Verismith: Detecting Bugs in Synthesis Tools

Summary

Verismith is a software program that is able to detect and locate bugs in synthesis tools. This technology outperforms current tools by locating the bug, and importantly, the root cause of the bug in the synthesis tool, which cannot be done with existing tools. Ultimately, this technology can make synthesis tools more dependable and enhance the accuracy and quality of Integrated Circuits.

Background

Hardware engineers who design circuits, such as Central Processing Units, use synthesis tools to convert hardware designs into a format that can be made into an integrated circuit or placed on a Field-Programmable Gate Array. Hardware engineers depend on the synthesis tool converting the design correctly. However, there is currently no reliable way of checking this.

Verismith provides a way of detecting and locating bugs in synthesis tools and has successfully found important problems in the most widely used, modern synthesis tools.

Technology

Verismith works by generating a hardware design, feeding it through the synthesis tool being tested, and checking that the output of the synthesis tool is equivalent to the original design. If it is not, Verismith has found a bug. The problematic design is then minimised in order to locate the root cause of the bug in the synthesis tool. This process is repeated with many thousands of hardware designs. Verismith outperforms current tools, such as VlogHammer, by utilising deterministic designs. Bugs found using deterministic designs are more important, as most real-world code is also deterministic. Ultimately, Verismith can reduce the bug into a minimal representation, which is valuable for locating the root cause of the bug in the synthesis tool, whereas this has to be done manually in VlogHammer.

Benefits

- Reliable testing of synthesis tools for correct conversion of FPGA design.
- Accurate detecting and locating of bugs in synthesis tools.
- Ability to locate the root cause of the bug.

Dr James Nightingale
Industry Partnerships and Commercialisation Officer, Engineering
e: j.nightingale15@imperial.ac.uk
t: +44 (0)20 7594 1320
Technology reference: 10558

Intellectual property information

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Team

Dr John Wickerson, Lecturer of Electrical and Electronic Engineering, Imperial College London
Yann Herklotz, Postgraduate Researcher, Electrical and Electronic Engineering, Imperial College London