

UEFI & EDK II Training

PLATFORM BUILD LAB WINDOWS EMULATOR

tianocore.org

PLATFORM BUILD LABS

- ✱ Pin Visual Studio Command Prompt to Windows Task Bar
- ✱ Build a EDK II Platform using Emulator package
- ✱ Run the Emulator in Windows

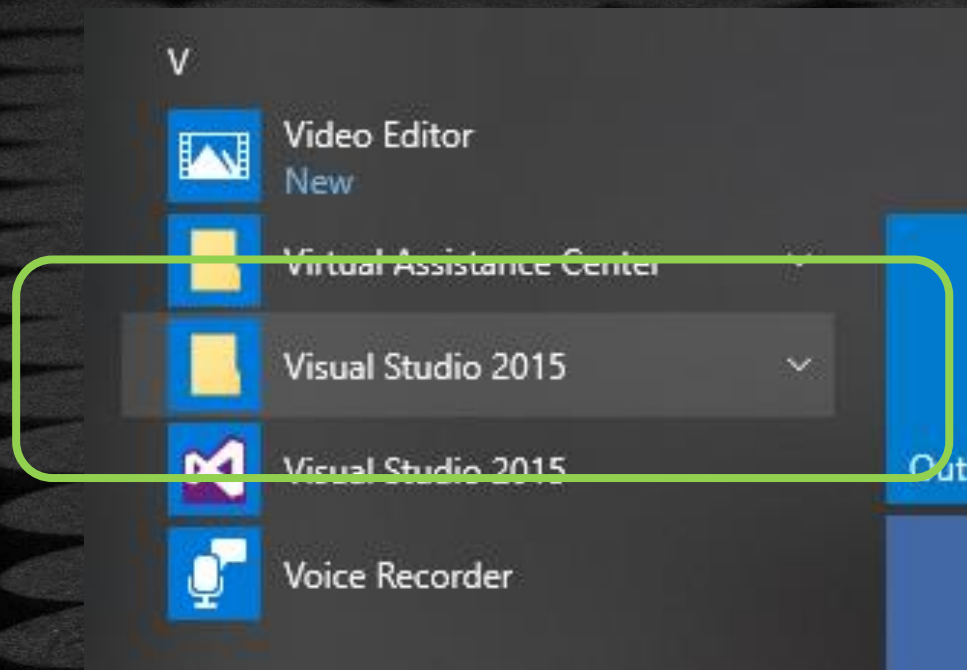
PIN VS COMMAND PROMPT

Pin the Visual Studio Command prompt to
Windows Task Bar

PIN VS COMMAND PROMPT

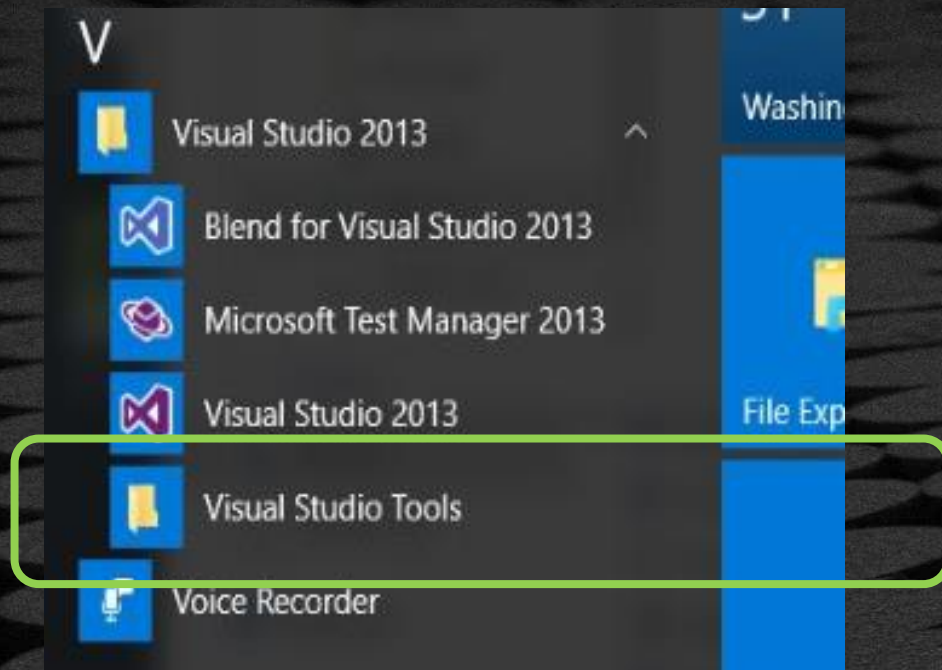


Windows 10



Steps to Pin Visual Studio Command Prompt to task bar for Windows 10

1. Using the Start menu in Windows 10, Left Click on “Windows Key” Lower Left 
2. Scroll down from the scroll bar on the right until “**Visual Studio 201ⁿ**”
3. Left Click “**Visual Studio 201ⁿ**”



VS 2013

4. Left Click “Visual Studio Tools”

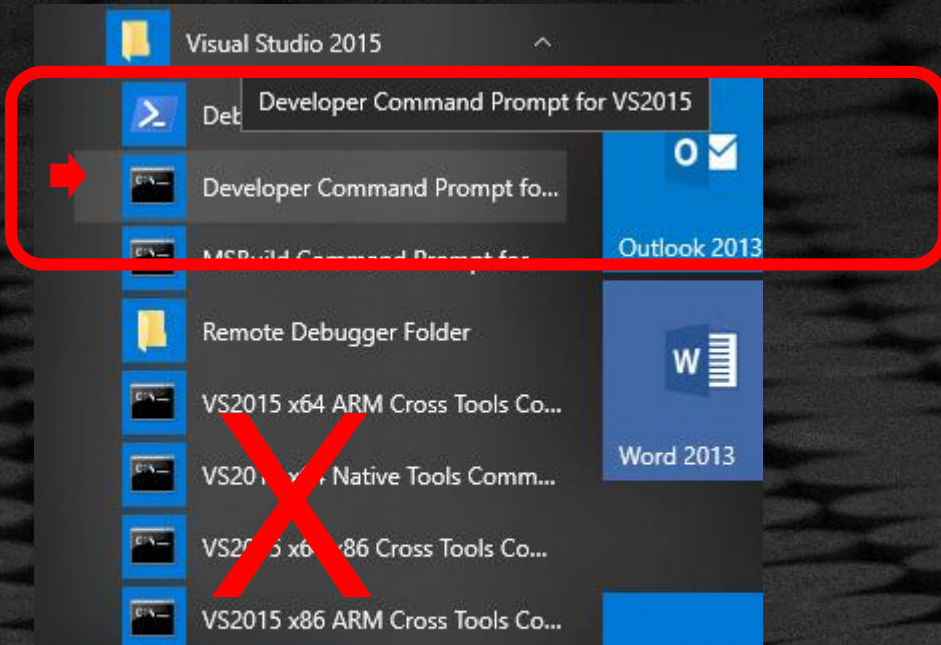
This will open another Windows file explorer window

Note: *VS 2013 example, other version of VS maybe different*

PIN VS COMMAND PROMPT

VS 2015

VS 2017 is similar

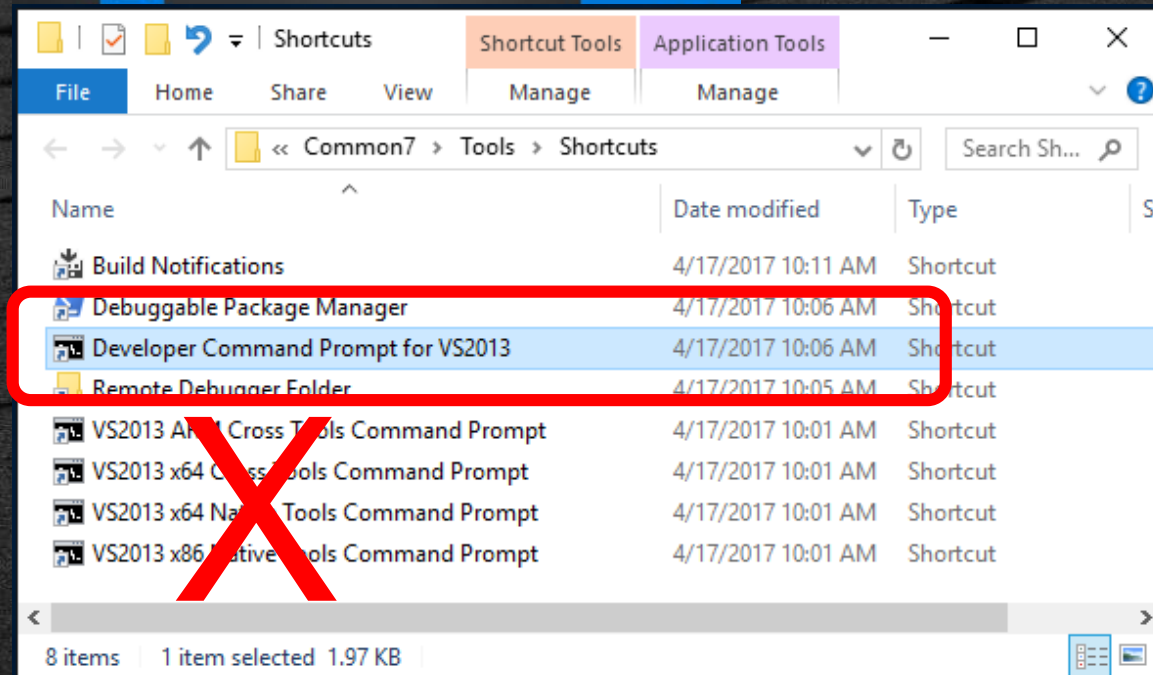


5. Select
“Developer Command Prompt for VS201n”

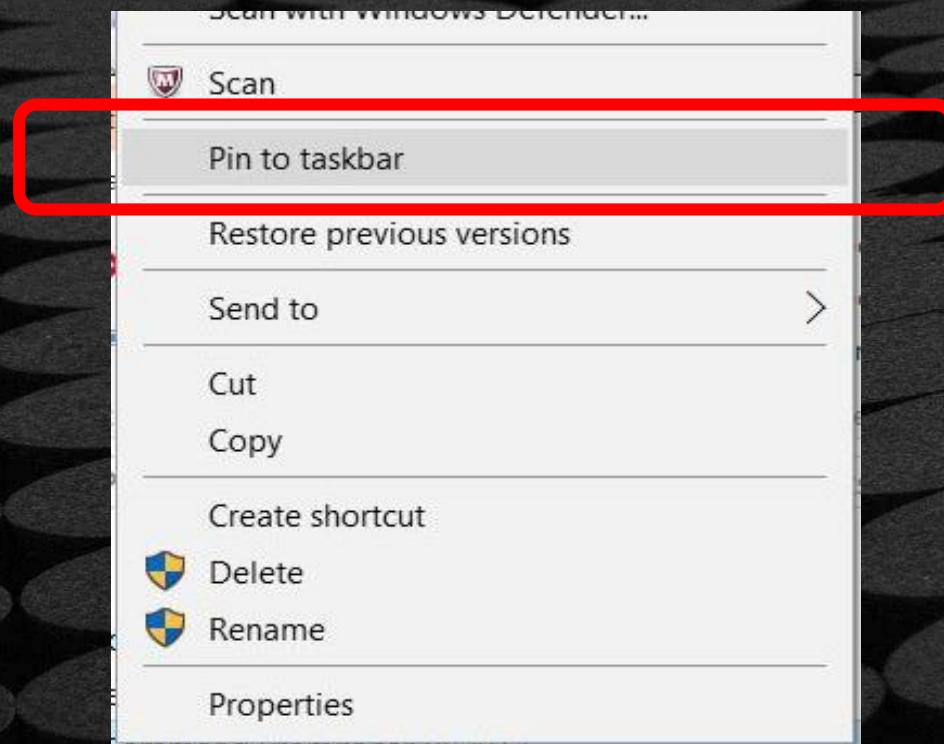
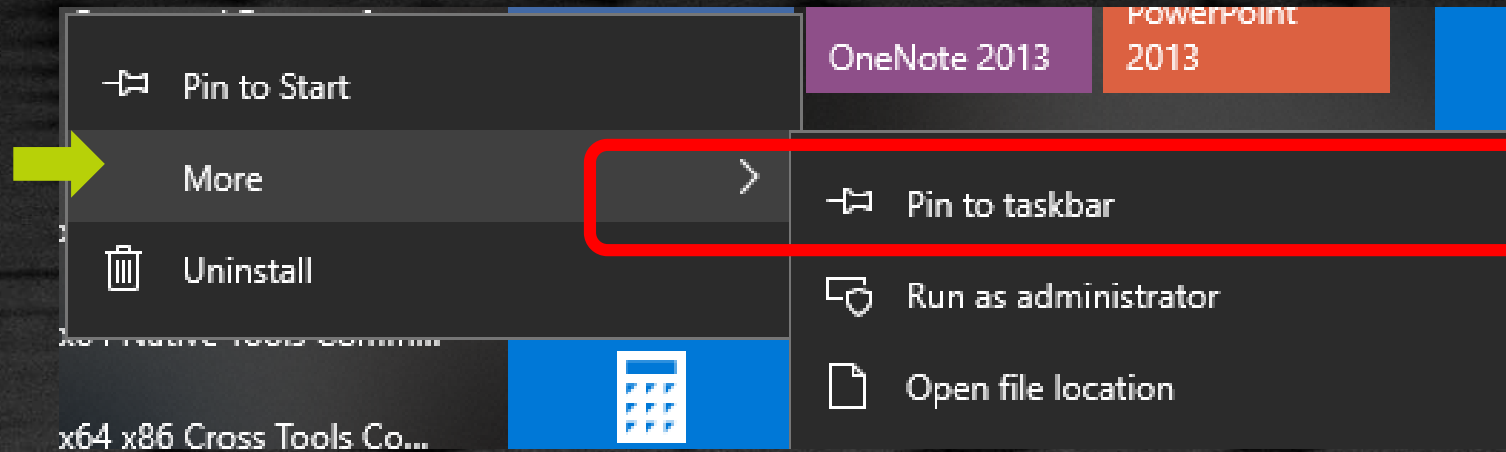
6. Right Click to open Windows dialog box

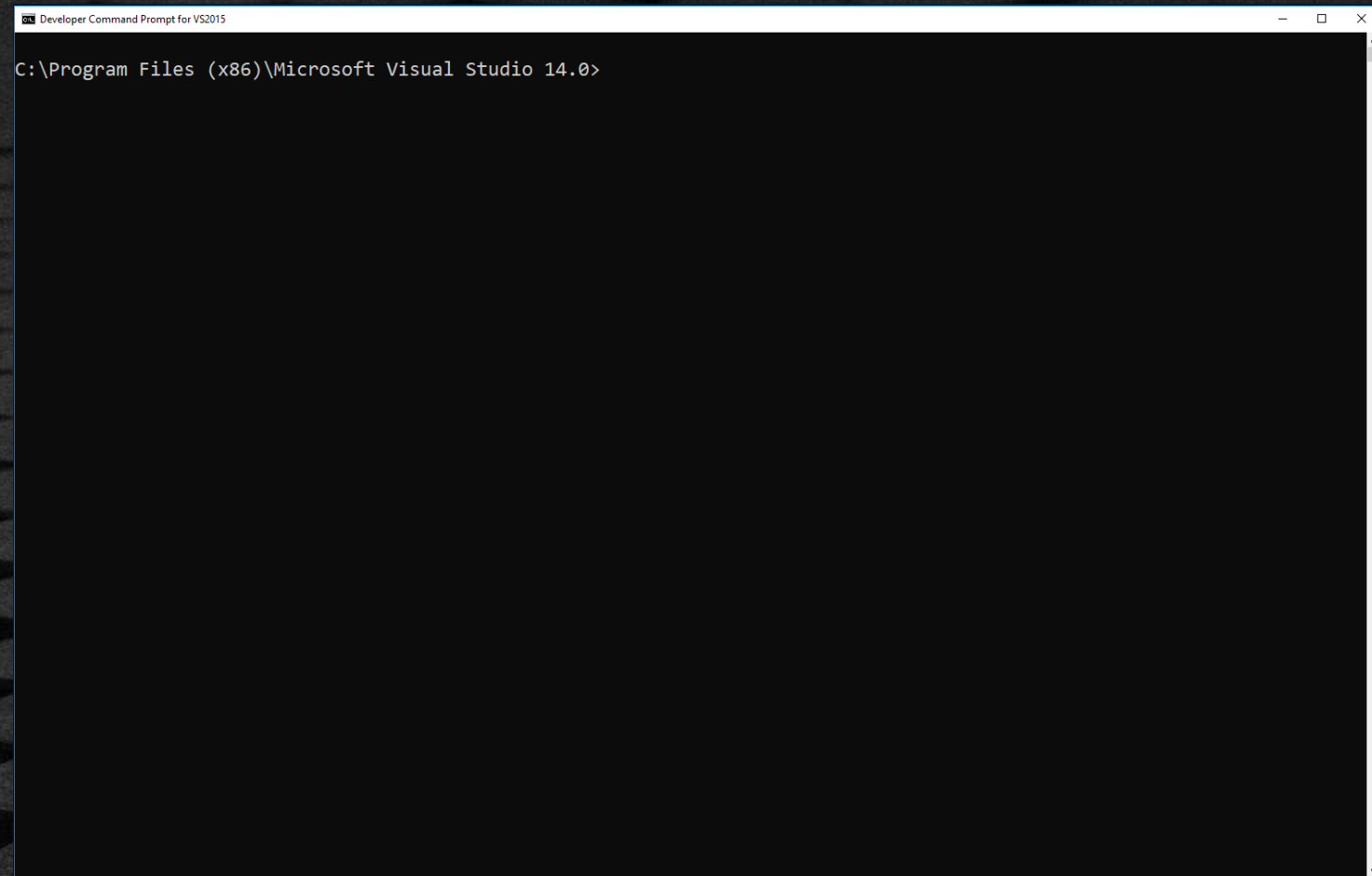
**Do not use any of the other
“.. Command Prompts”**

VS 2013



7. Left Click on
“Pin to taskbar”





8. Open VS Command Prompt”

All Windows Labs use this short-cut to Build Edk II platforms and projects using Windows Visual Studio :
2010 / 2012 / 2013 / 2015 or 2017

END OF PIN VS PROMPT

BUILD EMULATOR

Setup EmulatorPkg to build and run
emulation with Windows

Download the EDK II Source - *Optional*

OPTIONAL - Open a “git” command prompt and create a source working directory

```
C:\>mkdir edk2-WS  
C:\> cd edk2-WS
```

OPTIONAL - Internet Proxies – (company Firewall used for example)

```
C:\edk2-WS> git config --global https.proxy <proxyname>.domain.com:<port>  
C:\edk2-WS> git config --global http.proxy <proxyname>.domain.com:<port>
```

OPTIONAL - Download edk2 source tree using Git command prompt

```
C:\edk2-WS> git clone https://github.com/tianocore/edk2.git  
C:\edk2-WS> git clone https://github.com/tianocore/edk2-libc.git
```

NOTE: Lab Material will have a different “edk2 and edk2-libc”

SETUP LAB MATERIAL

Lab_Material_FW.zip

DOWN LOAD LAB MATERIAL

Download the Lab_Material_FW.zip from :  github.com
Lab_Material_FW.zip

OR

Use git clone to download the Lab_Material_FW

```
C:\> git clone https://github.com/tianocore-training/Lab_Material_FW.git
```

Directory Lab_Material_FW will be created

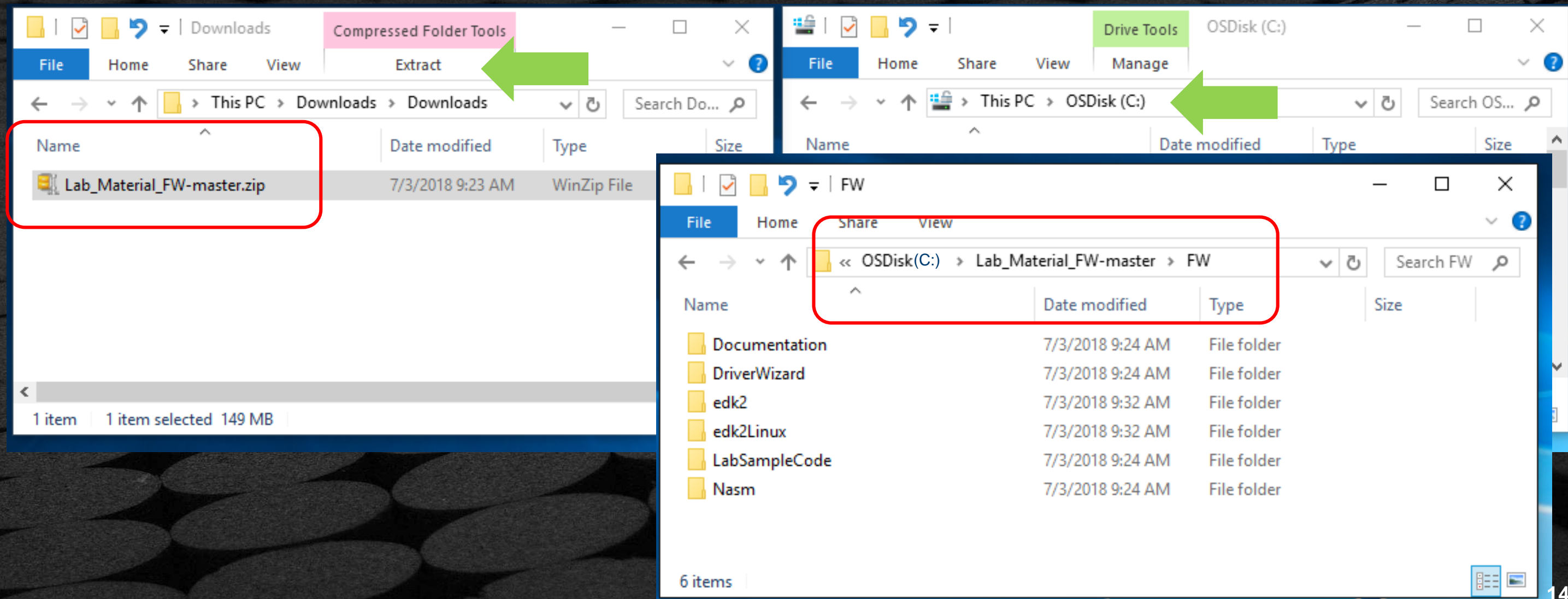
FW

- Documentation
- DriverWizard
- edk2-ws
- LabSampleCode
- Nasm

BUILD EDK II

-Extract the Source

1. Extract the Downloaded Lab_Material_FW-master.zip to C:\



The screenshot illustrates the process of extracting the downloaded file. It consists of two overlapping File Explorer windows.

Left Window (Downloads):

- Address bar: This PC > Downloads > Downloads
- Tab: Compressed Folder Tools
- File list:

Name	Date modified	Type	Size
Lab_Material_FW-master.zip	7/3/2018 9:23 AM	WinZip File	

Right Window (OSDisk (C:)):

- Address bar: This PC > OSDisk (C:)
- Tab: Drive Tools
- File list:

Name	Date modified	Type	Size
Documentation	7/3/2018 9:24 AM	File folder	
DriverWizard	7/3/2018 9:24 AM	File folder	
edk2	7/3/2018 9:32 AM	File folder	
edk2Linux	7/3/2018 9:32 AM	File folder	
LabSampleCode	7/3/2018 9:24 AM	File folder	
Nasm	7/3/2018 9:24 AM	File folder	

Green arrows indicate the extraction path from the Downloads folder to the C: drive. Red boxes highlight the file in the Downloads window and the extracted folder path in the C: drive window.

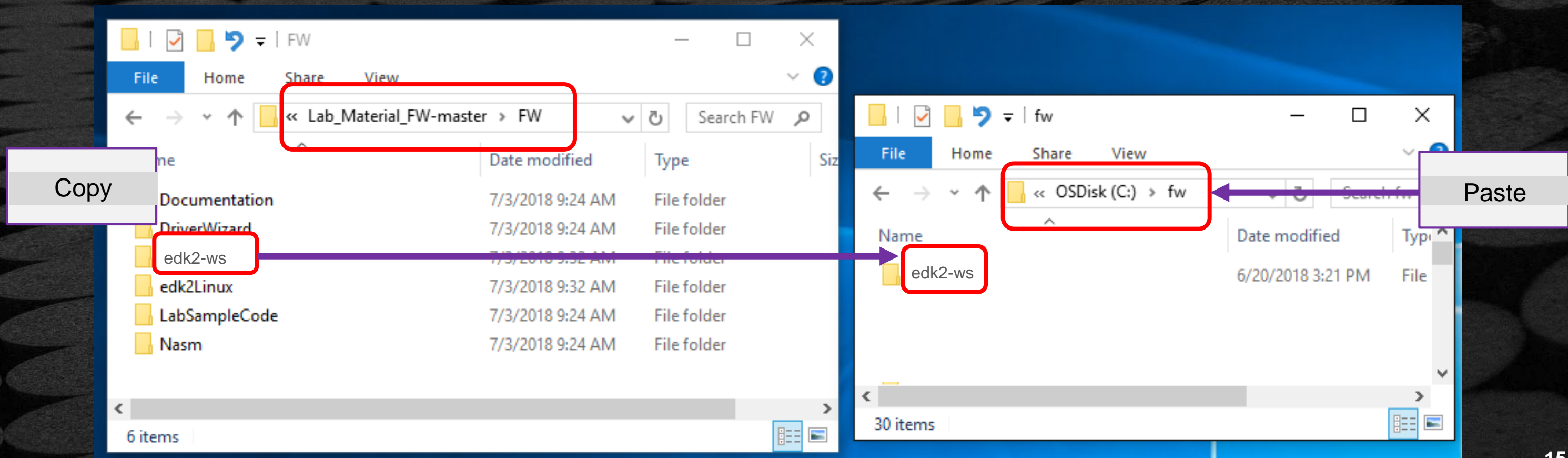
BUILD EDK II

- Copy edk2-ws

2. Open a VS Command prompt
3. Create a working space directory "FW"

```
C:\> mkdir FW
```

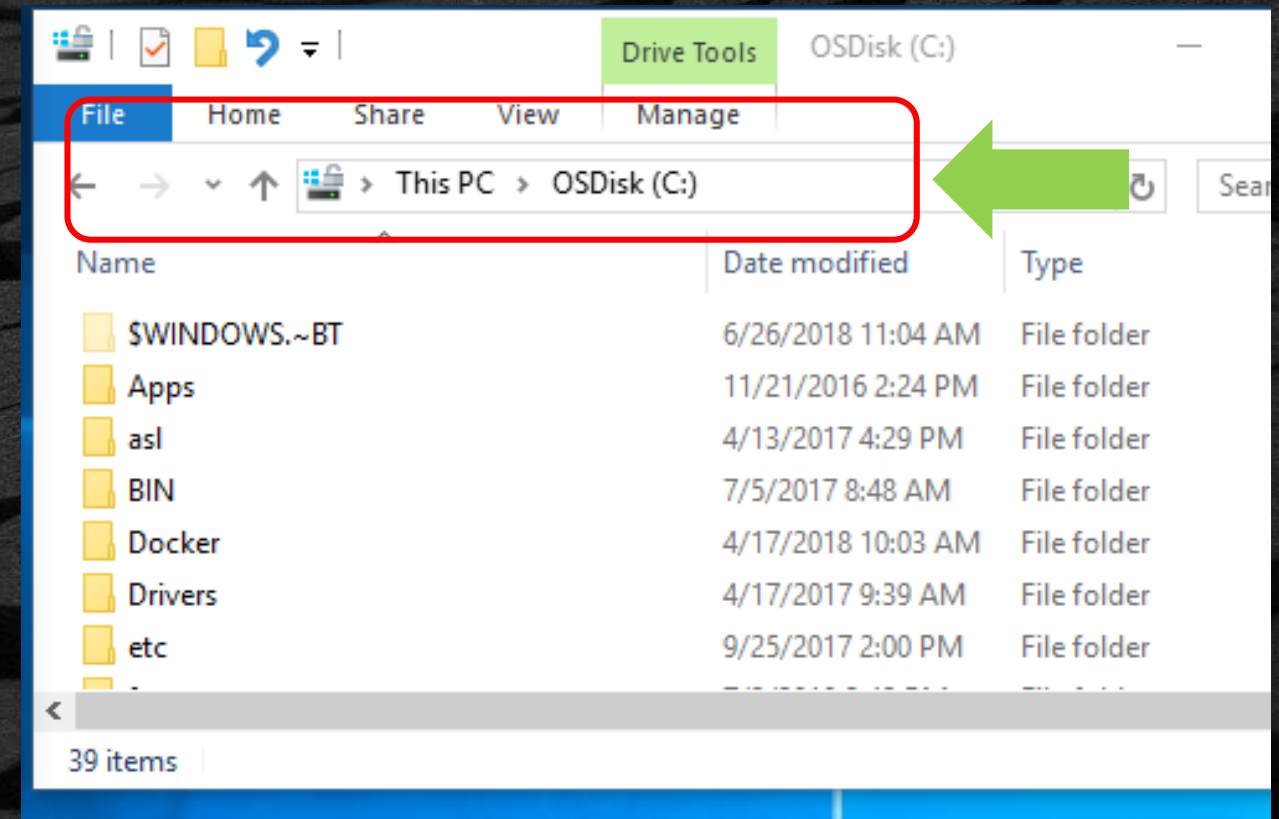
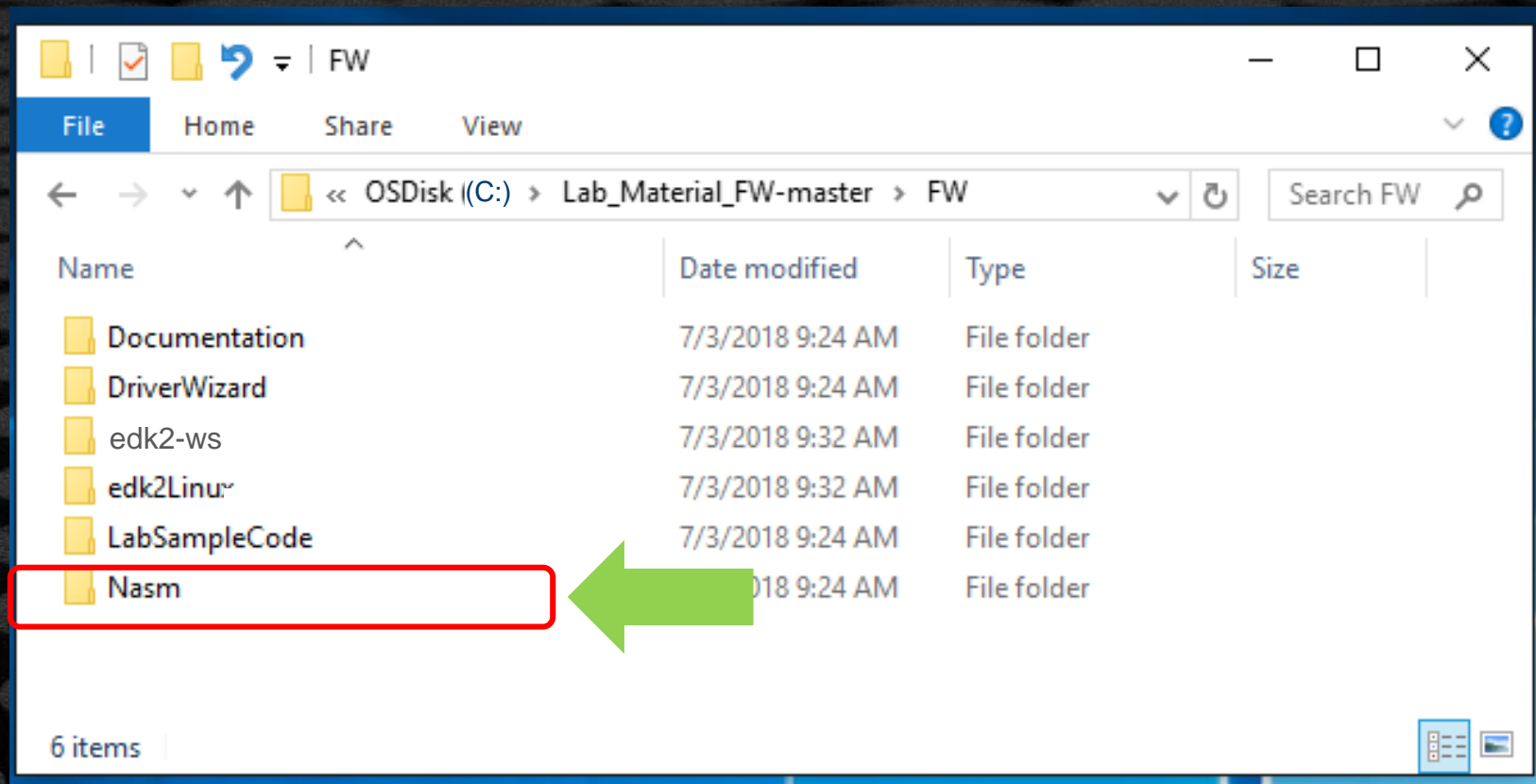
4. From the downloaded Lab_Material_FW folder, **copy** and **paste** folder "..\edk2-ws" to C:/FW



BUILD EDK II

-Get Nasm

Copy Nasm directory to C:\
(creating C:\Nasm directory)



BUILD EDK II NT32

-Download & Install Python

Download and install Python 3.7.x for Windows from: <https://www.python.org/>



To Build BaseTools Python 3.7.x is needed

BUILD EDK II NT32

- build BaseTools

Open VS Command prompt & Cd to work space directory

```
$> cd C:\FW\edk2-ws
```

Setup the local environment: (see batch file [setenv.bat](#))

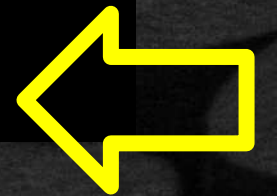
```
$> set WORKSPACE=%CD%
```

```
$> set PACKAGES_PATH=%WORKSPACE%\edk2;%WORKSPACE%\edk2-libc
```

Invoke Edksetup.bat from directory C:/FW/edk2-ws/edk2 to Build BaseTools

```
$> cd edk2
```

```
$> edksetup.bat Rebuild
```



Building BaseTools only needs to be done once but setting up local environment and edksetup.bat needs to be done each new VS prompt session

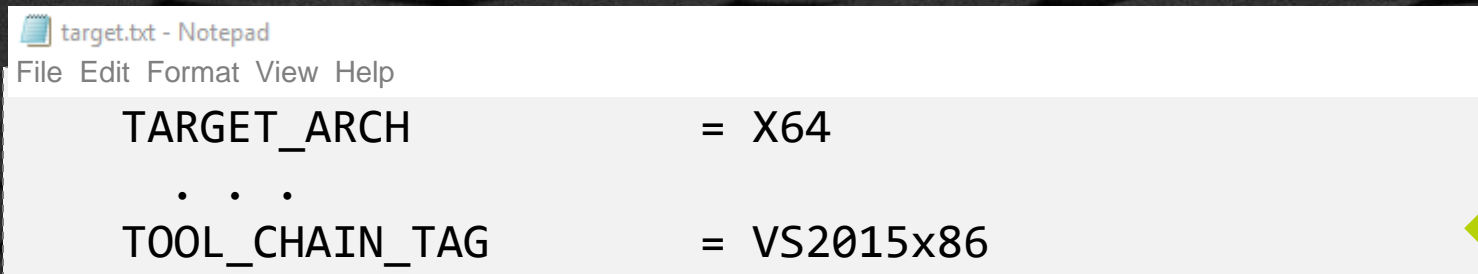
BUILD EMULATORPKG

EmulatorPkg - Build with edk2

Invoke Edksetup.bat

```
$> cd C:\FW\edk2-ws\edk2
$> edksetup.bat
```

Edit the file Conf/target.txt (*change* TOOL_CHAIN_TAG)
notepad Conf/target.txt



```
target.txt - Notepad
File Edit Format View Help
TARGET_ARCH          = X64
. . .
TOOL_CHAIN_TAG       = VS2015x86
```

VS version	TOOL_CHAIN_TAG
2010	VS2010x86
2012	VS2012x86
2013	VS2013x86
2015	VS2015x86
2017	VS2017

Save and Exit

Build EmulatorPkg

```
$> build -D ADD_SHELL_STRING -a X64
```


POSSIBLE BUILD ERRORS

1. If you get a BUILD Error: Error “C:/Program “ not found
 - First check that you have opened Visual Studio and installed the “C++”
 - Open Visual Studio and create a “C++” project
 - (This will take some time to install)
2. If you get a BUILD Error: Check if RC.Exe compiler not found is the error -[here](#)
3. If you get a BUILD Error: fatal error C1041: cannot open program database ... Check [here](#)

BUILD EDK II

-Inside VS Prompt

```

C:\FW\edk2-ws\edk2>build -D WIN_SEC_BUILD -a X64

# Install to C:\FW\edk2-ws\edk2
#####
execute command "nmake all" in

!!! WARNING !!! NASM_PREFIX env
Found nasm.exe, setting the e

!!! WARNING !!! No CYGWIN_HOME

C:\FW\edk2-ws\edk2>build -D WIN
Build environment: Windows-10-1
Build start time: 11:13:20, Aug

WORKSPACE      = c:\fw\edk2-w
PACKAGES_PATH   = c:\fw\edk2-w
EDK_TOOLS_PATH  = c:\fw\edk2-w
EDK_TOOLS_BIN   = c:\fw\edk2-w
CONF_PATH       = c:\fw\edk2-w
PYTHON_COMMAND  = py -3

Processing meta-data
.Architecture(s) = X64
Build target     = DEBUG
Toolchain        = VS2015x86

Active Platform  = c:\f
...

d\Emulato
orX64\DEBU
LowBitSet6
RRotU32.c
DivU64x64R
SetJump.c
FilePaths.
X86Thunk.c
X86EnableP

X86FxResto
SwapBytes1
X86FxSave.
LinkedList
HighBitSet
LRotU64.c
X86RdRand.
GetPowerOf
LongJump.c
"C
6 /SUBSYS
d\Emulato
x86\X64\DE
latoX64\DI
LShiftU64.
CpuDeadLoop
ModU64x32.
DivU64x32R
X86ReadGdt
CheckSum.c
DivS64x64R
"C
d\Emulato
orX64\DEBU
LowBitSet6
RRotU32.c
DivU64x64R
SetJump.c
FilePaths.
X86Thunk.c
X86EnableP

Generate Region at Offset 0x580000
Region Size = 0xC000
Region Name = DATA

Generate Region at Offset 0x58C000
Region Size = 0x2000
Region Name = None

Generate Region at Offset 0x58E000
Region Size = 0x2000
Region Name = DATA

Generate Region at Offset 0x590000
Region Size = 0x10000
Region Name = None

GUID cross reference file can be found at c:\fw\edk2-ws\Build\EmulatorX64\DEBUG_VS2015x86\FV\Guid.xref

FV Space Information
#####FVRECOVERY [47%Full] 5767168 total, 2726792 used, 3040376 free
#####
#####- Done -
#####Build end time: 11:17:31, Aug.12 2019
#####Build total time: 00:04:11
###

C:\FW\edk2-ws\edk2>

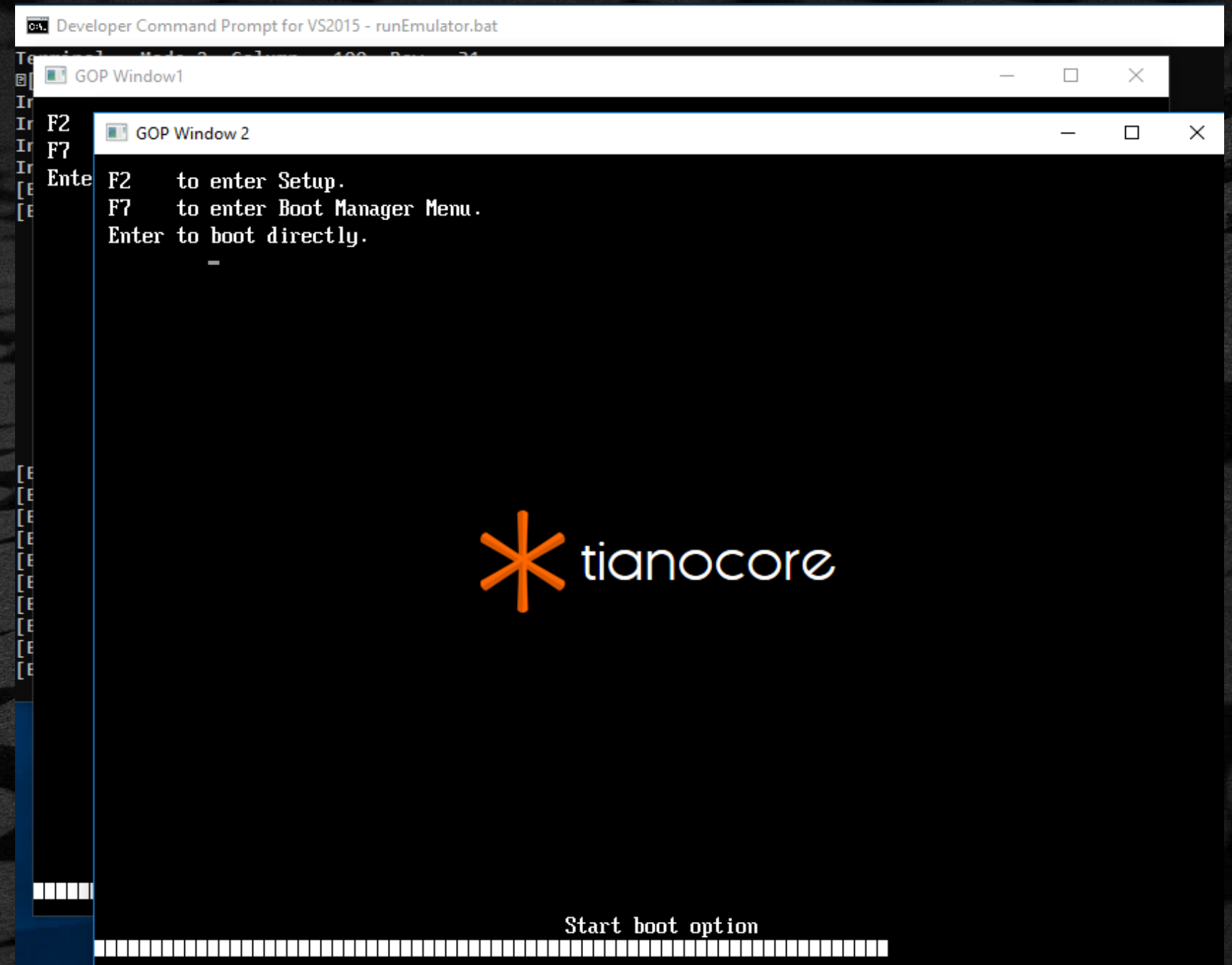
```

Finished build

From the command prompt
\$> RunEmulator.bat

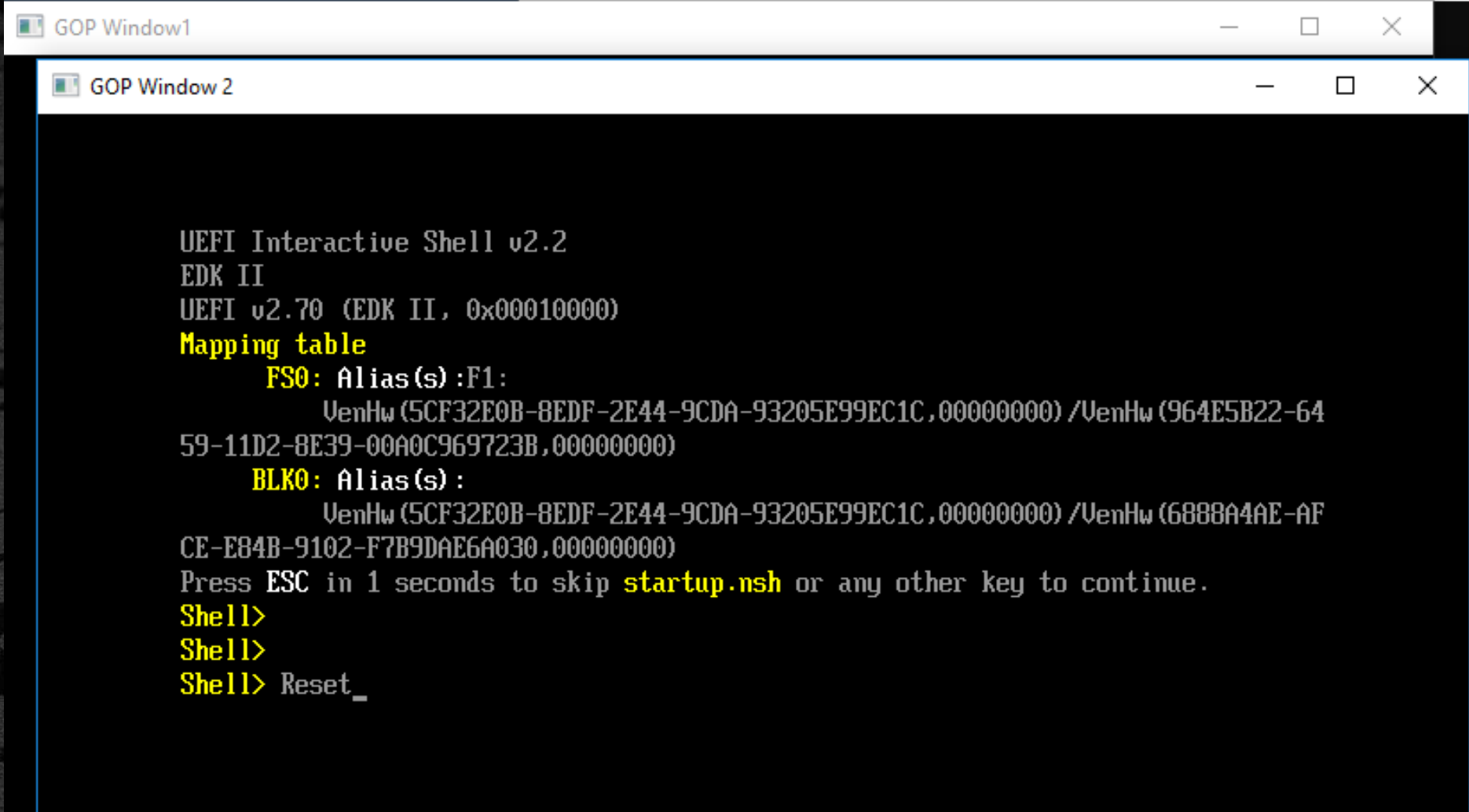
Or
run **WinHost.exe** from:
Build/.../X64 directory

Notice 2 "GOP Window n" opened



EMULATOR AT SHELL PROMPT

Type : “Reset” to exit



```

GOP Window 1
GOP Window 2

UEFI Interactive Shell v2.2
EDK II
UEFI v2.70 (EDK II, 0x00010000)
Mapping table
  FS0: Alias(s) :F1:
        VenHw (5CF32E0B-8EDF-2E44-9CDA-93205E99EC1C,000000000) /VenHw (964E5B22-64
59-11D2-8E39-00A0C969723B,000000000)
  BLK0: Alias(s) :
        VenHw (5CF32E0B-8EDF-2E44-9CDA-93205E99EC1C,000000000) /VenHw (6888A4AE-AF
CE-E84B-9102-F7B9DAE6A030,000000000)
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Shell>
Shell>
Shell> Reset_
```


SUMMARY

- ✱ Pin Visual Studio Command Prompt to Windows Task Bar
- ✱ Build a EDK II Platform using Emulator package
- ✱ Run the Emulator in Windows

Questions?



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[Link](#)

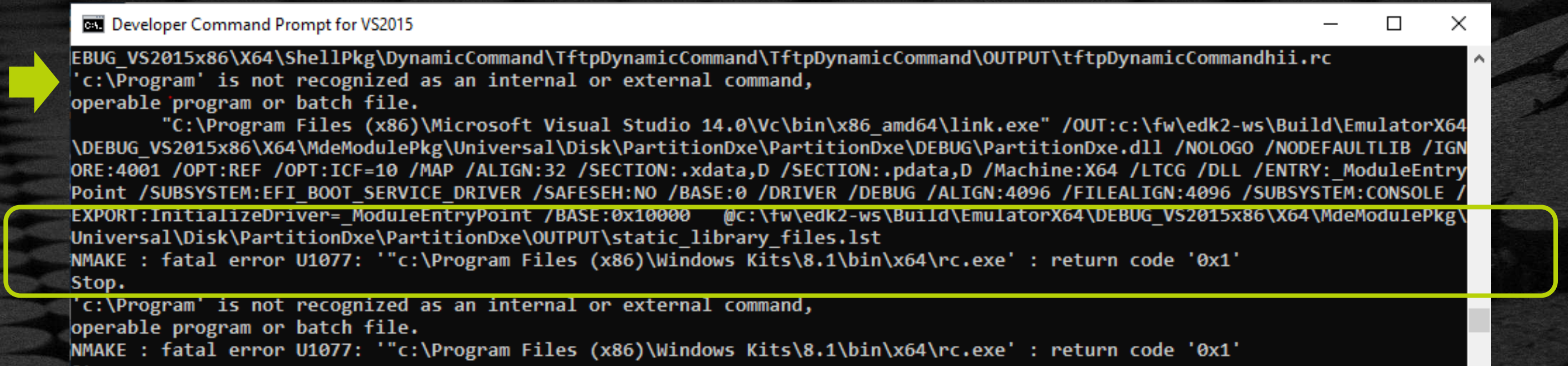


BACKUP

BUILD ERRORS

Build Error- RC.exe

Error message:



```

Developer Command Prompt for VS2015
EBUG_VS2015x86\X64\ShellPkg\DynamicCommand\TftpDynamicCommand\TftpDynamicCommand\OUTPUT\tftpDynamicCommandhii.rc
'c:\Program' is not recognized as an internal or external command,
operable program or batch file.
"C:\Program Files (x86)\Microsoft Visual Studio 14.0\VC\bin\x86_amd64\link.exe" /OUT:c:\fw\edk2-ws\Build\EmulatorX64
\DEBUG_VS2015x86\X64\MdeModulePkg\Universal\Disk\PartitionDxe\PartitionDxe\DEBUG\PartitionDxe.dll /NOLOGO /NODEFAULTLIB /IGN
ORE:4001 /OPT:REF /OPT:ICF=10 /MAP /ALIGN:32 /SECTION:.xdata,D /SECTION:.pdata,D /Machine:X64 /LTCG /DLL /ENTRY:_ModuleEntry
Point /SUBSYSTEM:EFI_BOOT_SERVICE_DRIVER /SAFESEH:NO /BASE:0 /DRIVER /DEBUG /ALIGN:4096 /FILEALIGN:4096 /SUBSYSTEM:CONSOLE /
EXPORT:InitializeDriver=_ModuleEntryPoint /BASE:0x10000 @c:\fw\edk2-ws\Build\EmulatorX64\DEBUG_VS2015x86\X64\MdeModulePkg\
Universal\Disk\PartitionDxe\PartitionDxe\OUTPUT\static_library_files.lst
NMAKE : fatal error U1077: '"c:\Program Files (x86)\Windows Kits\8.1\bin\x64\rc.exe' : return code '0x1'
Stop.
'c:\Program' is not recognized as an internal or external command,
operable program or batch file.
NMAKE : fatal error U1077: '"c:\Program Files (x86)\Windows Kits\8.1\bin\x64\rc.exe' : return code '0x1'

```

Find where the RC.EXE is located on your VS Installation:

Example (VS 2015): The RC.exe is located on this machine:

C:\Program Files (x86)\Windows Kits\8.1\bin\x64

Edit Conf\tools_def.txt

Build Error- RC.exe Cont.

Edit [Conf\tools_def.txt](#)

Search for your installation of Visual Studio (2013, 2015, 2017) “RC.EXE”

Probably in path [C:\Program Files \(x86\)\Windows Kits\](#)

Update according to the path for where the RC.EXE is found

```
# Microsoft Visual Studio 2013 Professional Edition
DEFINE WINSDK8_BIN      = c:\Program Files\Windows Kits\8.1\bin\x86\
DEFINE WINSDK8x86_BIN   = c:\Program Files (x86)\Windows Kits\8.1\bin\x64

# Microsoft Visual Studio 2015 Professional Edition
DEFINE WINSDK81_BIN     = c:\Program Files\Windows Kits\8.1\bin\x86\
DEFINE WINSDK81x86_BIN  = c:\Program Files (x86)\Windows Kits\8.1\bin\x64

# Microsoft Visual Studio 2017 Professional Edition
DEFINE WINSDK10_BIN     = C:\Program Files (x86)\Windows Kits\10\bin\x86
```

Paths on your
machine



Copy and Paste RC error: [Link](#)

Build Error: fatal error C1041:

Build Error from fatal error C1041: cannot open program database

This Error is usually because the location you are building is being shared by another application in Windows. Example: Syncplicity may cause this

Error Message:

```
k:\fw\edk2\MdePkg\Library\BaseLib\LinkedList.c : fatal error C1041: cannot open program
database
'k:\fw\edk2\build\nt32ia32\debug_vs2013x86\ia32\mdepkg\library\baselib\baselib\vc120.pdb'; if
multiple CL.EXE write to the same .PDB file, please use /FS
NMAKE : fatal error U1077: '"C:\Program Files (x86)\Microsoft Visual Studio
12.0\Vc\bin\cl.exe"' : return code '0x2'
Stop.
```

Solution: Try using a Workspace that is not shared