

Computação Quântica

Pedro Maciel Xavier

`pedromxavier@poli.ufrj.br`

19 de novembro de 2019

IM-UFRJ

Algoritmos Quânticos

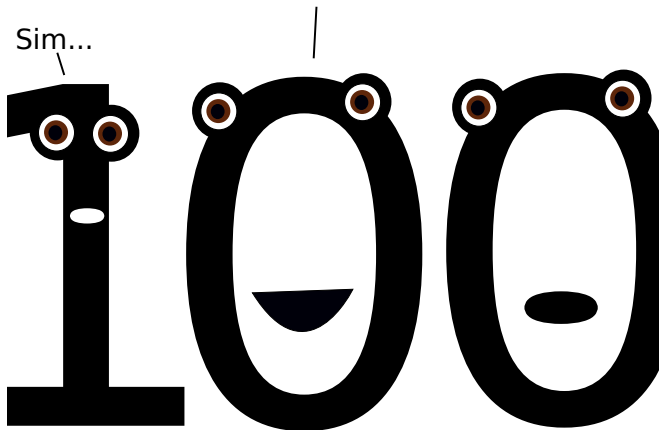
01001011000010101010101010101111101010110011111001010101000010110000011000001010001011001001
10010000101110011010010100001010101011010110101011000101010101000100100110110000000110111101010010
0111001110011100000011000101111100100001000101001011100010011000010100001010001110111011001
0011000010100001000100100101111101011101000110100011110000000111000010011010101010000011001011
1011100000001110011000110110011010001010100100100001001111011010101111011001111001101001000100011
101000001011001000000010101001100111101111001010010101000001000100101101100100101001010101010
10101010100101010101111000001011110100111110100010101001010011010000011010101010101010100001101
1000100000001011100000100110110101000101010101010010110110100011111100011101101100111110100
10011000000000000001101101001011000001000001110101100100101101111010011010101010010110010101
110001110000010111000110010000101101011011111011001100000110010000110010001000101011111
011010011000001100010100101100010011001110111110111101111111000110100011010000100100001010011
00011000001010001111101011110101010010000100010100011011011001001100101100000011011010011011001
010010000111111010101010010111101011010100111010001011000101101010001111101001110011000100
00011010101011100000111111000011100101000101011100011111000001100111000100100111001000000011
00101111100100101010010101010000110001011101011100001010010011000000010101111100011011000101100001
11010000000010101101111000011000101110000110011000001000000111010110111001100000011110111110110
101000110001000011100110101100001100010101101000101111110101100110101101000000110000101
1001111010101010010110101010000010101110001100011100000001100011101100100010011011000100001000
001011110011001100000101110100001011011110010100111001001100101100001111001000000111101100101
01111001001011000110000100100001011111010101000001111001000000010000100111111000001100100
10111110011101110000000010100101000101010110001010000010000111011111001001110000011010000011
01111010000000101101011110100101000010101010010101110011001100110101101101100100010101010
00111010100000101010101011100111001100001001000010110000011101000110001111110100110000010111
01001011010111100000100110001010010111010101000010101010101001100111110000010100101011101
01010010101111100100101001001011110110101000110010011011011100110000010001101001000111100110100
10101100110000111000000100011101010100010010010011100001100001110101000111100011100100101110011
010000100110100000000100101000111011011101101010101011001111101010110110011000010000101100
01100000111000100010101101010100100101110010000101001110110010000110001000011000100001000
01010000100111010110101001001000000110010101101010010000111000100100110110010010010100101001
0011100110100100100010010010001001100001010101100011110010101010111110011110001000010111001
00110000111100100010000101110101000100110011110001001100100010001010101000001001001010111
010101111010100000101001110000000100001011001100010000000111000001100100010101101010011000010100
0101000011101001010100100101000001010000100111011001000101001101101001000001001001010011100
10000110111011100000111110101001110000101001001110111000001010000100101010110111010010101010
001100001010000111000011100111001100001000010110101001001100010110001000110001001010101101101
1110000101011100000100100000000001100101001101100010111000010011000000011101001100101101101
1110110100111000010101010100110111011101000100110110000111010010000100101010100001010000
00101001111110011110001011001001100001001011101100101010001100010011010100001010100001010000
11110010000100110010010100000011111100110000000101010000101010100000100010011010100000010001
10011001001001111000100111001001010111011100110000100101001110001000010100010010101010011
11011010010101100000101010101001101111011101000100110110000111010010000100101010000101010001
00011001000101110000100010100010100101010111000101100001011000010110000101100101000101011
101001101000010101010100101110010011000010101010010101110001001010111000001011110101011
10100011010010101010101010011111101001010101001010101001000101011111000001011110101011
010110110000001010101010101110010011000001010100101010111000001010111000001001001010101
00011001101010101001010001
11101010100001
111100001101001001001010100010011100011101
0001110101110010010010100101000001101001101001000000010001010111010000010100001001001001010
10110101010001
111100001101001001001010100010011100011101
000111101011100100100101001010000011010011010010000000100010101110101000001010001001001010
10111111010000111011000011100111110000010100001000000001101101000100100111111010111001001100011

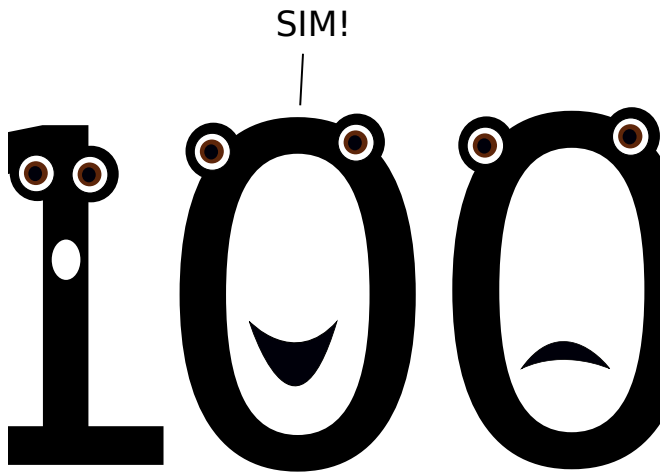
0101101
1101001
1110100



Finalmente! É o meu grande dia!

Sim...





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.

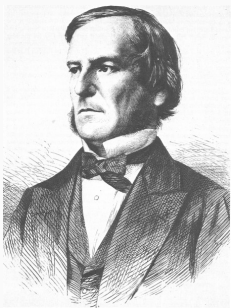
Technical information:

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

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

Sobre os *bits*:

- Eles moram em \mathbb{Z}_2
- Formam vetores em \mathbb{Z}_2^n , onde cada $\vec{a} = (a_1, a_2, \dots, a_n) \in \mathbb{Z}_2^n$ representa um valor entre $00\dots0 = 0$ e $11\dots1 = 2^n - 1$
- Realizamos operações *Booleanas* com eles: \neg , \wedge , \vee , \oplus .



George Boole

1815 - 1864

$$\neg : \mathbb{Z}_2 \rightarrow \mathbb{Z}_2$$

$$a \rightarrow \bar{a} = (1 - a)$$



Arquitetura de Von Neuman



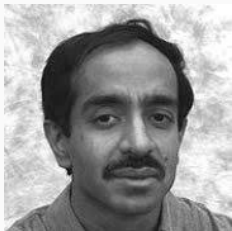
John Von Neuman

1903 - 1957



Richard Feynman

1918 - 1988



Lov Grover

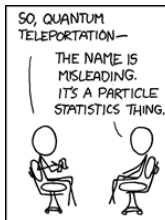
Bell Labs

Algoritmo de Grover

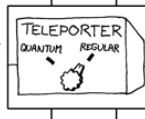


Peter Shor

MIT



SO IT'S NOT LIKE STAR TREK? THAT'S BORING.





Introduction to topological quantum computation with non-Abelian anyons, FIELD, B. & SIMULA, T., School of Physics and Astronomy, Monash University, Victoria 3800, Australia.