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Cloud services for the Fermilab scientific stakeholders

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As part of the Fermilab/KISTI cooperative research project, Fermilab has successfully run an experimental simulation workflow at scale on a federation of Amazon Web Services (AWS), FermiCloud, and local FermiGrid resources. We used the CernVM-FS (CVMFS) file system to deliver the application software. We established Squid caching servers in AWS as well, using the Shoal system to let each individual virtual machine find the closest squid server. We also developed an automatic virtual machine conversion system so that we could transition virtual machines made on FermiCloud to Amazon Web Services.
We used this system to successfully run a cosmic ray simulation of the NOvA detector at Fermilab, making use of both AWS spot pricing and network bandwidth discounts to minimize the cost. On FermiCloud we also were able to run the workflow at the scale of 1000 virtual machines, using a private network routable inside of Fermilab. We present the details of the technological improvements that were used to make this successfully.

Primary authors: Dr GARZOGLIO, Gabriele (FERMI NATIONAL ACCELERATOR LABORATORY); TIMM, Steven (Fermilab)

Co-authors: BERNABEU, Gerard (FERMI NATIONAL ACCELERATOR LABORATORY); Dr KIM, Hyunwoo (FERMI NATIONAL ACCELERATOR LABORATORY); BOYD, Joe (FERMI NATIONAL ACCELERATOR LABORATORY); SHARMA, Neha (FERMI NATIONAL ACCELERATOR LABORATORY); PEREGONOW, Nicholas (FERMI NATIONAL ACCELERATOR LABORATORY); MHASHILKAR, Parag (Fermi National Accelerator Laboratory); PALUR, SANDEEP (ILLINOIS INSTITUTE OF TECHNOLOGY); NOH, Seoyoung (KISTI Korea Institute of Science & Technology Information (KR))

Presenter: MHASHILKAR, Parag (Fermi National Accelerator Laboratory)

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