Python – May 23 lab

First, we need to continue with Friday’s examples of working with large input files. ☺ I also have one new problem for you, which will be another application of a dictionary.

1. If you have not done so already, please finish questions 3 and 4 from Friday’s lab. For question 3 you need to sort all of the counties in descending order of population. Include in this output the name of the county (with state abbreviation), the population, land area and density. Question 4 asks you to write an interactive program that will determine how many people live within a specified distance from a specific latitude/longitude point given by the user.
2. Let’s apply the dictionary concept to a new problem. As with many simple computer programs, all we are essentially doing is process an input file, filter and detect information from it, perform some calculations, and derive some output. The subject of this program is a hockey game.

A common statistic for evaluating hockey players is called the plus/minus system.

Players on the ice have the offensive responsibility to help their team score goals. At the same time, they have the defensive responsibility to prevent the opposing team from scoring. The plus/minus statistic aims to reward players who contribute (even indirectly) to their team scoring, and penalize players for letting the opposing team score. Plus/minus has no effect on the outcome of the game. It’s only a statistic for evaluating the performance of individual players.

While on the ice, players earn +1 whenever their team scores a goal, and they earn –1 each time the opposing team scores. But there is an exception to this rule. Normally, there are 6 players on the ice from each team. Players who commit a penalty are taken out of the game temporarily (usually for 2 minutes). During this time, the offending player cannot be replaced, so the team is said to be “shorthanded” and the opposing team is said to have a “power play.” If your team has a power play, then you are expected to capitalize on this opportunity and score a goal. Thus, power play goals do not contribute to any player’s plus/minus rating. On the other hand, goals scored by a team that is equally matched or shorthanded do count for plus/minus.

Although the goalie is usually one of the 6 players on the ice, goalies are not evaluated according to plus/minus. They have their own statistics which we won’t address in this program.

Since this program is about hockey players, you may want to define a Player class. The attributes of a player will be the name, position, (jersey) number, and the plus/minus rating. You could instead simply store these attributes in a list, rather than formally define a Player class. A team would then be a dictionary of Players or a dictionary of these list objects. However, for the purpose of this assignment, you will not need to store all players on the team.

When your program starts, it should ask the user for the name of the input file. This file will summarize a single hockey game. The beginning of the file will mention which teams are playing. The visiting team is displayed first. The rest of the file will describe the “goal” events.

Each time there is a goal, you will see which team scored, what kind of goal it was, and which players on both teams were on the ice at the time of the goal. Again, the visiting team is listed first no matter which team just scored. Based on the goal information, your program should calculate the plus/minus ratings of all players on each team. There will be a blank line separating each goal. The first line of the goal will announce the goal like this “<name of team> scored goal!”. This may be followed by “(Power Play)” or “(Shorthanded)” as appropriate. If there is no notation after the ‘!’, then it is a goal when both teams had equal strength. Note that players do not earn plus/minus on a power play goal. When each player is listed, you will see three pieces of information: the player’s position, name and jersey number. See the example input below for the precise format of the input.

Finally, print a list of players on each team, with the visiting team displayed first. Within a team, players should be sorted in descending order by the plus/minus rating. Your output should appear in neat columns, similar to the example output below.

*Assumptions and Hints:*

There will be at least 1 goal scored during the game.

The possible player positions are “Center”, “Right Wing”, “Left Wing”, “Defense”, and “Goalie”. This is the order in which players on a team are listed in the input file.

As noted earlier, goalies do not earn plus/minus. Don’t include goalies in your output.

Your output should only list those players who actually received a plus/minus score. For example, a player who was only present during a power play goal should not appear in your output. Note that at the end of the game it is possible for a player’s plus/minus rating to be zero. For example, this can be achieved by a +1 and a –1.

On the file server you can find example I/O. PL030124.txt is an example input file, and 30124.out is its corresponding output file that your program should try to match.

1. Just a reminder: On Friday I gave your Homework Assignment #5, which was listed as question #5 on Friday’s lab handout. This was the question about tract-level output.