tianocore

UEFI & EDK II Training

Platform Build Lab MinnowBoard Max - Windows

tianocore.org

tianocore

PLATFORM BUILD LABS

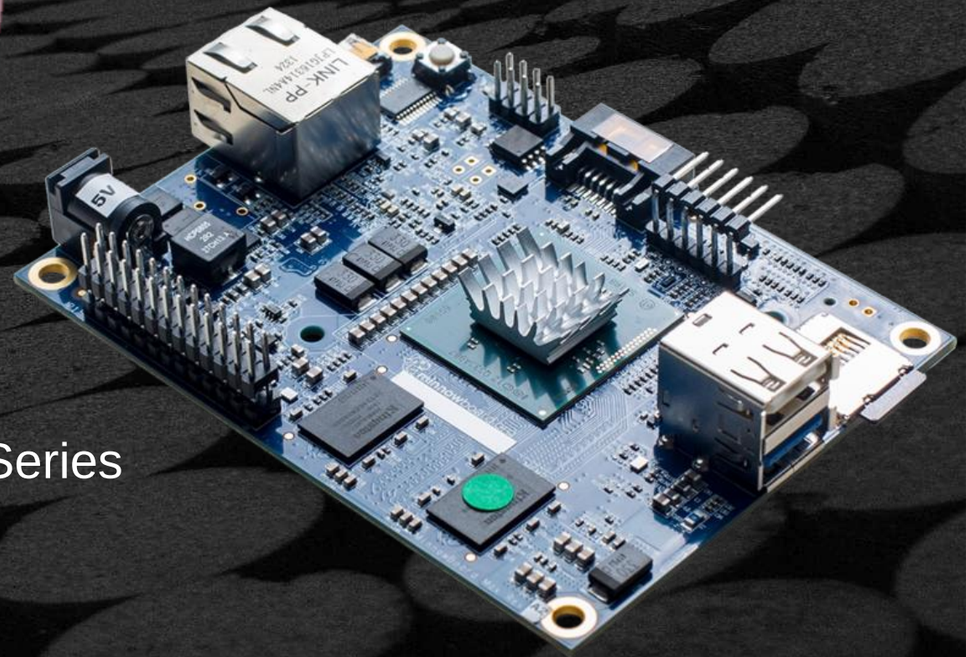
- Hardware Setup for MinnowBoard Max/Turbot
- Build a EDK II Platform using MinnowBoard Max/Turbot

tianocore

PLATFORM HW SETUP

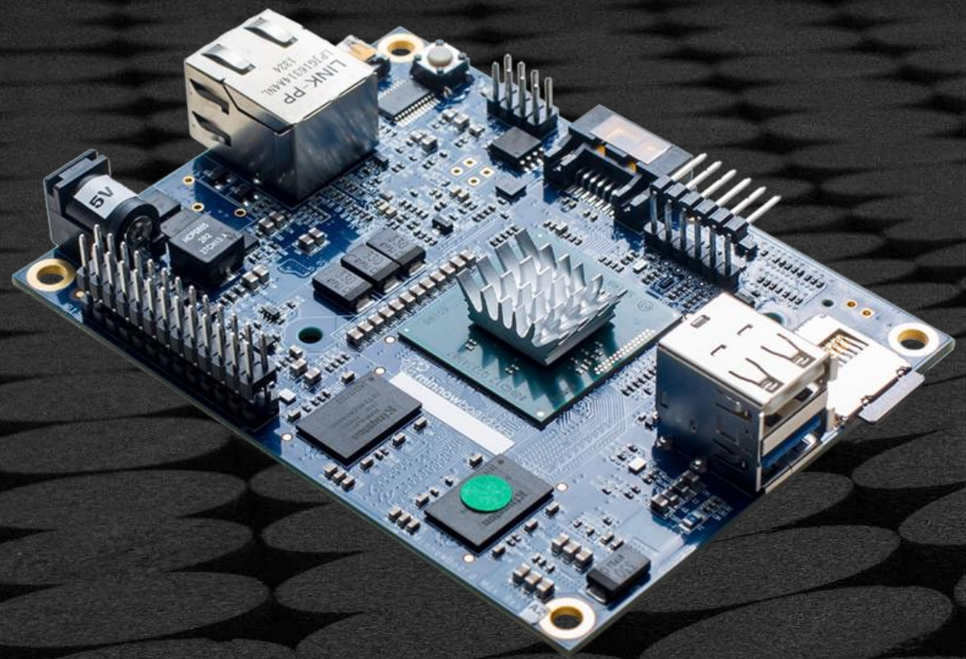
Setup hardware for the MinnowBoard Max/Turbot

EDK II Platform – MinnowBoard Max/Turbot



Intel® Atom processor E3800 Series
(Formerly Bay Trail-I)

MinnowBoard Max/Turbot Workshop Lab Hardware



FTDI USB Cable

5V** Power Supply

USB thumb drive

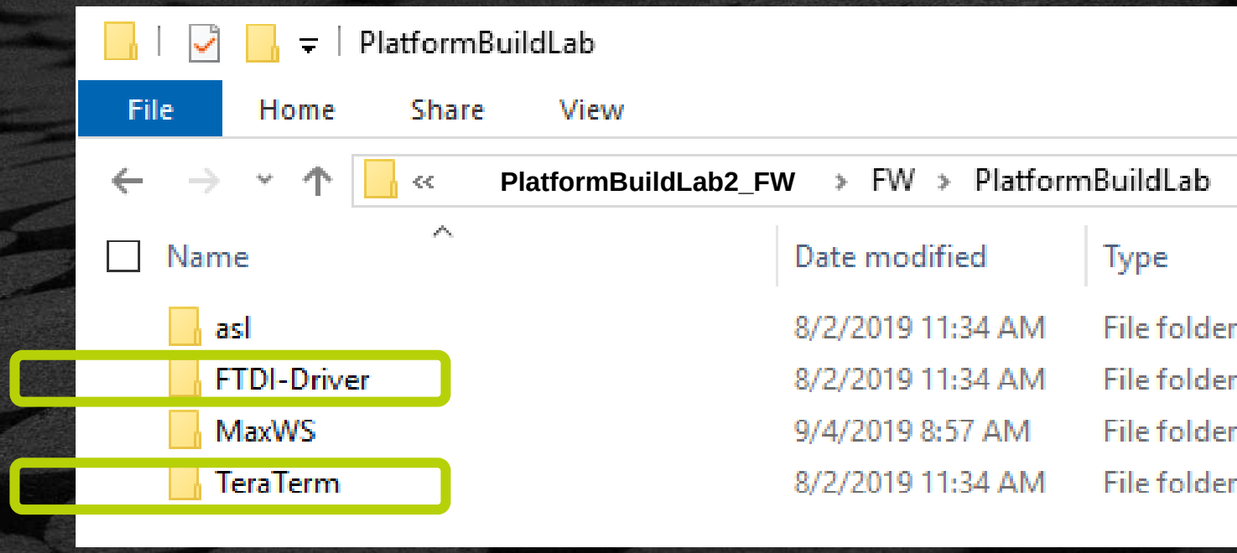
**Warning do not use any other power supply than 5V or the board will Fry

Instructions for Lab Materials

Directory C:\PlatformBuildLab2_FW\FW\PlatformBuildLab

FTDI Driver for Serial UART Cable (COM Port)
http://www.ftdichip.com/FTDrivers.htm

TeraTerm (terminal software for COM Port)
https://en.osdn.jp/projects/ttssh2/releases/



Note: Download FTDI Driver and TeraTerm as described in the Readme.txt for each directory

Setup MinnowBoard Max Test System

Hardware:

- System Under Test (SUT) – MinnowBoard Max
- USB to 3.3V TTL Cable (6 pin to USB Type A)
- 5V power supply

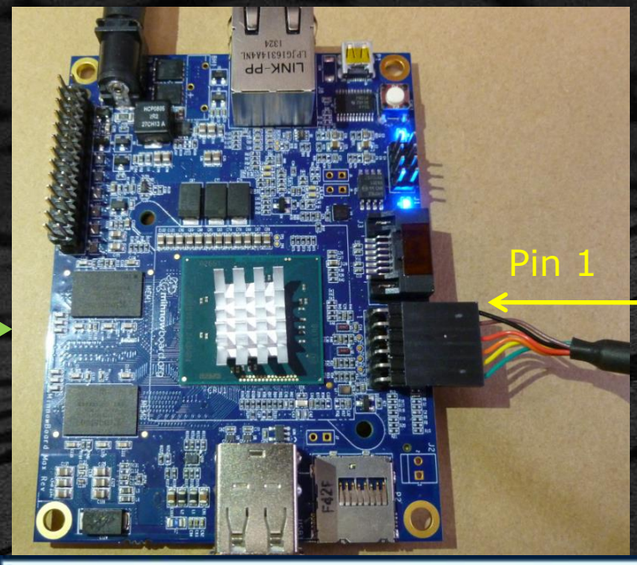
Connect the USB w/ 6 pin header to SUT (Max)

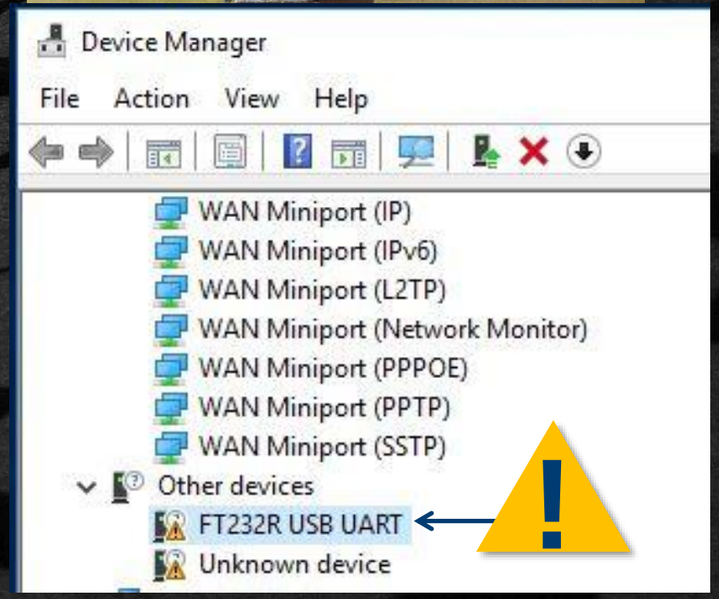
Connect the USB Type A connector to Host (Laptop)

On your Host **Go to the “Device Manager”** in the control panel.

Under the "**Other devices**" category you will see a yellow ⚠ with a warning icon next to it.

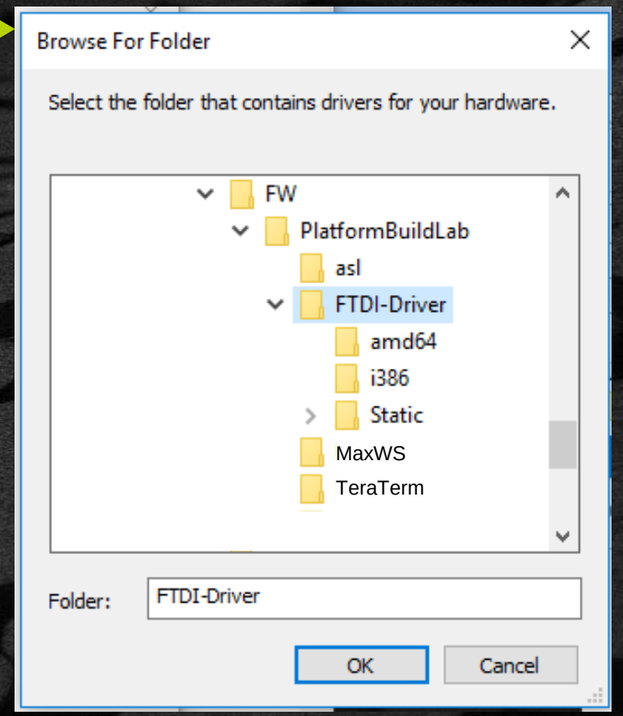
You may already have this driver installed if you do not see a ⚠ warning under “**Other devices**”





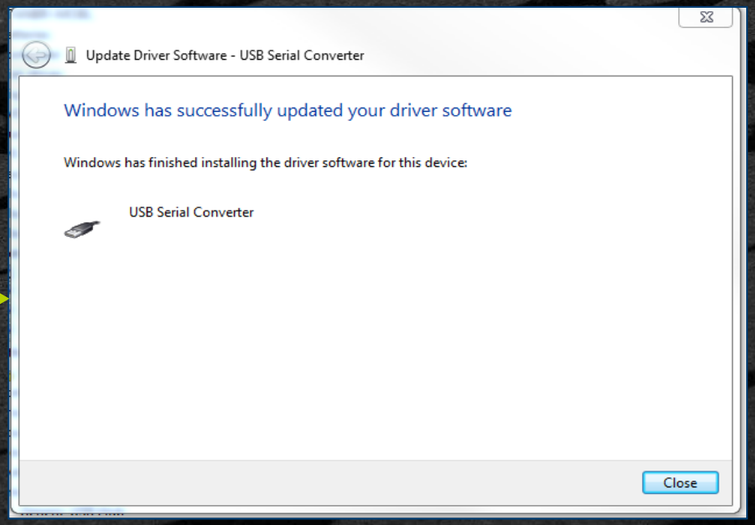
Setup COM port on Host

- Right click yellow ⚠ and select "Update Driver Software“ from the **Device Manager** menu
- Select "Browse my computer for driver software”.
- Click the **Browse** button. – Click on “Include subfolders”
- Browse to the location of the folder you unzipped earlier for the FIDI driver.
- Click on the folder and press **OK**.



- Press **Next**.

  Driver will be installed

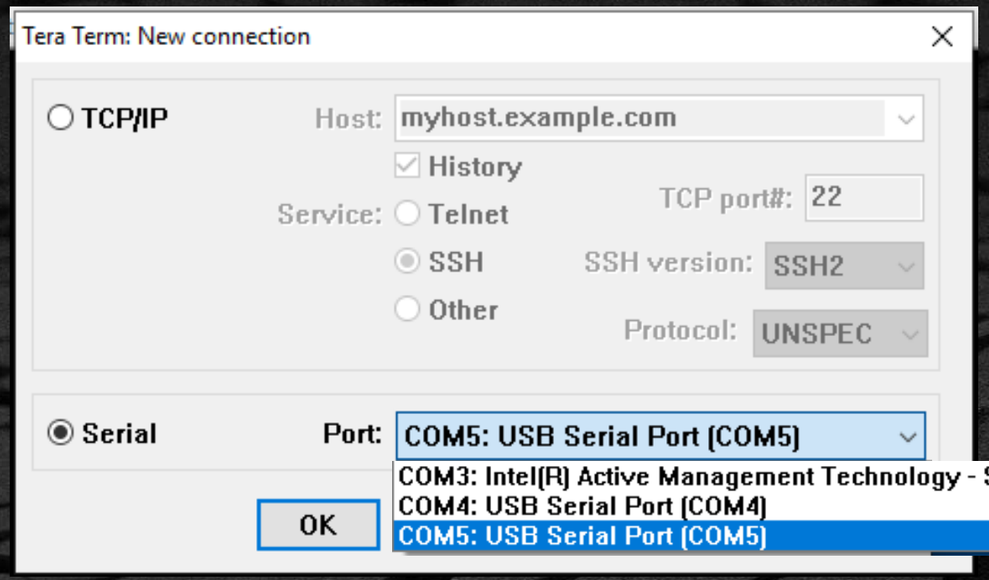


Setup TeraTerm

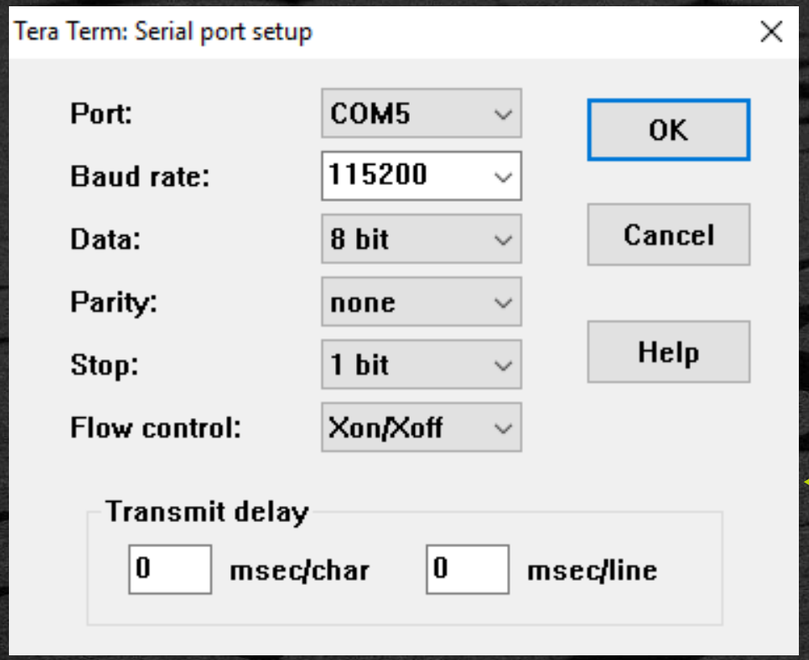
Unzip and Install TeraTerm

Open TeraTerm Software

Select the serial port assigned



Choose the correct COM Port number



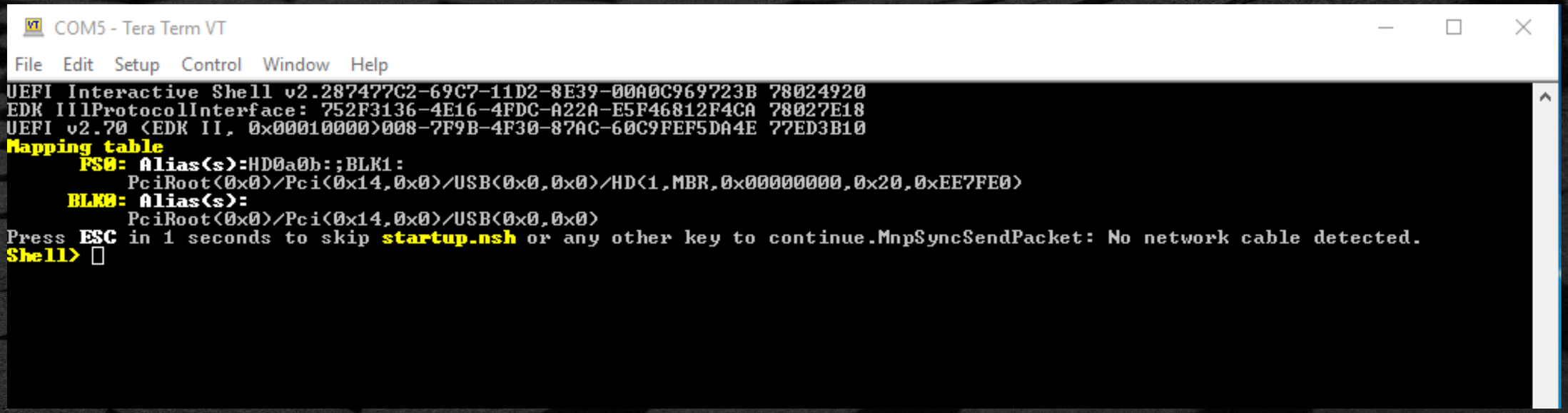
Go to **Setup->Serial Port** and set the following:

- Baud: 115200
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- Flow Control: Xon/Xoff

Power on MinnowBoard Max

Connect the Power supply cable to the MinnowBoard Max

MinnowBoard Max should boot to the UEFI Shell in the TeraTerm window.



tianocore

END OF LAB

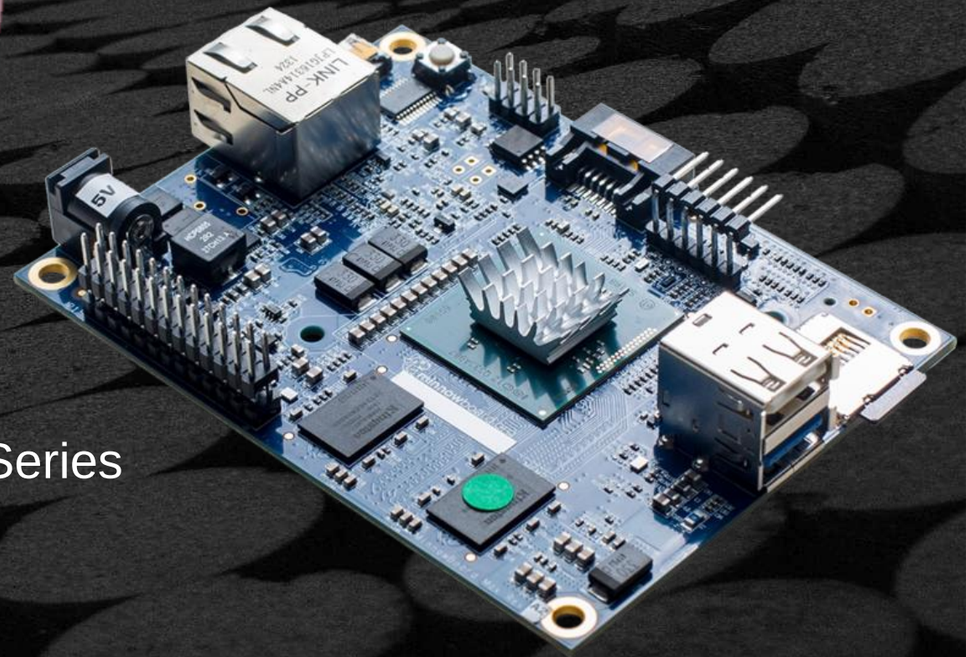
Return to the Beginning

tianocore

BUILD MINNOWBOARD TURBOT

EDK II Platform – MinnowBoard Max/Turbot

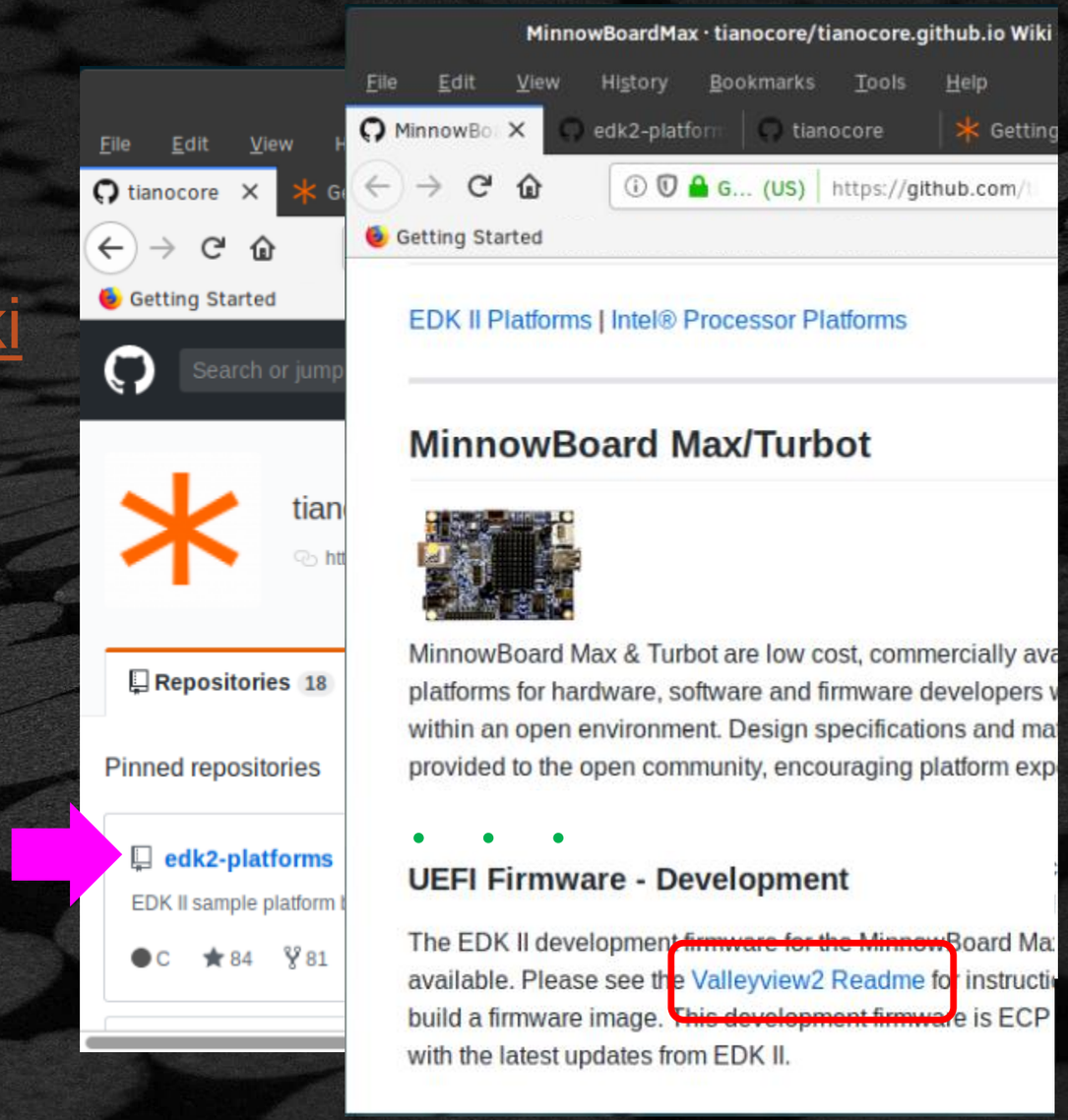
MinnowBoard.org



Intel® Atom processor E3800 Series
(Formerly Bay Trail-I)

Where to get Open Source MinnowBoard Max

- Open Source Max Development Wiki
- How to Download & Build: Readme.md



Download Max Lab Source

Download the PlatformBuildLab2_FW.zip from : github.com PlatformBuildLab2_FW.zip

OR

Use `git clone` to download the PlatformBuildLab2_FW

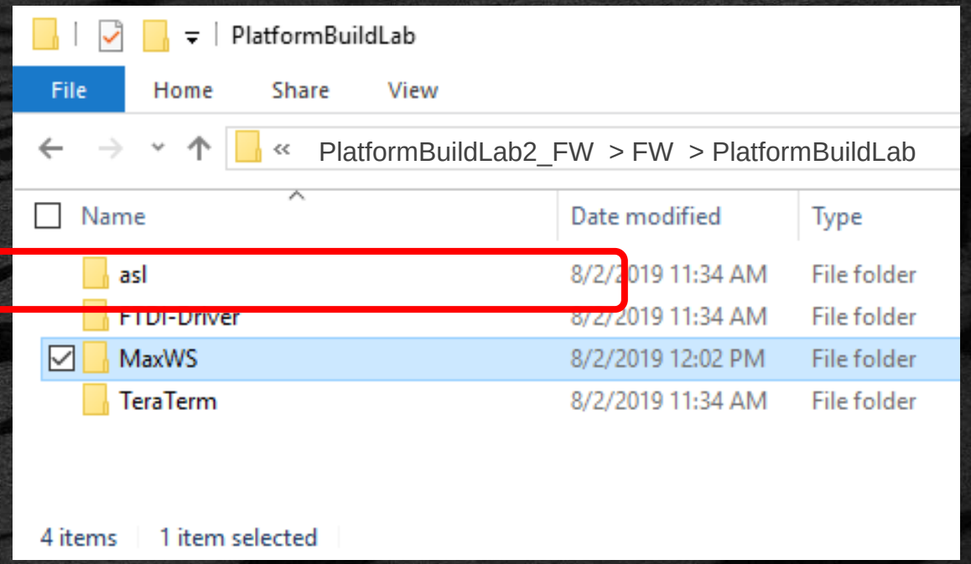
```
C:/> git clone https://github.com/tianocore-training/PlatformBuildLab2_FW.git
```

Directory PlatformBuildLab2_FW will be created

```
/FW
 /PlatformBuildLab
       - asl                          - Asl Compiler
       - FTDI-Driver                  - Serial / USB cable
       - MaxWS                        - MinnowBoard Max Source for the Labs
       - TeraTerm                     - Terminal app
```

Preparing to Build

Directory C:\PlatformBuildLab2_FW\FW\PlatformBuildLab from Download or zip



1. Copy \asl Folder to C:\

Note: Download Asl compiler described in the Readme.txt

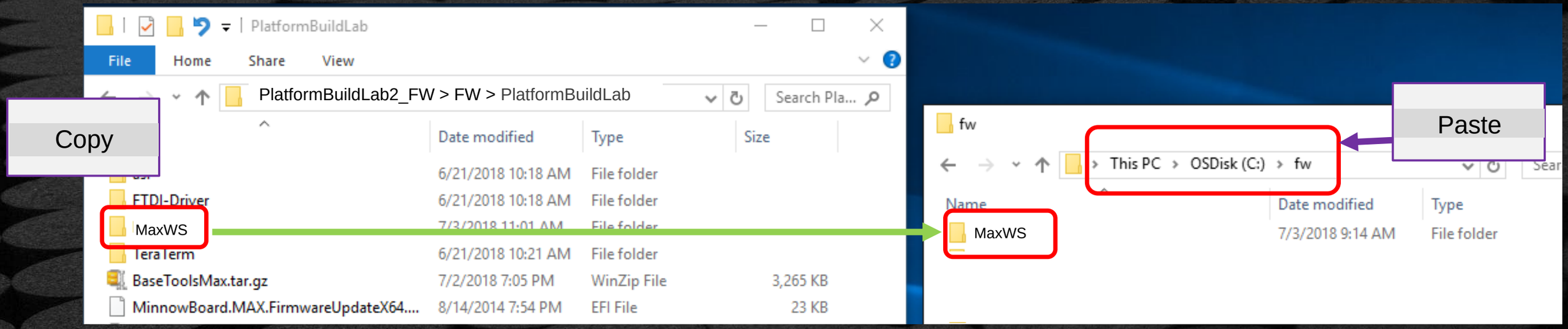
Copy MinnowBoard Max Source

2 Open a VS Command prompt

Create a working space source directory under the home directory

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

From the `FW/PlatformBuildLab` folder, copy and paste folder "`..FW/MaxWS`" to `C:/FW/MaxWS`



Platform Source Directory Structure

```
./MaxWs/
    edk2/
        (EDK II common packages)
        BaseTools/
    edk2-platforms/
        Platform/Intel/
            Vlv2TbltDevicePkg /
        Silicon/Intel/
            Vlv2DeviceRefCodePkg/
    edk2-non-osi/
    nasm/**
    openssl/**
```

Invoke the Build from here

Platform DSC here

** Nasm compiler and ** Openssl may need to be downloaded per the Readme.txt file in each directory

tianocore

Steps to Build & Install Firmware

1. At VS command prompt Cd to directory : C:/FW/MaxWS
2. Set up local build environment
3. Invoke “`Edksetup Rebuild`” (build `BaseTools`)
4. Invoke the build process (DEBUG & RELEASE)
5. Locate build output (.cap files for BIOS image)
6. Flash capsule image onto the platform
7. Reset and boot new firmware to UEFI Shell

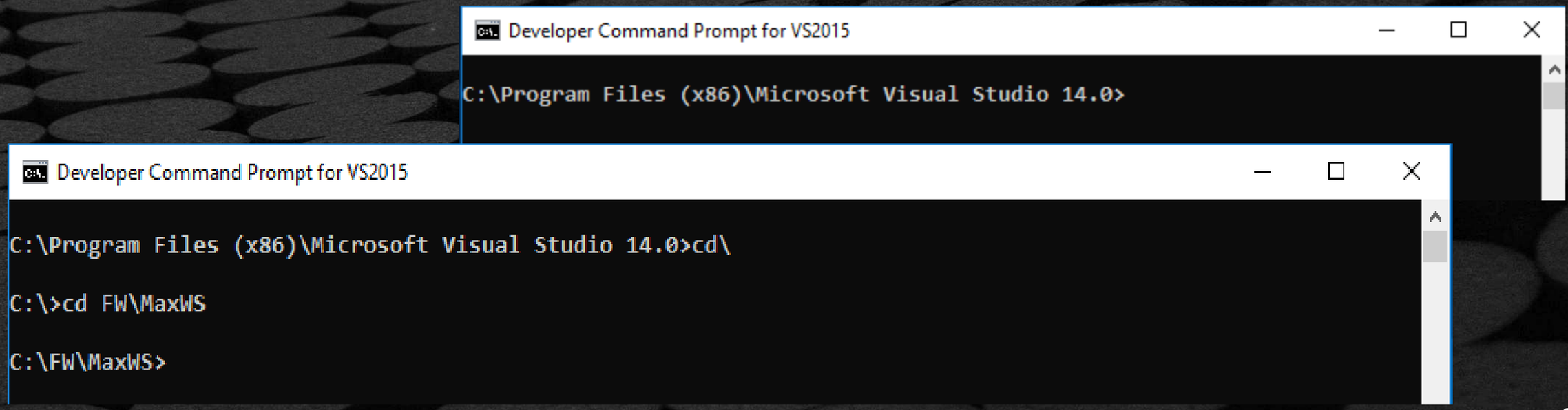
Next slide will follow the above steps

Open a VS Command Prompt

Follow Steps from here to Pin the Visual Studio Command Prompt to the Windows Task Bar

1. Open a Visual Studio Command Prompt &

```
> cd C:\FW\MaxWS
```



tianocore

Setup the Build Environment

2

Run Setenv.bat or type the following: (assumes Python3.7.2 installed)

```
$> setenv.bat
```

```
set WORKSPACE=%CD%
set PACKAGES_PATH=%WORKSPACE%\edk2;%WORKSPACE%\edk2-platforms\Silicon\Intel;%WORKSPACE%\edk2-
platforms\Platform\Intel;%WORKSPACE%\edk2-non-osi\Silicon\Intel

set EDK_TOOLS_PATH=%WORKSPACE%\edk2\BaseTools
path=%path%;%WORKSPACE%\openssl;%USERPROFILE%\AppData\Local\Programs\Python\Python37-32
set NASM_PREFIX=%WORKSPACE%\nasm\
```

Check if Python okay

```
$>  python --version
Python 3.7.2
```

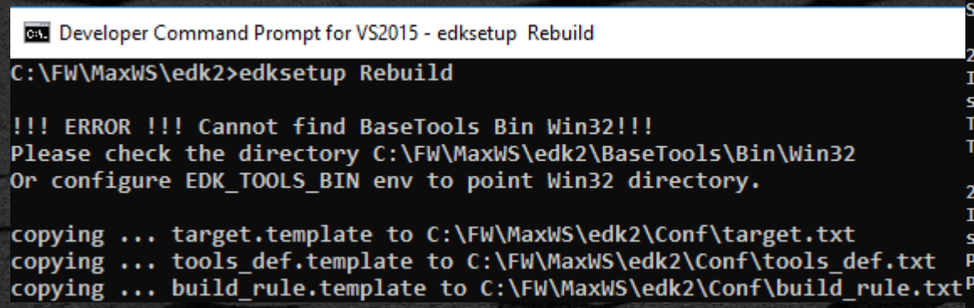
Note: Download Nasm compiler and Openssl described in each of the Readme.txt files

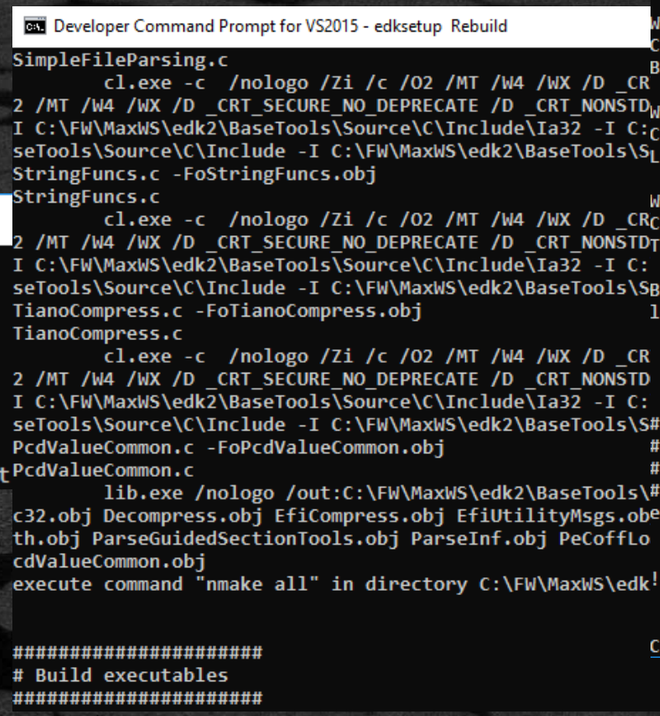
Invoke Edksetup

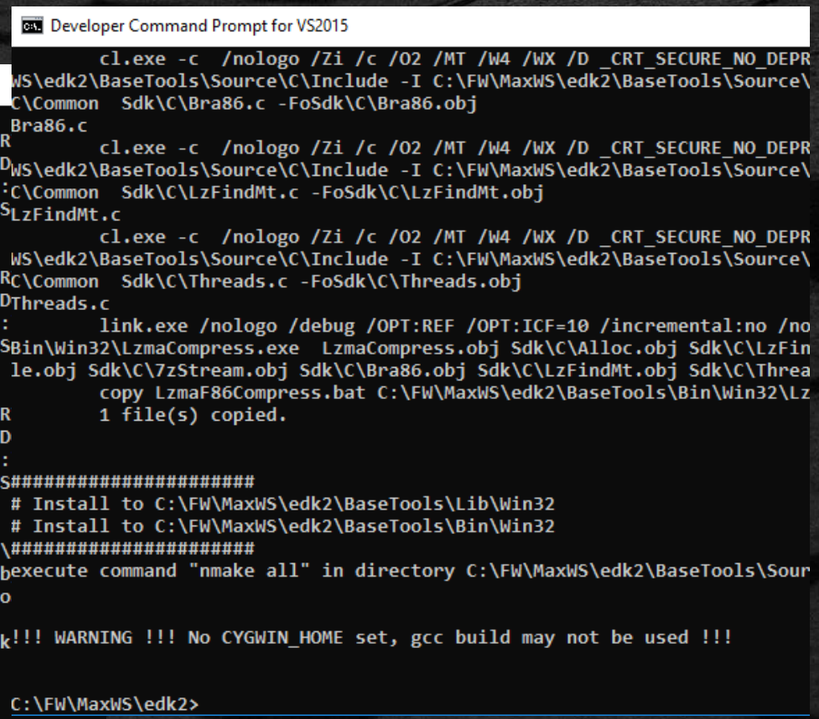
3

Invoke Edksetup from edk2 directory

```
$> cd edk2
$> Edksetup Rebuild
```







Platform Build Scripts

Platform Pre & Post Build Scripts

Many Platforms have a bash, bat or Python script file to pre or post process the EDK II build process

For MinnowBoard Max :

Pre build processing:

Python script Vlv2TbltDevicePkg/PreBuild.py – determines date and creates BiosId.bin in build output directory

Post build processing:

Python script Vlv2TbltDevicePkg/Feature/Capsule/GenerateCapsule/GenCapsuleAll.py – creates .CAP files for updating

Build Process for DEBUG Target

4

From the edk2 directory invoke the “build” command to build MinnowBoard Max
Note: Use the Your VS TAG below with “-t” option

```
$> build -a IA32 -a X64 -t VS2015x86 -p Vlv2TbltDevicePkg\PlatformPkgX64.dsc –y Vlv.report -v
```

```
Developer Command Prompt for VS2015 - build  -a IA32 -a X64 -n 5 -t VS2015x86 -b DEBUG -p Vlv2TbltDevicePkg\PlatformPkgX64.dsc -v
PREBUILD         = python c:\fw\maxws\edk2-platforms\Platform\Intel\Vlv2TbltDevicePkg/PreBuild.p
 -n 5 -t VS2015x86 -b DEBUG -p Vlv2TbltDevicePkg\PlatformPkgX64.dsc -v --conf=c:\fw\maxws\edk2\c
POSTBUILD        = python c:\fw\maxws\edk2-platforms\Platform\Intel\Vlv2TbltDevicePkg/Feature/Ca
psule/GenCapsuleAll_EDKII_TEST.py -a IA32 -a X64 -n 5 -t VS2015x86 -b DEBUG -p Vlv2TbltDevicePkg
dsc -v --conf=c:\fw\maxws\edk2\conf all

- Prebuild Start -

PreBuild: RelativePathc:\fw\maxws\Build
PreBuild: mkdir Build
PreBuild: RelativePathc:\fw\maxws\Build\Vlv2TbltDevicePkgX64
PreBuild: mkdir Build\Vlv2TbltDevicePkgX64
PreBuild: RelativePathc:\fw\maxws\Build\Vlv2TbltDevicePkgX64\DEBUG_VS2015x86
PreBuild: mkdir Build\Vlv2TbltDevicePkgX64\DEBUG_VS2015x86
PreBuild: python C:\FW\MaxWS\edk2-platforms\Platform\Intel\Tools\GenBiosId\GenBiosId.py -i c:\fw
2TbltDevicePkgX64\DEBUG_VS2015x86\BiosId.env -o c:\fw\maxws\Build\Vlv2TbltDevicePkgX64\DEBUG_VS2
n -ot c:\fw\maxws\Build\Vlv2TbltDevicePkgX64\DEBUG_VS2015x86\BiosId.txt
PreBuild:
PreBuild:
End of Pre-BUILD
Press Enter key to continue
```

Press Enter to
Continue the build

Note: RC.EXE Resource Compiler See Link:

Errors

Examine Build Parameters

```
build -a IA32 -a X64 -t VS2015x86
      -p Vlv2TbltDevicePkg\PlatformPkgX64.dsc -y Vlv.report -v
```

TARGET	= DEBUG	Build Mode
TARGET_ARCH	= IA32 X64	CPU Architecture
TOOL_CHAIN_TAG	= VS2015x86	VS Tool Chain
ACTIVE_PLATFORM	= Vlv2TbltDevicePkg /PlatformPkgX64	Platform DSC file
Report file created	= Vlv.report	PCDs, Libs, etc.

Platform Build and PCD Parameters

Platform Parameters

Many Platform Parameters are defined in a top .DSC file that controls PCD and build switches

For MinnowBoard Max : `Vlv2TbltDevicePkg/PlatformPkgConfig.dsc`

Example:

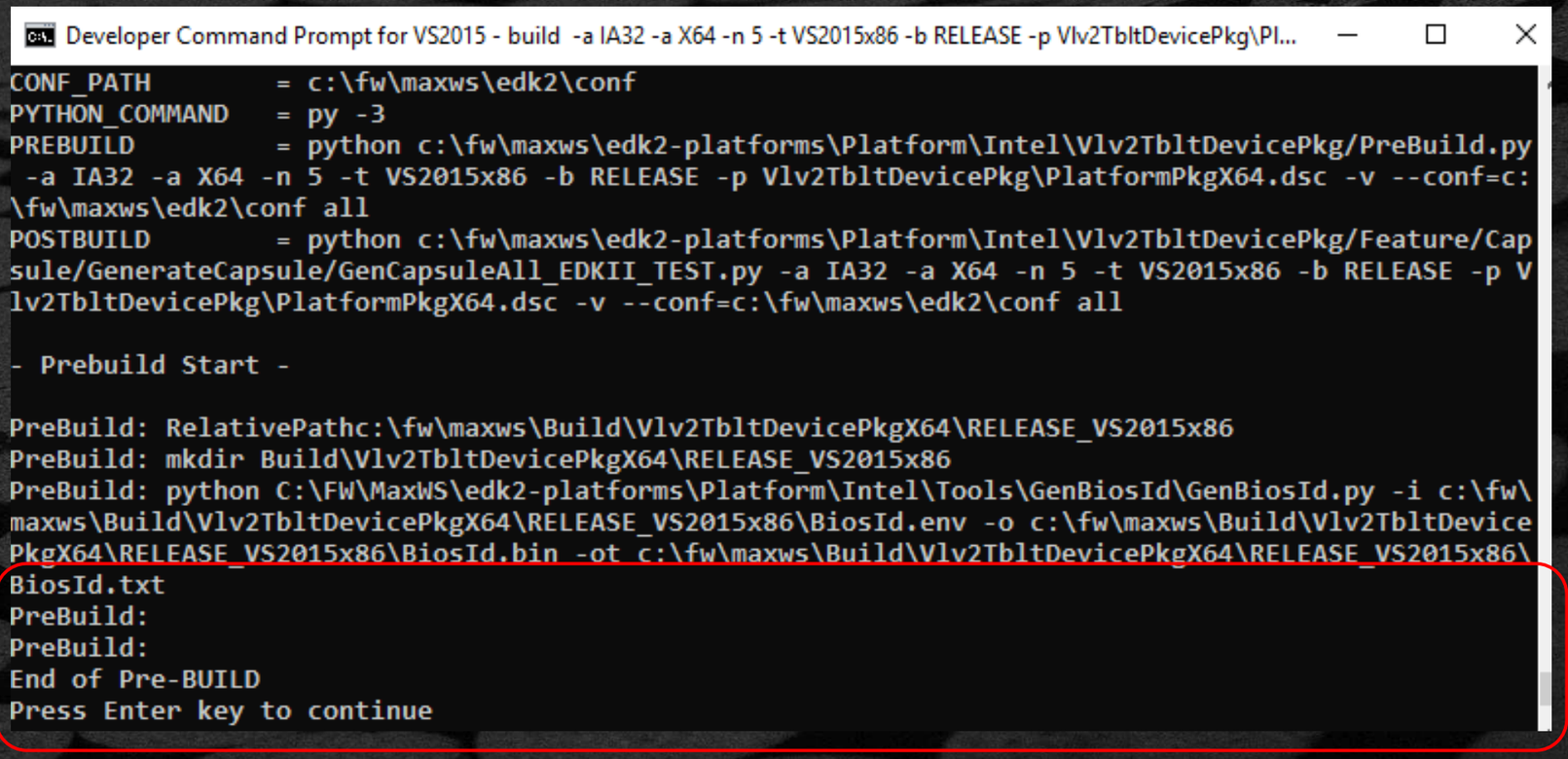
```
#
# TRUE is ENABLE. FALSE is DISABLE.
#
 //  . . .
DEFINE SECURE_BOOT_ENABLE = TRUE
DEFINE USER_IDENTIFICATION_ENABLE = FALSE
DEFINE VARIABLE_INFO_ENABLE = FALSE
DEFINE S3_ENABLE = TRUE
DEFINE CAPSULE_ENABLE = TRUE
DEFINE CAPSULE_RESET_ENABLE = TRUE
 // . . .
```

Build Process for RELEASE Target

4

From the VS Command Prompt …
Note: Use the Your VS TAG below with “-t” option

```
> build -a IA32 -a X64 -t VS2015x86 -b RELEASE -p Vlv2TbltDevicePkg\PlatformPkgX64.dsc -v
```



Press Enter to
Continue the build

DEBUG & RELEASE Differences

Slower boot because the time it takes to display debug info

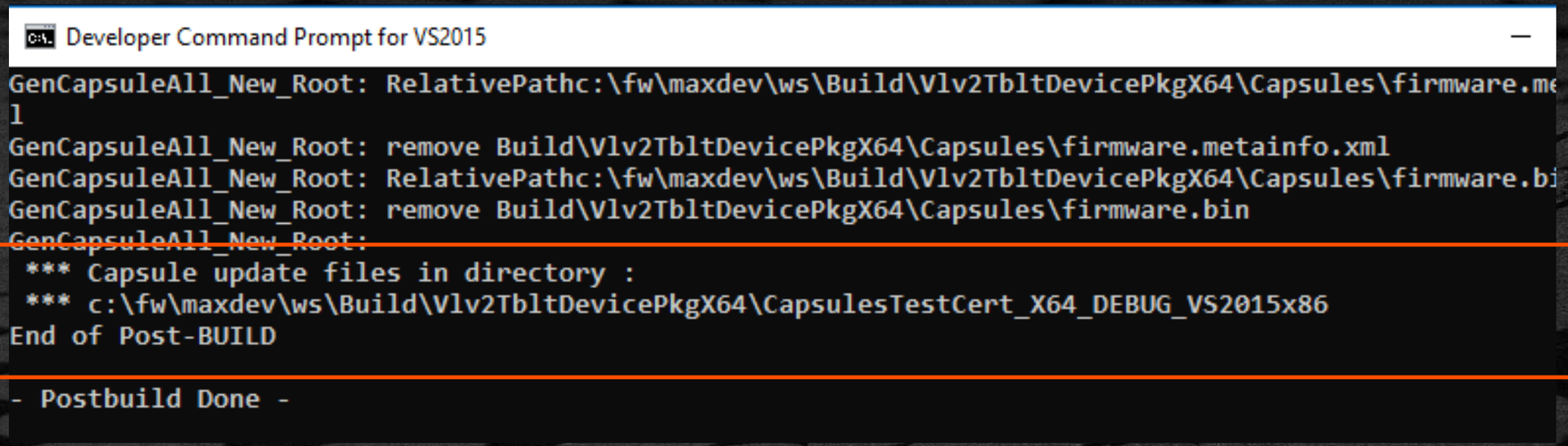
Larger image because of debug code & embedded info

Uses the serial port for debug string output

Contains detailed debug strings that show
the boot process and various ASSERT/TRACE errors

Build Process Completed

5 Locate the build .Cap images



The platform post build process will create capsule images to use with a capsule update process

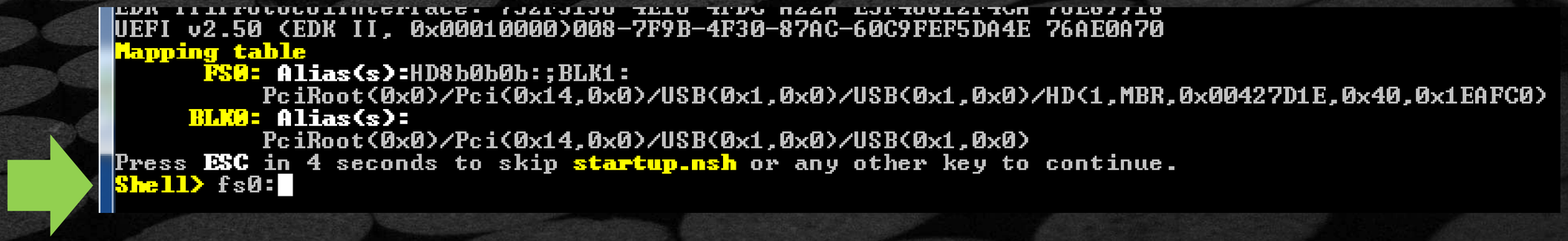
The script displays the location of the final .cap files

tianocore

Flashing the New Firmware

6 Flash the binary image

1. Access Max .CAP files from build folder
   - `. . ./Build/Vlv2TbltDevicePkgX64/Capsules/TestCert_X64_DEBUG_VS2015x86`
   - `*.cap`
   - `RELEASE  . . ./Capsules/TestCert_X64_RELEASE_VS2015x86`
2. Copy .cap files to a USB Thumb drive
3. Copy `CapsuleApp.efi` to a USB thumb drive
4. Boot into the UEFI Shell on Max then type "**`FS0:`**"



tianocore

Flashing the New Firmware

6

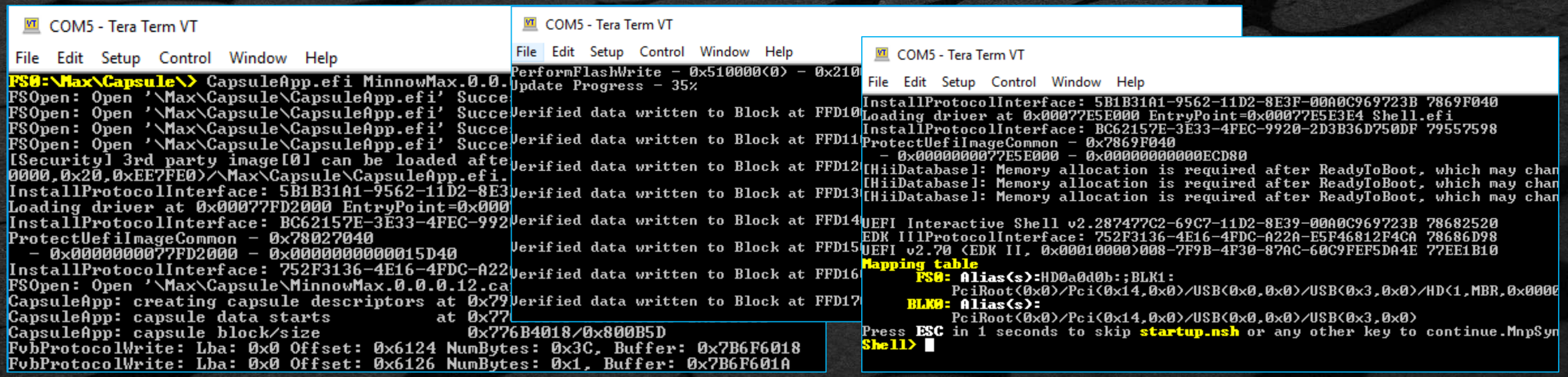
Run CapsuleApp.efi utility with MinnowMax. . . cap file

(Note the "*TAB*" Key will fill out the command line for you)

```
FS0:\> CapsuleApp.efi MinnowMax.0.0.0.12.cap
```

System will start the Capsule update process

There will be 2 reboots



Capsule Update with External Monitor

Logo with a progress bar will display update process progress

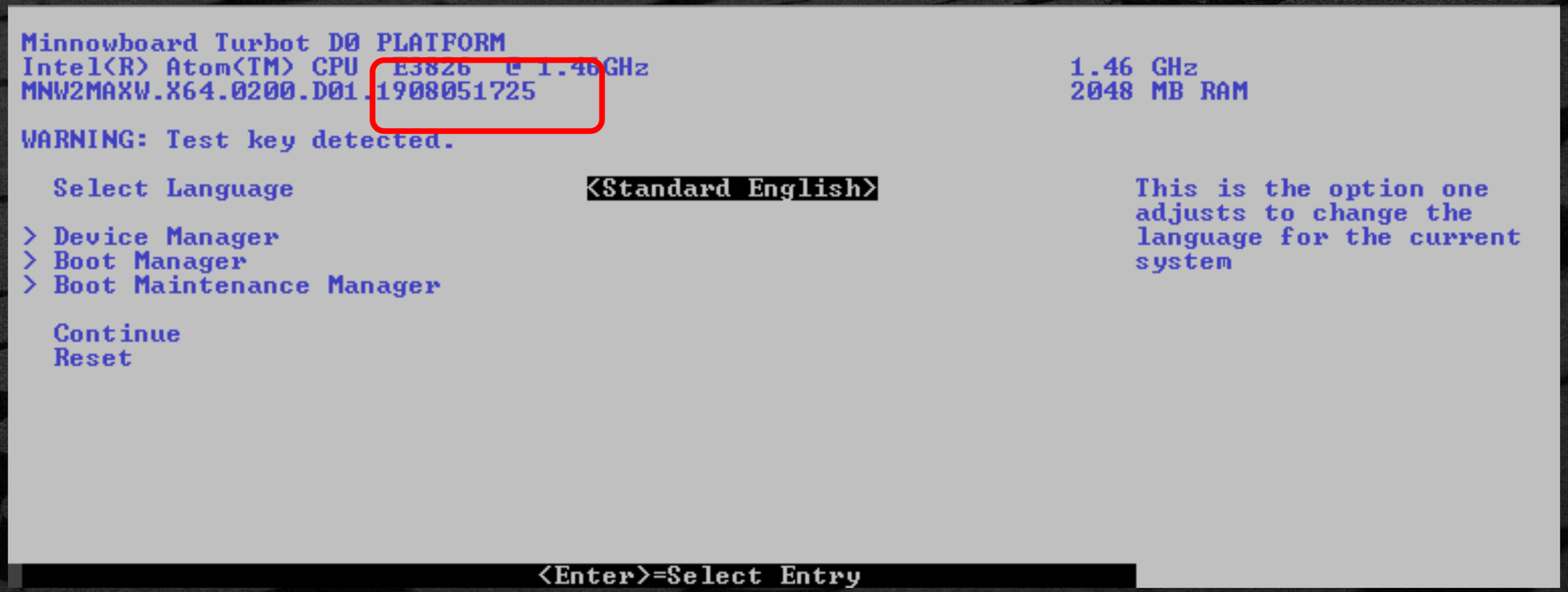
Verify After Firmware Update

7 Reboot and Verify

- Verify that the Firmware was updated by checking the Date
- At the shell prompt type “exit”

```
Shell>
Shell> exit
```

- The EDK II front page will show the BIOS ID with Date/time stamp



tianocore

SUMMARY

- Hardware Setup for MinnowBoard Max/Turbot
- Build a EDK II Platform using MinnowBoard Max/Turbot

tianocore

Questions?

Return to Main Training Page

Return to Training Table of contents for next presentation

Link


tianocore

tianocore

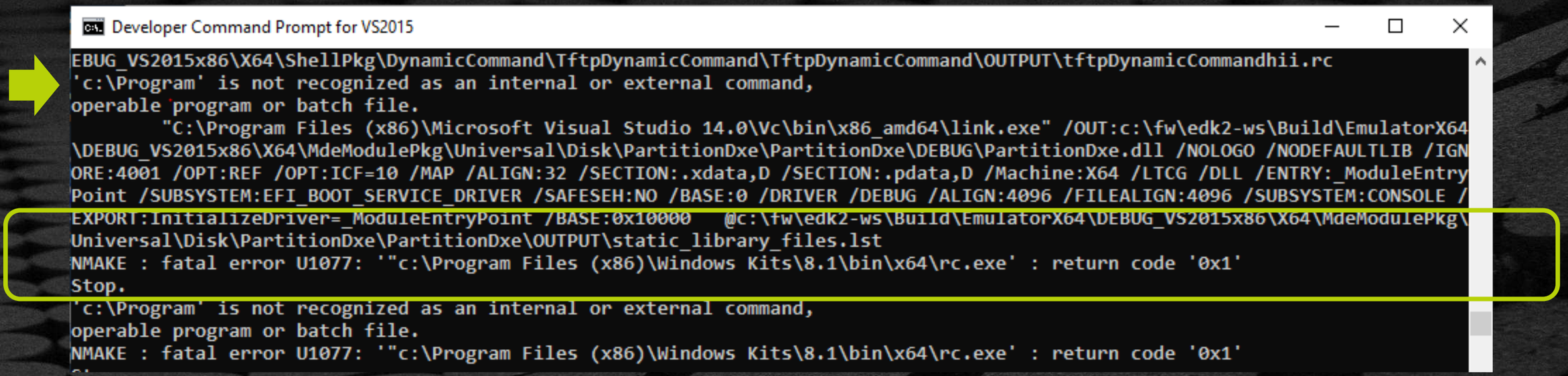
BACKUP

tianocore

BUILD ERRORS

Build Error- RC.exe

Error message:



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

Paths on your machine

```
# 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
```

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