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Arm SVE Hackathon

February 2021

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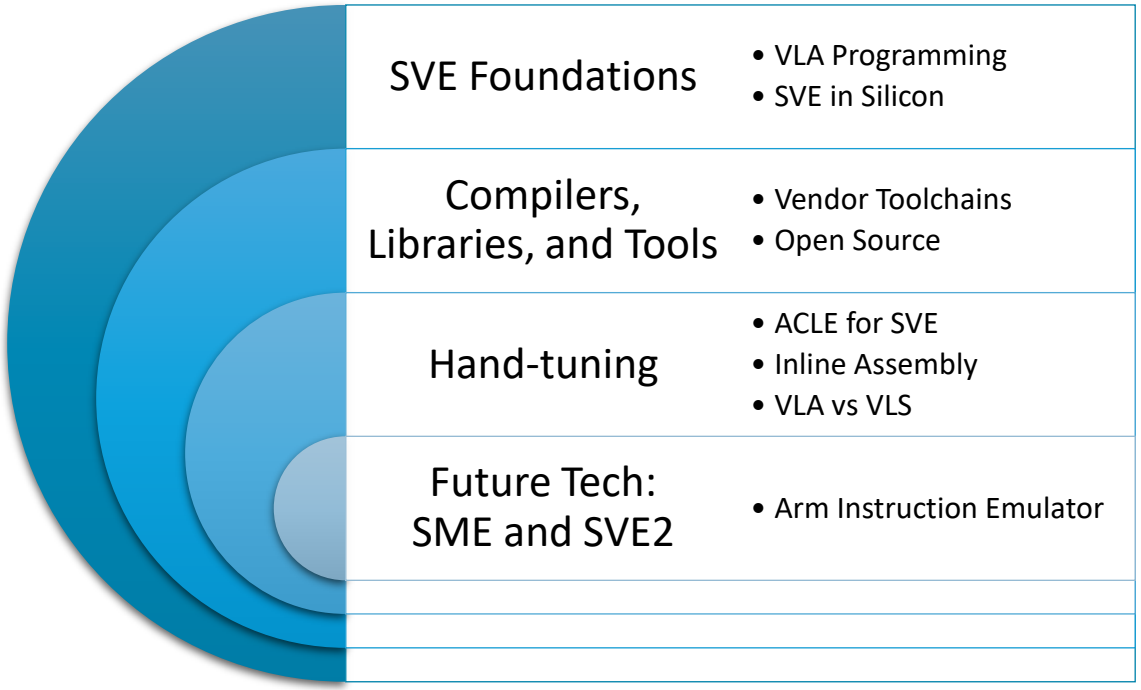
Welcome!

Goals and Objectives

- Introduce SVE as a tool for enhancing scientific application codes
- Equip prospective SVE programmers with performance engineering tools for SVE
- Found positive working relationships between application developers and SVE experts
- Have fun!

Content Structure



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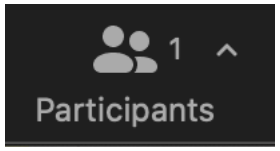
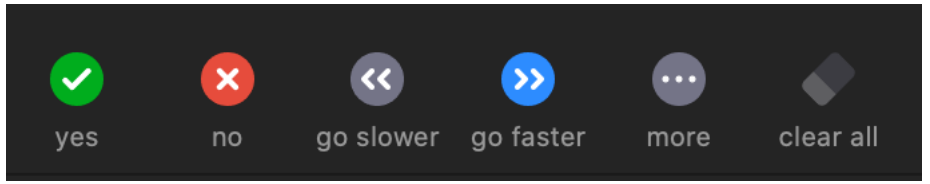
Virtual Event 101

- **This event is being recorded.** Please be careful while sharing your screen
- Please be VOCAL! If you have a technical issue or start to fall behind **let us know!**
- Please speak up! And please mute when not speaking

Click on this => 

Use these => 

- Upgrade zoom! Version 5.4.0 or later is strongly recommended
  - https://support.zoom.us/hc/en-us/articles/201362233-Upgrade-update-to-the-latest-version

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Structured Content Schedule

	Minutes	Topic	Materials
Day 1: Platform	50	Welcome, Cluster First-touch, and Intro to Fujitsu A64FX	06_A64FX
	10	Break	
	30	The Arm HPC Ecosystem	
	20	Introduction to the Scalable Vector Extension (SVE)	05_Apps
	10	Q&A / Prep for tomorrow's hands-on	
Day 2: Tools	15	Open Source SVE Compilers: GNU and LLVM	01_Compiler
	15	Arm Compiler for Linux and ArmPL	01_Compiler
	15	Fujitsu Compiler and Fujitsu SSL II	01_Compiler
	10	Cray Compiler and Cray LibSci	01_Compiler
	5	Break	
	60	Hands-on	
Day 3: Advanced	45	SVE Intrinsics and Advanced Features	02_ACLE, 03_SVE
	15	Arm Instruction Emulator	04_ArmIE
	5	Break	
	60	Hands-on	

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Hands-on Materials

https://gitlab.com/arm-hpc/training/arm-sve-tools

Content Structure

- **01_Compiler**: Compare autovec compilers
- **02_ACLE**: SVE Intrinsics
- **03_SVE**: Low-level SVE examples
  - See PDF documentation in this directory
- **04_ArmIE**: Arm Instruction Emulator (SVE2)
- **05_Apps**: HPC application examples
- **06_A64FX**: Demonstrate Fujitsu A64FX Features
- **Slides**: These slides

Tips and Suggestions

- Examples may be taken in any order. The numbering is a suggested order.
- Many examples support multiple compilers. Type `make **COMPILER=help**` to see options.
- Some examples use optimized math libraries. Type `make **LIBRARY=help**` to see options. If no library is specified, a library will be chosen based on the selected compiler.
- Each example includes a detailed README.md that can be easily read in your web browser or terminal.


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Let’s Get Started!

Live Notes

Notes

Day 1

- HW Register Renaming?
  - Yes, 64+96+32 renaming registers. See uArch manual, Page 16
- Paper on A64FX perf modeling with ECM?
  - https://arxiv.org/abs/2009.13903
- Energy consumption?
  - Yes, see PMU manual
  - Events: 01e0, 03e0, 03e8

Day 2

- More power/energy details?
  - Many thanks to Yuetsu Kodama!
  - **06_A64FX/03_energy**
- SVE128 vs. NEON?
  - Slide 15, *Intro to SVE*
- How to find slow code?
  - Demo: MAP with NPB
- Why won't GCC vectorize HACC with SVE?
  - GCC11 -mcpu=a64fx

Day 3

- Send links to recordings
- Send link to Forge client

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