asgn4 design

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Design

asgn4 creates Conway's game of life which imiates how life can evolve from an initiated state. The game will create a universe and print out the grids, alive and dead cells, onto a window. There will be a main program file that enables different options.

Files

-universe.c
-universe.h
-life.c
-Makefile
-README.md
-DESIGN.pdf
-WRITEUP.pdf

Pseudocode

universe.c

create universe structure

rows
columns
grid
toroidal

uv create function
allocate memory for universe
declare rows in universe
declare cols in universe
declare toroidal for universe

allocate memory for rows
for loop through rows
allocate memory for cols

return created universe

uv delete function
for loop through rows
free every row

free grid
free universe

uv rows function
return rows

uv cols function
return cols

uv live cell function
if row is less than rows and col is less than columns
set that grid point as true

uv dead cell function
if row is greater than rows and col is greater than cols
set that grid point as false

uv get cell function
if row is greater than rows or col is greater than cols
return false

return grid cell

uv out bounds function
if rows less than rows or col less than columns
return true

return false

uv populate function
while scanning file with row and col unfinished
if cell out of bounds
return false

uv live cell to set cell alive

return true

uv census function
for loop through x values for 3x3 area
for loop through y values for 3x3 area
if not toroidal
if universe out of bounds
continue

else if uv get cell for row + x, col + y
increment neighbor by one

if toroidal
if universe cell out of bounds
continue

else if uv get cell for row + x, col + y
increment neighbor by one

return neighbors

uv print function
for loop through rows
for loop through cols
if uv get cell
print o

else if dead
print .

print newline

life.c

message function
print program usage

universe swap function
create temp universe
set universe a equal to universe b
set universe b equal to universe temp

main function
create default get op variables

create file variables
get op
case t
enable toroidal

case s
disable ncurses

case n
specify generations

case i
specify infile

case o
specify outfile

case h
enable message

if message enabled
call message function

open infile
if unable to open infile
print error message
close file
end program

open outfile
if unable to open outfile
print error message
close file
end program

scan infile for row and col
uv create universe a and b with scanned rol and col
uv populate universe a with infile

for loop through generations
if ncurses enabled
intialize screen
hide cursor
clear screen
refresh
for loop through uv rows

for loop through uv columns
set neighbors equal to uv census
set alive equal to uv get cell

if alive and neighbor equal 2 or neighbor equal 3
uv live cell grid as alive

if not alive and neighbor equal 3
uv live cell grid as alive

else
uv dead cell grid as dead

if ncurses enabled
if uv get cell true
print a live cell for every row and col
refresh screen

if ncurses enabled
refresh screen
sleep for 50k microseconds

uni swap function uni a and uni b
if ncurses enabled
close window

uv print uni a to outfile
close infile and outfile

uv delete uni a and uni b

end program

Structure

-universe.c creates functions needed to create universes, delete them, return rows and cols, set live and dead cells, return live cells, return out of bound cells, populate universes with rows and cols, finding neighbors of cells, and printing universe to an outfile. these functions are necessary when implementing the game of life

-life.c is a program that contains a get opt that takes in options and has the ability to animate the game of life in a window and print out the universe into an outfile. life.c uses the functions created in universe.c and the rules of the game

to implement when cells are alive or dead and when to print them. contains error handling for generations, file openings, and rows and columns.

Credit

-cse13s
-piazza