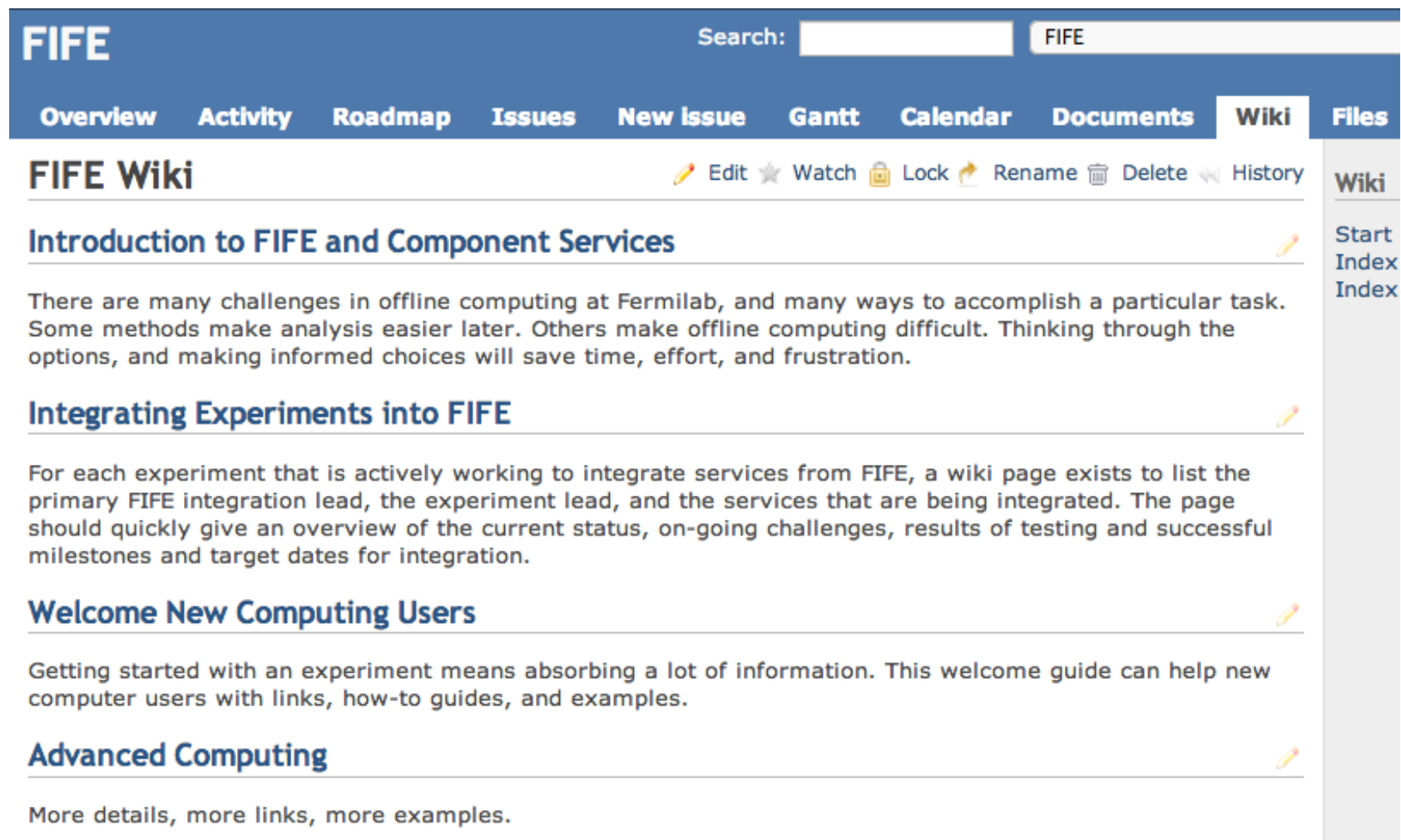# Introduction to FIFE

Mike Kirby/Ken Herner
FIFE Support Group

Documentation

- https://cdcvs.fnal.gov/redmine/projects/fife/wiki

Documentation

Introduction to FIFE and Component Services

- There is an overview of all of the topics, but also links for detailed documentation

- Please read and send us feedback - it's a work in progress

- we will focus on big picture for computing
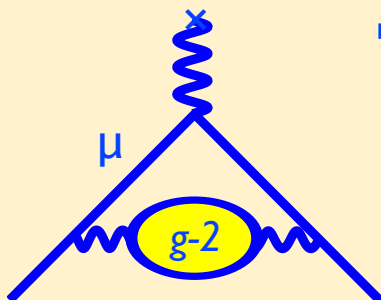
The Muon *g-2* Computing "Big Picture"

μ

g-2

Adam Lyon

(Fermilab/Scientific Computing Division)

g-2 **for Beginners**
February 20, 2013

g-2
man!

Fermilab

I'll discuss the following topics:

What is the Fermilab computing vision and
how do we fit in?
   Grids, Virtualization, Clouds
   Art, Multicore, GPUs

I'll tell you how this matters to you
(yes, we all just want to make plots!)

Many opinions here are mine alone

"Hopefully I'll tell you a little more than what you already know; certainly a
little more than what I already know." - R. Mohapatra

Fermilab provides many computing services

Fermilab has hosted many *batch* farms, but we now wrap farms in the *GRID*.

Grid computing:
 A common interface to many batch systems on many farms. Common infrastructure and assistance

Main US DOE Grid

HEP, Biology, Seismology

Not the same as NSF's Supercomputer Xsede (Teragrid)

What is a Grid?

A step in the direction of "computing as a utility"
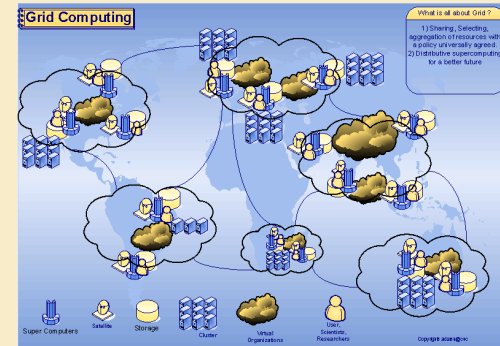
-You submit your job, and it advertises requirements.
-Sites advertise capabilities.
-A "broker" matches your job to the site and it runs.

You don't care where your job runs, in principle

In practice it's been difficult to make this work smoothly

But the payoff? Opportunistic cycles! Even in the LHC era!

Our Fermilab Grid (Fermigrid)

Fermigrid is a collection of farms at the lab all with an OSG interface: CDF, DØ, CMS, General Purpose
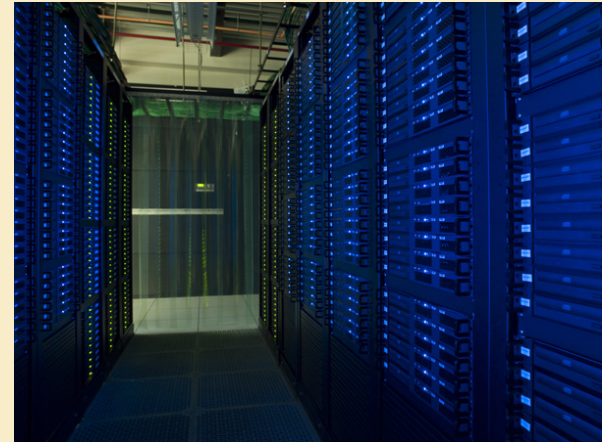
~25,000 slots! Separate farms cause some inefficiency

FermiGrid - Overall Total/Busy/Free Slots - Last Year
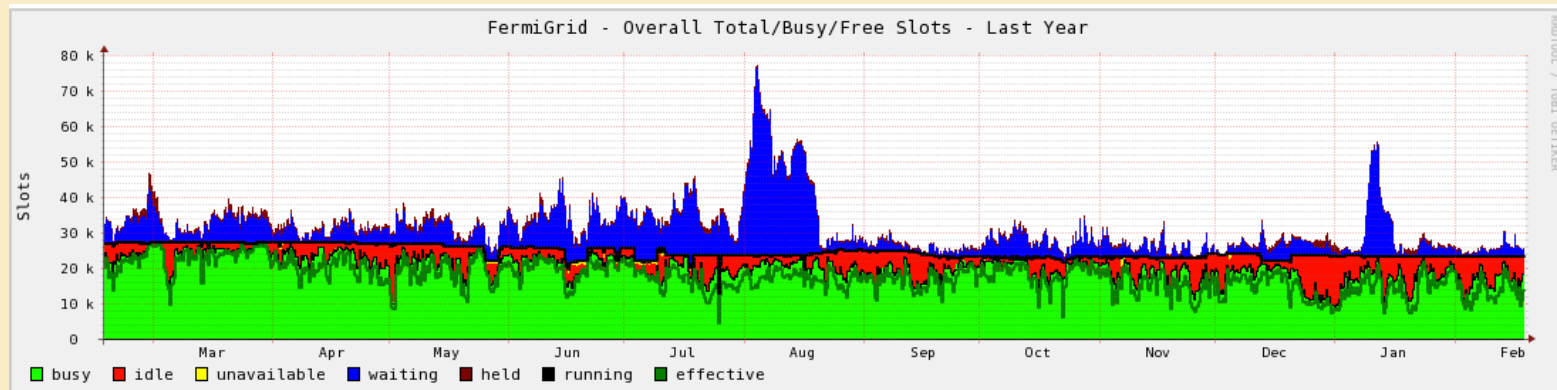
Some things to know about µBooNE Computing

µBooNE has 200 allocated slots on FermiGrid

potentially about to get more slots than that

you will compete against other folks from µBooNE first for those 200, and then with everyone for opportunistic slots
- fairshare

there are limits on jobs - 48 hours of wall time, memory limits, local disk storage

The Grid isn't easy!

Making different sites accept Grid requirements (better if they are LHC sites)

Authentication and authorization – are you who you say you are? Do you have permission to run there?

Do your job requirements really match the site?

How do you get your application and data to the job? How are the results returned?

How do I get to data?
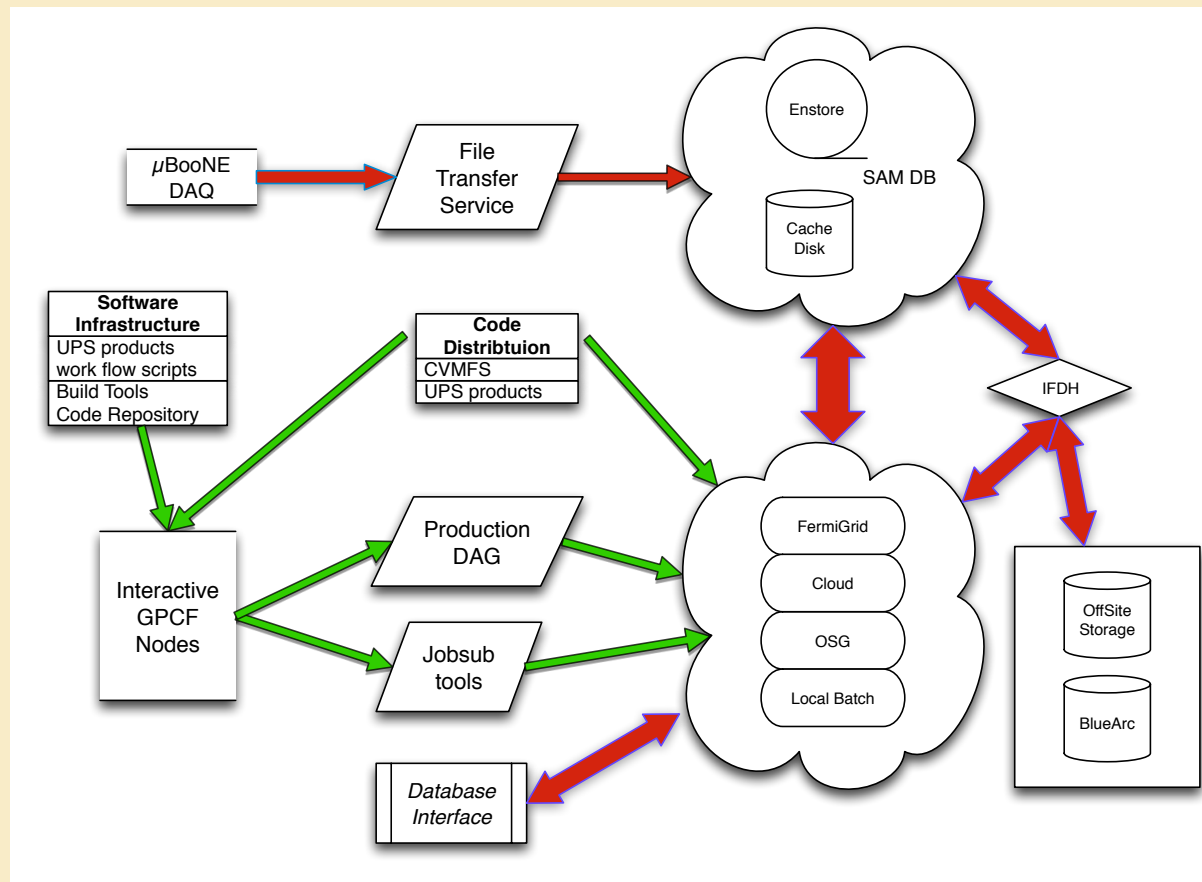
Some solutions to these problems

"Glidein-WMS" – a batch system "projected" onto the Grid that looks local

The outside world sees:

Site A   Site B   Site C   Site D
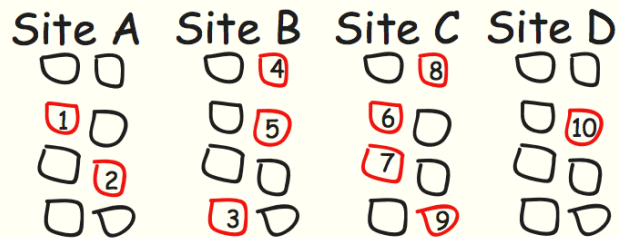
= worker node running pilot

We see

1 6
2 7
3 8
4 9
5 10
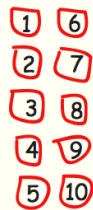
We submit to unified batch system we manage made up of worker nodes distributed around the grid and activated on demand

We can enforce our policies (fair share, time limits), but are subject to underlying grid system limits too

Pilots prevent jobs from landing on unsuitable worker nodes

Looks like one big batch system to us - easier to manage.

The "JobSub" package does this for you

Local storage - Bluearc

Good news:
When used as designed, it works great

Bad news:
When used outside of its design, it kills computing for all of the IF experiments (hard to buy a robust, reasonably priced, multi-PB system)

OK

CPUs   Storage Volumes

Deadly

CPUs   Storage Volumes

Batch jobs can do this!
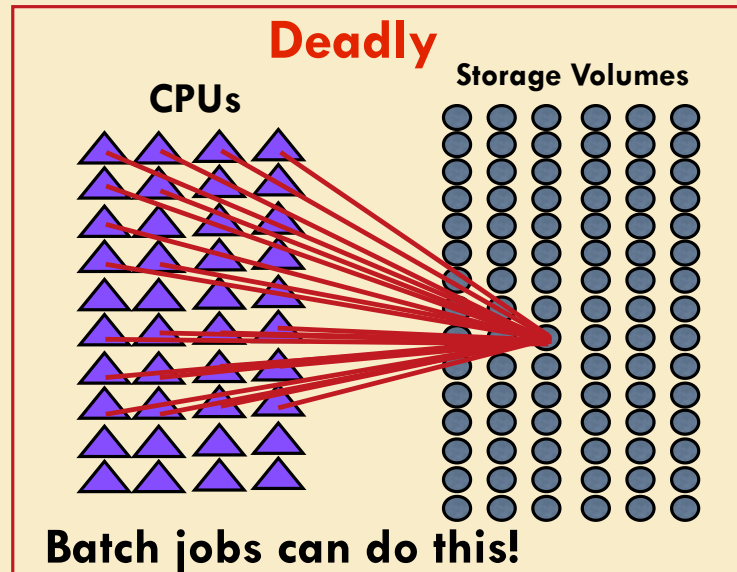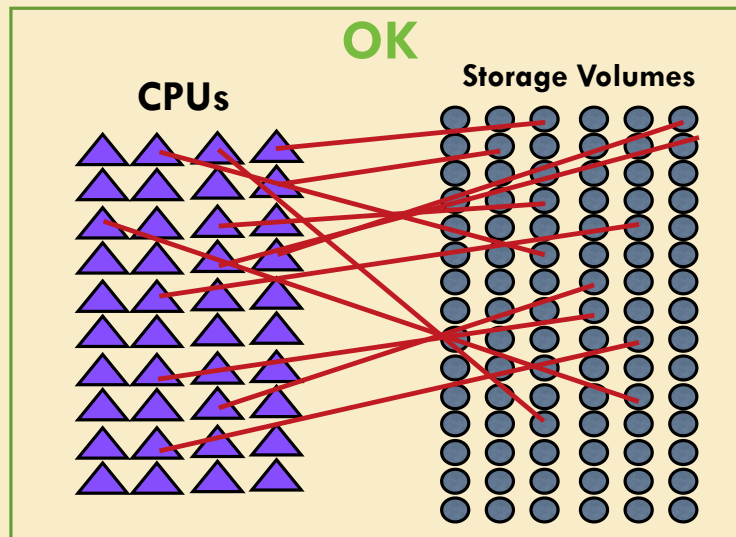
Local storage - Bluearc

some general rules:
- never use "cp" command in a grid job. EVER!
- never open a file that is on BlueArc from grid
- copy the file onto the local grid disk, then process
- we'll get to the question of quotas shortly

OK

CPUs   Storage Volumes

Deadly

CPUs   Storage Volumes

Batch jobs can do this!
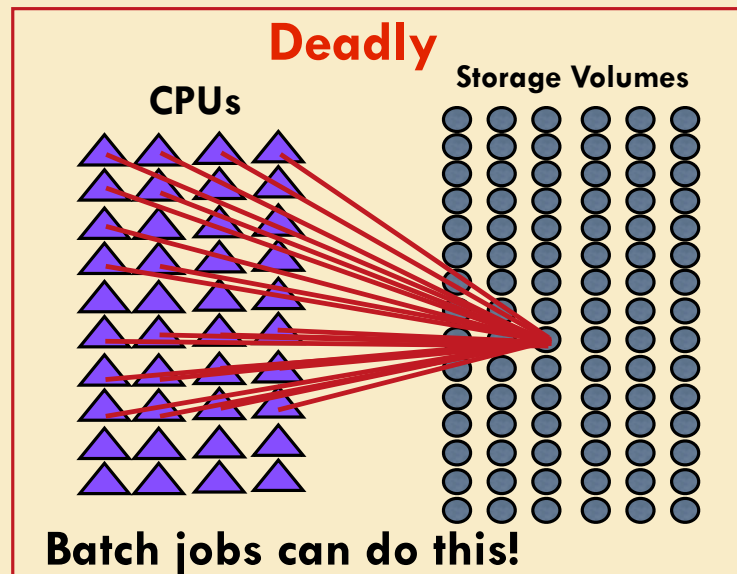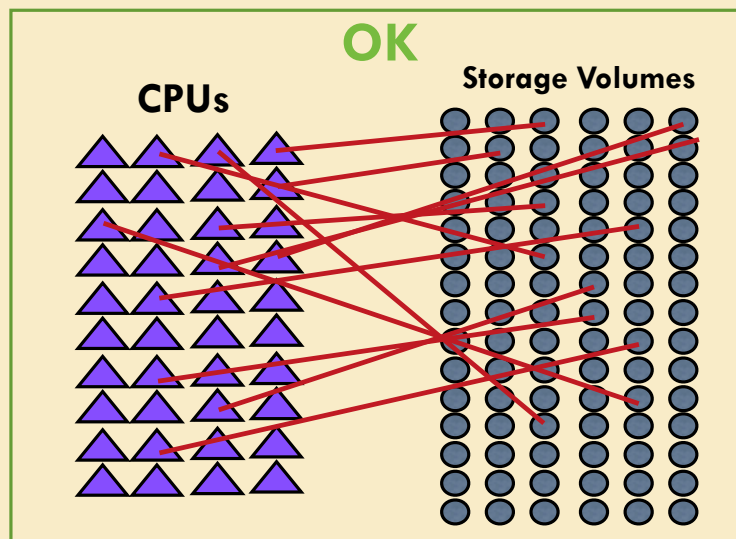
ifdh to move files around

https://cdcvs.fnal.gov/redmine/projects/ifdhc/wiki/

- ifdh uses several different techniques to move files
  - cpn - this is a throttled cp command - only 10 per exp
  - gridftp - this throttle the same way as cpn but it is a global access point - any grid site can copy it back - also comes back with the right ownership of files
  - BestMan - internal throttling using OSG software SRM copy to move files - the wave of the future
- Always use ifdh to move files over then network on the grid
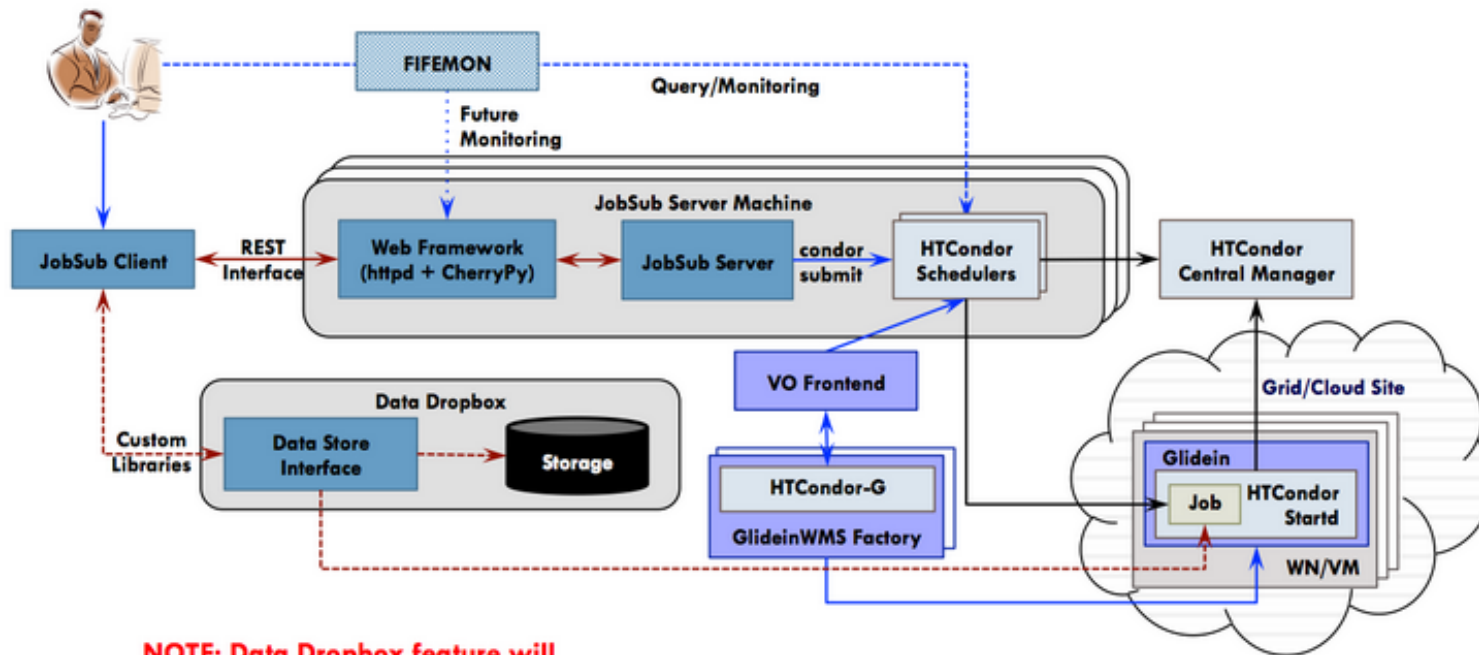
jobsub and all it's options

jobsub and all it's options

- https://cdcvs.fnal.gov/redmine/projects/jobsub/wiki/Using_the_Client

- we're going to steal from Ken for a hello world example

- Thanks Ken!

jobsub hello world

log into gm2gpvm01.fnal.gov

> source /grid/fermiapp/products/common/etc/setups.sh
> setup jobsub_client
> get-cert

cp /afs/fnal.gov/files/home/room2/kherner/monitoring_test.sh /gm2/app/users/<your username>

jobsub_submit.py -G lariat -M —OS=SL5,SL6 —resource-provides=usage_model=DEDICATED,OPPORTUNISTIC file:///gm2/app/users/<your username>/moniroting_test.sh

-G is your experiment GROUP

-M mails you when your jobs finish at <your username>@fnal.gov

—OS says which flavor of Scientific Linux you want, this requests both

—resource-provides tells what to look for in a computing resource, this time it's both dedicated and opportunistic

- last element is the file to copy in and run as the executable

Monitoring my jobs

- fifemon.fnal.gov/monitor/

- all kinds of stuff here, we'll just discuss it…

Moving your data to your job

Note that the LHC experiments tried "move your job to the data" and are migrating to this method instead

"SAM" finds the files, manages the cache, and initiates and throttles the file transfers

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