



Latin American National Research
and Education Networks (NRENs)

LATIN AMERICAN GRID INITIATIVES

Carlos Casasús

Vicepresident of the Board Red**CLARA**

General Director **CUDI**



The Mexican NREN

May 14, 2007

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- **International Grid collaborations in Latin America**
 - **High Energy Physics**
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 - **RINGRID (EU initiative)**
 - **LA GRID (IBM initiative)**

- **Individual country Grid efforts**

- **Conclusions**

Brief history of networking in Latin America

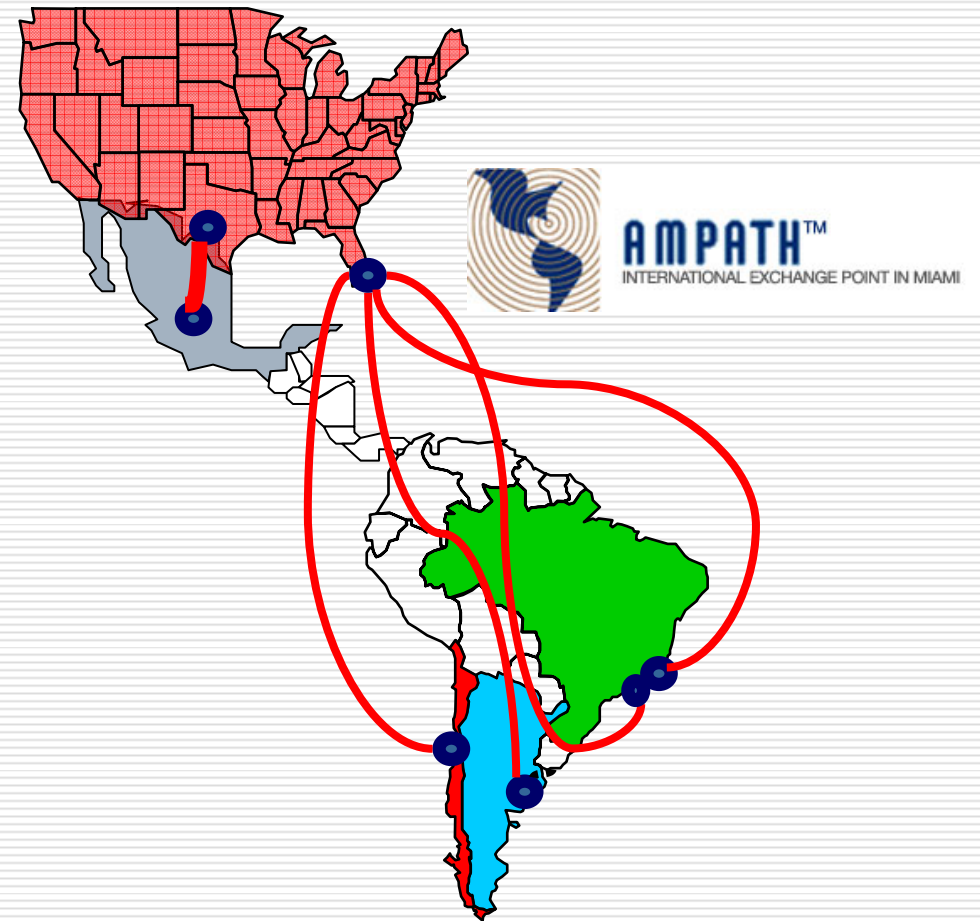
- Political, linguistic and cultural considerations have traditionally led to considerable interaction between countries within the region
- However, networking has been slow to develop because of lack of telecommunications infrastructure in the continent

Regional educational networking depends on the availability of infrastructure. Recent important changes (since late 1990s):

- End of state telecom monopolies in many countries
- Competition and lower prices
- Optical cables

Internet2 Connectivity in Latin America before CLARA

- AmPath (Florida International U. + Global Crossing)
 - uses Global Crossing cables
 - connects AR, BR (2), CL
 - 45 Mbps links
 - all connections point to point from Miami
- Mexico had direct connections to the US



AMPATH 's achievements

- Initial boost for Advanced Networking in LA
- Stimulus for advanced connectivity inside each country
- Motivation for collaborative projects

*2003 A new European initiative -
@LIS: Alliance for the Information Society*

- Outcome of EU-LA heads of state summit held in Madrid
- 62.5 Million Euros for EU-LA on Information Society initiatives
- 10 Million Euros for Interconnecting Europe & Latin American Researchers

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.



A Latin American networking organization is created

- Cooperacion Latino-Americana de Redes Avanzadas (CLARA) is created as a vehicle to receive @LIS funds for the creation of a regional network
- CLARA countries will fund 20% of the costs
- Non profit association of NRENs from LA. Open to all LA Countries
- One NREN per country. Backed by each government
- Incorporated in Uruguay
- CLARA is not limited to the @LIS time scale and restrictions
- Will connect LA to Europe and to other regions

Backbone Timetable

- Project ALICE - America Latina Interconecta Con Europa
 - June 2003: Contracts assigned
 - September/October 2004: Continental ring established and connection to Geant

- Notes:
 - DANTE was the project coordinator and signed initial contracts with users and providers
 - CLARA has now taken over administrative responsibilities

CLARA Budget and topology...

Budget 12.5 M€

EC 80% + LA partners 20%

14 LA countries connected
(Bolivia, Cuba, Honduras and Paraguay still not connected)



Achievements

- Has promoted and strengthen National Research and Education Networks
- More than 700 universities connected
- New topology that includes a node in Miami has been established to save costs

WHREN is an NSF 2005 grant project that reinforces LA connectivity and the CLARA infrastructure...



- ***WHREN has enabled 3 important exchange points for Latin American connectivity:***
Miami
Sao Paulo
San Diego



Other developments...

- November 2006. The Center for Energy, Environment and Technology Research (CIEMAT, Spain) signs an agreement with RedCLARA for €250,000 in exchange for EELA support activities.
- April 2007. The IADB provides CLARA a \$600,000 USD grant for institutional development.
- May 2007. Extension of ALICE funding until March 2008 approved

Sustainability...

- From the point of view of the EU, CLARA has been a very successful project.
- A new funding scheme is needed in 2008
- European Union support is needed and expected
- Regional governments should undertake a bigger commitment
- Regional financial institutions can help organize the business plan and sell the project to governments.

National R+E Networks

More developed			
Brazil (RNP, ANSP)	369 institutions, Government funding	Fiber backbone + Gbps int'l connectivity	Nelson Simoes, nelson@na-df.rnp.br
Mexico (CUDI)	190 institutions, University funding	155 Mbps backbone + Gbps int'l connectivity	Carlos Casasús, ccasasus@cudi.edu.mx
Chile (Reuna)	14 institutions, University funding	155 Mbps backbone + 90 Mbps int'l connectivity	Paola Arellano, parellan@reuna.cl

National R+E Networks

Medium development			
Argentina (Retina transitioning to Innova-T)	55 institutions, Government funding	Low bandwidth backbone + 90 Mbps int'l connectivity	Alejandro Ceccatto, ceccatto@ifir.edu.ar
Colombia (Renata)	55 institutions, Government funding	Low bandwidth backbone + 10 Mbps int'l connectivity	Martha Giraldo mgiraldo@agenda.gov.co
Ecuador (Cedia)	24 institutions, university funding	Low bandwidth backbone + 155 Mbps int'l connectivity	Enrique Pelaez epelaez@espol.edu.ec

National R+E Networks

Medium development			
Peru (RAAP)	7 institutions, Government funding	Low bandwidth backbone + 45 Mbps int'l connectivity	Beau Flores, bflores@uni.edu u.pe
Uruguay (RAU)	15 institutions, Government funding	Low bandwidth backbone + 45 Mbps int'l connectivity	Ida Holz, holz@seciu.edu .uy
Venezuela (Reacciun2)	67 institutions, Government funding	155 Mbps bandwidth backbone + 45 Mbps int'l connectivity	Alberto Gilberto Landaeta, glandaeta@cnti .gob.ve

National R+E Networks

Low development	
Costa Rica (CR NET)	Vigny Alvarado, valvarad@uned.ac.cr
El Salvador (Raices)	Rafael Ibarra, ribarra@di.uca.edu.sv
Guatemala (Ragie)	Luis Furlan, furlan@uvg.edu.gt
Nicaragua (Renia)	Roberto Blandino, blandino@una.edu.ni
Panama (Redcyt)	Ignacio Laguna, ilaguna@senacyt.gob.pa

Not connected: Honduras, Cuba, Bolivia and Paraguay

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- **International Grid collaborations in Latin America**
 - **High Energy Physics**
 - **EELA**
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 - **LA GRID**

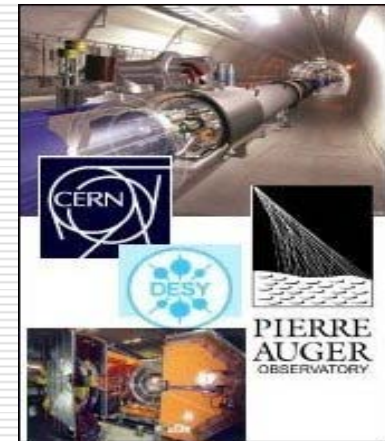
- **Individual country Grid efforts**

- **Conclusions**



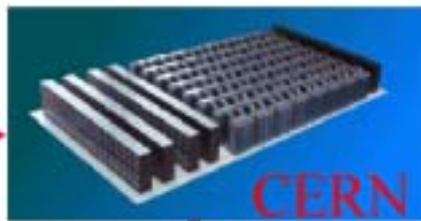
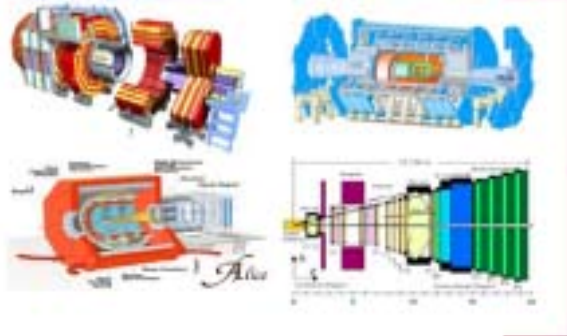
Physicists from 22 Universities/Research Centers of 8 Latin American countries (3 from Argentina, 4 from Brazil, 2 from Chile, 4 from Colombia, 1 from Cuba, 4 from Mexico, 2 from Peru and 2 from Venezuela) participate in HEP projects and experiments that are under development at the following laboratories:

- CERN (Suisse) *Large Hadron Collider (LHC)*
- DESY (France) *High energy electron-proton collider*
- The Gran Sasso Laboratories of INFN (Italy) *solar neutrinos, double beta decay, and the search for dark matter*
- Pierre Auger Observatory (PAO) (Argentina) *ultra high energy cosmic rays*



An extended Model for Latin America

COMPACT WOVEN BEAMS



One T1 for Latin America

10 Gbps

France

Germany

Italy

HEPGRID Latin America

USA

T2 For Countries

HEPGRID Argentina

HEPGRID Venezuela

HEPGRID.Brasil

HEPGRID

HEPGRID Colombia

T3 For Institutes

HEPGRID Chile

HEPGRID-Mexico

HEPGRID-Peru

T4 For Groups
Individual
Machines or
Small Clusters



São Paulo Regional Analysis Center



- Funded by FAPESP
- Implemented in 3 phases

	Phase 1 (2004)	Phase 2 (2005)	Phase 3 (2006)
CPU	50	115	180
Comp. Power (GHz)	125	325	550
Storage (TB)	4	12	12



Open Science Grid



State University of Rio de Janeiro



What is the Open Science Grid?

Is a distributed computing infrastructure for large-scale scientific research, built and operated by a consortium of universities, national laboratories, scientific collaborations and software developers. 50 sites in the United States, Asia and South America.



Brazil +



- Florida International University (FIU), in collaboration with partners at Florida State University (FSU), the University of Florida (UF), the California Institute of Technology (Caltech), along with the Brazilian high energy physics community, are operating an inter-regional Grid-enabled Center for High-Energy Physics Research and Educational Outreach (CHEPREO) at FIU, encompassing an integrated program of research, cyberinfrastructure, and education and outreach at one of the largest minority schools in the US.

Contact:

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novaes@ift.unesp.br



International ICFA Workshop on Digital Divide Issues

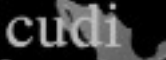


Mexico City
October 24-27, 2007



Introduction

The major high energy physics experiments in operation today and those of the next generation face daunting technological challenges associated with the need to acquire, process and analyze unprecedented quantities of data. But the principal challenge facing our field is that of global collaboration. HEP has had a remarkable tradition of success in global collaboration on accelerators, detectors and communications in physics. In this information era the field is, on the contrary, experiencing difficulties in providing equal access to the data. Scientists from all regions must be able to access and analyze the data, and above all be able to collaborate effectively with their peers around the world, including when they are at their home institutions.





EELA, initiated on the 1st of January 2006 and coordinated by CIEMAT (Spain), is a 2-year project run by 21 institutions of Europe and Latin America under the 6th Framework Programme for Research, Technological Development and Demonstration (FP6) of the European Commission (EC).

PRINCIPLES

- A. To establish collaborative human and infrastructure networks**
- B. To share an interoperable grid infrastructure**
- C. To identify and promote a sustainable framework for e-Science**



EELA TaskForce, Workshop on Itacuruca, Brazil. June06

APPLICATIONS

- 1. Biomedicine**
- 2. High Energy Physics**
- 3. e-Education**
- 4. Climate**

EUROPE

- Italy: INFN
- Portugal: LIP
- Spain: CIEMAT (coordinator), CSIC, RED.ES, UC, UPV

INTERNATIONAL ORGANIZATIONS

- CERN
- CLARA

LATIN AMERICA

- Argentina: UNLP
- Brazil: CECIERJ/CEDERJ, RNP, UFF, UFRJ
- Chile: REUNA, UDEC, UTFSM
- Cuba: CUBAENERGIA
- Mexico: UNAM
- Peru: SENAMHI
- Venezuela: ULA



Institute for Photonics and Nanotechnologies, Fundação Centro de Ciências e Educação Superior à Distância do Estado do Rio de Janeiro, Laboratório de Instrumentação e Física Experimental de Partículas, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, Consejo Superior de Investigaciones Científicas, U. Nacional de la Plata, Universidade Federal Fluminense, Universidad Técnica Federico Santa María, Servicio Nacional de Meteorología e Hidrología, U. de los Andes

- Bioinformatics Applications
 - BLAST (Basic Local Alignment Search Tool) in Grids www.cecalc.ula.ve/blast ULA (Ve) contact H.Hoeger - grid portal for BLAST
 - Mr. Bayes (Bayesian Interference of Phylogeny). ULA (Ve)
- Computational Biochemical Processes
 - Wide in-Silico Docking on Malaria (WISDOM). UNAM(Mx) resources, UFRJ(Br) resources, ULA(Ve). Two targets in Plasmodium Vivax parasite
- Biomedical Models
 - GEANT4 Application for Tomographic Emission (GATE). CUBAENERGIA(Cu) Contact Henry Ricardo Mora - Thyroid Cancer and Treatment of Metastasis

- LA partners
 - Initial applications
 - ALICE (Heavy ion physics at LHC) <http://aliceinfo.cern.ch/>
 - ◆ UNAM (Mx)
 - LHCb (physics at LHC) <http://lhcb.web.cern.ch/lhcb/>
 - ◆ UFRJ (Br)
 - Other LHC applications
 - ATLAS (general purpose) <http://atlas.web.cern.ch/Atlas/>
 - ◆ UFRJ (Br), UNLP(Ar) and UTFSM(CI)
 - CMS (general purpose) <http://cms.cern.ch/>
 - ◆ UNIANDDES(Co) not EELA partner
 - New projects
 - Pierre Auger Observatory <http://www.auger.org/>
 - ◆ UFRJ(Br), UNAM(Mx), and UNLP(Ar)

LA partners

- Video on Demand (Remote Lab, distributed interactive multimedia video server to stream lectures of each class)
 - ◆ Consortium of public universities in the state of Rio de Janeiro CEDERJ, UFRJ(Br) <http://trindade.land.ufrj/~vod/rio/> and <http://www.ufrj.br/html/home.php>
- LEMDist (web access to laboratory equipment and web service to help e-science and e-learning users)
 - ◆ UFRJ(Br) <http://www.ufrj.br/html/home.php>
- PILP (Project on Inductive Logic Programming)
 - ◆ UNAM(Mx): <http://www.unam.mx/>
- SATyrus (approach to the specification and solving of optimization problems)
 - ◆ CUBAENERGIA: <http://www.cubaenergia.cu/>

LA partners

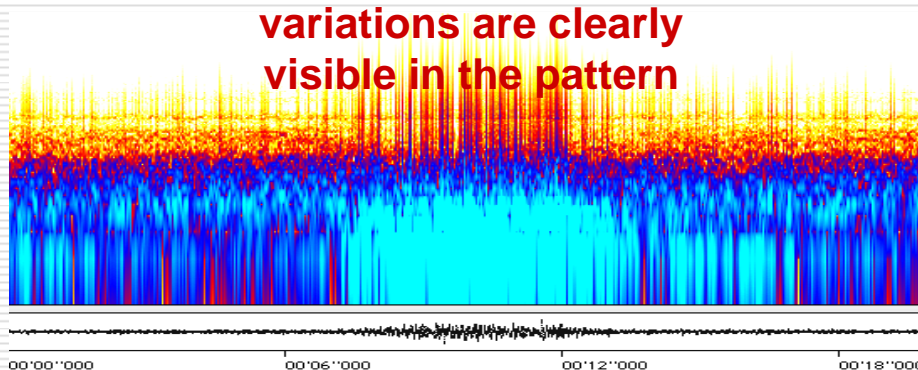
- CAM/CCM3 (Climate Atmospheric Model)
 - Servicio Nacional de Meteorología e Hidrografía de Perú
www.senamhi.gob.pe
- MM5/WRF (Regional atmospheric model)
 - U de Concepción(CI)
- SOM (Self-Organizing Maps, data mining clustering algorithm)
 - UC(Es) www.unican.es

VOLCANO SONIFICATIONS

- Currently no definitive method to predict the eruption of a volcano has been discovered or implemented (yet)
- The calculations have been performed in the EELA e-Infrastructure by INFN & CERN



Oscillation pattern variations are clearly visible in the pattern



Picture: M. Monzier IRD/IG-EPN

BELIEF Bringing Europe's eElectronic Infrastructures to Expanding Frontiers



BELIEF, funded by the EU's Sixth Framework Programme, encourages the **effective development and exploitation of e-Infrastructures** to create value for business and research worldwide. By accessing the BELIEF [Digital Library](#) of e-Infrastructure documentation and becoming involved in our [events](#), you can learn about and help shape the future of e-Infrastructures – how they are developed and used in new application areas and by many communities around the world.



Belief eeLa e-Infrastructures Conference
Connecting the knowledge of today for the value of tomorrow

Home | Committees | Programme | Registration | Promotional Zone | Logistics
Newsroom | Media Partners

Programme

[Download the Pdf version](#)

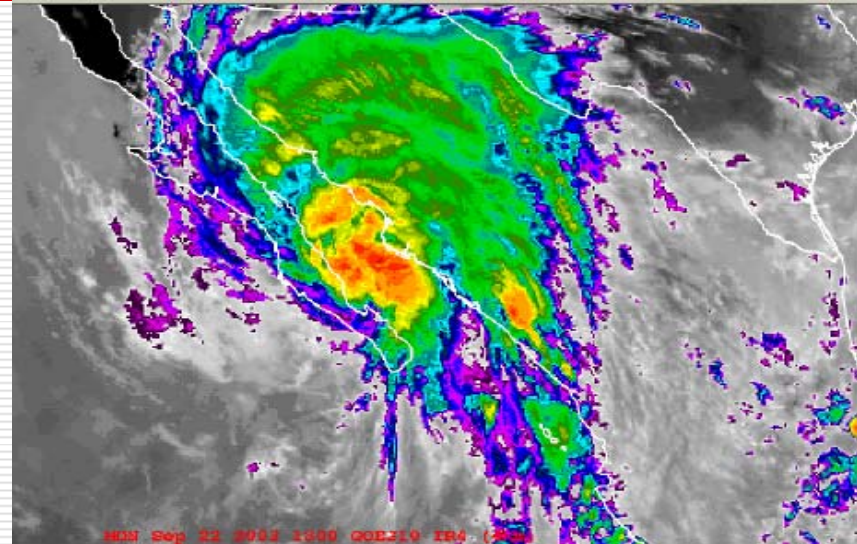
Monday 25 June 2007	BELIEF-EELA e-Infrastructures Conference - Connecting the knowledge of today for the value of tomorrow
10:00 - 11:30	BELIEF-EELA e-Infrastructures Conference Welcome Addresses
11:30 - 12:00	Networking Coffee & Tea Break
12:00 - 13:30	BELIEF-EELA e-Infrastructures Conference Keynote Plenary Session

- The Pacific Rim Application and Grid Middleware Assembly (PRAGMA) was formed in 2002 with NSF funding to establish sustained collaborations and advance the use of grid technologies in applications among a community of investigators working with leading institutions around the Pacific Rim.

Mexico and Chile participating in



- CICESE, Mexico in collaboration with Calit2 and KISTI (Korea) uses PRAGMA's experience to run the project MM5/Mpich-Gx: climate model

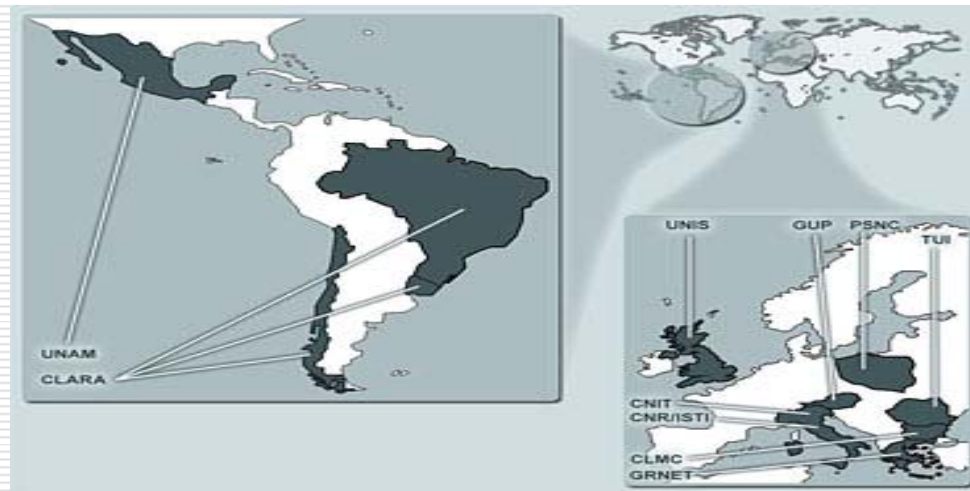


http://www.igrid2005.org/program/applications/escience_fiberhighway.html

- Alejandro Jofré and Alejandro Maass, from the Center of Mathematic Modeling (CMM) of Universidad de Chile. "Dynamics, uncertainty equilibrium and information on networks" using PRAGMA.
Develop new algorithms and the knowledge to solve complex network models taking into account the parallelism in networking structures

Remote Instrumentation in Next-generation Grids

- Funded by the 6th FP. Specific Support Action
- Project start date: **October 1st, 2006**
- Project duration: **18 months**
- Number of partners: **10** (incl. two consortia: Italy and Latin America) from 11 countries (Poland, Austria, Greece, Bulgaria, Romania, Mexico, Uruguay, Chile, Brazil, Italy, United Kingdom)



- Standardization
- Automatic identification of tools
- Identification of communities & users
- Synergy between remote instrumentation and high performance next generation networks (GRIDs)
- Budget €999.165
- Increased scientific cooperation among EU and LA using RedCLARA
- RNP (Brazil) and REUNA (Chile) on Work Projects



The LA Grid program links faculty, students and researchers from the IBM T.J. Watson Research Centers across the United States, Latin America and Spain to collaborate on innovative industry projects for applications in areas such as:

- Health Care
- Biotechnology
- Nanotechnology
- Hurricane Mitigation.

Participants: IBM, **USA:** Florida International University, Florida Atlantic University, University of Miami, **Mexico:** Tecnológico de Monterrey, Universidad de Guadalajara, Universidad Autónoma de San Luis Potosí; **Spain:** Barcelona Supercomputing Center; **Argentina:** Universidad Nacional de la Plata

LA GRID today

- 1500 Processors, across the Universities are operational
- 52 Faculty members engaged in LA Grid based research projects.
- 40 Research projects have been launched
- USD\$ 40M+ in new Research Grant applications
- 100 "Top 10" LA Grid Scholars from Universities on board.
- 30 IBM Internships have been completed
- 6 Shared University Research Grants awarded
- 2 IBM equipment donations made

Contact:

Pete Martínez.

Vice President, Global Business Services

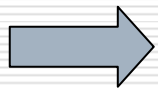
and Senior Location Executive IBM South Florida

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- **Individual country Grid efforts**
- **Conclusions**

Brazil



PAUÁ Pauá Grid Project
HP Brazil Sponsored Grid

Introduction

- Pauá means "emerging" in ancient native Brazilian tribes language (Tupá)
- All institutions made by many research centers that have relationship with HP Brazil
- Each research center contributes with computational resources and specific grid technology expertise

Motivation

- Creating a geographically distributed Grid in Brazil
- Combining existing grid knowledge in current HP Brazil projects
- Attracting projects from other knowledge areas that need high performance computing

Solution

- MyGrid/OurGrid based solution
- Getting dedicated/dedicated resources
- Pauá federation regulates grid policies

Status

- A Grid covering the south, south-east and north-east of Brazil
- Total nodes: ~30k
- Coverage: ~ 1.800 mil

Participating institutions and their roles:

- UFPA - Developing using Grid
- INSITU/MEMO - Research and security grid management
- UFPA - CAET - A university that researches the Brazilian fauna specimens collection and culture
- UNIC - Gaspar - Biotechnology operations development
- IPT - Serra - Mobile services as cloud computing - Model for wireless applications
- UNESP - Data Mining and Management
- UFPA - Chaves - Data visualization environment
- PUCRS - Klaring - Applications development, research in mobility, application scheduling



Stripped-down grid: A lightweight grid for computing's have-nots

A new, open grid computing network provides computing power for medical research, weather prediction and more.

HP is working with researchers in Brazil exploring new technologies that could bring the advantages of grid computing to some of computing's have-nots.

The Brazilian effort, relying on a software program called OurGrid, represents a lightweight approach to grid computing. Most grids today are composed of large organizations and new users must negotiate entry. To join the new network, users need only download the open source software (the latest release is OurGrid 3.0.2). By installing and using this software, users can make their own resources available to others and also become able to access resources from peers.

Walfredo Cirne of Universidade Federal de Campina Grande (UFCG), which initiated the effort. "OurGrid is an attempt to change this, delivering grid power to whoever needs it."

Brazil

Global Resource Information Database

São José dos Campos/SP - Brazil

INPE

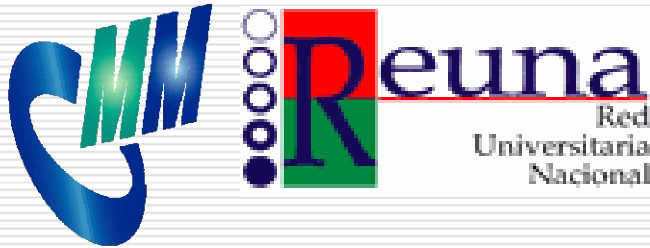
UNEP

Home Data Sets Free & Open Source Reports Contact

- ▣ The UNEP / GRID Network
- ▣ Establishment of Grid São José dos Campos

Prepared by OBT - INPE

CL Grid



Chilean Grid Initiative @ Centro de Modelamiento Matemático.
Scientific applications of national interest

CENTRO DE
MODELAMIENTO
MATEMATICO



At present:

- 3 Universities actives in CLGrid
- 4 Universities joining

■ Activities:

- Workshop 1 and 2 + Intel software college
- (Scientific presentations, coordination reunions, technical talks, tutorials)
- Grid programming: Testbeds
- Cluster implementation: hardware, OS, middleware
- Cluster programming: Parallel & distributed



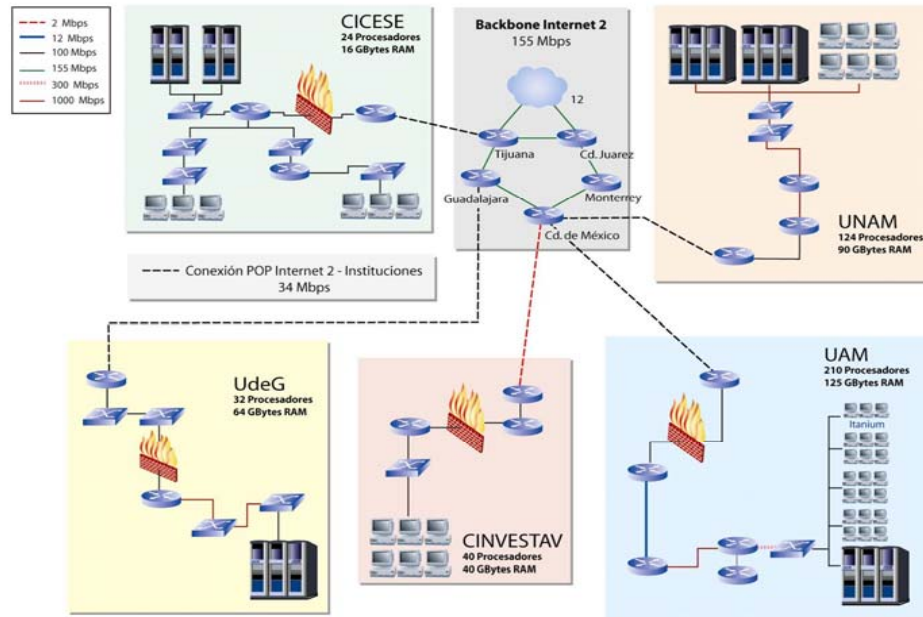
invent



GRID Mexico: GRAMA (2004-2005)

Grid Académica Mexicana (GRAMA)

Supercomputer grids used on scientific applications in Mexico



Participation

- CICESE
- Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (CINVESTAV),
- Universidad Autónoma Metropolitana plantel Iztapalapa (UAM-I),
- Universidad de Guadalajara (UdeG)
- Universidad Nacional Autónoma de México (UNAM)

Project: "Construction of an Interinstitutional Grid in Mexico" sponsored by CUDI and CONACYT continuous collaboration among the different research groups using grid technology

2 new Grid initiatives have been announced by Conacyt...

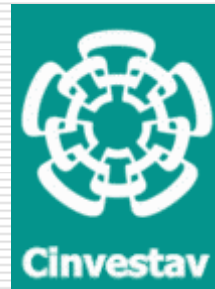
- Delta Metropolitana de Cómputo de Alto Rendimiento.
- Laboratorio Nacional de Grids de Supercómputo para el Soporte de Aplicaciones de E-Ciencia CICESE

Delta Metropolitana de Cómputo de Alto Rendimiento.

2007

10 Gps

GRID, or "virtual center" with initial capacity of 300 processors per node reaching a minimum of 1,000 processors per node in three years



362 nodes

10 Gps

High performance computer centers connected through high capacity dedicated links

KanBalam. 126th largest supercomputer in the world

316 nodes



Casa abierta al tiempo

"Virtual center" with proper middleware to take advantage of the delta resources,

10 Gps



Laboratorio Nacional de Grids de Supercómputo para el Soporte de Aplicaciones de E-Ciencia

2007

Participating institutions:

- Centro de Investigación y de Educación Superior de Ensenada, (CICESE) rhazas@cicese.mx
- Corporación Universitaria para el Desarrollo de Internet, A.C. Internet 2 – México (CUDI) salmajalife@cudi.edu.mx
- Instituto Potosino de Investigación Científica y Tecnológica, A.C. (IPICYT) ccdiaz@ipicyt.edu.mx
- Instituto Politécnico Nacional (IPN), fmenchac@ipn.mx
- Universidad de las Américas de Puebla (UDLAP), hugola@mail.udlap.mx
- Universidad de Guadalajara (UDEG) carmenta@cencar.udg.mx y
- Universidad de Sonora (UNISON) carmen@mail.investigacion.uson.mx

Objective:

Develop and implement a national laboratory for grid supercomputing to support e-Science applications in Mexico

Venezuela GRID



Project supported by FRIDA (Regional Fund for Digital Innovation in Latin America and the Caribbean) LACNIC, IDRC, IDC

GRID tools for the integration and administration of network services in Latin America,
Centro Nacional de Cálculo Científico,
U de Los Andes,
Contact: Herbert Hoeger Zibauer

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- **Individual country Grid efforts**



- **Conclusions**

Conclusions

- Grid applications depend on connectivity. International and domestic.
- CLARA is a critical regional infrastructure. It needs to find a long term financial model and increase bandwidth to its member countries
- With the exception of Brazil, NREN's of Latin America lack adequate bandwidth for grid applications.

Conclusions

- Several international grid initiatives are gathering organizational strength, specially those funded by the 6th FP and the high energy physics communities. Should increase participation and applications
- Domestic grid initiatives in the more advanced countries need improved connectivity and support from funding agencies
- Grid technology could be adapted to less developed countries

ccasasus@cudi.edu.mx
<http://www.cudi.edu.mx>



Links

- CLARA: <http://www.redclara.net/>
- AMPATH: <http://www.ampath.fiu.edu/>
- HELEN:
<http://www.roma1.infn.it/exp/helen/>
- EELA: <http://www.eu-eela.org/>
- Pragma: <http://pragma.sdsc.edu/>
- RINGRID: <http://www.ringrid.eu/>
- LA GRID: <http://latinamericangrid.org/>

Links

- DANTE: <http://www.dante.org.uk/>
- GÉANT2: <http://www.geant2.net/>
- ALICE: <http://alice.dante.net>
- RETINA: <http://www.retina.ar/>
- RNP: <http://www.rnp.br/>
- REUNA: <http://www.reuna.cl>
- RENATA: <http://www.renata.edu.co/>
- CRNET: <http://www.crnet.cr/cr2net>
- CEDIA: <http://www.cedia.org.ec/>

Links

- RAICES: <http://www.raices.org.sv/>
- RAGIE: <http://www.ragie.org.gt/>
- CUDI: <http://www.cudi.edu.mx>
- RENIA: <http://www.renia.net.ni/>
- REDCYT: <http://www.redicyt.org.pa/>
- RAAP: <http://www.raap.org.pe/>
- RAU: <http://www.rau.edu.uy/>
- REACCIUN2: <http://www.reacciun2.edu.ve/>

Links

- CERN: <http://lhcb.web.cern.ch/lhcb/>
- DESY:
http://zms.desy.de/research/linear_collider_ilc/index_eng.html
- The Gran Sasso Laboratories of INFN:
<http://www.lngs.infn.it/>
- Pierre Auger Observatory (PAO):
<http://www.auger.org/>
- Our Grid.Paua Grid
http://www.hp.com/hpinfo/newsroom/feature_stories/2005/05grid.html

Links

- Helen, <http://www.roma1.infn.it/exp/helen/>
- Open Science Grid: <http://www.opensciencegrid.org/>
- Chepreo: <http://www.chepreo.org/>
- Icfat digital divide workshop:
<http://fismat.uia.mx/HEP/ICFADDW2007/Welcome.htm>
|
- Eela: <http://www.eu-eela.org/>
- Belief: <http://www.beliefproject.org/>
- La grid: <http://www-03.ibm.com/grid/lagrid.shtml>
- Grid: <http://www.grid.inpe.br/>
- Clgrid: <http://clgrid.reuna.cl/>
- Frida:
http://www.isoc.org/educpillar/docs/FRIDA_may-2006_EN.pdf

LABS THAT INTEGRATE HELEN

- **CERN** is the world's largest particle physics centre and one of Europe's first joint ventures (1954) for research and high-tech activities. The CERN scientific programme is mainly based on the construction and future operation of the Large Hadron Collider (due to start in 2007) and its four experiments: ALICE, ATLAS, CMS and LHCb. CERN is currently building a Long-Baseline neutrino beam, the first in Europe, aimed at the Gran Sasso Laboratory 730 km south of Geneva (CNGS: CERN Neutrino beam to Gran Sasso).
Currently, around 500 institutes and universities from all over the world, mainly from the Member States, are involved in the research and technology programme of CERN, in physics and on a wide range of applied disciplines.
- **DESY** is the second largest accelerator laboratory in Europe. The scientific programme is centred on the HERA facility, a high-energy electron-proton collider, and its two experiments ZEUS and H1. Current experiments are probing the internal structure of the proton to unprecedented precision, setting stringent limits to possible substructures of quarks and leptons and to the production of new particles. DESY is at the forefront of the superconducting technologies for high-energy linear electron accelerators (the TESLA project) and for Free Electron Laser. Physicists from Institutions all over the world participate in DESY experiments.
- **The Gran Sasso Laboratories of INFN** are located besides the tunnel (10.4 km long) on the highway connecting Teramo to Rome (Italia). The underground structure consists of three experimental halls, enclosing a volume in excess of 180,000 m³. The experimental programme features the study of solar neutrinos, double beta decay, and the search for dark matter. The Laboratory will host two detectors (OPERA, ICARUS) for the CERN Neutrino beam to Gran Sasso (CNGS, extending over a distance of 730 km) built and operated by wide international collaborations.