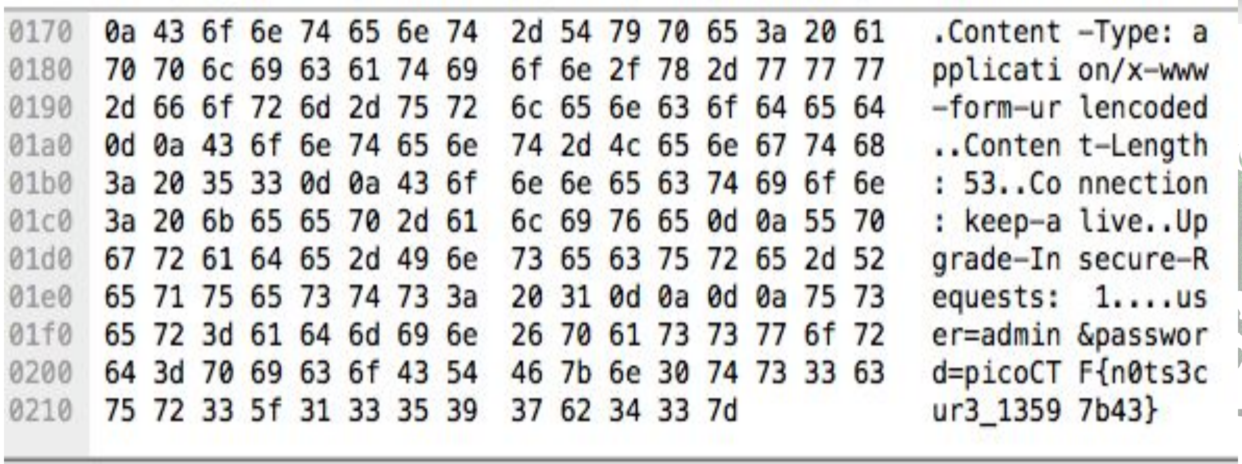
Username

Password

Step 3: Look at useful info and read!



```
Info
GET / HTTP/1.1
HTTP/1.0 200 OK  (tex
POST /login HTTP/1.1
HTTP/1.0 302 FOUND  (
GET /admin HTTP/1.1
HTTP/1.0 200 OK  (tex
GET /logout HTTP/1.1
HTTP/1.0 302 FOUND  (
GET / HTTP/1.1
HTTP/1.0 200 OK  (tex
POST /login HTTP/1.1
HTTP/1.0 200 OK  (tex
```



```
0170  0a 43 6f 6e 74 65 6e 74  2d 54 79 70 65 3a 20 61   .Content -Type: a
0180  70 70 6c 69 63 61 74 69  6f 6e 2f 78 2d 77 77 77   pplicati on/x-www
0190  2d 66 6f 72 6d 2d 75 72  6c 65 6e 63 6f 64 65 64   -form-ur lencoded
01a0  0d 0a 43 6f 6e 74 65 6e  74 2d 4c 65 6e 67 74 68   ..Conten t-Length
01b0  3a 20 35 33 0d 0a 43 6f  6e 6e 65 63 74 69 6f 6e   : 53..Co nnection
01c0  3a 20 6b 65 65 70 2d 61  6c 69 76 65 0d 0a 55 70   : keep-a live..Up
01d0  67 72 61 64 65 2d 49 6e  73 65 63 75 72 65 2d 52   grade-In secure-R
01e0  65 71 75 65 73 74 73 3a  20 31 0d 0a 0d 0a 75 73   equests:  1....us
01f0  65 72 3d 61 64 6d 69 6e  26 70 61 73 73 77 6f 72   er=admin &passwor
0200  64 3d 70 69 63 6f 43 54  46 7b 6e 30 74 73 33 63   d=picoCT F{n0ts3c
0210  75 72 33 5f 31 33 35 39  37 62 34 33 7d            ur3_1359 7b43}
```

ext-super-magic.img

- ext2 is a filesystem
- it has “superblocks” that contain metadata about files
- Something has happened to one of the superblock fields!
- could it be…. the magic number????
- more info: this GNU spec or this page from OSdev wiki
- you can mount filesystems using the mount command

Get started!

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Flags are up on sigpwny.com