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arm

arm

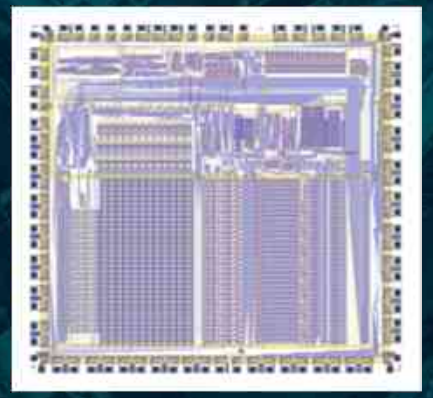
- Exemples de thèmes adressés durant la présentation
  - Un peu d histoire
  - La situation de notre écosystème dans le domaine du compute. DC/HPC.
  - Les axes de développement et les évolutions des marchés (accélérateurs, chiplet, mémoire, CXL…)
  - Les solutions technologiques que nous amenons qui permettrons aux acteurs de se positionner/développer.
  - Les évolutions attendues dans les développements d'application cloud natif sur les terminaux (IoT, SW defined car …) et leurs implications.
  - HPC
  - La cession de nos activités Forge (ex Allinea) à Linaro.
  - Un point sur nos activités en France.
  - Notre accompagnement de l'EPI, de l'EU chip act.
  - Questions réponses.

An Introduction to Arm

Arm Holdings

1981

BBC Micro



1985

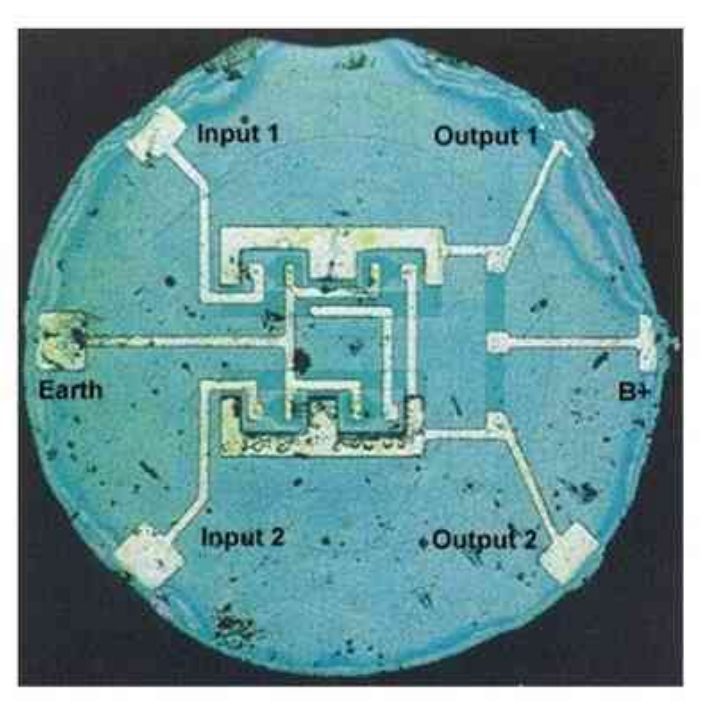
ARM1 CPU

1990

Creation of ARM Ltd

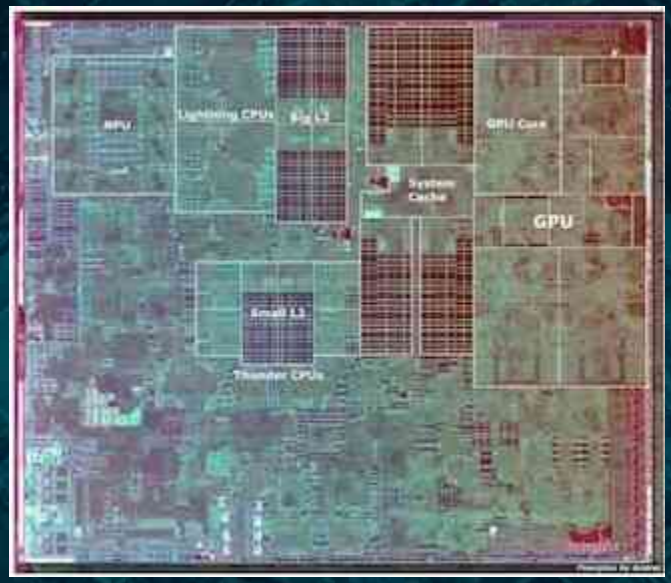
Chip design – then and now

1961



4 transistors
1 engineer

2023



60+ billion transistors
Thousands of engineers

A system-on-chip contains multiple blocks of IP

Main processor for running the operating system, applications and user interface

Graphics processor for generating images

Accelerators for frequently-used compute workloads, e.g. image processing, encryption, vision

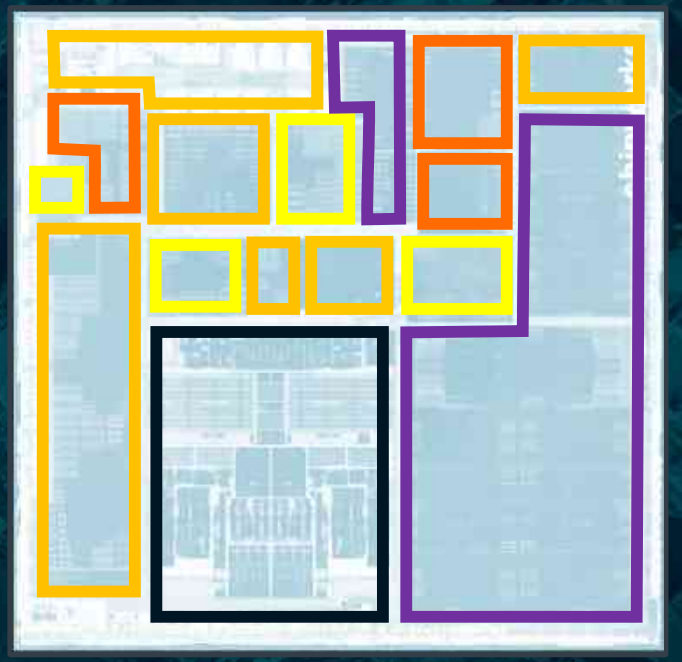
Radio controllers for mobile, wifi, Bluetooth, GPS

Hardware controllers for the display, memory, image sensors, power supply, etc

Input/Output interfaces for USB, Ethernet, etc

Memories

… **Chiplet**



70% of the world's **population** use Arm processor technology

arm

Semiconductor IP & Solutions Business

250bn+

Arm-based chips shipped to-date

29bn+

Arm-based chips shipped in 2021
8B Q3 22

Mobile Revolution

Designed into first mobile phones and then smartphones.

To Cloud Disruption

All devices, from sensor to supercomputer, can use intelligent Arm technology.

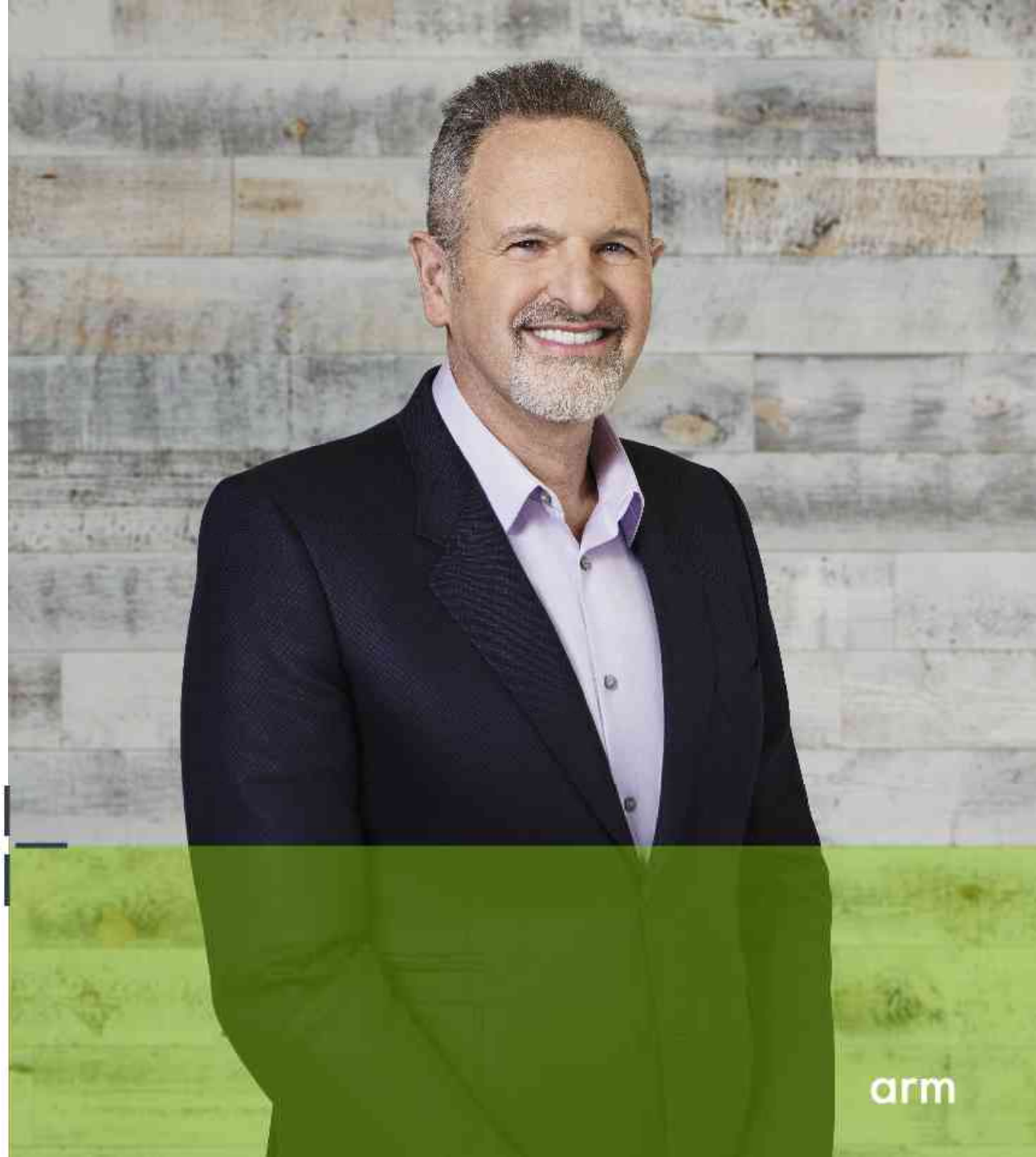
70%

of the world’s population use products and services powered by Arm technology.

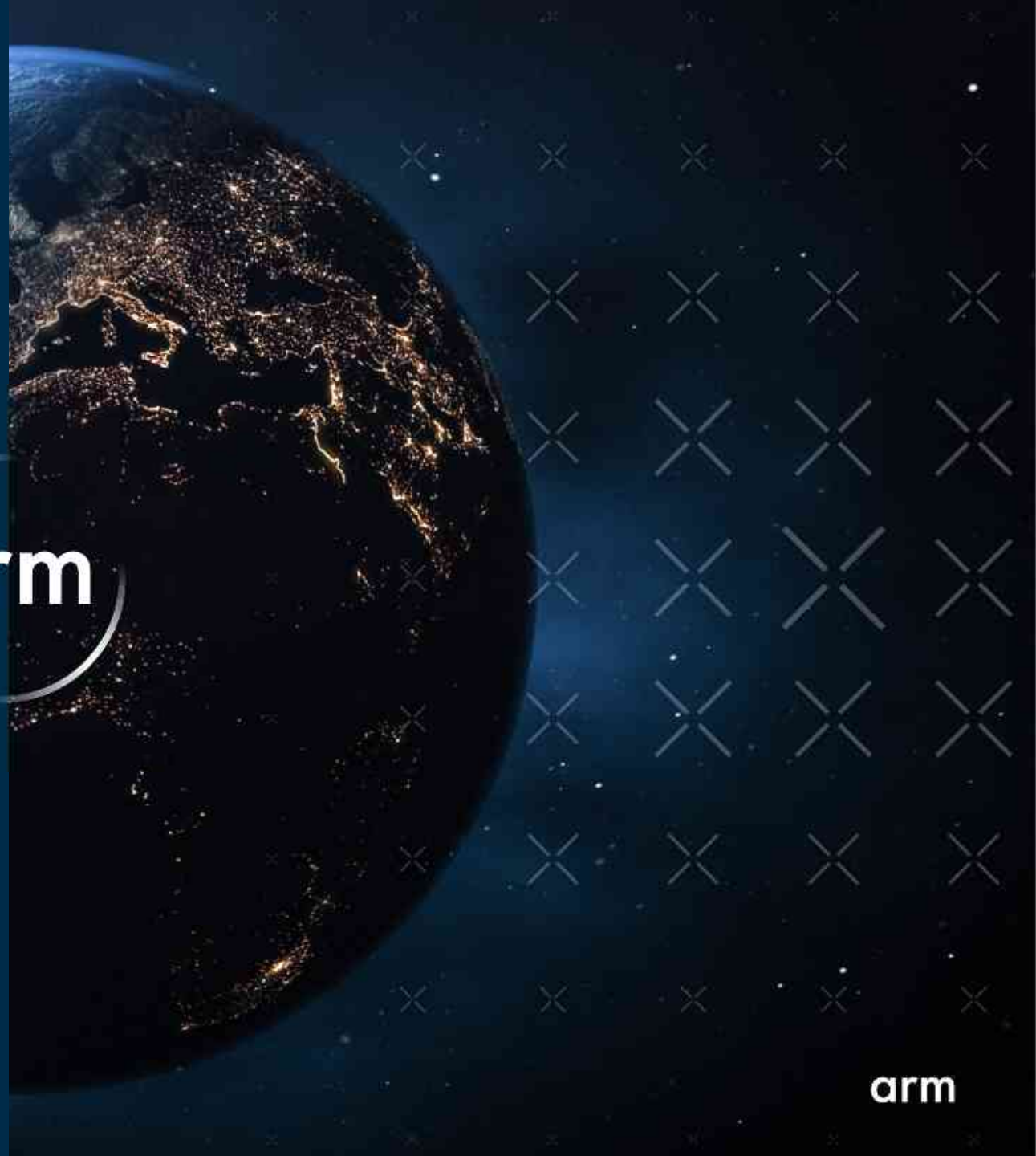
"As the innovators of one of the industry's most pervasive compute architectures, Arm changed lives around the globe by delivering the technology at the heart of the smartphone revolution.

We are emboldened by a renewed energy to address exciting markets such as AI, IoT, cloud, automotive and the Metaverse, and change lives around the world—again."

Rene Haas, Arm CEO



A Future Built on arm



arm

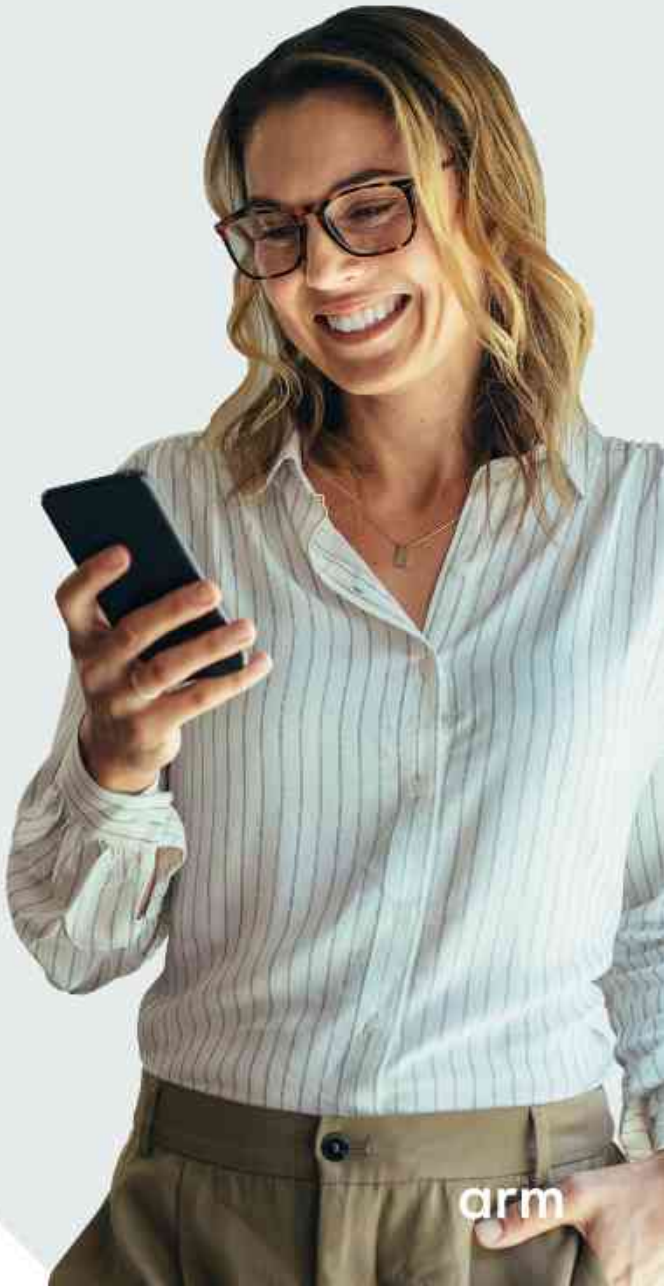
We are defining the next universal mobile experience.

Shaping the Future of Real-time 3D Experiences

- More than eight billion GPUs shipped - the world's number one shipping GPU.
- Over 110x improvement in compute performance over the past decade.

The World Runs on Arm

- A strong foundation to build the future of mobile, with 99% of smartphones based on Arm.
- Over 35 billion Arm Cortex-A based chips shipped to date.



We are redefining what's possible in cloud computing.

Cloud Providers

Greater performance and lower power consumption are driving cloud providers like AWS, Google, Microsoft and Alibaba to adopt Arm.

High-Performance Computing

World-class performance and efficiency drive leadership systems like Fugaku and NVIDIA Grace Superchips to new heights.

5G and Carrier Infrastructure

Open standards and RAN initiatives make Arm the preferred architecture for 5G core networks for telco operators and vendors.

Infrastructure and IoT Edge

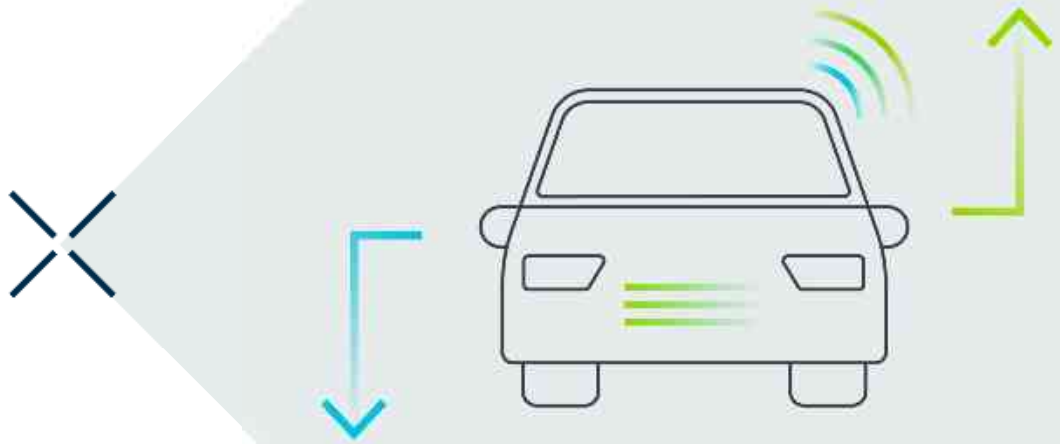
Ensuring a cloud-native experience across a diverse and secure IoT and edge ecosystem with Project Cassini.

arm

We are transforming the automotive industry.

Arm is driving the digital transformation of mobility with a focus on safety, scalability and collaboration:

- SoCs designed with functional safety for self-driving vehicles.
- Proven and trusted technology for end-to-end security.



Arm is in automotive today:

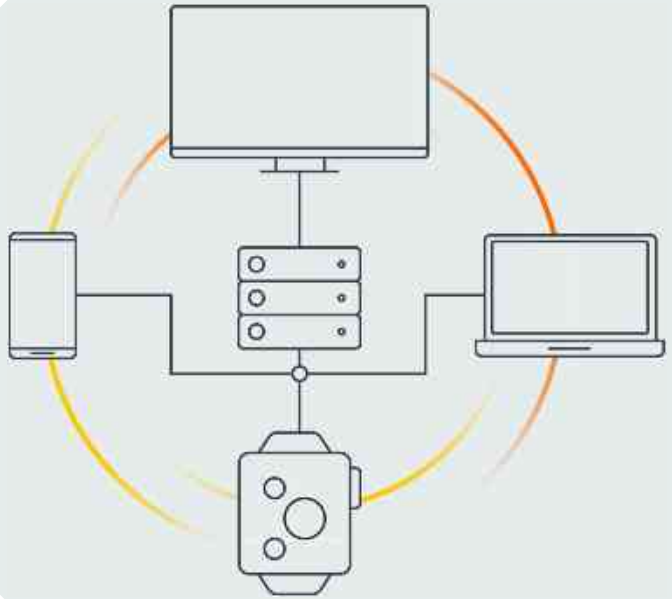
- 15 top automotive chipmakers license Arm IP.
- 100% of ADAS chip vendors are building their next chip on Arm techn
- 85% of IVI systems are Arm-based.

arm

We are enabling a thriving IoT economy.

Creating a New IoT Economy

- Arm's customers shipped over 29 billion Arm-based chips in 2021, and around 70% of these were based on Cortex-M which was designed for IoT/embedded markets.
- 70% share of rich embedded devices are occupied by Arm-base SoCs.



The IoT Runs on Arm

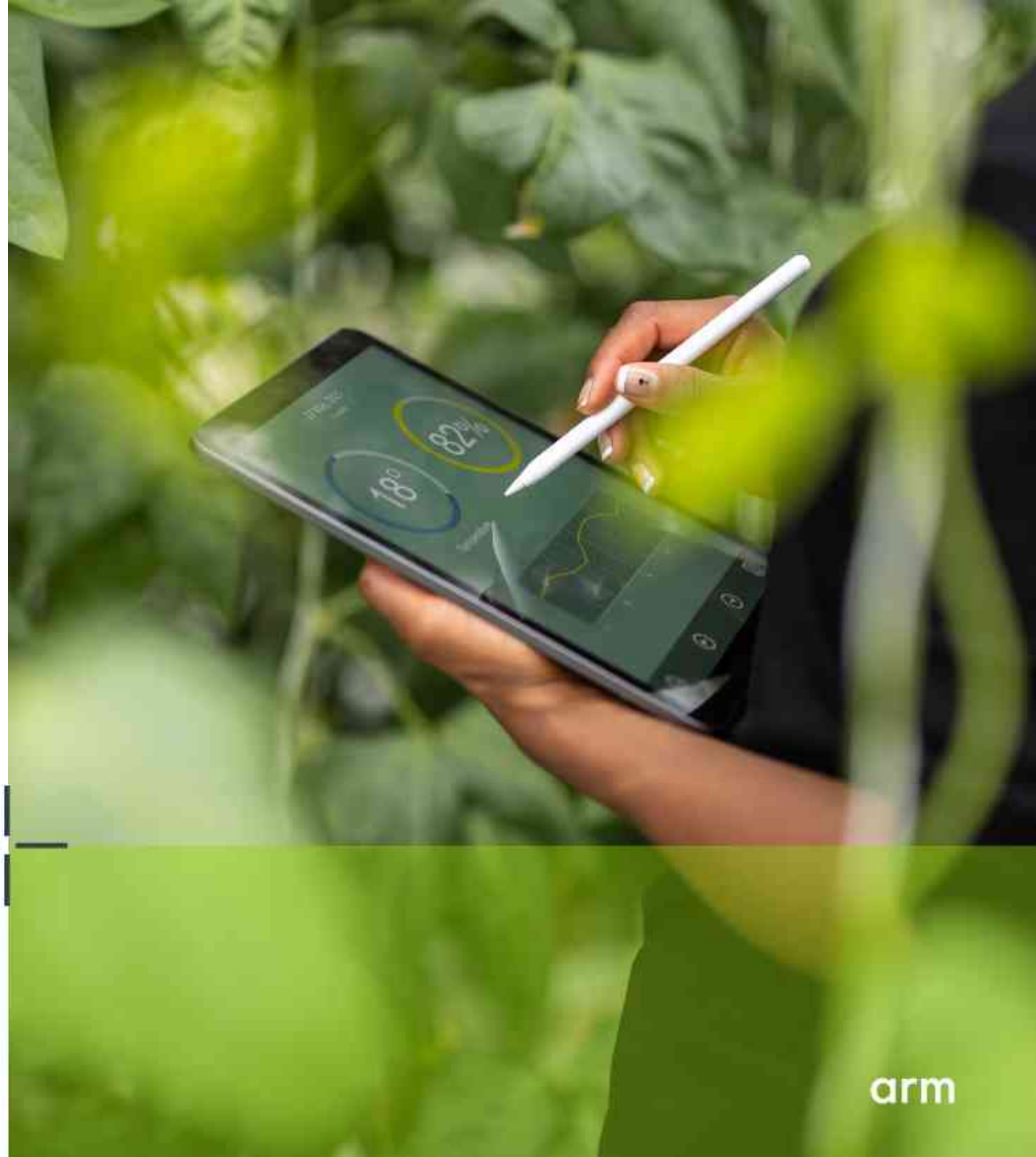
- Over 40 million Arm-based Raspberry Pi devic have shipped to date.
- Arm IP powers 55% of consumer devices.
- Arm-based SoCs power 90% of wearables.

We are making the metaverse a reality.

We are enabling Artificial Intelligence to work everywhere.

We are delivering the foundation for trust in the digital world…from chip-to cloud.

We will bring hope to the world for a more sustainable future.



arm

SOAFEE Membership Reaches More Than 60 Automotive Industry Leaders

- SOAFEE is a software architecture that brings the real-time and safety needs of automotive together with the advantages of a cloud-native approach for the development and deployment of the software defined vehicle.
- Members across from across the automotive supply chain are collaborating to enable the software-defined vehicle of the future.
- SOAFEE has quadrupled its membership since its September 2021 launch.

"This fast growth is proof of how seriously the automotive industry is taking the shift to software-defined and the opportunity it presents."

Dipti Vachani, SVP and GM,
Automotive Line of Business, Arm

arm

We changed the world once.

arm

Next Generation Native Experiences for Windows on Arm

- Windows Dev Kit 2023, a mini desktop form factor to help developers build Windows apps that leverage the power of Arm Cortex processors to accelerate AI workloads.
- This will be the first Windows on Arm developer kit to ship with a flagship Snapdragon SoC and ready to install comprehensive Arm native developer toolchain.

Google Cloud Platform Adopts Arm Neoverse

- Arm-based T2A VMs feature the Ampere Altra processor, with up to 48 vCPUs per VM and 4GB of memory per vCPU.
- Up to 32 Gbps networking bandwidth and a range of network attached storage options.
- Ideal for scale-out workloads including web servers, containerized microservices, data-logging processing, media transcoding, and large-scale Java applications.
- T2A Free Tier available with up to 8 vCPUs and 32 GB of RAM for 3 months.

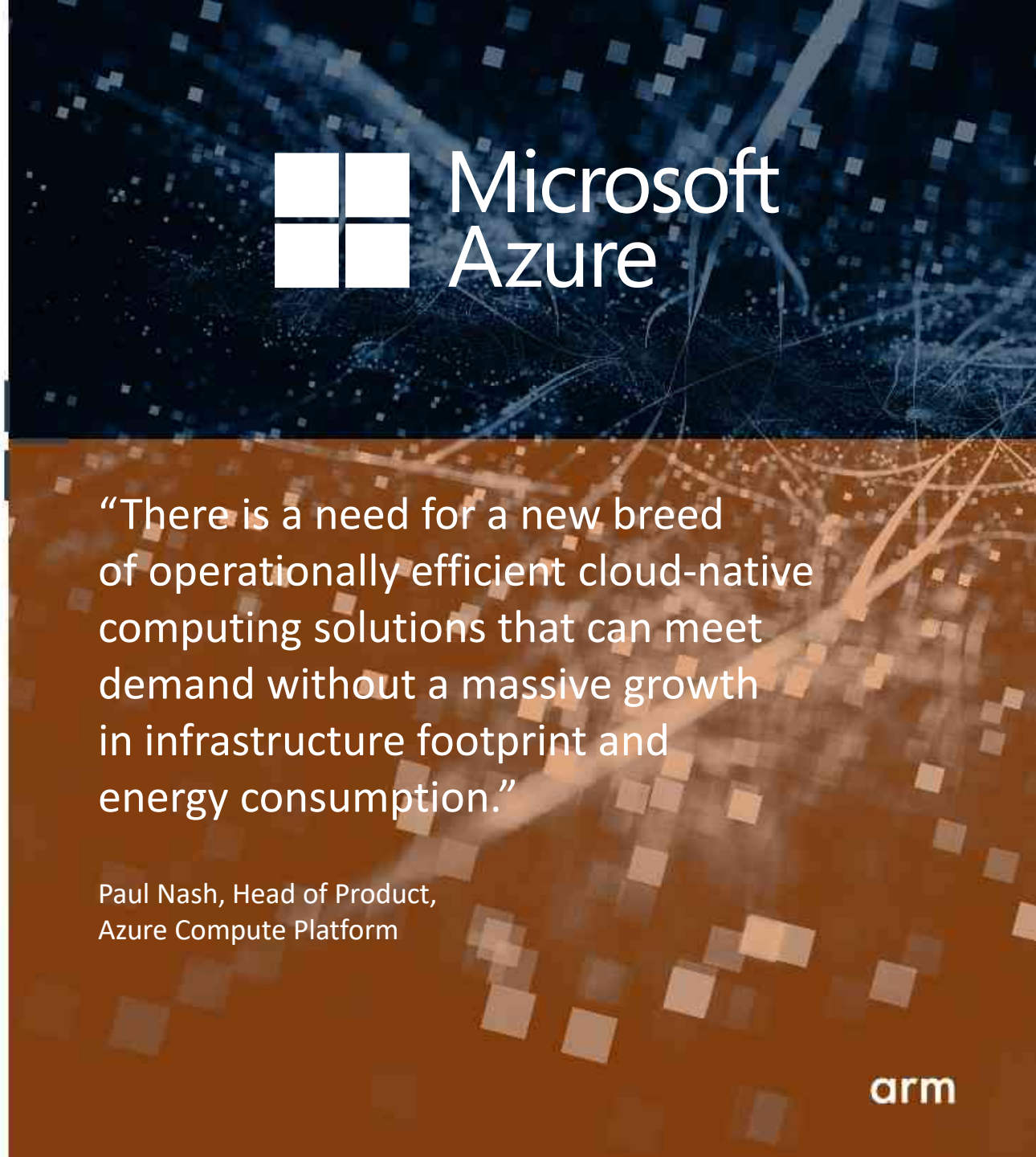
"Our drug discovery research at Harvard includes several compute intensive workloads that run on SLURM using VirtualFlow. We ported our workload to the new T2A VM family from Google and were up and running with minimal effort. The improved price-performance of the T2A will help us screen more compounds and therefore discover more promising drug candidates."

Christopher Gorgulla, Research Associate,
Harvard University

arm

Microsoft Azure Cloud Adopts Arm Neoverse

- Arm-based Azure VM-series feature the Ampere Altra processor operating at up to 3.0GHz.
- Up to 50% better price-performance than comparable x86-based VMs.
- Arm-based Azure VMs are 20% less expensive than comparable x86-based VMs.



HPE ProLiant Gen11 runs on Arm

- HPE ProLiant RL300 Gen11 server is first in a series that will deliver next-gen compute performance with higher efficiency using Ampere® Altra® and Altra Max processors.
- HPE becomes first tier-one OEM to offer Arm-based compute for cloud-native development.
- Target customers that offer digital services, media streaming, social platforms, e-commerce, financial, or online services, and cloud-based services such as IaaS, PaaS and SaaS.

Arm, Cruise and the Driverless Road Ahead

- Cruise will be using a suite of Arm technology, including devices from:
  - Arm ecosystem partners.
  - Cruise in-house developments based on Arm's high-performance CPUs.
  - Arm's leading edge automotive-enhanced (AE) line of IP.

"Collaboration is critical on the road to mass deployment of autonomous vehicles, and one of the most exciting parts of our job is getting to work with partners like Cruise on these opportunities and challenges."

Dipti Vachani, SVP and GM,
Automotive and IoT Line of Business, Arm

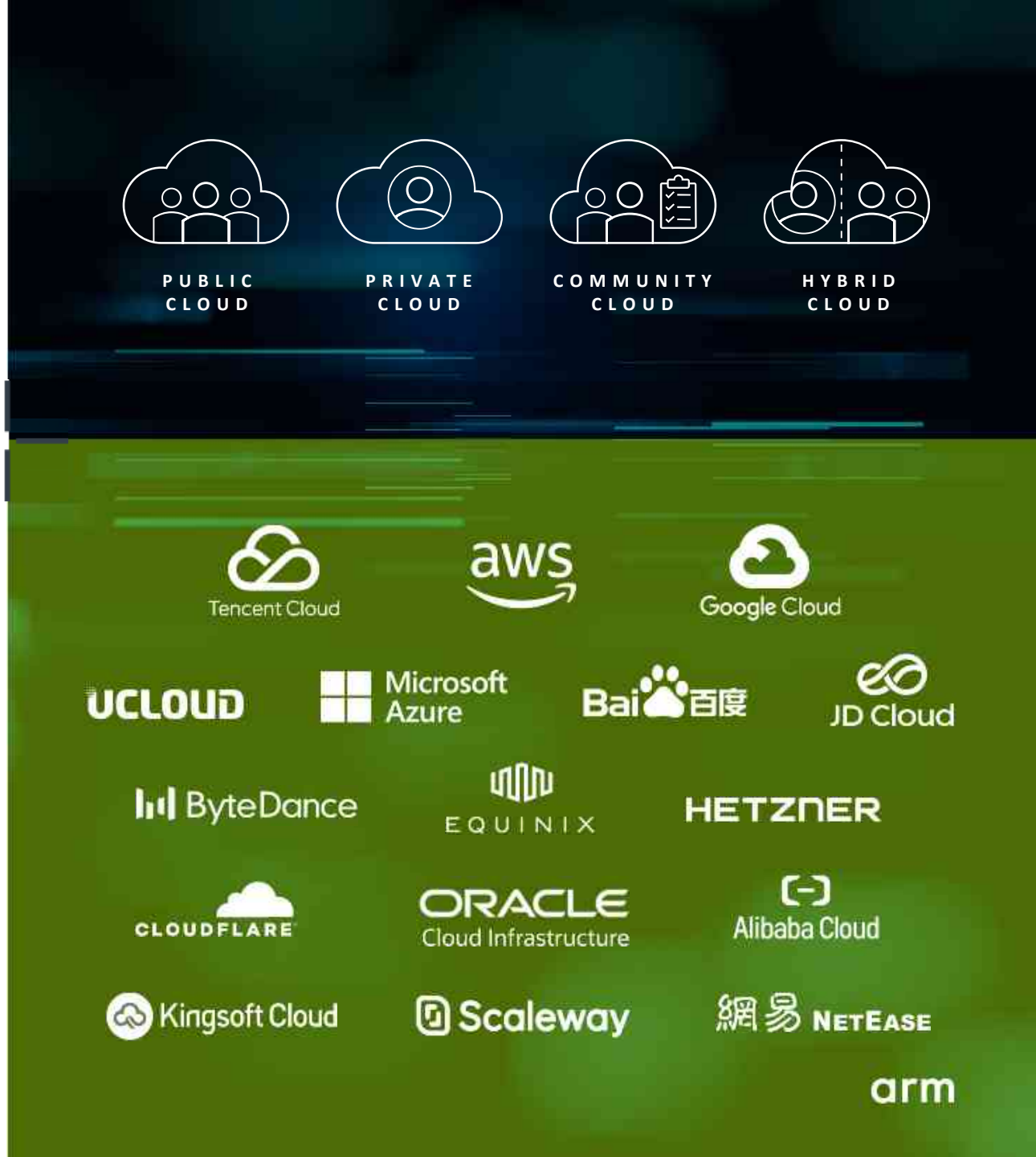
arm

Vodafone is accelerating 5G Open RAN on Arm

- Using Marvell's advanced SoC technology, specifically adapted for Open RAN, smartphone users are given a fast and reliable 5G connection using new open architecture.
- Marvell chipset, the OCTEON Fusion processor, is based on Arm Neoverse cores and works by taking on the heavy lifting calculations of the standard CPU in existing virtualized mobile networks.
- Open RAN allows operators to significantly improve the performance of future networks to even outperform existing single-supplier radio networks.

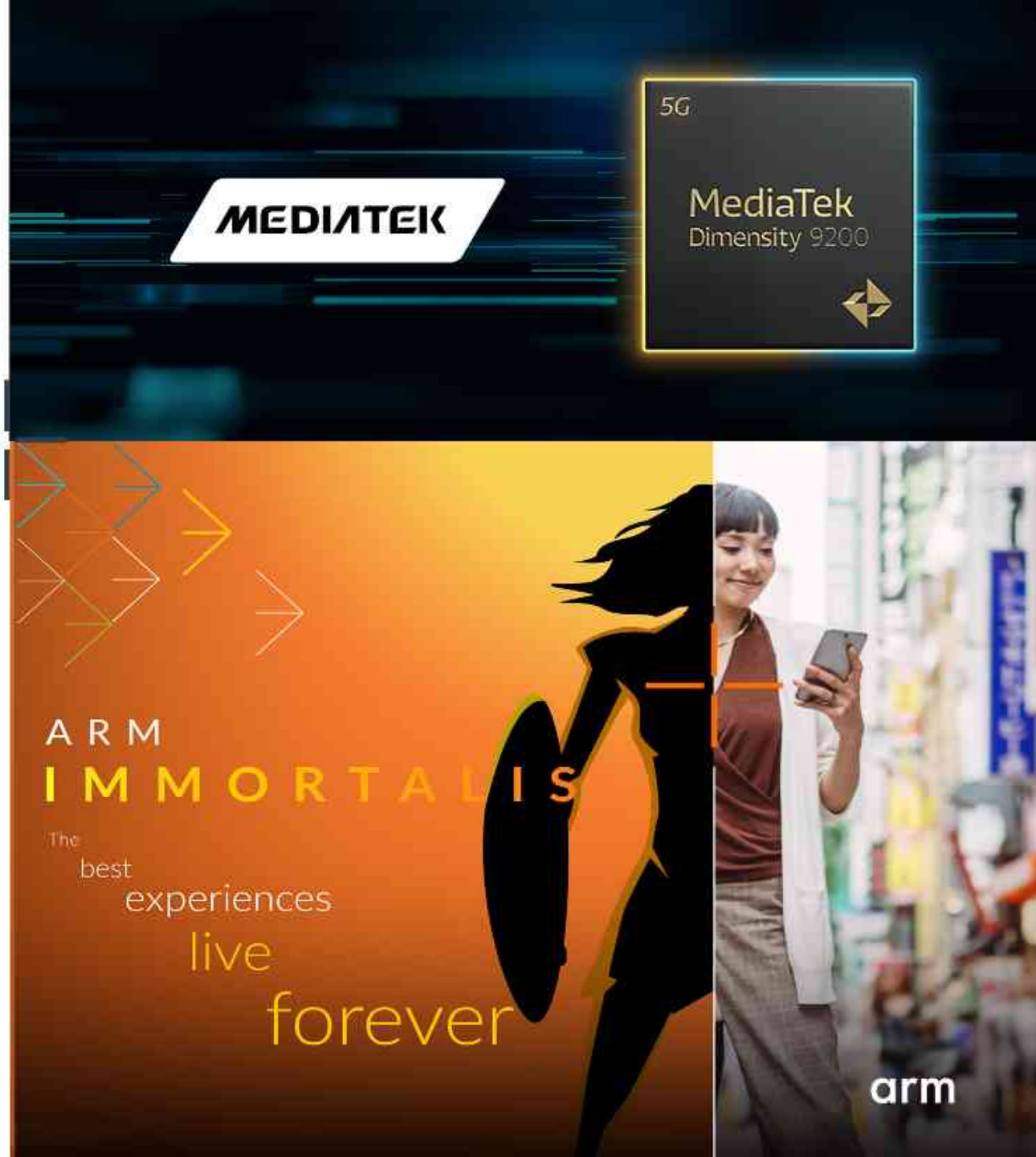
Clouds everywhere are deploying Arm-based servers

- The future of infrastructure requires the performant and power-efficient compute foundation built on Arm Neoverse.
- Neoverse is in all the major public clouds.
- Today, every developer across the world can get access to a modern cloud based on Arm.



MediaTek Launches New Chip Based on Arm Immortalis

- MediaTek launches the Dimensity 9200 SoC to power incredible experiences with a new era of flagship phones, based on the Arm TCS22 Total Compute Solutions.
- It also features the new Arm Immortalis-G715 GPU with hardware ray tracing to ensure incredible visuals with smooth high frame-rate gameplay.
- Delivering immersive multimedia, 3D gaming, all while scaling peak performance and power efficiency with an 8-core CPU cluster.



New Partnerships Accelerate IoT Software Development

- GitHub and Arm are now partnering to further accelerate the developer experience for embedded Arm devices with the integration of Arm development tools into GitHub Actions.
- Qeexo and Nota.AI integrate Arm Virtual Hardware for better accessibility and ease-of-deployment of ML workloads.

"Our ongoing investment and growing number of partnerships in the IoT and embedded market will continue to empower developers to innovate for a future built on Arm."

Paul Williamson, SVP and GM,
IoT Line of Business, Arm

arm

arm

Arm’s Next Chapter

Arm technology is defining the future of computing.

arm

A future built by one of the most successful technology ecosystems in the world.

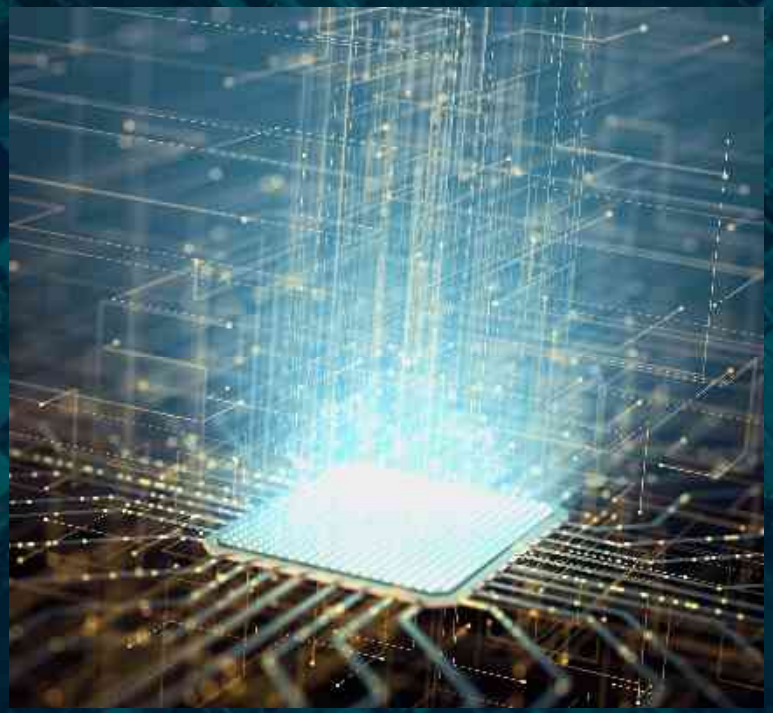
1000+ Ecosystem Partners

arm

Today’s Infrastructure Challenges

Scale

Performance

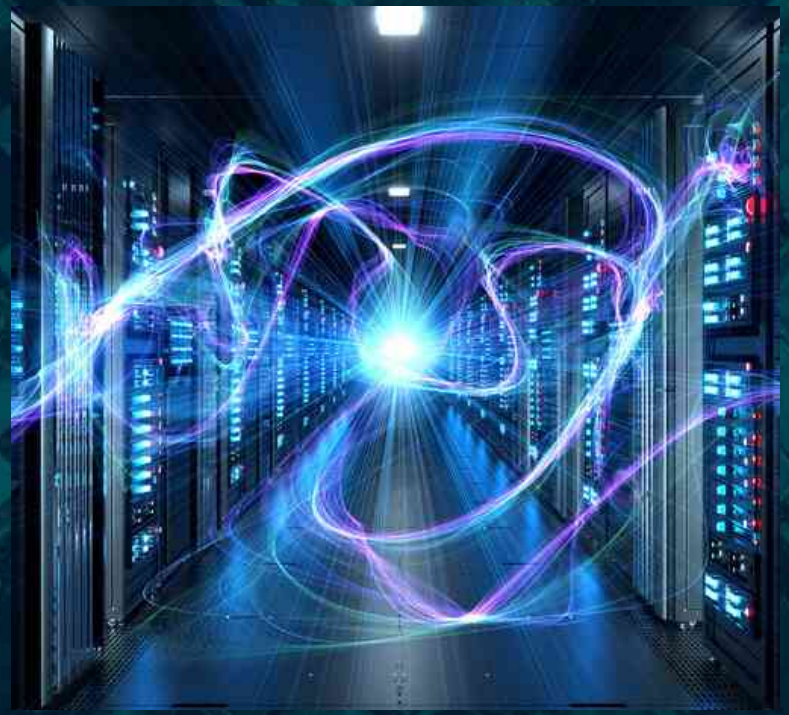


Power Cost

The Future of Infrastructure

Ubiquitous

Accelerated



Power Efficient

Scalable Efficiency

- Unmatched performance, power and area foundations for cloud-to-edge infrastructure

V-series

Maximum Performance and Optimal TCO

N-series

Scale Out Performance

E-series

Efficient Throughput

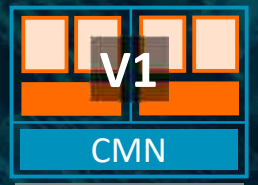
Rapid Pace of Innovation

V-series

Maximum Performance and Optimal TCO

Performance

V1 Platform



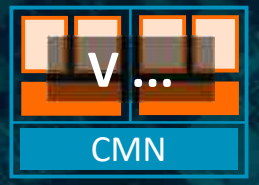
DDR5, PCIe g5

2020

V2 Platform

DDR5, PCIe g5, CXL 2.0

Poseidon Platform



DDR5, PCIe g6, CXL 3.0

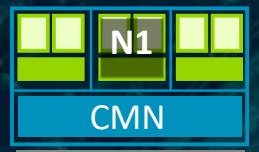
2023+

N-series

Efficient Performance

Performance per watt

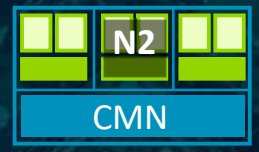
N1 Platform



DDR4, PCIe g4

2019

N2 Platform



DDR5, PCIe g5, CXL 2.0

N-series Next

DDR5, PCIe g6, CXL 3.0

2023+

E-series

Efficient Throughput

Throughput efficiency

E1 Platform

DDR4, PCIe g4

2019

E2 Platform

DDR5, PCIe g5, CXL 2.0

E-series Next

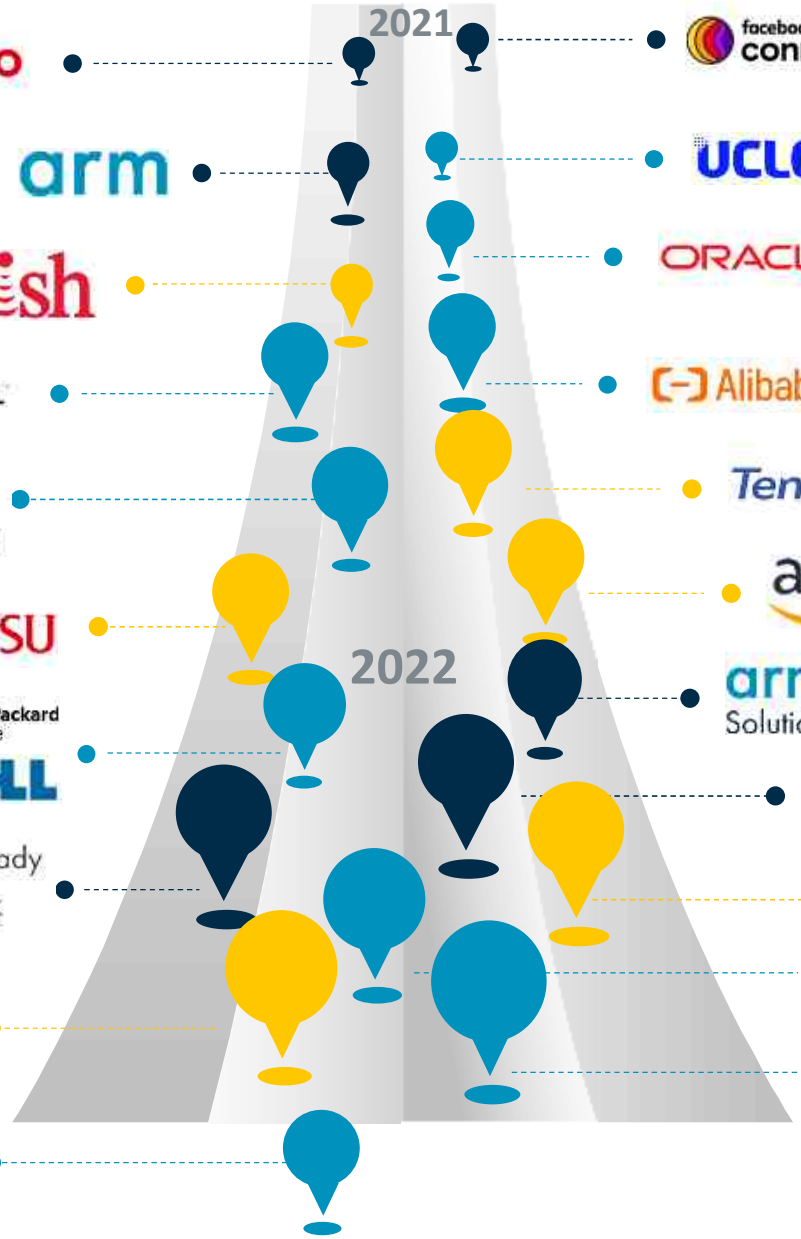
DDR5, PCIe g6, CXL 3.0

2023+

CMN: Core Mesh Network
CXL: Compute Express Link

arm NEOVERSE

Arm Neoverse Momentum for 2021-22



Lenovo adopts Arm technology as it expands 5G its strategy

Arm launches the Neoverse V1 and N2 CPUs

DISH adopts AWS Graviton2 for cloud-based 5G O-RAN

Marvell announces OCTEON 10 DPU

Google Cloud and Intel announced “Mt Evans” DPU

Fugaku remains #1 on Top500

Marvell collaborates with Dell and HPE on 5G Open RAN

SystemReady certified ADLKINK Arm developer platforms launch

NVIDIA announces Arm “Grace” CPU Superchip and ODM support

Google Cloud adopts Arm Neoverse

Arm and FaceBook Connectivity collaborate on Magma

Ucloud adopts Ampere Altra for cloud-based HPC

Oracle Cloud Infrastructure launches Ampere A1 compute instances

Alibaba Cloud unveils Armv9-based Yitian 710 CPU and instance family

Tencent launches Arm-based instances

AWS announces the Graviton3 CPU and C7g instance family on V1

Arm 5G Solutions Lab launched

Azure launches Arm-based instances and Arm dev kits

RedHat brings OpenShift to Arm

AWS Graviton3 C7g instances go GA

HPE ProLiant Gen11 Server Using Ampere

Arm Ecosystem Momentum is Accelerating

Marvell and Dell accelerate the no-compromise **5G Open RAN**

Red Hat OpenShift

Red Hat announces **GA for OpenShift** on Arm

AWS Graviton3 **EC2 C7g instances** go GA

Google Cloud

Tau T2A is first Compute Engine VM to run on Arm

FEB | MAR | APR | MAY | JUNE | JULY

NVIDIA Introduces Arm-based **Grace CPU Superchip**

Microsoft Azure

Microsoft Azure rolls out Ampere Altra-based **Arm Virtual Machines**

HPE **ProLiant RL300 Gen11** with 128 core Ampere Altra Max

Alibaba Cloud

Alibaba Cloud T-Head **Yitian 710 crushes SPECrate2017**

arm NEOVERSE

Clouds everywhere are deploying Arm-based servers

arm

Ampere® Altra® and Altra Max®

Predictable High Performance

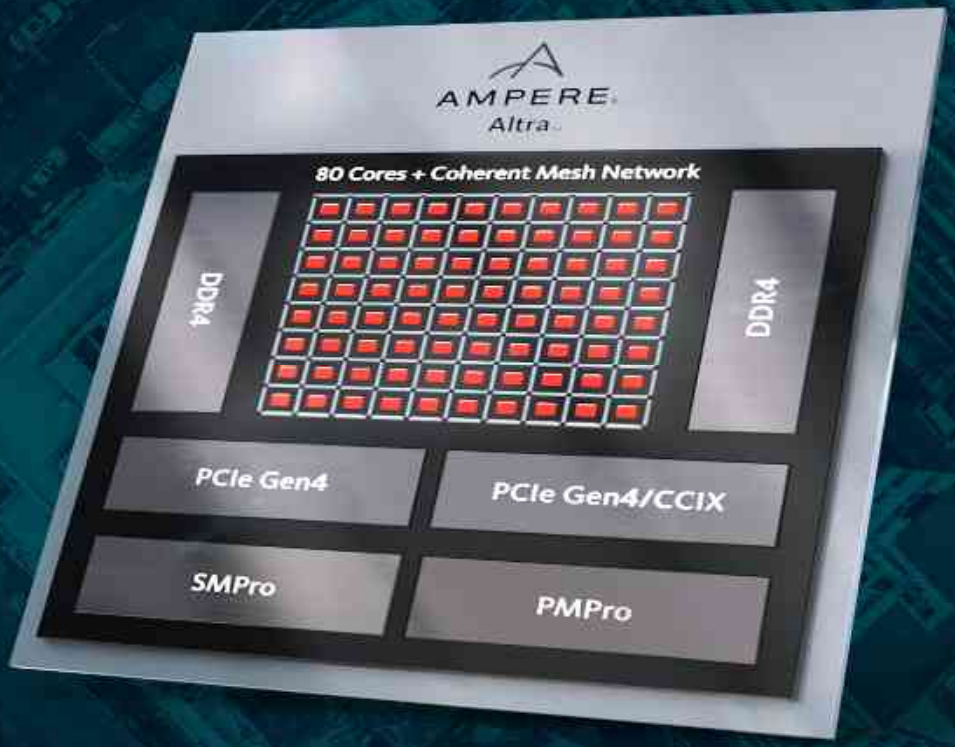
- Arm Neoverse N1 cores up to 3.0GHz, no SMT
- 1MB L2 cache per core

High Scalability

- Up to 128-cores per socket
- 8-channel DDR4 with ECC
- 128 lanes PCIe Gen4 per CPU

Power Efficiency

- 2.9x[1] and 1.8x[2] higher performance/watt on SPECint2017 vs. x86

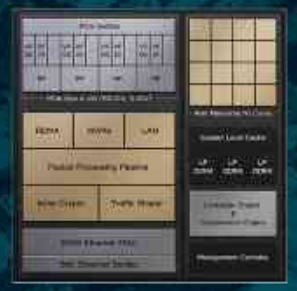


1. Ampere Altra Max compared to Intel Xeon 8380 (https://amperecomputing.com/products/built-for-the-sustainable-cloud.html)
2. Ampere Altra Max compared to AMD EPYC 7763 (https://amperecomputing.com/products/built-for-the-sustainable-cloud.html)

Cloud Networking Leadership

AWS Nitro

Intel Mt. Evans



Marvell OCTEON

NVIDIA BlueField

AMD Pensando

DPUs underpin all cloud workloads

DPUs are built on Arm

arm NEOVERSE

Enabling 5G Cloud RAN

arm 5G Solutions Lab

Next generation RAN infrastructure built on Arm

1. BUILDING A DISAGGREGATED RAN

Evaluate the key use cases and deployment scenarios

2. CLOUD-NATIVE REALIZATION OF THE DU

Server and accelerator selection, capacity dimensioning, power efficiency

3. SOFTWARE STACK OPTIMIZATION

RAN functions to be realized as microservices in containers delivering near real time capability and scalability

L1 ACCELERATOR CARDS



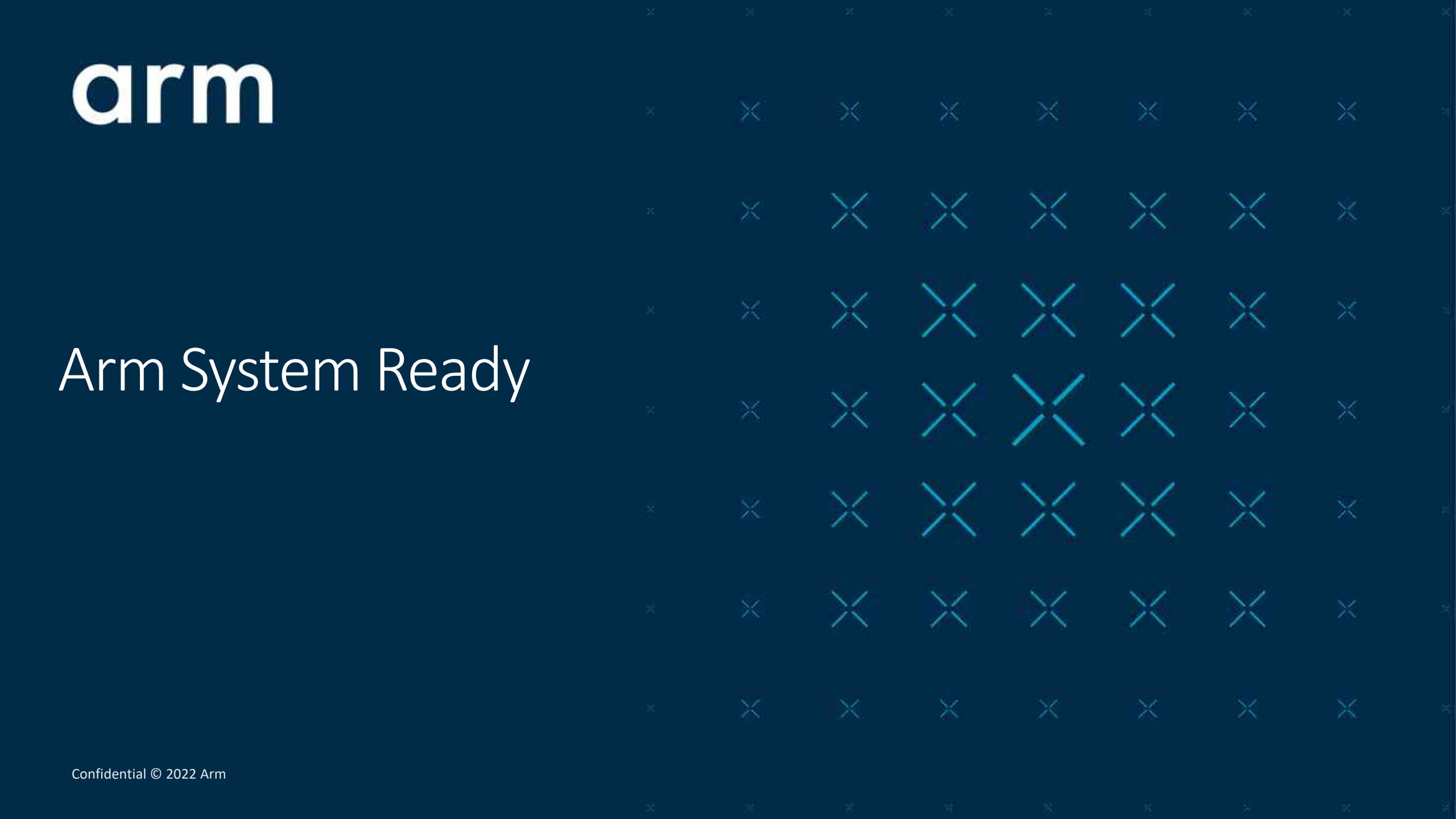


SOFTWARE ECOSYSTEM

DPDK · magma · kubernetes · Red Hat · CANONICAL · SUSE · CommAgility · Capgemini

Xelleran · ArrayComm · ASTRI · Parallel Wireless · MAVENIR · Phluido · Radisys

arm

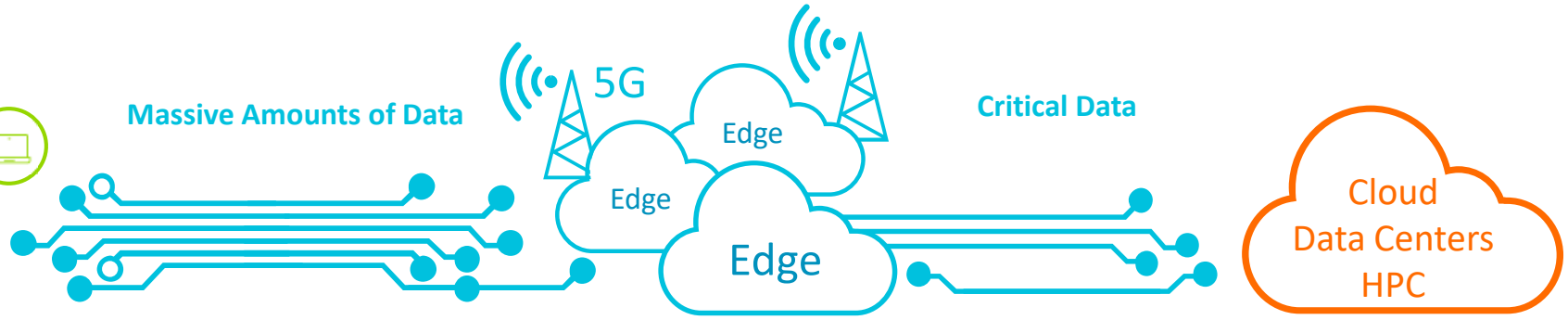


Arm System Ready

End to End Computing for Everything, Anyone & Anywhere

Trillions

connected Devices
by **2035†…**



Local Decisions

Filter & React

Analyze & Store

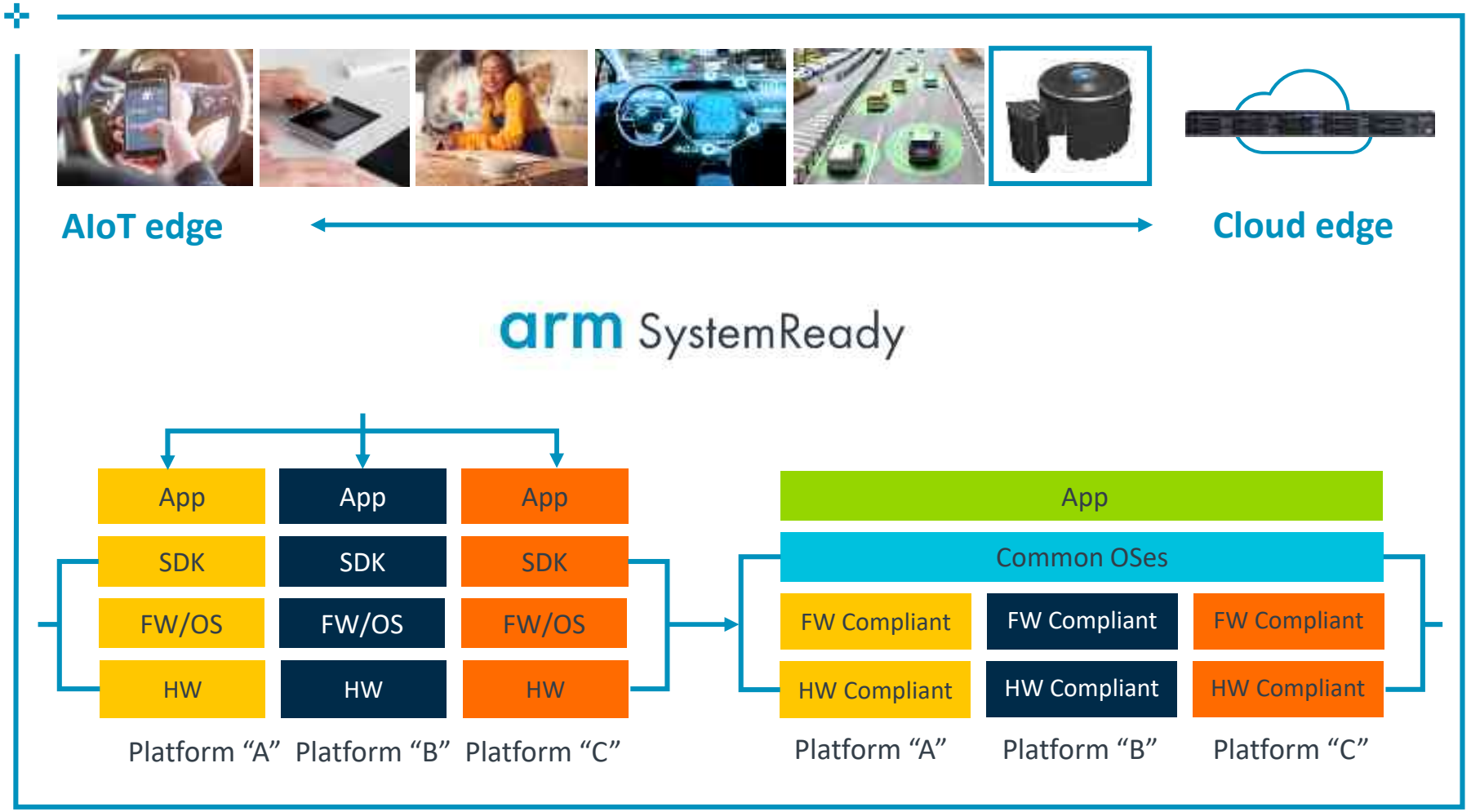
- Connectivity (Cortex-R / Cortex-M)
  Application (Cortex-A / Cortex-M)
  Embedded (Cortex-M) / NPU
- Modem (Cortex-R)
  Applications/ Analytics (Cortex-A)
  Control (Cortex-A)
- Neoverse

arm

Vision

arm SystemReady

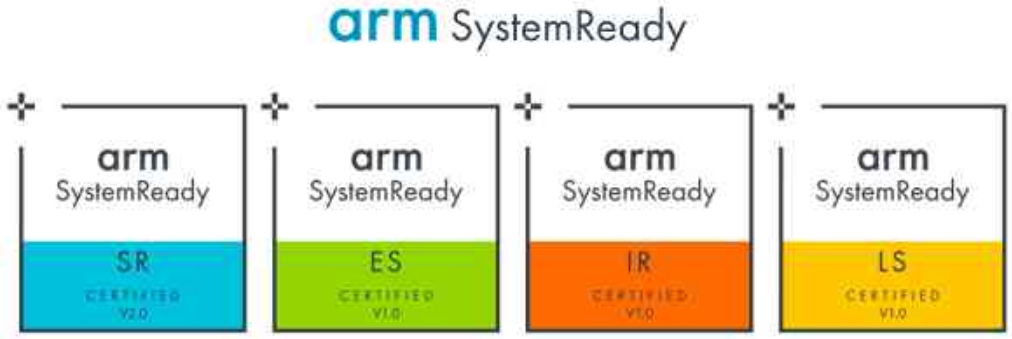
Software Can Just Work on Arm-based Devices



arm

A Balance of Standardization for Partner Success

arm SystemReady



Low Flexibility

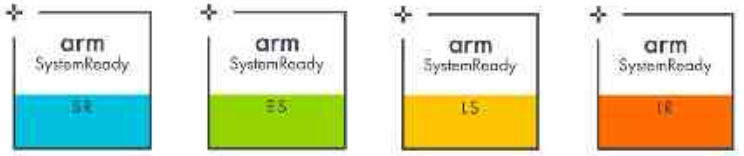
Enabling Innovation

High Software Maintenance Cost

arm

Platform standardization via Arm SystemReady

- 65 certified platforms across 4 bands of SystemReady



- Certified first Virtual Environment

Microsoft Azure

"At its core, the Arm SystemReady compliance certification program preserves the investments that we and customers make in our software stacks.

Arun Kishan, Technical Fellow & Corporate VP
Microsoft

- Pre-silicon compliance program now available with support from leading IP vendors

cadence SYNOPSYS®

arm

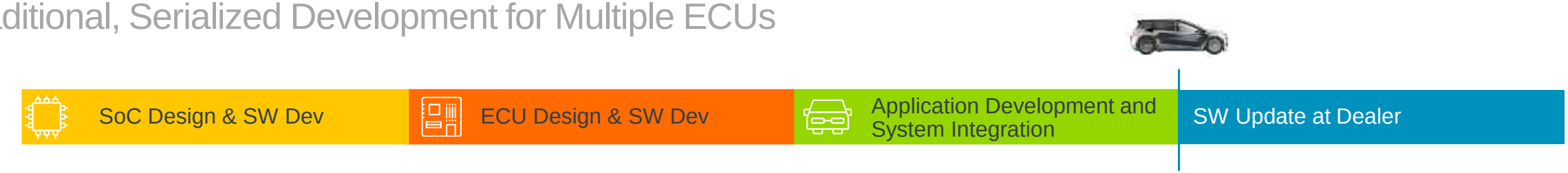
arm

Cloud Native Developments Enabling SW defined objects

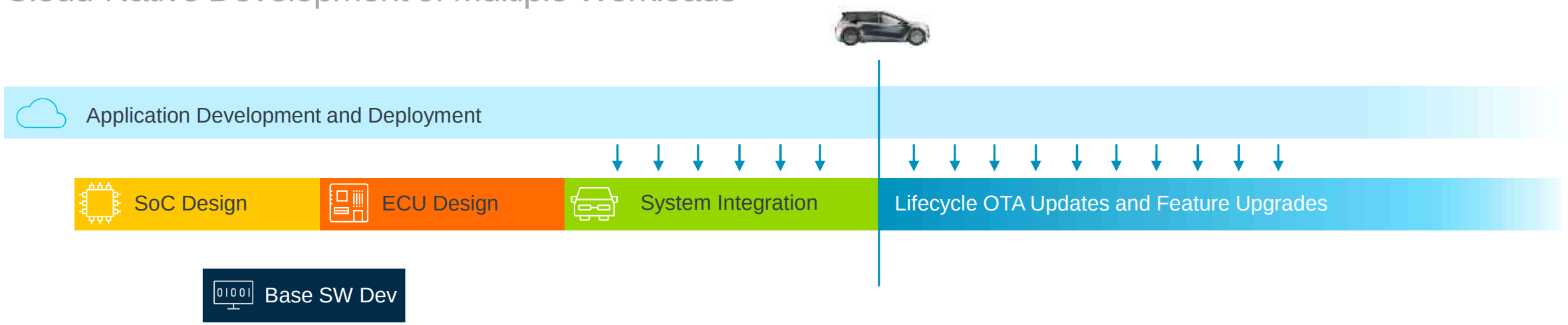
Enabling a “Shift-Left” for Automotive Development

Start Software Development Earlier, Deploy Updates and New Features After Manufacture

Traditional, Serialized Development for Multiple ECUs



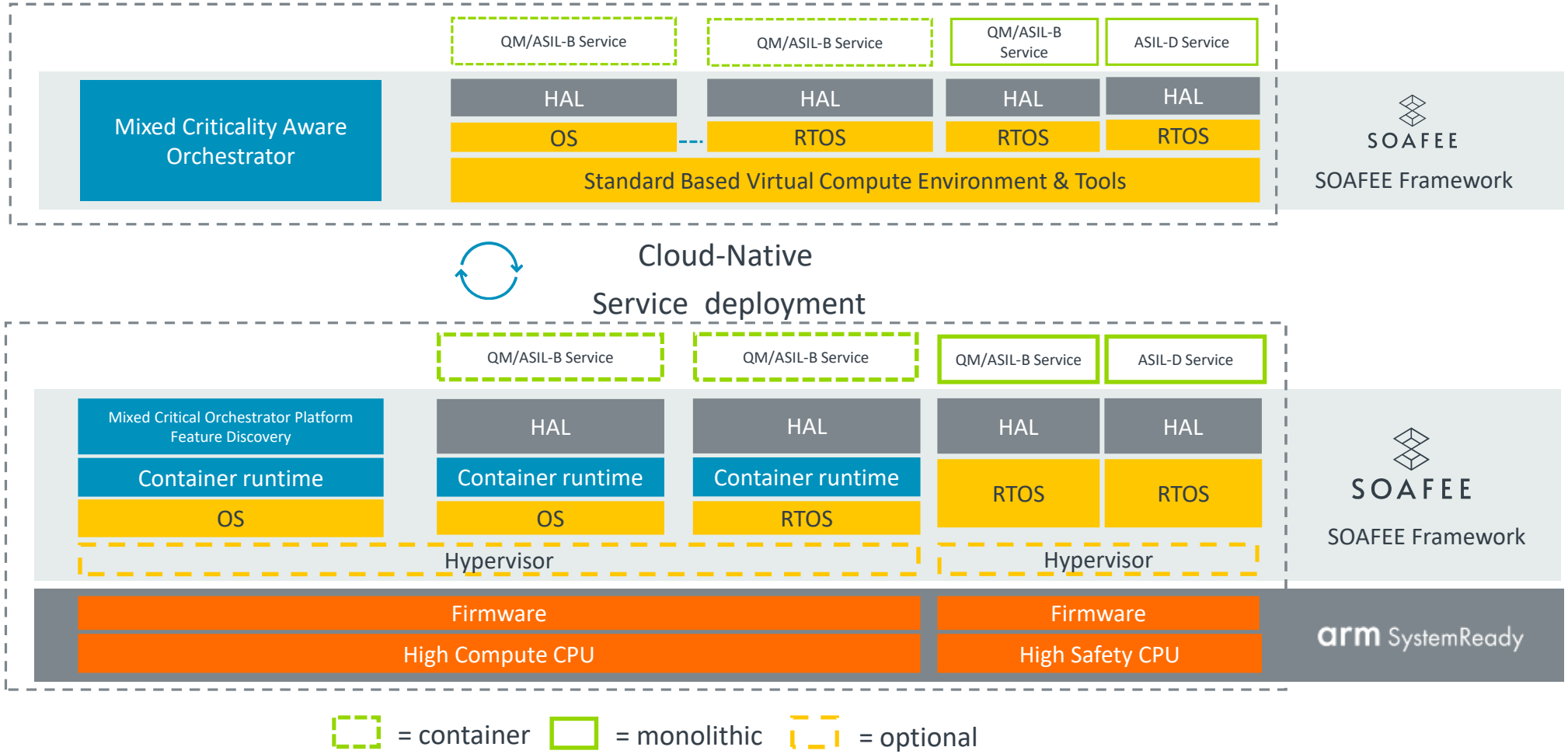
Cloud-Native Development of Multiple Workloads



arm

SOAFEE Cloud Native Architecture Vision

Framework for Enabling Mixed Critical Workload Across Cloud and Vehicle



arm

SOAFEE SIG – Formed October 2021

SOAFEE
Governing Members

arm aws BOSCH
CARIAD Continental Red Hat
SUSE woven planet

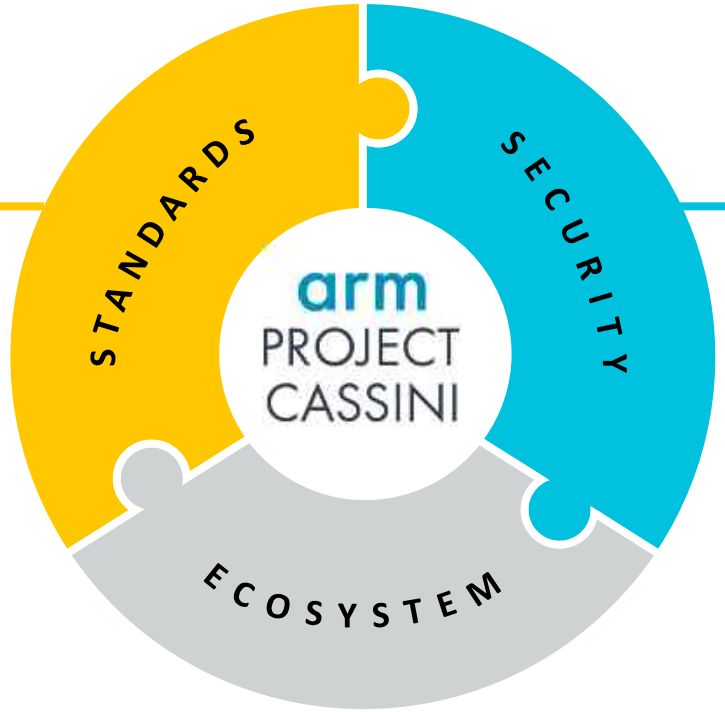
- 9 funding members
- Expanding quickly
- 59 voting working group members
- The SOAFEE VISION is to bring cloud-native development paradigm and its ubiquitous ecosystem to the highly diverse, heterogeneous compute platforms that will power the next generation of automotive and safety critical systems.

Project Cassini

Ensuring a cloud-native experience across a diverse and secure edge ecosystem

arm SystemReady

- Hardware, firmware specifications
- Certification program



psacertified™

PARSEC

- Security Certification program
- Open API for cross-platform security services

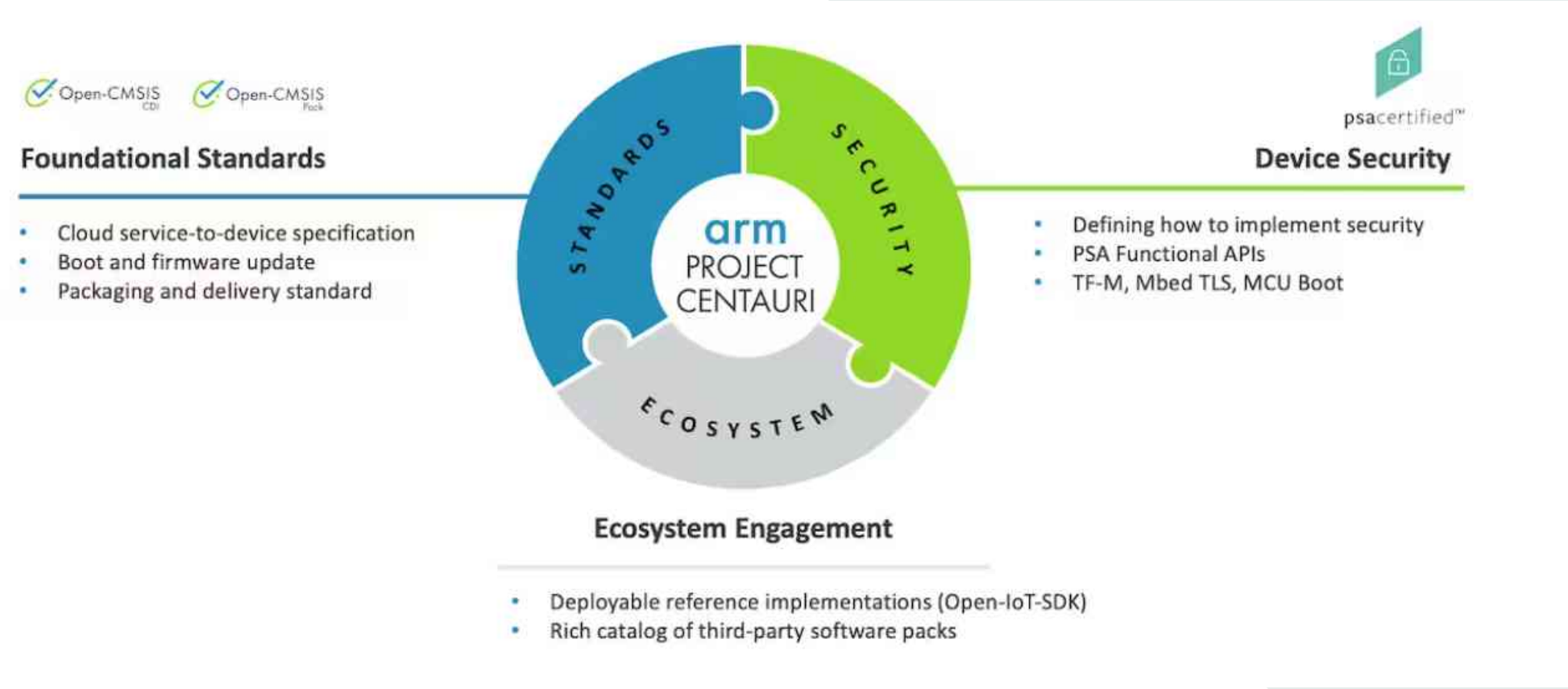
Cloud Native Stacks

- Edge Solution Reference Implementations

arm

Driving Rapid, Exponential IoT Growth with Arm-based Microcontrollers

- Project Centauri will define foundational standards to ensure IoT applications can be portable across virtual and physical MCU hardware. It will use secure firmware updates from different cloud service provider (CSP) stacks to demonstrate this capability.
- Arm is working with the ecosystem in the open to ensure that the standards are delivered by silicon partners in their SDKs, used by CSPs in their IoT clients, and is available to ODM and OEMs to use



Arm SystemReady Partners

arm SystemReady

OSVs

CANONICAL, Microsoft, Red Hat, SUSE, vmware

SiPs

AMPERE, BROADCOM, FUJITSU, MARVELL, MEDIATEK, nuvoTon, NVIDIA, NXP, RENESAS, Rockchip 瑞芯微电子, SIPEARL The Silicon Pearl, XILINX

EDAs

cadence, SYNOPSYS

IFVs

ami, BYOSOFT, phoenix technologies, Semihalf

OEMs/ODMs

AAEON an ASUS company, ADLINK, ADVANTECH Enabling an Intelligent Planet, PRO, ASUS IoT, AVANTEK COMPUTER, bamboo, Compulab, congatec, CyberTAN, DIGI, EUROTECH Imagine. Build. Succeed., GIGABYTE, HAWKEYE TECH, Hewlett Packard Enterprise, 华辰连科 HuachenLink, kontron S&T Group, Lanner, Lenovo, NEXCOM, NORCO, PEGATRON, PHYTEC, Raspberry Pi, Scalys, SECO, SolidRun, 日海飞信, Toradex Swiss. Embedded. Computing., Variscite, wiwynn

Communities

Linaro, OpenGCC, yocto PROJECT PARTICIPANT

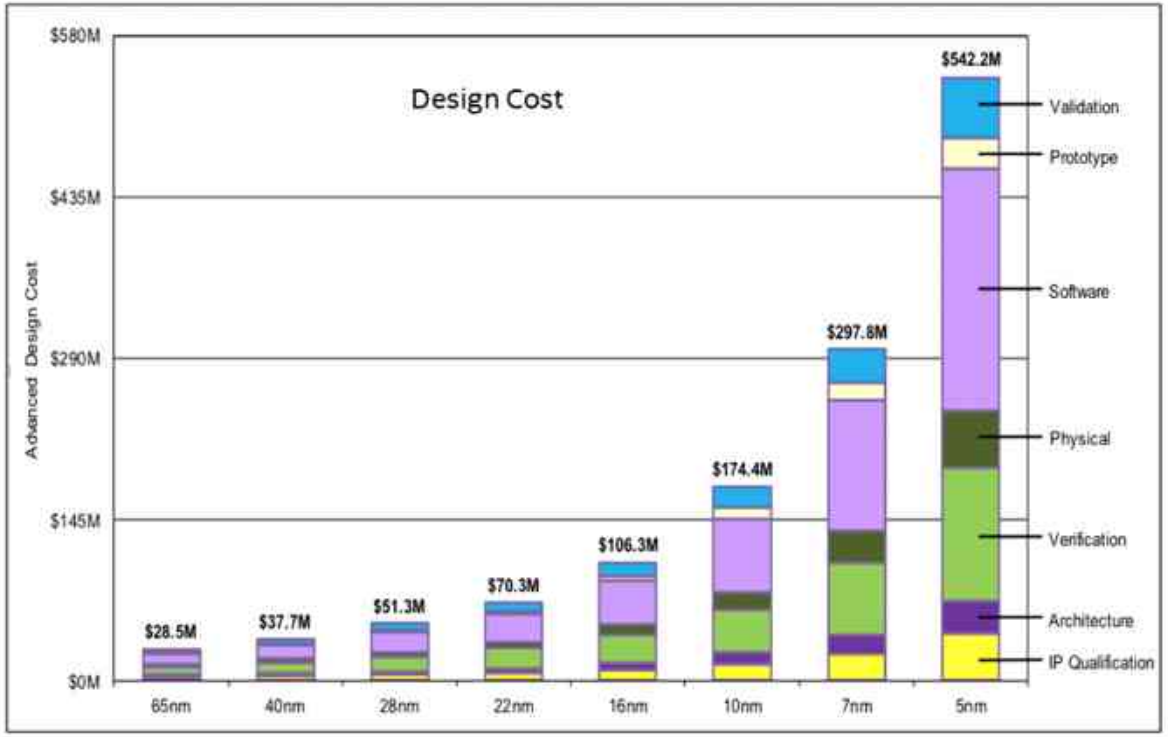
arm

arm

Trend in chip integration/packaging

Economics Driving Chiplet Investments

- Increasing design cost with less benefit
  - Logic continues to scale, but IO & SRAM only shrinking by 5~10%
- SoC NRE limiting product derivatives
  - Chiplets lowers overall platform cost and barrier to deploy a diverse product portfolio
- Market demands performance and efficiency
  - New chiplet technology offers a 20x speed and power improvement over traditional PCIe SERDES



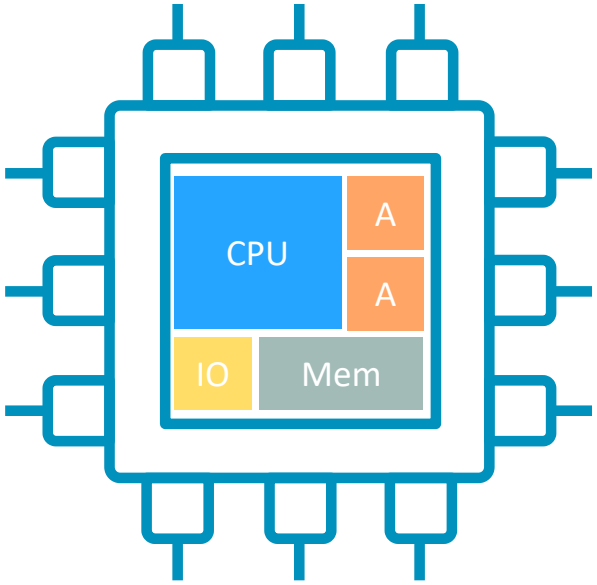
Source: IBS, as cited in IEEE Heterogeneous Integration Roadmap

arm

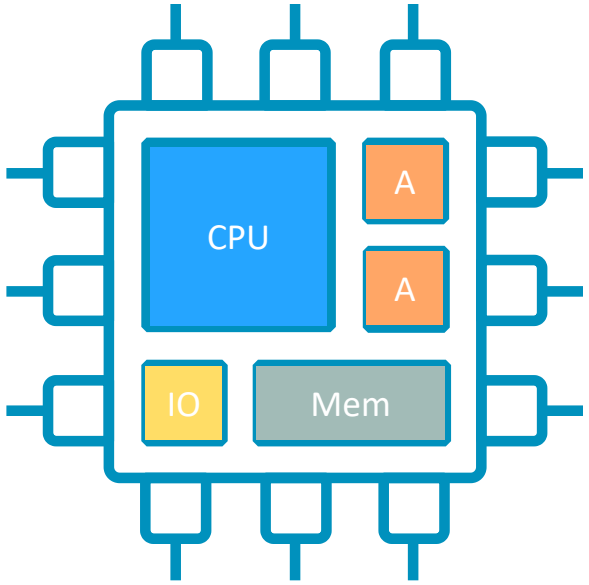
SoC Accelerator Framework for Heterogenous Compute

Moving from Monolithic to Chiplet

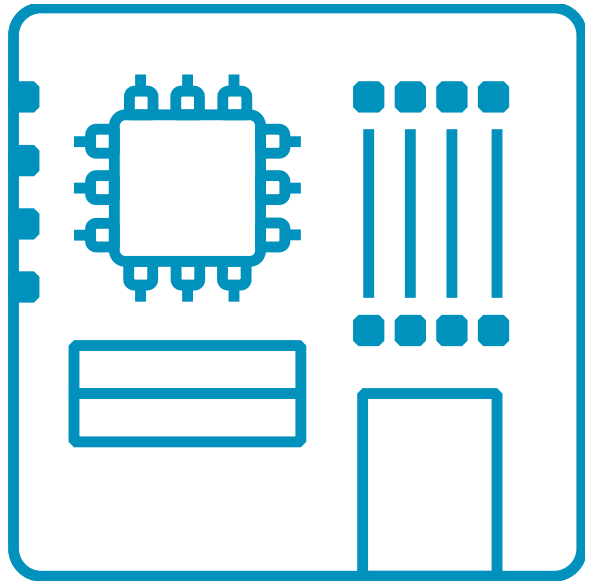
SINGLE DIE
(AMBA)



MULTI-DIE
(UCIe)

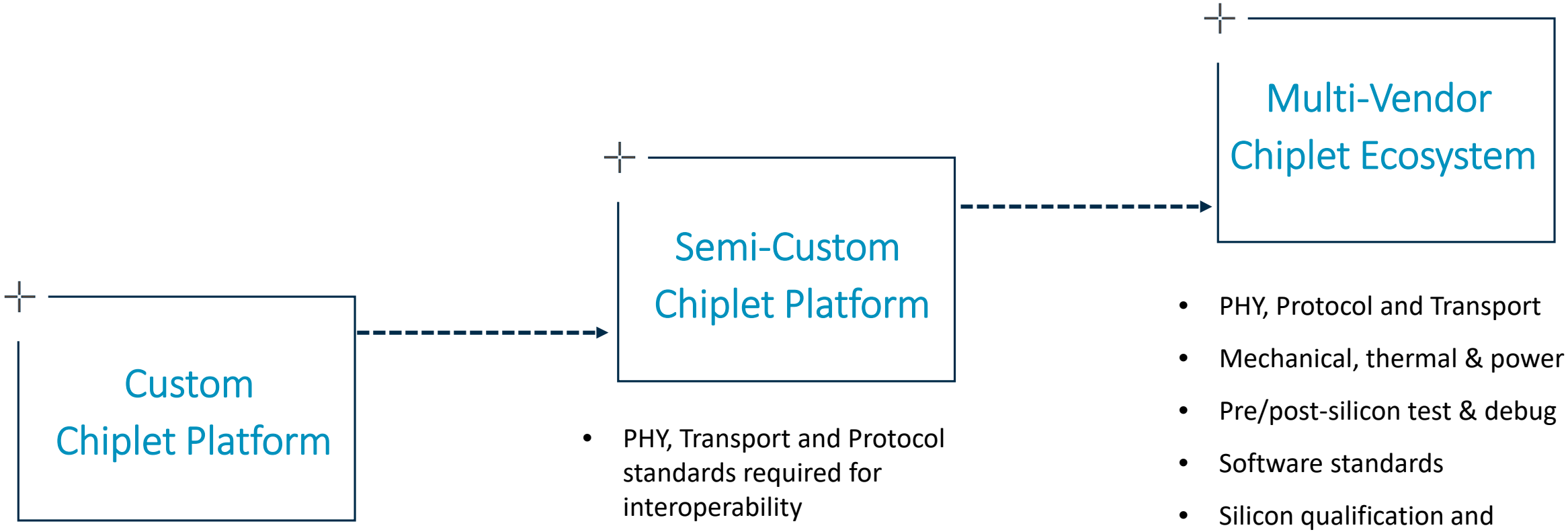


MULTI-CHIP on
PCB
(PCIe, CXL)



arm

The Path to a Chiplet Ecosystem



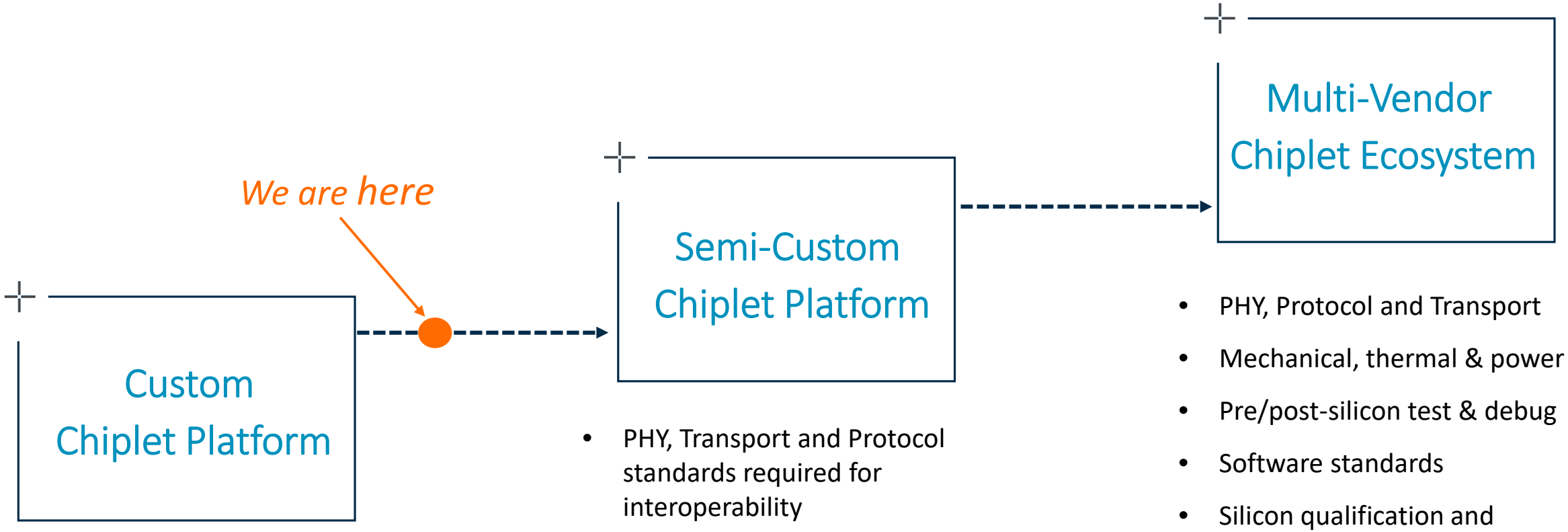
- PHY, Transport and Protocol standards drive IP development and broader adoption

- PHY, Transport and Protocol standards required for interoperability

- PHY, Protocol and Transport
- Mechanical, thermal & power
- Pre/post-silicon test & debug
- Software standards
- Silicon qualification and reliability

arm

The Path to a Chiplet Ecosystem



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- PHY, Protocol and Transport
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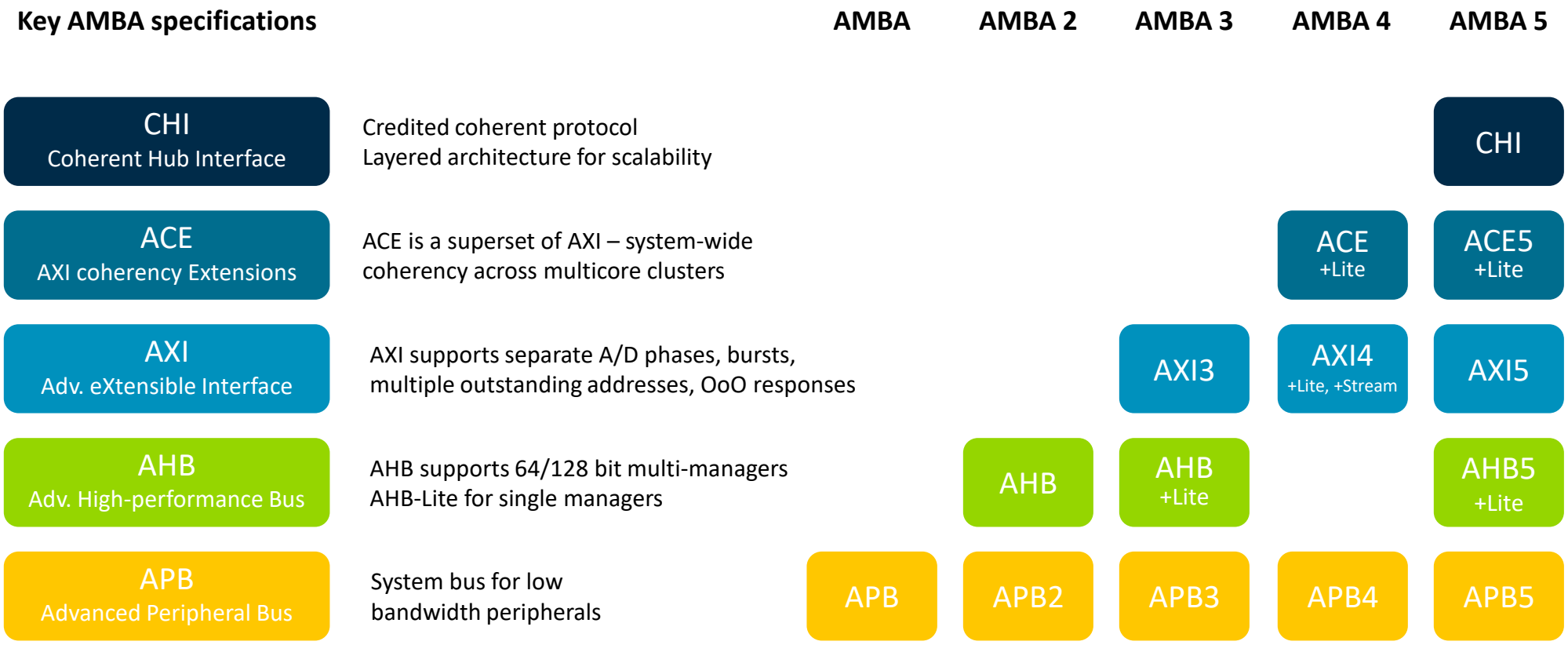
- Software standards
- Silicon qualification and reliability

arm

AMBA: Specifications, Interface and Protocols Diagram

Key AMBA Specifications: CHI, ACE, AXI, AHB, APB



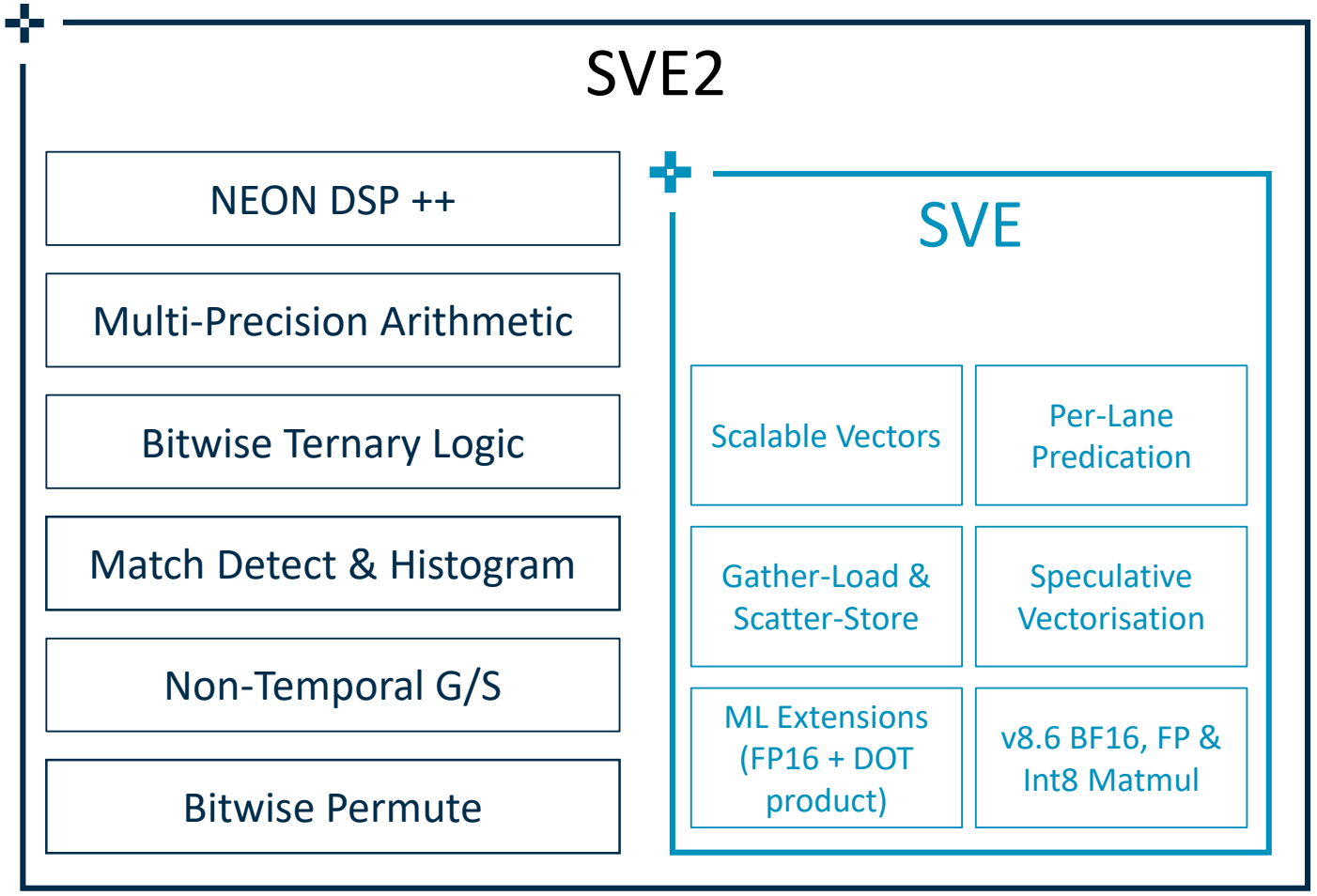
Selected AMBA specifications only. Other specifications include: ATB, ATP, CXS, DTI, GFB, LPI and LTI.

arm

Scalable Vector Extensions (SVE and SVE2)

Enabling vector length agnostic programming

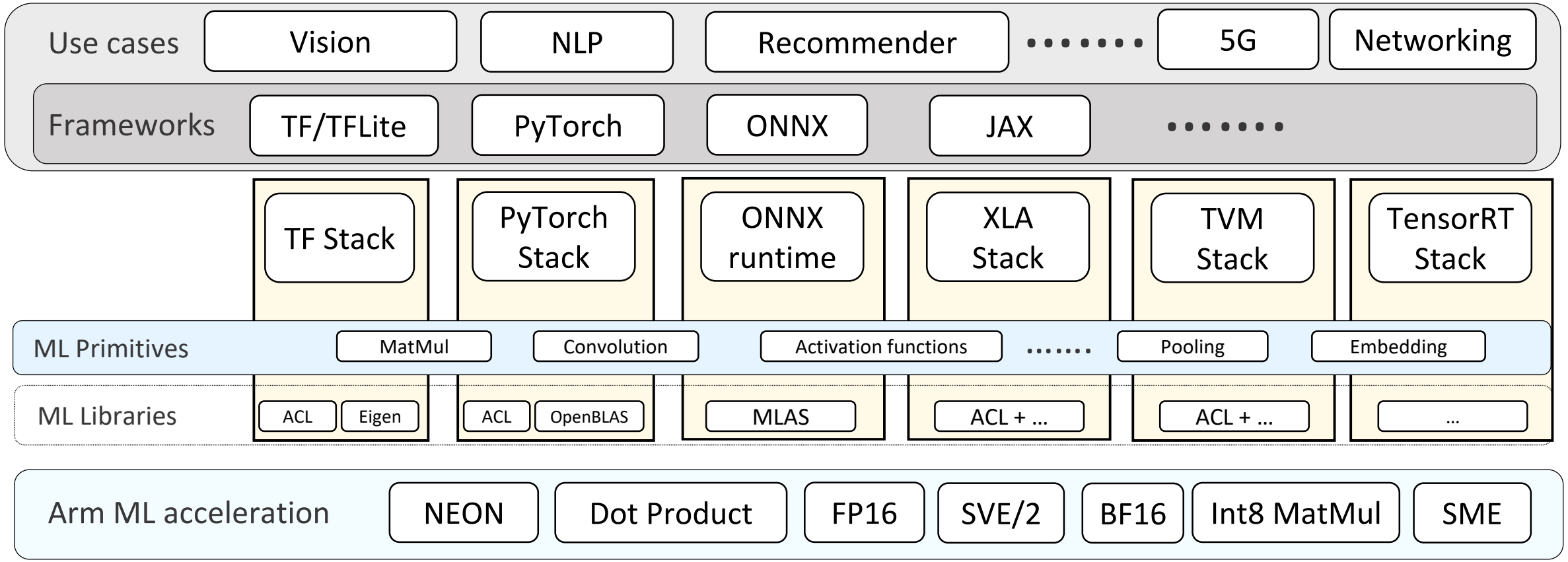
- SVE and SVE2 are variable length vector extensions for Arm
  - Enables Vector Length Agnostic (VLA) programming
  - Tackles traditional barriers to auto-vectorization
- SVE2 covers all traditional Neon use cases
  - Original SVE targeted at HPC
- Further reading:
  - Introduction to SVE and SVE2
  - SVE2 programming examples



arm

Machine Learning on Arm Servers

Supports all major frameworks



https://community.arm.com/arm-community-blogs/b/tools-software-ides-blog/posts/aarch64-docker-images-for-tensorflow-and-pytorch

arm

Software Workloads Performance on Arm Neoverse

- Higher performance
- Lower power for same workloads
- Deployed cost advantage

Integration		
Cloudflare +57% perf/W	Wordpress +17% perf -34% cost	Magento +60% perf

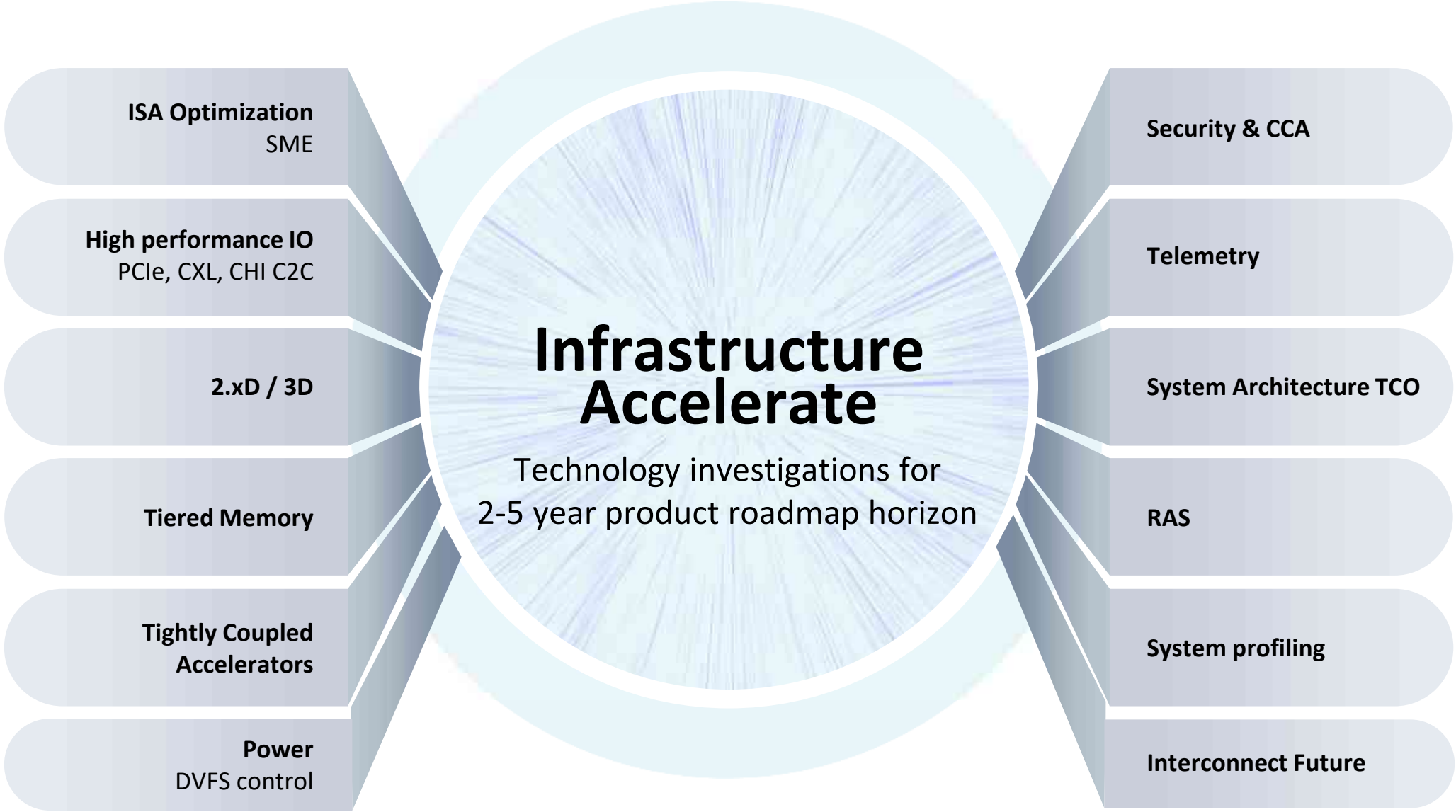
Java	Runtimes	Firewall, Security	Key-value/ search	Object store	Data-analysis / ML	
OpenJDK Major uplifts	PHP +17% perf -20% cost	Snort Hyperscan +150% perf	ElasticSearch Memcached Redis Etcd +15-50% perf -20-80% cost	MongoDB Cassandra -30-45% cost	Spark +55% perf -60% cost	Hadoop +40% perf

Reverse-Proxy Load-balancer	Video Encode		Compression	Database		Storage		EDA
Nginx +54% perf -20% cost	H.264 +10% perf -35% cost	H.265 +25% perf -40% power	Zstd Snappy +40% perf -75% cost	mySQL Clickhouse +26% perf	Spark SQL + 50% perf	NVME +60% headroom	Ceph +25% perf -50% power	Cadence Xcelium +150% perf

Orchestration, Deployment	Gitlab, Kata, Docker, K3s
Service-Mesh	Istio/Envoy

arm

Arm Neoverse - Infrastructure Accelerate



arm

arm

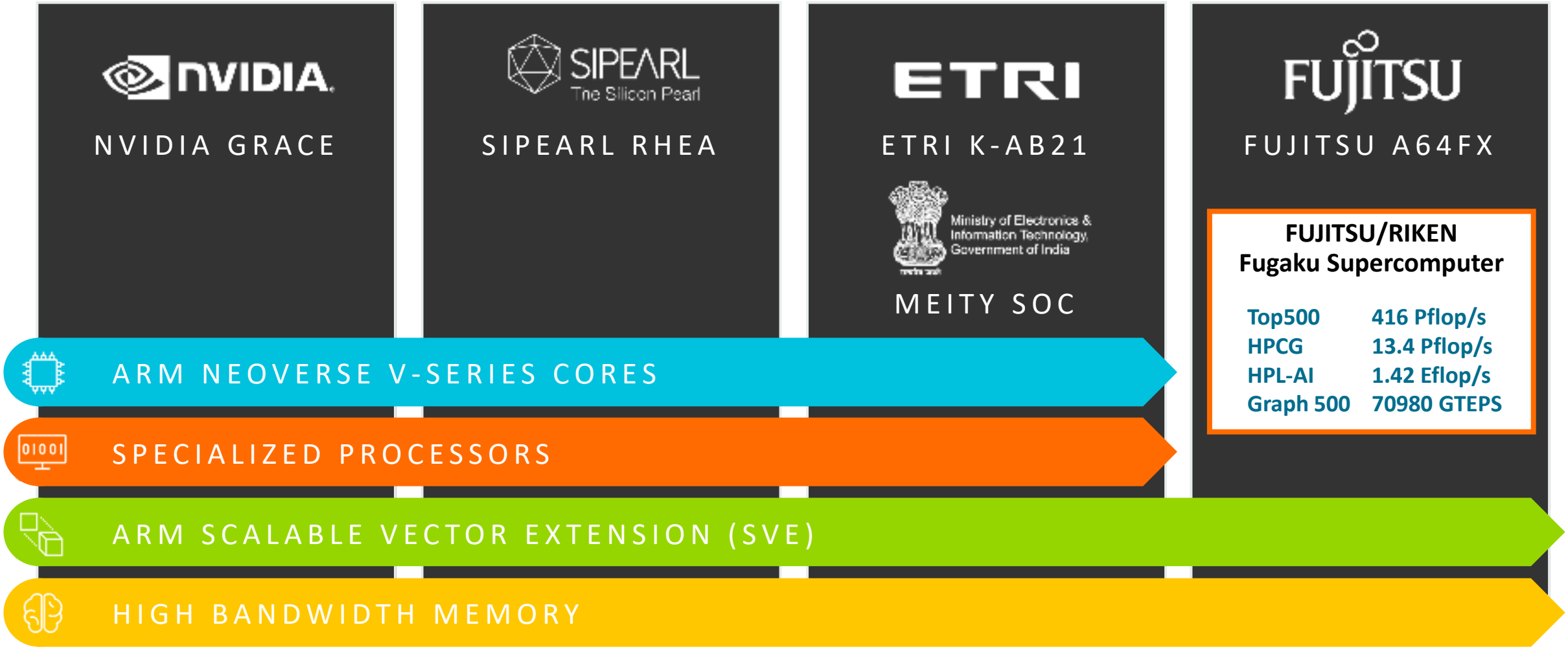
HPC on Arm

Grace and the Next Part of the Journey

- Swiss National Supercomputing Center deploying Grace
- Named “Alps”, it’s built on:
  - The new NVIDIA Grace CPU
  - NVIDIA HGX supercomputing platform
  - NVIDIA GPUs and the NVIDIA HPC SDK
  - HPE Cray EX supercomputer product line

arm

Arm Is the Driving Force Behind Exascale-Class CPUs

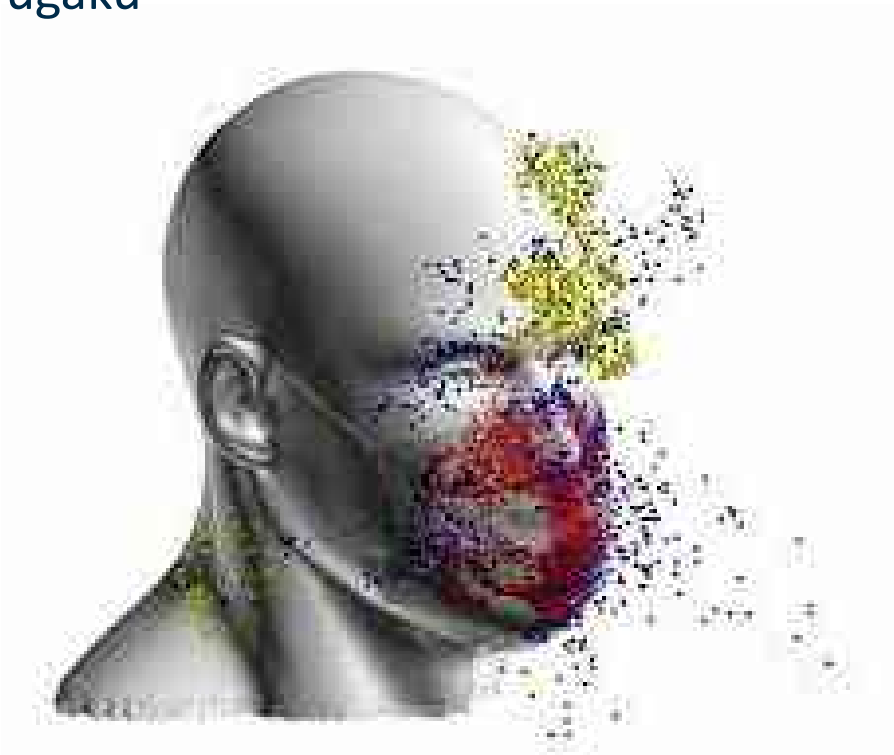


arm

COVID Research at RIKEN with Fugaku Fujitsu A64FX

Four-time #1 on Top500

"COVID-19: Wear Mask & Ventilate,"
said Fugaku



Linpack (#1)	442 Pflop/s
HPCG (#1)	16.0 Pflop/s
HPL-AI (#1)	2.0 Eflop/s
Graph 500 (#1)	102956 GTEPS

arm

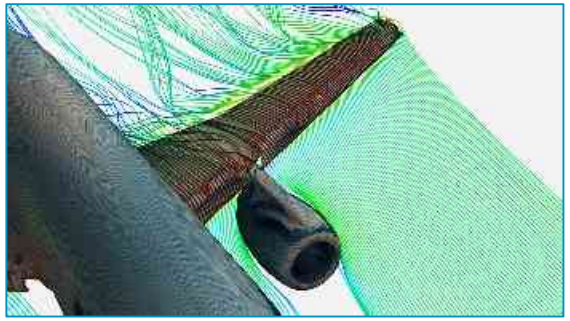
Ansys on Arm

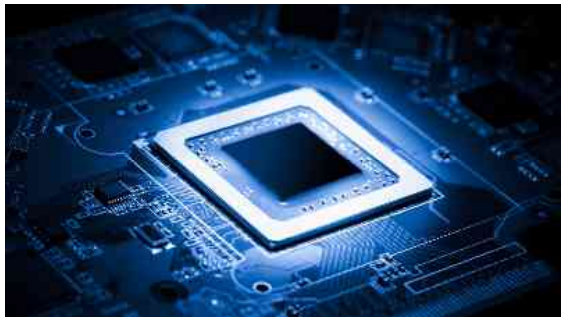
Engineering

Ansys Fluent® 2022 R2
(beta support)

LS-DYNA® 11.2.2
and 13.1

Electronic Design Automation





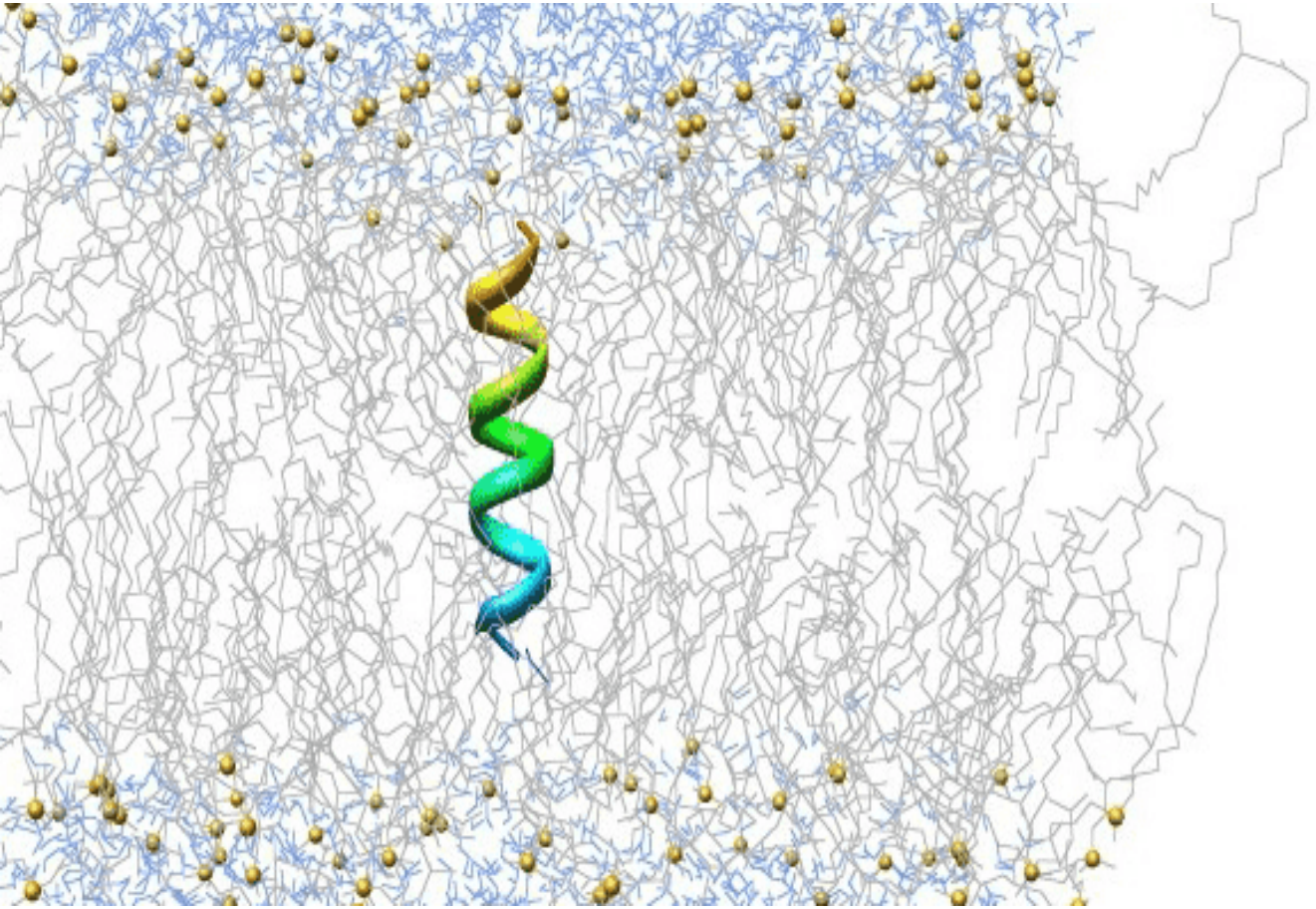
Ansys Power Library
for RedHawk-SC™
2021 R2

Ansys RedHawk-SC™
2022 R2
(beta support)

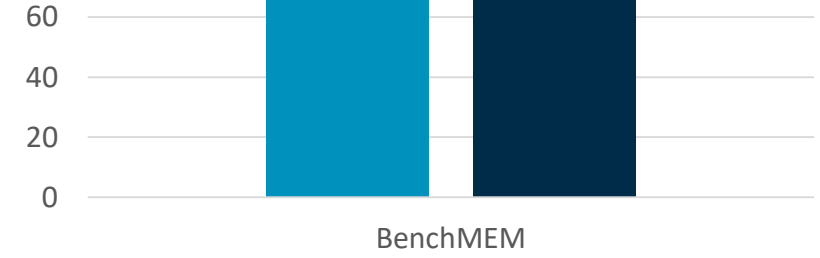
Ansys RedHawk-SC
Security™
2022 R2
(beta support)

Ampere Altra Max and GROMACS

128 cores at 3.0 GHz in a single socket



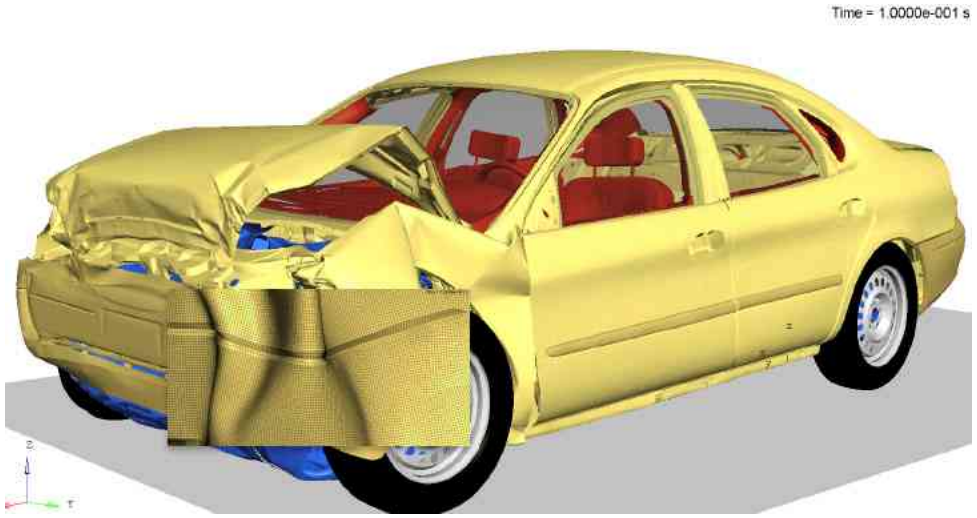
GROMACS
FAST. FLEXIBLE. FREE.

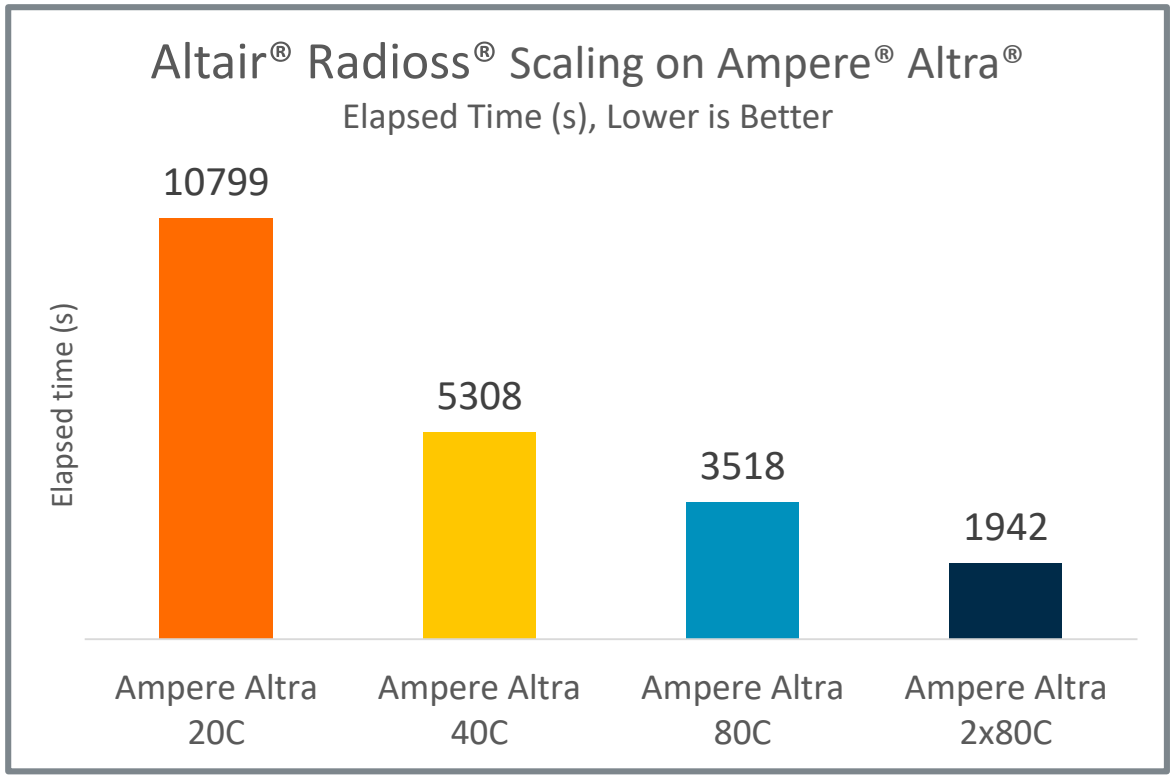


arm

Altair® Radioss® for Arm

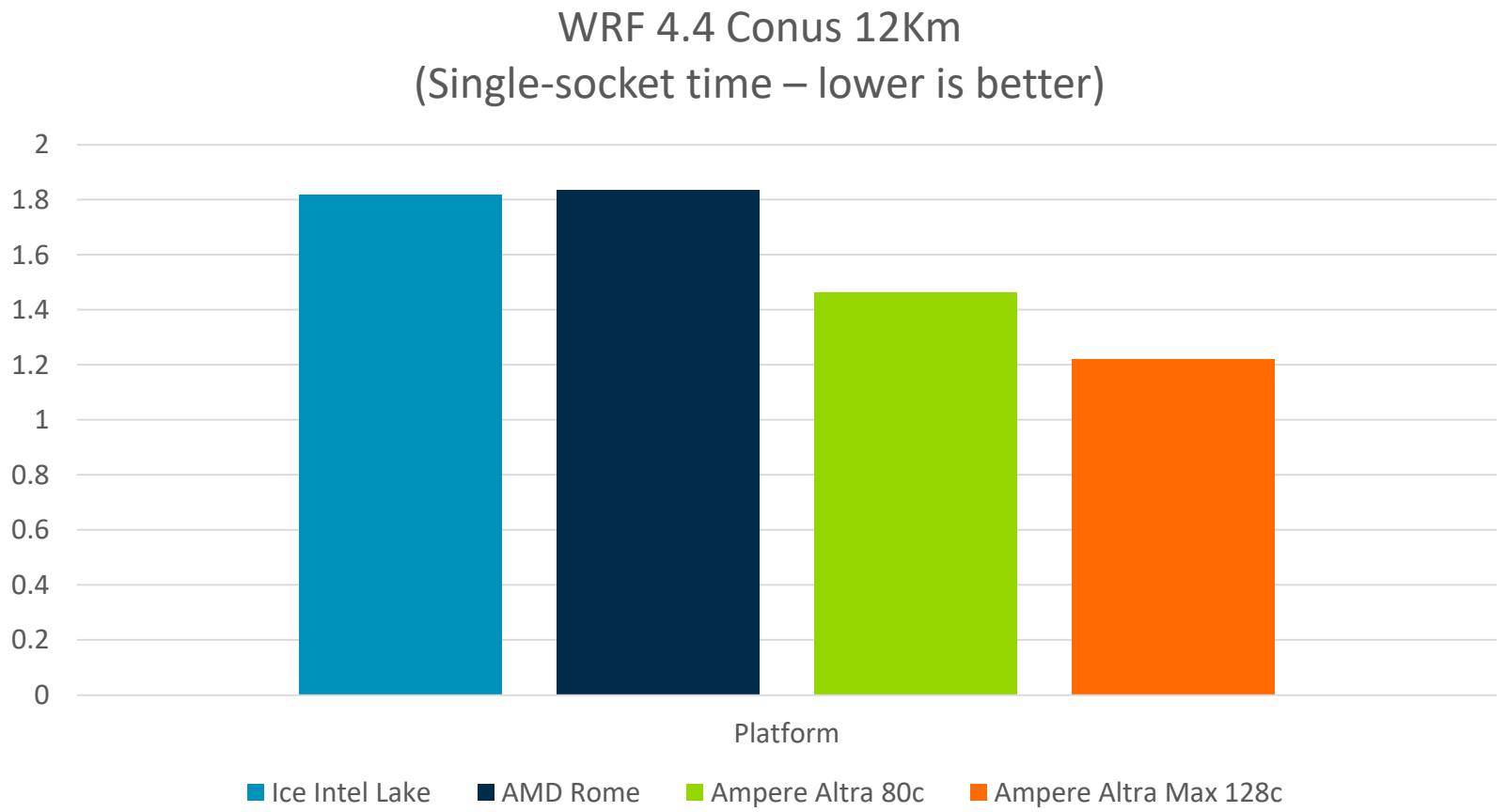
- Arm Neoverse N1 platform
- Ampere® Altra® 80C CPU at 3.0GHz
- 256GB DDR4 3200
- 70% efficiency scaling from 20 to 160 cores





Weather and Climate

Arm partners providing leadership performance and cost



arm

EU related activities

- EPI
- EU chip act: Chip design platform
- …

Sipearl / EPI

- Since day 1, Arm is collaborating with the EU and the EPI
- Sipearl & Arm made the decision to work together leveraging the arm ecosystem strengths
- No other party in Europe is playing in the same league as Sipearl
- Heavy and strategic engagement for both Sipearl, EU, France & Arm's ecosystem
- Sipearl building its own ecosystem

SiPearl works with AMD on GPU su Arm HPC chip

Duo also hope to support development of exascale computing at res

Dan Robinson Tue 15 Nov 2022 17:30

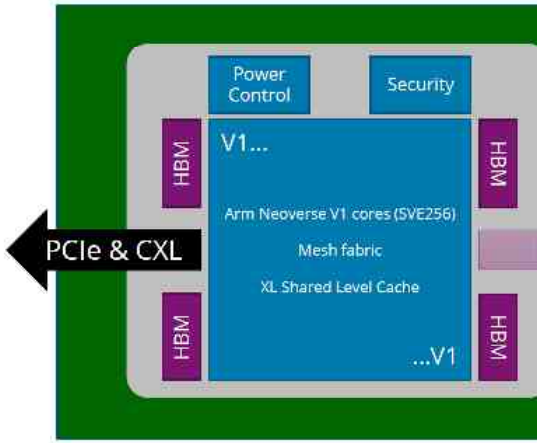
Chip designer SiPearl is working with AMD on software support to enable supercomputing systems that pair SiPearl's high-performance Rhea processor with AMD's Instinct GPU accelerators.

At the heart of Rhea

With its high-performance, low-power Arm Neoverse V1 architecture, Rhea will meet the needs of all supercomputing workloads.

Key features

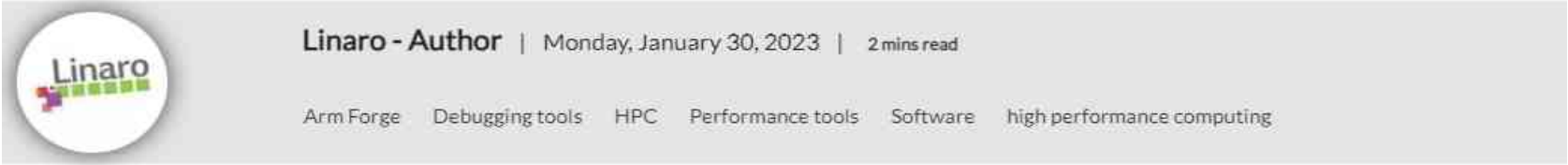
Core	- Arm architecture - Neoverse V1 cores - SVE 256 per core supporting 64/32/BF16 and Int8 - ArmVirtualization extensions
SoC	- Arm mesh fabric - Advanced RAS support including Arm RAS extensions - Link protection for NoC & high-speed IO - ECC support for selected memory
Cache	- Large L3 (Shared Level Cache) - RAS supported for all cache levels
Memory	- HBM2e - And DDR5 - ECC for memory and link protection for controllers
High Speed I/O	- PCIe, CCIX & CXL - Root and endpoint support
Other I/O	- USB, GPIO, SPI, I²C
Power Management	- Power management block to optimize perf/watt accross use cases and workloads.
Security Block Support	- Secure boot and secure upgrade - Crypto - True random number generation - Made in Europe



Rhea will deliver extraordinary real compute performance and efficiency with an unmatched Bytes/Flops ratio.

Linaro to Acquire Arm Forge Software Tools Business

marcin.krzysztofik@linaro.org



Linaro - Author | Monday, January 30, 2023 | 2 mins read

Arm Forge Debugging tools HPC Performance tools Software high performance computing

Linaro Limited, the UK open source collaborative engineering organisation which develops software solutions and provides software development tools and services for the Arm® ecosystem, today announced that it has signed a definitive agreement with Arm to acquire those assets relating to the Arm Forge high performance computing (HPC) tools business (Arm Forge). Arm Forge provides leading debug and performance analysis tools across multiple compute architectures for server and HPC applications.

The Arm Forge suite of tools helps users maximise the efficiency of software for HPC by providing them with the ability to optimize the performance and efficiency of their code from the latest compilers and C++ standards to Intel, 64-bit Arm, AMD and Nvidia GPU hardware.

"Arm acquired Allinea and the Forge product line (now Arm Forge) in 2016 to ensure that Arm and its ecosystem had access to essential developer technologies required to succeed in the HPC and cloud markets," said Javier Orensanz Martinez, vice president development solutions, Arm. *"Since then, Arm and our partners have established a strong and rapidly growing position in this space, with every major hyperscaler now offering Arm instances, and Arm-based systems for HPC and server applications available from leading OEMs. Forge tools are available and thriving across the market, and the time is right for a trusted partner like Linaro to continue to develop and grow this business."*

arm

Linaro Forge

Debugging and Optimization Tools for HPC

Linaro Forge

Linaro Forge

An interoperable toolkit for debugging and profiling

The de-facto standard for HPC development

- Most widely-used debugging and profiling suite in HPC
- Fully supported by Arm on Intel, AMD, Arm, IBM Power, Nvidia GPUs, etc.

State-of-the art debugging and profiling capabilities

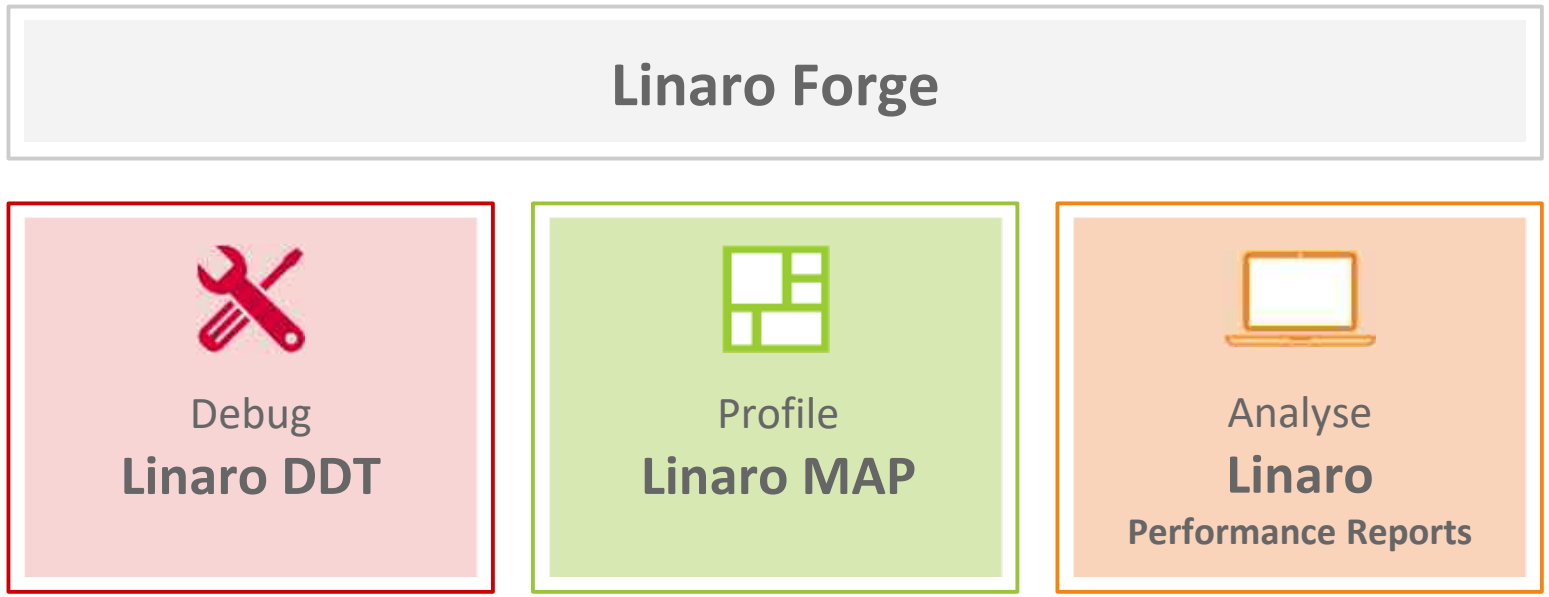
- Powerful and in-depth error detection mechanisms (including memory debugging)
- Sampling-based profiler to identify and understand bottlenecks
- Available at any scale (from serial to petaflopic applications)

Easy to use by everyone

- Unique capabilities to simplify remote interactive sessions
- Innovative approach to present quintessential information to users

HPC Development Solutions from Linaro

Best in class commercially supported tools for Linux and high-performance computing (HPC)



Performance Engineering for any architecture, at any scale

Arm France SAS

- One of the 3 CPU clusters in Arm
- 350+ engineers
  - Advance technologies
  - Processors
  - Security
  - Physical IP
  - Compiler
  - Hpc
- ~1000 European employees (outside UK)
- Hiring in EU/UK
  - Graduate to experimented

Neoverse platform Momentum

- ARM silicons are adressing HPC requirements and been deployed gradually
  - Grace-Hooper, Fujitsu Monaka, Sipearl….
- All leading Hyperscalers have endorsed Arm Neoverse as main & smartNic/DPUs
  - AWS, Oracle, Alibaba, Microsoft, Google, Tencent, Baidu, Equinix, and others are incorporating Arm technology into their services. Some also design their own processors.
  - Annapurna Labs, Ampere Computing, NVIDIA, Intel, Marvell, Pensando Systems, and others use Arm Neoverse and Arm technologies to create cloud-optimized CPUs and DPUs.
- Arm servers available from ODMs/OEMs
  - Gigabyte, Wywinn, HPE …
- Cloud native development enable new horizons for automotive, IOT, industrial developpers
- Arm working closely with the EU to contribute to the EU Chip act initiative

arm

Thank You
Danke
Gracias
Grazie
谢谢
ありがとう
Asante
Merci
감사합니다
धन्यवाद
Kiitos
شكرًا
ধন্যবাদ
תודה