Lecture 24
System Design Case Studies

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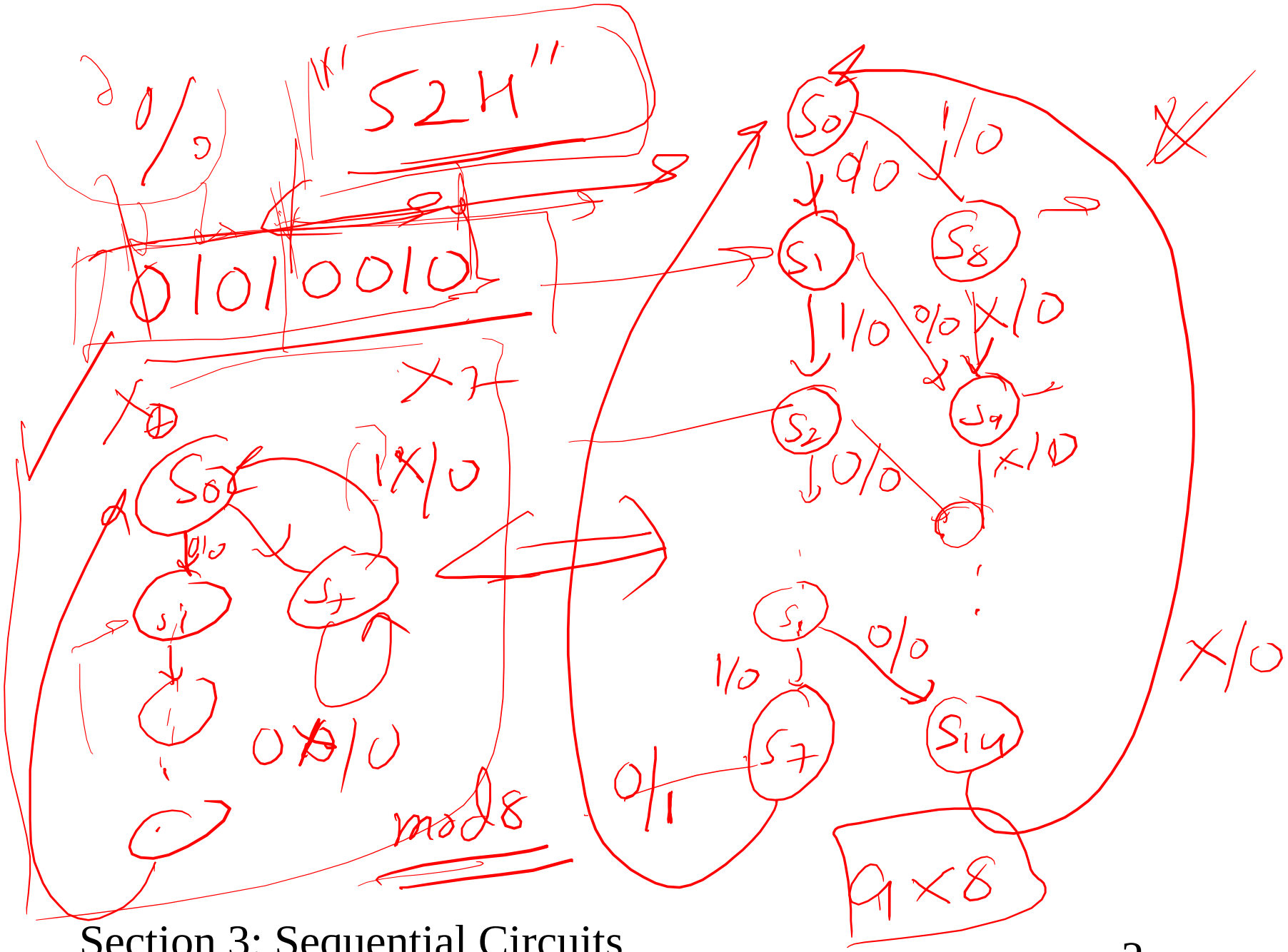
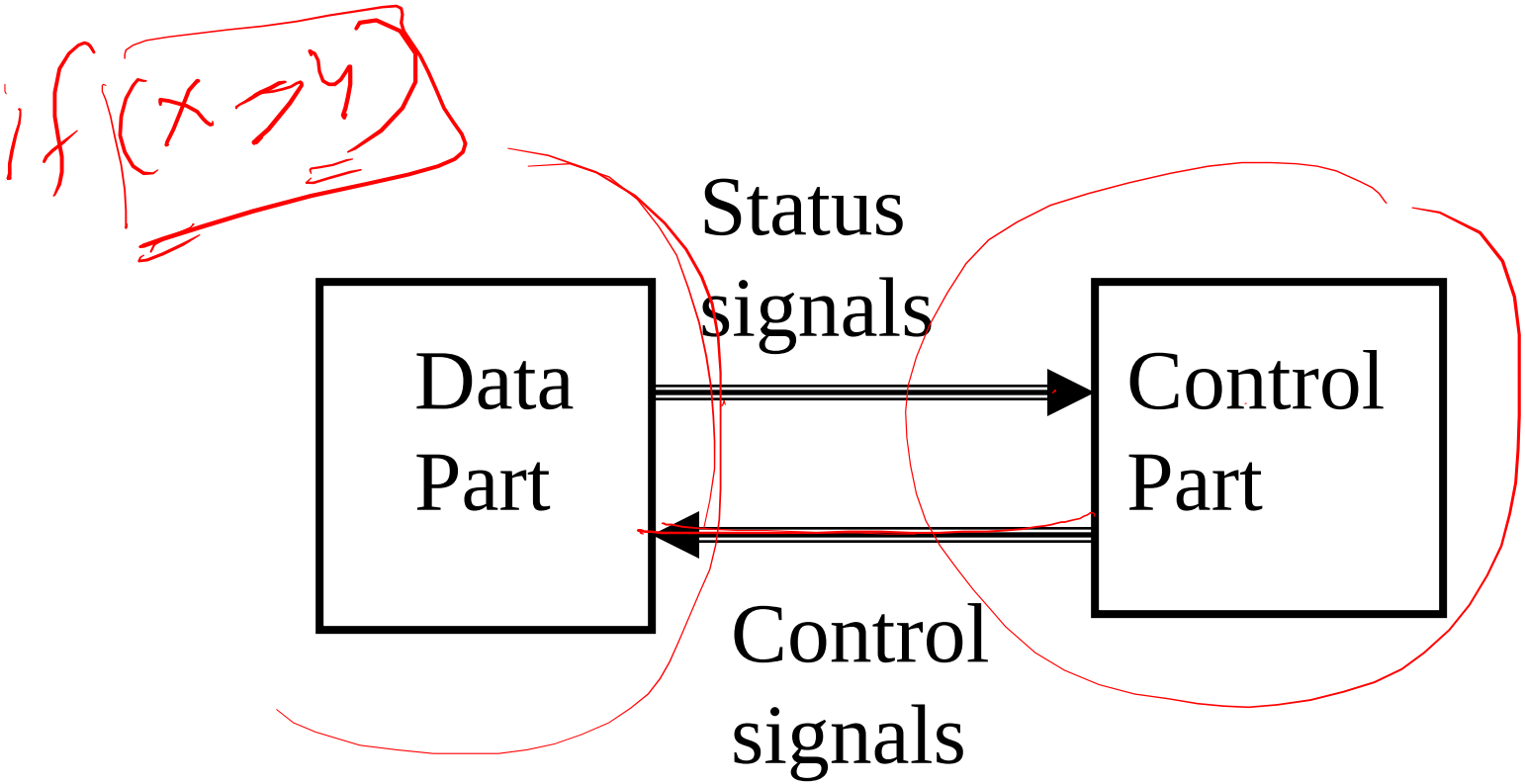
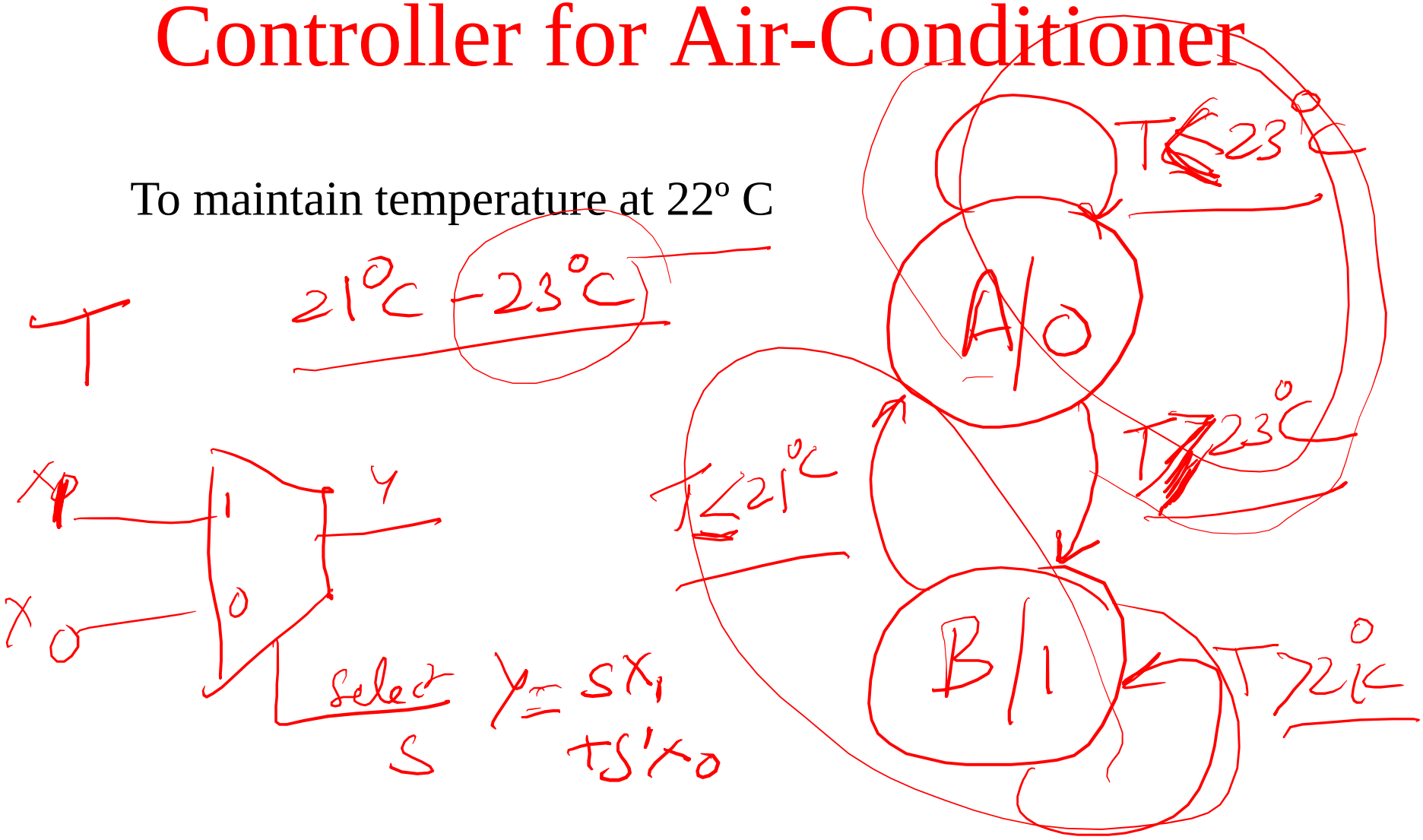

"S2H"
0/0
0101001010
X0
X7
S0
1/X/0
0/0
S1
S7
0/X/0
mod8
S0
1/0
S8
0/0
X/0
S2
S9
X/0
0/0
S1
1/0
0/0
S7
S14
0/1
X/0
9×8

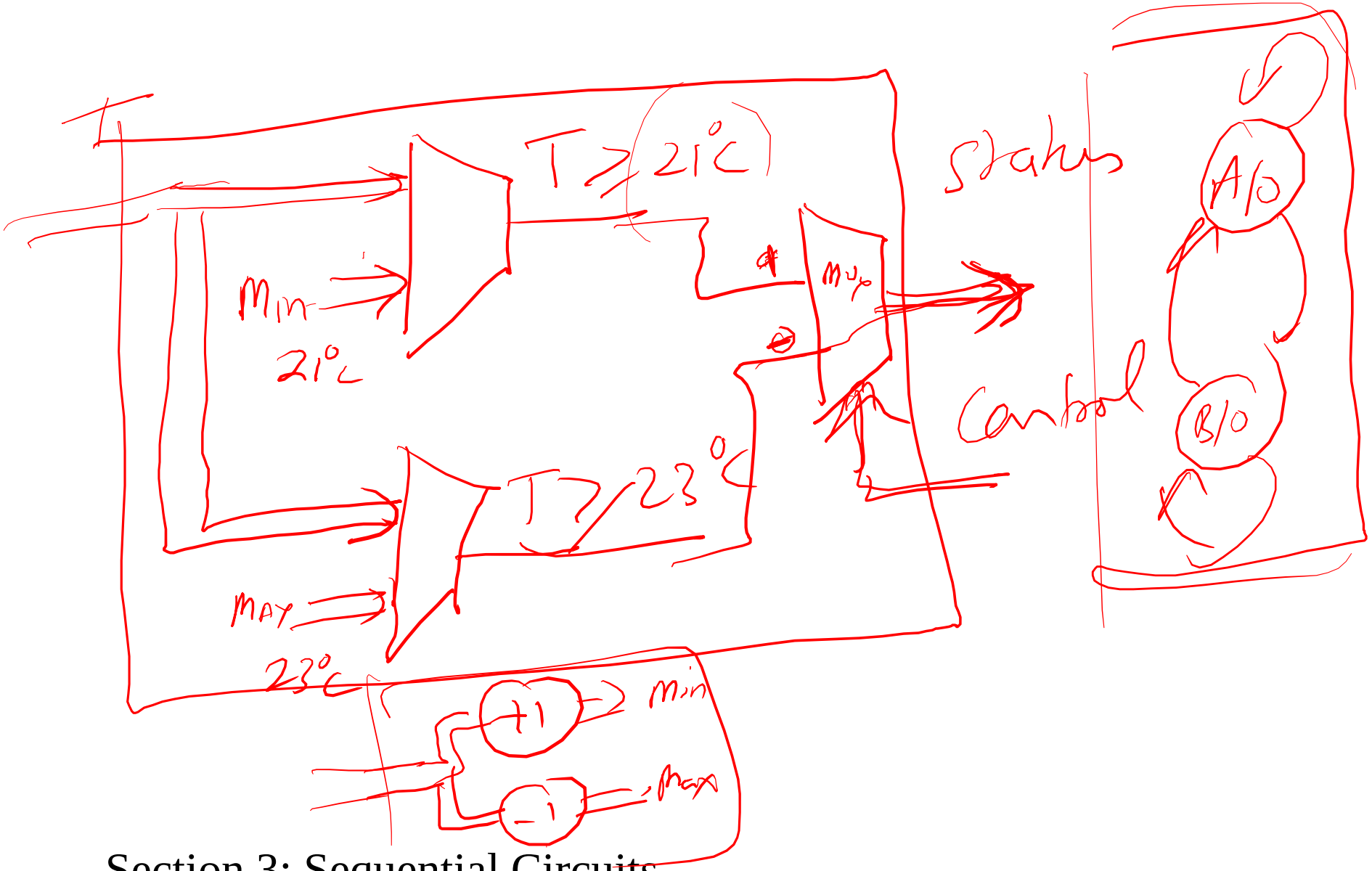
Data-Control Partition



Controller for Air-Conditioner

To maintain temperature at 22° C




T
T ≥ 21°C
Min
21°C
MUX
Status
A/D
Control
B/D
T ≥ 23°C
MAX
23°C
+1
Min
-1
Max

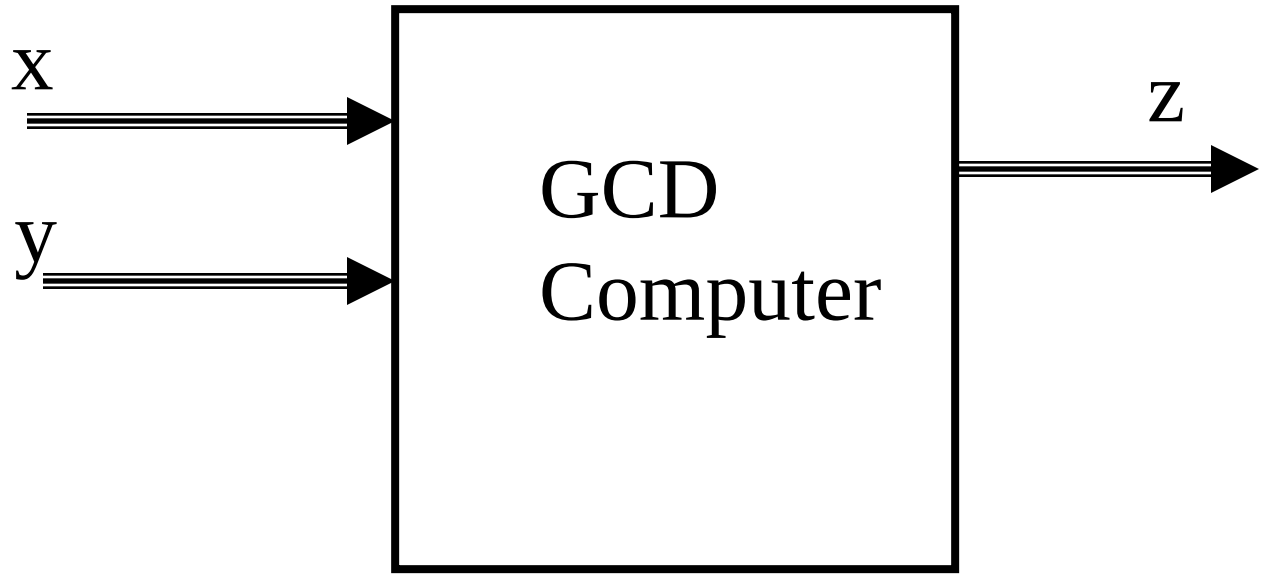

clk
E
Up/Dn
Clr
1
0
Dominates
Synchronous
level

Steps in System Design

- Choose an algorithm
- Identify the data modules (operators & storage)
- Identify the control signals
- Extract the state machine for control
- Implement the state machine to complete the design

Case Study1: GCD Computer

$z = gcd(x, y)$



GCD Algorithm

```
Input x, y;
while ( x ≠ y ) do
    if ( x > y )     then  x := x - y
                     else  y := y - x
    endif;
endwhile;
z := x;
end.
```

Modified GCD Algorithm (RTL)

S0:R1:= x, R2:= y;

S1:while (R1 ≠ R2) do

S2: if (R1 > R2)

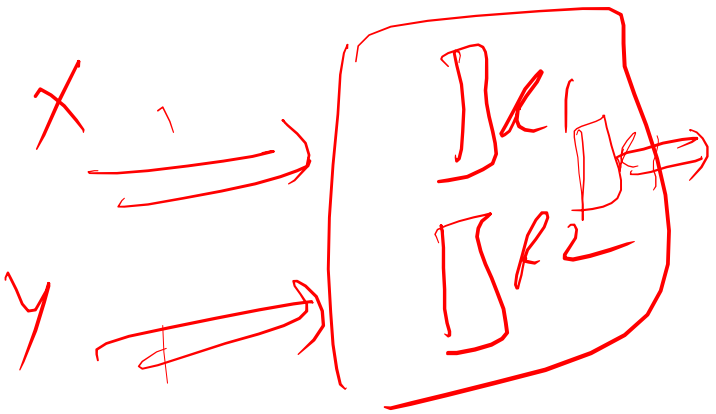
S3: then R1:= R1 - R2

S4: else R2:= R2 - R1

endif;

endwhile;

S5: R3:= R1;



GCD Computer: Data Part