

# [1100] Conway's Game of Life

Our first application will be to program [Conway's Game of Life](https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life) ([https://en.wikipedia.org/wiki/Conway%27s\\_Game\\_of\\_Life](https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life))- a very famous cellular automata game.

Here's what a graphical version of Life looks like:

(It's a mathematical "game" - not an actual game.)

The Game of Life is the first program that I write whenever I am learning a new programming language.

Here's how the "game" is "played:"

Cells can "live" on a two dimensional grid of squares. On that grid, each square can either be alive or dead. If a cell is alive, it appears as a filled in box otherwise it is empty.

The only thing a "player" can do is to set the initial state of the game - i.e. determine which cells are alive and which are dead at the start. Once the game is started, the cells live and die according to the rules of life (see below).

Each cell has 8 neighbors - horizontal, vertical and diagonal - that it interacts with.

Time passes as a never ending series of "generations" with each generation instantly appearing and overwriting the previous generation.

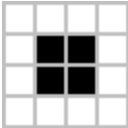
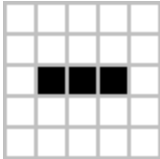
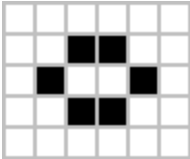
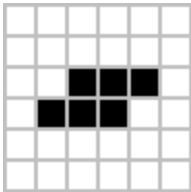
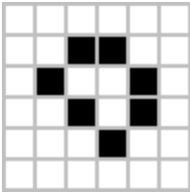
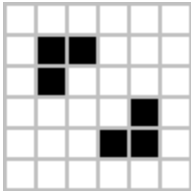
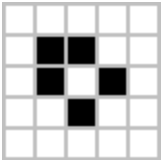
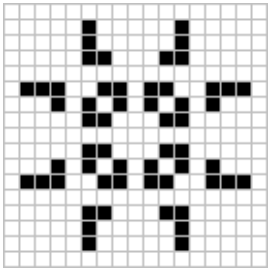
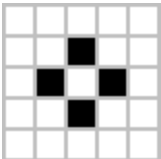
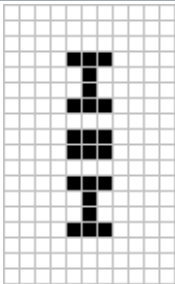
For each generation, depending on the number of neighbors they have, a living cell can either stay living or die, and a dead cell can either stay dead or become alive.

## The Rules of Life:

- If a cell is alive and has 2 or 3 neighbors, it stays alive.
- If a cell is alive and has 0 or 1 neighbors, it dies of loneliness
- If a cell is alive and has more than 3 neighbors, it dies of overpopulation
- If a cell is dead and has exactly 3 neighbors, it becomes alive in the next generation
- If a cell is dead and doesn't have exactly 3 neighbors, it stays dead.

## Life Patterns:

- Still Lifes
- Oscillators
- Gliders/Ships
- etc.

Still lifes		Oscillators	
Block	<div> (<a href="https://en.wikipedia.org/wiki/File:Game_of_life_block_with_border.svg">https://en.wikipedia.org/wiki/File:Game_of_life_block_with_border.svg</a>)</div>	Blinker (period 2)	<div> (<a href="https://en.wikipedia.org/wiki/File:C">https://en.wikipedia.org/wiki/File:C</a>)</div>
Beehive	<div> (<a href="https://en.wikipedia.org/wiki/File:Game_of_life_beehive.svg">https://en.wikipedia.org/wiki/File:Game_of_life_beehive.svg</a>)</div>	Toad (period 2)	<div> (<a href="https://en.wikipedia.org/wiki/File:C">https://en.wikipedia.org/wiki/File:C</a>)</div>
Loaf	<div> (<a href="https://en.wikipedia.org/wiki/File:Game_of_life_loaf.svg">https://en.wikipedia.org/wiki/File:Game_of_life_loaf.svg</a>)</div>	Beacon (period 2)	<div> (<a href="https://en.wikipedia.org/wiki/File:C">https://en.wikipedia.org/wiki/File:C</a>)</div>
Boat	<div> (<a href="https://en.wikipedia.org/wiki/File:Game_of_life_boat.svg">https://en.wikipedia.org/wiki/File:Game_of_life_boat.svg</a>)</div>	Pulsar (period 3)	<div> (<a href="https://en.wikipedia.org/wiki/File:C">https://en.wikipedia.org/wiki/File:C</a>)</div>
Tub	<div> (<a href="https://en.wikipedia.org/wiki/File:Game_of_life_flower.svg">https://en.wikipedia.org/wiki/File:Game_of_life_flower.svg</a>)</div>	Pentadecathlon (period 15)	<div> Column.gif (<a href="https://en.wi">https://en.wi</a>)</div>

[https://en.wikipedia.org/wiki/Conway%27s\\_Game\\_of\\_Life#Examples\\_of\\_patterns](https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life#Examples_of_patterns)  
([https://en.wikipedia.org/wiki/Conway%27s\\_Game\\_of\\_Life#Examples\\_of\\_patterns](https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life#Examples_of_patterns))

The r-Pentomino:

A Glider Gun:

Something even more interesting:

## More info:

Interview with John Conway:

[Inventing Game of Life - Numberphile](https://www.youtube.com/watch?v=R9Plq-D1gEk) [\(https://www.youtube.com/watch?v=R9Plq-D1gEk\)](https://www.youtube.com/watch?v=R9Plq-D1gEk)

[\(https://www.youtube.com/watch?v=R9Plq-D1gEk\)](https://www.youtube.com/watch?v=R9Plq-D1gEk)

Amazing Game of Life Patterns:

[epic conway's game of life](https://www.youtube.com/watch?v=C2vgICfQawE) [\(https://www.youtube.com/watch?v=C2vgICfQawE\)](https://www.youtube.com/watch?v=C2vgICfQawE)

[\(https://www.youtube.com/watch?v=C2vgICfQawE\)](https://www.youtube.com/watch?v=C2vgICfQawE)

### 3-D Game of Life Visualization:

[Game of life : time's up \(first tests\)](https://www.youtube.com/watch?v=iiEQg-SHY1g) [\(https://www.youtube.com/watch?v=iiEQg-SHY1g\)](https://www.youtube.com/watch?v=iiEQg-SHY1g)

[\(https://www.youtube.com/watch?v=iiEQg-SHY1g\)](https://www.youtube.com/watch?v=iiEQg-SHY1g)

The Game of Life *programmed in The Game of Life!* #whoa

[Life in life](https://www.youtube.com/watch?v=xP5-ileKXE8) [\(https://www.youtube.com/watch?v=xP5-ileKXE8\)](https://www.youtube.com/watch?v=xP5-ileKXE8)

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