



Departamento de
Engenharia Elétrica e
de Computação

SEL 414 - Sistemas Digitais

SISTEMAS LÓGICOS SOMADORES

Prof. Homero Schiabel



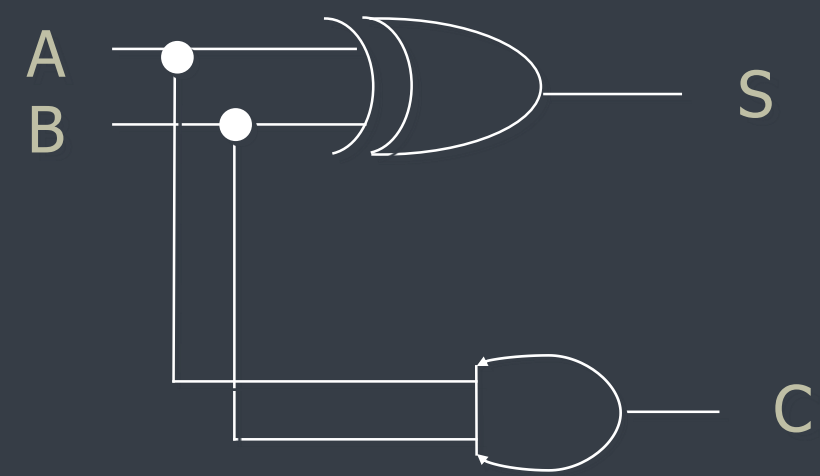
Dois nros A e B de 1 bit cada:

A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

$$S = \bar{A}B + A\bar{B} = A \oplus B$$

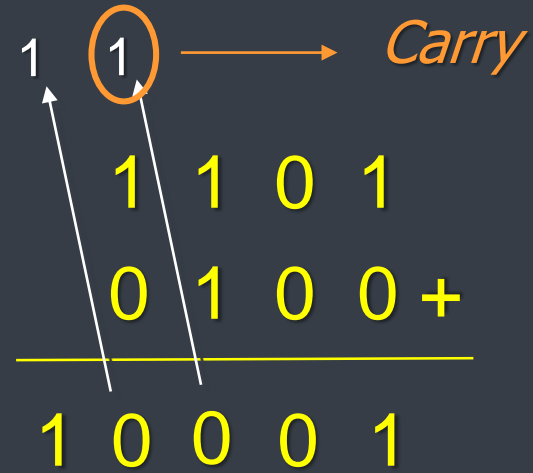
$$C = AB$$

SOMADOR

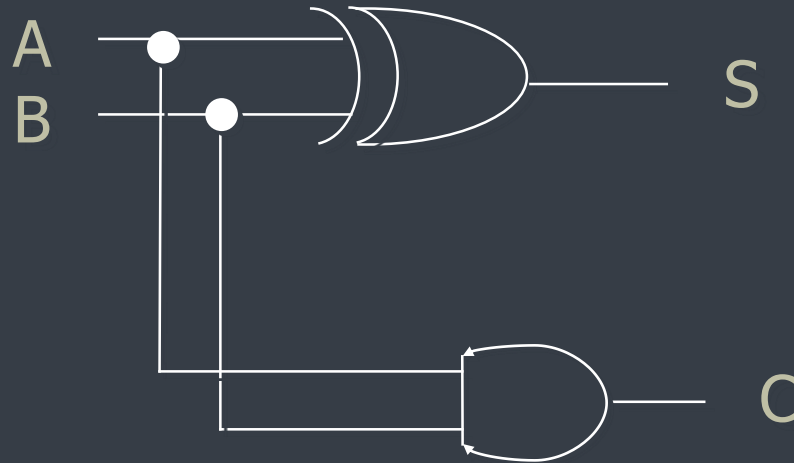


Dois nros A e B de mais de 1 bit:

A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

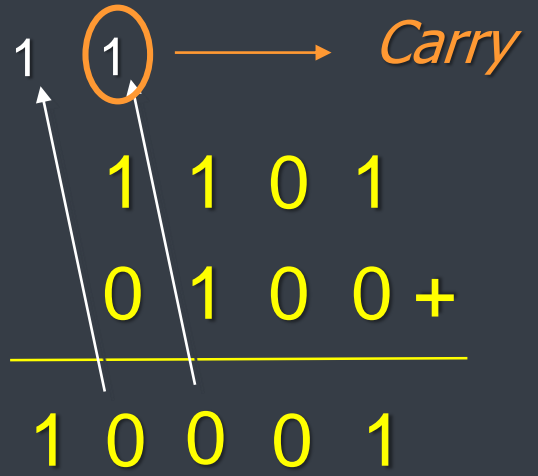


MEIO SOMADOR



SOMADOR COMPLETO

Ca	A	B	S	Cf
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1



Ca \ AB	00	01	11	10
0	0	1	0	1
1	1	0	1	0

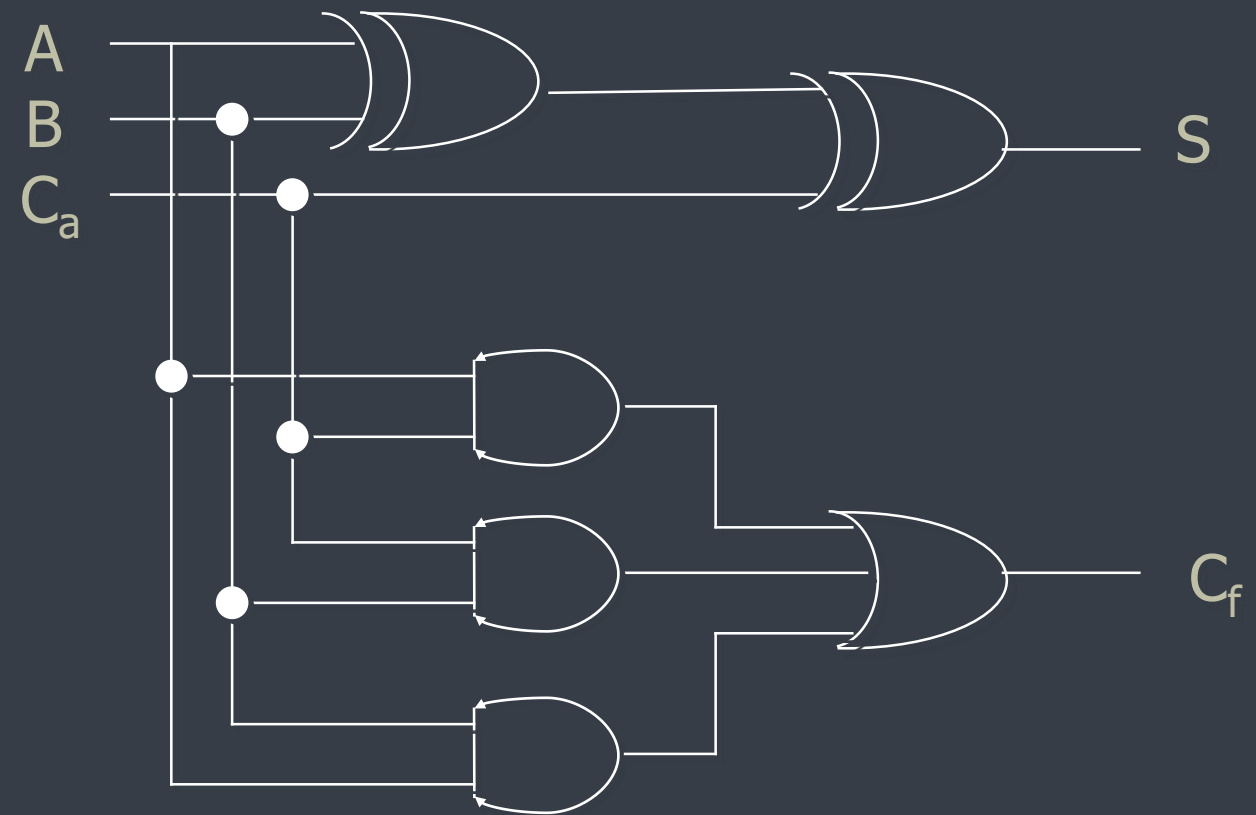
$$S = A \oplus B \oplus Ca$$

0	0	0	1	0
1	0	1	1	1

The bottom row and the last two columns of this table are circled with a red dashed line.

$$C_f = AB + ACa + BCa$$

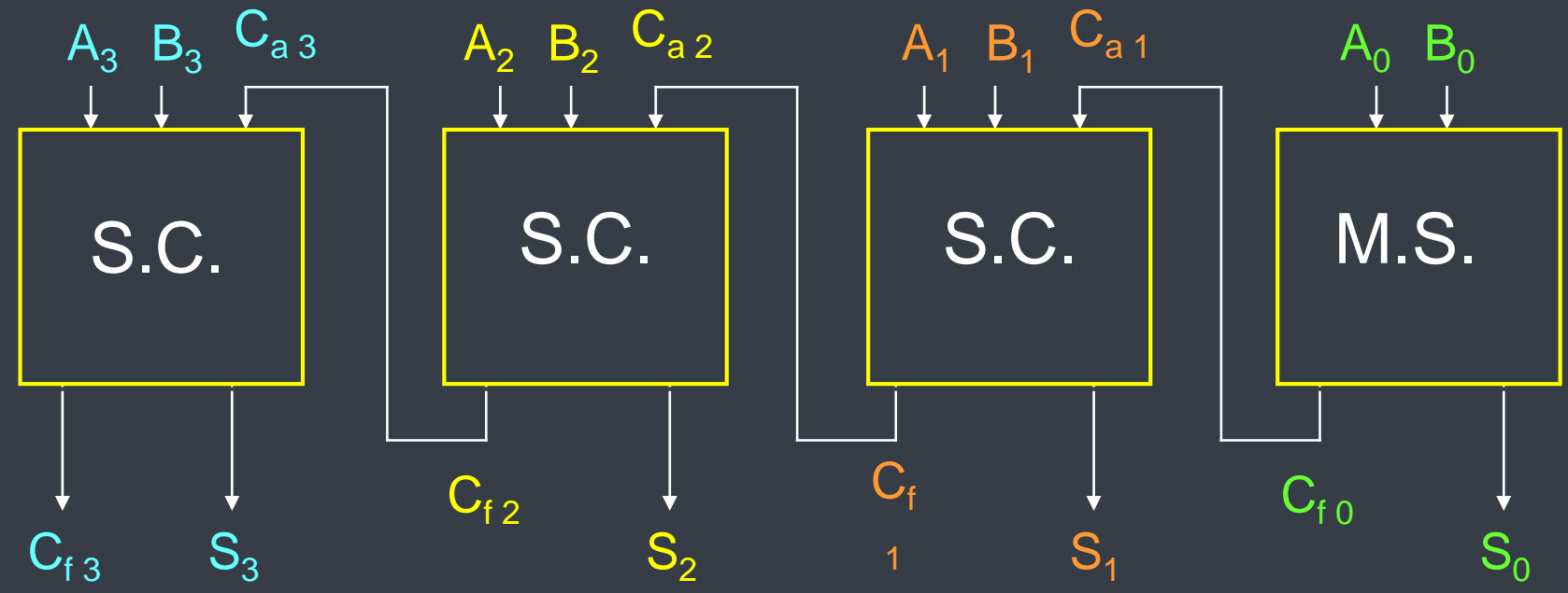
SOMADOR COMPLETO



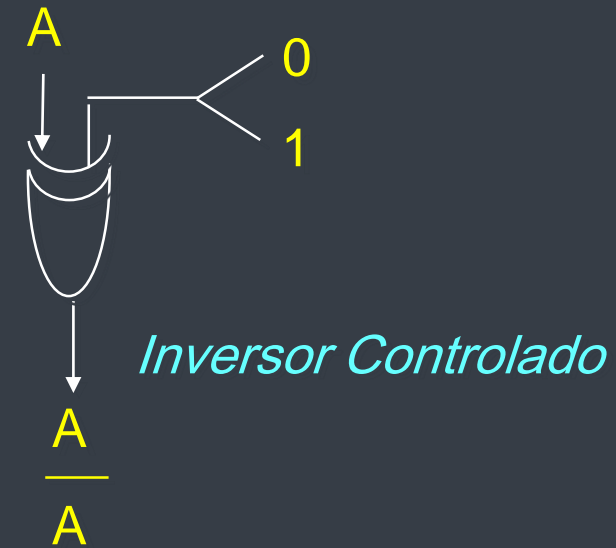
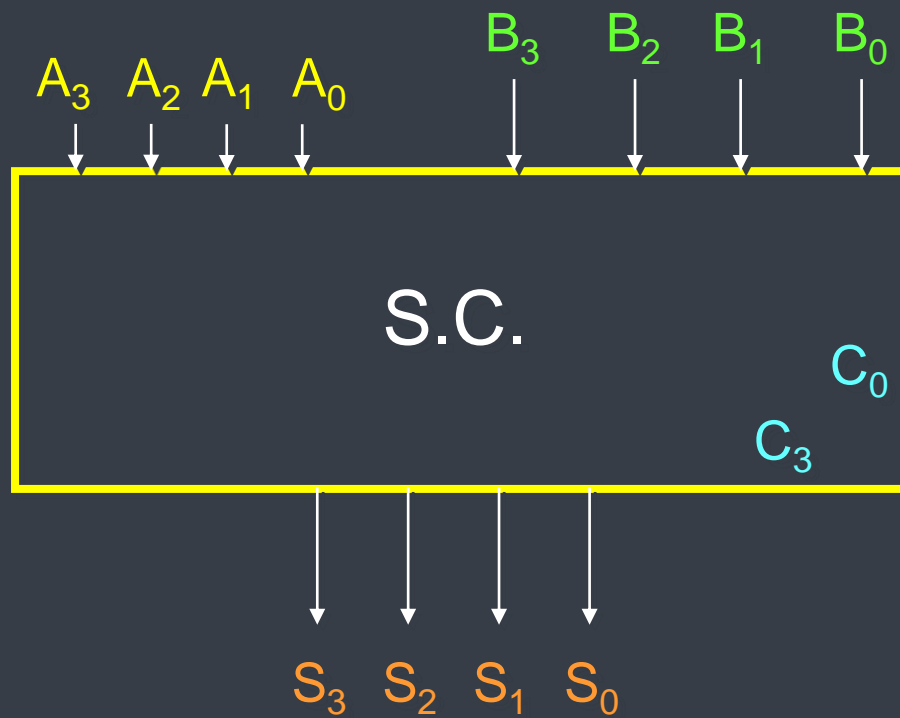
$$S = A \oplus B \oplus C_a$$

$$C_f = AB + AC_a + BC_a$$

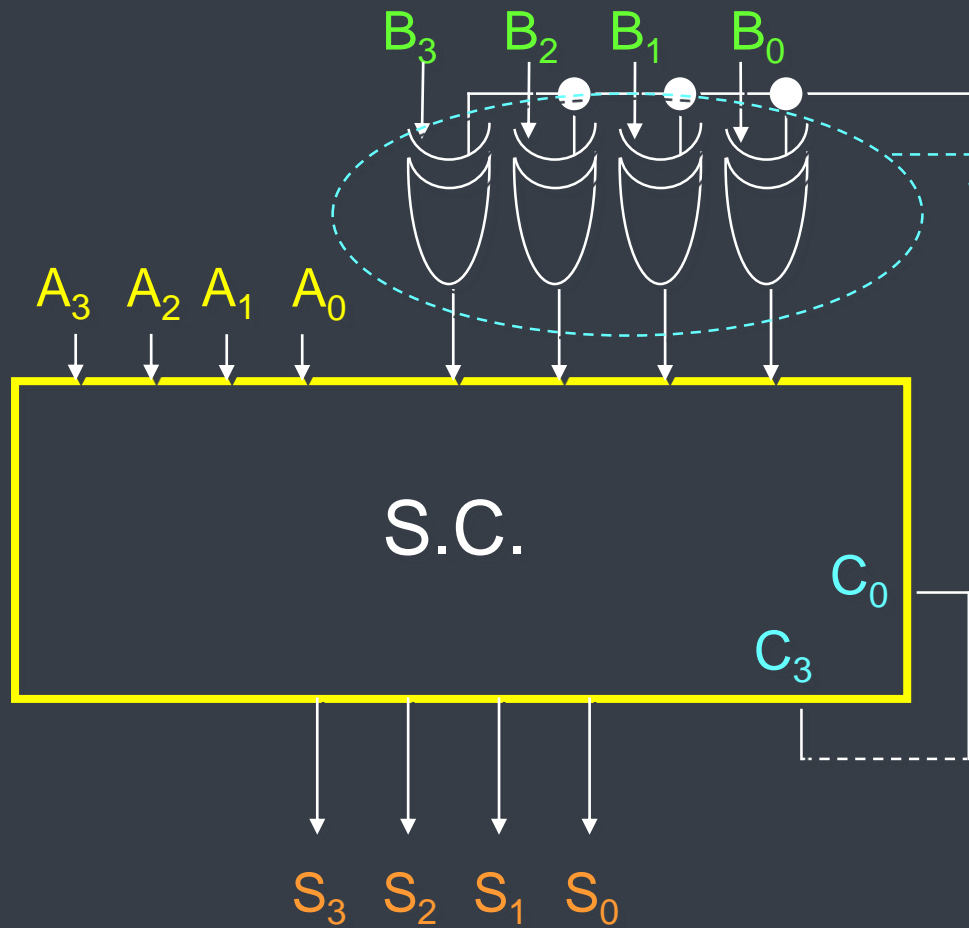
SOMADOR PARALELO (4 BITS)



SOMADOR PARALELO INTEGRADO (4 BITS)



SOMADOR PARALELO INTEGRADO (4 BITS)



	Soma	Subtração
$A_0 \dots A_3 \Rightarrow$ parcela		minuendo
$B_0 \dots B_3 \Rightarrow$ parcela		subtraendo

$M = 0 \Rightarrow$ soma
 $M = 1 \Rightarrow$ subtração

UNIDADE LÓGICA ARITMÉTICA



John Von
Neumann
(1903-1957)
Un. Princeton

- 1945: descreveu o que acreditava necessário na sua máquina, incluindo uma ULA → uma necessidade porque garantiria que o computador calcularia operações matemáticas básicas (adição, subtração, multiplicação, divisão)
- Achava razoável que um computador tivesse um órgão especializado para essas operações

ENIAC (1946)

*Electronic Numerical Integrator
and Computer*



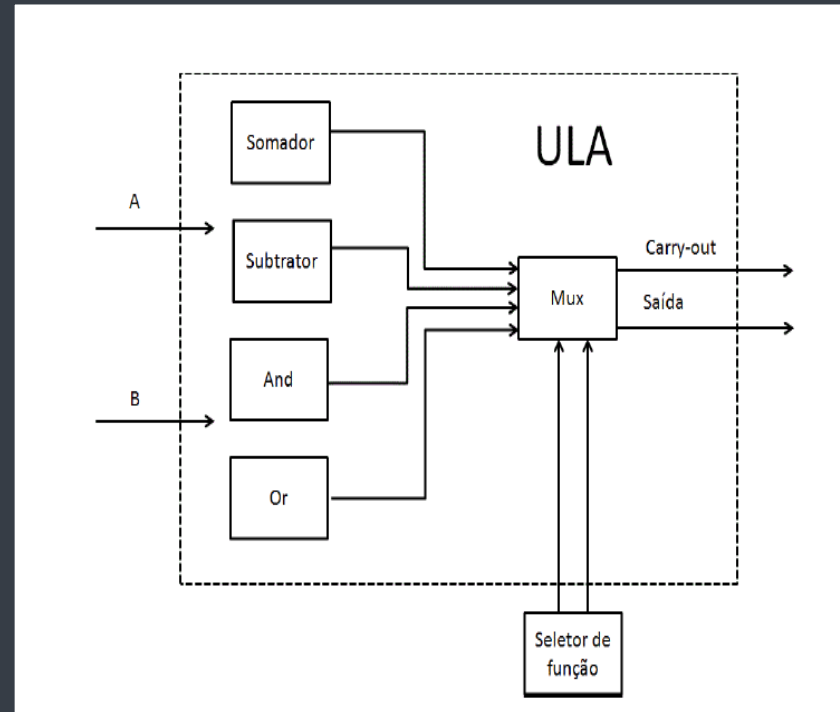
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John Von Neumann
(1903-1957)
Un. Princeton



EDVAC (1949)
*Electronic Discrete Variable
Automatic Computer*



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