

3. Write a program to implement the Sudoku game structure and implement searching operations along rows, columns and grids.

Code:

```
#include <stdio.h>

#define SIZE 9

// Sudoku board print
void printBoard(int board[SIZE][SIZE]) {
    int i, j;
    for (i = 0; i < SIZE; i++) {
        for (j = 0; j < SIZE; j++) {
            printf("%d ", board[i][j]);
        }
        printf("\n");
    }
}

// Search number in a specific row
int searchRow(int board[SIZE][SIZE], int row, int num) {
    for (int col = 0; col < SIZE; col++) {
        if (board[row][col] == num)
            return 1;
    }
    return 0;
}

// Search number in a specific column
int searchColumn(int board[SIZE][SIZE], int col, int num) {
    for (int row = 0; row < SIZE; row++) {
        if (board[row][col] == num)
            return 1;
    }
    return 0;
}

// Search number in a 3x3 grid
```

```

int searchGrid(int board[SIZE][SIZE], int startRow, int startCol, int
num) {
    for (int row = 0; row < 3; row++) {
        for (int col = 0; col < 3; col++) {
            if (board[startRow + row][startCol + col] == num)
                return 1;
        }
    }
    return 0;
}

// Check if placing num at board[row][col] is valid
int isValid(int board[SIZE][SIZE], int row, int col, int num) {
    if (searchRow(board, row, num))
        return 0;

    if (searchColumn(board, col, num))
        return 0;

    if (searchGrid(board, row - row % 3, col - col % 3, num))
        return 0;

    return 1;
}

int main() {
    int board[SIZE][SIZE] = {
        {5,3,0,0,7,0,0,0,0},
        {6,0,0,1,9,5,0,0,0},
        {0,9,8,0,0,0,0,6,0},
        {8,0,0,0,6,0,0,0,3},
        {4,0,0,8,0,3,0,0,1},
        {7,0,0,0,2,0,0,0,6},
        {0,6,0,0,0,0,2,8,0},
        {0,0,0,4,1,9,0,0,5},
        {0,0,0,0,8,0,0,7,9}
    };

    printf("Sudoku Board:\n");
    printBoard(board);

    int row = 0, col = 2, num = 3;
}

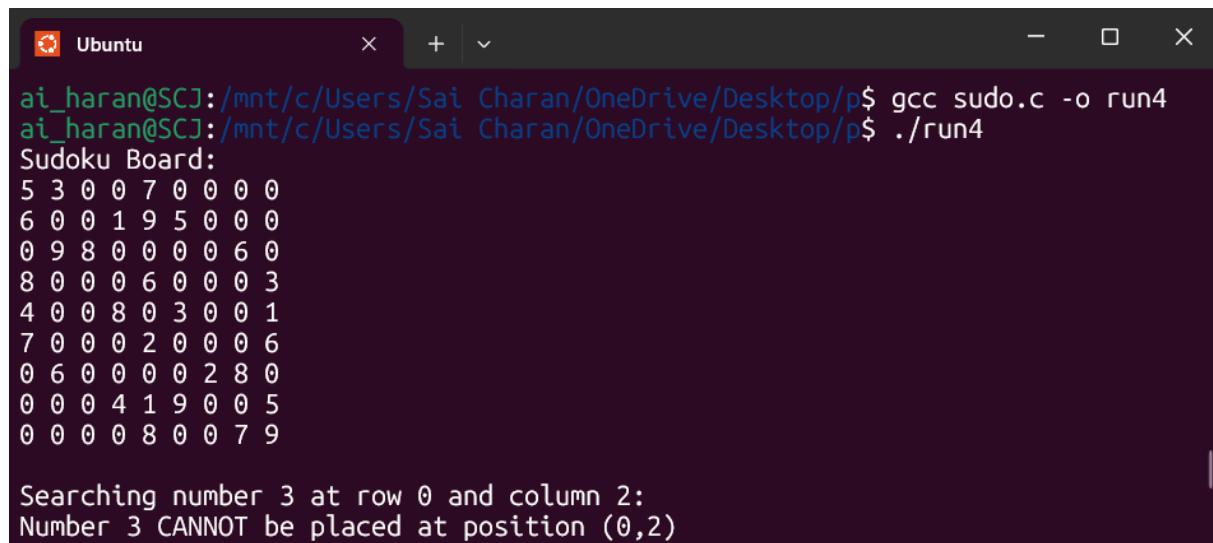
```

```
printf("\nSearching number %d at row %d and column %d:\n", num,
row, col);

    if (isValid(board, row, col, num))
        printf("Number %d can be placed at position (%d,%d)\n", num,
row, col);
    else
        printf("Number %d CANNOT be placed at position (%d,%d)\n", num,
row, col);

    return 0;
}
```

OutPut:



A screenshot of a terminal window titled "Ubuntu". The terminal shows the following command-line session:

```
ai_haran@SCJ:/mnt/c/Users/Sai Charan/OneDrive/Desktop/p$ gcc sudo.c -o run4
ai_haran@SCJ:/mnt/c/Users/Sai Charan/OneDrive/Desktop/p$ ./run4
Sudoku Board:
5 3 0 0 7 0 0 0 0
6 0 0 1 9 5 0 0 0
0 9 8 0 0 0 0 6 0
8 0 0 0 6 0 0 0 3
4 0 0 8 0 3 0 0 1
7 0 0 0 2 0 0 0 6
0 6 0 0 0 0 2 8 0
0 0 0 4 1 9 0 0 5
0 0 0 0 8 0 0 7 9

Searching number 3 at row 0 and column 2:
Number 3 CANNOT be placed at position (0,2)
```