CDF Computing Experience

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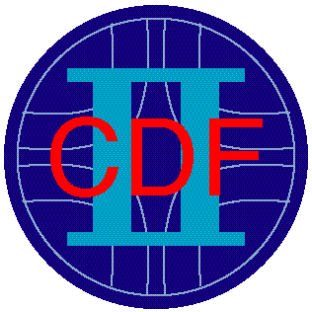
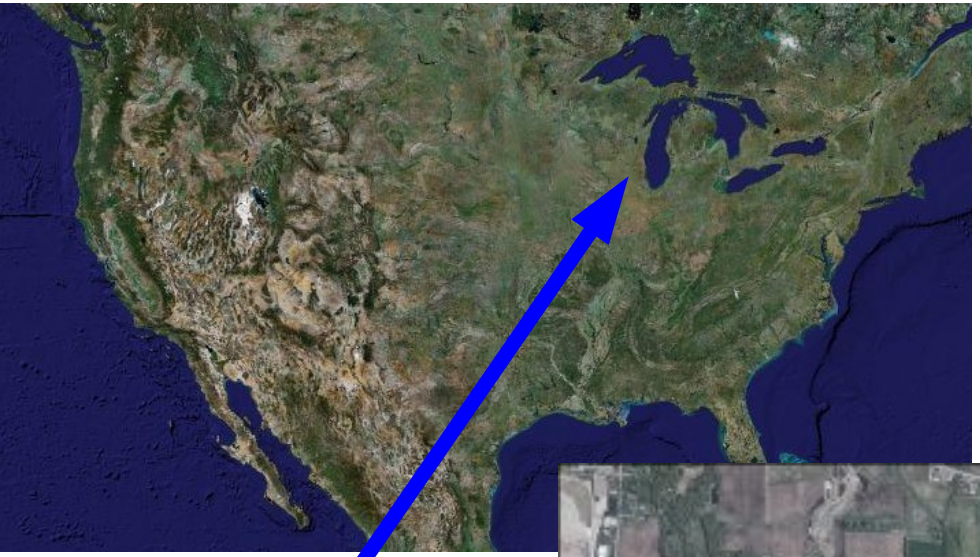
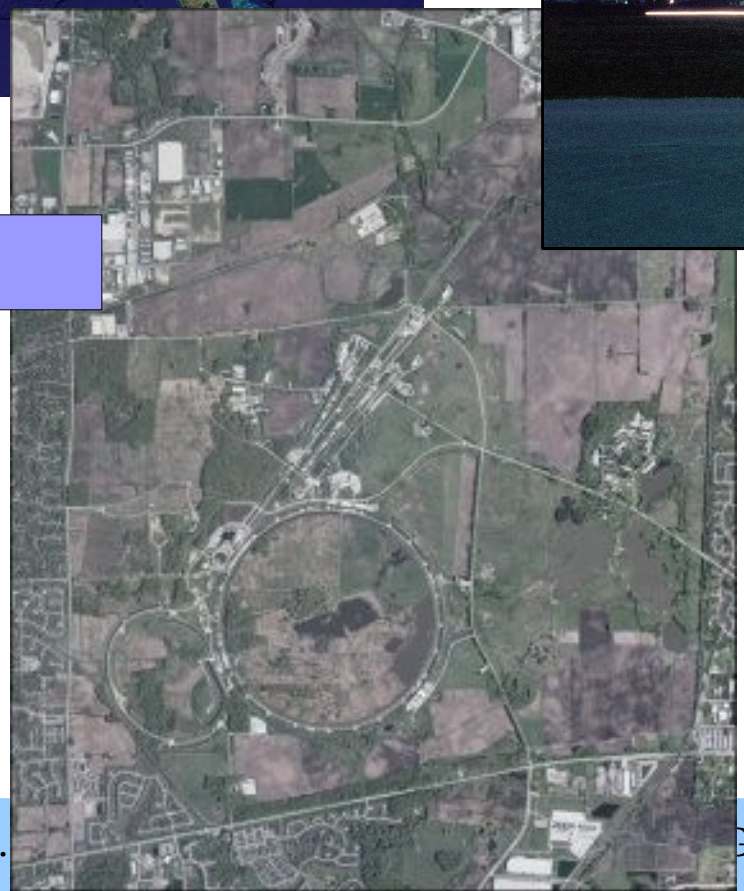
on behalf of CDF computing Group



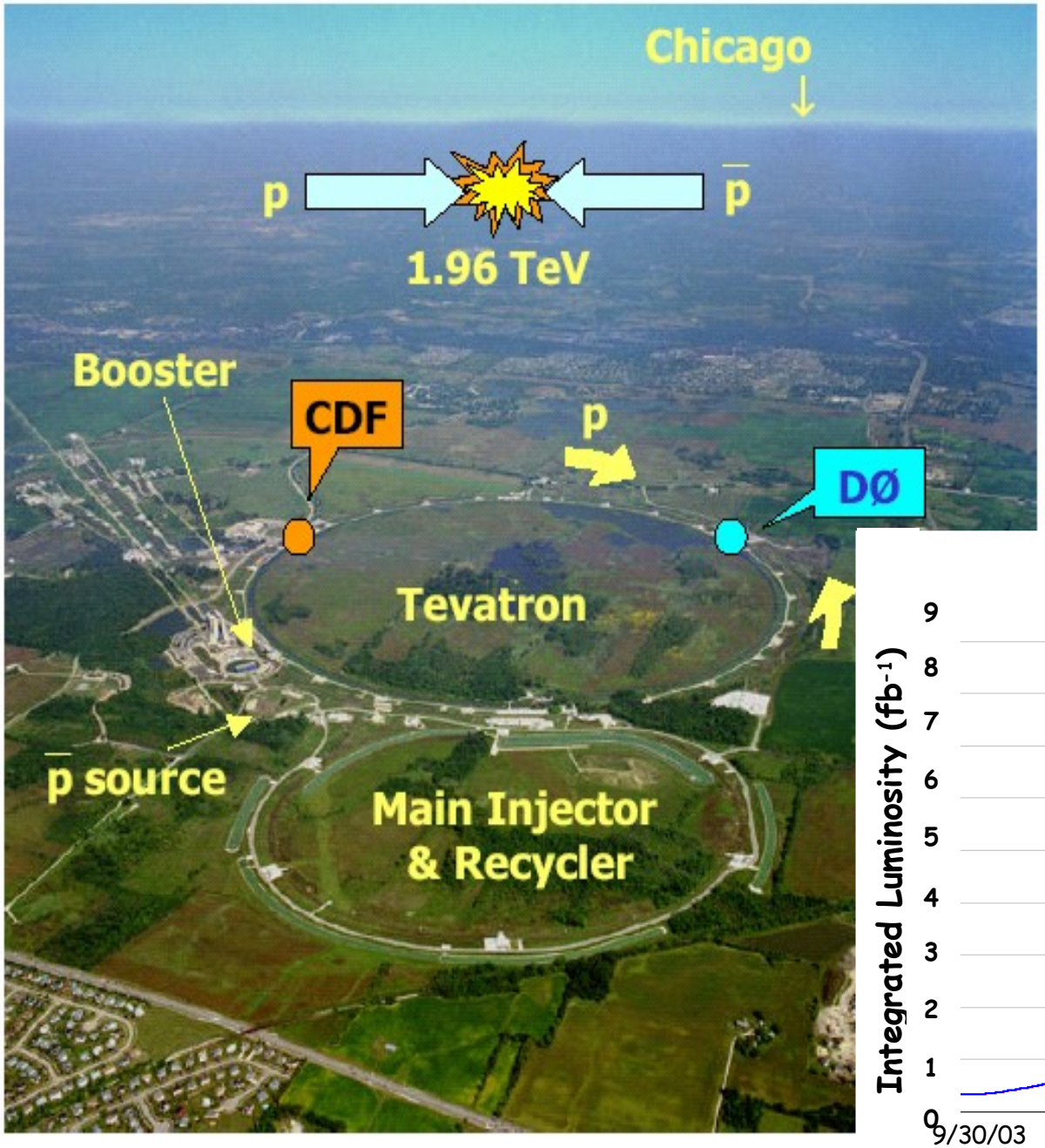
Fermilab Accelerator Complex



Batavia, IL, USA

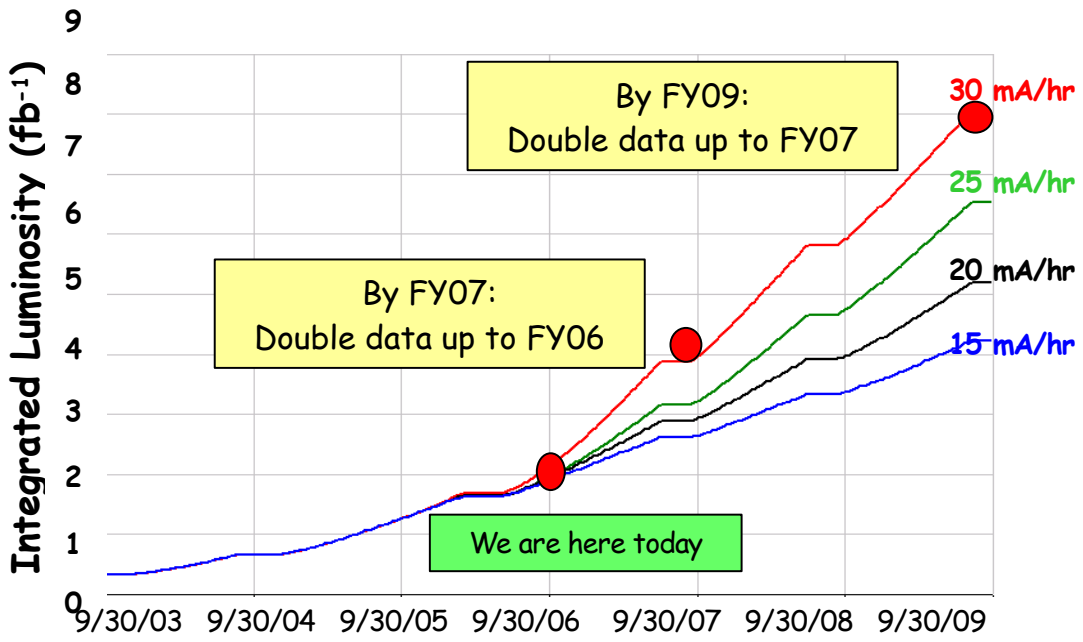


CDF Experiment Luminosity

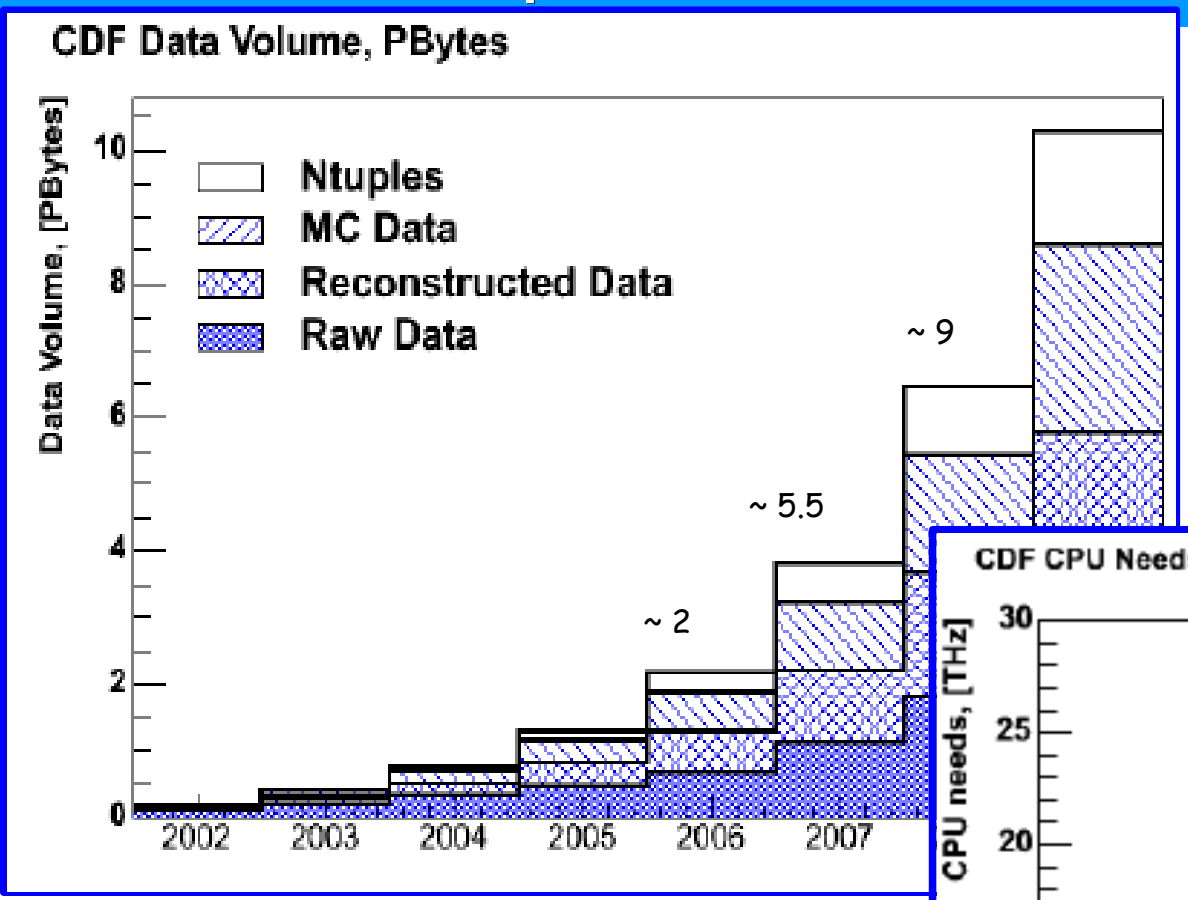


- L_{peak}: $2.3 \times 10^{32}\ s^{-1}\ cm^{-2}$
- 36 bunches, 396 ns crossing time

Collected Luminosity



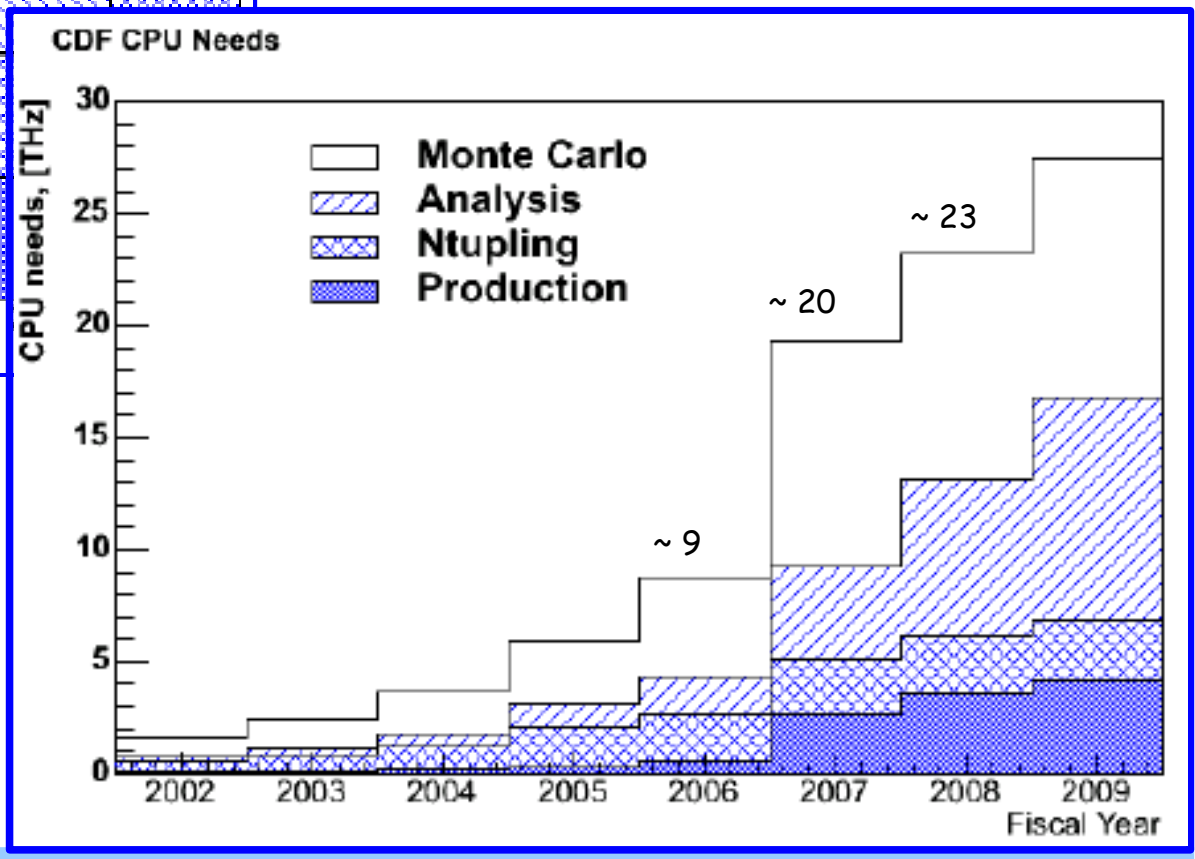
CDF Experiment Data Volumes



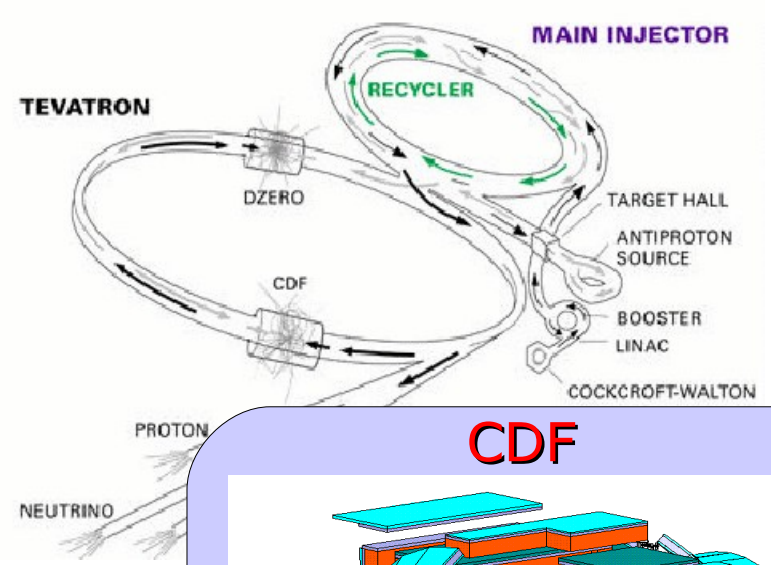
Collected Data

$(2fb^{-1} \approx 3.9 \times 10^{9} events)$

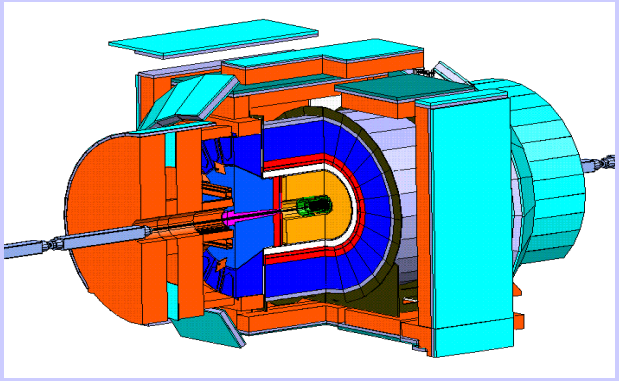
Estimated CPU needs



CDF Data Production



CDF

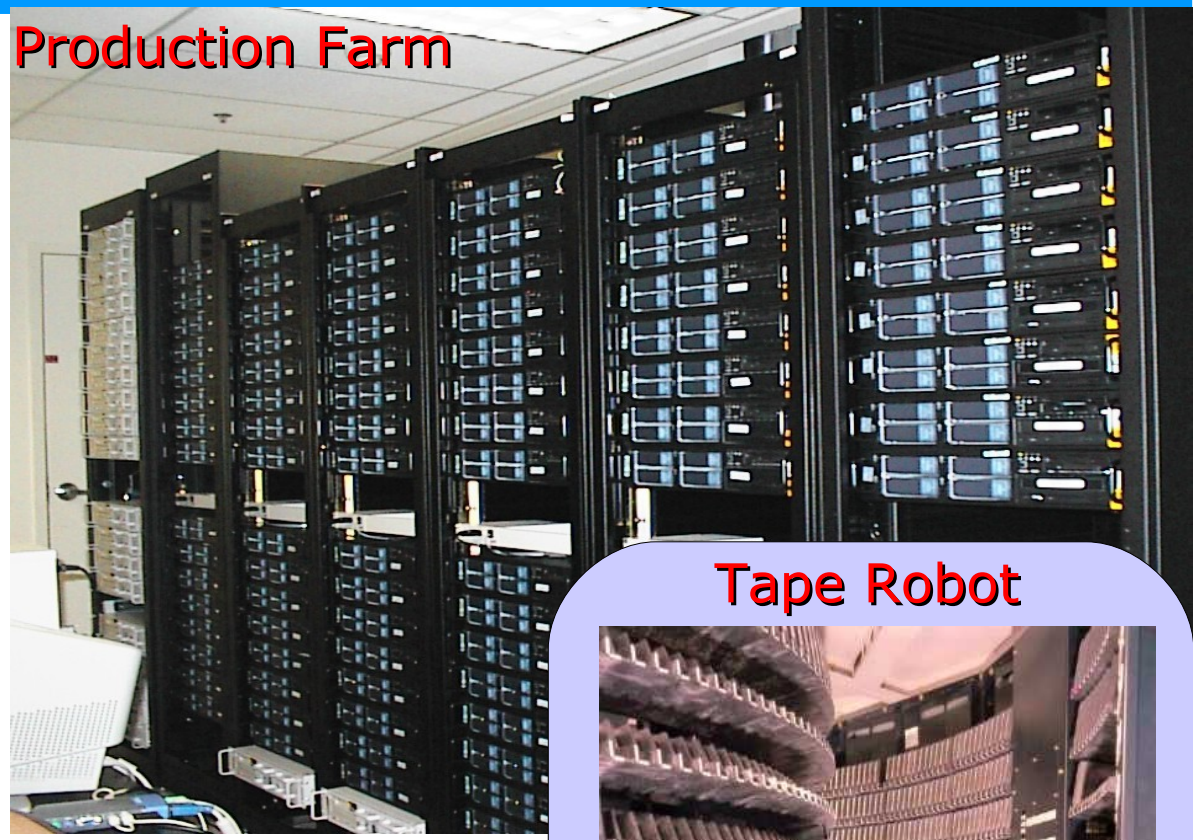


L3 Trigger

Disk Cache

Raw Data

Production Farm



Production Data

Tape Robot

SAM

- Data Handling model relies on SAM (Sequential data Access via Metadata), a centralized system that manages all official data
- File Catalog for data on tape and on disk:
  - Files based, with metadata attached
  - Files are organized in datasets, users can create their own
- Manage File Transfers: tape-to-cache, cache-to-disk, disk-to-tape
- For jobs accessing data:
  - copy necessary files from the closest location to local cache
  - provide files in the optimal order
  - keep track of processed and unprocessed files
  - Failed sections can be automatically recovered
- Each site serving data needs to have a SAM Station

Users Analysis and MC Production

- CAF Central Analysis Facility: mostly User analysis

  FNAL hosts data -> farm used to analyze them

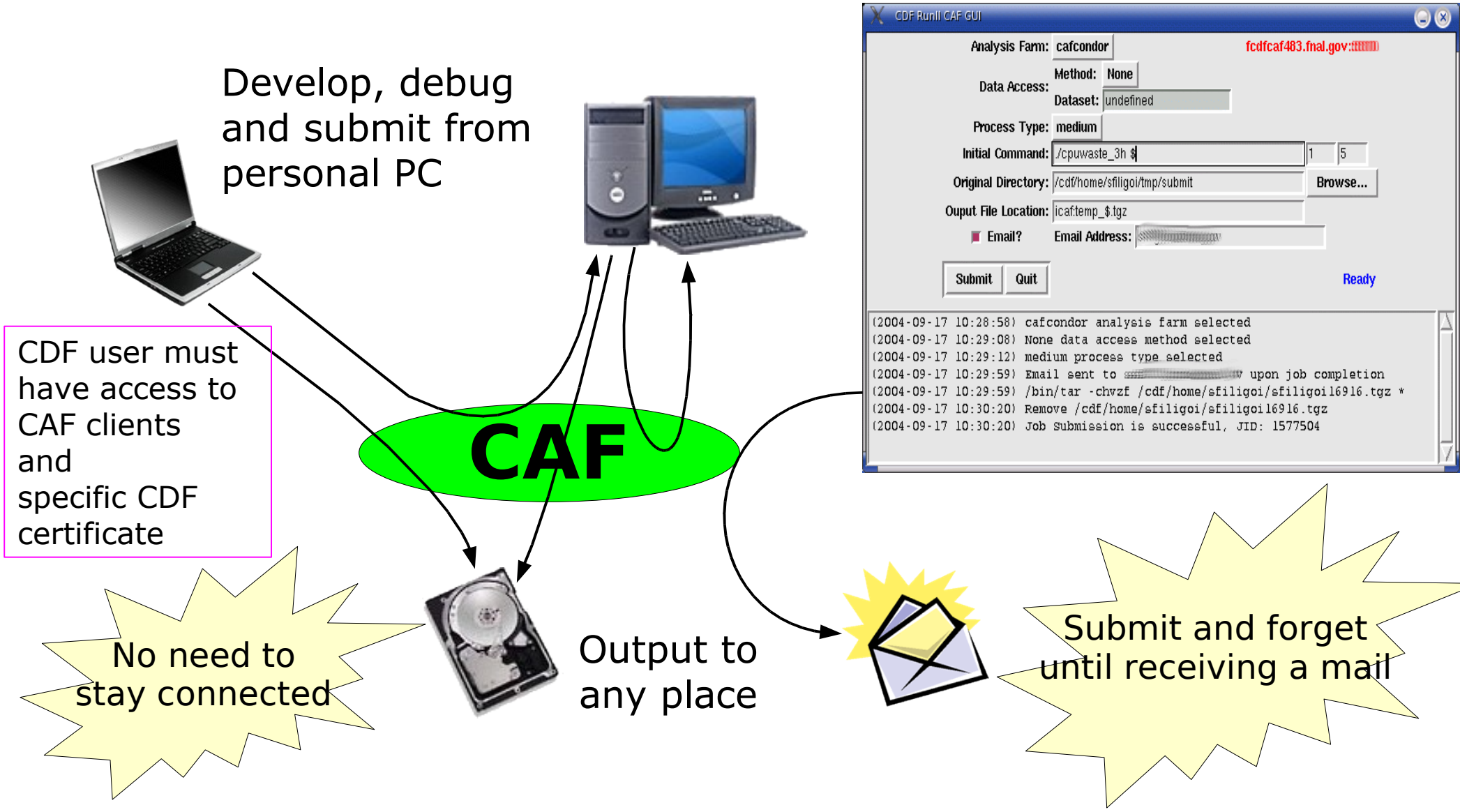
- Decentralized CAF (dCAF): mostly Monte Carlo production

  Remote sites produce Monte Carlo, some (ex. CNAF) have also data

  Produced files are then uploaded to SAM

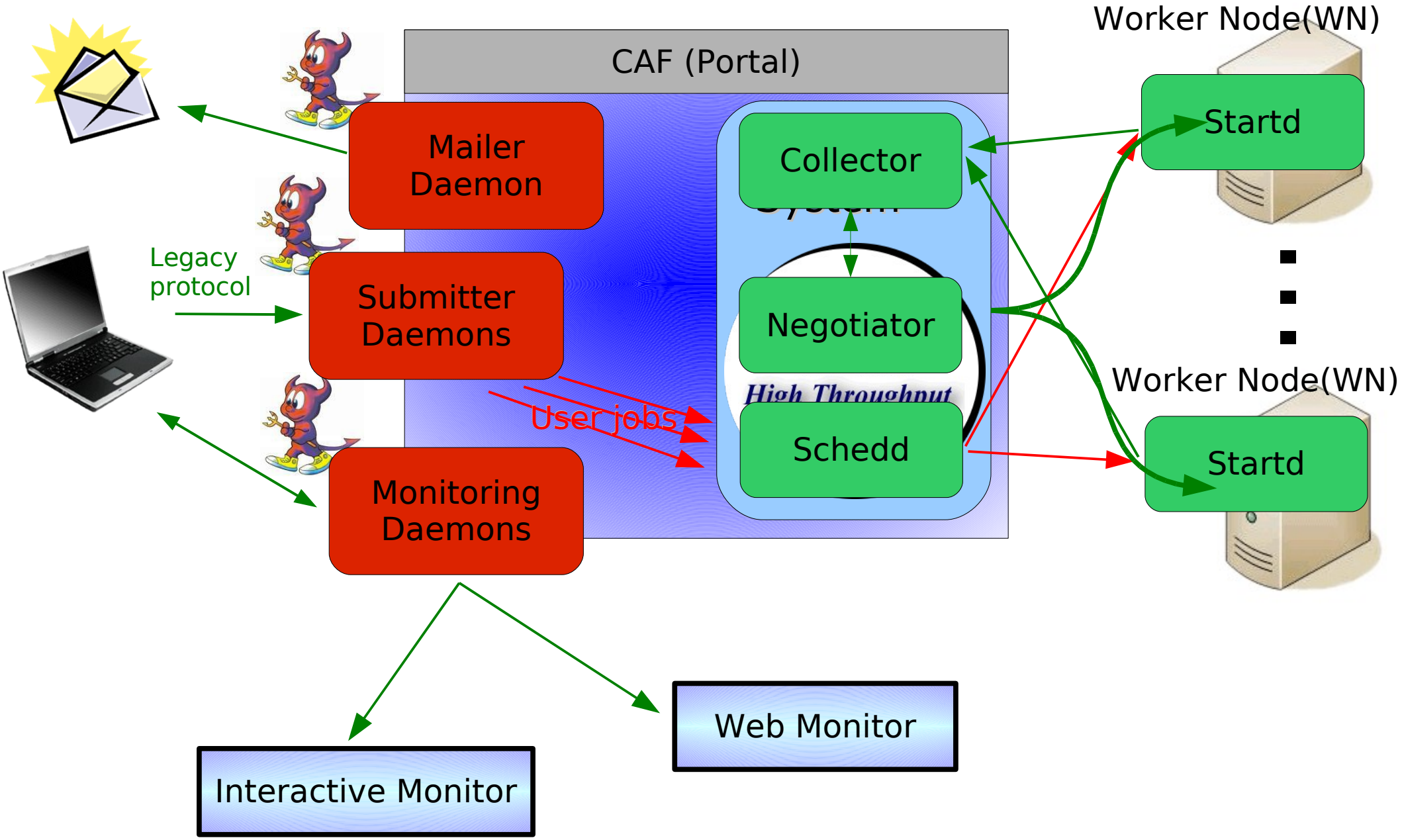
- CAF and dCAF are CDF dedicated farms

CAF Model

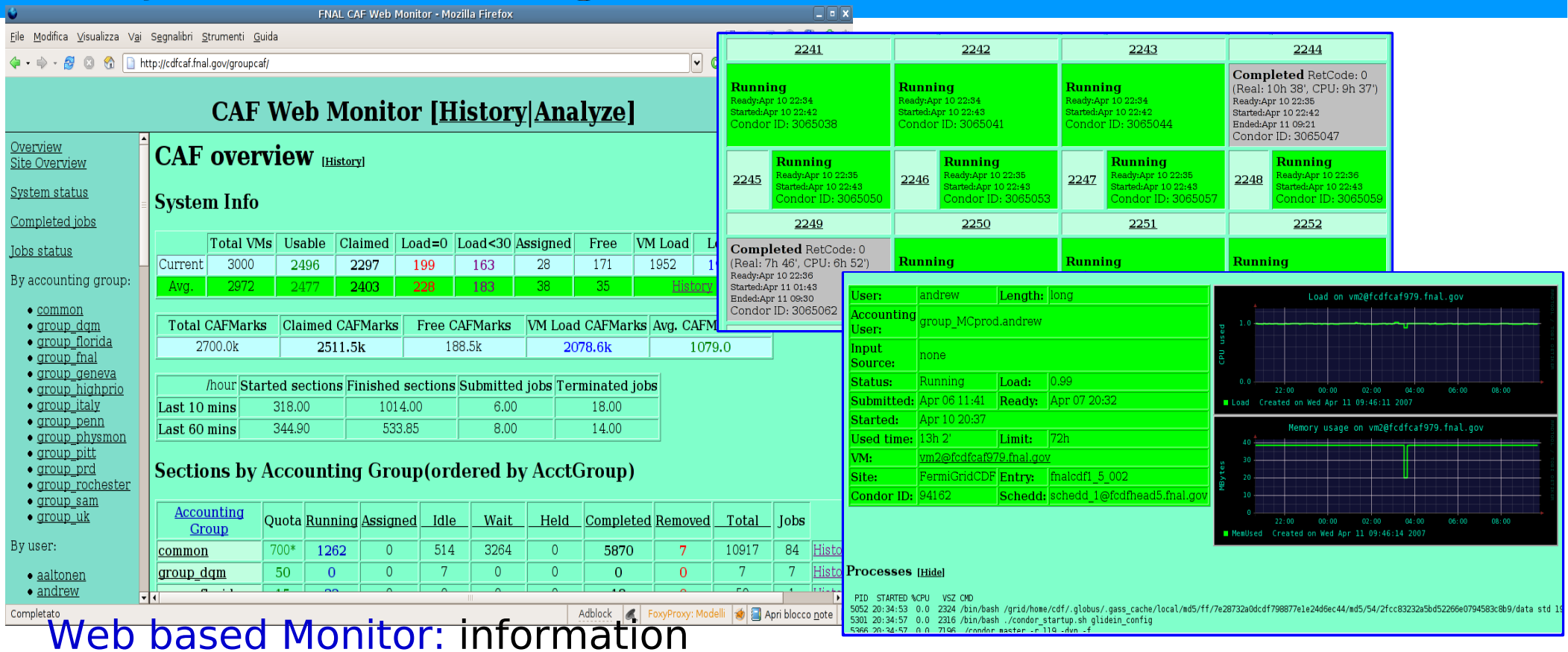


Developed by: H. Shih-Chieh, E. Lipeles, M. Neubauer, I. Sfiligoi, F. Wuerthwein

The CAF Headnode



Job Monitoring



Web based Monitor: information
on running jobs for all users and jobs/users history

Interactive job Monitor:
Available commands:

CafMon list CafMon kill
CafMon dir CafMon tail
CafMon ps CafMon top

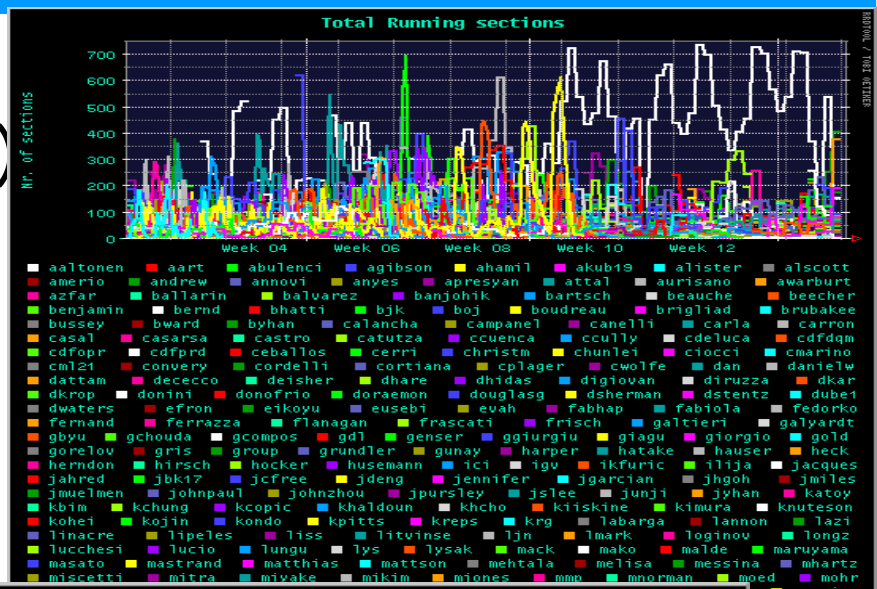
```
$ CafMon jobs

Analysis Farm: lcgcaf    Host: pcdf11.pd.infn.it
    Job        Group     From     To    Status

    1208        short       Total:    50
-------------------------------------------------------
    1208        short         1       11 Pending
    1208        short         7       15 Running
    1208        short        16       50 Success
-------------------------------------------------------
    1208        short       Success:    42 Pending:     8
    1208        short       Success:   84% Pending:   16%
$
```

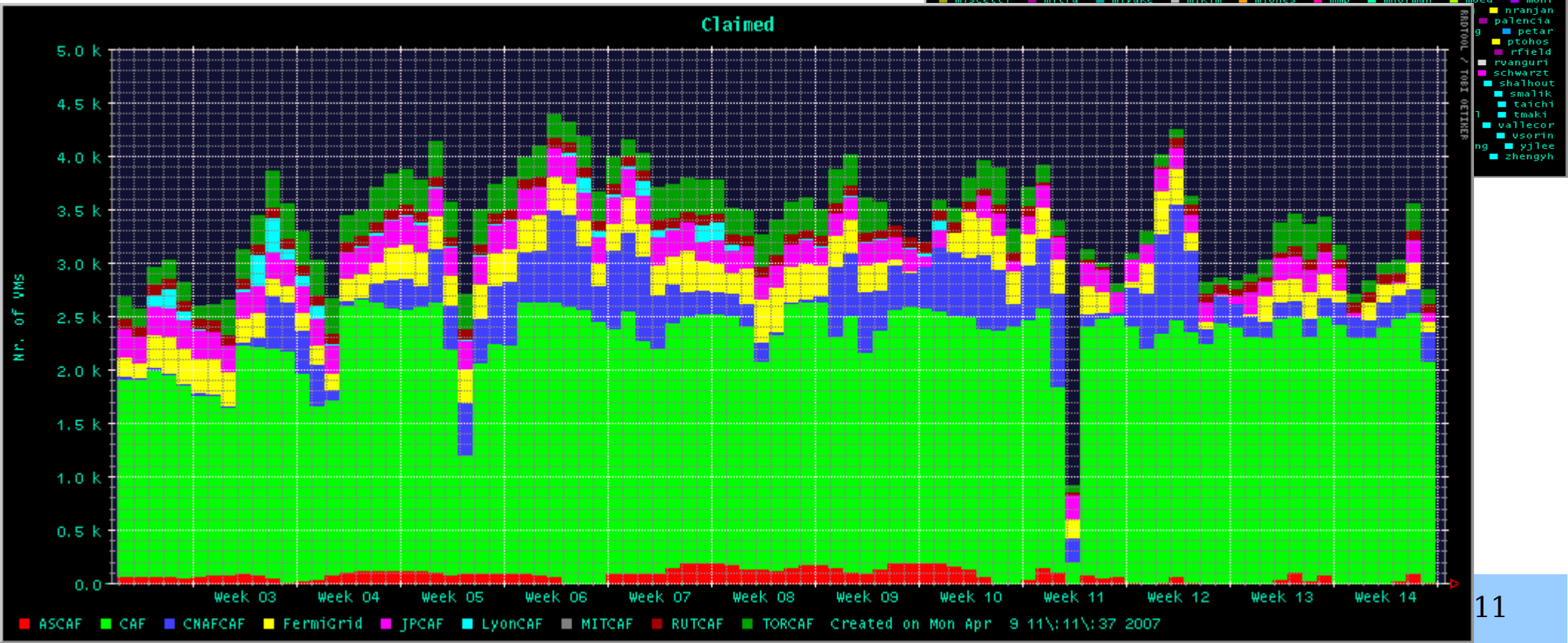
CDF batch computing in numbers

Up to 4000 batch slots(last 3 months)

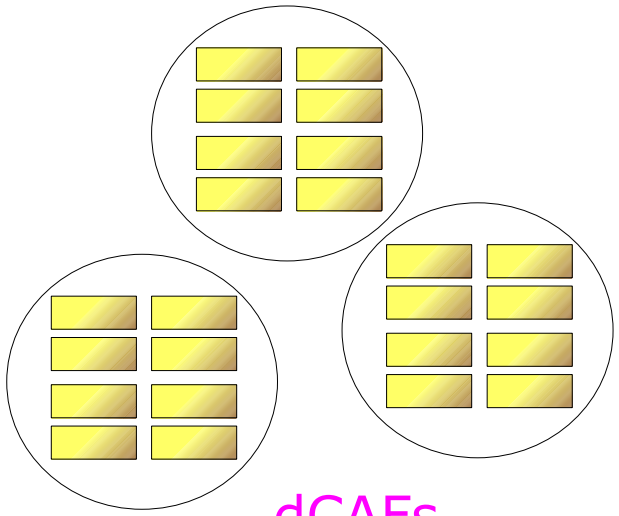
Almost 800 registered users,

Approx. 100 active at any given time





Moving to the Grid



dCAFs

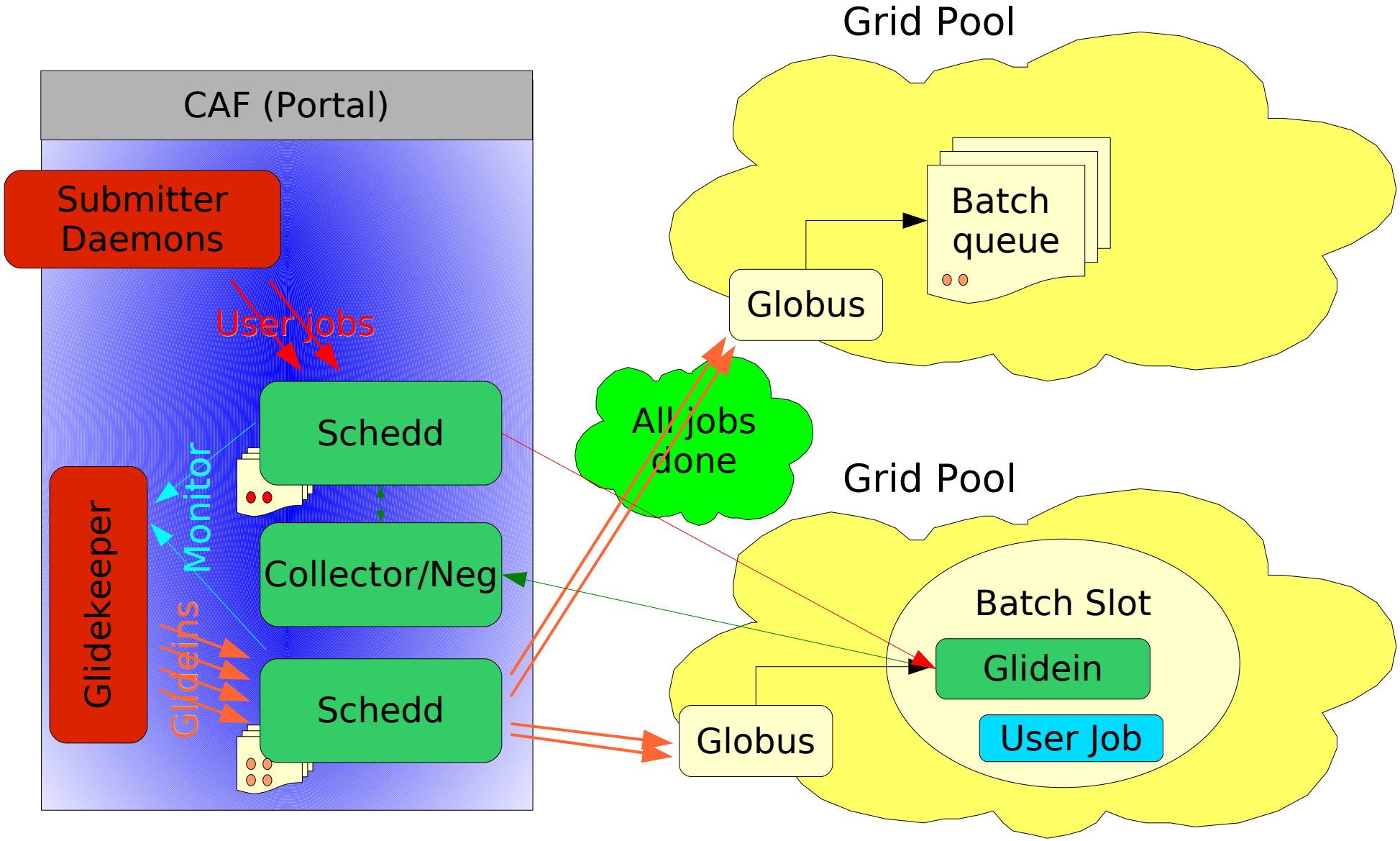
- Need to expand resources, luminosity expect to increase by factor ~4 until CDF stops taking data.
- Resources were in dedicated pools: limited expansion and need to be maintained by CDF personnel
- GRID resources can be fully exploited before LHC experiments will start to analyze data
- As a first step, we can move MC jobs to the Grid (no data access...)
- Keep on using CAF (and CNAF) for data analysis.
- CDF developed 2 portals to the GRID:
  - NamCAF for OSG and LcgCAF for LCG

NamCAF

Condor Glidein based CAF

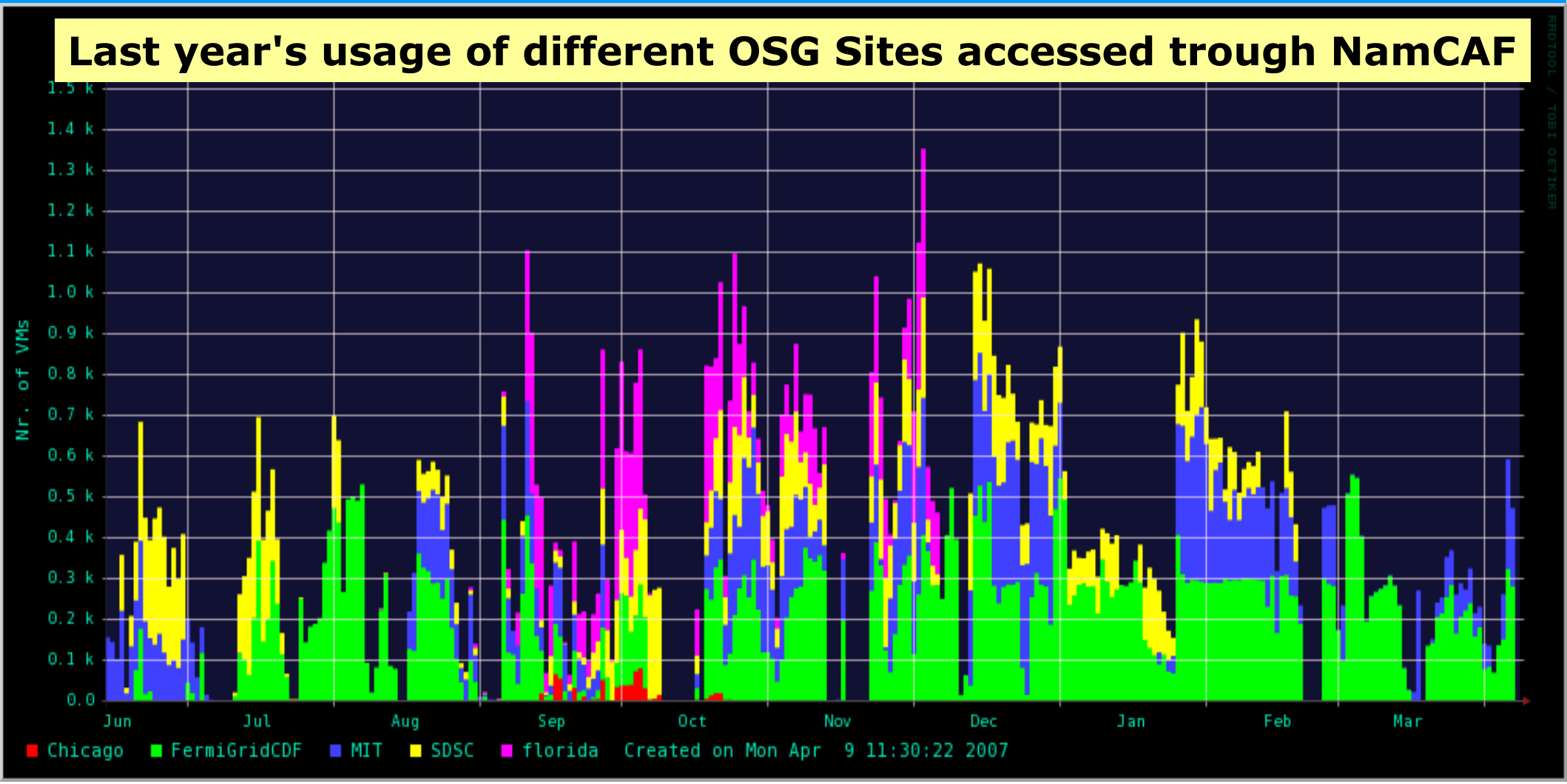
More info at:
http://cdfcaf.fnal.gov
http://cdfcaf.fnal.gov/namcaf

CDF use of Condor glide-ins



By I. Sfiligoi, S. Sarkar

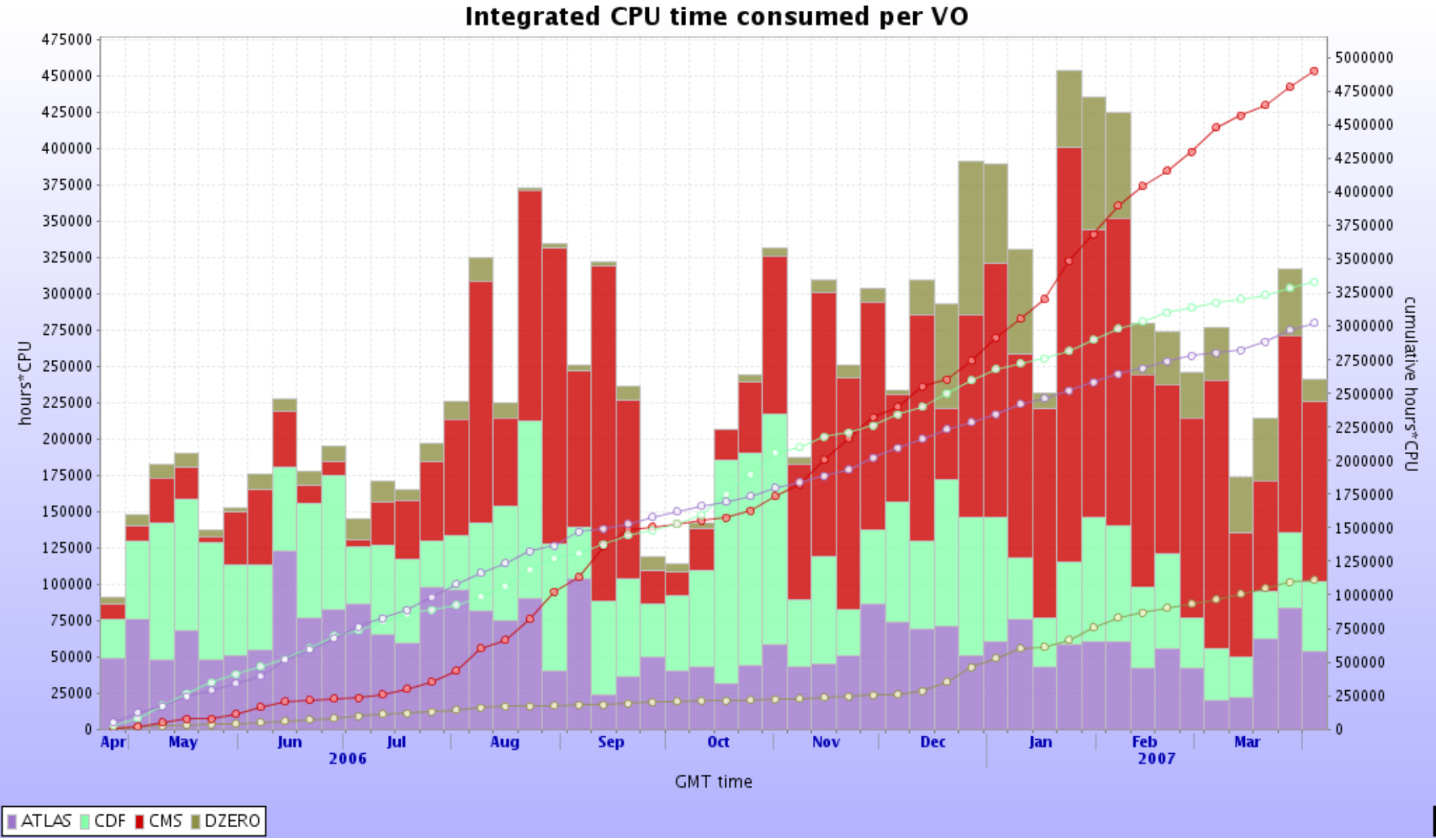
CDF usage of OSG resources per site



- ...Up to 1500 batch slots
- Self contained tarballs
- No specific support on Grid sites

http://cdfcaf.fnal.gov/namcaf/

CDF usage of OSG resources



http://grid02.uits.indiana.edu:8080/show?page=index.html

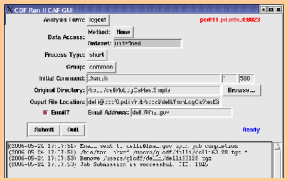
LcgCAF

CDF Submission Portal to LCG

More info at:
http://www.ts.infn.it/cdf-italia/public/offline/lcgcaf.html

LcgCAF: General Architecture

User Desktop



CDF user must have access to CAF clients and Specific CDF certificate

job

cdf-ui
~
cdf-head

Monitor

Mailer

Submitter

job

WMS

job

CafExe

GRID site

...

...

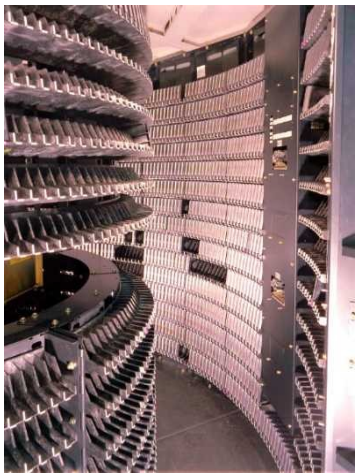
GRID site

output

CDF-SE

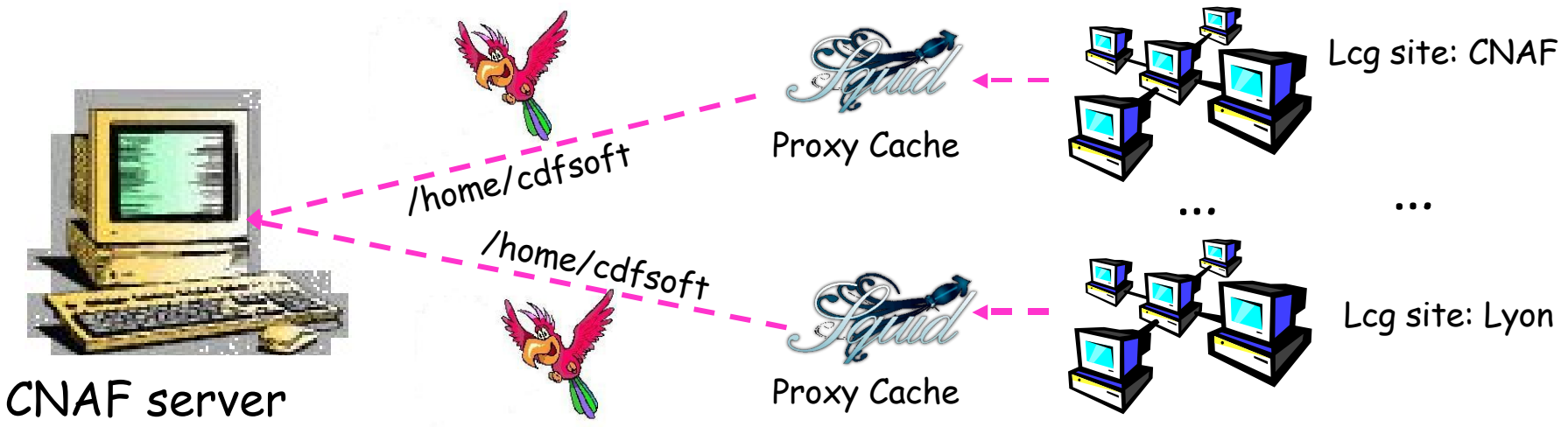
output

Robotic tape Storage



Developed by: F.Delli Paoli, D.Jeans, D.Lucchesi, S.Sarkar, I.Sfiligoi

CDF Code Distribution



In order to run, a CDF MC job needs available to the WN:

- CDF code distribution:

  Parrot is used as virtual file system for CDF code

  To have good performances with Parrot, a Squid web proxy cache is also needed.

- Run Condition DB:

  FroNTier is used for DB access (...in NamCAF too)

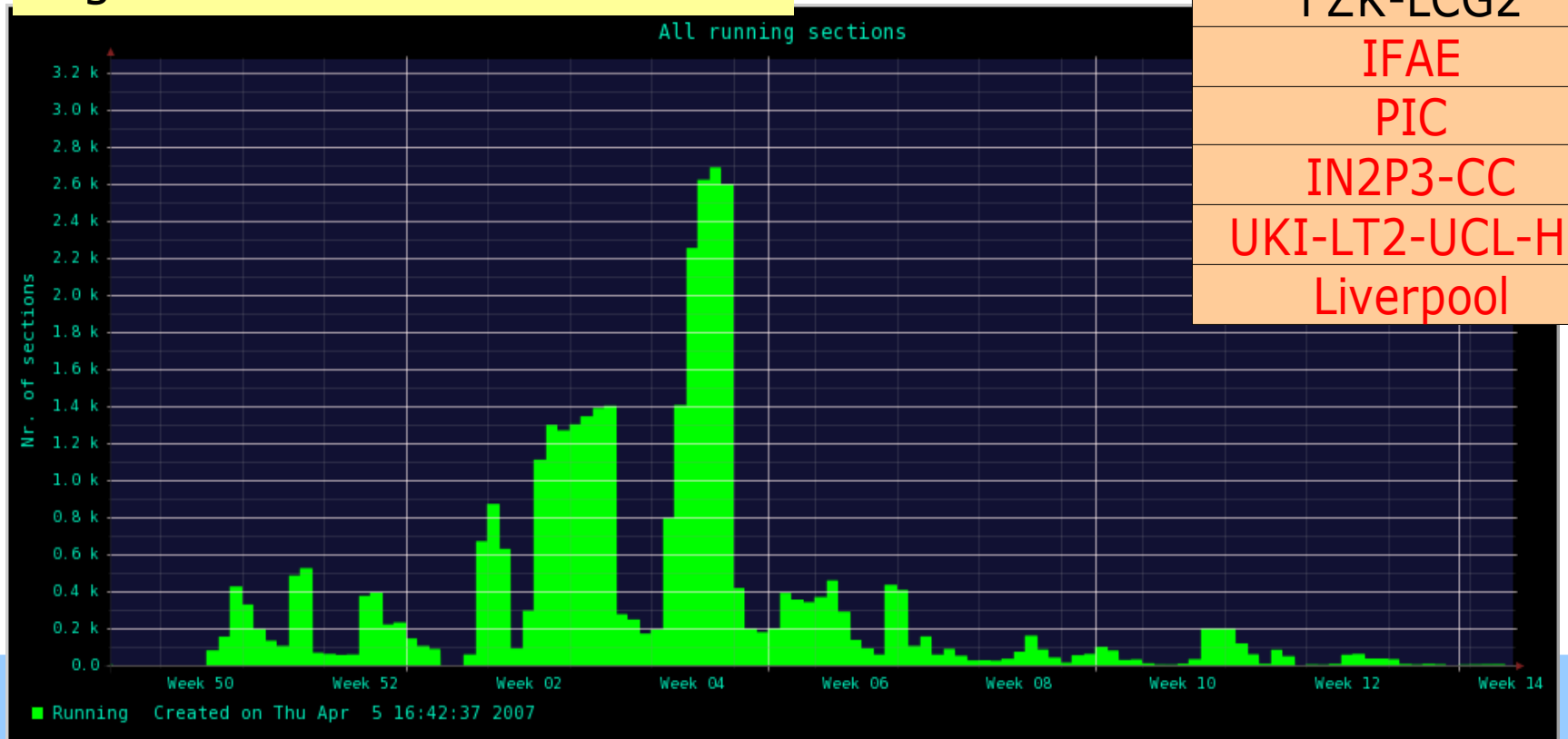
- Job monitor (implementation different from CAF, same functionalities)

LcgCAF Usage

LcgCAF opened to all users and officially supported by CDF since November 2007.

Currently an average of 10 users running, peaks of more than 2500 running sections.

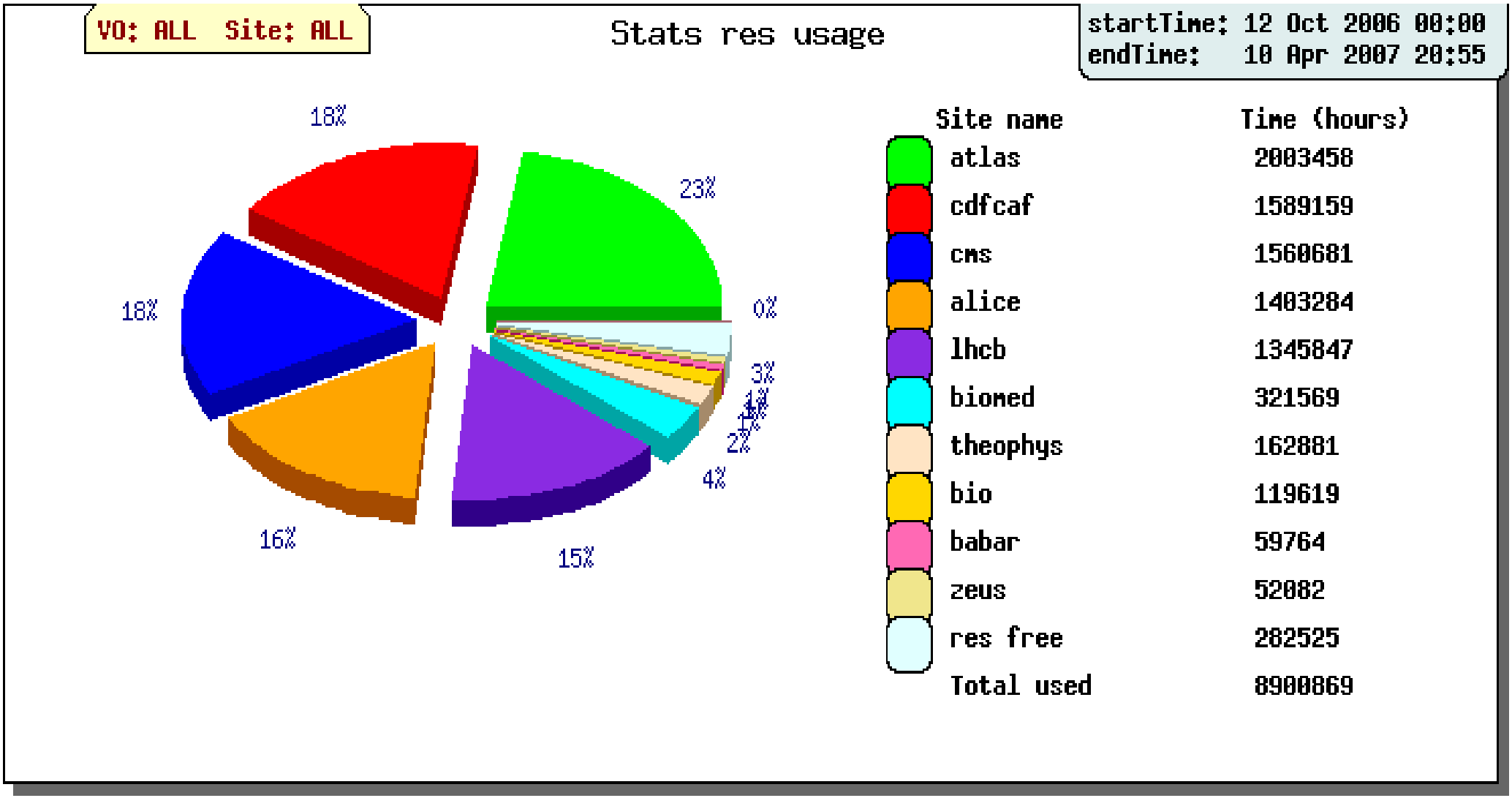
LcgCAF Monitor: last 4 months



Sites accessed trough LcgCAF

INFN-Padova	Italy
INFN-Catania	Italy
INFN-Bari	Italy
INFN-Legnaro	Italy
INFN-Roma1	Italy
INFN-Roma2	Italy
INFN-Pisa	Italy
FZK-LCG2	Germany
IFAE	Spain
PIC	Spain
IN2P3-CC	France
UKI-LT2-UCL-HE	UK
Liverpool	UK

CDF Usage of LCG resources



(European sites not included in this plot)

Conclusions and Future developments

...GRID can serve also a running experiment!

CDF proved to have an adaptable, expandable and succesfull computing model

Great effort has been put on exploiting GRID, using oportunistic resources, and MC production is completely moving towards distributed systems

Future Developments:

- Plan to add more resources into NamCAF and LcgCAF
- Plan to implement a mechanism of policy management for LcgCAF on top of GRID policy tools
- Explore the possibility of running on data moving jobs towards sites that can serve the desired files
- SAM-SRM interface under development to allow:
  - output file declaration into catalogue directly from LcgCAF
  - automatic transfer of output files from local CDF storage to FNAL tape