PUZZLE - CODING 300

"By following the information hidden in the text, R-Boy finds some very odd looking files in the directories. He can't understand what he's looking at and needs your help"

The challenge provide us a strange archive with a lot of files nested in many subdirectories. The files are only of two types:

- 7Zip archive protected with a password
- Text file with a special information

As first step we collected all the files inside the subdirectories into a single folder, resulting with a total of 16384 zip archives and 16384 text files.

The text files are all in this format:

r4TjXc8f-176:FIRST3MROCKPASSWORDS:335142485ef6d8b1dadf2f79720942630ac6e0d8e52dbea4976f9fcac34a1e26

Where the first part is the name of an archive in the folder, the second part is always *FIRST3MINTEGERS* or *FIRST3MROCKPASSWORDS* and the third part is a sha256 string.

The files so provide us the informations about the password of the encrypted archives.

Where the second part is *FIRST3MINTEGERS* the sha256 is of the password, a number under 3.000.000.
Where the second part is *FIRST3MROCKPASSWORDS* the sha256 is of a password, one of the first 3.000.000 strings in the famous "rockyou.txt" password list.

To extract the archives of *FIRST3MINTEGERS* we use this python script:

```
import hashlib
import os

def encrypt_string(hash_string):
    sha_signature = hashlib.sha256(hash_string.encode()).hexdigest()
    return sha_signature

shamap = {}

for i in range(0, 3000001):
  shamap[encrypt_string(str(i))] = str(i)

sha256 = open("FIRST3MINTEGERS.txt").readlines()
```

```
for f in sha256:
  opt = f.strip().split(":")
  sha = opt[3]
  arc = opt[1]
  print(arc, sha, shamap[sha])
  print("7za x coding3/" + arc + " -p" + shamap[sha])
  print()
  os.system("7za x coding3/" + arc + " -p" + shamap[sha])
```

Where FIRST3MINTEGERS.txt contains the list of all the FIRST3MINTEGERS password.

Same for FIRST3MROCKPASSWORDS:

```
import hashlib
import os
import re
import string
import subprocess

shamap = {}

with open("rockyou.txt", "br") as f:
  data = f.read().splitlines()
  for s in data:
    shamap[hashlib.sha256(s).hexdigest()] = s.decode("latin")

sha256 = open("FIRST3MROCKPASSWORDS.txt").readlines()

for f in sha256:
  opt = f.strip().split(":")
  sha = opt[3]
  arc = opt[1]
  print(arc, sha, shamap[sha])

  subprocess.call(["7z", "x", "-p" + shamap[sha], "-ocoding3", "-aoa",
"coding3/"+arc], stdout=subprocess.DEVNULL)
```

Where FIRST3MROCKPASSWORDS.txt contains the list of all the FIRST3MROCKPASSWORDS password.

As result we have 16384 png images, most of them are images of 718 bytes with no particular contents. Only 200 images seems to contains something interesting, in particular

a green text with a black background. As confirm of this, the suffix of the 200 images contains all the number between 0 and 199.

As final step we merged all the 200 images into one with this script:

```
import sys
from PIL import Image
import glob

lista = []
for i in range(200):
  lista = lista + glob.glob("correct/*-"+str(i)+".png")

imgs = [Image.open(i) for i in lista]

min_img_height = min(i.height for i in imgs)

total_width = 0
for i, img in enumerate(imgs):
    total_width += imgs[i].width

img_merge = Image.new(imgs[0].mode, (total_width, min_img_height))
x = 0
for img in imgs:
    img_merge.paste(img, (x, 0))

    x += img.width
img_merge.save('flag.jpg')
```

The resulting image is the solution:

{FLG:IC0mpl3t3dMyPuzzl3!}