Assignment

Imagine an infinite two-dimensional orthogonal grid of square cells, each of which is in one of two possible states, live or dead. Every cell interacts with its eight neighbors, which are the cells that are directly horizontally, vertically, or diagonally adjacent.

At each step in time (tick), the following transitions occur:

1. Any live cell with fewer than two live neighbors dies, as if by loneliness.

2. Any live cell with more than three live neighbors dies, as if by overcrowding.

3. Any live cell with two or three live neighbors lives, unchanged, to the next generation.

4. Any dead cell with exactly three live neighbors comes to life.

The initial pattern constitutes the 'seed' (randomly placed 500 cells) of the system. The first generation is created by applying the above rules simultaneously to every cell in the seed — births and deaths happen simultaneously, and the discrete moment at which this happens is called a tick. (In other words, each generation is a pure function of the one before.)

Java Program –

```
import java.util.Scanner;


public class Assessment {


  public static void main(String args[])
  {
    Assessment  s=new Assessment ();
    Scanner sc=new Scanner(System.in);
    int r=10,c=10;
    char choice;
    int ch;
    // Initializing the grid
    int[][] grid= { { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 },
```

```
        { 0, 0, 0, 1, 1, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 1, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 1, 1, 0, 0, 0, 0, 0 },
        { 0, 0, 1, 1, 0, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 0, 1, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 1, 0, 0, 0, 0, 0 },
        { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 }
};

int grid1[][] = new int[r][c];


do
{
   System.out.print("\nOriginal generation:\n");
   for(int i=0;i<grid.length;i++)
   {
      for(int j=0;j<grid.length;j++)
      {
         System.out.print(grid[i][j]+" ");
      }
      System.out.println();
   }
```

```
        System.out.println("\n1.Next generation");
        System.out.println("\n2.Cell status");
        System.out.println("\nEnter Your Choice ");
        ch=sc.nextInt();

        switch(ch)
        {
           case 1 : System.out.println("The next generation is:\n");
              s.nextGrid(grid,r,c,grid1);
              break;

           case 2 :
              s.checkStatus(grid1);
              break;



           default:
              System.out.println("Wrong Choice");
        }
        System.out.println("Do you want to continue:Press(y || n)");
        choice=sc.next().charAt(0);
     }while(choice=='y');
}
public  void nextGrid(int grid[][], int r, int c,int grid1[][])
```

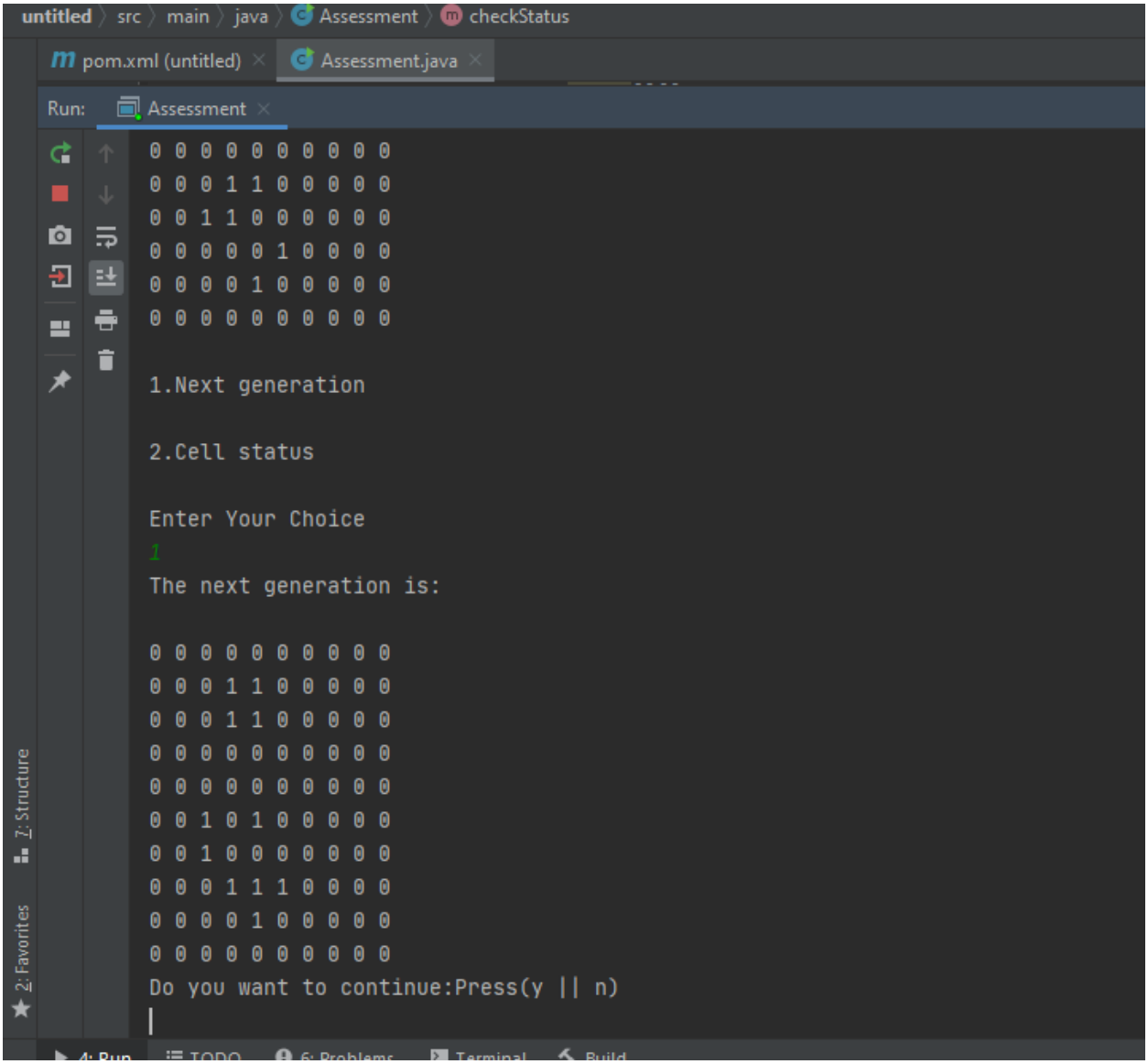
```
{

   for (int l = 1; l < r - 1; l++)
   {
      for (int m = 1; m < c - 1; m++)
      {
         // finding no Of Neighbours that are alive
         int alive_Neighbours = 0;
         for (int i = -1; i <= 1; i++)
            for (int j = -1; j <= 1; j++)
               alive_Neighbours += grid[l + i][m + j];

         // Cell is lonely and dies
         if ((grid[l][m] == 1) && (alive_Neighbours < 2))
            grid1[l][m] = 0;

         // Cell dies due to overcrowding
         else if ((grid[l][m] == 1) && (alive_Neighbours > 3))
            grid1[l][m] = 0;

         // A new cell is born
         else if ((grid[l][m] == 0) && (alive_Neighbours == 3))
            grid1[l][m] = 1;
         else       // Remains the same
```

```
                grid1[l][m]=grid[l][m];
            }

        }

        for (int i = 0; i < r; i++)
        {
            for (int j = 0; j < c; j++)
            {
                System.out.print(grid1[i][j] + " ");
            }
            System.out.println();
        }

    }

    public  void checkStatus(int grid1[][])
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Cell Checking");
        System.out.println("Enter row you to Check:");
        int cell1=sc.nextInt();
//Input

        System.out.println("Enter col you to Check ");
```

```
        int cell2=sc.nextInt();
//Input


        if(grid1[cell1][cell2]==1)
            System.out.println("Cell is live.");
        else
            System.out.println("Cell is dead.");
    }
}
```

Output –

1st Choice output -



2nd Choice Output -