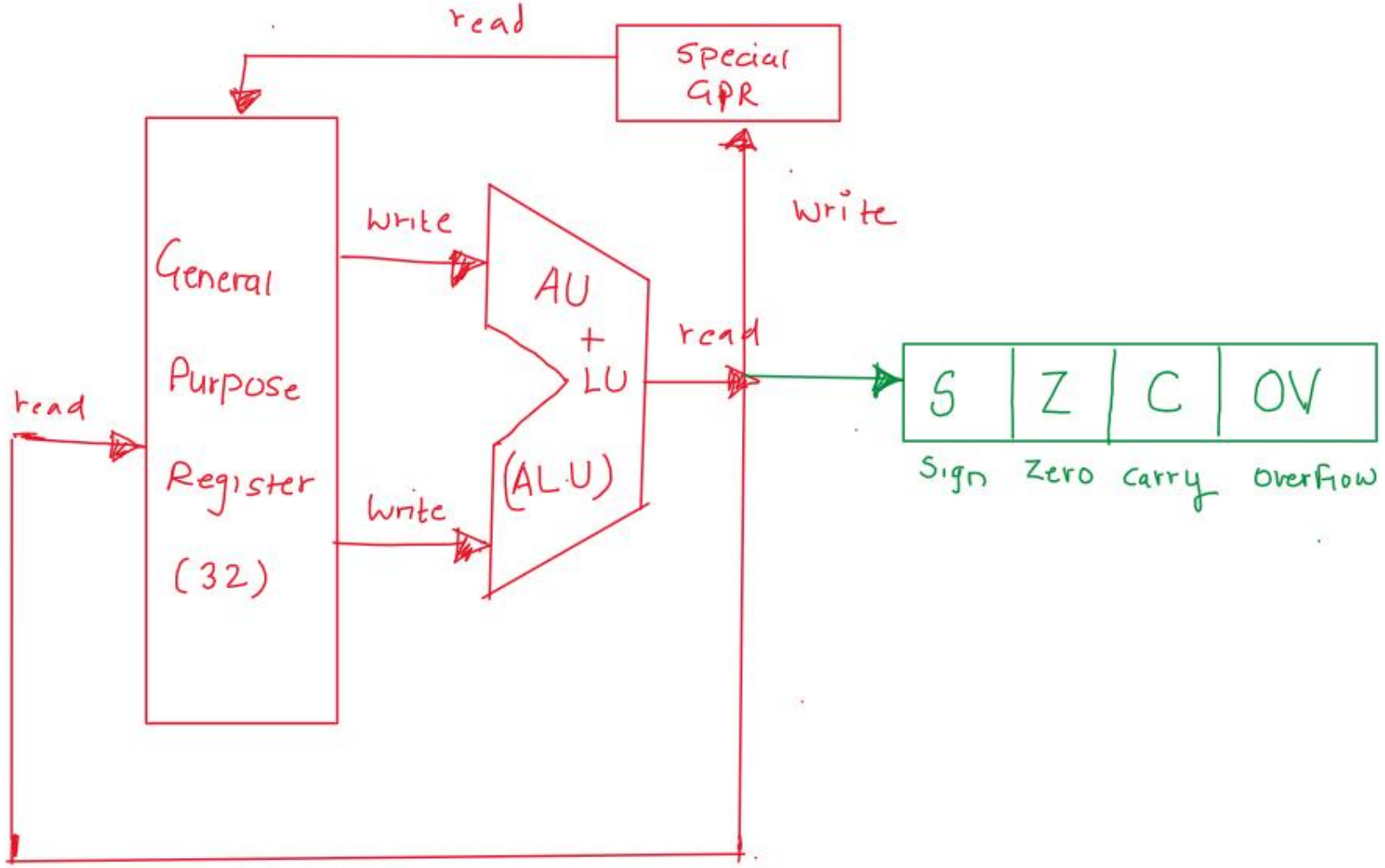
read
Special GPR
General Purpose Register (32)
write
AU + LU (ALU)
write
read
read
write
S
Z
C
OV
Sign
Zero
carry
overflow

Addition Operation

Carry Flag

reg [3:0] I/P 1 = 1011

reg [3:0] I/P 2 = 1000

1

Carry = IP1[3] & IP2[3];

Sign Flag

reg[3:0] result = 1000 → Negative no.

0111 → Positive no.

Sign = result[3];

Zero Flag

reg [3:0] result = 0 0 0 0 ⟶ Set

0 0 0 1 ⟶ reset

Zero = ~ (result[3] | result[2] | result[1] | result[0]) ;

= ~ (| result) ;

Overflow flag

Add

IP1	IP2	res		OV
>0	>0	>0	3+1 = 4	0
>0	>0	<0	1+2 = -1	1
>0	<0	>0	3-1 = 2	0
>0	<0	<0	3-5 = -2	0
<0	>0	>0	-1+3 = 2	0
<0	>0	<0	-5+1 = -4	0
<0	<0	>0	-1+(-4) = -5	1
<0	<0	<0	-1+(-4) = -5	0

(~IP1[M] & ~IP2[M] & res[M]) | (IP1[M] & IP2[M] & ~res[M])

Sub

IP1	IP2	res		OV
>0	>0	>0	3 - 2 = 1	0
>0	>0	<0	4 - 5 = -1	0
>0	<0	>0	3 - (-1) = 4	0
>0	<0	<0	1 - (-5) = 6	1
<0	>0	>0	-1 - 3 = -4	1
<0	>0	<0	-1 - 3 = -4	0
<0	<0	>0	-1 - (-2) = 1	0
<0	<0	<0	-3 - (-1) = -2	0

(~IP1[M] & IP2[M] & res[M]) |

(IP1[M] & ~IP2[M] & ~res[M])