



Penguin Edge™ MVME2500 VxWorks 6.8 AMP

User Guide

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About this Manual

Overview of Contents

This manual is divided into the following chapters and appendix:

Chapter 1, Introduction on page 9, provides an overview of this manual.

Chapter 1, Booting VxWorks on page 11, describes the procedure to boot VxWorks 6.8 AMP on the Product-ShortName.

Chapter 1, Building Board Support Package on page 17, describes the procedure to build Board Support Package (BSP).

Appendix A, Sample Output on page 27, provides the sample output of VxWorks 6.8 AMP booting through network, disk and USB.

Appendix B, Related Documentation on page 37 lists the related documents of VxWorks on the Product-ShortName 6.8 AMP.



Abbreviations






This document uses the following abbreviations:

Abbreviation	Definition
AMP	Asymmetric Multiprocessing
BSP	Board Support Package
FTP	File Transfer Protocol
IP	Internet Protocol
SATA	Serial Advanced Technology Attachment
SBC	Single Board Computer
TFTP	Trivial File Transfer Protocol

Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
bold	Used to emphasize a word
Screen	Used for on-screen output and code related elements or commands. Sample of Programming used in a table (9pt)
Courier + Bold	Used to characterize user input and to separate it from system output
<i>Reference</i>	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a sub-menu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
.	Omission of information from example/command that is not necessary at the time
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
	Logical OR
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury

Notation	Description
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
<p>Use ESD protection</p> 	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered, pay attention to important information

Summary of Changes

This manual has been revised and replaces all prior editions.

Part Number	Publication Date	Description
6806800M27C	September 2019	Re-branded to SMART Embedded Computing template. Updated Conventions table; updated Freescale to NXP; updated Related Documentation paragraph.
6806800M27B	August 2014	Re-branded to Artesyn template.
6806800M27A	April 2011	Initial version

Introduction

1.1 Overview

The MVME2500 Single Board Computer (SBC) is a VMEbus board, which features a single-core P2010 or the dual-core P2020 NXP® QorIQ® processors.

VxWorks 6.8 Asymmetric Multiprocessing (AMP) allows the independent instances of the VxWorks operating system to run on the individual CPUs of a multi-core processor.

This document describes the procedure to boot the VxWorks 6.8 AMP on the MVME2500 board.

1.2 Deliverables

The following table lists the MVME2500 deliverables.

Table 1-1 List of Deliverables

Name	Description
<code>vxWorks_00.st</code>	VxWorks boot image file for Core 0
<code>vxWorks_01.st</code>	VxWorks boot image file for Core 1
<code>mvme2500_AMP_re11.0.tar.gz</code>	VxWorks 6.8 AMP Board Support Package (BSP) for MVME2500

Booting VxWorks

1.1 Introduction

You can boot VxWorks AMP on the MVME2500 board using any of the following methods:

- Network Boot
- Disk Boot
- USB Boot

1.2 Network Boot

1.2.1 Prerequisites

You should have Connectivity to the TFTP server

1.2.2 Booting Procedure

The TFTP server should be configured and started in the connected PC. The VxWorks boot Image file, `vxWorks_00.st`, should be made available at the standard TFTP boot image path `/tftpboot`.

To boot VxWorks AMP through network, perform the following steps:

1. Power up the MVME2500 board.
By default, it provides the U-Boot prompt.
2. Set the environmental variables at the U-Boot prompt.

```
setenv ipaddr <Board ip address>
setenv serverip <TFTP server ip address>
setenv gatewayip <Gateway ip address>
setenv netmask <Netmask>
```

Example:

```
setenv ipaddr 10.130.101.206
setenv serverip 10.130.101.216
setenv gatewayip 10.130.101.254
setenv netmask 255.255.255.0
```

3. Set the VxWorks boot image file name.
`setenv vxbootfile vxWorks_00.st`
4. Set the VxWorks bootline arguments.

Booting VxWorks

```
setenv vxbootargs 'motetsec(0,0)10.130.101.216:vxWorks
h=10.130.101.216 e=10.130.101.206:ffffff00 u=vxworks pw=vxworks
f=0x80'
```

Parameters description:

motetsec(0,0) : ethernet interface 0 on cpu 0

10.130.101.216 : Host Machine IP

10.130.101.206 : Board IP

ffffff00 : Netmask

u=vxworks : Username on host machine

p=vxworks : Password for the above user in host machine

f=0x80 : File Transfer Protocol (FTP)

5. Set the VxWorks network boot command.

```
setenv vxboot 'tftpboot $vxbootfile && setenv bootargs $vxbootargs
&& bootvx'
```

6. Save your current environmental variables.

```
saveenv
```

7. Boot VxWorks on Core 0 through network.

```
run vxboot
```

This will boot the VxWorks on Core 0 only.

For sample output of VxWorks booting on Core 0 through network, refer to [Section A.1.1, VxWorks Booting on Core 0 on page 27](#).

8. Boot VxWorks Image on Core 1, execute `wrload` command.

Example: `wrload "-file <image dir>/vxWorks -cpu 1"`

To access the Core1 Console use the tip utility.

Example: `tip "dev=/ttyMsd0#tag=green"`.

For more information refer the tip utility documentation.

For sample output of VxWorks booting on Core 1 through network, refer to [Section A.1.2, VxWorks Booting on Core 1 on page 29](#).

1.3 Disk Boot

1.3.1 Prerequisites

You should have Serial Advanced Technology Attachment (SATA) hard disk with ext2 file system loaded, and VxWorks image loaded to the ext2 file system

1.3.2 Booting Procedure

To boot VxWorks AMP using disk, perform the following steps:

1. Power up the MVME2500 board.
By default, it provides the U-Boot prompt.
2. Set the environmental variables at the U-Boot prompt.

```
setenv ipaddr <Board ip address>
setenv serverip <TFTP server ip address>
setenv gatewayip <Gateway ip address>
setenv netmask <Netmask>
```

Example:

```
setenv ipaddr 10.130.101.206
setenv serverip 10.130.101.216
setenv gatewayip 10.130.101.254
setenv netmask 255.255.255.0
```

3. Set the VxWorks boot image file name.
`setenv vxbootfile vxWorks_00.st`

4. Set the VxWorks bootline arguments.
`setenv vxbootargs 'motetsec(0,0)10.130.101.216:vxWorks
h=10.130.101.216 e=10.130.101.206:ffffff00 u=vxworks pw=vxworks
f=0x80'`

Parameters description:

```
motetsec(0,0) : ethernet interface 0 on cpu 0
10.130.101.216 : Host Machine IP
10.130.101.206 : Board IP
ffffff00 : Netmask
u=vxworks : Username on host machine
p=vxworks : Password for the above user in host machine
f=0x80 : File Transfer Protocol (FTP)
```

5. Set the VxWorks disk boot command.

Booting VxWorks

```
setenv vxdiskboot 'ext2load scsi 0:1 0x1000000 $vxbootfile &&  
setenv bootargs $vxbootargs && bootvx'
```

6. Save your current environmental variables.

```
saveenv
```

7. To boot VxWorks on Core 0 through hard disk, execute the following command:

```
run vxdiskboot
```

This will boot VxWorks on Core 0 only.

For sample output of VxWorks booting on Core 0 through hard disk, refer to [Section A.2.1, VxWorks Booting on Core 0 on page 30](#).

8. Boot VxWorks Image on Core 1, execute `wrload` command.

Example: `wrload "-file <image dir>/vxWorks -cpu 1"`

To access the core1 Console use the tip utility

Example: `tip "dev=/ttyMsd0#tag=green"`.

For more information refer the tip utility documentation.

For sample output of VxWorks booting on Core 1 through hard disk, refer to [Section A.2.2, VxWorks Booting on Core 1 on page 31](#).

1.4 USB Boot

1.4.1 Prerequisites

You should have USB pen drive with VxWorks image, and vfat or ext2fs file system

1.4.2 Booting Procedure

To boot VxWorks AMP using USB, perform the following steps:

1. Power up the MVME2500 board.
By default, it provides the U-Boot prompt.

2. Set the environmental variables.

```
setenv ipaddr <Board IP address>
setenv serverip <TFTP server IP address>
setenv gatewayip <Gateway IP address>
setenv netmask <Netmask>
```

Example:

```
setenv ipaddr 10.130.101.206
setenv serverip 10.130.101.216
setenv gatewayip 10.130.101.254
setenv netmask 255.255.255.0
```

3. Set the VxWorks boot image file name.

```
setenv vxbootfile vxWorks_00.st
```

4. Set the VxWorks bootline arguments.

```
setenv vxbootargs 'motetsec(0,0)10.130.101.216:vxWorks
h=10.130.101.216 e=10.130.101.206:ffffff00 u=vxworks pw=vxworks
f=0x80'
```

Parameters description:

```
motetsec(0,0) : ethernet interface 0 on cpu 0
10.130.101.216 : Host Machine IP
10.130.101.206 : Board IP
ffffff00 : Netmask
u=vxworks : Username on host machine
p=vxworks : Password for the above user in host machine
f=0x80 : File Transfer Protocol (FTP)
```

Booting VxWorks

5. Set the VxWorks USB boot command.
`setenv vxusbboot 'usb reset && fatload usb 0:1 0x1000000 $vxbootfile && setenv bootargs $vxbootargs && bootvx'`
6. Save your current environmental variables.
`saveenv`
7. To boot VxWorks on Core 0 through USB, execute the following command:
`run vxusbboot`
This will boot VxWorks on Core 0 only.
For sample output of VxWorks booting on Core 0 through USB, refer to [Section A.3.1, VxWorks Booting on Core 0 on page 33](#).
8. Boot VxWorks Image on Core 1, execute `wrload` command.
Example: `wrload "-file <image dir>/vxWorks -cpu 1"`
To access the Core1 Console use the tip utility
Example: `tip "dev=/ttyMsd0#tag=green"`.
For more information refer the tip utility documentation.
For sample output of VxWorks booting on Core 1 through USB, refer to [Section A.3.2, VxWorks Booting on Core 1 on page 34](#).

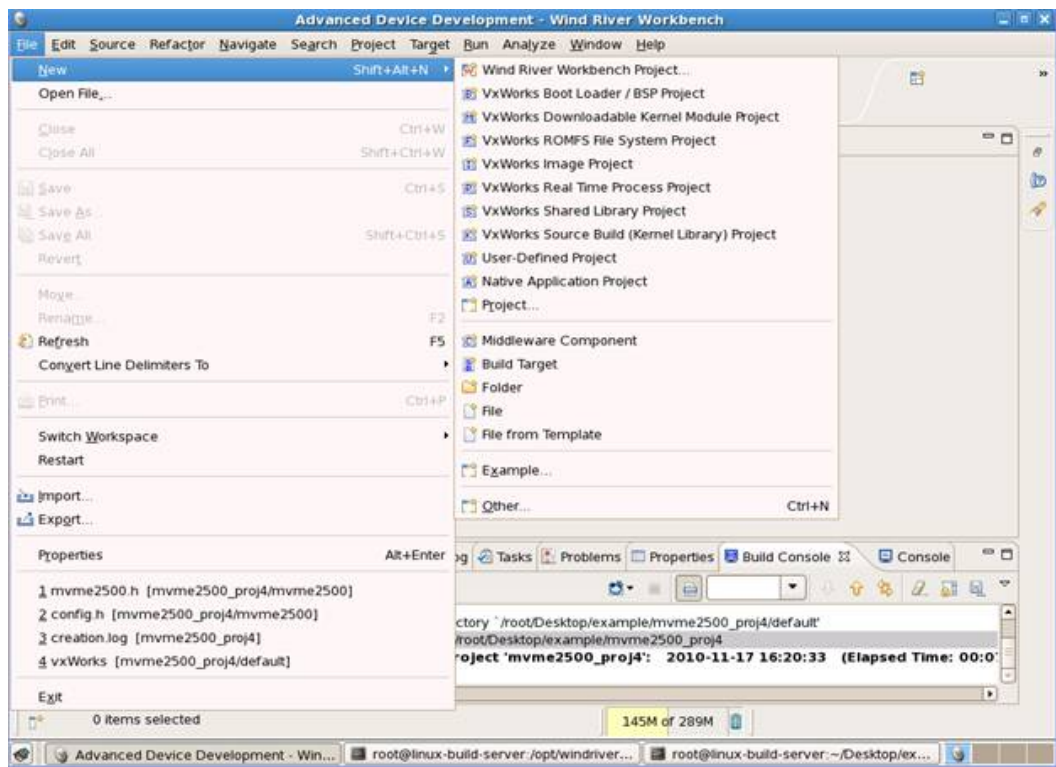
Building Board Support Package

1.1 Building Procedure

The `mvme2500_AMP_re11.0.tar.gz` contains VxWorks 6.8 AMP BSP source files for the MVME2500 board.

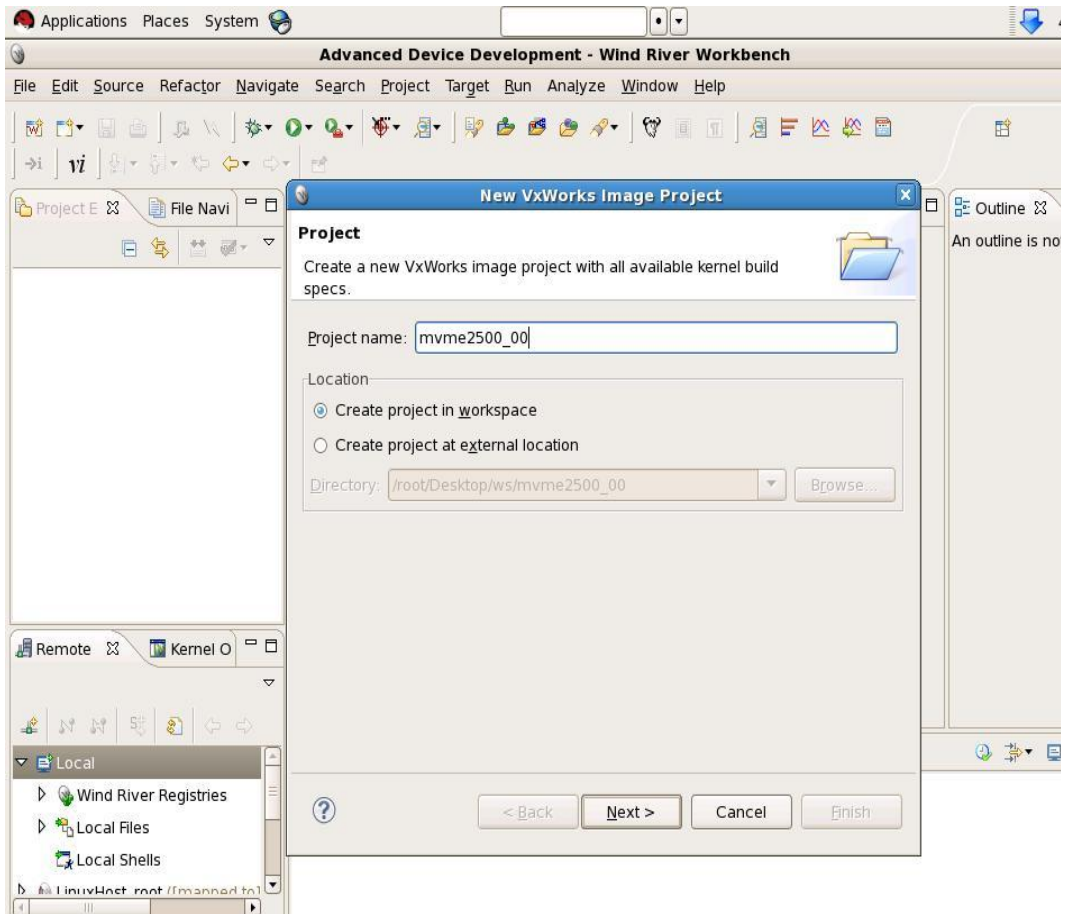
Perform the following steps to build the BSP:

1. Extract the `mvme2500_AMP_re11.0.tar.gz` to any working directory.
2. Start the Wind River VxWorks Workbench by executing the following command:
`<VxWorks Installation Directory>/startWorkbench.sh`
3. Create a new project for Core 0:
 - Open the Wind River VxWorks Workbench. Select **File -> New -> VxWorks Image Project**.



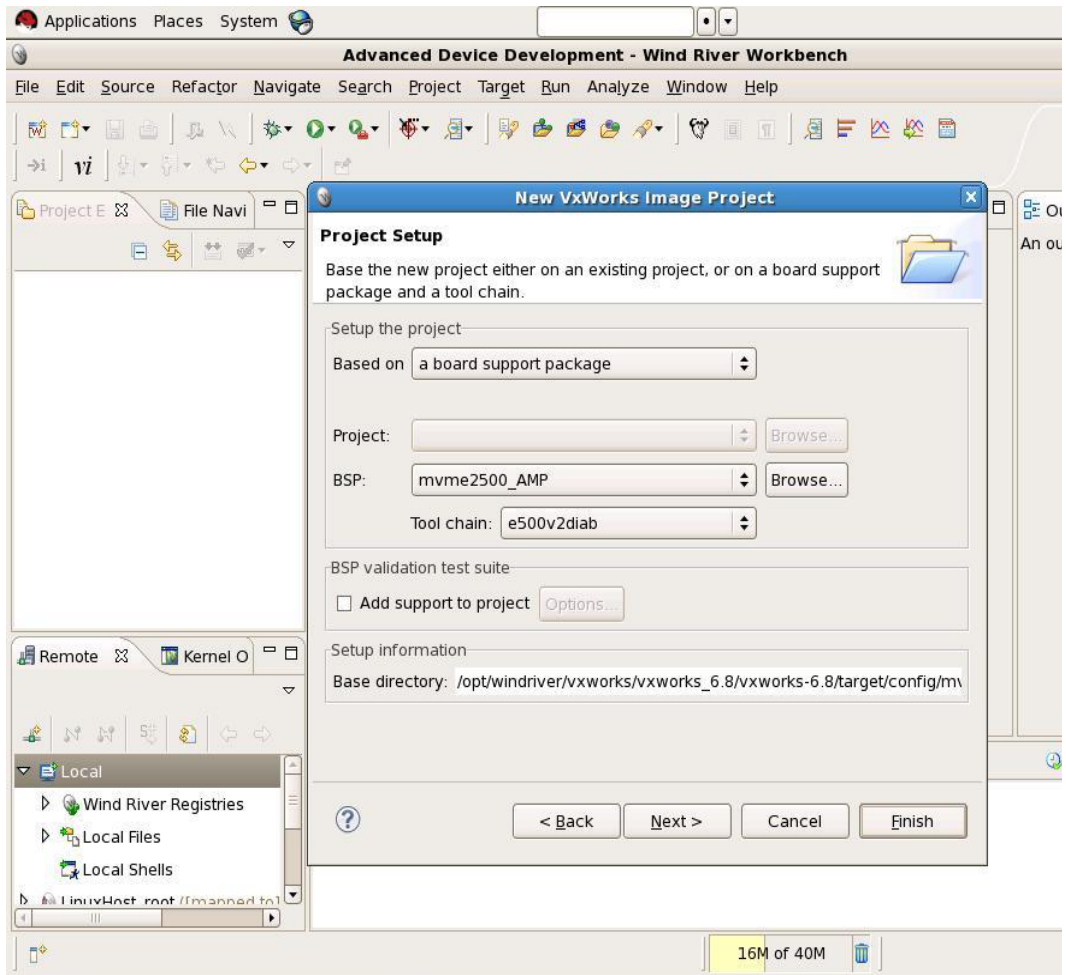
Building Board Support Package

- Give a project name and then click **Next**.



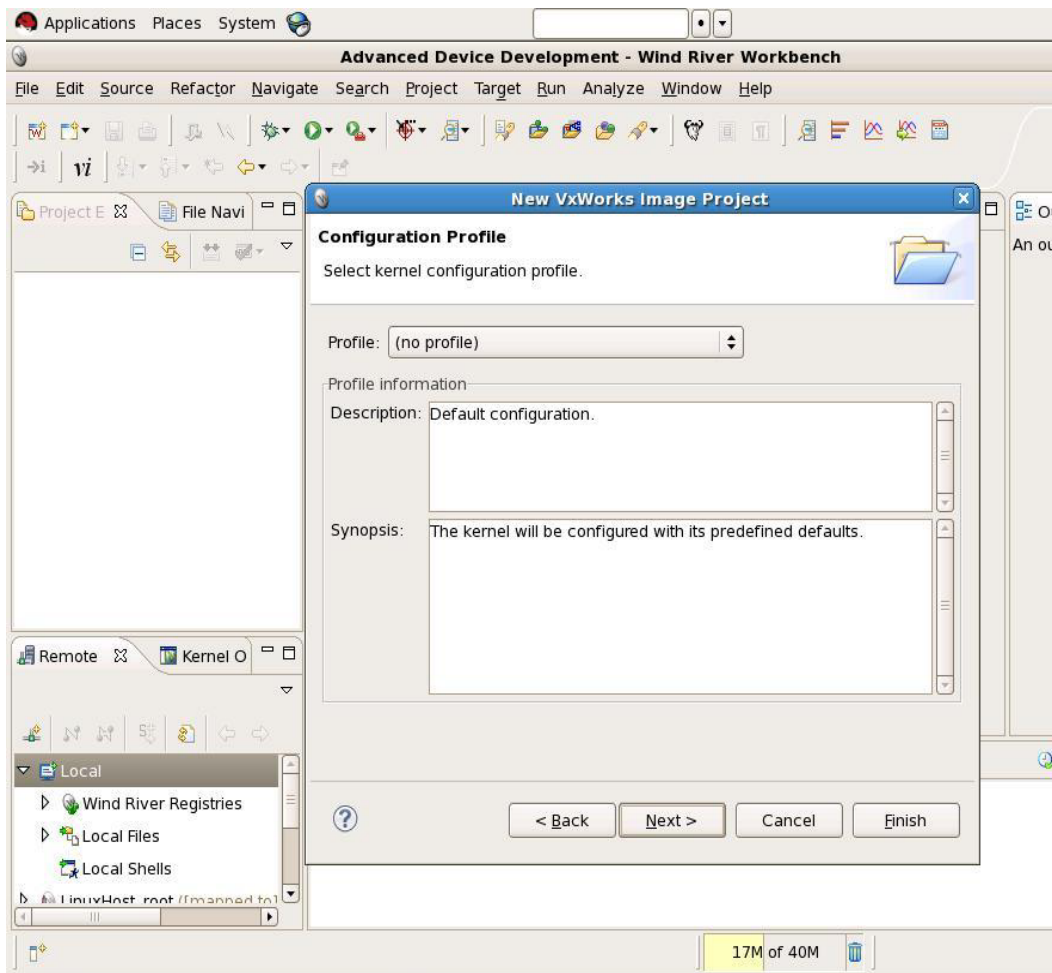
Building Board Support Package

- Go to BSP and select **mvme2500_AMP** from the drop down list. Click **Browse** and point to the location where you have extracted the BSP. Click **Next**.

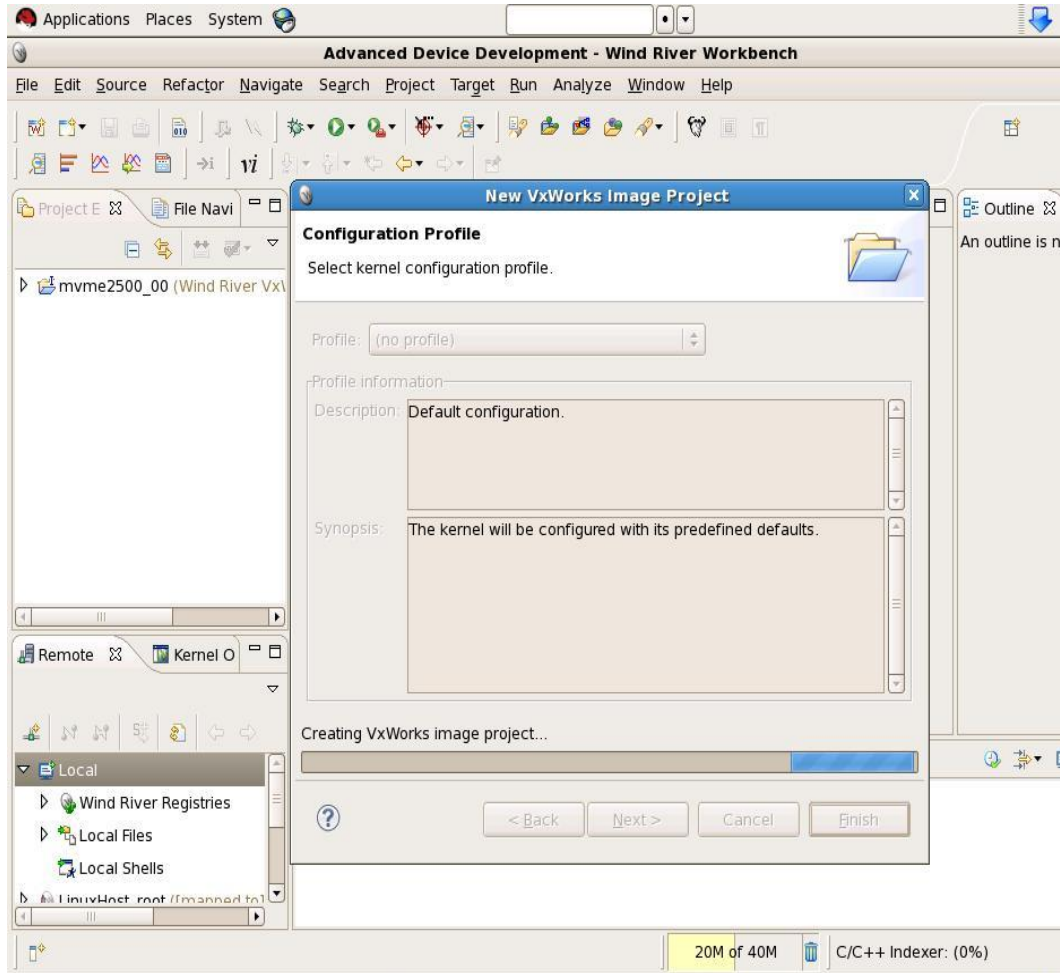


Building Board Support Package

- Select any configuration profile.

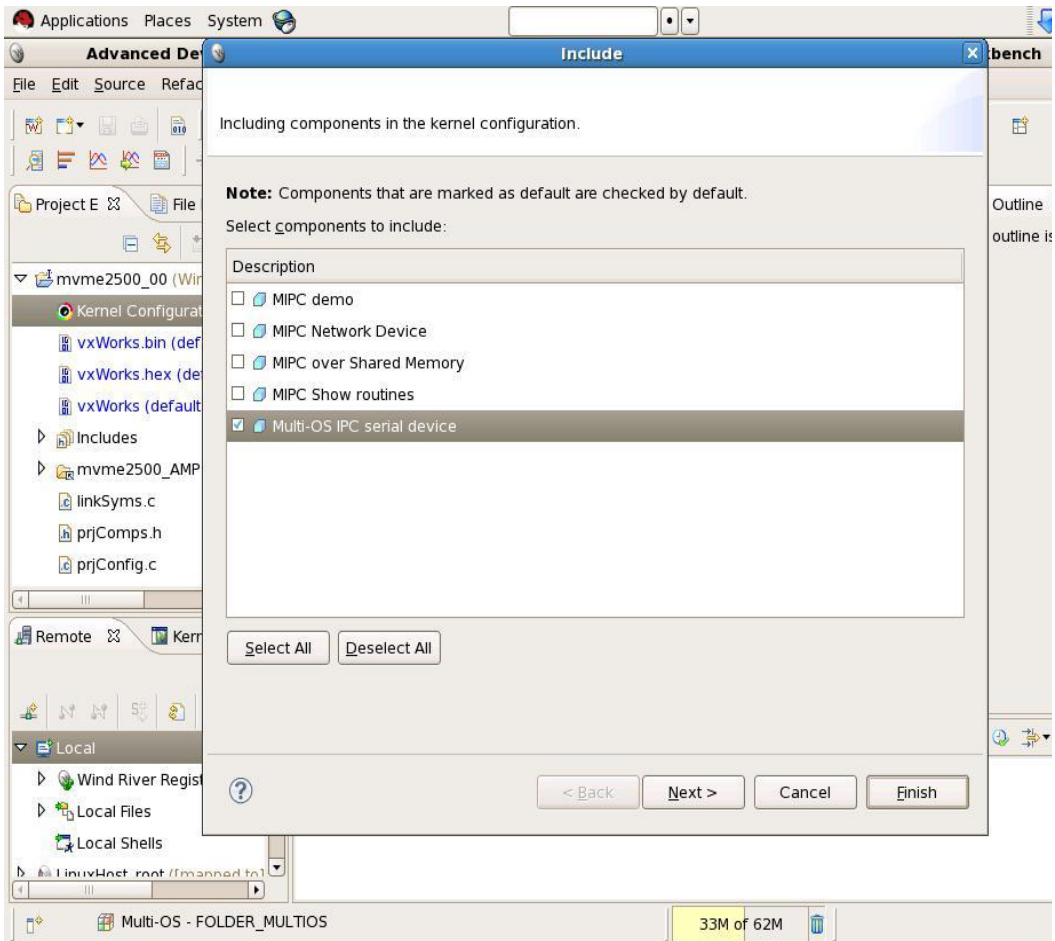


- Click **Finish**.

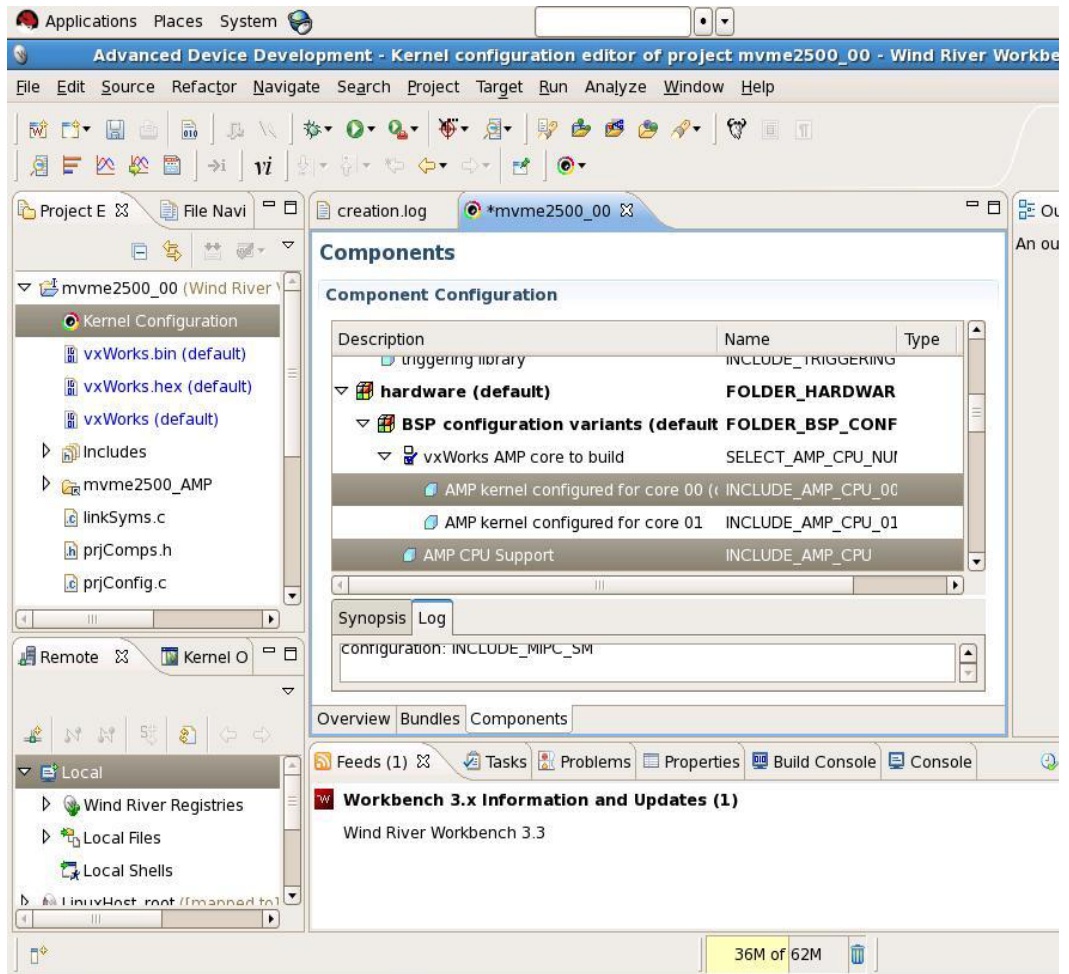


Building Board Support Package

- Once the Project is created, click **Kernel Configuration** and perform the following:
 - Enable **Multi-OS IPC serial device**

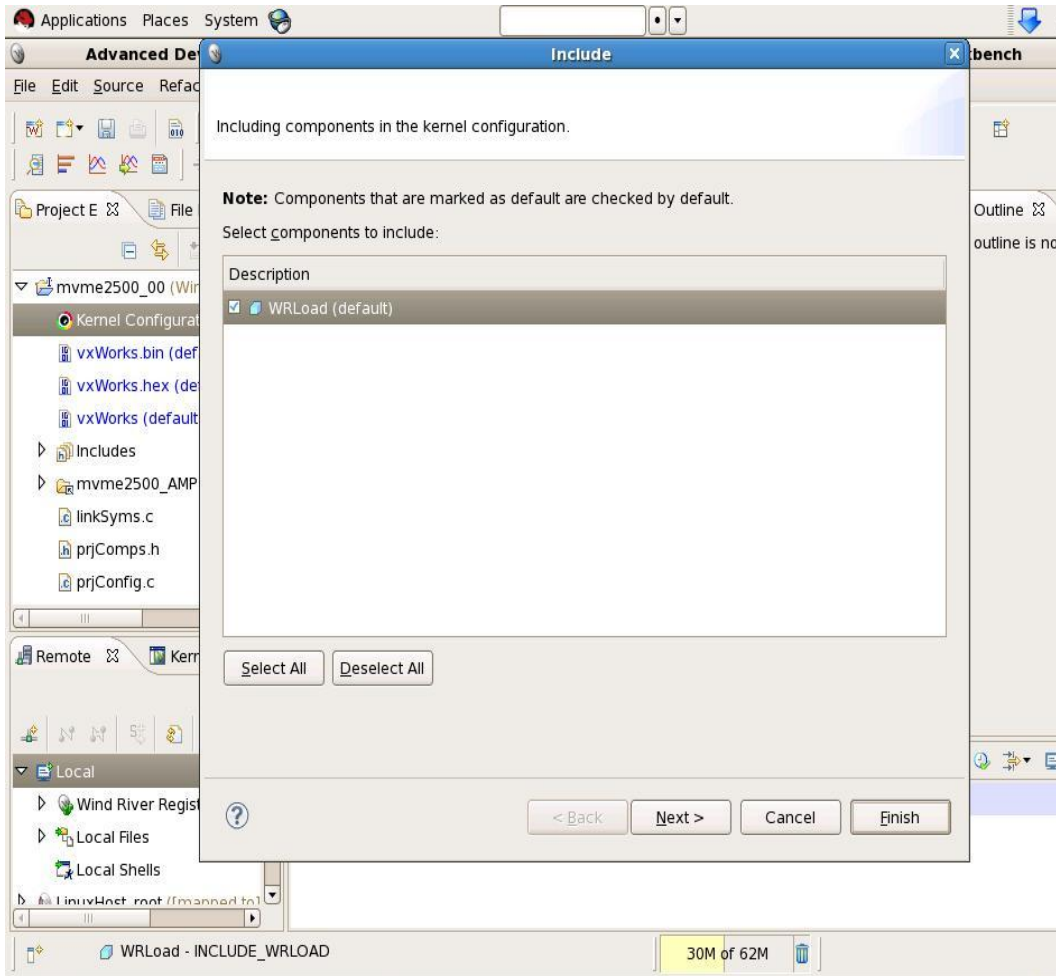


- Enable **INCLUDE_AMP_CPU** and **INCLUDE_AMP_CPU_00**

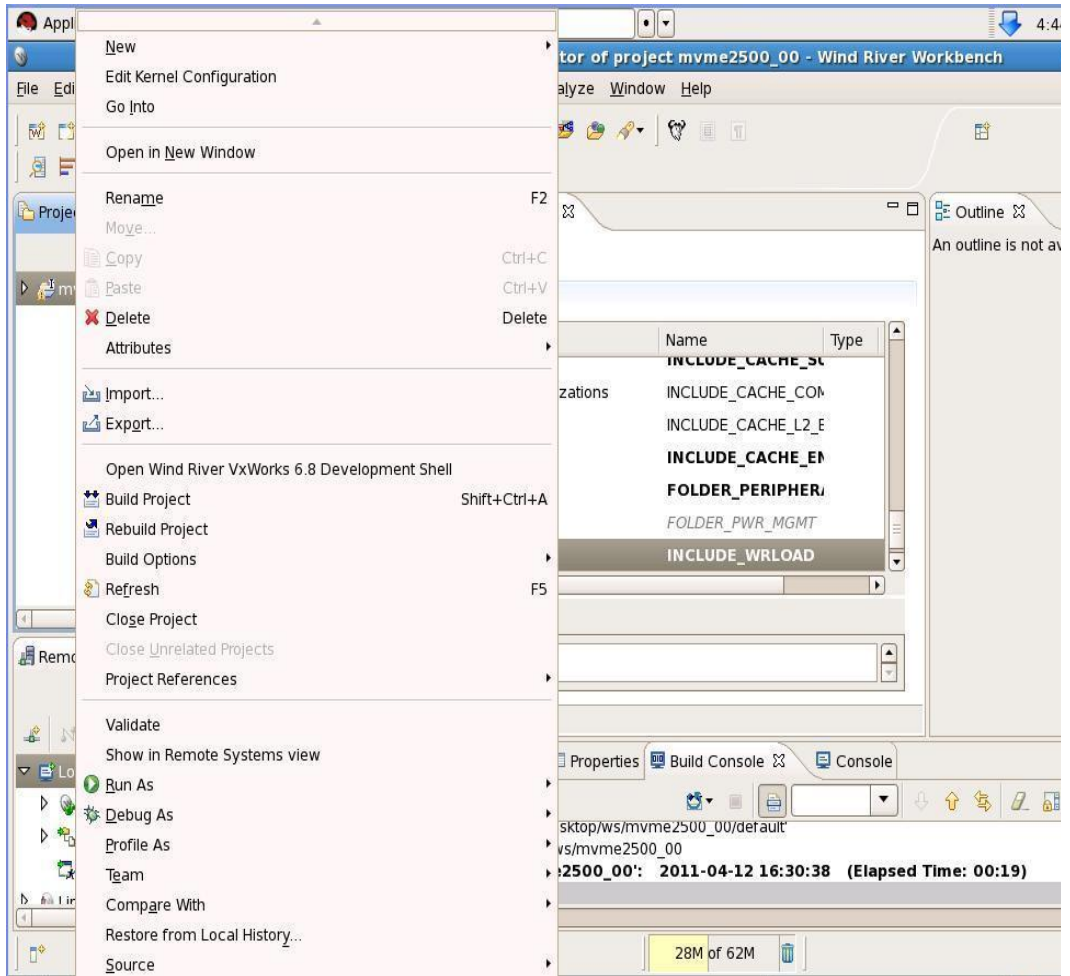


Building Board Support Package

- Enable `INCLUDE_WRLoad`



- Save the Kernel configuration. Right-click the project name which you have created, and select **Build Project**.



Building Board Support Package

4. Create a new project for Core 1:
 - Follow the first five sub-steps in Step 3.
 - Enable the following Kernel Configuration parameters:
 - Enable **Multi-OS IPC Serial Device**.
Modify **MFD_CFG_STR**, change "#dev=/ttyMsd0 node=0 instance=0 console=**n** bus=main" to "#dev=/ttyMsd0 node=0 instance=0 console=**y** bus=main"
 - Enable **INCLUDE_AMP** and **INCLUDE_AMP_CPU_01**
 - Enable **INCLUDE_WRLOAD_IMAGE_BUILD**
 - Save the Kernel Configuration. Right-click the project name which you have created, and select **Build Project**.

Sample Output

A.1 Network Boot

A.1.1 VxWorks Booting on Core 0

```

MVME-2500 (Mon 1.0) => run vxboot
Speed: 100, full duplex
Using eTSEC1 device
TFTP from server 10.130.101.216; our IP address is 10.130.101.206
Filename 'vxWorks_00.st'.
Load address: 0x1000000
Loading:
#####
#####
#####
#####
done
Bytes transferred = 3326700 (32c2ec hex)
## Ethernet MAC address not copied to NV RAM
## Using bootline (@ 0x4200): motetsec(0,0)10.130.101.216:vxWorks
h=10.130.101.216 e=10.130.101.206:ffffff00 u=vxworks pw=vxworks f=0x80
## Starting vxWorks at 0x00100000 ...
Target Name: vxTarget
0x2541220 (devConnect): vxbIntelAhciInstConnect pDev 0x3888a8

Adding 8307 symbols for standalone.

```



```
-> 0x2585430 (devConnect): ahciDrv called 0x2583640 0xa4100000
0x25a5a90 (BusM A): INFO: usb2Msc - Storage driver got a device attach
notification.
0x25a5a90 (BusM A): INFO: usb2Msc - Mounting device (PDT 0x0 PQ 0x0 RMB
0x1)
VID = JetFlash : PID = Transcend 8GB      : REV = 1100

0x25a5a90 (BusM A): INFO: usb2Msc - Device 0x2 LUN 0 of 7925760 (KB) will
be mounted with base name /bd0
Instantiating /ahci00:2 as rawFs, device = 0x30001

0x259b770 (tErfTask): INFO: usb2Msc - Device /bd0 has been claimed by
filesystem
NOTIFY: hDevice 0x2 lun 0 medium changed (mediumInsert = 1)
->
```

A.2.2 VxWorks Booting on Core 1

```
=> wrload "-f vxWorks_01.st"

Loading...
0x21000000 - 0x21200670 loaded
0x21200670 - 0x212007b4 loaded
0x212007b4 - 0x212008a8 loaded

0x21240000 - 0x21277ef8 loaded
0x21277ef8 - 0x212a283c zeroed
value = 0 = 0x0
-> tip "dev=/ttyMsd0"
Connected to /ttyMsd0.

Press ~? for the list of available commands.

[Now listening to session 1 (/ttyMsd0)]

[Input wired to session 1 (/ttyMsd0)]
Target Name: vxTarget

Adding 8240 symbols for standalone.
```


Sample Output

```
CPU: Freescale P2020E - Security Engine. Processor #0.
Memory Size: 0x20000000. BSP version 2.0/2.
Created: Apr 14 2011, 17:53:10
ED&R Policy Mode: Deployed
WDB Comm Type: WDB_COMM_END
WDB: Ready

->0x2585430 (devConnect): ahciDrv called 0x2583640 0xa4100000
0x25a5a90 (BusM A): INFO: usb2Msc - Storage driver got a device attach
notification.

0x25a5a90 (BusM A): INFO: usb2Msc - Mounting device (PDT 0x0 PQ 0x0 RMB
0x1)
VID = JetFlash : PID = Transcend 8GB : REV = 1100
0x25a5a90 (BusM A): INFO: usb2Msc - Device 0x2 LUN 0 of 7925760 (KB) will
be mounted with base name /bd0
Instantiating /ahci00:2 as rawFs, device = 0x30001
0x259b770 (tErfTask): INFO: usb2Msc - Device /bd0 has been claimed by
filesystem
NOTIFY: hDevice 0x2 lun 0 medium changed (mediumInsert = 1)

->
```

A.3.2 VxWorks Booting on Core 1

```
=> wrload "-f vxWorks_01.st"

Loading...
0x21000000 - 0x21200670 loaded
0x21200670 - 0x212007b4 loaded
0x212007b4 - 0x212008a8 loaded

0x21240000 - 0x21277ef8 loaded
0x21277ef8 - 0x212a283c zeroed
value = 0 = 0x0
-> tip "dev=/ttyMsd0"
Connected to /ttyMsd0.

Press ~? for the list of available commands.

[Now listening to session 1 (/ttyMsd0)]

[Input wired to session 1 (/ttyMsd0)]
Target Name: vxTarget

Adding 8240 symbols for standalone.
```


Sample Output

Related Documentation

B.1 Penguin Solutions Documentation

Technical documentation can be found by using the Documentation Search at <https://www.penguinsolutions.com/edge/support/> or you can obtain electronic copies of Penguin Solutions documentation by contacting your local sales representative.

Table B-1 Penguin Solutions Documentation

Document Title	Document Number
MVME2500 Installation and Use	6806800L01
MVME2500 Quick Start Guide	6806800L03
MVME2500 Safety Notes Summary	6806800L13
MVME2500-ECC Installation and Use	6806800N30
MVME2500 VxWorks 6.8 User Guide	6806800M27

Related Documentation

PENGUIN[™]

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