API Hooking - Minhook Library

Introduction

Minhook is a hooking library written in C that can be used to achieve API hooking. It is compatible with both 32-bit and 64-bit applications on Windows and uses x86/x64 assembly for inline hooking, similar to the Detours library. In comparison to other hooking libraries, MinHook is simpler and offers lightweight APIs, making it easier to work with.

Using The Minhook Library

Similarly to the Detours library, the Minhook library requires the static `.lib` file and the MinHook.h header file to be included in the Visual Studio project.

Minhook API Functions

The Minhook library works by initializing a structure that holds the required information needed for the hook's installation or removal. This is done via the `MH_Initialize` API that initializes the HOOK_ENTRY structure in the library. Next, the `MH_CreateHook` function is used to create the hooks and `MH_EnableHook` is used to enable them. `MH_DisableHook` is used to remove the hooks and finally, `MH_Uninitialize` is used to clean up the initialized structure. The functions are listed again below for convenience.

- MH_Initialize - Initializes the HOOK_ENTRY structure.
- MH_CreateHook - Create the hooks.
- MH_EnableHook - Enables the created hooks.
- MH_DisableHook - Remove the hooks.
- MH_Uninitialize - Cleanup the initialized structure.

The Minhook APIs return a `MH_STATUS` value which is a user-defined enumeration located in Minhook.h. The returned `MH_STATUS` data type indicates the error code of a specified function. An `MH_OK` value, which is a 0, is returned if the function succeeds and a non-zero value is returned if an error occurs.

It is worth noting that both `MH_Initialize` and `MH_Uninitialize` functions should be only called once, at the beginning and the end of the program, respectively.

The Detour Function

This module will utilize the same MessageBoxA API example from the preceding module, which will be hooked and changed to execute a different message box.

```
fnMessageBoxA g_pMessageBoxA = NULL;

INT WINAPI MyMessageBoxA(HWND hWnd, LPCSTR lpText, LPCSTR lpCaption, UINT
uType) {

        printf("[+] Original Parameters : \n");
        printf("\t - lpText     : %s\n", lpText);
        printf("\t - lpCaption  : %s\n", lpCaption);

        return g_pMessageBoxA(hWnd, "Different lpText", "Different
lpCaption", uType);
}
```

Notice the `g_pMessageBoxA` global variable is used to run the message box, where `g_pMessageBoxA` is a pointer to the original, unhooked MessageBoxA API. This is set to `NULL` because the Minhook MH_CreateHook API call is the one that initializes it for use, as opposed to the Detours library where `g_pMessageBoxA` was set manually. This is done to prevent the occurrence of a hooking loop issue, which was discussed in the previous module.

Minhook Hooking Routine

As mentioned earlier, to hook a specific API using Minhook, it is first required to execute the `MH_Initialize` function. Hooks can then be created with `MH_CreateHook` and enabled with `MH_EnableHook`.

```
BOOL InstallHook() {

        DWORD   dwMinHookErr = NULL;

        if ((dwMinHookErr = MH_Initialize()) != MH_OK) {
                printf("[!] MH_Initialize Failed With Error : %d \n",
dwMinHookErr);
                return FALSE;
        }

        // Installing the hook on MessageBoxA, to run MyMessageBoxA instead
        // g_pMessageBoxA will be a pointer to the original MessageBoxA
function
        if ((dwMinHookErr = MH_CreateHook(&MessageBoxA, &MyMessageBoxA,
&g_pMessageBoxA)) != MH_OK) {
                printf("[!] MH_CreateHook Failed With Error : %d \n",
dwMinHookErr);
                return FALSE;
        }
```

```
        // Enabling the hook on MessageBoxA
        if ((dwMinHookErr = MH_EnableHook(&MessageBoxA)) != MH_OK) {
                printf("[!] MH_EnableHook Failed With Error : %d \n",
dwMinHookErr);
                return -1;
        }

        return TRUE;
}
```

Minhook UnHooking Routine

Unlike the Detours library, the Minhook library does not require the use of transactions. Instead, to remove a hook, the only requirement is to run the `MH_DisableHook` API with the address of the hooked function. The `MH_Uninitialize` call is optional, but it cleans up the structure initialized with the previous `MH_Initialize` call.

```
BOOL Unhook() {

        DWORD   dwMinHookErr = NULL;

        if ((dwMinHookErr = MH_DisableHook(&MessageBoxA)) != MH_OK) {
                printf("[!] MH_DisableHook Failed With Error : %d \n",
dwMinHookErr);
                return FALSE;
        }

        if ((dwMinHookErr = MH_Uninitialize()) != MH_OK) {
                printf("[!] MH_Uninitialize Failed With Error : %d \n",
dwMinHookErr);
                return FALSE;
        }

    return TRUE;
}
```

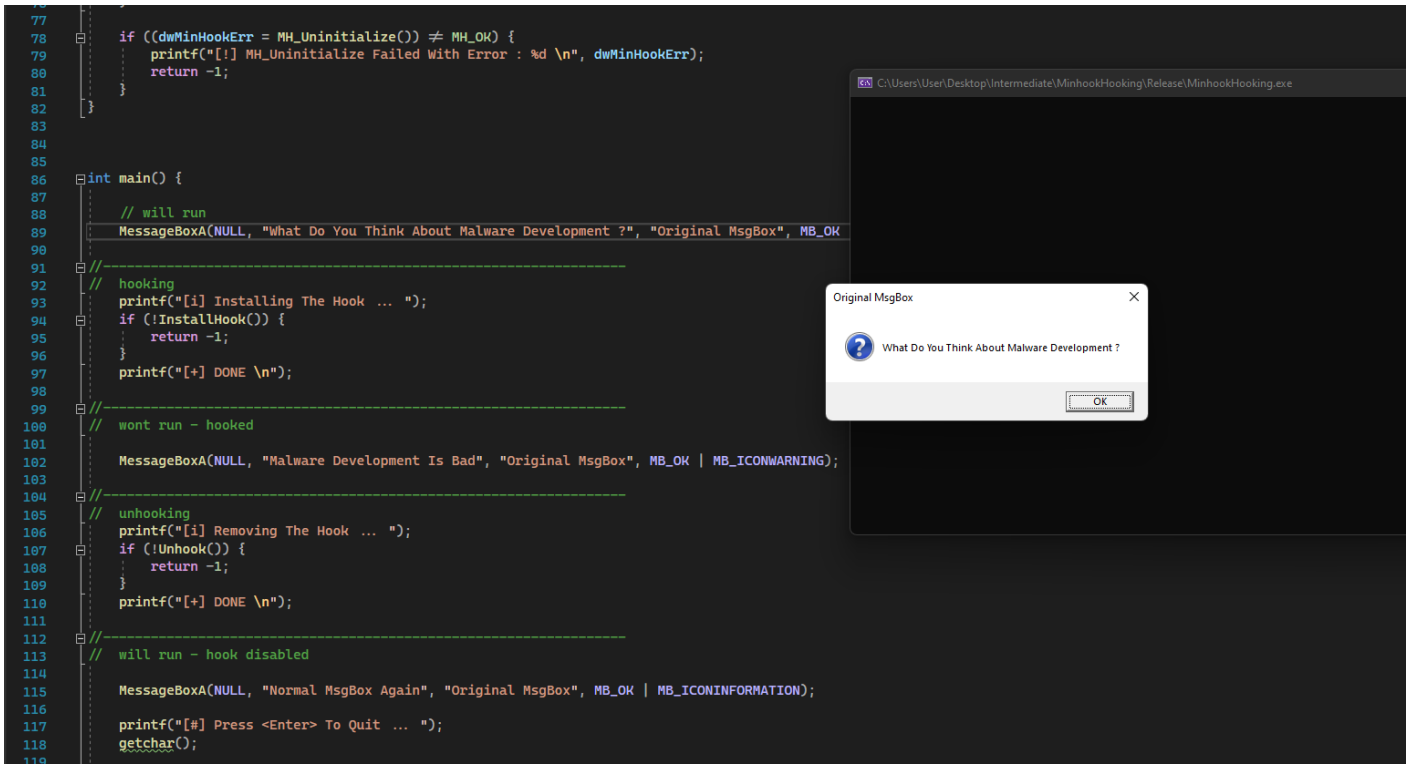
The Main Function

The hooking and unhooking routines previously shown do not include a main function. The main function is shown below which simply invokes the unhooked and hooked versions of `MessageBoxA`.

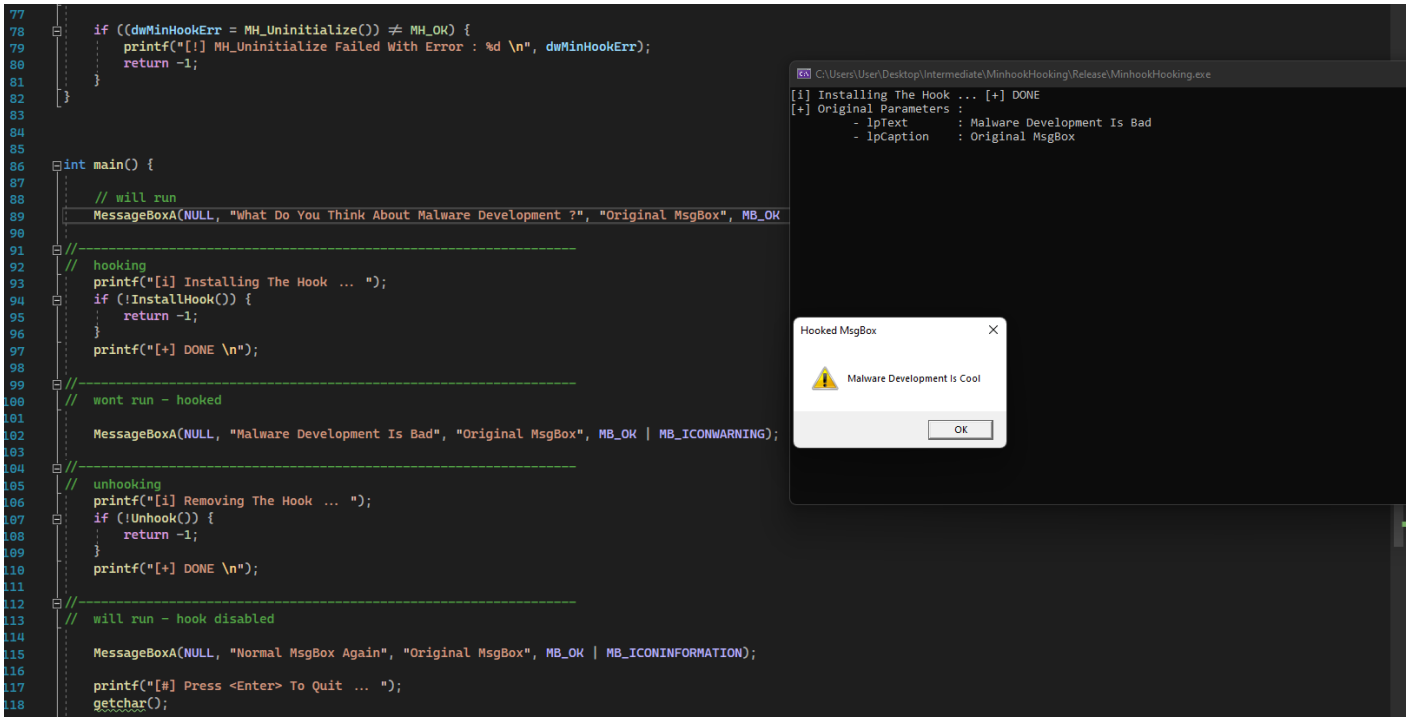
```
int main() {

	//  will run
	MessageBoxA(NULL, "What Do You Think About Malware Development ?", "Original MsgBox", MB_OK | MB_ICONQUESTION);

	//  hooking
	if (!InstallHook())
		return -1;

	//  wont run - hooked
	MessageBoxA(NULL, "Malware Development Is Bad", "Original MsgBox", MB_OK | MB_ICONWARNING);

	//  unhooking
	if (!Unhook())
		return -1;

	//  will run - hook disabled
	MessageBoxA(NULL, "Normal MsgBox Again", "Original MsgBox", MB_OK | MB_ICONINFORMATION);

	return 0;
}
```

Demo

Running the first MessageBoxA (Unhooked)



Running the second MessageBoxA (Hooked)



Running the third MessageBoxA (Unhooked)

```c
int main() {

    // will run
    MessageBoxA(NULL, "What Do You Think About Malware Development ?", "Original MsgBox", MB_OK

//---------------------------------------------------------------
//  hooking
    printf("[i] Installing The Hook ... ");
    if (!InstallHook()) {
        return -1;
    }
    printf("[+] DONE \n");

//---------------------------------------------------------------
//  wont run - hooked

    MessageBoxA(NULL, "Malware Development Is Bad", "Original MsgBox", MB_OK | MB_ICON

//---------------------------------------------------------------
//  unhooking
    printf("[i] Removing The Hook ... ");
    if (!Unhook()) {
        return -1;
    }
    printf("[+] DONE \n");

//---------------------------------------------------------------
//  will run - hook disabled

    MessageBoxA(NULL, "Normal MsgBox Again", "Original MsgBox", MB_OK | MB_ICONINFORMATION);

    printf("[#] Press <Enter> To Quit ... ");
    getchar();
```

```
C:\Users\User\Desktop\Intermediate\MinhookHooking\Release\MinhookHooking.exe
[i] Installing The Hook ... [+] DONE
[+] Original Parameters :
        - lpText        : Malware Development Is Bad
        - lpCaption     : Original MsgBox
[i] Removing The Hook ... [+] DONE
```