



LEADING
COLLABORATION
IN THE ARM
ECOSYSTEM

Extending the thermal framework

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Issues with modeling the SoC in current framework

What is the best way to represent a octa-core CPU with 8 thermal sensors?

1. Single thermal zone with 8 sensors using coefficients for a linear equation
But this might end up throttling all CPUs, how to handle hotspots?
2. ... so let's make it one thermal zone per sensor
Now there is no way to reflect the conductive heat from other cpus

Potential solutions:

- Sensors spanning thermal zones
- Hierarchical thermal zones

Issues with modeling the SoC in current framework

No way to ensure lower thermal threshold

1. Very cold environments, to ensure circuit closures

Potential solutions:

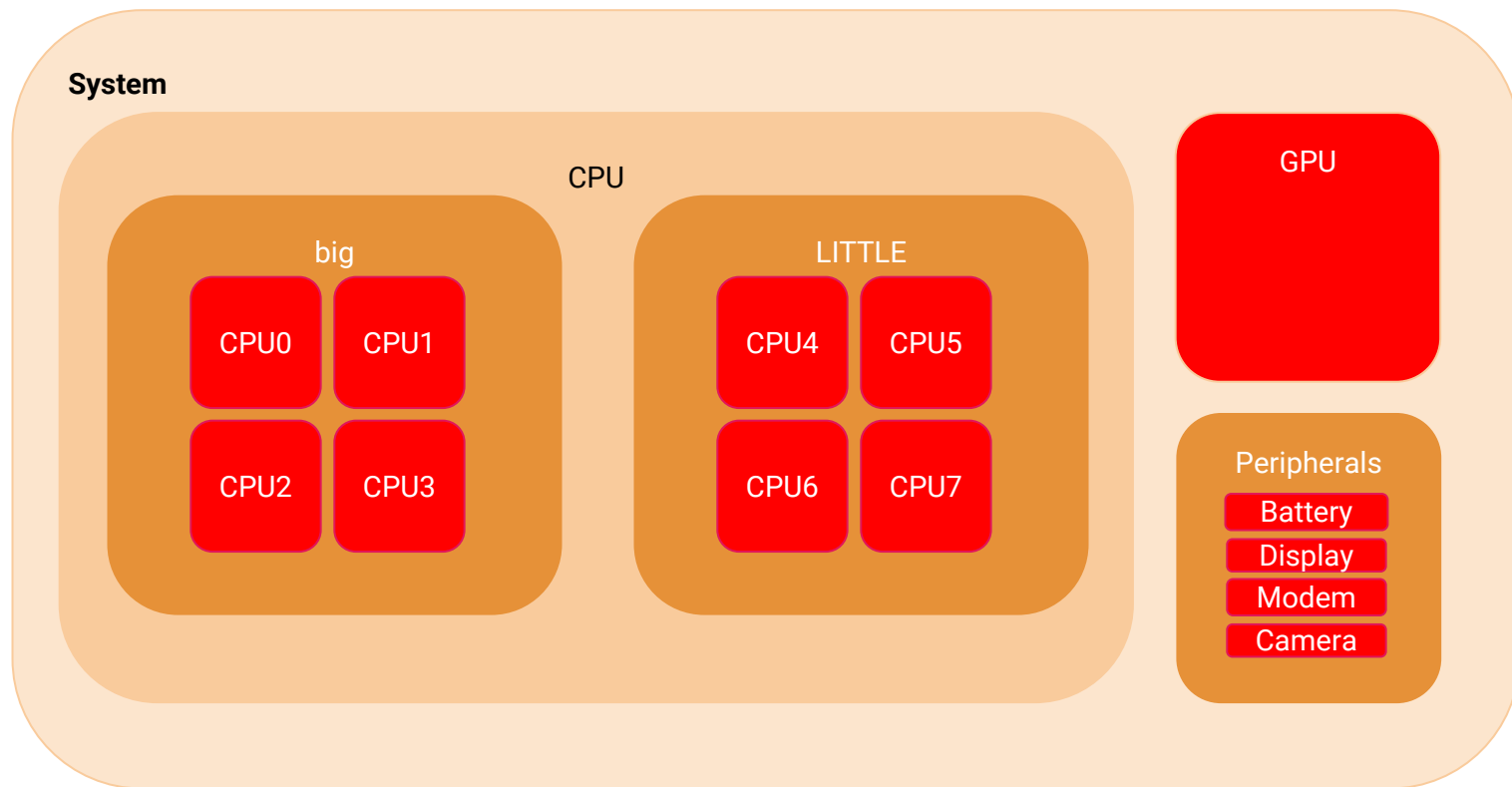
- Range-based governors (working on a patch)
- Regulator “cooling” (heating) devices to raise floor value?

Issues with modeling the SoC in current framework

How to relate battery voltage to performance limits?

1. Battery voltage droop → throttle max frequency?
2. Applications for battery charging too (modulate charging based on temperature of battery)

How it might look like in the end



Framework changes needed

- More flexible sensor/thermal zone topology in thermal framework
- Aggregation functions in thermal zone hierarchy
 - Average, min, max
- Range-based governor

Things already in flight on LKML

- Allow different governors for each thermal zone at boot
 - Patch rejected to keep in line with other frameworks that don't allow governors to be specified in DT
- Separate out sensors data from thermal zones to allow spanning thermal zones
 - Needs review help
- **Thermal microconf at LPC** accepted, send topics to me or Eduardo Valentin