Curs 2 0X01

Alg Karatsuba

$$\begin{array}{r} 456\times \\ 111 \\ \hline 456 \\ 456 \\ 456 \\ \hline + \end{array}$$

R.S.A?

$\theta(N^d)$, $d<2$

$\downarrow$

$\theta(N \log N)$

$0\times 1111 = (\underbrace{0001}\ \underbrace{0001}\ \underbrace{0001}\ \underbrace{0001})_2$

N biți: 2^N

$0, 1 \ldots 2^{N}-1$

~~0100~~

~~11111000~~

~~10001000~~

Floating Point

± 0

$\frac{1.0}{0.0}$

$$2^N = \sum_{i=0}^{N-1} 2^i + 1$$

$$-2^N = -\sum_{i=0}^{N-1} 2^i - 1 + \ldots$$

$$\begin{array}{r} 0111 \\ 1 \\ \hline 1000 \end{array}$$

$\boxed{\text{Lectură suplimentară}}$

Seminar 2

0X 1111	16
0001 0001 0001 0001	2
01 01 01 01	4
0 1 0 4 2 1	8
$16^3 + 16^2 + 16^1 + 16^0 = \dots$	16

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(2) 1111 1111 0000 0000
(4) 3 3 3 3 0 0 0 0
(8) 1 7 7 4 0 0
(16) F F 0 0
(10) $2^{16} - 1 - (2^8 - 1) = 65280$

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(16) 0XFEED
1111 1110 1110 1101 (2)
333 2 3 2 3 1 (4)
1 7 7 3 5 5 (8)
(16)

0000 0001 0001 0010 +1
0000 0001 0001 0011
$-(1 + 2 + 16 + 256) = -275$

0101 1100 1111 0011
1111 1111 0000 0000 +
1|0101 1011 1111 0011

1111 1111 1111 1111
0000 0000 0000 0001
10000 0000 0000 0000

~~extindere~~

0101 1100 1111 0011
0101 1100 1111 0011 AND
0101 1100 1111 0011

~~1101 1100 1111~~

1100 0110 1001 1110
1001 1111 0110 1100 XOR
1100 0110 1001 1110 XOR
1001 1111 0110 1100

101.101 valoarea zecimală

$\cancel{5}$. 5.625

3.75

11.11

$\frac{2}{3} \approx 0,666\ldots = 0.10(10)$

7

$b_0 b_1 \ldots b_{n-1}$

$$X = \sum_{i=0}^{n-2} (b_i * 2^i) - 2^{n-1} \cdot b_{n-1}$$

$$2^{n-1} = \sum_{i=0}^{n-2} 2^i + 1$$

$$X = \sum_{i=0}^{n-2} b_i * 2^i - \left(\sum_{i=0}^{n-2} 2^i + 1\right) \cdot b_{n-1}$$

$$|X| = \sum_{i=0}^{n-2} 2^i (b_i - 1) - 1$$

$$= \sum_{i=0}^{n-2} 2^i (1 - b_i) + 1$$

9

$x = 2^0 \cdot b_0 + 2^1 \cdot b_1 + \dots + 2^{n-1} \cdot b_{n-1}$

$\cancel{\log_2 x = 2^{imax}}$

$\log_2 x = \log_2 \left[2^{imax} \left(\cancel{1 + 2^1 + \dots +} \right. \right.$

$\cancel{b_{imax} + b_{imax-1} + \dots}$

$\log_2 \left[2^{imax} \left(b_{imax} + \frac{b_1 \cdot 2^{imax-1}}{2^{imax}} \right. \right.$

$\left. \left. \dots + \frac{b_0 \cdot 2^0}{2^{imax}} \right) \right]$

$\log_2 x = \log_2 2^{imax} + \log_2 ($

8 Temă

①

ASC - seminar 1

• $\underbrace{10}_{2}\underbrace{01}_{1}\ \underbrace{11}_{3}\underbrace{00}_{0}\ \underbrace{11}_{3}\underbrace{11}_{3}\ \underbrace{00}_{0}\underbrace{11}_{3}$

$(1001\ 1100\ 1111\ 0011)_2 = (21303303)_4$

$(\underbrace{1}_{1}\underbrace{001}_{1}\ \underbrace{1100\ 1111\ 0011}_{6\ 3\ 6\ 3})_2 = (116363)_8$

$(\underbrace{1001}_{9}\ \underbrace{1100}_{c}\ \underbrace{1111}_{f}\ \underbrace{0011}_{3})_2 = 9cf3$

• $(22331)_4 =$

2	2	3	3	1
10	10	11	11	01

$= (1010111101)_2$

$(\underbrace{1}_{1}\underbrace{010}_{2}\ \underbrace{111}_{7}\underbrace{101}_{5})_2 = (1275)_8$

$(\underbrace{10}_{2}\ \underbrace{1011}_{b}\underbrace{1101}_{d})_2 = (2bd)_{16}$

• 0XDEAF

DEAF

D	E	A	F
1101	1110	~~1110~~ 1010	1111

$(DEAF)_{16} = (1101\ 1110\ 1010\ 1111)_2$

eximderea pe biți se face cu 0 pentru numere naturale, cu 1 pentru numere negative.

② numere întregi pe 16 biți

0X FEED

F	E	E	D
1111	1110	1110	1101

$(0xFEED)_{16} = (1111\ 1110\ 1110\ 1101)_2$

$(\underbrace{11}_{3}\underbrace{11}_{3}\ \underbrace{11}_{3}\underbrace{10}_{2}\ \underbrace{11}_{3}\underbrace{10}_{2}\ \underbrace{11}_{3}\underbrace{01}_{1})_2 = (33323231)_4$

$(\underbrace{1}_{1}\underbrace{111}_{7}\ \underbrace{111}_{7}\underbrace{0\,11}_{3}\underbrace{10\,1}_{5}\underbrace{101}_{5})_2 \overset{=b.}{=} (177355)_8$

$(1111\ 1110\ 1110\ 1101)_2 = 2^0 + 2^2 + 2^3 + 2^5 + 2^6 + 2^7 + 2^9$
$+ 2^{10} + 2^{11} + 2^{12} + 2^{13} + 2^{14} + 2^{15} = -27$

$\sim b = (0000\ 0001\ 0001\ 0010)_2 = (274)_{10}$

$(\sim b + 1) = (000\ 0001\ 0001\ 0011)_2 = 275$

$b = -(\sim b + 1)$

- 0x FFFF

$(FFFF)_{16} = (1111\ 1111\ 1111\ 1111)$

$(FFFF)_{16} = -1$

- $\underbrace{1111}_{F}\ \underbrace{1111}_{F}\ \underbrace{0000}_{0}\ \underbrace{0000}_{0}$

$(1111\ 1111\ 0000\ 0000)_2 = (FF00)_{16}$

$\sim b = 0000\ 0000\ 1111\ 1111$; $(\sim b + 1) = (0000\ 0001\ 0000\ 00$

$b = -(\sim b + 1) = -2^8 = -256$

$(1111\ 00001111\ 0000)_2$

$= 2^4+2^5+2^6+2^7+2^{12}+2^{13}+2^{14}-2^{15} = -3856$

③

```
111         1 111
0101 1100 1111 0011
0111 0000 1111 0000   +
-------------------
1100 1101 1110 0011
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$(-12829)_{10}$

④

```
1100 0110 1001 1110
1001 1111 0110 1100   XOR
1100 0110 1001 1110   XOR
-------------------
1001 1111 0110 1100
```

^	0	1
0	0	1
1	1	0

⑥

a) $(101.101)_2 =$

5.625

(binary fixed point)

...	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	...

$\frac{1}{2} + \frac{1}{8} = 0,5 + 0.125$

e) 1111.0010011

$\simeq 15.8515625$

$2^0+2^1+2^2+2^3 = 2^4-1 = 15$

$\frac{1}{8} + \frac{1}{64} + \frac{1}{128} = .8515625$

$(3.75)_{10}$

$= (11.11)_2$

~~$0.75 = 1 - \frac{1}{4}$~~

$0.75 = 0.5+0.25$

lucrăm pe 8 biți

$(1110\ \ 1010)_2 = -22 \quad (2^1+2^3+2^5+2^6-2^7)$

extindem cu 4 biți de 1

$(1111\ \ 1110\ \ 1010)_2 = \left(-22 + 2\cdot 2^7 = 234 \right)$

$\downarrow$ decimal

$234 + 2^8 + 2^9 + 2^{10} - 2^{11}$

$2^8+2^9+2^{10} = 2^8(1+2+4) = 7\cdot 2^8 = 2^8(8-1)$

$2^8+2^9+2^{10}-2^{11} = 8\cdot 2^8 - 2^8 - 2^{11} = \cancel{2^{11}} - 2^8 - \cancel{2^{11}}$

$= -2^8$

$\Rightarrow 234 + 2^8 + 2^9 + 2^{10} - 2^{11} = 234 - 256 = \boxed{-22}$