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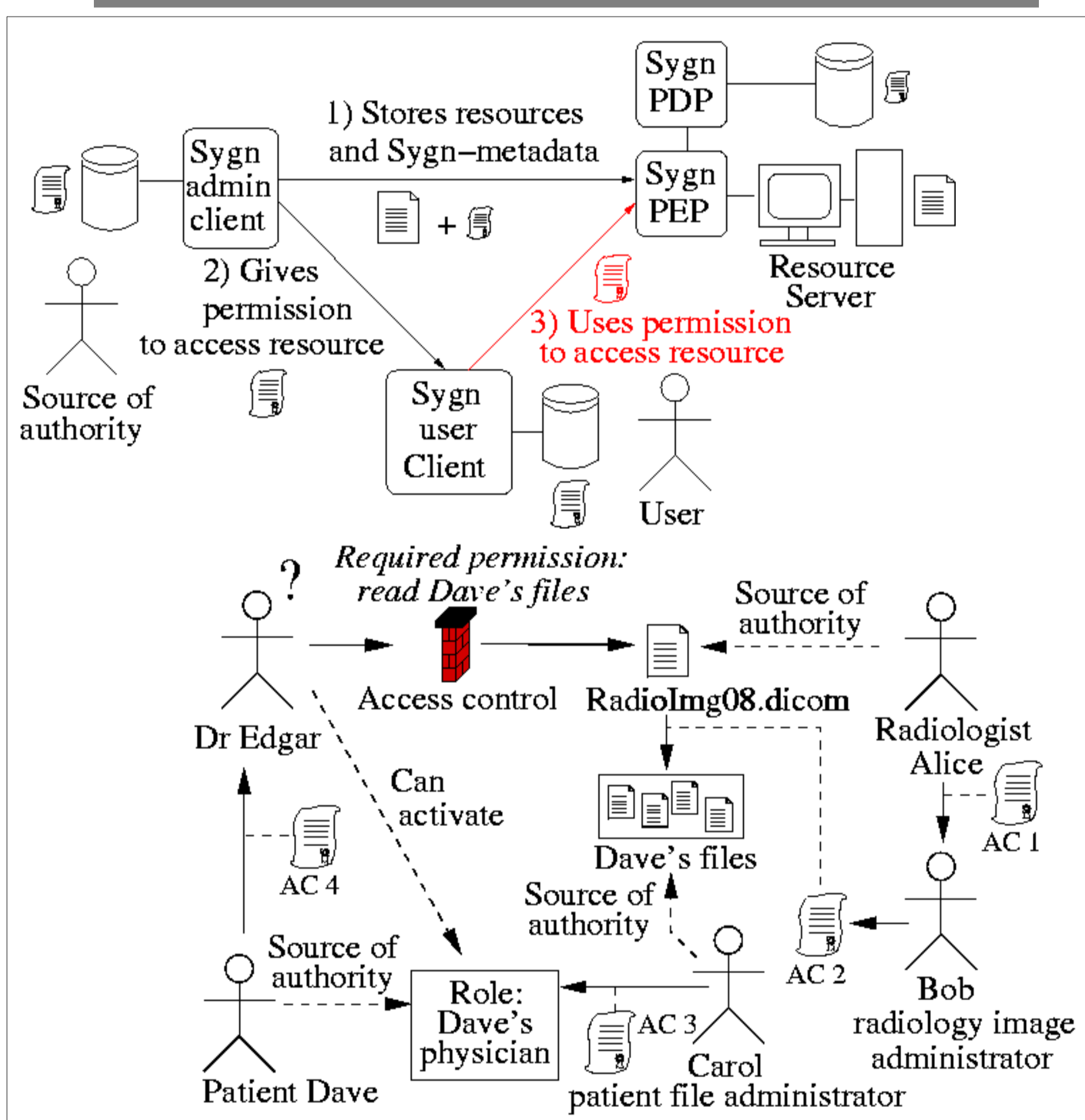
## Objectives

The aim of the MEDIGRID project is to explore the use of the GRID technologies for tackling the processing of huge medical image databases available in the hospitals today. The very large size of medical datasets, and the complexity of some modeling and signal processing algorithms create the need for tremendous processing power and storage capacity. The MEDIGRID project is addressing to kind of medical applications for which GRIDS can bring a valuable support:

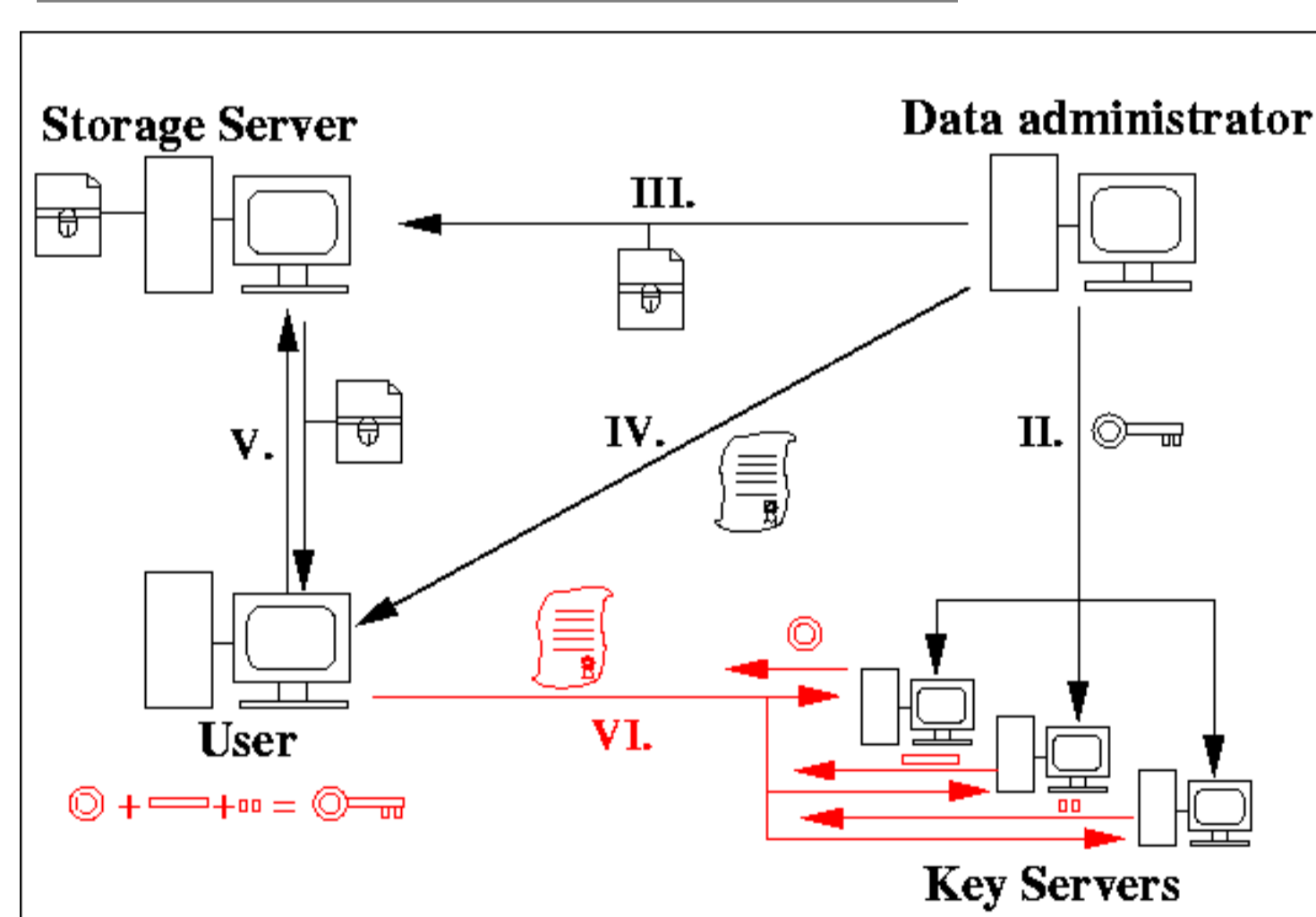
- Complex image processing algorithms requiring a parallel implementation to become tractable.
- Tools for handling and processing complete databases of medical images.

## Security

### Sygn Certificate-based access control with delegation

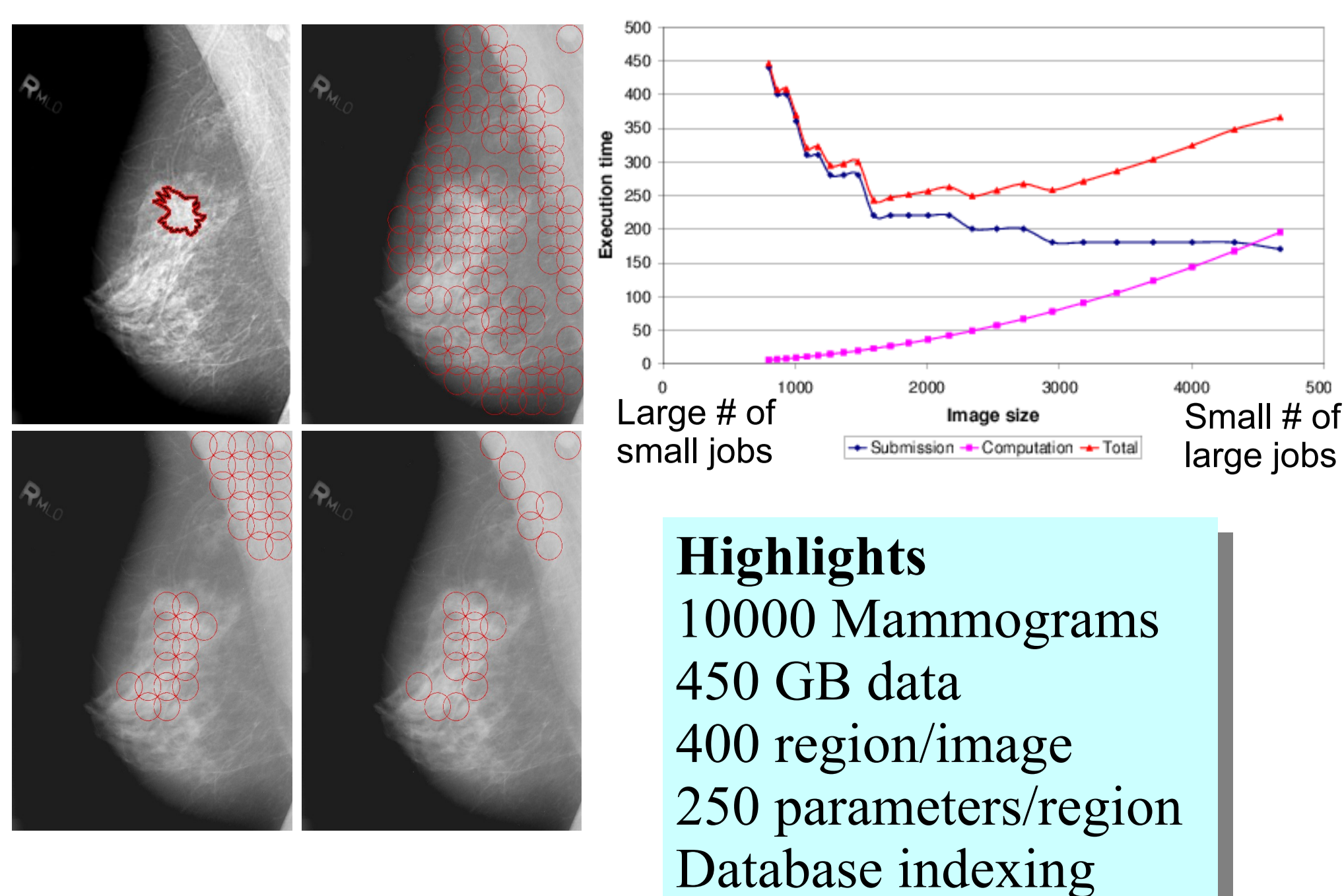


### CryptStore Distributed key management



## Applications

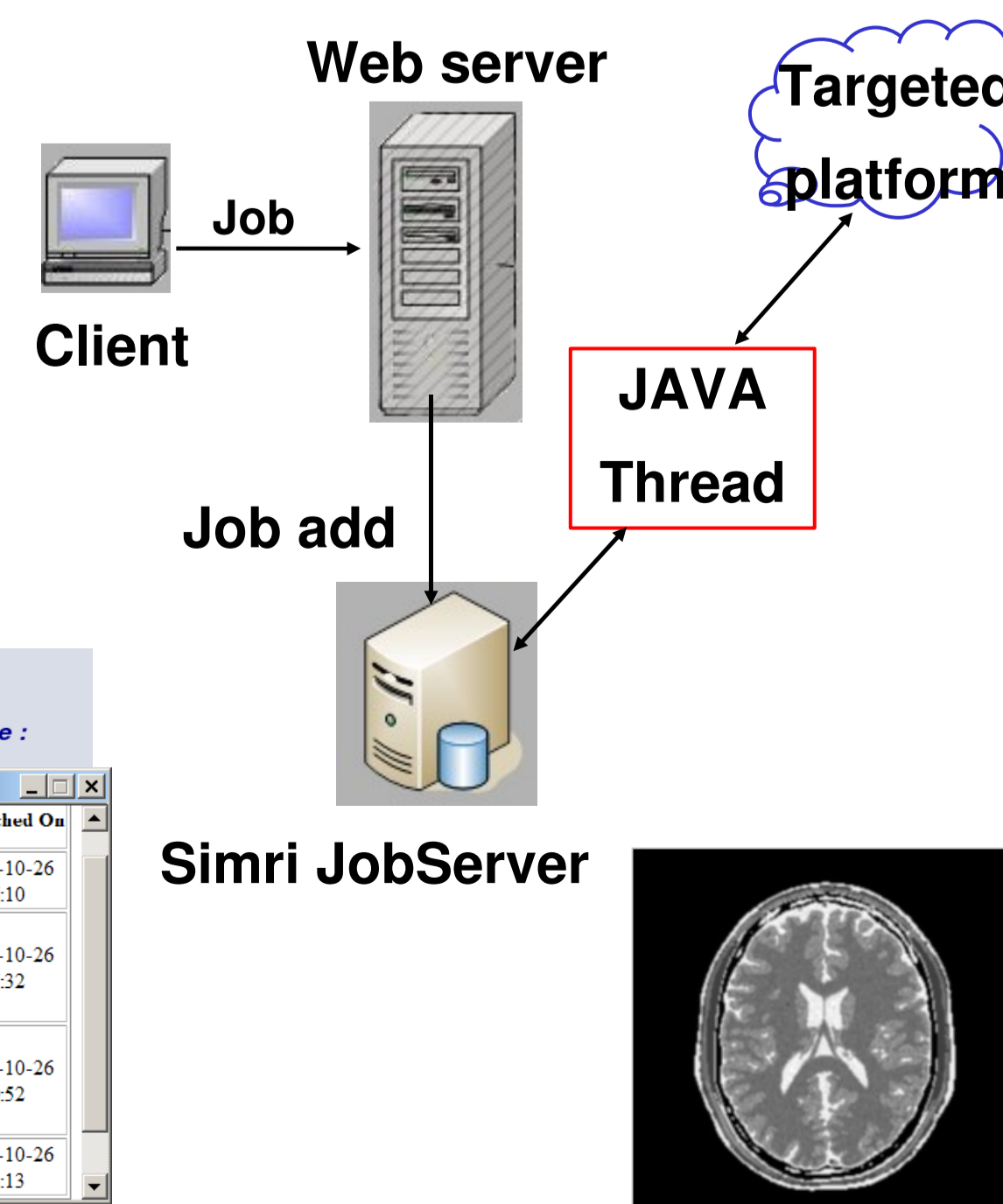
### Mammograms analysis



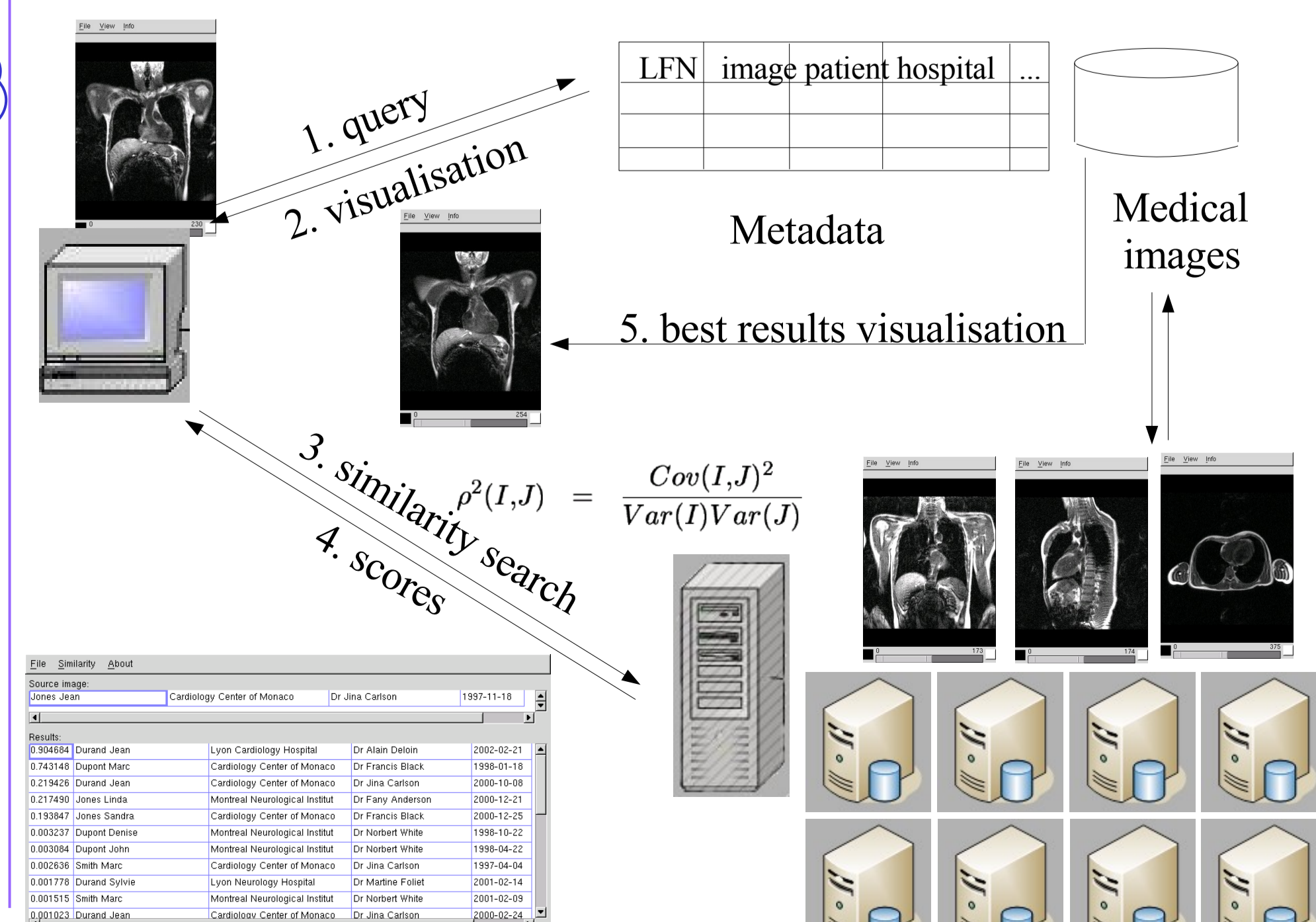
### Magnetic Resonance Image Simulator

- Highlights**
- MRI physics simulation (including artifacts)
  - MPI parallel code
  - MRI studies
  - Algorithms validation

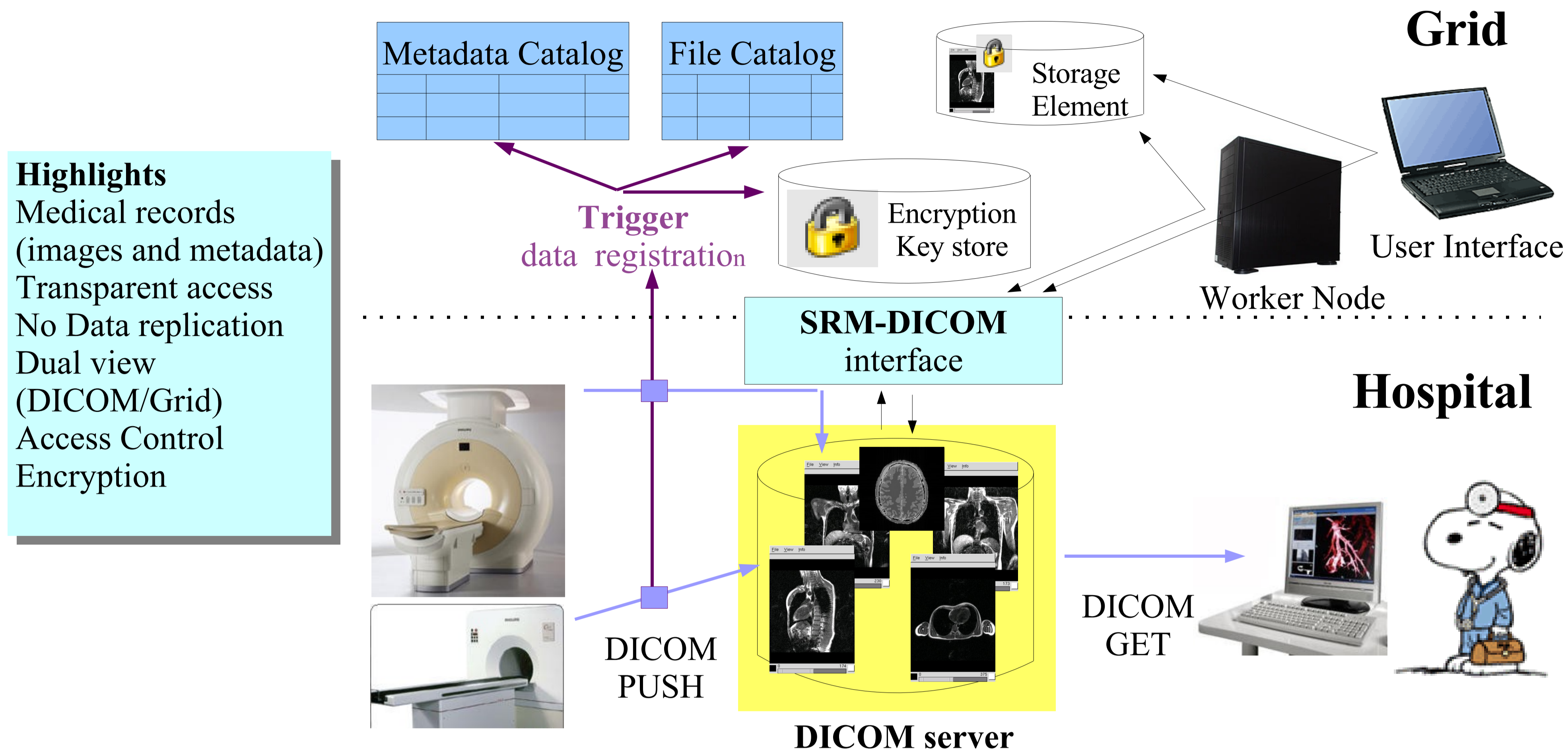
Sign out	Submit job	Running jobs	Ended jobs
On Cluster			
ImageName	startTime		
Image	Submitted	Running	Submitted
Image	Submitted	Running	Submitted
Image	Submitted	Running	Submitted
Image	Submitted	Running	Submitted



### Indexing and content-based retrieval



## Interface to medical data



- Highlights**
- Medical records (images and metadata)
  - Transparent access
  - No Data replication
  - Dual view (DICOM/Grid)
  - Access Control
  - Encryption

## Medical Databases

- Several data sources**
- Clinical images
  - Simulated images
  - Annotated mammograms
- Simple Medical metadata schema**
- Patient-related
  - Image-related
  - Acquisition-related
  - Hospital-related
  - Diagnosis
  - History
  - System (file, logs, access control)

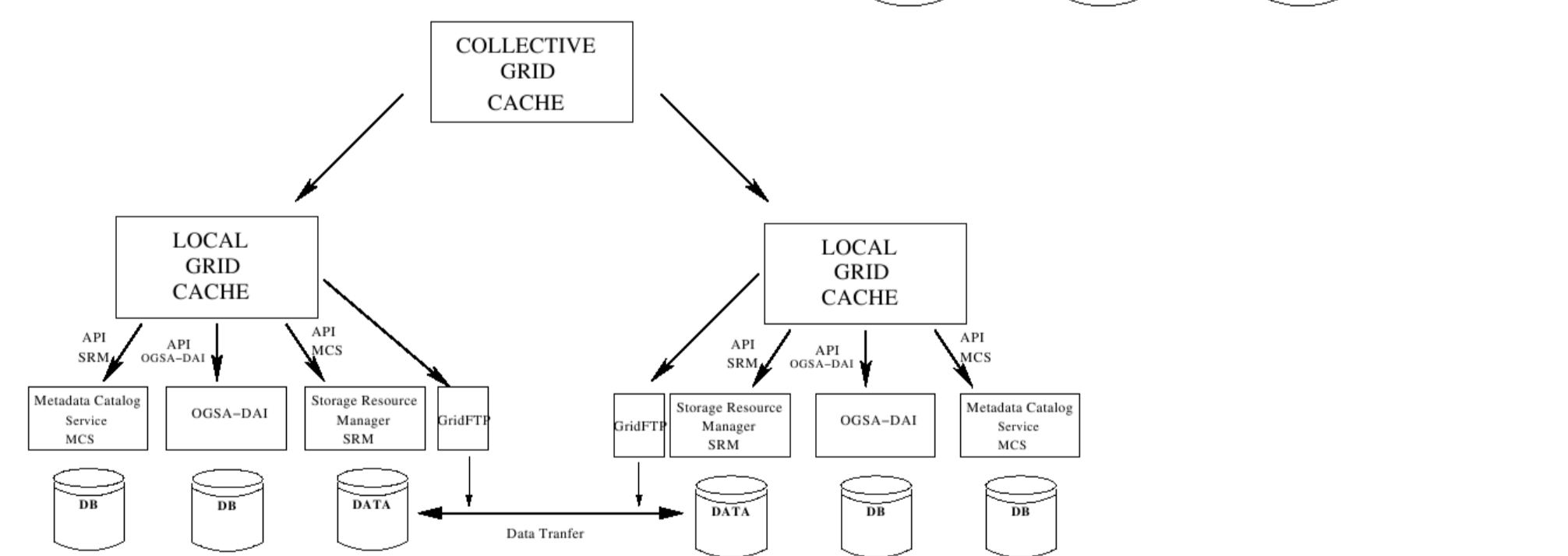
## Distributed queries, caching

### Uniform Distributed Cache Service

- Two-levels (local, inter-cache)
- Data consistency checks
- OGSA compliant

### Replacement policies

- Least recently used
- Least frequently used
- Size



## References

Using grid technologies to face medical image analysis challenges. J. Montagnat, V. Breton, I. E. Magnin, Biogrid'03, IEEE CCGrid03, pp 588-593, May 2003, Tokyo, Japan.

Medical images simulation, storage, and processing on the European DataGrid testbed. J. Montagnat, F. Bellet, H. Benoit-Cattin, V. Breton, L. Brunie, H. Duque, Y. Legré, I.E. Magnin, L. Maigne, S. Miguet, J.-M. Pierson, . Seitz, and T. Tweed. Journal of Grid Computing, 2.(4):387-400, Dec. 2004.

A versatile and interactive MRI simulator, H. Benoit-Cattin, G. Collewet, B. Belaroussi, H. Saint-Jalmes, and C.Odet, Journal of Magnetic Resonance, Sept. 2004.

Partitioning medical image databases for content-based queries on a grid. J. Montagnat, Vincent Breton, Isabelle E. Magnin. Methods of Information in Medicine, 44(2):154-160, 2005.

Encrypted Storage of Medical Data on a Grid, L. Seitz, JM. Pierson, L. Brunie. Methods of Information in Medicine, 44(2):198-202, 2005.

Metadata Management for Efficient, Secure and Extensible Access to Data in a Medical Grid, JM. Pierson, L. Seitz, J. Montagnat et H. Duque, Globe'04, Saragosse, Spain, Sept 2004.

A multi-resolution approach for a content-based image retrieval on the grid. Application to breast cancer detection. K Hassan, T Tweed, S Miguet. Methods of Information in Medicine, 44(2): 211-214, 2005.