

Forum TERATEC

20 - 21 OCTOBRE 2026

PARIS · PALAIS DES CONGRÈS

From a EU concern to the European CPU built for sovereign HPC and beyond

Vincent Casillas, Chief Technology Officer - SiPearl

At the beginning, **the European Processor Initiative**



The situation in Europe at the end of 2018

Slide from the archives of the European Processor Initiative (EPI) consortium

CPUs control almost every aspect of our lives

- **Security issues**: backdoors, kill switch, etc.
- **Embargo risks**: risk of **future restrictions on exports to the EU** due to increased protectionism.

A necessary European response

- **A competitive European supply chain** for HPC technologies, driving growth and job creation within Europe.
- **Sovereignty:** data security, embargoes, and impact of the economy.

Amazon exec and Super Micro CEO call for retraction of spy chip story

'[Tim Cook] is right. Bloomberg story is wrong about Amazon, too.'



NSA May Have Backdoors Built Into Intel And AMD Processors



The US Cloud Act v The EU's GDPR - Data Privacy & Security

A group of researchers showed how a Tesla Model S can be hacked and stolen in seconds using only $600 worth of equipment

A jet sale to Egypt is being blocked by a US regulation, and France is over it



USA TODAY

Car hacking remains a very real threat as autos become ever more loaded with tech

archive image

Sources :
The Verge – "Amazon exec and Super Micro CEO ccall for retractation of spy chip story – October 22, 2018
Business Insider – "A group of researchers showed how a Tesla Model S can be hacked and stolen in seconds using only $600 worth of equipment - September 16, 2018
Detroit Free Press – "Car hacking remains a very real threat as autos become ever more loaded with tech" – September 2018
eTeknix – "NSA May Have Backdoors Built Into Intel And AMD Processors" – July 31, 2013, updated on January 25, 2018
Pearse Trust blog – "The US Cloud Act versus the EU's GDPR – Data Privacy & Security" – March 2018
Defense News – "A jet sale to Egypt is beign blocked by a US regulation, and France is over it" – August 1st, 2018

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The response of the European Union

EuroHPC Joint Undertaking

Launch of EuroHPC JU in September 2018

- Develop a new European supercomputing ecosystem: HPC systems, network, software, applications, access through the cloud
- Make HPC resources available to public and private users, including SMEs
- Stimulate a technology supply industry



Launch of a call for proprosals to foster the development of high-end European CPUs

- Won at the end of 2018 by the European Processor Initiative (EPI) consortium

European Processor Initiative

epi

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European Processor Initiative

The decisive factors of the proposal submitted to the EU call for proposals

1 Bringing high-performance computing to the exascale level
(1 billion billion calculations per second).

Supporting research and development in key areas.



2 Fostering the deployment of connected mobility through secure, end-to-end data processing at the edge of the network, from vehicles to smart cities via the cloud.



3 Equipping the first open acceleration platform, enabling AI start-ups to develop their own solutions at very low licence costs.



EPI consortium members in 2018 – EPI SGA1

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European Processor Initiative

A framework to foster the return of high-end processor technologies to Europe







Close cooperation between all EPI members

- To define the key features of the first-generation CPU for HPC workloads, Rhea1
- And to launch its design (hardware and software)



A private company incubated inside the consortium

- To design Rhea1
- To finance its development
- and bring it to market



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Then, **SiPearl**



SiPearl today

Incorporated
In France in June 2019,
deployed in Spain & Italy

Seed funded
By the European Union

Funded by the European Union

€130m Series A
with arm, 國泰創投 Cathay Venture, European Innovation Council Fund, European Investment Bank, Bull, France 2030

Sovereign design
Data centre in France

258 servers / **212TB** memory
14,000 cores / **3PB** storage

2 design wins
JUPITER & Alice Recoque,
the 2 first European exascale
supercomputers funded by
EuroHPC and EU Member States

Rhea1, right the 1st time
May 2026

200 employees
from Bull, MEDIATEK, ST, MARVELL, NXP, HPE, intel, NOKIA

Fabless IC design house
Manufacturing entrusted to
TSMC with N6P

tsmc

Technological partnership
Intellectual property

arm

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RHEA1 for HPC and AI

The most complex server CPU ever designed in Europe

SILICON PROCESS 6 nm TSMC N6

LOGIC DIE IN ADVANCED SILICON PROCESS

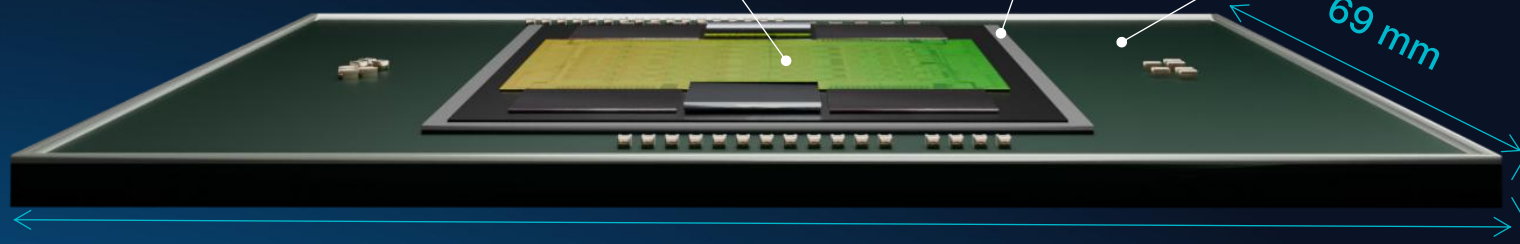
- 80 arm® Neoverse V1 cores(1)
- +61 billion transistors
- 7.8 billion equ. gates
- 16 metal layers
- 6 PCIe x16 Gen5
- 2 PCIe x4 Gen5
- 4 DDR5 interfaces
- 80 MB distributed SLC

SILICON INTERPOSER

- 2.5D advanced packaging
- 4 HBM 4x16=64GB

PACKAGE

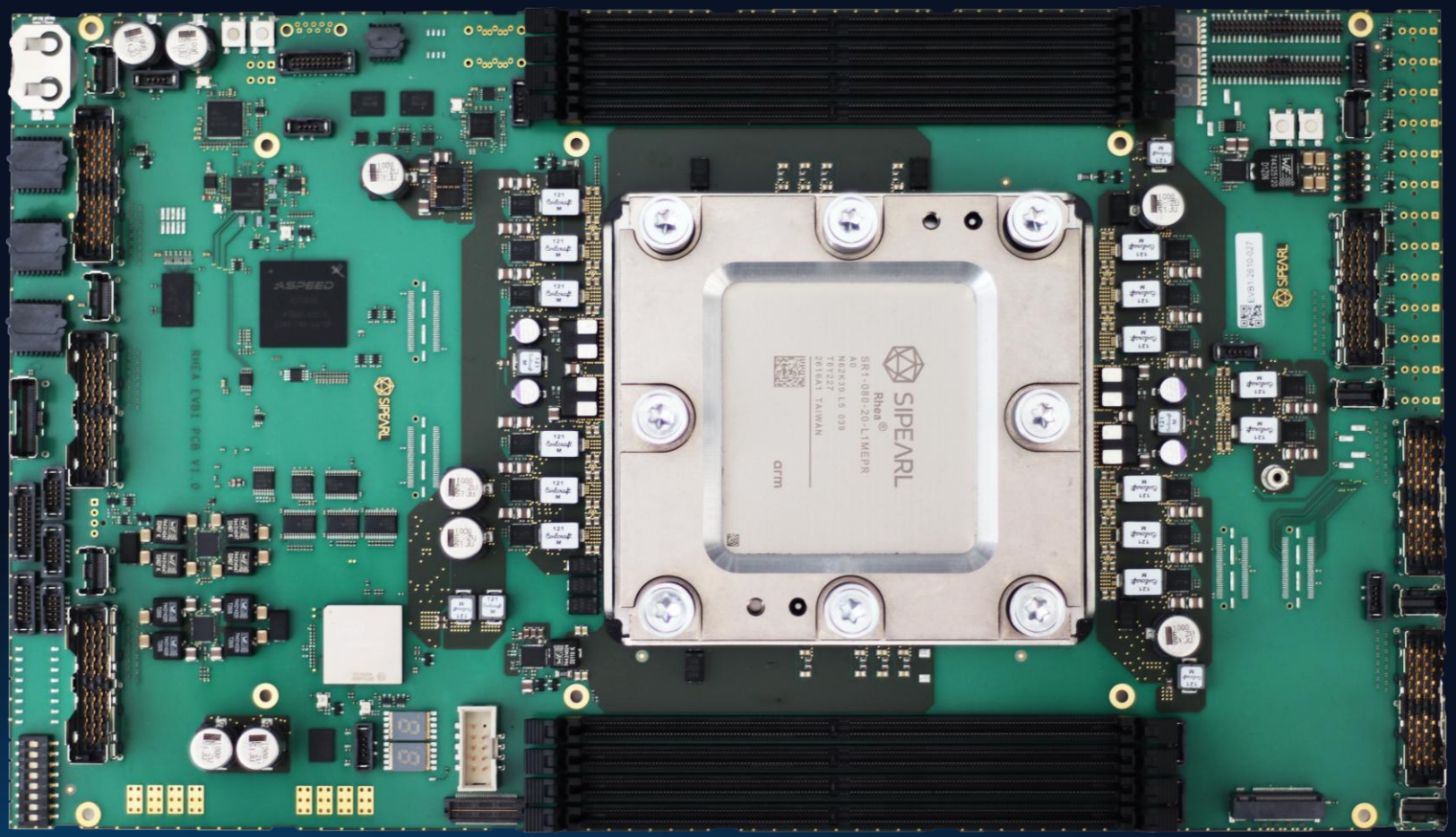
- 5,430 pins



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(1) with 2x SVE256 engines each

RHEA1 for HPC and AI





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Reference design server

SEINE REFERENCE SERVER

Multifunctional, flexible & versatile

1. Full expertise

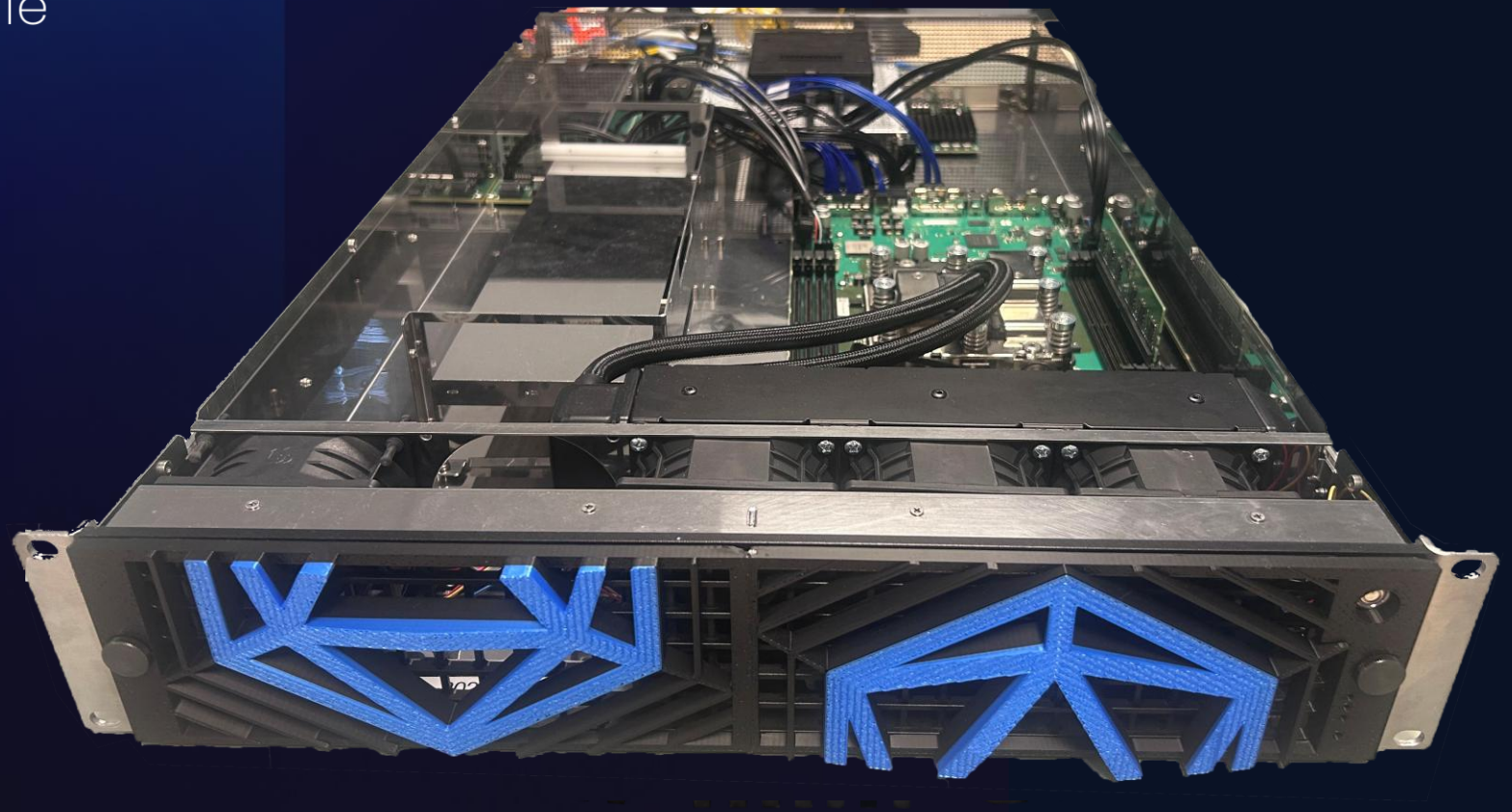
Processor: Architecture / Design / Go to production / Deployment

Server: Schematics / Layout / Thermals

2. Reference design

3. Validation & testing

4. Multiple demos



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Delivery of the 1st Rhea1 CPUs to Bull for JUPITER



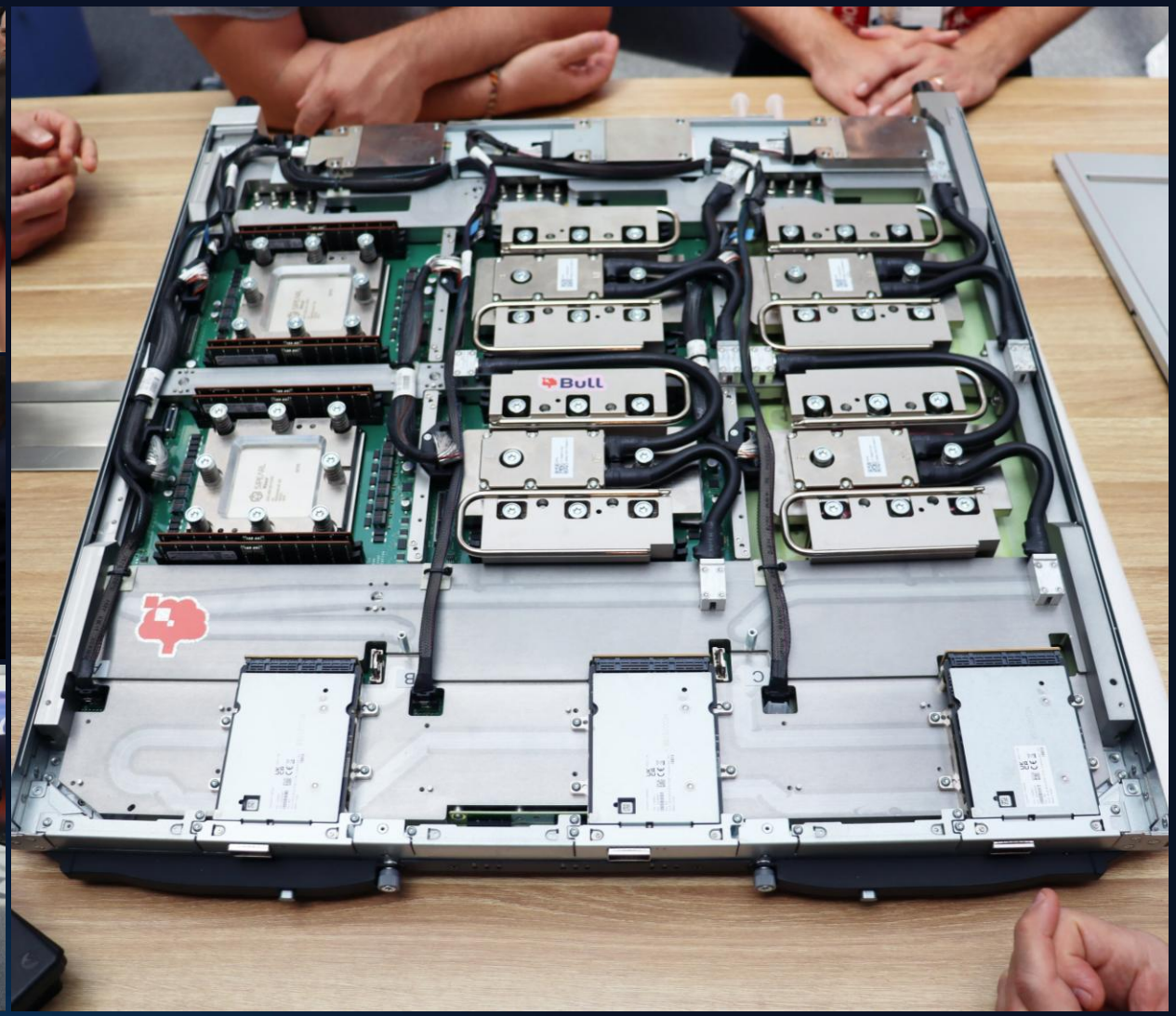






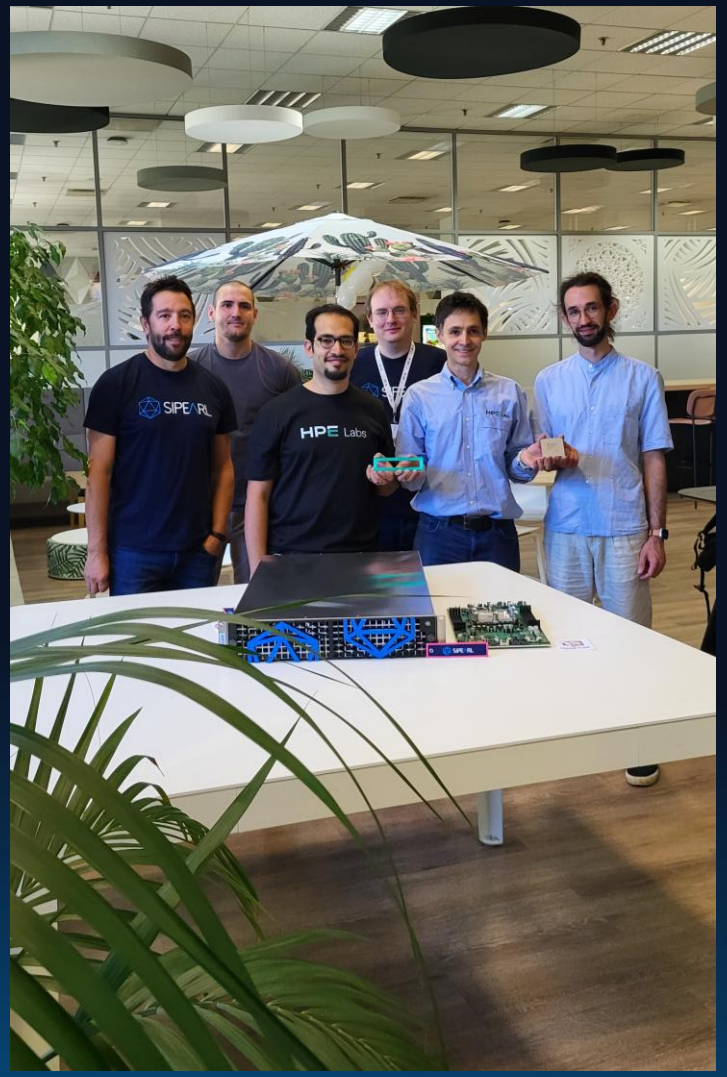


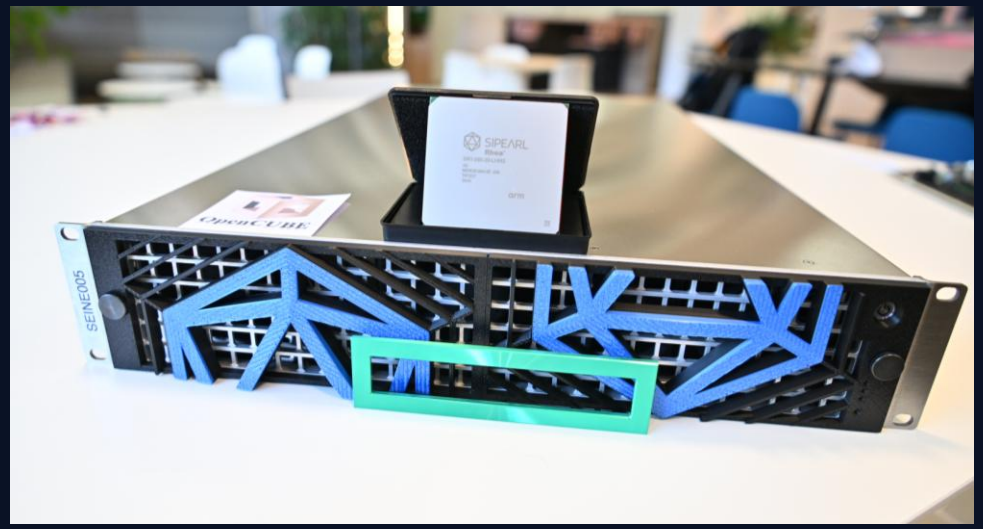




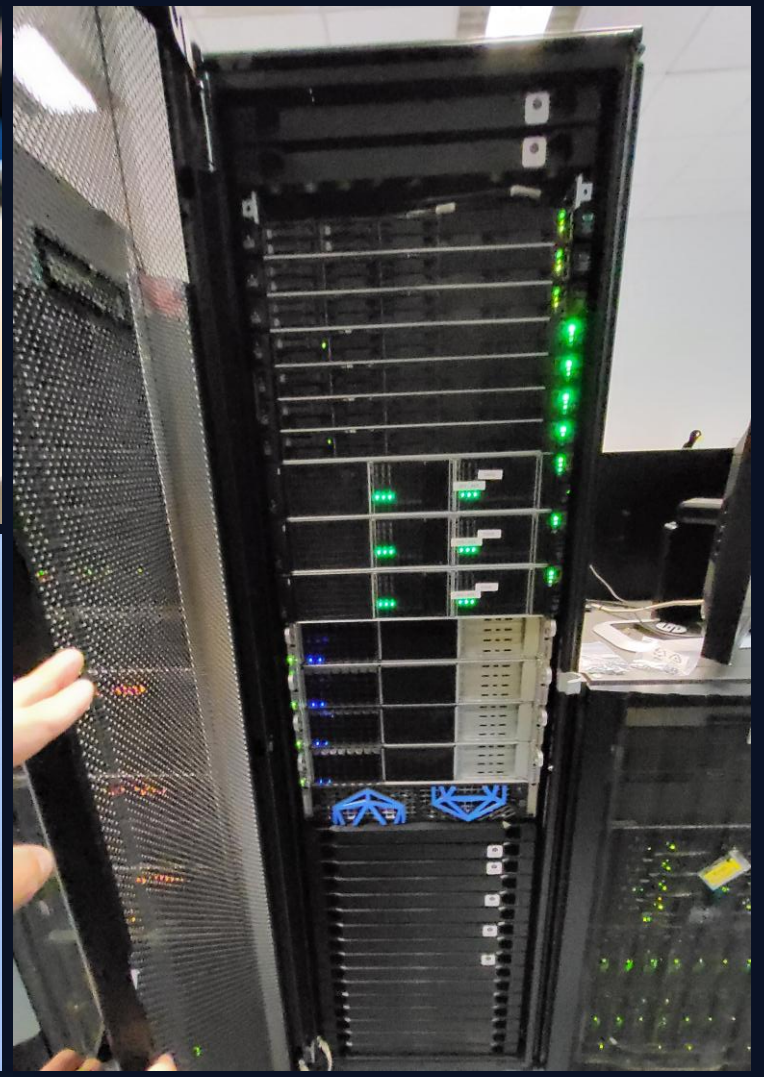
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Delivery of the 1st Seine Server to HPE for OpenCUBE project









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What's **next?**



How this work is useful in space domain



October 2026 – ESA call for FULL G-NODEB FOR SPACE BASED ON A EUROPEAN SIGNAL PROCESSING PLATFORM

September 2026 – Submission of CORTEX project with ALATYR
Orbital data center preparation (Rhea1DC or Athena1) with cooling and radiation tests

August 2026 – NTN Forum panel on CPU and chiplet technologies

June 2026 – Presentation to CNES for SATCOM usage

March 2026 – Presentation at ESA Component Workshop of SiPearl roadmap

October 2025 - First contact with ESA during EPI Forum in Paris

September 2025 –Application to EIC transition with TAS
Radiation tests on Rhea1 and evaluation of use case

July 2025 – New Space panel presentation by Philippe Notton

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Rhea1 family: a Defence CPU to fulfill strategic needs

ATHENA 1
Dual-use processor

Under design / Release H2 27

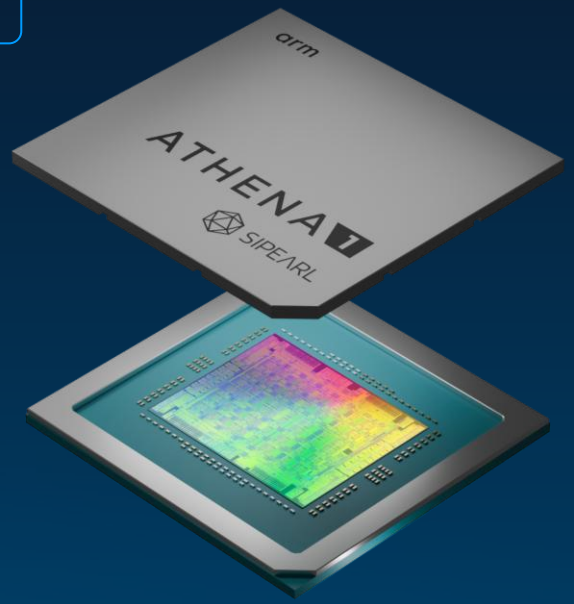
A bespoke version of Rhea1

European technology

SKUs of 16, 32, 48, 64 or 80
Arm Neoverse V1 cores

New packaging

No HBM





Defence

Aerospace

indra
RHEINMETALL
SAFRAN
AIRBUS DEFENCE & SPACE
LEONARDO
THALES
BAE SYSTEMS
DASSAULT AVIATION
SAAB
FINCANTIERI
Helsing
MBDA MISSILE SYSTEMS

Rhea1 family: more to come, stay tuned.

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For the future: chiplet for specialized processing

SiPearl chiplets and co-designed chiplets

Base



Chiplets library

- **Compute Chiplet** — SIPEARL
- **AI Accelerator**
- **Cyber**
- **I/O**

Off the shelf I/Os chiplets

Memory interfaces

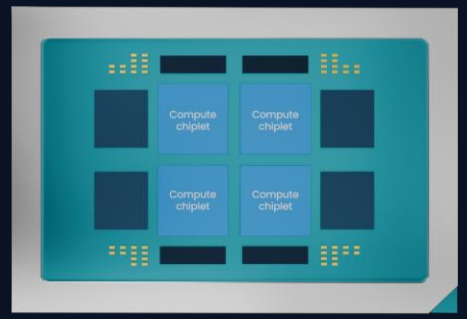
- DDR
- HBM
- LPDDR

Communication interfaces

- PCI-e
- CXL
- Ethernet
- Photonics

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A fully disaggregated CPU platform



SIPEARL

CPU with multiple compute chiplets

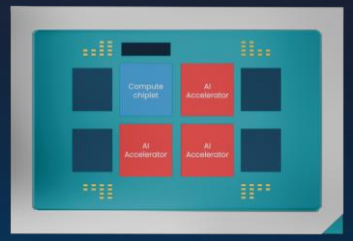
Compute chiplet

KGD[1]

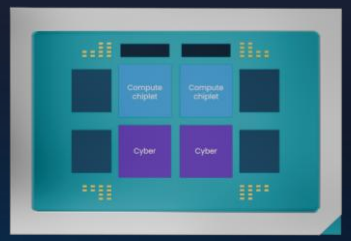
Silicon process: 3nm or less

Illustrations of CPU chiplet approaches

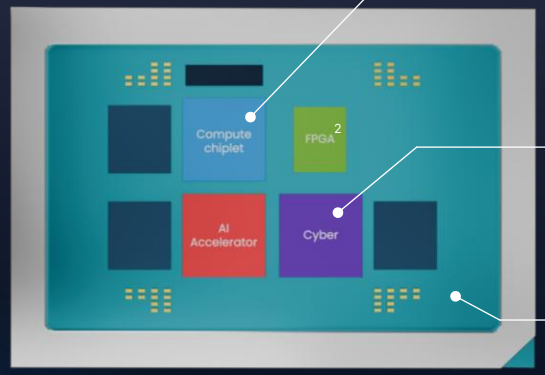
Co-designed with the European ecosystem to orchestrate accelerators



AI SKU[3]



Cyber SKU



Defence SKU

Compute chiplet
Manufactured in Taiwan in advanced process (KGD[1])

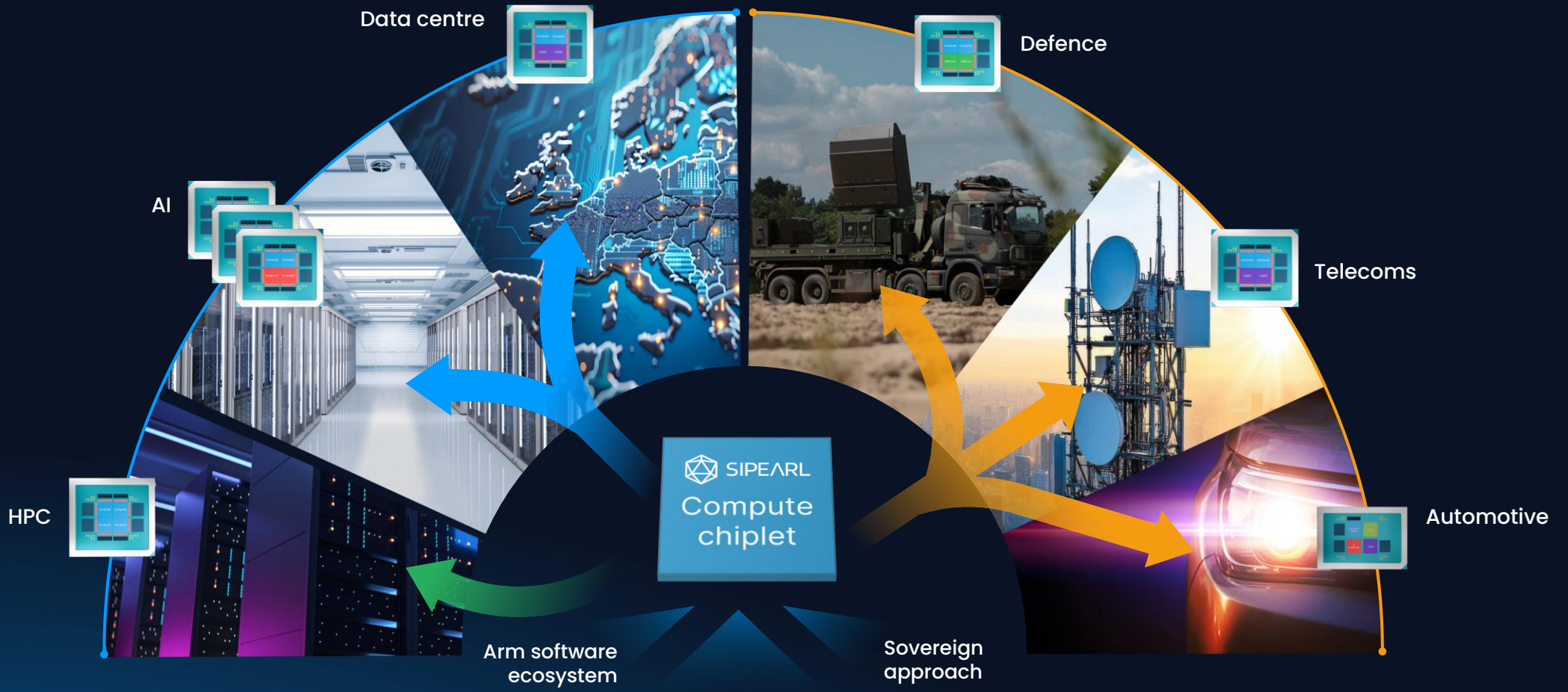
Defence Cyber
Manufactured in EU

Packaging
Assembled in the near future in EU

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[1] KGD: Known Good Die
[2] FPGA: Field-programmable gate array
[3] SKU: Stock Keeping Unit

Compute chiplets are needed in many domains



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[1] Network Interface Cards



About... SiPearl

SiPearl is the European fabless designer of secure high-performance energy-efficient CPUs for sovereign HPC, AI and data centre. These CPUs will help address strategic challenges in the fields of security, defence, medical research, energy, climate and engineering with a reduced environmental footprint.

Featuring 80 Arm Neoverse V1 cores with 61 billion transistors, SiPearl's first-generation CPU, Rhea1, will be released end of 2026. Sipearl's CPUs will equip the two first European exascale supercomputers: Rhea1 will be integrated into the JUPITER machine based in Germany and Rhea2 will be part of Alice Recoque in France.

Supported by the European Union and France, SiPearl employs 200 people in France, Spain, Italy and Taiwan.

Contact

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the European Union