



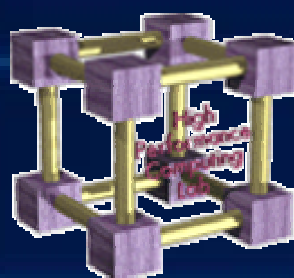
# G H P N

## Grid High Performance Networking

**Marco Tana**

**CACT/ISUFI**

**University of Lecce**





**Grid High Performance Networking**

## **SATELLITE DATA TRANSFERS IN A DATA GRID ENVIRONMENT**

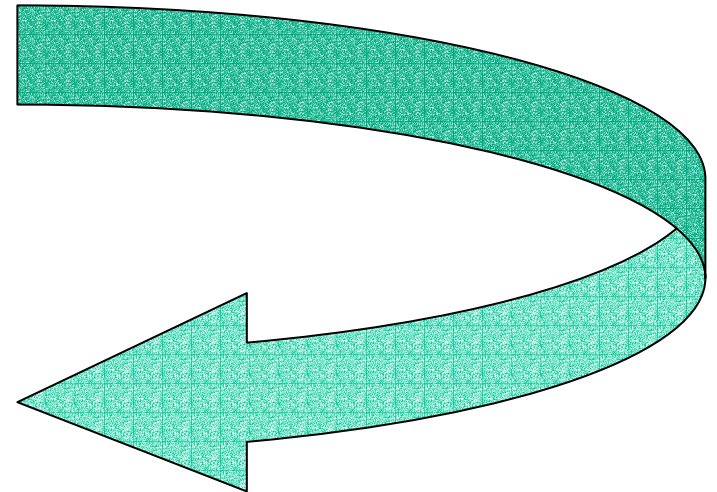


# Grid High Performance Networking

**Here are some types of grids**

- Computational grids
- Scavenging grids
- Data grids

**which provide a unified interface for all data repositories in an organization, and through which data can be queried, managed, and secured**



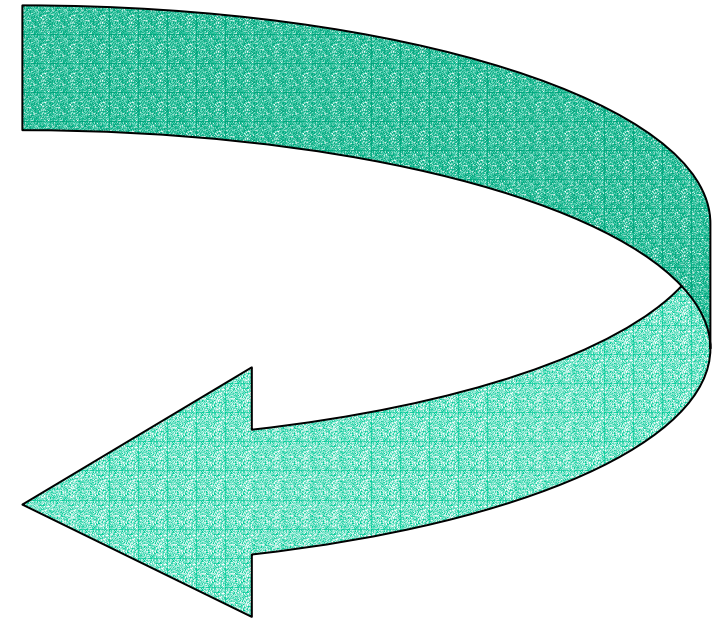


# Grid High Performance Networking

**What are the key components of Grid computing?**

- Security
- Data management
- Resource management
- Information services

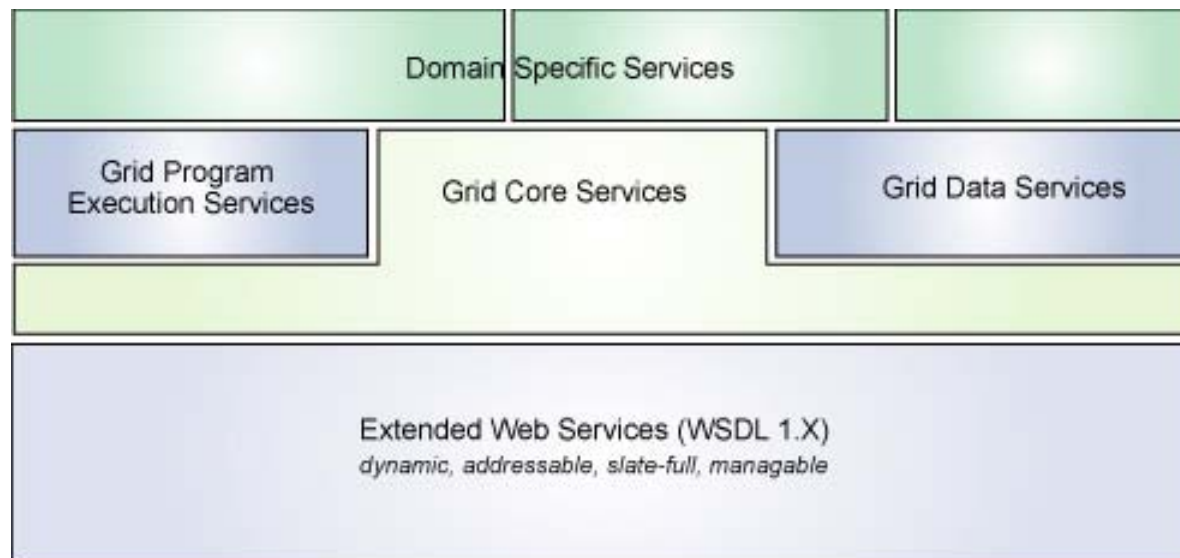
**Data must be transported, cleansed, parceled,  
processed**





# Grid High Performance Networking

## The structure of OGSA architected services





# Grid High Performance Networking

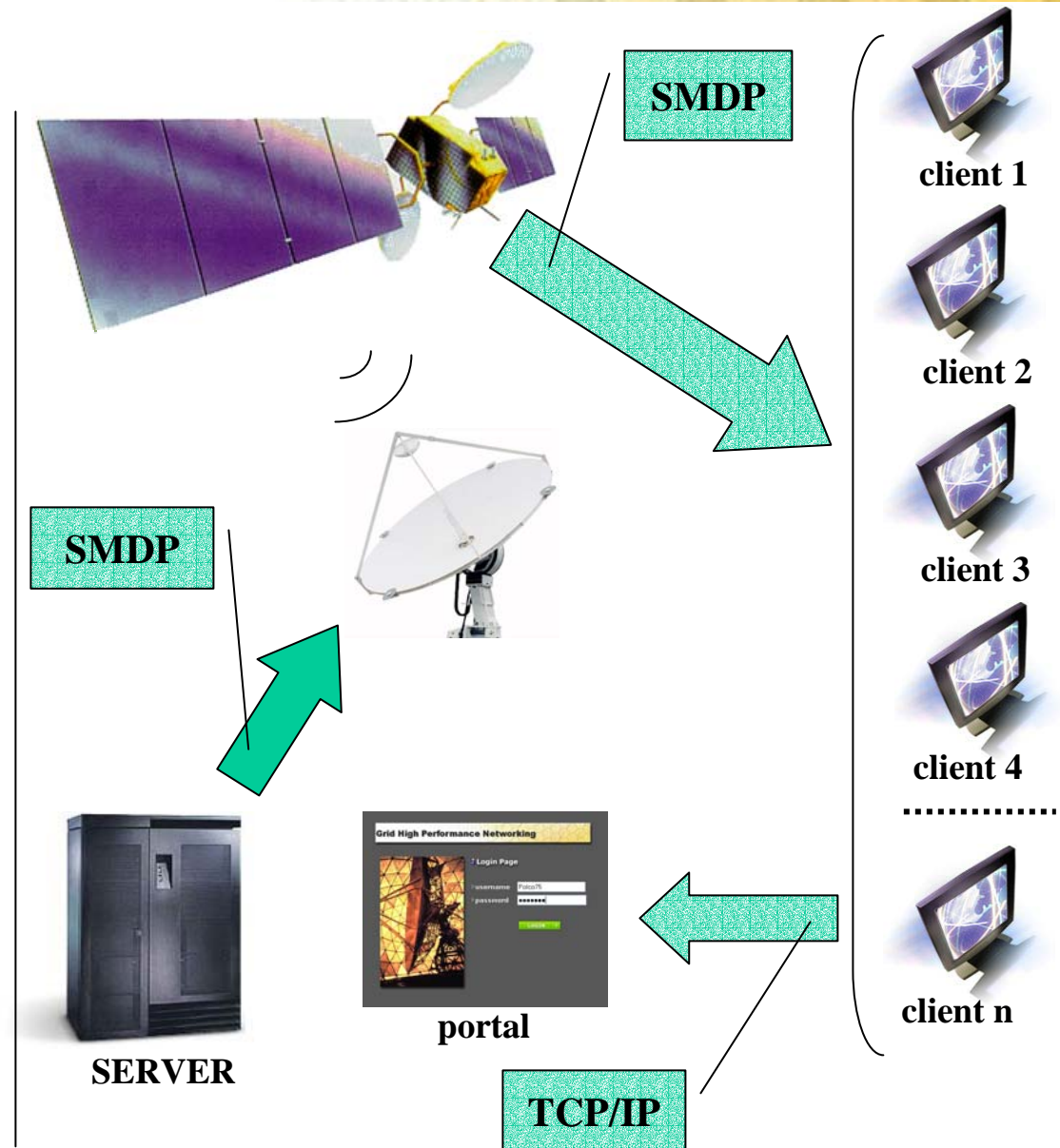
## Introduction

n clients connect to Web portal that furnishes the service via TCP/IP, request it and then wait for the requested data

After deciding priorities depending on the requested service, the server begins to transmit requested resources via satellite link utilizing SMDP protocol

Clients waiting for that particular resource receive it through SMDP

Clients request a retransmission via TCP/IP in case of erroneous packets (server sends these packets again via wired links)





# **Grid High Performance Networking**

## **Migration from SMDP to SRDP in the near future**

**Satellite Reliable Distribution Protocol** to appear in GLOBECOM 2003.

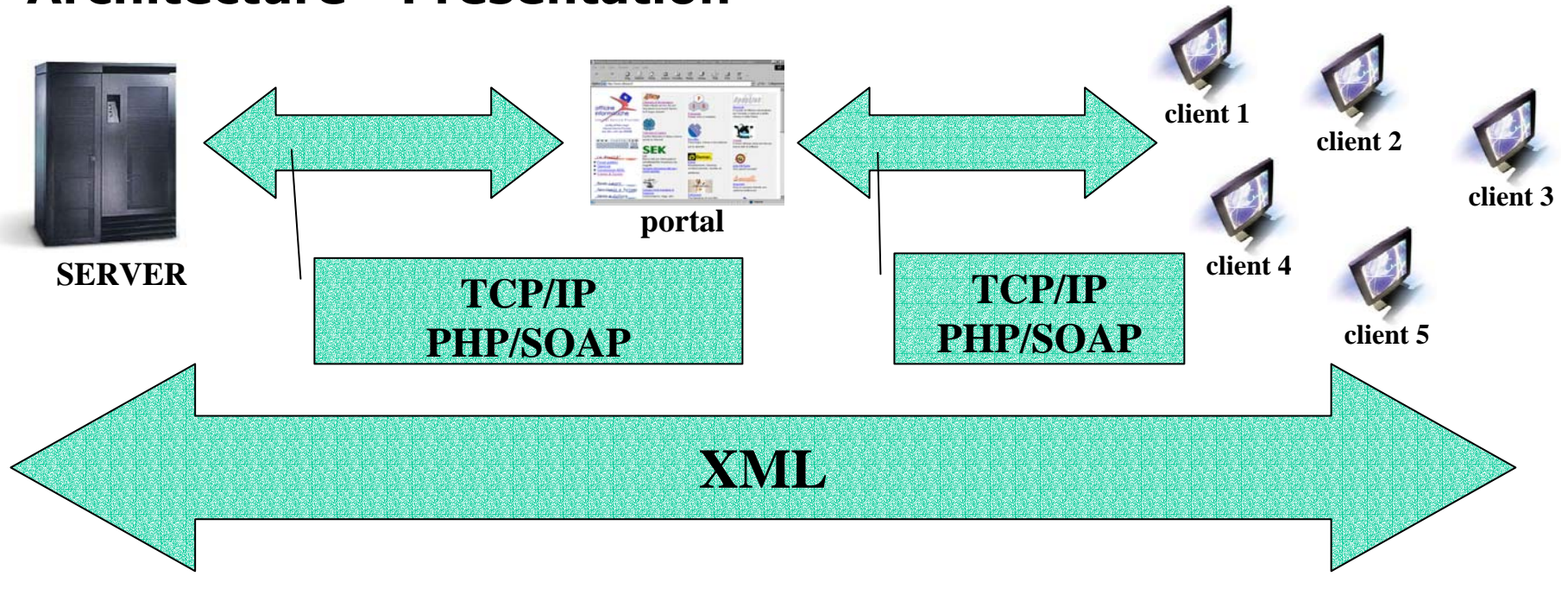
It provides some useful improvements!





# Grid High Performance Networking

## Architecture - Presentation



- Web Services based architecture
- Apache PHP server extended by SOAP (pear SOAP: [pear.php.net](http://pear.php.net))
- Messages traverse between clients and server via XML/SOAP





# **Grid High Performance Networking**

## **Architecture – Data exchanging**



**Server advertises its web services by means of WSDL (web services description language).**



**Data exchanging is performed through XML documents by means of SOAP protocol.**



**Pear SOAP packets guarantee complete integration of SOAP/WSDL/XML and PHP allowing secure usage of web services in a PHP environment.**



# **Grid High Performance Networking**

## **Architecture – Pear SOAP**

**Pear SOAP is a package implementing protocol  
and SOAP client/server services in PHP**

### **Pros**

- Information exchange in a decentralized and distributed environment in a simple and secure way.
- Interoperability among heterogeneous systems.
- HTTP, HTTPS, TCP and SMTP
- WSDL complete support
- Automatic generation of WSDL code

### **Cons**

- Not yet complete SOAP 1.2 support
- Script based



# **Grid High Performance Networking**

## **Utilization contexts**

This architecture is well suited for those environments in which a large quantity of data simultaneous update is requested on geographically distributed systems.

Then it is very useful in some contexts such as

**Collaborative environments**

**Distributed systems/databases update**

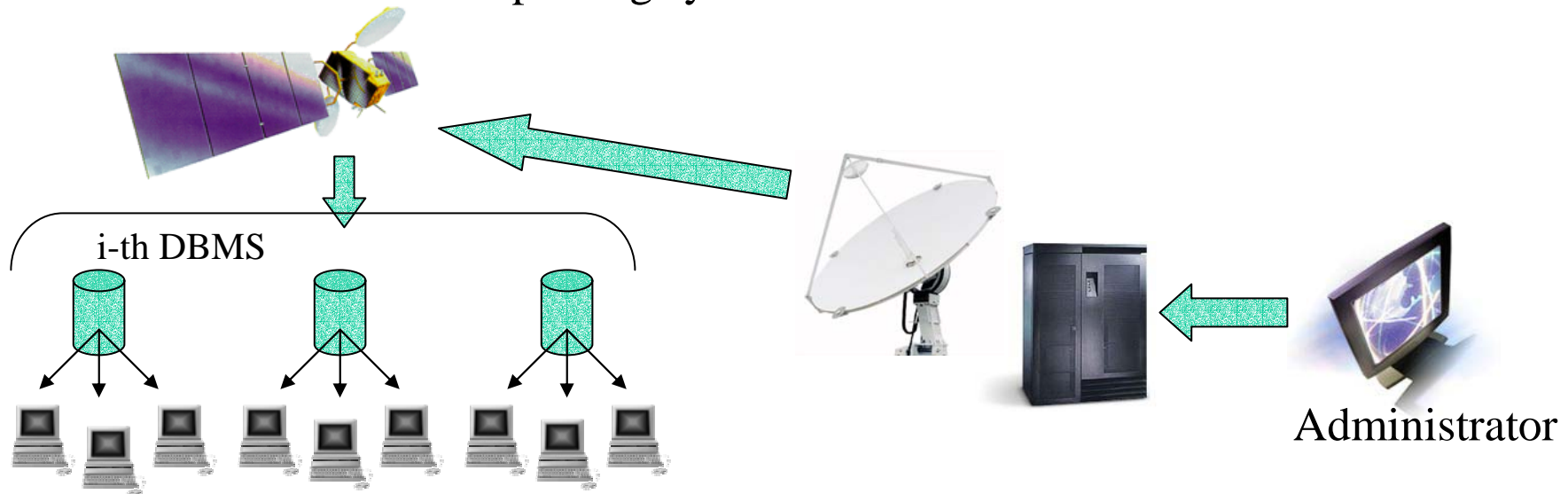
**Multicast of large size files (data-intensive multicasting)**



# Grid High Performance Networking

## Applications 1/3

Updating system of  $n$  DBMS servers



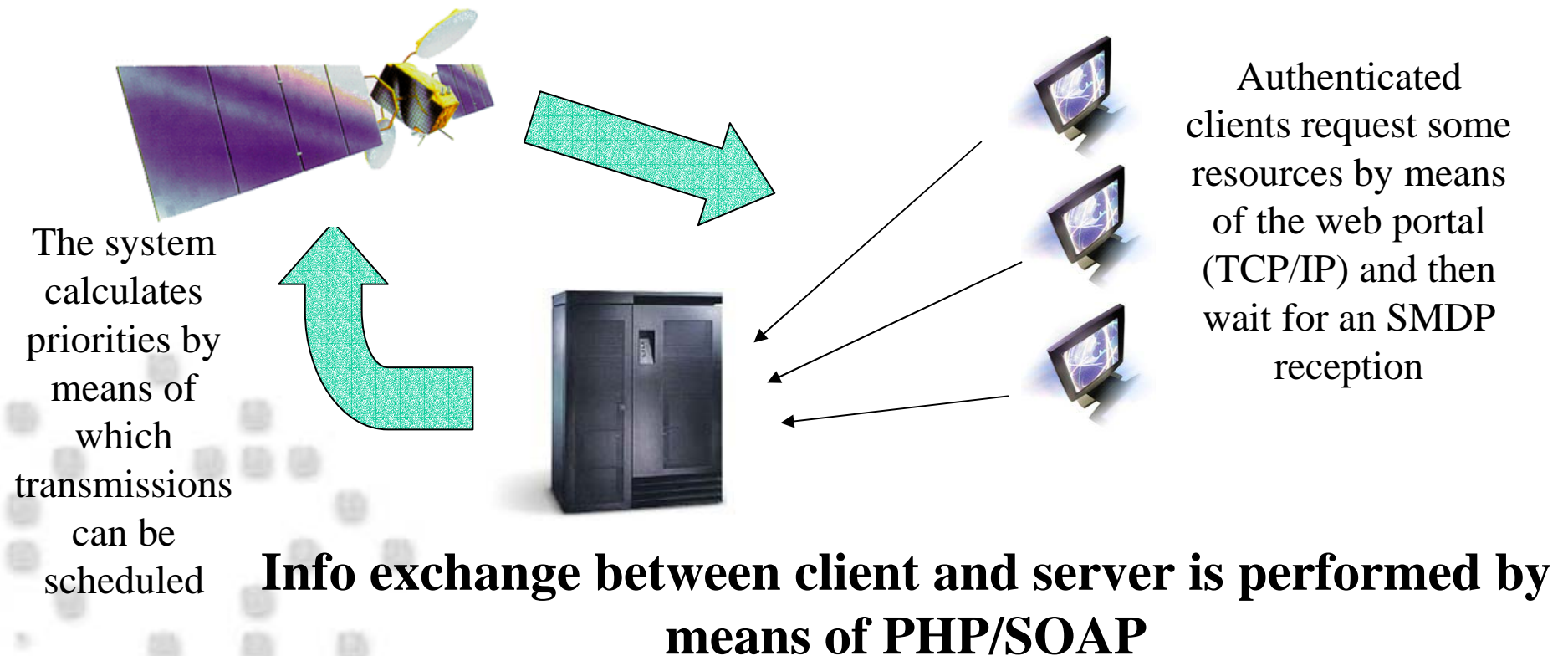
**An authorized administrator can simultaneously update  $n$  DBMS servers that are geographically distributed.**



# Grid High Performance Networking

## Applications 2/3

An authenticated and authorized user may browse a list of available files through a web portal (i.e. SAR data, huge archives) and then request the reception of some of them. The system will schedule different transmissions based on some priorities.



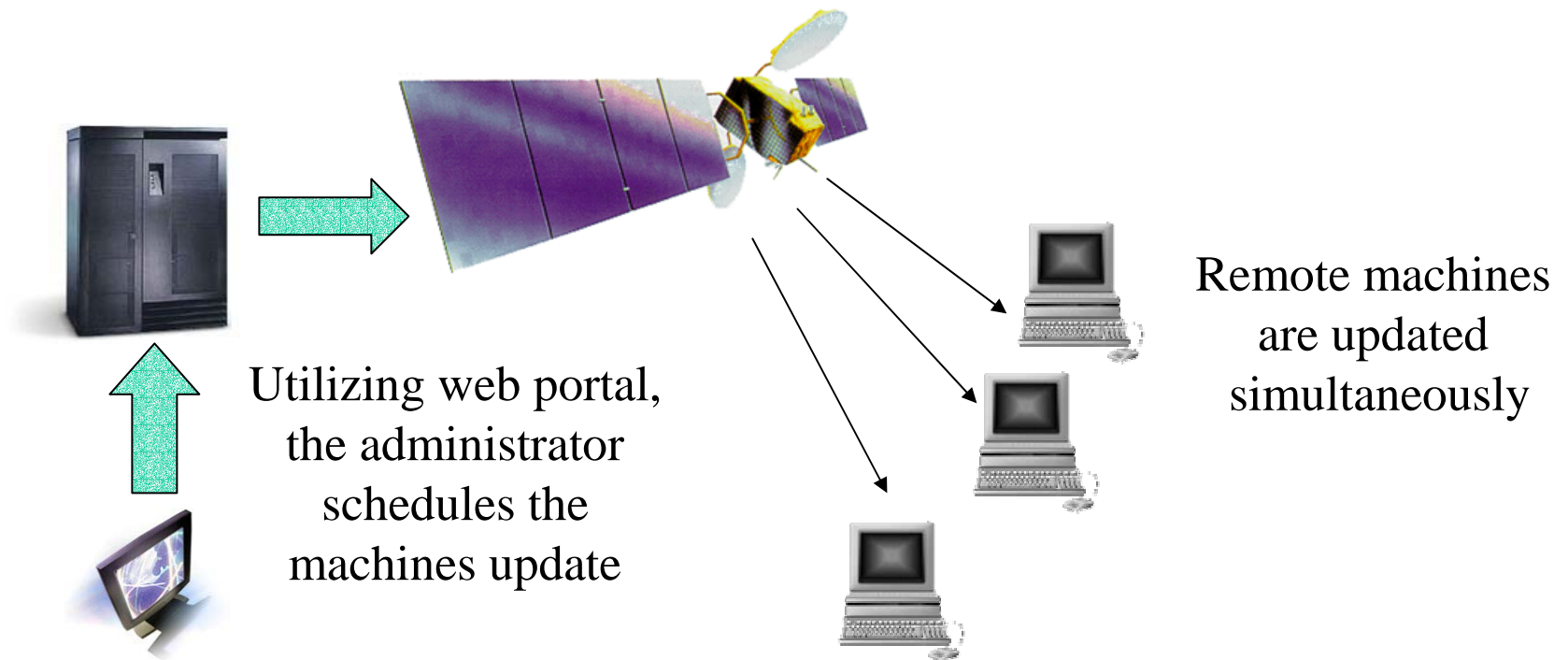




# Grid High Performance Networking

## Applications 3/3

Centralized resource updating. Administrator can schedule simultaneous updates of homogeneous groups of distributed machines.

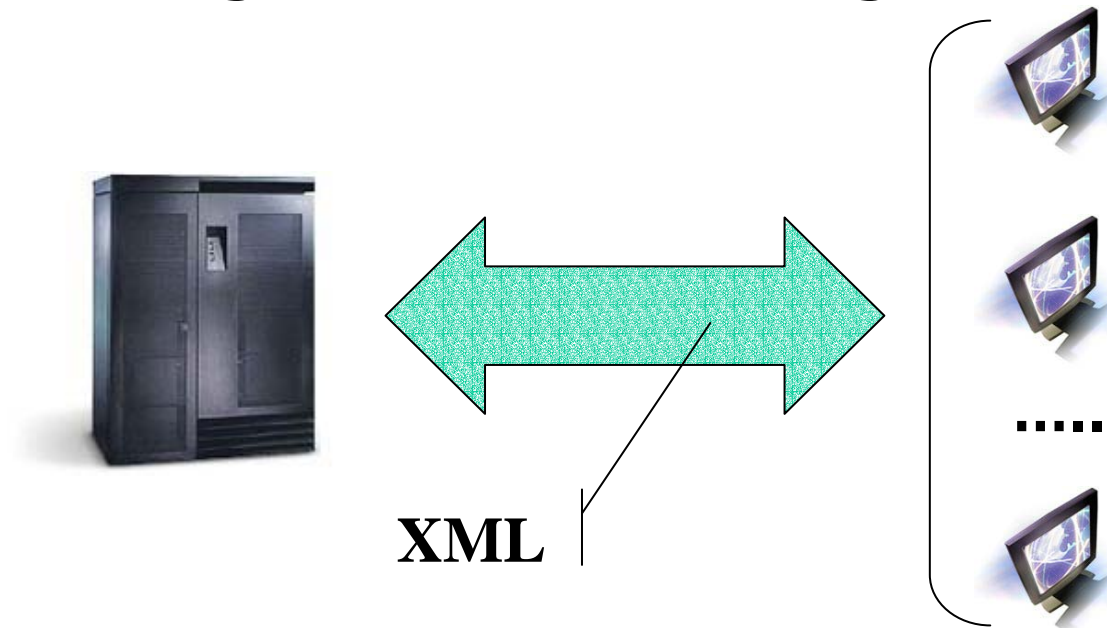


**Info exchange between client and server is performed by means of PHP/SOAP**



# Grid High Performance Networking

## Announcing and content filtering



By means of XML, clients are able to filter messages advertised by the server since they are generally interested in a subset of all the data that are going to be transmitted. In this way, clients are aware of the transmission information they are interested in (transmission date, starting and ending time, file size, ...).





# Grid High Performance Networking



## Authentication is provided through gSOAP GSI Plug-in

### gSOAP GSI's Goal

Development of Web Services using the Globus Security Infrastructure:

- ◆ Mutual Authentication/Authorization
- ◆ Credential Delegation
- ◆ Connection Caching

Director: Prof. Giovanni Aloisio

Project P.I. : Massimo Cafaro, Daniele Lezzi, Robert Van Engelen

Link: <http://sara.unile.it/~cafaro/gsi-plugin.html>



# Grid High Performance Networking

## The Web Portal

A screenshot of the GHPN web portal's login page. The page has a dark grey background. At the top, there is a yellow banner with the text 'Grid High Performance Networking'. Below the banner, on the left, is a square image showing a close-up of a geodesic dome structure, possibly a radio telescope, with a person visible on a ladder. To the right of the image, the text 'Login Page' is displayed. Below this, there are two input fields: 'username' with the value 'Folco75' and 'password' with a masked password of ten dots. A green 'LOGIN' button is positioned below the password field. A large, light blue arrow points from the login form towards the right side of the slide.

Log in page

After login, the user gains access to *the resource locator's* page.

Through this page, the user can browse files, then select and reserve the resources he wants to receive.

Work in progress ...



# Grid High Performance Networking

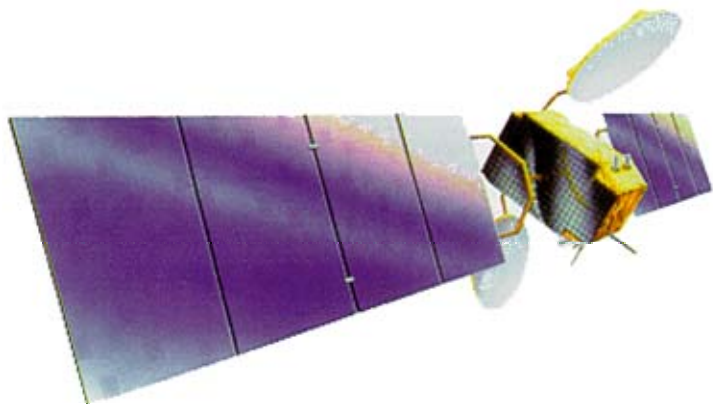
## Advantages

- **Speed** the transmission is simultaneous for all the receivers in the group
- **Server efficiency** multiple clients downloading the same content no longer overload server
- **Network optimization** the network (in particular near the server) is not loaded with multiple transmissions of the same content
- **Scalability** all these advantages do not depend on the group size

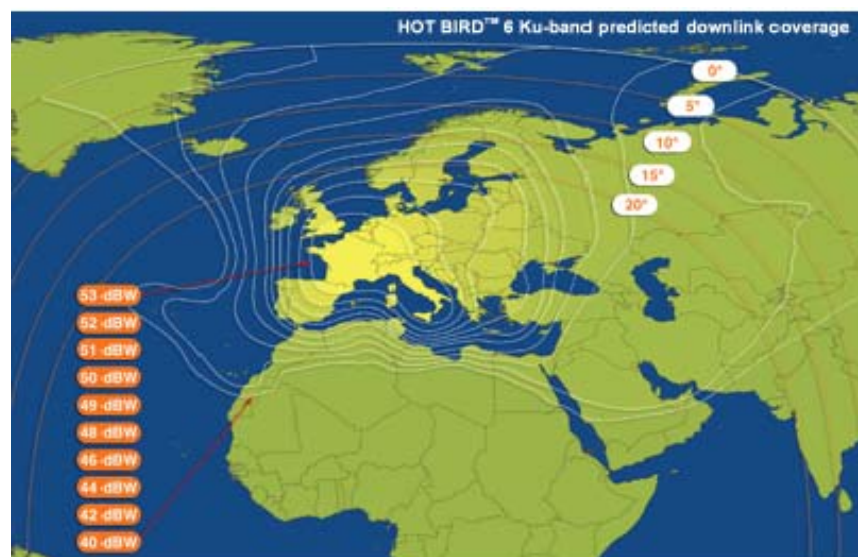


# Grid High Performance Networking

## Eutelsat HOT BIRD 6 (13° east)



Offering a total of 32 transponders (28 Ku-band, 4 Ka-band) and eight SKYPLEX units for on-board multiplexing, HOT BIRD™ 6 delivers digital services to satellite and cable homes in Europe, North Africa and large parts of the Middle East, reinforcing one of the largest broadcasting systems in the world.





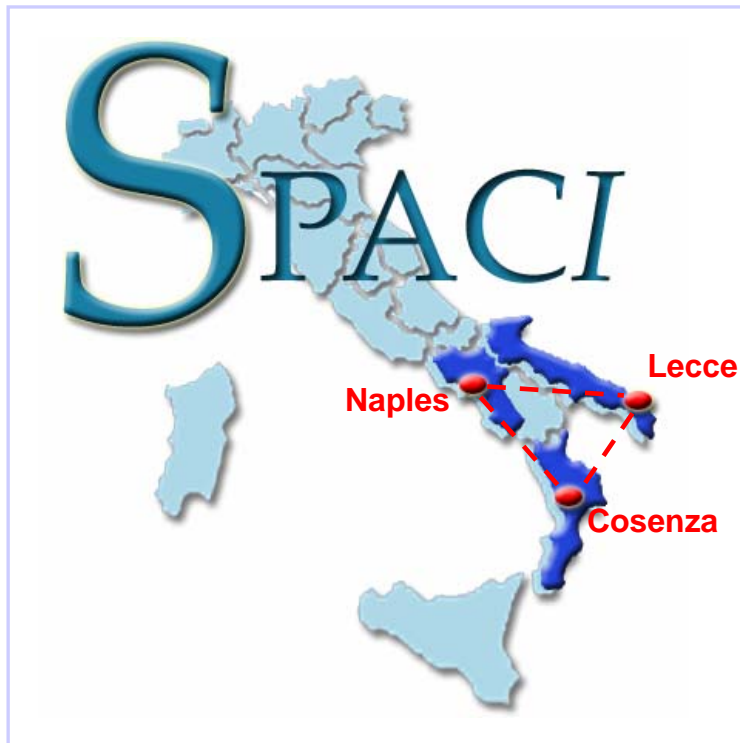


# Grid High Performance Networking

## SPACI - The Core Nodes



SPACI is a grid infrastructure based on three  
High Performance Computing Research Centers located in Southern Italy



### ■ MIUR/HPCC

University of Calabria, Rende (CS)

(Dir. Prof. Lucio Grandinetti)

### ■ ISUFI/CACT

Center for Advanced Computational Technologies

University of Lecce

(Dir. Prof. Giovanni Aloisio)

### ■ DMA/ICAR

University of Naples "Federico II"

(Dir. Prof. Almerico Murli)

**Consortium** among three Universities

❖ University of Calabria, Rende (CS)

❖ University of Lecce

❖ University of Naples



# **Grid High Performance Networking**

## **Future collaborations with other CACT staff members**

Accounting and billing based on GRELC middleware; possible collaboration for data transfers/updates involving distributed DBs

[Sandro Fiore]

Bioinformatics applications because of the large size of biological data sets

[Euro Blasi, Maria (alias Luisa) Mirto]



# Grid High Performance Networking

**For more information...**

visit <http://sara.unile.it/ghpn/> Web site

email to *marco.tana@unile.it*





# **Grid High Performance Networking**

**That's All Folks!**