P=NP CTF Team

Writeups   Categories   Tags   About

sCTF Q1 2016 - Verticode

Apr 20, 2016 • By thezero

Category: writeups

Tags: crypto   sctf-2016

Verticode

Cryptography - 90 Points

Welcome to Verticode, the new method of translating text into vertical codes.

Each verticode has two parts: the color shift and the code.

The code takes the inputted character and translates it into an ASCII code, and then into binary, then puts that into an image in which each black pixel represents a 1 and each white pixel represents a 0.

For example, A is 65 which is 1000001 in binary, B is 66 which is 1000010, and C is 67 which is 1000011, so the corresponding verticode would look like this.

Except, it isn't that simple.

A color shift is also integrated, which means that the color before each verticode shifts the ASCII code, by adding the number that the color corresponds to, before translating it into binary. In that case, the previous verticode could also look like this.

The table for the color codes is: 0 = Red, 1 = Purple, 2 = Blue, 3 = Green, 4 = Yellow, 5 = Orange

This means that a red color shift for the letter A, which is 65 + 0 = 65, would translate into 1000001 in binary; however, a green color shift for the letter A, which is 65 + 3 = 68, would translate into 1000100 in binary.

Given this verticode, read the verticode into text and find the flag.

Note that the flag will not be in the typical sctf{flag} format, but will be painfully obvious text. Once you find this text, you will submit it in the sctf{text} format. So, if the text you find is adunnaisawesome, you will submit it as sctf{adunnaisawesome}`

Writeup

I started analyzing the problem step by step.

I wrote a script that can read Black/White Verticode from file.
After that I've added the colors shifts and finally I've glued all together.

The parse_bin and parse_color function detect Black/White and Colors Shifts.
In the main cicle the script read the image pixel per pixel (scaled by m=12, because a "block" is 12x12 pixels).
If we are in the first 7 pixel, detect the Color Shift. Otherwise read the "word" in data.
When it finish reading the current line apply the color shift to data char and append to key.

```python
#!/usr/bin/env python

import os, sys
import Image

def parse_bin(r,g,b):
    if r+g+b == 0:
        return 1
    else:
        return 0 # white is the new black 0

def parse_color(r,g,b):
    if r == 255 and g == 0 and b == 0: #Red
        return 0
    if r == 128 and g == 0 and b == 128: #Purple
      return 1
    if r == 0 and g == 0 and b == 255: #Blue
        return 2
    if r == 0 and g == 128 and b == 0: #Green
        return 3
    if r == 255 and g == 255 and b == 0: #Yellow
        return 4
    if r == 255 and g == 165 and b == 0: #Orange
        return 5

def main():
    im = Image.open("code1.png")
    pix = im.load()
```

```python
     m = 12
    data = ""
    key = ""
    for i in xrange(im.size[1]/m): # Row
        color = 0
        for j in xrange(im.size[0]/m): # Col
            if j == 0:
                r,g,b = pix[0,i*m]
                color = parse_color(r,g,b)
            if j>=7:
                r,g,b = pix[j*m,i*m]
                data += str(parse_bin(r,g,b))
            if j==13:
                key += chr(int(data, 2)-color)
                data = ""
    print "\n"+key
    return 0

if __name__ == '__main__':
    main()
```

This will print out a nice story about a man named *Joe Lopo*.
And suddently…

iamtheflagalllowercasenojoke

---

0 Comments   **P=NP CTF Team**   **1** **Login**

♡ **Recommend**   ⤴ **Share**   Sort by Newest

       Start the discussion…

                        Be the first to comment.

✉ **Subscribe**   Ⓓ **Add Disqus to your site Add Disqus Add**   🔒 **Privacy**

PequalsNP   -|-   visit us on ⭘ github - 🐦 twitter - ctftime.org   actually collaborating with JBZ team
subscribe via RSS