Hierarchical

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Hierarchy is necessary because we are working with different layers of hardware. Thus abstraction is needed in order to remain sane.

The upper level connects the lower level modules together. So we want to:

- Specify which sub components we want to use
- Specify how they are connected

Here's an example of making a top-level entity using smaller entities:

- Use wires to connect them together

```
module top(X, Y, Z)
    input X, Y;
    output Z;

    wire S0, S1;

    INV_GATE U0 (X, S0);
    AND_GATE U2 (S0, X, S1);
    INV_GATE U1 (S1, Z);

endmodule
```

Specifying input and output signals

Positional

```
AND_GATE U1(S0, Y, S1);
```

By Parameter Name

```
AND_GATE U1(.A(S0), .F(S1), .B(Y));
```

Typically, specifying I/O by parameter name is better because it's less error-prone

Summary

- Highest level should consists of major units of design (CPU, memory, etc)
- Lowest level should consists of simple combinational and sequential logic blocks