Maya2cellVIEW: Integrated Tool For Authoring Large Molecular Scenes

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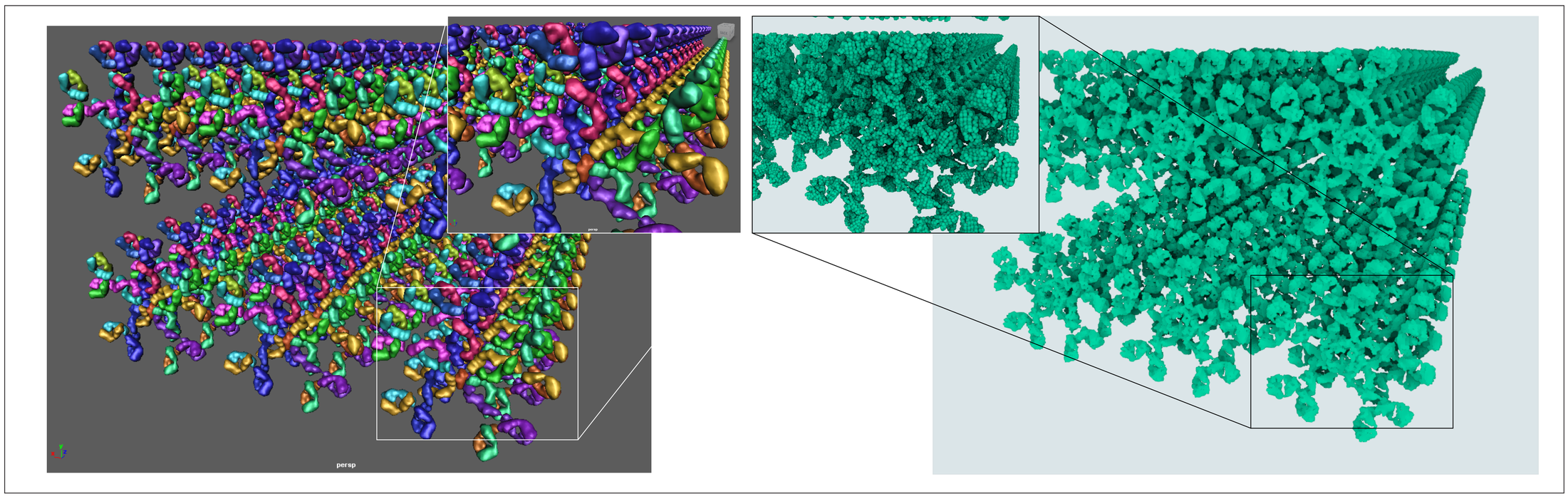

Motivation

The job of scientific illustrators is to communicate science, visualize what we know and put knowledge into perspective. Illustrators are using various tools to create these artworks, ranging from clasical drawing and painting methods, to commercial 3D programs like Autodesk Maya or Cinema4D. However, there exist other - more domain-specific - visualization tools that come from research in visualization itself. These tools are unfortunately not integrated into the tools that illustrators use and therefore these people can't easily use state-of-the-art methods for visualization.

In the domain of molecular visualization a tool called cellVIEW exists. This program (built on Unity engine) enables rendering of large molecular sceneries (several billions(?) of atoms) at interactive framerates. The goal of this project was to investigate how the rendering powers of cellVIEW could be used in the workflow of molecular illustrators and animators.

Method

We achieve this by connecting Maya and cellVIEW via shared memory writes/reads. On the Maya side, we write data about molecular scene - positions, rotations and type of each molecule - into shared memory and on the cellVIEW side we read this data and render it. Shared memory approach is used instead of file transfer as it provides better workflow for illustrators because this way they get real-time preview of each change they make.

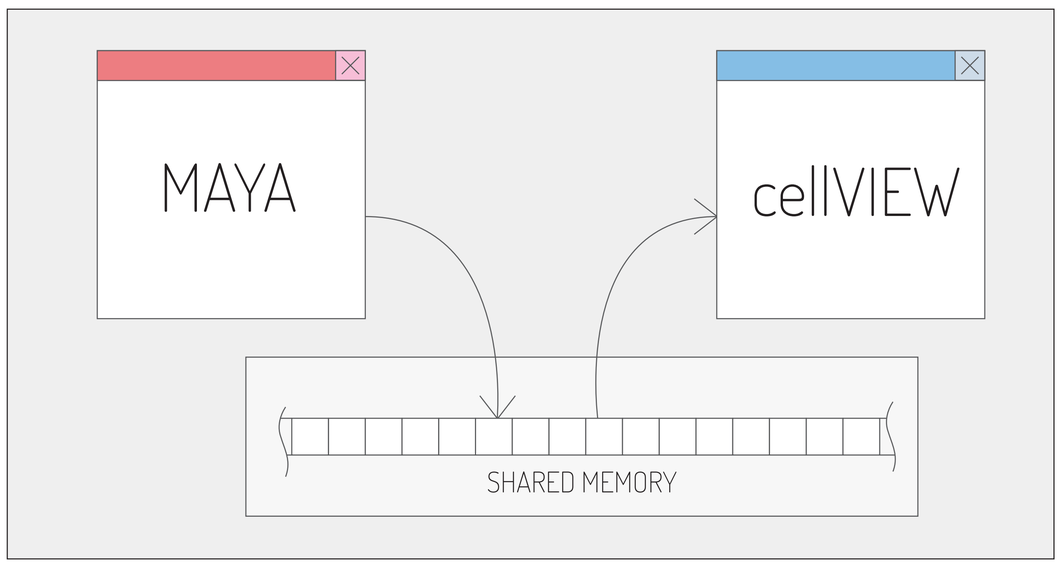

Figure 1: Overview of the system

Implementation

We have implemented this approach using Maya as the modeling software and cellVIEW as the domain-specific renderer. The system is composed of three parts - plugin for Maya which writes data into shared memory, plugin for Unity which reads this data and a Unity script that assembles the scene from the data. We take advantage of Maya API written in C++ as it brings us the most performance.

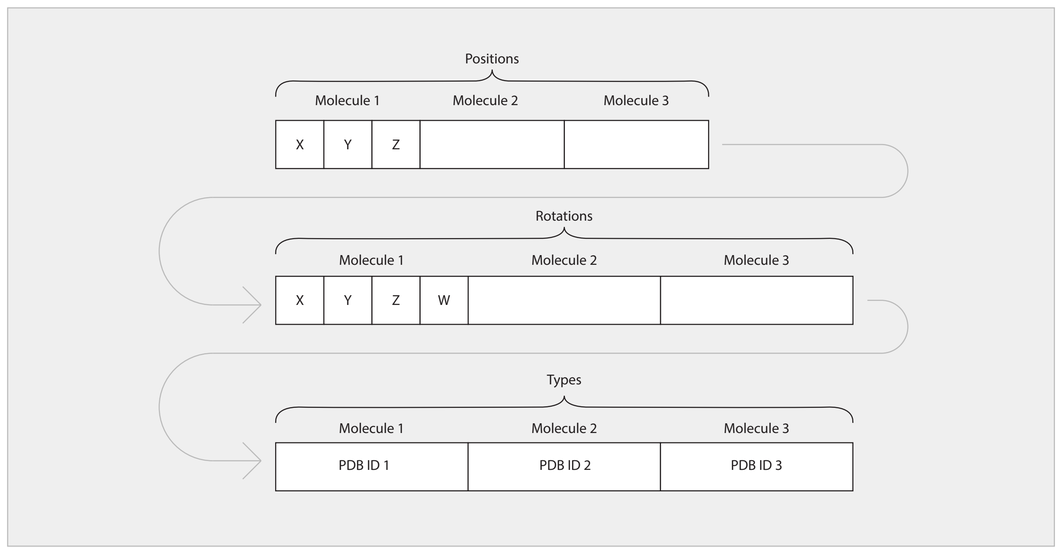

Figure 2: Data layout in shared memory

References

[1] cellview reference

[2] drew berry reference