

# UD01. Information Representation Computer Systems

## Part 2

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ceedcv  
CENTRE ESPECÍFIC  
D'EDUCACIÓ A DISTÀNCIA DE  
LA COMUNITAT VALENCIANA

Desarrollo de Aplicaciones Web  
1er Curso  
Curso 2020-2021  
Autor: Vicent Bosch  
[vicent.bosch@ceedcv.es](mailto:vicent.bosch@ceedcv.es)



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# Recordatorio

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**Esta  
presentación no  
sustituye los  
apuntes  
disponibles en  
el aula virtual.**



**Las apuntes  
oficiales son los  
que tenéis en el  
aula virtual**

# Recordatorio: convalidaciones



El plazo para solicitar convalidación  
termina el **28 de Octubre**.

Cualquier duda debéis enviar correo  
al tutor.

# Forums: reminder

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- ✓ **Always use English language**
- ✓ **Open a thread in the correct forum**
- ✓ **Before creating a new thread, check if already exists one about the one you want to post.**
- ✓ **To get the extra points (between 0 and 1):**
  - **Help your classmates frequently**
  - **Use always English language**
  - **Be polite**

# Assessable activities: reminder

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- ✓ **Must be done in English.**
- ✓ **Must be delivered within the term.**
- ✓ **Just one delivery is permitted. Be sure before delivering it.**
- ✓ **The activities can not be delivered out of the delivery term.**

# Activity 21 IEEE754 (1):

What is the decimal value of C19E0000?

The number is represented using 32 bits IEEE754

1. Convert hex to binary (groups of 4 bits / each digit)

C 1100 E 1110  
1 0001  
9 1001

16 ds

EXC

2. Place each bit in order, using the IEEE754 format

S	EXPONENT								MANTISSA																							
1	1	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			



## Activity 21 IEEE754(2):

3. Get the sign, then the exponent codified in Excess-K

**S=1, negative. Exp = 1 0 0 0 0 0 1 1 = 131**

**Exp = 127 + X = 131  $\rightarrow$  X = 131 - 127  $\rightarrow$  X=4**

4. Get the final number using the mantisse

**1, 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0**

**Exp=4  $\rightarrow$  1 0 0 1 1, 1 1**

**10011=19**

**,11=0,75  $\rightarrow 1*2^{-1} + 1*2^{-2} \rightarrow 0,5+0,25=0,75$**

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1. Convert hex to binary (groups of 4 bits / each digit)

2. Place each bit in order, using the IEEE754 format

S	EXPONENT	MANTISSA



# Let's practice IEEE754 (1)

What is the decimal value of 0x42150000?

The number is represented using 32 bits IEEE754

1. Convert hex to binary (groups of 4 bits / each digit)

4 → 0100

2 → 0010

1 → 0001

5 → 0101

1000001002

13210  
- 127

2. Place each bit in order, using the IEEE754 format

S	EXPONENT	MANTISSA
0	10010101	000000000000000000000000

# Let's practice IEEE754 (2)

What is the decimal value of 0xC315F333?

The number is represented using 32 bits IEEE754

1. Convert hex to binary (groups of 4 bits / each digit)

2. Place each bit in order, using the IEEE754 format

S	EXPONENT	MANTISSA

# Let's practice IEEE754 (2)

What is the decimal value of 0xC315F333?

The number is represented using 32 bits IEEE754

1. Convert hex to binary (groups of 4 bits / each digit)
2. Place each bit in order, using the IEEE754 format

S	EXPONENT								MANTISSA																					
1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	1	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1

3. Get the sign, then the exponent codified in Excess-K

**S=1, negative. Exp = 1 0 0 0 0 1 1 0 = 134**

**Exp = 127 + X = 134 → X = 134 - 127 → X = 7**

4. Get the final number using the mantisse

**1, 0 0 1 0 1 0 1 1 1 1 0 0 1 1 0 0 1 1 0 0 1 1**

**Exp=7 → 1 0 0 1 0 1 0 1, 1 1 1 1 0 0 1 1 0 0 1 1 0 0 1 1**

**1 0 0 1 0 1 0 1 = 149**

**, 1 1 1 1 0 0 1 1 0 0 1 1 0 0 1 1 →  $1 \cdot 2^{-1} + 1 \cdot 2^{-2} + 1 \cdot 2^{-3} + 1 \cdot 2^{-4} +$   
 $1 \cdot 2^{-7} + 1 \cdot 2^{-8} + \dots \rightarrow 0,5 + 0,25 + 0,125 + 0,0625 + \dots = 0,95$  (rounded)**

**-149,95**

Solution: -149.950 (rounded)



# Activity 22 Unit change (1)

## c) 100 Mb (megabits) to kB (kilobytes)

1. Convert to unit base  $\rightarrow$  bit
2. Convert to bytes
3. Divide by 1000 .... N times to get the final unit (kB)

**!! 1 Mbit  $\rightarrow 10^6$  (1 million) bits !!**

$$100 \times 10^6 = 10^8 \text{ bits}$$

*Handwritten notes:*  
Below the equation, there is a handwritten "0.8" with a slash, and a large arrow pointing from the result "10<sup>8</sup> bits" towards the bottom right corner of the slide.



**b  $\rightarrow$  bit**


**B  $\rightarrow$  Byte**

# Activity 22 Unit change (2)

## d) 6 Mb/s (megabits) to GB/week(Gigabytes)

1. Convert to unit base  $\rightarrow$  bit
2. Convert to bytes
3. Divide by 1000 .... N times to get the final unit (GB)
4. Multiply
  - X 60 seconds/minute
  - X 60 minutes/hour
  - X 24 hours/day
  - X 7 days/week

GB/s

 **b  $\rightarrow$  bit**  
**B  $\rightarrow$  Byte**

# Unit change.

## Let's practice a bit 😊

Convert 3 KB to KiB

- Which is the unit base?
- Result:


→ 1024 b

Convert 10 MiB to KB

- Which is the unit base?
- Result:

→ 1000 b

1 TB → 931 MB  
1000

 **b** → bit  
**B** → Byte



# Unit change.

## Let's practice a bit 😊

### Convert 3 KB to KiB

- Which is the unit base?
- Result:

**3 KB → 3000 bytes**


**3000 bytes / 1024 bytes → 2,9296875 KiB**

### Convert 10 MiB to KB

- Which is the unit base?
- Result:

**10 MiB →  $10 * 2^{20}$  (10.048.576) bytes**

**10.048.576 bytes / 1000 bytes → 10.485,76 KB**

 **b → bit**  
**B → Byte**

# Unit change.

## Let's practice a bit (2) ☺

Convert 1000 Kb to KB

- Which is the unit base?
- Result:

Convert 1 TB to GiB

- Which is the unit base?
- Result:

Verify your results [here](#)

$\frac{K}{10}$   
 $i \rightarrow 2$   
 ~~$i \rightarrow 10^3$~~



**b** → bit  
**B** → Byte

# Unit change.

## Let's practice a bit (2) ☺

### Convert 1000 Kb to KB

- Which is the unit base?
- Result:

**1000 Kb  $\rightarrow$  1.000.000 bits =  $10^6$  bits**

**$10^6$  bits / 8 bits (byte)  $\rightarrow$  125000 bytes**

**125000 bytes / 1000 bytes (kilo)  $\rightarrow$  125 KB**


### Convert 1 TB to GiB

- Which is the unit base?
- Result:

**1 TB  $\rightarrow$   $10^{12}$  bytes**

**$10^{12}$  bytes / 1024 / 1024 / 1024 = 931,32 GiB**  
*to KB    to MB    to GB*

Verify your results [here](#)

 **b  $\rightarrow$  bit**  
**B  $\rightarrow$  Byte**

# Binary division. Activity 23:

Divide 105 / 5

0-1

$$\begin{array}{r} 1101001 \\ -101110 \\ \hline 00110 \\ -1011 \\ \hline 00101 \\ -101 \\ \hline 0000 \end{array}$$

$$\begin{array}{r} 101 \\ \hline 10101 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 105 \overline{) 5} \\ -101 \\ \hline 005 \\ -5 \\ \hline 0 \end{array}$$






# Activity 24. Clues.

How long will it take (maximum) to download a 3.5GB movie if your Internet provider tells you that it provides 100 Mb/s ? And if they told you that the error rate is 5%,?

1. Convert to unit base → bit
2. Error rate. Suppose always a 5% (5% out of 100Mb). But you can use the minimum(0% error) and the maximum ( 5% error).
3. You can express the result in seconds or minutes.

bits

 **b → bit**  
**B → Byte**

# Arithmetic operations (1)

## Let's practice together



$$\begin{array}{r} + 111011_{(2)} \\ 011110_{(2)} \\ \hline \end{array}$$

$$\begin{array}{r} - 111001_{(2)} \\ 011110_{(2)} \\ \hline \end{array}$$





# Arithmetic operations (2)

## Let's practice together



$$\begin{array}{r} \times \quad 101001_{(2)} \\ \quad 101_{(2)} \\ \hline \end{array}$$

$$\begin{array}{r} \div \quad 1011011_{(2)} \\ \quad 111_{(2)} \\ \hline \end{array}$$

# Exercises:

Ex 2.10.1K = 2<sup>2-1</sup>

8 bits

31 → 00011111 178

2 + 31

10011111 ← 159

# Exercises:



$$\begin{array}{r} -17 \\ \rightarrow 1 \end{array}$$

$$\begin{array}{l} (a_1 \rightarrow 0) \\ (a_2 \rightarrow 1) \\ (a_2 \rightarrow 17) \end{array} \quad \begin{array}{l} \rightarrow 0 \\ \rightarrow 0 \\ \rightarrow 17 \end{array} \quad \begin{array}{l} +1 \\ +1 \\ +1 \end{array} \quad \begin{array}{l} n=6 \\ n=6 \\ n=6 \end{array}$$
$$\begin{array}{r} 01110 \\ +1 \\ \hline \end{array}$$