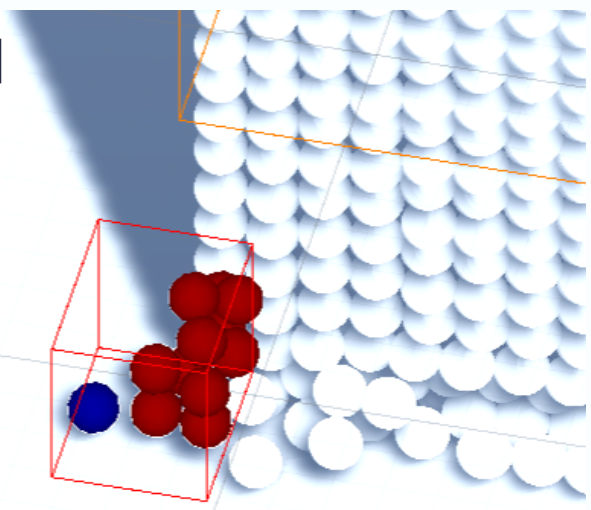
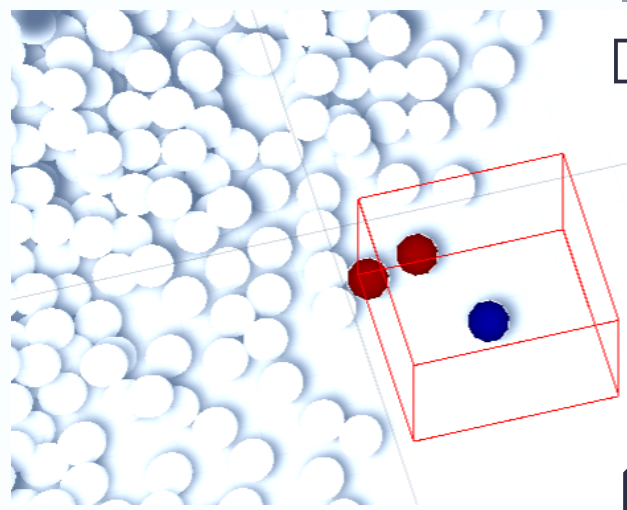




AIM

- Integrating fluid simulation into the Unity platform.
- Creating ready system for users to comparing the algorithms.
- Preparing platform to test algorithms.

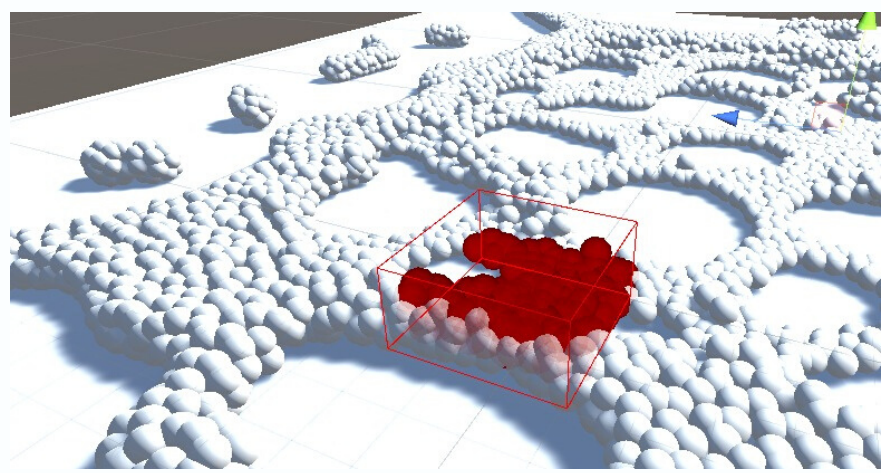


EVALUATION

Hash system benefits to find particles.

Surface recognition helps to find surface particles.

POF system increases the performance and memory efficiency.



IMPLEMENTATION

Hashing

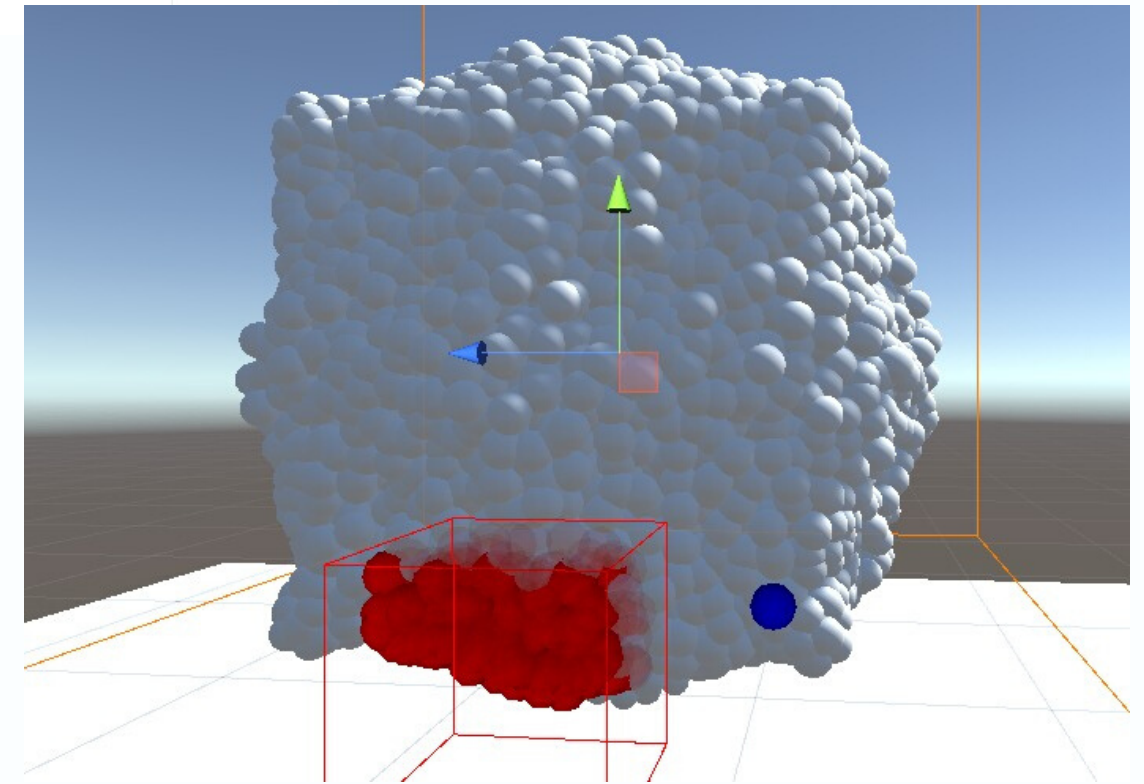
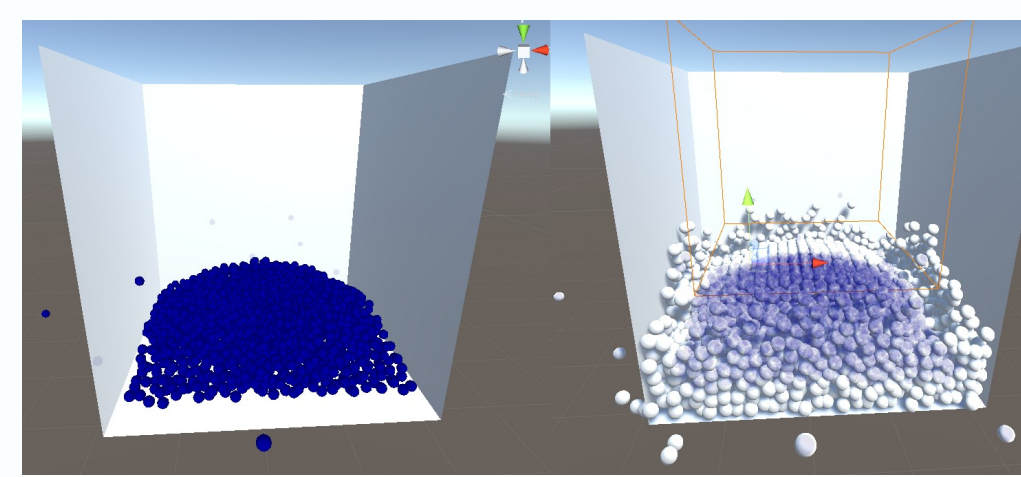
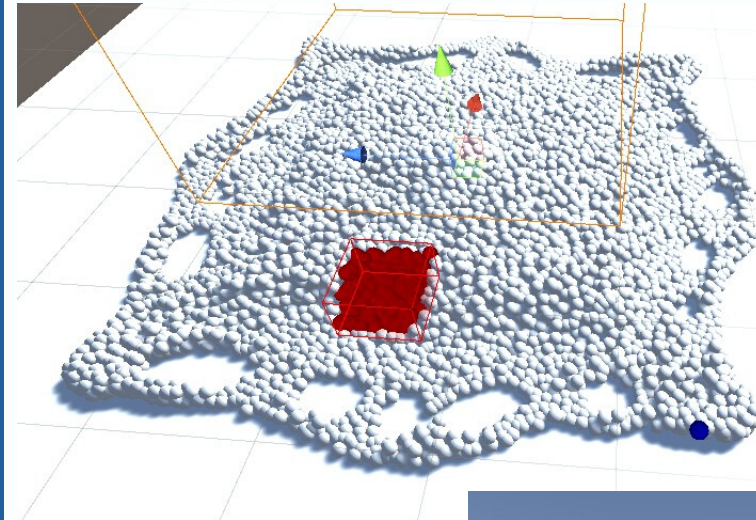
Hashing is a method to mapping particles in a three-dimensional space converted to the one-dimensional hash table.

Surface Recognition

Surface recognition algorithm detects surface particles and the other necessary data about a particle.

Zhu&Bridson

Zhu and Bridson[7] offers an alternative solution to simulate liquids and mentions surface reconstruction from particles.



POF

Objectives

1

Using particle based fluid simulation through the Unity

2

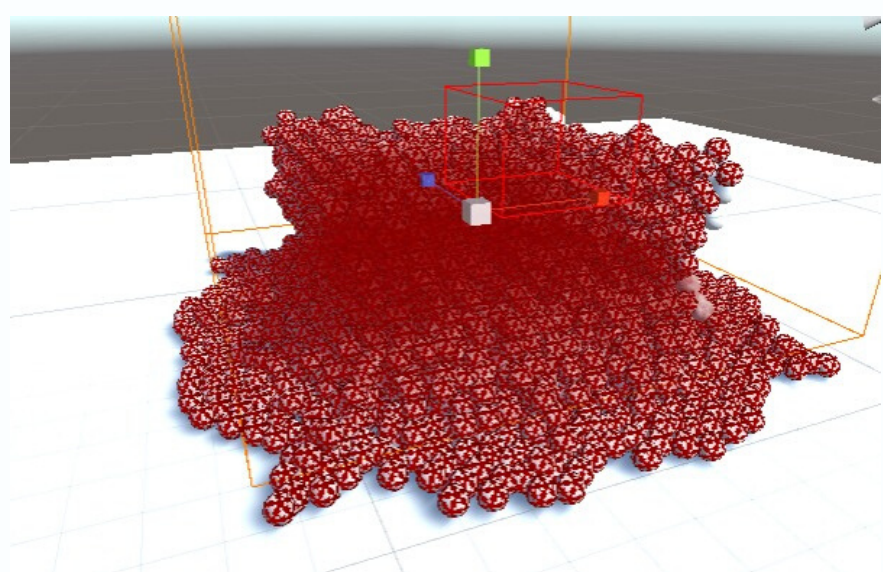
Recognizing surface particles mathematically.

3

Creating stable test environment for users.

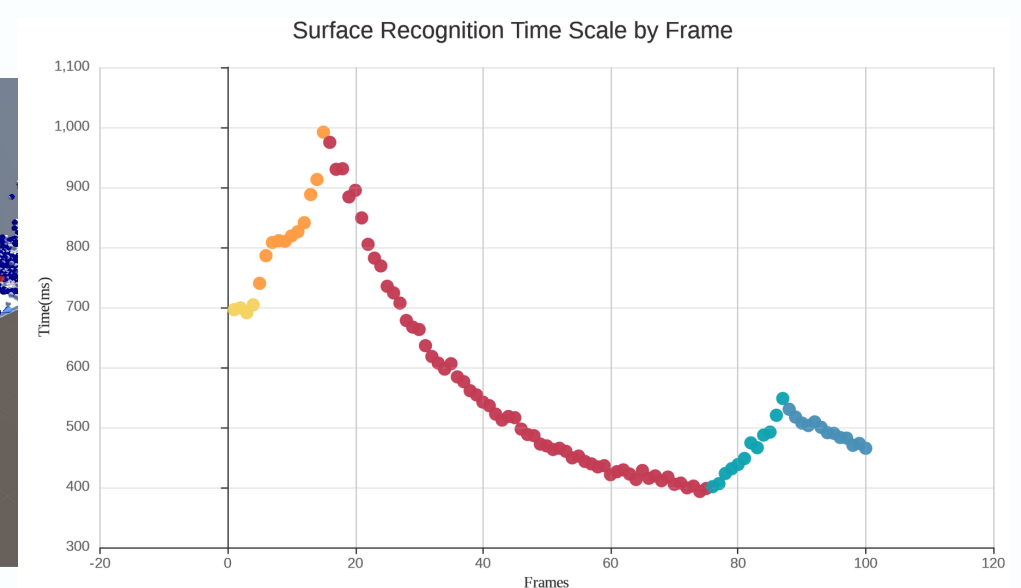
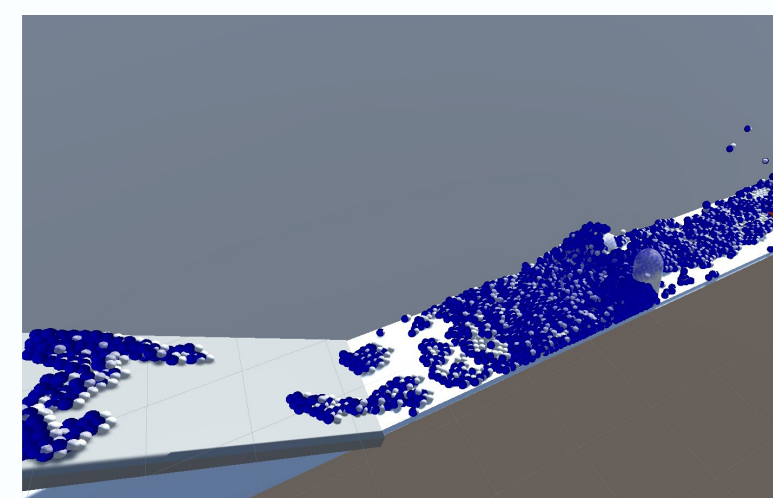
4

Establishing a system to comparing algorithms.

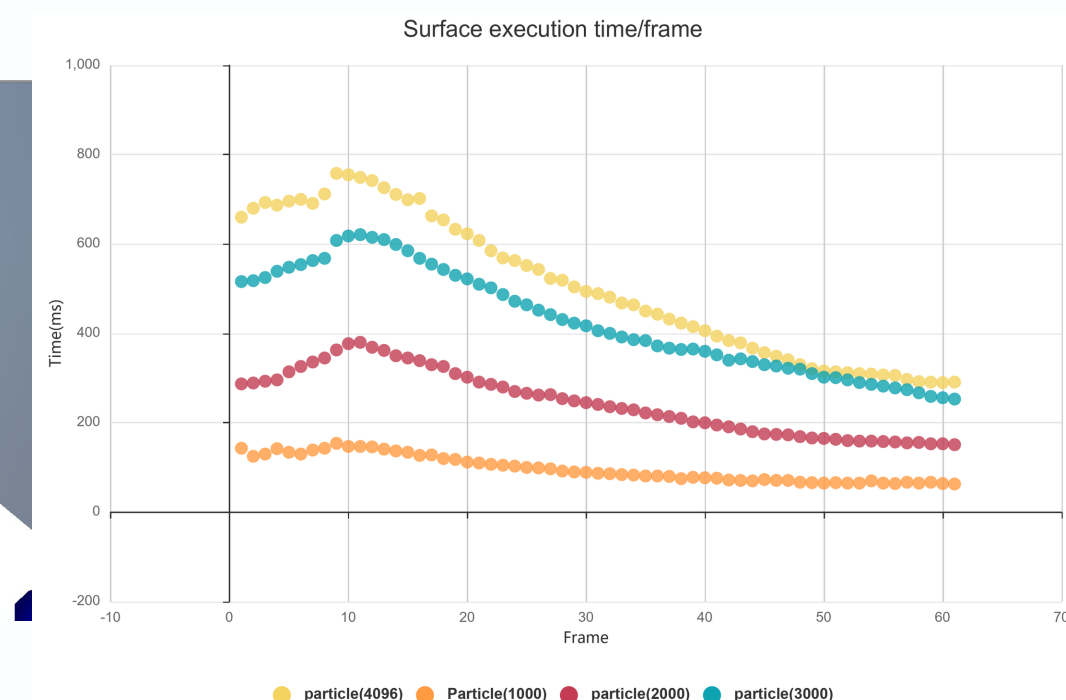
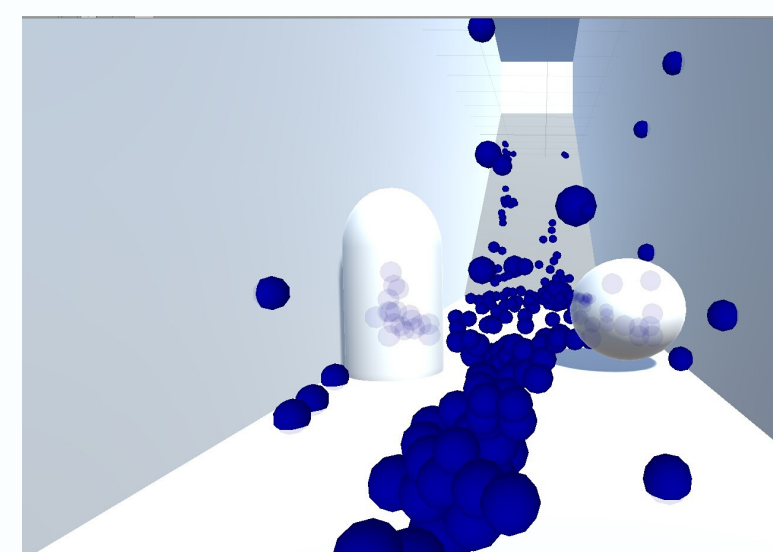


Test Results

We have two testing case: the first case is getting execution times by different states of the same scene. In the first case(represented in the upper diagram) execution time of surface recognition takes more time when particles hit or collide with objects in the scene because more calculations are required to compute surface particles. The second case describes execution time by the change of particle number. With increasing particle number, execution of surface recognition requires more time but not linear, it is increasing exponentially.



Surface recognition diagram time scale by frame.



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Conclusion

Various methods are implemented to get better results by doing research. POF project concentrates on solving computational difficulty problems by increasing performance and efficiency in particle-based fluid simulation. POF makes easier to simulate with higher quantities of particles or getting better results with the same number of particles by using the hash algorithm and surface particle recognition algorithm.