

# Enable RISC-V In Cloud Computing

Zhipeng Huang, Huawei

# Bio

- Open Source Manager and Principal Engineer from Huawei
- Involved in
  - 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](https://github.com/hannibalhuang)

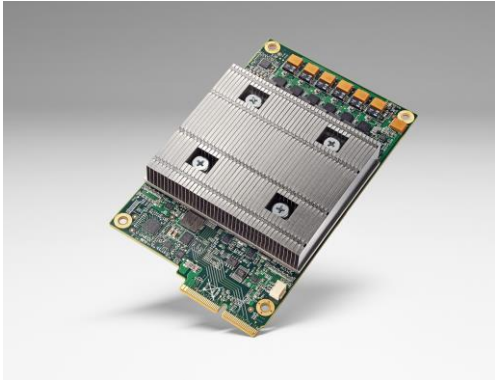
📅 Joined May 2009

Background

# New Era of Domain Specific Architecture

## NPU

Neural network processors for machine learning



## GPU

GPUs for graphics, virtual reality, ML

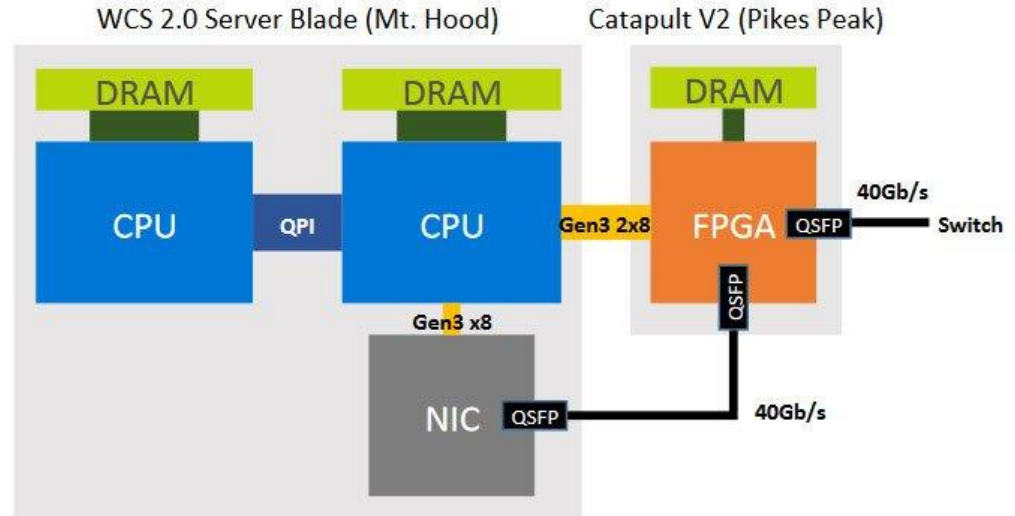
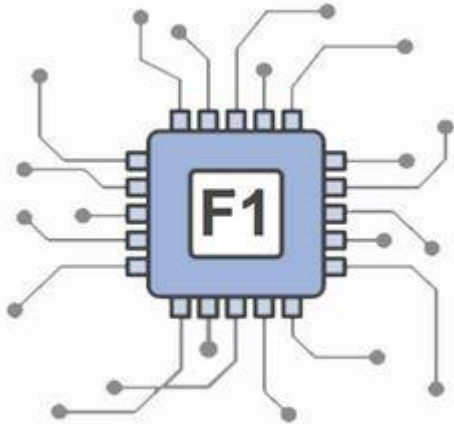


## SmartNIC/FPGA

Programmable network switches and hardware



# Cloud Computing Beyond Hype



# Open Source In Prime Time



# However The Problem Few Talks About

What is the software ecosystem you need?

What is the hardware ecosystem you need?

What is the main problem you have?

Device SDKs !!



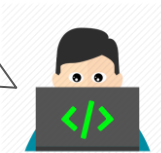
Accelerator Dev

It's not already there ??



Application Dev

Applications presume they can just ran, and loads of SDKs we don't have a clue how to connect them to cloud



Cloud Infra Dev

# Example



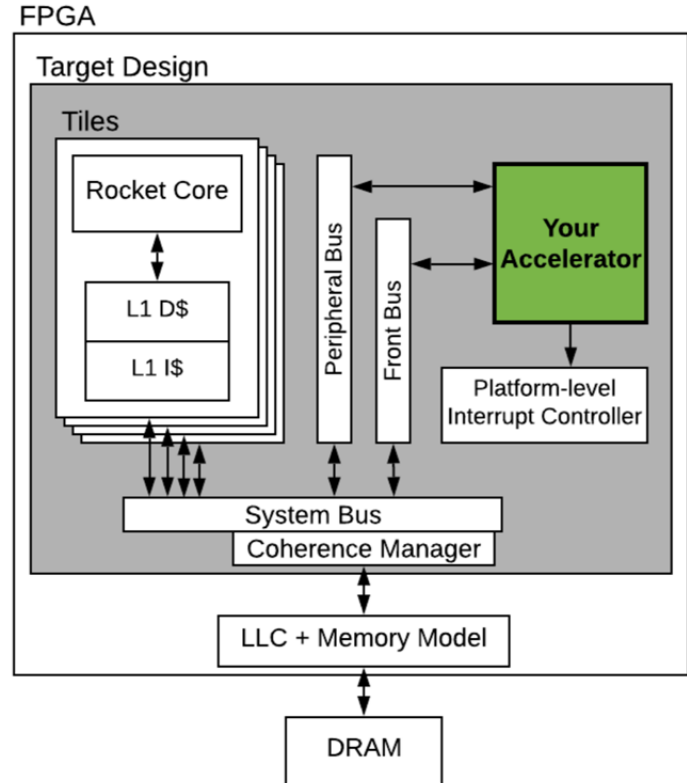
GPU talks: 3, FPGA talks: 0, Acceleration in general: 0, **out of nearly Four hundreds of accepted talks**



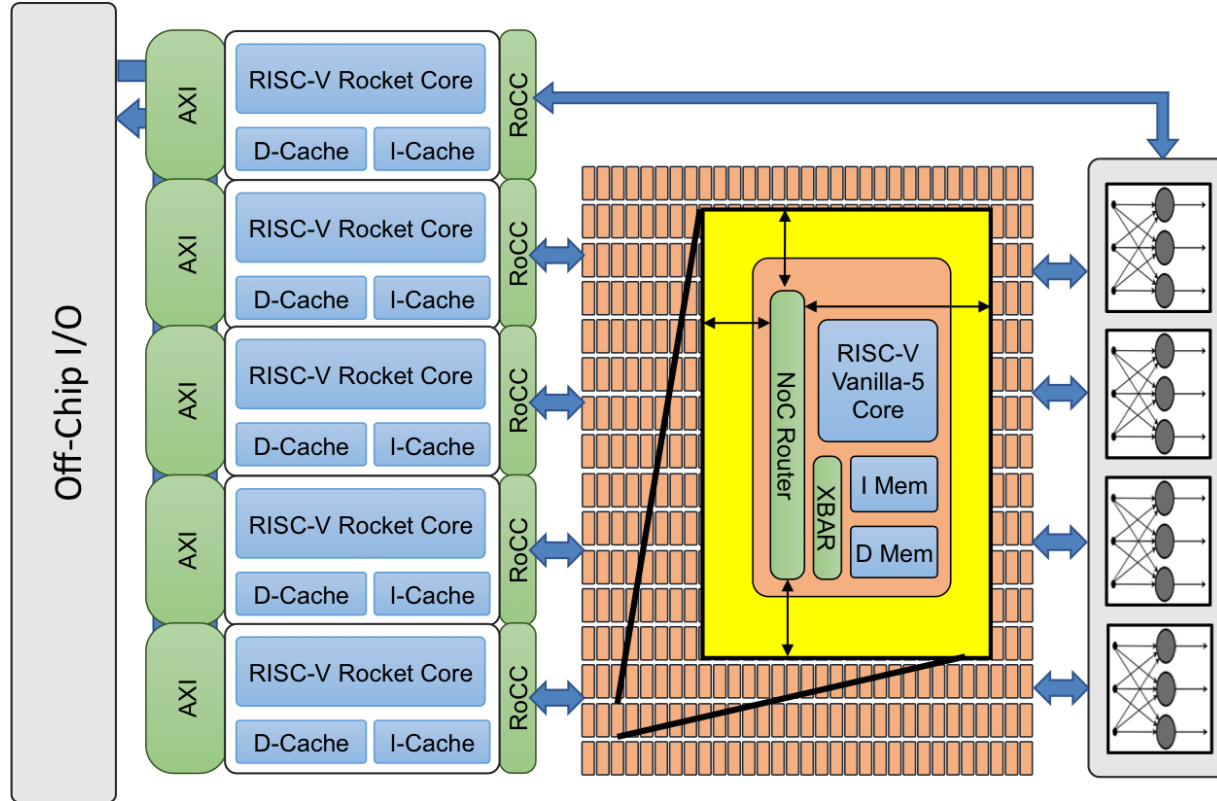
# RISC-V and Accelerators

# 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

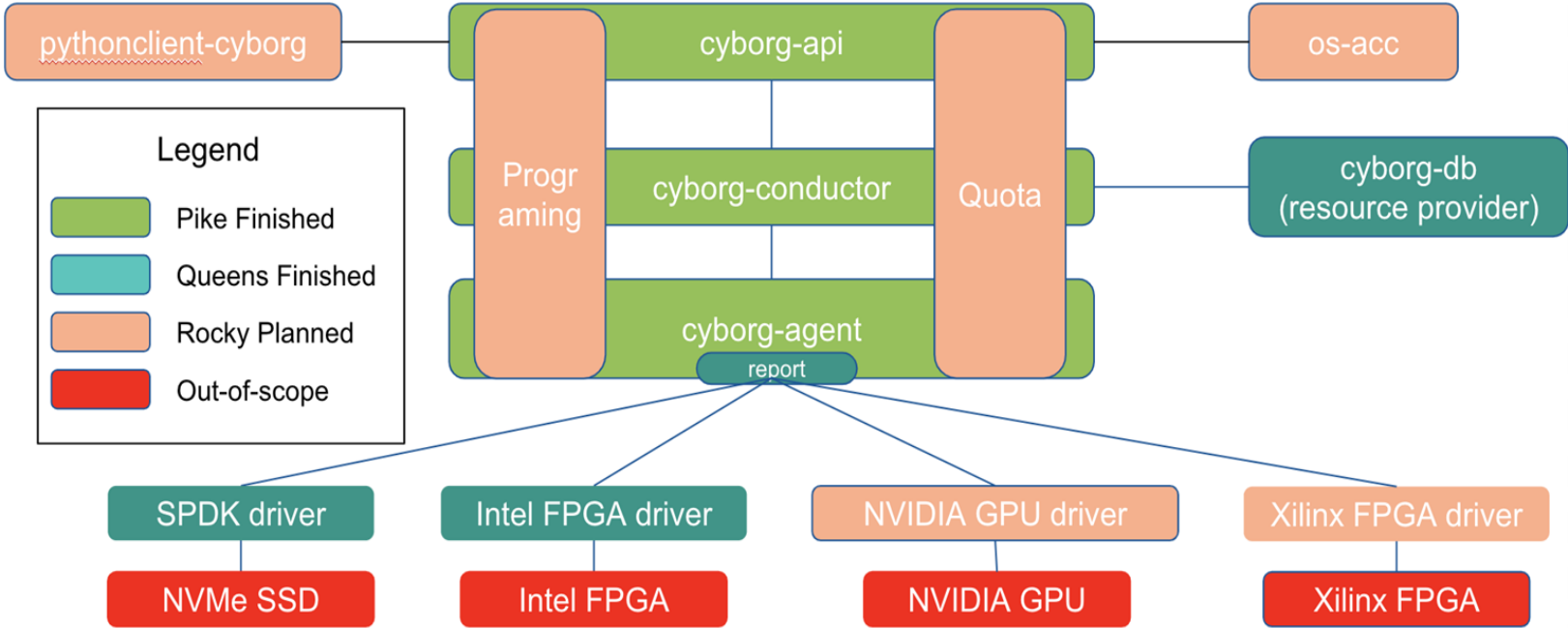


# Open Celerity Accelerator Centric SoC

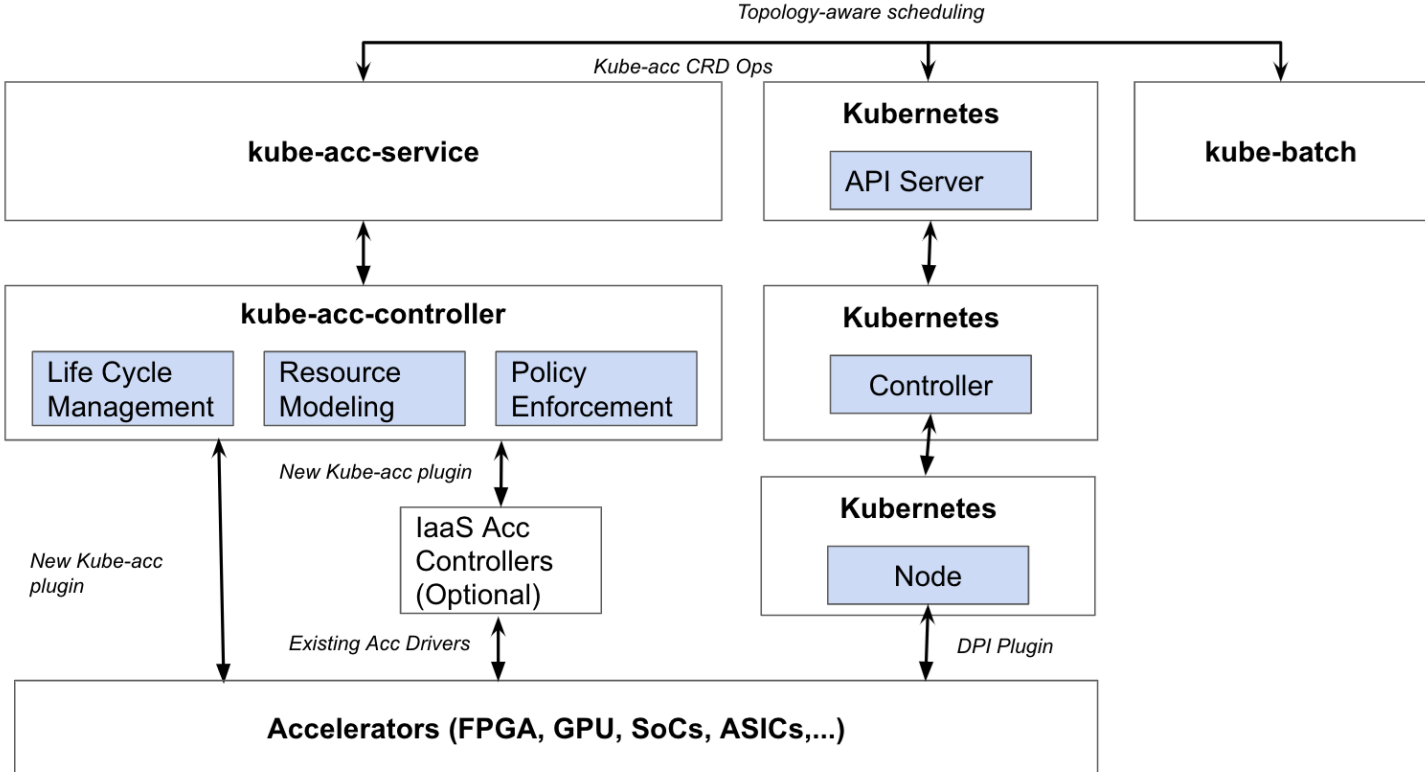


Support RISC-V  
Accelerators in Open  
Source Cloud Computing

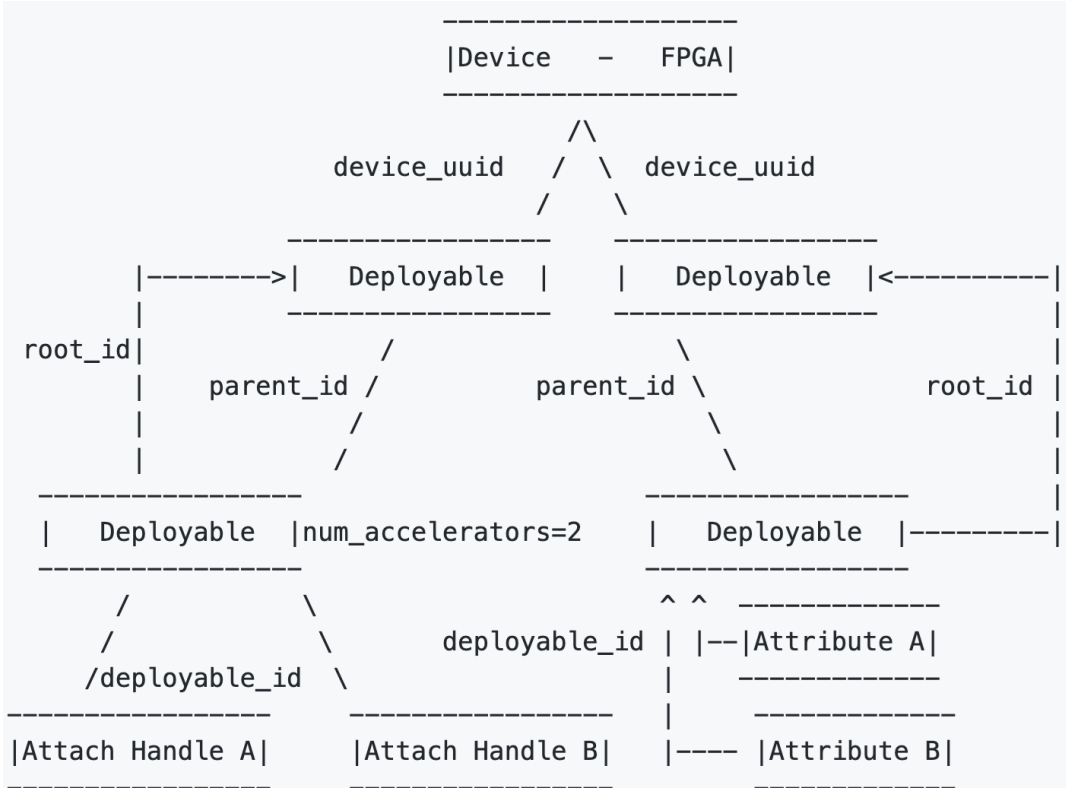
# Open Source Cloud Infrastructure With Acc Support



# Open Source Cloud Infrastructure With Acc Support



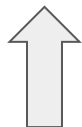
# Metadata - The Thing Needed The Most For Cloud



name	value	nullable	description
bs-name	aes-128	False	name of the bitstream(not unique)
bs-uuid	{uuid}	False	The uuid generated during synthesis
vendor	Xilinx	False	Vendor of the card
board	KU115	False	Board type for this bitstream to load
shell_id	{uuid}	True	Required shell bs-uuid for the bs
version	1.0	False	Device version number
driver	SDX	True	Type of driver for this bitstream
driver_ver	1.0	False	Driver version
driver_path	/path/	False	Where to retrieve the driver binary
topology	{CLOB}	False	Function Topology
description	desc	True	Description
region_uuid	{uuid}	True	The uuid for target region type
function_uuid	{uuid}	False	The uuid for bs function type
function_name	nic-40	True	The function name for this bitstream

# Build Open Source Cloud Ecosystem For RISC-V

Cloud Management  
(OpenStack, Kubernetes, etc...)



RISC-V Core Capabilities (topology,  
socket closeness, affinity, power, ...)

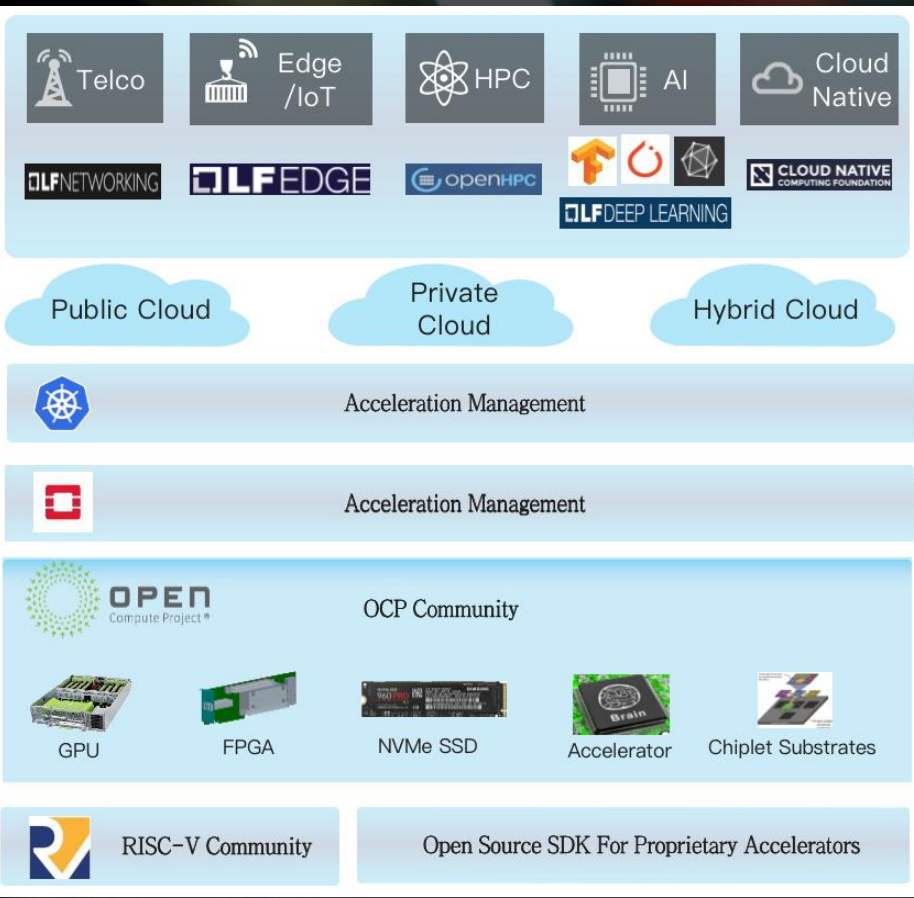
RISC-V Core Based Accelerator



## General Rule For Acc support in Cloud

*You want to expose as little as possible to the application, but as much as possible to the cloud management/orchestration platform*

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

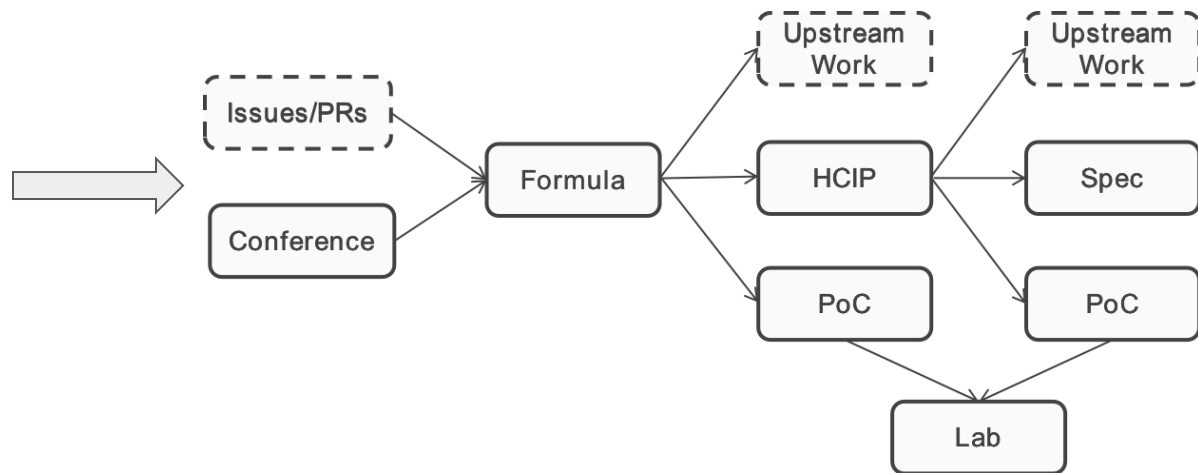
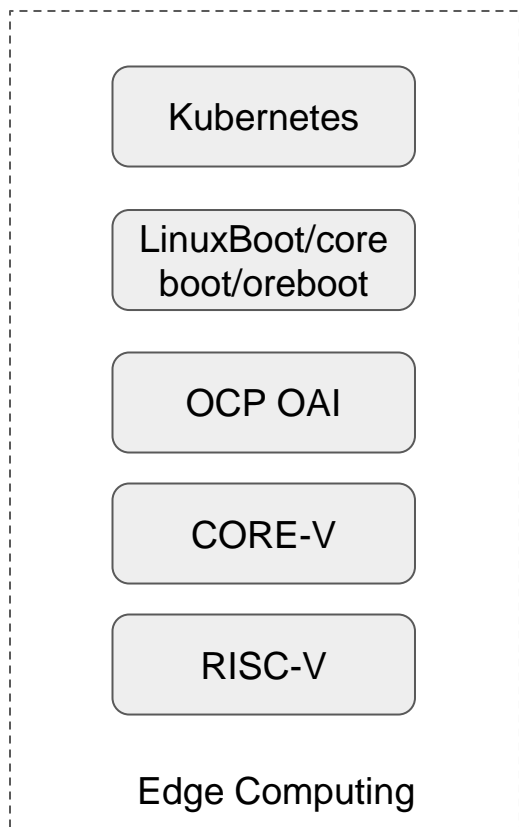


# Proposed Governance

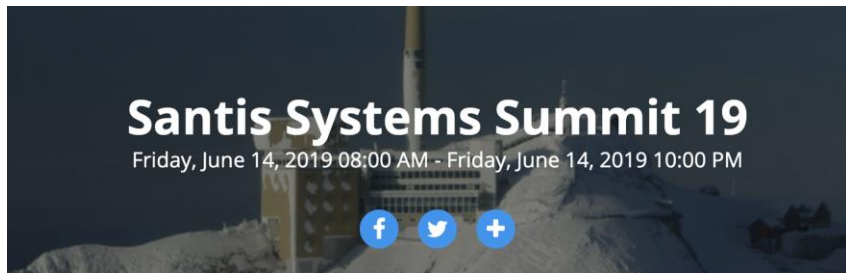
Emeritus Status	
Boards, Committees, Seats ....	

- **Lightweight organized developer centric technical community**
- **Foundation structure focus on marketing operation**

# Example Workflow



# Upcoming 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](mailto:zhipengh512@gmail.com)

# Github-Issue based CFP process

open-heterogeneous-computing-framework / conference

Unwatch 2 Star 0 Fork 1

Code Issues 7 Pull requests 0 Projects 0 Wiki Security Insights Settings

Filters is:issue is:open Labels 8 Milestones 0 [New issue](#)

<input type="checkbox"/>	7 Open	0 Closed	Author	Labels	Projects	Milestones	Assignee	Sort
<input type="checkbox"/>	<a href="#">大规模GPU虚拟化在讯飞云上的应用</a>							
	<small>#7 opened 9 days ago by xgoeforever</small>							
<input type="checkbox"/>	<a href="#">Open Source: Accelerating Innovation in the AI Market</a>							
	<small>#6 opened 20 days ago by ibrahimhaddad</small>							
<input type="checkbox"/>	<a href="#">A Lightweight Accelerator Management Framework in Edge</a>							
	<small>#5 opened 26 days ago by wangzh1993</small>							
<input type="checkbox"/>	<a href="#">A AI accelerator HDDL in Edge Computing</a>							
	<small>#4 opened 26 days ago by lvmxh</small>							
<input type="checkbox"/>	<a href="#">TLS offloading solution using heterogeneous HW management</a>							
	<small>#3 opened 26 days ago by xxinran</small>							
<input type="checkbox"/>	<a href="#">A heterogeneous hardware management solution for 5G Ultra Reliable &amp; Low Latency Network</a>							
	<small>#2 opened 27 days ago by YumengBao</small>							
<input type="checkbox"/>	<a href="#">Proposed Topic: An accelerated AI platform for heart disease diagnosis</a>							
	<small>#1 opened 27 days ago by gaojinghua</small>							



# Thank you !

## Q & A

Feel free to contact me

- Via email: [zhipengh512@gmail.com](mailto:zhipengh512@gmail.com)
- Via twitter: @nopainkiller
- Via slack: ohcf.slack.com