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CS 162 W17

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Final Project Reflection

Design Description

I decided to make an NBA basketball game. I knew that I would need to create 3 subclasses for the squares on the court, so I decided to create a 3-Pointer, 2-Pointer, and Out-of-Bounds class. I decided to create a player class that could move around the court and shoot the ball. The number of points earned pends on where they shot from. I used some actual statistics from the players' careers to determine their shooting percentage for 2-point and 3-point shots. I also decided to include some Easter Egg shooters, one who never missed and one who could even score without the ball.

The Square class has accessor functions for each member variable, and its status changes from unoccupied to occupied when the player steps there.

The Player class holds a lot of the important code. The player has a move() function and a shoot() function, which are the two options the user has. There are also 8 accessor methods (one for each member variable) and other functions such as pickUpBall() and resetPlayer(), which sets the player back to his original starting spot and changes the inBounds and hasPossession bools.

To create the court, I created a 2D array of pointers to the Square class. I initialized this as a 3-D pointer (Square*** court) and each square had a type, points value, and ints representing their row and column in the array. Each square also had 4 points, to the square above, to the left, below, and to the right. While testing my program, I realized that moving left to right one column at a time was too slow, so I changed the player's lateral movement to move 2 squares at a time.

I also created a Ball class and made the player hold a ball object. When the player has the ball, they can move it with them when they move around the court and shoot it. Unless they are Lonzo Ball, in which case they can score without even possessing the ball.

For the game itself, I decided to create a game where the player essentially has a limited number of turns (possessions) to score 21 points. They can move around the court and shoot from wherever they want. There are 6 players to choose from, all of them either current, retired, or future NBA players. If the player steps out of bounds, the possession is over. If they shoot, the possession is over as well, regardless of whether they made the shot or not. If they make the shot, they get those points, if not, the user begins the next round with the same score.

If the user scores 21 points, they win the game. If they don't score within 30 rounds, they lose. Either way, the user has the opportunity to play again.

I used Notepad++ and the internet to draw the court, NBA logo, and trophy.

Test Plan

Player/Scenario	Expected Outcome	Observed Outcome	Rounds
LeBron James	LeBron wins in under 20 possessions	Lebron won in 26 possessions He missed a lot of 3's despite his 40% 3-point shooting percentage	26
Stephen Curry	Steph wins in under 18 possessions	Steph won in 19 possessions.	19
Kobe Bryant	Kobe wins in 25 possessions	Kobe won in 18 possessions Basically Kobe is still beast…even though he has a lower 2-point and 3-point percentage than the other players, he is still clutch and hits shots when you need them. Less possessions than Steph AND Bron.	18
Shaquille O'Neal	Shaq wins in 27 possessions.	Shaq won in 21 rounds. Shaq is an animal. He gets to the basket at will. Even with his laughably-low 0% 3-point percentage, Shaq is able to convert close-up shots to 2 points 50% of the time. That's winning basketball folks.	21
Ivica Zubac	Zubac wins in 7 possessions, more if you don't shoot 3's.	As long as Zubac has possession of the ball, he can't miss. I took all 3's so it was only 7 total possessions.	7
Lonzo Ball	Ball wins in 7 possessions.	Ball scores even if he doesn't have the ball. I can hit space 7 times and Ball wins. He's unbelievable. Like a herd of bison being released into the Canadian National Parks. A stampede of buffalo. Thank you Bill Walton.	7
Go out of bounds	Possession ends, reset player	Possession ends, reset player	N/A
Shoot without ball	Possession ends, reset player Unless you're Lonzo	Possession ends, reset player Lonzo Ball makes the 3	N/A

Results:

- My results matched my expected outcome for the most part
- LeBron missed an oddly high number of 3's, which is why he needed 26 possessions
- Steph shot mostly 3's and did about as well as I expected
- Shaq did better than expected, but that's because I know that his shooting percentage from 3 is 0%. If I had played normally it would take more and I would maybe lose.
- Zubac can't miss, so shoot whatever you want. This is an Easter Egg player, but he also helps show that the shoot() functions are working for other players.
- Lonzo Ball scores on every possession where he stays in bounds. He doesn't even need the ball. This is another Easter Egg player

How I Solved My Problems

- Unexpectedly, one of my major difficulties was seg faults. With a 2D array containing ~2000 pointers, it's bound to happen. I was able to fix this through a lot of debugging and using pointers rather than row/column to determine where a player was, how much their shot is worth, and whether or not they are out of bounds.
- I also had a hard time designing and printing my court. I had to essentially create each element for the court class AND to be printed, meaning I would need an array that contained each square's data and a "parallel" character array holding each square's character for printing.
- Moving the player with the ball and moving the player without the ball ended up being more difficult than I had originally envisioned. For some reason, sometimes the ball would move with the player, other times it wouldn't. Again, using pointers helped me.
- Creating the game so that it showed each step and was easy to use took a while. The first time I showed the program to someone they had no clue how they were supposed to use it. This is a more UX thing, but I had to be way more specific about the rules and how to play the game.