

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

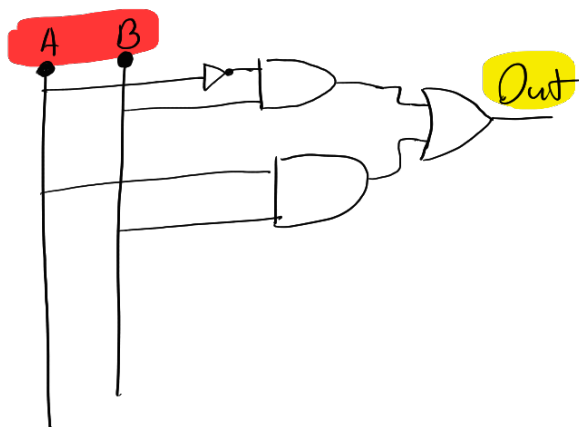
Boolean Logic

Draw the circuit for the boolean equations provided

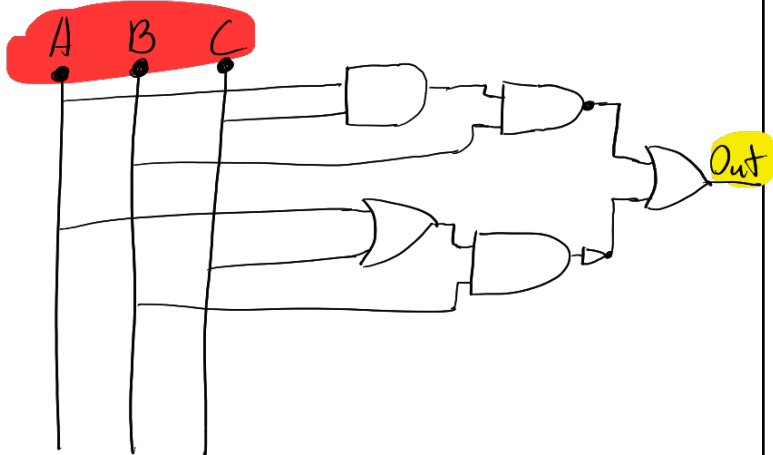
Boolean Equation	Circuit
$AB + \overline{(A + B)}$	
$\overline{A(A + B)} + B$	

((not A) and B) or (A and B)

$$(\overline{A}) \cdot B + (A \cdot B)$$

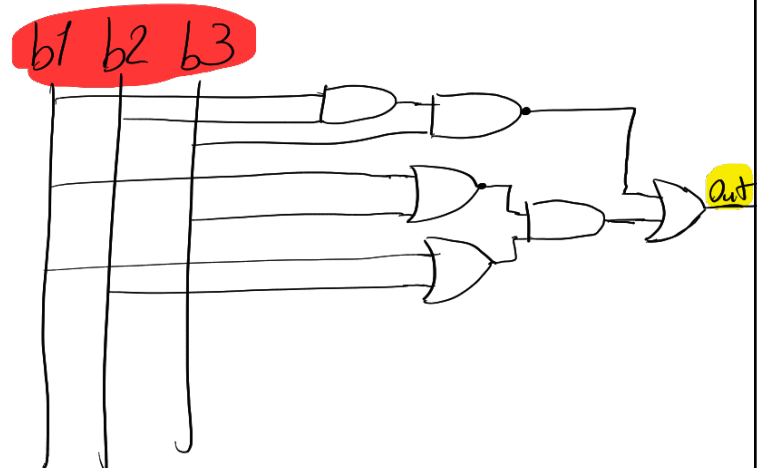


$$\overline{ACB} + \overline{(A + C)B}$$



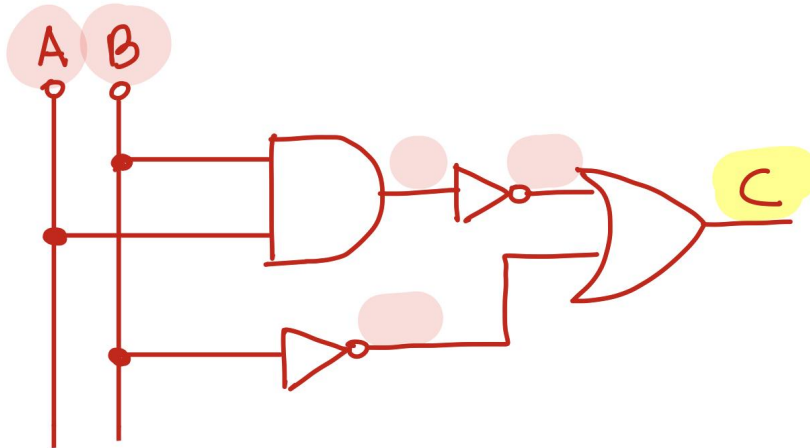
[HL]

$$\overline{b1b2b3} + \overline{(b1 + b3)(b1 + b2)}$$

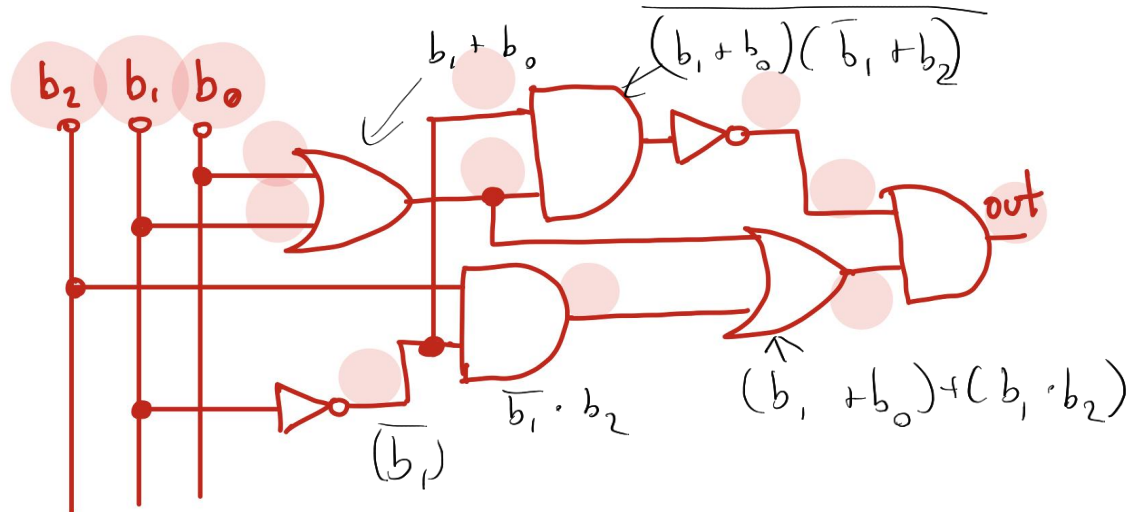


Get the Equation

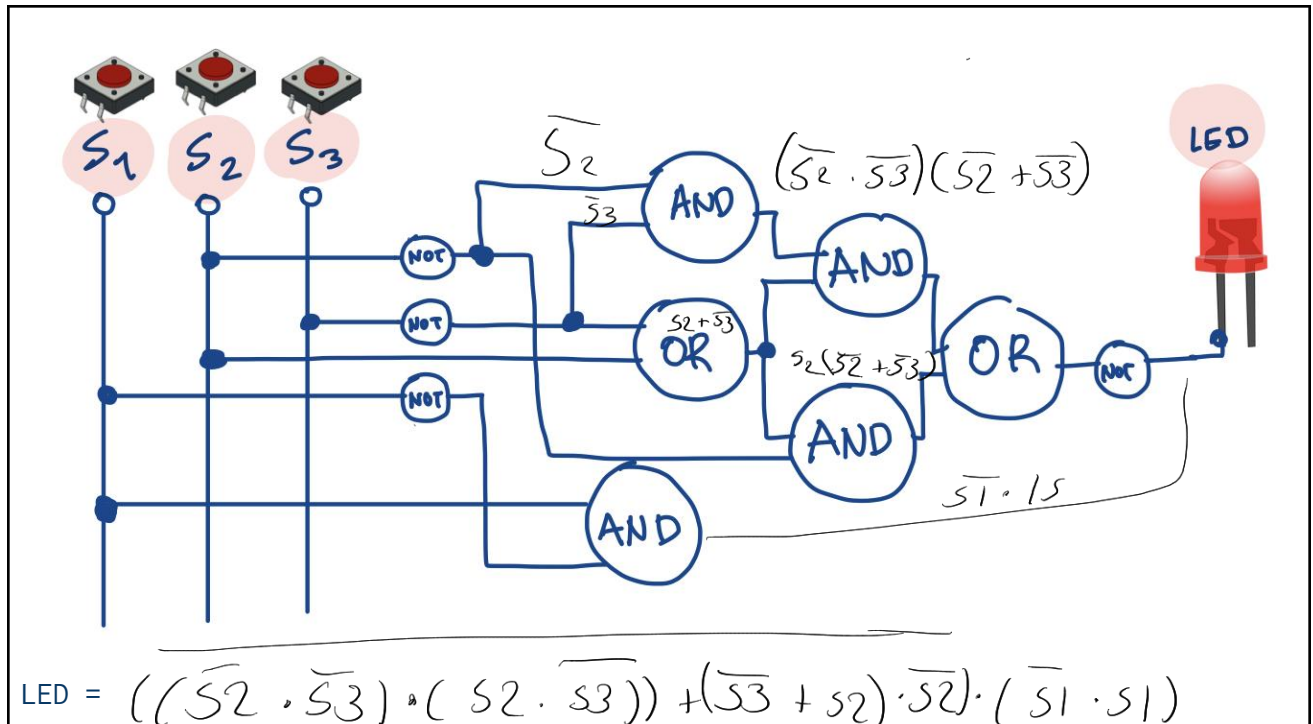
Write the boolean equation for the circuit shown



$$C = \text{not}(A \cdot B) + \text{not}(B)$$



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



Truth table

Write the truth table for the equations below

Boolean Equation	Truth Table																																																															
$X = A \text{ and } B$	<table><tr><th>A</th><th>B</th><th>X (Output)</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	X (Output)	0	0	0	0	1	0	1	0	0	1	1	1																																																
A	B	X (Output)																																																														
0	0	0																																																														
0	1	0																																																														
1	0	0																																																														
1	1	1																																																														
$\text{Out} = \text{input1 or input2}$	<table><tr><th>Input1</th><th>input2</th><th>Out</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	Input1	input2	Out	0	0	0	0	1	1	1	0	1	1	1	1																																																
Input1	input2	Out																																																														
0	0	0																																																														
0	1	1																																																														
1	0	1																																																														
1	1	1																																																														
$\text{Light} = \overline{S_1} + (\overline{S_2} + S_3) + S_1 S_2 \overline{S_3}$	<table><tr><th>S_1</th><th>S_2</th><th>S_3</th><th>$\overline{S_1}$</th><th>$\overline{S_2} + S_3$</th><th>$S_1 S_2 \overline{S_3}$</th><th>Light</th></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	S_1	S_2	S_3	$\overline{S_1}$	$\overline{S_2} + S_3$	$S_1 S_2 \overline{S_3}$	Light	0	0	0	1	1	0	1	0	0	1	1	0	0	1	0	1	0	1	0	0	1	0	1	1	1	0	0	1	1	0	0	0	1	0	1	1	0	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1	0	0	0	0
S_1	S_2	S_3	$\overline{S_1}$	$\overline{S_2} + S_3$	$S_1 S_2 \overline{S_3}$	Light																																																										
0	0	0	1	1	0	1																																																										
0	0	1	1	0	0	1																																																										
0	1	0	1	0	0	1																																																										
0	1	1	1	0	0	1																																																										
1	0	0	0	1	0	1																																																										
1	0	1	0	0	0	0																																																										
1	1	0	0	0	1	1																																																										
1	1	1	0	0	0	0																																																										

[HL] $\text{Login} = \overline{P_1 P_2 P_3} + \overline{(P_3 P_2 P_1)} + \overline{P_1 + P_3}$	P_1	P_2	P_3	$\overline{P_2 P_1}$	$\overline{P_1 P_2 P_3}$	$\overline{P_3 P_2 P_1}$	$\overline{P_1 + P_3}$	Login
	0	0	0	1	1	1	1	1
	0	0	1	1	1	0	0	1
	0	1	0	1	1	1	0	1
	0	1	1	0	1	0	0	1
	1	0	0	1	1	1	1	1
	1	0	1	1	1	0	0	1
	1	1	0	1	1	1	0	1
	1	1	1	0	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) 100 000000
	Base 4 10000

	<p>Base 6</p> <p>1104</p>
433 (Base 5)	<p>Base 10 (Decimal)</p> <p>118</p> <p>Base 8 (Octal)</p> <p>166</p> <p>Base 16 (Hexadecimal) 76</p>
FA32 (Base 16)	<p>Base 10</p> <p>64050</p> <p>Base 2</p> <p>1111101000110010</p> <p>Base 8</p> <p>175062</p>

