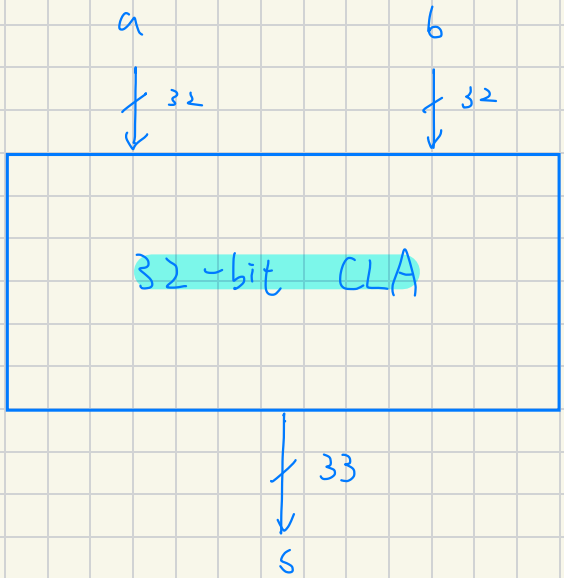
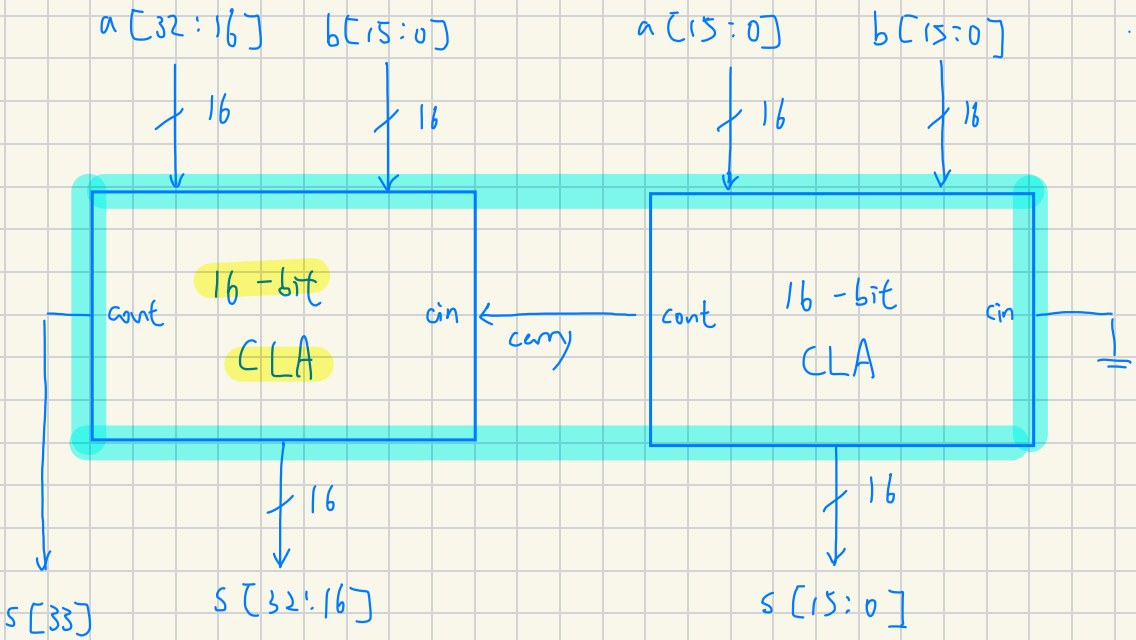
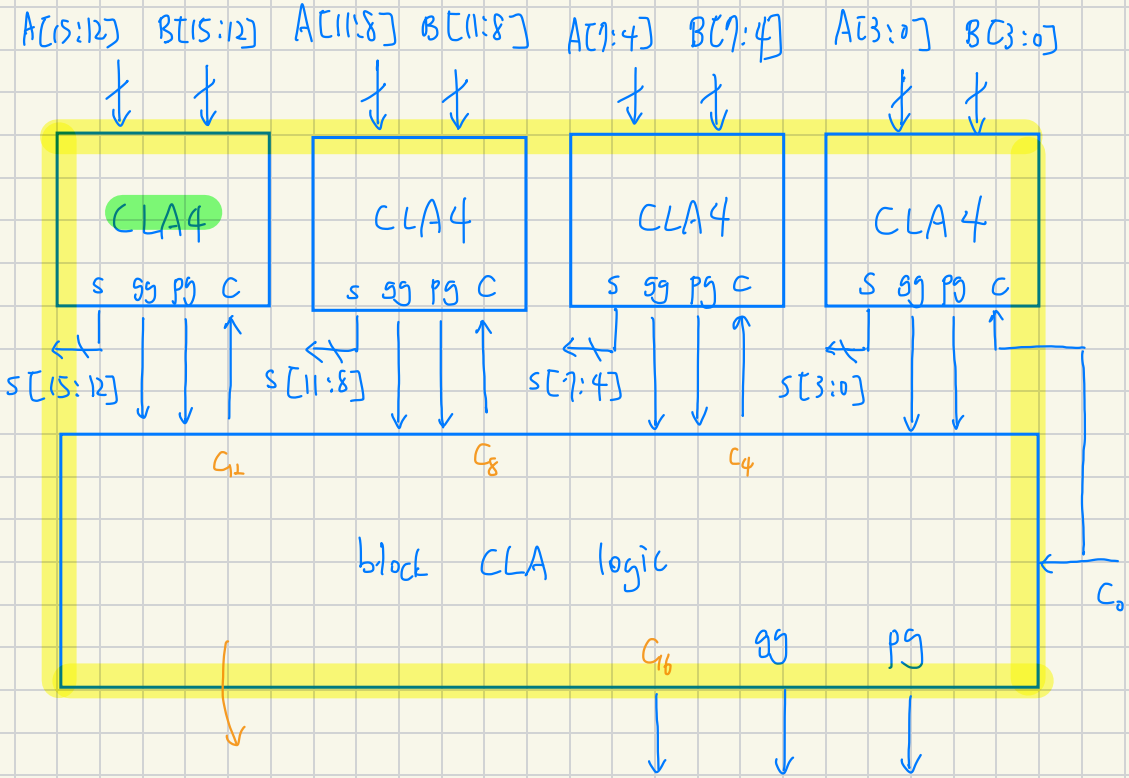
4.3 32-bit Carry-lookahead Adder







$$C_4 = G_{G_0} + P_{G_0} C_0$$

$$C_8 = G_{G_1} + P_{G_1} C_4$$

$$= G_{G_1} + P_{G_1} G_{G_0} + P_{G_1} P_{G_0} C_0$$

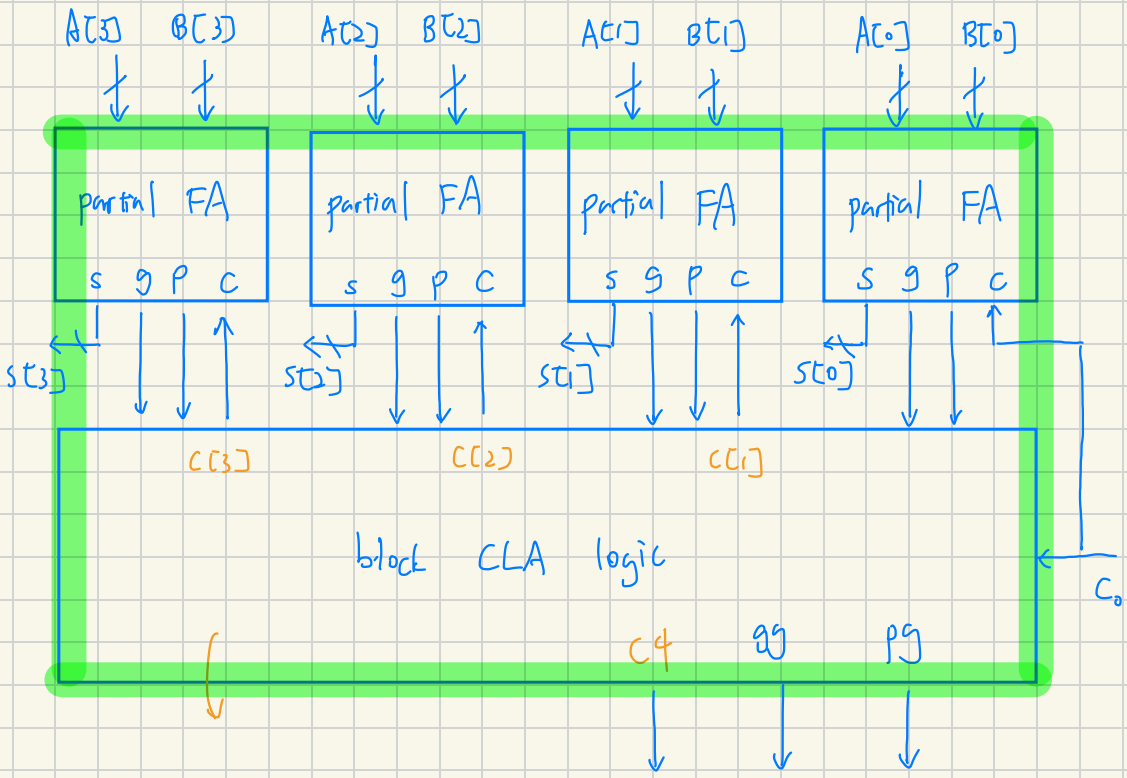
$$C_{12} = G_{G_2} + P_{G_2} C_8$$

$$= G_{G_2} + P_{G_2} G_{G_1} + P_{G_2} P_{G_1} G_{G_0} + P_{G_2} P_{G_1} P_{G_0} C_0$$

$$C_{16} = G_{G_3} + P_{G_3} G_{G_2} + P_{G_3} P_{G_2} G_{G_1} + P_{G_3} P_{G_2} P_{G_1} G_{G_0} + P_{G_3} P_{G_2} P_{G_1} P_{G_0} C_0$$

$$= G_G + P_G C_0$$

(G_G : group generate, P_G : group propagate)



$$C_1 = G_0 + P_0 C_0$$

$$C_2 = G_1 + P_1 C_1$$

$$= G_1 + P_1 G_0 + P_1 P_0 C_0$$

$$C_3 = G_2 + P_2 C_2$$

$$= G_2 + P_2 G_1 + P_2 P_1 G_0 + P_2 P_1 P_0 C_0$$

$$C_4 = G_3 + P_3 G_2 + P_3 P_2 G_1 + P_3 P_2 P_1 G_0 + P_3 P_2 P_1 P_0 C_0$$

$$= G_G + P_G C_0$$

(G_G : group generate, P_G : group propagate)

for each partial FA

$$P_i = A_i \oplus B_i$$

$$G_i = A_i B_i$$

$$S_i = A_i \oplus B_i \oplus C_i = P_i \oplus C_i$$