ZHOU, QI

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EDUCATION

University of Edinburgh, Computer Science (BSc Hons) 2019 - 2023

WORK EXPERIENCE

Asteria Sept 2020 - Feb 2021
https://www.asteria-space.com/

- Came up with possible solution for attaching a camera on a single-board computer which will be launched into space.

Codeplay June 2022 - Sept 2022
https://www.codeplay.com/

- Worked on ComputeArota (CA), a toolkit implementing cross-platform OpenCL, Vulkan and etc.
- Added RV32 and half float (Zfh extension) support to the simulator in CA, such that RV32 or Float16 instructions can be generated by CA and simulated using SPIKE.
- Learnt about Sollya's fpminimax function that computes a polynomial approximation for float point operations, then investigated some test failures caused by float point precision issues.
- Implemented a faster and more intuitive replacement of SPIKE for CA using RISCV-64 QEMU with a Linux operating system, where the host (client) communicates with simulator (server) by sockets.

Teaching assistant Sept 2022 - May 2023
Demonstrator in workshops and labs for these courses:

- Computer Architecture and Design (INFR10076),
- Compiling Techniques (INFR10065).

PROJECTS

Lorenz Attractor
https://github.com/AOIDUO/LorenzAttractor/

- A animated figure of Lorenz attractor written in Haskell.
- Demo: `https://homepages.inf.ed.ac.uk/wadler/fp-competition-2019/#(16)`.

RISC-V Processor

- Programs a Xilinx PYNQ demo board into a working RV32IM processor.
- Classic 5-stage pipeline and speculative result forwarding.
- Fast 32-bit multiplier by utilizing FPGA's builtin 16-bit multiplier in parallel.

Turing Machine Emulator
https://github.com/AOIDUO/RegisterMachineEmulator/

- A emulator for the register variant of turing machine with only 2 instructions: `inc` and `decjz`.
- Has a parser that recognizes instruction source code in BNF style.
- Planning to complete the support of macro in the future.

SIMD Support for LLVM MLIR Presburger library - In progress
`llvm/llvm-project/blob/main/mlir/lib/Analysis/Presburger/Simplex.cpp`

- This library performs overflow-checked multiplication and addition on small and sparse matrix.
- Compute 52-bit integer using FPU could be fast, because:
  - Fraction part of double precision float point number is exactly 52 bits,
  - Exploits fused-multiply-add,
  - Float point overflow and imprecision checking is convenient.

SKILLS

- Have experience with GNU/Linux,
- Familiar with Java, Agda, Haskell, Python, Shell, Verilog and C++,
- Capable of building embedded widgets with single board computers and PCDIY.