

Relaxed-math mode

History

- In-person CG-10 meeting
 - relaxed-simd was presented, there were concerns about nondeterminism
 - https://docs.google.com/presentation/d/1sqZy8B3D55r_J2_EDjy4m9u-fqbu55b2rM6eSftcKeM/edit#slide=id.p
 - <https://github.com/WebAssembly/meetings/blob/main/main/2022/CG-10.md#relaxed-simd--phase-4-poll>
 - <https://github.com/WebAssembly/meetings/blob/main/main/2022/CG-10.md#follow-up-session-relaxed-simd--phase-4-poll>
- relaxed-simd subgroup meetings
 - relaxed-math mode proposed
 - <https://sunfishcode.github.io/RelaxedMathMode.pdf>
 - <https://github.com/WebAssembly/meetings/blob/main/simd/2022/SIMD-11-04.md#discussion-on-cg-meeting-feedback>
 - <https://github.com/WebAssembly/meetings/blob/main/simd/2022/SIMD-11-18.md#relaxed-mode-next-steps>
- Relaxed-simd subgroup poll for relaxed-math mode:
 - <https://github.com/WebAssembly/relaxed-simd/issues/105>
 - 6 for, 3 neutral, 0 against
- Relaxed-simd next steps
 - <https://github.com/WebAssembly/relaxed-simd/issues/107>
- Profiles
 - <https://github.com/WebAssembly/profiles/pull/3>
 - <https://github.com/WebAssembly/profiles/issues/2>

Do we want profiles?

- Rough consensus for adding a relaxed-math mode, with the meaning of “mode” to be drafted
- Profiles is a general-purpose way to define “modes”
 - Do we want this?
 - Could codify wasm subsets without GC, stack-switching, etc.?
 - Implementation costs vs. fragmentation
 - Profiles works in terms of subsets, so it’d be Base (relaxed) + deterministic mode
- Or, should we just have “deterministic mode” vs. “relaxed-math mode” and no profiles?
 - Avoids some of the risks of having a general-purpose profile mechanism
 - This could potentially use Base (deterministic) mode + relaxed mode as originally proposed
- Or, model all nondeterministic instructions using staged compilation and imports?
 - Staged compilation has many potential applications
 - It’s also a pretty big change to how compilation works
 - There is a concern that this just shifts problems elsewhere
 - But it does solve at least one problem: it give us ways to have graphs of instances that all want the same behavior as each other

Bfloat16 dot product

- <https://github.com/WebAssembly/relaxed-simd/issues/106>
- Poll results: 3 for, 4 against
- Is there a single deterministic semantics we could pick which is:
 - Efficient enough on enough platforms today to be at least somewhat practical in the short term
 - Suitable for blessing for the long-term