Fermilab

Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

Fall 2016 HEPiX Workshop – Fermilab Site Report

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17 October 2016

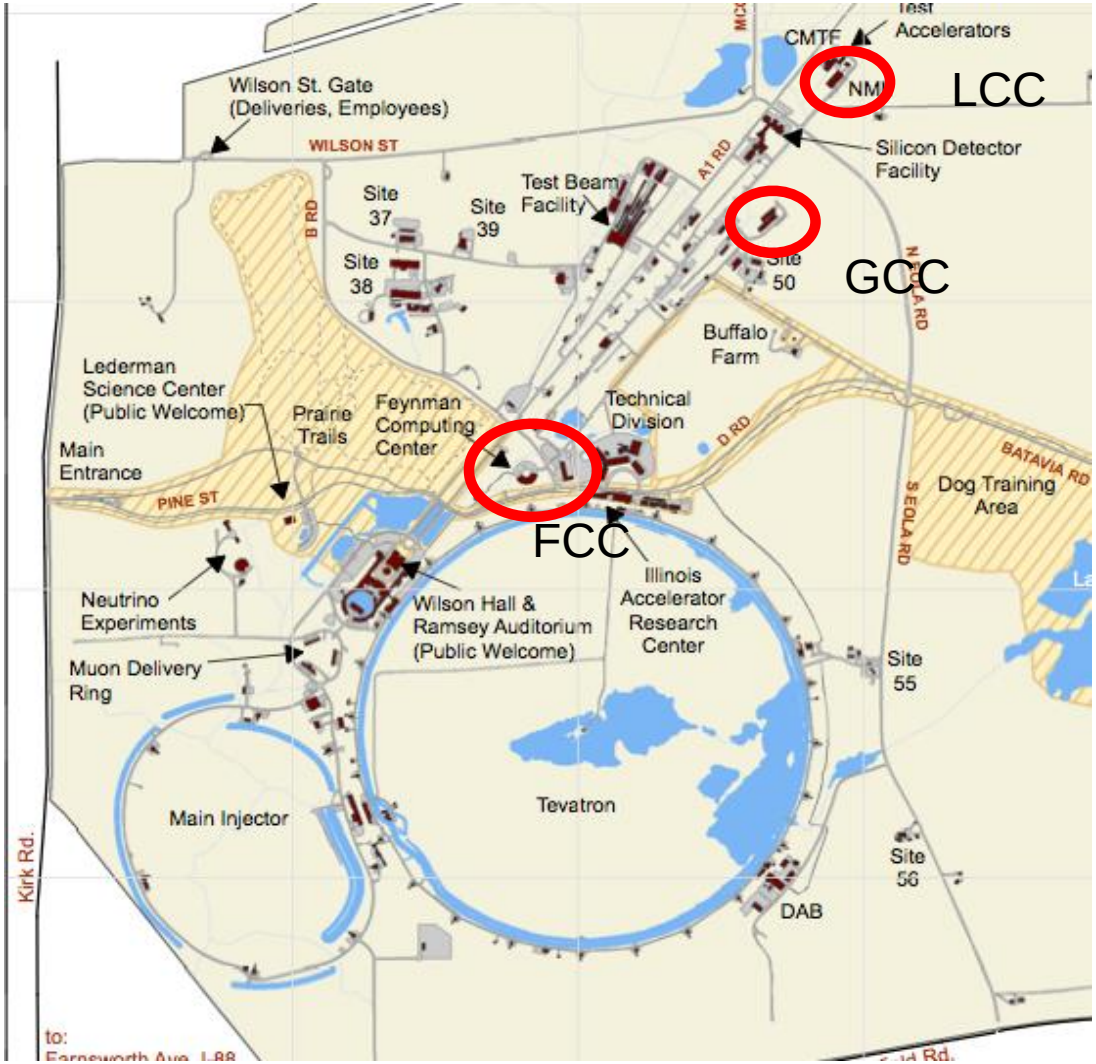
Fermilab - Introduction

- *2 Divisions*
  - *Core Computing*
    - *Traditional IT services*
    - *Networking*
    - *Facilities*
  - *Scientific Computing*
    - *Software*
    - *DAQ*
    - *Scientific Batch Computing*
- 32 Fermilab experiment groups
- Common solutions across experiments
- ITIL Service focused

Computing Facilities on the Fermilab site

3 main computer room locations

- **Feynman Computing Center (FCC)**
  - 2 rooms with 0.75 MW nominal cooling and electrical power each
    - UPS with independent generator backup
  - Hosts power critical services
    - central services (Mail, web servers, etc.) and disk servers
- **Grid Computing Center (GCC)**
  - 3 rooms with 0.90 MW nominal power each
    - UPS with taps for external generators (no permanent generator)
  - Hosts CPUs and Tape libraries, UPS sustains power during power outages till systems can be powered down in a controlled way
- **Lattice Computing Center (LCC)**
  - Being decommissioned



Computing Facilities

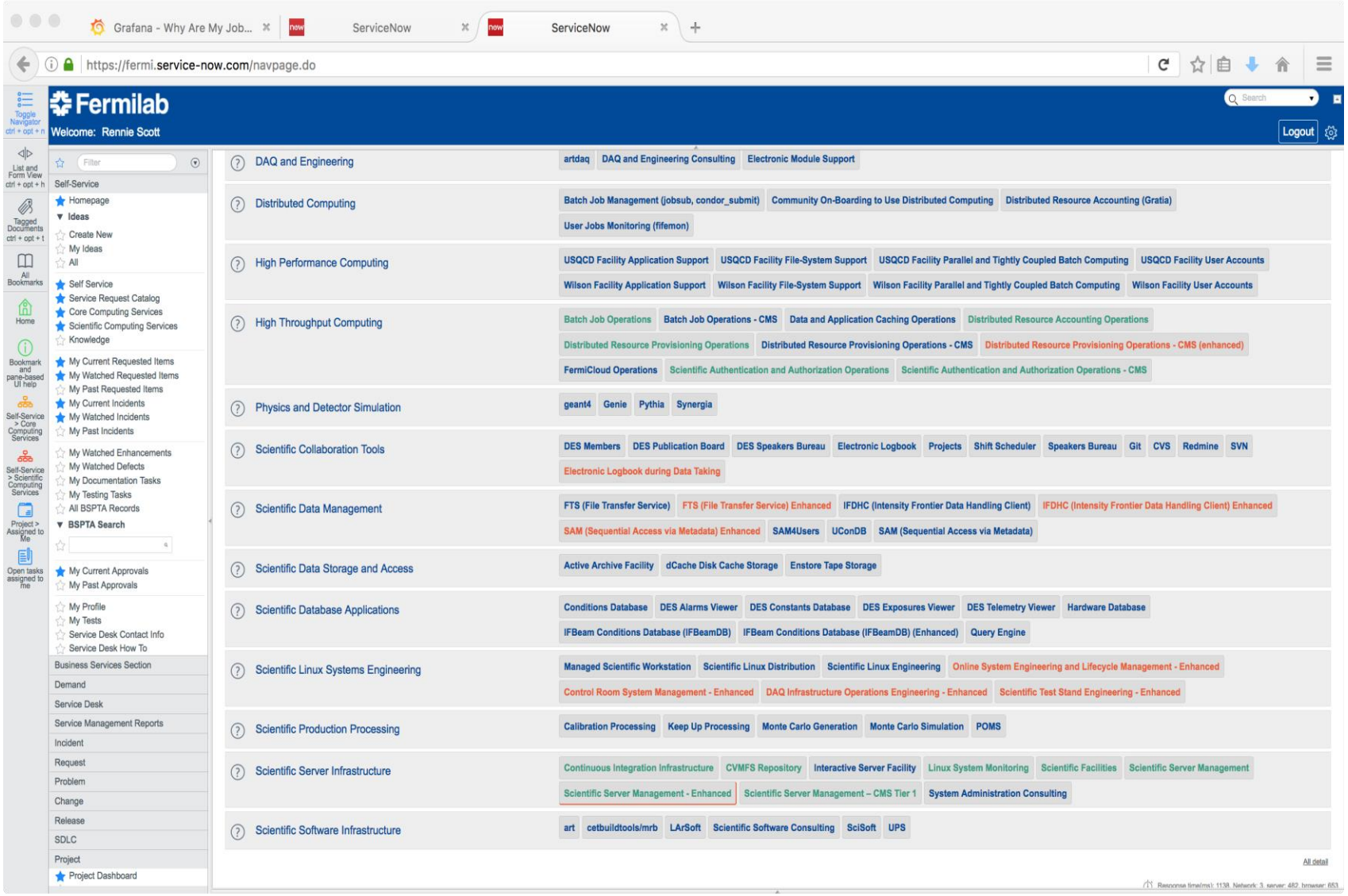
- Generator switch issue was found during normal maintenance
  - Affected both Data Center switches so full outage required

- Scheduled outage on September 2016, 2016
  - Utilized Continuity Management dependencies
  - Required a lot of planning and coordination
  - Lessoned learned will be used to improve Continuity Management
- Overall opinion was that it went very well

ISO 20K / ITIL Service Management

- ISO 20K audit scheduled for Mid November
- Completed the Onboarding of all of the Scientific Computing Division Services:
  - Incident / Request
  - Change Management
  - Continuity Management
  - Problem Management
  - Configuration Management
  - Capacity Management

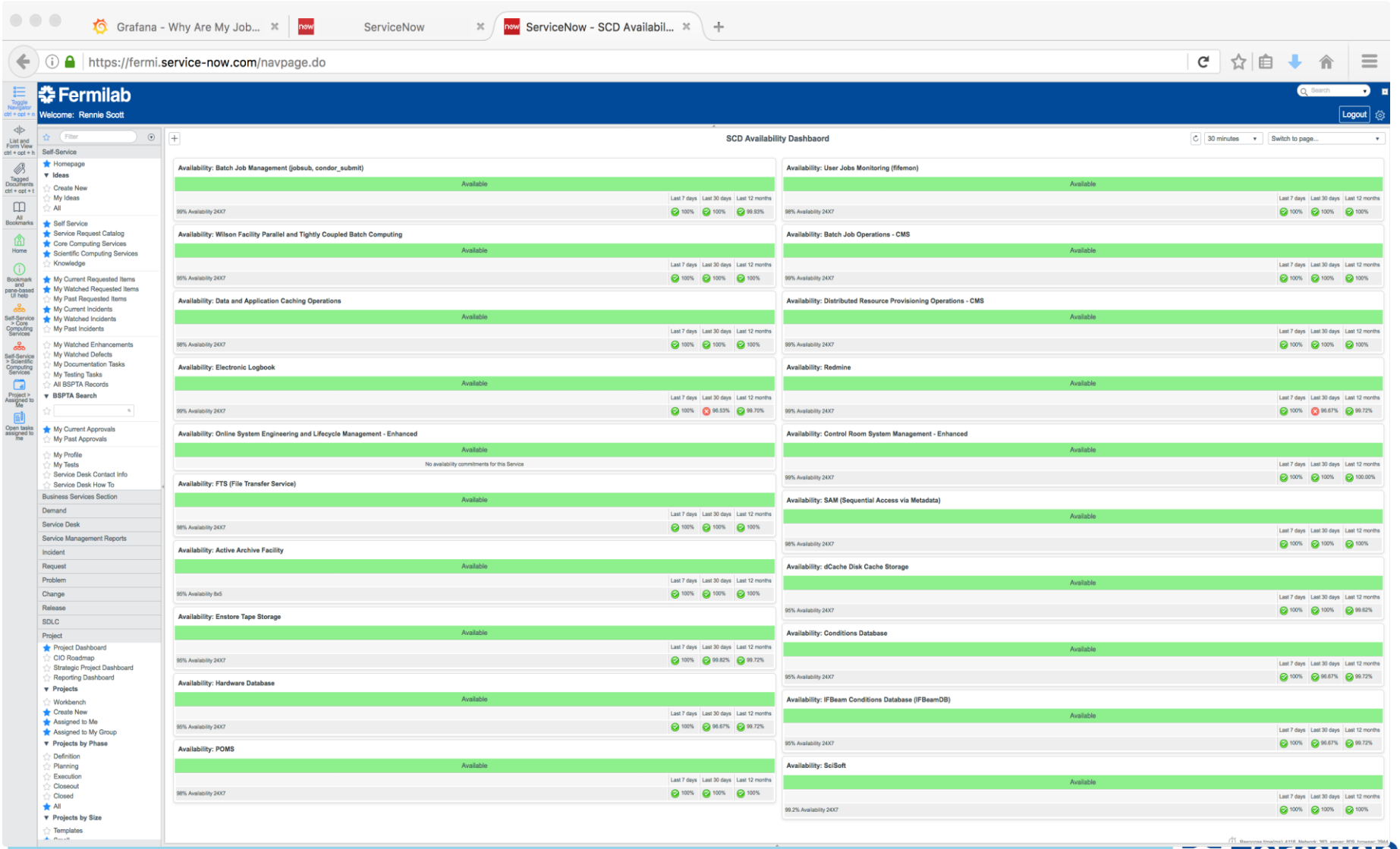
Scientific Services Page



ISO 20K / ITIL Service Management

- Usability Project
  - Build a sustainable service taxonomy.
  - Extending Service Now – Evergreen Portal Product .
  - User focused portal using card sorting exercise with users to better understand how they find services.
- Availability Management Project – in process
- Release Management
- Standard Project Management

Availability Management



Authentication/Identity Management

- KCA Server retired all services migrate ci-logon
- DOE mandate to implement Multi-Factor Authentication of identified sensitive areas
  - Scientific Linux source repositories
  - Finance/business areas
- Implemented Smart Cards

System Facility Management

- Common offline provisioning
  - Internally developed Kickstart service
  - Scientific Linux Fermi 6 / Scientific Linux 7 Fermilab Context
  - Puppet 4.0 for all provisioning
  - Nagios/OMD toolkit for server monitoring service

- Online Provisioning
  - Red Hat Satellite 6.0 –Presentation on Thursday

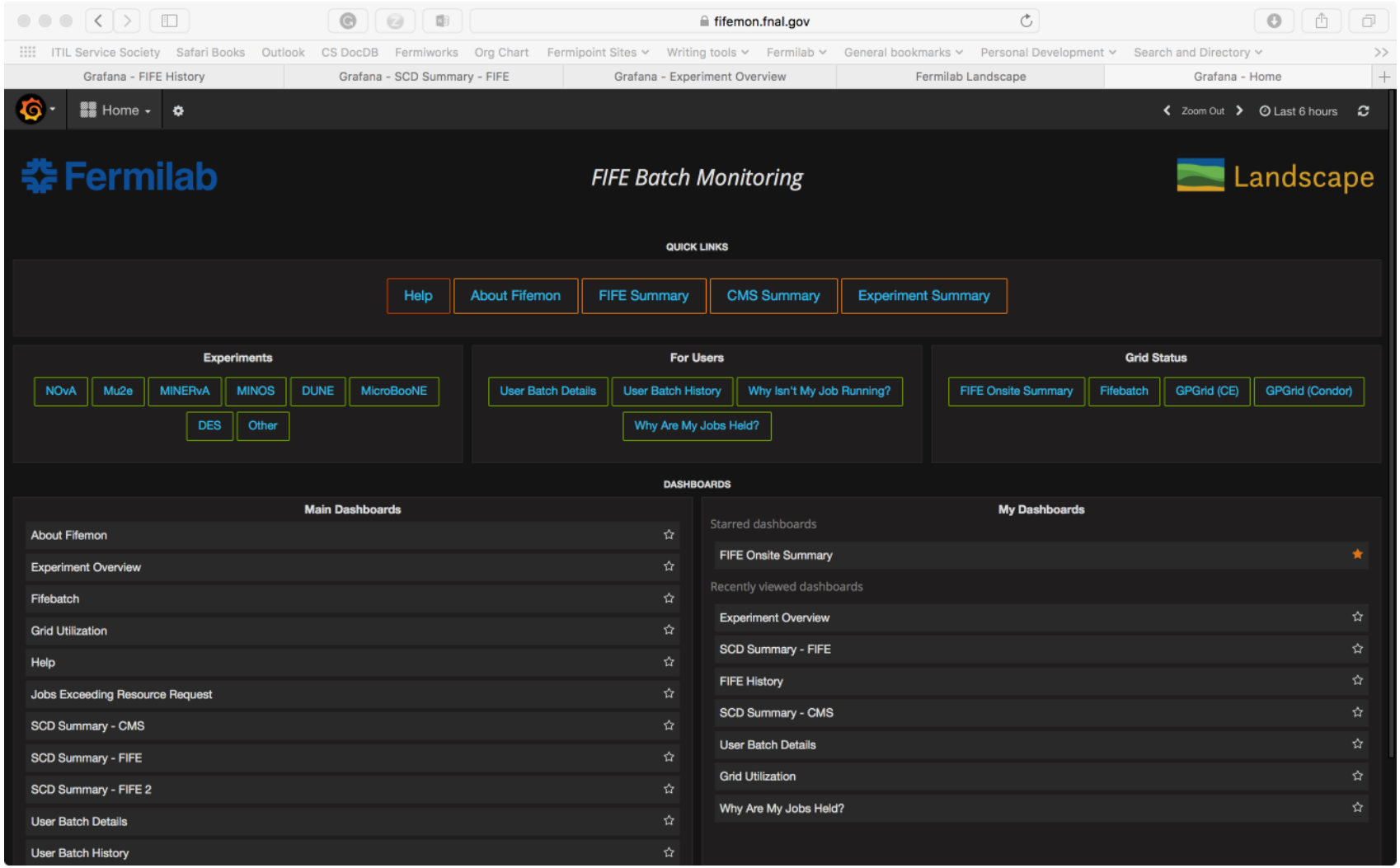
Distributed Computing

- 32 Fermilab experiment groups submitting batch jobs to one condor cluster using a common job submission utility developed at Fermilab called Jobsub
  - GPGrid 22,000 cores
  - CMS Tier-1 20,500 cores
  - LPC 4800 cores
- Dynamic job slots
- Future – HEPCloud Project extend into commercial clouds

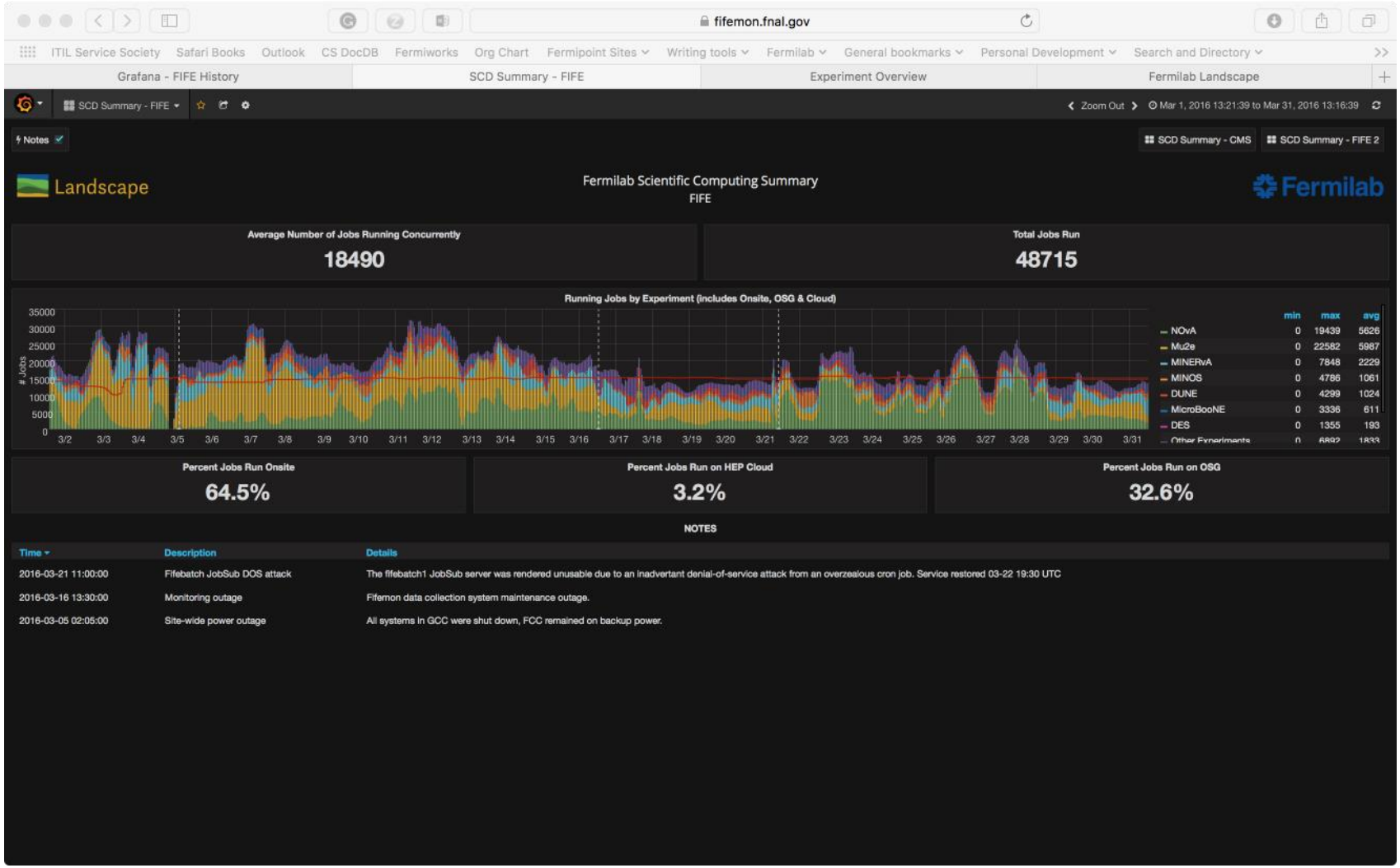
Distributed Computing

- Distribute production analysis code via CVMFS
- Continue development of features for Landscape/Fifemon monitoring for job optimization.

Fifemon - Homepage

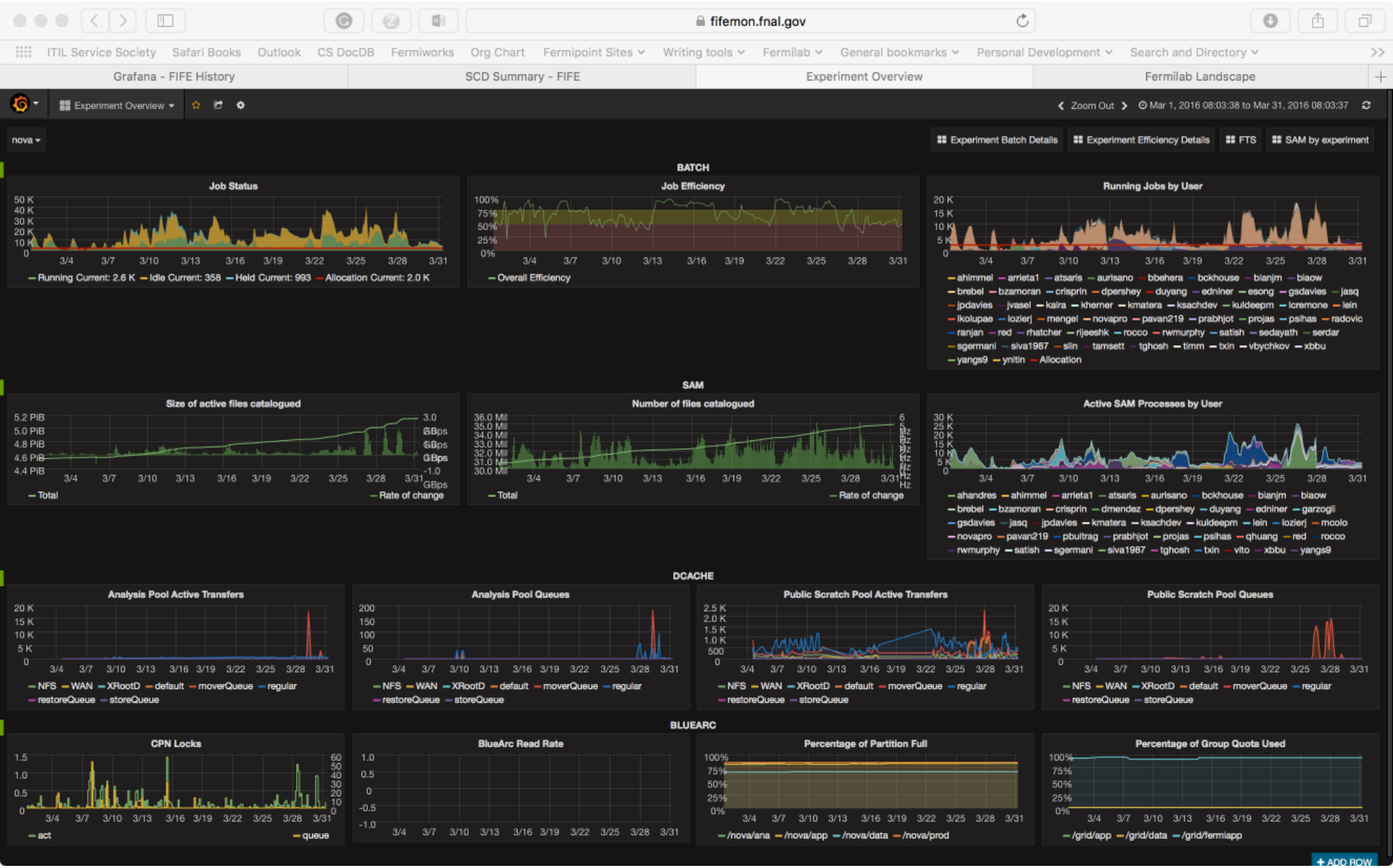


Overview


fifemon.fnal.gov
ITIL Service Society
Safari Books
Outlook
CS DocDB
Fermiworks
Org Chart
Fermipoint Sites
Writing tools
Fermilab
General bookmarks
Personal Development
Search and Directory
Grafana - FIFE History
SCD Summary - FIFE
Experiment Overview
Fermilab Landscape
SCD Summary - FIFE
Zoom Out
Mar 1, 2016 13:21:39 to Mar 31, 2016 13:16:39
Notes
SCD Summary - CMS
SCD Summary - FIFE 2
Landscape
Fermilab Scientific Computing Summary
FIFE
Fermilab
Average Number of Jobs Running Concurrently
18490
Total Jobs Run
48715
Running Jobs by Experiment (includes Onsite, OSG & Cloud)
Jobs
35000
30000
25000
20000
15000
10000
5000
0
3/2 3/3 3/4 3/5 3/6 3/7 3/8 3/9 3/10 3/11 3/12 3/13 3/14 3/15 3/16 3/17 3/18 3/19 3/20 3/21 3/22 3/23 3/24 3/25 3/26 3/27 3/28 3/29 3/30 3/31
min max avg
NOvA 0 19439 5626
Mu2e 0 22582 5987
MINERvA 0 7848 2229
MINOS 0 4786 1061
DUNE 0 4299 1024
MicroBooNE 0 3336 611
DES 0 1355 193
Percent Jobs Run Onsite
64.5%
Percent Jobs Run on HEP Cloud
3.2%
Percent Jobs Run on OSG
32.6%
NOTES
Time
Description
Details
2016-03-21 11:00:00
Fifebatch JobSub DOS attack
The fifebatch1 JobSub server was rendered unusable due to an inadvertant denial-of-service attack from an overzealous cron job. Service restored 03-22 19:30 UTC
2016-03-16 13:30:00
Monitoring outage
Fifemon data collection system maintenance outage.
2016-03-05 02:05:00
Site-wide power outage
All systems in GCC were shut down, FCC remained on backup power.

Job Management Overview

Experiment


fifemon.fnal.gov
Grafana - FIFE History
SCD Summary - FIFE
Experiment Overview
Fermilab Landscape
Experiment Overview
Zoom Out
Mar 1, 2016 08:03:38 to Mar 31, 2016 08:03:37
nova
Experiment Batch Details
Experiment Efficiency Details
FTS
SAM by experiment
BATCH
Job Status
Running Current: 2.6 K
Idle Current: 358
Held Current: 993
Allocation Current: 2.0 K
Job Efficiency
Overall Efficiency
Running Jobs by User
SAM
Size of active files catalogued
Total
Rate of change
Number of files catalogued
Active SAM Processes by User
DCACHE
Analysis Pool Active Transfers
Analysis Pool Queues
Public Scratch Pool Active Transfers
Public Scratch Pool Queues
NFS
WAN
XRootD
default
moverQueue
regular
restoreQueue
storeQueue
BLUEARC
CPN Locks
act
queue
BlueArc Read Rate
Percentage of Partition Full
/nova/ana
/nova/app
/nova/data
/nova/prod
Percentage of Group Quota Used
/grid/app
/grid/data
/grid/fermiapp
ADD ROW

Fermilab Test Beam Facility

- Continues to see popular usage from experimenters from lots of institutions.
- CS solutions for remote scientists
  - Secure
  - Keep images updates
  - Packaged Solution

Experiment Summary

- Running experiments
  - NOvA
  - Uboone
  - Minerva
  - SeaQuest
  - ANNIE
  - LArIAT

External Projects

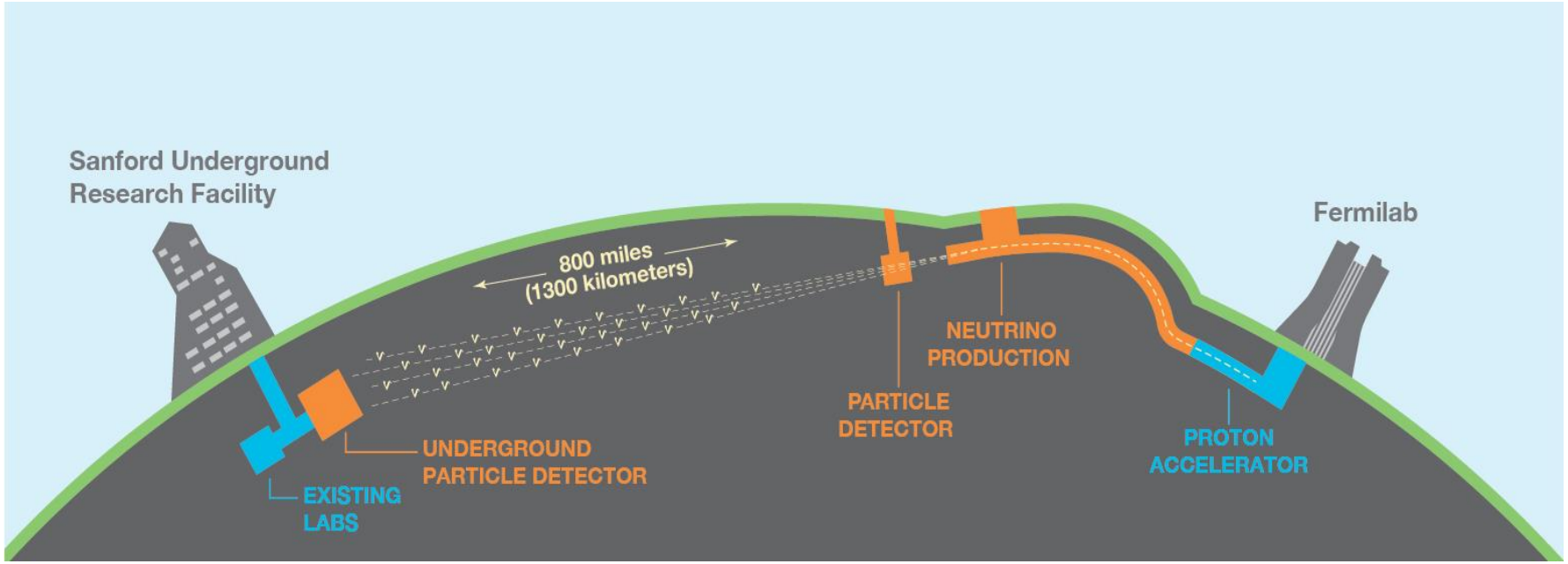
- External Projects
  - Dark Energy Survey
  - ProtoDUNE
    - 2 detectors
    - Hosted at CERN
    - artDAQ – Data Acquisition

New Experiment Coming

- Coming to Fermilab
  - Short Baseline Neutrino Complex
    - SBND
    - ICARUS
    - Mu2E
  - G-2 preparing to take data next year

Future Project - DUNE

- Future Projects
  - DUNE



Upcoming Fermilab HEPiX talks

- Gerard– SL Talks
- Rennie – Satellite discussion

Questions?