Noțiuni despre circuite logice integrate

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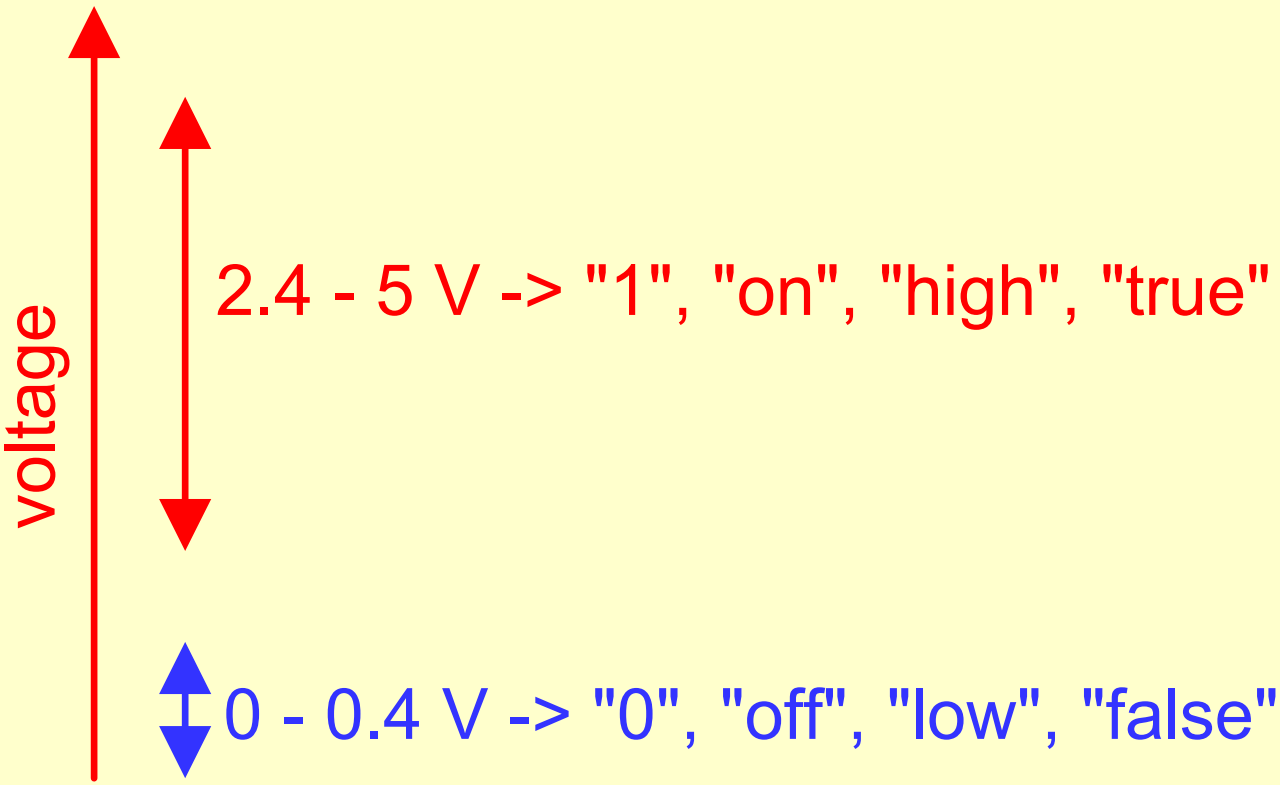
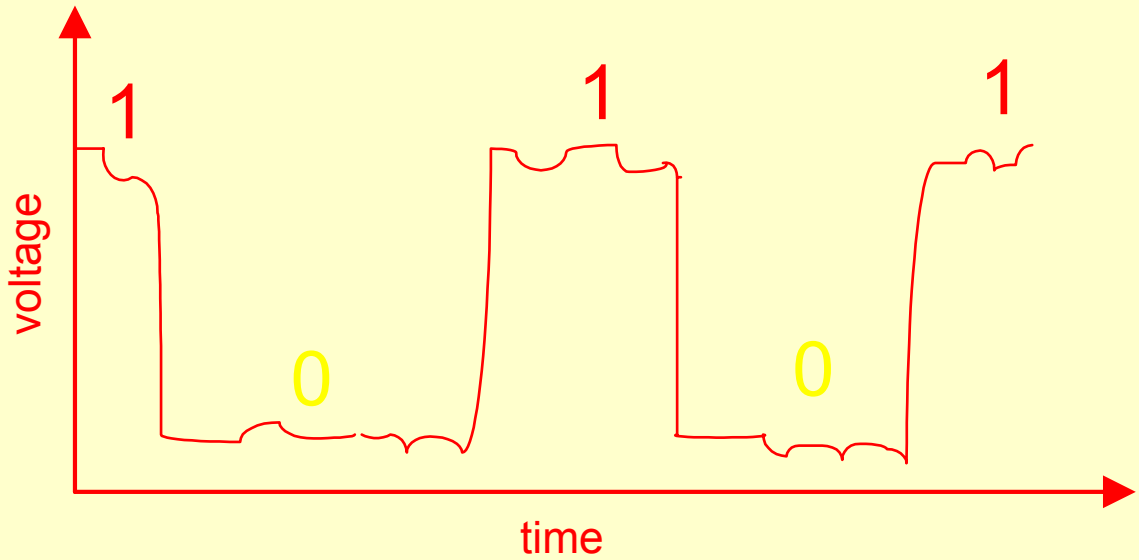
Semnale logice

- Exemple: semnale pentru circuite logice TTL (Transistor-Transistor-Logic):



Filtrarea zgomotelor

- Datorită domeniilor de definiție a volorilor 0 logic şi 1 logic zgomotele sunt înlăturate

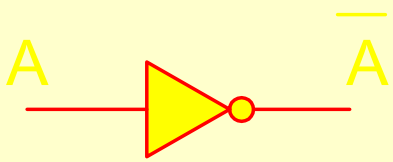


Circuitele logice integrate

- Circuitele logice de bază sunt:
  - *NOT sau NU*
  - *AND sau ŞI*
  - *OR sau SAU*
  - *NOR sau SAU-NU*
  - *NAND sau ŞI-NU*
  - *XOR sau SAU-EXCLUSIV*
  - *BUFFER sau REPETOR*
  - *EQUIVALENCE sau COMPARATOR*

NOT (NU)

- Simbol:



- Tabel de adevăr:

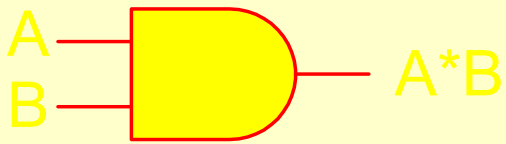
A	$\overline{A}$=not(A)
0	1
1	0

- Relații folositoare:

  not(0) = 1, not(1) = 0, not(not(A)) = A

AND (ŞI)

- Simbol:



- Tabel de adevăr:

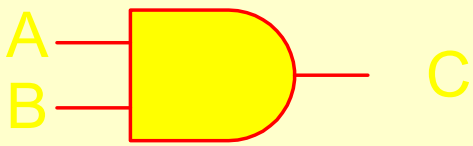
A	B	A*B
0	0	0
0	1	0
1	0	0
1	1	1

- Relaţii folositoare:

A*A=A, A*1=A, A*0=0, A*B = B*A,
A*(B*C) = (A*B)*C = A*B*C, A*not(A)=0

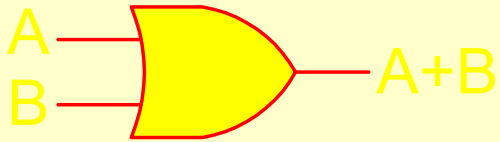
AND Exemplu

- C = porneşte motorul pentru urcare ascensor
- A = uşa închisă
- B = buton urcare ascensor acționat



OR (SAU)

- Simbol:



- Tabel de adevăr:

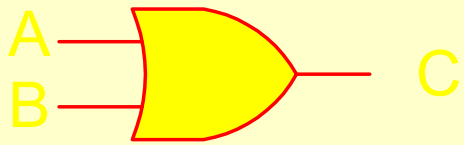
A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

- Relații folositoare:

A+A=A, A+1=1, A+0=A, A+B = B+A,
A+(B+C) = (A+B)+C = A+B+C, A+not(A)=1

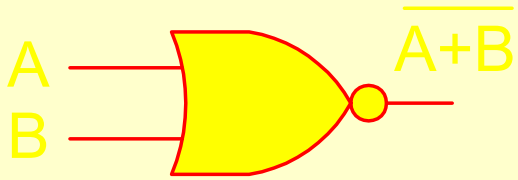
OR Exemplu

- C = porneşte motorul pentru urcare ascensor
- A = butonul urcare de pe palier este acționat
- B = butonul urcare din cabină este acționat



NOR (NOT-OR) (SAU-NU)

- Simbol:



- Tabel de adevăr:

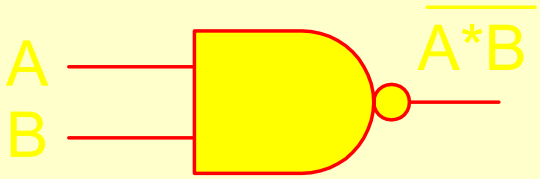
A	B	$\overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

- Relații folositoare:

$\overline{A+A}=\overline{A}$, $\overline{A+1}=0$, $\overline{A+0}=\overline{A}$, $\overline{A+B} = \overline{B+A}$,
$\overline{A+(B+C)} = \overline{(A+B)+C} = \overline{A+B+C}$, $\overline{A+\text{not}(A)}=0$

NAND (NOT-AND) (ŞI-NU)

- Simbol:



- Tabel de adevăr:

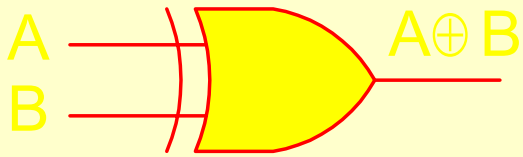
A	B	$\overline{A*B}$
0	0	1
0	1	1
1	0	1
1	1	0

- Relații folositoare:

$\overline{A*A}=\overline{A}$, $\overline{A*1}=\overline{A}$, $\overline{A*0}=1$, $\overline{A*B} = \overline{B*A}$,
$\overline{A*(B*C)} = \overline{(A*B)*C} = \overline{A*B*C}$, $\overline{A*\text{not}(A)}=1$

XOR (Exclusive-OR) (SAU-EXCLUSIV)

- Simbol:



- Tabel de adevăr:

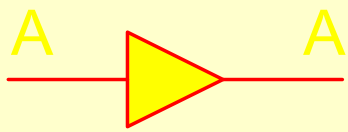
A	B	A ⊕ B
0	0	0
0	1	1
1	0	1
1	1	0

- Relații folositoare:

$A \oplus \overline{A}=0$, $A \oplus 1=\overline{A}$, $A \oplus 0=A$, $A \oplus B = B \oplus A$, $A \oplus \overline{A}=1$

BUFFER (REPETOR)

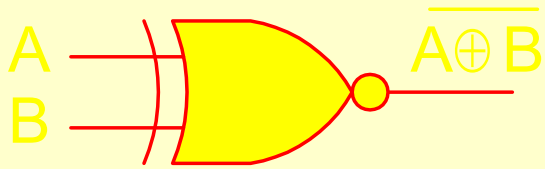
- Simbol:



- Aplicații:
  - *amplificarea semnalului (sarcină de impedanță mică sau un număr mare de circuite logice conectate la acelaşi semnal logic)*

Equivalence (NOT-XOR) (COMPARATOR)

- Simbol:



- Tabelul de adevăr:

A	B	$\overline{A \oplus B}$
0	0	1
0	1	0
1	0	0
1	1	1