Vectorgates

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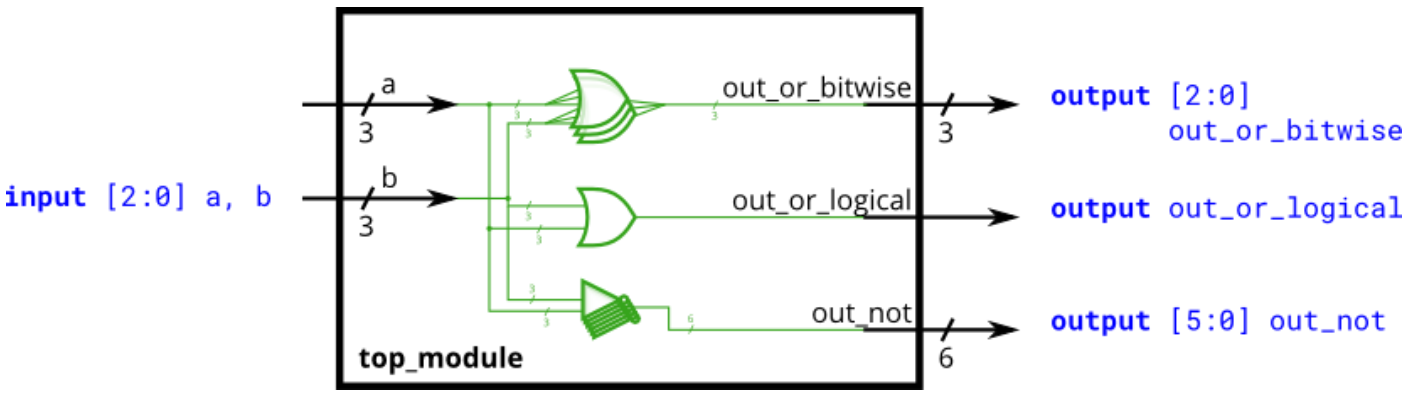
Build a circuit that has two 3-bit inputs that computes the bitwise-OR of the two vectors, the logical-OR of the two vectors, and the inverse (NOT) of both vectors. Place the inverse of b in the upper half of `out_not` (i.e., bits [5:3]), and the inverse of a in the lower half.

Bitwise vs. Logical Operators

Earlier, we mentioned that there are bitwise and logical versions of the various boolean operators (e.g., norgate (/wiki/norgate)). When using vectors, the distinction between the two operator types becomes important. A bitwise operation between two N-bit vectors replicates the operation for each bit of the vector and produces a N-bit output, while a logical operation treats the entire vector as a boolean value (true = non-zero, false = zero) and produces a 1-bit output.

Look at the simulation waveforms at how the bitwise-OR and logical-OR differ.



(/wiki/File:Vectorgates.png)

Module Declaration

```
module top_module(
    input [2:0] a,
    input [2:0] b,
    output [2:0] out_or_bitwise,
    output out_or_logical,
    output [5:0] out_not
);
```

Hint...

Even though you cannot `assign` to a wire more than once, you can use a part select on the left-hand-side of an `assign`. You don't need to assign to the entire vector all in one statement.

Write your solution here

```
module top_module(
    input [2:0] a,
    input [2:0] b,
    output [2:0] out_or_bitwise,
    output out_or_logical,
    output [5:0] out_not
);

endmodule

```

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Solution

Show solution

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