

→ DSP (Digital Signal Processing) utilizza segnali binari.

Conversione da base 10 a binario

→ $\{0, 1\}$
low, basso → high, alto

esempio: $25_{10} \rightarrow$

$25 : 2 = 12$	con resto	$R = 1$
$12 : 2 = 6$	=	$R = 0$
$6 : 2 = 3$	=	$R = 0$
$3 : 2 = 1$	=	$R = 1$
$1 : 2 = 0$	=	$R = 1$

$$1 \cdot 2^4 + 1 \cdot 2^1 + 2^0 = 25 \quad \leftarrow \quad 10011 = 25_2$$

Conversione da binario a base 10

→ Base ottale e Esadecimale

10	2	8	16
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5

...

se ho 16 bit

Binario

1	1	0	0	1	0	1	1	0	1	1	0	0	1	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Esadecimale

1	1	1	1	0	0	0	1	0	1	0	0	1	1	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

F 1 4 A

Ottale

1	1	1	1	0	0	0	1	0	1	0	0	1	0	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

1 7 0 5 1 2

-D Hamming Distance (HD), é definita come il numero di bit diversi che hanno due numeri nel dominio digitale.

es)

0 0 1 1 0 1
1 1 1 1 0 1

HD = 2 \Rightarrow equivale a fare
10 XOR

-D SUM

\hookrightarrow ho due output, R result, il risultato,
C carry, il riporto.

riporto della somma
prec.

a	b	R	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

a	b	C ₋₁	R	C _i
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
[...]				

-D DIFFERENCE

\hookrightarrow come la somma ma non ho il
riporto ma il prestito B, R é
sempre il result

\rightarrow Module and Sign Notation \rightarrow uso un bit per il segno
del numero (MSB)

→ **PRODUCT** → And Logico

$$\begin{array}{r}
 110100 \\
 000110 \\
 \hline
 000000 \\
 110100- \\
 110100-- \\
 \hline
 100111000
 \end{array}$$

↳ faccio un left-shift quando trovo gli 1

ESERCIZI

1) Trasforma i numeri in binario, octale e esadecimale

267	2	
133	2	1
66	2	1
33	2	0
16	2	1
8	2	0
4	2	0
2	2	0
1	2	1
0		

↑

$$267 = 100001011_2$$

$$\begin{array}{c}
 0001 \ 0000 \ 1011_2 \\
 \underbrace{\hspace{1cm}} \quad \underbrace{\hspace{1cm}} \quad \underbrace{\hspace{1cm}} \\
 \quad \quad \quad 0 \ 4 \ 1 \ 3_8
 \end{array}$$

$$\begin{array}{c}
 0001 \ 0000 \ 1011_2 \\
 \underbrace{\hspace{1cm}} \quad \underbrace{\hspace{1cm}} \quad \underbrace{\hspace{1cm}} \\
 \quad \quad \quad 1 \ 0 \ B_{16}
 \end{array}$$

520	2	0
260	2	0
130	2	0
65	2	1
32	2	0
16	2	0
8	2	0
4	2	0
2	2	0
1	2	1
0		0

$$\begin{aligned} 520_{10} &= \\ &= 01000000\ 1000_2 \\ &\approx \underbrace{0010}_{10}_{10}\ \underbrace{0000}_{0}_{00}\ \underbrace{1000}_8_8 \\ &\quad \underbrace{\hspace{1cm}}_{2008_{16}} \end{aligned}$$

2) HD di 12-28, 8 e 7

$$12 = 8 + 4 = 2^3 + 2^2 = 01100_2$$
$$28 = 16 + 8 + 4 = 2^4 + 2^3 + 2^2 = 11100_2$$

$$HD = 1$$

$$\begin{array}{c|c} 8 & 2 \\ \hline 4 & 2 \\ 2 & 2 \\ 1 & 2 \\ 0 & 2 \end{array} \quad \begin{array}{c} 0 \\ 0 \\ 0 \\ 1 \\ 1 \end{array}$$

$$\underbrace{001000}_{=8} \quad \swarrow \quad \begin{array}{c} 1000 \\ 0111 \end{array}$$

$$7 = 4 + 2 + 1 =$$

$$HD = 4$$