

# Parallel Sorting Algorithms

- **Comparison Sorts**

- if ( $A > B$ )

- { temp=A; A=B; B=temp; }

- **Potential Speed-up**

- Optimal Comparison Sort:  
 $O(N \lg N)$

- Optimal Parallel speed-up  
 $O(\lg N)$  if  $P=N$

- Huge Big Oh constant

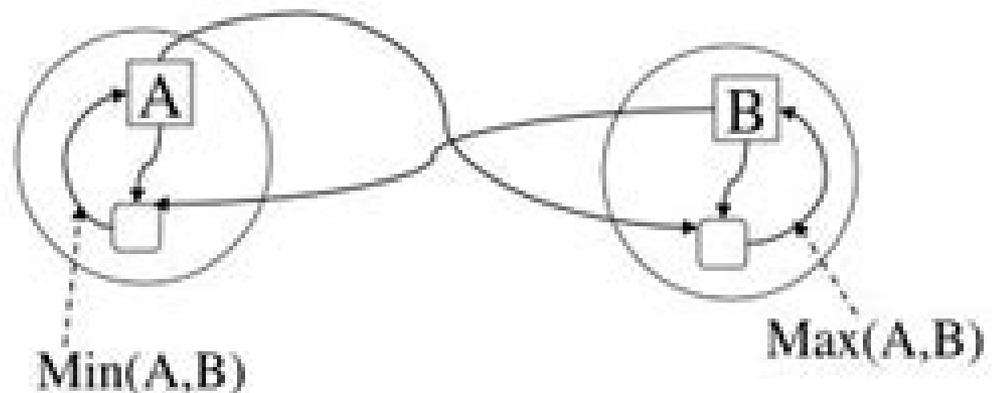
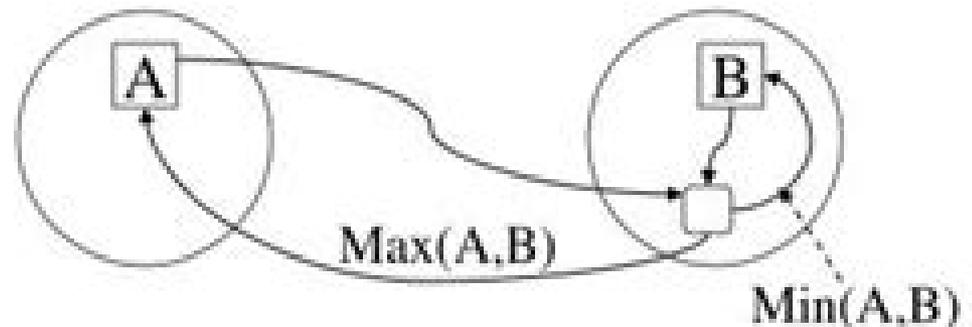
- **Source of problems**

- Duplicate computations to  
reduce message passing

- Different precision at  
different processors

- **Key**

- Processors independently  
working on data sections



# Parallel Sorting Algorithms

**Massoumeh Karimi**



## **Parallel Sorting Algorithms:**

**Parallel Sorting Algorithms** Selim G. Akl,2014-06-20 *Parallel Sorting Algorithms* explains how to use parallel algorithms to sort a sequence of items on a variety of parallel computers The book reviews the sorting problem the parallel models of computation parallel algorithms and the lower bounds on the parallel sorting problems The text also presents twenty different algorithms such as linear arrays mesh connected computers cube connected computers Another example where algorithm can be applied is on the shared memory SIMD single instruction stream multiple data stream computers in which the whole sequence to be sorted can fit in the respective primary memories of the computers random access memory or in a single shared memory SIMD processors communicate through an interconnection network or the processors communicate through a common and shared memory The text also investigates the case of external sorting in which the sequence to be sorted is bigger than the available primary memory In this case the algorithms used in external sorting is very similar to those used to describe internal sorting that is when the sequence can fit in the primary memory The book explains that an algorithm can reach its optimum possible operating time for sorting when it is running on a particular set of architecture depending on a constant multiplicative factor The text is suitable for computer engineers and scientists interested in parallel algorithms

**Parallel Sorting Algorithms** Selim G. Akl,1985 [Parallel Sorting Algorithms](#)  
Catherine Jane Scherp,1990 *An Analysis of Parallel Sorting Algorithms and Techniques* Kelly Dean Crawford,1986

**Parallel Sorting Algorithms** Mary Elizabeth Hribar,1991 [An Implementation of Parallel Sorting Algorithms](#)  
Cheng-tze Steve Chang,1988 *Implementing Parallel Sorting Algorithms* Jamal Elabed,1989 [A Taxonomy of Parallel Sorting Algorithms](#) University of Wisconsin--Madison. Computer Sciences Department,David J. De Witt,D. B. Friedland,D. K. Hsiao,J. Menon,1982 [Parallel Sorting Algorithms for Hypercube Multiprocessors](#) Bülent Abali,1989 [A Study of Sequential and Parallel Sorting Algorithms](#) Massoumeh Karimi,1979 **Design, Analysis, and Implementation of**

**Parallel External Sorting Algorithms** Dina Bitton Friedland,1981 [A Survey of Parallel Sorting Algorithms](#) David J. De Witt,Dina Friedland,David K. Hsiao,M. Jaishankar Menon,OHIO STATE UNIV COLUMBUS COMPUTER AND INFORMATION SCIENCE RESEARCH CENTER.,1981 A rather comprehensive survey of parallel sorting algorithms is included herein Parallel sorting algorithms are considered in two major categories the internal parallel sorting algorithms and the external parallel sorting algorithms Because external sorting algorithms are important to the database applications considerable emphases are made in the motivation and analysis of the external parallel sorting algorithms surveyed in the report In particular the authors of this report have conducted research in external parallel sorting algorithms and made some important contributions Their findings are also reported herein Author **Parallel Sorting Algorithms on a**

**Mesh-connected Computer** Chung-horng Lung,1988 **Parallel Sorting Algorithms** Shian-Shyong Tseng,1984  
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Pal,2025-12-22 This book presents original peer reviewed research papers from the International Conference on Recent Trends in Artificial Intelligence and Data Sciences CONFLUENCE 2025 It highlights the latest advancements across diverse areas of data science and computational techniques The volume focuses on artificial intelligence machine learning deep learning soft computing and other emerging methodologies By sharing recent findings in these domains the book serves as a valuable resource for researchers scientists industry professionals and students alike [Fast Parallel Algorithms for Sorting and Median Finding](#) Taoufik Dachraoui,1996 Many sorting algorithms that perform well on uniformly distributed data suffer significant performance degradation on non random data Unfortunately many real world applications require sorting on data that is not uniformly distributed In this thesis we propose a new strategy A ranksort for sorting on parallel machines which has a stable behavior on input distributions of different entropies Our sorting algorithm essentially consists of deterministically computing approximate ranks for the input keys and using these to route to destinations that are guaranteed to be close to the final destination and finally using a few steps of odd even transposition sort to complete the sorting We implemented A ranksort B flashsort 40 Radix sort 20 and Bitonic sort 6 on a 2048 processor Maspar MP 1 Thearling 73 proposes a test suite of inputs with which to evaluate the performance of sorting algorithms We tested all the algorithms on a very similar test suite Using similar ideas we also designed a new deterministic selection algorithm for integers that is simple and fast Abstract shortened by UMI *A Randomized Parallel Sorting Algorithm with an Experimental Study* David Robert Helman,David A. Bader,Joseph JáJá,1996 Previous schemes for sorting on general purpose parallel machines have had to choose between poor load balancing and irregular communication or multiple rounds of all to all personalized communication In this paper we introduce a novel variation on sample sort which uses only two rounds of regular all to all personalized communication in a scheme that yields very good load balancing with virtually no overhead Moreover unlike previous variations our algorithm efficiently handles the presence of duplicate values without the overhead of tagging each element with a unique identifier The algorithm was implemented in SPLIT C and run on a variety of platforms including the Thinking Machines CM 5 the IBM SP 2 and the Cray Research T3D We ran our code using widely different benchmarks to examine the dependence of our algorithm on the input distribution Our experimental results illustrate the efficiency and scalability of our algorithm across different platforms In fact it seems to outperform all similar algorithms known to the authors on these platforms and its performance is invariant over the set of input distributions unlike previous efficient algorithms Our results also compare favorably with those reported for the simpler ranking problem posed by the NAS Integer Sorting IS Benchmark [Dataflow Processing](#) ,2015-02-06 Since its first volume in 1960 *Advances in Computers* has presented detailed coverage of innovations in computer hardware software theory design and applications It has also provided contributors with a medium in which they can explore their subjects in greater depth and breadth than journal articles usually allow As a result many articles have become standard references that continue to be of significant

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