DaVinci PSP 03.01 GA (r39) Release Notes

DaVinci PSP 03.01 GA Release (Build r39)

Release Notes

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Introduction

This is the DaVinci PSP 03.01 GA release (Build r39). The PSP serves to provide a fundamental software platform for development, deployment and execution of Linux based applications on Texas Instruments DM365/DM368 EVM. This abstracts the functionality provided by the hardware. The product forms the basis for all application development on this platform. The Linux Kernel in this release is based on the linux-davinci tree [1], version 2.6.32.17. The U-Boot is based on the u-boot.git denx tree [2], version 2010.12-rc2. The File system is based on the Arago [3], version 2009.11.

Release Components

The DaVinci PSP 03.01 GA release package contains following components:

Components	**Repository**	**Build: r39 Release Tag/Commit Id <release-tag/commit-id>**
DaVinci Linux Kernel Source tarball	[4]	NA
DaVinci Linux Kernel GIT repository	[5]	DEV.DaVinciPSP.03.01.01.39
U-Boot Source tarball	[6]	NA
U-Boot GIT repository	[7]	DEV.DaVinciPSP.03.01.01.39
Examples	[8]	DEV.DaVinciPSP.03.01.01.39
Serial Flash, NAND Writer and UBL Utilities (pre-built binaries)	[9]	NA
Serial Flash, NAND Writer and UBL Utilities (source code)	[10]	NA
Linux kernel, U-Boot and Filesystem (pre-built binaries)	[11]	NA
Documentation	DaVinci PSP 03.01 Linux Installation User Guide	NA
Arago SDK images	[12]	NA

The DaVinci PSP 03.01 GA release package also contains Arago components, to be used only if you want to build Kernel, U-Boot in the Arago Environment or to re-build a filesystem:

Components	Repository	Build: r39 Release Tag/Commit Id <release-tag/commit-id>
Arago Package Build Recipes	[13]	DEV.DaVinciPSP.03.01.01.39
Arago OpenEmbedded Development	[14]	DEV.DaVinciPSP.03.01.01.39
Arago Bitbake Build tool	[15]	DEV.DaVinciPSP.03.01.01.39

The components have been compiled under Arago Build Environment (OE based) using the CodeSourcery GNU Toolchain for ARM Processors: 2009q1-203 version [16]

DaVinci PSP 03.01 Build in the Arago OE environment

- Download Arago, Arago OE and Arago bitbake tool based on the <release-tag or commit-id>

```
$ mkdir $HOME/oe
$ cd $HOME/oe
$ git clone -n git://arago-project.org/git/arago.git
$ cd arago
$ git checkout <release-tag or commit-id>
```

```
$ cd $HOME/oe
$ git clone -n git://arago-project.org/git/arago-oe-dev.git
$ cd arago-oe-dev
$ git checkout <release-tag or commit-id>
```

```
$ cd $HOME/oe
$ git clone -n git://arago-project.org/git/arago-bitbake.git
$ cd arago-bitbake
$ git checkout <release-tag or commit-id>
```

- Follow the instructions to configure OEBASE, SCRATCH and http/git proxies - http://arago-project.org/wiki/index.php/Setting_Up_Build_Environment
- Build Arago base filesystem for dm365-evm or dm368-evm

```
$ MACHINE=<machine> bitbake arago-base-image
```

- Build U-Boot and Arago demo filesystem for dm365-evm or dm368-evm; The Kernel uses the default configuration with all drivers (except Ethernet) built as dynamic modules. The Kernel modules are populated in the demo filesystem

```
$ MACHINE=<machine> bitbake board-set arago-demo-image
```

- Build Kernel image for dm365-evm or dm368-evm, using the default configuration with all drivers built as static

```
$ MACHINE=<machine> bitbake linux-davinci-staging-static
```

- The images will be available under $HOME/oe/arago-deploy folder

Download DaVinci PSP 03.01 Components

The DaVinci PSP 03.01 release components can be downloaded from the corresponding GIT repositories and can also be built standalone (not in the Arago build Environment).

- Download DaVinci Kernel component from linux-davinci-staging tree using the <release-tag or commit-id>

```
  $ git clone -n git://arago-project.org/git/projects/linux-davinci.git
  $ cd linux-davinci
  $ git checkout <release-tag or commit-id>
```

- Download DaVinci U-Boot component from u-boot-davinci tree using the <release-tag or commit-id>

```
  $ git clone -n git://arago-project.org/git/projects/u-boot-davinci.git
  $ cd u-boot-davinci
  $ git checkout <release-tag or commit-id>
```

- Download DaVinci examples component from linux-davinci-examples tree using the <release-tag or commit-id>

```
  $ git clone -n
git://arago-project.org/git/projects/examples-davinci.git
  $ cd examples-davinci
  $ git checkout <release-tag or commit-id>
```

Documentation

DaVinci PSP 03.01 Linux Installation User Guide provides instructions on how to flash the EVM using Serial Flash or CCS based NAND Writer utilities. This user guide also provides information on the migration path for customers using Montavista Professional Edition 5.0 based LSP releases.

What's Supported

- Booting from MMC/SD card.
- CCS based NAND writer utilities for DM365/DM368
- Serial Flash utilities for DM365/DM368 - Requires DM365 PG 1.2
- Command line based MMC/SD flashing utility
- Primary Bootloader: UBL for NAND and MMC/SD
- Secondary Bootloader: U-Boot 2010.12-rc2
- Base Kernel 2.6.32.17
- Base-port for DM365/DM368
- Device Drivers
  - UART driver
  - I2C driver
  - GPIO driver
  - EDMA driver
  - EMAC Ethernet driver
  - NAND driver with 4-bit ECC, SLC/MLC, up to 4K page size support
  - MMC/SD driver with SDHC and SDIO support
  - SPI driver with EEPROM support
    - Polled mode of operation
    - PIO mode of operation
    - DMA mode of operation

- WDT driver
- USB Driver with Host, Device and OTG modes; Supports USB Host/Device Mass Storage Class, USB Hub and HID classes and USB Device CDC and RNDIS classes
- Audio (ALSA ASoC based) driver
  - AIC3101 audio codec support
- Keyscan driver
- RTC driver
- Video drivers
  - VPFE capture - V4L2 driver
  - DM365 CCDC
  - TVP5146 decoder driver for SD resolutions - NTSC, PAL standards and UYVY, NV12 Pixel formats
  - TVP7002 decoder driver for HD resolutions - 720p-60, 1080i-30 standards and UYVY, NV12 Pixel formats
  - Raw capture support on DM365 using Micron sensor imager (MT9P031 - 5MP)
    - Standards supported: 720p-30, 1080i-30 and 1080p-30 standards
    - Image formats supported: SBGGR8/16, UYVY and NV12
  - VPBE display - V4L2 (Video planes, NTSC/PAL and HD)
    - Standards supported: NTSC, PAL, 720p-60 and 1080i-30 on Video planes (VID0 and VID1)
    - Pixel formats supported: UYVY and NV12 (only on VID0)
  - VPBE display - fbdev
    - Standards supported: NTSC, PAL and 720p-60 and 1080i-30 on Video planes - VID0 and VID1;
    - Pixel formats supported: UYVY
    - OSD planes - OSD0 (RGB656) and OSD1 (attribute, blending) are supported
  - H3A (AF/AEW) drivers (Interim char device based drivers, patches not meant for upstream)
  - IPIPE (Previewer/Resizer) drivers (Interim char device based drivers, patches not meant for upstream)
    - Resizer with on-the-fly/single-shot YUV capture using TVP5146 and TVP7002 is supported; UYVY and YUV420SP Pixel formats are supported
    - Previewer with on-the-fly/single-shot Bayer RGB input is supported
    - IPIPE Advanced features unit-tested - Bayer RGB to YUV conversion in single shot mode, vertical/horizontal flip, LUT/OTF DPC, Noise Filter 1/2, Global Imbalance Correction, White balance, CFA, RGB2RGB1, RGB2RGB2, Gamma (ROM/RAM table), 3D LUT, RGB2YUV, GBCE, YUV 4:2:2 conversion, Luminance Adjusting, Edge Enhancement, CAR and CGS

What's not supported

- Audio (ALSA ASoC based) driver with internal voice codec support
- Facedetect driver support
- VLYNQ driver
- PWM driver
- Power Management

Upgrade and Compatibility Information

Refer to the Migration section of **DaVinci PSP 03.01 Linux Installation User Guide**

Host Support

- Red Hat Enterprise Linux 4 for Code Sourcery toolchain
- Windows XP SP2 for CCS v3.3 Installation

Dependencies

The DaVinci PSP release depends on Code Sourcery tool chain.

Device Support

This release supports the Texas Instruments DM365 and DM368 SoCs along with their Evaluation Modules (EVMs).

Validation Information

This release has passed the system test cycle on the following devices

- ARM running at 297MHz and DDR at 270MHz on DM365 EVMs
- ARM running at 432MHz and DDR at 340MHz on DM368 EVMs.

Fixed in this release (GA, Build r39)

- LCD corruption on some EVMs
- Configuring SD1_DATA2 as GPIO
- Modify dm365 string to dm36x both in Linux and U-Boot

New in this release (GA, Build r38)

- Linux Kernel rebased to 2.6.32.17
- U-Boot rebased to 2010.12-rc2
- Support for MT9P031 - 5MP sensor
- Support for LCD
- Support for Touch Screen

Fixed in this release (GA, Build r37)

- Video: DM365 video does not look sharp with 720p
- Audio: DM365 audio becomes noisy when played along with encoded video
- MMC/SD: DM365 MMC/SD1 slot does not work for all MMC/SD cards
- NAND: DM365 nandtest fails
- General
  - Enable INPUT_MOUSEDEV in kernel configuration because most Qt applications need it.
  - Enable FRAMEBUFFER_CONSOLE in kernel configuration so splash screen is visible early in boot process.
  - Fix compilation warnings in MUSB driver.

Fixed in this release (Beta, Build r35)

- EDMA: DM355/DM365: The codec hangs when H264 or MPEG4 encode or decode operation done with audio. This is because of kernel EDMA driver clearing the IPR bits for EDMA channels owned by codecs as well.
- MMC/SD: DM355: DM355 MPEG4 encoder fails due to insufficient EDMA resources. The two instances of MMC/SD take away most of the available EDMA slots

Fixed in this release (Beta, Build r31)

- IR Remote: DM365: The open-source dm365input_keys driver did not support the newer Remotes, so this driver was disabled so that DVSDK demos can map the keys by talking to the MSP430 directly via I2C driver APIs

Fixed in this release (Phase 3, Build r28)

- SPI: DM355: EVM hangs during bootup, when SPI driver operation mode is set to interrupt mode; This release fixes the issue of interrupt mode (PIO mode of operation), and also supports DMA mode of operation
- Video capture(V4L2): Cannot switch between the formats - NTSC/PAL (at run time, from Linux). This release fixes the issue in the TVP514x decoder driver
- Video display (fbdev): The boot parameters for fbdev display are not mapped correctly in the video driver
- Video display (fbdev): The fbset command hangs when the console is on (which by default on)
- Video display (V4L2): V4l2 display hangs during loopback in MMAP mode
- Video display (V4l2): Display driver displays the previous queued frame in place of current queued frame
- RTC, Keyscan: RTC and Keyscan drivers could not be insmod'ed, after they are built as modules
- USB ISO Video: DM355/DM365: WebCam does not get enumerated properly, when plugged in, after unit has booted up. There seems to be an issue with Microsoft webcam drivers. Logitech webcam seems to work fine.

Fixed in this release (Phase 2, Build r26)

- NAND ECC on DM365: Only the error bits introduced in first 512byte chunk get corrected and other 512byte chunks of the page do not get corrected; A delay was required before starting the ECC correction
- NAND (JFFS2) on DM365: Intemittent kernel failure is observed during NAND read/write test; The problem is not reproducible after the linux-davinci staging tree was rebased to Kernel version 2.6.32-rc1
- USB OTG: When the USB Host, Slave drivers are built as modules and the driver is configured to be in OTG mode, removing the module gives a kernel panic; The issue is fixed in the musb driver
- USB ISO: Audio class does not work; This was due to setup related issues with USB ISO Audio.
- NAND ECC test failed when using uImage built from Arago; but it pass when using uImage built on the cloned kernel. After moving to 2009q1 CodeSourcery toolchain the issue is not reproducible
- NAND: After lots of write/read, read operation becomes slow and 'ls' becomes really slow even after umount and reboot.
- NAND: First nand read in uboot return failed message; but the second nand read in uboot works fine
- U-Boot: There is a limitation in the length of the uboot environment variables.

Known Issues

- Video display: On DM365 EVM (up to board revision E), PAL video play-out has worse quality than NTSC video play-out operation
  - Workaround: Use board revision E, where board modifications have been done to improve the PAL video quality.
- Video display (fbdev): fbdev display driver fails to allocate coherent memory for 1080i resolution (set via bootargs)
  - Workaround: If most of the other drivers are built as module, fbdev driver can allocate coherent memory for 1080i resolution.
- Resizer: DM365: Resizing any resolution to SD resolution have a lot of noise in the display in continuous mode. Resizing operation on YUV stream in continuous mode have intermittent noises
  - Workaround: None
- USB OTG: OTG fails the USB-Forum Test suite on both high-speed and full-speed modes
  - Workaround: None
- USB MSC: The performance with this release is lower than the LSP release (2.10, 2.6.18 based); With this release the Host MSC read performance is 9.4MBps and write is 0.72MBps, while with the LSP 2.10 release Host MSC read performance is 11.4MBps and write is 0.84MBps
  - Workaround: None
- USB Slave: USB Slave MSC Performance under GIT release is lower than the LSP release (2.10, 2.6.18 based)
  - Workaround: None
- NAND/MTD: flash_eraseall option -j is not working; The issue is due to the 4K support. It required a parameter in the mtd-abi structure to be updated which broke the IOCTL flash_eraseall -j option was calling.
  - Workaround: None
- NAND/MTD/JFFS2: 'sync' command or 'umount' command are really slow for first write which results in kernel dump. This seems to be an expected behavior, since the filesystem commands seem to cache the data in RAM before writing to NAND devices
  - Workaround: None
- NAND/MTD/JFFS2: NAND performance in r28 (2.6.32-rc1) is worse than previous build (2.6.31-rc7) for all platforms including dm365. This seems to be a JFFS2 issue, NAND raw performance is consistent across the builds
  - Workaround: Moving to a stable 2.6.32 version can help
- EMAC: Ethernet performance under GIT release is lower than the LSP release (2.10, 2.6.18 based) when using Iperf.
  - Workaround: None
- MMC/SD: When the MMC or SD card is unplugged while mmcblock device mounted, the device hangs and device cannot not recover even after plugging back the card
  - Workaround: Always unmount the MMC/SD card before unplugging.
- SPI: Performance under GIT release is lower than LSP release (2.10, 2.6.18 based); This is due to the raw EEPROM driver in the open-source kernel (Misc driver), as against the MTD driver in LSP 2.10.
  - Workaround: None

Driver Performance

Ethernet Driver

Ethernet Performance

TCP Window Size (in KBytes)	Bytes Transfers (in MBytes/sec)		Bandwidth (in Mbits/sec)	
	DM365	DM368	DM365	DM368
212	355	364	49.6	50.8

The performance numbers were captured using the iperf tool. Usage details are mentioned below:

- On the DUT iperf is invoked in client mode : "-c <server ip> -w <window size> -d -t60"
- On PC Host invoke iperf in the server mode : "-s" - window size default of 212KB
- The transfers are measured over a duration of 60Secs
- Cross cable is used to measure performance.
- Speed is set to 100Mbps

V4L2 Display Driver

V4L2 Capture Driver Performance

Output Interface	Resolution	Frame Rate (FPS)		CPU Load (%)	
		DM365	DM368	DM365	DM368
COMPOSITE	NTSC	33	33	74	74
COMPOSITE	PAL	25	25	75	73
COMPONENT	720P	16	20	92	82

V4L2 Capture Driver

V4L2 Capture Driver Performance

Output Interface	Resolution	Frame Rate (FPS)		CPU Load (%)	
		DM365	DM368	DM365	DM368
COMPOSITE	NTSC	20	20	99	92
COMPOSITE	PAL	20	25	93	92

RNDIS Driver

RNDIS Performance

Window Size (in KBytes)	Bytes Transfers (in MBytes/sec)		Bandwidth (in Mbits/sec)	
	DM365	DM368	DM365	DM368
212	201	34.5	28	29

The performance numbers were captured using the iperf tool. Usage details are mentioned below:

- On the DUT iperf is invoked in client mode : "-c <server ip> -w <window size> -d -t60"
- On PC Host invoke iperf in the server mode : "-s" - window size default of 212KB
- The transfers are measured over a duration of 60Secs

CDC Driver

CDC Performance

Window Size (in KBytes)	Bytes Transfers (in MBytes/sec)		Bandwidth (in Mbits/sec)	
	DM365	DM368	DM365	DM368
212	261	58	34.1	49.5

The performance numbers were captured using the iperf tool. Usage details are mentioned below:

- On the DUT iperf is invoked in client mode : "-c <server ip> -w <window size> -d -t60"
- On PC Host invoke iperf in the server mode : "-s" - window size default of 212KB
- The transfers are measured over a duration of 60Secs

USB MSC Host Driver

USB MSC Host Driver Write performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)		CPU Load (%)	
		DM365	DM368	DM365	DM368
100	100	7.62	9.15	97.90	98.52
256	100	7.72	9.14	98.02	97.92
512	100	7.60	9.01	97.62	97.94
1024	100	7.66	9.15	98.03	98.61
5120	100	7.54	9.21	96.70	99.04

USB MSC Host Driver Read performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)		CPU Load (%)	
		DM365	DM368	DM365	DM368
100	100	16.89	18.79	94.86	82.77
256	100	17.08	18.69	94.81	76.99
512	100	17.00	18.92	93.99	82.47
1024	100	16.94	18.79	94.22	75.89
5120	100	16.67	19.25	89.61	90.89

The performance numbers were captured using the following

- Hard disk: IOMEGA 120 GB Hard disk
- File Format: ext3

MMC/SD Driver

MMC/SD Driver Write performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)	
		DM365	DM368
512	100	5.53	7.71

MMC/SD Driver Read performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)	
		DM365	DM368
512	100	10.60	17.51

The performance numbers were captured using the following

- Card Used:SanDisk Extreme III
- File Format:ext2

NAND Driver

NAND Driver Write performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)		CPU Load (%)	
		DM365	DM368	DM365	DM368
100	100	1.67	2.49	100	100
256	100	1.67	2.37	100	100
512	100	1.67	2.46	100	100
1024	100	1.70	2.46	100	100
5120	100	1.69	2.48	100	100

NAND Driver Read performance

Buffer size (KB)	File size(MB)	Throughput(MB/sec)		CPU Load (%)	
		DM365	DM368	DM365	DM368
100	100	5.71	8.19	100	100
256	100	5.71	8.21	100	100
512	100	5.73	8.15	100	99.92
1024	100	5.78	8.13	100	100
5120	100	5.77	8.09	100	100

The performance numbers were captured using the following

- File Format:jffs2

Versioning

This is the DaVinci PSP 03.01 GA release (Build r39).

Technical Support and Product Updates

For further information or to report any problems, contact http://community.ti.com or http://support.ti.com.

DaVinci Linux Mailing List: http://linux.davincidsp.com/mailman/listinfo/davinci-linux-open-source.

References

[1] http://git.kernel.org/?p=linux/kernel/git/khilman/linux-davinci.git;a=summary
[2] http://git.denx.de/?p=u-boot.git;a=summary
[3] http://arago-project.org/git/
[4] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/sources/linux-davinci-staging.tar.gz
[5] http://arago-project.org/git/projects/?p=linux-davinci.git;a=shortlog;h=refs/heads/master
[6] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/sources/u-boot-davinci.tar.gz
[7] http://arago-project.org/git/projects/?p=u-boot-davinci.git;a=shortlog;h=refs/heads/master
[8] http://arago-project.org/git/projects/?p=examples-davinci.git;a=summary
[9] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/board-utils/board-utils-davinci.tar.gz
[10] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/sources/flash-utils-davinci.tar.gz
[11] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/images/
[12] http://arago-project.org/files/releases/davinci-psp_03.01.01.39/sdk/
[13] http://arago-project.org/git/?p=arago.git;a=summary
[14] http://arago-project.org/git/?p=arago-oe-dev.git;a=summary
[15] http://arago-project.org/git/?p=arago-bitbake.git;a=summary
[16] http://www.codesourcery.com/sgpp/lite/arm/portal/release858

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