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Isambard PI

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Reflections from Isambard and Catalyst

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Which compiler was fastest* on each code?

Benchmark	Broadwell	Skylake	Isambard	Catalyst
CloverLeaf	Intel 2019	Intel 2019	CCE 9.0	Arm 19.0
TeaLeaf	Intel 2019	Intel 2019	GCC 8.3	Arm 19.0
SNAP	Intel 2019	Intel 2019	CCE 9.0	GCC 8.2
GROMACS	GCC 8.3	GCC 8.3	Arm 19.2	GCC 8.2
OpenFOAM	GCC 7.3	GCC 7.3	GCC 7.3	GCC 7.1
OpenSBLI	CCE 9.0	GCC 8.3	GCC 8.3	GCC 8.2
VASP	Intel 2019	Intel 2019	GCC 7.3	-

* Fastest when running across 32 nodes using all cores.

https://github.com/UoB-HPC/benchmarks

Comparison of compilers on Isambard

	GCC 8.3	Arm 19.2	CCE 9.0
CloverLeaf	88%	92%	100%
TeaLeaf	100%	91%	87%
SNAP	58%	CRASH	100%
GROMACS	96%	100%	88%
OpenFOAM	100%*	79%	BUILD
OpenSBLI	100%	91%	96%
VASP	100%*	BUILD	BUILD

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Results: Vectorisation

Application	% time	# Loops	Loops Vectorised SVE			Loops Vectorised NEON			Loops Vectorised AVX*		
			Arm	Cray	GCC	Arm	Cray	GCC	Intel	Cray	GCC
BUDE	98.6	4	4	3	3	3	4	3	4	4	3
TeaLeaf (cg)	87.2	8	5	6	8	5	6	8	8	6	6
TeaLeaf (ppcg)	91.2	6	6	6	6	6	6	6	6	6	6
CloverLeaf	62.5	10	9	10	6	8	9	6	10	9	8
MegaSweep	70.3	4	1	4	0	1	1	0	4	1	0
Neutral	85.8	2	0	0	0	0	0	0	0	0	0
MiniFMM	98	8	7	—	5	3	—	5	7	—	5
Total		**42**	**32**	**29**	**28**	**26**	**26**	**28**	**39**	**26**	**28**

Compiler versions used: Arm 19.2, Cray 9.0a, GCC 8.2

0%	< 25 %	25–75%	> 75%	100%

* No difference between AVX2 and AVX-512

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Arm-based HPC status in the UK

http://uob-hpc.github.io/2019/09/17/ARS.html

1. Currently shipping technology approaching maturity (2019)

2. Anticipation ramping for next-generation technologies (2020)

3. How are chip & vendor ecosystem diversities really panning out?

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