VisIt Tutorial
Background

- [https://wci.llnl.gov/codes/visit/](https://wci.llnl.gov/codes/visit/)
- Open Source, Multiplatform, interactive parallel visualization and graphical analysis tool
- Developed by the Department of Energy (DOE) Advanced Simulation and Computing Initiative (ASCI)
- Although VisIt was developed for visualizing terascale data, it is also well suited typical desktop simulations
Data Types

• Supports a wide variety of data types
  – Structured grids
    • uniform rectilinear, non-uniform rectilinear, and curvilinear
  – Unstructured grids
  – Polygonal data
  – Images
  – Multi-block
  – AMR

• Time series support
Visualization Algorithms

- VisIt’s visualization capabilities are grouped into two categories:
  - Plots are used to visualize data and include boundary, contour, label, mesh, pseudocolor, scatter, streamline, and others
  - Operators consist of operations that can be performed on the data prior to visualization. (Examples include slice, isosurface, threshold among others)
Special Features

• Supports derived fields
  – New fields to be calculated using existing fields.

• Supports multiple mesh types (rectilinear, curvilinear, and unstructured meshes)

• Employs distributed architecture to handle extremely large data sets interactively
Data Formats

• Supports over 100 different file formats
  http://visitusers.org/index.php?title=Detailed_list_of_file_formats_VisIt_supports
  – Application Formats
    • FLASH, Fluent, Gadget, LAMMPS, etc.
  – General Scientific Formats
    • HDF5, NetCDF, Silo, etc.
  – Visualization Formats
    • EnSight, TecPlot, VTK, etc.
VisIt Test-Drive
Getting Started

• Download example data file ‘noise.silo’
  – Right-click, Save link as...

• Open VisIt
Today we will:

- Create contours for a scalar variable
- Create isosurfaces for a scalar variable
- Clip and slice the isosurfaces
- Use glyphs to display a vector field
- Use streamlines to show flow through a vector field
- Edit annotations and background
- Add slices to show variable values over a plane
- Create volume rendering
Open the file (and display information)

Noise.silo

• **Click** File -> Open file
• **Select** noise.silo
• **Click** OK
• **Note** name of file under -> Active source
• **Click** File -> File information
• **Close** Window
Open the file (and display information)
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- **Click** *OK*
- **Note** name of file under -> *Active source*
- **Click** *File* -> *File information*
- **Close** *Window*
Create contour

- **Click** Add -> Contour -> hardyglobal
- **Click** Draw
- **Double click on** Contour
- **Under select by choose** ->N Levels enter 5
- Change the opacity levels
- **Click** Apply
- **Click** Dismiss
- **Click** Delete
VisIt

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- Click Add -> Contour -> hardyglobal
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- Click Add -> Contour -> hardyglobal
- Click Draw
- Double click on Contour (or Right-click -> Edit plot description)
- Under select by choose -> N Levels enter 5
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- Click Delete
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- **Click** Dismiss
- **Click** Delete
Create Pseudocolor and isosurfaces

- **Click** Add -> Pseudocolor -> hardyglobal
- **Click** Draw
- **Click** Operator -> Slicing -> Isosurface
- **Click** Draw
- **Click** Arrow to expand
- **Double-Click** Isosurface
- **Under select by choose** -> Percent(s) **enter** 50
- **Click** Apply & Dismiss
Create Pseudocolor and isosurfaces

- Click Add -> Pseudocolor -> hardyglobal
- Click Draw
- Click Operator -> Slicing -> Isosurface
- Click Draw
- Click Arrow to expand
- Double-Click Isosurface
- Under select by choose -> Percent(s) enter 50
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VisIt

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- Double-Click Isosurface
- Under select by choose -> Percent(s) enter 50
- Click Apply & Dismiss
Create Pseudocolor and isosurfaces

- **Double-Click** -> Pseudocolor
- Change Opacity
- Click Apply
- Unselect Apply operators/Selection to all plots
- Click Add -> Pseudocolor -> hardyglobal
- Click Operator -> Slicing -> Isosurface
- Click Arrow to expand
- Double-Click Isosurface
- Under select by choose ->Percent(s) enter 80
- Click Apply -> Dismiss -> Draw
VisIt

Create Pseudocolor and isosurfaces

- **Double-Click** -> Pseudocolor
- **Change** Opacity
- **Click** Apply
- **Unselect** Apply operators/Selection to all plots
- **Click** Add -> Pseudocolor -> hardyglobal
- **Click** Operator -> Slicing -> Isosurface
- **Click** Arrow to expand
- **Double-Click** Isosurface
- **Under select by choose** -> Percent(s) **enter** 80
- **Click** Apply -> **Dismiss** -> Draw
VisIt

Create Pseudocolor and isosurfaces

- **Double-Click** -> **Pseudocolor**
- **Change Opacity**
- **Click Apply**
- **Unselect Apply operators/Selection to all plots**
- **Click Add** -> **Pseudocolor** -> hardyglobal
- **Click Operator** -> **Slicing** -> **Isosurface**
- **Click Arrow to expand**
- **Double-Click** **Isosurface**
- **Under select by choose** -> **Percent(s)** enter 80
- **Click Apply** -> **Dismiss** -> **Draw**
VisIt

Create Pseudocolor and isosurfaces

- Double-Click -> Pseudocolor
- Change Opacity
- Click Apply
- Unselect Apply operators/Selection to all plots
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- Double-Click Isosurface
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- **Click** Apply -> Dismiss -> Draw
VisIt

Clip Isosurfaces

- Select -> apply operators and selection to all plots
- Click Operators -> Selection -> Clip
- Click Draw
- Double-Click -> Clip
- Click Apply & Dismiss
- Click x (to delete)
- Click Draw
VisIt

Clip Isosurfaces

- Select -> apply operators and selection to all plots
- **Click** Operators -> Selection -> Clip
- Click Draw
- Double-Click -> Clip
- Click Plane 2
- Click Apply & Dismiss
- Click x (to delete)
- Click Draw
Clip Isosurfaces

- Select -> apply operators and selection to all plots
- Click Operators -> Selection -> Clip
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- Double-Click -> Clip
- Click Plane 2
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Clip Isosurfaces

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- **Click** Plane 2
- **Click** Apply & Dismiss
- **Click** x (to delete)
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VisIt

Slice Isosurfaces

- **Click** Operators -> Slicing -> Slice
- Double-Click -> Slice
- Select Z-Axis & Unselect Project to 2D
- Click Apply
- Click Dismiss
- Click Draw
VisIt

Slice Isosurfaces

- **Click** Operators -> Slicing -> Slice
- **Double-Click** -> Slice
- **Select** Z-Axis & **Unselect** Project to 2D
- **Click** Apply
- **Click** Dismiss
- **Click** Draw
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- **Double-Click** -> Slice
- **Select** Z-Axis & Unselect Project to 2D
- **Click** Apply
- **Click** Dismiss
- **Click** Draw
VisIt

Create Glyph of Vector

- **Unselect** Apply operators/selection to all plots
- **Click** Add → Vector → airVfGradient
- Click Draw
- Double click on Vector
- Under Vector amount enter 1000
- Click Apply
- Click Dismiss
- Click Hide/Show
Create Glyph of Vector

- **Unselect** Apply operators/selection to all plots
- **Click** Add -> Vector -> airVfGradient
- **Click** Draw
- **Double click on** Vector
- Under Vector amount enter **1000**
- **Click** Apply
- **Click** Dismiss
- **Click** Hide/Show
VisIt

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- **Click** Hide/Show
Create Streamlines

- **Click** Add -> Streamline -> grad
- **Double click on** Streamline
- **Under Source Type Select** Plane
- **Enter:**
  - Samples in X and Y: 15
  - Distance in X and Y: 20
  - Streamline Direction Both
  - Select **limit Maximum Time Step**
- **Click** Apply
- **Click** Dismiss
- **Click** Draw and Dismiss warning
- **Double click on** Streamline
Create Streamlines
• Click Add -> Streamline -> grad
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• **Double click on Streamline**
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VisIt

Create Streamlines

- **Click on** Appearance
- **Under Draw as select** Tubes -> Radius 0.005
- **Unselect** Show seeds
- **Unselect** Legend
- **Click** Apply
- **Under Data Value select** Variable -> Scalars -> hardyglobal
- **Click** Apply (dismiss warning)
- **Under Color -> Color table, click Default Choose** bluehot
- **Click** Apply & Dismiss
VisIt

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VisIt

Background Color and Legend

- **Click on Controls -> Annotation**
- **Click on Colors**
- **Select Black for Background and White for Foreground**
- **Click on General**
- **Click no annotations**
- **Select legend**
- **Click Apply & Dismiss**
- **Hide Pseudocolor Plots**
VisIt

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- Click **Apply**
- Click on **General**
- Click **no annotations**
- Select **legend**
- Click **Apply & Dismiss**
- Hide **Pseudocolor Plots**
Create Slice

- **Click** Add -> Pseudocolor -> grad_magnitude
- **Click** Draw
- **Click** Operator -> Slicing -> Slice
- **Double click on** Slice
- **Select** Z Axis
- **Unselect** project to 2D
- **Click** Apply & Dismiss
- **Click** Draw
- **Click** Hide/Show
Create Slice

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Create Slice

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- Double click on Slice
- Select Z Axis
- Unselect project to 2D
- Click Apply & Dismiss
- Click Draw
- Click Hide/Show
VisIt

Create Slice

- **Click** Add ->
- **Pseudocolor** ->
- **grad_magnitude**
- **Click** Draw
- **Click** Operator ->
- **Slicing** -> **Slice**
- **Double click on** **Slice**
- **Select** **Z Axis**
- **Unselect** **project to 2D**
- **Click** **Apply & Dismiss**
- **Click** **Draw**
- **Click** **Hide/Show**
Create Volume Rendering

- Click Add -> Volume -> grad_magnitude
- Click Draw
- Double click on Volume
- Click on 1D transfer function
- Change Transfer Function (Under Opacity)
- Click Apply
- Click Dismiss
VisIt

Create Volume Rendering

- **Click** Add -> Volume -> grad_magnitude
- **Click** Draw
- **Double click on** Volume
- **Click on 1D transfer function**
- **Change Transfer Function** (Under Opacity)
- **Click** Apply
- **Click** Dismiss
VisIt

Create Volume Rendering

• Click **Add** -> **Volume** -> **grad_magnitude**
• Click **Draw**
• Double click on **Volume**
• **Click on 1D transfer function**
• Change Transfer Function (Under Opacity)
• Click **Apply**
• Click **Dismiss**
Create Volume Rendering

- **Click** Add -> Volume -> grad_magnitude
- **Click** Draw
- **Double click on** Volume
- **Click on** 1D transfer function
- **Change Transfer Function** (Under Opacity)
- **Click** Apply
- **Click** Dismiss
VisIt

Create Volume Rendering

• Click Add -> Volume -> grad_magnitude
• Click Draw
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• Change Transfer Function (Under Opacity)
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• Click Dismiss
Questions?

• More tutorials available:
  – https://wci.llnl.gov/codes/visit/manuals.html

• More information:
  – http://visitusers.org

• More help:
  – Visit User mailing list: visit-users@email.ornl.gov