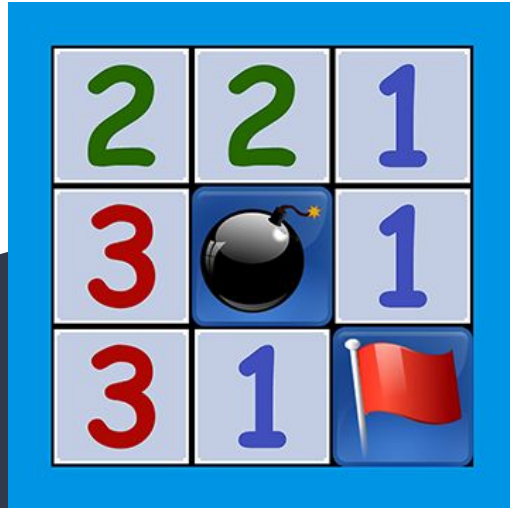


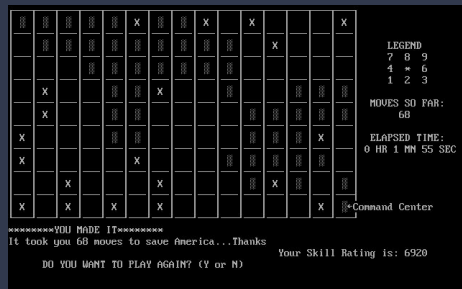
# [Minesweeper]

404-not-found

By: Liam, Yusen, and Richard (R.I.P)



# Project Overview



```
CUBE OF SIDE 3. ANY OF THE 27 LOCATIONS CAN BE DESIGNATED
BY INPUTTING THREE NUMBERS SUCH AS 2,3,1. AT THE START,
YOU ARE AUTOMATICALLY AT LOCATION 1,1,1. THE OBJECT OF
THE GAME IS TO GET TO LOCATION 3,3,3. ONE MINOR DETAIL:
THE COMPUTER WILL PICK, AT RANDOM, 5 LOCATIONS AT WHICH
IT WILL PLANT LAND MINES. IF YOU HIT ONE OF THESE LOCATIONS
YOU LOSE. ONE OTHER DETAIL: YOU MAY MOVE ONLY ONE SPACE
IN ONE DIRECTION EACH MOVE. FOR EXAMPLE: FROM 1,1,2 YOU
MAY MOVE TO 2,1,2 OR 1,1,3. YOU MAY NOT CHANGE
TWO OF THE NUMBERS ON THE SAME MOVE. IF YOU MAKE AN ILLEGAL
MOVE, YOU LOSE AND THE COMPUTER TAKES THE MONEY YOU MAY
HAVE BET ON THAT ROUND.

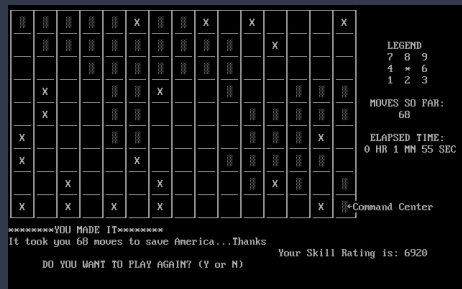
ALL YES OR NO QUESTIONS WILL BE ANSWERED BY A 1 FOR YES
OR A 0 (ZERO) FOR NO.

WHEN STATING THE AMOUNT OF A WAGER, PRINT ONLY THE NUMBER
OF DOLLARS (EXAMPLE: 250). YOU ARE AUTOMATICALLY STARTED WITH
500 DOLLARS IN YOUR ACCOUNT.

GOOD LUCK!
WANT TO HAVE A WAGER?
```

- Game - MineSweeper
- Early Inspiration
  - 1960-1970
    - Battleship and other grid based strategy games.
    - Cube - grid based game with hidden hazards
- Birth of Minesweeper - 1989
  - Robert Donner and Curt Johnson
- Microsoft Minesweeper
  - 1992 - Minesweeper became pre-installed with Windows 3.1
  - Iconic difficulty levels (Beginner, Intermediate, Expert) and features like flagging mines and timing challenges were introduced in this version.

# Project Overview cont.



CUBE OF SIDE 3. ANY OF THE 27 LOCATIONS CAN BE DESIGNATED BY INPUTTING THREE NUMBERS SUCH AS 2,3,1. AT THE START, YOU ARE AUTOMATICALLY AT LOCATION 1,1,1. THE OBJECT OF THE GAME IS TO GET TO LOCATION 3,3,3. ONE MINOR DETAIL: THE COMPUTER WILL PICK, AT RANDOM, 5 LOCATIONS AT WHICH IT WILL PLANT LAND MINES. IF YOU HIT ONE OF THESE LOCATIONS YOU LOSE. ONE OTHER DETAIL: YOU MAY MOVE ONLY ONE SPACE IN ONE DIRECTION EACH MOVE. FOR EXAMPLE: FROM 1,1,2 YOU MAY MOVE TO 2,1,2 OR 1,1,3. YOU MAY NOT CHANGE TWO OF THE NUMBERS ON THE SAME MOVE. IF YOU MAKE AN ILLEGAL MOVE, YOU LOSE AND THE COMPUTER TAKES THE MONEY YOU MAY HAVE BET ON THAT ROUND.

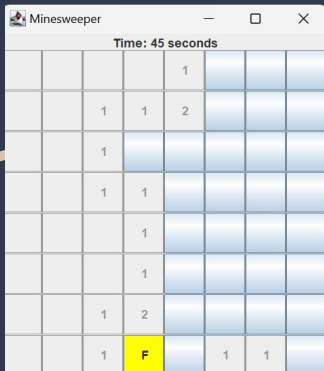
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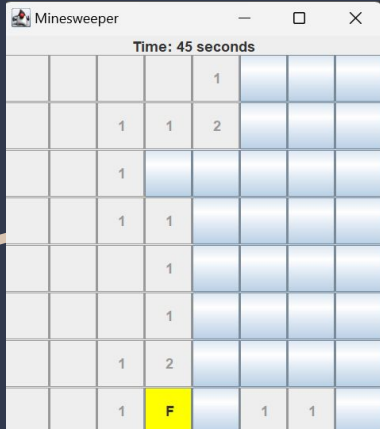
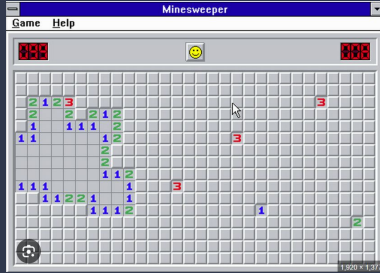
- Features
  - Random Mine Placement
  - Clue system
  - Flagging
  - Difficulty
  - Timer
- Limitations
  - Performance of large boards
  - Forced guessing scenarios
  - No “undo” for mistakes
- Assumptions
  - Players know the rules
    - No “help” / “rules” tab
  - Players interact through clicking
  - Players understand the clue system

# Game description and rules



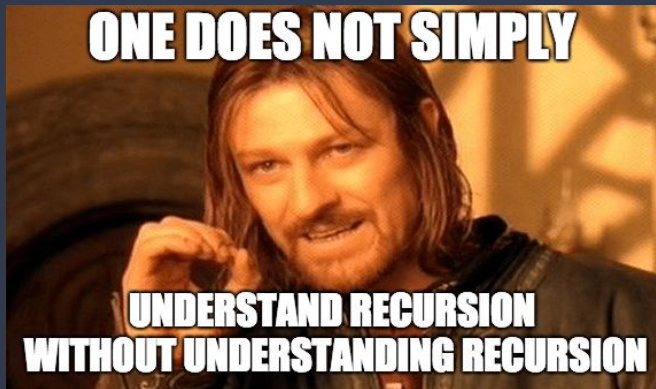
- We wanted to make the popular retro like version of Minesweeper that Microsoft released
- Rules
  - Objective
    - Clear all non mine squares while flagging bombs
  - Board
    - Grid of squares varying is size based of difficulty
      - Square status:
        - Bomb || empty
        - Revealed || hidden
        - Flagged || not flagged
  - Player actions
    - Right click - flag
    - Left click - reveal
  - win/lose condition
    - Hitting a bomb
  - Clues
  - Timing
    - Used for competitive play

# Project Requirements



- Functional
  - Left click - Reveals a cell. If the cell contains a mine, the game ends. If it contains a number, display the number of adjacent mines.
  - Right click - Flags a cell to mark a potential mine. A second right-click removes the flag.
  - Randomly arrange mines through the map
- Non-functional
  - When the user starts playing, a timer should be visible and start counting.
  - There should be a reset button to restart the game
  - There should be a quit button to quit out of the game

# Project Solution Approach



```
// Recursively reveal surrounding cells
for (int dr = -1; dr <= 1; dr++) {
    for (int dc = -1; dc <= 1; dc++) {
        revealCell(row + dr, col + dc);
    }
}
```

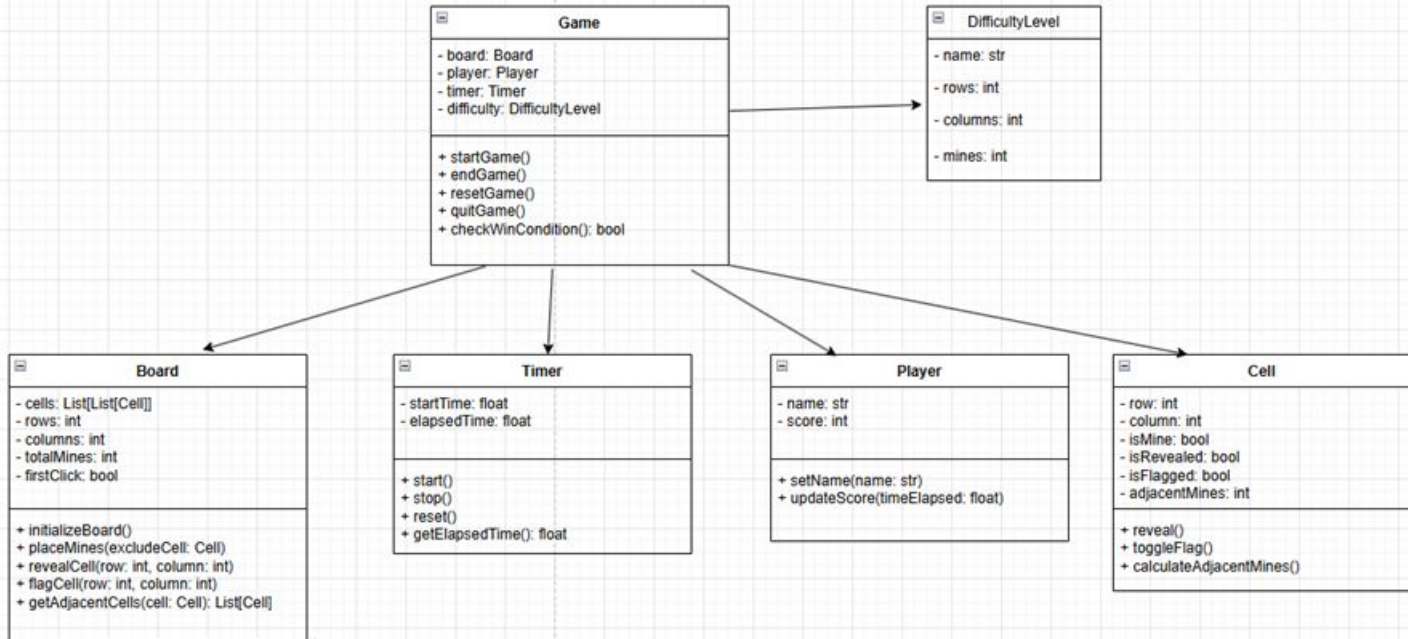
- Components of Solution Design

- MVC
- Grid Layout
  - Lifesaver
- Recursion
  - Cascade reveal only

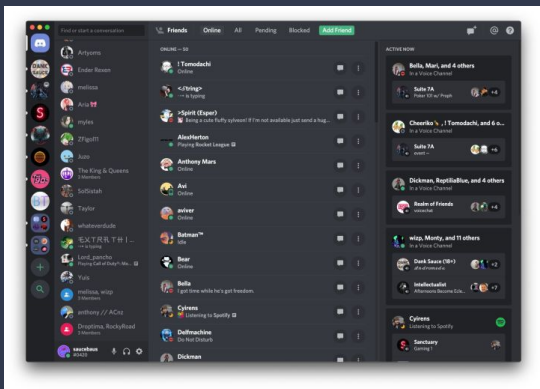
- UI Features

- Main board and grid btns
- Difficulty, end (win), end (lose) screens.

# UML Design



# Team Collaboration Approaches



- Team Collaborations Methods

- Messages
  - Discord
    - Texting
    - Calling
      - Separate time zones
  - Email
    - files
- Github issues? - duh
- Git Branching?
  - I'll take my changes in "main"
- Lessons learned
  - There might be a reason why someone created git branching
  - Plan != outcome
  - Always start sooner than you think - there will be problems
- A couple minor group hacking sessions
  - Peer coding



# Testing, Validation, and Acceptance Plan

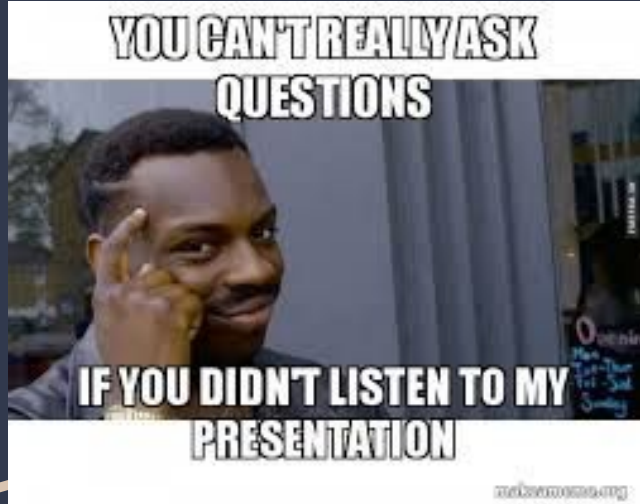
```
Mine placed at: (6, 7)
Mine placed at: (0, 1)
Mine placed at: (3, 0)
Mine placed at: (2, 0)
Mine placed at: (3, 1)
Mine placed at: (1, 3)
Mine placed at: (0, 2)
Mine placed at: (5, 3)
Mine placed at: (7, 3)
Mine placed at: (1, 2)
Cell (2, 3) has 2 adjacent mines.
Revealed cell at (2, 3) with 2 adjacent mines
Cell (3, 2) has 1 adjacent mines.
Revealed cell at (3, 2) with 1 adjacent mines
```

- Testing we planned on
  - Unit tests
  - Integration tests
  - Functional tests
  - User tests
- Testing we did
  - User tests
  - Function test
  - Console logging
- Project Done?
  - User tests verified - users who are familiar with the rules/game refer to it as Minesweeper
  - Functionalities complete
  - Game loop intact and includes edge cases

# Live Demo Time



# Summary & Questions



- Coolest part
  - When it worked
- Lessons learned
  - It's not easy to work in groups
  - It is always more work than you think
- Bugs are features is you look at it the right way
- Notes / progress logging
  - Creates pseudo documentation
- QUESTIONS