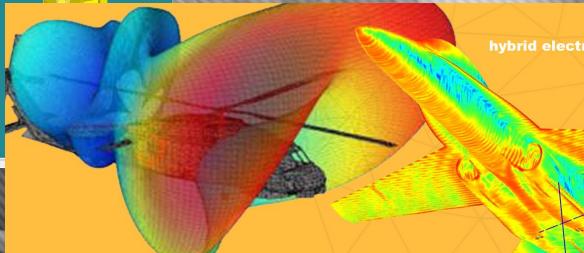
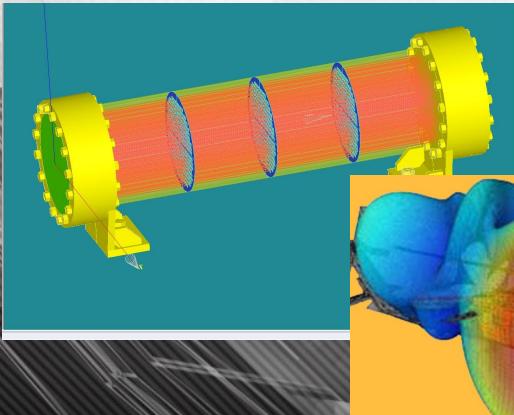
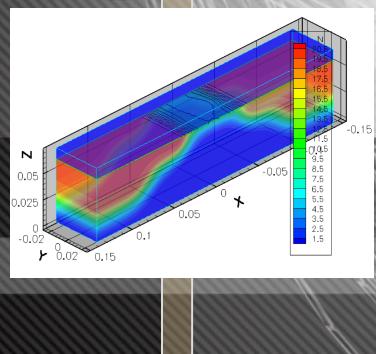


Servicios del CESGA para el sector del automóvil



FETECS TERRAE



Andrés Gómez

agomez@cesga.es

VIGO, SPAIN, 2007

ESTABLISHED IN 1993 IN SANTIAGO DE COMPOSTELA



MISSION STATEMENT

To provide high performance computing and communication resources and services to the scientific community of Galicia and to the National Research Council (CSIC), as well as, to institutions and enterprises with R&D activity.

To promote the use of new information and communication technologies applied to research within the scientific community of Galicia.

To become a consolidated RTD Centre of Excellence serving as international scientific and technological reference in the field of computational science and numerical simulation.

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LEGAL ENTITIES

- Public Company
- Public Foundation

PARTNERS

- Regional Government of Galicia 70%
- National Research Council of Spain 30%



Xunta de Galicia



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European Regional
Development Fund



CURRENT CESGA'S COMMUNITY OF USERS

- Galician Universities
- Galician Regional Government Research Centres
- Spanish National Research Council (CSIC) Centres
- Other public or private enterprises and institutions
 - Hospital Laboratories
 - Private Industries R&D Departments
 - Technological & Research Centres
 - Other Universities worldwide
 - Non-profit R&D organizations

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- HPC, HTC & GRID Computing
- User Data Storage
- Advanced Communications Network
- Video streaming broadcast & on-demand
- Remote Learning & Collaboration Room Network
- e-Learning & Collaboration Tools
- GIS (Geographical Information Systems)
- e-Business Innovation Consulting
- R&D&I Project management



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TECHNOLOGY

CESGA'S TECHNOLOGICAL EVOLUTION SERVERS INSTALLED

1993
VP 2400



2,5 GFLOPS

1998

VPP 300



14,1 GFLOPS

AP 3000



12 GFLOPS

1999

HPC 4500



9,6 GFLOPS

STORAGETEK



51 TERABYTES

2001
SVG



9,9 GFLOPS

2002

HPC 320



64 GFLOPS

BEOWULF



16 GFLOPS

2003

SUPERDOME



768 GFLOPS

2004, 2005, 2006

SVG



3,142 GFLOPS

2007

FINIS TERRAE



16,000 GFLOPS

Installation Year	1993	1998	1999	2001	2002	2003	2004	2005	2006	2007
Capacity				SVG			SVG	SVG	2006	
Capability	VP2400	VPP300E AP3000	HPC4500		HPC320	SUPERDOME				FINIS TERRAE

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HISTORICAL SUPERCOMPUTERS AT CESGA



1993: VP-2400

2,5 GFLOPS

0,5 GB memory

Nº 1 in Spain

Nº 145 in the World

2003: SUPERDOME

768 GFLOPS

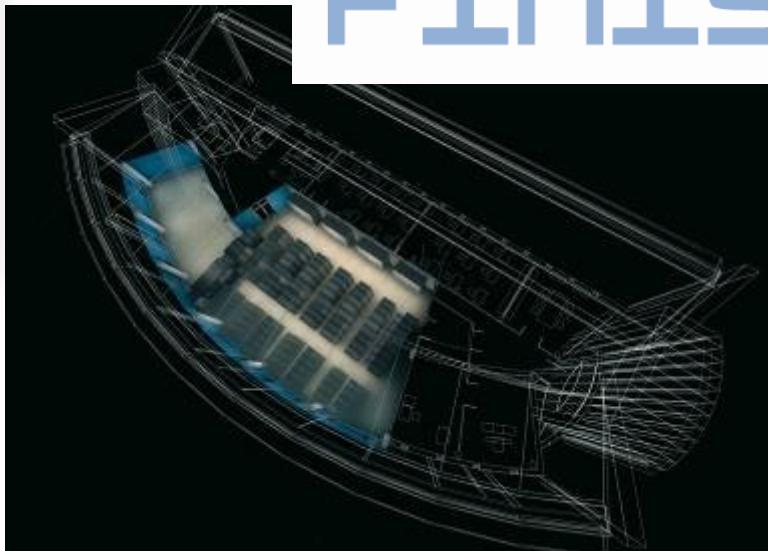
384 GB memory

Nº 1 in Spain

Nº 227 in the World

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FINISTERRAE



New Server HPC (December 2007)

More than 16 TFLOPS and 19TB RAM Memory

Plus Agreement among

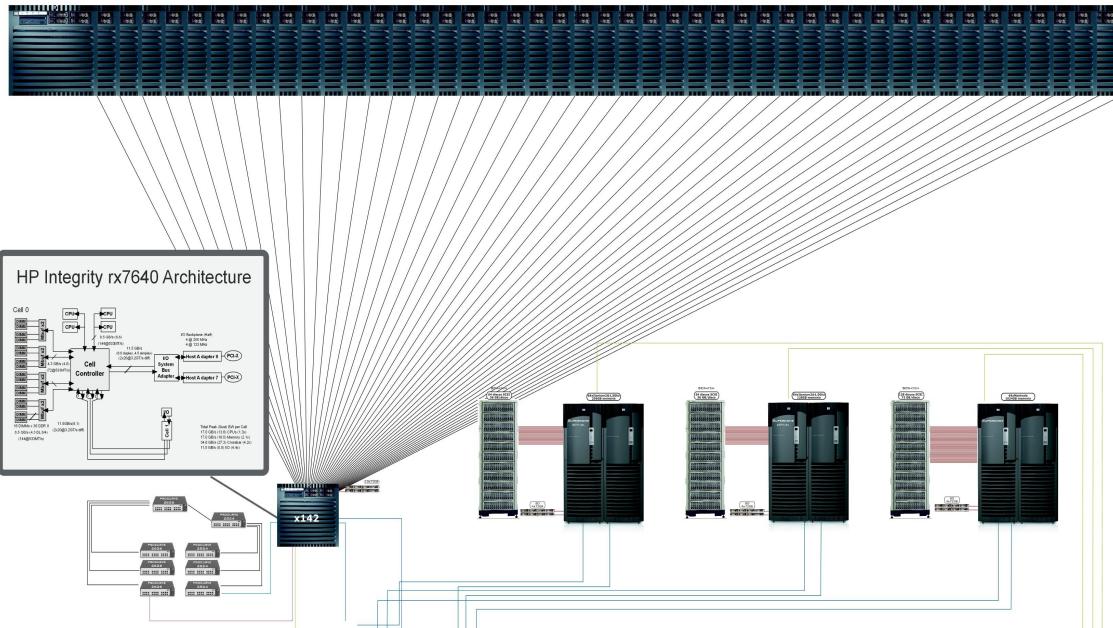


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FINIS TERRAE (2007) – COMPUTING NODES

- Fiber Channel 2Gbits/s
- Fiber Chanel 4Gbits/s
- Infiniband 10 Gbits/s
- 1 GbitEthernet
- FastEthernet
- USCSI 320 MB/S



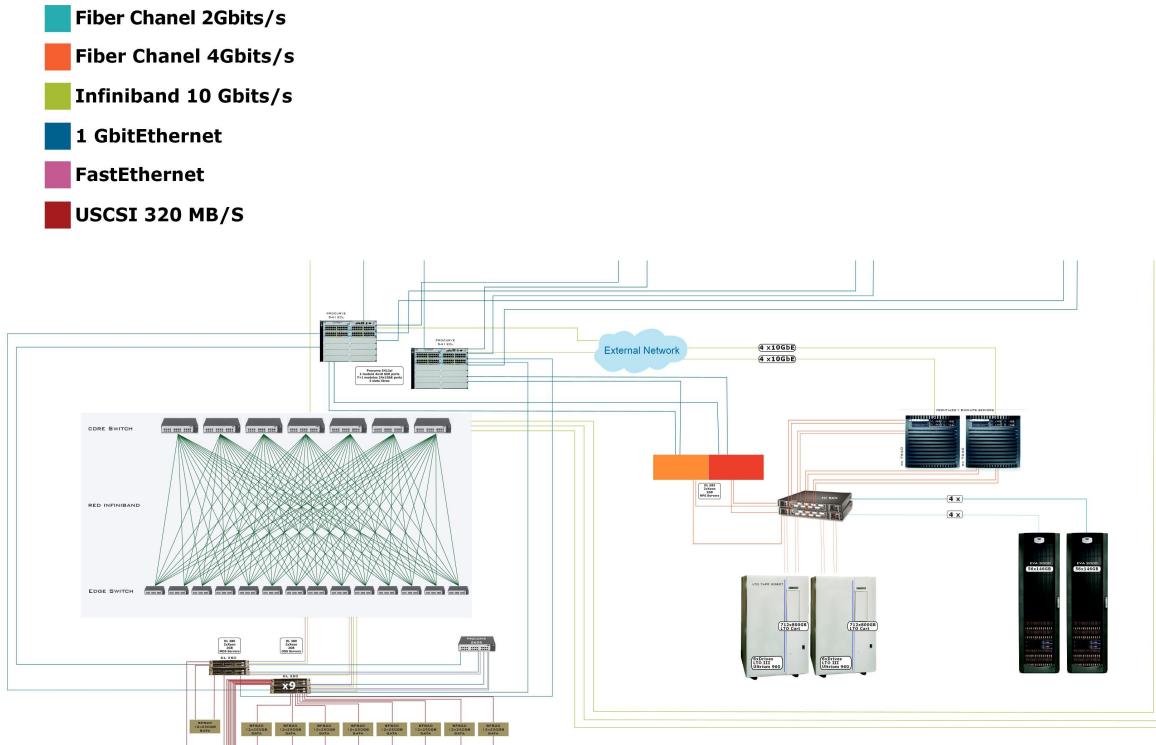
SUPERCOMPUTING NODES:

144 cc-NUMA Nodes with Itanium CPUs connected through a high efficiency INFINIBAND network

- 1 node: 128 cores, 1.024 GB memory
- 1 node: 128 CPUs, 384 GB memory
- 142 nodes: 16 cores, 128 GB memory
- 2 nodes: 4 cores, 4 GB memory for testing

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FINIS TERRAE (2007) – DATA STORAGE RESOURCES

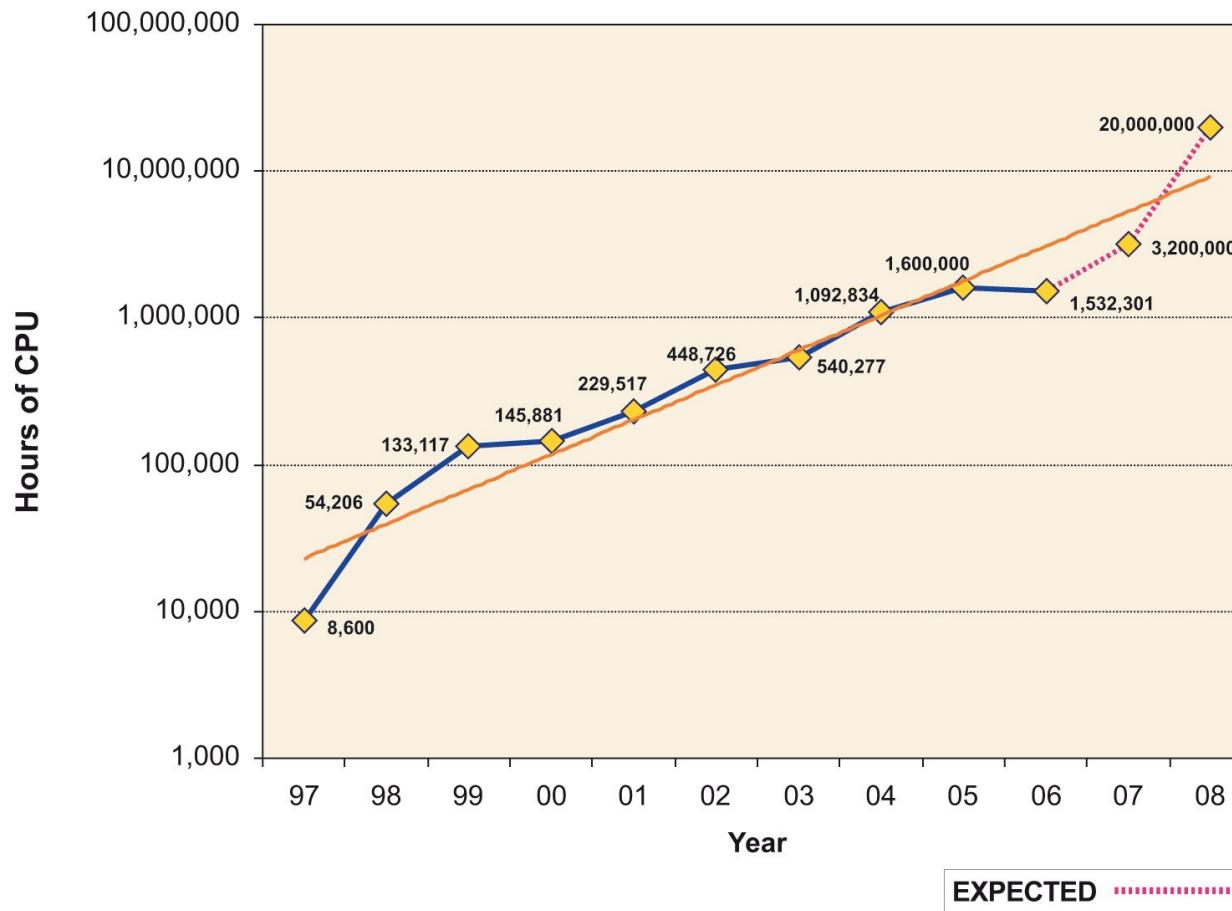


DATA STORAGE:

- 22 nodes with 44 cores for storage management.
- 390 TB disk.
- 1 PB Robot Tape Library.

Santiago de Compostela, SPAIN, 2007

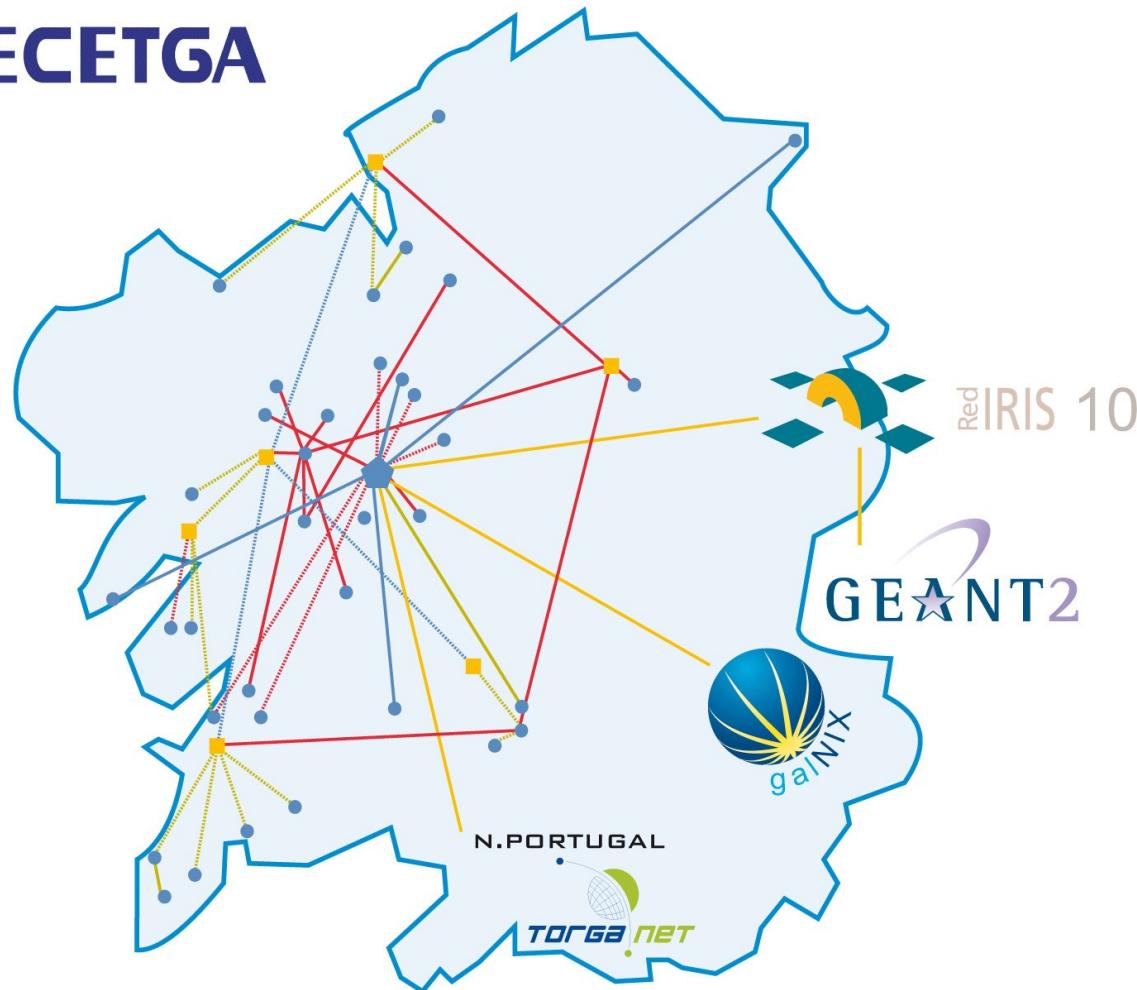
USER'S CPU TIME CONSUMED SINCE 1997



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GALICIAN' SCIENCE & TECHNOLOGY NETWORK

 RECETGA



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GALICIAN' SCIENCE & TECHNOLOGY NETWORK



Abilene (12)
Canarie ESnet

5 x 2,5 Gbps

10 Gbps
+ 2,5 Gbps

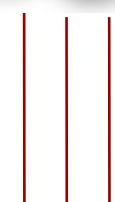
5 x 2,5 Gbps

NRENs
Europeas

Red Norte África
en construcción

2,5 Gbps

Red Latinoamericana
en construcción



Sinet (JP)

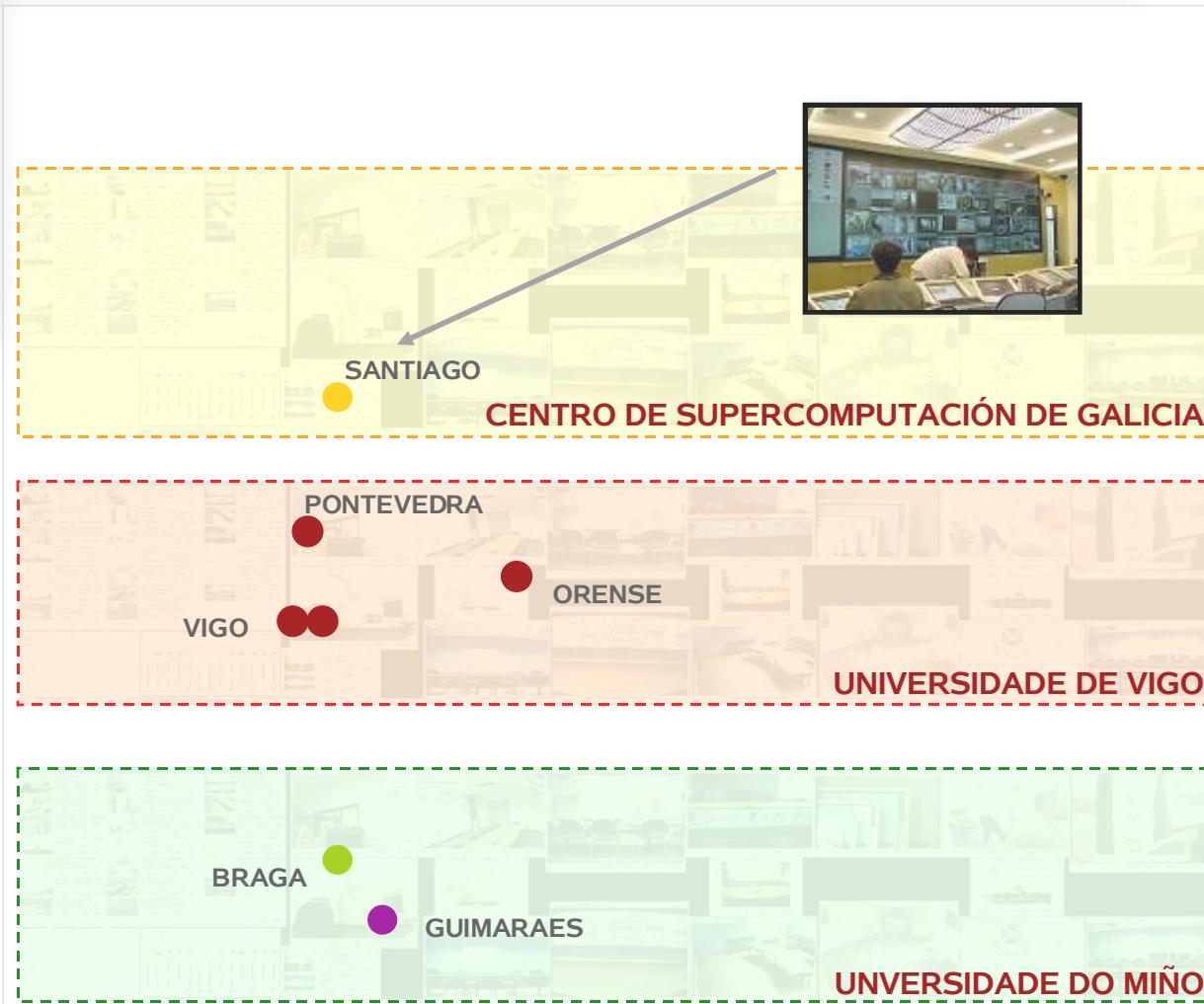
VIGO, SPAIN, 2007



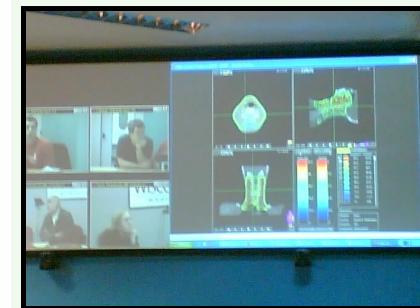
CONSEJO SUPERIOR
DE INVESTIGACIONES
CIENTÍFICAS



ACCESS GRID ROOMS



- CCG
- Universidad de Miño
- Universidad de Vigo
- CESGA



VIGO, SPAIN, 2007



HOW REQUEST HPC, HTC, STORAGE SERVICES

- Galician University, CSIC or Public Regional Center



- It is FREE, no FEE Except for Special Requirements
- Fill Form

- Other Public Organization



- Agreement (It is NOT free)
- Public calls (from Jan. 2008)

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HOW REQUEST HPC, HTC, STORAGE SERVICES

- Private Organizations & Companies



- ONLY for R&D (maybe &I)
- Small FEE (less 2€/CPU-hour)
- Soft Licenses NOT included
- Contact us for Budget
- Public calls (from Jan. 2008)

- Independent Researcher

- Contact us
- Public calls (from Jan. 2008)

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HOW REQUEST NETWORK & STREAMING SERVICES

- Organizations in Galicia
 - Contact us
 - Needs analysis
- Other
 - No Service
 - But, contact us!



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THE SOFT LICENSE PROBLEM

- Commercial Licenses



- It is expensive for R&D
- Allow limited innovation
- OK, Obligation in Innovation

- Solutions



- We can use your license (if contracted allowed) or
- Rent a new license (likely)

- Other

- USE OPEN SOFTWARE in R&D



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OPEN SOFTWARE BENEFITS

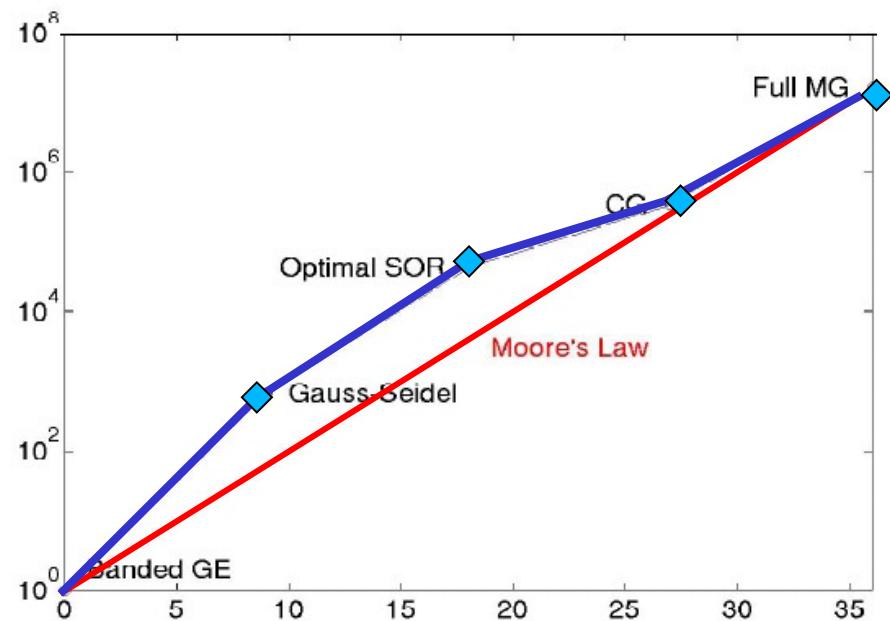
- Unlimited number of licenses
- Allows faster inclusion of new methods
 - Optimization
 - Solvers
 - Base libraries (BLAS, FFTW,etc)
 - ...
- Encourages the knowledge
- Allows the production of new soft products easily
- Faster response to new CPU architectures
- As good as commercial software



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NEW MATH ALGORITHMS

Method	Storage	Flops
GE (banded)	n^5	n^7
Gauss-Seidel	n^3	$n^5 \log n$
Optimal SOR	n^3	$n^4 \log n$
CG	n^3	$n^{3.5} \log n$
Full MG	n^3	n^3



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OPEN SOFTWARE INITIATIVE

<http://simula.cesga.es>

- Joint project of



- CESGA
- Applied Math Departments (USC, UDC, UVIGO)

- Analyze Open Software for CAD/CAE (i.e. CAELINUX)
- We have selected:

SALOME



Elmer



- SALOME (CAD, PRE-POST)
- CODE-ASTER (Thermo-Mechanic)
- ELMER (Multi-physics)

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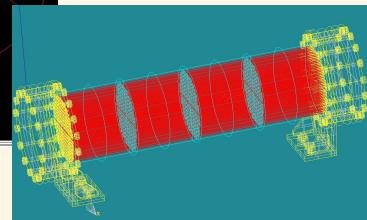
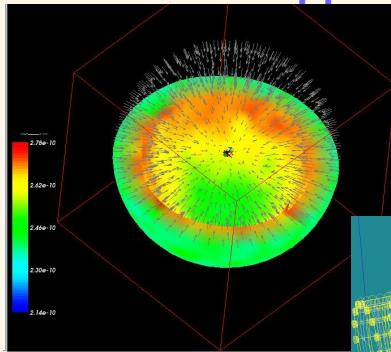
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CIENTÍFICAS

ERDF
European Regional
Development Fund



OPEN SOFTWARE INITIATIVE

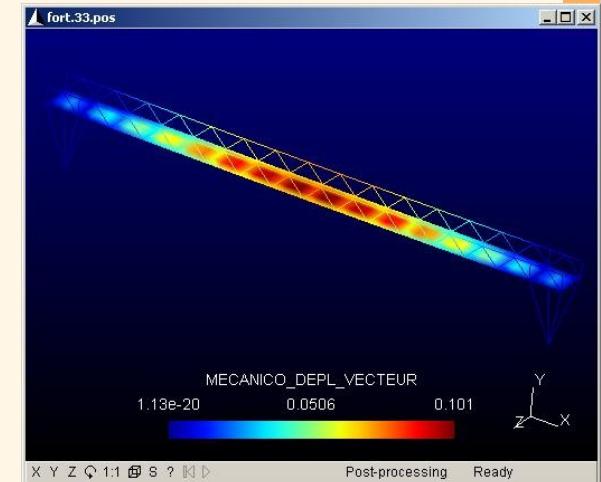
- Test applications for:



- Well-known academic cases
- Real Industrial cases

- Produce Distribution with (October):

- Software
- Manuals
- Tutorials



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END

THANK YOU!

QUESTIONS

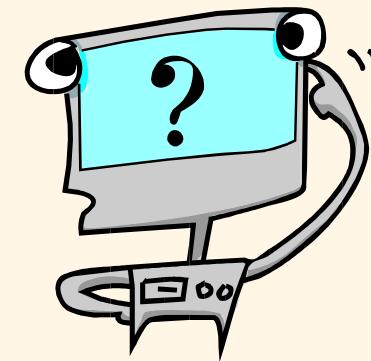
CONTACT:

Andrés Gómez Tato

agomez@cesga.es

<http://www.cesga.es>

<http://mathematica.nodo.cesga.es>



VIGO, SPAIN, 2007