

Report for login at 2024-06-17

Enkidu by Debrunbaix.

Summary

- General Information
- Security of the Binary
- Strings
- Assembly Code
- Code Analysis
- Exploits
- Credits

Enumeration

Binary Information

File Name	Path	Format	Bit
login	app/testFile/login	ELF	32-bit

This information comes from the **file** command.

Security of the Binary

Basic Security Features			
Linked	Stripped	RELRO	Canary
dynamically linked	no	partial	no

Advanced Security Mechanisms		
NX	PIE	RPath
no	no	no

Security Meta-Information		
RunPath	Symbols	Fortify Source
no	yes	no

This information comes from the **checksec** command.

Strings

- Enter admin password:
- pass
- Correct Password!
- Incorrect Password!
- Successfully logged in as Admin (authorised=%d) :)
- Failed to log in as Admin (authorised=%d) :(
- login.c
- .note.gnu.build-id

This information comes from Binary sections and the **strings** command.

Vulnerable Functions

- gets
- printf

Libraries

- linux-gate.so.1
- libc.so.6
- /lib/ld-linux.so.2

This information comes from the **ldd** command.

Assembly Code

```
xor ebp, ebp
pop esi
mov ecx, esp
and esp, 0xffffffff0
push eax
push esp
push edx
call 0x80490b3
add ebx, 0x2f70
lea eax, [ebx - 0x2d40]
push eax
lea eax, [ebx - 0x2da0]
push eax
push ecx
push esi
mov eax, 0x8049192
push eax
call 0x8049070
hlt
mov ebx, dword ptr [esp]
ret
nop
nop
nop
nop
nop
nop
ret
nop
nop
nop
nop
nop
nop
nop
nop
nop
nop
```

```
nop
mov ebx, dword ptr [esp]
ret
nop
nop
nop
nop
nop
nop
mov eax, 0x804c028
cmp eax, 0x804c028
je 0x8049110
mov eax, 0
test eax, eax
je 0x8049110
push ebp
mov ebp, esp
sub esp, 0x14
push 0x804c028
call eax
add esp, 0x10
leave
ret
lea esi, [esi]
nop
ret
lea esi, [esi]
lea esi, [esi]
nop
mov eax, 0x804c028
sub eax, 0x804c028
mov edx, eax
shr eax, 0x1f
sar edx, 2
add eax, edx
sar eax, 1
je 0x8049158
```

```
mov edx, 0
test edx, edx
je 0x8049158
push ebp
mov ebp, esp
sub esp, 0x10
push eax
push 0x804c028
call edx
add esp, 0x10
leave
ret
lea esi, [esi]
ret
lea esi, [esi]
cmp byte ptr [0x804c028], 0
jne 0x8049180
push ebp
mov ebp, esp
sub esp, 8
call 0x80490e0
mov byte ptr [0x804c028], 1
leave
ret
lea esi, [esi]
ret
lea esi, [esi]
lea esi, [esi]
nop
jmp 0x8049120
lea ecx, [esp + 4]
and esp, 0xffffffff0
push dword ptr [ecx - 4]
push ebp
mov ebp, esp
push ebx
push ecx
```

```
sub esp, 0x10
call 0x80490d0
add ebx, 0x2e57
mov dword ptr [ebp - 0xc], 0
sub esp, 0xc
lea eax, [ebx - 0x1ff8]
push eax
call 0x8049060
add esp, 0x10
sub esp, 0xc
lea eax, [ebp - 0x12]
push eax
call 0x8049050
add esp, 0x10
sub esp, 8
lea eax, [ebx - 0x1fe1]
push eax
lea eax, [ebp - 0x12]
push eax
call 0x8049030
add esp, 0x10
test eax, eax
jne 0x804920c
sub esp, 0xc
lea eax, [ebx - 0x1fdc]
push eax
call 0x8049060
add esp, 0x10
mov dword ptr [ebp - 0xc], 1
jmp 0x804921e
sub esp, 0xc
lea eax, [ebx - 0x1fca]
push eax
call 0x8049060
add esp, 0x10
cmp dword ptr [ebp - 0xc], 0
je 0x804923b
```



```
sub esp, 8
push dword ptr [ebp - 0xc]
lea eax, [ebx - 0x1fb4]
push eax
call 0x8049040
add esp, 0x10
jmp 0x8049250
sub esp, 8
push dword ptr [ebp - 0xc]
lea eax, [ebx - 0x1f80]
push eax
call 0x8049040
add esp, 0x10
mov eax, 0
lea esp, [ebp - 8]
pop ecx
pop ebx
pop ebp
lea esp, [ecx - 4]
ret
nop
push ebp
call 0x80492c1
add ebp, 0x2d9a
push edi
push esi
push ebx
sub esp, 0xc
mov ebx, ebp
mov edi, dword ptr [esp + 0x28]
call 0x8049000
lea ebx, [ebp - 0xf0]
lea eax, [ebp - 0xf4]
sub ebx, eax
sar ebx, 2
je 0x80492b5
xor esi, esi
```

```
lea esi, [esi]
sub esp, 4
push edi
push dword ptr [esp + 0x2c]
push dword ptr [esp + 0x2c]
call dword ptr [ebp + esi*4 - 0xf4]
add esi, 1
add esp, 0x10
cmp ebx, esi
jne 0x8049298
add esp, 0xc
pop ebx
pop esi
pop edi
pop ebp
ret
lea esi, [esi]
ret
mov ebp, dword ptr [esp]
ret
```

This information comes from the Capstone's library and elftools command.

Code Analysis

Pseudo C Code

main.c

```
/* WARNING: Function: __x86.get_pc_thunk.bx replaced with  
injection: get_pc_thunk_bx */
```

```
undefined4 main(void)
```

```
{  
    int iVar1;  
    char local_1a [6];  
    int local_14;  
    undefined *local_10;  
  
    local_10 = &stack0x00000004;  
    local_14 = 0;  
    puts("Enter admin password: ");  
    gets(local_1a);  
    iVar1 = strcmp(local_1a,"pass");  
    if (iVar1 == 0) {  
        puts("Correct Password!");  
        local_14 = 1;  
    }  
    else {  
        puts("Incorrect Password!");  
    }  
    if (local_14 == 0) {  
        printf("Failed to log in as Admin (authorised=%d) :  
(\n",0);  
    }  
    else {  
        printf("Successfully logged in as Admin
```

```
(authorised=%d) :)\n",local_14);  
}  
return 0;  
}
```

This information comes from Ghidra CLI.

`_start.c`

```
/* WARNING: Function: __i686.get_pc_thunk.bx replaced with  
injection: get_pc_thunk_bx */  
  
void processEntry _start(undefined4 param_1,undefined4  
param_2)  
  
{  
    undefined auStack_4 [4];  
  
    __libc_start_main(main,param_2,&stack0x00000004,__libc_csu_init,__libc_  
    ;  
    do {  
        /* WARNING: Do nothing block with  
infinite loop */  
        } while( true );  
    }
```

This information comes from Ghidra CLI.

`_init.c`

```
/* WARNING: Function: __x86.get_pc_thunk.bx replaced with
injection: get_pc_thunk_bx */

int _init(EVP_PKEY_CTX *ctx)

{
    undefined *puVar1;

    puVar1 = PTR___gmon_start___0804bffc;
    if (PTR___gmon_start___0804bffc != (undefined *)0x0) {
        puVar1 = (undefined *)(*(code
*)PTR___gmon_start___0804bffc)();
    }
    return (int)puVar1;
}
```

This information comes from Ghidra CLI.

Exploit

Fuzzing

Exploit success with this input :

- pass
- login.c

Buffer Overflow

To determine if a buffer overflow is possible, the process involves injecting progressively larger payloads into the target binary and observing the results. By starting with a small payload and incrementally increasing its size, the goal is to trigger a **segmentation fault**, which indicates a buffer overflow vulnerability. If such a fault occurs, the binary is deemed vulnerable, and the specific payload size at which this happens is noted. This method ensures a systematic approach to identifying potential vulnerabilities within a predefined limit.

The memory of the binary is writable with this offset : 12

Credits

The development of Enkidu utilized various tools and libraries to achieve its functionality:

file: For determining file types.

checksec: To check the security properties of binaries.

strings: For extracting printable strings from files.

ldd: To list dynamic dependencies of executables.

elftools & **capstone:** For parsing and analyzing ELF files and disassembling binaries.

Ghidra: Used for decompiling binaries into C-like pseudocode through the AnalyseHeadless script.

ChatGPT API: For enhancing code comprehension and generating explanatory paragraphs.

markdown: For converting text formatted in Markdown to HTML, facilitating report generation.

WeasyPrint: To convert HTML documents into PDF files for easy distribution and archiving of reports.