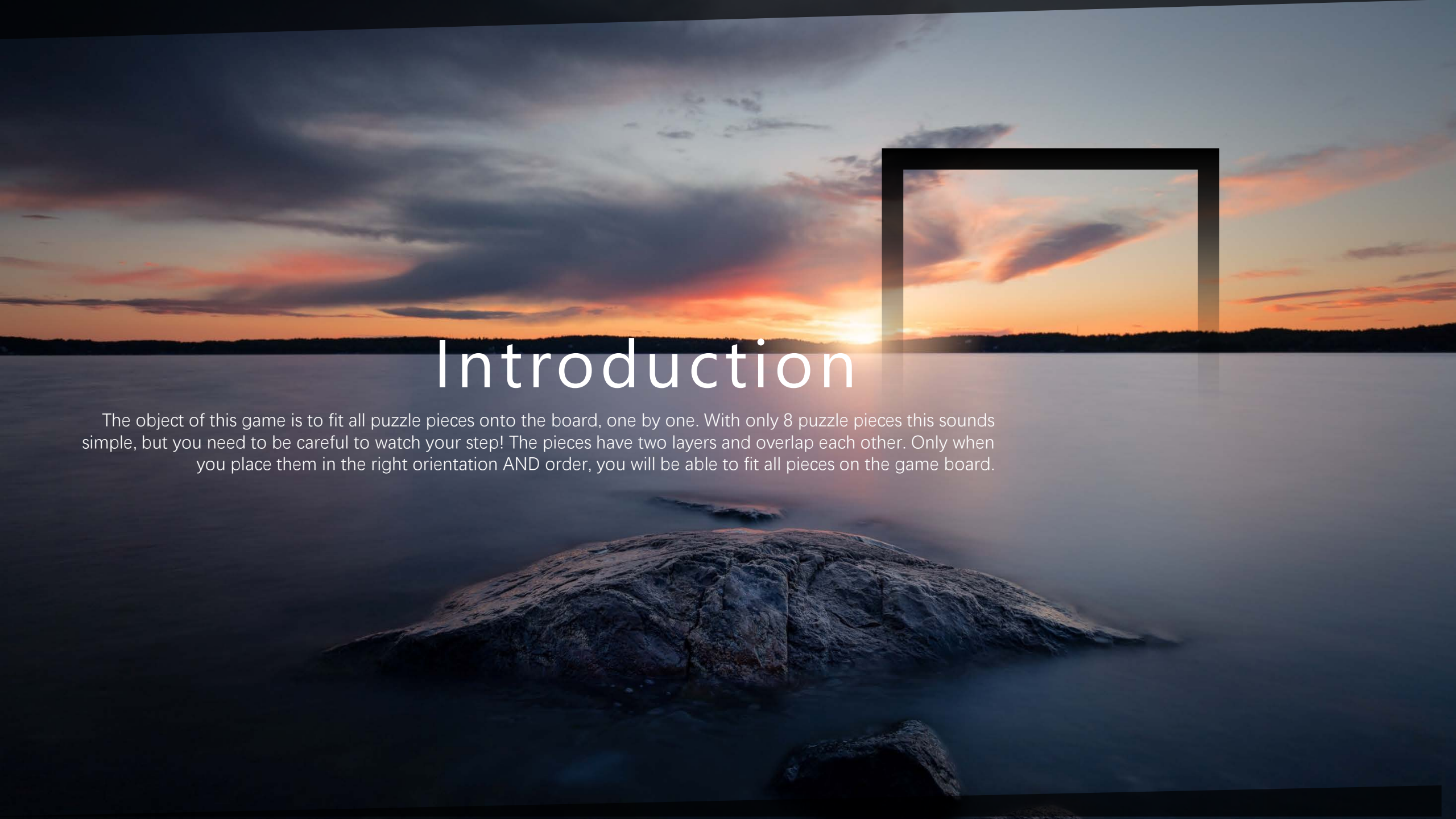
IQ Steps

GROUP : Wed 17e

WE COMPLETED ALL THE TASKS.

Group member : u6557591 (Jiawen He)
u5656487 (Wei XING)
u6179865 (Yifan Cheng)



Introduction

The object of this game is to fit all puzzle pieces onto the board, one by one. With only 8 puzzle pieces this sounds simple, but you need to be careful to watch your step! The pieces have two layers and overlap each other. Only when you place them in the right orientation AND order, you will be able to fit all pieces on the game board.

SUMMARY

4 Classes we wrote

Viewer

Task 4

- draw the pieces on board using the placement string

Board

- FXPiece and Draggable FXPiece (inner class)
- draw pegs, pieces
- buttons and handlers
- background music,image
- hint
- operation help
- step calculator

Grid

- put,rotate,flip
- check piece placement legal

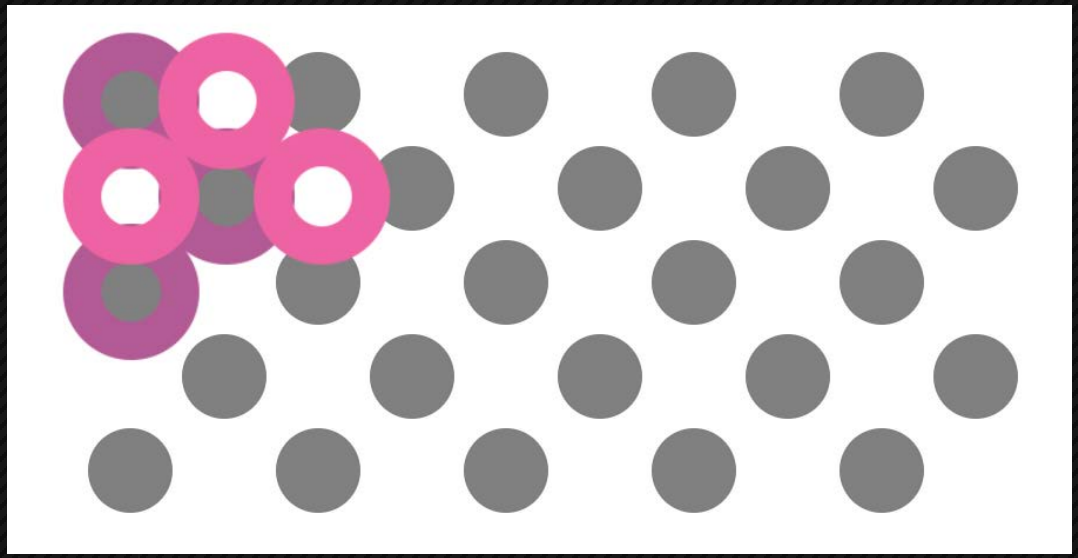
StepsGame

- Task 2,3,5,6,9
- Generate interesting starting placement

1 Our Data Structure

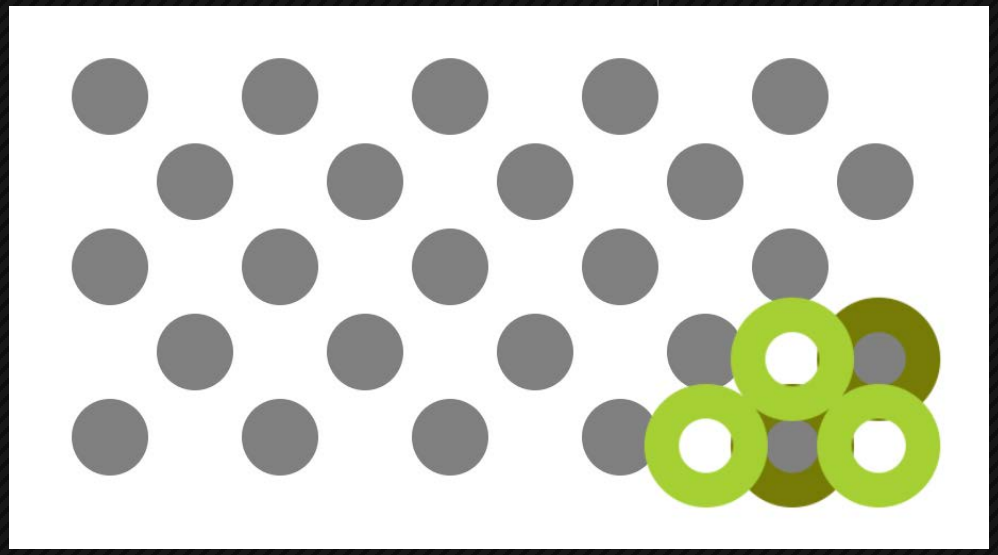
—— Grid class

We use a 50-bit long number
to store the board state.



0b10000000011100000000011L

0b1110000000110000000000000000000000000000000000000000L



Or

```
  1110001
| 0010101
---------
  0010001
```

Bit Shift

11111001<<3 => 11111001000

11111001>>3 => 11111

And

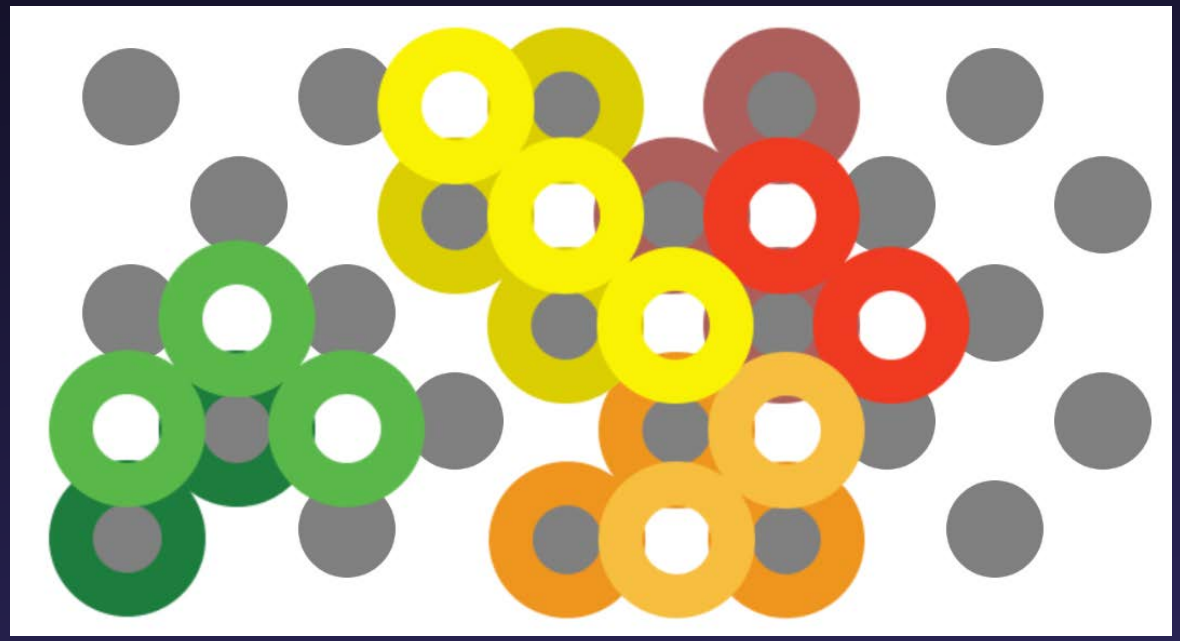
```
  1110001
& 0010101
---------
  1110101
```

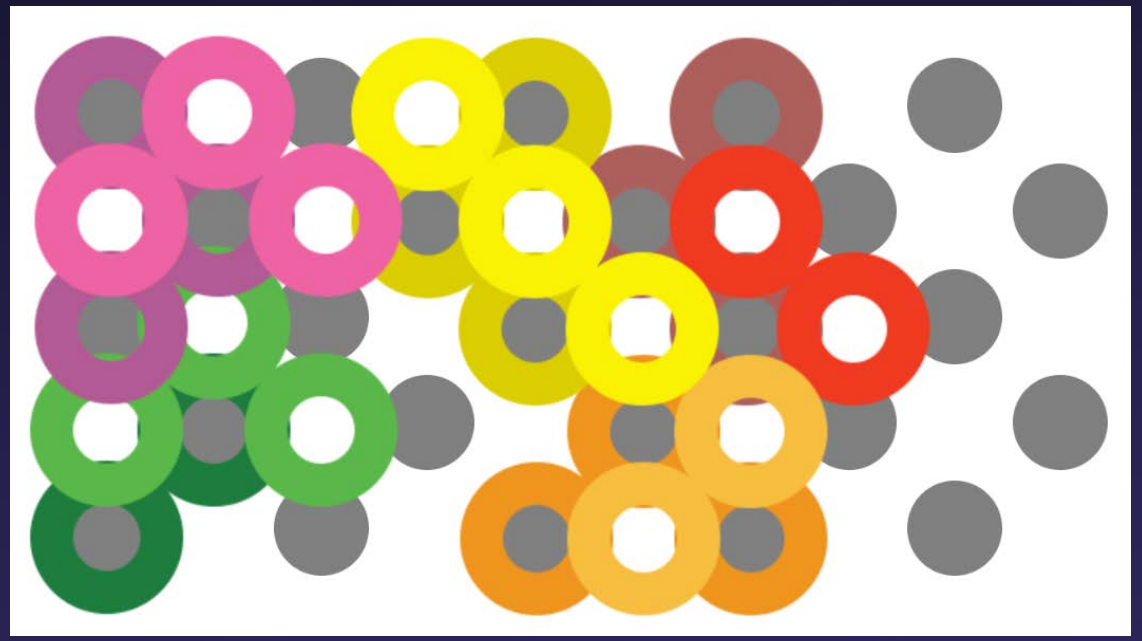
Main idea

- When updating a piece, we use or operation
- When checking validity, we use and operation

2 Task 6 getViablePiecePlacement

—— check all neighbours





getSolutions helper method

- public static Set<String> getPiecePossPos(long grid, char piece) {

}

- public static Set<String> getAllPossPos(long grid, String placement) {

}

- private static Set<String> getSolutionsIterator(long grid, String placement){

}

3 Task 9 getSolutionsIterator

—— We tried all possible moves

Possible next pieces for:

Keep on recursion...

3 Task 9 getSolutions

—— remove duplicate solutions

- Use HashMap to map all the sorting solutions of piece name into a list.

"DFQFDNGGSEBxCAkHCiAALBBgI , DFQFDNGGSEBxCAkHCiAALBBgI"

order

"AALBBgICAkDFQEBxFDNGGSHCi , AALBBgICAkDFQEBxFDNGGSHCi"

remove

"AALBBgICAkDFQEBxFDNGGSHCi"

3 Task 9 getSolutions

—— final speed

Run T9 SolutionsTest

All 3 tests passed - 31s 730ms

SolutionsTest (comp1110.ass2) 31s 730ms
- testMulti 17s 842ms
- testSimple 2ms
- testSingle 13s 886ms

```
/usr/lib/jvm/oracle-java8-jdk-amd64/bin/java ...
Solving DFOGGQEDI...
Got sequenced solutions: [DFOGGQEDIBAkHCiFHnAALCAg, DFOGGQEDIBAkFHnHCiAALCAg, DFOGGQEDICAkHCiAALBBgFHn, DFOGGQEDICAkHCiAALFHnBBg, DFOGGQEDIBAkHCiAALCAgFHn, DFO
Got unique solutions: [DFOGGQEDIFHnCAkHCiAALBBg, DFOGGQEDIBAkHCiAALFHnCAg]
Solving EGOCGQGGS...
Got sequenced solutions: [EGOCGQGGSHBLFEnADgDAiBAk, EGOCGQGGSHBLADgDAiFEnBAk, EGOCGQGGSHBLADgFEnDAiBAk, EGOCGQGGSFEnHBLADgDAiBAk, EGOCGQGGSFEnBAkHCiAALDBg]
Got unique solutions: [EGOCGQGGSFEnHBLADgDAiBAk, EGOCGQGGSFEnBAkHCiAALDBg]
Solving CGOGGQEDI...
Got sequenced solutions: [CGOGGQEDIBAkFHnHCiAALDBg, CGOGGQEDIBAkHCiFHnAALDBg, CGOGGQEDIBAkHCiAALFHnDBg, CGOGGQEDIHBLADgDAiBAkFHn, CGOGGQEDIBAkHCiAALDBgFHn]
Got unique solutions: [CGOGGQEDIBAkHCiAALDBgFHn, CGOGGQEDIHBLADgDAiBAkFHn]
Solving GFSEAoBBG...
Got sequenced solutions: [GFSEAoBBGFCLHBNADgDAiCDk, GFSEAoBBGFDNCAkHCiAALDBg, GFSEAoBBGFDNHBLADgDAiCDk]
Got unique solutions: [GFSEAoBBGFDNHBLADgDAiCDk, GFSEAoBBGFCLHBNADgDAiCDk, GFSEAoBBGFDNCAkHCiAALDBg]
```

4: Run | 6: TODO | 9: Version Control | Terminal | 0: Messages | Event Log

Tests Passed: 3 passed (moments ago) LF÷ UTF-8÷ Git: master÷

around 31s

Part three

4 Task 11 Generating interesting startingPlacement

- public static List<String> task11(String m, String o, String n, String p) {

}

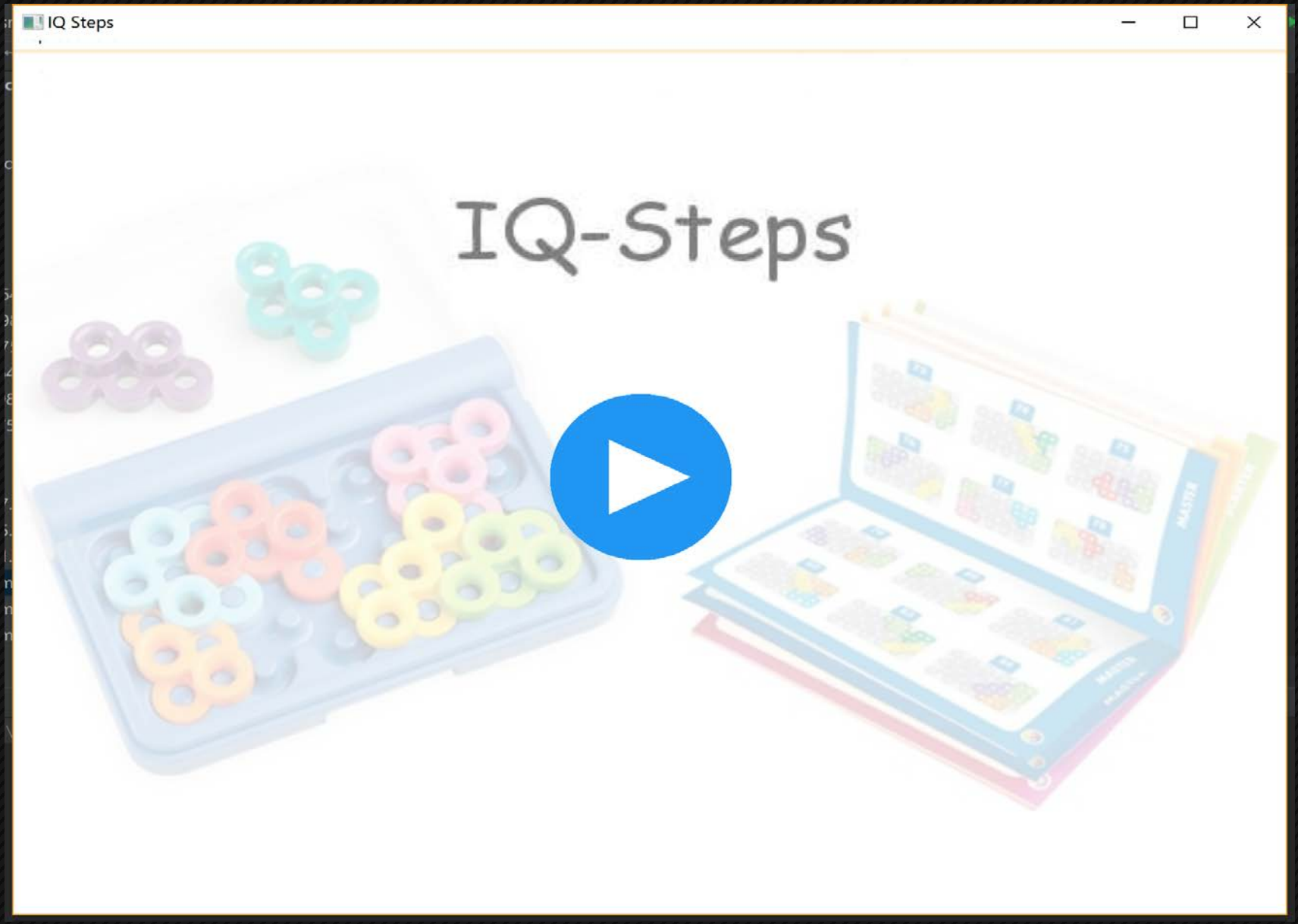
65	66	67	68	69	70	71	72	73	74
75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	97	98	99	100	101
102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121

F r o n t E n d

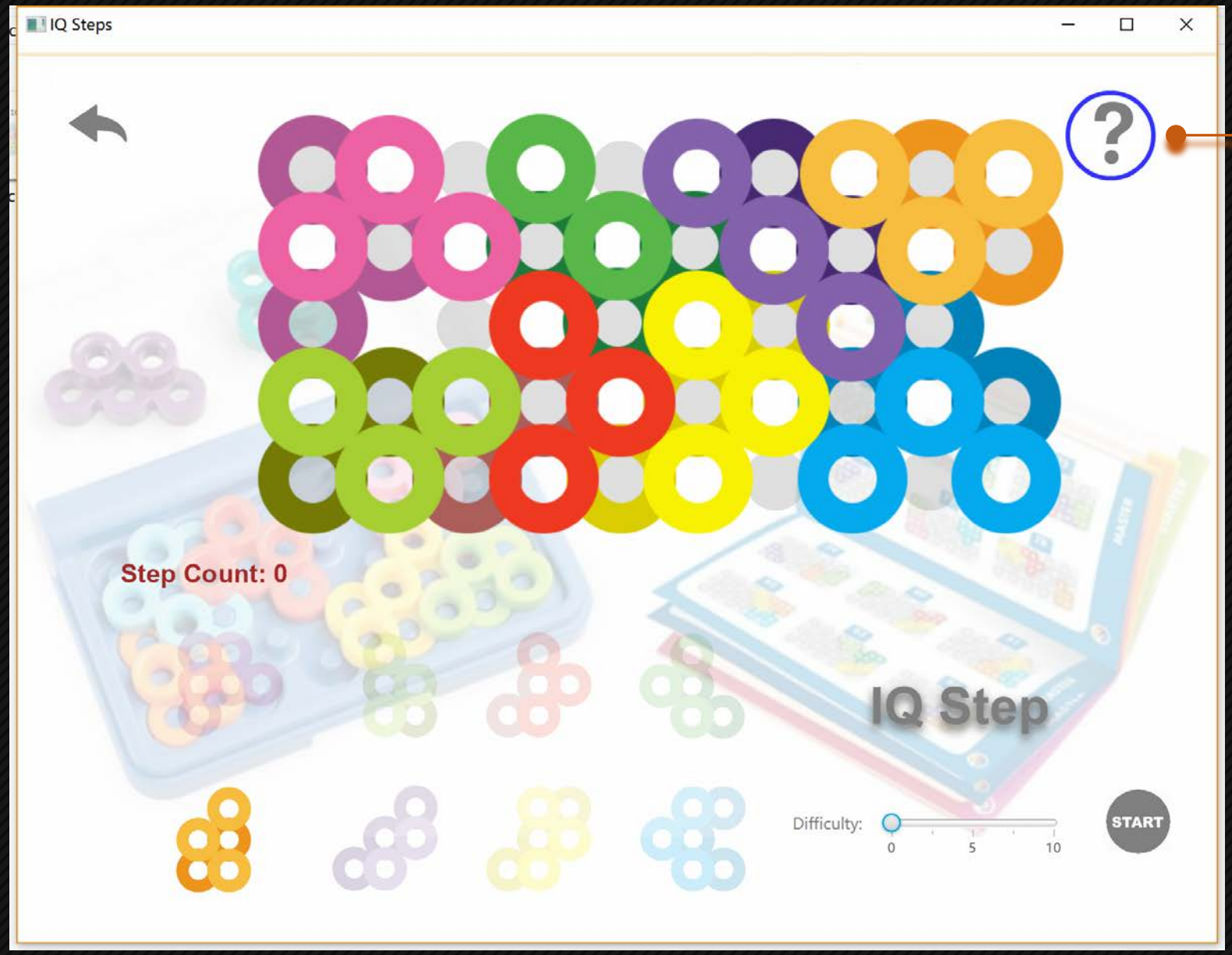
JavaFX

```java
package comp1110.ass2.gui;

import ...

/* Note :  All codes without author are done by group. */

public class Board extends Application {
    private static final int BOARD_WIDTH = 933;
    private static final int BOARD_HEIGHT = 700;
    private static final int SQUARE_SIZE = 60;  //size of each peg/ring
    private static final int PIECE_IMAGE_SIZE = (int) ((3*SQUARE_SIZE)*1.33);   //size of each piece
    private static final int MARGIN_X = (BOARD_WIDTH - 4 * 2 * SQUARE_SIZE) / 2 - 180;    //for unplaced pieces
    private static final int MARGIN_Y = 200; //same as above
    private static final int TOP_LEFT_X = 230;
    private static final int TOP_LEFT_Y = 100;

    private static final String URI_BASE = "assets/";
    private static final String LOOP_URI = Board.class.getResource( name: URI_BASE + "13-graze-the-roof.wav").toString();
    private AudioClip loop;

    /* game variables */
    private boolean loopPlaying = false;
    private boolean loopForbidden = false;

    /* message on completion */
    private Text completionText = new Text("Well done!");
    private Text gameTitle = new Text("IQ Step");
    private Text wrongMessage = new Text("Wrong Step!");
    private Text operationInfo = new Text("press 'm' to stop or play music\npress '/' for hint\n\nwhen on board, scroll mouse to rotate pieces\nwhen off board, scr
    private Text steps = new Text("Step Count: " + Integer.toString(step));

    private static Group root = new Group();
    private static Group pegs = new Group();
    private static Group pieces = new Group();
    private static Group homePieces = new Group();
    private static Group startingPieces = new Group();
    private static Group controls = new Group();
    private static Group controlsHome = new Group();
    private static Group hint = new Group();
    private static Group background = new Group();
    private static Group operationHelp = new Group();
```

IQ-GAME



IQ-GAME



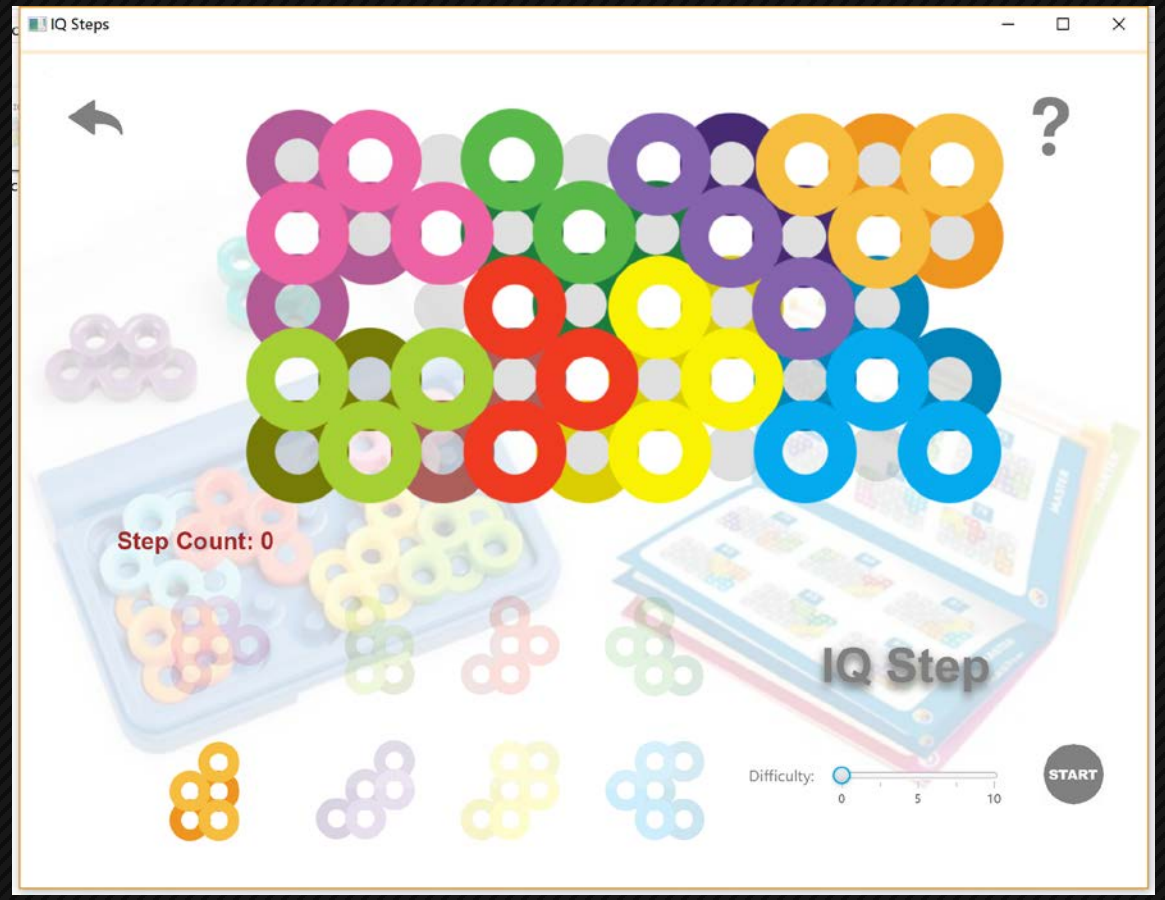
Operation Help

provide cue when you meet trouble

IQ-GAME

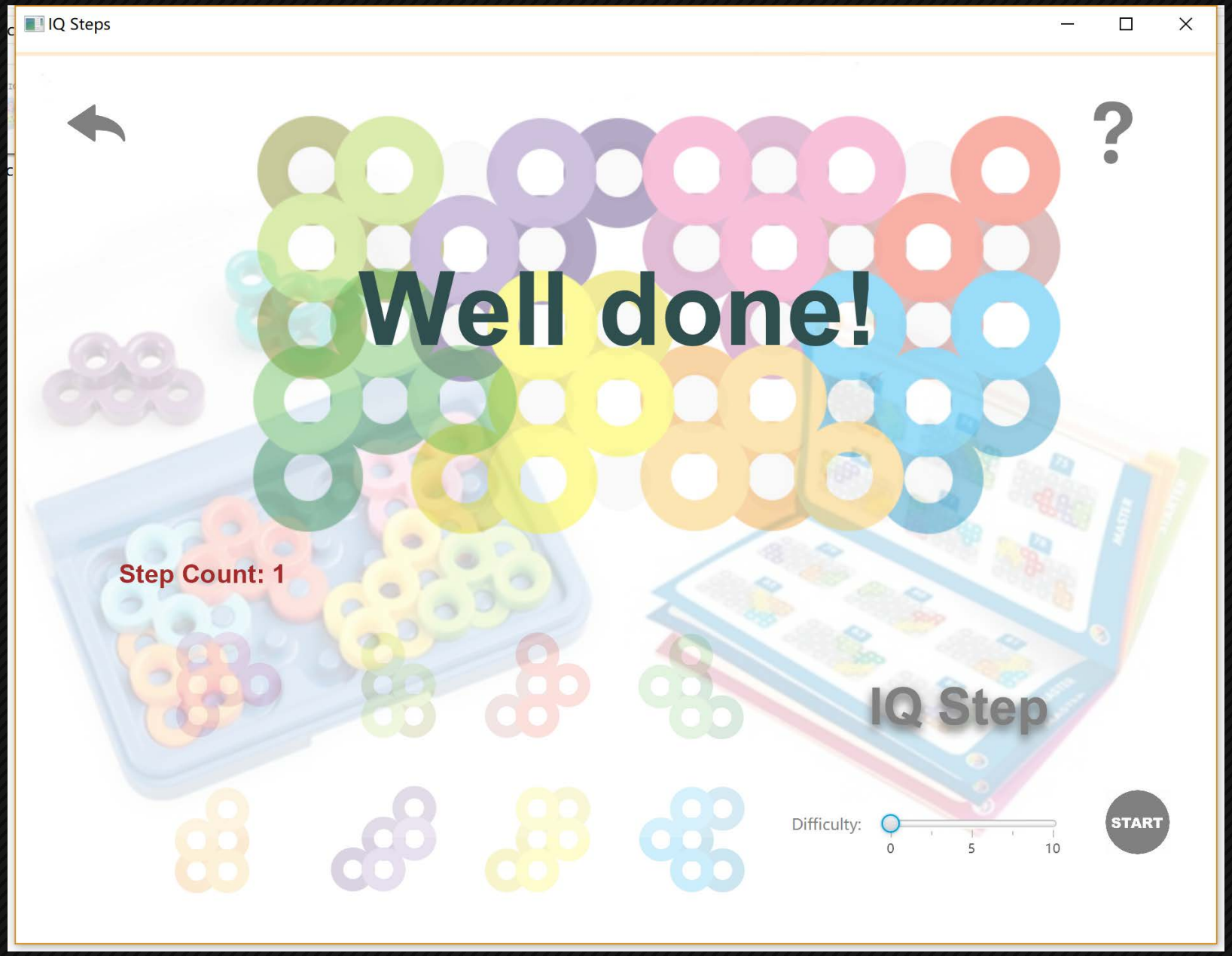

IQ Steps
press 'm' to stop or play music
press '/' for hint
when on board, scroll mouse to rotate pieces
when off board, scroll mouse to rotate and flip pieces
Enjoy your game~! haha
Step Count: 0
IQ Step
Difficulty:
0
5
10
START

IQ-GAME


IQ Steps
Step Count: 0
IQ Step
Difficulty:
0
5
10
START


IQ Steps
Step Count: 1
Wrong Step!
IQ Step
Difficulty:
0
5
10
START

IQ-GAME


IQ Steps
Well done!
Step Count: 1
IQ Step
Difficulty:
0
5
10
START

CONCLUSION

What we get from this assignment?

Merits

- Make appropriate use of object-oriented features such as inheritance and enum types.
- Comments are clear and sufficient.
- Make good / appropriate use of JUnit tests throughout the project
- Demonstrates interesting extensions that go beyond the basic task
- Works well and easy for a new user to run the game.
- The speed is satisfying.

Demerits

- Not use many constraints to getSolution() strategically
- GUI not look very attractive

Possible actions need to improve

- apply more constraints to implement faster when get solutions
- Enhance GUI design

CONCLUSION

How to apply more constraint?

Possible actions need to improve

- Each row has at most for home positions.
- Each column has at most two home positions.
- The number of entries between any 2 home positions should be greater or equal than one.
- The number of entries between any 2 home positions in the same row should be less or equal than three.
- Each sub-matrix of 3*3 has at most a home positions.

65	66	67	68	69	70	71	72	73	74
75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	97	98	99	100	101
102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121

THANK YOU

- Thank you for your listening.
  Hope you enjoy it.

Q&A: If you have any questions, you can ask us now!