Highlights: Virtual Machine Provisioning, Code Management, and Data Movement Design for the Fermilab HEP Cloud Facility

- Fermilab HEP Cloud successfully completed three demonstrators. We successfully ran data-intensive workflows for CMS, NOvA and DES-GW.
- We successfully ran up to scale of 60000 simultaneous jobs on Amazon Web Services
- Code was distributed via the CVMFS system and cached by on-demand squid servers on AWS
- CMS Frontier database was cached via the squid servers.
- Boto routines were used to read accounting and monitoring information from Amazon Web Services.

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- Benchmarking showed average AWS instance to be comparable to average Fermilab US-CMS-Tier1 instance.
- Custom Images were made using Scientific Linux Fermi
- Input data was cached in AWS S3 service. Output data was in some cases staged back directly to Fermilab and in other cases cached in S3 and transferred back later.