

# API for Grid Based Visualization Systems

Workshop on  
Grid Application Programming Interfaces

Monday, September 20, 2004

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# Outline

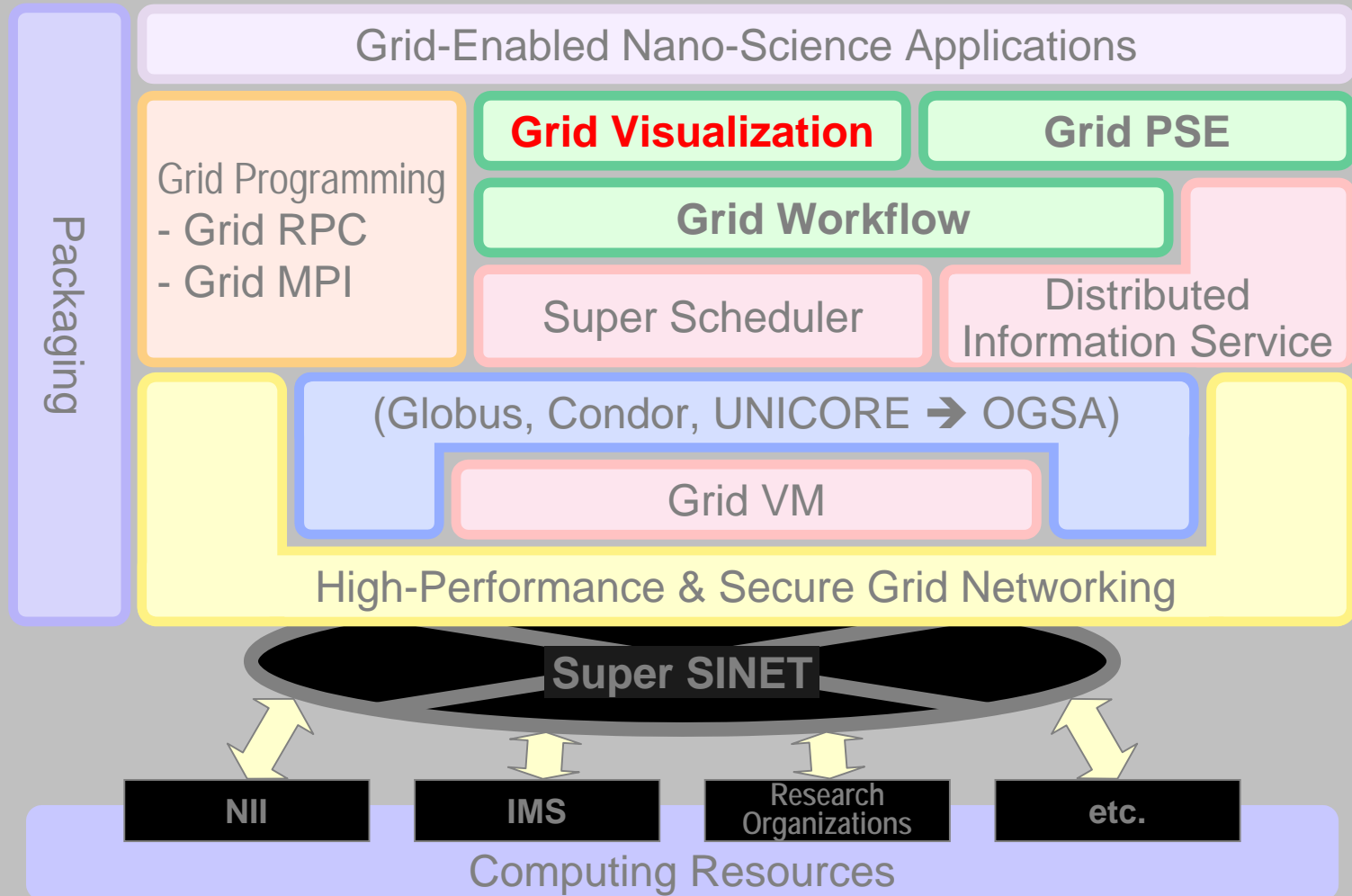
- Introduction
- Visualization API
- Grid Visualization Services API
- Future Work
- Summary

# Introduction

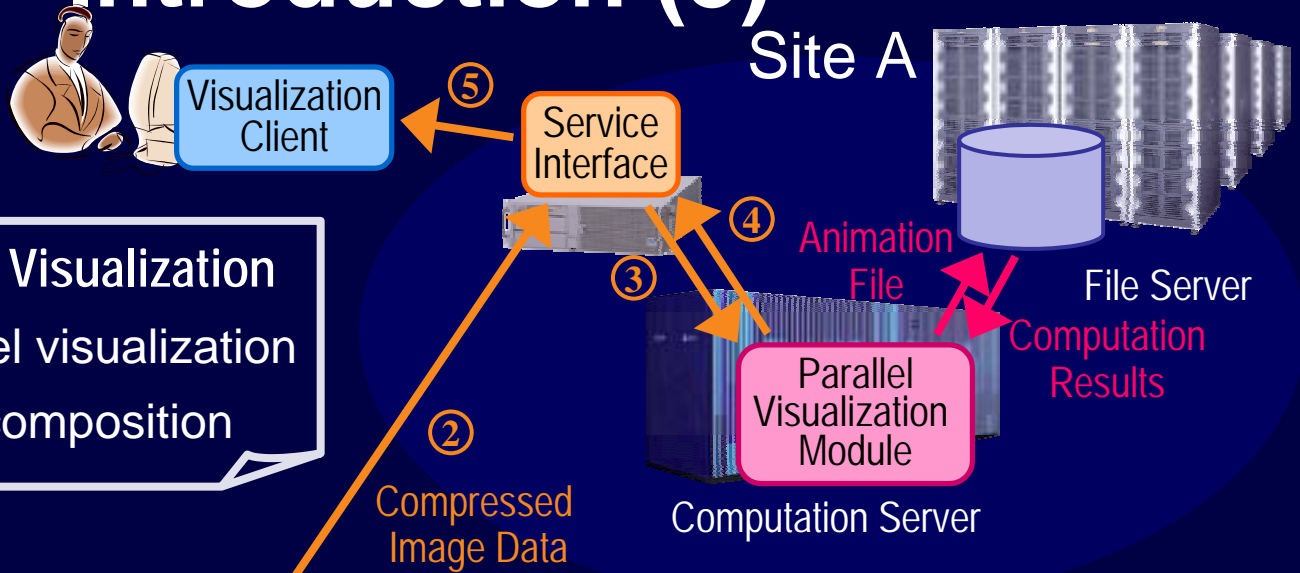
- Background
  - Essential tool for scientific simulations
  - Critical demand for coping with data in the Grid
- Objectives
  - Visualization large-scale distributed data
  - Generalized Grid visualization services

# Introduction (2)

## 100 TFLOPs Scientific Grid Environment

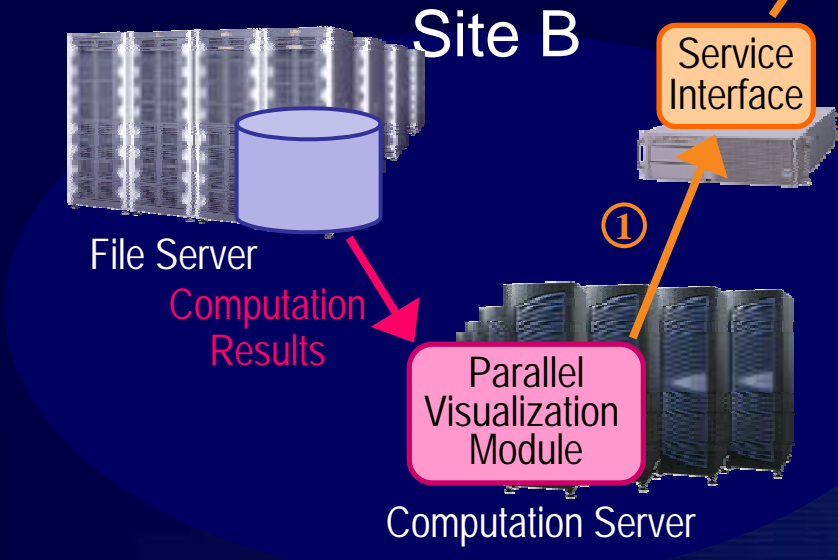


# Introduction (3)



**Image-Based Remote Visualization**

- Server-side parallel visualization
- Image transfer & composition



**Advantages**

- No need of rich CPUs, memories, or storages for clients
- No need to transfer large amounts of simulation data
- No need to merge distributed massive simulation data
- Light network load
- Visualization views on PCs anywhere
- Visualization in high resolution without constraint

# Introduction (4)

- Merits of the Server-side Visualization
  - Concurrent Visualization
    - No need to input or output results to disks
    - Tracking and steering simulations
    - Visualization with the highest resolution
  - Post-Processing Visualization
    - No need to merge distributed data
    - No need to transfer large volumes of data
    - Visualization with the highest resolution

# Visualization API

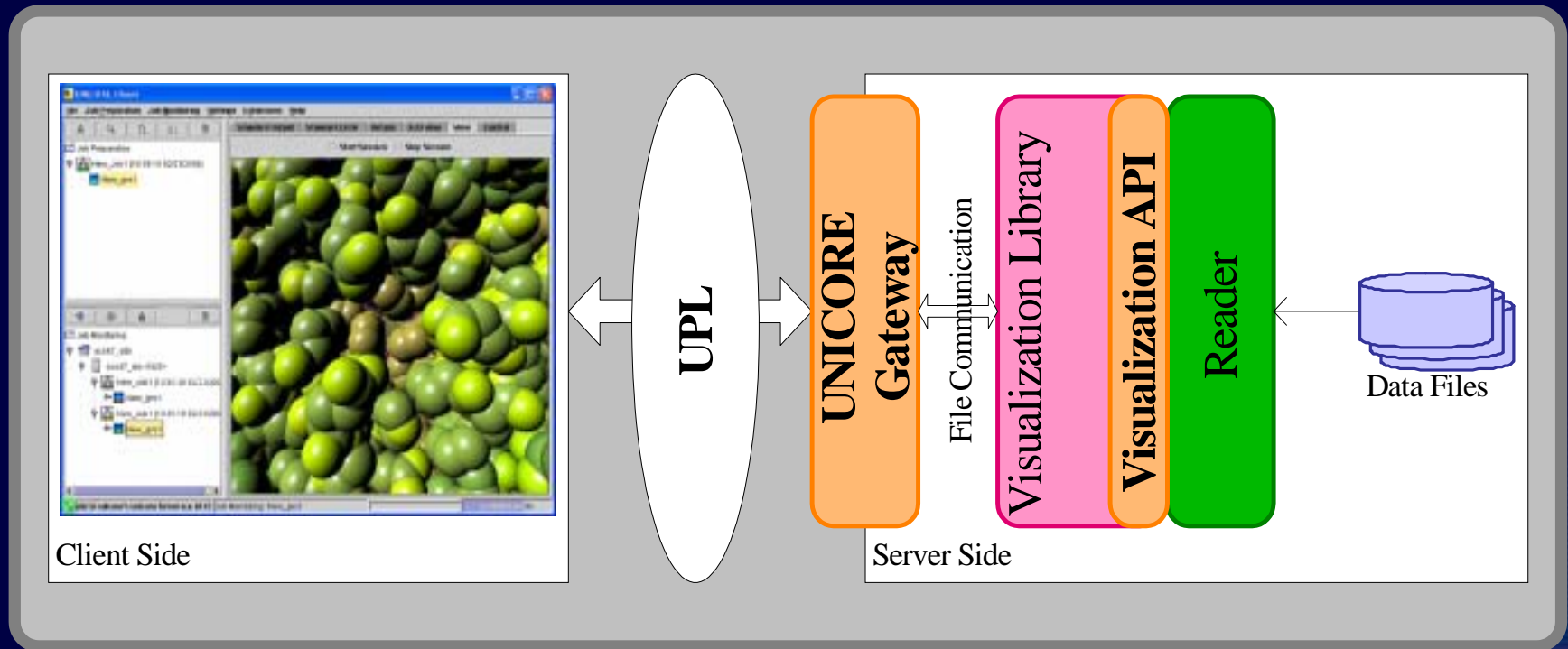
- Mission
  - Make visualization-enabled a server module
- Targets
  - Visualization module for concurrent computation
  - Visualization module for post-processing

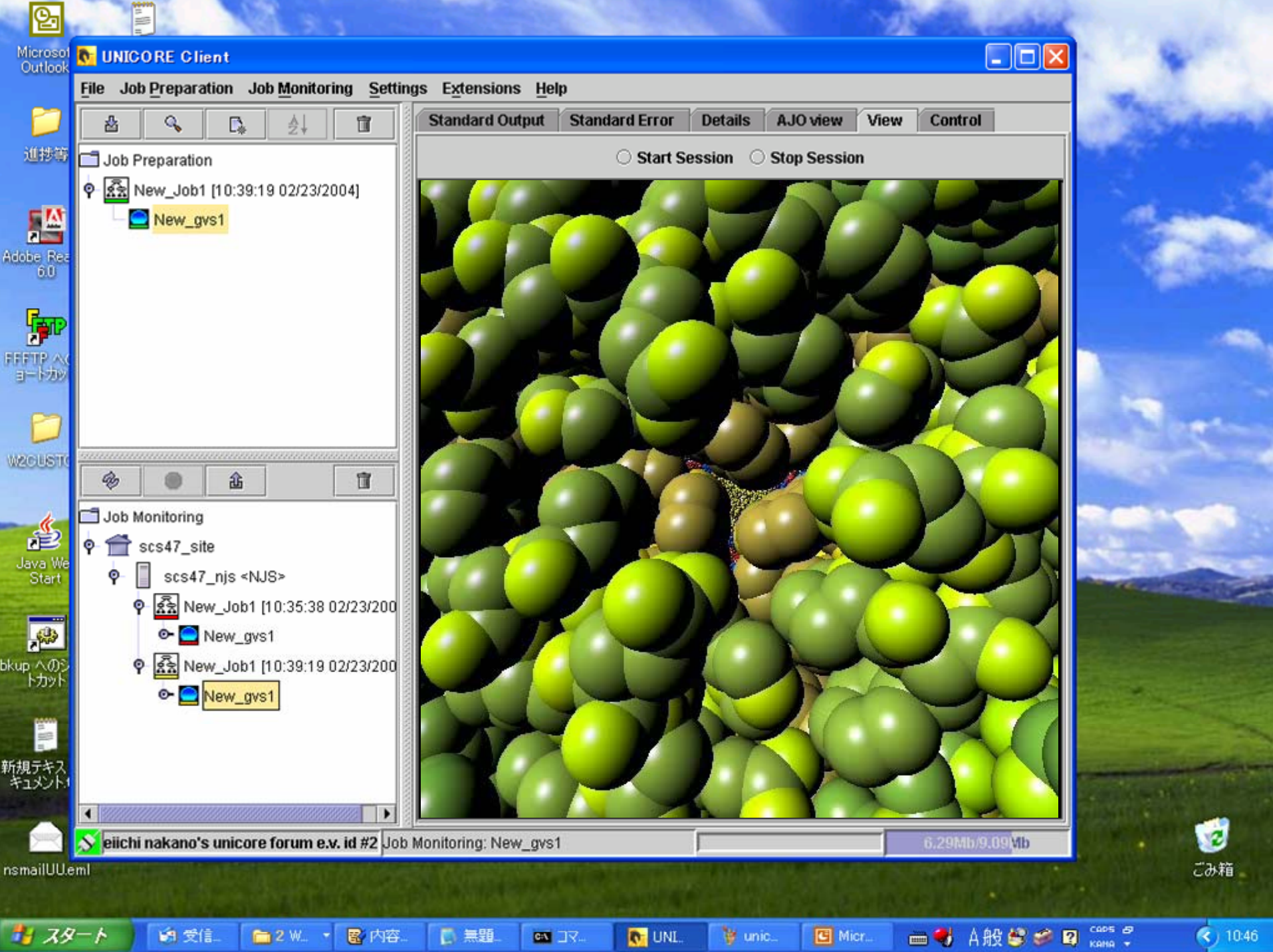
# Visualization API (2)

- Format: Simple API in Fortran & C
  - General
    - GVS\_INIT
    - GVS\_MAIN
    - GVS\_TERM
  - Molecular Science
    - GVS\_INIT\_[SCALAR, REAL]
    - GVS\_[ATOM, QUANTUM, ATOM\_SCAL\_INT, ATOM\_SCAL\_REAL]

# Visualization API (3)

- Use Case





UNICORE Client

File Job Preparation Job Monitoring Settings Extensions Help

Standard Output Standard Error Details AJO view View Control

Start Session  Stop Session



Job Preparation

New\_Job1 [10:39:19 02/23/2004]

New\_gvs1

Job Monitoring

scs47\_site

scs47\_njs <NJS>

New\_Job1 [10:35:38 02/23/2004]

New\_gvs1

New\_Job1 [10:39:19 02/23/2004]

New\_gvs1

eiichi nakano's uncore forum e.v. id #2 Job Monitoring: New\_gvs1

6.29Mb/9.09Mb

# Grid Visualization Services API

- Mission
  - High-level of Abstraction
  - Easy to Use
  - Extendable
- Target Services
  - Concurrent Visualization
  - Post-processing Visualization
  - Database Visualization

# Grid Visualization Services API (2)

- Format: Java
- Operations (Examples)
  - `setCamera`
  - `setImageSize`
  - `setLight`
  - `setColorTable`
  - `setBackgroundColor`
  - `getImage`

# Grid Visualization Services API (3)

- Example 1

```
// Generate an instance of Post visualization service.
PostVisualizationService pvs= new PostVisualizationService();

// Set data file which contents is visualized
pvs.setDataFile("gsiftp://localhost:2811/tmp/file1");

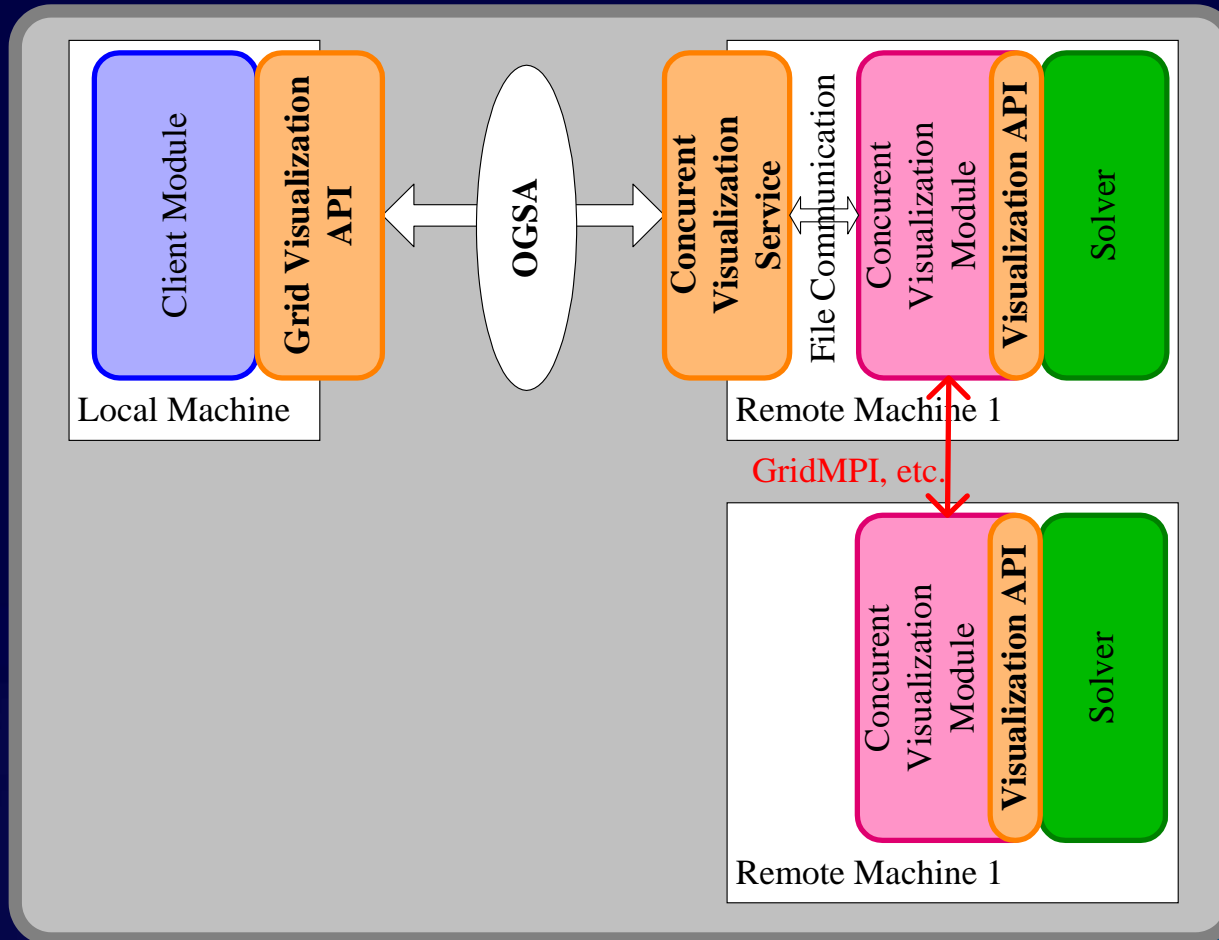
// Setting Camera parameter
pvs.setCamera(...);

// Setting a light
pvs.setLight(...);

// Generate a visualized image
byte[] imageData= pvs.getImage();
```

# Grid Visualization Services API (4)

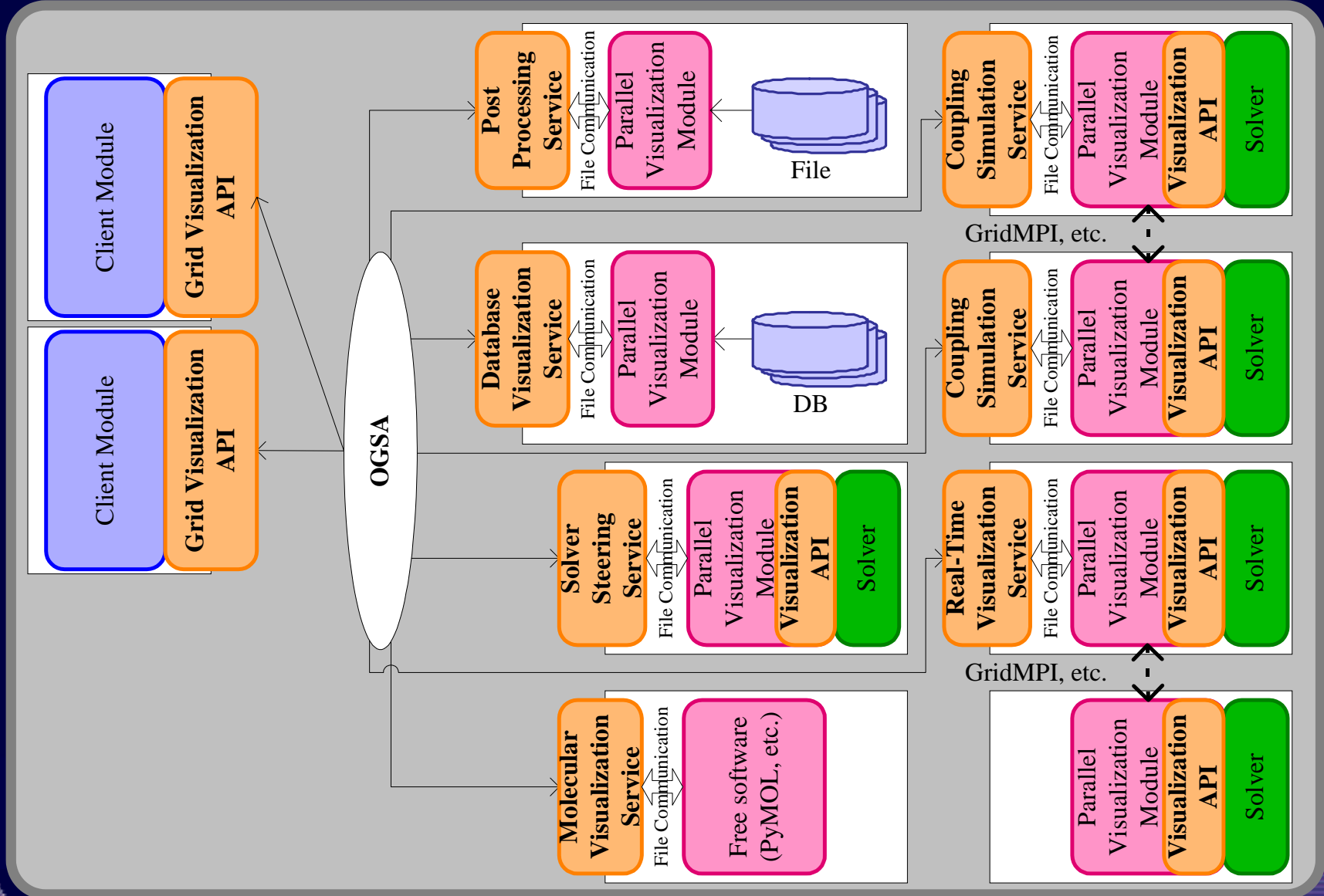
- Example 2



# Future Work

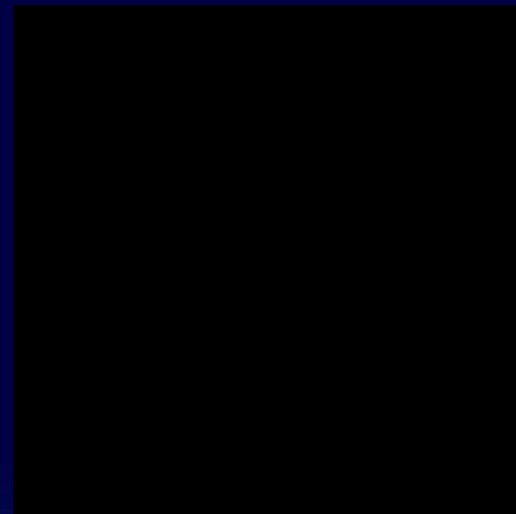
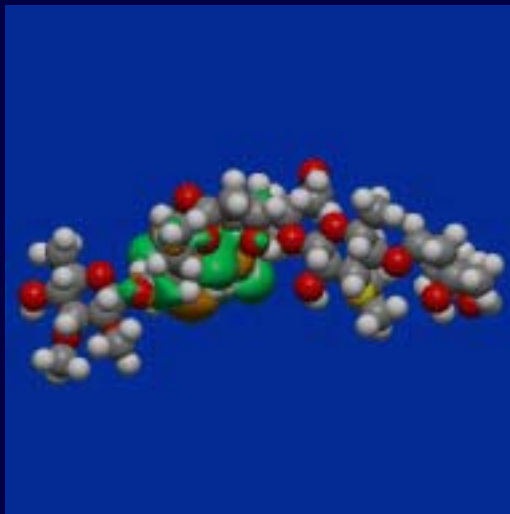
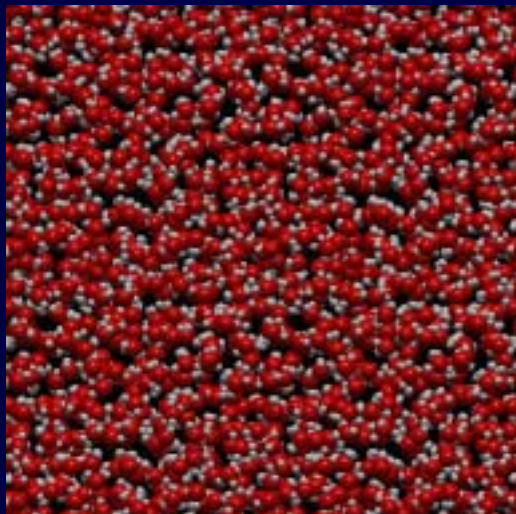
- Generalized Grid Visualization Services
  - Universal parameters
  - Field-specific parameters
  - Software-specific parameters
- Become a Grid Standard

# Future Work (2)



# Summary

- We have a Solution



- Acknowledgements
  - Institute for Molecular Science (IMS)
  - National Institute of Informatics (NII)