

Building RISC-V Cloud Computing Ecosystem

Zhipeng Huang, Huawei

Bio

- Open Source Manager and Principal Engineer from Huawei
- Involved in
 - LFAI, CCC, CNCF Security SIG, Kubernetes Policy WG, OpenStack Cyborg Project, OpenStack Public Cloud WG, OpenSDS, Open Service Broker API, Akraino, LF Edge, ONNX, MLSpec
- Heavy metal fan and proud father of two daughters !



Zhipeng Huang
@nopainkiller

Venture Technologist, Open Source Infra
for Cloud, AI, Blockchain, and Beyond

📍 33.642931,-117.84131

🔗 hannibalhuang.github.io

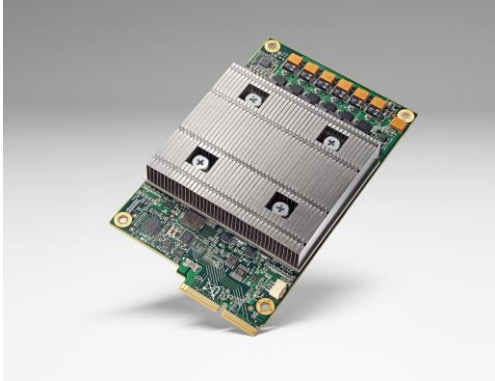
📅 Joined May 2009

Why

New Era of Domain Specific Architecture

NPU

Neural network processors for machine learning



GPU

GPUs for graphics, virtual reality, ML

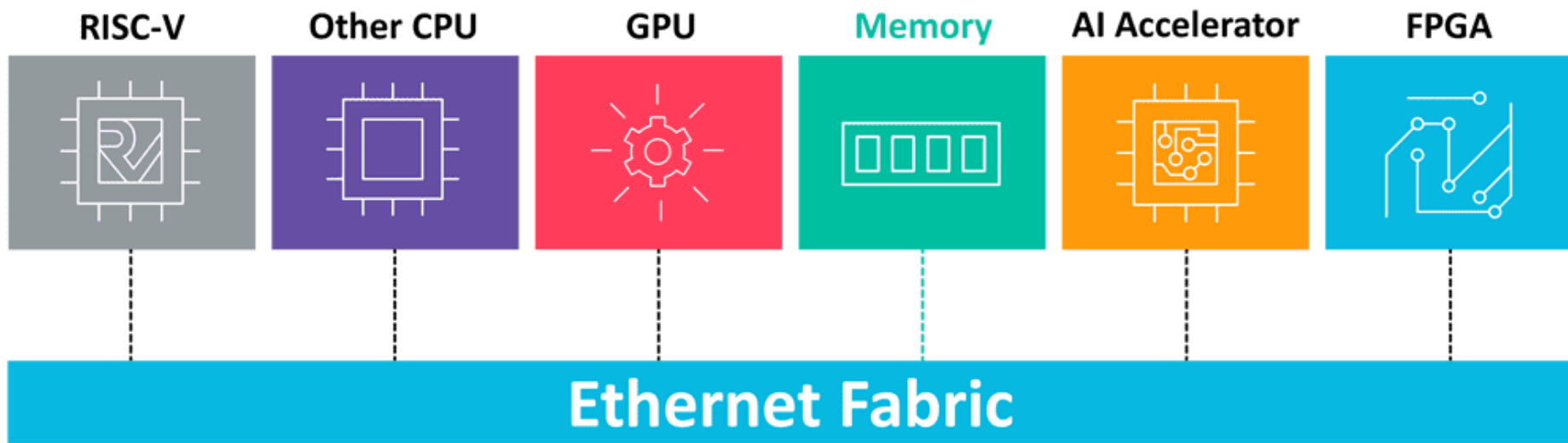


SmartNIC/FPGA

Programmable network switches and hardware



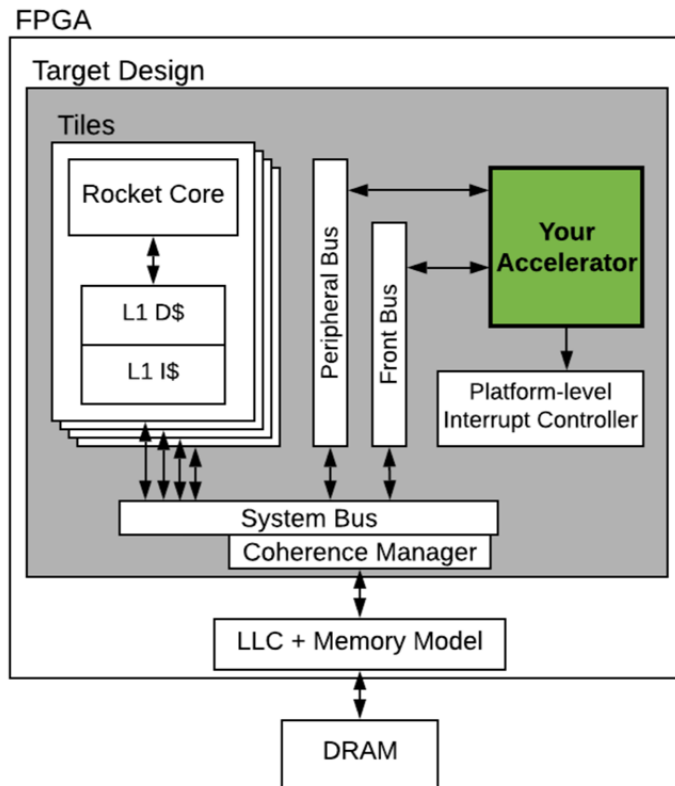
Yet RISC-V still largely missed out in the cloud computing scene



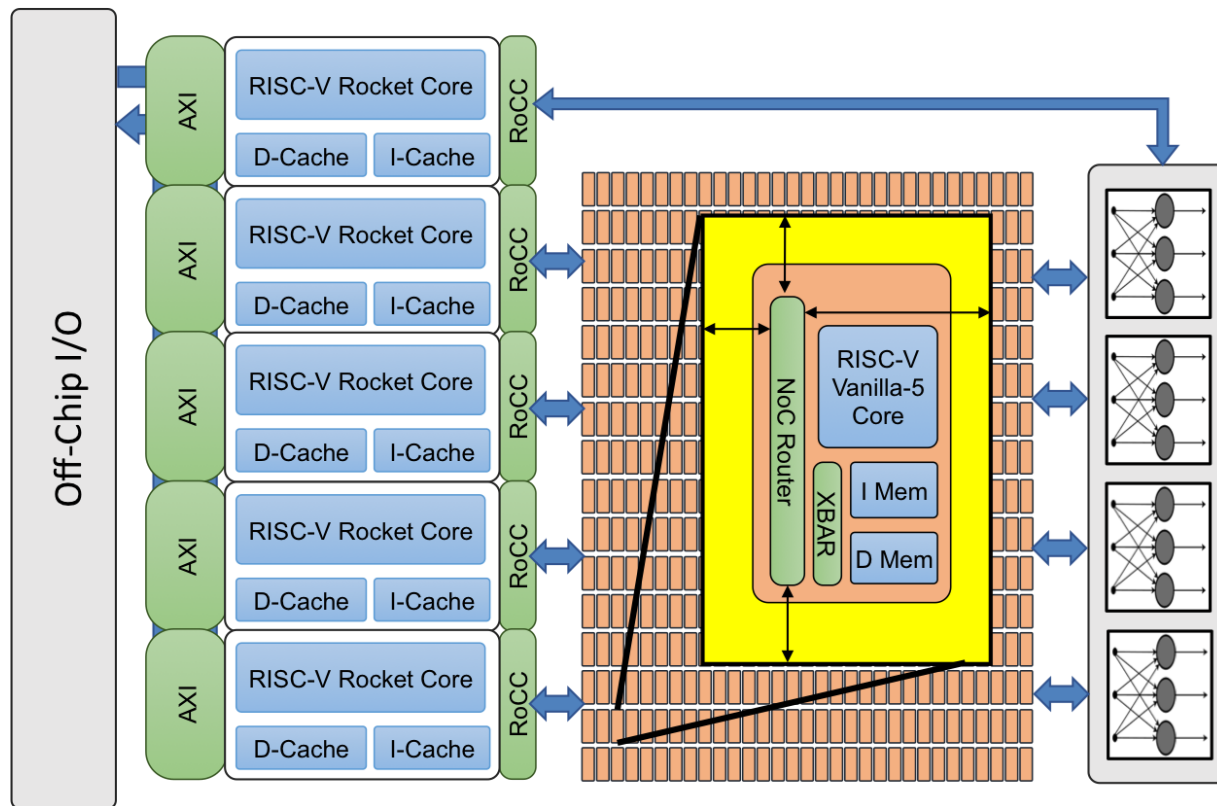
RISC-V and Accelerators

FireSIM as Accelerator

- Any accelerator can be integrated (if it fits inside FPGA)
- Develop and test software for your accelerator in Linux environment before having the chip in hand
- Get fast and accurate performance results



Open Celerity Accelerator Centric SoC



Support RISC-V
Accelerators in Open
Source Cloud Computing

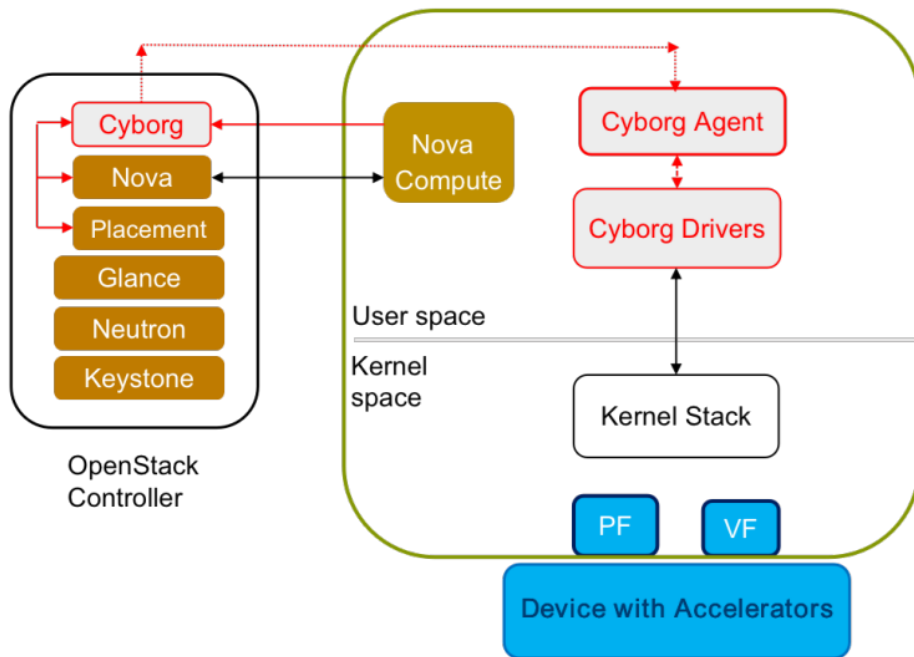
OpenStack Heterogeneous Computing Project

Cyborg

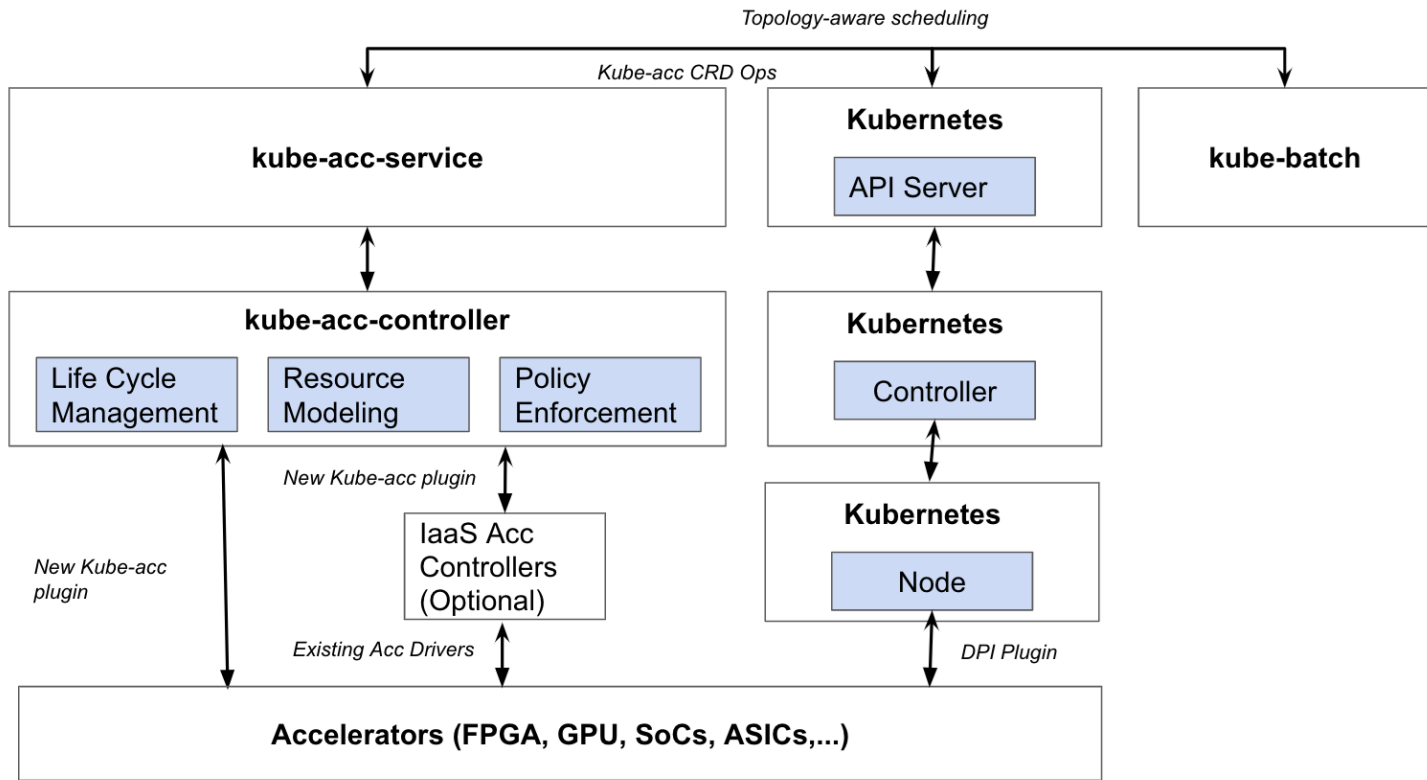
Lifecycle management for accelerators.

- GPUs, FPGAs, AI chips, ...
- Vendor-neutral
- Hypervisor-neutral

<https://wiki.openstack.org/wiki/Cyborg>



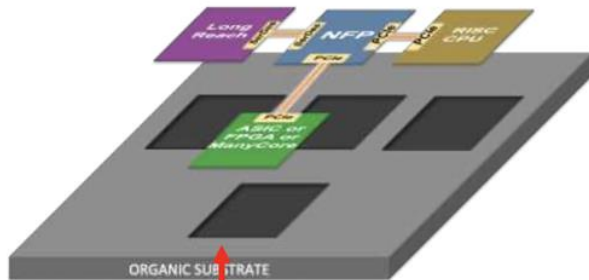
Kubernetes Heterogeneous Computing Project



OCP Heterogeneous Computing Project - ODSA

PoC

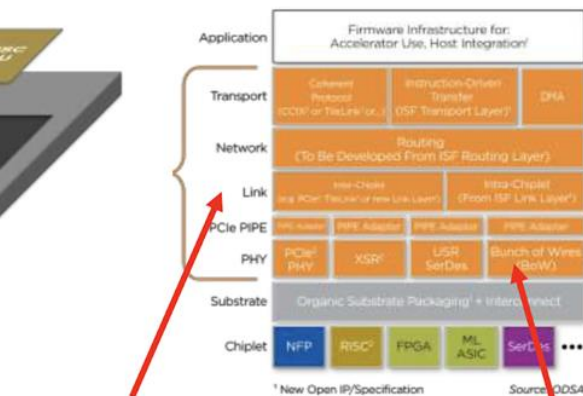
(Achronix/zGlue)



Develop
Packaging + Socket,
Dev Board

Interface/Standards

(AveraSemi, Facebook)

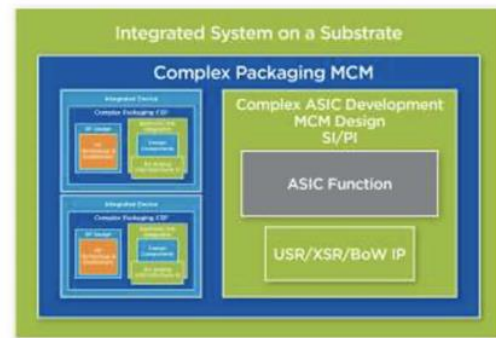


Define Architectural
Interface

Provide PHY technology

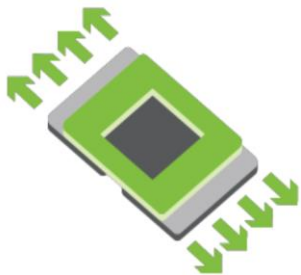
Business, IP and Workflow

(NXP, Kandou Bus)



OCP Heterogeneous Computing Project - OAI

Current Work: **OAM** Spec (1.0)



Hierarchical **Base Specification**

Well-defined boundaries

Fostering Innovation while maintaining Interoperability

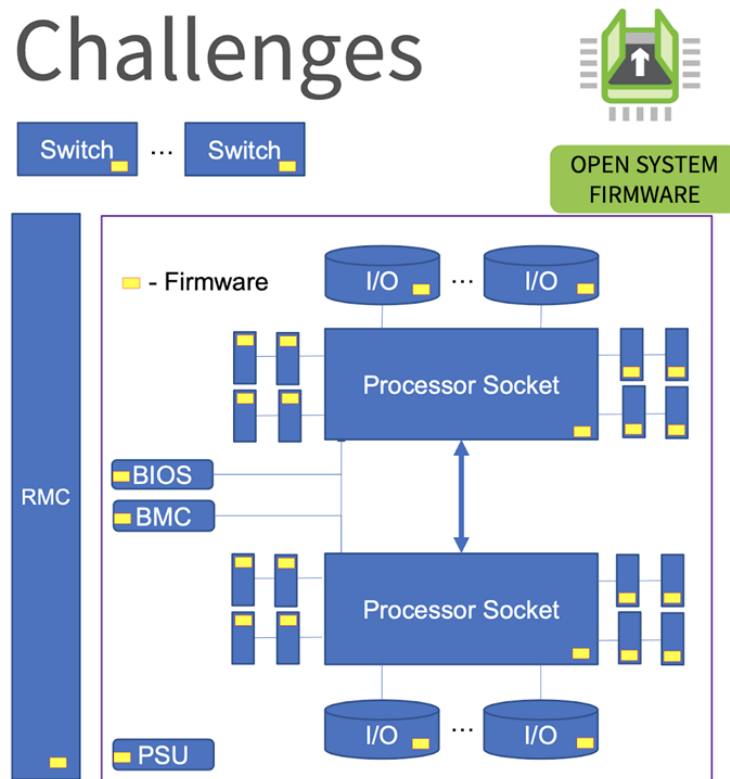
- Power and Cooling
- Mechanical
- Electrical
- Security & Management
- OAM
- UBB (Interconnect Topology)
- HIB
- PDB
- Tray, Chassis
- OAI-SCM
- Expansion

Designs and **Products** may be compliant to any or all specifications

OCP Heterogeneous Computing Project - OSF

Cloud Firmware Update Challenges

- Today's OCP system contains many hardware components with firmware
 - System Firmware – BIOS, BMC, etc.
 - Device Firmware – Microcode, Network, Storage, PSU, etc.
- Over life time of the system, the firmware components are upgraded to address:
 - Security, power, performance, bug fixes, debug/telemetry, etc.
- In most cases, system is rebooted to activate new firmware



OCP Heterogeneous Computing Project - Security

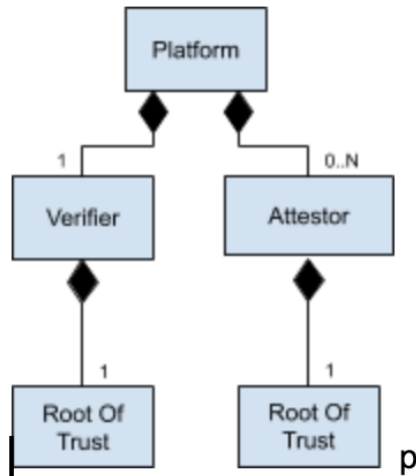


Figure 1. Platform Attestation UML Model

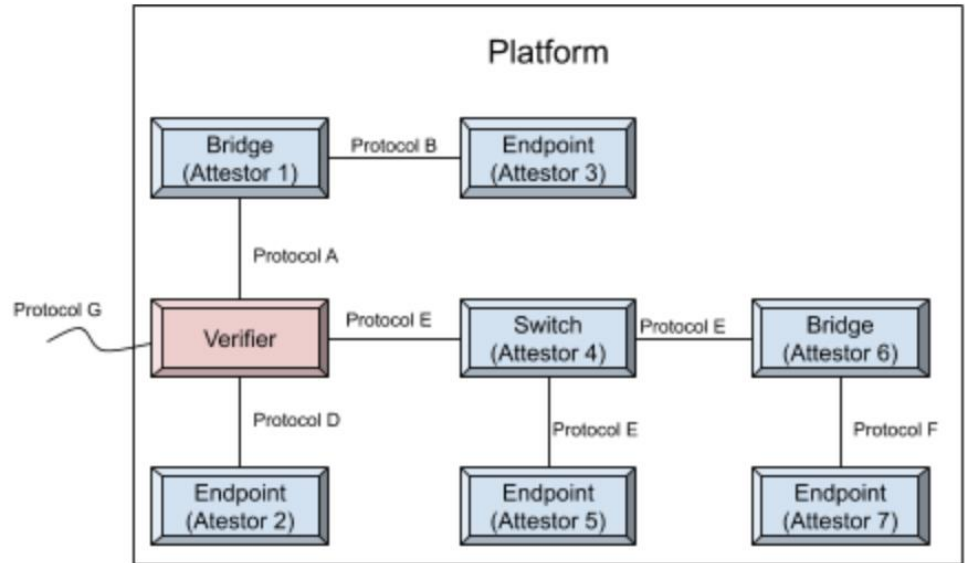
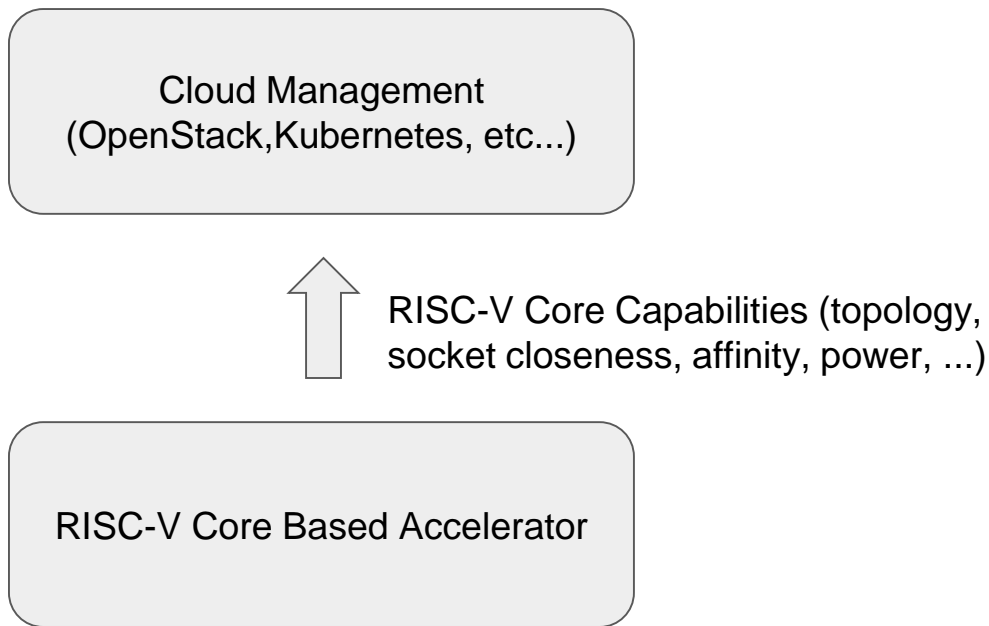
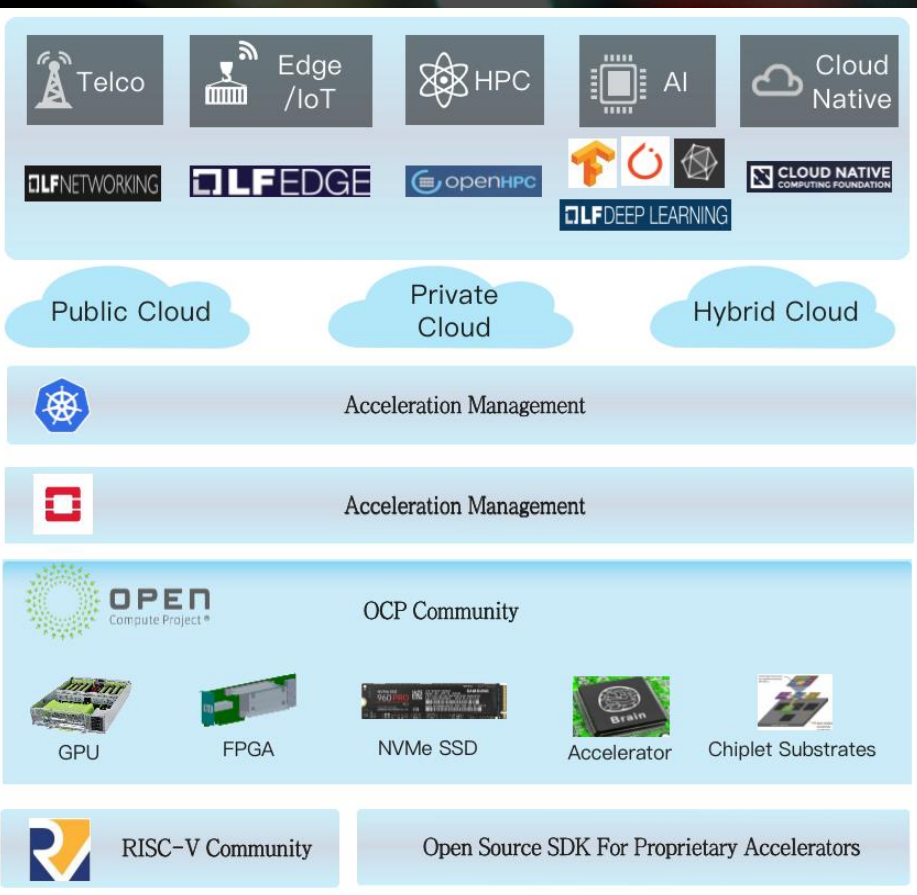


Figure 2. Platform Attestor Class Model

Build Open Source Cloud Ecosystem For RISC-V



New Open Source Accelerator Ecosystem Initiative



Open Heterogeneous Computing Framework

Developer driven full stack open source reference framework built with Formula and Tournaments

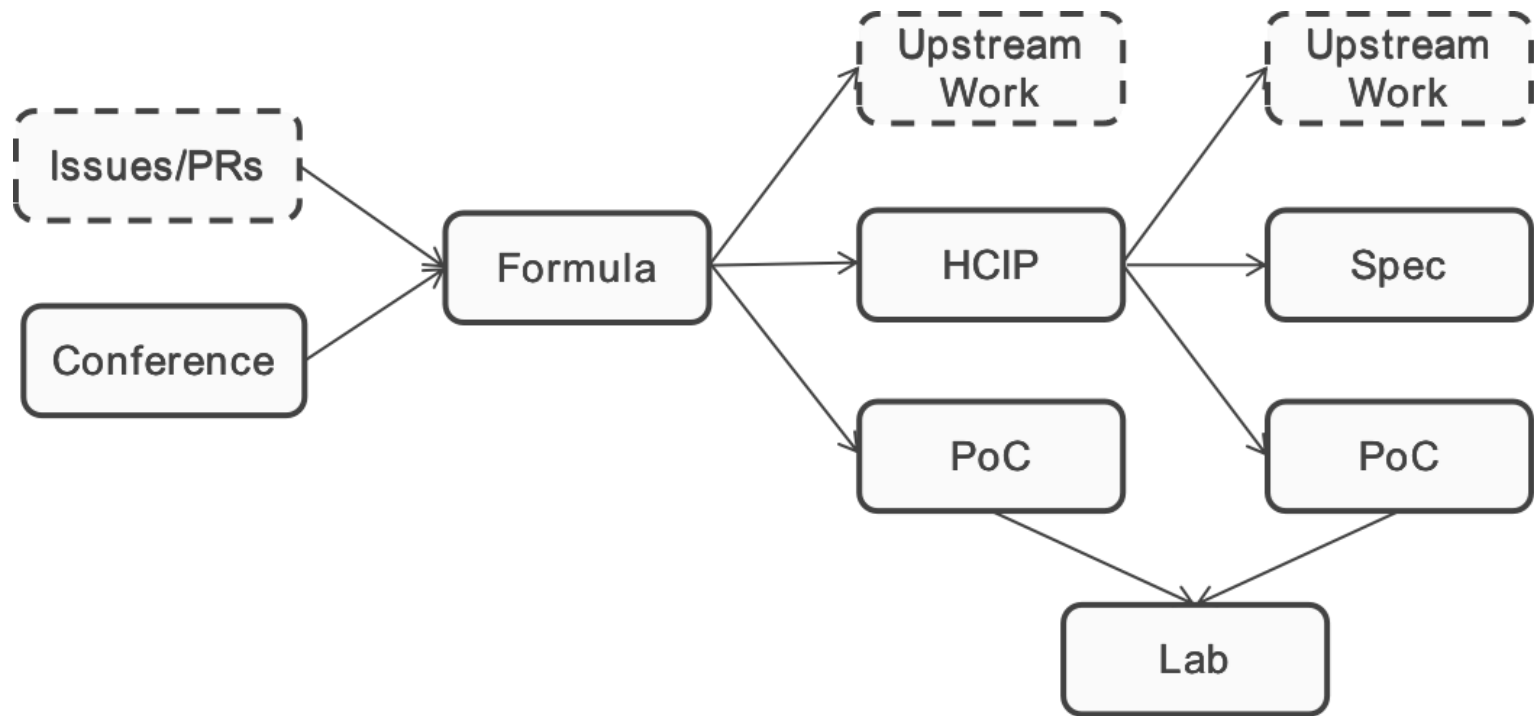
<https://github.com/open-heterogeneous-computing-framework>

Proposed Governance

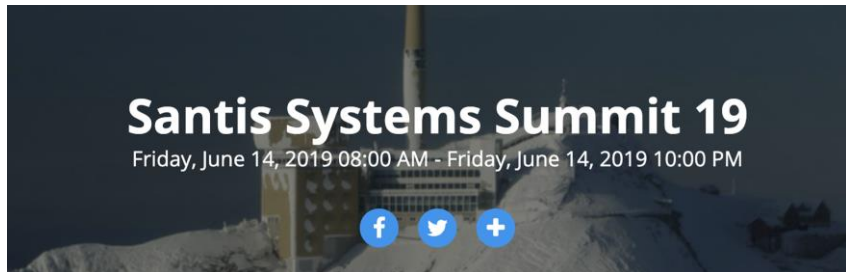
Open Heterogeneous Computing Framework



Example Workflow



Past OHCF related events



Monday, June 24 • 09:00 - 16:00

● Open Heterogeneous Computing Framework Introduction hosted by Huawei (Additional Registration Required)

[Click here to add to My Sched.](#)

<https://sched.co/Nv2!>

[Tweet](#)

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Registration Fees: Complimentary

Presentation will be in: English

In this event we will introduce the new open source initiative Open Heterogeneous Computing Framework, efforts from related communities and planning for 2019 and 2020/在本次活动中我们会介绍“Open Heterogeneous Computing Framework”这个新的开源社区，与其相关的几大开源社区的开发活动，以及2019和2020年的一些计划

How to Register: Pre-registration is required. To [register](#) for Open Heterogeneous Computing Framework Introduction, add it on during your KubeCon + CloudNativeCon + Open Source Summit registration.

For questions regarding this event, please reach out to zhipengh512@gmail.com

Participation

- Confirmed

- OpenStack Cyborg
- Kubernetes kube-acc
- TornadoVM from Manchester U

- In Process

- OCP (ODSA, OAI, OSF, Security)

- **Look forward to having RISC-V open source projects participate !**