Driving Innovation
Evolving the role of software in RISC-V beyond enablement

Dr. Philipp Tomsich
Chief Technologist & Founder, VRULL GmbH
In 2021 new ISA extensions positioned RISC-V to grow in key application domains:

- Virtualisation support: Enabling virtualisation for cloud servers, within the datacenter and in multi-domain IoT gateways.
- Cryptographic extensions: Accelerating cryptographic primitives securely today and in the post-quantum world.
- Bitmanipulation extensions: Improving code-density and performance for embedded and server workloads.
- CMOs & PBMTs: Countering fragmentation and fostering off-the-shelf operating system support.

Fostering adoption in 2022 needs a great leap forward for our software ecosystem.
Stakeholders in the RISC-V software ecosystem

- **Architecture Development and Co-Optimization**
  - Emulators & Simulators
  - Compilers & Debuggers
  - Performance Analysis and Modelling Tools

- **Pre-Silicon Verification**

- **Foundation Software**
  - Performance Libraries
  - Managed Runtimes
  - Operating Systems

- **Software Enablement for Adopters, Independent Software Vendors, and End-Users**

---

Thursday, May 5th, 2022 | Spring 2022 RISC-V Week
Foster adoption and innovation
Foster a workload-driven evolution of the RISC-V ISA
Enable the coexistence with vendor-specific extensions

Manage fragmentation
Standardise the basic platforms
Enable vendors to gracefully transition from existing non-standard solutions

Deliver optimised software support
Foster Open-Source Projects, early-adopters, and academia
Guide the community towards optimisations for RISC-V
Foster adoption and innovation

Foster a workload-driven evolution of the RISC-V ISA
Enable the coexistence with vendor-specific extensions

Upstream support for vendor-defined extensions

Toolchains and Runtimes SIG
Foster adoption and innovation

Foster a workload-driven evolution of the RISC-V ISA
Enable the coexistence with vendor-specific extensions

OpenJDK support
donated upstream and merged

Managed Runtimes SIG
with Huawei and Alibaba Cloud
Unified Discovery

for vendor-defined extensions

Unified Discovery TG

Manage fragmentation

Standardise the basic platforms
Enable vendors to gracefully transition from existing non-standard solutions
Indirect functions
and optimised string functions

Manage fragmentation

Standardise the basic platforms
Enable vendors to gracefully transition from existing non-standard solutions

Toolchains and Runtimes SIG
Auto-vectorisation
contributed by our membership

Toolchains and Runtimes SIG
Deliver optimised software support

Foster Open-Source Projects, early-adopters, and academia
Guide the community towards optimisations for RISC-V

Nested virtualisation validated in software

Hypervisor SIG
Deliver optimised software support

Foster Open-Source Projects, early-adopters, and academia
Guide the community towards optimisations for RISC-V

Optimised cryptography submitted to OpenSSL
Deliver optimised software support

Foster Open-Source Projects, early-adopters, and academia
Guide the community towards optimisations for RISC-V

End-to-End Performance Workflows

Performance Modelling SIG
Performance Analysis SIG
**Domain-specific extensions**

Drive the definition of extensions using quantitative and software-driven methodologies to benefit **domain-specific software** workloads and coexistence of **vendor-specific extensions**

**Platform standardisation**

Attract independent software vendors and **reduce platform fragmentation** for hardware/software interoperability with off-the-shelf devices and software

**Building a contributor culture**

Collaborate closely with major **Open-Source Projects** to better align our standardisation and member's contributions with each upstream project’s processes
Domain-specific extensions

Drive the definition of extensions using quantitative and software-driven methodologies to benefit domain-specific software workloads and coexistence of vendor-specific extensions.

Upstream support for vendor extensions unlocks performance for novel applications.
Profiles and Platforms are simplifying the developer journey

Platform standardisation

Attract independent software vendors and reduce platform fragmentation for hardware/software interoperability with off-the-shelf devices and software
Member companies are joined together to build the best open-source ecosystem.

Building a contributor culture

Collaborate closely with major Open-Source Projects to better align our standardisation and member’s contributions with each upstream project’s processes.
RVM-CSI
Common Software Interface

Source level portability
Bare-metal applications
Support for modern languages

OS-A Platform

Binary compatibility
Rich operating systems
Investment protection for ISVs
Thank you!

https://lists.riscv.org/g/software

philipp.tomsich@vrull.eu