

# GLEX-Alltoall: Multi-leader All-to-all Communication on Multi-core Supercomputer

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## Abstract

All-to-all communication is commonly used in parallel applications like FFT. In modern supercomputers, there are multiple cores, NUMAs and network endpoints. These features bring much parallelism. However, there is no method which makes use of the parallelism to improve the all-to-all communication. In this paper, we introduce an optimized multi-leader all-to-all library which explores the parallelism on network, CPU cores and overlaps the intra- and inter-node communication. The results show that, compared to MPI, our library achieves up to 20x speedup and 4x speedup on average. For application, our method achieves up to 1.75x speedup on peak performance for 16384 cores.

**Keywords:** `elsarticle.cls`, L<sup>A</sup>T<sub>E</sub>X, Collective Communication, Multi-core processor, MPI all-to-all

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## 1. Introduction

## 2. Front matter

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## References

## References

- [1] R. Feynman, F. Vernon Jr., The theory of a general quantum system interacting with a linear dissipative system, *Annals of Physics* 24 (1963) 118–173. doi:10.1016/0003-4916(63)90068-X.
- [2] P. Dirac, The lorentz transformation and absolute time, *Physica* 19 (1–12) (1953) 888–896. doi:10.1016/S0031-8914(53)80099-6.

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