Programación I

2021-2

Clase 8

Operaciones a nivel de bits

Universidad de Concepción

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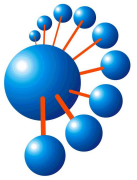
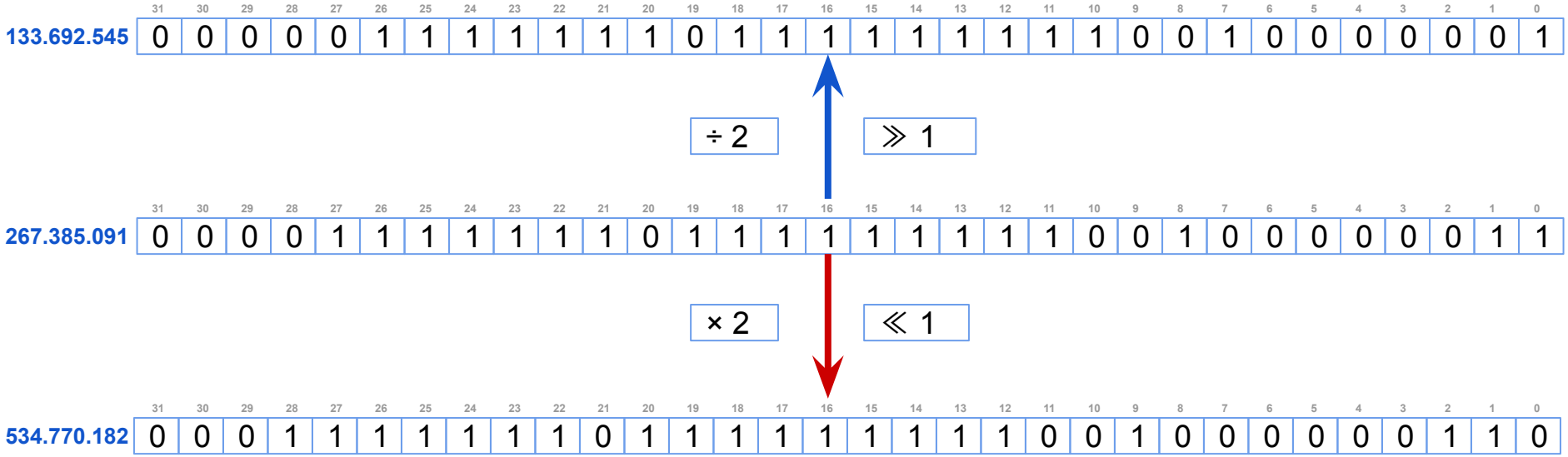


Bit shifting

$n \times 2^k \Leftrightarrow n \ll k$

$n \div 2^k \Leftrightarrow n \gg k$

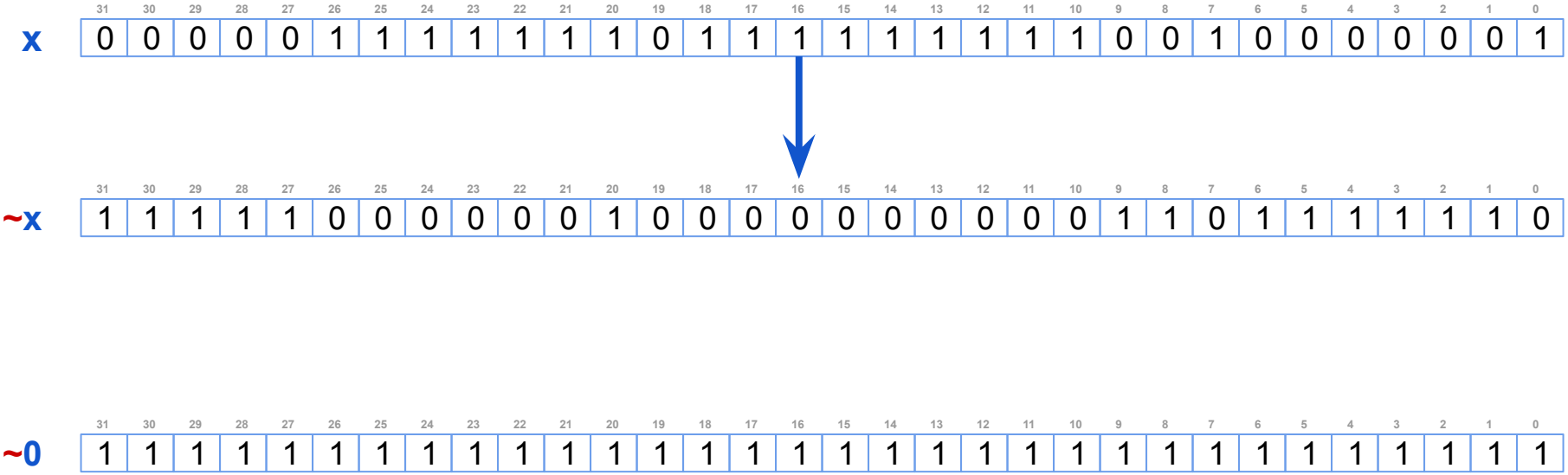


Complemento

Operador ~

0 → 1

1 → 0



Operador AND (&)

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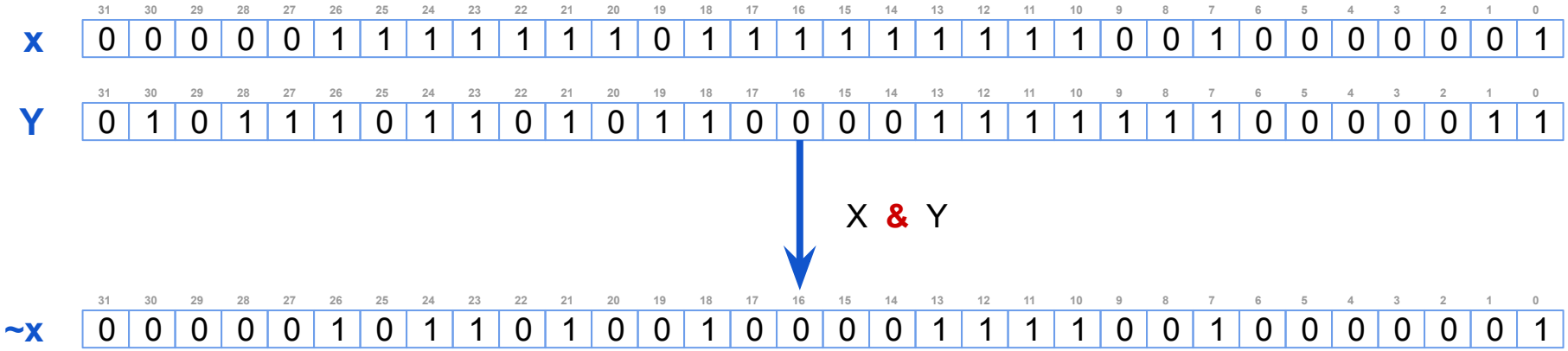
Operador &
0 **AND** 0 → 0
0 **AND** 1 → 0
1 **AND** 0 → 0
1 **AND** 1 → 1

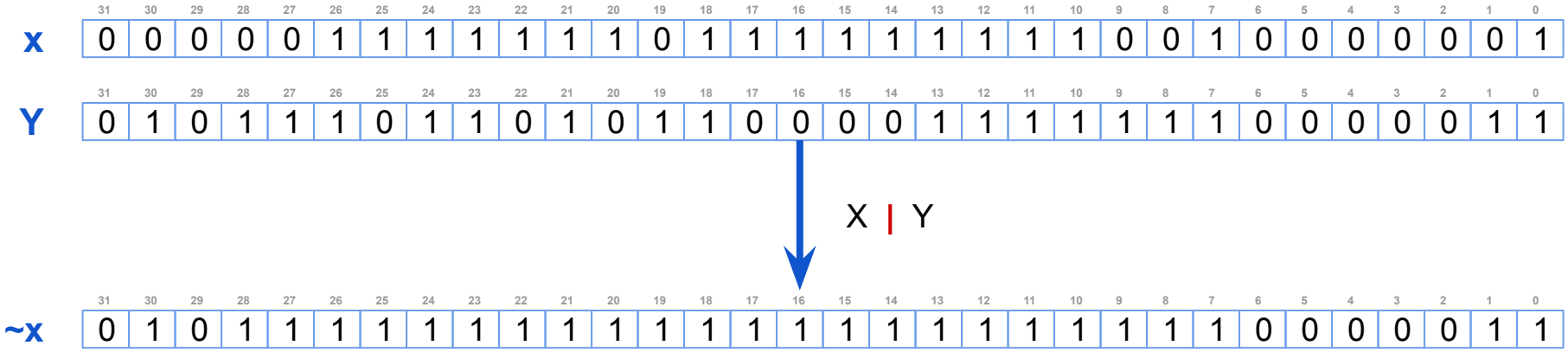


Operador OR (|)

– – –

Operador |

0 **OR** 0 → 0
0 **OR** 1 → 1
1 **OR** 0 → 0
1 **OR** 1 → 1



Operador XOR (^)

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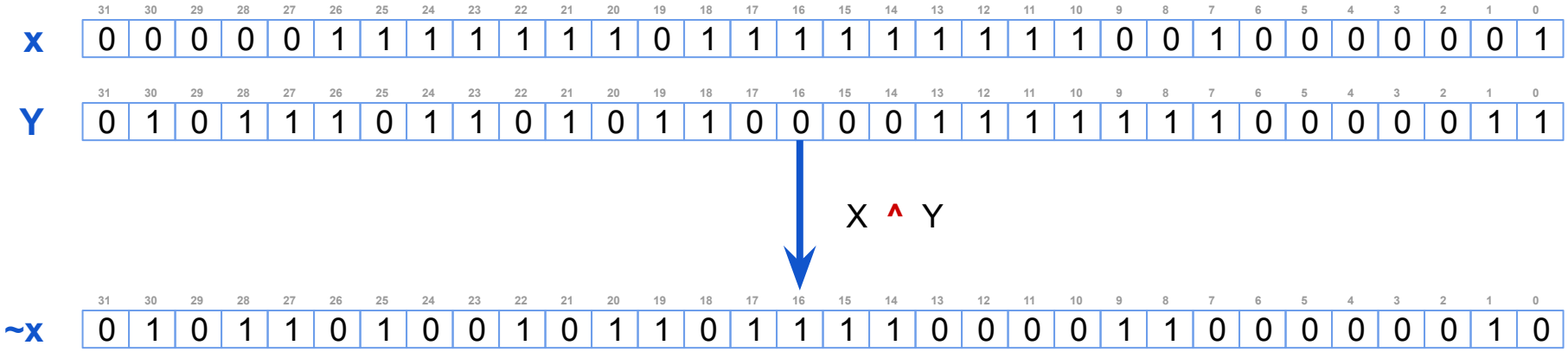
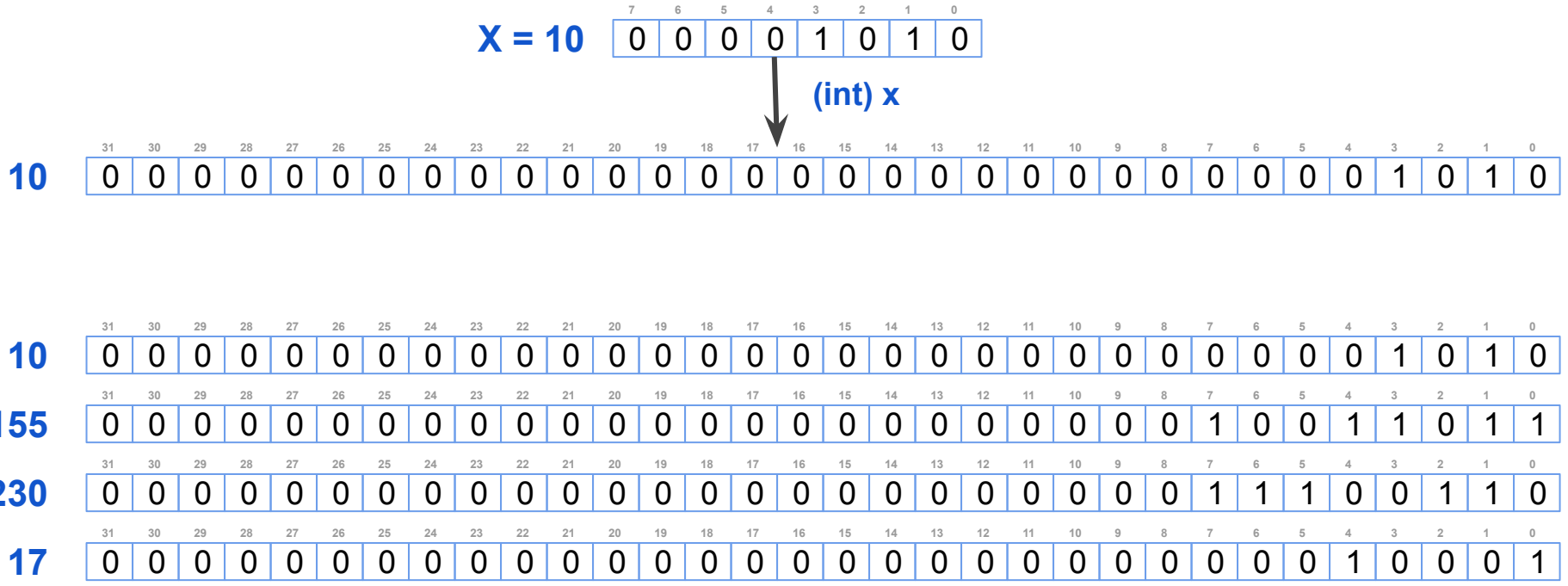
Operador ^

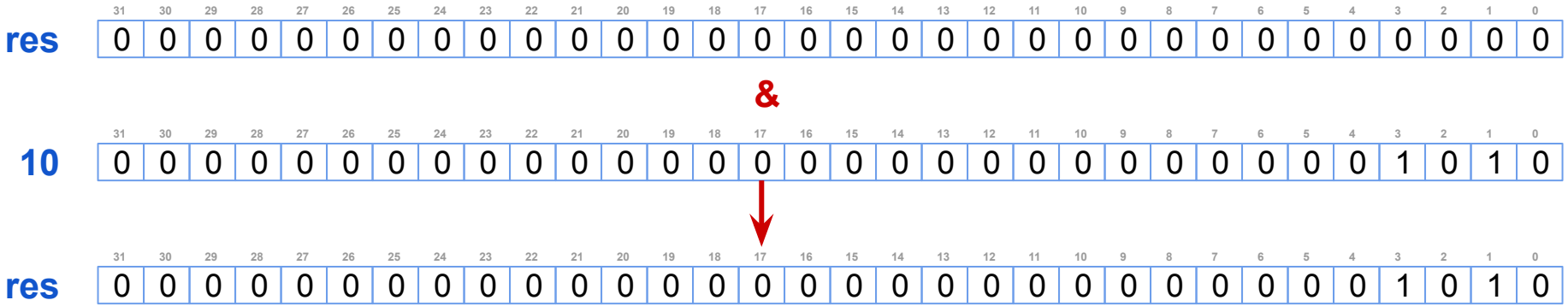
0 **XOR** 0 → 0
0 **XOR** 1 → 1
1 **XOR** 0 → 1
1 **XOR** 1 → 0



Ejercicio: Empaquetar 4 variables char en un entero



Ejercicio: Empaquetar 4 variables char en un entero (cont.)



Ejercicio: Empaquetar 4 variables char en un entero (cont.)

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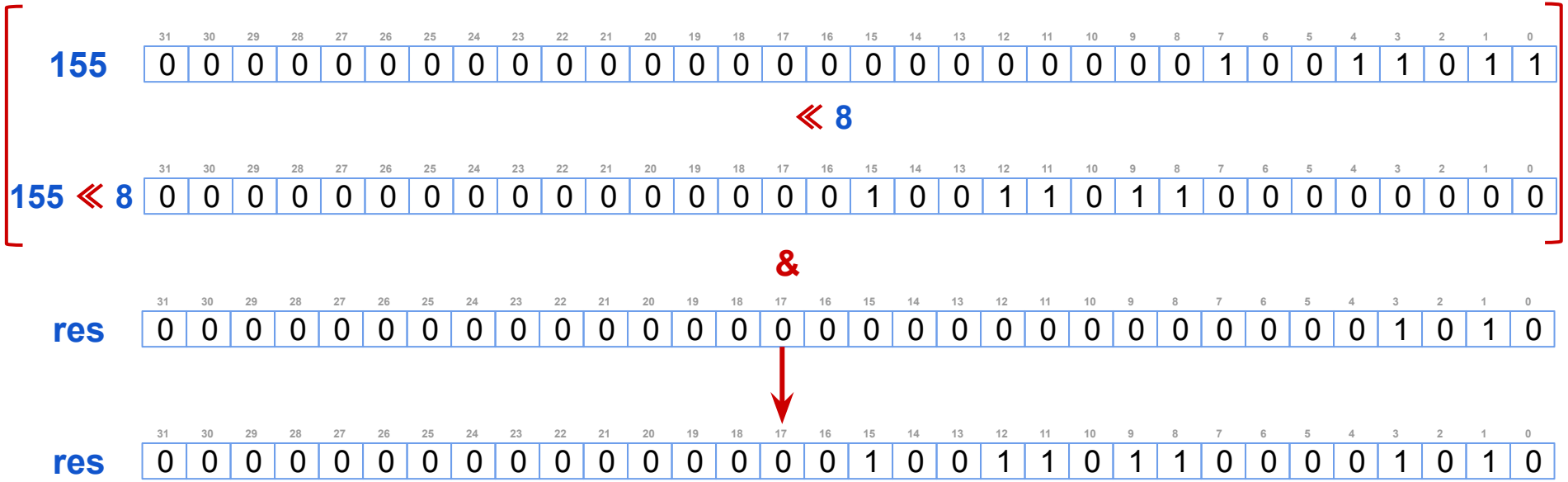
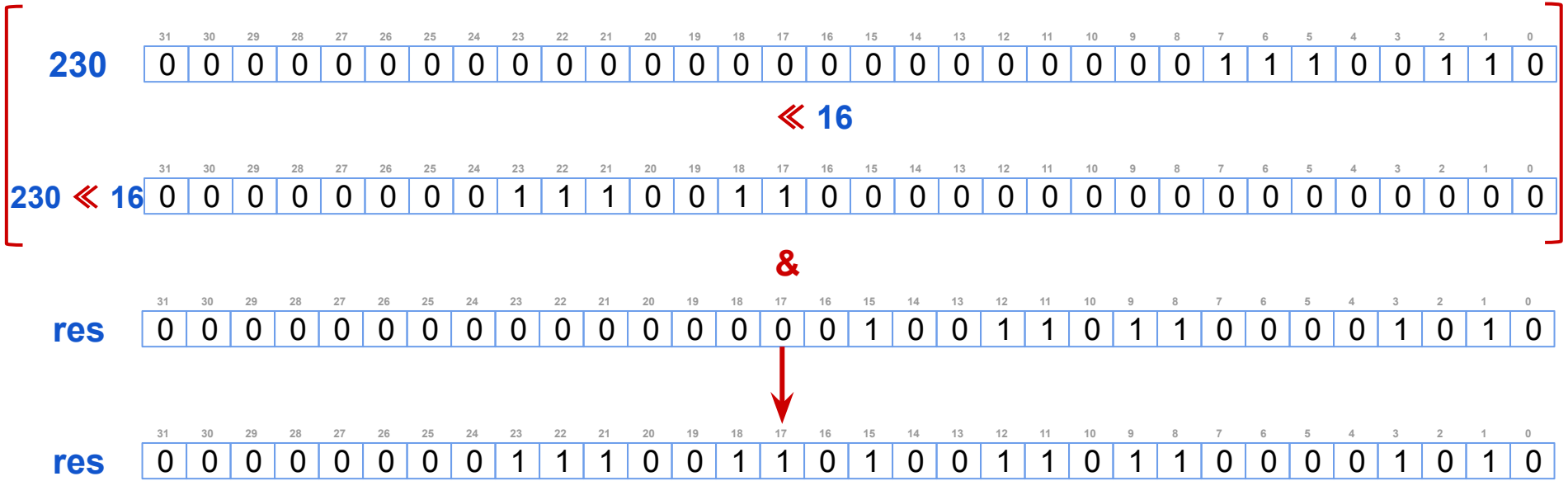
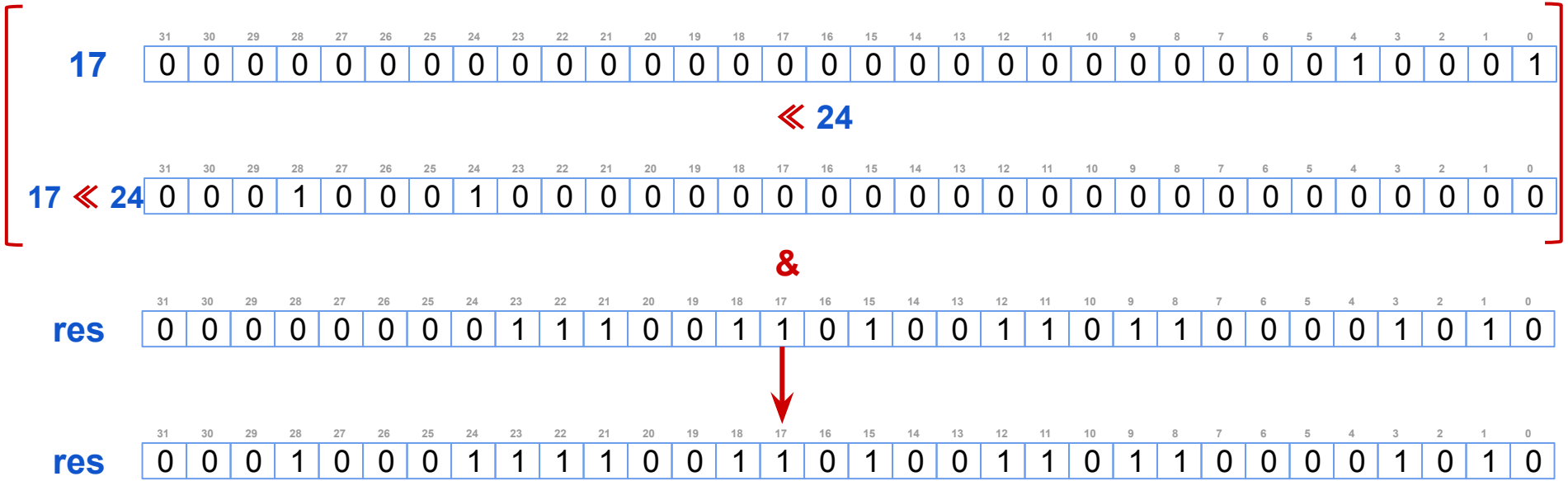


Ejercicio: Empaquetar 4 variables char en un entero (cont.)

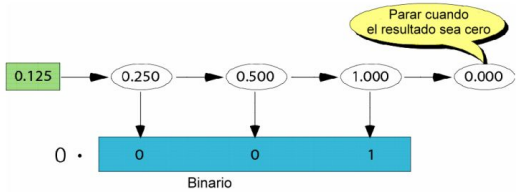


Ejercicio: Empaquetar 4 variables char en un entero (cont.)



Representación de números punto flotante

Representación binaria de la parte decimal



Representación normalizada

Número original	Desplazamiento	Normalizado
+ 1010001.11001	← 6	$+2^{+6}$ x 1.01000111001
-111.000011	← 2	-2^{+2} x 1.11000011
+0.00000111001	6 →	$+2^{-6}$ x 1.11001
-0.001110011	3 →	-2^{-3} x 1.110011

Estándar IEEE (Institute of Electrical and Electronics Engineers)

a. Precisión simple

b. Precisión doble

Ejemplos estándar IEEE

Número	Signo	Exponente	Mantisa
-2^{2} x 1.11000011	1	10000001	11000011000000000000000
$+ 2^{-6}$ x 1.11001	0	01111001	11001000000000000000000
-2^{-3} x 1.110011	1	01111100	11001100000000000000000

¡A practicar!

Ejemplo 1:
operadores.c

Ejemplo 2:
potencias_de_2.c

Ejemplo 3:
compactar.c

Ejemplo 4:
diccionario.c