



Production Pipeline Aurora

Wirecell Meeting

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SBND Gen-2 BNB light Run-1 MC production

- Goal: reproduce the SBND Gen-2 BNB light Run-1 MC production using the same workflow used for production on Aurora.
- Production stack
 - Workflow: SBN-ALCF/sbn_parsl, branch develop_v0.1
 - sbndcode: v10_14_02_03, e26:prof
 - Aurora: 1 node, 102 CPUs, capacity queue
 - 100 GEN attempts → 30 accepted physics events
- Full production chain
 - GEN → G4 → DetSim → Reco1 → Reco2 → CAF
 - GEN + G4 executed as one combined Parsl task
 - DetSim, Reco1, Reco2, and CAF executed as separate dependent tasks
 - All 30 accepted events propagated successfully through CAF
 - Result: complete end-to-end Gen-2 production workflow demonstrated on Aurora.

Timing Performance of the Parsl Production

- Successful 100-attempt Parsl run — 30 accepted physics events
- GEN + G4: 39 min 37 sec
- DetSim: 80 min 29 sec
 - ~161 sec/event
- Reco1: 12 min 00 sec
 - ~24 sec/event
- Reco2: 20 min 05 sec
 - ~40 sec/event
- CAF: 9 min 19 sec
 - ~19 sec/event
- Active chain total: 2 h 41 min 30 sec
- PBS elapsed: ~2 h 53 min
- Reco1 output: 835 MB total
- Reco1 size: ~27.8 MiB/event

Resource Footprint, Production

- Measured Aurora memory footprint from Gen-2 tests
 - GEN peak RSS: ~2.2 GiB
 - G4 peak RSS: ~2.9 GiB
 - DetSim peak RSS: ~6.6 GiB
 - Reco1 peak RSS: ~5.2 GiB
- Thomas production reference
 - GEN: ~2.0 GiB
 - G4: ~2.6 GiB
 - DetSim: ~6.6 GiB
 - Reco1: ~4.3 GiB
- Key observations
 - Peak physical memory is only about 6–7 GiB per process
 - DetSim is both the time-dominant and memory-dominant stage
 - Current Parsl test used 1 Aurora node / 102 CPUs
 - There may be room for future event-level packing or concurrency because process memory is much smaller than node memory

Lessons & Next Step

- Production issue identified
 - First Parsl run failed because scisoft/larsoft was not visible inside the container
 - Art could not find CORSIKA Gen.fcl
 - Fixed by adding the required Aurora bind mount for scisoft/larsoft
 - Successful retry completed GEN → G4 → DetSim → Reco1 → Reco2 → CAF
- Next step
 - Compare directly against Thomas's new nominal 100-GEN-attempt Parsl sample
 - Compare:
 - accepted event count
 - stage wall times
 - memory footprint
 - Reco1 file size/event
 - Reco1 product schema

Back Up Slides