

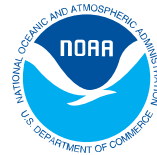
# A Grid-based Tool for the Composition of Distributed Signal Processing Operators

By: Mariana Mendoza-Botero, MS Student

Advisor:  
Prof. Wilson Rivera

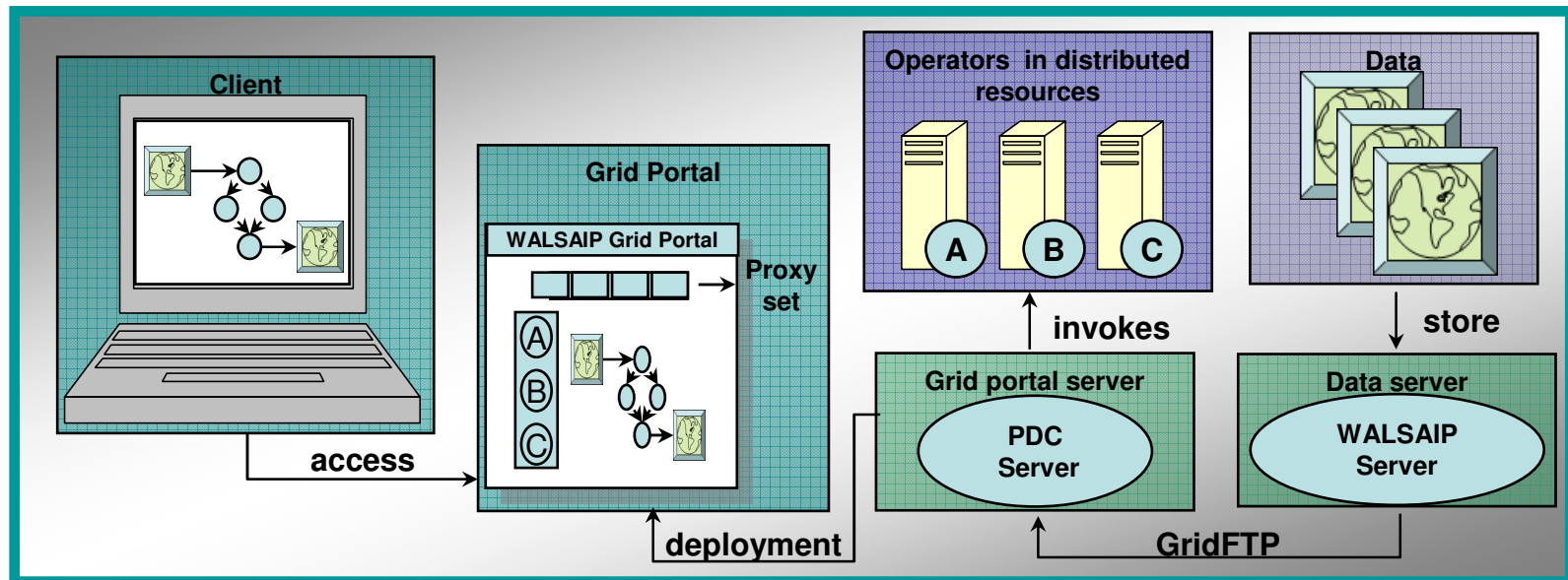
# WALSAP

Parallel and Distributed Computing Laboratory  
University of Puerto Rico at Mayaguez (UPRM)  
May 2007

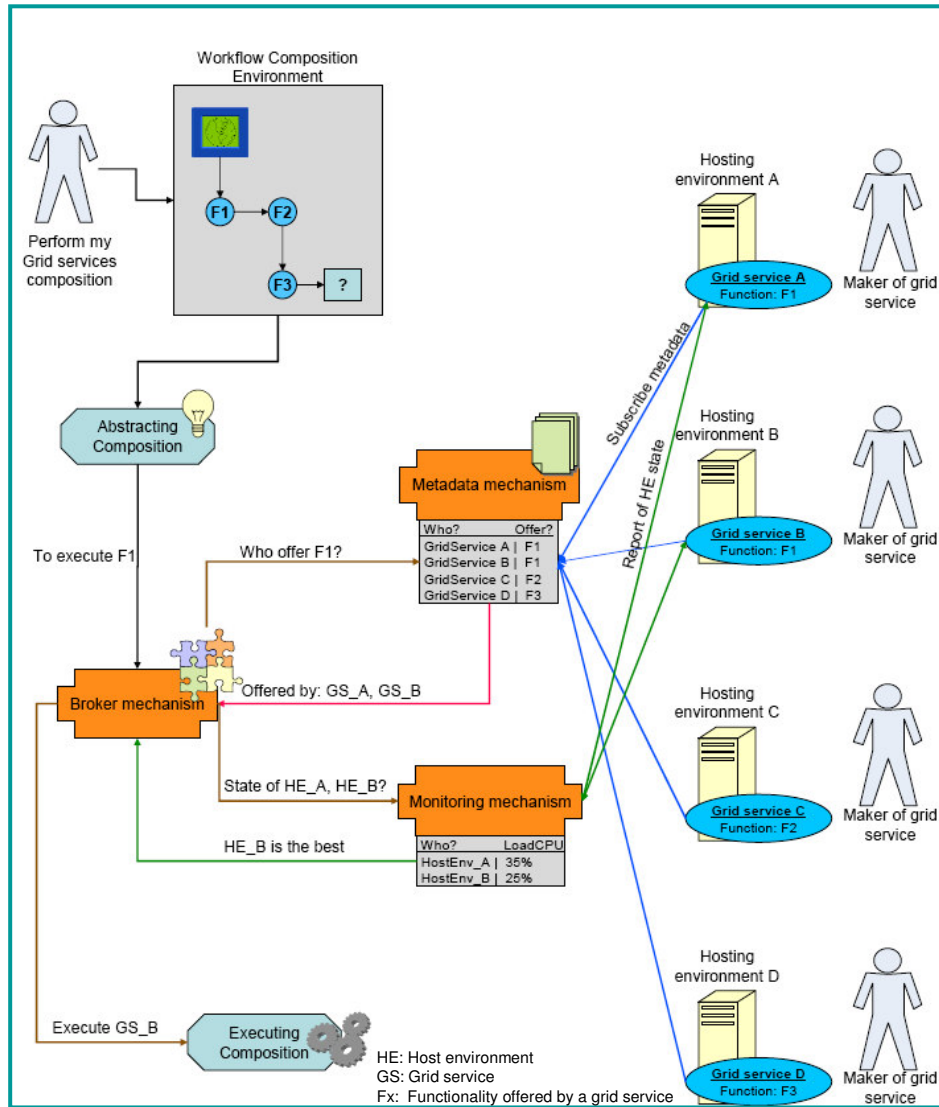


# Problem Formulation

- **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.

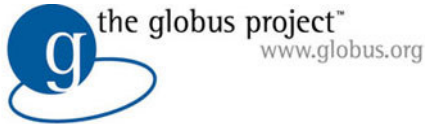
## Monitoring Mechanism

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

## Broker Mechanism

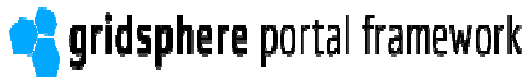
- Uses metadata and monitored data **to perform the resultant operator-based grid service**.

# Application Tools



Globus Toolkit

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



Gridsphere Portal Framework

Portal framework to create reusable portal components (portlet) 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.



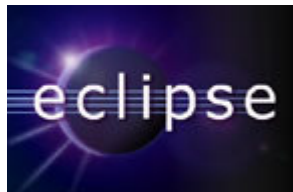
Java

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.

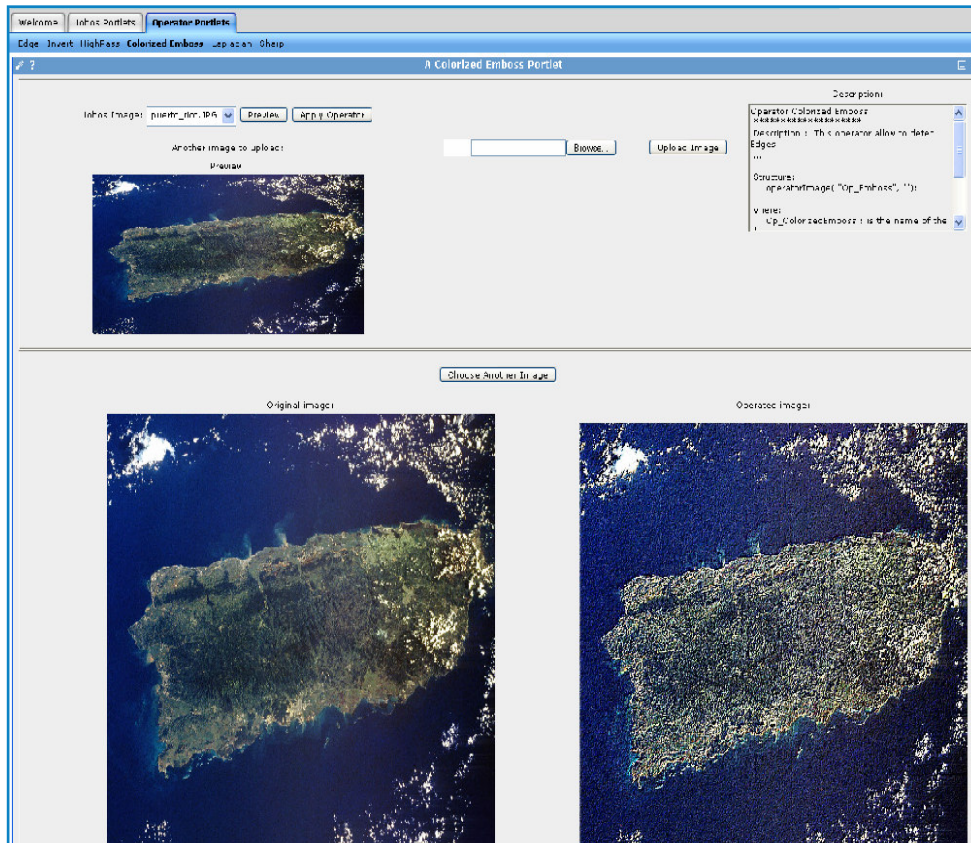


Eclipse IDE

Integrated Application development environment



# Research Results



Signal Processing Portlet

- 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