New issue

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base ISA naming conventions for E and I #894

Open **neelgala** opened this issue 8 days ago · 7 comments

neelgala commented 8 days ago — Collaborator

I believe its legal for an implementation to have support for both : E and I base extensions. But section 28.2 in the spec says :

```
RISC-V ISA strings begin with either RV32I, RV32E, RV64I, or RV128I indicating the supported
address space size in bits for the base integer ISA.
```

Shouldn't RV32IE and RV64IE also be valid isa strings ?

aswaterman commented 8 days ago — Member

It is indeed legal for an implementation to support, for example, both RV32I and RV32E. But we consider these to be different base ISAs. E is not an extension of I, nor is I considered to be an extension of E, and so the ISA string RV32IE is invalid.

neelgala commented 8 days ago — Collaborator Author

so what should be the legal ISA string for that device ? RV32I or RV32E ?

neelgala mentioned this issue 8 days ago

Isa regex improvements issue 104 riscv-software-src/riscv-config#105

Merged

neelgala commented 8 days ago — Collaborator Author

I ask because.. in the arch-test framework we choose the I or E tests based on which character is present in the ISA string (from riscv-config yaml). For devices that implement both, as per your suggestion, we might now end up running only of those extensions instead of both. So then we need a separate field in the YAML to indicate it both exist or not - which somehow feels unpleasant.

I know misa can be used to discover if "E" is implemented or not.. but misa itself is an optional CSR, and it falls under the privilege spec which is not a required dependency for "E" to exist.

aswaterman commented 8 days ago • edited Member

We describe such a hart as supporting both base ISAs. At any moment in time, it only uses one base ISA, and so it can correctly be described as either an RV32I hart or an RV32E hart, depending on its current mode. But we wouldn't describe it as being both simultaneously.

I do understand the concern you've raised. Conceivably, we could invent a new extension name to indicate that an RVI hart supports RVE mode via the misa register (Sme?). Similarly, we could invent a name to indicate that an RV64 hart supports being configured into RV32 mode (Smxt, for "XLEN three"?). But this is a half-baked idea, and I already see some oversimplifications in my proposal, given the great deal of flexibility we offer for the various XL fields. It would need input from others, including e.g. our PrivArch chair **@gfavor**.

allenjbaum commented 7 days ago

Strictly speaking, riscof doesn't need an ISA string for this, does it?
A hart may support both RV32I and RV64I, and could choose tests by

- looking in a specific directory
- or it could use the OR of two test_case macro conditions (i.e. RV64 or RV32)
- or even determine it because misa.XLEN is writable
  Couldn't we do the same thing thing here?

pawks commented 7 days ago

The ISA string in question here is the "ISA" field of the hart in the yaml file.
The ISA string is the most reliable way to ensure that the test selection conditions are controlled inside the test itself. The current tests define a regex on the isa string. The xlen problem is already accounted for because every hart has a xlen field which is a list. So, if the hart support dynamic xlen switching it will have multiple entries in the list.
The spec does make the following statement:

```
RV32E uses the same instruction-set encoding as RV32I, except that only registers x0–x15 are
provided. Any future standard extensions will not make use of the instruction bits freed up by the
reduced register-specifier fields and so these are designated for custom extensions.
```

So no standard extensions will be developed which are so to say "incompatible with I but compatible with E", meaning the problem can be solved by just having a boolean variable which indicates whether the `E` extension is supported and this variable can be set to `True` only if the base isa is `RV64I`. The caveat being that the above statement stands true for any "E" variants of the RV64 and RV128 base ISAs too.

neelgala commented 6 days ago Collaborator Author

@pawks is refering to the supported_xlen field in the isa yaml which can be used to select rv32/64 tests for a device supporting both.

Assignees

No one assigned

Labels

None yet

Projects

None yet

Milestone

No milestone

Development

No branches or pull requests

4 participants