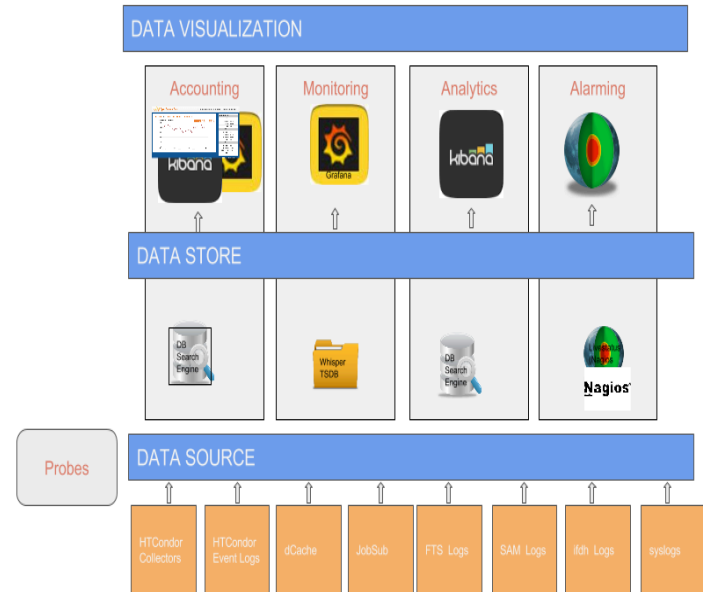


<http://cern.ch/cenf>



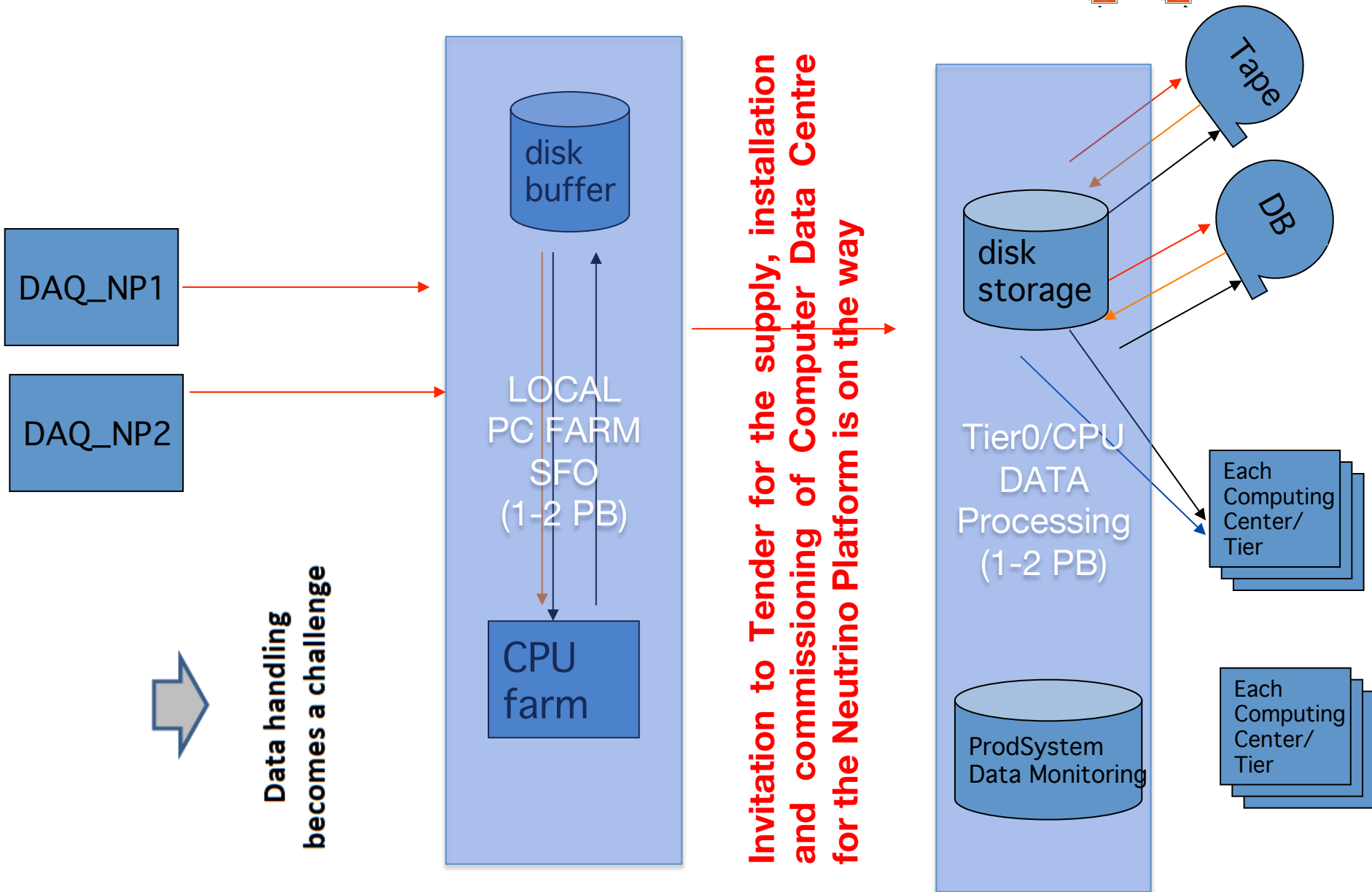
# Neutrino Computing Cluster at CERN as part of Big Data Science for Neutrino Research/Science

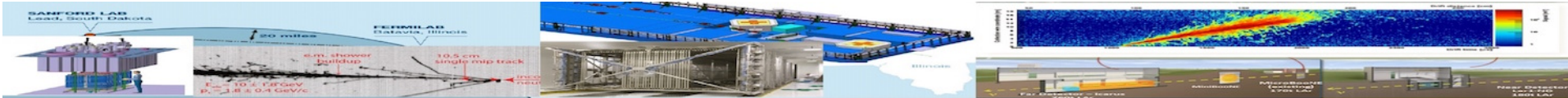


Marzio Nesi (CERN), Nektarios Benekos (CERN),  
Theodoros Giannakopoulos (UoP), Christos Lezos (UoP)

<https://twiki.cern.ch/twiki/bin/view/CENF/Computing>  
<https://twiki.cern.ch/twiki/bin/view/CENF/NeutrinoClusterCERN>

# Simplified Computing Model



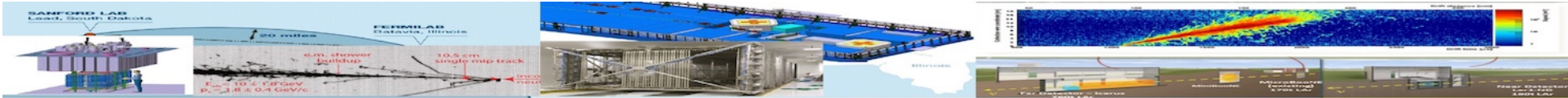


- **Thanks to Marzio**, we have 55 servers (for the time being) in our disposal
  - approximately 350 on the way + 20 racks
  - All will be installed at [Bld. 185](#)
  - Power and Network infrastructure under investigation.
    - It is foreseen for a fast connection 20Gbps connectivity to the CERN Tier-0 / EOS data storage space.
- We have a computing cluster at CERN and we have set up a DNS with domain name *neutplatform.cern.ch*
- Priorities (TBD) (related to pDUNE)
  - Data Handling/MC production/processing/challenges
  - DAQ
  - Data Quality monitoring prompt processing

<https://twiki.cern.ch/twiki/bin/view/CENF/DUNEProtSPHComputing>

**[NeutrinoPlatform gitlab repository](#)**

<https://gitlab.cern.ch/groups/NeutrinoPlatform>

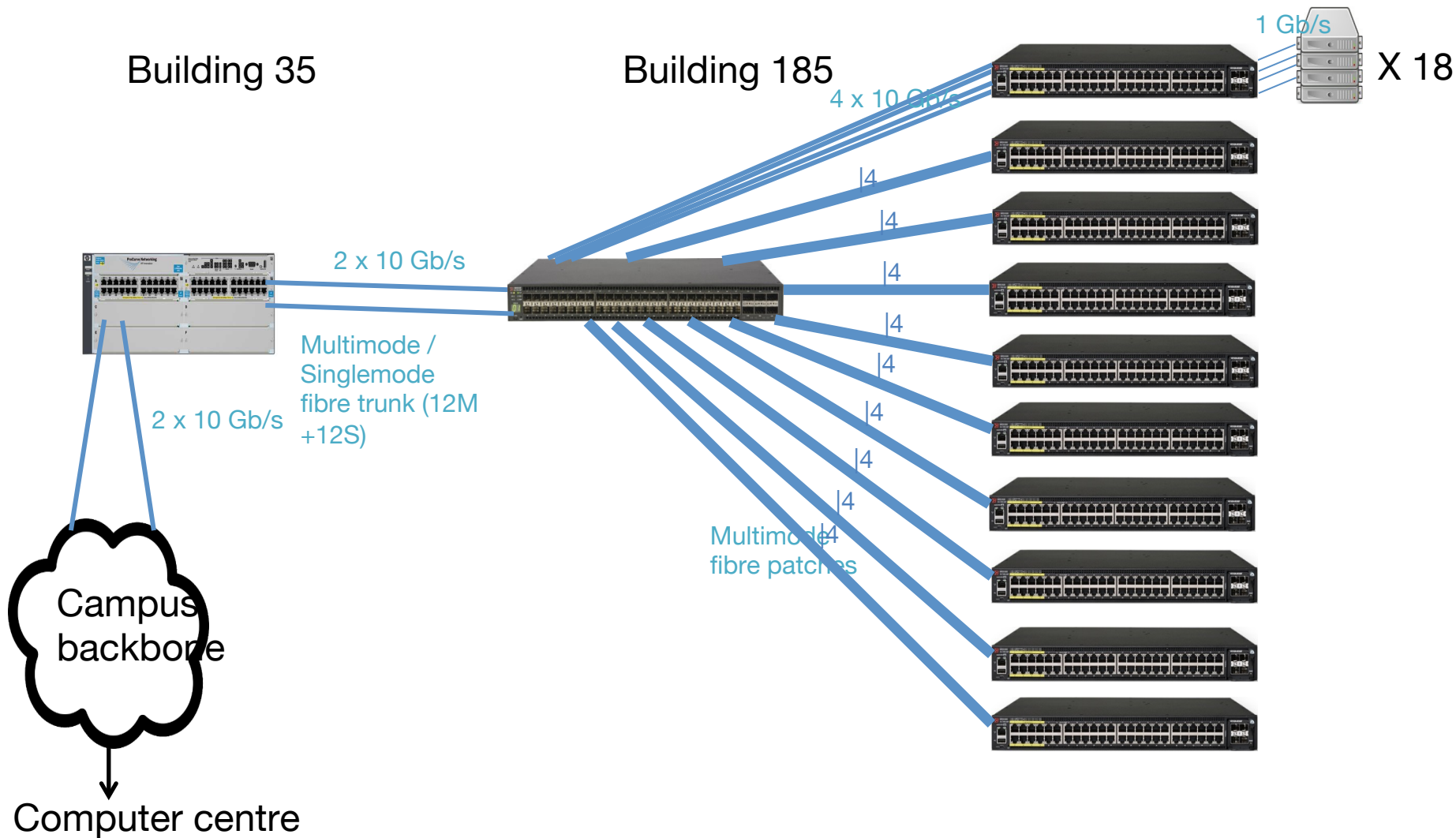


- We have set-up CVMFS that we mount
  - `dune.opensciencegrid.org`
  - `fermilab.opensciencegrid.org`
  
- We have EOS space available with 400TB space
  - `/eos/neutplatform`
  - `//eospublic//eos/neutplatform/`
  - xrootd is used and works with EOS technology
  - We have developed quota note visualization tool
    - <http://eoscockpit-quota.cern.ch/quotas/eospublic/eos/neutplatform.html>
  
- We are currently underway for OSG and we are installing
  - Puppet
  - Configuring HTCodor-CE

# Requirements for Network Infrastructure

- ~ 400 servers in the hall 185.
- 20 racks with 18 servers per rack
- 1 top of the rack switch for 2 racks
- 10 or 20 Gpbs uplink for data transfer to the computer centre
  - Start with one probably to avoid overload traffic.
- Redundancy ?
  - Not feasible for the moment. The development to support routing on these switches is not yet done and the stacking mode is on study.

# Network setup

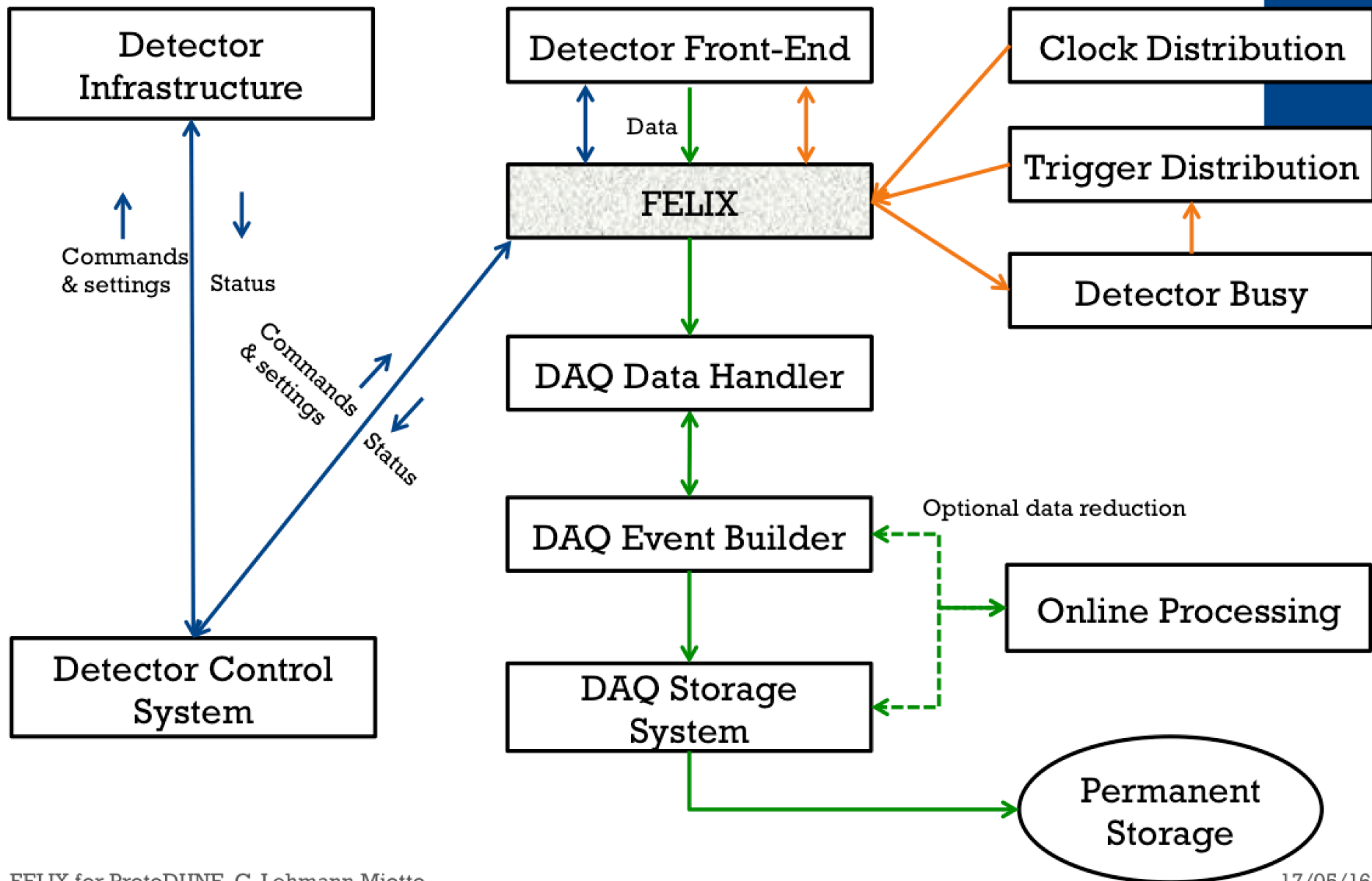


# Computing activities at CERN & software/CPU commissioning

- ✓ We are exploring the possibility to develop with LHC a new DAQ system based on the ATLAS FELIX concept. A kickoff meeting has happen already and work is starting. A CERN support group has been setup.

FELIX : <https://indico.cern.ch/event/530990/>

# + Functional Architecture



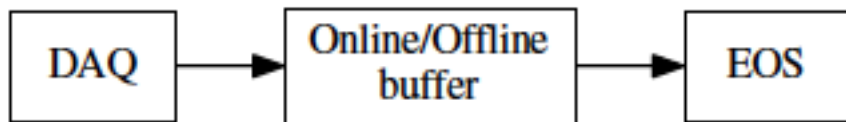


# Work we can start now with Neutrino Platform Cluster

- Data generator/DAQ emulator
- BoardReader
- EventBuilder: data compression, data interface
- Nearline/online monitoring : Validate online monitoring system and metrics
  - Decide on monitoring system (ganglia, grafana, epics, etc.), build plug-ins if necessary
  - Queue occupancies, timing, etc.
  - Develop system for displaying/storing results
- Note: much of this work is on developing hardware and software
  - Full integration performance tests need setup exactly mirroring DAQ production
  - Work now can prepare all software pieces and validate basic performance/feasibility

## Neutrino Platform Cluster as part of Online Buffer Test

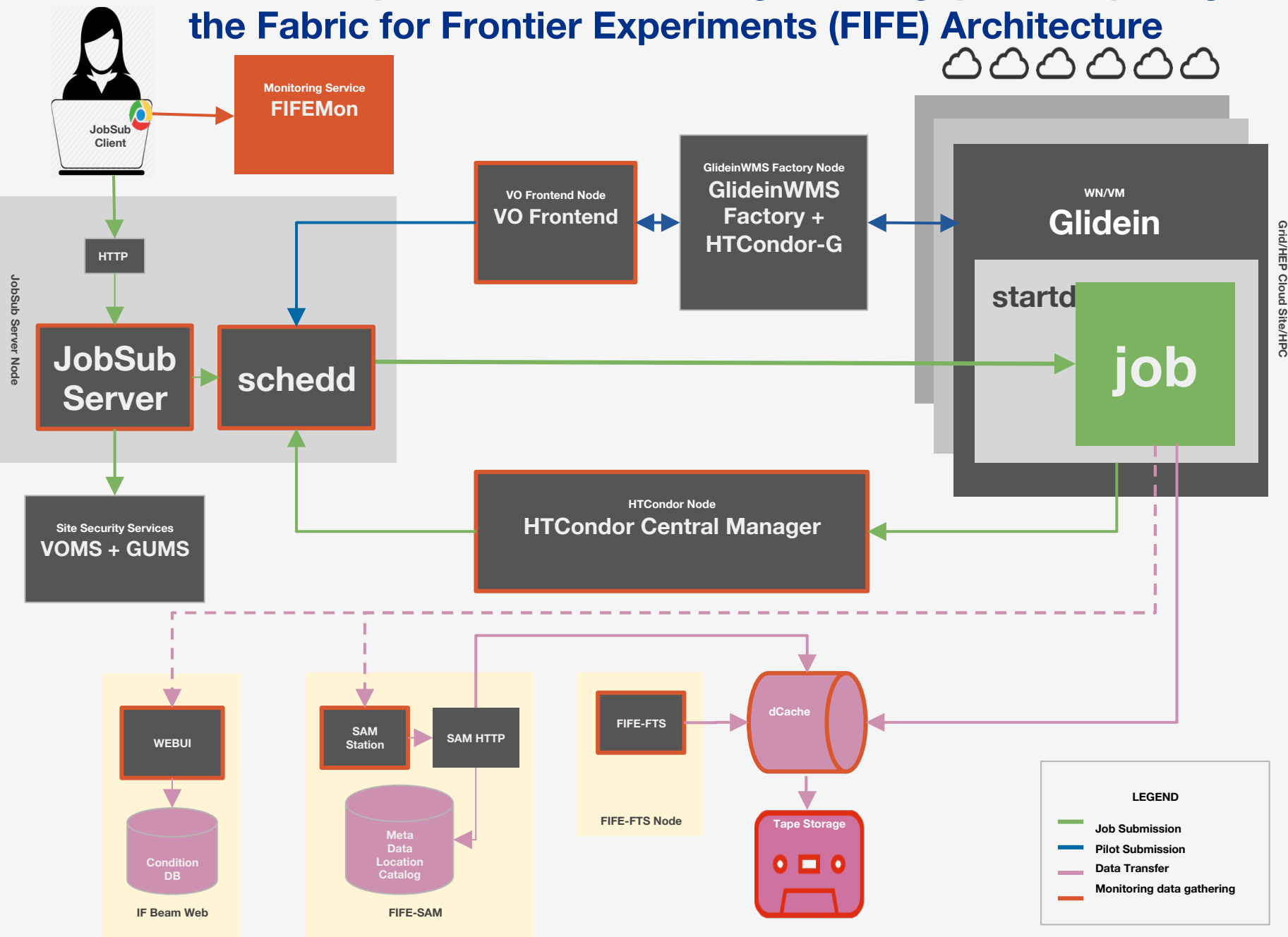
The online buffer of the NP04 experiment must be put in place to absorb the high instantaneous (in-spill) DAQ data rate before transmission of raw data to mass storage. It is also needed to satisfy the nominal CERN requirement of providing 3 days worth of storage to make operation of the experiment possible in case of a network and/or central services outage. Combined with the projected data rate, this requirement determines the overall capacity of the buffer. From the buffer, the data needs to be delivered to the high-performance disk storage (EOS) located at the CERN central services. EOS serves as the staging area for data transfer to other mass storage facilities such as dCache and tape at FNAL.



- beam spill is 4.5 seconds and cycle is 22.5 seconds
- the beam trigger rate (assumed 25 or 50 Hz)
- one out-of-spill cosmic trigger for every in-spill beam trigger
- read out all APAs
- a compression factor of 4 will be applied in the DAQ

Metric	Value
trigger rate	25 – 50 Hz
peak data rate	1.5 – 3.0 GB/s
daily data volume	25 – 50TB
3-day buffer capacity	150 – 300TB

# Neutrino Cluster part of Distributed High Throughput Computing for the Fabric for Frontier Experiments (FIFE) Architecture



# Jobs: User View

