

THE IMPLEMENTATION CONSISTS IN A CASCADE OF TWO FULL ADDERS (TWO LEVELS IN TOTAL) : THE bits A_0 AND B_0 ARE SUMMED BY A FIRST XOR GATE, THEN THE C_i IS ADDED TO P_0 (SUM OF A_0 AND B_0) TO GENERATE THE FIRST bit OF \underline{S} . IN THE SAME TIME g_0 IS GENERATED ($A_0 B_0$) THE SECOND STAGE GENERATES S_1 (SECOND ELEMENT OF \underline{S}) IN THE EXACT SAME WAY OF S_0 , BUT " C_i " THIS TIME IS EQUAL TO $g_0 + (P_0 C_i)$

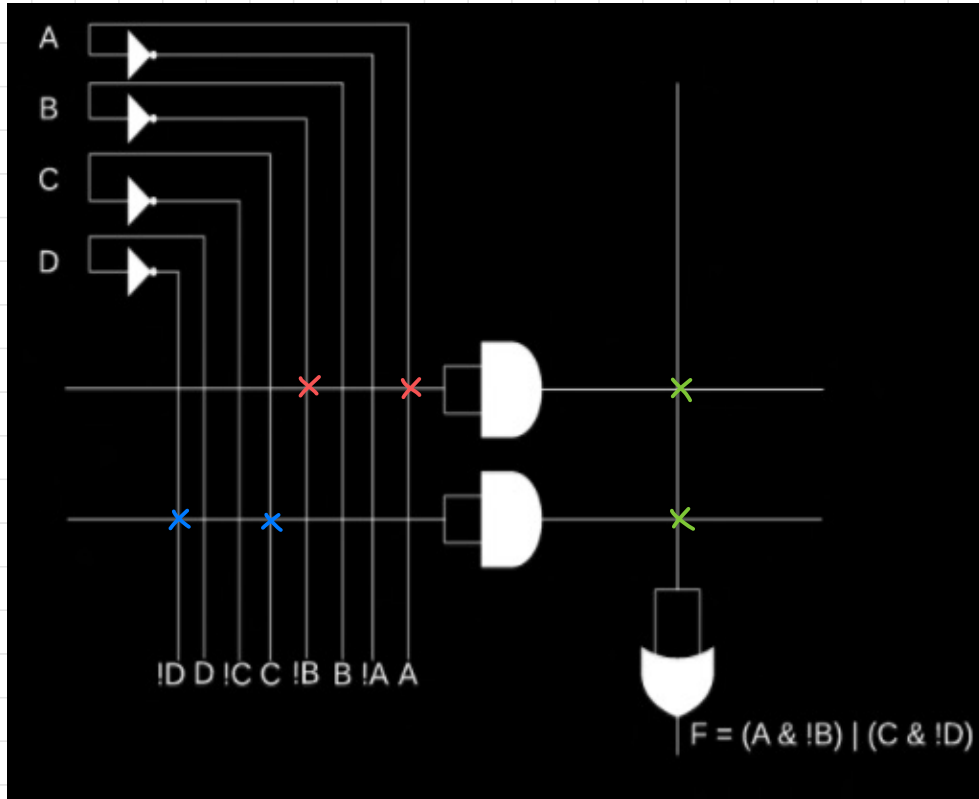
INPUTS					OUTPUTS		
A0	A1	B0	B1	Ci	S0	S1	Co
0	0	0	0	0	0	0	0
1	0	0	0	0	1	0	0
0	1	0	0	0	0	1	0
1	0	1	0	0	0	1	0
0	1	0	1	0	0	0	1
0	1	0	0	1	1	1	0
1	0	1	0	1	1	1	0
1	1	1	1	1	1	1	1

$$\underline{S} = \begin{cases} S_0 = (A_0 \oplus B_0) \oplus C_i = p_0 \oplus C_i \\ S_1 = (A_1 \oplus B_1) \oplus (A_0 B_0 + (A_0 \oplus B_0) C_i) = p_1 \oplus (g_0 + p_0 C_i) \end{cases}$$

$$C_o = A_1 B_1 + ((A_1 \oplus B_1) (A_0 B_0 + (A_0 \oplus B_0) C_i)) = g_1 + (p_1 (g_0 + p_0 C_i))$$

$$p_i = A_i \oplus B_i \quad , \quad g_i = A_i B_i$$

IMPLEMENTATION OF THE FUNC. $F = (A \text{ AND } !B) \text{ OR } (C \text{ AND } !D)$ USING THE PLA BELOW



STEP 1) CONNECT THE WIRES ASSOCIATED TO SIGNALS A AND !B TO THE UPPER AND-PORT (CONNECTIONS MARKED WITH RED Xs)

STEP 2) WITH THE SAME PROCEDURE OF THE FIRST STEP CONNECT THE WIRES CARRYING SIGNALS C AND !D TO THE LOWER AND GATE (BLUE Xs)

STEP 3) NOW USING THE OUTPUTS OF BOTH AND GATES AS INPUTS OF THE OR GATE WE CAN GENERATE THE OUTPUT OF FUNC. F

IMPLEMENTATION OF THE FUNC. $F = (A \text{ AND } !B) \text{ OR } (C \text{ AND } !D)$ USING THE LOOKUP TABLE BELOW

RAM CONTENTS				
Address				Output Data
A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

WE CAN ASSIGN THE VALUE OF THE OUTPUT FOR FUNC. F LOOKING AT THE VALUES OF THE 4 INPUTS A, B, C, D. REFERRING TO THE BOOLEAN EXPRESSION OF F THE OUTPUT VALUE WILL BE 1 IN TWO CASES:

① $A=1, B=0, C=D=-$

② $A=B=-, C=1, D=0$

"-" STANDS FOR "DON'T CARE", IT MEANS THAT WE ARE NOT INTERESTED IN THE VALUE OF THOSE INPUTS