



Comparison of Profiling Results for Run 3 and High Pileup LHC Simulation and Reconstruction

Mentee: Heather Thompson (Navajo Tech Univ.)

Mentor: Patrick Gartung (Fermilab)



Abstract

Abstract: The performance of CMS simulation and reconstruction software will be critical given the resource constraints on CPU and memory for the high luminosity LHC. Profiling the CPU and memory usage of the simulation and reconstruction software with every release is essential to ensure that performance remains stable or improves. Several profilers are available for profiling CMS software including Igprof and Intel Vtune. This project involves profiling with both profilers for each new release of CMSSW.



Overview

- Introduction
- Work to do
- Methods



Introduction

- A profiler is software that
 - Records snapshots of code performance on CPU.
 - Reports the sum of time spent in functions and their children
 - Reports the sum of memory allocated and used in functions and their children

- Profilers to be used
 - Igprof - fast and lightweight; handles loaded shared libraries, threads and sub-processes
 - Intel Vtune - Analysis and tuning tool that provides various examinations of performances.

Rank	% total	Counts		Paths		Symbol name
		to / from this	Total	including child / parent	Total	
	85.22	1,072.75	1,074.28	5	5	edm::WorkerT<edm::stream::EDProducerAdaptorBase>::implDo (edm::EventTransitionIt
[16]	85.22	0.01	1,072.74	5	5	edm::stream::EDProducerAdaptorBase::doEvent (edm::EventTransitionIt
	11.64	146.47	146.47	1	1	cms::CkfTrackCandidateMakerBase::produceBase (edm::Event&, edm::Event
	7.65	96.30	96.30	1	1	CAHitNtupleEDProducerT<CAHitQuadrupletGenerator>::produce (edm::Event
	6.33	79.66	79.66	1	1	PrimaryVertexProducer::produce (edm::Event&, edm::EventSetup const&
	5.34	67.21	67.21	1	1	TrackProducer::produce (edm::Event&, edm::EventSetup const&)
	4.13	51.98	51.98	1	1	MuonIdProducer::produce (edm::Event&, edm::EventSetup const&)
	3.50	44.12	44.12	1	1	TrackListMerger::produce (edm::Event&, edm::EventSetup const&)

```

; ; ; ;
; ; ; ; edm::WorkerT<edm::stream::EDProducerAdaptorBase>::implDo <cycle
[8];42.47;0.050986;3189.507993;edm::stream::EDProducerAdaptorBase::do
; ; ; ; 199.385318;33.207570; TrackListMerger::produce; [46]
; ; ; ; PFBBlockProducer::produce <cycle 15>;[958]
; ; ; ; 19.921059;50.005972; produce; [198]

```



Work to do

- Connect to the CMSLPC cluster
- Learn how to run CMS software
- Learn how to run the profiler on CMS software
- Compare the text output of the profiler for each release
 - What are the top 5 functions for CPU usage
 - What are the top 5 functions for memory usage



Method

- Run scripts provided by mentor to gather profiles for each release and each profiler
- Make comparisons of top 5 functions by CPU usage and memory usage for each release and profiler
- Run script provided by mentor to gather profiles for Run 3 and high pileup LHC simulation and reconstruction software