



Release Note for Morello Instruction Emulator

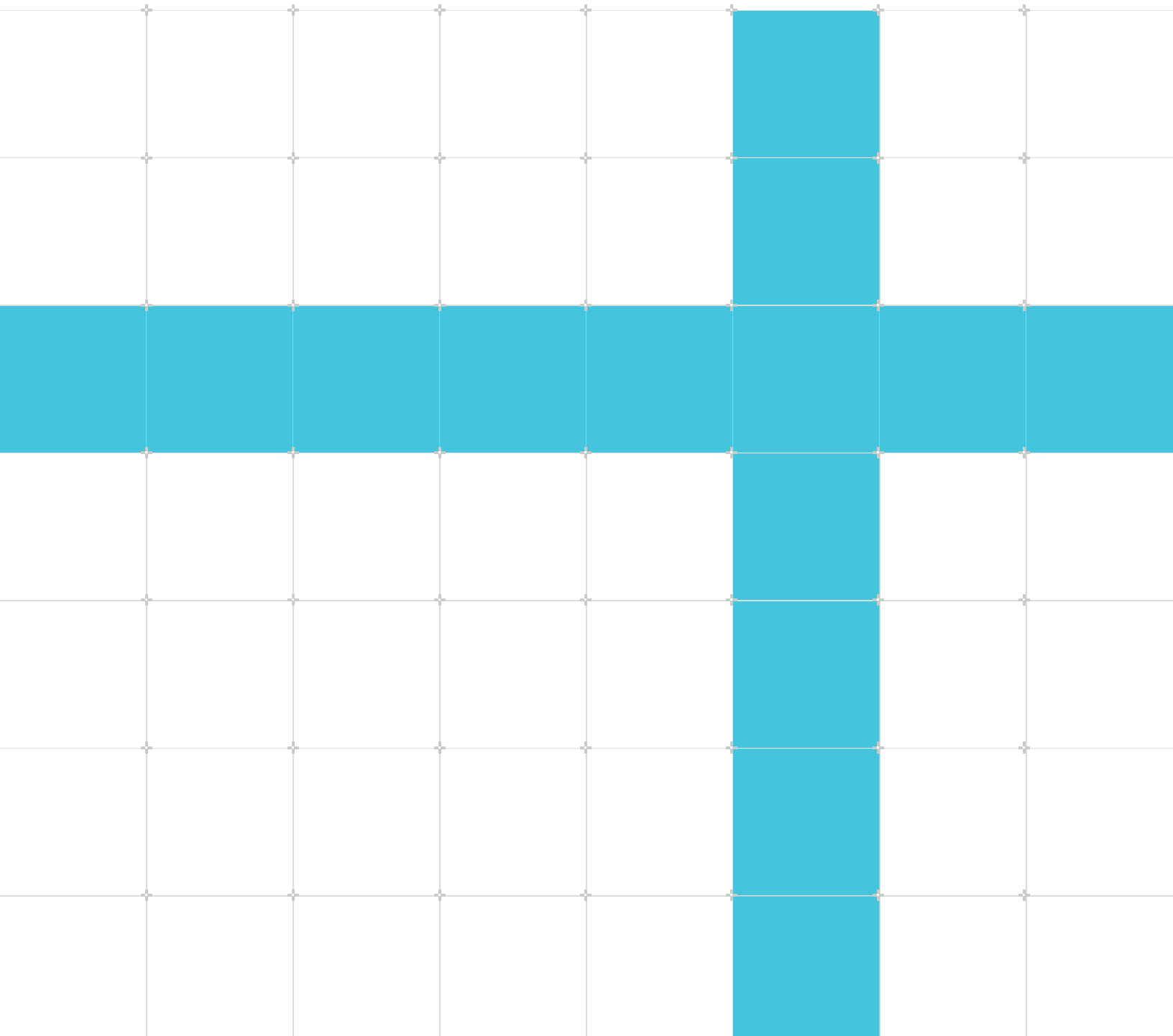
2.2-74

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Issue 01

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Release Note for Morello Instruction Emulator

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Release information

Document history

Issue	Date	Confidentiality	Change
2068-01	28 July 2022	Non-Confidential	2.0-68 release
2170-01	27 October 2022	Non-Confidential	2.1-70 release
2274-01	28 February 2023	Non-Confidential	2.2-74 release

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1. Release Note for Morello Instruction Emulator 2.2-74

Version 2.2-74

Target platform

Linux AArch64

Date published

28 February 2023

MD5

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47fc592af36f6ed9c71a132010126e60c3c7c512eff43c19b1e3f33c838c3ed6

Description

The Morello Instruction Emulator (Morello IE) is a tool for software developers and researchers who are interested in the Morello architecture. It allows running userspace Morello applications on AArch64 Linux systems in a non-Morello environment and provides a number of analysis and debugging tools. It can be used to help with porting software to Morello, to experiment with capabilities and Morello compartments as well as measure and analyse performance of Morello applications.

System requirements

System requirements are as follows:

- Arm v8.2 64-bit hardware (v8.0 supported with limitations).
- Existing userspace GNU/Linux environment (for example, Debian 10 or Ubuntu 18.04).
- The host system must have Glibc 2.28 or above.

Install

To install, run the downloaded installer in a Bash shell. Use `--help` option for the usage details. More information can be found in:

- <https://developer.arm.com/documentation/102270>
- <https://developer.arm.com/morello>
- <https://community.arm.com/support-forums/f/morello-forum>

Feedback

Feedback and questions can be sent to `morello-emulator-support (at) arm.com`.

Highlights

Highlights in this release:

- Emulation of pure capability kernel user Linux ABI (PCuABI).
- Support for Musl-based (static and dynamic) and Glibc-based (only static) purecap binaries.
- Improved debugger.
- Updated system requirements.
- Added example purecap applications.

New functionality

New functionality in this release:

- PCuABI emulation added: the emulator will now run purecap Morello binaries targeting Linux systems with PCuABI Morello kernel.
- Morello IE will run purecap applications based on both Glibc and Musl C library (with the exception that dynamically linked and multi-threaded Glibc-based programs may not work correctly).
- Whenever kernel would write to userspace buffers using non-capability writes, the emulated capability tags will be cleared.
- When a memory mapping is created, corresponding capability tags in memory are cleared.
- Emulated capability registers are now synchronised with hardware aliased registers immediately after updating.
- Added `-strace` command line option to provide verbose output related to system calls and its arguments.
- Added `-stack-limit` option to allow setting custom CSP limit for purecap programs.
- Added `disassembly` debugger command.
- Morello IE now requires host system to have Glibc of version 2.28 or above.

Fixed in this release

Fixed in this release:

- Fixed ignoring breakpoints in shared libraries in debugger.
- Fixed ignoring the `MREMAP_DONTUNMAP` flag in `mremap` wrapper.
- Fixed error in debugger where incorrect values of capability registers could be printed by the `print register` command.
- Fixed showing memory in the debugger: the layout of data has been improved to represent data and memory tags as well as offsets and addresses.
- Fixed crash in debugger when remote debugger host was not an IP address.
- Fixed endless loop in debugger when using `ctrl+D` to exit debugger.
- Fixed problem in debugger with resolving function names with upper case symbols.