Datalogger for AXM5600

# Overview

The pre-watchdog datalogger is a feature which allows ATF to dump CPU, GIC and CCN-504 registers to a DDR memory area and attempt a DDR Retention Reset prior to the main system watchdog timing out and resetting the AXM5600 with loss of all data.

The system will attempt a DDR retention reset after the register data is stored. If this succeeds, the register data will be available for debug purposes after the reset. If it fails, the main system watchdog will generate a Chip or System Reset to recover the system.

The basic idea is as follows:

1. In Linux, Timer 7 in 32-bit timer block is used to generate a ‘pre-watchdog’ interrupt. This interrupt will occur ~1 second before the system watchdog (timer 5) times out. The interrupt generated will be an FIQ interrupt. This will pre-empt standard Linux interrupts, which are IRQs. The FIQ interrupt will jump a CPU to ATF.
2. The CPU in ATF will use SGI/IPI 15 to interrupt all other CPUs and jump them to ATF. SGI/IPI 15 is also configured as an FIQ to pre-empt standard Linux IRQs
3. Once in ATF, each CPU will store selected CPU registers to a RAM area. Each CPU has 1x 4KB block of RAM within the RAM area to store registers. Additional 4KB blocks for GIC and CCN-504 registers are also provided after the CPU blocks. The first CPU to respond to the timer 7 interrupt (the ‘primary’ CPU) is responsible for storing GIC and CCN504 registers. All other CPUs (‘secondary’ CPUs) are only required to store their CPU registers.
4. After storage of all registers, the primary CPU triggers a DDR Retention Reset. This flushes the caches, puts DDR controllers in self refresh, then generates a Chip reset. If one or more of the secondary CPUs have not stored their registers (for example, if a CPU has locked up or fails to respond to FIQ), the primary CPU will wait for a short time, then initiate a DDR Retention Reset. This is to prevent a locked-up CPU blocking the DDR Retention Reset.
5. If the DDR Retention Reset fails (for example, if the memory subsystem has had a catastrophic failure and locked up, preventing code execution), the main system watchdog will eventually time out and recover the system, but all register data will be lost.

The RAM area containing the register data can be read in u-boot or Linux after the DDR Retention Reset. The data is stored as ASCII text. In u-boot, the ‘md’ command can be used to read the data. In Linux, the RAM area can be read using a simple char device driver. An example device is provided.

There are many ways that Linux could be configured to access the RAM area, and configured to generate the timer 7 interrupt, and the ATF code provided does not enforce any particular method. Intel provides patches for Linux to implement to following setup:

1. A watchdog driver is provided for timer 7. This integrates with the standard Linux watchdog infrastructure (each active CPU has a watchdog thread which periodically kicks timer 7 using device /dev/watchdog. Killing the watchdog thread allows the timer to time out, triggering the datalogger).
2. RAM area is defined as a ‘reserved-memory’ block in the Linux device tree. A simple char driver is supplied that can read the contents of this area using simple ‘cat’ commands.

# Implementation Details

The pre-watchdog datalogger (simply called ‘datalogger’ in rest of doc) function requires changes to ATF and Linux

## ATF Changes

Changes to the Axxia ATF port are included from version atf\_84091c4\_axxia\_1.26 on. The following changes were made.

1. Enable ‘Group0 Secure Interrupts’ and route them EL3 privilege level. This allows the ATF to receive FIQs from timer 7 and SGI/IPI 15. In standard ATF, secure interrupts are masked and even if enabled, they would be routed to Secure-EL1. Since Axxia devices do not use Secure EL1 payloads, this change should have no side-effects. This change is made in files plat/intel/axxia/bl31\_plat\_setup.c and plat/intel/axxia/plat\_gic.c
2. Add interrupt handler for EL3 secure group 0 interrupts. This handler should check for timer 7 interrupt and the SIG/IPI 15 interrupt, handle register storage, then trigger DDR Retention Reset. The function is called ‘datalogger\_int\_handler’. It is registered with the ATF in file /plat/intel/axxia/plat\_gic.c, function axxia\_gic\_setup, and implemented in file /plat/intel/axxia/datalogger.c. It calls various assembly code subroutines to dump register contents, implemented in file /plat/intel/axxia/aarch64/datalogger\_dump.S. The dump routines use various register name strings defined in the ATF ‘crash reporting’ functions in order to save memory.
3. Add some #defines in /plat/intel/axxia/include/axxia\_def.h to configure the datalogger:

* **#define CONFIG\_DATALOGGER** - Enable/disable the datalogger function in ATF. Default is to enable
* **#define DATALOGGER\_STORE\_BASE** - Set physical base address of RAM area for register storage. Default is 0x30000000. This will need to be modified to match target’s memory configuration and Linux setup.
* **#define DATALOGGER\_STORE\_SIZE\_PER\_CPU** – Amount of memory for each CPU, GIC and CCN-504 to store registers. Default is 4KB. In a system with 16 CPUs, you would need 72KB to store all registers (4KB for each CPU, 4KB for GIC, 4KB for CCN-504)
* **#define NUM\_CORES** – Number of CPUs in the system. Default is 16. This value is used by ATF to determine if all CPUs have completed register storage.
* **#define DATALOGGER\_POLL\_LOOP\_COUNT –** Datalogger counts number of cores that have completed register storage. If less than **NUM\_CORES** have completed storage after polling count by **DATALOGGER\_POLL\_LOOP\_COUNT**, DDR Retention Reset will be triggered without waiting. **DATALOGGER\_POLL\_LOOP\_COUNT** allows user to control length of time waiting for cores to reply.

## Linux Changes

The Linux changes are available as a patch in the Axxia errata repository, linux/datalogger/0001-datalogger-The-Axxia-Test-Case.patch.

1. The Linux GIC V3 driver requires a slight change to make timer 7 interrupt and SGI/IPI 15 interrupt use secure Group0 / FIQ. Standard Linux does not use Secure Group 0 interrupts and has no FIQ handling. The change is made in file /drivers/irqchip/irq-gic-v3.c
2. A method of generating the timer 7 interrupt is required. In customer application, we expect a driver would be added for timer 7 and the timer would be kicked periodically by customer’s watchdog infrastructure. Intel does not have access to this code, so instead, we supply a timer 7 watchdog driver which integrates with standard Linux watchdog infrastructure. The driver uses device /dev/watchdog. This must be written periodically to kick the timer and prevent interrupt. The timeout period is set to 17 seconds by default.
3. A method for allocating a RAM area for register storage, and a method to read its contents is required. Intel provides an example which reserves a memory area using the ‘reserved-memory’ feature in the Device Tree. A char device driver (called datlog\_reader) is supplied which allows the RAM area contents to be dumped to console or a file using the Linux ‘cat’ command.

# Deliverables

As mentioned above, the ATF changes are integrated into the Intel ATF available on git hub as of version atf\_84091c4\_axxia\_1.26. The Linux changes are available in the Axxia errata repository, which can be cloned from

<https://github.com/axxia/axxia_errata.git>

See the linux/datalogger directory for the Linux patch, the datalog\_reader example Linux module, and the latest version of this document.

* 0001-datalogger-The-Axxia-Test-Case.patch
  + The Linux patch described above.
* datalog\_reader
  + The example Linux module to read register dumps. Use KDIR to specify the Linux source tree to reference when building.
* PreWatchdogDataloggerManual.docx
  + This document.

# The Intel Test Case on Victoria

1. Use ATF version atf\_84091c4\_axxia\_1.26 or later.
2. Apply 0001-datalogger-The-Axxia-Test-Case.patch to a Linux source tree for Axxia and build as described in the wiki (https://github.com/axxia/axxia\_yocto\_linux\_4.1/wiki/NonYoctoBuildInstructions)
3. Build the datalog\_reader module using the patched Linux source tree above. KDIR=<linux source tree> && make.

With all above changes, Linux will boot and enable the sp804 watchdog timer. It will be configured to generate an FIQ on timeout. Linux will generate threads to occasionally kick the watchdog. As a simple demo, we will kill the main thread that controls updates to the watchdog. This will lead to a timeout and the system will execute the datalogger function in ATF. After the reset, we can then read data stored in the RAM area.

1. Boot the system to the Linux prompt.
2. Log into Linux as root.
3. Check in the /dev directory for /dev/watchdog. If not present, the watchdog has not started. You can try manually adding on with ‘mknod /dev/watchdog c 10 130’ and then a reboot.
4. List all watchdog threads on the system with the following command.

ps ax | grep watchdog

For a 16 core system you should see the following.

root@axxiaarm64:~# ps ax | grep watchdog

ps ax | grep watchdog

11 ? S 0:00 [watchdog/0]

12 ? S 0:00 [watchdog/1]

18 ? S 0:00 [watchdog/2]

24 ? S 0:00 [watchdog/3]

30 ? S 0:00 [watchdog/4]

36 ? S 0:00 [watchdog/5]

42 ? S 0:00 [watchdog/6]

48 ? S 0:00 [watchdog/7]

54 ? S 0:00 [watchdog/8]

60 ? S 0:00 [watchdog/9]

66 ? S 0:00 [watchdog/10]

72 ? S 0:00 [watchdog/11]

78 ? S 0:00 [watchdog/12]

84 ? S 0:00 [watchdog/13]

90 ? S 0:00 [watchdog/14]

96 ? S 0:00 [watchdog/15]

1332 ? SLs 0:00 /usr/sbin/watchdog

ie, 1 thread for each CPU and a main thread

1. Kill the main thread using command

kill -9 1332

*Note: the thread PIDs can be different on each test run and board, always run the ps ax command to get correct PID.*

The system will reset after a few seconds (watchdog timeout is set to 17 seconds by default). You will see text below as system resets. It will boot to the Linux prompt.

root@axxiaarm64:~watchdog watchdog0: watchdog did not stop!

#

root@axxiaarm64:~# INFO: ATF DDR retention reset

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/\_/ |\_/\_/|\_| /\_/|\_| /\_/ \\_\_,\_/ /\_\_\_\_/ /\_/ /\_\_\_\_\_/

Axxia Version: UNKNOWN

Axxia ATF Version: UNKNOWN

Started Watchdog Timer

Parameters: Watchdog 0 A/B Valid 1/1 A/B Sequence 0/0 => A

Parameter Table Version: 9

Description: JL DDR Retention On

DDR Retention Enabled, Recovery = 1

skipping SM PLL setup for ddrRecovery

initializing ELMs for ddrRecovery

== PLL/Clock Speeds ==

System: 500 MHz Loss of Lock Count 0

CPU: 1400 MHz Loss of Lock Count 0

Memory: 533 MHz Loss of Lock Count 0 / 0

Fabric: 1200 MHz Loss of Lock Count 0

Tree: 533 MHz Loss of Lock Count 0

Peripheral: 250 MHz

SD/eMMC: 50 MHz

System Initialized

1. Log into Linux.
2. Check in /dev/directory for a /dev/datalogger entry. If not present, add one with command:

**mknod /dev/datalogger c 60 0**

1. Install datalog\_reader with command:

**insmod datalog\_reader.ko**

1. Dump RAM area contents to file using command:

**cat /dev/datalogger > dump.txt**

1. Read contents of dump.txt using:

**cat ./dump.txt** or

**vi dump.txt**

The file should contain register dumps for each CPU core, and also the GIC and CCN504. It will list CPU0-16 first, then GIC, then CCN504

# Appendix A – Example Register Dump

This section contains an example register dump from am Axxia device. Only CPUs 0-1, GIC and CCN504 are shown, format for CPUs 2- 15 is same

Core Registers For CPU: 0000000000000000

x0: ffffffc0000fbcd4

x1: 0000000000000000

x2: ffffffc3fff99b9c

x3: ffffffc000574028

x4: 000000004189374c

x5: 0000000000000020

x6: 0010b07600000000

x7: 0000000100030710

x8: ffffffc3ee231c80

x9: ffffffc3ee243ed0

x10: ffffffc0006cc820

x11: 00000000132f2bf6

x12: 0000000000000018

x13: ffffffffa7cb8bfb

x14: 003354ca5f000000

x15: 003b9aca00000000

x16: ffffffc00023a510

x17: 0000007fac92df50

x18: 0000000000000001

x19: ffffffc3ee240000

x20: ffffffc0009aa000

x21: ffffffc0009aa820

x22: ffffffc0006cbb88

x23: ffffffc000995b58

x24: ffffffc000a39000

x25: ffffffc3ee243f70

x26: 0000000000a84000

x27: ffffffc000a37000

x28: 0000000000000000

x29: ffffffc3ee243f50

x30: ffffffc000086924

scr\_el3: 0000000000000535

sctlr\_el3: 0000000000c5183e

cptr\_el3: 0000000000000000

tcr\_el3: 0000000000000000

daif: 00000000000002c0

mair\_el3: 44e048e000098aa4

spsr\_el3: 00000000600001c5

elr\_el3: ffffffc000099988

ttbr0\_el3: 0000000000000000

esr\_el3: 0000000000000000

far\_el3: 0000000000000000

spsr\_el1: 0000000060000145

elr\_el1: ffffffc000086928

spsr\_abt: 0000000000000000

spsr\_und: 0000000000000000

spsr\_irq: 0000000000000000

spsr\_fiq: 0000000000000000

sctlr\_el1: 0000000034d5d91d

actlr\_el1: 0000000000000000

cpacr\_el1: 0000000000300000

csselr\_el1: 0000000000000000

sp\_el1: ffffffc3ee243f50

esr\_el1: 0000000056000000

ttbr0\_el1: 003a0000fa683000

ttbr1\_el1: 0000000000a84000

mair\_el1: 000000ff440c0400

amair\_el1: 0000000000000000

tcr\_el1: 00000034b5193519

tpidr\_el1: 00000003ff604000

tpidr\_el0: 0000000000000000

tpidrro\_el0: 0000000000000000

dacr32\_el2: 0000000000000000

ifsr32\_el2: 0000000000000000

par\_el1: 0000008031022900

mpidr\_el1: 0000000080000302

afsr0\_el1: 0000000000000000

afsr1\_el1: 0000000000000000

contextidr\_el1: 0000000000000000

vbar\_el1: ffffffc000084800

cntp\_ctl\_el0: 0000000000000001

cntp\_cval\_el0: 00000089a707dc05

cntv\_ctl\_el0: 0000000000000000

cntv\_cval\_el0: 0000000000000000

cntkctl\_el1: 00000000000000f6

fpexc32\_el2: 0000000000000700

sp\_el0: 0000008031012a20

Core Registers For CPU: 0000000000000001

x0: ffffffc0000fbcd4

x1: 0000000000000000

x2: ffffffc3fffaab9c

x3: 0000000000000001

x4: 0000027a73640bcd

x5: ffffffc3ed3b3970

x6: 0010b07600000000

x7: 0000000100030710

x8: ffffffc3ee232800

x9: ffffffc3ee247ed0

x10: ffffffc0006cc820

x11: 4d47205d646c255b

x12: 646c253d66666f54

x13: 000000000000000a

x14: 0000000000005a54

x15: 0005a5d48d980000

x16: ffffffc00011bba0

x17: 0000007f9627fc70

x18: fffffffffffffffb

x19: ffffffc3ee244000

x20: ffffffc0009aa000

x21: ffffffc0009aa820

x22: ffffffc0006cbb88

x23: ffffffc000995b58

x24: ffffffc000a39000

x25: ffffffc3ee247f70

x26: 0000000000a84000

x27: ffffffc000a37000

x28: 0000000000000000

x29: ffffffc3ee247f50

x30: ffffffc000086924

scr\_el3: 0000000000000535

sctlr\_el3: 0000000000c5183e

cptr\_el3: 0000000000000000

tcr\_el3: 0000000000000000

daif: 00000000000002c0

mair\_el3: 44e048e000098aa4

spsr\_el3: 00000000600001c5

elr\_el3: ffffffc000099988

ttbr0\_el3: 0000000000000000

esr\_el3: 0000000000000000

far\_el3: 0000000000000000

spsr\_el1: 0000000060000145

elr\_el1: ffffffc000086928

spsr\_abt: 0000000000000000

spsr\_und: 0000000000000000

spsr\_irq: 0000000000000000

spsr\_fiq: 0000000000000000

sctlr\_el1: 0000000034d5d91d

actlr\_el1: 0000000000000000

cpacr\_el1: 0000000000300000

csselr\_el1: 0000000000000000

sp\_el1: ffffffc3ee247f50

esr\_el1: 0000000056000000

ttbr0\_el1: 03560000301b0000

ttbr1\_el1: 0000000000a84000

mair\_el1: 000000ff440c0400

amair\_el1: 0000000000000000

tcr\_el1: 00000034b5193519

tpidr\_el1: 00000003ff615000

tpidr\_el0: 0000000000000000

tpidrro\_el0: 0000000000000000

dacr32\_el2: 0000000000000000

ifsr32\_el2: 0000000000000000

par\_el1: 0000008031022900

mpidr\_el1: 0000000080000303

afsr0\_el1: 0000000000000000

afsr1\_el1: 0000000000000000

contextidr\_el1: 0000000000000000

vbar\_el1: ffffffc000084800

cntp\_ctl\_el0: 0000000000000001

cntp\_cval\_el0: 00000089a707dc05

cntv\_ctl\_el0: 0000000000000000

cntv\_cval\_el0: 0000000000000000

cntkctl\_el1: 00000000000000f6

fpexc32\_el2: 0000000000000700

sp\_el0: 0000008031013220

GIC Registers

icc\_hppir0\_el1: 00000000000003ff

icc\_hppir1\_el1: 00000000000003ff

icc\_ctlr\_el3: 0000000000000400

gicd\_ispendr regs (Offsets 0x200 - 0x278)

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

0000000000000000

CCN504 Error Registers

MN Registers

errint\_status: 0000000000000010

dvm\_domain\_ctl: 0000000000000000

err\_sig\_val\_63\_0: 0000000000000000

err\_sig\_val\_127\_64: 0000000000000000

err\_sig\_val\_191\_128: 0000000000000000

err\_type\_31\_0: 0000000000000000

err\_type\_63\_32: 0000000000000000

err\_type\_95\_64: 0000000000000000

err\_type\_159\_128: 0000000000000000

err\_syndrome\_reg0: 0000000000000000

HNI Registers

err\_syndrome\_reg0: f80000de88091291

err\_syndrome\_reg1: 0000000000000000

HNF (L3 0 -7) Registers

snoop\_domain\_ctl: 0000000000080a02

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg1: 0000000000000000

snoop\_domain\_ctl: 0000000000080a02

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg1: 0000000000000000

snoop\_domain\_ctl: 0000000000080a02

err\_syndrome\_reg0: 0000000000000000

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snoop\_domain\_ctl: 0000000000080a02

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg1: 0000000000000000

snoop\_domain\_ctl: 0000000000080a02

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg1: 0000000000000000

XP 0 - 10 Registers

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg0: 0000000000000000

err\_syndrome\_reg0: 0000000000000000

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err\_syndrome\_reg0: 0000000000000000

# Appendix B – Log Of Test Run

This section contains the console output for a successful test of the datalogger feature

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Axxia Version: UNKNOWN

Axxia ATF Version: UNKNOWN

Started Watchdog Timer

Parameters: Watchdog 0 A/B Valid 1/1 A/B Sequence 0/0 => A

Parameter Table Version: 9

Description: JL DDR Retention On

DDR Retention Enabled, Recovery = 0

== PLL/Clock Speeds ==

System: 500 MHz Loss of Lock Count 0

CPU: 1400 MHz Loss of Lock Count 0

Memory: 533 MHz Loss of Lock Count 0 / 0

Fabric: 1200 MHz Loss of Lock Count 0

Tree: 533 MHz Loss of Lock Count 0

Peripheral: 250 MHz

SD/eMMC: 50 MHz

System Initialized

Checking U-Boot Image A

Checking U-Boot Image B

U-Boot: Watchdog 0 A/B Valid 1/1 A/B Sequence 15/10 => A

INFO: Options: 5600, hardware, none, 238 MHz, 9600

NOTICE: BL31: v1.2(debug):8c3c280

NOTICE: BL31: Built : 13:24:49, Dec 7 2016

INFO: Force timer 7 int to Secure

INFO: Enable timer 7 int in GICD

INFO: BL31: Initializing runtime services

INFO: plat\_setup\_psci\_ops called

INFO: BL31: Preparing for EL3 exit to normal world

INFO: Entry point address = 0x0

INFO: SPSR = 0x9

INFO: Adding cluster 0 to the coherency domain.

\_\_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_

\_\_\_ |\_\_\_ \_\_\_\_\_ \_\_\_\_(\_)\_\_\_\_\_ \_ \_\_ / / / \_\_\_ \_\_ )\_\_\_\_\_\_\_\_\_\_\_\_\_ /\_

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Axxia Version: jl\_1.50

EL2

U-Boot 2015.10 (Nov 22 2016 - 10:23:36 +0000)

Watchdog enabled

DRAM: 1 GiB

SF: Detected S25FL128S\_64K with page size 256 Bytes, erase size 64 KiB, total 16 MiB

Parameters: Watchdog 0 A/B Valid 1/1 A/B Sequence 0/0 => A

Parameter Table Version: 9

Description: JL DDR Retention On

Sysmem Size: 16384 MB

Relocation Address: 0x3ff44000

SF: Detected S25FL128S\_64K with page size 256 Bytes, erase size 64 KiB, total 16 MiB

In: serial

Out: serial

Err: serial

Net: NEMAC

Hit any key to stop autoboot: 0

NEMAC Waiting for PHY auto negotiation to complete...... done

NEMAC: 1000Mbps, full duplex

Using NEMAC device

TFTP from server 172.28.198.60; our IP address is 172.28.198.53

Filename 'jjlogan/multi.fit'.

Load address: 0x4000000

Loading: #################################################################

#################################################################

#################################################################

#################################################################

###########################################

5.3 MiB/s

done

Bytes transferred = 4435356 (43ad9c hex)

## Loading kernel from FIT Image at 04000000 ...

Using 'conf@1' configuration

Trying 'kernel@1' kernel subimage

Description: Linux Kernel

Type: Kernel Image

Compression: gzip compressed

Data Start: 0x040000d8

Data Size: 4422754 Bytes = 4.2 MiB

Architecture: AArch64

OS: Linux

Load Address: 0x00080000

Entry Point: 0x00080000

Hash algo: crc32

Hash value: c4c03b36

Hash algo: sha1

Hash value: 3fed4cf1867c120ebeb7b2f9b1fbea8121c5e8a8

Verifying Hash Integrity ... crc32+ sha1+ OK

## Loading fdt from FIT Image at 04000000 ...

Using 'conf@1' configuration

Trying 'fdt@1' fdt subimage

Description: Flattened Device Tree blob

Type: Flat Device Tree

Compression: uncompressed

Data Start: 0x04437e68

Data Size: 11244 Bytes = 11 KiB

Architecture: AArch64

Hash algo: crc32

Hash value: 599b7aa8

Hash algo: sha1

Hash value: 23f0d32b0350937aad24fb4379e997bb22985272

Verifying Hash Integrity ... crc32+ sha1+ OK

Booting using the fdt blob at 0x4437e68

Uncompressing Kernel Image ... OK

Loading Device Tree to 000000001fffa000, end 000000001ffffbeb ... OK

board/axxia/common/axxia.c:292 - control is 0x8100c000

Linux will handle PEI setup.

Enabling PEI0 as Root Complex

Disabling PEI1

Disabling PEI2

Disabling SRIO0

Disabling SRIO1

Disabling SATA0

Disabling SATA1

config: PEI0x2 PEI2x2 PEI1x2 SATA0x1 SATA1x1

Peripheral frequency: 250000000

Starting kernel ...

INFO: Adding cluster 1 to the coherency domain.

INFO: Adding cluster 2 to the coherency domain.

INFO: Adding cluster 3 to the coherency domain.

Booting Linux on physical CPU 0x0

Initializing cgroup subsys cpu

Linux version 4.1.33-rt23+ (jl@jl-VirtualBox) (gcc version 5.2.0 (Wind River Linux 5.2.0-8.0-axxiaarm64-ml) ) #24 SMP Wed Dec 7 13:43:07 GMT 2016

CPU: AArch64 Processor [411fd073] revision 3

Detected PIPT I-cache on CPU0

efi: Getting EFI parameters from FDT:

efi: UEFI not found.

cma: Reserved 16 MiB at 0x00000000ff000000

psci: probing for conduit method from DT.

psci: PSCIv1.0 detected in firmware.

psci: Using standard PSCI v0.2 function IDs

PERCPU: Embedded 17 pages/cpu @ffffffc3ffeab000 s31424 r8192 d30016 u69632

Built 1 zonelists in Zone order, mobility grouping on. Total pages: 4128736

Kernel command line: console=ttyAMA0 ip=dhcp root=/dev/sda rootwait maxcpus=16

log\_buf\_len individual max cpu contribution: 4096 bytes

log\_buf\_len total cpu\_extra contributions: 61440 bytes

log\_buf\_len min size: 16384 bytes

log\_buf\_len: 131072 bytes

early log buf free: 14652(89%)

PID hash table entries: 4096 (order: 3, 32768 bytes)

Dentry cache hash table entries: 2097152 (order: 12, 16777216 bytes)

Inode-cache hash table entries: 1048576 (order: 11, 8388608 bytes)

software IO TLB [mem 0xfafff000-0xfefff000] (64MB) mapped at [ffffffc0fafff000-ffffffc0feffefff]

Memory: 16396220K/16777088K available (6418K kernel code, 655K rwdata, 2344K rodata, 560K init, 239K bss, 364484K reserved, 16384K cma-reserved)

Virtual kernel memory layout:

vmalloc : 0xffffff8000000000 - 0xffffffbdbfff0000 ( 246 GB)

vmemmap : 0xffffffbdc0000000 - 0xffffffbfc0000000 ( 8 GB maximum)

0xffffffbdc0000000 - 0xffffffbdd0000000 ( 256 MB actual)

fixed : 0xffffffbffabfd000 - 0xffffffbffac00000 ( 12 KB)

PCI I/O : 0xffffffbffae00000 - 0xffffffbffbe00000 ( 16 MB)

modules : 0xffffffbffc000000 - 0xffffffc000000000 ( 64 MB)

memory : 0xffffffc000000000 - 0xffffffc400000000 ( 16384 MB)

.init : 0xffffffc000911000 - 0xffffffc00099d000 ( 560 KB)

.text : 0xffffffc000080000 - 0xffffffc000910804 ( 8771 KB)

.data : 0xffffffc0009a1000 - 0xffffffc000a44c00 ( 655 KB)

SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=16, Nodes=1

Hierarchical RCU implementation.

Additional per-CPU info printed with stalls.

RCU restricting CPUs from NR\_CPUS=64 to nr\_cpu\_ids=16.

RCU: Adjusting geometry for rcu\_fanout\_leaf=16, nr\_cpu\_ids=16

NR\_IRQS:64 nr\_irqs:64 0

CPU0: found redistributor 0 region 0:0x0000008010200000

Architected cp15 timer(s) running at 256.00MHz (phys).

clocksource arch\_sys\_counter: mask: 0xffffffffffffff max\_cycles: 0x3b0a9be803, max\_idle\_ns: 440795202125 ns

sched\_clock: 56 bits at 256MHz, resolution 3ns, wraps every 2199023255550ns

Console: colour dummy device 80x25

Calibrating delay loop (skipped), value calculated using timer frequency.. 512.00 BogoMIPS (lpj=2560000)

pid\_max: default: 32768 minimum: 301

Security Framework initialized

Mount-cache hash table entries: 32768 (order: 6, 262144 bytes)

Mountpoint-cache hash table entries: 32768 (order: 6, 262144 bytes)

Initializing cgroup subsys memory

Initializing cgroup subsys hugetlb

ftrace: allocating 22692 entries in 89 pages

hw perfevents: enabled with arm/armv8-pmuv3 PMU driver, 7 counters available

EFI services will not be available.

CPU1: Booted secondary processor

Detected PIPT I-cache on CPU1

CPU1: found redistributor 1 region 0:0x0000008010220000

CPU2: Booted secondary processor

Detected PIPT I-cache on CPU2

CPU2: found redistributor 2 region 0:0x0000008010240000

CPU3: Booted secondary processor

Detected PIPT I-cache on CPU3

CPU3: found redistributor 3 region 0:0x0000008010260000

CPU4: Booted secondary processor

Detected PIPT I-cache on CPU4

CPU4: found redistributor 100 region 0:0x0000008010280000

CPU5: Booted secondary processor

Detected PIPT I-cache on CPU5

CPU5: found redistributor 101 region 0:0x00000080102a0000

CPU6: Booted secondary processor

Detected PIPT I-cache on CPU6

CPU6: found redistributor 102 region 0:0x00000080102c0000

CPU7: Booted secondary processor

Detected PIPT I-cache on CPU7

CPU7: found redistributor 103 region 0:0x00000080102e0000

CPU8: Booted secondary processor

Detected PIPT I-cache on CPU8

CPU8: found redistributor 200 region 0:0x0000008010300000

CPU9: Booted secondary processor

Detected PIPT I-cache on CPU9

CPU9: found redistributor 201 region 0:0x0000008010320000

CPU10: Booted secondary processor

Detected PIPT I-cache on CPU10

CPU10: found redistributor 202 region 0:0x0000008010340000

CPU11: Booted secondary processor

Detected PIPT I-cache on CPU11

CPU11: found redistributor 203 region 0:0x0000008010360000

CPU12: Booted secondary processor

Detected PIPT I-cache on CPU12

CPU12: found redistributor 300 region 0:0x0000008010380000

CPU13: Booted secondary processor

Detected PIPT I-cache on CPU13

CPU13: found redistributor 301 region 0:0x00000080103a0000

CPU14: Booted secondary processor

Detected PIPT I-cache on CPU14

CPU14: found redistributor 302 region 0:0x00000080103c0000

CPU15: Booted secondary processor

Detected PIPT I-cache on CPU15

CPU15: found redistributor 303 region 0:0x00000080103e0000

Brought up 16 CPUs

SMP: Total of 16 processors activated.

CPU: All CPU(s) started at EL2

devtmpfs: initialized

DMI not present or invalid.

clocksource jiffies: mask: 0xffffffff max\_cycles: 0xffffffff, max\_idle\_ns: 19112604462750000 ns

NET: Registered protocol family 16

vdso: 2 pages (1 code @ ffffffc0009a9000, 1 data @ ffffffc0009a8000)

hw-breakpoint: found 6 breakpoint and 4 watchpoint registers.

DMA: preallocated 256 KiB pool for atomic allocations

Serial: AMBA PL011 UART driver

8080000000.uart: ttyAMA0 at MMIO 0x8080000000 (irq = 18, base\_baud = 0) is a PL011 rev2

console [ttyAMA0] enabled

8080010000.uart: ttyAMA1 at MMIO 0x8080010000 (irq = 19, base\_baud = 0) is a PL011 rev2

8080020000.uart: ttyAMA2 at MMIO 0x8080020000 (irq = 20, base\_baud = 0) is a PL011 rev2

8080030000.uart: ttyAMA3 at MMIO 0x8080030000 (irq = 21, base\_baud = 0) is a PL011 rev2

PLLA didn't lock

pcie-axxia: PEI setup failed!

axxia-pcie: probe of a002000000.pcie failed with error -22

vgaarb: loaded

SCSI subsystem initialized

ssp-pl022 8080100000.ssp: ARM PL022 driver, device ID: 0x000b6022

pl022: mapped registers from 0x8080100000 to ffffff8000054000

usbcore: registered new interface driver usbfs

usbcore: registered new interface driver hub

usbcore: registered new device driver usb

Switched to clocksource arch\_sys\_counter

NET: Registered protocol family 2

TCP established hash table entries: 131072 (order: 8, 1048576 bytes)

TCP bind hash table entries: 65536 (order: 8, 1048576 bytes)

TCP: Hash tables configured (established 131072 bind 65536)

UDP hash table entries: 8192 (order: 6, 262144 bytes)

UDP-Lite hash table entries: 8192 (order: 6, 262144 bytes)

NET: Registered protocol family 1

RPC: Registered named UNIX socket transport module.

RPC: Registered udp transport module.

RPC: Registered tcp transport module.

RPC: Registered tcp NFSv4.1 backchannel transport module.

kvm [1]: GICv3: no GICV resource entry

kvm [1]: disabling GICv2 emulation

kvm [1]: interrupt-controller@ffffffc0000b23b8 IRQ5

kvm [1]: timer IRQ3

kvm [1]: Hyp mode initialized successfully

futex hash table entries: 4096 (order: 6, 262144 bytes)

audit: initializing netlink subsys (disabled)

audit: type=2000 audit(4.640:1): initialized

HugeTLB registered 2 MB page size, pre-allocated 0 pages

squashfs: version 4.0 (2009/01/31) Phillip Lougher

fuse init (API version 7.23)

9p: Installing v9fs 9p2000 file system support

io scheduler noop registered

io scheduler cfq registered (default)

pl061\_gpio 8080180000.gpio: PL061 GPIO chip @0x0000008080180000 registered

pl061\_gpio 8080190000.gpio: PL061 GPIO chip @0x0000008080190000 registered

Serial: 8250/16550 driver, 4 ports, IRQ sharing disabled

Unable to detect cache hierarcy from DT for CPU 0

brd: module loaded

loop: module loaded

Could not create /proc/driver/axxia\_actlr\_el3!

Could not create /proc/driver/axxia\_actlr\_el2!

m25p80 spi32766.0: found s25fl129p1, expected s25fl016k

m25p80 spi32766.0: s25fl129p1 (16384 Kbytes)

8 ofpart partitions found on MTD device spi32766.0

Creating 8 MTD partitions on "spi32766.0":

0x000000000000-0x000000040000 : "spl-0"

0x000000040000-0x000000080000 : "spl-1"

0x000000080000-0x000000090000 : "parameters-0"

0x000000090000-0x0000000a0000 : "parameters-1"

0x0000000a0000-0x0000000b0000 : "env-0"

0x0000000b0000-0x0000000c0000 : "env-1"

0x000000100000-0x000000300000 : "u-boot-0"

0x000000300000-0x000000500000 : "u-boot-1"

m25p80 spi32766.1: found s25fl129p1, expected s25fl016k

m25p80 spi32766.1: s25fl129p1 (16384 Kbytes)

8 ofpart partitions found on MTD device spi32766.1

Creating 8 MTD partitions on "spi32766.1":

0x000000000000-0x000000040000 : "spl-0"

0x000000040000-0x000000080000 : "spl-1"

0x000000080000-0x000000090000 : "parameters-0"

0x000000090000-0x0000000a0000 : "parameters-1"

0x0000000a0000-0x0000000b0000 : "env-0"

0x0000000b0000-0x0000000c0000 : "env-1"

0x000000100000-0x000000300000 : "u-boot-0"

0x000000300000-0x000000500000 : "u-boot-1"

libphy: Fixed MDIO Bus: probed

tun: Universal TUN/TAP device driver, 1.6

tun: (C) 1999-2004 Max Krasnyansky <maxk@qualcomm.com>

axxia-nemac 8080240000.ethernet: NEMAC HW rev 3.4

libphy: Axxia MDIO: probed

xhci-hcd xhci-hcd.0.auto: xHCI Host Controller

xhci-hcd xhci-hcd.0.auto: new USB bus registered, assigned bus number 1

xhci-hcd xhci-hcd.0.auto: hcc params 0x0220f665 hci version 0x100 quirks 0x00010010

xhci-hcd xhci-hcd.0.auto: irq 51, io mem 0x9000000000

hub 1-0:1.0: USB hub found

hub 1-0:1.0: 1 port detected

xhci-hcd xhci-hcd.0.auto: xHCI Host Controller

xhci-hcd xhci-hcd.0.auto: new USB bus registered, assigned bus number 2

usb usb2: We don't know the algorithms for LPM for this host, disabling LPM.

hub 2-0:1.0: USB hub found

hub 2-0:1.0: 1 port detected

usbcore: registered new interface driver usb-storage

mousedev: PS/2 mouse device common for all mice

i2c /dev entries driver

usb 1-1: new high-speed USB device number 2 using xhci-hcd

DDR Retention Reset Initialized

Wdt: Probing sp804\_wdt\_axxia

sp804\_wdt\_axxia 80802200e0.watchdog: registration successful

sdhci: Secure Digital Host Controller Interface driver

sdhci: Copyright(c) Pierre Ossman

sdhci-pltfm: SDHCI platform and OF driver helper

usbcore: registered new interface driver usbhid

usbhid: USB HID core driver

NET: Registered protocol family 10

sit: IPv6 over IPv4 tunneling driver

NET: Registered protocol family 17

8021q: 802.1Q VLAN Support v1.8

9pnet: Installing 9P2000 support

registered taskstats version 1

hctosys: unable to open rtc device (rtc0)

IPv6: ADDRCONF(NETDEV\_UP): eth0: link is not ready

usb-storage 1-1:1.0: USB Mass Storage device detected

scsi host0: usb-storage 1-1:1.0

scsi 0:0:0:0: Direct-Access CBM Flash Disk 5.00 PQ: 0 ANSI: 2

sd 0:0:0:0: [sda] 2052608 512-byte logical blocks: (1.05 GB/1002 MiB)

sd 0:0:0:0: [sda] Write Protect is off

sd 0:0:0:0: [sda] No Caching mode page found

sd 0:0:0:0: [sda] Assuming drive cache: write through

sd 0:0:0:0: [sda] Attached SCSI removable disk

axxia-nemac 8080240000.ethernet eth0: Link is Up - 1Gbps/Full - flow control rx/tx

IPv6: ADDRCONF(NETDEV\_CHANGE): eth0: link becomes ready

Sending DHCP requests ., OK

IP-Config: Got DHCP answer from 172.28.198.2, my address is 172.28.198.90

IP-Config: Complete:

device=eth0, hwaddr=98:4f:ee:10:e4:05, ipaddr=172.28.198.90, mask=255.255.255.128, gw=172.28.198.1

host=172.28.198.90, domain=isw.intel.com, nis-domain=(none)

bootserver=0.0.0.0, rootserver=0.0.0.0, rootpath=

nameserver0=10.248.2.1, nameserver1=163.33.253.68, nameserver2=10.216.46.196

uart-pl011 8080000000.uart: no DMA platform data

EXT3-fs (sda): error: couldn't mount because of unsupported optional features (240)

EXT2-fs (sda): error: couldn't mount because of unsupported optional features (244)

EXT4-fs (sda): INFO: recovery required on readonly filesystem

EXT4-fs (sda): write access will be enabled during recovery

EXT4-fs (sda): recovery complete

EXT4-fs (sda): mounted filesystem with ordered data mode. Opts: (null)

VFS: Mounted root (ext4 filesystem) readonly on device 8:0.

devtmpfs: mounted

Freeing unused kernel memory: 560K (ffffffc000911000 - ffffffc00099d000)

Freeing alternatives memory: 8K (ffffffc00099d000 - ffffffc00099f000)

INIT: version 2.88 booting

EXT4-fs (sda): re-mounted. Opts: (null)

Starting udev

udevd[962]: starting version 182

EXT4-fs (sda): re-mounted. Opts: (null)

random: dd urandom read with 88 bits of entropy available

INIT: Entering runlevel: 5misc/rtc':

Configuring network interfaces... udhcpc (v1.23.2) started

Sending discover...

Sending select for 172.28.198.90...

Lease of 172.28.198.90 obtained, lease time 43200

/etc/udhcpc.d/50default: Adding DNS 10.248.2.1

/etc/udhcpc.d/50default: Adding DNS 163.33.253.68

/etc/udhcpc.d/50default: Adding DNS 10.216.46.196

done.

Starting system message bus: dbus.

Starting OpenBSD Secure Shell server: sshd

done.

Starting portmap daemon...

Starting rpcbind daemon...done.

Starting watchdog: [ OK ]

starting statd: done

Starting atd: OK

Starting automount: random: nonblocking pool is initialized

done.

Starting domain name service: named.

hwclock: can't open '/dev/misc/rtc': No such file or directory

Starting IrDA: irattach fail

exportfs: can't open /etc/exports for reading

NFS daemon support not enabled in kernel

Starting system log daemon...0

Starting kernel log daemon...0

Starting internet superserver: xinetd.

\* Starting Avahi mDNS/DNS-SD Daemon: avahi-daemon [ ok ]

Starting ypbind . . . . . . . . . . No domainname setStarting crond: OK

Poky (Yocto Project Reference Distro) 2.0.2 axxiaarm64 /dev/ttyAMA0

axxiaarm64 login: root

root

root@axxiaarm64:~#

root@axxiaarm64:~# **ls /dev/watchdog**

ls /dev/watchdog

/dev/watchdog

root@axxiaarm64:~#

root@axxiaarm64:~# **ps ax | grep watchdog**

ps ax | grep watchdog

11 ? S 0:00 [watchdog/0]

12 ? S 0:00 [watchdog/1]

18 ? S 0:00 [watchdog/2]

24 ? S 0:00 [watchdog/3]

30 ? S 0:00 [watchdog/4]

36 ? S 0:00 [watchdog/5]

42 ? S 0:00 [watchdog/6]

48 ? S 0:00 [watchdog/7]

54 ? S 0:00 [watchdog/8]

60 ? S 0:00 [watchdog/9]

66 ? S 0:00 [watchdog/10]

72 ? S 0:00 [watchdog/11]

78 ? S 0:00 [watchdog/12]

84 ? S 0:00 [watchdog/13]

90 ? S 0:00 [watchdog/14]

96 ? S 0:00 [watchdog/15]

1333 ? SLs 0:00 /usr/sbin/watchdog

1432 ttyAMA0 R+ 0:00 grep watchdog

root@axxiaarm64:~#

root@axxiaarm64:~# **kill -9 1333**

kill -9 1333

root@axxiaarm64:~watchdog watchdog0: watchdog did not stop!

#

root@axxiaarm64:~#

root@axxiaarm64:~# INFO: ATF DDR retention r

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Axxia Version: UNKNOWN

Axxia ATF Version: UNKNOWN

Started Watchdog Timer

Parameters: Watchdog 0 A/B Valid 1/1 A/B Sequence 0/0 => A

Parameter Table Version: 9

Description: JL DDR Retention On

DDR Retention Enabled, Recovery = 1

skipping SM PLL setup for ddrRecovery

initializing ELMs for ddrRecovery

== PLL/Clock Speeds ==

System: 500 MHz Loss of Lock Count 0

CPU: 1400 MHz Loss of Lock Count 0

Memory: 533 MHz Loss of Lock Count 0 / 0

Fabric: 1200 MHz Loss of Lock Count 0

Tree: 533 MHz Loss of Lock Count 0

Peripheral: 250 MHz

SD/eMMC: 50 MHz

System Initialized

Checking U-Boot Image A

Checking U-Boot Image B

U-Boot: Watchdog 0 A/B Valid 1/1 A/B Sequence 15/10 => A

INFO: Options: 5600, hardware, none, 238 MHz, 9600

NOTICE: BL31: v1.2(debug):8c3c280

NOTICE: BL31: Built : 13:24:49, Dec 7 2016

INFO: Force timer 7 int to Secure

INFO: Enable timer 7 int in GICD

INFO: BL31: Initializing runtime services

INFO: plat\_setup\_psci\_ops called

INFO: BL31: Preparing for EL3 exit to normal world

INFO: Entry point address = 0x0

INFO: SPSR = 0x9

INFO: Adding cluster 0 to the coherency domain.

\_\_\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_

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Axxia Version: jl\_1.50

EL2

U-Boot 2015.10 (Nov 22 2016 - 10:23:36 +0000)

Watchdog enabled

DRAM: 1 GiB

SF: Detected S25FL128S\_64K with page size 256 Bytes, erase size 64 KiB, total 16 MiB

Parameters: Watchdog 0 A/B Valid 1/1 A/B Sequence 0/0 => A

Parameter Table Version: 9

Description: JL DDR Retention On

Sysmem Size: 16384 MB

Relocation Address: 0x3ff44000

SF: Detected S25FL128S\_64K with page size 256 Bytes, erase size 64 KiB, total 16 MiB

In: serial

Out: serial

Err: serial

Net: NEMAC

Hit any key to stop autoboot: 0

NEMAC Waiting for PHY auto negotiation to complete...... done

NEMAC: 1000Mbps, full duplex

Using NEMAC device

TFTP from server 172.28.198.60; our IP address is 172.28.198.53

Filename 'jjlogan/multi.fit'.

Load address: 0x4000000

Loading: #################################################################

#################################################################

#################################################################

#################################################################

###########################################

5.2 MiB/s

done

Bytes transferred = 4435356 (43ad9c hex)

## Loading kernel from FIT Image at 04000000 ...

Using 'conf@1' configuration

Trying 'kernel@1' kernel subimage

Description: Linux Kernel

Type: Kernel Image

Compression: gzip compressed

Data Start: 0x040000d8

Data Size: 4422754 Bytes = 4.2 MiB

Architecture: AArch64

OS: Linux

Load Address: 0x00080000

Entry Point: 0x00080000

Hash algo: crc32

Hash value: c4c03b36

Hash algo: sha1

Hash value: 3fed4cf1867c120ebeb7b2f9b1fbea8121c5e8a8

Verifying Hash Integrity ... crc32+ sha1+ OK

## Loading fdt from FIT Image at 04000000 ...

Using 'conf@1' configuration

Trying 'fdt@1' fdt subimage

Description: Flattened Device Tree blob

Type: Flat Device Tree

Compression: uncompressed

Data Start: 0x04437e68

Data Size: 11244 Bytes = 11 KiB

Architecture: AArch64

Hash algo: crc32

Hash value: 599b7aa8

Hash algo: sha1

Hash value: 23f0d32b0350937aad24fb4379e997bb22985272

Verifying Hash Integrity ... crc32+ sha1+ OK

Booting using the fdt blob at 0x4437e68

Uncompressing Kernel Image ... OK

Loading Device Tree to 000000001fffa000, end 000000001ffffbeb ... OK

board/axxia/common/axxia.c:292 - control is 0x8100c000

Linux will handle PEI setup.

Enabling PEI0 as Root Complex

Disabling PEI1

Disabling PEI2

Disabling SRIO0

Disabling SRIO1

Disabling SATA0

Disabling SATA1

config: PEI0x2 PEI2x2 PEI1x2 SATA0x1 SATA1x1

Peripheral frequency: 250000000

Starting kernel ...

INFO: Adding cluster 1 to the coherency domain.

INFO: Adding cluster 2 to the coherency domain.

INFO: Adding cluster 3 to the coherency domain.

Booting Linux on physical CPU 0x0

Initializing cgroup subsys cpu

Linux version 4.1.33-rt23+ (jl@jl-VirtualBox) (gcc version 5.2.0 (Wind River Linux 5.2.0-8.0-axxiaarm64-ml) ) #24 SMP Wed Dec 7 13:43:07 GMT 2016

CPU: AArch64 Processor [411fd073] revision 3

Detected PIPT I-cache on CPU0

efi: Getting EFI parameters from FDT:

efi: UEFI not found.

cma: Reserved 16 MiB at 0x00000000ff000000

psci: probing for conduit method from DT.

psci: PSCIv1.0 detected in firmware.

psci: Using standard PSCI v0.2 function IDs

PERCPU: Embedded 17 pages/cpu @ffffffc3ffeab000 s31424 r8192 d30016 u69632

Built 1 zonelists in Zone order, mobility grouping on. Total pages: 4128736

Kernel command line: console=ttyAMA0 ip=dhcp root=/dev/sda rootwait maxcpus=16

log\_buf\_len individual max cpu contribution: 4096 bytes

log\_buf\_len total cpu\_extra contributions: 61440 bytes

log\_buf\_len min size: 16384 bytes

log\_buf\_len: 131072 bytes

early log buf free: 14652(89%)

PID hash table entries: 4096 (order: 3, 32768 bytes)

Dentry cache hash table entries: 2097152 (order: 12, 16777216 bytes)

Inode-cache hash table entries: 1048576 (order: 11, 8388608 bytes)

software IO TLB [mem 0xfafff000-0xfefff000] (64MB) mapped at [ffffffc0fafff000-ffffffc0feffefff]

Memory: 16396220K/16777088K available (6418K kernel code, 655K rwdata, 2344K rodata, 560K init, 239K bss, 364484K reserved, 16384K cma-reserved)

Virtual kernel memory layout:

vmalloc : 0xffffff8000000000 - 0xffffffbdbfff0000 ( 246 GB)

vmemmap : 0xffffffbdc0000000 - 0xffffffbfc0000000 ( 8 GB maximum)

0xffffffbdc0000000 - 0xffffffbdd0000000 ( 256 MB actual)

fixed : 0xffffffbffabfd000 - 0xffffffbffac00000 ( 12 KB)

PCI I/O : 0xffffffbffae00000 - 0xffffffbffbe00000 ( 16 MB)

modules : 0xffffffbffc000000 - 0xffffffc000000000 ( 64 MB)

memory : 0xffffffc000000000 - 0xffffffc400000000 ( 16384 MB)

.init : 0xffffffc000911000 - 0xffffffc00099d000 ( 560 KB)

.text : 0xffffffc000080000 - 0xffffffc000910804 ( 8771 KB)

.data : 0xffffffc0009a1000 - 0xffffffc000a44c00 ( 655 KB)

SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=16, Nodes=1

Hierarchical RCU implementation.

Additional per-CPU info printed with stalls.

RCU restricting CPUs from NR\_CPUS=64 to nr\_cpu\_ids=16.

RCU: Adjusting geometry for rcu\_fanout\_leaf=16, nr\_cpu\_ids=16

NR\_IRQS:64 nr\_irqs:64 0

CPU0: found redistributor 0 region 0:0x0000008010200000

Architected cp15 timer(s) running at 256.00MHz (phys).

clocksource arch\_sys\_counter: mask: 0xffffffffffffff max\_cycles: 0x3b0a9be803, max\_idle\_ns: 440795202125 ns

sched\_clock: 56 bits at 256MHz, resolution 3ns, wraps every 2199023255550ns

Console: colour dummy device 80x25

Calibrating delay loop (skipped), value calculated using timer frequency.. 512.00 BogoMIPS (lpj=2560000)

pid\_max: default: 32768 minimum: 301

Security Framework initialized

Mount-cache hash table entries: 32768 (order: 6, 262144 bytes)

Mountpoint-cache hash table entries: 32768 (order: 6, 262144 bytes)

Initializing cgroup subsys memory

Initializing cgroup subsys hugetlb

ftrace: allocating 22692 entries in 89 pages

hw perfevents: enabled with arm/armv8-pmuv3 PMU driver, 7 counters available

EFI services will not be available.

CPU1: Booted secondary processor

Detected PIPT I-cache on CPU1

CPU1: found redistributor 1 region 0:0x0000008010220000

CPU2: Booted secondary processor

Detected PIPT I-cache on CPU2

CPU2: found redistributor 2 region 0:0x0000008010240000

CPU3: Booted secondary processor

Detected PIPT I-cache on CPU3

CPU3: found redistributor 3 region 0:0x0000008010260000

CPU4: Booted secondary processor

Detected PIPT I-cache on CPU4

CPU4: found redistributor 100 region 0:0x0000008010280000

CPU5: Booted secondary processor

Detected PIPT I-cache on CPU5

CPU5: found redistributor 101 region 0:0x00000080102a0000

CPU6: Booted secondary processor

Detected PIPT I-cache on CPU6

CPU6: found redistributor 102 region 0:0x00000080102c0000

CPU7: Booted secondary processor

Detected PIPT I-cache on CPU7

CPU7: found redistributor 103 region 0:0x00000080102e0000

CPU8: Booted secondary processor

Detected PIPT I-cache on CPU8

CPU8: found redistributor 200 region 0:0x0000008010300000

CPU9: Booted secondary processor

Detected PIPT I-cache on CPU9

CPU9: found redistributor 201 region 0:0x0000008010320000

CPU10: Booted secondary processor

Detected PIPT I-cache on CPU10

CPU10: found redistributor 202 region 0:0x0000008010340000

CPU11: Booted secondary processor

Detected PIPT I-cache on CPU11

CPU11: found redistributor 203 region 0:0x0000008010360000

CPU12: Booted secondary processor

Detected PIPT I-cache on CPU12

CPU12: found redistributor 300 region 0:0x0000008010380000

CPU13: Booted secondary processor

Detected PIPT I-cache on CPU13

CPU13: found redistributor 301 region 0:0x00000080103a0000

CPU14: Booted secondary processor

Detected PIPT I-cache on CPU14

CPU14: found redistributor 302 region 0:0x00000080103c0000

CPU15: Booted secondary processor

Detected PIPT I-cache on CPU15

CPU15: found redistributor 303 region 0:0x00000080103e0000

Brought up 16 CPUs

SMP: Total of 16 processors activated.

CPU: All CPU(s) started at EL2

devtmpfs: initialized

DMI not present or invalid.

clocksource jiffies: mask: 0xffffffff max\_cycles: 0xffffffff, max\_idle\_ns: 19112604462750000 ns

NET: Registered protocol family 16

vdso: 2 pages (1 code @ ffffffc0009a9000, 1 data @ ffffffc0009a8000)

hw-breakpoint: found 6 breakpoint and 4 watchpoint registers.

DMA: preallocated 256 KiB pool for atomic allocations

Serial: AMBA PL011 UART driver

8080000000.uart: ttyAMA0 at MMIO 0x8080000000 (irq = 18, base\_baud = 0) is a PL011 rev2

console [ttyAMA0] enabled

8080010000.uart: ttyAMA1 at MMIO 0x8080010000 (irq = 19, base\_baud = 0) is a PL011 rev2

8080020000.uart: ttyAMA2 at MMIO 0x8080020000 (irq = 20, base\_baud = 0) is a PL011 rev2

8080030000.uart: ttyAMA3 at MMIO 0x8080030000 (irq = 21, base\_baud = 0) is a PL011 rev2

PLLA didn't lock

pcie-axxia: PEI setup failed!

axxia-pcie: probe of a002000000.pcie failed with error -22

vgaarb: loaded

SCSI subsystem initialized

ssp-pl022 8080100000.ssp: ARM PL022 driver, device ID: 0x000b6022

pl022: mapped registers from 0x8080100000 to ffffff8000054000

usbcore: registered new interface driver usbfs

usbcore: registered new interface driver hub

usbcore: registered new device driver usb

Switched to clocksource arch\_sys\_counter

NET: Registered protocol family 2

TCP established hash table entries: 131072 (order: 8, 1048576 bytes)

TCP bind hash table entries: 65536 (order: 8, 1048576 bytes)

TCP: Hash tables configured (established 131072 bind 65536)

UDP hash table entries: 8192 (order: 6, 262144 bytes)

UDP-Lite hash table entries: 8192 (order: 6, 262144 bytes)

NET: Registered protocol family 1

RPC: Registered named UNIX socket transport module.

RPC: Registered udp transport module.

RPC: Registered tcp transport module.

RPC: Registered tcp NFSv4.1 backchannel transport module.

kvm [1]: GICv3: no GICV resource entry

kvm [1]: disabling GICv2 emulation

kvm [1]: interrupt-controller@ffffffc0000b23b8 IRQ5

kvm [1]: timer IRQ3

kvm [1]: Hyp mode initialized successfully

futex hash table entries: 4096 (order: 6, 262144 bytes)

audit: initializing netlink subsys (disabled)

audit: type=2000 audit(4.640:1): initialized

HugeTLB registered 2 MB page size, pre-allocated 0 pages

squashfs: version 4.0 (2009/01/31) Phillip Lougher

fuse init (API version 7.23)

9p: Installing v9fs 9p2000 file system support

io scheduler noop registered

io scheduler cfq registered (default)

pl061\_gpio 8080180000.gpio: PL061 GPIO chip @0x0000008080180000 registered

pl061\_gpio 8080190000.gpio: PL061 GPIO chip @0x0000008080190000 registered

Serial: 8250/16550 driver, 4 ports, IRQ sharing disabled

Unable to detect cache hierarcy from DT for CPU 0

brd: module loaded

loop: module loaded

Could not create /proc/driver/axxia\_actlr\_el3!

Could not create /proc/driver/axxia\_actlr\_el2!

m25p80 spi32766.0: found s25fl129p1, expected s25fl016k

m25p80 spi32766.0: s25fl129p1 (16384 Kbytes)

8 ofpart partitions found on MTD device spi32766.0

Creating 8 MTD partitions on "spi32766.0":

0x000000000000-0x000000040000 : "spl-0"

0x000000040000-0x000000080000 : "spl-1"

0x000000080000-0x000000090000 : "parameters-0"

0x000000090000-0x0000000a0000 : "parameters-1"

0x0000000a0000-0x0000000b0000 : "env-0"

0x0000000b0000-0x0000000c0000 : "env-1"

0x000000100000-0x000000300000 : "u-boot-0"

0x000000300000-0x000000500000 : "u-boot-1"

m25p80 spi32766.1: found s25fl129p1, expected s25fl016k

m25p80 spi32766.1: s25fl129p1 (16384 Kbytes)

8 ofpart partitions found on MTD device spi32766.1

Creating 8 MTD partitions on "spi32766.1":

0x000000000000-0x000000040000 : "spl-0"

0x000000040000-0x000000080000 : "spl-1"

0x000000080000-0x000000090000 : "parameters-0"

0x000000090000-0x0000000a0000 : "parameters-1"

0x0000000a0000-0x0000000b0000 : "env-0"

0x0000000b0000-0x0000000c0000 : "env-1"

0x000000100000-0x000000300000 : "u-boot-0"

0x000000300000-0x000000500000 : "u-boot-1"

libphy: Fixed MDIO Bus: probed

tun: Universal TUN/TAP device driver, 1.6

tun: (C) 1999-2004 Max Krasnyansky <maxk@qualcomm.com>

axxia-nemac 8080240000.ethernet: NEMAC HW rev 3.4

libphy: Axxia MDIO: probed

xhci-hcd xhci-hcd.0.auto: xHCI Host Controller

xhci-hcd xhci-hcd.0.auto: new USB bus registered, assigned bus number 1

xhci-hcd xhci-hcd.0.auto: hcc params 0x0220f665 hci version 0x100 quirks 0x00010010

xhci-hcd xhci-hcd.0.auto: irq 51, io mem 0x9000000000

hub 1-0:1.0: USB hub found

hub 1-0:1.0: 1 port detected

xhci-hcd xhci-hcd.0.auto: xHCI Host Controller

xhci-hcd xhci-hcd.0.auto: new USB bus registered, assigned bus number 2

usb usb2: We don't know the algorithms for LPM for this host, disabling LPM.

hub 2-0:1.0: USB hub found

hub 2-0:1.0: 1 port detected

usbcore: registered new interface driver usb-storage

mousedev: PS/2 mouse device common for all mice

i2c /dev entries driver

usb 1-1: new high-speed USB device number 2 using xhci-hcd

DDR Retention Reset Initialized

Wdt: Probing sp804\_wdt\_axxia

sp804\_wdt\_axxia 80802200e0.watchdog: registration successful

sdhci: Secure Digital Host Controller Interface driver

sdhci: Copyright(c) Pierre Ossman

sdhci-pltfm: SDHCI platform and OF driver helper

usbcore: registered new interface driver usbhid

usbhid: USB HID core driver

NET: Registered protocol family 10

sit: IPv6 over IPv4 tunneling driver

NET: Registered protocol family 17

8021q: 802.1Q VLAN Support v1.8

9pnet: Installing 9P2000 support

registered taskstats version 1

hctosys: unable to open rtc device (rtc0)

IPv6: ADDRCONF(NETDEV\_UP): eth0: link is not ready

usb-storage 1-1:1.0: USB Mass Storage device detected

scsi host0: usb-storage 1-1:1.0

scsi 0:0:0:0: Direct-Access CBM Flash Disk 5.00 PQ: 0 ANSI: 2

sd 0:0:0:0: [sda] 2052608 512-byte logical blocks: (1.05 GB/1002 MiB)

sd 0:0:0:0: [sda] Write Protect is off

sd 0:0:0:0: [sda] No Caching mode page found

sd 0:0:0:0: [sda] Assuming drive cache: write through

sd 0:0:0:0: [sda] Attached SCSI removable disk

axxia-nemac 8080240000.ethernet eth0: Link is Up - 1Gbps/Full - flow control rx/tx

IPv6: ADDRCONF(NETDEV\_CHANGE): eth0: link becomes ready

Sending DHCP requests ., OK

IP-Config: Got DHCP answer from 172.28.198.2, my address is 172.28.198.90

IP-Config: Complete:

device=eth0, hwaddr=98:4f:ee:10:e4:05, ipaddr=172.28.198.90, mask=255.255.255.128, gw=172.28.198.1

host=172.28.198.90, domain=isw.intel.com, nis-domain=(none)

bootserver=0.0.0.0, rootserver=0.0.0.0, rootpath=

nameserver0=10.248.2.1, nameserver1=163.33.253.68, nameserver2=10.216.46.196

uart-pl011 8080000000.uart: no DMA platform data

EXT3-fs (sda): error: couldn't mount because of unsupported optional features (240)

EXT2-fs (sda): error: couldn't mount because of unsupported optional features (244)

EXT4-fs (sda): INFO: recovery required on readonly filesystem

EXT4-fs (sda): write access will be enabled during recovery

EXT4-fs (sda): recovery complete

EXT4-fs (sda): mounted filesystem with ordered data mode. Opts: (null)

VFS: Mounted root (ext4 filesystem) readonly on device 8:0.

devtmpfs: mounted

Freeing unused kernel memory: 560K (ffffffc000911000 - ffffffc00099d000)

Freeing alternatives memory: 8K (ffffffc00099d000 - ffffffc00099f000)

INIT: version 2.88 booting

EXT4-fs (sda): re-mounted. Opts: (null)

Starting udev

udevd[961]: starting version 182

EXT4-fs (sda): re-mounted. Opts: (null)

random: dd urandom read with 85 bits of entropy available

INIT: Entering runlevel: 5misc/rtc':

Configuring network interfaces... udhcpc (v1.23.2) started

Sending discover...

Sending select for 172.28.198.90...

Lease of 172.28.198.90 obtained, lease time 43200

/etc/udhcpc.d/50default: Adding DNS 10.248.2.1

/etc/udhcpc.d/50default: Adding DNS 163.33.253.68

/etc/udhcpc.d/50default: Adding DNS 10.216.46.196

done.

Starting system message bus: dbus.

Starting OpenBSD Secure Shell server: sshd

done.

Starting portmap daemon...

Starting rpcbind daemon...done.

Starting watchdog: [ OK ]

starting statd: done

Starting atd: OK

Starting automount: random: nonblocking pool is initialized

done.

Starting domain name service: named.

hwclock: can't open '/dev/misc/rtc': No such file or directory

Starting IrDA: irattach fail

exportfs: can't open /etc/exports for reading

NFS daemon support not enabled in kernel

Starting system log daemon...0

Starting kernel log daemon...0

Starting internet superserver: xinetd.

\* Starting Avahi mDNS/DNS-SD Daemon: avahi-daemon [ ok ]

Starting ypbind . . . . . . . . . . No domainname setStarting crond: OK

Poky (Yocto Project Reference Distro) 2.0.2 axxiaarm64 /dev/ttyAMA0

axxiaarm64 login: root

root

root@axxiaarm64:~#

root@axxiaarm64:~# **mknod /dev/datalogger c 60 0**

mknod /dev/datalogger c 60 0

root@axxiaarm64:~#

root@axxiaarm64:~# **insmod datalog\_reader.ko**

insmod datalog\_reader.ko

Inserting datalog\_reader module

root@axxiaarm64:~#

root@axxiaarm64:~# **cat /dev/datalogger > dump.txt**

cat /dev/datalogger > dump.txt

root@axxiaarm64:~#

root@axxiaarm64:~#