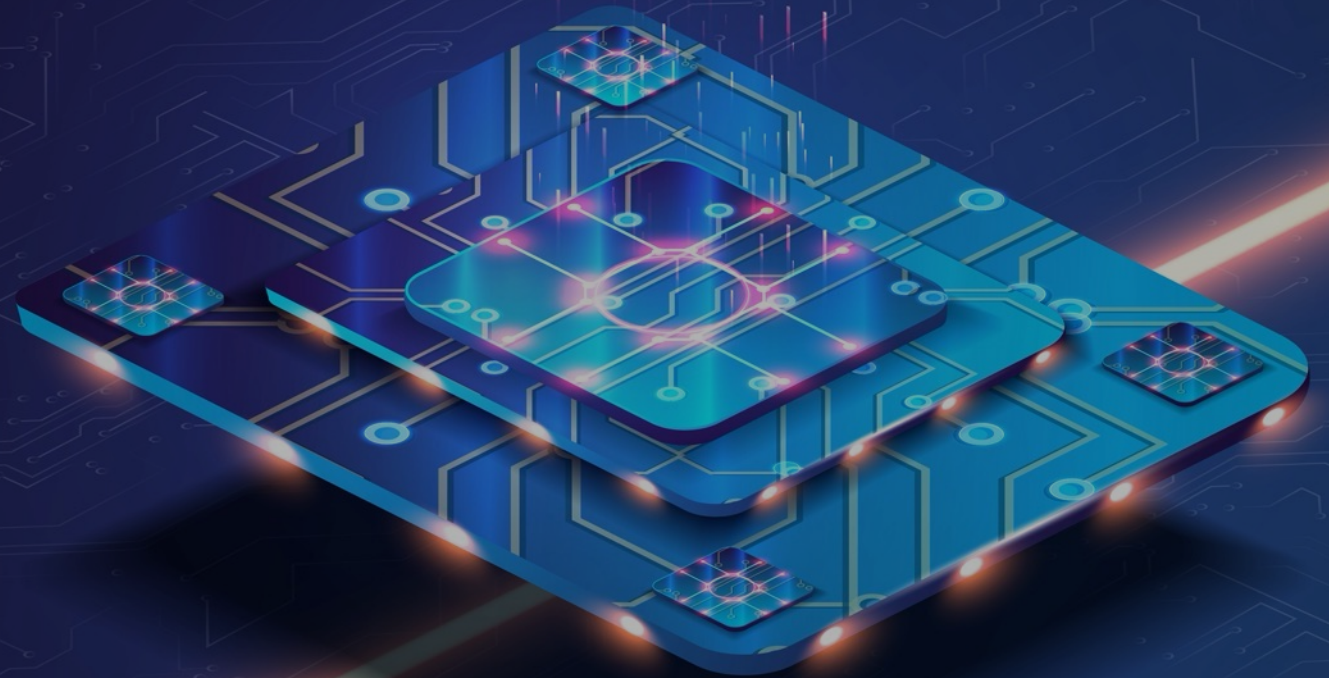




arm

Morello Program

Morello Style Guide



Architecture and Technology Group

Vision and Mission

Vision:

- **Morello is a research and prototyping program to determine if Morello prototype architecture is viable to create more secure hardware architecture for processors of the future.**

Mission:

- To create prototype hardware, the Morello Board, as a real-world test platform for the Morello prototype architecture developed by Arm, based on the University of Cambridge's CHERI protection model. A broad set of industry and academic partners will assess the security benefits of foundational new technologies.

Description

- Morello is a five-year research program (launched in 2019) that, if successful, could radically update the security foundations of the digital computing infrastructure that underpins the entire economy and could be implemented in future digital devices worldwide. It focuses on new ways of designing CPU architecture that will make processors more robust in the future and able to prevent the most prevalent security breaches.
- Morello is led by Arm and includes key partners: UKRI (funding body), CUCL (developers of the CHERI technology), University of Edinburgh, and Linaro.

Usage Rules



Morello must be written with a capital 'M' both in a title and throughout a body of text.



Morello, Arm Morello or Arm Morello Program can be used interchangeably to refer to the project. Arm Morello must be used in the first instance and Morello can be used subsequently.



Morello is not an acronym – only the M should be capitalized.

Usage Rules

Correct Use	Incorrect Use
Morello	MORELLO morello
Arm Morello Program	ARM MORELLO program Arm morello program ARM Morello
Digital Security by Design (DSbD)	digital security by design
Capability Hardware Enhanced RISC Instructions (CHERI)	Cherry Cheri cheri
UK Research and Innovation (UKRI)	Ukri Uk research and innovation
Innovate UK	Innovateuk innovate uk
Industrial Strategy Challenge Fund (ISCF)	Iscf Industrial strategy challenge fund
Morello evaluation board	MEB Morello Evaluation Board
Morello software or Morello open-source software or Morello OSS	CHERI software (this is a different software on which the Morello SW is based)

Terminology

Term	Definition
Compartmentalization	Compartmentalization works to guarantee that if there is a security breach, it will be contained within one compartment, therefore preventing the whole computing system from being compromised. Software that is constructed with fine-grained compartmentalization could result in inherently more robust software that is resistant to attack.
CHERI (Capability Hardware Enhanced RISC Instructions)	CHERI extends conventional hardware Instruction-Set Architectures (ISAs) with new architectural features to enable fine-grained memory protection and highly scalable software compartmentalization.
Digital Security by Design	A UK government funded program with the aim to help the UK digital computing infrastructure become more secure.
The Morello prototype architecture	Arm architecture specifications for the Morello project which is at a research stage.
Morello evaluation board	A prototype board developed by Arm using the Morello SoC, to distribute to partners for testing and research of the Morello prototype architecture and capability hypothesis.
Morello SoC (System on Chip)	A prototype SoC developed by Arm to test the Morello architecture and software.
Arran	An internal Arm project name, not to be used externally.
Morello software or Morello open-source software or Morello OSS	Currently CUCL, Arm and Linaro are key contributors to the Morello software, but it is intended to be an open-source engagement.

Approved Logos (White Logos Shown on Blue Background for Visibility)



Morello Graphics

RGB

1	1	2
2	3	3
3	4	4

arm Morello Program

1

R 0
G 193
B 222

2

R 50
G 205
B 229

3

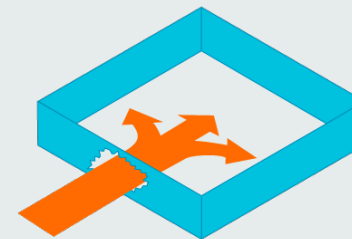
R 102
G 218
B 235

4

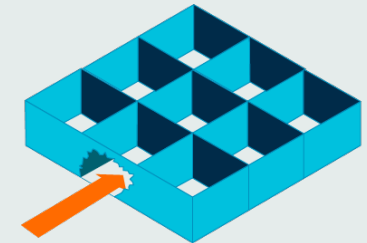
R 154
G 230
B 242

Approved Morello Diagram: Scalable Compartmentalization

Compartmentalization



Breach has full access



Breach is contained to a specific area

Morello Messaging

Standard Boilerplate Text

- Arm is leading a research program called Morello, which could radically change the way we design and program processors in future, to enable better built-in security. This is funded by the UK government's Industrial Strategy Challenge Fund (ISCF) Digital Security by Design (DSbD) program. The main output of DSbD will be a technology platform prototype called the Morello evaluation board*.
- *UKRI refer to this as The DSbD Technology Platform Prototype.

Abbreviated Boilerplate Text

- Morello focuses on new ways of designing CPU architecture that will make processors more robust in future, and able to deter some types of security breaches.

One Sentence Statement

- Arm is leading a research program called Morello, which could radically change the way we design and program processors in future, to enable better built-in security.

Useful Terminology and Phrases

UKRI's text:

- Arm is leading a multimillion-pound project funded by the UK Government's ISCF Digital Security by Design (DSbD) programme, to build Morello, the DSbD Technology Platform Prototype. Morello will be used to investigate radical changes to the way we design and program processors and enable better built-in security. Focused on new ways of designing CPU architecture that will make processors more robust in the future and able to deter some type of prevalent security breaches. A five-year research program that, if successful, could be implemented in future digital devices worldwide.

Linaro's text:

- Morello is a research program led by Arm in association with partners and funded by the UKRI as part of the UK government Digital Security by Design (DSbD) programme . It defines a new prototype security architecture based on CHERI (Capability Hardware Enhanced RISC Instructions). A System on Chip (SoC) implementation of the architecture will provide a DSbD technology platform prototype, enabling industry and academic partners to test real-world use cases and inform future development.

Resources

- Arm Morello Program Landing Page: www.arm.com/morello
- Official Morello OSS Website: morello-project.org
- UK Research and Innovation Website: ukri.org/our-work/our-main-funds/industrial-strategy-challenge-fund/artificial-intelligence-and-data-economy/digital-security-by-design-challenge
- University of Cambridge Computer Lab CHERI Webpage: cl.cam.ac.uk/research/security/ctsrd/cheri
- Department of Computer Science and Technology: cst.cam.ac.uk
- Digital Security by Design Webpage: dsbd.tech

arm

Thank You

Danke

Gracias

谢谢

ありがとう

Asante

Merci

감사합니다

धन्यवाद

Kiitos

شكراً

ধন্যবাদ

תודה

arm

The Arm trademarks featured in this presentation are registered trademarks or trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. All rights reserved. All other marks featured may be trademarks of their respective owners.

www.arm.com/company/policies/trademarks