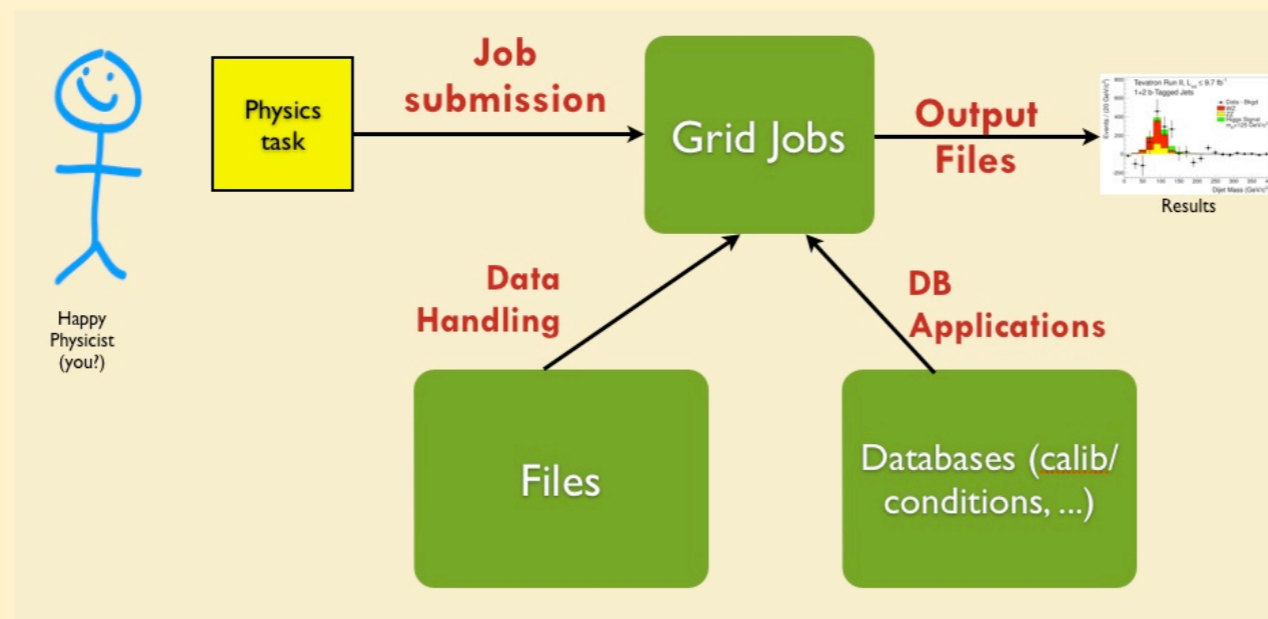


Our work with Data Management for the IF Experiments

Adam Lyon / FNAL SCD & Muon $g-2$

**LBNE S&C Meeting
November 2013**

Context for Data Management



Data Management for IF is part of FIFE (see Mike Kirby's talk from yesterday)

- **Integrated common and experiment specific components for end-to-end solutions for each experiment, including LBNE**
- **Interfaces to art and Run II frameworks**

Current data management solution is "SAM"

- **Three aspects of data management: Data Movement, Data cataloging with meta-data and provenance, data tracking for recovery**
- **An evolution of what worked very well as a global solution for Tevatron Run II (see many CHEP talks and papers from past few years)**

SAM @ the intensity frontier

We provide ongoing effective and production level support for currently running and commissioning IF experiments – MINOS, NOvA, Microboone, Muon g-2 (NOvA and MicroBoone will report on experiences here)

We have a proof of concept working for LBNE (Mike Diesburg & Qizhong)

Taking steps towards the future

- **Web/http based tools rather than CORBA [mainly done]
Allows for very thin clients, ease of framework integration**
- **Migrating from Oracle to Postgres for backend database (addressing licensing cost) [FY14]**

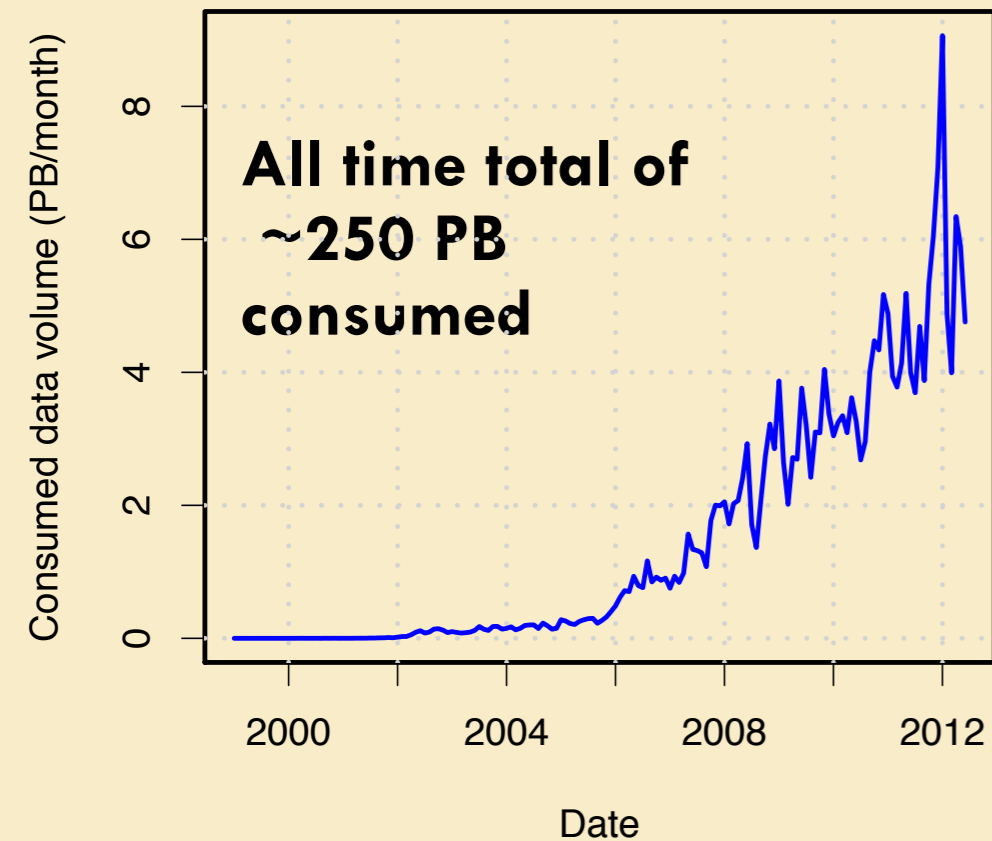
SAM's place

- **Cognizant of the CMS data management system**
- **Recently reorganized in SCD – merged CMS and IF data management and operations into same department (mine)**
- **We know less about the ATLAS system and want to learn more (today?)**
- **FIFE experiments are interested in interfacing to XROOTD federations**
- **We are testing SAM interfaces with XROOTD. Plan to support this**

Details on what SAM does...

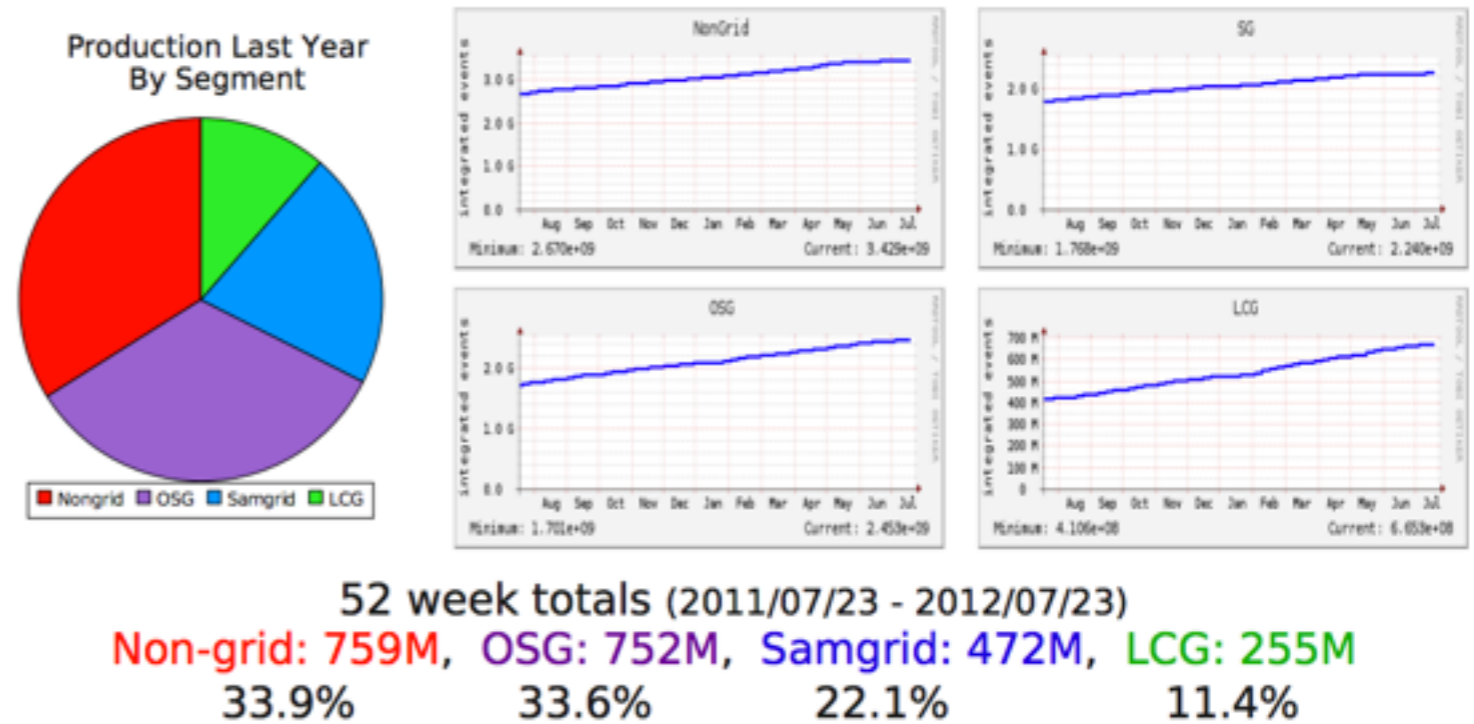
SAM History @ DØ

DØ SAM data consumption



DØ	Plan from 1999	Actual in 2012
Entire dataset:	0.5 - 1 PB	8.2 PB
Tapes:	50 GB, 6 MB/s	800 GB, 120 MB/s
Cache size:	20 TB	760 TB
# files in <u>catl</u> :	1 million	140 million

Cumulative since September, 2005



Monte Carlo Production

8.75B events produced total over life of DØ

2011-12: ~40% on OSG+LCG

We still have a powerful old-style SAMGrid site in the Czech Republic

France hosts a big compute farm for special MC requests (non-grid)

SAM Data Movement Philosophy & Experience

**Jobs destinations are not set by datasets at sites
(essential for mostly opportunistic running)**

Data go to the jobs, where ever they are

The data handling system starts from tape

Upshot:

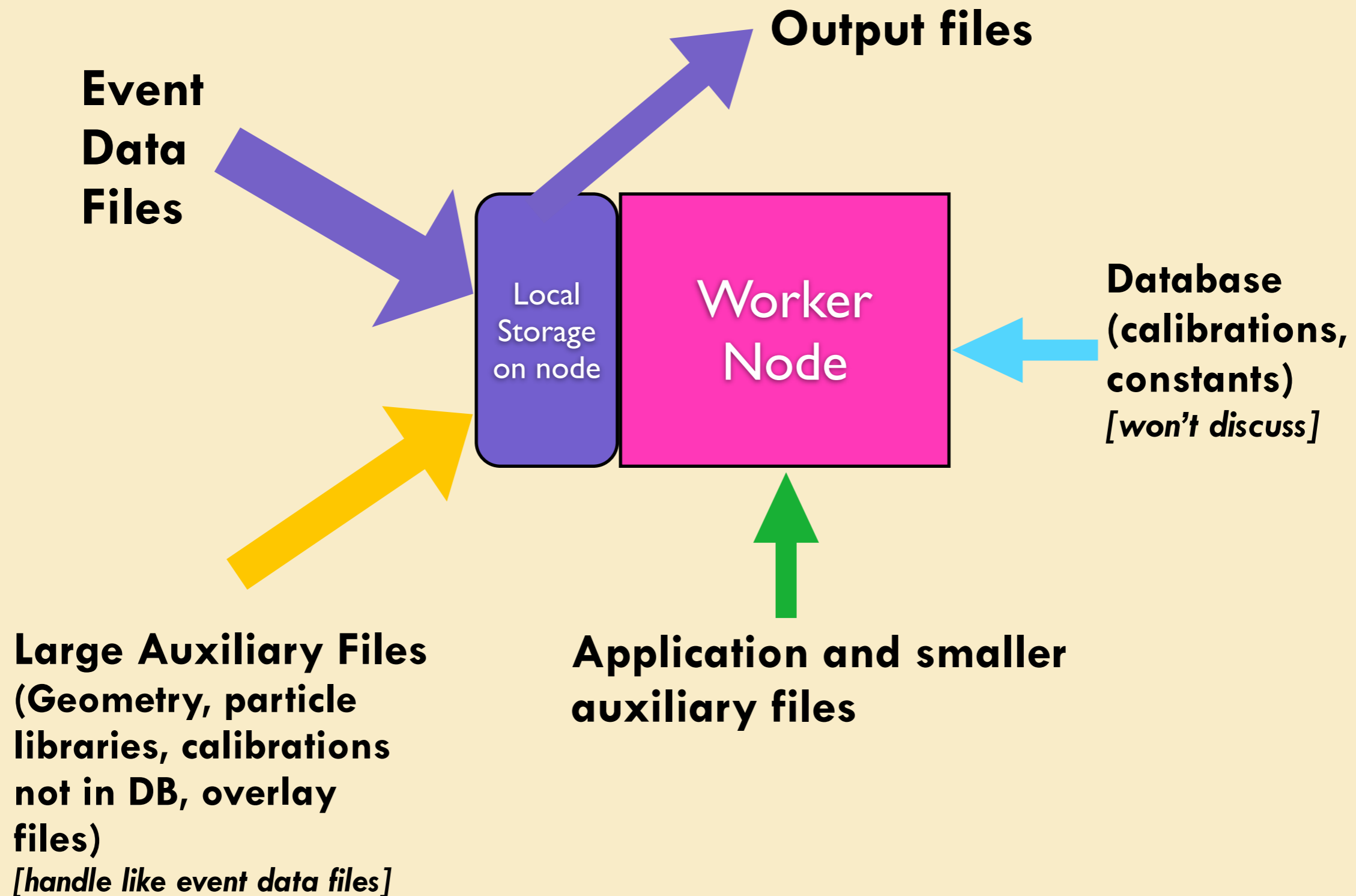
We never pre-position data

We rarely pin data to a cache

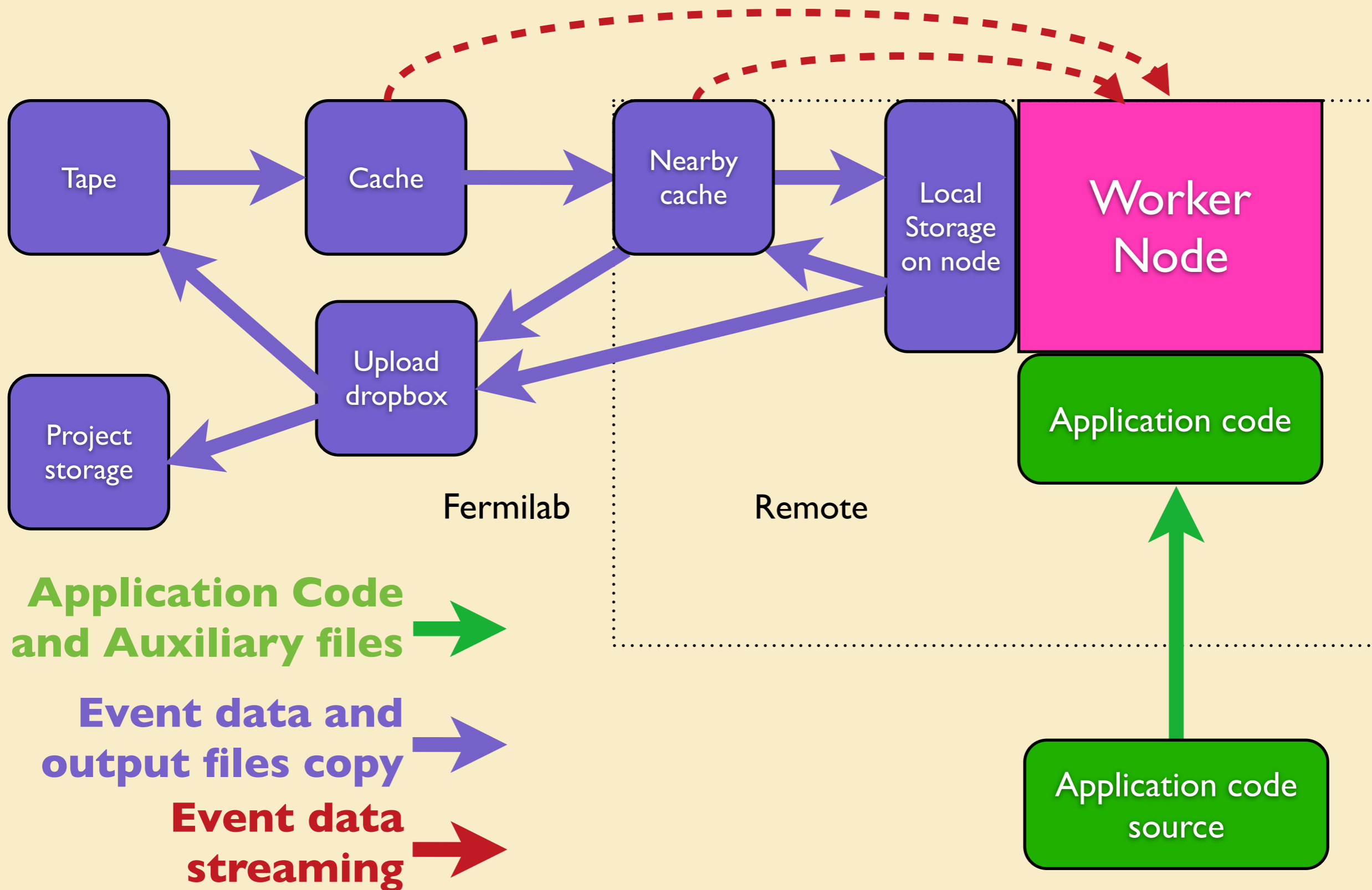
We rely on fast and robust WANs and LANs

The caching system just does it right (popular files enter the cache and live there while they are popular; fade away and replaced when popularity wanes)

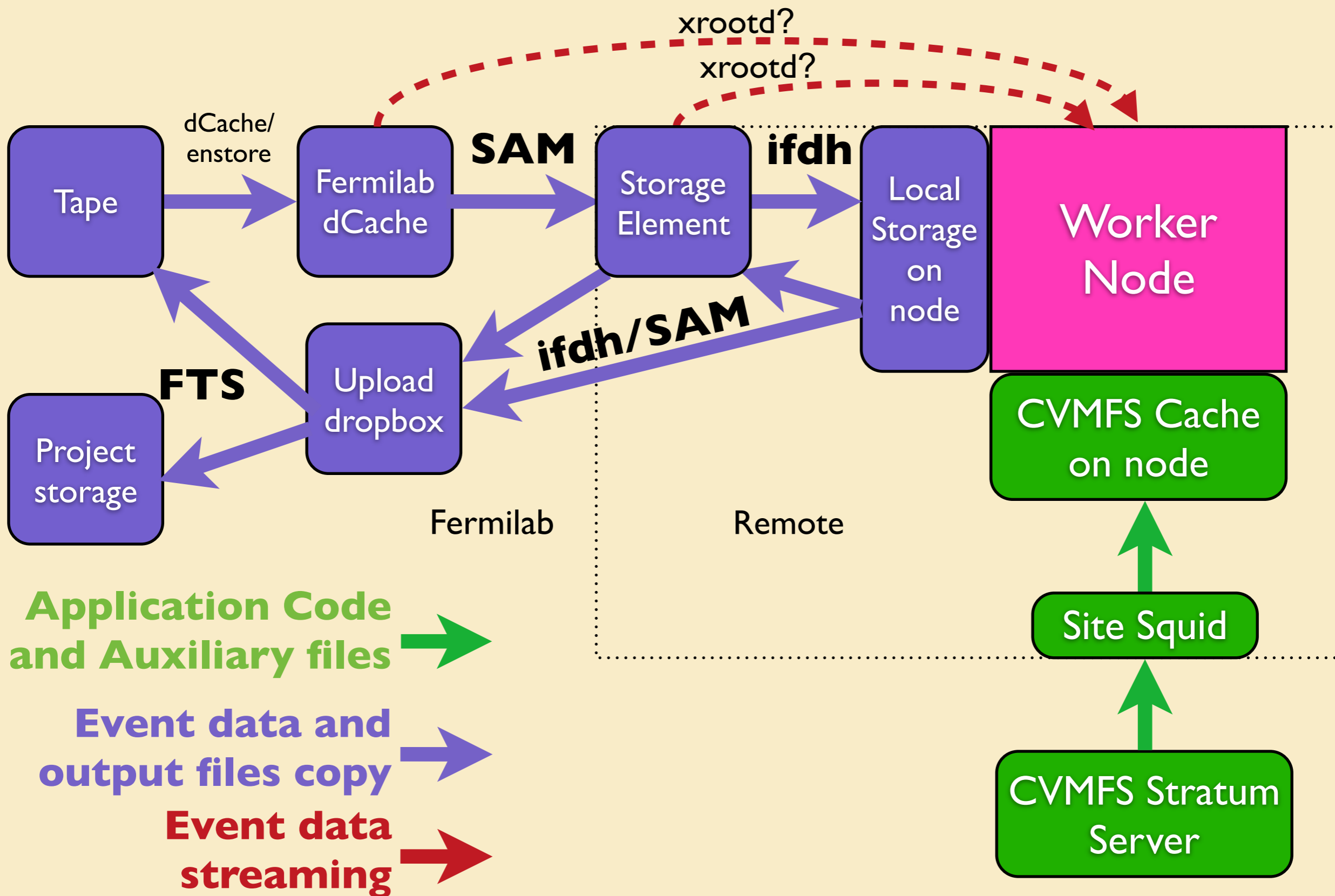
We must handle many file types



Data Handling Functionality



Current end-to-end solution for IF experiments



Example UI

NOvA Monte Carlo Dataset Definition Editor

This page is designed to allow you to define your own custom data sets based on the current NOvA Monte Carlo data files that have been generated.

To access the raw data or processed data set pages follow these links:

[Raw Data Files and Sets](#)

[Processed \(Reco\) Data Files and Sets](#)

For more information on creating and using custom data sets see:

[SAM Data Sets Wiki](#)

Monte Carlo Selection Criteria

Previously Defined Data Sets:

Group/User:

(To start with a previously defined dataset)

<input type="button" value="Monte Carlo"/>	<input type="button" value="Add Data Tier"/>
<input type="button" value="Run Start Time"/> = <input type="text"/> to <input type="text"/>	<input type="button" value="Add Date Range"/>
<input type="button" value="Run Number"/> = <input type="text"/>	<input type="button" value="Run/Subrun Selection"/>
<input type="button" value="Trigger Stream"/> = <input type="text" value="NuMI"/>	<input type="button" value="Trigger Selection"/>
<input type="button" value="Detector"/> = <input type="text" value="NDOS"/>	<input type="button" value="Detector Selection"/>
<input type="button" value="Generator"/> = <input type="text" value="Cosmics"/>	<input type="button" value="Generator Selection"/>
<input type="button" value="Horn Polarity"/> = <input type="text" value="Forward Horn Current (Neutrinos)"/>	<input type="button" value="Horn Selection"/>
<input type="button" value="ν Type"/> = <input type="text" value="ν<sub>μ</sub>"/>	<input type="button" value="Horn Selection"/>
<input type="button" value="ν Interaction"/> = <input type="text" value="Charged Current"/>	<input type="button" value="Int. Selection"/>
<input type="button" value="No. Spills"/> > <input type="text"/>	<input type="button" value="Add Event Selection"/>
<input type="button" value="GDML Geom File"/> = <input type="text"/>	<input type="button" value="Geometry Selection"/> (Example: Geometry/gdml/ndos.gdml)
<input type="button" value="Job FHCL File"/> = <input type="text"/>	<input type="button" value="FHCL Selection"/> (Example: cosmics_ndos_10000_r1_99.fcl)
<input type="button" value="Clear Query"/>	(Date format: 2011-05-09 or Date/Time format: 2011-05-09T23:46:04)

Logical Operators

Use these operators to join your criteria together.

Data Set Definition (Dimensions query):

(you may also edit this query string directly to add custom fields to your query)

(SAM Translate)

Name your dataset: : user: group:

Datasets can have an arbitrary name but should not include spaces or special characters (underscores and dashes are permitted)

SAM @ LBNE so far

Qizhong has been storing MC files onto tape with FTS & SAM

Mike Diesburg

- Helped define initial metadata
- Runs test jobs retrieving data from tape & cache
- Retrieves files directly to his laptop

← → ↻ lbnesamgpvm01.fnal.gov:8787/fts/status

FTS status for lbnesamgpvm01.fnal.gov

Generated at 2013-11-14 01:53:55 CST ([refresh](#))

Summary

FTS: OK	FSS: OK	Stager: OK
---------	---------	------------

Completed files:	2782
Failed transfers:	0
All error files:	0
Pending files:	0
New files:	0

- Recent completed transfers

Time	File name	Destination
mc		
2013-11-13 18:14:48 CST	35T_singleparticle_pizero_30_0.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:46 CST	35T_singleparticle_pizero_30_1.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:44 CST	35T_singleparticle_pizero_30_2.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:43 CST	35T_singleparticle_pizero_30_3.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:41 CST	35T_singleparticle_pizero_30_4.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:39 CST	35T_singleparticle_pizero_30_5.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 18:14:12 CST	35T_singleparticle_pizero_30_6.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 15:38:50 CST	35T_singleparticle_pizero_30_7.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 15:38:47 CST	35T_singleparticle_pizero_30_8.root	enstore:/pnfs/lbne/mc/lbne/simulated/001
2013-11-13 15:38:44 CST	35T_singleparticle_pizero_30_9.root	enstore:/pnfs/lbne/mc/lbne/simulated/001

+ Failed transfers (0 hidden)

+ All errors (0 hidden)

+ Pending (0 hidden)

+ New (0 hidden)

+ Configuration

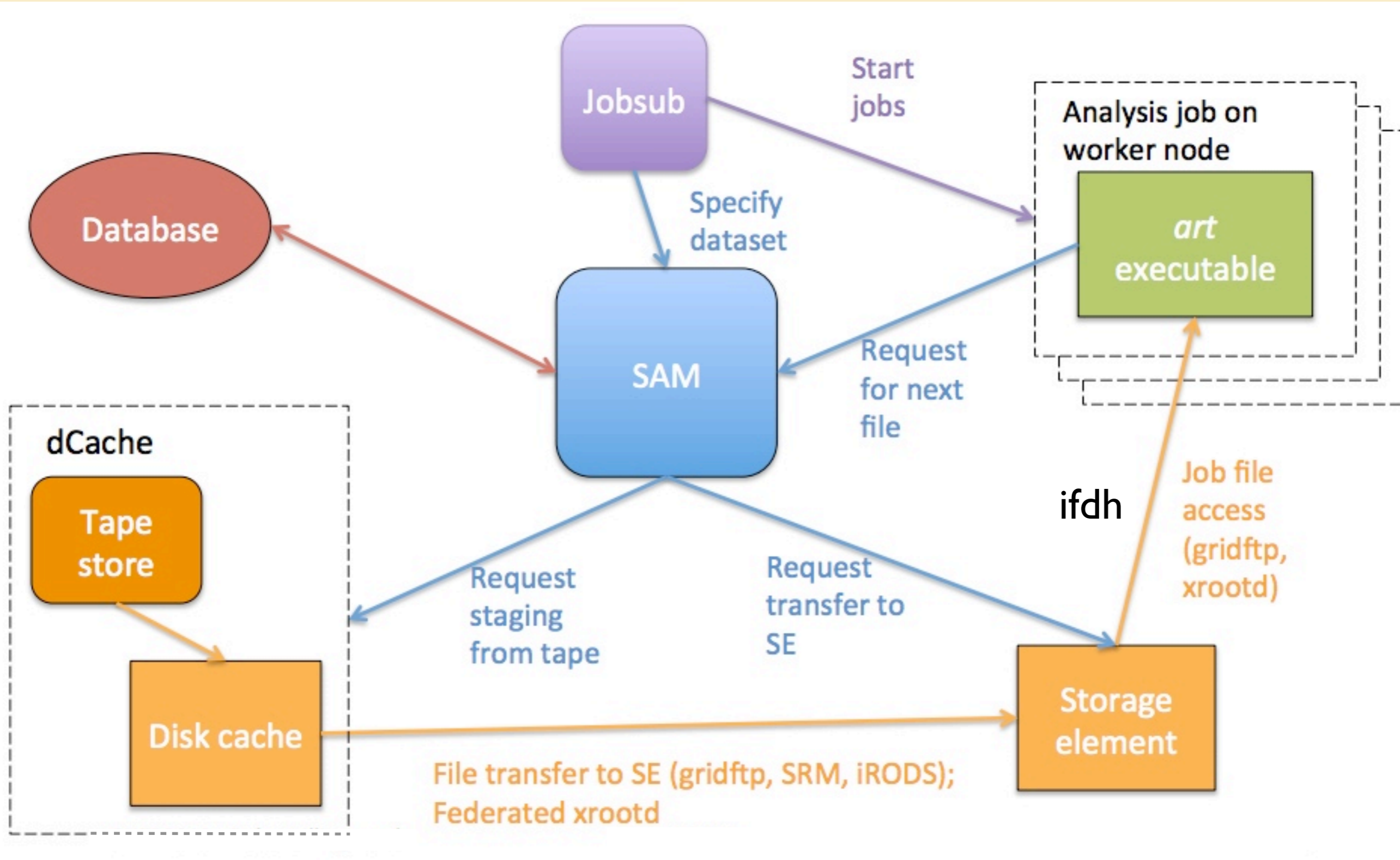
Conclusions

Next we'll here from some experiences from experiments

Looking forwarding to talking, listening and working towards common solutions for our common future!

Backup slides

Putting it all together



SAM Support

SAM and rest of offline the SCD supports is 8x5 + best effort

For D0 & CDF we operated SAM with ~ 1 FTE

**We already have rotating data handling shifts for IF
(needs < 1 FTE)**

Data movement is an excellent monitor of networks

o We are often the first ones to see network and system problems

What do you need to run SAM?

Database, SAM station, SAMWeb servers (we operate)

Tape (enstore and others)

Cache (Fermilab will soon have a 4 PB dCache system, SAM can use many caches in many places)

You will need to distribute the ifdh client to worker nodes

You need to determine your file-metadata

We work very closely with the experiments (we're not merely a service provider – also a partner and collaborator)