Software Release Document

XM-ARM

Fent Innovative Software Solutions

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Approved		

Summary: This software release document provides a description of a given software version in terms of known problems, limitations or restrictions with respect to its approved baseline.

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Change record:

Version	Date	Author	Comments
01	09/06/2015	Javier Coronel	Initial document. XM-ARMv2.0.0 Multicore version.
02	26/02/2016	Javier Coronel	New release XM-ARMv2.0.3 Multicore version.
03	14/09/2016	Javier Coronel	New release XM-ARMv2.0.4 Multicore version.
04	03/07/2017	Javier Coronel	New release XM-ARMv2.0.5 Multicore version.

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Chapter 1

Introduction

1.1 Purpose and objectives

The purpose of this document is to describe the release of XM-ARM for the processor ARM CORTEX-A9 dual-core.

The purpose of the Software Release Document (SReID) is to describe a given version software version in terms of known problems, limitations or restrictions with respect to its approved baseline.

1.2 Executive Summary

- Chapter 4 describes the configuration items released.
- Chapter 5 describes the changes with respect to the previous release.
- Chapter 6 describes the use of the configuration items.
- Chapter 7 describes future work.

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Chapter 2

Applicable and reference documents

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Chapter 3

Terms, definitions and abbreviated terms

3.1 Terms and definitions

XM-ARM XtratuM for ARM.

XtratuM Temporal and spatial partitioning kernel according to the Integrated Modular Avionics (IMA) concept based on Para-virtualisation techniques.

3.2 Abbreviated terms

SReID Software Release Document.

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Chapter 4

Software release overview

4.1 Released software configuration items

This release contains the following software configuration items:

14-035-03.007.sreld.04 Software Release Document This document.

14-035-03.004.src.r9248 Source Code XM-ARM source code v2.0.5. Revision subversion r9248.

14-035-03.005.sum.04 Software User Manual Software User Manual for XM-ARM hypervisor.

14-035-03.006.sum.03 Software Reference Manual Software Reference Manual for XM-ARM hypervisor.

14-035-03.009.sum.03 Software Development Starter Guide Software Development Starter Guide for XM-ARM hypervisor

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Chapter 5

Status of the software configuration item

5.1 Evolution since previous version (XM-ARMv2.0.4)

- Source code:
  - XM-ARM-2:CP-161214-01: BPU activation by default.
  - XM-ARM-2:SPR-170221-01: Reset status of partition is set to WARM instead of COLD after a system warm reset.
  - XM-ARM-2:CP-161209-04: Automatically enable FPU in XAL if FPU flag is set in the partition configuration.
  - XM-ARM-2:SPR-161209-02: Enable the access to the PL M_AXI_GP1.
  - XM-ARM-2:CP-161209-03: Enable PMU access in non-secure mode on ZYNQ.
  - XM-ARM-2:SPR-161209-07: SMP support and SCU.
  - XM-ARM-2:CP-161019-01: XtratuM management of cache(s) parity on ZYNQ:
    - Caches L1 and L2 can be enabled at hypervisor and partition level.
    - Caches polices for L1 and L2 can be chosen independently for the hypervisor (data and code) and partitions.
    - Modification of the initialization of the hypervisor in order to support simultaneous enabling of caches L1 and L2 using different cache polices.
    - Redesign of the partition context switch and hypervisor initialization when cache L2 is enabled due to issues related to switch between "secure" and "non-secure" worlds.
    - Parity check: consideration of the different sources of parity errors: L1 data/instruction caches, L2 cache, TLB, SCU and GHB/BTAC. For each source a set of actions and handlers were installed.
  - XM-ARM-2:SPR-161209-06: Flush cache at partition context switch was re-reviewed. Now it considers flush or invalidation depending on the caches

polices.
  - XM-ARM-2:CP-170221-01: the printf function of the XAL environment includes support for floating point data.

- User manual:
  - Add snoop control unit (SCU) description.
  - Add branch prediction description.
  - Add memory map access table, documenting the possibles ways to access to the I/O ports from the partitions.
  - Add parity errors description
  - Processor frequency constraints are documented.
  - Add UART clock allowed frequency values.

- Starter guide:
  - Fix minor typos in the document.

5.2 Evolution since previous version (XM-ARMv2.0.3)

- Source code:
  - Fix the XM-ARM-2:SPR-160913-01: Avoid PTL2 mmaping when PTL1 is present previously.
  - Fix the XM-ARM-2:SPR-160906-01: XM_reset_partition: Entry Point argument Check.
  - Fix the XM-ARM-2:SPR-150112-01: Update defconfig files with new values.
  - Fix the XM-ARM-2:SPR-160908-01: Allow access to entire Memory Map.
  - Fix the XM-ARM-2:SPR-160907-01: Memory areas Attributes assigned improperly for XM Services.
  - Fix the XM-ARM-2:SPR-160905-02: Name of installation file when Distro-Run is performed is not correct.
  - Fix the XM-ARM-2:SPR-160819-02: Provide access to OCM (High Addresses).
  - Fix the XM-ARM-2:SPR-160819-01: Access localProcessorInfo in assembly code.
  - Fix the XM-ARM-2:SPR-160802-01: printf function and add strcpy function.
  - Implements XM-ARM-2:CP-160616-01: Update Clock Freq configurations (UART and TIMERS).
  - Fix the XM-ARM-2:SPR-151124-01: Revert XM-ARM-2:SPR-151124-01 that is not applicable to this version.

- Reference manual:
  - Update description of the entry point in XM_reset_partition.

  - Update HCALL XM_clear_irqmask.
  - Update HCALL XM_clear_irqpend.
  - Update HCALL XM_reset_system.

- User manual:
  - Add explanation about XM memory map.
  - System flag not present in partition configuration.
  - IO Access Clarification.

5.3 Evolution since previous version (XM-ARMv2.0.0)

- Source code:
  - Fix the XM-ARM-2:SPR-160225-01: Hardware settings not needed when simulator is used.
  - Fix the XM-ARM-2:SPR-160215-02: XM code areas placed in ph1MB virt16MB. XM code ph and virt multiple of 16MB.
  - Fix the XM-ARM-2:SPR-160215-01: Remove deprecated NonSecure DDR 64MB areas for Flush and IRQs.
  - Fix the XM-ARM-2:SPR-151125-01: Acces to PL is not possible from Non-sec World.
  - Fix the XM-ARM-2:SPR-160121-06: Some partitions are not loaded in SMP.
  - Fix the XM-ARM-2:SPR-160121-05: HCall API is not up to date.
  - Fix the XM-ARM-2:SPR-150112-01: Updated defconfig files.
  - Fix the XM-ARM-2:SPR-160121-04: Memory access checks as Secure when XM_HYPERVISOR_ID is set
  - Fix the XM-ARM-2:SPR-160121-03: Remove ambiguous tab UNCHECKED_-ID
  - Fix the XM-ARM-2:SPR-160121-02: Overflow Warning fix
  - Fix the XM-ARM-2:SPR-160121-01: Fix XM_set_timer XM_EXEC_-CLOCK absTime reference
  - Fix the XM-ARM-2:SPR-151209-01: Delete dead code.
  - Fix the XM-ARM-2:SPR-150615-01: Remove dead code
  - Fix the XM-ARM-2:SPR-150720-04: Value misdefined for slots flags number: "NO_SLOTS_FLAGS" "10"
  - Fix the XM-ARM-2:SPR-151124-01: Bug on xmcparser when checking the slots identifiers
  - Fix the XM-ARM-2:SPR-160108-01: Allow dcache and icache configuration separately.
  - Fix the XM-ARM-2:SPR-150527-01: XM_COLD_RESET does not jump into rsw.

- Fix the XM-ARM-2:SPR-151211-01: Configure PLL in XM setUP to enable clocks properly.
- Fix the XM-ARM-2:SPR-150715-01: Fix the misspelled label XM_DEACTIVATE_CACHE
- Fix the XM-ARM-2:SPR-150601-01: Hw Interrupts interfere extended interrupt propagation.
- Fix the XM-ARM-2:SPR-151125-01: Fix PL mapping cache attributes.
- Fix the XM-ARM-2:SPR-151123-01: XM map at 16MB mem area.
- Fix the XM-ARM-2:SPR-151118-01: Use Uart configuration attending menuconfig selection.
- Fix the XM-ARM-2:SPR-150806-01: Add XM_switch_imm_sched_plan Hypercall.
- Fix the XM-ARM-2:SPR-150715-07: Add XM_imm_resume_partition Hypercall.
- Fix the XM-ARM-2:SPR-150805-01: Update the function SwitchSchedPlan in order to set the new scheduling plans on all cores
- Fix the XM-ARM-2:SPR-150715-03: Cache was initialized only for core 0. Now is configured in both cores.
- Fix the XM-ARM-2:SPR-150720-02: When any extended interrupt arrives to partition, the XAL common handler clear the pending bit of the extended interrupt being processed before the specific handler is called.
- Fix the XM-ARM-2:SPR-150717-02: Remove the automatic clear irq pend. Now the partition must clear the extended irq. The irqIndex is reset after a clear extended irq pending
- Fix the XM-ARM-2:SPR-150717-01: Include verbose information for hypercalls execution
- Fix the XM-ARM-2:SPR-150716-02: The DisarmVTimer function has been modified because the ktimer associated with a Vtimer wasn't disarmed when the vtimer was disarmed.
- Fix the XM-ARM-2:SPR-150716-01: The XM_VT_HW_MAX is defined as the number of configured irqs (CONFIG_NO_HWIRQS).
- Fix the XM-ARM-2:SPR-150715-05: Remove commented hypercalls and unused hypercalls.
- Fix the XM-ARM-2:SPR-150715-04: Parameters name are added to the hypercalls XM_arm_inport and XM_arm_outport.
- Fix the XM-ARM-2:SPR-150715-02: The macros XM_disable_irqs and XM_enable_irqs have been modified to work with ARM.
- Fix the XM-ARM-2:SPR-150714-01: Update software version for the generation of a new patch.
- Fix the XM-ARM-2:SPR-150710-04: Update XAL examples.
- Fix the XM-ARM-2:SPR-150710-03: Update the source code wrt xm-q - Update changes in xm-q with no SPR associated.
- Fix the XM-ARM-2:SPR-150710-02: Allocation of the memory areas derived of the allocation of devices to partitions.

  - Fix the XM-ARM-2:SPR-150710-01: Access to memory blocks from XM_-memory_copy.
  - Fix the XM-ARM-2:SPR-150708-01: Generation of extended interrupts.
  - Fix the XM-ARM-2:SPR-150626-02: Enable SMP IPIs.
  - Fix the XM-ARM-2:SPR-150626-01: Remove TZ DDR Protection.
  - Fix the XM-ARM-2:SPR-150625-01: Enable XM_get_gid_by_name.

- Reference manual:
  - Update hypercall XM_clear_irqmask.xml()
  - Update hypercall XM_clear_irqpend()
  - Update hypercall XM_set_irqmask()
  - Update hypercall XM_set_irqpend()
  - Update hypercall XM_set_timer()
  - Update hypercall XM_create_queuing_port()
  - Update hypercall XM_create_sampling_port()
  - Update hypercall XM_get_gid_by_name()
  - Update hypercall XM_get_partition_mmap()
  - Update hypercall XM_get_partition_status()
  - Update hypercall XM_get_plan_status()
  - Update hypercall XM_get_queuing_port_info()
  - Update hypercall XM_get_queuing_port_status()
  - Update hypercall XM_get_sampling_port_info()
  - Update hypercall XM_get_sampling_port_status()
  - Update hypercall XM_get_system_status()
  - Update hypercall XM_get_time()
  - Update hypercall XM_get_vcpuid()
  - Update hypercall XM_halt_partition()
  - Update hypercall XM_halt_system()
  - Update hypercall XM_halt_vcpu()
  - Update hypercall XM_hm_raise_event()
  - Update hypercall XM_hm_read()
  - Update hypercall XM_hm_status()
  - Update hypercall XM_idle_self()
  - Update hypercall XM_memory_copy()
  - Update hypercall XM_params_get_PCT()
  - Update hypercall XM_read_sampling_message()
  - Update hypercall XM_receive_queuing_message()
  - Update hypercall XM_reset_partition()
  - Update hypercall XM_reset_system()
  - Update hypercall XM_reset_vcpu()
  - Update hypercall XM_resume_imm_partition()

  - Update hypercall XM_resume_partition()
  - Update hypercall XM_send_queuing_message()
  - Update hypercall XM_set_cache_state()
  - Update hypercall XM_shutdown_partition()
  - Update hypercall XM_suspend_partition()
  - Update hypercall XM_switch_imm_sched_plan()
  - Update hypercall XM_switch_sched_plan()
  - Update hypercall XM_trace_event()
  - Update hypercall XM_trace_read()
  - Update hypercall XM_trace_status()
  - Update hypercall XM_write_console()
  - Update hypercall XM_write_sampling_message()
  - Update hypercall init_libxm()
  - Update hypercall XEF_parse_file.xml()

- User manual:

  - Add Partition FPGA Access description.
  - Add attribute Hypervisor Feature.
  - Update xml example to multicore.
  - Add “make defconfig” description.
  - Add XM_resume_imm_parition hypercall.
  - Add XM_switch_imm_sched_plan hypercall.
  - Update Warm Reset description.
  - Update section: "Configuration".
  - Update memory protection mechanisms.
  - Update requirements.
  - Update processor management.
  - Update section: "XAL development environment".

5.4 Evolution since previous version (XM-3.9.11)

- Source code:

  - Fix the XMARM/SPR-150429-01: modify xmcparser
  - Fix the XMARM/SPR-150506-01: modify xmcparser
  - Fix the XMARM/SPR-150601-02: modify XM_get_time hypercall
  - Fix the XMARM/SPR-150608-01: add hypercalls XM_arm_inport and XM_arm_outport
  - Fix the XMARM/SPR-150608-02: modify enabling the FPU on a multicore configuration.

  - Add XAL examples to show as the devices management should be performed: example.007, example.008, example.009.
  - Review the management of the extended interrupts.
  - Review the devices list of Zynq board.
  - Review partitions and system resets.
  - Review the mechanism of Health monitor for generation of event related to access to memory.
  - The numbering of the UART has been fixed. In previous version the UART used by default in XM / XML was "0". However, based on hardware configuration of the core where the UART0 does not have output and the UART1 is connected to the plug on the board, the new ID that should be used in the XM configuration and XML should be 1 instead of 0.
  - Default configuration for XM/XAL/RSW (defconfig) has been updated.
  - XML of the examples have been updated: UART ID has been changed from 0 to 1.
  - The required attribute xmlns (XML namespace) in the files xml that define the sytem configuration has been updated. Now the configuration files shall define the attribute xmlns as "http://www.xtratum.org/xm-arm-2.x".

- Reference manual:
  - Update Health Monitor hypercall and move this hypercall to ARM specific hypercalls:
    - XM_arm_hm_raise_event()
  - Update Interrupt management hypercalls:
    - XM_clear_irqmask()
    - XM_clear_irqpend()
    - XM_set_irqmask()
    - XM_set_irqpend()
  - Update memory copy hypercall:
    - XM memory copy()
  - Add new hypercalls to ARM specific hypercalls section:
    - XM_arm_inport()
    - XM_arm_outport()

- User manual:
  - Update section "Access to devices" (Section 2.10)
  - Update section "Exceptions" (Section 2.11)
  - Remove section "Know limitation". The know limitations are determinated for the 007.sreld document.
  - Update section "Hypervisor Configuration File".
  - Update annex "XML Schema Definition"
  - Update diagram and images related to XM_CF.

5.5 Known problems or limitations

1. XtratuM physical and virtual address must be the same (XM-ARM-2:SPR-150421-01).
2. The hypercall XM_system_reset is not running properly when SMP is enabled (XM-ARM-2:SPR-150608-03).
3. The OCM (On Chip Memory) is not accesible in Low Addresses. (XM-ARM-2:SPR-160819-02).

Chapter 6

Advice for use of the software configuration item

The user manual ([**14-035-03.005.sum.04**]) and stater guide ([**14-035-03.009.sum.03**]) details how to configure and use XM-ARM.

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Chapter 7

On-going changes

The following know limitations are being relaxed: 1, 2, 3.

The following SPRs are still open and are being addressed:

XM-ARM-2:SPR-150608-03 : The system is blocked on the hypercall XM_system_reset when the system is configured as multicore.

XM-ARM-2:SPR-150421-01 : XtratuM do not allow to use virtual Addressed for XtratuM.

XM-ARM-2:SPR-160819-02 : OCM is not accessible in Low Addresses.

XM-ARM-2:SPR-170628-01 : Currently the system is facing problems in multicore configuration when the caches L1 and L2 are each one configured as Write-back/Write Allocate.