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The Grid-it: the Italian Grid Production infrastructure

INFN-Grid – goals

◆ Promote computational grid technologies research & development: Middleware and grid tools

- Through European and national projects
  - DataGrid, DataTAG, Firb-GRID-it, EGEE, LCG, CoreGRID etc
- Internal R&D activities

◆ Deploy – operate - support the Grid-it Italian Grid Production Infrastructure: Grid as "coordinated resource sharing" on a large scale for a multi-institutional and dynamic virtual organization

◆ Set up the Italian Grid Production Infrastructure open to the national research community

- FIRB: Grid.it – astrophysics, geophysics, biomedicine, computational chemistry etc
- Research community and industry

INFN-Grid – goals

◆ Provide operation and support of the EGEE/LCG production infrastructure, national Grids interconnection

◆ Promote dissemination activity to 'gridify' scientific applications

- GILDA testbed
- Genius portal

INFN-GRID participation to EGEE

- ◆ EGEE SA1 – infrastructure operation and support
  - ▪ ROC – Regional Operation Center
  - ▪ CIC - Core Infrastructure Center

- ◆ EGEE JRA1 – IT-CZ cluster
  - ▪ Workload management system
  - ▪ Resource access - CE – accounting - policy
  - ▪ VOMS

- ◆ EGEE NA4/NA3/NA2/NA5
  - ▪ HEP application
  - ▪ Generic application
  - ▪ Dissemination

INFN-GRID participation to GRID.IT/FIRB

◆ Set up the national production grid Infrastructure open to the national research community

◆ Grid management and support tools - system

- First tools in production

- R&D on
  - Resource Utilization Policies
  - Data Management
  - Scientific Data Base grid integration

Italian – Grid : Site map

- ◆ 26 resource centers (number is increasing rapidly) of different size in term of computing and storage

- ◆ About 2000 CPUs of computing power

- ◆ 15 Virtual Organizations

Italian Production Grid – Computing and Storage Resources

Site name	CPU#	Storage (GB)	Alice	Atlas	Cms	Lhcb	Bio	Inaf	Infngrid	Ingv	Gridit	Theophys	Virgo	Babar	Zeus	Cdf	Enea	Dteam	Esr	compchem	Magic	Biomed	Planck
INFN-Bari	62	1800	X	X	X	X	X	X	X	X	X	X	X	X	X	X				x	x	X	
INFN-Bologna-CMS	22	2700			X			X										X					
INFN-CNAF	10	2000	X	X	X	X	X	X	X	X	X	X	X	X	X	X	x	X	x	x	x	x	x
INFN-Bologna	10	75	X	X	X	X	X	X	X	X	X	X	X	X	X	X		x					
INFN-Cagliari	14	142	X	X	X	X	X	X	X	X	X	X	X		X	X		x					
INFN-Catania	56	2000	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X				x	x
INFN-Firenze	36	755	x	x	x	x	x	x	x	x	x	x	x	x	x			x					
INFN-Ferrara	14	26	X	X	X	X	X	X	X	X	X	X	X	X	X	X		x					
INFN-Frascati	6	1200		X				X			X							X					
INFN-Lecce	2	20		X				X			X												
INFN-Legnaro	180	1500	x	X	X	X			X									X					
INFN-Milano	54	3000	x	X	x	x			X					x				X					
INFN-Napoli	24	870	X	X	X	X	X	X	X	X	X	X	X	X	X	X		x					
INFN-Napoli-Atlas	12	0	x	X	x	x					X							X					
INFN-Padova	102	10000	X	X	X	X	X	X	X	X	X	X	X	X				X				x	
INFN-Perugia	26	250			X				X		X	x		X				x					
INFN-Pisa	32	120	X	X	X	X	X	X	X	X	X	X	X	X	X	X		x					
INFN-Roma1-tier2	42	3000		X					X									X					
INFN-Roma1-Virgo	10	15	X	X	X	X	X	X	X	X	X	X	X	X	X		x	x				x	
INFN-Roma2	8	1100		X			X	X	X	X	X	X	X	X	X	X		x					
INFN-Torino	56	1900	x	X	X	X			X				x		x			X					
INFN-Trieste	2	35	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
SNS-Pisa	2	34	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
NA- ICAR-CNR	2	0	x	x	x	x	x	x	x	X	X	X	X	X	X	X							
INAF-Trieste	3	35						X	X		X												x
HPCC-Unile	2	0	x	x	x	x	x	x		x	x	x	x	x	x			x					
Esa-Esrin	12	440																	x	x			
TOTAL	**787**	**32577**																					
INFN-CNAF-CR	640	90000	X	X	X	X								X		X		X					
TOTAL	**1427**	**122577**																					

Grid-it:Italian Grid Production Services

- **Resource Brokers:**
  - EGEE/LCG infrastructure open to all EGEE VO (LHC exps , Biomed, MAgic, Planck, Compchem, ESR)
    - egee-rb-01.cnaf.infn.it ;
    - grid008g.cnaf.infn.it (DAG enabled)
  - ATLAS VO egee-rb-02.cnaf.infn.it, egee-rb-05.cnaf.infn.it
  - CMS VO egee-rb-04.cnaf.infn.it, egee-rb-06.cnaf.infn.it
- Replica Location Service for babar, virgo, cdf, planck and other Italian VOs
  - datatag2.cnaf.infn.it,
  - To be replaced by LFC: lfcserver.cnaf.infn.it
- Voms server:
  - testbed008.cnaf.infn.it
  - VOs: infngrid, zeus, cdf, planck, compchem
- LDAP SERVER FOR National Vos (bio, inaf, ingv, gridit,theophys, virgo) :
  - grid-vo.cnaf.infn.it

Grid-it:Italian Grid Production Services

- ◆ MyProxy servers:
  - ■ testbed013.cnaf.infn.it

- ◆ User Interfaces:
  - ■ UIs are not Core servives..., anyway you can find a list of italian UIs
    - · http://grid-it.cnaf.infn.it/index.php?userinterface&type=1

- ◆ Monitoring:GridICE server:
  - ■ EGEE/LCG Production infrastructure
    - · http://gridice2.cnaf.infn.it:50080/gridice/site/site.php
  - ■ Italian Production Infrastructure
    - · http://edt002.cnaf.infn.it:50080/gridice/site/site.php
  - ■ Atlas
    - · http://egee005.infn.it:50080/gridice/site/site.php
  - ■ CMS
    - · http://egee004.cnaf.infn.it:50080/gridice/site/site.php

INFN-GRID Middleware release

- Based on LCG

- Several VOs added (about 15)

- Authorization via VOMS + LCAS/LCMAPS

- MPI configuration

- Cert queue for site functional tests

- Gridice includes WNs monitor

- AFS support in the WN

- DAG jobs support

- DGAS accounting system

Grid-it Production Grid

◆ The access point for user and site mangers is the Grid-it Production Grid Website:

◆ http://grid-it.cnaf.infn.it

- Documentation (prerequisites, middleware installation, upgrade, testing, using the Grid, current applications and VOs, etc.)

- Software repository

- Monitoring of resources and services (GridICE)

- Tools for the CMT (Central Management Team), site managers and supporters (Calendar/downtime manager)

- Trouble ticketing system for problems, advisories and suggestions

- A knowledge base to complement the documentation

Grid-it: Ticketing system

◆ INFN-GRID ticketing system is used:

- from users to ask questions or to communicate troubles;
- from system manager to communicate about common grid tasks (ex: upgrading to a new grid release)
- from Central Management Team to system manager to notify a problem

- **Support Groups** :
  - Support Grid Services (RB, RLS, VOMS, GridICE, etc) Group;
  - Support VOApplications Group (each for every VO: Atlas, CMS, Alice, LHC, Babar, CDF, Virgo,....);
  - Support Site Group (each for every site)

- **Operative Groups** Operative Central Management Team (CMT);
  - Operative Release & Deployment Team;

Users -> *Create a ticket*	
Supporters/**Operatives** -> *Open the ticket*	
Users and/or Supporters/**Operatives** -> *Update an open ticket*	
Supporters/**Operatives** -> *Close the ticket*	

Grid-it: Operations activities

- ◆ Operation of the grid infrastructure:
  - Shifts (Monday to Friday 08:00-20:00): about 20 people from different sites monitor and test the status of the grid resources (STF, others), certify of the italian sites/resources and provide VO and user support
  - Management of the grid services (general purpose and VO specific)
  - Participation to CIC-on-Duty shifts

- ◆ Support (operations, user and VO):
  - Regional ticketing system
  - Support groups are defined and operational for experiments and applications
  - Participation to Support-on-Duty shifts

- ◆ Release and installation:
  - currently INFN-GRID release is based on LCG. INFN-GRID-2.4.0 contains DAG, DGAS, VOMS, support for afs client and GridIce monitoring for the WNs; it is now in the deployment phase on the italian grid infrastructure
  - Installation and configuration scripts (YAIM) are provided

- ◆ Grid Install working group → Fabric and software management WG

Certification activity

◆ The Central Management Team is responsible of the resource centers certification: checking the functionalities of a site <u>before</u> joining the site to the production grid.

◆ Although all certification jobs are VO independent, the INFNGRID VO is used to perform these jobs;

◆ In particular are checked:

- MPI functionalities
- GIIS' information consistence;
- Local jobs submission (LRMS);
- Grid submission with Globus (globus-job-run);
- Grid submission with the ResorceBroker;
- ReplicaManager functionalities;

◆ In order to certificate a site the CMT uses dedicated grid services:

- RB & BDII: gridit-cert-rb.cnaf.infn.it

◆ In this way we avoid to have an uncertified site in the production grid services;

Towards gLite:
Pre-production, Middleware Certification

◆ Pre-production Service

  ▪ 3 sites in Italy (CNAF,Padova, Bari) ready

  ▪ CNAF is the pilot site:
    • LCG release: 1 CE, 1 SE, 3 WN available
    • gLite release: 1 CE, 3 WN, 1 I/O service, 1 VOMS server, 1 WMS node (formerly RB), 1 double-stack WN, 1 R-GMA server and 1 UI available soon

  ▪ Migration strategies will be tested

  ▪ Stress test middleware components in particular the WMS system

  ▪ Open to the experiments applications to verify middleware

◆ Certification Infrastructure

  ▪ 4 sites (CNAF, Padova, Roma and Torino)

  ▪ goal: certificate the INFN-GRID release partecipating to the certification of the gLite release and adding new, specific middleware components to gLite: storRM, G-PBOX

  ▪ produce and verify the installation procedures

Towards gLite: migration

- gLite Migration

  - gLite release 1 in the pre-production service to verify:
    - Functionality
    - Stability
    - Performance

  - pre-production open to experiments

  - INFN-GRID/LCG fall back solution

  - Production infrastructure migration to gLite step by step
    - First: migration from RB to gLlite WMS
    - Then CE / WNs:
      - Major sites deploy gLite CEs in parallel with the LCG-2 CEs.
      - Some of the smaller sites convert fully to gLite.

Current activities

- Production service quality and stability improvements

  - Improve monitoring systems: Gridice with reactive alarms and notification, new release

  - Site isolation - need simple mechanism to remove sites

  - Improve the grid management and monitoring structure

- INFN-GRID Support infrastructure:

  - VO support - Experiments
  - Site administartors
  - Grid services support

- Accounting and policy system management

Resource centers status: Feb. 2005

SITE NAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CNAF-T1																												
INFN-BARI																												
INFN-BOLOGNA																												
INFN-BOLOGNA-CMS																												
INFN-CAGLIARI																												
INFN-CATANIA																												
INFN-CNAF																												
INFN-FERRARA																												
INFN-FRASCATI																												
INFN-LNL-LCG																												
INFN-MILANO-LCG2																												
INFN-NAPOLI																												
INFN-NAPOLI-ATLAS																												
INFN-PADOVA																												
INFN-PERUGIA																												
INFN-PISA																												
INFN-ROMA1																												
INFN-ROMA1-VIRGO																												
INFN-ROMA2																												
INFN-TORINO-LCG2																												

Status OK
Critical test failed
Scheduled downtime
unknown error

Resource centers status: Mar. 2005

SITE NAME	1	2	3	4	5	6	7	8	9	10	11			14	15	16	17	18	19	20	21	22	23	24
CNAF-T1																								
INFN-BARI																								
INFN-BOLOGNA																								
INFN-BOLOGNA-CMS																								
INFN-CAGLIARI																								
INFN-CATANIA																								
INFN-CNAF																								
INFN-FERRARA																								
INFN-FRASCATI																								
INFN-LNL-LCG																								
INFN-MILANO-LCG2																								
INFN-NAPOLI																								
INFN-NAPOLI-ATLAS																								
INFN-PADOVA																								
INFN-PERUGIA																								
INFN-PISA																								
INFN-ROMA1																								
INFN-ROMA1-VIRGO																								
INFN-ROMA2 **																								
INFN-TORINO-LCG2																								

Status OK
Critical test failed
Scheduled downtime
unknown error

Graphs of resources utilization

Stats Res Usage (hours)
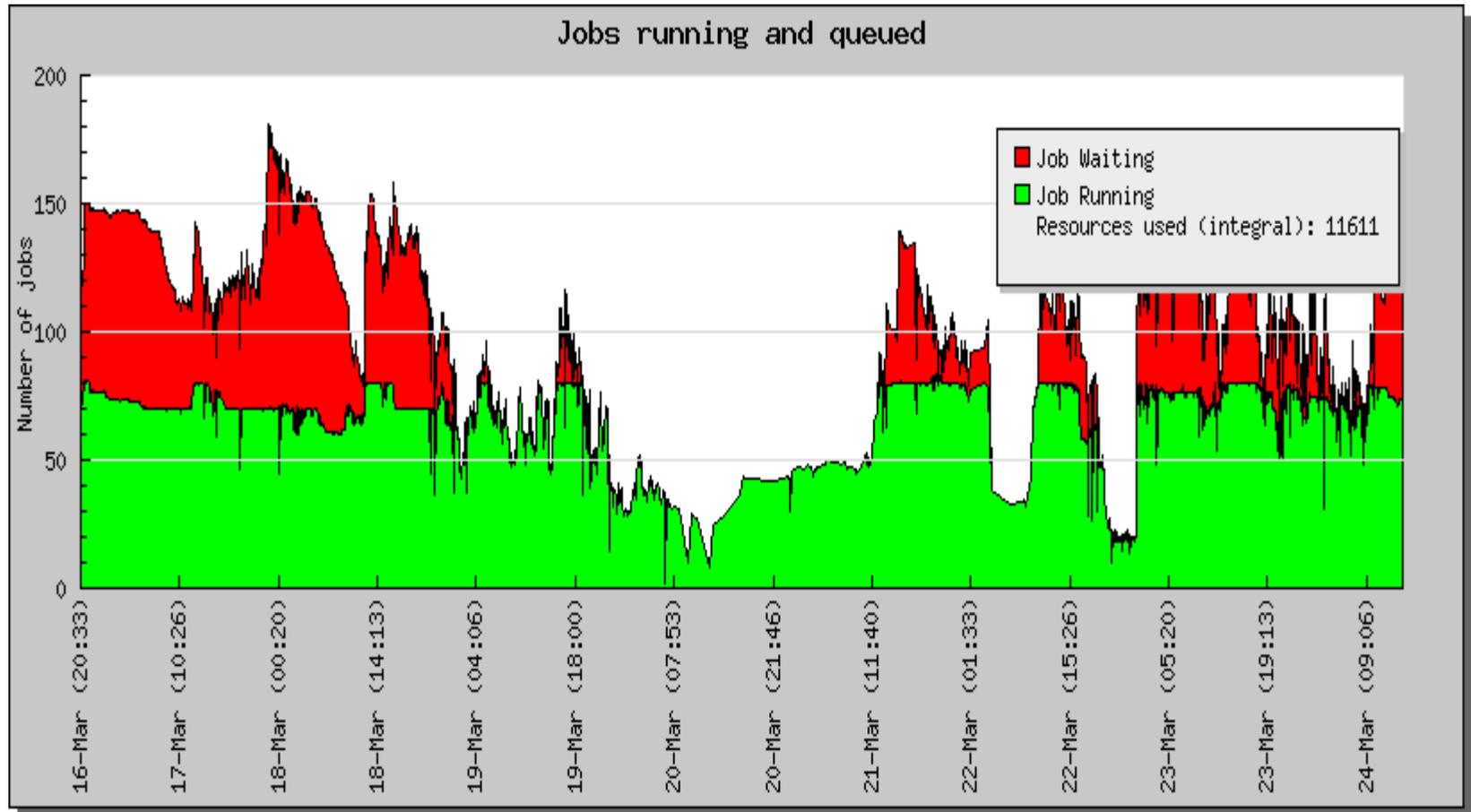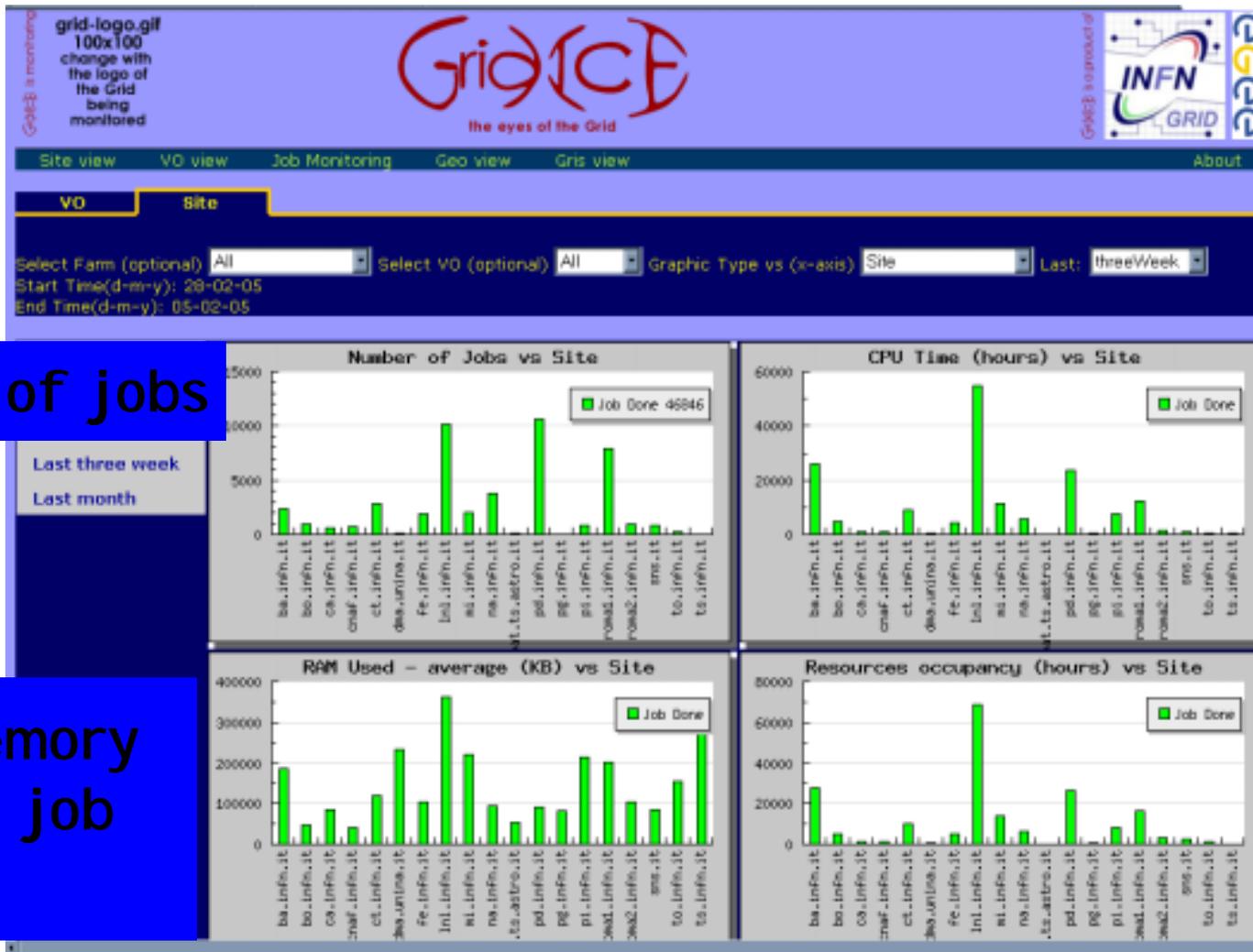
Total resource used: 7492
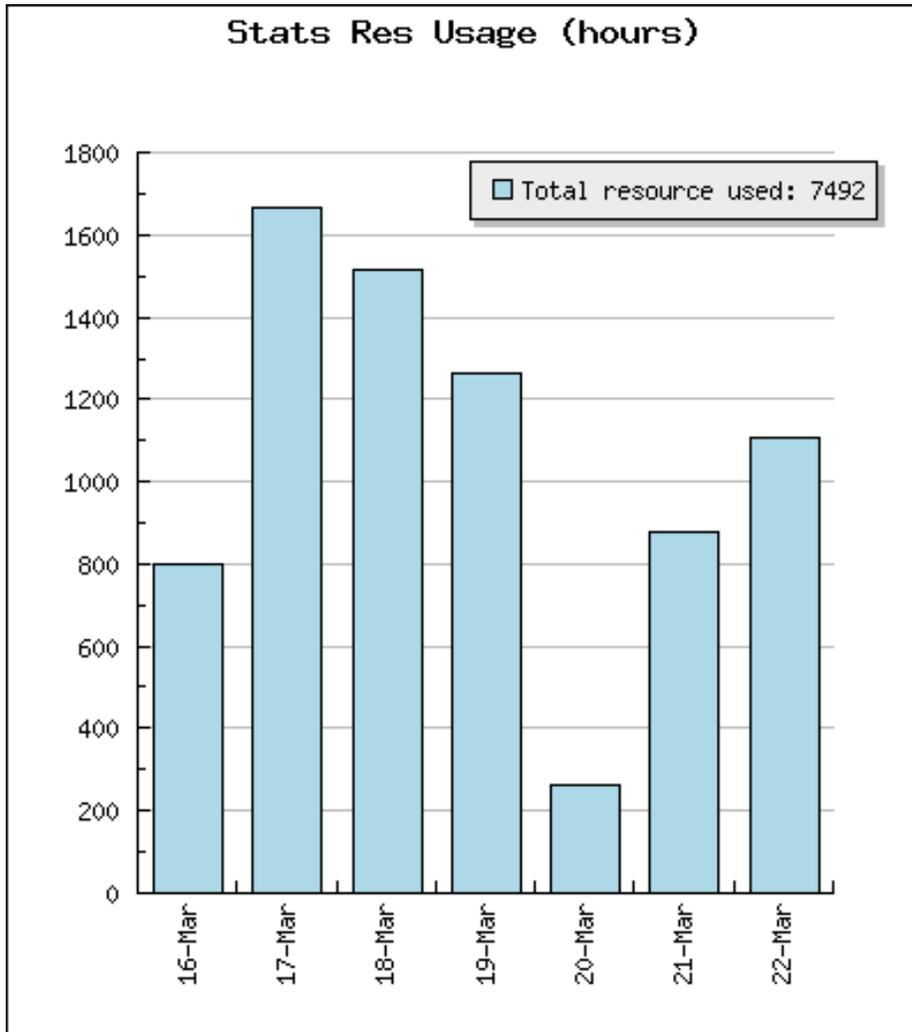
Default param. shown
Resources usage in the last
week per all site and all VO

Site, virtual oraganization,
time interval, on/off show
values on bar, size picture

Jobs waiting and jobs running

Default view: number of jobs in the last day per all site and all VO
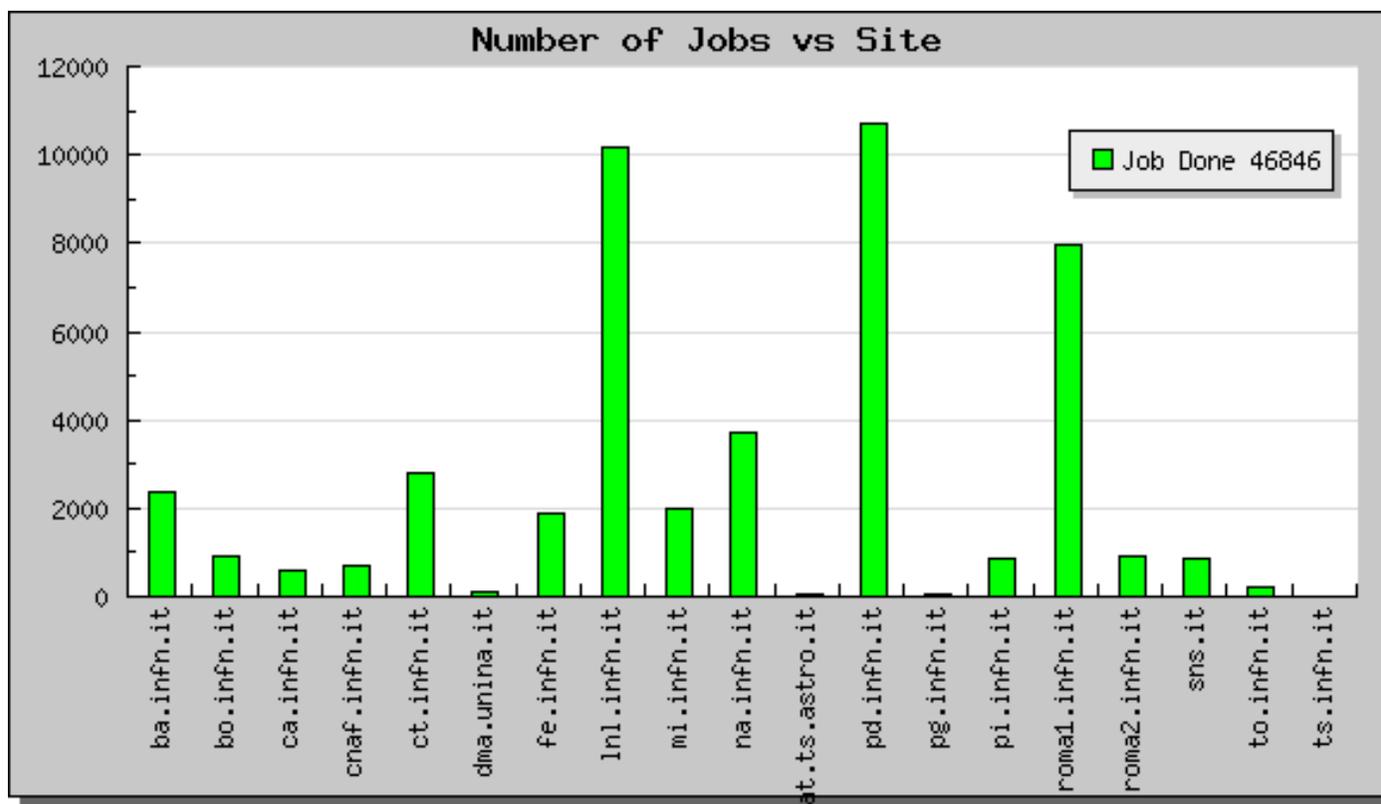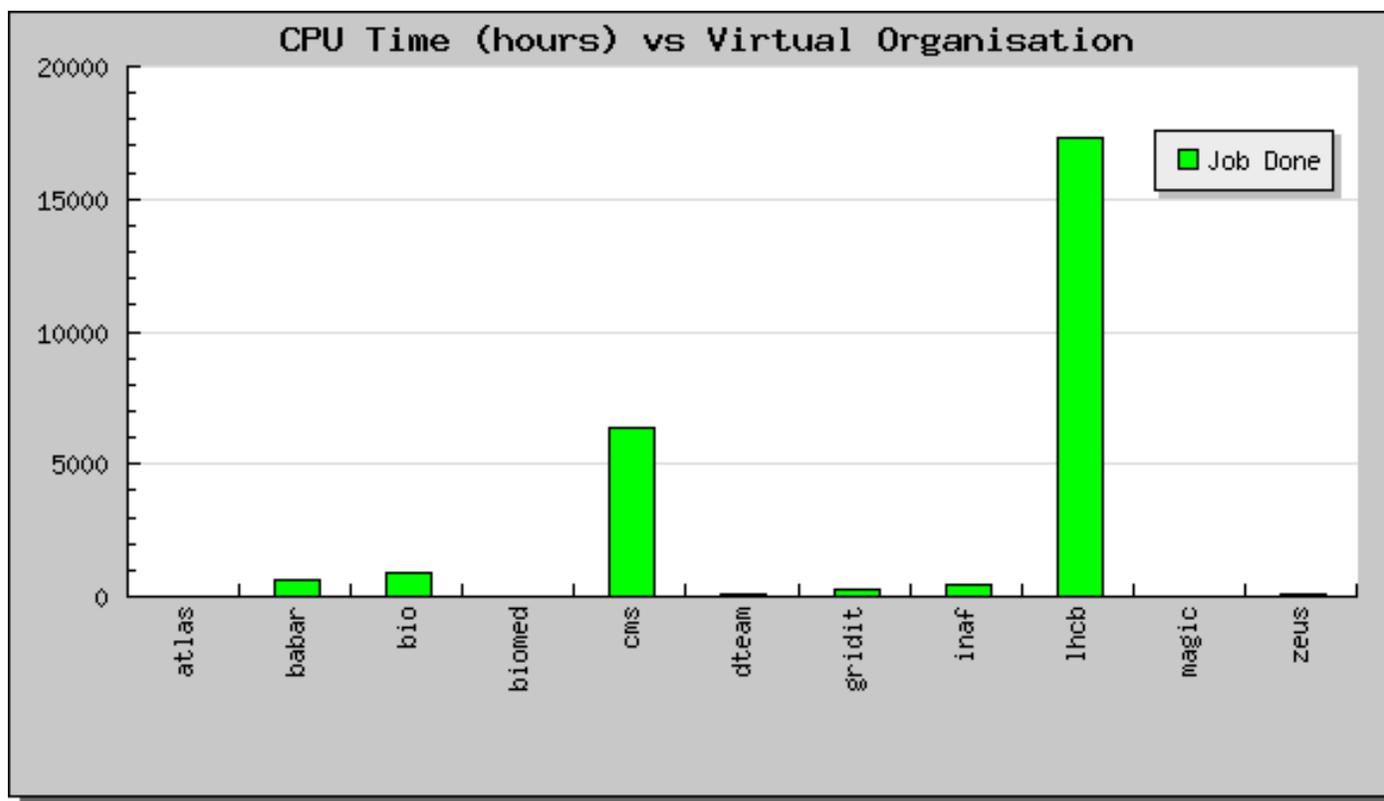

Jobs running and queued

- Job Waiting
- Job Running

Resources used (integral): 11611

Number of jobs

CPU hours

Used memory (average job size)

Wall Time hours

Executed Jobs in the last three weeks per site

Site specific data: CPU hours per VO

CPU Time (hours) vs Virtual Organisation

Useful links

◆ Grid-it Production Grid

  ▪ http://grid-it.cnaf.infn.it/

◆ Grid-it Monitoring/Management GridICE

  ▪ http://grid-it.cnaf.infn.it/index.php?grisview&type=1

◆ Grid-it test and certification

  ▪ http://grid-it.cnaf.infn.it/index.php?sitetest&type=1

◆ Grid-it Support

  ▪ http://grid-it.cnaf.infn.it/index.php?id=51&type=1

◆ Contact

  ▪ grid-manager@infn.it

  ▪ Grid-release@infn.it

  ▪ Ticket for operational issue