Writeup ITobaFest2017

$(Cyber Security IPB - Pwning The World)

-|Recon|-

Temukan Jalannya

Diberikan sebuah string base64

QmFuayBJZGVudGlmaWNhdGlvbiBOdW1iZXINCjQ1NzA5OElTTzMxNjYtMQ==

Kita decode

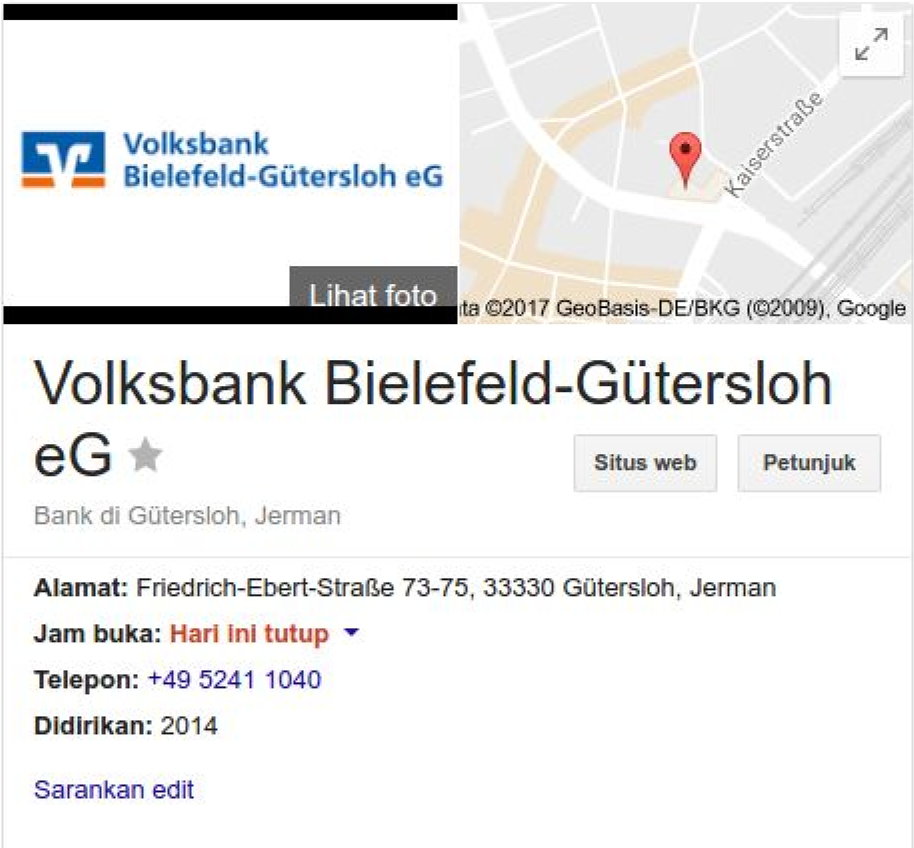
```
$ echo 'QmFuayBJZGVudGlmaWNhdGlvbiBOdW1iZXINCjQ1NzA5OElTTzMxNjYtMQ=='
| base64 -d

Bank Identification Number
457098ISO3166-1
```

Dengan skill Google-Fu, kita mencoba searching dengan keyword Bank Identification Number kita dapatkan https://binlist.net/ , nah pada website tersebut di jelaskan cara lookup Bank Identification Number

```
$ curl "https://lookup.binlist.net/457098"
{"scheme":"VISA","number":{"length":null,"prefix":"457098"},"type":
"CREDIT","brand":"","prepaid":false,"bank":{"name":"VOLKSBANK
GUETERSLOH","logo":"","url":"","city":"","phone":"49"},"country":{"
alpha2":"DE","name":"Germany","numeric":"276","latitude":51,"longit
ude":9}}
```

Didapatkan nama sebuah bank yaitu :
`VOLKSBANK GUETERSLOH`

Cari di google: "`VOLKSBANK GUETERSLOH`"



Volksbank Bielefeld-Gütersloh eG ★

Bank di Gütersloh, Jerman

Alamat: Friedrich-Ebert-Straße 73-75, 33330 Gütersloh, Jerman

Jam buka: Hari ini tutup ▾

Telepon: +49 5241 1040

Didirikan: 2014

Sarankan edit

Flagnya adalah Alamat: Friedrich-Ebert-Straße 73-75

Flagnya tanpa spasi
Flag: **ITF{Friedrich-Ebert-Straße73-75}**

-|Reversing|-

File binary bisa di-download di:

https://drive.google.com/open?id=0B2bPphSraI9FQ0pGZVRkX3A1R1U

Rev1

Diberikan binary

```
ev1: ELF 64-bit LSB executable, x86-64, version 1 (SYSV),
dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, for
GNU/Linux 2.6.24,
BuildID[sha1]=e6bc58d8305e173e600769315fd849e85d12c1d0, not
stripped
```

Yang jika dijalankan akan meminta flag dari inputan scanf kita. Coba buka dengan IDA.

```
int __cdecl main(int argc, const char **argv, const char **envp)
{
  int result; // eax@9
  __int64 v4; // rcx@9
  signed int i; // [sp+8h] [bp-38h]@1
  int v6; // [sp+Ch] [bp-34h]@1
  char v7[40]; // [sp+10h] [bp-30h]@1
  __int64 v8; // [sp+38h] [bp-8h]@1

  v8 = *MK_FP(__FS__, 40LL);
  printf("Flag: ", argv, envp);
  __isoc99_scanf(4196251LL, v7);
  v6 = 0;
  for ( i = 0; i <= 30; ++i )
  {
     if ( v7[i] == s[30 - i] )
     ++v6;
  }
  if ( v6 == 31 )
     puts("Correct!");
  else
     puts("Wrong!");
  result = 0;
  v4 = *MK_FP(__FS__, 40LL) ^ v8;
  return result;
}
```

Terlihat bahwa inputan kita, v7 akan dicek dengan array s. Namun urutannya terbalik. Dan dengan panjang 31, karena v6 harus bernilai 31. Kita coba lihat isi array s tersebut.

```
.data:0000000000601080 ; int s[]
.data:0000000000601080 s             dd 7Dh               ; DATA
XREF: main+6Ar
.data:0000000000601084               db  79h ; y
.data:0000000000601085               db    0
.data:0000000000601086               db    0
.data:0000000000601087               db    0
.data:0000000000601088               db  73h ; s
.data:0000000000601089               db    0
.data:000000000060108A               db    0
.data:000000000060108B               db    0
.data:000000000060108C               db  61h ; a
.data:000000000060108D               db    0
```

```
.data:000000000060108E            db   0
.data:000000000060108F            db   0
.data:0000000000601090            db  65h ; e
.data:0000000000601091            db   0
.data:0000000000601092            db   0
.data:0000000000601093            db   0
.data:0000000000601094            db  5Fh ; _
.data:0000000000601095            db   0
.data:0000000000601096            db   0
.data:0000000000601097            db   0
.data:0000000000601098            db  73h ; s
.data:0000000000601099            db   0
.data:000000000060109A            db   0
.data:000000000060109B            db   0
.data:000000000060109C            db  69h ; i
.data:000000000060109D            db   0
.data:000000000060109E            db   0
.data:000000000060109F            db   0
.data:00000000006010A0            db  5Fh ; _
.data:00000000006010A1            db   0
.data:00000000006010A2            db   0
.data:00000000006010A3            db   0
.data:00000000006010A4            db  65h ; e
.data:00000000006010A5            db   0
.data:00000000006010A6            db   0
.data:00000000006010A7            db   0
.data:00000000006010A8            db  73h ; s
.data:00000000006010A9            db   0
.data:00000000006010AA            db   0
.data:00000000006010AB            db   0
.data:00000000006010AC            db  72h ; r
.data:00000000006010AD            db   0
.data:00000000006010AE            db   0
.data:00000000006010AF            db   0
.data:00000000006010B0            db  65h ; e
.data:00000000006010B1            db   0
.data:00000000006010B2            db   0
.data:00000000006010B3            db   0
.data:00000000006010B4            db  76h ; v
.data:00000000006010B5            db   0
.data:00000000006010B6            db   0
.data:00000000006010B7            db   0
.data:00000000006010B8            db  65h ; e
.data:00000000006010B9            db   0
.data:00000000006010BA            db   0
.data:00000000006010BB            db   0
.data:00000000006010BC            db  72h ; r
```

```
.data:00000000006010BD                 db    0
.data:00000000006010BE                 db    0
.data:00000000006010BF                 db    0
.data:00000000006010C0                 db  5Fh ; _
.data:00000000006010C1                 db    0
.data:00000000006010C2                 db    0
.data:00000000006010C3                 db    0
.data:00000000006010C4                 db  79h ; y
.data:00000000006010C5                 db    0
.data:00000000006010C6                 db    0
.data:00000000006010C7                 db    0
.data:00000000006010C8                 db  73h ; s
.data:00000000006010C9                 db    0
.data:00000000006010CA                 db    0
.data:00000000006010CB                 db    0
.data:00000000006010CC                 db  61h ; a
.data:00000000006010CD                 db    0
.data:00000000006010CE                 db    0
.data:00000000006010CF                 db    0
.data:00000000006010D0                 db  65h ; e
.data:00000000006010D1                 db    0
.data:00000000006010D2                 db    0
.data:00000000006010D3                 db    0
.data:00000000006010D4                 db  7Bh ; {
.data:00000000006010D5                 db    0
.data:00000000006010D6                 db    0
.data:00000000006010D7                 db    0
.data:00000000006010D8                 db  74h ; t
.data:00000000006010D9                 db    0
.data:00000000006010DA                 db    0
.data:00000000006010DB                 db    0
.data:00000000006010DC                 db  73h ; s
.data:00000000006010DD                 db    0
.data:00000000006010DE                 db    0
.data:00000000006010DF                 db    0
.data:00000000006010E0                 db  65h ; e
.data:00000000006010E1                 db    0
.data:00000000006010E2                 db    0
.data:00000000006010E3                 db    0
.data:00000000006010E4                 db  46h ; F
.data:00000000006010E5                 db    0
.data:00000000006010E6                 db    0
.data:00000000006010E7                 db    0
.data:00000000006010E8                 db  61h ; a
.data:00000000006010E9                 db    0
.data:00000000006010EA                 db    0
.data:00000000006010EB                 db    0
```

```
.data:00000000006010EC                 db  62h ; b
.data:00000000006010ED                 db    0
.data:00000000006010EE                 db    0
.data:00000000006010EF                 db    0
.data:00000000006010F0                 db  6Fh ; o
.data:00000000006010F1                 db    0
.data:00000000006010F2                 db    0
.data:00000000006010F3                 db    0
.data:00000000006010F4                 db  54h ; T
.data:00000000006010F5                 db    0
.data:00000000006010F6                 db    0
.data:00000000006010F7                 db    0
.data:00000000006010F8                 db  49h ; I
.data:00000000006010F9                 db    0
.data:00000000006010FA                 db    0
.data:00000000006010FB                 db    0
```

Ok, terlihat ya dari bawah ke atas (terbalik) bahwa itu adalah flagnya.
Flag : **ITobaFest{easy_reverse_is_easy}**

Rev2

Diberikan sebuah file berformat .pyc yang merupakan file format python yang sudah ter-compile. Dengan menggunakan uncompyle6 kami mendapatkan hasil decompilenya.

```
$ uncompyle6 rev2.pyc
# uncompyle6 version 2.9.11
# Python bytecode 2.7 (62211)
# Decompiled from: Python 2.7.12 (default, Nov 19 2016, 06:48:10)
# [GCC 5.4.0 20160609]
# Embedded file name: medium.py
# Compiled at: 2017-05-08 00:00:46
exec 'import re;import base64'
exec (lambda p, y: (lambda o, b, f: re.sub(o, b, f))('([0-9a-f]+)',
lambda m: p(m, y),
base64.b64decode('NSAzNwoKMWQgPSBbMjgsIDJjLCAyYiwgMWIsIDMwLCAxNCwgZ
SwgZSwgMjksIDJhLCBjLCAzNiwgMTMsIDI1LCAyZiwgMzEsIDcsIDM1LCAyMSwgMTYs
IDgsIDMyLCAyMSwgMTUsIGQsIGQsIDEyLCA2LCBjLCAyMywgMzQsIDgsIDE3LCA2LCA
yNywgMjQsIDMzLCAxMiwgMmUsIDJkLCA3LCAxYywgMjYsIDIyXQoKMTAgPSAiIgoxOC
AxZSAxZiBhKDAsIDE5KDFkKSk6CgkxMCA9IDEwICsgMWEoMWUgXiAxZFsxZV0pCgpmI
D0gMygiMTE6ICIpCjIwICgzNy4yKDEwKSA9PSBmKToKICAxICI0ISIKYjoKICAxICI5
ISI='))(lambda a, b: b[int('0x' + a.group(1), 16)],
'0|print|b64decode|raw_input|Correct|import|119|114|112|Wrong|range
|else|68|65|64|f|s|Flag|72|105|104|125|126|122|for|len|chr|117|113|
t|i|in|if|88|22|46|89|63|26|27|83|82|81|80|87|85|96|92|93|99|77|70|
76|35|59|base64'.split('|'))
```

```
# okay decompiling rev2.pyc
```

Ternyata hasil decompile-nya di-obfuscate, mudahnya kami hanya tinggal mengganti ‘exec’ kedua dengan fungsi ‘print’ agar string source codenya terprint

```
exec 'import re;import base64'
print (lambda p, y: (lambda o, b, f: re.sub(o, b,
f))('([0-9a-f]+)', lambda m: p(m, y),
base64.b64decode('NSAzNwoKMWQgPSBbMjgsIDJjLCAyYiwgMWIsIDMwLCAxNCwgZ
SwgZSwgMjksIDJhLCBjLCAzNiwgMTMsIDI1LCAyZiwgMzEsIDcsIDM1LCAyMSwgMTYs
IDgsIDMyLCAyMSwgMTUsIGQsIGQsIDEyLCA2LCBjLCAyMywgMzQsIDgsIDE3LCA2LCA
yNywgMjQsIDMzLCAxMiwgMmUsIDJkLCA3LCAxYywgMjYsIDIyXQoKMTAgPSAiIgoxOC
AxZSAxZiBhKDAsIDE5KDFkKSk6CgkxMCA9IDEwICsgMWEoMWUgXiAxZFsxZV0pCgpmI
D0gMygiMTE6ICIpCjIwICgzNy4yKDEwKSA9PSBmKToKICAxICI0ISIKYjoKICAxICI5
ISI='))(lambda a, b: b[int('0x' + a.group(1), 16)],
'0|print|b64decode|raw_input|Correct|import|119|114|112|Wrong|range
|else|68|65|64|f|s|Flag|72|105|104|125|126|122|for|len|chr|117|113|
t|i|in|if|88|22|46|89|63|26|27|83|82|81|80|87|85|96|92|93|99|77|70|
76|35|59|base64'.split('|'))
```

Sehingga hasilnya:

```
import base64

t = [83, 87, 80, 117, 93, 104, 64, 64, 82, 81, 68, 59, 105, 63, 92,
99, 114, 35, 88, 126, 112, 77, 88, 125, 65, 65, 72, 119, 68, 46,
76, 112, 122, 119, 27, 89, 70, 72, 96, 85, 114, 113, 26, 22]

s = ""
for i in range(0, len(t)):
     s = s + chr(i ^ t[i])

f = raw_input("Flag: ")
if (base64.b64decode(s) == f):
  print "Correct!"
else:
  print "Wrong!"
```

Flagnya tinggal di print

```
import base64
```

```
t = [83, 87, 80, 117, 93, 104, 64, 64, 82, 81, 68, 59, 105, 63, 92,
99, 114, 35, 88, 126, 112, 77, 88, 125, 65, 65, 72, 119, 68, 46,
76, 112, 122, 119, 27, 89, 70, 72, 96, 85, 114, 113, 26, 22]

s = ""
for i in range(0, len(t)):
     s = s + chr(i ^ t[i])

print base64.b64decode(s)
```

Flag: **ITobaFest{deobfuscate_the_snake}**

Rev3

Diberikan sebuah binary

```
rev3: ELF 64-bit LSB executable, x86-64, version 1 (SYSV),
dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, for
GNU/Linux 2.6.24,
BuildID[sha1]=e34b346ae24465d98bfce358395a1ddfd5d4ec71, stripped
```

Sama seperti sebelumnya, diminta flag dari scanf juga. Oke langsung saja dibuka dengan IDA.

```
int sub_400677()
{
  int v0; // eax@2
  int result; // eax@3
  int v2; // eax@7
  int v3; // eax@12
  int v4; // eax@17
  int v5; // eax@22
  __int64 v6; // rbx@27
  int i; // [sp+8h] [bp-48h]@1
  int j; // [sp+8h] [bp-48h]@6
  int k; // [sp+8h] [bp-48h]@11
  int l; // [sp+8h] [bp-48h]@16
  int m; // [sp+8h] [bp-48h]@21
  int v12; // [sp+Ch] [bp-44h]@1
  char v13[40]; // [sp+10h] [bp-40h]@1
  __int64 v14; // [sp+38h] [bp-18h]@1

  v14 = *MK_FP(__FS__, 40LL);
  printf("Flag: ");
  __isoc99_scanf(4196651LL, v13);
```

```
v12 = 0;
for ( i = 0; i < dword_601114; ++i )
{
    v0 = v12++;
    if ( dword_601060[i] != v13[v0] )
    {
    result = sub_40064D();
    goto LABEL_27;
    }
}
for ( j = 0; j < dword_601118; ++j )
{
    v2 = v12++;
    if ( dword_601080[j] != (v13[v2] ^ dword_601060[j]) )
    {
    result = sub_40064D();
    goto LABEL_27;
    }
}
for ( k = 0; k < dword_60111C; ++k )
{
    v3 = v12++;
    if ( dword_6010A0[k] != (v13[v3] ^ dword_601080[k]) )
    {
    result = sub_40064D();
    goto LABEL_27;
    }
}
for ( l = 0; l < dword_601120; ++l )
{
    v4 = v12++;
    if ( dword_6010C0[l] != (v13[v4] ^ dword_601080[l]) )
    {
    result = sub_40064D();
    goto LABEL_27;
    }
}
for ( m = 0; m < dword_601124; ++m )
{
    v5 = v12++;
    if ( dword_6010E0[m] != (v13[v5] ^ dword_601100[m]) )
    {
    result = sub_40064D();
    goto LABEL_27;
    }
}
result = sub_400662();
```

```
LABEL_27:
  v6 = *MK_FP(__FS__, 40LL) ^ v14;
  return result;
}
```

Jika dilihat, terdapat beberapa looping yang mengolah inputan kita dengan operasi xor. Fungsi xor adalah reversible, artinya jika a ^ b = c, maka b ^ c = a. Ok, dengan menelusuri setiap looping tersebut, kita dapat mengembalikan kembali inputan apa yang seharusnya dimasukkan agar dapat menjadi benar inputan kita tersebut. Dan juga, sudah jelas apa isi variable array tujuannya agar menjadi benar. Dengan begitu, didapatlah flagnya.

Flag : **ITobaFest{ok_this_is_not_hard}**

Rev4

Diberikan sebuah binary

```
easy: ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV), for
GNU/Linux 2.6.32, dynamically linked, interpreter \004, stripped
```

Binary tersebut jika dijalankan akan langung akan bernilai salah. Coba dibuka dengan IDA untuk didapatkan hasil decompile kode C nya.

Berikut kodenya yang penting. Terdapat 2 fungsi.

```
int __cdecl sub_804872B(int a1, int a2)
{
  FILE *stream; // [sp+8h] [bp-10h]@1
  char v4; // [sp+Fh] [bp-9h]@1

  v4 = 0;
  snprintf(ptr, 0x100u, "%s.txt", *(_DWORD *)a2);
  stream = fopen(ptr, "r");
  if ( stream )
  {
     memset(ptr, 0, 0x100u);
     fread(ptr, 1u, 0x14u, stream);
     fclose(stream);
     v4 = sub_804854B(ptr);
  }
  if ( v4 != 1 )
     puts("Masih salah, silakan coba lagi...");
  return 0;
}
```

Pada fungsi tersebut akan dibuka sebuah file .txt dan dibaca isinya. Dilakukan pengecekan dengan fungsi berikut.

```
int __cdecl sub_804854B(int a1)
{
  char v2; // [sp+Bh] [bp-Dh]@1
  signed int i; // [sp+Ch] [bp-Ch]@21

  v2 = 0;
  if ( *(_BYTE *)(a1 + 19) == 33
      && *(_BYTE *)(a1 + 5) == 118
      && *(_BYTE *)(a1 + 9) == 48
      && *(_BYTE *)(a1 + 15) == 117
      && (*(_BYTE *)(a1 + 1) == 109 || *(_BYTE *)(a1 + 18) == 109)
      && (*(_BYTE *)(a1 + 3) == 55 || *(_BYTE *)(a1 + 8) == 55)
      && (*(_BYTE *)(a1 + 4) == 95 || *(_BYTE *)(a1 + 13) == 95)
      && (*(_BYTE *)(a1 + 6) == 49 || *(_BYTE *)(a1 + 11) == 49)
      && (*(_BYTE *)(a1 + 7) == 99 || *(_BYTE *)(a1 + 14) == 99)
      && (*(_BYTE *)(a1 + 10) == 114 || *(_BYTE *)(a1 + 16) == 114)
      && (*(_BYTE *)a1 == 52 || *(_BYTE *)(a1 + 2) == 52 || *(_BYTE
*)(a1 + 12) == 52 || *(_BYTE *)(a1 + 17) == 52) )
  {
      for ( i = 0; i <= 7; ++i )
      {
      dword_804A060[i] ^= 0xCAFEBABE;
      printf(
      "%c%c%c%c",
      (unsigned int)dword_804A060[i] >> 24,
      (unsigned int)dword_804A060[i] >> 16,
      (unsigned int)dword_804A060[i] >> 8,
      (unsigned __int8)dword_804A060[i]);
      }
      v2 = 1;
  }
  return (unsigned __int8)v2;
}
```

Pada fungsi tersebut, terlihat bahwa ada nilai ASCII untuk setiap karakternya yang kemudian bernilai 4m47_v1c70r14_cur4m!. Namun jika dimasukkan sebagai flag, tetap salah. Lalu dilihat lebih jauh, ternyata jika benar isi dari file tersebut, akan menjalankan printah printf. Akhirnya, langsung dicoba saja mereplika fungsi tersebut agar jawabannya dapat pasti. Kemungkinan itu adalah flagnya. Berikut scriptnya dalam bahasa C.

```
#include<stdio.h>

int main()
{
    int i = 0;
    int a[] = {0x83AAD5DC,0x0ABB8DFCD,0xBE85D7DF,0xB88DD3CE,
0xAB8ACFCC,0xAFA1D2CB,0xBE9FD4DF,0x959CDFC3};

    for(i = 0; i < 8; ++i)
    {
      a[i] ^= 0xCAFEBABE;
      printf("%c%c%c%c", a[i] >> 24, a[i] >> 16, a[i] >> 8, a[i]);
    }
    return 0;
}
```

Flag : **ITobaFest{marsipature_hutana_be}**

Rev5

Diberikan sebuah binary

```
medium: ELF 32-bit LSB executable, Intel 80386, version 1 (SYSV),
for GNU/Linux 2.6.32, dynamically linked, interpreter \004,
stripped
```

Jika dijalankan, akan keluar komen salah. Langsung decompile dengan IDA. Didapatkan fungsi mainnya seperti berikut.

```
int __cdecl main(int argc, const char **argv, const char **envp)
{
  int result; // eax@7
  void *thread_return; // [sp+0h] [bp-1Ch]@3
  int v5; // [sp+4h] [bp-18h]@3
  int v6; // [sp+8h] [bp-14h]@3
  int v7; // [sp+Ch] [bp-10h]@3
  int i; // [sp+10h] [bp-Ch]@3
  int *v9; // [sp+18h] [bp-4h]@1

  v9 = &argc;
  if ( argc != 2 || strlen(argv[1]) != 34 )
  {
```

```
LABEL_8:
     puts("Silakan coba lagi...");
     result = 1;
  }
  else
  {
     memset(dest, 0, 0x24u);
     strncpy(dest, argv[1], 0x22u);
     pthread_create(&th, 0, start_routine, 0);
     pthread_create(&dword_804A074, 0, sub_80486BF, 0);
     pthread_create(&dword_804A078, 0, sub_8048765, 0);
     pthread_create(&dword_804A07C, 0, sub_804880B, 0);
     pthread_join(th, &thread_return);
     pthread_join(dword_804A074, (void **)&v5);
     pthread_join(dword_804A078, (void **)&v6);
     pthread_join(dword_804A07C, (void **)&v7);
     for ( i = 0; i <= 3; ++i )
     {
     if ( !*(_DWORD *)*(&thread_return + i) )
     goto LABEL_8;
     }
     puts("Selamat, Anda benar...");
     result = 0;
  }
  return result;
}
```

Jika dilihat program meminta input melalui argv dengan panjang 34 karakter dan akan menghasilkan hasil yang benar setelah melalui pthread yang ada. Terlihat bahwa akan dibuat 4 pthread yang dijalankan bersamaan dan digabung lagi. Coba buka masing - masing fungsi tersebut.

`Start_routine`

```
void __noreturn start_routine()
{
  char v0; // [sp+Bh] [bp-1Dh]@1
  char v1; // [sp+Ch] [bp-1Ch]@1
  char v2; // [sp+Dh] [bp-1Bh]@1
  char v3; // [sp+Eh] [bp-1Ah]@1
  char v4; // [sp+Fh] [bp-19h]@1
  char v5; // [sp+10h] [bp-18h]@1
  char v6; // [sp+11h] [bp-17h]@1
  char v7; // [sp+12h] [bp-16h]@1
  char v8; // [sp+13h] [bp-15h]@1
  char v9; // [sp+14h] [bp-14h]@1
  char v10; // [sp+15h] [bp-13h]@1
  char v11; // [sp+16h] [bp-12h]@1
  char v12; // [sp+17h] [bp-11h]@1
  char v13; // [sp+18h] [bp-10h]@1
  char v14; // [sp+19h] [bp-Fh]@1
  char v15; // [sp+1Ah] [bp-Eh]@1
  char v16; // [sp+1Bh] [bp-Dh]@1
  int i; // [sp+1Ch] [bp-Ch]@1

  v0 = 4;
  v1 = 5;
  v2 = 6;
  v3 = 6;
  v4 = 6;
  v5 = 4;
  v6 = 6;
  v7 = 7;
  v8 = 7;
  v9 = 7;
  v10 = 7;
  v11 = 7;
  v12 = 6;
  v13 = 7;
  v14 = 6;
  v15 = 6;
  v16 = 5;
  dword_804A060 = 0;
  for ( i = 0; i <= 16; ++i )
  {
     if ( (char)(*(_BYTE *)(i + 134520960) >> 4) != (unsigned
__int8)*(&v0 + i) )
     goto LABEL_6;
  }
  dword_804A060 = 1;
LABEL_6:
  pthread_exit(&dword_804A060);
}
```

sub_80486BF

```
void __noreturn sub_80486BF()
{
  char v0; // [sp+Bh] [bp-1Dh]@1
  char v1; // [sp+Ch] [bp-1Ch]@1
  char v2; // [sp+Dh] [bp-1Bh]@1
  char v3; // [sp+Eh] [bp-1Ah]@1
  char v4; // [sp+Fh] [bp-19h]@1
  char v5; // [sp+10h] [bp-18h]@1
  char v6; // [sp+11h] [bp-17h]@1
  char v7; // [sp+12h] [bp-16h]@1
  char v8; // [sp+13h] [bp-15h]@1
  char v9; // [sp+14h] [bp-14h]@1
  char v10; // [sp+15h] [bp-13h]@1
  char v11; // [sp+16h] [bp-12h]@1
  char v12; // [sp+17h] [bp-11h]@1
  char v13; // [sp+18h] [bp-10h]@1
  char v14; // [sp+19h] [bp-Fh]@1
  char v15; // [sp+1Ah] [bp-Eh]@1
  char v16; // [sp+1Bh] [bp-Dh]@1
  int i; // [sp+1Ch] [bp-Ch]@1

  v0 = 6;
  v1 = 6;
  v2 = 7;
  v3 = 6;
  v4 = 6;
  v5 = 6;
  v6 = 7;
  v7 = 7;
  v8 = 5;
  v9 = 7;
  v10 = 6;
  v11 = 7;
  v12 = 6;
  v13 = 6;
  v14 = 6;
  v15 = 6;
  v16 = 7;
  dword_804A064 = 0;
  for ( i = 0; i <= 16; ++i )
  {
     if ( (char)(dest[i + 17] >> 4) != (unsigned __int8)*(&v0 + i)
)
     goto LABEL_6;
  }
  dword_804A064 = 1;
LABEL_6:
  pthread_exit(&dword_804A064);
}
```

sub_8048765

```
void __noreturn sub_8048765()
```

```
{
  char v0; // [sp+Bh] [bp-1Dh]@1
  char v1; // [sp+Ch] [bp-1Ch]@1
  char v2; // [sp+Dh] [bp-1Bh]@1
  char v3; // [sp+Eh] [bp-1Ah]@1
  char v4; // [sp+Fh] [bp-19h]@1
  char v5; // [sp+10h] [bp-18h]@1
  char v6; // [sp+11h] [bp-17h]@1
  char v7; // [sp+12h] [bp-16h]@1
  char v8; // [sp+13h] [bp-15h]@1
  char v9; // [sp+14h] [bp-14h]@1
  char v10; // [sp+15h] [bp-13h]@1
  char v11; // [sp+16h] [bp-12h]@1
  char v12; // [sp+17h] [bp-11h]@1
  char v13; // [sp+18h] [bp-10h]@1
  char v14; // [sp+19h] [bp-Fh]@1
  char v15; // [sp+1Ah] [bp-Eh]@1
  char v16; // [sp+1Bh] [bp-Dh]@1
  int i; // [sp+1Ch] [bp-Ch]@1

  v0 = 9;
  v1 = 4;
  v2 = 15;
  v3 = 2;
  v4 = 1;
  v5 = 6;
  v6 = 5;
  v7 = 3;
  v8 = 4;
  v9 = 11;
  v10 = 4;
  v11 = 5;
  v12 = 13;
  v13 = 0;
  v14 = 1;
  v15 = 12;
  v16 = 15;
  dword_804A068 = 0;
  for ( i = 0; i <= 16; ++i )
  {
     if ( (*(_BYTE *)(i + 134520960) & 0xF) != *(&v0 + i) )
     goto LABEL_6;
  }
  dword_804A068 = 1;
LABEL_6:
  pthread_exit(&dword_804A068);
}
```

sub_804880B

```
void __noreturn sub_804880B()
{
  char v0; // [sp+Bh] [bp-1Dh]@1
  char v1; // [sp+Ch] [bp-1Ch]@1
  char v2; // [sp+Dh] [bp-1Bh]@1
  char v3; // [sp+Eh] [bp-1Ah]@1
  char v4; // [sp+Fh] [bp-19h]@1
  char v5; // [sp+10h] [bp-18h]@1
  char v6; // [sp+11h] [bp-17h]@1
  char v7; // [sp+12h] [bp-16h]@1
  char v8; // [sp+13h] [bp-15h]@1
  char v9; // [sp+14h] [bp-14h]@1
  char v10; // [sp+15h] [bp-13h]@1
  char v11; // [sp+16h] [bp-12h]@1
  char v12; // [sp+17h] [bp-11h]@1
  char v13; // [sp+18h] [bp-10h]@1
  char v14; // [sp+19h] [bp-Fh]@1
  char v15; // [sp+1Ah] [bp-Eh]@1
  char v16; // [sp+1Bh] [bp-Dh]@1
  int i; // [sp+1Ch] [bp-Ch]@1

  v0 = 4;
  v1 = 15;
  v2 = 2;
  v3 = 9;
  v4 = 1;
  v5 = 14;
  v6 = 5;
  v7 = 3;
  v8 = 15;
  v9 = 0;
  v10 = 1;
  v11 = 2;
  v12 = 4;
  v13 = 5;
  v14 = 4;
  v15 = 5;
  v16 = 13;
  dword_804A06C = 0;
  for ( i = 0; i <= 16; ++i )
  {
     if ( (dest[i + 17] & 0xF) != *(&v0 + i) )
     goto LABEL_6;
  }
  dword_804A06C = 1;
LABEL_6:
  pthread_exit(&dword_804A06C);
}
```

Jika dilihat, fungsi start_routine akan berpadanan dengan sub_8048765, sementara sub_80486BF akan berpadanan dengan sub_804880B. Hal ini dikarenakan variable yang digunakan sama dan thread tersebut jalan secara bersamaan. Sebagai contoh, untuk sub_routine dan sub_8048765, `if ( (*(_BYTE *)(i + 134520960) & 0xF) != *(&v0 + i) )` dan `if ( (char)(*(_BYTE *)(i + 134520960) >> 4) != (unsigned __int8)*(&v0 + i) ).` Artinya bahwa kondisi tersebut harus terpenuhi. Begitu pula untuk padanan sub_80486BF dan sub_804880B. Fungsi - fungsi tersebut menjalankan hal yang sama namun untuk 17 karakter pertama, dan juga 17 karakter berikutnya.

Cara termudah adalah dengan melakukan bruteforce. Oleh karena itu, dengan memperhatikan kondisi tersebut, dibuat script yang paling sederhana dengan python.

```
#!/usr/bin/python

a = [4,5,6,6,6,4,6,7,7,7,7,7,6,7,6,6,5]
b = [9,4,15,2,1,6,5,3,4,11,4,5,13,0,1,12,15]
for j in range(17):
    for i in range(255):
      if (i >> 4 == a[j]) and (i & 0xF == b[j]):
           print(chr(i), end="")

a = [6, 6, 7, 6, 6, 6, 7, 7, 5, 7, 6, 7, 6, 6, 6, 6, 7]
b = [4, 15, 2, 9, 1, 14, 5, 3, 15, 0, 1, 2, 4, 5, 4, 5, 13]

for j in range(17):
    for i in range(255):
      if (i >> 4 == a[j]) and (i & 0xF == b[j]):
           print(chr(i), end="")
```

Didapatkan
Flag : **ITobaFest{tumpal_dorianus_pardede}**

-|Stegano|-

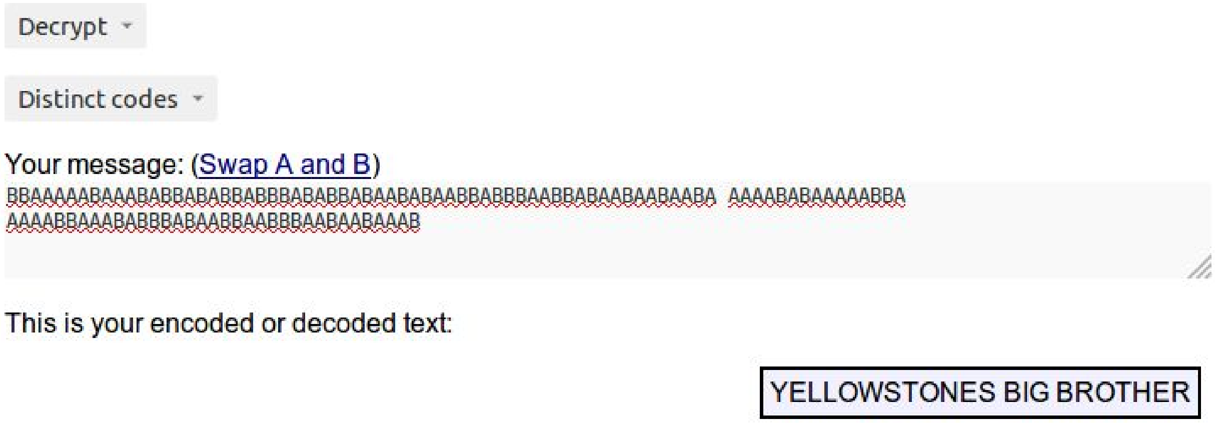
Morning Glory Pool

Diberikan sebuah gambar dengan hint : Perhatikan Gambar,LETAK tanpa koma dan simbol.

Kita mencoba membuka file gambar dengan

```
$ strings morning-glory-pool.jpg | grep AA
BBAAAAABAAABABBABABBABBBABABBABAABABAABBABBBAABBABAABAABAABA
AAAABABAAAAABBA AAAABBAAABABBBABAABBAABBBAABAABAAAB
```

Didapatkan sebuah string Bacon Chiper, decrypt di web
http://rumkin.com/tools/cipher/baconian.php



Decrypt

Distinct codes

Your message: (Swap A and B)

BBAAAAABAAABABBABABBABBBABABBABAABABAABBABBBAABBABAABAABAABA AAAABABAAAAABBA
AAAABBAAABABBBABAABBAABBBAABAABAAAB

This is your encoded or decoded text:

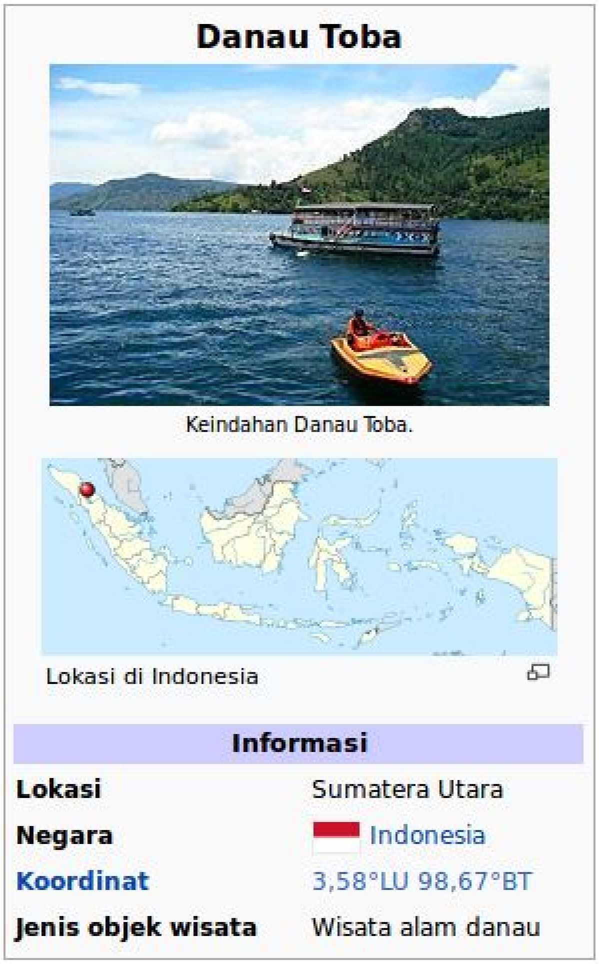
YELLOWSTONES BIG BROTHER

Didapatkan string YELLOWSTONES BIG BROTHER

Dengan skill Google-Fu saya mendapatkan beberapa informasi yang berkaitan dengan YELLOWSTONES BIG BROTHER , Ternyata YELLOWSTONES BIG BROTHER = Danau Toba

Hint dari soal adalah Perhatikan Gambar,**LETAK** **tanpa koma** dan **simbol**.

Maka kita coba cari yang berkaitan dgn **LETAK** dari danau Toba



Danau Toba

Keindahan Danau Toba.

Lokasi di Indonesia

Informasi	
Lokasi	Sumatera Utara
Negara	Indonesia
Koordinat	3,58°LU 98,67°BT
Jenis objek wisata	Wisata alam danau

Koordinat : 3,58°LU 98,67°BT

Flag **tanpa koma** dan **simbol**
Flag: **ITF{358LU9867BT}**

-|Web|-

Web1

Diberikan sebuah target (http://ctf.itobafest.del.ac.id/source/1/), kami lihat source html-nya. Terdapat string

```
admin:&lt;~1bpas1M/UU0P34T3+4g%2)d&lt;N1,h%%@:_H.@q@PQA25u$3FX^O
~&gt;
```

Diduga string tersebut merupakan credential untuk mendapatkan flag. Dengan format [username]:[password].

```
username: admin
password: &lt;~1bpas1M/UU0P34T3+4g%2)d&lt;N1,h%%@:_H.@q@PQA25u$3FX^O~&gt;
```

Namun ternyata passwordnya salah, disinilah skill TEBAK-TEBAKAN kami diuji.

&lt;~1bpas1M/UU0P34T3+4g%2)d**&lt;**N1,h%%@:_H.@q@PQA25u$3FX^O~**&gt;**

Terlihat ada karakter yang ter-encode HTML, setelah di-decode

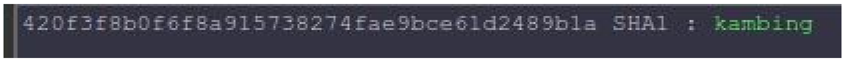
```
<~1bpas1M/UU0P34T3+4g%2)d<N1,h%%@:_H.@q@PQA25u$3FX^O~>
```

Namun tetap salah, string apakah itu? Hasrat **tebak-tebakan** kami muncul yang sudah lama terpendam dalam lubuk hati, perasaan kesal pun membara… didapatkan bahwa itu merupakan ASCII85!!

Setelah di-decode didapatkan sebuah string hexadecimal

```
420f3f8b0f6f8a915738274fae9bce61d2489b1a
```

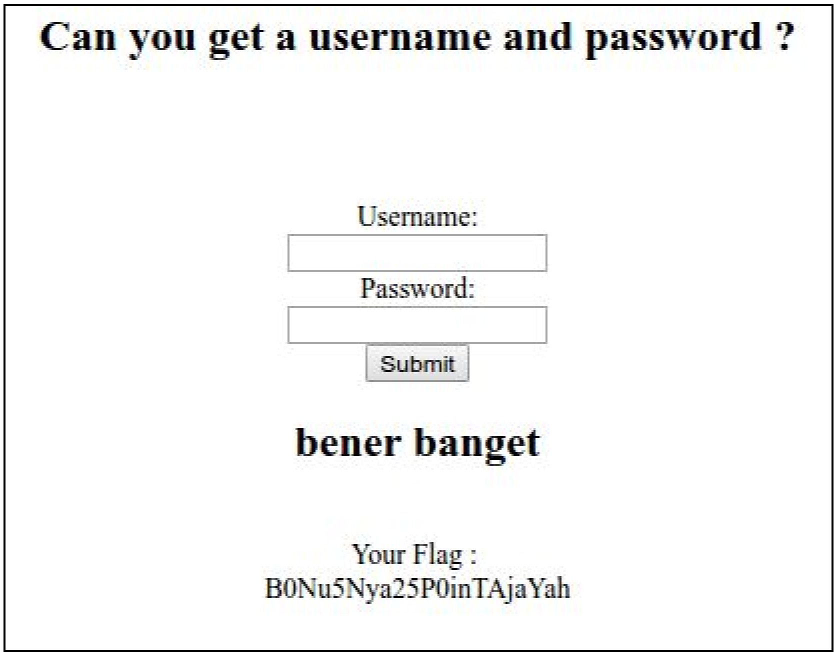
Setelah ditebak string itu tipe hash SHA1 karena 40 karakter. Kami decrypt menggunakan hashkiller.co.uk .



```
420f3f8b0f6f8a915738274fae9bce61d2489b1a SHA1 : kambing
```

Lalu masukkan credential

username: admin
password: kambing



Can you get a username and password ?

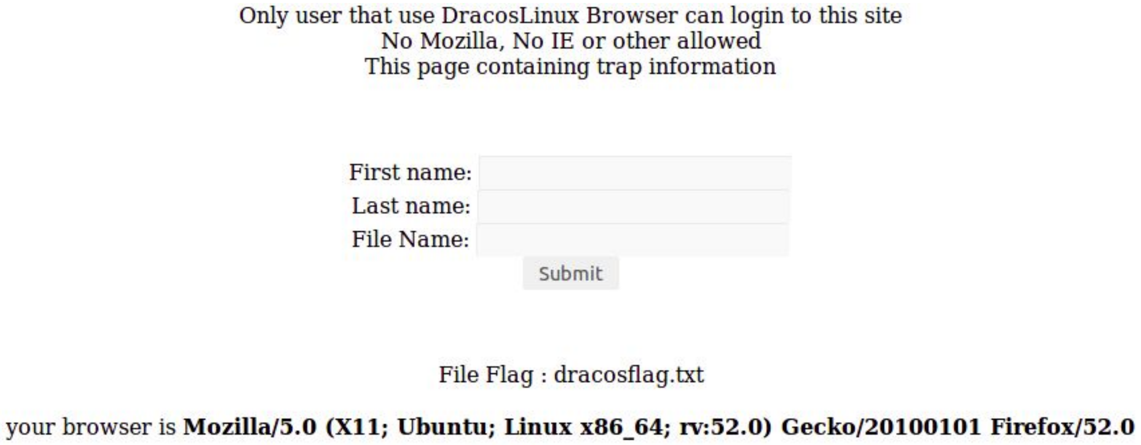
bener banget

Your Flag :
B0Nu5Nya25P0inTAjaYah

Flag: **ITF{B0Nu5Nya25P0inTAjaYah}**

Web3

Diberikan sebuah target (http://ctf.itobafest.del.ac.id/source/3/), kami lihat ada string user agent harus DracosLinux untuk mendapatkan flag.

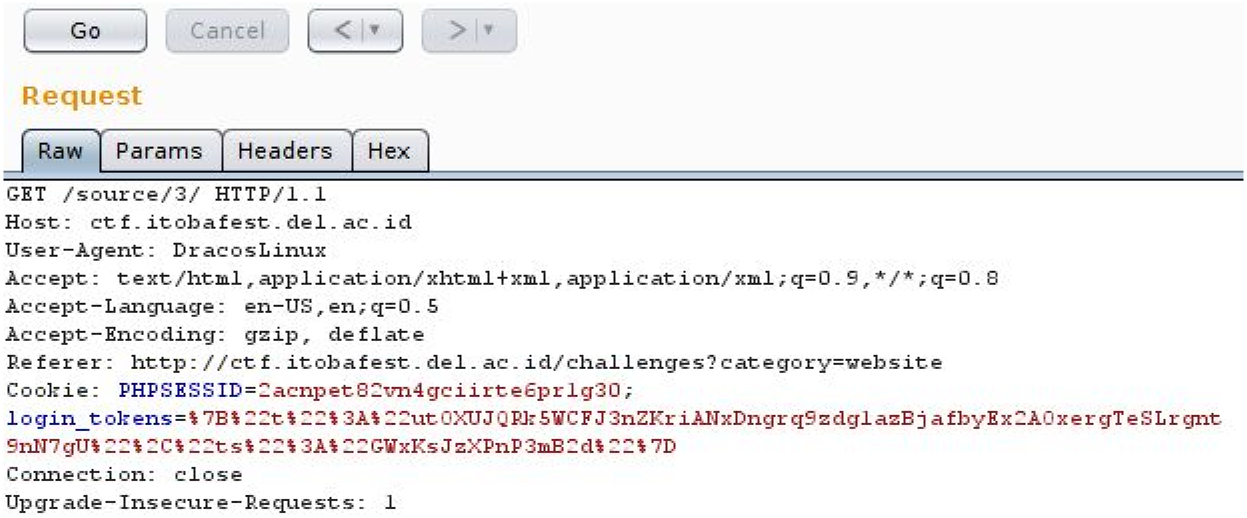


Only user that use DracosLinux Browser can login to this site
No Mozilla, No IE or other allowed
This page containing trap information

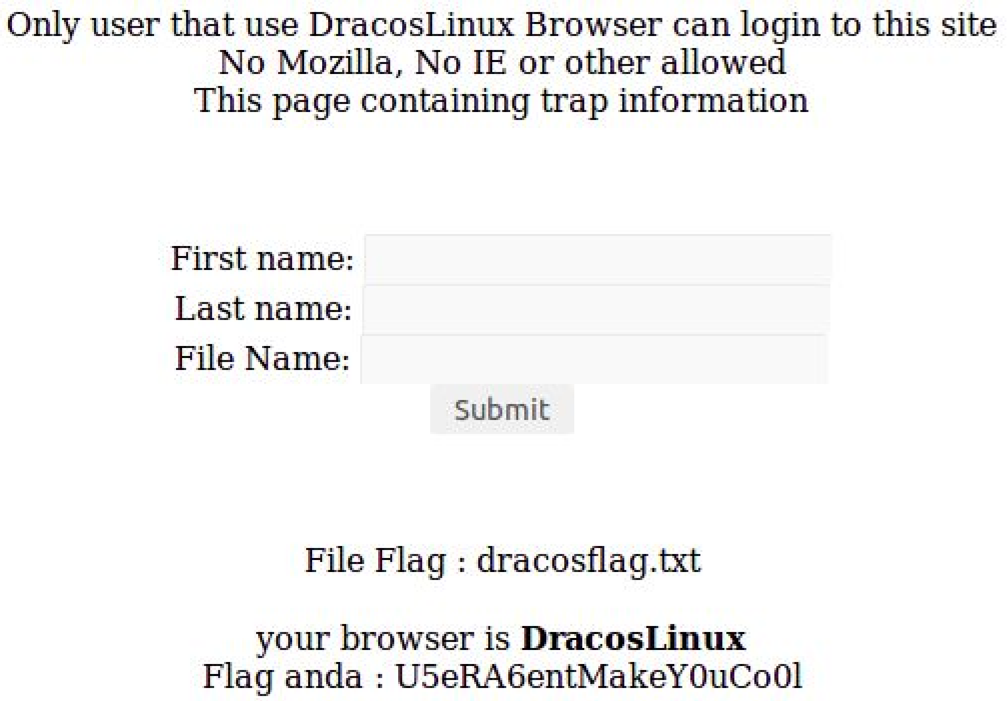
File Flag : dracosflag.txt

your browser is **Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:52.0) Gecko/20100101 Firefox/52.0**

Pakai tools Burpsuite untuk mengganti UserAgent



```
GET /source/3/ HTTP/1.1
Host: ctf.itobafest.del.ac.id
User-Agent: DracosLinux
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://ctf.itobafest.del.ac.id/challenges?category=website
Cookie: PHPSESSID=2acnpet82vn4gciirte6prlg30;
login_tokens=%7B%22t%22%3A%22ut0XUJQRk5WCFJ3nZKriANxDngrq9zdglazBjafbyEx2A0xergTeSLrgmt
9nN7gU%22%2C%22ts%22%3A%22GWxKsJzXPnP3mB2d%22%7D
Connection: close
Upgrade-Insecure-Requests: 1
```



Only user that use DracosLinux Browser can login to this site
No Mozilla, No IE or other allowed
This page containing trap information

First name:
Last name:
File Name:

File Flag : dracosflag.txt

your browser is **DracosLinux**
Flag anda : U5eRA6entMakeY0uCo0l

Flag : **ITF{U5eRA6entMakeY0uCo0l}**