



ML410 VxWorks BSP and System Image Creation for the BSB Design Using EDK 8.2i SP1

April 2007



www.BDTIC.com/XILINX



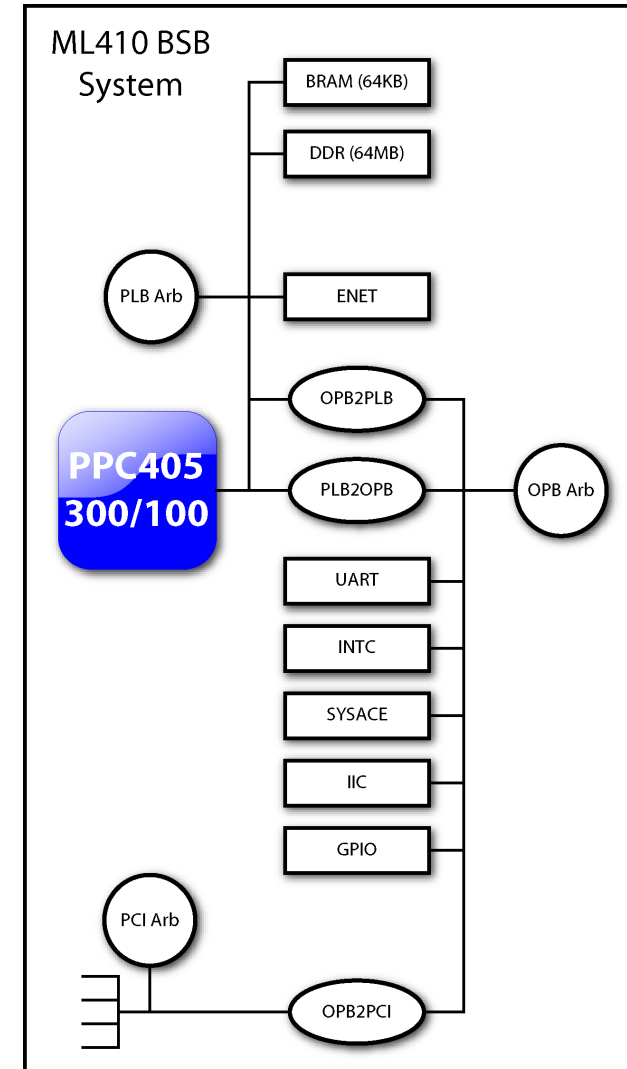
Overview

- Hardware Setup
- Software Setup & Requirements
- Generate VxWorks BSP
- Create VxWorks Project
- Create VxWorks System Image
- Generate and Run an ACE File



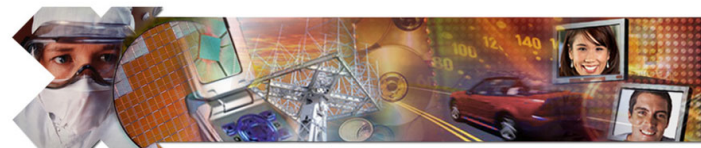
ML410 BSB Hardware

- The ML410 BSB design hardware includes:
 - 64 KB BRAM
 - DDR1 Interface (64 MB)
 - UART
 - Interrupt Controller
 - System ACE Interface
 - IIC
 - GPIO (LEDs and LCD)
 - PLB2OPB Bridge
 - PLB and OPB Arbiters
 - Networking
 - OPB2PLB Bridge
 - OPB2PCI Bridge
 - PCI Arbiter



Additional Setup Details

- Refer to ml410_overview_setup.ppt for details on:
 - Software Requirements
 - ML410 Board Setup
 - **Equipment and Cables**
 - **Software**
 - **Network**
 - Terminal Programs
 - **This presentation requires the 9600-8-N-1 Baud terminal setup**



ML410 Overview and Setup

Overview of the Hardware Designs and Software Applications
How to set up the equipment, software, CompactFlash,
network, and terminal programs



Hardware Setup

- Connect the Xilinx Parallel Cable IV (PC4) to the ML410 board
- Connect the RS232 null modem cable to the ML410 board



Software Setup

- Install Wind River Systems Tornado 2.2

- (1) CD part number TDK-14620-ZC-01
- (2) CD part number TDK-14630-ZC-01

- Download and install

Patch T22CP1: Tornado 2.2

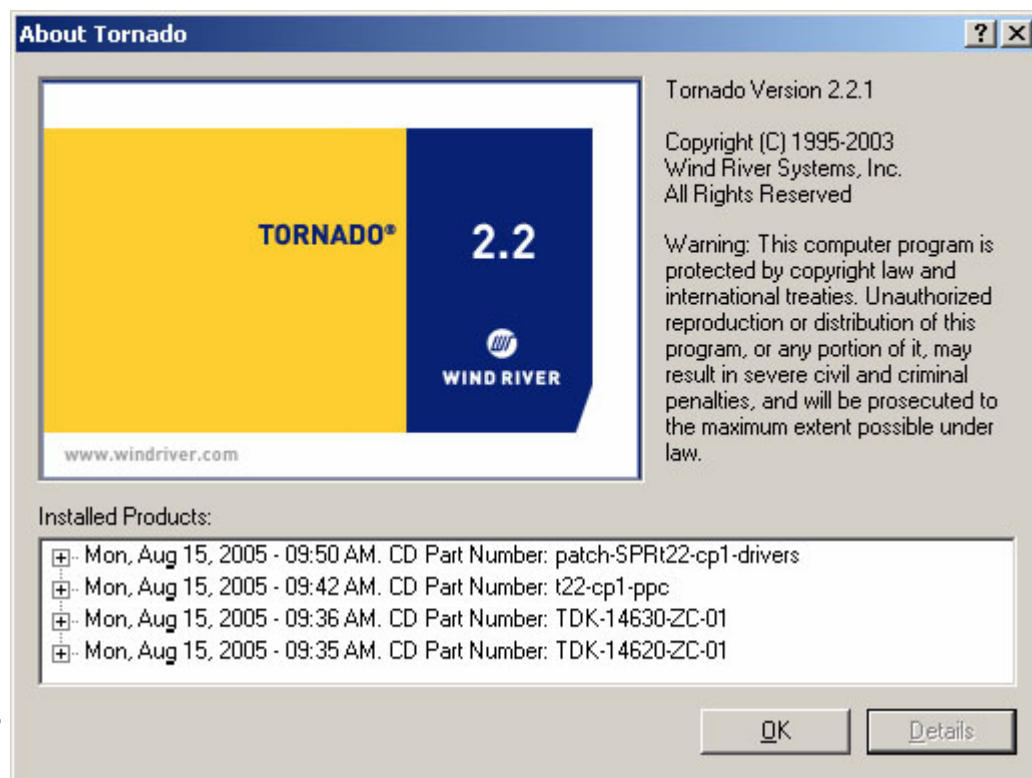
Cumulative Patch 1 "CP-1"

- The patch files:

- **T22CP1_install.html**
- **(3) t22-cp1-ppc.tar**
- **(4) t22-cp1-drivers.tar**

- Install order (1), (2)...

- Details on the installed products can be found by clicking on **Help → About Tornado → Details**



ISE Software Requirement

- Xilinx ISE 8.2i SP2 software



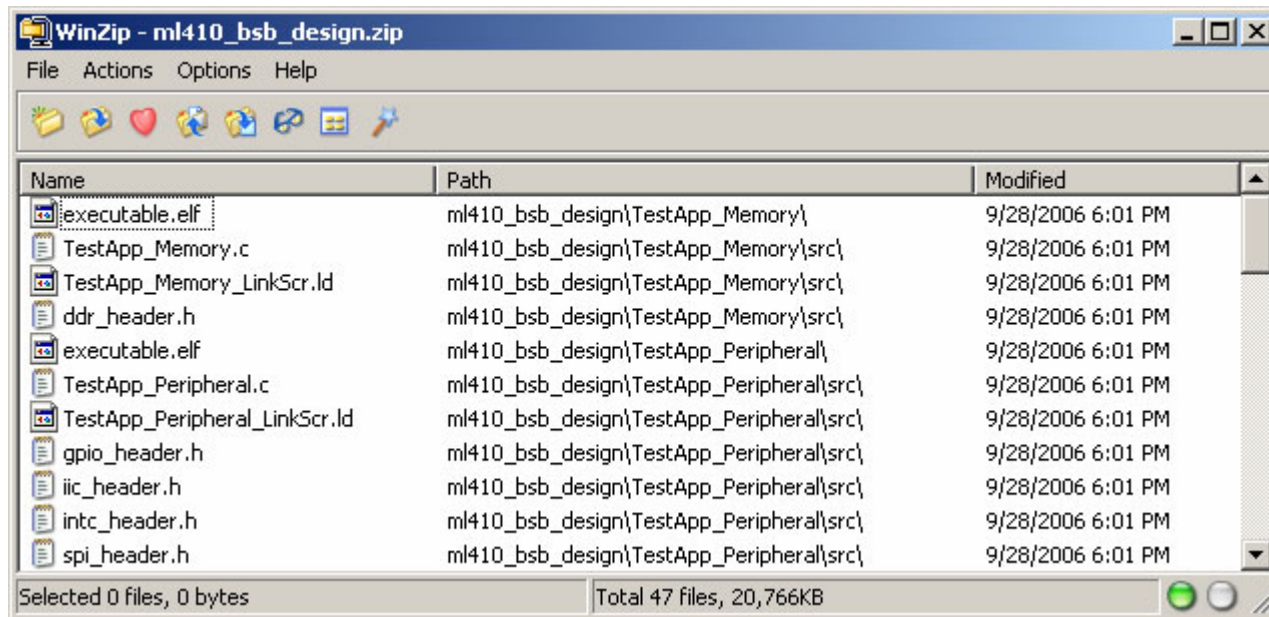
EDK Software Requirement

- Xilinx EDK 8.2i SP1 software



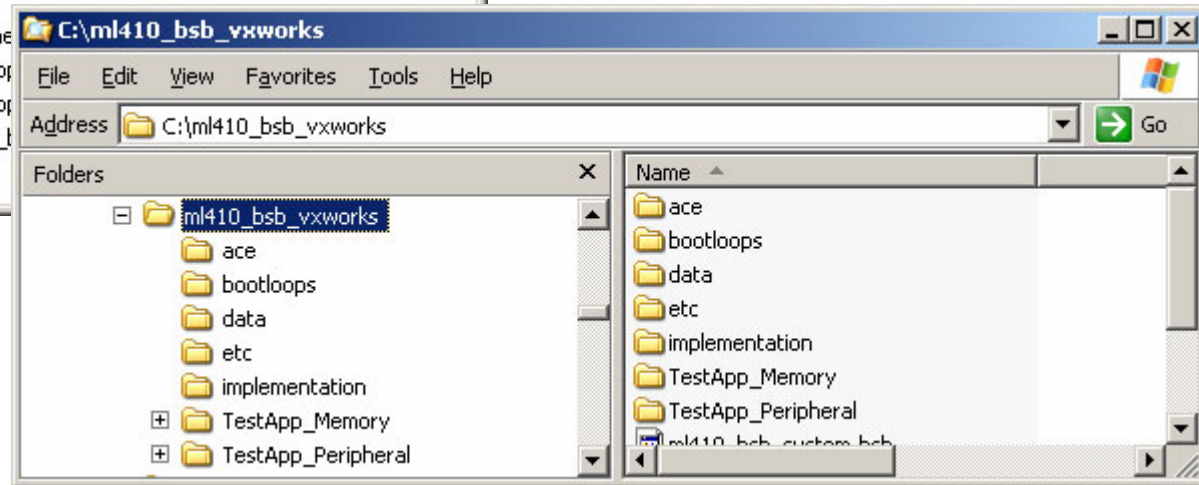
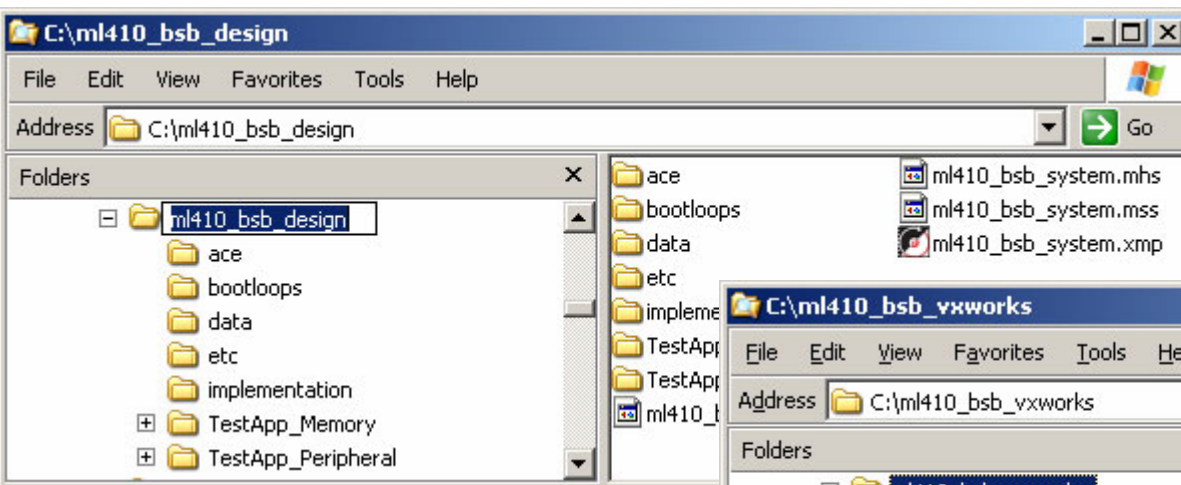
Extracting the Design

- Unzip the ml410_bsb_design.zip file
 - This creates ISE and EDK project directories



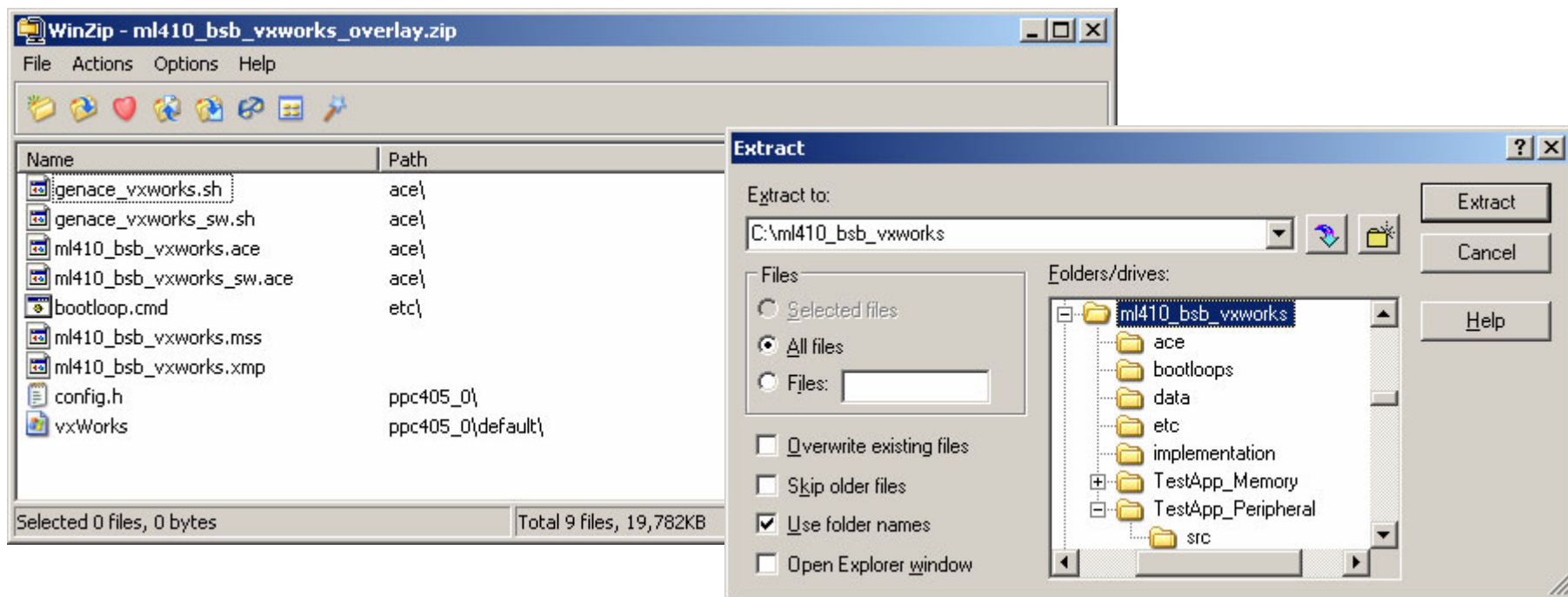
Extracting the Design

- Rename the project directory to ml410_bsb_vxworks



Extracting the Design

- Unzip the ml410_bsb_vxworks_overlay.zip file
 - Unzip to the ml410_bsb_vxworks directory (overwrite existing files)
 - This adds the VxWorks XMP and MSS files, ELF files, SW source, and ACE files



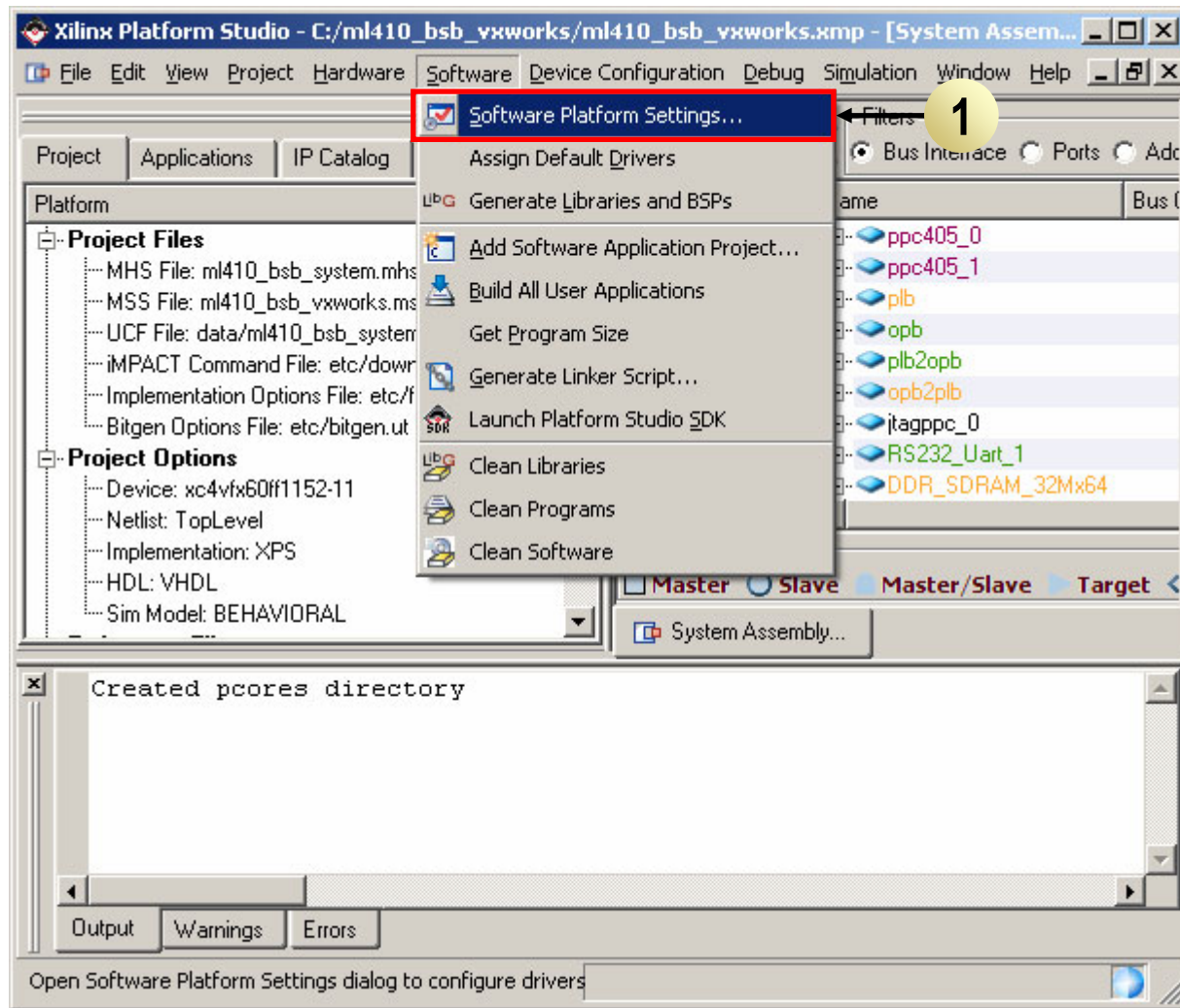
Generate VxWorks BSP in EDK

- Parameters preset for VxWorks in ml410_bsb_vxworks.xmp
 - Common hardware design (ml410_bsb_system.mhs) across software apps
 - Software Platform Settings
 - **OS selection set to VxWorks 5.5**
 - **Bus Speed**
 - **Peripheral for Standard Input**
 - **Peripheral for Standard Output**
 - **Select peripherals connected for OS interface**



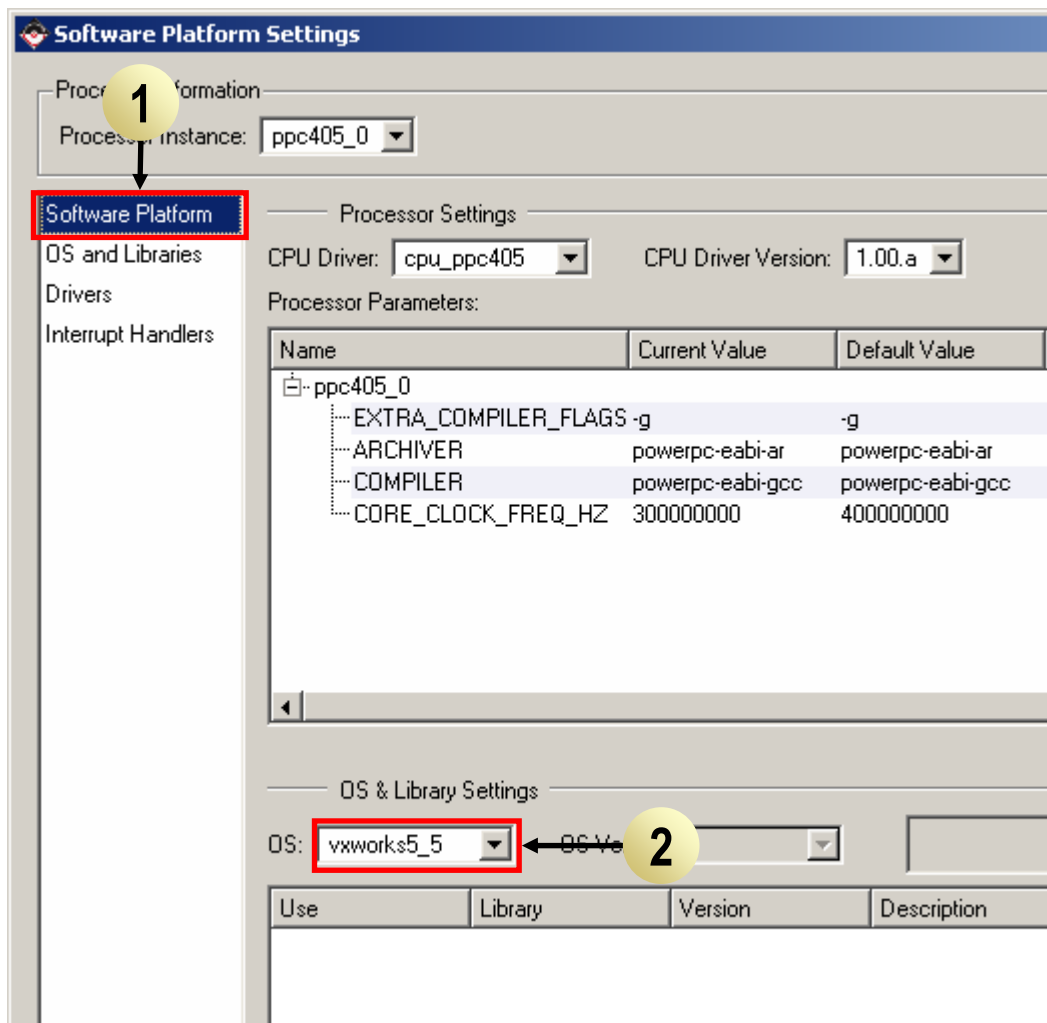
Generate VxWorks BSP in EDK

- Launch EDK project:
<design path>\
ml410_bsb_vxworks.xmp
 - Select **Software** → **Software Platform Settings...** (1)



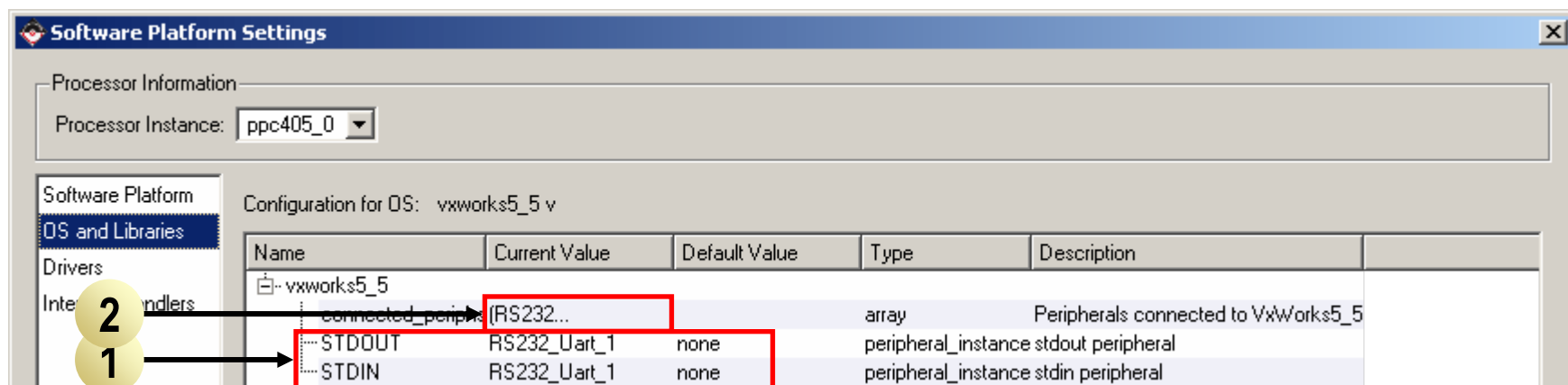
Generate VxWorks BSP in EDK

- Under Software Platform (1) verify that **vxworks5_5** is selected for **ppc405_0** (2)



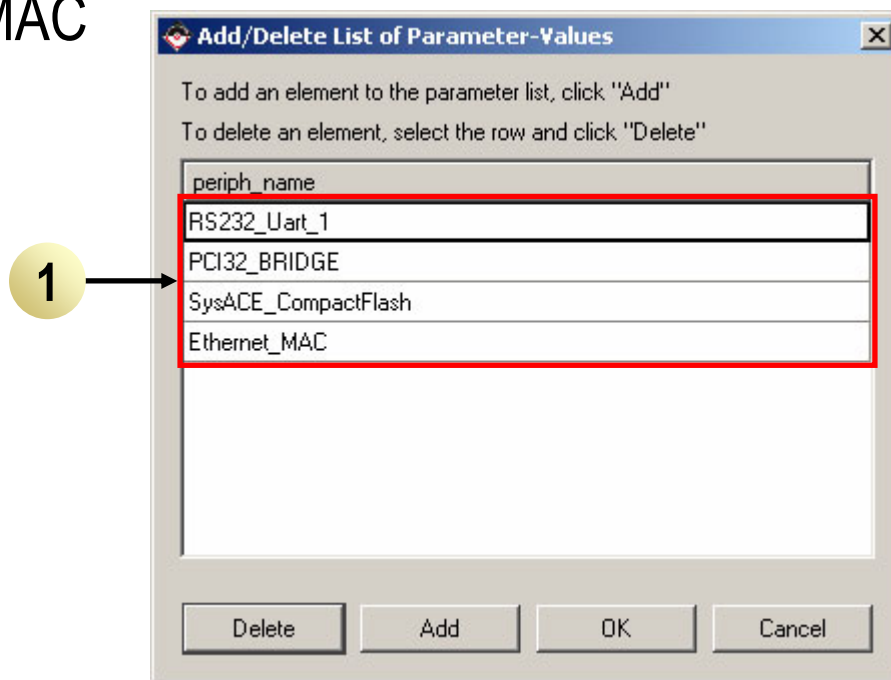
Generate VxWorks BSP in EDK

- Ensure these fields are set as follows (1):
 - STDIN = RS232_Uart_1
 - STDOUT = RS232_Uart_1
- Click the connected_periphs button (2)



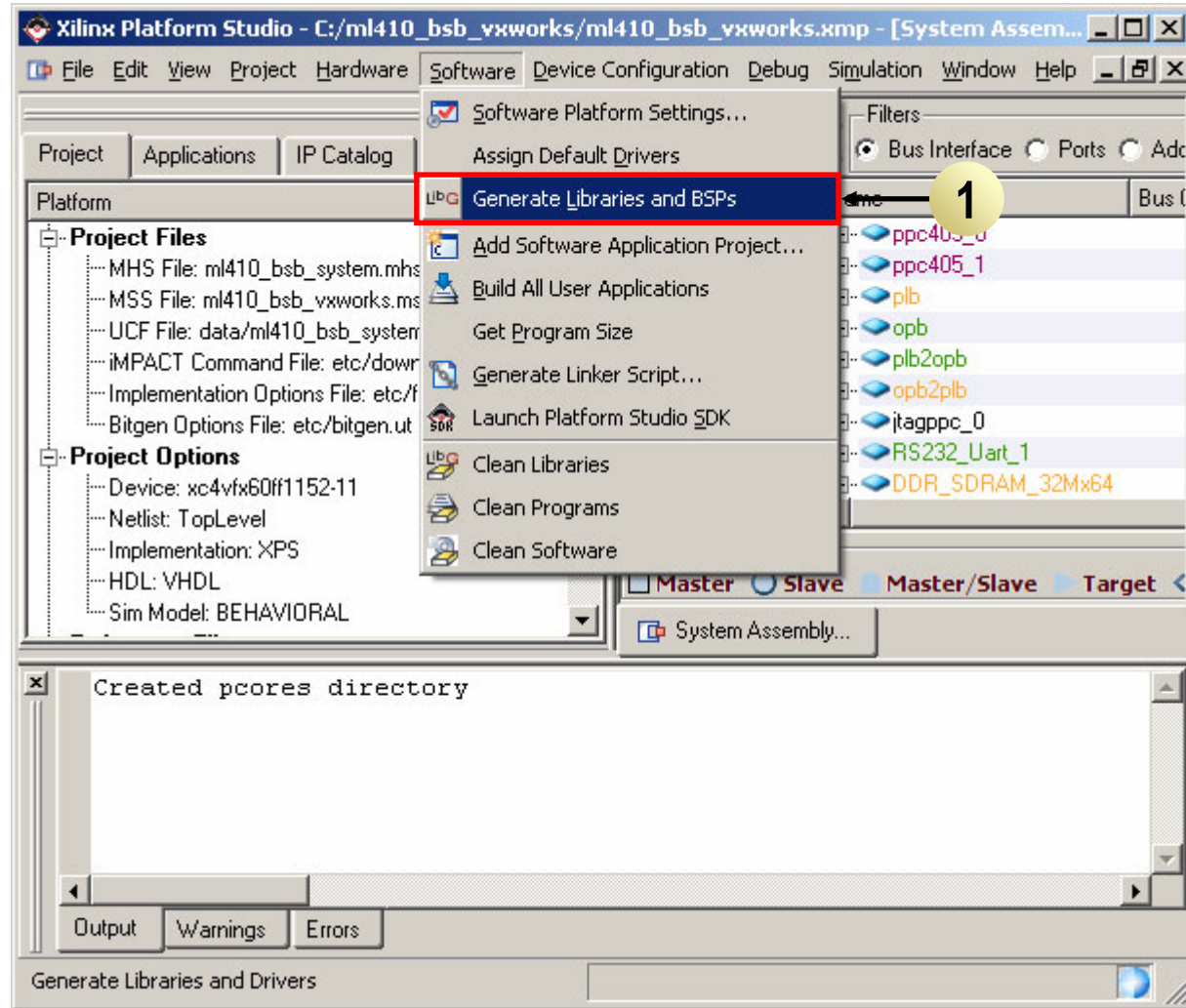
Generate VxWorks BSP in EDK

- Verify three peripherals are included in the pop-up dialog box (1)
 - RS232_Uart_1
 - PCI32_BRIDGE
 - SysACE_CompactFlash
 - Ethernet_MAC



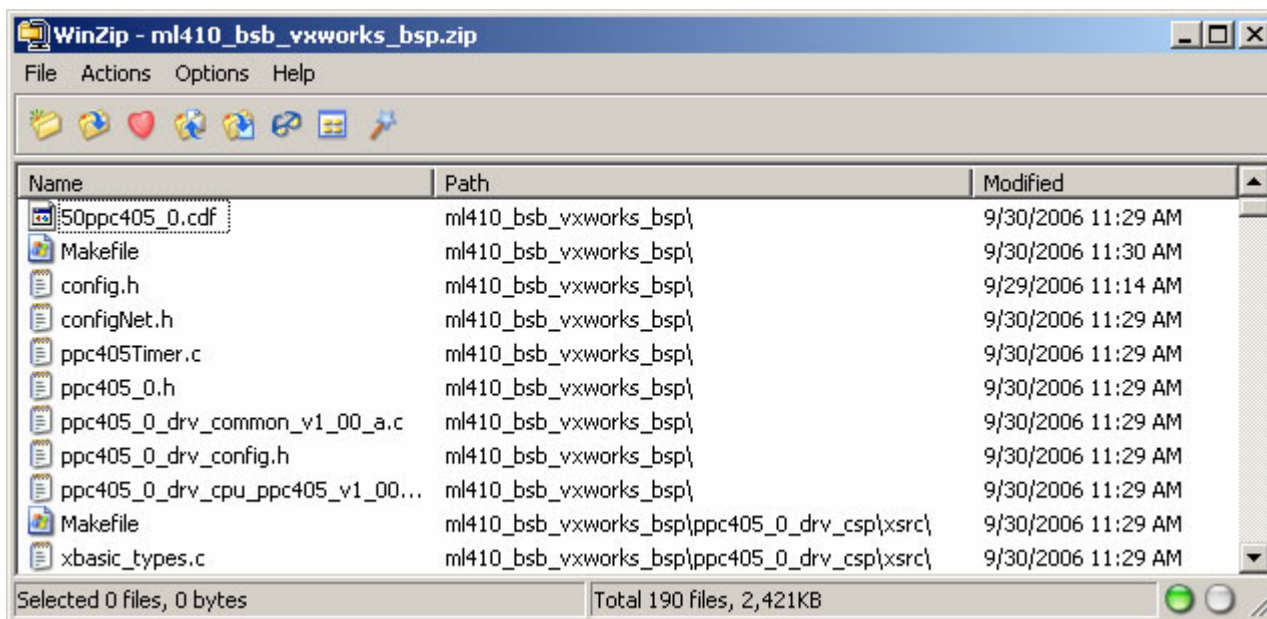
Generate BSP in EDK

- Select :
 - **Software → Generate Libraries and BSPs (1)**
- The generated VxWorks BSP will be:
<design path>\
ppc405_0\
bsp_ppc405_0



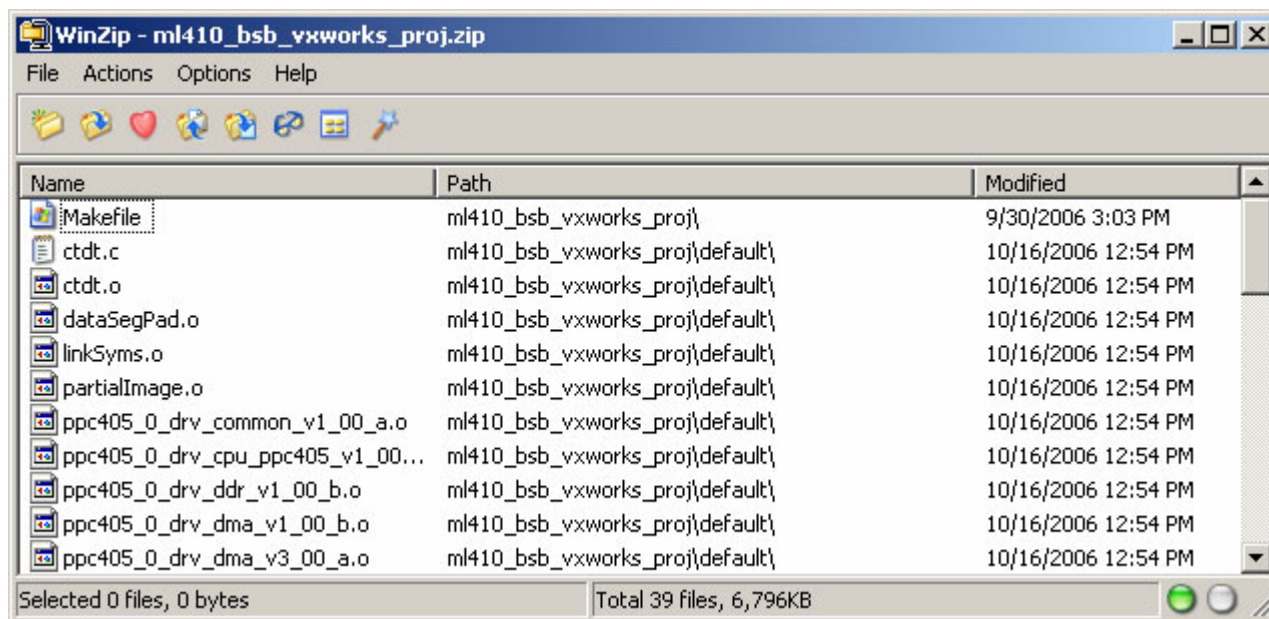
Optional Installation

- Bypass the VxWorks BSP and Project creation steps in this presentation by using the pre-built BSP and Project:
- **BSP:** Unzip the file ml410_bsb_vxworks_bsp.zip to the <Tornado Dir>\target\config directory



Optional Installation

- **Project:** Unzip the ml410_bsb_vxworks_proj.zip file to the <Tornado Dir>\target\proj directory
- Skip slides 20 through 54 if doing the Optional Installation



Updated config.h in the BSP

- The config.h file needs several updates, as seen here:

The screenshot displays two side-by-side windows of a file viewer, comparing two versions of the `config.h` file. The left window shows the original file from 7/5/2006, and the right window shows the updated file from 2/28/2006. The updates are highlighted in green in the right window.

Left Window (Original):

```
#define LOCAL_MEM_SIZE 0x200000 /* TODO: fixed memory size */
#define RAM_HIGH_ADRS 0x00200000 /* RAM address for bootrom */
#define PCI_MEMORY_START 0x70000000 /* PCI memory space (prefetch) */
#define PCI_MEMORY_END 0x700007FF /* PCI memory end (prefetch) */
#define PCI_BRIDGE_SUBBUSNO 0 /* Host bridge sub-bus number */
#define PCI_MSTR_MEM_SIZE 0x00000800
#define PCI_MSTR_MEMIO_LOCAL (PCI_MEMORY_START + PCI_MSTR_MEM_SIZE)
#define PCI_MSTR_MEMIO_BUS (PCI_MSTR_MEMIO_LOCAL + PCI_MSTR_MEM_SIZE)
#define PCI_MSTR_MEMIO_SIZE 0x00100000
#define PCI_MSTR_IO_LOCAL 0x00000000
#define PCI_MSTR_IO_BUS 0x00000000
#define PCI_MSTR_IO_SIZE 0x00000000
```

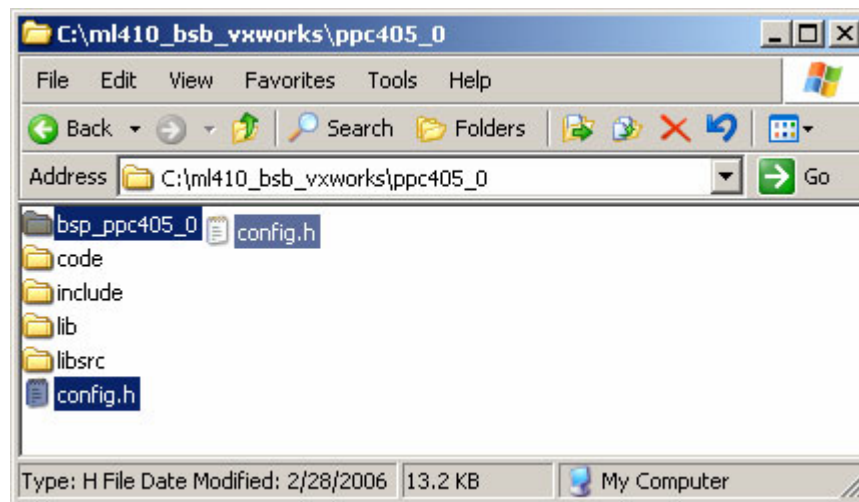
Right Window (Updated):

```
/*#define LOCAL_MEM_SIZE 0x200000 /* TODO: fixed memory size */
#define LOCAL_MEM_SIZE 0x04000000 /* 64 MB Memory Size */
#define RAM_HIGH_ADRS 0x00200000 /* RAM address for bootrom */
#define RAM_HIGH_ADRS 0x04000000 /* RAM address for bootrom */
#define PCI_MEMORY_START 0x70000000 /* PCI memory space (prefetch) */
#define PCI_MEMORY_END 0x700007FF /* PCI memory end (prefetch) */
#define PCI_MEMORY_START XPAR_PCI32_BRIDGE_BASEADDR /* PCI memory space */
#define PCI_MEMORY_END XPAR_PCI32_BRIDGE_HIGHADDR /* PCI memory end */
/*#define PCI_BRIDGE_SUBBUSNO 0 /* Host bridge sub-bus number */
#define PCI_BRIDGE_SUBBUSNO 255 /* Host bridge sub-bus number */
#define PCI_MSTR_MEM_SIZE 0x00000800
#define PCI_MSTR_MEM_SIZE (PCI_MEMORY_END - PCI_MEMORY_START + 1)
#define PCI_MSTR_MEMIO_LOCAL (PCI_MEMORY_START + PCI_MSTR_MEM_SIZE)
#define PCI_MSTR_MEMIO_BUS (PCI_MSTR_MEMIO_LOCAL + PCI_MSTR_MEM_SIZE)
#define PCI_MSTR_MEMIO_SIZE 0x00100000
#define PCI_MSTR_MEMIO_LOCAL XPAR_PCI32_BRIDGE_IPIFBAR_0
#define PCI_MSTR_MEMIO_BUS XPAR_PCI32_BRIDGE_IPIFBAR_0
#define PCI_MSTR_MEMIO_SIZE (XPAR_PCI32_BRIDGE_IPIF_HIGHADDR_0 - XPAR_
#define PCI_MSTR_IO_LOCAL 0x00000000
#define PCI_MSTR_IO_BUS 0x00000000
#define PCI_MSTR_IO_SIZE 0x00000000
#define PCI_MSTR_IO_LOCAL XPAR_PCI32_BRIDGE_IPIFBAR_1
#define PCI_MSTR_IO_BUS XPAR_PCI32_BRIDGE_IPIFBAR_1
#define PCI_MSTR_IO_SIZE (XPAR_PCI32_BRIDGE_IPIF_HIGHADDR_1 - XPAR_
```

The status bar at the bottom indicates "9 Section(s) Different".

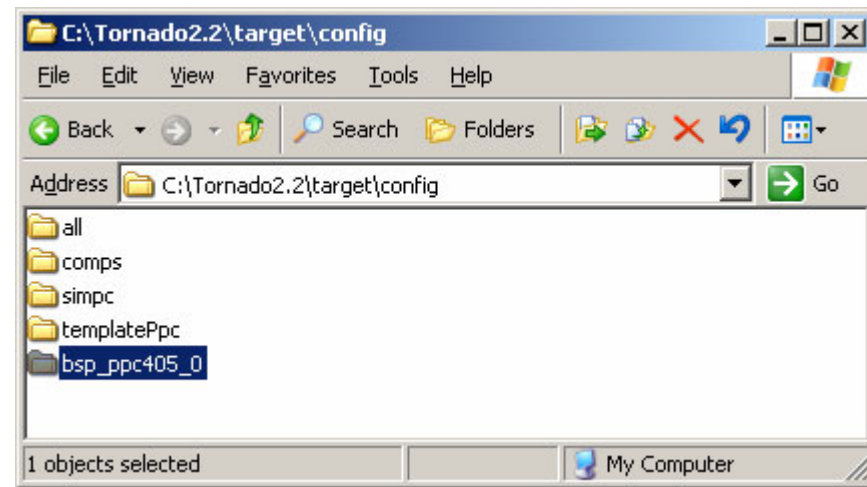
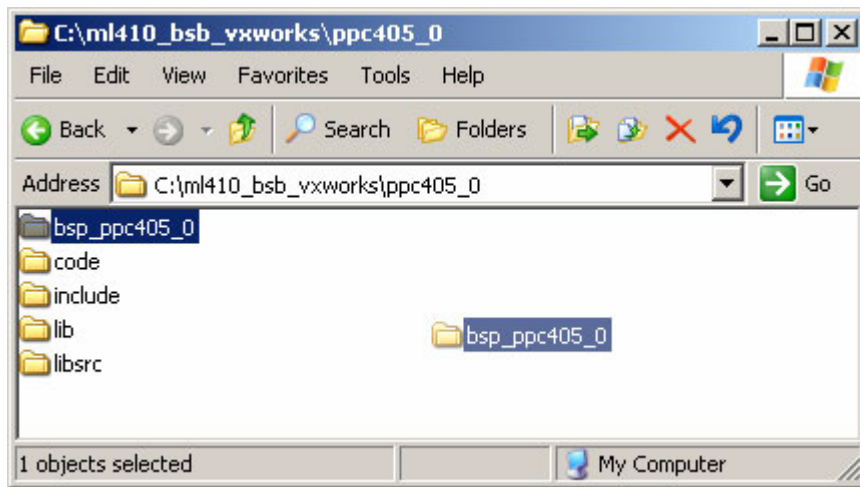
Updated config.h in the BSP

- To update the config.h file, copy this file:
<design path>\ml410_bsb_vxworks\ppc405_0\config.h
To this directory:
<design path>\ml410_bsb_vxworks\ppc405_0\bsp_ppc405_0
– Overwrite the existing file



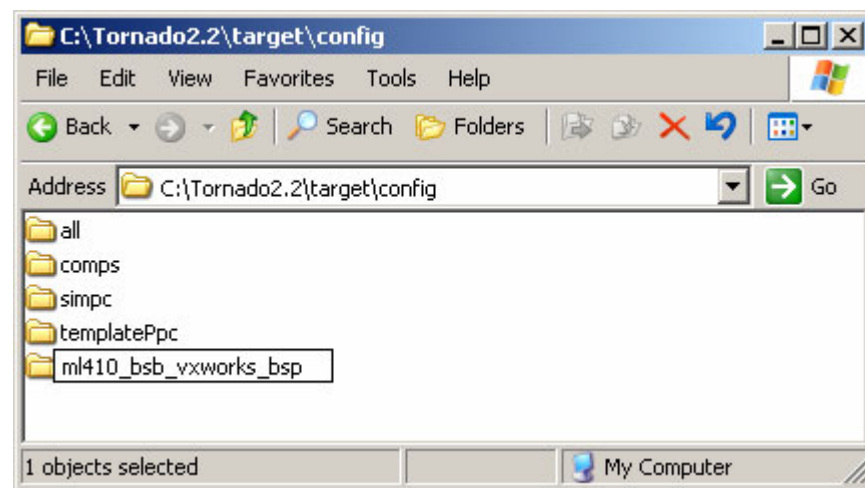
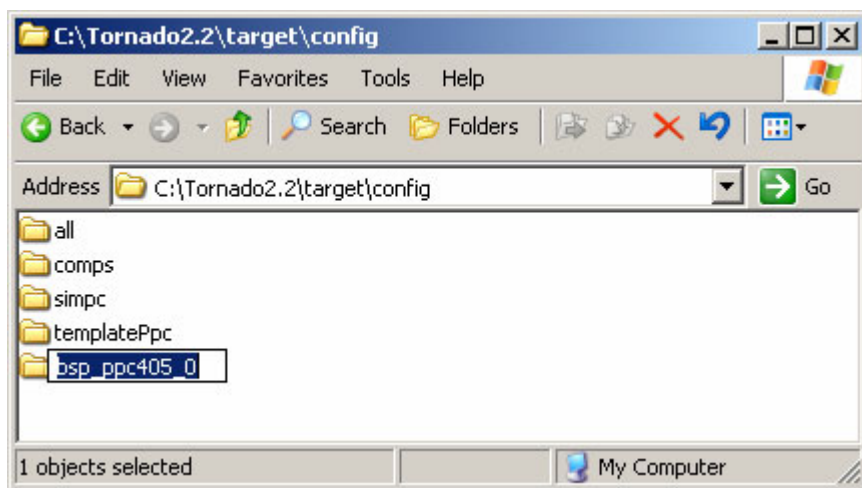
Copy Updated BSP to Tornado Tree

- Copy
 <design path>\ml410_bsb_vxworks\ppc405_0\bsp_ppc405_0
To:
 <Tornado Dir>\target\config\
 - Hold down the <Ctrl> while dragging to copy instead of move



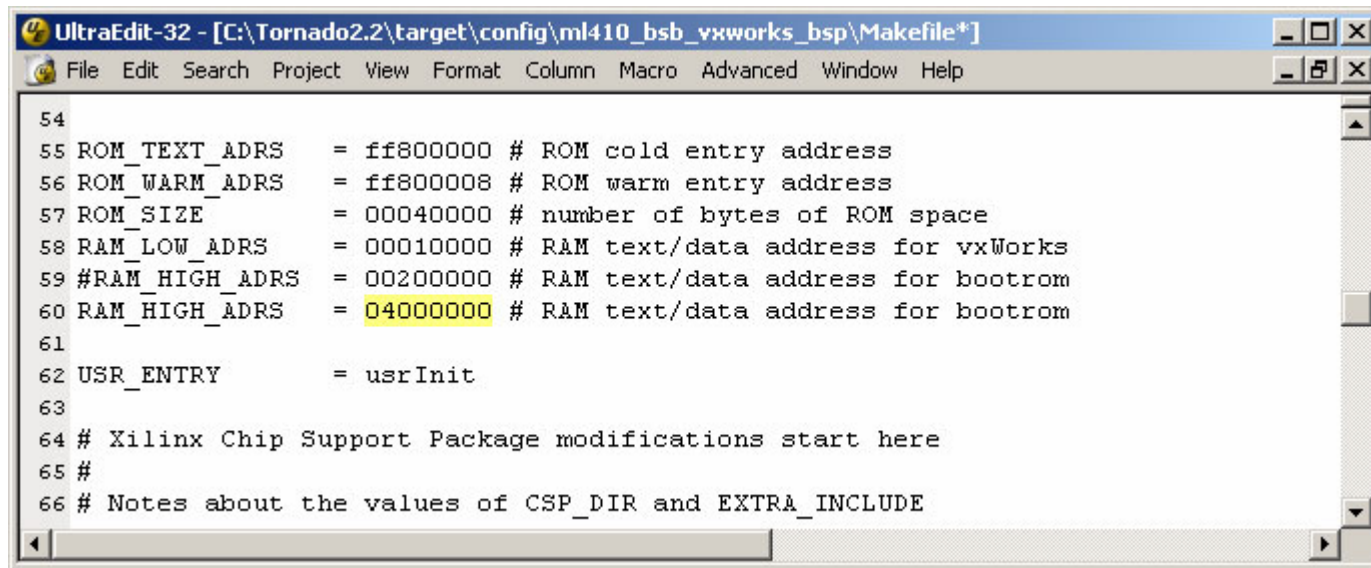
Rename BSP in Tornado Tree

- In <Tornado Dir>\target\config rename the bsp directory:
bsp_ppc405_0
to:
ml410_bsb_vxworks_bsp



Update BSP Configuration

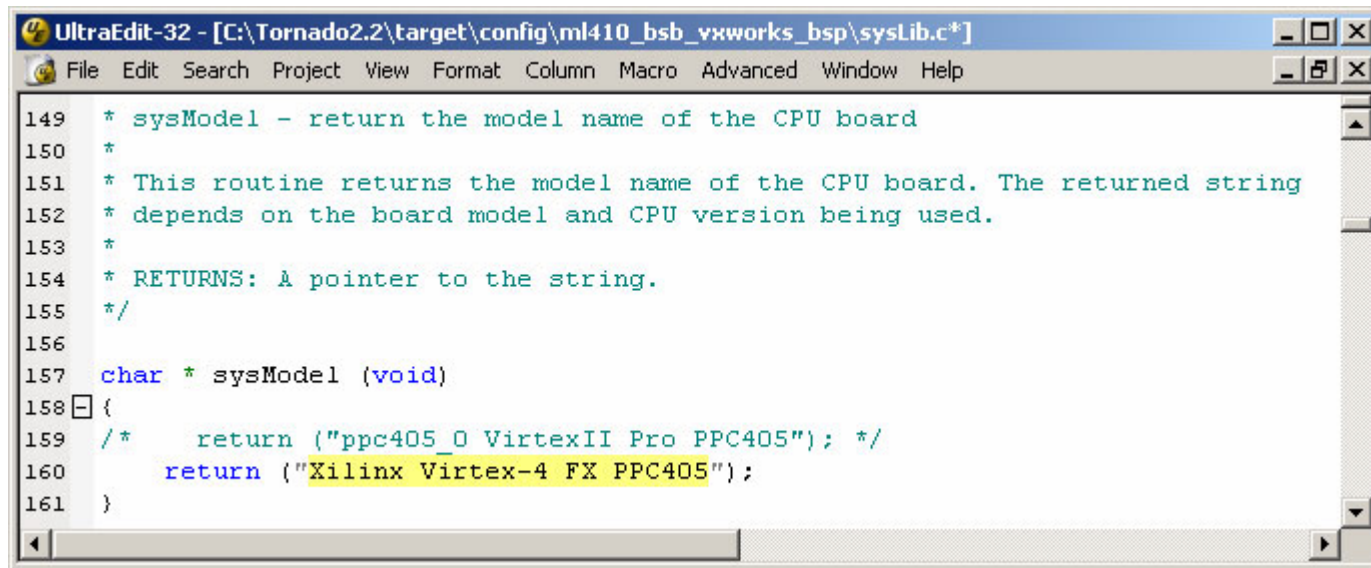
- Update this line in the <Tornado Dir>\target\config\ml410_bsb_vxworks_bsp\Makefile file:
 - Set RAM_HIGH_ADRS to 04000000



```
54
55 ROM_TEXT_ADRS    = ff800000 # ROM cold entry address
56 ROM_WARM_ADRS    = ff800008 # ROM warm entry address
57 ROM_SIZE         = 00040000 # number of bytes of ROM space
58 RAM_LOW_ADRS     = 00010000 # RAM text/data address for vxWorks
59 #RAM_HIGH_ADRS   = 00200000 # RAM text/data address for bootrom
60 RAM_HIGH_ADRS    = 04000000 # RAM text/data address for bootrom
61
62 USR_ENTRY        = usrInit
63
64 # Xilinx Chip Support Package modifications start here
65 #
66 # Notes about the values of CSP_DIR and EXTRA_INCLUDE
```

Update BSP Configuration

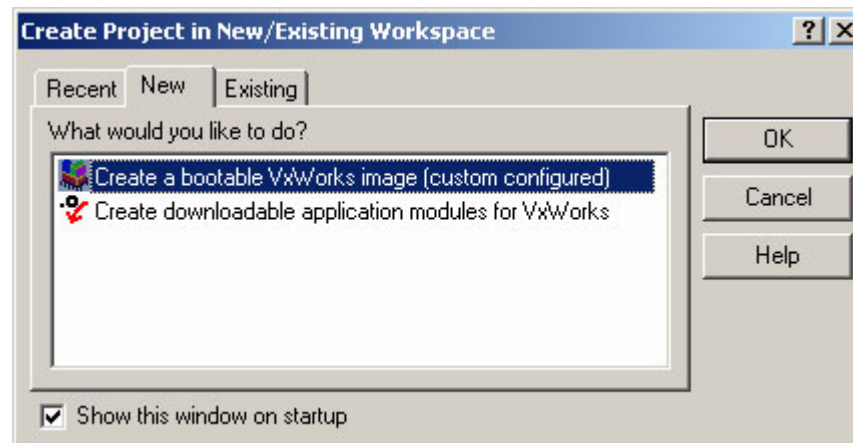
- Update the splash message in the <Tornado Dir>\target\config\ ml410_bsb_vxworks_bsp\sysLib.c file:
 - From: ppc405_0 VirtexII Pro PPC405
 - To: Xilinx Virtex-4 FX PPC405



```
UltraEdit-32 - [C:\Tornado2.2\target\config\ml410_bsb_vxworks_bsp\sysLib.c*]  
File Edit Search Project View Format Column Macro Advanced Window Help  
149 * sysModel - return the model name of the CPU board  
150 *  
151 * This routine returns the model name of the CPU board. The returned string  
152 * depends on the board model and CPU version being used.  
153 *  
154 * RETURNS: A pointer to the string.  
155 */  
156  
157 char * sysModel (void)  
158 {  
159     /* return ("ppc405_0 VirtexII Pro PPC405"); */  
160     return ("Xilinx Virtex-4 FX PPC405");  
161 }
```

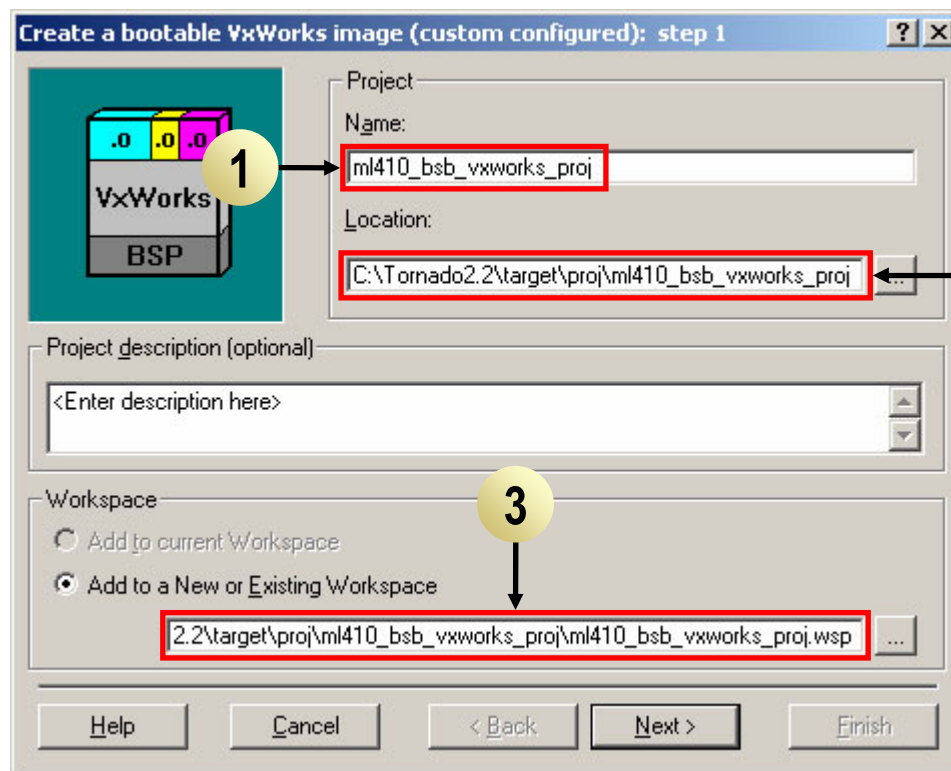
Create VxWorks Project

- Launch Tornado and select **File** → **New Project**
- Choose “Create a bootable VxWorks image...”



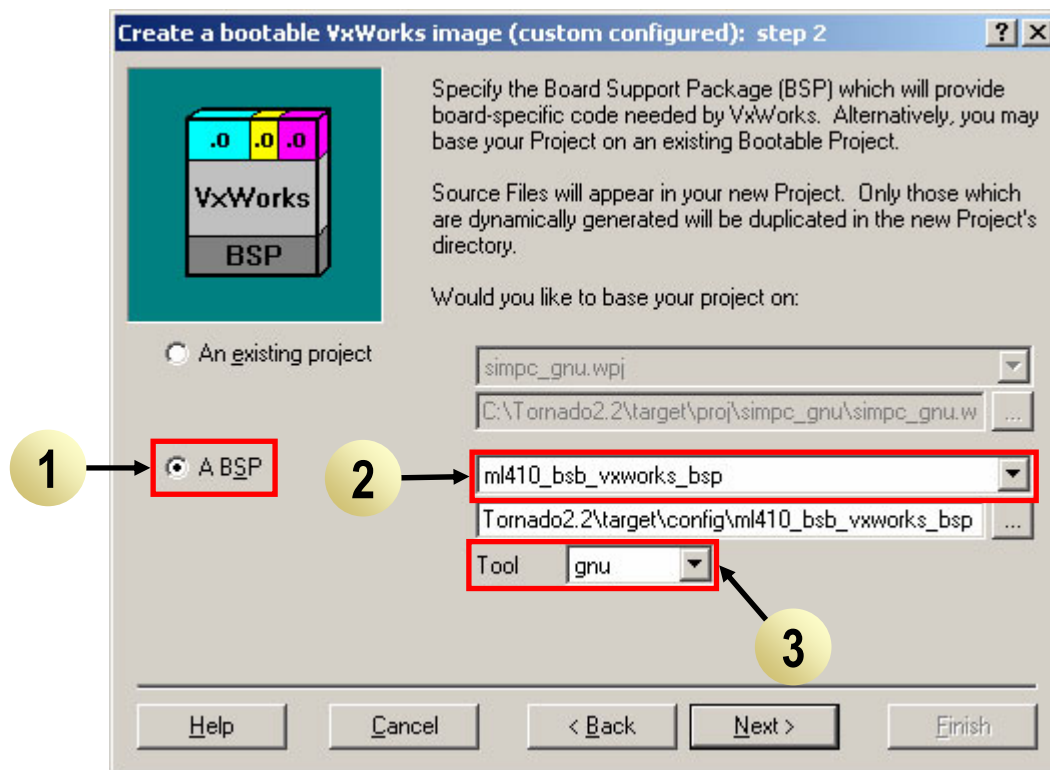
Create VxWorks Project

- Set the project name to **ml410_bsb_vxworks_proj** (1)
- Update the Location and Workspace entries with this project name (2) , (3)



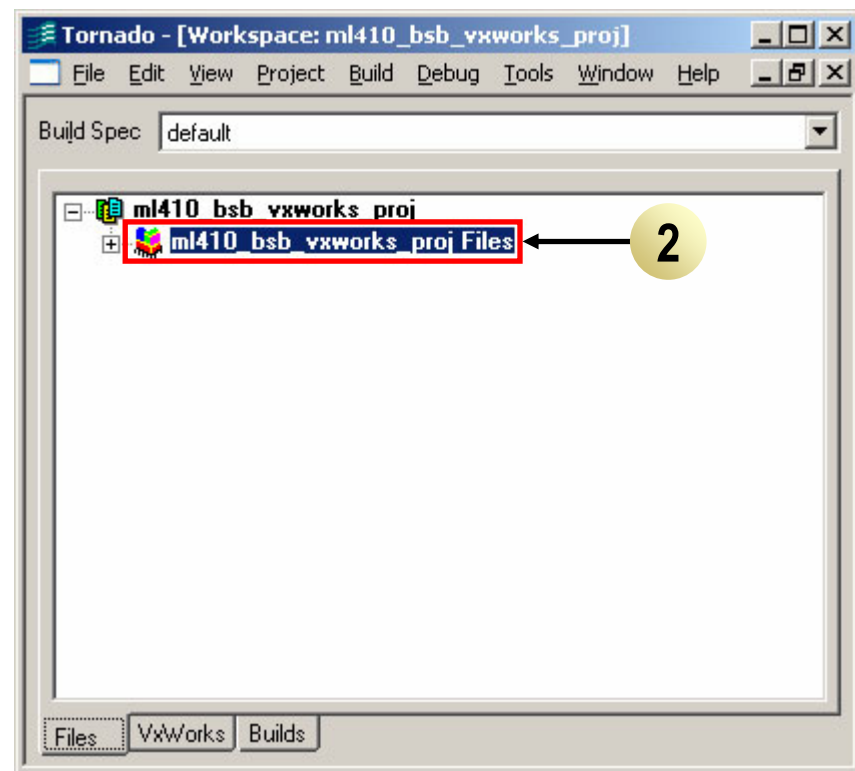
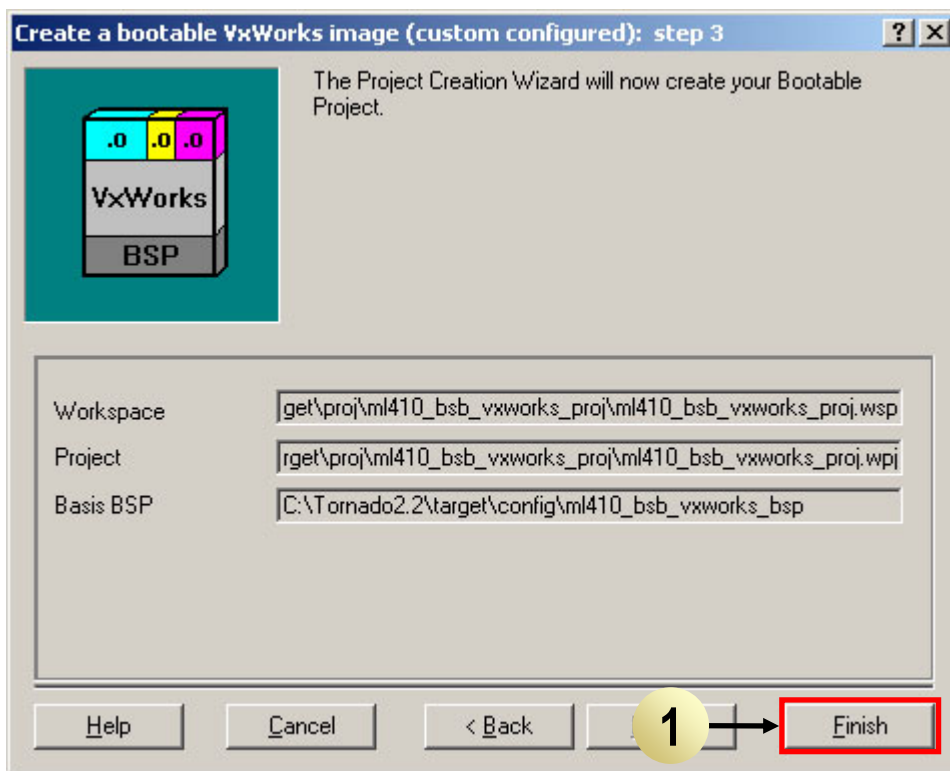
Create VxWorks Project

- Base the project on a BSP (1), (2)
 - Select the ml410_bsb_vxworks_bsp just added to the Tornado tree
- Select gnu from the Tool drop-down menu (3)



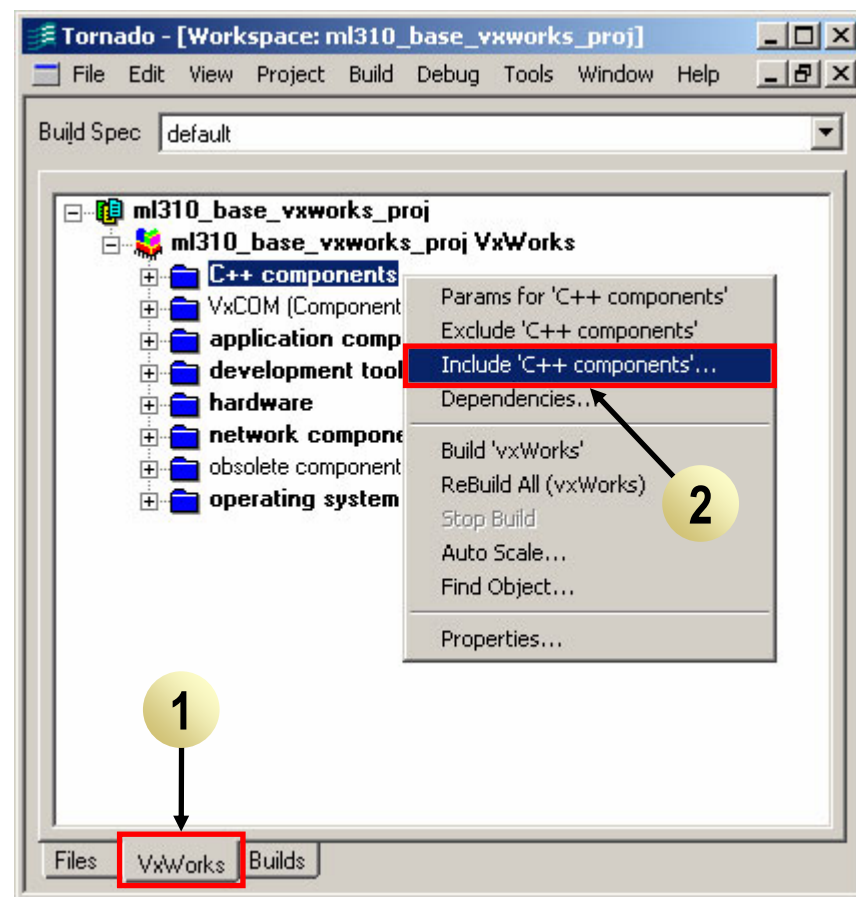
Create VxWorks Project

- Select Finish to create the Bootable project (1)
- New Tornado Project available after BSP processed (2)



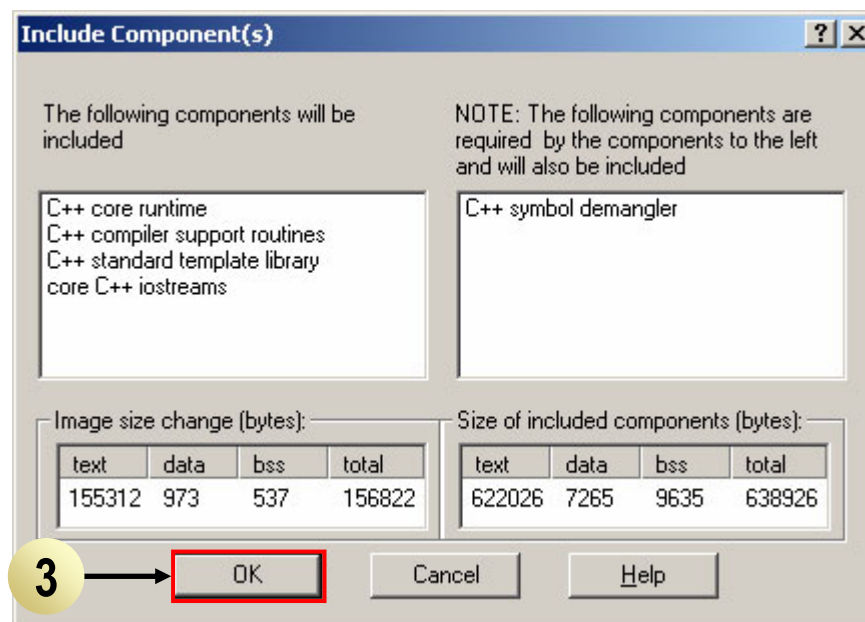
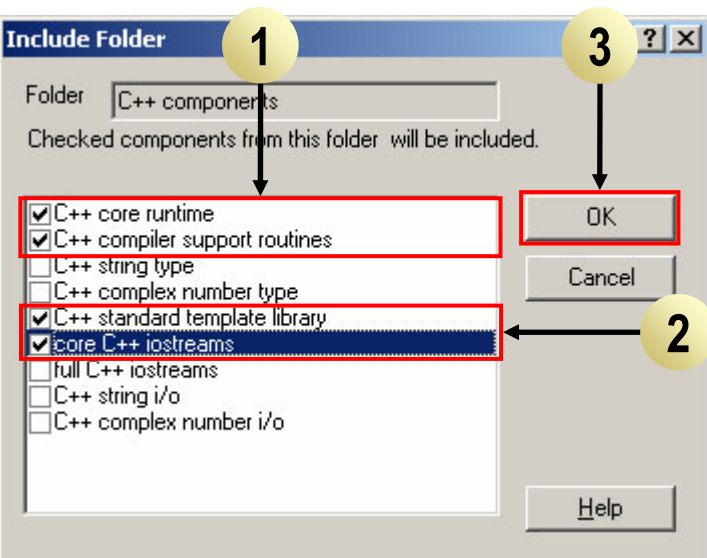
Configure System Image

- To reproduce the pre-compiled BSB VxWorks system image
 - Components must be Included or Excluded
- Select the “VxWorks” tab (1)
- Right-click on the desired components and select “Include <component>” (2)
 - In some cases you will select “Exclude <component>”



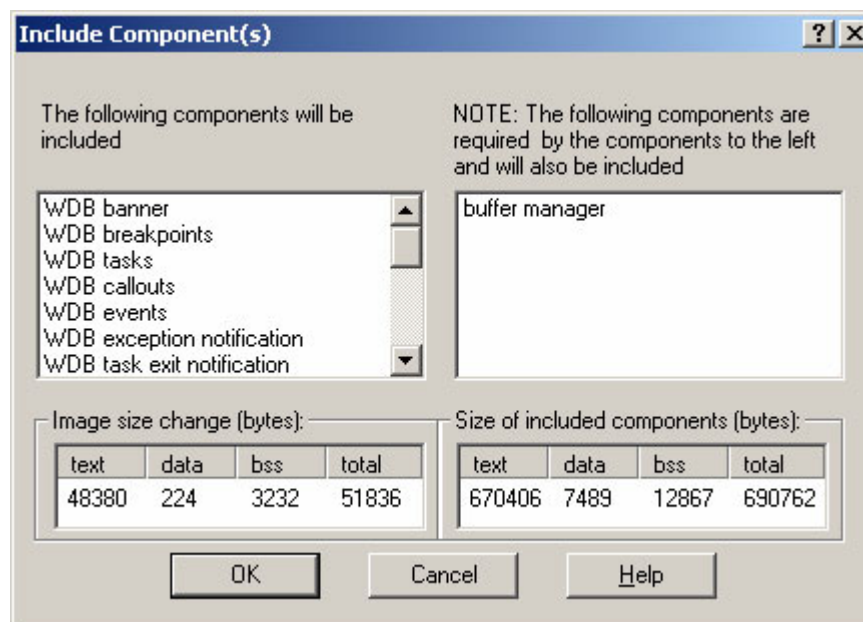
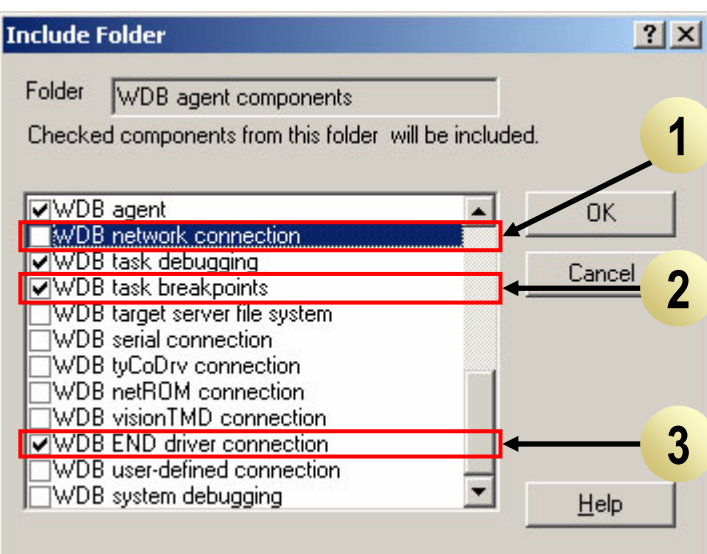
Configure System Image

- Include: C++ Components
 - Some components are “pre-checked” - leave these checked (1)
 - Check “C++ standard template library” (2)
 - Check “core C++ iostreams” (2)
 - Click OK in the respective dialog boxes (3)



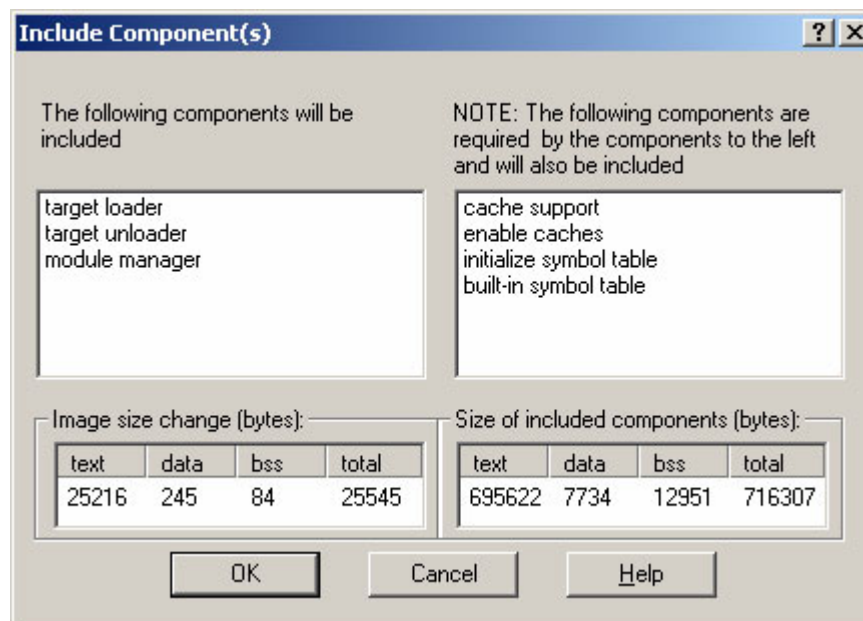
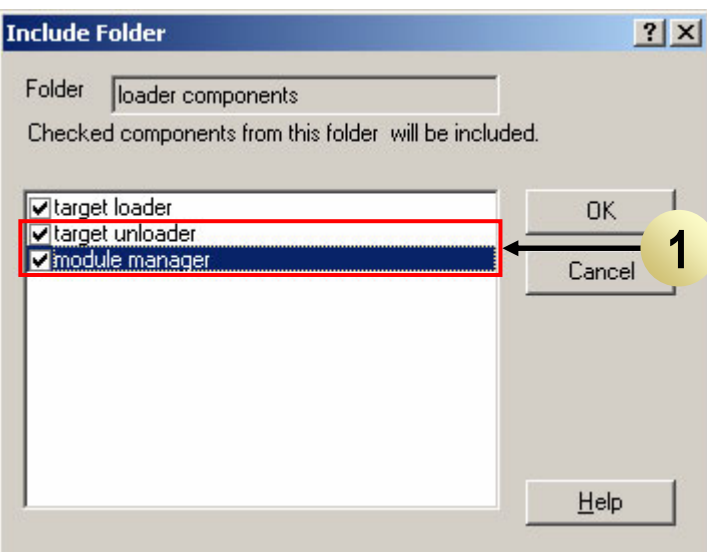
Configure System Image

- Include: development tool components > WDB agent components
 - **Uncheck** “WDB network connection” (1)
 - Check “WDB task breakpoints” (2)
 - Check “WDB END driver connection”(3)



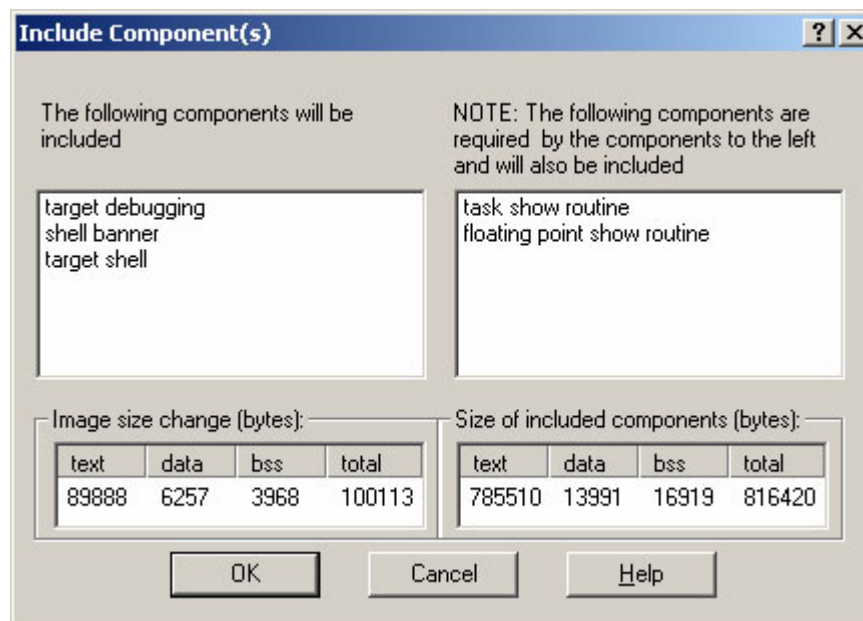
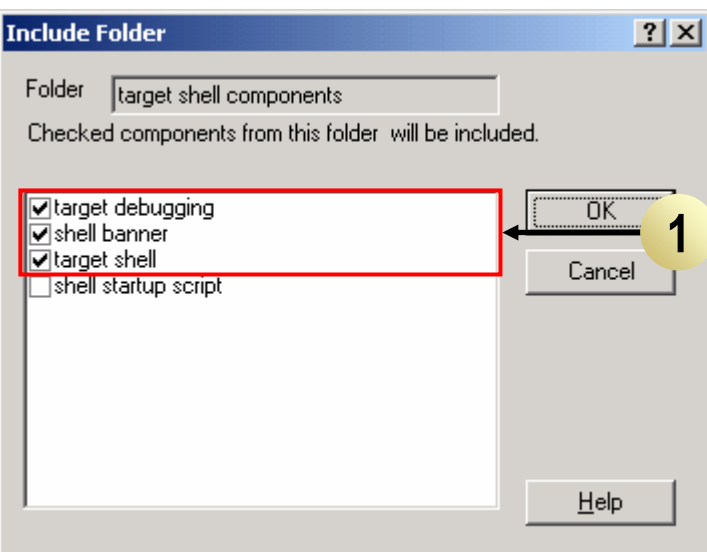
Configure System Image

- Include: development tool components > loader components
 - Check “target unloader” (1)
 - Check “module manager” (1)



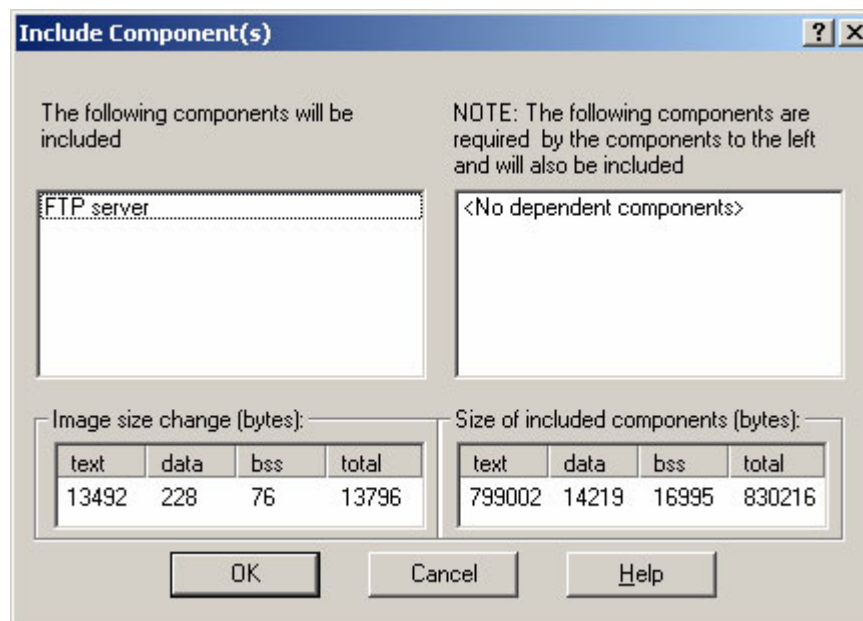
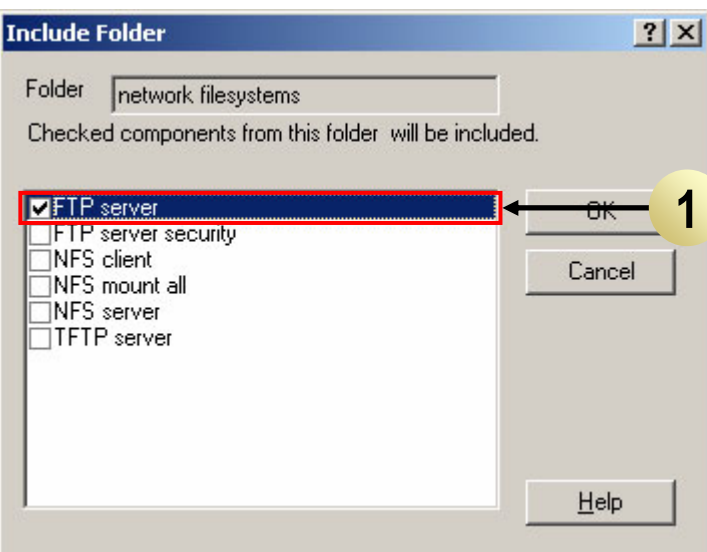
Configure System Image

- Include: development tool components > target shell components
 - Use default includes of the first 3 check boxes (1)



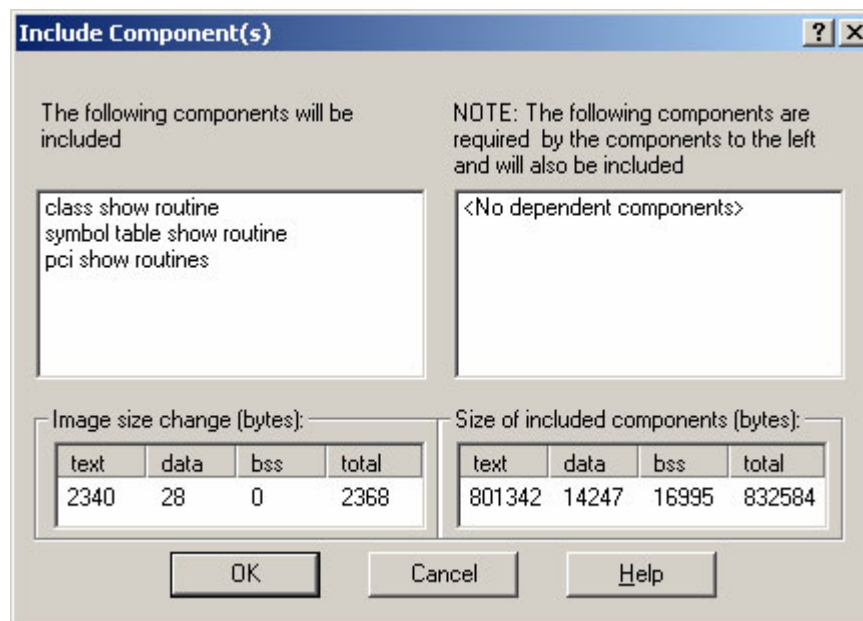
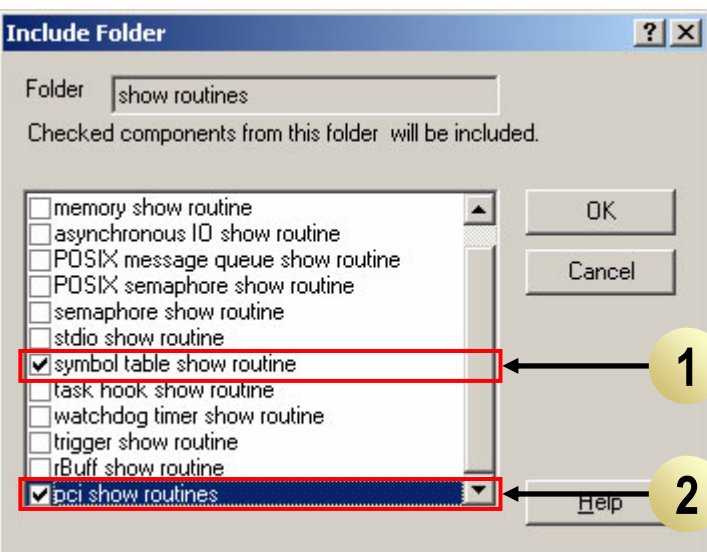
Configure System Image

- Include: network components > networking protocols
> network filesystems
 - Check “FTP server” (1)



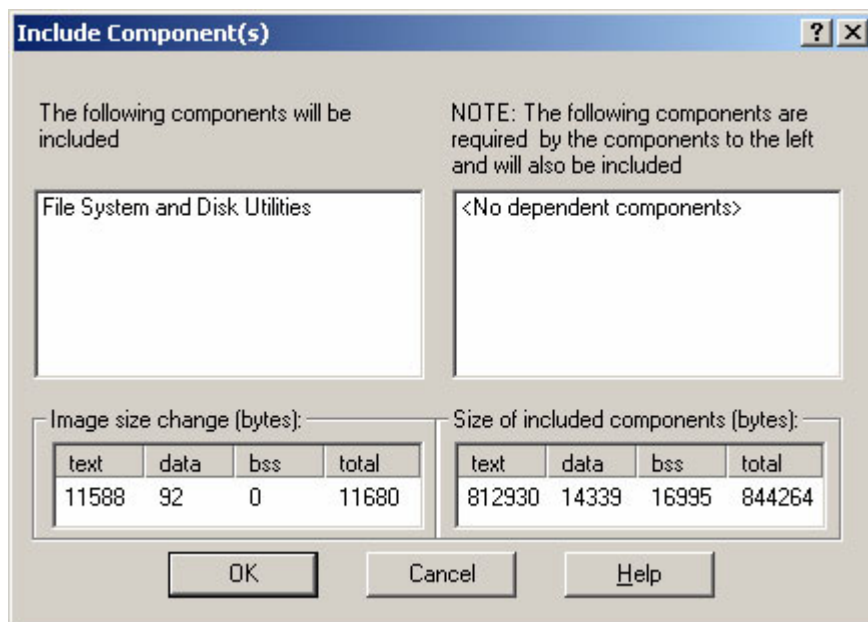
Configure System Image

- Include: development tool components > show routines
 - Check “symbol table show routine” (1)
 - Check “pci show routines” (2)



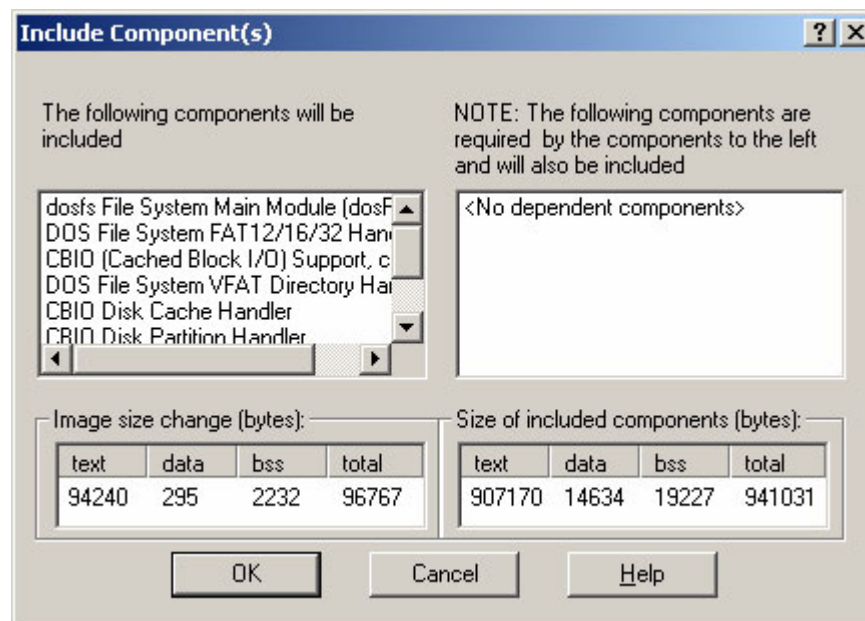
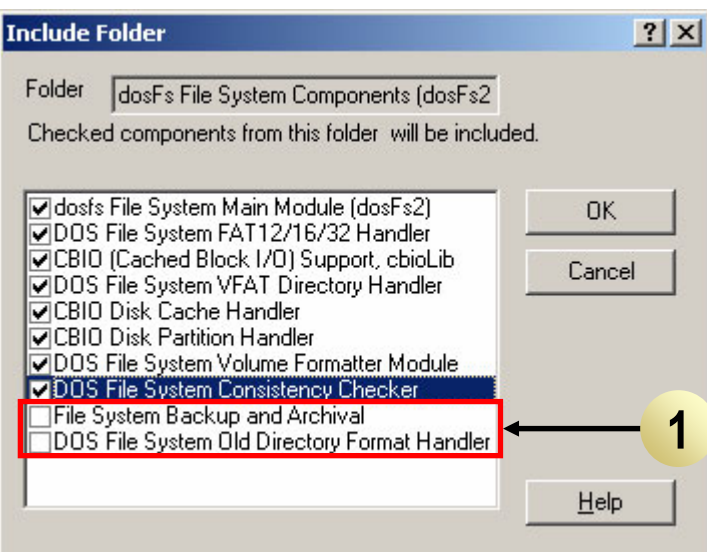
Configure System Image

- Include: operating system components > IO system components > File System and Disk Utilities



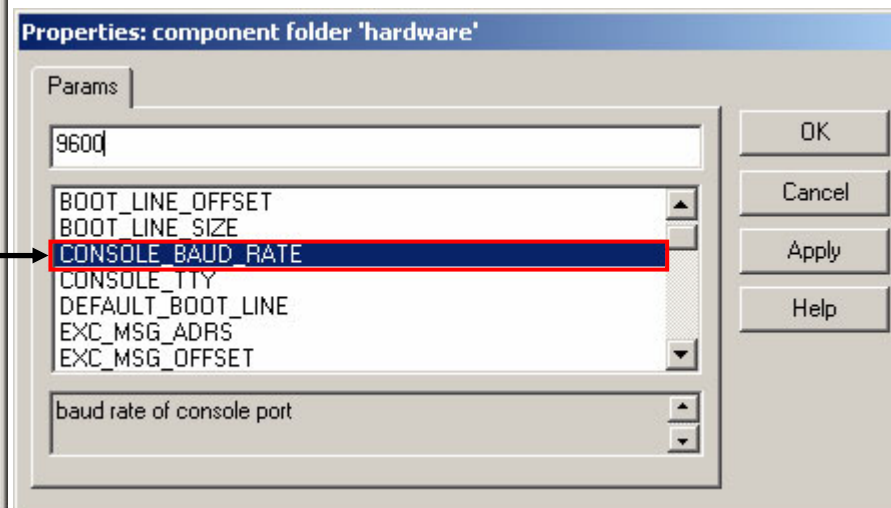
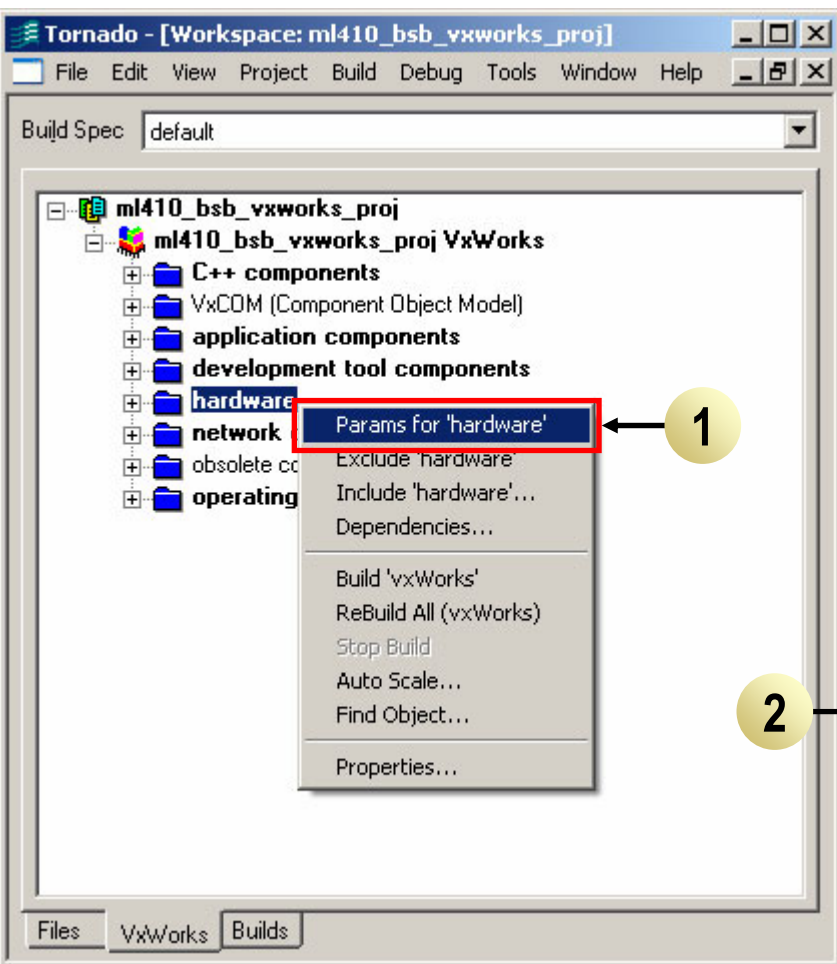
Configure System Image

- Include: operating system components > IO system components > dosFs File System Components
 - Check **all** boxes, except (1):
 - File System Backup and Archival
 - DOS File System Old Directory Format Handler



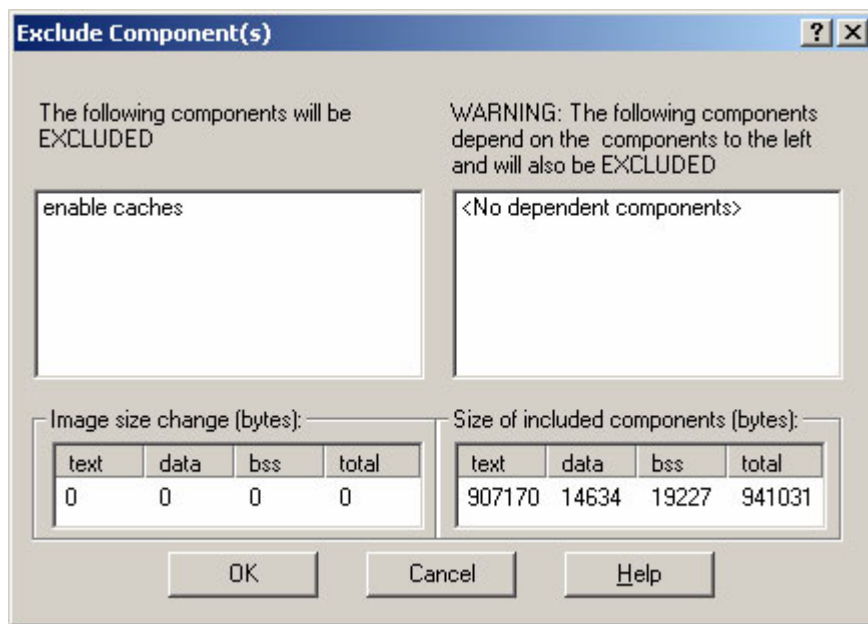
Configure System Image

- Set Parameter:
 - Right-click on hardware and select Params for 'hardware' (1)
 - Click on CONSOLE_BAUD_RATE (2) then enter 9600 to set the baud rate



Configure System Image

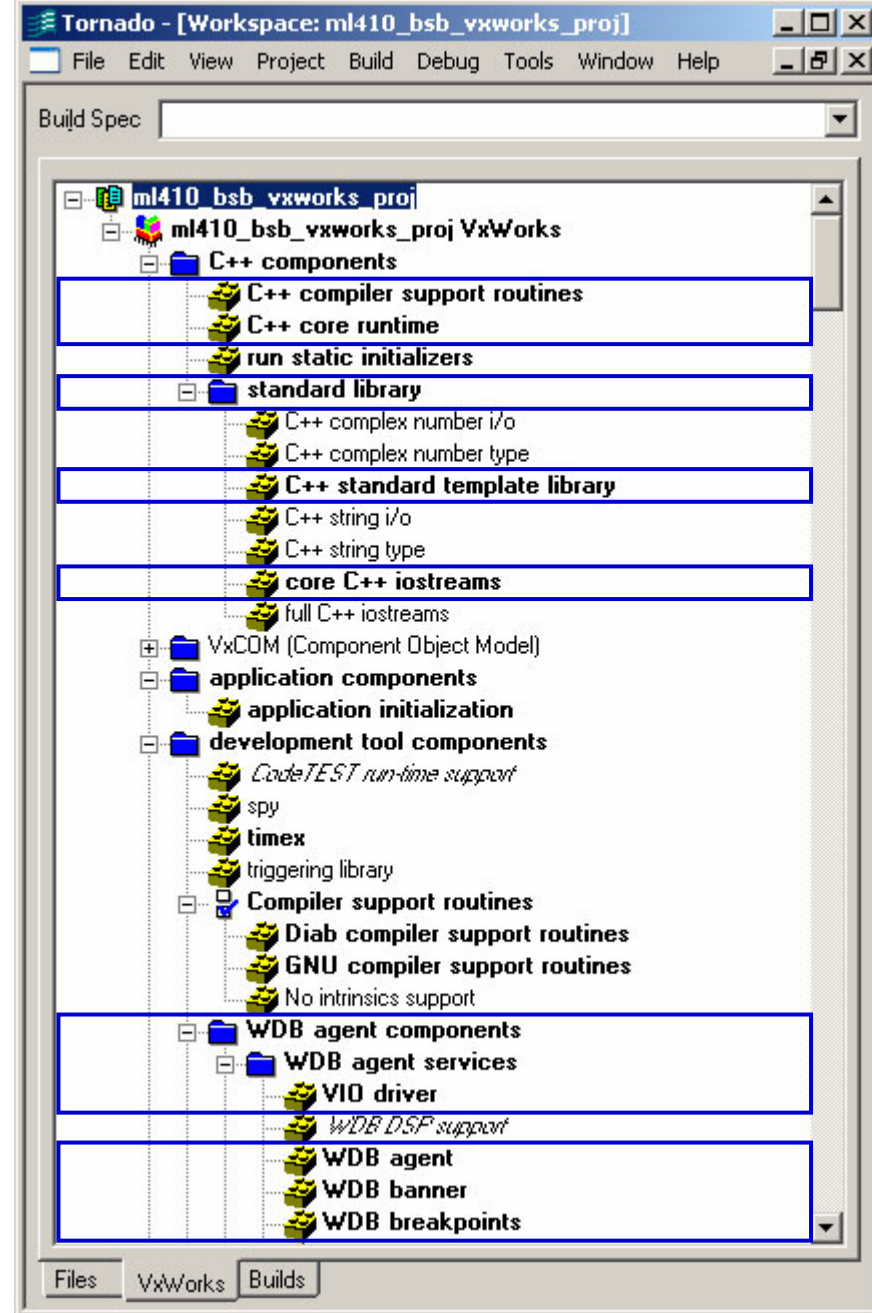
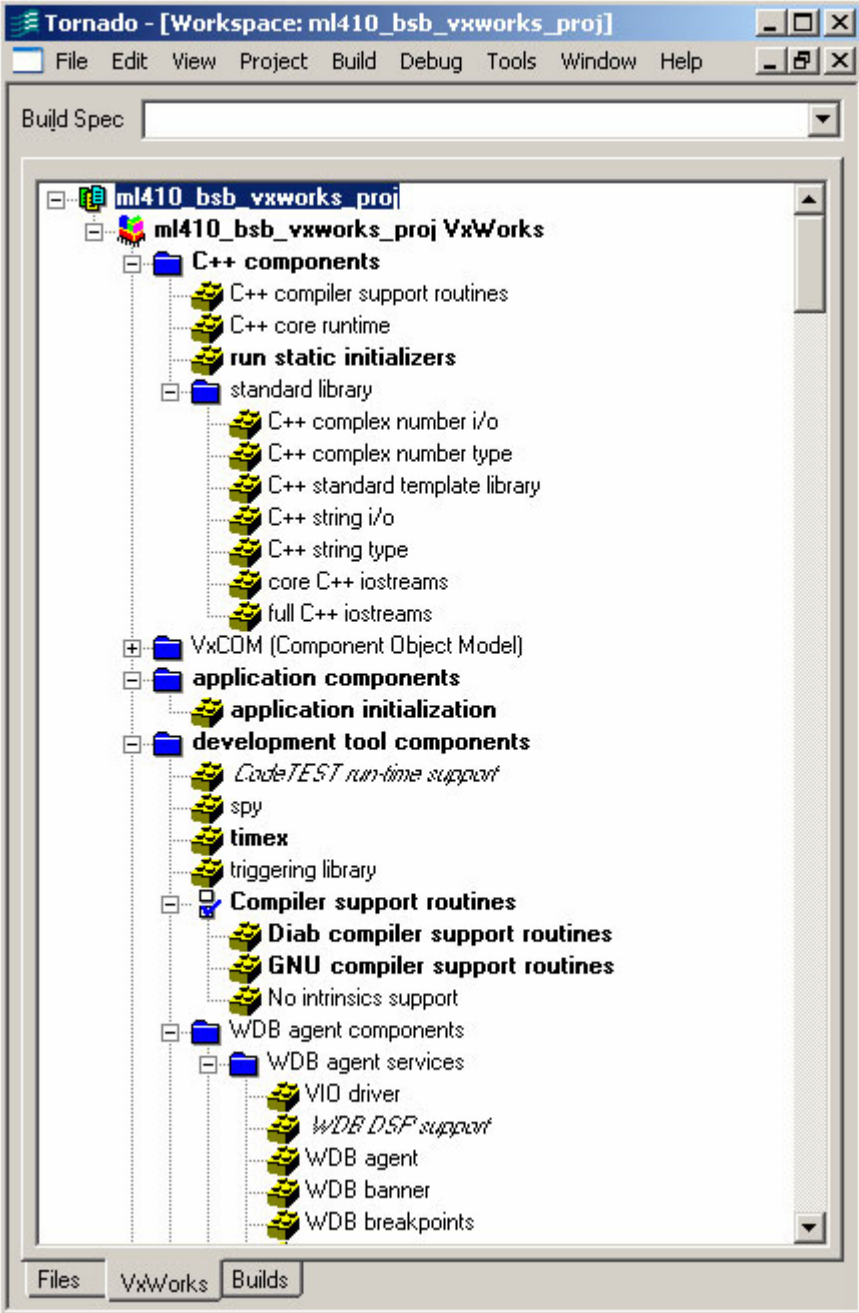
- Do this step last, after adding other components
 - Exclude: hardware > memory > enable caches

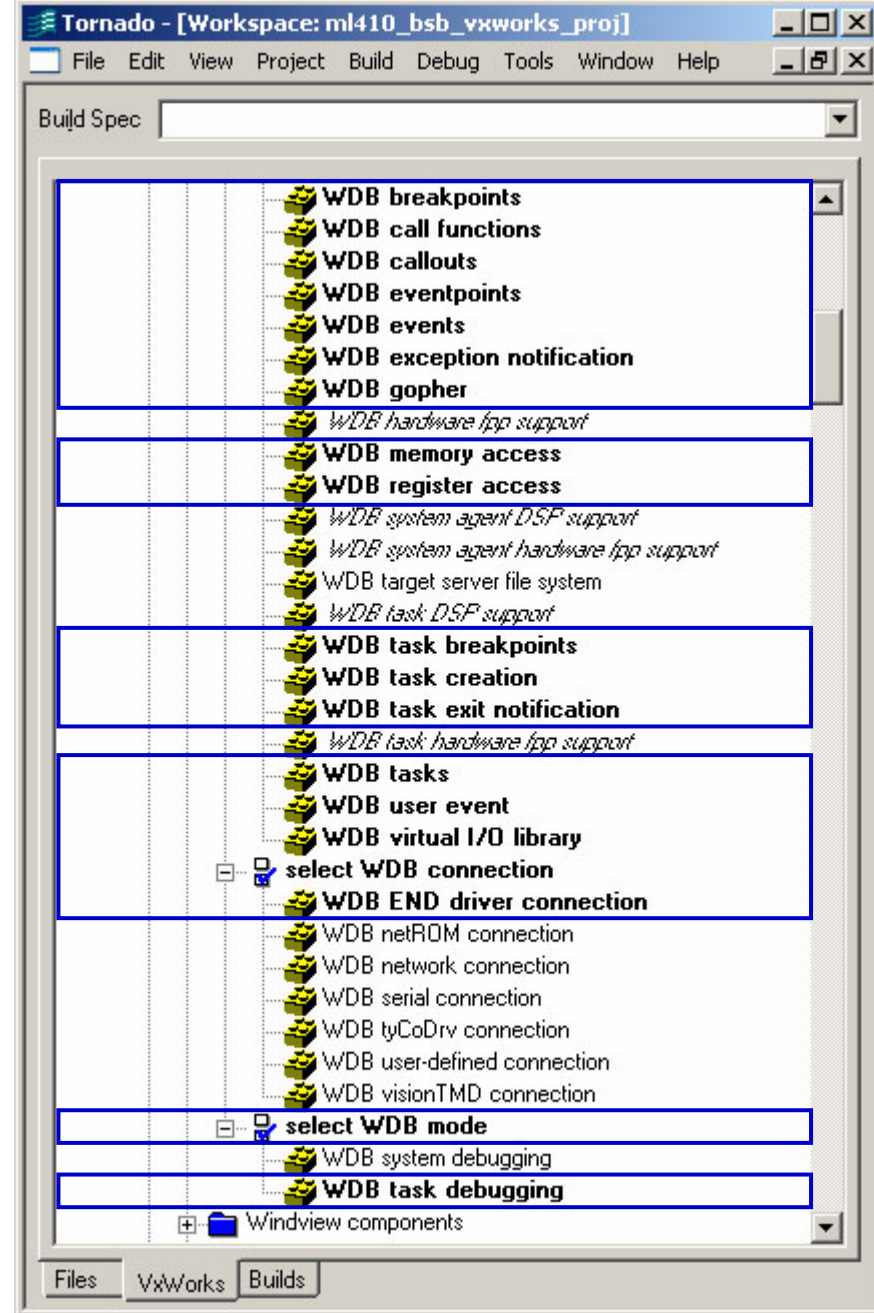
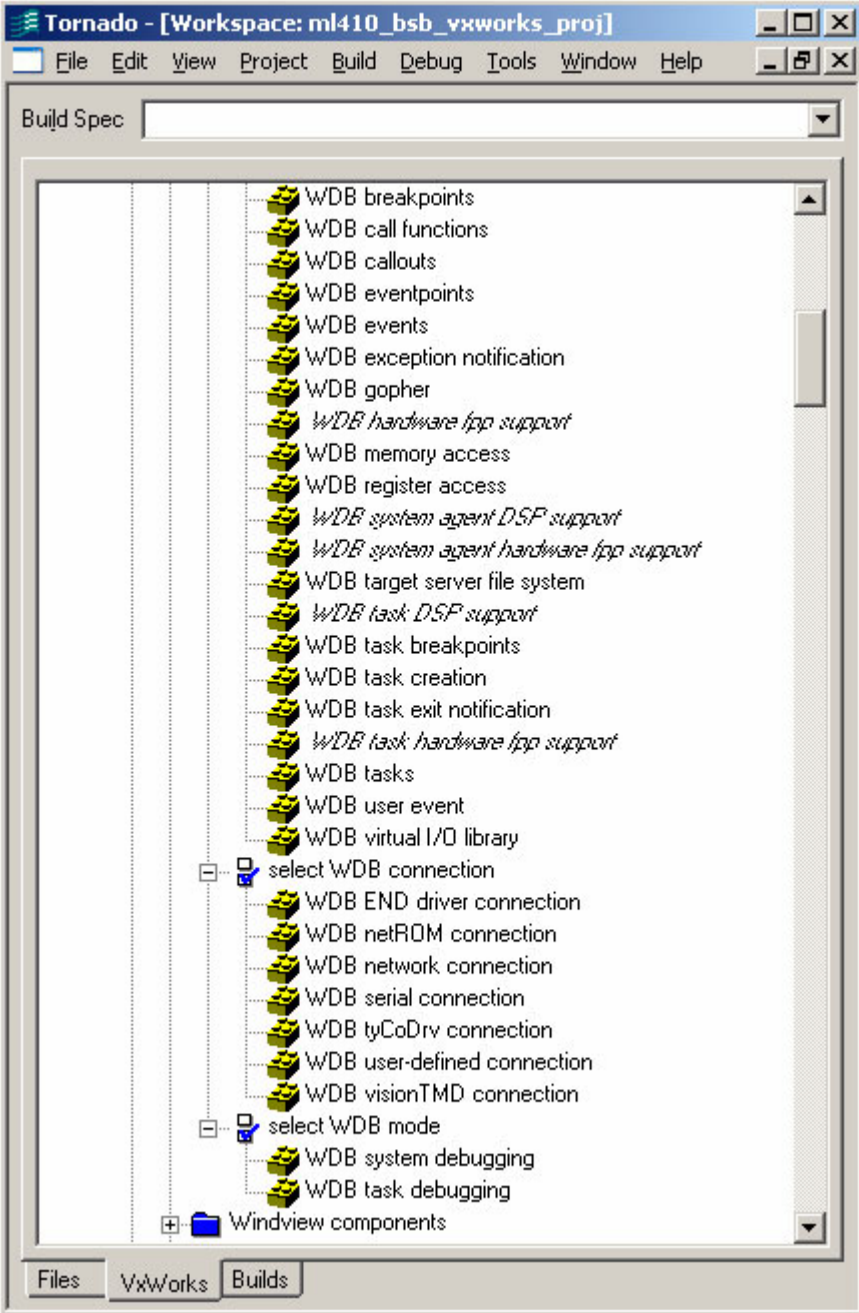


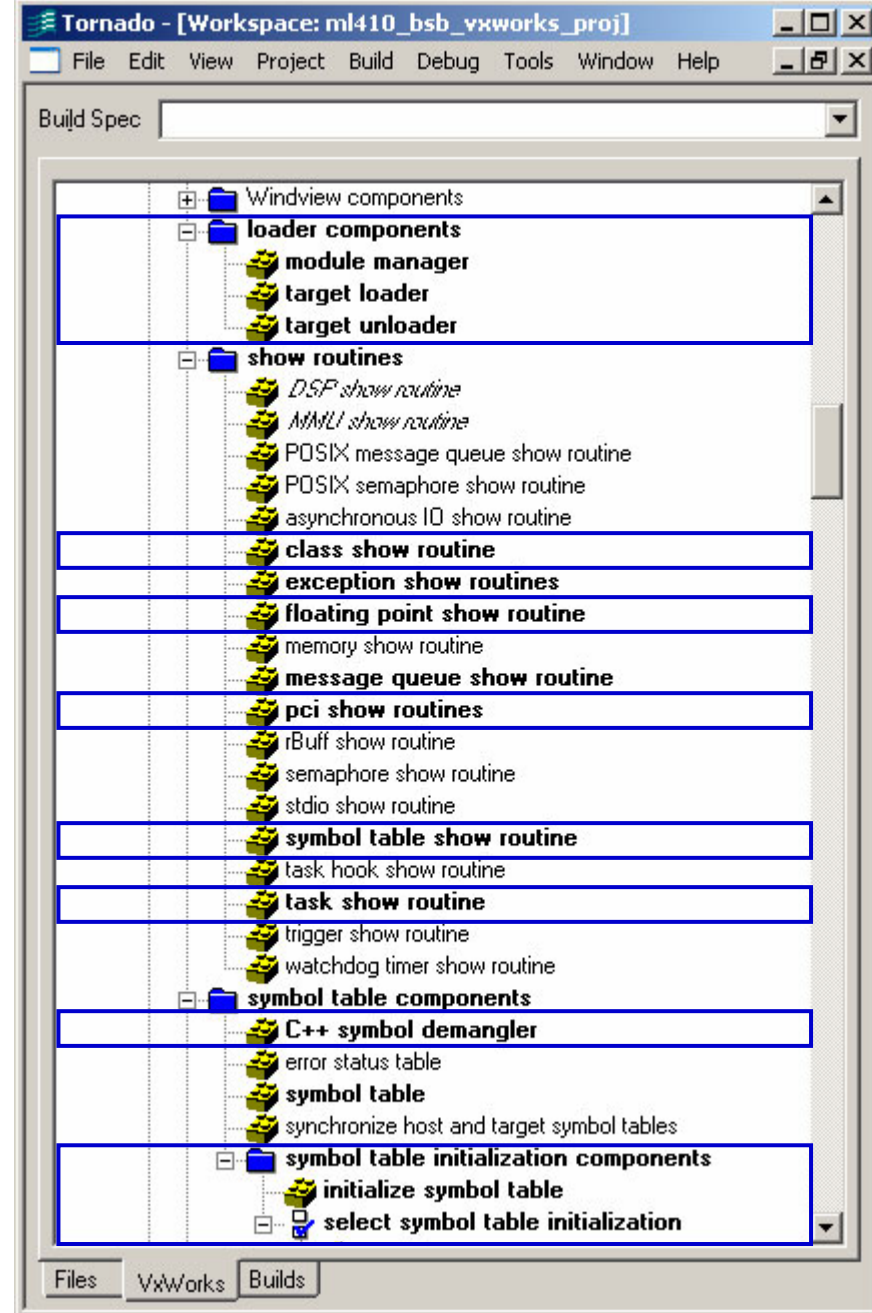
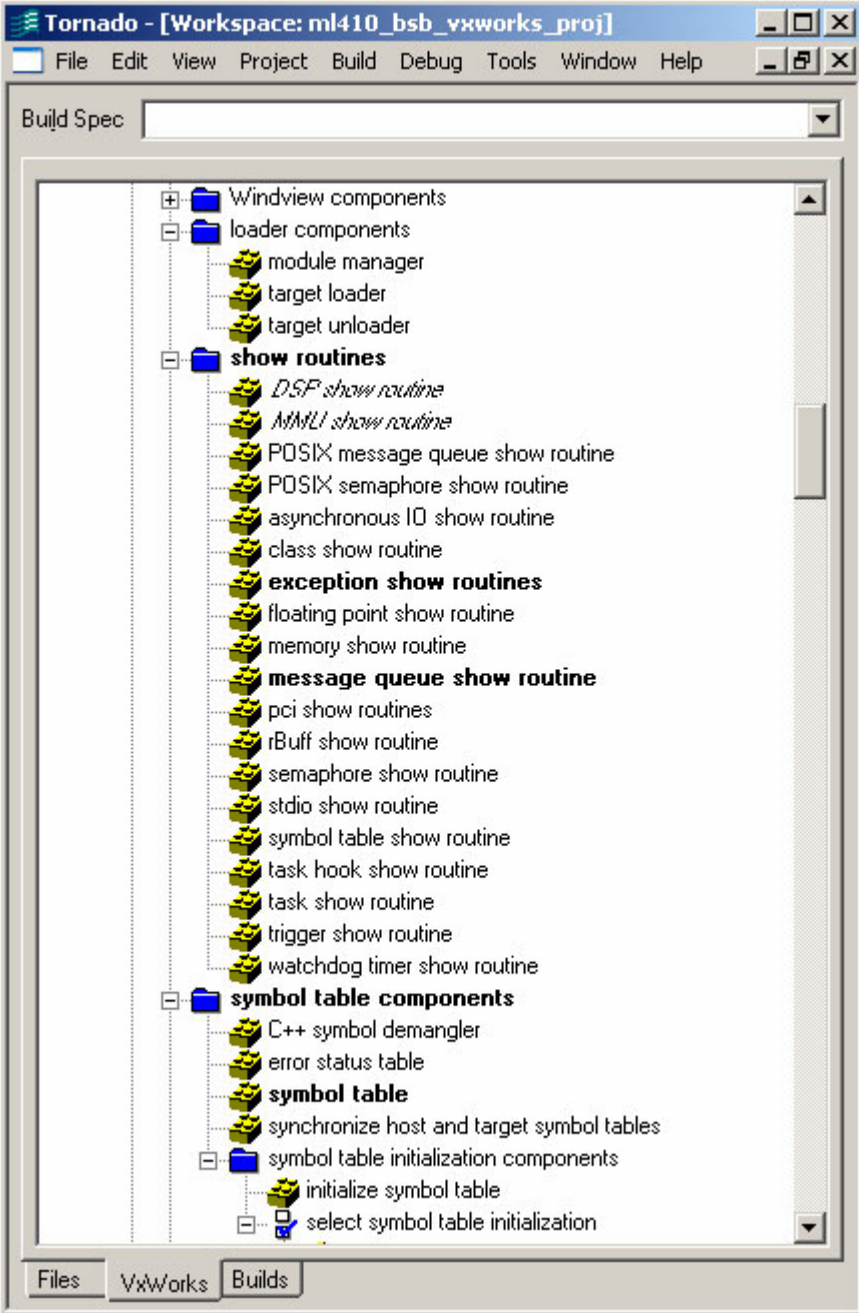
Configure System Image

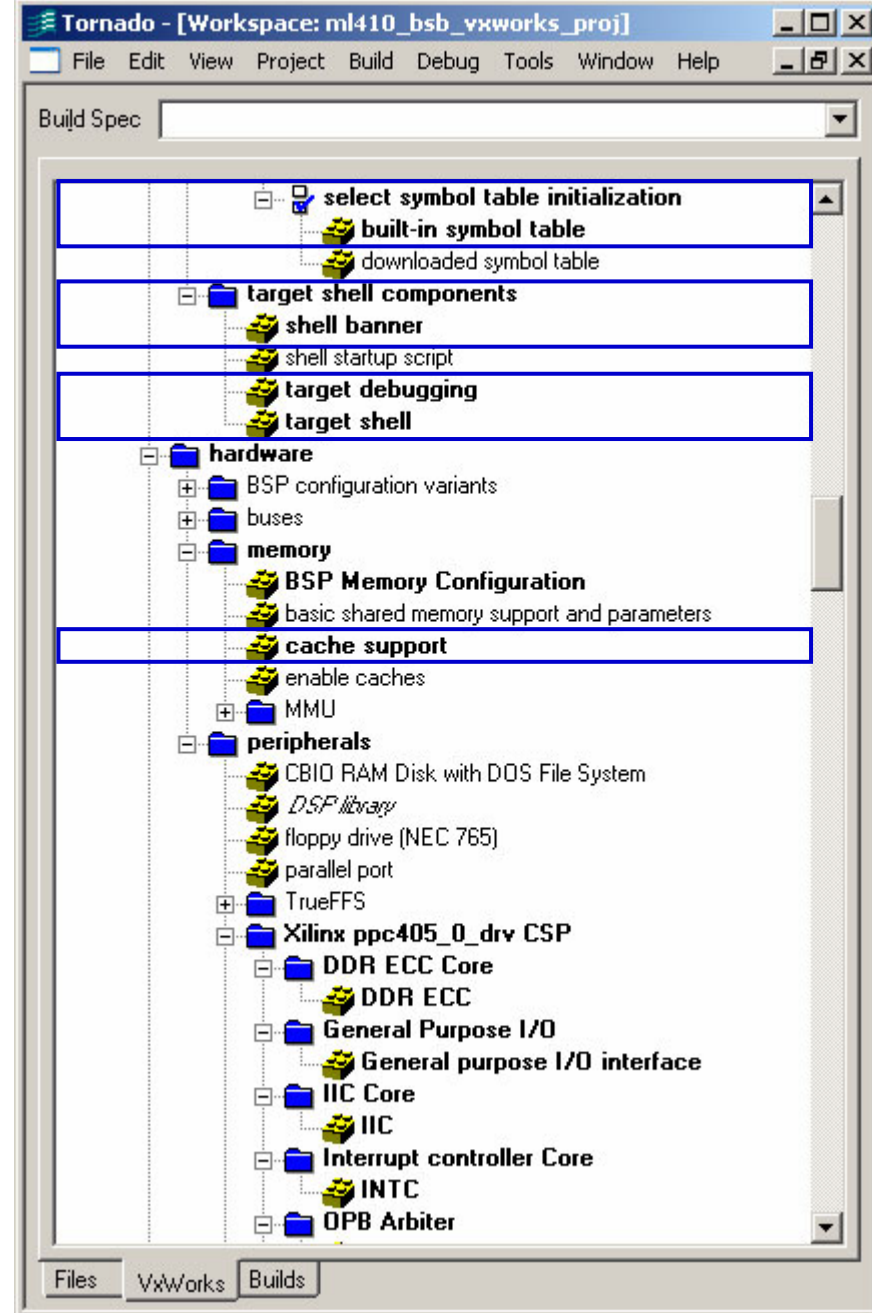
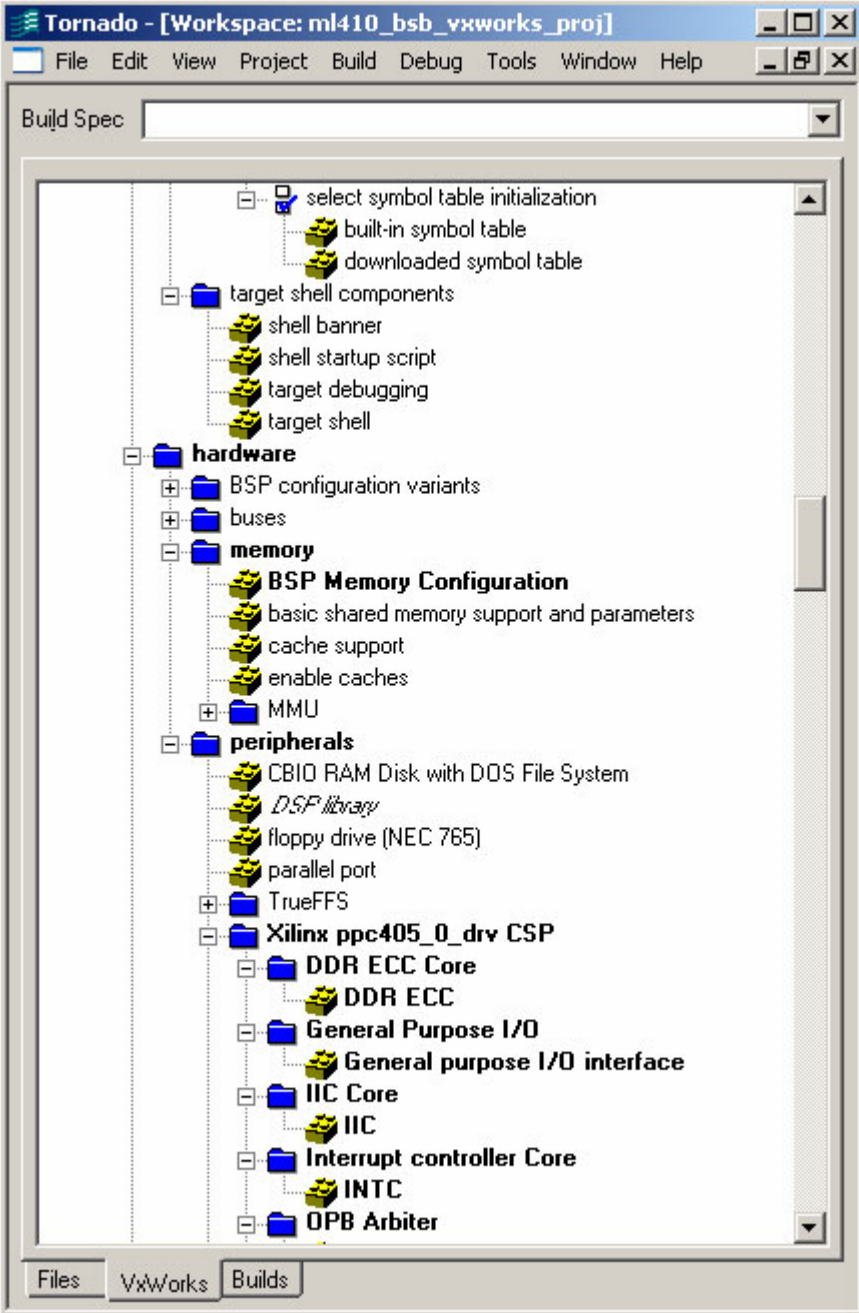
- The next several slides graphically compare the differences between:
 - A default Workspace, based on the BSP(left side)
 - A modified Workspace after system configuration (right side)
- Your included components should match the screenshots on the right
- Blue boxes on the right side show components included
- Red boxes on the left side show components excluded
 - Either because it was initially included or was added as a result of a dependency
- **Note:** If you have made any errors in configuring the system, the items may corrected (included or excluded) individually at this time

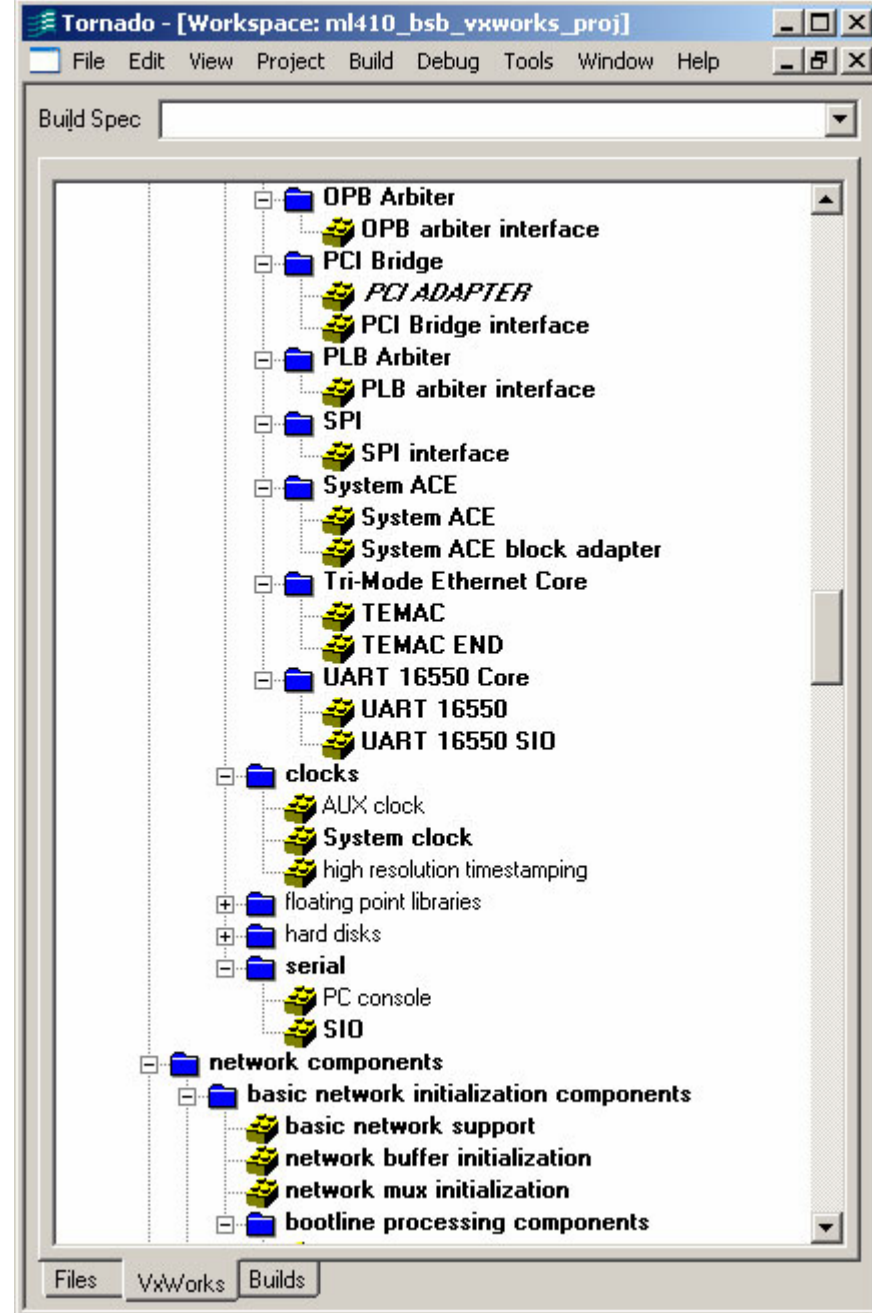
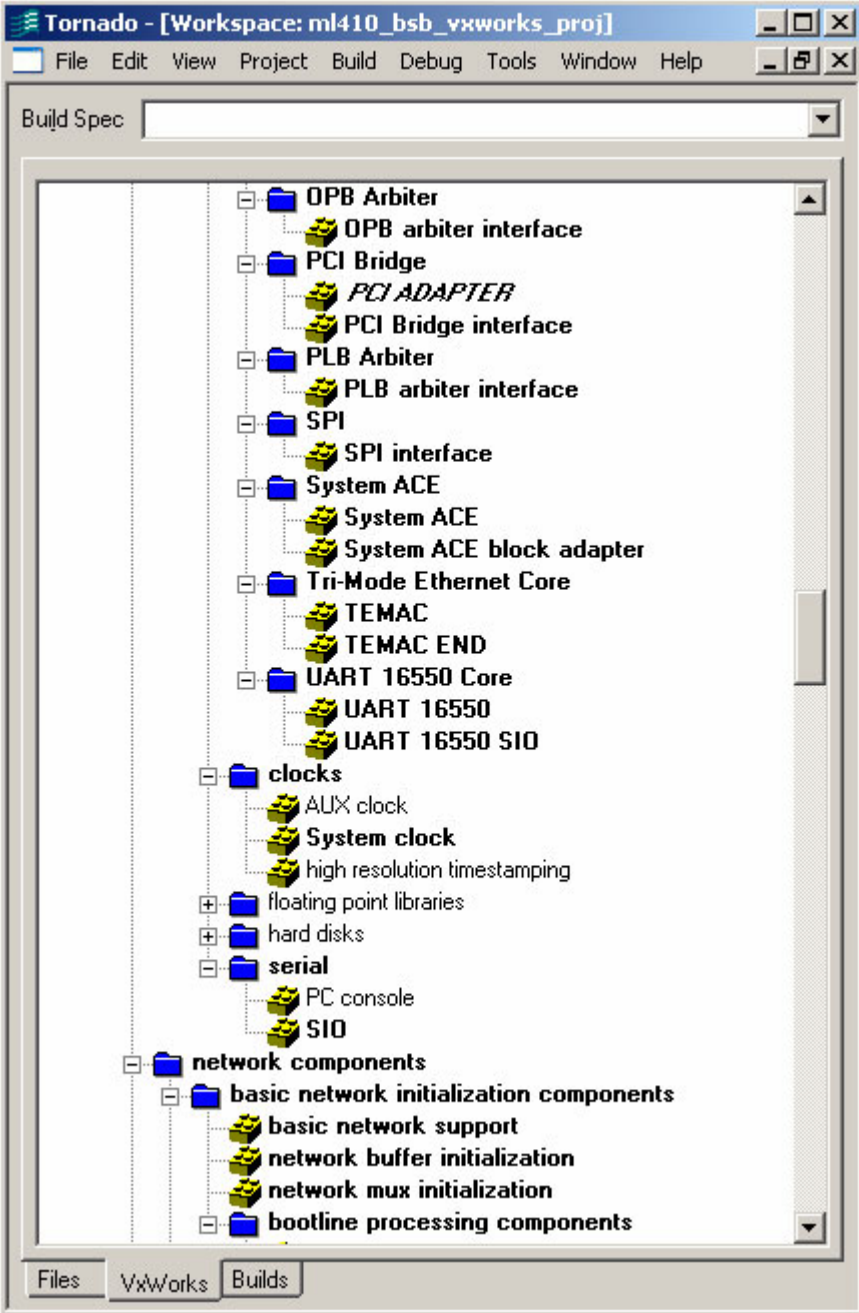


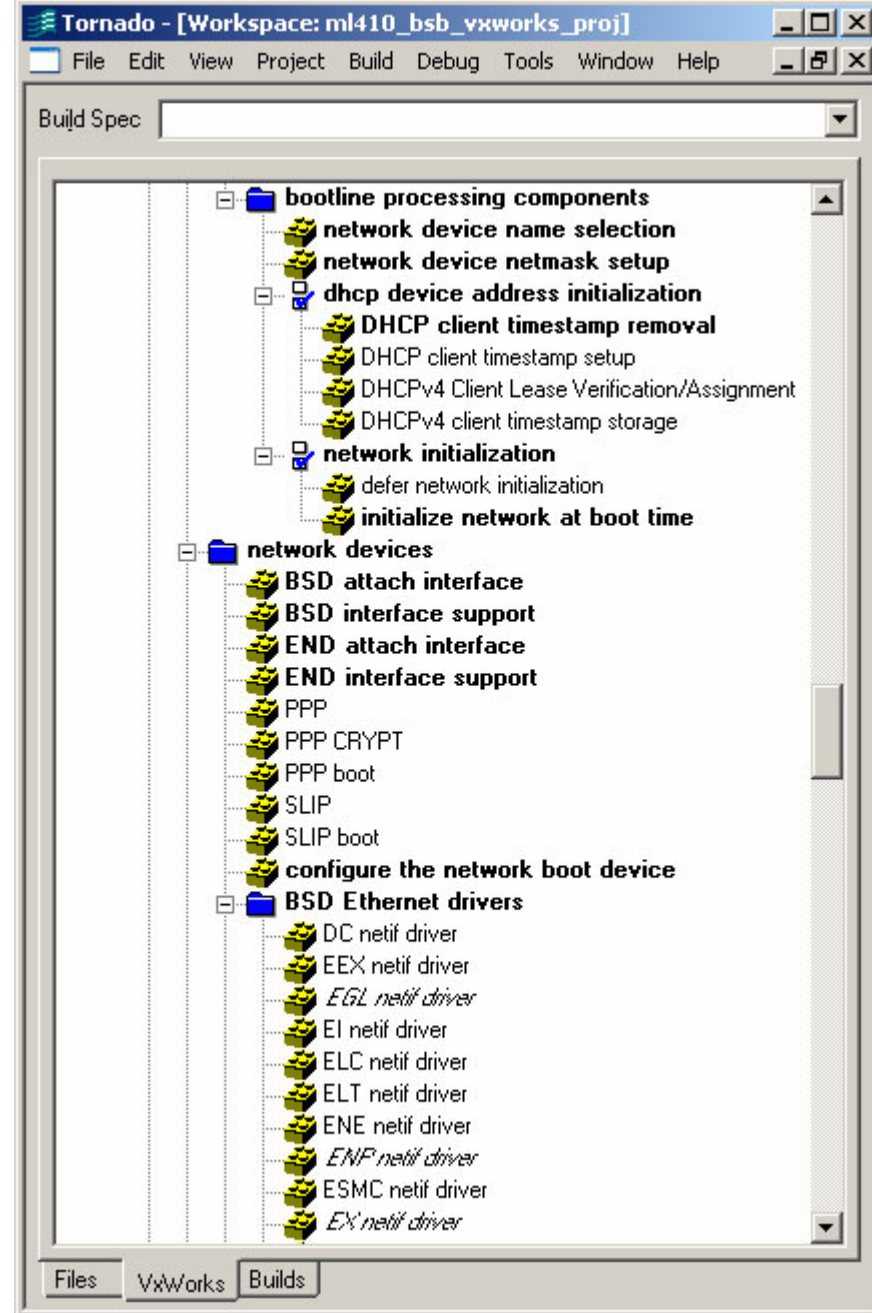
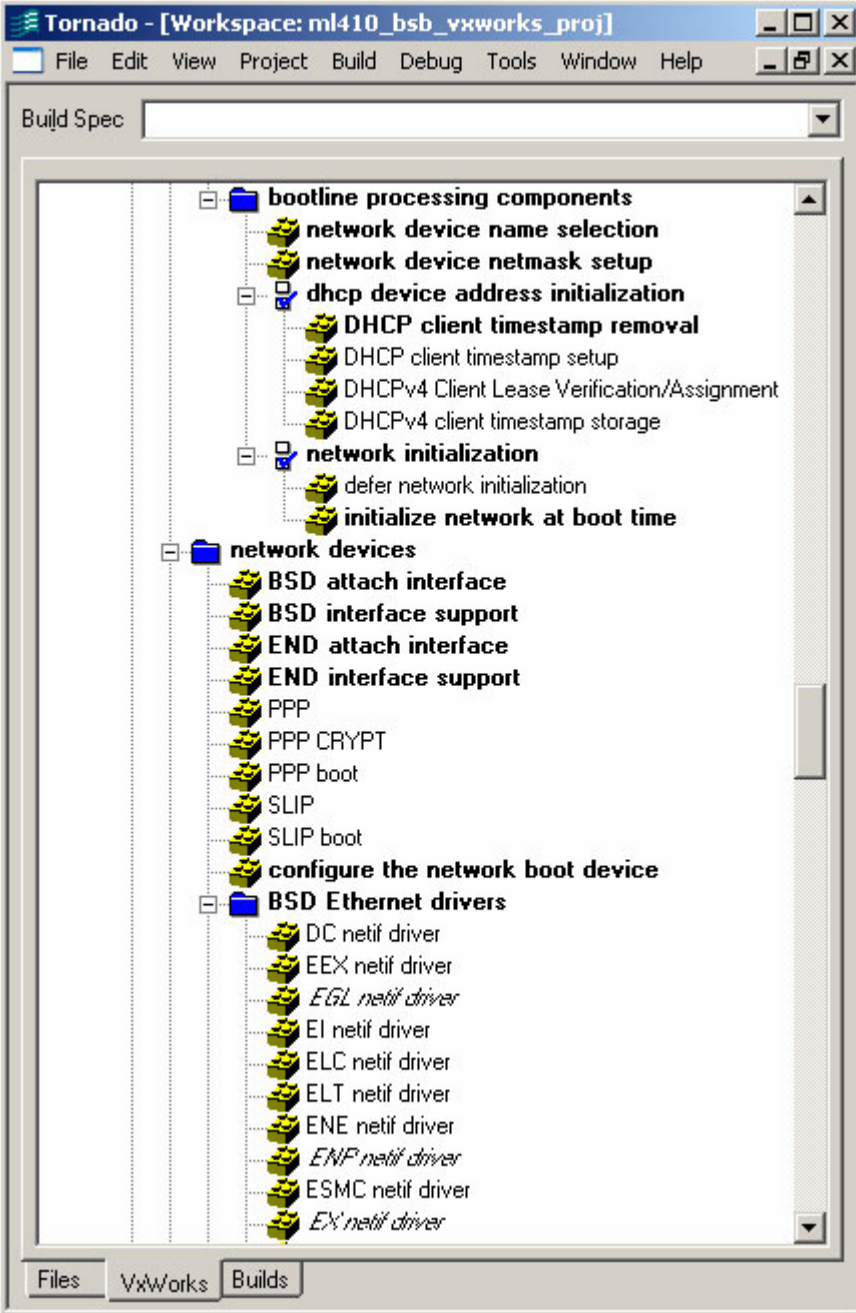


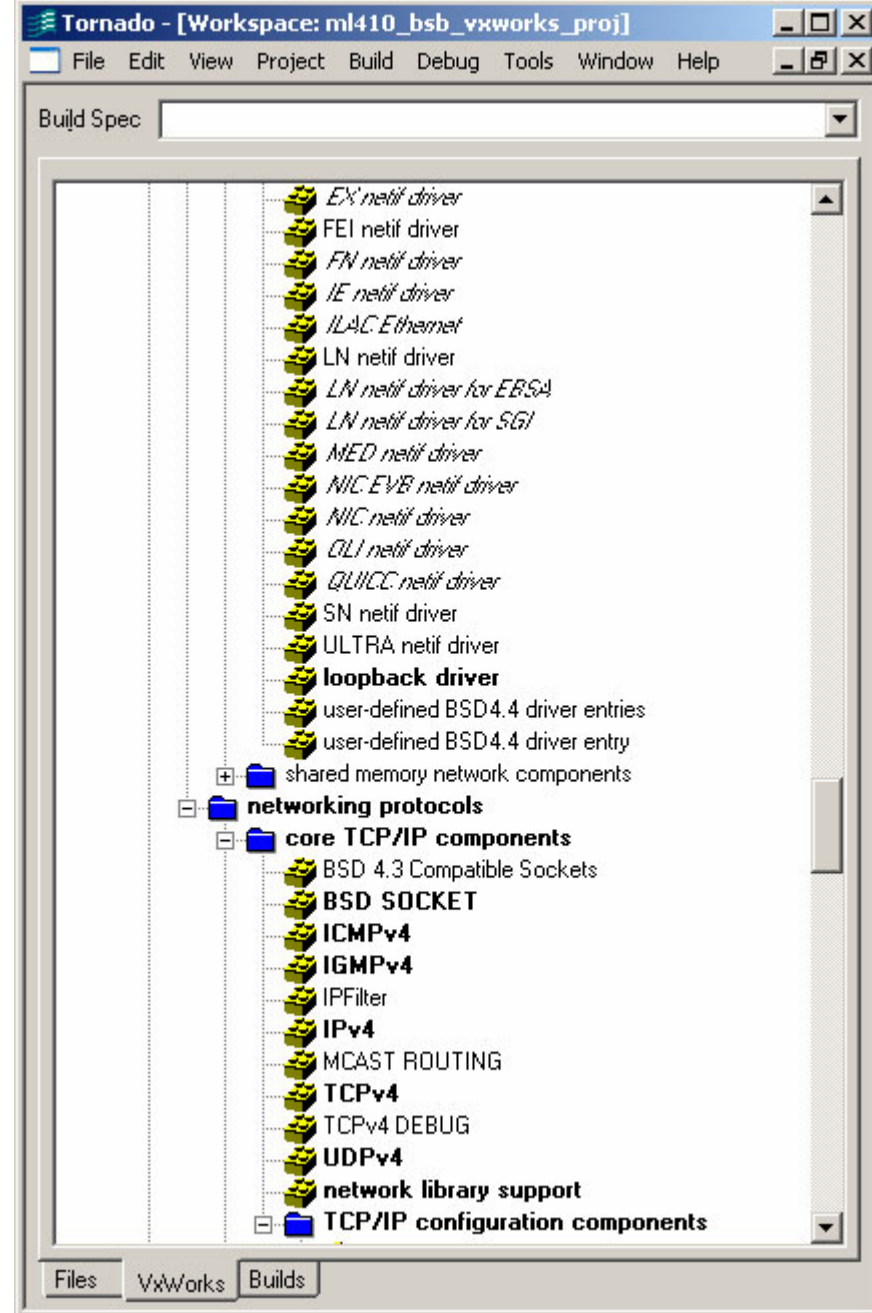
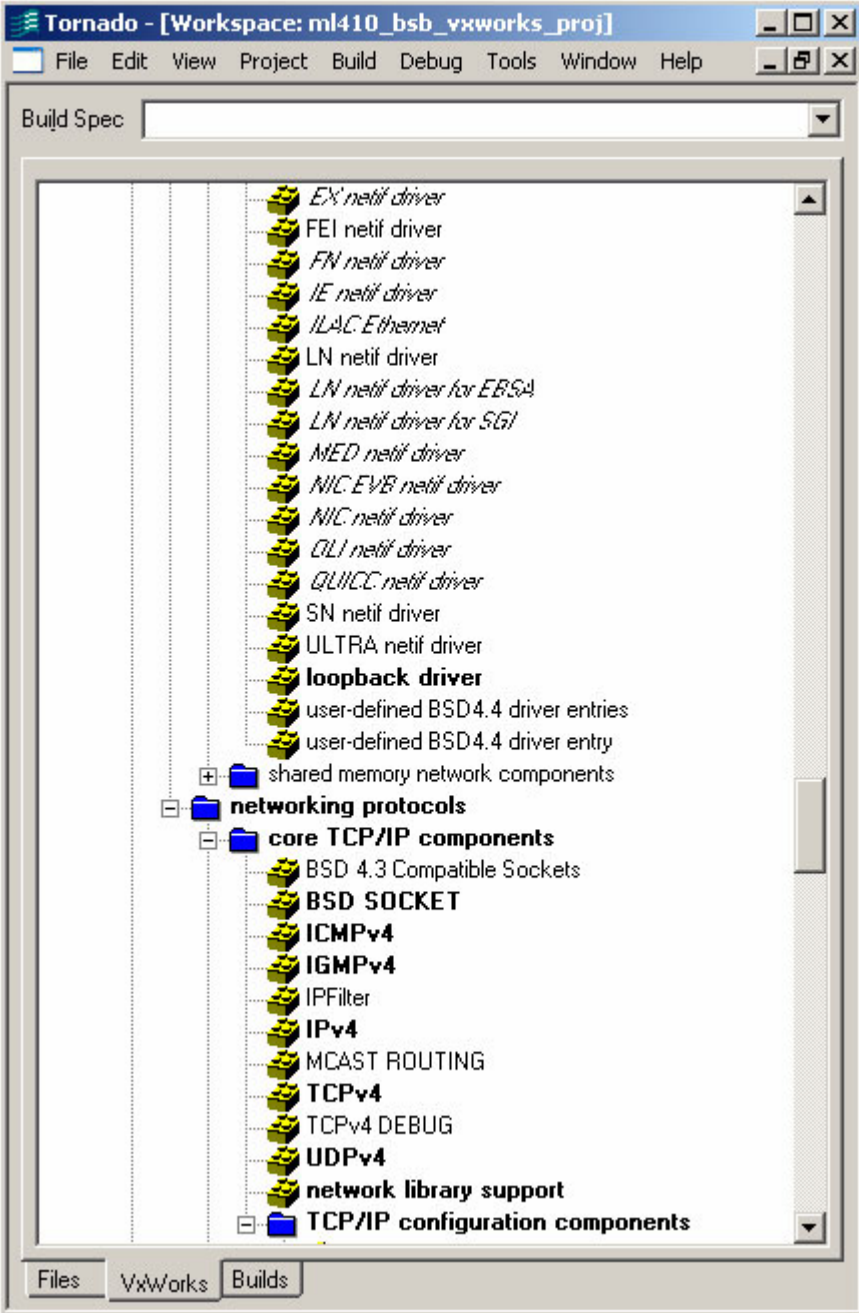


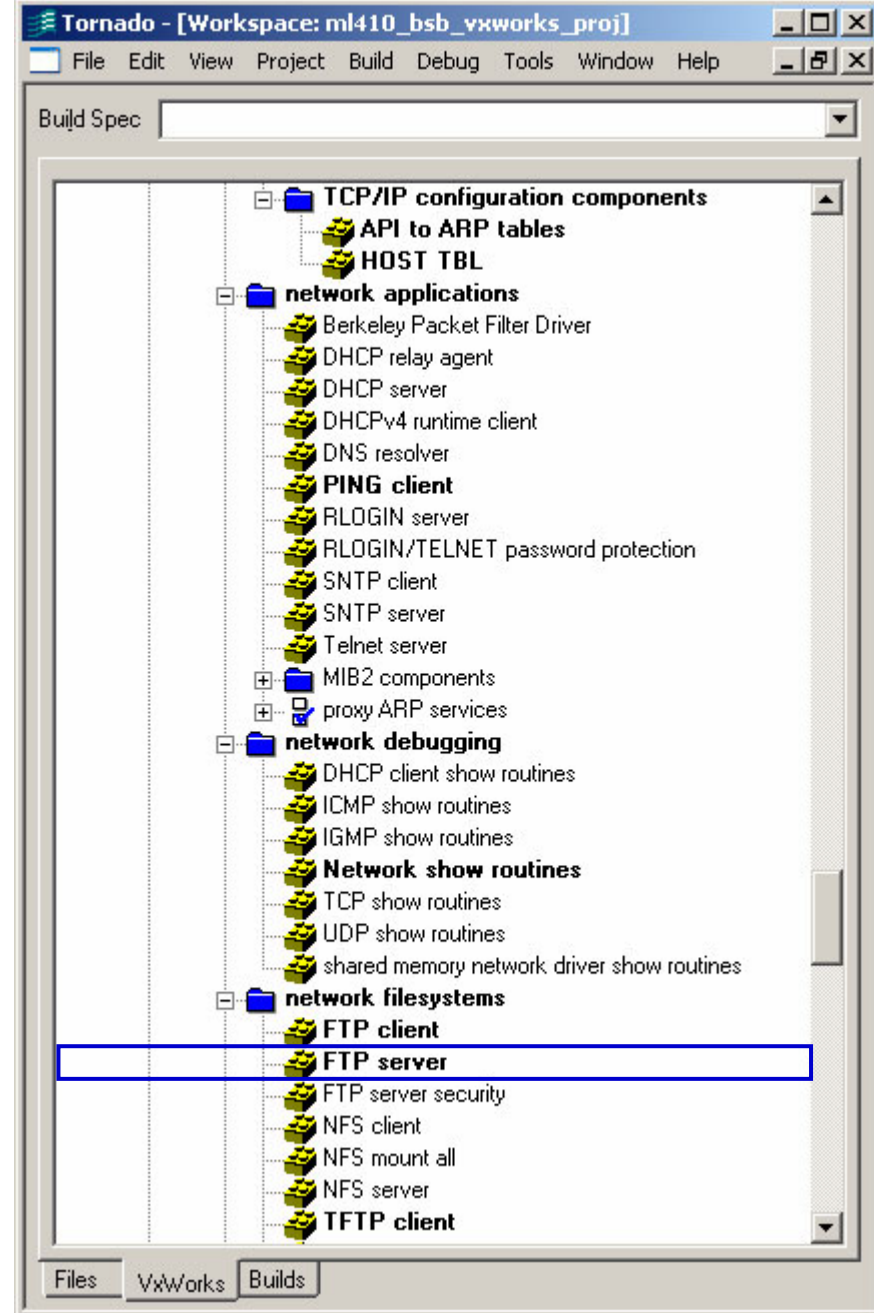
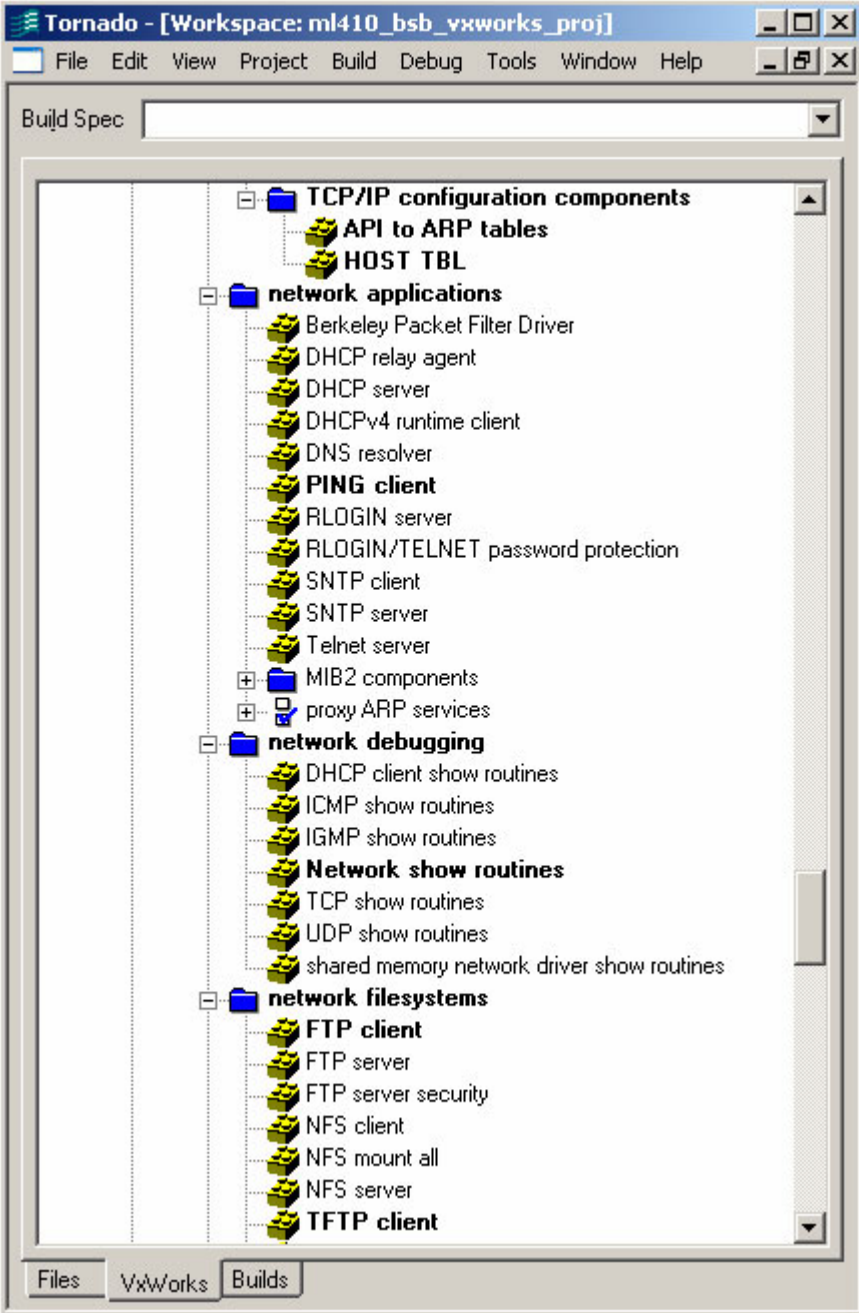


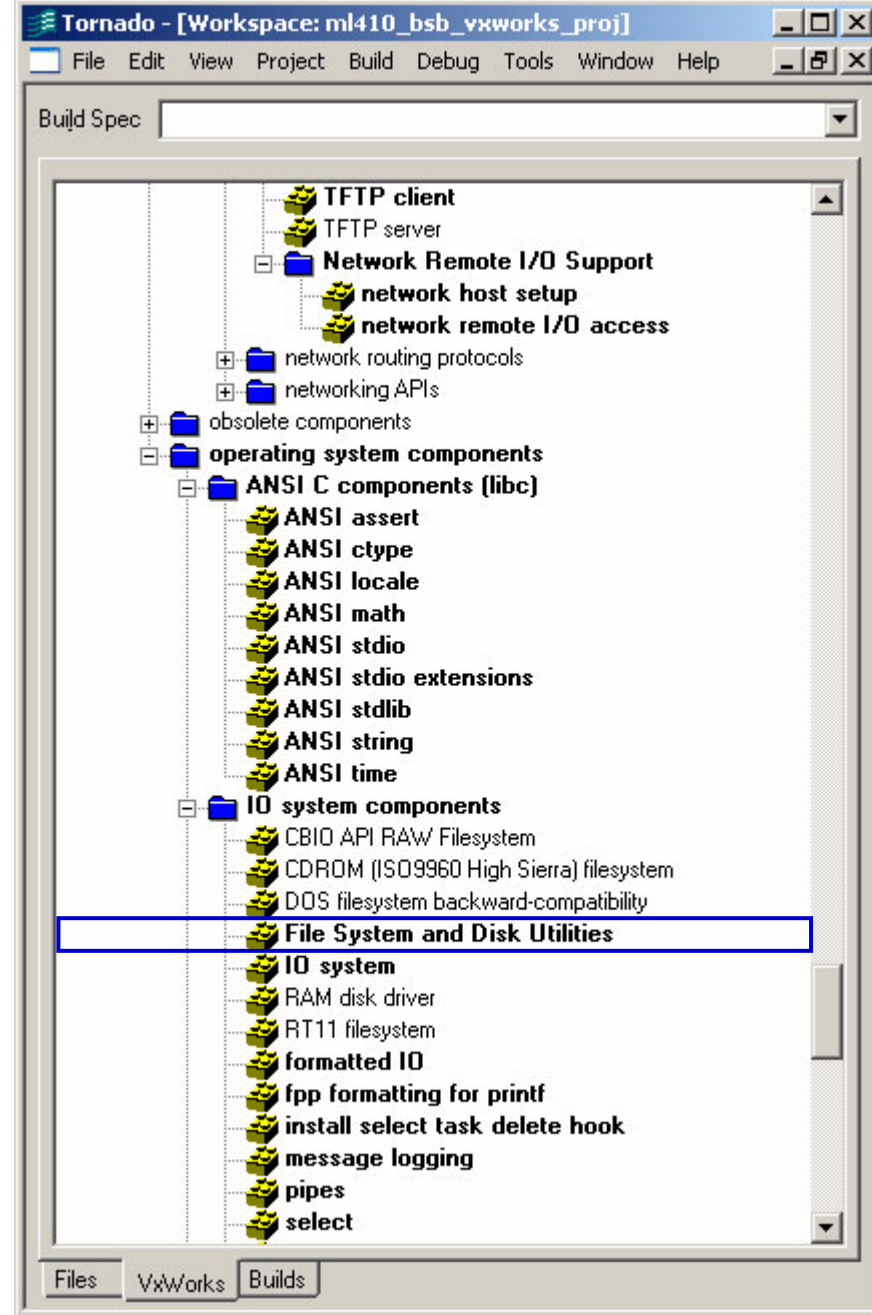
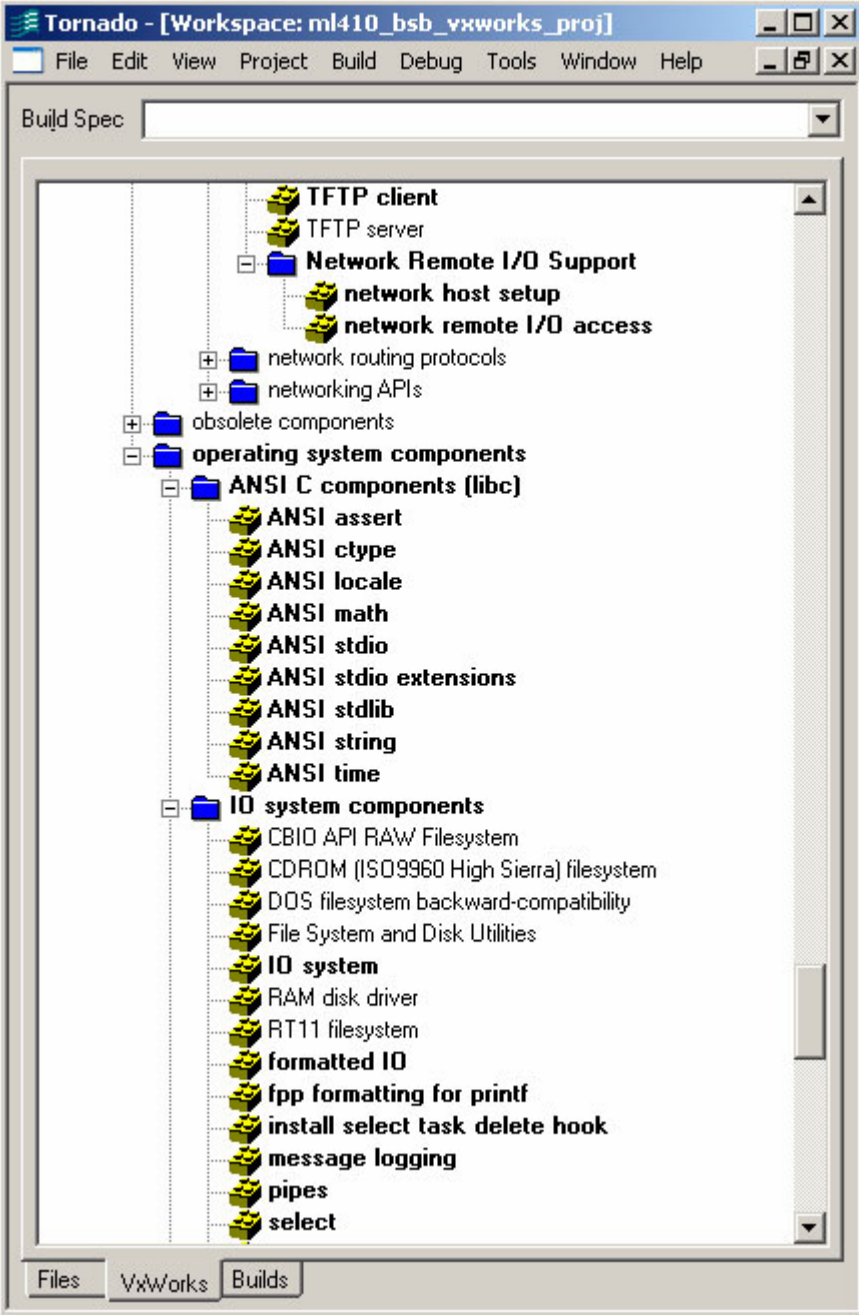


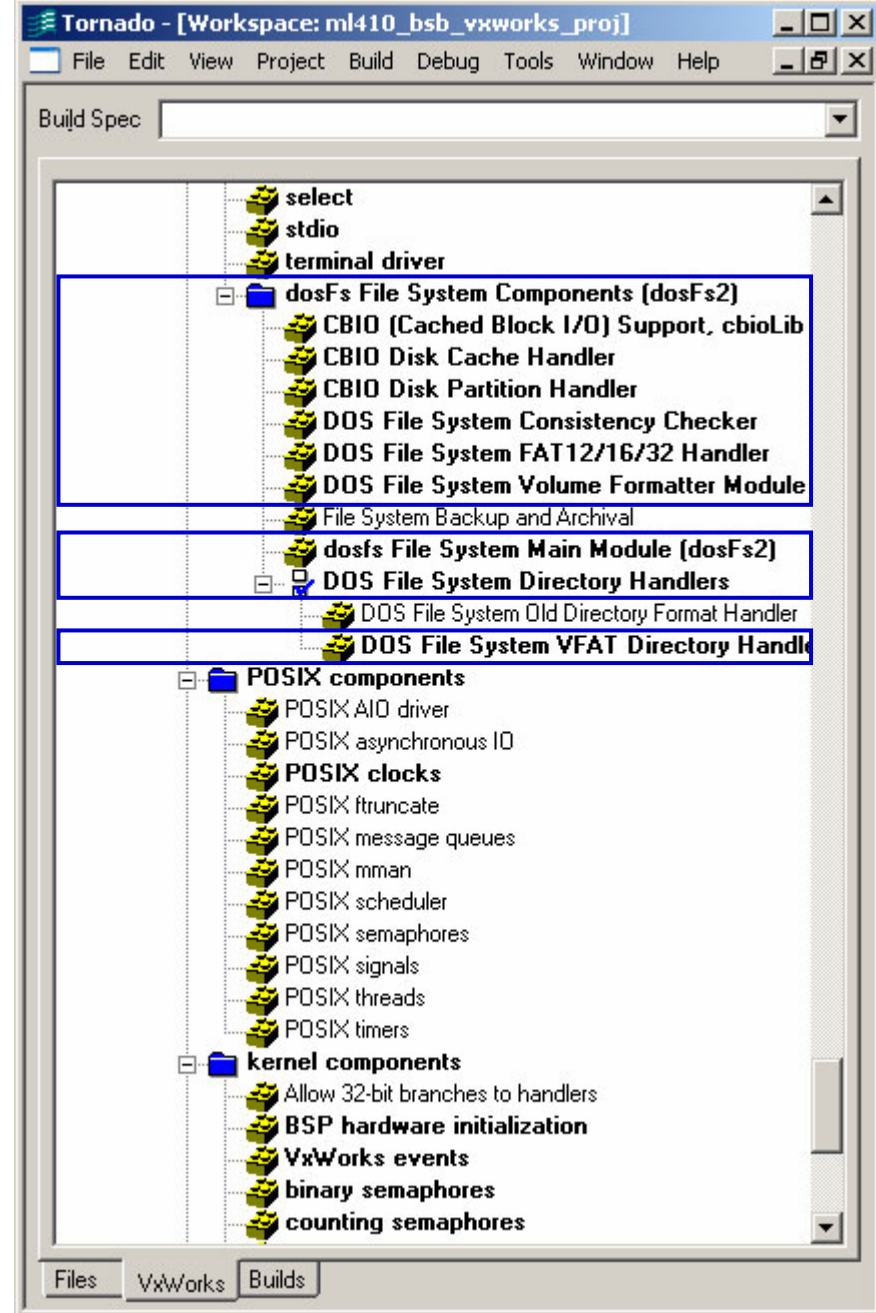
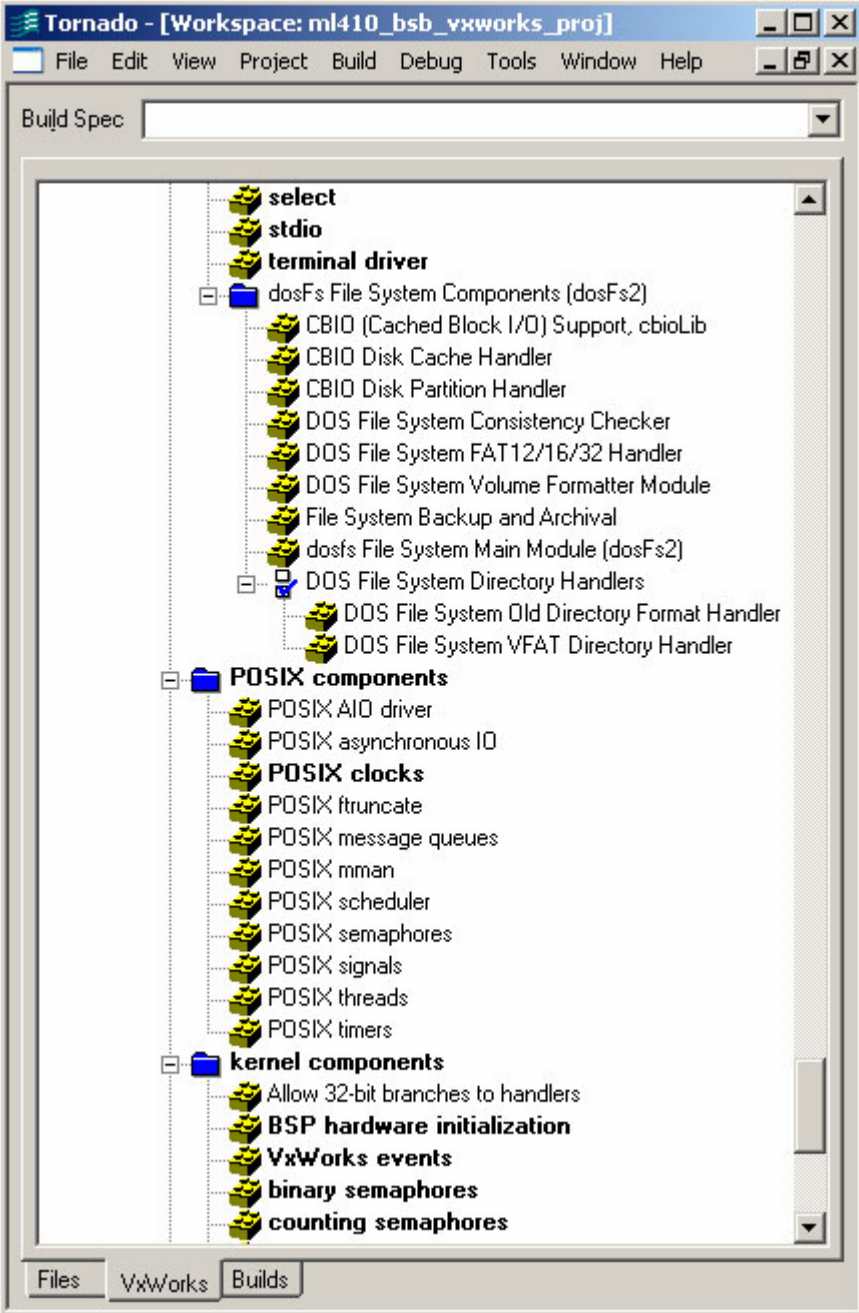


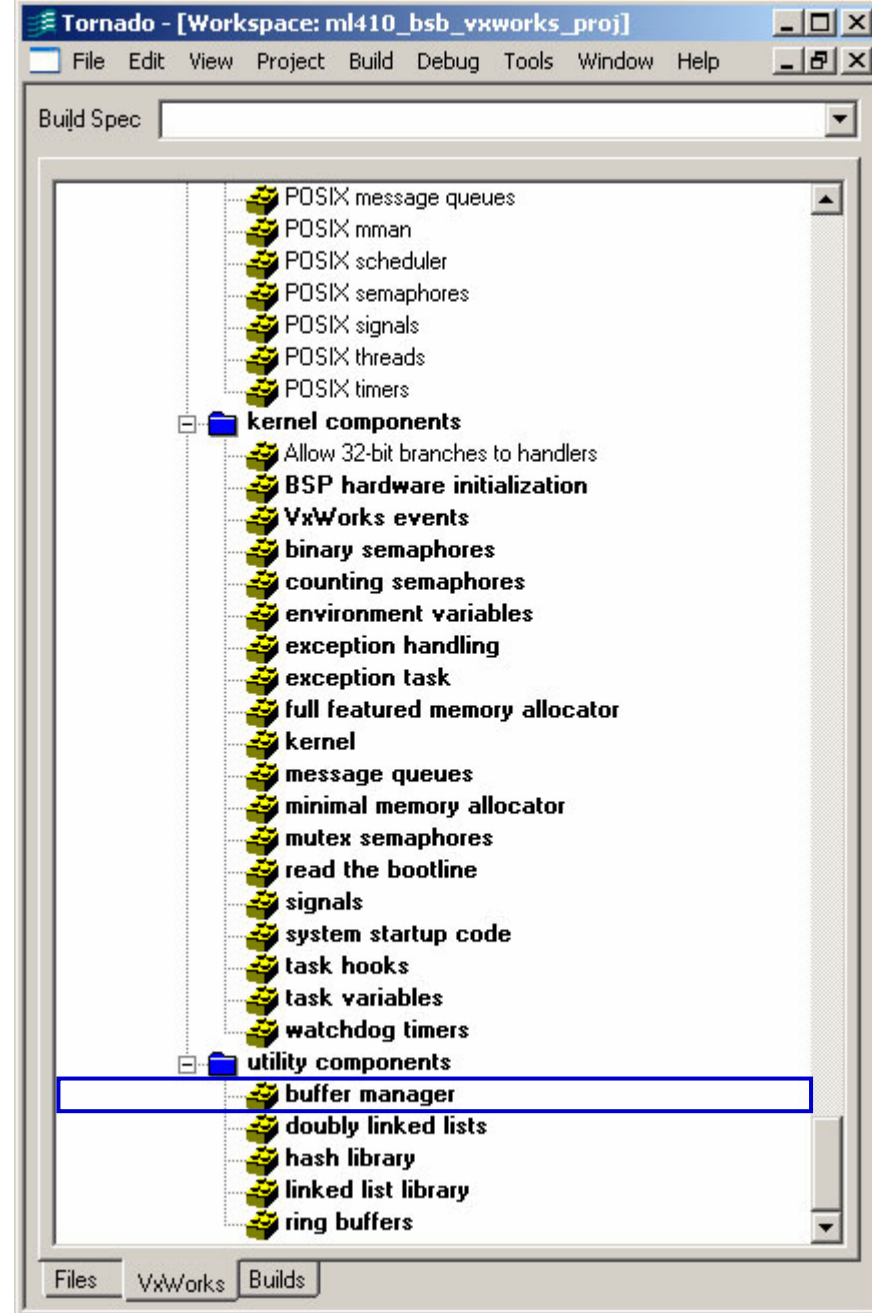
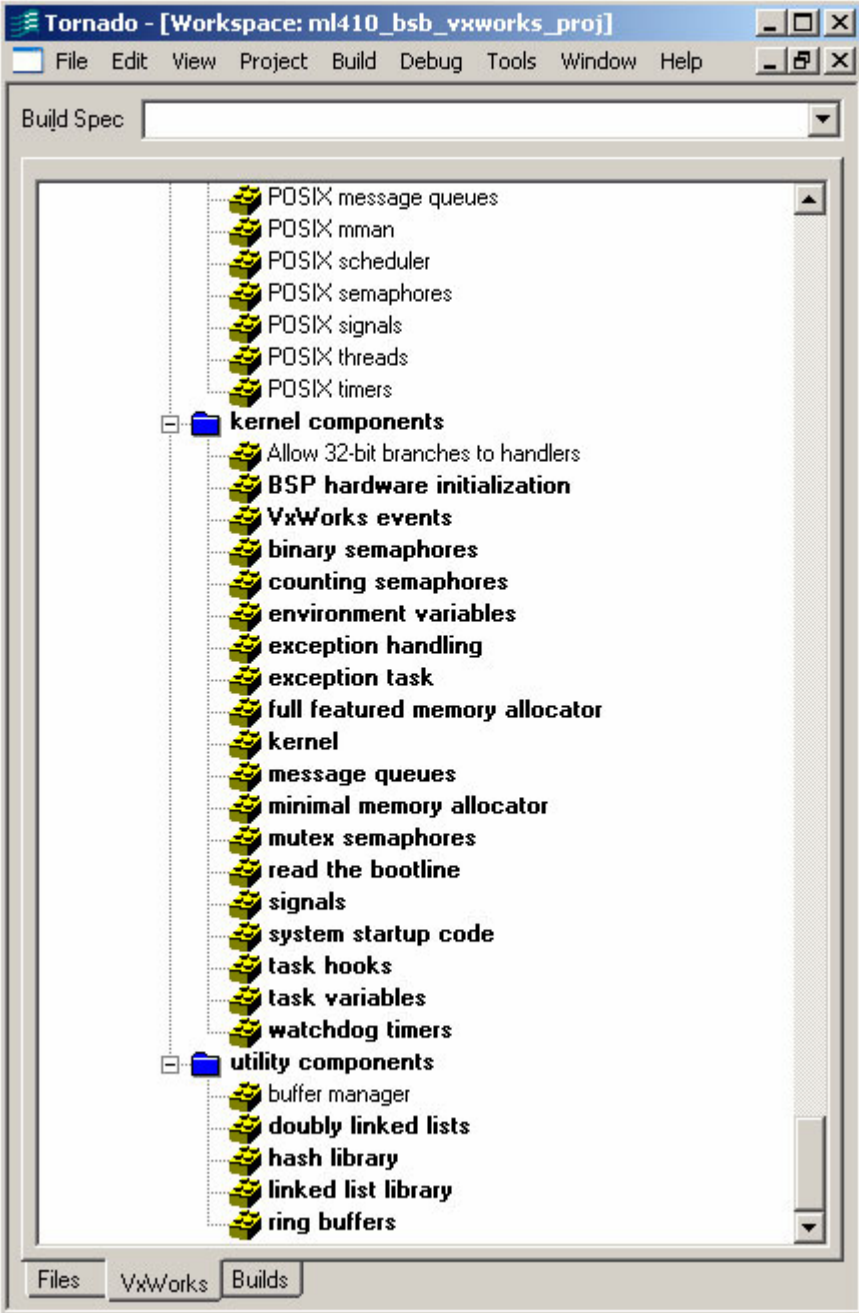




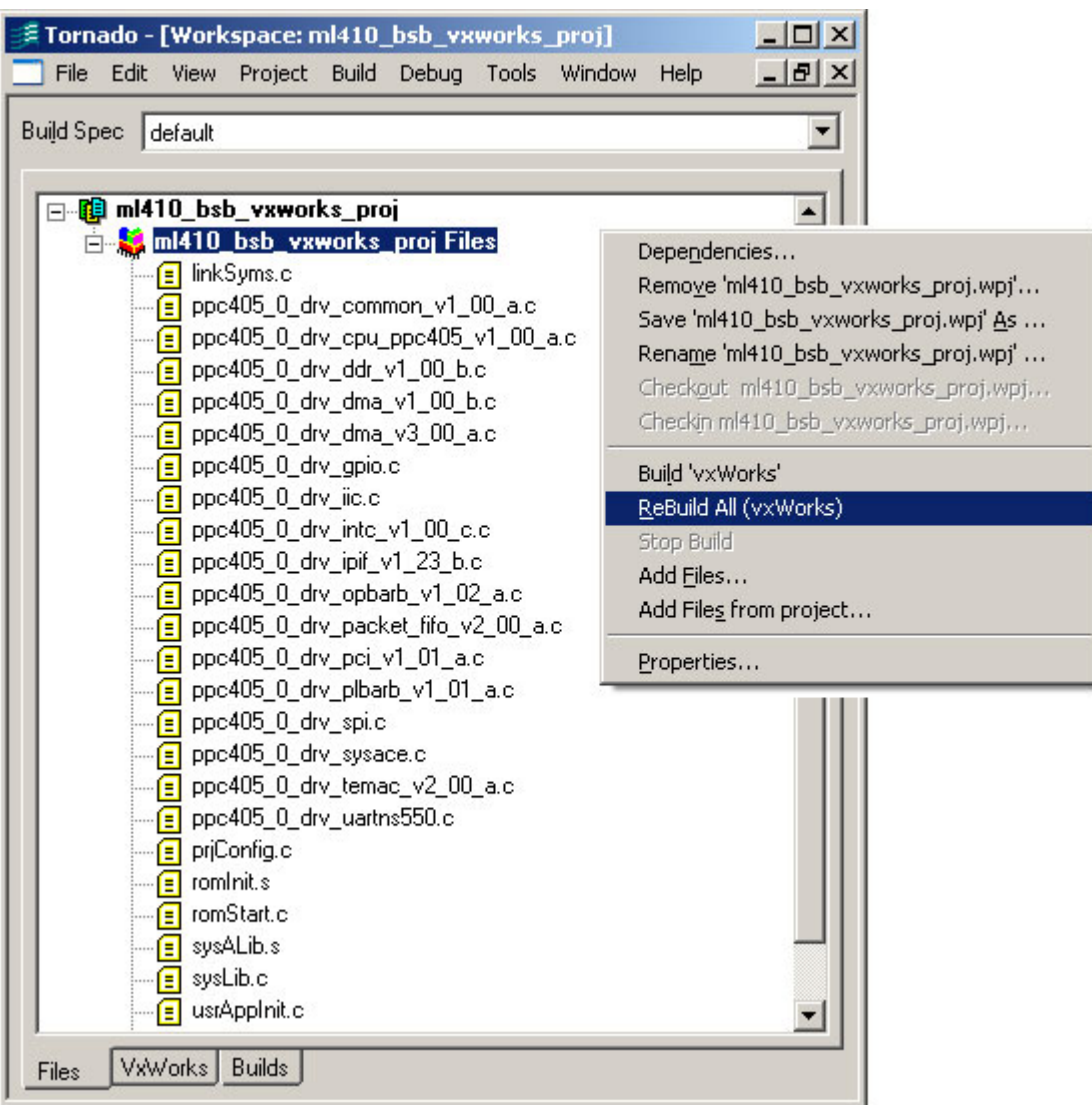








Create VxWorks System Image



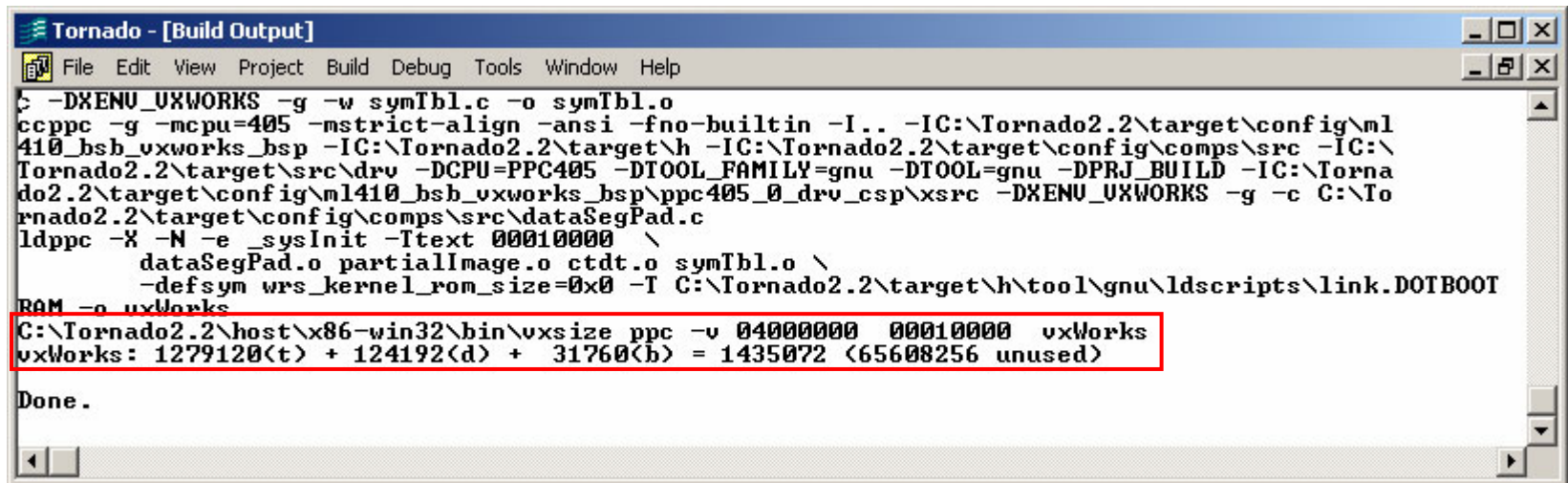
Select the Files tab and perform a “Rebuild All (vxWorks)”

- This creates a VxWorks system image



Create VxWorks System Image

- A successful compile creates a VxWorks ELF filesystem image
- <Tornado Dir>\target\proj\ml410_bsb_vxworks_proj\default\vxWorks



```
Tornado - [Build Output]
File Edit View Project Build Debug Tools Window Help
C -DXENU_UXWORKS -g -w symTbl.c -o symTbl.o
ccppc -g -mcpu=405 -mstrict-align -ansi -fno-builtin -I.. -IC:\Tornado2.2\target\config\ml
410_bsb_vxworks_bsp -IC:\Tornado2.2\target\h -IC:\Tornado2.2\target\config\comps\src -IC:\
Tornado2.2\target\src\drv -DCPU=PPC405 -DTOOL_FAMILY=gnu -DTOOL=gnu -DPRJ_BUILD -IC:\Torna
do2.2\target\config\ml410_bsb_vxworks_bsp\ppc405_0_drv_csp\src -DXENU_UXWORKS -g -c C:\To
rnado2.2\target\config\comps\src\dataSegPad.c
ldppc -X -N -e _sysInit -Ttext 00010000 \
    dataSegPad.o partialImage.o ctdt.o symTbl.o \
    -defsym wrs_kernel_rom_size=0x0 -T C:\Tornado2.2\target\h\tool\gnu\ldscripts\link.DOTBOOT
RAM -o vxWorks
C:\Tornado2.2\host\x86-win32\bin\vxsize ppc -v 04000000 00010000 vxWorks
vxWorks: 1279120(t) + 124192(d) + 31760(b) = 1435072 (65608256 unused)
Done.
```

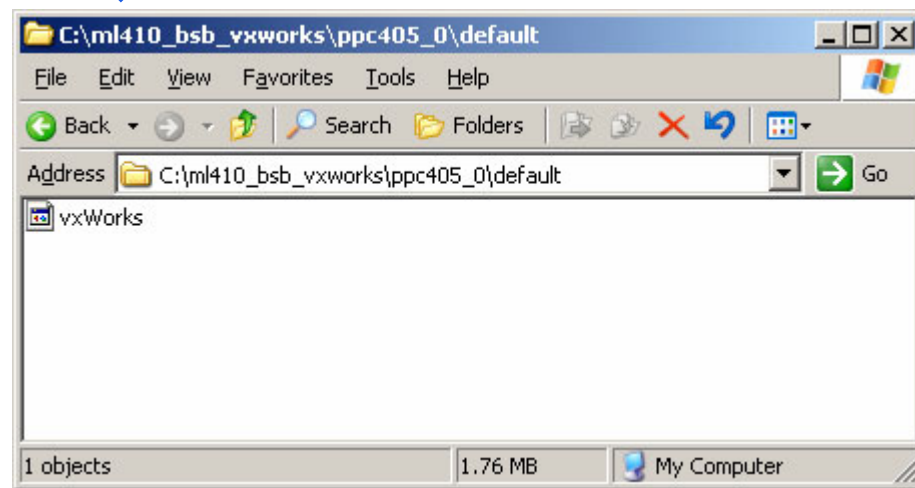
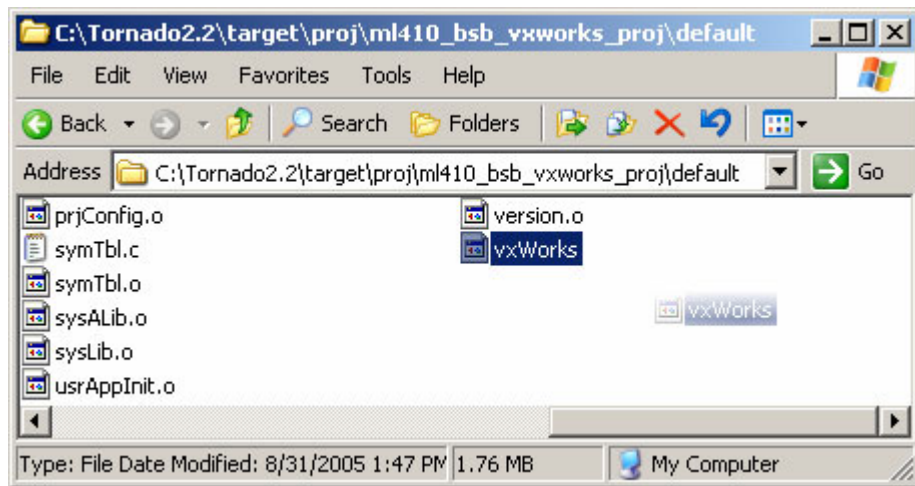
Create VxWorks Image

- Copy

<Tornado Dir>\target\proj\ml410_bsb_vxworks_proj\default\vxWorks
to:

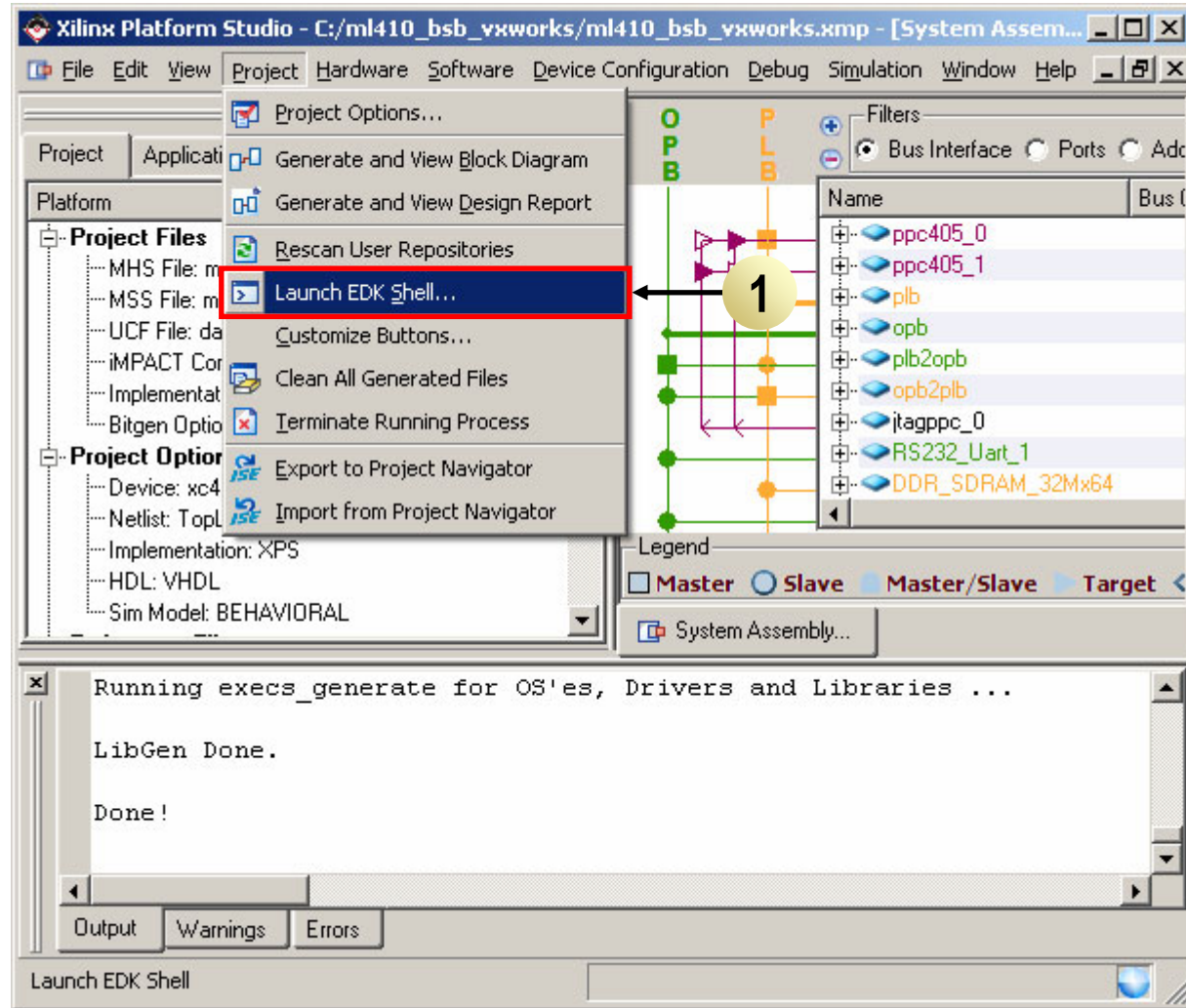
<design path>\ml410_bsb_vxworks\ppc405_0\default

– Use <Ctrl> key while dragging to make a copy (overwrite existing file)



Download Bootloop Bitstream

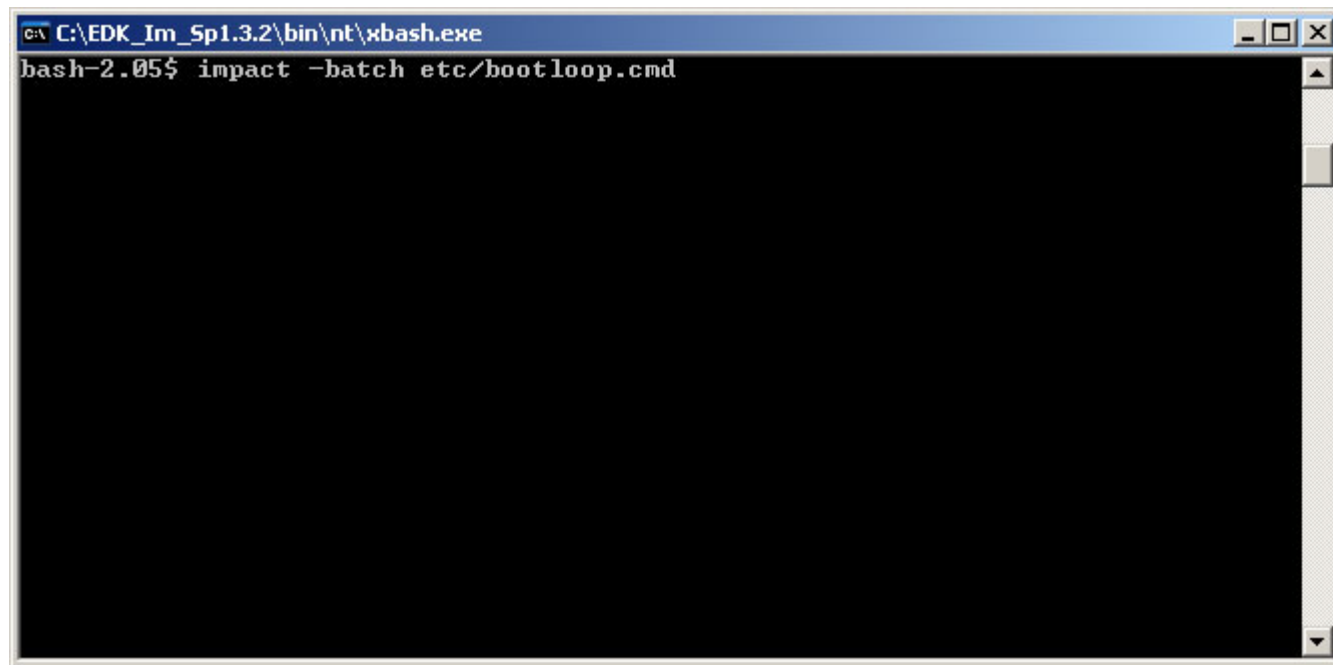
- Open an EDK shell
 - Select **Project** → **Launch EDK Shell (1)**



Download Bootloop Bitstream

- Download the pre-built bootloop bitstream using this command:

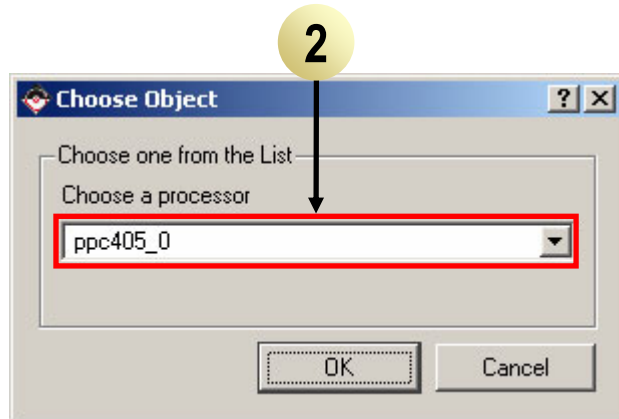
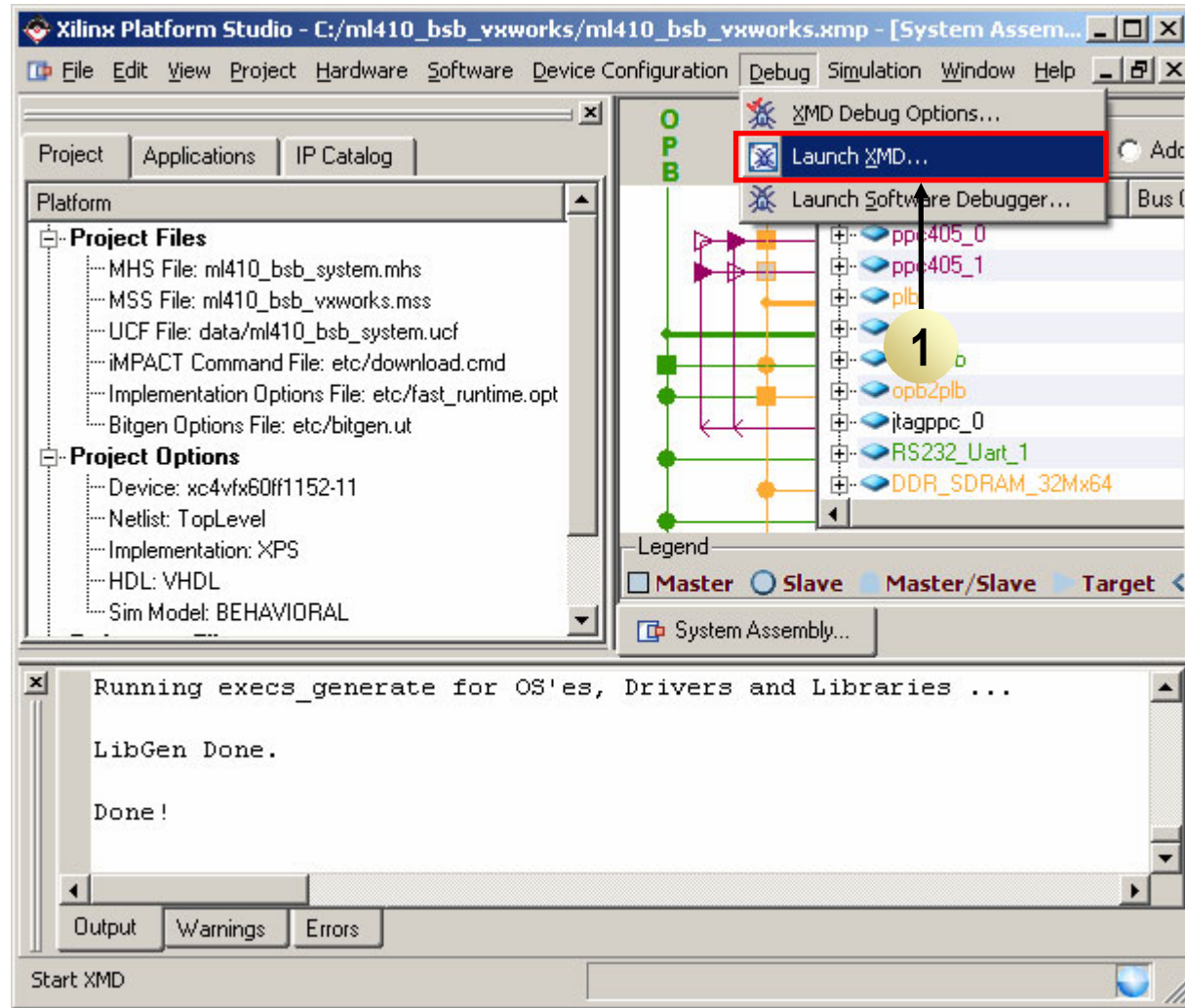
impact -batch etc/bootloop.cmd



A screenshot of a terminal window titled "C:\EDK_Im_Sp1.3.2\bin\nt\xbash.exe". The terminal shows the command "bash-2.05\$ impact -batch etc/bootloop.cmd" entered at the prompt. The terminal background is black, and the text is white. The window has standard Windows-style title bar controls (minimize, maximize, close) in the top right corner.

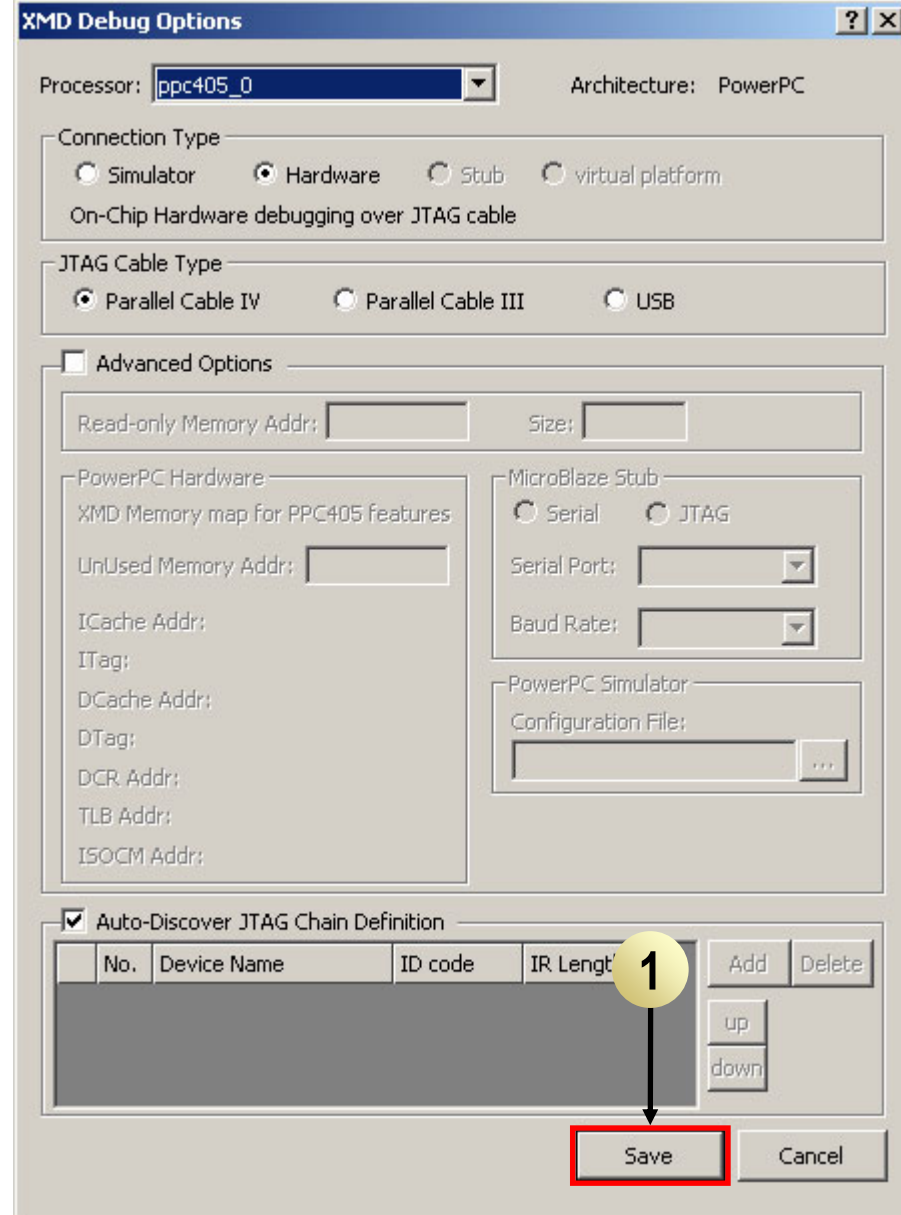
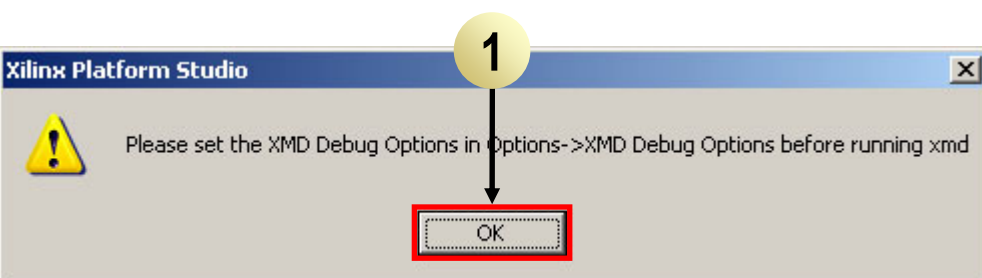
Verify Bootloop Bitstream

- A memory read can be executed to test if the bootloop was successfully loaded
 - Select **Debug** → **Launch XMD** (1)
 - Select **ppc405_0** (2)



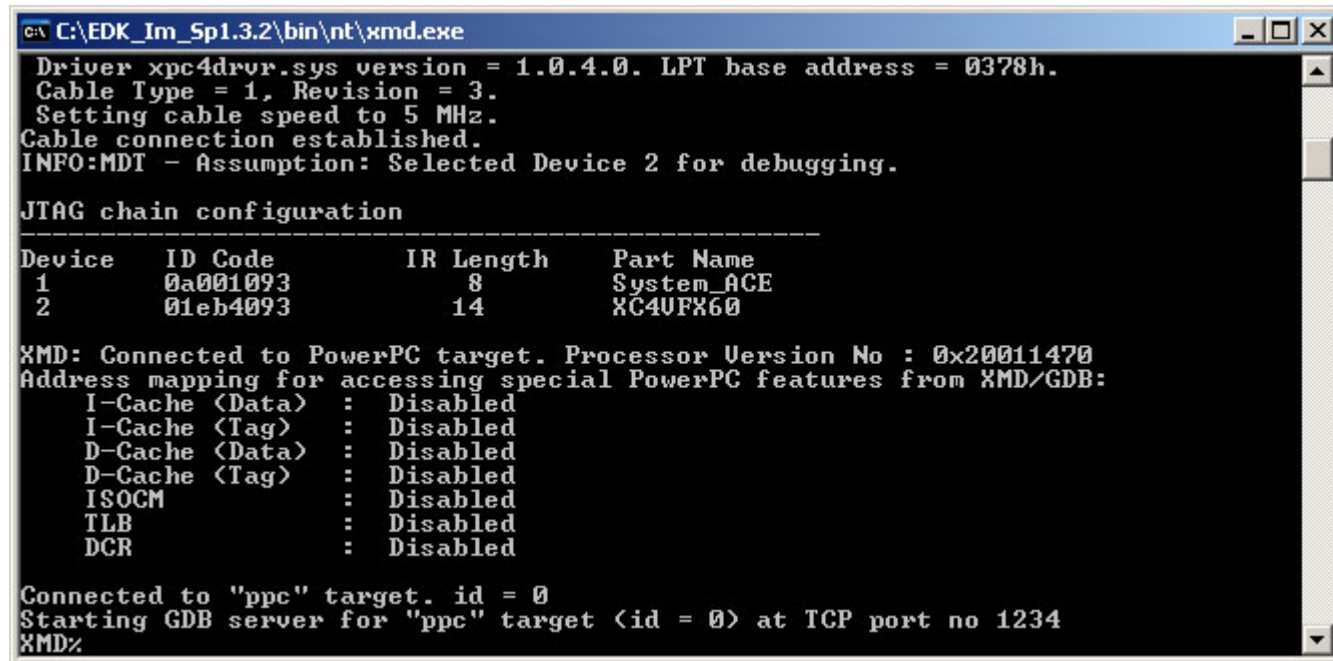
XMD Setup

- The first time XMD runs on a project, the options will be set
 - Click OK (1)
 - Click Save (2)



Verify Bootloop in BRAM

- XMD opens and connects to the processor, using the default options



```
C:\EDK_Im_Sp1.3.2\bin\nt\xmd.exe
Driver xpc4drv.sys version = 1.0.4.0. LPT base address = 0378h.
Cable Type = 1, Revision = 3.
Setting cable speed to 5 MHz.
Cable connection established.
INFO:MDT - Assumption: Selected Device 2 for debugging.

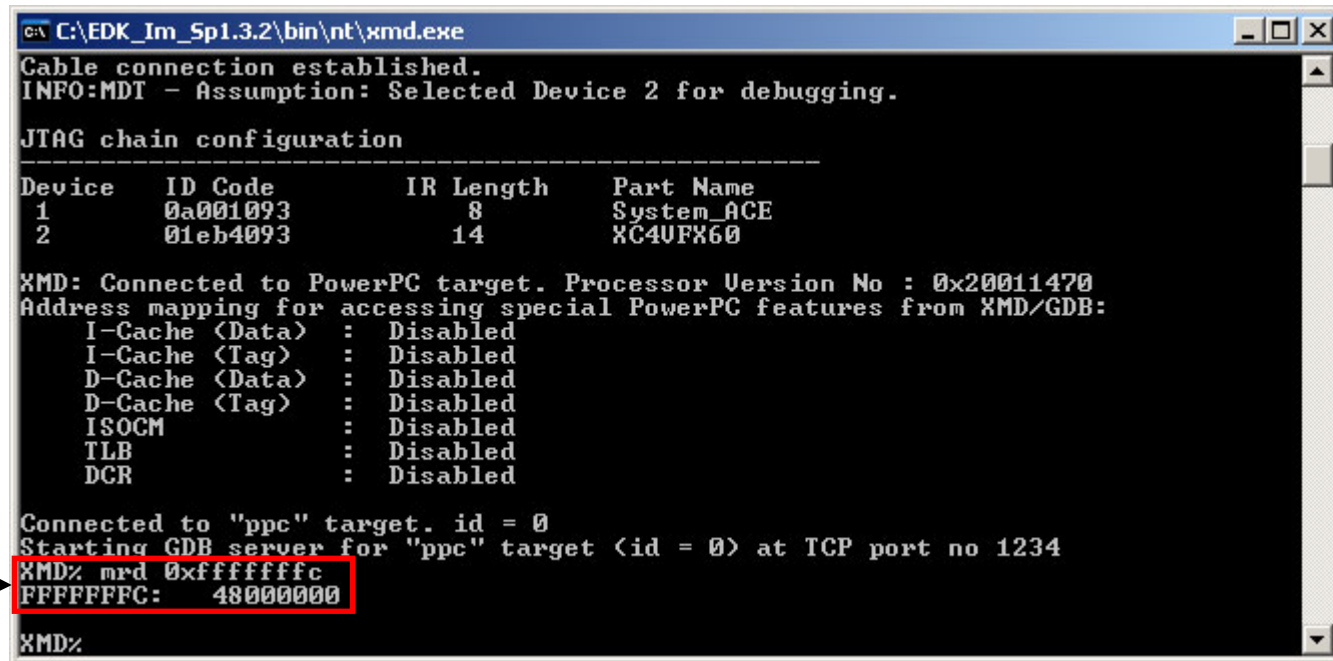
JTAG chain configuration
-----
Device  ID Code      IR Length  Part Name
  1      0a001093         8    System_ACE
  2      01eb4093        14    XC4VFX60

XMD: Connected to PowerPC target. Processor Version No : 0x20011470
Address mapping for accessing special PowerPC features from XMD/GDB:
  I-Cache <Data> : Disabled
  I-Cache <Tag>  : Disabled
  D-Cache <Data> : Disabled
  D-Cache <Tag>  : Disabled
  ISOCM          : Disabled
  TLB            : Disabled
  DCR            : Disabled

Connected to "ppc" target. id = 0
Starting GDB server for "ppc" target <id = 0> at TCP port no 1234
XMD%
```

Verify Bootloop in BRAM

- To verify existence of bootloop inside of Block RAM:
`mrd 0xffffffffc`
- This will read the memory address at the reset vector; the value should be **0x48000000** as shown below (1)



```
C:\EDK_Im_Sp1.3.2\bin\nt\xmd.exe
Cable connection established.
INFO:MDT - Assumption: Selected Device 2 for debugging.

JTAG chain configuration
-----
Device  ID Code      IR Length  Part Name
  1      0a001093         8      System_ACE
  2      01eb4093        14      XC4VFX60

XMD: Connected to PowerPC target. Processor Version No : 0x20011470
Address mapping for accessing special PowerPC features from XMD/GDB:
  I-Cache <Data> : Disabled
  I-Cache <Tag>  : Disabled
  D-Cache <Data> : Disabled
  D-Cache <Tag>  : Disabled
  ISOCM         : Disabled
  TLB           : Disabled
  DCR           : Disabled

Connected to "ppc" target. id = 0
Starting GDB server for "ppc" target (id = 0) at TCP port no 1234
XMD% mrd 0xffffffffc
FFFFFFFFC:  48000000
XMD%
```

A yellow circle with the number '1' and an arrow points to the command `XMD% mrd 0xffffffffc` and its output `FFFFFFFFC: 48000000` in the screenshot.

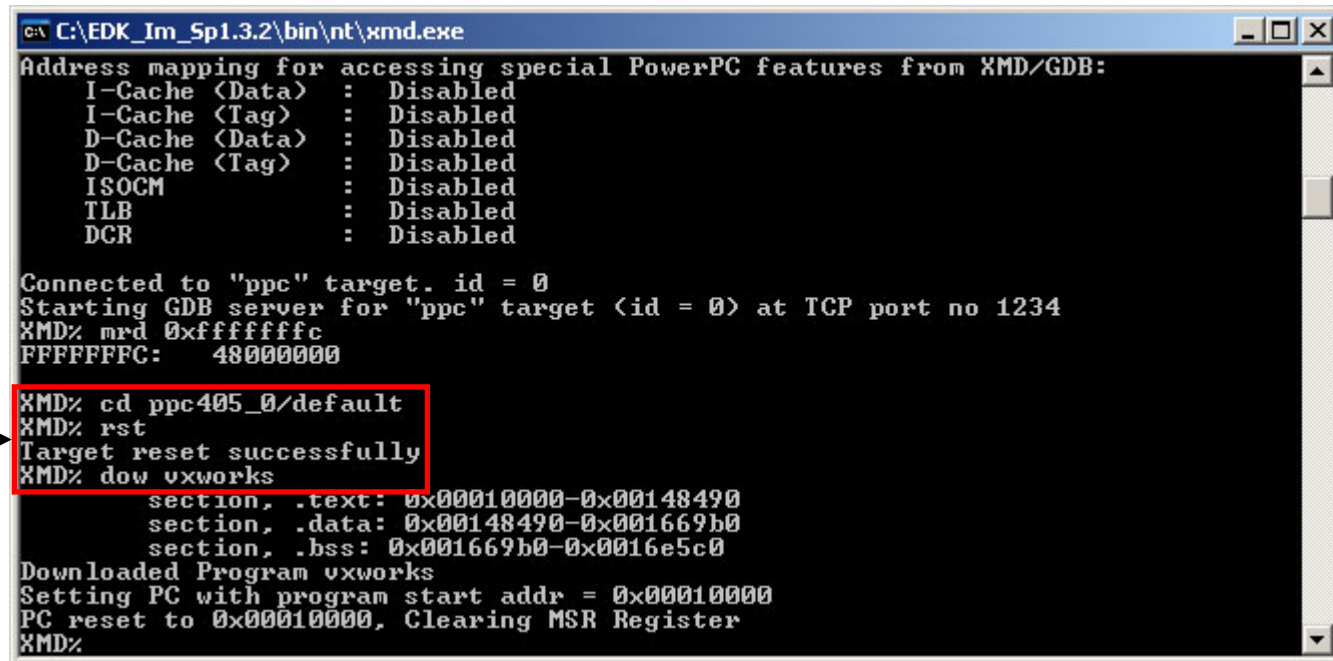
Download ELF File

- Download the vxworks ELF file from XMD

`cd ppc405_0/default`

`rst`

`dow vxworks (1)`



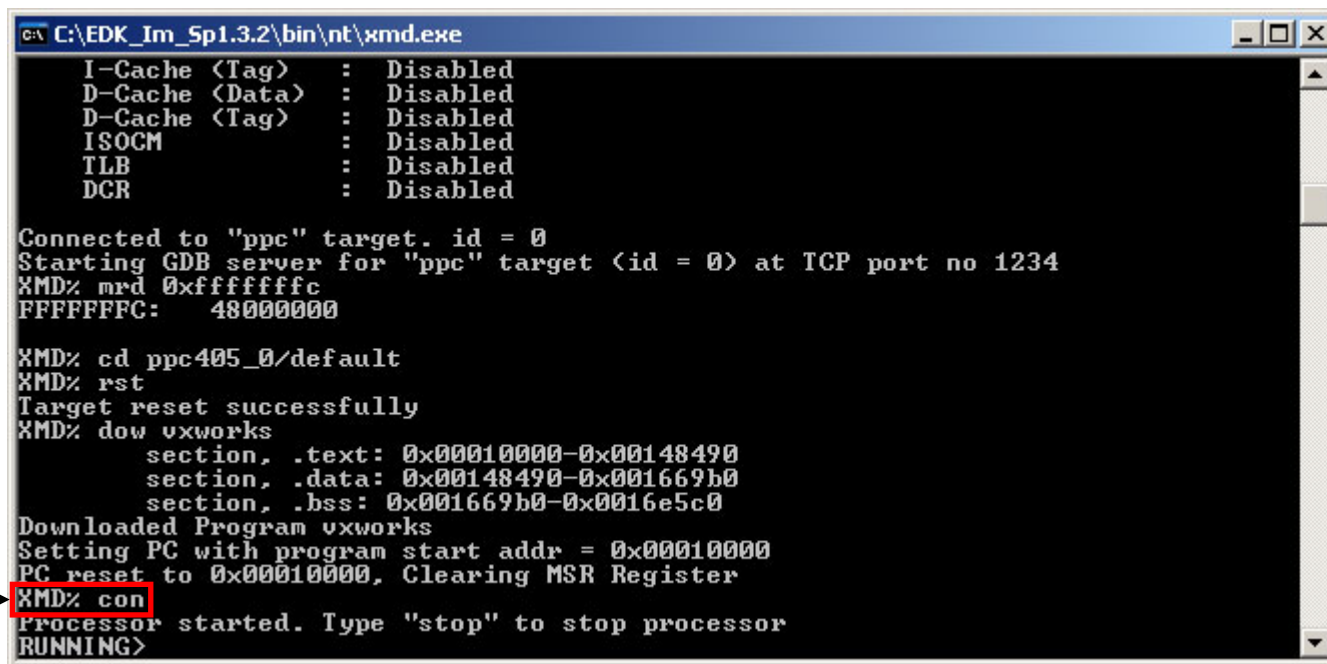
```
C:\EDK_Im_Sp1.3.2\bin\nt\xmd.exe
Address mapping for accessing special PowerPC features from XMD/GDB:
I-Cache <Data> : Disabled
I-Cache <Tag> : Disabled
D-Cache <Data> : Disabled
D-Cache <Tag> : Disabled
ISOCM : Disabled
TLB : Disabled
DCR : Disabled

Connected to "ppc" target. id = 0
Starting GDB server for "ppc" target <id = 0> at TCP port no 1234
XMD% mrd 0xffffffff
FFFFFFFFC: 48000000

XMD% cd ppc405_0/default
XMD% rst
Target reset successfully
XMD% dow vxworks
section, .text: 0x00010000-0x000148490
section, .data: 0x000148490-0x0001669b0
section, .bss: 0x0001669b0-0x00016e5c0
Downloaded Program vxworks
Setting PC with program start addr = 0x00010000
PC reset to 0x00010000, Clearing MSR Register
XMD%
```

Run VxWorks

- Open a terminal program
- Enter **con** in the XMD window to start VxWorks (1)



```
C:\EDK_Im_Sp1.3.2\bin\nt\xmd.exe
I-Cache <Tag> : Disabled
D-Cache <Data> : Disabled
D-Cache <Tag> : Disabled
ISOCM : Disabled
TLB : Disabled
DCR : Disabled

Connected to "ppc" target. id = 0
Starting GDB server for "ppc" target <id = 0> at TCP port no 1234
XMD% mrd 0xffffffff
FFFFFFFFC: 48000000

XMD% cd ppc405_0/default
XMD% rst
Target reset successfully
XMD% dow vxworks
section, .text: 0x00010000-0x00148490
section, .data: 0x00148490-0x001669b0
section, .bss: 0x001669b0-0x0016e5c0
Downloaded Program vxworks
Setting PC with program start addr = 0x00010000
PC reset to 0x00010000, Clearing MSR Register
1 → XMD% con
Processor started. Type "stop" to stop processor
RUNNING>
```

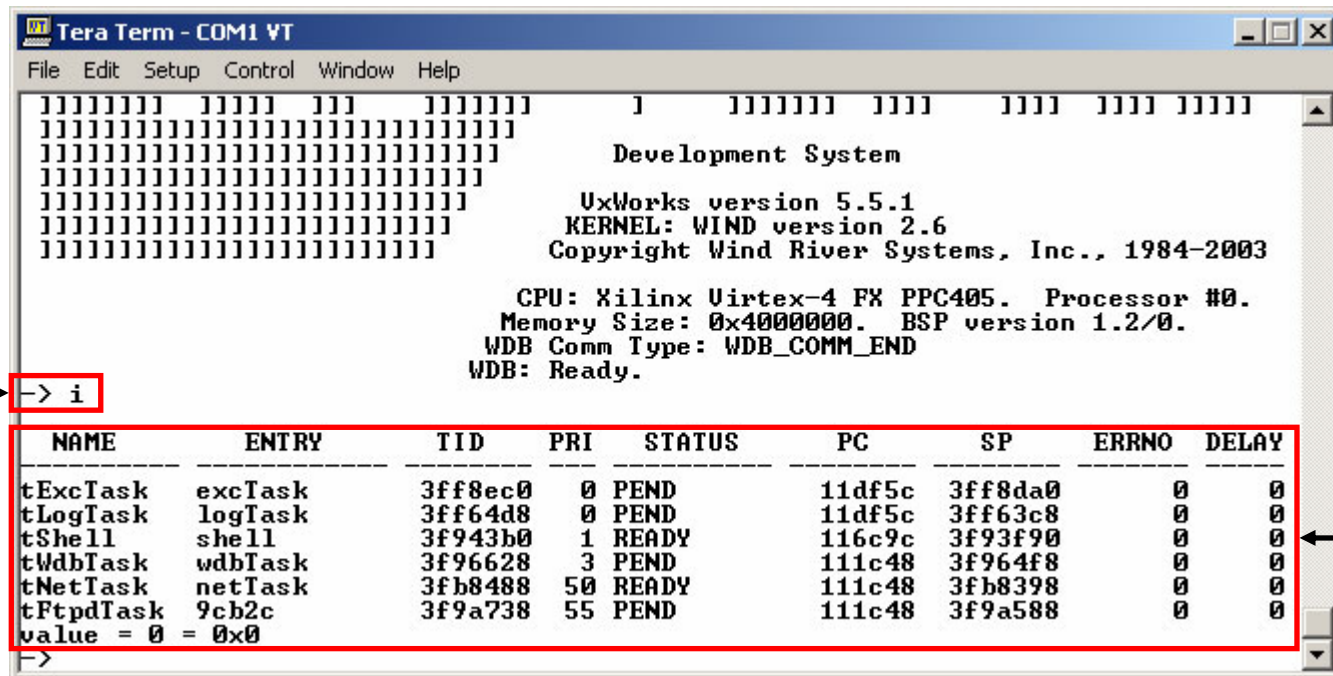
Run VxWorks

- View the output in the terminal program
- VxWorks running in external memory of ML410 (below)

[illegible]

Target Shell Task Listing

- After the VxWorks banner screen, type i (1)
- View a list of tasks running on the ML410 (2)



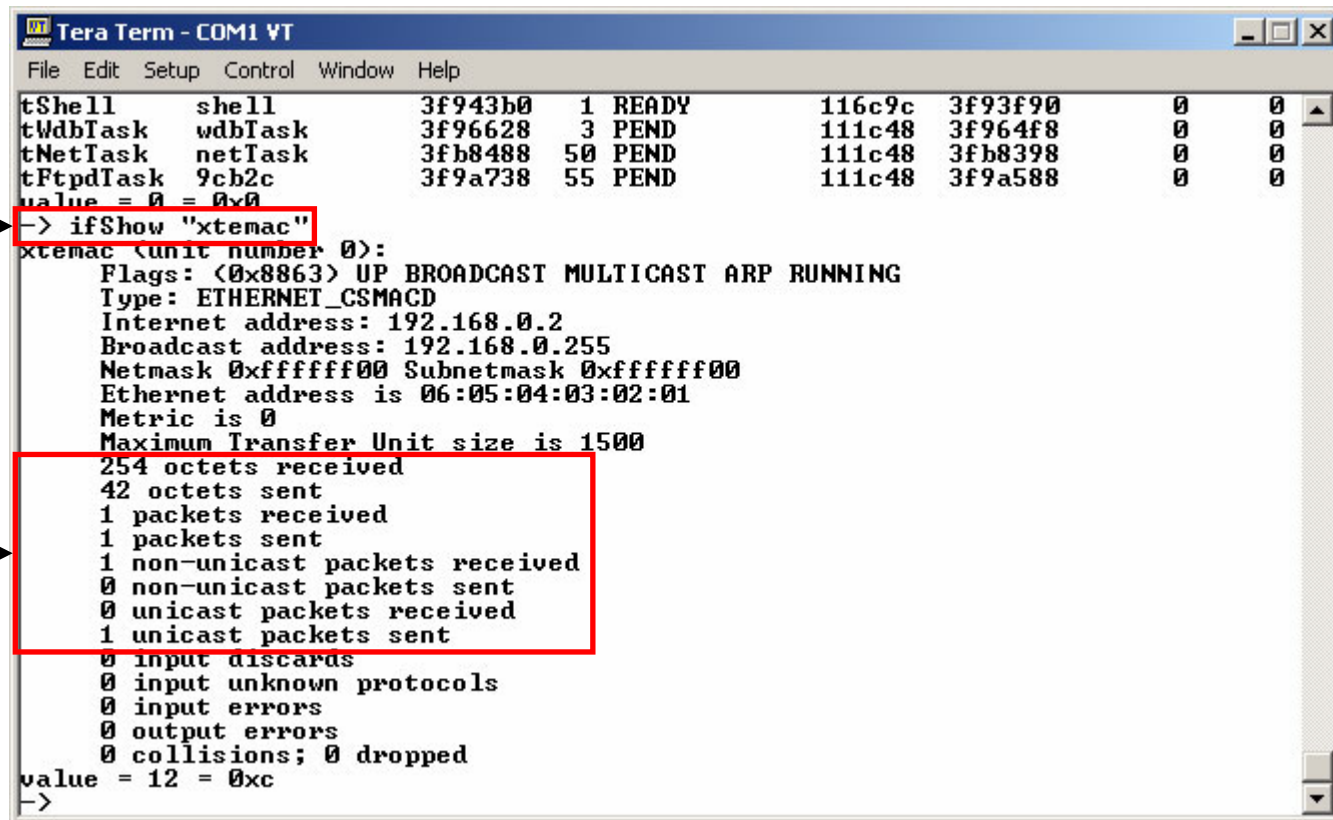
The screenshot shows a Tera Term terminal window titled "Tera Term - COM1 VT". The terminal displays the VxWorks banner, including "Development System", "UxWorks version 5.5.1", "KERNEL: WIND version 2.6", "Copyright Wind River Systems, Inc., 1984-2003", "CPU: Xilinx Uirtex-4 FX PPC405. Processor #0.", "Memory Size: 0x4000000. BSP version 1.2/0.", "WDB Comm Type: WDB_COMM_END", and "WDB: Ready.". Below the banner, a list of tasks is displayed. A red box highlights the command prompt "-> i" and the task list table. A yellow circle with the number "1" points to the command prompt, and a yellow circle with the number "2" points to the task list table.

```
-> i
```

NAME	ENTRY	TID	PRI	STATUS	PC	SP	ERRNO	DELAY
tExcTask	excTask	3ff8ec0	0	PEND	11df5c	3ff8da0	0	0
tLogTask	logTask	3ff64d8	0	PEND	11df5c	3ff63c8	0	0
tShell	shell	3f943b0	1	READY	116c9c	3f93f90	0	0
tWdbTask	wdbTask	3f96628	3	PEND	111c48	3f964f8	0	0
tNetTask	netTask	3fb8488	50	READY	111c48	3fb8398	0	0
tFtpdTask	9cb2c	3f9a738	55	PEND	111c48	3f9a588	0	0
value = 0 = 0x0								

Network Statistics

- Type ifShow "xtemac" (1)
- Note the number of packets (2)



The screenshot shows a Tera Term terminal window with the following content:

```
Tera Term - COM1 VT
File Edit Setup Control Window Help

tShell      shell      3f943b0  1  READY      116c9c  3f93f90  0  0
tWdbTask    wdbTask    3f96628  3  PEND       111c48  3f964f8  0  0
tNetTask    netTask    3fb8488  50  PEND       111c48  3fb8398  0  0
tFtpdTask   9cb2c      3f9a738  55  PEND       111c48  3f9a588  0  0
value = 0 = 0x0

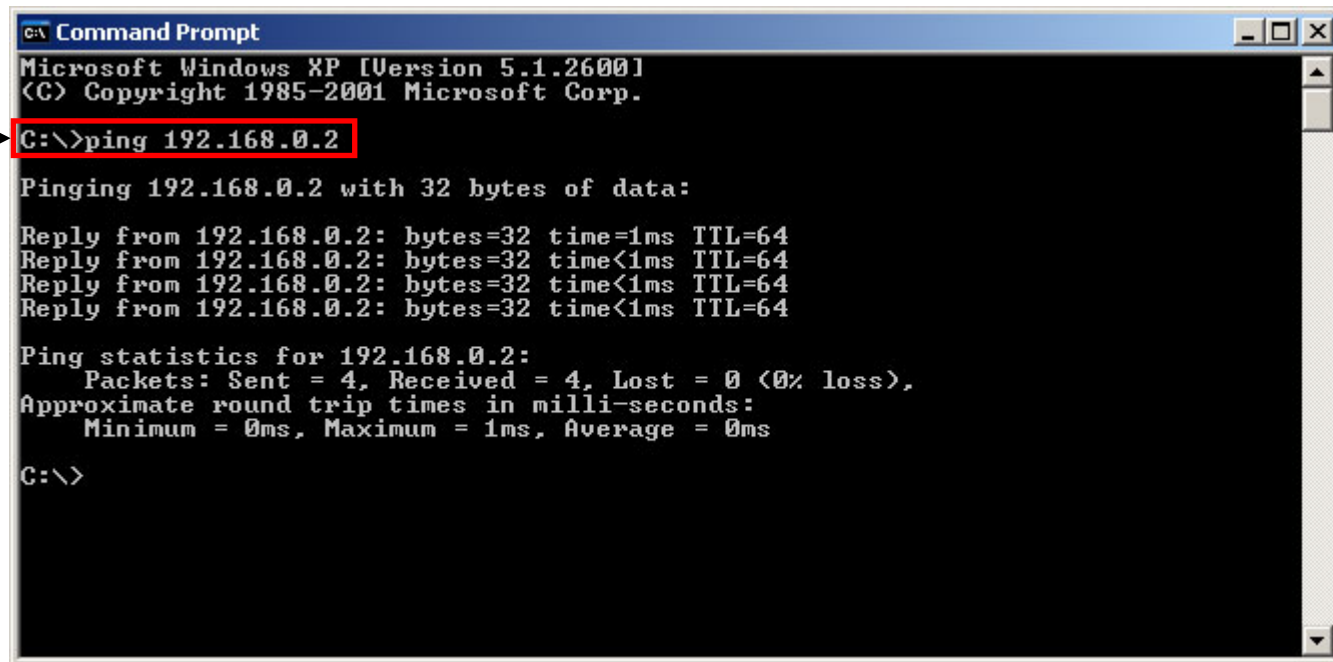
1 -> ifShow "xtemac"
xtemac (unit number 0):
  Flags: <0x8863> UP BROADCAST MULTICAST ARP RUNNING
  Type: ETHERNET_CSMACD
  Internet address: 192.168.0.2
  Broadcast address: 192.168.0.255
  Netmask 0xffffffff Subnetmask 0xffffffff
  Ethernet address is 06:05:04:03:02:01
  Metric is 0
  Maximum Transfer Unit size is 1500
  254 octets received
  42 octets sent
  1 packets received
  1 packets sent
  1 non-unicast packets received
  0 non-unicast packets sent
  0 unicast packets received
  1 unicast packets sent
  0 input discards
  0 input unknown protocols
  0 input errors
  0 output errors
  0 collisions; 0 dropped
value = 12 = 0xc
->
```

Annotation 1 points to the command `-> ifShow "xtemac"`. Annotation 2 points to the network statistics section, which includes:

- 254 octets received
- 42 octets sent
- 1 packets received
- 1 packets sent
- 1 non-unicast packets received
- 0 non-unicast packets sent
- 0 unicast packets received
- 1 unicast packets sent

Ping ML410 Target from Host

- Open a DOS window on the PC Host
(Start → Programs → Accessories → Command Prompt)
- Type **ping 192.168.0.2 (1)**
 - Ping from PC host 192.168.0.1 to ML410 target 192.168.0.2



```
C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\>ping 192.168.0.2

Pinging 192.168.0.2 with 32 bytes of data:

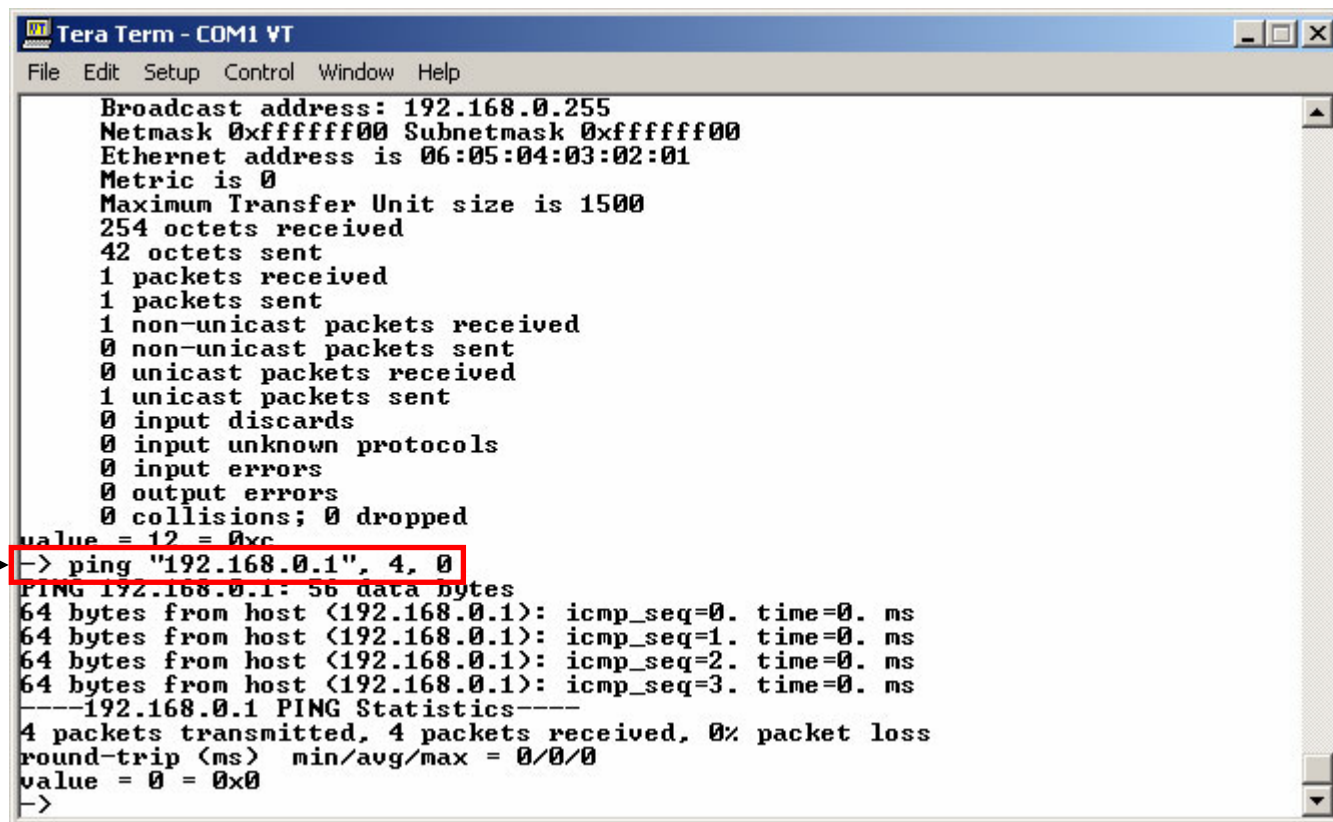
Reply from 192.168.0.2: bytes=32 time=1ms TTL=64
Reply from 192.168.0.2: bytes=32 time<1ms TTL=64
Reply from 192.168.0.2: bytes=32 time<1ms TTL=64
Reply from 192.168.0.2: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Ping Host from ML410 Target

- Type ping "192.168.0.1", 4, 0 (1)
 - Ping from ML410 target 192.168.0.2 to PC host 192.168.0.1
 - Note: VxWorks requires double quotes on the IP address



```
Tera Term - COM1 VT
File Edit Setup Control Window Help

Broadcast address: 192.168.0.255
Netmask 0xffffffff Subnetmask 0xffffffff
Ethernet address is 06:05:04:03:02:01
Metric is 0
Maximum Transfer Unit size is 1500
254 octets received
42 octets sent
1 packets received
1 packets sent
1 non-unicast packets received
0 non-unicast packets sent
0 unicast packets received
1 unicast packets sent
0 input discards
0 input unknown protocols
0 input errors
0 output errors
0 collisions; 0 dropped
value = 12 = 0xc
-> ping "192.168.0.1", 4, 0
PING 192.168.0.1: 56 data bytes
64 bytes from host (192.168.0.1): icmp_seq=0. time=0. ms
64 bytes from host (192.168.0.1): icmp_seq=1. time=0. ms
64 bytes from host (192.168.0.1): icmp_seq=2. time=0. ms
64 bytes from host (192.168.0.1): icmp_seq=3. time=0. ms
----192.168.0.1 PING Statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/0/0
value = 0 = 0x0
->
```

Network Statistics

- Type **ifShow "xtemac"** again (1)
- Number of packets has increased after pinging (2)

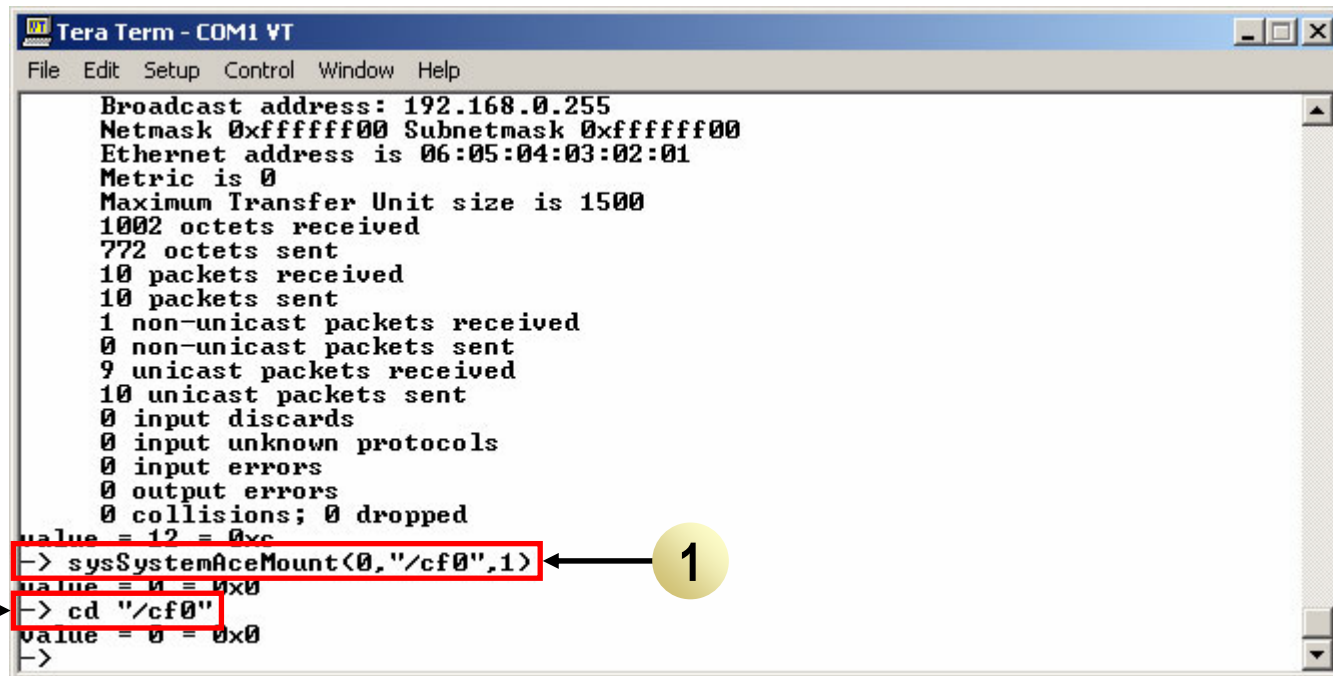
```
Tera Term - COM1 VT
File Edit Setup Control Window Help

64 bytes from host (192.168.0.1): icmp_seq=3. time=0. ms
----192.168.0.1 PING Statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/0
value = 0 = 0x0

1 -> ifShow "xtemac"
xtemac (unit number 0):
  Flags: (0x8863) UP BROADCAST MULTICAST ARP RUNNING
  Type: ETHERNET_CSMACD
  Internet address: 192.168.0.2
  Broadcast address: 192.168.0.255
  Netmask 0xffffffff Subnetmask 0xffffffff
  Ethernet address is 06:05:04:03:02:01
  Metric is 0
  Maximum Transfer Unit size is 1500
  1002 octets received
  772 octets sent
  10 packets received
  10 packets sent
  1 non-unicast packets received
  0 non-unicast packets sent
  9 unicast packets received
  10 unicast packets sent
  0 input discards
  0 input unknown protocols
  0 input errors
  0 output errors
  0 collisions; 0 dropped
value = 12 = 0xc
->
```

Mounting a Local File System

- Mount the System ACE CF file system to prepare for transferring files via ftp
 - Type **sysSystemAceMount(0,"/cf0",1)** (1)
 - Type **cd "/cf0"** (2)

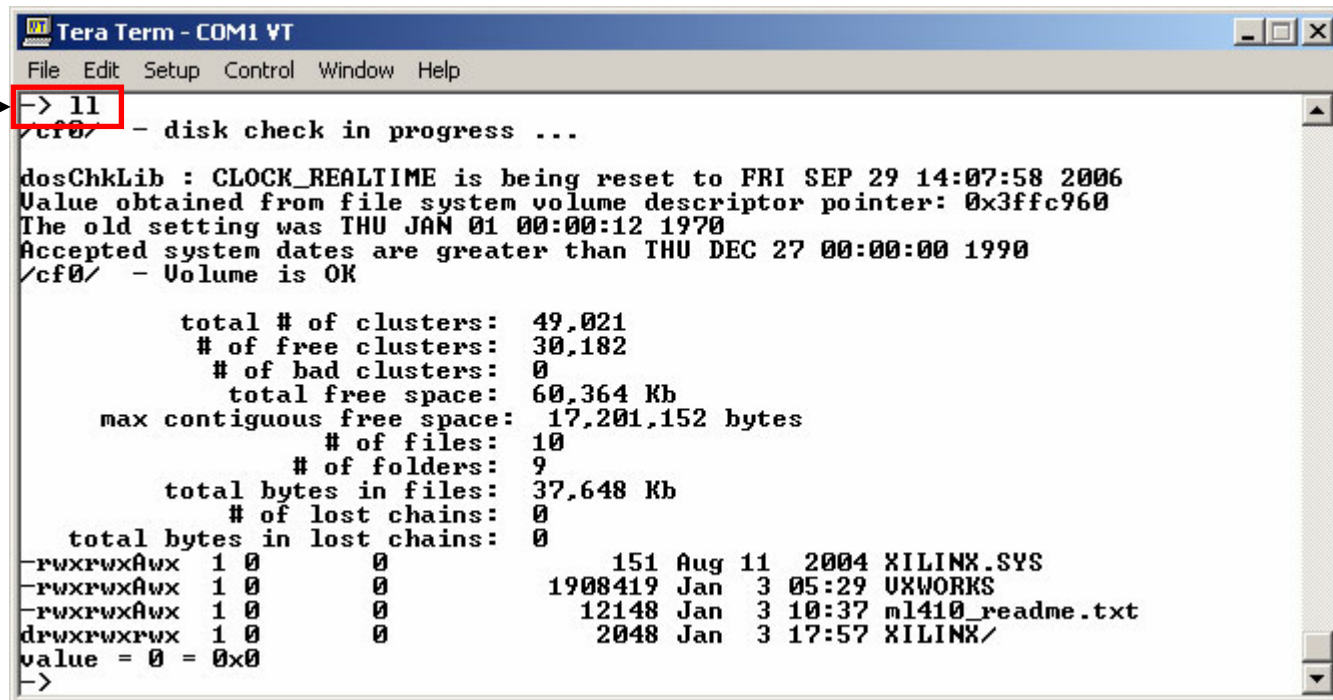


The screenshot shows a terminal window titled "Tera Term - COM1 VT" with a menu bar (File, Edit, Setup, Control, Window, Help). The terminal output displays network statistics for an Ethernet interface, including broadcast address (192.168.0.255), netmask (0xffffffff), subnetmask (0xffffffff), and various packet counts. Below the statistics, two commands are entered and highlighted with red boxes. A yellow circle with the number "1" points to the first command, and a yellow circle with the number "2" points to the second command.

```
Broadcast address: 192.168.0.255
Netmask 0xffffffff Subnetmask 0xffffffff
Ethernet address is 06:05:04:03:02:01
Metric is 0
Maximum Transfer Unit size is 1500
1002 octets received
772 octets sent
10 packets received
10 packets sent
1 non-unicast packets received
0 non-unicast packets sent
9 unicast packets received
10 unicast packets sent
0 input discards
0 input unknown protocols
0 input errors
0 output errors
0 collisions; 0 dropped
value = 12 = 0xc
-> sysSystemAceMount(0,"/cf0",1)
value = 0 = 0x0
-> cd "/cf0"
value = 0 = 0x0
->
```

List Directory

- The System ACE CF provides DOS FAT16 access
- Type **ll** to see a listing of files (1)
 - Wait for disk check to complete after the initial mount



```
Tera Term - COM1 VT
File Edit Setup Control Window Help

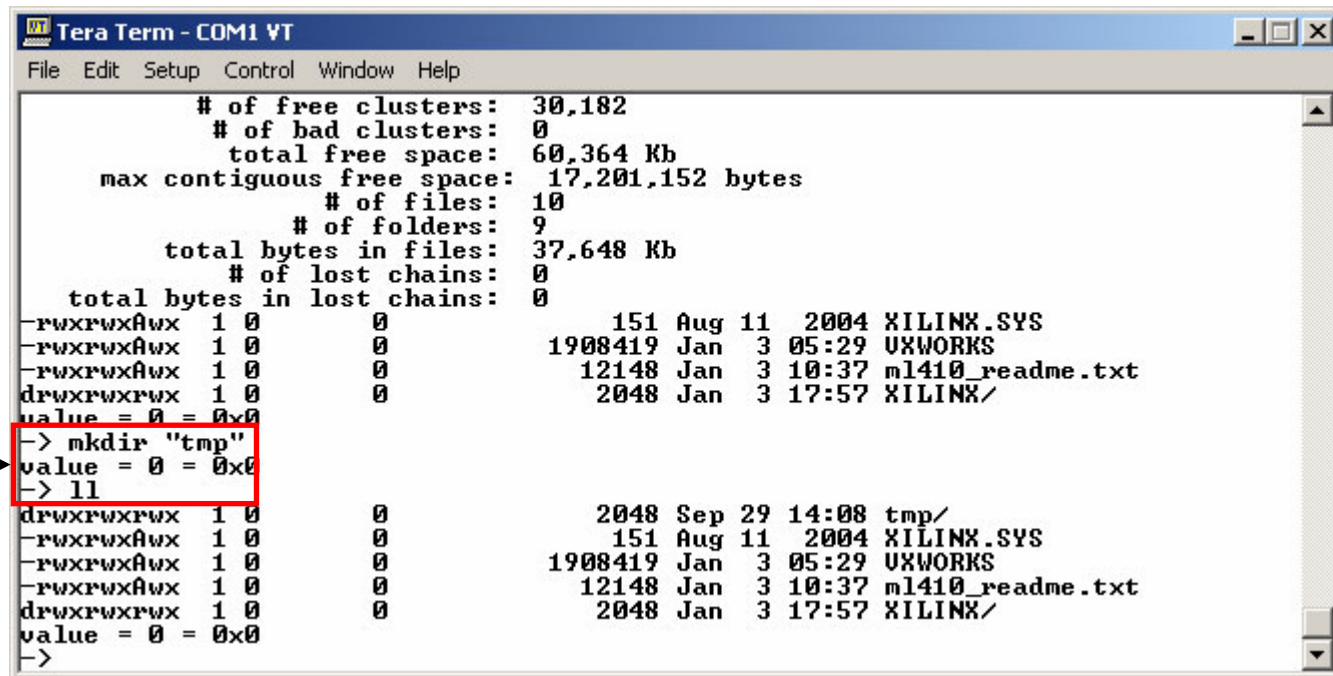
-> ll
/cf0/ - disk check in progress ...

dosChkLib : CLOCK_REALTIME is being reset to FRI SEP 29 14:07:58 2006
Value obtained from file system volume descriptor pointer: 0x3ffc960
The old setting was THU JAN 01 00:00:12 1970
Accepted system dates are greater than THU DEC 27 00:00:00 1990
/cf0/ - Volume is OK

      total # of clusters: 49,021
      # of free clusters: 30,182
      # of bad clusters: 0
      total free space: 60,364 Kb
max contiguous free space: 17,201,152 bytes
      # of files: 10
      # of folders: 9
      total bytes in files: 37,648 Kb
      # of lost chains: 0
      total bytes in lost chains: 0
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 UXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 ml410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
->
```

List Directory

- CompactFlash devices have a root directory write limitation
- To minimize this, create a tmp directory if none exists
 - Type **mkdir "tmp"**
 - Type **ll** to view the results (1)



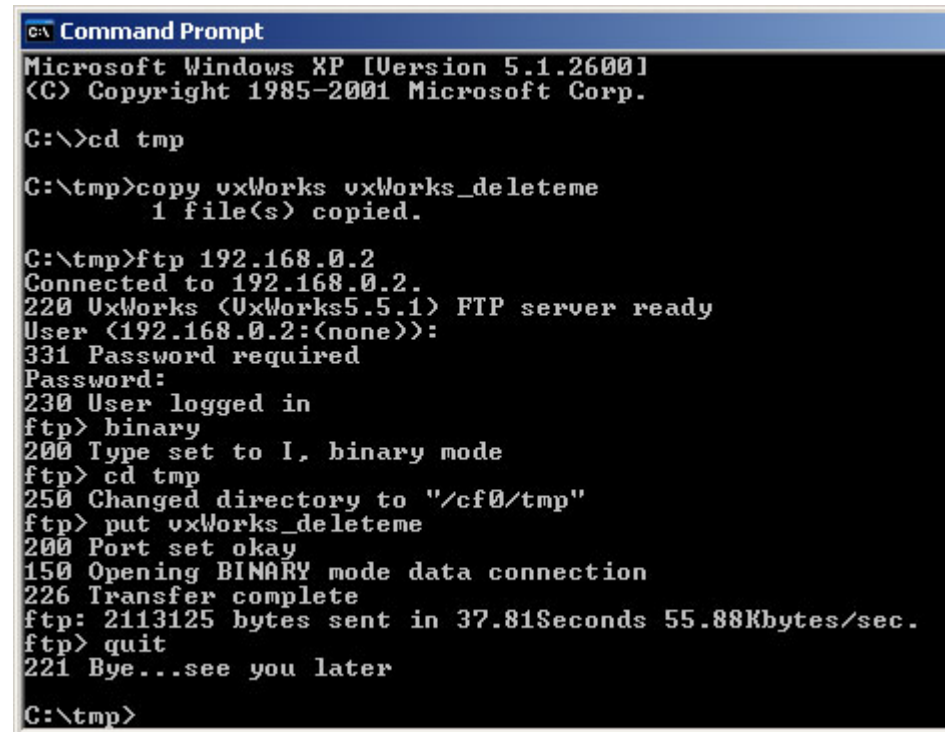
The screenshot shows a terminal window titled "Tera Term - COM1 VT" with a menu bar (File, Edit, Setup, Control, Window, Help). The terminal displays the output of the 'll' command, showing file permissions, sizes, dates, and names. A red box highlights the command prompt area where the user has entered 'mkdir "tmp"' and 'll'. A yellow circle with the number '1' and an arrow points to the 'll' command. The output of 'll' shows the creation of the 'tmp' directory.

```
# of free clusters: 30,182
# of bad clusters: 0
total free space: 60,364 Kb
max contiguous free space: 17,201,152 bytes
# of files: 10
# of folders: 9
total bytes in files: 37,648 Kb
# of lost chains: 0
total bytes in lost chains: 0
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 UXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 ml410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
-> mkdir "tmp"
value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 tmp/
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 UXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 ml410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
->
```

FTP to VxWorks Target

- From the DOS window, perform an FTP transfer of any file to the ML410 CompactFlash Disk:

```
cd <tmp dir>
copy vxWorks <file name>
ftp 192.168.0.2
<enter*>
<enter*>
binary
cd tmp
put <file name>
quit
```



```
C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\>cd tmp

C:\tmp>copy vxWorks vxWorks_deleteme
        1 file(s) copied.

C:\tmp>ftp 192.168.0.2
Connected to 192.168.0.2.
220 VxWorks (VxWorks5.5.1) FTP server ready
User (192.168.0.2:(none)):
331 Password required
Password:
230 User logged in
ftp> binary
200 Type set to I, binary mode
ftp> cd tmp
250 Changed directory to "/cf0/tmp"
ftp> put vxWorks_deleteme
200 Port set okay
150 Opening BINARY mode data connection
226 Transfer complete
ftp: 2113125 bytes sent in 37.81Seconds 55.88Kbytes/sec.
ftp> quit
221 Bye...see you later

C:\tmp>
```

FTP to VxWorks Target

- Type `cd "tmp"` and `ll` (1)
- The file (2) was transferred via ftp from the host to the CompactFlash card using the System ACE CF controller

```
Tera Term - COM1 VT
File Edit Setup Control Window Help

# of lost chains: 0
total bytes in lost chains: 0
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 VXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 m1410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
-> mkdir "tmp"
value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 tmp/
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 VXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 m1410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
-> cd "tmp"
value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:10 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
-rwxrwxrwx 1 0 0 2113125 Sep 29 14:11 vxWorks_deleteme
value = 0 = 0x0
->
```

Create an Executable File

- These commands use I/O redirection with a file:
 - Type **printf"ll\n">mycmd** (1) which “prints” the mycmd file
 - Type **<mycmd** (2) which executes the ll command and shows the new mycmd file on disk (3)

```
Tera Term - COM1 VT
File Edit Setup Control Window Help

-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 tmp/
-rwxrwxrwx 1 0 0 151 Aug 11 2004 XILINX.SYS
-rwxrwxrwx 1 0 0 1908419 Jan 3 05:29 UXWORKS
-rwxrwxrwx 1 0 0 12148 Jan 3 10:37 m1410_readme.txt
drwxrwxrwx 1 0 0 2048 Jan 3 17:57 XILINX/
value = 0 = 0x0
-> cd "tmp"
value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:10 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
-rwxrwxrwx 1 0 0 2113125 Sep 29 14:11 uxWorks_deleteme
value = 0 = 0x0
1 -> printf"ll\n">mycmd
value = 3 = 0x3
2 -> <mycmd
ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:12 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
-rwxrwxrwx 1 0 0 2113125 Sep 29 14:11 uxWorks_deleteme
-rwxrwxrwx 1 0 0 3 Sep 29 14:12 mycmd
value = 0 = 0x0
->
```

Delete Files

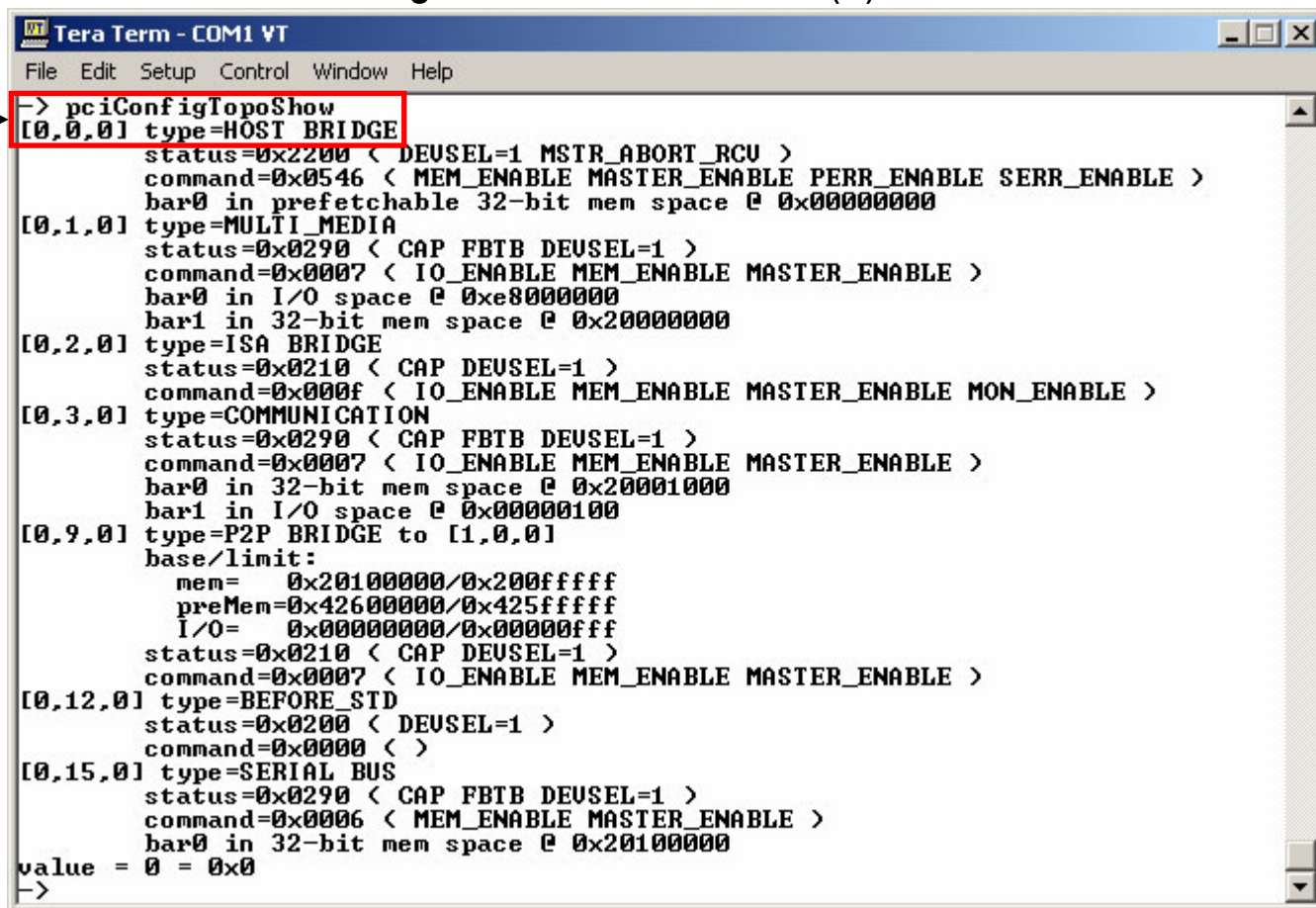
- Delete the two new files with these commands (1):
`rm "vxWorks_deleteme"`
`rm "mycmd"`
- Type `ll` and verify the files were deleted (2)

```
Tera Term - COM1 VT
File Edit Setup Control Window Help

value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:10 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
-rwxrwxrwx 1 0 0 2113125 Sep 29 14:11 vxWorks_deleteme
value = 0 = 0x0
-> printf "ll\n">mycmd
value = 3 = 0x3
-> <mycmd
ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:12 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
-rwxrwxrwx 1 0 0 2113125 Sep 29 14:11 vxWorks_deleteme
-rwxrwxrwx 1 0 0 3 Sep 29 14:12 mycmd
value = 0 = 0x0
-> rm "vxWorks_deleteme"
value = 0 = 0x0
-> rm "mycmd"
value = 0 = 0x0
-> ll
drwxrwxrwx 1 0 0 2048 Sep 29 14:12 ./
drwxrwxrwx 1 0 0 2048 Sep 29 14:08 ../
value = 0 = 0x0
->
```

Scan PCI Bus

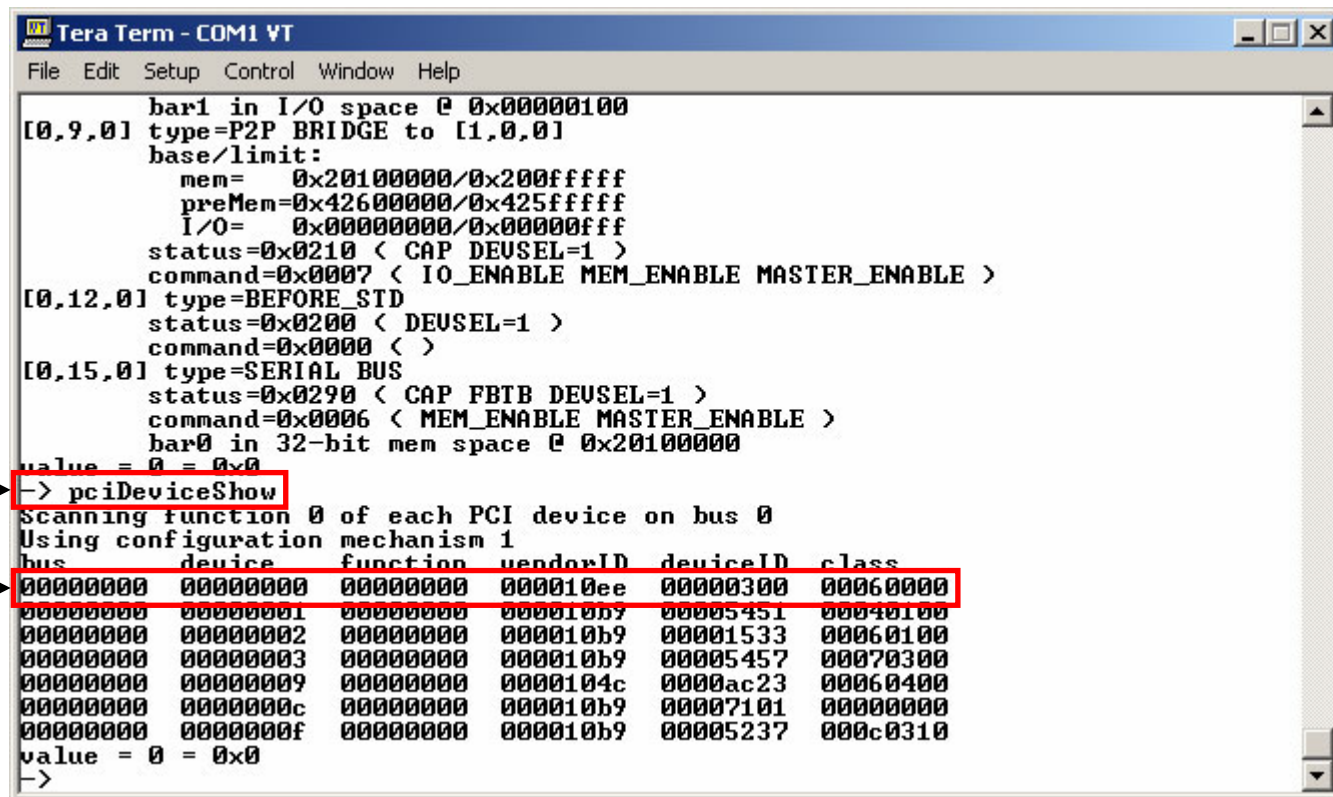
- Type `pciConfigTopoShow` (1)
 - A [bus, device, function] listing of devices attached to the PCI bus is displayed
 - The Xilinx Host Bridge is numbered 0,0,0 (1)



```
Tera Term - COM1 VT
File Edit Setup Control Window Help
-> pciConfigTopoShow
[0,0,0] type=HOST BRIDGE
      status=0x2200 < DEUSEL=1 MSTR_ABORT_RCU >
      command=0x0546 < MEM_ENABLE MASTER_ENABLE PERR_ENABLE SERR_ENABLE >
      bar0 in prefetchable 32-bit mem space @ 0x00000000
[0,1,0] type=MULTI_MEDIA
      status=0x0290 < CAP FBTB DEUSEL=1 >
      command=0x0007 < IO_ENABLE MEM_ENABLE MASTER_ENABLE >
      bar0 in I/O space @ 0xe8000000
      bar1 in 32-bit mem space @ 0x20000000
[0,2,0] type=ISA BRIDGE
      status=0x0210 < CAP DEUSEL=1 >
      command=0x000f < IO_ENABLE MEM_ENABLE MASTER_ENABLE MON_ENABLE >
[0,3,0] type=COMMUNICATION
      status=0x0290 < CAP FBTB DEUSEL=1 >
      command=0x0007 < IO_ENABLE MEM_ENABLE MASTER_ENABLE >
      bar0 in 32-bit mem space @ 0x20001000
      bar1 in I/O space @ 0x00000100
[0,9,0] type=P2P BRIDGE to [1,0,0]
      base/limit:
        mem= 0x20100000/0x200fffff
        preMem=0x42600000/0x425fffff
        I/O= 0x00000000/0x00000fff
      status=0x0210 < CAP DEUSEL=1 >
      command=0x0007 < IO_ENABLE MEM_ENABLE MASTER_ENABLE >
[0,12,0] type=BEFORE_STD
      status=0x0200 < DEUSEL=1 >
      command=0x0000 < >
[0,15,0] type=SERIAL BUS
      status=0x0290 < CAP FBTB DEUSEL=1 >
      command=0x0006 < MEM_ENABLE MASTER_ENABLE >
      bar0 in 32-bit mem space @ 0x20100000
value = 0 = 0x0
->
```

View PCI Configuration Space

- Type `pciDeviceShow` (1)
 - This shows each device on Bus 0
 - The Vendor ID and Device ID for the Xilinx Bridge are seen here (2)



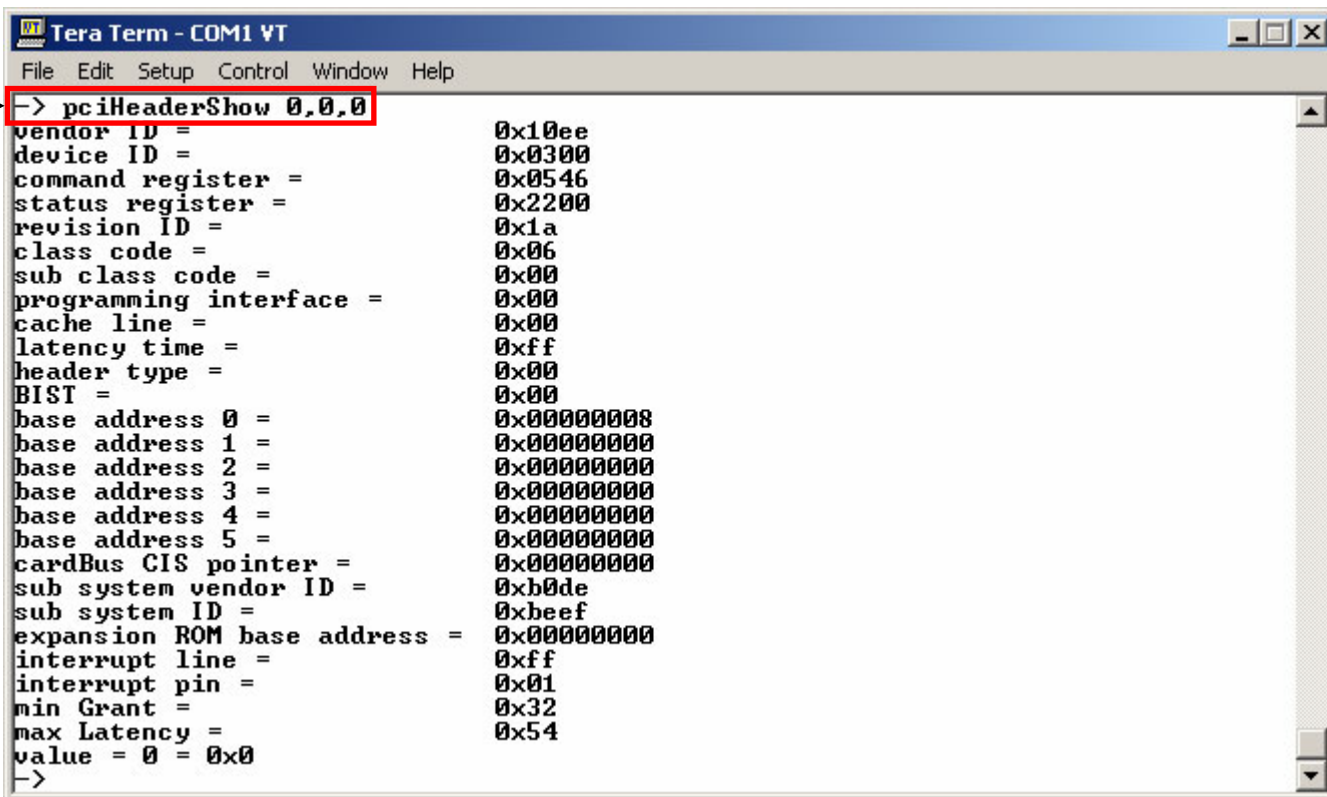
```
Tera Term - COM1 VT
File Edit Setup Control Window Help

bar1 in I/O space @ 0x00000100
[0,9,0] type=P2P BRIDGE to [1,0,0]
base/limit:
  mem= 0x20100000/0x200fffff
  preMem=0x42600000/0x425fffff
  I/O= 0x00000000/0x00000fff
status=0x0210 < CAP DEUSEL=1 >
command=0x0007 < IO_ENABLE MEM_ENABLE MASTER_ENABLE >
[0,12,0] type=BEFORE_STD
status=0x0200 < DEUSEL=1 >
command=0x0000 < >
[0,15,0] type=SERIAL BUS
status=0x0290 < CAP FBTB DEUSEL=1 >
command=0x0006 < MEM_ENABLE MASTER_ENABLE >
bar0 in 32-bit mem space @ 0x20100000
value = 0 = 0x0

-> pciDeviceShow
Scanning function 0 of each PCI device on bus 0
Using configuration mechanism 1
bus device function vendorID deviceID class
00000000 00000000 00000000 000010ee 00000300 00060000
00000000 00000001 00000000 000010b9 00005451 00040100
00000000 00000002 00000000 000010b9 00001533 00060100
00000000 00000003 00000000 000010b9 00005457 00070300
00000000 00000009 00000000 0000104c 0000ac23 00060400
00000000 0000000c 00000000 000010b9 00007101 00000000
00000000 0000000f 00000000 000010b9 00005237 000c0310
value = 0 = 0x0
->
```

View PCI Configuration Space

- Type **pciHeaderShow 0,0,0 (1)**
 - PCI configuration header of the Xilinx Host Bridge is displayed

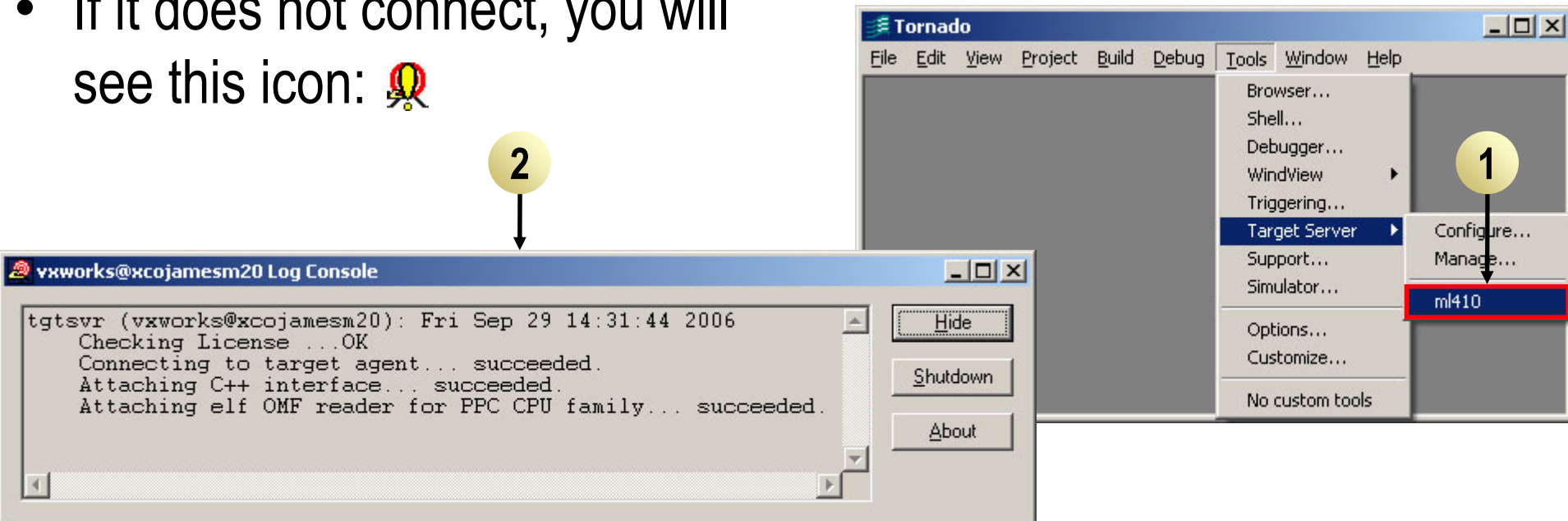


A screenshot of a Tera Term terminal window titled "Tera Term - COM1 VT". The window has a menu bar with "File", "Edit", "Setup", "Control", "Window", and "Help". A yellow circle with the number "1" and an arrow points to the command prompt where the command `pciHeaderShow 0,0,0` has been entered and is highlighted with a red box. Below the command, the output of the command is displayed, showing various PCI configuration space fields and their hexadecimal values.

```
-> pciHeaderShow 0,0,0
vendor ID = 0x10ee
device ID = 0x0300
command register = 0x0546
status register = 0x2200
revision ID = 0x1a
class code = 0x06
sub class code = 0x00
programming interface = 0x00
cache line = 0x00
latency time = 0xff
header type = 0x00
BIST = 0x00
base address 0 = 0x00000000
base address 1 = 0x00000000
base address 2 = 0x00000000
base address 3 = 0x00000000
base address 4 = 0x00000000
base address 5 = 0x00000000
cardBus CIS pointer = 0x00000000
sub system vendor ID = 0xb0de
sub system ID = 0xbeef
expansion ROM base address = 0x00000000
interrupt line = 0xff
interrupt pin = 0x01
min Grant = 0x32
max Latency = 0x54
value = 0 = 0x0
->
```

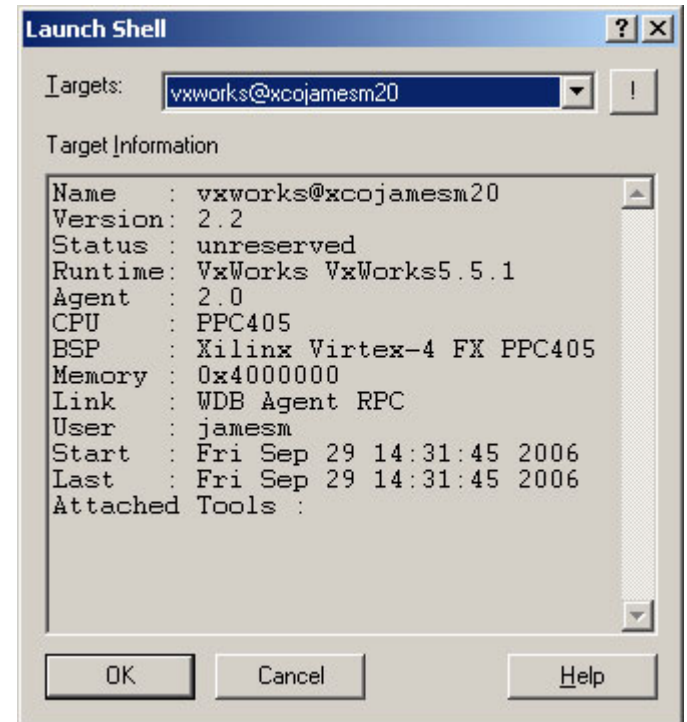
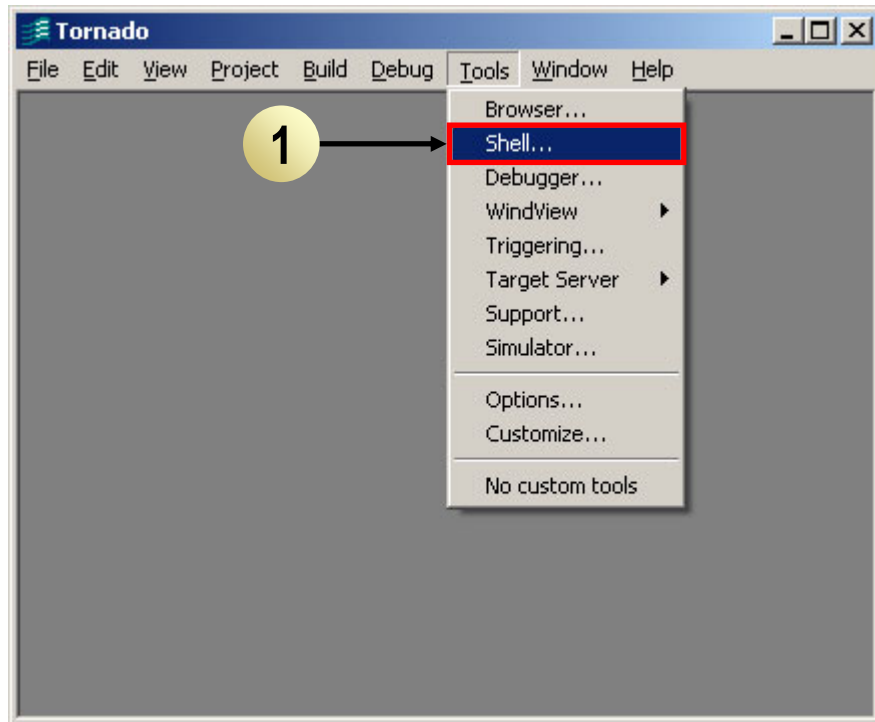
Establish a Tornado Tools Connection

- With the VxWorks demo running, launch Tornado 2.2
- Launch the target server (1)
- Double-click on the target server icon  in the systray to view the target server console (2)
- If it does not connect, you will see this icon: 



Host Shell

- Launch a host shell in Tornado and click OK



Host Shell

- Type **i** in the host shell
- Also type **i** in the target shell
- See the same task listings in both shells

Host Based Shell

Version 2.2

Copyright 1995-2003 Wind River Systems, Inc.

C++ Constructors/Destructors Strategy is AUTOMATIC

-> i

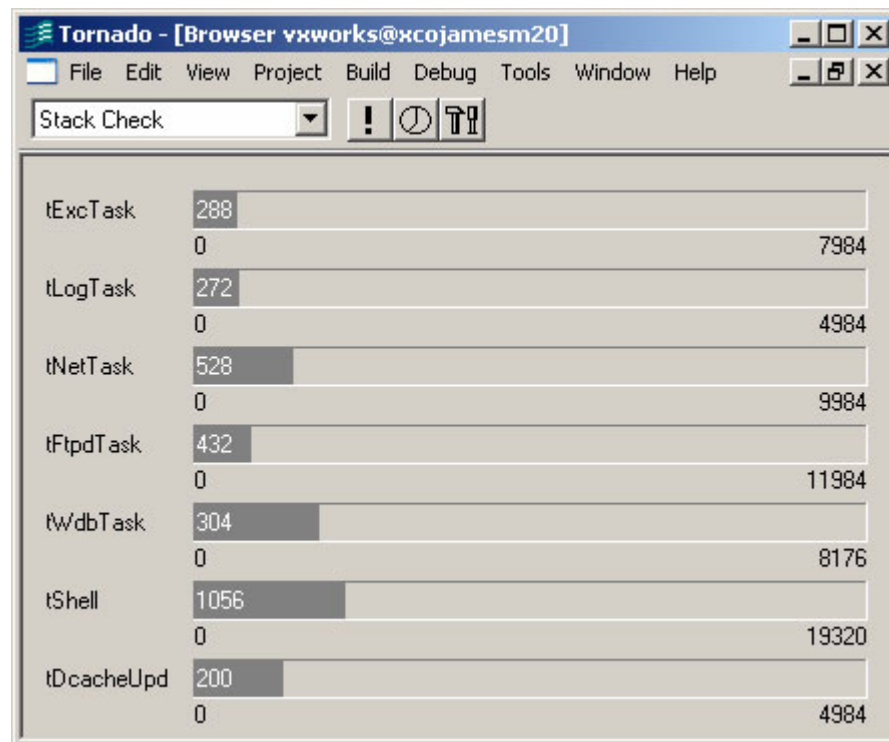
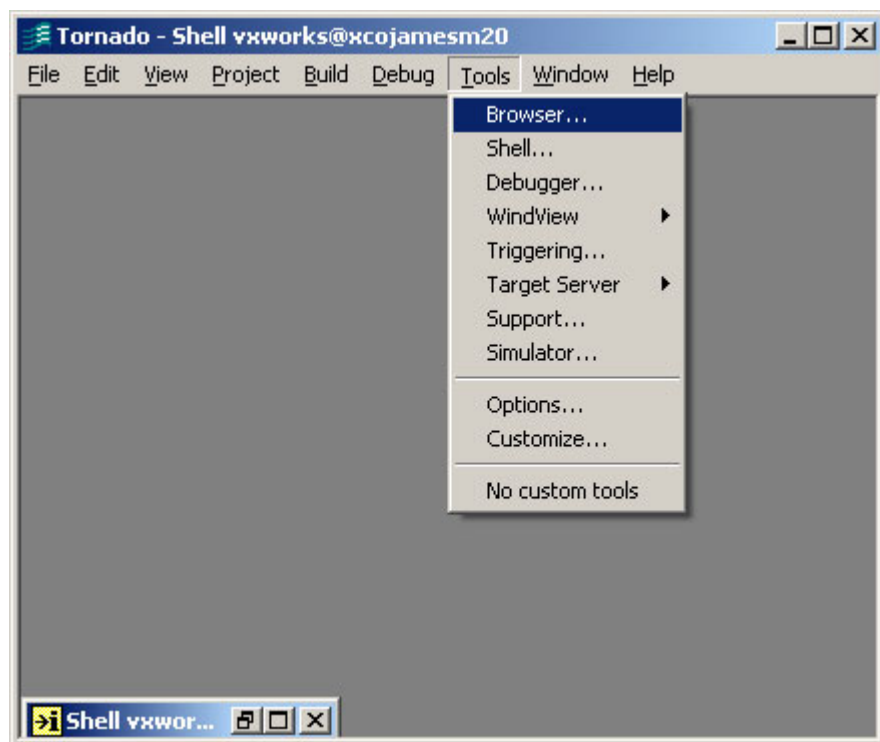
NAME	ENTRY	TID	PRI	STATUS	PC	SP	ERRNO	DELAY
tExcTask	excTask	3ff8ec0	0	PEND	11df5c	3ff8da0	0	0
tLogTask	logTask	3ff64d8	0	PEND	11df5c	3ff63c8	0	0
tShell	shell	3f943b0	1	PEND	111c48	3f93f90	1c0001	0
tWdbTask	wdbTask	3f96628	3	READY	111c48	3f964f8	0	0
tNetTask	netTask	3fb8488	50	READY	111a9c	3fb8278	0	0
tFtpdTask	0x9cb2c	3f9a738	55	PEND	111c48	3f9a588	0	0
tDcacheUpd	dcacheUpd	3ffef18	250	DELAY	116618	3ffee58	3d0002	9

value = 0 = 0x0

->

Tornado Info Browser

- Select **Tools** → **Browser** and do a “Stack Check”



Software-Initiated Reboot

- Perform a software-initiated reboot from the target shell
- Reboot using configuration 2, the ml410_bsb_vxworks.ace file
 - Type **sysSystemAceSetJtagConfigAddr(2)**
 - Type **sysSystemAceJtagReboot(0x41800000)**
 - Reboot address (0x41800000) is the opb_sysace base address

1 → `-> sysSystemAceSetJtagConfigAddr<2>`

`value = 0 = 0x0`

2 → `-> sysSystemAceJtagReboot<0x41800000>`

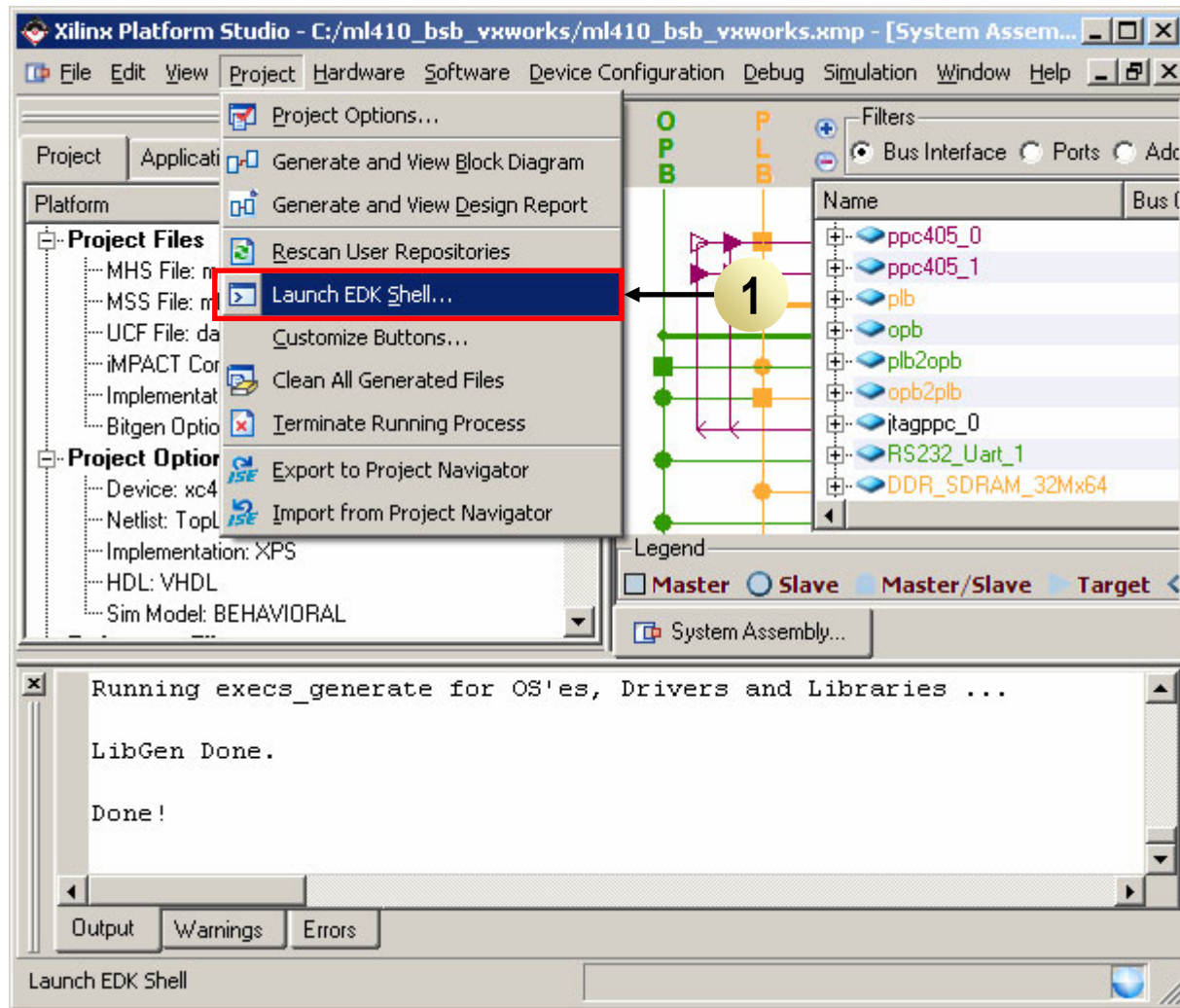
temac: warning - pll clock is defaulted to 100 mhz
 temac: Buffer information:
 0x00018810 bytes allocated for all buffers
 1564 byte cluster size
 64 Rx buffers, 1st buffer located at 0x03F9CCC0
 Attached TCP/IP interface to xtemac unit 0
 Attaching interface lo0...done
 Adding 4327 symbols for standalone.

```

00000000: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000004: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000008: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000000C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000010: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000014: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000018: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000001C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000020: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000024: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000028: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000002C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000030: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000034: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000038: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000003C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000040: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000044: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000048: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000004C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000050: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000054: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000058: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000005C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000060: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000064: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000068: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000006C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000070: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000074: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000078: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000007C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000080: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000084: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000088: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000008C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000090: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000094: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000098: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0000009C: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000A0: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000A4: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000A8: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000AC: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000B0: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
000000B4: 00000000 00000000 00000000 00000000 00000000 0000000
```

Create an ACE File

- Open an EDK shell
 - Select **Project** → **Launch EDK Shell (1)**
 - This shell is used for entering and executing the commands to create a concatenated (HW+SW) ACE file

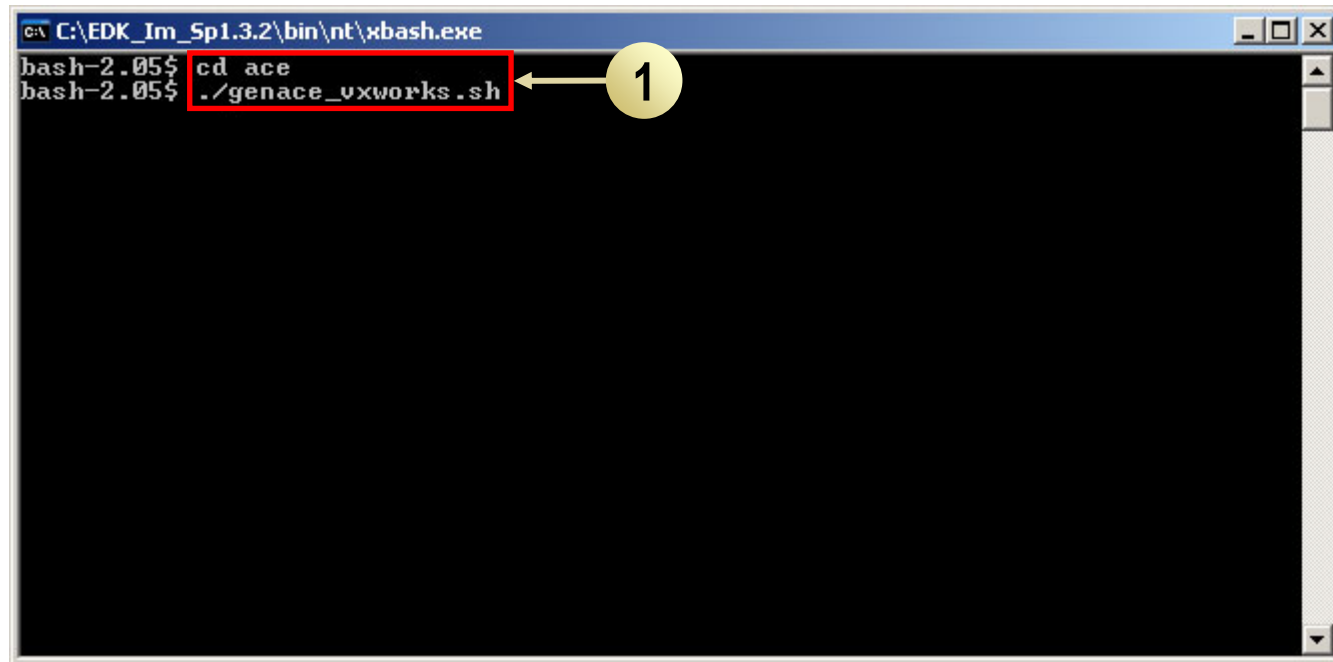


Create an ACE File

- At the EDK shell prompt, type (1):

`cd ace`

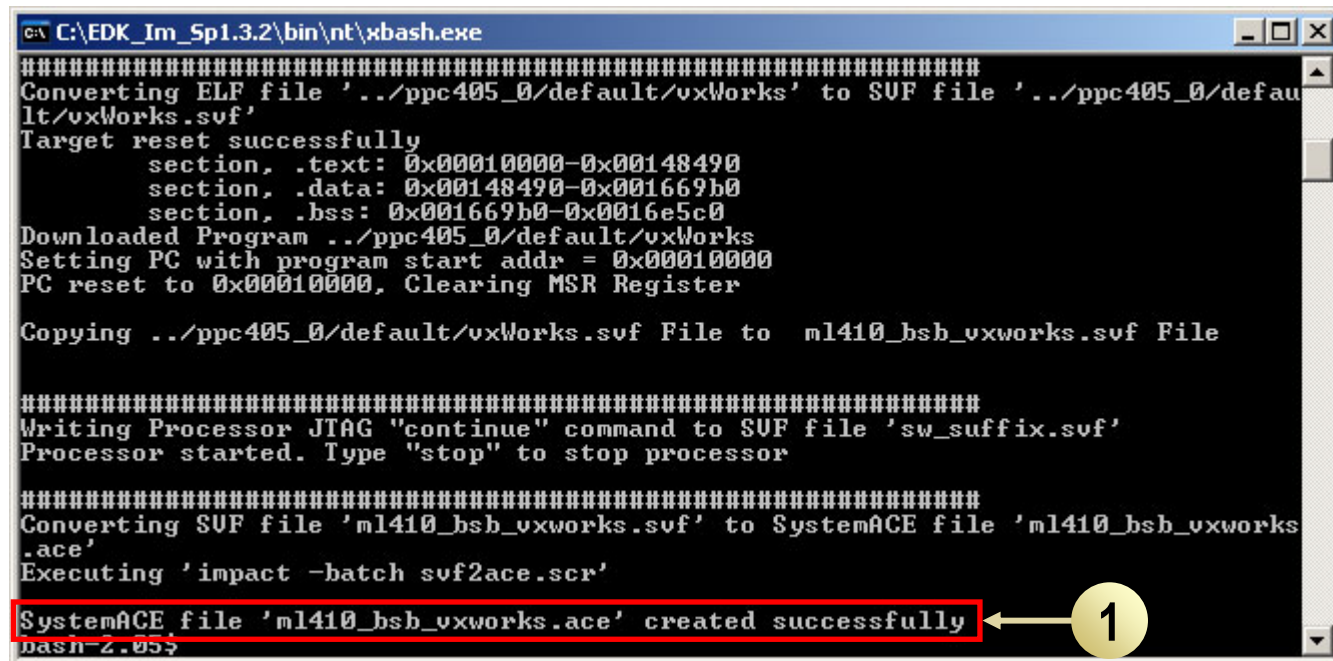
`./genace_vxworks.sh`



```
C:\EDK_Im_Sp1.3.2\bin\nt\xbash.exe
bash-2.05$ cd ace
bash-2.05$ ./genace_vxworks.sh
```

Create an ACE File

- This creates a concatenated (HW+SW) ACE file
 - Input: vxWorks ELF file, ml410_bsb_bootloop.bit (bsb hardware build)
- Genace_vxworks.sh uses XMD and a genace.tcl script with ML410 appropriate options to generate an ACE file (1)



```
C:\EDK_Im_Sp1.3.2\bin\nt\xbash.exe
#####
Converting ELF file '../ppc405_0/default/vxWorks' to SVF file '../ppc405_0/default/vxWorks.svf'
Target reset successfully
    section, .text: 0x00010000-0x00148490
    section, .data: 0x00148490-0x001669b0
    section, .bss: 0x001669b0-0x0016e5c0
Downloaded Program ../ppc405_0/default/vxWorks
Setting PC with program start addr = 0x00010000
PC reset to 0x00010000, Clearing MSR Register

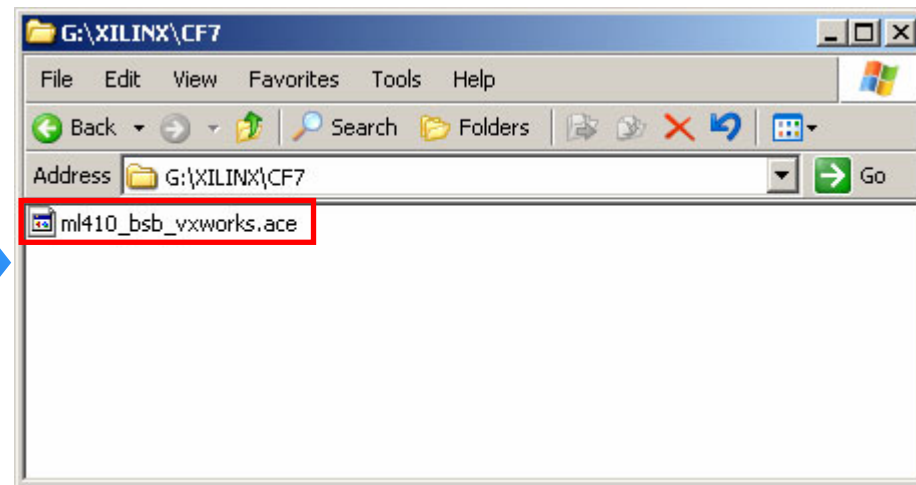
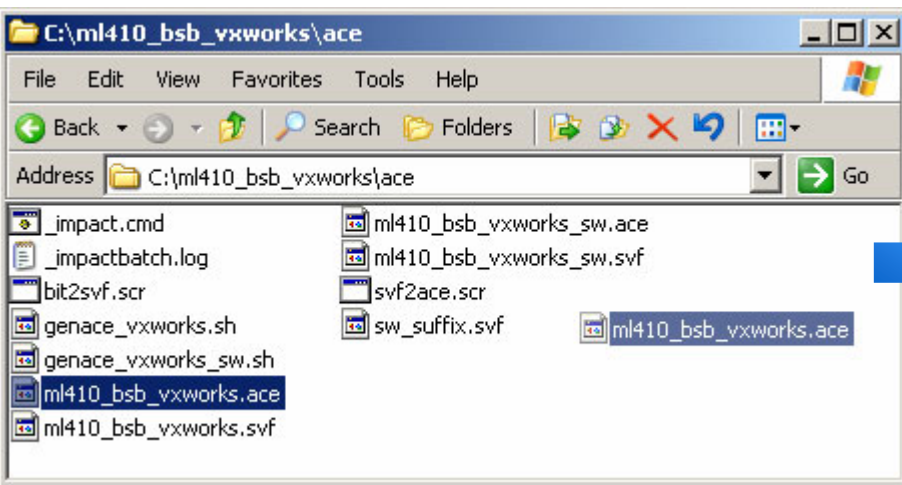
Copying ../ppc405_0/default/vxWorks.svf File to ml410_bsb_vxworks.svf File

#####
Writing Processor JTAG "continue" command to SVF file 'sw_suffix.svf'
Processor started. Type "stop" to stop processor

#####
Converting SVF file 'ml410_bsb_vxworks.svf' to SystemACE file 'ml410_bsb_vxworks.ace'
Executing 'impact -batch svf2ace.scr'
SystemACE file 'ml410_bsb_vxworks.ace' created successfully
bash-2.05$
```

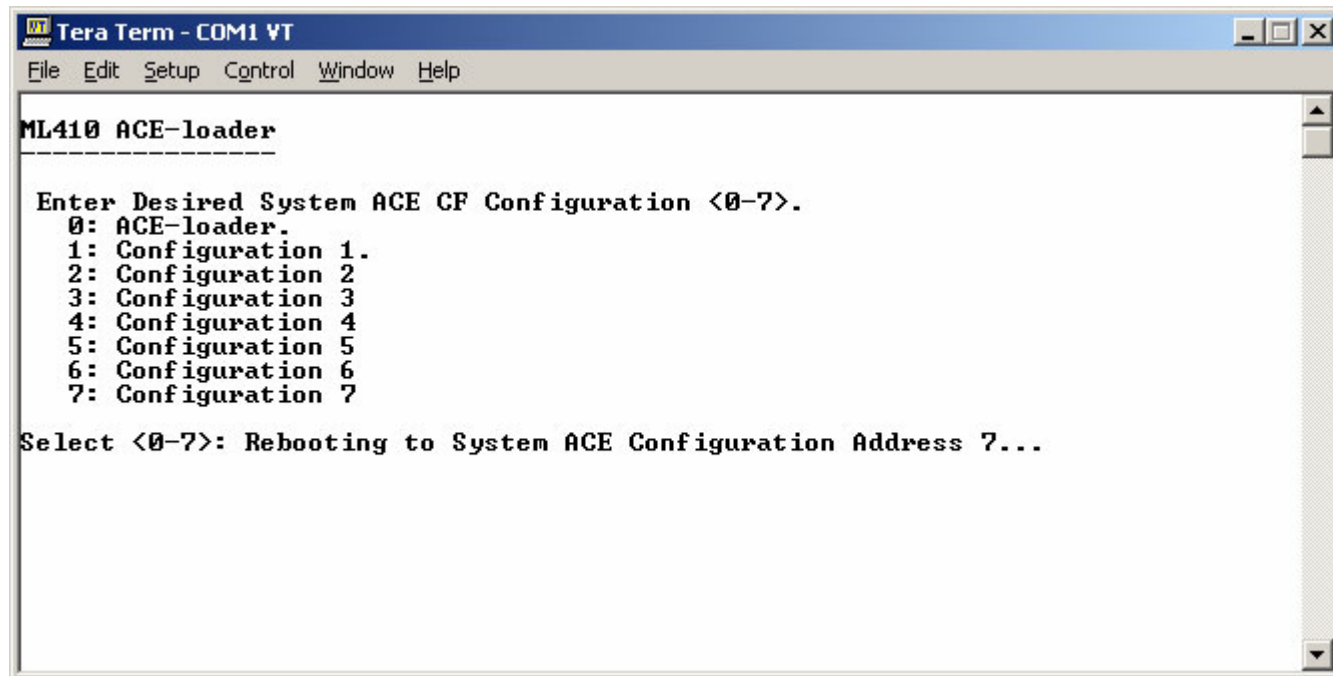
Run ACE File

- Copy ml410_bsb_vxworks.ace to the xilinx\cf7 directory on your CompactFlash card
 - **Important:** Delete any existing ace files in this cf7 directory
 - **Note:** Use a CompactFlash reader to mount the CompactFlash as a disk drive



Run ACE File

- Eject the CompactFlash from your PC and insert it back into the ML410
- Type 7 to run the newly created ACE file and load vxWorks



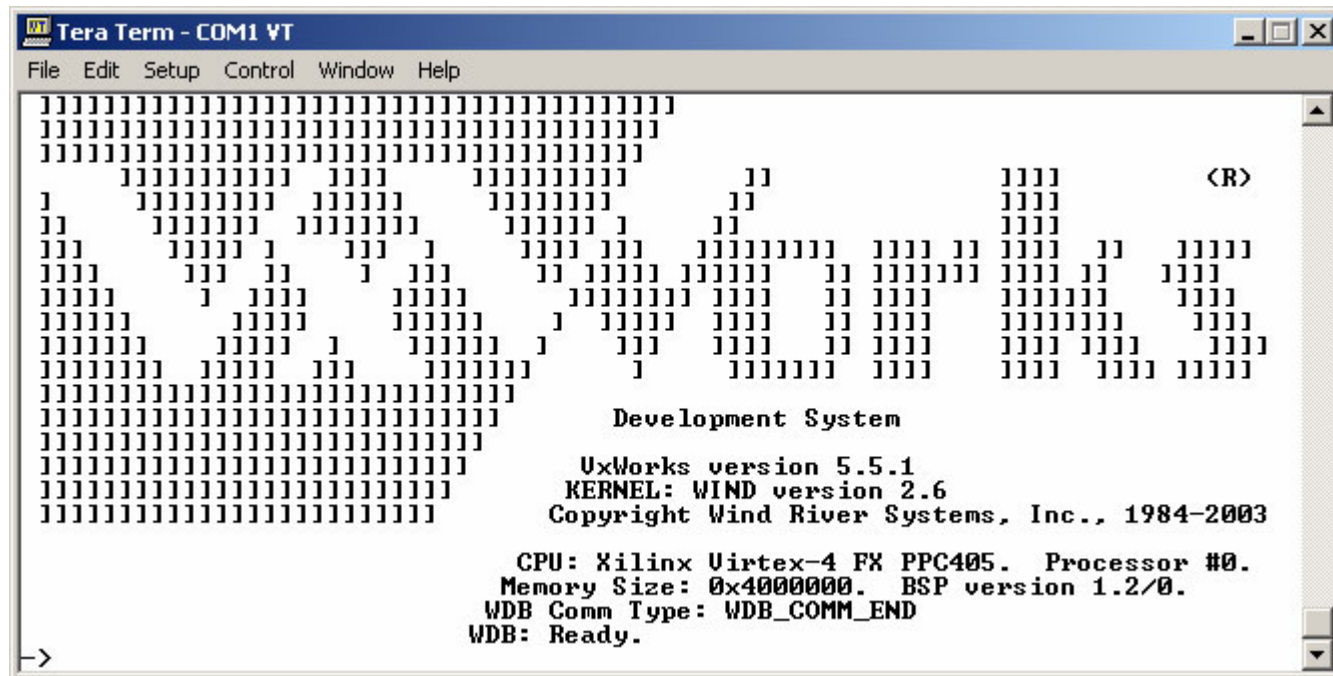
The screenshot shows a terminal window titled "Tera Term - COM1 VT". The menu displayed is:

```
ML410 ACE-loader
-----
Enter Desired System ACE CF Configuration <0-7>.
0: ACE-loader.
1: Configuration 1.
2: Configuration 2.
3: Configuration 3.
4: Configuration 4.
5: Configuration 5.
6: Configuration 6.
7: Configuration 7.

Select <0-7>: Rebooting to System ACE Configuration Address 7...
```

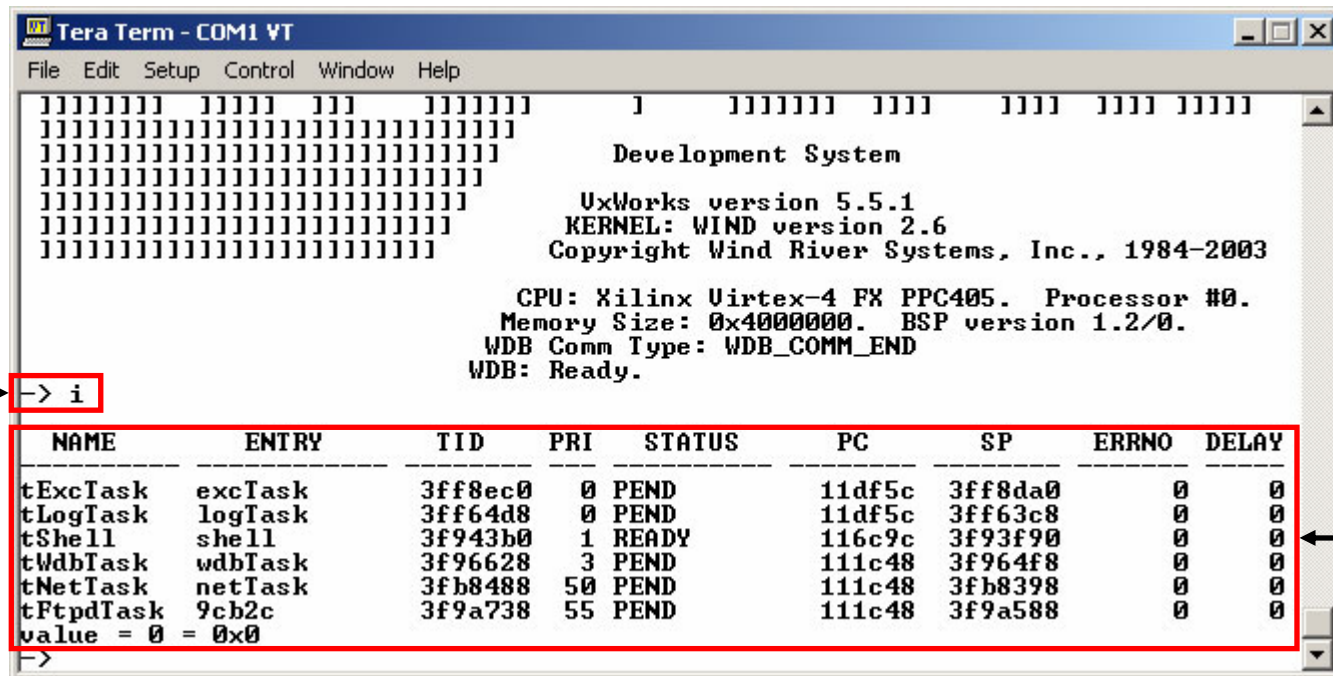
Using the ACE File

- Target shell output after booting ACE file



Target Shell Task Listing

- After the VxWorks banner screen, type `i` (1)
- View a list of tasks running on the ML410 (2)



The screenshot shows a Tera Term window titled "Tera Term - COM1 VT". The window contains the VxWorks banner text, which includes "Development System", "UxWorks version 5.5.1", "KERNEL: WIND version 2.6", "Copyright Wind River Systems, Inc., 1984-2003", "CPU: Xilinx Uirtex-4 FX PPC405. Processor #0.", "Memory Size: 0x4000000. BSP version 1.2/0.", "WDB Comm Type: WDB_COMM_END", and "WDB: Ready.". Below the banner, a list of tasks is displayed. A red box highlights the command prompt "`-> i`" and the task list table. A yellow circle with the number "1" points to the command prompt, and a yellow circle with the number "2" points to the task list table.

```
-> i
```

NAME	ENTRY	TID	PRI	STATUS	PC	SP	ERRNO	DELAY
tExcTask	excTask	3ff8ec0	0	PEND	11df5c	3ff8da0	0	0
tLogTask	logTask	3ff64d8	0	PEND	11df5c	3ff63c8	0	0
tShell	shell	3f943b0	1	READY	116c9c	3f93f90	0	0
tWdbTask	wdbTask	3f96628	3	PEND	111c48	3f964f8	0	0
tNetTask	netTask	3fb8488	50	PEND	111c48	3fb8398	0	0
tFtpdTask	9cb2c	3f9a738	55	PEND	111c48	3f9a588	0	0
value = 0 = 0x0								

Available Documentation

- Platform Studio Documentation
 - Embedded Development Kit (EDK) Resources
http://www.xilinx.com/ise/embedded_design_prod/platform_studio.htm
 - OS and Libraries Document Collection
http://www.xilinx.com/ise/embedded/oslib_rm.pdf
 - Automatic Generation of Wind River VxWorks 5.5 Board Support Packages
http://www.xilinx.com/ise/embedded/vxworks5_5.pdf
- ML410
 - ML410 User's Guide
<http://www.xilinx.com/bvdocs/userguides/ug085.pdf>
 - ML410 Overview
<http://www.xilinx.com/ml410>
 - ML410 Schematics
http://www.xilinx.com/products/boards/ml410/docs/ml410_revE.pdf

