

Victoria University of Wellington  
School of Engineering and Computer Science

## SWEN222: Software Design

### Assignment 1

Due: Monday 12 August @ Midday

#### 1 Introduction

You are to implement parts of a program allowing people to play the latest revised game of Cluedo on a computer. If you have not heard of the game Cluedo before, don't worry as a specification detailing what you need to do is provided. For the purposes of this assignment, your program will be a working prototype and will run on an ordinary desktop computer.

Wikipedia, as usual, has an article on the new version of the game:

[http://en.wikipedia.org/wiki/Cluedo:\\_Discover\\_the\\_Secrets](http://en.wikipedia.org/wiki/Cluedo:_Discover_the_Secrets) (accessed: Sunday, July 21st).

**NOTE: the Keepers and Clocks rule variant in that article is a challenge for those wishing to receive an A+. It is not required as part of the core of the assignment.**

You will be given a rough specification of the Cluedo game, and asked to design and implement a solution. Your program will be implemented in Java and structured using classes, inheritance, and collections. Your program *should not have a graphical-user interface*; instead, a simple command-line interface is required.

#### 2 Specification

What follows is a simple specification for the game of Cluedo. The rules of the game have been simplified for the purposes of this assignment. Furthermore, the specification is neither complete nor extremely detailed and you must make reasonable assumptions where necessary.

##### 2.1 Objective

The game consists of between three and six players who move around a board consisting of different rooms. The aim is to deduce who the murderer was, what weapon they used and what room it happened in.

##### 2.2 Board

The (revised) Cluedo board consists of ten rooms laid out in a grid-like fashion (see Figure 1). The board is also divided into a grid of (approx) 25x25 squares. The corner rooms each provides an entry to a corridor that connects to the room in the opposite corner of the board. The center-most room (the swimming pool) is only used during play when a player is ready to make an accusation. There



Figure 1: The Cluedo Board

are six starting squares located on the outside of the board. Each starting square indicates which character starts at that position.

## 2.3 Character

There are six characters in the game, one of which is the murderer:

- Kasandra Scarlett
- Jack Mustard
- Diane White
- Jacob Green
- Eleanor Peacock
- Victor Plum

Each player in the game assumes the role of one of these characters. There may be unused characters if there are less than six players.

## 2.4 Weapons

There are nine weapons in the game, one of which is the murder weapon:

- Rope
- Candlestick
- Knife
- Pistol
- Baseball Bat
- Dumbbell
- Trophy
- Poison
- Axe

Each weapon is located in a room chosen at random, such that no two weapons are in the same room.

## 2.5 Rules

Every character, weapon and room is represented by a special card in the game. Before the game starts one character, one weapon and one room card are selected at random and placed in a special envelope. This is then located in the center of the board. These cards represent the “solution” — that is, they identify the murderer, the murder weapon and murder room. The remaining weapon, room and character cards are then dealt evenly to the players.

Players take it in turns to roll the dice and move their character token a corresponding number of squares. When a player enters a room he/she can announce a *suggestion* which consists of that room, and a character and weapon (if necessary, the character and weapon pieces are moved into the room). By making the announcement, the player is hypothesising that these solve the murder.

When an announcement is made, each player responds in a clock-wise fashion until either: the suggestion is refuted; or, all players have indicated they cannot refute the suggestion. A suggestion is refuted by a player if that player contains a matching card. In other words, the player contains a card and, hence, that card cannot be in the solution envelope.

Play continues until a player believes he/she has determined the solution. At that point, he/she should move to the swimming pool, and make an *accusation* consisting of a weapon, character and room. The accusation is then checked by the player against the solution. If it is correct the player wins, otherwise the player is eliminated from the game.

## 2.6 User Interface

You are asked to implement an object-oriented program for playing the Cluedo game. This should provide a simple, text-driven user interface (see the catalogue program for ideas on how to do this) and should at least do the following:

1. The program begins by asking how many players are required.

2. At the start of each turn, the program rolls the dice, moves the player's token to the desired spot.
3. Once a player has moved, he/she is presented with the option of making an announcement or — if they are in the swimming pool — an accusation. Note, the program should prevent the player from breaking the rules (e.g. announcing a hypothesis for a room the player is not currently in).
4. The program then repeats steps 2-4 for the next player and so on.

All input/output for this should occur via `System.in` and `System.out`. **DO NOT USE A GRAPHICAL USER INTERFACE MARKS WILL BE DEDUCTED FOR DOING THIS!**

### 3 What to Do

For this assignment, you have the option of:

1. **Working on your own.** In such case, all work must be your own.
2. **Working in a pair.** In such case, you may work together with another partner on the project. You must register your intent to do this using the team signup system:

<http://ecs.victoria.ac.nz/cgi-bin/teamsignup>

**NOTE:** In marking the assignment, no distinction will be made between students who worked in pairs and those who did not. Therefore, there is a clear advantage for students who chose to work in pairs. This is because the workload will be shared between them. We wish to encourage you to work in pairs, as this will help develop good teamwork skills and better prepare you for the group project.

You should begin by formulating a rough design for your project. Begin by constructing *CRC cards*, following the technique outlined in lectures. Then, construct a preliminary *UML class diagram* (for those who have not taken SWEN102, information on these will be made available on the course homepage).

Once you are happy with your initial design, you should begin the implementation. During this, you will most likely want to refine your design as problems are uncovered. Finally, you should complete the remaining documents as necessary (see below).

### 4 Submission

Your program code should be submitted electronically via the *online submission system*, linked from the course homepage. Your submitted code should be packaged into a jar file, including the source code (see the export-to-jar tutorial linked from the course homepage). Your program should include appropriate Javadoc comments, and provide a suite of JUnit test cases.

In addition to the source code, various pieces of design documentation are required. These should be submitted as PDF or PNG files; other formats will not be accepted. The required documents are:

1. CRC Cards for the main classes in the system.
2. Class Diagram illustrating the main aspects of the class hierarchy. This should not be cluttered with unnecessary information such as, for example, `toString` methods.

3. Sequence diagram illustrating the sequence of events which occur when a player takes his/her turn.
4. A one-page report written in your own words giving an overview of the design for the cluedo program.
5. A one-page report written in your own words stating the amount of time you spent on the project, roughly divided between activities and/or components.

**NOTE:** The written report must be your own work. That means you cannot submit a report which is identical to that of your other team member(s). Furthermore, it is not acceptable to simply copy material from other sources, such as the internet or text books.

## 5 Assessment

This assignment will be marked as a letter grade (A+ ... E), based primarily on the following criteria:

- **Design.** This overall quality of the design will be assessed. A good design will provide an appropriate decomposition of real-world objects, and make effective use of inheritance, polymorphism and design patterns (where appropriate).
- **Documentation.** Marks will be awarded on an individual basis for clear communication. In particular, diagrams should focus on correctly identifying the most important issues in the design and communicating them effectively. Marks will also be awarded for good justification of the design, and for showing evidence that alternative approaches were considered.
- **Implementation.** Marks will be awarded for various aspects related to the program itself including, but not limited to, correctness and style. Submitted projects are expected to follow the appropriate style guide, and include comments suitable for documentation purposes (e.g. Javadoc), as well as general understanding. Submitted projects are also expected to provide a range of JUnit tests to give confidence that the program is correct.