



VisNow Visualization Workshop

Advanced visualization and programming with VisNow platform

13-17 October 2014, Monday – Friday

A*STAR Computational Resource Centre, Singapore

Part 1: VisNow introduction (Monday – Tuesday)

Prerequisites: general knowledge on scientific data and visualization

Abstract: Within Part 1 of VisNow training we will introduce the general concepts of scientific visualization and visual analysis, especially in HPC environments. VisNow platform will be described, including the philosophy beneath, generic data structures and data flow network. User interfaces will be introduced and several case studies presented in hands-on sessions, to familiarize participants with VisNow interface and most common visualization schemes.

1. Introduction to Visual Analysis
2. Visualization systems and paradigms
3. Generic data structures
4. Introduction to VisNow
 - a. User Interface
 - b. Installation
 - c. Plugins
5. Case Study #1 – 2D data visualization
 - a. 2 dimensional regular grids
 - b. Introduction to viewers
 - c. 2D and 3D scene manipulation
 - d. Data presentation layer – colormapping and display properties
 - e. Module: Isolines
 - f. Module: Graph 3D
 - g. Module: Line Slice
 - h. Image creation
6. Case Study #2 – 3D data visualization
 - a. 3 dimensional regular grids
 - b. 3D data representation
 - c. Field slicing
 - d. Volume presentation
 - e. Module: Isosurface
 - f. Module: Volume Renderer

- g. Module: Differential Operations
- 7. Case Study #3 – Vector data visualization
 - a. Vector data concept and representation
 - b. Glyph and streamline visualization
 - c. Module: Glyphs
 - d. Module: Streamlines
 - e. Flow animation
 - f. Movie rendering
- 8. Case Study #4 – Unstructured data visualization
 - a. Irregular field concept
 - b. Mesh representation
 - c. Grid remapping
 - d. Examples
- 9. Data computations
 - a. Data component concept
 - b. Module: Component Calculator
 - c. Multidimensional histograms and density fields
 - d. Module: Multicomponent Histogram

Part 2: VisNow advanced topics and programming (Wednesday – Friday)

Prerequisites: VisNow introduction, Java SE programming

Abstract: Within part 2 of VisNow training we will cover the more sophisticated or specific problem related visualization possibilities of VisNow, including the overview of time dependent data, applications of visualization in debugging and data exploration, and various visualization techniques. Participants will be introduced to the generic data header for own regular datasets I/O. For most advanced users and programmers, the functionality of VisNow plugins will be introduced with a hands-on module programming course.

- 10. Introduction to time dependent data in VisNow
- 11. Case Study #5 – Time dependent data visualization
 - a. Module: Trajectories
 - b. Module: Time Select/Animate
 - c. Example: numerical weather forecasts
- 12. Case Study #6 – Visual debugging and analysis
 - a. Data errors propagation (numerical weather forecast example)
 - b. MPI communication debugging (particle simulation example)
 - c. Unknown data analysis
- 13. Various visualization techniques and modules
 - a. Module: Field Viewer 3D
 - b. Module: Orthoviewer
 - c. Module: Parallel Coordinates

- d. Modules: Plot 3D, City Plot, Ribbon Plot
- e. Module: Radial Coordinates
- f. Skeletonization and segmentation

14. VisNow data I/O

- a. Read/write modules
- b. VisNow field data format
- c. VNF headers

15. VisNow plugins and module programming

- a. VisNow and Java
- b. JLargeArrays library and API
- c. LargeDatasets library and API
- d. Module basics
- e. Module structure definition
- f. Module API
- g. User interface and module parameters
- h. Plugins and libraries