

# UEFI & EDK II Training

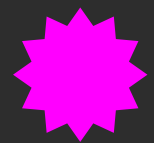

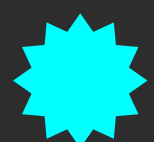
Platform Build Lab Simics® Quick Start Platform (QSP)  
- Windows

[tianocore.org](https://tianocore.org)

Copy and Paste see [Lab Guide](#)

# PLATFORM BUILD LABS

First Setup for Building EDK II, See [Lab Setup](#)

-  Build and Run the EmulatorPkg
-  Build a EDK II Platform using Simics Open Source QSP Board
-  Run Simics with the QSP Board

# Build the EmulatorPkg

Note: May need to update conf/target.txt for other labs

# Build EDK II EmulatorPkg

Open VS Command prompt & Cd to workspace directory

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

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

Sets WORKSPACE and PACKAGES\_PATH env variables

```
$> setenv.bat
```

**Invoke** Edksetup.bat

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

```
$> edksetup.bat
```

**Edit** the file Conf/target.txt (*change* TOOL\_CHAIN\_TAG & TARGET\_ARCH If Needed)

**Build EmulatorPkg**

```
$> build -D ADD_SHELL_STRING -a X64 -p EmulatorPkg\EmulatorPkg.dsc
```

# Build EDK II -Inside VS Prompt

```

C:\FW\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
  WORKSPACE      = c:\fw\edk2-ws
  PACKAGES_PATH  = c:\fw\edk2-ws
  EDK_TOOLS_PATH  = c:\fw\edk2-ws
  EDK_TOOLS_BIN   = c:\fw\edk2-ws
  CONF_PATH      = c:\fw\edk2-ws
  PYTHON_COMMAND = py -3

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

Active Platform    = c:\fw
...

d\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>
  
```



Approx.  
6 Min

Finished build

# Run the Emulator



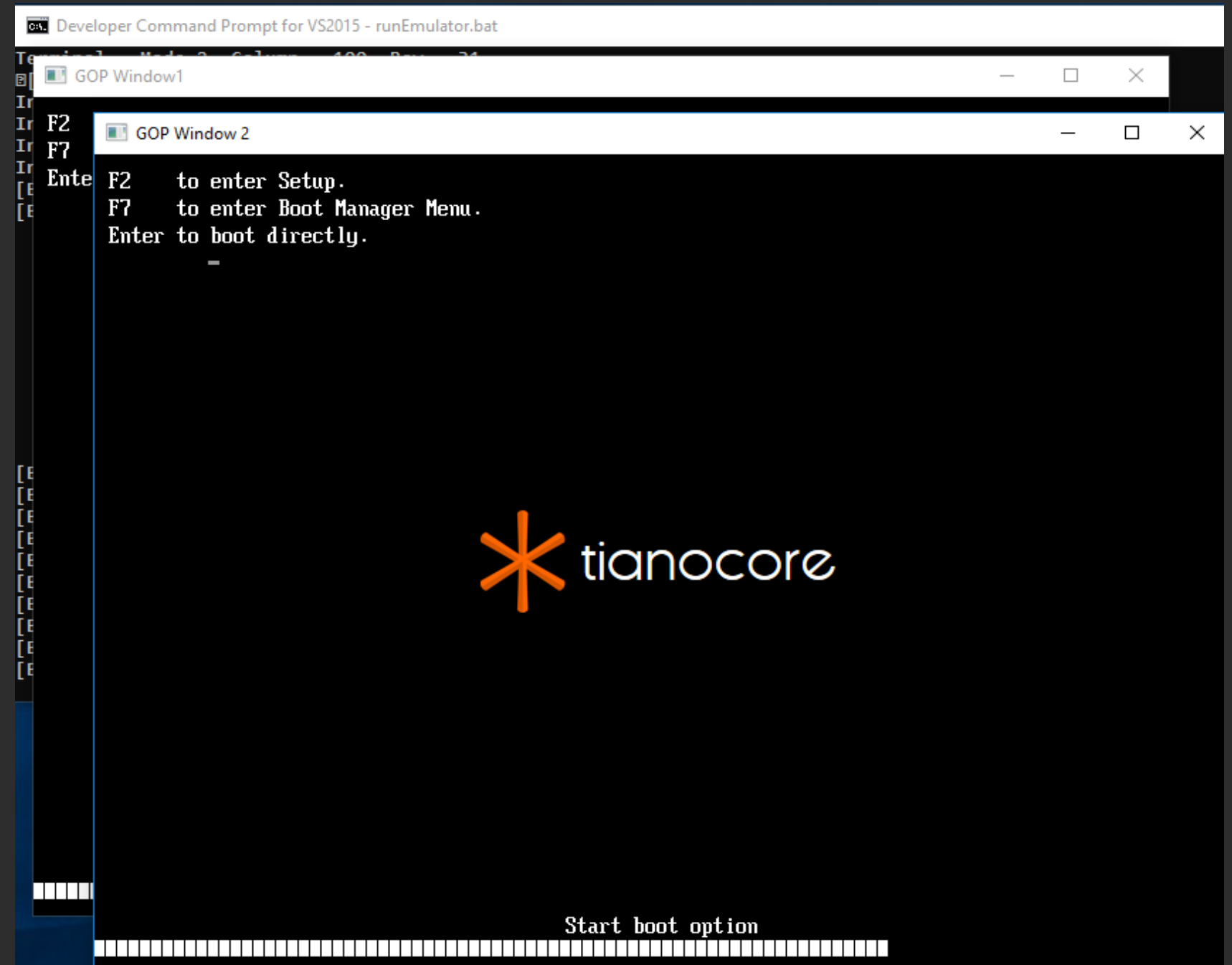
# Invoke Emulation

From the command prompt

```
$> RunEmulator.bat
```

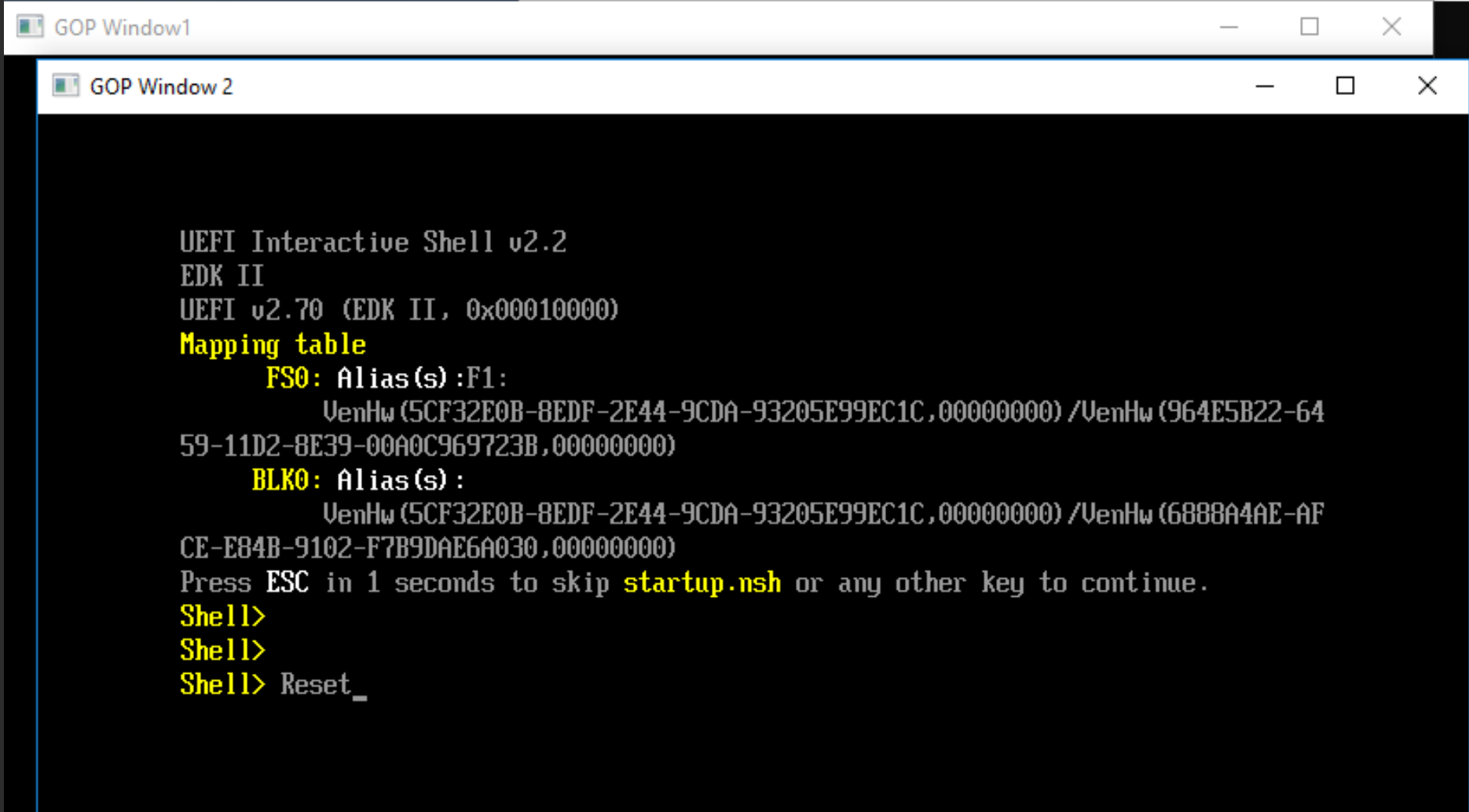
Or  
run **WinHost.exe** from:  
Build/ . . ./X64 directory

**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_
```

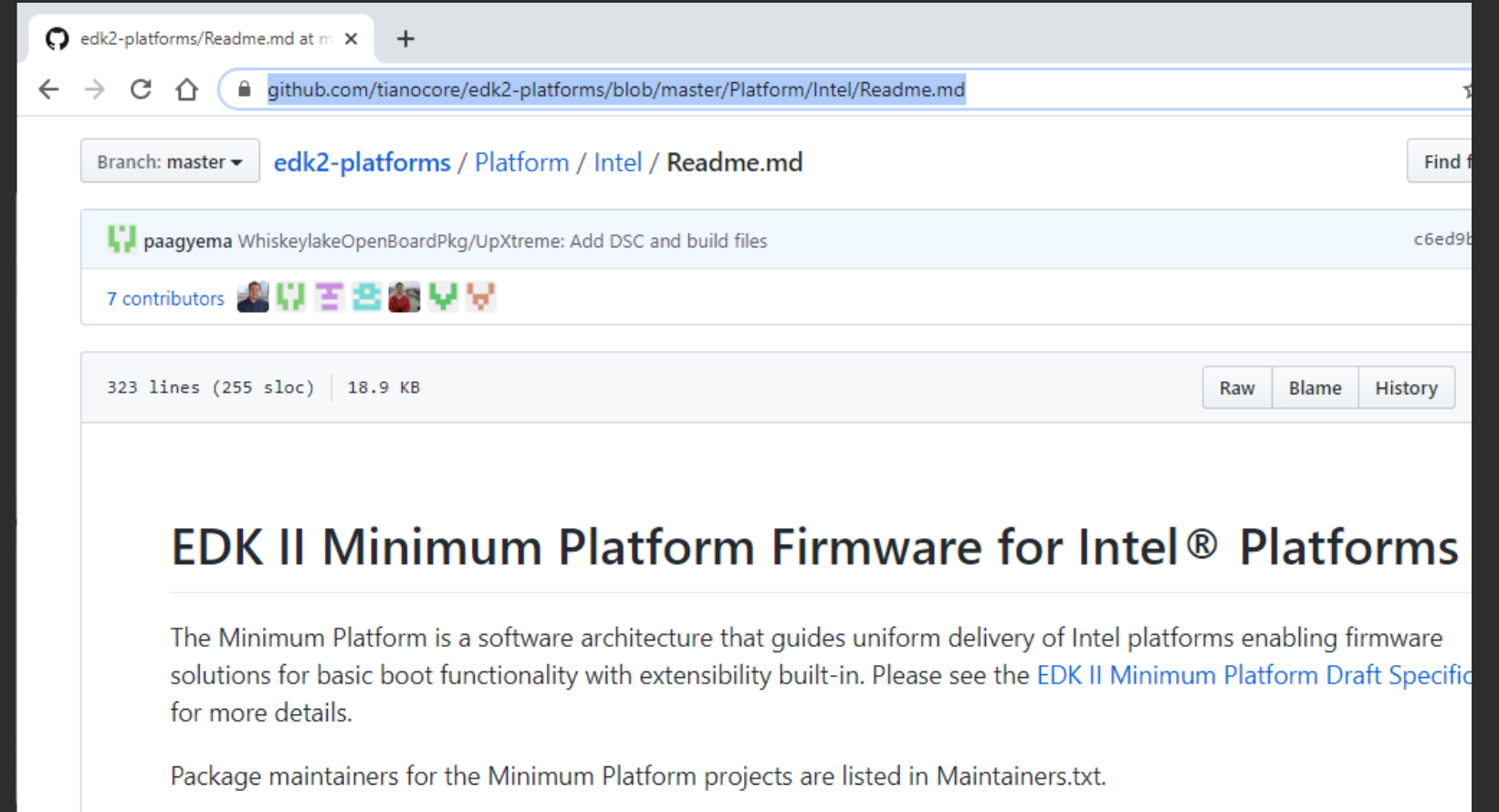


# Build Simics QSP Open board

# Where to get Open Source Simics

The Simics QSP is part of the MinPlatformPkg

How to Download & Build: Open Source MinPlatform [Readme.md](#)



Note: done in Lab 1

# MinPlatform Open Board Tree Structure

edk2/ <https://github.com/tianocore/edk2>

. . .

edk2-platforms/ <https://github.com/tianocore/edk2-platforms>

Platform/

Intel/

BoardModulePkg

SimicsOpenBoardPkg

BoardX58Ich10

MinPlatformPkg

Silicon/

Intel/

SimicsIch10Pkg

SimicsX58ktPkg

. . .

Features/Intel

AdvancedFeaturePkg

edk2-non-os/ <https://github.com/tianocore/edk2-non-os>

Silicon/

Intel/

SimicsIch10BinPkg

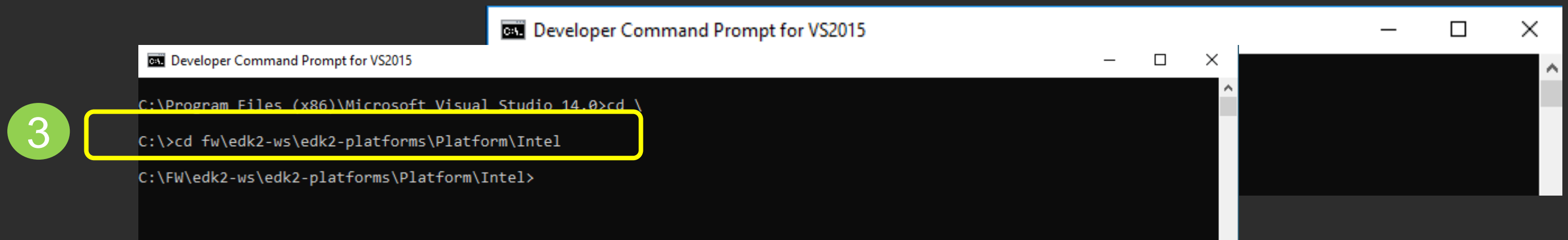
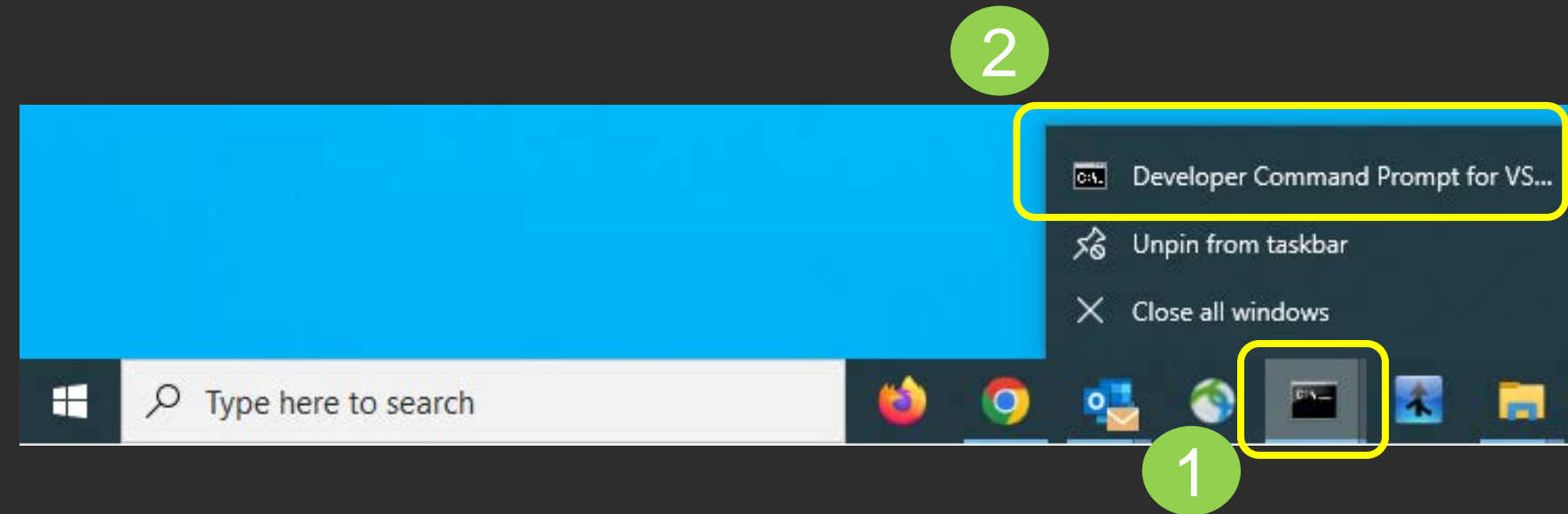
FSP/ <https://github.com/IntelFsp/FSP>

Invoke the Build .py from here

Platform DSC & FDF here

# Open a VS Command Prompt

1. Right Click on the Task tray VS Command prompt Icon to Open another Visual Studio Command Prompt
2. Left Click on “Developer . . .”  
(this opens another window)
3. Then CD to:  
> cd C:\fw\edk2-ws\edk2-platforms\Platform\Intel

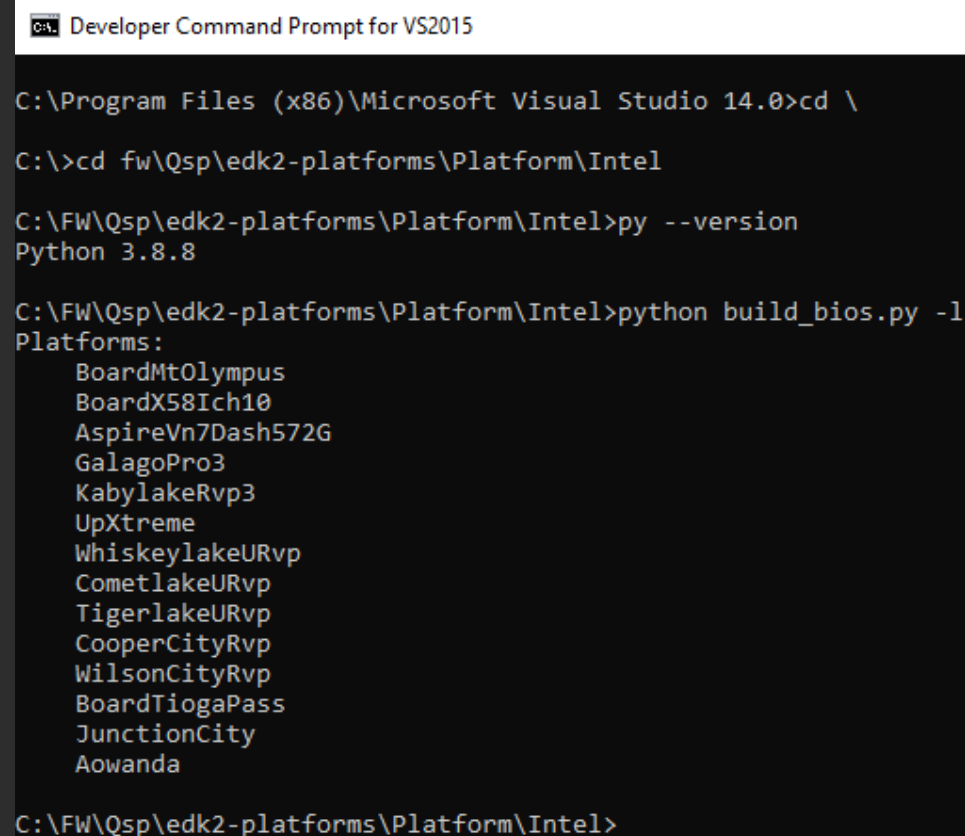


Check if Python okay (may also need to set PYTHON\_HOME)

```
$> python --version  
Python 3.8.8
```

Check for available MinPlatform Boards

```
$> python build_bios.py -l
```



```
Developer Command Prompt for VS2015  
  
C:\Program Files (x86)\Microsoft Visual Studio 14.0>cd \  
  
C:\>cd fw\Qsp\edk2-platforms\Platform\Intel  
  
C:\FW\Qsp\edk2-platforms\Platform\Intel>py --version  
Python 3.8.8  
  
C:\FW\Qsp\edk2-platforms\Platform\Intel>python build_bios.py -l  
Platforms:  
BoardMtOlympus  
BoardX58Ich10  
AspireVn7Dash572G  
GalagoPro3  
KabylakeRvp3  
UpXtreme  
WhiskeylakeURvp  
CometlakeURvp  
TigerlakeURvp  
CooperCityRvp  
WilsonCityRvp  
BoardTiogaPass  
JunctionCity  
Aowanda  
  
C:\FW\Qsp\edk2-platforms\Platform\Intel>
```

# Invoke the Build

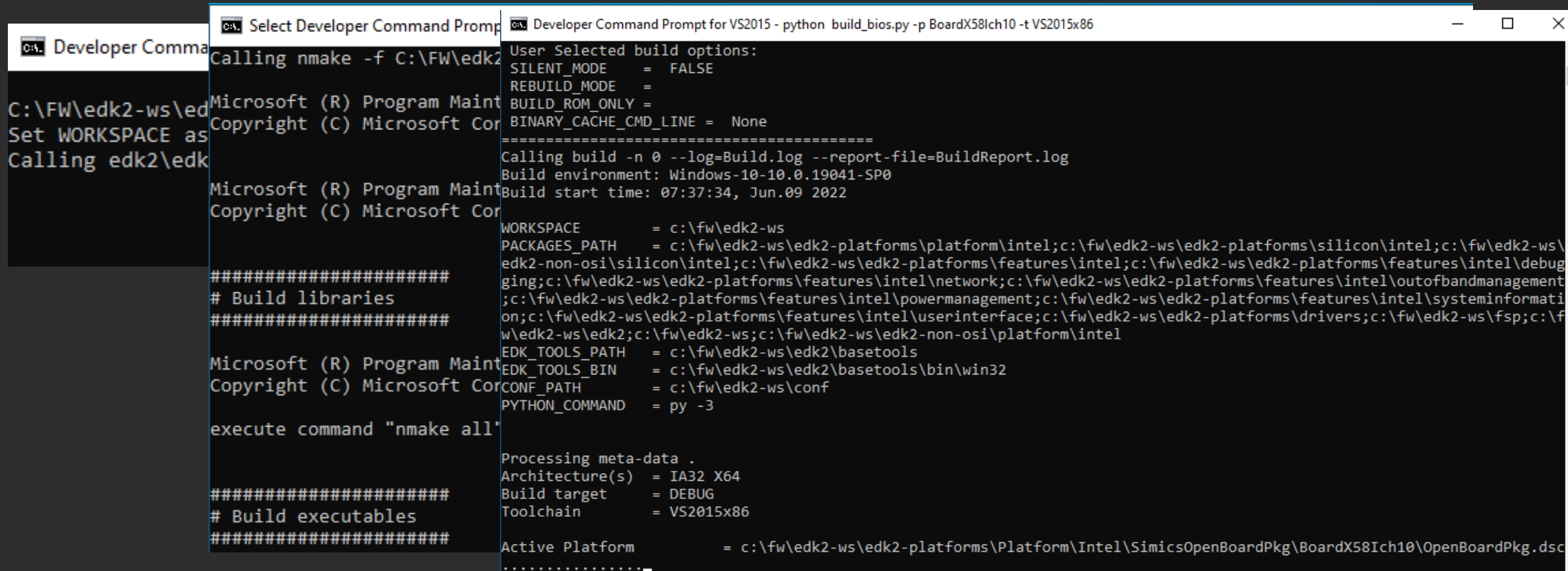
Invoke the Python Build script for Simics QSP

```
$> python build_bios.py -p BoardX58Ich10 -t VS20XX
```

Where XX is 15x86 or 17 or 19



Takes  
about 8  
minutes



```

C:\FW\edk2> python build_bios.py -p BoardX58Ich10 -t VS2015x86

User Selected build options:
SILENT_MODE = FALSE
REBUILD_MODE =
BUILD_ROM_ONLY =
BINARY_CACHE_CMD_LINE = None

Calling build -n 0 --log=Build.log --report-file=BuildReport.log
Build environment: Windows-10-10.0.19041-SP0
Build start time: 07:37:34, Jun.09 2022

Workspace = c:\fw\edk2-ws
Packages Path = c:\fw\edk2-ws\edk2-platforms\platform\intel;c:\fw\edk2-ws\edk2-platforms\silicon\intel;c:\fw\edk2-ws\edk2-non-osi\silicon\intel;c:\fw\edk2-ws\edk2-platforms\features\intel;c:\fw\edk2-ws\edk2-platforms\features\intel\debugging;c:\fw\edk2-ws\edk2-platforms\features\intel\network;c:\fw\edk2-ws\edk2-platforms\features\intel\outofbandmanagement;c:\fw\edk2-ws\edk2-platforms\features\intel\powermanagement;c:\fw\edk2-ws\edk2-platforms\features\intel\systeminformation;c:\fw\edk2-ws\edk2-platforms\features\intel\userinterface;c:\fw\edk2-ws\edk2-platforms\drivers;c:\fw\edk2-ws\fsp;c:\fw\edk2-ws\edk2;c:\fw\edk2-ws;c:\fw\edk2-ws\edk2-non-osi\platform\intel
EDK_TOOLS_PATH = c:\fw\edk2-ws\edk2\basetools
EDK_TOOLS_BIN = c:\fw\edk2-ws\edk2\basetools\bin\win32
CONF_PATH = c:\fw\edk2-ws\conf
PYTHON_COMMAND = py -3

Processing meta-data .
Architecture(s) = IA32 X64
Build target = DEBUG
Toolchain = VS2015x86

Active Platform = c:\fw\edk2-ws\edk2-platforms\Platform\Intel\SimicsOpenBoardPkg\BoardX58Ich10\OpenBoardPkg.dsc

```

NOTE: May require PYTHON\_HOME to be set:

```
$ Set PYTHON_HOME=%USERPROFILE%\AppData\Local\Programs\Python\Python38-32
```

Where 38-32 is the version of Python you have installed

Rebuild takes about 2 minutes

# Examine Build Parameters

**Python build\_bios.py -p BoardX58Ich10 -t VS2015x86**

...

Calling **build -n 0 --log=Build.log --report-file=BuildReport.log**  
and from **\edk2-ws\conf\target.txt**

TARGET	= <b>DEBUG</b>	Build Mode
TARGET_ARCH	= <b>IA32 X64</b>	CPU Architecture
TOOL_CHAIN_TAG	= <b>VS2015x86</b>	VS Tool Chain
ACTIVE_PLATFORM	= <b>... \SimicsOpenBoardPkg\BoardX58Ich10\OpenBoardPkg.dsc</b>	Platform DSC file
Report file created (via python script)	= <b>BuildReport.log</b>	PCDs, Libs, etc.



# Build EDK II -Inside VS Prompt

```
Developer Command Prompt for VS2015

Region Size = 0x8000
Region Name = None

Generate Region at Offset 0x20000
Region Size = 0xE0000
Region Name = FV

Generate Region at Offset 0x100000
Region Size = 0xA00000
Region Name = FV

GUID cross reference file can be found at c:\fw\edk2-ws\Build\SimicsOpenBoardPkg\BoardX58Ich10\DEBUG_VS2015x86\FV\Guid.x
ref

FV Space Information
FVTEMPMEMORYSILICON [28%Full] 81920 (0x14000) total, 23416 (0x5b78) used, 58504 (0xe488) free
FVPREMEMORY [33%Full] 917504 (0xe0000) total, 302992 (0x49f90) used, 614512 (0x96070) free
DXEFV [49%Full] 10485760 (0xa00000) total, 5203960 (0x4f67f8) used, 5281800 (0x509808) free
FVMAIN_COMPACT [93%Full] 1490944 (0x16c000) total, 1394096 (0x1545b0) used, 96848 (0x17a50) free
Build report can be found at C:\FW\edk2-ws\BuildReport.log

- Done -
Build end time: 14:13:31, Jun.08 2022
Build total time: 00:01:33

Running post_build to complete the build process.
Done
Fd file can be found at C:\FW\edk2-ws\Build\SimicsOpenBoardPkg\BoardX58Ich10\DEBUG_VS2015x86\FV\BOARDX58ICH10.fd

C:\FW\edk2-ws\edk2-platforms\Platform\Intel>
```

Finished build

Note the location  
of the final .fd file

# Invoke QSP Simics with BOARDX58ICH10

# Open Simics Environment

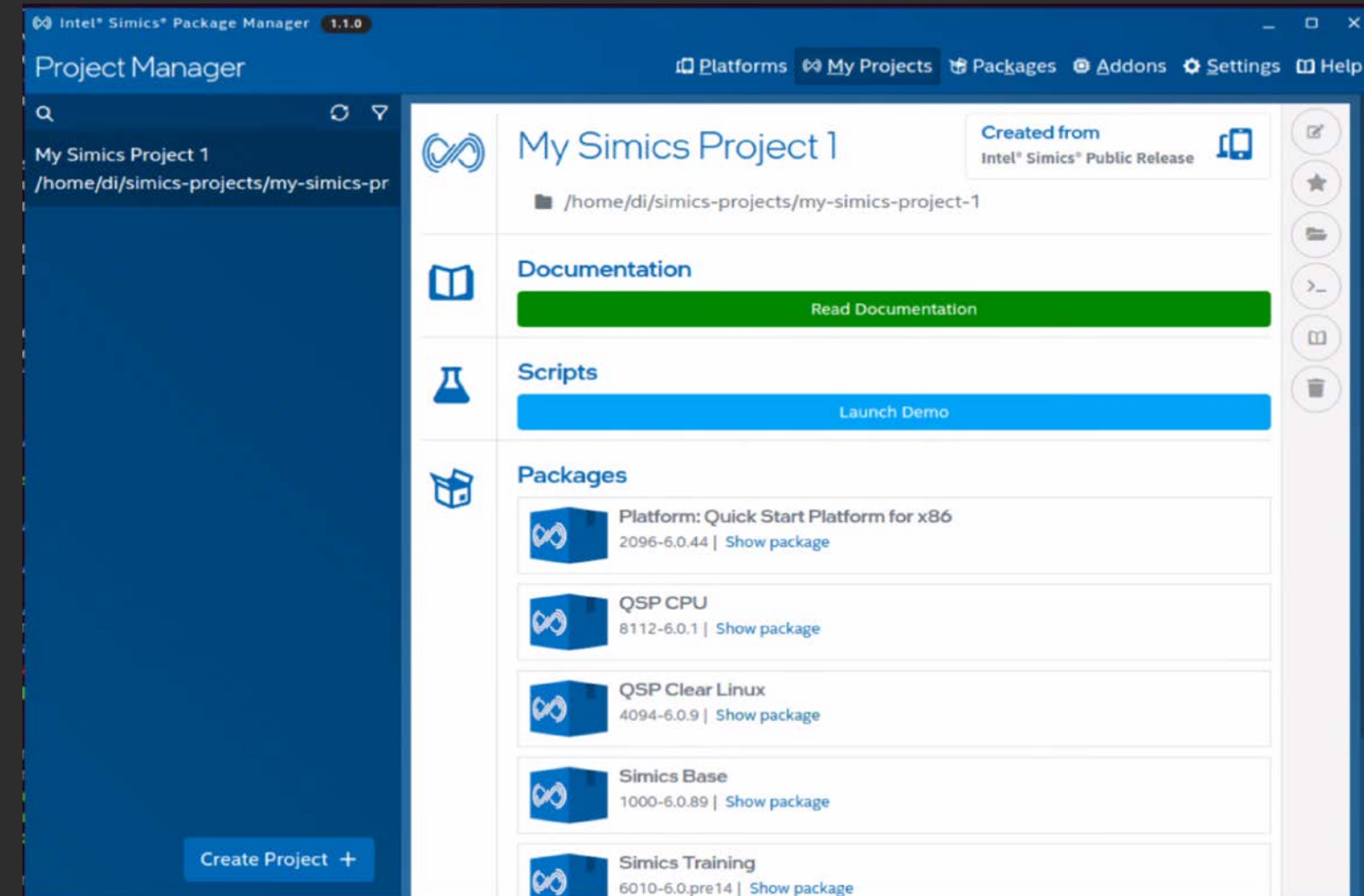
Open the “Intel Simics Package Manager”

1. Using the Start menu in Windows , Left Click on “Windows Key” Lower Left
2. Scroll down from the scroll bar on the right until “Intel Simics Package Manager”
3. Select “My Projects”

Here is a snapshot of Intel Simics Package Manager with “My Simics Project 1” created

Alternatively, Open a Windows CMD prompt and Cd to:

```
simics-projects\my-simics-project-1
```



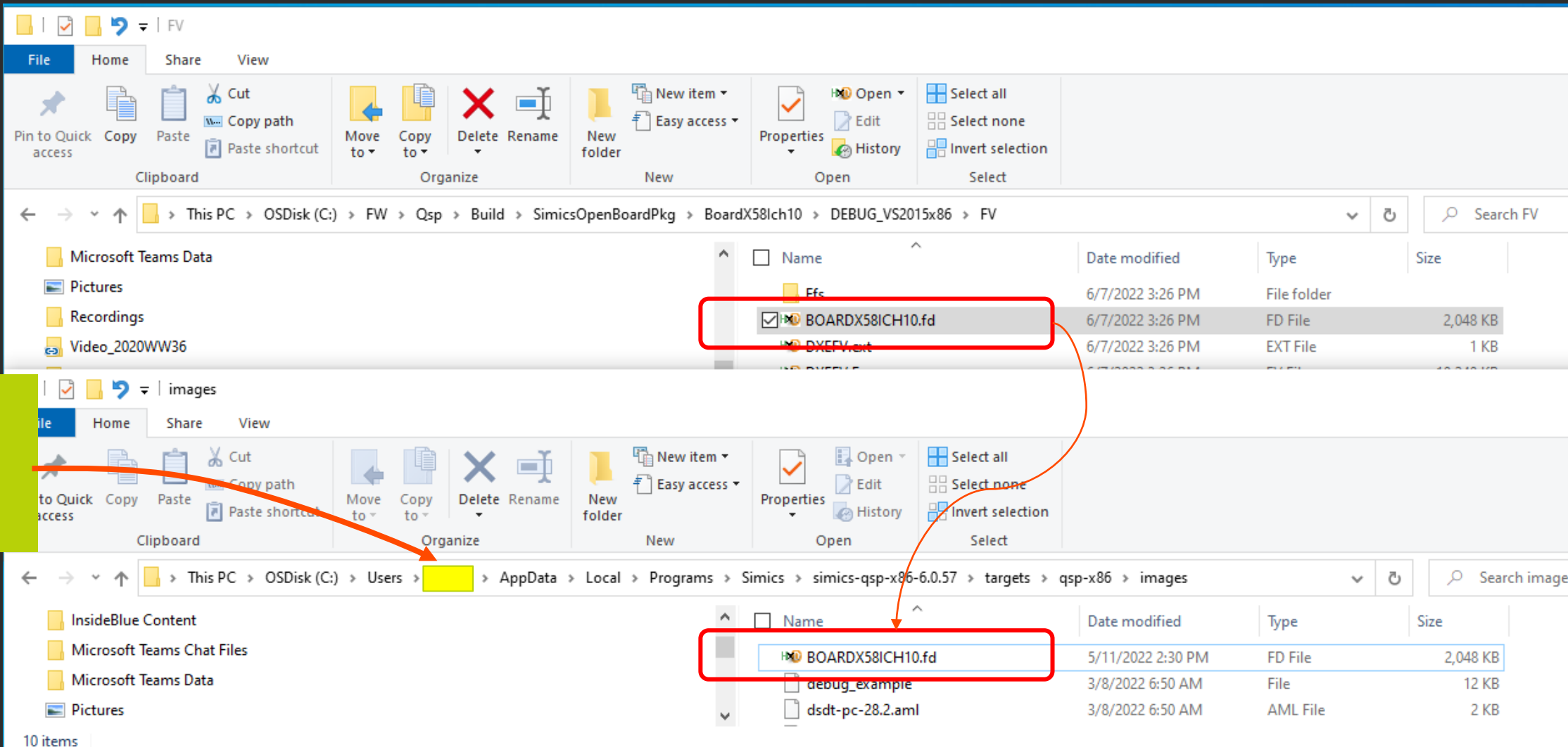
# Copy BoardX85lch10.fd to Simics

Copy C:\fw\edk2-ws\Build\SimicsOpenBoardPkg\BoardX58lch10\DEBUG\_VS20XX\FV\BOARDX58ICH10.fd

To

Where XX is 15x86 or 17 or 19

%USERPROFILE%\AppData\Local\Programs\Simics\simics-qsp-x86-6.0.57\targets\qsp-x86\images



# Update the Simics Script

Update the Simics Script to Use the BoardX85Ich10.fd image just built

Edit the file:

*%USERPROFILE%*  
\\AppData\\Local\\Programs\\Simics\\simics-qsp-x86-6.0.57\\targets\\qsp-x86\\qsp-uefi.include

Replace  
SIMICSX58IA32X64\_1\_0\_0\_bp\_r.fd  
With BOARDX58ICH10.fd

Save qsp-uefi.include

File: qsp-uefi.include

```
decl {  
  params from "qsp-images.include"  
  default bios_image =  
    "%simics%/targets/qsp-x86/images/BOARDX58ICH10.fd"  
  # "%simics%/targets/qsp-x86/images/SIMICSX58IA32X64_1_0_0_bp_r.fd"  
  default enable_efi = TRUE  
}
```



# Invoke Simics QSP Script

Open A Simics Command Prompt: Double Click on



Invoke the `qsp-modern-core.simics` script:

```
$> .\simics targets/qsp-x86/qsp-modern-core.simics
```

```

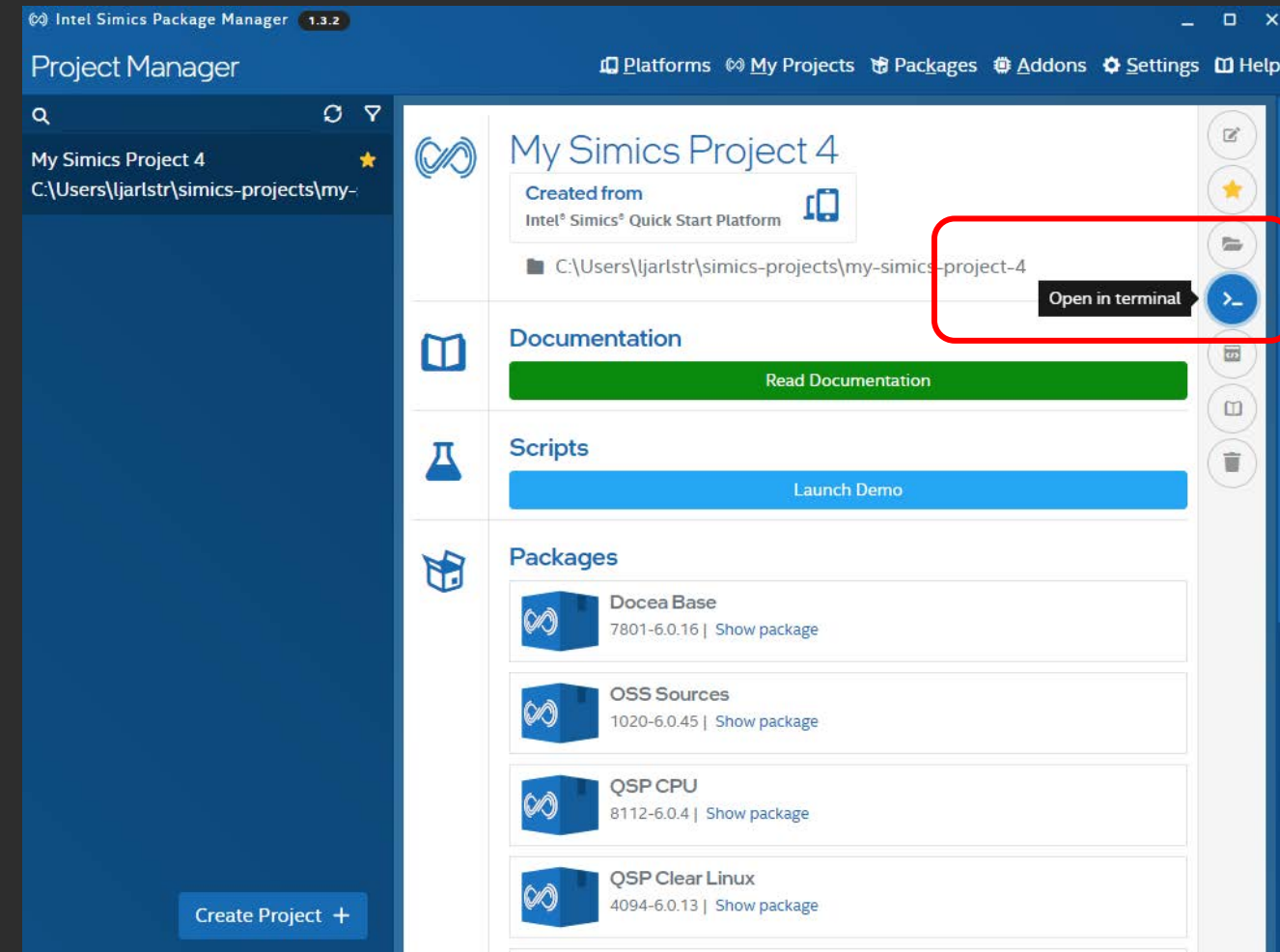
C:\Users\ljarlstr\simics-projects\my-simics-project-4>.\simics targets/qsp-x86/qsp-modern-core.simics
Intel Simics 6 (build 6149 win64) Copyright 2010-2021 Intel Corporation

Use of this software is subject to appropriate license.
Type 'copyright' for details on copyright and 'help' for on-line documentation.

[board.mb.cpu0.core[0][0] info] VMP disabled. Failed to open device.

WARNING: Simics failed to enable VMP. Enabling VMP substantially improves
simulation performance. The problem is most likely caused by the
vmxmon kernel module not being properly installed or updated.
See the "Simics User's Guide", the "Performance" section,
for instructions how to setup VMP.

NAPT enabled with gateway 10.10.0.1/24 on link ethernet_switch0.link.
NAPT enabled with gateway fe80::2220:20ff:fe20:2000/64 on link ethernet_switch0.link.
simics>
  
```




# Simics Windows

After Invoking the Simics QSP script, Many Simics Windows will have opened

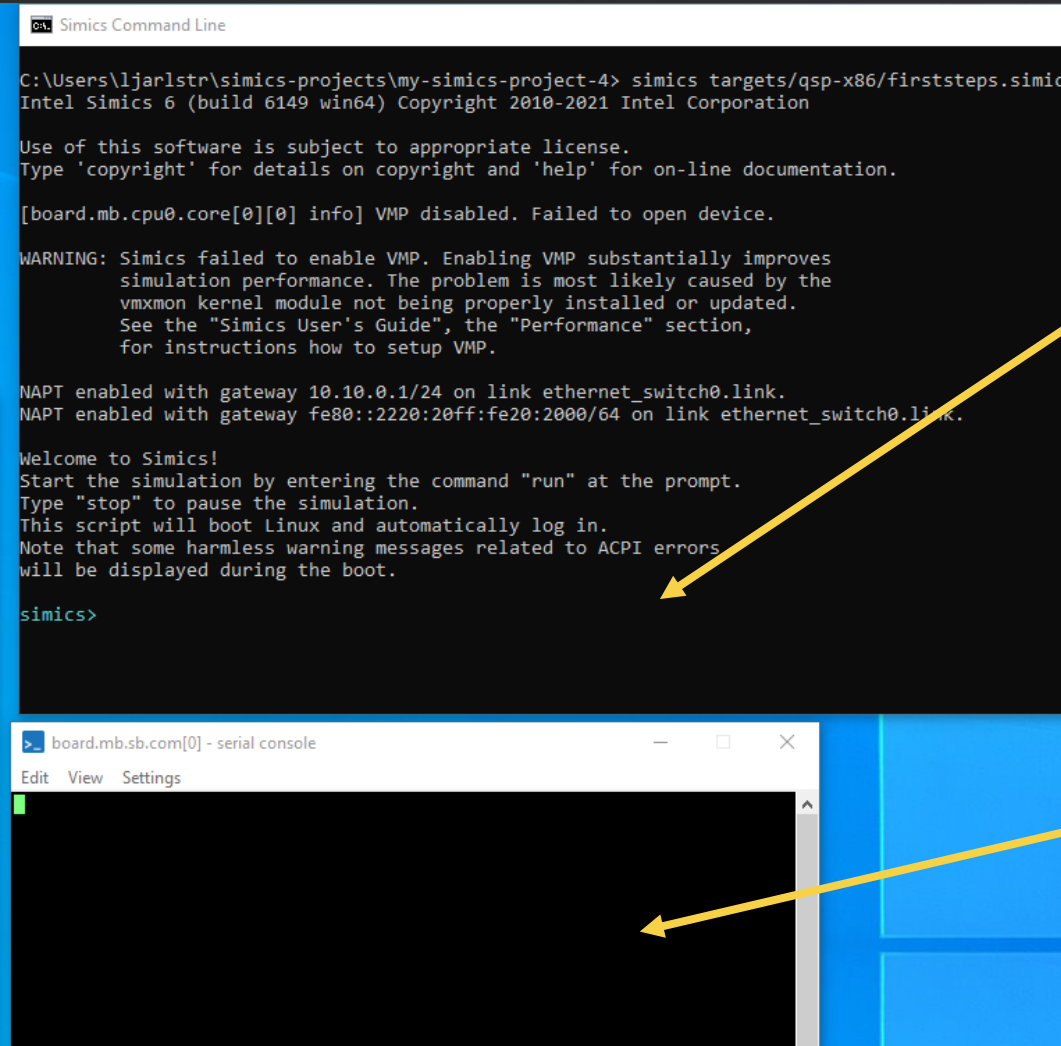
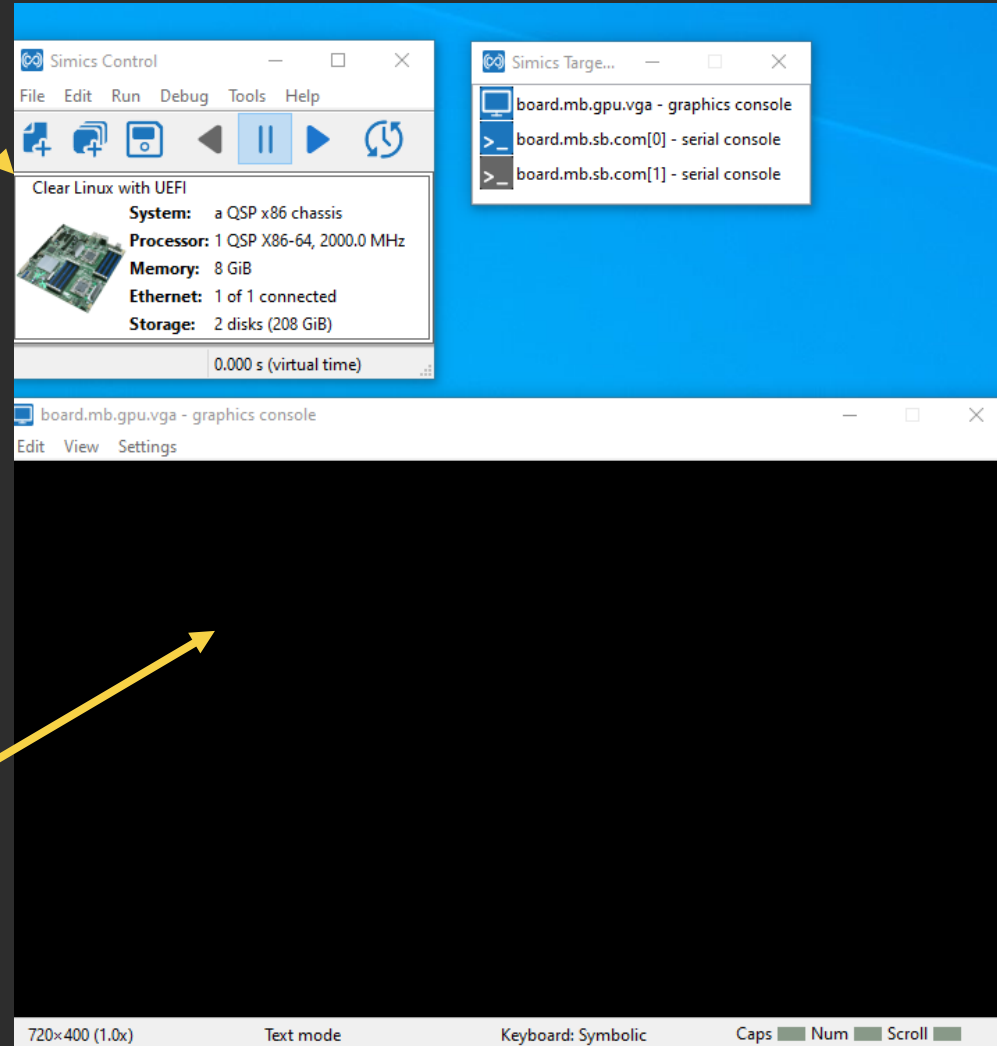
Simics Control Console

Stop 

Run 

Target Graphics Console

Video from Target



Simics Command Prompt

Issue Simics Commands  
Stop  
Quit  
Run  
etc.

Target COM1 Console

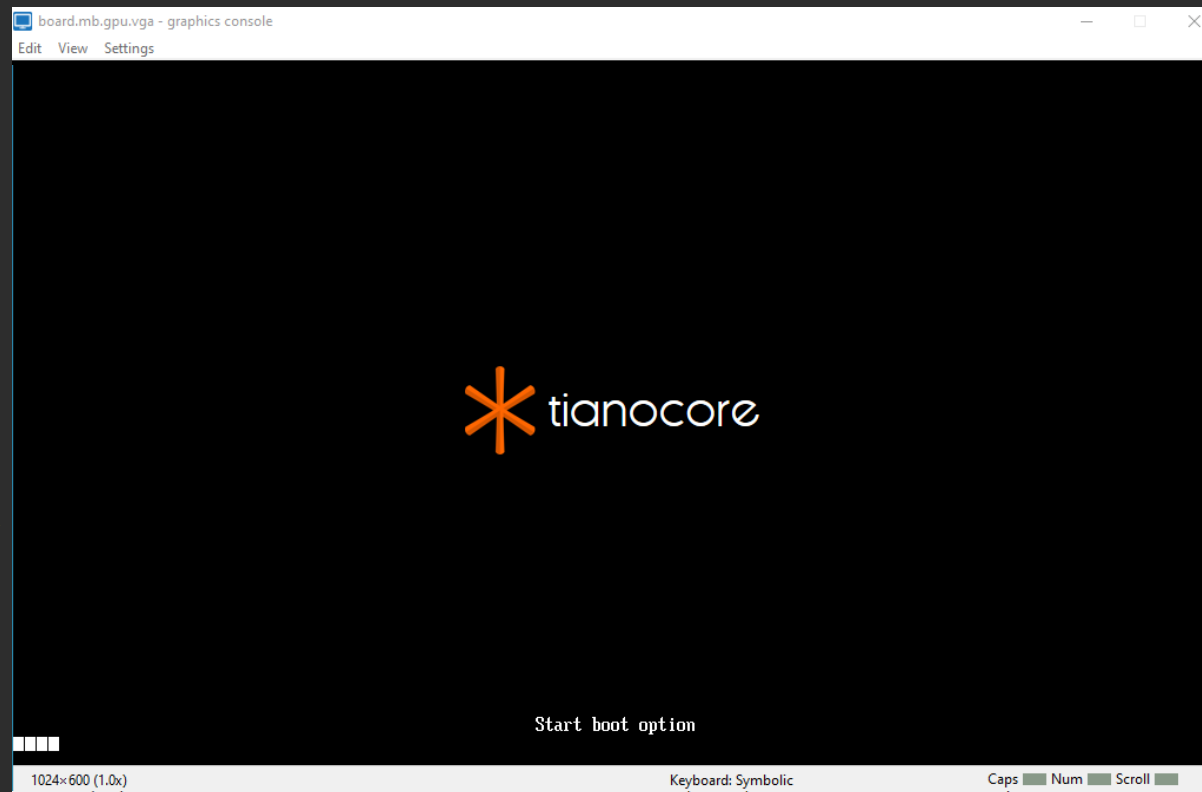
Debug Output from Target

Simics Getting Started: <https://www.intel.com/content/www/us/en/developer/articles/guide/simics-simulator-get-started.html>



# Run Simics to Boot Target

1. Next Type “Run” in the Simics Command Line
2. Be ready to press “F2” in the Target Graphics console when Logo is displayed



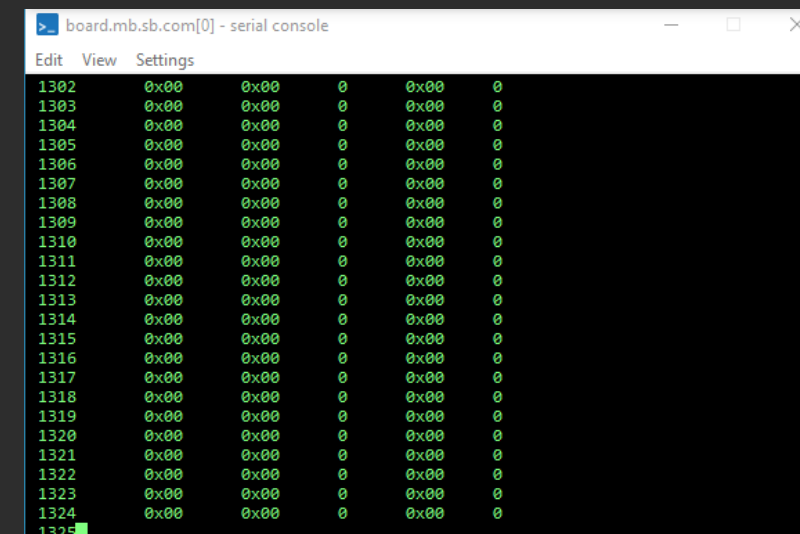
```
Simics Command Line

WARNING: Simics failed to enable VMP. Enabling VMP substantially improves
simulation performance. The problem is most likely caused by the
vmxmon kernel module not being properly installed or updated.
See the "Simics User's Guide", the "Performance" section,
for instructions how to setup VMP.

NAPT enabled with gateway 10.10.0.1/24 on link ethernet_switch0.link.
NAPT enabled with gateway fe80::2220:20ff:fe20:2000/64 on link ethernet_switch0.link.

Welcome to Simics!
Start the simulation by entering the command "run" at the prompt.
Type "stop" to pause the simulation.
This script will boot Linux and automatically log in.
Note that some harmless warning messages related to ACPI errors
will be displayed during the boot.

simics> Run
```

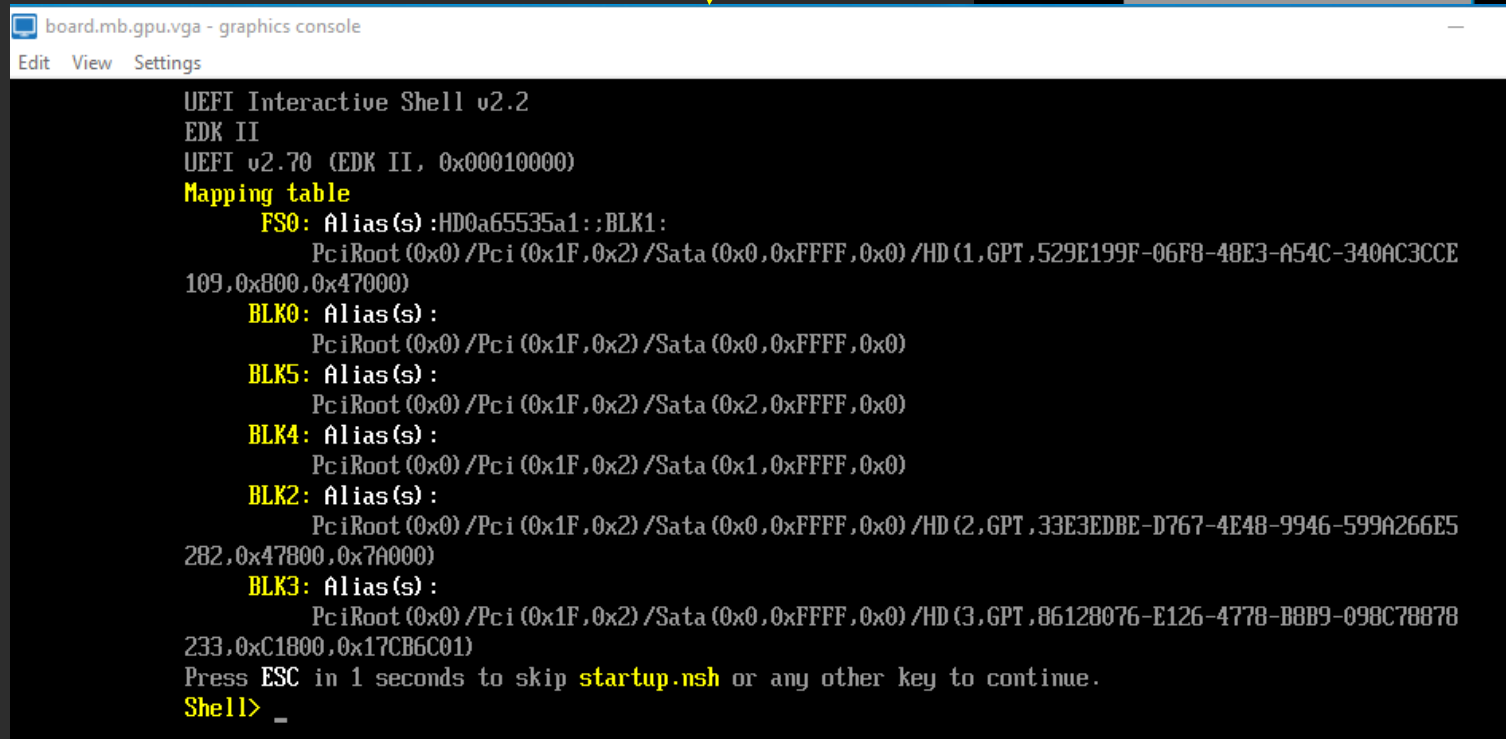
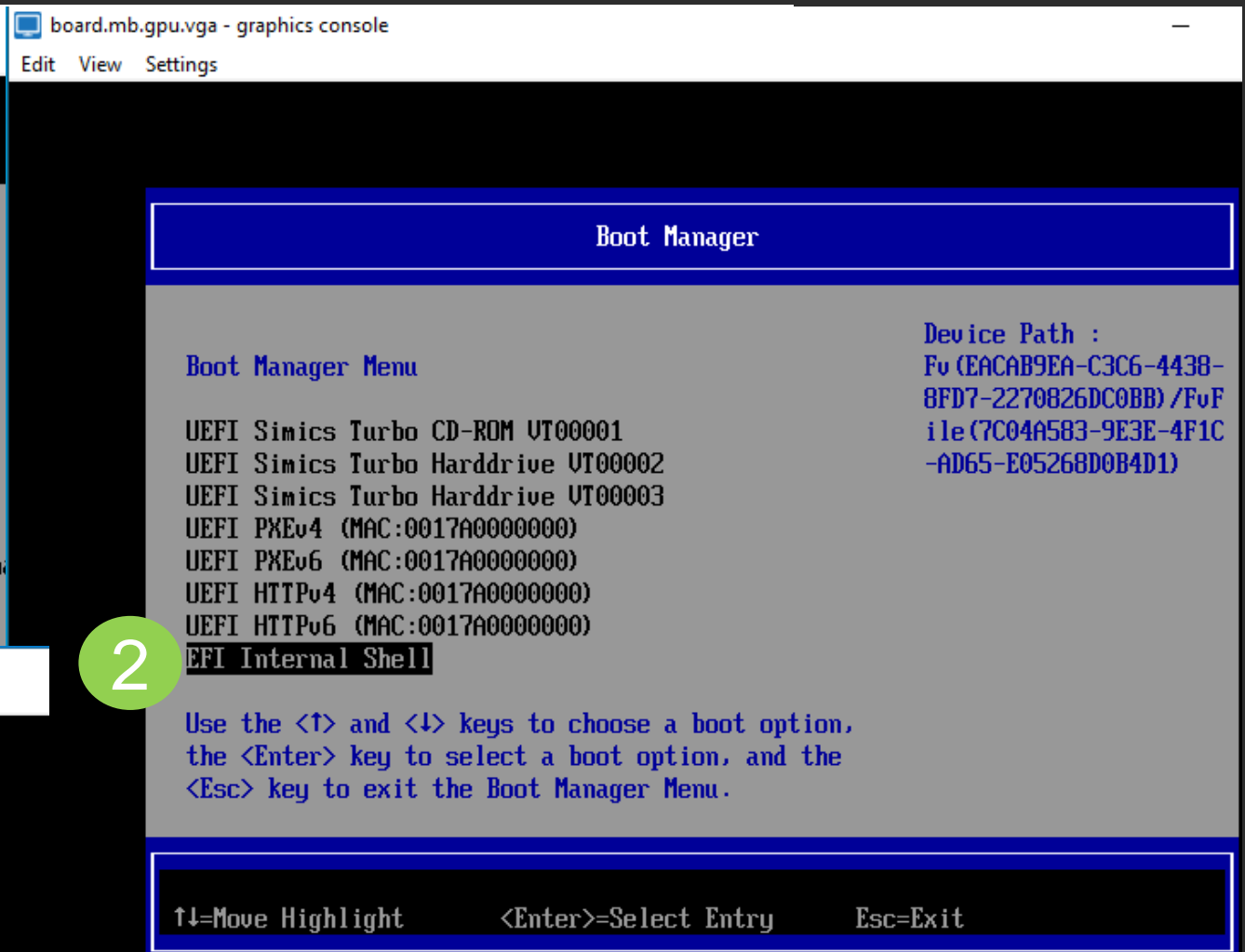
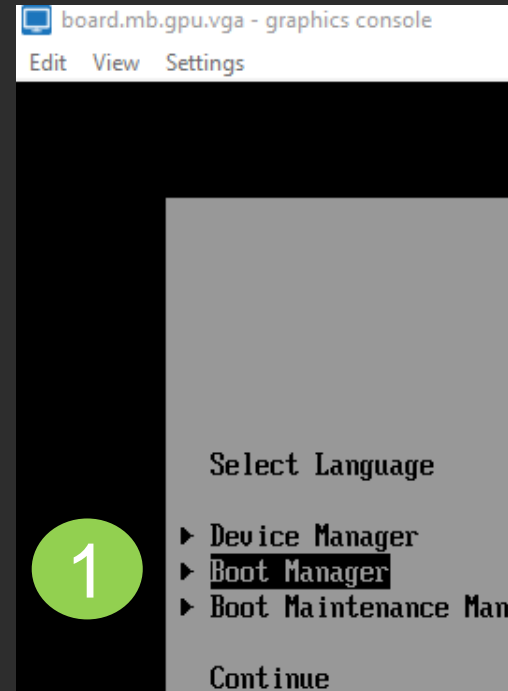


# QSP Setup –Boot to UEFI Shell

From QSP Setup

1. Click on “Boot Manager”
2. Click on “EFI Internal Shell”

Boots to UEFI Shell



# Exit QSP UEFI Shell & Simics

- To Stop the QSP Simulation, from the Simics Command Line Prompt Window, Type: “**stop**”
  - This will stop the Simics simulation of the QSP board
  - To continue, type: “run”
- To Exit this Simulation, type: “**quit**”
  - This will remove all other Simics windows
- To Restart, reissue the command:

```
$> .\simics targets/qsp-x86/qsp-modern-core.simics
```

```
cmd

Use of this software is subject to appropriate license.
Type 'copyright' for details on copyright and 'help' for on-line documentation.

[board.mb.cpu0.core[0][0] info] VMP disabled. Failed to open device.

WARNING: Simics failed to enable VMP. Enabling VMP substantially improves
simulation performance. The problem is most likely caused by the
vmxmon kernel module not being properly installed or updated.
See the "Simics User's Guide", the "Performance" section,
for instructions how to setup VMP.

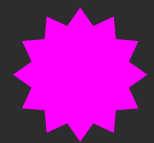

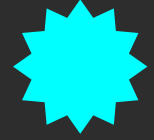
NAPT enabled with gateway 10.10.0.1/24 on link ethernet_switch0.link.
NAPT enabled with gateway fe80::2220:20ff:fe20:2000/64 on link ethernet_switch0.link.

Welcome to Simics!
Start the simulation by entering the command "run" at the prompt.
Type "stop" to pause the simulation.
This script will boot Linux and automatically log in.
Note that some harmless warning messages related to ACPI errors
will be displayed during the boot.

simics> run
running> stop
simics> quit

C:\Users\ljarlstr\simics-projects\my-simics-project-4>
```

# SUMMARY

-  Build and Run the EmulatorPkg
-  Build a EDK II Platform using Simics Open Source QSP Board
-  Run Simics with the QSP Board

# Questions?





# Return to Main Training Page



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# ACKNOWLEDGEMENTS

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BACKUP

# BUILD ERRORS

# Build Error- RC.exe

Error message:



```

Developer Command Prompt for VS2015
DEBUG_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



# 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