

PHYSICALLY-BASED SIMULATION OF SOFT BODIES IN INTERACTIVE SYSTEMS AND GAMES

Group: **FlowMo**

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Project Introduction

- ❑ Interactive Game with Physically-based Interactive System
- ❑ Interactive System consists of Soft-Bodies & Rigid-Bodies
- ❑ Implementation of Forces applied on Soft-Bodies & Rigid-Bodies

Simulation Methods

- Verlet Integration [[Advanced Character Physics T.J.](#)]
- Rigid Body Simulation using Particles
- Collision Detection & Handling
- Soft-Body Simulation

MILESTONES – *What we achieved*

Project Goals

1. Set up Basic Scene ✓
2. Rigid-Body Implementation ✓
3. Collision Handling for Rigid-Body ⚠
 - OBB vs OBB (90%) ✓
 - OBB vs Sphere ✓
 - Sphere vs Sphere ✓
4. Soft-Body Implementation ✓
5. Soft-Body Collision Handling ✓
6. Interactivity ✓

“Above and Beyond!” : Additional Goals

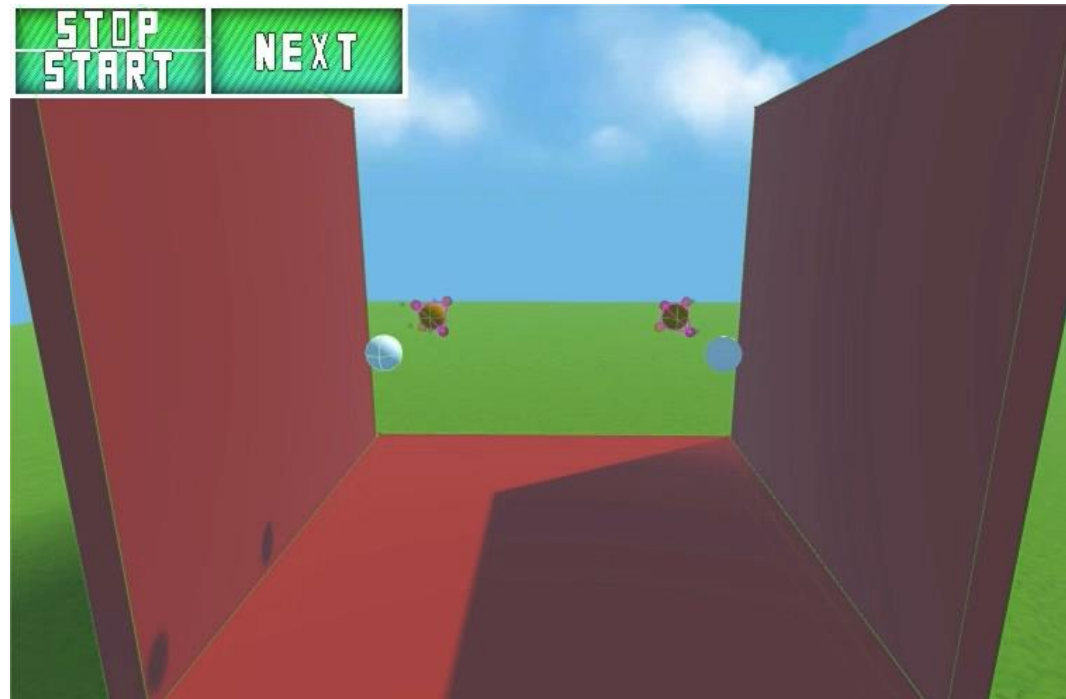
1. Cloth Simulator ✓
 - i. Tool with parameter settings
 - ii. Collisions with Spheres/Obb
2. Dynamic Octree (90%) ⚠
3. Soft-Bodies of rigged and skinned meshes ✓

Rigid Body

Sphere|Sphere

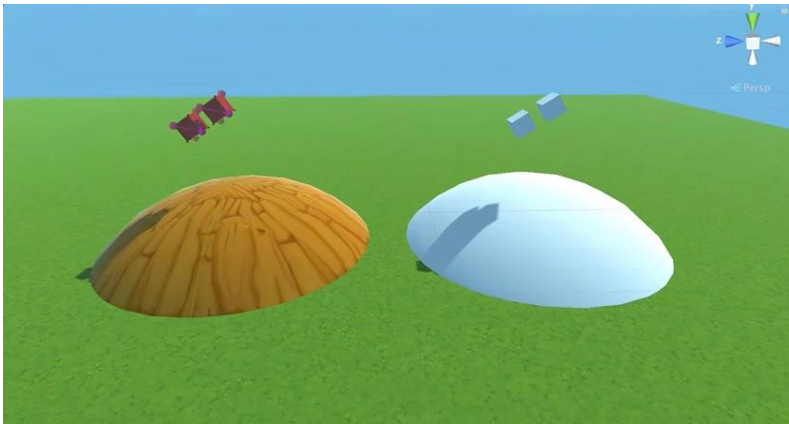
Sphere|OBB

OBB|OBB

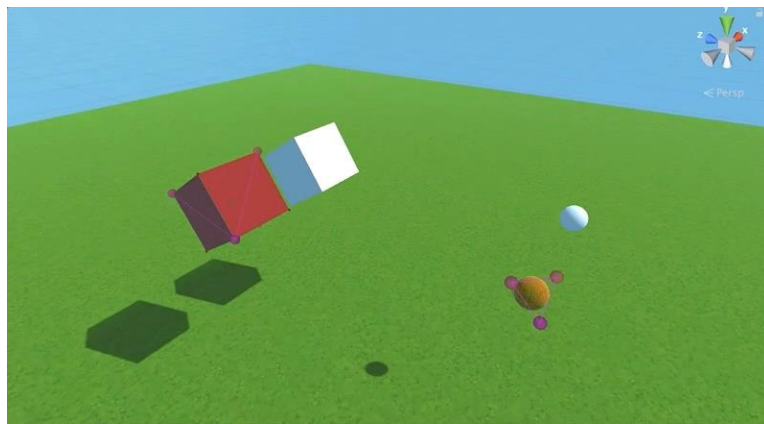


Rigid Body

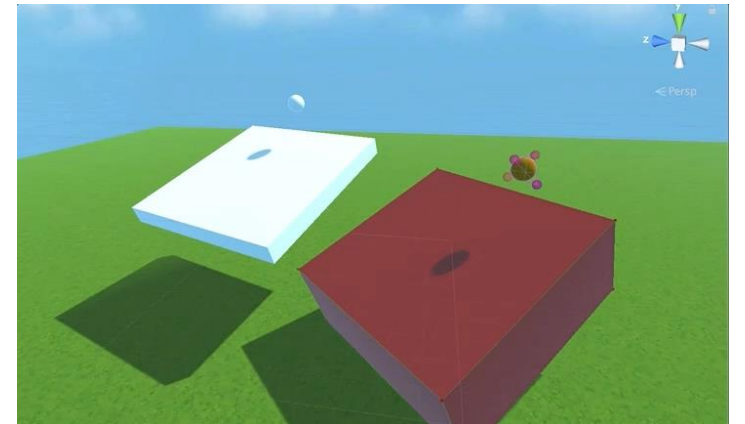
Sphere|Sphere



Sphere|OBB

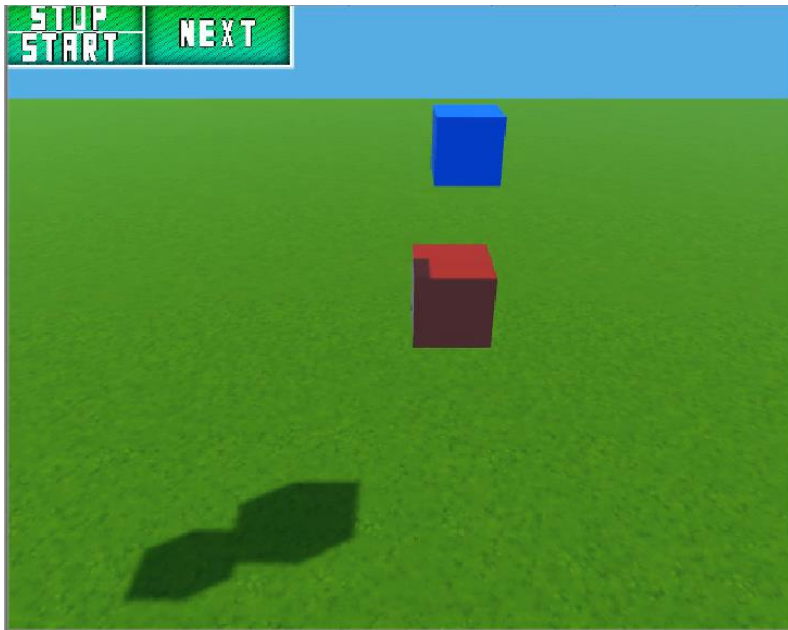


OBB|OBB

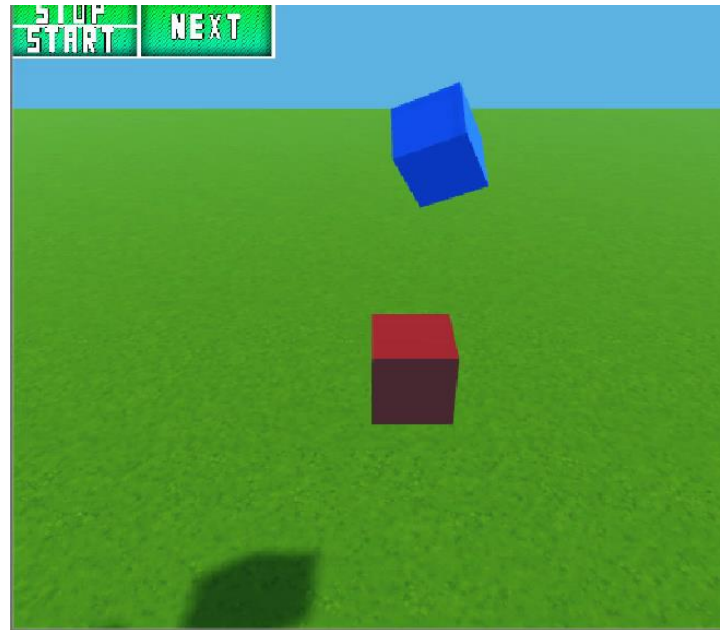


Rigid Body

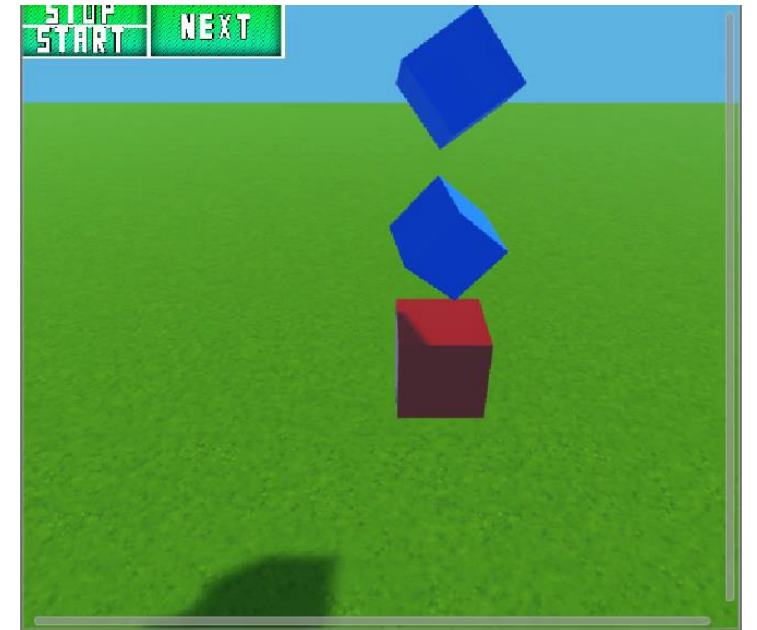
Sphere|Sphere



Sphere|OBB

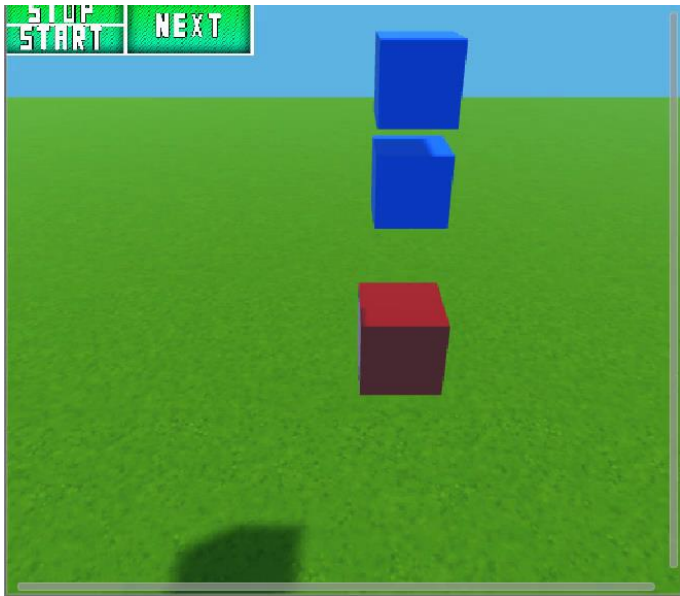


OBB|OBB ✓

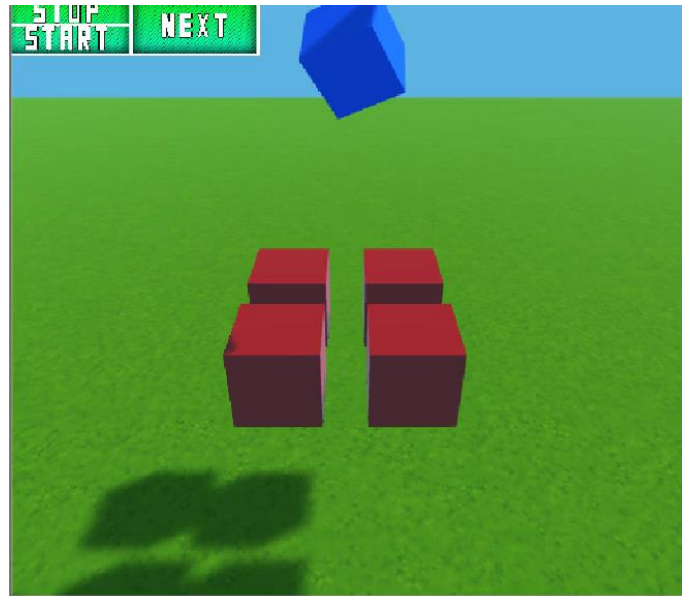


Rigid Body

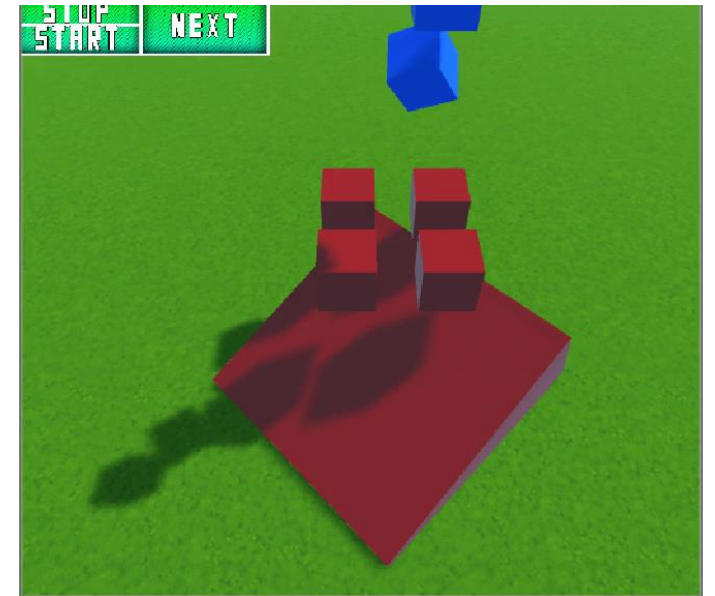
Sphere|Sphere



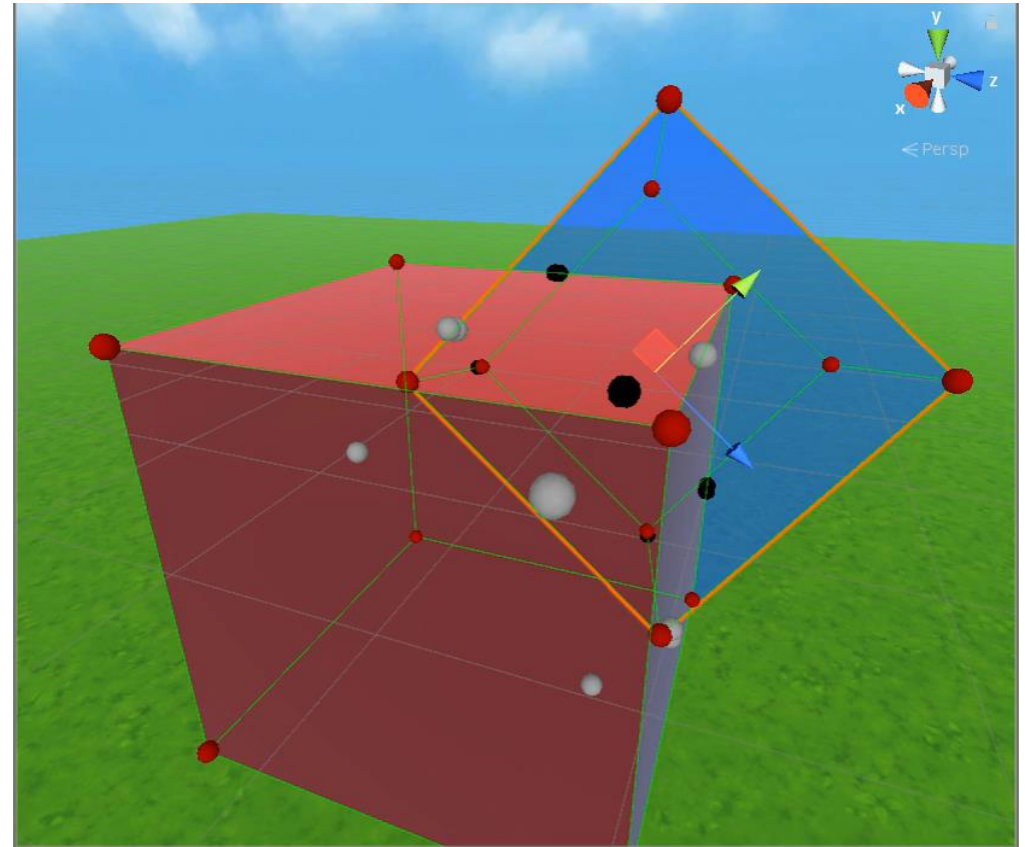
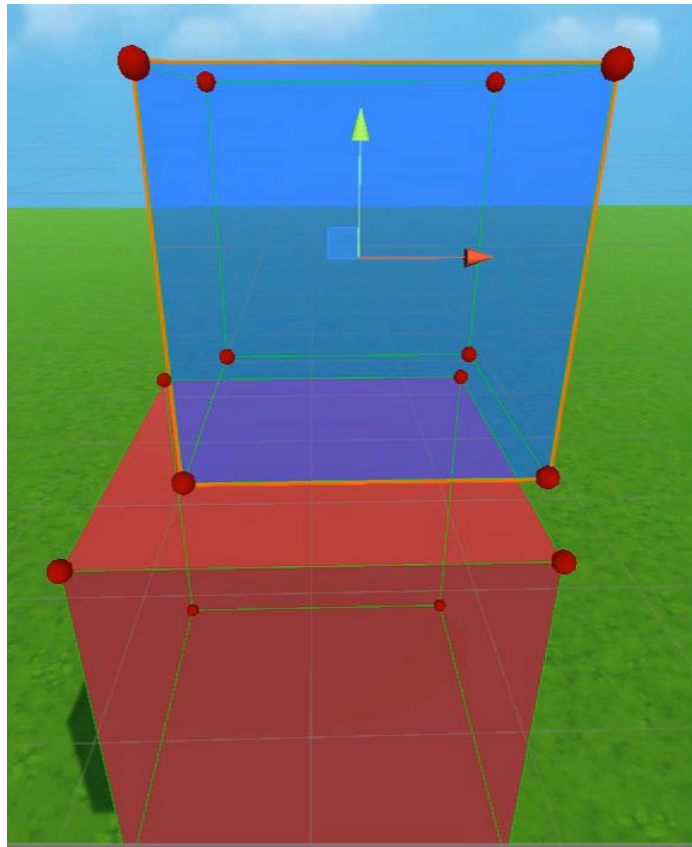
Sphere|OBB



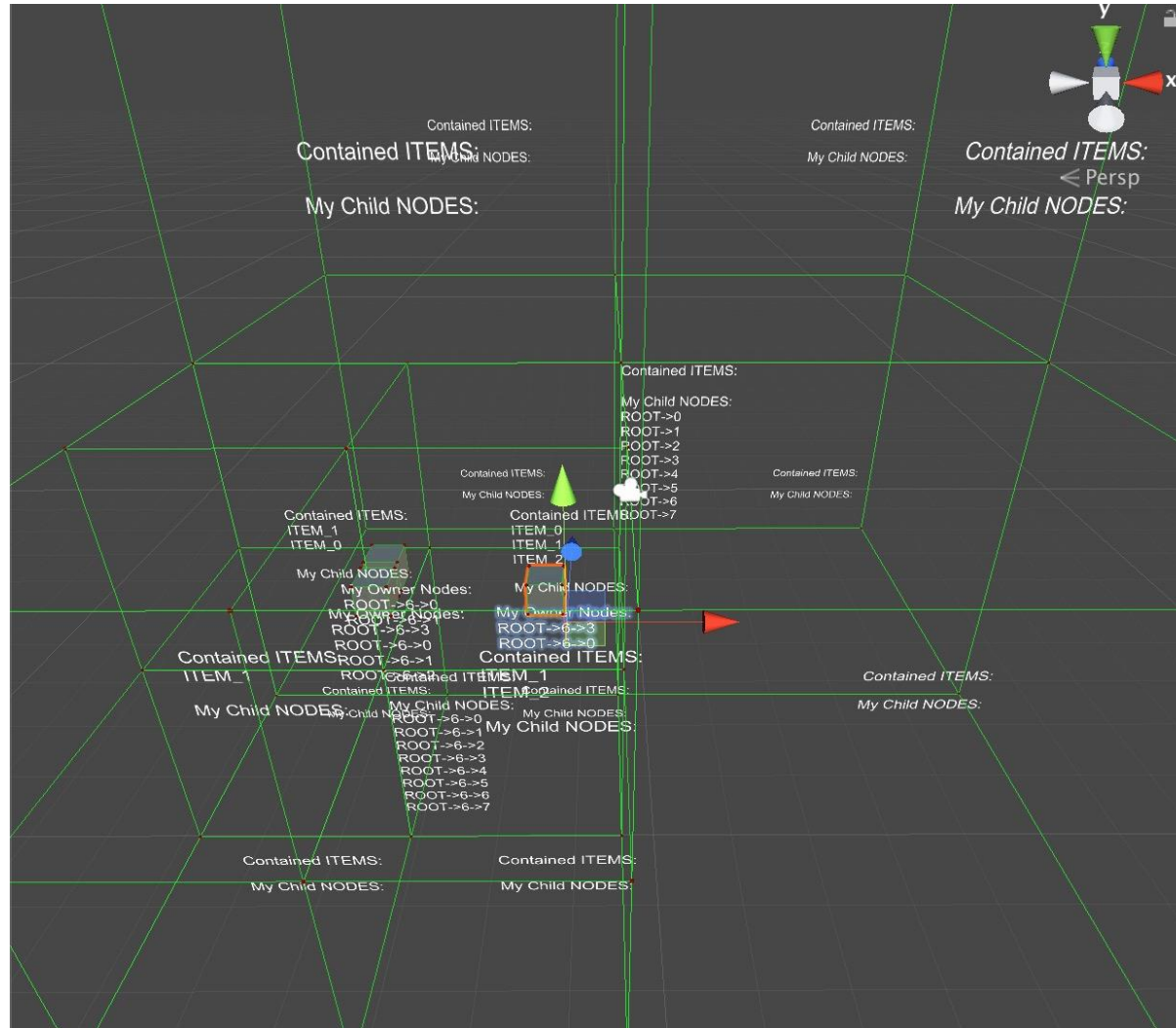
OBB|OBB ⚠



Challenges – OBB|OBB Collision

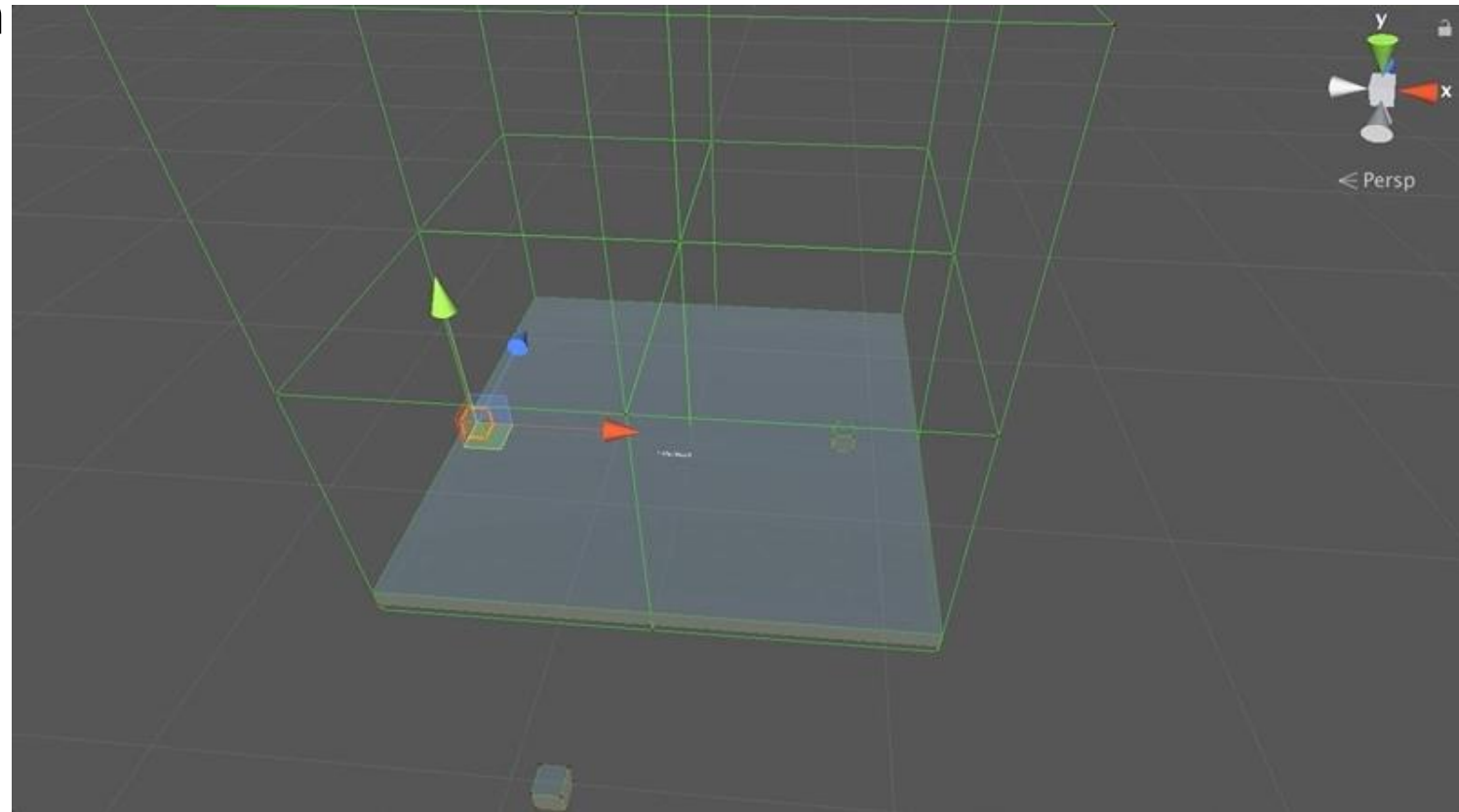


Challenges - Octree



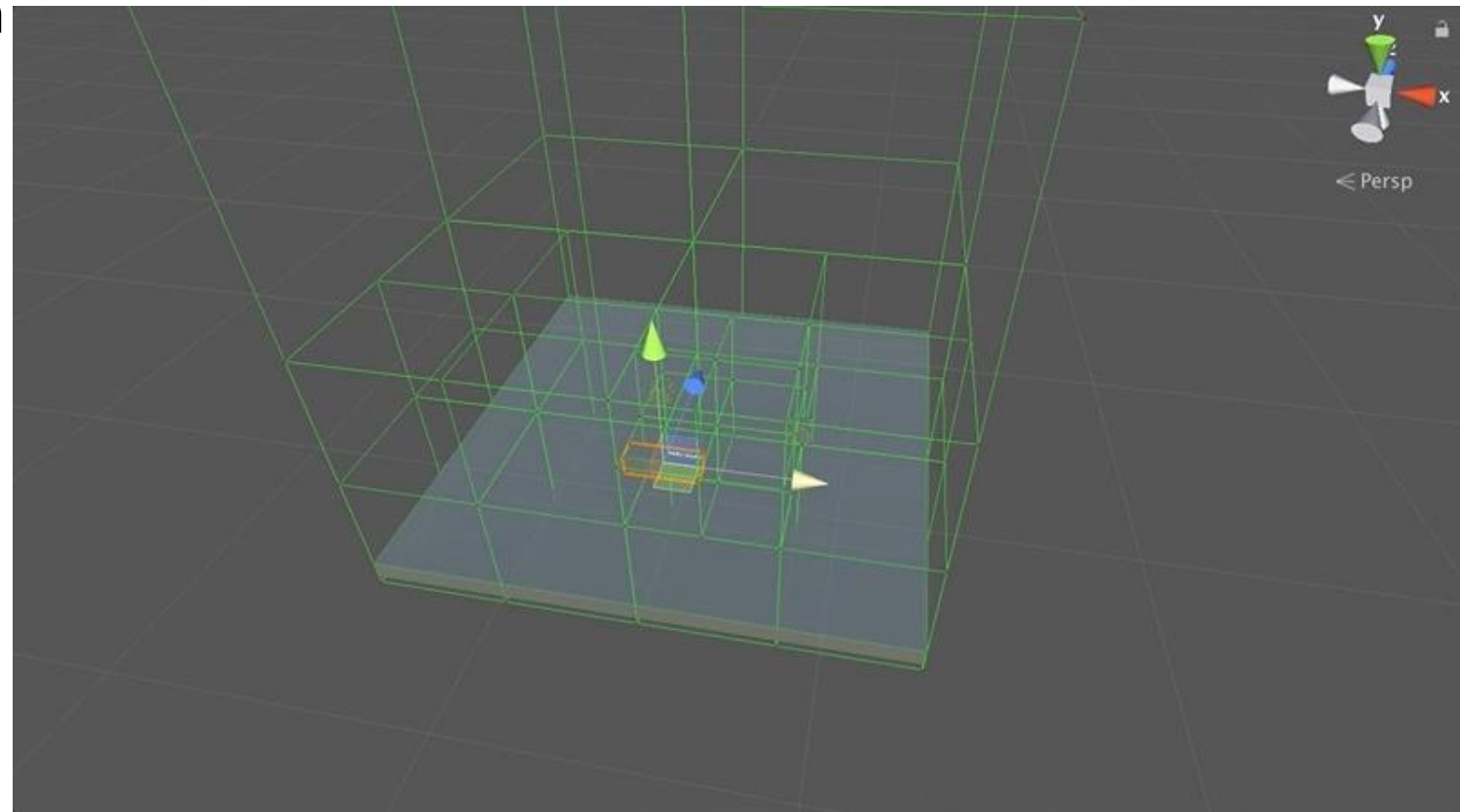
Challenges - Octree

- Octree for collision detection



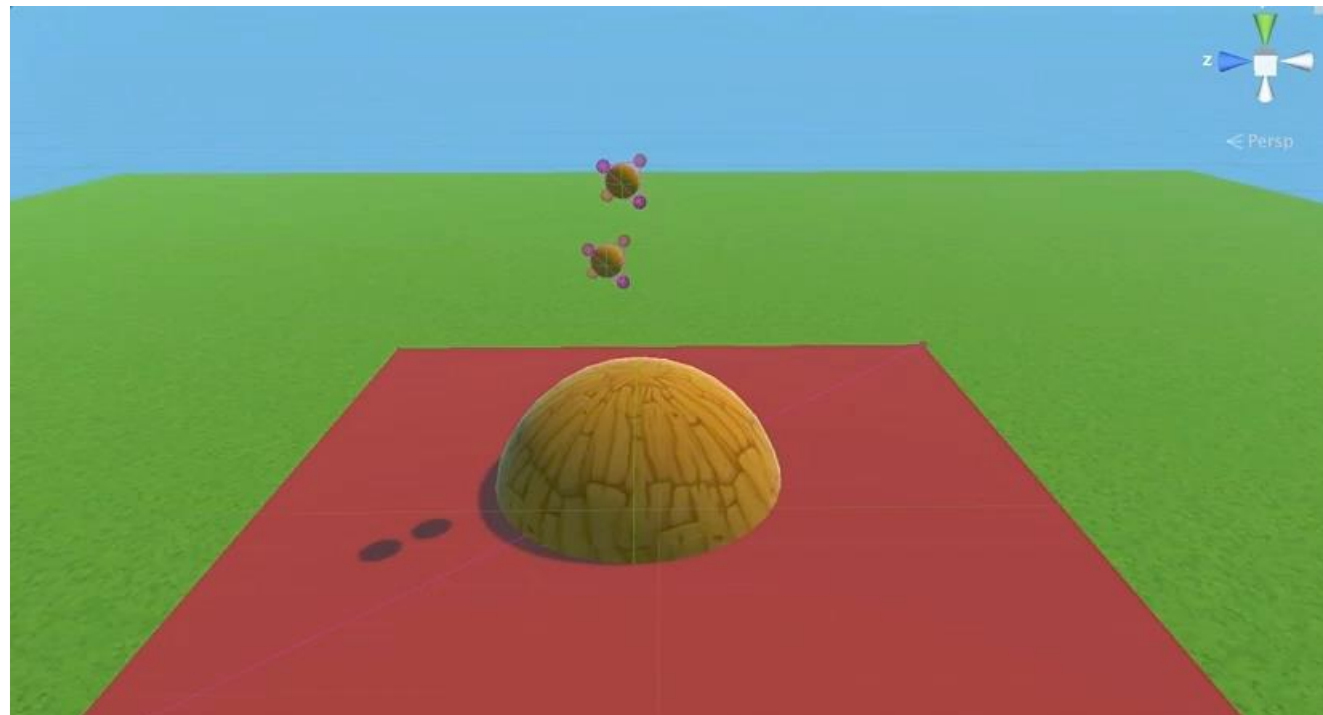
Challenges - Octree

- Octree for collision detection



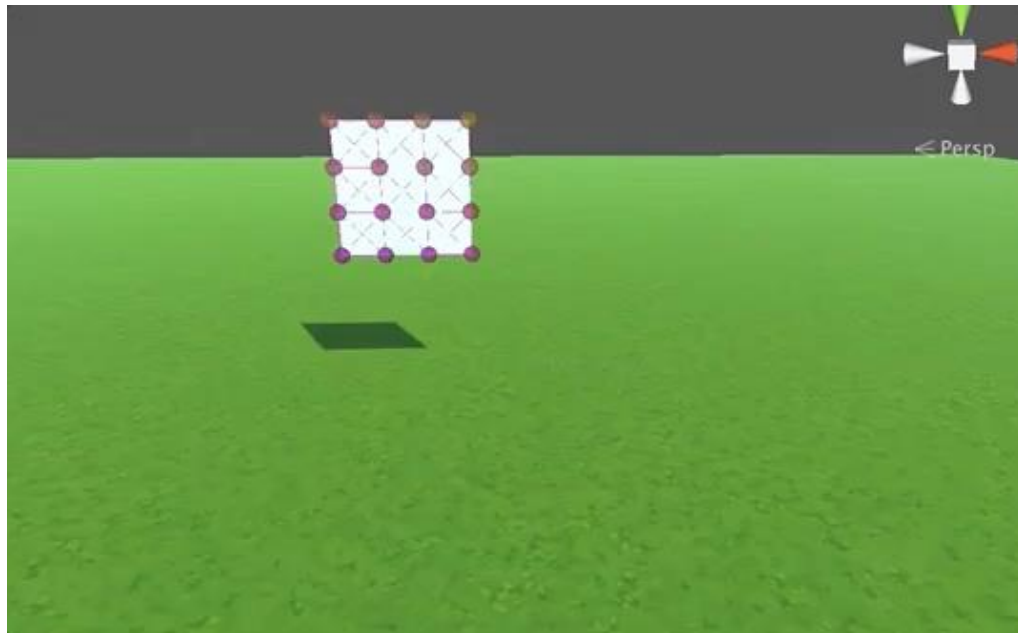
Rigid Body

Fixed Joint



Soft Body

Constraint solver using mesh



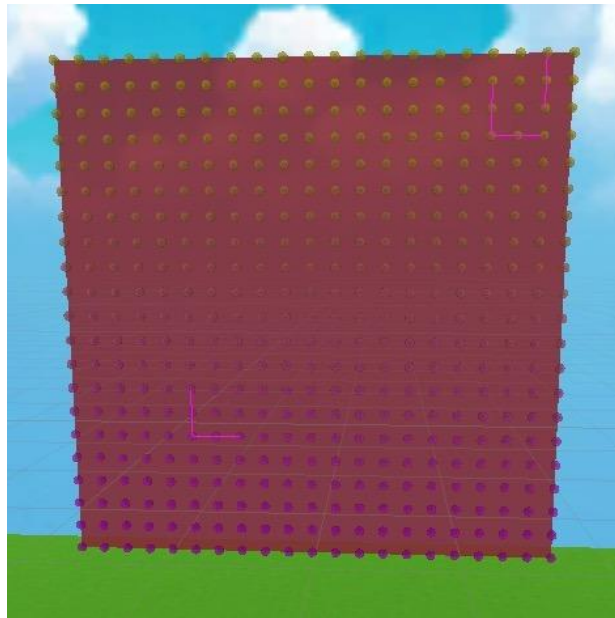
Soft Body

What we struggled with in the start

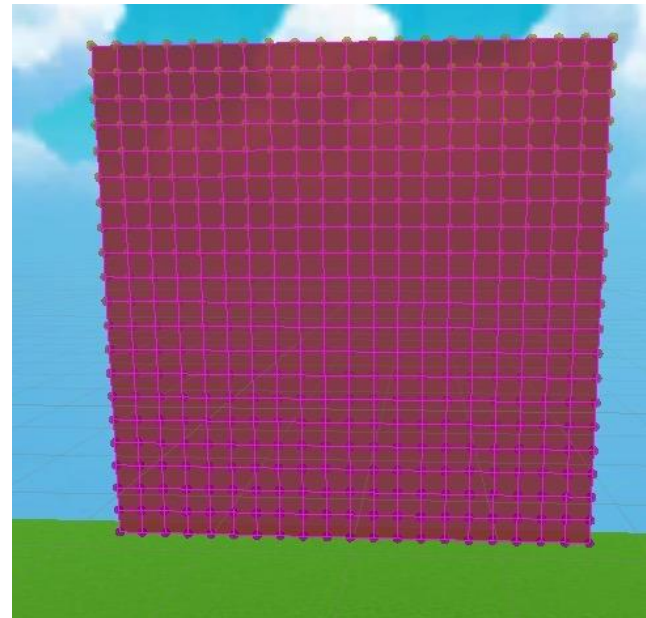


Cloth Simulation

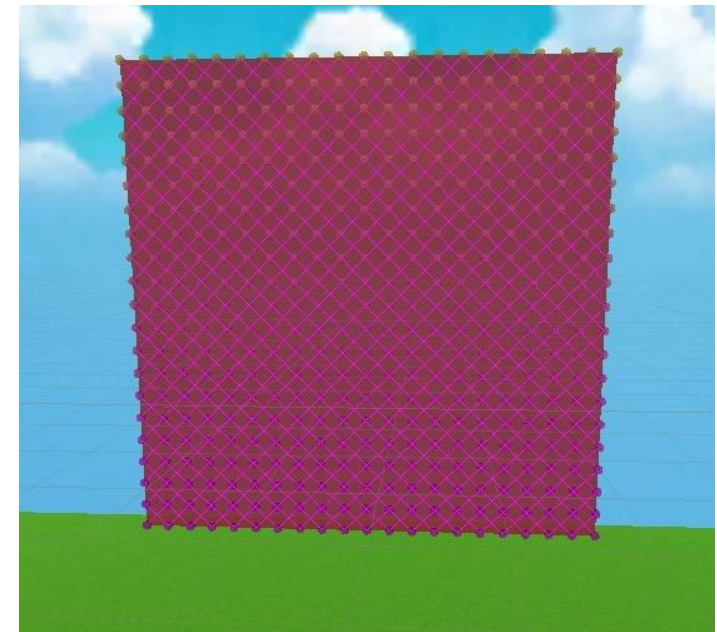
Composition/Construction



Bend



Structural

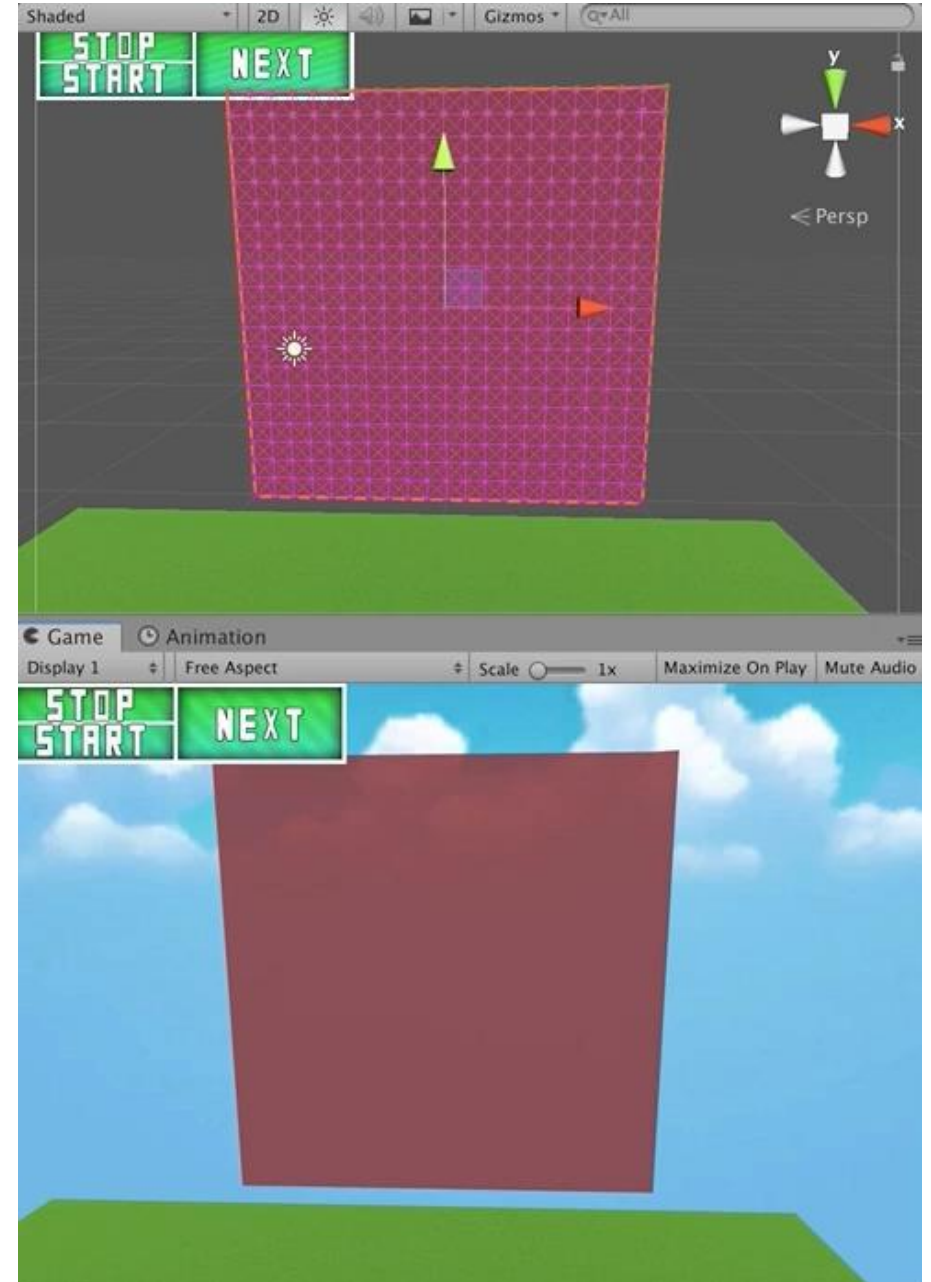


Shear

Cloth Simulation

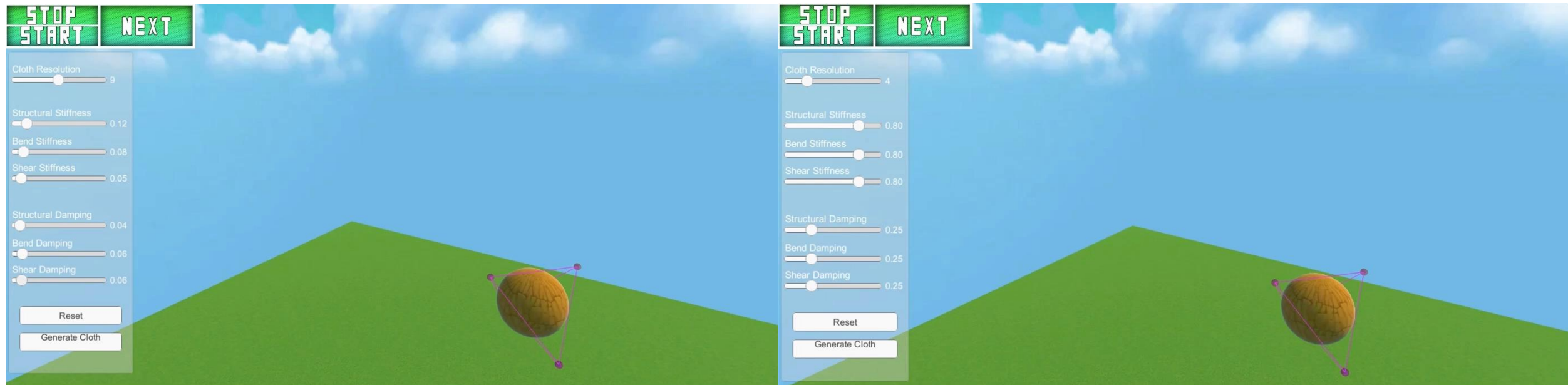


Only with shear and structural constraints



Cloth Simulation

Collisions



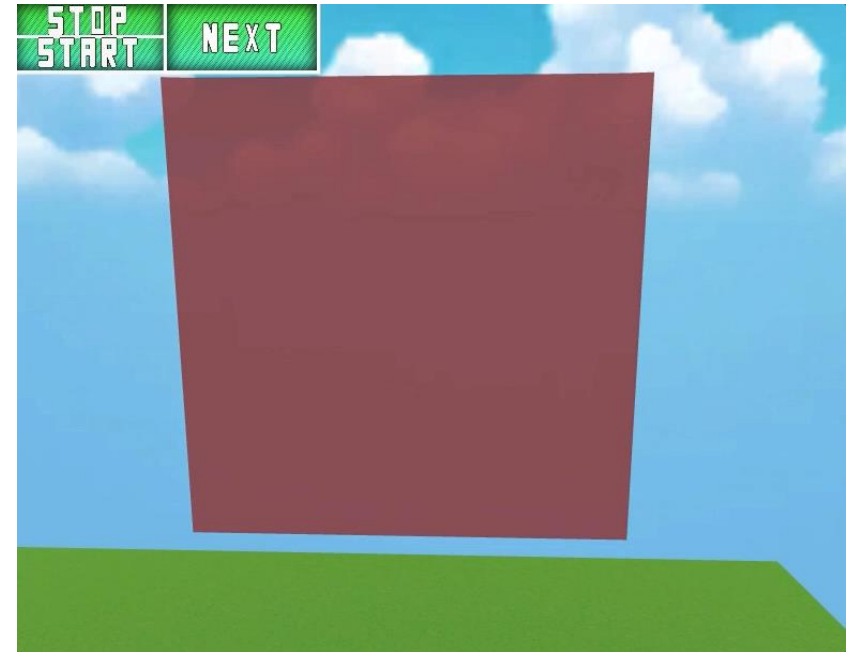
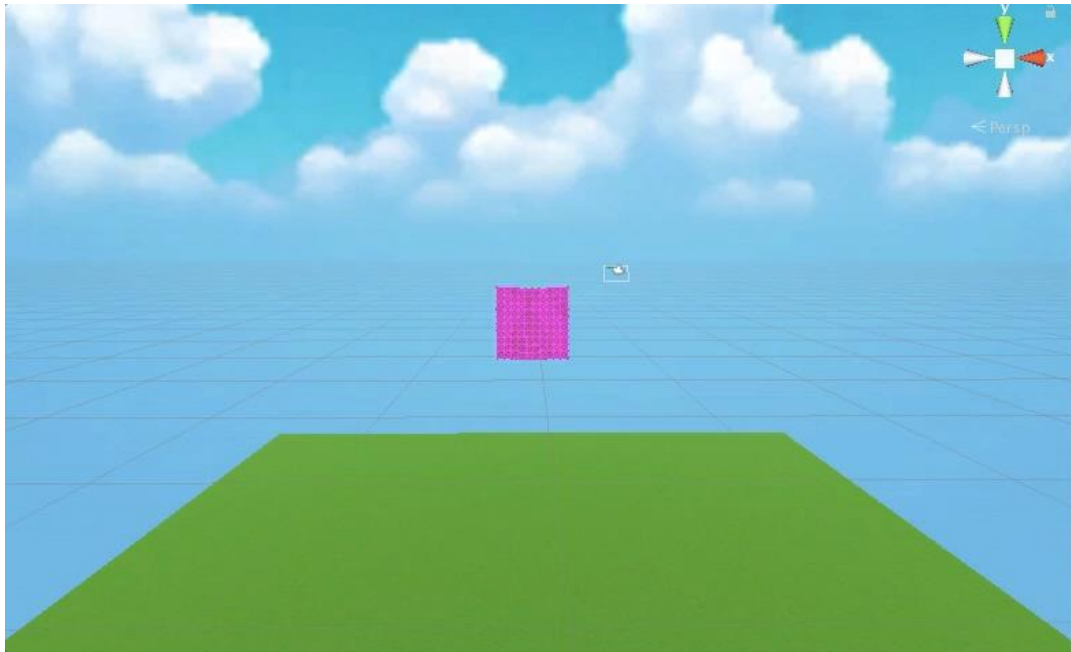
Cloth Simulation

Collisions

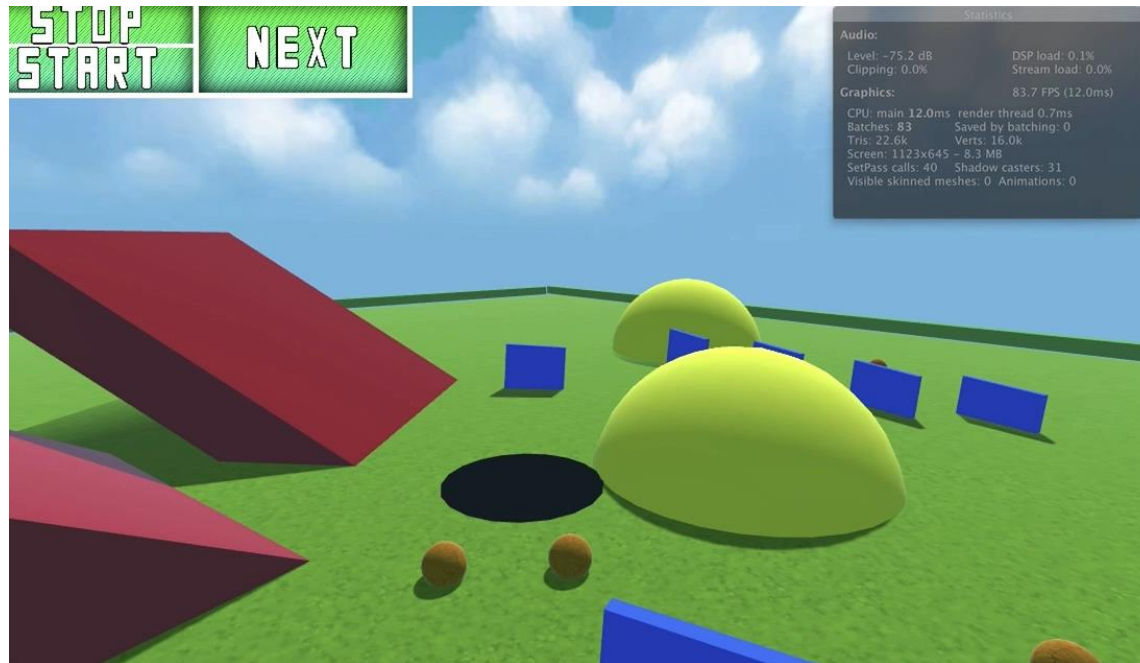


Cloth Simulation

The Struggle



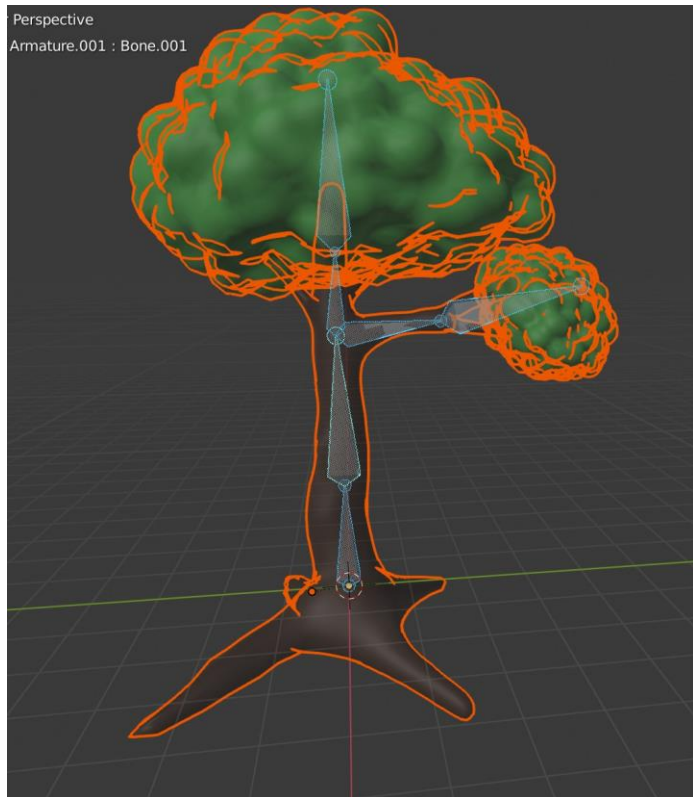
Interactivity



Softbodies of skinned meshes



Softbodies of skinned meshes



The Return of the Meatballs



THANKS!

