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Five Things to Consider before Designing a System-on-Chip

The instruction set architecture (ISA) is the foundation of all chip or System-on-Chip (SoC) products. It is therefore one of the most fundamental design choices you will make. If you are considering using an open-source ISA, such as RISC-V, it is critical to understand the key factors you should consider as part of your go-to-market strategy.


1
Cost
Open-source instruction set architectures, such as RISC-V, have no license fee and currently no ongoing royalty model, but the instruction set architecture (ISA) is only the foundation of a RISC processor implementation. The cost of licensing any RISC ISA accounts for a small fraction of the total design-to-delivery investment required to create a commercial processor.
2
A large, supportive ecosystem
It is important an architecture is well supported by a global, mature ecosystem of partners offering a diverse range of software, services and design support. This guarantees market choice, product quality and an optimal time to market. RISC-V ecosystems have not yet reached this stage of development.
3
Fragmentation risk
The RISC-V instruction set architecture allows IP vendors to add private extensions. This means each implementation may be different or customized. This fragmentation effect makes it more difficult for an ecosystem to coalesce around the ISA.
4
Security
Cyberthreats mean that robust chip security cannot ever be optional. RISC-V based products are relatively new and have yet to benefit from years of scrutiny from partners and industry experts.
5
Design assurance
Verification and validation of processor designs can consume 75% of total design time. Modifying an instruction set architecture, as is possible with RISC-V, means expensive re-validation of the central processing unit (CPU or processor) and customization of software tooling. This adds to design costs.

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Whether you are looking to create a chip from scratch or looking for a complete solution, take advantage of an architecture that has been tried and tested in more than 125 billion chips and already in processor designs licensed by more 500 partners. Get started with Arm DesignStart – the fastest, simplest route to proven IP.

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