

Linux Plumbers Conference

Dublin, Ireland September 12-14, 2022

ACPI support for RISC-V - Updates

Sunil V L



Linux
Plumbers Conference | Dublin, Ireland Sept. 12-14, 2022

Agenda

- Platform requirements to support ACPI
- Engineering Change Requests (ECR) - status/ plan for basic support
- Additional UEFI requirement
- Upstream process discussion
- Proposals for advanced features (WIP)



**Linux
Plumbers Conference**

| Dublin, Ireland Sept. 12-14, 2022

Platform requirements

1. **RV64** platforms, and
2. Advanced Interrupt Architecture (**AIA**)
 - IMSIC - Incoming MSI Controller
 - APLIC - Advanced Platform-Level Interrupt Controller (optional)



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

ACPI ECR status/plan

Batch 1 : Non-AIA (Under ASWG review)

Boot linux with SBI console, initrd

1. MADT RINTC V1 :

- Per processor interrupt controller
- ACPI processor ID and hartid association

2. RHCT : RISC-V Hart Capabilities Table

- Timer frequency
- ISA string - provides information about the extensions



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

ACPI ECR status/plan

Batch 2 : AIA + NUMA (Under RVI review)

1. MADT RINTC V2 :
 - Update with IMSIC base address/size
2. MADT – Add IMSIC and APLIC
3. APLIC device in the namespace
4. New RINTC affinity structure in the SRAT



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Additional UEFI requirements

RISCV_EFI_BOOT_PROTOCOL

- Primarily to pass the boot hartid
- Ratified this year, UEFI spec is updated
- Support added in upstream u-boot and linux
- EDK2 support in progress
- Specification available [here](#)



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Upstreaming linux patches

- Next version of ACPI spec would take at least an year even though ECRs get approved early
- ACPICA patches/ release



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Features (WIP)

IOMMU support

- RISC-V IO Mapping Table (RIMT) specification

Power/Performance Management

- RISC-V FFH (Fixed Feature Hardware) specification
 - Required for LPI and CPPC
 - To be ratified and maintained within RVI



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Acknowledgments

RISC-V Platform Runtime Services TG : tech-prs@lists.riscv.org

RISC-V Platform HSC : tech-unixplatformspec@lists.riscv.org

RISC-V OS-A-SEE Task Group : tech-os-a-see@lists.riscv.org



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

References

<https://github.com/riscv-non-isa/riscv-acpi>

email: tech-prs@lists.riscv.org



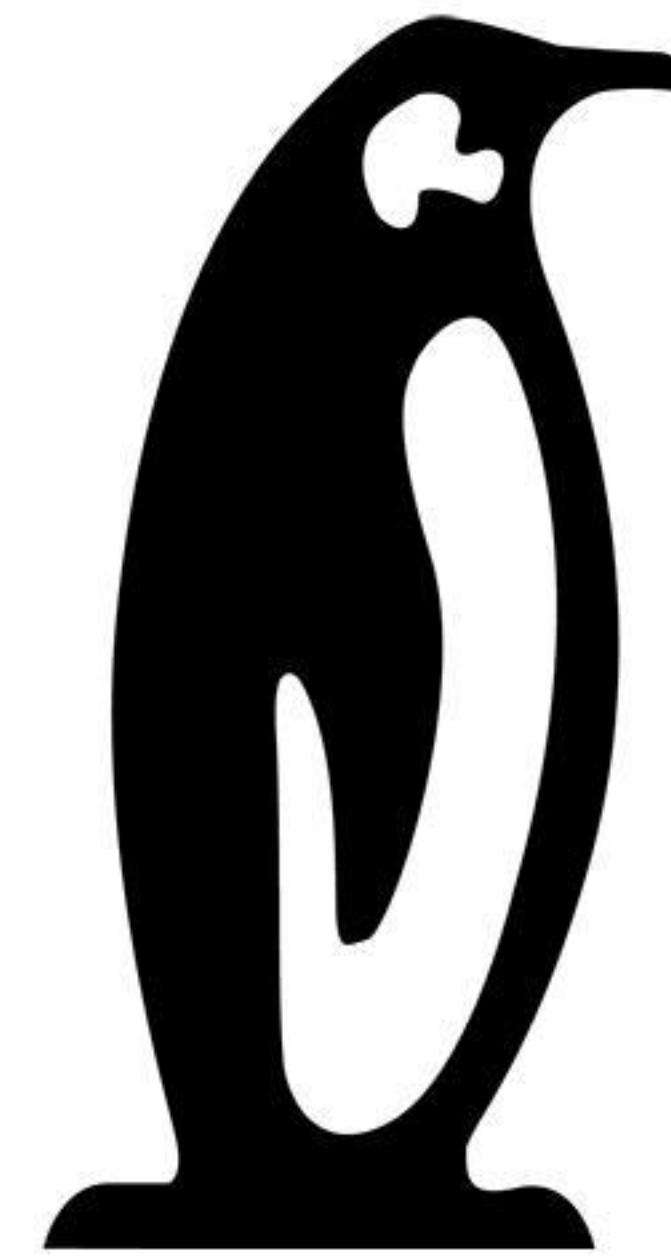
Linux
Plumbers Conference | Dublin, Ireland Sept. 12-14, 2022



Thank You!
Sunil V L
[**<sunilvl@ventanamicro.com>**](mailto:sunilvl@ventanamicro.com)



**Linux
Plumbers Conference** | Dublin, Ireland Sept. 12-14, 2022



Linux Plumbers Conference

Dublin, Ireland September 12-14, 2022

Backup



**Linux
Plumbers Conference** | Dublin, Ireland Sept. 12-14, 2022

Power / Performance Management

System sleep state management (_Sx states)

- Discovery of supported system sleep states - `_Sx` object
- Actual state transition through an SBI extension



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Power / Performance Management

CPU idle state management (_LPI states)

- Support LPI (Low Power Idle) states for RISC-V
- Discovery of LPI states via _LPI objects
- State transition (entry method) via the SBI HSM extension
- FFH specification to transition to SBI call for the entry method



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022

Power / Performance Management

- Support Collaborative Processor Performance Control (CPPC)
- Discovery of CPPC - `_CPC` object
- FFH spec for CPPC register access
 - Optional SBI extension



Linux
Plumbers Conference

| Dublin, Ireland Sept. 12-14, 2022