Overflow Errors

$$\begin{array}{r} 5 \\ +\ 3 \\ \hline 8 \end{array} \qquad \begin{array}{r} \\ + \\ \hline \end{array}$$

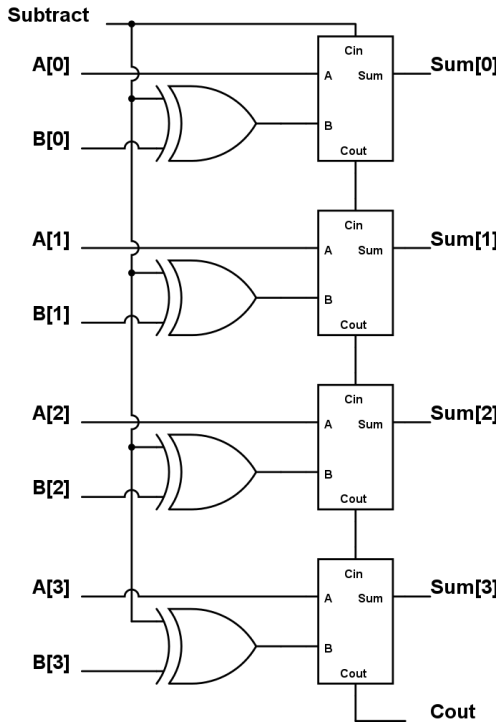
$$\begin{array}{r} 7 \\ +\ 7 \\ \hline 14 \end{array} \qquad \begin{array}{r} \\ + \\ \hline \end{array}$$

Underflow Errors

$$\begin{array}{r} -5 \\ +\ -4 \\ \hline -9 \end{array} \qquad \begin{array}{r} \\ + \\ \hline \end{array}$$

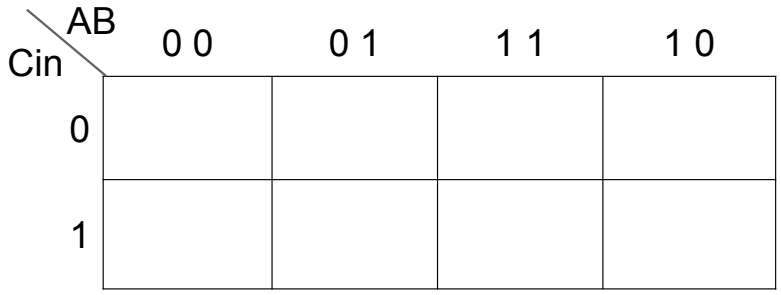
$$\begin{array}{r} -8 \\ +\ -8 \\ \hline -16 \end{array} \qquad \begin{array}{r} \\ + \\ \hline \end{array}$$

Adder / Subtractor



Adder / Subtractor

Carry Look Ahead

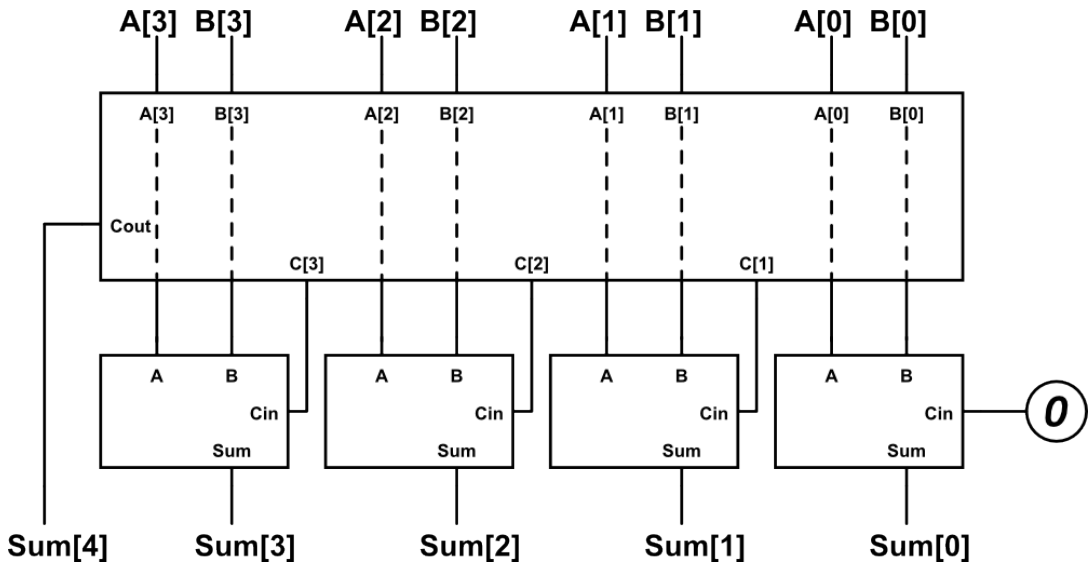


Carry Look Ahead

Cin[0] = C0
Cin[1] = G[0] + P[0]*Cin[0]
Cin[2] = G[1] + P[1]*Cin[1]
Cin[3] = G[2] + P[2]*Cin[2]
...

Cin[0] = C0
Cin[1] = G[0] + P[0]*(C0)
Cin[2] = G[1] + P[1]*(G[0] + P[0]*C0)
Cin[3] = G[2] + P[2]*(G[1] + P[1]*(G[0] + P[0]*C0))
...

Carry Look Ahead



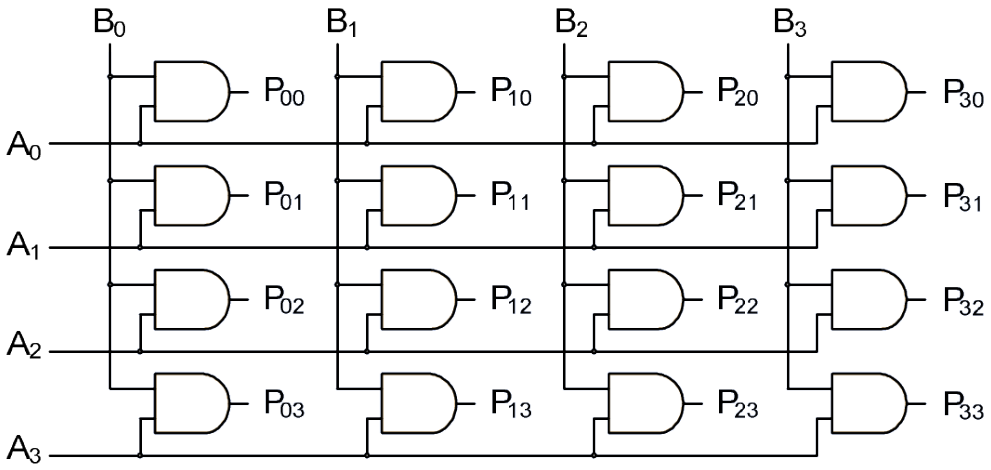
Multiplication

$$\begin{array}{cccccc} & 1 & 0 & 1 & 0 \\ \times & 1 & 1 & 0 & 1 \\ \hline \end{array}$$

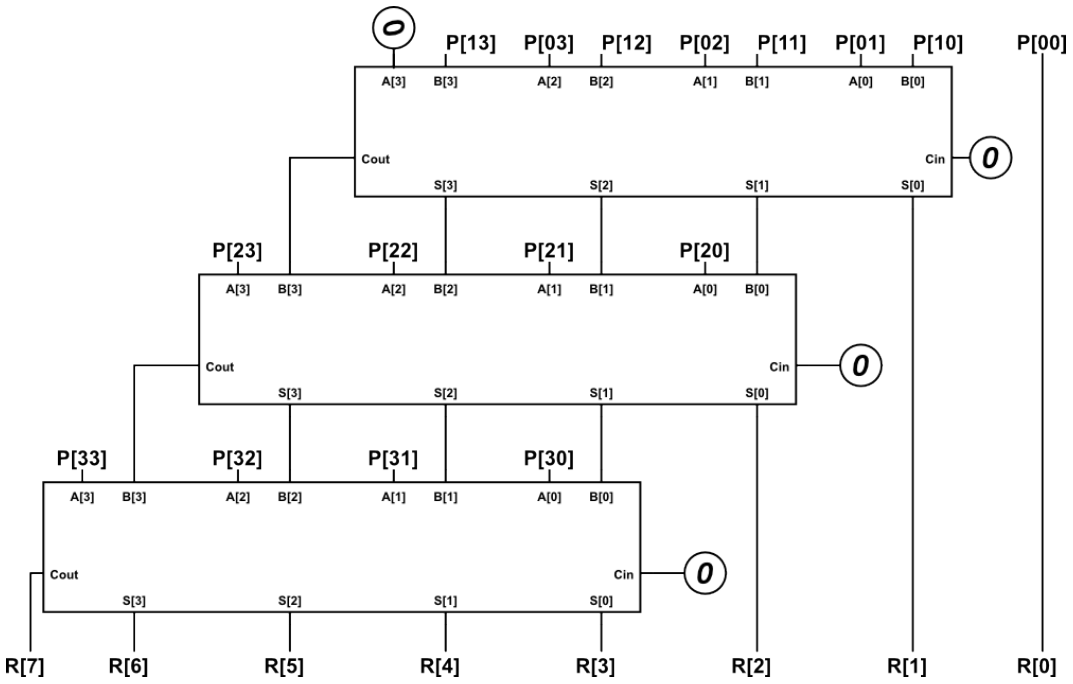
Multiplication

				A_3	A_2	A_1	A_0	
			x	B_3	B_2	B_1	B_0	
				P_{03}	P_{02}	P_{01}	P_{00}	
			P_{13}	P_{12}	P_{11}	P_{10}		
		P_{23}	P_{22}	P_{21}	P_{20}			
	P_{33}	P_{32}	P_{31}	P_{30}				
R_7	R_6	R_5	R_4	R_3	R_2	R_1	R_0	

Multiplication



Multiplication

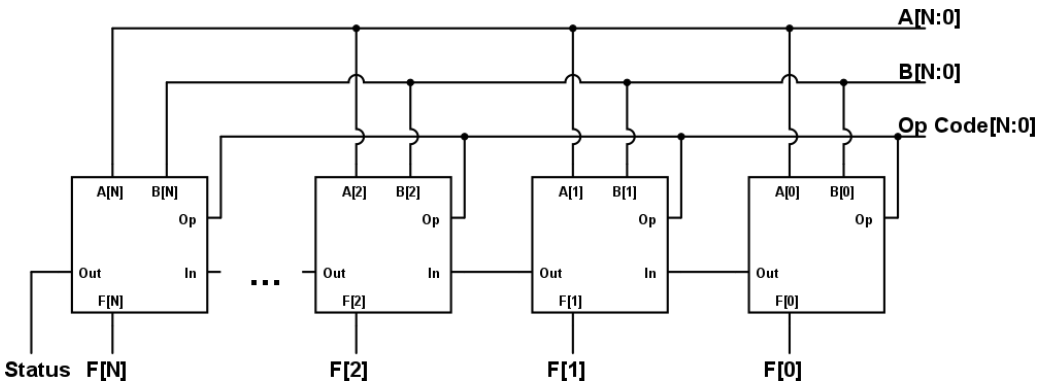


Central Processing Unit (CPU)

Arithmetic Logic Unit (ALU)

Arithmetic Logic Unit (ALU)

Arithmetic Logic Unit (ALU)



ALU Operation Table

Op Code	Function	Status
000		
001		
010		
011		
100		
...		
111		