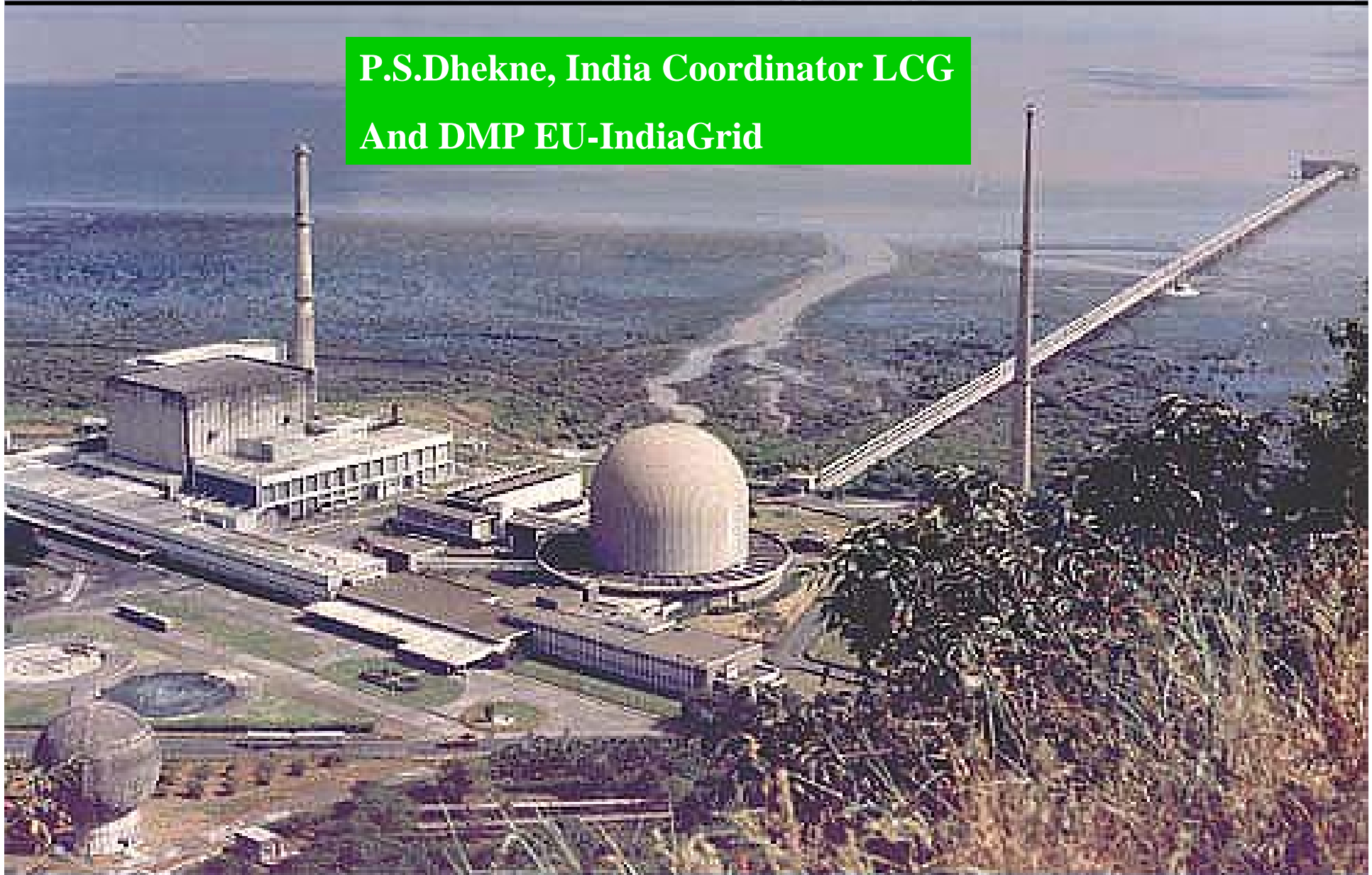


# Grid Status and EU-IndiaGrid

P.S.Dhekne, India Coordinator LCG  
And DMP EU-IndiaGrid



# BARC Experience in Distributed Computing

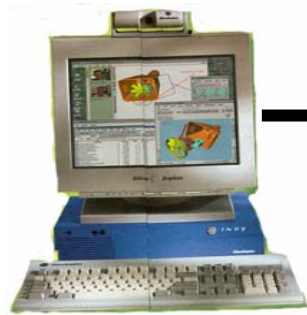
- BARC started development of Parallel & Cluster Computing to meet computing demands of in-house users with the aim to provide inexpensive high-end computing since 1990-91
- Have built so far 16 different models using varying CPU and networking technologies
- Today Clusters are the primary IT infrastructure



Pre-processing

Solver

Post-processing



Front-end

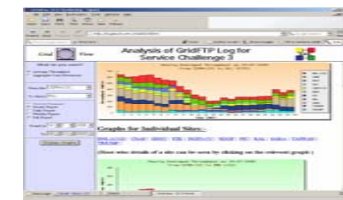


Multiple Graphics HW



- ❑ Clustering is replacing all traditional Computing platforms and can be configured depending on the method and applied areas
- ❑ A 512-node ANUPAM-AMEYA Supercomputer was developed with a speed of 1.7 Teraflop for HPC benchmark and High resolution 20 Mpixel mutli-tiled Display System

- Protocol agreement signed in 1991; India became a CERN observer state in 2002 with LCG collaboration
- Large Hadron Collider (LHC) Grid Software Development, DAE-CERN Protocol agreement on computing for LHC data analysis, a DATA Grid called LCG
  - ~ 5 years/50 man-years amounting to 7.5 MSWF
- DAE developed software is deployed at LCG, CERN
  - Co-relation Engine, Fabric management
  - Problem Tracking System (SHIVA)
  - Grid Operations (GRID VIEW)
  - Quattor toolkit enhancements
  - Data Management
  - Fortran Library conversion



- Fully web based system providing
  - **Tracking** : Tracking reported bugs, defects, feature requests, etc.
  - **Assignment** : Automatic routing and notification to support staff to get issues resolved
  - **Communication** : Capturing discussion and sharing knowledge
  - **Enforcement** : Automatic reminders according to severity of the issues
  - **Accountability** : History and Logs





Problem Tracking System - Netscape

http://lxplus004.cern.ch:8888/SHIVA/problems.php

shiva

Home Register Logout Update ticket Open List Projects

Admin Pending Emails Change Password Addressbook Update profile

You are logged in as **zs** (Helpdesk Administrator)  
You are operator for SHIVA Helpdesk.

107 problems found.

Ticket No	Subject	State	Severity	Project	Proj Ver
SHIVA-1	<a href="#">This is for SHIVA project</a>	CLOSED	NORMAL	SHIVA	1.1
SHIVA-2	<a href="#">Testing project SHIVA via SHIVA itself</a>	CLOSED	NORMAL	SHIVA	1.0
SHIVA-3	<a href="#">Need to be able to change ticket no. in the 'update' form</a>	CLOSED	URGENT	SHIVA	1.0
SHIVA-4	<a href="#">Login needs mouse click</a>	CLOSED	NORMAL	SHIVA	1.0
SHIVA-5	<a href="#">Make emailing a problem simpler</a>	CLOSED	NORMAL	SHIVA	1.0
SHIVA-6	<a href="#">How do I see all (open probably) problems for the project for which I am not troubleshooter?</a>	CLOSED	NORMAL	SHIVA	1.0

Document: Done (7.109 secs)

Start SHIVA\_Over... shiva\_demo ptsdemo Problem Tr... 2:59 PM



- Lemon is a system designed to monitor performance metrics, exceptions & status information of extremely large clusters
- At CERN it monitors ~2000 nodes, ~70 clusters with ~150 metrics/host producing ~1GB of data. Estimated to monitor up to 10000 nodes
- A variety of web based views of monitored data for – Sysadmins, managers and users
- Highly modular architecture allows the integration of user developed sensors for monitoring site-specific metrics.



- Quattor is a tool suite providing automated installation, configuration and management of clusters and farms
- Highly suitable to install, configure and manage Grid computing clusters correctly and automatically
- At CERN, currently used to auto manage nodes >2000 with heterogeneous hardware and software applications
- Centrally configurable & reproducible installations, run time management for functional & security updates to maximize availability







# Analysis of GridFTP Log for Service Challenge 3



## What do you want?

- Average Throughput
- Aggregate Data Movement

From Site: CERNCI

To Site(s): ALL

- Current Summary
- Hourly Report
- Daily Report
- Weekly Report
- Full Report

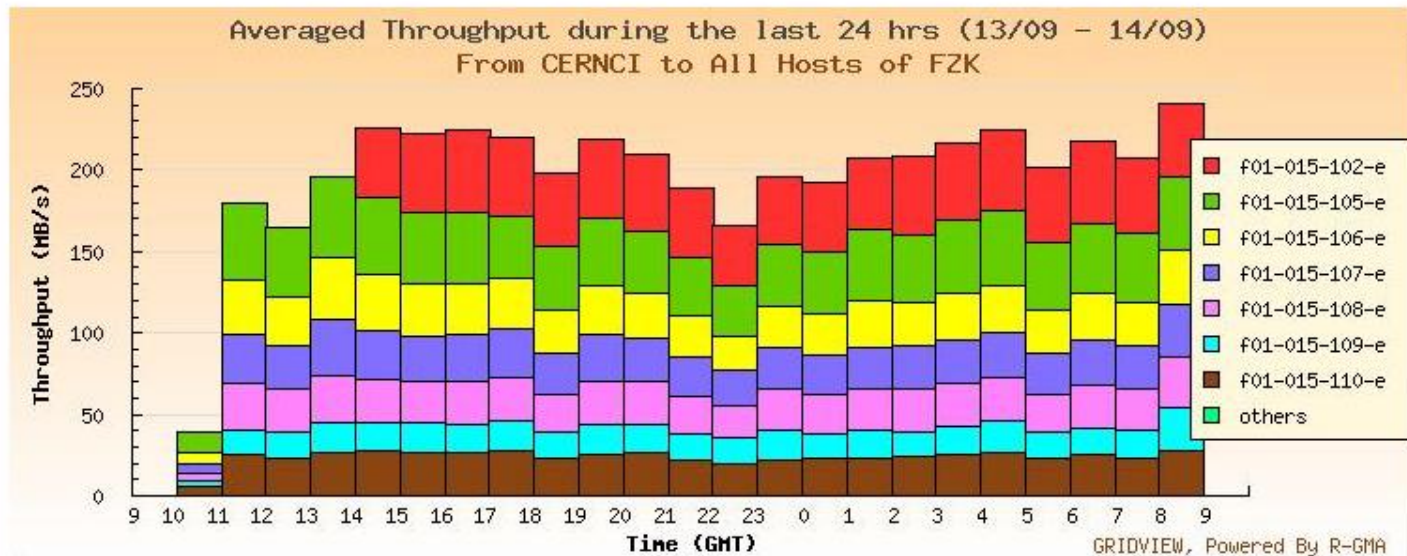
From/On: 14/9/2005

To: 14/9/2005

Display Graphs

[Sites Abbreviations](#)

## Host-wise details for the Destination Site



(others: Hosts giving throughput less than 5% of max, [click here for names](#))

Show Source Host Details

Show Dest Host Details

Go Back

[Table of Averaged Throughput](#)

[Graphs for Individual Hosts](#)



# Analysis of GridFTP Log for Service Challenge 3



**What do you want?**

- Average Throughput
- Aggregate Data Movement

From Site:

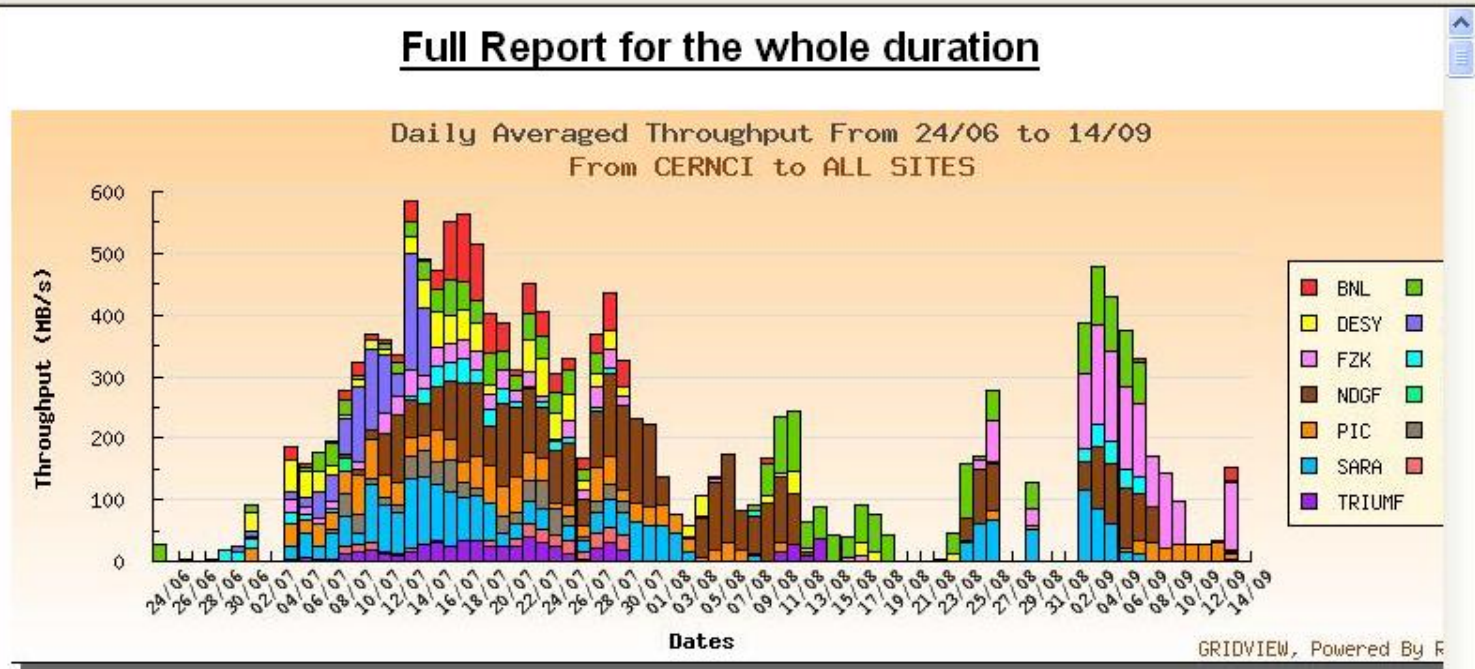
To Site(s):

- Current Summary
- Hourly Report
- Daily Report
- Weekly Report
- Full Report

From/On:

To:

[Sites Abbreviations](#)



(OTHERS: Sites giving throughput less than 5% of max, [click here for names](#))

### Datewise Pie-Graphs for Daily Averaged Throughput:-

- [24/06](#) | [25/06](#) | [26/06](#) | [27/06](#) | [28/06](#) | [29/06](#) | [30/06](#) | [01/07](#) | [02/07](#) | [03/07](#) | [04/07](#) | [05/07](#) |
- [06/07](#) | [07/07](#) | [08/07](#) | [09/07](#) | [10/07](#) | [11/07](#) | [12/07](#) | [13/07](#) | [14/07](#) | [15/07](#) | [16/07](#) | [17/07](#) |

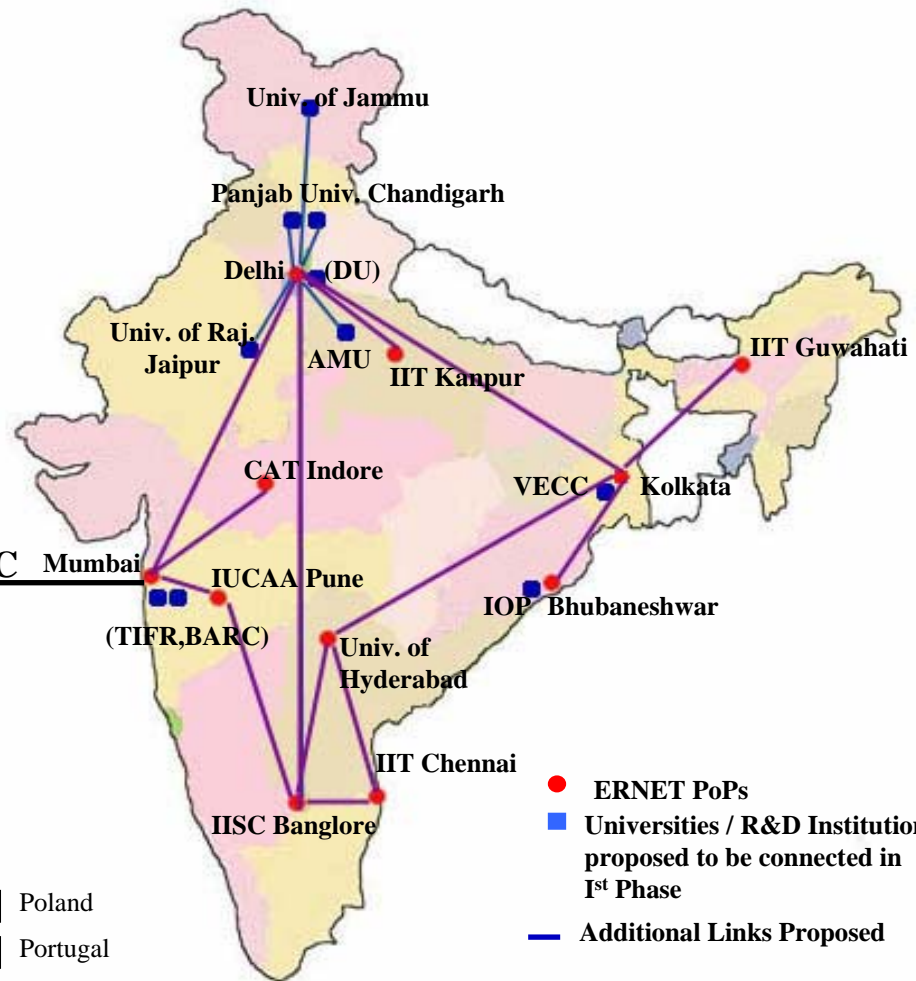
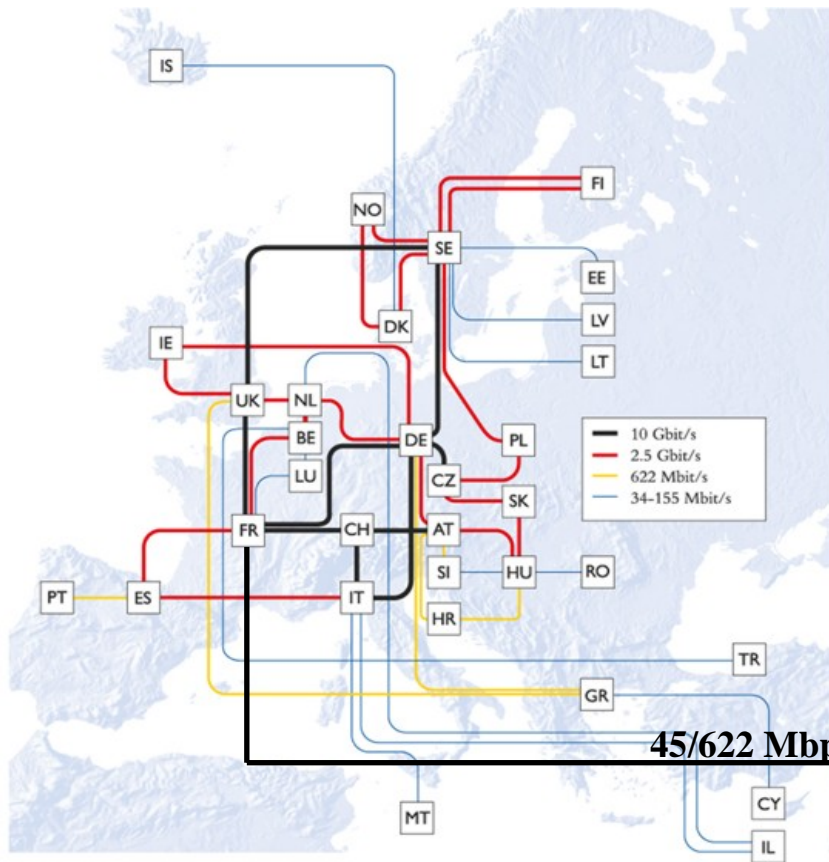
- Department of Information Technology (DIT), Govt. of India, has funded ERNET to connect to Geant network for Educational network connectivity.
- TIFR/DAE signed an MOU with ERNET to provide connectivity to CERN on 6<sup>th</sup> Sep 2005.
- Cost shared between DAE, DST and DIT



- A 45 Mbps connectivity was planned between ERNET and GEANT.
- It is a program funded by European Union through DANTE and Govt. of India through ERNET, TIFR & DST.
- 12 research institutes/universities will use the link for collaborative research in High Energy Physics.
- Runs IPv6 on this link.



# ERNET Connectivity with European Grid



- Multi-Gigabit pan-European Research Network
- Connecting 32 European Countries and 28 NRENs
- Backbone capacity in the range of: 622 Mb/s-10Gb/s

AT	Austria	DK	Denmark	HR	Croatia	LT	Lithuania	PL	Poland		
BE	Belgium	EE	Estonia	HU	Hungary	LU	Luxembourg	PT	Portugal		
CH	Switzerland	ES	Spain	IE	Ireland	LV	Latvia	RO	Romania		
CY	Cyprus	FI	Finland	IL	Israel	MT	Malta	SE	Sweden		
CZ	Czech Republic	FR	France	IS	Iceland	NL	Netherlands	SI	Slovenia	TR	Turkey
DE	Germany	GR	Greece	IT	Italy	NO	Norway	SK	Slovakia	UK	United Kingdom

- ERNET PoPs
- Universities / R&D Institutions proposed to be connected in 1st Phase
- Additional Links Proposed
- ERNET Backbone Links

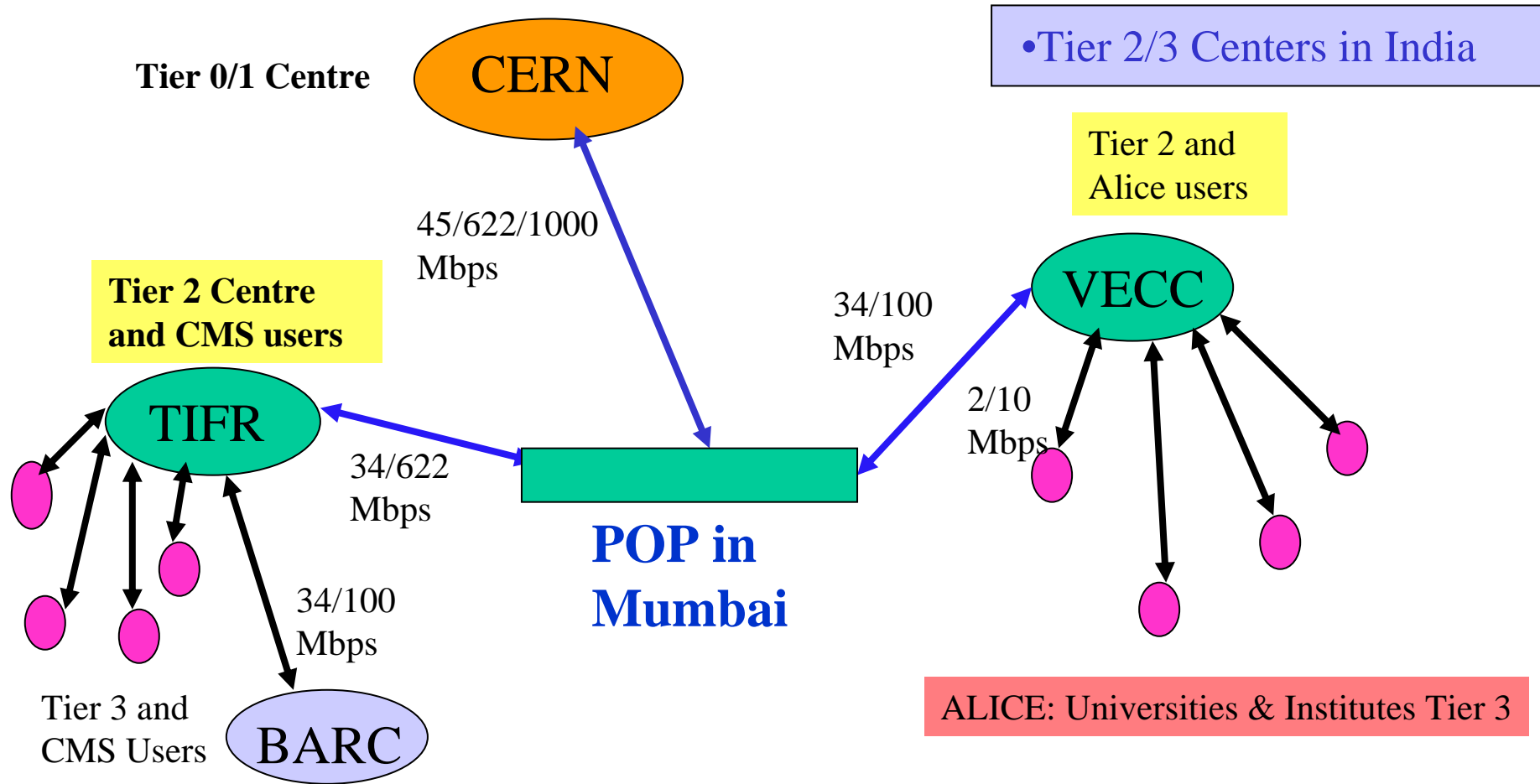


EU-IndiaGrid (RI-031834) is funded by the European Commission under the Research Infrastructure Programme  
[www.euindiagrid.eu](http://www.euindiagrid.eu)

- At present it is possible to get 45 Mbps IPLC line via Geant : 34 Mbps dedicated for LCG Tier-2s
- 622 Mbps link to be set up by June 2007
- Proposal to go for 1Gbs in 2008, 2.5 Gb/s in 2009/10Gb/s in 2009
- Today cost is a problem
- More organization should get involved



# Regional LCG Tier-2 in India



•Tier 2/3 Centers in India

CMS: Universities & Institutes Tier 3

ALICE: Universities & Institutes Tier 3

**DAE/DST/ERNET: Geant link operational since August 2006**



# Tier-II Centre for CMS (Update on TIFR Activities)

## Present status

### Hardware

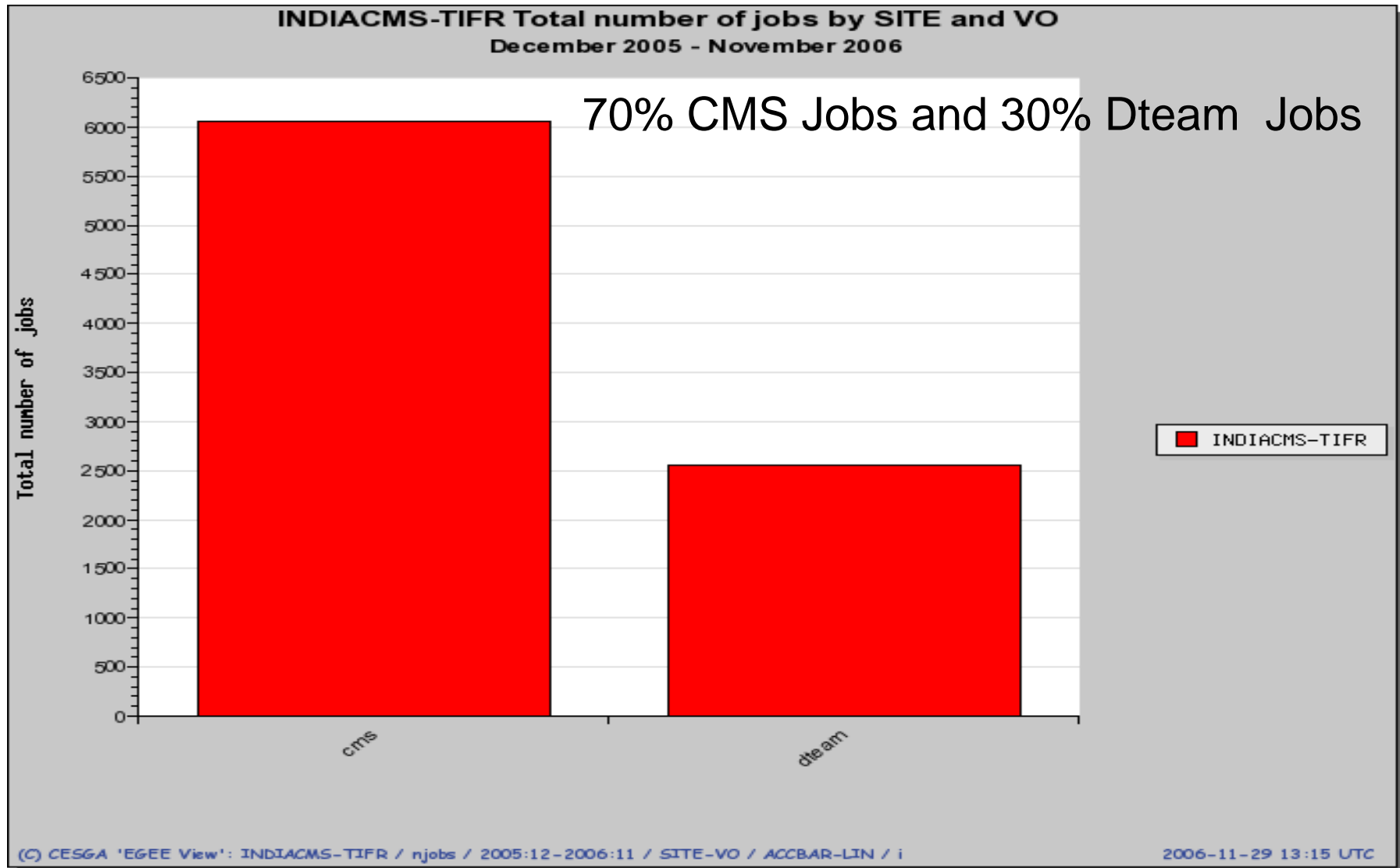
- 4 Grid managing servers. (CE+BDII, SE, Mon)
- 36 Intel Pentium-IV worker nodes.
- 34 Mbps internet connection.
- SE with 1 TB storage

### Software and maintenance

- Scientific Linux 3.0.5 O.S.
- Middleware upgraded to gLite 3.0
- Upkeep/upgradation according to broadcast intimations
- Regular (mandatory) report submission
- **> 99 % uptime** (till August 2006)



# Total number of jobs on TIFR site



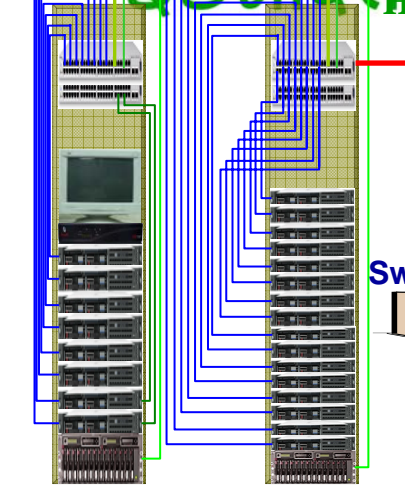
# Tier-II Centre for ALICE

## (Update on VECC and SINP Activities)

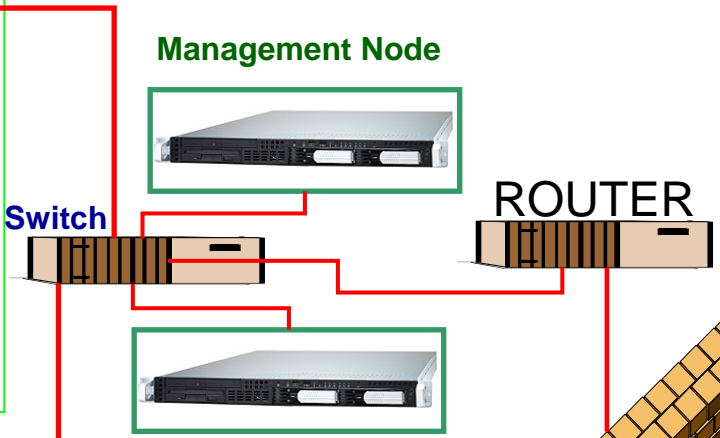
- ✓ New Domain name “tier2-kol.res.in” has been registered and work is going on
- ✓ CONDOR Batch System is running with one server and eight Clients under **QUATTOR** cluster management environment
- ✓ **AliROOT**, **GEANT** and other production related packages are tested successfully in both ways
- ✓ **ALICE Environment ( AliEn )** at present NOT running
- ✓ Data Grid has been registered at **cern.ch**
- ✓ Linked with **CERN** via **34Mbps** available Internet link

Present Status

CERN



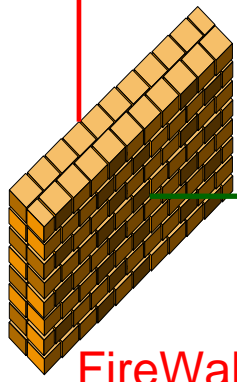
Gigabit Network



Management Node

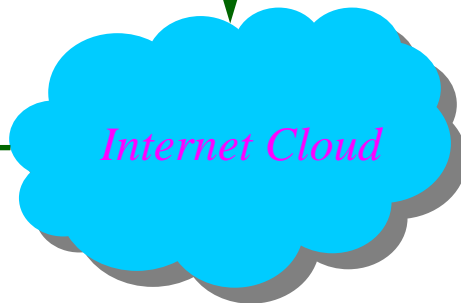
ROUTER

Management Node  
(Stand-by)



FireWall

34Mbps



Internet Cloud

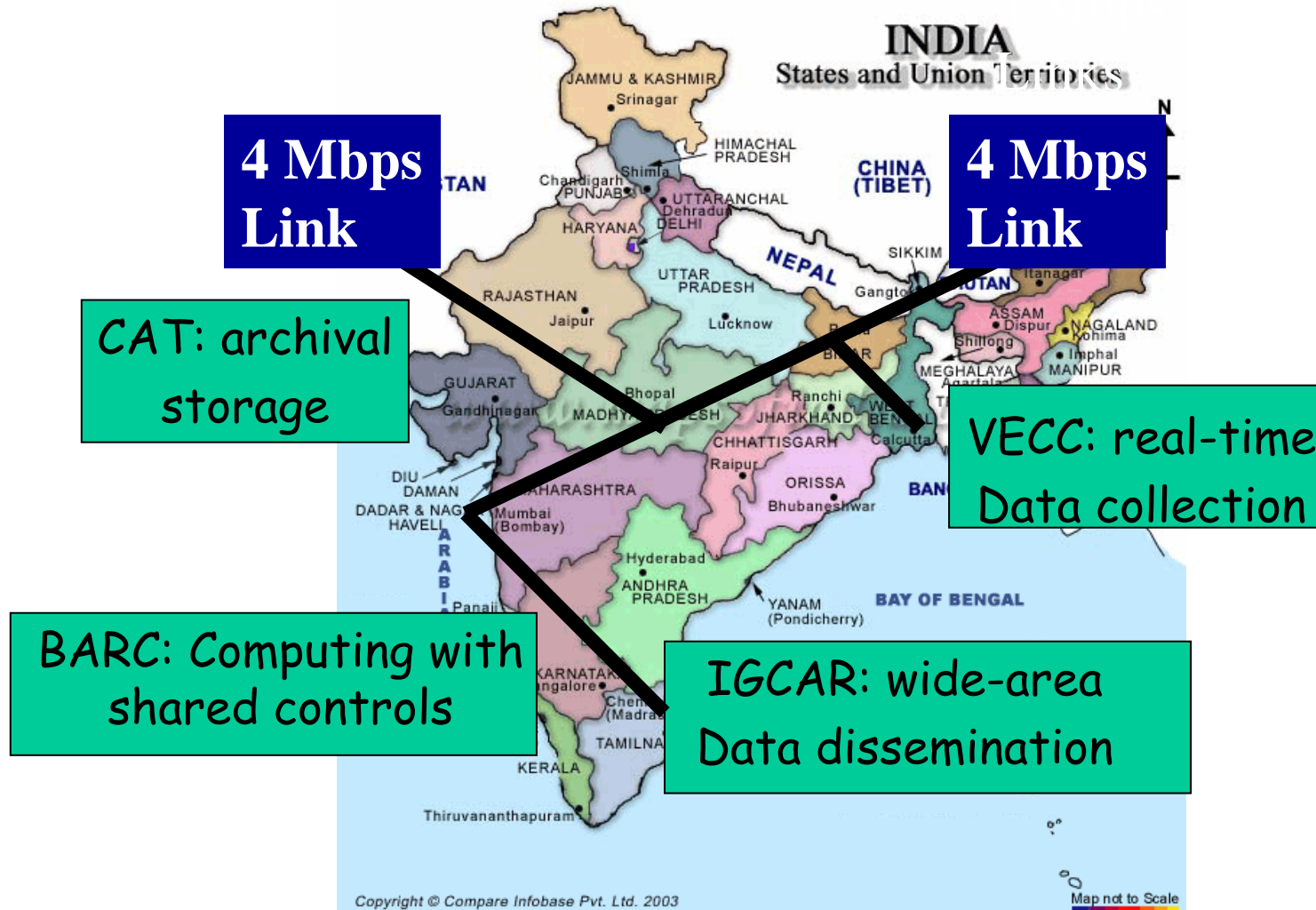


32 Mbps used by few users alone

SINP- Cluster :  
High Availability Quattor

Tier-2@Kolkata

# DAE Grid (Private)



Resource sharing and coordinated problem solving in dynamic, multiple R&D units

**ANUNET with max of 512 Kbps**

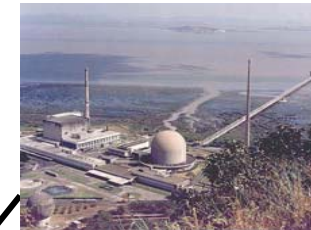
**Bandwidth**



NRL Laboratory

Remote Control & Monitoring

VECC Cyclotron



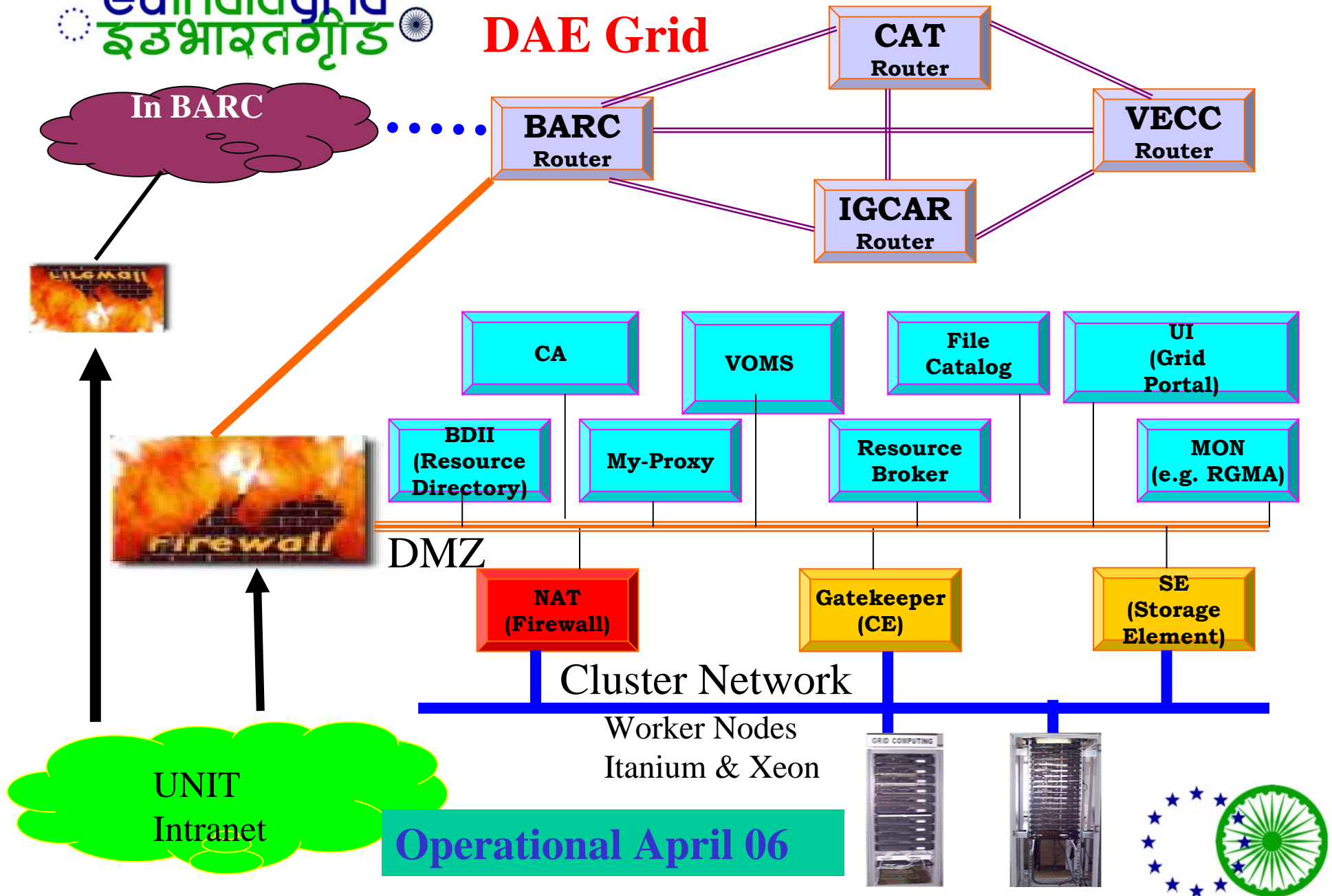
Simulations  
On ANUPAM at  
BARC, Mumbai

RRCAT Synchrotron

**Inter University Consortium : Increasing Academia Interaction**  
**Coherent Synergy, sharing of instruments, data**



# DAE Grid



Operational April 06

Welcome to the BARC GRID Portal - Mozilla Firefox


File Edit View Go Bookmarks Tools Help

https://gridportal.barc.daegrid.gov.in/

Scientific Linux Distros

Welcome to the BARC GRID Portal Welcome to the GENIUS INFN GR...

## BARC Grid Portal




### Grid Services

- File Services
- Security Services
- Job Services
- Data Services
- Info Services
- Interactive Services
- Grid Settings
- Set VO
- Current VO Services
- Statistics
- Logout

based on Genius  
INFN GridPortal

# Welcome to BARC Grid Portal



New Computer Centre, BARC

Done gridportal.barc.daegrid.gov.in

Welcome to the BARC GRID

16:13

Welcome to the VECC GRID Portal - Mozilla Firefox


File Edit View Go Bookmarks Tools Help

https://gridportal.daegrid.vecc.gov.in/

Scientific Linux Distros

Welcome to the BARC GRID Portal Welcome to the BARC GRID Portal Welcome to the VECC GRID Portal

# VECC Grid Portal



Single Job [barc\\_lcg](#) [VO:testvo](#) [RLS: BARCLCG](#) [Your Data](#) [Logout](#)

## Job Queue

	JDL Name	Last Update	Destination	Status	Exit Code
<a href="#">of4DtZ20L5gjcA</a>	<a href="#">/home/veccuser/job.jdl</a>	Fri Mar 05:45:38 2006	aksha-ce2.daegrid.barc.gov.in:2119/jobmanager-pbs-testvo	Scheduled	
<a href="#">AhLKnC8tsnczw</a>	<a href="#">/home/veccuser/job.jdl</a>	Fri Feb 11:19:16 2006	aksha-ce2.daegrid.barc.gov.in:2119/jobmanager-pbs-testvo	Done	0

Computer Division  
VECC

Done [gridportal.daegrid.vecc.gov.in](#)

1 2 3 4 Welcome to the VECC GRID root@admin:/usr/snapshots - 11:24

[www.euindiagrid.eu](http://www.euindiagrid.eu)





grid-logo.gif 70x70  
change with the logo of the Grid being monitored

GridICE >> VO::ALL >> Job Details

CE SE Job Charts

From: Day 28 Month 2 Year 2006 To: Day 3 Month 3 Year 2006

Site: site2 VO: All VOs Status: Running, Queued ID: Jobs x page: 20 view

View 1 View 2 View 3

1 Entries in 1 Page

1 |

#	LocalID	VO	Site	Status	Creation	Start	Duration	CPU/Wall	Exit	RAM	VM	RB
1	419	testvo	site2	R	2006-03-03 11:29	00:00:01	00:00:01	0 0 0 0	-	-	-	-
		GlobalID: n/a		GlobalOwner: /C=IN/O=DAE/OU=VECC/CN=veccuser		LocalID: 419 ExecutionTarget: aksha10						

Generated: Fri, 3 Mar 2006 11:36:00 +0530

GridICE Homepage

Done

- Department of Information Technology (DIT), Govt. of India, has funded CDAC to deploy computational grid named GARUDA as Proof of Concept project.
- It has connected 45 institutes in 17 cities in the country at 10/100 Mbps bandwidth
- BARC is one of the partner



- **ERNET-Geant connectivity for Education Research**
- **BARC MOU with INFN, Italy to establish Grid research Hub in India and Italy**
- **EU-IndiaGrid with 5 European & 9 Indian partners**
- **11<sup>th</sup> five year plan proposals for E\_infrastructure and Grid for S&T applications submitted to GOI with possibility for Weather, Bio and e-Governance**



## EU-IndiaGrid Status & Issues

- First kickoff meeting in ICTP Italy
- Present workshop at TIFR
  - **Issues**
    - EU-IndiaGrid infrastructure
    - Interoperabilities
    - CA for India
    - Testing
    - How users will use and what applications



## Conclusions

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- Grids allow the scientific community to interact in real-time with modeled phenomena to steered through distributed simulations.
- Grid collaboratories can successfully negotiate access to distributed yet highly expensive scientific instruments such as telescopes, SCM, Bio-microscopes, telemedicine
- Grid Computing reaches out from high-energy physics to governance and helps to aggregate distributed computing resources



# Thank You

