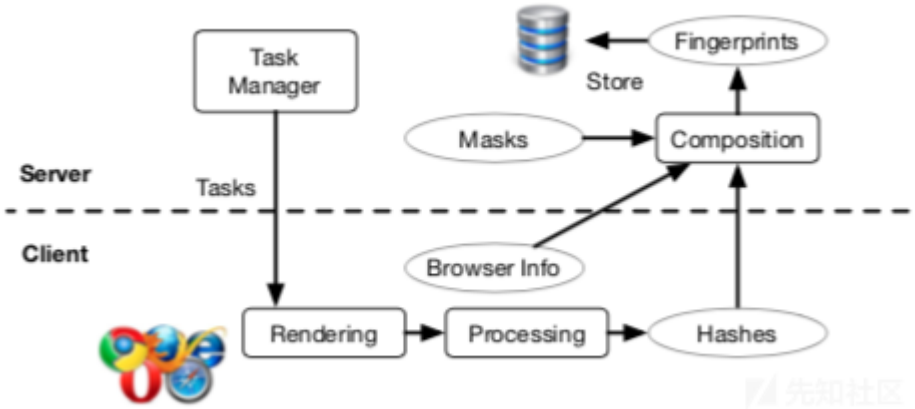
Cross-Browser-Tracking-Summary-Part-4

一叶飘零 / 2018-12-31 09:59:00 / 浏览数 2656 技术文章 技术文章 顶(0) 踩(0)

前言

上一篇文章主要讲解了论文中具有代表性的模块的代码实现，这一篇文章主要讲论文的整体架构和处理流程，包括数据生成，数据收集，数据处理等。

整体架构



1.后端给前端下发渲染任务
2.前端进行渲染，并且将部分结果进行hash后发送给后端
3.渲染任务同时搜集浏览器信息，设备信息，一并发送给后端
4.后端接收到数据进行处理
5.生成浏览器指纹与设备指纹
6.将指纹存储到数据库，并将指纹打印到前端

模块整合/数据生成

作者使用loader.js进行模块整合，测试项目大概如下

```
this.testList.push(new CubeTest('normal'));
this.testList.push(new CubeTest('aa'));
this.testList.push(new CameraTest());
this.testList.push(new LineTest('normal'));
this.testList.push(new LineTest('aa'));
this.testList.push(new TextureTest(....));
this.testList.push(new TextureTest(....));
this.testList.push(new SimpleLightTest(....));
this.testList.push(new SimpleLightTest(....));
this.testList.push(new MoreLightTest(....));
this.testList.push(new TwoTexturesMoreLightTest(....));
this.testList.push(new TransparentTest(....));
this.testList.push(new LightingTest());
this.testList.push(new ClippingTest());
this.testList.push(new BubbleTest());
this.testList.push(new CompressedTextureTest());
this.testList.push(new ShadowTest());
```

测试结果利用dataurl传递给toServer.js进行hash处理
例如CubeTest('normal')结果如下

```
1                                                                    toServer.js:187
                                                                     toServer.js:188
Uint8Array(262144) [0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255
▶, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0,
  0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, 0, 0, 0, 255, …]
```

这十多个任务基本用来测试GPU的渲染
然后还有浏览器的字符渲染支持测试

```
this.asyncTests.push(new LanguageDector());
```

将浏览器支持的字符返回给后端

数据收集

对于数据的搜集，作者这里使用了toServer.js，大致代码解读如下
作者对如下数据进行测试和搜集

```
var Sender = function() {
 this.finalized = false;
 this.postData = {
   fontlist: "No Flash",
   fonts: "",
   WebGL: false,
   inc: "Undefined",
   gpu: "Undefined",
   hash: "Undefined",
   timezone: "Undefined",
   resolution: "Undefined",
   plugins: "Undefined",
   cookie: "Undefined",
   localstorage: "Undefined",
   manufacturer: "Undefined",
   gpuImgs: {},
   adBlock: "Undefined",
   cpu_cores: "Undefined",
   canvas_test: "Undefined",
   audio: "Undefined",
   langsDetected: [],
   video: []
 };
```

在调用toServer函数的时候，会传入5个参数，分别是

```
WebGL, inc, gpu, hash, id, dataurl
```

然后进行相应赋值

```
this.toServer = function(
     WebGL, inc, gpu, hash, id,
     dataurl) { // send messages to server and receive messages from server

   this.postData['gpuImgs'][id] = dataurl.hashCode();

   if (WebGL) {
     this.postData['WebGL'] = WebGL;
     this.postData['inc'] = inc;
     this.postData['gpu'] = gpu;
     this.postData['hash'] = hash;
   }
 };
```

其中的

```
this.postData['inc'] = inc;
this.postData['gpu'] = gpu;
```

分别来自于

```
gl.getParameter(debugInfo.UNMASKED_VENDOR_WEBGL);
gl.getParameter(debugInfo.UNMASKED_RENDERER_WEBGL);
```

对于

```
this.postData['gpuImgs'][id] = dataurl.hashCode();
this.postData['hash'] = hash;
```

来自于如下运算

```
Uint8Array.prototype.hashCode = function() {
 var hash = 0, i, chr, len;
 if (this.length === 0)
   return hash;
 for (i = 0, len = this.length; i < len; i++) {
```

```
    chr = this[i];
    hash = ((hash << 5) - hash) + chr;
    hash |= 0; // Convert to 32bit integer
  }
  return hash;
}
```

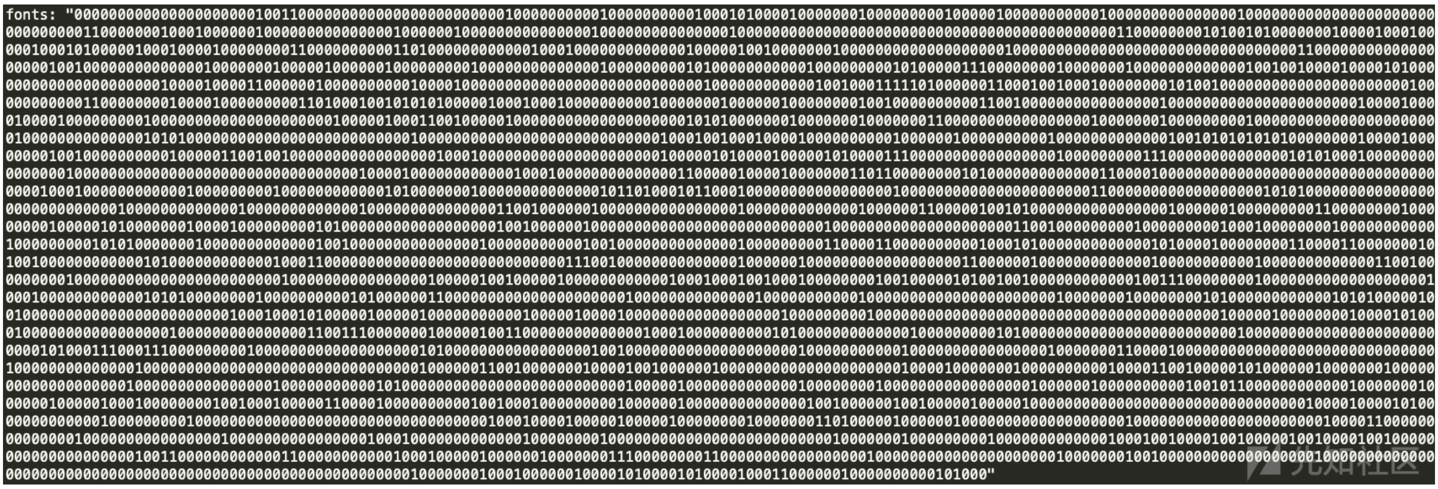
这里我们知道dataurl是各种模块渲染的结果传递而来，然后利用hashcode转成数字，得到大致如下结果

```
▼ gpuImgs:
    0: -1914283016
    1: 1162298933
    2: 1699334155
    3: 1015470206
    4: -1845702422
    5: 959950211
    6: -1586769663
    7: -210705507
    8: 1845374004
    9: 1371681631
    10: 278281231
    11: -906422261
    12: 656514208
    13: 1582080968
    14: -1476774810
    15: 1499489935
    16: -457865815
    17: 1345892236
    18: -843376850
    19: -2023652240
    20: 301413135
    21: -1149409483
    22: -346105991
    23: -732263890
    24: -676198130
    25: 182686738
    26: -1525876703
    27: 286990594
```

紧接着

```
this.sendData =
  function() {
    $('#status').html("Getting Fonts (This may take a long time)");

    this.fontsData = "";
    var fonts = ['Segoe WP', 'FreeMono', 'Heiti TC Light', 'VNI-Kun', 'Liberation Serif', 'Dotum',
    var detector = new fontDetector();
    for(i = 0, len = fonts.length; i < len;++ i) {
      if(detector.detect(fonts[i])) this.fontsData += '1';
      else this.fontsData += '0';
    }

    this.postData['fonts'] = this.fontsData;
```


作者对4422种字体进行探测，若支持，则标记为1，不支持则标记为0
得到形如如下的数组



然后有进行了本地时间与 GMT 时间之间的时间差的搜集：

```
this.postData['timezone'] = new Date().getTimezoneOffset();
```

例如我的

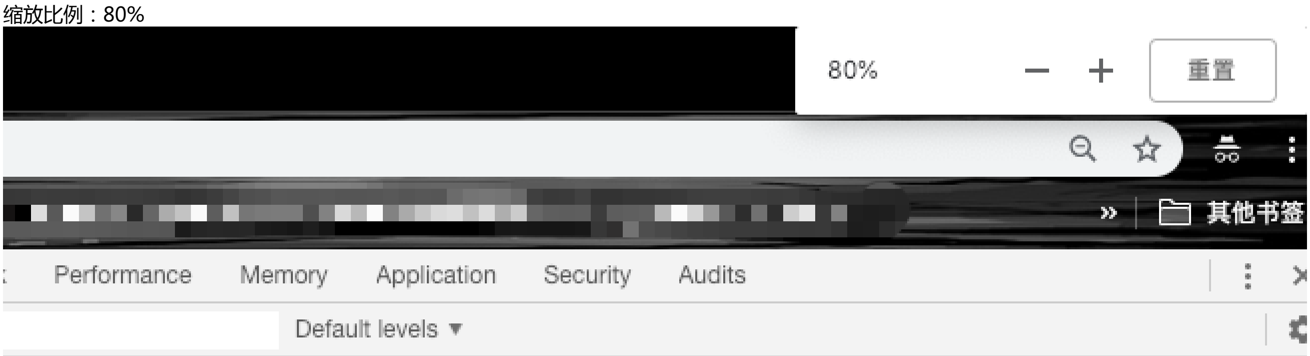
```
> new Date()
< Mon Dec 24 2018 10:51:30 GMT+0800 (中国标准时间)
> new Date().getTimezoneOffset();
< -480
```

然后作者又搜集了分辨率

```
this.postData['resolution'] = getResolution();
```

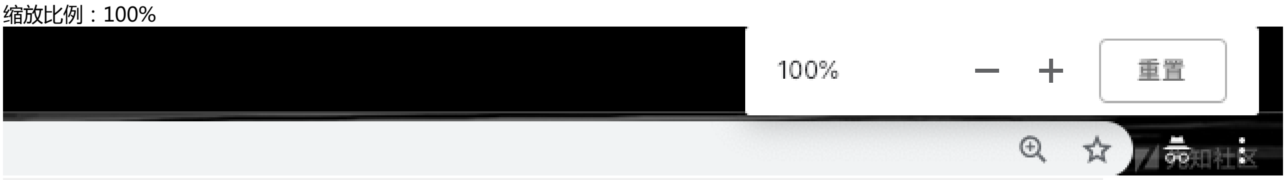
这里搜集了浏览器缩放比例，浏览器的页面大小等，如下

缩放比例：80%




```
VM546:1
> getResolution()
  0.800000011920929
< "1536_864_0.800000011920929_1920_1080_24_1920_975_undefined_undefined_0_23_1150_1920_0"
```

缩放比例：100%




```
> getResolution()
  1
< "1920_1080_1_1920_1080_24_1920_975_undefined_undefined_0_23_920_1920_0"
```

浏览器页面大小：小窗和窗口最大化。缩放比例100%

```
> getResolution()
  1
<- "1920_1080_1_1920_1080_24_1920_975_undefined_undefined_0_23_261_1261_0"
> getResolution()
  1
<- "1920_1080_1_1920_1080_24_1920_975_undefined_undefined_0_23_920_1920_0"
>
```

然后作者又使用了navigator对象，获取了如下参数

```
this.postData['plugins'] = navigator.plugins;
this.postData['cookie'] = navigator.cookieEnabled;
this.postData['cpu_cores'] = navigator.hardwareConcurrency;
```

然后又使用了localStorage特性，判断浏览器是否支持localStorage这个属性

```
try {
       localStorage.setItem('test', 'test');
       localStorage.removeItem('test');
       this.postData['localstorage'] = true;
     } catch(e) {
       this.postData['localstorage'] = false;
     }
```

最后收集如下信息

```
this.postData['adBlock'] = $('#ad')[0] == null ? 'Yes' : 'No';
this.postData['canvas_test'] = Base64EncodeUrlSafe(calcSHA1(cvs_test.substring(22, cvs_test.length)));
this.postData['audio'] = audioFingerPrinting();
this.postData['langsDetected'] = get_writing_scripts();
```

然后将数据发送到指定ip

```
function startSend(postData){
       $.ajax({
         url : "http://" + ip_address + "/features",
         dataType : "json",
         contentType: 'application/json',
         type : 'POST',
         data : JSON.stringify(postData),
         success : function(data) {
           data['finished'] = true;
           parent.postMessage(data,"http://uniquemachine.org");
         },
         error: function (xhr, ajaxOptions, thrownError) {
           alert(thrownError);
         }
       });
}
```

数据处理

后端采用python flask框架编写

```
@app.route('/features', methods=['POST'])
def features():
   agent = ""
   accept = ""
   encoding = ""
   language = ""
   IP = ""

   try:
       agent = request.headers.get('User-Agent')
       accpet = request.headers.get('Accept')
       encoding = request.headers.get('Accept-Encoding')
       language = request.headers.get('Accept-Language')
       IP = request.remote_addr
   except:
```

```
        pass
```

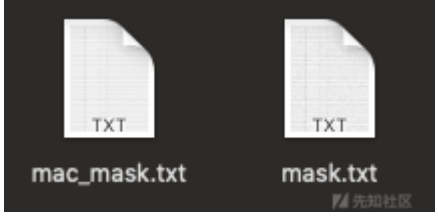
但由于是demo，很多功能尚未加入，这里的跨浏览器特性就只用到了2个，难怪稳定性不是很高= =

```
feature_list = [
     "agent",
     "accept",
     "encoding",
     "language",
     "langsDetected",
     "resolution",
     "fonts",
     "WebGL",
     "inc",
     "gpu",
     "gpuImgs",
     "timezone",
     "plugins",
     "cookie",
     "localstorage",
     "adBlock",
     "cpu_cores",
     "canvas_test",
     "audio"]

cross_feature_list = [
     "timezone",
     "fonts",
     "langsDetected",
     "audio"
     ]
```

处理方式也比较简单，没有想象中的复杂

```
result = request.get_json()
mask = []
mac_mask = []

with open(root + "mask.txt", 'r') as f:
    mask = json.loads(f.read())

if 'Mac' in agent or 1:
    with open(root + "mac_mask.txt", 'r') as fm:
        mac_mask = json.loads(fm.read())
else:
    mac_mask = [1 for i in range(len(mask))]

single_hash = ""
cross_hash = ""
```


作者简单的通过agent去判断是否为mac，然后加载了不同的mask



然后利用之前搜集的支持的字体

```
fonts = list(result['fonts'])

cnt = 0
for i in range(len(mask)):
    fonts[i] = str(int(fonts[i]) & mask[i] & mac_mask[i])
    if fonts[i] == '1':
        cnt += 1
```

进行与运算

然后作者将所有特性的值字符串化然后拼接在一起，再进行md5，得到哈希值，作为浏览器指纹和设备指纹

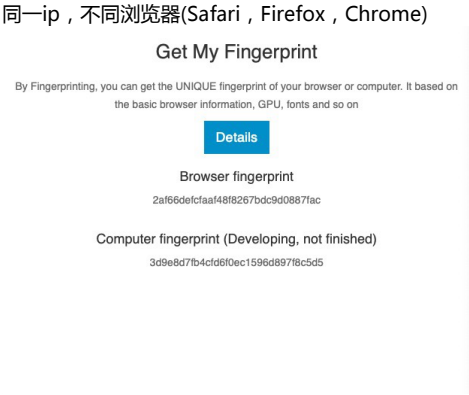
```
  if feature == 'langsDetected':
      value = str("".join(value))
      value = value.replace(" u'", "")
      value = value.replace("'", "")
      value = value.replace(",", "_")
      value = value.replace("[", "")
      value = value.replace("]", "")
      value = value[1:]

  value_str += ",'" + str(value) + "'"
```

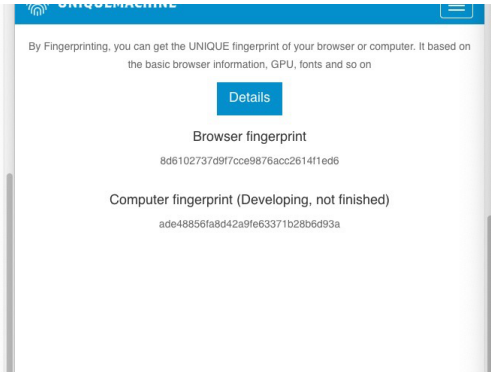
```
result['fonts'] = fonts
for feature in cross_feature_list:
    cross_hash += str(result[feature])
    hash_object = hashlib.md5(str(result[feature]))

hash_object = hashlib.md5(value_str)
single_hash = hash_object.hexdigest()

hash_object = hashlib.md5(cross_hash)
cross_hash = hash_object.hexdigest()

feature_str += ',browser_fingerprint,computer_fingerprint_1'
value_str += ",'" + single_hash + "','" + cross_hash + "'"
```

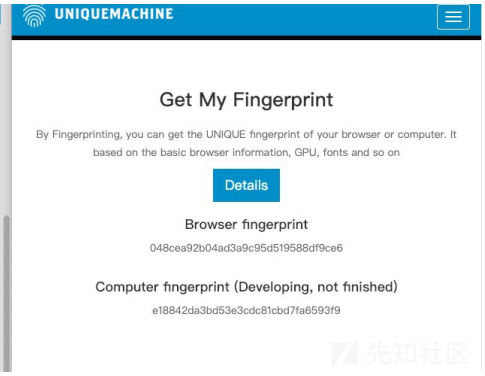
测试结果

因为作者给出了demo网站，我进行了测试

- 同一ip，不同浏览器(Safari，Firefox，Chrome)

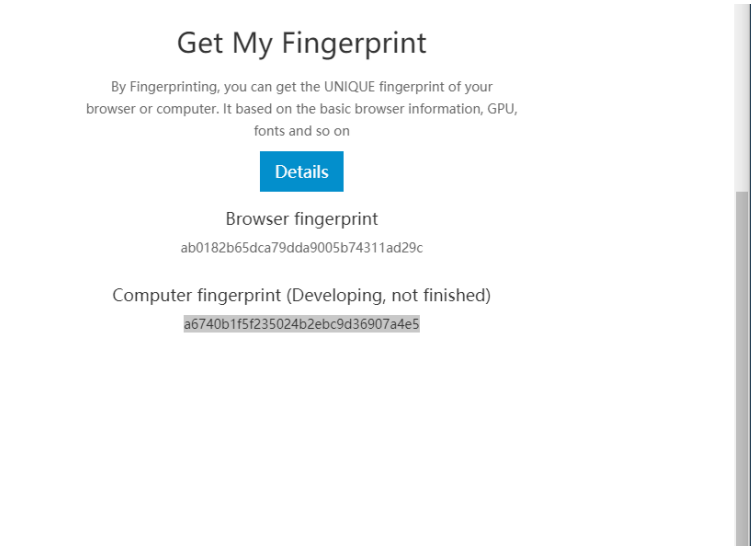


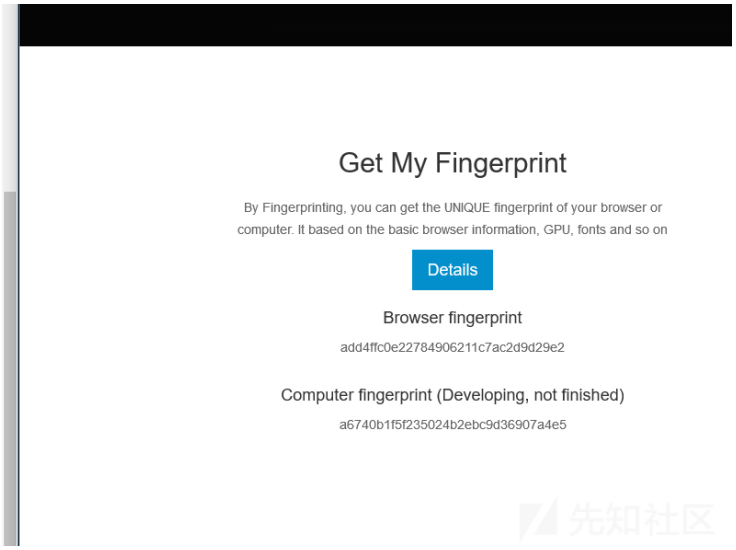




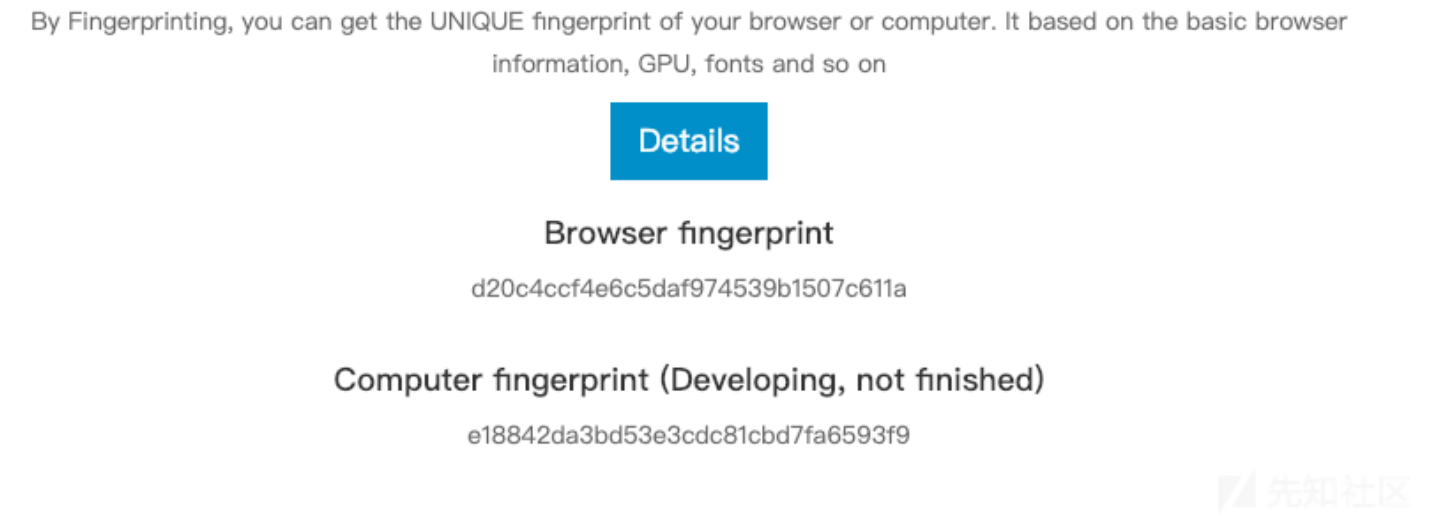
识别都失败了

当然，也有成功的人(Chrome，Firefox)

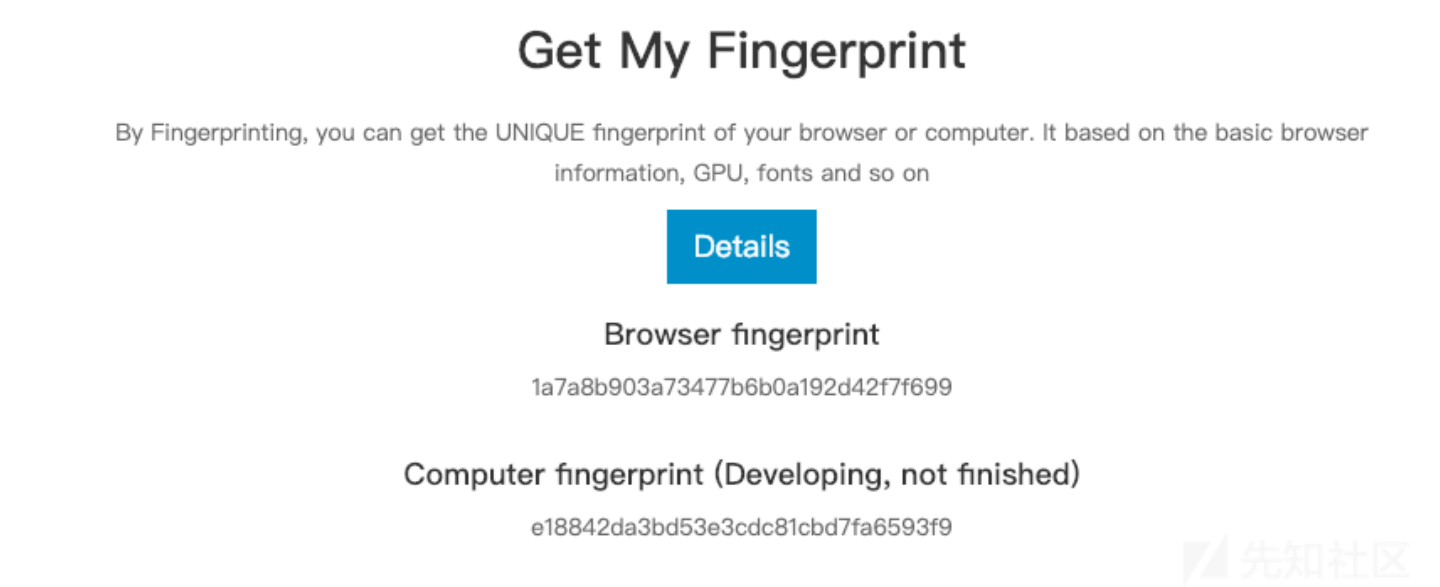




- 不同ip，同一浏览器(Chrome)
  挂上代理后



不挂代理



发现识别成功。

后记

进行跨浏览器设备指纹识别依旧是一个难题，论文提出了很多有趣的特征，我也不能一一阐述解释，并且由于这只是论文的demo，稳定性不够强可以理解，这可以为我们后

上一篇：gogs/gitea CVE-20... 下一篇：OSINT Resources f...
1. 1 条回复

Saferman 2019-01-07 16:38:31

你好，你的稿费发了吗想问一下

0 回复Ta

登录 后跟帖

先知社区

现在登录

热门节点

技术文章

社区小黑板

目录

RSS 关于社区 友情链接 社区小黑板