



## Digital Design Verification

**Weekly Task**

**Game of Life**

**Submitted by:**

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## Lab Report Summary:

In this lab, I implemented Conway's Game of Life in C by developing two main programs: lab1a.c, which computes and outputs only one generation of the game, and lab1b.c, which simulates multiple generations with live visualization. The core challenges I faced involved correctly calculating neighbors for each cell and applying the game rules consistently across generations. Initially, handling edge cases and syncing current and next generations caused unexpected results, but by isolating logic into helper functions like `get_next_state()` and `num_neighbors()`, and finalizing updates using `finalize_evolution()`, I ensured correctness. I also learned how to modularize code using headers (`lifegame.h`) and source files (`lifegame.c`), and how to interact with external files for input and output.

## Terminal Output:

### Lab1a.c

```
● khalilrehman@khalilrehman-ThinkPad-T14-Gen-1:~/Documents/Wekly project 1/weekly task - game_of_life$ gcc lab1a.c lifegame.c -o lab1a
● khalilrehman@khalilrehman-ThinkPad-T14-Gen-1:~/Documents/Wekly project 1/weekly task - game_of_life$ ./lab1a glider.txt
+
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| * |
| * |
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○ khalilrehman@khalilrehman-ThinkPad-T14-Gen-1:~/Documents/Wekly project 1/weekly task - game_of_life$
```

The terminal window shows the compilation of `lab1a.c` and `lifegame.c` into `lab1a`. The command `./lab1a glider.txt` is run, and the output displays a glider pattern in a 10x10 grid. The glider is a 3x3 pattern of asterisks (\*), moving diagonally across the grid. The terminal prompt returns at the end.



## Lab1b.c

The screenshot shows a terminal window with two identical patterns displayed side-by-side. Each pattern is a 10x10 grid of asterisks (\*) representing live cells in a Game of Life simulation. The top pattern is a 5x5 square cluster of live cells, while the bottom pattern is a 3x3 square cluster of live cells. Both patterns are enclosed in dashed rectangular borders. The terminal window has a dark background and a light gray border. The command prompt at the bottom shows the user's session: `khalilrehman@khalilrehman-ThinkPad-T14-Gen-1:~/Documents/Weekly project 1/weekly task - game_of_life/Files_game_of_life$`.