A Grid-based Tool for the Composition of Distributed Signal Processing Operators

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Problem Formulation

- **Problem**
  - How to compose signal processing operators in a distributed (grid) environment.

- **Design Requirements**
  - Signal processing operators may be geographically distributed in different domains and developed by different researchers.
  - Efficient utilization of resources for the composition workflow.
  - Appropriate use of signal processing metadata.
Methodology (Technical Approach)

- **Metadata Mechanism**
  - Automatically generates a descriptor file for each operator.
  - The descriptor file contains metadata associate to the creation and functionality of the signal processing operator.

- **Monitoring Mechanism**
  - Supplies information regarding the availability and utilization of resources hosting the operators.
  - The model abstracts the composition constructing a XML descriptor.

- **Broker Mechanism**
  - Uses metadata and monitored data to perform the resultant operator-based grid service.
Application Tools

- **Globus Toolkit**
  - Open source middleware used for building grid systems and applications.
  - We use GT 4.0.1 to support the grid environment functionality of grid-based tool.

- **Gridsphere Portal Framework**
  - Portal framework to create reusable portal components (portlets) that can be integrated in a common portal container system.
  - We use GridSphere 2.7 to construct the grid portal and portlet for visual composition of operators.

- **Java**
  - Object-oriented programming language.
  - Signal processing grid services are implemented in Java.

- **Java Advanced Imaging (JAI) API**
  - API that provides a set of object-oriented interfaces that support a simple, high-level programming model to manipulate images easily.
  - We use JAI to execute signal processing operators.

- **Eclipse IDE**
  - Integrated Application development environment
Research Results

- A set of signal processing operators deployed on distributed grid enabled resources.
- A prototype of a grid portal to access data and operators via portlets.

“Grid Portal Development for Sensing Data Retrieval and Processing.”
D. Arias, M. Mendoza, F. Cintron, K. Cruz, and W. Rivera
IEEE/ACM Second International Workshop on Grid Computing Environments (GCE06), Supercomputing 2006