

Binære Tællere

Gerth Støtting Brodal (Aarhus Universitet)

Mark Greve (Aarhus Universitet)

Vineet Pandey (BITS Pilani, Indien)

S. Srinivasa Rao (Seoul, Syd Korea)

O

1

10

1

1

1000

101

1

1

0

1

1

1

1000

1001

10 10

1011

1

1

0

0

1101

1

1

1

0

1

1

1

1

0000

- vi tæller modulo $10000_2 = 16_{10}$

1011

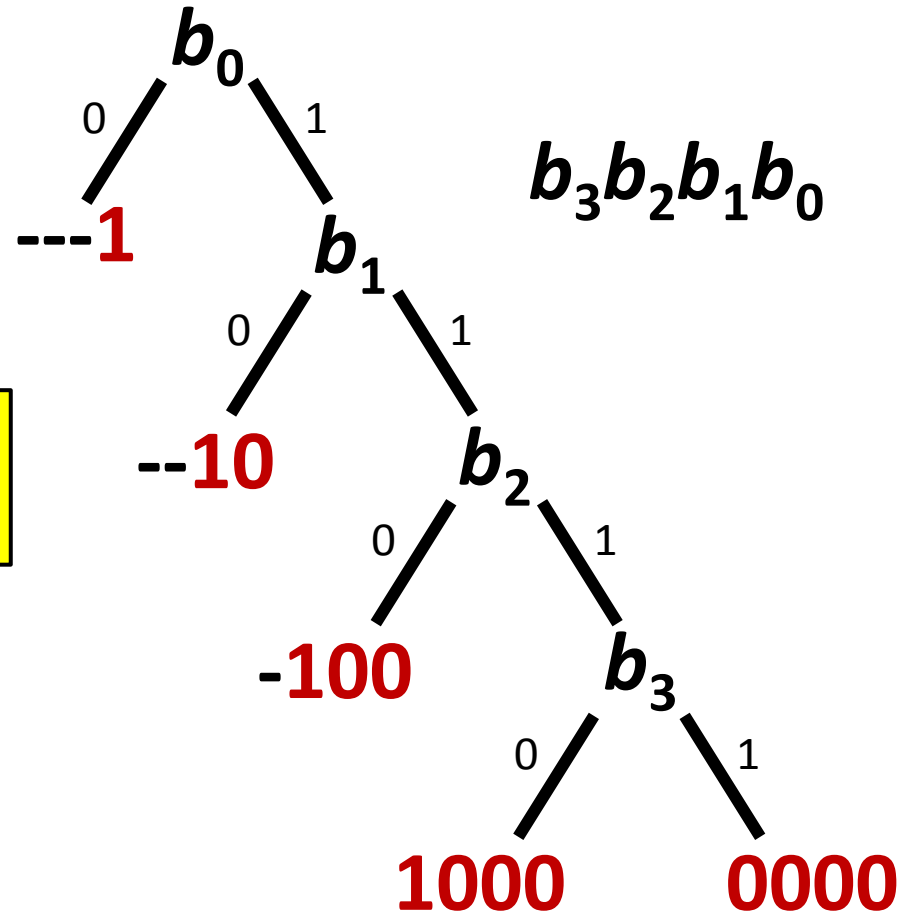


$$1 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0 = 8 + 2 + 1 = 11_{10}$$

Algoritme

Decimal	Binær
0	000 <u>0</u>
1	000 <u>1</u>
2	00 <u>10</u>
3	00 <u>11</u>
4	0 <u>100</u>
5	0 <u>101</u>
6	0 <u>110</u>
7	<u>0111</u>
8	<u>1000</u>
9	<u>1001</u>
10	<u>1010</u>
11	<u>1011</u>
12	<u>1100</u>
13	<u>1101</u>
14	<u>1110</u>
15	<u>1111</u>
0	0000

læser 4 bits
skriver 4 bits



A problem has been detected and windows has been shut down to prevent damage to your computer.

The problem seems to be caused by the following file: SPCMDCON.SYS

PAGE_FAULT_IN_NONPAGED_AREA

If this is the first time you've seen this stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x00000050 (0xFD3094C2,0x00000001,0xFBFE7617,0x00000000)

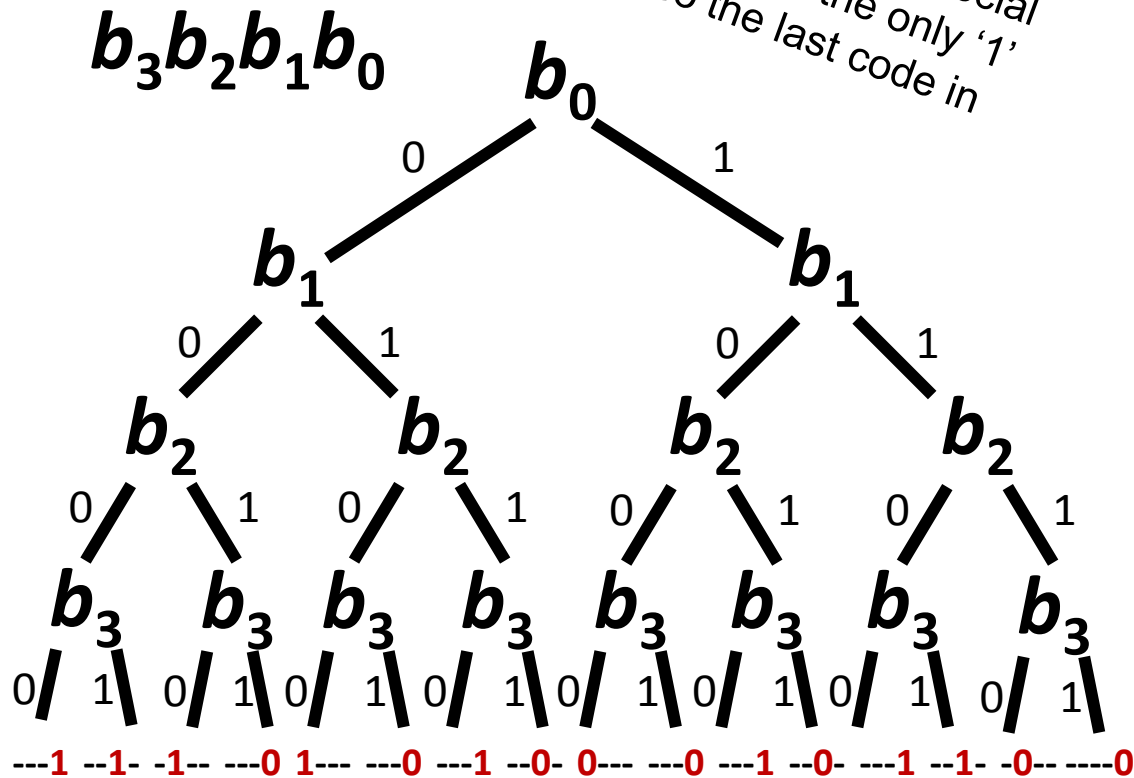
*** SPCMDCON.SYS - Address FBFE7617 base at FBFE5000, Datestamp 3d6dd67c

Recovering.....

Decimal Binær Spejlet Gray kode

0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	0100	0110
5	0101	0111
6	0110	0101
7	0111	0100
8	1000	1100
9	1001	1101
10	1010	1111
11	1011	1110
12	1100	1010
13	1101	1011
14	1110	1001
15	1111	1000
0	0000	0000

"To get the next code, for a code with even parity, flip the rightmost bit. For a code with odd parity, find the rightmost '1' and flip the bit to its left. The only special case is when the last bit b_n is the only '1' in the code. This is also the last code in the sequence."

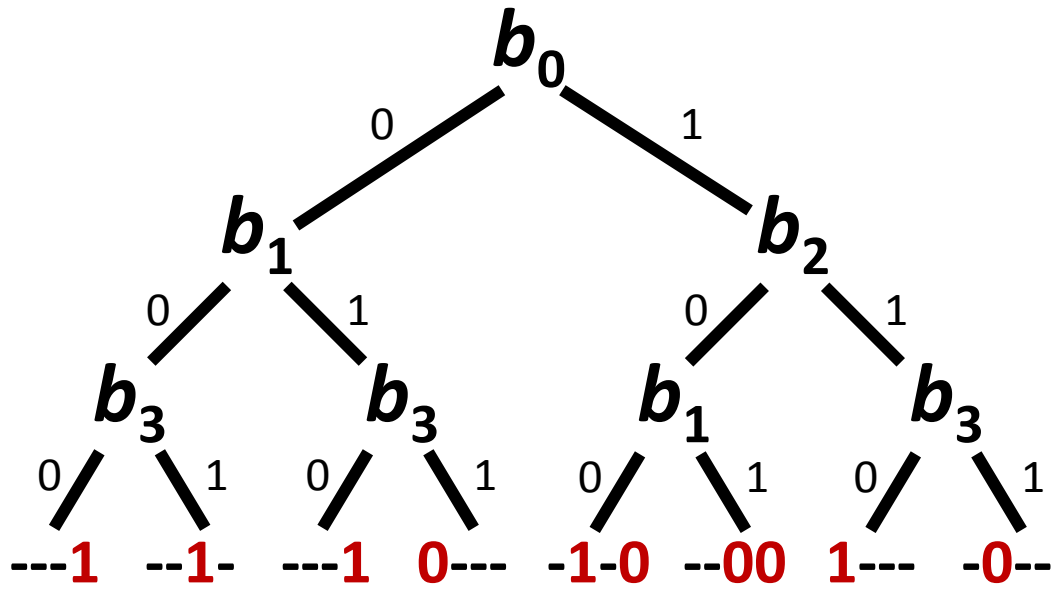


læser altid 4 bits
skriver altid 1 bit

Decimal

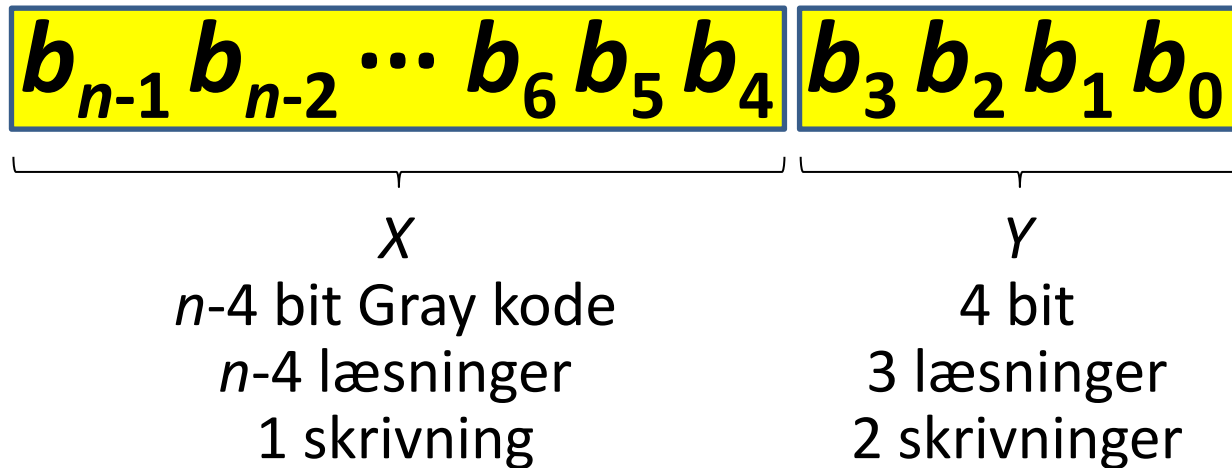
0	<u>0000</u>
1	0 <u>001</u>
2	<u>0100</u>
3	<u>0101</u>
4	<u>1101</u>
5	1 <u>001</u>
6	<u>1100</u>
7	<u>1110</u>
8	<u>0110</u>
9	<u>0111</u>
10	<u>1111</u>
11	1 <u>011</u>
12	<u>1000</u>
13	<u>1010</u>
14	<u>0010</u>
15	0 <u>011</u>
0	<u>0000</u>

$b_3 b_2 b_1 b_0$



læser altid 3 bits
 skriver altid ≤ 2 bits

Generalisering til tællere med n bit



metode Increment(XY)

inc(X)

if ($X == 0$) inc(Y)

læser altid $n-1$ bits
skrives altid ≤ 3 bits

Sætning

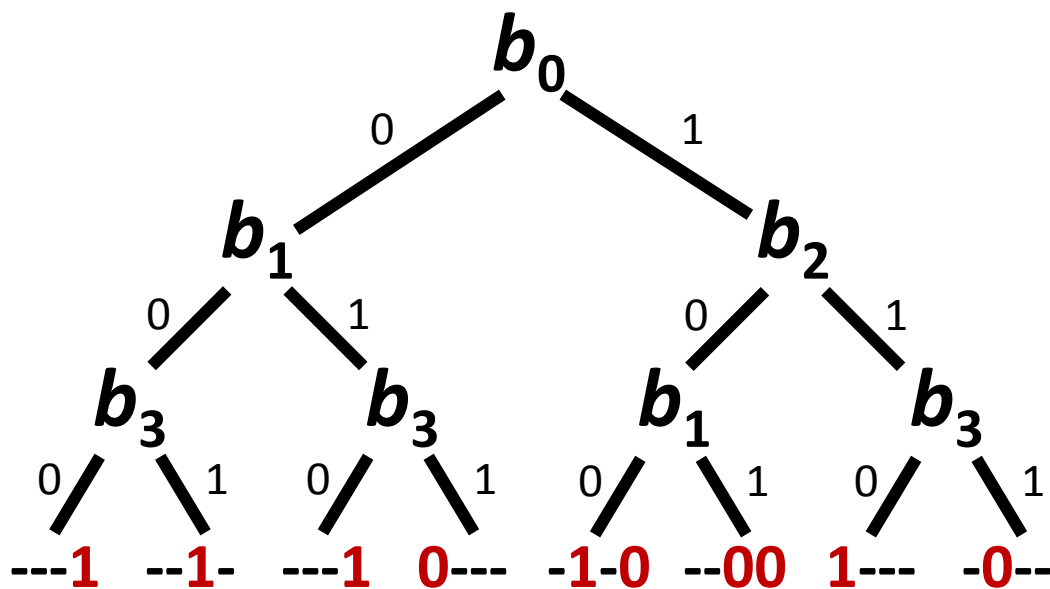
4-bit tæller med 3 læsninger og 2 skrivninger

n -bit tæller med $n-1$ læsninger og 3 skrivninger

Åbne problemer

$n-1$ læsninger og 2 (eller 1) skrivninger ?

« n læsninger og skrivninger ? [skal mindst læse $\log_2 n$]



$n=5$

		bit læst				
		1	2	3	4	5
bit skrevet	1	⊥	⊥	⊥	?	+ ¹
	2	⊥	⊥	⊥	?	+
	3	⊥	⊥	⊥	+ ²	+
	4	⊥	⊥	⊥	+	+
	5	⊥	⊥	⊥	+	+

TAK

