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Background

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Hardwa

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Results

Evaluation

Backup Slides

# An Extensible Framework for Evaluation of Arithmetic Hardware

Zifan Wang Supervisor: Dr. James Davis

Imperial College London

June 25, 2019

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Background Motivation

**Design & Implementation** 

System Hardware Software

Results

Results Demo

Evaluation Evaluation

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### Backgrou

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### Motivation

- Started as a specialised evaluation system for high-radix online arithmetic units
  - At-speed
  - Precision Checking

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### Motivation

- Started as a specialised evaluation system for high-radix online arithmetic units
  - At-speed
  - Precision Checking
- Digital designers all use their own testbenches

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### Motivation

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### Motivation

- Started as a specialised evaluation system for high-radix online arithmetic units
  - At-speed
  - Precision Checking
- Digital designers all use their own testbenches
- Propose an extensible framework

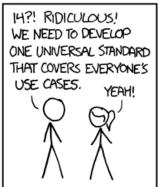
### Motivation

Motivation

Besults

HOW STANDARDS PROLIFERATE: (SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)

SITUATION: THERE ARE 14 COMPETING STANDARDS.



500N:

SITUATION: THERE ARE 15 COMPETING STANDARDS.

xkcd.com/927

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### Purpose

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- Design and Implement an evaluation framework
  - High maximum frequency

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# Purpose

- Design and Implement an evaluation framework
  - High maximum frequency
  - Controllable frequency

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Motivation

## Purpose

- Design and Implement an evaluation framework
  - High maximum frequency
  - Controllable frequency
  - Provide information regarding precision of output

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Motivation

# Purpose

- Design and Implement an evaluation framework
  - High maximum frequency
  - Controllable frequency
  - Provide information regarding precision of output
  - Flexible, customisable

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# Purpose

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Demo Evaluation

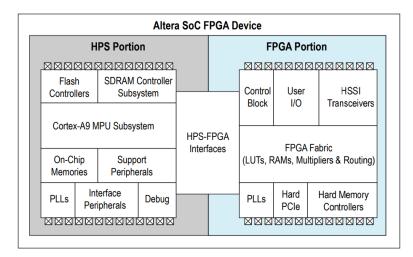
Evaluation Evaluation

- Design and Implement an evaluation framework
  - High maximum frequency
  - Controllable frequency
  - Provide information regarding precision of output
  - Flexible, customisable
  - User-friendly

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### Hardware Choice

### Cyclone V SX SoC Development Board



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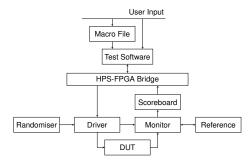
Demo

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# System Architecture

- Inspired by UVM agent
- Modular, thus extensible



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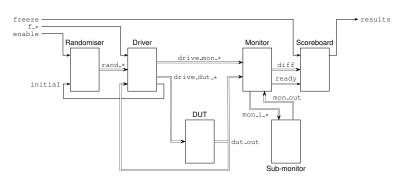
Results

Results

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### Hardware



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Software

### Software

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### Results

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- Flexible
- Robust
- User-friendly

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- Shows the configuration process
- Shows software interaction

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### Limitations

- Limited customisability of current implementation
- Tedious and error-prone
- Could be overcame with 2 improvements
- Unified software system + Verilog preprocessor
- Set up a more powerful HPS-FPGA communication system
- Not limits to the extensibility of the framework

### Questions?

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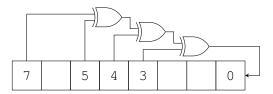
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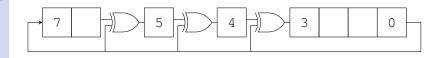
#### Evaluation

Evaluation

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## **LFSRs**





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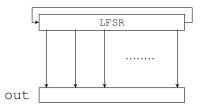
Demo

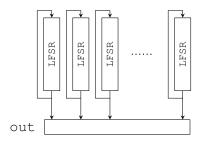
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### Randomiser Structure







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### **Monitor Structure**

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