
HPC Visualization with EnSight

Beijing
2010.10.27

Aric Meyer
Marketing Director, Asia & Pacific
CEI

Computational Engineering International, Inc.



- Founded in 1994 out of Cray Research
- Headquarters in Raleigh, North Carolina, USA

- Offices in Germany, Japan, China, Detroit, Houston
- Distributors around the world

- Financially strong, stable, and growing

Dedication to cutting-edge visualization

Select CEI Major Accounts



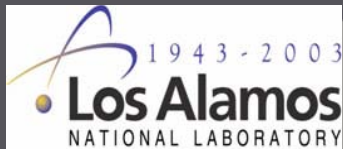
PSA PEUGEOT CITROËN



RENAULT



Sandia
National
Laboratories



Lawrence Livermore
National Laboratory



United
Technologies

OAK RIDGE NATIONAL LABORATORY

Managed by UT Battelle for the Department of Energy

A Brief History of CEI HPC Visualization

Date	Headline
1999.02	CEI's EnSight Software Visualizes Model Containing More than One-Billion Cells
2000.08	CEI Signs \$1.8 Million ASCI Contract to Accelerate Visualization
2000.08	CEI's EnSight Gold Software Visualizes Model Containing 11.5 Billion Cells
2000.09	CEI Wins \$1.4 Million ASCI Contract to Apply Beowulf Cluster for Advanced Visualization
2004.08	EnSight selected as application viewset for industry-standard SPECviewperf benchmark
2005.04	CEI becomes first high-end viz vendor to support 64-bit Windows computing
2005.08	CEI uses commodity clusters at LLNL to shatter world graphics rendering record
2006.06	Linux Networx Sets Visualization World Record By Tripling Previous Rendering Rate

About Computer-Aided Engineering

Typical work flow:

CAD

(Computer-Aided Design)



CAE

(Computer-Aided Engineering)
'Virtual testing'



Pre-Processing

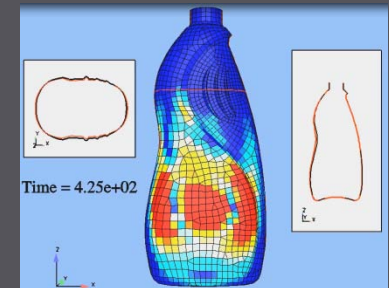
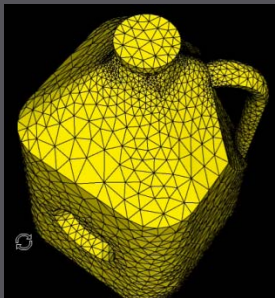
- Converting from CAD
- Preparing the simulation

Solving

- Running the simulation

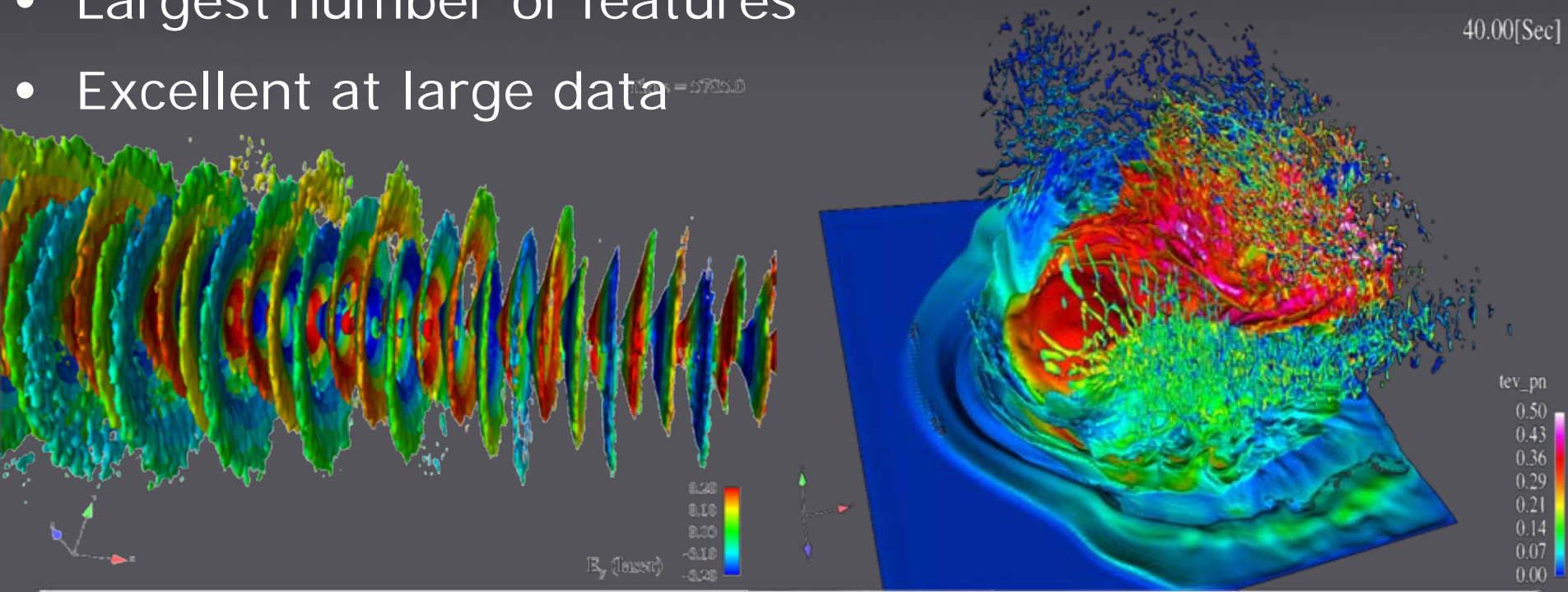
Post-Processing

- Visualizing the results
- Extract meaningful info



EnSight

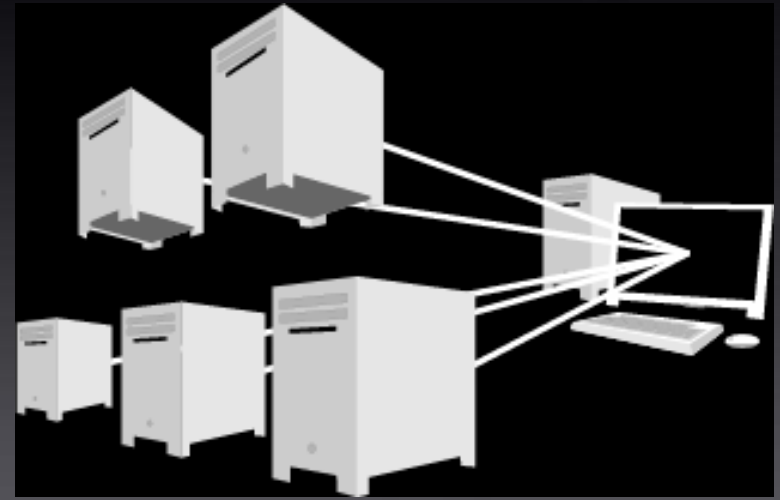
- **Engineering InSight**
- General visualization and post-processing software for scientific and engineering simulation data
- Used for CFD, FEA, EM, DEM, MBD, multiphysics, ...
- Largest number of features
- Excellent at large data



Parallel Post Processing

Parallel Processing

- CPU threading for shared-memory parallel (SMP)
- Handles partitioned data for distributed-memory parallel (DMP)
- Distributed rendering for multiple displays or extremely large data
- Compatible with remote visualization



Remote Visualization

- Powerful CPU
- Large RAM
- Access to data



Efficient: minimal data transfer
over the network



- Good graphics hardware
- User interface

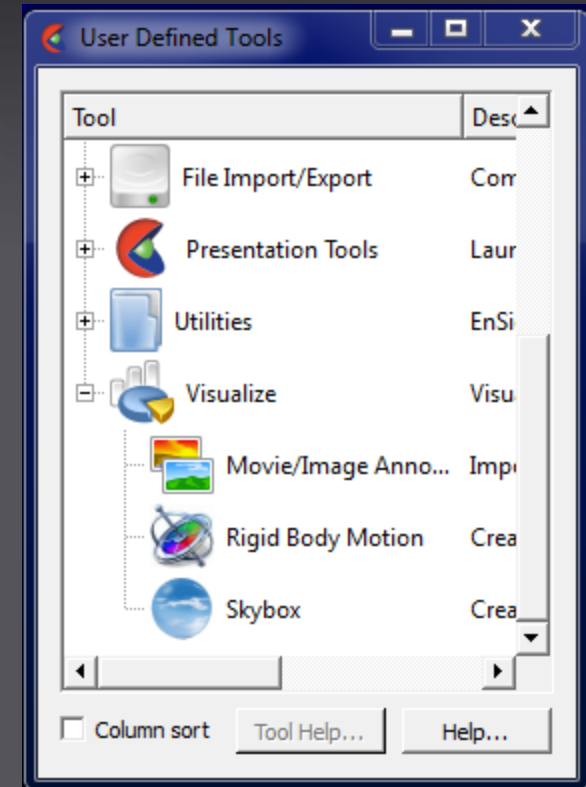


Remote Visualization

- Client-Server capability give access to data anywhere in the world
- Server runs remotely to access the data
- Client runs locally to the user
- Stable, fast, and transparent to the user
- Easy setup

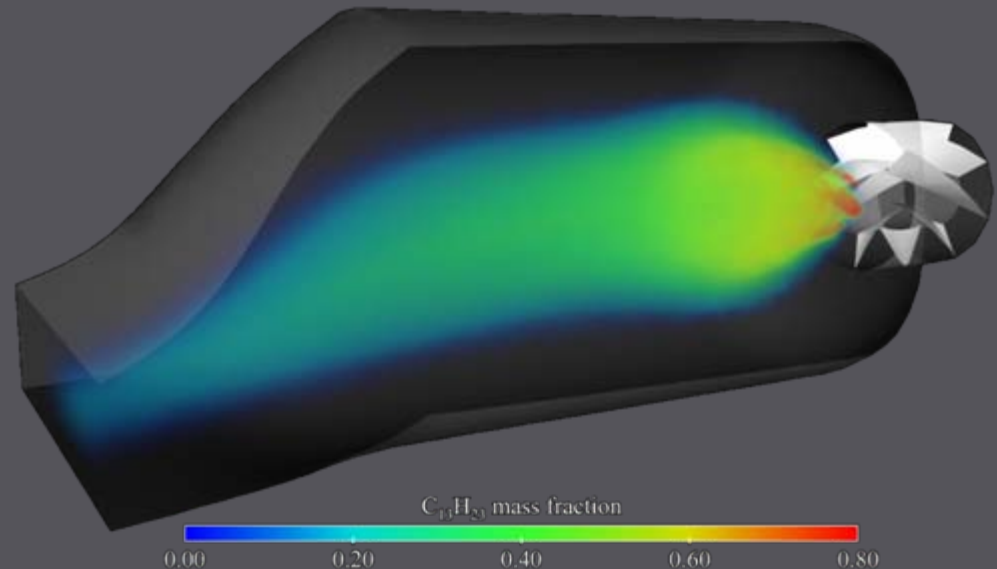
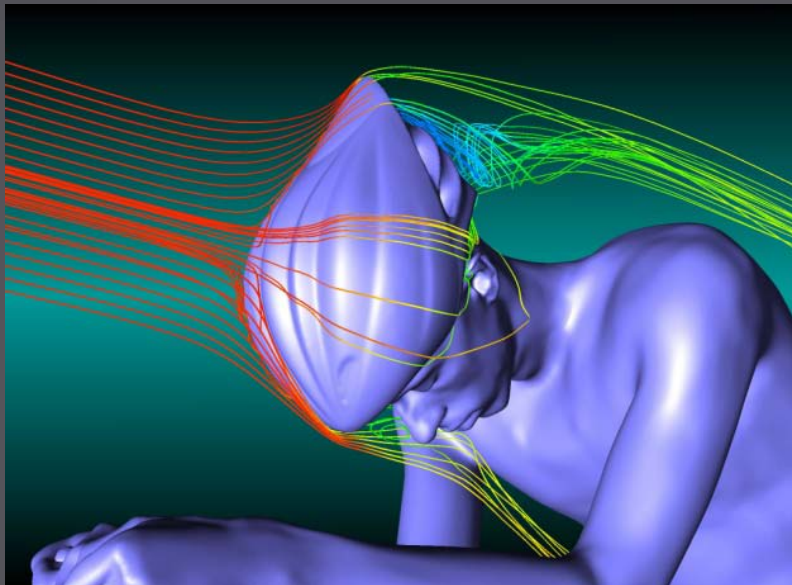
Batch, scripting, and extensions

- EnSight is fully scriptable in Python or EnSight command language
- Scripts can run automatically in batch, including output of images and animations
- Python extensibility:
 - User-defined tools
 - User-defined menus
 - User-defined GUIs
- C/C++ extensibility:
 - Math functions
 - Readers for data import
 - Writers for data export



Other Advantages of EnSight

- Many interfaces, up to 16 datasets simultaneously
- Powerful free multi-platform 3D viewer
- High output quality, customizable view
- Strong animation capabilities
- Can be a standard post-processing solution



EnSight 9.2

Release in November 2010

“HPC release”

Primarily contains features requested by our HPC customers

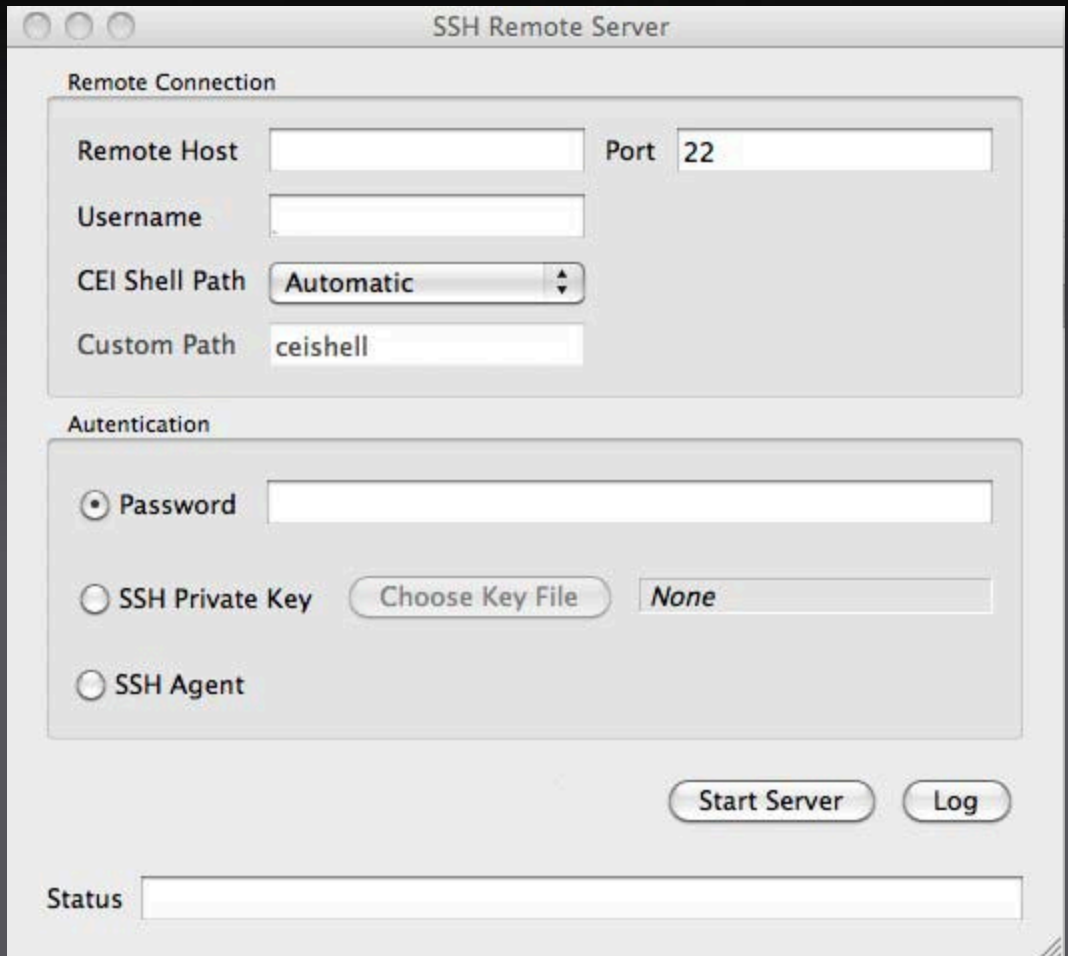
What's New in 9.2?

- Launching in HPC environments
 - Users shouldn't have to set `$CEI_HOME` or modify their `$PATH` environment variables
 - Better support for running EnSight components in network environments
 - Better support for batch queuing systems
 - Site customized launch configuration, ssh, port forwarding, etc.
- Don't bother most users
- Make significantly better for users that need it



What's New in 9.2?

- Client-Server Launcher
 - Easy
 - Faster
 - No memorization
 - Random ports
 - Switch from Standalone
 - Future?
 - SOS? DR?
 - PowerWalls?

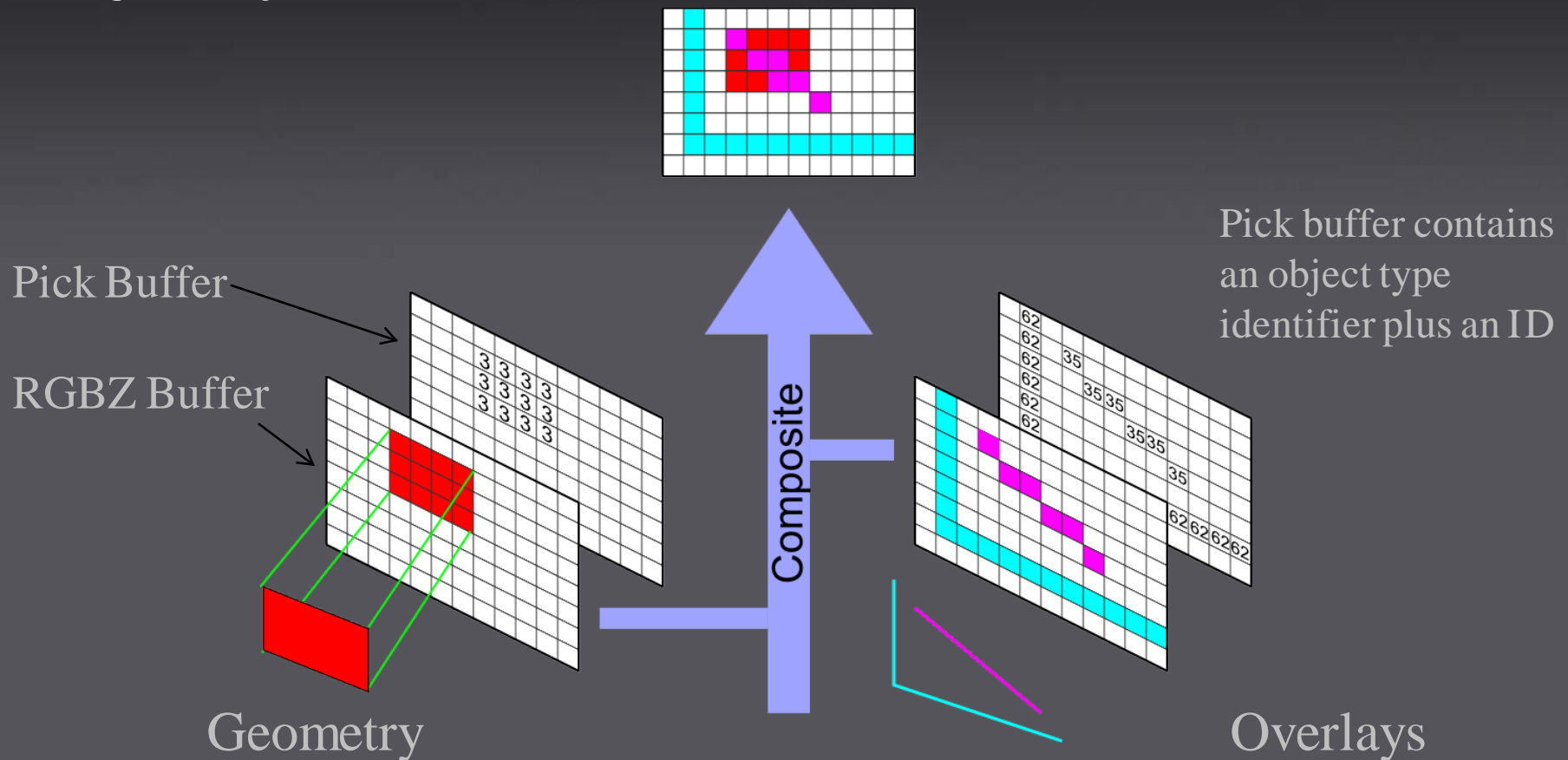


The screenshot shows a window titled "SSH Remote Server" with the following fields and controls:

- Remote Connection:**
 - Remote Host:
 - Port:
 - Username:
 - CEI Shell Path: (dropdown menu)
 - Custom Path:
- Authentication:**
 - Password:
 - SSH Private Key:
 - SSH Agent
-
- Status:

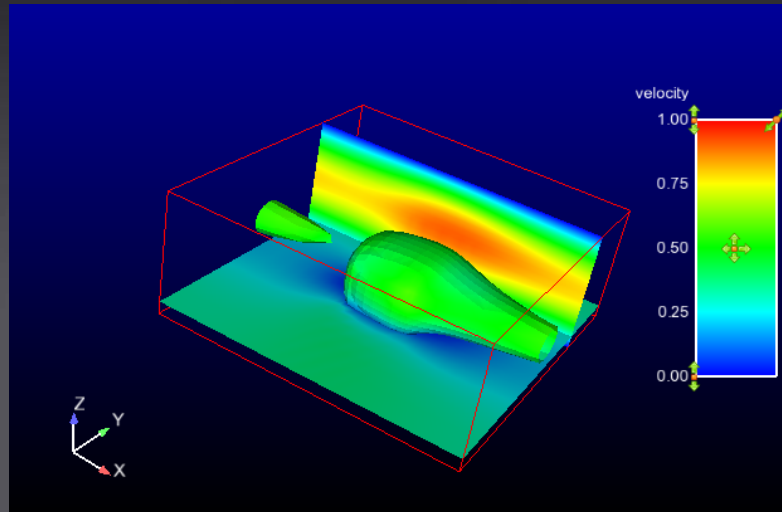
What's New in 9.2?

- Compositing of geometry with annotations
 - Can manipulate annotations, legends, and plots at high frame rates independent of EnSight mode – redraw annotation plane then composite with geometry buffer



What's New in 9.2?

- Touch-n-go enhancements to Click-n-go
 - Touch-n-go - simply move the mouse on top of objects
 - Handles (all of them) will appear



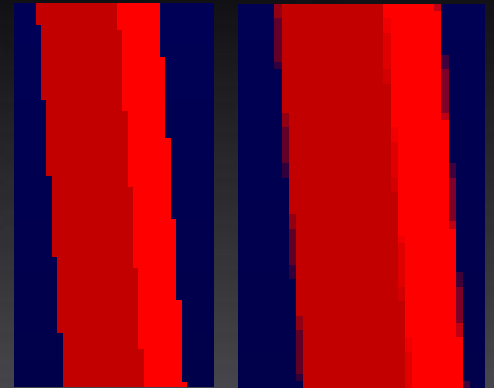
Move mouse to object –
handles appear

- Handle display required **no** redraw of scene (just a overlay redraw + composite)
- Manipulation of the handles required **no** redraw of scene
- Parts do not have touch-n-go handles – still need click-n-go
- Preferences exist to turn on/off touch-n-go for various object types

What's New in 9.2?

- Anti-aliasing filters

- Many new features prevented multi-sampled visuals
 - "jaggies" are back in 9.0-9.1
- 9.2 adds multi-sampled visuals via "shaders"
 - done in the graphics hardware
 - smooth out the images during interactive
- Does not effect batch rendering or saving images
 - these are already anti-aliased



9.0-9.1

9.2

- Variables for vortex identification

- Gamma 1 and 2 scalars on clip planes
- PSA

EnSight 10.0

Release in Q2 2011

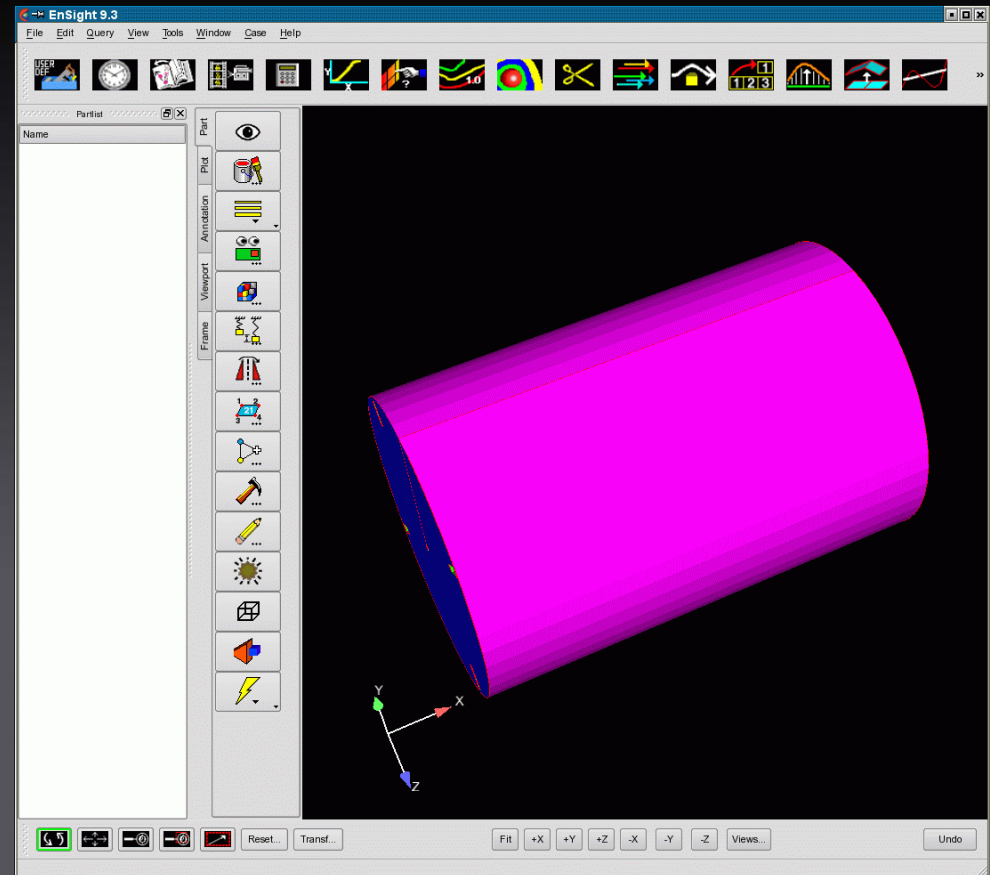
New GUI

Main feature is a new, modern GUI made in Qt

Coming Q2 2011 – EnSight 10.0

New GUI built with PyQt

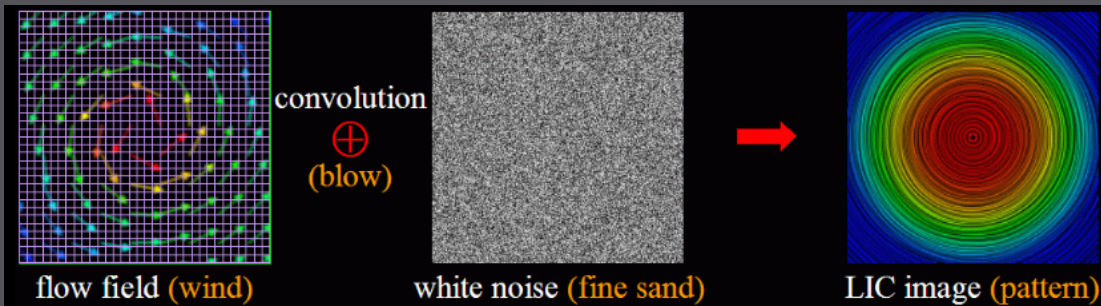
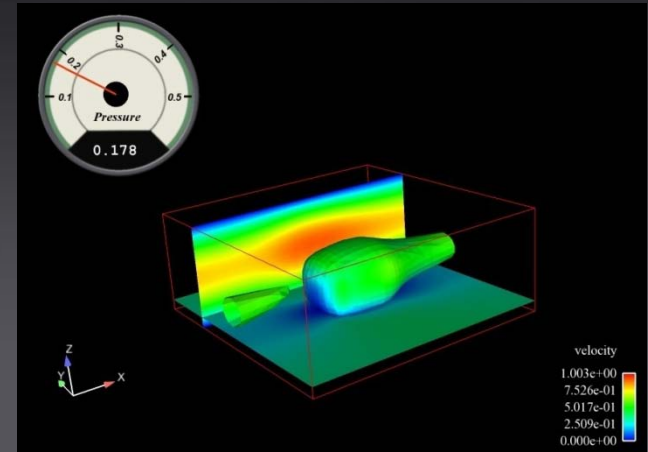
- Modern look and feel
- Consolidation of Win, Mac, and Linux
- Use of Drag and Drop
- Native File Open dialog (when running stand-alone)
- Dock, resize, and move GUI panels
- Right click on objects in graphics window
- Right click on GUI items



- Existing users will require no training
- Part list from EnSight CFD with additional enhancements
- Sorting, hierarchical views, use of metadata

EnSight 10

- April 2011 Target Date!
- With not-yet-determined feature enhancements
 - Report Generation
 - Plotting Enhancements
 - Volume Rendering options
 - N-faced element memory and performance
 - Instruments
 - Units
 - Selection by arbitrary polygon
 - LIC (Line Integral Convolution)



Thank you!

For the second part of my talk I will show a few slides from a presentation by our largest customer:

Los Alamos National Laboratory