Capture The Flag 101

SecTalks SYD0x0b

Sydney, Australia

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#!/whoami

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What

Capture the flag

Capture The Flag (CTF)

- An IT security puzzle
- Topics
  - Computer security
  - Computer science
  - Networking
  - IT operation
- Objective: Find a way to get the flag in a limited time

Challenges

Web/Network

- Weaknesses in web applications/servers

Forensics

- Finding the needle in the haystack

Cryptography

- Weakness in cryptography, primitives or implementations

Reverse engineering

- Exploring a binary data (static and dynamic analysis)

Exploitation

- Write a working code

Miscellaneous

- Recon, Algorithm, Puzzle

Flag

Hidden or seems impossible to access through normal ways

Types:

- A file
- A message
- A series of characters

Solutions

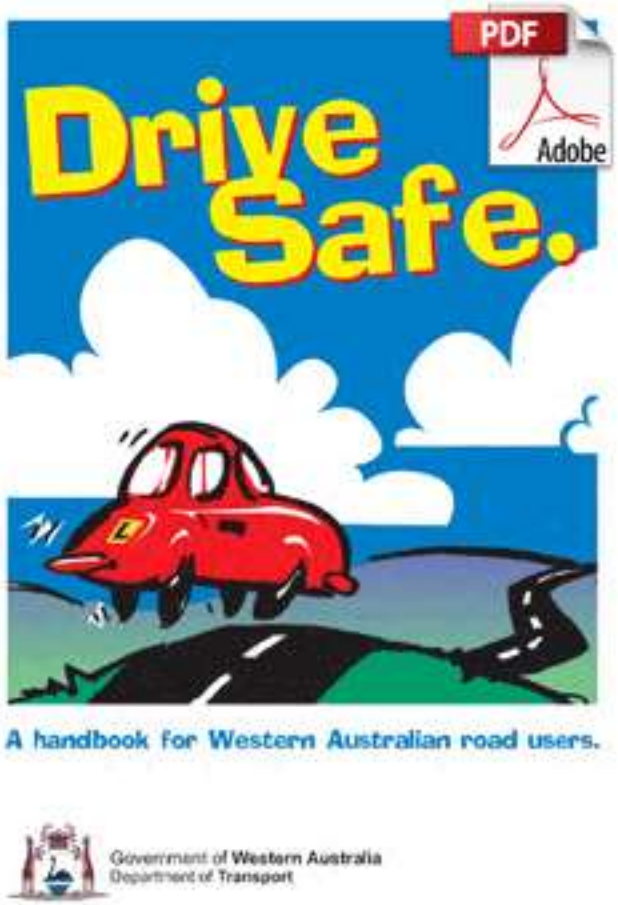
- Writing a code snippet
- Exploiting a known vulnerabilities (or maybe zero-day)
- Script (e.g. bash)
- Using a **tool** (e.g. debugger, static code analysers, proxies)
- Finding an algorithm to get the flag
- Engineer a way to get to the flag

Rules

- Bring along your gears.
- Attacking CTF scoring system results in disqualification.
- Attacking CTF competitors results in disqualification*.
- You get point(s) for solving each challenge.
- Team with highest number of points wins.

Why

Capture the flag



We never learn to drive by reading a book!

We like games!

- We enjoy learning through games.
- We learn skillset as well as the theory.
- In a game we need to put the theory in practice.

CTF

1. Understand the concept
2. Get hands-on skillset
3. Learn a new computer security techniques
4. Improve problem solving skills
5. Improves the thought process to think like a hacker/attacker
6. Helps to think out of the box and intuitively

Do you want to be a security tester?

Security testing is not about running XYZ tool.

It is about thinking intuitively, out-of-the-box and coming up with edge cases that no one has thought.

You need to be able to think like a hacker/attacker.

A taste of CTF

Get a taste of different CTF challenges

Words Misheard

Silent! Listen...

I run to escape a persecution.

The eyes, they see.

The flag is insatiable.

Category: Recon, Points: 100

Hint

Pay attention to the search result of “I run to escape a persecution”

Hint

Anagram

a word, phrase, or sentence formed from another by rearranging its letters: “Angel” is an anagram of “glean.”

Solution

The flag is banalities that is one-word anagram for insatiable.

Reference

http://hsctf.com/

Find the password

Browse to

http://hax.tor.hu/warmup1/

What is the password?

Category: Web, Points: 100

Hint

View the source of the page source

Search for “Password:”

Search for “function a”

Hint

- Press F12, go to Debugger, Click on line 398, Type a password, press Go.
- Press Ctrl+P, Type “*thepw”.

Solution

warmup1lolcopter

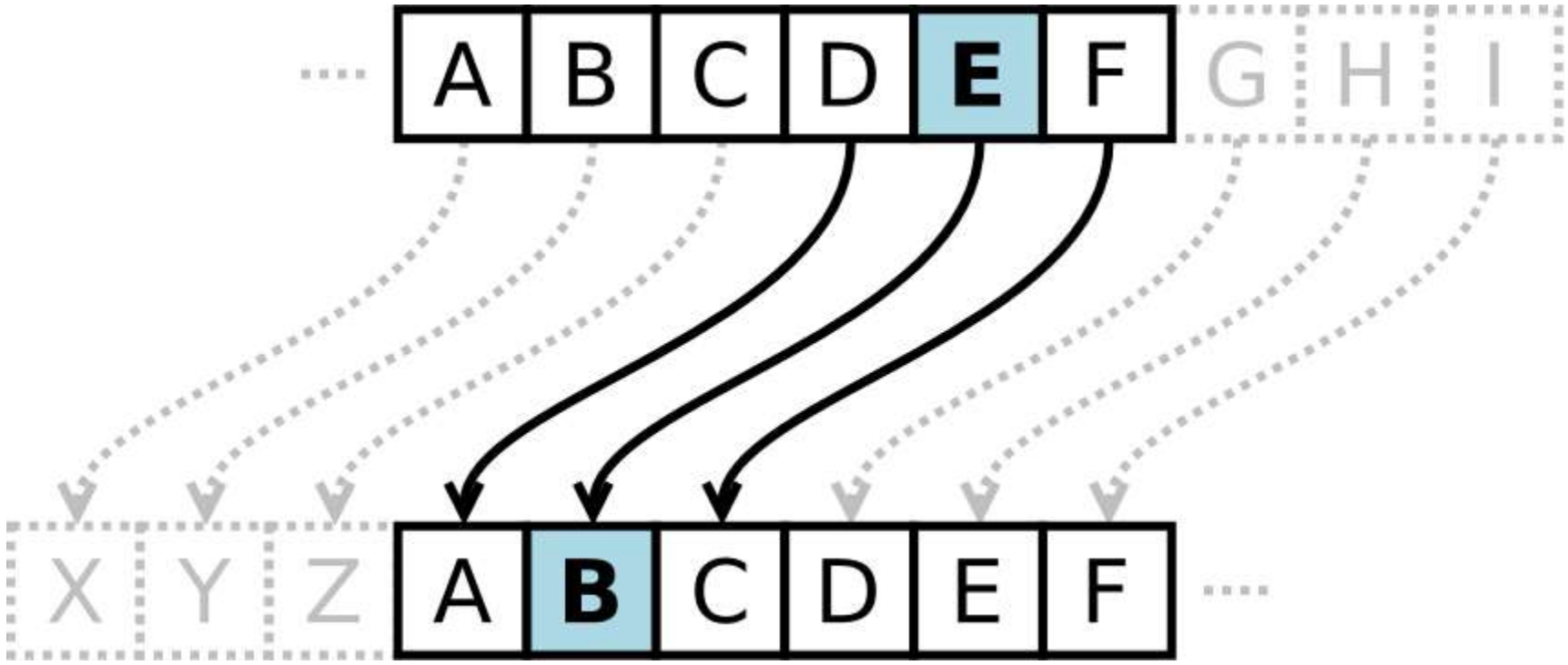
What is the secret message?

GUR PNRFNE PVCURE VF BAR BS GUR FVZCYRFG RAPELCGVBA NYTBEVGUZF VA JUVPU RIREL YNGVA YRGGRE BS N TVIRA FGEVAT VF FVZCYL FUVSGRQ PLPYVNPNYYL OL N PREGNVA BSSFRG. SBE PENPXVAT GUR RAPELCGVBA, JR PBHYQ VGRENGR BIRE NYY BCCBEGHAVGVRF NAQ NF BHE NYCUNORG HFRF WHFG 26 YNGVA YRGGREF, JR JBHYQ BOGNVA GUR QRPELCGRQ FGEVAT VA NG ZBFG 25 GEVRF, JUVPU VF DHVGR GEVIVNY. GUR SYNT VF FRPGNYXF

Category: Crypto, Points: 100

Hint

The Caesar cipher is one of the simplest encryption algorithms in which every latin letter of a given string is simply shifted cyclically by a certain offset.



Hint

For cracking the encryption, we could iterate over all opportunities and as our alphabet uses just 26 Latin letters, we would obtain the decrypted string in at most 25 tries, which is quite trivial. An example of the Caesar cipher is rot13 (rotate by 13 places) in which the alphabet is rotated by exactly the halve alphabet.

Solution

The Caesar cipher is one of the simplest encryption algorithms in which every Latin letter of a given string is simply shifted cyclically by a certain offset. For cracking the encryption, we could iterate over all opportunities and as our alphabet uses just 26 Latin letters, we would obtain the decrypted string in at most 25 tries, which is quite trivial.
The flag is sectalks

http://www.cryptool-online.org/index.php?option=com_content&view=article&id=48&Itemid=95&lang=en

Never login through HTTP

We tapped a line while someone logging in to a server. Can you tell if the person managed to login successfully?

Here is the capture file:

http//www.sectalks.org/ctf101/01-the-basics/ctf101_the-basics_forensic.zip

Category: Forensic, Points: 150

Hint

File extensions (.XYZ) do not tell us anything.

In Linux, run ‘file [FILENAME]’ to understand the file type.

Hint

Open the file with wireshark

Hint

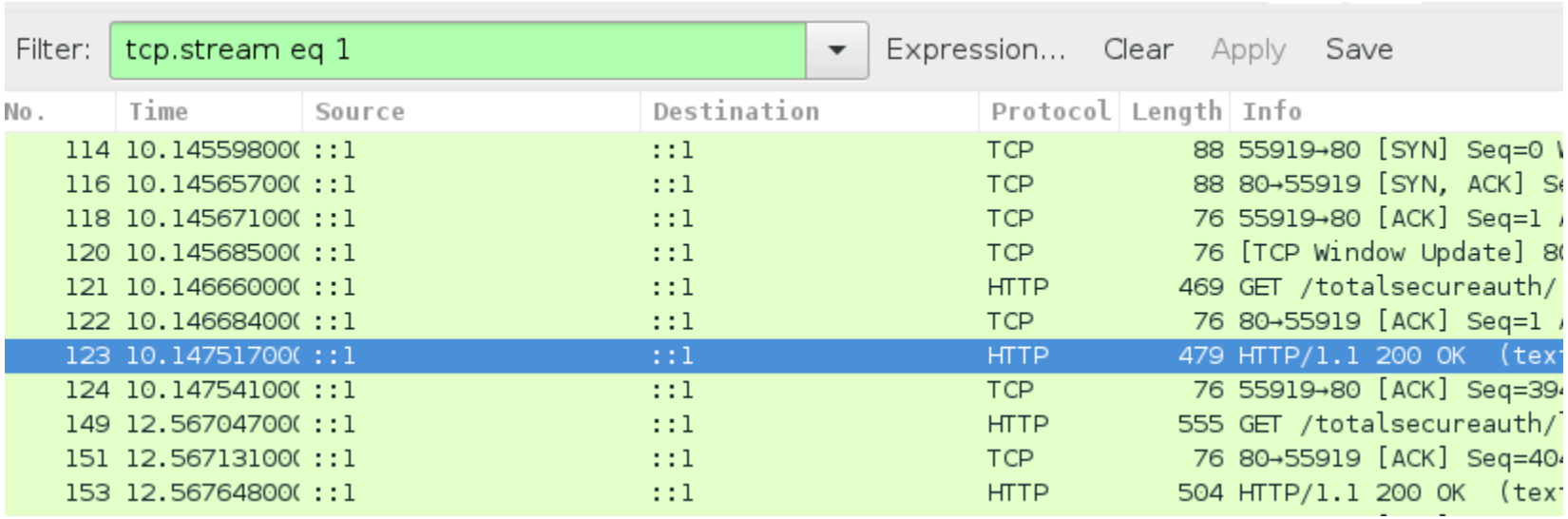
Find http communications

Right click and select “TCP Follow”

Hint

The person tried to login twice.

Solution

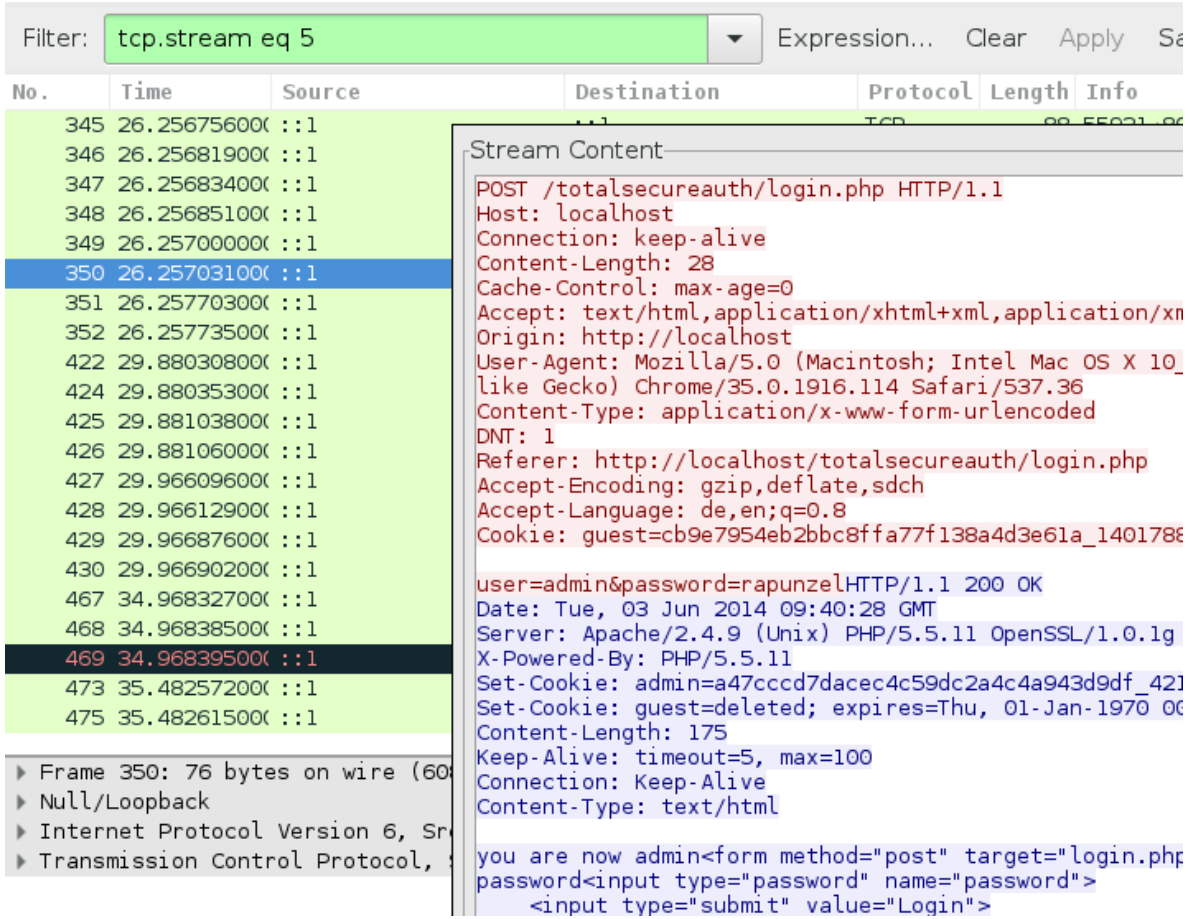


Solution

Stream Content

```
Accept-Encoding: gzip,deflate,sdch
Accept-Language: de,en;q=0.8
Cookie: guest=cb9e7954eb2bbc8ffa77f138a4d3e61a_1401788412

HTTP/1.1 200 OK
Date: Tue, 03 Jun 2014 09:40:14 GMT
Server: Apache/2.4.9 (Unix) PHP/5.5.11 OpenSSL/1.0.1g mod_perl/2.0.8-dev Perl/v5.16.3
X-Powered-By: PHP/5.5.11
Content-Length: 158
Keep-Alive: timeout=5, max=99
Connection: Keep-Alive
Content-Type: text/html

<form method="post" target="login.php">user<input name="user">
password<input type="password" name="password">
    <input type="submit" value="Login">
</form>POST /totalsecureauth/login.php HTTP/1.1
Host: localhost
Connection: keep-alive
Content-Length: 23
Cache-Control: max-age=0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Origin: http://localhost
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_9_3) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/35.0.1916.114 Safari/537.36
Content-Type: application/x-www-form-urlencoded
DNT: 1
Referer: http://localhost/totalsecureauth/login.php
Accept-Encoding: gzip,deflate,sdch
Accept-Language: de,en;q=0.8
Cookie: guest=cb9e7954eb2bbc8ffa77f138a4d3e61a_1401788412

user=test&password=testHTTP/1.1 200 OK
Date: Tue, 03 Jun 2014 09:40:19 GMT
Server: Apache/2.4.9 (Unix) PHP/5.5.11 OpenSSL/1.0.1g mod_perl/2.0.8-dev Perl/v5.16.3
X-Powered-By: PHP/5.5.11
Content-Length: 172
Keep-Alive: timeout=5, max=98
Connection: Keep-Alive
Content-Type: text/html

wrong password<form method="post" target="login.php">user<input name="user">
password<input type="password" name="password">
    <input type="submit" value="Login">
</form>
```

Solution



How to master a CTF?

The golden rule

Practice

Practice and practice even more!

SecTalks

What

Monthly technical (in)security talks and hands-on challenges, no bullshit!

How

CTF and/or Presentation

When

Monthly

Where

Currently in Perth, Sydney and Brisbane

Connect

IRC

irc.sectalks.org:6697 (SSL) channel: #sectalks

Twitter: sectalks

Next meetup

Find your next local meetup at

www.sectalks.org

Wrap up

Conclusion

Wrap up

- What CTF is
- Two very benefits of CTF
  - Improves the thought process to think like a hacker/attacker
  - Helps to think out of the box and intuitively
- Went through Recon, Crypto, Web, Forensic challenges
  - Learn fundamental method to solve CTF challenges
- The golden CTF rule
    - Practice and practice even more

Hand picked resources

- Cryptography
  - 9 minutes video on cryptography 101 (by Prof. D. Brumley)
  - Introduction to Cryptography (by picoctf.com)
  - Ciphers and tools to test (from cryptool-online.org)
  - Cryptography step-by-step exercises (from Matasano)

Next

What will be covered in the next workshop

Coming up

Cryptography

- Common ciphers
- Cryptanalysis
- Breaking the crypto code using Python
- Some crypto challenges

That’s all for now.

Get in touch if you have any questions.

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