1014-06-421 **Vijay K Garg*** (garg@ece.utexas.edu), Electrical and Computer Engineering Dept, University of Texas at Austin, Austin, TX 78712, and **Neeraj Mittal** and **Alper Sen**. *Using Order in Distributed Computing.*

We survey applications of the theory of partial order to distributed computing. A distributed computation is a poset on the set of events based on the observable happened-before relation. Online chain decomposition of posets has applications in timestamping events with vectors such that the vectors preserve the partial order. The lower bounds on the dimension of these vectors use the dimension theory of posets.

Global states of a distributed computation corresponds to its order ideals. An important problem in distributed computing is to detect a global state that satisfies a given predicate. Although, this problem is NP-complete in general, it has efficient solution for classes of predicates called linear and relational. The concept of meet-closure is used for detecting linear predicates and the algorithms for merging chains are used for relational predicates. For general predicates, one can use algorithms for enumeration of all order ideals of the poset.

A slice of a computation captures all global states that satisfy a given predicate. Slicing is based on Birkhoff's duality theorem of finite distributive lattices. Further, lattice congruences help in reducing the size of the global state graph for verification of temporal logic formulas. (Received September 15, 2005)