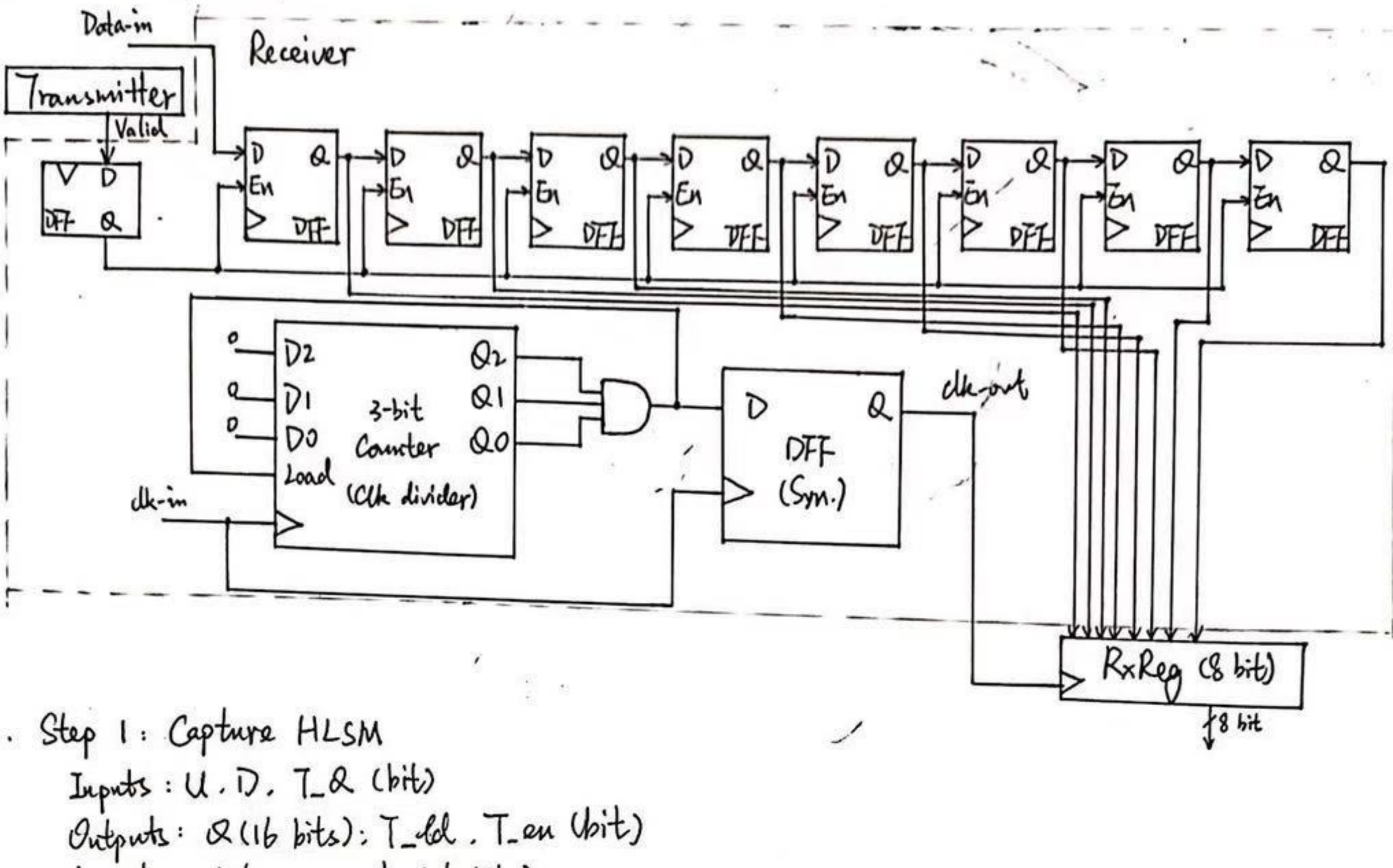
~~VE270~~ Hw 9

张心怡 5183709100 96

1.

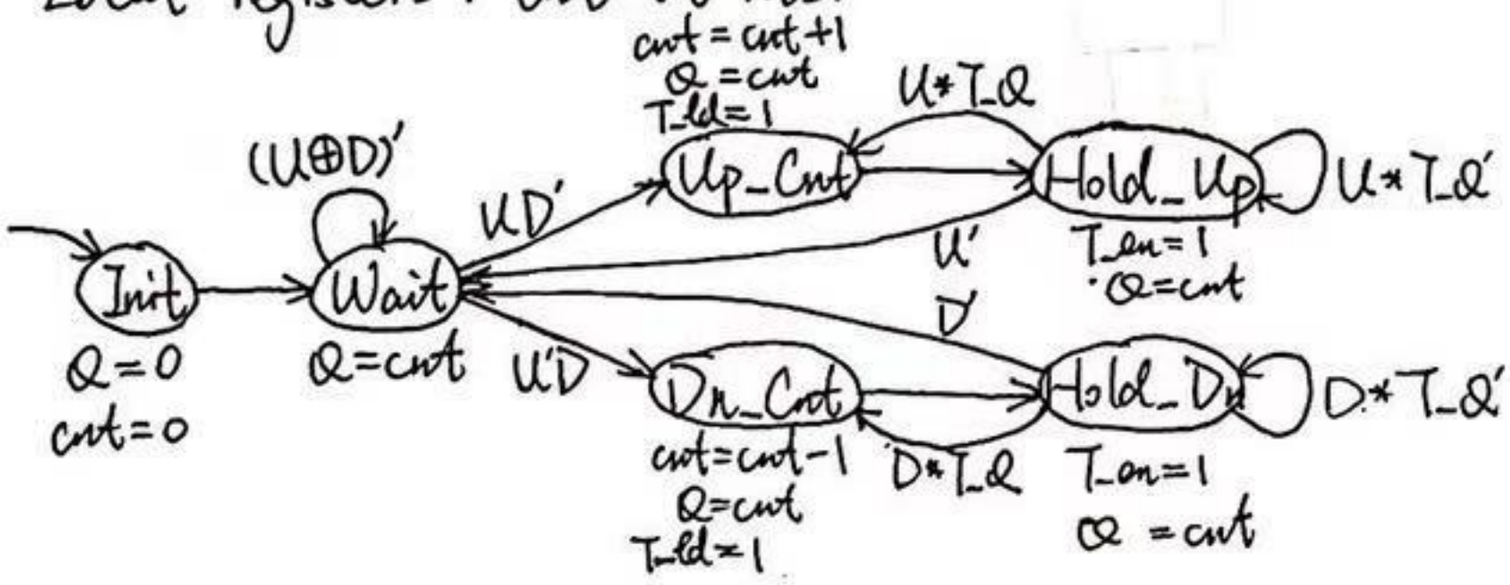


2. Step 1: Capture HLSM

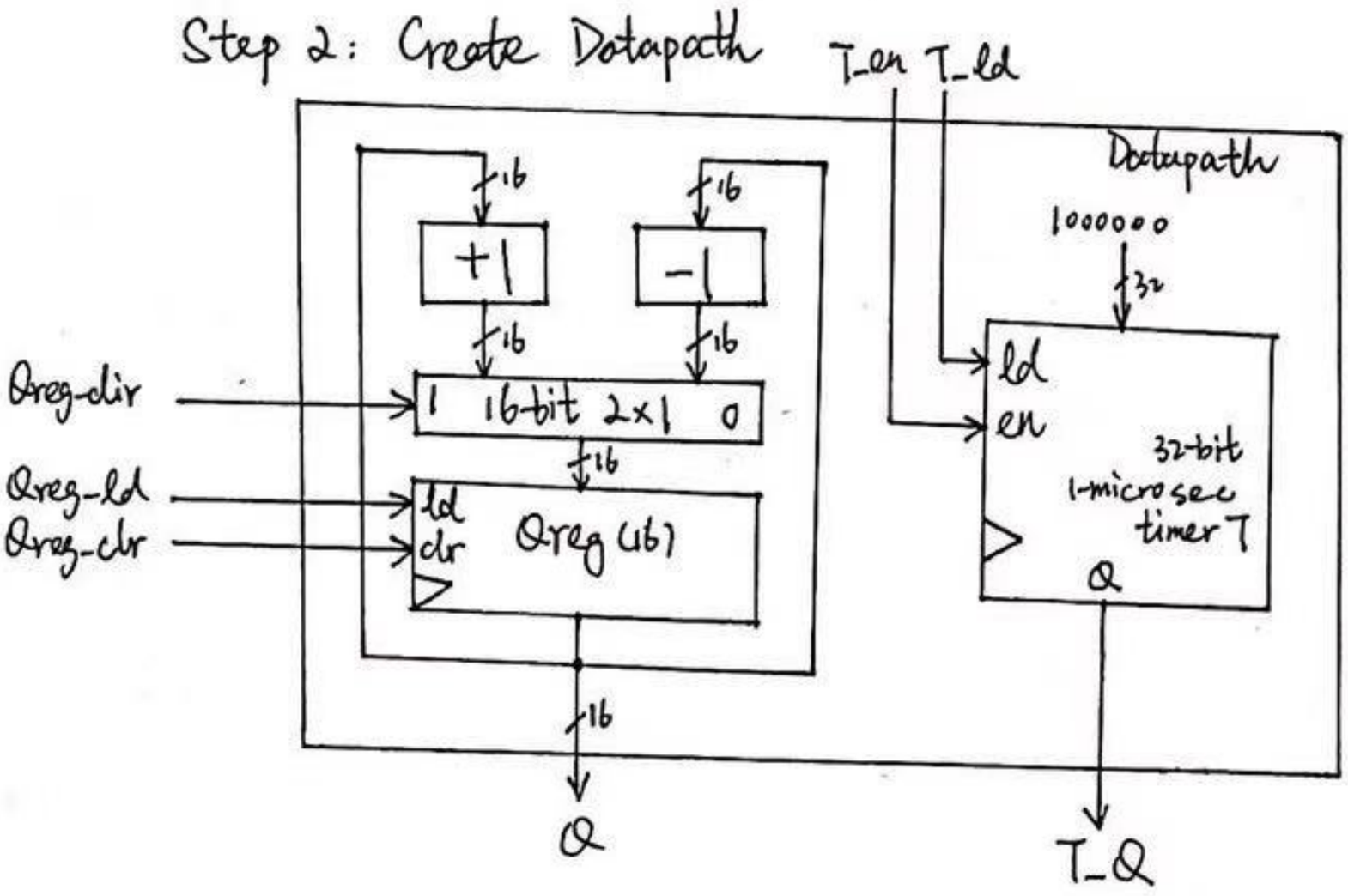
Inputs: U, D, T_Q (bit)

Outputs: Q (16 bits); T_ld, T_en (bit)

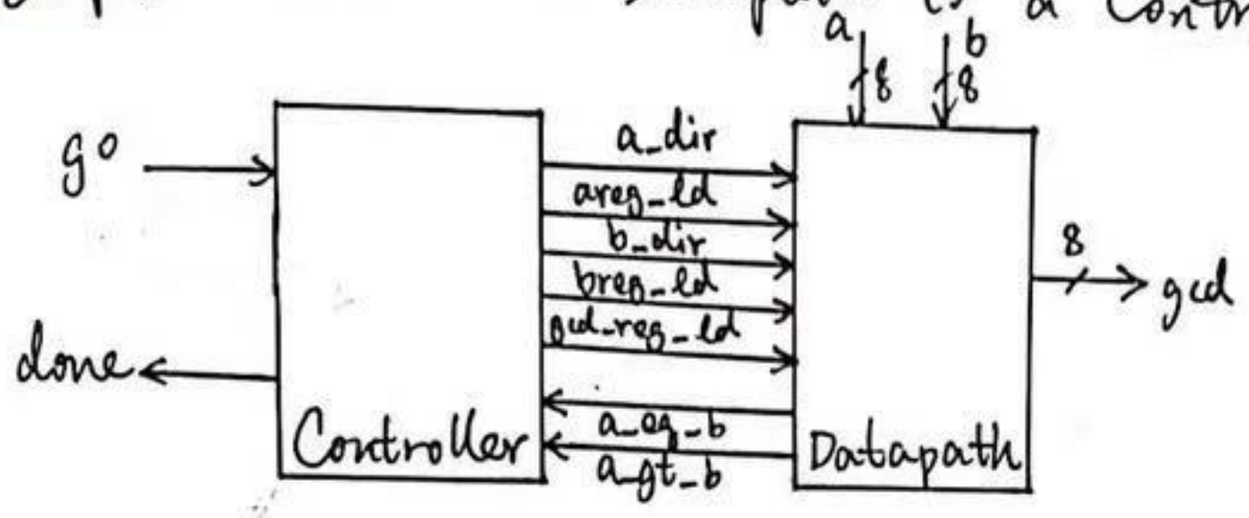
Local registers: cnt (16 bits)



Step 2: Create Datapath

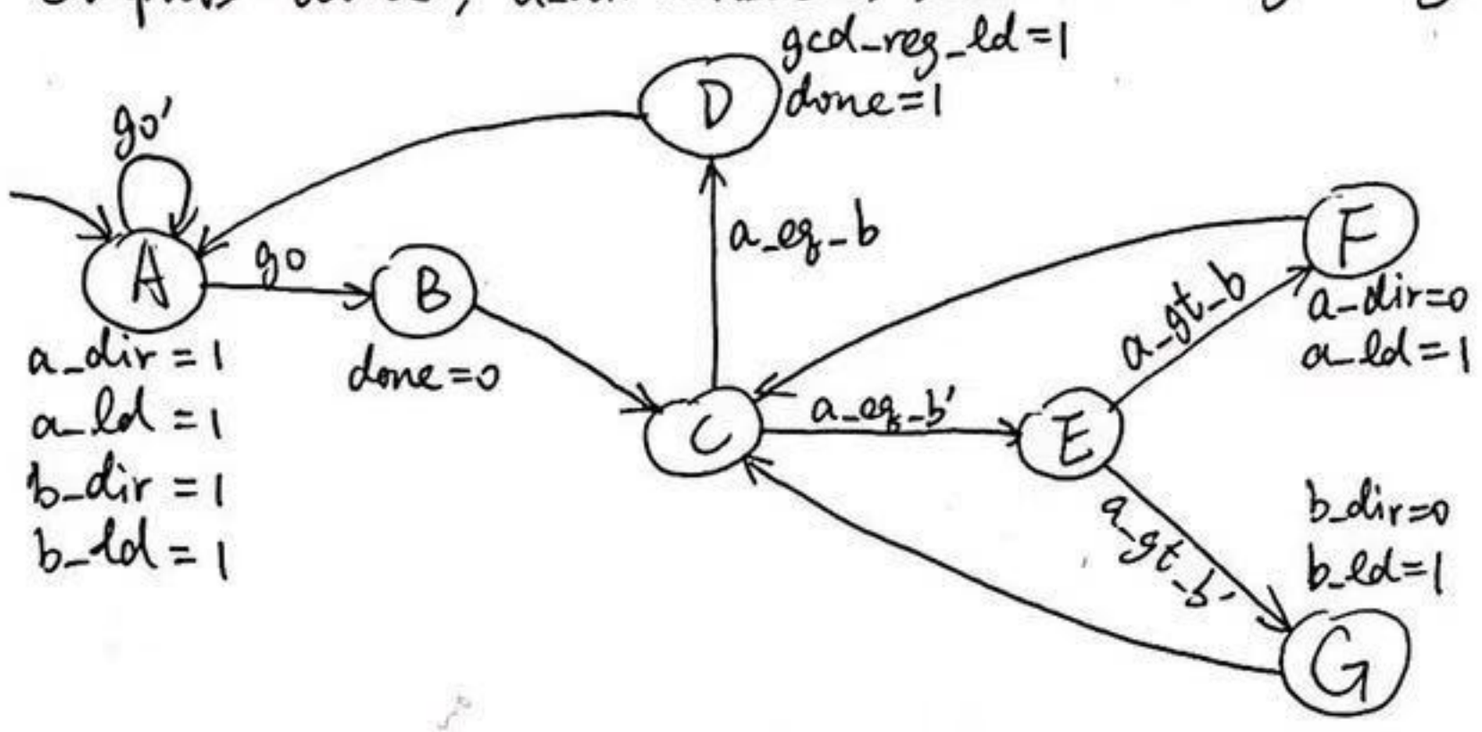


Step 3: Connect the Datapath to a Controller

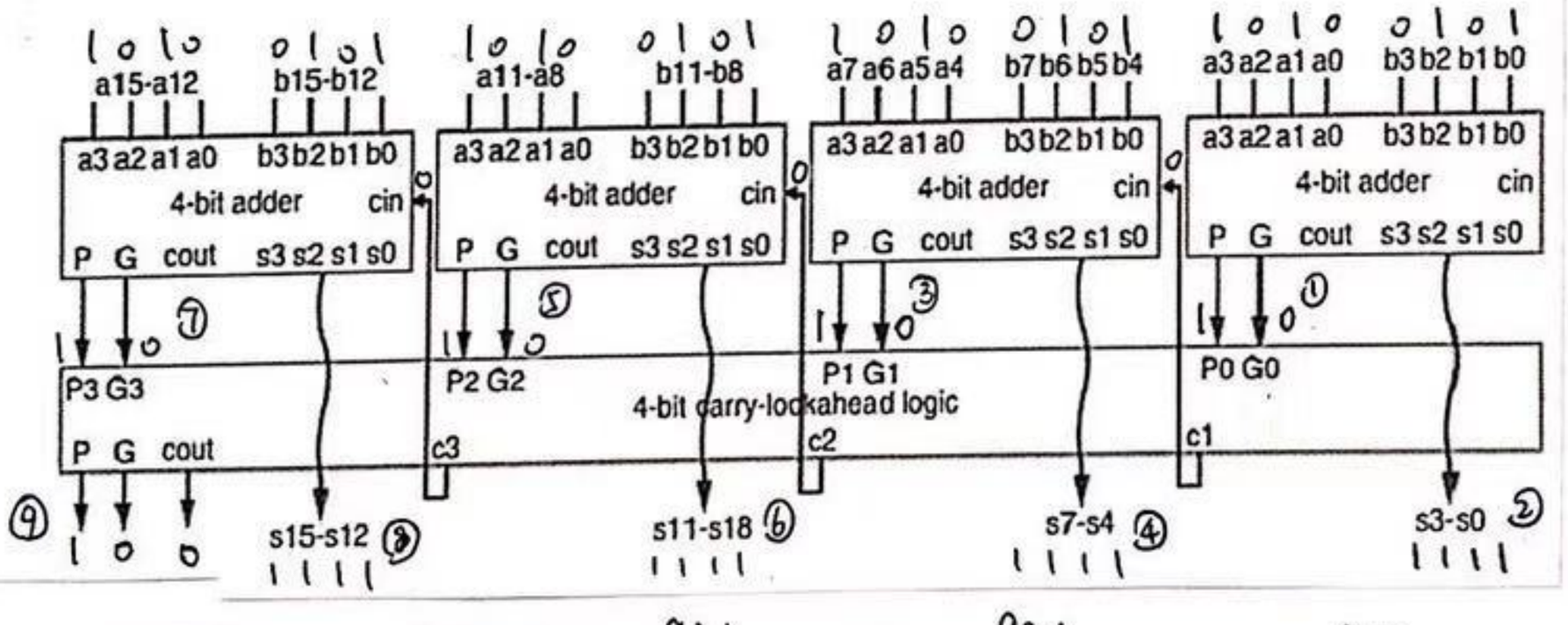


Step 4: Derive the Controller's FSM

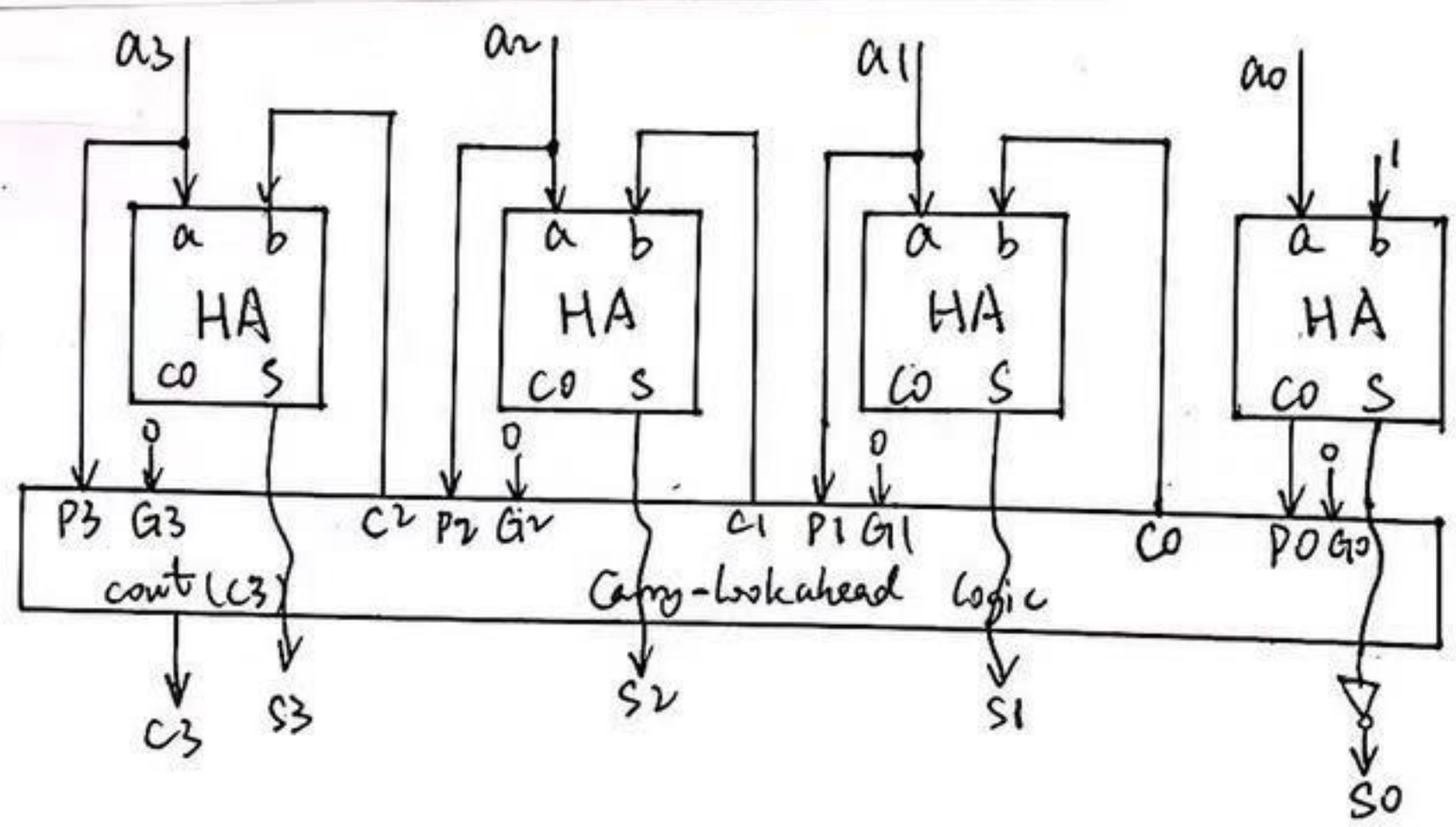
Inputs: go, a_eq_b, a_gt_b (bit)
Outputs: done, a_dir, a_ld, b_dir, b_ld, gcd_reg_ld (bit)



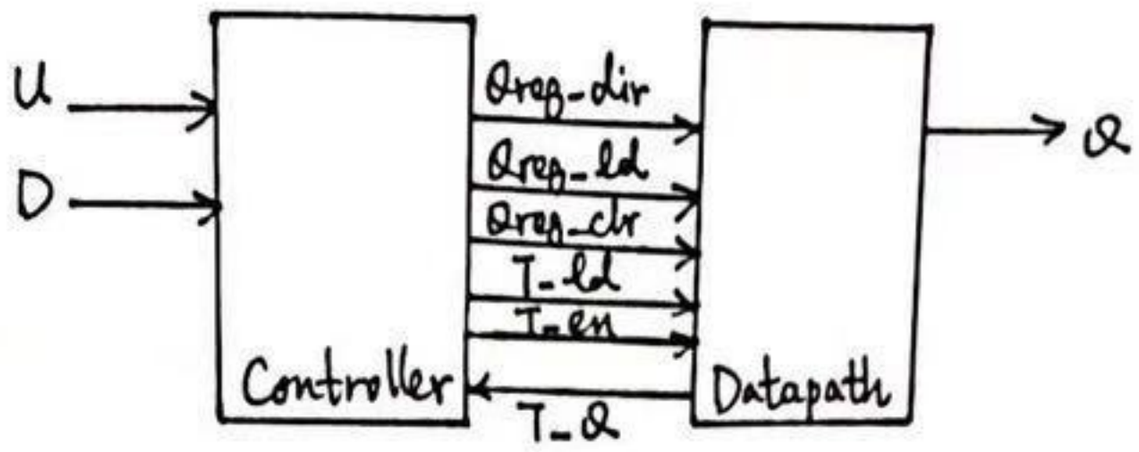
5. $a = (43690)_{10} = (1010\ 1010\ 1010\ 1010)_2$
$b = (21845)_{10} = (0101\ 0101\ 0101\ 0101)_2$



6. $c_0 = a_0 * 1 = a_0$
$c_1 = a_1 * c_0 = P_1 c_0$
$c_2 = a_2 * c_1 = P_2 c_1$
$c_3 = a_3 * c_2 = P_3 c_2$
$cout = PC + G$
$\Rightarrow P_n = a_n \cdot G = 0$
$s_0 = a_0' = P_0' = (P_0 \oplus 0)'$
$s_1 = a_1 \oplus c_0 = P_1 \oplus c_0$
$s_2 = a_2 \oplus c_1 = P_2 \oplus c_1$
$s_3 = P_3 \oplus c_2$



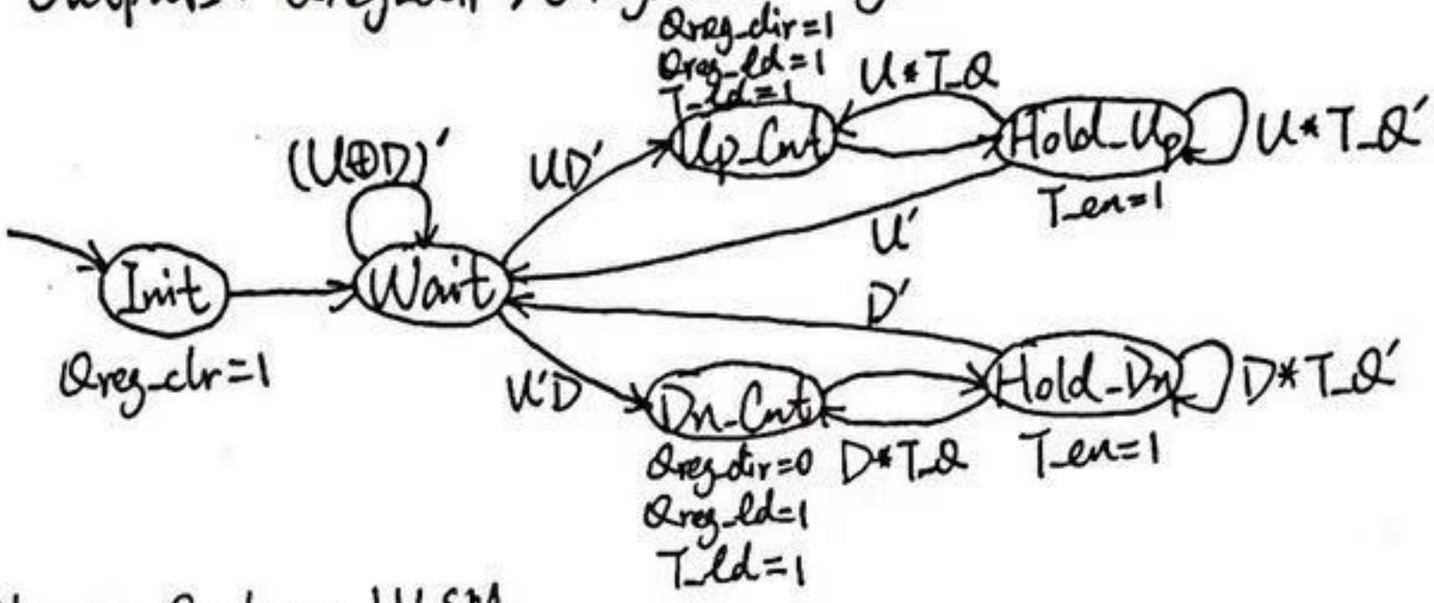
Step 3: Connect the Datapath to a Controller



Step 4: Derive the Controller's FSM

Inputs: U, D, T_Q (bit)

Outputs: Qreg_dir, Qreg_ld, Qreg_clr, T_ld, T_en (bit)

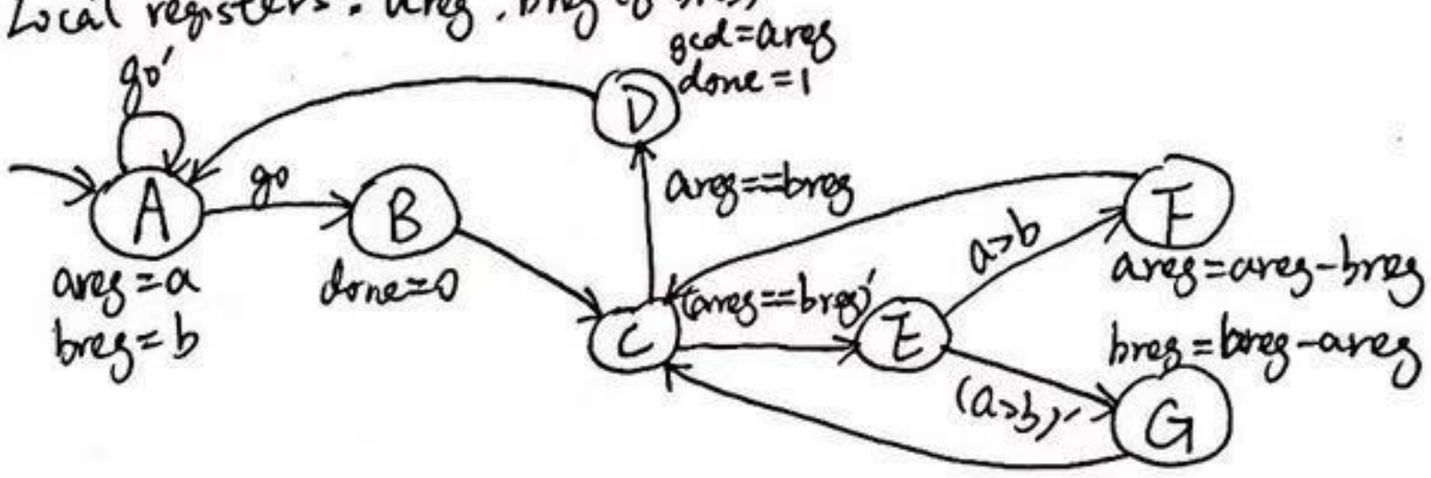


3&4. Step 1: Capture HLSM

Inputs: a, b (8 bits); go (bit)

Outputs: gcd (8 bits); done (bit)

Local registers: areg, breg (8 bits)



Step 2: Create Datapath