



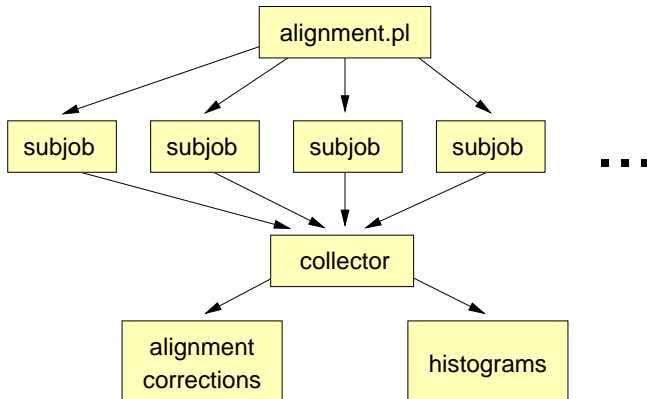
Large Alignment Jobs and Parallel Processing

Jim Pivarski, Alexei Safonov

Texas A&M University

7 May, 2007

Existing Infrastructure in CommonAlignment*/HIP





Existing Infrastructure in CommonAlignment*/HIP

- ▶ HIP algorithm is a weighted mean of residuals $\sum x_i w_i / \sum w_i$
 1. N subjobs calculate residuals over subsets of the data, saves $\sum x_i w_i$ and $\sum w_i$ to `jobN/IOUserVariables.root`
 2. 1 collector job reads all `jobN/IOUserVariables.root`, computes average.
- ▶ `alignment.pl` splits the data and submits subjobs to “cmsalca” farm; we can modify this for muon alignment
- ▶ `CommonAlignmentMonitor` rides in the same job with `HIPAlignmentAlgorithm`
 1. in a subjob, it saves histograms to `jobN/histograms.root`
 2. in a collector job, it reads all `jobN/histograms.root`, and merges them all (preserving directory structure)(only histograms are merged, not ntuples)



Large(r) statistics test

- ▶ $\frac{1}{4}$ million StandAlone muons from $Z \rightarrow \mu\mu$ (12 GB AICaReco) processed in 2.75 hours on one computer
- ▶ 1 mm x /1.6 cm y alignment resolution— assuming design resolution is 250 μm in x
- ▶ Scaled to design resolution: 4 million StandAlone muons or 0.04 million Global muons? (10 \times better resolution)
- ▶ But $Z \rightarrow \mu\mu$ is especially clean: simple read-out of 500 QCD events (tracker tracks) took 10 minutes: 30 times as long
- ▶ 4 million StandAlone muons: 44 computer-hours/iteration
0.04 million Global muons: 13 computer-hours/iteration?



CSA07 Logistics

- ▶ We'd like to run both algorithms: how does MuonStandAloneAlgorithm parallel-process?
 1. Fill a matrix (ROOT file) in the loop over hits (Mille), and
 2. invert the matrix in ROOT (Pede)?
- ▶ If so, we can put the matrix-filling part in the same event loop as iteration 1 of HIPAlignmentAlgorithm (in N subjobs)
- ▶ HIPAlignmentAlgorithm/CommonAlignmentMonitor collection jobs would be separate from the ROOT matrix inversion
- ▶ Submit on “cmsalca” farm, use CASTOR for disk space?
- ▶ HIPAlignmentAlgorithm disk space is dominated by histograms; is MuonStandAloneAlgorithm disk space dominated by the matrix?