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Design Problem: 32-bit ALU

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Lab due Nov 7, 2016 21:59 -02 Past due

Design Problem: 32-bit ALU

0.0/10.0 points (graded)

Click to open [Instructions](#) in another window. This will allow you to have the instructions open and enter your design at the same time.

Use the Jade instance below to enter your design. To complete this design problem, select the /lab3/alu module and click ✓ in the Jade toolbar and the built-in tester will either report any discrepancies between the expected and actual outputs, or, if your design is correct, it will record the test passed so that clicking **Check & Save** will give you credit for completing the problem.

Module: /alu/alu

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Passed Lab! Here's some tips:

discussion posted 7 years ago by [SohanFernando](#)

Hi All. Eureka! I passed this Lab just now. Had several areas of confusion, largely due to my having some lack of clarity re some Jade related issues. Below, here are some hints/tips/my experiences, in case they help any of you - I assume there might be another half hour or so of the grace period remaining.

1. Firstly, you might find some help in https://courses.edx.org/asset-v1:MITx+6.004.1x_3+3T2016+type@asset+block/pdfs_course_jadefaq.pdf and of course VERY carefully follow the advice of https://courses.edx.org/asset-v1:MITx+6.004.1x_3+3T2016+type@asset+block/labs_lab4_1_instructions.html

2. I found that a JUMPER is needed to be used when trying to "tap" the value of something like S[31].

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I.e., sometimes, things would not work if I try to label a wire as S[31] and then directly connect that wire to a gate's input; instead, needed a jumper between that wire and the gate's input.
[edited: above is not quite correct, as Silvina and srijal point out in response. It was mainly when having trouble in connecting a individual bit like S[31] directly to an output, that I found the use of a jumper would solve the problem.]

3. In SHIFT module. I found some errors coming, when I used something like A[31:1],GND or BLAH[31:2],GND#2. (that might not be the exact example, but anyway I am illustrating just the problem, here). I found that things DID work for me when I replaced my uses of "GND" or "GND#2" (etc) with something like: "0'1" and "0'2" .

E.g,: BLAH[31:2],0'2

4. less clear to me, in my other post I have a clumsy set of updates written as I solved some errors; i can't write it succinctly now but if you're really stuck then go see if anythign there gives you any ideas.
5. Having trouble with the 32-NOR gate? I made my own module for that (and just specified the inputs as A[31:0] in its icon, rather than drawing 32 inputs). BUT when I dragged that gate into my main Arith unit, I was having various errors when I tried to connect my S[31:0] to the 32-NOR's input.

I don't yet necessarily fully understand what nuances of Jade make that all happen, but anyhow; those helped me. Also thanks to several of you all's comments, Silvina firstly; and several others of you seemed to have a very good grasp of what's going on and your comments in other posts helped to make see the need to do the above.

This post is visible to everyone.

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2 responses

Srijal

7 years ago



I don't think that the 2nd point is true. I did not use a single jumper in my entire design and directly connected say S[31], or even buses like S[0:31] to gate inputs, which make Jade automatically replicated the required gates.

Many someone can explain what jumpers are really for?



You should not use a jumper to get a bit like S[31] to a gate's input. That can actually cause issues with jade. The only time you should use a jumper is when you connect two wires together that have different signal names. (Note that this includes inputs/outputs). So a perfect example of using a jumper is in connecting S[31] to the output N in the arith module.

posted 7 years ago by **silvinahw** (Staff)



Yes you are both correct, I checked this now - late night on this made my memory confused I think. It was when connecting direct to output N was giving me mysterious errors, that I first stumbled upon this matter of using a jumper. (Later, some errors whose meaning I couldn't fathom, lead me to also trying similarly with some gates and that SEEMED to improve things. In fact I still have those jumpers :-| with some gates, so I better recheck without jumpers, for future use.)

posted 7 years ago by **SohanFernando**



I used a non-inverting buffer gate instead of a jumper, is that equally okay or is one method superior to the other (other than the hardware cost)?

posted 7 years ago by **Srijal**



Hi Srijal. That's a neat solution. I definitely am quite inexperienced in this area so can't be at all sure, but my tentative thought on this is:

- I would guess that in REAL life, connecting the two wires directly together, would be (electrically/etc.) no different from using a jumper;
- and that the only reason to use a jumper HEBE₂ is due to some jade-related shortcomings/features



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- and that the only reason to use a jumper HERE is due to some JADE-related shortcomings/features.
- I also assume that the buffer solution WOULD have real life application in situations where our output signal is driving some load (or *potentially* might later need to drive a load) which draws a higher current than OUR output device can safely produce.
- I'm not sure how this'd be done exactly: but gut feeling is that if multiple other devices all wanted to use "N" as an input, then too using an intermediate buffer(s?) would be helpful.

All tentative thoughts only, though.

(I've been dabbling with some microcontroller stuff recently: Raspberry Pi and mainly Arduino/PIC; and I have come across cases where either due to the 20mA output limitation of the Arduino outputs, or due to simply wanting to isolate (for protection) the Pi's or Arduino's pins from my external device, it is better to use a buffer like you have done.

Something I am EVEN less sure about: I have also read about, but not yet used, cases where a buffer is used to change the LOGIC voltage between devices: e.g., if the R.Pi uses 3.3V logic, but I want to connect its output pins to some device whose logic voltage is 5V and which ideally requires a High to stay close to 5V. Rather hazy about the issues and advantages/etc so won't even try to suggest anything more about that example.)

posted 7 years ago by [SohanFernando](#)

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Azharkhann21
2 years ago

+

...

Hi Sohan I'm getting the following error: Test 1: Expected n=L at 99ns. Test 1: Expected s[0]=L at 99ns. Test 1: Expected s[10]=L at 99ns. Test 1: Expected s[11]=L at 99ns. Test 1: Expected s[12]=L at 99ns.

Would be really grateful if you help me out

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