ELECTRICAL ENGINEERING

RISC-V assembly lui?

Asked 2 years, 2 months ago Modified 2 years, 2 months ago Viewed 5k times

0

In RISC-V assembly I wrote:

```
addi s0,x0,0x20000
```

Is this legal such that the assembler will prove the command and make it work right or I'm forced to change it to:

```
lui s0,0x20
```

Can someone kindly explain what `lui` does?

assembly assembler risc-v

Share Cite Follow

edited Jan 28, 2021 at 20:37
Mike
2,138 1 13 29

asked Jan 27, 2021 at 23:36
daniel
11 1 5

1 I strongly suggest that for questions like this you write little snippets of code and try them out. Even if you don't have a RISC V chip lying around, there should be emulators. The *reason* I suggest this is that you generally learn the answer to your question, plus about half a dozen other questions -- and their answers, eventually -- that you didn't know to ask. – TimWescott Jan 28, 2021 at 0:13

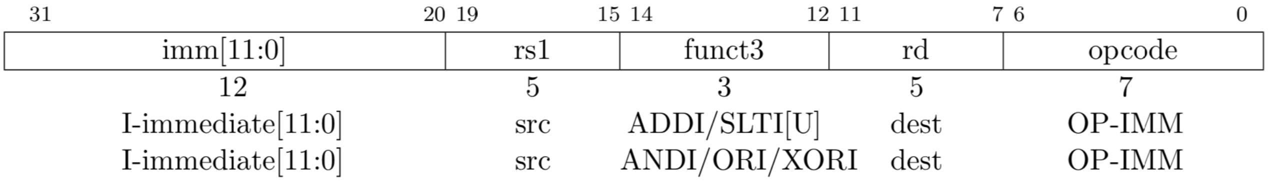
what part of the risc-v documentation do you not understand? – old_timer Jan 28, 2021 at 23:36

1 Answer

Sorted by: Highest score (default)

1

No, this won't work because ADDI can only add 12-bit immediate values which are sign-extended to 32 bits. RISC-V is not like ARM where almost any immediate value can be shifted before it's used. Therefore with ADDI you can add 0x000-0x7FF or subtract 0x001-0x800. The limitation to 12-bit immediate values is because of the encoding of ADDI:



31 20	19 15	14 12	11 7	6 0
imm[11:0]	rs1	funct3	rd	opcode
12	5	3	5	7
I-immediate[11:0]	src	ADDI/SLTI[U]	dest	OP-IMM
I-immediate[11:0]	src	ANDI/ORI/XORI	dest	OP-IMM

However, ADDI with x0 as the source register is valid for loading smaller immediate values, so you could do `ADDI s0, x0, #0x123` , for example. NOP is also implemented this way, and is just a pseudo-instruction for `ADDI x0, x0, #0x0` . Other forms of NOP (for example adding 0 to a register other than x0) are considered non-canonical and are not recommended because they may be redefined to be a different, meaningful instruction in the future.

As for LUI, it loads a 20-bit immediate value into the upper 20 bits of a (32-bit) register and fills in other 12 bits with 0's. Notice how you can use LUI to set the upper 20 bits of a register and then ADDI set the lower 12 bits, thus loading a 32-bit constant into the register with just two instructions.

Share Cite Follow

edited Jan 28, 2021 at 0:06

answered Jan 27, 2021 at 23:49

Zane Kaminski

880 6 13