

# Visualization with ParaView

#### Introduction

August 31, 2009

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.



## Outline

- Introduction
- Basic Usage
- Cluster Processing Large Models
- Configuring ParaView for Vis Clusters
- Python Scripting





#### What is ParaView?

- An open-source, scalable, multi-platform visualization application.
- Support for distributed computation models to process large data sets.
- An open, flexible, and intuitive user interface.
- An extensible, modular architecture based on open standards.
- Commercial maintenance and support.





## **Current ParaView Usage**

- Used by academic, government, and commercial institutions worldwide.
  - Downloaded ~3K times/month.
- Used for all ranges of data size.
- Current landmarks of SNL usage:
  - 6 billion structured cells.
  - Billions of AMR cells.
  - 250 million unstructured cells.





#### **ParaView Development**

- Started in 2000 as collaborative effort between Los Alamos National Laboratories and Kitware Inc. (lead by James Ahrens).
  - -ParaView 0.6 released October 2002.
- September 2005: collaborative effort between Sandia National Laboratories, Kitware Inc. and CSimSoft to rewrite user interface to be more user friendly and develop quantitative analysis framework.

-ParaView 3.0 released in May 2007.





# **Current Funding**



- Army SBIR
- ERDC Contract
- US NSF SBIR
- Other contributors
  - Swiss National Supercomputing Centre

- Support Contracts
  - Electricity de France
  - Mirarco
  - Oil Industry





#### **Basics of Visualization**

0265640	132304	133732	032051	037334	024721	015013	052226	001662
0265660	025537	064663	054606	043244	074076	124153	135216	126614
0265700	144210	056426	044700	042650	165230	137037	003655	006254
0265720	134453	124327	176005	027034	107614	170774	073702	067274
0265740	072451	007735	147620	061064	157435	113057	155356	114603
0265760	107204	102316	171451	046040	120223	001774	030477	046673
0266000	171317	116055	155117	134444	167210	041405	147127	050505
0266020	004137	046472	124015	134360	173550	053517	044635	021135
0266040	070176	047705	113754	175477	105532	076515	177366	056333
0266060	041023	074017	127113	003214	037026	037640	066171	123424
0266100	067701	037406	140000	165341	072410	100032	125455	056646
0266120	006716	071402	055672	132571	105645	170073	050376	072117
0266140	024451	007424	114200	077733	024434	012546	172404	102345
0266160	040223	050170	055164	164634	047154	126525	112514	032315
0266200	016041	176055	042766	025015	176314	017234	110060	014515
0266220	117156	030746	154234	125001	151144	163706	136237	164376
0266240	137055	062276	161755	115466	005322	132567	073216	002655
0266260	171466	126161	117155	065763	016177	014460	112765	055527
0266300	003767	175367	104754	036436	172172	150750	043643	145410
0266320	072074	000007	040627	070652	173011	002151	125132	140214
0266340	060115	014356	015164	067027	120206	070242	033065	131334
0266360	170601	170106	040437	127277	124446	136631	041462	116321
0266400	020243	005602	004146	121574	124651	006634	071331	102070
0266420	157504	160307	166330	074251	024520	114433	167273	030635
0266440	133614	106171	144160	010652	007365	026416	160716	100413
0266460	026630	007210	000630	121224	076033	140764	000737	003276
0266500	114060	042647	104475	110537	066716	104754	075447	112254
0266520	030374	144251	077734	015157	002513	173526	035531	150003
0266540	146207	015135	024446	130101	072457	040764	165513	156412
0266560	166410	067251	156160	106406	136770	030516	064740	022032
0266600	142166	123707	175121	071170	076357	037233	031136	015232
0266620	075074	016744	044055	102230	110063	033350	052765	172463







# **Data Types**



Uniform Rectilinear (Image Data)



Non-Uniform Rectilinear (Rectilinear Data)







Curvilinear (Structured Data)

# **Multi-block**

Hierarchical Adaptive Mesh Refinement (AMR)

Hierarchical Uniform AMR

Octree





# **More Information**

- Online Help
- The ParaView Guide
- The ParaView web page

<u>www.paraview.org</u>

ParaView mailing list

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