ACRN

The Little Hypervisor for IoT

Anthony Xu
Intel Open Source Technology Center

ACRN

Agenda

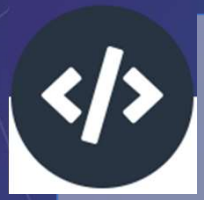
- What's ACRN
- Architecture
- Q&A

What is ACRN?

ACRN

ACRN* is a flexible, lightweight **reference hypervisor**, built with real-time and safety-criticality in mind, **optimized** to streamline **embedded development** through an open source platform.

ACRN Features



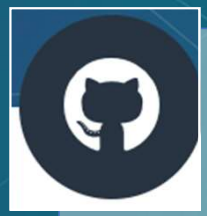
Small Footprint

Built for IoT

Adaptability

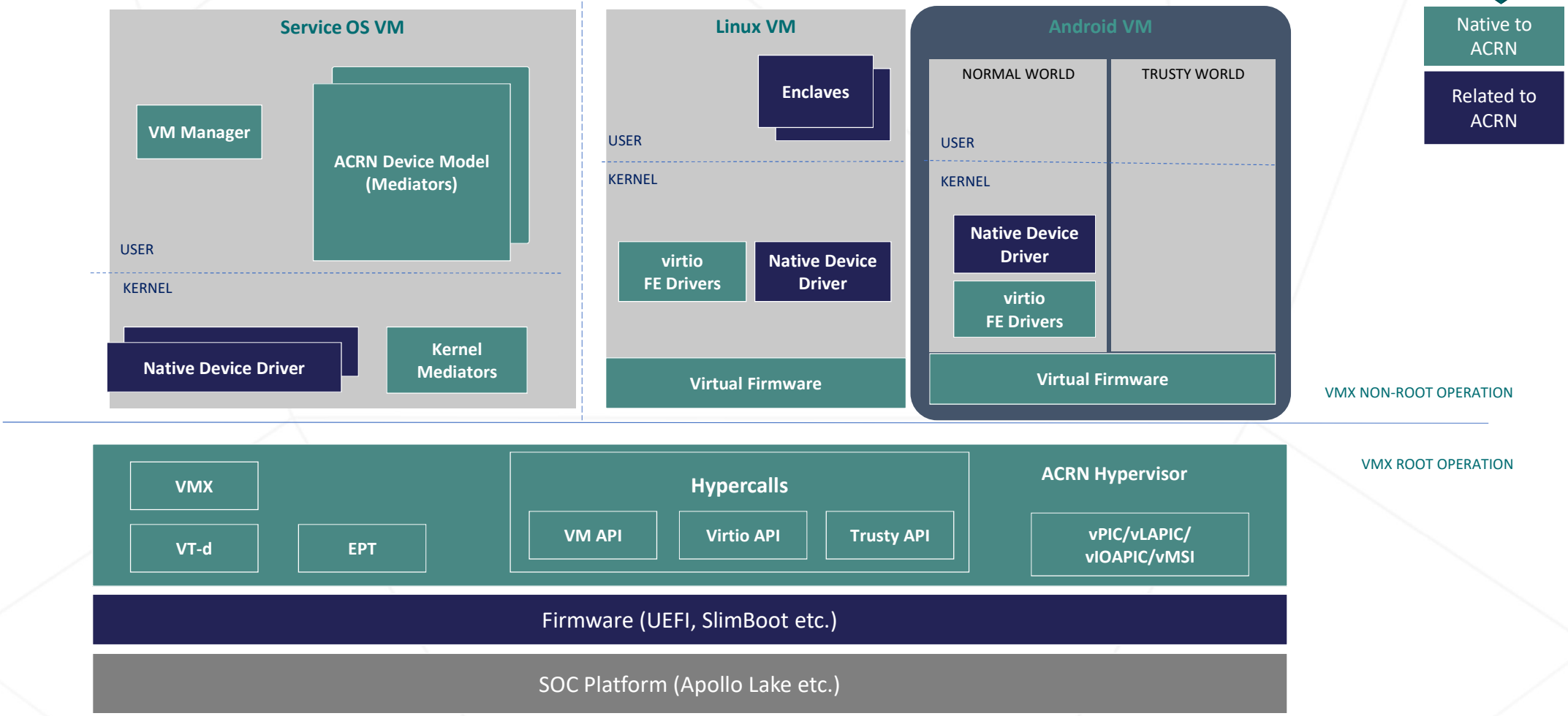
Built for Real-Time

Safety Criticality

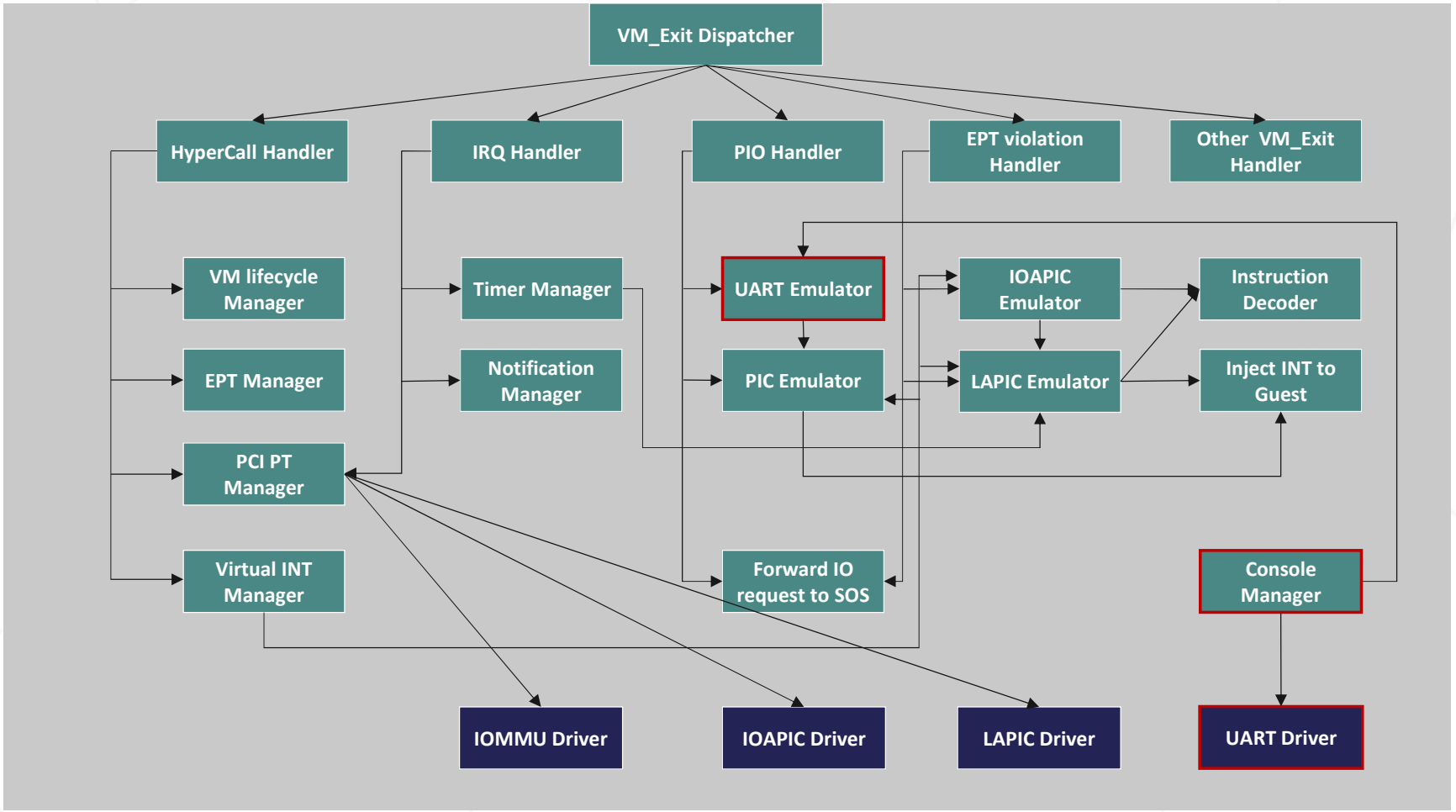


Truly Open Source

ACRN Share Mode



ACRN HV Share Mode

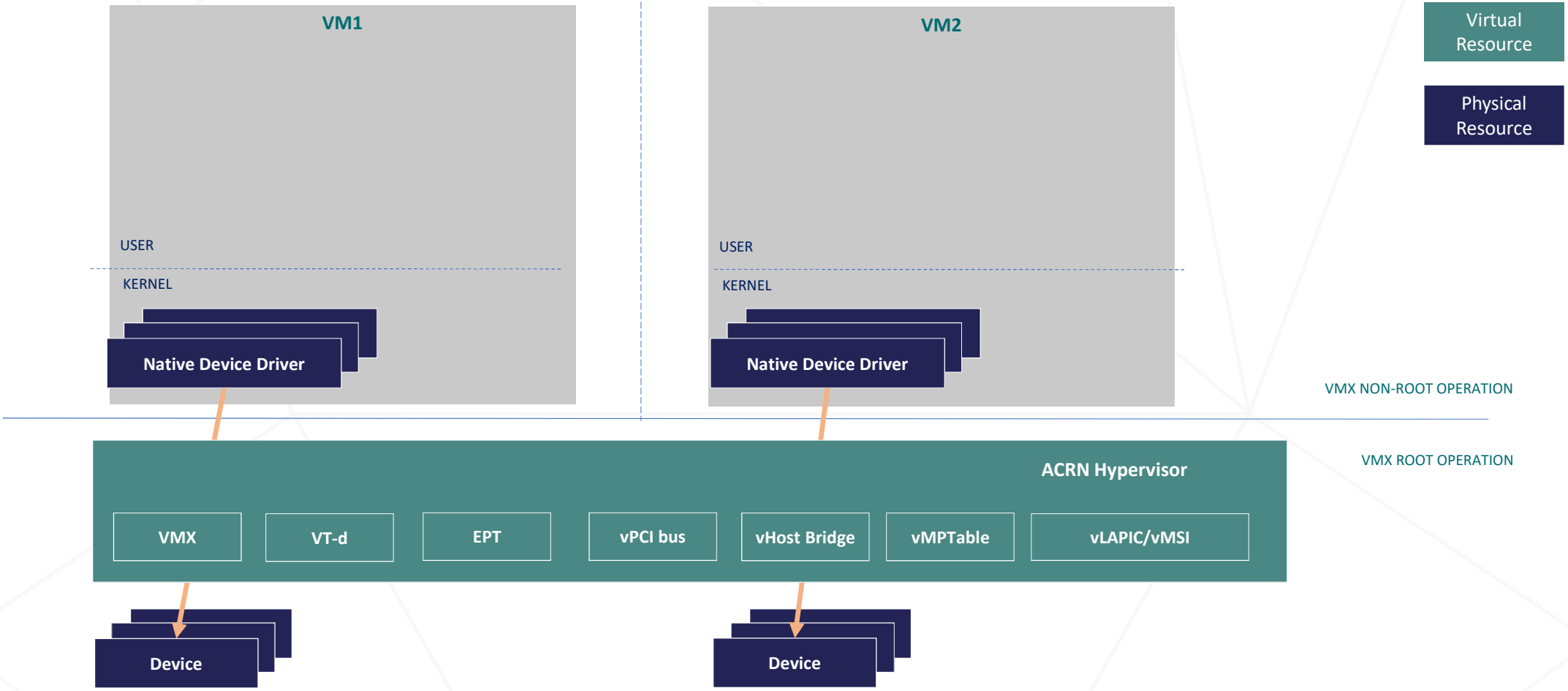


Software Module

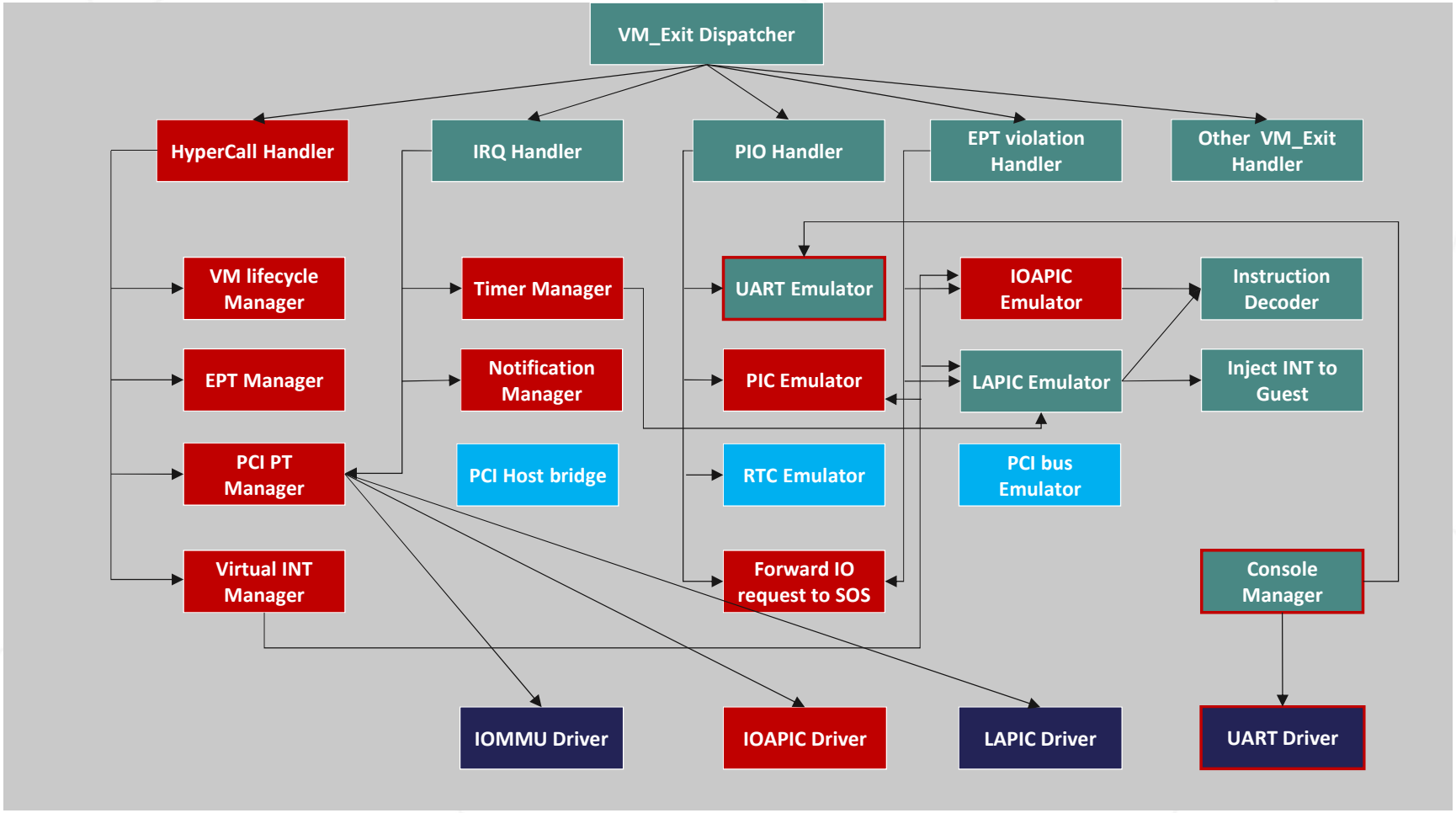
Hardware Driver

For Debug

ACRN Partition Mode



ACRN HV Partition Mode



Software Module

Hardware Driver

For Debug

Not Used

New Module

We didn’t see any performance improvement in partition mode ☹

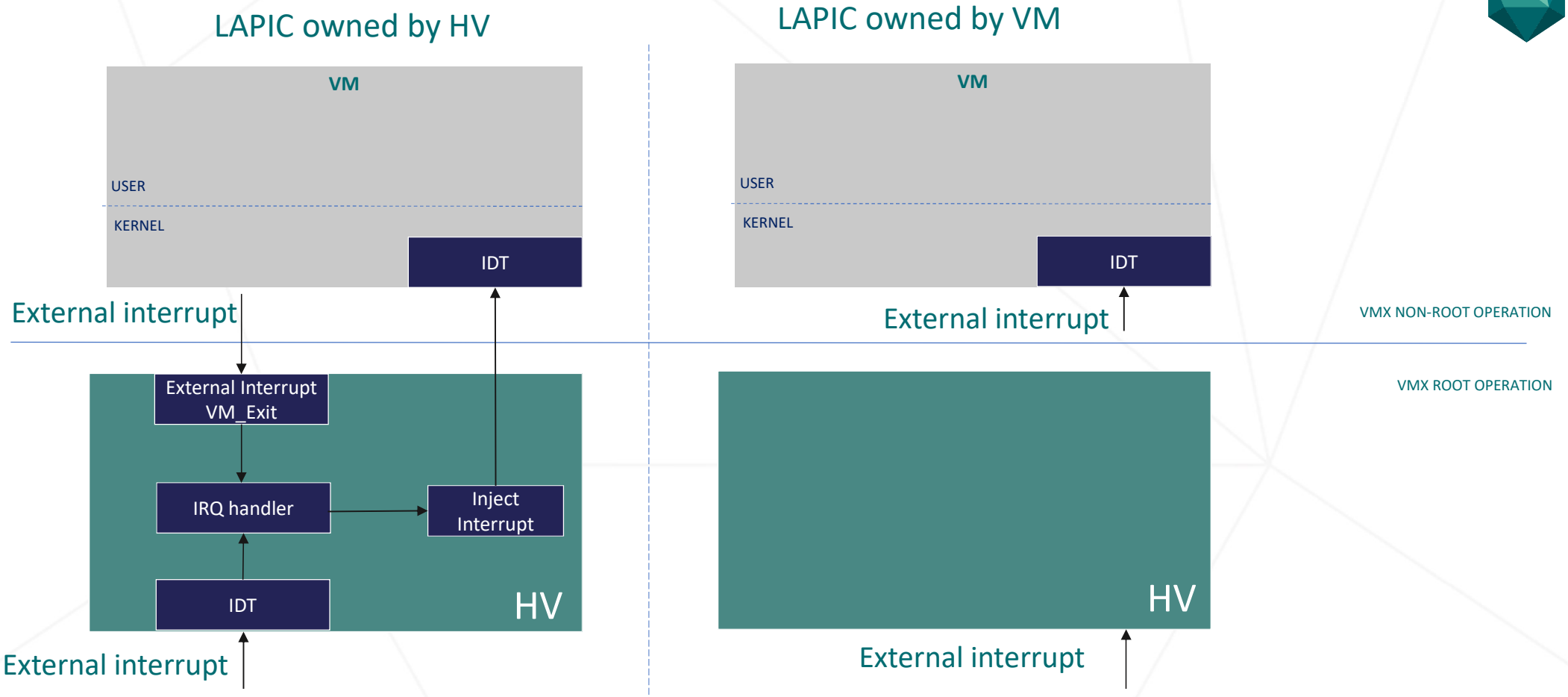
After investigation, we think similar performance is reasonable. Because same technologies are used in both modes.

We noticed there are a lot of LAPIC related VM_Exits

Can we pass through LAPIC?

Yes

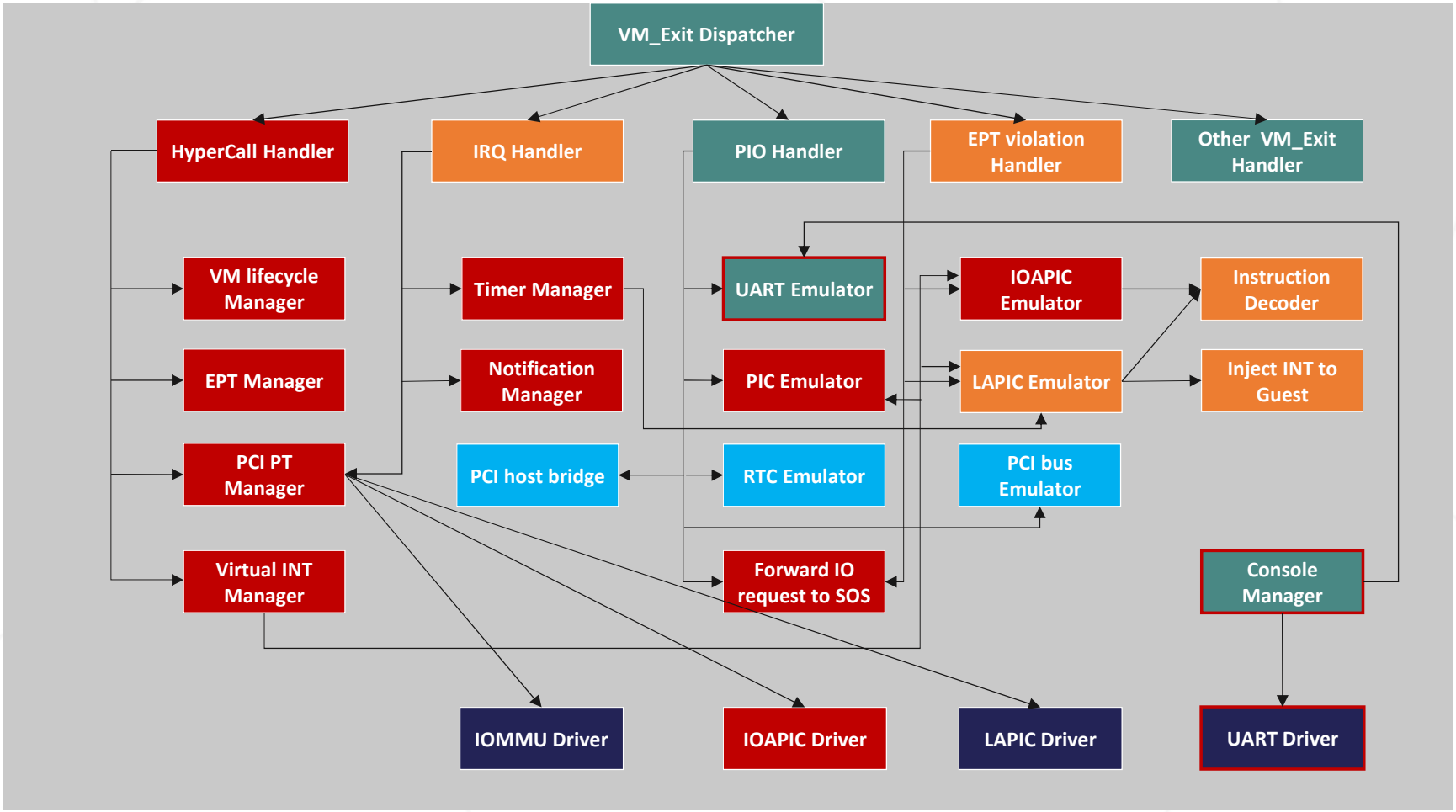
Guest Interrupt Delivery



- Interrupt is enabled in HV
- External Interrupt VM_Exit is enabled

- Interrupt is disabled in HV
- External Interrupt VM_Exit is disabled

ACRN HV Partition Mode w/ LAPIC PT



Software Module

Hardware Driver

For Debug

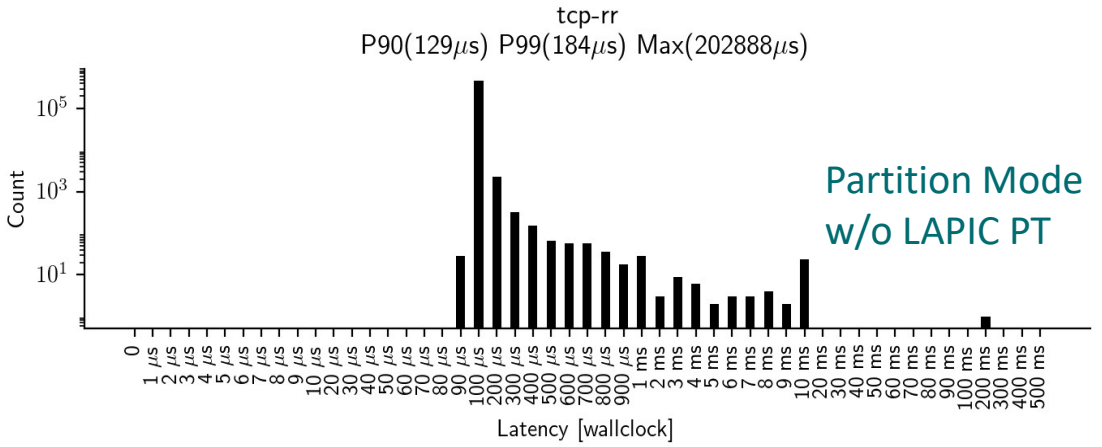
Not Used

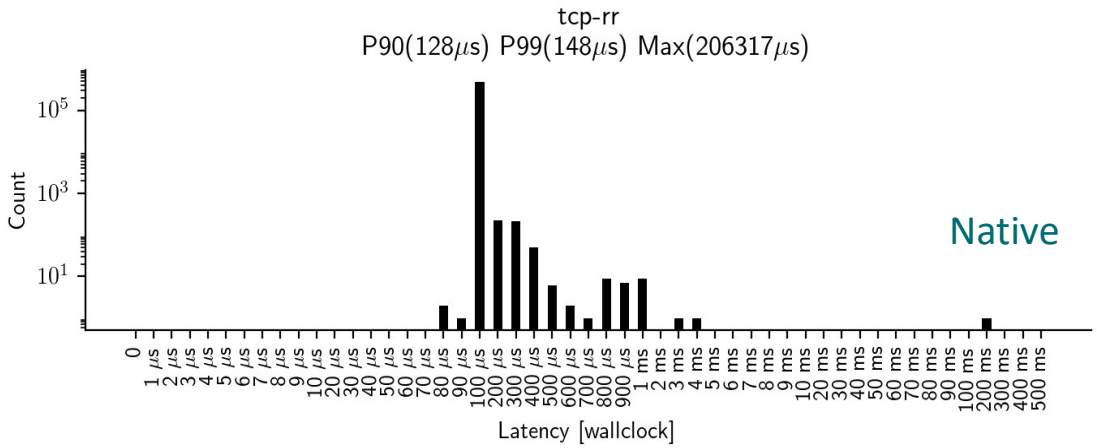
New module

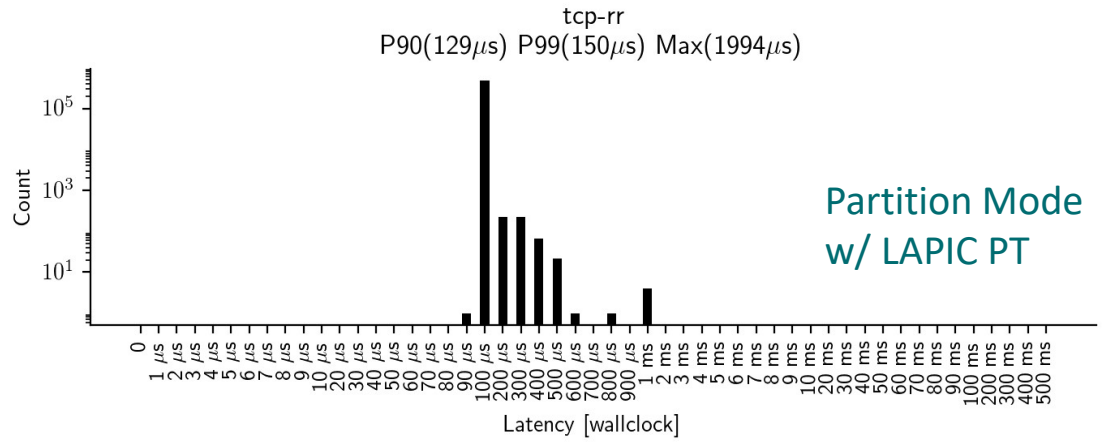
Not Used For LAPIC PT

Performance

- Coffee Lake desktop
- C/P state is disabled
- 2CPU, 8G mem for both native and VM
- Integrated 1Gbps NIC card
- Netperf TCP latency test





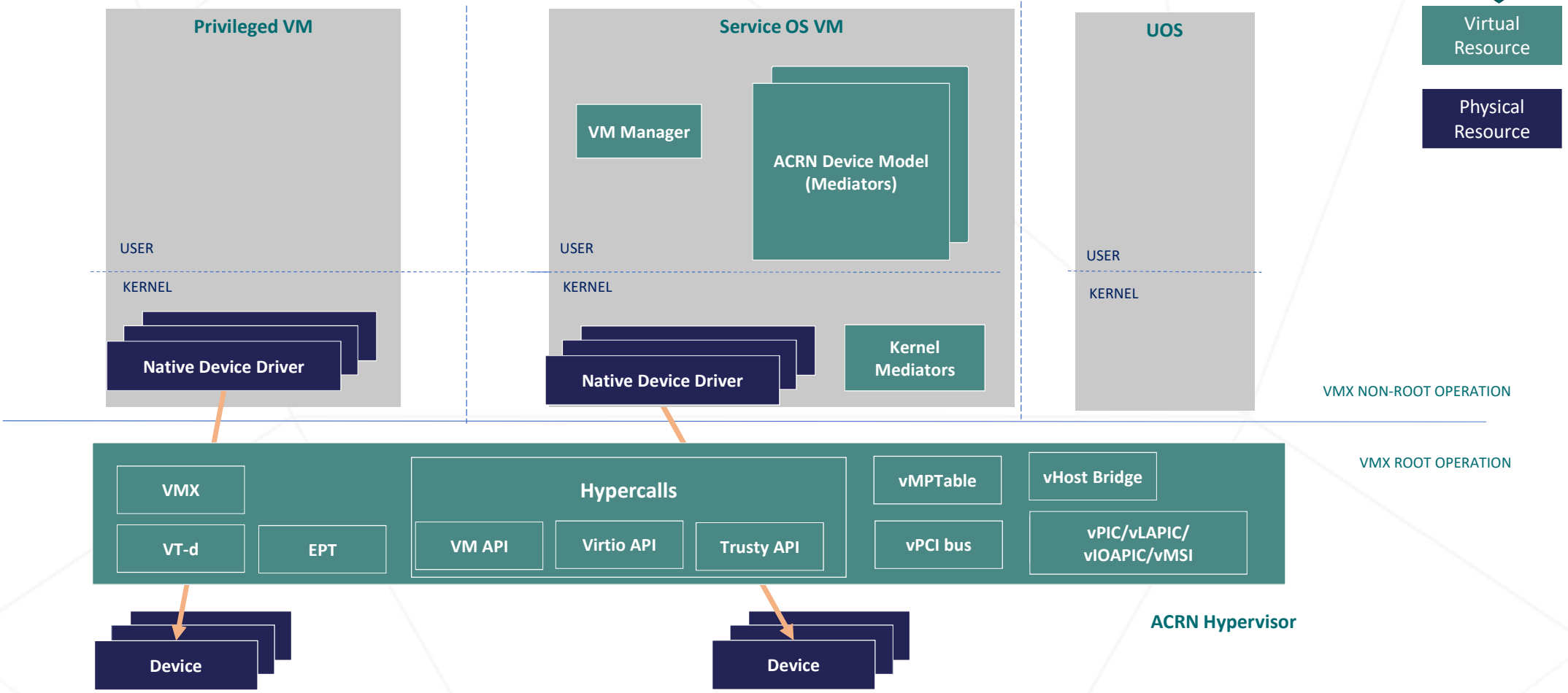


Security issue!
VM might send IPI to other VMs.

1. Make sure Guest OS doesn’t do that.

2. Enable x2APIC, only intercept/emulate Guest IPI operation.

ACRN Hybrid Mode



Footprint

	Hypervisor	Device Module
ACRN Share Mode	28k	39k
ACRN Partition Mode	15k	0
ACRN Partition Mode w/ LAPIC PT	11k	0
ACRN Hybrid Mode	29k	39k

Call to Action

Join us!

If you support the ACRN project and feel that this is the right thing for the embedded ecosystem, join us in moving this project forward together as a community member.

We need code contributors, users, and project direction influencers!

Contribute code!

Make a difference to the project by committing code, help us become a better project.

Project code merged in the past 6 months allows you to become a voting member of the Technical Steering Committee.

GitHub: https://github.com/projectacrn

All Contributions Matter

•In open source projects a contribution can be anything which helps the project to accomplish its mission. Examples of Contributions beyond just code include:

•Financial Assistance, Requirements Gathering, Documentation, Testing, Bug Reporting

Join the ACRN Community Today!
https://projectacrn.org

ACRN

Q&A

Any Questions?

ACRN Sessions at OSS NA

ACRN Technical Overview
ACRN Hypervisor for Embedded IoT

Speaker:
Anthony Xu
ACRN Architect

Wednesday August 29, 2018
3:00pm – 3:40pm
Room 114/115

ACRN BOF Session
The Little Hypervisor for IoT Development

Moderator:
Jeffrey Osier-Mixon
ACRN Community Manager

Wednesday August 29, 2018
5:40pm – 6:20pm
Room 109

ACRN Demo

THANK YOU