NTDLL Unhooking - Introduction

Introduction

Earlier modules demonstrated the power of using direct syscalls to avoid userland hooks by creating a syscall in their project file and invoking it instead. In this module, a different approach will be presented to achieve the same goal of circumventing these hooks. This approach replaces the hooked DLL in the loaded process with an unaltered version that is not hooked.

The difficulty in this method is obtaining the unhooked DLL, which is usually the `ntdll.dll` file.

Unhooking

Replacing the hooked DLL with an unhooked version requires manually setting up the IAT, fixing reallocations, and other tedious tasks. To avoid this, a portion of the DLL, specifically the `.text` section which contains the hooks, can be replaced instead. The text section contains the DLL's exported functions code, which is where potential userland hooks are installed.

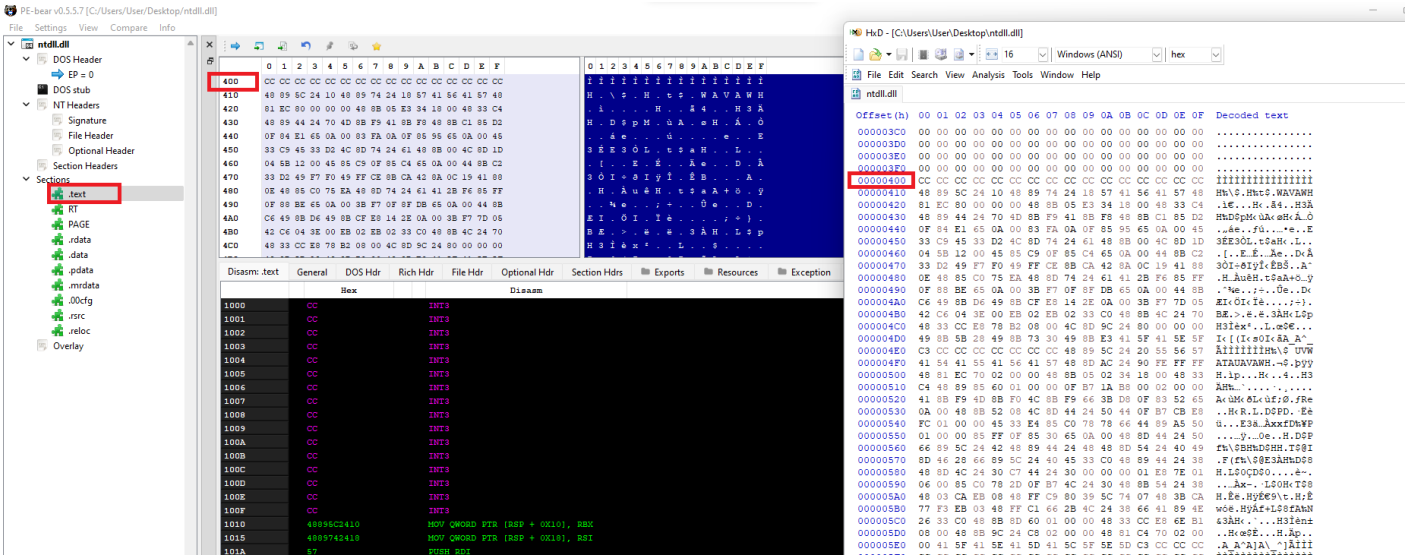
Replacing the text section of an image file simply requires its base address and size, both of which are located in the `IMAGE_OPTIONAL_HEADER` header as `BaseOfCode` and `SizeOfCode` respectively.

Another way to retrieve the base address of the text section and its size, is through the `IMAGE_SECTION_HEADER` header, by searching for the `.text` string in the `IMAGE_SECTION_HEADER.Name` array, which was demonstrated in the *Parsing PE Headers* module.

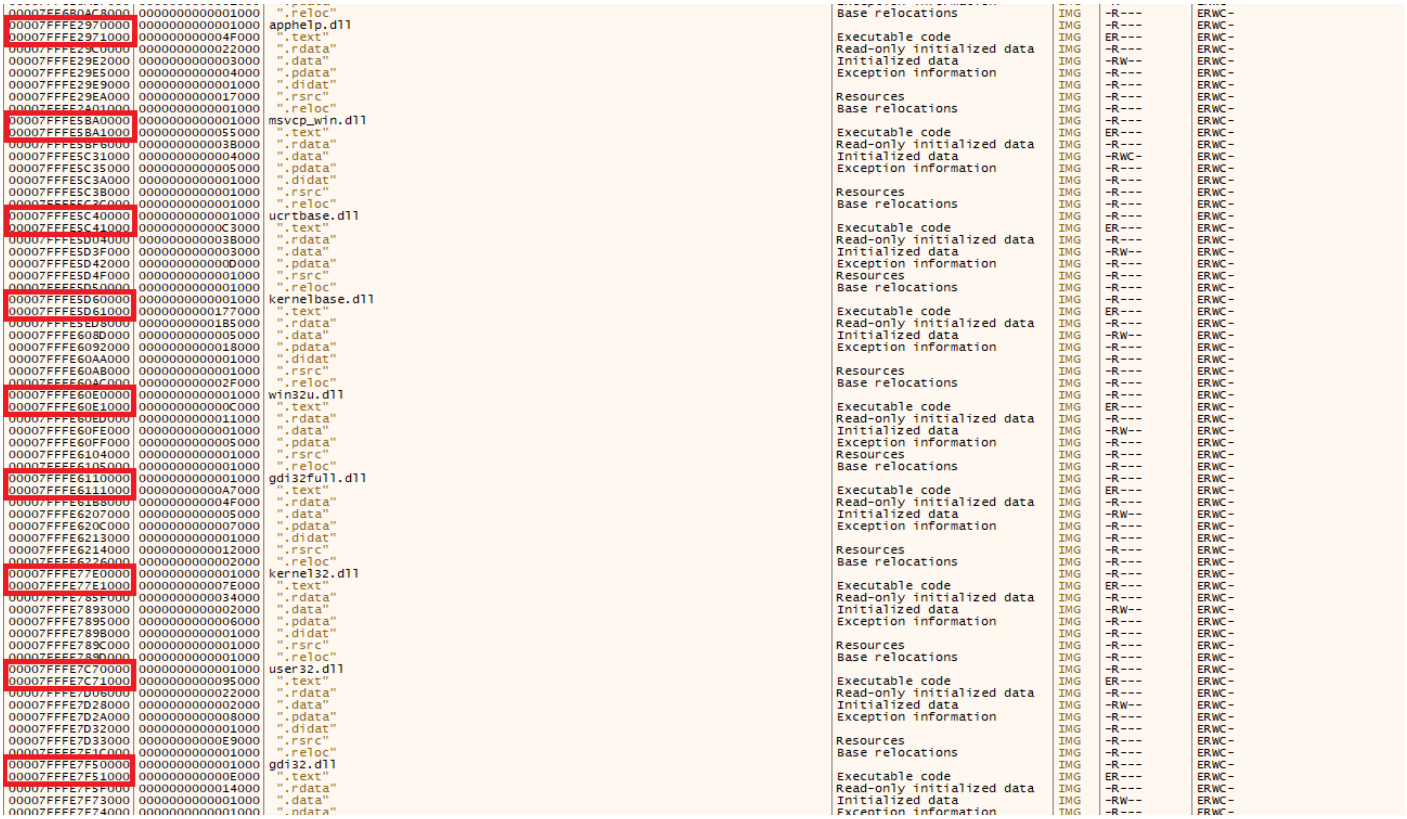
The memory permissions of the text section of the DLL need to be changed to replace it with a new text section. To do this, the `VirtualProtect` WinAPI must be used. The text section is generally marked as `RX`, however in order to replace it with a new text section, the memory permissions should be modified to allow for writing data. Ensure the new memory permissions are set to `PAGE_EXECUTE_READWRITE` or `PAGE_EXECUTE_WRITECOPY` to allow for writing data as well as executing the functions.

Text Section Alignment

The offset of the text section for most DLLs **on disk** is `0x400` which is equivalent to 1024. This can be seen below using Pe-Bear and HxD binary editor when inspecting `ntdll.dll`.



The offset will change when the DLL file **is mapped into the memory of a process**. The text section is mainly set to be at an offset of `0x1000` or 4096 as shown below.



On Disk vs In Memory Offset

The text section of the DLL image on disk is set to an offset of 1KB or 1024 bytes due to binary files often being aligned on 1kb boundaries, which assists in improving disk I/O operations performance.

When the binary is loaded into memory and mapped into a process, it is aligned to a different boundary of 4KB or 4096 bytes, which is often utilized as a page size for virtual memory operations to enhance memory access and CPU performance.

It's crucial to keep this in mind as this information will be required when implementing the unhooking logic in the upcoming modules.

NTDLL Unhooking Methods

Later modules will teach how to replace the text section of the `ntdll.dll` file with a different version retrieved from the sources below.

- From Disk - This is where the `ntdll.dll` binary is saved `C:\Windows\System32\ntdll.dll`.
- From KnownDlls Directory - A directory in the Windows OS that contains a group of DLLs and is used by the Windows loader for performance reasons.
- From a Suspended Process - Where `ntdll.dll` is read from another remote suspended process.
- From a Webserver - Where `ntdll.dll` is read from a web server, which in this case will be Winbindex.