CDF long term data preservation

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CDF computing in the future

Fermilab Computing Division will support the **current status** of CDF computing in the period 2012-2016.

The support could be renegotiated if there is very little use.

The Computing Division will store Tevatron data for at least 10 years.

By the end of 2012, CDF has to define and start implementing a long term data preservation plan, to insure data access beyond 2016.

Why?

Tevatron data are unique

• in terms of initial state particles (p-pbar collider) → measurements of effects enhanced by qqbar production will remain competitive with LHC (ttbar asymmetry);

• in terms of energy domain.

Advances is theoretical models and analysis methods may push for re-producing analysis.

New analyses can be triggered in the light of LHC discoveries.

Different levels of data preservation

DPHEP (Data Preservation in HEP study group) proposes different level of data preservation:

Preservation Model	Use case
1. Provide additional documentation	Publication-related information search
2. Preserve the data in a simplified format	Outreach, simple training analyses
3. Preserve the analysis level software and data format	Full scientific analysis based on existing reconstruction
4. Preserve the reconstruction and simulation software and basic level data	Full potential of the experimental data

More effort
BUT
More benefits

Preserving the **data** and the **full physics analysis chain**

How much data? In which format?
Where will data be stored?

Which versions of the software?

How can I run CDF software in the future OS?

Who can access data in the future? Open access?

Current effort at CDF

→ A task force has been formed:

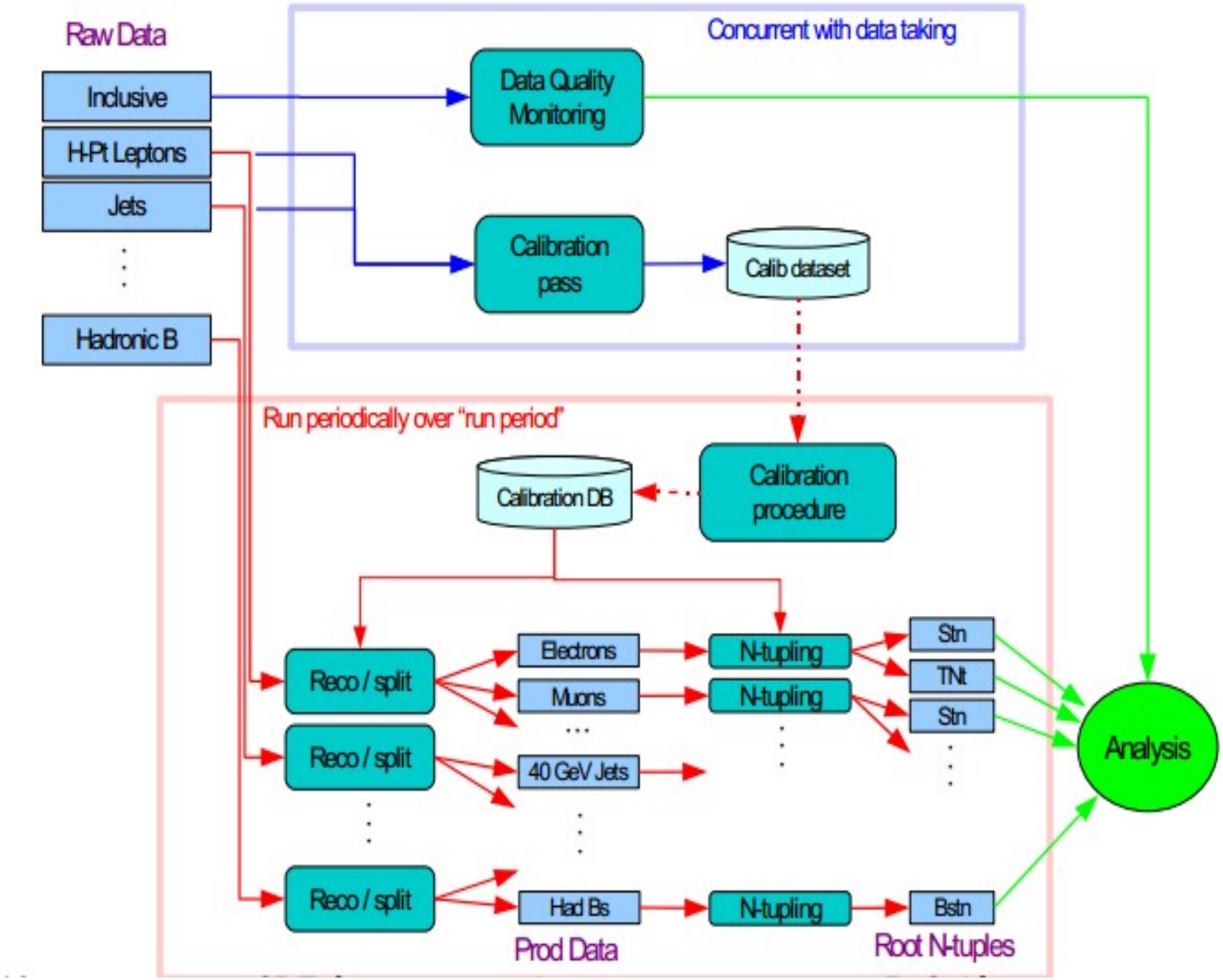
- S.Amerio (CDF and Eurogrid admin)
- Ray Culbertson (CDF offline computing convener)
- Rick Snider (CDF and Computing Division)
- Steve Wolbers (CDF and Computing Division)
- Tyler Parsons (Computing Division, expert on VM)
- Physics groups conveners/experts
- Seo-Young Noh (Official contact with Kisti)
- Qizhong Li (D0 offline computing convener, official contact with D0)

The task force is defining all the aspects of the problem and contacting offsite centers.

→ DPHEP will assign us a reviewer to follow the progress of the project

→ At next CHEP, talk about CDF status during DPHEP session.

CDF data analysis chain

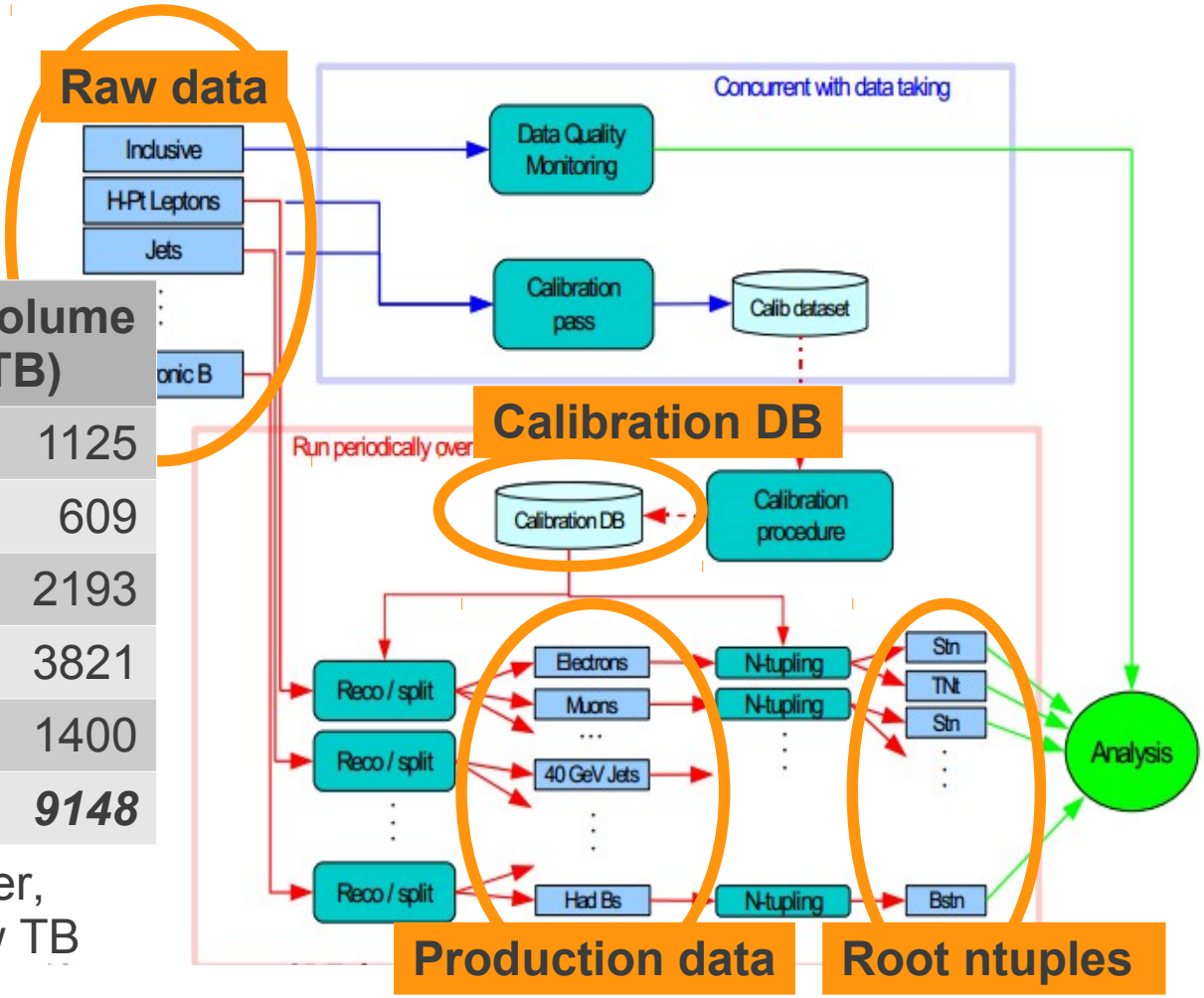


From Rick Snaider's talk at JP meeting (03/15/2012)

Data to be preserved

Data type	Volume (TB)
MC Prod	1125
MC Ntuples	609
Data Raw	2193
Data Production	3821
Data Ntuples	1400
TOTAL	***9148***

+ Calibrations, trigger, run condition.. = few TB



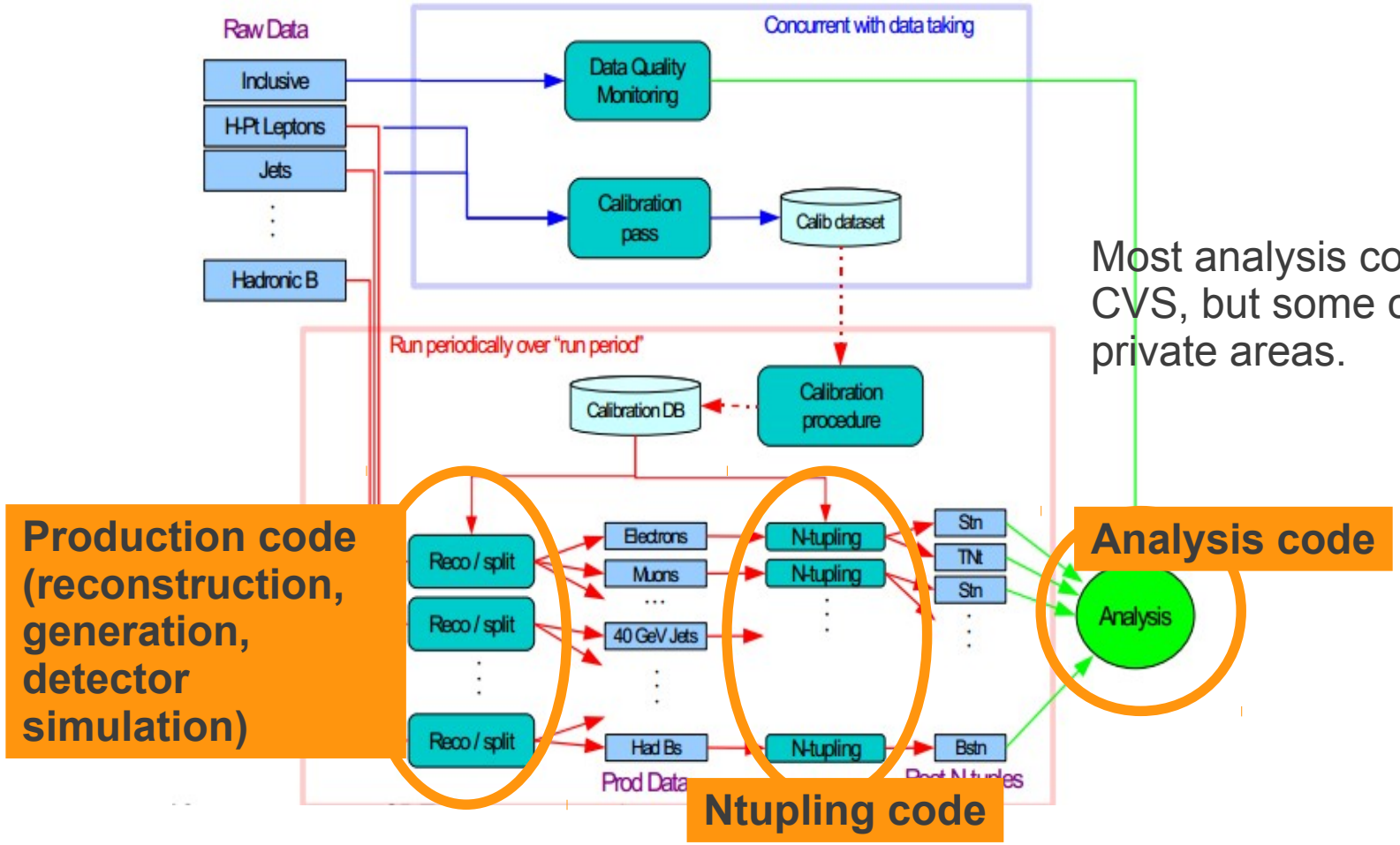
Raw data reprocessed with latest CDF code
No further reprocessing planned.

Data handling based on SAM.

All data currently stored on LTO3, LTO4 and T10K tapes.
Migration of all CDF data to T10K tapes ongoing.

May want to store critical data in multiple copies!
We need to check data integrity over the time and plan recovery mechanisms.

Software to be preserved



Most analysis code on CVS, but some code on private areas.

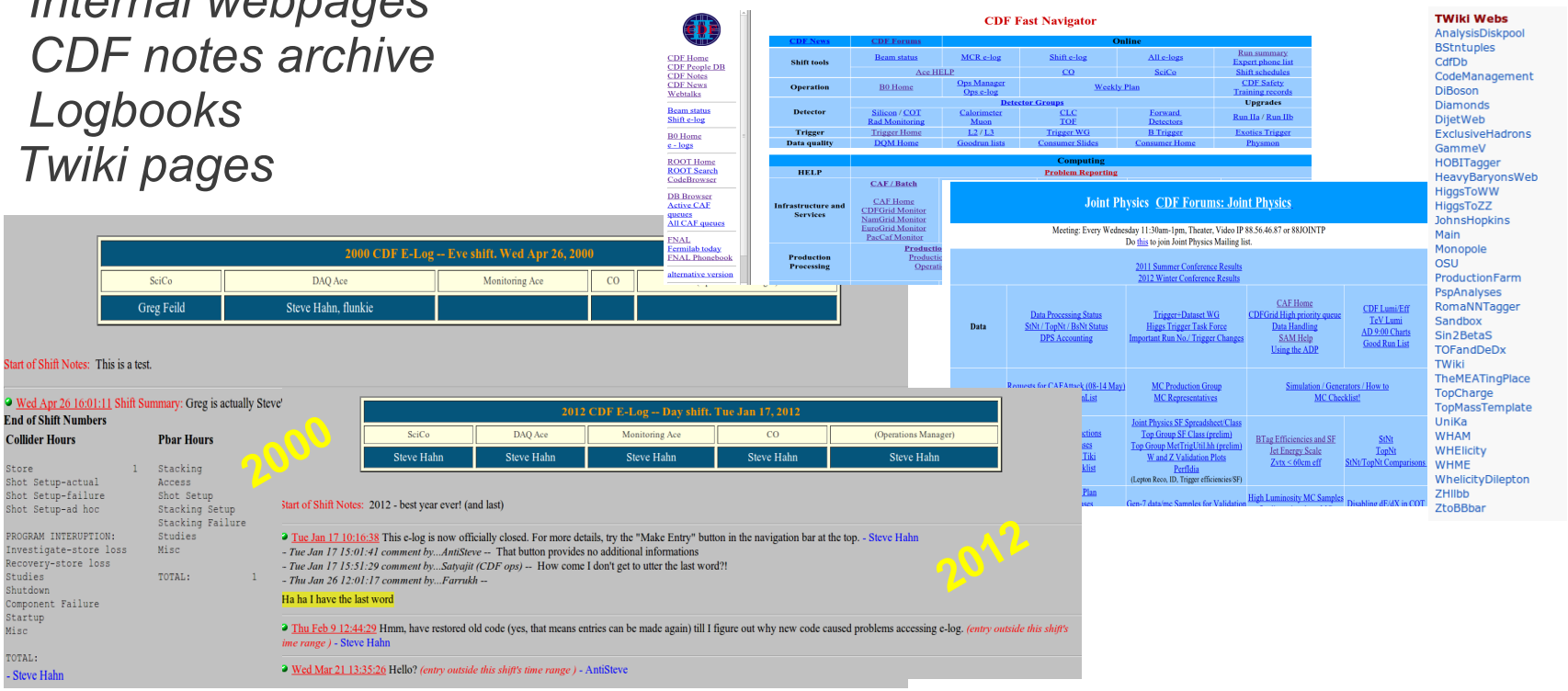
Code in frozen releases or in CVS repositories
Currently in all code on SL5. New SL6 version in 2013.
Production and ntupling code is stable.

External dependencies: GEANT3, CERNLIB, Neurobayes, Root, Oracle

Documentation

We need to carefully preserve and re-organize as much documentation as possible

- *Internal webpages*
- *CDF notes archive*
- *Logbooks*
- *Twiki pages*



A lot of information on private e-mails or users' desktops → need to be retrieved and archived.

Collaboration with offsite computing centers

CDF has a lot of computing resources outside Fermilab (both CPU and storage). Redundancy is important to ensure long term preservation.

CNAF in Italy has already expressed interest in CDF long term data preservation plan. *A draft project is being designed to be presented at INFN at the end of May.*

KISTI already an agreement with CDF to support data preservation. The terms of their collaboration are under discussion.

Offsite computing center could contribute to CDF data preservation
- as storage, hosting part of CDF data
- as access points to stored data, developing in collaboration with FNAL the future job submission framework

Topics of today

CNAF as offsite storage point for CDF data in the long term future: how can we copy 5PB of data (raw+ntuples)?
- Setup at FNAL (Gene's proposal in the backup slides), setup at CNAF, network, …

The preservation of CDF full analysis capability requires not only to archive data, code and documentation, but to effectively allow users to run an analysis job on that data, to produce new Monte Carlo samples, to reproduce data ntuples in case of new experimental insights.

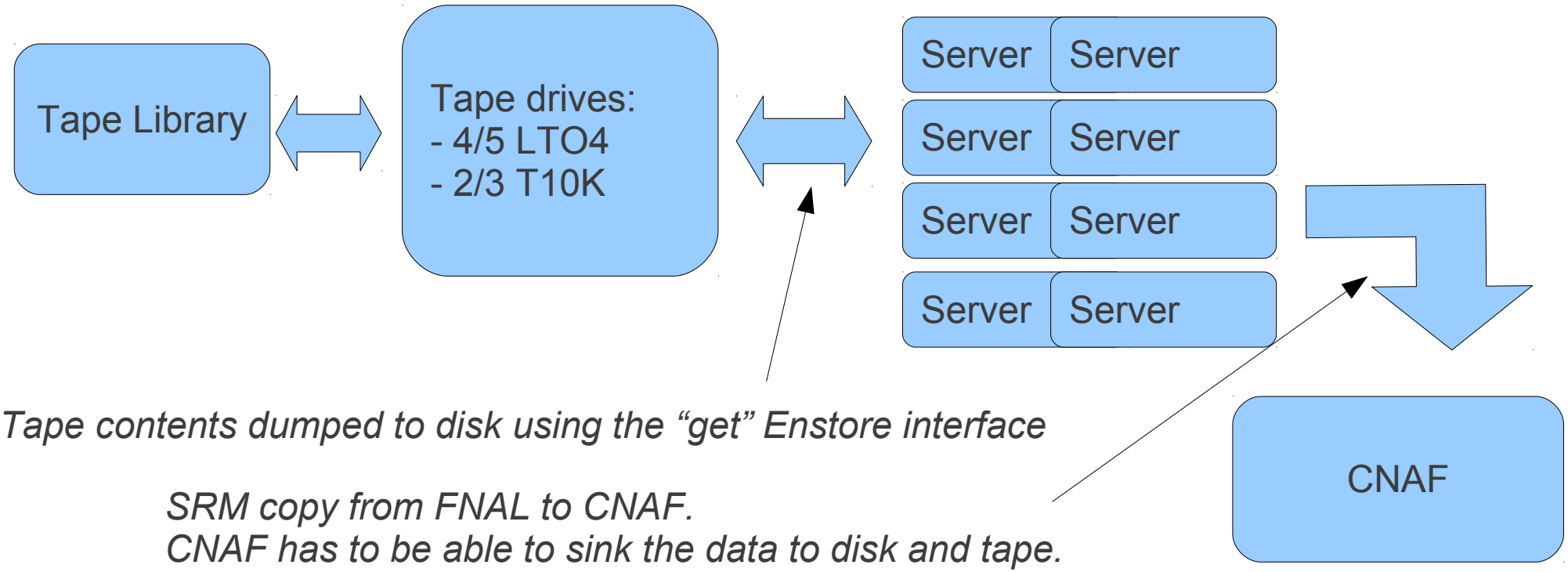
A framework for job submission, transparent for users and in common between FNAL and the offsite centers, has to be designed.

Open questions under discussion:
- is CDF code going to be frozen or do we want to keep it in pace with new OS?
- how can we exploit **virtualization and cloud computing?**

- Backup -

FNAL to CNAF copy - FNAL side

Solution 1



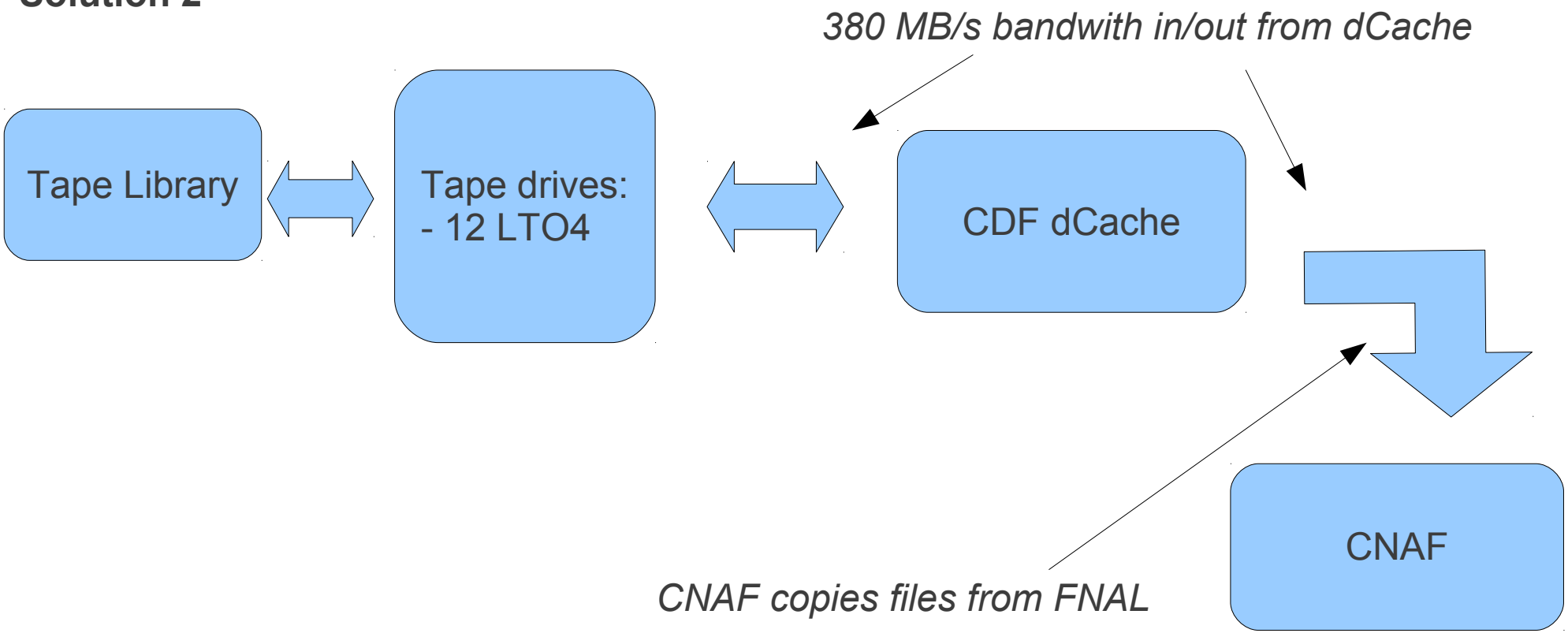
Tape contents dumped to disk using the "get" Enstore interface

SRM copy from FNAL to CNAF.
CNAF has to be able to sink the data to disk and tape.
FNAL sends lists of the files and their metadata (name, size, Adler 32 checksum) on the completion of each tape.

Solution 1:
- *Requires a limited amount of resources wrt Solution 2 (next slide)*
- *The copy is driven by FNAL.*

FNAL to CNAF copy - FNAL side

Solution 2

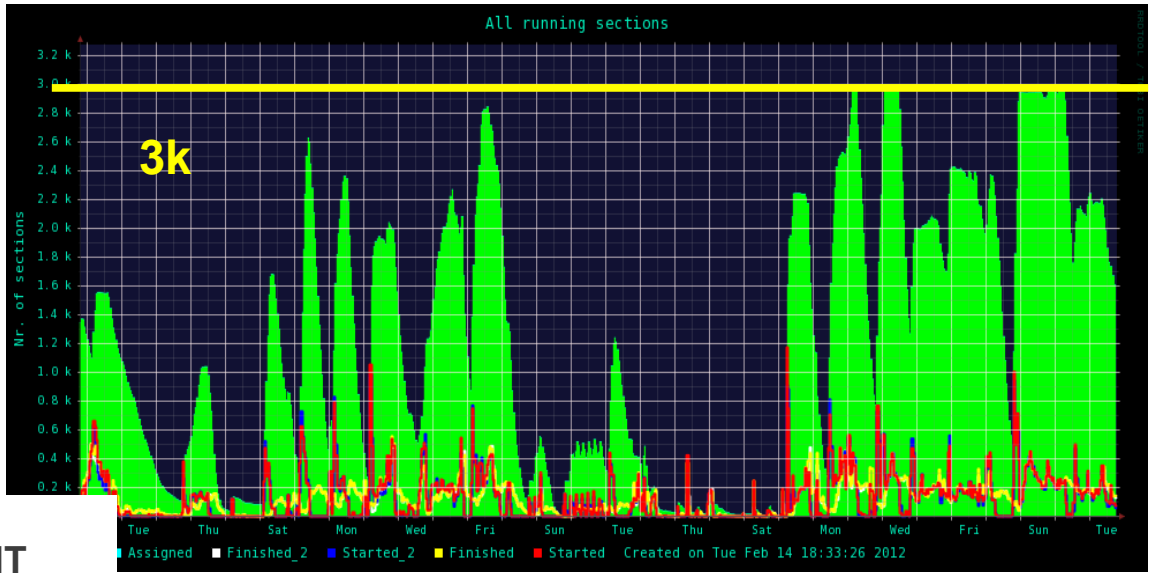


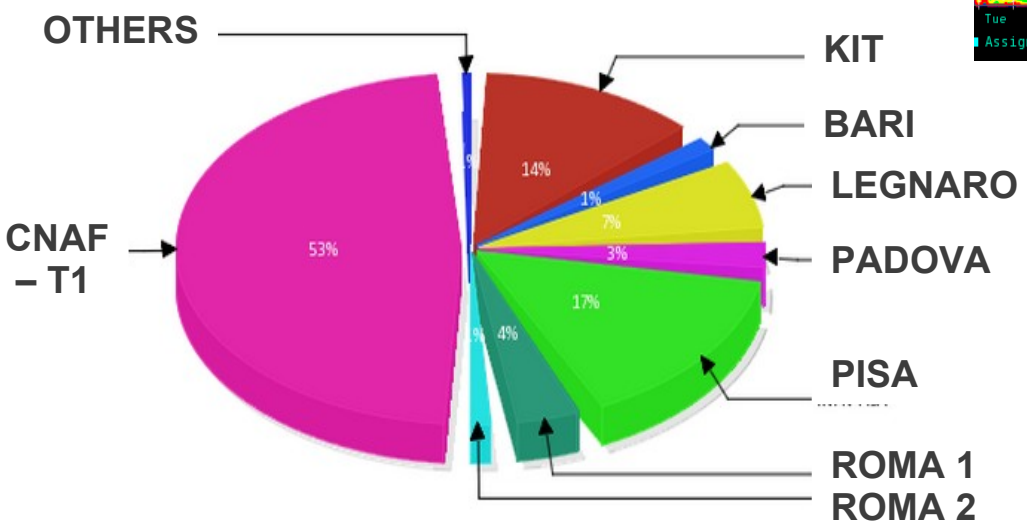
Solution 2:
- *On FNAL side nothing is changed*
- *It requires much more resources wrt Solution 1: 12 LTO4, 760 MB/s bandwith in/out from dCache (380 MB/s in , 380 MB/s out)→ this may have a significant impact on other dCache operations.*
- *The copy is driven by CNAF.*

CDF computing resources in Europe

- In Europe CDF can exploit a dedicated farm at CNAF Tier-1 and Tier-2 resources in Italy, Spain, France and Germany

- In most of the sites resources are guaranteed to CDF.
- Accessed through a new portal → EUROGRID





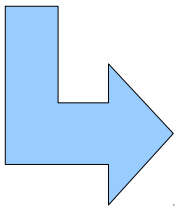
- 500 TB of disk (subsample of CDF datasets and MC)
- SAM station
- CDF code via AFS
- Icaf user's area

Same tools used at FNAL
Completely transparent to users

CDF computing at CNAF in the future

2012 -2013:
- Main goal: support CDF analysis
- Eurogrid (CPU, subset of CDF data, CDF software)
- Disk: 500T

> 2013:
- Maintain disk, CPU and all services with full functionalities
- Move to *long term data preservation plan*



What can we preserve at CNAF?
1) Data and MC samples
2) Code
3) Accessibility