

Practical Reversing V – Exploit Development Basics

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Acknowledgement

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Reversing & Malware Analysis Training

This presentation is part of our **Reverse Engineering & Malware Analysis** Training program. Currently it is delivered only during our local meet for FREE of cost.



For complete details of this course, visit our [Security Training page](#).

Who am I #1

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- ⦿ Classification of exploits
- ⦿ Exploitation Techniques
 - Direct EIP overwrite
 - SEH overwrite

Vulnerability

- In computer security, a vulnerability is a weakness which allows an attacker to reduce a system's information assurance.
- Vulnerability is the intersection of three elements: a system susceptibility or flaw, attacker access to the flaw, and attacker capability to exploit the flaw.

- Source: Wikipedia

Exploit

- ⦿ Piece of software/code that takes advantage of a vulnerability in order to cause unintended or unanticipated behaviour to occur on computer software, hardware [Wiki]
- ⦿ This frequently includes
 - gaining control of a computer system or
 - privilege escalation or
 - a denial-of-service attack.

Exploit (contd)

- ⦿ Exploits can be in any form based on the software it exploits:
- ⦿ Software : exploit
 - Adobe reader : pdf file
 - Microsoft word : doc file
 - Microsoft excel : xls file
 - Internet Explorer : Attacker hosted website or html file
 - and so on..

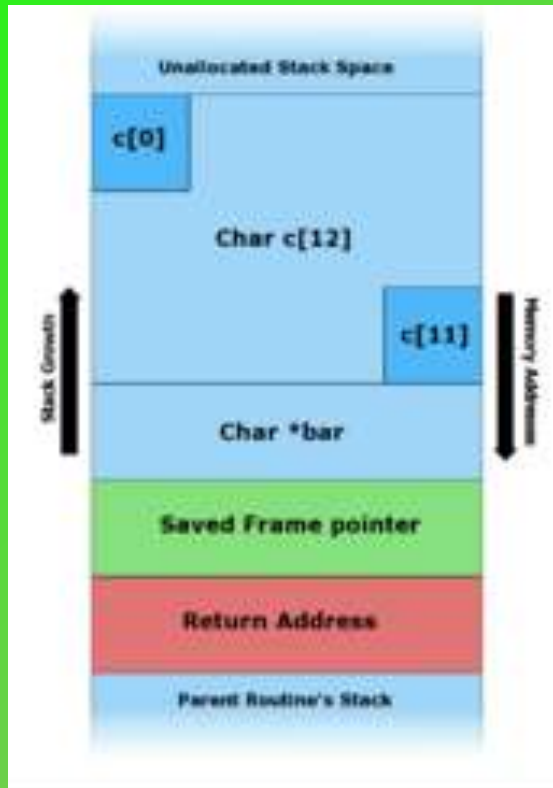
Classification

- ⦿ Based on the vulnerability they exploit
 - Buffer Overflow, Memory Corruption, Use-After-Free
- ⦿ Local or Remote
 - Local Privilege Escalation, Remote code execution
- ⦿ Result of running the exploit
 - DoS, EoP etc

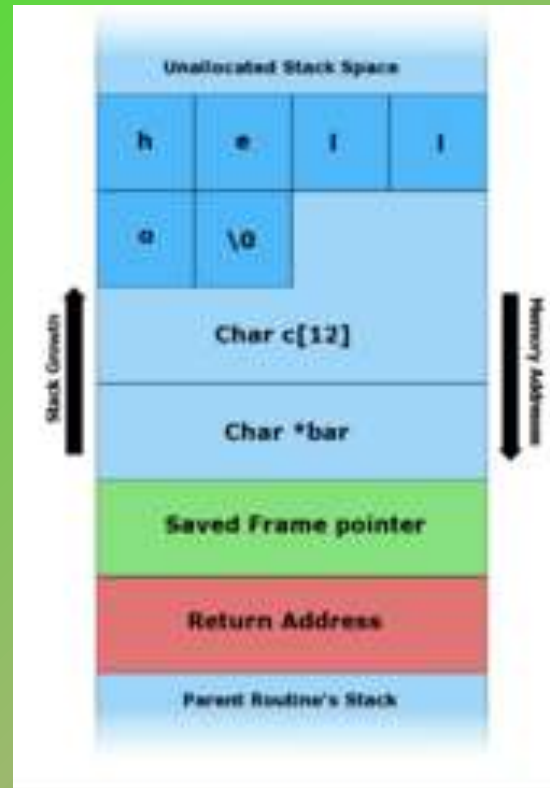
Stack Buffer Overflow

- Occurs when a program writes to memory addresses on the stack outside of the allocated buffer
- For exploiting a stack based buffer overflow is to overwrite the function return address with a pointer to attacker-controlled data (usually on the stack itself)

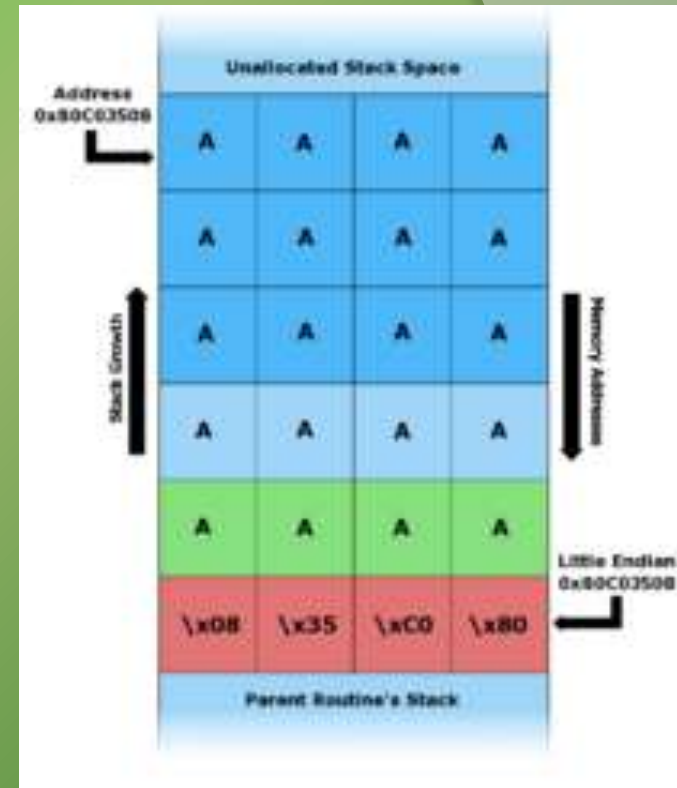
Stack Buffer Overflow in Action



A - Before data is copied.



B - "hello" is the first command line argument.



C -
 AAAAAAAAAAAAAAAAAAAAAA
 A\x08\x35\xC0\x80" is the first command line argument.

Direct EIP overwrite

- Every Windows uses process memory that contains 3 major components :
 - code segment (executable instructions). The EIP keeps track of the next instruction
 - data segment (variables, dynamic buffers)
 - stack segment (used to pass data/arguments to functions, and is used as space for variables)
 - The stack starts (= the bottom of the stack) from the very end of the virtual memory of a page and grows upwards (to a lower address).
 - PUSH adds something to the top of the stack,
 - POP will remove one item (4 bytes) from the stack and puts it in a register.

EIP Overwrite Demo

⦿ A vulnerability in

- “Shadow Stream Recorder version 3.0.1.7
- Buffer overflow when reading file (.asx)

Step -1 : Create a PoC to generate a crash in the software to verify the vuln

Step -2 : Find the offset to overwrite EIP

Step -3: Find an address of the “jmp esp” instruction

Step -4: Generate a shellcode and append it to the exploit code

Step -5: Putting it all together

DEMO - EIP

- ◎ http://www.youtube.com/watch?v=erl_Aee8oDg

SEH Overwrite

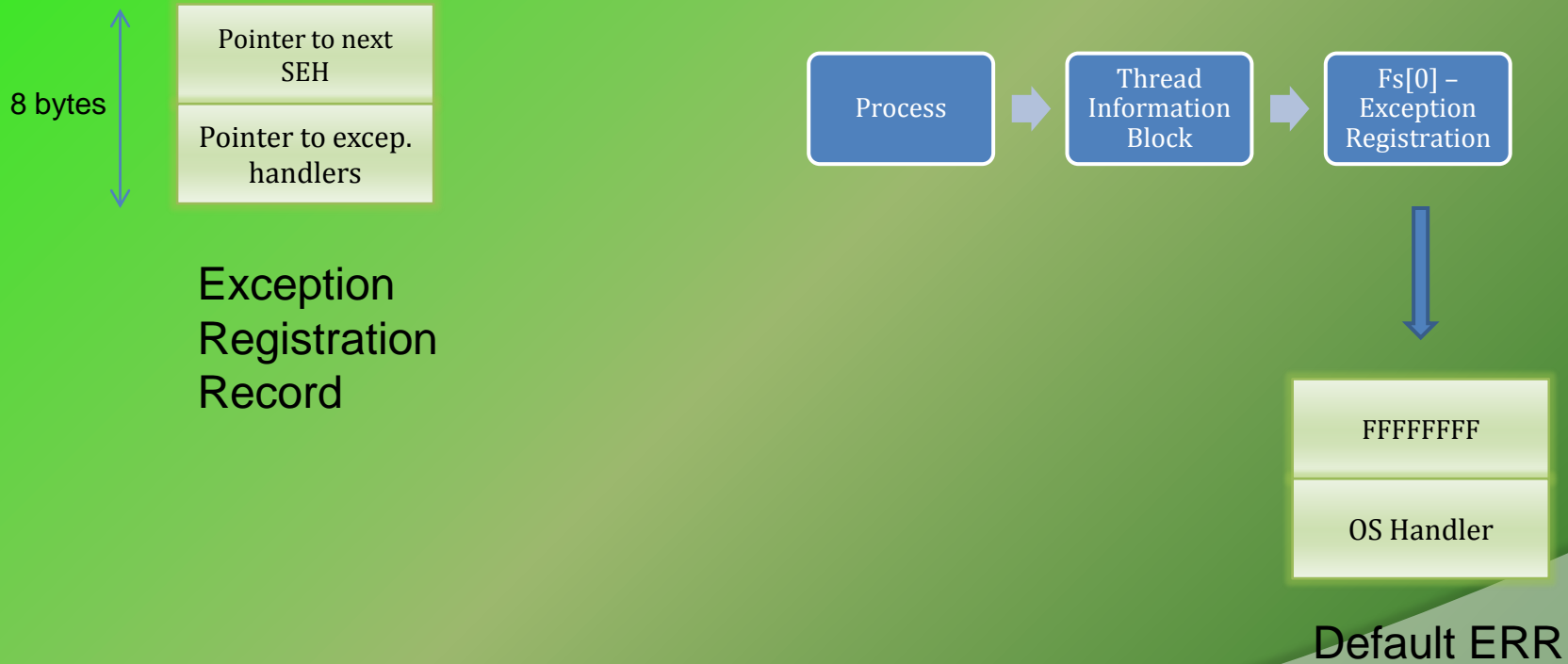
⦿ Exception?

- An event which disrupts normal execution flow of code and requires execution outside normal flow
- Software Exception –Generated by program (e.g Invalid file handle)
- Hardware Exception – Access invalid memory, divide by zero etc

⦿ SEH (structured exception handler)

- Patented by Borland and licensed to Microsoft
- Software's method of dispatching and handling exceptions
- Can handle both software and hardware exceptions
- For eg `try{ } ; except { } ; block`
- Whenever an exception happens control is passed on to the OS, which in turn locate and pass the control to the handler chain

SEH Overwrite in Action



SEH Overwrite Demo

- ⦿ A vulnerability in
 - “MM Player 2.2
 - Buffer overflow when reading file (.ppl)

Step -1 : Create a PoC to generate a crash in the software to verify the vuln

Step -2 : Find the offset to overwrite nSEH + SEHandler

Step -3: Find an address of the command sequence “pop pop ret ”

Step -4: Generate a shellcode and append it to the exploit code

Step -5: Putting it all together

SEH Overwrite Demo

- <http://www.youtube.com/watch?v=njQ47H7jO4s&feature=youtu.be>

Reference

- [Complete Reference Guide for Reversing & Malware Analysis Training](#)

Thank You !



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