



Fedora and RISC-V

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DISCLAIMER: This is not my presentation!

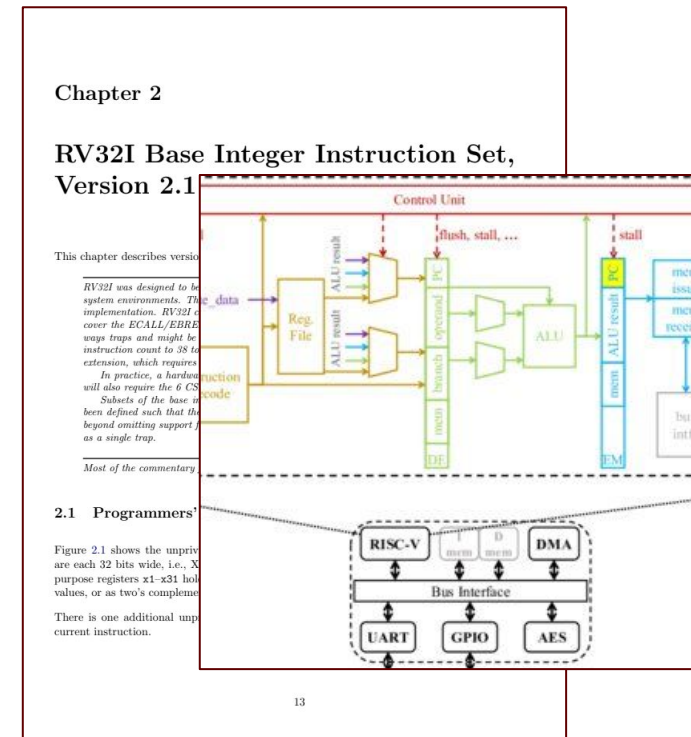
- This session was proposed by Isaac Chute of The Linux Foundation. Isaac is the Director of RISC-V Software Ecosystem.
- Isaac could not make it to Flock and asked me if I could give the presentation instead.
- I do not work on RISC-V things as part of my day job. I am on the Fedora Council and FESCo and at Red Hat I am part of the Software Management team where I work on dnf, rpm, and software adjacent to those tools.
- RISC-V *is* interesting to me so I hope I can give a perspective from a long time Linux developer watching this ecosystem grow.
- Please hold all questions until the end.

Agenda

- What is RISC-V (brief)
- Red Hat position on RISC-V
- Short Term Planning - Fedora
- Evolutionary Next Steps

Open Standard RISC Instruction Set Architecture

- **Next Generation of RISC** - *reduced instruction set computing* makes up a huge proportion of current architectures, including RISC-V, Arm, and PowerPC
- **Open Instruction Set Architecture** - ISA initially developed at UCB as the 5th generation of RISC, *published with a Creative Commons license*, enables both open and proprietary hardware designs
- **Open Process** - the RISC-V development community is made up of thousands of developers and hundreds of companies globally, all working collaboratively in a global foundation (riscv.org) using best practices for open standards



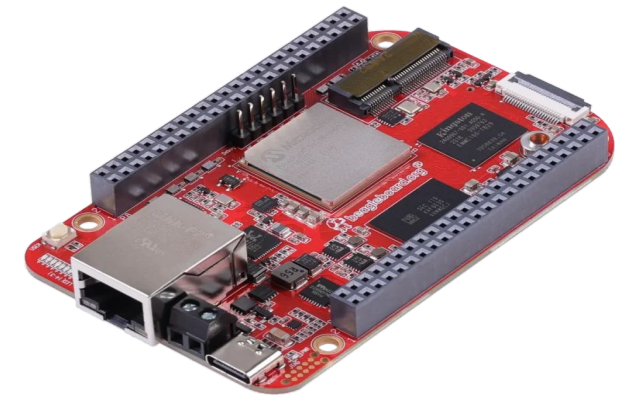
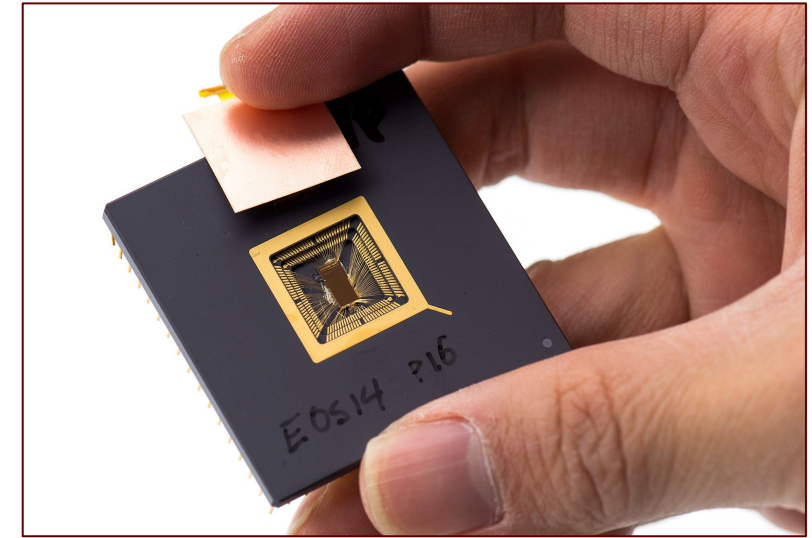
Red Hat's position on RISC-V: Not If, but When

RISC-V represents the first commercial successful implementation of an open Instruction Set Architecture (ISA)

Many cores available, both open and closed - the ISA copyright terms and IPR policies enable both fully open and completely proprietary designs

Some companies take it seriously - Western Digital converted its entire line of disk controllers to RISC-V in 2019, NVIDIA ships 8-12 RISC-V cores on every board, expected 92B TAM by 2030

Very popular globally - RISC-V development and production is roughly evenly spaced among Europe, Asia, and the Americas, with the organization RISC-V International based in Switzerland



Red Hat's position on RISC-V: Not If, but When

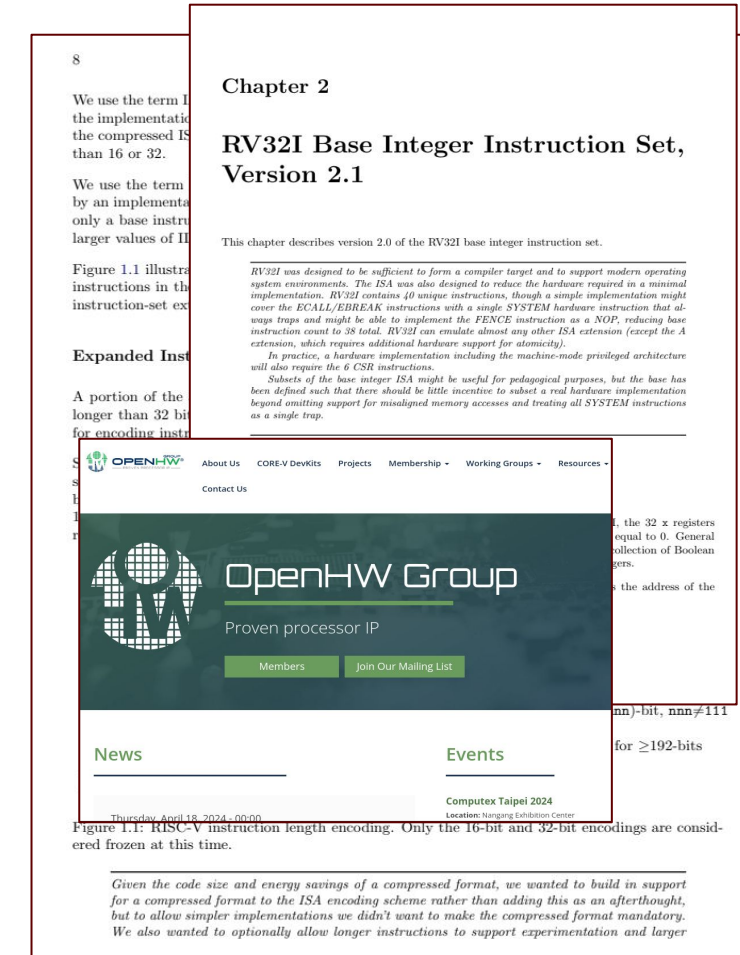
RISC-V Hardware and Software Ecosystem growing quickly

RISC-V Technical Working Groups - member-driven primary ISA development, curated by RISC-V Int'l

RISC-V Discussion Groups - open Google Groups and Slack channels for technical discussions about RISC-V, private working groups within RISC-V for ISA development

OpenHW Group - open hardware cores based on RISC-V

CHIPS Alliance - open hardware cores, interconnects, and development tools



Red Hat's position on RISC-V: Not If, but When

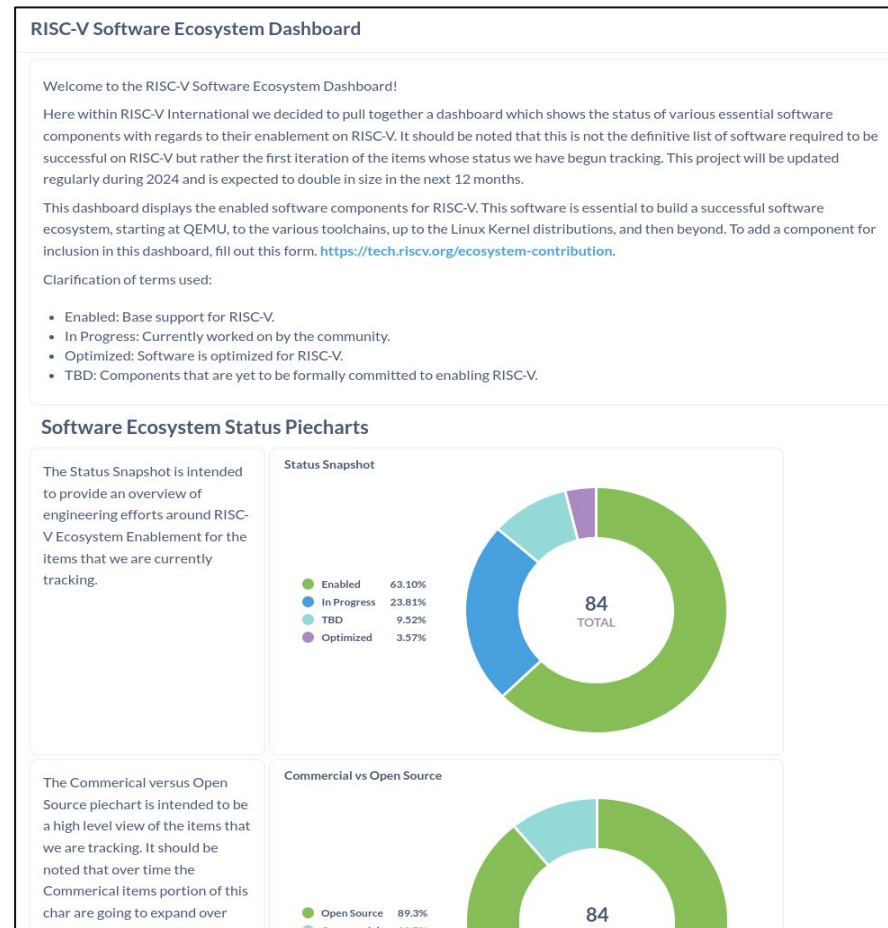
RISC-V Standardization

Hardware and ISA standardization - 'Optional' hardware support for features like vector/crypto is hard to reflect up into libraries or workloads. We would like to see crisp definitions for ISV versions.

Defined profiles & platforms with minimum configurations

The work to define the spec standards (eg. RVA23) and minimum HW configuration for different usage models (Server, Virt, Embedded etc) is key to adoption

Hardware and ISA standardization - In general, Red Hat doesn't support vendors specific ISA extensions, despite enthusiasm from the HW vendors



RISE is very important to Red Hat

Red Hat understands that software ecosystems need help

Founding member of the [RISE Project](#), which provide engineering and financial support for upstream projects to invigorate the RISC-V software ecosystem

Red Hat chairs the **Distro Integration** [working group](#) within RISE, focused on Linux and other binary distros, including **Fedora**

Red Hat also chairs the Outreach Committee and serves on the RISE board as a voice for open source

Technical Working Groups

The work done within RISC-V International is organized on our groups server at lists.riscv.org. This includes mailing, other things. Groups are organized into a hierarchy by functional area. New groups are proposed and approved through the [groups](#) page.

All RISC-V technical committees and work groups are non-confidential – list traffic, meeting minutes, and deliverables on lists and meetings is limited to RISC-V members. Please see the [membership page](#) for information on how you can join.

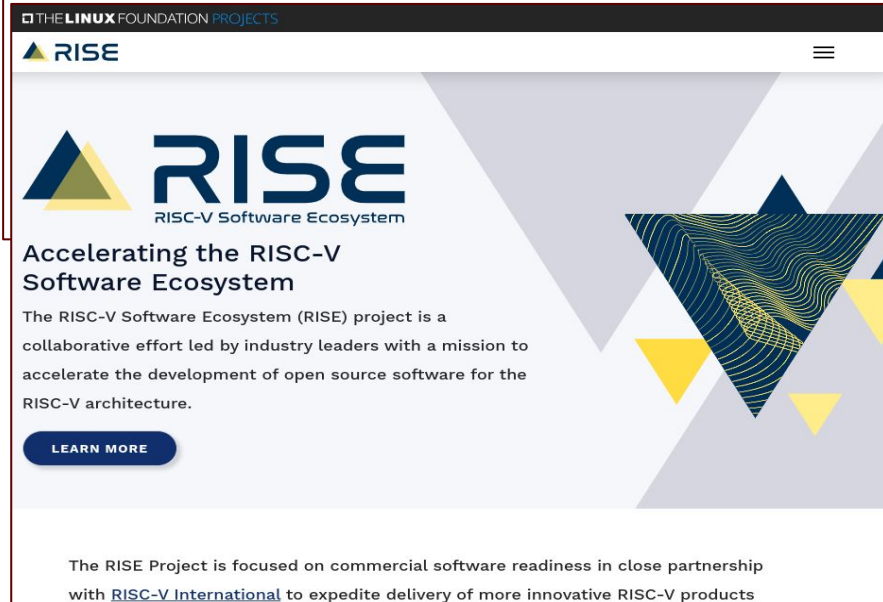
Visit [Working with the Member Portal](#) to learn more about how to use these groups.

The [Directory of Working Groups](#) page has an organized listing of all current working groups in the system.

Public Discussion Lists

There is a set of public discussion lists hosted on Google Groups. These lists are open to anyone regardless of membership within the RISC-V member community. All RISC-V lists are subject to the [RISC-V Code of Conduct](#).

Public discussion lists include:

A screenshot of the RISE project website. The header shows 'THE LINUX FOUNDATION PROJECTS' and the 'RISE' logo. The main content area features the RISE logo and the text 'Accelerating the RISC-V Software Ecosystem'. Below this, a paragraph describes the project as a collaborative effort led by industry leaders. A 'LEARN MORE' button is visible. At the bottom, a footer states that the RISE Project is focused on commercial software readiness in close partnership with RISC-V International.

THE LINUX FOUNDATION PROJECTS

RISE

RISE
RISC-V Software Ecosystem

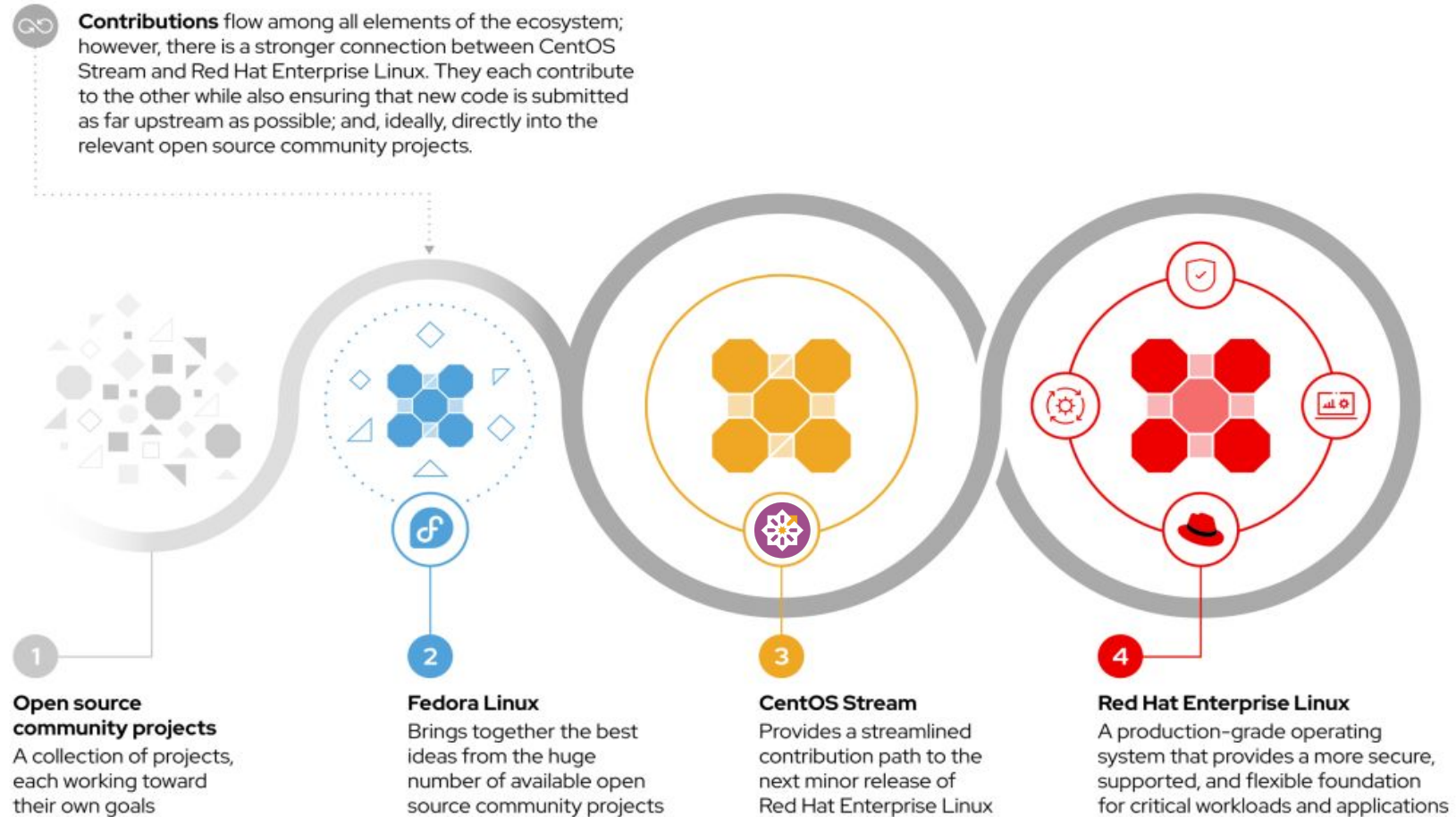
Accelerating the RISC-V Software Ecosystem

The RISC-V Software Ecosystem (RISE) project is a collaborative effort led by industry leaders with a mission to accelerate the development of open source software for the RISC-V architecture.

[LEARN MORE](#)

The RISE Project is focused on commercial software readiness in close partnership with [RISC-V International](#) to expedite delivery of more innovative RISC-V products

Red Hat technology evolution



Fedora Implementation

Fedora supports dozens of RISC-V platforms

Fedora 39 fully supported, Fedora 40 nearly all supported

Fedora 41/rawhide 93% of packages

OCI image courtesy of Docker

Discussion groups on both Matrix and Fedora Discussions

Also supports the Sipeed Lichee processors and laptop, the BeagleV-Ahead, Milk-V Pioneer, and many other development boards and systems

<https://fedoraproject.org/wiki/Architectures/RISC-V>



Fedora Implementation

Fedora + RISC-V - [Fedora RISC-V page](#), [Fedora RISC-V Installing page](#), [riscv.rocks koji](#), [OCI image](#), [kernel build page](#), [Fedora Discussions](#), [Matrix](#)

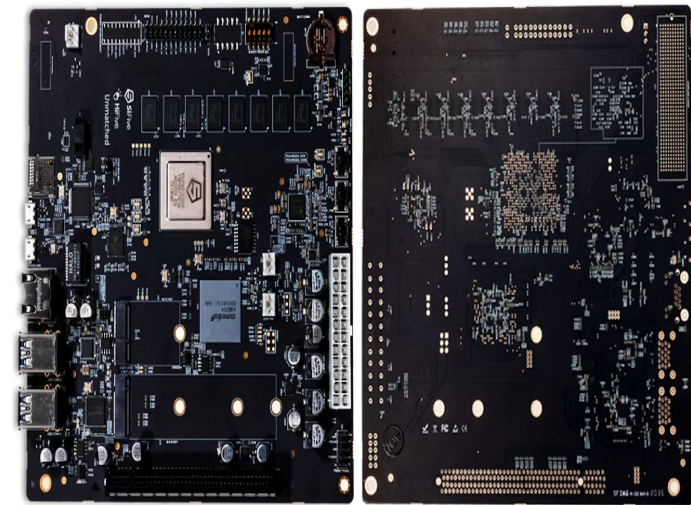
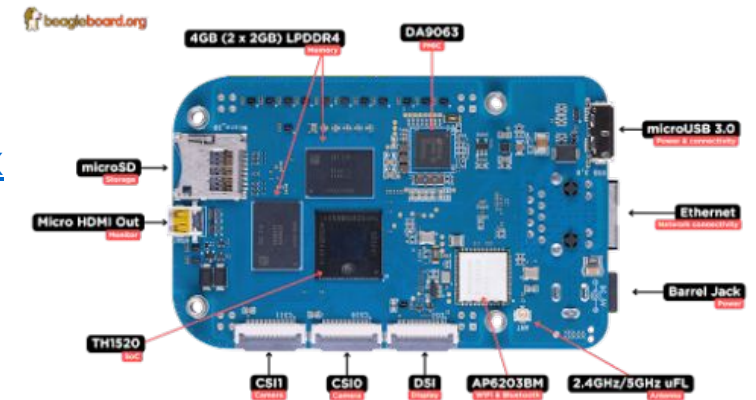
Red Hat + RISC-V - [DISL project](#), [RISC-V Summit keynote](#), [recent blog](#)

RISC-V International - [website](#), [technical wiki](#), [software dashboard](#), [RISC-V Exchange](#), [technical forums](#), [specifications](#), [dev boards program](#)

RISE Project - [website](#), [technical wiki](#)

OpenHW Group - [website](#), [Fedora + CVA6 demo](#)

CHIPS Alliance - [website](#)



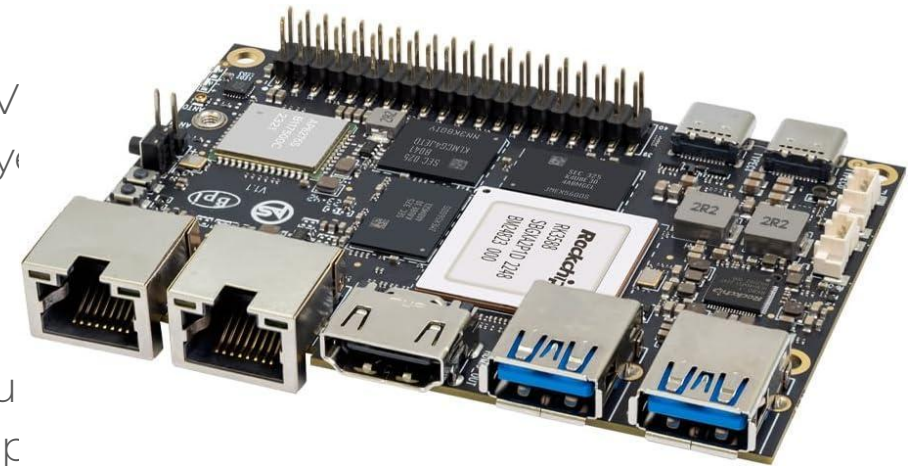
Evolutionary Next Steps

RISC-V 'Data Center' Hardware Availability

Hardware - The current wave of SBC/Development platforms don't represent Enterprise Server design. This is not a criticism, just an observation of the current market. We have a distinct lack of developer platforms.

Server Definition - A standard definition of the minimum RV + Extensions, plus minimum hardware specification doesn't yet exist. We have confidence it is forthcoming!

Until Enterprise Server hardware designs begin to become available and a Server has a RISC-V specification of a minimum HW configuration, Fedora will remain as the Red Hat Flagship



Thank You