CLAIMS

1. A computer-implemented system for optimizing allocation of products, the system comprising:

a memory storing instructions; and

at least one processor configured to execute the instructions to:

receive an initial set of solutions, the initial set of solutions comprising an initial distribution of a plurality of stock keeping units (SKUs) for storage among a plurality of fulfillment centers (FCs), each of the FCs comprising a physical location configured to store products for shipping to customers;

apply one or more constraints, the one or more constraints comprising an item compatibility, wherein the item compatibility comprises restrictions associated with each of the FC's for allowing or preventing certain SKUs to be stored;

execute a genetic algorithm to run a simulation of each solution of the initial set of solutions;

calculate a participation ratio for each solution of the initial set of solutions;

determine a score for each solution of the initial set of solutions based on the calculated participation ratio;

select at least one solution with a highest determined score to feed the genetic algorithm;

execute the genetic algorithm, using the selected at least one solution with the highest determined score, to generate one or more additional solutions;

terminate the genetic algorithm when a participation ratio at one or more of the plurality of FCs has increased by a predetermined threshold; and

modify an allocation of the plurality of SKUs for storage among the plurality of FCs based on a best-performing solution, wherein the best-performing solution has the highest determined score among all solutions generated.

2. The system of claim 1, wherein each of the plurality of SKUs is indicative of at least one of a manufacturer, material, size, color, packaging, type, or weight of a product.

3. The system of claim 1, wherein the best-performing solution raises the participation ratio for at least one FC by 2%.

4. The system of claim 1, wherein the genetic algorithm comprises at least one constraint, the constraint comprising at least one of customer demand at each of the FCs, maximum capacities of the FCs, compatibility with FCs, or transfer costs between FCs.

5. The system of claim 1, wherein executing the genetic algorithm, using the selected at least one solution with the highest determined score to generate one or more additional solutions comprises changing, via the genetic algorithm, at least one parameter associated with the at least one solution selected to generate the one or more additional solutions.

6. The system of claim 1, wherein the initial distribution of the plurality of SKUs among the plurality of FCs is randomly generated.

7. The system of claim 1, wherein the participation ratio for each of the solutions is indicative of a percentage of FCs that contributed to a total output of products from a network of FCs.

8. The system of claim 1, wherein the at least one processor is further configured to execute the instructions to:

simulate customer demand at each of the plurality of FCs; and

allocate the plurality of SKUs among the plurality of FCs based on the simulated customer demand.

9. The system of claim 1, wherein the at least one processor is further configured to execute the instructions to cache at least a portion of the genetic algorithm.

10. The system of claim 9, wherein the cached portion of the genetic algorithm comprises at least one constraint that remains substantially constant with each run of the genetic algorithm.

11. A computer-implemented method for optimizing allocation of products, the method comprising:

receiving an initial set of solutions, the initial set of solutions comprising an initial distribution of a plurality of stock keeping units (SKUs) for storage among a plurality of fulfillment centers (FCs), each of the FCs comprising a physical location configured to store products for shipping to customers;

applying one or more constraints, the one or more constraints comprising an item compatibility, wherein the item compatibility comprises restrictions associated with each of the FC's for allowing or preventing certain SKUs to be stored;

executing a genetic algorithm to run a simulation of each solution of the initial set of solutions;

calculating a participation ratio for each solution of the initial set of solutions;

determining a score for each solution of the initial set of solutions based on the calculated participation ratio;

selecting at least one solution with a highest determined score to feed the genetic algorithm;

executing the genetic algorithm, using the selected at least one solution with the highest determined score, to generate one or more additional solutions;

terminating the genetic algorithm when a participation ratio at one or more of the plurality of FCs has increased by a predetermined threshold; and

modifying an allocation of the plurality of SKUs for storage among the plurality of FCs based on a best-performing solutions, wherein the best-performing solutions has the highest determined score among all solutions generated.

12. The method of claim 11, wherein the participation ratio for each of the solutions is indicative of a percentage of FCs that contributed to a total output of products from a network of FCs.

13. The method of claim 11, wherein the best-performing solution raises the participation ratio for at least one FC by 2%.

14. The method of claim 11, wherein the genetic algorithm comprises at least one constraint, the constraint comprising at least one of customer demand at each of the FCs, maximum capacities of the FCs, compatibility with FCs, or transfer costs between FCs.

15. The method of claim 11, wherein executing the genetic algorithm, using the selected at least one solution with the highest determined score to generate one or more additional solutions comprises changing, via the genetic algorithm, at least one parameter associated with the at least one solution selected to generate the one or more additional solutions.

16. The method of claim 15, wherein the initial distribution of the plurality of SKUs among the plurality of FCs is randomly generated.

17. The method of claim 11, further comprising:

simulating customer demand at each of the plurality of FCs; and

allocating the plurality of SKUs among the plurality of FCs based on the simulated customer demand.

18. The method of claim 11, further comprising caching at least a portion of the genetic algorithm.

19. The method of claim 18, wherein the cached portion of the genetic algorithm comprises at least one constraint that remains substantially constant with each run of the genetic algorithm.

20. A computer-implemented system for optimizing allocation of products, the system comprising:

a memory storing instructions; and

at least one processor configured to execute the instructions to:

receive an initial set of solutions, the initial set of solutions comprising an initial distribution of a plurality of stock keeping units (SKUs) for storage among a plurality of fulfillment centers (FCs) that is

randomly generated, each of the FCs comprising a physical location configured to store products for shipping to customers;

apply one or more constraints, the one or more constraints comprising an item compatibility, wherein the item compatibility comprises restrictions associated with each of the FC's for allowing or preventing certain SKUs to be stored;

execute a genetic algorithm to run a simulation of each solution of the initial set of solutions;

calculate a participation ratio for each solution of the initial set of solutions;

determine a score for each solution of the initial set of solutions based on the calculated participation ratio;

select at least one solution with a highest determined score to feed the genetic algorithm;

execute the genetic algorithm, using the selected at least one solution with the highest determined score, to generate one or more additional solutions, wherein:

the genetic algorithm comprises at least one constraint, the constraint comprising at least one of customer demand at each of the FCs, maximum capacities of the FCs, compatibility with FCs, or transfer costs between FCs;

at least one constraint that remains substantially constant with each run of the genetic algorithm is cached; and

executing the genetic algorithm, using the selected at least one solution with the highest determined score, to generate one or more additional solutions comprises changing, via the genetic algorithm, at least one parameter associated with the at least one solution selected to generate the one or more additional solutions;

simulate customer demand at each of the plurality of FCs;

terminate the genetic algorithm when a participation ratio at one or more of the plurality of FCs has increased by a predetermined threshold; and

modify an allocation of the plurality of SKUs for storage among the plurality of FCs based at least on the simulated customer demand and on a best-performing solution, wherein the best-performing solution raises the participation ratio for at least one FC by 2%.