CHAPTER VIII
CONCLUSION AND FUTURE RESEARCH

8.1. Conclusion

The main contribution from this thesis has been to design parallel algorithms for tree based problems and all-pairs-shortest-path problem. The utility of the algorithms studied in this thesis is seen in various fields and these algorithms are used to solve many complex scientific problems arising in the fields of Coding theory, Graph Theory and Manufacturing Technology and so on.

In the third chapter, we considered the problem of developing a parallel algorithm for Huffman decoding. We provided an \( O(\log N + \frac{1}{2}(n+1)) \)-time algorithm on CREW PRAM algorithm and also we claim that our algorithm is scalable and best possible solution for Huffman decoding.

For most of the applications that we consider, in general, we have become conditioned to think that an algorithm must be memory efficient in order to consume less memory space. Considering this interest, we extended our parallel Huffman decoding algorithm discussed in fourth chapter to memory efficient one. This memory efficient Huffman decoding algorithm on CREW PRAM model requires only \( \lceil 3n/2 \rceil + \lceil n/2 \log n \rceil + 1 \) memory space for storing input and takes \( O(\log N \cdot (n+1)) \) running time where \( n \) is the number of symbols in a Huffman tree.
In chapter V, we proposed an $O(1)$-time parallel algorithm for Huffman decoding on LARPBS computational model, which is the efficient and easily implementable model. It is of importance to pinpoint out that according to Li et al.,[12], the direct simulation of CREW PRAM counterpart leads to have $O(\log n)$ factor in addition whereas we developed the algorithm such that it works in $O(1)$ time itself without additional $O(\log n)$ factor.

In the sixth chapter, we discussed the parallel version of MST approach for the formation of machine cells. We developed a parallel algorithm using maximal spanning tree approach on LARPBS model. We checked our parallel algorithm with practical data's and its time complexity is $O(\log n')$-time.

The new efficient parallel algorithm for All-Pairs-Shortest-Length (APSL) problem has been designed using CREW PRAM model and it is described in chapter VII. This algorithm takes $O(n')$-time and also we claim that our algorithm is efficient.

8.2. Scope for Future Work

- Efficient algorithm may be developed for Huffman Decoding algorithm on LARPBS model, by modifying the data structure and it may also be extended in such a way, to work on LARPBS(P) model and restricted LARPBS model.

- Efficient Parallel algorithm may be designed by removing the constraints that the number of machines in each cell should be at least two and number of cells required is two.
Different approach of paralyzing the step 1 to step 3 of our CREW PRAM algorithm, which is discussed in chapter VII, may still improve the cost of the algorithm and may lead to removing of the constraints between the problem size and the number of processor. Another line of thought is to provide a parallel solution to APSL problem on Linear Array with a Reconfigurable Pipelined Bus System (LARPBS) model.