Programming of Supercomputers (WS12/13)

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Outline

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Compilation Improvements

- Comparision of different compilation flags
- Compare outcomes w.r.t:
  - Execution time
  - Memory hit ratio

Binary Input

- Modify input from ASCII to binary
- Lower dimesion of files
- Faster reading
- Loss in legibility

Outline

Execution Time

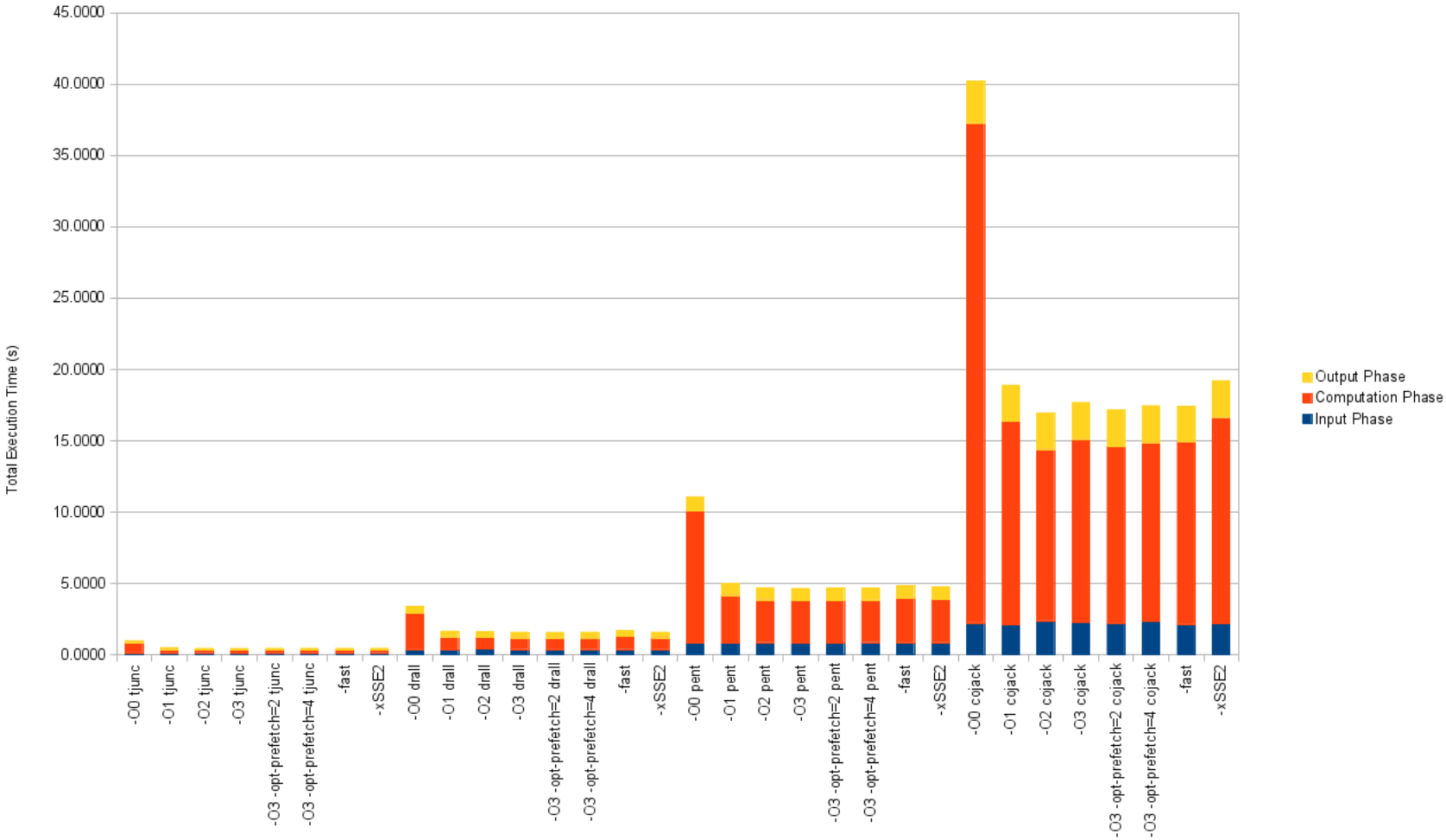

Figure: Execution time comparision using different optimization flags

Input Phase

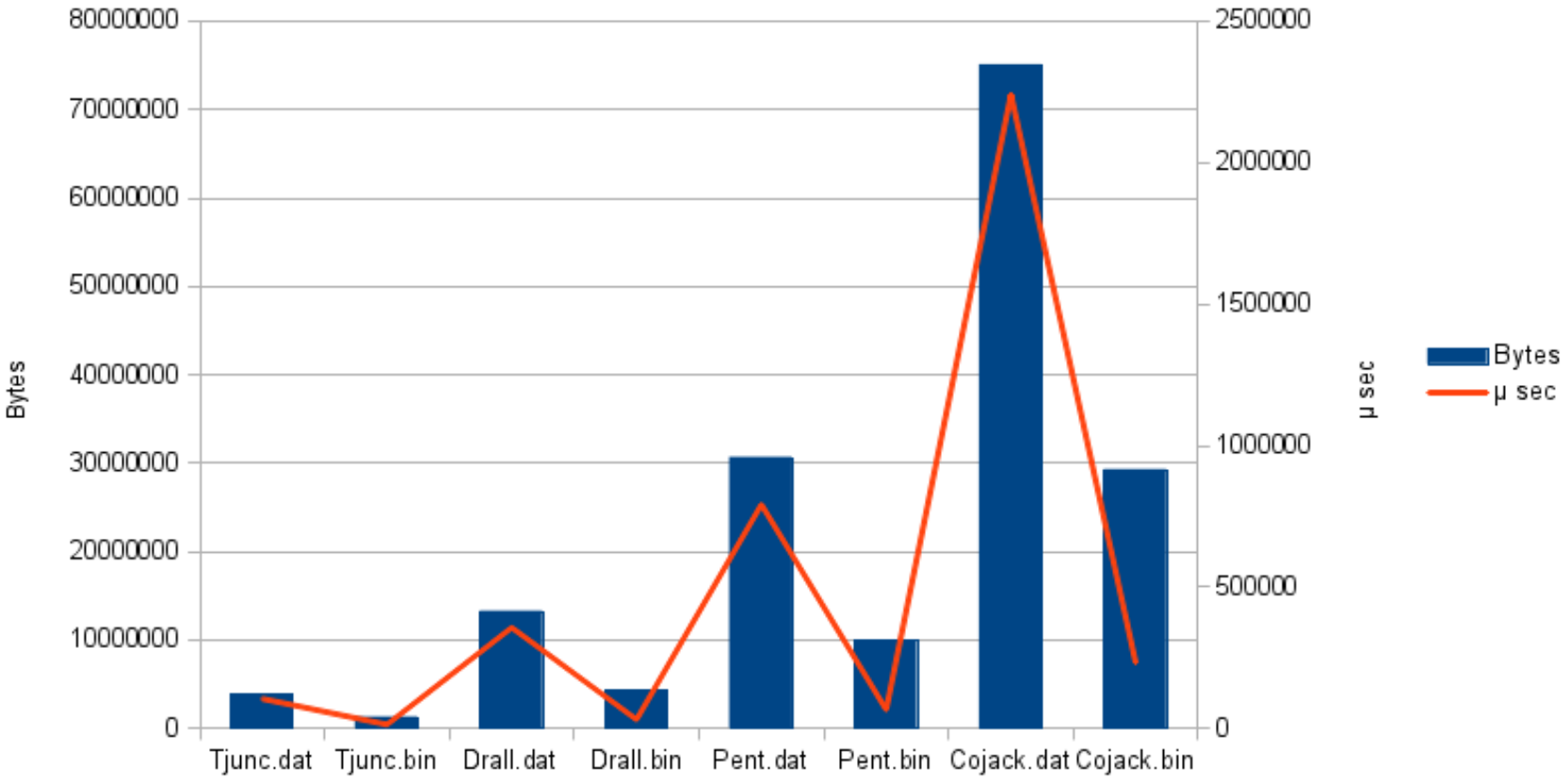

Figure: Input phase time comparision using input data

Outline

Data Distribution

- Different partitioning algorithms
  - Common
  - Metis Dual
  - Metis Nodal
- Differences reduced to the minimum

Communicaton Model

- Send/Receive lists
- Global to local index
- Local to global index
- LCC

Communicaton Model

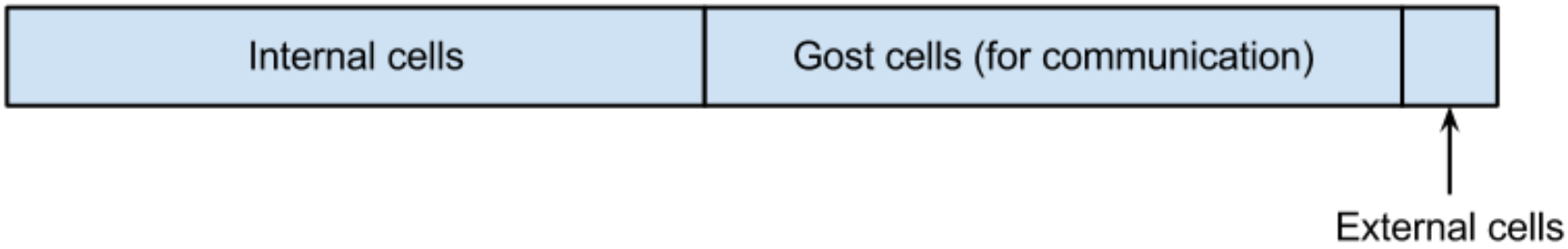

Figure: Data distribution in local to global index

MPI Implementation

- Collective operations
- Point to point
- Non blocking
- Indexed data types

Outline

Optimization Tools

- Score-P
- Periscope
- Cube

Improvements

- Overlap communication and computation
- Duplicate removal
- `Allreduce` bottleneck

Outline

Execution Time

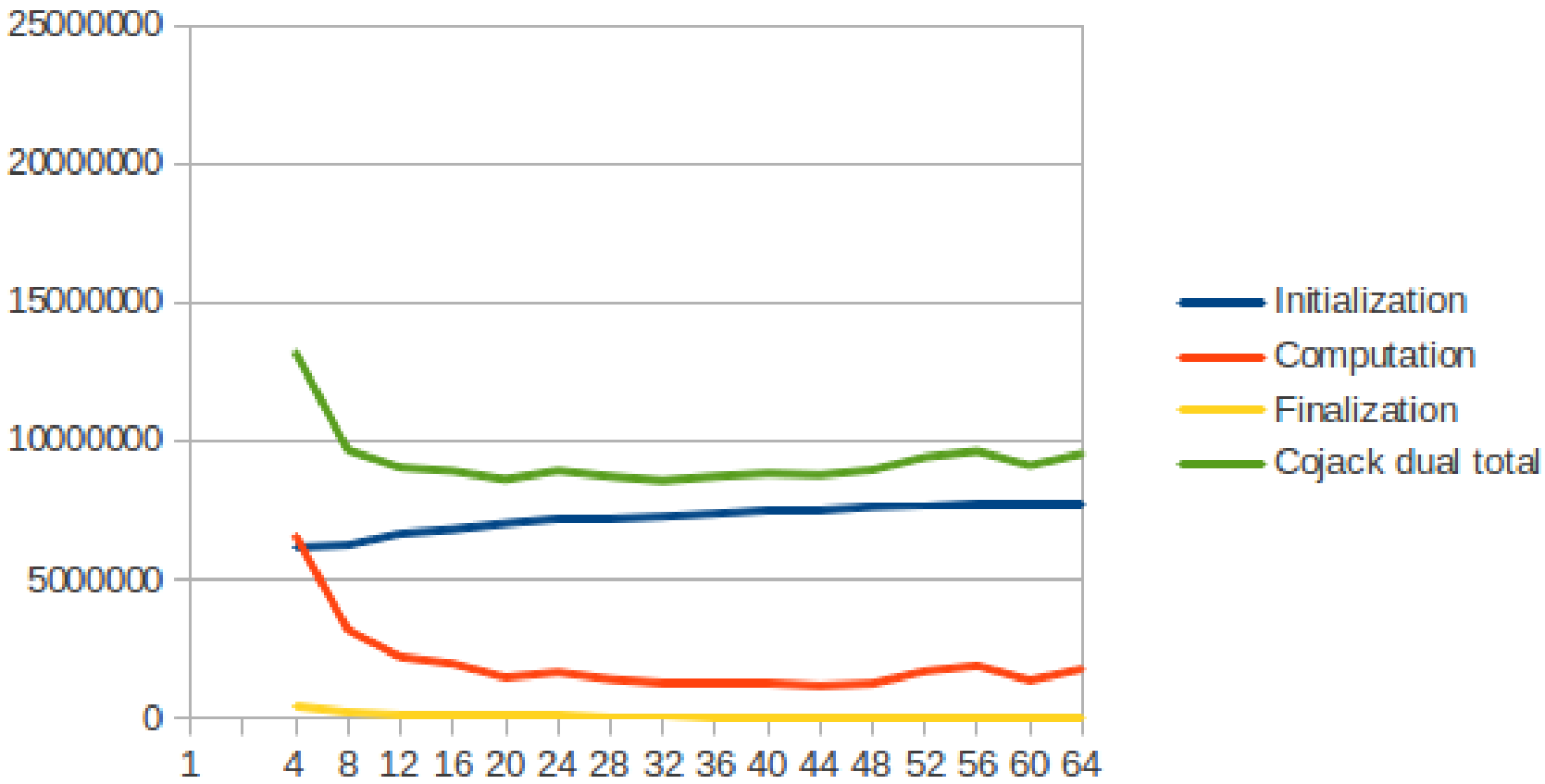

Figure: Times in μsec of the single parts of Cojack input run on multiple processes using the dual partitioning algorithm.

Scaling

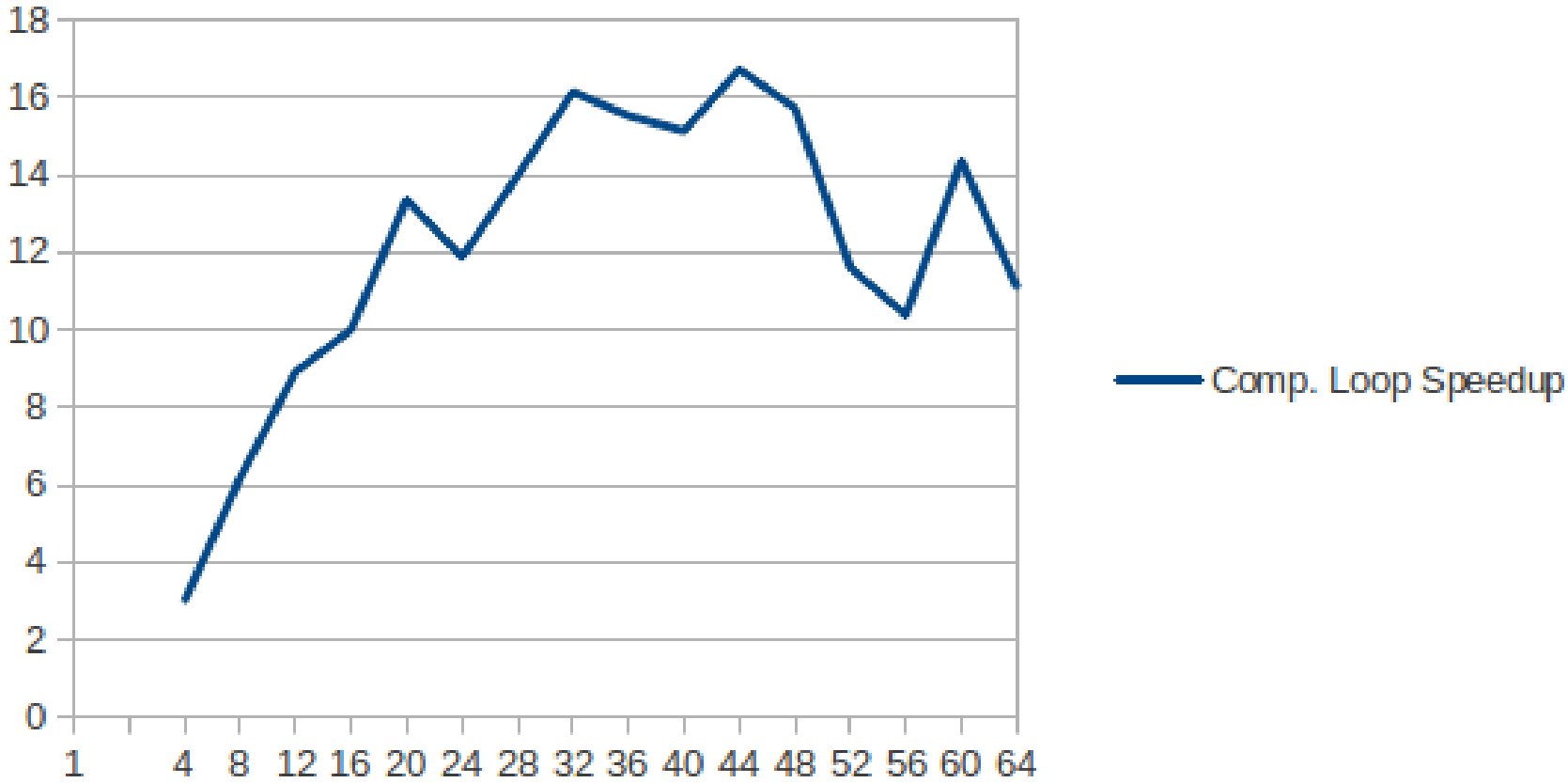

Figure: Scaling for computational loop for Cojack input run on multiple processes using the dual partitioning algorithm

Summary

- Good understanding of data strutures used by the application
- Careful planning of the communication model