Software Engineering Project

Requirements

You are required to design and implement a variant of the *Cluedo* game. Cluedo is a murder mystery game. It is assumed that a person is murdered in a mansion and the players need to identify who is the murderer.

The number of players should range from 3 to 6.

The game is composed of a *gameboard*, *pawns*, a pack of *cards*, and a *notebook* for each player. These are described below.

Gameboard:

The gameboard represents the house where the murder occurred. The gameboard is composed of slots representing parts of the corridor or parts of a room. There are nine rooms in the mansion where the murder can take place. Each of the four corner rooms contains a secret-passage that leads to the room on the opposite diagonal corner of the map. For each room there are adjacent corridors slot that have a door and that allow access to the room. There are no rooms in the game that are not accessible from a corridor through a door. The rooms are Kitchen, Ballroom, Conservatory, Dining Room, Lounge, Hall, Study, Billiard Room and Library.

Pawns:
There are two types of pawns: the pawns representing suspects and the pawns representing weapons.

Weapon pawns: They represent the potential weapons used in the murder. The weapon pawns can be: candlestick, knife, lead pipe, revolver, rope and poison. Weapon pawns shall be placed in the rooms of the gameboard. They shall move from a room to another when a player formulates a hypothesis or makes an accusation of murder. (See more below).

Suspect pawns: They represent the potential murder suspects. Each player holds a suspect pawn and impersonates one suspect character. Characters are: Miss Scarlett, Professor Plum, Mrs. Peacock, Reverend Mr Green, Colonel Mustard and Mrs White. Each player can move the suspect's pawn s/he impersonate on the gameboard using a pair of dices.

Cards:
Cards can be of 3 types: suspects, weapons, and rooms. They represent respectively the suspects, the weapons and the rooms available in the game. They are used to identify a solution for the murder mystery and/or to refute hypotheses and accusations (see rules).

Notebook:
All the events of the game shall be stored by the system. Each player has a notebook showing the events of the game s/he is allowed to see. There are game events that are publicly visible (for example, pawns movements) and events of the game that are private (for example, when a hypothesis is refuted).

Players play on the same machine in turns. You can assume that while a player is playing, the others cannot see what is happening.

Rules of the Game:

1. *Start*
   At the start of the game, the system randomly picks 3 cards (1 from the suspects, 1 from the rooms and 1 from the weapons). These indicate the murder mystery solution: the murderer, the room in which the murder took place and the weapon adopted. Obviously, none of the players should be able to see these 3 cards. The rest of the cards are shuffled and distributed in turns one by one to each player. Therefore it might be the case that a player has more cards than others or that has character cards that do not correspond to the character s/he impersonates.

2. *Game*
   Players play in turns. The order of the players shall always be maintained during the game. The ordering of players is established at the beginning, for example, following the order in which players are created). At each turn, a player can decide whether to move his/her pawn. Note that this is optional. S/he can use the dices to identify the number of slots s/he can traverse. Note that the player can only move between adjacent slots. Every room contains a fixed number of slots, the slots representing secret passages are considered adjacent to the room in which they are placed and the room in which they lead.

   Only if a player is in a room (i.e. not in the corridor), s/he can decide to perform one of the following actions.

   - *Formulate a hypothesis*: The player can give a possible solution to the murder indicating a murderer (one of the characters including the one s/he impersonates), a room, and a weapon. The necessary precondition is that the room of the hypothesis should be the same in which the player is placed. At this point the system checks - starting from the player who played immediately before the current one – whether s/he holds at least a card equal to the one used for the hypothesis (character, room or weapon) that can refute the hypothesis. If not the process continues to the previous player until either one player disproves the suggestion, or no one can do so. If the system finds a card that can refute the hypothesis that card is shown only to the player who formulated the hypothesis. The other players only know if the hypothesis was refuted or not, and by whom (see more details below). Finally, the system moves the pawns of the suspect and of the weapon in the room in which the hypothesis was formulated and the game can progress to the next player in the turn.

   - *Formulate an accusation*: If the player is sure to know who is the murderer, where the murder happened and the weapon adopted s/he can formulate an accusation. However, she needs to be placed in the room in which she thinks the murder took place. Then the system moves the pawns of the suspect and the weapon in the room in which the accusation was formulated. The system checks that the accusation is correct and if so the game is concluded and the player who formulated the accusation wins. If not, the player loses and has to leave the game. The cards of the player who leaves the game are kept secret.

   At this stage the turn moves to the next player.

Events of the Game in The Notebook

If the player X formulated a hypothesis that Z made the murder in the kitchen with the gun and the hypothesis was refuted by Y using card Kitchen, this is what player X will see in his/her notebook:

- I formulated the hypothesis that Z made the murder in the kitchen with the gun.

- Y refuted the hypothesis showing the card "Kitchen".

Y instead will see the following:

- X formulated the hypothesis that Z made the murder in the kitchen with the gun.
- I refuted the hypothesis showing card "kitchen".

All the other players instead will not be able to see the card that was revealed but will know that Y refuted the hypothesis. This is what the other players will see in their notebook:

- X made the hypothesis that Z made the murder in the kitchen with the gun
- Y refuted the hypothesis showing a card.