南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

2017-2018 Academic Year
Fall Semester
Answer Key

Course Name： Java 2　　Course Code： CS209

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Part 2: MineSweeper Game (50 points)

第一条 Object design (15 points)

Widget to extend (5points):

Any widget that you can click on is OK - Button or CheckBox probably the best choices .

Additional attributes: (5 points)

```
private boolean hasMine;    // 1.5 point
private boolean isClicked ; // 1.5 point
private boolean isFlagged;  // 0.5 point - likely to be forgotten
// Optional: count of mines around (can be counted dynamically)
// - 0.5 bonus even if not really useful
// For the location: either row and column on the board, or
// array of references to the surrounding cells - 2 points
private int     row;
private int     col;
```

Container: (5 points)

Best choice: GridPane (5 points)

Acceptable: multiple Hbox in VBox or multiple Hbox in Vbox (3.5 points)

第一条 Game initialization (15 points)

Important points when grading:

- Function must be called on the first click (2 point if specified)
- There must be a boolean variable to check if initialization was performed, which must be set by the initialization method (3 points)
- No mine must be set on current position (6 points)
- Random computation of both row and column (2 points)
- 2 points for while loop to check if the right number of mines was set, 1 point if a for loop is used (if we try to set a mine on the current position, the mine count would be one less than expected)

Example code

I'm using class attributes rows, cols, mines, board and initialized. My board has a single

dimension, could be two dimensions.

```
private void initBoard(int excludeRow, int excludeCol) {
        Random rand = new Random();
        int    r;
        int    c;
        int    mineCount = 0;

        while (mineCount < mines) {
           r = rand.nextInt(rows);
           c = rand.nextInt(cols);
           if ((r != excludeRow) || (c != excludeCol)) {
             board[r * cols + c].plantMine();
                // Method that sets the mine attribute to true
             mineCount++;
           }
        }
        initialized = true;
     }
```

第一条 Playing the game (20 points)

Important points when grading:

- Check if first click and call initialization if this is the case (5 points)
- Do nothing if cell was already clicked (3 points)
- Return with an "end of game" indication if mine hit (1 point)
- Reveal everything if mine hit (3 points)
- Reveal count (can count dynamically or display a stored count) if no mine (2 points)
- Recursive click of surrounding mines if no mine around (6 points)
  2 points if loops on surrounding cells to show what they contain without recursion.

Example code

```
private boolean click() {
    boolean gameOver = false;
    if (!isClicked) {
      if (!initialized) {
        initBoard(this.row, this.col);
      }
      this.getStyleClass().add("clicked");
      isClicked = true;
      if (this.hasMine) {
        System.out.println("Boom");
        Image image = new Image("boom.png");
        ImageView iv = new ImageView();
```

```
            iv.setImage(image);
            setGraphic(iv);
            gameOver = true;
            for (int i = 0; i < rows; i++) {
              for (int j = 0; j < cols; j++) {
                 board[cols * i + j].reveal();
              }
            }
          } else {
            int minesAround = countSurroundingMines();
            if (minesAround > 0) {
              this.setText(Integer.toString(minesAround));
              this.getStyleClass().add("m" +
                              Integer.toString(minesAround));
            } else {
              for (int i = -1; i <= 1; i++) {
                for (int j = -1; j <= 1; j++) {
                  if (((row + i) >= 0)
                      && ((row + i) < rows)
                      && ((col + j) >= 0)
                      && ((col + j) < cols)
                      && ((i != 0) || (j != 0))) {
                    gameOver = board[cols * (row + i)
                                    + (col + j)].click();
                  }
                }
              }
            }
          }
        }
        return gameOver;
    }
```

Part 3: Data Handling (20 points)

1. Collection type (5 points)
   - Two pieces of data to store (clue + gender) therefore begs for a Map
     - TreeMap or HashMap OK
   - Array of two collections (one for male clues, other for female clues) not as good but could work 3 points.
2. Finding gender - ArrayList categories (15 points)

   Important for grading:
   - Loop on categories (3 points)

- Split category into words (5 points)
- Search each word as key of map (4 points) or try to get the first list where it is if using two lists (3 points)
- Returns immediately when found (3 points)

  If use of counters 2 points

  If looping on everything and remembering what was found 1 point

  If looping n everything and overwriting what was found 0.5 for effort ...

```
String gender; // or char
for (String cat: categories) {
  //split cat into words
  String[] words = cat.split(' ');
  for (String w: words) {
     gender = clues.get(w);  // if clues is a map
     if (gender != null) {
        // Two options:
        // a. Return immediately the gender found   (Best)
        // b. Maintain one counter for each gender and count clues (OK)
     }
     // If clues is an array of two lists:
     // loop on two positions
     //     if list contains w, then return immediately or count clues
  }
}
```

Bonus remark: give more importance to female than male clues. For instance, there is no special word for "female director". These are for example the categories for Ann Hui:

- Asian Film Award winners
- 1947 births
- Living people
- Alumni of the University of Hong Kong
- Chinese women film directors
- Fukuoka Asian Culture Prize winners
- Hong Kong film actresses
- Hong Kong film directors
- Hong Kong film producers
- Hong Kong people of Japanese descent
- Hong Kong screenwriters
- Hong Kong women writers
- Members of the Order of the British Empire
- People from Anshan
- Writers from Liaoning
- Actresses from Liaoning

- Film directors from Liaoning
- Asian film producers
- Alumni of the London Film School
- Chinese film directors