Silicon Errata and Software Workarounds

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It is an unfortunate fact of life that hardware is often produced with so-called "errata", which can cause it to deviate from the architecture under specific circumstances. For hardware produced by ARM, these errata are broadly classified into the following categories:

Category A	A critical error without a viable workaround.
Category B	A significant or critical error with an acceptable workaround.
Category C	A minor error that is not expected to occur under normal operation.

For more information, consult one of the "Software Developers Errata Notice" documents available on infocenter.arm.com (registration required).

As far as Linux is concerned, Category B errata may require some special treatment in the operating system. For example, avoiding a particular sequence of code, or configuring the processor in a particular way. A less common situation may require similar actions in order to declassify a Category A erratum into a Category C erratum. These are collectively known as "software workarounds" and are only required in the minority of cases (e.g. those cases that both require a non-secure workaround *and* can be triggered by Linux).

For software workarounds that may adversely impact systems unaffected by the erratum in question, a Kconfig entry is added under "Kernel Features" -> "ARM errata workarounds via the alternatives framework". These are enabled by default and patched in at runtime when an affected CPU is detected. For less-intrusive workarounds, a Kconfig option is not available and the code is structured (preferably with a comment) in such a way that the erratum will not be hit.

This approach can make it slightly onerous to determine exactly which errata are worked around in an arbitrary kernel source tree, so this file acts as a registry of software workarounds in the Linux Kernel and will be updated when new workarounds are committed and backported to stable kernels.

Implementor	Component	Erratum ID	Kconfig
Allwinner	A64/R18	UNKNOWN1	SUN50I_ERRATUM_UNKNOWN1
ARM	Cortex-A510	#2064142	ARM64_ERRATUM_2064142
ARM	Cortex-A510	#2038923	ARM64_ERRATUM_2038923
ARM	Cortex-A510	#1902691	ARM64_ERRATUM_1902691
ARM	Cortex-A53	#826319	ARM64_ERRATUM_826319
ARM	Cortex-A53	#827319	ARM64_ERRATUM_827319
ARM	Cortex-A53	#824069	ARM64_ERRATUM_824069
ARM	Cortex-A53	#819472	ARM64_ERRATUM_819472
ARM	Cortex-A53	#845719	ARM64_ERRATUM_845719
ARM	Cortex-A53	#843419	ARM64_ERRATUM_843419
ARM	Cortex-A55	#1024718	ARM64_ERRATUM_1024718
ARM	Cortex-A55	#1530923	ARM64_ERRATUM_1530923
ARM	Cortex-A57	#832075	ARM64_ERRATUM_832075
ARM	Cortex-A57	#852523	N/A
ARM	Cortex-A57	#834220	ARM64_ERRATUM_834220
ARM	Cortex-A57	#1319537	ARM64_ERRATUM_1319367
ARM	Cortex-A72	#853709	N/A
ARM	Cortex-A72	#1319367	ARM64_ERRATUM_1319367
ARM	Cortex-A73	#858921	ARM64_ERRATUM_858921
ARM	Cortex-A76	#1188873,1418040	ARM64_ERRATUM_1418040
ARM	Cortex-A76	#1165522	ARM64_ERRATUM_1165522
ARM	Cortex-A76	#1286807	ARM64_ERRATUM_1286807
ARM	Cortex-A76	#1463225	ARM64_ERRATUM_1463225
ARM	Cortex-A77	#1508412	ARM64_ERRATUM_1508412
ARM	Cortex-A510	#2051678	ARM64_ERRATUM_2051678
ARM	Cortex-A510	#2077057	ARM64_ERRATUM_2077057
ARM	Cortex-A710	#2119858	ARM64_ERRATUM_2119858
ARM	Cortex-A710	#2054223	ARM64_ERRATUM_2054223
ARM	Cortex-A710	#2224489	ARM64_ERRATUM_2224489
ARM	Cortex-X2	#2119858	ARM64_ERRATUM_2119858
ARM	Cortex-X2	#2224489	ARM64_ERRATUM_2224489
ARM	Neoverse-N1	#1188873,1418040	ARM64_ERRATUM_1418040

Implementor	Component	Erratum ID	Kconfig
ARM	Neoverse-N1	#1349291	N/A
ARM	Neoverse-N1	#1542419	ARM64_ERRATUM_1542419
ARM	Neoverse-N2	#2139208	ARM64_ERRATUM_2139208
ARM	Neoverse-N2	#2067961	ARM64_ERRATUM_2067961
ARM	Neoverse-N2	#2253138	ARM64_ERRATUM_2253138
ARM	MMU-500	#841119,826419	N/A
Broadcom	Brahma-B53	N/A	ARM64_ERRATUM_845719
Broadcom	Brahma-B53	N/A	ARM64_ERRATUM_843419
Cavium	ThunderX ITS	#22375,24313	CAVIUM_ERRATUM_22375
Cavium	ThunderX ITS	#23144	CAVIUM_ERRATUM_23144
Cavium	ThunderX GICv3	#23154,38545	CAVIUM_ERRATUM_23154
Cavium	ThunderX GICv3	#38539	N/A
Cavium	ThunderX Core	#27456	CAVIUM_ERRATUM_27456
Cavium	ThunderX Core	#30115	CAVIUM_ERRATUM_30115
Cavium	ThunderX SMMUv2	#27704	N/A
Cavium	ThunderX2 SMMUv3	#74	N/A
Cavium	ThunderX2 SMMUv3	#126	N/A
Cavium	ThunderX2 Core	#219	CAVIUM_TX2_ERRATUM_219
Marvell	ARM-MMU-500	#582743	N/A
NVIDIA	Carmel Core	N/A	NVIDIA_CARMEL_CNP_ERRATUM
Freescale/NXP	LS2080A/LS1043A	A-008585	FSL_ERRATUM_A008585
Hisilicon	Hip0{5,6,7}	#161010101	HISILICON_ERRATUM_161010101
Hisilicon	Hip0{6,7}	#161010701	N/A
Hisilicon	Hip0{6,7}	#161010803	N/A
Hisilicon	Hip07	#161600802	HISILICON_ERRATUM_161600802
Hisilicon	Hip08 SMMU PMCG	#162001800	N/A
Qualcomm Tech.	Kryo/Falkor v1	E1003	QCOM_FALKOR_ERRATUM_1003
Qualcomm Tech.	Kryo/Falkor v1	E1009	QCOM_FALKOR_ERRATUM_1009
Qualcomm Tech.	QDF2400 ITS	E0065	QCOM_QDF2400_ERRATUM_0065
Qualcomm Tech.	Falkor v{1,2}	E1041	QCOM_FALKOR_ERRATUM_1041
Qualcomm Tech.	Kryo4xx Gold	N/A	ARM64_ERRATUM_1463225
Qualcomm Tech.	Kryo4xx Gold	N/A	ARM64_ERRATUM_1418040
Qualcomm Tech.	Kryo4xx Silver	N/A	ARM64_ERRATUM_1530923
Qualcomm Tech.	Kryo4xx Silver	N/A	ARM64_ERRATUM_1024718
Fujitsu	A64FX	E#010001	FUJITSU_ERRATUM_010001