Powerdebugging inside Linaro

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https://wiki.linaro.org/WorkingGroups/PowerManagement/
Linaro?

Source Consolidation

Patches

Architecture consolidation

Optimizations

Tools

Evaluation builds
PM WG: Story so far...

- 1 full Linaro cycle
- Focus on consolidation and tools
- Some kernel work...

<table>
<thead>
<tr>
<th>Feature</th>
<th>Freescale i.MX51</th>
<th>TI OMAP3</th>
<th>TI OMAP4</th>
<th>Samsung Orion</th>
<th>ST-E UX8500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export clock tree to debugfs</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Cpufreq driver</td>
<td>Y</td>
<td>WIP</td>
<td>WIP</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Cpuidle driver</td>
<td>WIP</td>
<td>Y</td>
<td>N</td>
<td>WIP</td>
<td>N</td>
</tr>
<tr>
<td>CPU Hotplug</td>
<td>NA</td>
<td>NA</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
Some tools work
  ● Powertop
  ● Powerdebug
And some experiments
  ● Thermal management
  ● CPU Hotplug
Survey
Problem Statement

User or Kernel
(TBD)

Generic Kernel
(/kernel, /driver, etc)

Device Drivers
- LDM
- Runtime PM
- platform_device
  pdata

Power Manager
- CPUidle
- DVFS / CPUfreq
  Governor
  Policy

PM QoS
- LDM suspend hooks
  (begin/end, prepare/finish, enter)
- PM runtime hooks
  (suspend, resume, idle)
- CPU hotplug
- CPU idle
- CPUfreq

SOC specific Kernel
(/arch/arm, /arch/arm/mach)

PM Core
- suspend and idle entry
  - SRAM idle
  - WFI

SoC abstraction
(if platform supported)

SOC PM layer
  devlat
  tput
  Freq
  MPU_fsl

opp

Clock fwk
- clockdomain
- powerdomain

Regulator

Hardware
- SOC HW
- PMIC

Linaro
Problem statement

Complexity is growing fast and it is hard to tune a product for optimum battery life.
Good old days

User

Kernel

Device Drivers

LDM

LDM suspend hooks

SRAM idle, WFI

Clock Framework

Hardware

SoC HW

PMIC

Generic code
Vendor code
P \propto V^2 f
Corralling regulators, idle states and offering latency guarantees

Device Drivers

LDM

LDM suspend hooks

SRAM idle, WFI

CPUfreq

Clock Framework

Regulator Framework

PM_QoS

CPUidle

SoC HW

PMIC

Generic code

Vendor code
Many hands make light work
Abstracting clock- & power-domain handling for peripherals

User

- CPU hotplug

Kernel

- Runtime PM
- CPUfreq
- Clock Framework
- LDM suspend hooks
- SRAM idle, WFI

Hardware

- SoC HW
- PMIC

Device Drivers

- LDM
- PM_QoS
- CPUidle

Regulator Framework

Generic code
Vendor code

Linaro
Performance points of devices

User

Kernel

Hardware

SoC HW

PMIC

CPU hotplug

Device Drivers

LDM

PM_QoS

Runtime PM

LDM suspend hooks

SRAM idle, WFI

CPUidle

CPUfreq

OPP

Clock Framework

Regulator Framework

Generic code Vendor code

Linaro
Warmth at last!

- User
  - Thermal manager
    - Vendor policy
  - CPU hotplug
  - Runtime PM
    - Thermal Framework
    - CPUfreq
    - OPP
    - Clock Framework
  - Device Drivers
    - LDM
  - PM_QoS
  - CPUidle
  - Regulator Framework

- Kernel
  - SoC HW
  - PMIC

- Hardware
  - Generic code
  - Vendor code

- Linaro
Focus areas for Linaro PM WG

- Hardware
  - SoC HW
  - PMIC

- User
  - Thermal manager
    - Vendor policy
  - CPU hotplug

- Kernel
  - CPUfreq
  - OPP
  - Runtime PM
  - Clock Framework
    - LDM suspend hooks
    - SRAM idle, WFI
  - Device Drivers
    - LDM
    - PM_QoS
  - CPUidle
  - Regulator Framework

- Linaro focus
  - Generic code
  - Vendor code
  - powerdebug
Remember!
We're just getting started...

https://wiki.linaro.org/WorkingGroups/PowerManagement/

http://git.linaro.org

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