



A life - How it works

A comprehensive summary

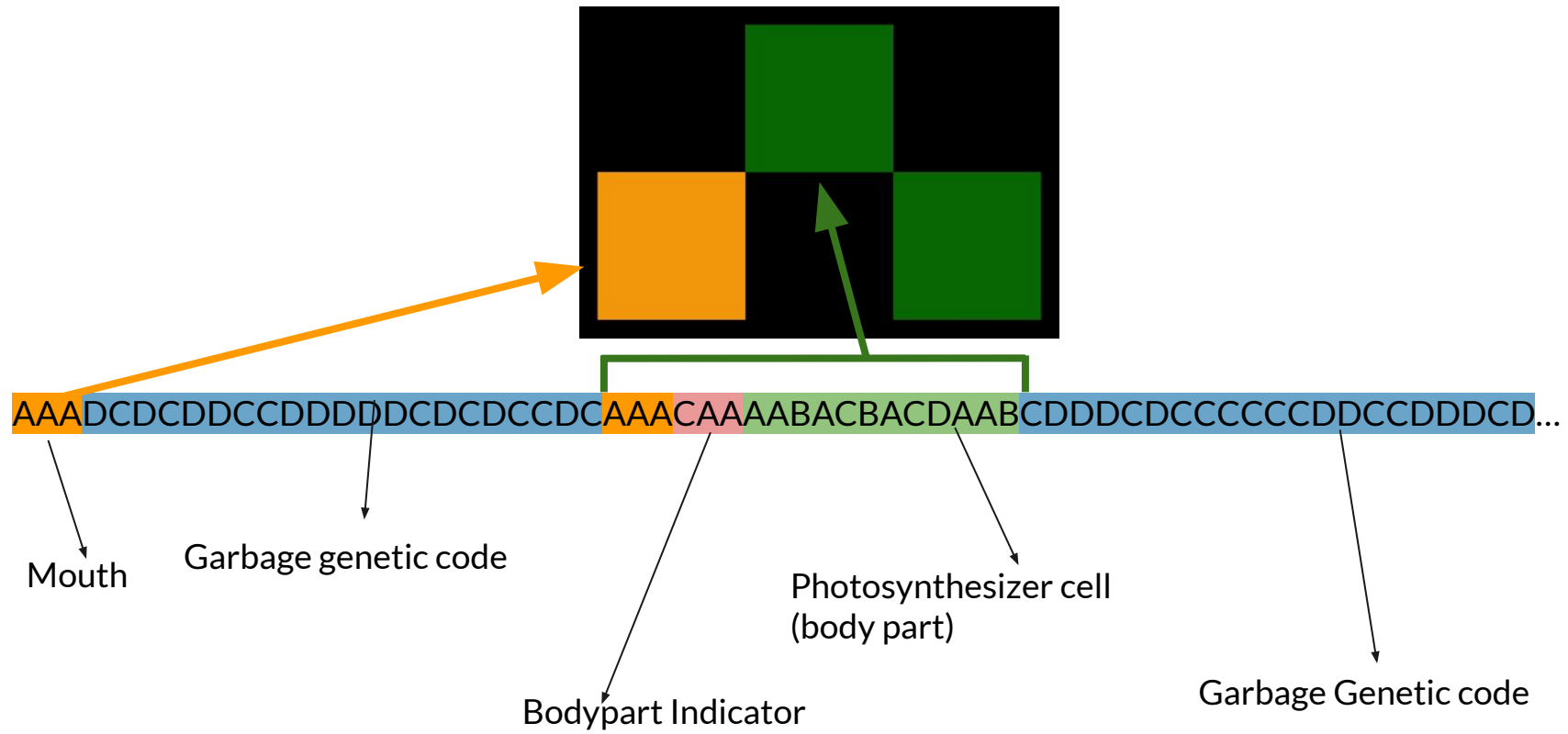


Genomes and Phonemes

The blueprint of the organism

Based on real biology

Genome -> Phenome -> Organism



Example of a genome string converted to a phenotype



Mutations

- Insertion, Deletion, Substitution
- Whole gene duplication
- Whole gene deletion



Gene Types

Body Gene

Determines placement of body parts

Eye Gene

Determines actions based on sight

Movement Gene

Sets rate of movement for organism

Mutation Gene

Sets rate and type of mutations for organism

Upgrade Gene

Upgrades body parts to more efficient versions








Placing New Cells

Organisms are built cell-by-cell

- The cells can be added in a semi random way
- Each cell has a body cell which has a direction
- Any of the 8 cardinal directions
- The cell moves in that direction
- A cell is placed in that spot
- A random number between 1 and 4 is assigned to it
- At a later time, it can choose to use that location
- Whatever direction that was, the cell is placed relative to the organism then



Cell Types

	Mouth Cell
	Mover Cell
	Photosynthesis Cell
	Weapon Cell
	Armor Cell
	Eye Cell
	Scaffolding Cell

Mouth Cell - Eats dead cells in the four spaces adjacent to it each tick
- Organism gets energy from those cells

Mover Cell - Organisms with the mover cells can move
- The more mover cells, the higher priority for moving

Photosynthesis Cell - Gives an organism the chance to gain energy from light
- The chance is diminished by surrounding organisms

Weapon Cell - Diminishes surrounding cells energy
- When a cells energy reaches 0, they die

Armor Cell - Protects organism from damage
- Also protects surrounding cells from damage some

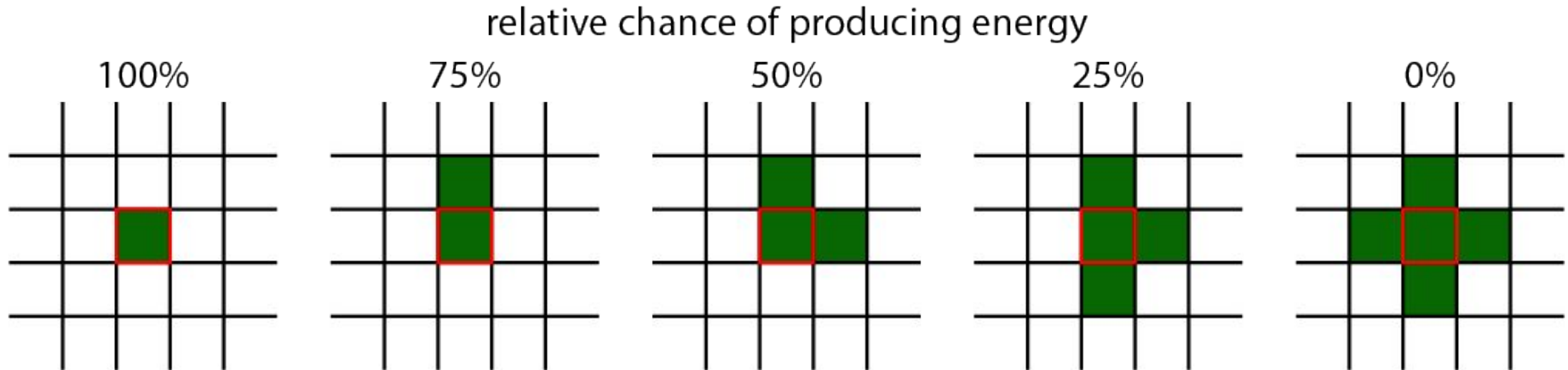
Eye Cell - Helps an organism to see around the environment

Scaffolding Cell - Low cost cell to have
- Doesn't do much until upgraded
- Then acts as shield cell for self only



Photosynthesis

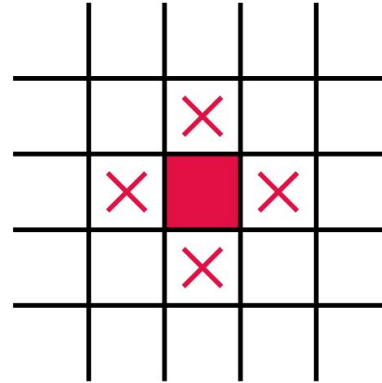
Chance to produce energy = light percentage * crowding percentage



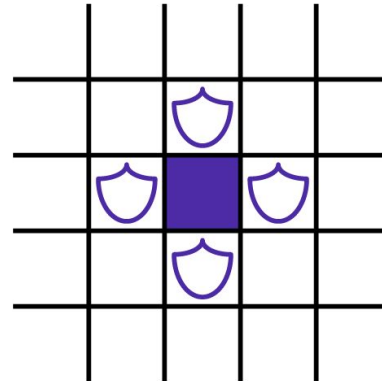
Weapons and Armor

- Weapons attack adjacent cells of other organisms
- Armor blocks attacks to adjacent cells from other organisms
- Armor itself is immune to weapon damage, but only partially protects adjacent cells

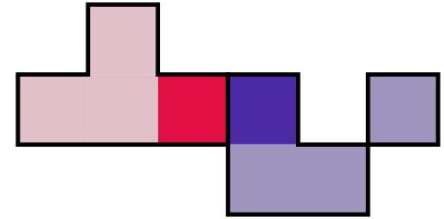
Weapon Attack Pattern



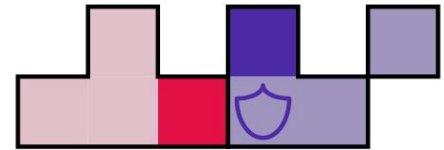
Armor Defense Pattern



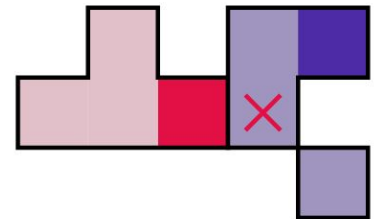
Fully blocked



Partially blocked

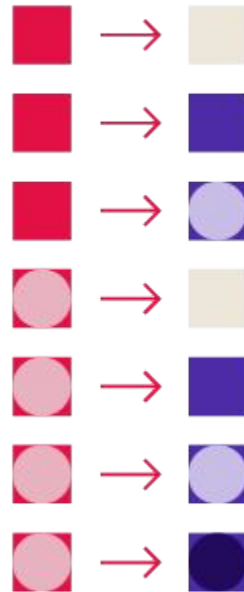


Full damage

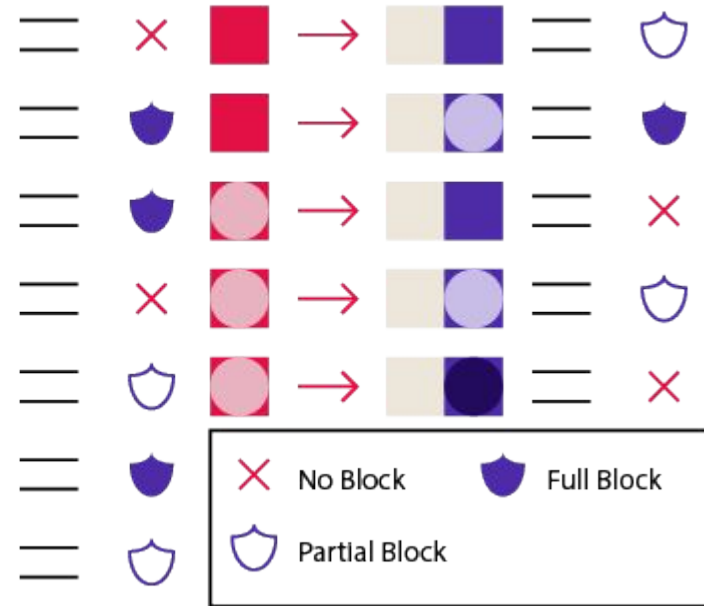


Upgraded Armor and Weapons

- Both weapons and armor can be upgraded in one of 3 different modes
- Modes of the same type (indicated by same lightness of upgrade circle) cancel each other out
- Upgraded weapons are more effective against unupgraded armor and upgraded armor of the wrong type



Weapon vs Armor chart





Messages

The two applications use sockets to send messages back and forth, passing messages about the current state and requesting data.

C++ -> Python

- Initialization
- Single Frame
- Request
- Controls
- Settings

Python -> C++

- Initialization
- Single organism
- Settings
- Controls
- Tree
- Frame



Light generation

Noise maps are used to distribute light throughout the map, providing varying levels of sustenance for organisms capable of photosynthesis

