RISC-V Gary Explains youtube

ISC-V Is it Open Source Hardware?

What is RISC-V

- RISC-V is a free and open ISA
- Seven Board of Directors
  - Google
  - Microsemi
  - NVIDIA
  - NXP
  - Berkeley
  - Western Digital

There have been many ISAs

- 6502 8bit
- Z80 8bit
- 68000 32bit
- X86 32bit & 64bit
- Alpha 64bit
- MIPS
- Power 32bit & 64bit
- SPARC 32bit &64bit
- VAX 32bit
- ARM 32bit 64bit

But RISC-V is the 1st open source ISA, no?

- SPARC
- MIPS
- J2

Is it open source hardware

- Is it required to release it source code for RISC-V core?
- No

It isn’t necssarily open source hardware!

- SiFive
- Andes Technology

You still don’t know what is on the chip!

- Backdoors
- Even if the company releases the source you don’t what is production version

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Stages to Designing a processor

https://www.youtube.com/watch?v=azMJuQWF6so

- ISA
- Microarchiecture
- Plumbing
- Manufacturing
- Software

Microarchitecture

- Intel
  - Skylake6th gen3/5/7
  - Kaby Lake 7th
  - Coffee Lake 8th
  - Cascade Lake Xeon
- AMD
  - K8 Athlon 64
  - Bullizer
  - Zen Ryzen
  - Zen 2 Ryzen + EPYC
  -
- ARM
  - A53
  - A73
  - A76
  - A77

Plumbing

- Interconnects
- Buses
- Memory controllers
- Caching controllers
- GPU
- DSP
- Media encode/decode
- More
-

None of this is covered by RISC-V

Extensions

- SIMD & DSP
- Virtualization
- Cryptography

Software

- Tools like compilers, debuggers, etc
- Operations Systems Linux, FreeRtos
- Applications desktop programs, server software, mobile apps
- Virtualization/containers

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Forking Compliance

Compliance

- CPU companues work hard to ensure all designs work correctly.
- This is why Itanium failed and AMD64 succeeded.

Forking

- Anyone is free to change RISC-V
- RISC-V says “please don’t do that” because the ISA won’t be compatible.

Open source software has taught that...

- Forking is inevitable
- Amazon fire tablet is example of forking Android
- Oracle Enterprize Linux forked from RedHat OpenBSD from NetBSD LibreOffice from OpenOffice

Nobn-standard extensions

- MMX 3D Now SSE

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RISC-V: Will it Succeed or Fail

What will happen?

- Can not tell yet
- Lots of hype
- Microcontrollers will succeed
  - Performance not as important
  - Simpler
  - FPGA development
  - Wait for first RISC-V Arduino

There will be many attempts

- Microarchitect will fail to deliver:
  - Performance
  - Efficiency
  - Cost

There will fragmentation and infighting

- RISC-V will split into two or more camps with different goals
  - Need to differeniate
  - Server vs Desktop ve Moblie
  - Non-standard extensions
  - A big corp will fork-to-own

You might not agree

- DEC
- SUN
- Transmeta
- Cyrix
- Itanium
- Intel on moblie