# 分析Strazzere-android-unpack脱壳工具源码

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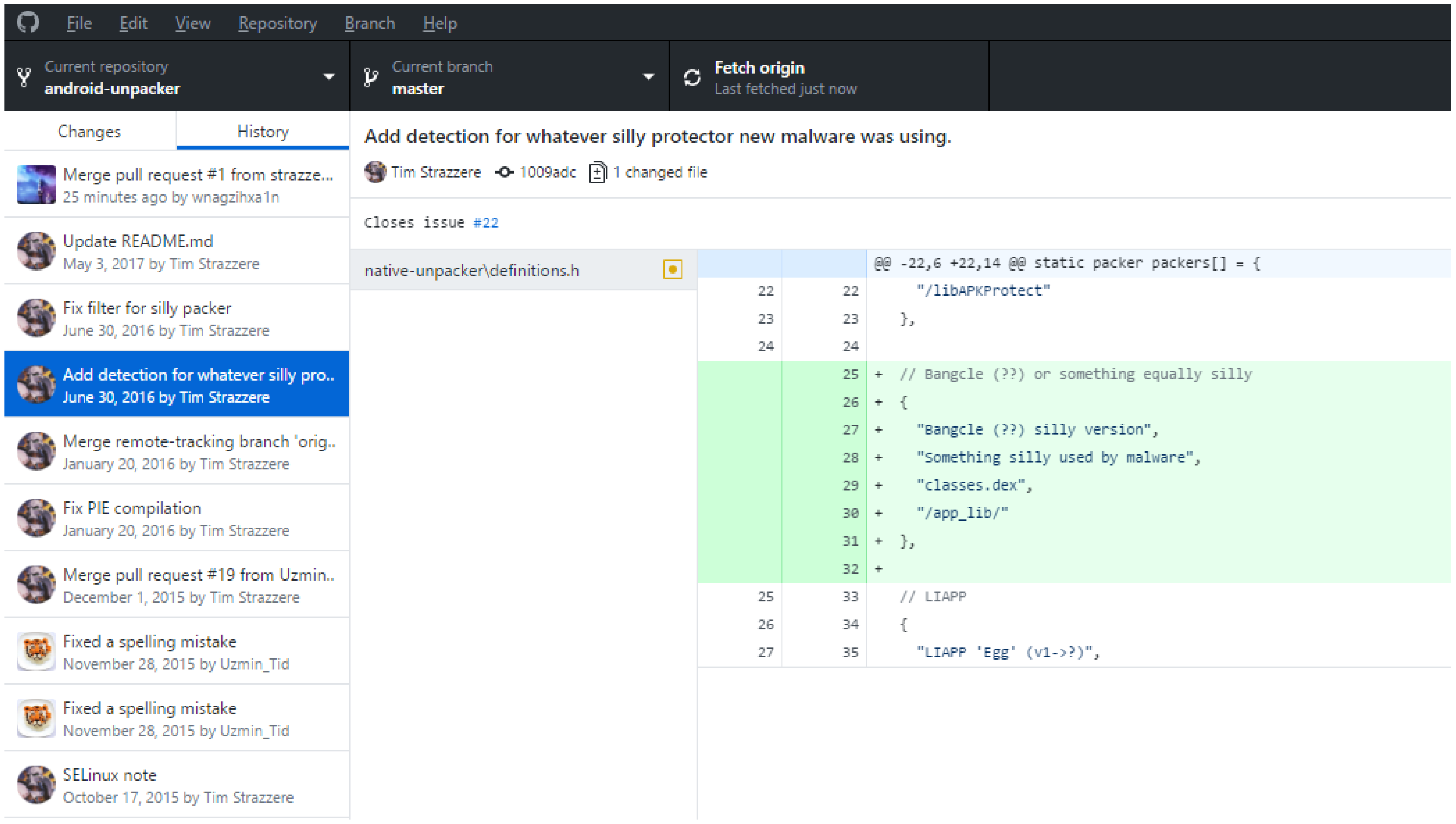
这是DEF CON 22关于安卓应用加固脱壳的一个工具，2014年的，所以脱壳思想简单粗暴，并不适合目前的壳

- https://github.com/strazzere/android-unpacker

两年前作者把代码传到了Gayhub，之后又更新了一波



Merge pull request #1 from strazze...
25 minutes ago by wnagzihxa1n

Update README.md
May 3, 2017 by Tim Strazzere

Fix filter for silly packer
June 30, 2016 by Tim Strazzere

Add detection for whatever silly pro..
June 30, 2016 by Tim Strazzere

Merge remote-tracking branch 'orig..
January 20, 2016 by Tim Strazzere

Fix PIE compilation
January 20, 2016 by Tim Strazzere

Merge pull request #19 from Uzmin..
December 1, 2015 by Tim Strazzere

Fixed a spelling mistake
November 28, 2015 by Uzmin_Tid

Fixed a spelling mistake
November 28, 2015 by Uzmin_Tid

SELinux note
October 17, 2015 by Tim Strazzere

Add detection for whatever silly protector new malware was using.

Tim Strazzere 1009adc 1 changed file

Closes issue #22

native-unpacker\definitions.h

```
@@ -22,6 +22,14 @@ static packer packers[] = {
     "/libAPKProtect"
   },
 
+  // Bangcle (??) or something equally silly
+  {
+    "Bangcle (??) silly version",
+    "Something silly used by malware",
+    "classes.dex",
+    "/app_lib/"
+  },
+
   // LIAPP
   {
     "LIAPP 'Egg' (v1->?)",
```

需要输入待脱壳应用的包名作为参数

```
printf("[ * ] Android Dalvik Unpacker/Unprotector -  < strazz@gmail.com > \n");
if (argc <= 0)
{
    printf(" [ ! ] Nothing to unpack, quitting\n");
    return 0;
}
```

获取当前用户的UID，确保有足够的权限做后续的操作

```
if (getuid() != 0)
{
    printf(" [ ! ] Not root, quitting\n");
    return -1;
}
```

通过包名获取待脱壳应用对应的PID

```
char *package_name = argv[1];
printf(" [ + ] Hunting for % s\n", package_name);
uint32_t pid = get_process_pid(package_name);
if (pid <= 0)
{
    printf(" [ ! ] Process could not be found ! \n");
    return -1;
}
printf(" [ + ] % d is service pid\n", pid);
```

获取PID

```
uint32_t get_process_pid(const char *target_package_name)
{
    char self_pid[10];
    sprintf(self_pid, "%u", getpid());
    DIR *proc = NULL;
    if ((proc = opendir("/proc")) == NULL)
        return -1;
    struct dirent *directory_entry = NULL;
    // 循环打开"/proc/$Pid"下的文件夹
    while ((directory_entry = readdir(proc)) != NULL)
    {
        if (directory_entry == NULL)
            return -1;
        // 过滤掉系统的应用以及脱壳进程自身
        if (strcmp(directory_entry->d_name, "self") == 0 ||
                strcmp(directory_entry->d_name, self_pid) == 0)
            continue;
        // 循环读取"/proc/$PID/cmdline"
        char cmdline[1024];
        snprintf(cmdline, sizeof(cmdline), "/proc/%s/cmdline", directory_entry->d_name);
        FILE *cmdline_file = NULL;
        // 如果读取到的数据为空，则直接进入下一次的读取
        if ((cmdline_file = fopen(cmdline, "r")) == NULL)
            continue;
        char process_name[1024];
        fscanf(cmdline_file, "%s", process_name);
        fclose(cmdline_file);
        // 如果获取到的包名与待脱壳应用包名一致，返回父文件夹名，父文件夹名为进程PID
        if (strcmp(process_name, target_package_name) == 0)
        {
            closedir(proc);
            return atoi(directory_entry->d_name);
        }
    }
    closedir(proc);
    return -1;
}
```

这里通过获取子线程的PID来绕过梆梆的反Ptrace调试

```
uint32_t clone_pid = get_clone_pid(pid);
if (clone_pid <= 0)
{
    printf(" [ ! ] A suitable clone process could not be found ! ");
    return -1;
}
printf("[ + ] % d is clone pid\n", clone_pid);
```

梆梆的三进程互相Ptrace，所以循环遍历子线程的PID，获取到最后一个子线程进行Ptrace即可

```
uint32_t get_clone_pid(uint32_t service_pid)
{
    DIR *service_pid_dir;
    char service_pid_directory[1024];
    sprintf(service_pid_directory, "/proc/%d/task/", service_pid);
    if ((service_pid_dir = opendir(service_pid_directory)) == NULL)
        return -1;
    struct dirent *directory_entry = NULL;
    struct dirent *last_entry = NULL;
    while ((directory_entry = readdir(service_pid_dir)) != NULL)
    {
        last_entry = directory_entry;
    }
    if (last_entry == NULL)
        return -1;
    closedir(service_pid_dir);
    return atoi(last_entry->d_name);
}
```

获取到子线程后进行Ptrace

```
int mem_file = attach_get_memory(clone_pid);
if (mem_file == -1)
{
    printf(" [ ! ] An error occurred attaching and finding the memory ! \n");
    return -1;
}
```

Ptrace该子线程并打开其mem文件

```
int attach_get_memory(uint32_t pid)
{
    char mem[1024];
    snprintf(mem, sizeof(mem), "/proc/%d/mem", pid);
    // Ptrace该子线程
    if (0 != ptrace(PTRACE_ATTACH, pid, NULL, NULL))
        return -1;
    // 获取该子线程的mem文件fd并返回
    int mem_file;
    if (!(mem_file = open(mem, O_RDONLY)))
        return -1;
    return mem_file;
}
```

通过特征检测壳

```
char *extra_filter = determine_filter(clone_pid, mem_file);
```

打开该进程的"/proc/$PID/maps"文件，然后进行特征的查找

```
char *determine_filter(uint32_t clone_pid, int memory_fd)
{
    char maps[1024];
    snprintf(maps, sizeof(maps), "/proc/%d/maps", clone_pid);
    printf(" [+] Attempting to detect packer/protector...\n");
    FILE *maps_file = NULL;
    if ((maps_file = fopen(maps, "r")) == NULL)
        return NULL;
    char mem_line[1024];
    while (fscanf(maps_file, "%[^\n]\n", mem_line) >= 0)
    {
        // Iterate through all markers to find proper filter
        int i;
        for (i = 0; i < sizeof(packers) / sizeof(packers[0]); i++)
        {
            if (strstr(mem_line, packers[i].marker))
            {
                printf("  [*] Found %s\n", packers[i].name);
                return packers[i].filter;
            }
        }
    }
    printf("  [*] Nothing special found, assuming Bangcle...\n");
    // For now we assume it's Bangcle if above filters failed
    return NULL;
}
```

使用的壳特征，感觉很是简单粗暴啊，个人觉得还是用so的名称会比较好，毕竟每一家厂商现在的壳so文件都是不同的名字

```
typedef struct
{
  char *name;
  char *description;
  char *filter;
  char *marker;
} packer;

static packer packers[] = {
    // APKProtect
    {
        "APKProtect v1->5",
        "APKProtect generialized detection",
        // This is actually the filter APKProtect uses itself for finding it's own odex to modify
        ".apk@",
        "/libAPKProtect"},
    // 梆梆加固
    {
        "Bangcle (??) silly version",
        "Something silly used by malware",
        "/app_lib/classes.dex",
        "/app_lib/"},
    // 阿里加固
    {
        "LIAPP 'Egg' (v1->?)",
        "LockIn APP (lockincomp.com)",
        "LIAPPEgg.dex",
        "/LIAPPEgg"},
    // 360加固保
    {
        "Qihoo 'Monster' (v1->?)",
        "Qihoo unknown version, code named 'monster'",
        "monster.dex",
        "/libprotectClass"}
};
```

搜索ODex文件的Magic Number

```
memory_region memory;
if (find_magic_memory(clone_pid, mem_file, &memory, extra_filter) <= 0)
{
    printf(" [ ! ] Something unexpected happened, new version of packer/protectors?Or it wasn't packed/protected!\n");
    return -1;
}
```

找到包含ODex文件Magic Number的内存段

```
int find_magic_memory(uint32_t clone_pid, int memory_fd, memory_region *memory, char *extra_filter)
{
    int ret = 0;
    char maps[1024];
    snprintf(maps, sizeof(maps), "/proc/%d/maps", clone_pid);
    FILE *maps_file = NULL;
    if ((maps_file = fopen(maps, "r")) == NULL)
        return -1;
    char mem_line[1024];
    while (fscanf(maps_file, "%[^\n]\n", mem_line) >= 0)
    {
        if (extra_filter != NULL && !strstr(mem_line, extra_filter))
            continue;
        if (extra_filter == NULL && (strstr(mem_line, "/") || strstr(mem_line, "[")))
            continue;
        char mem_address_start[10];
        char mem_address_end[10];
        sscanf(mem_line, "%8[^-]-%8[^ ]", mem_address_start, mem_address_end);
        uint32_t mem_start = strtoul(mem_address_start, NULL, 16);
        // 判断前8字节是否为ODex的Magic Number
        if (peek_memory(memory_fd, mem_start))
        {
            memory->start = mem_start;
            memory->end = strtoul(mem_address_end, NULL, 16);
            ret = 1;
        }
    }
    fclose(maps_file);
    return ret;
}
```

只判断前8字节，有些不妥

```
int peek_memory(int memory_file, uint32_t address)
{
    char magic[8];
    if (8 != pread(memory_file, magic, 8, address))
        return -1;
    // We are currently just dumping odex or jar files, letting the packers/protectors do all
    // the heavy lifting for us
    if (strcmp(magic, odex_magic) == 0)
        return 1;
    return 0;
}
```

找到ODex文件在内存中的起始地址后就开始执行脱壳操作

```
printf(" [+] Unpacked odex found in memory!\n");
// 新建一个脱壳后的ODex文件名
char *dumped_file_name = malloc(strlen(static_safe_location) + strlen(package_name) + strlen(suffix));
sprintf(dumped_file_name, "%s%s%s", static_safe_location, package_name, suffix);
// 开始脱壳
if (dump_memory(mem_file, &memory, dumped_file_name) <= 0)
{
    printf(" [!] An issue occurred trying to dump the memory to a file!\n");
    return -1;
}
printf(" [+] Unpacked/protected file dumped to : %s\n", dumped_file_name);
close(mem_file);
// 停止Ptrace
ptrace(PTRACE_DETACH, clone_pid, NULL, 0);
return 1;
```

进行脱壳操作

```
int dump_memory(int memory_fd, memory_region *memory, const char *file_name)
{
    int ret;
    // 计算整个ODex文件长度
    char *buffer = malloc(memory->end - memory->start);
    printf(" [+] Attempting to dump memory region 0x%x to 0x%x\n", memory->start, memory->end);
    // 读取数据
    int read = pread(memory_fd, buffer, memory->end - memory->start, memory->start);
    if ((memory->end - memory->start) != read)
    {
        printf(" [!] pread seems to have failed!\n");
        return -1;
    }
    // 将数据写进文件
    FILE *dump = fopen(file_name, "wb");
    if (fwrite(buffer, memory->end - memory-> start, 1, dump) <= 0)
    {
        ret = -1;
    }
    else
    {
        ret = 1;
    }
    free(buffer);
    fclose(dump);
    return ret;
}
```

本工具，在目前的加固环境下，参考一下代码就好

针对APKProtect，还有一个隐藏模拟器小脚本，原理就是Hook函数`strlen()`，判断参数是否是`"/system/bin/qemud"`

```
#include <stdlib.h>
#include <dlfcn.h>
#include <android/log.h>

#define LOG_TAG "StupidHideQemu"
#define LOGD(...) __android_log_print(ANDROID_LOG_DEBUG, LOG_TAG, __VA_ARGS__)
#define DPRINTF(...) __android_log_print(ANDROID_LOG_DEBUG, LOG_TAG, __VA_ARGS__)

static void _libhook_init() __attribute__((constructor));
static void _libhook_init()
{
    LOGD("[] Hooking!\n");
}

size_t strlen(const char *s)
{
    static size_t (*func_strlen)(const char *) = NULL;
    int retval = 0;
    if (!func_strlen)
        func_strlen = (size_t(*)(const char *))dlsym(RTLD_NEXT, "strlen");
    if (strcmp(s, "/system/bin/qemud") == 0)
    {
        LOGD("[] Caught apkprotect checking for the qemu");
        return 1;
    }
    return func_strlen(s);
}
```

另外，有大牛根据这个脱壳工具进行了改进，改进了匹配的方法

- https://github.com/DrizzleRisk/drizzleDumper