Conway's "Competitive" Game of Life

A software developed by:
As Long As We Graduate

Who are we?

Daniel Sachs - documentation, game coder, testing

James Walls - game coder, testing, documentation

Sarah Alvarez - game coder, GUI coder, point of contact

Innocent Kironji - game coder, testing

Jason Schuler - documentation

Pablo Burgos - researcher, GUI coder

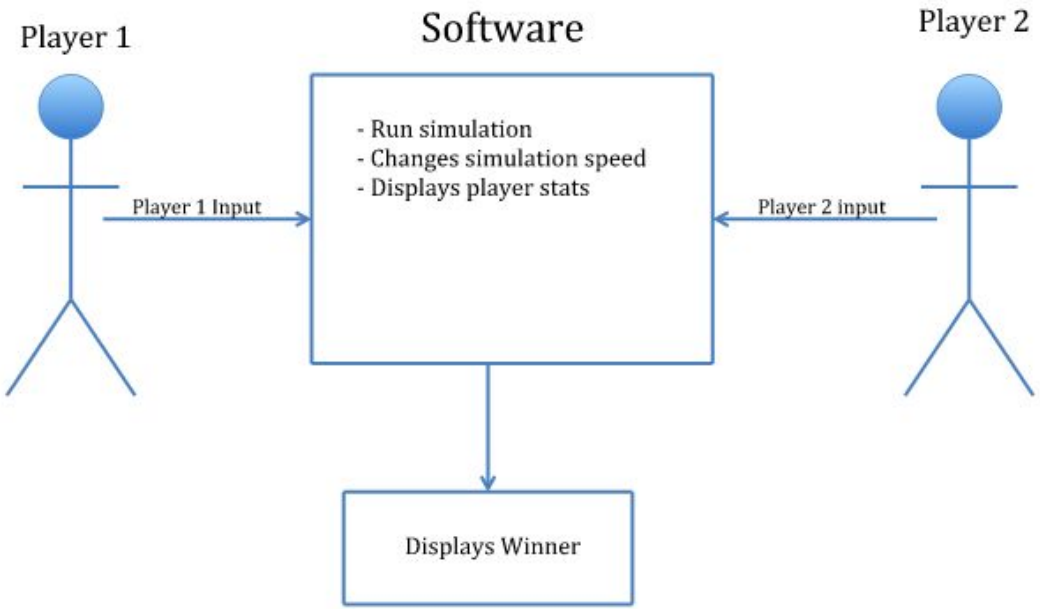
Agenda

- User Stories
  - Requirements
- Documentation
  - Design
  - Tests
- Trades
- SW Summary
- Licenses
- Demo
- Conclusions
- Q & A

Story Time

- Our client knew what the Game of Life was and wanted to turn it into a competitive game with two players.
- How would the game work?
  - Each player would pick cells
  - Iterate the simulation
  - End up with the least amount of whitespace.
- Goals
  - Create a full-feature and user-friendly game
  - Preserve the rules of Conway's Game of Life

UML


Player 1
Software
Player 2
- Run simulation
- Changes simulation speed
- Displays player stats
Player 1 Input
Player 2 input
Displays Winner

Requirements

Requirement	CD	Test Status	Test Method
Shall be a desktop application	03/01/19	Complete	Observation
Shall operate on Windows	03/05/19	Complete	Observation
The game file(s) shall not exceed 500 MB	05/08/19	Complete	Observation (of file info)
Main menubar shall have an exit feature that ends game	03/05/19	Complete	Observation
Pre game screen shall have two color selection menus	04/28/19	Complete	Unit Test + Observation
Color selection menu allows: green, purple, red, blue	04/30/19	Complete	Unit Test + Observation

*CD = Completion Date

Requirements

Requirement	CD	Test Status	Test Method
Choosing first color changes P1’s color selection	05/01/19	Complete	Observation
Choosing second color changes P2’s color selection	05/01/19	Complete	Observation
Game shall have a start button that only displays when both players have selected their color	05/02/19	Complete	Observation
Game shall have one 35x35 grid of cells for each player	04/01/19	Complete	Observation (count tiles)
Cells shall have two states called “alive” and “dead”	03/08/19	Complete	White-Box
“Alive” cells shall be colored with player color choice	04/25/19	Complete	Observation

*CD = Completion Date

Requirements

Requirement	CD	Test Status	Test Method
“Dead” cells shall have a state of “painted”	04/26/19	Complete	White-Box
Any previously alive cells shall be “painted”	04/10/19	Complete	White-Box
“Dead, painted” cells shall be colored using a lighter hue of player’s choice of color	04/10/19	Complete	Observation
“Dead, not painted” cells shall be colored white	03/08/19	Complete	Observation
Players shall edit their boards at beginning of each turn	04/29/19	Complete	Unit Test
The person who edits first on a turn shall alternate	Not Met (Need +1 week)	Incomplete	Unit Test

*CD = Completion Date

Requirements

Requirement	CD	Test Status	Test Method
Players shall have 15 credits to use each turn	04/16/19	Complete	Unit Test
Editing the current player's board shall cost one credit	04/16/19	Complete	Unit Test + Observation
Editing the opposing player's board shall cost two credits	04/25/19	Complete	Unit Test + Observation
Editing alive cell changes it to "dead and painted," and vice versa	04/20/19	Complete	Unit Test + Observation
The player's remaining credits shall be displayed	04/25/19	Complete	Observation
A player may stop editing without spending all credits	05/08/19	Partial (50%)	Unit Test

*CD = Completion Date

Requirements

Requirement	CD	Test Status	Test Method
The game shall have a start button	03/29/19	Complete	Observation
If players are done editing, begin one turn. Otherwise, do not begin the turn	05/04/19	Partial (70%)	Unit Test
A turn is defined as 20 “ticks” of the Game of Life simulation, as defined on Wikipedia	04/18/19	Complete	White-box
The player with the highest score wins the game.	04/28/19	Complete	Observation
If both players have the same score, game ends in a tie	04/29/19	Complete	Observation
When game ends, return to the pre-game menus	Not met (Need +2 weeks)	Incomplete	Observation

*CD = Completion Date

Requirements

Requirement	CD	Test Status	Test Method
The game shall provide a “Total Unclaimed” statistic for each player, equaling the total of all cells painted white	04/22/19	Complete	Observation
The game shall provide a “Total Claimed” statistic for each player, equaling their alive plus dead cells count	04/08/19	Complete	Observation
The game shall enable a user to change the iteration speed anywhere between 1 and 1000 ms	04/24/19	Partial (70%)	Unit Test

*CD = Completion Date

Documentation

Document	Status	CD	Author(s)
Software Design Document	Complete	5/6	Daniel
Software Requirements Sheet	Complete	5/7	Daniel, Sarah, Jason
Software Test Document	Complete	5/7	Jason
Software Test Report	Complete	5/7	Jason
Software User Manual	Incomplete	5/14	Jason
Software Acceptance Report	Complete	5/9	James, Pablo, Innocent

*CD = Completion Date

Trades

Weights											5	8	2	4	3	1	5	7	1			
Language	Intended use	Imperative	Object-oriented	Functional	Procedural	Generic	Event-driven	Standardized?	Failsafe I/O		Imperative?	OOP?	Functional?	Procedural?	Generic?	Event-Driven?	Standardized?	Failsafe I/O?	Team's Combined Years of Experience		Results		Highest Scoring Language
C	Application, system,[13] general purpose, low-level operations	Yes			Yes	Yes		1989, ANSI C89, ISO C90, ISO C99, ISO C11[14]	No		1	0	0	1	1	0	1	0	5		22		Python
C++	Application, system	Yes	Yes	Yes	Yes	Yes		1998, ISO/IEC 1998, ISO/IEC 2003, ISO/IEC 2011,ISO/IEC 2014,ISO/IEC	Some (STL iostreams throw on failure but C APIs like stdio or POSIX do not)[15][16]		1	1	1	1	1	0	1	1	12		46		
C#	Application, RAD, business, client-side, general, server-side, web	Yes	Yes	Yes[16]	Yes	Yes	Yes	2000, ECMA, ISO[17]	Yes		1	1	1	1	1	1	1	1	5		40		
COBOL	Application, business	Yes	Yes		Yes			ANSI X3.23 1968, 1974, 1985; ISO/IEC 1989:1985, 2002, 2014	No		1	1	0	1	0	0	1	0	1		23		
Java	Application, business, client-side, general, mobile development, server side, web	Yes	Yes	Yes	Yes	Yes	Yes	*De facto* standard via Java Language Specification	Yes		1	1	1	1	1	1	1	1	15		50		
JavaScript	Client-side, server-side, web	Yes	Yes	Yes	Yes		Yes	1997, ECMA	No		1	1	1	1	0	1	1	0	3		28		
Lua	Application, embedded scripting	Yes	Yes[29]	Yes	Yes			No	No (some functions do not warn or throw exceptions)		1	1	1	1	0	0	0	0	2		21		
MATLAB	Highly domain-specific, numerical computing	Yes	Yes		Yes			No	No		1	1	0	1	0	0	0	0	1		18		
Perl	Application, scripting, text processing, Web	Yes	Yes	Yes	Yes	Yes		No	No[FSIO 4]		1	1	1	1	1	0	0	0	2		24		
PHP	Server-side, web application, web	Yes	Yes[33]	Yes[34]	Yes			"De facto" standard via language specification and Requests for Comments (RFCs)	Yes		1	1	1	1	0	0	1	1	2		33		
Python	Application, general, web, scripting, artificial intelligence, scientific computing	Yes	Yes	Yes	Yes	Yes	Yes	"De facto" standard via Python Enhancement Proposals (PEPs)	Yes		1	1	1	1	1	1	1	1	18		53		
R	Application, statistics	Yes	Yes	Yes	Yes			No	No		1	1	1	1	0	0	0	0	3		22		
Visual Basic	Application, RAD, education, business, general, (Includes VBA), office automation	Yes	Yes			Yes	Yes	No	Yes		1	1	0	0	1	1	0	1	1		25		

Trades

- https://docs.google.com/spreadsheets/d/1vJP3t9YtCR7mqZPIND0n4Krr9bF0lBzDMxpkcVtqLbE/edit?usp=sharing
- Results
  - Python is the language of choice
    - Easy to learn/use
    - Modular
    - Most experience

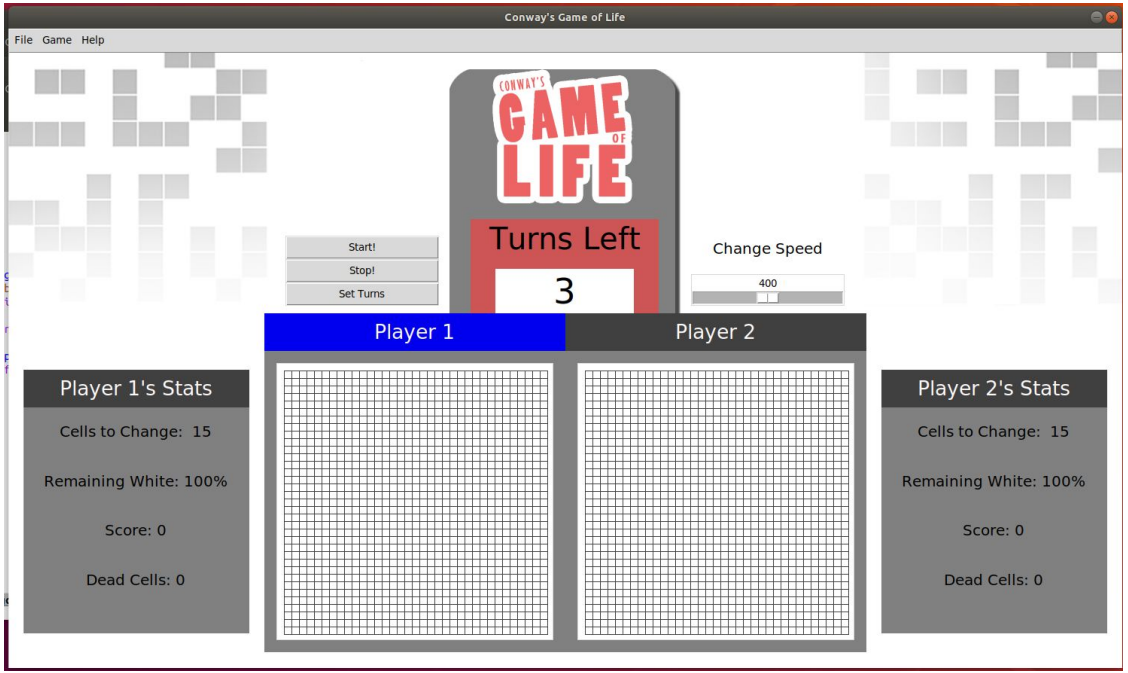
SW Summary

- Coded in Python 3.7
- SLOC
  - gol.py has 456
  - main.py has 288
- Libraries
  - Python tkinter (for graphics)
  - Pyinstaller (for executable)
  - Time/Functools (for managing events)
- Sources
  - https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life
  - https://github.com/paramsingh/game-of-life

Licenses

- MIT License (from starting source code)
- BSD License
- Python (PSF License)

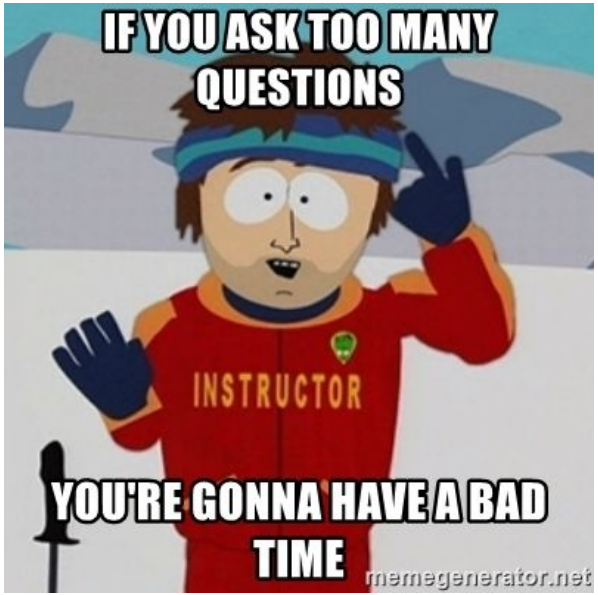
Demo Time!!!


Conway's Game of Life
File Game Help
CONWAY'S GAME OF LIFE
Start!
Stop!
Set Turns
Turns Left
3
Change Speed
400
Player 1
Player 2
Player 1's Stats
Cells to Change: 15
Remaining White: 100%
Score: 0
Dead Cells: 0
Player 2's Stats
Cells to Change: 15
Remaining White: 100%
Score: 0
Dead Cells: 0

Conclusions

- We were successful in completing our initial goals
- We learned a lot
- Future changes:
  - Further develop requirements
  - Make it bulletproof
    - Reprompt user for proper game input
  - Let player choose number of turns

Questions?


IF YOU ASK TOO MANY QUESTIONS
INSTRUCTOR
YOU'RE GONNA HAVE A BAD TIME
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