

Roma, 18 Marzo 2016

{CODEMOTION}



You Turing-Complete Me

L'arte di programmare (perdere ancora più tempo) dentro i videogiochi



Ciao!

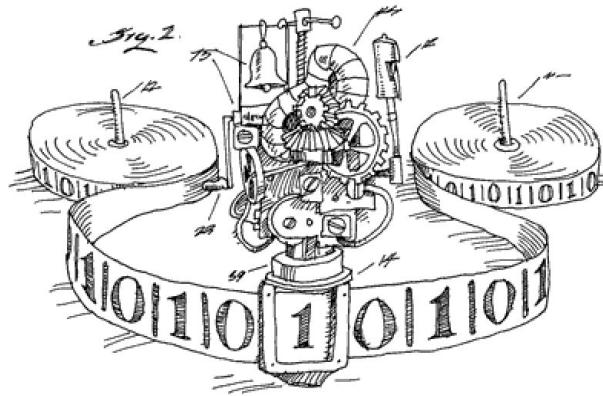
Siamo Sara e Luca Di Bartolomeo

Studiamo informatica, ci diletiamo nella creazione
di piccoli videogiochi e insegnamo ai bambini di
Codemotion Kids a programmare usando Minecraft.

1. Macchine di Turing

*Cinque minuti di teoria prima della parte divertente
(vi prometto che durerà poco)*

Cos'è una macchina di Turing



Una macchina di Turing è una macchina astratta che:

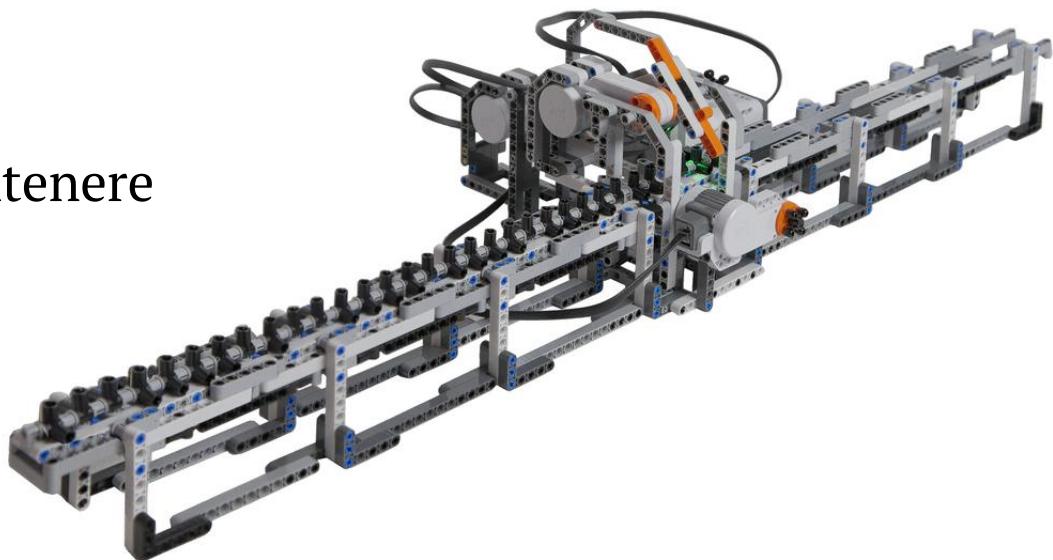
- Legge dei simboli in input
- Esegue delle azioni seguendo delle regole

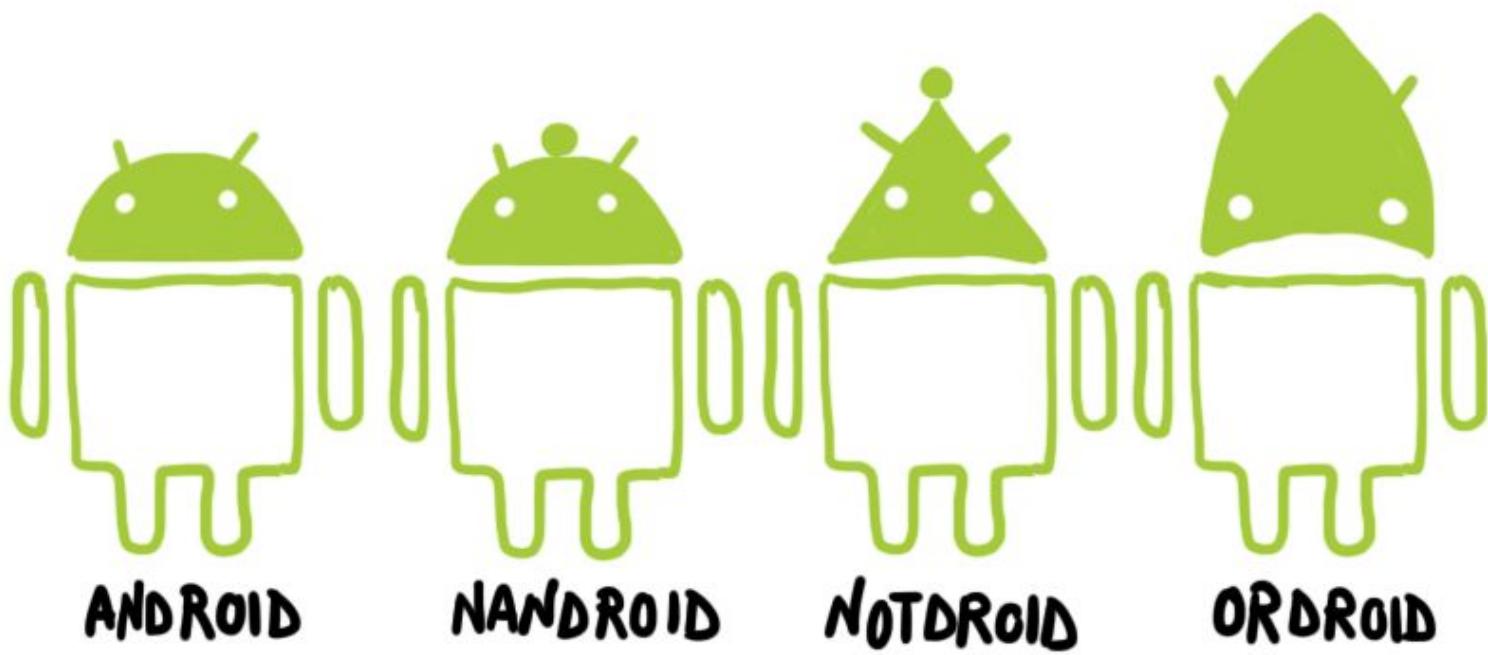
Una macchina di Turing universale è una macchina che può simulare tutte le altre macchine di Turing.

A partire da un meccanismo basilare è possibile simulare ogni possibile operazione che può essere eseguita da un computer.

Ingredienti:

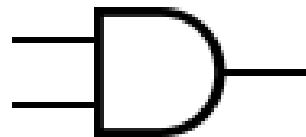
- Lettura di input
- Capacità di mantenere uno stato
- Svolgimento di operazioni basilari



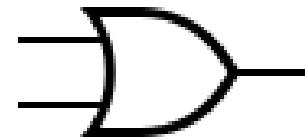


Le porte logiche sono i mattoncini basilari per la costruzione di un circuito digitale

AND



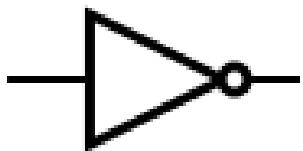
OR



A	B	A and B
1	1	1
1	0	0
0	1	0
0	0	0

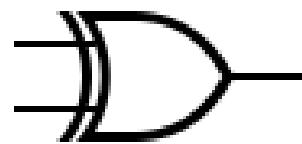
A	B	A or B
1	1	1
1	0	1
0	1	1
0	0	0

NOT



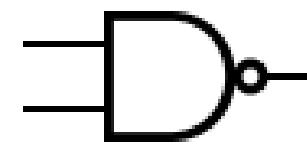
A	Not A
1	0
0	1

XOR

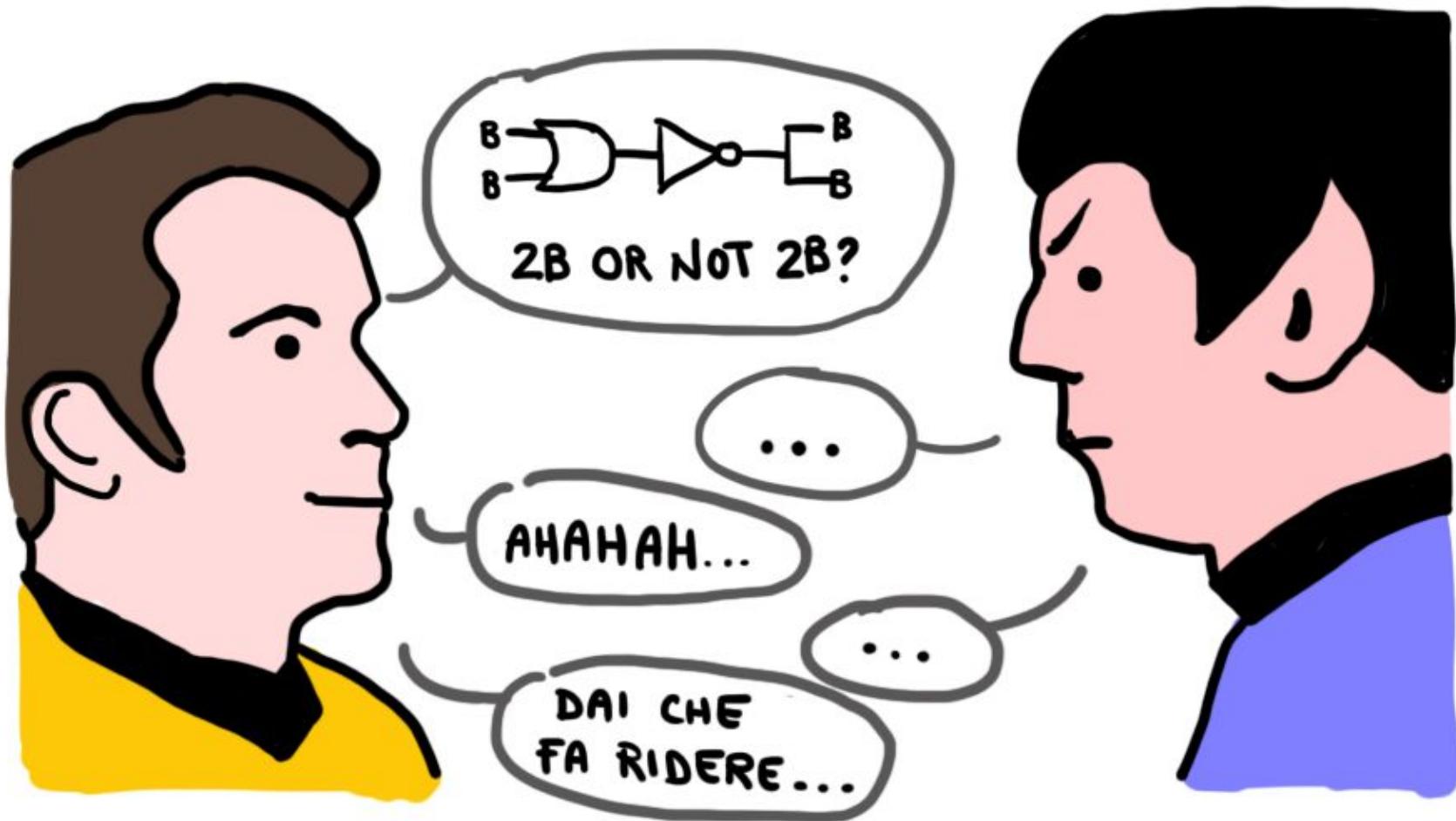


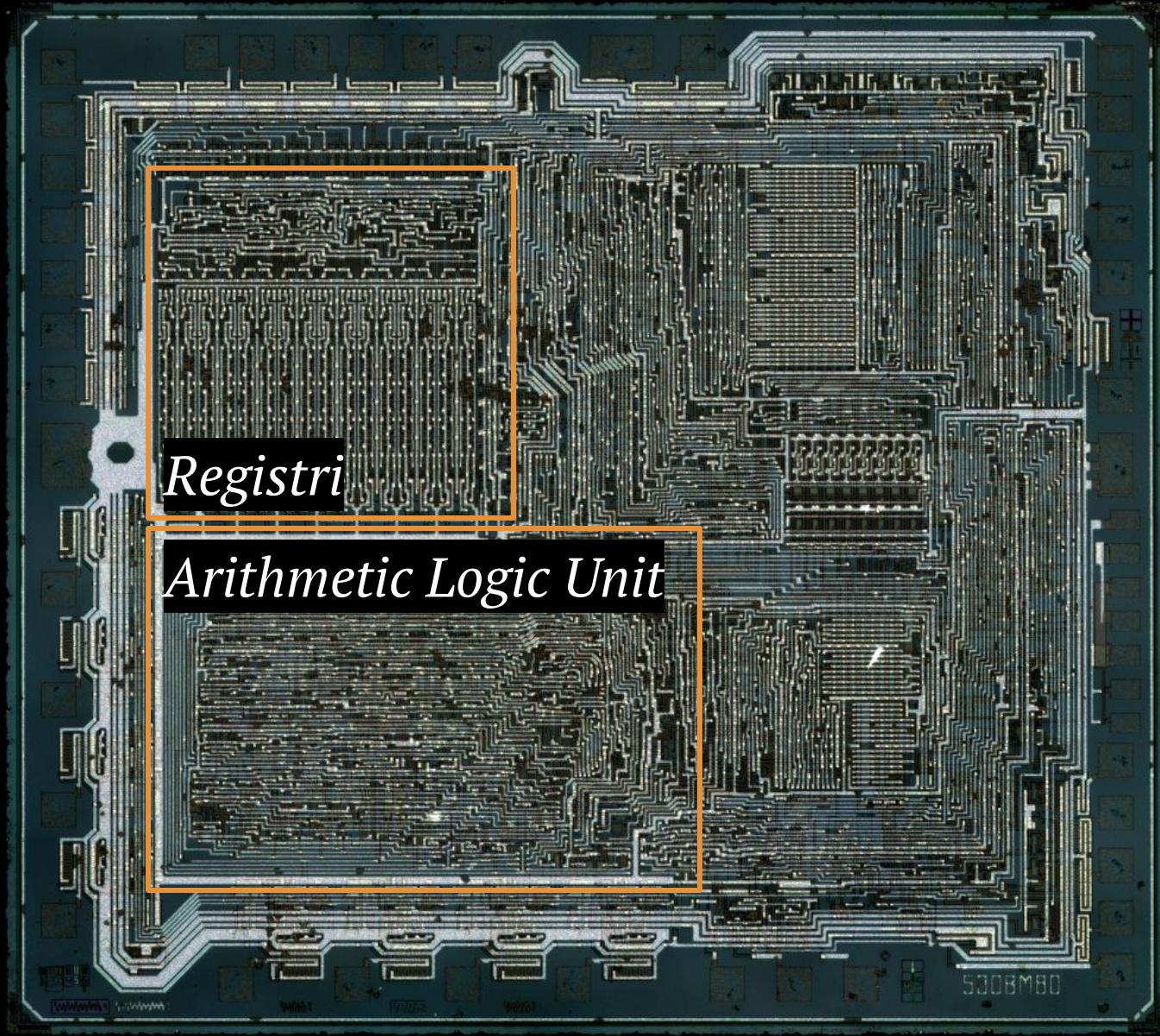
A	B	A xor B
1	1	0
1	0	1
0	1	1
0	0	0

NAND



A	B	A nand B
1	1	0
1	0	1
0	1	1
0	0	1





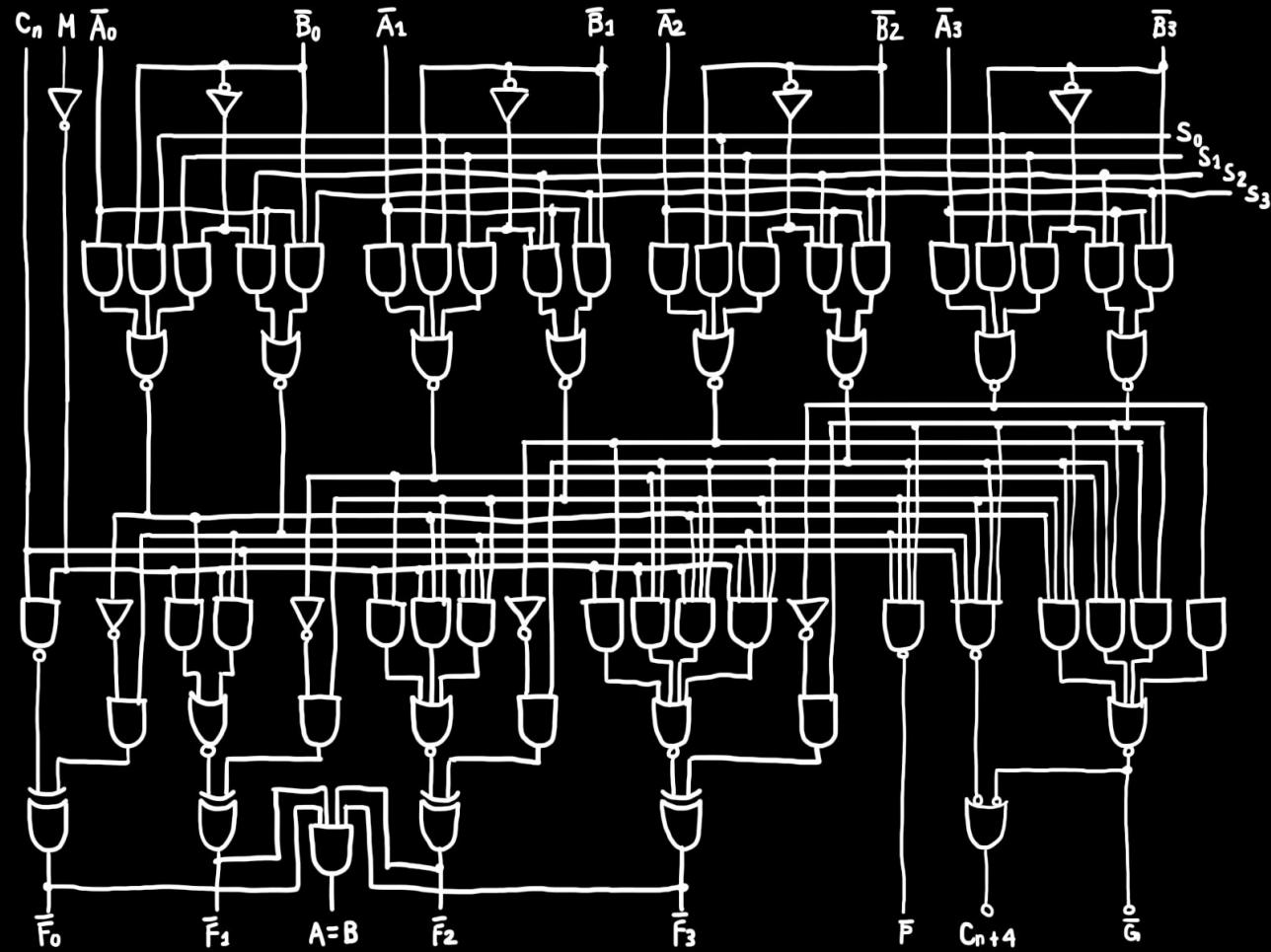
Registers

Arithmetic Logic Unit

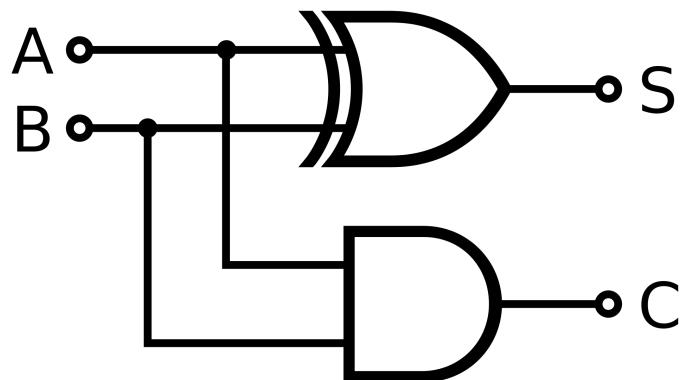


WE NEED TO GO DEEPER

Com'è fatta un'ALU:

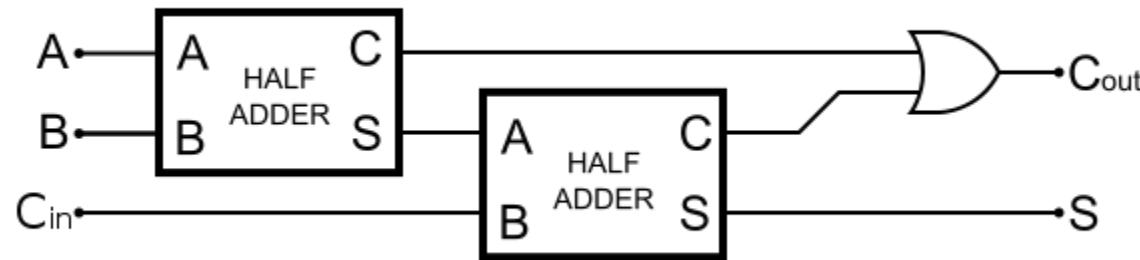


Half Adder

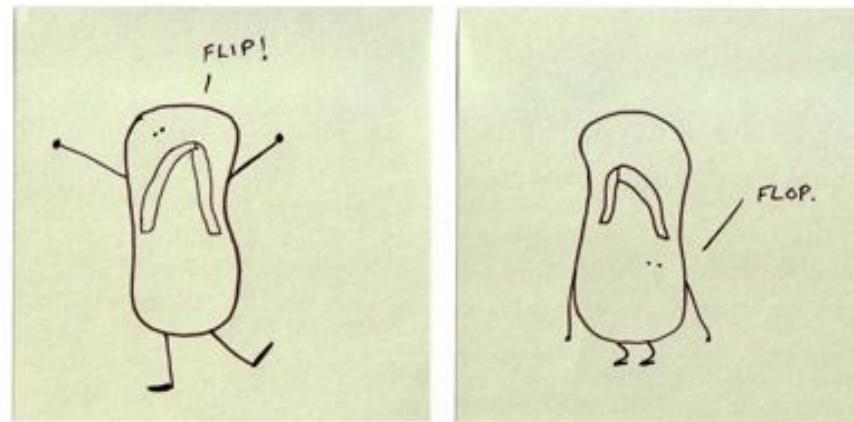
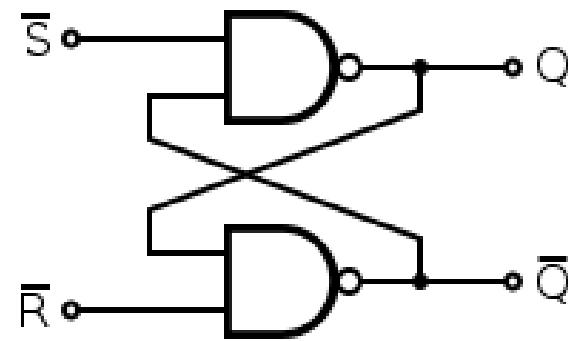


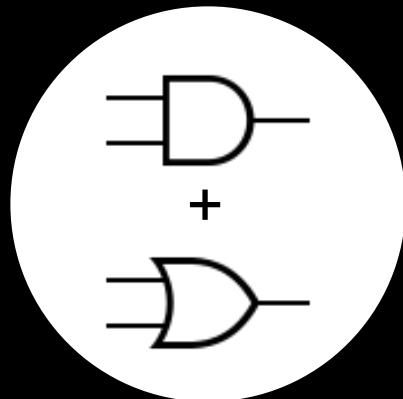
Input		Output	
A	B	S	C
1	1	0	1
1	0	1	0
0	1	1	0
0	0	0	0

Full Adder



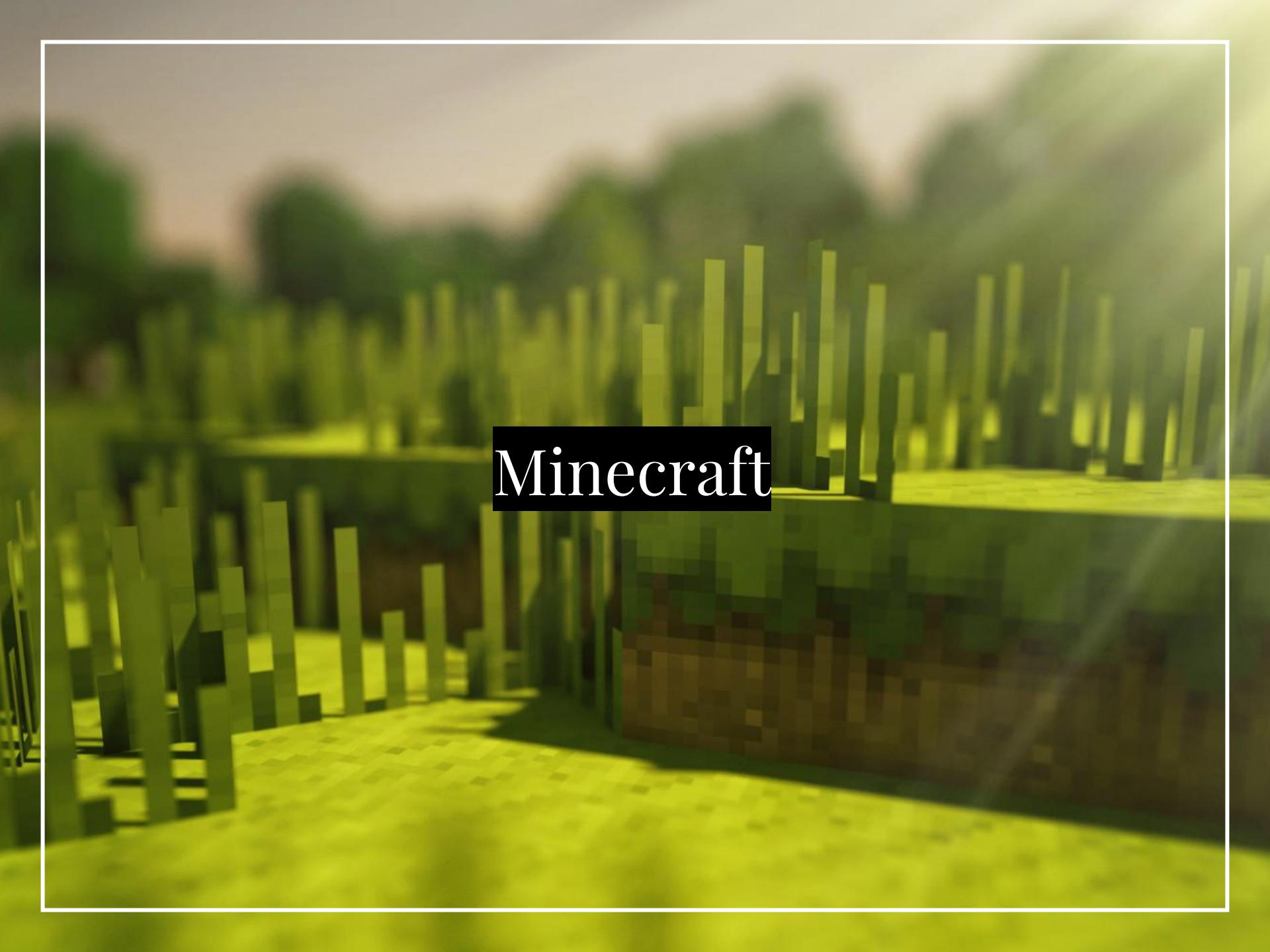
Flip Flop (SR latch)





*E' sufficiente poter costruire un
AND e un OR per poter dire che un
sistema è turing-completo?*

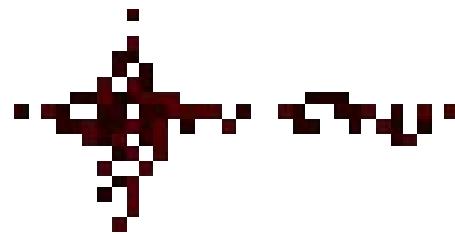
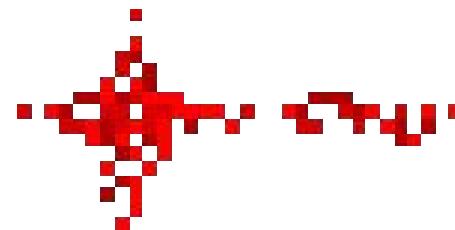
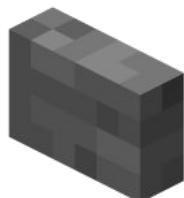
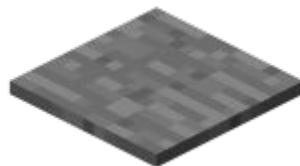
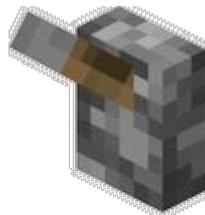
(La risposta è: sì)

A blurred background image of a Minecraft landscape. It features a wooden fence in the foreground, a dirt path leading towards a forest of birch trees, and a bright sky above.

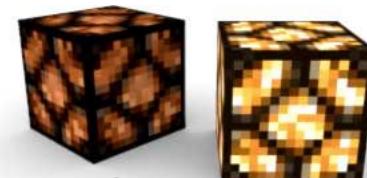
Minecraft

Redstone: simula il comportamento di un filo attraverso cui può passare un segnale

Input



Output



YOU MUST BE A REDSTONE TORCH,
BECAUSE YOU ARE EXTENDING MY
PISTON.





Air
(Null)



Switch
(Input)



Block
(Generic)



Torch
(Side of Block)



Torch
(On Ground)



Torch
(Top of Block)



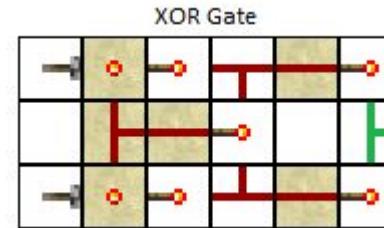
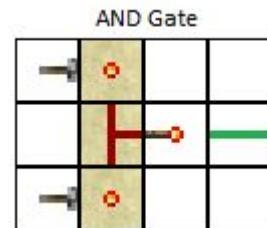
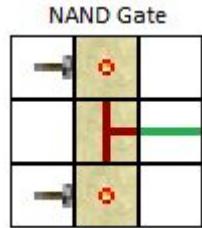
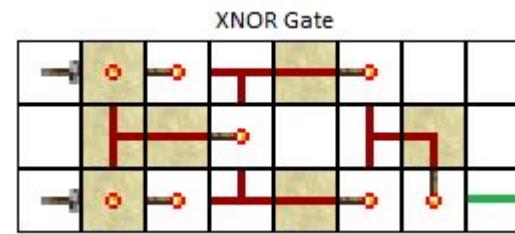
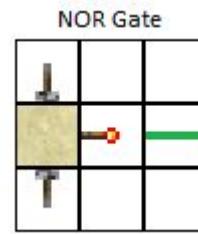
Redstone
(On Ground)



Redstone
(Top of Block)



Redstone
(Output)



Si può ricostruire Minecraft
dentro Minecraft?

256 mb

La quantità minima di RAM per eseguire Minecraft

2,147,483,648 flip flop

Per ricostruire 256 mb

$53 * 10^9$

Blocchi necessari, considerando flip flop grandi 5x5, per 256 mb

65536

Blocchi in un chunk, un chunk pesa 6 mb

819200

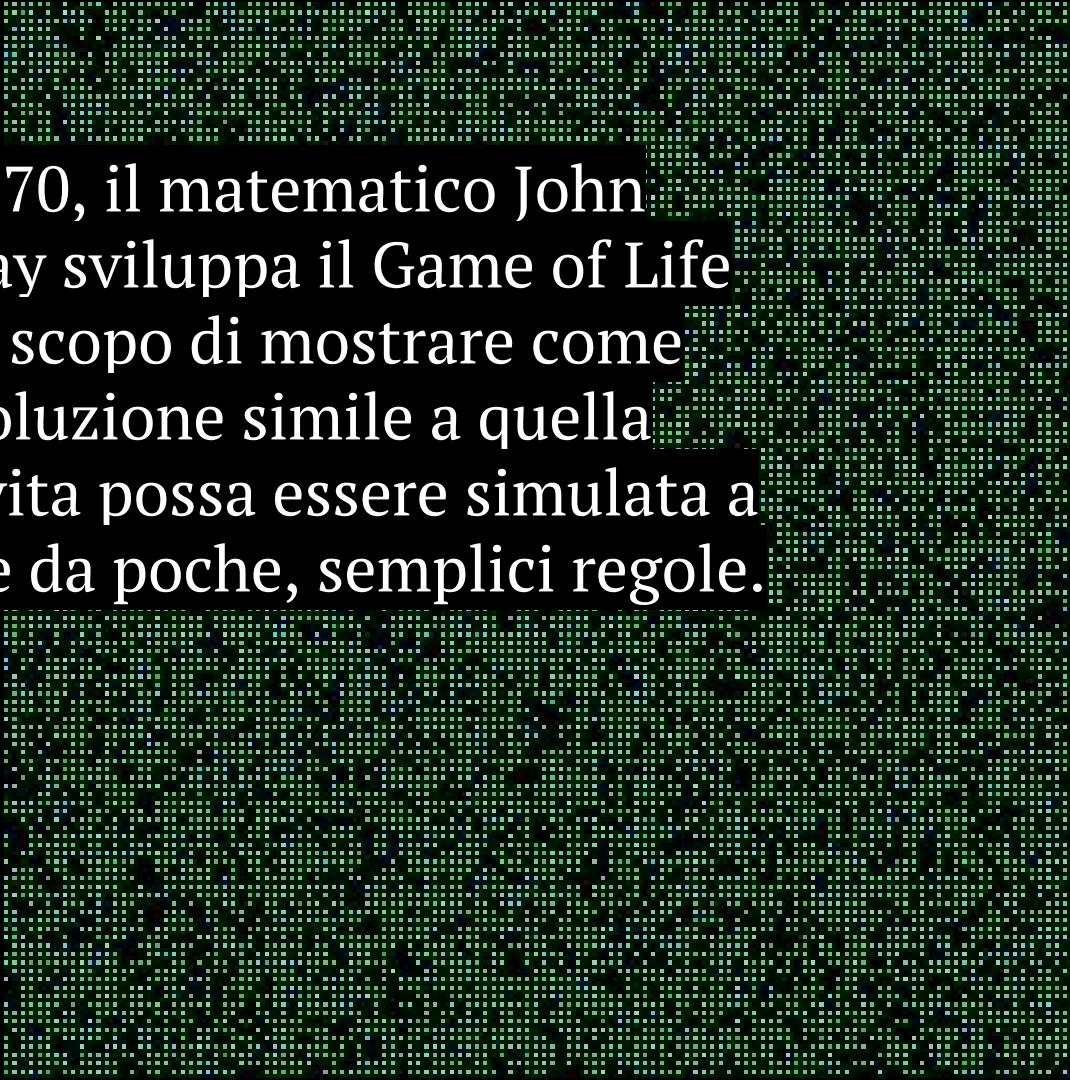
Per contenere $53 * 10^9$ blocchi

4915200 mb = 4,7 tb

Memoria necessaria per contenere tutti quei chunk

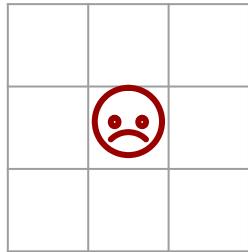
A black and white image showing a simulation of Conway's Game of Life. The background is black, and it contains numerous small, greenish-yellow clusters of dots representing living cells. These clusters vary in size and density, some appearing as single dots while others form larger, more complex shapes like loops or chains. The overall pattern is organic and non-repeating.

Conway's Game of Life

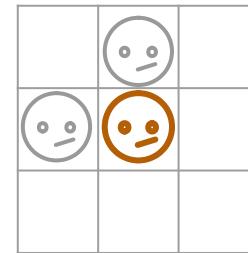


Nel 1970, il matematico John Conway sviluppa il Game of Life con lo scopo di mostrare come un'evoluzione simile a quella della vita possa essere simulata a partire da poche, semplici regole.

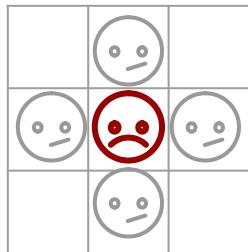
Il gioco si svolge su una griglia di dimensioni arbitrarie.
Ogni cella della griglia può essere viva o morta.



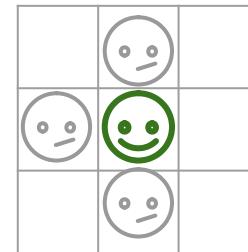
Se una cella viva non ha nessun vicino vivo, oppure un solo vicino vivo, muore di solitudine.



Se una cella viva ha 2 vicini vivi, non cambia il suo stato.



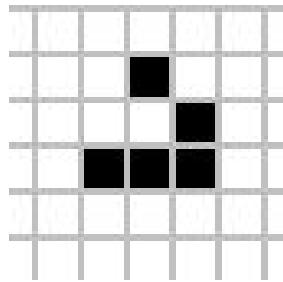
Se una cella viva ha 4 vicini vivi, muore per sovraffollamento.



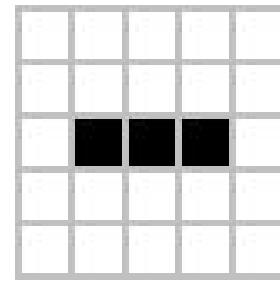
Se una cella ha tre vicini vivi, si riproduce.

Alcune configurazioni sono particolarmente interessanti:

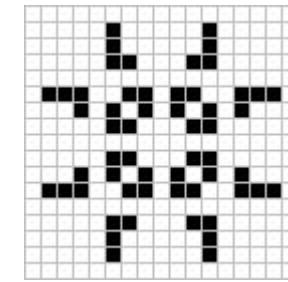
Glider:



Blinker:



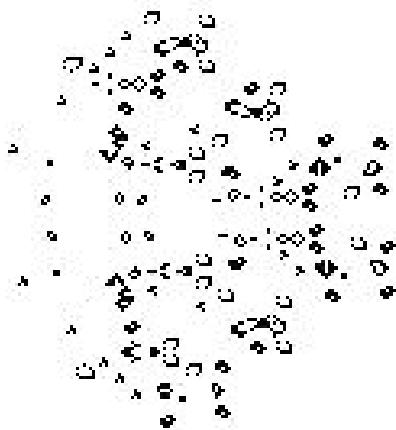
Pulsar:



Glider Gun:

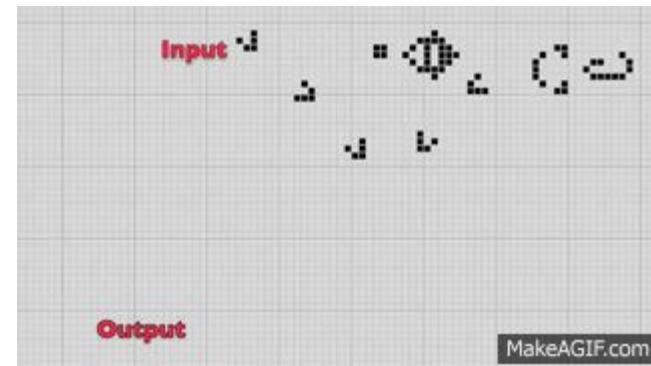
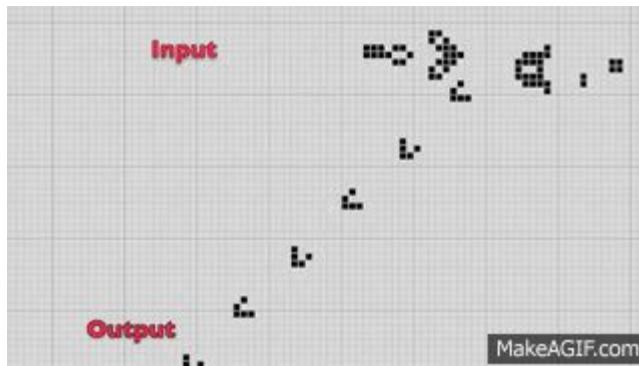


Un esempio:



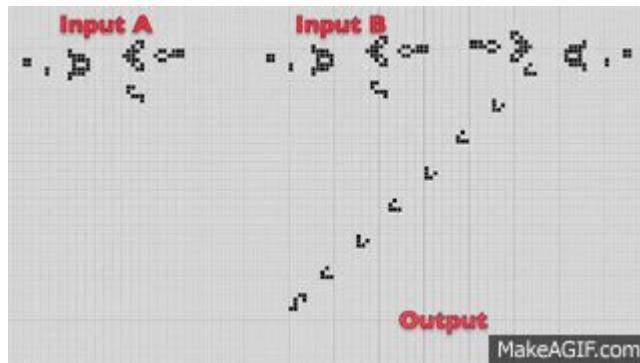
Porte logiche nel game of life

NOT

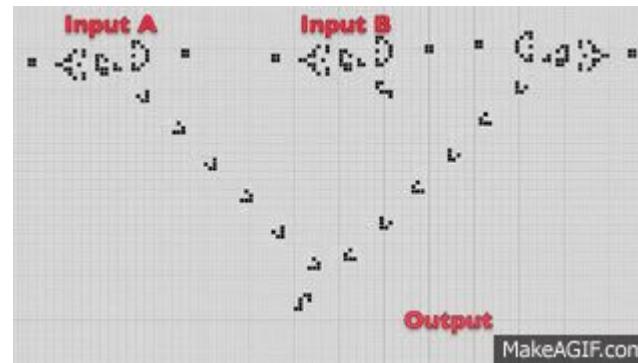


AND

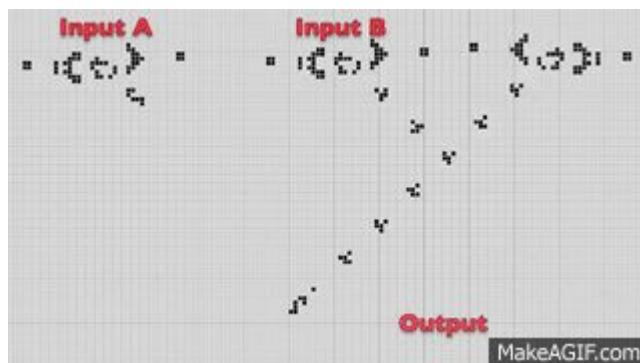
A = 0, B = 0, out = 0



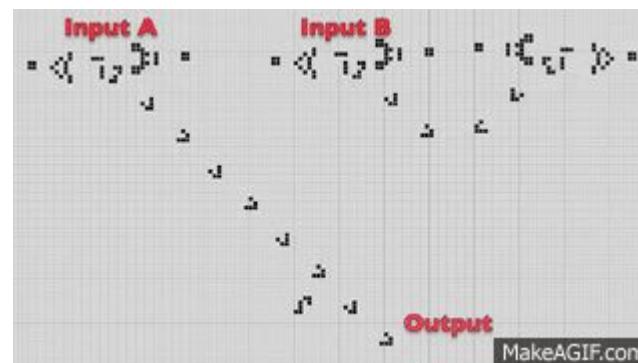
A = 1, B = 0, out = 0



A = 0, B = 1, out = 0

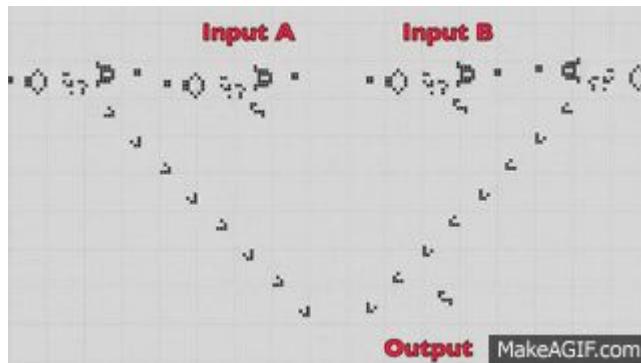


A = 1, B = 1, out = 1

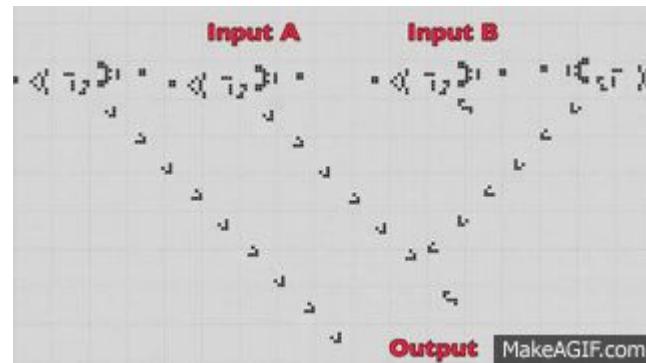


OR

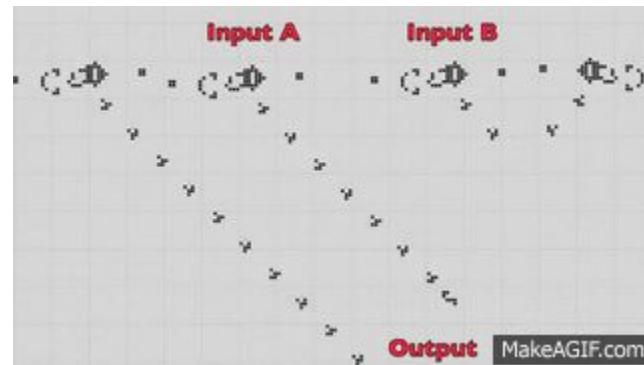
$$A = 0, B = 0, \text{out} = 0$$



A = 1, B = 0, out = 1



A = 1, B = 1, out = 1



Campo Minato

31224

2 2 1 1 1

2 2 2 1 1 2

4 3 1 1 1

1 1 1 1

32211

2 1 1 1

32112

11

111

1

1

2

Page 10

ANSWER

Table 1. Summary of the main characteristics of the samples.

100% of the time.

ANSWER

Table 1. Summary of the main characteristics of the four groups.

Table 1. Summary of the main characteristics of the samples.

Table 1. Summary of the main characteristics of the samples.

Table 1. Summary of the main characteristics of the samples.

100% Polyester

—
—
—
—
—

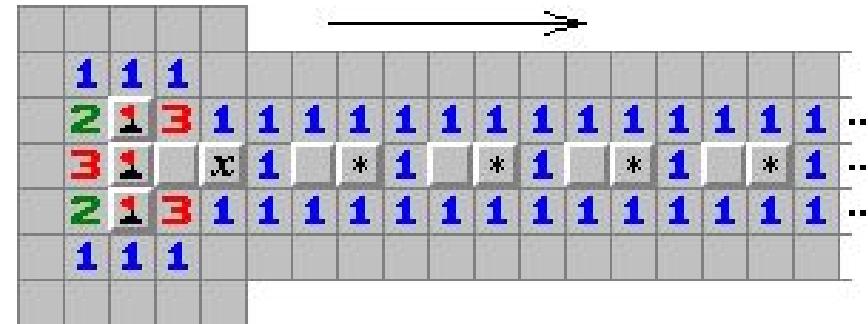
10 of 10

Digitized by srujanika@gmail.com

Consistente:

1	1	1	
1			
1	1	1	

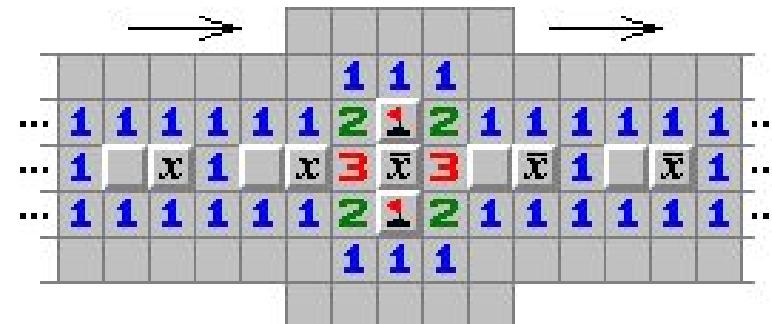
Trasportare un segnale:



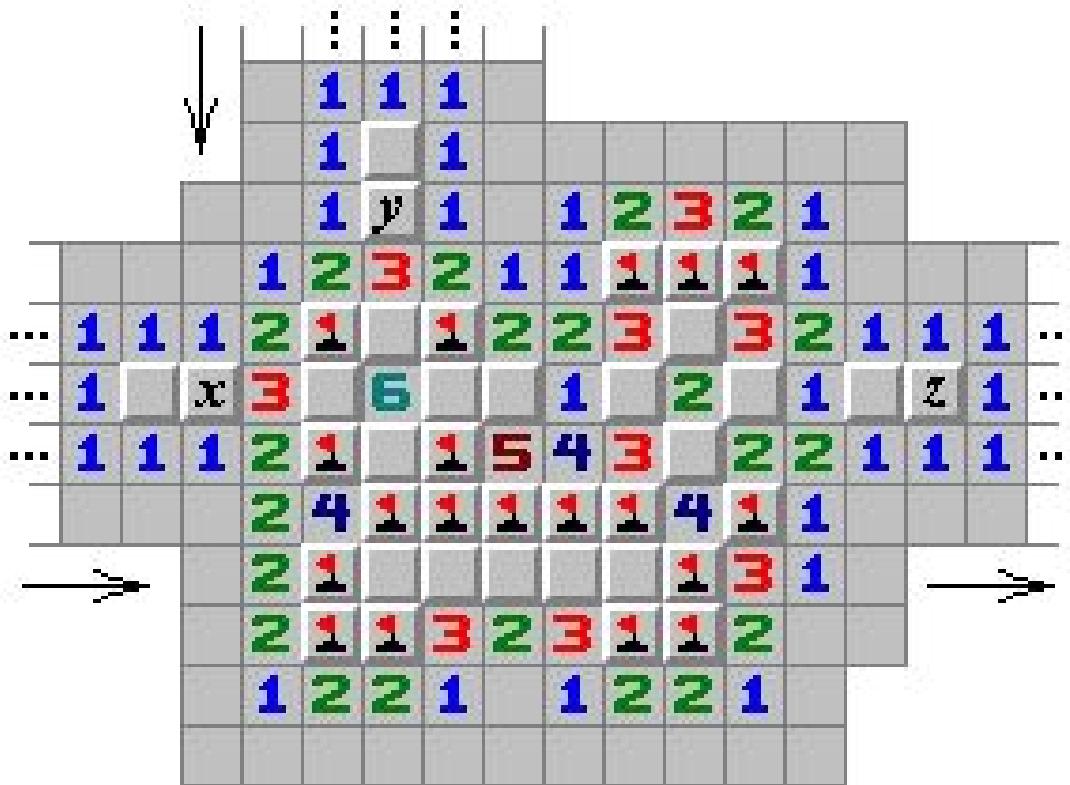
Inconsistente:

1	2	1	
1			
1	2	1	

Negare un segnale:



Un Or in campo minato:





Pokemon Giallo



©1995-1999 GAME FREAK inc.

Basic Pokémon

guitaristchamp



Pokémon. Length: A███████████, Weight: b

Pokémon Power: Self Destruct Throw all the cards off the table and break the game.

Exploit Transform the game into another game.

nan

weakness

resistance

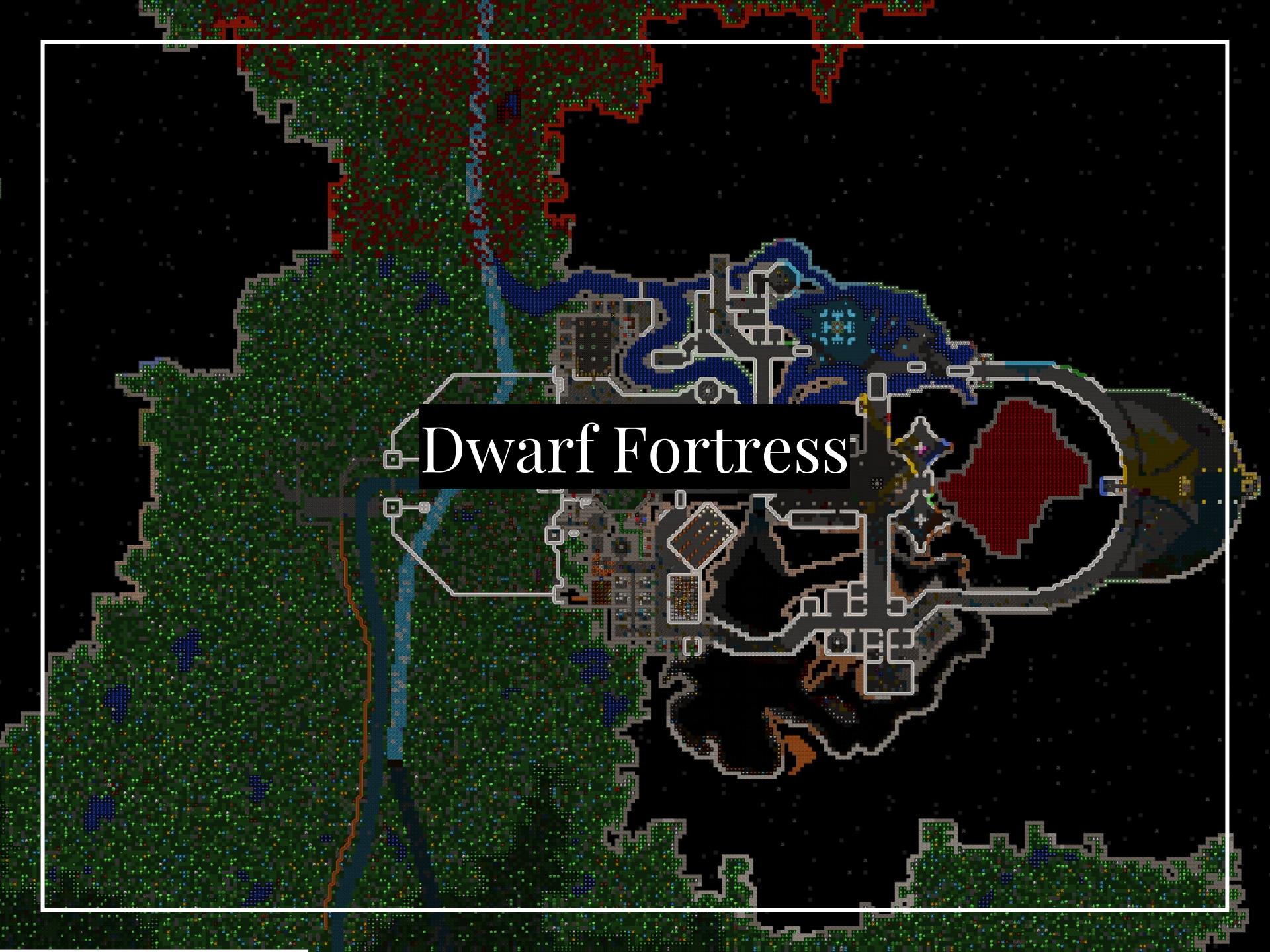
retreat cost

incorrect **id** **hB** **V**

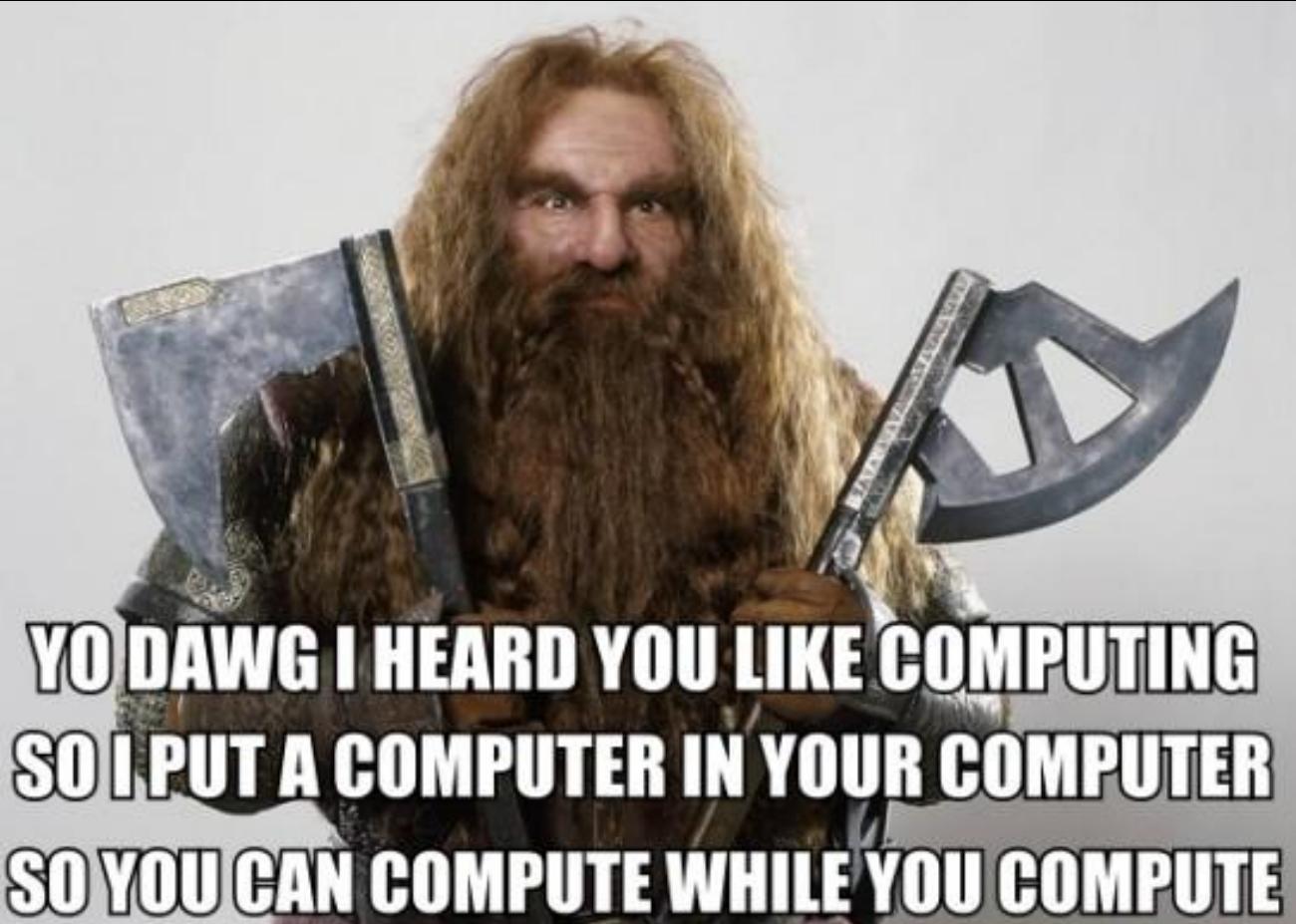
©1995, 96, 98 Nintendo, Creatures, GAMEFREAK.



Fare i conti con i treni

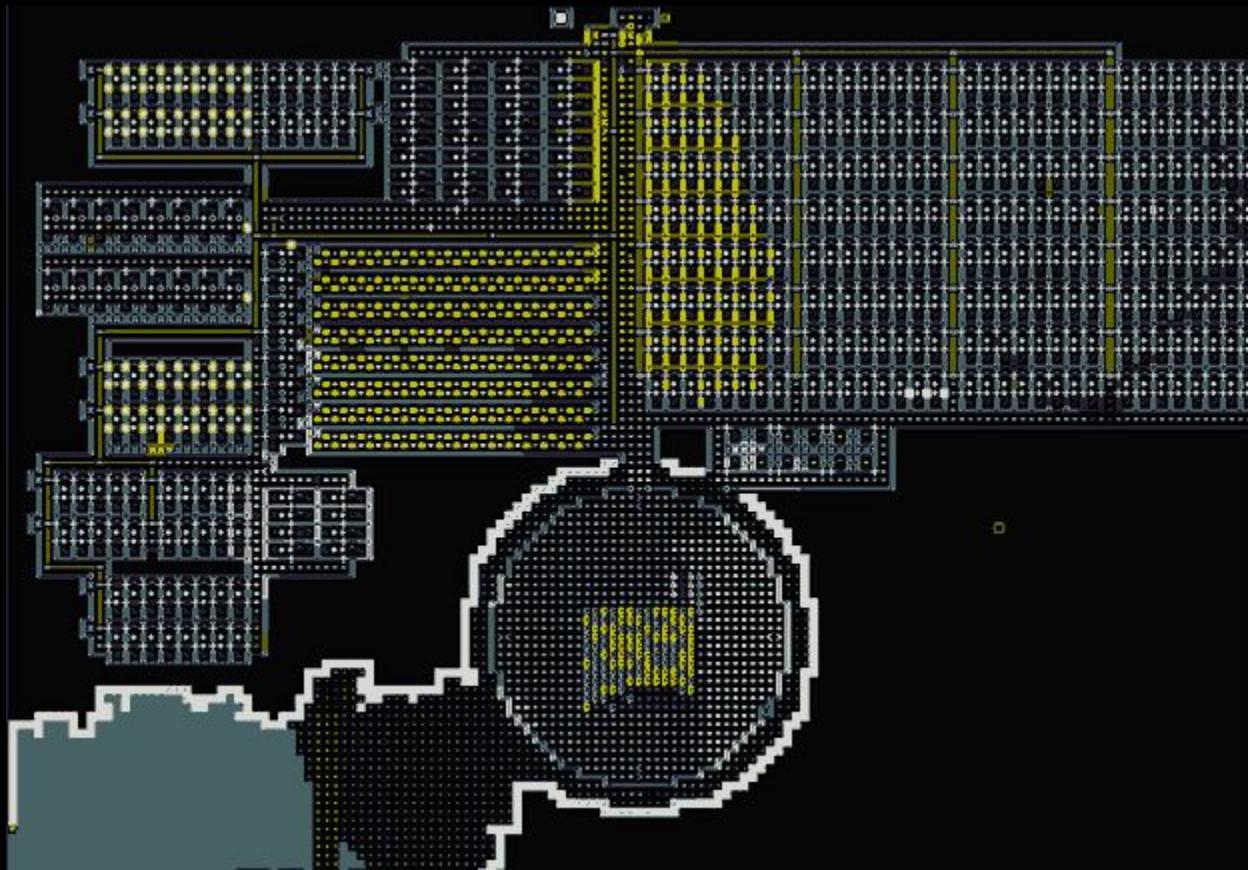


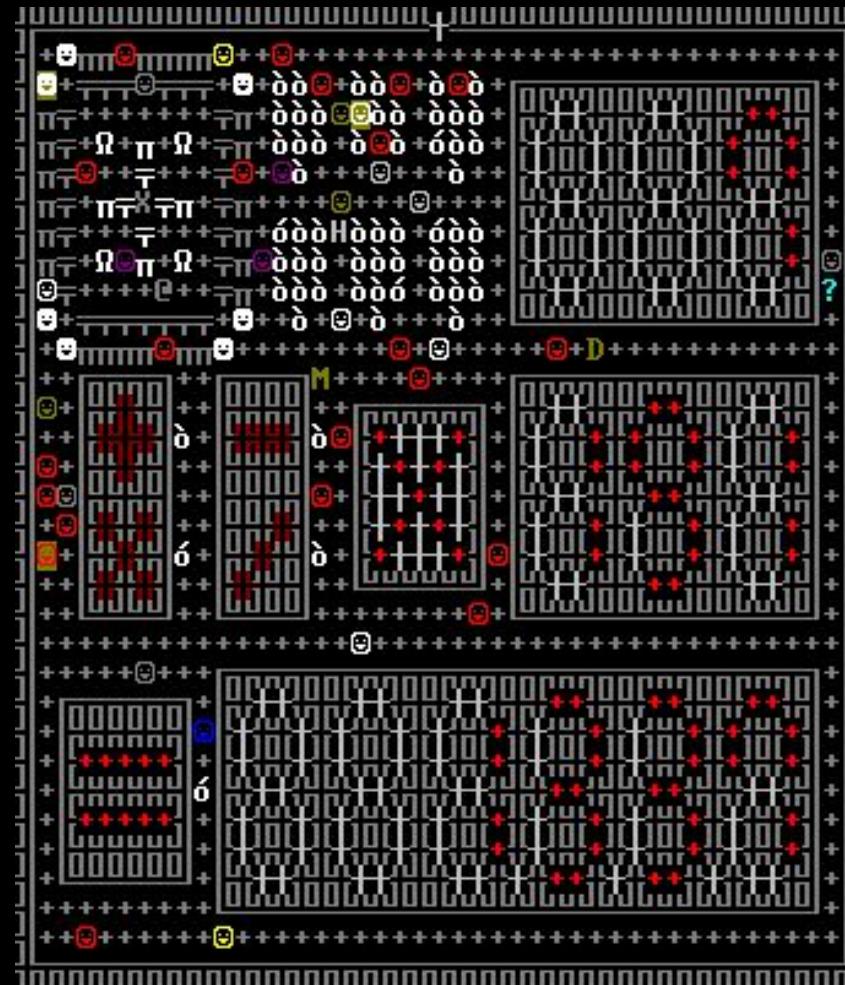
Dwarf Fortress

A close-up photograph of a dwarf from the movie "The Hobbit". He has long, light brown hair and a very long, bushy brown beard. He is wearing dark armor with gold-colored shoulder guards. He is holding a large, two-handed battle-axe with both hands, the head of which is angled upwards and to the right. The background is plain white.

**YO DAWG I HEARD YOU LIKE COMPUTING
SO I PUT A COMPUTER IN YOUR COMPUTER
SO YOU CAN COMPUTE WHILE YOU COMPUTE**

THE DWARVEN COMPUTER







Ecco una foto del nostro pappagallo per ringraziarvi dell'attenzione.

Domande?

Puoi trovarci a:

dibartolomeo.sara@gmail.com

lucadb96@gmail.com