CMPE 202 PROJECT

GRAPH COLORING PROBLEM.

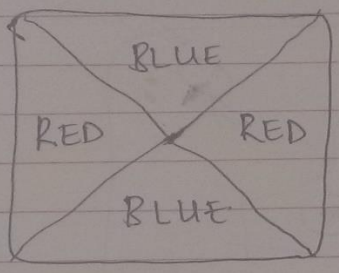
After we hit a dead end with Public Key Encryption, and while were discussing other options on which we could do our project. I put forth the topic that I had liked very much. The main challenge in selecting a topic was that we had to make an interactive multiplayer game out of it. And after considering and discarding dozens of topics, we finally decided on the graph coloring problem.

The first time I had come across it, I was very much impressed and thought here might be an interesting topic which could meet all the conditions. I had a faint idea about how we could develop a game about it but it was nothing concrete. It was only when I put forth the idea to my teammates, explained it to them, and we discussed it that the solution became clearer and clearer to me. It's still a long way to realizing the solution but it's a start. Here's how I went about explain the problem for the first time.

I explained with the help of a diagram of a map. These were the two main requirements of the graph –

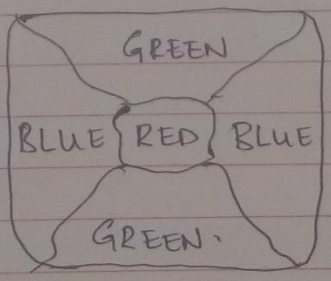
- Each country in the map should be colored.
- No two adjacent countries which share a common boundary should have the same colors. (The boundary should be visible)
- The aim is to use the minimum number of colors possible.

GRAPH COLORING PROBLEM - To find the minimum number of colors that are needed for a particular graph.



← Graph (Map) with 4 countries

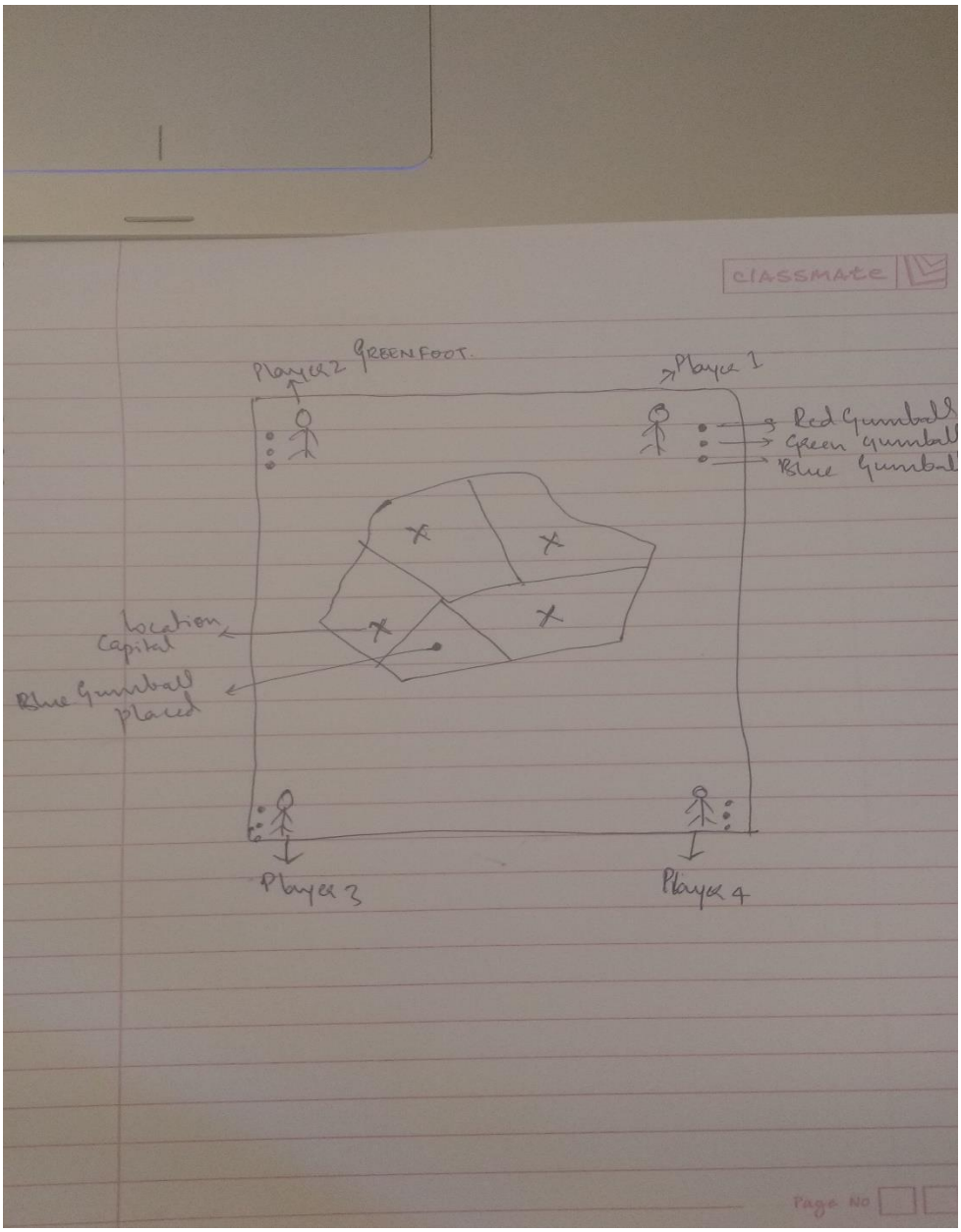
So this graph can be colored with a minimum of 2 colors. for ex



But the minimum number of colors for the above graph would be 3.
Because the country in the middle cannot have either the color Blue or Green.

The next thing was how to make an interactive multiplayer game out of this. We all were thinking of implementing it on Greenfoot first. We decided that two or more players can be given 5 colors each and each would take turns in filling a part of the map, keeping in mind that no parts can have the same color. The winner would be the player who used the least number of colors when the graph was fully colored.

Next we faced the challenge of how we would go about actually implementing this in Greenfoot. All of us came with many different ideas for it. It was decided that we could either do it using predefined maps or we can let the players themselves create a map. I had an idea, borrowing it from the Greenfoot lab we had done the previous week. I suggested that, in a predetermined graph, we could find out particular points in each country, mark it as X (say the capital) and whenever a player wants to color that country, it could be accomplished by the simple task of placing a colored gumball at X, and in effect it could be considered as the color for the while country.



Onto the next issue we faced, whether to have predetermined maps or let the players themselves create a map on which they could play. We discussed it for some time and then decided we could give ourselves some time and each one come up with solutions and we can discuss and choose the best one.