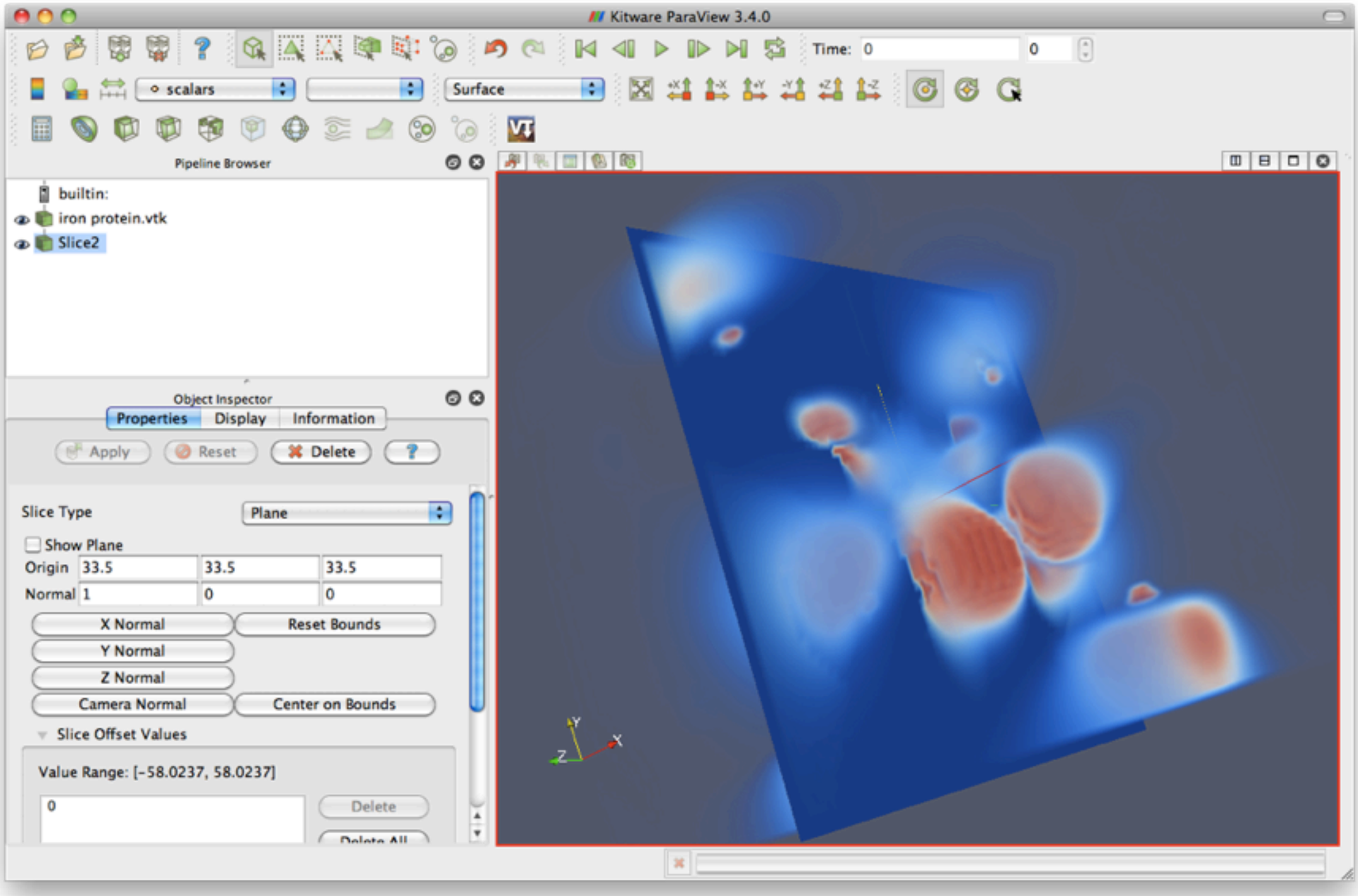
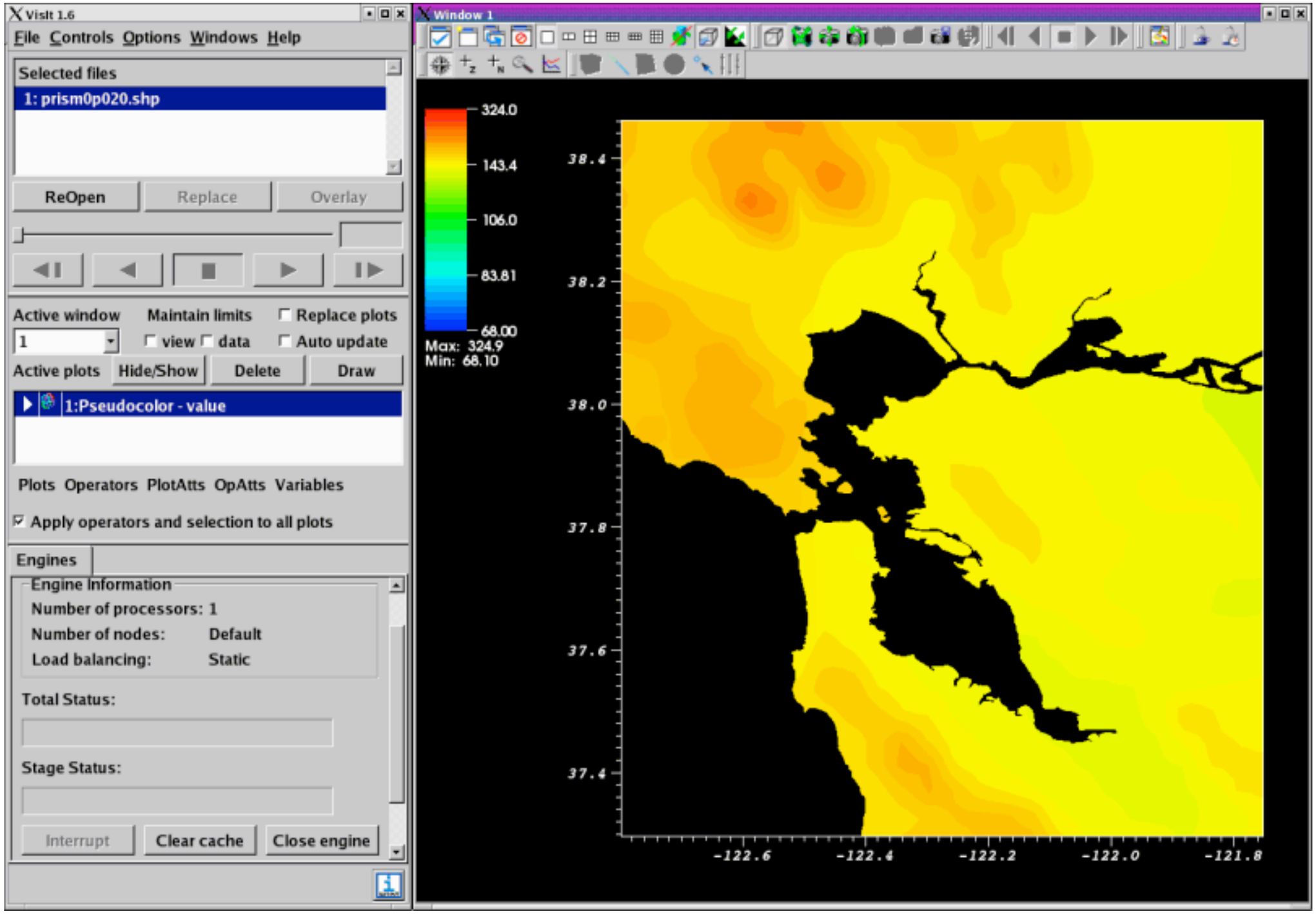
Developing a plug-in

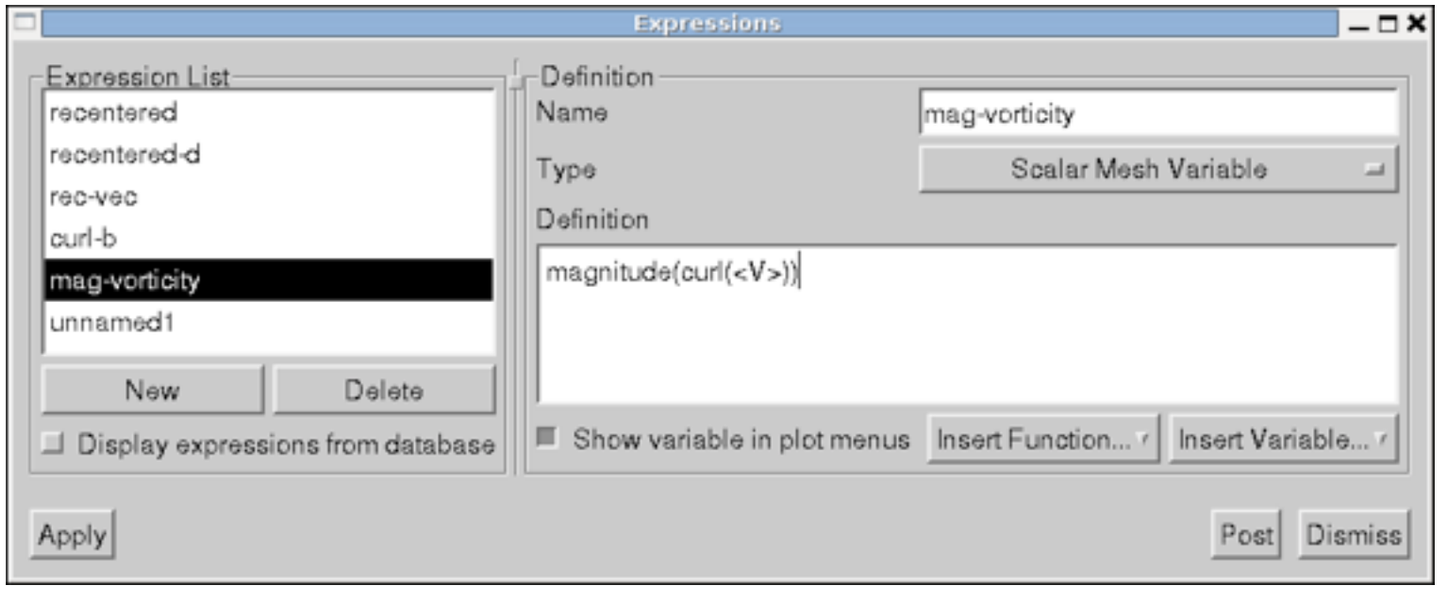
ParaView

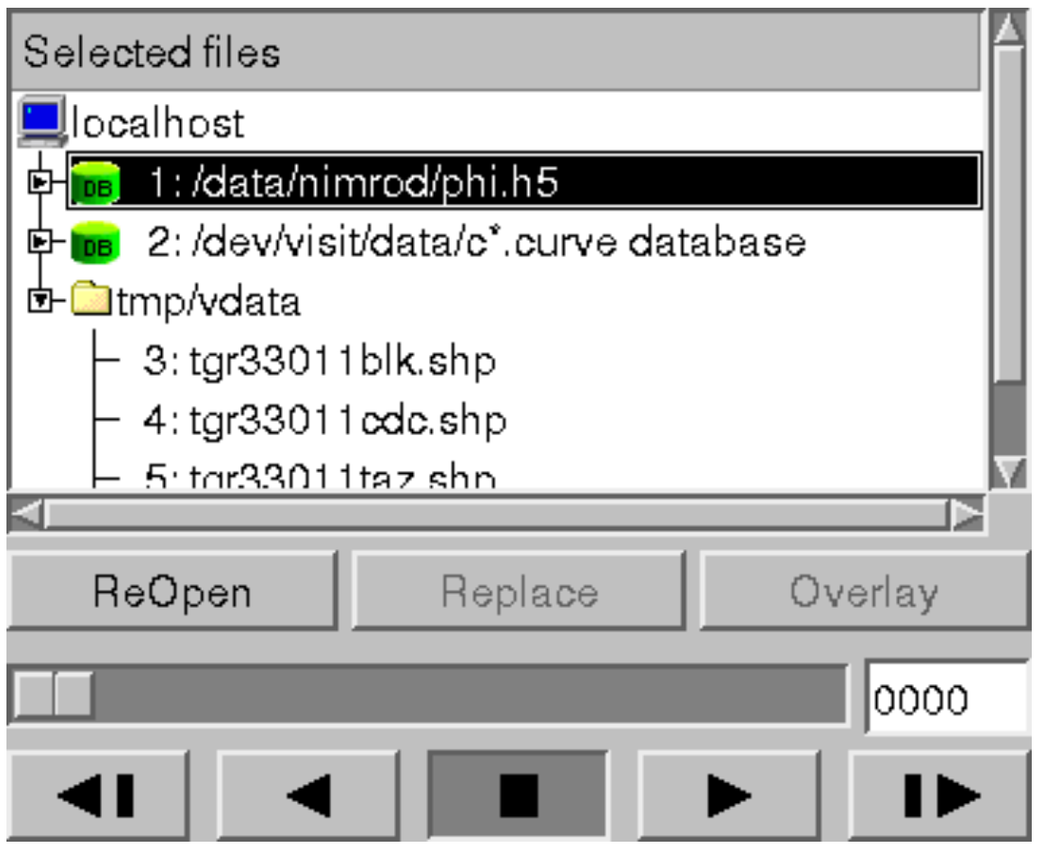

Kitware ParaView 3.4.0
Time: 0
0
scalars
Surface
Pipeline Browser
builtin:
iron protein.vtk
Slice2
Object Inspector
Properties
Display
Information
Apply
Reset
Delete
Slice Type
Plane
Show Plane
Origin 33.5 33.5 33.5
Normal 1 0 0
X Normal
Reset Bounds
Y Normal
Z Normal
Camera Normal
Center on Bounds
Slice Offset Values
Value Range: [-58.0237, 58.0237]
0
Delete
Y
X
Z

VisIt


VisIt 1.6
File Controls Options Windows Help
Selected files
1: prism0p020.shp
ReOpen
Replace
Overlay
Active window
Maintain limits
Replace plots
1
view
data
Auto update
Active plots
Hide/Show
Delete
Draw
1:Pseudocolor - value
Plots Operators PlotAtts OpAtts Variables
Apply operators and selection to all plots
Engines
Engine Information
Number of processors: 1
Number of nodes: Default
Load balancing: Static
Total Status:
Stage Status:
Interrupt
Clear cache
Close engine
Window 1
324.0
143.4
106.0
83.81
68.00
Max: 324.9
Min: 68.10
38.4
38.2
38.0
37.8
37.6
37.4
-122.6
-122.4
-122.2
-122.0
-121.8

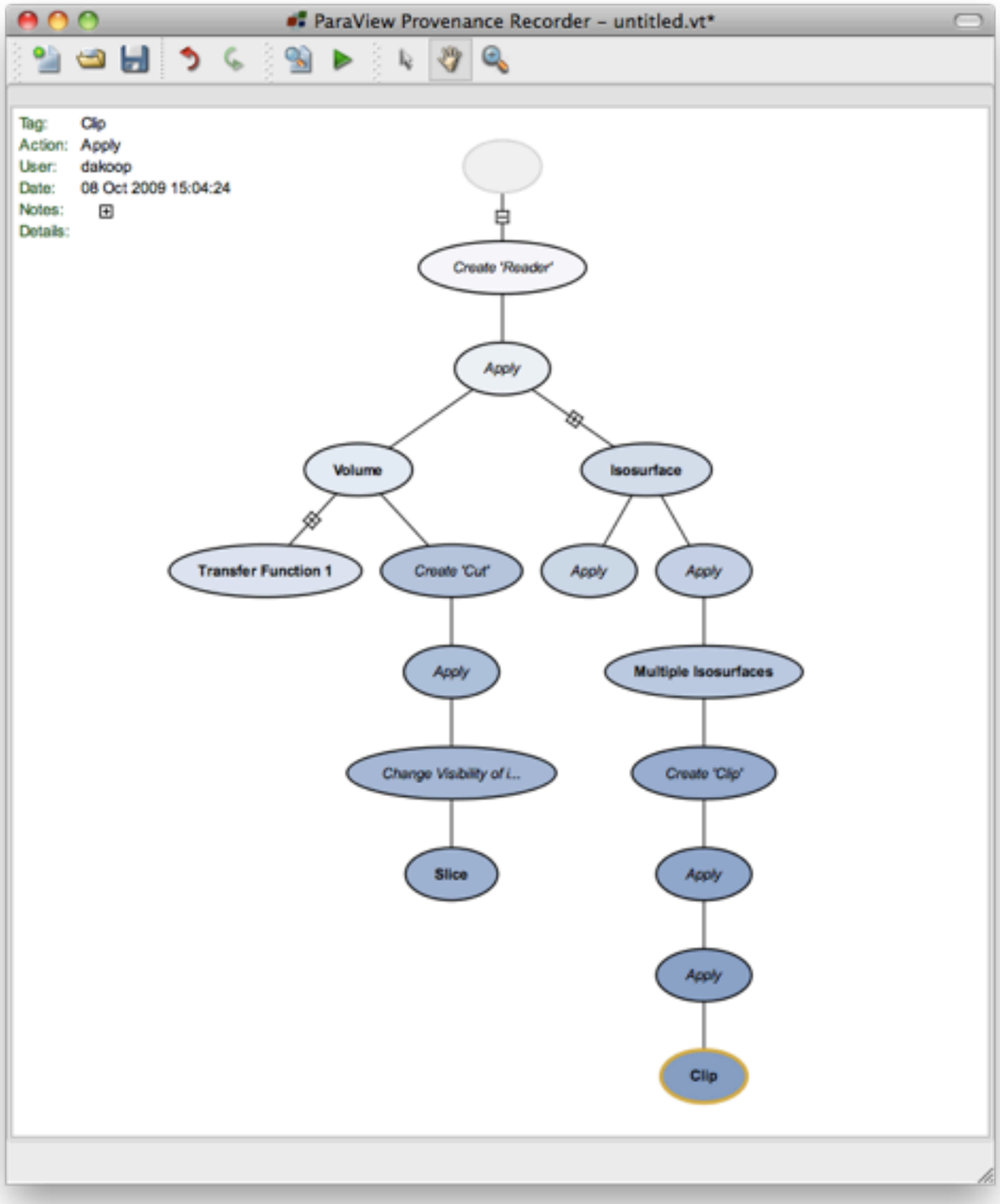
State Information



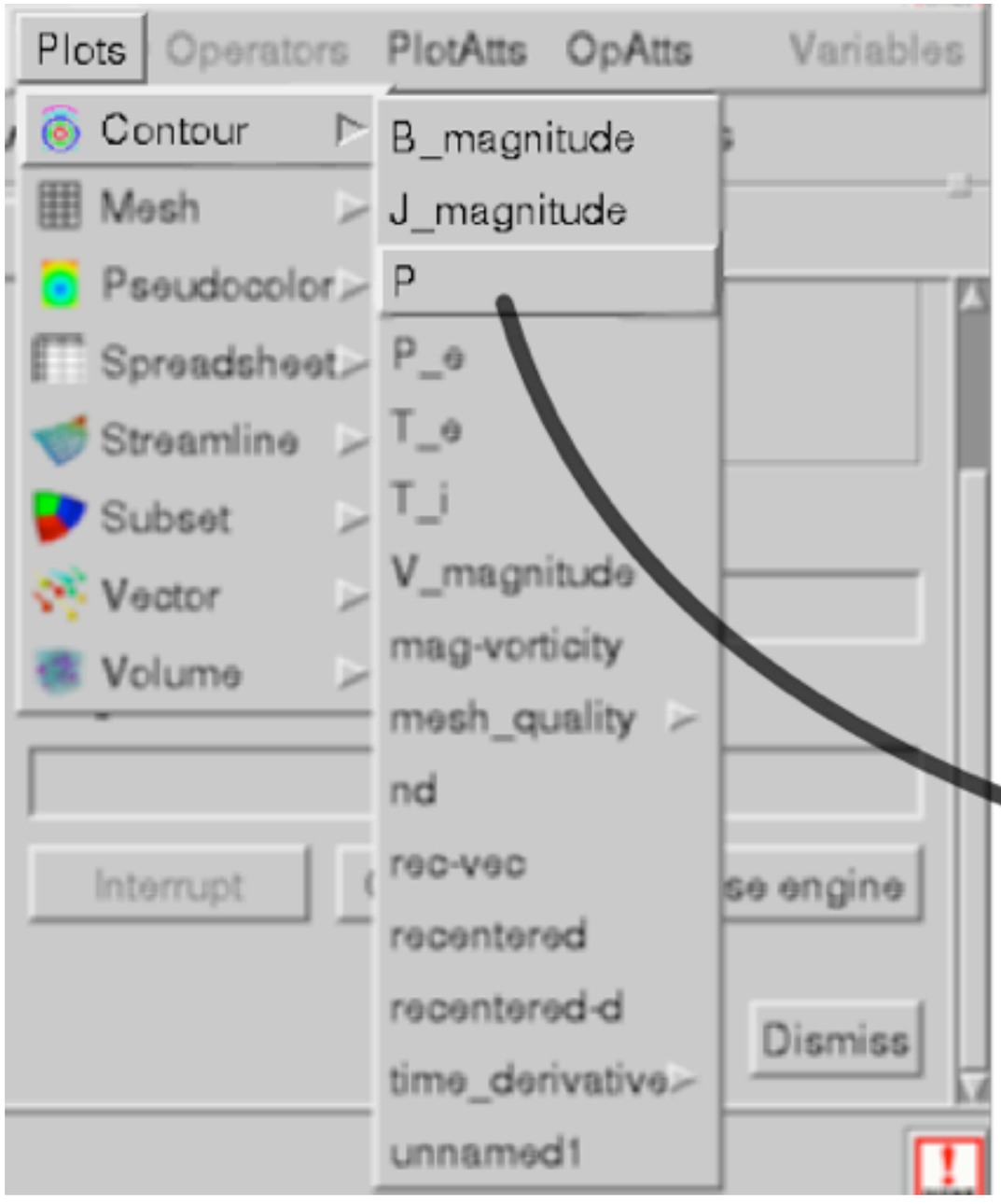


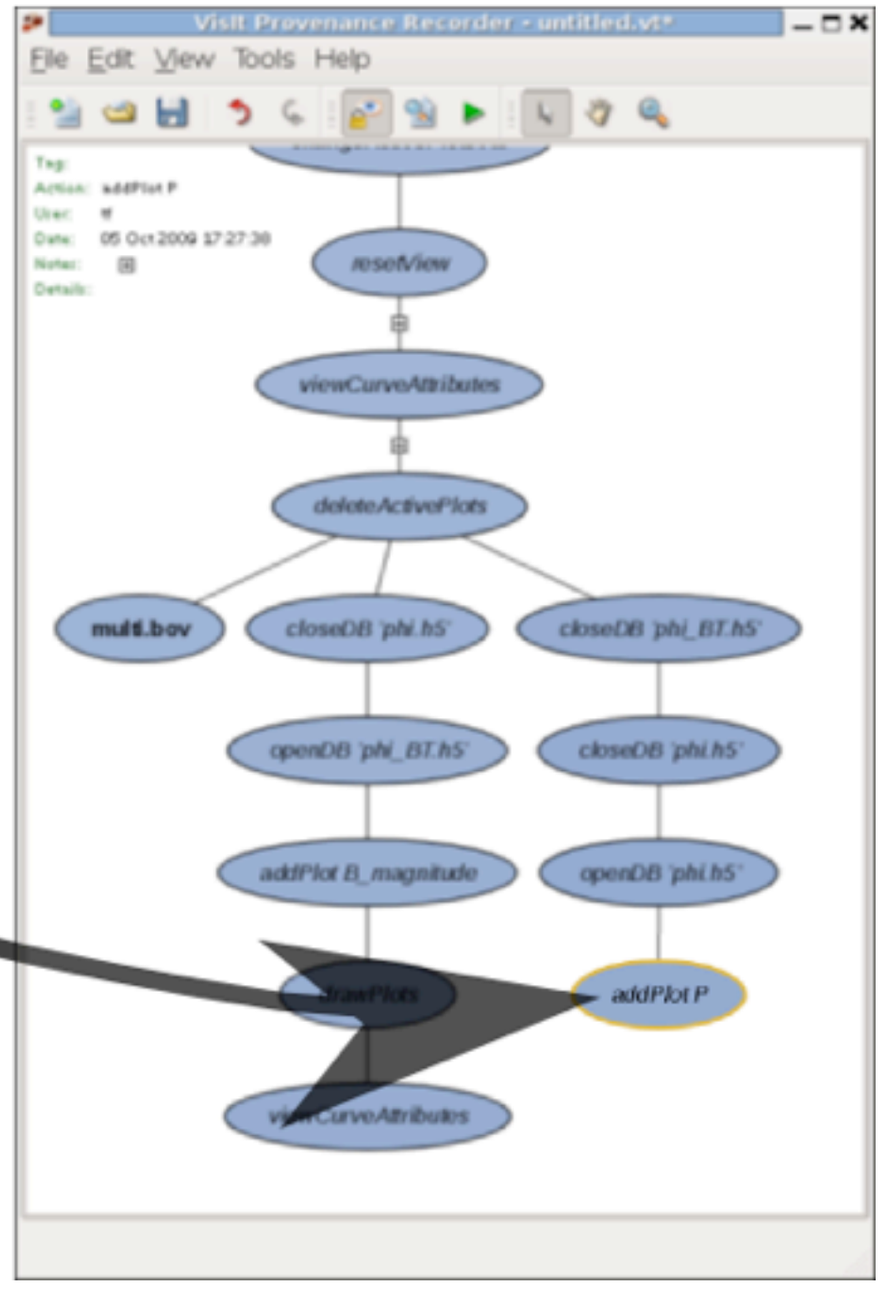
Why Plug-ins?

- Enable provenance capabilities for tools that have existing interfaces
- Store each step involved in developing a product
- Materialize any version with a single click
- Use the VisTrails provenance capture mechanism, version tree interface, and annotation capabilities across multiple tools



Why Plug-ins?


Plots
Operators
PlotAtts
OpAtts
Variables
Contour
Mesh
Pseudocolor
Spreadsheet
Streamline
Subset
Vector
Volume
B_magnitude
J_magnitude
P
P_e
T_e
T_i
V_magnitude
mag-vorticity
mesh_quality
nd
rec-vec
recentered
recentered-d
time_derivative
unnamed1
Interrupt
se engine
Dismiss

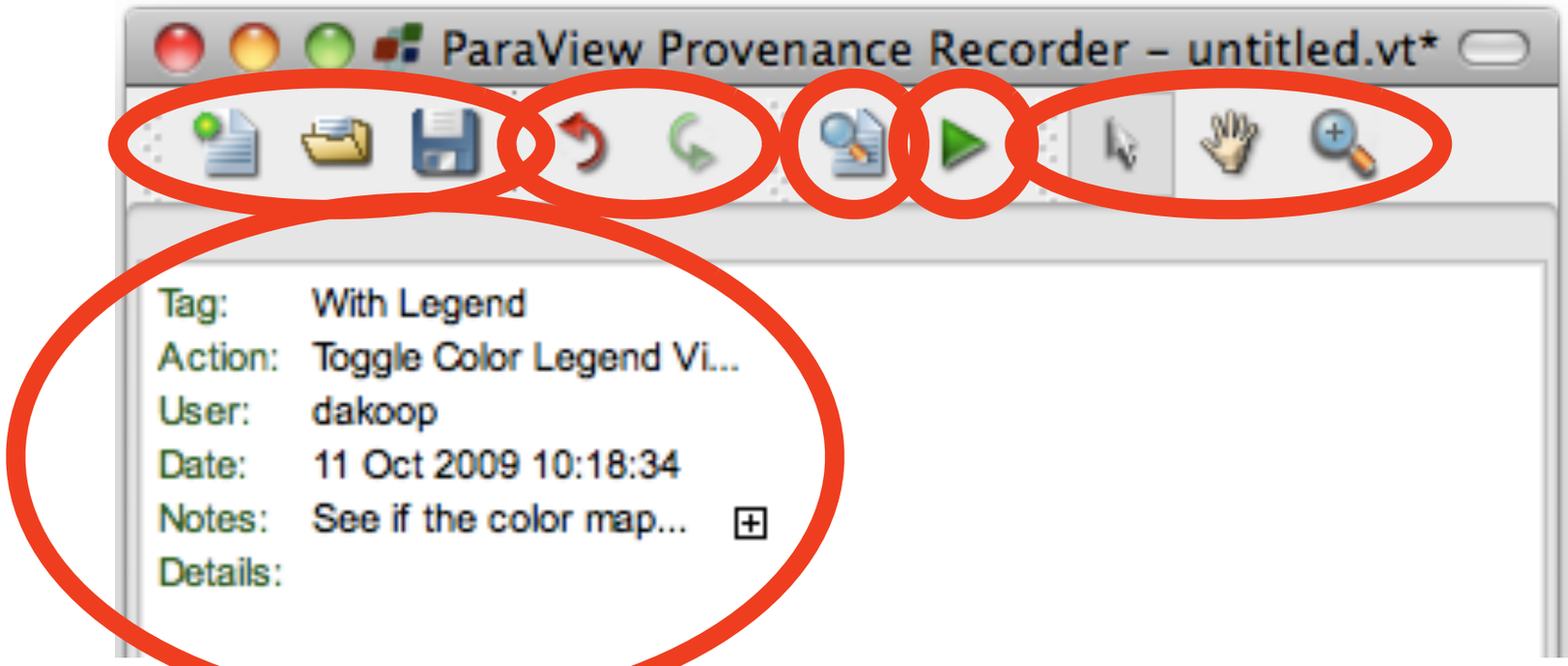

VisIt Provenance Recorder - untitled.vtp*
File Edit View Tools Help
Tag:
Action: addPlot P
User:
Date: 05 Oct 2009 17:27:30
Notes:
Details:
resetView
viewCurveAttributes
deleteActivePlots
mult.bov
closeDB 'phi.h5'
closeDB 'phi_BT.h5'
openDB 'phi_BT.h5'
closeDB 'phi.h5'
addPlot B_magnitude
openDB 'phi.h5'
DrawPlots
addPlot P
viewCurveAttributes

VisTrails Package vs. VisTrails Plug-in

- Package:
  - Ideal for libraries not attached to a GUI
  - Can connect with other VisTrails modules (VTK, Matplotlib, etc.)
- Plug-in:
  - Ideal for end-user tools with their own GUI
  - Capture provenance from undo stack, state information
  - Plug-ins do not change the existing interface, just add a new window

Plug-in Features

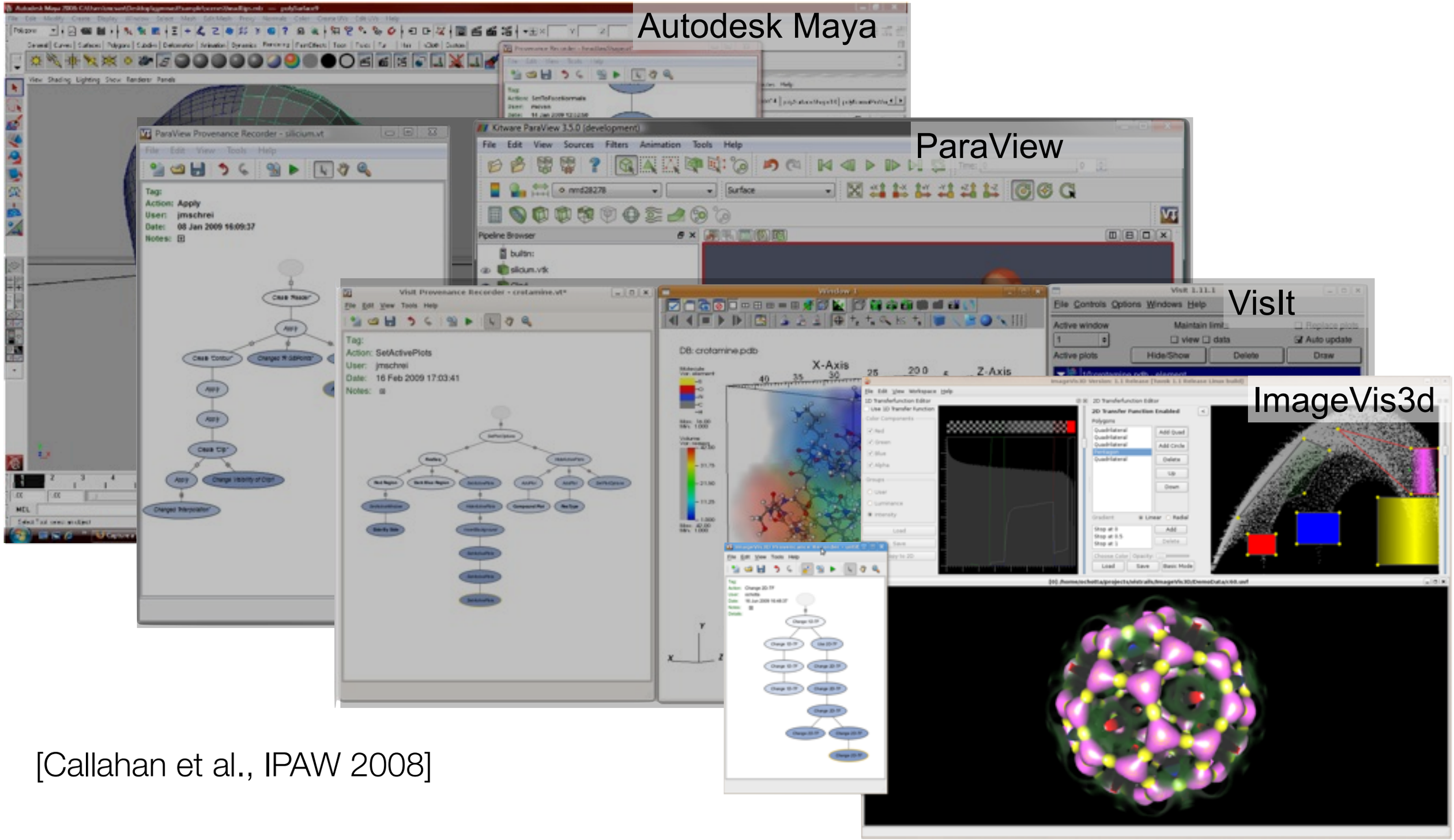
- New, Open, Save
- Undo, Redo
- Search
- Playback
- Select, Pan, Zoom
- Metadata



ParaView Demo

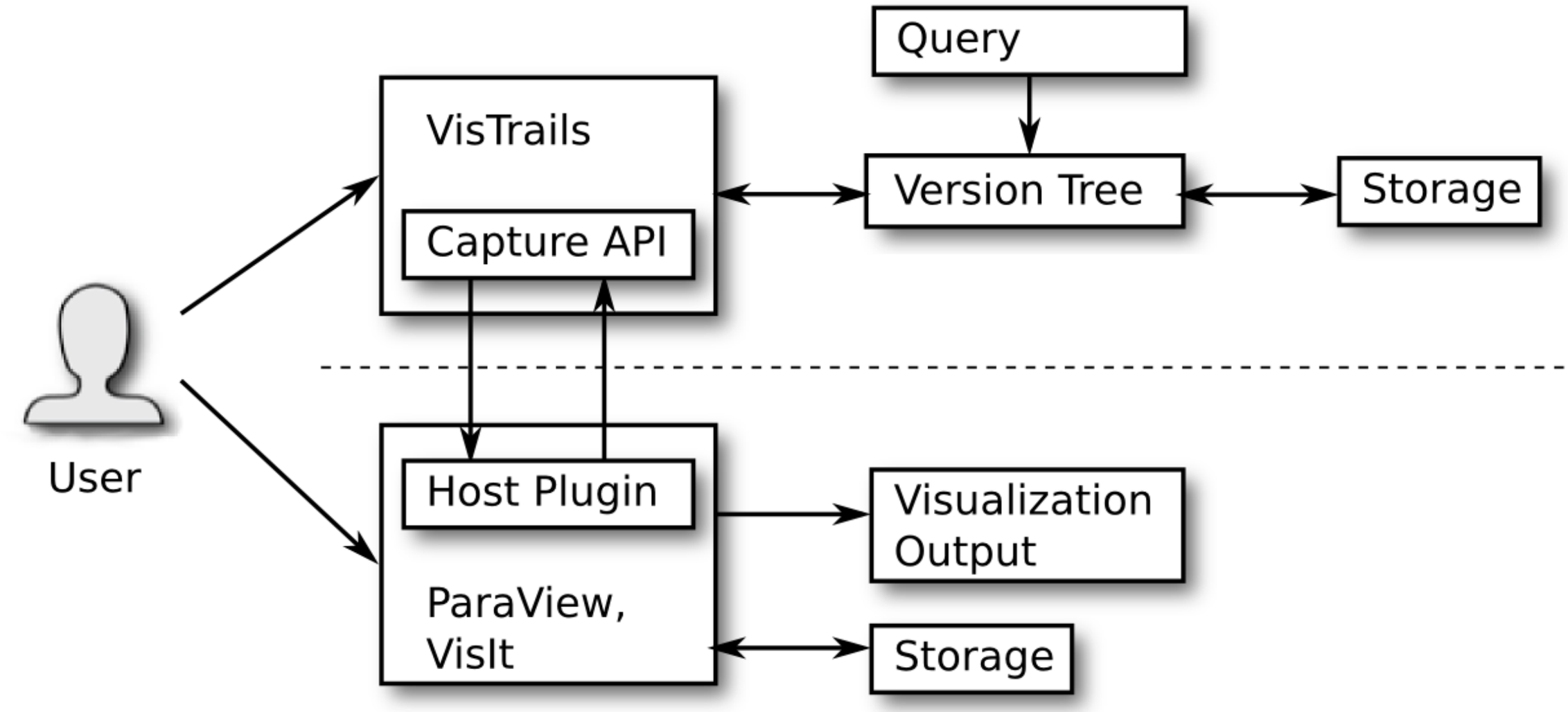
[Callahan et al., IPAW 2008]

Provenance Enabling 3rd-Party Tools



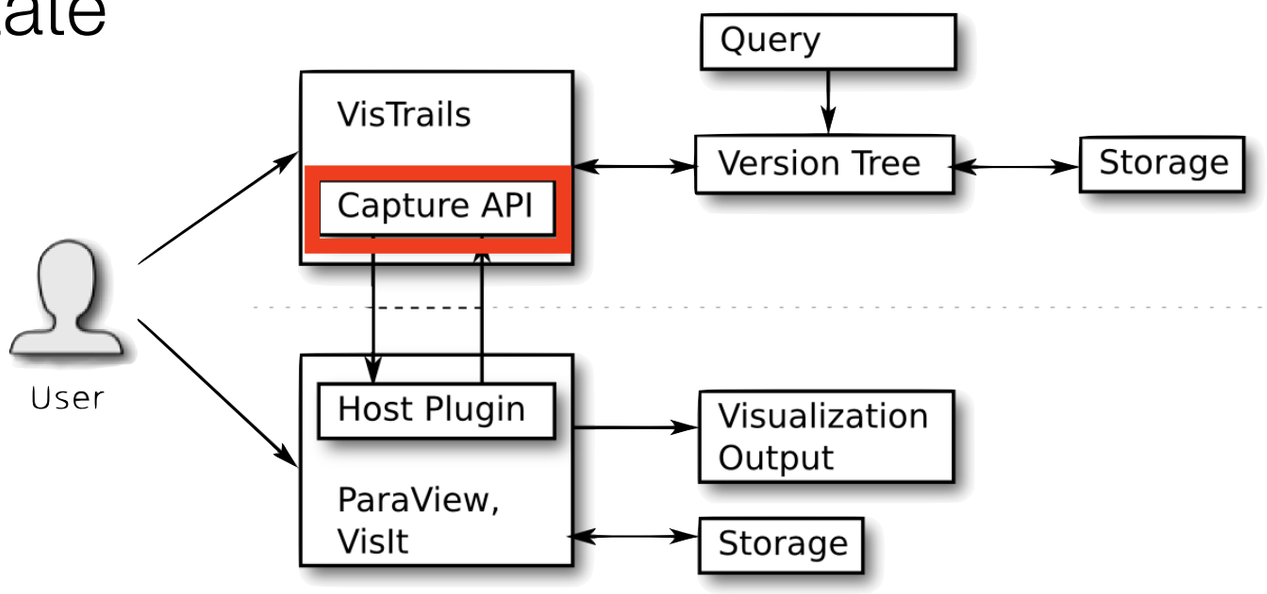
[Callahan et al., IPAW 2008]

Plug-in Architecture



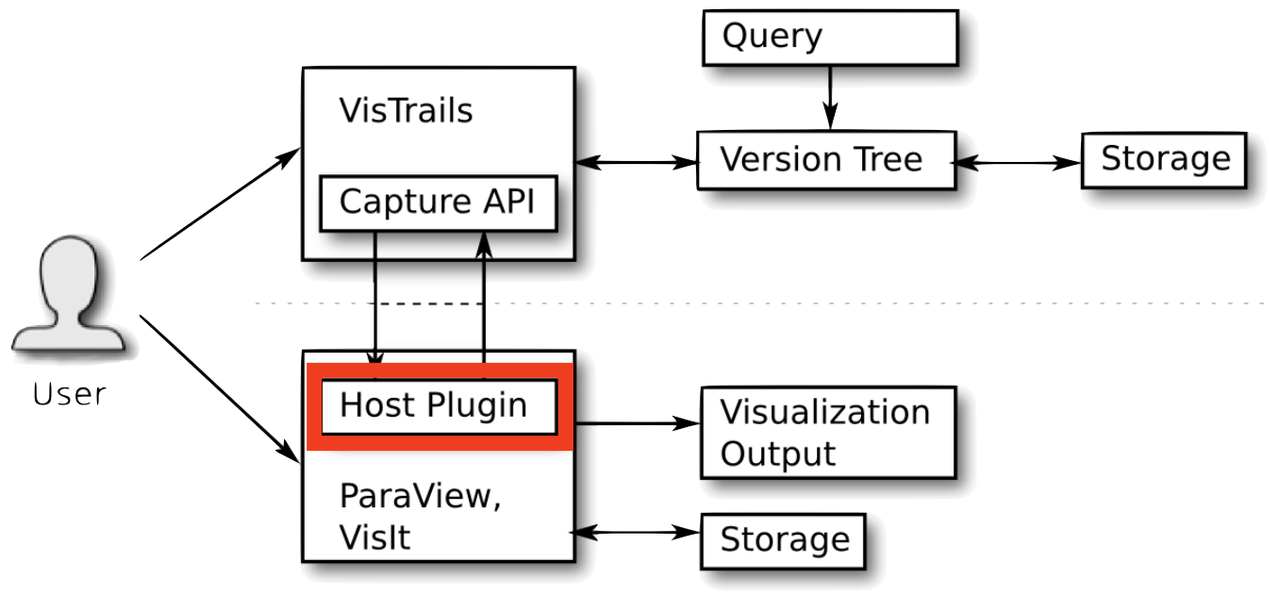
VisTrails Capture API

- Python-based, uses Qt & PyQt
- Creates .vt files like VisTrails
- Capture user actions
- Description of actions relies on host specifications
- Can use any serialization that permits reproduction
- Better serializations facilitate difference, analogy possibilities



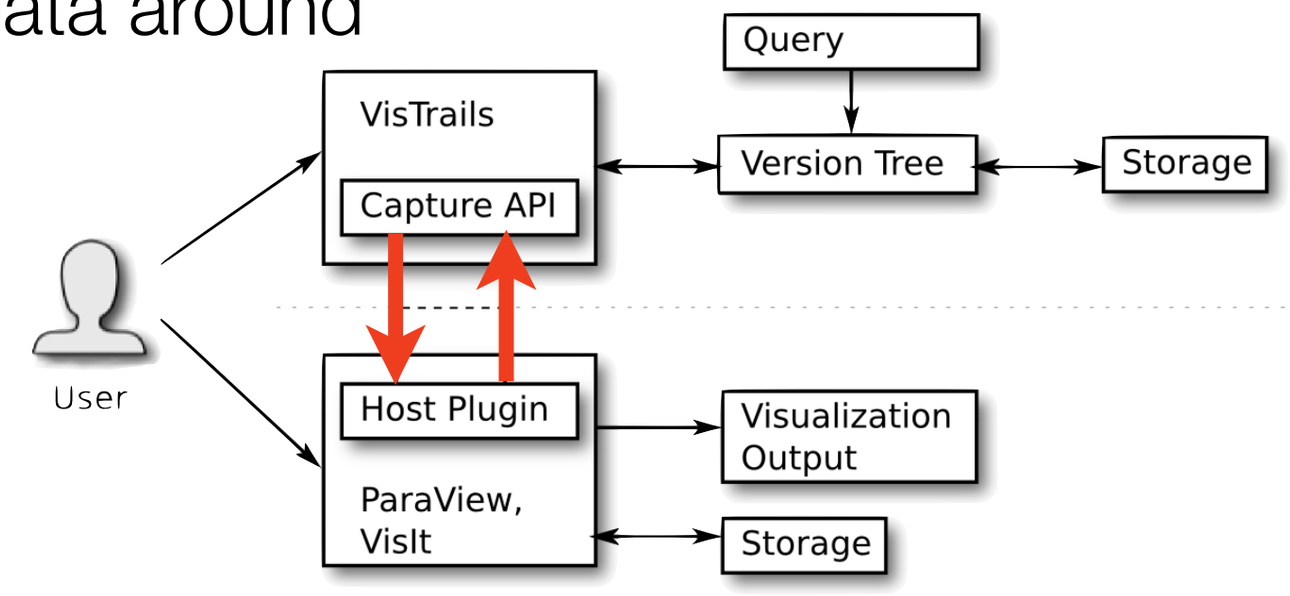
Attaching the Host Plug-in

- Undo/redo stack
  - Requires serializable state information
- Callback mechanism
  - Hook into root callbacks
  - Take advantage of existing save functionality (session saves)



Link between Host Plug-in and Capture API

- Callbacks
  - Build calls to the Capture API into host plug-in
  - Can use existing python capabilities
- Sockets
  - Run VisTrails as a separate application
  - Use sockets to push data around



ParaView Plug-in Implementation Details

- Capturing actions:
  - Take advantage of built-in 'undo/redo' functionality
  - Extract top item from undo stack
  - XML action representation
- Materializing versions:
  - Apply sequence of deltas captured from undo stack
  - Caching possible for faster access
- Exposing the undo stack (C++ source modifications):
  - Qt/Core/pqUndoStack.*
  - Servers/ServerManager/vtkSMUndoStack.*

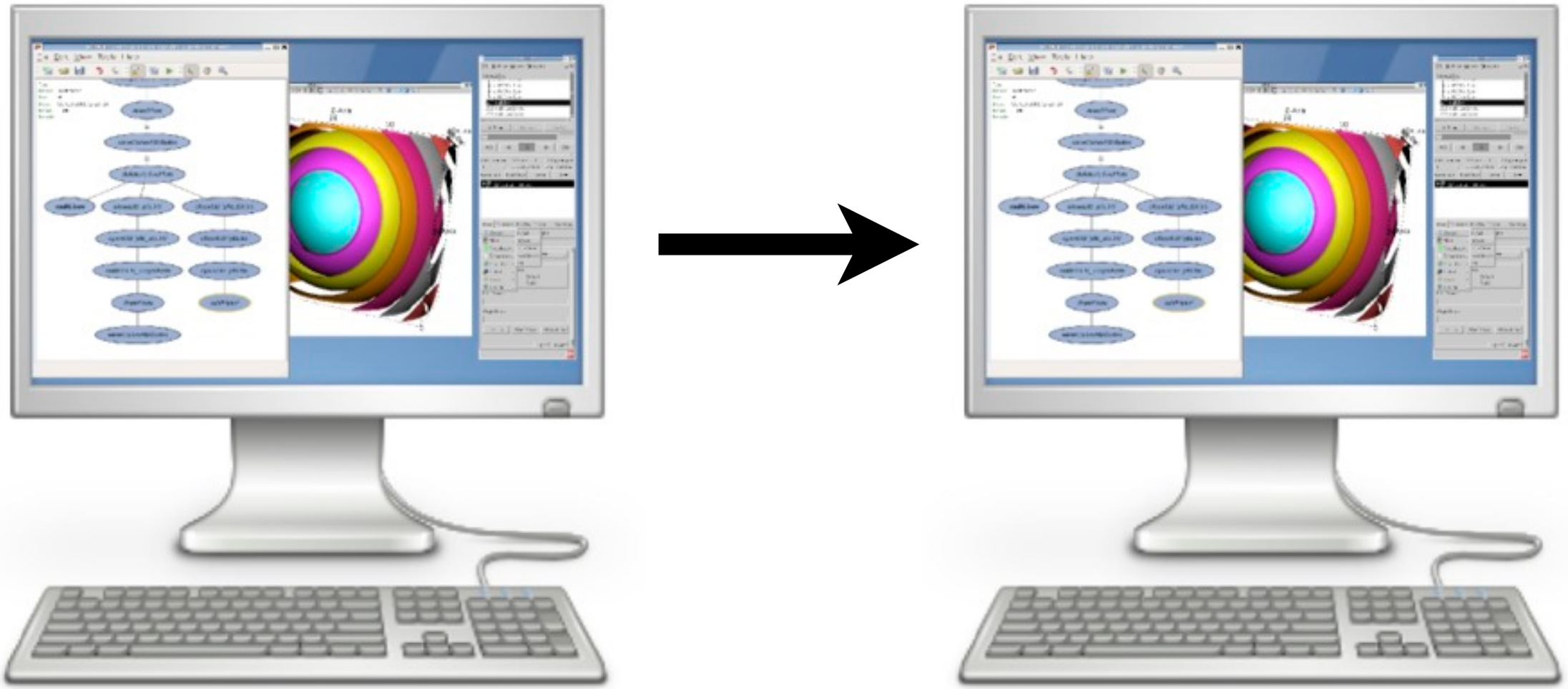
ParaView Plug-in Implementation Details

- Single QApplication instance per process
  - Use sockets for communication
  - Starts the VisTrails Capture API as a separate process
  - Establish TCP connection with the Capture API once started

VisIt Plug-in Implementation Details

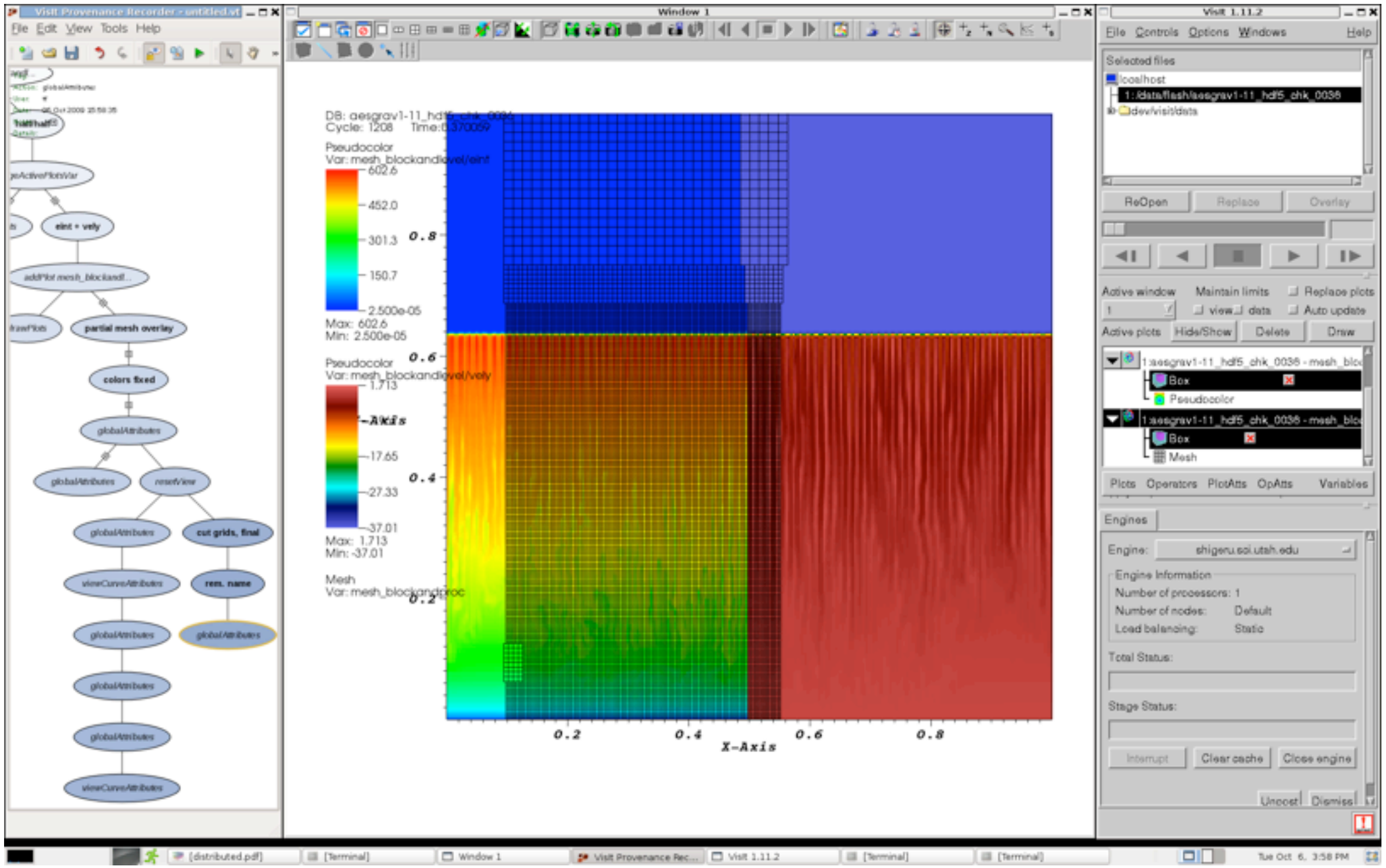
- Capturing actions:
  - Trigger via hooks into callbacks
  - Use VisIt's session saving capabilities
  - Compute difference between sessions to produce actions
- Connecting to Capture API:
  - Use VisIt's python support
  - Contact VisTrails Capture API directly

Uses: Collaboration

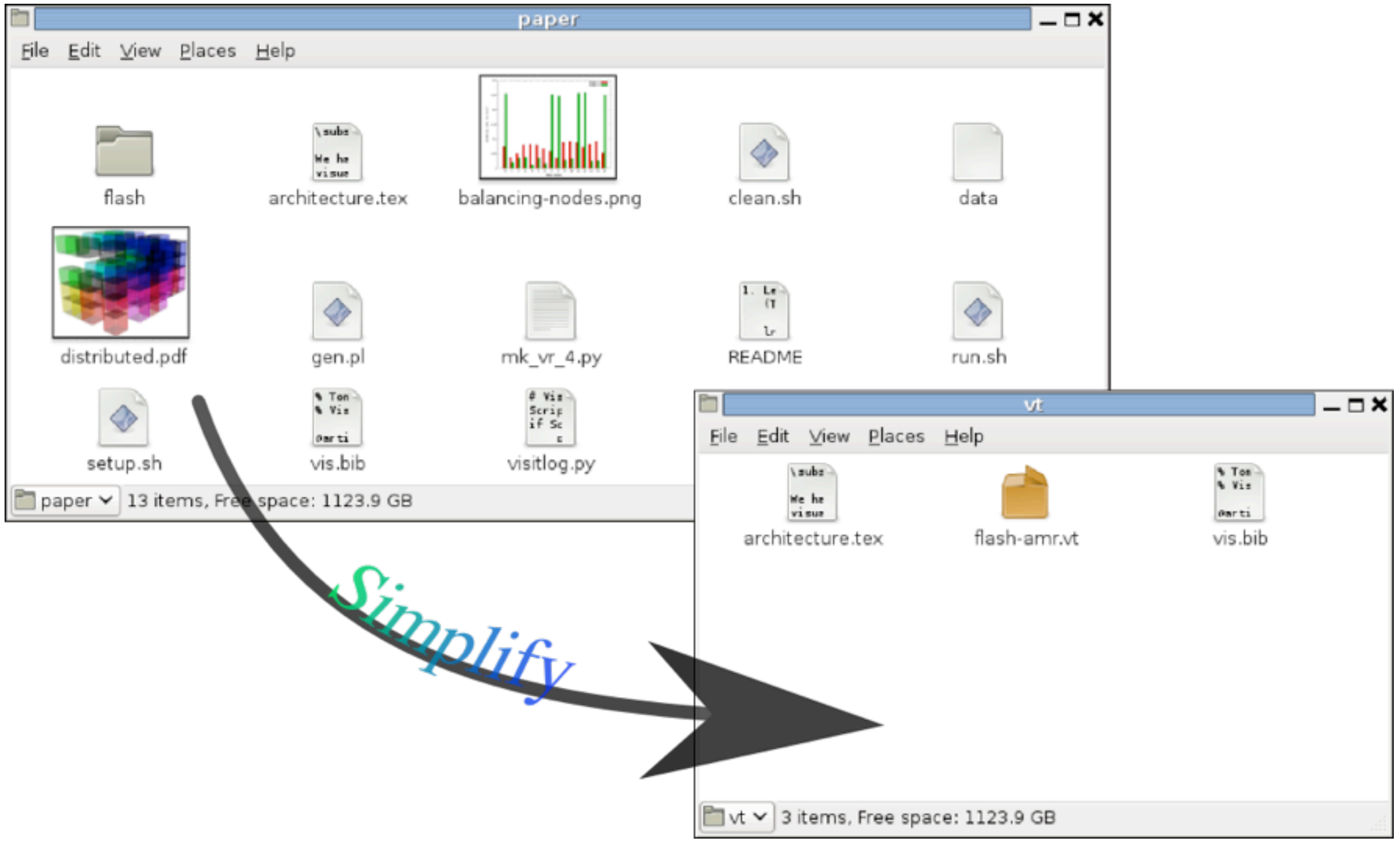


- Send **vistrails** instead of images
- Allow collaborators to manipulate and explore results

Uses: Simulation Debugging



Uses: Publishing



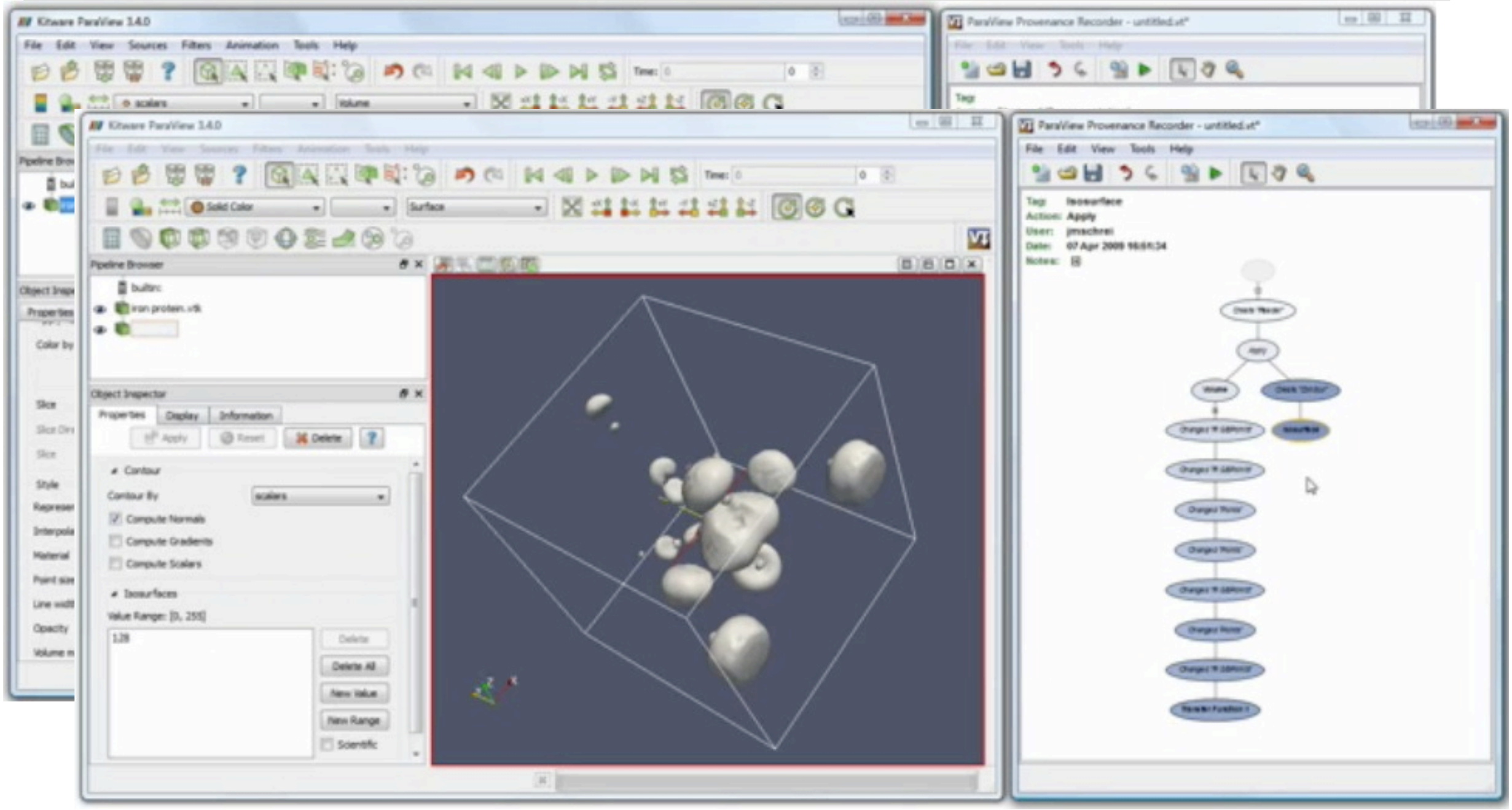
Availability

- ParaView: http://www.vistrails.org/index.php/ParaView_Plugin
  - VisTrails plug-in included with next ParaView release
- VisIt: Working with VisIt developers to release soon
- Maya: Available from www.vistrails.com
- ImageVis3d: Available from www.sci.utah.edu

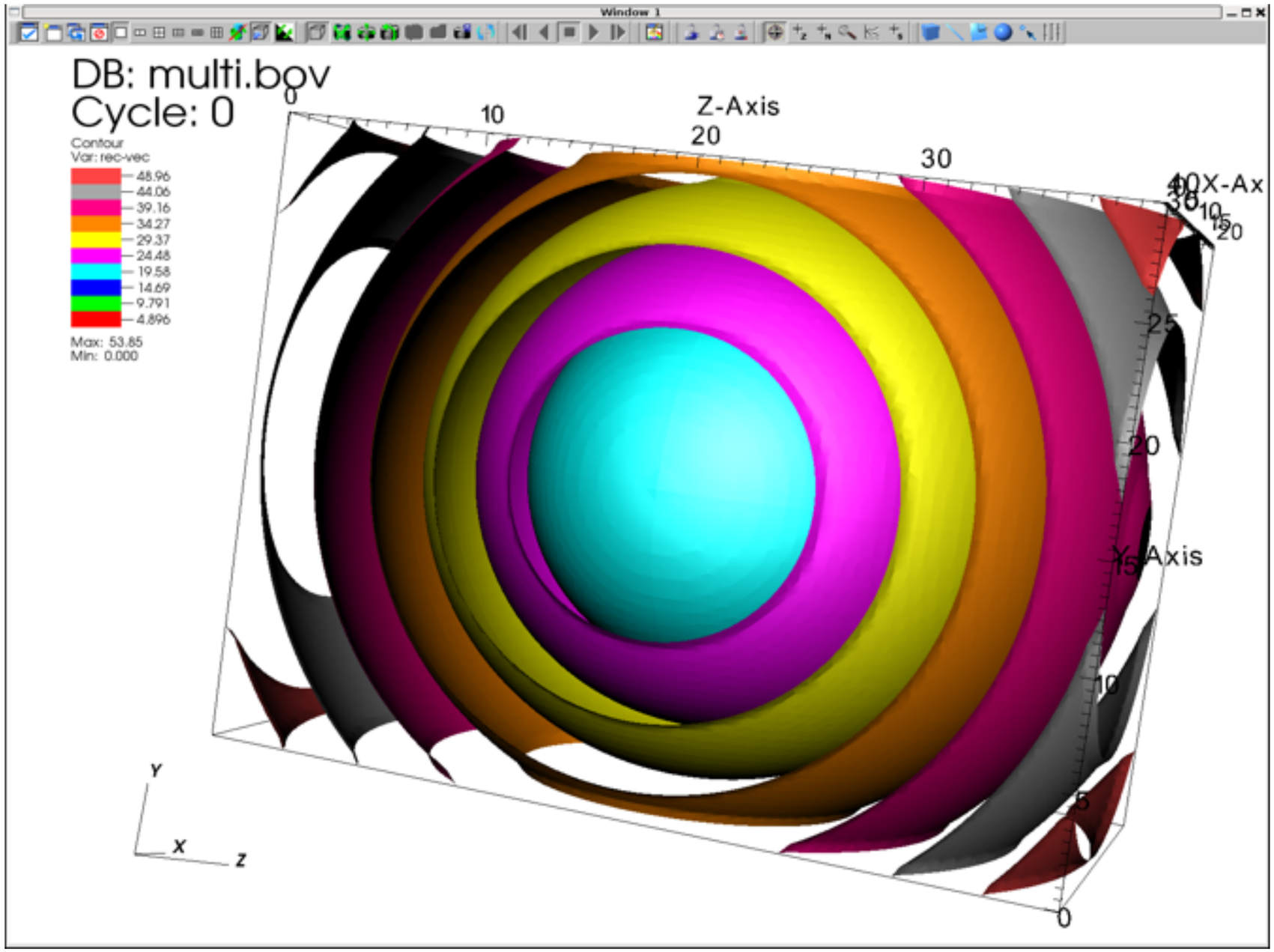
Future Directions

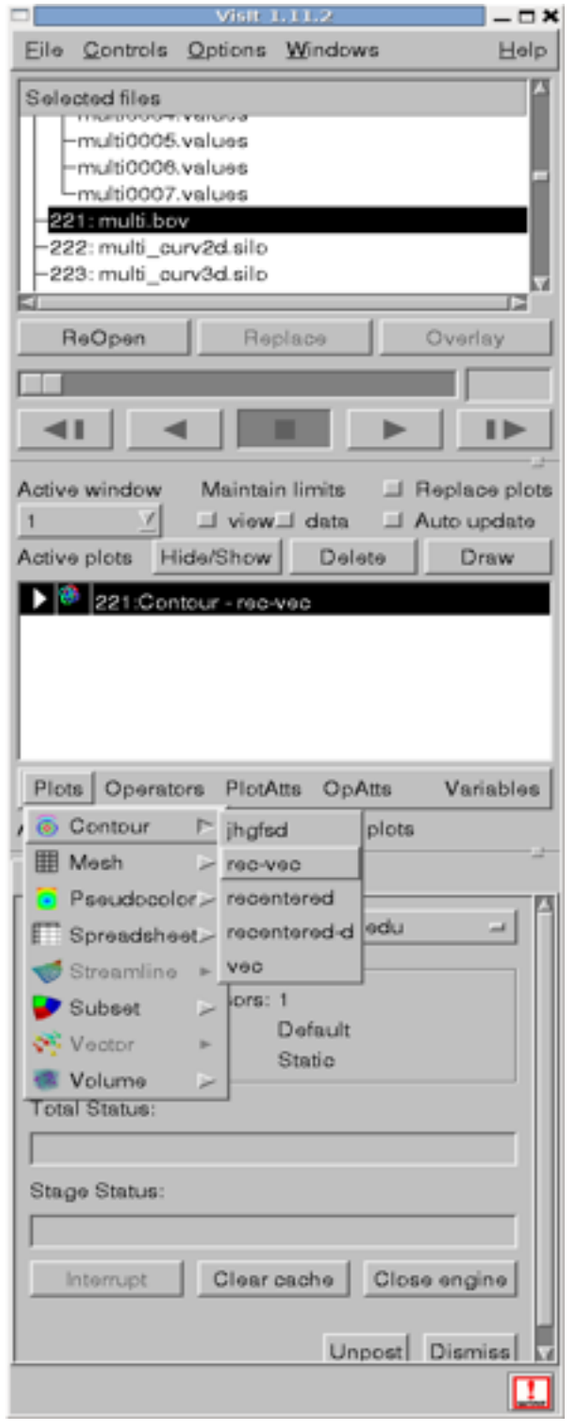
- Plan to release an SDK that allows developers to include provenance with their tools
- If you are interested in adding provenance capabilities to your tools, please contact us: www.vistrails.org

Questions?


Kitware ParaView 3.4.0
File Edit View Sources Filters Animation Tools Help
Time:
scalars
volume
Pipeline Browser
builtin:
iron.protein.vtk
Object Inspector
Properties Display Information
Apply Reset Delete
Contour
Contour By
scalars
Compute Normals
Compute Gradients
Compute Scalars
Isosurfaces
Value Range: [0, 255]
128
Delete
Delete All
New Value
New Range
Scientific
Solid Color
Surface
ParaView Provenance Recorder - untitled.vt*
File Edit View Tools Help
Tag: Isosurface
Action: Apply
User: jmschrei
Date: 07 Apr 2009 16:51:24
Notes:

VisIt


Window 1
DB: multi.bov
Cycle: 0
Contour
Var: rec-vec
48.96
44.06
39.16
34.27
29.37
24.48
19.58
14.69
9.791
4.896
Max: 53.85
Min: 0.000
Z-Axis
0
10
20
30
X-Ax
Y-Axis
Y
X
Z


VisIt 1.11.2
File Controls Options Windows Help
Selected files
multi0005.values
multi0006.values
multi0007.values
221: multi.bov
222: multi_curv2d.silo
223: multi_curv3d.silo
ReOpen
Replace
Overlay
Active window
Maintain limits
Replace plots
view
data
Auto update
Active plots
Hide/Show
Delete
Draw
221:Contour - rec-vec
Plots
Operators
PlotAtts
OpAtts
Variables
Contour
Mesh
Pseudocolor
Spreadsheet
Streamline
Subset
Vector
Volume
jhgfsd
rec-vec
recentered
recentered-d
vec
plots
Default
Static
Total Status:
Stage Status:
Interrupt
Clear cache
Close engine
Unpost
Dismiss