

# FUJITSU-MONAKA: Optimized for High Performance and Energy Efficiency for AI

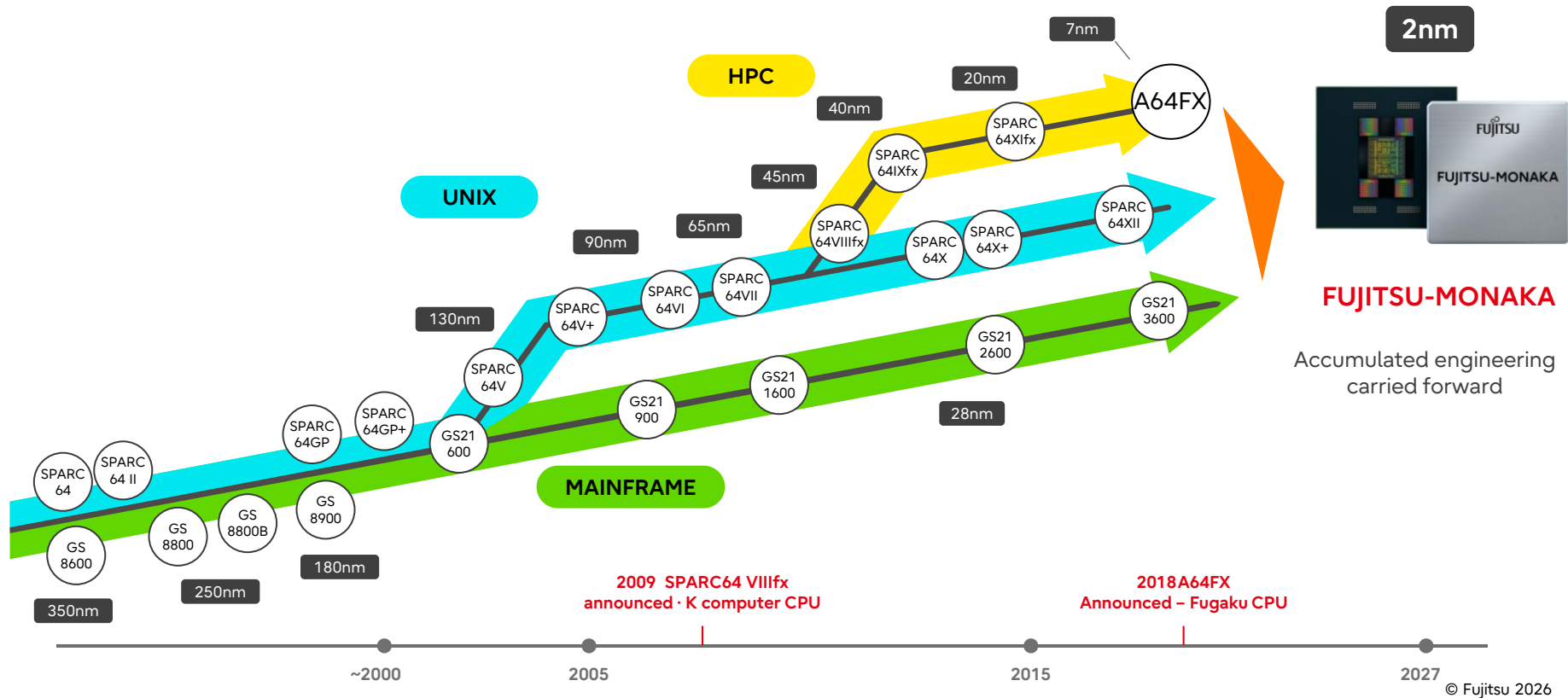


\* This presentation is based on results obtained from a project subsidized by the New Energy and Industrial Technology Development Organization (NEDO).

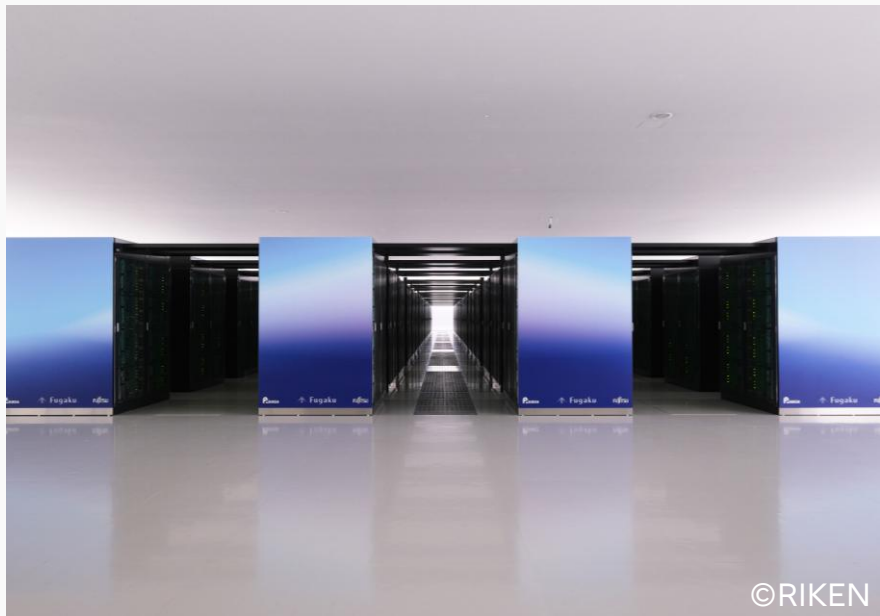
# Decades of Fujitsu Processor and Server Development



- Long-standing mainframe, UNIX server and HPC expertise shapes FUJITSU-MONAKA



# Power-Efficient Computing Proven at System Scale



Supercomputer Fugaku

**7,630,848**

CPU compute cores

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## FUJITSU A64FX

Power-Efficient CPU with Arm SVE for high performance per watt

## Massive Node system Operation

Massive scale node, processor, network, cooling, software for reliable operation

**Fujitsu combines power-efficient CPU design with system-level engineering and large-scale operational expertise.**

# AI/Data Center Infrastructure Demands More Than Peak Performance

The adoption of generative AI is accelerating as organizations seek to strengthen competitiveness and transform operations. Beyond AI training, demand is growing for higher inference performance to maximize the value of generative AI. At the same time, new infrastructure challenges are emerging, including performance, power consumption, security and integration.

01



## Performance

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More inference throughput from general-purpose compute

02



## Power Consumption

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More compute within constrained power and cooling envelopes

03



## Security

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Protect sensitive data and AI workloads in use

04



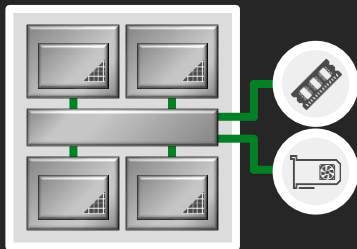
## Integration

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Fit into existing data-center infrastructure and software ecosystems

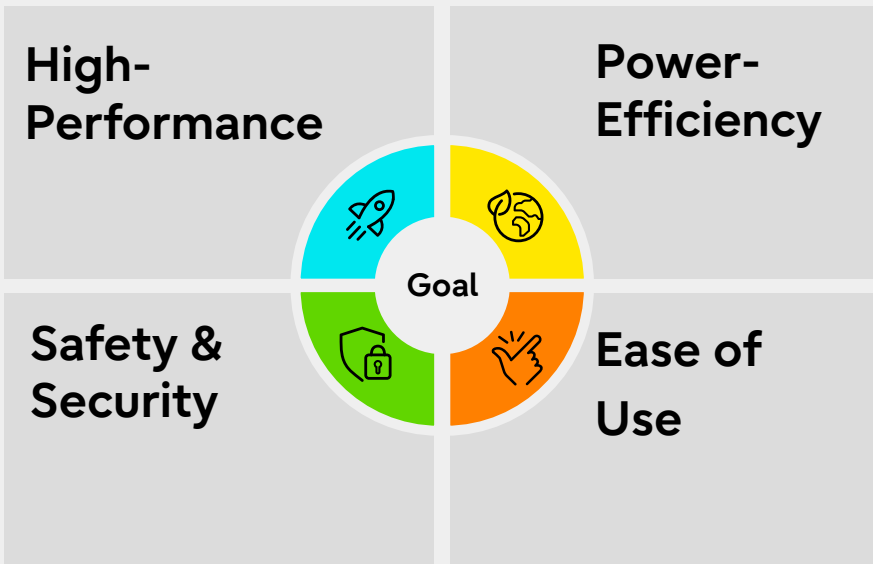
# FUJITSU-MONAKA Processor Overview

## FUJITSU-MONAKA



-  **Arm®v9.3-A Architecture**
-  **3D chiplet**
  - Core die 2nm
  - SRAM die/I/O die 5nm
-  **Ultra low voltage for energy-efficiency**
-  **DDR5 12 channels 8800MT/s**
-  **Liquid / Air-cooling**
-  **Arm SVE2-256bit for AI and HPC**
-  **144 cores x 2 sockets (288 cores per node)**
-  **Confidential Compute Architecture for security**
-  **PCI Express 6.0 (CXL3.0) 96 lanes**

## A Made-in-Japan CPU Engineered for AI Performance and Power Efficiency

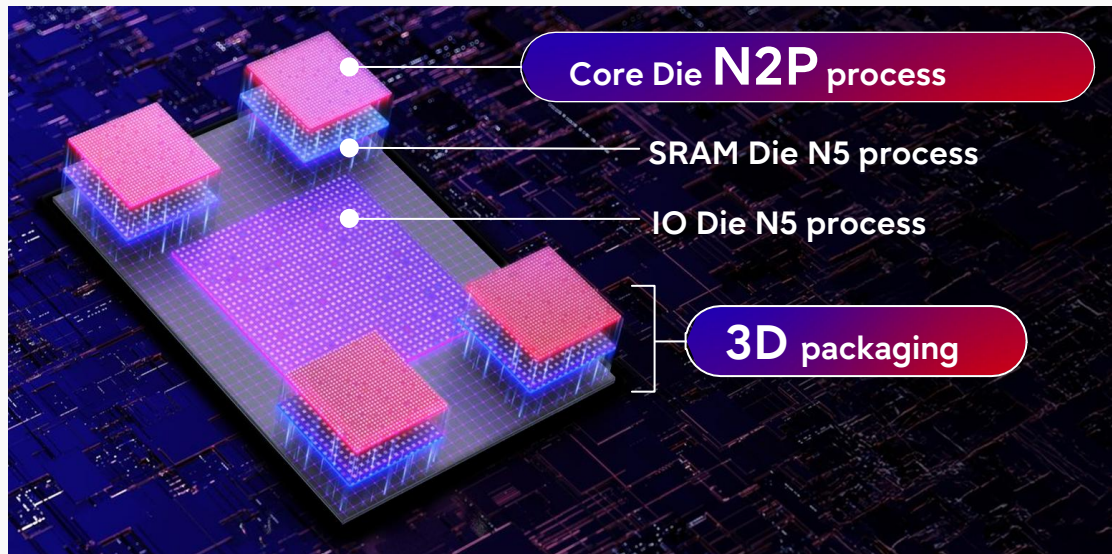


# Fujitsu's Unique Design Technologies That Create Competitiveness



## 3D Many-Core Architecture

Using cutting-edge 2nm process for core die and adopting a 3D packaging design to shorten the physical data transfer distance, FUJITSU-MONAKA delivers high performance and efficiency.

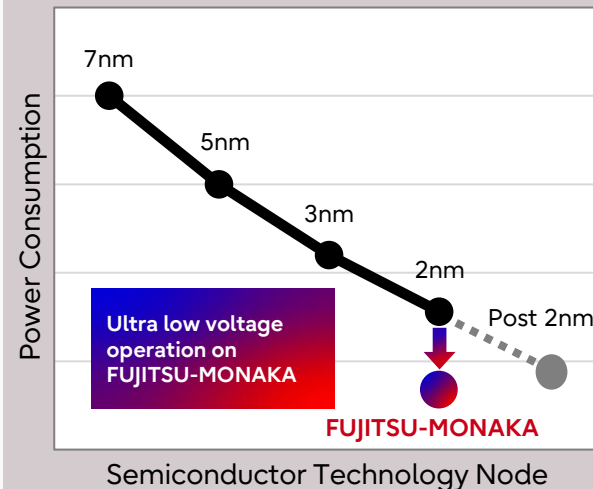


## Ultra Low Voltage Technology

Fujitsu's ultra low voltage technology enables energy savings beyond the 2nm generation.

### Semiconductor Trends\*

\*Fujitsu estimation

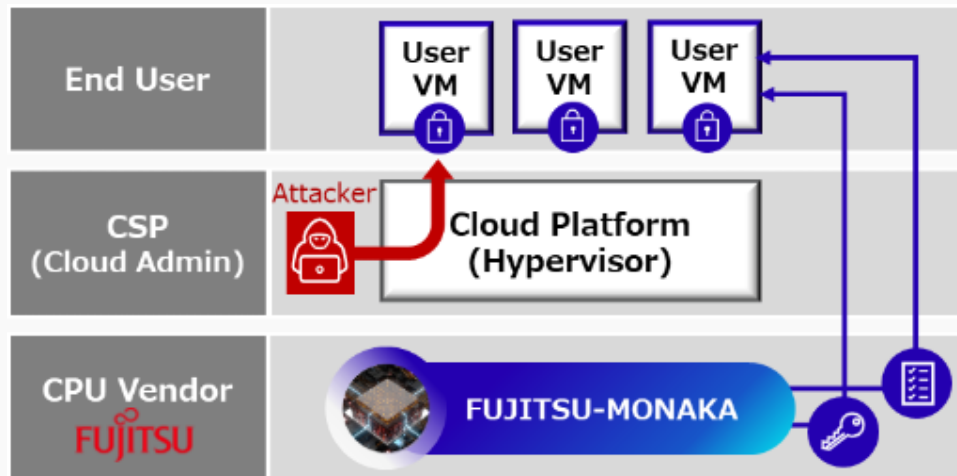


# Secure AI and Cloud Workloads by Confidential Computing at Scale



## 4,096 User VMs

Supported with Confidential Computing Security



### 01 Per-VM memory encryption

A CPU-generated key protects each VM's memory.

### 02 CPU as the Root of Trust

Hardware and firmware anchor the trust chain.

### 03 Remote attestation

Platform evidence can be checked before workloads run.

# Open Standards Integration Friction and AI Inference Performance



Integrate through standard interfaces, open firmware and the Arm software ecosystem.

## Data Center ready TECHNOLOGY

Arm  
SystemReady SR

Open system  
firmware  
- OpenBMC/EDK2 UEFI

Redfish  
manageability

Arm software  
ecosystem  
- ISVs/IOVs/IFVs

## Data Center ready PERFORMANCE

**213.8 TOPS**

INT8 peak performance

※TOPS: Tera Operations Per Second

**307.0 Token/s** Batch size 2  
gpt-oss-20B (\*)

**55.2 Token/s** Batch size 2  
Gemma4-31B (\*)

\*Measured on a FUJITSU-MONAKA reference platform without GPU.

# FUJITSU-MONAKA Reference Platform



Fujitsu built this reference platform as the foundation for planning, designing, and validating servers utilizing FUJITSU-MONAKA.

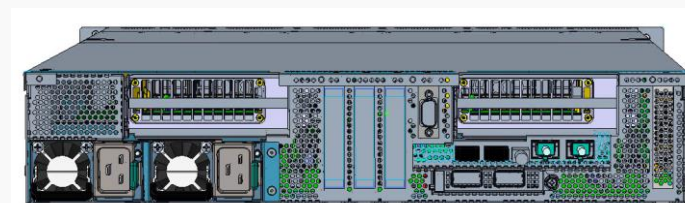
## Reference Platform Specification

\* Equivalent to scalable air-cooling server

|                   |                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------|
| Processor         | FUJITSU-MONAKA CPU x 2                                                                                               |
| Cores / Processor | Up to 144 cores                                                                                                      |
| PCIe Slot         | PCIe Gen6 x16 lane (PCIe LP) x 3<br>PCIe Gen6 x8 lane (PCIe Slot FH) x 4 or<br>PCIe Gen6 x16 lane (PCIe Slot FH) x 2 |
| Memory            | RDIMM (DDR5) x 24 slots, up to 6TB (21GB/core)                                                                       |
| Front Storage     | EDSFF E3.S SSD PCIe Gen6 x4                                                                                          |
| Chassis Size      | 19 inch (W) x 873.1 mm (D) x 2U (H)                                                                                  |
| Cooling           | Air cooling                                                                                                          |
| Power             | 2700W 80 PLUS Titanium (1+1, 2+0 for GPU support)                                                                    |

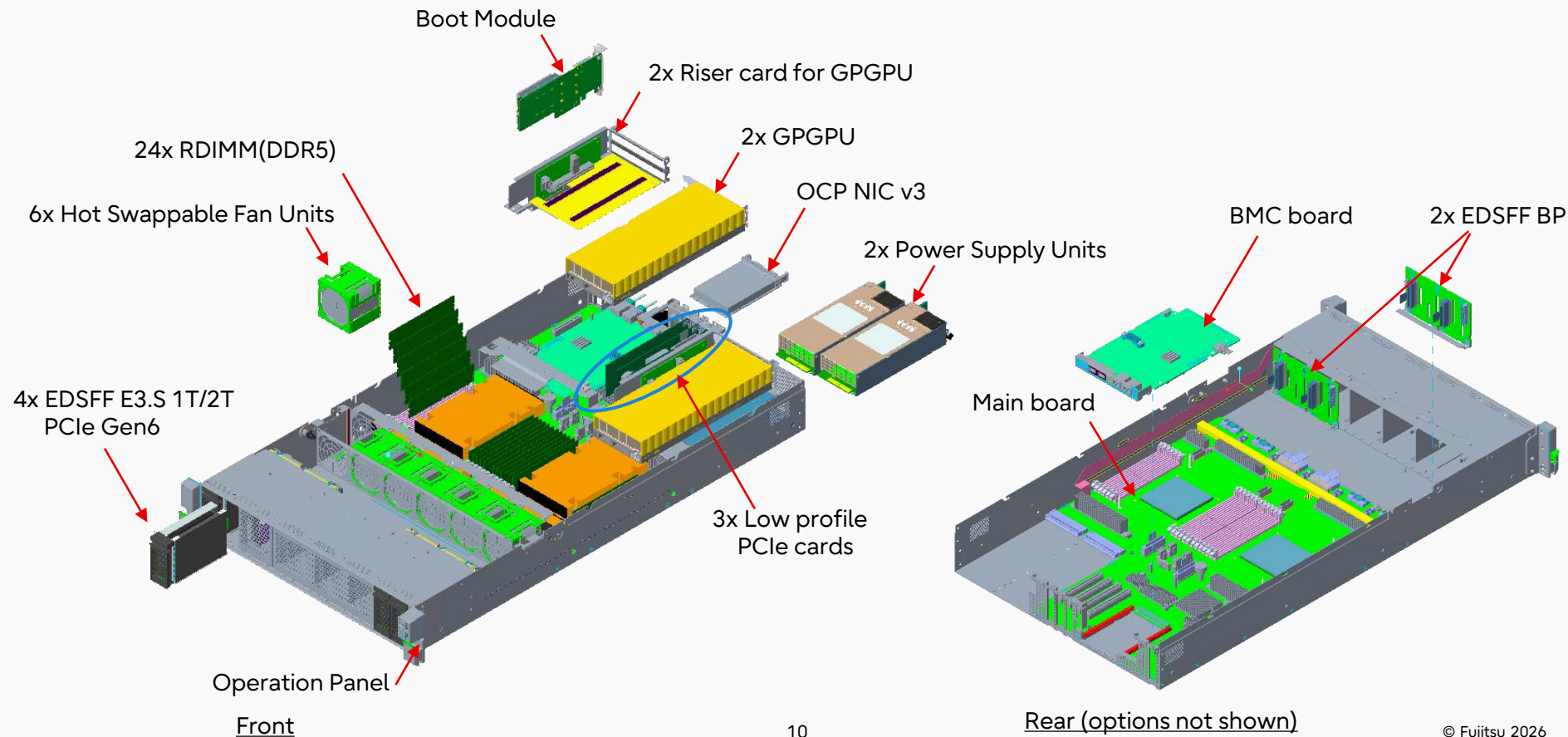


Front-side view



Rear-side view

# FUJITSU-MONAKA Reference Platform: Perspective View



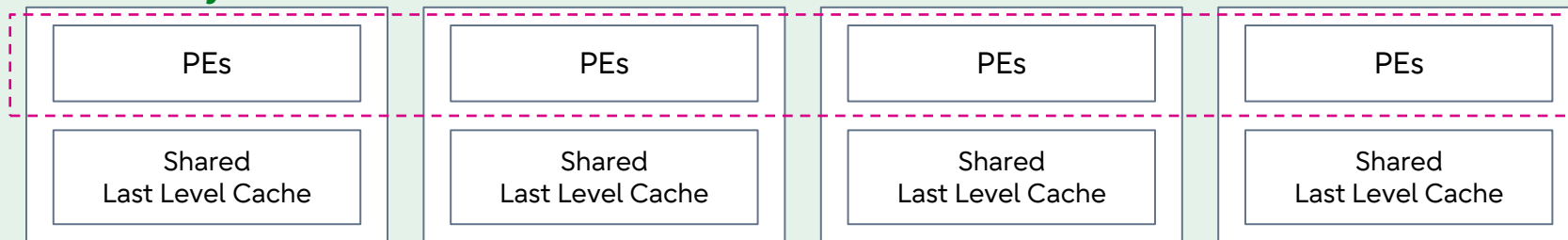
# FUJITSU-MONAKA SoC System Architecture

## FUJITSU-MONAKA SoC Package (Arm SystemReady BSA/SBSA compliant)

### Core Die Subsystems

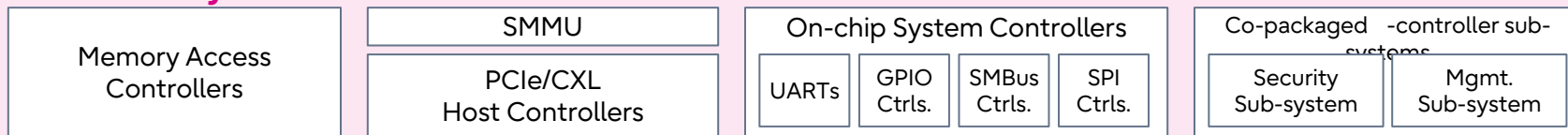
Max 144 cores

Number of PEs and core dies varies depending on SKUs



### SoC interconnect network

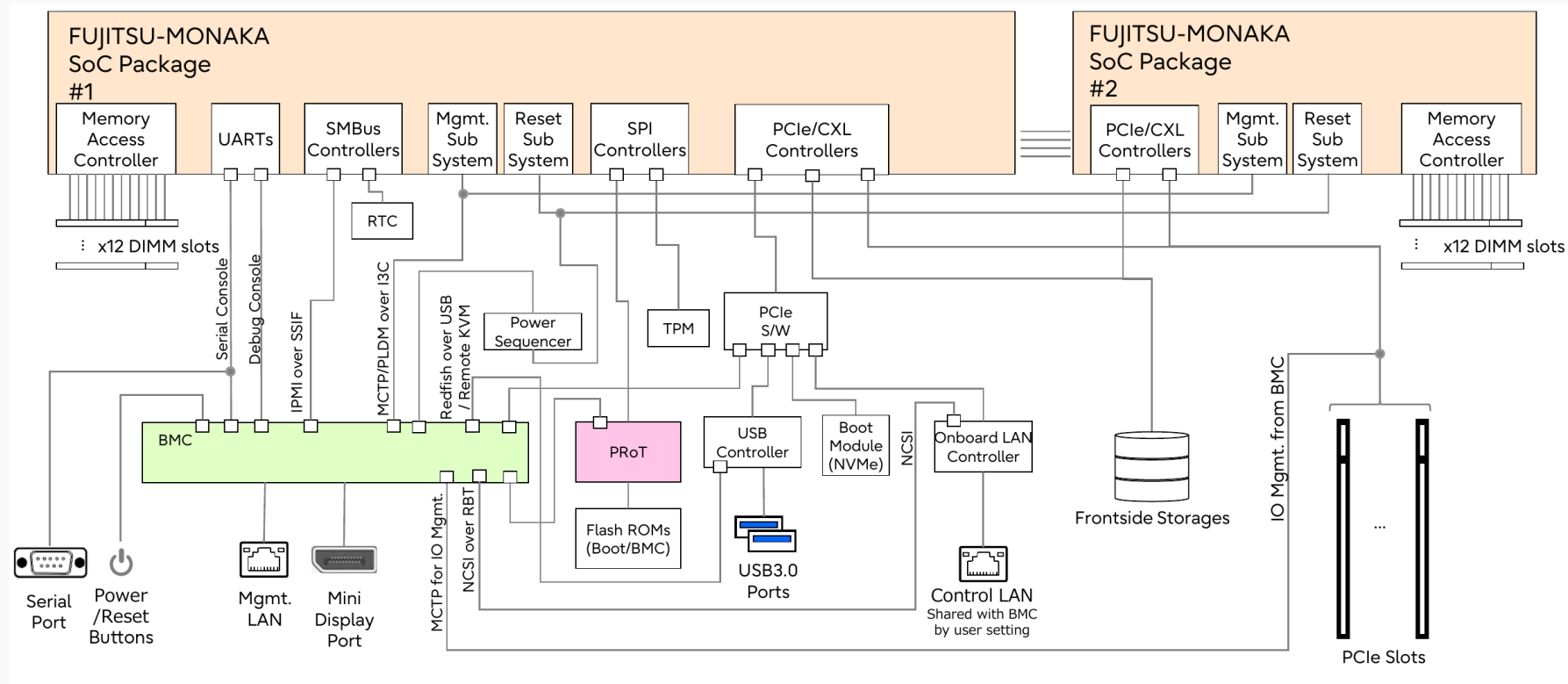
### I/O Die Subsystem



DDR memory system

Note: Some components are not depicted.  
subject to change without notice

# FUJITSU-MONAKA Reference Platform Design



Note: Some components are not depicted. subject to change without notice

# Firmware Components and Arm SystemReady Compliance

## FUJITSU-MONAKA

### Core Die Subsystems

#### Boot Firmware

running on Non-secure EL2

- UEFI v2.10+
- ACPI v6.10+
- SMBIOS v3.7.0+
- UEFI Secure Boot
- UEFI Auth Variable
- TPM Measured Boot

#### RMM

running on  
Realm EL2

- Realm mgmt.

#### Monitor Firmware

running on Root EL3

- SMCC, PSCI, SDEI
- TPM Measured Boot
- CCA Verified Boot

### Co-packaged -controller sub-systems

#### Security Firmware

- CCA Verified Boot
- CCA Delegated Attestation

#### Cntrl. Firmwares

- SCMI for power control

#### Mgmt. Firmwares

- MCTP/PLDM for Sensor, RAS

## BMC Firmware

- Redfish
- IPMI
- Web UI

## PRoT Firmware

- NIST SP800-193

## Arm SystemReady Target Levels

**BSA / SBSA**      **BSA 1.2+, SBSA 7.2+**

A-profile v9+, GICv4+, SMMUv3+; Arm CCA (FEAT\_RME); PCIe Gen6, CXL 3.0

**BBR**      **SBBR recipe**

SMCC v1.4, PSCI v1.1, SDEI v1.1; UEFI v2.10; ACPI v6.10+; SMBIOS v3.7.0+

**BBSR**      **v1.2**

CCA Verified Boot and UEFI Secure Boot with Silicon Root of Trust and TPM 2.0; TPM measured boot

**SBMR**      **M3-M4**

Redfish and IPMI, Web UI; MCTP/PLDM over I2C/I3C

Target levels as of June 2024; subject to change without notice

# Foundational Software Optimized for FUJITSU-MONAKA

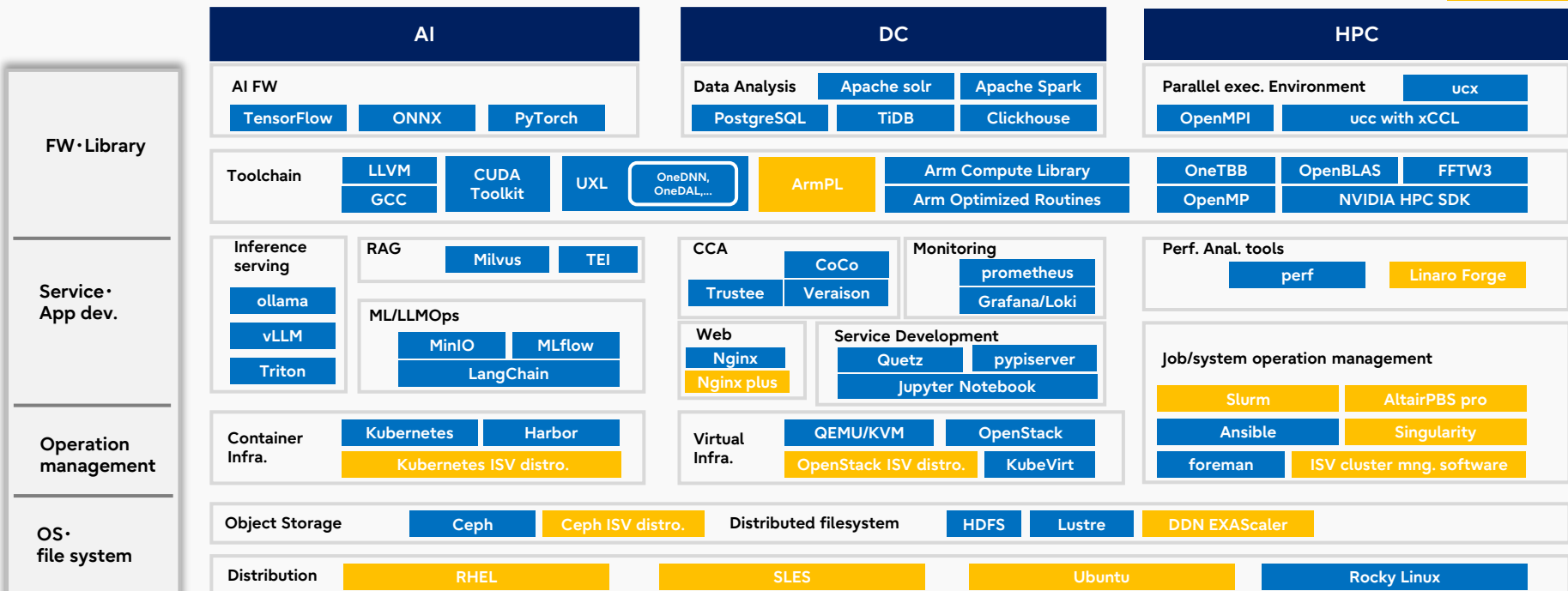


## Offer a software stack that maximizes the performance of FUJITSU-MONAKA

- Prepare a lineup of verified **OSS** tailored to specific use cases
- Support major **ISVs** in each domain and provide comprehensive support services

OSS

ISV or  
OSSsupport



# Sales Begin November 2026



Processor GLOBAL SALES

## November 2026

Target Market : AI and Cloud data center • HPC

FUJITSU-MONAKA Reference Platform

Available now for evaluation



# Timeline Toward Launch

## 2026

### FUJITSU-MONAKA Introduction Consultation, and Initial PoC

- Solution overview presentation
- Understanding customer challenges through consultation
- FUJITSU-MONAKA use case discussion



## NOW

### Sample Request Acceptance Begins (Remote/Sampling Servers)

- Trials/PoC using demo systems
- Performance evaluation and validation of customer applications with Arm CPU specialists support
- Analysis of validation results and report creation



## 2027

### FUJITSU-MONAKA Shipment Begins

- Deployment to customer environments



# Evaluate. Integrate. Build Together.



## 01 Evaluate FUJITSU-MONAKA

Benchmark your workloads and facility constraints.

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## 02 Integrate your technology

Connect firmware, OS, devices, memory, networking and management.

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## 03 Build Together

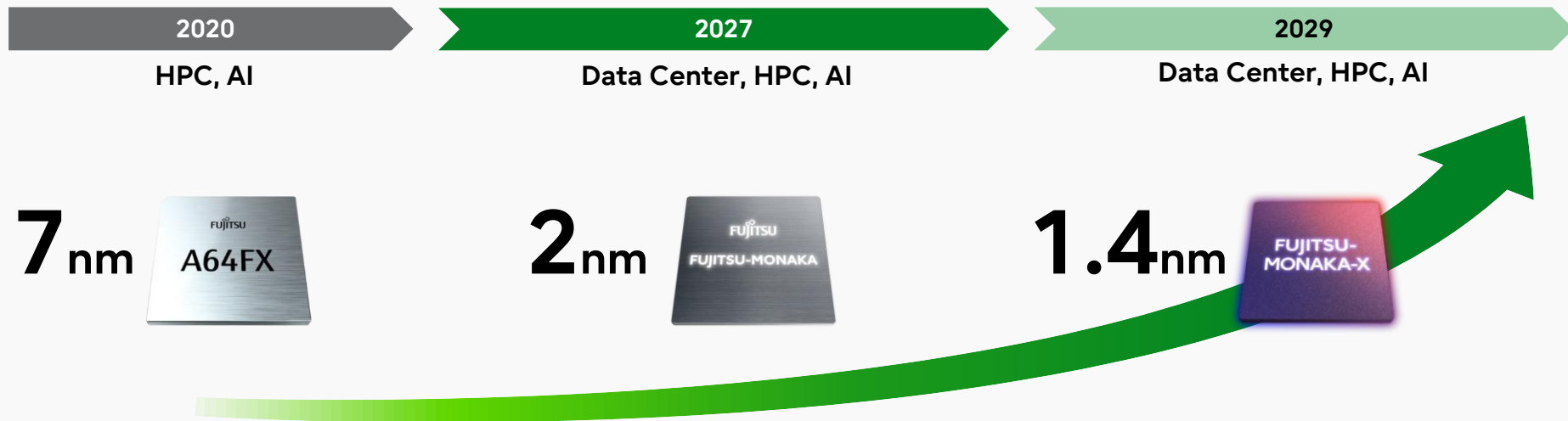
Move from validation to deployable products and services.

Cloud • Data center • Server • ODM • Firmware • OS • Device partners

# "FUJITSU-MONAKA"

## Power-Efficient High-Performance CPU Development Journey

### Development Roadmap



- Adopted in the supercomputer Fugaku
- First in the world to implement Arm SVE
- Low voltage operation

- Arm SVE2 support
- 3D many core
- Ultra-low voltage operation
- CCA

- SME2 for AI
- Selected for FugakuNEXT
- NVLink™ Fusion for AI/HPC

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