

Optical Interconnections and Parallel Processing: Trends at the Interface

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Optical Interconnections And Parallel Processing

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Harold S. Stone



Optical Interconnections And Parallel Processing Optical Interconnections And Parallel Processing:

Optical Interconnections and Parallel Processing Pascal Berthome,Alfonso Ferreira,1998-01-31 Optical media are now widely used in the telecommunication networks and the evolution of optical and optoelectronic technologies tends to show that their wide range of techniques could be successfully introduced in shorter distance interconnection systems This book bridges the existing gap between research in optical interconnects and research in high performance computing and communication systems of which parallel processing is just an example It also provides a more comprehensive understanding of the advantages and limitations of optics as applied to high speed communications Audience The book will be a vital resource for researchers and graduate students of optical interconnects computer architectures and high performance computing and communication systems who wish to understand the trends in the newest technologies models and communication issues in the field Parallel Computing Using Optical Interconnections Kegin Li,Yi Pan,Si-Qing

Zheng,1998-10-31 Advances in optical technologies have made it possible to implement optical interconnections in future massively parallel processing systems Photons are non charged particles and do not naturally interact Consequently there are many desirable characteristics of optical interconnects e g high speed speed of light increased fanout high bandwidth high reliability longer interconnection lengths low power requirements and immunity to EMI with reduced crosstalk Optics can utilize free space interconnects as well as guided wave technology neither of which has the problems of VLSI technology mentioned above Optical interconnections can be built at various levels providing chip to chip module to module board to board and node to node communications Massively parallel processing using optical interconnections poses new challenges new system configurations need to be designed scheduling and data communication schemes based on new resource metrics need to be investigated algorithms for a wide variety of applications need to be developed under the novel computation models that optical interconnections permit and so on Parallel Computing Using Optical Interconnections is a collection of survey articles written by leading and active scientists in the area of parallel computing using optical interconnections This is the first book which provides current and comprehensive coverage of the field reflects the state of the art from high level architecture design and algorithmic points of view and points out directions for further research and development Fifth International Conference on Massively Parallel Processing Lennart Johnsson,1998 This text covers the subjects of computer architecture and parallel and high performance computing Topics include free space optical interconnect systems design and analysis of optical interconnects interconnect system analysis and fiber based interconnects **Optical Interconnections**

and Parallel Processing Pascal Berthome,Alfonso Ferreira,2012-12-06 Optical media are now widely used in the telecommunication networks and the evolution of optical and optoelectronic technologies tends to show that their wide range of techniques could be successfully introduced in shorter distance interconnection systems This book bridges the existing gap between research in optical interconnects and research in high performance computing and communication systems of which

parallel processing is just an example. It also provides a more comprehensive understanding of the advantages and limitations of optics as applied to high speed communications. Audience: The book will be a vital resource for researchers and graduate students of optical interconnects, computer architectures and high performance computing and communication systems who wish to understand the trends in the newest technologies, models and communication issues in the field. *Proceedings of the Second International Conference on Massively Parallel Processing Using Optical Interconnections, October 23-24, 1995, San Antonio, Texas*. Eugen Schenfeld, 1995. Annotation: Offers eight invited lectures by contributors from academia and industry in the fields of parallel computer systems, optical interconnections and technology, two panel discussions and 34 papers by contributors from throughout the world. In addition to reporting on recent advances in the field, they speculate on how optical interconnections might impact the design of parallel computer systems and communication networks and the writing of applications and algorithms. Among the topics are reconfigurable architectures, embedding and mapping of applications and algorithms, the packaging and layout of optical interconnections, passive optical elements, data distribution and partitioning and cost performance studies. No subject index. Annotation copyright by Book News Inc, Portland, OR.

Parallel Computing Using Optical Interconnections Keqin Li, Yi Pan, Si-Qing Zheng, 2007-08-26. Advances in optical technologies have made it possible to implement optical interconnections in future massively parallel processing systems. Photons are non-charged particles and do not naturally interact. Consequently, there are many desirable characteristics of optical interconnects: e.g., high speed, speed of light, increased fanout, high bandwidth, high reliability, longer interconnection lengths, low power requirements and immunity to EMI with reduced crosstalk. Optics can utilize free space interconnects as well as guided wave technology, neither of which has the problems of VLSI technology mentioned above. Optical interconnections can be built at various levels, providing chip to chip, module to module, board to board and node to node communications. Massively parallel processing using optical interconnections poses new challenges; new system configurations need to be designed; scheduling and data communication schemes based on new resource metrics need to be investigated; algorithms for a wide variety of applications need to be developed under the novel computation models that optical interconnections permit; and so on. **Parallel Computing Using Optical Interconnections** is a collection of survey articles written by leading and active scientists in the area of parallel computing using optical interconnections. This is the first book which provides current and comprehensive coverage of the field, reflects the state of the art from high level architecture design and algorithmic points of view and points out directions for further research and development. *Proceedings of the Third International Conference on Massively Parallel Processing Using Optical Interconnections*, Allan Gottlieb, Yao Li, Eugen Schenfeld, 1996. **Proceedings of the Fourth International Conference Massively Parallel Processing Using Optical Interconnections** Joseph W. Goodman, 1997. This text covers the subjects of computer architecture and parallel and high performance computing. **Efficient Parallel Processing with Optical Interconnections** Lili Hai, 1997. With the

advances in VLSI technology it is now possible to build chips which can each contain thousands of processors The efficiency of such chips in executing parallel algorithms heavily depends on the interconnection topology of the processors It is not possible to build a fully interconnected network of processors with constant fan in fan out using electrical interconnections Free space optics is a remedy to this limitation Qualities exclusive to the optical medium are its ability to be directed for propagation in free space and the property that optical channels can cross in space without any interference In this thesis we present an electro optical interconnected architecture named Optical Reconfigurable Mesh ORM It is based on an existing optical model of computation There are two layers in the architecture The processing layer is a reconfigurable mesh and the deflecting layer contains optical devices to deflect light beams ORM provides three types of communication mechanisms The first is for arbitrary planar connections among sets of locally connected processors using the reconfigurable mesh The second is for arbitrary connections among N of the processors using the electrical buses on the processing layer and N^2 fixed passive deflecting units on the deflection layer The third is for arbitrary connections among any of the N^2 processors using the N^2 mechanically reconfigurable deflectors in the deflection layer The third type of communication mechanisms is significantly slower than the other two Therefore it is desirable to avoid reconfiguring this type of communication during the execution of the algorithms Instead the optical reconfiguration can be done before the execution of each algorithm begins Determining a right configuration that would be suitable for the entire configuration of a task execution is studied in this thesis The basic data movements for each of the mechanisms are studied Finally to show the power of ORM we use all three types of communication mechanisms in the first $O(\log N)$ time algorithm for finding the convex hulls of all figures in an $N \times N$ binary image presented in this thesis

Proceedings of the First International Workshop on Massively Parallel Processing Using Interconnections, April 26-27, 1994, Cancún, Mexico, 1994 *Selected Papers on Optical Interconnects and Packaging* Sing H. Lee, 1997 SPIE Milestones are collections of seminal papers from the world literature covering important discoveries and developments in optics and photonics **Optical Interconnections and Networks** Hartmut Bartelt, 1990 **Parallel Processing Architectures and VLSI Hardware** Angel L. DeCegama, 1989

Massively Parallel, Optical, and Neural Computing in the United States Gilbert Kalb, Robert Moxley, 1992 A survey of products and research projects in the field of highly parallel optical and neural computers in the USA It covers operating systems language projects and market analysis as well as optical computing devices and optical connections of electronic parts *Micro- and Nano-optics for Optical Interconnection and Information Processing* Mohammad R. Taghizadeh, Hugo Thienpont, Ghassan E. Jabbour, 2001 **Parallel computing with optical interconnections**, 1998 **IEICE Transactions on Electronics**, 2001 1986 Proceedings Harold S. Stone, 1986 **1986 Proceedings** IEEE Computer Society, 1986 *Optoelectronic Interconnects and Packaging ...*, 1997

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