ctf-实验吧-crypto

原创

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crypto
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1.trivial

下载文件解压，得到一个py文件，里面又一个加密算法，这是一个类移位加密，加密算法的key和加密之后的密文已知，然后对每个明文在不同范围内进行移位加密，直接解密即可

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

alphaL = "abcdefghijklnmopqrstuvqxyz"
alphaU = "ABCDEFGHIJKLMNOPQRSTUVQXYZ"
num    = "0123456789"
keychars = num+alphaL+alphaU
key="T0pS3cre7key"
plaintext="Bot kmws mikferuigmzf rmfrxrwqe abs perudsf! Nvm kda ut ab8bv_w4ue0_ab8v_DDU"
ciphertext=""
for i in range(len(plaintext)):
  rotate_amount = keychars.index(key[i%len(key)])
  if plaintext[i] in alphaL:
    enc_char = ord('a') + (ord(plaintext[i])-ord('a')-rotate_amount)%26
  elif plaintext[i] in alphaU:
    enc_char = ord('A') + (ord(plaintext[i])-ord('A')-rotate_amount)%26
  elif plaintext[i] in num:
    enc_char = ord('0') + (ord(plaintext[i])-ord('0')-rotate_amount)%10
  else:
    enc_char = ord(plaintext[i])
  ciphertext = ciphertext + chr(enc_char)
print ciphertext
```

2.rsarsa

rsa加密，已知p，q，e，c，算出n，d，直接解密，提交十进制的明文即可

```
import gmpy2
p=96484230290105156765905517400104265349457376392357398006439893520398525072984913995610350091634270503701
q=11874843837980297032092405848653656852760910154543380907650040190704283358909208578251063047732443992230
e=65537
c=83208298995174604174773590298203639360540024871256126892889661345742403314929861939100492666605647316646
n=p*q
d=int(gmpy2.invert(e,(p-1)*(q-1)))
mingwenint=pow(c,d,n)
print mingwenint
```

3.Marvin is plain Jane

根据题目提示这是Menezes-Vanstone加密（题中提到他的朋友叫menezes或van-stone），这里简单介绍一下Menezes-Vanstone加密，有利于理解下面的内容，Menezes-Vanstone加密是基于椭圆曲线的加密方案，在椭圆曲线上去一个基点G(x,y)，A，B选择随机数da，db作为密钥，然后就可以得到公钥DA=da*G，DB=db*G。A将明文M转化为二元组m(m1,m2)，然后计算(x1,y1)=da*Db，最后计算x2=(m1*x1)modp，y2=(m2*y1)modp组成二元组(x2,y2)即为密文，而B拿到密文后计算(x1,y1)=db*Da，则可以得到m1=(x2*x1^(-1))modp，m2=(y2*y1^(-1))modp，将m1和m2组合即可。在这道题中提到的brainpool p256r1经查询是椭圆曲线中的一个标准(在rfc5639中），可查到该椭圆曲线的一些标准，而在这里我们已知了二元组m中m1（文中反复提到的"Marvin is"），以及m加密后的(x2,y2)，而(x1,y1)所在的椭圆曲线已知(brainpool p256r1)，那么首先计算x1=x2*m1^(-1)，根据椭圆曲线得到x1对应点y1，在计算m2=y2*y1^(-1)即可得到答案。

```
def txt(istr):
 return int(istr.encode("hex"),16)
x1 = txt("Marvin is")
y1 = 71164450240897430648972143714791734771985061339722673162401654668605658194656
y2 = 12951693517100633909800921421096074083332346613461419370069191654560064909824
p = 0xA9FB57DBA1EEA9BC3E660A909D838D726E3BF623D52620282013481D1F6E5377
A = 0x7D5A0975FC2C3057EEF67530417AFFE7FB8055C126DC5C6CE94A4B44F330B5D9
B = 0x26DC5C6CE94A4B44F330B5D9BBD77CBF958416295CF7E1CE6BCCDC18FF8C07B6
#这里使用Tonelli-shanks算法寻找整数x使得a=(x^2)modp成立
def modular_sqrt(a, p):
 if legendre_symbol(a, p) != 1:
  return 0
 elif a == 0:
  return 0
 elif p == 2:
  return p
 elif p % 4 == 3:
  return pow(a, (p + 1) / 4, p)
 s = p - 1
 e = 0
 while s % 2 == 0:
  s /= 2
  e += 1
 n = 2
 while legendre_symbol(n, p) != -1:
  n += 1
 x = pow(a, (s + 1) / 2, p)
 b = pow(a, s, p)
 g = pow(n, s, p)
 r = e
 while True:
  t = b
  m = 0
  for m in xrange(r):
```

```
    if t == 1:
     break
    t = pow(t, 2, p)

   if m == 0:
    return x

   gs = pow(g, 2 ** (r - m - 1), p)
   g = (gs * gs) % p
   x = (x * gs) % p
   b = (b * g) % p
   r = m
#这里使用Euler's criterion判别是否存在整数x使得a=(x^2)modp成立
def legendre_symbol(a, p):
 ls = pow(a, (p - 1) / 2, p)
 return -1 if ls == p - 1 else ls
def egcd(a, b):
 if a == 0:
  return (b, 0, 1)
 else:
  g, y, x = egcd(b % a, a)
  return (g, x - (b // a) * y, y)
def modinv(a, m):
 g, x, y = egcd(a, m)
 if g != 1:
  raise Exception('modular inverse does not exist')
 else:
  return x % m
def gety(x):
 y = modular_sqrt(x**3 + A * x + B, p) % p
 y2 = -y % p
 return y,y2
def hextotext(nbr):
 s = hex(nbr)[2:-1]
 if len(s) % 2 ==1:
  s = "0"+s
 return s.decode("hex")
x1_inv = modinv(x1, p)
c1 = (y1 * x1_inv) % p
c2_1, c2_2 = gety(c1)
print repr(hextotext(y2*modinv(c2_1, p)  % p))
print repr(hextotext(y2*modinv(c2_2, p)  % p))
```

5.RSAROLL

根据题意可知该题是使用了RSA加密，而在文件中给出了n，e和一些c，这里n比较小，很容易就可以分解成p，q，然后即可解出d，再对c解密发现他们都在128以内，使用ascii表转化组合即可得到答案

```
import gmpy2
n=920139713
p=18443
q=49891
e=19
d=int(gmpy2.invert(e,(p-1)*(q-1)))
c=[704796792,752211152,274704164,18414022,368270835,483295235,263072905,459788476,483295235,459788476,66355
ch=""
for i in c:
    m=pow(i,d,n)
    ch+=chr(m)
print ch
```

6.神秘字母

阅读链接中的文字可知该加密是hill加密，对密文进行hill解密即可

```
from numpy import *
a=mat([[1,2],[0,1]])
a=a.I
mistr="dloguszijluswogany"
i=0
mingstr=""
while i<len(mistr):
    b=mat([[ord(mistr[i])-ord('a')+1],[ord(mistr[i+1])-ord('a')+1]])
    i=i+2
    c=(a*b).tolist()
    for j in xrange(-2,2):
        ch=26*j+c[0][0]
        if ch>0 and ch<=26:
            mingstr+=chr(int(ch)+ord('a')-1)
    for j in xrange(-2,2):
        ch=26*j+c[1][0]
        if ch>=0 and ch<26:
            mingstr+=chr(int(ch)+ord('a')-1)

print mingstr
```

7.我喜欢培根

打开文件发现是摩斯电码，解密，发现结尾可能是培根解密，而根据题目提示可以确定，求解。

```
#encode=utf-8
s='-- --- .-. ... . ..--.- .. ... ..--.- -.-. --- --- .-.. ..--.- -... ..- - ..--.- -... .- -.-. --- -. ..-
codebook = {
    'A':".-",'B':"-...",'C':"-.-.",'D':"-..",'E':".",'F':"..-.",'G':"--.",'H':"....",'I':"..",'J':".---",'K
}
codebook3 = {
    'A':"CCCCC",
    'B':"CCCCD",
    'C':"CCCDC",
    'D':"CCCDD",
    'E':"CCDCC",
    'F':"CCDCD",
    'G':"CCDDC",
    'H':"CCDDD",
```

```
    'I':"CDCCC",
    'J':"CDCCD",
    'K':"CDCDC",
    'L':"CDCDD",
    'M':"CDDCC",
    'N':"CDDCD",
    'O':"CDDDC",
    'P':"CDDDD",
    'Q':"DCCCC",
    'R':"DCCCD",
    'S':"DCCDC",
    'T':"DCCDD",
    'U':"DCDCC",
    'V':"DCDCD",
    'W':"DCDDC",
    'X':"DCDDD",
    'Y':"DDCCC",
    'Z':"DDCCD",
}
def decode(s):
    cipher=""
    i=0
    while i<len(s):
        c=s[i:i+5]
        sign=True
        for k in codebook3.keys():
            if codebook3[k] == c:
                cipher+=k
                sign=False
                break
        if sign:
            #cipher+=c
            pass
        i=i+5
    return(cipher)
cipher=""
ss = s.split(" ")
for c in ss:
    for k in codebook.keys():
        if codebook[k] == c:
             cipher+=k
             break
    else:
        cipher+=c
ch=cipher[34:]
list2=ch.split("/")
mingwen=""
for i in list2:
    mingwen+=decode(i)
    mingwen+=" "
print mingwen
```

8.Strength

打开文件发现顶部写着n，e，c，说明这是rsa加密，而再仔细看这里的所有n相同，猜测这里是相同明文在不同公钥加密而来的结果，而n有相同，所以这里可以使用rsa共模攻击，只需找到两个互质的e即可

```
import gmpy2
def egcd(a, b):
  if a == 0:
    return (b, 0, 1)
  else:
    g, y, x = egcd(b % a, a)
    return (g, x - (b // a) * y, y)

def shuchu(mingwenstr):
    if mingwenstr[len(mingwenstr)-1]=='L':
        mingwenstr=mingwenstr[2:len(mingwenstr)-1]
    else:
        mingwenstr=mingwenstr[2:len(mingwenstr)]
    if not len(mingwenstr)%2==0:
            mingwenstr='0'+mingwenstr
    i=len(mingwenstr)
    mingwen=""
    while i>=1:
        str1=mingwenstr[i-2:i]
        if int(str1,16)>33 and int(str1,16)<126:
            mingwen=chr(int(str1,16))+mingwen
        else :
            mingwen=" "+mingwen
        i=i-2
    print mingwen
list1=[{'e':0x1614984a0df,'c':0x7ded5789929000e4d7799f910fdbe615824d04b055336de784e88ba2d119f0c708c3b21e9d5
{'e':0x15ef25e10f54a3,'c':0x7c5b756b500801e3ad68bd4f2d4e1a3ff94d049774bc9c37a05d4c18d212c5b223545444e7015a7
{'e':0x1da0ca25f5a8d,'c':0x65af8559c93c05efecb6a3029dce7e831787878d5539f7b20fc7645ef4892cee23f53384377180a8
{'e':0xc2eac4c2b,'c':0x711892a29a738e3ac3b996427e4188f23d1c63d9d9c962bfd65b675698e432f27f0ce4e42101576dacaf
{'e':0x1a6c23,'c':0x57ab8d4c79a58718c0db0dd62a8ba97883e03cd7d14cc3366108a37e8998fc55abd555ca54f81fc975c64e1
{'e':0x2beccafd,'c':0x6630d2faf104547351da66f760fde920203a041b82f07c0db9034148f9dd17c1f14c2c8ec95ae64e8d0b5
{'e':0x280554063943,'c':0x5bcc5f5435fd087c9615bf04864a82a8fed19576fd311cfde565ca340303cd72d3842ad7a8de9c712
{'e':0x23b0d,'c':0x48bd06fba0691da8883286c21cd49e02eb65d0e3b6ee12b2113940cc64d9f6b921fcb6a8aa82aac592e6a955
{'e':0x6b8a5ae7,'c':0x6fdcbfb5cd2cacd032ef7200fd49b9f304a6dbd8399f4a91a72d1d9150f97b3b513f44dfc56f6f7c8ec41
{'e':0x360f1c91fed,'c':0xa149bb3969479d5b9eff15099ce863d36899d1146c731a91db91ef15869358df4dbe82eaca128d5cd9
{'e':0xefe30ec7dabb,'c':0x6fce7de911abe59864e01b9b306c167bdde17da28dfcfb7b3c768ec47d0ae4160cebedae9e482468c
{'e':0x753fdb5,'c':0xa2403b99c19c2a882bbca51ee414486e1d60db003d16fdf8f30290bae586aaa5500c74b6e8dfe7a3081092
{'e':0x12546aff963f4b6b35fL,'c':0x7293cec4d46c8073ce78b4ec8d97c086124376cf75fbcc4c0a57159b02e9c7a8545d4fa73
{'e':0x11d2843e693,'c':0x9d96bc542c7afe105b6415d7f0f6d55114d81761f46bfaebbfbf36188f9fbc3759c4693645f4605d17
{'e':0x9d540226f,'c':0x4c17528a0d1e36030f882d9c1060ccf974e48178cb7c4c8630968846ca668773881e41a780ba686315cc
{'e':0xee4c39df4ed4c0f,'c':0x9fdf693d41e020a9eff786f87f12dc2e2b518ecaa178c8991d06a3ef2e8e136aba94441bc8dbd5
{'e':0x213901ef4052b8b251c3L,'c':0xefa14d35d75b629673e8d983f1253134e4584ef16fd13618b23ea4e281f775942d370b38
{'e':0xe93f,'c':0x2e1622191a5d6092ef23dabb82bdbf0f5f9eb018f27184c05512679a38be06fc23ca57c1bd4129720e5d562ff
{'e':0x4042c3955,'c':0x8caeaa7d272f9606fee9222efd1d922143db738b95bd64746b27bc4c0fd979a2c57b4735131a4391a81b
{'e':0x61553816b407935,'c':0x9eade5cb88d453b00c0558f76ab78dc76537588ed1212ffdfdc4ecff98c55457a4b581d1579011
n=0xa5f7f8aaa82921f70aad9ece4eb77b62112f51ac2be75910b3137a28d22d7ef3be3d734dabb9d853221f1a17b1afb956a50236a
gcdlist=[]
for i in xrange(0,len(list1)):
    j=i+1
    while j<len(list1):
        g,x,y=egcd(list1[i]['e'],list1[j]['e'])
        if g==1:
            gcdlist.append(x)
            gcdlist.append(y)
            c1 = list1[i]['c']
            c2 = list1[j]['c']
```

```
            break
        else:
            j=j+1

if gcdlist[0]<0:
    c1=int(gmpy2.invert(c1,n))
    gcdlist[0]=-gcdlist[0]
if gcdlist[1]<0:
    c2=int(gmpy2.invert(c2,n))
    gcdlist[1]=-gcdlist[1]
miwenint=(pow(c1,gcdlist[0],n)*pow(c2,gcdlist[1],n))%n
shuchu(hex(miwenint))
```

9.唯密文攻击

根据后面作者提示可知，在200个密文中有一个明文与n有公因子，找到这个明文，求出其与n的公因子，即可找到n的素因子中最小的那个，求其md5值按要求填入答案即可

```
import hashlib
def gcd(a,b):
    if b>a:
        temp=a
        a=b
        b=temp
    c=1
    while not c==0:
        c=a%b
        a=b
        b=c
    return a
list1=[]
file = open("ciphertext.txt")
line = file.readline()
n=file.readline()
n=int(n)
while 1:
    line = file.readline()
    if not line:
        break
    elif line[0]>='0' and line[0]<='9':
        list1.append(line)
file.close()
for i in list1:
    b=int(i)
    if not gcd(n,b)==1:
        g=gcd(n,b)
        break
ga=n/g
if ga>g:
    print (hashlib.md5(str(g)).hexdigest()).upper()[:6]
else:
    print (hashlib.md5(str(ga)).hexdigest()).upper()[:6]
```

10.RSA

下载文件打开，发现开头有“pk”，猜测只是zip压缩文件(可用binwalk检测)，添加后缀后解压，发现enc文件和pem文件，pem文件打开时openssl的公钥文件，而enc不是数据包文件，所以enc文件应该时公钥文件加密后的密文文件，使用openssl得到RSA的n，e，用yafu对n分解获得p，q，从而得到d，用密钥(n,d)对密文解密即可

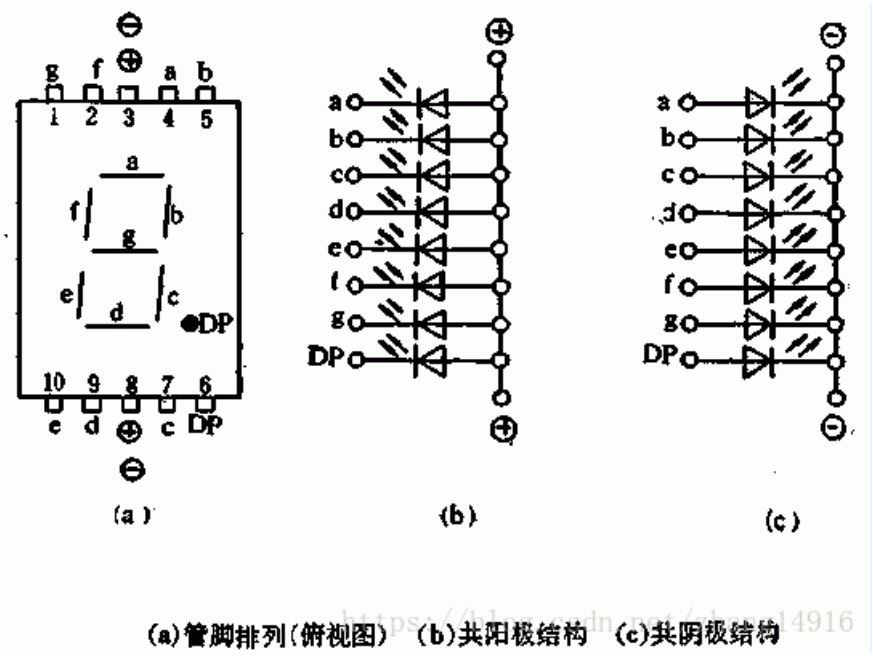
```
import sys
import os
import gmpy2
def shuchu(mingwenstr):
    if mingwenstr[len(mingwenstr)-1]=='L':
        mingwenstr=mingwenstr[2:len(mingwenstr)-1]
    else:
        mingwenstr=mingwenstr[2:len(mingwenstr)]
    if not len(mingwenstr)%2==0:
            mingwenstr='0'+mingwenstr
    i=len(mingwenstr)
    mingwen=""
    while i>=1:
        str1=mingwenstr[i-2:i]
        if int(str1,16)>33 and int(str1,16)<126:
            mingwen=chr(int(str1,16))+mingwen
        else :
            mingwen=" "+mingwen
        i=i-2
    print mingwen
p=258631601377848992211685134376492365269
q=286924040788547268861394901519826758027
e=65537
n=p*q
d=int(gmpy2.invert(e,(p-1)*(q-1)))
with open("flag.enc" , "rb") as f:
    s=f.read()
    miwen=long(s.encode('hex'),16)
    mingwenint=pow(miwen,d,n)
    mingwenstr=hex(mingwenint)
    shuchu(mingwenstr)
```

11.NSCTF crypto200

这个题准确的说应该是一道隐写题，下载得到一张图片，放入stegsolve中，发现在blue plane 0时这是个二维码，对其反色扫描即可得到答案

12.数码管

打开文件发现一张数码管的图片，查询有关数码管的资料，得知一个数码管需要8个电位(即0，1)控制，而且有共阴显示和共阳显示两种（即发光对应高电位还是低电位），这里的8个电位可组成一个ascii值，而颜色的不同是表示是其是否发光所对电位不同，尝试求解即可（从dp到a为从二进制高位到低位的方向）



13.压缩的问题

打开链接，发现一串16进制字符串，看开头就知道这大概是rar文件，用winhex将16进制写入文件，生成rar文件，解压，发现需要密码，根据题目提示取出65h-71h字符输入，解压成功，获得txt文件，计算文件sha1值输入即可(可直接使用linux下命令）

```
from hashlib import sha1
sha1Obj = sha1()
with open("秒破测试By天易love.txt", 'rb') as f:
    sha1Obj.update(f.read())
print sha1Obj.hexdigest()[:8]
```