implement java program that solve sudoku puzzle using recursion,bit manipulation and arrays :

#project:3

```
public class SudokuSolver {

static int N = 9;

static boolean solveSudoku(int grid[][], int row,
        int col)
        {

        if (row == N - 1 && col == N)
        return true;

        if (col == N) {
        row++;
        col = 0;
        }

        if (grid[row][col] != 0)
        return solveSudoku(grid, row, col + 1);

        for (int num = 1; num < 10; num++) {

        if (isSafe(grid, row, col, num)) {

        grid[row][col] = num;

        if (solveSudoku(grid, row, col + 1))
        return true;
        }

        grid[row][col] = 0;
        }
        return false;
        }

static void print(int[][] grid)
        {
        for (int i = 0; i < N; i++) {
        for (int j = 0; j < N; j++)
        System.out.print(grid[i][j] + " ");
        System.out.println();
        }
        }


static boolean isSafe(int[][] grid, int row, int col,
        int num)
        {

        for (int x = 0; x <= 8; x++)
        if (grid[row][x] == num)
        return false;
```

```
        for (int x = 0; x <= 8; x++)
        if (grid[x][col] == num)
        return false;

        int startRow = row - row % 3, startCol
        = col - col % 3;
        for (int i = 0; i < 3; i++)
        for (int j = 0; j < 3; j++)
        if (grid[i + startRow][j + startCol] == num)
        return false;

        return true;
        }

// Driver Code
public static void main(String[] args)
        {
        int grid[][] = { { 3, 0, 6, 5, 0, 8, 4, 0, 0 },
        { 5, 2, 0, 0, 0, 0, 0, 0, 0 },
        { 0, 8, 7, 0, 0, 0, 0, 3, 1 },
        { 0, 0, 3, 0, 1, 0, 0, 8, 0 },
        { 9, 0, 0, 8, 6, 3, 0, 0, 5 },
        { 0, 5, 0, 0, 9, 0, 6, 0, 0 },
        { 1, 3, 0, 0, 0, 0, 2, 5, 0 },
        { 0, 0, 0, 0, 0, 0, 0, 7, 4 },
        { 0, 0, 5, 2, 0, 6, 3, 0, 0 } };

        if (solveSudoku(grid, 0, 0))
        print(grid);
        else
        System.out.println("No Solution exists");
        }

        }
```

#output:

C:\Users\Vaibhav\.jdks\openjdk-20.0.2\bin\java.exe "-javaagent:C:\Users\Vaibhav\AppData\Local\JetBrains\IntelliJ IDEA Community Edition 2023.2\lib\idea_rt.jar=59385:C:\Users\Vaibhav\AppData\Local\JetBrains\IntelliJ IDEA Community Edition 2023.2\bin" -Dfile.encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath C:\Users\Vaibhav\IdeaProjects\search.java\out\production\search.java SudokuSolver

3 1 6 5 7 8 4 9 2

5 2 9 1 3 4 7 6 8

4 8 7 6 2 9 5 3 1

2 6 3 4 1 5 9 8 7

9 7 4 8 6 3 1 2 5

8 5 1 7 9 2 6 4 3

1 3 8 9 4 7 2 5 6

6 9 2 3 5 1 8 7 4

7 4 5 2 8 6 3 1 9

Process finished with exit code 0