Big Data Analysis with ParaView

Going beyond the built in server
Session 1: Introductory Lecture

See also: http://vimeo.com/63567497

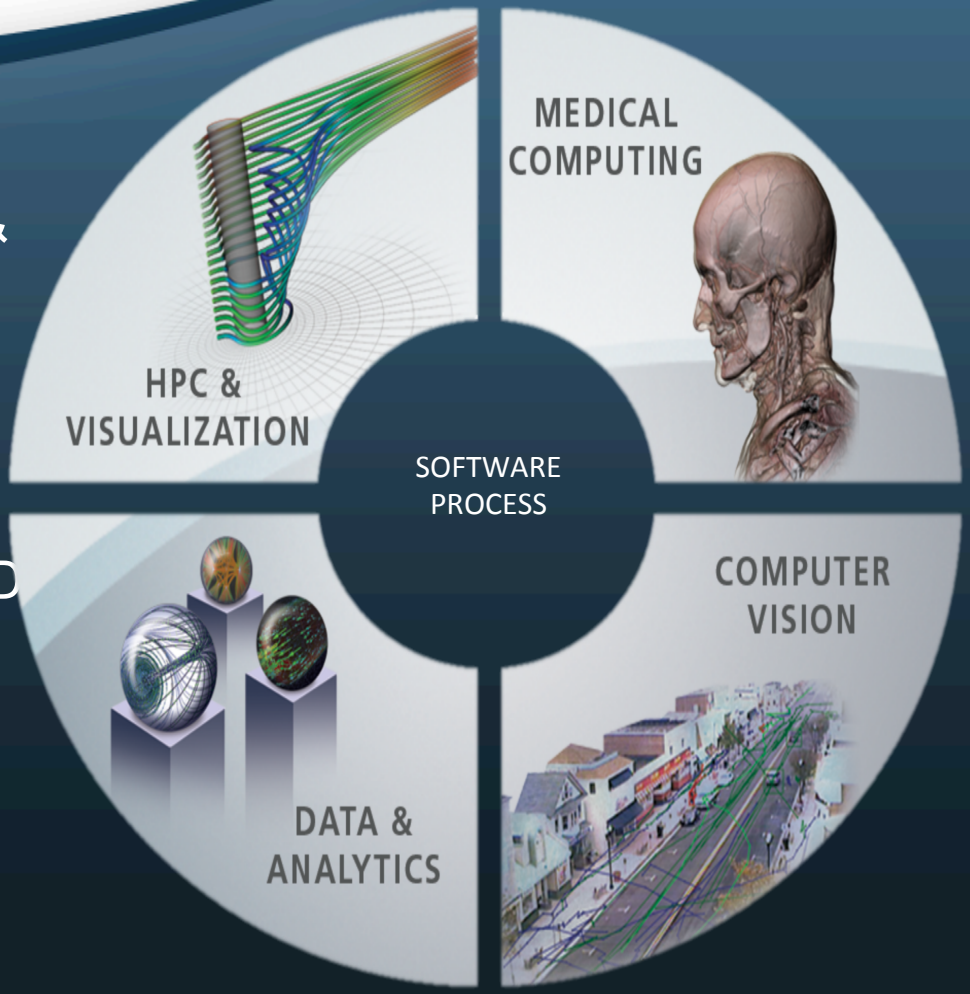
Agenda

- Session 1:
  - What the heck is Kitware?
  - What is ParaView?
  - Fundamentals of Parallel ParaView
- Session 2:
  - Hands on practice using ParaView at ANL

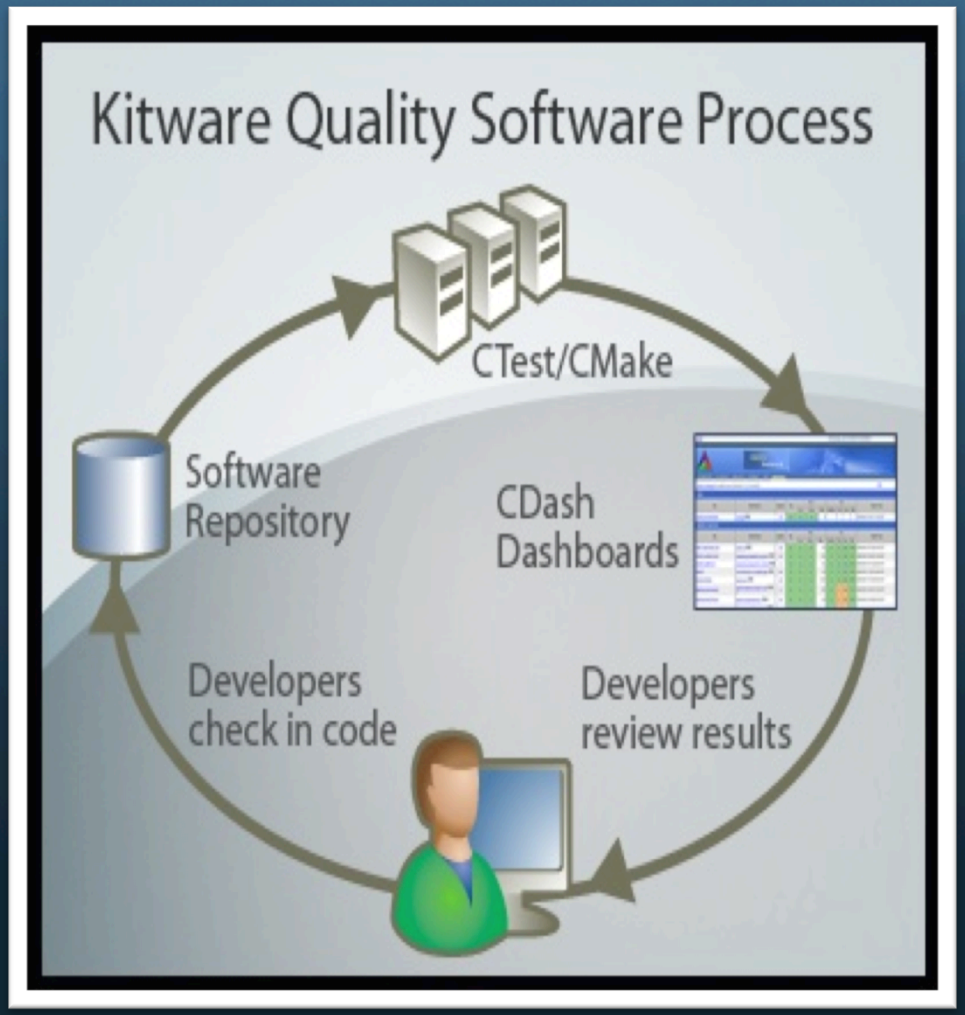
Kitware

Kitware

- Collaborative software R&D: algorithms & applications, image & data analysis, support & training
- Industry, government, academia
- Best known for open source toolkits and applications
- 126 employees: ⅓ masters, ⅓ PhD
- Founded in 1998; $28M revenue 2011



Software Process

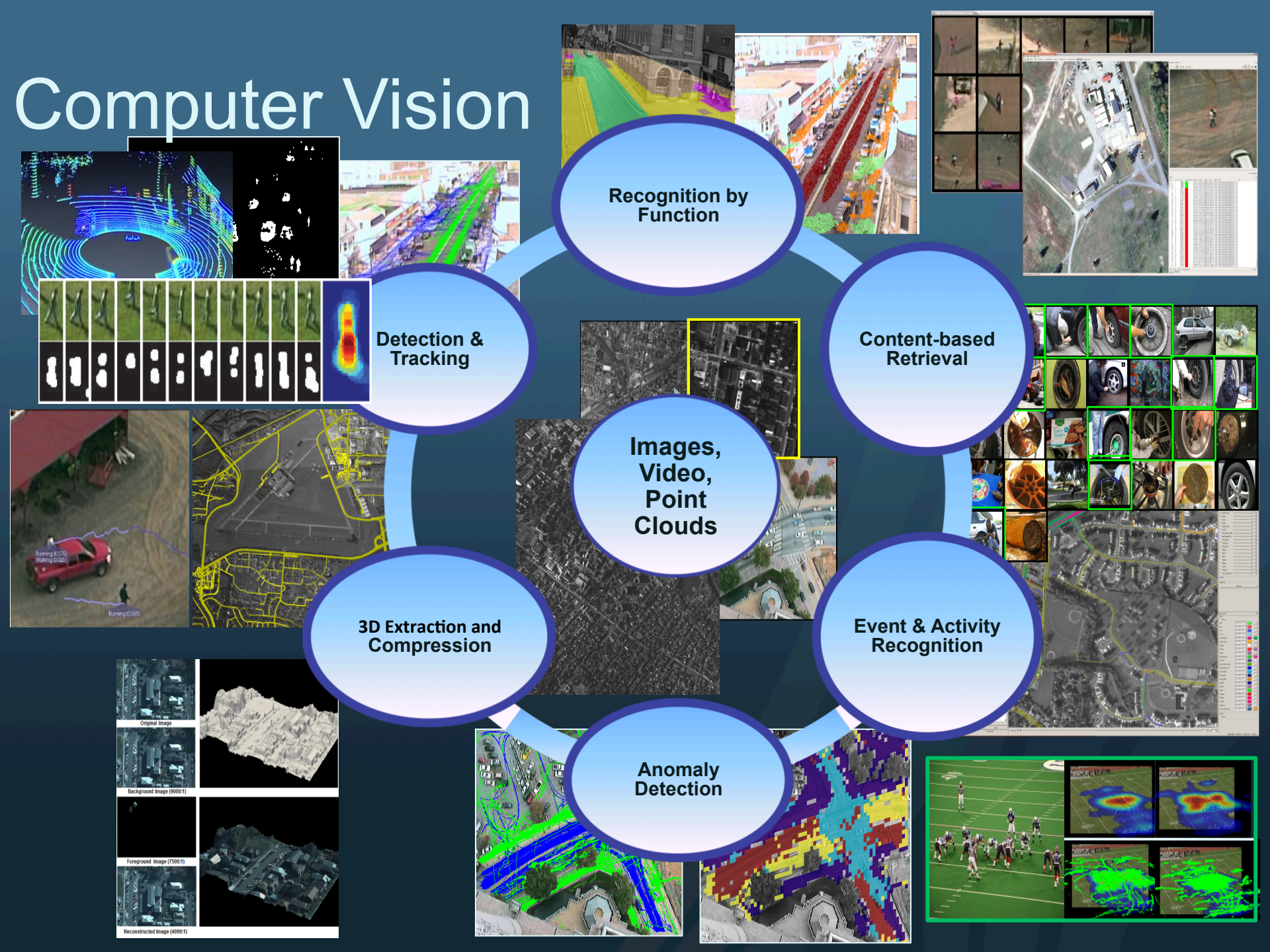


- Kitware's software R&D foundation
- Experience managing small projects through large open-source collaborations
- CMake toolset: configure, build, test, report on, and package projects on multiple platforms
  - Used by thousands of software teams; over 3,000 downloads per day

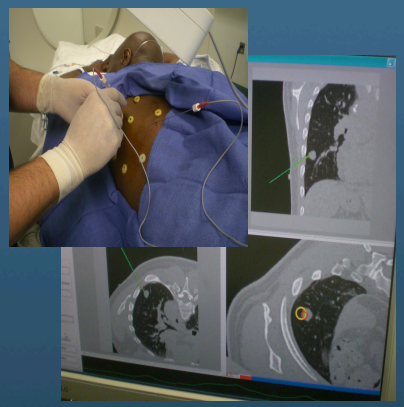
DCMTK

LLVM/clang

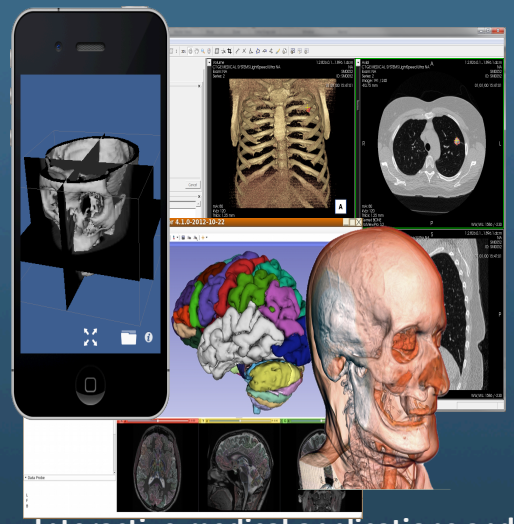
Computer Vision



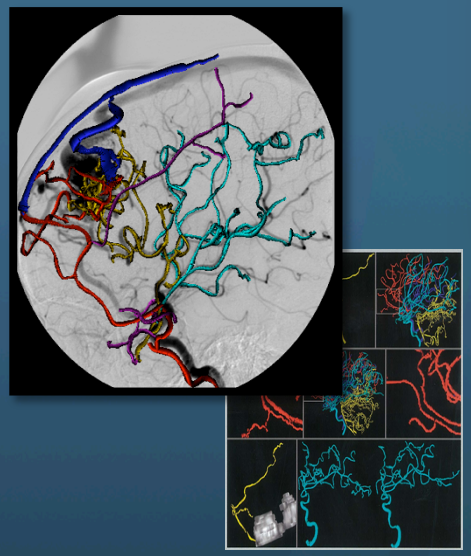
Medical Computing



Surgical guidance
And simulation

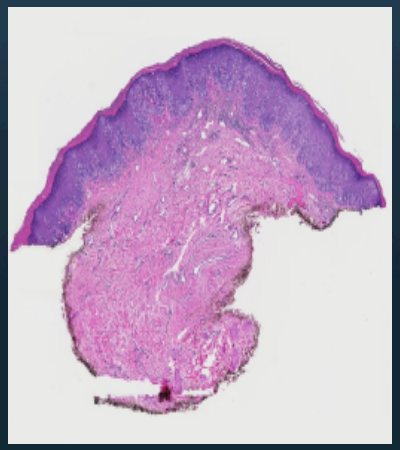


Interactive medical applications and visualizations

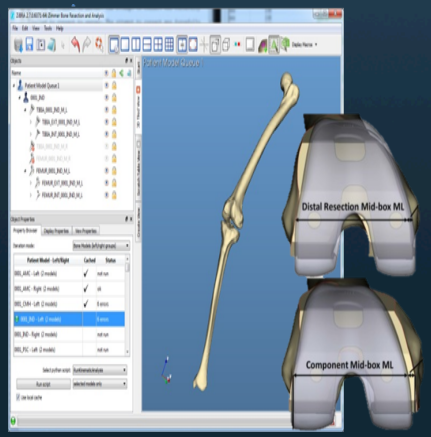


Vascular analysis

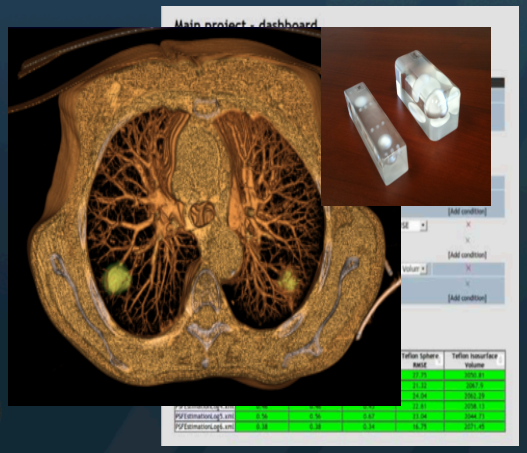
Longitudinal and population shape analysis



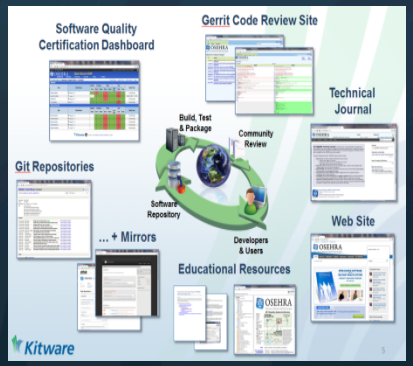
Digital pathology



Orthopedic analysis



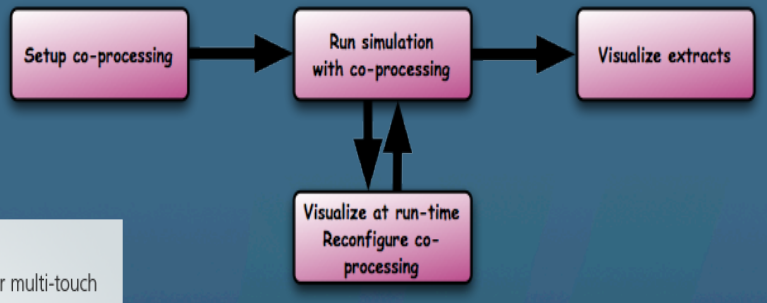
Quantitative imaging



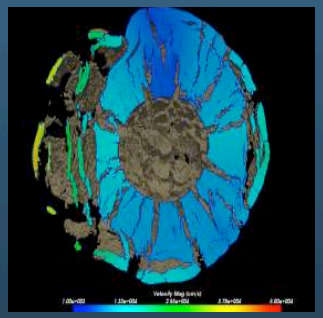
Electronic health records

HPC & Visualization

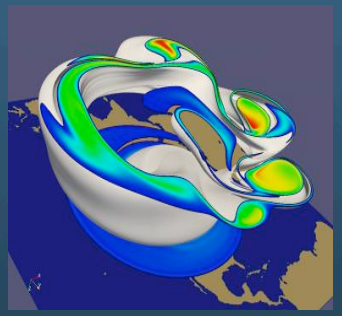
Co-processing



Massive data visualization



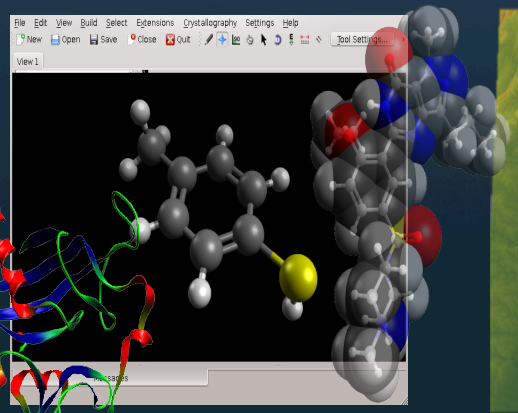
1 billion cell asteroid simulation



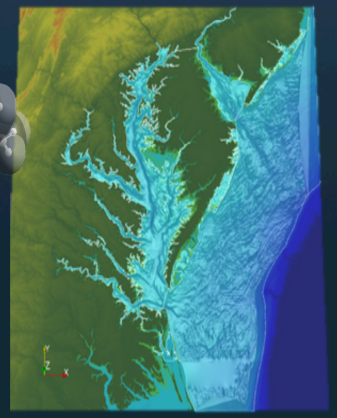
½ billion cell weather simulation

Mobile visualization

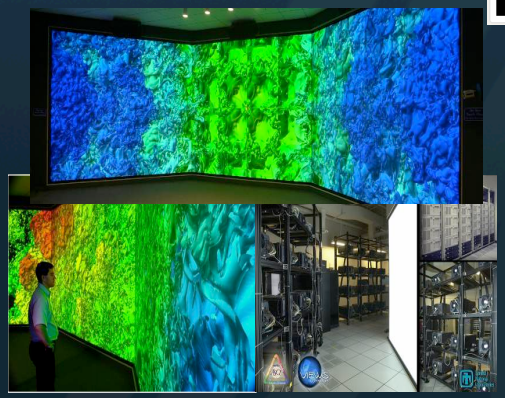
Large displays and virtual reality

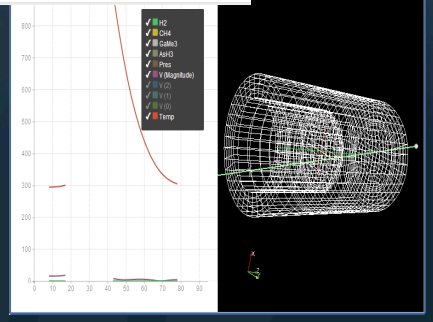


Computational Chemistry



Simulation





Web visualization

What is ParaView?

An application and architecture for display and analysis of **massive** scientific datasets.

- Client/Server architecture lets it runs on variety of platforms
  - from netbooks
  - to the largest machines in the world
- Support for tile display and parallel rendering
- Level of detail techniques keep it interactive on huge data

History (http://www.paraview.org/Wiki/ParaView_Release_Notes

- 1999 LANL/Kitware project (via ASCI Views)
  - Build an end user tool from VTK
  - Make VTK scale
  - October 2002 first public release, version 0.6
- 2002-2005 Versions 0.6 through 2.6
  - Continued growth under DOE Tri Labs, Army Research Lab and various other partnerships
- September 2005 ParaQ project started
  - Sandia, Kitware and CSimSoft
  - Make ParaView easier to use
  - Add quantitative analysis
  - May 2007 version 3.0 released
- Continuing to evolve
  - 4.0 released Jun 2013 – releases ~3 months

Current Directions

- Catalyst
  - In situ ParaView http://catalyst.paraview.org
- Web and Mobile
  - ParaViewWeb front end http://paraviewweb.kitware.com/PW
  - VES/KiwiViewer http://www.kiwiviewer.org
- OpenGL rendering overhaul
  - http://www.kitware.com/news/home/browse/459
- SMP and GPGPU acceleration
  - http://viz.lanl.gov/projects/PISTON.html
  - http://www.daxtoolkit.org/index.php/Main_Page
  - Inria&EDF vtkSMP EGPGV 2013

Kitware

What to expect from parallel ParaView?

- Amdahl's Law

$$Speedup(CPUs) = \frac{1}{Serial + \frac{Parallel}{CPUs}}$$

aka Strong scaling

If data size is fixed, don't expect great scalability.

More processors != faster

- Gustafson's Law

$$Speedup(Machines) = Machines - Serial * (Machines - 1)$$

aka Weak scaling

As data size grows, you must have more resources.

More disk and IO = higher resolution possible

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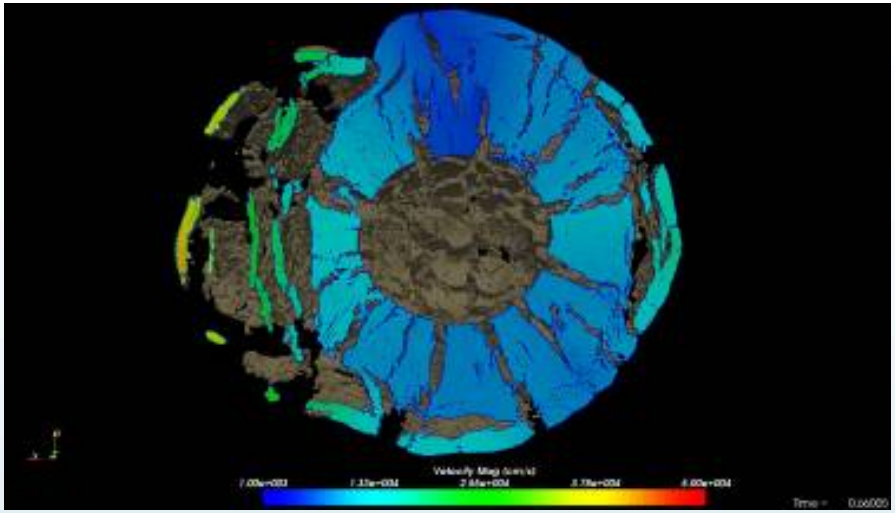
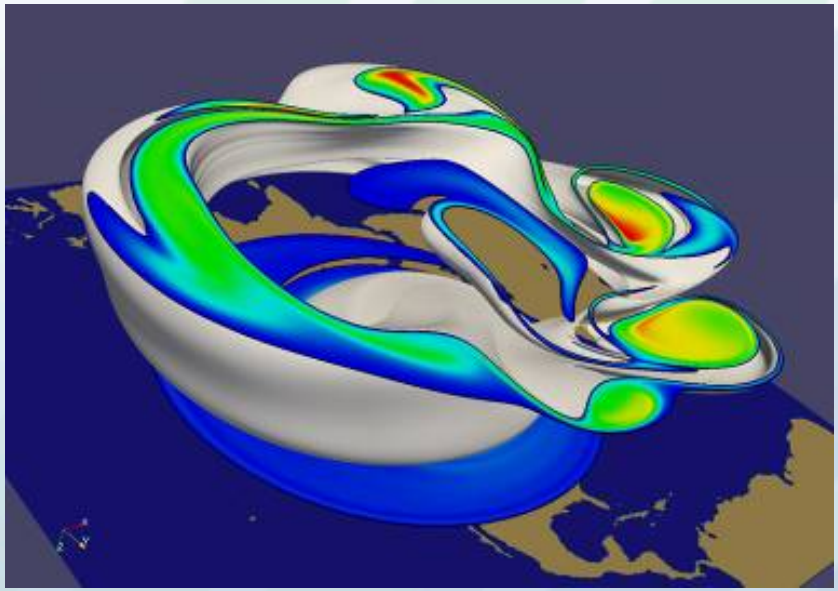
ParaView is for Extremely Large Data



1 billion cell asteroid detonation simulation

½ billion cell weather simulation



source: Sandia National Lab

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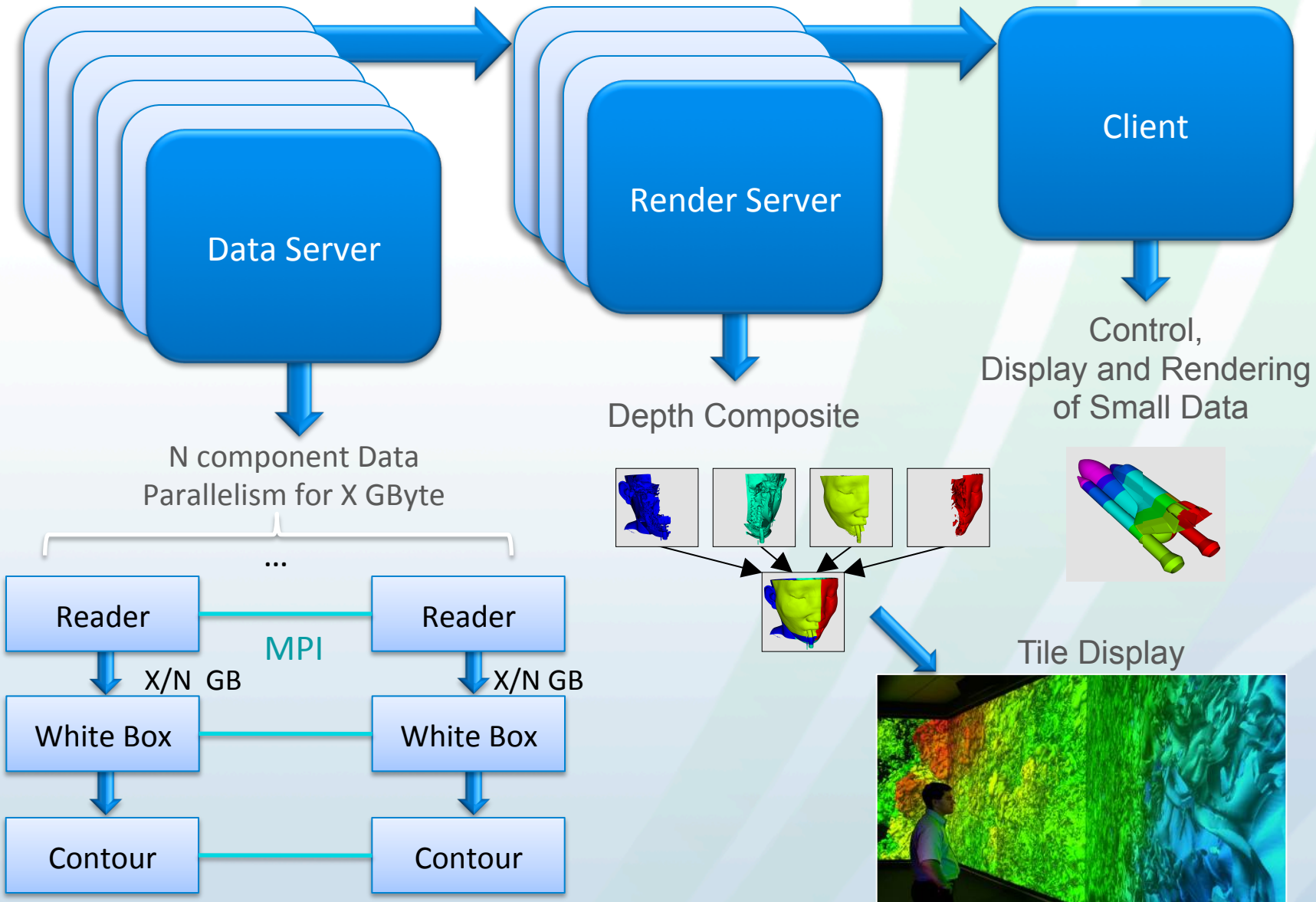

http://www.paraview.org/Wiki/ParaView/
ParaView_Readers_and_Parallel_Data_Distribution

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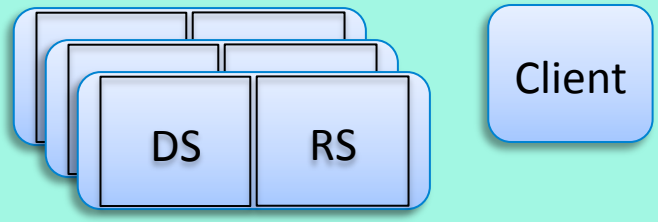
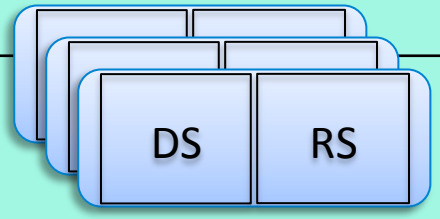
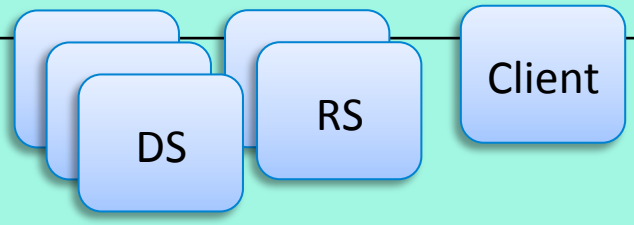
ParaView's running modes

Builtin aka Standalone aka Serial		all components within one process (client may be GUI or pvpython) "paraview" || "pvpython"
Combined Server		data processing and parallel rendering in MPI job of combined processes. control from TCP connected client. "mpiexec -n x pvserver &; paraview"#||pvpython #+ Connect
Batch		Server is an MPI job which directly runs a python script "mpiexec –n x pvbatch \ vis_script.py"
Split server		Data processing and parallel rendering are both MPI jobs. " mpiexec –n x pvdataserver&; \ mpiexec –n y pvrenderserver &; \ paraview" #+ Connect

Is my ParaView parallel capable?

- MPI is required for large data processing
  - Kitware binaries not really suitable
- Enable Python is strongly recommended
  - enables scriptability = unattended use, reproducibility, simplifies parameter studies, additional features, …
- How to get access to Parallel ParaView
  - Option 1: access a system with it already installed
    - http://paraview.org/Wiki/ParaView/HPC_Installations
  - Option 2: check your distro (Fedora example has paraview-mpi)
  - Option 3: build your own
    - PARAVIEW_USE_PYTHON, PARAVIEW_USE_MPI = ON, QT=OFF
    - http://paraview.org/Wiki/ParaView:Build_And_Install
    - http://paraview.org/Wiki/ParaView/Superbuild

Kitware

Python on a Cray? (are you nuts!)

- Wait, pvbatch is only scripting interface
- No pvbatch without python
- No python without shared libs???
- Modern Cray OS (Cluster Compatibility Mode) has shared libs
  - although not ideal - 10k cores opening same shared library simultaneously is a bad thing
- Best to compile statically
- ParaViewSuperBuild git://paraview.org/ParaViewSuperbuild.git

  does so for Cray and BlueGene
- PV 4.1 will have frozen python (NO disk access at all)

Kitware

Static python linking

- A simple python module example

```
import mymodule
mymodule.say_hello()
```

- Pure python module: mymodule.py
- Extension module: mymodule.so
  - mymodule.so is dynamically loaded
  - contains C function: void initmymodule()

Kitware

Static python linking

```
#include <Python.h>

int main()   {
  Py_Initialize();
  const char* code = "import mymodule          \n"
                     "mymodule.say_hello()    \n";
  PyRun_SimpleString((char*)code);
  Py_Finalize();
  }
```

Not linked to mymodule.so, will use dlopen at runtime to load mymodule.so

Kitware

Static python linking

```
#include <Python.h>
extern void initmymodule();

int main()   {
  PyImport_AppendInittab(" mymodule ", initmymodule);
  Py_Initialize();
  const char* code = "import mymodule          \n"
                     "mymodule.say_hello()    \n";
  PyRun_SimpleString((char*)code);
  Py_Finalize();
  }
```

When compiled statically uses symbols that it found in mymodule.a.

Kitware

Static python linking

- Use static linking to avoid shared library dependencies
- Must compile python statically
  - configure –disable-shared
  - libpython2.6.a instead of libpython2.6.so
- Python standard library includes many extension modules
  - want to compile math.c into libpython2.6.a, instead of producing math.so
  - So, after configuring python, edit file Modules/Setup to indicate which modules should be included as part of libpython2.6.
- Or, use CMake! CMake handles static extension modules and cross compiling
  - Python build in ParaViewSuperbuild patches to cmakeify then doe this

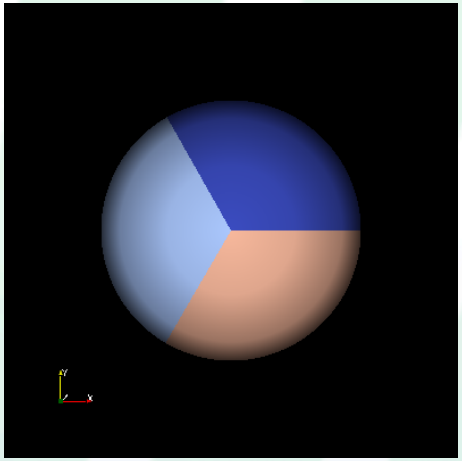
Kitware

pvbatch example

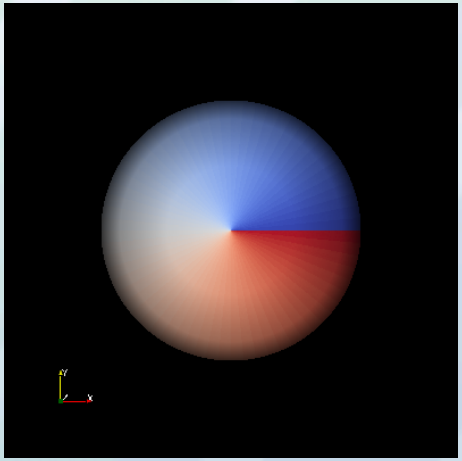
parallelSphere.py

```
from paraview.simple import *
numProcs = paraview.servermanager.\
   ActiveConnection.\
   GetNumberOfDataPartitions()
sphere = Sphere()
sphere.ThetaResolution=512+numProcs
pids = ProcessIdScalars()
rep = Show()
lut = GetLookupTableForArray(
     "ProcessId",1,
     RGBPoints=[0.0,          0.23,0.299,0.754,
                      numProcs,0.706,0.016,0.15],
     ColorSpace='Diverging’)
rep.LookupTable = lut
rep.ColorArrayName = 'ProcessId'
Render()
WriteImage("parallelSphere.png”)
```

```
mpiexec -n 3 \
 pvbatch parallelSphere.py
```



```
mpiexec -n 64\
 pvbatch parallelSphere.py
```



See “Tools->Trace”, the ParaView book, and Kitware training offerings, for ParaView syntax.

Kitware

How to Learn ParaView Scripting

1. http://paraview.org/Wiki/ParaView/Python_Scripting

2. Tools -> Python Shell

3. **Trace:**

   ParaView -> Tools -> Start Trace

   Do something in GUI

   ParaView -> Tools -> Stop Trace

   File -> Save

Kitware

Visualization on Big Iron

- Offscreen rendering useful/essential

  OSMesa easy option: see pure offscreen rendering section of http://paraview.org/Wiki/ParaView/Users_Guide/Parallel_Rendering

- Environment search paths
  - Where ParaView binaries, libraries and python can be found

mypaths.sh

```
set dir = /lustre/widow2/scratch/demarled/pv3.14.0/GNUINSTALL
setenv PATH ${dir}:${PATH}
setenv PYTHONHOME ${dir}/pythonhome #where my python is
setenv PYTHONPATH ${dir}/pythonlib  #where paraview module is
```

  - Or more typically when sys admins installed ParaView

```
soft add +paraview-3.98.1
```

Or perhaps

```
module load paraview-3.98.1
```

Kitware

Visualization on Big Iron

Access resource through the queue - syntax varies per scheduler (MOAB, Oracle Grid Engine, Microsoft HPC server…).

- Interactive Session

```
qsub -I \
  -q debug -A yourProject \
  -l size=16 -l walltime=00:60:00
```

Wait for session to be given to you

```
source mypaths.sh
aprun -n 16 pvbatch parallelSphere.py
```

look at result

```
aprun -n 16 pvbatch doSomethingElse.py
```

- Unattended Session

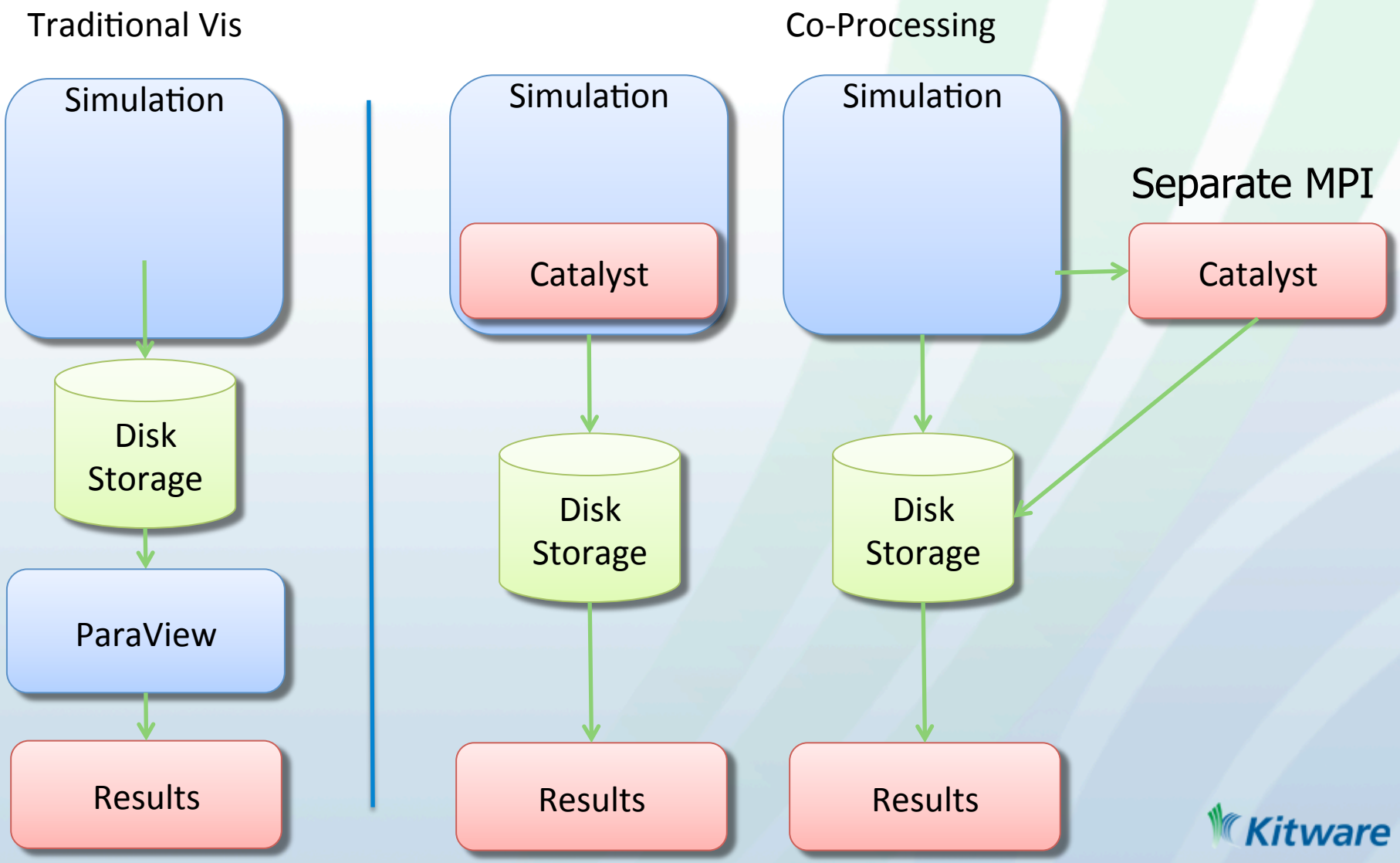
```
qsub -v PYTHONHOME=${dir}/pythonhome … \
  -q batch -A yourProject \
  -l size=1600 -l walltime=03:00:00 \
  aprun –n 1600 pvbatch parallelREALLYHUGESphere.py
```

Kitware

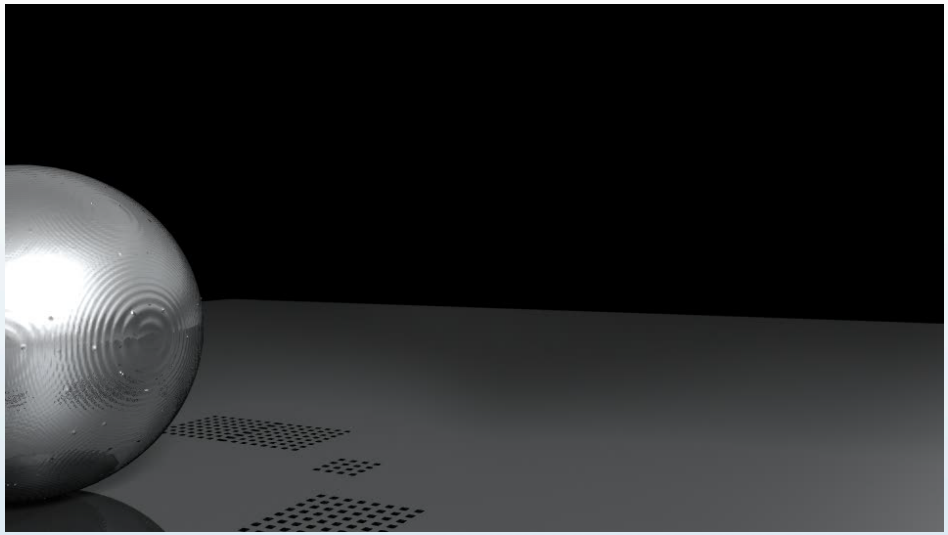
Demonstration of batch visualization

- connect to (ssh -R) titan.alcf.ornl.gov
- reserve some nodes
- set paths
- mpiexec pvbatch
- send result back and view them

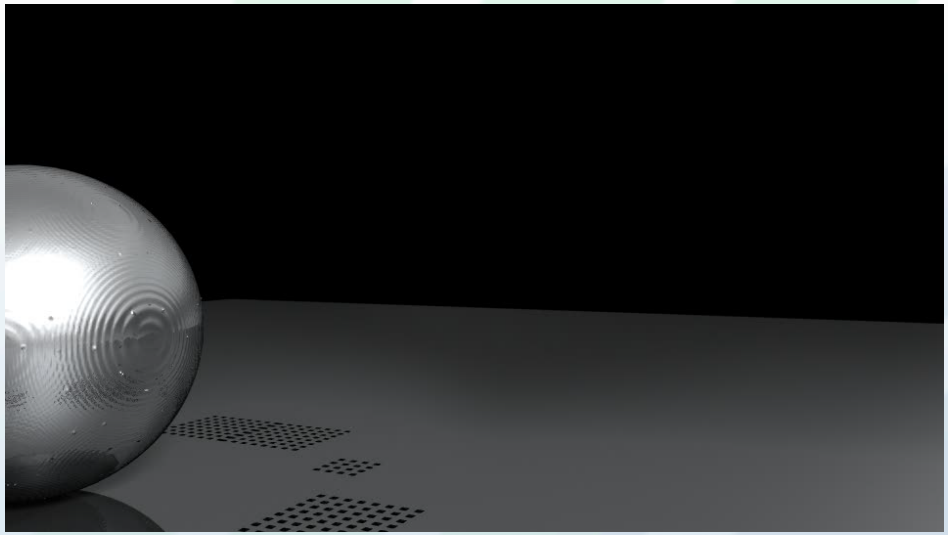
From Tera- to Exa-scale
http://catalyst.paraview.org



Catalyst: Access More Data



Post Processing



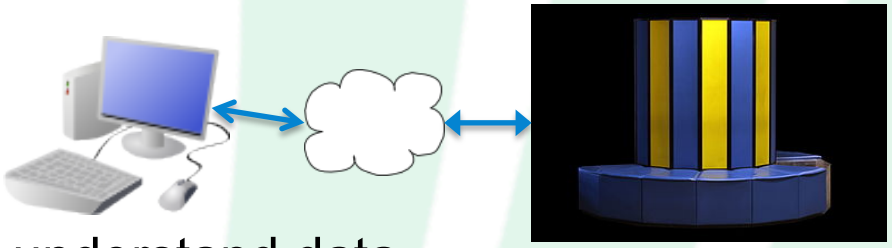
In situ Processing

Roughly equal data stored at simulation time

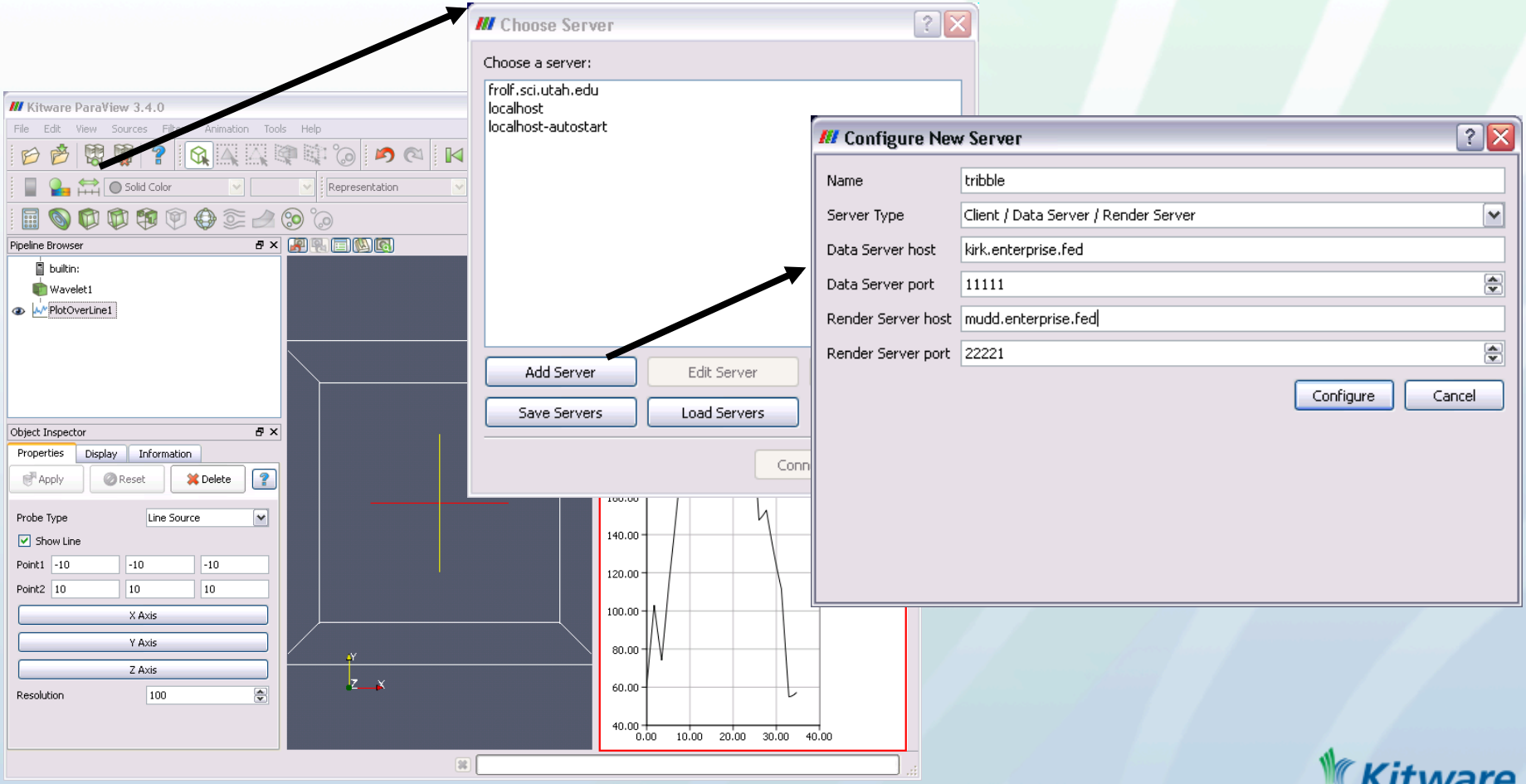
Reflections and Shadows added in post-processing

Kitware

Interacting with the data



- Interaction is sometimes important to understand data
- Establish a connection to control ParaView server from your desktop



Kitware

Establishing the connection

- Server Type:
  - Client/Server - data and render servers combined, and wait for client to contact it
  - … **(reverse connection)** - the client will wait for the server to contact it instead
- Startup Type:
  - Manual - you start the server job however you want
  - **Command** - enter commands that ParaView will run to start the job for you
- NOTE: client and server release numbers must match
  - Platform (mac/win/lin) doesn't matter, only rel number and VTK_USE_64BIT_IDS
- Examples:

```
1. mpiexec -n 8 pvserver &
2. ssh remote_machine mpiexec -n 8 pvserver &
3. xterm -e ssh remote_machine mpiexec -n 8 pvserver &
4. ssh -R 22222:local_machine:11111 remote_machine \
   mpiexec -n N pvserver \
   --reverse-connect --server-port=22222 &
5. ssh -R 22222:local_machine:11111 script.sh &
```

Where script.sh contains:

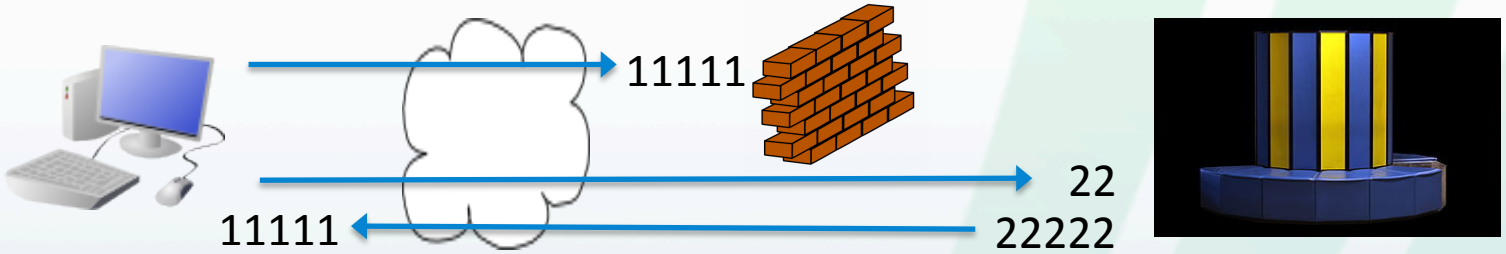
```
qsub reserve_then_tunnel2_backto_login_and_run_server.sh
```

Kitware

Tunneling

- Examples:

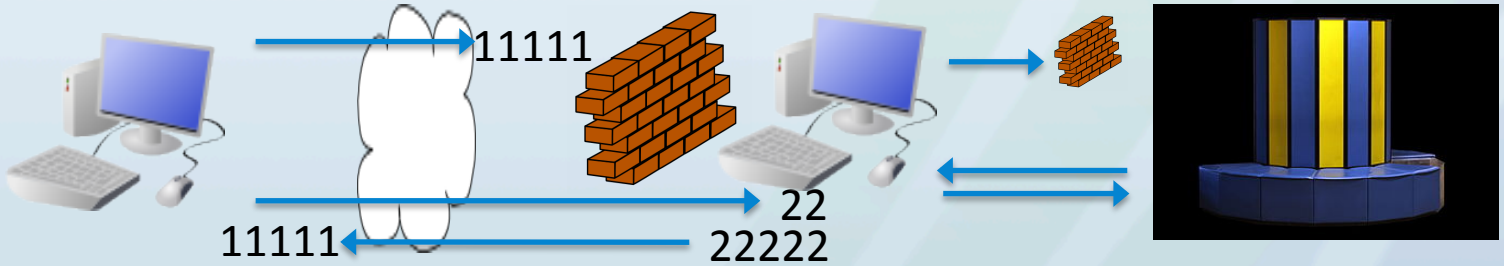
```
4. ssh -R 22222:local_machine:11111 remote_machine \
   mpiexec -n N pvserver \
   --reverse-connect --server-port=22222 &
```




```
5. ssh -R 22222:local_machine:11111 script.sh &
```

Where script.sh contains:

```
qsub reserve_then_tunnel2_backto_login_and_run_server.sh
```



- http://paraview.org/Wiki/Reverse_connection_and_port_forwarding

Kitware

.pvsc file

- The client saves all connection settings in an XML text file
  - %APPDATA%\ParaView\servers.pvsc on windows
  - ~/.config/ParaView/servers.pvsc elsewhere
  - Options entries build simple GUIs

```
<Option name="PORTNUM"/> <Option name="NUMPROC"/>
```

  - Arguments entries pass user's choices into the command

```
<command exec ="xterm"> <Arguments> …
  <argument value="$PORTNUM$:localhost:22222"/>
  <argument value="qsub -l size=$NUMPROC$"/> …
</arguments>
```

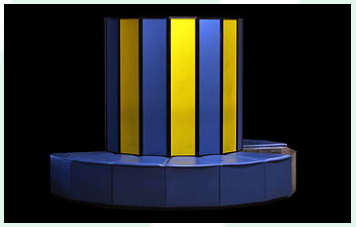
- File can be moved, edited, emailed, restored manually
- Since 3.14 you can import them within ParaView
  - **Connect->Fetch Servers**
  - Enter URL of a public web/wiki page where your sys admin has posted a .pvsc
  - ParaView will scan that and add connections it finds
- http://paraview.org/Wiki/ParaView:Server_Configuration

Demonstration of live connection

- Use port forward and sub script to connect to titan

Kitware

Local view of remote data



- File->Open : always shows you data server's file system
- Big data stays on server
- Visualization (typically) produces small subset of full data:
  - At one moment in data time
  - External surface polygons or pixels sent to client for display
  - Rendering is easy, let client do it when possible
- Run client on desktop, not on login node
  - Login nodes generally not very powerful and shared resource among many
  - X11 forwarding is best avoided
    - Lots of unnecessary communication underneath
    - Can end up with "parallel rendering" meaning N nodes ask your client to render
  - VNC session can be OK
  - Let ParaView take care of graphics delivery

Kitware

About Remote Rendering

- Preferences/Settings->Render View->General ->

  Use Immediate Mode Rendering

  - Make sure it is checked (enabled)
  - Display lists only work well with small datasets

- Preferences/Settings -> Render View -> Server ->

  Remote Render Threshold

surface polygons < threshold

- Client side rendering
- Root node of server gathers polygons
- Sends polygons to Client
- Client renders polygons
- Communicates only when data changes

surface polygons > threshold

- Server side rendering
- N nodes render 1/n'th of data
- Server decides nearest pixels to client
- Server sends images to client
- Communicates on every camera move

- Preferences/Settings -> Render View -> Server ->

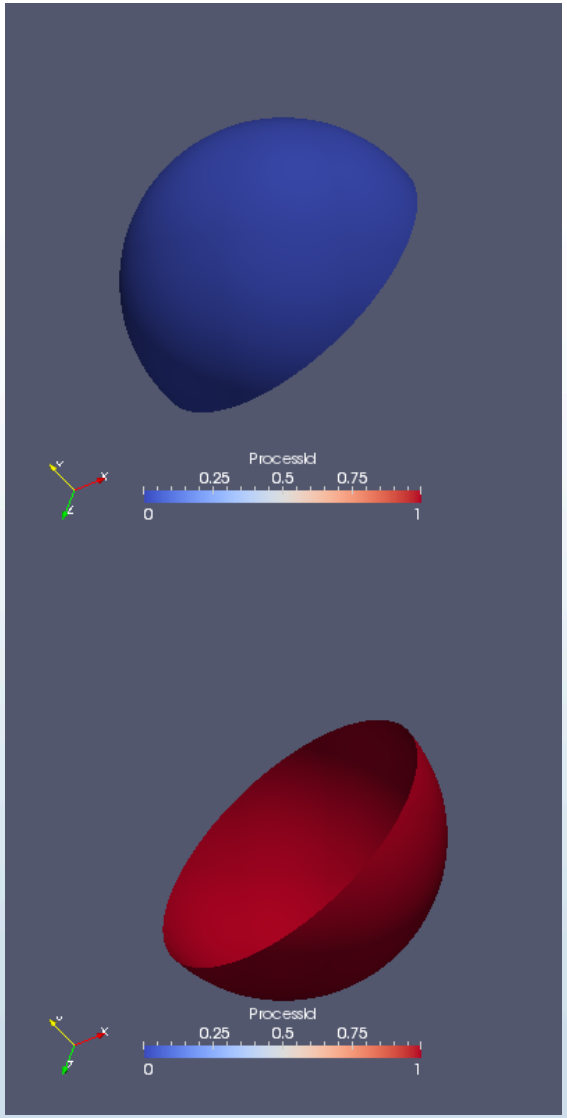
  Client/Server Parameters -> Presets

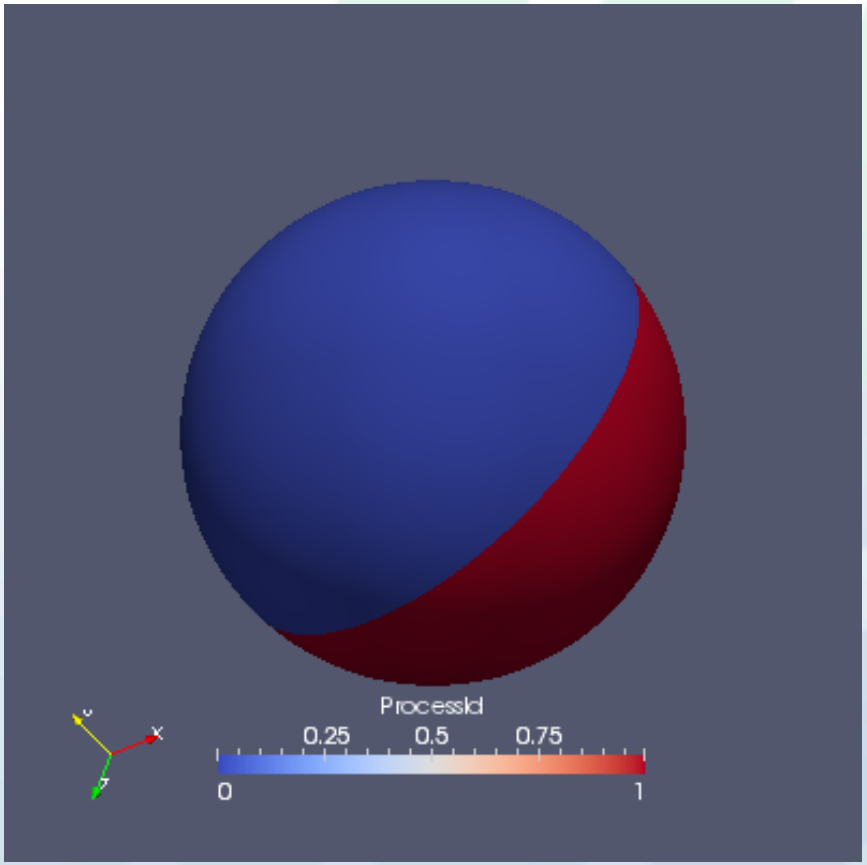
Kitware

OpenGL on a Cray? (are you nuts!)

- Typically use OSMesa compiled statically
  - Configure ParaView to use it as a pure offscreen rendering solution
- CPU render cost vs ship to GPU render cost
  - Transfer time significant whenever GPU is not local and you have big data
  - Current generation of supercomputers have GPUs on each node
  - The tradeoff of when to use OSMesa may shift
- See ParaView Guide Parallel Rendering chapter
  - for instructions and recommendations on either case

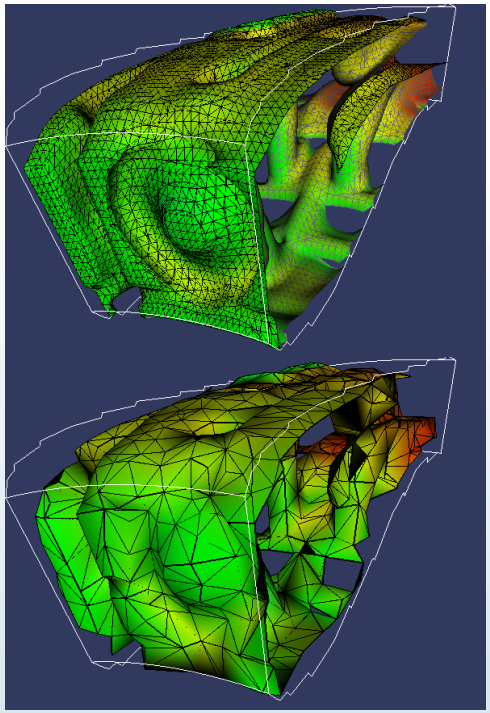
Depth Compositing





Kitware

Level of Detail – to maintain interactivity



Type 1: Spatially based

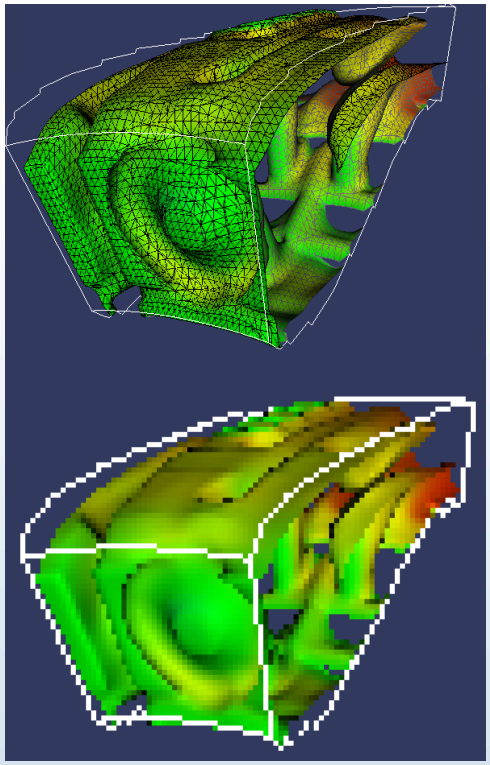
- Edit->Settings->Render View->General

  LOD threshold

  Down-samples geometry while interacting

Kitware

Level of Detail – to maintain interactivity



Type 2: Image Based

- Edit->Settings->Render View->Server Interactive Subsample Rate

  Down-samples pixels while interacting

- Image compression

  Compress pixel stream on the fly

Try preset for your situation first

Kitware

Where to go to for more information
www.paraview.org portal to all things ParaView

- Wiki Page
  - http://www.paraview.org/Wiki/ParaView
- Mailing List
  - Sign up->http://public.kitware.com/mailman/listinfo/paraview
  - Search ->http://markmail.org/search/?q=list:paraview
- User Voice - feature request voting
  - "Tell us what you think" link
  - http://paraview.uservoice.com/forums/11350-general
- Source Code Documentation
  - http://www.paraview.org/ParaView3/Doc/Nightly/html/classes.html
  - http://www.vtk.org/doc/nightly/html/
- Support
  - http://www.kitware.com/products/support.html

Kitware

Big Data Analysis with ParaView

Going beyond the built in server
Session 2: Hands on Practice

Hands On Practice

Get comfortable using ParaView at ORNL/ANL

Using both modes batch and interactive

- General Use
  1. Create viz pipeline with GUI on builtin server
- Batch
  1. Recreate viz pipeline in a python script
  2. Run as batch job on HPC server
- Interactive
  1. Connect GUI to local server
  2. Connect to HPC server interactively

Exercise: General Use #1

Create viz pipeline with GUI on builtin server

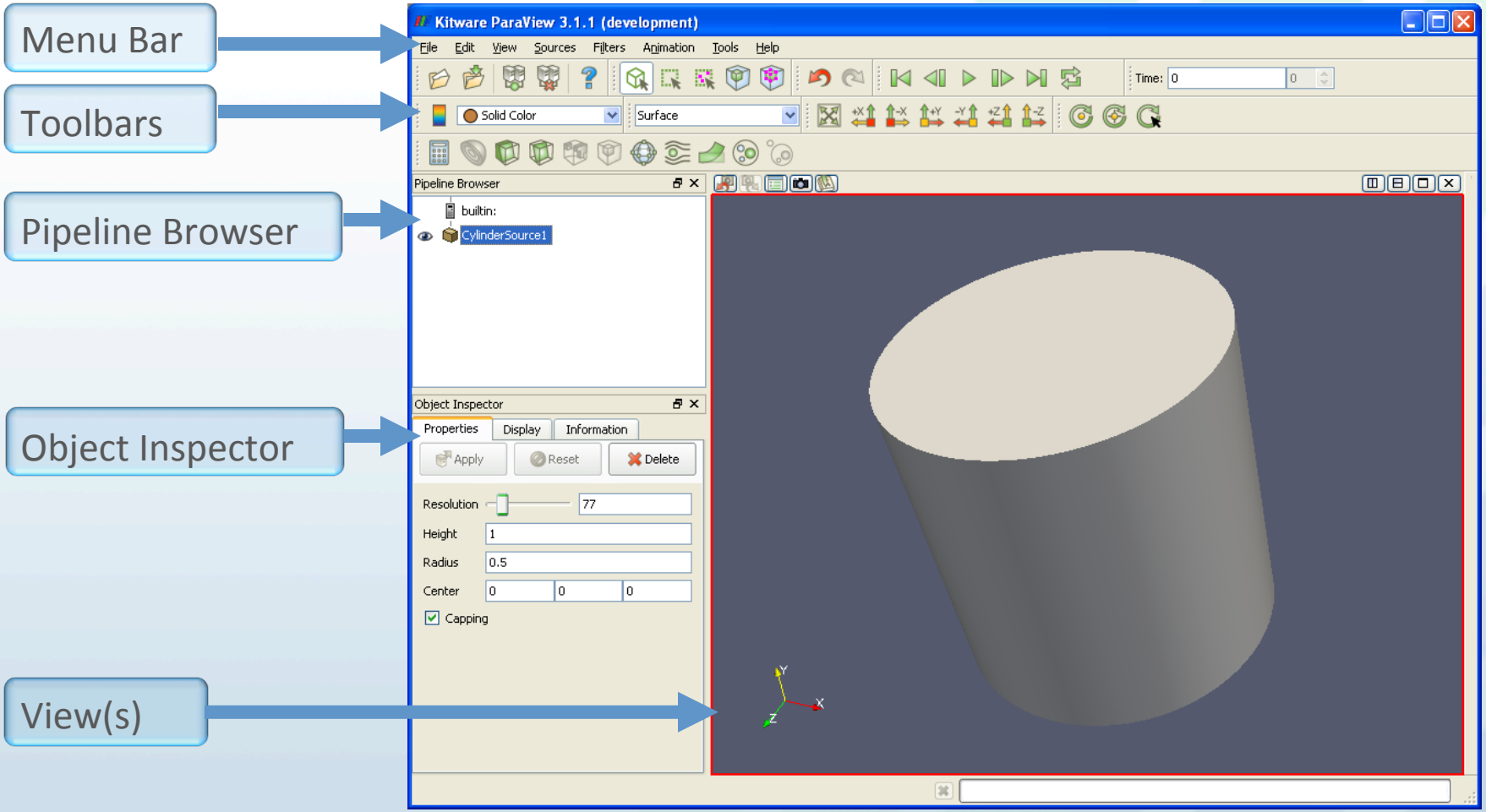
You will learn how to:

- Start ParaView
- Open disk_out_ref exodusII file
- What have we got?
- Slice along Z and warp slices to show vector field
- Insert Streamlines to show vector field in another way
- Save screen shot

See also: http://vimeo.com/41009606

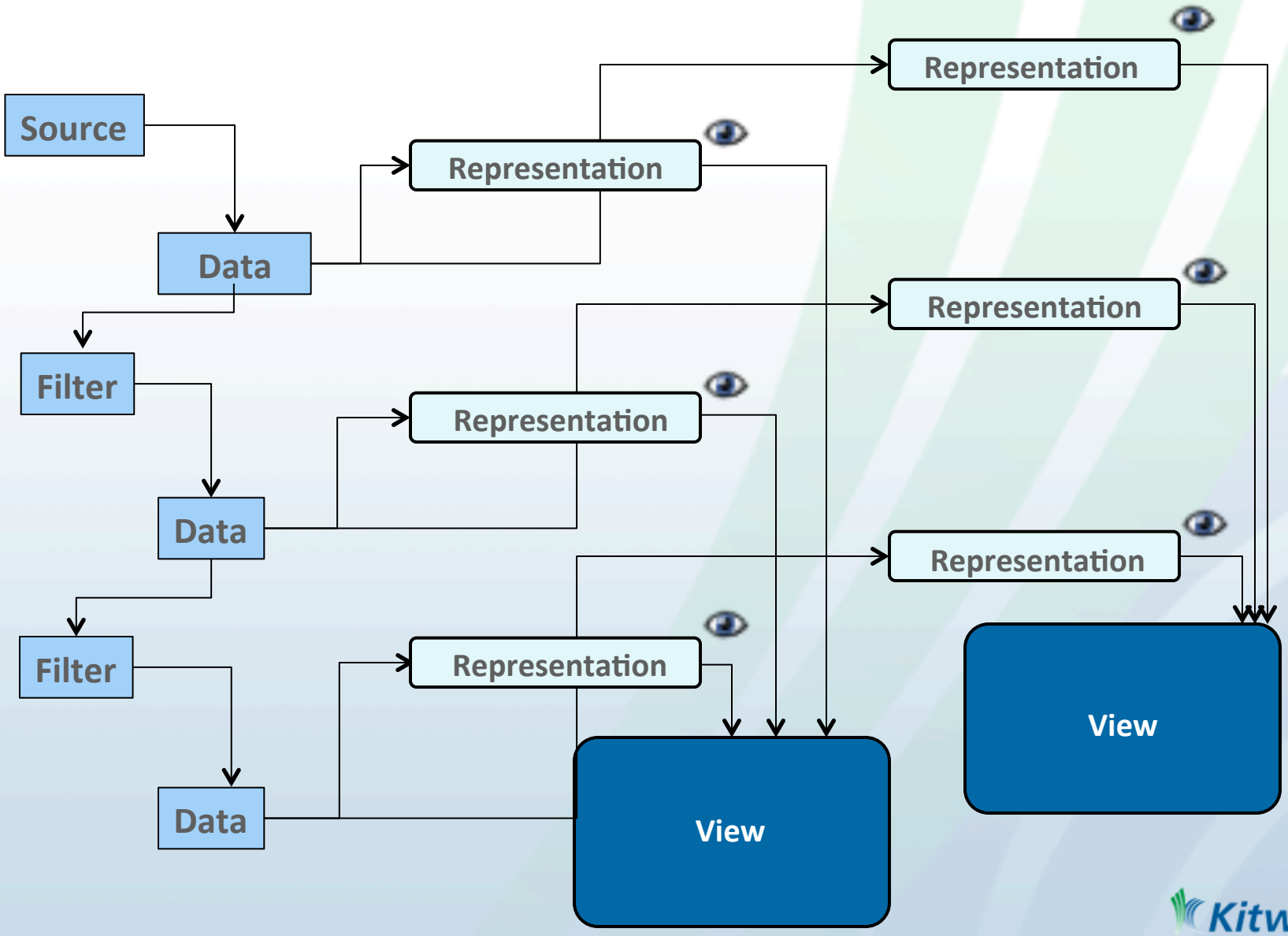
Kitware

User interface



Kitware

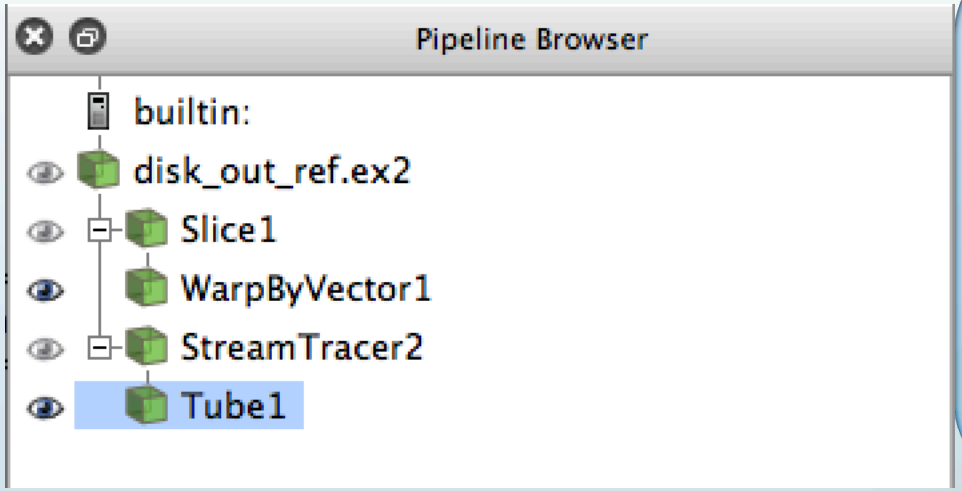
Multi-View visualization pipeline

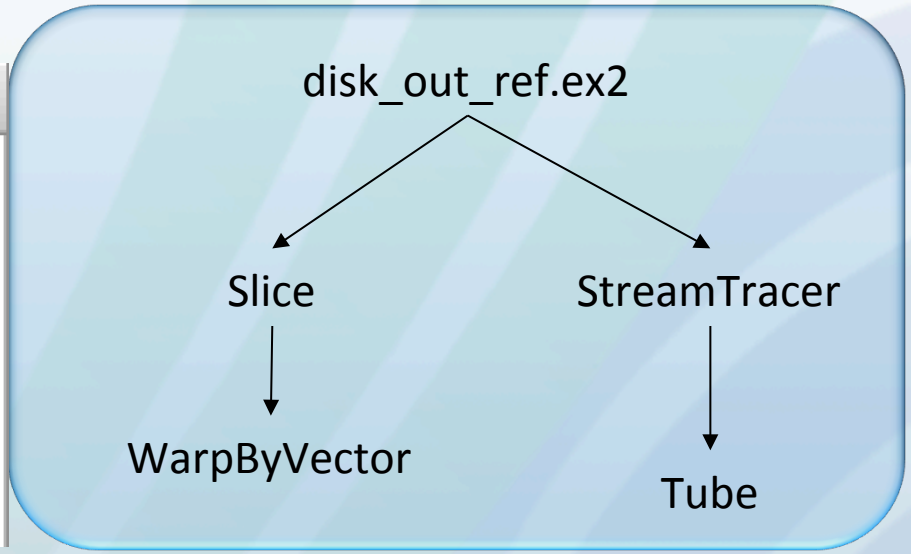


Kitware

Pipeline Browser : condensed pipeline graph

- Use pipeline browser to navigate the graph
- Select a reader/filter to make it active, then object inspector, information tab and display tab pertain to it



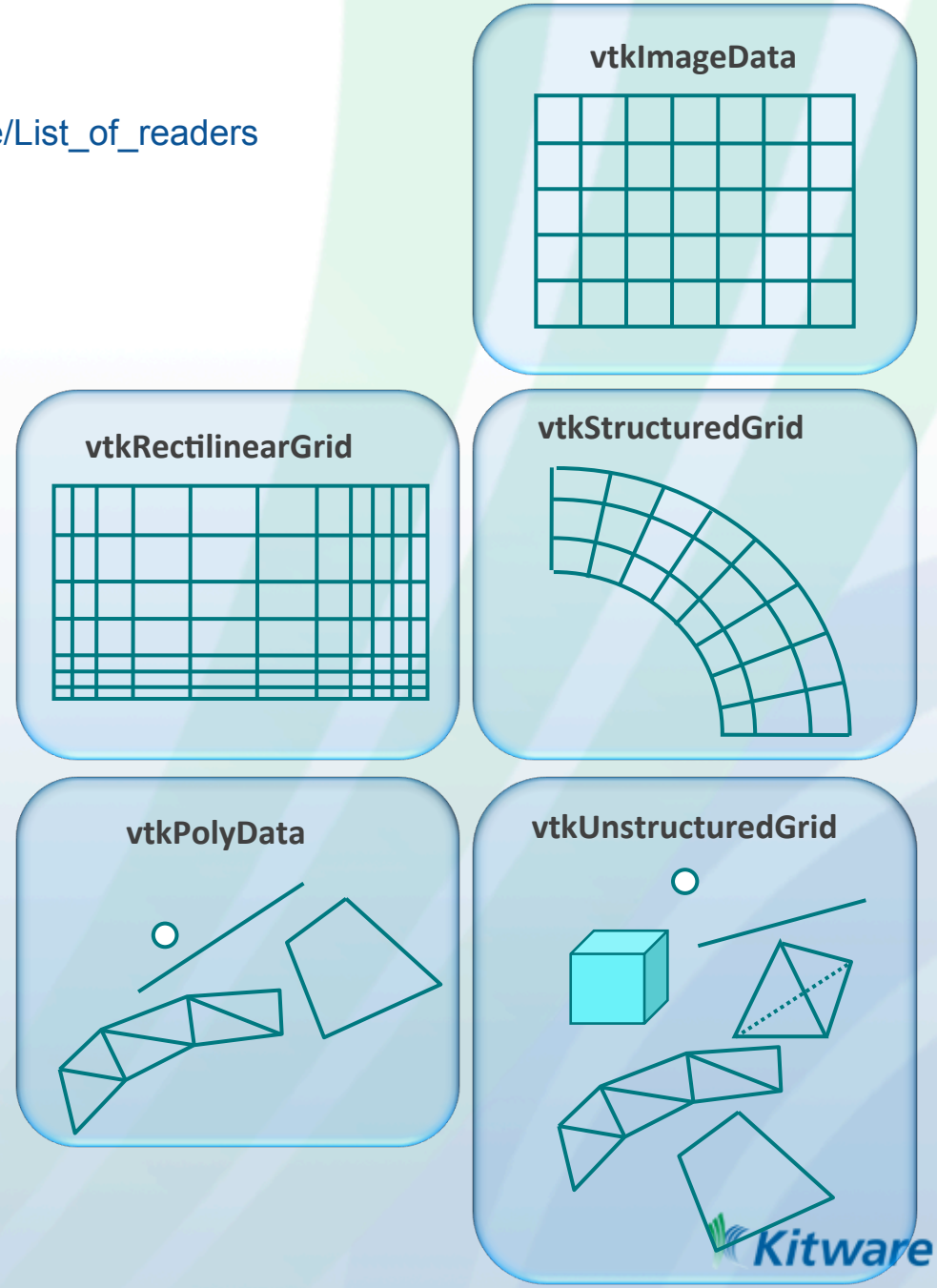


Kitware

File->Open

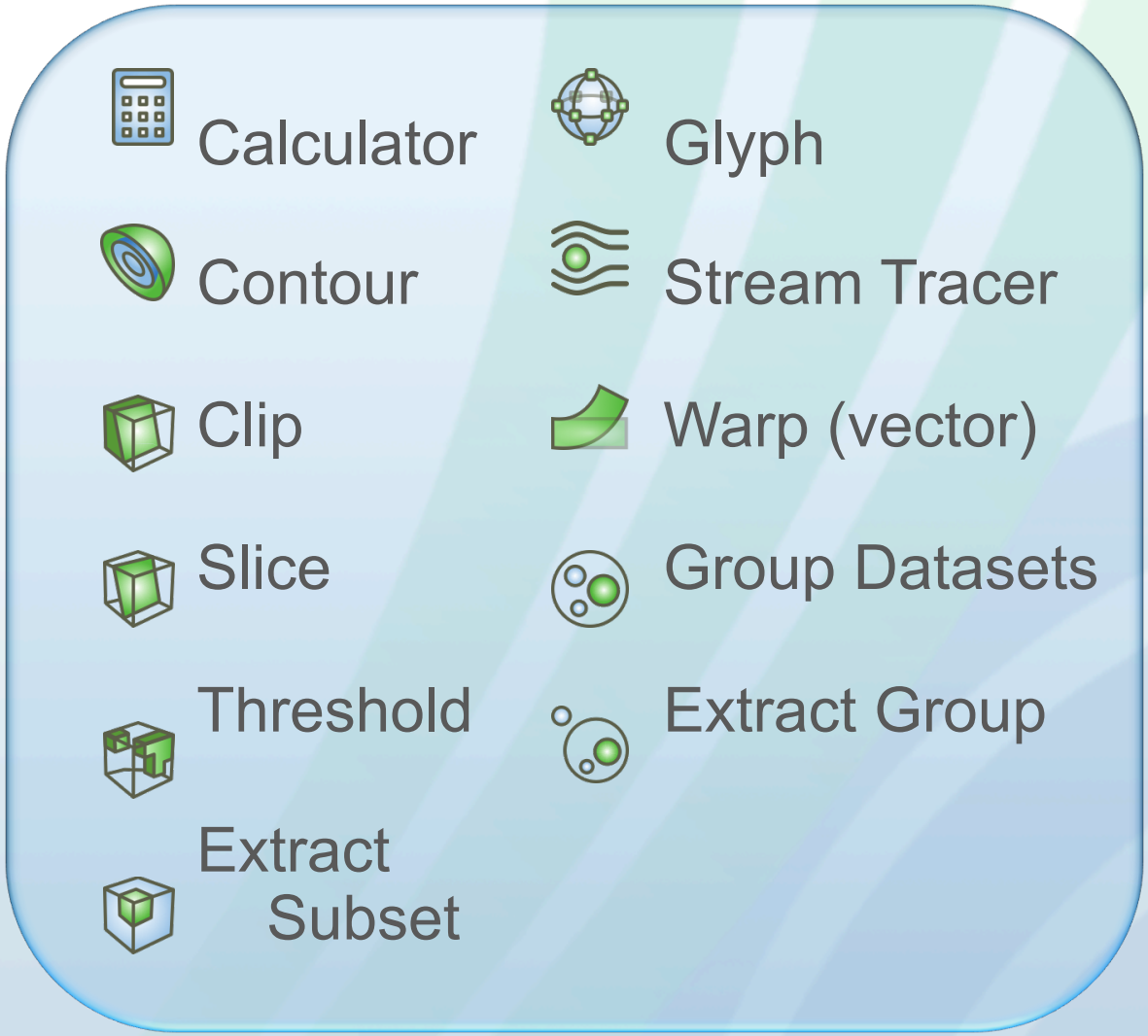
http://paraview.org/Wiki/ParaView/Users_Guide/List_of_readers

- Kitware formats: (.vtk, .pvd, .vt?, pvt*)
- Exodus
- Xdmf annotated hdf5 (.xmf, .xdmf)
- netCDF CF (.ncdf, .nc)
- SpyPlot CTH
- EnSight (.case, .sos)
- Protein Data Bank (.pdb)
- Digital Elevation Map (.dem)
- Tecplot ASCII (.tec, .tp)
- Fluent Case Files (.cas)
- OpenFOAM Files (.foam
- LANL VPIC (.vpc)
- SLAC netCDF mesh, mode and particle data
- Stanford Polygonal (.ply)
- PNG Image Files
- NRRD image files (.nrrd)
- Comma Separated Values (.csv)
- All visit formats: enzo, miranda, pixie, samrai, silo, +visit extensions
- NCAR vapor data format
- And many more



Manipulate the data

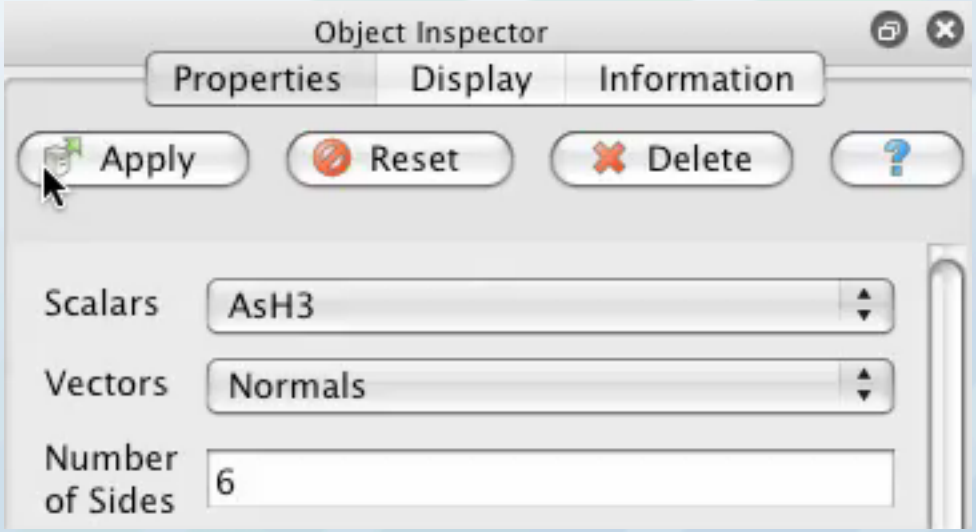
- Filters Menu
  - Recent
  - Common
  - Data Analysis
  - Statistical
  - Temporal
  - Alphabetical
- Quick Launch
  - PC/Linux
    CTRL-Space
  - Mac
    ALT-Space
- Apply Undo/Redo



Kitware

Apply

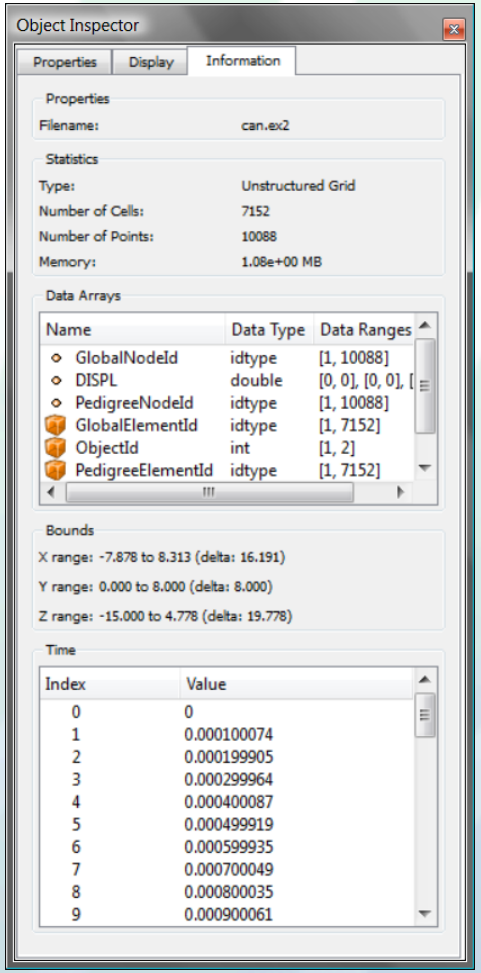
- ParaView is meant to process large data
- It waits for you to commit to any action that might take a long time on a really large data set
- Net result is you won't see any data change until you hit the glowing Apply button on the Properties tab of the Object inspector



Kitware

Inspect the data

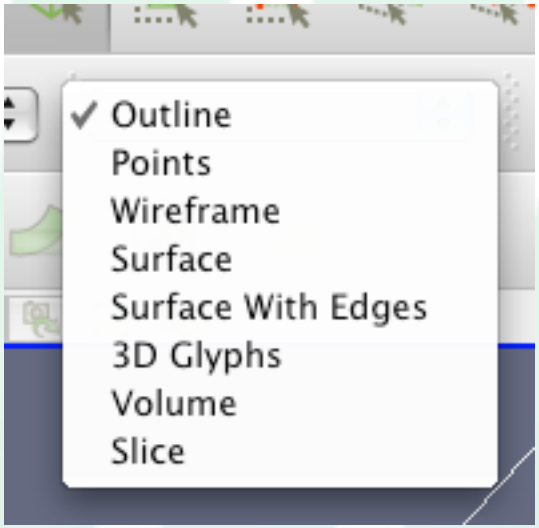
- Information about the Active Filter's output
- DataObject structure
- Size (Bytes, #points, #cells)
- Geometric bounds
- Structured bounds
- Arrays:
  - Name
  - Association =point, =cell)
  - Data Type
  - Data Ranges (and scalar/ vector)
- Temporal Domain

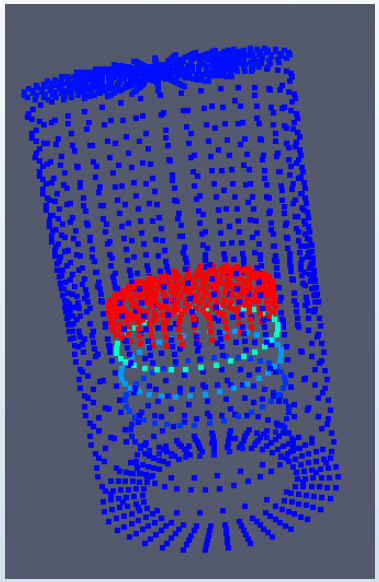


Kitware

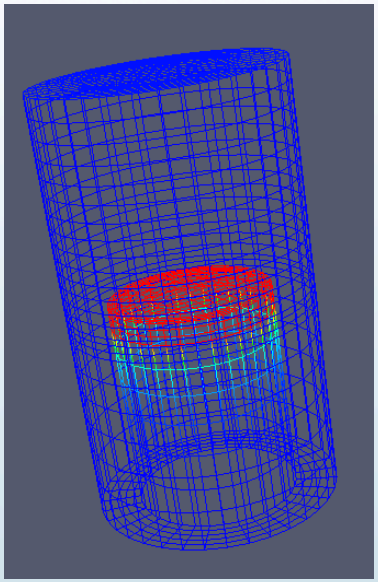
Display the data

- Representations (aka Displays): visual characteristics of one particular data set in one particular view

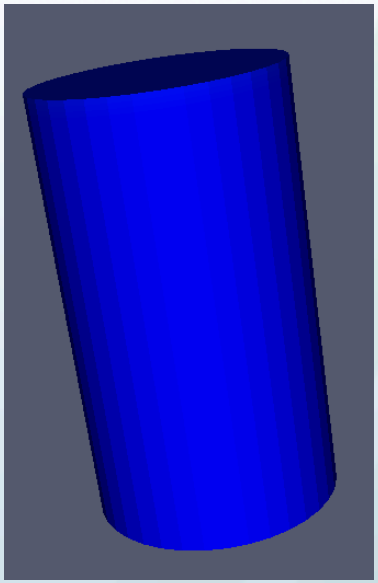




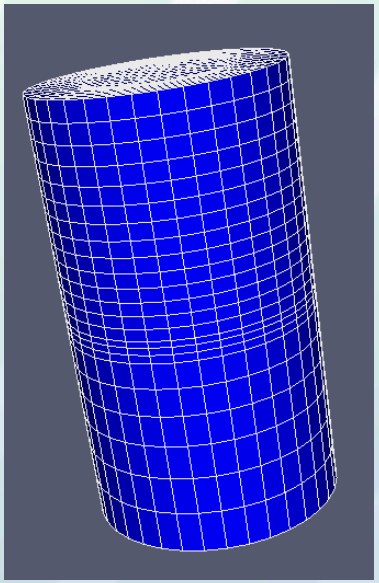
Points



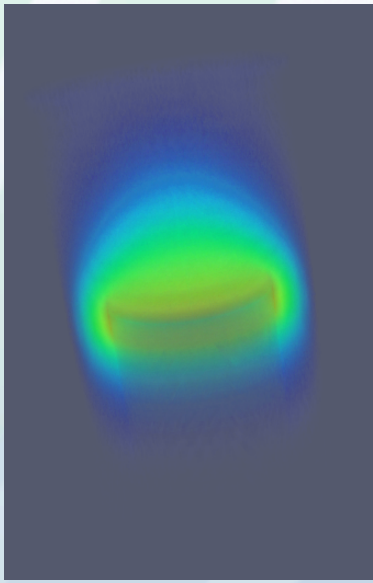
Wireframe



Surface



Surface with Edges

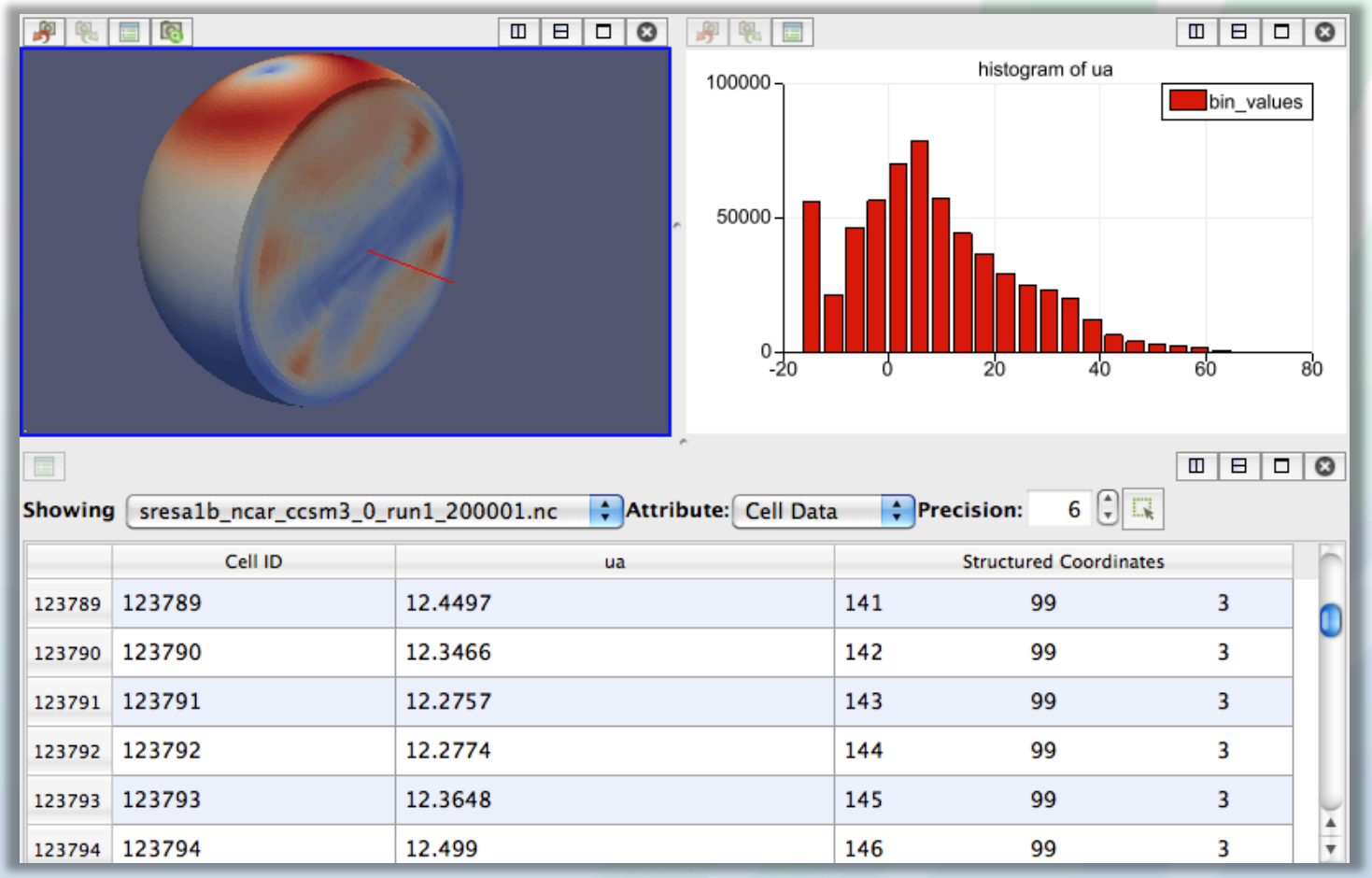


Volume

Kitware

Display the data

- Views – Windows onto one or more data sets



Kitware

Now go ahead and do it

1. Start ParaView
2. File -> Open disk_out_ref.ex2
3. Information Tab : What have we got?
4. Slice it along Z
5. Warp the slices
6. Insert Streamlines
7. File -> Save Screenshot

Exercise: Batch #1
Recreate viz pipeline as python script

You will learn how to:

- Create a python script that sets up a viz pipeline
- Play it back on local machine

See also: http://paraview.org/Wiki/ParaView/Python_Scripting

Kitware

Two Options : State or Trace

State File

record of current pipeline

- File ->Save State -> filename.pvsm
- Load within python script

myfile.py:

```
servermanager.LoadState(
  filename.pvsm)
SetActiveView(GetRenderView())
Render()
```

- pvbatch myfile.py

Trace File

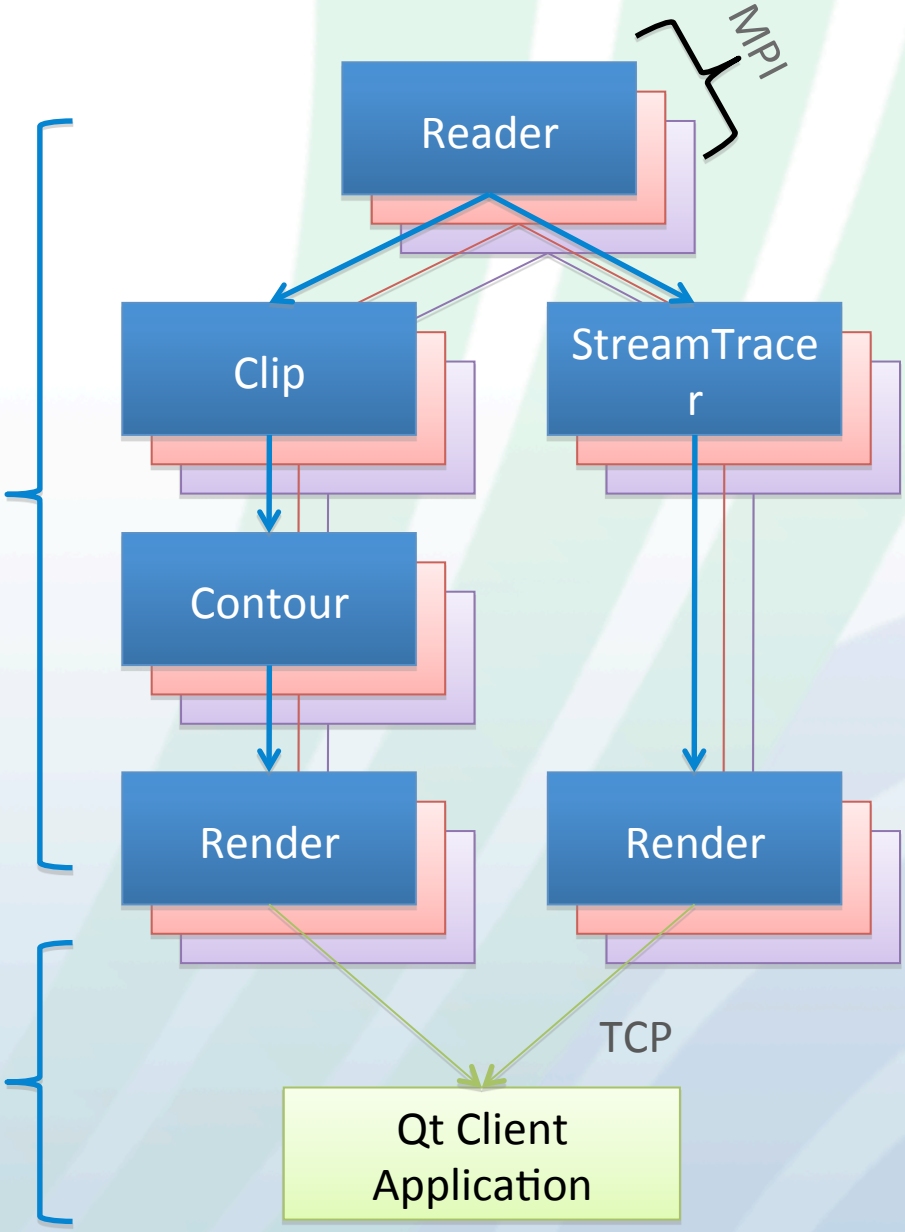
GUI actions translated to python

- Tools->Start Trace
- Do something
- Tools -> Stop Trace
- File -> save myTrace.py
- pvbatch recordedTrace.py

Kitware

ParaView Architecture

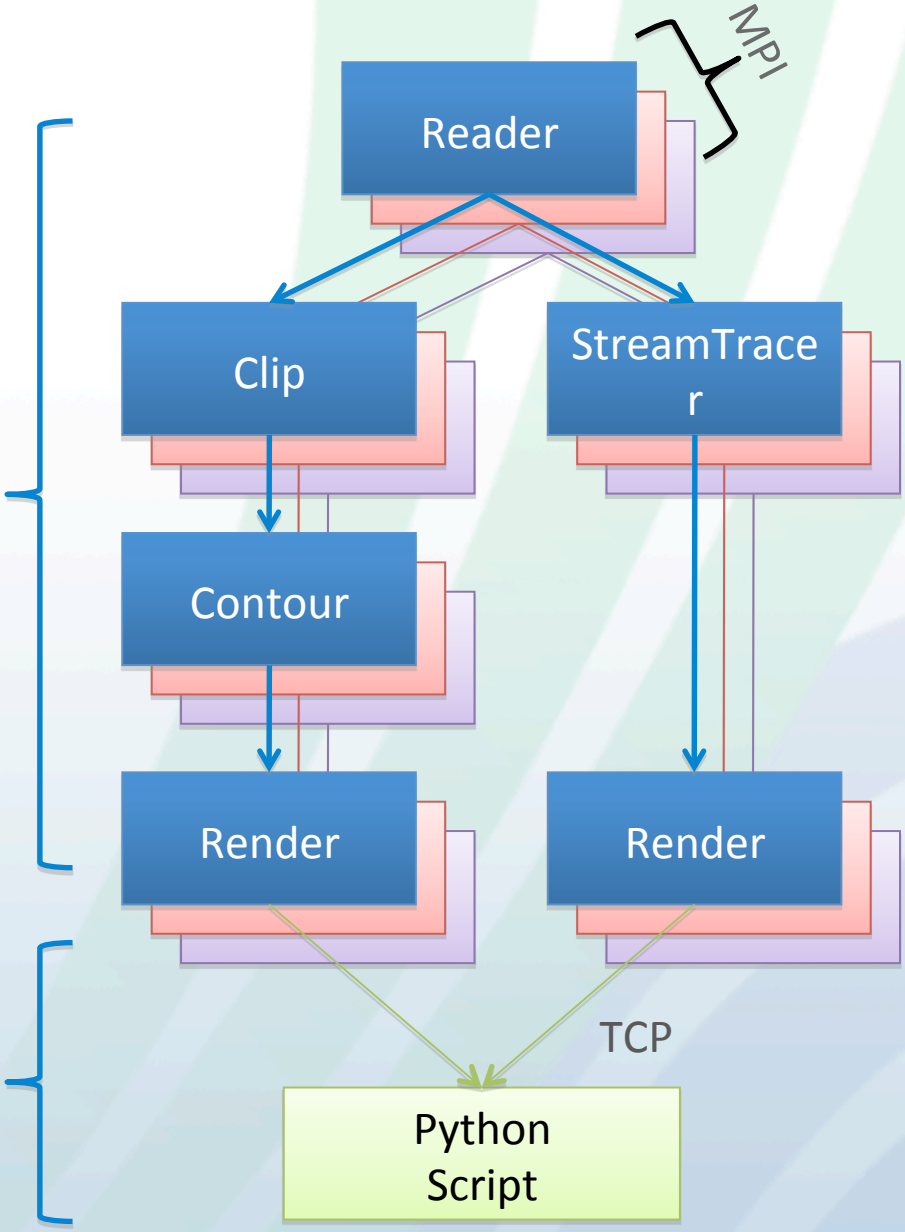
- VTK Pipeline,in parallel,on remote server(s),
- controlled by and feeds into client application.



Kitware

ParaView Scripting

- VTK Pipeline,in parallel,on remote server(s),
- controlled by and feeds into client application.

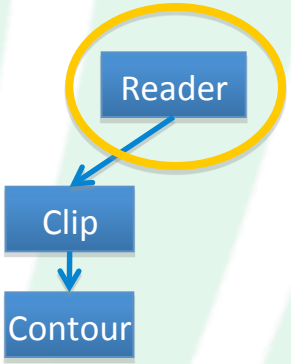


Kitware

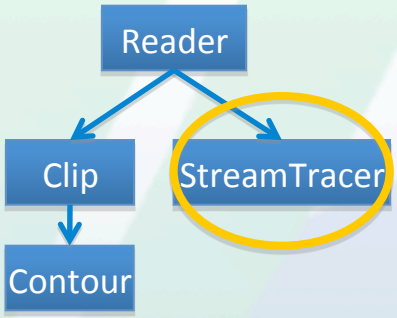
Building a Pipeline

- Branch by changing the active source, like choosing in GUI's PipelineBrowser

```
>>> SetActiveSource(aReader)
```

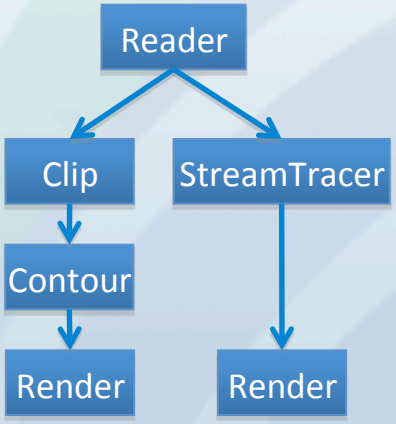



```
>>> aST = StreamTracer()
>>> aST.Vectors = "Momentum"
>>> aST.SeedType.Center = [3,2,28]
>>> aST.SeedType.Radius = 2
>>> aST.SeedType.NumberOfPoints = 100
```



- Unlike in GUI, displays are not automatically made or refreshed

```
>>> Show(aContour)
>>> Show(aST)
>>> Render()
```



Kitware

Navigating the Pipeline

- Don't have to use active source to branch, can assign at creation
- Can change after the fact
- Can inspect ActiveSource
- Can get a hold of all or any particular SourceProxy

```
>>> aST = StreamTracer(Input=aReader)
```

```
>>> aST = StreamTracer()
>>> aST.Input = aReader
>>> aST.Input = aClip
```

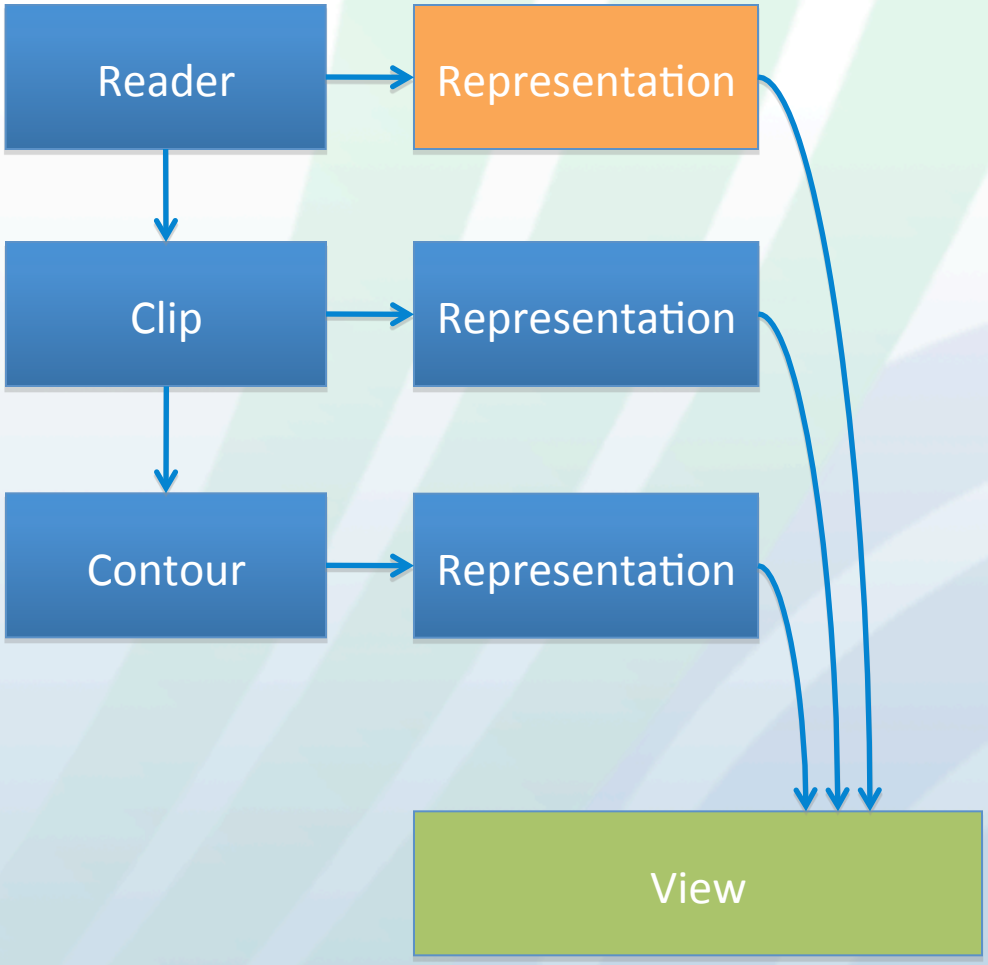
```
>>> aSource = GetActiveSource()
```

```
>>> GetSources()
>>> someSource = FindSource("Contour1")
```

Kitware

Multi-View visualization pipeline

- Can show output of any SourceProxy
- Parallel Flexible Display Pipeline complexity encapsulated by "Representations" in "Views"
- Representation – visual qualities of an output ≈ Mapper + Actor + parallel transport. Show() returns a Representation
- View - Visual qualities of a window ≈ Renderer + Camera + Lights + RenderWindow. Render() returns a View
- To make it easier to build, commands default to working with the Active Representation and Active View



Kitware

Controlling Display

- Many methods take ActiveRepresentation and ActiveView as default arguments

```
>>> activeSourcesRep = GetDisplayProperties()
>>> clipFiltersRep = GetDisplayProperties(aClip)
>>> clipFiltersRepInMyView =
    GetDisplayProperties(aClip, myView)
```

- But can get hold of and then control any particular View and Representation

```
>>> GetRenderViews()
>>> view0 = GetRenderViews()[0]
>>> allReps = view0.Representations()
>>> rep0_0 = allReps[0]
```

- Screen Shots

```
>>> WriteImage(filename, view=ActiveView,
    Magnification=0.0)
```

Kitware

pvbatch

- Run a recorded paraview script under pvbatch
- Use mpi to spawn it as a parallel job

- [**mpiexec** -N <numprocessors> [other-args-for-mpi]] \
  pvbatch [args-for-pvbatch] \
  script-filename [args-for-script]

  mpiexec to run a parallel program
  pvbatch to run offline paraview script processor
  script-filename.py – your paraview python script

Kitware

Now go ahead and do it

1. Restart ParaView
2. Tools -> Start Trace
3. Recreate Vis pipeline
4. Tools -> Stop Trace
5. Save -> mytrace.py
6. Edit mytrace.py and add Save Image Command at End

   WriteImage(filename, view=ActiveView, Magnification=0.0)
7. Play it back under pvbatch

   pvbatch mytrace.py

Kitware

Exercise: Batch #2
Run batch job on big iron

You will learn how to:

- Run paraview on HPC server

Kitware

Visualization on Big Iron

Access resource through the queue - syntax varies per scheduler (MOAB, Oracle Grid Engine, Microsoft HPC server…).

- Interactive Session

```
qsub -I \
  -q debug -A yourProject \
  -l size=16 -l walltime=00:60:00
```

Wait for session to be given to you

```
source mypaths.sh
aprun -n 16 pvbatch parallelSphere.py
```

look at result

```
aprun -n 16 pvbatch doSomethingElse.py
```

- Unattended Session

```
qsub -v PYTHONHOME=${dir}/pythonhome … \
  -q batch -A yourProject \
  -l size=1600 -l walltime=03:00:00 \
  aprun –n 1600 pvbatch parallelREALLYHUGESphere.py
```

Kitware

Integration with system scheduler

Encapsulate command to run pvbatch in pbs submission:

qsub –N jobname –l environment_spec –j eo –e logfilename.txt **mpiexec** …

Or

qsub shellscript.sh

where shellscript.sh =

#PBS –N jobname -l environment_spec …
module load paraview
mpiexec –N …. **pvbatch** … script-filename …

Kitware

Now go ahead and do it

1. scp data file and script to server

   ssh -R 99999 localhost:22 ruser@hostname

   cd /somewhereonlustre

   scp -P 99999 -r luser@locahost:~/mywork .
2. Edit demoscript.pbs, make it run mytrace.py
3. Edit mytrace.py, tell it to load disk_out_ref.ex2 from correct directory
4. qsub demoscript.pbs
5. scp -P 99999 result.png ~/mywork

Kitware

Exercise: Interactive #1

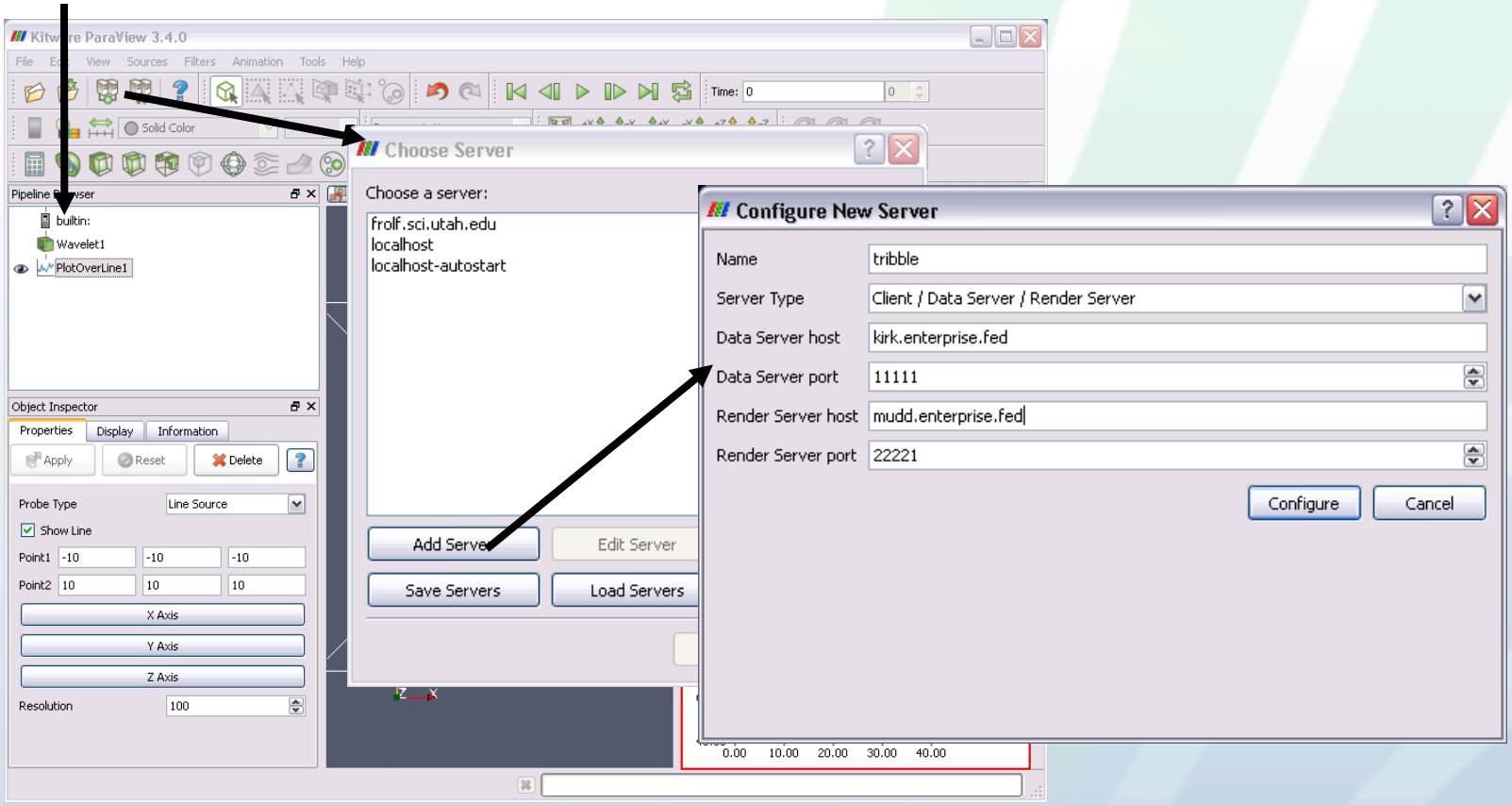
Connect GUI to local server and use it

You will learn how to:

- Start up paraview interactive server
- Connect paraview GUI client to it
- Control remote processing parameters

Connecting to a Server

- builtin – the server within the client process



- see: http://www.paraview.org/Wiki/Setting_up_a_ParaView_Server
- For information on configuring a server cluster

Kitware

Connecting to a Server

- File->Connect
- First time, Add Server
  - Name this connection to reuse it later
  - Client/Server most common
  - Host, Port = IP address of a machine to run pvserver on
  - Manual:
    - if it is already running or you prefer to start it by hand
- or
  - Command:
    - a shell command to start pvserver on that machine

```
ssh -R 22222:local_machine:11111 xterm -e script.sh &
```

Where script.sh contains:

```
qsub reserve_then_tunnel2_backto_login_and_run_server.sh
```

Thereafter just choose the connection you set up above

Kitware

Now go ahead and do it

- Connect GUI to local server and use it

1. Start pvserver

   pvserver & (or mpirun pvserver & if you've got it locally)

2. Start paraview GUI

   paraview

3. Connect "localhost"

   File->Connect

   Add Server

   Name = "localhost", Configure

   Type = Manual, Save

   Select "localhost", Connect

4. Create visualization

Kitware

Now go ahead and do it part2

- Connect GUI to Auto-spawned local server and use it

1. Start pvserver
2. Start paraview GUI
3. Connect “localhostAUTO”

   File->Connect

   Add Server

   Name = “localhostAUTO”, Configure

   Type = Command, Save

   Command = /path/to/pvserver/pvserver &

   Select “localhost”, Connect
4. Create visualization

Kitware

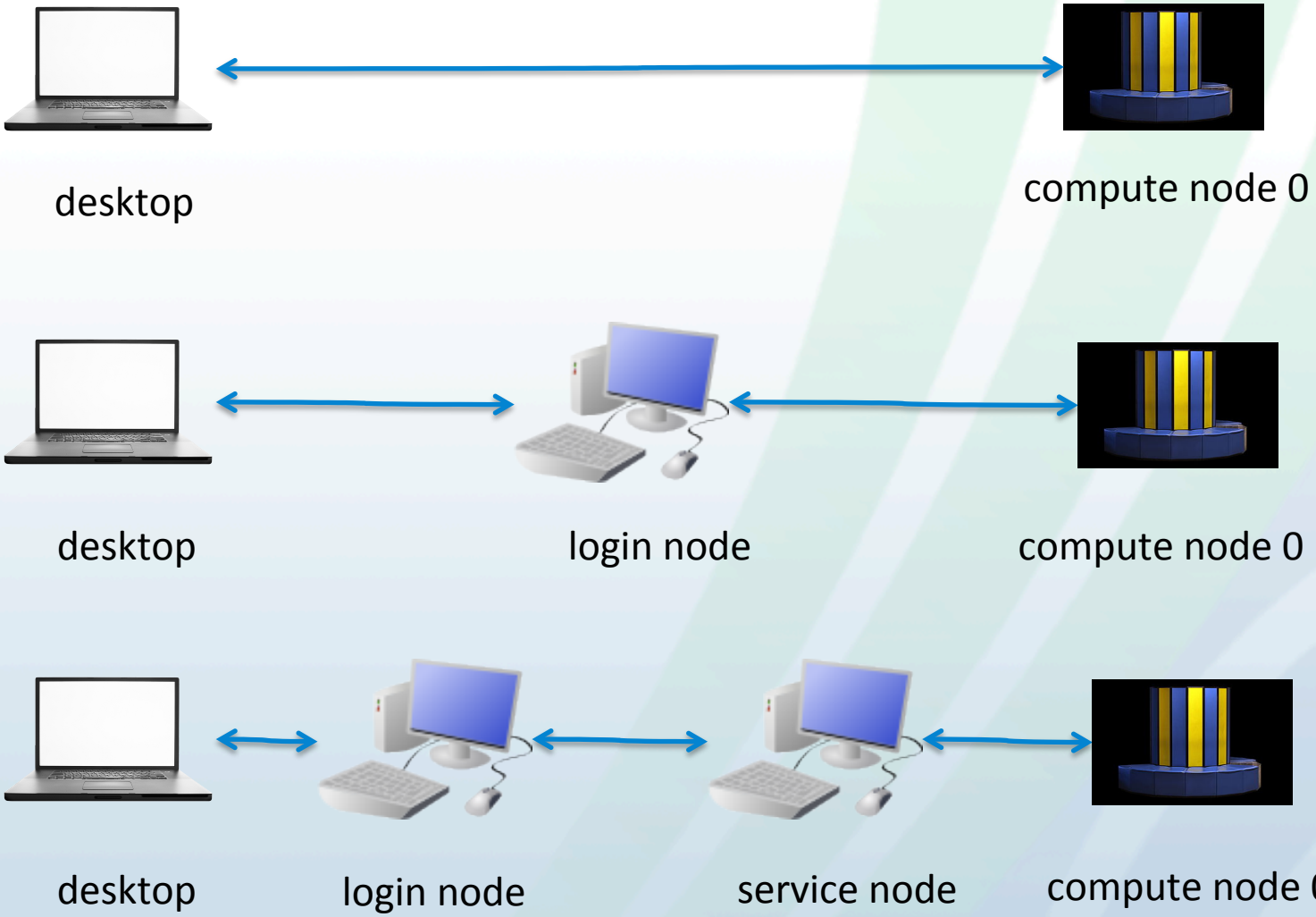
Exercise: Interactive #2

Connect GUI to remote server and use it

You will learn how to:

- Spawn a remote pvserver session
- Connect the local GUI to it through reverse connection tunnels

Path from laptop to compute node



Kitware

PVSC

- Your connections settings are stored in a servers.pvsc config file
- a text file: edit it, save it as a backup, replace it
- OPTION entries (username for example) changeable via GUI

- Since 3.14 you can import servers entries from the GUI
  - **Connect->Fetch Servers**
  - Enter URL of a public web/wiki page where your sys admin has posted a .pvsc
  - ParaView will scan that and add connections it finds

- Only sysadmins have to go to trouble of establishing the path

- Trying to post connections to all public HPC centers we know

Now go ahead and do it

- Connect GUI to remote server and use it

1. Start ParaView GUI
2. File->Connect, Fetch Servers
3. http://paraview.org/Wiki/images/9/99/Argonne.xml
4. Select “eureka”
5. Fill in your username and project
6. Save
7. Connect
8. Create visualization

Thank you!

- www.kitware.com
  - portal to all communities kitware referees

  (p.s. we are hiring) http://jobs.kitware.com/opportunities.html

- www.paraview.org
  - portal to all things ParaView

- Please contact us, we are here to help.

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