Module fadd ○

← module_add⛔ (/wiki/module_add)

module_cseladd○ (/wiki/module_cseladd) →

In this exercise, you will create a circuit with two levels of hierarchy. Your `top_module` will instantiate two copies of `add16` (provided), each of which will instantiate 16 copies of `add1` (which you must write). Thus, you must write *two* modules: `top_module` and `add1`.

Like module_add⛔ (/wiki/module_add), you are given a module `add16` that performs a 16-bit addition. You must instantiate two of them to create a 32-bit adder. One `add16` module computes the lower 16 bits of the addition result, while the second `add16` module computes the upper 16 bits of the result. Your 32-bit adder does not need to handle carry-in (assume 0) or carry-out (ignored).

Connect the `add16` modules together as shown in the diagram below. The provided module `add16` has the following declaration:

```
module add16 ( input[15:0] a, input[15:0] b, input cin, output[15:0] sum, output cout );
```

Within each `add16`, 16 full adders (module `add1`, not provided) are instantiated to actually perform the addition. You must write the full adder module that has the following declaration:

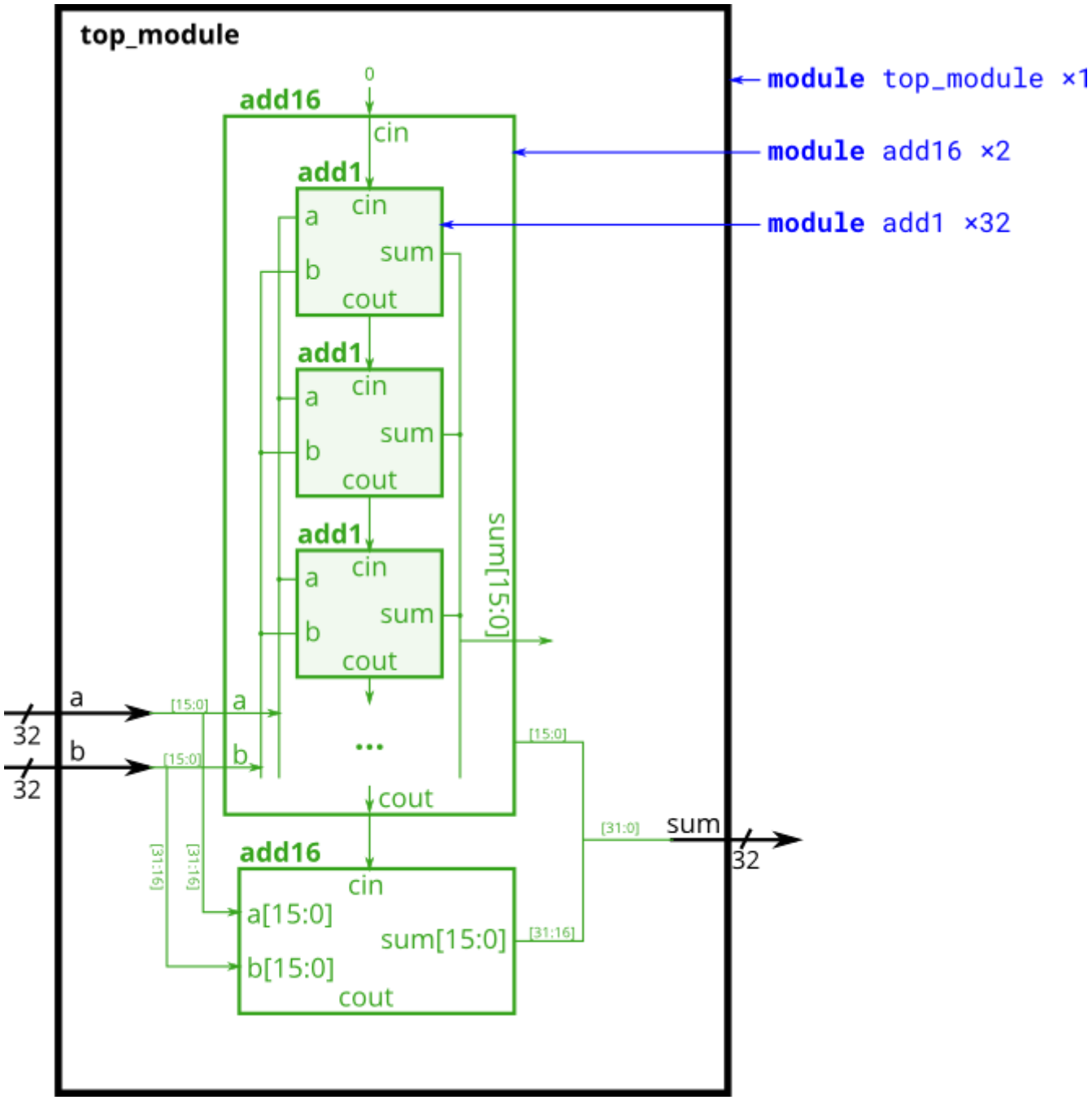
```
module add1 ( input a, input b, input cin, output sum, output cout );
```

Recall that a full adder computes the sum and carry-out of a+b+cin.

In summary, there are three modules in this design:

- `top_module` — Your top-level module that contains two of...
- `add16`, provided — A 16-bit adder module that is composed of 16 of...
- `add1` — A 1-bit full adder module.

If your submission is missing a `module add1`, you will get an error message that says `Error (12006): Node instance "user_fadd[0].a1" instantiates undefined entity "add1".`



(/wiki/File:Module_fadd.png)

Module Declaration

```
module top_module (
    input [31:0] a,
    input [31:0] b,
    output [31:0] sum
);
```

Hint...

Write your solution here

```
1 module top_module (
2     input [31:0] a,
```

```
    input [31:0] b,
    output [31:0] sum
);//

endmodule

module add1 ( input a, input b, input cin,   output sum, output cout );

// Full adder module here

endmodule

```

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