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Game Project Report

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Introduction:

In this report I will mention the techniques and the algorithms used in the Catch The Balls Project and explain the program structure.

The Structure:

The system is divided into 7 Classes:

1. **Program.cs**: this class contains the main methods to control the game like:
    - Calculating the score.
    - Start or end the levels.
    - Determines if the player wins or loses the level.
    - Increase the level difficulty according to the level number.
    - Dealing with the input from the player like:
        - The Arrow keys to move the basket.
        - The Space bar to pause and resume the game.
        - The Esc key to exit the program.
2. **Utilities.cs**: this class is responsible for deal with the images.
3. **Basket.cs**: this class is responsible for construct the basket, draws it, and move it. And it also contains the basket's properties like Width, Height, Speed, and Position.
4. **Ball.cs**: this class is responsible for construct the ball, draws it, and drops it. And it also contains the ball's properties like Width, Height, Speed, and Position, and etc.
5. **Block.cs**: this class is responsible for construct the block, draws it, and drops it. And it also contains the block's properties like Width, Height, Speed, and Position, and etc.

6. **Writer.cs**: this class is responsible for writing on the screen, where the texts on the screen were dealt with as images of letters and numbers next to each other. This class is responsible for creating and drawing the text. It also contains the characteristics of the character (letter or number) such as its width and height. It also contains the starting position of the text that we want to write on the screen.
7. **Stars.cs**: this class is responsible for displaying the stars on the screen when the level ends to evaluate the player's performance at this level. This class is responsible for creating and drawing the stars. It also contains the characteristics of the stars such as its width and height.

How the system works and the used thinking algorithms:

The system accomplishes the following ideas:

- When the game starts, it starts at level 1.
- Each level lasts for one and a half minutes.
- The system contains two timers:
  - **DropTimer**: this timer determines the time between dropping the objects whether they are balls or blocks.
  - **LevelTimer**: this timer is responsible for calculating the remaining time to end the level.
- The probability of dropping blocks in the first levels is very small, as it is in the first level 1% and increases with the progress through the levels every time by 1% i.e., in level 2 it is 2% and in level 3 it is 3% and the matter continues until this possibility reaches a maximum value of 50%.
- The difficulty of the game depends on the number of the level so the game becomes more difficult with the progress through the levels.

- We increase the difficulty with the following process:
  - The speed of the balls and blocks increases until this speed reaches a maximum speed and that to keep the game playable.
  - The time between dropping the objects decreases until it reaches a minimum value and that to keep the game playable.
  - The probability of dropping blocks increases until this possibility reaches a maximum value of 50% and that to keep the game playable.
- The player can pause the game and display the current score by clicking the Space Bar, and he can resume the game if he clicks the Space Bar again.
- When the level ends, the program askes the player to click the Space Bar to start the next level if he passed the level or to restart the current level if he failed the level.
- The level ends when the level time ends then the player passes the level, or when he fails the level.
- The player fail any level if he missed 10 balls or if he broke the basket by catching a block.
- There are two kinds of balls:
  - A normal ball and by catching it the player receive 1 point.
  - A special ball and by catching it the player receive 5 points.
- When generating a ball there is 10% chance for it to be special.
- When generating a ball, the start dropping position is assigned randomly and the same thing applies to the blocks.
- The class Ball implements the interface IDisposable and implementing this interface means that any object from this class can be deleted and free up the memory that was occupied by it by calling the method Dispose and the same thing applies to the class Block.

- We dispose of an object (ball or block) in one of two cases:
  - The lower edge of the object touches the lower edge of the screen and if the object is a ball the missing balls count increases by 1.
  - The lower edge of the object touches the upper edge of the basket and the object is Catchable and if the object was a block the level ends with a failure.
- The object is Catchable from the moment of its creation and it becomes Uncatchable when its lower edge passes the upper edge of the basket without touching it.
- We can move the basket with the Arrow keys but it can’t go out the bounders of the screen and its upper edge can’t go higher than -0.2 on the Y axis.