**A Development and Deployment Framework for Distributed Branch & Bound**

Branch and bound is a systematic method for solving optimization problems without actually examining (searching) all feasible solutions. This is achieved by progressively partitioning the set of all feasible solutions into a search tree with each tree node representing a partial solution.

The Traveling Salesman Problem (TSP) is a typical candidate where this approach can be applied. For instance, in the TSP branch and bound, each search tree node has a partial tour that represents all possible tours that begin with that partial tour and as one progresses down the search tree, each node represents a larger partial tour with the leaf node representing the full tour. The branching continues until we reach a node that represents a set of feasible solutions, all of which are costlier than the feasible solution in hand (upper bound). When this happens, we prune that sub-tree and do not continue branching any further. An optimal solution is finally found by exploring all the nodes of the search tree whose partial solutions are bounded by the cost of the most optimal solution at the time of exploring each node.

The authors have presented a framework called JICOS, that facilitates the development of such branch and bound computations in a distributed environment. The infrastructure which allows the application developer to focus only on the problem-specific aspects of branch and bound. JICOS provides a fault-tolerant solution for doing scalable, adaptively parallel computations that internally hide the communication latencies involved. The API includes a simple set of application-controlled directives such as Task caching, Task prefetching and execution of tasks on the Task Server (Compute Space, that represents the task store) instead of executing them on the Hosts (Compute Server) for improving performance.

The computation is modeled as a directed acyclic graph (DAG) whose nodes represent the tasks to be performed. All the tasks have access to an environment consisting of an immutable input object and a mutable shared object which the tasks can modify during the course of the computation. When a branch and bound task finds a complete solution whose cost is less than the current least cost solution, it sets the shared object to this new value, which implicitly causes JICOS to propagate the new least cost to all the Compute Servers.

The authors then talk about the different components of the Branch and Bound framework and the problem specific classes that the application developers must provide to run any optimization problem that can be solved using the branch and bound technique. Finally, through various speedup experiments on a TSP application with 200 cities, the authors show that the framework is highly efficient, fault tolerant and easily scalable.