

# Freescal FAE75 Training Genesi Pegasos II Linux Training

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# FAE75 Part 2

# Open Firmware

# Orientation

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# What is FirmWare?

- **Firmware is the first code executed after power on**
- **Dink32, U-boot, Open Firmware, and x86 bios are all firmware**
- **Dink32 is proprietary software owned by Freescale**
  - Available for free under Freescale license
  - exclusively for Sandpoint
- **U-boot is GPL software available for free under GPL license**
  - Available for many boards, including ADS, Arcadia, and others
- **Open Firmware is implementation proprietary software**
  - Available for many boards, including ADS, Arcadia, and others

# What does FirmWare do?

- **Queries the board**

- **Determines the processor**
- **Discovers the memory controller**
- **Sets the chip set registers to a known state**
- **specific to a particular processor family**
- **Enumerates PCI, serial port, and other board features**
- **Can boot an Operating System automatically**

- **After the firmware boot gains control**

- **User can query the board and peripherals**
- **User can set and see environment variables**
- **User can set and see various processor and chipset registers**
- **User can boot into an Operating System**

# Why are there so many FirmWares?

## •Why not?

- There are many variants of windows
- There are many variants of Linux
- There are many variants of real time OS
- Competition among vendors

## •Each have their advantages and Uses

- Dink32 gives Freescale ownership of Sandpoint firmware, we can give it to our customers
- U-boot is fairly ubiquitous and free within GPL rules and everyone can add and debug it.
- Open Firmware is maintained by a commercial company, codegen, and supported by genesi. The standard is open, the implementation is proprietary.

# Open Firmware boot script

## Boot Options

Upon PowerUP, this menu is presented

### Pegasos boot menu

1. MorphOS
2. Debian GNU/Linux 2.4 kernel
3. Debian GNU/Linux 2.6 kernel
4. Yellow Dog Linux 2.4 kernel
5. Return to OF prompt

Press 1-5 (default: 3): 25 seconds to choose

**Error: error while trying to load or boot =>**

**This message indicates that boot failed because we went to the firmware control. It is not an error.**

# OpenFirmware prompt and commands

**ok**

**ok help**

**ok help <option>**

**example: ok help bplan**

# Open Firmware Help Screens

**Lab: everyone type in “help”**

**ok: Help**

**Help category/Forth-word**

**where category is one of:**

**booting devices nvram vn-vars testing  
debugging bplan**

**ok:**



# Open Firmware Help bplan

**Lab: everyone type in “help bplan”**

**ok: Help bplan**

**bplan Pegasos OpenFirmware BIOS**

**copyright 2002**

**ok:**

# Open Firmware Controls

- **Lab: everyone type in these commands**
- **command line history**
  - arrow-up key and tab key
- **scrolling**
  - try help booting before setting the scrolling
  - 18 to lines/page
  - try this with help booting after you set this scrolling option
- **listing devices**
  - show-devs
- **listing files on devices**
  - `ls /pci/ide/disk@0,0:0` – list first partition on first disk on first ide

# Open Firmware Help booting

- **Lab: everyone type in “help booting”**
- **Note that Booting can be done manually**
- **boot [device] [args]**
  - **device is a hardware device e.g. cd, hd, /pci/ide/disk**
  - **args are file names and args to the boot program**
  - **Load and go from the specified device with the device args or from parameter settings.**
  - **First check the aliases by cd /aliases and then .properties**
  - **This will display shortcuts you can easily use**

# Open Firmware Help devices

- **Lab:** everyone type in “help devices”
- **ok:** Help devices
- **A device path is like a Unix file path:**
  - /device@address:options/dev2/...
  - / is the root
- **pwd**
  - display the currently open device
- **cd device –**
  - open the specified device
- **ls**
  - list devices at current tree location
- **show-devs**
  - list all known devices
- **devalias**
  - print all aliases or define an alias
- **.properties**
  - display the property list for the currently opened device

# Open Firmware Help nvram

- **Lab:** everyone type in “help nvram  
type in “printenv”  
type in “help nv-vars”
- **ok:** help nvram
- **change non-volatile memory settings**
- **ok:** help nv-vars
  - **What each nvram variable does**
    - screen-#columns number
      - > number of columns for console, if 0 use max
    - screen-#rows number
      - > number of rows for console, if 0 use max

# printenv

- **Lab: type in printenv**
- **printenv [var]**
  - **print value of var or all values**
  - **look at**
    - boot-file
    - boot-command
    - auto-boot

# Open Firmware Help testing

- Lab: everyone type in “help testing”
- ok: help testing

# Open Firmware Help debugging

- **ok: help debugging**
  - Some of the internal diagnostic commands
- **cpustat**
  - shows the important cpu registers
- **dump-env**
  - shows OF environment
- **dump-all**
  - shows OF state dump
- **dump addr len**
  - shows memory in word-sized chunks
- **mem-stats**
  - shows OF memory stats
- **This command will hang your system – Don't use it**
- **dump-chipset**
  - shows the important chipset registers



# Stopping any openfirmware command

**Control – c**  
**stops any firmware command**



## Genesi Presentation Part 2

