# Volume Representation in ParaView 5.5.0

A comparison of Volume representation modes and abilities in ParaView 5.5.0.

## Caveat: Responsive GUI

After selecting "Volume" from the Representation menu, the volume mappers made available in the Properties will depend upon the VTK Data Set type of the selected item in the Pipeline Browser.

## vtkStructuredGrid, vtkUnstructuredGrid Volume Mappers

- Projected tetra
- Z sweep
- Bunyk ray cast
- Resample to Image

The exposed properties are:

- Scalar Opacity Unit Distance
- Select Mapper
- Use Floating Point Frame Buffer
- Sampling Dimensions (Resample to Image only)

## vtkImageData, vtkStructuredPoints Volume Mappers

- Smart
- Ray Cast Only
- GPU Based
- OSPRay Based

The exposed properties are:

- Scalar Opacity Unit Distance
- Volume Rendering Mode
- Shade
- Show Isosurfaces
    - Isosurface value list editor

### Notes

- It is unclear why one would use the "Resample to Image" volume mapper  instead of applying a "Resample to Image" filter in the pipeline.
- It is not clear how using the "OSPRay Based" volume mapper differs from enabling OSPRay overall.
- vtkRectilinearGrid and vtkPolyData are not supported. vtkRectilinearGrid can have a Tetrahedralize filter applied to create an unstructured grid, though.
- The texture-based volume mappers were dropped at some point.

## Scalar Opacity Unit Distance

This is an attribute of vtkVolumeProperty. It is NOT the number of samples along the ray nor the distance between samples. It is "the unit distance on which the scalar opacity transfer function is defined." I believe this is used to attenuate the OTF values, i.e., it's a hack to defer editing the CTF and OTF if possible. The number of samples seems to be auto generated. Starting with 8 voxels there are approximately 200 samples/voxel. At 1,000,000 voxels there are approximately 2 samples/voxel.

## NVidia IndeX Volume Mapper

## Intel OSPRay Volume Mapper