Fermilab U.S. DEPARTMENT OF ENERGY Office of Science

FIFE Status

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OSG AH Meeting

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FABRIC FOR FRONTIER EXPERIMENTS

FIFE Overview, Again?

- We have already given several presentations about FIFE.
- We mostly talked about experiments and workflows.
- Today I want to concentrate on the FIFE project.
  - Why are we special?
  - What do we have to offer to our customers?
  - How do we benefit from the OSG?
  - What's next?

Why FIFE Is So Special?

- We support more than 20 experiments.
- The experiments study different physics (neutrino, muon, dark matter), use very different detectors and have different workflows.
- The experiments have to transfer a lot of data. Sometimes they transfer a lot of very small files, sometime they need access to big flux files.
- Each experiment has its own schedule. They do not coordinate their production runs, conferences, etc.
- The experiments have collaborators from different institutions that want to contribute local resources.
- The experiments don't contribute to middleware software development or provide infrastructure support.
- The experiments need onboarding help. We help them with workflows, software distribution, data transfer and OSG access.
- We have to make sure that all experiments are getting Fermilab resources according to their allocations.

What Does the FIFE Project Have To Offer?

- Set of tools for computing and data handling.
- The tools have been developed and supported by experts.
- The tools are constantly evolving.
- Experiments could request new tools and features. The requests are prioritized and implemented.
- Feedback: alarms about inefficient and wasteful jobs, massive failures and transfer problems.
- Support is provided not only for Fermi resources but we are also dealing with problems at remote sites.
- Help the experiments to set up and use collaborator resources.
- Consultation during on-boarding process.

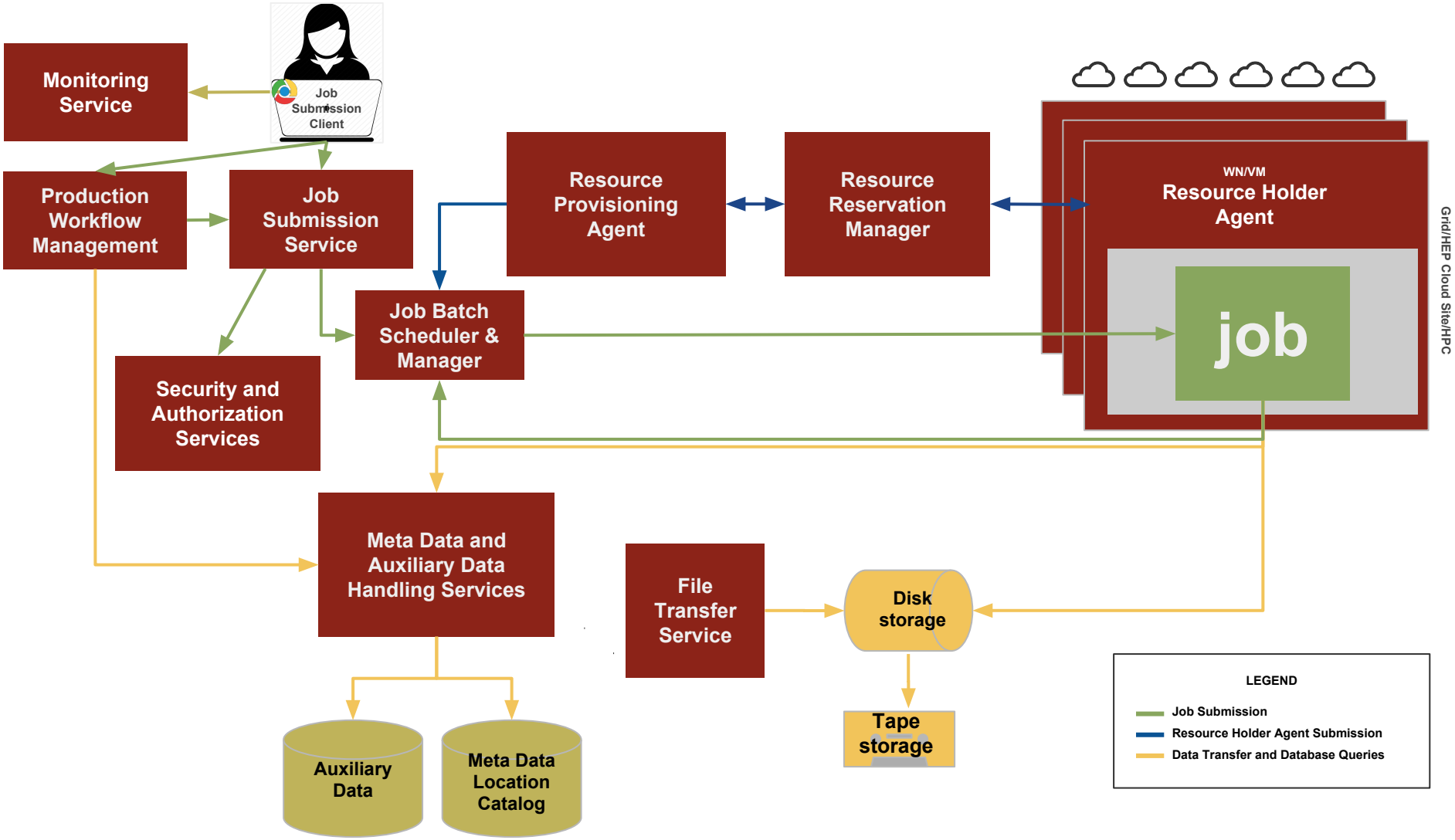
How Does FIFE Benefit From The OSG?

- Opportunistic resources: “immediate” access when we have a spike of requests
- OSG Software Stack and expertise
- OSG Technology research (StashCache, singularity)
- OSG GlideinWMS factory and support
- CVMFS support
- StachCache access
- Accounting (Gratia and GRACC)
- GOC Ticketing Service
- CILogon OSG CA
- Vulnerability reports and security information exchange

FIFE Toolchest For Grid Jobs

- Submission to distributed computing (JobSub)
- GlideinWMS frontend and factory
- Production Operation Workflow Management (POMS)
- Job and transfer monitoring dashboards and alarms (FifeMon)
- Data Handling and Distribution
  - Sequential Access Via Metadata (FIFE SAM)
  - dCache/Enstore
  - File Transfer Service (FIFE FTS)
  - Intensity Frontier Data Handling Client (ifdh)
- Software stack distribution (CVMFS)
- Continuous Integration (CI)
- Electronic Logbooks, Databases, and Beam information

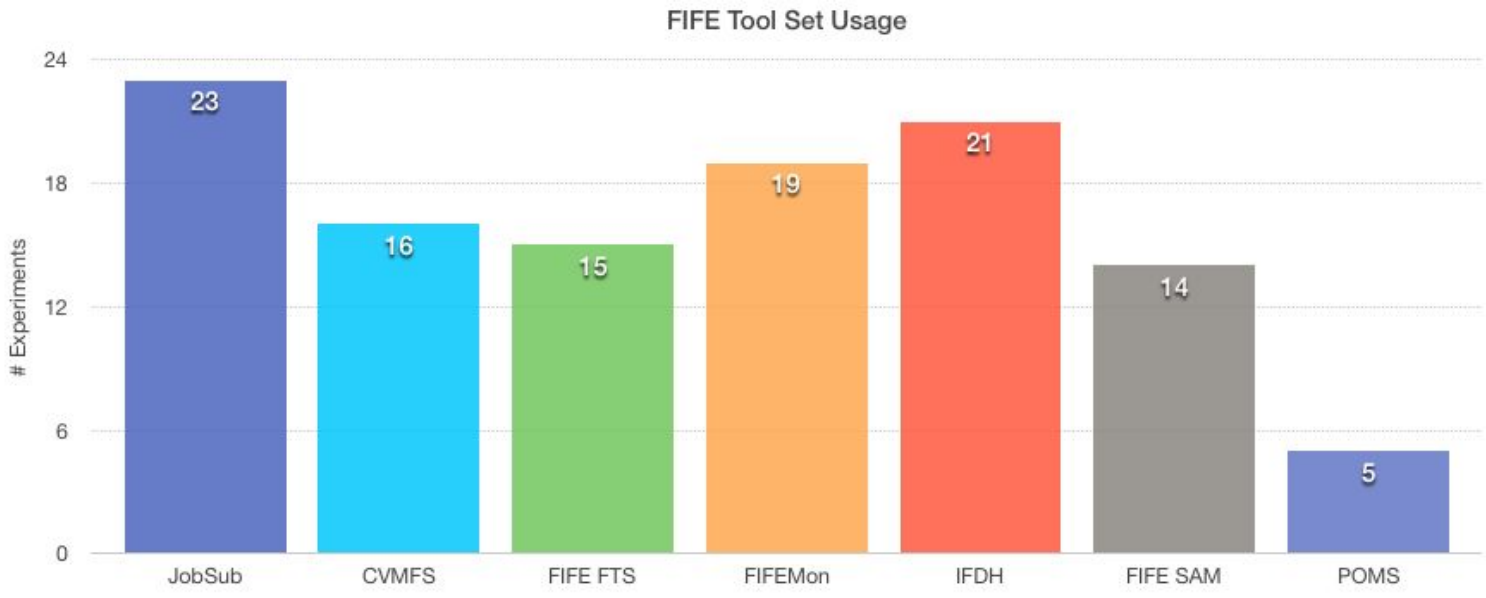
FIFE Architecture



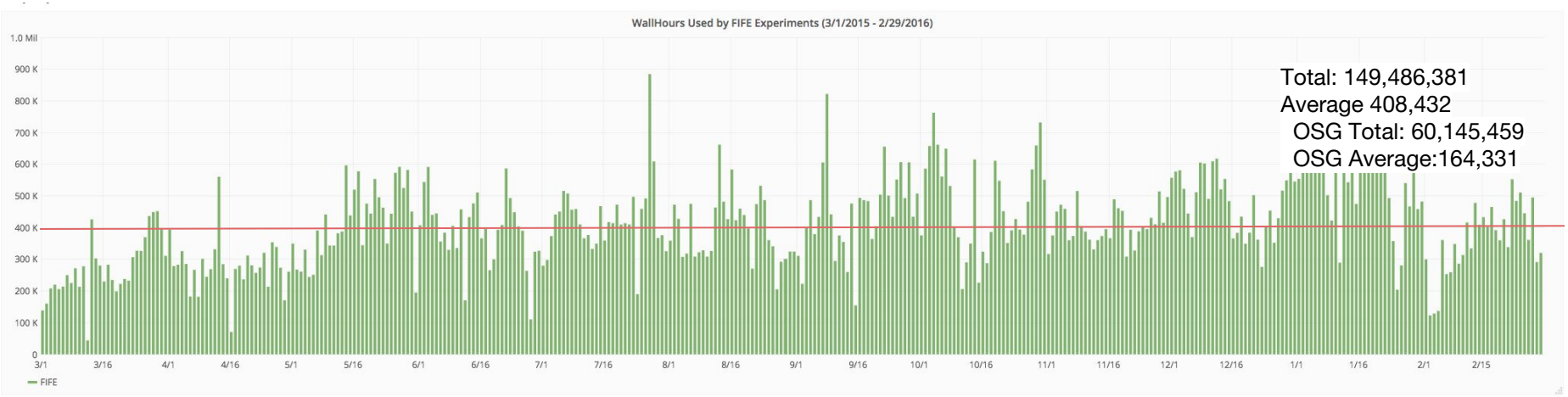
FIFE Resource Usage And Other Stats

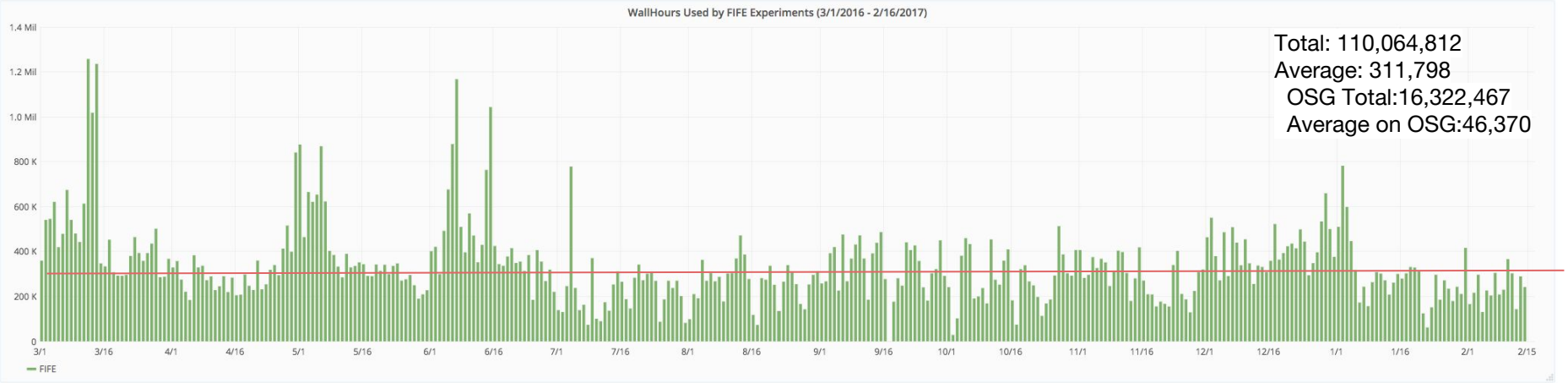
FIFE Stats

- Number of supported experiments: 23
- Number of unique users: more than 500
- FIFE tools usage by experiments:



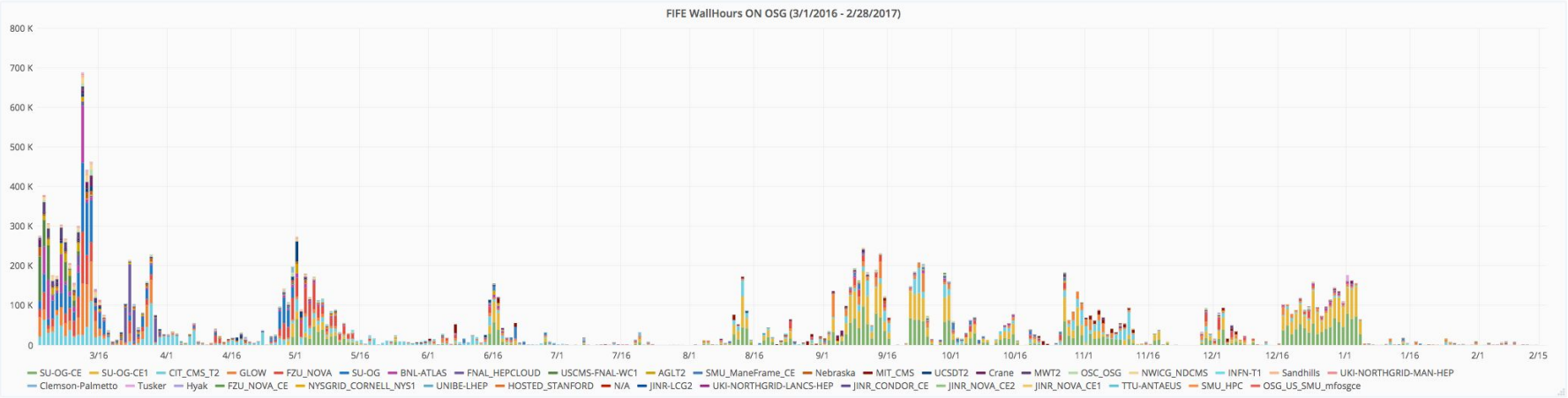
Wall Hours Used (2015 vs 2016)





Usage Of The OSG Resources

- We have used 16M Wall Hours in 2016 vs 60M WallHours in 2015 on OSG.
- Last year several new VOs started using the OSG.
  9 VOs total (DUNE, CDMS, etc.).
- We are running on 27 sites.
- Some of these sites are dedicated sites for NOvA, MicroBooNE, CDF.
- We set up Stampede to run MINOS jobs.

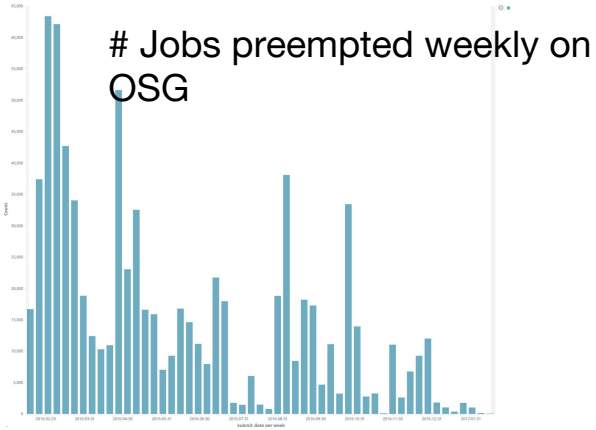


Why Has Opportunistic Usage Decreased?

Is Something Wrong With The OSG?

No, but ….

- GPGrid capacity has increased from 15K to 22K slots
- Demand didn't grow drastically
- Big increase in memory footprint (order of 10). Many jobs are now requesting more than 2GiB of memory.
- GPGrid also provides 35GiB of scratch space vs OSG's 20GiB default.
- Pre-emption rate is pretty high.



Frequently Encountered Problems

- Glexec failure
- GlideIns will not start
- Node is a black hole (mostly cvmfs client problem)
- Wrong condor pool configuration (e.g sl7 as sl6)
- Failure proxy lifetime check
- Disk quota is full on a worker node
- CRL is not updated on a worker node
- Host cert is not valid
- Network issues

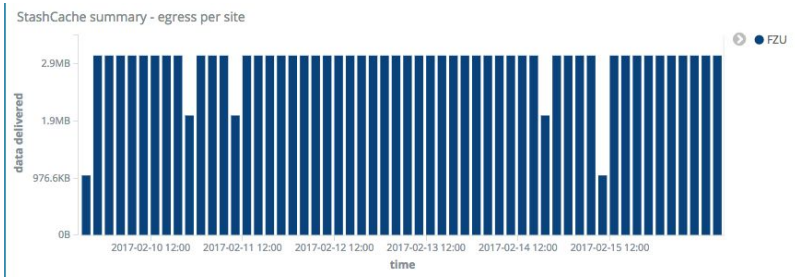
Issues With FIFE International Sites

- Added 3 new international sites: INFN-t1, UKI-NORTHGRID-LANCS-HEP, JINR
- Usage on some other dedicated sites has increased: UNIBE-LHEP, UKI-NORTHGRID-MAN-HEP
- Issues:
  - Acceptance CI Logon Basic (glexec failure)
  - Registration with OIM (Rebus problem)
  - Slow transfers

What's Next for FIFE?

StashCache

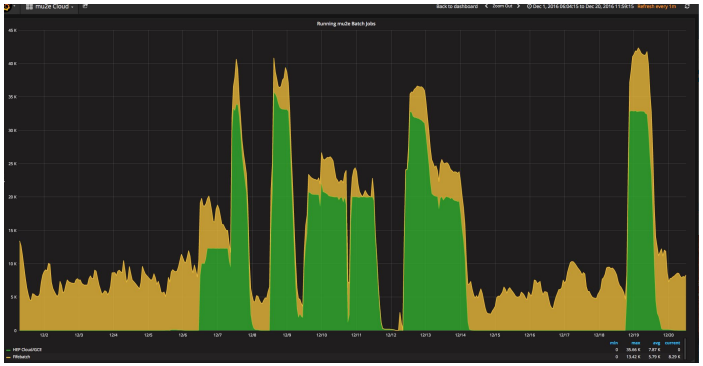
- Stash Cache is helpful to access large auxiliary files.
- NOvA is using it to get access to flux files. The current set is about 38GB:
- DES is in process of testing it.
- MicroBooNE and MU2E are interested to try out.

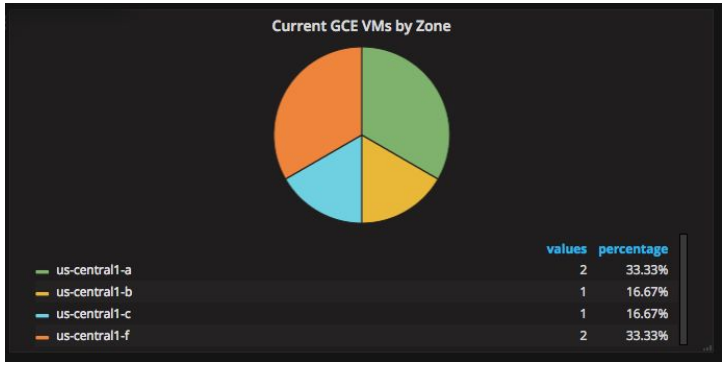


StashCache Monitoring: FZU files access by NOvA.

HEP Cloud Program

- The goal is to enable expansion of Fermilab resources to other Grids (OSG, XSEDE) and Cloud resources (AWS, GCE, Azure). It will be in production in 2018. (See Dirk Hufnagel's HEP Cloud talk tomorrow at 5:15 pm.)
- Relies on decision engine to make decisions based on cost, efficiency, and the requirements of the scientific workflow.
- We have used AWS early in 2016, recently NOvA and MU2E used GCE resources.





Summary (I)

- The FIFE project is essential for Fermilab experiments and projects.
- Continue to improve and enhance the existing tool chest:
  - Improve POMS scalability and expand usage.
  - Provide physics validation capability through CI.
  - Work with the security team to allow access to FermiLab submission infrastructure with Federated Identity credential.
  - SAM4Users is a new tool suite that enables general end users to more easily group analysis files according to general criteria, manage datasets, and bring SAM's capabilities to small-scale analysis jobs.
- Work on increasing resource usage efficiency.

Summary (II)

- Get access to HPC resources and GPUs.
- Help in integration of dedicated, opportunistic, and commercial computing resources via HEPCloud.
- OSG remains a crucial partner. We need to continue close collaboration!