GLOVE : Visualization of large-scale dataset in virtual environment

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Contents

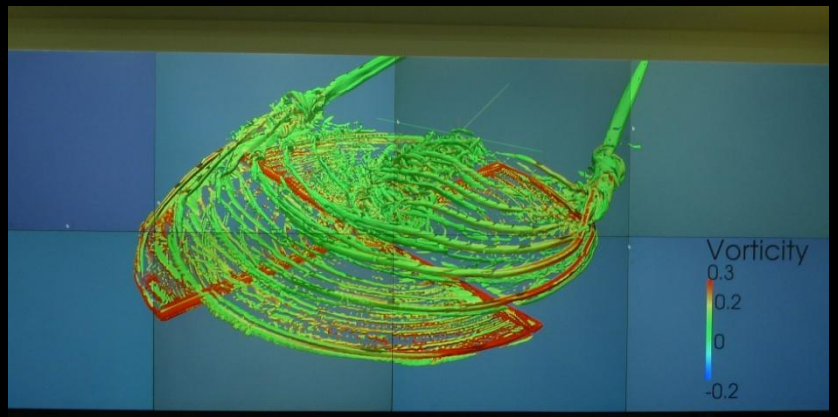
1. Visualization System

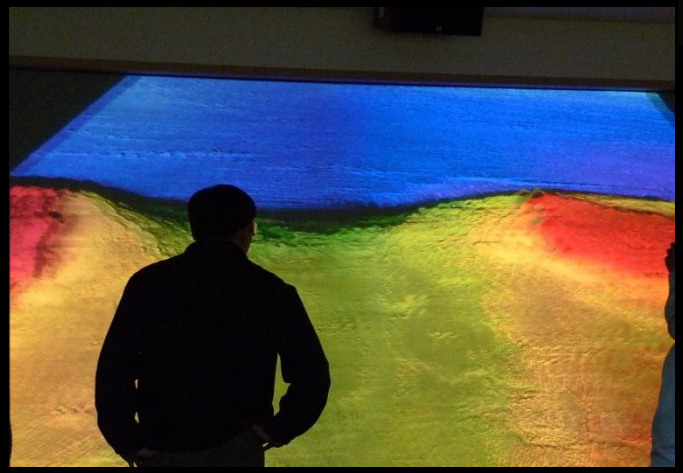
➲ Visualization system

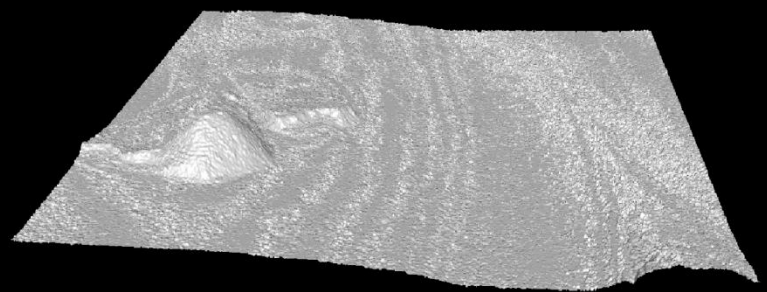
R_{max} / R_{peak}	8.3 / 10.4 TFLOPS
Nodes with GPU(#)	109
Processor	Xeon x5450 @ 3GHz
CPU(#)	872 cores
GPU	NVIDIA QuadroFX 5600
GPU(#)	109
Main memory	4 TB
Storage	450 TB

1. Visualization System

- Scientific data visualization support





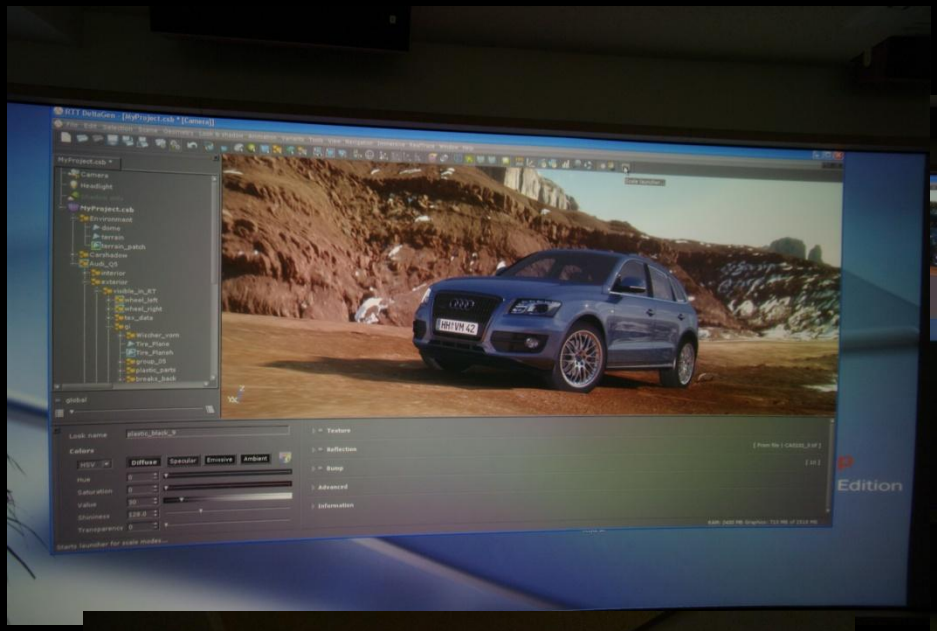


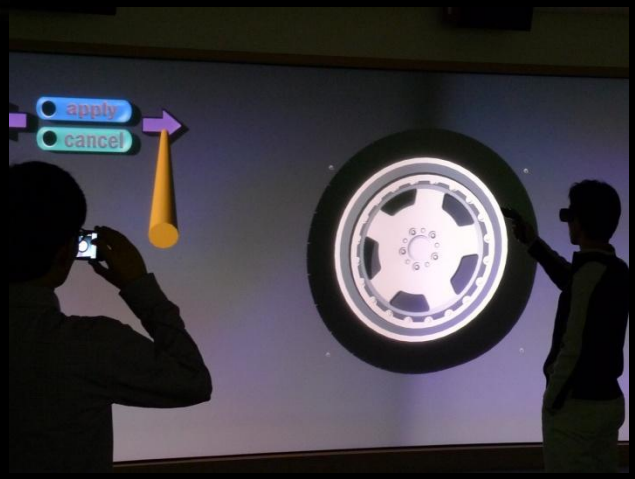
1. Visualization System

- Computer generated effects support

1. Visualization System

➲ Design visualization support



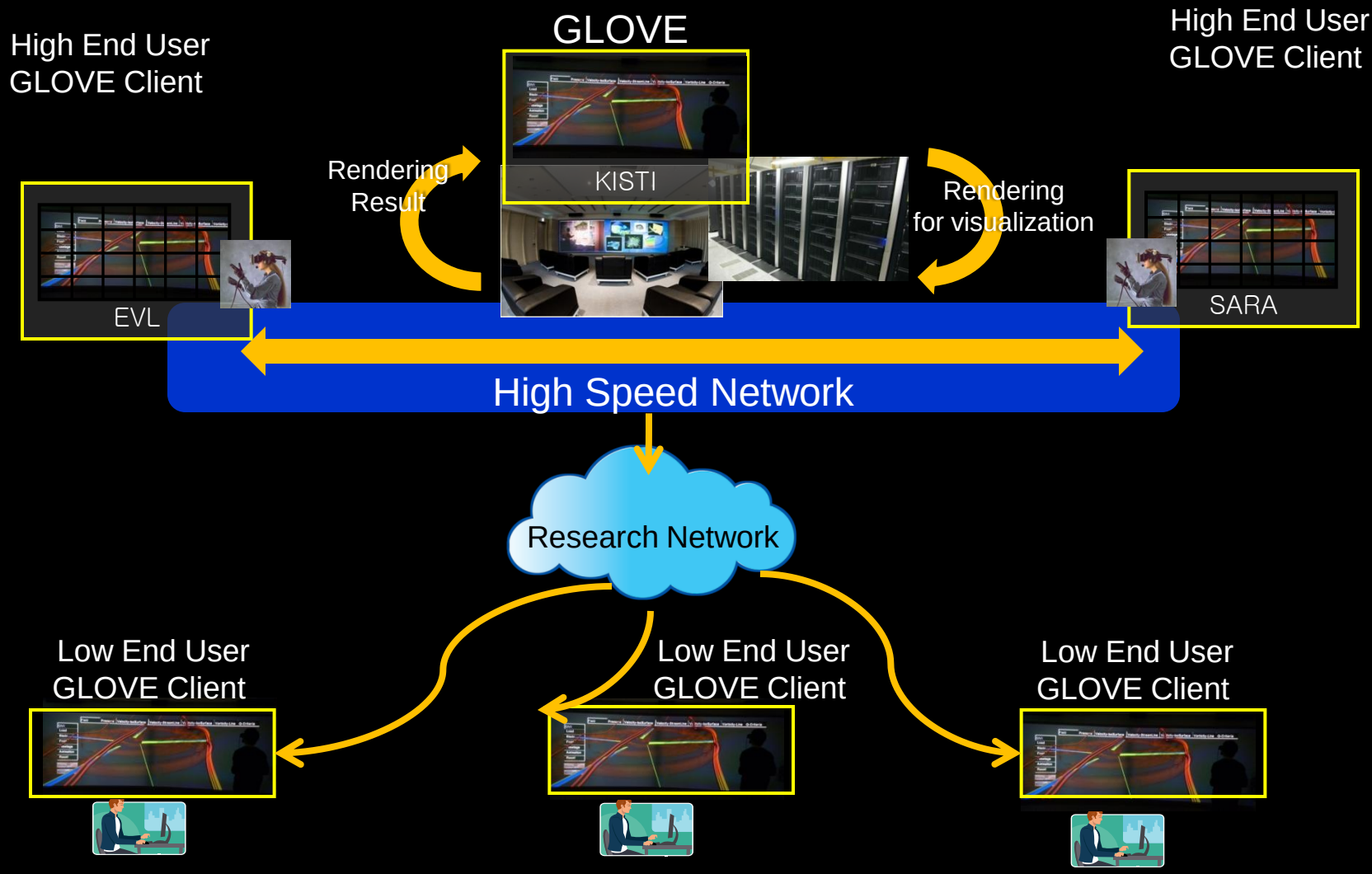


2. GLOVE

- GLOVE
  - Visualization system for large-scale scientific dataset in virtual environment
- Design Focus
  - Interactive-time manipulation of tera-scale dataset
    - ✓ Need to parallelize visualization & rendering, I/O, transfer, etc.
  - Integrated visualization & analysis in VR environment
    - ✓ Support of various types of displays
  - User Interface familiar not to graphic experts but to researchers.

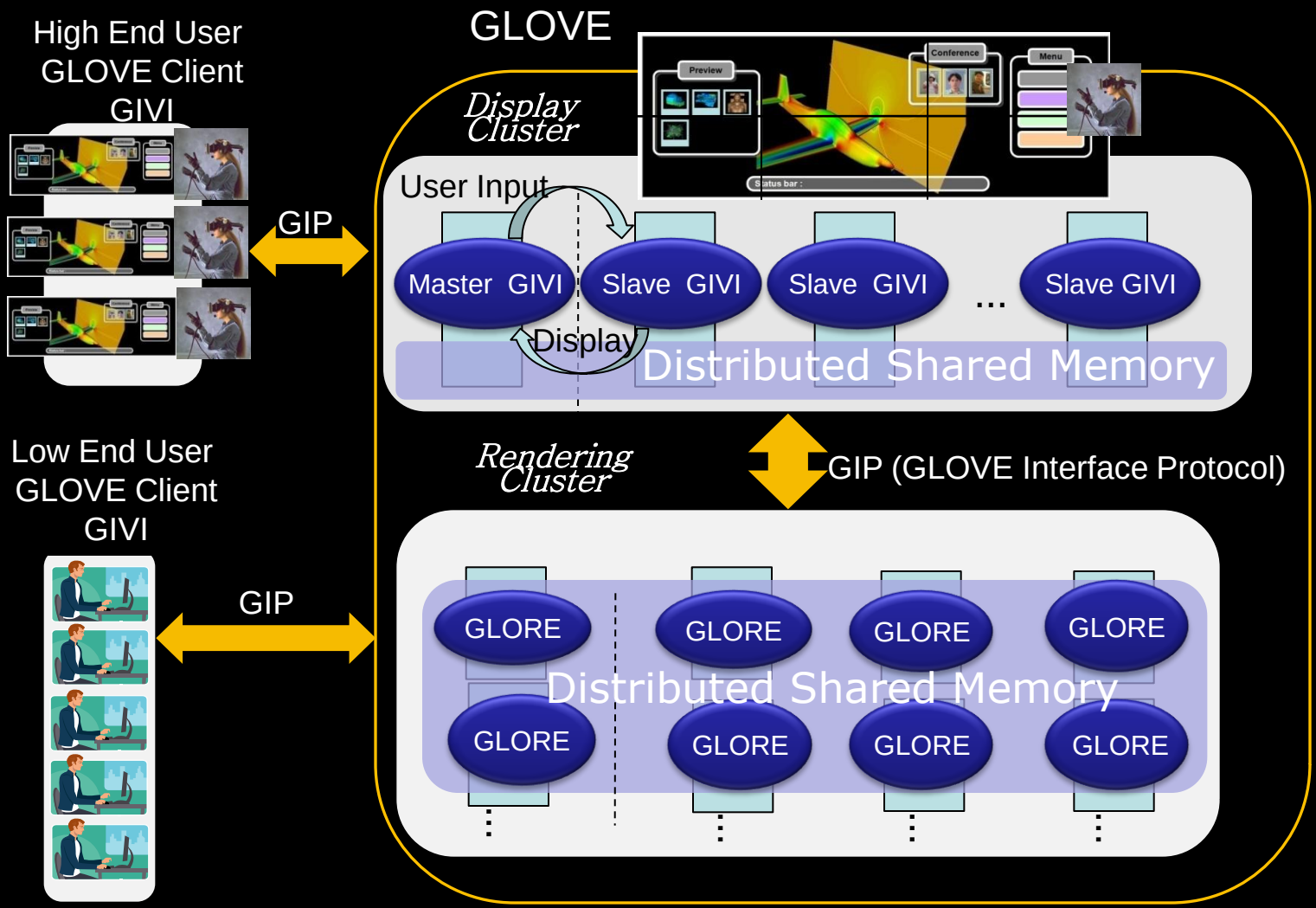
2. GLOVE

- GLObal Virtual Environment for collaborative research



2. GLOVE

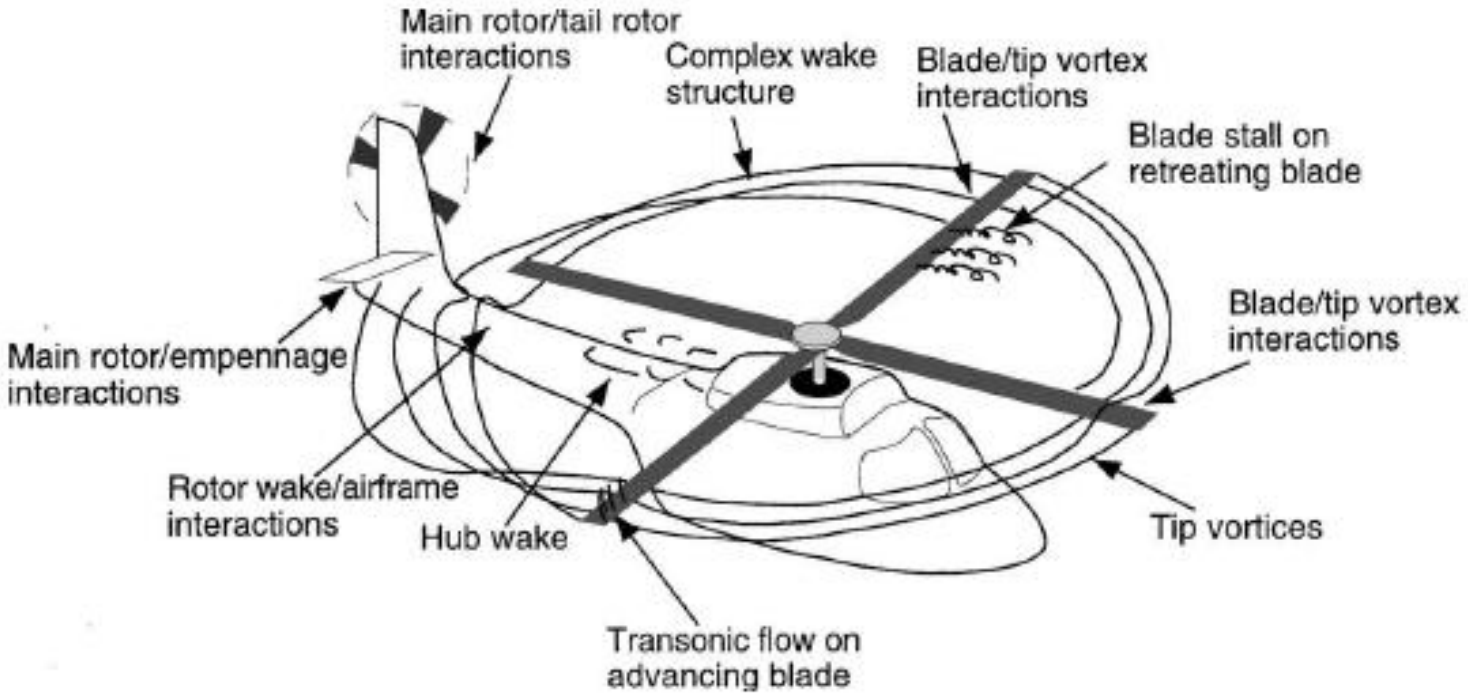
GLOVE System Architecture



GIVI : GLOVE Integrated Visualization Interface
GLORE : GLOVE Rendering Engine

3. Rotor Simulation Data Visualization

➲ Rotor Dynamics



Typical flow phenomena found on a helicopter in forward flight

Leishman, J. G. and Bagai A.

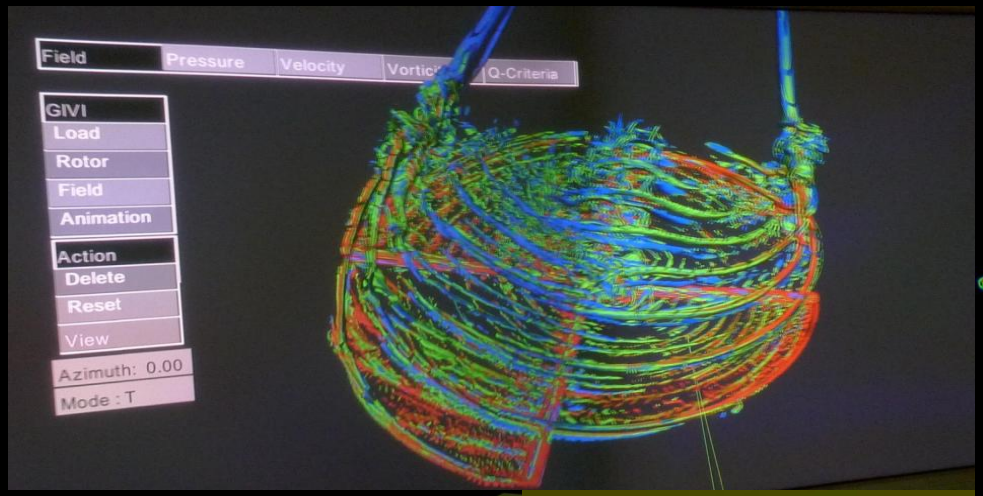
"Challenges in Understanding the Vortex Dynamics of Helicopter Rotor

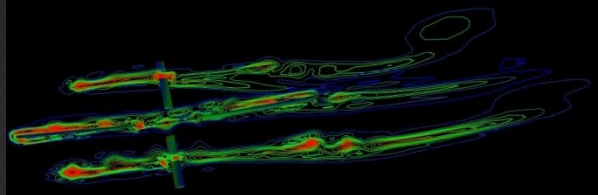
3. Rotor Simulation Data Visualization

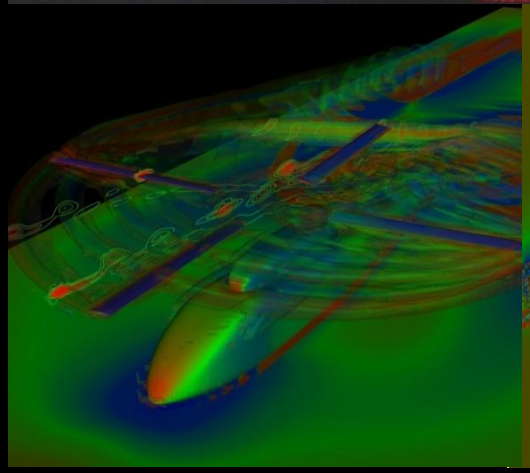
- Blade-vortex interaction

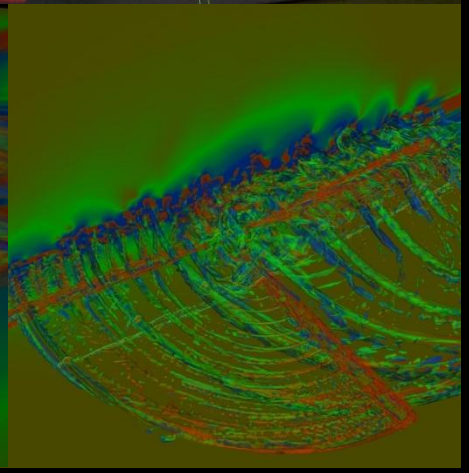
Want to trace vortices and know what happens on a blade in interaction

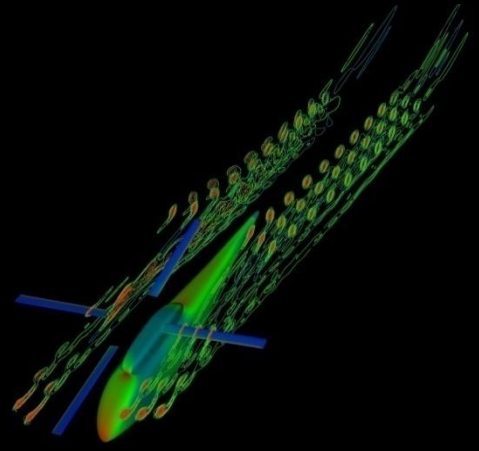
3. Rotor Simulation Data Visualization











4. Rotor Simulation Data Visualization

3. Rotor Simulation Data Visualization

➲ Performance

<1.2TB, 90 time step>

	Parallel	COVISE (sec)	ParaView (sec)	GLOVE (sec)	C : P : G
Cutting surface	Single	36	11.93	20.04	1.8 : 0.59 : 1
	Parallel	N/A	1.79	1.80	N/A : 0.99 : 1
Iso-surface	Parallel	N/A	10.11	2.12	N/A : 4.76 : 1
Iso-surface animation	Parallel	N/A	274	2.12	N/A : 129.2 : 1

- COVISE (http://www.hlrs.de/covise)

  Collaborative VIsualization and Simulation Environment

- ParaView (http://www.paraview.org)

  Open-source, multi-platform data analysis and visualization application

4. Future

- Visual Interactive Supercomputing