COSC363 Assignment 1 – Synchronized Coupled Animation

Name: Oliver Cranshaw

User Code: ojc31

Student ID: 18433423

# The Scene:

The scene consists of 5 cylinders, 5 balls, and 1 swept surface arm. 4 of the balls bounce according to a simple gravity concept and the arm rotates around which the balls jump over and under. The shape of the arm mimics the curved shape of the balls so they can fit perfectly over and under. The balls bounce on top of the cylinders with the centre cylinder and ball propping up the rotating arm. All these objects are contained within a skybox as shown in the image below. The balls and cylinders are also textured with images from the labs.

A picture containing sky

Description automatically generated A picture containing sky, water, flag

Description automatically generatedA picture containing outdoor, snow, orange

Description automatically generated

# Extra Features:

* Planar Shadows as shown in the previous images.
* Physics based animation: The balls move with a constant downward acceleration reducing their speed in the y direction. This acts as gravity. When the balls hit the cylinders, they have a perfectly elastic collision as their downward speed is maintained but reversed to be upwards. This allows the balls to travel up and down in the exact same amount of time with a bounce like motion. For the perfectly elastic collision the formula for the balls speed is v = -u. Where v is the new velocity and u is the initial velocity. For the change in speed caused by the constant acceleration I used v = u + at. Where v is the new velocity, u is the initial velocity, a was my chosen acceleration (gravity) and t was always taken as 1.
* Collision detection: When the balls reach the top height of a cylinder their direction is reversed.
* Sky Box: A snowy sky box texture can be seen in the images.
* CMakeLists.txt:

# Control Functions:

* Up arrow key: Move the camera forward.
* Down arrow key: Move the camera backward.
* Page up key: Move the camera upward.
* Page down key: Move the camera downward.
* Right arrow key: Change the camera angle rightward.
* Left arrow key: Change the camera angle leftward.
* Home key: Change the camera angle upward.
* End key: Change the camera angle downward.

# Build Commands:

## Command Line:

To compile and run the program from the command line, please follow these steps:

1. Extract the .zip folder provided to your chosen directory.
2. Open the command line inside the extracted folder.
3. Run the following command: ‘g++ -o main main.cpp -lGL -lGLU -lglut’. This will produce an output file ‘main’ inside the extracted folder.
4. To run the program, run the command: ‘./main’ or ‘./main.out’

## Qtcreator

To compile and run the program from the command line, please follow these steps:

1. Extract the .zip folder provided to your chosen directory.
2. Open Qtcreator
3. Go to: File →Open File or Project... →Navigate to the extracted folder →select CMaleLists.txt
4. Select the Desktop kit →Configure Project
5. Not sure after this…