ParaView

An End User Tool for Large-Scale Visualization

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Important Stuff I Won’t Talk About

- Large Scale
  - Parallel client/server architecture
  - Demonstrated 100’s of thousands processes, trillions of cells

- Next Generation Architectures
  - Multi-core, many-core

- Alternate Solutions
  - VisIt: DOE Funded, SciDAC supported, large scale, similar capabilities
  - EnSight: Commercially sold, parallel service
  - Others (Visus, VisTrails, MayaVi)

- Google “ParaView Tutorial”
  - Or come to Supercomputing
## Space of “In Situ” Solutions

<table>
<thead>
<tr>
<th></th>
<th>Capability</th>
<th>Coupling</th>
<th>Footprint</th>
<th>Transfer</th>
<th>Interactive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tightly Integrated</strong></td>
<td>Low</td>
<td>Tight</td>
<td>Low</td>
<td>None</td>
<td>No</td>
</tr>
<tr>
<td><strong>Embedded</strong></td>
<td>High</td>
<td>Tight</td>
<td>High</td>
<td>Possible memcpy</td>
<td>No</td>
</tr>
<tr>
<td><strong>Hybrid</strong></td>
<td>High</td>
<td>Tight</td>
<td>Medium</td>
<td>Subset Hi Speed Transfer</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Co-Scheduled</strong></td>
<td>High</td>
<td>Loose</td>
<td>~5% Extra Nodes</td>
<td>Hi Speed Transfer</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Off-Line</strong></td>
<td>High</td>
<td>Loose</td>
<td>None</td>
<td>Slow Persistent Storage Cost</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Simulation

ParaView
Catalyst

Output
Processed
Data

Rendered Images
Simulation

ParaView

Catalyst

Statistics

Line Series

Polygonal Surfaces Field Data

Rendered Images

Output Processed Data
# Create the reader and set the filename.
reader = servermanager.sources.Reader(FileNames=path)
view = servermanager.CreateRenderView()
repr = servermanager.CreateRepresentation(reader, view)
reader.UpdatePipeline()
dataInfo = reader.GetDataInformation()
pDInfo = dataInfo.GetPointDataInformation()
arrayInfo = pDInfo.GetArrayInformation("displacement9")
if arrayInfo:
    # get the range for the magnitude of displacement9
    range = arrayInfo.GetComponentRange(-1)
lut = servermanager.rendering.PVLookupTable()
lut.RGBPoints = [range[0], 0.0, 0.0, 1.0, range[1], 1.0, 0.0, 0.0]
lut.VectorMode = "Magnitude"
repr.LookupTable = lut
repr.ColorArrayName = "displacement9"
repr.ColorAttributeType = "POINT_DATA"
Full scale Simulation w/ In situ

Smaller scale Covisualization

Interactive Client

ParaView
Interactive Visualization

In-situ Library, Coupled with codes

Thousands of Cores

2007 2008 2009 2010 2011

Intrepid (ANL)

Cielo (LANL/SNL)

Red Sky (SNL)
Vis Computation Nodes

Staging Nodes

Simulation

Simulation Results

Vis Interactive Vis Controls

Visualization Results

Vis Client
Vis Computation Nodes
Staging Nodes
Simulation
Simulation Results
Vis
Visualization Results
Interactive Vis Controls
Vis Client
Biddiscombe, et al, "Parallel Computational Steering and Analysis for HPC Applications using a ParaView Interface and the HDF5 DSM Virtual File Driver."