AMD Alchemy™ Au1200™ Processor-Based Systems Media Software Installation Guide

1.0   Scope

This document is for developers creating an AMD Alchemy™ Au1200™ processor-based system that can be used to demonstrate AMD Media Player (AMP) software, as well as the Implicit Networks application software that utilizes the AMP interface. Once set up, the system is ready for developing additional modules using the AMD media software development kit (SDK). Installation of the SDK and building components are beyond the scope of this document.

This is revision D of this document. The changes from revision C (dated June 2005) are:

- Removed `% sudo` from all commands.

- Added clarifying sentence to Section 3.1 on page 3 - The commands listed in this section should be run as root, rather than as a regular user using the "sudo" command. This is most important with the commands executed within the target file system (/mnt/).

- Edited system file package name in Section 3.1 on page 3, steps 3 and 4.

- Section 3.1 on page 3, step 4:
  — Corrected the second command in this step.
  — Added instructions and command line under power management and Ethernet features - `% cd /mnt/etc/rc.d/rcS.d`
  — Corrected command line - `% ln -s ../init.d/amdpm S38AMDpminit`

- Replaced text in Step 6 of Section 3.1 on page 3.

- Edited text in Step 7 of Section 3.1 on page 3 on downloading Autoboot.

- Edited the Included Files list in Section 4.1.1 on page 7.

- Replaced consoleAMPplayer with maiplayer in Section 4.2.1 on page 9.

- Renamed mae-driver.o to mae-driver.ko in Section 4.2.2 on page 9.

- Removed instruction to copy shared libraries to the /usr/lib directory in Section 4.2.3 and Section 4.2.5 on page 9.

- Replaced instructions in Section 5.0 on page 10.

- Replaced instructions in Section 7.0 on page 10.

2.0   Platform Requirements

2.1   Hardware Requirements

The system must have an IDE hard disk drive (HDD) with a minimum size of 10 GB. Maxtor or Seagate drives are recommended; there are known problems with certain Western Digital drives. More information on Linux UDMA drives is found here: http://www.linux.org/docs/ldp/howto/Ultra-DMA.html.

A USB2.0-to-IDE drive adapter cage is also required to mount the hard drive to the Linux host computer for initial partitioning, formatting of the file systems, and rapid copying of file system data to the disk. It is not recommended to use the Au1200 processor-based system to partition, format, and copy files, because the host computer can perform these tasks much faster.

The display must have one of the following resolutions:

- QVGA, 320x240 pixels
- VGA, 640x480 pixels
- SVGA, 800x600 pixels
- XVGA, 1024x768 pixels

Any additional display configurations must be created in the LCD controller device driver for the Au1200 processor.

Speakers or a headphone amplifier are necessary. For the AMD Alchemy DBAu1200™ development board, the AC97 codec is used, and powered (line-level input) speakers are attached at "AC97 HEADPHONE".

Note: While this connector says otherwise, do not attach headphones or headphone-impedance level speakers. The output gain is too low to deliver good gain and audio quality.

Line level impedance is typically 1 kOhm or greater.
Headphone impedance is typically 600 Ohms or less.

To copy software to the device using automatic updates, the platform must be connected to Ethernet. Files may be transferred by FTP.

Lastly, to run the Implicit Networks software on the DBAu1200 development board, a USB keyboard must be attached to operate the graphical user interface (GUI).

2.2   Software Requirements

The media software currently runs using the Montavista Linux operating system. For simple evaluation, use the Montavista Preview kit included with your DBAu1200 development board kit. However, to develop, debug and profile additional software to build a complete product, Montavista Pro 3.1 Linux (MVL Pro 3.1) must be purchased. Additionally, development using Montavista Linux requires a host machine running Red Hat Linux (version 9) to provide cross-compiler tools and an NFS-mounted target Linux file system.

All instructions below assume that MVL Pro 3.1 is installed and running on a Red Hat 9 PC.

3.0   Target System Linux Installation

The Au1200-based systems shipped from the factory do not have hard disks. Consequently, there is no software pre-installed. You will need to supply an IDE hard drive and follow the first time installation instructions below.

3.1   First Time Target Setup

The commands listed in this section should be run as root, rather than as a regular user using the "sudo" command. This is most important with the commands executed within the target file system (/mnt/).

1) Attach the IDE hard disk drive via the USB-to-IDE adapter cage to the Linux host computer. In most cases the drive is referenced as /dev/sda.

2) Partition the disk:

```
% /sbin/fdisk /dev/sda
  (delete any existing partitions with 'd' and partition number)

Command (m for help): p

Disk /dev/sda: 200.0 GB, 200049647616 bytes
255 heads, 63 sectors/track, 24321 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

    Device Boot  Start     End    Blocks    Id     System

Command (m for help):
Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)

p
Partition number (1-4): 1
First cylinder (1-24321, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-24321, default 24321): +32M

Command (m for help): t
Selected partition 1
Hex code (type L to list codes): e
Changed system type of partition 1 to e (Win95 FAT16)

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)

p
Partition number (1-4): 2
First cylinder (6-24321, default 6):
Using default value 6
Last cylinder or +size or +sizeM or +sizeK (6-24321, default 24321): <CR>

Command (m for help): p
```

```
Disk /dev/sda: 200.0 GB, 200049647616 bytes
255 heads, 63 sectors/track, 24321 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot    Start      End     Blocks     Id      System
   /dev/sda1      1          5       40131      e       Win95 FAT16 (LBA)
   /dev/sda2      6          249     1959930    83      Linux

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
```

3)   Format the file systems on the disk for each partition:

```
% /sbin/mkfs.msdos /dev/sda1
% /sbin/mkfs.ext3 /dev/sda2
```

At this point, the hard drive is ready to have system files copied to it. Download the system files package from the AMD Alchemy™ Au1200™ Developer Beta site (db1200-linux26-ddmmmyyyy.tgz). Enter and locate the elf kernel to run as a HDD based system. For example, for the pb1200: vmlinux-pb1200-hdd-MMDDYY.elf.

4)   Write the file systems to the disk partitions.

First write the Linux root file system to the second partition:

```
% mount /dev/sda2 /mnt
% cp –R /opt/montavista/pro/devkit/mips/nfp_le/target/* /mnt
```

Next, obtain the system package from the AMD Alchemy™ Au1200™ Developer Beta site: db1200-linux26-ddmmmyyyy.tgz. Unpack this master tarball into a temporary directory:

```
% tar zxvf db1200-system-mmddyy.tgz
amdpm
interfaces
linux-alchemy-db1200-bin-2.6.11-r000014.tar.gz
linux-alchemy-db1200-nfs-bin-2.6.11-r000014.tar.gz
modtools.tar.gz
nodes.sh
README.txt
```

Now untar the kernel and libraries into the root file system:

```
% cd /mnt
% tar zxf <temp dir>/linux-alchemy-db1200-bin-2.6.11-r000014.tar.gz
```

and untar the version 2.6.11 modtools over the existing 2.4 tools:

```
% tar zxf <temp dir>/modtools.tar.gz
```

Set up the power management and Ethernet features:

Edit /mnt/etc/modules and add these three lines:

/etc/modules/ohci-hcd

/etc/modules/ehci-hcd

/etc/modules/usbhid

Also add the three lines above to the etc/modules file in your NFS root file system.

```
% cp <temp dir>/amdpm /mnt/etc/rc.d/init.d
% chmod +x /mnt/etc/rc.d/init.d/amdpm
% cd /mnt/etc/rc.d/rcS.d
% ln -s ../init.d/amdpm S38AMDpminit

% cp <temp dir>/interfaces /mnt/etc/network
% umount /mnt
```

5) The Linux kernel itself is read from the FAT partition at boot time, not from the root file system. Therefore it must be copied to the /dev/hda1 partition and renamed so the bootloader can find it.

```
% mount /dev/sda1 /mnt
% tar zxf <temp dir>/linux-alchemy-db1200-bin-2.6.11-r000014.tar.gz
% cd <temp dir>/linux-alchemy-db1200-bin-2.6.11-r000014/boot/
% cp linux26-db1200-00.00.14.srec /mnt/db1200.rec
% umount /mnt
```

6) Create mount directories and mounting table information for each partition (FAT and EXT3) on each of the file systems: one for NFS and one for HDD-based operation. This allows the HDD partitions to be accessed whether running stan-dalone (HDD) or connected to NFS for development work.

```
% cd /opt/montavista/pro/devkit/mips/nfp_le/target
% mkdir hdd1
% mkdir hdd2
% chmod 777 hdd1
% chmod 777 hdd2

% cd etc
% vi fstab
```

and add the following three lines:

```
/dev/hda    /hdd     auto     defaults      0 0
/dev/hda1   /hdd1    auto     defaults      0 0
/dev/hda2   /hdd2    ext3     data=journal  0 0

% mount /dev/sda2 /mnt
% cd /mnt
% mkdir hdd1
% chmod 777 hdd1
% cd etc
% vi fstab
```

and add the following line:

```
/dev/hda1   /hdd1    auto     defaults      0 0

% umount /mnt
```

Formatting the target hard disk is now complete. Remove the drive from the USB2.0-to-IDE adapter cage and attach it to the IDE connector on the target system.

7) Burn a small program, booter-xxxxx.rec, into FLASH memory that enables the IDE drive and loads the Linux kernel from the FAT partition. This file is downloaded from the AMD Alchemy™ Au1200™ Developer Beta site: "Autoboot (Booter) Source Code". The file is booter.tgz.

```
YAMON> erase bfd00000 100000

The following area will be erased:

Start address = 0x1fd00000
Size          = 0x00100000
Confirm ? (y/n) y
Erasing…Done

YAMON> load booter-<system name>.rec

YAMON> set start "go bfd00000"
```

8) At this point, the target system is ready to be booted and run in standalone mode. Once past YAMON initialization, the board automatically loads the Linux kernel and runs. The console will present a login prompt.

9) Create the device nodes on both the NFS file system and HDD file system. These nodes are required to open device drivers and mount the IDE drive partitions created above. The "nodes.sh" script is part of the system package. This script must be run twice, once when running with the NFS partition, and once when running as a HDD-based system. Boot with each kernel, then login as root and run the script:

```
# ./nodes.sh
```

The target system is now fully configured and ready to run media software. See Section 4.0 on page 7 to install the media software.

4.0 Media and Application Software Installation

AMD provides the latest version of the media software online. Details on downloading can be found in the documentation included with your development platform.

4.1 Choosing a Configuration

The AMD software has several configurations to enable playback of various formats. However, some formats have special licenses requiring a separate agreement in order to download and use them. Therefore, AMD has isolated these components under separate downloads. Read each agreement carefully to make sure you are within the guidelines before downloading.

Upon agreeing to the license(s) the binary components can be downloaded. These files must be copied to the target.

4.1.1 AMD Media Player Core Package Configuration

This configuration requires a single license agreement covered under the Lesser General Public License rules. The functions supported under this license are:

• MPEG-2 Program Stream and Transport Stream file playback
• MPEG-1 System Stream file playback
• MPEG-4 AVI file playback
• MPEG-4 MP4 file playback
• MP3 Audio file playback
• MP3 Audio encoder
• Ogg Vorbis Audio file playback
• WAV Audio file playback
• MPEG-1 and MPEG-2 Audio playback
• AAC Audio file playback

The files included are:

• maiplayer
• libmaifilereader.so
• libmaiengine.so
• libmaimpeg2demux.so
• libmaimp4demux.so
• libmaimpeg2dec.so
• libmaimpeg4dec.so
• libmaimpadec.so
• libmaiaacdec.so
• libmaiwavdec.so
• libmaiwavwrite.so
• libmaiaudrend.so
• mae-driver.ko
• load
• reload
• install.sh
• fbio
• nodes.sh
• libmaimpamdec.so

4.1.2   Windows® Media Components

Upon agreement to a separate license for audio, the Windows Media Audio library may be downloaded. The functions supported under this license are:

- ASF file format demultiplex
- WMA Windows Media 7/8/9 audio decoder

The files included are:

- libmaiasfdemux.so
- libmaiwmadec.so

Upon agreement to a separate license for video, the Windows Media Video library may be downloaded. The functions supported under this license are:

- ASF file format demultiplex
- WMV Windows Media 8/9 video decoder

The files included are:

- libmaiasfdemux.so
- bmaiwmvdec.so

Note: The ASF file format demultiplex library is identical for both audio and video libraries. It is provided twice as a convenience to customers who download only a single library.

4.1.3   DivX Network Components

Upon agreement to a separate license, the DivX media libraries may be downloaded. The functions supported under this license are:

- DivX 3.11/4.x/5.x format video decoder

The files included are:

- libmaiavidemux.so
- libmaiavidemux2.so
- libmaidivxdec.so

4.1.4   Dolby AC-3 Components

Upon agreement to a separate license, the Dolby media libraries may be downloaded. The functions supported under this license are:

- AC-3 Audio decoder

The files included are:

- libmaiac3dec.so

4.1.5   TiVo Components

Upon agreement to a separate license, the TiVoToGo libraries may be downloaded. The functions supported under this license are:

- TiVoToGo (TiVo Series 2 DVR discovery, file sharing, and TiVo encrypted media playback)

The files included are:

- libmaitivocon.so
- libcurl.so
- libssl.so

4.2   Installation of the Files onto the Target

This section shows where to place the various libraries, drivers, applications, scripts and media files on the target.

4.2.1   Content: Movie and Sound Files (.mpg, .wmv, .avi, .mp3, etc.)

Always copy content to /implicit/content. While the standalone maiplayer can play content from any location, the Implicit Media Player requires all content to be in /implicit/content. This makes it easier to move between the AMP player and Implicit player.

Media and NFS-mounted file systems: Do not play media files that are located on the NFS-mounted file system. The transfer rate of the file is too slow to demonstrate smooth, high-quality playback. The libraries and applications may be located on the NFS file system, which is often the case during library and application development. But even in this case, the media is still played from the mounted HDD (e.g., /hdd2/implicit/content/filename.mpg).

4.2.2   Driver: mae-driver.ko

The driver does not require a specific location. It is usually put in the same directory as the application. The driver must be loaded before the application is executed and does not need to be unloaded until system shut down.

4.2.3   Player: AMD Media Player libraries

To run the AMD Media Player without the Implicit Networks software, a directory can be created such as /demo to copy all the files into. To use the Implicit Networks software as well, copy all of the libraries and drivers into the /implicit/bin directory.

Lastly, copy the libraries to /usr/bin. This is due to a temporary issue in the dynamic library loading scheme that will be fixed in future revisions.

4.2.4   GUI: Linux Support Libraries (if used)

To use either the Implicit Networks GUI or AMP GUI, install the GUI support libraries package. Download the package "gui-support-libs.tgz" from the AMD Alchemy™ Au1200™ Developer Beta site and install the libraries into the HDD /usr/local/lib directory. If running the target under NFS mount, verify that the libraries are being installed onto the actual HDD, /usr/local/lib (e.g., /hdd2/usr/local/lib).

The following libraries are in the package:

- SDL: Provides access to graphics framebuffer, audio, mouse and keyboard
- SDL_image: Loads images as SDL surfaces
- SIGC++: Callback support
- FreeType: TrueType font rendering engine
- ParaGUI: High-level application framework and GUI

4.2.5   Implicit: Implicit Networks Libraries and Application (if used)

To use the Implicit Networks software, first install the GUI libraries package in Section 4.2.4. Then download the Implicit Networks package from the AMD Alchemy™ Au1200™ Developer Beta site. Copy the library to the target and into the HDD root directory.

Note: Be sure to run the target from the hard drive for the installation below.

Un-tar the package from the root directory, which creates a directory such as /ImplicitInstall-20050102. Enter this directory and type './install.sh'.

It will perform installation and also print out many errors. These are not actually harmful errors, but Implicit Networks software looking for test content that does not exist on your platform. It is safe to ignore these errors.

Example error: ERROR: Attribute not updated for file:///implicit/content/xxxxxxxx

Note: Only the alpha version of the AMD Media Player shared libraries and drivers work with the Implicit Networks application. The alpha version is available for downloading on the same page as the Implicit Networks application.

5.0 Running the AMD Media Player Console Application

Load the MAE-enabled device driver. To do this, make sure the load script is executable and then call it.

```
% chmod 777 reload
% reload
```

To manually load the driver, issue the following command:

```
% insmod -f mae-driver.ko
```

Follow the instructions in the AMD Alchemy™ Au1200™ Processor-Based System Media Player Software User's Guide (PID # 33050) to run the player and for more options on media playback configuration.

6.0 Implicit Media Player Configuration

There are extra steps needed to configure the Implicit Media Player on the target. Only perform these configurations in order to show the specific features in Section 6.1.

6.1 Content Attributes and Metadata

If new content is copied to the device, scripts must be run to rebuild the attribute index. On the target, run the following:

```
# /implicit/mkindex.sh /implicit/content
# /implicit/attrib-movies.sh
# /implicit/attrib-photos.sh
```

Do not be alarmed about the many error messages in the attribute scripts:

```
ERROR: Attribute not updated for file:///implicit/content/...
```

The Implicit Media Player has built in attributes for many files that most demo users will not have installed. This does not affect the operation of the software.

7.0 Running the Implicit Software

Load the MAE-enabled device driver. To do this, make sure the load script is executable and then call it.

```
% chmod 777 reload
% reload
```

To manually load the driver, issue the following command:

```
% insmod -f mae-driver.ko
```

8.0   Frequently Asked Questions

Q: Linux is mounting the hard drive file system as read only. How can I fix this?

A: The file system has likely become corrupted. This happens when frequently rebooting the system, and files have not been saved completely to the HDD. To fix this problem, boot the target using the NFS file system version of the kernel included with the system package. Log into the target. At the prompt, run e2fsck on the second partition to fix the file system:

```
# e2fsck /dev/hda2
e2fsck 1.27 (8-Mar-2002)
/dev/hda2 is mounted.

WARNING!!! Running e2fsck on a mounted file system may cause
SEVERE file system damage.

Do you really want to continue (y/n)? y

/dev/hda2: recovering journal
/dev/hda2: clean, 27252/1026144 files, 457852/2048287 blocks
```

Q: When I boot my DBAu1200™ development board, **it hangs at "Sending BOOTP requests ...." How do I fix this?**

A: The Au1200 Linux kernel you are using is configured to use the file system on the host computer, mounted via NFS. Thus it will always look at the network during boot using BOOTP protocol. If you built your own kernel, you may disable this by entering menuconfig and removing IP Autoconfiguration:

Make menuconfig

Select Networking options

De-select IP: kernel level autoconfiguration

Save your new configuration

Make a new kernel

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