Task 1: Data Rep. and Boolean logic

Save this document in your repository for Unit 2 with name:
data_rep_boolean_log.md

🤔 Resources (Learning Log):

4	Notes Topic 2:	Computer Architecture
5	Boolean Algebra	Video about boolean algebra
6	Examples Base Conversion	Whiteboard notes on conversion of numbers with different bases

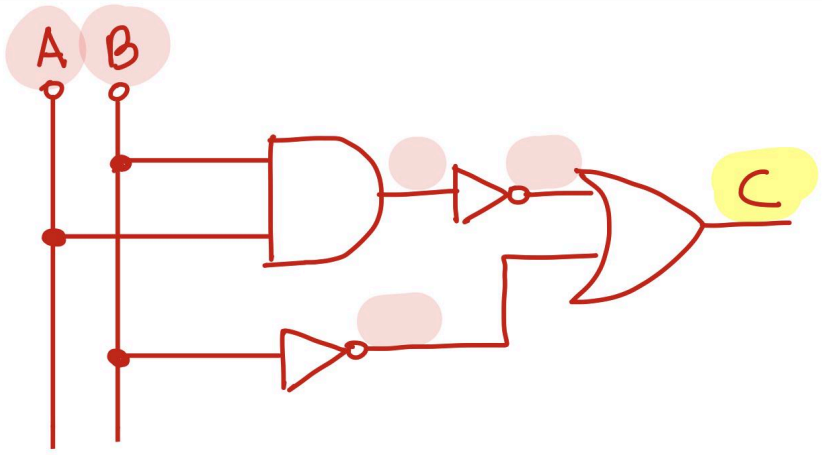
Boolean Logic

Draw the circuit for the boolean equations provided

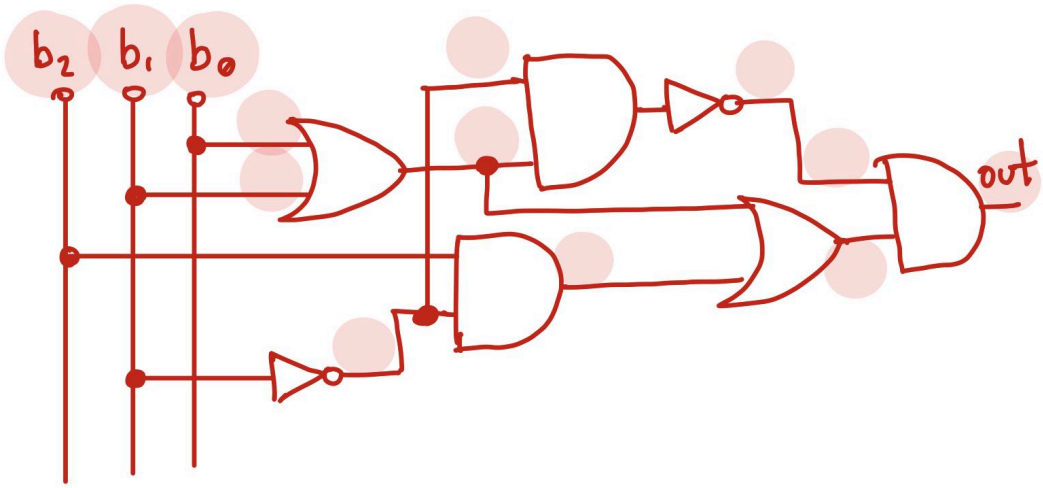
Boolean Equation	Circuit
$AB+\overline{(A + B)}$	
$\overline{A(A + B)} + B$	
`((not A) and B) or (A and B)`	
$\overline{ACB} + \overline{(A + C)B}$	
[HL] $\overline{b1b2b3} + \overline{(b1 + b3)}(b1 + b2)$	

Get the Equation

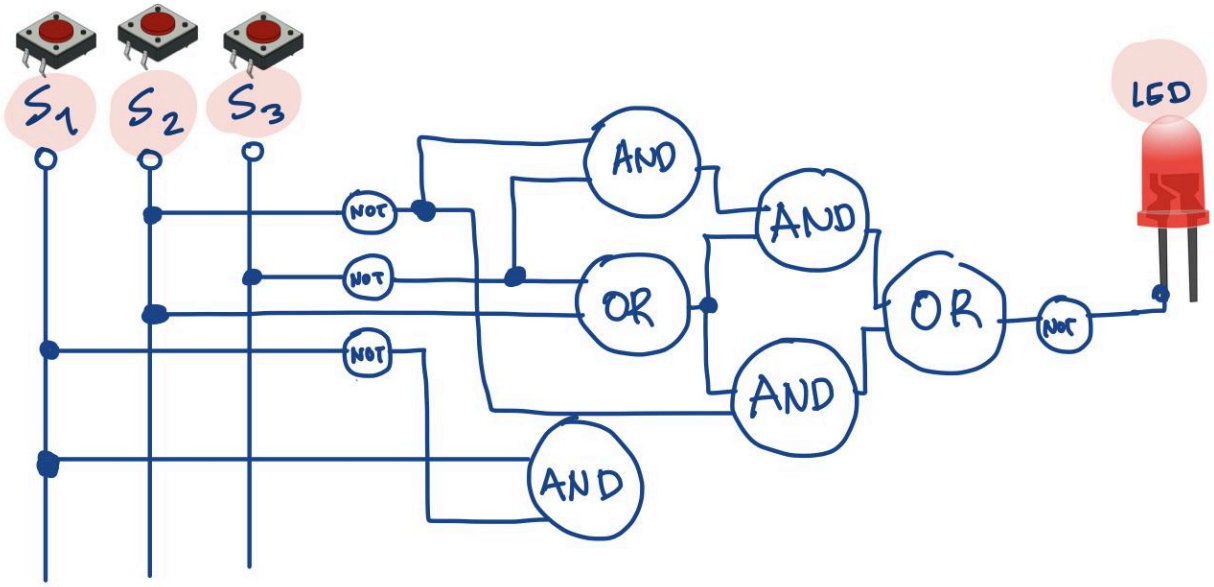
Write the boolean equation for the circuit shown



C = $\overline{AB} + \overline{B}$



out = $((b_0 + b_1) + \overline{b_1}\ b_2)\ \overline{(\overline{b_1}((b_0 + b_1))}$



$$\text{LED} = \overline{(S_3(\overline{S_2}\,\overline{S_3}))(S_2 + \overline{S_3}) + (\overline{S_2}(S_2 + \overline{S_3}))}$$

Truth table

Write the truth table for the equations below

Boolean Equation	Truth Table
`X = A and B`	

A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

`Out = input1 or input2`

input1	input2	Out
0	0	0
0	1	1
1	0	1
1	1	1

Light = $\overline{S_1} + \overline{(S_2 + S_3)} + S_1 S_2 \overline{S_3}$

S1	S2	S3	$\overline{(S_2 + S_3)}$	$S_1 S_2 \overline{S_3}$	$\overline{S_1}$	L.
0	0	0	1	0	1	1
0	0	1	0	0	1	1
0	1	0	0	0	1	1
0	1	1	0	0	1	1
1	0	0	1	0	0	1
1	0	1	0	0	0	0
1	1	0	0	1	0	1
1	1	1	0	0	0	0

PARITY = A⊕B⊕C

#Parity checker

A	B	C	$A\overline{B} + \overline{A}B$: Z	$C\overline{Z} + \overline{C}Z$: PARITY
0	0	0	0	0
0	0	1	0	1
0	1	0	1	1
0	1	1	1	0
1	0	0	1	1
1	0	1	1	0
1	1	0	0	0
1	1	1	0	1

[HL]

Login = $\overline{P_1 P_2 P_3} + \overline{(P_3 \overline{P_2 P_1})} + \overline{P_1 + P_3}$

P1	P2	P3	$\overline{P_1 P_2 P_3}$	$\overline{(P_3 \overline{P_2 P_1})}$	$\overline{P_1 + P_3}$	L
0	0	0	1	1	1	1
0	0	1	1	0	0	1
0	1	0	1	1	1	1
0	1	1	1	0	0	1
1	0	0	1	1	0	1
1	0	1	1	0	0	1
1	1	0	1	1	0	1
1	1	1	0	1	0	1

Data Conversion

Information can be represented in different systems, for example the number `10` in decimal (system base 10) can be represented in binary (system base 2) as `1010` or `12` in base 8.

It is critical for you to understand how to represent information in different ways, this will help you visualize how the computer processes data.

Original Number	Convert to

`256 (Decimal)`	`Base 2 (Binary)`
	
	`Base 4`
	
	`Base 6`

433 (Base 5)	Base 10 (Decimal) Base 8 (Octal) Base 16 (Hexadecimal)
FA32 (Base 16)	Base 10 Base 2 Base 8