Optimization 101

A Case-based Study

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1 Introduction

1.1 What is Optimization in Our Terms

The problem to be address is the minimization of resource usage while maintaining a high level of output. Examples of resources that may be targets for optimization are

Walltime — The elapsed time in which the process (or master process) runs.

CPU Time — The amount of time that the processor spends doing active computation. This is often very different from the walltime and can very difficult to control on a time-sharing system. Not typically used.

FLOPS — Floating Point operations per second.

Memory Usage — Peak use of memory during the computation.

Number of completed processes within a time period — For High Through-Put computations, it may be better to focus on the number of processes that completely within a certain time period. This can account for some variance due to differences in input sets and that impact on overall performance, but give meaningful expectations in the aggregate.

1.2 Example Problem

1.3

2 Serial Process

2.1 Manual Profiling

2.1.1 Walltime using the time command

Determining the walltime using `/usr/bin/time` can be a very useful place to start and requires very little intervention.

3 Parallel Process

4 Conclusion