

Changelog to WAGE (Round 2 Candidate)

Mark Aagaard, Riham ALTawy, Guang Gong,
Kalikinkar Mandal, Raghvendra Rohit, and Nusa Zidaric

September 27, 2019

The following changes are done in WAGE Round 2 submission.

1. In Chapter 6: Major editorial changes, including:

- Fix in Figure 6.1: `i_mode` signal remove 2-bit(mistake in old fig)
- Expanded Section 6.2 with details on
 - 6.2.1 Interface protocol
 - 6.2.2 Protocol timing
 - 6.2.3 Control phases
- Expanded Section 6.3 (changed section title accordingly)
 - 6.3.1 State machine
 - 6.3.2 WAGE datapath (previously Section 6.3.1)
- Changes between old and new WAGE datapath section
 - * added more detailed explanation
 - * new Figure 6.11, showing details on input/output multiplexers and control multiplexers, figure reflected in text
- Expanded table 6.2 to include more detailed theoretical estimates (now table 6.5), corresponding text is changed to match the new table
- Removed old Section 6.3.2 “The WAGE_module and the control” Rationale: Section 6.3.1 is entirely dedicated to WAGE FSM
- In Section 6.4:
 - * Removed table 6.3:
 - the synthesis results for the WAGE permutation are subsumed in Table 6.2
 - the “pre-PAR, no optimizations” synthesis results are replaced by “post-PAR, with optimizations” synthesis results in Table 6.7 (column ST Micro 65 nm)
 - * Table 6.7 - new ASIC implementation results
 - “post-PAR, with optimizations” synthesis results
 - added technologies: TSMC 65 nm, ST Micro 90 nm, IBM 130 nm
 - results for unrolled (parallel) implementations

Note that the area and performance data have changed slightly due to improvements in the synthesis scripts.

2. Fixed the bug related to tag generation in the reference implementation. More specifically, the last 2 bits of tag were always zero. The bug was in `wage_gentag` function and details are as follows.

- **Incorrect one:** `tmp_tag[18] = ((state[18] >> 2) & (0x03));`
- **Correct one:** `tmp_tag[18] = ((state[18] << 2) & (0x60));`

Note that the bug does not affect the specification of WAGE. The fixed code has been already posted on LWC forum (OFFICIAL COMMENT: WAGE, dated April 30, 2019). We have included the updated code with round 2 package for the sake of completeness.

3. Added microcontroller code with the submission package.
4. Fixed some minor typos in the document.
5. Updated the current affiliation of Riham AlTawy and link of WAGE website in coversheet.