

VisIt: HPC Visualization and Data Analysis

Presentation Outline

Part 1: Introduction to VisIt

Lawrence Livermore National Laboratory has created a number of tutorials and sample data sets and activities to help users learn how to visualize and analyze numerical simulations. The first part of this lecture is a slide deck prepared by Kevin Griffin, Eric Brugger, and Cyrus Harrison at LLNL.

Here is the slide deck from June 2020.

http://portal.nersc.gov/project/visit/cyrush/2020_06_05_llnl_visit_tutorial_intro.pdf

Here is a good tutorial to get you started:

https://visit-sphinx-github-user-manual.readthedocs.io/en/develop/tutorials/VisIt_Basics.html

Part 2: Getting Started with VisIt

The VisIt software can be used to visualize data three ways, depending on (a) where the data reside and (b) where the software is running:

1. If you wish to run VisIt on your local machine (PC, Mac or Linux), download and install the application using this tutorial:

http://visitusers.org/index.php?title=Tutorial_Preparation

- a. If the data reside on your local hard drive as well, then download the sample data in this tutorial, unpack the archive, and follow the instructions. This is the simplest way to use VisIt.
- b. If the data reside on a remote machine (i.e., on a remote supercomputer), then you can run VisIt from your local machine in client-server mode. Detailed instructions here:
<https://visit-sphinx-github-user-manual.readthedocs.io/en/develop/tutorials/RemoteUsage.html#usingclientserver>

Part 2: Getting Started with VisIt

2. If the data resides on a remote machine (supercomputer) and the cluster supports running VisIt in parallel mode, then you can run VisIt on the cluster using either (i) X display forwarding, or (ii) a VNC session. To do this:

<https://visit-sphinx-github-user-manual.readthedocs.io/en/develop/tutorials/RemoteUsage.html#>

Part 3: Aneurysm tutorial

Part 3 is the LLNL Aneurysm tutorial. The simulation was run using the LifeV finite element solver and made available for this tutorial thanks to Gilles Fourestey and Jean Favre, Swiss National Supercomputing Centre.

The data are available from these two sites:

http://portal.nersc.gov/project/visit/cyrush/tutorial_data/aneurysm_tutorial_data.tar.gz

<https://visit-dav.github.io/largedata/datarchives/aneurysm>

The tutorial is here:

<https://visit-sphinx-github-user-manual.readthedocs.io/en/develop/tutorials/Aneurysm.html>

This third part of the module could be an in-class student activity, or a student assignment, with a formative assessment.

Part 4: Advanced topic: making movies

Numerical simulations are often solved from a set of initial conditions, with the simulation evolving forward in time. An optional activity could involve students creating movies in VisIt.

In this tutorial, the dataset simulates the evolution of water and air in a water tank after an interface holding a column of water is instantaneously removed. This tutorial uses the dbreak3d dataset – available at:

http://www.visitusers.org/index.php?title=Tutorial_Data

The tutorial is here:

<https://visit-sphinx-github-user-manual.readthedocs.io/en/develop/tutorials/MakingMovies.html>