

Claims

1. A computerized system for determining item groupings for packaging, comprising:
  - at least one processor; and
  - at least one non-transitory storage medium comprising instructions that, when executed by the at least one processor, cause the at least one processor to perform steps comprising:
    - receiving an order comprising at least one item;
    - searching at least one data store to determine a tag, volume, weight, and an exclusion list associated with each item, wherein the exclusion list comprises a list of items that may not be in a same package as a hazardous item;
    - sorting the items into groups based on the tags of the items;
    - performing an optimization process for each group of items having the same tag by:
      - creating a data structure representing a first package of the group, the data structure comprising properties of the first package;
      - iteratively simulating packing a largest remaining item of the group into the first package, wherein if the simulating determines that a threshold is exceeded:
        - creating an additional data structure representing an additional package, and
        - iteratively simulating packing a largest remaining item until all items of the group are packed into a package, wherein if the simulating determines that an item from the exclusion list is packed into a package, the hazardous item is assigned to a different package;
      - generating at least one list of items for the data structures representing packages; and
      - sending the generated list to a computer system for display, the list including at least one item identifier and at least one package identifier.

2. The system of claim 1, wherein the threshold comprises at least one of a volume of the first package or a weight limit of the first package.
3. The system of claim 1, wherein the tags include fragile, standalone, or normal.
4. The system of claim 3, wherein the steps further comprise:
  - determining that the received order comprises at least one item associated with the standalone tag; and
  - searching the at least one data store to determine a binding number associated with the items having the standalone tag; wherein
  - the threshold comprises the binding number.
5. The system of claim 1, wherein the steps further comprise:
  - searching the at least one data store to determine a large purchase quantity associated with each item; and
  - assigning a large purchase tag to items of a same type if a quantity of the items of the same type in the order exceeds a large purchase quantity associated with the items of the same type; wherein
  - when items are sorted into a group based on the large purchase tag, items are further sorted into a group of a same item type.
6. The system of claim 5, wherein the steps further comprise:
  - iteratively simulating packing items having the large purchase tag by dividing a group having items of the same type into subgroups until a volume and a weight of each subgroup are less than or equal to a volume limit and a weight limit, respectively, of the first package or the additional package.
7. The system of claim 1, wherein an item having a fragile tag indicates that an item volume for the item having the fragile tag comprises the volume of the item and the volume of added packaging material.

8. The system of claim 1, wherein the optimization process further comprises:
  - determining a volume and a weight of one or more items simulated to be packed in a last package of the group; and
  - assigning the one or more items previously assigned to the last package to a smaller last package having a smaller volume if the volume and the weight of the one or more items are less than a volume limit and a weight limit of the smaller package, respectively.
9. The system of claim 1, wherein the steps further comprise:
  - iteratively attempting to simulate packing a largest remaining item of a group into existing packages until a total volume of the largest remaining item and items assigned to an existing package is less than a volume limit of the package or all existing packages have been attempted;
  - assigning the largest remaining item to the existing package; and
  - if the largest remaining item does not fit in any existing packages, creating an additional package and assigning the largest remaining item to the additional package.
10. A computer-implemented method for automatically determining item groupings for packaging, comprising:
  - receiving an order comprising at least one item;
  - searching at least one data store to determine a tag, volume, weight, and an exclusion list associated with each item, wherein the exclusion list comprises a list of items that may not be in a same package as a hazardous item;
  - sorting the items into groups based on the tags of the items;
  - performing an optimization process for each group of items having the same tagby:
  - creating a data structure representing a first package of the group, the data structure comprising properties of the first package;
  - iteratively simulating packing a largest remaining item of the group into the first package, wherein if the simulating determines that a threshold is exceeded:

creating an additional data structure representing an additional package, and

iteratively simulating packing a largest remaining item until all items of the group are packed into a package, wherein if the simulating determines that an item from the exclusion list is packed into a package, the hazardous item is assigned to a different package;

generating at least one list of items for the data structures representing packages; and

sending the generated list to a computer system for display, the list including at least one item identifier and at least one package identifier.

11. The computer-implemented method of claim 10, wherein the threshold comprises at least one of a volume of the first package or a weight limit of the first package.

12. The computer-implemented method of claim 10, wherein the tags include fragile, standalone, or normal.

13. The computer-implemented method of claim 12, further comprising:  
determining that the received order comprises at least one item associated with the standalone tag; and  
searching the at least one data store to determine a binding number associated with the items having the standalone tag; wherein  
the threshold comprises the binding number.

14. The computer-implemented method of claim 10, further comprising:  
searching the at least one data store to determine a large purchase quantity associated with each item; and  
assigning a large purchase tag to items of a same type if a quantity of the items of the same type in the order exceeds a large purchase quantity associated with the items of the same type; wherein  
when items are sorted into a group based on the large purchase tag, items are

further sorted into a group of a same item type.

15. The computer-implemented method of claim 14, further comprising  
iteratively simulating packing items having the large purchase tag by dividing a group having items of the same type into subgroups until a volume and a weight of each subgroup are less than or equal to a volume limit and a weight limit, respectively, of the first package or the additional package.
16. The computer-implemented method of claim 10, wherein an item having a fragile tag indicates that an item volume for the item having the fragile tag comprises the volume of the item and the volume of added packaging material.
17. The computer-implemented method of claim 10, further comprising:  
determining a volume and a weight of one or more items simulated to be packed in a last package of the group; and  
assigning the one or more items previously assigned to the last package to a smaller last package having a smaller volume if the volume and the weight of the one or more items are less than a volume limit and a weight limit of the smaller package, respectively.
18. A computer-implemented method for automatically determining item groupings for packaging, comprising:  
receiving an order comprising at least one item;  
searching at least one data store to determine a tag, volume, weight, and an exclusion list associated with each item, wherein the exclusion list comprises a list of items that may not be in a same package as a hazardous item;  
determining that the received order comprises items having a standalone tag;  
searching the at least one data store to determine a binding number associated with the items having the standalone tag;  
sorting the items having the standalone tag into a group;  
performing an optimization process for the group by:

creating a data structure representing a first package of the group;  
iteratively simulating packing items having the standalone tag in packages of same items, wherein if the simulating determines that the binding number associated with the item is exceeded:

creating an additional data structure representing an additional package, and

iteratively simulating packing items having the standalone tag in packages of same items until all items of the group are packed into a package, wherein if the simulating determines that an item from the exclusion list is packed into a package, the hazardous item is assigned to a different package;

generating at least one list of items for the data structures representing packages; and

sending the generated list to a computer system for display, the list including a number of packages, a number of items for each package, and packaging materials needed for each package.