

Explorez et visualisez vos données massives avec ParaView

7 novembre 2023 - François Mazen

Qui suis-je ?

- François Mazen
- Directeur Adjoint Visualisation Scientifique à Kitware Europe, France
- Carrière dans les logiciels pour la simulation scientifique (Ansys, Siemens PLM)
- Développeur de logiciels libres
- Mainteneur de la distribution linux Debian



Kitware / Leader in AI & scientific open source solutions

Software development

Based on open source tools
300+ active projects worldwide



Sustained Growth

Since creation of the company
100% employee-owned



230 employees Worldwide

6 offices across USA/Europe



65% staff with PhD or Master

High Level customer expertise



20+ years of expertise

Kitware USA, 1998
Kitware Europe, 2010

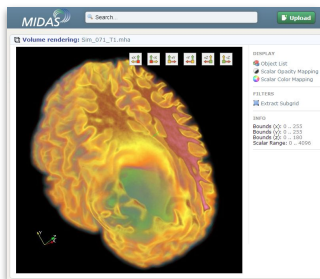


Revenue 2020

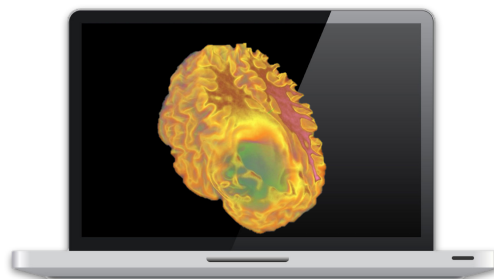
\$39M consolidated



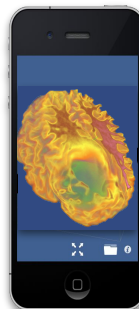
Applications / Universal Platforms



Web



Desktop



Mobile



Cloud /HPC

kitware
Platforms



3D Slicer



ParaView



KWIVER



mstk



Pulse
Physiology Engine



CMake



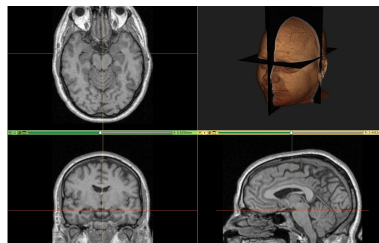
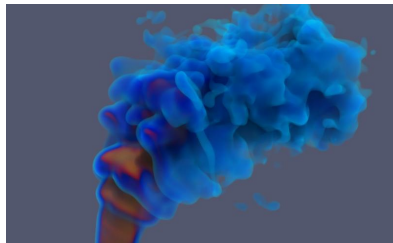
Resonant



tomviz



Areas of expertise / Built on open source



```
ceLists.txt
CMakeLists.txt x main.cp
1 cmake_minimum_requir
2 project(cmake_testap
3
4 set(CMAKE_CXX_STANDA
5
6 add_executable(cmake
soles
```



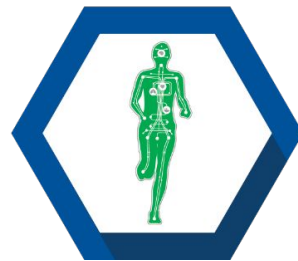
Computer
Vision



Data and
Analytics



Scientific
Computing



Medical
Computing



Software
Solutions

Kitware / Services



TRAINING



SUPPORT



DEVELOPMENT

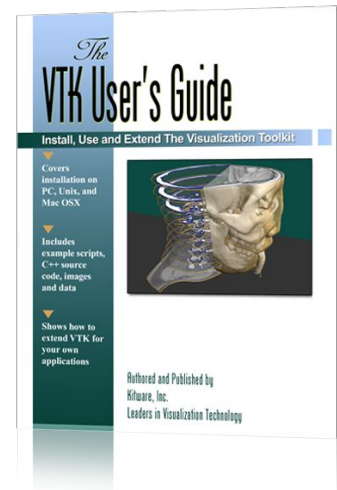
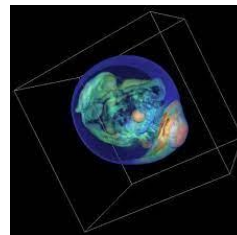
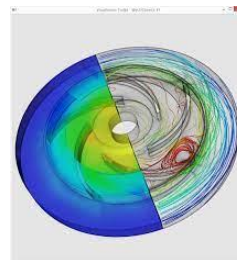


GRANT
COLLABORATION

VTK / Cross-Platform Visualization Toolkit (1993)

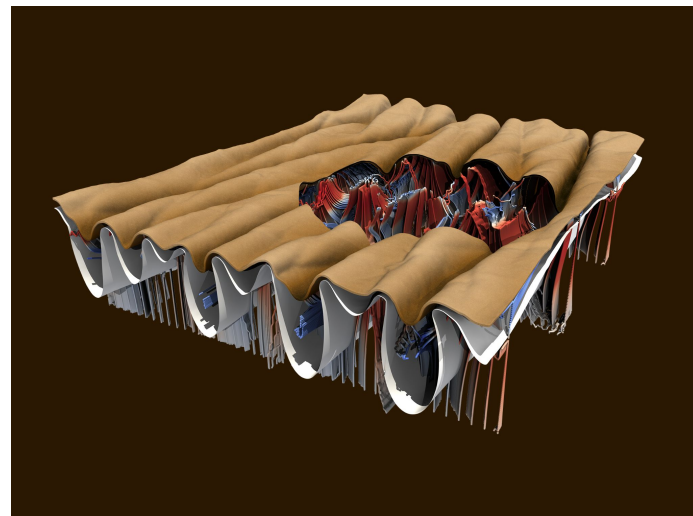
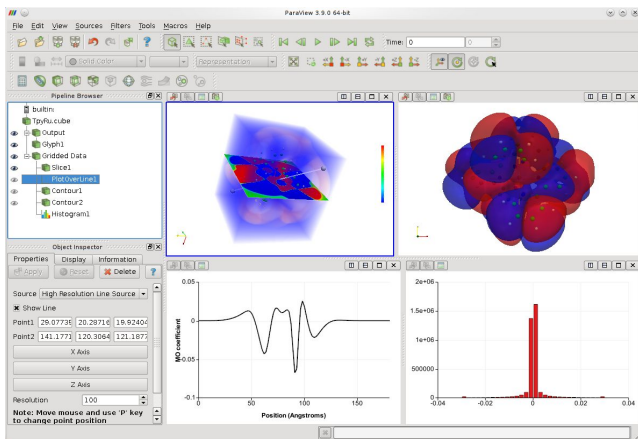
- Open-source (BSD-3 licence), freely available, cross-platform toolkit for post-processing and visualization of scientific data

VTK



ParaView / High-Performance Post-Processing (2002)

- Open-source, multi-platform, data analysis and visualization application
- Analysis of extremely large datasets using distributed memory computing resources

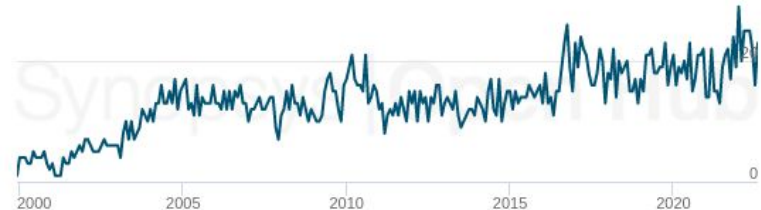


ParaView Community

- **Open Source Software (BSD license)**
- **Run on most of Top500 HPC**
- **300000+ download yearly from Kitware servers**
 - More users via other unknown download channel (Linux packaging, Enterprise distribution...)
- **157k commits made by 339 contributors since 2000**
- **1.6M lines of code**



Contributors per Month

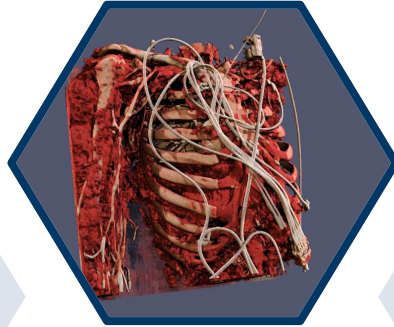


Features / Application Domains



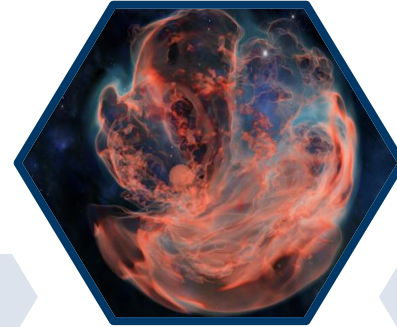
Fluid
Dynamic

Structural
Analysis



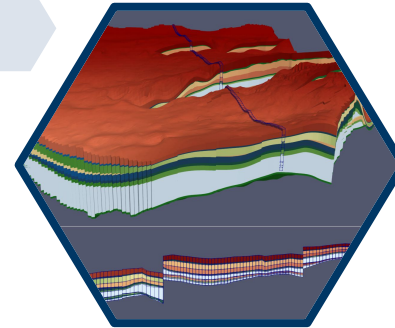
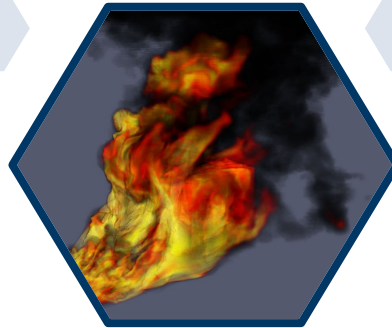
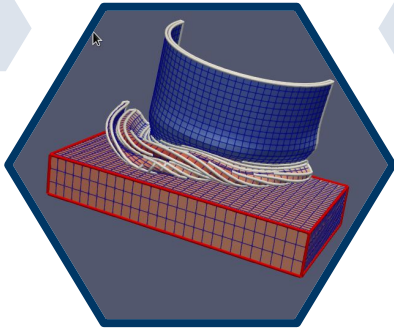
Medical

Particles

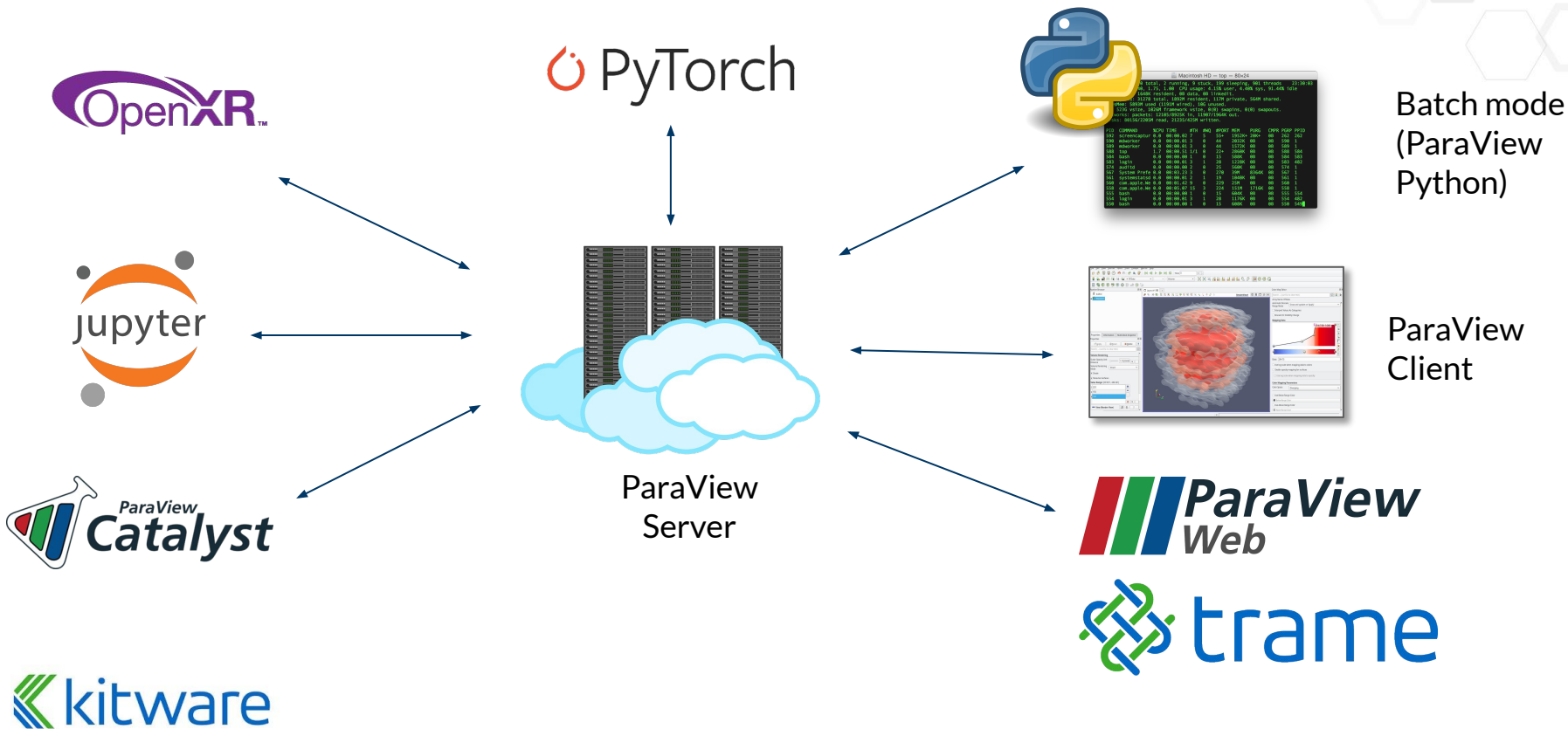


Astrophysic

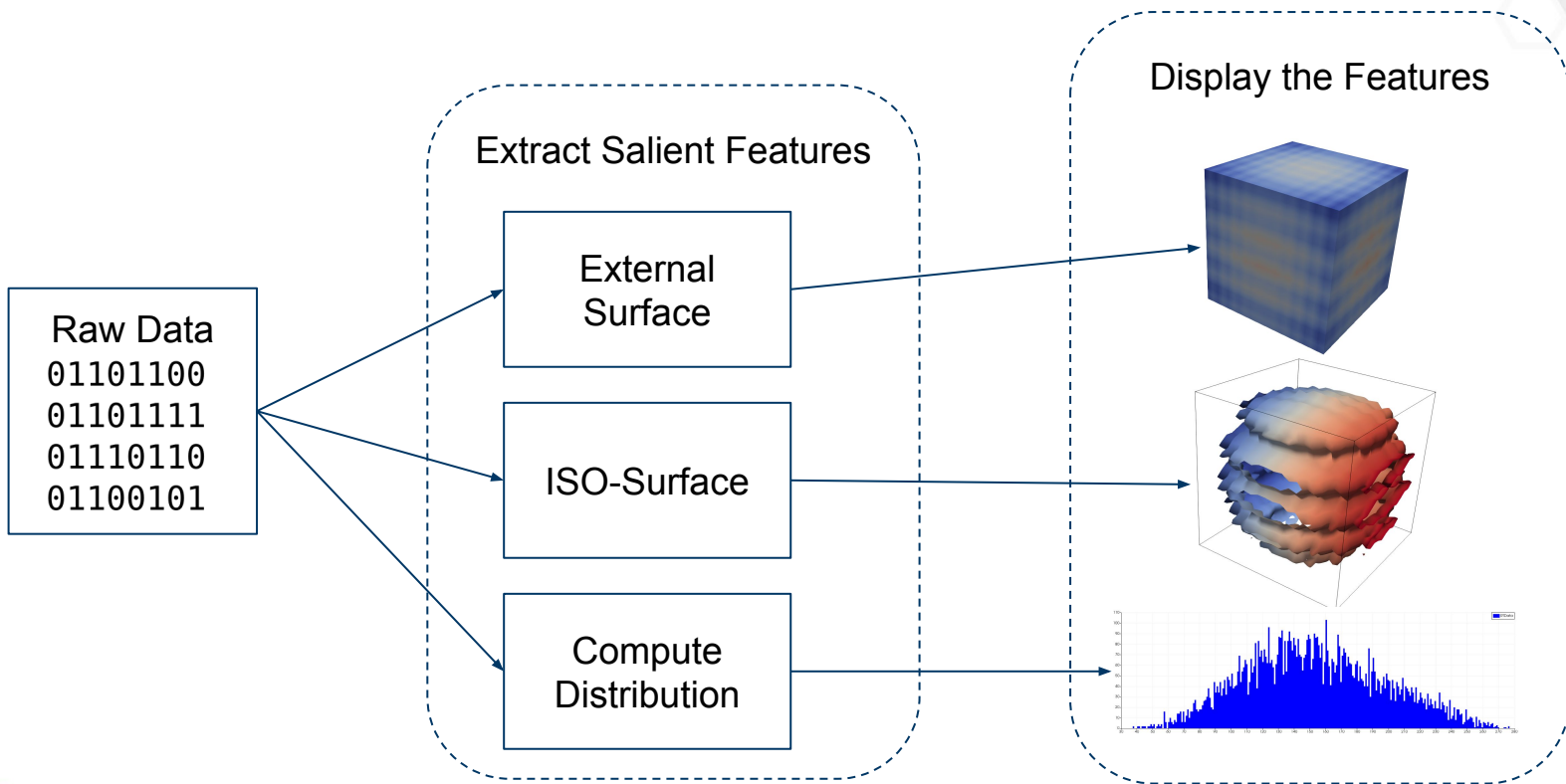
Geoscience



ParaView Ecosystem



Scientific Visualization Basics



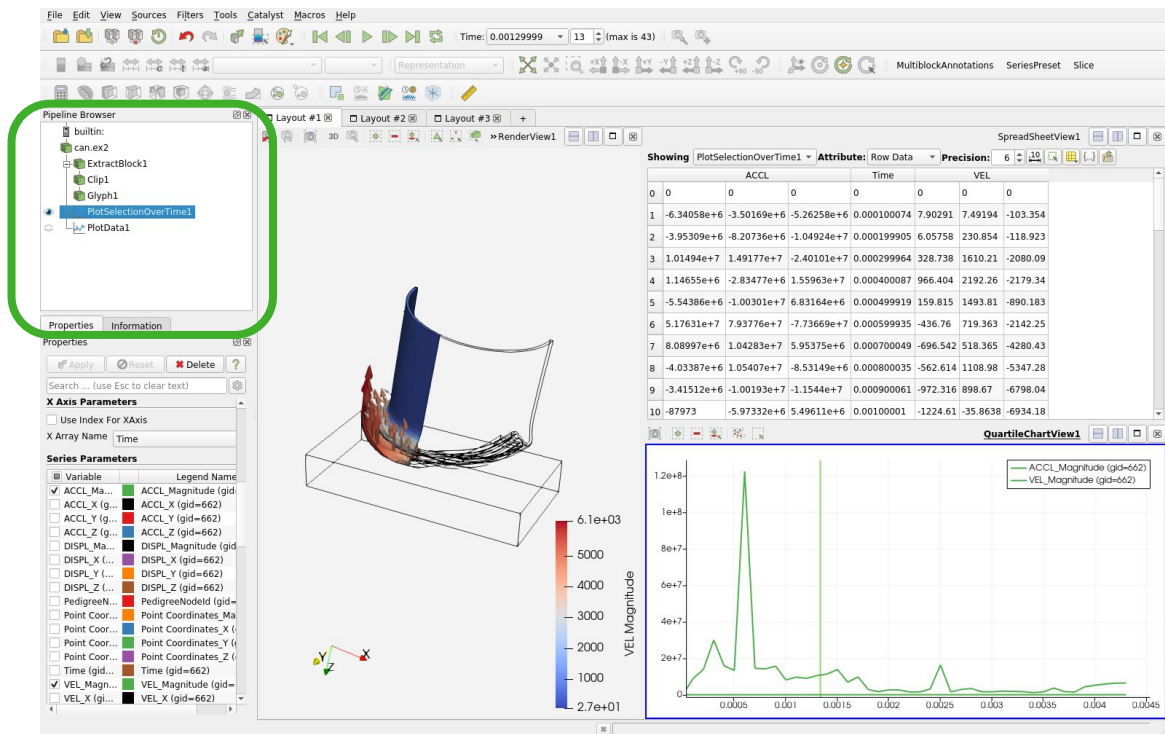
ParaView - Graphical User Interface

The screenshot displays the ParaView interface with several key components highlighted by callouts:

- Menu bar:** Located at the top, containing File, Edit, View, Sources, Filters, Tools, Catalyst, Macros, and Help.
- Pipeline Browser:** On the left, showing a pipeline with nodes like ExtractBlock1, Clip1, Glyph1, PlotSelectionOverTime1, and PlotData1.
- Object Inspector:** Below the Pipeline Browser, showing properties for the selected object, including X Axis Parameters and Series Parameters.
- Toolbars:** Multiple toolbars are visible, including the top toolbar with icons for file operations and the bottom toolbar with visualization controls.
- View(s):** The central 3D view shows a flame simulation on a rectangular base. A color scale on the right indicates values from 2.7e+01 to 6.1e+03. A SpreadsheetView1 window is open, displaying a table of data. A QuartileChartView1 window shows a line graph of ACCL_Magnitude and VEL_Magnitude over time.

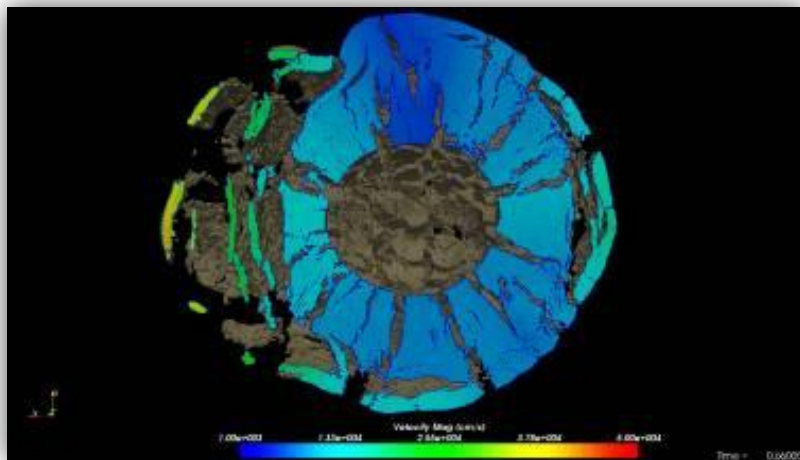
0	0	0	0	0	0	0
1	-6.34058e+6	-3.50169e+6	-5.26258e+6	0.000100074	7.90291	7.49194
2	-3.95309e+6	-8.20736e+6	-1.04924e+7	0.000199905	6.05758	230.854
3	1.01494e+7	1.49177e+7	-2.40101e+7	0.000299964	328.738	1610.21
4	1.14655e+6	-2.83477e+6	1.55963e+7	0.000400087	966.404	2192.26
5	-5.54386e+6	-1.00301e+7	6.83164e+6	0.000499919	159.815	1493.81
6	5.17631e+7	7.93776e+7	-7.73669e+7	0.000599935	-436.76	719.363
7	8.08997e+6	1.04283e+7	5.95375e+6	0.000700049	-696.542	518.365
8	-4.03387e+6	1.05407e+7	-8.53149e+6	0.000800035	-562.614	1108.98
9	-3.41512e+6	-1.00193e+7	-1.1544e+7	0.000900061	-972.316	898.67
10	-8.7973	-5.97332e+6	5.49611e+6	0.00100001	-1224.61	-35.8638

Pipeline Browser

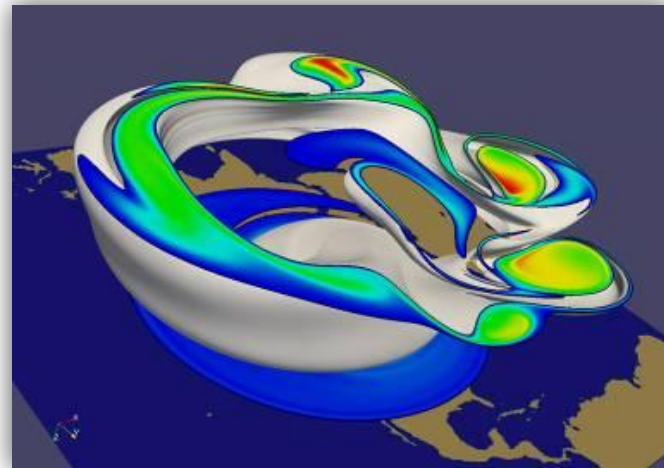


Extremely Large Data

1 billion cell asteroid
detonation simulation



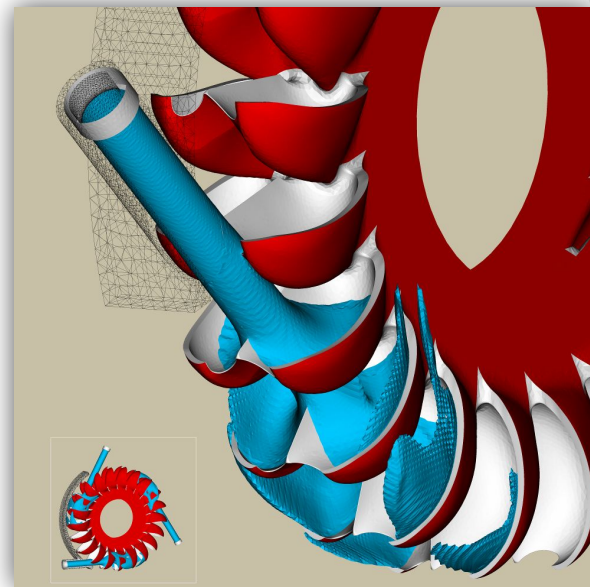
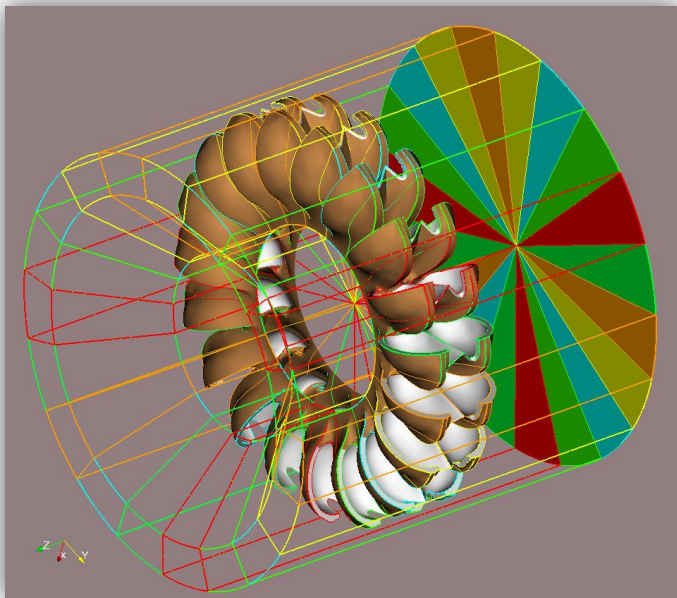
½ billion cell weather
simulation



Source: Sandia National Lab

Fast Large Data Interaction

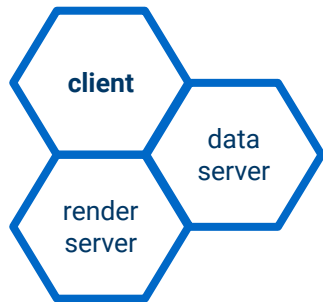
CFD simulation of 20-30 million cells
with load balancing



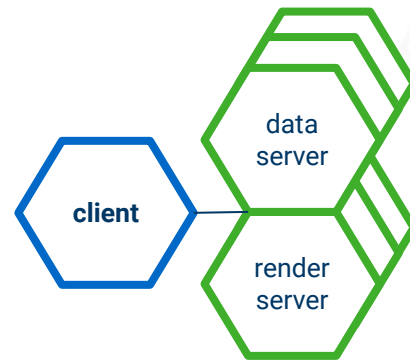
Source: Swiss supercomputing center

Client Server Architecture

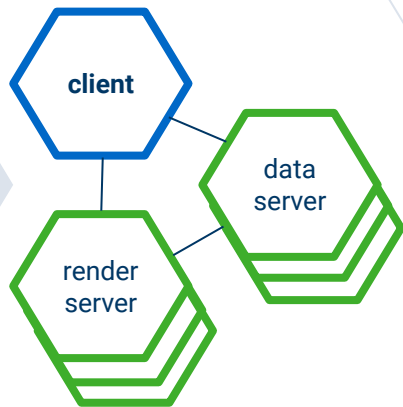
Built-in
paraview



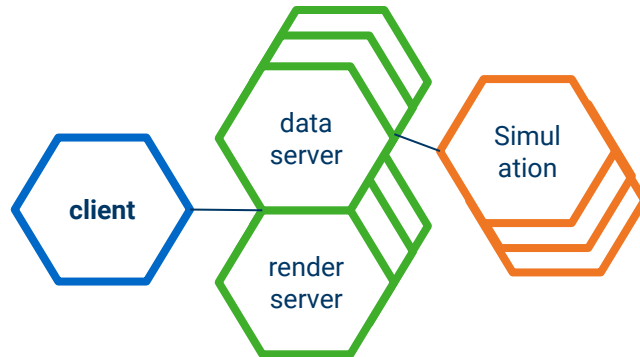
Distributed
pvserver



Graphic Nodes
data/render server

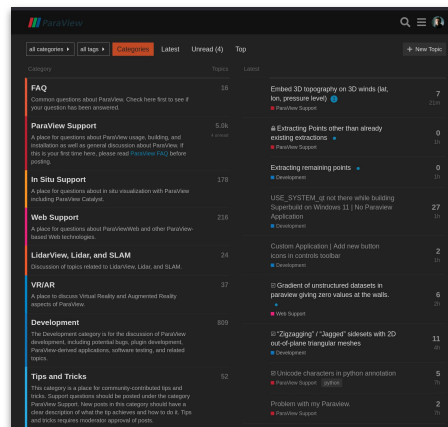


In Situ
catalyst

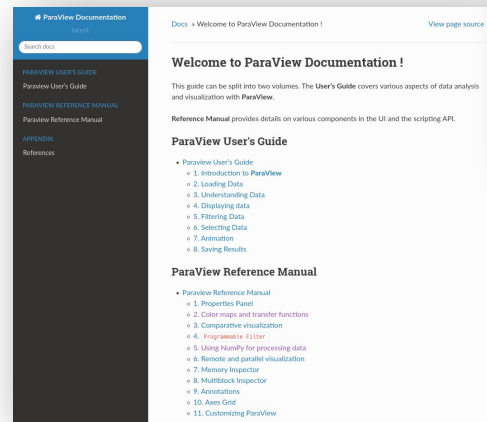


Going Further ...

- **ParaView User Doc (Guide) – Official user's manual and reference guide**
 - Accessible in the binary version of ParaView
 - Freely available as a website: <https://docs.paraview.org>
 - Printed version on Amazon
- **Wiki and Forum**
 - Plenty of user and developer resources
 - <https://discourse.paraview.org/>



Category	Topics	Labels
FAQ	16	
ParaView Support	5,041	
In Situ Support	178	
Web Support	216	
LidarView, Lidar, and SLAM	24	
VR/AR	27	
Development	509	
Tips and Tricks	62	



ParaView Documentation

Search docs

ParaView USER'S GUIDE
ParaView USER'S GUIDE

ParaView REFERENCE MANUAL
ParaView REFERENCE MANUAL

APPENDIX
References

Docs • Welcome to ParaView Documentation 1 View page source

Welcome to ParaView Documentation !

This guide can be split into two volumes. The **User's Guide** covers various aspects of data analysis and visualization with ParaView.

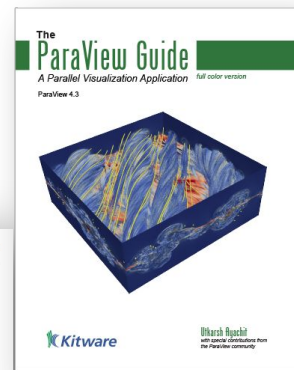
Reference Manual provides details on various components in the UI and the scripting API.

ParaView User's Guide

- ParaView User's Guide
 - 1. Introduction to ParaView
 - 2. Loading Data
 - 3. Understanding Data
 - 4. Displaying data
 - 5. Filtering Data
 - 6. Selecting Data
 - 7. Animation
 - 8. Saving Results

ParaView Reference Manual

- ParaView Reference Manual
 - 1. Properties Panel
 - 2. Color maps and transfer functions
 - 3. Comparative visualization
 - 4. Programmable Filter
 - 5. Using Humfly for processing data
 - 6. Remote and parallel visualization
 - 7. Memory Inspector
 - 8. Multiblock Inspector
 - 9. Annotations
 - 10. Axes Grid
 - 11. Customizing ParaView





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