

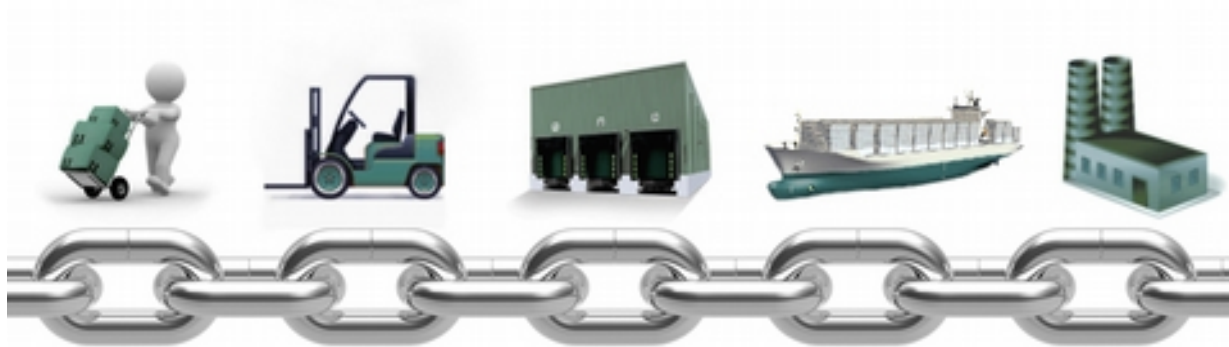
# GenMRP

***Generating Optimized MRP Lot Sizes Using  
Genetic Algorithm: Considering Supplier Deals***

**Supervised By**  
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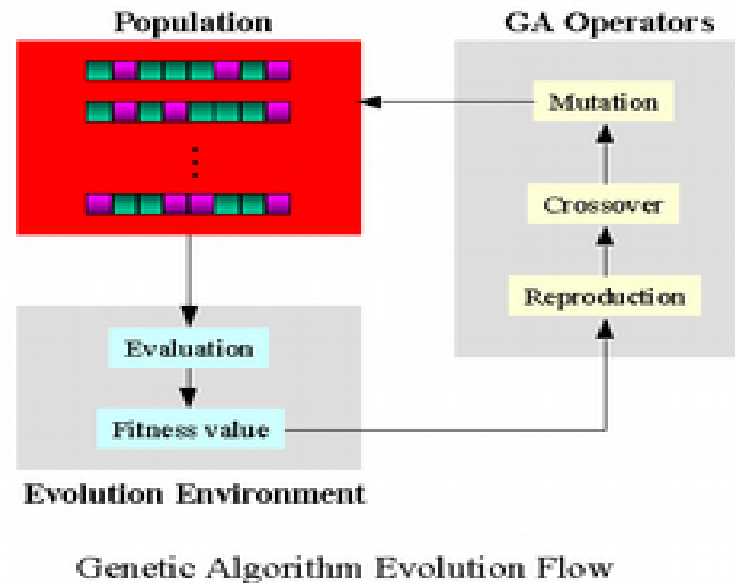
**Nipuna Thanura**  
**Udakara**  
**Rathnayake**

# Material Requirements Planning



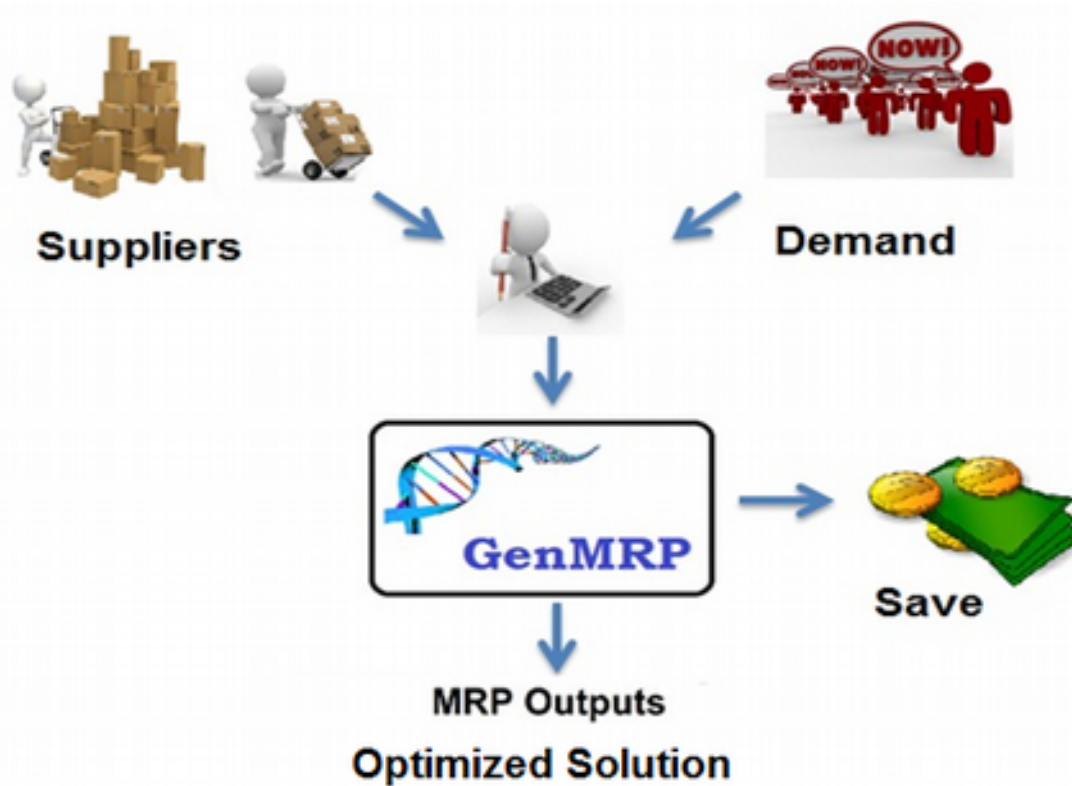
- **The production planning, scheduling, and inventory control system**
- **Used to manage manufacturing processes**
- **Answers the problems of:**
  - ✓ **When to buy?**
  - ✓ **What quantity?**

# Genetic Algorithms (GA)



- **A search heuristic algorithm**
- **Mimics the process of natural evolution**
  - ✓ **Survival of the fittest**
- **Ideal for highly constrained problems similar to MRP**

# What is GenMI



- **Minimizes the total cost by deciding suitable suppliers and lot-sizes.**

# What is GenMRP?

- Generates optimized MRP solutions
- Considers
  - ❖ **supplier discounts/deals**
  - ❖ **storage capacity limitations**
  - ❖ **Transportation/ Holding Costs**
- Answers
  - ✓ From whom to buy?
  - ✓ When to buy?
  - ✓ What quantity should be bought?
- A genetic algorithm is used

# Related Work

1. “MRP Lot Sizing Using Genetic Algorithms”  
L. Q. D.J Stockton, BPICS CONTROL, 1993  
✓ initial efforts
  2. “Applying Genetic Algorithms for Inventory Lot-Sizing Problem with Supplier Selection under Storage Capacity Constraints” C. Woarawichai, K. Kuruvit, Paitoon V. ,2012  
✓ Has high relevance to ours
- AiPLAN: Advanced Production Planning System

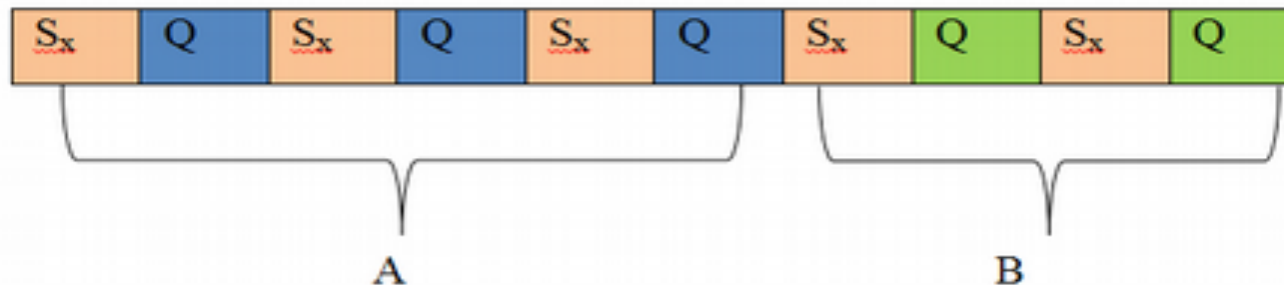
# Methodology

## Planned Order Release (POR)

Period \ parts	1	2	3	4	5	6	7	8	9
A					Q	Q		Q	
B			Q		Q				
C		Q	Q	Q	Q				

## Chromosome

e

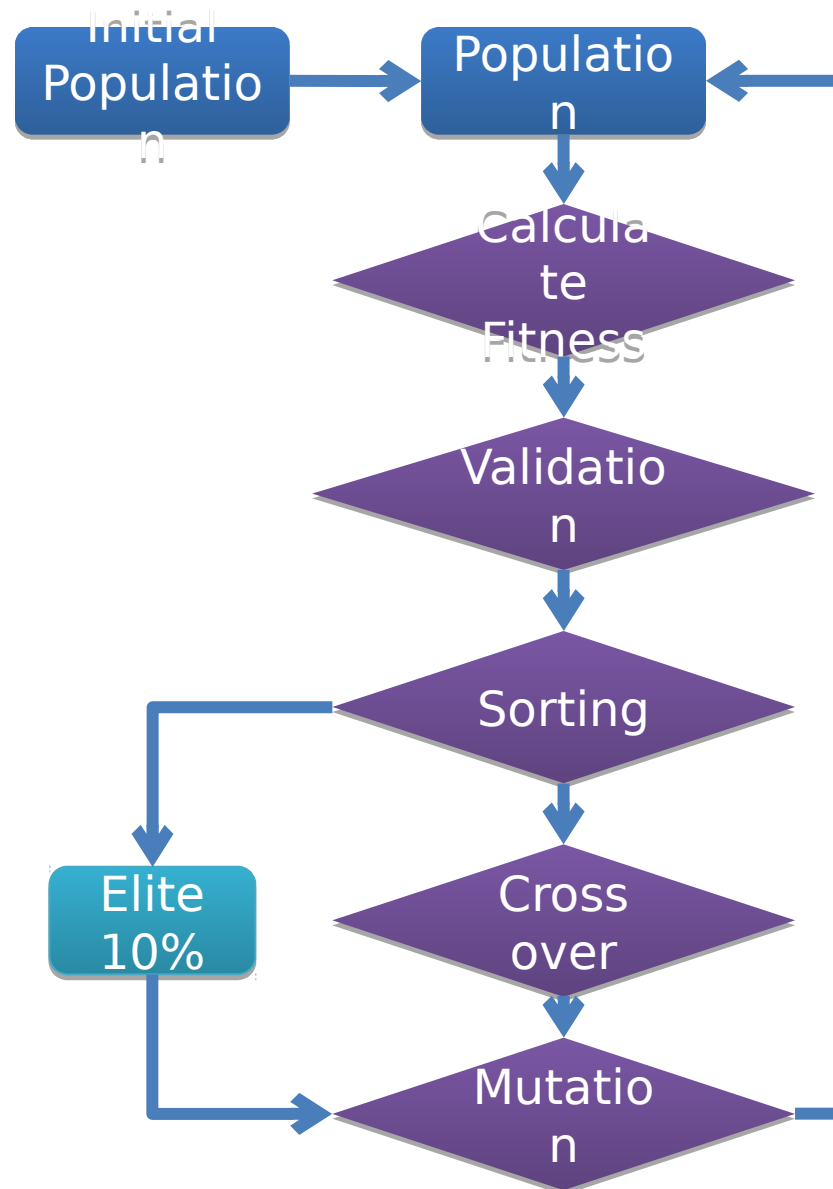


**S<sub>x</sub> = Supplier**

**Q = Order**

**Quantity**

# Algorithm Flow

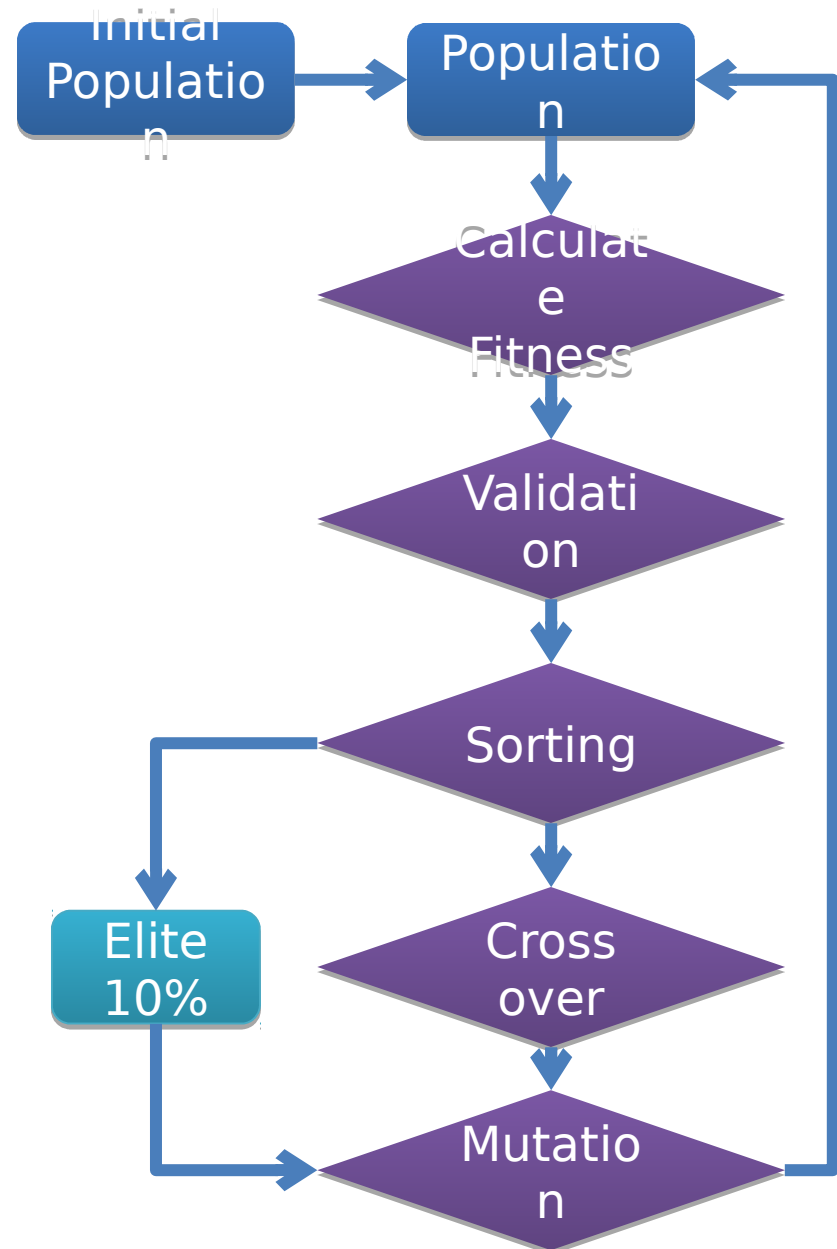




# Algorithm Flow

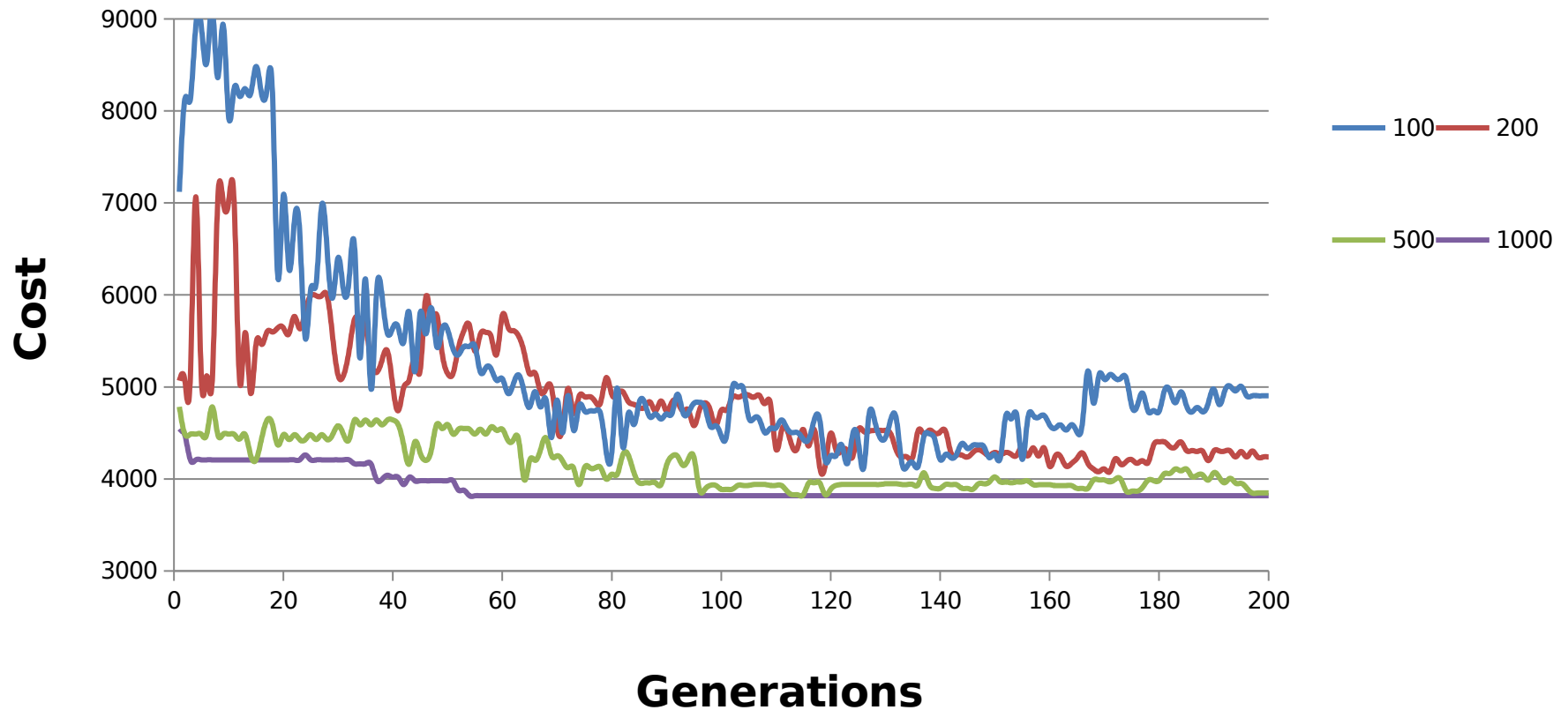
## Elitism

Allow the best 10% from the current generation to carry over to the next, unaltered.



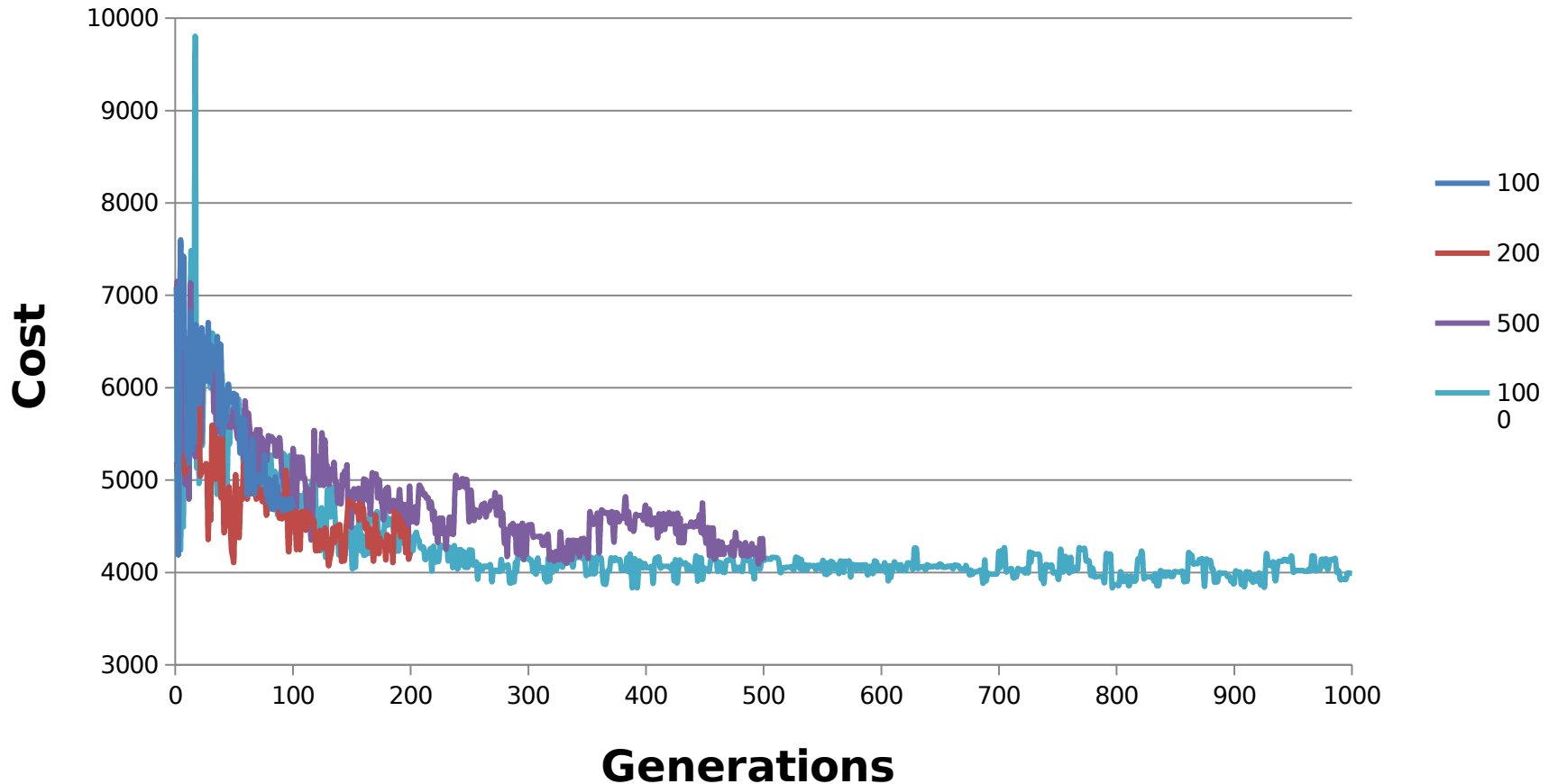
# Results

## Cost with population sizes



# Results

## Cost with different generation sizes



# Conclusion

- This project present a method to get an optimized solution to multi-level, multi-product MRP problem
  - ✓ From whom to buy?
  - ✓ When to buy ?
  - ✓ What quantity should be bought?
- More cost functions can be added directly to the database
- Parallel computing is being implemented
- This project is a continuation of an IFS project (by Mr. Lakshika Rajakaruna)

*Thank You!*