

Roofline Performance Model for Supercomputers

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Abstract—The roofline performance model [1] is a simple 2-D visual tool that provides useful insight on kernel optimization on multi-core systems. In this report, an attempt is made to extend the roofline performance model to a 3-D roofline model for homogeneous distributed-memory systems, taking into consideration the peak floating point performance, the peak memory throughput and the peak communication throughput across nodes. A 3-D roofline performance model is constructed for 16 AMD Opteron Interlagos x86_64 nodes on BigRed II and used to bound the performance of the *SUMMA* parallel algorithm [2] on BigRed II.

Index Terms—TODO; TODO; TODO;

I. INTRODUCTION

TODO [1]

II. RELATED WORK

TODO

III. PROPOSED 3-D ROOFLINE MODEL

TODO

A. Peak Network Throughput

TODO

B. Communication Intensity

TODO

IV. RESULTS

TODO

V. CONCLUSIONS AND FUTURE EXTENSIONS

TODO

ACKNOWLEDGMENT

REFERENCES

- [1] S. Williams, A. Waterman, and D. Patterson, "Roofline: An insightful visual performance model for multicore architectures," *Commun. ACM*, vol. 52, no. 4, pp. 65–76, Apr. 2009. [Online]. Available: <http://doi.acm.org/10.1145/1498765.1498785>
- [2] R. A. van de Geijn and J. Watts, "Summa: Scalable universal matrix multiplication algorithm," Austin, TX, USA, Tech. Rep., 1995.