



Structure machine

Chapitre VII

(Normalisation d'un circuit)

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Normalisation d'un circuit combinatoire

Un ensemble d'opérateurs forme un système logique s'il peut réaliser les trois opérations de bases :

Non (NOT), Et (AND) et Ou (OR).

Exemples

- {Not, AND} forme un système logique complet:

$$A + B = \overline{\overline{A} + \overline{B}} = \overline{\overline{A} \cdot \overline{B}}$$

- {Not, OR} forme un système logique complet:

$$A \cdot B = \overline{\overline{A} \cdot \overline{B}} = \overline{\overline{A} + \overline{B}}$$

- {NAND} forme un système logique complet.
- {NOR} forme un système logique complet.

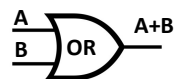
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Porte universelle (NAND)

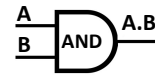
Porte universelle (NAND)



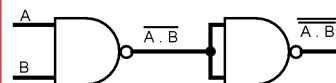
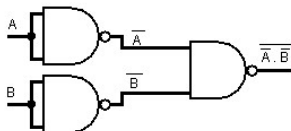
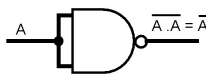
A	\bar{A}
0	1
1	0



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



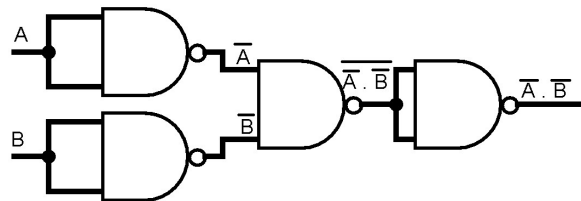
A	B	A.B
0	0	0
0	1	0
1	0	0
1	1	1



Porte universelle (NAND)

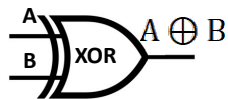


A	B	$\overline{A + B}$
0	0	1
0	1	0
1	0	0
1	1	0

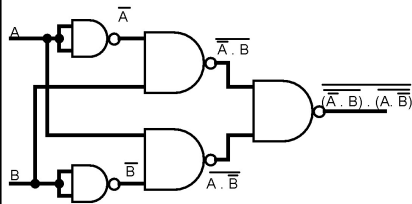


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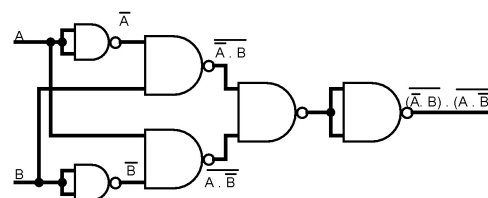
Porte universelle (NAND)



A	B	$A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0




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



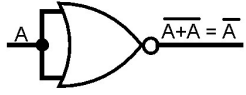
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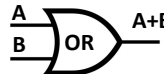
Porte universelle (NOR)

Porte universelle (NOR)

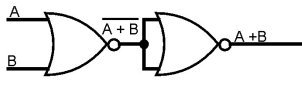


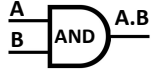
A	\bar{A}
0	1
1	0



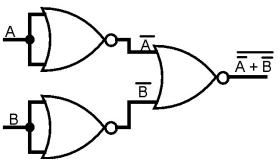


A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1





A	B	A.B
0	0	0
0	1	0
1	0	0
1	1	1



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Exemple

Exercice

Soit la fonction suivante:

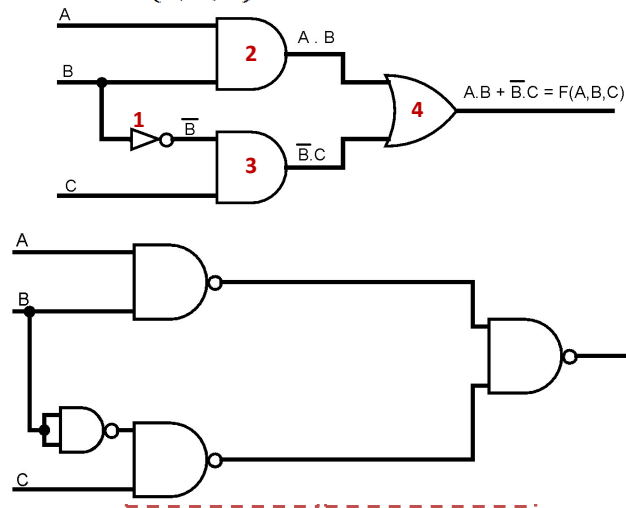
$$F(A, B, C) = A \cdot B + \overline{B} \cdot C$$

Normaliser cette fonction en utilisant des portes :

1. NAND seulement;
2. NOR seulement;

Utilisation de la porte NAND (Méthode schématique)

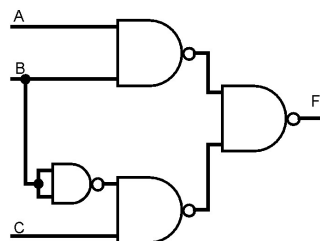
$$F(A, B, C) = A \cdot B + \bar{B} \cdot C$$



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Utilisation de la porte NAND (Méthode algébrique)

$$\begin{aligned} F(A, B, C) &= A \cdot B + \bar{B} \cdot C \\ &= \overline{\overline{A \cdot B + \bar{B} \cdot C}} \\ &= \overline{\overline{A \cdot B} \cdot \overline{\bar{B} \cdot C}} \end{aligned}$$



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Conclusion

- Système complet d'opérateur.
- Normalisation: Utilisation des portes NAND, et NOR.
- Exercices
<https://elearning.univ-boumerdes.dz/enrol/index.php?id=411>