Chapter 3.8 Is-a and Has-a Problem Set

# Problem 3.8.1: Types of Notes

Create a class diagram for the following scenario:

A note-taking application can store any number of notes. Each note can be one of three types: a list, a drawing, or free-form text. These types of note all respond to edits, display requests, file open, and file save operations.

Justify your design decisions according to the principles presented in the chapter.

A diagram of a computer

AI-generated content may be incorrect.

I chose to design this class this way, because I interpreted the design as Has-A. This is because notepad does not change to fit whatever is on it, but what is on it does change. So, a notepad “has a” list, or drawing, or text, etc.

# Problem 3.8.2: Guessing Game

Create a class diagram for the following scenario:

A guessing game has 24 envelopes, each with a different amount of cash. The first has $1, the second has $2, the third has $4, and the 10th has $210 or $1,024. The player is given an envelope at random and can choose to walk away with the cash. The dealer will offer to buy the envelope off the user for the average of all the cash in an envelope. If the user does neither, then one envelope is opened and the dealer recomputes a new offer. This process continues until the user has accepted the dealer’s offer, has walked away with the envelope in hand, or the last free envelope is opened.

Justify your design decisions according to the principles presented in the chapter.:

A diagram of a graph

AI-generated content may be incorrect.

For this design, I built it in a way that fits more into the “Is-A” type. I did this because each object is independent of each other, though they are partially related, though only through association and implementation.

# Problem 3.8.3: War

Create a class diagram for the following scenario:

War is played with two or more players. The deck of 52 standard playing cards are evenly distributed to all the players of the game. With each turn, all the players simultaneously lays down the top card from his or her stack. The player with the highest card wins the turn and collects all the cards. If there is a tie, then each player turns up one card face-down and another face-up. Again, winner takes all or the tie procedure continues. The game ends when one player has all the cards in the deck.

Justify your design decisions according to the principles presented in the chapter

# Problem 3.8.4: Skeet

Create a class diagram for the following scenario:

The game of skeet consists of a gun controlled by the user and targets. The gun has five bullets. This means that the gun can only fire when there are less than five bullets currently moving towards the target. One type of target is a clay pigeon (called the pigeon for short). Hitting a pigeon will give the user a point and missing one (when the pigeon makes it to the end of the range without being hit) will result in the loss of a point. There is also a special target which is smaller and travels faster. Hitting it will give the user five points but missing will not result on a loss. There is also a real bird which the user is forbidden to hit. If this is struck, then the user loses 10 points. The bullets and the targets all obey the laws of physics: they fall to the earth due to gravity and they slow down because of wind resistance.

Justify your design decisions according to the principles presented in the chapter