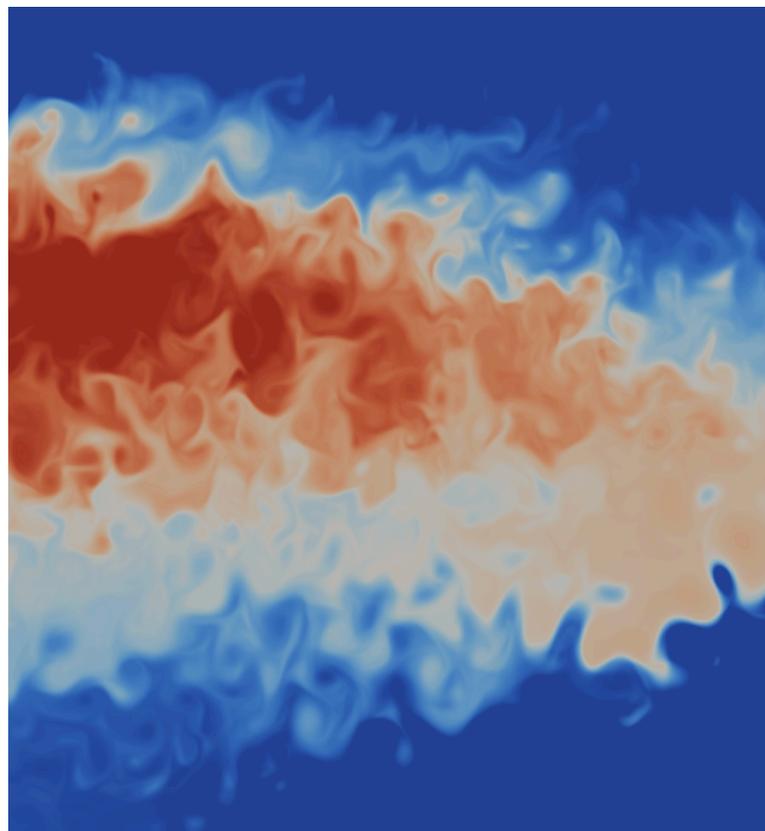


Parallel Visualization and Analysis with ParaView on a Cray XT4

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Introduction

- Cray supercomputers getting bigger and faster
- Data becoming larger and more plentiful
- Users can be at distance
- Connections to the supercomputer can be fast or slow
- Interactive remote viz with ParaView



Previous Work

- 2 papers at CUG last year
 - Large Scale Visualization on the Cray XT3 Using ParaView
 - Parallel Analysis and Visualization on Cray Compute Node Linux
- ParaView had been built on both the Cray XT3 and an IBM BlueGene

Approach

- Intelligently guess a theoretical performance
- read from lustre
- Isosurface
- Render
- Composite
- Send to Client

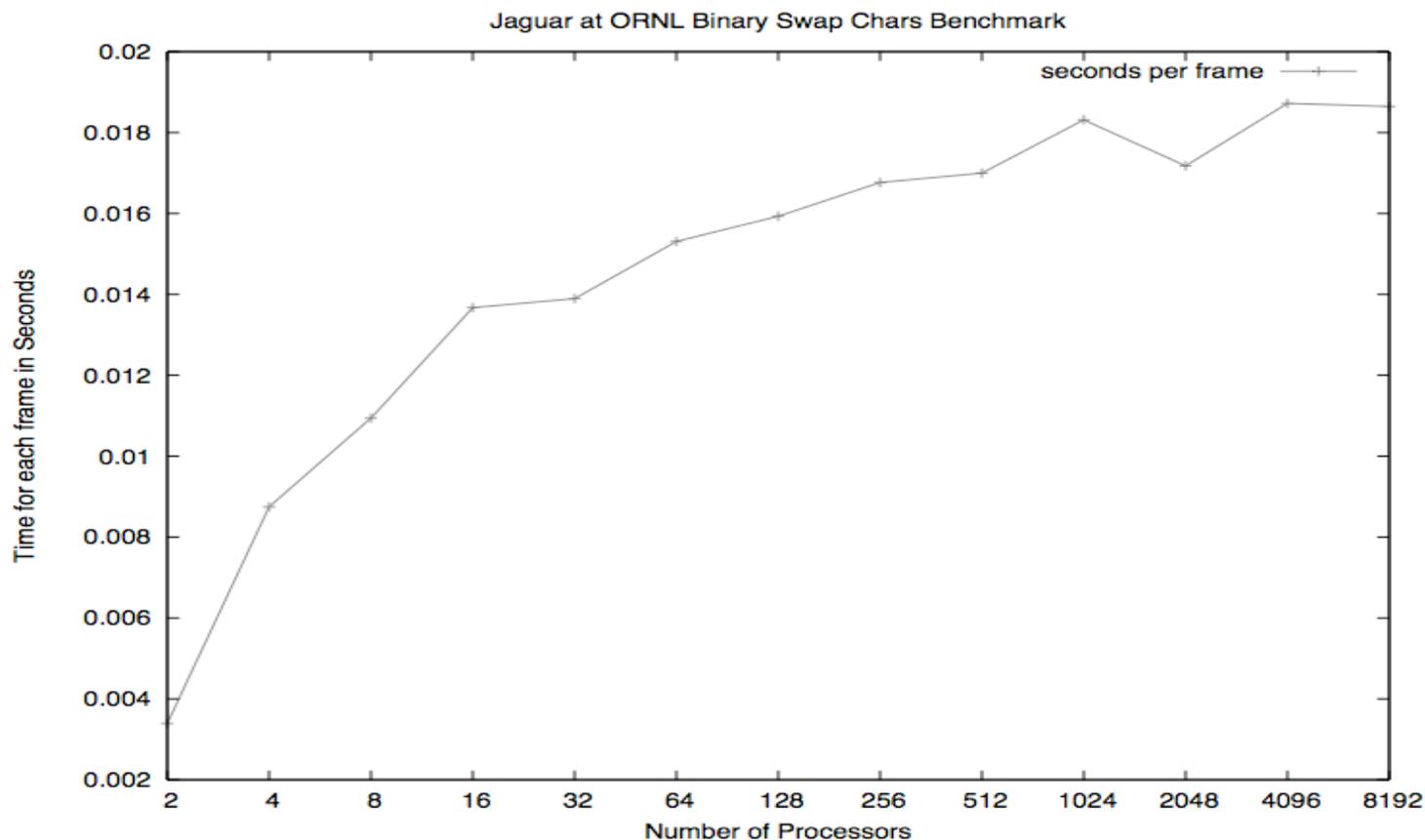
- Lustre
- Large number of cores might be slow
- Low number of cores might be slow
- We performed very little work on this
 - Set stripe size to 1MB
 - Set stripe Count to 32

- OSMesa
 - Offscreen GL
- Parallel Rendering
 - Requires Compositing
 - Trivially Parallel

Compositing

- Binary Swap
- ICE-T
- Network Intensive
- Scales well

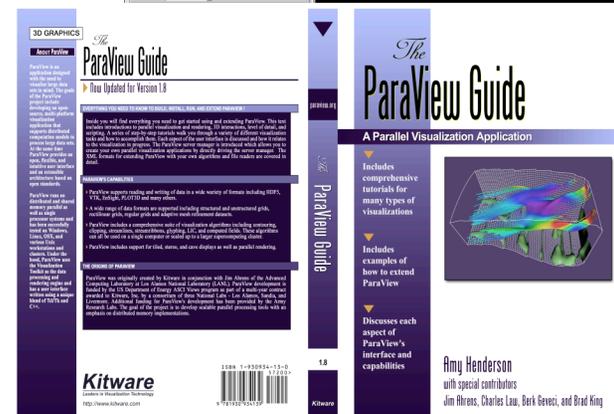
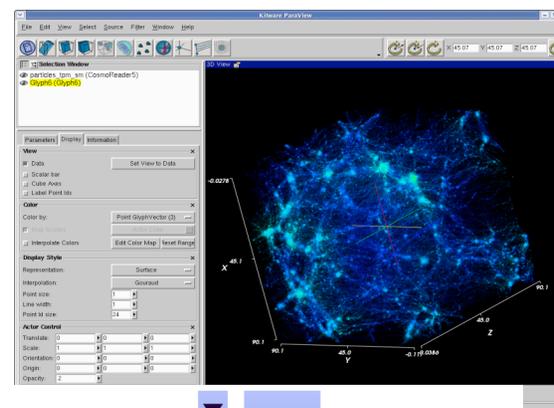
Composite Timings



- Jaguar to LANL
 - Between 10 and 11 Mbps
 - 1.4 MB/s (downhill, wind at back)
- Time to send
 - Function of image size (Render Window Size)
 - Don't need to send Z buffer
 - Somewhat hard to measure

ParaView

- Open source model
- Entities using/developing
 - Laboratories
 - ANL, NCSA, EVL
 - LANL, LLNL, SNL
 - CEA, CHCH
 - ARL
 - Universities
 - Stanford, UNC, Utah
 - Commercial companies
 - GE, DuPont
- Past agency funding
 - NSF, NIH, DOE, DOD
- Thousands of downloads / users



Interactive vs. Batch

- Work Flow Issue
- Write script, submit, look at image or animation. Wait. Look at Results.
 - Repeat
- Open ParaView, load data, apply filters, move, change your mind, change your mind again.
 - Continue interacting

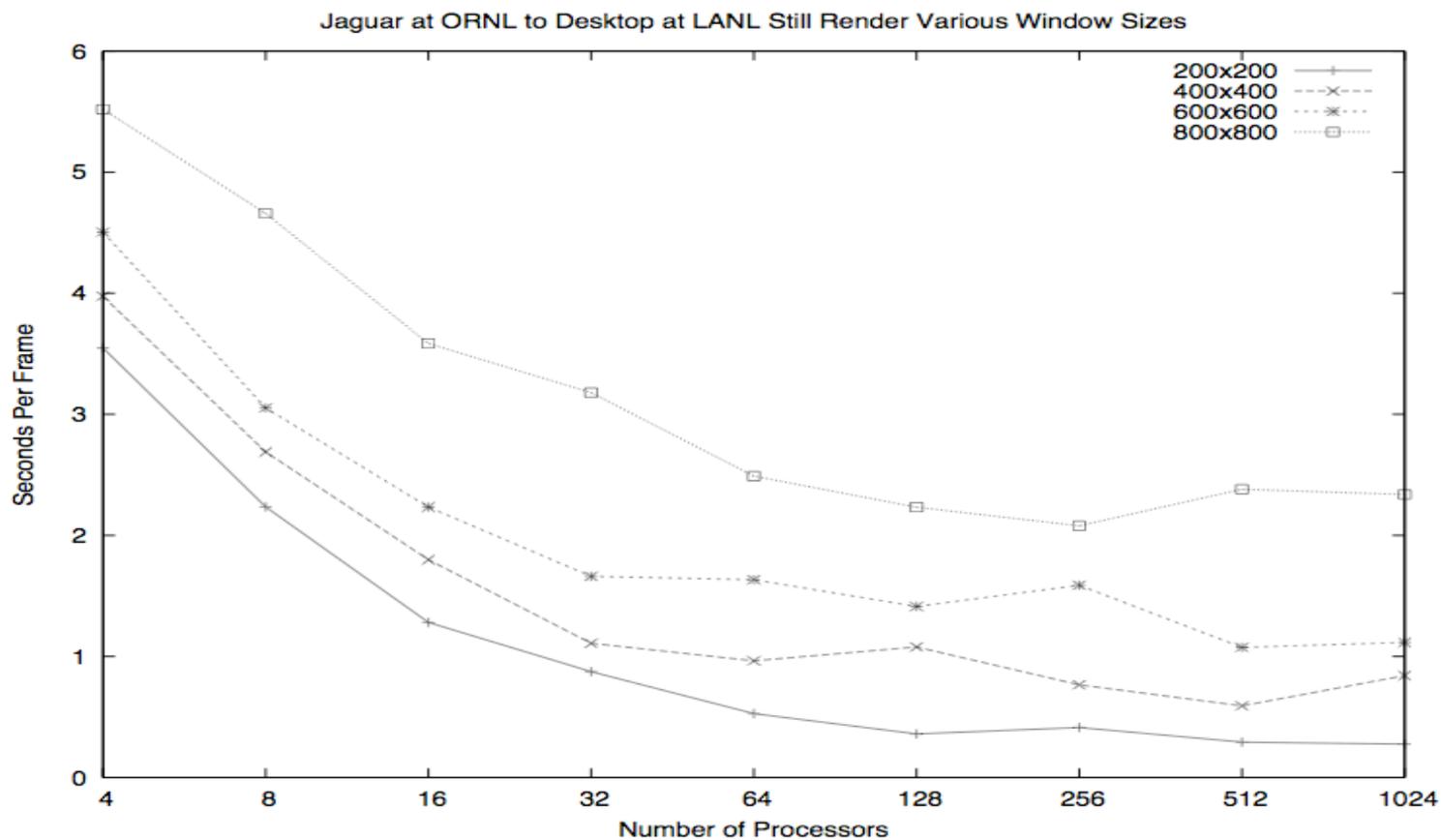
Building ParaView

- Cross Compiling with Cmake
 - ToolChain File
 - Answer file for “try run”
- XT4 Socket Support
 - Very good for interactivity
- Native Paraview
 - make pvHostTools

Running ParaView

- Get an allocation
 - Find out process0 hostname
 - Start a PV server
- Start new ssh tunnel with port forwarding to process0.
- Start local client
 - Connect to localhost

Results



- Rendering
 - Render Window Size and geometry
- Compositing
 - Render Window Size
- Sending
 - Render Window Size

Conclusion

- Remote Distance Visualization works with Jaguar as the visualization Server
- Scales Well
- Could be better
 - qsub should give an estimate till allocation
- More visualization users would help drive further work.