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LoongArch Biweekly

Session #2 (May 28, 2026)

Discord Server

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Before We Start

- This meeting is organised by Loongson Hobbyists' Community, a 3rd-party organisation unaffiliated with Loongson Technology or any of the companies, entities, and institutions mentioned in this document.
- Please limit discussion to open information only - we will not answer questions for products and designs currently under development or testing.
- Please refrain from making political statements or commentary for the duration of the meeting.
- Opinions expressed in this meeting are strictly of the individual speakers.

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How This Meeting Works

- Most of the upstream updates comes from the Chinese biweekly, which took place last Sunday.
  - With additional updates from the past three days.
- If you would like to present, please contact for editing permissions.
  - Telegram: @JeffBai, Discord: @mingcongbai
  - Or simply shout out in the group chats!
  - You may edit until the sessions begin.
- Presentations will be in English, but Russian translation/clarification is available per request. We will have a short Q&A after each segment.
  - If you would like to help in other languages, please let us know.
- Meetings will be live streamed on YouTube…
  - … and will be recorded and made available on YouTube, VK, and Bilibili.

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Upstream Development

GCC

- **Zhou Qiankang**:
  - Fixed an issue where the GCC plugins fail to build due to missing an internal header file `<cpu-features.h>`. The fix has been merged and backported to GCC 16.2.
- **Xi Ruoyao**:
  - The patches implementing the spaceship operation and optimizing the logic operation pattern `a^b^(a|c)` to `(c&~a)^b`, as mentioned in the last session, have been revised and merged.
  - The patch that addressed the unexpected lifetime of stack canary values (as mentioned in the last session) has been backported to GCC 15.3, while the backport to GCC 14.4 and 13.5 are still in progress.
  - Renamed `rbit<mode>` expansions to `bitreverse<mode>2` to adapt to the newly introduced builtin functions `__builtin_bitreverse{8,16,32,64}` in GCC 17.
  - Discovered an issue where GCC 16.1 miscompiles the RAR decoding code from libarchive-3.8.7 on LoongArch64, and later triaged as an target-independent issue.
    - The fix has been merged and backported to GCC 16.2.

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GCC (newly reported issue)

- **Jiajie Chen**:
  - GCC fails to utilize the `xvmulwev.h.bu.b` instruction (and its cousins) to optimize dot products of the signed-extension of a vector and the zero-extension of another.
  - This causes a performance issue in SPEC CPU 2026 `706.stockfish_r`.
  - Xi Ruoyao has drafted a patch which is undergoing regression test.

LLVM

- **heiher:**
  - Backported the commit `301e89f` in the master branch to the LLVM 22.x branch.
    - This commit reverted the new expansion which processes vector average operations.
    - The previous implementation didn't consider the case when an element of the sum of the two vectors overflows in the corresponding type, resulting in miscalculations.
  - Fixed an issue where the stack frame containing any temporarily allocated compound value, which gets passed indirectly as a pointer, gets deallocated if `musttail` is specified, resulting in dangling references.
- **hazohelet:**
  - Reported an ICE (Internal Compiler Error), which could be triggered with vector half-precision extension (`fpext <N x half>`) operations when LSX is enabled, due to incomplete or inadequate expansion.

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Linux Kernel

- Platform Support
  - **Tianyang Zhang**: Introduced support for Loongson 3B/3C6000 interrupt-redirect controllers (Revision 12)
- KVM Subsystem
  - **Bibo Mao**: Improved the interrupt injection and interrupt status fetching mechanisms, introduced a helper function `kvm_vcpu_sync_intr()` and removed high-overhead functions such as `vcpu_{load,put}()` (Revision 4)
  - **Chi Zeng**: Added various missing slot-locking logic for `kvm->slots_lock` in the EIOINTC virtual extension device registration (Revision 1)
    - **Bibo Mao** later pointed out that absence of the lock protection like such for the call `kvm_io_bus_unregister_dev()` also appears in the file pch_pic.c, ipi.c and eiontc.c

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Linux Kernel

- Other Code & Functional Fixes
  - **Eric Biggers**: Added the missing `select CRYPTO_RNG` statement in the Kconfig entry of the Loongson RNG driver (`CRYPTO_DEV_LOONGSON_RNG`) to fix build failures (Revision 1)
  - **Bibo Mao**: Removed unnecessary timer interrupt injections when the software timer expires (Revision 2)
  - **Rui Wang**: Moved KASLR logic into EFI stub, mitigating memory segment overlaps between initrd and boot services/kernel (which may cause boot failures) (Revision 5)
  - **Tiezhu Yang**: Fixed several functional problems in ftrace and kprobes (Revision 1)
  - **Tiezhu Yang**: Fixed several tail-call issues in the BPF subsystem, all unit tests are now passing (Revision 1)
- Code Cleanup & Refactoring
  - **Huacai Chen**: Removed unused variable page in the memory management code to suppress compiler warnings (Revision 1)
  - **Ethan Nelson-Moore**: Removed `arch/loongarch/crypto`, which is no longer needed (Revision 1)

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Box64

- Box64 0.4.3-2 was released
  - This release resolves a recent issue that prevented Steam games from launching.
  - The rest listed below are considered upcoming features and fixes.
- Wine support
  - Emulated syscall user dispatch for Wine 11.5+.
  - Added Vulkan extension wrappers to support Wine 11.9.
  - Fixed a memory protection bug that occurred with Wine 11.9.
- More library and function wrappers (SDL1, libGL, Vulkan, …), notably:
  - Added SDL1 library wrappers to Box32, enabling the 32-bit game *Psychonauts* to run.
- Deferred signals optimization:
  - Signals occurring during critical sections are now recorded and replayed afterwards, avoiding reliance on (slow) Linux signal masking.
  - On 3B6000, Wine 11.9's explorer.exe startup time speedup by 60%.

Box64

- Code file caching improvements
  - Improved the file versioning logic, which now automatically generates a version string based on file content as a way to distinguish file caches.
  - Optimized code cache loading to skip stale code blocks.
  - Fixed a bug where the code cache CLI utility did not correctly probe emulated CPU extensions.
  - Added code cache file compression support, with compression level 1 enabled by default.
    - *Factorio*'s startup time remains largely unchanged with compression enabled, while the code cache size shrinks from 205 MiB to 55 MiB.
  - Enhanced the LRU caching mechanism by updating the usage timestamp on every cache hit.
- LoongArch64's dynamic recompiler improvements:
  - Optimized the AES implementation using the **VPAES** algorithm, significantly speeding up encryption and decryption.
  - Decompression speed increased 5x, as observed while testing 7-Zip self-extracting archives.

Box64

- Other fixes and improvements
  - Added a Python interpreter wrapper so that **`platform.machine()`** returns **`x86_64`** when scripts run under the native interpreter.
  - Optimized **`add_next`** function for code discovery in big block mode using a hash table.
    - Measured Wine explorer startup time speedup by another 30%.
  - Fixed a decoding issue with the **`0x66`** instruction prefix in the Box64 interpreter.
  - Improved handling of illegal **`MOVNT`** instruction combinations.
  - Fixed a bug where LASX instructions could be incorrectly selected when the CPU only supports LSX.
  - Added support for the **`fastround=2`** rounding mode, aligning with the ARM backend.
  - Extended the decoder to support several 16-bit instructions.
  - Fixed a few edge cases in calculations involving multiple x87 instructions.
  - Added named symbol support for the **`R_X86_64_TLSDESC`** relocation.

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Box64

- Other fixes and improvements (Continued)
  - Fixed a potential register conflict between the `nativeflags` optimizations and the Trace mode.
  - Refactored stale block management, replacing the old complex logic with a simpler FIFO circular buffer for caching code blocks, which also improves safety.
  - Added a profile for Call of Duty 4 that enables necessary safety options, preventing crashes due to over-optimization.

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Eden (fork of the Yuzu, a Nintendo Switch emulator)

- Eden is a fork of Yuzu, a Nintendo Switch emulator, hosted on its own Forgejo instance.
- Bootstrapped preliminary support for LoongArch.
  - First PR submitted and the next PR (basic JIT implementation) ready to submit.
  - A working version planned this year.

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Vector Packet Processing

- Vector Packet Processing, a high performance network packet processing library, is receiving LoongArch64 support thanks to **Liu Yang:**
  - Useful for networking applications/appliances such as software routers, firewalls, and high-performance routers, providing vector-accelerated data processing.
  - This LoongArch64 port will enable more applications as network backends.
  - For those who are interested - please make use of this port and share your feedback!

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Other Updates (Community Bounties)

- **elysia-best** reported that the .deb packages for LoongArch64 from the electerm project can not be installed on Debian 13, due to incompatible architecture names in the package metadata.
  - The .deb packages shipped by electerm use `loongarch64` as the architecture name, while Debian only recognizes `loong64`. We suspect that the packages are built on AOSC OS.
  - Upstream later stated that they will publish .deb packages with both architecture name variants.
- **bitm-cn** reported that while porting Eclipse Equinox to the LoongArch64 platform, Tycho packaging tool can't find the LoongArch64 Launcher fragments installed on the local repository, resulting in build failures.
  - bitm-cn also requested that the upstream clarify steps to add support for new architectures.

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Other Updates (Contributions)

- **emmasun**:
  - Implemented LSX/LASX optimizations for the ML-DSA and ML-KEM algorithm for Chinese Shangmi (commercial cryptography) library written in Go, gmsm.
  - The implementation covers various polynomial operations such as basic calculations and NTT, adds new encoding and scheduling code, and various code written in assembly.
- **nihui**:
  - Added support for handling 4D tensors to multiple operators in the NCNN inference framework.
  - This implementation employs LSX/LASX to accelerate runtime performance.
- **doruche**:
  - Added new syscalls handling futexes, interval timers, I/O and credentials to the Anemone kernel, its syscall table has been updated for LoongArch64.

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Other Updates (Contributions)

- **Gelbpunkt**:
  - Implemented hardware accelerated CRC32 operations for zlib-rs (a zlib implementation in Rust), which utilizes the builtin CRC instructions in LoongArch64.
  - This implementation relies on inline assembly blocks instead of compiler intrinsics, as this feature is still marked “unstable” by rustc, further `std::arch` enhancements are planned.
  - Fixed an issue where the missing LoongArch64-specific directory causes CMake to fail when building zlib-ng for the zlib-sys crate.
- **numpy1314**:
  - Fixed an error in QEMU-LVZ, a fork of QEMU with LoongArch64 virtualization support, where the flag bits accidentally gets involved in the physical address calculations in the `lddir`/`ldpte` helper functions, resulting in errors during page table iteration.
  - This fix has also been proposed in the rcore-os project.

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Other Updates (Contributions)

- **numpy1314**:
  - Added minimal support for booting ArceOS guests on LoongArch64 to AxVisor, a Type-1 hypervisor and fixed various issues on page table flag bits, MMIO handling and CI configuration, updates QEMU-LVZ to ensure that the guest behaves correctly.
- **JounQin**:
  - Added conditional compilation logic for unrs-resolver, which excludes a flag `STATX_DONT_SYNC` on the `loongarch64-musl` platform, fixing the build failure where the flag is not exported by rustix on loongarch64-musl.
- **anematode**:
  - Added LoongArch specific optimizations to the Stockfish chess engine, utilizing inline assembly blocks to implement the bit reversal operations required in the hyperbola quintessence algorithm, speeding up the bitboard calculations. It also removes unnecessary type casts in the NNUE accumulator code.

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Other updates (Contributions)

- **arrowd**:
  - Added build support for LoongArch64 to the snappy.java project, a Snappy compression library written in Java, utilizing the dockcross toolchain to cross compile the library, thus allowing the build system to produce native libraries for LoongArch64.
    - However, the upstream's LLM-driven review discovered outdated comments and function re-declarations in the helper script, requiring further improvements.
- **yetist**:
  - Disabled LSX/LASX SIMD instruction generation for the LoongArch builds of the iPXE project, a PXE network boot implementation, and reimplemented TCP/IP checksum routines using hand-written assembly code, resulting in a 3,900% performance increase.
    - Additionally, after a review by the upstream maintainers, Secure Boot builds are also supported on LoongArch.
    - The upstream maintainers hope that Loongson will clarify its approach to supporting UEFI Secure Boot in the future.

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Other updates (Contributions)

- **zhaixiaojuan**:
  - Added LoongArch support to the Go ruleset (rules_go) of Bazel, a build system commonly used by Android-related projects.
- **leno23**:
  - Optimized the `fast_needs_escaping` function using LSX SIMD instructions for the simdjson project, speeding up the detection of character escape sequences.

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Distro/OS Updates

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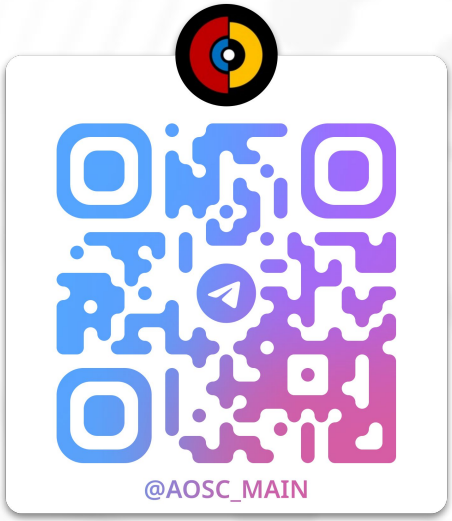
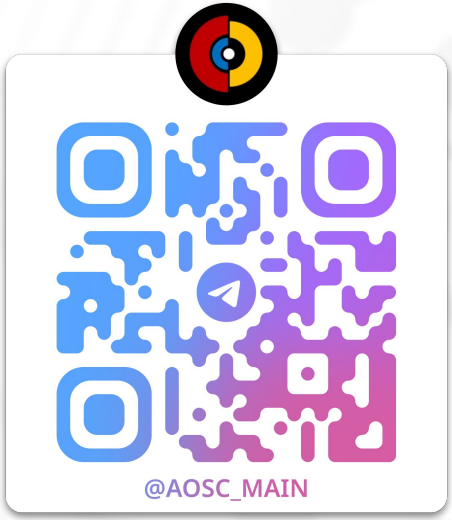
AOSC OS

- Core 13.2.0 has been made available to the stable repository:
  - Backports the stack protector enhancement from GCC 16.2 to GCC 15.2 and the THP-aware load segment aligning patches from glibc 2.44 to glibc 2.42.
  - Real-world testing shows a 2% CPU time reduction when building larger projects with LLVM.
  - Backports 3 security fixes.
- Linux 7.0.9 has been made available for testing:
  - Backports the refactor of amdgpu's kernel-mode FPU context preserving/restoring code from Linux 7.1, newer AMD GPUs such as the Radeon 9070 XT should now work.
  - Disables writecombine, which caused various troubles with Intel GPUs and AMD RX 7600, such as artifacts, lock ups, etc.
    - Writecombine has never worked correctly so we'd keep it disabled… until the next generation?



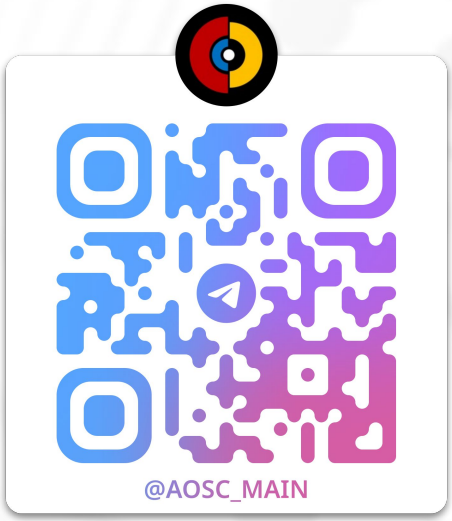
AOSC OS

- LoongGPU driver was updated from 1.0.2-oky11.1~0.10 to 1.0.2-ud25.1-rc1.10.1.
  - Driver date found in DKMS module sources was updated from 1/27/2026 to 3/13/2026, there may have been fixes (details to which are unclear).
  - MIPI displays now works on the Orange Pi Nova.
  - 4KiB kernel pages seems to still be broken.
- GHC, along with pandoc, are now available.
  - siyuan-note, a note organizer and knowledge-base software, is also available on LoongArch.
- Zotero 9.x, based on Firefox 140 ESR, is now available.
  - Fellow students, researchers, and “data hoarders” - rejoice!



AOSC OS

- 25 security updates in the past 2 weeks fixed **5 critical and 31 high risk vulnerabilities**, including:
  - LPE vulnerabilities targeting the Linux kernel, codenamed “Dirty Frag” and “PinTheft”.
  - 7 high-severity vulnerabilities were fixed in PostgreSQL 18.4, 17.10, 16.14, 15.18 and 14.23.



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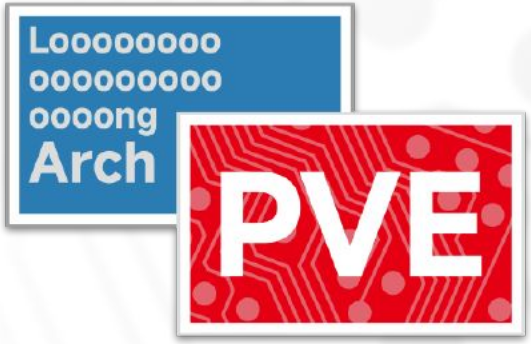
OpenWrt

- Xinmu submitted a backport of 3 kernel patches, adding support for the built-in Ethernet in the 2K3000/3B6000M SoC for their 6.12 kernel.
  - The PR is now merged and will be included in the next OpenWrt release.

Proxmox VE

- Kaiyang Wu and Mingcong Bai has started an upstream-facing port for Proxmox VE, with patches tracking the latest upstream changes, hosted at the GitHub organization pve-loong64-port.
  - The port is based on the unofficial “loong13” distro (stable Debian 13 for LoongArch) from Miao Wang.
  - We have contacted Proxmox VE’s upstream, the upstream is positive about the effort but has declined to include LoongArch as an official port due to lack of (official) stable Debian releases and low device availability in Europe.
  - So for now, we will keep working on providing a port with upstream quality, while submitting patches that universally improves support for non-x86 architectures, as suggested by upstream maintainer Thomas Lamprecht.
  - ISO should be available in the near future and a website will be set up to provide downloads.



BaseAlt

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- Hardware manufacturers support
  - Working in close contact with Tramplin Electronics
- Packet base update
  - Several changes, nothing big, state can be checked here
- Build infrastructure setup
  - Finally moved regular nightly build to Irtysh-based servers
- Stable products
  - Preparations to release of Alt Server and Alt Workstation for loongarch are on progress. Products passed development phase and ready to internal functional testing

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Community News & Events

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Session #1 Recap

- Thank you everyone for joining our first International LoongArch Biweekly!
  - ***Woweeee!*** More than 50 people attended the session!
  - **Mia**, an UEFI firmware engineer from Tramplin Electronics, shared some UEFI debugging and troubleshooting techniques.
  - **A few other of our friends** from Tramplin Electronics supported us with Russian translation for live Q&A and for the slides. They also made a recording with Russian slides.
- Please subscribe to our YouTube channel!
  - https://www.youtube.com/@loongfans

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Upcoming Presentation

- ptitSeb, founder and maintainer of Box64, will give a presentation on his project at the next meeting!

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Q&A

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Next Meeting

June 11th, 2026 @ 13:00 (UTC)

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