Q1) Implement a 3-bit ALU for the following operations.

S1	S0	Operation
0	0	X OR Y
0	1	X AND Y
1	0	X + Y
1	1	Y'

Q2) Design a 4-bit up-counter which counts beginning from a load input and signals 1 when a counting round finishes before starting a next round.

Q3) Use the RTL design process to create an alarm system that sets a single-bit output alarm to 1 when the average temperature of four consecutive samples meets or exceeds a user-defined threshold value. A 32-bit unsigned input CT indicates the current temperature, and a 32-bit unsigned input WT indicates the warning threshold. A single- bit input clr when 1 disables the alarm and the sampling process. Start by capturing the desired behavior as an HLSM, and then convert to a controller/datapath.

Q4) Implement a 4-bit register with the functionality specified in the following table. A is the current value of the register, and B is the loaded value

S1S0	Action	Output
00	Load	B
01	Keep current value	A
10	if (B>A) load B/2 else load B*2	if(B>A) B/2; else B*2
11	if (B<A/2) load B else keep current value	if (B<A/2)B; else A