Discussion on Design Changes: the Carcasonne Game

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Ever since the first design in homework 4a, lots of changes are made along the milestones. First of all, I was reminded at the design meeting by a kind TA that the center of a tile should be a list of feature types since there are tiles like tile O and P, where multiple feature types show up together in the center part of a tile. Besides, I did not pay much attention to the benefit of immutability at first. Even though I didn't provide methods to modify a Tile instance, I didn't declare it clearly as immutable as well, which is remedied in my final design report.

Another important design change is that a Segment class is added. I think in the first version of my design I am aware of this class, but I haven't made up my mind that I really need it, so it didn't show up in my 4a documents. Soon after 4b begins, I realized that it is an essential and necessary class because every tile is made up of different segments, and this also applies to every feature.

The third major change I made is removing the Meeple class which appeared in my first edition of design. Initially I represent meeples as a class, with fields like player id, availability, and position. During the process of redesign, I realized that each meeple can be fully represented by recording a meeple's player id in Segment class and keeping track of the meeple number in the Player class. This change greatly simplified my design as well as reduced some overhead.

Talking about Feature class, initially I didn't provide a method to compute score for each type of features, which is obviously a major design flaw. Also, in my original object model, I overrode *checkComplete* method in each of the three subclasses, which is unnecessary since the road and city feature share the same logic for checking completion and thus the code can and should be reused.

Another point is that I was wondering how exactly I should represent a board and coordinates in the first place. I thought about maintaining a map from position to tile, which basically is a relative coordinate system. Then I felt like accessing and maintaining such map is way more complex than simply applying a large enough 2-D array to include all possible tile positions. Therefore the 2-D array is what appeared in my final design report.

The final major change I made to the core design is that I have no method in the GameSystem class to represent the change of players in the first place. I added a method called *nextRound* in my implementation, which is responsible for changing the current player id in the game system to indicate the next round.

Since a GUI is added in homework 4c, some minor changes are also made to the core

design such as adding a GameChangeListener interface, maintaining a listener list in the GameSystem class, several methods to notify each listener, and so on. These are necessary changes to implement the observer pattern, which I already discussed in my final rationale document.

Basically, these are all major changes I made since my first design. Particularly, I appreciate the hard work made by all TAs. Your effort makes the whole process a lot easier and a much more pleasant journey for me.