



**Barcelona
Supercomputing
Center**
Centro Nacional de Supercomputación



OSH in HPC

Panel: The advent of Open Source Hardware and the Internet of Things

Prof. Jesús Labarta

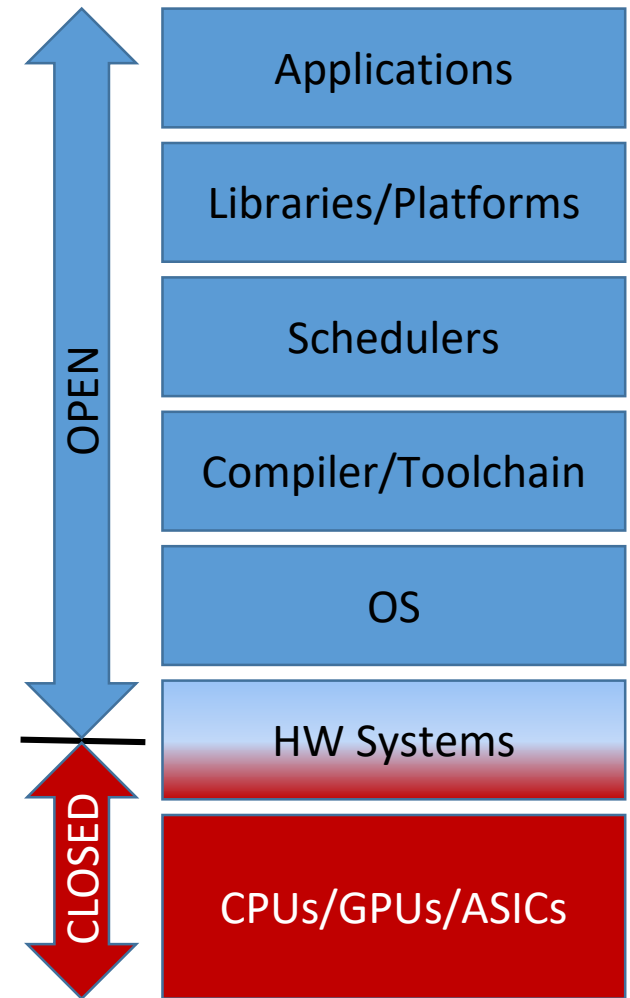
BSC & UPC

Open Source beyond 2020

Brussels, Nov. 14th 2019

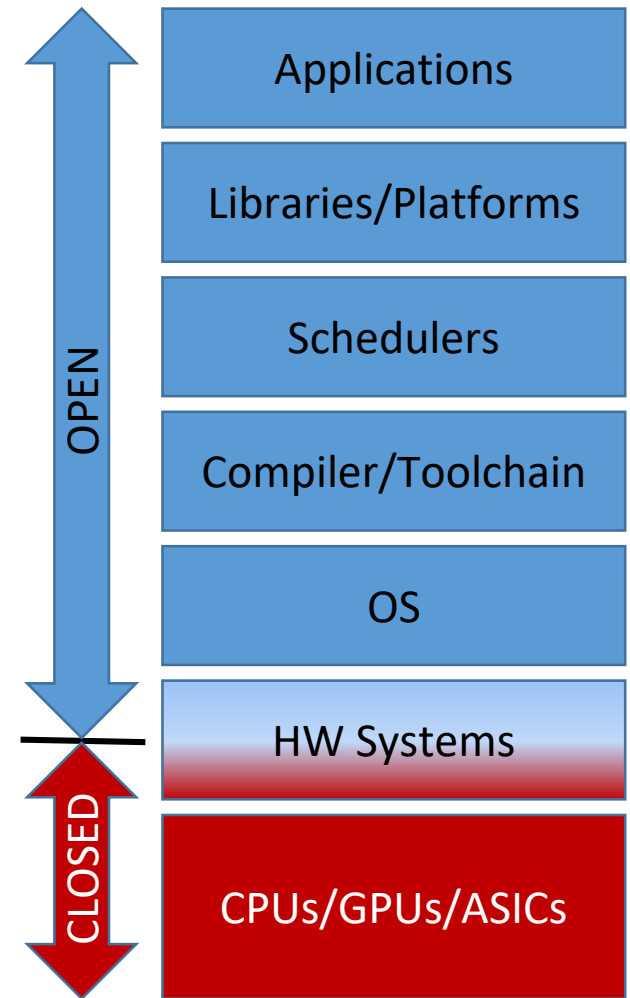
Open Source * in HPC ?

- Europe has been very active in Open Software and standards at all levels (Apps, system software)
- Software landscape from Cloud to IoT already enjoys the benefit of open source
- Open source provides:
 - A common platform, specification and interface
 - Accelerates building new functionality by leveraging existing components
 - Lowers the entry barrier for others to contribute new components
 - Crowd-sources solutions for small and larger problems
- **What about Hardware and in particular, the CPU and accelerators?**



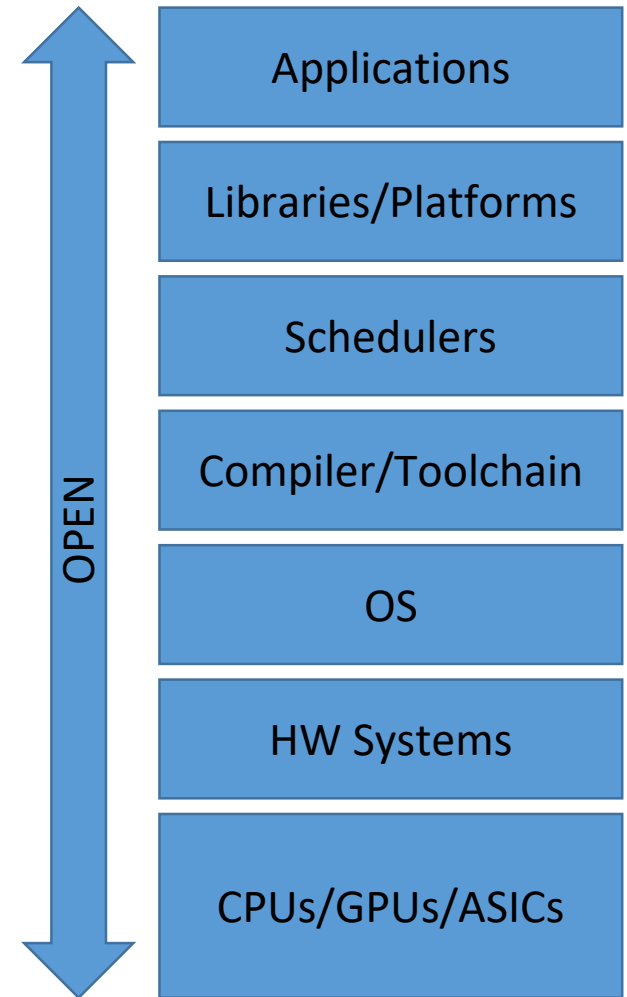
Open Source * in HPC ?

- Inhibits opportunities in Holistic co-design
 - Facing barrier to innovation
 - Being able to have a conversation or not



Our wish ...

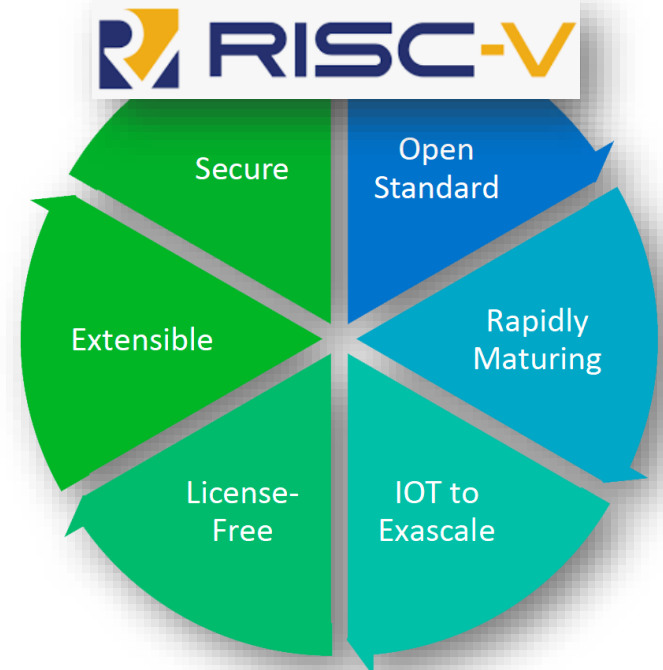
- Would like to see open source core and memory designs ...
- ... leveraging high end computer architecture techniques ...
- ... targeting the broadly convergent needs ...
- ... from high end HPC to edge, embedded and IoT



Just an example: RISC-V in EPI



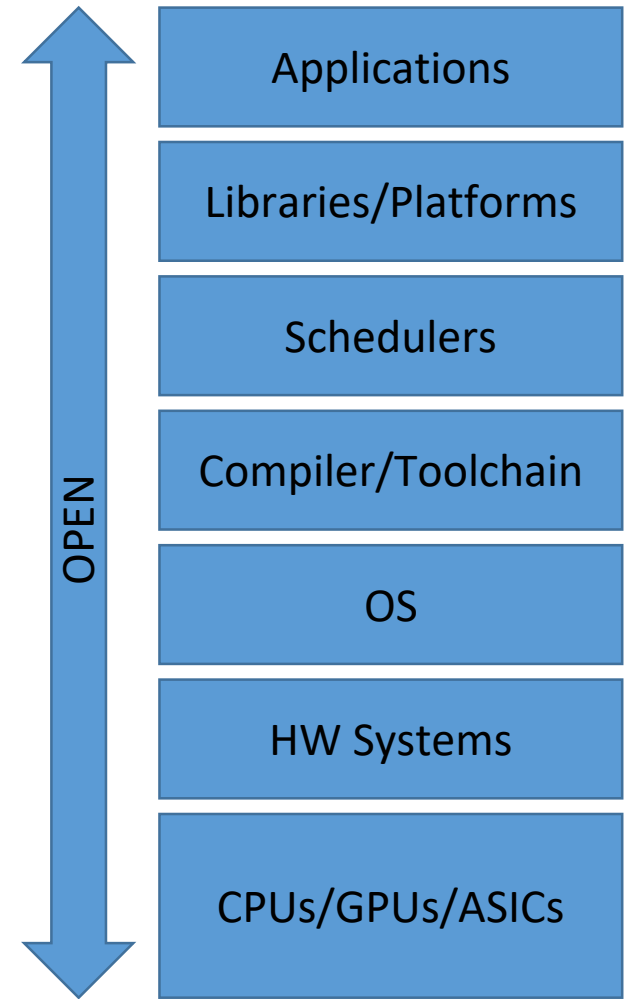
- ➔ More and more global IT actors are adopting RISC-V architectures to be vendor independent
- ➔ And of course the entire IoT ecosystem for lower performance, lower energy applications.



Our wish ...

- Would like to see open source core and memory designs ...
- ... leveraging high end computer architecture techniques ...
- ... targeting the broadly convergent needs ...
- ... from high end HPC to edge, embedded and IoT

- Need for Catalyst ... initiative



LOCA @ BSC?



LOCA

European Laboratory for Open
Computer Architecture

LOCA Goals

- Mechanism to extend open source ecosystem to include H/W
 - Add H/W expertise to BSC and European partners, leverage existing S/W expertise
 - Open European IP repository → rapid implementation
 - Provide usable Open Source H/W
 - Intersection of academia and industry
 - Involvement in standardization
 - Catalyst to reinvigorate European ICT industry Global collaboration and training center
 - Incubator for European IP



LOCA → broader ?



Casteller
(human tower)



European Laboratory for Open
Computer Architecture



European
Open
Hardware,
Architecture
Initiative ?



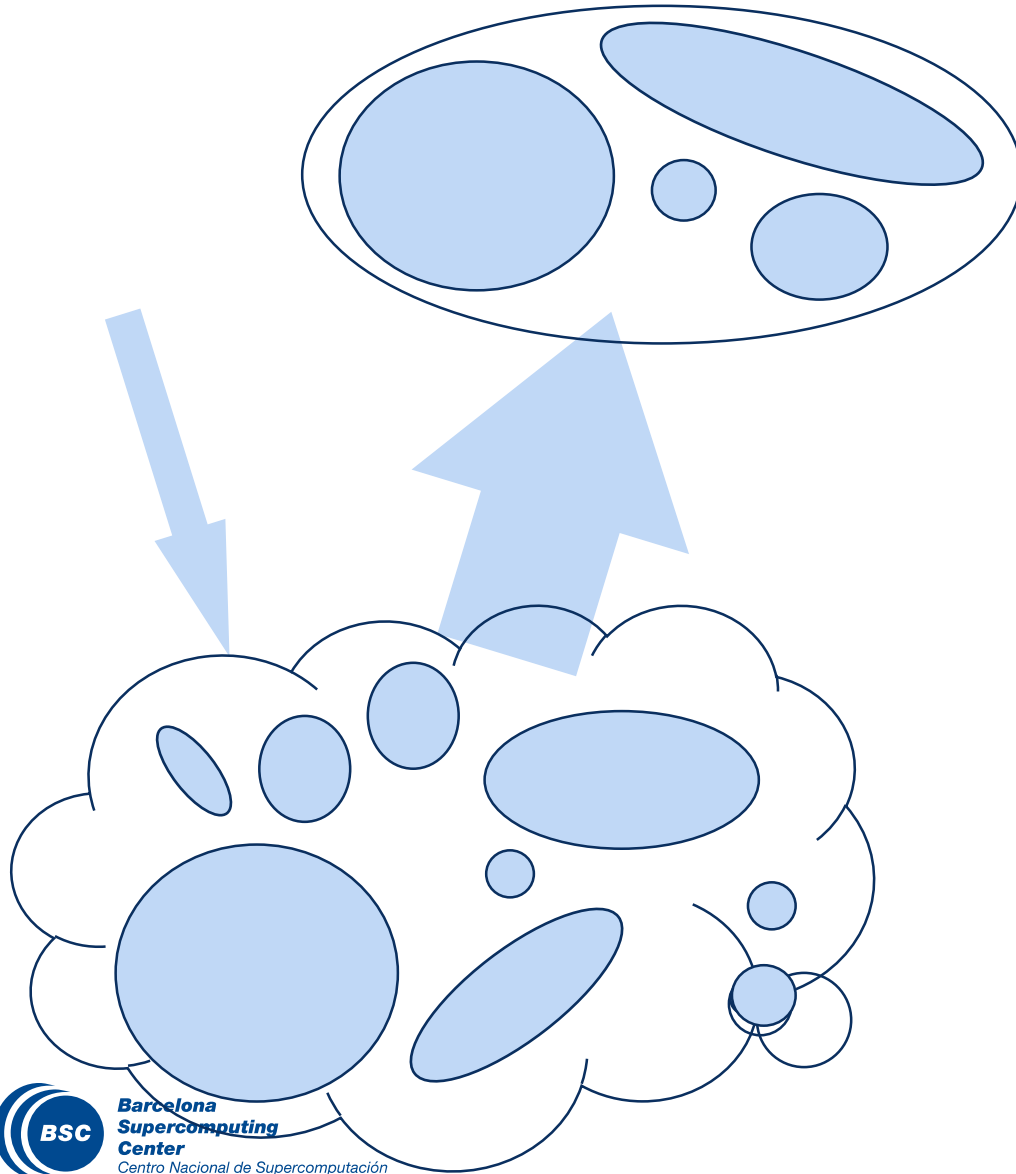
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**EXCELENCIA
SEVERO
OCHOA**

Thanks

Open Source * → give & take



- Enabler
 - Accelerates innovation
 - Lower the entry barrier for contributors
 - Crowd-sources solutions for small and larger problems
-
- Interest in taking, interest in giving

Important in Open Source *

- Flexibility
- Modularity, Interfaces, interoperability
- Standards
- Strategy
 - Vision, objective
 - What to develop, what to contribute what to take

