## Track 4 ModSim

01/15/2025 Monthly Meeting

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#### Overall Design and Roadmap

Dispatcher: e.g. PanDA breaks task into jobs and assign them to compute sites.

Real-time Feedback

# INPUT (Surrogate model of INPUT)

INPUT: user and managed tasks submitted to the distributed system.

Build an interactive dynamic model to represent the system and evaluate different policies.

Dispatcher (PanDA)
(Break Task into Jobs,
assign Jobs to sites,)

Environment (Sites, storage capacity, computing capacity, bandwidth, local queues)

Environment: different sites will have different computing capabilities, storage, data partition, network bandwidth, local jobs, and failure rate, etc.

OUTCOME (reliability, queuing time, error rate, data movement)

OUTCOME: observables of the distributed system. We can use these observables to define the performance and reliability metrics, calibrate dynamic models and provide real-time feedback to the dispatcher.

#### Long-term goals

- High fidelity Event-based Simulation (HF-EBS):
  - ATLAS distributed computing grid, calibration and validation.
  - Error understanding and Error injection. (Reliability, main theme)
  - Global data movement. (Unique to this project.)
- HF-EBS to fast ML/Al Surrogate
- ML Surrogate to provide fast feedback for Optimization (e.g.RL).

#### Updates and near-term goals

#### High fidelity Event-based Simulation (HF-EBS):

- PanDAs records:
  - Thanks to Kaushik's sharp eyes. (too few jobs)
  - Tania & Ozgur found the bug
  - CHEP 2024 paper due by the end of Feb, Ozgur is leading a paper write up.
  - (ACAT 2025 is open for abstract, due Feb 19, <u>link</u>)
- ATLAS distributed computing grid, calibration and validation.
  - Raeese & Sairam (BNL), Fred, Paul, ...
  - HF-EBS -> First paper.
- Error understanding and Error injection. (Reliability, main theme)
  - Tania, Paul, Sankha (BNL), ...
  - PanDA Error understanding -> paper
- Global data movement. (Unique to this project.)
  - Tania, Paul, Kuan-Chieh (BNL), ...
  - Important for data movement v.s. waiting & computing trade-off

### Today's talk

- Raeese on event-based simulation
- Paul on error code