UEFI & EDK II Training

PLATFORM BUILD LAB – MAX -WIN

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PLATFORM BUILD LABS

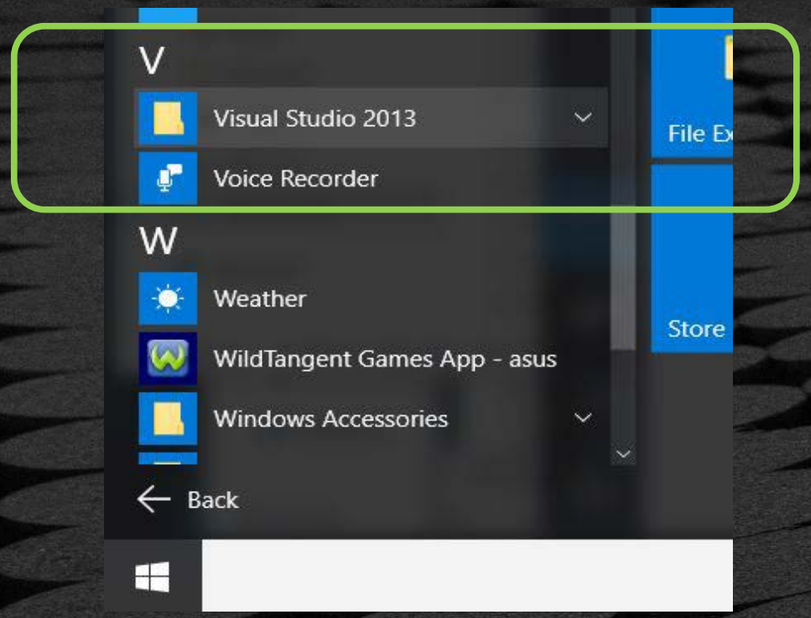
Lab Setup and Build for Minnowboard Max/Turbot

- Pin Visual Studio Command Prompt to Windows Task Bar
- Hardware Setup for Minnowboard Max/Turbot
- Build a EDK II Platform using Minnowboard Max/Turbot

PIN VS COMMAND PROMPT

Pin the Visual Studio Command prompt to Windows Task Bar

PIN VS COMMAND PROMPT

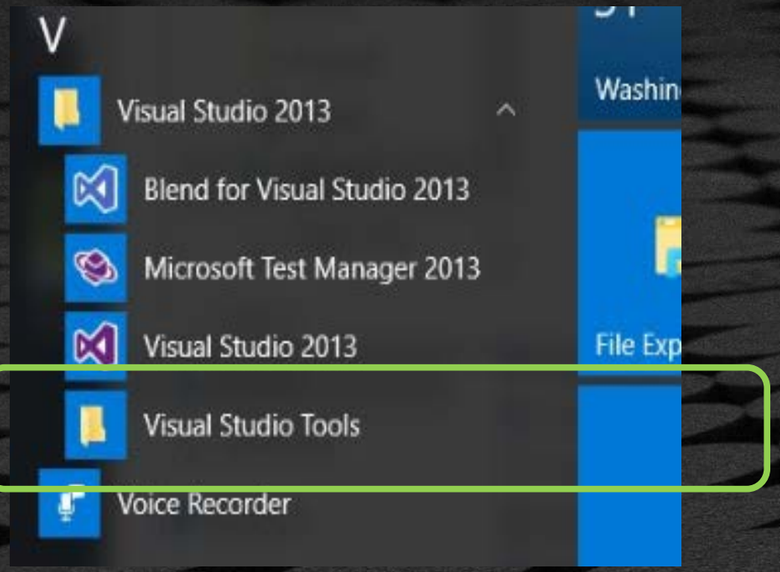


Windows 10

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 201*n***"
3. Left Click "**Visual Studio 201*n***"

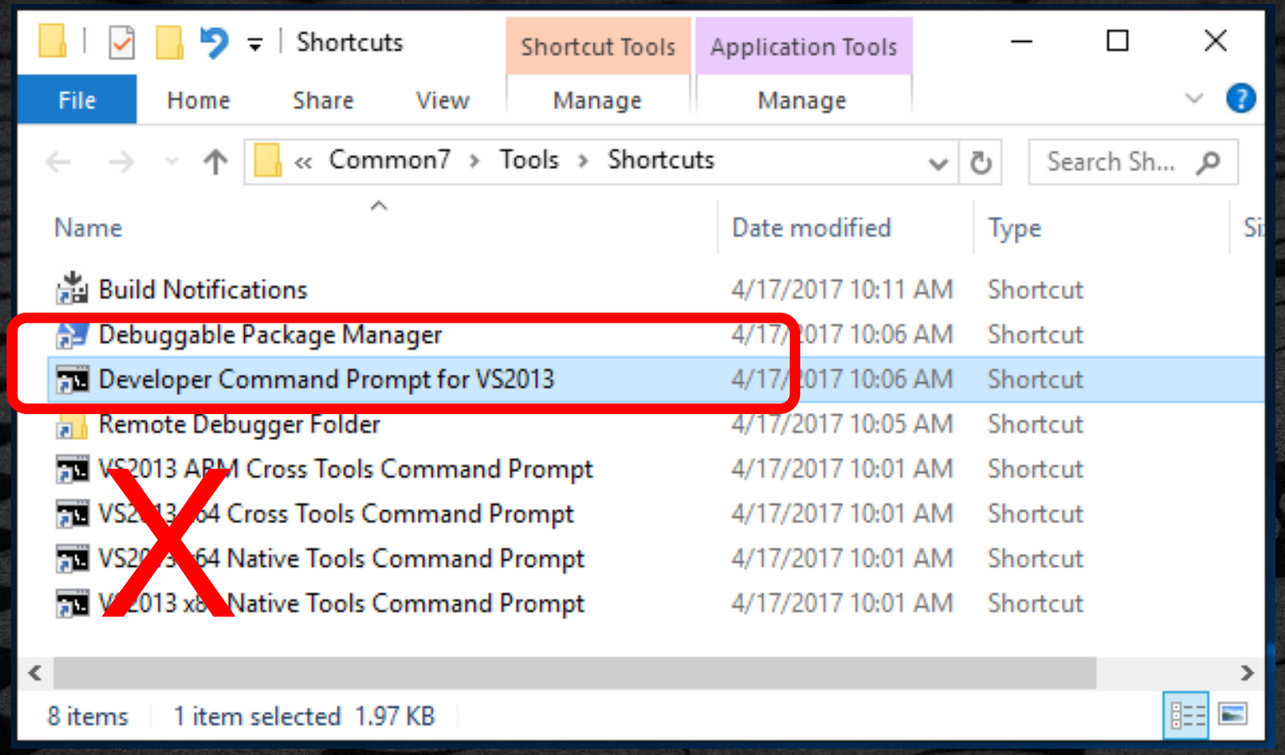
PIN VS COMMAND PROMPT



4. Left Click “**Visual Studio Tools**”

This will open another Windows file explorer window

PIN VS COMMAND PROMPT

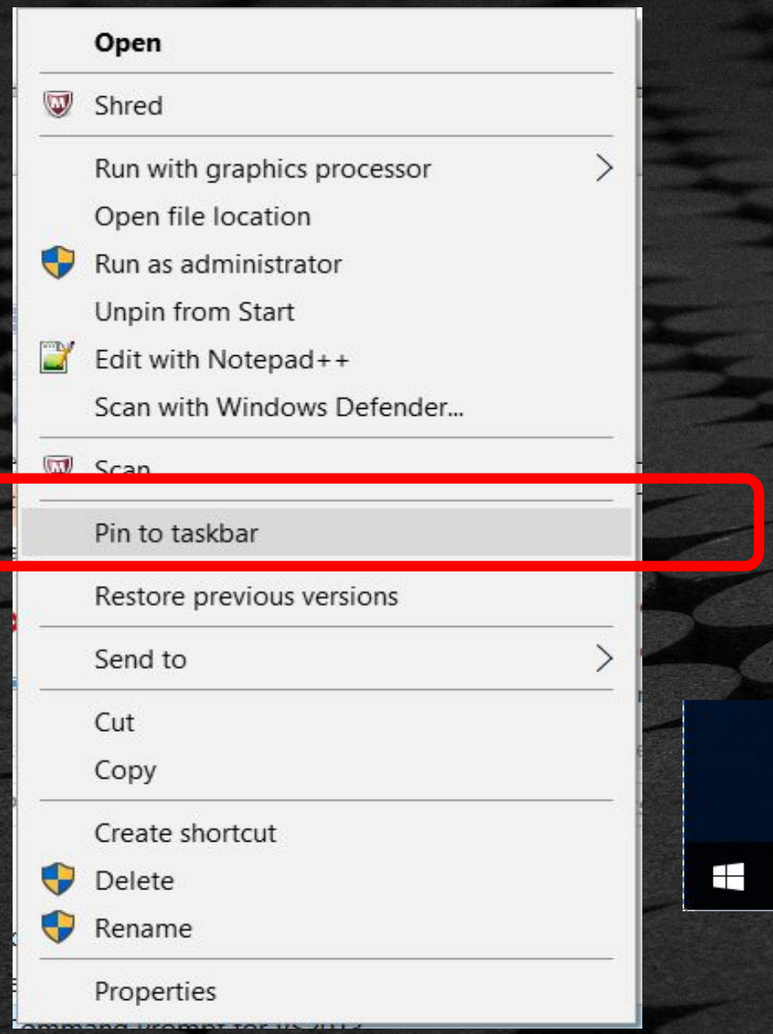


5. Select "**Developer Command Prompt for VS201n**"

6. Right Click to open Windows dialog box

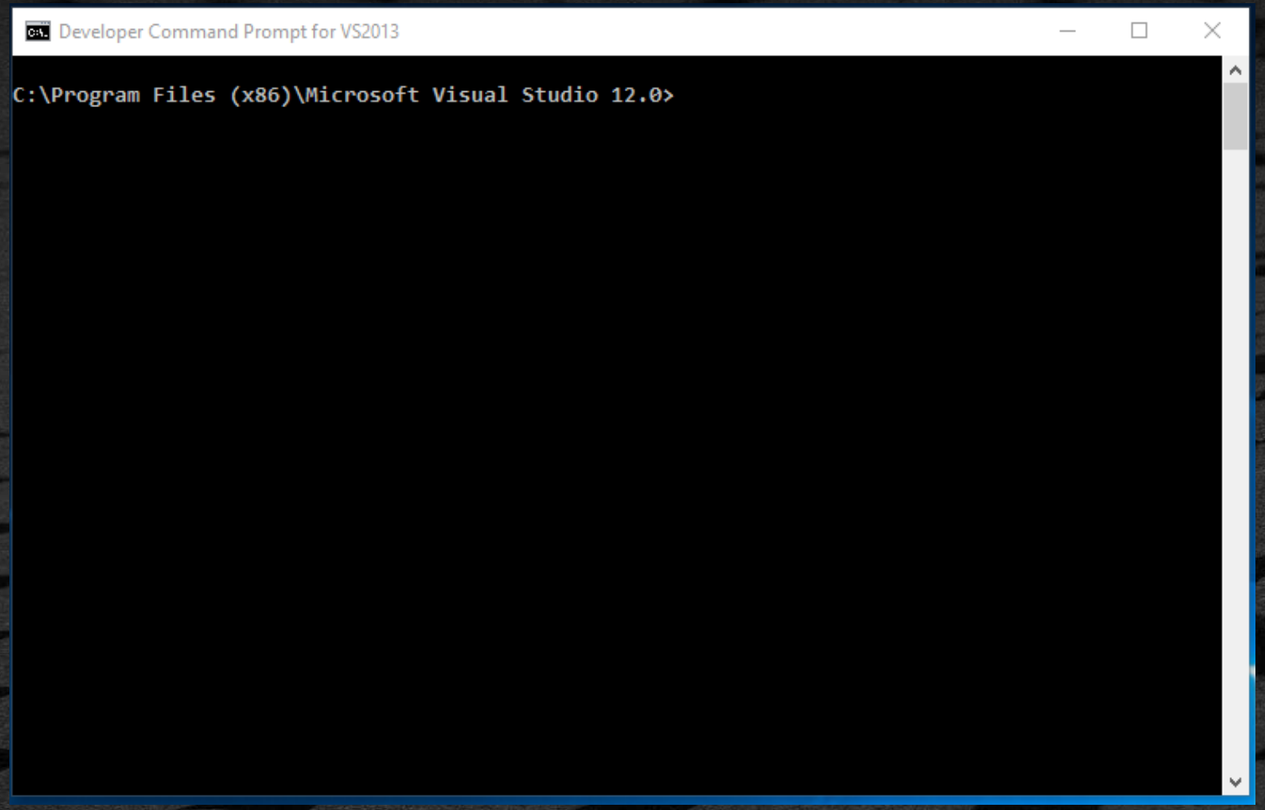
Do not use any of the other ".. Command Prompts"

PIN VS COMMAND PROMPT



7. Left Click on “Pin to Taskbar”

PIN VS COMMAND PROMPT



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

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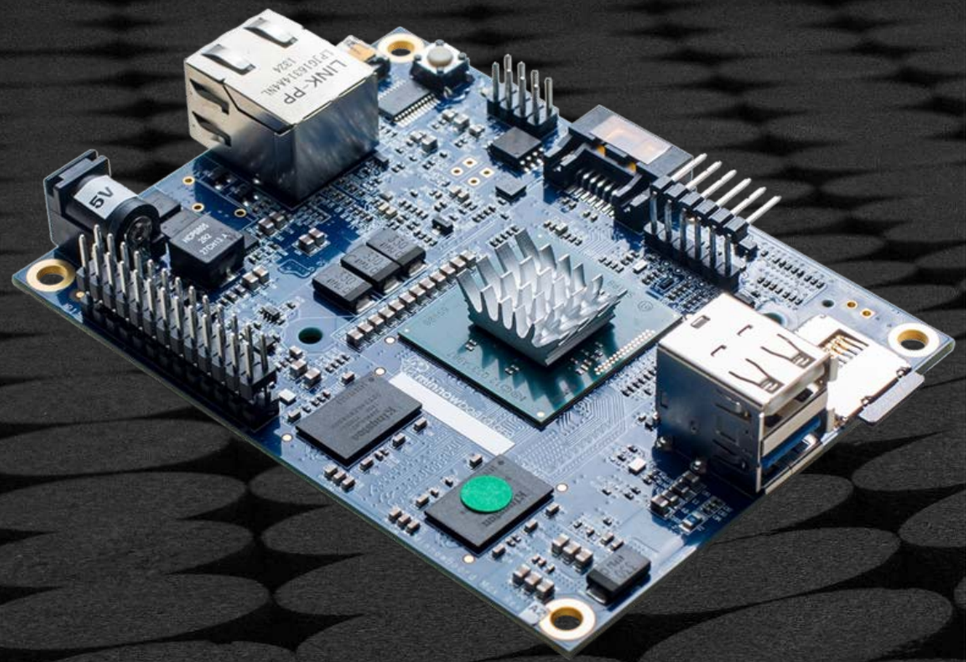
PLATFORM HW SETUP

Setup hardware for the MinnowBoard Max/Turbot

EDK II PLATFORM (MINNOWBOARD MAX/TURBOT)

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

MINNOWBOARD MAX WORKSHOP LAB HARDWARE



FTDI USB Cable

5V** Power Supply

USB thumb drive

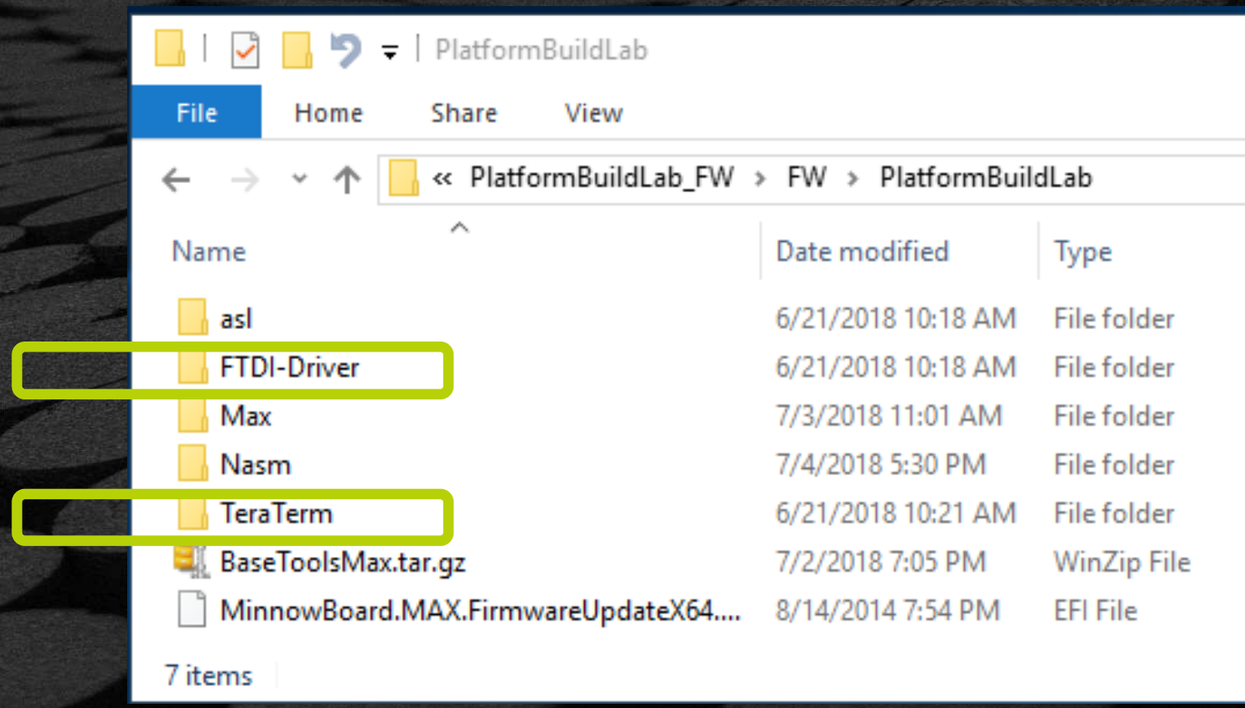
**Warning do not use any other power supply than 5V or the board will Fry

INSTRUCTIONS FOR LAB MATERIALS

Directory C:\PlatformBuildLab_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/

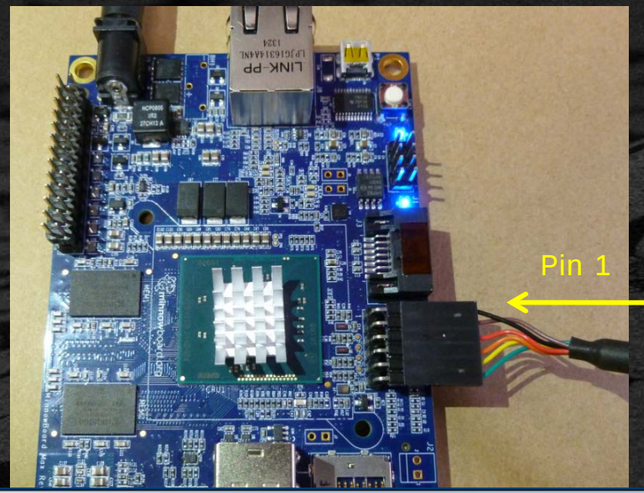


SETUP MINNOWBOARD MAX TEST SYSTEM

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)

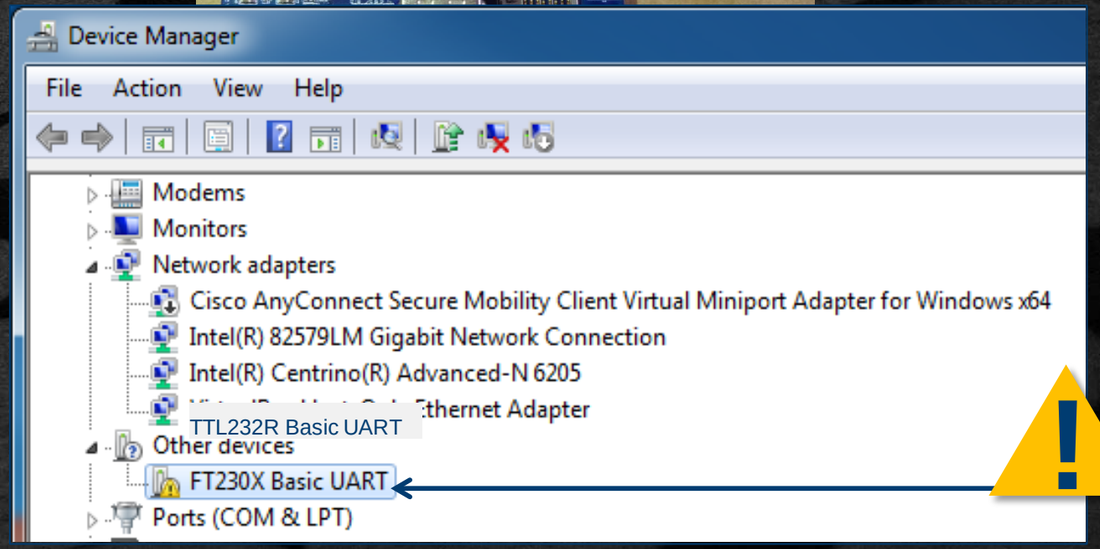


Connect the USB Type A connector to Host (Laptop)

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”.

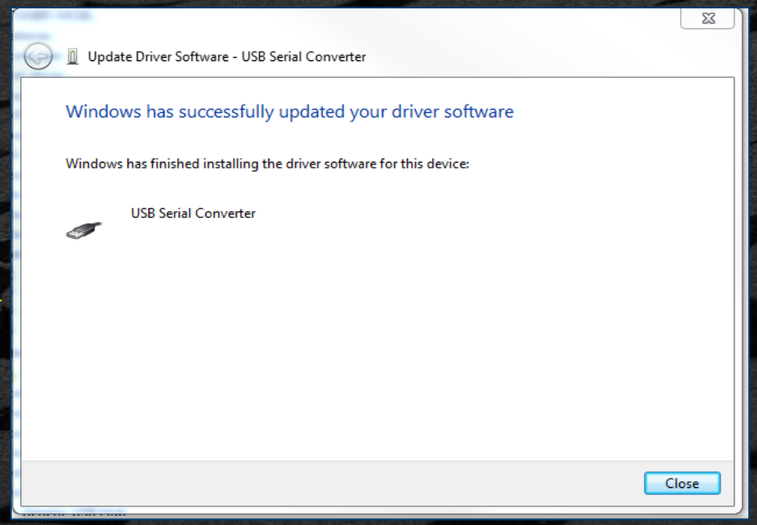
Click the **Browse** button. – Click on “Include subfolders”

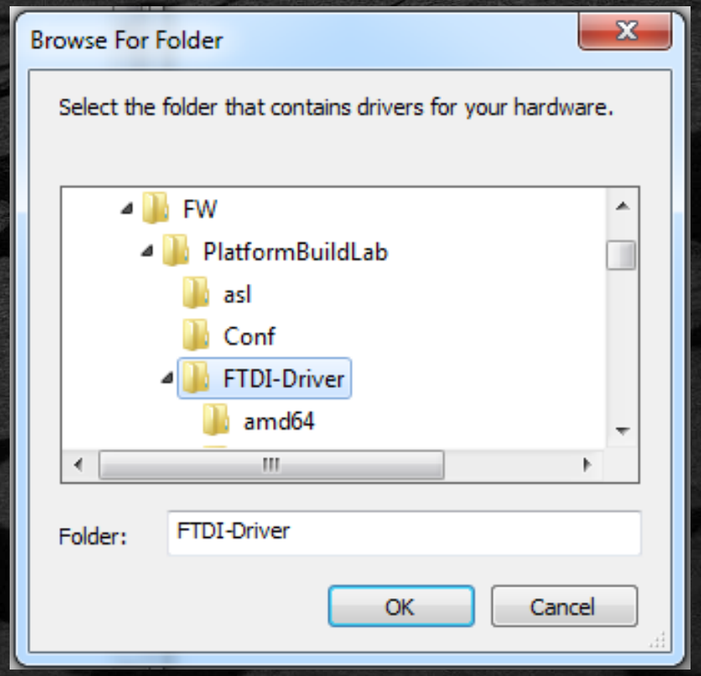
Browse to the location of the folder you unzipped earlier for the FIDI driver.

Click on the folder and press **OK**.

Press **Next**.

Driver will be installed



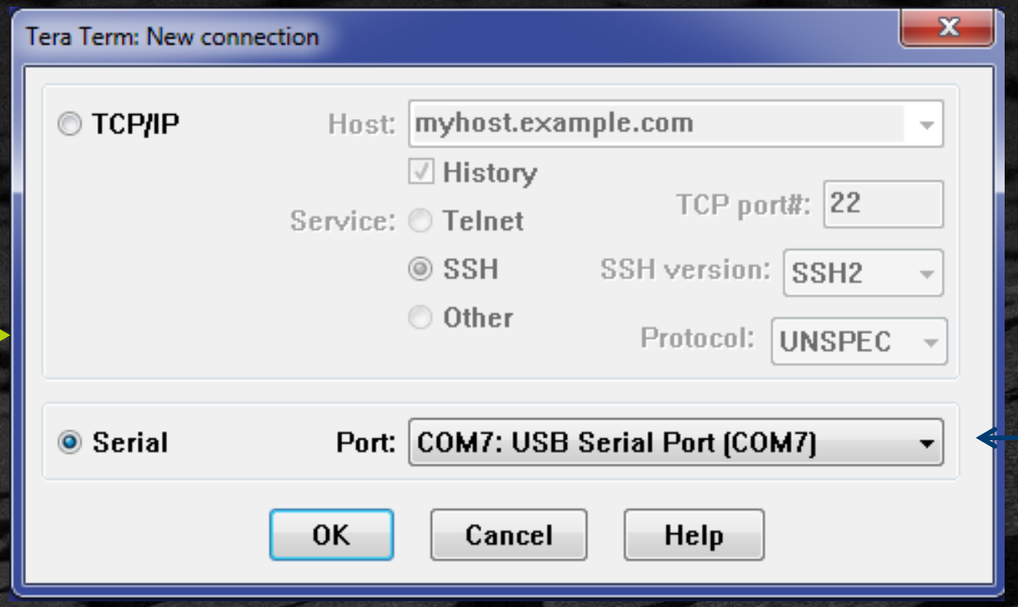


SETUP TERATERM

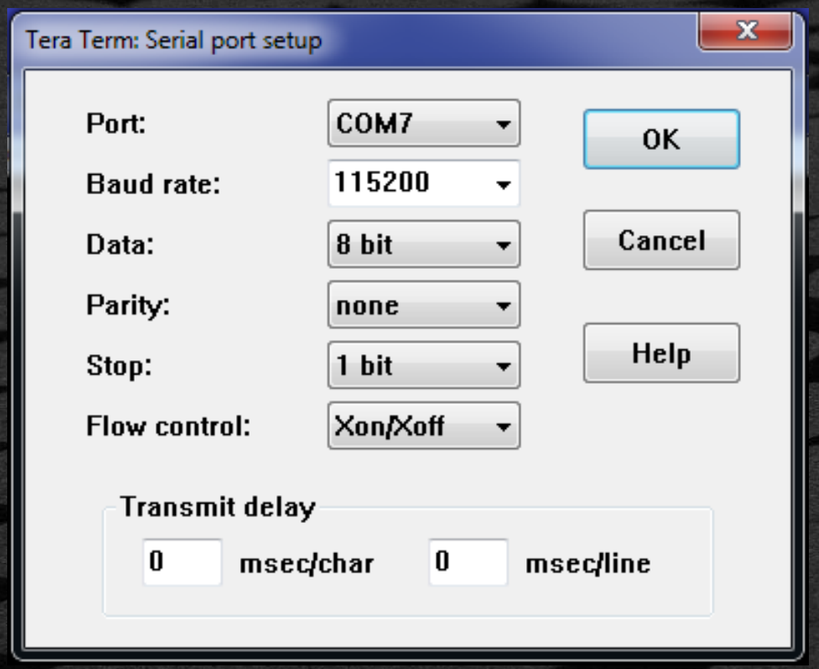
Unzip and Install TeraTerm

Open TeraTerm Software

Select the serial port assigned



Choose the correct COM Port number



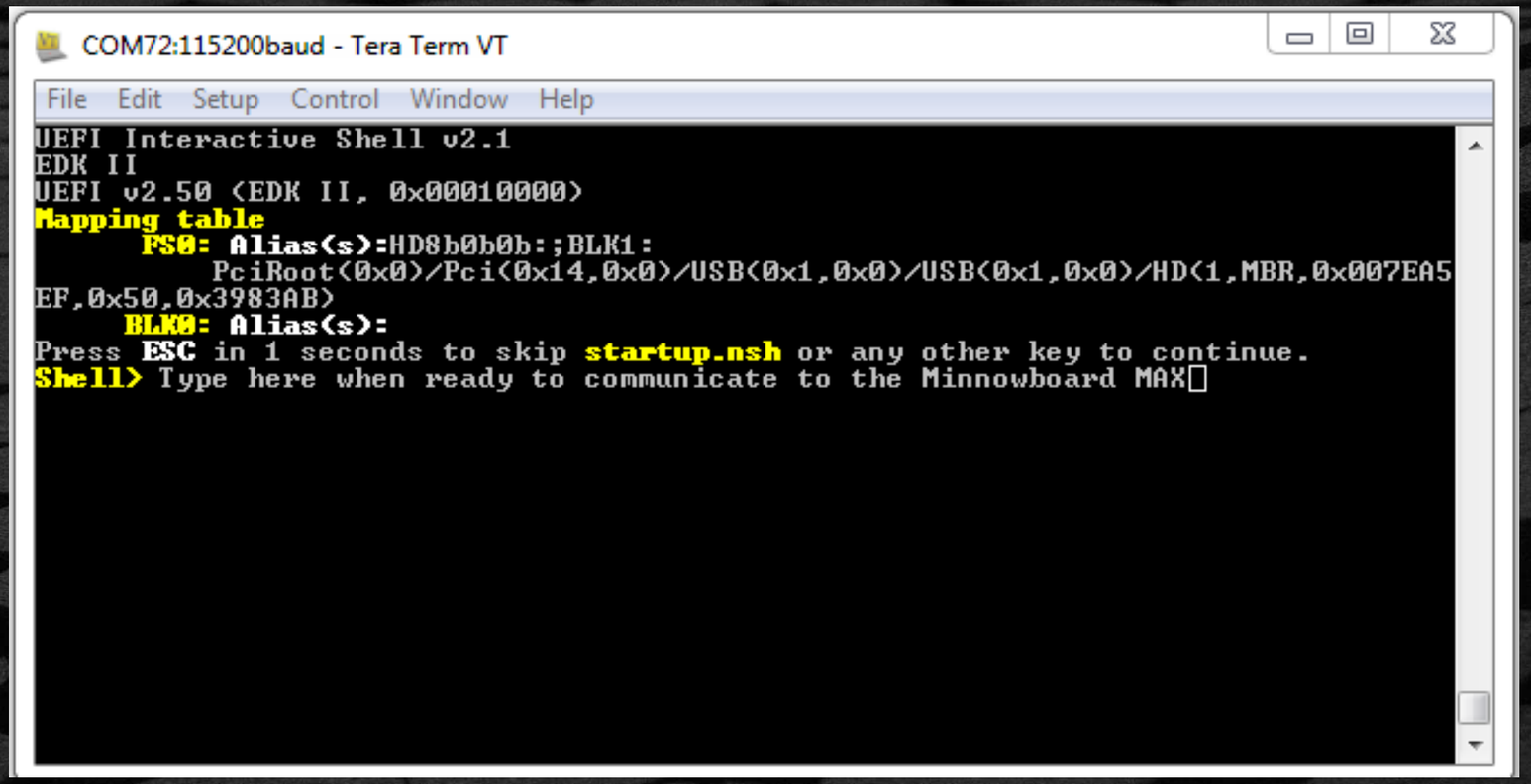
Go to **Setup->Serial Port** and set the following:

- 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.



END OF LAB

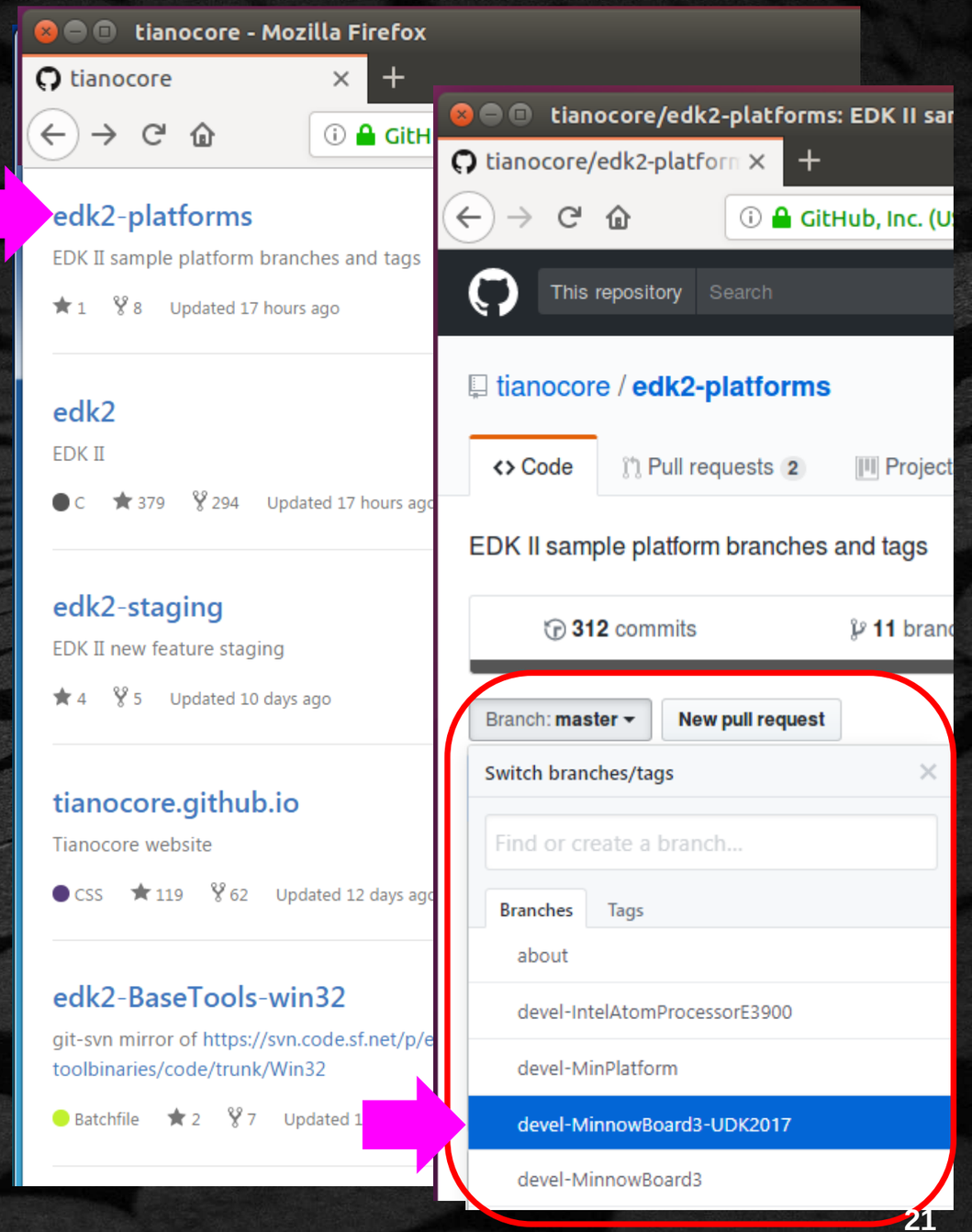
BUILD MINNOWBOARD TURBOT

EDK II PLATFORM (MINNOWBOARD MAX/TURBOT)

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

Where to get Open Source MinnowBoard Max

- Open Source Max Wiki
  - V.98 -Github Link
- Binary Object Modules firmware.intel.com
- How to Build: Release Notes



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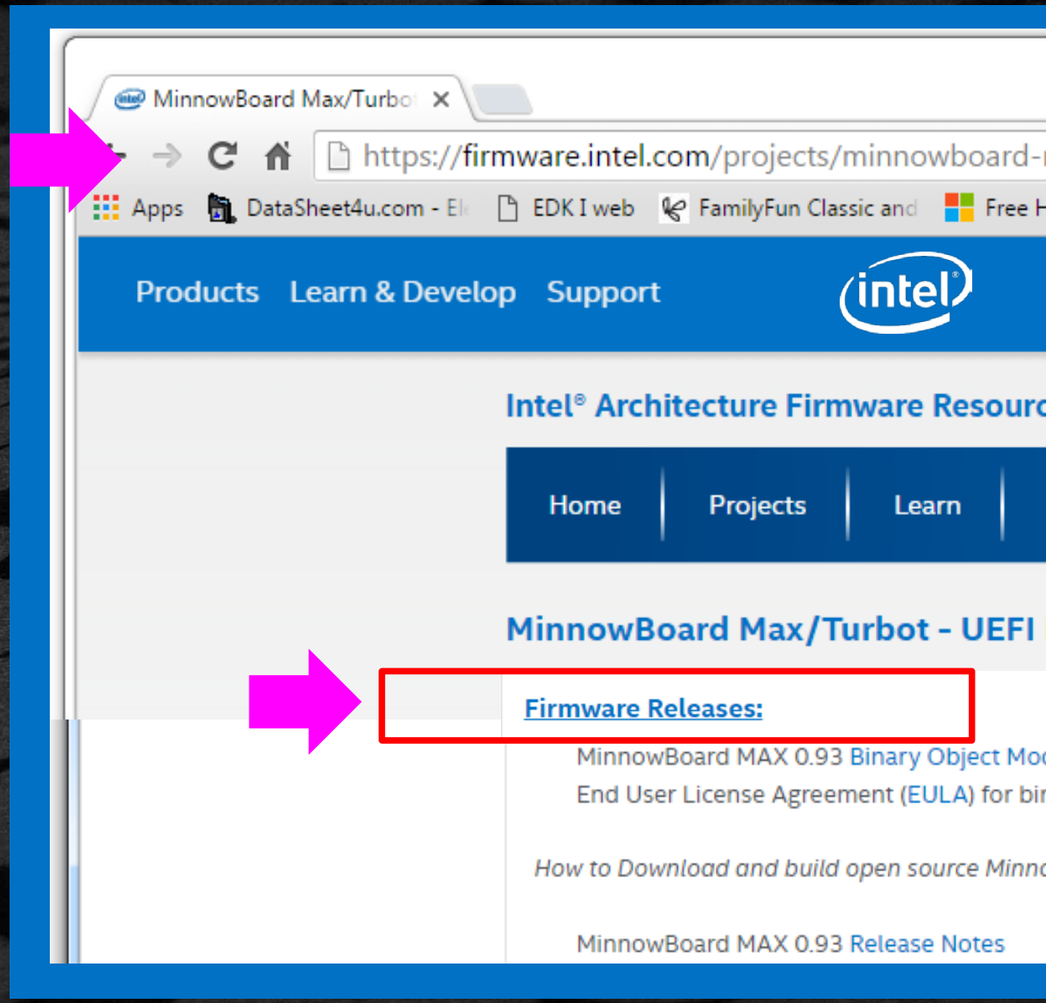


DOWN LOAD MAX LAB SOURCE

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

OR

Use **`git clone`** to download the PlatformBuildLab_FW

```
C:/> git clone https://github.com/Laurie0131/PlatformBuildLab_FW.git
```

Directory Lab_Material_FW will be created

```
/FW
 /PlatformBuildLab
        - asl                              - Asl Compiler
        - FTDI-Driver                      - Serial / USB cable
        - Max                              - Minnowboard Max Source for the Labs
        - MinnowBoard.MAX.FirmwareUpdateX64.efi  - UEFI App to flash
        - TeraTerm                         - Terminal app
```

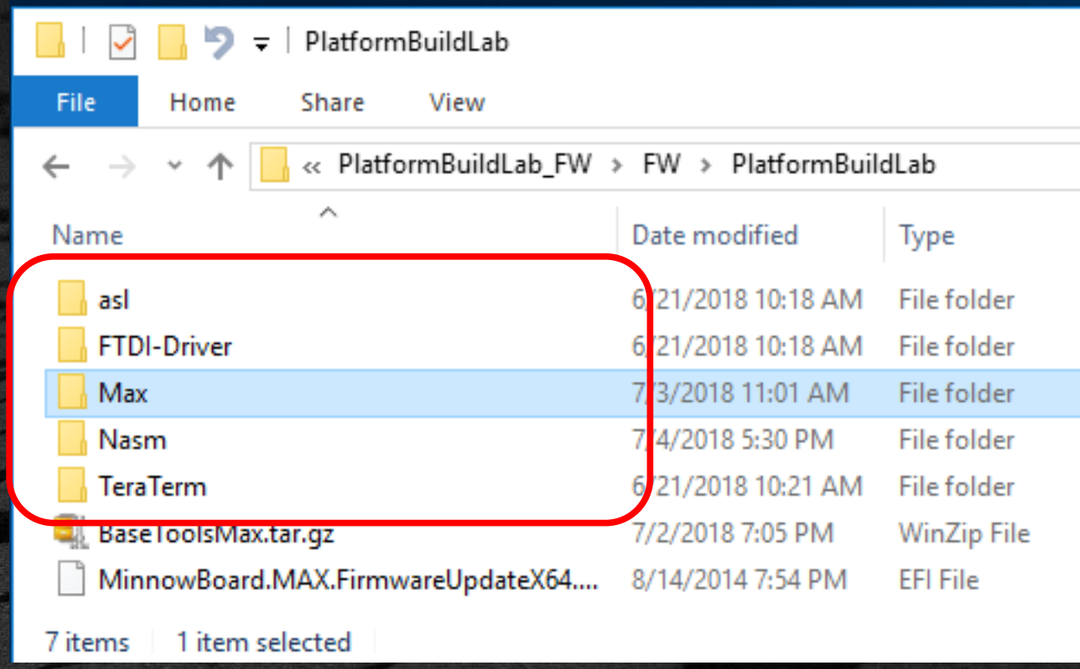
MINNOWBOARD MAX LAB SETUP

Previous Lab Setup Requirements

NASM

Copy …Lab_Material_FW\FW\Nasm to **C:**

Additional Lab Setup – PlatformLab_FW/FW/PlatformBuildLab



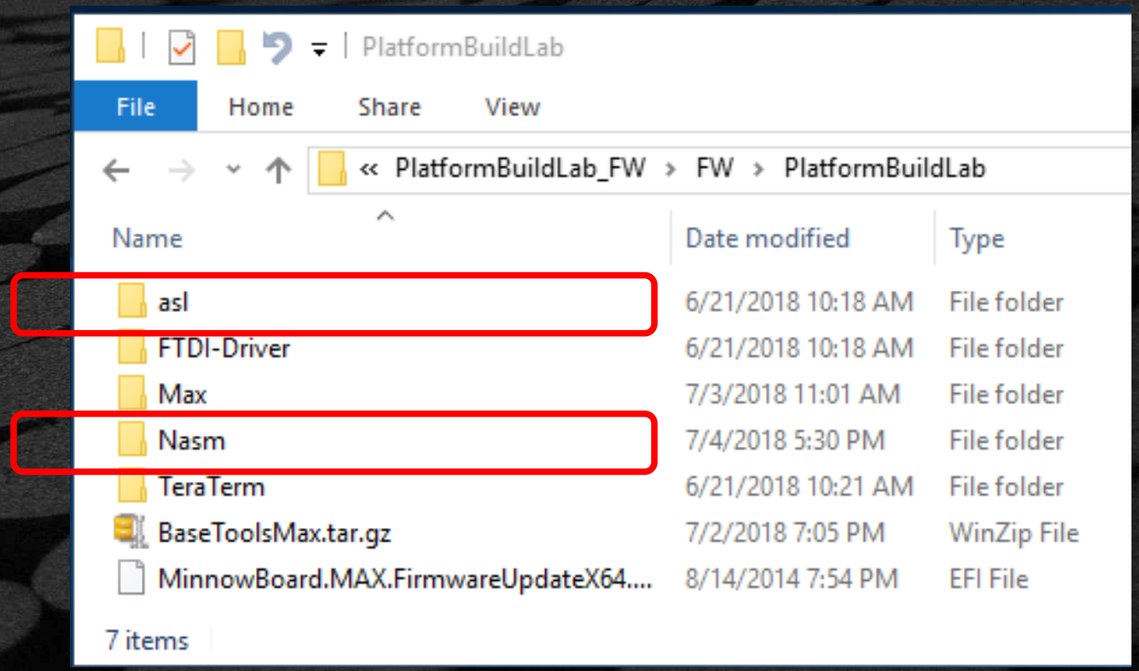
Directories

- Max – MinnowBoard Max Project source code
- asl – Iasl Assembler C:/asl directory
- FTDI-Driver – Driver for Seria/USB Uart cable
- Nasm – Nasm Assembly compiler- Same as previous lab
- TeraTerm – TeraTerm application

PREPARING TO BUILD

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

1. Copy \Nasm Folder to C:\
2. Copy \asl Folder to C:\



COPY MINNOWBOARD MAX SOURCE

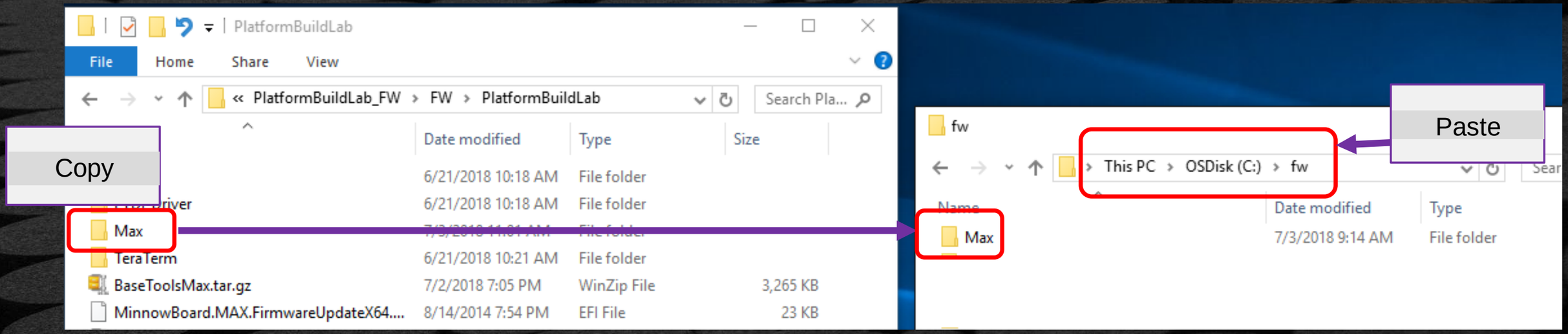
3

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/Max” to C:/FW/Max



PLATFORM SOURCE DIRECTORY STRUCTURE

```
./Max
    /edk2
        /(UDK2017 Directories)

    /edk2-platforms
        /Vlv2DeviceRefCodePkg
        /Vlv2TbltDevicePkg
    /silicon
        /IA32FamilyCpuPkg
        /Vlv2BinaryPkg
        /Vlv2MiscBinariesPkg
```

Invoke the Build script from here

STEPS TO BUILD & INSTALL FIRMWARE

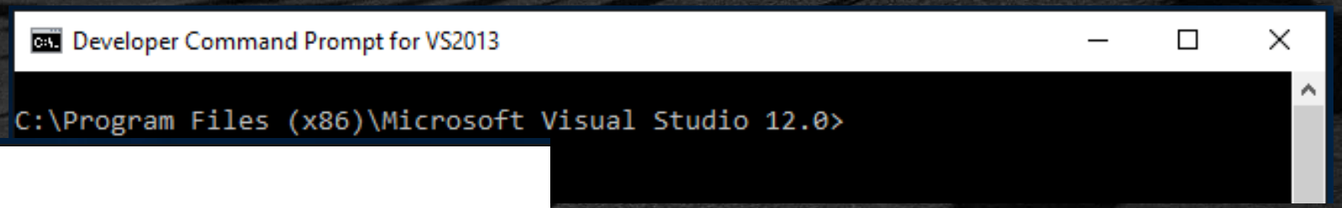
1. Open VS command prompt
2. Cd to project directory : C:/FW/Max/edk2-platforms/Vlv2TbltDevicePkg
3. Invoke the build process script: **`Build_IFWI`**
4. Locate build output (.BIN file for BIOS image)
5. Flash binary image onto the platform
6. Reset and boot new firmware to UEFI Shell

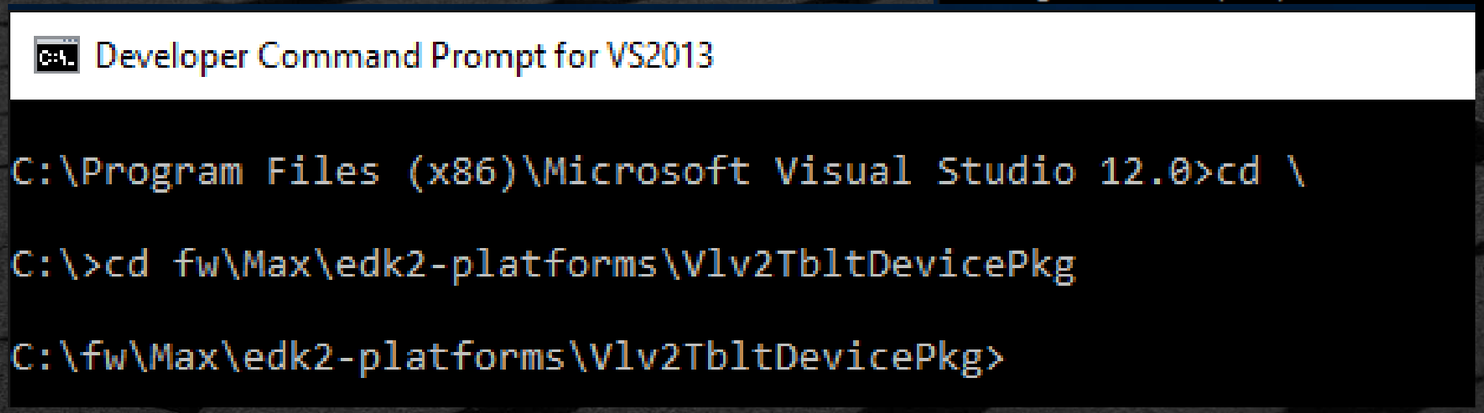
Next slide will follow the above steps

OPEN A VS COMMAND PROMPT

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

Open a Visual Studio Command Prompt

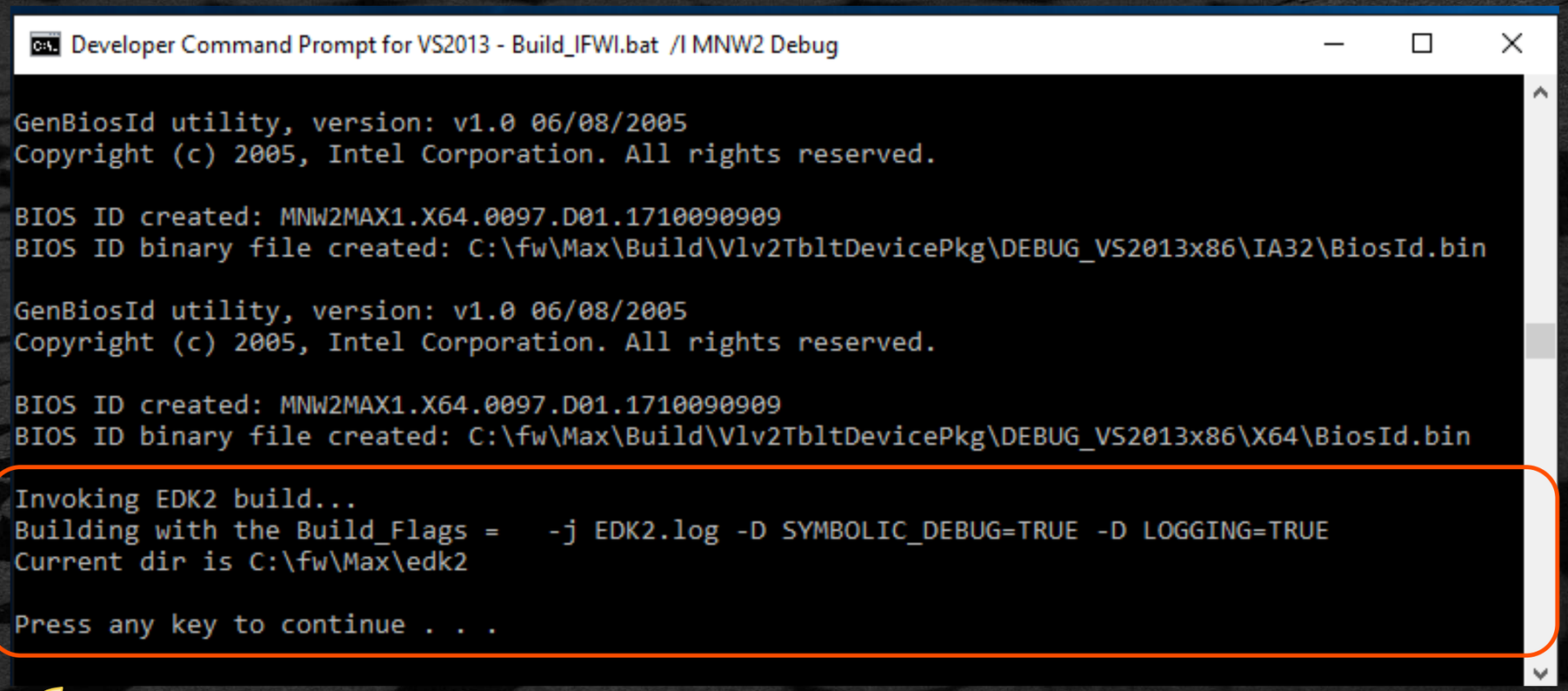




BUILD PROCESS FOR DEBUG BIOS

From the VS Command Prompt … ENTER:

```
cd C:\FW\Max\edk2-Platforms\Vlv2TbltDevicePkg
Build_IFWI.bat /l MNW2 Debug
```



Press Enter to Continue the build

Errors

Note: VS2017 Not supported with MinnowBoard Max See Link:
Note: RC.EXE Resource Compiler See Link:

EXAMINE BUILD PARAMETERS

```
build
```

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
         . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

TARGET = DEBUG

Build mode

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

TARGET = DEBUG
TARGET_ARCH = IA32 X64

Build mode
CPU architecture

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

```
TARGET                = DEBUG
TARGET_ARCH           = IA32   X64
TOOL_CHAIN_TAG        = VS2013x86
```

Build mode

CPU architecture

Tool Chain VS 2013

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

```
TARGET                = DEBUG
TARGET_ARCH           = IA32   X64
TOOL_CHAIN_TAG        = VS2013x86
ACTIVE_PLATFORM       =
      Vlv2TbltDevicePkg/PlatformPkgX64.dsc
```

Build mode
CPU architecture
Tool Chain VS 2013
Platform (.DSC file)

EXAMINE BUILD PARAMETERS

```
build  -D SYMBOLIC_DEBUG=TRUE -D LOGGING=TRUE
          . . .   -D Option (n)
```

MACROS

Logging

Symbolic Debug

Properties from conf\Target.txt

```
TARGET                = DEBUG
TARGET_ARCH           = IA32   X64
TOOL_CHAIN_TAG        = VS2013x86
ACTIVE_PLATFORM       =
      Vlv2TbltDevicePkg/PlatformPkgX64.dsc

MAX_CONCURRENT_THREAD_NUMBER = 1
```

Build mode
CPU architecture
Tool Chain VS 2013
Platform (.DSC file)
Thread Count

BUILD PROCESS FOR RELEASE BIOS

From the VS Command Prompt …

Enter:

`Build_IFWI.bat /l MNW2 Release`

```
Developer Command Prompt for VS2013 - Build_IFWI.bat  /l MNW2 Release
TOOL_CHAIN_TAG   = VS2013x86
BUILD_RULE_CONF  = Conf/build_rule.txt
ACTIVE_PLATFORM  = C:\fw\Max\edk2-platforms\Vlv2TbltDevicePkg/PlatformPkgX64.dsc
MAX_CONCURRENT_THREAD_NUMBER = 1

Creating BiosId...

GenBiosId utility, version: v1.0 06/08/2005
Copyright (c) 2005, Intel Corporation. All rights reserved.

BIOS ID created: MNW2MAX1.X64.0097.R01.1710090917
BIOS ID binary file created: C:\fw\Max\Build\Vlv2TbltDevicePkg\RELEASE_VS2013x86\IA32\BiosId.bin

GenBiosId utility, version: v1.0 06/08/2005
Copyright (c) 2005, Intel Corporation. All rights reserved.

BIOS ID created: MNW2MAX1.X64.0097.R01.1710090917
BIOS ID binary file created: C:\fw\Max\Build\Vlv2TbltDevicePkg\RELEASE_VS2013x86\X64\BiosId.bin

Invoking EDK2 build...
Building with the Build_Flags =   -j EDK2.log -D SYMBOLIC_DEBUG=FALSE -D LOGGING=FALSE
Current dir is C:\fw\Max\edk2

Press any key to continue . . .
```

Press Enter to Continue the build

NOTE: MACROS

Logging

Symbolic Debug

Set to False

DEBUG & RELEASE DIFFERENCES

DEBUG has a slower boot than RELEASE
because of time it takes to display debug info

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DEBUG & RELEASE DIFFERENCES

DEBUG has a slower boot than RELEASE
because of time it takes to display debug info

DEBUG has a larger image than RELEASE
because the embedded debug info

DEBUG uses the serial port for debug string output

DEBUG contains the debug strings

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

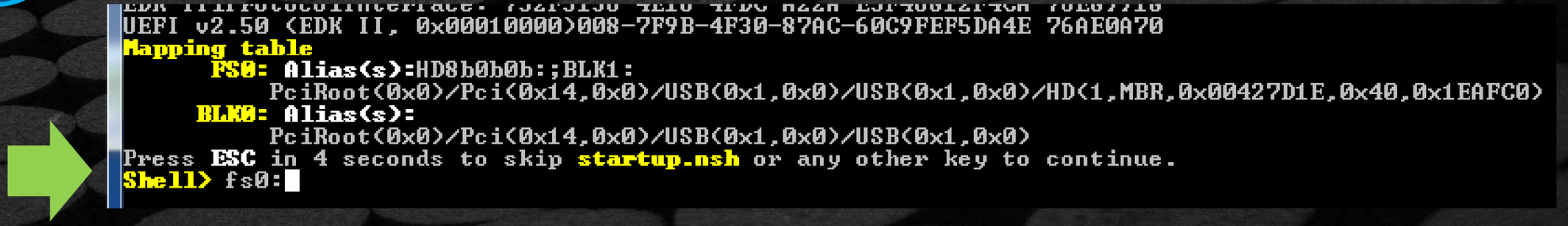
BUILD PROCESS COMPLETED

```
.

Build_IFWI is finished.
The final IFWI file is located in C:\fw\Max\edk2-platforms\Vlv2TbltDevicePkg\Stitch\
================================================================================

C:\fw\Max\edk2-platforms\Vlv2TbltDevicePkg>
```

The EDK II build generates multiple firmware volumes, which are combined in the .BIN image.

FLASING THE NEW BIOS

1. Access Max Binary image file from build folder
   - **C:/FW/Max/Vlv2TbltDevicePkg/Stitch**
   - **DEBUG MNW2MAX1.X64.D01.0098._*date*_.bin**
   - **RELEASE MNW2MAX1.X64.R01.0098._*date*_.bin**
2. Copy BIN files to a USB Thumb drive
3. Copy **MinnowBoard.MAX.FirmwareUpdateX64.efi** to a USB thumb drive from /FW/PlatformBuildLab
4. Boot into the UEFI Shell on MAX then type **“FS0:”**



FLASING THE NEW BIOS

5 Run update .efi utility with either BIN file
(Note the "*TAB*" Key will fill out the command line for you)

```
FS0:\> MinnowBoard.MAX.FirmwareUpdateX64.efi MNW2MAX1.X64.0098.D01.1801181447.bin
```

WAIT for the new firmware update to finish

```
FS0:\> MinnowBoard.MAX.FirmwareUpdateX64.efi MNW2MAX1.X64.0094.D01.1701181447.bi
InstallProtocolInterface: 5B1B31A1-9562-11D2-8E3F-00A0C969723B 76EAA8C0
Loading driver at 0x00076B7A000 EntryPoint=0x00076B7B650
InstallProtocolInterface: BC62157E-3E33-4FEC-9920-2D3B36D750DF 76EAAC98
InstallProtocolInterface: 752F3136-4E16-4FDC-A22A-E5F46812F4CA 787EA7A8
Intel(R) UDK2014 Firmware Update Utility for the Intel(R) Server Board S1200V3RP
S
Version 0.97
Copyright(c) Intel Corporation 2006 - 2014

Reading file MNW2MAX1.X64.0094.D01.1701181447.bin

Updating Firmware.  This may take a few minutes.
.............
Update successful
Shutdown system in 1 seconds ...IntelPchResetSystem() Start
_
```

6 Reset and boot new firmware

VERIFY AFTER FIRMWARE UPDATE

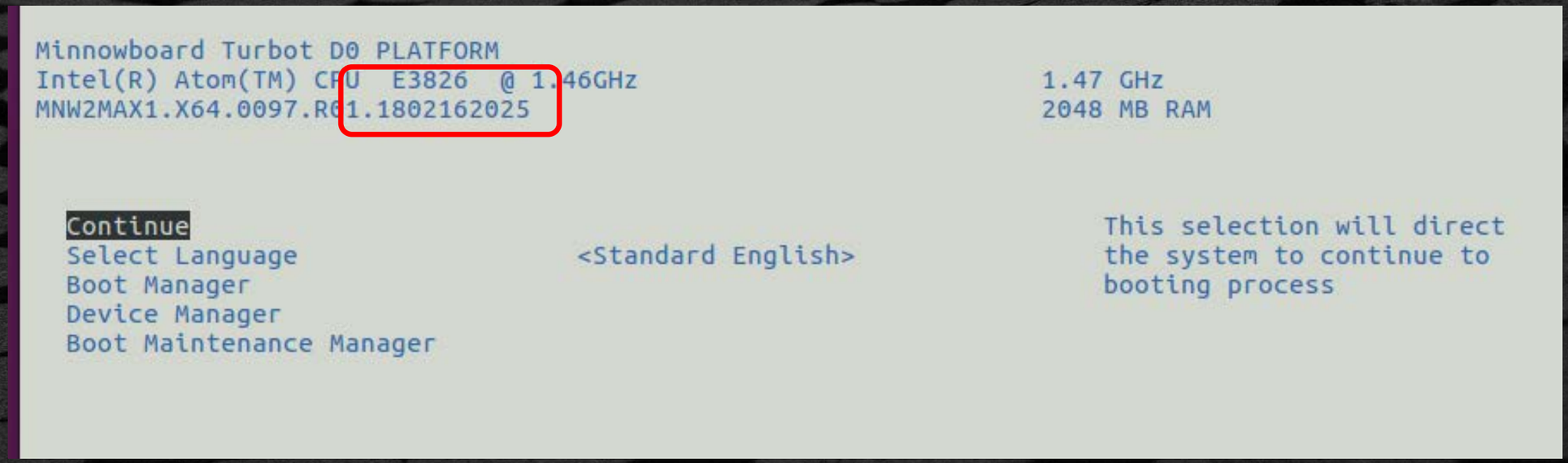
7

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



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SUMMARY

Lab Setup and Build for Minnowboard Max/Turbot

- Pin Visual Studio Command Prompt to Windows Task Bar
- Hardware Setup for Minnowboard Max/Turbot
- Build a EDK II Platform using Minnowboard Max/Turbot

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Questions?


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BACKUP

BUILD ERRORS

Build Error- RC.exe

Error message:

```
      "c:\Program Files (x86)\Windows Kits\8.0\bin\x64\rc.exe"
/Foc:\edkii.svn\Build\NT32IA32\DEBUG_VS2013x86\IA32\MdeModulePkg\Application\HelloWorld\HelloWorld\OUTPUT
\HelloWorldhii.lib
c:\edkii.svn\Build\NT32IA32\DEBUG_VS2013x86\IA32\MdeModulePkg\Application\HelloWorld\HelloWorld\OUTPUT\He
lloWorldhii.rc
'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\8.0\bin\x64\rc.exe' : return code '0x1'
Stop.
```

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

Example (VS 2013): 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 or 2015)

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
```

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

SUPPORT FOR VS 2015 FOR MINNOWBOARD MAX

The Open Source Max release does not support VS 2015

To work around do the following:

Copy the file

“..Max/edk2/conf/tools_def_VS2015x86.txt” to “..Max/edk2/conf/tools_def.txt”

Check out the differences:

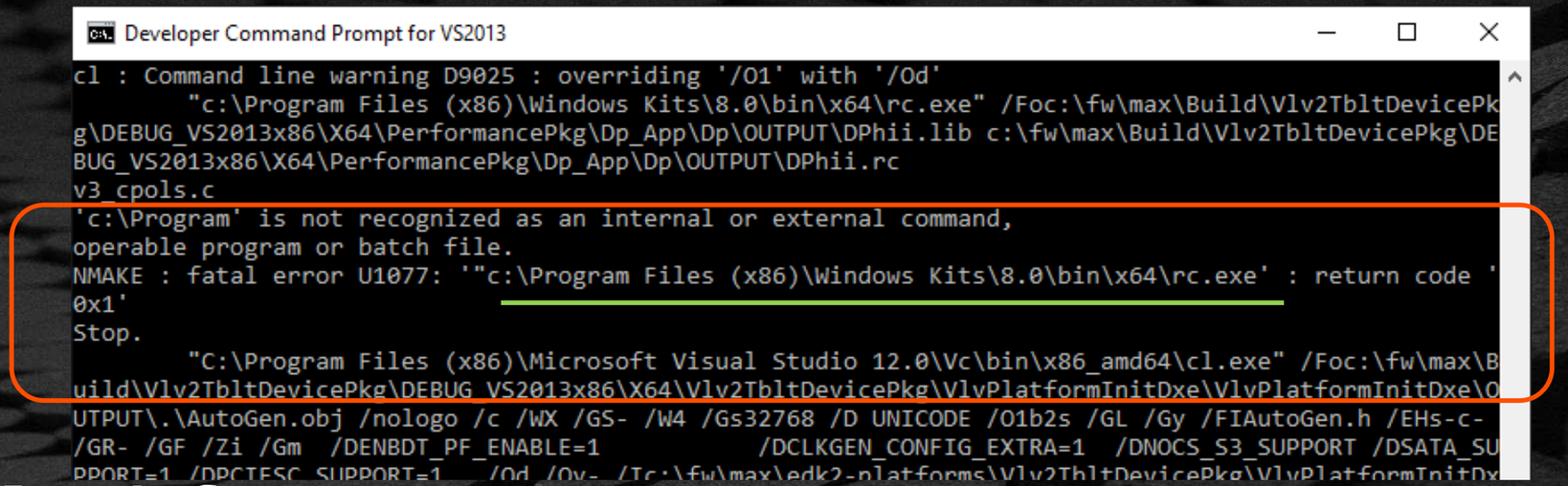
There is a check for **VS140COMNTOOLS** and if defined setup for VS 2015

See that tools_def.txt replaces /Wx and /W4 with /w to turn off warnings as errors

VISUAL STUDIO RESOURCE COMPILER ERROR – RC.EXE

The Rc.exe was not found and the build fails

Find where rc.exe is located and update the **`tools_def.txt`**



Update **`Max/edk2/conf/tools_def.txt`**

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

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

# Microsoft Visual Studio 2017 Professional Edition
DEFINE WINSDK10_BIN      =  Location of Rc.exe
```

Highlighted is where the Rc.exe is located on your local PC Laptop

SUPPORT FOR VS 2017 FOR MINNOWBOARD MAX

The Open Source Max release does not support VS 2017

To work around do the following:

Copy the file

“C:/FW/edk2/conf/tools_def_VS2015x86_w.txt” to “C:/FW/Max/edk2/conf/tools_def.txt”

See that tools_def.txt replaces /Wx and /W4 with /w to turn off warnings as errors

At MS Command Prompt

```
>Set  TOOL_CHAIN_TAG=VS2010x86
```