Sudoku Design

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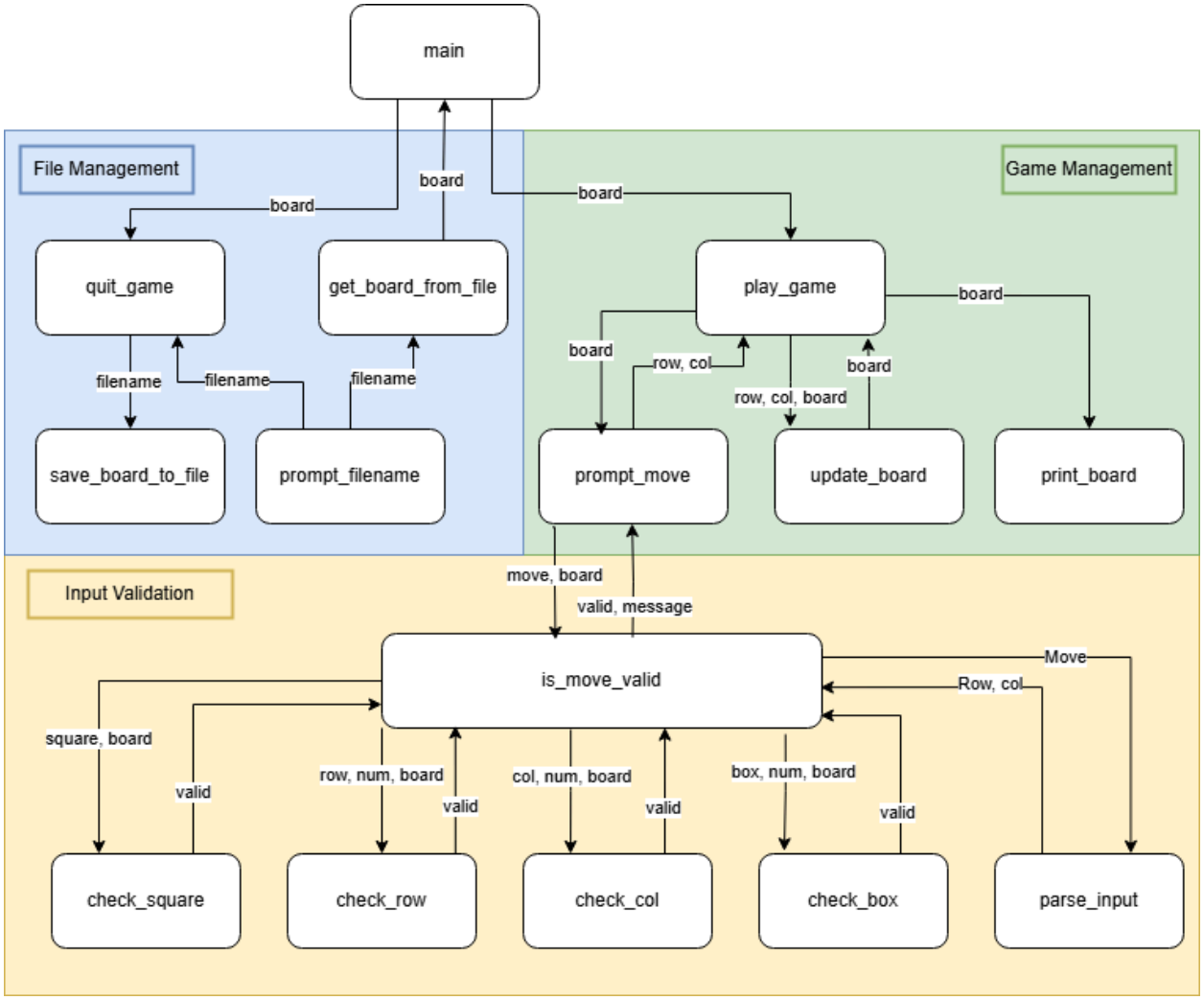
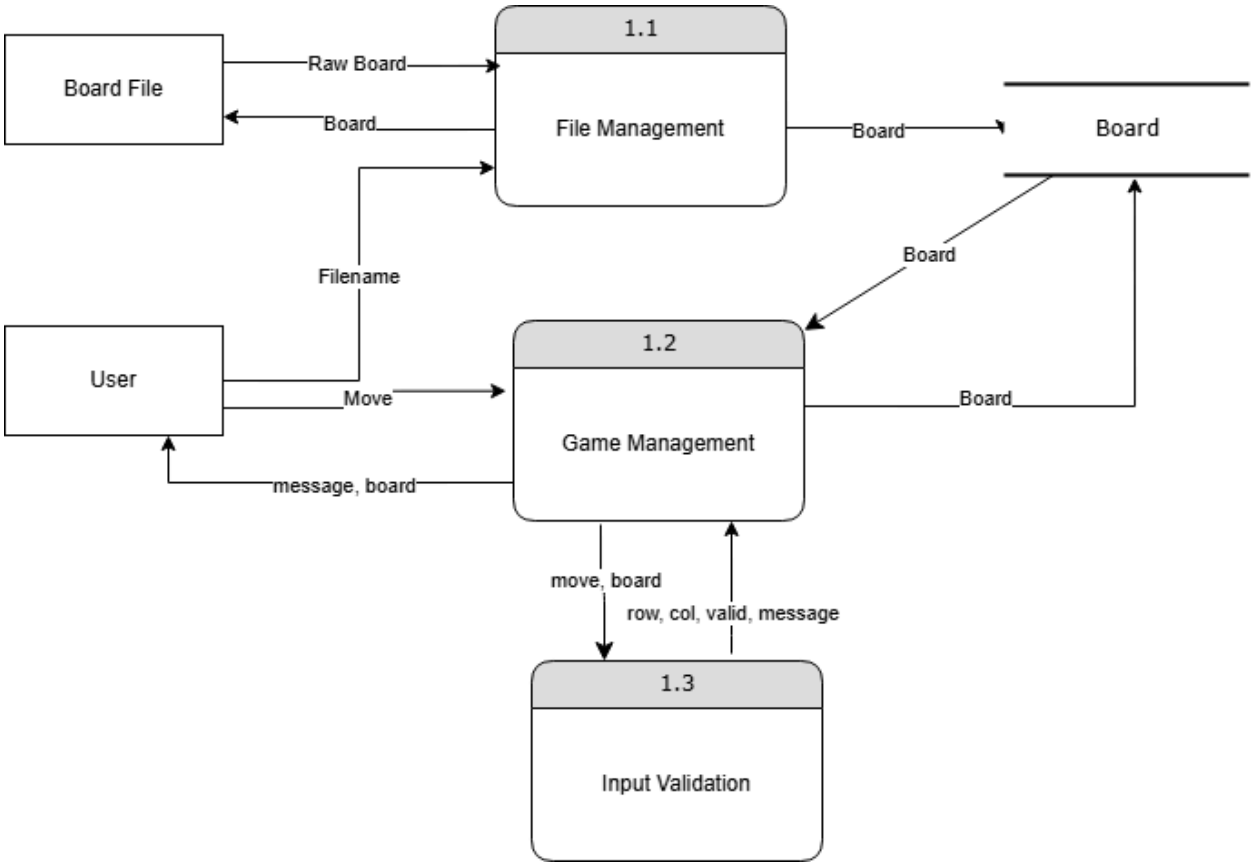
Structure Chart



Data Flow Diagram



Pseudocode

My own work (parse_input):

```
FUNCTION parse_input ( move ) -> tuple(int, int)
      # Returns 0,0 if  move is invalid
      invalid <-- tuple (0, 0)

      IF move.Length != 2
            return invalid
      TRY
            move <-- tuple( ascii of move[0].lower() - ascii offset,
      string(move[1]))
      EXCEPT
            return invalid

      IF move[0] > 0 AND move[0] < 10 AND move[1] > 0 AND move[1] <
10
            return move
```

AI & Human collaborative Work:

My prompt:

I need pseudocode for a function in a sudoku program, a function called is_move_valid. This program will receive as parameters:

- A string (user input for a board space, e.g. “B5”)
- a string (the number the user would like to insert at said space)
- the current board (2d list)

The function will return:

- bool indicating validity of move
- message to display to user (what’s wrong with their input, or potential success message)

The function will call the following functions:

- parse_input - returns tuple (row, col) from user’s input, or 0,0 if invalid
- check_square (row, col, board) -> bool ; checks the square the user is trying to edit
- check_row (row, num, board) -> bool
- check_col (row, num, board) -> bool
- check_box (row, num, board) -> bool

Parse_input will determine if the board space input has errors. Is_move_valid() is responsible for validating all the rest. Use normal 9x9 sudoku rules.

AI Code:

```
function is_move_valid(user_input, num, board):
    # Step 1: Parse the user input to get row, col
    (row, col) = parse_input(user_input)

    # Step 2: Check if the input is invalid (invalid row, col)
    if row == 0 and col == 0:
        return (False, "Invalid input. Please enter a valid board
position (e.g., 'A1', 'C5').")

    # Step 3: Check if the cell is already occupied
    if board[row][col] != 0:
        return (False, "This space is already occupied. Choose an
empty space.")

    # Step 4: Check if the number is valid in the current row
    if not check_row(row, num, board):
        return (False, "The number already exists in this row. Try
another number.")

    # Step 5: Check if the number is valid in the current column
    if not check_col(col, num, board):
        return (False, "The number already exists in this column. Try
another number.")

    # Step 6: Check if the number is valid in the 3x3 sub-box
    if not check_box(row, col, num, board):
        return (False, "The number already exists in this 3x3
sub-box. Try another number.")

    # Step 7: Check if the number is valid in the square the user is
trying to edit
    if not check_square(row, col, board):
        return (False, "The move is not valid for this square. Try
again.")

    # Step 8: If all checks pass, return success message
    return (True, "Move is valid. Good job!")
```

My response:

Please also provide the pseudocode for its respective helper functions (all except parse_input)

AI code:

```
function check_square(row, col, board):
    # Calculate the top-left corner of the 3x3 sub-box
    start_row = (row // 3) * 3
    start_col = (col // 3) * 3

    # Loop through the 3x3 sub-box
    for i from start_row to start_row + 2:
        for j from start_col to start_col + 2:
            # If the number already exists in this 3x3 box, return
False
            if board[i][j] == num:
                return False

    # If no conflicts, return True
    return True


function check_row(row, num, board):
    # Loop through all columns in the given row
    for col from 0 to 8:
        # If the number already exists in the row, return False
        if board[row][col] == num:
            return False

    # If no conflicts, return True
    return True


function check_col(col, num, board):
    # Loop through all rows in the given column
    for row from 0 to 8:
        # If the number already exists in the column, return False
        if board[row][col] == num:
            return False

    # If no conflicts, return True
    return True
```

```
function check_box(row, col, num, board):
    # Calculate the top-left corner of the 3x3 sub-box
    start_row = (row // 3) * 3
    start_col = (col // 3) * 3

    # Loop through the 3x3 sub-box
    for i from start_row to start_row + 2:
        for j from start_col to start_col + 2:
            # If the number already exists in this 3x3 box, return
False
            if board[i][j] == num:
                return False

    # If no conflicts, return True
    return True
```

My response:

Check_square should identify if the user-selected space is already occupied, rather than checking the 3x3 box it belongs to. Please rewrite

AI code:

```
function check_square(row, col, board):
    # Check if the cell is already occupied
    if board[row][col] != 0:
        return False  # The space is occupied by another number

    # If the cell is empty, return True
    return True
```