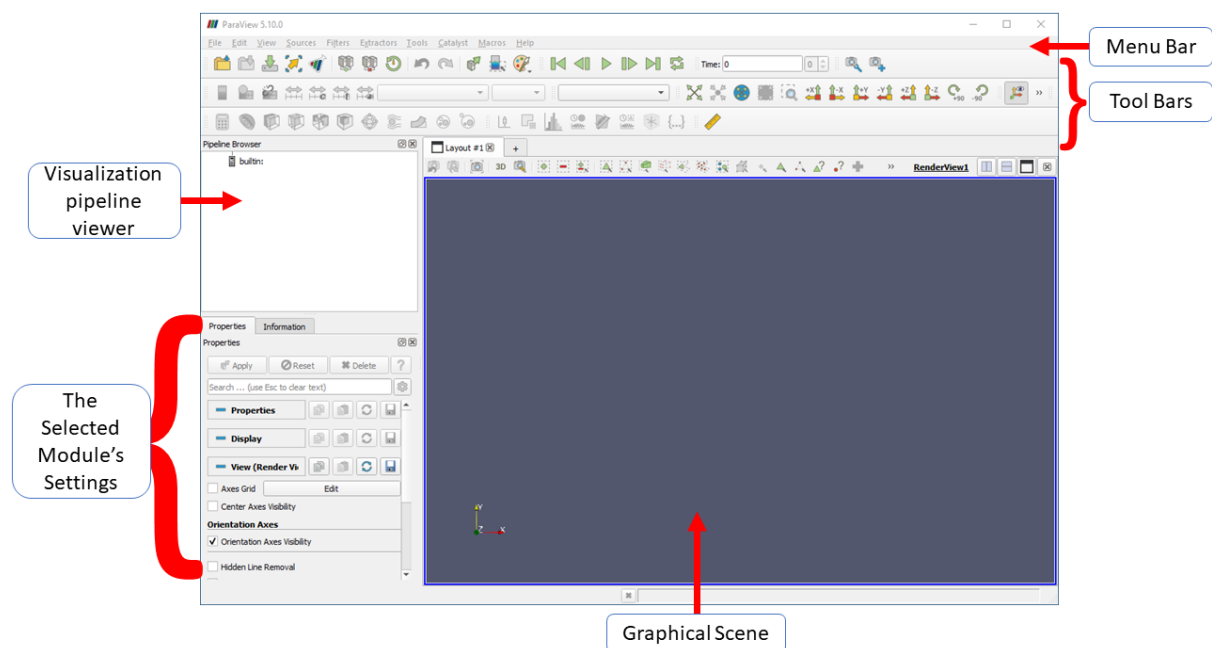


# ParaView Crib Sheet

ParaView is an open-source modular visualization environment that is popular for the analysis and presentation of the results of computational simulations. This crib sheet was created for ParaView version 4.3.1 in 2016 and revised for version 5.10 in 2022.

## Overview of the Graphical User Interface



## Modular Visualization Environment

A modular visualization environment has key features:

### Modular

1. Building blocks of code
2. Users can extend the functionality

### Visualization

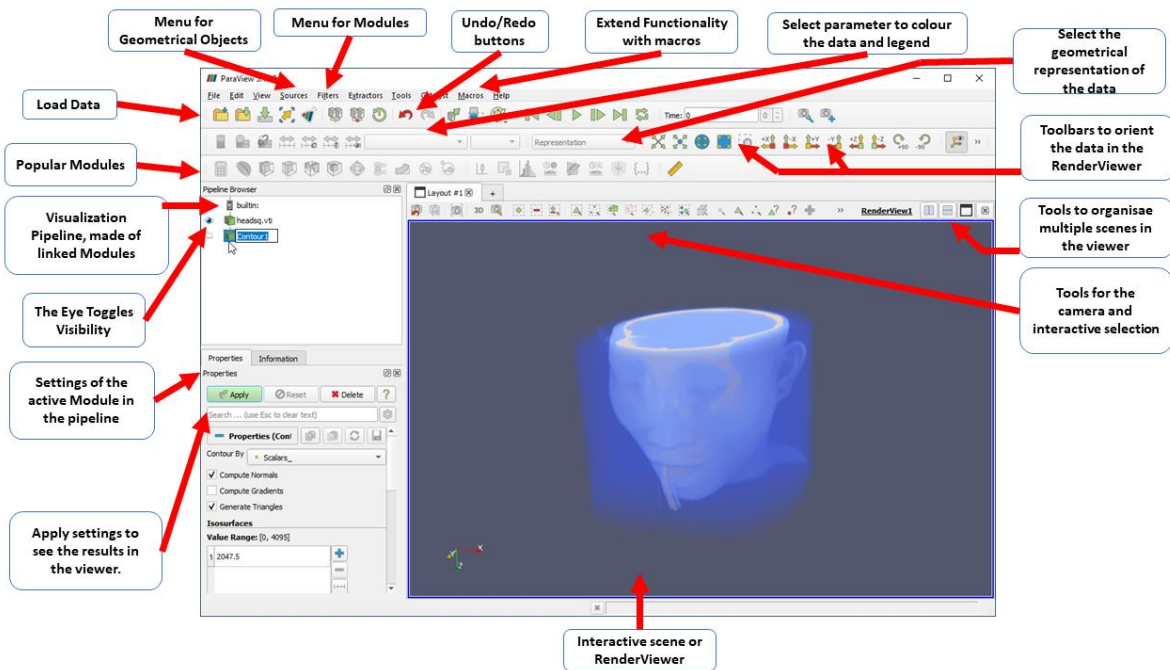
1. Analyses data and presents it in a visually appealing form that adds meaning.

### Environment

1. A library of modules that perform particular types of analysis on the data.
2. A visual programming area where the modules are joined together into a pipeline; data is thought to flow through the pipeline from the top where it is read in to the bottom where it is displayed.

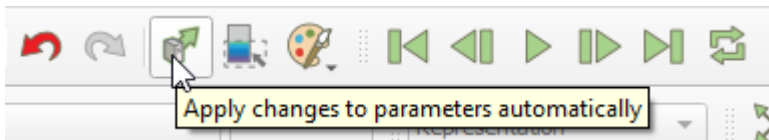
3. A graphics scene where the results of the pipeline are rendered and where the user can manipulate the objects on display e.g, displayed objects can be rotated.

## Common Functions



Most of the things you will want to do with ParaView are controlled with menus, buttons and mouse manipulations in the interactive scene. These are labelled in the screen shot of the ParaView application above. Full documentation of these menus, buttons and mouse interactions with their proper names is not given here. See the links at the end of this document to access the full documentation.

If you do not know what a button does use the tooltip information provided with all user interface widgets. This means that if you hover your mouse over a widget an information box will pop-up, there is a slight lag so hold your mouse there until it appears.



# Shortcuts

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To open the module/filters library to search it:

`ctrl + space` Win/Linux, `alt + space` Mac -- quick launch

## 3D Camera Interactions: Mouse interactions

	Left	Middle	Right
	Rotate	Pan	Zoom
<code>Shift +</code>	Roll	Rotate	Pan
<code>Ctrl +</code>	Zoom	Rotate	Zoom

## 2D Camera Interactions: Mouse interactions

	Left	Middle	Right
	Pan	Roll	Zoom
<code>Shift +</code>	Zoom	Zoom	Zoom
<code>Ctrl +</code>	Roll	Pan	Rotate

# Menus

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Titles of the menu items and their place in the menus are given here. Details of how to use them is not given but menu item titles can be used in a digital search of the documentation and this listing gives an overview of the functions that ParaView can perform. The “>” is used to indicate a submenu that is too long to list here.

- File
  - Open
  - Recent Files >
  - Reload Files
  - Load State
  - Save State
  - Save Catalyst State
  - Save Data
  - Save Screenshot
  - Export Scene
  - Export Scene Animation
  - Save Animation
  - Save Extract
  - Save Geometry
  - Load Path Tracer Materials
  - Load Window Arrangement
  - Save Window Arrangement
  - Connect
  - Disconnect
  - Exit
  
- Edit
  - Undo
  - Redo
  - Camera Undo
  - Camera Redo
  - Copy Screenshot to Clipboard
  - Copy
  - Paste
  - Apply
  - Reset
  - Delete
  - Rename
  - Change input
  - Ignore Time
  - Show All
  - Hide All
  - Reset session
  - Find Data
  - Search an item list
  - Settings
  - Reset to default settings
  - Rename Window
  
- View

- Toolbars >
    - Active Variable Controls
    - Camera Controls
    - Center Axes Controls
    - Common
    - Current Time Controls
    - Custom Viewpoints Toolbar
    - Data Analysis
    - Macros Toolbars
    - Main Controls
    - Measurement Tools
    - Representation Toolbar
    - VCR Controls
  - Animation View
  - Collaboration Panel
  - Color Map Editor
  - Comparative View Inspector
  - Find Data
  - Information
  - Light Inspector
  - Material Editor
  - Memory Inspector
  - Multi-block Inspector
  - Output Messages
  - Pipeline Browser
  - Properties
  - Python Shell
  - Statistics Inspector
  - Time Inspector
  - Preview
    - 1280 x 720 (HD)
    - 1280 x 800 (WXGA)
    - 1280 x 1024 (SXGA)
    - 1600 x 900 (HD+)
    - 1920 x 1080 (FHD)
    - 3840 x 2160 (4K UHD)
    - Custom ...
  - Full Screen
  - Show Frame Decorations
  - Toggle Lock Panels
- Sources
    - Search
    - Recent >
    - Alphabetical >
    - Annotation >
    - Data Objects >

- Geometrical Shapes >
  - Measurement Tools >
- Filters
  - Search
  - Recent >
  - Favourites >
  - Alphabetical >
  - AMR >
  - Annotate >
  - CTH >
  - Chemistry >
  - Common >
  - Data Analysis >
  - Hyper Tree Grid >
  - Material Analysis >
  - Point Interpolation >
  - Quadrature Points >
  - Statistics >
  - Temporal >
- Extractors
  - Search
  - Alphabetical
  - Data
  - Experimental
  - Image
- Tools
  - Create Custom Filter
  - Add Camera Link
  - Link with Selection
  - Manage Custom Filters
  - Manage Links
  - Manage Plugins
  - Manage Favourites
  - Customise Shortcuts
  - Record Test
  - Play Test
  - Lock View Size
  - Lock View Size Custom
  - Timer Log
  - Log Viewer
  - Start Trace
  - Python Script Editor
- Catalyst
  - Connect...

- Pause Simulation
- Continue
- Set Breakpoint
- Remove Breakpoint
  
- Macros
  - Add new Macro...
  - Edit... >
  - Delete... >
  
- Help
  - Getting Started with ParaView
  - ParaView Guide
  - Reading, Filter, and Writer Reference
  - ParaView Self-directed Tutorial
  - ParaView Classroom Tutorials
  - Example Visualizations
  - ParaView Web Site
  - ParaView Wiki
  - ParaView Community Support
  - Release Notes
  - Professional Support
  - Professional Training
  - Online Tutorials
  - Online Blogs
  - Bug Report
  - About...

## Toolbars

The toolbars are collections the controls to a particular feature of ParaView. The toolbars are "greyed out" at start-up and change their appearance as they become active.



In the order that they are made visible from the *View -> Toolbars* menu option.

### Active Variable Controls



## Camera Controls



## Center Axis Controls



## Common



## Current Time Controls



## Custom Viewpoints Toolbar



## Data Analysis



## Macros Toolbars

There is no image for this toolbar because I have not created any macros yet.

## Main Controls



## Representation Toolbar



## VCR Controls

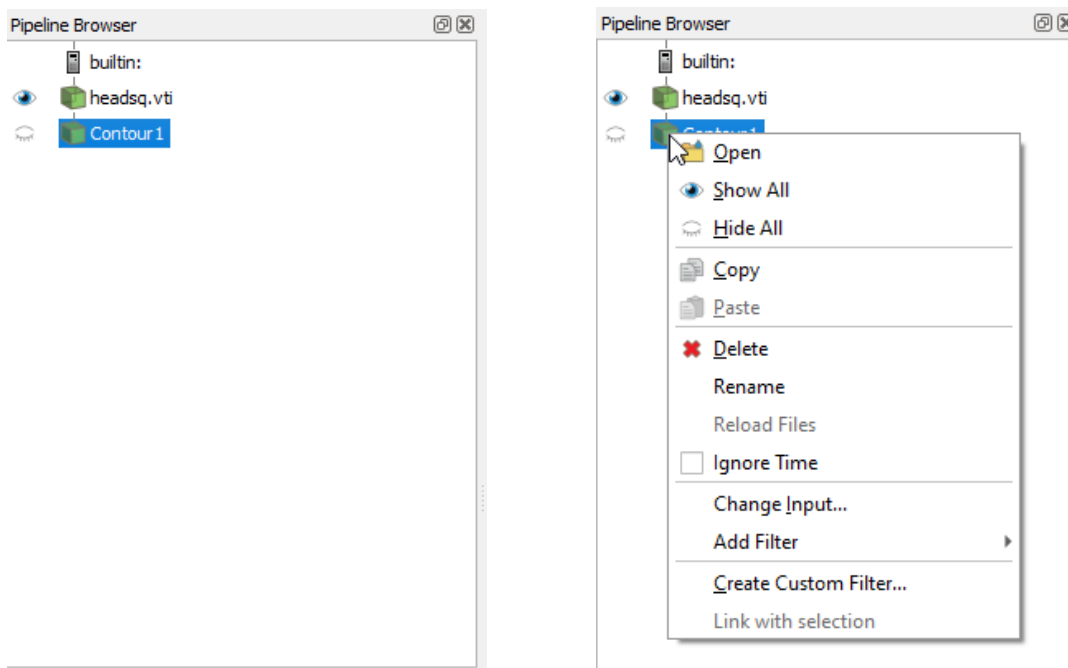


## The Visualization Pipeline



The visualization pipeline is often explained using the metaphor of water flowing down a water fall. The data is read in at the top of the water fall and then parts of the data "fall" down the water fall into modules that change the data by analysing it and making it suitable for rendering.

The resulting visualization pipeline is made of modules that the user can add to the pipeline. Once in the pipeline the user can alter the settings and properties of the modules. In reality the data does not flow down in ParaView instead it must be pulled down. This makes the application more computationally efficient and means that each time a change is made to a module's settings and properties the user must apply the changes.

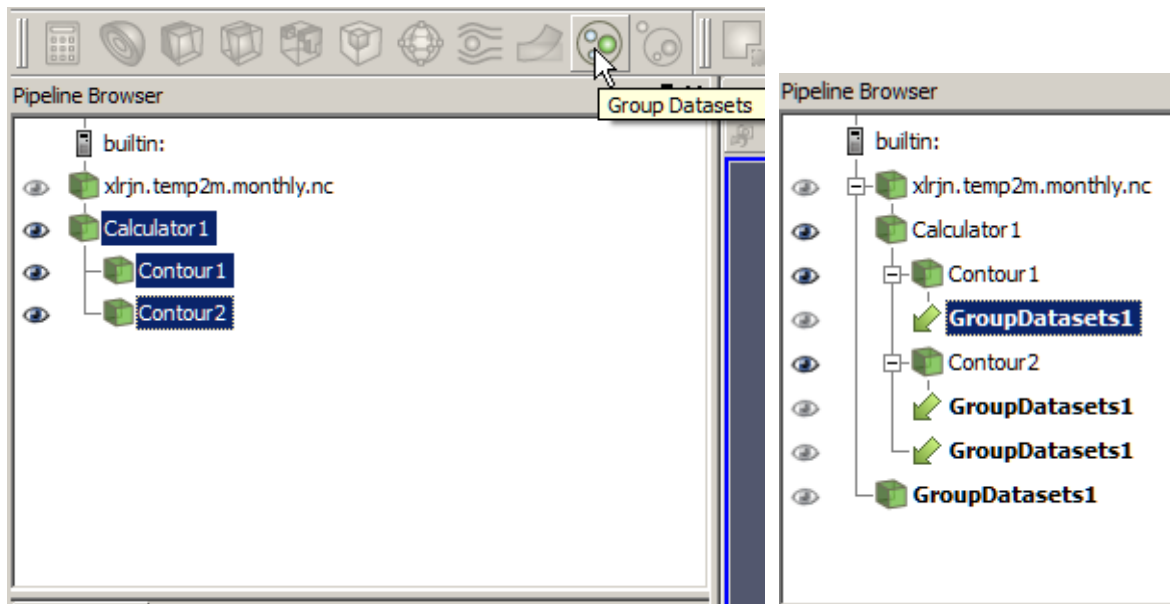


*Right click on a selected module to see the menu.*

In ParaView the visualization pipeline is viewed through the Pipeline Browser which is on the left of the main Window. The eye icon to the left of the module in the pipeline must be highlighted (not greyed-out) if you are to view the results of that module in the RenderView. Multiple objects can be viewed in the same RenderView at the same time.

Modules can be adjusted in the pipeline through the module menu which is accessed by hovering the mouse over the module and right clicking.

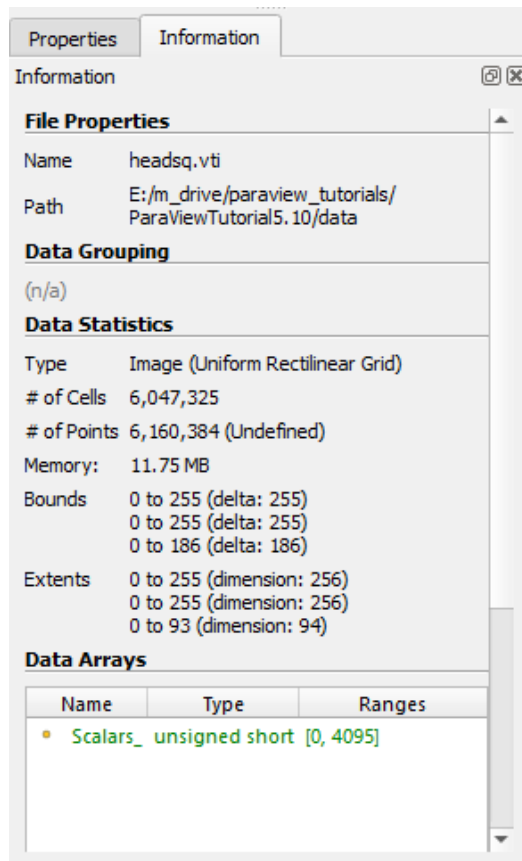
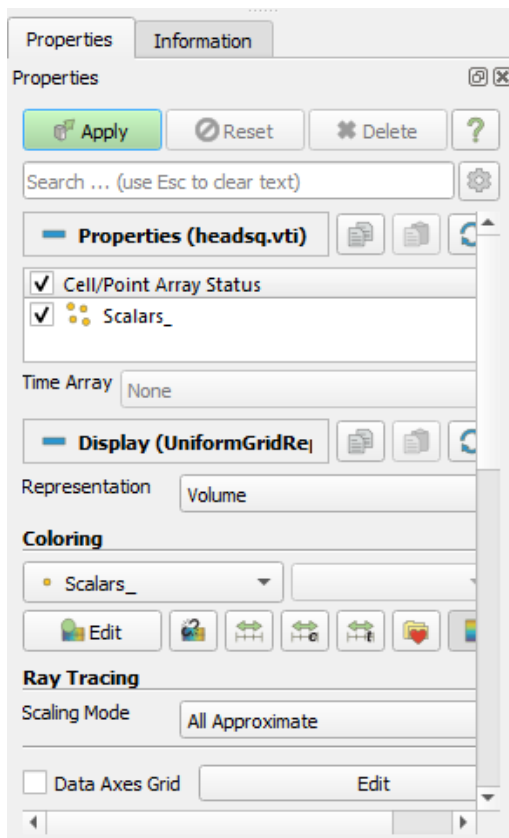
When a module needs the input from more than 1 module the modules that are to be the input of the next module selected are highlighted in the pipeline browser. This is done by holding down **Ctrl** and selecting the modules with a right mouse button click.



Hold down **Ctrl** and select the module with the right mouse button – all the modules that work with this combination of modules can be seen from the menu option *Filters -> Alphabetical*

Then select the module that requires multiple inputs. The pipeline looks like the one on the right. Although there are several instances of the GroupDatasets module they all share the same panel for Properties and Information.

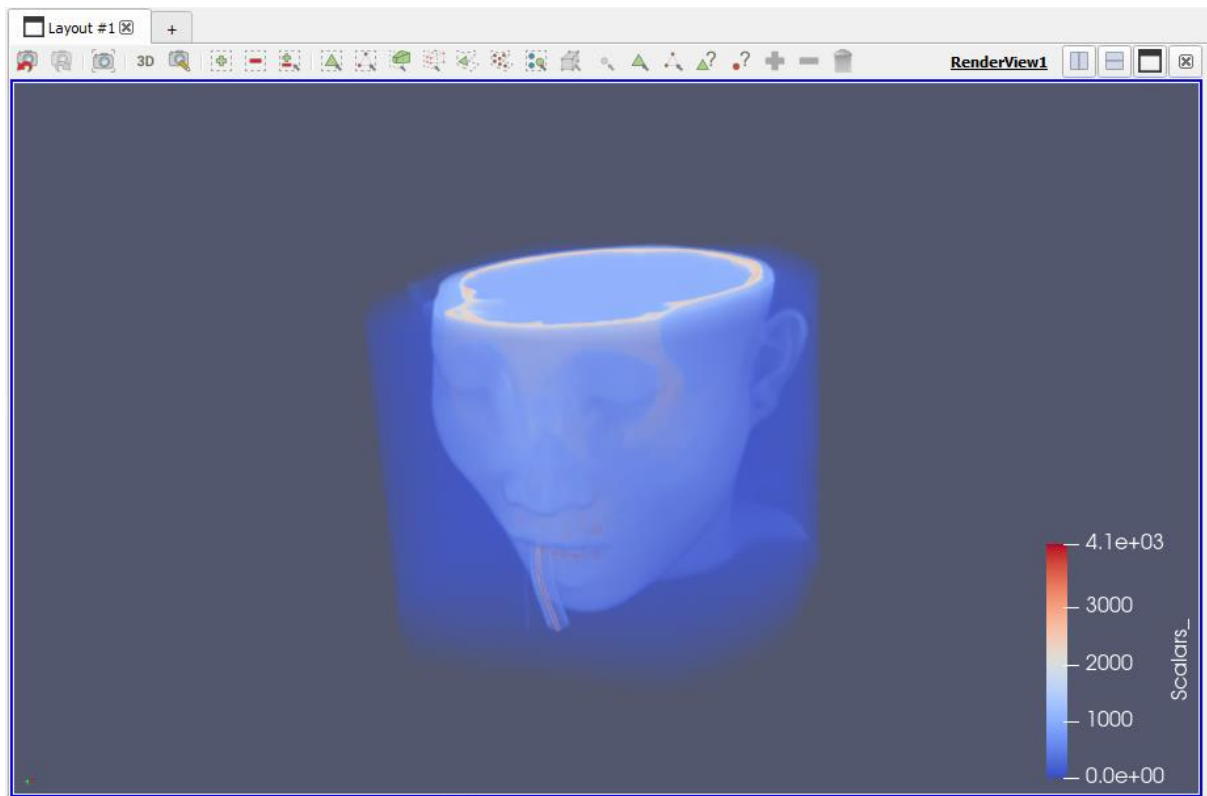
Below the Pipeline Browser is a Window that displays the Properties and the Information for the highlighted module in the pipeline.



The properties tab allows you to set any settings or parameters that are part of the module that is highlighted in the pipeline while the information tab allows you to view information about the data that is the output of the highlighted module in the pipeline.

## The Graphical Scene: The RenderView

The output of the visualization pipeline is rendered into a computer graphics scene that allows the users to interact with the data using a mouse.



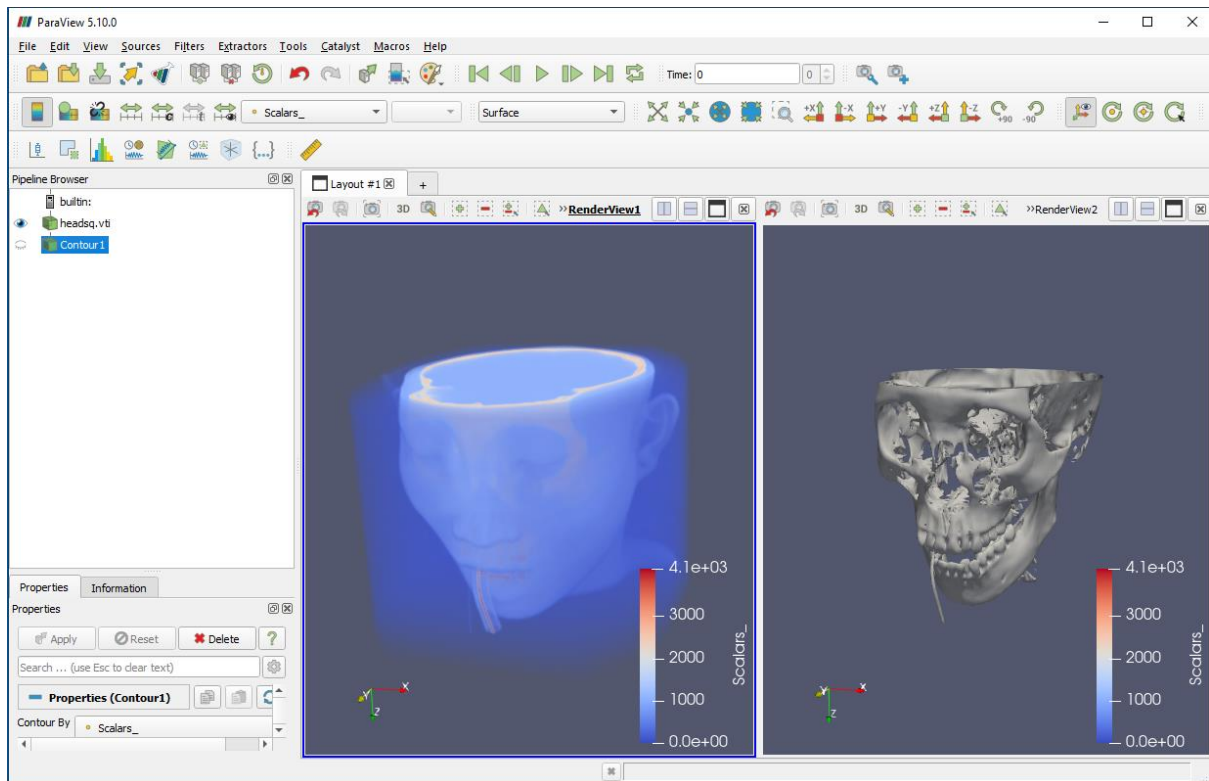
The mouse has a relatively small number of controls so there are a number of useful functions that can be selected with the mouse from buttons that are located just about the graphical scene.



These controls allow you to adjust the camera and select areas of your data through the rendered scene.



Complex visualization pipelines may generate more than one graphical scene. These scenes have related views of the same data so these controls allow you to arrange a selection of views in the same Window.



When ParaView has multiple scenes the active RenderView is selected by clicking in it with the left mouse button, (its active status is indicated with a narrow blue line bordering the window). When the RenderView is active the output from modules in the Pipeline Browser can be selected to be viewed by highlighting the eye next to the module.

## States

ParaView applications are saved as states through the File menu. Multiple states can be loaded into ParaView at any time, all are visible in the pipeline browser. All states can be removed by selecting Reset Session in the Edit menu.

## Web Links

Web site:

<http://www.paraview.org/>

Wiki:

<http://www.paraview.org/Wiki/ParaView>

Mailing list:

<http://www.paraview.org/mailling-lists/>

The ParaView Tutorial (and Data):

[http://www.paraview.org/Wiki/The\\_ParaView\\_Tutorial](http://www.paraview.org/Wiki/The_ParaView_Tutorial)