Specification for the bouncing ball program (BBP)

Functionality Specification:

1. **Initialize a transparent window:**

- Input: no inputs. The window should automatically initialize after the program starts.
- Output: A Transparent window

2. **Add balls:**

- Input: Users click on the ADD BALLS button
- Output: There should be a sub-window for users to select the number, texture, color and size of the ball. After completing the settings, there should be corresponding balls added to the window.

3. **Bouncing effect:**

- Input: No input from users. As long as the balls are produced, they start bouncing.
- Output: All the balls will move, bounce, and collide in the window.

4. **Manipulation – Individual ball manipulation**

- Input: Users click on one ball, and then move the pointer.
- Output: The selected ball will be repositioned to the location designated by the user's cursor upon release.

5. **Manipulation – Group ball manipulation**

- Input: Users click and drag to draw a selection box around multiple balls, then drags the group to a new location.
- Output: The selected ball or group of balls will be repositioned to the location designated by the user's cursor upon release.

6. **Manipulation – Ball Aggregation**

- Input: Users click on an empty space within the window.
- Output: All balls in the window will move towards the clicked point and merge into one large ball. For division, the clicked ball will split into two smaller balls.

7. **Manipulation – Ball Division**

- Input: Users double-click on any ball.
- Output: The clicked ball will split into two smaller balls.

8. **Personalized ball design**

- Input: Users right-click on a ball.
- Output: A sub-window will appear allowing the user to change the texture, color, and size of the selected ball.

9. **Ball classification**

- Input: Users enter a keyword related to the texture, color, or size of the balls in the input provided by the transparent window, and type enter to confirm.
- Output: After confirmation, the input will become a cancel button. The program filters and displays only the balls matching the entered keyword. The balls that don’t match will be temporarily hidden.

10. **Cancel classification**

- Input: Users click on the cancel classification button.
- Output: The program will make hidden balls visible again. The cancel button will become an input again.

11. **Delete balls**

- Input: Users right-click on a ball to delete it or select a group of balls and choose a delete option.
- Output: The selected ball(s) are deleted removed from the window.

Performance Specification:

1. **Low memory consumption:**

- Measurement: The program's memory usage will be monitored to ensure it remains within acceptable limits.
- Output: The program operates efficiently without significant memory consumption.

2. **Compatibility with IDEs:**

- Measurement: The program will be tested for performance while running alongside various mainstream Integrated Development Environments.
- Output: The program will run smoothly without causing slowdown or lag in the operation of these IDEs.