

WASM to WAVM

Not all WASM instructions are 1:1 with WAVM opcodes. This document lists those which are not, and explains how they're expressed in WAVM. Many of the WAVM representations use opcodes not in WASM, which are documented in [wavm-custom-opcodes.md](#).

block

andloop

In WASM, a block contains instructions. Branch instructions exit a fixed number of blocks, jumping to their destination. A normal block's destination is the end of the block, whereas a loop's destination is the start of the loop.

In WAVM, instructions are flat. At transpilation time, any branch instructions are replaced with jumps to the corresponding block's destination. This means that WAVM interpreters don't need to track blocks, and thus block instructions are unnecessary.

if

andelse

These are translated to a block with an `ArbitraryJumpIf` as follows:

begin block with endpoint end conditional jump to else [instructions inside if statement] branch else: [instructions inside else statement] end

br

andbr_if

`br` and `br_if` are translated into `ArbitraryJump` and `ArbitraryJumpIf` respectively. The jump locations can be known at transpilation time, making blocks obsolete.

br_table

`br_table` is translated to a check for each possible branch in the table, and then if none of the checks hit, a branch of the default level.

Each of the non-default branches has a conditional jump to a section afterwards, containing an `adrop` for the selector, and then a jump to the target branch.

local.tee

`local.tee` is translated to a `WAVMDup` and then a `LocalSet`.

return

To translate a return, the number of return values must be known from the function signature. A `WAVMMoveFromStackToInternal` is added for each return value. Then, a loop checks `IsStackBoundary` (which implicitly pops a value) until it's true and the stack boundary has been popped. Next, a `MoveFromInternalToStack` is added for each return value to put the return values back on the stack. Finally, a `WAVMReturn` is added, returning control flow to the caller.

Floating point instructions

A floating point library module must be present to translate floating point instructions. They are translated by bitcasting `f32` and `f64` arguments to `i32` and `i64`, then a cross module call to the floating point library, and finally bitcasts of any return values from `i32` and `i64` to `f32` and `f64`. [Edit this page](#) Last updated on Mar 19, 2024 [Previous One Step Proof Assumptions](#) [Next WAVM Custom opcodes not in WASM](#)