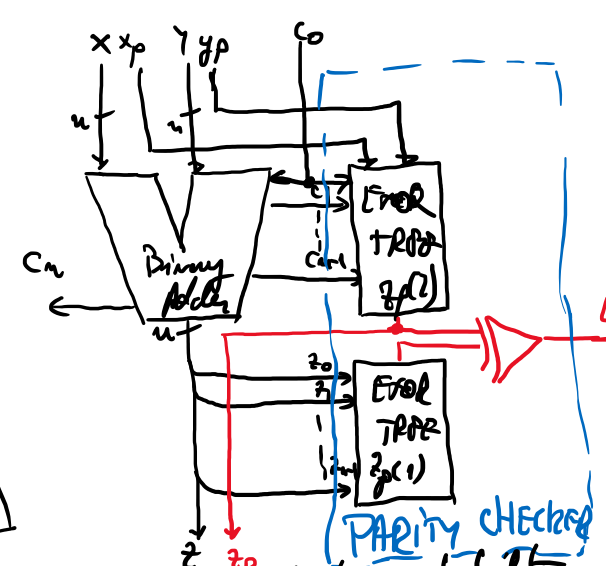


$X = 13 = \begin{matrix} x_3 & x_2 & x_1 & x_0 \\ 1 & 1 & 0 & 1 \end{matrix}$   $M_i = x_i \cdot y \cdot 2^i$   
 $Y = 11 = \begin{matrix} y_3 & y_2 & y_1 & y_0 \\ 1 & 0 & 1 & 1 \end{matrix}$   
 $M_0 = x_0 \cdot y \cdot 2^0 = 1 \cdot 1 \cdot 1 = 1$   
 $M_1 = x_1 \cdot y \cdot 2^1 = 1 \cdot 0 \cdot 2 = 0$   
 $M_2 = x_2 \cdot y \cdot 2^2 = 1 \cdot 1 \cdot 4 = 4$   
 $M_3 = x_3 \cdot y \cdot 2^3 = 1 \cdot 1 \cdot 8 = 8$   
 $P = 1 + 0 + 4 + 8 = 13$

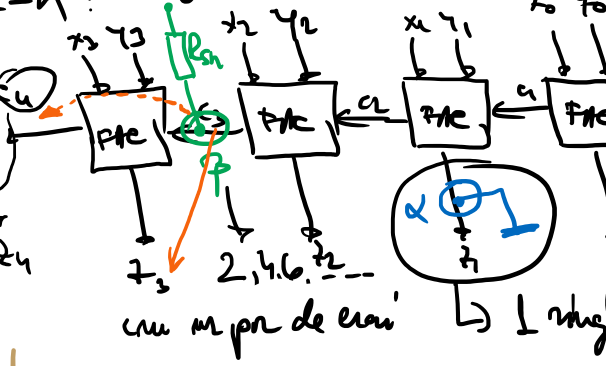
1.5.1. Binary adders with parity control  
 Attributes of a reliable system:  
 - accuracy  
 - reliability  
 - maintainability  
 - no lost parts

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PARITY CHECKER  
 Single stuck-at fault  
 Multiple stuck-at faults  
 Logic manufacturer



Single stuck-at fault  
 Multiple stuck-at faults  
 Logic manufacturer

fault-free  
 $X = 0011$   
 $Y = 0011$   
 $C = 0$   
 $z = 0110$

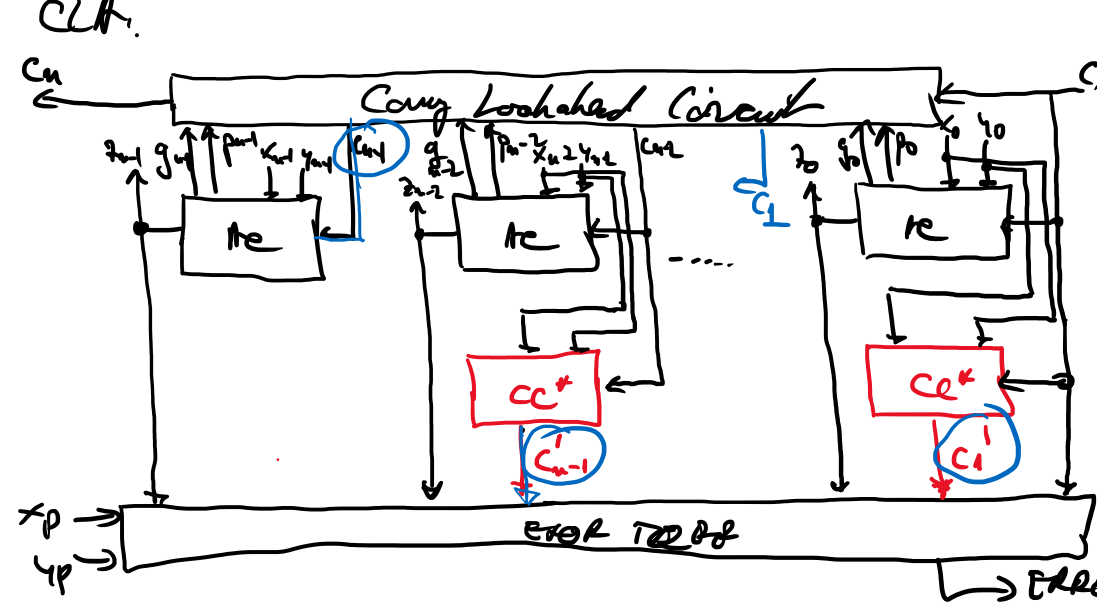
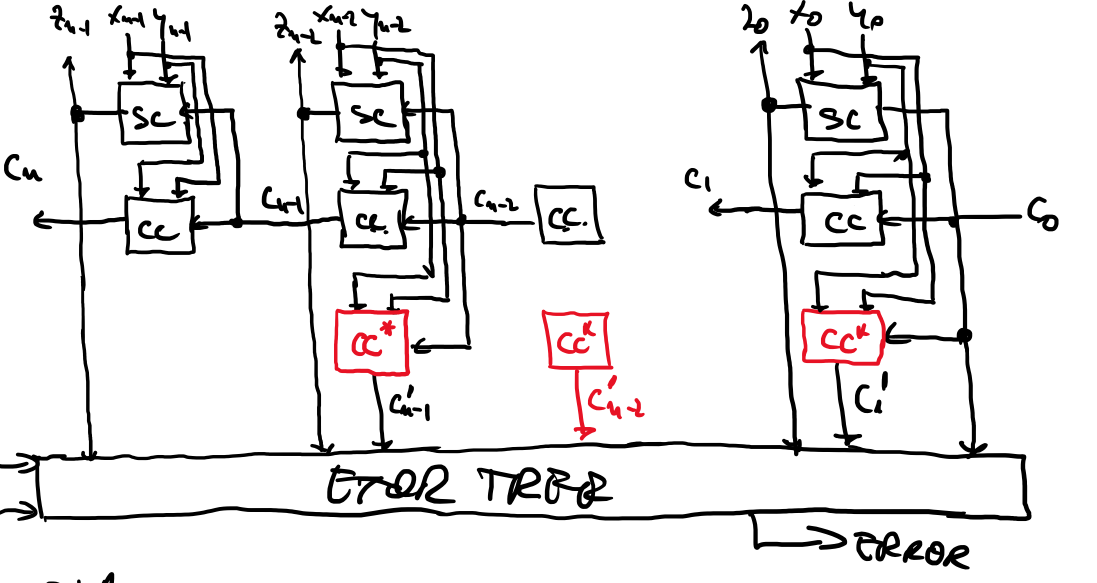
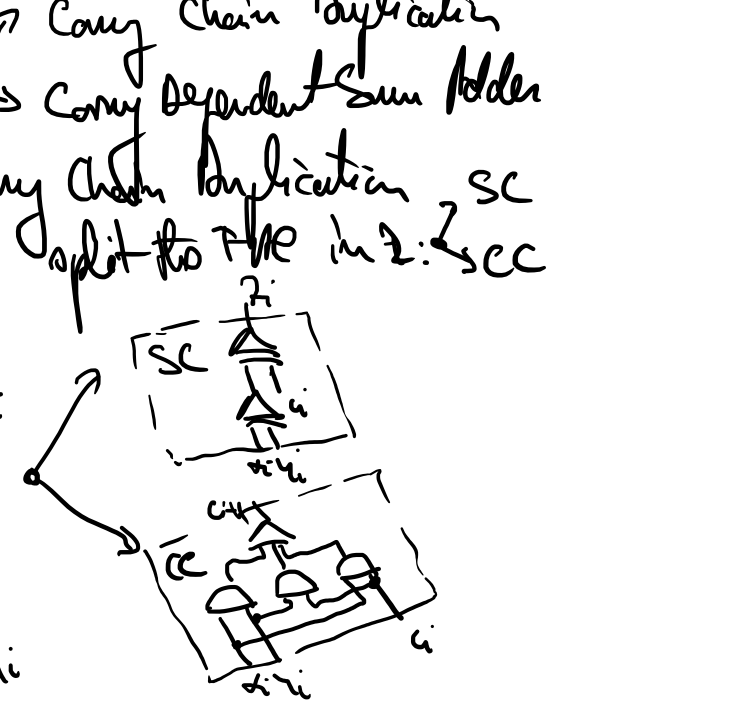
$x_p = 0 \oplus 0 \oplus 0 \oplus 1 = 1$   
 $y_p = 0 \oplus 0 \oplus 0 \oplus 1 = 1$   
 $c_p = 0 \oplus 1 \oplus 1 \oplus 0 = 0$   
 $z_p = 1 \oplus 1 \oplus 0 \oplus 0 = 0$   
 NO ERROR

$X = 0011$   
 $Y = 0011$   
 $C = 0$   
 $z = 0100$

$x_p = 0$   
 $y_p = 0$   
 $c_p = 0$   
 $z_p = 1$   
 ERROR

$X = 0011$   
 $Y = 0011$   
 $C = 0$   
 $z = 1110$

$x_p = 0$   
 $y_p = 0$   
 $c_p = 1$   
 $z_p = 1$   
 NO ERROR



Solution: Carry Chain Duplication  
 Carry Dependent Sum Adder  
 1.5.2. Carry Chain Duplication SC for RCA: Split the FFA in 2: SCC

