

Release Notes

μClinux/LM32, FCS release (re-release)

2007-11-30

New features and improvements since the FCS release

Since the FCS release, the following bug-fixes and improvements have been provided for the μClinux/LM32 port:

1. OS-aware GDB debugging correctly support single-step and breakpoints

OS-aware (remote) GDB debugging made incorrect assumptions regarding the delivery of debug exceptions, which caused breakpoints to be ignored.

This has been fixed in this release.

2. Issues with stopping and restarting a triple-speed Ethernet peripheral

The kernel did not properly free the interrupt associated with a triple-speed Ethernet peripheral. This caused issues, when stopping and restarting the driver (i.e. the device could not be brought back up, as the interrupt could not be acquired).

This issue has been fixed in this release.

3. Change in behaviour of the “reset” command in u-boot

In earlier releases, the “reset” command in u-boot merely entered an infinite loop.

This behaviour has been changed to u-boot printing a warning message, which informs the user that “reset” is not supported on the hardware and no action will be taken.

New features and improvements since the release candidate (RC)

Since the release candidate (RC), a number of major improvements and new features have been added to the μClinux/LM32 port.

4. OS-aware GDB correctly associates debug symbols with in-memory process image

The OS-aware GDB now correctly understands the runtime-relocation of binaries and correctly associates debug symbols with the in-memory process image

5. full conformance with LTP (Linux Test Project) test suite

Linux/LM32 passes all applicable tests of the LTP test suite, with the exception of those tests that need to fail to provide expected behaviour for Linux (i.e. those tests that assume different system call semantics from those provided by architecture-independent Linux code).

6. JFFS2 kernel hangs resolved

JFFS2 file systems in flash no longer causes kernel hangs during boot-up. (Issue #142)

7. Linux kernel upgraded to 2.6.23

The Linux kernel code base has been updated to conform with the 2.6.23 upstream release.

Known bugs and limitations

This release candidate dated 2007-11-06 contains a small number of known bugs and limitations, which are mainly due to limitations of the underlying infrastructure and .

8. The `fork()` system call is not supported

Many (if not most) Linux/UNIX software makes use of the `fork()` system call to spawn child-processes. However, this system call is not available on the Mico32-port of Linux due to the lack of a memory management unit.

This is a limitation common to all MMU-less Linux ports and limits the portability of software between Linux for architectures with and without a memory management unit.

9. Executable format

The kernel continues to use a runtime executable loader, which parses ELF files and dynamically rewrites the instruction stream to support execution at the target address (i.e. relocation). In contrast to the earlier Beta-builds, this functionality has been updated to be “production-grade” and no longer leaks memory.

Unlike fully position-independent ELF files, some special flags have to be passed to the linker and an extra step has to be observed to remove unneeded debug symbols before downloading applications to a target board.

10. A conflict between the Linux exception handlers and JTAG exist

Since the addition of proper Linux exception handling (i.e. data aborts generate signals that are delivered to the user-space processes), JTAG debugging of the kernel and drivers does no longer work as expected.

As a work-around, `arch/lm32/kernel/entry.S` can be edited to disable proper exception handling and break into the JTAG debugger. However, this is recommended for debugging device drivers only!

11. MTD (block devices accessing flash memory) performance

Writing to or erasing a ‘mtdblock’ device will incur a significant performance penalty due to a high level of data cache flushing when communicating with CFI flash devices.

This is an intrinsic limitation of the Lattice Mico32 architecture and will not be resolved.

12. The 7-segment display is limited to a single digit on the ECP2-50 evaluation boards

The 7-segment display will only display a single digit. This is an intended feature of the 7-segment driver in Linux, as displaying multiple digits would increase the interrupt load considerably.

13. Multicast is not supported in the LM32 triple-speed ethernet driver

The LM32 triple-speed ethernet driver in Linux does not support multicast.

14. ‘halt’ and ‘reboot’ commands (and system calls) do nothing

The ECP2-50 boards and the Mico32 cores do not provide a way to perform a reset from software. The ‘halt’ and ‘reboot’ commands (and their corresponding system calls) therefore have no function and do nothing (but issue a warning), when called. (Issue #130)