Physics Sandbox

Requirements and Test Document

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**Introduction:**

The program is an interactive physics modeling simulation. It is a user-controlled sandbox of fully interacting particles in a contained environment. This document details the expected behavior of the simulation in order for the goals described in the Software Design Document to be considered complete.

**Background information:**

The updatePosition(double time) function is a part of the Kinematic class, and changes the x and y attributes of its object based on the velocity attribute and the time parameter. The play and pause buttons control the boolean ‘running’ which determines whether the simulation is running or paused. The applyForce(Vector force) function updates the object’s currentForces ArrayList with the parameter force. The Vector class’s add(Vector other) function adds the parameter other to the object from which it is called. The Particle class’s delete() function removes the object’s force from other object’s currentForces lists, then removes the object from the simulation.

*[Shall be completed by deliverable P3, and edited as needed for future deliveries.]*

**Requirements:**

The requirements take the following form:

[Requirement ID]. [Requirement description] | [Corresponding user story number from SDD]

1. Particles shall update their position each frame | 0
2. The simulation shall start and stop with play and pause buttons | 1
3. Particles shall apply forces to each other | 4
4. Vectors shall be able to add and subtract from each other accurately | 0
5. Particles shall destroy themselves and their circles when deleted | 0, 2, 4

**Test Cases:**

The table below describes the test cases for each requirement listed above. The Expected Behavior column describes the ideal result when the Initial Conditions column occurs. The Actual Behavior column details the real result of the Initial Conditions column once the test is executed. The Pass/Fail column describes whether or not the Actual Behavior matches the Expected Behavior.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req’t**  **ID** | **Test**  **Case**  **ID** | **Initial**  **Conditions**  **And Input** | **Expected Behavior**  **Or Output** | **Actual**  **Behavior**  **Or Output** | **Pass**  **Fail** |
| 0 | 0.0 | running = true  updatePosition(.1); | X and Y updated by .1 seconds | X and Y updated by .1 Seconds | Pass |
| 0 | 0.1 | running = true  updatePosition(0); | X and Y updated by 0 seconds  (no change) | X and Y updated by 0 seconds | Pass |
| 0 | 0.2 | running = false  updatePosition(3); | X and Y not updated  (no change) | X and Y not updated | Pass |
| 1 | 1.0 | running = false  play button pressed | running = true | Running = true | Pass |
| 1 | 1.1 | running = true  play button pressed | running = true | Running = true | Pass |
| 1 | 1.2 | running = true  pause button pressed | running = false | Running = false | Pass |
| 2 | 2.0 | force is a valid Vector  applyForce(force) | Force added to object’s currentForces list | Force added to object’s currentForces list | Pass |
| 2 | 2.1 | position is a valid Point  applyForce(position) | Error: Input not a Vector | Error | Pass |
| 2 | 2.2 | force is a valid Vector  Vector test = applyForce(force) | test = null | applyForce has no return value | Pass |
| 3 | 3.0 | test and test2 are valid Vectors  test.add(test2) | test x and y components reflect that test2 has been added to it | Test2 x and y have been added to test x and y | Pass |
| 3 | 3.1 | test and test2 are valid Vectors  Vector test3 = test.add(test2) | test3 = null | Vector add function has no return value | Pass |
| 3 | 3.2 | test is a valid Vector and test2 is a valid Point  test.add(test2) | Error: Input not a Vector | Error | Pass |
| 4 | 4.0 | particle1 is a Particle with particle2’s force in its currentForces list  delete particle2 | particle1’s currentForces list no longer contains particle2’s force | Particle2 no longer applies force to particle1 | Pass |
| 4 | 4.1 | Test is a valid Particle  Delete Test | Test no longer exists | Test no longer exists | Pass |
| 4 | 4.2 | Test is a valid Particle  Circle represents Test  Delete Test | Circle no longer exists | Circle no longer exists | Pass |

**References:**

**Appendices:**