Activities Planning for HEP-CCE IOS

All

Darshan & ROOT

- Darshan for ROOT I/O in HEP workflows on HPC.
- ROOT I/O is central to all HEP experiments. Measurements of its performance on HPC using tools like Darshan, could give valuable insights for possible improvements.
- This will initially instrument ROOT in general, but than move on to study/tune selected target workflow only,
  - eg ATLAS/CMS simulation.

Related IOS discussion

- Darshan:
  - 04/22: **Introduction to Darshan**
    https://indico.fnal.gov/event/24189/contributions/75646
- ROOT:
  - 04/01: **ROOT I/O, deep dive**
    https://indico.fnal.gov/event/23925/contributions/74567
- HEP Workflows:
  - 04/08: **CMS Workflows**
    https://indico.fnal.gov/event/24028/contributions/75000

Volunteers

Name	~FTE	Task
Doug Benjamin		ATLAS Workflow
Shane Snyder		Darshan
Chris Jones, TBD		CMS Workflow
…		
ANL post doc (to be hired)		

HDF5 for HEP Simulation (on HPC)

- Investigate HDF5 as intermediate event storage for HPC processing.
- In some workflows, such as the ATLAS EventService, temporary data is written to ROOT files.
  - Moving this data to a parallel file format such as HDF5 could be benefitial.
    - HDF5 is much better supported by the HPC community.
    - HDF5 has advantages for parallel file access, but limitations in multithreading that have to be considered.

Related IOS discussion

- HDF5:
  - 05/06: **Introduction to HDF5**
    https://indico.fnal.gov/event/43135/contributions/185190
- HEPnOS:
  - 04/15: **Introduction to HEPnOS**
    https://indico.fnal.gov/event/24129/contributions/75358
- ROOT:
  - 03/18: **HEP Experiment and ROOT I/O**
    https://indico.fnal.gov/event/23680/contributions/73557
- HEP Workflows:
  - 04/29: **Introduction to ATLAS Simulation and EventService**
    https://indico.fnal.gov/event/24265/contributions/76000

Name	~FTE	Task
Peter van Gemmeren		ATLAS Event Data and I/O
Suren Byna		HDF5
Saba Sehrish		CMS, nanoAOD, HEPnOS
Paolo		
ANL post doc (to be hired)		

- Chris: Multithreaded I/O
  - Avoiding Posix limitation thread to file
- Plan some follow up (educational) discussion
  - Multithreaded I/O on HPC
  - ROOT improvements in concurrency for CMS use case and beyond.