Grid Registration Services

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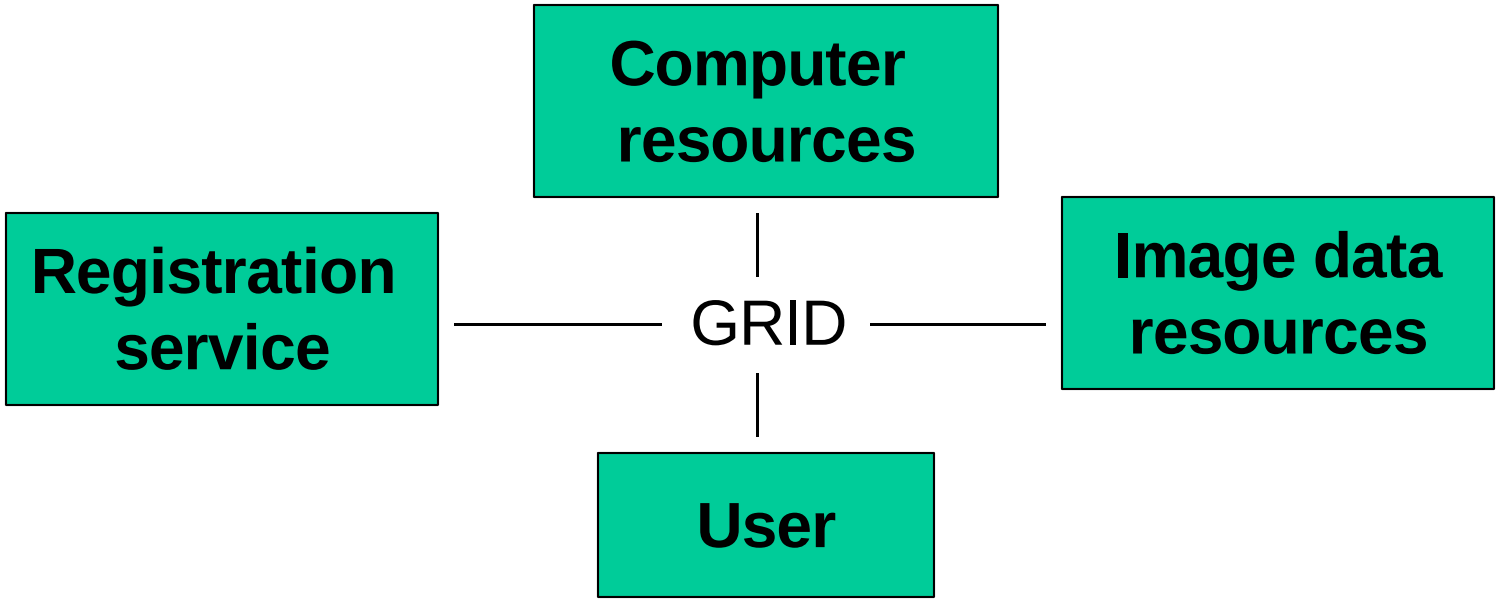
Registration grid services



- Scenario 1: user accesses to registration services through the grid on his own data
- Scenario 2: the user test his algorithm on standard image databases

Registration service: interoperability

- Image format (input / output)
  - Dicom (communication module ?)
  - Basic 3D image format ?
- Transformation formats
  - Standardized displacement field / resampled image
  - Internal representation + std resampling function
- Algorithm parameters / options
  - Define std param. w.r.t. classes of registration problems
- Interactivity
  - State of advancement (reporting)
  - Interactive corrections

Registration Service: the GRID environment

- Access to the grid infrastructure
  - Middleware
  - Portal
  - Registry

- What moves: algorithm, data or both?
  - Resource allocation
  - Portability
  - Security and confidentiality
  - Access policies

Ontology of Algorithms
(registration service)

- Type of data
  - Images (2D, 3D, time series)
  - Point clouds, landmarks
- Type of spatial transformation
  - Rigid / similarity / affine
  - Non rigid (global / local) (splines, def. Fields, polyrigids…)
- From Data to Transformation
  - Comparison metric (SSD, Correlation coefficient) takes into account the intensity transformation
  - Optimization procedure
  - Interactivity

Ontology of Registration Problems
(image databases)

- Modality involved (specifies the type of data)
  - Monomodal (CT, MR, US, Video, point measures…)
  - Multimodal (combination of above)
  - Atlas to modality
- Image content (specifies the type of transformation)
  - Anatomical part concerned (head, thorax, abdomen…)
  - Changes expected
    - intrasubject / intersubject / atlas
    - Smooth evolution / pathology

Way forward

- Data
  - **Currently:** 3D images, Analyze format
  - Minimal information: image dimensions, voxel size (mm), voxel type (8/16bit, signed, float…), endianness
  - Image coordinate system (e.g. SPM)?
  - Image conversion service: add formats by providing a bidirectional conversion tool into an already known format

- Transformations
  - **Currently:** Resampled input image
  - Standardized displacement field (format ?)
  - Internal representation + standard C++ resampling function

Way forward

- Ontologies
  - Xml?
- Grid infrastructure
  - SSH, Web service, GT3, DataGrid 2.0 ?
  - Algorithms running on the author's platform
- Databases
  - **Currently:** a few anonymized images with permissions
  - Consistent formats and meta-informations
  - Access policies