Wallace Tree (H1)

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References

Some Figures from the following sites

[1] http://pages.hmc.edu/harris/cmosvlsi/4e/index.html
Weste & Harris Book Site

[2] en.wikipedia.org

The Wallace tree has three steps:

1. Multiply (that is – AND) each bit of one of the arguments, by each bit of the other, yielding n^2 results. Depending on position of the multiplied bits, the wires carry different weights, for example wire of bit carrying result of $a_2 b_3$ is 32 (see explanation of weights below).
2. Reduce the number of partial products to two by layers of full and half adders.
3. Group the wires in two numbers, and add them with a conventional adder.[2]

https://en.wikipedia.org/wiki/Wallace_tree

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The second phase works as follows. As long as there are three or more wires with the same weight add a following layer:

- Take any three wires with the same weights and input them into a full adder. The result will be an output wire of the same weight and an output wire with a higher weight for each three input wires.
- If there are two wires of the same weight left, input them into a half adder.
- If there is just one wire left, connect it to the next layer.

https://en.wikipedia.org/wiki/Wallace_tree

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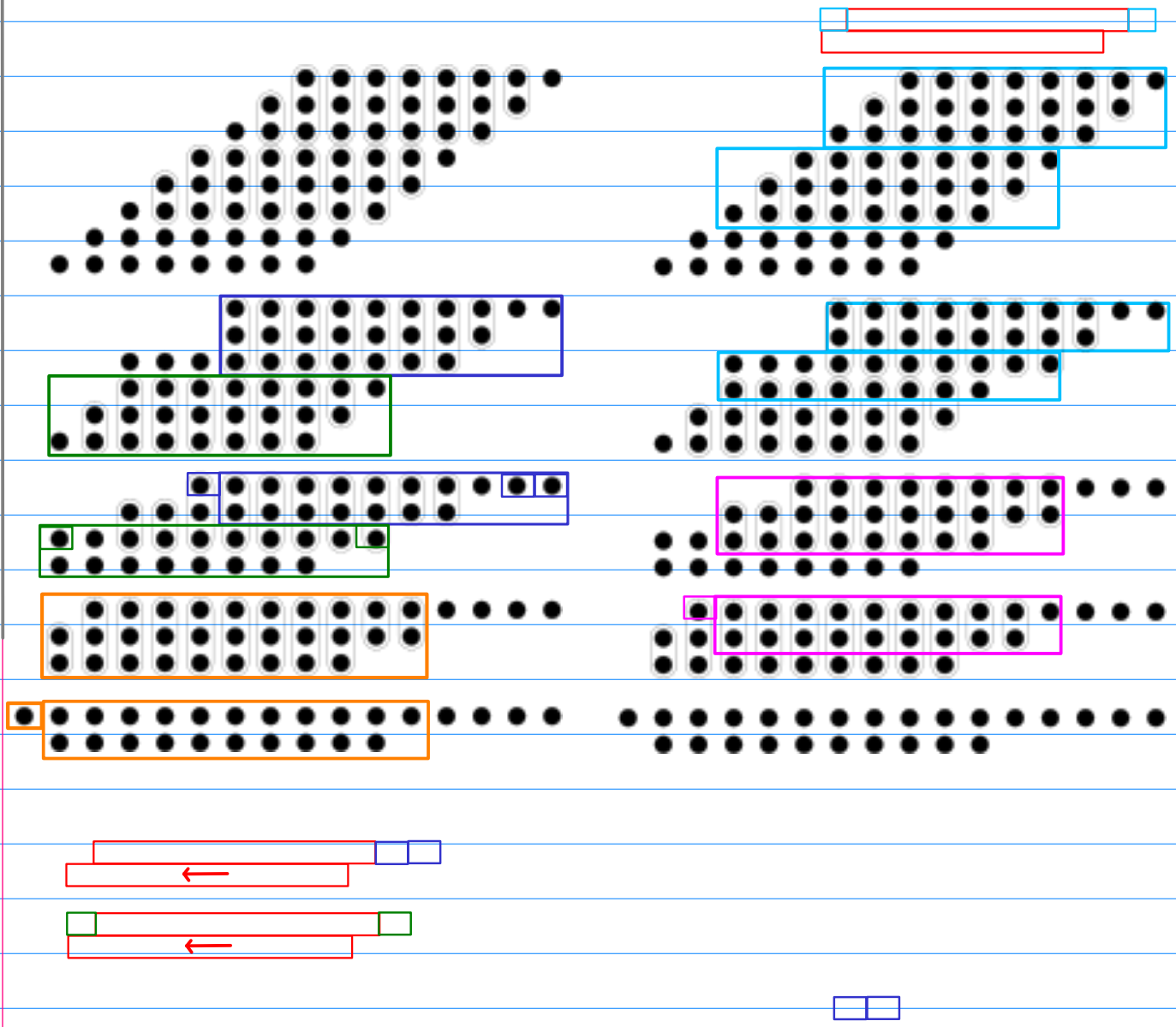
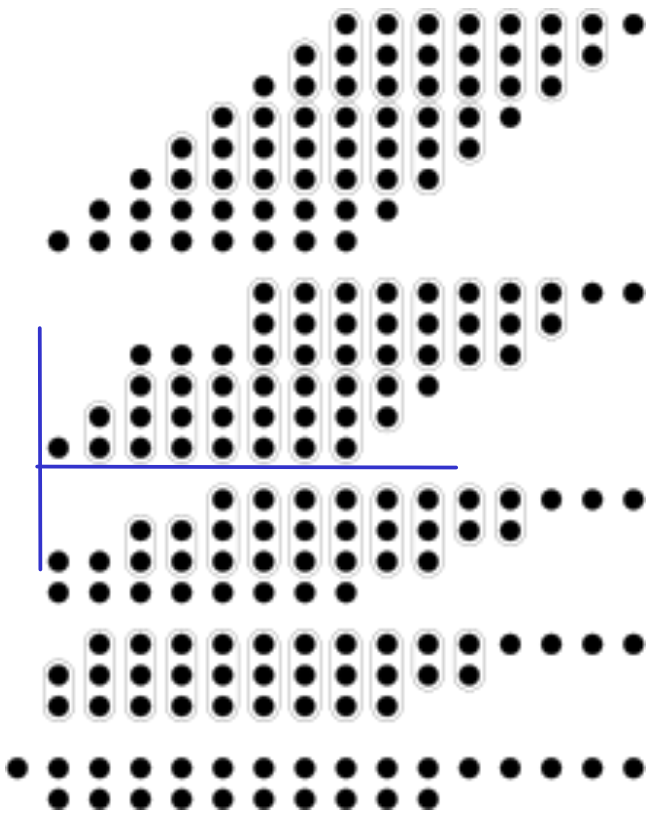
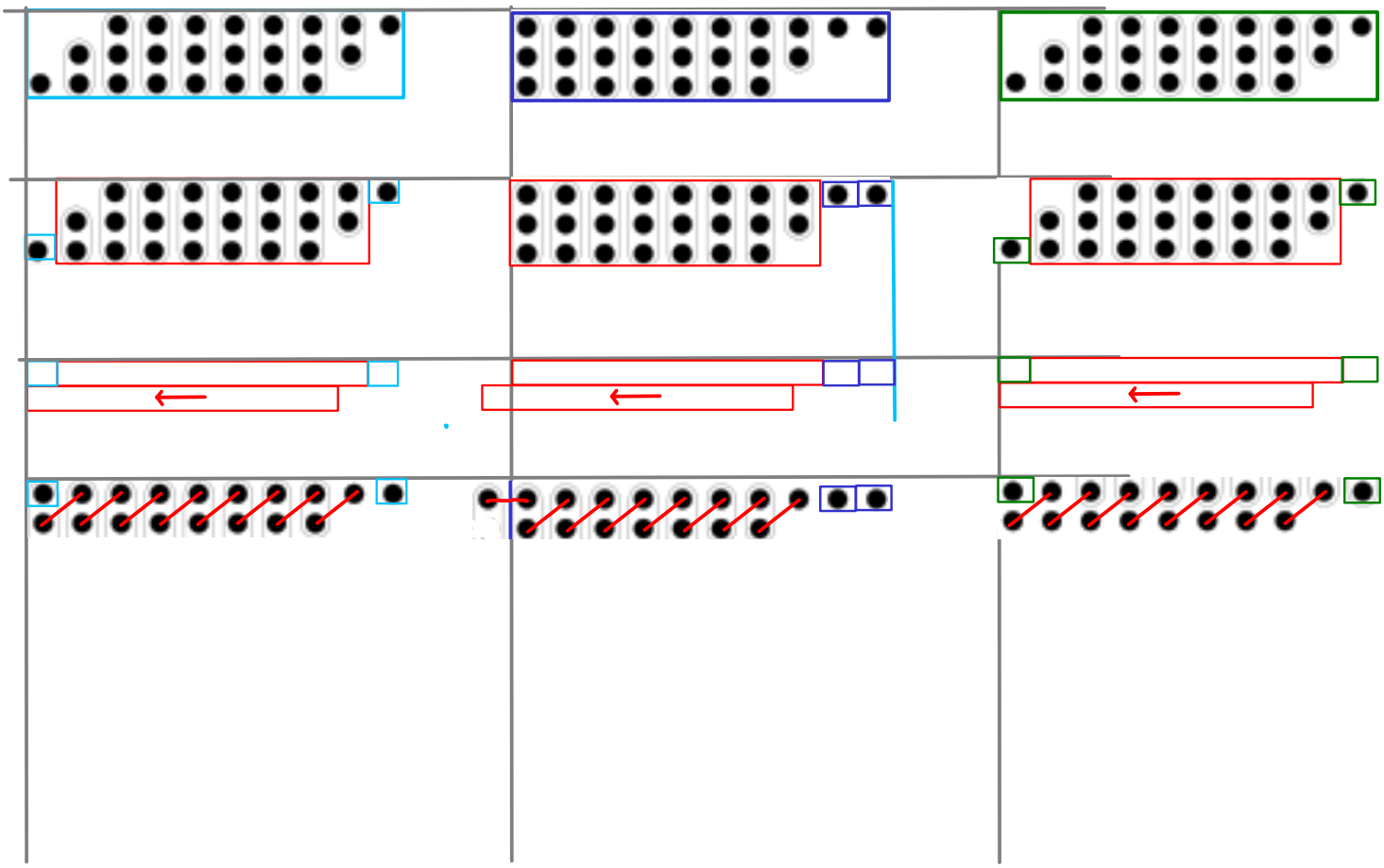
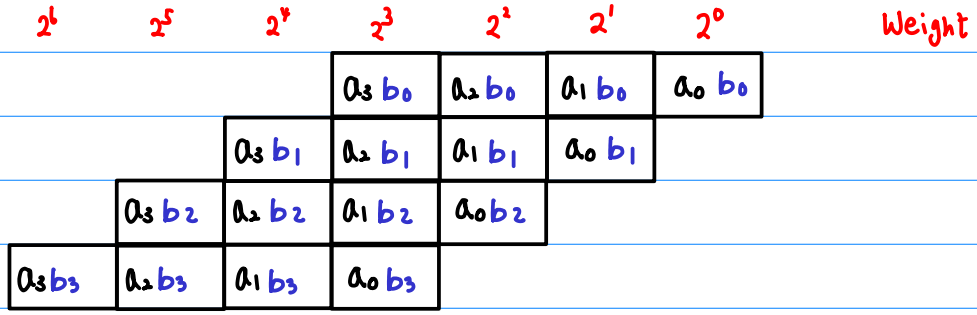
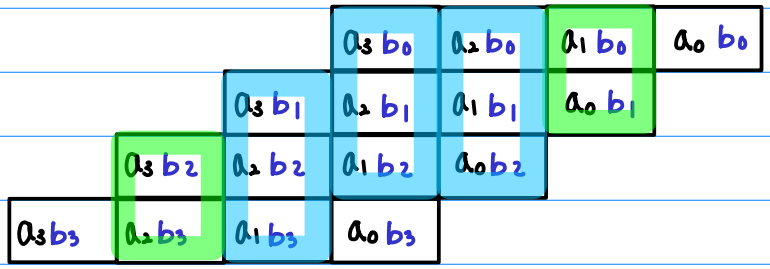
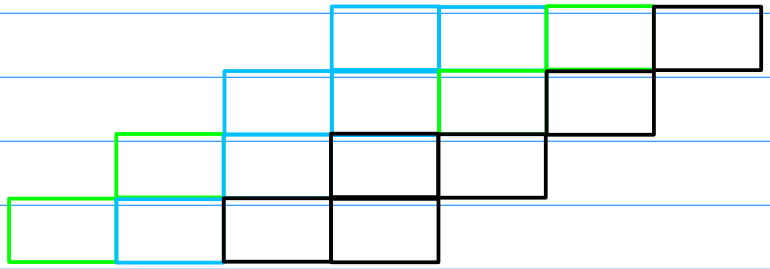


Example of reduction on an 8x8 multiplier.
It's not a wallace multiplier because it violates rule 1

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