

MCC092 Postlab

Lab 2 lab review

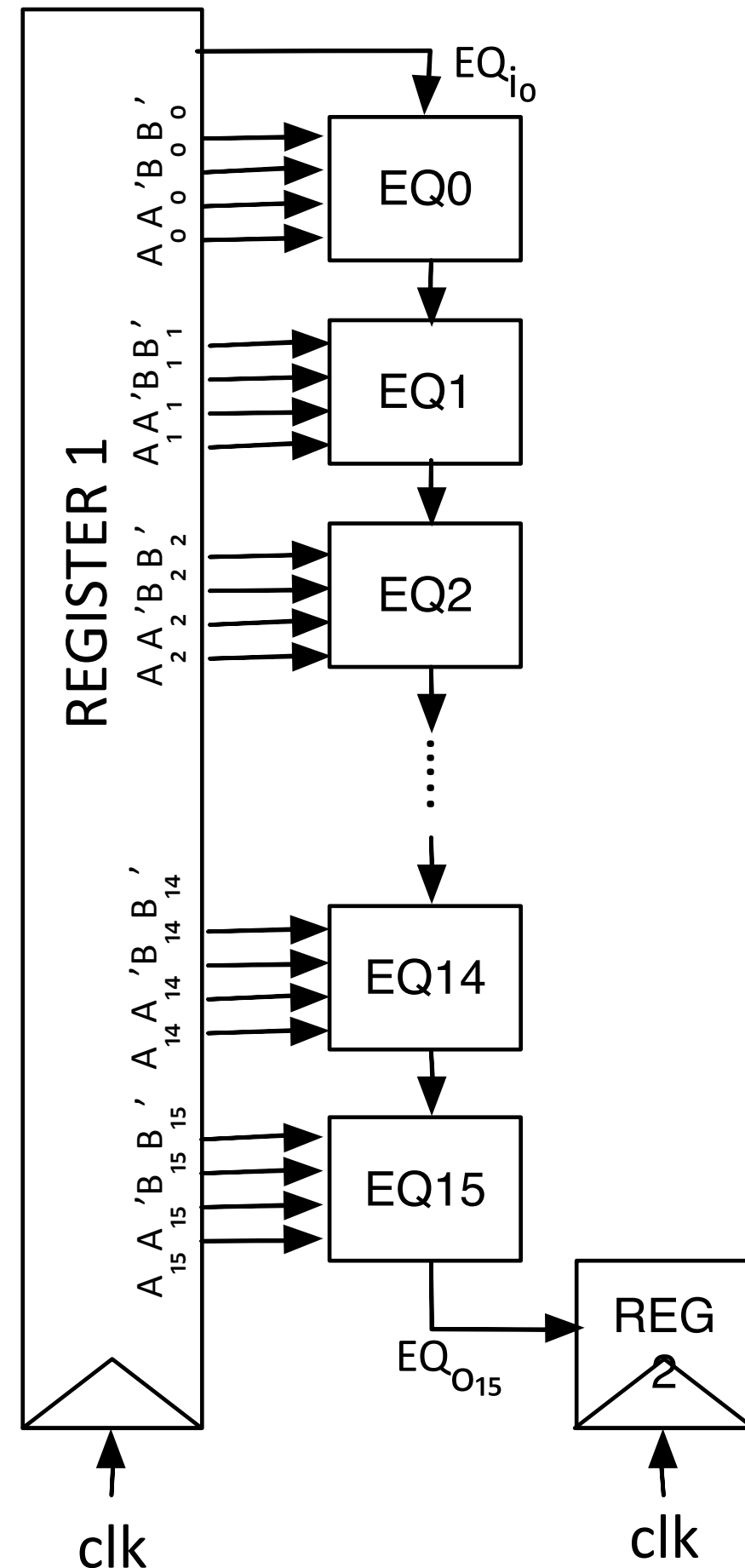
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2017-09-21

Lab 2 main question

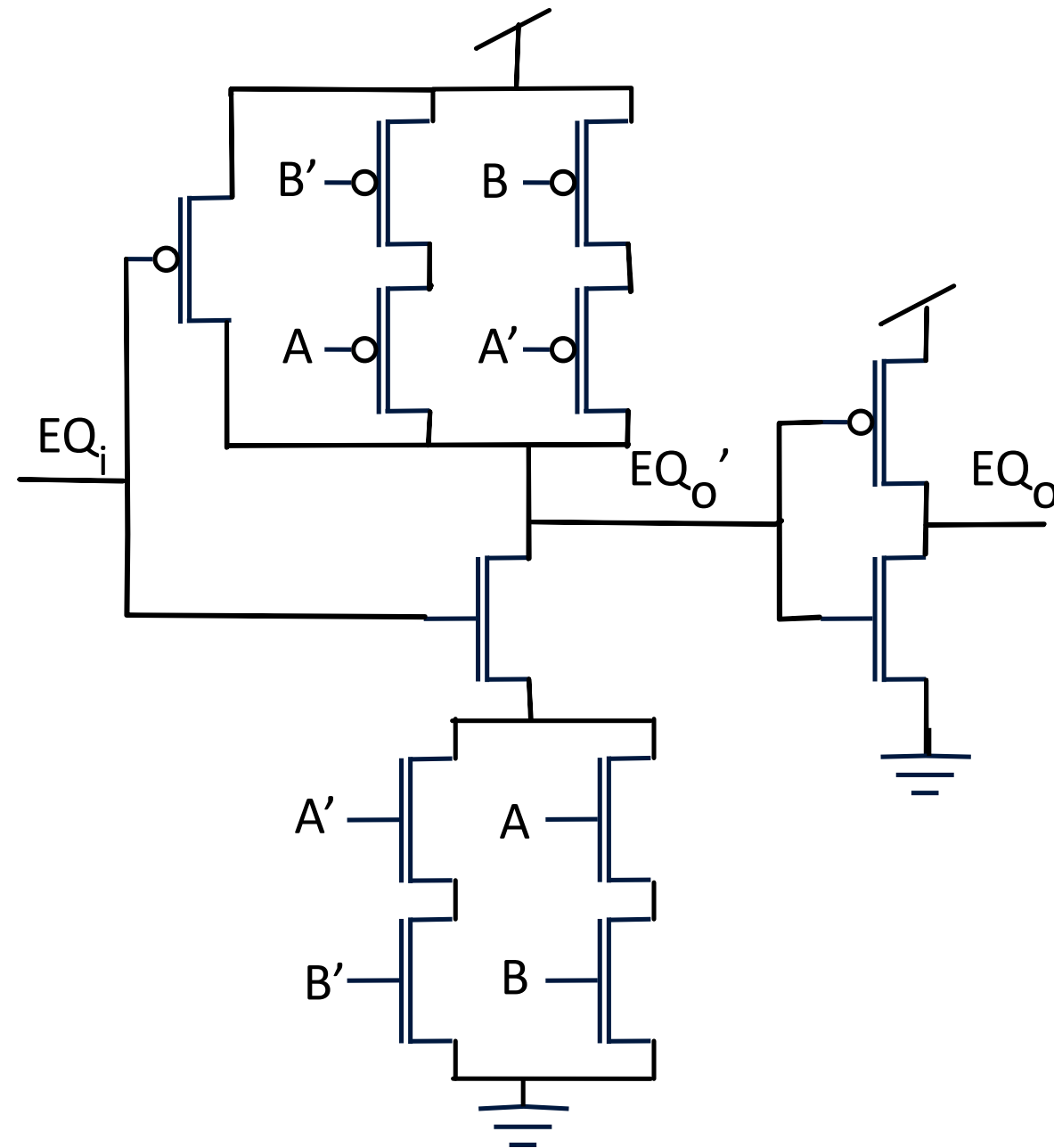
- What is the critical path?
- The sum part should also play a role...

Equal circuit example revisited I

All A's, B's and EQio arrive to
the equal circuit at the same
time.

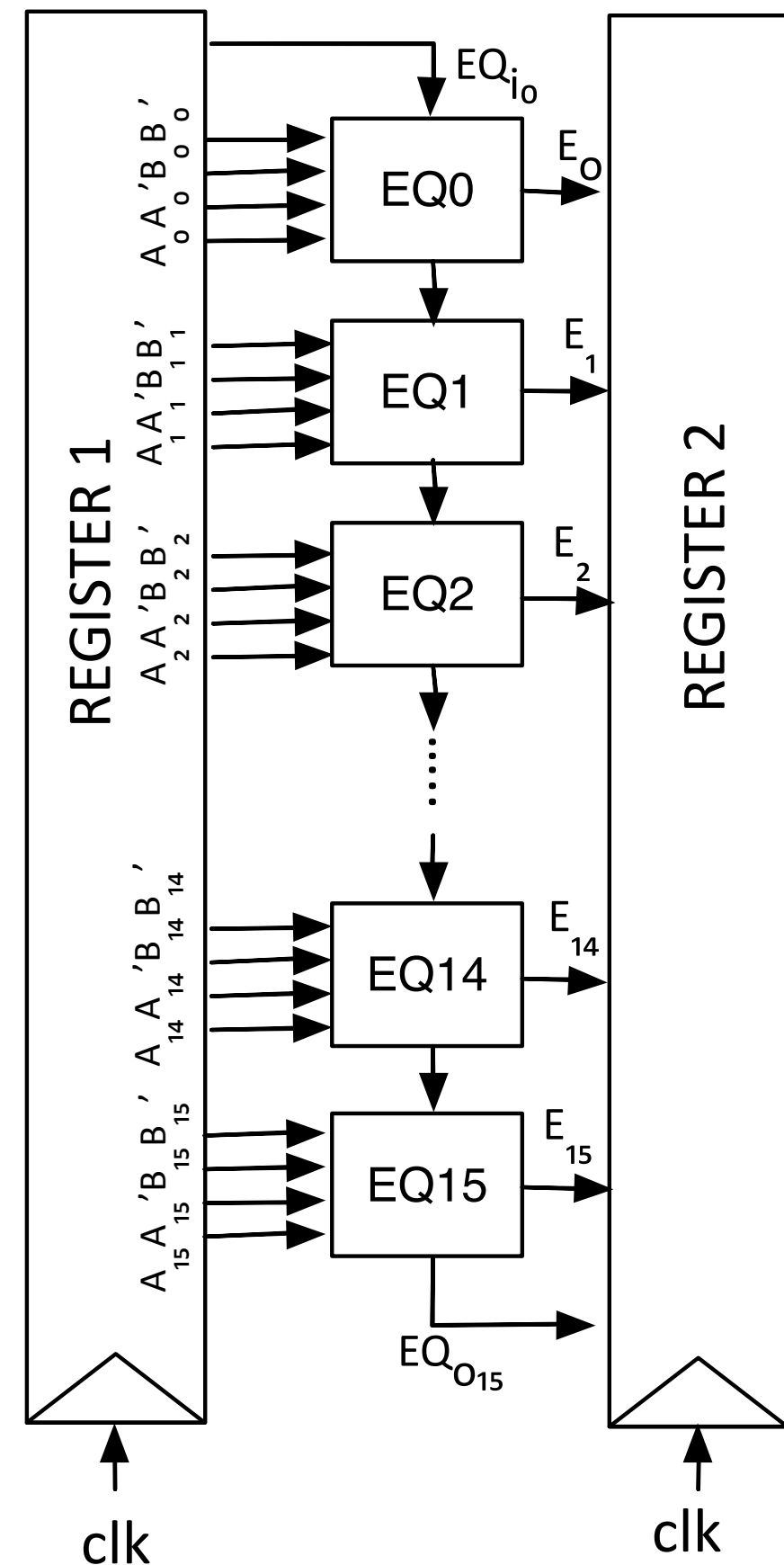


Original EQ cell

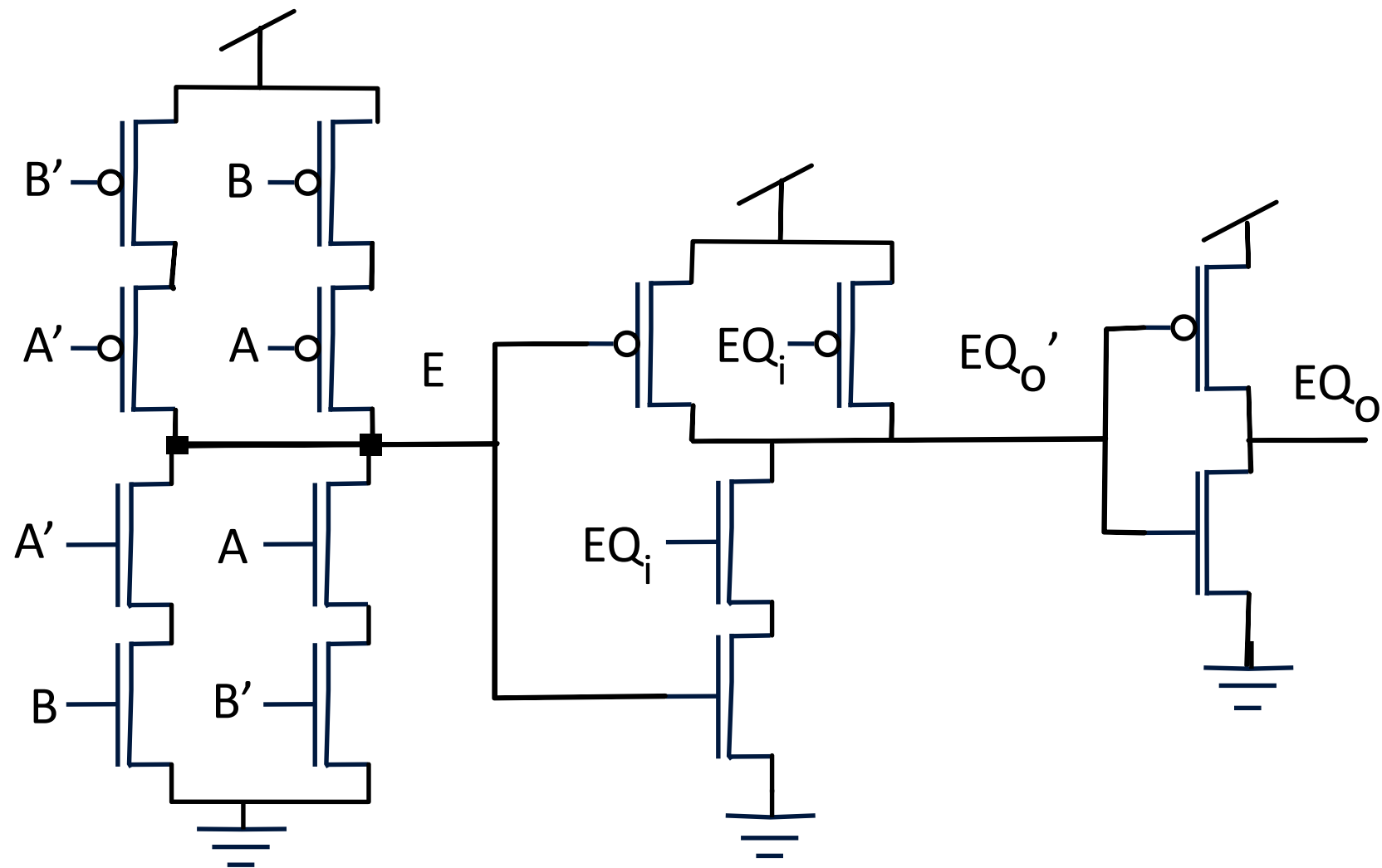


Equal circuit example revisited 2

All A's, B's and EQio arrive to the circuit at the same time.



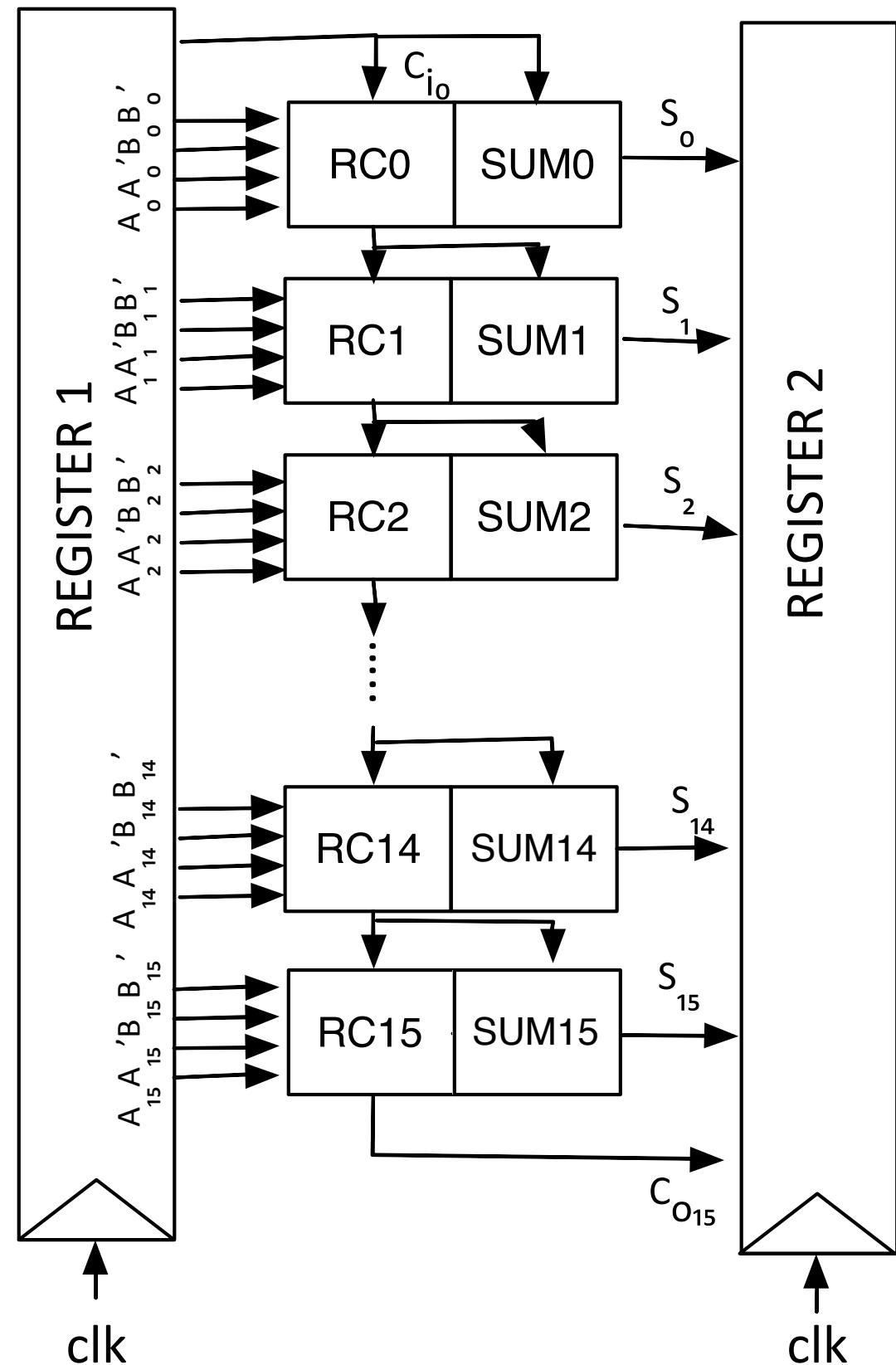
Modified EQ cell with E output



Ripple.carry Adder circuit

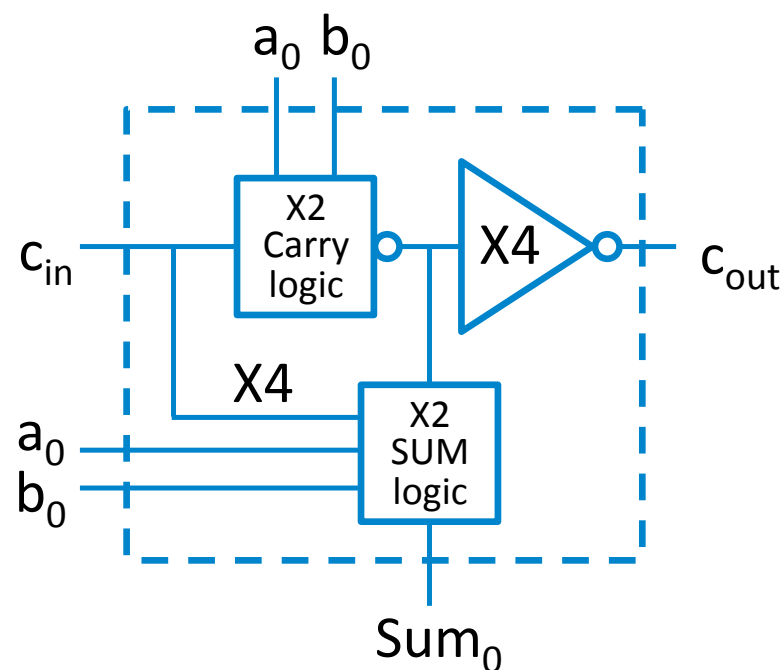
All A's, B's and C_{i0} arrive to the circuit at the same time.

Worst-case
propagation delay
depends on which is slower of
RC15 and SUM15

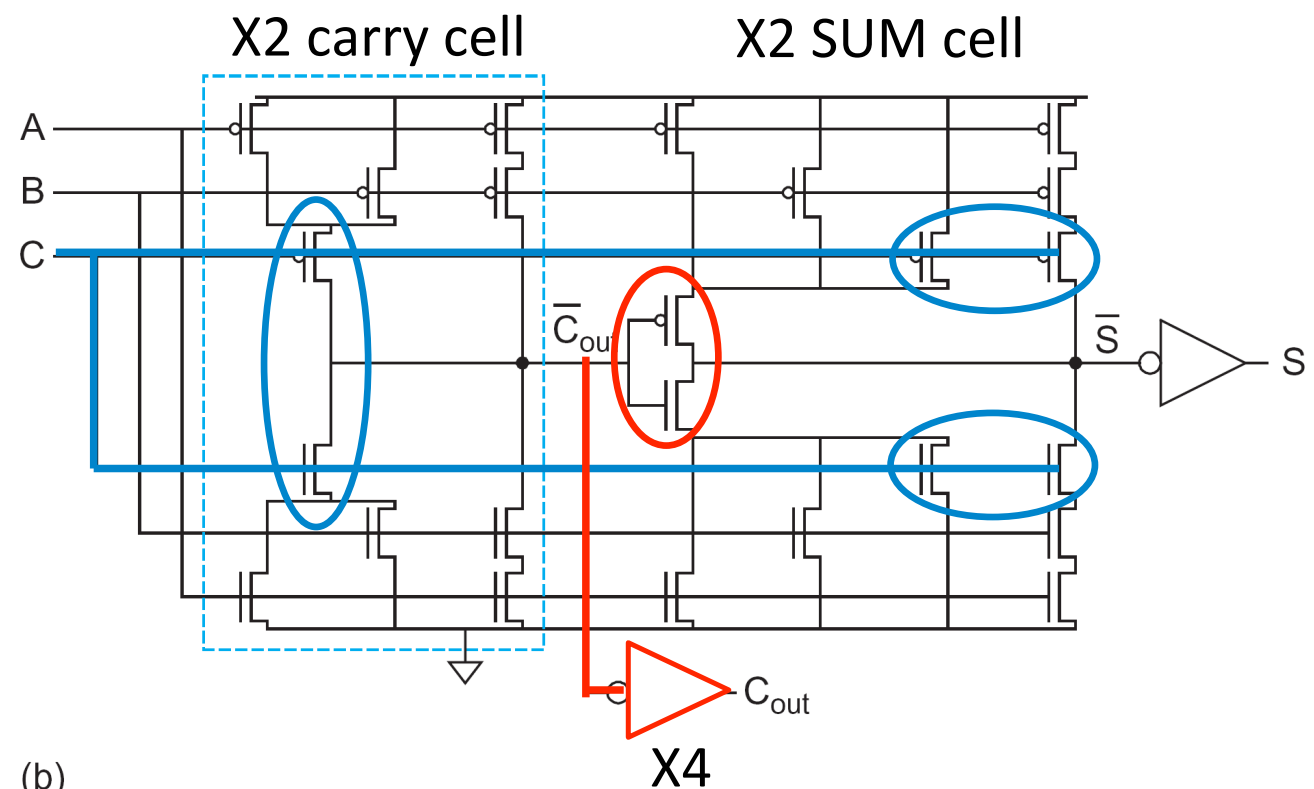


What if we build the full adder like this?

Textbook solution



Design structure as proposed in textbook!



Precalculation for adders

		AB			
		00	01	11	10
C _{in}	0	0	0	1	0
	1	0	1	1	1
		Kill	Propagate	Generate	Propagate

Kill: $C_{out} = 0$

Generate:
 $C_{out} = 1$

Propagate:
 $C_{out} = C_{in}$

A little preview for week 6 & 7 : Faster adders

Precalculation for adders

How to calculate P and G:

Generate:

$$C_{out} = 1$$

Propagate:

$$C_{out} = C_{in}$$

Generate: $G = AB$

Propagate: $P = A \oplus B$

Can be done for all bits immediately

How to use P and G in full adder:

$$C_{out} = G + PC_{in}$$

$$Sum = P \oplus C_{in}$$

Which operation has the longest propagation delay?

A little preview for week 6 & 7 : Faster adders