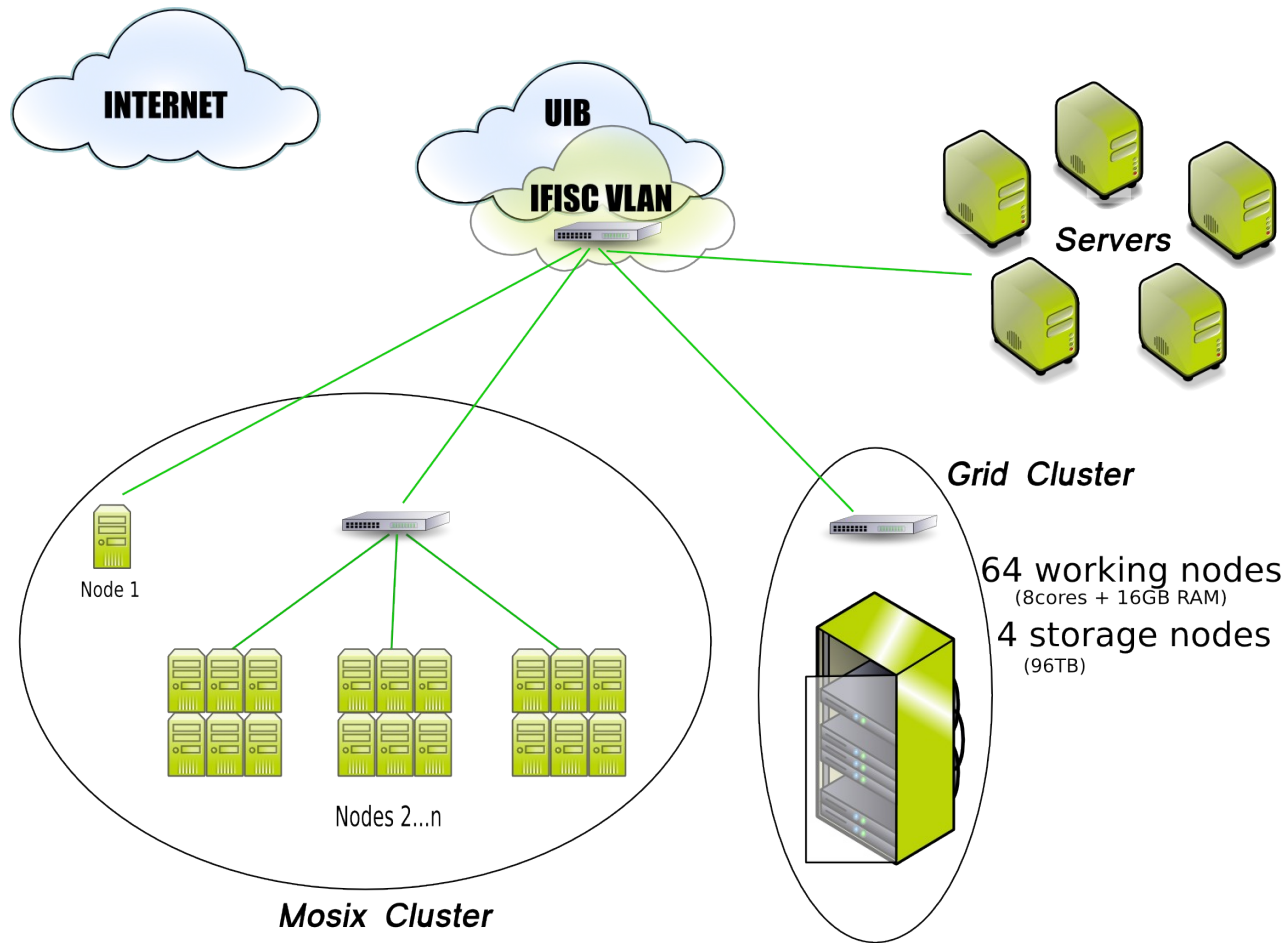


Grid Computing

M. Antònia Tugores Pons



IFISC VLAN



Nuredduna Mosix vs Nuredduna Grid



~70 computers
~30 dual core
~40 quad core

200 cores

Storage: **8TB**

RAM:
256/512MB per core
Total: 70GB

64 computers
64 eight cores

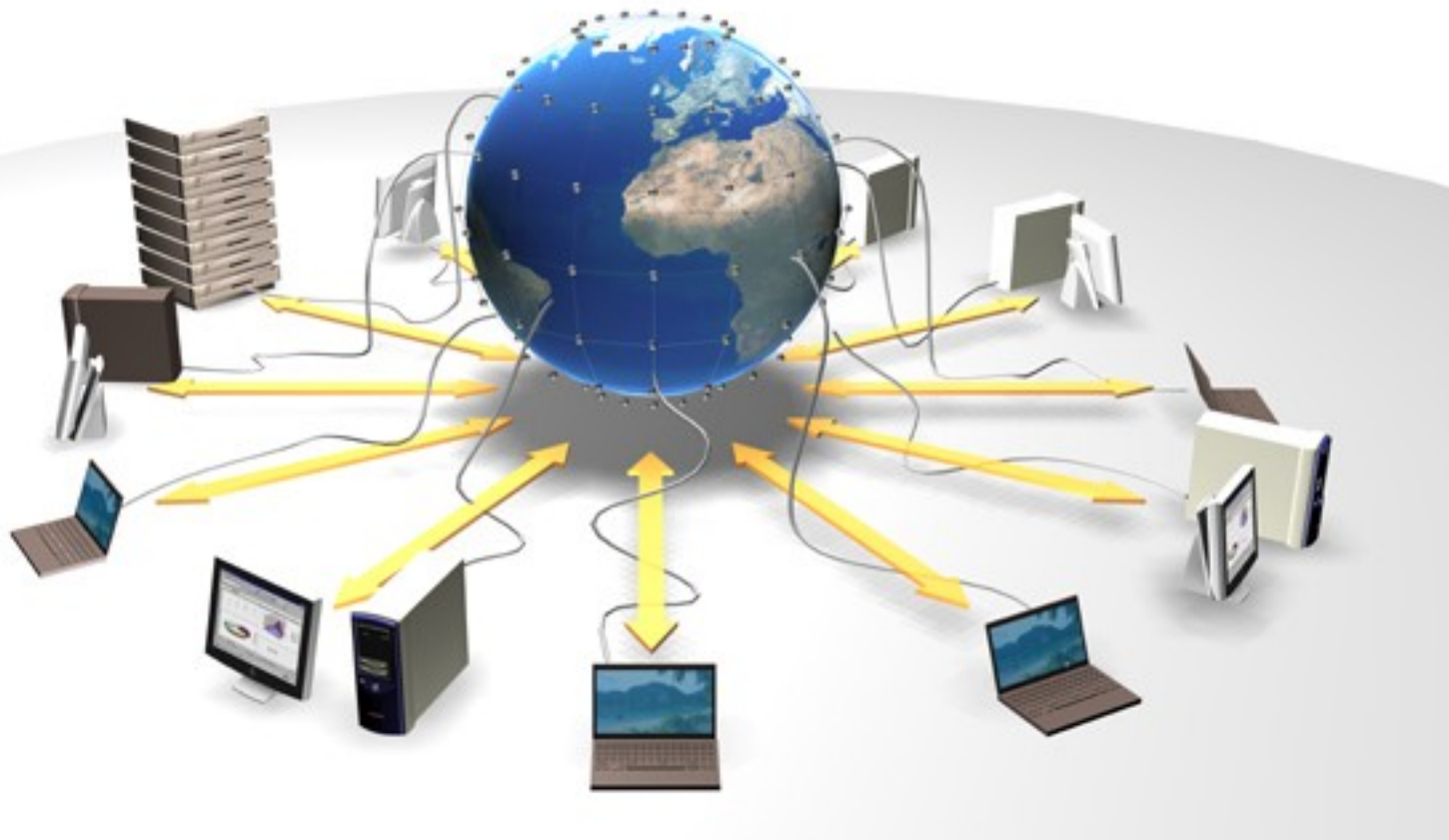
512 cores

Storage: **54TB**
4 dedicated nodes
fibre connections

RAM: 16GB per computer
2GB per core
Total: 1024 GB



The Grid



The Grid

Grid computing is the combination of computer resources from multiple administrative domains for a common goal.

Technology allowing the coordinated use of computational resources in a decentralized way.

Usually used to solve a scientific or technical problems that require a great number of computer processing cycles or access to large amounts of data.

Examples: seti@home



Grids and VOs

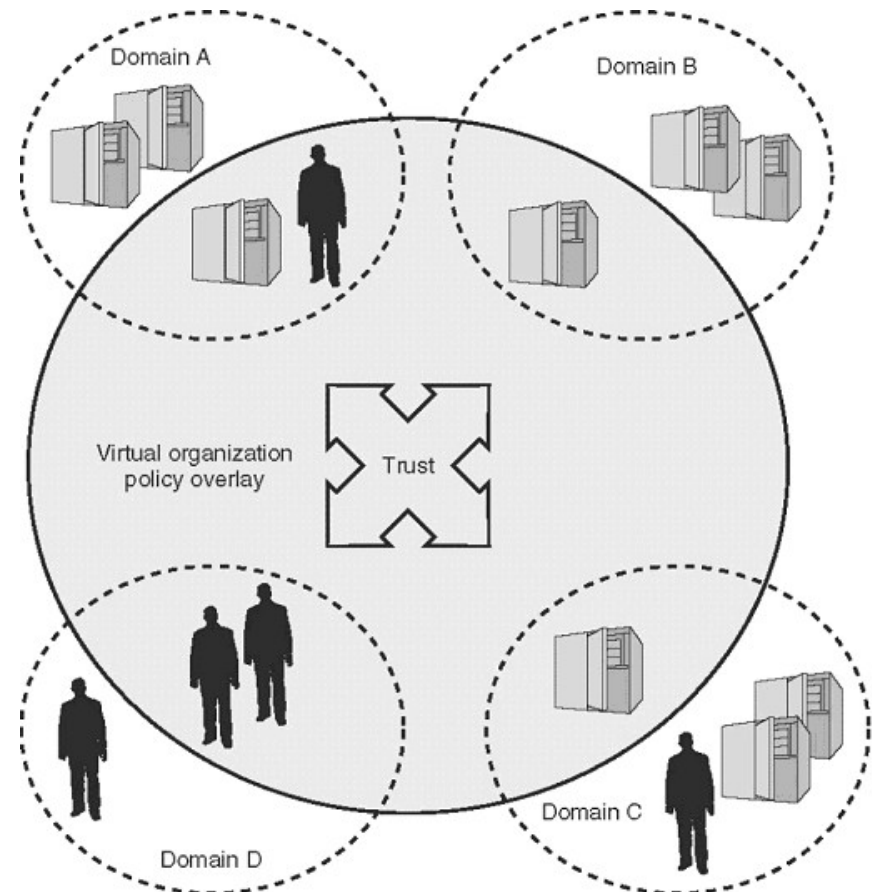
- * Individual and organizations with a common interest.

- * Can benefit from sharing their computing resources using Grid techniques.

- * Examples:

- vo.general.es-ngi.eu
 - vo.photonics.es-ngi.eu
 - vo.meteo.es-ngi.eu
 - vo.ifisc.csic.es

- ...



How the Grid was born...

The fathers: Ian Foster and Carl Kesselman

The book: “The Grid”, 1998

The current state of computing would be analogous to the state of development of electricity power in the beginning of the XX century. The true revolution came not from the production of electricity but from the possibility of distributing it transparently over a network



The idea: Access to computational services (data storage and CPU) should be as transparent as using a plug

- The user does not need to know where his electricity has been generated
 - The user pays for consumption

Grid-CSIC



Project coordinated by IFCA

Distributed infrastructure:

CPU: 8000

Storage: 1000TeraB (1PetaB)

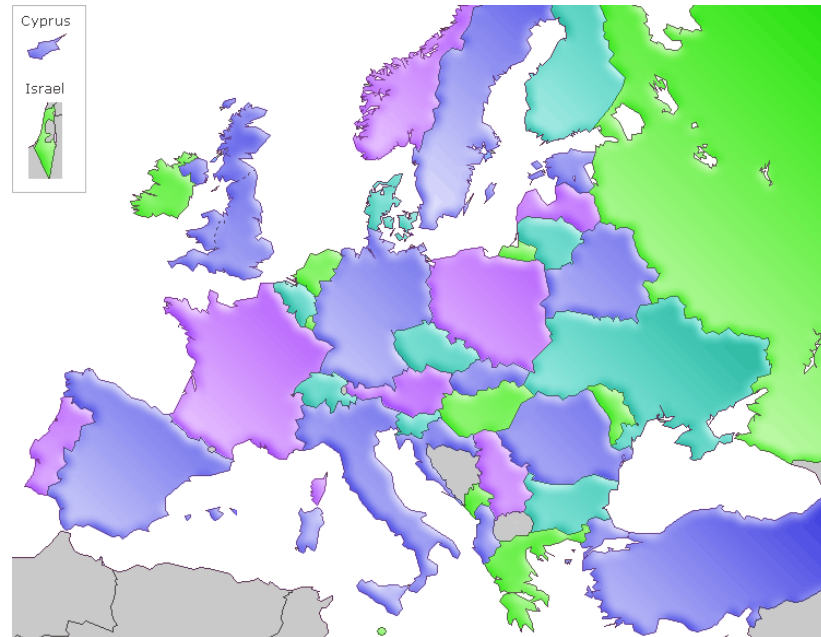
Members:

- * Instituto de Física de Cantabria (IFCA)
- * Instituto de Física Corpuscular (IFIC)
- * Instituto de Astrofísica de Andalucía (IAA)
- * Centre d'Investigació en Nanociència i Nanotecnologia (CIN2)
- * Institut de Ciència de Materials de Barcelona (ICMAB)
- * Centro de Física Miguel Antonio Catalán (CFMAC-IEM/IO/IFF)
- * Institut de Física Interdisciplinar i Sistemes Complexos (IFISC)



es-NGI and EGI

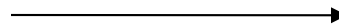
- The **European Grid Initiative** is a sustainable computing grid infrastructure in Europe. The EGI will provide a forum to link together computing resources in different European countries to support international research in many scientific disciplines.
- EGI is based on the federation of individual **National Grid Infrastructures (NGI)**, to support a multi-disciplinary user community
- **es-NGI** is composed by Grid-CSIC centers and others from Zaragoza, Valencia, Galicia, Madrid, Oviedo, ...



Interoperability

Heterogeneous resources
Geographically distributed
Uncentralized management

security?
reliability?
efficiency?



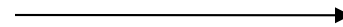
NO



Interoperability

Heterogeneous resources
Geographically distributed
Uncentralized management

security?
reliability?
efficiency?



Standards



Grid Middleware

Specific software product, which enables the sharing of heterogeneous resources, and Virtual Organizations.



gLite nodes

User Interface: where the middleware clients are installed

Virtual Organization Membership Service: central repository

Workload Management System: the distribution and management of tasks

Logging & book-keeping: logs and status

Computing Element: receives the jobs from the WMS, checks that the user is allowed to access and sends the data to the nodes

Worker Node: run jobs sent by the gLite Computing Element

Storage Element: provides uniform access to data storage resources

Catalog File: data catalog containing logical to physical file mappings

Information Service (top-BDII): provides information about the Grid resources and their status

Site-BDII: retrieves information from all the resources of the site

Are all these node types installed at IFISC?

gLite nodes

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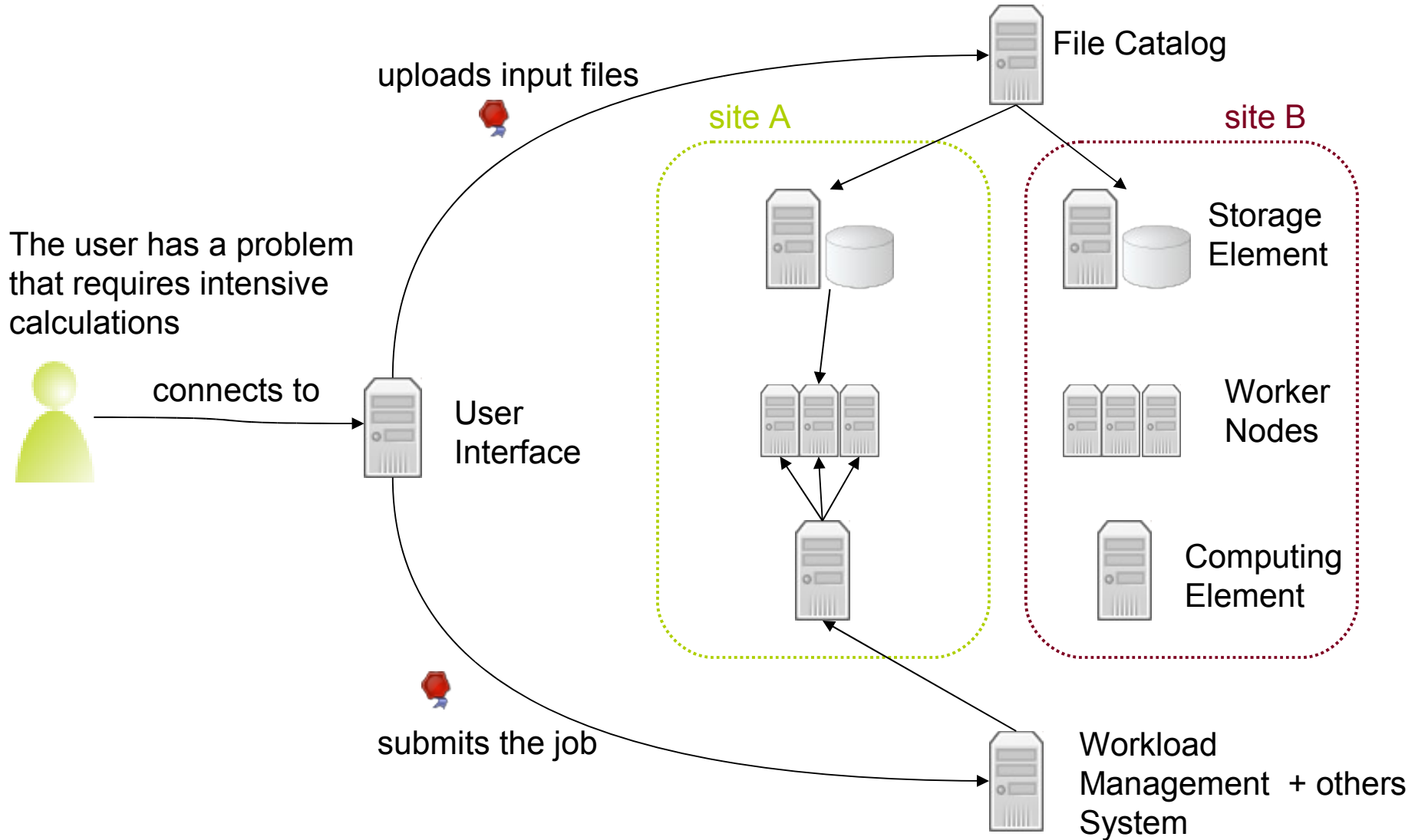
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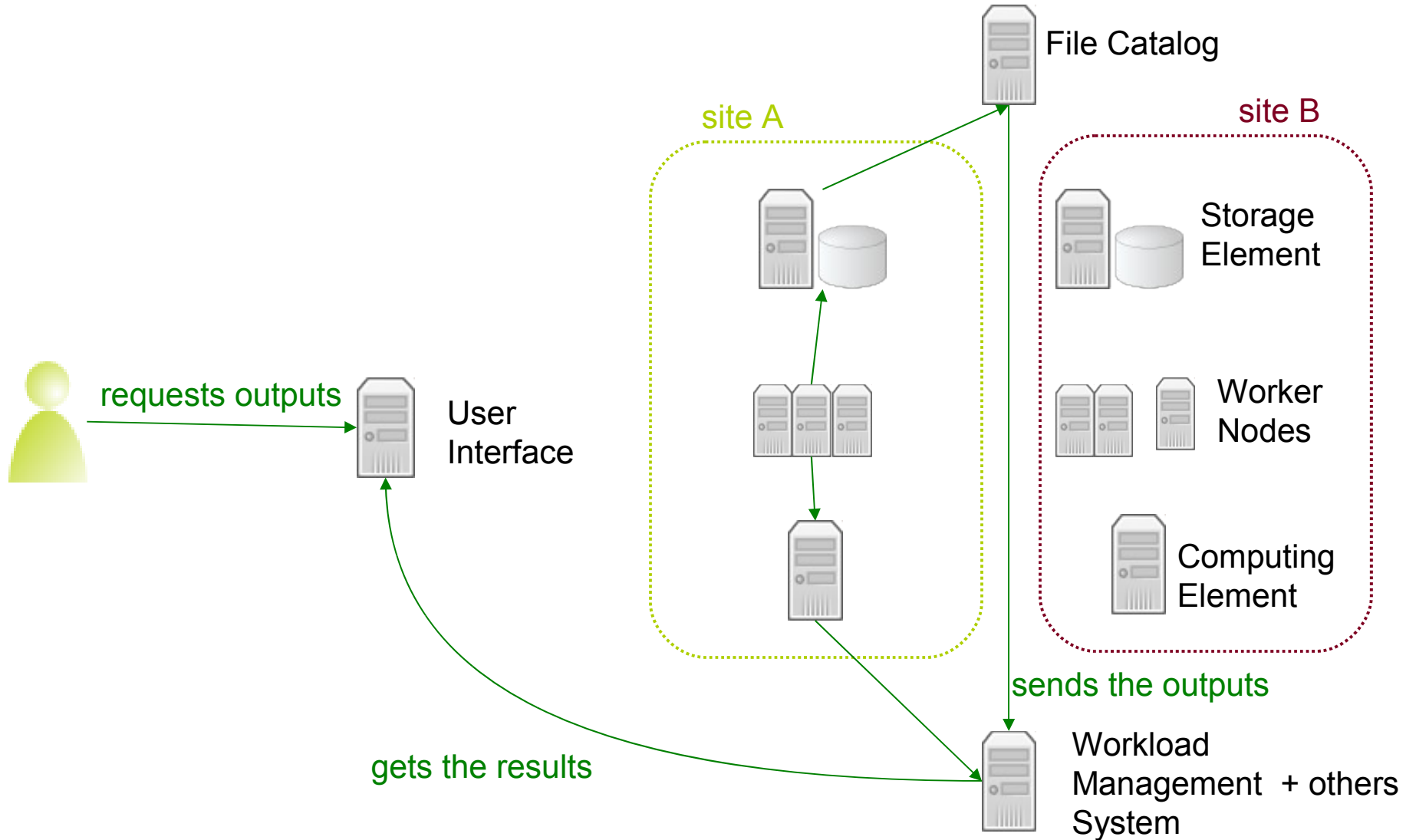


Site-BDII: retrieves information from all the resources of the site

How grid works



How grid works



Why should we use the Grid?

Use of external resources

Collaboration

Parametrization

Use of external applications

8 cores

50T of local storage

Job Submission

Can we submit jobs, retrieve the results, ...

USE THE GRID?

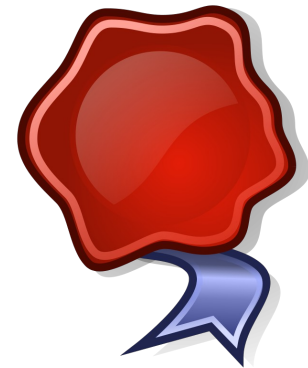
Certificates

Request certificate

Get Certificate

Register to an VO

Use the Grid!



That's all folks!