Research Report

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What I needed to do

Looking into Phase 1 of the code in detail. Figure out ways to (auto)tune the code

Looking into Rose compiler whole application auto-tuning framework

Progress & Problems

1. The 2 minute program (with the large input file) is mostly spent in Phase 1 of all 6 phases. The Phase 1 contains 41 loop iterations and the first three iteration takes about 60% of the time. The following shows the time/energy/power info for the first four iterations of phase 1.

Loop 1 <line-101263> - Time 18.255798 Total energy consumed 1173.448770 Ave. Power Level 64.278140

Loop 2 <line-102263> - Time 18.362993 Total energy consumed 1168.866735 Ave. Power Level 63.653390

Loop 3 <line-103263> - Time 3.835975 Total energy consumed 269.822010 Ave. Power Level 70.339883

Loop 4 <line-104263> - Time 1.141106 Total energy consumed 96.631650 Ave. Power Level 84.682470

Issues

1. The compute-intensive part indeed is hash map function operations: insert/find
2. The code involvement of indirect and even double indirect access of array elements seems inevitable.
3. No existing tool to generate valid transformations.

The plan

Think about alternative ways of algorithm re-implementation

Try Rose with the transformation on the bottle neck code.