Overview of the RISER Project

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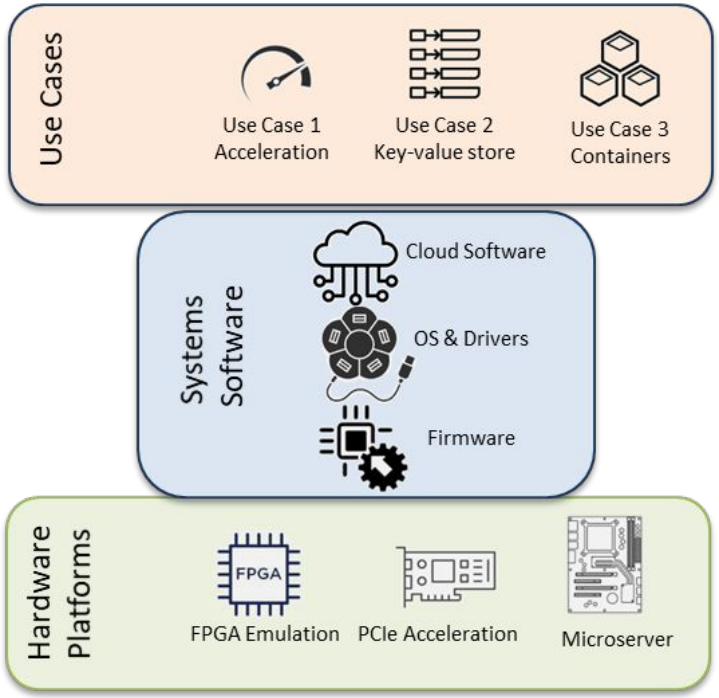
European Commission
Horizon Europe
2021-2027

Call: Open source for cloud-based services, GA Nr: 101092993 (HaDEA)

RISC-V for Cloud Services 1/

RISER will develop the first all-European RISC-V cloud server infrastructure, significantly enhancing Europe's open strategic autonomy.

- ***Develop & validate open-source designs for standardized form-factor system platforms***
  - PCIe Acceleration Card, Microserver (Blade)
  - Use cases: acceleration, networked storage, containerized execution
- *Enabling the path towards a **European-based cloud infrastructure***
  - The first Cloud architecture using RISC-V processor technology being developed within the EPI and EUPILOT projects
  - Key technologies:
    - RISC-V processors, PCI-Express/CXL, Cache-coherent Chip-to-Chip links
- ***Open hardware interfaces***
  - Expand the interface possibilities of EPI/EUPILOT processors:
    - High-speed networking and storage capabilities
    - Essential support for cloud applications and services deployment



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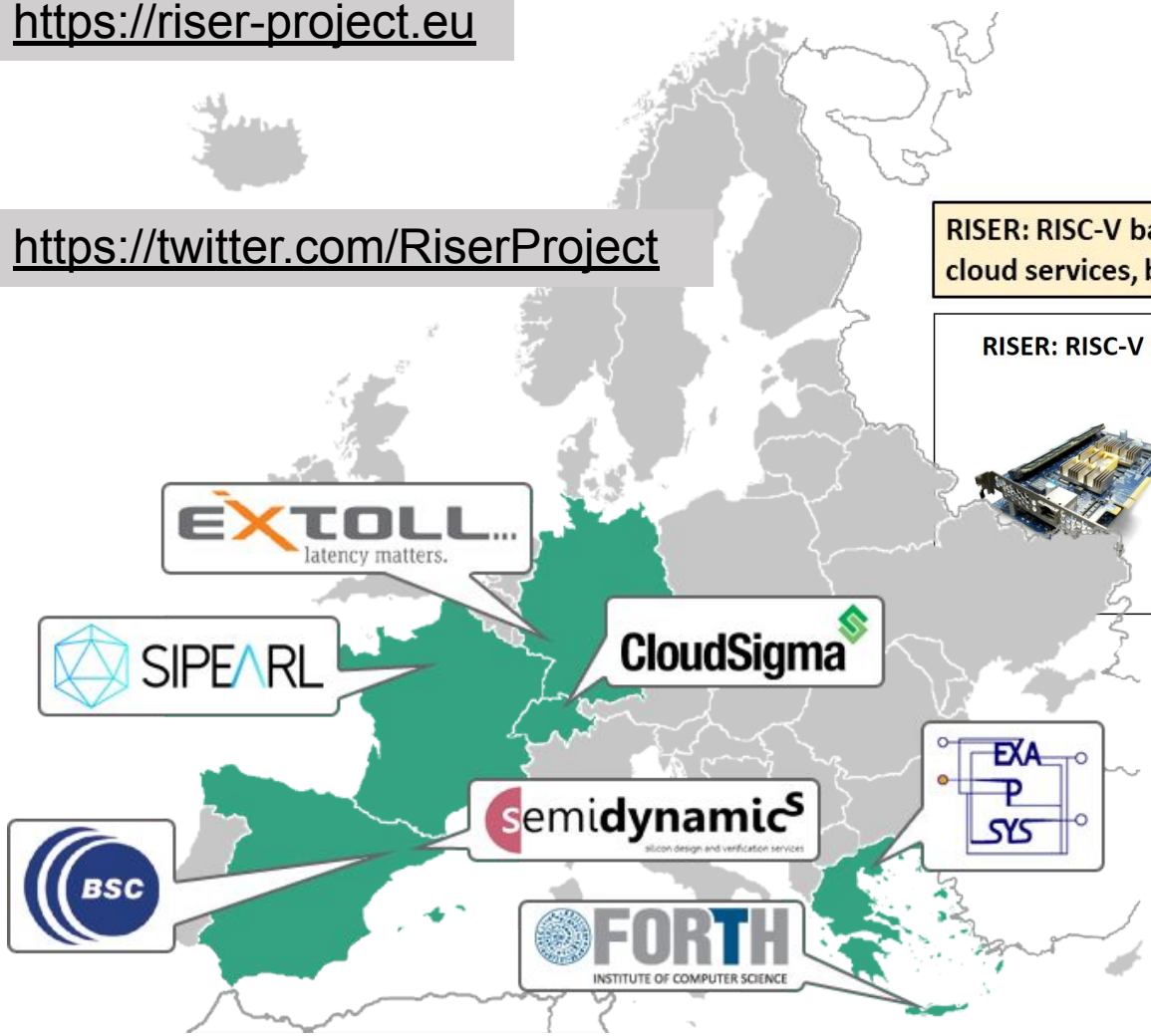
RISC-V for Cloud Services 2/

https://riser-project.eu

https://twitter.com/RiserProject



RISER: RISC-V based Linux server for cloud services, built on open interfaces

RISER: RISC-V for Cloud Services

RISC-V Processors
Source: EPI and EUPilot projects (chips)
* Currently operating on system boards designed for dev/test purposes

Server Boards (PCB + firmware)
Standard form factors (PCIe accelerator card, Microserver)
* Following industry standards to utilize server I/O peripherals

- DRAM Memory
- NVM-Express Storage
- 100 Gbps Ethernet

Boot Firmware
Initialization of execution platform, Including high-speed I/O peripherals (storage, networking)

OS, drivers, runtime
Configured/adapted for cloud services: workload acceleration, networked storage, containerized execution
*Integration in IaaS environment

Integrated all-European Hardware and Open-Source Software for Cloud Services and Applications

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RISC-V for Cloud Services 3/

The Heilmeier Catechism [https://www.darpa.mil/work-with-us/heilmeier-catechism]

- **What are you trying to do?**
  - Cloud servers based on open ISA and interfaces
- **How is it done today, and what are the limits of current practice?**
  - x86 servers, proprietary ISA and interfaces
- **What is new in your approach and why do you think it will be successful?**
  - RISC-V open standards, reuse/repackaging/evolution of results from ongoing related projects (EPI, EUPILOT)
- **Who cares?**
  - Global applicability in a growing market where cost effectiveness coupled with flexible integration is key
- **What are the risks?**
  - Execution risk due to technical/organizational complexity, schedule risk due to “upstream” dependencies
- **How much will it cost?**
  - 656 person-months
- **How long will it take?**
  - 36 months for “first light”
- **What are the mid-term and final “exams” to check for success?**
  - Open-access programme for evaluation, deployment in IaaS infrastructure, open-source release of interfaces (HW + SW)

Can become the **linchpin** in a longer-term roadmap that spans projects

Server motherboard (example)

- Firmware:
  - UEFI
  - ACPI
  - SMBIOS

- Baseboard Management Controller (BMC)
  - Root-of-Trust
  - IPMI (successor: RedFish)
  - System Health Monitoring
- CPLD (for power sequencing)

+ setup of memory controllers
  + I/O device controllers
  + onboard devices

+ toolchains for development
+ low-level libraries & tools
+ workload-focused SW packages

Are we there yet with RISC-V ?

(hint: attend the panel)