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Lab experiment – Creating secure and safe executable

Download and install visual studio (recent edition)

Write a C++ code of your own to build an executable and run the same.

Download process explorer and verify the DEP & ASLR status

Enable software DEP, ASLR and SEH in the visual studio and rebuild the same executable

Again, verify the DEP & ASLR status in the process explorer

Report the same with separate screenshot - before and after enabling DEP & ASLR.

Happy Learning!!!

Experiment analysis:

1) Create an executable

Executable created: Factorial.exe

Select C++ as the language and open an empty CLR project and select Windows Form.

Then create the above GUI by adding labels, textbox and button and make the modifications accordingly.

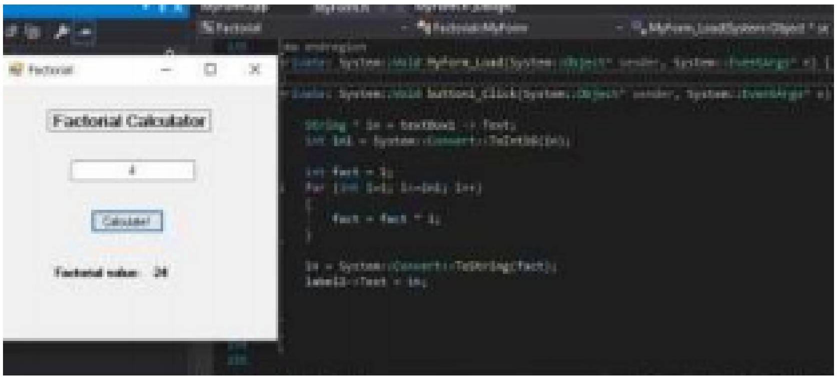
While making the form the code gets auto generated. Later click on particular control option and add functionality to it.

Right click on the Factorial in solution explorer and select “Properties”.

Select Linker and then Select System.

In Sub System option select Windows

Then go to Advanced option and give “main” in the Entry point option.



```
#pragma endregion
private: System::Void MyForm_Load(System::Object^ sender, System::EventArgs^ e) {
private: System::Void button1_Click(System::Object^ sender, System::EventArgs^ e) {

    String ^ in = textBox1 -> Text;
    int in1 = System::Convert::ToInt16(in);

    int fact = 1;
    for (int i=1; i<=in1; i++)
    {
        fact = fact * i;
    }

    in = System::Convert::ToString(fact);
    label2->Text = in;
```

Now turning DEP and ASLR ON

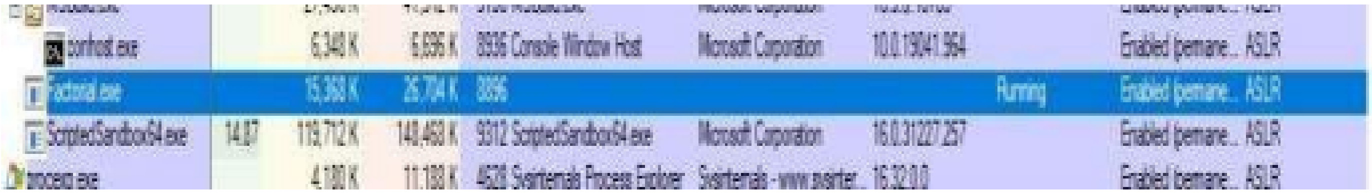
Now open Process Explorer (Sysinternals) and check the DEP and ASLR status for Factorial.exe

Firstly let us check the status by turning on ASLR and DEP

Check Randomized base address and DEP and make sure it is YES

View Status in process Explorer

Factorial.exe status

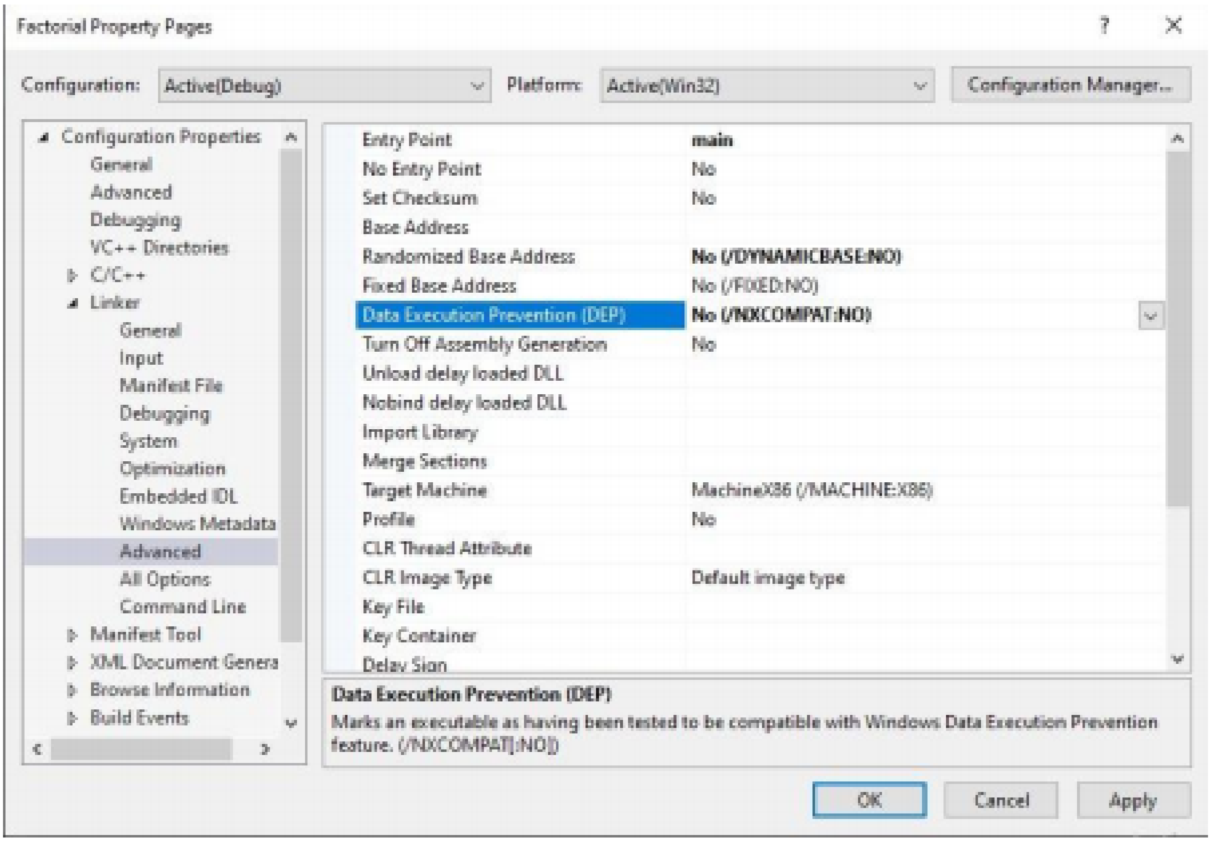


conhost.exe		6,340 K	6,696 K	8936 Console Window Host	Microsoft Corporation	10.0.19041.964		Enabled (permane...	ASLR
Factorial.exe		15,368 K	26,704 K	8896			Running	Enabled (permane...	ASLR
ScriptedSandbox64.exe	14.87	119,712 K	140,460 K	9312 ScriptedSandbox64.exe	Microsoft Corporation	16.0.31227.257		Enabled (permane...	ASLR
procexp.exe		4,180 K	11,180 K	4628 Sysinternals Process Explorer	Sysinternals - www.sysinter...	16.32.0.0		Enabled (permane...	ASLR

It is enabled

Now lets turn off Dep and ASLR and see

Now let us disable the DEP and ASLR and see if it is reflecting in Process Explorer



Factorial Property Pages

Configuration: Active(Debug)　Platform: Active(Win32)　Configuration Manager...

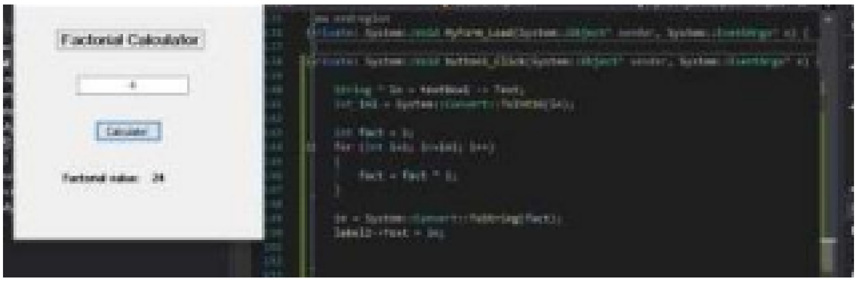
- Configuration Properties
  - General
  - Advanced
  - Debugging
  - VC++ Directories
  - C/C++
  - Linker
    - General
    - Input
    - Manifest File
    - Debugging
    - System
    - Optimization
    - Embedded IDL
    - Windows Metadata
    - Advanced
    - All Options
    - Command Line
  - Manifest Tool
  - XML Document Genera
  - Browse Information
  - Build Events

Entry Point	main
No Entry Point	No
Set Checksum	No
Base Address	
Randomized Base Address	No (/DYNAMICBASE:NO)
Fixed Base Address	No (/FIXED:NO)
Data Execution Prevention (DEP)	No (/NXCOMPAT:NO)
Turn Off Assembly Generation	No
Unload delay loaded DLL	
Nobind delay loaded DLL	
Import Library	
Merge Sections	
Target Machine	MachineX86 (/MACHINE:X86)
Profile	No
CLR Thread Attribute	
CLR Image Type	Default image type
Key File	
Key Container	
Delay Sign	

Data Execution Prevention (DEP)

Marks an executable as having been tested to be compatible with Windows Data Execution Prevention feature. (/NXCOMPAT[:NO])

Run the exe again



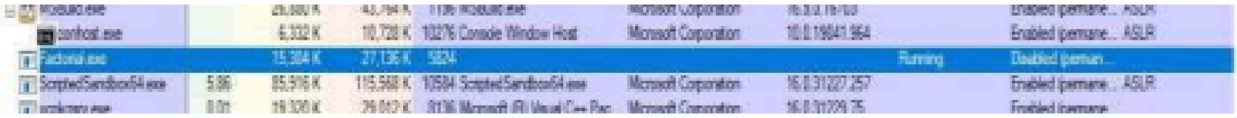
```
#pragma endregion
private: System::Void MyForm_Load(System::Object^ sender, System::EventArgs^ e) {
private: System::Void button1_Click(System::Object^ sender, System::EventArgs^ e) {

    String ^ in = textBox1->Text;
    int in1 = System::Convert::ToInt32(in);

    int fact = 1;
    for (int i=1; i<=in1; i++)
    {
        fact = fact * i;
    }

    in = System::Convert::ToString(fact);
    label2->Text = in;
```

Check ASLR and DEP status



MSBuild.exe		26,880 K	43,764 K	1196 MSBuild.exe	Microsoft Corporation	16.3.2.1??		Enabled (permane... ASLR
conhost.exe		6,332 K	10,728 K	10276 Console Window Host	Microsoft Corporation	10.0.19041.964		Enabled (permane... ASLR
Factorial.exe		15,304 K	27,136 K	5824			Running	Disabled (perman...
ScriptedSandbox64.exe	5.86	85,916 K	115,568 K	10584 ScriptedSandbox64.exe	Microsoft Corporation	16.0.31227.257		Enabled (permane... ASLR
vcpkgsrv.exe	0.01	19,320 K	29,012 K	3136 Microsoft (R) Visual C++ Pac...	Microsoft Corporation	16.0.31229.75		Enabled (permane...