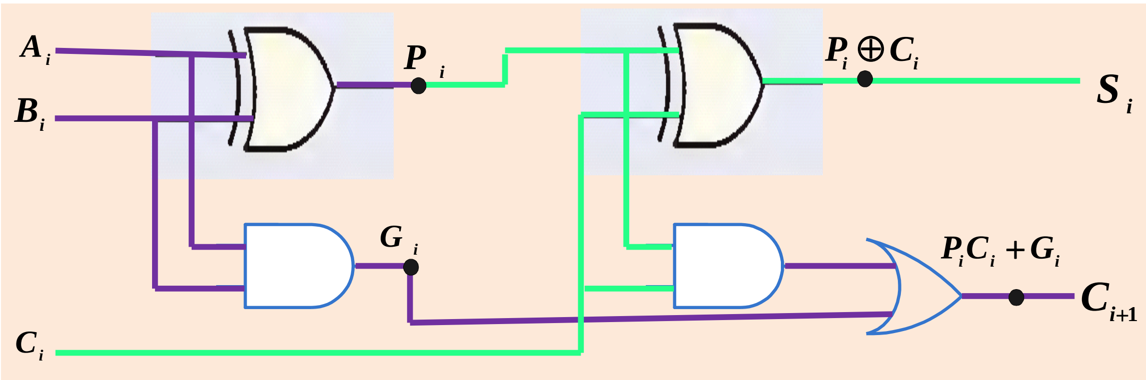
Example:

$A + B$ $(A = 1011)$ and $(B = 0011)$

Subscript i	3	2	1	0		
Input Carry	0	1	1	0	C_i	
A +	1	0	1	1	A_i	$C_0 = 0$
B	0	0	1	1	B_i	
Sum	1	1	1	0	S_i	
Output Carry	0	0	1	1	C_{i+1}	

Carry Propagation

- The addition of $A + B$ binary numbers in ***parallel*** implies that all the bits of A and B are available for computation at the same time.
- As in any combinational circuit, the signal must ***propagate*** through the gates before the correct output sum is available.
- The output will not be correct unless the signals are given enough time to propagate through the gates connected form the input to the output.
- The longest ***propagation delay time*** in an adder is the time it takes the carry to propagate through the full adders.



Full Adder with P and G

- The signal form the carry input C_i to the output carry C_{i+1} propagates through an ***AND*** gate and an ***OR*** gate, which equals ***2 gate levels***.
    - If there are **4** full adders in the binary adder, the output carry C_4 would have ***2×4=8 gate levels***, form C_0 to C_4
    - For an n-bit adder, $2n$ gate levels for the carry to propagate form input to output are required.