3D Tetris

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1. What functions were implemented
   1. The size for the stack of blocks equal to 5 X 10 X 5.
      1. Make “bool stack[5][10][5] = {false};”
      2. Once the position is confirmed, stack[x][y][z] = true
   2. A block keeps going down by one cell every one second.
      1. Minus the length of the cube every second at the y-coordinate every second.
   3. If the moving block touches the ground or any other existing block below it, make it stacked over the ground or existing block. Then, another new block, randomly chosen, should come down from the top again.
   4. If the current height of the stack of blocks is greater than the maximum height, the game is over, and the program should ask the user to do another round.
      1. If more than 10 cubes are stacked on the y-axis, the game is over maximum height.
      2. If another game starts with an "y", initialize the score, stack, and the required variables.
   5. The game score is the total number of layers that have been cleared from the stack.
      1. If the xy plane is filled with all blocks, +1
   6. As soon as any layer of the stack is completely filled with blocks, it should be cleared.
      1. Remove blocks from all filled xy planes.
      2. Lower the blocks of the xy plane on the upper floor one step at a time.
   7. The interactive viewing control of HW9 supported (tumble, track, zoom, dolly, projection modes).
   8. Position control (x-Axis, z-Axis)
      1. It moves separately between the x-axis and the z-axis according to the angle.
      2. If the block tries to move out of range, it stops it from moving.(x-Axis: 5 blocks, z-Axis: 5 blocks)
   9. Rotation a block about the y-axis by 90 degrees.
      1. Changes occur in x-coordinates and z-coordinates.
         1. x좌표 🡪 z좌표
         2. z좌표 🡪 x좌표
2. What functions were missing
   1. Rotation a block about the x-axis by 90 degrees.
   2. Rotation a block about the z-axis by 90 degrees.
   3. If the rotated block exceeds the empty stack space or penetrates the existing blocks, that rotation should not be allowed.

* I think the reason why I failed to implement the above functions is because I set up the wrong coordinate system. The current cube position should be multiplied by M(modeling transformation matrix) to obtain the rotated position. (p’ = M \* p) However, since the array has an index from 0 to 4, and the coordinates are origin (2,0,2), there is a problem in connecting the coordinates and the array. (coordinate: -2 ~ 2, array: 0 ~ 4) Also, y had to come down from the top, so it was not easy to exchange it with the x-coordinates and the z-coordinates, and it was still confusing.

1. How to play the game
   1. After starting the game, use the arrow(up, down, left, right) to position the block to the desired position.
   2. Rotation can be rotated around the y-axis by pressing 's'.
   3. If blocks exist in all positions on the xy plane (one layer), you can earn one point.
   4. If you stack blocks to the maximum height, the game ends.
   5. If you want to start a new game, type ‘y’ in the console window if you want to exit ‘n’.
2. What learned or discussion

* Through this assignment, I was able to completely review and organize what I learned through computer graphics classes during the semester. It was a regrettable time that I couldn't completely finish the project, but it was a time. Above all, I am very proud that I have experienced making a 3D game on my own. Before I made it myself, I thought it was a very simple game, but when I made it myself, it was very difficult to manage the coordinates that changed depending on rotation and movement. Above all, it was very difficult to match the coordinates of the cube with the index of the stack. I was able to make the current result by thinking a lot about what to set the starting point with and failing. Even now, the rotation part is not well executed, so even if the project period is over, I want to continue to think about it and solve it. I couldn't complete the project because I had more experience and learning while continuing to think about which method would be the best, but it was a very beneficial time for me. I sincerely thank the professor for answering the questions kindly and in detail.